EAGLE GOLD PROJECT

HEAP LEACH AND PROCESS FACILITIES PLAN

Version 2014-01

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1 INTRODUCTION

This Heap Leach and Process Facilities Plan (Plan) describes the construction, operation and shut-down of the heap leach facilities. The Plan provides details about the design of the heap leach facility (HLF) including relevant components, phases and processes. Designs include plans, cross-sections, long-sections, detailed figures, process charts, ore stacking sequencing and other pertinent figures that illustrate how the proposed facilities will be constructed and operated. The detailed design reports and analyses are included as Appendix A.

1.1 OVERVIEW

The HLF will be progressively developed in three phases: one phase during initial construction (pre-mining), and two phases during mining operations. The HLF will occupy an area of 48 ha and contain about 32 MT at the end of Phase 1; 99 ha and contain about 75 MT at the end of Phase 2; and 138 ha and contain up to 92 MT at the end of the life of mine.

The HLF is a valley fill design which incorporates a rock filled embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam also creates an In-Heap Pond leaching configuration that provides storage of pregnant solution within the pore spaces of the ore which eliminates the need for downstream process solution ponds. The major design components for the HLF includes the following:

- a rock filled embankment (dam) and the In-Heap Pond;
- a composite liner system;
- solution recovery wells;
- associated piping network for solution collection and distribution;
- a leak detection and recovery system (LDRS); and
- a down-stream Events Pond.

The in-heap solution storage area will act as an In-Heap Pond for the primary storage of pregnant leach solution (PLS). The In-Heap Pond (essentially a saturated zone within the lower extent of the HLF ore pile) is a cold-weather mitigation and has the added benefit that PLS will not be exposed during normal operations.

The heap leach pad will consist of two liner systems, the up-gradient liner system and the In-Heap Pond liner system. The single composite liner system in the upper portion of the pad (above the in-heap solution storage area) will be comprised of a double-side textured 60 mil linear low-density, polyethylene (LLDPE) liner over a geosynthetic clay liner (GCL) system. The double composite liner system in the lower portion of the pad (forming the in-heap solution storage area) will be comprised of two discrete layers of LLDPE liner, separated by a layer of geonet material to form the LDRS, over a GCL system.

Process (barren) solution containing cyanide will be applied to the ore via a drip irrigation system (buried during winter). The resultant PLS will be captured in the solution collection system and flow to the In-Heap Pond. The PLS will be recovered via a sump and using pumps and standpipes. The PLS will be transferred to the ADR plant for gold recovery.

The heap leach pad is designed to contain a network of pipes that will be distributed throughout the limits of the facility at the base of the ore pile. This pipe network will collect and convey PLS and an infiltrated stormwater to the In-Heap Pond where it will be pumped to the process plant via the solution collection wells.

The downstream Events Pond will serve as an overflow containment area that provides additional solution storage in case the In-Heap Pond capacity is exceeded.

1.2 CONCORDANCE TABLES

The following two tables of concordance summarizes how commitments applicable to the HLF and made by StrataGold during the environmental assessment process, which include the decision document terms and conditions and our project commitments, have been addressed.

Table 1.2-1: Table of Concordance for April 2013 Yukon Government Decision Document Relevant to this Plan

No.	Terms and Conditions	Where Addressed
To ensure process leach solution leakage through the liner system in the upper portion of the Heap Leach Facility (HLF) can be monitored, captured and controlled:		
29.	The Proponent shall implement quality assurance and quality control (QA/QC) programs during construction of the HLF and liner system. QA/QC records should be retained for third-party review.	See Section 4 of the Technical Specifications and CQA Plan in the second part of Appendix P (Construction Plan and Project Technical Specifications) of the HLF Design Report (Appendix A of this Plan)
30.	The Proponent shall have appropriately qualified personnel: (i) review design and oversee construction of the HLF and liner system; (ii) approve the final construction; and (iii) provide documentation to responsible regulators that the facility and liner system has been built in accordance with regulatory approvals.	See Section 1 of the Technical Specifications and CQA Plan in the second part of Appendix P (Construction Plan and Project Technical Specifications) of the HLF Design Report (Appendix A of this Plan)
31.	The Proponent shall ensure that seepage collected in the underdrain system reports to a point of control (e.g. lined sump) to allow the Proponent to monitor, collect, and manage seepage. Seepage shall be sampled and monitored prior to discharge to surface water.	See Section 3.9.3 of this Plan See the Environmental Monitoring and Adaptive Management Plan
32.	The Proponent shall sample water collected from: the proposed Leak Detection Recovery System; the underdrain sump; and additional surface and ground monitoring locations as dictated in the HLF Operations and Maintenance System plan required as part of the Water Use Licence and Quartz Mining License application guidelines.	See Sections 4.2 and 4.3 of this Plan See Section 18 of the Environmental Monitoring and Adaptive Management Plan
33.	Prior to completion of the HLF liner system, the Proponent shall develop a plan satisfactory to responsible regulators that includes sampling frequency, reporting timelines, and response measures.	See Sections 4.2 and 4.3 of this Plan See Section 18 of the Environmental Monitoring and Adaptive Management Plan
34.	In conjunction with responsible regulators, the Proponent shall evaluate the construction, QA/QC reports, and performance of the Phase 1 HLF liner system prior to construction of the Phase 2 and 3 HLF liner systems. Should the actual performance of the Phase 1 HLF liner system not meet predicted performance, the Proponent shall, in conjunction with responsible regulators, review the Phase 2 and 3 HLF liner systems and if necessary, modify their design.	See Section 4.3 of this Plan

To ensure process leach solution leakage through the liner system in the event ponds is minimized:		
35.	Unless otherwise demonstrated to the satisfaction of the responsible regulators that a different liner system will adequately mitigate adverse effects from uncontrolled discharge, the Proponent shall construct double geomembrane liner systems for the event ponds which include leak detection and recovery systems and allow for independent monitoring of each pond.	See Section 2.4.5 of this Plan See Section 18 of the Environmental Monitoring and Adaptive Management Plan
To reduce uncertainties associated with the water balance model as well as provide sufficient basis for future monitoring:		
37.	The Proponent shall update the site WBM and Heap Leach Facility (HLF) WBM with updated stream flow and climatic input estimates based on additional data collected since the proposal was submitted. This information shall be provided to responsible regulators during the regulatory approval process.	See Appendix B of this Plan and Knight Piesold (2014).
38.	The Proponent shall revise the site WBM and the HLF WBM to account for direct precipitation (i.e. rain and snow) and evaporation to model components (e.g. event ponds and HLF) and run scenarios using a shorter time-step (e.g. weekly or daily rather than monthly time-step). The Proponent shall update the water management plan to account for revised predictions.	See Appendix B of this Plan, Knight Piesold (2014), and the Water Management Plan
To ensure stability of the HLF:		
39.	The Proponent shall ensure the HLF and embankment are designed to the Probable Maximum Flood for long-term stability.	
	This Condition is ambiguously written and possibly irrelevant. First, the HLF, as a facility cannot be designed to the PMF, as the HLF is comprised of a number of hydrotechnical and non-hydrotechnical components including the embankment, liners, sumps, piping network, irrigation and collection systems, ponds, etc). The HLF embankment is designed, nevertheless, for long-term stability for closure and this is primarily a function of geotechnical criteria (e.g., seismic criteria and overall slope) but not hydrotechnical criteria, and thus the condition to design the HLF or embankment to the PMF is not applicable. Secondly, while the embankment itself does not have hydrotechnical criteria, the spillway on the embankment does. The spillway criteria is based on assigned risk, and in this case the criteria is only relevant during operations, as the spillway would operate only if the in-heap pond reached capacity. At closure, there is no in-heap pond and therefore no need for a spillway, so it does not require long-term stability. It will be decommissioned around Year 12 or 13. Thus, the hydrotechnical criteria (based on CDA guidelines) calls for a design that can convey the flow that is 1/3 of the way between the 1:1,000 year event and the PMF (See Appendix D to Appendix A of this Plan). Finally, the actual design of the spillway exceeds the criteria, such that there will be 0.5 m of freeboard above the modeled depth of flow for the design event.	
40.	The Proponent shall review the assumptions and confirm the appropriateness of the application of the proposed weir discharge coefficient of 3.0 for the HLF embankment spillway. The spillway shall be sized accordingly.	See Section 3.7.2 of this Plan, and Drawings 300-GT-36 to 300-GT-39 in Appendix A of this Plan
To ensure the HLF in-heap pond and the event ponds are sized appropriately to manage emergency or upset conditions:		
41.	In conjunction with responsible regulators, the Proponent shall develop an adaptive management plan to compare the actual on-site conditions to predicted conditions. The plan shall outline requirements for: a) monitoring (e.g. frequency, documentation, review procedures), defined thresholds, and management responses; b) refining the HLF WBM, site WBM, and water management plan based on results from on-site monitoring as well as any changes to the mine plan and site infrastructure during operations; c) reviewing the HLF WBM, site WBM, and water management plan prior to (i) the Phase 2 expansion of the HLF and (ii) the Phase 3 expansion of the HLF; and	See Section 4.2 and 4.3 of this Plan See Section 18 of the Environmental Monitoring and Adaptive Management Plan

	d) follow-up monitoring of management responses.	
42.	The Proponent shall ensure that the area identified for an emergency event pond (i.e. down gradient from the two proposed event ponds and north of the Dublin Gulch Diversion Channel) remains available in case a temporary or permanent event pond is required in the future.	There is sufficient area downstream of the Events Pond to build a second pond of comparable size. See the General Arrangement, Figure 1.1-1 in the WUL application
43.	The Proponent shall, prior to the regulatory approval process, conduct a sensitivity analysis to assess the effect of infiltration on the HLF in-heap pond and event ponds volumes. Pond volumes and sizes shall be reviewed based on the results of the sensitivity analysis.	See Appendix B to this Plan; the effect of infiltration as a variable is evaluated by deterministic and stochastic modeling
To ensure stability of the event ponds:		
44.	The Proponent shall construct the event ponds with emergency overflow spillways which are able to safely convey the Inflow Design Flood predicted by the water balance model.	See Drawings 300-GT-30 through 300-GT-35 in Appendix A for the Events Pond design details. The spillway design flow is based on the results of HEC-HMS modeling.
To mitigate significant adverse effects related to permafrost degradation on environmental quality:		
81.	As proposed, the Proponent shall submit the consolidated results from its subsurface investigations in conjunction with their applications for a Quartz Mining License and Type A Water Use Licence.	See the following: Site Facilities Geotechnical Investigation Factual Report; prepared by BGC Engineering Inc., Vancouver, for Victoria Gold Corp March 5, 2010 (BGC, 2010). 2010 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report; prepared by BGC Engineering Inc., for Victoria Gold Corp. November 17, 2011 (BGC 2011). 2011 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report (BGC 2012a). 2011 Geotechnical Investigation for Mine Site Infrastructure Foundation Report. Final Report (BGC 2012b). 2012 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report (BGC 2012e)
82.	The Proponent shall ensure sufficient storage is available for temporary containment, management, and thawing of excavated ice rich soils/permafrost.	See the Frozen Material Management Plan
To mitigate significant adverse effects related to terrain and HLF instability on environmental quality:		
83.	The Proponent shall implement the mitigations outlined in Section 6.0 of Appendix 4 to the Supplementary Information Report (VIT 2012a including additional information on Appendix 4 in VIT 2012b) regarding the stability of the HLF and embankment including: a) removal of loose or unsuitable materials from the HLF area; b) excavation of foundation to bedrock in area of HLF confining embankment and the diversion embankment; and c) installation of geotechnical instrumentation within and below the HLF to monitor and verify the that the facility components are performing as expected and to provide sufficient warning in the event of problematic conditions.	For a) and b), see Section 3.2 of this Plan For c), see Section 4.2 of this Plan and the Environmental Monitoring and Adaptive Management Plan

84.	The Proponent shall identify and excavate ice rich soils/permafrost beneath the footprint of the HLF rather than use other methods to manage ice rich soils/permafrost (e.g. fill blankets as insulation).	See Section 3.2 of this Plan
85.	The Proponent shall ensure that additional agglomeration test work is completed on sample ore representative of final crushing/processing output prior to loading the HLF.	See Section 3.11.1 of this Plan
86.	The Proponent shall ensure long-term column tests are initiated to study the effects to stability and permeability of the HLF. Consideration should be given to the migration of fines and the behaviour of saturated of ore in the in-heap pond.	See Section 4.2 and 4.3 of this Plan
87.	The Proponent shall ensure the HLF and permanent structures associated with the HLF are designed to withstand seismic ground motions from the maximum credible earthquake for long-term stability.	See Sections 2.4.3 and 3.4 of this Plan

Table 1.2-2: Table of Concordance for Project Commitments (made June 2011) Relevant to this Plan

No.	Proponent Commitments	Where Addressed
Surficial Geology, Terrain, and Soils		
1	VIT will complete geotechnical investigations as part of detailed mine planning during the permitting stage, prior to construction. Once exact locations for Project infrastructure have been identified, qualified professionals will carry out on-site terrain stability assessments in areas identified as having potential terrain stability issues.	2011 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report (BGC 2012a). 2011 Geotechnical Investigation for Mine Site Infrastructure Foundation Report. Final Report (BGC 2012b). 2012 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report (BGC 2012e) Geotechnical Design Ice-Rich Overburden Storage Area Berms (NELPCo 2013).
2	VIT will establish a program to monitor permafrost conditions adjacent to cleared areas within the Project footprint once mine infrastructure is constructed. Downslope movement and soil moisture will be monitored. Monitoring frequency will be sufficient to assess the effects of freshet, large storm events, and other weather conditions that may affect terrain stability.	See Section 15 of the Environmental Monitoring and Adaptive Management Plan See Section 4 of the Water Management Plan
9	VIT will implement an Erosion and Sediment Control Plan for the footprint area during construction, operations and closure and reclamation (Environmental Management Plans – Appendix 30).	See Section 4 of the Water Management Plan
Water Quality and Aquatic Biota		
14	VIT will implement codified erosion prevention and sediment control practices and the Water Management Plan (Appendix 18) to prevent sediment release during construction (sediment control ponds).	See Section 4 of the Water Management Plan
16	VIT will construct and maintain diversion channels to keep non-contact water away from mine activities. These will be built with erosion protection measures and designed to convey large runoff volumes. Design criteria will be determined based on water license requirements.	See Sections 4 and 5 of the Water Management Plan
17	Sediment control ponds will be constructed and maintained to allow fine sediments to settle out. Permanent sediment control ponds will be sized for a 1:200 year 24-hour flood event and temporary sediment control ponds will be sized for a 1:100 year 24-hour flood event.	See Section 4 of the Water Management Plan

Fish and Fish Habitat		
23	The following are commitments of particular importance to fish and fish habitat: a) During construction, inspection and monitoring of suspended sediments will be required within Project area watercourses to ensure sediment and erosion control measures have been implemented effectively and are functioning in accordance with regulatory requirements and commitments in the Erosion and Sediment Control Plan (Environmental Management Plans – Appendix 30). b) During operations and closure, monitoring will be conducted periodically to confirm that reclamation efforts and environmental protection measures, such as sediment and erosion control provisions, are properly maintained and functioning until no longer required. c) Once mitigation measures are no longer required, the VIT environmental manager will ensure that non-biodegradable materials are removed and disposed of in an appropriate manner. d) During operations and closure, water quality monitoring programs will comply with Metal Mining Effluent Regulations' requirements for effluent characterization and receiving environment conditions.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Section 9 of the Environmental Monitoring and Adaptive Management Plan
25	VIT will implement the following measures to control soil erosion and leaks from equipment into fish habitat: a) Minimize the extent of clearing, grubbing, and grading adjacent to watercourses to that required for safe vehicle access and construction activities b) Restrict vehicle and construction traffic in the vicinity of water courses to existing roads, and restrict crossing to existing bridges where possible, using appropriate temporary crossing methods where needed (e.g., temporary bridges) c) Flag environmentally sensitive areas before clearing and construction begins near watercourses d) Re-vegetate where soil stabilization and erosion control is required e) Protect stockpiles from erosion with tarps, sumps, or berms f) Stage the timing of activities for construction within 16 m of all watercourses and retain buffer zones until construction activities begin to limit time of bank and soil exposure g) Maintain 30 m riparian buffer between mine components (including temporary work spaces and stockpiles) and fish-bearing watercourses h) Implement a rigorous erosion and sediment control program including sediment and erosion control ponds sized to 1:100 year 24-hour flood event i) Monitor total suspended solids and turbidity levels from sediment control ponds prior to release j) Ensure industrial equipment operating near fish-bearing watercourses is in good working order and free of leaks.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Sections 9 of the Environmental Monitoring and Adaptive Management Plan
Vegetation Resources		
31	VIT makes the following commitments to mitigate against invasive species: a) Vegetation communities adjacent to Project disturbance will be monitored throughout all Project phases to ensure that populations of invasive plant species are promptly identified as they become established and that appropriate control measures are applied in a timely manner. b) Follow guidelines to prevent the introduction and spread of	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Section 12 of the Environmental Monitoring and Adaptive Management Plan

	invasive plants as per the Invasive Plants Management Plan during all Project phases (Appendix 24 – Eagle Gold Conceptual Closure and Reclamation Plan). c) Minimize the extent of grubbing, soil stripping, and the removal of shrubs and herbaceous species, where possible, to reduce the area of bare ground potentially subject to invasive plant establishment. d) Mitigate against the establishment of invasive species and reduce erosion potential by re-establishing native vegetation on disturbed areas as soon as possible. e) Ensure that construction equipment is clean and free of soil and seeds before mobilizing to the Project site f) Use native species, to the greatest extent possible, during all Project phases, but most specifically during closure and reclamation phases to re-vegetate disturbed sites.	
32	VIT makes the following commitments to minimize potential effects of clearing on vegetation resources: a) Flag and stake known rare plant locations near the maximum disturbance boundary and instruct equipment operators to avoid these areas. Conduct regular monitoring of these sites during construction and operations. b) Reduce vegetation loss in areas around the footprint perimeter by adhering closely to construction plans, and avoiding off- site machine use. c) Clear the necessary trees and tall shrubs within the transmission line RoW during periods when the ground is frozen and snow-covered to minimize the disturbance to low shrubs, the moss layer, and topsoil. d) Minimize the extent of grubbing, stripping, and the removal of shrubs and herbaceous species where possible. e) When clearing is required, retain the humus layer and vegetation root mat, when possible. f) Re-vegetation of disturbed soils where appropriate to encourage slope stability and minimize soil degradation and erosion.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Section 12 of the Environmental Monitoring and Adaptive Management Plan
33	VIT makes the following commitments to minimize potential effects on wetlands and riparian areas: a) Minimize disturbance in sensitive areas by implementing best management practices including the creation and maintenance of buffer zones around riparian and wetland ecosystems. b) Maintain existing drainage patterns to and from wetlands in areas outside of the disturbance footprint. c) When clearing is required, retain the humus layer and vegetation root mat to the extent practical, to reduce the potential for soil erosion and deposition in riparian and wetland ecosystems. d) Employ hand cutting of vegetation near access road and transmission line stream crossings to reduce disturbance to riparian areas during construction of the transmission line.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Sections 12 of the Environmental Monitoring and Adaptive Management Plan
Wildlife		
40	Implement a progressive Conceptual Closure and Reclamation Plan (Appendix 24). VIT will: a) re-vegetate reclamation areas with native species consistent with surrounding vegetation, except where regulatory agencies indicate that natural succession is preferable; and b) maximize use of direct placement techniques (minimizing stockpiling) to minimize the loss of biological activity in reclamation capping materials.	See Section 7 of the Reclamation and Closure Plan

Conceptual Closure and Reclamation Plan		
102	In developing the Conceptual Closure and Reclamation Plan, VIT will: a) Use Guidelines for Reclamation/Re-vegetation in Yukon as a guide for selecting appropriate candidate reclamation species to be assessed by seeding/planting trials. b) Take measures that will reduce the likelihood of plant infestations from occurring and actively manage infestations that may become established on mine operations areas. c) Address invasive plant establishment through the development and implementation of an Invasive Plant Management Program that will be conducted over the mine Project life.	See the Reclamation and Closure Plan
103	In the event that invasive plant populations do become established on the mine site or associated disturbances, VIT will utilize one or a combination of methods (pulling, mowing or cutting, burning, herbicide spraying, biological control) to control these infestations. VIT will liaise with Yukon Invasive Species Council (YISC), Environment Yukon (EY) and other proponents to keep informed of invasive plant species and management strategies in the region. VIT will focus its invasive plant management activities on species that have been categorized by YISC and EY as species of concern, species that are humans, animals, or ecosystems.	See the Reclamation and Closure Plan
105	During construction, an environmental monitor will be on site to monitor activities and to verify compliance with the provisions of all applicable permits, licenses and approvals. The environmental monitor will: a) Conduct monitoring programs as required under the respective permits, licenses, and approvals, and report the results of such programs, as required b) Ensure that soil salvage and replacement activities are completed appropriately to meet reclamation objectives c) Ensure that vegetative erosion control cover is established on soil stockpiles and on any other areas of disturbance, as appropriate d) Provide direction and recommend implementation measures aimed at avoiding or minimizing adverse environmental effects e) Implement erosion control measures such as installation of riprap, erosion control blankets, silt fences and filter fabrics.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan
106	As soon as reclamation areas become available, VIT will establish trials testing plant species suitable for reclamation in the Project footprint and trials testing vegetation establishment/growth on various topsoil depths and waste rock material. Information obtained from the trials/monitoring programs will be used to adjust reclamation activities or methods that will be best suited for reclaiming remaining mine disturbance areas.	See Section 3.3 of this Plan; will be part of Construction Quality Assurance and Quality Control Plan See Section 10 of the Reclamation and Closure Plan
Environmental Management Plans		
110	VIT is committed to developing and implementing Environmental Management Plans (Appendix 30) with the following components: a) Erosion and Sediment Control Plan b) Fugitive Dust Control Plan c) Combustion Source Control Plan d) Vegetation Management Plan e) Wildlife Protection and Management Plan f) Environmental Monitoring Plan g) Schedule of Environmentally Sensitive Activity h) Heritage Resources Protection Plan i) Traffic and Access Management Plan j) Occupational Health and Safety Plan	See the following: Water Management Plan Dust Control Plan Wildlife Protection Plan Environmental Monitoring and Adaptive Management Plan Spill Response Plan Solid Waste and Special Waste Management Plan Cyanide Management Plan

	k) Cyanide Transportation Management Plan l) Spill Contingency Plan m) Noise Abatement Plan n) Waste Management Plan o) Water Management Plan p) Closure and Reclamation Plan.	Heritage Resources Protection Plan Decommissioning and Reclamation

2 DESIGN BASIS AND CRITERIA

This section provides the design basis and criteria that guided the HLF design including project constraints, regulatory and guidance-based criteria and other criteria. These criteria define the effectiveness of the proposed design. Criteria are described for all components of the system, along with the rationale for the selection of all criteria, including how the criteria were developed in accordance with specific regulatory requirements and/or guidance documents. The rationale demonstrates how the proposed criteria meet regulatory requirements and/or guidance documents. Where applicable, detailed site-specific analyses in support of the establishment of certain criteria (e.g., water balance and stability analyses) are briefly summarized and referenced to more detailed descriptions in appendices. Design documentation that meets the proposed design criteria is also referenced.

2.1 PERMITTING CONSIDERATIONS

Regulations and permitting requirements for Heap Leach Facilities in the Yukon Territory are not expressly stated; but rather, they have historically relied on regulations from other regions and on precedence established from other successful projects. Previous studies (Scott Wilson 2010) selected Brewery Creek, the gold mine (1996-2002) located approximately 55 km east of Dawson City, Canada as the example facility to follow for permitting guidelines. This was understood to be the only HLF permitted in the Yukon, the design of which was based on the Nevada State guidelines and associated permitting limitations. This approach has been carried into the final design along with best engineering practice.

The Heap Leach Facility design standards adopted for the project include:

- The regulatory requirements of Yukon and Canada;
- The Yukon Water Board Licensing Guidelines (2009);
- Guidelines from the Canadian Dam Association (2007); and
- Permitting requirements of the State of Nevada. These are not regulatory requirements in the Yukon, but are considered as standards for best practice.

2.2 DESIGN REQUIREMENTS

There are currently no published international standards for the design and construction of a heap leach facility. Nevada State Guidelines provide minimum standards for heap leach facilities and have been adopted for the Project. North American standards for the design of embankment dams were used where applicable, specifically the Canadian Dam Association guidelines. Table 2.2-1 summarizes the main technical and permitting requirements for the State of Nevada for the key elements of the HLF design.

Table 2.2-1: Summary of Design Requirements for the State of Nevada

Heap Leach Feature	Description
Leach Pad	System must have containment capability equal to or greater than that of a composite liner consisting of a synthetic liner over one foot of compacted soil at a permeability of 1 x 10^{-6} cm/s or 1 x 10^{-5} cm/s if a leak detection system is used beneath portions of the liner with the greatest potential for leakage.
	Synthetic liners must be rated as having resistance to fluid passage equal to a permeability of less than or equal to 1 x 10^{-11} cm/s.
Solution Ponds	System must have a primary synthetic liner and a secondary liner that meet the above-described liner specifications. The synthetic liners must be separated by a fluid transmission layer which is capable of transmitting leaked fluids at a rate that will ensure that excessive head will not develop on the secondary liner.
Solution Management and Containment	Process components must be demonstrated to have the capacity to "withstand" the runoff from a 100-year, 24-hour precipitation event. In addition, facility fluid management systems must demonstrate the capability of remaining "fully functional and fully contain all process fluids including all accumulation resulting from a 25-year, 24 hour precipitation event. The foregoing standards are minimal and additional containment capacity may be required if surface water bodies or human populations are in close proximity to the facility, or if groundwater is shallow.
Foundations	Consider static / dynamic loads and differential movement or shifting
Construction QA/QC	Regulations require that each applicant develop and carry out a quality assurance and quality control program for liner construction. A summary of the QA/QC program must be submitted with as-built drawings after construction has been completed.
Neutralization/Detoxification of Spent Ore	Spent ore, whether it is to be left on pads or removed from a pad, must be rinsed until it can be demonstrated either the remaining solid material, when representatively sampled does not contain levels of contaminants that are likely to become mobile and degrade the waters of the state under the conditions that will exist at the site, or, the spent ore is stabilized in such a manner as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the state.

2.3 DESIGN BASIS

The Yukon Water Board Licensing Guidelines for Type A Quartz Mining Undertakings provide specific guidance for selected mine site earthworks facilities, as follows:

"*General: Type A quartz mining undertakings may vary significantly in their magnitude and in the potential environmental effects associated with them. The guidelines contained in this document assume the development of a mine with significant potential environmental impacts such as those resulting from acid rock drainage or the failure of a large tailings impoundment. Projects such as this are considered to fall into the Very High Consequence of Failure category described in the Canadian Dam Safety Guidelines (January 1999). In situations where this category is not appropriate for some reason, the Board is prepared to consider well developed and documented justification for the use of alternative consequences of failure criteria developed in accordance with the Canadian Dam Safety Guidelines*."

Further, specific design guidance is included as follows:

- The design, construction, operation, maintenance and surveillance of dams and associated water management structures should be carried out in a manner which is consistent with the recommendations contained in the Canadian Dam Safety Guidelines (January 1999) for the Very High

Consequence Category, unless compelling reasons consistent with the Canadian Dam Safety Guidelines for a lower consequence category are provided.

- Long-term dams and associated water management structures should be designed to withstand the Maximum Credible Earthquake (MCE) and pass the Probable Maximum Flood (PMF). Shorter term structures may be built to lesser standards but a compelling rationale for the selected criteria must be provided.
- Heaps should be designed to have a minimum factor of safety under static loading of 1.3 for short term cases (i.e. within the mine life) and 1.5 for long term cases (i.e. abandonment) as described in the Investigation and Design of Mine Dumps (British Columbia Mine Dump Committee, 1991). The factor of safety for dams should be as recommended in the Canadian Dam Safety Guidelines (January 1999).
- Designs for dams and associated water management structures, rock dumps, and heaps should recognize the probable presence of permafrost and should include appropriate measures to manage permafrost and maximize the stability of the structures consistent with recommendations contained in the Canadian Dam Safety Guidelines (January 1999).

Although the 1999 CDA are referenced, the latest version of the CDA guidelines (2007) was used for the Project.

Tetra Tech performed a dam breach analysis to determine the hazard classification of the confining embankment in accordance with CDA dam classification guidelines. The results indicate the confining embankment can be classified as a high hazard dam. Results from the dam breach analysis and inundation mapping show that loss of human life or damage to public and commercial facilities are unlikely in the event of a dam breach. However, the dam breach may cause significant damage to fish and wildlife habitat downstream of the embankment considering the potential for release of cyanide solution from upstream of the heap confining embankment. The dam breach analysis report is presented as Appendix D in Appendix A.

2.4 DESIGN CRITERIA

The parameters and criteria presented in Sections 2.4.1 to 2.4.6 below form the basis of design for the HLF. Geotechnical design criteria (Section 2.4.3) were developed while considering the analyses and discussions in the following appendices to Appendix A: Appendix C - Site Seismic Hazard Analysis, Appendix J - HLF Stability Analyses, Appendix K - Liquefaction Analysis and Appendix M - Settlement Analysis, and the Eagle Gold – Geotechnical Design Basis for Mine Site Infrastructure in the Project Proposal (BGC 2011). Ore parameters were taken from Eagle Gold Project Report of Metallurgical Test Work (KCA 2012).

2.4.1 Ore Quantities

Table 2.4-1: HLF Design Criteria - Ore Quantities

Ore	Quantity/Criteria
Mine Life	10 years
Life of mine (LOM) ore quantity to be stacked on heap leach pad	Approximately 92 Mt (Phase 1 through 3)
Crushing rate, stages	Fine ore crushing rate approximately 41,300 tpd based on 10.3 million tonnes per year over a 250 day crushing and stacking

Ore	Quantity/Criteria
	season Three-stage crushing
Final ore crush size	6.35 mm (P_{80})
Leach pad type	Permanent, multiple lift
Initial stacking capacity	Minimum of 2 years for Phase 1 pad
Stacking schedule	250 days per year (e.g., approximately March through mid-November)
Stacking Rate	41,300 tpd
Agglomeration	Belt Type or Agglomerator Drum, first 2 years of operation or as needed.
Stacking method	Conveyor-stacker
Stacked dry density of ore	Initial - 1.70 t/m^3
Stack / lift height	Nominal 10 m lifts
Overall slope angle of stacked ore	2.5:1 (H:V), 22 degrees
Ore Setback	5m from perimeter road 10m from dam

2.4.2 Leaching

Table 2.4-2: HLF Design Criteria - Leaching

Leaching	Quantity/Criteria
Leach schedule	365 days per year
Solution application method	Drip emitters (buried for cold weather operations)
Solution application rate	10 l/hr/m^2
Total leach cycle time (includes drain-down, cross-ripping and installation of drip irrigation piping/Active leach cycle	150 days total /120 days active
Solution application flow	2,770 m^3/hour

2.4.3 Geotechnical Criteria

Table 2.4-3: HLF Design Criteria - Geotechnical

Geotechnical Stability	Quantity/Criteria
Design Basis Earthquake (DBE)	0.14g (1 in 475 year return period) 0.25g (1 in 2475 year return period)
Maximum Design Earthquake (MDE)	0.35g (Maximum Credible Earthquake) Moment Magnitude 6.0
Minimum embankment Factor of Safety	Static Loading - 1.5 (impounding), 1.3 (non-impounding), Seismic Loading - 1.0 (use pseudo-static methods)

Geotechnical Stability	Quantity/Criteria
Permafrost	Ice-rich materials encountered in the pad or pond foundations, if thaw unstable, will be removed.

2.4.4 Hydrologic and Storage Criteria

Table 2.4-4: HLF Design Criteria - Hydrology and Storage

Confining Embankment	Quantity/Criteria
General	To provide stable confinement of the ore and in-heap storage of solution.
In-Heap Pond storage	To attenuate variation in flows into the heap to allow a constant flow to the process plant and minimize treatment and release. 1. Minimum operational storage volume (to ensure the pumps stay primed to supply the process plant) equivalent to 12 hours of supply at the 2770 m^3/hr application rate. 2. Contain the runoff volume from a 100-year, 24-hour storm event rainfall event. 3. Contain the snowmelt volume from the 100-year 24-hour rain-on-snow event then 48 hours of melting following this event. 4. Maximum storage volume to allow for three day's (72-hours) of drain-down.
Overflow spillway	Sized to pass 1/3 between the 1000-year event and the PMF assuming heap storage is at capacity at the start of the event.
Event Pond	**Quantity/Criteria**
General	The purpose of the events pond (constructed downstream of the embankment) is to temporarily store excess inflows that cannot be stored in the in-heap pond. Any overflow into the events pond will be evacuated, and used as make-up water, as fresh ore is added to the HLF. During the initial heap build-up, the events ponds may also be used as temporary storage for make-up water. Otherwise, the events pond will be kept dry.
Overflow spillway (from HLF and In-Heap Pond)	Sized for PMF assuming heap storage is at capacity at the start of the event. Spillways to be provided in the events pond to safely pass the peak PMF flow.
Storage Capacity	Sized to contain ¾ of the runoff volume from the PMF event or the runoff volume from the 100-year 24-hour rainfall event plus the subsequent snowmelt volume of the next 48 hours.
Solution Recovery Wells	**Quantity/Criteria**
General	Solution is to be recovered from the heap through inclined well casings equipped with submersible pumps installed in the in-heap solution storage area along the upstream dam slope. Adequate access for installing and recovering pumps from well casings will be provided on the dam crest.

2.4.5 Liner Criteria

Table 2.4-5: HLF Design Criteria - Liner

Pad Liner System	Quantity/Criteria
Overliner	Crushed clean rock to provide a free draining layer under the placed ore and to protect the lining system from damage by ore placement while not impacting the conveyance of solution to the recovery wells.
Geosynthetic (geomembrane) liner	Suitable liner material to provide required puncture resistance, elastic strain range and resistance to solution attack along with good cold weather performance.
Geosynthetic Clay Liner (GCL)	Geosynthetic clay liner below the geosynthetic liner to provide a composite liner to minimize leakage. Objective maximum permeability 1×10^{-5} cm/s or 1×10^{-6} cm/s in the absence of a leachate detection and removal system.
Leachate collection and recovery system	A system to collect leachate and convey it to solution recovery wells. System to comprise overliner drain fill and a network of collection pipes to convey solution to in-heap storage area while limiting solution head on liner.
Leak detection and recovery system (LDRS)	A system to collect leakage through the composite liner and convey it to monitoring points. The system to comprise geonet or similar synthetic drainage product to collect and convey any leaked solution to a gravel filled sump and pumping system.
LDRS monitoring	Monitoring of the flow into the LDRS to ensure that allowable rates (determined by permitting authorities) are not exceeded.
Event Pond Liner System	**Quantity/Criteria**
Geosynthetic (geomembrane) liner	Suitable liner material to provide required puncture resistance, elastic strain range and resistance to solution attack along with good cold weather performance.
Geosynthetic Clay Liner (GCL)	Geosynthetic clay liner below the geosynthetic liner to provide a composite liner to minimize leakage. Objective maximum permeability 1×10^{-5} cm/s or 1×10^{-6} cm/s in the absence of a leachate detection and removal system.
Leachate collection and recovery system	A system to collect leachate and convey it to the barren tank in the process plant. System to comprise overliner drain fill back to the process plant including a network of collection pipes while limiting solution head on liner.
Leak detection and recovery system (LDRS)	A system to collect leakage through the composite liner and convey it to monitoring points. The system to comprise geonet or similar synthetic drainage product to collect and convey any leaked solution to a gravel filled sump and pumping system.
LDRS monitoring	Monitoring of the flow into the LDRS to ensure that allowable rates (determined by permitting authorities) are not exceeded.
Groundwater	**Quantity/Criteria**
General	A drainage system is required beneath the liner system to control groundwater pressures. The system is to collect non-impacted groundwater in a controlled manner before discharge

	downslope of the containment embankment.

2.4.6 Process Plant Design Criteria

Table 2.4-6: HLF Design Criteria - Process Plant

Process Plant	Quantity/Criteria
Carbon adsorption	Five stages, three trains
Solution velocity to fluidized carbon bed	9.8 lpm/m^2
Barren solution heating	During winter months as needed
Fluid Discharge Loss	Zero
Recovery to carbon	95% or higher
Metal Recovery	Pressure elution stripping followed by electrowinning
Flow Rate	2,770 m^3/h

3 HEAP LEACH FACILITIES DESIGN AND CONSTRUCTION

3.1 FOUNDATION CONDITIONS

A detailed description of the HLF foundation conditions is provided in BGC (2010, 2011, 2012a, 2012b and 2012c). In general, the HLF site has moderate to high relief, with ground elevation varying from approximately 800 m asl near the west end of the Events Pond to 1225 m asl at the top of the Phase 3 pad. A surface geology map of the site was prepared by BGC and is presented as Drawing 300-GT-005 in Appendix A.

3.1.1 Subsurface Conditions

Today's geologic conditions at the HLF site reflect the geotectonic forces that produced the Eagle Zone deposit. Folding, faulting and plutonic activities have resulted in relatively weak rock mass in places with relatively poor mechanical properties. Further, frost fracturing and discontinuous permafrost affect rock/soil characteristics in areas lower in elevation.

Overburden soils encountered on the sloping ground in the Ann Gulch valley typically consist of a veneer of organic soils overlying a blanket of colluvium, which overlies weathered bedrock.

Glacial till is generally only encountered on the lower flanks of the north-facing slopes of the Dublin Gulch valley, so is not very prevalent at the HLF site. Where present, the till is often overlain by colluvium. Placer tailings (fill) cover most of the valley bottom of the Dublin Gulch valley.

The bedrock encountered under the proposed HLF site is generally classified as metamorphosed sedimentary rock, with a variably deep weathering profile. The intact rock strength of the encountered rock types is highly variable, with strength ranging between R0 class (i.e. corresponding to < 1 MPa Unconfined Compressive Strength, UCS) and R4 (50-100 MPa UCS). The average intact strength is estimated to be approximately R2 (5-25 MPa) in the metasedimentary rock, depending upon the degree of weathering, but with significant variability across the site.

3.1.1.1 Overburden

Overburden soil conditions are distinctly different in the Dublin Gulch valley bottom from those encountered above the valley bottom in Ann Gulch and south of Dublin Gulch along the southern edge of the proposed heap. In the uplands above the valley bottom, the upper soil unit consists of a thin horizon of organic soil, rootlets, woody debris and plant matter ranging from 0.1 to 2.7 m thickness and averaging approximately 0.3 m. The organic cover above the valley bottom overlies colluvium; the colluvium ranges in thickness from 0.2 to 15.2 m, and averaging approximately 2.9 m. The colluvium consists of loose to compact angular gravel with occasional cobbles in a silt and sand matrix, derived from transported weathered metasedimentary bedrock. The colluvium may also include variable amounts of organics, which are often observed in distinct layers within the colluvium.

The overburden soils in the valley bottom have been reworked by historical placer mining activities. Placer tailings (fill) are observed from the ground surface to bedrock, with thicknesses ranging between 2.4 m and 16.5 m, and an average thickness of approximately 6.6 m. The material encountered is generally a well graded, loose to dense, silty sand and gravel, ranging to sand and gravel with some silt and occasional cobbles and boulders.

Loose and moist zones have been encountered within the placer tailings. There is little to no vegetative cover on the placer tailings. A placer fill map is presented as Drawings 300-GT-006 in Appendix A.

The placer tailings in the valley bottom have highly variable particle size distribution and density, and are generally saturated. Recorded Standard Penetrometer (SPT) blow counts, N, are summarized in BGC (2010, 2011 and 2012a) for the placer tailings within the footprint of the proposed process management pond. No blow count data are available within the footprint of the Heap Leach Pad, but the placer tailings (fill) materials are expected to have a similar extreme variability in penetration resistance and associated strength and stiffness.

The overburden at the southern edge of the proposed HLF includes 4.4 m of placer tailings, and a variable thickness of till ranging between 1.5 m to 16.4 m. The till is a compact to dense sandy silt to silty sand with some gravel.

Seismic refraction surveys were performed to evaluate the variability of the overburden depth (Appendix H in BGC 2012a). Generally, the seismic refraction survey results indicate that the thickness of the overburden transitions smoothly from very little at the top of the slopes increasing to the valley floor. This is the same trend with the depth of weathering.

3.1.1.2 Bedrock

Bedrock was observed in the uplands above Dublin Gulch immediately below colluvium at depths ranging between 0.0 and 16.8 m below existing grade (average depth to bedrock at 3.5 m where observed). Bedrock was observed in the valley bottom at depths ranging between 1.5 and 16.5 m below existing grade, with an average depth to bedrock at 6.2 m where observed.

Bedrock at the mine site is subdivided into three broad categories – Type 1, Type 2 and Type 3 – on the basis of rock mass quality and inferred engineering behavior, with Type 1 being the highest quality, and Type 3 being the lowest quality with unconfined compressive strength of 1 to 5 MPa. Type 3 bedrock, the lowest quality rock mass considered to behave as rock (rather than as a soil), can be recognized on the basis of evident preserved fabric of the parent rock within the highly weathered rockmass, and the requirement for moderate effort to excavate with heavy excavators. Types 1 and 2 bedrock are of generally better rockmass quality. The transition from Type 3 to Type 2 can be inferred where it becomes necessary to rip the rock. Type 1 bedrock will require the use of hydraulic hammers and/or drilling and blasting to excavate.

Observed bedrock consisted of highly to completely weathered metasedimentary rock (i.e.Type 3 rock) or moderately to highly weathered rock (i.e. Type 2 rock). The metasediments in general are observed as strongly foliated yellowish brown to dark grey phyllites interbedded with quartzites. The quartzites are variably gritty, micaceous, and massive. Phyllitic metasediments are composed of muscovite-sericite and chlorite.

The rock mass quality and characteristics have been inferred from observations in boreholes within the heap leach pad footprint. Rock Mass Rating values of 20 to 30 were determined from the observed rock core to about 10 m depth, then increased to about 45 to 50 at most locations.

The seismic refraction work (Appendix H in BGC 2012a) confirmed the depth to bedrock to be relatively deep ranging from 5 to 15 m along the southeast limits of the HLF. The depth to moderately weathered bedrock ranged from 20 to 35 m.

3.1.1.3 Groundwater

The observed groundwater depths on the open slopes in the upper Ann Gulch valley range from 6.1 m below grade close to the middle of Ann Gulch to 15.4 m in the headwaters of Ann Gulch. Water levels are typically about 2.5 m below ground surface in the Dublin Gulch valley bottom, but can be expected to be closer to ground surface near streams and deeper below piles of tailings. It is anticipated that these levels will vary seasonally (Stantec 2012). Detailed assumptions related to groundwater levels used for design purposes are discussed in Section 5.10 of Appendix A.

3.1.1.4 Permafrost

Frozen ground was typically encountered within colluvial gravels and gravels and sands with depths varying between 0.6 m to 2.8 m, and occasionally included excess ice with limited thickness. Frozen ground was not encountered in the valley bottom nor on the southern edge of the proposed HLF, but localized pockets of frozen ground may be present in these areas.

Frozen ground was encountered in the upper part of the HLF footprint (i.e. upland area) in a few test pits. When observed in a plan view, many of the test pits are located on the eastern slope of Ann Gulch, and generally align in a NE trend, covering the entire HLF footprint, from its most eastern edge to its western end at the heap leach containment dike.

The reason for this connection between the frozen ground observations is unknown and might simply correspond to sporadic disconnected patches; nevertheless the continuity of the linear feature may deserve to be studied in more detail and accounted for during site preparation and construction.

3.2 SITE PREPARATION

3.2.1 Construction Staging

The HLF is a valley fill design that incorporates a rock filled embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam will also provide for the storage and management of cyanide process solutions within the heap, which eliminates the need for downstream pregnant and barren process solution ponds or tanks.

The heap leach pad will be built in three phases over the life of mine (Figure 3.2-1). The ore will be stacked in nominal 10 m thick lifts, however, the first lifts at the pad's lowest point adjacent to the dam may need to be thicker to allow sufficient space for leaching. The Phase 1 pad (Figure 3.2-2) will be constructed in pre-production to accommodate a maximum of three years of ore production or approximately 30 Mt of ore. The construction of the Phase 2 pad (Figure 3.2-3) will start at the beginning of Year 3 of operations, at the latest. The Phase 2 heap will consist of approximately 30 Mt of ore and will be stacked above the Phase 1 heap and the Phase 2 pad. The Phase 2 heap stacking will begin in Year 4 and conclude at the end of Year 7 of operation.

The Phase 3 pad (Figure 3.2-4) will be constructed by end of Year 7. The Phase 3 heap stacking will start at the beginning of Year 8 of operation and conclude near the end of Year 10 after covering most of the Phase 3 pad. The Phase 3 heap amount will be approximately 30 Mt. The heap ore quantities amounts are based on an estimated average stacked ore heap dry density of 1.7 tonnes/m^3.

3.2.2 HLF Foundation Preparation

Foundation preparation includes removing or relocating any existing structures, removing vegetation and unsuitable materials, site grading, ground treatment of the placer tailings deposit, and installation of subsurface drainage pipelines.

Several conditions could affect the performance of the HLF foundation; however, when properly identified the conditions can be mitigated. For occurrences of ice-rich material, over-excavation with rock fill replacement is specified. The grading plan for the HLF accounts for removal of known ice-rich materials within the footprint of the facility. However, during the course of construction, additional ice-rich material may be encountered and will be removed based on the strategies described in the Frozen Materials Management Plan.

In the area of the HLF embankment, the foundation abutment areas (outside the limits of the placer tailings in colluvial materials) will be excavated to bedrock (Type 3 rock or better) to remove any poorly consolidated or ice-rich material that could shift or settle upon loading the foundation with the embankment and crushed ore. It is currently assumed that the dam foundation within the limits of the placer tailings will be treated with Deep Dynamic Compaction however the actual foundation preparation methods are still being evaluated and standard excavation and backfill methods may be employed. Both Deep Dynamic Compaction and standard excavation and backfill foundation preparation methods are suitable for meeting the proposed design criteria for the HLF.

Surface runoff and near surface groundwater must be controlled to avoid ponding and the saturation of low strength soils. Proof rolling the base of the HLF prior to liner placement will identify problem areas that should be reworked to produce a stable foundation.

3.2.3 Deep Dynamic Compaction

Deep Dynamic Compaction (DDC) ground treatment will likely be performed to densify the placer materials within the footprint of the dam and the In-Heap Pond of the HLF. The work will be extended below the dam to the upper portion of the Events Pond to ensure stability of the downstream toe of the embankment and the adjacent excavation cut slope of the Events Pond. The performance criteria have been developed to provide a minimum factor of safety of 1.5 against liquefaction triggering of the placer material during the maximum credible earthquake.

The work will be carried out by a qualified DDC contractor to meet specified project performance criteria set forth by the Owner's Engineer. The key tasks involved in the DDC work include:

- Preparation of the treatment area to include site earthworks to lines and grades specified by the Owner's Engineer. The grading plan was developed to provide a suitable surface for DDC work, and a maximum depth of placer material of 12 m (depth of achievable DDC treatment).
- Dewatering to achieve a minimum of 1.5m freeboard (top of graded placer tailings to top of groundwater).
- Surface water controls to include ditching and sumps to prevent inundation of the work area and to help control groundwater levels.
- Densification of soil using DDC to achieve the minimum criterion described in Appendix P - Construction Plan and Project Technical Specifications to Appendix A.
- Site verification testing for confirmation that the project specification has been achieved.

- Preparation of an engineering report of the densification to be submitted to the Owner's Engineer for review and acceptance.

The general extent of the DDC treatment area is shown on Figure 3.2-5. The Owner's Engineer may modify the treatment limits based on field observations.

Appendix P - Construction Plan and Project Technical Specifications to Appendix A provide details and requirements for DDC work. A test section consisting of 40 meters by 40 meters shall be densified at the beginning of the densification work at a location determined by the Owner's Engineer.

The intent of the test section is that the Contractor shall demonstrate that the procedures used for the test section are satisfactory and can be continued throughout the remainder of the work.

Acceptance of the densification method based on the results of the test section will be based on field Becker Penetration Testing (BPT). Additionally, geophysical seismic refraction field testing will be conducted by the Owner's Engineer for Quality Assurance (QA). The Technical Specifications include the BPT and seismic wave velocity criteria requirements.

The Owner's Engineer will periodically monitor progress and performance of the densification work. The monitoring may include but is not limited to any or all of the following: observance of the Densification Contractor's procedures, recording of craters volumes, witness of BPT testing and additional QA geophysical testing.

Testing to determine specification compliance will consist of performing one BPT boreholes to a minimum depth of 12 m or refusal below the finished floor every 5,000m^2 of densified soil.

Owner's Engineer will conduct, at a minimum, geophysical testing within the footprint of the proposed embankment for QA purposes. Areas of the site that do not achieve the required penetration resistance or seismic shear wave velocity shall be remedied by the Contractor to ensure that the project technical specifications are met.

3.2.4 Foundation Drainage

An underdrain system will be constructed to remove any surface runoff and near surface groundwater from beneath the HLF. The HLF underdrain piping network will collect and route natural seepage flows beneath the liner system and confining embankment to a monitoring vault located near the Events Pond.

The underdrains will be entrenched at approximately 75m spacing with vertical or 1H:1V side trench walls and constructed with geofabric wrapped around granular drain rock backfill materials and perforated PE piping to form a french drain. The backfilled and geofabric wrapped drain fill will be covered by soil backfill to limit geofabric exposure time to the wind and sunlight.

The backfilled underdrain trench final surface will be rubber tire wheel-rolled without scarification to prevent construction equipment damage to the geofabric wrap in preparation for placement of the HLF composite liner and overdrain system. The drains will be installed with a minimum 1 percent longitudinal grade for gravity drainage and the perforated piping will be routed beneath the HLF dam to the monitoring vault.

Table 3.2-1 presents a summary of the material and construction requirements for foundation preparation and underdrains.

Table 3.2-1: HLF Material and Construction Requirements

Component	Material and Construction Requirements
Structures	Remove any existing structures Plug any boreholes or piezometers in top 30 m depth with concrete grout or bentonite.
Vegetation	Strip organic soil cover to minimum 3 m beyond the HLF construction limits and place in temporary topsoil stockpiles for final reclamation. Locate stockpiles as shown on drawings or at the direction of the Owner.
Organic Surface Soils	Strip organic soil cover to minimum 3 m beyond the HLF construction limits and place in temporary topsoil stockpiles for final reclamation. Locate stockpiles as shown on drawings or at the direction of the Owner.
Foundation Improvement	Perform Deep Dynamic Compaction of placer tailings to project Technical Specifications. Remove loose and unsuitable materials to Type 3 or better bedrock at the dam abutments. Remove ice-rich materials.
Underdrains	Construct underdrain system as shown on the drawings. Perform grading as necessary in drainage bottoms to allow equipment access and to accommodate the required underdrain size. Install underdrains with geotextile, ADS N12 (or equal) PE pipe and gravel materials as specified.
Site Grading	Remove loose or unsuitable materials within the dam and limits as directed by the Engineer. Engineer to inspect exposed rock in dam foundation to determine suitability. Stripped rock subgrade surfaces and rock outcrops in at-grade areas to be cleared of loose rock fragments greater than 150 mm in size and wetted in preparation for foundation preparation. Foundation preparation to consist of placing and compacting fill material in varying thicknesses to suit field conditions to support the liner system. Site Grading Soil Fill material shall consist of soil with 150-mm maximum particle size and less than 30 percent particles larger than 19 mm. Place fill in maximum 0.3-m loose lifts and compact each lift to a minimum 95 percent of the maximum dry density (ASTM D-698) within ±2 percent of the optimum moisture content. Site grading rockfill will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size shall be no more than two thirds the loose thickness of the fill lift. The rockfill shall generally have 300-mm maximum rock particle size and oversized rocks larger than 300 mm shall be removed to the exterior fill slopes. Rocks larger than 300 mm may be incorporated in thicker fill lifts provided the rocks do not protrude from the lift surfaces after compaction, and the required compaction of the lifts is proven achievable by a test fill.
Subgrade	After clearing, grubbing, stripping, and excavating, the exposed subgrade surface shall be inspected and evaluated by the Engineer for the presence of loose or soft areas or unsuitable material prior to fill placement or geomembrane installation. Subgrade evaluation methods will depend on the location and the materials that will be placed over the subgrade and on the prevailing field conditions. Evaluation methods may include proof-

	rolling with a loaded dump truck or similar pneumatic-tired equipment to ensure that the surface is firm and smooth. Probing with a metal rod may also be performed. Soil subgrade surface receiving site grading fill or geomembrane shall be scarified to a minimum depth of 150mm, moisture conditioned if necessary to within plus or minus two (±2) percent of the optimum moisture content as determined by the Standard Proctor test (ASTM D-698), and recompacted to a minimum of 95 percent of the maximum dry density (ASTM D-698). Soil subgrade surface receiving geosynthetics shall be prepared such that it is smooth and free of protruding rocks, vegetation, or any other materials, or objects deemed unsuitable by the Engineer. In areas where rocks larger than 38 mm are protruding, the rocks shall be removed and replaced with compacted fine-grained soil material. This may also be performed in other areas to produce a relatively smooth surface suitable for installation of the liner system.

3.2.5 HLF Confining Embankment

The embankment dam is designed as an earth fill/rock fill structure with a geomembrane lined upstream dam face and appropriate filter and transition zones to provide a suitable surface for geomembrane installation and to ensure containment integrity with filter compatible materials. The planned fill placement for the HLF structures includes the use of conventional earth moving equipment, water wagons, roller compactors for earth fills, and vibratory compactors for rock fills. Suitable fill materials will be produced from required excavations for the HLF structures, borrow areas and onsite mine pit excavations. Moisture conditioning will be performed as needed in the embankment fills for compaction.

The fill types include compacted rock fill material taken from selective excavations and pit overburden for placement in the central and downstream section of the HLF embankment. The pre-production overburden removal excavations are estimated to include sufficient quantities of materials suitable for embankment fill and site grading fills. More competent durable rock for production of required drain rock will be quarried and crushed from required site excavations and filter materials will be produced from screening of placer fill materials in the Dublin Gulch valley bottom that require excavation. Rock fill material containing more than 30 percent of particles above 19 mm (3/4 inch) size may be considered for use as fill in areas for select applications where frost susceptibility and drainage are less important such as the HLF containment embankment.

The rock fill specifications will require selection of competent rock with strength rating of R2 or harder as determined by International Society of Rock Mechanics (ISRM) procedures. Dozers will spread the dumped rock piles in controlled lifts for compaction by the loaded trucks or by large vibratory steel drum compactor rollers. The lift thickness and compaction effort for rock fill placement will be determined by the Engineer in test fills at the embankment site during start-up of embankment construction and as required during construction or when material differing from the initial test materials is encountered. Compaction control requirements for rock fill may be determined based on the results of a test fill. The test fill should be constructed and monitored in accordance with the U. S. Army Corps of Engineers' (USACE) guidelines for test fill construction (USACE EM 1110-2-2301). In the event a source of higher quality rock is located capable of producing hard, durable rock particles, as expected from some of the rock derived from the pre-strip of the open pit, the Steiner knob, or some of the placer tailings, the rock fill can be constructed in 1 m lifts and compacted by heavy construction traffic.

The compacted earth and rock fill embankment section will use compacted rock fill materials in the compacted rock fill zone for dam slope stability. A low-permeability earth fill section will be placed in the upstream section

for seepage control with a filter zone to provide transition from the upstream seal zone fill to the downstream rock fill section. The dam configuration and fill descriptions are provided in Table 3.2-2.

Table 3.2-2: Dam Configuration and Zoning

Component	Specifications and Criteria
Dam Configuration	Constructed in a single stage with a top crest with of 11m for each stage and a final crest elevation of 888m and upstream and downstream slopes of 2.5H:1V.
Zoning	Upstream seal zone with 3m horizontal thickness as shown on the drawings. Filter / transition zone of 3m width.
Seal Zone Fill	Low-permeability fine-grained (silty) soil compacted in 0.15m lifts to a minimum 95 percent of the maximum dry density (ASTM D-698) within -2 to +1 percent of the optimum moisture content. 75-mm maximum particle size with minimum 60 percent passing the No. 4 ASTM sieve size (4.75-mm) and minimum 35 percent passing the No. 200 ASTM sieve size (0.075-mm). Final outer upstream dam surface to be minus 19-mm material, compacted with a smooth drum roller to form a smooth, firm and unyielding surface in preparation for geomembrane placement. Plasticity Index (PI) at 15 or higher. Permeability at 1×10-7 m/sec or lower.
Filter Zone	Derived from screened alluvial, placer fill or site soil borrow sources. 75-mm maximum particle size with minimum 70 to100 percent passing the No. 4 ASTM sieve size (4.75-mm) and maximum 5 percent non-plastic fines passing the No. 200 ASTM sieve size (0.075-mm). Coefficient of uniformity (Cu) shall be less than 6.
Compacted Rock Fill	Rock fill with compaction effort based on large-scale test fill results. Fill materials to consist mainly of rock fill excavated from mine pre-stripping operations that will generate a relatively high strength, durable and relatively clean marbleized limestone. Rock fill shall be competent material with a strength rating of R2 (soft to medium hard rock) or harder as determine by ISRM procedures. Rock fill material will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size to be no more than two thirds the fill loose lift thickness. Place rock fill in maximum loose lifts and compact each lift according to specifications derived from the results of a test fill.

3.2.6 Liner System

The liner system provides a boundary to contain ore and process fluids. A single composite liner system will be constructed within the HLF limits (double composite liner within the In-Heap Pond and on the upstream face of the dam embankment). In conjunction with the geomembrane, a geosynthetic clay liner (GCL) will be used in the entire HLF impoundment, and an additional low permeability soil zone at the dam upstream face.

The selected composite liner system consists of a primary geomembrane liner barrier in direct contact with a low permeability bentonite GCL barrier for containment. The liner system design includes 1m of overliner drain fill (ODF) above the liner to protect the liner during ore placement and limit hydraulic heads on the geomembrane liner surface during operations.

The lining system for the HLF In-Heap Pond is comprised of the following:

- a minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- a 2.0mm (80-mil) LLDPE liner;
- a geonet that is part of the LDRS and located between the top and bottom liners;
- a 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- a geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE liner; and
- liner bedding beneath the GCL.

The lining system for the HLF Phase 1 pad (up-gradient of the In-Heap Pond) is comprised of the following:

- a minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- a 2.0mm (80-mil) LLDPE liner;
- a geosynthetic clay liner (GCL) below the 2.0mm (80-mil) LLDPE liner; and
- liner bedding beneath the GCL.

The Events Pond will be a double-lined facility with LDRS having the following components:

- an 2.0mm (80-mil) high-density, polyethylene (HDPE) liner (top liner);
- a geonet that is part of the LDRS and located between the top and bottom liners;
- a 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- a geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE bottom liner; and
- liner bedding beneath the GCL.

3.2.7 Overliner Drain Fill

Overliner Drain Fill (ODF) material will be produced from crushing and/or screening operations from screening of sand and gravel aggregate from borrow sources. Crushed cobbles and boulders screened from the placer fill deposit in Dublin Gulch and/or crushed competent rock from site excavations are the primary anticipated source for ODF material. The ODF shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm). The material shall be free of organic matter and soft, friable particles in quantities objectionable to the Engineer. The minimum in place hydraulic conductivity of the ODF will be 2x10-4 m/s. Table 3.2-3 summarizes the specifications and criteria for drain pipework and overliner drain fill for the overliner system.

The ODF material shall be placed in such a manner as to reduce segregation and construct the zones in accordance with the details and to the lines and grades shown on the Drawings, or as specified by the Engineer. Methods shall be developed on site for placing the material in a manner that will protect the geomembranes and drain pipework from damage and keep compaction of the material to a minimum. Any drain fill material that has received too much compaction shall be scarified to a loose condition without damage to the underlying geomembrane and pipework.

The overliner drain fill above the geomembrane shall be placed in a single 1-m minimum lift thickness by suitable dozer and truck equipment, as approved by the Engineer. A thicker layer, a minimum of twice the pipe diameter, shall be placed above the larger diameter primary collection drain pipes as detailed on the Drawings. No moisture conditioning or compaction is required. Haul truck speeds, braking, and turning during drain cover fill placement shall be strictly controlled by the Contractor to prevent damage to the underlying geomembrane and pipework. The cover fill thickness shall also be increased in concentrated traffic areas or across collection pipes, as required, to prevent damage to the geomembrane and pipework. Haul traffic on the cover fill surface shall be spread out as much as practical to prevent overcompaction of the cover fill in localized areas.

Select drain fill to construct the process pond leak detection sump shall be placed in a single lift thickness with no moisture conditioning or compaction. The top surface of the select drain fill shall be hand leveled in preparation for geocomposite placement. Any loose particles spilled outside of the backfilled sump area shall be removed from the pond's bottom geomembrane surface to prevent geomembrane puncture.

Table 3.2-3: Overliner System

Component	Specifications and Criteria
Drain Pipework	Perforated corrugated PE primary collection pipes to be ADS N-12 dual wall smooth interior Type SP, or approved equivalent. 450, 375, 250 and 100 mm diameter perforated corrugated polyethylene (PE) collection pipes.
Overliner Drain Fill	The ODF shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm) with minimum in place hydraulic conductivity of $2x10^{-4}$ m/s.

3.3 CONSTRUCTION QUALITY ASSURANCE / QUALITY CONTROL

The HLF Construction and Technical Specifications and CQA Plans are provided in Appendix P to Appendix A. The Construction Plan describes the stages in development of the lined pad, confining embankment, In-Heap Pond, Events Pond, interceptor ditches and diversions, and conveyors corridors and describes construction staging, foundation preparation and drainage for the HLF pad and embankment, overliner and liner systems. The plan also addresses borrow material development, geotechnical instrumentation and construction quality assurance testing. The Technical Specifications and CQA Plan provide a detailed accounting of the entire construction work scope that includes: site preparation, fill placement, geosynthetic installation and pipework installation. Specific features of the plan include, but are not limited to the following:

- Mobilization/demobilization of all equipment and material required for the work;
- Installation of temporary interceptor collection ditches and diversions for surface water control;
- Clearing, grubbing and stripping in required areas;
- Excavation in required areas;
- Development of borrow areas within and outside of the HLF limits;
- Construction of access roads;

- Foundation preparation for site grading fill and liner placement;
- Fill placement and compaction;
- Installation of geosynthetic materials for liner, drainage and leak detection systems;
- Installation of solution collection pipework;
- Placement of overliner drain fill; and
- Furnishing and installing materials and constructing items appurtenant and incidental to the above.

3.4 STABILITY AND SETTLEMENT ANALYSES

3.4.1 Slope Stability

Slope stability analyses were conducted on four two-dimensional sections to assess the slope stability of the proposed design for the heap leach facility. The locations of these sections are illustrated in Figure 3.1 of Appendix J to the HLF Design Report (Appendix A).

Based on a dam break analysis and inundation study (Tetra Tech 2013a), the HLF dam has been classified as "High" according to Canadian Dam Association (CDA, 2007) dam classification guidelines. The dam break analysis is presented in Appendix D to the HLF Design Report (Appendix A). CDA design recommendations for “High” hazard dams include consideration of the Earthquake Design Ground Motion (EDGM) for 1/2500 return frequency and factors of safety as summarized in Table 2.4-3. The HLF was evaluated for both static and pseudo-static (earthquake) conditions using a Design Basis Earthquake (DBE) for operational conditions and a Maximum Design Earthquake (MDE) for long-term post-closure conditions. The engineering design criteria provide for an operational minimum static factor of safety of 1.3 for the ore heap (non-impounding areas) and 1.5 for the confining embankment. The minimum factor of safety for pseudo-static conditions is 1.0.

3.4.1.1 Phreatic Conditions

Leach Ore Pile

The granular ore heap will be wetted by controlled leaching, but will have a gravity drain system above the pad liner draining to an internal sump. Therefore, the heap will remain in an unsaturated state except within a portion of the In-Heap Pond, where the embankment provides physical confinement. For design purposes, a maximum head of 1.0 m on the pad liner was used in areas outside the In-Heap Pond and the water level in the In-Heap Pond was assumed to be at the spillway invert. Piezometers will be installed in the heap above the In-Heap Pond level to monitor and confirm the low phreatic conditions during operations.

Embankment and Collection Ponds

The HLF embankment upstream face will be lined with a double geomembrane designed to limit seepage. However a phreatic surface was conservatively modeled in the HLF embankment to simulate a large rupture in the liner system on the upper portion of the dam. This condition is considered highly unlikely and representative of a “worst-case” scenario.

Foundation

A phreatic surface was included in the foundation materials beneath the Events Pond based on a conservative assumption that groundwater could be present several meters below the liner system. A liner underdrain has been incorporated into the design to drain the foundation materials and prevent upward hydraulic pressure on the liner. Although shallow groundwater conditions exist at the site (particularly in the placer deposits along the Dublin Gulch valley floor), the combination of the liner underdrain, interception collection trenches to be installed along the upstream edge of the Phase 1 HLF pad, and reduction of infiltration due to placement of the liner system is expected to result in a lower groundwater level during operations and into post-operations.

Modeled Conditions

Two different groundwater conditions were assumed: operational and long-term post-closure. The operational condition was considered for both static and pseudo-static analyses. This condition was modeled by an upper phreatic surface within the crushed ore, the liner interface and the structural fill in the embankment, and a lower phreatic surface which impacted the in-situ materials (colluvium, placer tailings and alluvium, and weathered bedrock).

The upper failure surface was intended to simulate a large rupture of the liner system at the embankment upstream face thereby allowing the phreatic surface to continue through the liner into the embankment structural fill, where it passed into the lower drain. The post-closure groundwater condition was used in the post-closure static and pseudo-static analyses. This case assumed the liner had been perforated during closure of the HLF and no longer retained the perched upper phreatic surface.

3.4.1.2 Liquefaction

Foundation

The confining embankment foundation preparation includes partial excavation stripping and removal of the poorly consolidated placer tailings in the Dublin Gulch valley. The loose placer tailings may be susceptible to liquefaction during intense earthquake events, and will likely be treated with DDC to strengthen the dam foundation and to provide a firm foundation for the liner system in the In-Heap Pond area.

The DDC method will achieve deep ground densification using the dynamic effects of high energy impacts resulting from the drop of large weights, mitigating against potential liquefaction. The liquefaction analyses and DDC performance criteria are presented Appendix K of the HLF Design Report (Appendix A) and the technical specification for DDC is provided in Appendix P of the HLF Design Report (Appendix A).

If DDC is not utilized, the HLF confining embankment foundation preparation will require excavation down to bedrock (Type 3 rock or better) to remove any poorly consolidated placer tailings or alluvium that could shift or settle upon loading the foundation with the embankment and crushed ore. In the area of the Events Pond, the loose surficial materials would be removed to a minimum depth of 3m.

Ore Heap

The upper leach facility (above the In-Heap Pond) is designed to operate with solution collection and low phreatic conditions within the heap. The mostly drained, generally granular heap has a negligible risk of experiencing the increases in pore pressure which cause liquefaction during dynamic (earthquake) loading. The ore within the In-Heap Pond is considered saturated, and therefore may be susceptible to liquefaction. For the

pseudo-static analyses, this material is assumed to have a reduced strength to simulate potentially liquefied ore within the In-Heap Pond during the design earthquake event.

Stability Analysis Methodology

Stability analyses were conducted using the Slope/W component of GeoStudio 2007 (v. 7.20) by GeoSlope International, Ltd. Slope/W was used to conduct limit equilibrium analyses using the general limit equilibrium (GLE) method, which satisfies both moment and force equilibrium. The Slope/W program incorporates a search routine to locate the failure surfaces with the lowest factor of safety within user-defined search limits. Trial failure surfaces were defined with "entry and exit" parameters. This option defines a range of possible slip surface entry and exit locations within which the most critical (lowest factor of safety) may be found. Additional details and material properties used in the analyses are provided in Appendix J of the HLF Design Report (Appendix A).

Stability Analysis Results

The results of the slope stability analyses are shown in Table 3.4-1, and are included as Attachment B to Appendix J of the HLF Design Report (Appendix A). Acceptable factors of safety are demonstrated for both the ore pile and the HLF confining embankment.

Table 3.4-1: Stability Results for the HLF

Stability Analysis Type	Section			
	T1	T2	T3	T4
Static - Global	1.92	2.07	1.98	2.11
Static - Critical	2.00	2.09	-	-
Operational Pseudo-static - Global	1.29	1.38	1.43	1.52
Operational Pseudo-static - Local	1.35	1.40	-	-
Post-Closure Pseudo-static - Global	1.22	1.32	1.28	1.37
Post-Closure Pseudo-static - Local	1.28	1.44	-	-

3.4.2 Empirical Estimate of Seismic Deformation of Rockfill Embankments

Previous studies indicate relatively low settlement occurs in large rockfill dams when subjected to earthquake loading. The performance of the Project embankment during earthquake loading was estimated using a variety of approaches including semi-empirical and simplified analytical procedures to evaluate an overall average or probable response and provide an indication of the potential 'order of magnitude' deformation under the levels of earthquake loading considered. These methods included the procedures of Makdisi and Seed (1978), Franklin and Chang (1978), Ambraseys and Srbulov (1995) Ambraseys and Menu (1998), Travasarou, Bray, and Der Kiureghian (2004), and Bray and Travasarou (2007). The deformation results for the Project are presented in Appendix L of Appendix A.

The results of the simplified deformation analyses demonstrate that the HLF is stable at the MCE seismic loading considered for a M=6.0 earthquake at a distance of 6km (PGA=0.35g) and for a M=7.0 earthquake at a

distance of 30km (PGA=0.31g). For the HLF confining embankment with a maximum height of about 50 m above the original ground surface, the maximum vertical deformation computed using any of the methods considered was 8.6 cm for the facility under MCE loading conditions using the empirical method of Travasarou (2007). These empirical values are consistent with those estimated using the simplified procedures and are within the industry engineering standard for heap leach facilities. It should be noted that the empirical data includes hydraulic fill and earthfill dams and the results tend to be conservative for higher quality compacted rockfill embankments.

3.4.3 Settlement Assessment

A one-dimensional settlement assessment was performed for the HLF. The construction of the HLF will apply loads to the foundation soils which would result in total and differential settlements. These settlements may impact the performance of the proposed liner system and collection pipe network at the base of the HLF pad. In addition, the settlements may impact the stability of the confining embankment and the performance of other facilities directly associated with the embankment such as the conveyor system and the In-Heap Pond. The assessment has been conducted using data collected from geotechnical site investigations and site information obtained by BGC (2010, 2011, 2012a, 2012b and 2012c).

Subsurface layer moduli were conservatively inferred from the limited SPT-N value data and from empirical correlations. Based on conservative estimates of strength parameters, the settlement calculations show that significant settlement may be expected in areas with deep fill (placer tailings) and colluvium. However, the planned ground treatment using DDC of these materials will result in minimal settlement upon loading. Settlement within the slightly weathered bedrock was considered negligible.

The results of this settlement evaluation support the previous subgrade preparation recommendations (BGC 2011):

1. Surficial organics should be removed from all foundation subgrades.
2. Frozen materials containing excess ice as described and classified in the Frozen Materials Management Plan should be removed from all foundation areas and replaced with structural fill as required to build the grades up to design elevations.
3. Where colluvium is exposed as HLF subgrade, it should be proof-rolled to identify weak zones for removal and replacement with structural or rock fill.
4. All placer tailings should be removed from all foundation subgrades to expose Type 3 or better rock. Structural or rock fill can be used to build the grade up to design foundation elevations. DDC is considered an acceptable alternative to removal of placer tailings.

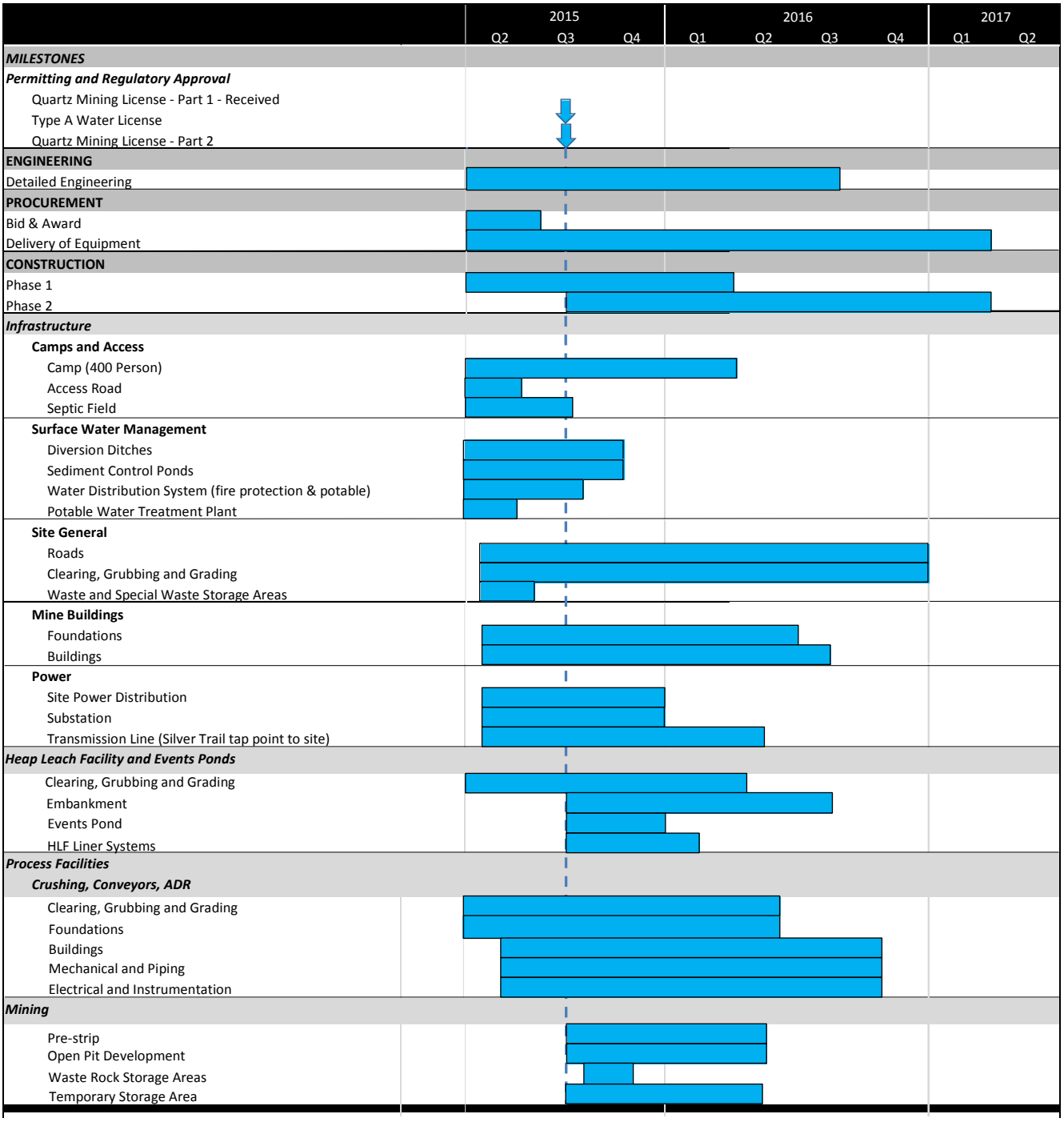
Appendix M of the HLF Design Report (Appendix A) presents the settlement calculations.

3.5 CONSTRUCTION SCHEDULE

3.5.1 Overview

A construction schedule is provided in Table 3.5-1. This construction schedule is illustrative and dependent upon receipt of the regulatory approvals, project financing, contractor availability and seasonal limitations.

Table 3.5-1: Construction Schedule



3.5.2 Rough Earthworks

Preparation of the ground for construction of Phase 1 of the HLF begins with snow management followed by the clearing and grubbing of the site to allow for foundation preparation of the confining embankment and the in-

heap pond area. Once cleared and grubbed, topsoil will be stripped and stockpiled for later use in the Reclamation and Closure phase of the Project. During these activities, any material identified to be suitable for use in the construction will be segregated and stockpiled when practicable.

Following topsoil stripping, the area will be assessed for any instances of permafrost with the intent to remove any such material and replace it with suitable fill. These activities are for the most part not seasonally dependent save for the handling of areas with permafrost, which will be managed in accordance with the Frozen Materials Management Plan.

Clearing, grubbing and grading for Phase 1 of the HLF is anticipated to begin in early Q2 2015 with a target completion date of Q3 2015. Additional rough earthworks will continue throughout 2015 and a component may extend in to 2016, with a winter hiatus due to cold weather, to prepare the Events Pond and the up-gradient Phase 1 HLF temporary diversion channel.

3.5.3 Foundation Preparation

3.5.3.1 Deep Dynamic Compaction

The effectiveness of the DDC ground treatment proposed to densify the placer materials within the footprint of the embankment and the In-Heap Pond of the HLF is impacted by wet soil conditions. It is currently assumed that if DDC is utilized for foundation preparation it would be initiated in early Q3 2015 with a target completion date of late Q3 or early Q4 2015.

3.5.3.2 Excavation and Backfill

The excavation and backfill method of foundation preparation for the HLF is not a seasonally constrained activity. If this method is employed for preparing the HLF foundation, it is anticipated to begin in Q2 2015 with an expected completion date of late Q3 2015.

3.5.4 Water Management Features

3.5.4.1 Sediment Control Ponds and Runoff Interception Ditches

Sediment control ponds, runoff interception ditches, and other sediment and erosion control structures will be constructed on an ongoing basis during the development of the HLF. The construction sequencing, inspection, and maintenance of these structures are discussed in the Operations Water Management Plan.

3.5.4.2 Dublin Gulch Diversion Channel

Construction of the Dublin Gulch Diversion Channel (DGDC) will commence in Q2 2015 and is anticipated to be complete by Q4 2015.

3.5.4.3 Events Pond

Upon completion of rough earthworks for the Events Pond as discussed in Section 3.5.2, subgrade will be leveled out and consolidated to provide a sound structure to build upon. This work is not seasonally constrained and is currently assumed to take place in Q3 2015. The placement of structural fill and the installation of the liner system, including leak detection and recovery systems, are then assumed to be completed in Q4 2015.

3.5.5 HLF Pad Liner

The first construction stage of the HLF liner system will commence upon completion of rough earthworks and begins with the installation of the underdrain system. Installation of the underdrain system is anticipated to be complete in one month in mid Q3 2015. The GCL will then be installed in Q3 2015 and will be complete within two months. Placement of the different Phase 1 geosynthetic liner systems, as described in Section 3.8.1, will then be completed in late Q3 and early Q4, 2015.

Construction activities on the HLF pad liner systems that require the use of heavy equipment will cease in mid Q4, 2015 to ensure the liner systems are not damaged during the coldest months in winter. In mid Q4 2015 through to mid Q1 2016 solution collection valves, flanges, couplings, etc. will be installed.

During the hiatus from major construction activities, the production of the overliner drain fill commence in preparation for the 2016 construction season. In mid to late Q1 2016, ODF placement will take place to complete the liner system installation.

3.5.6 Confining Embankment

Construction of the earth fill/rock fill embankment will commence in Q3 2015 and will continue for approximately 12 months. The placement of the embankment fill is not a seasonally constrained activity but may be halted for brief periods on the recommendation of onsite geotechnical engineers during periods of heavy snow which could impact the compaction of the fill material.

3.6 HEAP LEACH PAD AND CONFINING EMBANKMENT

3.6.1 General

The design incorporates a double-side textured 80 mil linear low-density, polyethylene (LLDPE) liner. A geosynthetic clay liner (GCL) will be used in lieu of a 300mm thick layer of compacted low-permeability material. GCL will be placed underneath the geomembrane and will provide equal or greater protection than 300mm material having a saturated hydraulic conductivity of no greater than 10^{-6} cm/sec.

The Heap Leach Pad is designed to contain a network of pipes that will be distributed throughout the limits of the facility and will collect and convey pregnant leach solution (PLS) in addition to stormwater.

In summary, the proposed Heap Leach Pad will consist of two liner systems (see Drawing 300-GT-011 in Appendix A):

- In-Heap Pond Liner System.
- Up-gradient Heap Leach Pad Liner System.

Section 3.8 presents the liner system details. A minimum one meter (1 m) thick layer of overliner material will be placed over the LLDPE geomembrane in a single lift. The Overliner Drain Fill (ODF) will be placed in bulk onto the liner using suitable haulage equipment or conveyors and spread by dozers in a uniform layer.

Solution collection pipes will be placed within the ODF to convey PLS and storm flows to the In-Heap Pond which is defined by the confining embankment.

The HLF embankment confines and provides stability to the HLF ore pile. It also creates an In-Heap Pond configuration that provides storage of pregnant solution within the ore pore spaces of the ore. The embankment location, geometry, and height determine the ore storage capacity and solution storage capacity of the HLF.

3.6.2 Confining Embankment Design Requirements

The HLF confining embankment will be constructed during initial construction. It will provide heap stability and containment of process solutions in the In-Heap Pond. The embankment dam is designed as an earthfill/rockfill structure with a geomembrane lined upstream dam face and appropriate filter and transition zones to ensure containment integrity. Appendix E of the HLF Design Report (Appendix A) presents the filter design. Section 3.2.5 provides details of the foundation preparation, embankment fill materials and sources, and anticipated construction methods.

The Embankment height was determined in conjunction with the In-Heap Pond storage capacity. The embankment height depends on the In-Heap Pond storage capacity and vice versa. To determine the confining embankment height, a stage-storage curved based on the embankment design and HLF grading was developed. The actual net capacity (storage volume within the open pore space) of the In-Heap Pond was determined by multiplying the gross storage volume by the ore storage solution factor of 0.1661 (0.1661 m^3 of solution /m^3 of ore). This factor was determined by assuming an initial ore moisture content of around 5.0 percent, an ore bulk density of 1.87 tons/m^3, an ore specific gravity of 2.7, and an ore leaching moisture content of 16.8 percent (KCA 2012). Detailed calculations for the derivation of the solution storage factor can be found in Attachment A to Appendix H of the HLF Design Report (Appendix A). The capacity of the In-Heap Pond associated with the embankment height and the stage-storage curve are discussed below in Section 3.7.

The embankment section includes an 10 m crest width at Elevation 888 m asl for road and pipeline access and 2.5H:1V upstream and downstream slopes (see Drawing 300-GT-018 in Appendix A). The fill types include compacted rockfill material taken from selective excavations for placement in the central and downstream section of the embankment. The pre-production mine pit overburden removal excavations are estimated to include sufficient quantities of materials suitable for embankment fill and site grading fills. More competent durable rock for production of required drain rock will be quarried and crushed from required site excavations and filter materials will be produced from screening of placer fill materials in the Dublin Gulch valley bottom that require excavation.

3.7 SOLUTION STORAGE FACILITIES

3.7.1 In-Heap Pond

The In-Heap Pond is defined as the storage volume created within the pore space of the ore, directly upstream of the confining embankment. The In-Heap Pond volume requirements were determined assuming a combination of low probability events occurring simultaneously. This approach was taken to ensure adequate storage volume under the worst of conditions. Based on the design criteria described in Section 2.4-4, the In-Heap Pond will provide containment storage for the following summation of events:

- Assumed Normal Operational Volume – the operational volume is the minimum amount of solution required in the pond to supply the gold recovery plant for 12 hours at a nominal rate of 2,770 m3/hr. This has been added more for additional storage. Standard operating practice will be to keep operating solutions below this level. The sumps for the pumps will be designed to be deep enough to prevent

pump cavitation and this will be the limiting factor for minimum process solution levels within the In-Heap Pond.

- Runoff Volume from 100-year 24-hour rainfall event – the contributing area for the 100-year 24-hour rainfall event is assumed to come from all three phases of the HLF. The contributing area for all three phases of the HLF including undeveloped areas of Anne Gulch is 1.45 km2, which assumes no interceptor ditches are operational. The depth of the 100-year 24-hour rainfall event is 72mm, which was derived by Knight Piesold (2013) from the Rainfall Frequency Atlas for Canada (Environment Canada, 1985). Thus, the runoff volume reporting to the In-Heap Pond is 104,400 m3 based on the SCS curve number method using a curve number of 77.
- Snowmelt Runoff Volume – the snowmelt runoff volume is the volume of water that is melted during a 24-hour rain-on-snow event followed by 48 hours of melting. The amount of snow that melts during the 100-year 24-hour rainfall event was calculated using an empirical equation in the Manual of Operational Hydrology for British Columbia (MOE, 1991). The equation is provided in Section 5.2.4 of Appendix A and results in a snowmelt of 26.4mm. The amount of snow that melts during the two days following 100-year 24-hour event was calculated using the degree-day method (NEH, 2007), and the result is 15.1 mm/day. This comes to a total of 56.6mm over three days. Thus, the snowmelt volume reporting to the In-Heap Pond is 82,026 m3. The snow melt volume reporting to the In-Heap Pond could be reduced by snow removal and disposal of snow that has not come into contact with placed ores or process solutions.
- Heap Draindown Volume – in the event of a power loss (pumps stop operating), pump malfunction, or pump maintenance, the pond must be able to accommodate the solution continuously draining down from primarily the irrigated column of the Heap. Generally, most operations are required to provide for 24-hours of draindown. The Eagle HLF has been conservatively designed to accommodate three days (72-hours) of draindown.
- Freeboard – 0.5 m of freeboard below the ultimate Embankment crest is required. The 0.5 m of freeboard is added above the corresponding stage-storage volume that provides the required total volume.

The summation of the In-Heap Pond volume requirements are summarized in Table 3.7-1.

Table 3.7-1: In-Heap Pond Volume Requirements Summary

Volume Requirement	Volume (m^3)
Assumed Normal Operational Volume*	33,240
Runoff from a 100-year 24-hour Rainfall Event	104,400
Snowmelt Runoff Volume from 100-year 24-hour Rainfall Event plus two days of melting	82,026
Heap 72-hour Draindown Volume	199,440
Total	**419,106**

* Standard operating practice will be to keep operating solutions below this level. The sumps for the pumps will be designed to be deep enough to prevent pump cavitation and this will be the limiting factor for minimum process solution levels within the In-Heap Pond.

The required In-Heap Pond volume (419,106 m^3) was compared to the net stage-storage curve behind the heap embankment to obtain a corresponding elevation that would provide the necessary storage volume. Based on

the net stage-storage curve, an elevation of 885 m will provide a volume of 421,154 m^3. Further, elevation 886 m will provide a volume of 447,945 m^3; this elevation was selected because it will provide an additional factor of safety and one meter of freeboard to account for possible decreases in storage capacity.

The final Embankment crest elevation will be at 888 m (2 m above the required elevation). The In-Heap Pond Spillway invert will be at elevation 886 m. Thus, the ultimate storage capacity of the In-Heap Pond up to the final Embankment crest elevation (888 m) is estimated at 504,560 m^3.

The In-Heap Pond design details are discussed further in Appendix H of the HLF Design Report (Appendix A).

3.7.2 In-Heap Pond Spillway

The In-Heap Pond spillway was designed in accordance with the Canadian Dam Association (CDA) guidelines for a "High" consequence dam. According to the CDA (2007) guidelines a dam classification of High indicates a design flood of 1/3 between the 1,000 year event and the Probable Maximum Flood (PMF). Flow from the Spillway will then be routed through to the Events Pond.

A worst case scenario was developed for calculating the largest peak flow to be experienced by the spillway. The scenario assumed that Phase 1 of the pad is constructed, Phases 2 and 3 are being cleared and grubbed for construction, and the pad is loaded with ore to elevation 883 m (roughly at the spillway invert - below the Embankment crest). The scenario also assumed that the ore is loaded to this elevation, and is completely saturated when the design storm events occur. The HLF interceptor collation ditches (sized for the 100-year, 24-hour event) were assumed to have overtopped resulting in the entire upstream watershed contributing to the peak flow.

The peak flow from the PMF is 24 m^3/s and 6 m^3/s for the 1000-year event based on hydrologic modeling. Therefore, the design flow for the spillway based on CDA regulations of 1/3 between the 1000-year and the PMF is 12 m^3/s. The summary of hydrologic modeling can be found in Appendix H of the HLF Design Report (Appendix A).

The Spillway will be built as box culverts to allow the embankment crest access road to go over the top of the spillway. The dimensions of the box culverts were determined using HY-8 (FHWA, 2008) and then verified with hydraulic analysis using HEC-RAS (HEC, 2010b). There will be two 2.4m wide by 1.5m high box culverts at the upstream end of the Spillway which will convey the design flow without overtopping.

The U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-RAS model, version 4.1 (HEC, 2010b) was used to analyze the entire length of the spillway to confirm dimensions and evaluate the hydraulic jump from the design flow before it enters the Events Pond.

Based on results of the HEC-RAS model, the Spillway downstream of the box culverts will be rectangular with a width of 4.5 m and a depth of 2 m. The spillway will have an invert of 886 m asl at the upstream end. This configuration allows a 0.5 m of freeboard from the maximum anticipated water surface elevation to the crest of the Embankment. The In-Heap Pond Spillway design details are discussed further in Appendix H of the HLF Design Report (Appendix A).

Drawings 300-GT-36 through 300-GT-39 in Appendix A present details of the In-Heap Pond Spillway design.

3.7.3 Events Pond

The Events Pond serves as overflow containment providing additional storage in case the In-Heap Pond capacity is exceeded. The Events Pond is sized to provide containment storage for ¾ of the PMF Event assuming the In-Heap Pond is at maximum Capacity. The PMF event rainfall depth was estimated to be 256 mm (Knight Piesold, 2012) over 1.45 km^2, or over the maximum contributing HLF area (Phases 1, 2 and 3) and the remaining undeveloped Ann Gulch catchment. The SCS curve number method was also used to calculate the peak flow and runoff volume form the HLF that overflows through the spillway and reports to the Events Pond. The rainfall volume from the PMF reporting to the Events Pond is 280,000 m^3, and thus the design capacity (or ¾ of the PMF) is 210,000 m^3.

The capacity of the Events Pond is 203,967 m^3 with freeboard, and is 254,848 m^3 without freeboard. The peak discharge from the PMF through the Events Pond after hydrologic routing is expected to be 3 m^3/s. The spillway on the Events Pond will have a bottom width of 3 meters and a depth of 1 meter. The Events Pond design details are discussed further in Appendix H of the HLF Design Report (Appendix A). See Drawings 300-GT-30 through 300-GT-35 in Appendix A for the Events Pond design details.

Thus, the combined total solution storage capacity of the Events Pond and the In-heap Pond is 702,793 m^3 (254,848 m^3 + 504,560 m^3).

3.8 LINER SYSTEMS

3.8.1 Liner System Design

3.8.1.1 General

The liner for the leach pad and event ponds will consist of a composite geomembrane and underlying low-permeability bedding material, which is the state-of-practice liner system for heap leach facilities. The primary purpose of the composite liner system is to prevent the loss of HLF process solutions for both environmental and economic reasons. In addition to playing a role in preventing leakage, the underliner beneath the geomembrane is necessary as a transition layer between the geomembrane and the prepared foundation.

A geosynthetic clay liner (GCL) will be used in lieu of a 300 mm thick layer of compacted low-permeability material due to the lack of suitable onsite soils in sufficient quantities. The GCL soil liner provides an equivalent 300 mm minimum thickness of $1x10^{-6}$ cm/sec or lower permeability soil layer.

Differential settlement on the liner system due to variable loading conditions was considered in the liner design. LaGatta et al. (1997) performed tests to measure the hydraulic conductivity (k) of GCLs exposed to differential settlement. They found that in most cases, needle-punched GCLs maintained a $k \leq 1x10^{-7}$ cm/sec even when exposed to tensile strains of up to 10 percent or more, depending on test conditions. Overlapped seams maintained the low k value even when slippage occurred along the overlap. Their literature review indicated that compacted clay subliner can experience failure at tensile strains as little as 0.1 to 4 percent. Thus, GCLs may be more resistant to damage from differential settlement than compacted clay liners.

The higher cost for GCL will be offset by cost savings in construction time due to the relatively rapid deployment of the GCL rolls during geomembrane liner installation, where no moisture conditioning or compaction is required. The GCL surface provides rock puncture protection to the overlying geomembrane liner, and only

requires a smoothed and compacted subgrade surface graded to drain and support the composite pad liner system.

Free-draining granular material will be placed on top of the pad liner together with a network of collection pipes to collect and drain process solutions and storm infiltration, and to minimize hydraulic heads on the liner, thereby reducing the risk of leakage. Piezometers will be installed within the liner cover fill at the strategic locations to monitor the hydraulic head on the liner system during pad operation.

The in-heap pond will have a double-geomembrane liner installed over a GCL liner together with a leak detection system. The leak detection system will be installed between the two geomembranes to monitor and contain any leaks through the top geomembrane.

The events pond also will be lined with a double-geomembrane liner installed over a GCL liner together with a leak detection and recovery system. This will allow it to contain excess solutions for short durations until the excess can be taken up by fresh ore. Details of the pad and pond liner systems are shown on Drawing 300-GT-011 in Appendix A.

3.8.1.2 Liner Subgrade

Subgrade preparation for the GCL placement will involve subgrade compaction to 95 percent of the maximum dry density based on ASTM D 698. Rocks larger than 38 mm in diameter will be removed first from the upper 150 mm of the subgrade prior to compaction. Areas to receive liner that consisted of weathered rock or site grading fill will require import of fine-grained material to cover the surface and form a suitable subgrade.

3.8.1.3 Geomembrane Selection

The critical aspects of geomembrane selection for the Project include accommodation for puncture resistance, elongation capacity (elasticity), expected foundation consolidation in fill areas under the ore heap, adequate interface shear strength between the pad geomembrane and the underlying soil liner or GCL and overlying cover fill for heap stability, and satisfactory performance under exposure to climatic conditions (temperature expansion and contraction, wind forces, and sunlight ultraviolet (UV) effects).

The geomembrane types typically used for HLFs are LLDPE, HDPE, and polyvinyl chloride (PVC). The more flexible LLDPE and PVC geomembranes are best for buried applications subjected to high loads such as the leach pad. HDPE geomembrane is best for exposed applications such as the ponds and ditches. LLDPE geomembranes were selected for the leach pad including the In-heap Pond geomembrane, and HDPE geomembranes were selected for the Events Pond for the following reasons:

- LLDPE geomembrane has significantly better elongation performance, puncture resistance, interface friction strength, and stress cracking resistance compared to HDPE geomembrane;
- LLDPE geomembrane remains flexible at temperatures well below freezing to about -25°C with a low temperature brittleness of -70°C according to ASTM D-746;
- HDPE geomembrane has better chemical and UV resistance; and
- LLDPE geomembrane can be readily seamed to HDPE geomembrane.

A 2.0-mm (80-mil) LLDPE top geomembrane was selected for the leach pad, based on performance requirements and past design and construction experience. The geomembrane will be double-side textured

above the GCL to enhance heap stability and construction safety. The event pond top geomembrane will be 2.0-mm (80-mil) single-side textured HDPE with the textured side up for traction.

A geocomposite (drainage net) will be installed between the in-heap pond and event pond geomembrane systems and will tie to a leak detection sump and pipe system for collecting and removing any leaks through the top geomembrane. The geocomposite will consist of a geonet heat-laminated on both sides with nonwoven geotextile. The geonet is a net-like polymeric material formed from intersecting ribs integrally joined at the junctions and is used to facilitate drainage between the geomembranes.

3.8.1.4 Description of Liner Systems

The lining system for the In-Heap Pond is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The lining system for the HLF Phase pad (up-gradient of the In-Heap Pond) is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geosynthetic clay liner (GCL) below the 2.0mm (80-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The Events Pond will be a double-lined facility with LDRS having the following components:

- An 2.0mm (80-mil) high-density, polyethylene (HDPE) liner (top liner);
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE bottom liner; and
- Liner bedding beneath the GCL.

3.8.1.5 Liner System Testing

A large-scale puncture test was performed on the 1.5mm (60-mil) and 2.0mm (80-mil) double-side textured LLDPE geomembrane underlain by a GCL and subgrade soil liner and overlain by granular fill with various maximum particle sizes. The soil subgrade and cover fill materials were of representative samples obtained from the project site. A normal stress of 4,413 kPa (640 psi), which represents 150% of maximum ore load, was applied for 48 hours and the geomembrane inspected for damage. No punctures were observed visually or detected by a vacuum box test with a negative pressure of 62 kPa (9 psi). The geomembrane puncture test results are included in Appendix B of the HLF Design Report (Appendix A). Liner puncture tests for the following drain cover materials:

- minus 25mm (1-inch)
- minus 38mm (1.5-inch)
- minus 50mm (2-inch)

All tests passed for both 1.5mm and 2.0mm LLDPE geomembrane with no significant damage to liner under max static loading. Therefore, 1.5mm LLDPE with a drain cover material containing particles up to 50mm could be considered acceptable for operational use. However, 2.0mm LLDPE with maximum 38mm drain cover particle size was conservatively selected for design for better operational reliability of the liner system and to mitigate against potential geomembrane damage considering construction loading that may occur during placement of the drain gravel over the geomembrane.

A large-scale direct shear test was performed on the interface between the textured LLDPE geomembrane and the underlying GCL and soil subgrade and overlying cover fill materials from the site. The test was performed to obtain interface shear strength parameters for use in the heap stability analyses. The results of the test are provided in Appendix J of the HLF Design Report (Appendix A) along with results of the stability analyses (Section 3.4).

3.8.2 Overliner Drain Fill

A drain cover fill layer (termed Overliner Drain Fill or ODF within the construction documents) will be placed over the entire In-Heap Pond and leach pad area including the upstream face of the confining embankment. The ODF will be produced from the crushing of relatively clean durable rock material. Some screening may be required to produce a free draining, non-plastic, ODF material with a minus 38 mm maximum rock size, less than 20 percent passing the No. 4 ASTM sieve size, and less than 5 percent fines passing the No. 200 ASTM sieve size. The design criteria specify an ODF permeability and maximum ore heap load to ensure both, reasonable spacing of the drain pipes and fully drained heap conditions.

The ODF will consist of a 1 meter thick layer of crushed material. A network of perforated piping will be embedded in the layer to help convey the solution within the layer. Drainage collected in the overliner will report to the In-Heap Pond and to be reclaimed via the solution collection wells located on the upstream face of the HLF confining embankment.

The primary functions of the ODF are as follows:

- minimize the head on the geomembrane liner system to reduce the risk of process solution leakage,
- protect the synthetic liner from damage during ore placement,
- maximize the return of the gold containing pregnant solution for processing.

The piping network embedded in the ODF will consist of a series of dual wall corrugated, smooth interior, slotted collection pipes. The piping network will provide rapid transport of process solution to the In-Heap Pond and maintain a minimal head on the liner. Drawings 300-GT-027 through 300-GT-029 in Appendix A illustrate the layout of the solution collection pipework in the ODF material. The minimum in place hydraulic conductivity of the overliner will be $2x10^{-4}$ m/s.

3.9 SOLUTION AND LEAKAGE COLLECTION SYSTEMS

3.9.1 Solution Collection System

3.9.1.1 Solution Pipe Network

Solution will be collected in the high permeability overliner material at the base of the heap pad, with perforated collection pipes placed within the overliner to increase solution removal rates. The designed heap leach pad will

contain a piping network that will be distributed throughout the limits of the facility and will accommodate the volumes from a 100-year, 24-hour storm in addition to 150% of the flow generated from the applied leaching solution. The drain pipes are located within the free-draining overliner material placed above the pad liner and will collect and convey the stormwater and Pregnant Leach Solution (PLS) to the In-Heap Pond.

The Heap Leach Pads' drain pipes will consist of 100-mm, 250-mm and 450-mm diameter corrugated dual-wall, perforated ADS N-12 pipes. A series of 100-mm primary collector pipes will be spaced at 25 m on center and arranged in a "herringbone" pattern to convey flows for collection in 450-mm header pipes. Where slope lengths dictate, secondary 250-mm collector pipes will be required to convey flows from the 100-mm pipes to the 450-mm header pipes.

To maximize the efficiency of the ore's drainage and to minimize the potential for leakage through the pads' liner system, the hydraulic head above the liner was designed to be less than a maximum height of 1.5 m between the drain pipes; this results in an average head of about 0.6 m. Considering the maximum allowable hydraulic head, the minimum secondary pipe spacing of 25 m on center will allow for efficient drainage and also represents a spacing that considers ease of placement during construction.

The pipes will be ultimately covered by an average ore stack height of approximately 61 m and a maximum ore stack height of 150 m. The effects of the maximum load on the pipes were analyzed to verify acceptable deflections are not exceeded to ensure integrity of the pipes under operational conditions.

Appendices F and G of the HLF Design Report (Appendix A) present the pipe spacing and flow design calculations, and the pipe deflection analysis, respectively.

3.9.1.2 Solution Collection Sump and Riser

The collection pipe network in the overliner drain fill will direct the solution to the sump at the toe of the embankment for pumping through inclined riser pipes to the process plant. The entire facility will be graded towards a collection sump at the toe of the Confining Embankment.

The base of the sump will be constructed approximately 2 m below the elevation of the surrounding liner, and will have approximate dimensions of 7 m by 21 m. The liner system and LDRS will extend under the sump. Solution will be pumped from the sump through three of five available inclined risers to the process plant.

The inclined arrangement will consist of five thick-walled, steel pipes, each approximately 0.90 m in diameter to allow for raising and lowering of a submersible pump. Three pumps will have the capacity to meet the solution application throughflow. The remaining two riser pipes will be installed as a back-up, to maintain access to the sump in the event that the any riser pipes becomes blocked. The base of the risers will rest on a gravel layer, additional layers of geotextile and geomembrane, and will be located within the overliner material, not on the liner, to provide a buffer zone above the liner system to resist the riser pipes from pushing down into the liner.

The riser pipes will be surrounded with a zone of fine gravel material, which will act as a protective cushioning layer. A zone of coarser gravel will be placed around the base of each riser to a minimum depth of 5m for frost protection and cushion material, and to promote flow of solution toward the riser. Beyond the zone of coarse gravel, the regular crushed ore will be placed.

Drawings 300-GT-020 through 300-GT-023 of the HLF Design Report (Appendix A) present the sump design details.

3.9.2 Leak Detection and Recovery Systems

3.9.2.1 General

A Leak Detection and Recovery System (LDRS) will be constructed within the In-Heap Pond and the Events Pond and will consist of a monitoring sump equipped with an automatic, fluid-level activated pump located between the top and bottom liners. The pump will be sized to sufficiently remove fluids to minimize head on the bottom liner and will also be connected to a flow meter to provide the volumes recovered over specific time intervals.

The ponds will be graded to the sump at a minimum 1% slope, facilitating gravity collection of any potential leaks in the top liner via the geonet material located between the two geomembranes to allow fluid to the sump. More detailed information regarding the LDRS is presented in Appendix I of the HLF Design Report (Appendix A).

Drawing 300-GT-024 of Appendix A presents the LDRS sump design details.

3.9.2.2 Action Leakage Rates

As presented in Appendix I of the HLF Design Report (Appendix A), potential leakage rates through the primary (top) liner of the ponds were calculated to determine required sump sizes and the Alert Levels for each pond.

Alert Levels were determined using industry-standard methodology and assuming good Quality Control and Quality Assurance during installation of the geomembrane and subsequent construction of the solution piping and overliner drain fill.

The Alert Levels for the In-Heap Pond, as measured by the amount of fluid potentially pumped out of a process solution pond's LDRS, were calculated to be:

- Alert Level 1 = 84 liters per minute
- Alert Level 2 = 1,582 liters per minute; and
- Design LDRS Pumping Capacity = 2,372 liters per minute.

The Alert Levels for the Events Pond were calculated to be:

- Alert Level 1 = 11 liters per minute
- Alert Level 2 = 217 liters per minute; and
- Design LDRS Pumping Capacity = 325 liters per minute.

If, during normal operations, it is found that the amount of fluid pumped back to the pond from the LDRS exceeds the AL1, the operator should take action to determine the cause. This action may include physical inspection, mechanical leak detection, electric leak location, or other methods to determine what is causing the Alert Level 1 exceedance to maintain the liner integrity such that the Alert Level 2 is not exceeded.

If, during normal operations, it is found that the amount of fluid pumped back to the pond from the LDRS exceeds Alert Level 2, the operator should follow the project Emergency Response Plan.

3.9.3 Underdrain System

The HLF underdrain system provides for the collection and drainage of subsurface water beneath the lined facility to limit upward pressure on HLF liner. The underdrain will be constructed with geofabric wrapped around granular drain rock backfill materials and 100mm perforated pipes placed at regular intervals (approximately

75m spacing) beneath all phases of the HLF, with additional drains to be installed during construction as field conditions dictate. The drains will convey unaffected subsurface water to collector pipes that will discharge to an outlet monitoring vault. The vault is configured to allow for sampling of seepage flows for water quantity and quality, and is equipped with a pump system to return flows to the HLF for use as make up water or allow flows to outfall to Dublin Gulch if discharge criteria are met. Details of the proposed underdrain system are shown in Drawings 300-GT-015 through 300-GT-016 of Appendix A.

In addition to providing control for groundwater seepage, the underdrain system also provides leak monitoring capability for the upper HLF (above the in-heap pond area). The transverse primary underdrains will provide interception of potential leakage through the liner, and the underdrain collection pipes will be placed below the PLS header pipe corridor where flows will be concentrated during leaching operations, thereby providing leak monitoring of critical areas most likely to have fluid present on the liner system during much of the operational life of the facility.

The proposed liner system is designed to limit any leakage through the geomembrane by use of a low permeability GCL. It is highly unlikely that substantial leakage through the geomembrane and GCL components of the liner due to the composite nature of the liner system. Under normal conditions, low hydraulic head levels will be present over the liner system in the upper HLF area resulting in low leakage rates. The lower HLF area will include a double lined facility with a leak detection and recovery system. In these areas, the underdrain system will provide a secondary detection capability.

In the unlikely event unplanned measureable leakage occurs from the liner system, the unplanned discharge would be identified during regular water quality monitoring of flows at the outlet monitoring vault. Separate non-perforated collection pipes for each phase of the HLF allow the outflows from each area to be monitored independently. This allows for more focused mitigation actions in the case of water quality exceedance from the underdrain monitoring system. The vault is also equipped with a pump system to return any leakage identified to the HLF.

3.9.4 Closure Drain System

During closure of the heap leach facility, any remaining cyanide in the spent ore will be destructed and the heap will be rinsed. Once acceptable water quality is verified, the liner system below the in-heap pond will be punctured by drilling to allow complete drainage of water through a pre-installed outlet system. The closure inlet sump and drain pipes are sized to convey the wettest month precipitation in order to minimize solution accumulation within the spent ore. The closure drain inlet system will consist of a LLDPE lined gravel sump with non-perforated PE outlet pipes. The closure inlet will be placed directly below the leak detection sump to ensure that residual flows from the leak detection system are directed to the closure outfall. The liner system will be punctured by drilling through two pre-installed open casing pipes extending to the PLS sump. A drill string will be lowered through each casing allowing drilling through the PLS and LDRS sump liners. A series of pre-installed steel plates will guide the drill and stop the drilling head at the appropriate depth within the closure sump. Once the drill string is retrieved, fluid will drain through the punctured liner into the closure sump where it will enter the closure outlet pipe and drain by gravity to the outlet vault.

The closure drainpipes will be directed to the underdrain system outlet vault, and will use similar controls to allow for water quality and quantity monitoring. The underdrain pump return system will remain in place to allow return of flows to the HLF if needed. The closure outlet system is presented in Drawings 300-GT-024 through 300-GT-026 of Appendix A.

3.10 SOLUTION CONVEYANCE AND PUMPING SYSTEMS

3.10.1 General

Barren solution containing cyanide will be applied to the ore stacked on the HLF to extract the gold. After passing through the ore, this solution will be collected by the solution recovery system.

A series of barren solution pumps located at the Adsorption Desorption Recovery (ADR) facility (Figure 3.10-1) will pump solution to the Heap Leach Pad. Pressure piping will be dual contained at all times. A series of pipe headers will distribute the solution to secondary and tertiary headers, and ultimately to 81 x 81 cm drip emitters placed under the surface of the ore. Fresh sodium cyanide solution will be added as needed to the barren solution tank at the ADR facility. The primary supply line will track along the west side of the HLF and has been located a safe distance from the service roads and conveyors.

The PLS recovery pumps are located in the In-Heap Pond sump as described above in Section 3.9.1. Up to four vertical turbine pumps will be used to advance the PLS to the ADR plant at 2,770 m^3/h. The PLS recovery pump system is presented in Drawings 300-GT-20 through 300-GT-25 of Appendix A.

The process pumping system includes pumps, pipelines, valves, and associated controls to move solution between the ADR plant and the HLF.

The process pumping and solution delivery systems include the following provisions for year-round operation:

- ability to heat barren solutions
- buried emitters (ripped in by dozer) and covered up to 3 m depth
- heat traced and insulated barren solution tank
- heat traced and insulated (or buried) pipelines as needed
- backup power supply to pumps via emergency generators
- provision for pipeline drain down upon shutdown.

3.10.2 Cold Weather Considerations

A review and comparison of heap leaching operations in cold climates indicates year-round leaching operations at the Eagle Gold site is feasible. Design provisions are incorporated to add and maintain heat in the process solutions applied to the heap.

Since ore particle size, ambient temperatures, delivered ore moisture, agglomeration requirements, and snowfall may play a role in the ability to stack in winter, the Project has adopted the following mitigation measures:

- selected an in-valley heap configuration to create a heat sink
- selected a south-facing valley
- use of the In-Heap Pond for PLS storage
- sizing of the fine ore crushing operation to allow increased production rate during warmer months
- incorporation of a temporary ore stockpile to accommodate 100 days of ore storage assuming a primary crushing rate of 29,500 t/d.

- sizing of the starter heap leach pad to accommodate more than one year of ore production to allow advanced stacking for at least the first winter season
- provision for a D9 track dozer equipped with a ripper assembly to rip frozen ore prior to resuming leaching in the spring
- heating of barren solution
- in-heap temperature monitoring
- burying drip emitter lines with up to 3 m of ore
- heat-tracing and insulating the barren tank
- heat-tracing and insulating (or burying) pipelines, and
- generators for backup power supply to pumps and emergency process equipment.

3.11 ORE PROCESSING AND PAD DEVELOPMENT

3.11.1 Ore Crushing and Delivery

Ore will be mined and delivered to the primary crusher at a rate of 29,500 t/d (10.3 Mt/a). The remaining crusher units, conveyor and portable stacking system are designed to crush and place ore at a rate of 41,300 t/d. The locations of the crushing plant is shown on Figure 3.11-1. The HLF will operate year-round. During most of the year (250 d/a) ore will be crushed, agglomerated, stacked and leached. Primary crushed ore will be stockpiled on the temporary ore stockpile during the coldest 100 d each winter while leaching continues on the HLF.

The crushed ore will then be transported by covered conveyor to the heap leach pad for stacking. Column leach test results (KCA 2012) indicated that crushing to a P80 size of 6.4 mm with conventional crushers will lead to an overall average gold recovery of 72.9% assuming a distribution of 39.1% (fresh granodiorite), 42.5% (oxidized granodiorite), 11.0% (altered granodiorite), and 7.4% (E-metasediments) with a leach time of ~150 days when stacked and leached in 10 m lifts. Sodium cyanide requirements were estimated to average 0.39 kg/t at a 6.4 mm crush size. Lime requirements were estimated to average 1.04 kg/t. To achieve heap permeability, agglomeration with 2.5 to 3 kg/t of cement may be needed in the lower lifts of the multi-lift heap leach operation.

A series of compacted permeability tests were conducted to determine heap permeability under various pressures. The tests simulated loads at various heap heights between 0 and 150 m. All of the conventionally crushed samples demonstrated good stability and low slump without cement agglomeration (KCA 2012). As part of standard quality assurance testing and final design development, additional agglomeration test work will be undertaken on representative ore during initial crushing and processing output runs and prior to loading the HLF.

If used, agglomeration (e.g., belt or drum as required) would occur during the first two or three years, and as deemed necessary, using lime and cement, after which only lime would be added to the ore before it is stacked on the heap leach pad. The location of the Agglomerator Building is shown in Figure 3.11-2. Ore will be stacked on a composite liner system in 10 m lifts using a stacking conveyor system.

3.11.2 Heap Leach Pad Stacking

The heap leach stacking plan was designed in coordination with the mining plan to efficiently schedule ore stacking and leaching over the LOM. The stacking plan is based on a loading rate of 41,300 t/d for approximately 250 loading days. The stacking plan is based on:

- Pad surface area
- Conveyor utilization integrated with the crushing plant
- Portable conveyor repositioning (mobile sections are moved every 1 to 2 d)
- Coordination of mobile equipment for moving the portable conveyors
- Coordination of piping to follow the ore placement as quickly as practical.

The In-Heap Pond area will be the first area filled with ore. As stacking operations advance, ore will be stacked on top of the heap leach pad in 10 m lifts. Ramps will be established to allow conveyor access to the top of the heap for construction of additional lifts. Table 3.11-1 summarizes the pad stacking plan. For this stacking plan, 22 of 39 leach lifts will be leached for the design leaching cycle (150 d) prior to having another lift placed over top. The remaining 17 leach lifts will experience a reduced primary leach cycle time, as additional lifts are progressively stacked on top before the full leaching cycle is complete. These 17 leach lifts will have primary leaching cycle times ranging from 48 to 132 d and consequently may experience some impairment in gold recovery (Table 3.11-2).

Table 3.11-1: Pad Stacking Plan

Pad ID	Pad Stacking (d)	Cumulative Pad Stacking (d)	Pad Stacking Remaining (d)	Percent Area Sacked Year End (%)	Pad Area Stacked (m2)	Pad Area Remaining (m2)	Leach Pad Stacked	Stack (a)	Year Pad Leach Cycle Starts (a)	Year Pad Leach Cycle Ends (a)
860	23.33	23.33	37.67	-	53,597	-	860	1	1	2
870	50.85	74.18	(13.18)	59	51,311	36,306	870	1	1	2
880	47.16	121.34	204.40	-	163,435	-	870, 880	2	2	2
890	62.09	183.43	142.31	-	163,164	-	890	2	2	2
900	68.48	251.91	73.83	-	161,291	-	900	2	2	2
910	67.99	319.90	5.84	-	160,047	-	910	2	2	3
920	67.36	387.27	(61.52)	7	11,088	146,231	920	2	2	3
930	58.82	446.08	144.03	-	286,990	-	920, 930	3	2	3
940	57.23	503.31	86.81	-	146,193	-	940	3	3	3
950	58.40	561.71	28.41	-	155,955	-	950	3	3	3
960	60.61	622.32	(32.20)	39	63,644	98,000	960	3	3	4
970	64.63	686.95	162.71	-	261,992	-	960, 970	4	3	4
980	68.19	755.14	94.52	-	179,184	-	980	4	3	4
990	73.53	828.67	20.99	-	179,184	-	990	4	4	4
1000	79.28	907.95	(58.29)	22	47,284	164,516	1000	4	4	4
1010	87.87	995.82	112.88	-	400,588	-	1000, 1010	5	4	5
1020	96.77	1,092.59	16.11	-	258,226	-	1020	5	4	5

Pad ID	Pad Stacking (d)	Cumulative Pad Stacking (d)	Pad Stacking Remaining (d)	Percent Area Sacked Year End (%)	Pad Area Stacked (m2)	Pad Area Remaining (m2)	Leach Pad Stacked	Stack (a)	Year Pad Leach Cycle Starts (a)	Year Pad Leach Cycle Ends (a)
1030	104.73	1,197.32	(88.62)	13	37,449	245,422	1030	5	4	5
1040	116.85	1,314.17	53.27	-	560,621	-	1030, 1040	6	5	5
1050	126.83	1,441.00	(73.56)	36	122,433	213,069	1050	7	5	6
1060	131.05	1,572.05	54.91	-	550,498	-	1050, 1060	7	5	6
1070	128.74	1,700.79	(73.83)	37	118,845	201,523	1070	8	5	6
1080	119.52	1,820.31	66.76	-	492,876	-	1070, 1080	8	6	6
1090	107.11	1,927.42	(40.35)	53	138,297	120,322	1090	8	6	7
1100	97.36	2,024.78	122.29	-	345,630	-	1090, 1100	9	6	7
1110	85.07	2,109.85	37.22	-	291,352	-	1110	9	7	7
1120	71.78	2,181.63	(34.56)	42	67,771	92,116	1120	9	7	8
1130	58.89	2,240.51	75.74	-	125,841	-	1120, 1130	10	7	8
1140	46.87	2,287.39	28.87	-	102,182	-	1140	10	8	8
1150	36.55	2,323.94	(7.68)	63	44,969	26,412	1150	10	8	9

Table 3.11-2: Leaching Plan

Pad ID	No. Days Impaired	No. Days Unimpaired	Ore (tonnes)	Impairment (%)
860	0	150	447,438	-
870	0	150	661,591	0.00
870	102	48	468,115	-
880	87	63	1,717,970	-
890	81	69	2,322,349	-
900	81	69	2,595,640	-
910	0	150	2,570,704	-
920	0	150	178,949	2.24
920	32	118	2,359,982	-
930	92	58	2,384,627	-
940	81	69	2,295,616	-
950	0	150	2,417,181	-
960	0	150	1,000,377	1.54
960	84	66	1,540,410	-
970	81	69	2,605,082	-
980	75	75	2,745,402	-
990	0	150	2,984,381	-
1000	0	150	724,513	1.61
1000	61	89	2,520,795	-
1010	52	98	3,582,973	-
1020	0	150	3,954,381	-
1030	0	150	573,078	0.51

Pad ID	No. Days Impaired	No. Days Unimpaired	Ore (tonnes)	Impairment (%)
1030	0	150	3,755,695	-
1040	0	150	4,784,560	-
1050	0	150	1,899,660	0.00
1050	18	132	3,305,954	-
1060	0	150	5,383,453	-
1070	0	150	1,952,148	0.01
1070	29	121	3,310,230	-
1080	0	150	4,893,766	-
1090	0	150	2,352,782	0.01
1090	52	98	2,046,985	-
1100	0	150	3,871,413	-
1110	0	150	3,347,680	-
1120	0	150	1,197,129	0.09
1120	90	60	1,627,177	-
1130	102	48	2,285,818	-
1140	0	150	1,824,179	-
1150	0	150	1,388,504	2.01

The shortened primary leaching cycle for these lifts will result in some leachable gold remaining in the ore. An estimated 80% of the impaired leachable gold will simply take longer to leach out of the heap. The remaining 20% is assumed to not be recovered until the heap leach is rinsed. During rinsing operations it is estimated 75% of the remaining impaired gold will be recovered. A total of 21,664 oz Au is delayed until the rinsing stage and 3,742 oz Au is assumed to be entirely impaired and not recovered through the leaching operations (Table 3.11-3).

Table 3.11-3: Life of Mine Heap Leach Metal Balance

Leaching Phase	Recovered/Balance (oz)
Design Leach (150 d)	1,676,234
Primary Leaching	1,650,828
Rinsing	21,664
Impairment	(3,742)

The impaired leaching times, and the plans for secondary and end-of-mine-life recovery, were accurately applied to the metal production schedule in the economic analysis. KCA (2012) provides more information with reference to leach kinetics assumed for the Heap Leach Pad.

The heap stacking system will include:

- a series of overland conveyors
- up to 20 grasshopper-type portable transfer conveyors, each approximately 38 m in length

- a 43 m long horizontal mobile bridge conveyor mounted on a dozer crawler carriage
- a 37 m long radial stacking conveyor, capable of powered luffing, slewing and stacking to a height of 10 m and fitted with a 6.1 m stinger.

The grasshopper conveyors will transport the ore from the overland conveyors to the bridge conveyor. The ore will be placed in 10 m lifts using radial stackers. The leach lifts will be constructed from east to west, retreating up the slope of the pad. As the stacker retreats, the grasshopper conveyors will be removed from the transfer train and relocated in an adjacent area so that the heap will be constructed from the toe upwards in a series of 60 m wide by 500 m long lifts.

During the pre-production period, the crushing and conveying system will be commissioned and upon completion of construction, ore will be sent to the Heap Leach Pad. The In-Heap Pond area will be the first area filled with ore. The maximum depth of a lift in this area will be approximately 26 m. As stacking operations advance, ore will be stacked on top of the heap leach pad in 10 m lifts. Ramps will be established to allow conveyor access to the top of the heap for construction of additional lifts.

3.12 SURFACE WATER MANAGEMENT

In general, designs for surface water management facilities and infrastructure (e.g., temporary diversions, permanent diversions, interceptor ditches, sediment control ponds, spillways) including layout, sizing, material and construction specifications, and erosion control are provide in the Water Management Plan. The following describes some additional water management design considerations specifically associated with the HLF.

3.12.1 General

Temporary interceptor runoff collection ditches will be constructed for each phase of the HLF to collect and divert stormwater flows from entering the heap leach pad. The ditches will be constructed and in operation before construction of each pad phase. The temporary ditches represent the limits of each phase of the Heap Leach Pad as the pad liner will tie into the access road adjacent to the channels. Once the Heap Leach Pad is ready for the next phase the temporary ditches will be filled and regraded for placement of the liner for the next phase.

As the interceptor ditches are only temporary and sized for the 100-year, 24-hour event, they will be unarmored and then backfilled at the end of each phase. See Drawings 300-GT-013 and 300-GT-014 of Appendix A for the layout of the ditches and liner tie and phase transition details.

A narrow bench (10 m wide) will be constructed at the 885.5 m elevation adjacent to and up-gradient from the HLF confining embankment crest for stormwater collection and conveyance of flows to the In-Heap Pond Spillway which has an invert elevation of 886 m. In the event of an emergency or other unforeseen circumstance in which pumping of solution ceases, or in the event of excessive surface runoff from the Heap Leach Pad, discharge of excess water or solution will be directed in a controlled manner through a lined Spillway to the Events Pond. Solution levels within the In-Heap Pond are expected to be kept low during normal operations (see Section 3.7.1). However, during emergency situations, the In-Heap Pond spillway will prevent overtopping of the embankment, and will maintain containment of the solution at all times. The In-Heap Pond Spillway is designed to safely convey the flow equivalent to 1/3 between the 1,000 year event and the PMF. The Events Pond will incorporate an outlet spillway to safely pass this design flow to the lower Dublin Gulch

valley after attenuation through the pond. Drawings 300-GT-034 through 300-GT-035 of Appendix A present the spillway designs and Appendix D of the HLF Design Report (Appendix A) presents the hydraulic calculations.

3.12.2 Dublin Gulch Diversion Channel

Construction of the Heap Leach Facility will encroach on the natural drainage of Dublin Gulch; this will necessitate diversion of Dublin Gulch around the Heap Leach Facilities (Heap Leach Pad, Confining Embankment, and Events Pond).

In general, the Channel will redirect flow in Dublin Gulch to the south of the proposed Heap Leach Facility and then ultimately drains to Haggart Creek. The design of the Dublin Gulch Diversion Channel (DGDC) is presented in Appendix A to the HLF Design Report (Appendix A) and is also discussed in the Water Management Plan.

The DGDC extends past the downstream end of the Events Pond and under the Haggart Creek Access Road. Two box culverts were designed to convey the flow from the 100-year 24 hour event safely under the road without overtopping. The DGDC is sized to convey the 500-year event with freeboard and the channel lining is stable for the 500-year event. The DGDC will be lined with ArmorMax Turf Reinforcement Matting (TRM) for slopes less than 5 percent and Fabriform for slopes greater than 5 percent.

3.13 METAL RECOVERY AND PROCESSING FACILITIES

Gold will be recovered from the PLS by activated carbon adsorption and pressurized cyanide/caustic desorption, followed by electrowinning onto stainless steel cathodes, and then subsequent on-site smelting to gold doré. This process is referred to as the adsorption, desorption and recovery (ADR) process. The gold-barren leach solution that remains after passing the PLS through the carbon columns will be replenished with reagents for cyanide and pH control and re-circulated back to the HLF as barren solution. Design criteria for the Process Plant are provided in Table 2.4-6.

3.13.1 Carbon Absorption Circuit

The proposed ADR plant will contain the following systems for adsorbing gold from cyanide solutions from the HLF:

- three carbon-in-column (C-I-C) trains operating in parallel (each sized for 927 m^3/h design flow of PLS) with five carbon adsorption columns, cascade type; column diameter 4.6 m with a height of 5.2 m
- carbon capacity of 8 t for the elution column
- a carbon transfer system including a transfer pump, valves and associated piping
- process solution pumps to provide barren solution transfer from the pump boxes to the barren solution tank, and carbon transfer solution
- a barren leach solution heating circuit to provide supplemental heat to the barren solution during the winter months.

Each of the three trains will be equipped with:

- a vibrating safety discharge carbon screen with 100 mesh openings (110 µm)

- a feed box
- samplers for pregnant and barren solutions.

Solution will be pumped from the In-Heap Pond to each of the three solution feed boxes ahead of each train. The solution feed box will discharge the PLS flow to the first column in each adsorption train. The PLS will flow by gravity from column to column. Within each column, the PLS will flow upwards, suspending the activated carbon particles in a fluidized bed; gold will be adsorbed onto the carbon particles. At daily intervals, the loaded carbon in each tank will be advanced by pumping a mixture of water and carbon counter-current to the pregnant solution flow. A screw-type pump will advance carbon from column to column; this pump has an open impeller to minimize carbon degradation. . This action will advance the carbon so as to have the freshest carbon exposure to the weakest tenor of PLS thereby maximizing gold recoveries and minimizing residual gold values in the barren solution.

For operational flexibility, the circuit design includes the ability to bypass any column at any time. The barren solution leaving the final column will discharge over an inclined vibratory carbon safety screen with 100 mesh (110 µm) openings to remove any carbon which may have been carried over into the barren solution. The barren solution will then flow by gravity to the barren solution tank.

Cyanide and pH concentration of the barren leach solution will be adjusted to the operational strength in the barren solution tank and be pumped back to the HLF. During winter operations the barren solution will have the ability to be heated.

3.13.2 Leach Solution Heating

During periods of extremely low temperatures, barren solution from the barren solution tank can be re-circulated through the cold side of three operating shell-and-tube heat exchangers. The hot side of the heat exchanger will be heated by a 5,300 kW shell and tube fuel oil fired hot water heater. The hot solution will be re-circulated from the heat exchangers back to the hot water heater in a closed loop. The barren solution will be circulated at a flow rate of 150 m^3/h through the three heat exchangers and then on to the barren solution tank. The solution temperature will increase by approximately 27°C as it passes through the heat exchanger. The heated solution returned to the barren solution tank will raise the temperature of the barren solution flowing to the heap leach pads by approximately 1.7°C.

3.13.3 Acid Washing

Loaded carbon will be pumped from the first column of each of the three C-I-C trains to either the acid wash tank, or to the elution/desorption column, depending on operational requirements. Under normal operating conditions, the loaded carbon will first be acid treated, then neutralized with caustic solution, followed by the subsequent elution stage. The acid wash is designed to manage scaling on the carbon, thereby maintaining its ability to adsorb gold.

The acid wash tank will be a fibre-reinforced-plastic lined steel vessel sized to contain 8 t of loaded carbon. A 3% (w/w) hydrochloric acid solution will be re-circulated through the bed of carbon in the acid wash tank. This acid washing treatment will remove scale build-up and other inorganic contaminants that will inhibit gold adsorption onto the carbon. After the wash solution discharging from the acid wash vessel has stabilized at a pH value of 1.0 to 2.0, the spent acid wash solution, which is only slightly acidic, will be pumped back to the acid mixing tank. After acid washing, the carbon will be neutralized by pumping alkaline barren solution through the

carbon bed. Caustic solution will be added to the wash solution to ensure complete acid neutralization. Periodically, the acid solution will be pumped into the barren solution tank to help reduce the build-up of contaminants in the circuit.

3.13.4 Elution/Desorption

After the acid washing step, the loaded carbon will be pumped to the elution column. The elution/stripping of gold from the loaded carbon will be accomplished with a hot caustic and cyanide solution at a temperature of 135°C at a pressure of 345 to 414 kPa. The elution solution will be heated using a combination of plate and frame heat exchangers and a diesel-fired hot water heater. After reaching the elution/stripping temperature, the solution will flow upward through the elution column. The elution column/strip vessel will be designed to treat an 8 t batch of loaded carbon. The gold-bearing solution will exit the elution vessel, and then flow through the two cool-down heat exchangers and then onwards by gravity to the electrowinning circuit.

3.13.5 Electrowinning

The electrowinning circuit will consist of two 2.0 m^3 electrolytic cells operating in parallel. The gold will be electro-plated onto stainless steel cathodes. Barren electrolyte solution exiting the electrolytic cells will flow by gravity back to the electrowinning solution discharge tank, then to the barren/strip solution tank for making up to strength with caustic and cyanide (if needed) and return to the elution/stripping vessel. At regular intervals concentrate will be washed from the cathodes, dewatered by filter, dried, fluxed, and smelted prior to shipment for off-site refining.

When the elution/stripping cycle has been completed, the eluted/stripped carbon will be transferred to either the thermal regeneration circuit or to the carbon storage tank. From the carbon storage tank, the carbon will be secured with carbon fines removed and the coarser fraction pumped back to the adsorption circuit.

The elution/strip solution temperature will be controlled by the hot water heater. Solution temperature control will be accomplished by hot water heater modulation and a control valve. A programmable controller will provide temperature sensing and output control. The hot water heater control system will be interlocked with the main control circuit to prevent operation during the carbon transfer cycle, or the solution drain down cycle. The elution solution transfer will be pressure controlled through the circuit by an air actuated pressure valve and sensor. Solution flow through the elution/strip column will be by manual system control and will be monitored by a magnetic flow meter.

3.13.6 Cyanide and Caustic Solution

Sodium cyanide briquettes will be added to the system via a 1 t super sack. The sodium cyanide will be mixed to a concentration of 20 to 25% (w/w) strength and then transferred to the cyanide mix storage tank. This concentrated cyanide solution will be metered into the barren solution tank, to the carbon columns, and to the strip solution tank, as required.

Sodium hydroxide, or caustic solution, will be used in the system for acid neutralization and for preparing the fresh elution solution. The sodium hydroxide will be received in bulk bags and will be made up to 10% solution strength. The bags containing caustic will be loaded to a combination bag breaker plus funnel and will discharge into the mix tank where barren solution will be added. The caustic solution preparation tank will be an agitated tank. The tank will be equipped with four operating pumps and with one spare pump. The pumps will be piped together to serve the seven points of use. Each caustic solution line will be a one-way delivery system

rather than a circulating loop. Caustic will be added at the points of addition to the system via a metering pump and a flow meter.

3.13.7 Cathodes and Smelting

Gold laden stainless steel cathodes will be removed after elution/stripping and electrowinning. The cathodes will be washed internally in the cathode wash box using a high-pressure spray and using raw water. The resulting gold sludge will be separated from the wash solution by a plate and frame filter press. The sludge will be periodically collected from the press and dried in the drying oven.

Smelting will take place in a diesel-fired tilting crucible furnace. The furnace will be equipped with hydraulic control of the tilt mechanism for the pouring of the molten gold melt product. The filtered precipitate will be mixed with fluxes, typically a combination of borax, niter and possibly silica sand. A cascading mould system will be included. Off gases from the melting furnace will be extracted with a fan and then discharged into a bag house to remove particulate matter. The bars of doré will be stored in a safe until they are despatched off the Property. Refining slags will be recycled first to re-melt and then sent to the HLF.

3.13.8 Carbon Handling Circuit

The carbon handling circuit will include all the components necessary to move, store, add, and remove carbon in the ADR system. Carbon will be transferred between the various unit operations in the ADR plant by a screw type pump (high clearance low degradation) and by pressurization in the elution column. Carbon transfer in the adsorption circuit will be by air operated valves and a high clearance pump. The valves will be operated locally or remotely from the programmable logic controller in the control room. Carbon regeneration will be conducted in a diesel fired rotary kiln at a temperature of 750°C. A carbon conditioning circuit will also be included in the circuit which will prepare the fresh carbon for use in the adsorption process and remove undersize carbon from the carbon circuit.

3.14 BORROW SOURCES

The planned borrow development for the HLF structures includes excavation of earth fill borrow materials from within the HLF and mine site. The rock borrow materials for embankment compacted rock fill will be competent rock that will generate a high strength, durable and relatively clean rock fill. Rock fill shall be competent material with a strength rating of R2 (soft to medium strong rock) or harder as determine by ISRM procedures. Filter and transition zone fill materials will be processed from required onsite excavations or screened/crushed alluvial and placer fill materials.

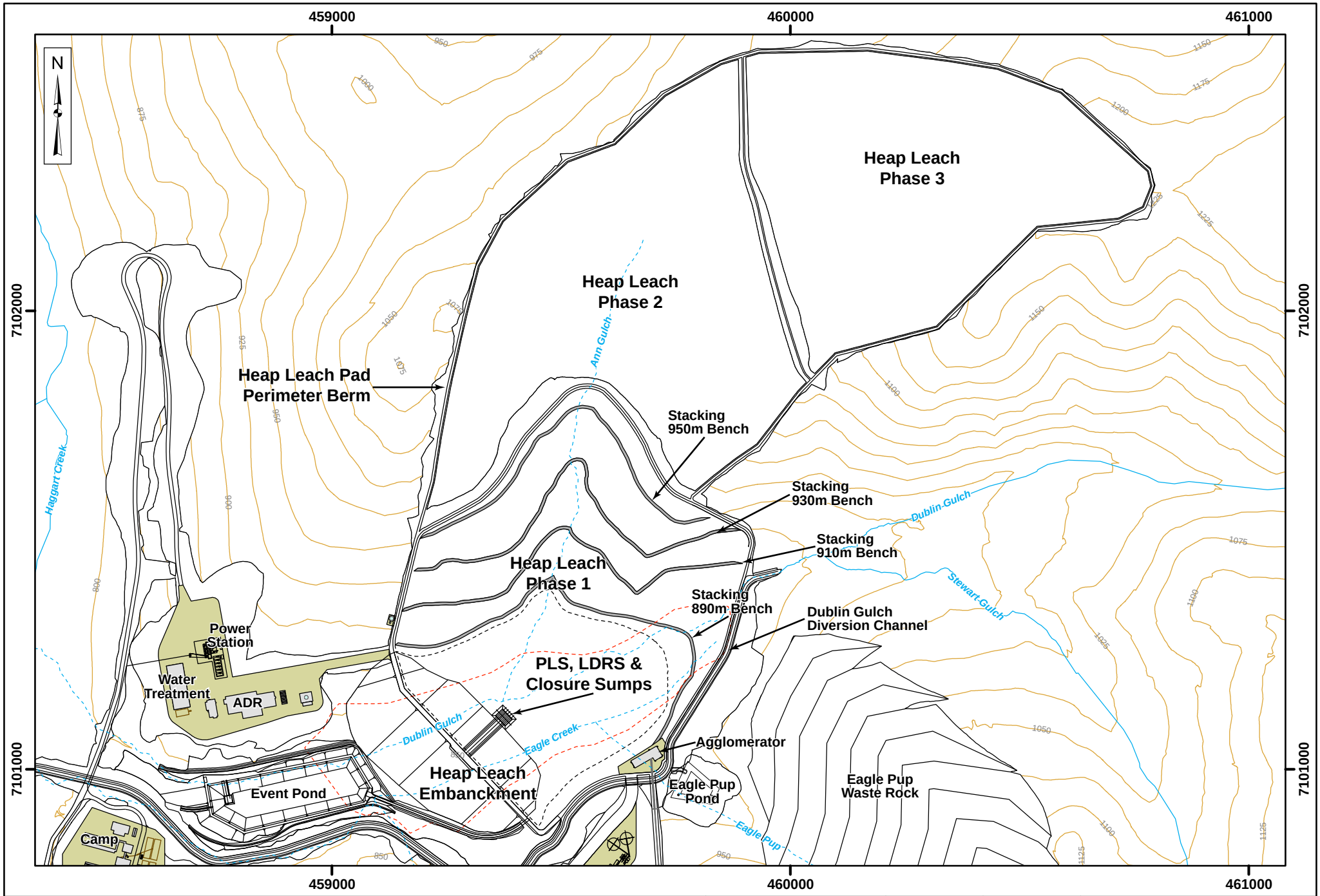
The required excavations within the footprint of the HLF include stripping of alluvial and placer fill soils in the valley bottoms and stripping of surficial soils on the abutments to a competent weathered rock or bedrock foundation. The required excavations for perimeter roads and benches around the HLF will generally be a cut and fill balance, as determined during construction. The suitable borrow materials from required stripping excavations are planned to be used directly in shallow compacted fills, or placed in temporary stockpiles for moisture conditioning or processing for filter materials.

For specific geotechnical details (e.g., testing, quantities, material specifications) on borrow materials proposed for construction, including borrow sources and borrow requirements, see Section 3.2.4 of the Mine Development, Operations and Material Management Plan. For geochemical characteristics of borrow materials see SRK (2013 and 2014).

3.15 ACCESS ROAD MANAGEMENT

Site access in general will be controlled via a guard station on the single access road leading into the site. Only authorized site personnel are authorized access to the heap leach and processing facilities and associated infrastructure. All other people must be accompanied by site personnel. Additionally signage will be posted at regular intervals to notify people of the facilities and restrictions on access and/or potential hazards.

Wildlife access management is further described in various plans including the Wildlife Monitoring Plan and the Road Maintenance Plan. In general all aspects of the heap leach and process facilities will either be contained within a building (e.g., ARD Plant, crusher buildings, etc), buried (e.g., emitter pipes for solution application on the HLF) or fenced off (e.g., Events Ponds) thereby regulating access from wildlife. Additional measures such as noise cannons or floating bird balls will be considered as necessary.



Legend:

- General Arrangement Infrastructure
- Deep Dynamic Compaction Treatment Area
- In-Heap Pond
- Contour (25m)
- Watercourse
- Watercourse (Diverted)
- Building
- Pad

StrataGold Corporation

0 50 100 200
Metres
Scale = As Shown

Projection: NAD83 UTM Zone 8N

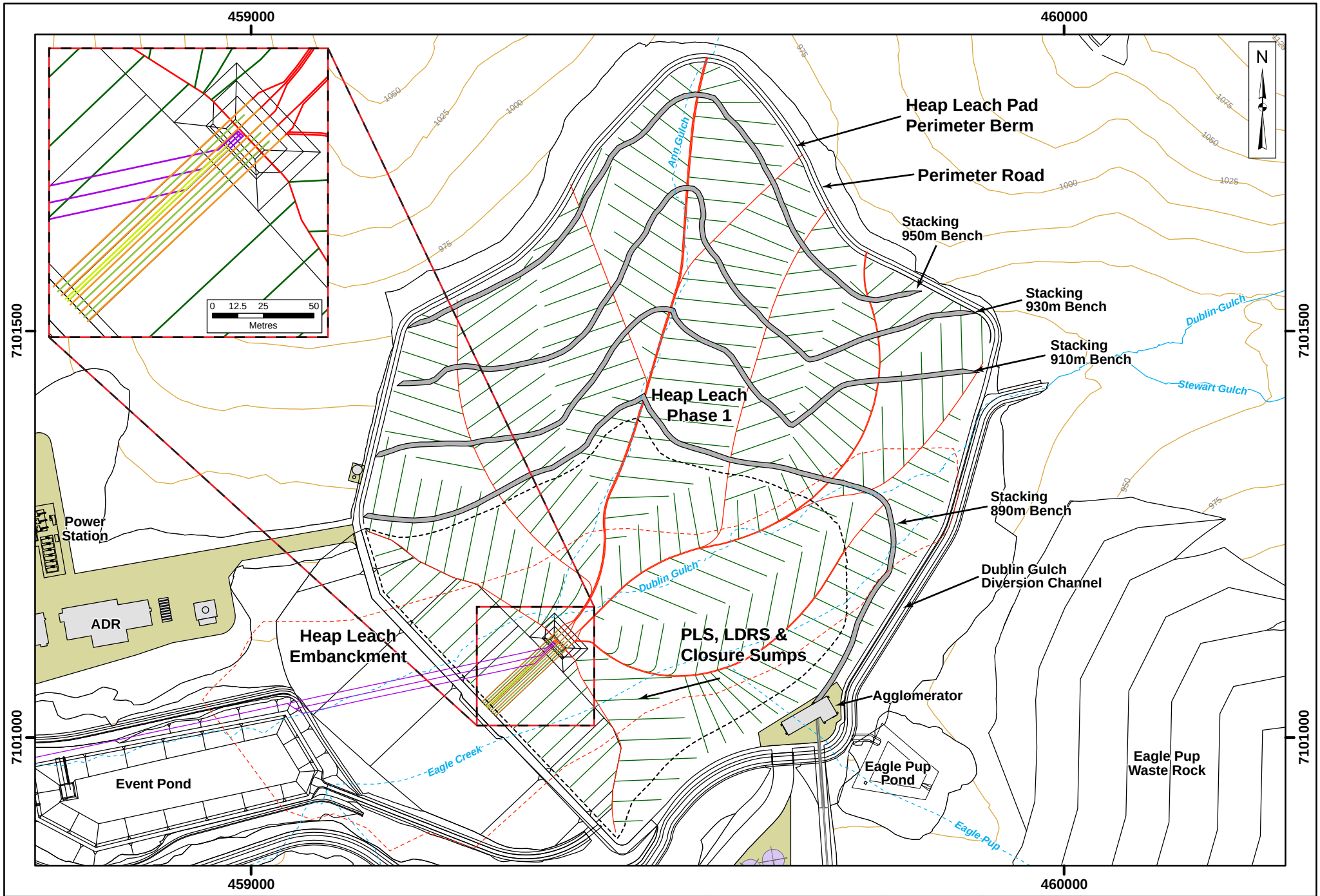
Drawn By: SS

Date: 2014/05/23

Figure: 3.2-1

EAGLE GOLD PROJECT
YUKON TERRITORY

Heap Leach Facility Phases



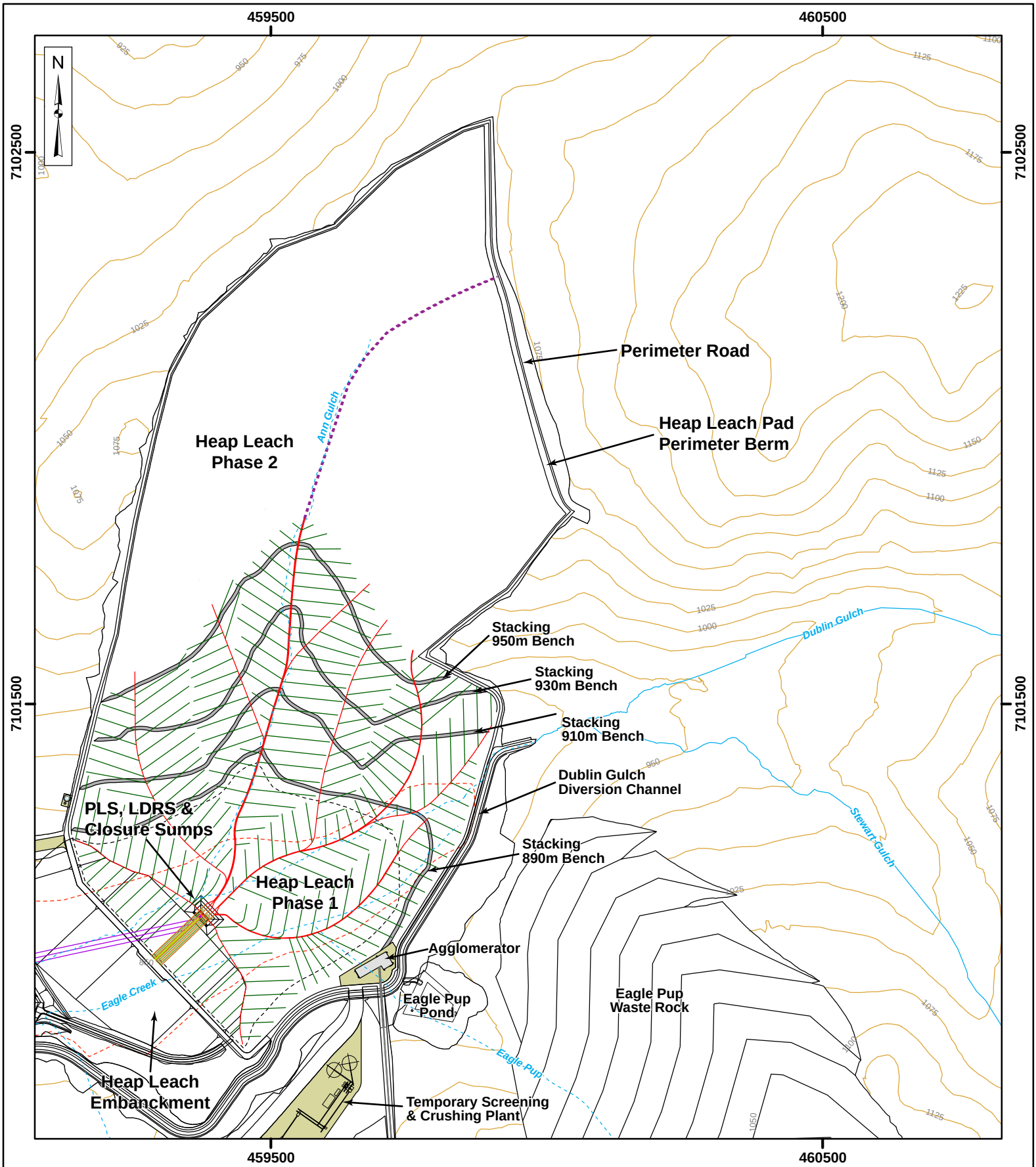
Legend:

- General Arrangement Infrastructure
- Deep Dynamic Compaction Treatment Area
- In-Heap Pond
- Contour (25m)
- Watercourse
- Watercourse (Diverted)
- Closure Drain Pipe
- Header PLS Drain Pipe
- Primary PLS Drain Pipe
- In-Heap Pond PLS Pump Casing
- In-Heap Pond LDRS Pump Casing
- Closure Drill Casing
- Building
- Pad

StrataGold Corporation

0 50 100
Metres
Scale = As Shown

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 UTM Zone 8N	SS	
Date: 2014/05/23	Figure: 3.2-2	Heap Leach Facility Phase 1



Legend:

- General Arrangement Infrastructure
- Deep Dynamic Compaction Treatment Area
- In-Heap Pond
- Contour (25m)
- Watercourse
- Watercourse (Diverted)
- Closure Drain Pipe
- Header PLS Drain Pipe
- Primary PLS Drain Pipe
- In-Heap Pond PLS Pump Casing
- In-Heap Pond LDRS Pump Casing
- Closure Drill Casing
- Building
- Pad

StrataGold Corporation

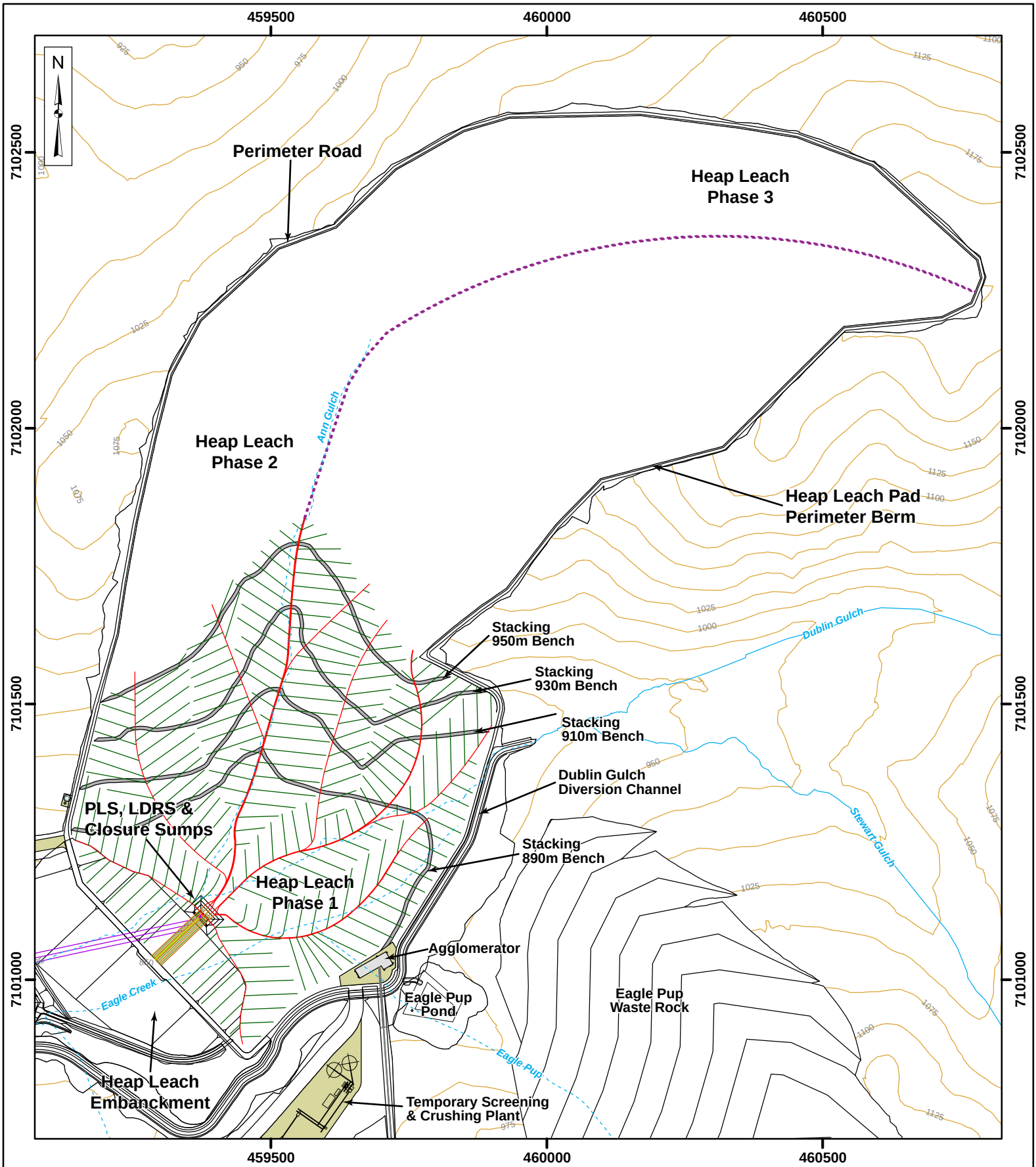
0 75 150 300

Metres
Scale = As Shown

EAGLE GOLD PROJECT
YUKON TERRITORY

Heap Leach Facility Phase 2

Projection:	Drawn By:	Date:	Figure:
NAD83 UTM Zone 8N	2014/05/23	SS	3.2-3



Legend:

- General Arrangement Infrastructure
- Deep Dynamic Compaction Treatment Area
- In-Heap Pond
- Contour (25m)
- Watercourse
- Watercourse (Diverted)
- Closure Drain Pipe
- Header PLS Drain Pipe
- Primary PLS Drain Pipe
- In-Heap Pond PLS Pump Casing
- In-Heap Pond LDRS Pump Casing
- Closure Drill Casing
- Building
- Pad

StrataGold Corporation

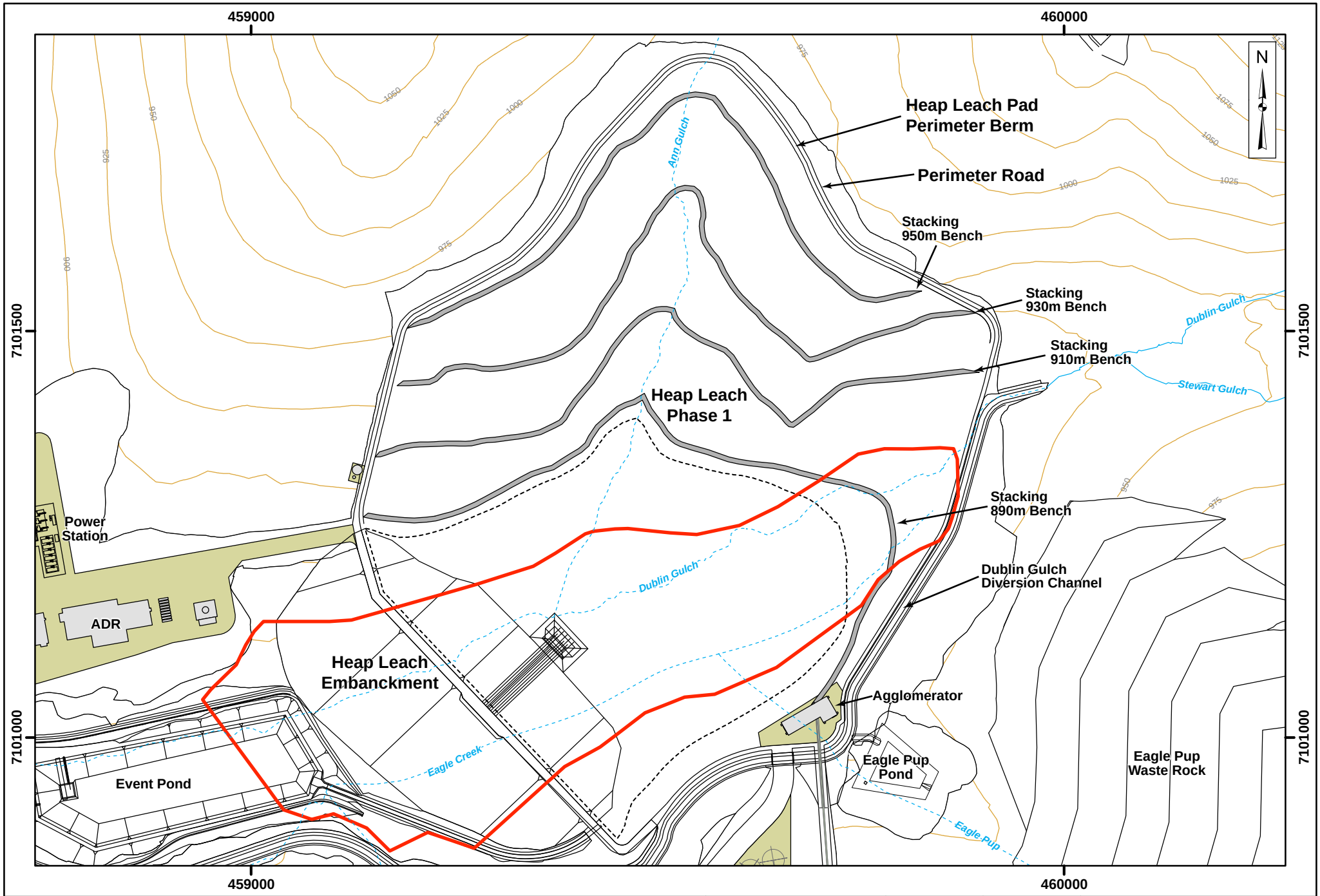
0 75 150 300

Metres
Scale = As Shown

EAGLE GOLD PROJECT
YUKON TERRITORY

Heap Leach Facility Phase 3

Projection:	Drawn By:	Date:	Figure:
NAD83 UTM Zone 8N	2014/05/23	SS	3.2-4



Legend:

- General Arrangement Infrastructure
- Deep Dynamic Compaction Treatment Area
- In-Heap Pond
- Contour (25m)
- Watercourse
- Watercourse (Diverted)
- Building
- Pad

StrataGold Corporation

0 50 100
Metres
Scale = As Shown

Projection: NAD83 UTM Zone 8N

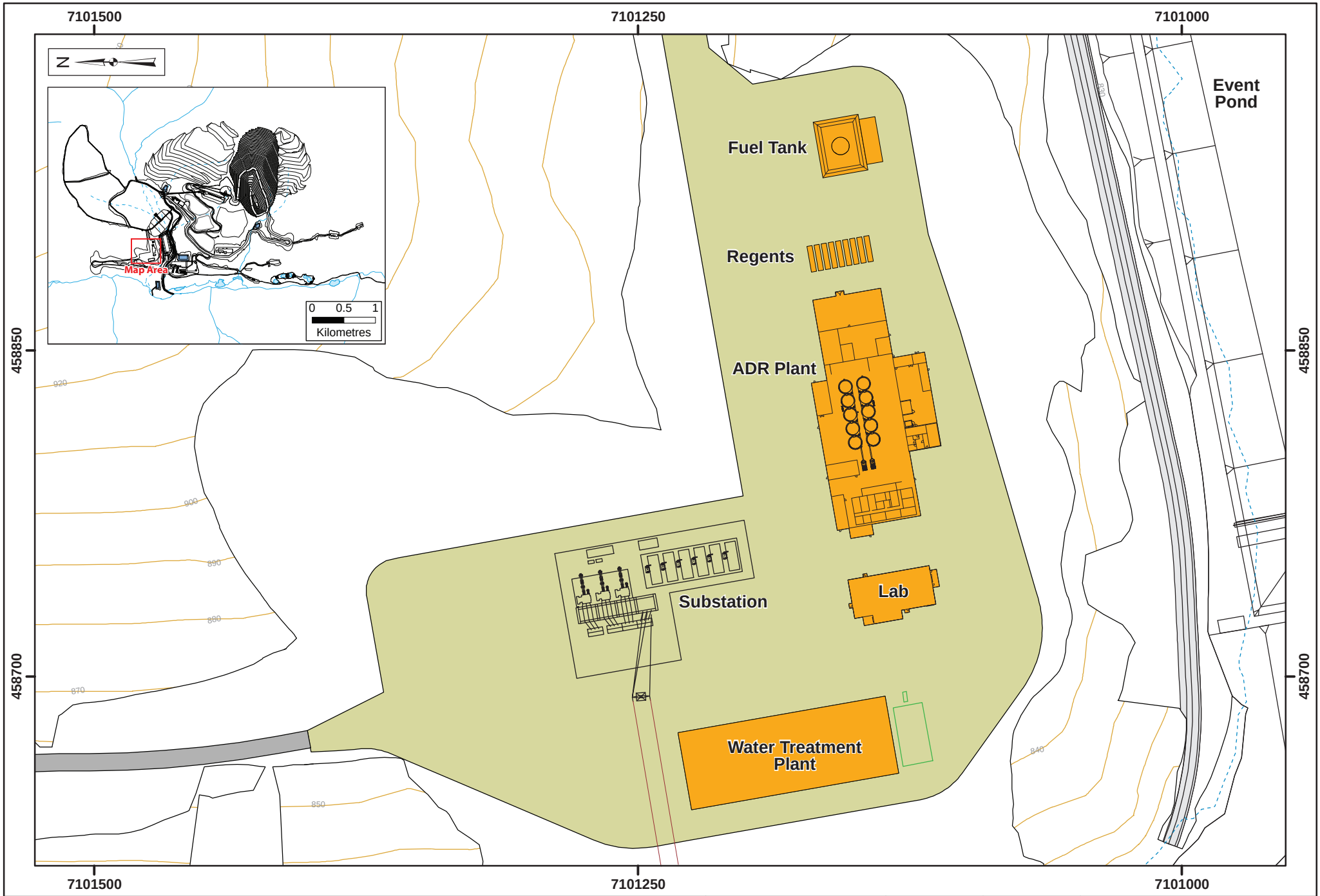
Drawn By: SS

Date: 2014/05/23

Figure: 3.2-5

EAGLE GOLD PROJECT
YUKON TERRITORY

Deep Dynamic Compaction Treatment Area



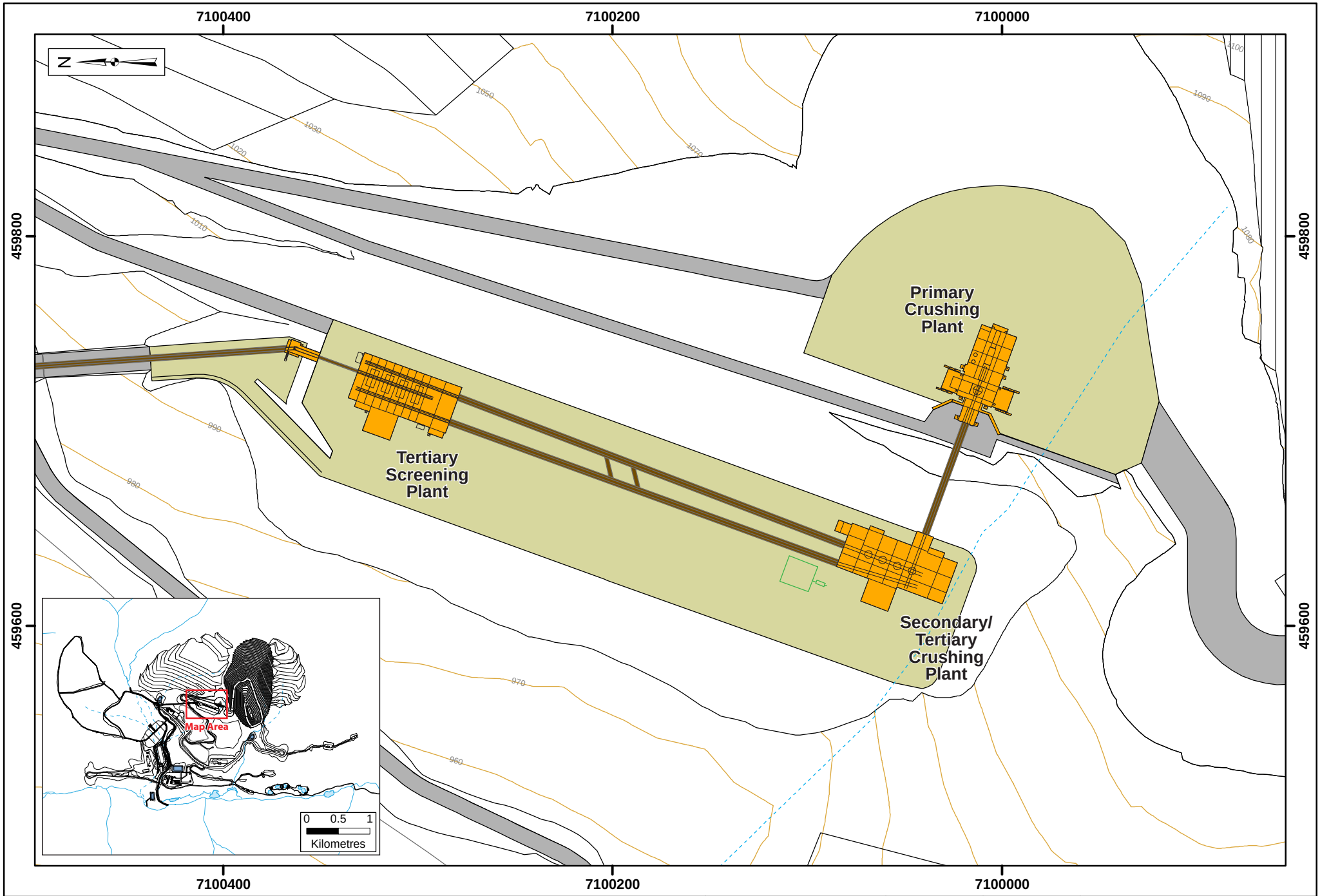
Legend:

- General Arrangement
- Septic Tank
- Contour (10m)
- Power Infrastructure
- Watercourse (Diverted)
- Building
- Pad
- Road Bed
- Spillway

StrataGold Corporation

0 25 50
Metres
Scale = As Shown

Projection: NAD83 UTM Zone 8N	Drawn By: SS	**EAGLE GOLD PROJECT YUKON TERRITORY**
Date: 2014/05/23	Figure: 3.10-1	**Absorption Desorption and Recovery Facility**



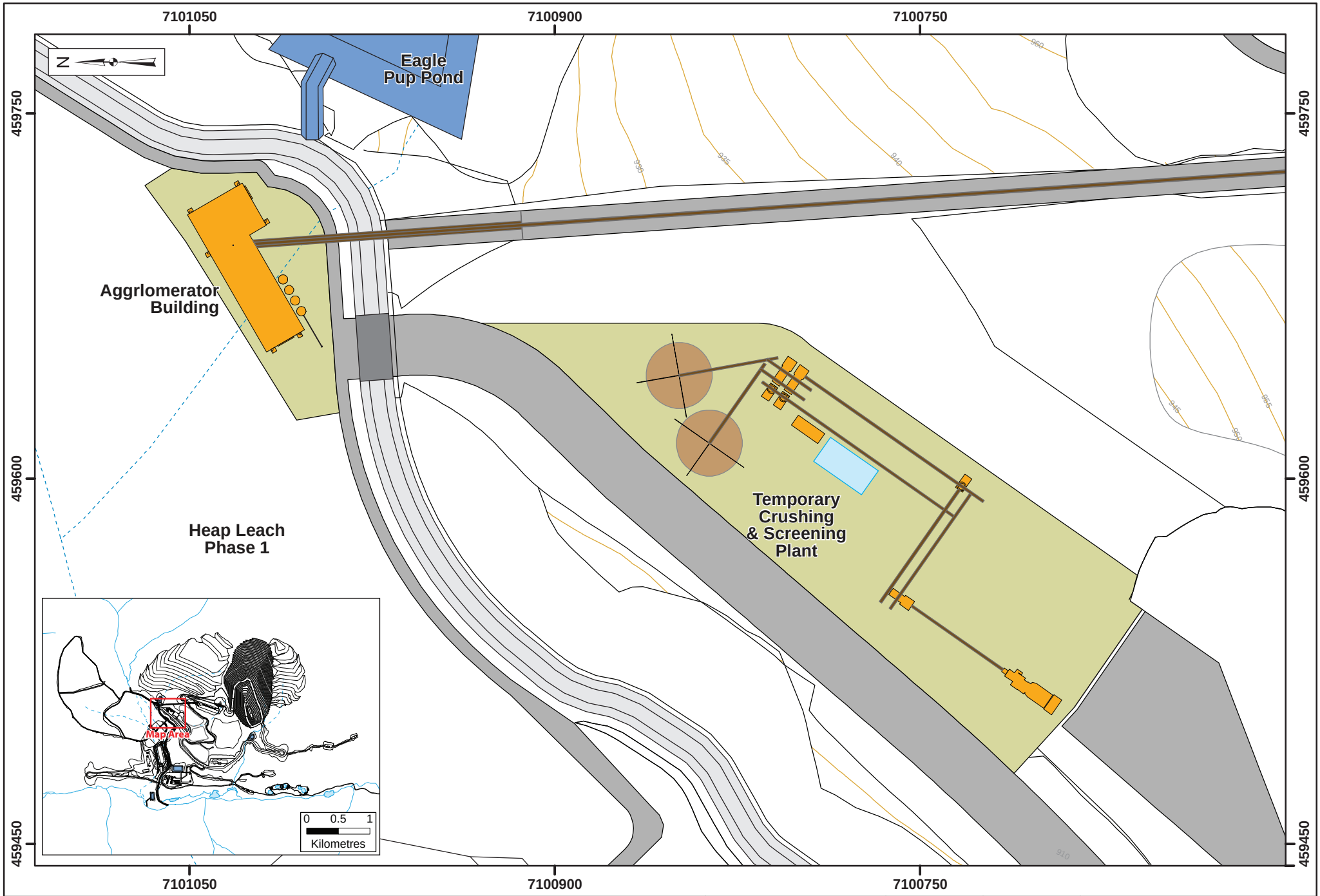
Legend:

- General Arrangement
- Septic Tank
- Contour (10m)
- Watercourse (Diverted)
- Building
- Pad
- Conveyor
- Road Bed

StrataGold Corporation

0 25 50
Metres
Scale = As Shown

Projection: NAD83 UTM Zone 8N	Drawn By: SS	**EAGLE GOLD PROJECT YUKON TERRITORY**
Date: 2014/05/23	Figure: 3.10-1	**Crushing Plant**



Legend:

- General Arrangement
- Watercourse (Diverted)
- Building
- Pad
- Diversion Channel
- Bridge
- Eagle Pup Pond
- Conveyor
- Crushed Rock Stockpile
- Pond

StrataGold Corporation

0 25 50
Metres
Scale = As Shown

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 UTM Zone 8N	SS	
Date:	Figure:	Agglomerator Building
2014/05/23	3.11-2	

4 HEAP LEACH FACILITIES OPERATION

Primary crushing of ore will occur year round (350 days) at a nominal rate of 29,500 dry t/d. Ore placement on the HLF will occur over a 250 day period at a rate of 41,300 tpd and stored on a 100-day stockpile during the coldest time of the year (November to March). The HLF will be loaded using a grasshopper conveyor system that will run down a lined corridor in the initial phase of loading with a stacker. Ore will be stacked at an overall slope of 2.5:1 (H:V) with benches between angle of repose lifts. The ore will be stacked in nominal 10 m thick lifts. However, the first lifts at the pad's lowest point adjacent to the dam may need to be thicker to allow sufficient space for leaching. Loading will begin at the toe of the embankment and progressively work upgradient and will alternate to permit sufficient time for leaching prior to placement of subsequent overlying lifts of ore. Drip emitters will be trenched into the top layer of the heap. Solution will be applied at an approximate irrigation rate of 2,770 m3/hour over an approximate area of 277,000 m2 for a planned leaching cycle estimated at 150 days.

Proposed heap leach operations will involve crushing and stacking 10 Mt of ore during 250 days per year with ore leaching year-round with active leach areas being leached in the winter months. The ore placement will be ahead of the active leaching areas during summer operations, then the emitters will be buried at the start of winter for frost protection and leaching will continue to "catch up" with the ore placement.

4.1 SOLUTION MANAGEMENT

As with all heap leap projects, solution management is a critical component to understand and quantify because during operation, rinsing and detoxification phases, most HLFs typically contain volumes of process solution that exceed the total storage capacity of the ponds (i.e., Events Pond and In-Heap Pond) and other on-site facilities (e.g., barren tank in the ADR). Robust solution management plans have been incorporated into the HLF design and developed based are HLF water balance modeling (Appendix B). These plans maximize the potential for avoiding loss of control of the water balance that could arise from climatic events, power failures or the failure of other site infrastructure.

The results of the HLF WBM describes how storage and water treatment facilities will be utilized during the seven phases of the project as defined below in Table 4.1-1.

Table 4.1-1: Project Schedule: Operational and Closure Conditions for the HLF

Project Phase	Approximate Project Years	Proposed Dates	Duration (yrs)	Project Conditions
C	-2 and -1	March 2015 – February 2017	2.0	Site development including construction of DGDC and Phase 1 heap embankment and pad liner
1	1, 2 and 3	March 2017 – August 2019	2.5	Startup through heap elevation ~1000 m – complete Phase 1 of Heap Contact water controlled through adaptive water management strategies (i.e., snowmaking, use of events ponds) Begin construction of HLF Phase 2
2	3, 4, 5 and 6	September 2019 – April 2023	3.7	Northward expansion of the HLF footprint and continued stacking to heap elevation 1090 m – complete Phase 2 of Heap Begin construction of HLF Phase 3
3	7, 8 and 9	May 2023 – April 2026	3.0	Northward expansion of the HLF footprint and continued stacking to final heap elevation 1150 m – complete Phase 3 of Heap
4	10	May 2026 –	1.0	Termination of mining and ore production, but continued irrigation of the ore

		April 2027		stack for gold production Managed pumpback of heap draindwon solution
5	11 and 12	May 2027 – April 2029	2.0	Termination of gold production and beginning of rinsing and cyanide destruction Managed pumpback of heap draindown solution – no heap discharge to treatment Closure of LDSP Decommission ADR Begin building cover on HLF
6	13 to 19	May 2029 – April 2035	7.0	Controlled draindown of heap (draindown solution split into two flows: managed pumpback to heap and proportion sent to treatment); When HLF seepage rate and concentration criteria are met - change from active treatment to passive treatment Complete building cover on HLF; complete any required stabilization of DGDC
7	20 to >50	May 2035 – onward	15.0	Uncontrolled draindown of heap – until seepage rate meets meteoric input HLF passive treatment systems (PTS) in place Decommission MWTP and CN Destruct Facility Post-closure monitoring – all project facilities closed except that which is needed to support monitoring programs and PTS maintenance, as needed

4.1.1 Heap Leach Facility Water Balance

An operational water balance model was developed (Appendix B) for the HLF with the primary objectives of evaluating heap leach pad performance in terms of predicting: 1) makeup water demands, and 2) the potential for filling the pond system (i.e., In-Heap Pond and Events Pond) and spilling to the environment. Two (2) different types of water balance models were used: a deterministic model (using a chain of single valued input parameters to produce a series of single valued results) and a stochastic model (probability based). In the stochastic model the single valued input parameters were replaced with probability distributions derived from the computed statistics of the observations (in this case the monthly mean and variance or its square root, the standard deviation). A Monte Carlo procedure was then used to propagate the uncertainty through the model by sampling all of the input parameter distributions and compiling output distributions for specific results of interest.

4.1.1.1 Deterministic Model

Using site-specific climate data from the Project (i.e., Potato Hills and Camp stations – see Knight Piesold 2013) and observations from regional climate stations (i.e., Mayo, Dawson, Keno Hill, Elsa and Klondike), a synthetic climate record was developed for the purposes of deterministic modeling to represent the expected precipitation history at the Project site (Appendix B). Results from the deterministic modeling showed that normal operating volumes in the ponds increased over time as the lined footprint of the HLF increased and the system recruited more and more meteoric water. Pond levels (primarily the In-Heap Pond) peaked after termination of mining and ore production but during continued irrigation for gold production (no new ore to soak up any incoming meteoric water). The model indicated, however, that the In-Heap Pond level during normal operations, rinsing and cyanide destruction (Phases 1 through 5) did not approach the level that would begin to spill into the Events Pond (Figure 16 in Appendix B). Clean water runoff from reclaimed areas with soil cover did not begin until the gold recovery phase and increased as the percent of the HLF covered increased. Makeup water demand was highest during start-up and Phase 1 and decreased over time as water accumulated in the system.

4.1.1.2 Stochastic Model

A stochastic model was also used to examine extreme or upset conditions and to quantify the risk of experiencing those upset conditions. The stochastic model produces results that are probability distributions, which show the entire range of possible values for each parameter of interest. With regard to the HLF, both the monthly makeup water requirements and the frequency with which treatment and discharge of process water might be required are important. Stochastic models use a Monte Carlo sampling procedure to sample input distributions and generate output distributions. In this case, a random number generator was used to sample distributions. About 3000 iterations (samples) were computed to get good definition in the tails or extreme limits of the distribution.

Based on the stochastic model, makeup water demand during HLF Phase 1, which includes start-up and the charging of the system with water, is very erratic (Figures 23 and 24 in Appendix B). Starting in HLF Phase 2 and continuing during HLF Phase 3, the makeup water demand pattern becomes considerably more consistent (Figures 23, 25 and 26 in Appendix B). The peak or maximum makeup water demand in Phases 2 and 3 occurs consistently in August or September of each year. During the irrigation period for additional gold recovery (assumed to be approximately one year) and mining and ore delivery have ceased, the peak makeup water demand, although very minimal, shifts away from August and September to the driest time of the year which is March and April (Figure 27 in Appendix B).

Both the mean and the 95th percentile makeup water demand peaks in Phase 1 and declines going forward through rinsing and cyanide destruction during early closure due to the increase in liner footprint and the accumulation of water in the system. Makeup water demand typically spikes in March and April (due to the resumption of ore stacking after the winter) declines to near zero during and immediately after the snowmelt (May and June), then gradually increases over the summer (July through September), and decreases again from October through December. Phase 1 makeup water demands are erratic and high, reaching mean values in the 80,000 m^3 to 90,000 m^3 range and 95th percentile values as high as 105,000 m^3 (Figures 23 and 24 in Appendix B). Phase 2 and 3 values drop into a more consistent range with means of 15,000 m^3 to 30,000 m^3 and 95th percentile values of 30,000 m^3 to 60,000 m^3 (Figures 23, 25 and 26 in Appendix B)

The risk of spilling from the In-Heap Pond to the Events Pond is very small (less than 1%), and from the Events Pond (to treatment) even smaller (0.2% or less) beginning midway through Phase 2 (Figures 41, 42 and 43 in Appendix B). Beginning in Phase 3 the likelihood of spilling into the Events Pond increases to 10% to 16%, and during May, June, and July the risk of needing treatment prior to discharge to the environment is in the 7% to 10% range (Figures 41 and 44 in Appendix B). This risk peaks during the additional gold recovery phase to about 13% to 19% probability of spilling to the Event Pond and a 10% to 15% probability of requiring treatment prior to discharge to the environment (Figures 41 and 45 in Appendix B).

4.1.2 Drain Down

Once all gold production has ceased and the proposed rinsing of the HLF is finished, the post closure heap will be allowed to dewater and drain. The draindown process is an unsaturated flow process that is controlled by the soil water retention characteristics of the ore. The rate of flow during draindown is a function of the unsaturated hydraulic conductivity which is in turn a function of the moisture content of the ore. As the ore drains, the moisture content decreases with the effective unsaturated hydraulic conductivity. This eventually leads to an exponentially declining flow rate curve.

There are two (2) distinctly different areas of the HLF that will behave differently during the draindown period. The first area is the column of ore below the area under leach which will have an elevated moisture content relative to the adjacent unirrigated ore. The elevated moisture allows the leach column to drain at a faster rate than the unirrigated ore. At some point in time the moisture content of the leach column will essentially equal the moisture content of the unirrigated ore and there will be no measureable difference in the draindown rate anywhere across the heap.

It is not practical, nor advantageous to simply turn off the pumps and allow the heap to freely drain as a very large volume of water would report quickly to the ponds, filling and overtopping them. Therefore, it is assumed that pumping will be directed both to treatment and back up to the irrigation system during this period. While pumping to treatment is more or less fixed, pumping to irrigation will continue at a declining rate until such time as the potential draindown volume remaining would not fill the ponds but would be captured in the pond system and still provide sufficient capacity to capture and store the low probability events (e.g., the 1% probability (100 yr) 24-hour storm). At that point the pumps would be turned off and the heap permitted to continue to drain until it reached meta-stable equilibrium with annual flux of meteoric water.

The rate at which the water is pumped to treatment will control the time required for the leach column to reach the moisture content of the unirrigated ore and also the time required to reach equilibrium with the meteoric precipitation regime. Although less of an impact, the placement of a cover material on the surface of the HLF will also impact the rate of drainage and time to equilibrium by creating clean surface runoff that can be diverted off of the HLF and released directly into the environment.

Figure 4.1-1 through Figure 4.1-3 show draindown model results (Appendix B) for a scenario that assumes about 10 l/s of water flow to a treatment plant both before and after the leach column water content equals the water content of the unirrigated ore. These results consider the water balance response for “average” annual precipitation conditions. For additional considerations for upset or low probability events refer to the Water Management Plan and Knight Piesold (2014).

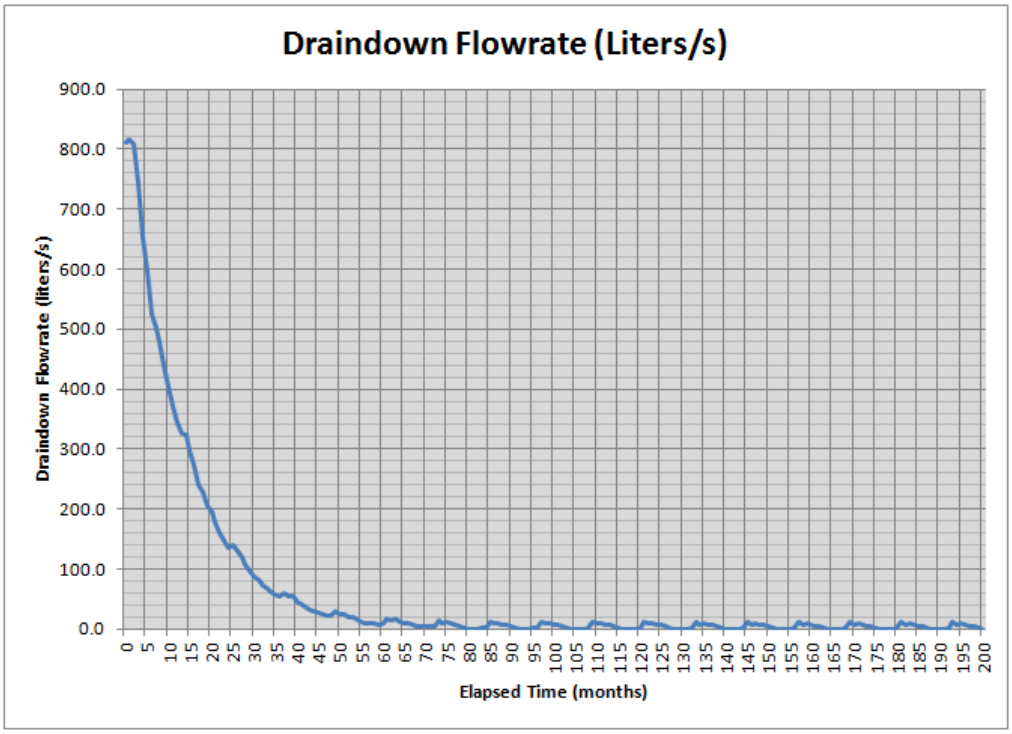


Figure 4.1-1: Draindown Flow Rate Over Time

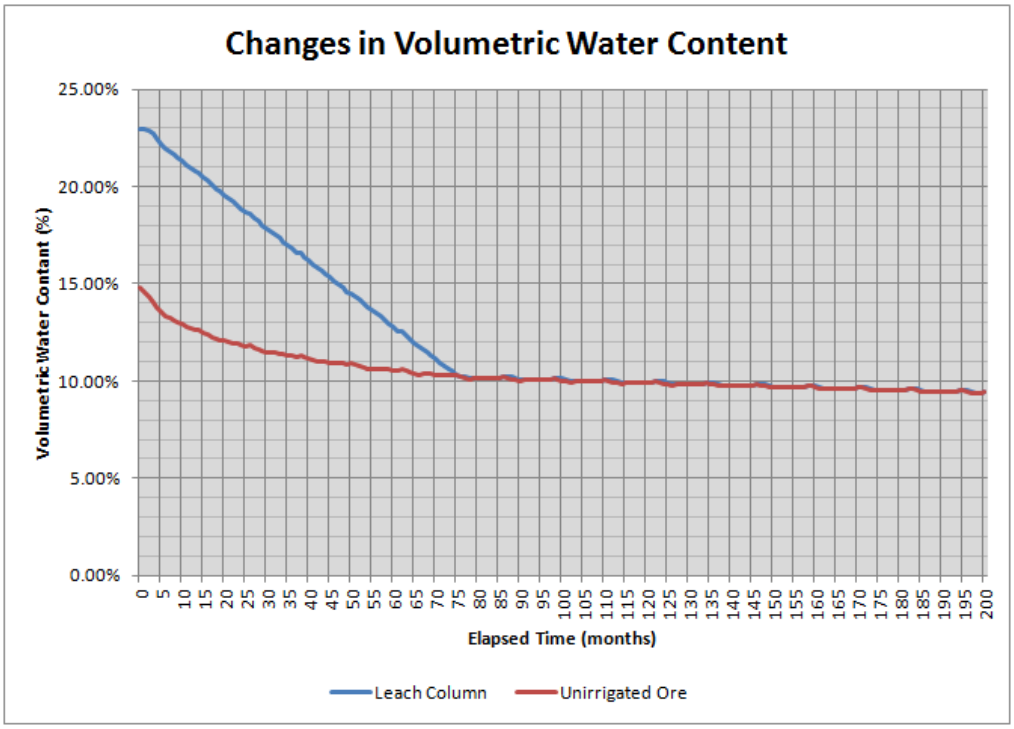


Figure 4.1-2: Changes in Volumetric Water Content Over Time

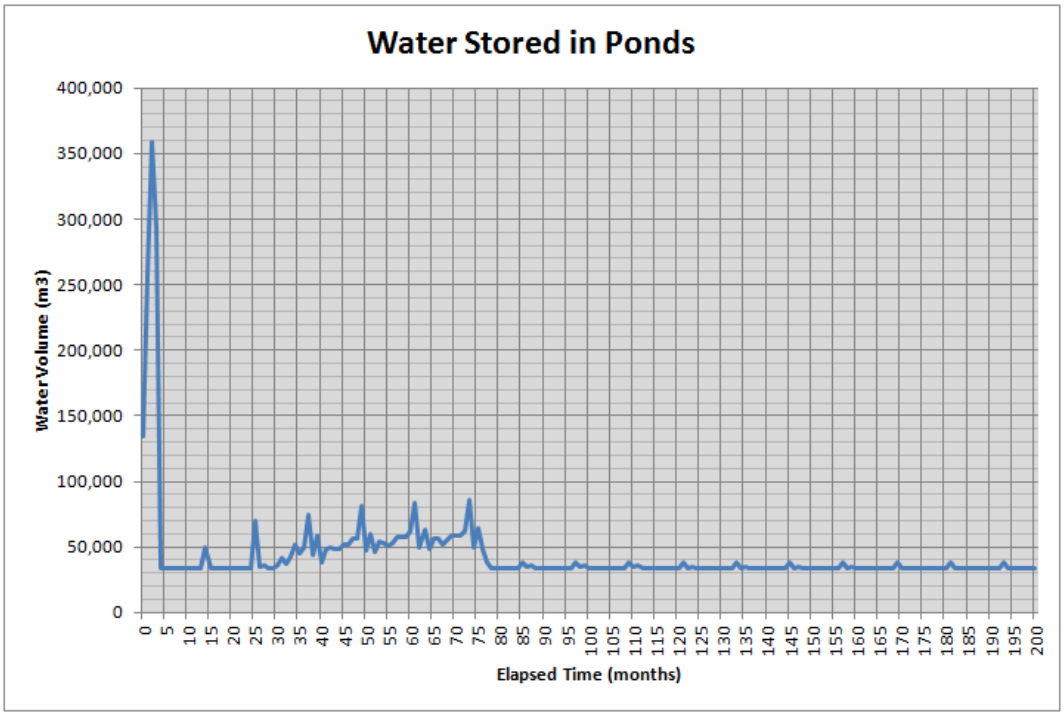
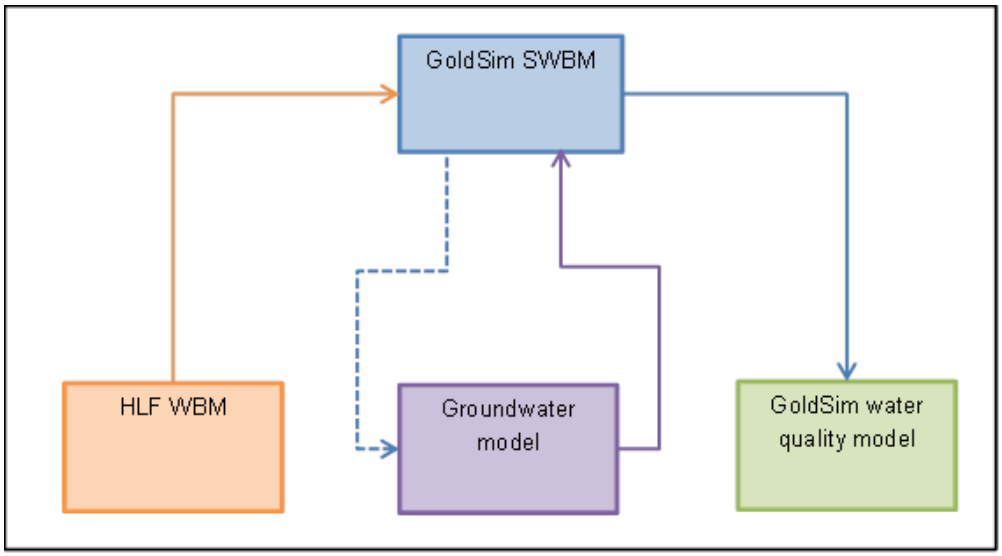


Figure 4.1-3: Estimate of Water Volume Stored in Ponds Over Time

4.1.3 Integration with Site Water Balance Model

A site water balance model (SWBM) was created in support of the Eagle Gold Project. The SWBM simulates the supply and demand for water on a month-by-month basis, from the initiation of mine operations through mine closure and post-closure. The SWBM was created using GoldSim, a dynamic probabilistic simulation model used extensively for mine site water management applications. GoldSim permits inputs to be entered as probability distributions (rather than discrete values), performs Monte Carlo simulations, tracks outputs from those simulations, and provides a graphic interface to facilitate the review and identification of interactions between components.

The SWBM created in GoldSim integrates logic and assumptions from the HLF WBM (Appendix B) and incorporates the groundwater baseflow and recharge rates estimated by the groundwater model as well as provides inputs to the water quality model. Figure 4.1-4 illustrates the integration of the SWBM with the HLF water balance, groundwater model and water quality model.



NOTES:

1. TRANSFER OF BASELINE DATA
2. TRANSER OF OPERATIONAL DATA (PREDICTED OR MODELLED)

Figure 4.1-4: Water Balance Model Integration Schematic

The framework and logic of the operational HLF WBM (which includes the closure draindown model) was integrated into the GoldSim SWBM.

The SWBM results indicate that the system is able to supply enough water to meet the process water requirements for the HLF and dust control throughout operations, under all runoff scenarios. During other months the system will operate in an excess condition, and site water that is not needed for makeup to the HLF and dust control for roads will be discharged to Haggart Creek at W4, via treatment as necessary. During the gold recovery and rinsing phase, net precipitation inputs to the HLF exceed the moisture losses to the ore, thereby creating a small increase in the overall moisture content in the heap. During these times and for the median climate condition discharge from the HLF system is not required.

Following the rinsing and cyanide destruction in the heap, the heap draindown phase commences when draindown water will be discharged to the environment and is assumed to require active treatment until passive treatment systems are in place. The heap draindown process has two parts, with the duration of each part a function of the moisture contents of both the ore under active leach and the unirrigated portions of the heap. The first part of draindown will be actively managed in which draindown water is bled from the system and pumped to active treatment until passive systems are in place, at a variable rate ranging from zero (during late winter) to up to 20 L/s during freshet, with an assumed average annualized rate of 10 l/s (note this average rate can vary based on water management strategies to optimize treatment options, draindown duration and environmental protection). At this time, the remaining draindown water is being recycled back to the heap pad surface through the irrigation system. The recycle rate to the heap will decrease since the ore under leach, given its higher moisture content, will drain at a faster rate than the unirrigated ore portions of the heap until a similar moisture content in both is reached.

Once all the heap ore is assumed to be at the same moisture content and the second part of draindown commences. During this phase all the ore in the heap drains at the same rate and the draindown water will be

allowed to drain freely to the In-Heap Pond, with no recycled pumpback. The accumulated water in the In-Heap Pond will then be directed to passive treatment at the assumed annualized average rate of 10 l/s (or less, depending on what is available in the In-Heap Pond) until the heap ore reaches a stable equilibrium with incoming infiltration, after which it will continue to drain to the environment on a seasonal basis in perpetuity.

4.1.4 Emergency Management

As noted above in Section 4.1.1.2, based on the stochastic modeling, the risk of spilling from the In-Heap Pond to the Events Pond is very small (less than 1%), and from the Events Pond (to treatment) even smaller (0.2% or less) beginning midway through Phase 2. Beginning in Phase 3 the likelihood of spilling into the Events Pond from the In-Heap Pond increases to 10% to 16%. This risk peaks during the additional gold recovery phase to about 13% to 19% probability of spilling to the Events Pond and a 10% to 15% probability of requiring treatment prior to discharge to the environment.

It is tempting to view the spill probabilities from the stochastic modeling in the same way as the design criteria (i.e., in this case, storing the 100 year rainfall and snowmelt events plus the 72-hour draindown). However, the probabilities of the single events should not be compared to the stochastic probabilities. Because storm pond design criteria are based on a single 24 hour event, the design basis assumes that there is not sufficient time to respond to or mitigate the event, such that the only available option is to detain the entire event in a pond. Conversely, the spill probabilities from the stochastic model represent some random combination of multiple events over an extended period of time (weeks or months), which would include the single 24 hour events.

For example, the SWBM (including the HLF WBM) accounts for how water and process leach solution will be managed under normal and abnormal conditions on a monthly basis. At the same time, the design basis for the HLF pond system provides for storage capacity allowances for emergency conditions. The In-Heap Pond maximum capacity is approximately 447,945 m^3 and the Events Pond capacity is 254,071 m^3. The total combined capacity of the In-Heap Pond and Events Pond is 702,071 m^3. Importantly, the criteria (the scenarios represented in Table 4.1-2 below) are calculated individually and then cumulatively to predict an extremely low probability events. This allows for the design of appropriate mitigation measures and facilities to ensure that discharge or loss of solutions does not occur under various extreme climatic conditions.

Table 4.1-2 below summarizes HLF system solution storage capacities during normal, abnormal and extreme conditions. The scenarios represent various extreme events including concurrent occurrence without allowance for attenuation effects (e.g. infiltration, percolation, time to peak). Thus, the examples below show the worst possible conditions for each scenario.

The scenarios analyzed include:

- Scenario 1: normal operating conditions (i.e. during wet, average, or dry conditions)
- Scenario 2: normal operating conditions with a wet year snowmelt event
- Scenario 3: normal operating conditions with a wet year snowmelt event plus a 72-hour power failure and drain-down
- Scenario 4: normal operating conditions with a wet year snowmelt event plus a 72-hour power failure and drain-down, and
- Scenario 5: In-Heap Pond full plus a rain event equal to ¾ of the PMF.

As demonstrated in Table 4.1-2, there will be at least a minimum of 44,000 m^3 of excess storage capacity remaining in the Events Pond in the unlikely scenario that the In-Heap Pond is full and the extremely rare design rainfall-runoff event (3/4 of the PMF) occurs.

Table 4.1-2: Summary of HLF System Emergency Storage Capacity under Various Scenarios

	Scenario 1 (m^3)	*Scenario 2 (m^3)*	*Scenario 3 (m^3)*	*Scenario 4* (m^3)*	*Scenario 5 (m^3)*
HLF Operating Volume	33,240	33,240	33,240	33,240	Assumes In-Heap Pond is full
A wet year snowpack melt event + 48 hour melt	0	82,026	82,026	82,026	
72-hr Drain-down volume	0	0	199,440	199,440	
100-year, 24-hour Rainfall for Phase 3 full build-out****	0	0	0	104,400	
Total Storage Volume Required	33,240	115,266	314,706	419,106	447,945
In-Heap Pond Maximum Capacity at Spillway Invert	447,945	447,945	447,945	447,945	447,945
In-Heap Pond Excess Capacity	414,705	332,679	133,239	28,839	0
¾ of PMF reporting to Events Pond	0	0	0	0	210,000
Total Pond System Capacity**	702,016	702,016	702,016	702,016	254,848
Total Pond System Excess Capacity	668,776	586,750	387,310	282,910	44,848

*Scenario 4 represents the criteria used to size the in-heap pond
**Includes Events Pond Maximum Capacity at Spillway Invert (254,071 m^3)

The quantified estimate of risk (exceedance probabilities from both the stochastic modeling and the design bases) must be interpreted in the context of both options and consequences. StrataGold expects that the circumstances leading to an increased probability of spilling to the environment can be seen ahead of time (e.g., from snow surveys and operational heap water balance tracking), and as result will have time to respond in some way. Options to reduce the risk once identified include making additional storage room in the system by pumping water into a contact water pond, sending water to treatment with discharge over a period of time, or installing additional pumping capacity to increase the area under leach thereby putting more water into circulation. Any or all of these actions can be deployed to prevent a spill as necessary. In the case of the Project, the highest flood risk is commonly associated with the spring snowmelt. The snow-water equivalent of the snowpack can be measured and monitored over the period from October through April so that the subsequent snowmelt event in May can be predicted with a high degree of certainty and prepared for well ahead of time.

4.2 OPERATIONS, MAINTENANCE AND SURVEILLANCE PLAN

An Operation, Maintenance and Surveillance (OMS) Manual has been prepared for the Eagle Gold Project Heap Leach Facility (HLF). Since the HLF design incorporates a dam, the OMS Manual was prepared in accordance with the procedures outlined in the Mining Association of Canada's (MAC) current guidance document Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities (MAC, 2011). This Manual is issued under separate cover (Tetra Tech 2012b) and provides a framework for actions and a basis for measuring performance and demonstrating due diligence for the HLF

operations. As discussed in the 2011 MAC guidance document, key items and activities covered in the OMS Manual include the following:

- Roles and responsibilities of personnel assigned to OMS activities for the HLF;
- Description of the HLF including site conditions, key components, regulatory requirements, and design criteria;
- Facility operations including ore stacking, leaching, in-heap solution management, solution processing, environmental protection, and documentation and reporting;
- Facility maintenance including routine and event-driven maintenance, and documentation and reporting;
- Facility surveillance including routine, event-driven and annual comprehensive inspections and documentation and reporting; and,
- Emergency preparedness and response planning.

Please refer to the OMS Manual (Appendix C) for additional details.

4.3 ADAPTIVE MANAGEMENT AND EMERGENCY MANAGEMENT

A Heap Leach Facility Emergency Response Plan (HLF EMP) (Appendix D) was developed to ensure that an adequate level of emergency preparedness and response will be available in the event of an emergency scenario involving the Heap Leach Facility (HLF) or associated structures. Adaptive Management for the HLF is wholly considered by the HLF ERP.

The Plan is supplemental to the Eagle Gold Project Emergency Response Plan.

This plan was developed based on the following guidelines:

- Dam Safety Guidelines (2007);
- International Cyanide Management (2012);
- Type A and B Quartz Mining Undertakings - Information Package for Applicants (2012); and
- Plan Requirement Guidance for Quartz Mining Projects (2013).

The HLF EMP includes a heap leach and process facilities overview, defines organizational and responsibility roles and communication protocols for responding to, coordinating and following up from an emergency event, and provides a summary of emergency detection and classification levels for each of the HLF facilities. To effectively and proactively manage the HLF, the HLF EMP provides the basis for understanding HLF processes and the associated uncertainties, risks and consequences related to the management of each process/facility. This includes identification of various emergency scenarios as well as the effective identification of preventative measures and responses. A Failure Modes Effects Analysis (FMEA) was conducted to provide a balanced evaluation of the risks associated with various components of the HLF system.

The following emergency scenarios were considered in the FMEA for the heap leach and process facilities:

- HLF foundation or slope failure
- Overtopping of HLF

- Ore heap slope failure
- Events Pond foundation or slope failure
- Overtopping of Events Pond
- Failure of liner system
- Failure of leak detection and recovery system
- Failure of overliner drain fill
- Failure of solution collection and delivery system
- Dublin Gulch Diversion Channel failure, and
- Catastrophic release of hydrogen cyanide from ADR plant or during transportation.

5 HEAP LEACH FACILITIES SHUTDOWN

5.1 TEMPORARY SHUTDOWN

Reclamation and closure of the HLF is addressed in the Reclamation and Closure Plan, which includes general cyanide destruction, heap rinsing and drain down of the HLF. This section addresses measures to be taken during temporary shut-down of HLF, which assumes that all solution management systems will be operational, and that solution will continue to be recycled through the HLF and ADR circuit, and that the total moisture content of the HLF will remain static (with the minor addition from meteoric input). If shut-down conditions persist, then solution management will enter the closure phase, including the destruction of cyanide, followed by rinsing and draindown as described above in Section 4.1.3 and 4.1.4, and as detailed in the Reclamation and Closure Plan.

Temporary shut-down conditions are considered in the design of the HLF and ADR. Specific design attributes include:

- redundancy in power sources (back-up generators),
- additional risers from which to pump PLS,
- excess capacity in the In-Heap Pond (exceeds design criteria)
- insulated lines,
- sump designed for closure,
- ability to continue to recirculate process solution on to the heap surface (HLF total moisture content is relatively low and the HLF process is a closed circuit),
- back-up active water treatment capacity for cyanide destruction.

Further, the Environmental Monitoring and Adaptive Management Plan includes extensive geotechnical and water quality monitoring sites associated with the HLF to continually assess the performance of the embankment dam, liners, and solution circuit integrity, and the potential affects on groundwater.

5.2 PERMANENT SHUTDOWN (CLOSURE)

5.2.1 Closure Objectives and Criteria

Closure objectives for the heap leach facility include:

- conducting drain-down and cyanide destruction activities in a controlled manner to achieve and maintain chemical stability of heap effluent;,
- performing grading and cover placement in a manner that will achieve long-term physical stability including minimizing erosion, subsidence or slope failure;
- incorporating design criteria and attributes so that the heap leach facility is able to withstand severe climatic and seismic events;

- achieving long-term chemical stability such that runoff and seepage quality meet water quality criteria; and
- implementing appropriate contingency measures as required.

5.2.2 Closure Measures

The HLF will be one of the last facilities to be reclaimed as the cyanide destruction and rinsing processes will take approximately 2.5 years, following the cessation of active mining and placement of ore. The construction of a hybrid (enhanced store-and-release) cover system will commence once cyanide destruction is deemed complete (i.e., meets criteria), and seepage from the HLF can be treated with a passive treatment system constructed down gradient of the facility. These measures are detailed below. There are essentially four stages in the closure process:

- residual leaching,
- cyanide destruction and rinsing,
- draindown, and
- passive water treatment

5.2.2.1 Residual Leaching

After the last ore materials are placed, transition to a residual leaching period will commence. During this phase, diffusion of the cyanide solutions into the heap materials continues and recovery of gold from the heap drainage continues until it is decided that it is economically beneficial to transition to a detoxification and rising phase. The exact duration of this residual leaching phase cannot be determined in advance (which will be a cost-benefit tradeoff of commodity prices, operational and overhead costs, and other site-specific factors), but for purposes of cost estimation, a duration of one year is assumed. During this residual leaching phase the crushing and stacking equipment is decommissioned, and the primary activities are movement of pipes and leaching equipment around the heap to maintain optimal leach phasing.

5.2.2.2 Cyanide Destruction and Rinsing

As the economic recovery of precious metals from the heap is reaching the transition point where the net economic benefits of gold recovery diminishes, the heap operations will transition to a cyanide destruction and rinsing stage. This stage refers to the destruction of cyanide within the solution, such that it is no longer acutely toxic from the toxicity of cyanide, and the term “rinsing” refers to the continued application of solutions that are low in cyanide concentration to the heap to flush out areas with higher concentrations. During this time there may continue to be recovery of gold-bearing solutions collected in the bottom of the heap.

This phase will appear similar to the residual leaching phase, in that the primary activities will be movement of pipes and leaching equipment around the heap as necessary to continue to deliver solutions to the heap. However, the solutions added to the top of the heap will no longer have cyanide present in them, Instead, biochemical treatment of the heap solutions will remove the active cyanide from solution. This will be achieved by adding sugar solutions (sugar solution with reducing sugars, typically molasses or corn syrup are the most cost effective) to the barren solution exiting the gold recovery circuit, where any residual free or reactive cyanide forms biochemically react with the sugar molecule, forming cyanohydrin. The rate of sugar solution added to the barren solution is designed to both react residual cyanide in the barren solution, as well as cyanide in the pores

of the heap. Thus the treatment is achieved both in the barren tank prior to circulation up to the heap, as well as within the heap, which is termed in situ treatment.

This process is similar to what was done at the Brewery Creek Heap to detoxify the solution inventory to close the heap, and also was successfully pilot tested for the Eagle heap materials (Tetra Tech 2014). This experience and experience elsewhere forms the basis for the application approach and dosing rate for the biochemical treatment reagents. Additional detail on the in-situ cyanide destruction process is included in the Reclamation and Closure Plan.

When the cyanide concentrations have decreased in the In-Heap Pond such that the heap outflow to the ADR is consistently below the required free cyanide concentrations, the treatment strategy will shift to a strategy that will stabilize and further improve the water quality from within the heap for water quality constituents beyond cyanide, including nitrogen species (ammonia, nitrate, nitrite, and thiocyanate) and metals and trace metalloids (e.g., copper, zinc, antimony, arsenic, selenium).

This subsequent phase of in situ treatment will provide a further treatment within the In-Heap Pond, as well as decreasing metals concentration to sufficient levels to either directly discharge, or at least provide water that is of sufficiently good quality to only require polishing in a passive treatment system (described below). As soon as the cyanide concentrations have decreased to less than the required free cyanide concentrations, heap draindown will begin.

5.2.2.3 Draindown

The heap drain-down and transition period (during which there will still be additional gold recovery) will be planned and managed to fully integrate with the site water management plan. The overall solution inventory will be decreased by processing water through the mine water treatment plant (MWTP) and/or the heap PTS for discharge. Depending on the flow rates achieved through the MWTP, the PTS, and the effectiveness of the cover system that is being built on the heap, the actively managed draindown period may take as long as 9 years. During this time the following activities will occur:

The transition to heap draindown will occur with the perforation of the sump and activation of the closure sump. The transition from cyanide destruction to draindown will include the following steps:

- Discharge of water from the closure sump to the MWTP at a controlled rate consistent with the capacity of the MWTP to treat and discharge the water.
- Discharge of some water from the closure sump to a contingency passive treatment system to be built in the Events Pond location.
- When either
    - ✓ The heap is sufficiently drained and is discharging below WUL discharge criteria, or
    - ✓ The passive treatment wetland system is treating all of the remaining flow at the design capacity and achieving discharge criteria
    - ✓ Then the MWTP can be turned off and decommissioned.

During the draindown period, the solutions that are recirculated back up into the heap will have organic carbon amended into them. This draindown in situ treatment period will switch from a sugar-based solution to an alcohol-based solution, with the purpose of creating sulfate reducing conditions within the saturated zone of the

heap. This will allow for the heap drainage to continue to improve ultimately to achieve water quality consistent with that observed in alcohol fed bioreactors. In these conditions, reduction in metal concentrations is also commonly observed as result of the reducing conditions established during microbial metabolic processes, because many metals are less soluble in a reduced state (chromium, copper, selenium, uranium, for instance). Other metals that preferentially sorb to iron or manganese oxides in a more neutral pH range created during the cyanide destruction process will generally decrease, including trace metals such as arsenic and antimony. Metals that form insoluble sulfides will also become substantially treated. It is expected that at the end of the recirculation and draindown period that the heap solutions can either be directly discharged in accordance with the site discharge criteria, or that the PTS will be able to polish it using primarily aerobic processes, as described below.

5.2.2.4 Passive Water Treatment

Several passive treatment technologies have been evaluated for potential application for late closure and post-closure water treatment technologies. Based on the information available at the time, preliminary studies and planning suggested that Constructed Wetland Treatment Systems (CWTS) would best fulfill the site-specific objectives for passive treatment at the Eagle Gold site; however, a hybrid Passive Treatment System (PTS) comprised of a biochemical reactor (BCR), permeable reactive barrier (PRB), or zero valent iron (ZVI), followed by a CWTS may be optimal. Thus, the PTS design has been further refined,.

Based on predicted water qualities and quantities, there are slight variations in the proposed PTSs for the HLF and waste rock storage area (WRSA) water sources. Using the predicted closure water quality, all CWTSs were sized according to plausible removal rate coefficients (RRC). The RRC is a way of expressing the rate of water treatment, based on treatability of the compound and hydraulic retention time. Although it is recognized that the treatment rate of a range of element concentrations varies in a CWTS, the influent and outflow concentrations predicted for this system are in a range that allow a first order RRC to be loosely applied, recognizing that this will be refined through the reclamation research program for the PTS. The RRCs were developed using two scenarios. The first RRC is based on CWTS with similar arsenic concentrations as those predicted for the Eagle Gold Project, undetectable iron concentrations, and a water temperature of approximately +20 to 25°C. This RRC was adjusted based on the principals of Arrhenius' equation, decreasing by half to adjust for temperature.

This is a conservative estimate, since the CWTS is designed such that aeration and sorption will be the initial treatment, and this CWTS is less influenced by temperature than other types of CWTS (such as those designed for municipal water and sewage, which is treating for high biological oxygen demand). After sorption, the slower process of biomineralization can occur, but this only needs to occur at a rate such that all sorption sites are not used within a given year, as the organic matter from the vegetation will provide sorption sites for the subsequent year(s).

A second RRC was also calculated based on a pilot-scale PTS that has similar arsenic concentrations, but with iron present. In this pilot system, when operating with water temperatures between +0.5 and +4C, the removal rate was triple that of the system with no iron operating at +20C (Lizama et al, 2011). The size of CWTS required under both scenarios is presented in Table 5.2-1.

Table 5.2-1: Sizing of HLF CWTS to meet the Year-Round PRS Outflow Goal of 250 µg/L Arsenic

	Water "as is"		Assumed pre-treatment bioreactor in HLF		
	Water "as is"	With added Iron in conveyance channel	Water "as is"		With added Iron in conveyance channel
			Sized for treatment	Sized for treatment and loading	
Hectares	8.55	1.35	0.47	4.8	0.07
Average Sediment Concentration (mg/kg)[1]	1,459	NC	2,620	256	NC

[1]Calculated for once water chemistry is stabilized in 2028.
[2]Based on effluent quality criteria enumerated in Lorax (2014b) and simulated in the Water Quality Model (Lorax 2014c).
NC - no calculation, distributed through CWTS and conveyance channel.

In an accreting CWTS, it is the removal rate that is key for determining size, while aspects such as total loading are secondary. The logic for this rationale is that loading can only be of concern after it is confirmed that it is thermodynamically possible to remove the compound from the water and load into the sediment. Secondary to determining size based on RRC's, the sizing must be confirmed based on overall loading of compounds into the sediments of the CWTS, while accounting for accretion. As both the RRC and loading generally follow a function that is exponentially decreasing (sometimes even logarithmically decreasing), it must be realized that building the system larger than appropriate can be detrimental to the system rather than beneficial due to thermodynamic minimums and concentration of compounds through evaporation. In other words, a larger CWTS of the same design as a smaller one will not necessarily produce better water quality.

Although, both iron and manganese can carry out precipitation reactions with arsenic, the predicted concentrations of both manganese and iron (Lorax 2014c) are insufficient to treat the predicted concentrations of arsenic. Further evaluation of this process will be useful to determine whether adding iron within the conveyance channels both upstream and between the cells of the CWTS will improve the treatment capacity.

The proposed passive water treatment systems were designed to meet discharge criteria during events of average flow and 75th percentile concentrations predicted for late closure and post-closure conditions (Lorax 2014c). Based on water quality and site-specific considerations, the HLF PTS has been conceptualized as a five-step treatment train.

1. The liner under the HLF to the sump will be perforated through the access piping built into the heap and sump during construction, allowing seepage to flow via gravity from the sump to the PTS. A valving system within the headworks of the piping can then be used to dose an organic material (such as ethanol or molasses) into the base of In-Heap Pond zone to implement it as an anaerobic bioreactor. For the HLF, the bioreactor will be responsible for carrying out the majority of water treatment.
2. The seepage will leave the anaerobic bioreactor through a rip-rap lined channel to re-aerate and precipitate elements as oxides. A preference will be given to rip-rap rock that contains iron or manganese oxides to help facilitate the formation of Fe/Mn surface coatings on the rip-rap that will enhance removal of As/Sb/Se.

3. The seepage will enter the Events Pond, which will now be repurposed into an equalization/sedimentation basin, followed by a CWTS. This will serve for flow equalization, dampening flow velocity from the channel, and providing water retention if maintenance is needed on the CWTS.
4. The CWTS will be the final treatment stage of the PTS, bringing water that has been largely treated by the bioreactor down to concentrations acceptable for discharge. The CWTS is designed to mineralize and sequester elements into the sediments in a benign manner through coupled biogeochemical reactions and accretion.
5. The treated water will exit the CWTS into a retention basin that will provide a mixing point for the water exiting all parallel replicate systems in the CWTS, and serve as a monitoring point for water prior to entering receiving water bodies.

More detail on the conceptual design of the HLF PTS is found in the Reclamation and Closure Plan.

5.2.3 Covers

The currently planned end land-use for the reclaimed HLF and WRSA at the Project site is natural habitat (wilderness). Key design objectives for the HLF / WRSA closure cover systems include long-term geotechnical and geomorphic stability, as well as providing a medium for sustainable growth of native plants. Another key function of the HLF / WRSA closure cover systems is to reduce long-term net percolation rates to the greatest extent possible using locally available materials for cover system construction. Passive treatment systems will be designed and implemented to handle resultant environmental loadings from the HLF and WRSA post-closure seepage.

The proposed covers are store and release covers, which reduce infiltration into the underlying material by storing precipitation (similar to a sponge) in the rooting zone of the cover material and then releasing some of the water back to the atmosphere through evapo-transpiration from vegetation. The cover comprises a thick layer of material placed in a loose state and re-vegetated with selected local species that have high moisture uptake characteristics. A similar store and release cover system was constructed at a similar open pit-heap leach gold mine project (Brewery Creek, YT) that was closed and reclaimed. The currently proposed closure HLF cover system design, referred to as the 'Base Case', is a 0.2 m thick layer of topsoil underlain by a 0.3 m thick layer of placer tailings / colluvium.

Two stages of modelling were conducted to aid in further development of cover system designs for closure of the proposed HLF at the Project site. The first series of models used The Hydrologic Evaluation of Landfill Performance (HELP) 3.90 D Model (2011) to inform the model design and estimate infiltration through the cover (Knight Piesold, 2013). The preliminary results from this modelling were considered during the cover system design work supporting the current design (OKC 2014). The current design is supported by forty-three long-term simulations to determine the sensitivity of the Base Case due to variations in materials, climate, and/or vegetation. The simulations were also completed to determine what, if any, improvements could be made to the Base Case cover system design. All the scenarios were initially completed without vegetation present so that changes in performance could be directly correlated to changes in materials or climate. Vegetation was then included to further evaluate select scenarios. Finally, the base case results presented in the previous section showed little difference in performance between the WRSAs and HLF simulations. The results of these simulations are found in the Reclamation and Closure Plan.

Based on the modelling of the Base Case a profile schematic of the cover that would be placed over the HLF is shown below as Figure 5.2-1. This conceptual design schematic shows the profile of the cover for the flat areas on the plateaus and benches, as well as the profile for the inter-bench slopes.

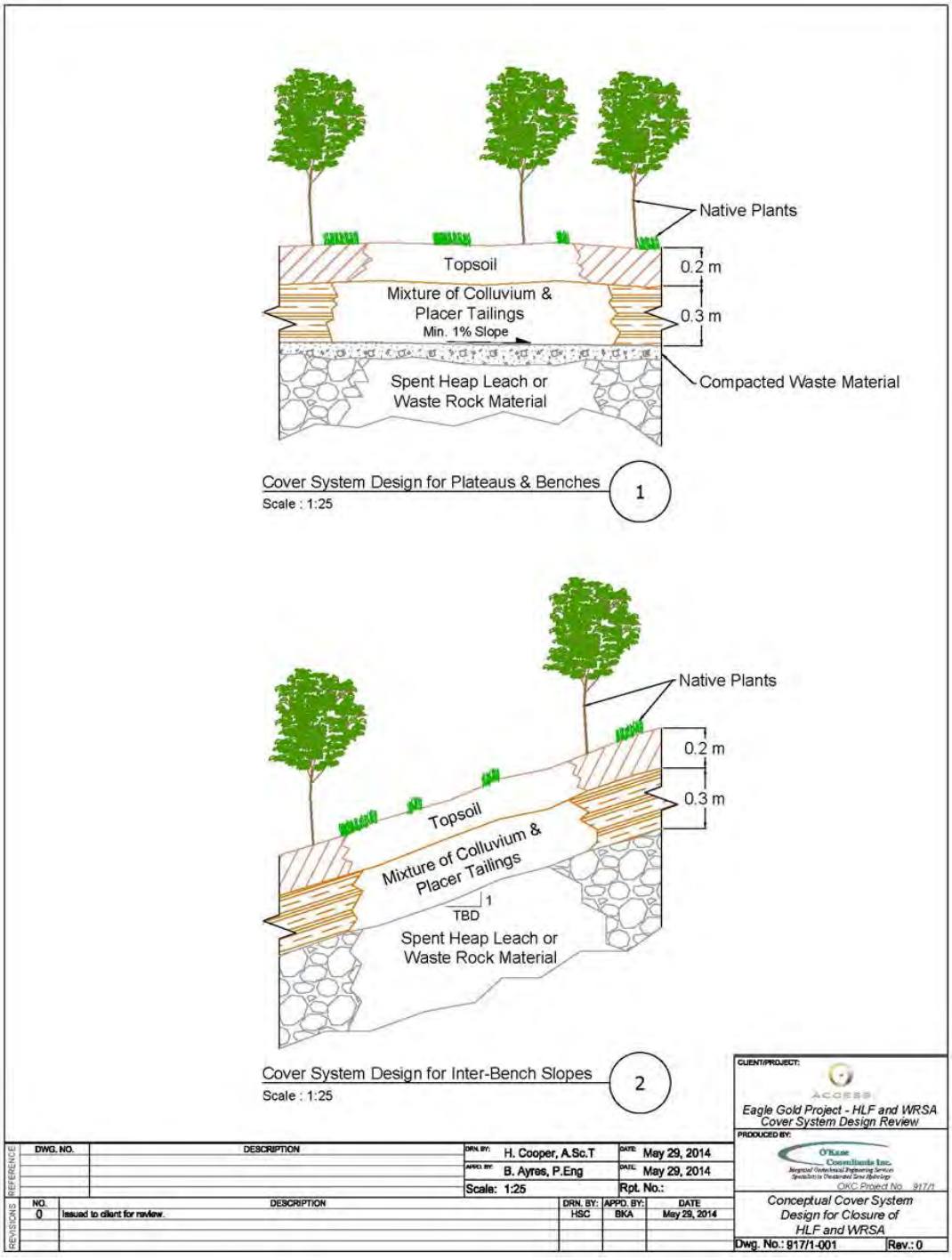


Figure 5.2-1: Conceptual HLF and WRSA Cover Design

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APPENDIX A

Heap Leach Facility Detailed Design - Eagle Gold Project

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EAGLE GOLD PROJECT
HEAP LEACH FACILITY
FINAL DESIGN REPORT

The following document has been prepared under the direct supervision of the **ENGINEER** of Record, who is a duly licensed Professional Engineer of Yukon, and whose seal and signature appear below.

The **INFORMATION** presented herein was prepared in accordance with generally accepted professional engineering principles and practices.

Yukon License #2010

Heap Leach Facility Detailed Design

Eagle Gold Project

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Tetra Tech Project No. 114-201087

April 23, 2014

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1.0 INTRODUCTION

1.1 General

StrataGold Corporation (StrataGold) commissioned Tetra Tech to advance the existing Feasibility Study (FS) to final detailed design for the Eagle Gold Heap Leach Facility (Project). This report presents the detailed design for the Heap Leach Facility (HLF), used to support the construction cost estimates. The FS design documents were included in a Feasibility Design Report (Tetra Tech, 2012a).

The project site is located in central Yukon Territory, Canada, as shown on Drawing 300-GT-001. StrataGold intends to process gold-bearing ore on the planned leach pad using standard cyanide heap leach technology. This report presents the design of the Phase 1 HLF including the lined pad, confining embankment, in-heap pond, events pond, temporary ditches, and conveyor corridors. The design for the Dublin Gulch Diversion Channel, which diverts flows around the HLF, is presented in a report titled "Dublin Gulch Diversion Channel Final Design Report" (Appendix A).

The design of mine facilities is being prepared by the Tucson, Arizona office of M3 Engineering (M3). M3's planned locations of the crushing facilities, cement and lime silos, agglomerator, process plant, and other pertinent structures including access and haul roads were utilized in developing the HLF limits and design. The planned mine facility general arrangement plan including the location of the HLF is shown on Drawing 300-GT-003.

1.2 Objective and Scope

The objective of this study is to provide a detailed design for the construction of the Eagle Gold HLF. This report presents the elements of the design work which include:

- *Project description including HLF aspects and design criteria;*
- *General site description including location, climatology, surface conditions, geology, geotechnical characteristics, and seismicity;*
- *Sizing, layouts and grading plans for the leach pad, confining embankment and event pond;*
- *Design details of the Phase 1 leach pad including liner systems, and solution drainage, collection and conveyance;*
- *Design details of the confining embankment including fill zone and liner systems;*
- *Evaluation of foundation settlement for the leach pad;*
- *Slope stability analyses for the embankment, ore heap and pad;*
- *Liquefaction analyses for the embankment foundation;*
- *Water balance computations for the HLF;*
- *Design details of the event ponds including crests, spillways, sumps, liner systems, and leak detection;*
- *Design of Phase 1 temporary surface water diversion channel; and*
- *Provision of technical specifications for construction.*

The various aspects of the detailed design are included in the following sections and appendices of the report and in the design drawings.

2.0 PROJECT DESCRIPTION

The Eagle Gold Site is in the center of the Yukon Territory about 350 kilometers north of the capital, Whitehorse, and approximately 45 kilometers north of Mayo, a small village on the Stewart River. The proposed project site is located within the lower Dublin Gulch/Eagle Creek watershed.

The proposed Heap Leach Facility (HLF) is located approximately 1.2 km north of the Eagle Zone orebody. The majority of the HLF is located in the Ann Gulch catchment, a small ephemeral tributary to Dublin Gulch. The base of the Phase 1 HLF is in the valley floor of Dublin Gulch at an elevation of 850 masl, and at full height in Phase 3 the HLF extends up Ann Gulch to an elevation of approximately 1225 masl. Facilities specific to the Heap Leach Facility Design can be seen in Drawing 300-GT-004.

The HLF comprises a number of elements: a confining embankment to provide stability to the base of the HLF, a lined storage area for the ore to be leached, an in-heap storage pond to contain the pregnant solution, pumping wells for the extraction of solution, a lined events pond to contain excess solution in extreme events, diversions, and leak detection, recovery and monitoring systems to ensure the containment of solution.

Engineering of these facilities is discussed in the following sections and attached design drawings. Supporting calculations and analyses are included in the Appendices.

An associated facility is the diversion structure and channel to relocate the Dublin Gulch waterway around the HLF. Engineering of this component is presented in a separate design report (Appendix A).

3.0 SITE CONDITIONS

A detailed description of the HLF site is provided in various reports prepared by BGC Engineering Inc. (BGC). The reports of primary relevance to the HLF include *2011 Geotechnical Investigation for Mine Infrastructure, Factual Data Report* issued by BGC and dated 20 January 2012 and *Eagle Gold – Heap Leach Pad, Water Diversion and Process Management Ponds DRAFT Foundation Report* issued by BGC and dated 21 April 2011. These reports are included as Appendix B and the relevant findings from these reports are summarized herein. The following additional BGC reports can be referenced as needed:

- *Eagle Gold – Borrow Evaluation Report*, BGC Engineering Inc., 21 April 2011
- *Eagle Gold – 2011 Mine Site Infrastructure Foundation Report, Final,* BGC Engineering Inc., 31 January 2012
- *Report on Seismic Refraction and Downhole Seismic Investigation and Proposed Mine Site Facilities Eagle Gold* – Frontier Geosciences Inc., Sept 2011
- *Eagle Gold Project – Dublin Gulch, Yukon – Site Facilities Geotechnical Investigation, Factual Data Report*, Final, BGC Engineering Inc., 5 March 2010

The site topography involves moderate to high relief, with ground elevation varying from approximately 800 to 1400 masl. Groundwater was observed at varying depths across the site during field investigations, generally close to the elevation of streams in the valley bottoms (i.e. less than 2 to 3 m below grade), and often below the depth of test pit excavation (i.e. often 5 to 6 m depth) on the hillsides.

A surface geology map of the site was prepared by BGC and is presented as Drawing 300-GT-005.

3.1 Climate

The property lies within the Mayo Lake–Ross River Eco-region in central Yukon. The area is characterized by a “continental” type climate, with moderate annual precipitation and a large temperature range. Summers are short and can be hot, while winters are long and cold with moderate snowfall. Rainstorm events can occur frequently during the summer, and may contribute 30% to 40% of the annual precipitation. Higher elevations are snow-free by mid-June.

Frost action may occur at any time during the summer or fall. Climate monitoring began at Potato Hills station (located in the upper Dublin Gulch watershed) in August 2007 and at the Camp station (located close to the existing exploration camp) in August 2009. Both stations are still in operation. Regional climate data was collected from up to nine stations throughout the Yukon Territory.

The mean annual temperature for the area is approximately -3°C, with an annual range of 63.5°C for the period of record. The estimated mean annual precipitation in the study area ranges from 350 mm to over 600 mm. This range in annual estimated precipitation reflects the elevation changes at the site.

This climate description has been summarized from Stantec (2011b).

3.2 Subsurface Conditions

Today’s geologic conditions at the Dublin Gulch site have been strongly influenced by the geotectonic forces that produced the Eagle Zone deposit. The folding, faulting and plutonic activities have resulted in relatively weak rock mass with relatively poor mechanical properties.

Further with frost fracturing and permafrost common at the latitude of the project site, shallow subsurface processes and rock/soil characteristics are more complex.

Overburden soils encountered on the sloping ground at the mine site typically consist of a veneer of organic soils overlying a blanket of colluvium, which overlies weathered bedrock.

Glacial till is generally only encountered on the lower flanks of the north and west-facing slopes located north and west of the proposed open pit, above Dublin Gulch and Haggart Creek. The till is often overlain by colluvium. Placer tailings (fill) cover most of the valley bottom of Dublin Gulch and Haggart Creek. Alluvial soils are occasionally encountered along undisturbed valley-bottom areas.

The bedrock encountered in the mine site area is generally classified as metamorphosed sedimentary rock, with a variably deep weathering profile. The intact rock strength of the encountered rock types is highly variable, with strength ranging between R0 class (i.e. corresponding to < 1 MPa Unconfined Compressive Strength, UCS) and R4 (50-100 MPa UCS). The average intact strength is estimated to be approximately R2 (5-25 MPa) in the metasedimentary rock, depending upon the degree of weathering, but with significant variability across the site.

3.2.1 *Overburden*

Overburden soil conditions are distinctly different in the Dublin Gulch valley bottom from those encountered above the valley bottom in Ann Gulch and south of Dublin Gulch along the southern edge of the proposed heap. In the Uplands above the valley bottom, the upper soil unit consists of a thin horizon of organic soil, rootlets, woody debris and plant matter ranging from 0.1 to 2.7 m thickness and averaging approximately 0.3 m. The organic cover above the valley bottom overlies colluvium; the colluvium ranges in thickness from 0.2 to 15.2 m, and averaging approximately 2.9 m. The colluvium consists of loose to compact angular gravel with occasional cobbles in a silt and sand matrix, derived from transported weathered metasedimentary bedrock. The colluvium may also include variable amounts of organics, which are often observed in distinct layers within the colluvium.

The overburden soils in the valley bottom have been reworked by historical placer mining activities. Placer tailings (fill) are observed from the ground surface to bedrock, with thicknesses ranging between 2.4 m and 16.5 m, and an average thickness of approximately 6.6 m. The material encountered is generally a well graded, loose to dense, silty sand and gravel, ranging to sand and gravel with some silt and occasional cobbles and boulders. Loose and moist zones have been encountered within the placer tailings. There is little to no vegetative cover on the placer tailings. A placer fill map was prepared by BGC and is presented as Drawings 300-GT-006.

The placer tailings in the valley bottom have highly variable particle size distribution and density, and are generally saturated. Recorded Standard Penetrometer (SPT) blow counts, N, are summarized in the BGC report (Appendix B) for the placer tailings within the footprint of the proposed process management pond. No blow count data are available within the footprint of the heap leach pad, but the placer tailings (fill) materials are expected to have a similar extreme variability in penetration resistance and associated strength and stiffness.

The overburden at the southern edge of the proposed HLF includes 4.4 m of placer tailings, and a variable thickness of till ranging between 1.5 m to 16.4 m. The till is a compact to dense sandy silt to silty sand with some gravel.

Seismic refraction surveys were performed to evaluate the variability of the overburden depth. Generally the thickness of the overburden transitions smoothly from very little at the top of the slopes increasing to the valley floor. This is the same trend with the depth of weathering.

3.2.2 *Bedrock*

Bedrock was observed in the uplands above Dublin Gulch immediately below colluvium at depths ranging between 0.0 and 16.8 m below existing grade (average depth to bedrock at 3.5 m where observed). Bedrock was observed in the valley bottom at depths ranging between 1.5 and 16.5 m below existing grade, with an average depth to bedrock at 6.2 m where observed. The very limited amount of data at the southern edge of the HLF suggests that bedrock is relatively deep (i.e. greater than 8 m).

Observed bedrock consisted of highly to completely weathered metasedimentary rock (i.e.Type 3 rock) or moderately to highly weathered rock (i.e. Type 2 rock). The metasediments in general are observed as strongly foliated yellowish brown to dark grey phyllites interbedded with quartzites. The quartzites are variably gritty, micaceous, and massive. Phyllitic metasediments are composed of muscovite-sericite and chlorite.

The rock mass quality and characteristics have been inferred from observations in boreholes within the heap leach pad footprint. Rock Mass Rating values of 20 to 30 were determined from the observed rock core to about 10 m depth, then increased to about 45 to 50 at most locations.

The seismic refraction work confirmed the depth to bedrock to be relatively deep ranging from 5 to 15 m along the southeast limits of the HLP. The depth to moderately weathered bedrock ranged from 20 to 35 m.

3.2.3 *Groundwater*

The observed groundwater depths on the open slopes in the upper Ann Gulch valley range from 6.1 m below grade close to the middle of Ann Gulch to 15.4 m in the headwaters of Ann Gulch. Water levels are typically about 2.5 m below ground surface in the Dublin Gulch valley bottom, but can be expected to be closer to ground surface near streams and deeper below piles of tailings. It is anticipated that these levels will vary seasonally.

Assumptions related to groundwater levels used for design purposes are discussed in Section 5.10 of this report.

3.2.4 *Permafrost*

Frozen ground was encountered in the upper part of the HLF footprint (i.e. Upland area) in various test pits. When observed in a plan view, many of the test pits are located on the eastern slope of Ann Gulch, and generally align in a NE trend, covering the entire HLF footprint, from its most eastern edge to its western end at the heap leach containment dike.

The reason for this connection between the frozen ground observations is unknown and might simply correspond to sporadic disconnected patches; nevertheless the continuity of the linear feature may deserve to be studied in more detail and accounted for during site preparation and construction. Frozen ground was typically encountered within colluvial gravels and gravels and sands with depths varying between 0.6 m to 2.8 m, and occasionally included excess ice with limited thickness.

Frozen ground was not encountered in the valley bottom nor on the southern edge of the proposed heap leach pad, but localized pockets of frozen ground may be present in these areas.

3.2.5 *Geological Hazards*

Around the HLF site area, geological hazards as determined by Stantec (2011a) mainly include permafrost processes in the west-facing slopes at the upper part of the valley and surface seepage at the bottom of the valley between the rockfill diversion berm and rockfill embankment. Some of the south-facing lower and steeper slopes above Dublin Gulch are affected by rockfall and rockslide hazards.

3.3 Hydrology

The Eagle Gold Project site lies within the upper regions of the Haggart Creek drainage basin, within the Dublin Gulch and Eagle Creek sub-basins. Haggart Creek flows to the south, ultimately flowing into the South McQuesten River. Lynx Creek is the largest creek in the Haggart Creek drainage basin and joins Haggart Creek south of the Dublin Gulch confluence.

The hydrology of the region is generally characterized by large snowmelt runoffs during the freshet, which quickly taper off to low summer stream flows interspersed with periodic increases in flow associated with intense rainfall events (Stantec, 2012). Placer mining has been conducted in both Haggart Creek and the Dublin Gulch basins over the past century. The outcome of these operations has resulted in large placer deposits which have altered the natural drainage character of Dublin Gulch, including channel diversions and some changes to sub-basin divides.

The drainage basins have steep terrain with a mean gradient of 18 percent, and vegetated slopes. Dublin Gulch, Eagle Creek, and Haggart Creek are perennial streams (Stantec, 2012). Several of the tributaries of these creeks/gulches are intermittent streams, which are streams that become dry at sections along the water course where flow is subsurface, or ephemeral streams, which are streams that have little to no groundwater storage and flow is in response to snowmelt or heavy rains.

The Events Pond and spillway for the In-Heap Pond were designed using the U.S. Army Corps of Engineers' Hydrologic Engineering Center — Hydrologic Modeling System (HEC-HMS) (HEC, 2010a) software. HEC-HMS is a hydrologic model that computes discharges from drainage basins based on unit hydrograph method for a given design storm event. For the analyses mentioned in this report SCS curve number method was used to account for infiltration losses.

A Curve Number of 60 was selected for the natural catchment based on calibration of several on-site observed rainfall-runoff events as presented in Appendix A – DGDC Final Design Report. Runoff from disturbed catchment areas, such as the HLF, is typically faster than natural vegetated catchments. As a result a higher CN value of 77 was applied to disturbed catchments within the mine site.

Tetra Tech obtained rainfall depths from a technical memorandum prepared by Knight Piesold (2012). The precipitation depths for annual extreme rainfall values were determined using the "Rainfall Frequency Atlas for Canada" (Environment Canada, 1985).

The Dublin Gulch diversion channel (DGDC) is designed to convey a 100-year storm with freeboard, and a 500-year storm with no freeboard. The spillway at the heap leach facility is designed to convey at least a discharge that is 1/3rd between 1/1000-year and the PMF event. All subsidiary drainage structures are designed to convey a 100-year storm.

Rainfall depths and rainfall distribution were calculated for 100-year, 500-year, 1000-year and Probable Maximum Precipitation (PMP) events. The rainfall depths measured from the Rainfall Frequency Atlas for Canada were multiplied by a factor of 1.5 to account for the orographic

pattern of precipitation. The factored rainfall depths are shown in Table 2.2 below. The PMP rainfall depth was calculated using Hershield's equation (1977) and was calculated to be 255.6 mm for a 24-hour PMP event. The frequency storm was used for rainfall distribution in the HEC-HMS model.

Table 2.2. Rainfall Depths for 100-year, 500-year, 1000-year and PMP events

Duration	100 years	500-years	1000-years	PMP
	(mm)	(mm)	(mm)	(mm)
5 min	9.3	11.8	12.9	39.2
10 min	11.3	14.1	15.3	44.2
15 min	14.0	17.8	19.4	58.9
30 min	15.0	18.4	19.8	55.4
1 hour	21.1	26.2	28.3	81.0
2 hour	22.7	27.8	29.9	82.6
6 hour	33.8	37.1	44.6	123.6
12 hour	60.6	72.8	78.1	206.4
24 hour	71.6	87.0	93.7	255.6

3.4 Hydrogeology

The Eagle Gold project is located in the Dublin Gulch/Eagle Creek watershed, a northeast trending drainage that ranges in elevation from 790 m to over 1,500 m. The regional drainage patterns are largely controlled by the structural geologic features such as faults and folds. Near surface groundwater is recharged by precipitation and flows toward the valley floors through the alluvial/colluvial sediments and the fractured bedrock. Therefore the groundwater table mimics the topography. Surface seeps have been noted at the site; they are typically seasonal and may be structurally controlled by geologic contacts in places. Some of the larger seeps have caused surface depressions by destabilizing the soils locally.

3.5 Seismicity

A seismic hazard analysis (SHA) was performed by Tetra Tech for the site. The SHA is presented in Appendix C of this report and includes results from both deterministic and probabilistic methods. Deterministic analyses were performed using five equally weighted attenuation relationships to evaluate seismic hazards for the property resulting from a maximum credible earthquake (MCE). A MCE, by definition, has no specific recurrence interval and is the largest reasonably conceivable earthquake that appears possible along a recognized fault or within a geographically defined tectonic province, under the presently known or presumed tectonic framework. Theoretically, no ground motion should occur which exceeds that of the MCE. A deterministic analysis therefore allows for a more conservative approach to the determination of risks associated with identified seismic hazards. Data published by Natural Resources Canada (NRCAN) were used in the probabilistic analysis to estimate the probability of exceedance of peak ground accelerations (PGA) at the site for various return periods which may be applicable to other mine facilities.

Based on the recommendations provided in the SHA, Tetra Tech used a design PGA of 0.35g for facilities requiring low-probability or MCE ground motions, as determined using an MCE of moment magnitude 6.0. For facilities requiring a PGA based on a return period of 2,475 years or less, the National Building Code values can be used (see Appendix C).

In summary, the seismic design requirements for the HLF are as follows:

- Maximum Design Earthquake (MDE) – Applies to the confining embankment and the long-term stability of the post-closure heap ore pile. Used PGA of 0.35g corresponding to the MCE event.
- Design Basis Earthquake (DBE) – Applies to the operational condition of the heap ore pile only; does not apply to the confining embankment. Used PGA of 0.25g corresponding to event return period of 2,475 years (equivalent to a 2 percent probability of exceedance in 50 years).

4.0 DESIGN CRITERIA AND APPROACH

4.1 Permitting Considerations

Regulations and permitting requirements for Heap Leach Facilities in the Yukon Territory are not expressly stated; but rather, they have historically relied on regulations from other regions and on precedence established from other successful projects. Previous studies (Scott Wilson 2010) selected Brewery Creek, the gold mine (1996-2002) located approximately 55 km east of Dawson City, Canada as the example facility to follow for permitting guidelines. This was understood to be the only HLF permitted in the Yukon, the design of which was based on the Nevada State guidelines and associated permitting limitations. This approach has been carried into the feasibility study and final design along with best engineering practice.

The Heap Leach Facility design standards adopted for the project include:

- The regulatory requirements of Yukon and Canada;
- The Yukon Water Board Licensing Guidelines (2009);
- Guidelines from the Canadian Dam Association (2007); and
- Permitting requirements of the State of Nevada. These are not regulatory requirements in the Yukon, but are considered as standards for best practice.

4.2 Design Requirements

There are currently no published international standards for the design and construction of the heap leach facility. Nevada State Guidelines provide minimum standards for heap leach facilities and have been adopted for the Project. North American standards for the design of embankment dams were used where applicable, specifically the Canadian Dam Association (CDA) guidelines and the National Building Code as required by the CDA guidelines. Table 4.1 summarizes the main technical and permitting requirements for the State of Nevada for the key elements of the HLF design.

Table 4.1: Summary of Design Requirements for State of Nevada

Heap Leach Feature	Description
Leach Pad	System must have containment capability equal to or greater than that of a composite liner consisting of a synthetic liner over one foot of compacted soil at a permeability of 1×10^{-6} cm/s or 1×10^{-5} cm/s if a leak detection system is used beneath portions of the liner with the greatest potential for leakage
	Synthetic liners must be rated as having resistance to fluid passage equal to a permeability of less than or equal to 1×10^{-11} cm/s.

Heap Leach Feature	Description
Solution Ponds	System must have a primary synthetic liner and a secondary liner that meet the above-described liner specifications. The synthetic liners must be separated by a fluid transmission layer which is capable of transmitting leaked fluids at a rate that will ensure that excessive head will not develop on the secondary liner
Solution Management and Containment	Process components must be demonstrated to have the capacity to "withstand" the runoff from a 100-year, 24-hour precipitation event. In addition, facility fluid management systems must demonstrate the capability of remaining "fully functional" and fully contain all process fluids including all accumulation resulting from a 25-year, 24 hour precipitation event. The foregoing standards are minimal and additional containment capacity may be required if surface water bodies or human populations are in close proximity to the facility, or if groundwater is shallow
Foundations	Consider static / dynamic loads and differential movement or shifting
Construction QA/QC	Regulations require that each applicant develop and carry out a quality assurance and quality control program for liner construction. A summary of the QA/QC program must be submitted with as-built drawings after construction has been completed
Neutralization/Detoxification of Spent Ore	Spent ore, whether it is to be left on pads or removed from a pad, must be rinsed until it can be demonstrated either the remaining solid material, when representatively sampled does not contain levels of contaminants that are likely to become mobile and degrade the waters of the state under the conditions that will exist at the site, or, the spent ore is stabilized in such a manner as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the state

4.3 Design Basis

The Yukon Water Board Licensing Guidelines for Type A Quartz Mining Undertakings provide specific guidance for selected mine site earthworks facilities, as follows:

"*General: Type A quartz mining undertakings may vary significantly in their magnitude and in the potential environmental effects associated with them. The guidelines contained in this document assume the development of a mine with significant potential environmental impacts such as those resulting from acid rock drainage or the failure of a large tailings impoundment. Projects such as this are considered to fall into the Very High Consequence of Failure category described in the Canadian Dam Safety Guidelines (January 1999). In situations where this category is not appropriate for some reason, the Board is prepared to consider well developed and documented justification for the use of alternative consequences of failure criteria developed in accordance with the Canadian Dam Safety Guidelines*."

Further, specific design guidance is included as follows:

- The design, construction, operation, maintenance and surveillance of dams and associated water management structures should be carried out in a manner which is consistent with the recommendations contained in the Canadian Dam Safety Guidelines (January 1999) for the Very High Consequence Category, unless compelling reasons consistent with the Canadian Dam Safety Guidelines for a lower consequence category are provided.
- Long-term dams and associated water management structures should be designed to withstand the Maximum Credible Earthquake (MCE) and pass the Probable Maximum Flood (PMF). Shorter term structures may be built to lesser standards but a compelling rationale for the selected criteria must be provided.
- Heaps should be designed to have a minimum factor of safety under static loading of 1.3 for short term cases (i.e. within the mine life) and 1.5 for long term cases (i.e. abandonment) as described in the Investigation and Design of Mine Dumps (British Columbia Mine Dump Committee, 1991). The factor of safety for dams should be as recommended in the Canadian Dam Safety Guidelines (January 1999).
- Designs for dams and associated water management structures, rock dumps, and heaps should recognize the probable presence of permafrost and should include appropriate measures to manage permafrost and maximize the stability of the structures consistent with recommendations contained in the Canadian Dam Safety Guidelines (January 1999).

Although the 1999 CDA are referenced, the latest version of the CDA guidelines (2007) was used for the Project.

Tetra Tech performed a dam breach analysis to determine the hazard classification of the confining embankment in accordance with CDA dam classification guidelines. The results indicate the confining embankment can be classified as a high hazard dam. Results from the dam breach analysis and inundation mapping show that loss of human life or damage to public and commercial facilities are unlikely in the event of a dam breach. However, the dam breach may cause significant damage to fish and wildlife habitat downstream of the embankment considering the potential for release of cyanide solution from upstream of the heap confining embankment. The dam breach analysis report is presented as Appendix D. It should be noted that the dam break analysis was performed assuming a dam crest elevation of 885m, which is 3 m lower than the design crest elevation of 888m. This minor difference is within the accuracy of the methodology used and does not affect the outcome of the study.

4.4 Engineering Design Criteria

The parameters and criteria presented in Table 4.2 below form the basis of design for the HLF. Geotechnical design criteria were developed by Tetra Tech and BGC while considering the analyses and discussions in Appendix C (Site Seismic Hazard Analysis), Appendix J (HLF Stability Analyses), Appendix K (Liquefaction Analysis), and Appendix M (Settlement Analysis), and the *Eagle Gold – Geotechnical Design Basis for Mine Site Infrastructure in the Project Proposal* (BGC 2011). Ore parameters were taken from a report issued by Kappes Cassiday & Associates titled *Eagle Gold Project Report of Metallurgical Test Work a*nd dated October 2012.

Table 4.2: Engineering Design Criteria

General	Quantity/Criteria
Mine Life	10 years
Life of mine (LOM) ore quantity to be stacked on heap leach pad	Approximately 92 Mt (Phase 1 through 3)
Crushing rate, stages	Fine ore crushing rate approximately 41,300 tpd based on 10.3 million tonnes per year over a 250 day crushing and stacking season Three-stage crushing
Final ore crush size	6.35 mm (P_{80})
Leach pad type	Permanent, multiple lift
Initial stacking capacity	Minimum of 2 years for Phase 1 pad
Stacking schedule	250 days per year
Stacking Rate	41,300 tpd
Agglomeration	Belt Type or Agglomerator Drum, first 2 years of operation or as needed.
Stacking method	Conveyor-stacker
Stacked dry density of ore	Initial - 1.70 t/m^3
Stack / lift height	Nominal 10 m lifts
Overall slope angle of stacked ore	2.5:1 (H:V), 22 degrees
Ore Setback	5m from perimeter road 10m from dam
Leach schedule	365 days per year
Solution application method	Drip emitters (buried for cold weather operations)
Solution application rate	10 l/hr/m^2
Total leach cycle time (includes drain-down, cross-ripping and installation of drip irrigation piping/Active leach cycle	150 days total /120 days active
Solution application flow	2,770 m^3/hour
Geotechnical Stability	**Quantity/Criteria**
Design Basis Earthquake (DBE)	0.14g (1 in 475 year return period) 0.25g (1 in 2475 year return period)
Maximum Design Earthquake (MDE)	0.35g (Maximum Credible Earthquake) Moment Magnitude 6.0

Minimum embankment Factor of Safety	Static Loading - 1.5 (impounding), 1.3 (non-impounding), Seismic Loading - 1.0 (use pseudo-static methods)
Permafrost	Ice-rich materials encountered in the pad or pond foundations, if thaw unstable, will be removed.
Confining Embankment	**Quantity/Criteria**
General	To provide stable confinement of the ore and in-heap storage of solution.
In-heap solution storage	To attenuate variation in flows into the heap to allow a constant flow to the process plant and minimize treatment and release. 1. Minimum operational storage volume (to ensure the pumps stay primed to supply the process plant) equivalent to 12 hours of supply at the 2770 m^3/hr application rate. 2. Contain the runoff volume from a 100-year, 24-hour storm event rainfall event. 3. Contain the snowmelt volume from the 100-year 24-hour rain-on-snow event then 48 hours of melting following this event. 4. Maximum storage volume to allow for three day's (72-hours) of drain-down.
Overflow spillway	Sized to pass 1/3 between the 1000-year event and the PMF assuming heap storage is at capacity at the start of the event.
Groundwater	**Quantity/Criteria**
General	A drainage system is required beneath the liner system to control groundwater pressures. The system is to collect and monitor groundwater in a controlled manner before discharge downslope of the containment embankment.
Pad Liner System	**Quantity/Criteria**
Overliner	Crushed clean rock to provide a free draining layer under the placed ore and to protect the lining system from damage by ore placement while not impacting the conveyance of solution to the recovery wells.
Geosynthetic (geomembrane) liner	Suitable liner material to provide required puncture resistance, elastic strain range and resistance to solution attack along with good cold weather performance.
Geosynthetic Clay Liner (GCL)	Geosynthetic clay liner below the geosynthetic liner to provide a composite liner to minimize leakage. Objective maximum permeability 1×10^{-5} cm/s or 1×10^{-6} cm/s in the absence of a leachate detection and removal system.
Leachate collection and recovery system	A system to collect leachate and convey it to solution recovery wells. System to comprise overliner drain fill and a network of collection pipes to convey solution to in-heap storage area

	while limiting solution head on liner.
Leak detection and recovery system (LDRS)	A system to collect leakage through the composite liner and convey it to monitoring points. The system to comprise geonet or similar synthetic drainage product to collect and convey any leaked solution to a gravel filled sump and pumping system.
LDRS monitoring	Monitoring of the flow into the LDRS to ensure that allowable rates (determined by permitting authorities) are not exceeded.
Solution Recovery Wells	**Quantity/Criteria**
General	Solution is to be recovered from the heap through inclined well casings equipped with submersible pumps installed in the in-heap solution storage area along the upstream dam slope. Adequate access for installing and recovering pumps from well casings will be provided on the dam crest.
Event Pond	**Quantity/Criteria**
General	The purpose of the events pond (constructed downstream of the embankment) is to temporarily store excess inflows that cannot be stored in the in-heap pond. Any overflow into the events pond will be evacuated, and used as make-up water, as fresh ore is added to the HLF. During the initial heap build-up, the events ponds may also be used as temporary storage for make-up water. Otherwise, the events pond will be kept dry.
Overflow spillway (from HLF and Event Pond)	Sized for PMF assuming heap storage is at capacity (with 2 m of freeboard) at the start of the event. Spillways to be provided in the events pond to safely pass the peak PMF flow.
Storage Capacity	Sized to contain ¾ of the runoff volume from the PMF event or the runoff volume from the 100-year 24-hour rainfall event plus the subsequent snowmelt volume of the next 48 hours.
Liner system	Lining to comprise a double composite geosynthetic liner system with LDRS

5.0 ENGINEERING ANALYSES

5.1 General

The following sections present the engineering analyses and design conducted for the Eagle Gold HLF. Design and analyses included: heap leach pad and confining embankment design, geotechnical stability and liquefaction analyses, liner system design, HLF water balance, In-Heap and Events Pond design. The Dublin Gulch Diversion Channel design is presented in a separate report.

5.2 Heap Leach Pad and Confining Embankment Design

5.2.1 *General*

The design incorporates a double-side textured 80 mil linear low-density, polyethylene (LLDPE) liner. A geosynthetic clay liner (GCL) will be used in lieu of a 300mm thick layer of compacted low-permeability material. GCL will be placed underneath the geomembrane and will provide equal or greater protection than 300mm material having a saturated hydraulic conductivity of no greater than 10^{-6} cm/sec.

The Heap Leach Pad is designed to contain a network of pipes that will be distributed throughout the limits of the facility and will collect and convey pregnant leach solution (PLS) in addition to stormwater.

In summary, the proposed Heap Leach Pad will consist of two liner systems (see Drawing 300-GT-011):

- In-heap Pond Liner System.
- Up-gradient Heap Leach Pad Liner System.

Section 5.4 presents the liner system details. A minimum one meter (1 m) thick layer of overliner material will be placed over the LLDPE geomembrane in a single lift. The Overliner Drain Fill (ODF) will be placed in bulk onto the liner using suitable haulage equipment or conveyors and spread by dozers in a uniform layer.

Solution collection pipes will be placed within the Overliner Drain Fill to convey PLS and storm flows to the In-heap pond which is defined by the confining embankment.

The HLF embankment confines and provides stability to the Phase 1 HLF ore pile. It also creates an In-Heap Pond leaching configuration that provides storage of pregnant solution within the ore pore spaces of the ore. The embankment location, geometry, and height determine the ore storage capacity and solution storage capacity of the HLF.

5.2.2 *Design Criteria and Requirements*

The Heap Leach Pad (Phases 1, 2 and 3) is designed to accommodate an ore production rate of 29,500 tonnes/day for an anticipated capacity of approximately 92 million tonnes (dry weight) of ore. The confining embankment will be designed such that the HLF will be able to provide safe storage for the required ore tonnages and will provide sufficient solution storage capacity in the In-Heap Pond. The requirements for the In-Heap Pond and Confining Embankment are described in the following sections.

5.2.3 *Confining Embankment*

The HLF confining embankment will provide heap stability and containment of process solutions in the In-Heap Pond. The embankment dam is designed as an earthfill/rockfill structure with a geomembrane lined upstream dam face and appropriate filter and transition zones to ensure containment integrity. Appendix E presents the filter design. The Construction Plan (Appendix P) provides details of the foundation preparation, embankment fill materials and sources, and anticipated construction methods.

The embankment height was determined in conjunction with the In-Heap Pond storage capacity. The embankment height depends on the In-Heap Pond storage capacity and vice versa. The capacity of the In-Heap Pond and embankment height are discussed further in Appendix F in the technical memorandum titled *In-Heap Pond, Spillway and Event Ponds Sizing.*

The embankment section includes an 10 m crest width at Elevation 888 masl for road and pipeline access and 2.5H:1V upstream and downstream slopes (see 300-GT-018). The fill types include compacted rockfill material taken from selective excavations for placement in the central and downstream section of the embankment. The pre-production mine pit overburden removal excavations are estimated to include sufficient quantities of materials suitable for embankment fill and site grading fills. More competent durable rock for production of required drain rock will be quarried and crushed from required site excavations and filter materials will be produced from screening of placer fill materials in the Dublin Gulch valley bottom that require excavation.

5.2.4 *In-Heap Pond*

The In-Heap Pond is defined as the storage volume created within the pore space of the ore, directly upstream of the confining embankment. The In-Heap Pond volume requirements are described in Appendix H and were determined assuming a combination of low probability events occurring simultaneously. This conservative approach was taken to ensure adequate storage volume under the worst of conditions. The In-Heap Pond will provide containment storage for the following summation of events:

- Assumed Normal Operational Volume – the operational volume is the minimum amount of solution required in the pond to supply the gold recovery plant for 12 hours at a nominal rate of 2,770 m^3/hr. This has been added more for additional storage. Standard operating practice will be to keep operating solutions below this level. The sumps for the pumps will be designed to be deep enough to prevent pump cavitation and this will be the limiting factor for minimum process solution levels within the in-heap pond.

- Runoff Volume from 100-year 24-hour rainfall event – the contributing area for the 100-year 24-hour rainfall event is assumed to come from a contributing area of approximately 1.45 km^2 , which comes from all three phases of the HLF and any remaining upgradient area within the Ann Gulch drainage basin. The depth of the 100-year 24-hour rainfall event is assumed to be 72 mm, which was derived by Knight Piesold (2012) from the *Rainfall Frequency Atlas for Canada* (Env. Canada, 1985). Thus, the runoff volume reporting to the In-Heap Pond is 104,400 m^3 based on the SCS curve number method using a curve number of 77.

- Snowmelt Runoff Volume ─ the snowmelt runoff volume is the volume of water that is melted during a 24-hour rain-on-snow event followed by 48 hours of melting. The amount of snow that melts during the 100-year 24-hour rainfall event was calculated using an empirical equation in the *Manual of Operational Hydrology for British Columbia* (MOE, 1991). The equation is shown below and results in a snowmelt of 26.4mm. The amount of snow that melts during the two days following 100-year 24-hour event was calculated

using the degree-day method (NEH, 2007), and the result is 15.1 mm/day. This comes to a total of 56.6mm over three days which is about one-third of the estimated maximum average snowpack depth of 164 mm (Wardrop, 2011a). Thus, the snowmelt volume reporting to the In-Heap Pond would be 82,026 m^3 if no mitigating management efforts, such as snow removal and disposal of snow that has not come into contact with placed ores or process solutions.

Rain-on-Snow Melt Equation (MOE, 1991):

$$M_t = T_a(1.33 + 0.86V + 0.0126P_r) + 2.33$$

Where:

M_t = *snowmelt in (mm/day)*
W_m = mean wind speed during event (m/s)
T_m = mean temperature during event (^{0}C), and
P_{24} = the 1:100 year 24-hour rainfall volume (mm).

Snowmelt Equation (Degree-Day Method, NEH, 2007)

$$M = C_m(T_a - T_b)$$

Where:

M = snowmelt (mm/day)
C_m = the degree-day coefficient (mm/degree-day °C)
T_a = mean daily air temperature (°C)
T_b = base temperature (°C)

- Heap Draindown Volume – in the event of a power loss (pumps stop operating), pump malfunction, or pump maintenance, the in-heap pond must be able to accommodate the draindown from the Heap. Generally, most operations have redundancy in pumping capacity as well as back-up generators to sustain pumping requirements, and standard practice is to provide for 24-hours of draindown. The Eagle HLF has been conservatively designed to accommodate 3 days (72-hours) of draindown.
- Freeboard – 0.5 m of freeboard below the ultimate Embankment crest is required. The 0.5 m of freeboard is added above the corresponding stage-storage volume that provides the required total volume. In this case, the embankment elevation (888 m asl) was conservatively designed to have 2 m of freeboard above the spillway invert elevation of 886 m asl.

The summation of the In-Heap Pond volume requirements are summarized in Table 5.1 below. The In-Heap Pond must provide 419,106 m^3 of solution storage capacity, excluding freeboard.

Table 5.1: In-Heap Pond Volume Requirements Summary

Volume Requirement	Volume (m^3)
Assumed Normal Operational Volume	33,240
Runoff from a 100-year 24-hour Rainfall Event	104,400
Snowmelt Runoff Volume	82,026
Heap Draindown Volume	199,440
Total	**419,106**

The total required In-Heap Pond volume (419,106 m^3) was compared to the net stage-storage curve to obtain a corresponding elevation that will provide the necessary storage volume. An elevation of 885 m will provide a volume of 421,154 m^3. Elevation 886 m was selected because it will provide 447,945 m^3 and an additional factor of safety.

The final Embankment crest elevation will be at 888 m, providing 2 m of freeboard above the spillway invert elevation of 886 m. The spillway is sized to convey 1/3 between the 1000-year event and the PMF per CDA guidelines. The ultimate storage capacity of the In-Heap Pond up to the final Embankment crest elevation (888 m) is estimated at 504,560 m^3.

5.2.5 *In-Heap Pond Spillway*

The In-Heap Pond spillway was designed in accordance with the Canadian Dam Association (CDA) guidelines for a "High" consequence dam. According to the CDA (2007) guidelines a dam classification of High suggests a design flood of 1/3 between the 1,000 year event and the Probable Maximum Flood (PMF). Flow from the Spillway will then be routed through to the Events Pond.

A worst case scenario was developed for calculating the largest peak flow to be experienced by the spillway. The scenario assumed that Phase 1 of the pad is constructed, Phases 2 and 3 are being cleared and grubbed for construction, and the pad is loaded with ore to elevation 883 m (roughly at the spillway invert - below the Embankment crest). The scenario also assumed that the ore is loaded to this elevation, and is completely saturated when the design storm events occur. The HLF temporary interception ditches above the Phase 1 pad (sized for the 100-year, 24-hour event) were assumed to have overtopped resulting in the entire upstream watershed contributing to the peak flow.

The peak flow from the PMF is 24.1 m^3/s and 6.0 m^3/s for the 1000-year event based on hydrologic modeling. Therefore, the design flow for the spillway based on CDA regulations of 1/3 between the 1000-year and the PMF is 12.0 m^3/s. The summary of hydrologic modeling can be found in Appendix H.

The Spillway will need to be box culverts to allow for a road to go over the top of the spillway (at elevation 886 m asl), the dimensions of these culverts were determined using HY-8 (FHWA, 2008) and then verified with hydraulic analysis using HEC-RAS (HEC, 2010b). There will be two 2.4m wide by 1.5m high box culverts at the upstream end of the Spillway which are needed to convey the design flow without overtopping.

The U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-RAS model, version 4.1 (HEC, 2010b) was used to analyze the entire length of the spillway to confirm dimensions and evaluate the hydraulic jump from the design flow before it enters the Events Pond.

Based on results of the HEC-RAS model, the Spillway downstream of the box culverts will be rectangular with a width of 4.5 m and a depth of 2 m. The spillway will have an invert of 886 m asl at the upstream end. This configuration allows for 2.0 m of freeboard from the maximum anticipated water surface elevation (886 m asl) to the crest of the Embankment (888 m asl). The In-Heap Pond Spillway design details are discussed further in Appendix H in the technical memorandum titled In-Heap Pond, Spillway and Event Ponds Sizing.

Drawings 300-GT-36 through 300-GT-39 present details of the In-Heap Pond spillway design.

5.3 Events Pond

The Events Pond serves as overflow containment providing additional storage in case the In-Heap Pond capacity is exceeded. The Events Pond is sized to provide containment storage for

¾ of the Probable Maximum Flood (PMF) Event. The PMF event rainfall depth was estimated to be 256 mm (Knight Piesold, 2012) which is assumed to contribute entirely over the maximum contributing area (Phases 1, 2 and 3 and the remaining upgradient area in the Ann Gulch drainage basin) of 1.45 square kilometers. The SCS curve number method was also used to calculate the peak flow and runoff volume form the HLF that overflows the spillway and reports to the Events Pond. The rainfall volume from the PMF reporting to the Events Pond is 280,000 m^3, and the peak flow is 24.1 m^3/s. Thus the maximum required pond volume is approximately 210,000 m^3 (i.e., ¾ of 280,000 m^3).

The maximum capacity of the Events Pond is designed to contain 254,848 m^3 with no freeboard, and 203,967 m^3 with 1 m of freeboard. The peak discharge from the PMF through the Events Pond after hydrologic routing is expected to be 3 m^3/s. The spillway on the Events Pond will have a bottom width of 3 meters and a depth of 1 meter. The Events Pond design details are discussed further in Appendix H in the technical memorandum titled In-Heap Pond, Spillway and Event Ponds Sizing.

See Drawings 300-GT-30 through 300-GT-35 for the Events Pond design details.

5.4 Liner System Design

5.4.1 *General*

The liner for the leach pad and events pond will consist of a composite geomembrane and underlying low-permeability bedding material, which is the state-of-practice liner system for heap leach facilities. The primary purpose of the composite liner system is to prevent the loss of HLF process solutions for both environmental and economic reasons. In addition to playing a role in preventing leakage, the underliner beneath the geomembrane is necessary as a transition layer between the geomembrane and the prepared foundation.

A geosynthetic clay liner (GCL) will be used in lieu of a 300mm thick layer of compacted low-permeability material due to the lack of suitable onsite soils in sufficient quantities. The GCL soil liner provides an equivalent 300 mm minimum thickness of $1x10^{-6}$ cm/sec or lower permeability soil layer.

Differential settlement on the liner system due to variable loading conditions was considered in the liner design. LaGatta et al. (1997) performed tests to measure the hydraulic conductivity (k) of GCLs exposed to differential settlement. They found that in most cases, needle-punched GCLs maintained a $k \leq 1x10^{-7}$ cm/sec even when exposed to tensile strains of up to 10 percent or more, depending on test conditions. Overlapped seams maintained the low k value even when slippage occurred along the overlap. Their literature review indicated that compacted clay subliner can experience failure at tensile strains as little as 0.1 to 4 percent. Thus GCLs may be more resistant to damage from differential settlement than compacted clay liners.

The higher cost for GCL can be offset by cost savings in construction time due to the relatively rapid deployment of the GCL rolls during geomembrane liner installation, where no moisture conditioning or compaction is required. The GCL surface provides rock puncture protection to the overlying geomembrane liner, and only requires a smoothed and compacted subgrade surface graded to drain and support the composite pad liner system.

Free-draining granular material will be placed on top of the pad liner together with a network of collection pipes to collect and drain process solutions and storm infiltration, and to minimize hydraulic heads on the liner, thereby reducing the risk of leakage. Piezometers will be installed within the liner cover fill at the strategic locations to monitor the hydraulic head on the liner system during pad operation.

The in-heap pond will have a double-geomembrane liner installed over a GCL liner together with a leak detection system. The leak detection system will be installed between the two geomembranes to monitor and contain any leaks through the top geomembrane.

The events pond also will be lined with a double-geomembrane liner installed over a GCL liner together with a leak detection system. This will allow it to contain excess solutions for short durations until the excess can be taken up by fresh ore. Details of the pad and pond liner systems are shown on Drawing 300-GT-011.

5.4.2 *Liner Subgrade*

Subgrade preparation for the GCL placement will involve subgrade compaction to 95 percent of the maximum dry density based on ASTM D 698. Rocks larger than 38 mm in diameter will first be removed from the upper 150 mm of the subgrade prior to compaction. Areas to receive liner that consisted of weathered rock or site grading fill will require import of fine-grained material to cover the surface and form a suitable subgrade.

5.4.3 *Geomembrane Selection*

The critical aspects of geomembrane selection for this project include accommodation for puncture resistance, elongation capacity (elasticity), expected foundation consolidation in fill areas under the ore heap, adequate interface shear strength between the pad geomembrane and the underlying soil liner or GCL and overlying cover fill for heap stability, and satisfactory performance under exposure to climatic conditions (temperature expansion and contraction, wind forces, and sunlight ultraviolet (UV) effects).

The geomembrane types typically used for heap leach facilities are LLDPE, HDPE, and polyvinyl chloride (PVC). The more flexible LLDPE and PVC geomembranes are best for buried applications subjected to high loads such as the leach pad. HDPE geomembrane is best for exposed applications such as the ponds and ditches. LLDPE geomembranes were selected for the leach pad including the in-heap pond geomembrane, and HDPE geomembranes were selected for the events pond for the following reasons:

- LLDPE geomembrane has significantly better elongation performance, puncture resistance, interface friction strength, and stress cracking resistance compared to HDPE geomembrane;
- LLDPE geomembrane remains flexible at temperatures well below freezing to about -25°C with a low temperature brittleness of -70°C according to ASTM D-746;
- HDPE geomembrane has better chemical and UV resistance; and
- LLDPE geomembrane can be readily seamed to HDPE geomembrane.

A 2.0-mm (80-mil) LLDPE top geomembrane was selected for the leach pad, based on performance requirements and past design and construction experience. The geomembrane will be double-side textured above the GCL to enhance heap stability and construction safety. The event pond top geomembrane will be 2.0-mm (80-mil) single-side textured HDPE with the textured side up for traction.

A geocomposite (drainage net) will be installed between the in-heap pond and event pond geomembrane systems and will tie to a leak detection sump and pipe system for collecting and removing any leaks through the top geomembrane. The geocomposite will consist of a geonet heat-laminated on both sides with nonwoven geotextile. The geonet is a netlike polymeric material formed from intersecting ribs integrally joined at the junctions and is used to facilitate drainage between the geomembranes.

5.4.4 *Description of Liner Systems*

The lining system for the HLF In-Heap Pond is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The lining system for the HLF Phase 1 pad (up-gradient of the In-Heap Pond) is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geosynthetic clay liner (GCL) below the 2.0mm (80-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The Events Pond will be a double-lined facility with LDRS having the following components:

- An 2.0mm (80-mil) high-density, polyethylene (HDPE) liner (top liner);
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE bottom liner; and
- Liner bedding beneath the GCL.

5.4.5 *Liner System Testing*

A large scale puncture test was performed on the 1.5mm (60-mil) and 2.0mm (80-mil) double-side textured LLDPE geomembrane underlain by a GCL and subgrade soil liner and overlain by granular fill with various maximum particle sizes. The soil subgrade and cover fill materials were of representative samples obtained from the project site. A normal stress of 4,413 kPa (640 psi), which represents 150% of maximum ore load, was applied for 48 hours and the geomembrane inspected for damage. No punctures were observed visually or detected by a vacuum box test with a negative pressure of 62 kPa (9 psi). The geomembrane puncture test results are included in Appendix B. Liner puncture tests for the following drain cover materials:

- minus 25mm (1-inch)
- minus 38mm (1.5-inch)
- minus 50mm (2-inch)

All tests passed for both 1.5mm and 2.0mm LLDPE geomembrane with no significant damage to liner under max static loading. Therefore 1.5mm LLDPE with a drain cover material containing particles up to 50mm could be considered acceptable for operational use. However 2.0mm LLDPE with maximum 38mm drain cover particle size was conservatively selected for design for better operational reliability of the liner system and to mitigate against potential geomembrane damage considering construction loading that may occur during placement of the drain gravel over the geomembrane.

A large scale direct shear test was performed on the interface between the textured LLDPE geomembrane and the underlying GCL and soil subgrade and overlying cover fill materials from the site. The test was performed to obtain interface shear strength parameters for use in the heap stability analyses. The results of the test are provided in Appendix J along with results of the stability analyses. Further discussion of the stability analyses is found in Section 5.10 of this report.

5.5 Overliner Drain Fill

A drain cover fill layer (termed Overliner Drain Fill or ODF within the construction documents) will be placed over the entire In-Heap Pond and leach pad area including the upstream face of the confining embankment. The ODF will be produced from the crushing of relatively clean durable rock material. Some screening may be required to produce a free draining, non-plastic, ODF material with a minus 38 mm maximum rock size, less than 20 percent passing the No. 4 ASTM sieve size, and less than 5 percent fines passing the No. 200 ASTM sieve size. The design criteria specify an ODF permeability and maximum ore heap load to ensure both, reasonable spacing of the drain pipes and fully drained heap conditions.

The ODF will consist of a 1 meter thick layer of crushed material. A network of perforated piping will be embedded in the layer to help convey the solution within the layer. Drainage collected in the overliner will report to the In-Heap Pond and to be reclaimed via the solution collection wells located on the upstream face of the HLF confining embankment.

The primary functions of the ODF are as follows:

- minimize the head on the geomembrane liner system to reduce the risk of process solution leakage,
- protect the synthetic liner from damage during ore placement,
- maximize the return of the gold containing pregnant solution for processing.

The piping network embedded in the ODF will consist of a series of dual wall corrugated, smooth interior, slotted collection pipes. The piping network will provide rapid transport of process solution to the In-Heap Pond and maintain a minimal head on the liner. Drawings 300-GT-027 through 300-GT-029 illustrate the layout of the solution collection pipework in the ODF material. The minimum in place hydraulic conductivity of the overliner will be $2x10^{-4}$ m/s.

5.6 Solution Collection System

5.6.1 *Solution Pipe Network*

Solution will be collected in the high permeability overliner material at the base of the heap pad, with perforated collection pipes placed within the overliner to increase solution removal rates. The designed heap leach pad will contain a piping network that will be distributed throughout the limits of the facility and will accommodate the volumes from a 100-year, 24-hour storm in addition to 150% of the flow generated from the applied leaching solution. The drain pipes are located within the free-draining overliner material placed above the pad liner and will collect and convey the stormwater and Pregnant Leach Solution (PLS) to the in-heap pond.

The Heap Leach Pads' drain pipes will consist of 100-mm, 250-mm and 450-mm diameter corrugated dual-wall, perforated ADS N-12 pipes. A series of 100-mm primary collector pipes will be spaced at 25 m on center and arranged in a "herringbone" pattern to convey flows for

collection in 450-mm header pipes. Where slope lengths dictate, secondary 250-mm collector pipes will be required to convey flows from the 100-mm pipes to the 450-mm header pipes.

In order to maximize the efficiency of the ore's drainage and to minimize the potential for leakage through the pads' liner system, the hydraulic head above the liner was designed to be less than a maximum height of 1.5 m between the drain pipes which results in an average head of about 0.6 m. Considering the maximum allowable hydraulic head, the minimum secondary pipe spacing of 25 m on center will allow for efficient drainage and also represents a spacing that considers ease of placement during construction.

The pipes will ultimately be covered by an average ore stack of less than 60 m, with a maximum ore stack height of 150 m. The effects of the maximum load on the pipes were analyzed to verify acceptable deflections are not exceeded in order to ensure integrity of the pipes under operational conditions.

Appendix F presents the pipe spacing and flow design calculations and Appendix G presents the pipe deflection analysis.

5.6.2 *Solution Collection Sump and Riser*

The collection pipe network in the overliner drain fill will direct the solution to the sump at the toe of the embankment for pumping through inclined riser pipes to the process plant. The entire facility will be graded towards a collection sump at the toe of the confining embankment.

The base of the sump will be constructed approximately 2 m below the elevation of the surrounding liner, and will have approximate dimensions of 7 m by 21 m. The liner system and LDRS will extend under the sump. Solution will be pumped from the sump through three of five available inclined risers to the process plant.

The inclined arrangement will consist of five thick-walled, steel pipes, each approximately 0.90 m in diameter to allow for raising and lowering of a submersible pump (designed by others). Three pumps will have the capacity to meet the solution application throughflow. The remaining two riser pipes will be installed as a back-up, in order to maintain access to the sump in the event that the any riser pipes becomes blocked. The base of the risers will rest on a gravel layer, additional layers of geotextile and geomembrane, and will be located within the overliner material, not on the liner, to provide a buffer zone above the liner system to resist the riser pipes from pushing down into the liner.

The riser pipes will be surrounded with a zone of fine gravel material, which will act as a protective cushioning layer. A zone of coarser gravel will be placed around the base of each riser to a minimum depth of 5m for frost protection and cushion material, and in order to promote flow of solution toward the riser. Beyond the zone of coarse gravel, the regular crushed ore will be placed.

Drawings 300-GT-020 through 300-GT-023 present the sump design details.

5.7 Leak Detection and Recovery Systems

5.7.1 *General*

A Leak Detection and Recovery System (LDRS) will be constructed within the In-Heap and Events Pond and will consist of a monitoring sump equipped with an automatic, fluid-level activated pump located between the top and bottom liners. The pump will be sized to sufficiently remove fluids to minimize head on the bottom liner.

The ponds will be graded to the sump at a minimum 1% slope, facilitating gravity collection of any potential leaks in the top liner via the geonet material located between the two geomembranes to allow fluid to the sump. More detailed information regarding the In-Heap and Event Pond LDRS is presented in Appendix I.

Drawing 300-GT-024 presents the LDRS sump design details.

5.7.2 *Action Leakage Rates*

As presented in Appendix I, potential leakage rates through the primary (top) liner of the ponds were calculated to determine required sump sizes and the Alert Levels for each pond.

Alert Levels were determined using industry-standard methodology assuming good Quality Control and Quality Assurance during installation of the geomenbrane and subsequent construction of the solution piping and overliner drain fill. The calculations are based on either Giroud's Equation, Bernoulli's Equation for free flow through an opening, and/or Darcy's Law. Detailed calculations are presented in Appendix I.

The Alert Levels for the In-Heap Pond, as measured by the amount of fluid potentially pumped out of a process solution pond's LDRS, were calculated to be:

- Alert Level 1 = 84 liters per minute
- Alert Level 2 = 1,582 liters per minute; and
- Design LDRS Pumping Capacity = 2,372 liters per minute.

The Alert Levels for the Event Pond were calculated to be:

- Alert Level 1 = 11 liters per minute
- Alert Level 2 = 217 liters per minute; and
- Design LDRS Pumping Capacity = 325 liters per minute.

If, during normal operations, it is found that the amount of fluid pumped back to the pond from the LDRS exceeds the AL1, the operator should take action to determine the cause. This action may include physical inspection, mechanical leak detection, electric leak location, or other methods to determine what is causing the Alert Level 1 exceedance in order to maintain the liner integrity such that the Alert Level 2 is not exceeded.

If, during normal operations, it is found that the amount of fluid pumped back to the pond from the LDRS exceeds Alert Level 2, the operator should follow the project Emergency Response Plan (ERP) (Tetra Tech 2014b).

5.8 Underdrain System

The HLF underdrain system provides for the collection and drainage of subsurface water beneath the lined facility in order to limit upward pressure on HLF liner. The underdrain will be constructed with geofabric wrapped around granular drain rock backfill materials and 100mm perforated pipes placed at regular intervals (approximately 75m spacing) beneath all phases of the HLF, with additional drains to be installed during construction as field conditions dictate. The drains will convey unaffected subsurface water to collector pipes that will discharge to an outlet monitoring vault. The vault is configured to allow for sampling of seepage flows for water quantity and quality, and is equipped with a pump system to return flows to the HLF for use as make up water or allow flows to outfall to Dublin Gulch if discharge criteria are met. Details of the proposed underdrain system are shown in Drawings 300-GT-015 through 300-GT-016.

In addition to providing control for groundwater seepage, the underdrain system also provides leak monitoring capability for the upper HLF (above the in-heap pond area). The transverse primary underdrains will provide interception of potential leakage through the liner, and the underdrain collection pipes will be placed below the PLS header pipe corridor where flows will be concentrated during leaching operations, thereby providing leak monitoring of critical areas most likely to have fluid present on the liner system during much of the operational life of the facility.

The proposed liner system is designed to limit any leakage through the geomembrane by use of a low permeability GCL. It is highly unlikely that substantial leakage through the geomembrane and GCL components of the liner due to the composite nature of the liner system. Under normal conditions, low hydraulic head levels will be present over the liner system in the upper HLF area resulting in low leakage rates. The lower HLF area will include a double lined facility with a leak detection and recovery system. In these areas, the underdrain system will provide a secondary detection capability.

In the unlikely event unplanned measureable leakage occurs from the liner system, the unplanned discharge would be identified during regular water quality monitoring of flows at the outlet monitoring vault. Separate non-perforated collection pipes for each phase of the HLF allow the outflows from each area to be monitored independently. This allows for more focused mitigation actions in the case of water quality exceedance from the underdrain monitoring system. The vault is also equipped with a pump system (designed by others) to return any leakage identified to the HLF.

5.9 Closure Drain System

During closure of the heap leach facility, the cyanide in the spent ore will be destructed and the heap will be rinsed. Once acceptable water quality is verified, the liner system below the in-heap pond will be punctured by drilling to allow complete drainage of water through a pre-installed outlet system. The closure inlet sump and drain pipes are sized to convey the wettest month precipitation in order to minimize solution accumulation within the spent ore. The closure drain inlet system will consist of a LLDPE lined gravel sump with non-perforated PE outlet pipes. The closure inlet will be placed directly below the leak detection sump to ensure that residual flows from the leak detection system are directed to the closure outfall. The liner system will be punctured by drilling through two pre-installed open casing pipes extending to the PLS sump. A drill string will be lowered through each casing allowing drilling through the PLS and LDRS sump liners. A series of pre-installed steel plates will guide the drill and stop the drilling head at the appropriate depth within the closure sump. Once the drill string is retrieved, fluid will drain trough the punctured liner into the closure sump where it will enter the closure outlet pipe and drain by gravity to the outlet vault.

The closure drain pipes will be directed to the underdrain system outlet vault, and will use similar controls to allow for water quality and quantity monitoring. The underdrain pump return system will remain in place to allow return of flows to the HLF if needed. The closure outlet system is presented in Drawings 300-GT-024 through 300-GT-026.

5.10 Slope Stability

Slope stability analyses were conducted on four two-dimensional sections to assess the slope stability of the proposed design for the heap leach facility. The locations of these sections are illustrated in Figure 3.1 of Appendix J.

Based on a dam break analysis and inundation study presented in Appendix D, the HLF dam has been classified as "High" according to Canadian Dam Association (CDA, 2007) dam

classification guidelines. CDA design recommendations for "High" hazard dams include consideration of the Earthquake Design Ground Motion (EDGM) for 1/2500 return frequency and factors of safety. Based on the site-specific SHA (Appendix C), the design PGA of 0.35g was selected for the HLF and represents a low-probability or MCE ground motion, as determined using an MCE of moment magnitude 6.0.

The HLF was evaluated for both static and pseudo-static (earthquake) conditions using a Design Basis Earthquake (DBE) for operational conditions and a Maximum Design Earthquake (MDE) for long-term post-closure conditions. The engineering design criteria provide for an operational minimum static factor of safety of 1.3 for the ore heap (non-impounding areas) and 1.5 for the confining embankment. The minimum factor of safety for pseudo-static conditions is 1.0.

5.10.1 ***Phreatic Conditions***

5.10.1.1 Leach Ore Pile

The granular ore heap will be wetted by controlled leaching, but will have a gravity drain system above the pad liner draining to an internal sump. Therefore, the heap will remain in an unsaturated state except within a portion of the in-heap solution pond, where the embankment provides physical confinement. For design purposes, a maximum head of 1.0 m on the pad liner was used in areas outside the in-heap solution pond and the water level in the in-heap pond was assumed to be at the spillway invert. Piezometers will be installed in the heap above the in-heap pond level to monitor and confirm the low phreatic conditions during operations.

5.10.1.2 Embankment and Collection Ponds

The HLF embankment upstream face will be lined with a double geomembrane designed to limit seepage. However a phreatic surface was conservatively modeled in the HLF embankment to simulate a large rupture in the liner system on the upper portion of the dam. This condition is considered highly unlikely and representative of a "worst-case" scenario.

5.10.1.3 Foundation

A phreatic surface was included in the foundation materials beneath the events pond based on a conservative assumption that groundwater could be present several meters below the liner system. A liner underdrain has been incorporated into the design to drain the foundation materials and prevent upward hydraulic pressure on the liner. Although shallow groundwater conditions exist at the site (particularly in the placer deposits along the Dublin Gulch valley floor), the combination of the liner underdrain, interception collection trenches to be installed along the upstream edge of the Phase 1 HLF pad, and reduction of infiltration due to placement of the liner system, a lowered groundwater level in the Dublin Gulch valley is expected during operations and into post-operations.

5.10.1.4 Modeled Conditions

Two different groundwater conditions were assumed: operational and long-term post-closure. The operational condition was considered for both static and pseudo-static analyses. This condition was modeled by an upper phreatic surface within the crushed ore, the liner interface and the structural fill in the embankment, and a lower phreatic surface which impacted the in-situ materials (colluvium, placer tailings and alluvium, and weathered bedrock).

The upper failure surface was intended to simulate a large rupture of the liner system at the embankment upstream face thereby allowing the phreatic surface to continue through the liner into the embankment structural fill, where it passed into the lower drain. The post-closure

groundwater condition was used in the post-closure static and pseudo-static analyses. This case assumed the liner had been perforated during closure of the HLF and no longer retained the perched upper phreatic surface.

5.10.2 *Liquefaction*

5.10.2.1 Foundation

The confining embankment foundation preparation includes partial excavation stripping and removal of the poorly consolidated placer tailings in the Dublin Gulch valley. The loose placer tailings may be susceptible to liquefaction during intense earthquake events, and will be treated with deep dynamic compaction to strengthen the dam foundation and to provide a firm foundation for the liner system in the in-heap pond area.

The confining embankment foundation preparation includes densification through Deep Dynamic Compaction (DDC). The DDC method will achieve deep ground densification using the dynamic effects of high energy impacts resulting from the drop of large weights, mitigating against potential liquefaction. Liquefaction analyses and DDC performance criteria are presented in Appendices K and L. The technical specification for DDC is provided in the Construction Plan (Appendix P).

5.10.2.2 Ore Heap

The upper leach facility (above the in-heap pond) is designed to operate with solution collection and low phreatic conditions within the heap. The mostly drained, generally granular heap has a negligible risk of experiencing the increases in pore pressure which cause liquefaction during dynamic (earthquake) loading. The ore within the in-heap pond is considered saturated, and therefore may be susceptible to liquefaction. For the pseudo-static analyses, this material is assumed to have a reduced strength to simulate potentially liquefied ore within the in-heap pond during the design earthquake event.

5.10.3 *Stability Analysis Methodology*

Stability analyses were conducted using the Slope/W component of GeoStudio 2007 (v. 7.20) by GeoSlope International, Ltd. Slope/W was used to conduct limit equilibrium analyses using the general limit equilibrium (GLE) method, which satisfies both moment and force equilibrium. The Slope/W program incorporates a search routine to locate the failure surfaces with the lowest factor of safety within user-defined search limits. Trial failure surfaces were defined with “entry and exit” parameters. This option defines a range of possible slip surface entry and exit locations within which the most critical (lowest factor of safety) may be found. Additional details and material properties used in the analyses are provided in Appendix J.

5.10.4 *Stability Analysis Results*

Appendix J presents results of the stability analyses for the HLF. Acceptable factors of safety are demonstrated for both the ore pile and the HLF confining embankment.

5.11 Empirical Estimate of Seismic Deformation of Rockfill Embankments

Previous studies indicate relatively low settlement occurs in large rockfill dams when subjected to earthquake loading. The performance of the Dublin Gulch embankment during earthquake loading was estimated using a variety of approaches including semi-empirical and simplified analytical procedures to evaluate an overall average or probable response and provide an indication of the potential ‘order of magnitude’ deformation under the levels of earthquake loading considered. These methods included the procedures of Makdisi and Seed (1978),

Franklin and Chang (1978), Ambraseys and Srbulov (1995) Ambraseys and Menu (1998), Travasarou, Bray, and Der Kiureghian (2004), and Bray and Travasarou (2007). The deformation results for the Eagle Gold project are presented in Appendix L.

The results of the simplified deformation analyses demonstrate that the heap leach facility is stable at the MCE seismic loading considered for a M=6.0 earthquake at a distance of 6km (PGA=0.35g) and for a M=7.0 earthquake at a distance of 30km (PGA=0.31g). For the HLF confining embankment with a maximum height of about 50 m above the original ground surface, the maximum vertical deformation computed using any of the methods considered was 8.6 cm for the facility under MCE loading conditions using the empirical method of Travasarou (2007). These empirical values are consistent with those estimated using the simplified procedures and are within the industry engineering standard for heap leach facilities. It should be noted that the empirical data includes hydraulic fill and earthfill dams and the results tend to be conservative for higher quality compacted rockfill embankments.

5.12 Settlement Assessment

A one-dimensional settlement assessment was performed for the HLF. The construction of the HLF will apply loads to the foundation soils which would result in total and differential settlements. These settlements may impact the performance of the proposed liner system and collection pipe network at the base of the HLF pad. In addition, the settlements may impact the stability of the confining embankment and the performance of other facilities directly associated with the embankment such as the conveyor system and the in-heap pond. The assessment has been conducted using data collected from geotechnical site investigations and site information obtained from various BGC reports.

Subsurface layer moduli were conservatively inferred from the limited SPT-N value data and from empirical correlations. Based on conservative estimates of strength parameters, the settlement calculations show that significant settlement may be expected in areas with deep fill (placer tailings) and colluvium. However, the planned ground treatment using Deep Dynamic Compaction of these materials will result in minimal settlement upon loading. Settlement within the slightly weathered bedrock was considered negligible.

The results of this settlement evaluation support the previous subgrade preparation recommendations by BGC, 2011:

1. Surficial organics should be removed from all foundation subgrades.
2. Frozen materials containing excess ice should be removed from all foundation and replaced with structural fill as required to build the grades up to design elevations.
3. Where colluvium is exposed as HLF subgrade, it should be proof-rolled to identify weak zones for removal and replacement with structural or rock fill.
4. All placer tailings should be removed from all foundation subgrades to expose Type 3 or better rock. Structural or rock fill can be used to build the grade up to design foundation elevations. Deep Dynamic Compaction is considered an acceptable alternative to removal of placer tailings.

Appendix M presents the settlement calculations.

5.13 Heap Leach Facility Water Balance

A water balance has been developed specifically for the Heap Leach Facility. The water balance model created accounts for a three phase Heap Leach Pad and a 100-day stockpile. The water balance model determines the amount of water available for recycle and the fresh make-up

water required in order to reach optimal leaching water content. Appendix N presents the water balance assumptions, parameters, calculations and results.

5.14 Surface Water Management of Heap Leach Pad

Temporary runoff interceptor ditches will be constructed for each phase of the heap leach pad in order to collect stormwater runoff from entering the heap. The ditches will be constructed and in operation before construction of each pad phase. The temporary ditches will be constructed at the up-gradient limit of each phase of the heap leach pad as the pad liner will tie into the access road adjacent to the ditches. Once the heap leach pad is ready for the next phase the temporary interceptor ditch will be filled and regraded for placement of the liner for the next phase.

As the ditches are only temporary and sized for the 100-year, 24-hour event, they will be unarmored and then backfilled at the end of each phase. See Drawings 300-GT-013 and 300-GT-014 for the layout of the temporary interceptor ditches and liner tie and phase transition details.

A narrow bench (10 m wide) will be constructed at the 885.5 m elevation adjacent to the HLF confining embankment crest for stormwater collection and conveyance of flows to the In-Heap Pond spillway which has an invert elevation of 886 m. In the event of an emergency or other unforeseen circumstance in which pumping of solution ceases, or in the event of excessive surface runoff from the heap leach pad, discharge of excess water or solution will be directed in a controlled manner through a lined spillway to the Events Pond. Solution levels within the heap are expected to be kept low during normal operations. However, during emergency situations, the In-Heap Pond spillway will prevent overtopping of the embankment, and will maintain containment of the solution at all times. The In-Heap pond spillway is designed to safely convey the flow represented as 1/3 between the 1,000 year event and the PMF. The Events Pond will incorporate an outlet spillway to safely pass the PMF peak flows after attenuation through the pond. Drawings 300-GT-034 through 300-GT-035 present the spillway designs and Appendix D presents the hydraulic calculations.

5.15 Dublin Gulch Diversion Channel

Construction of the Heap Leach Facility will encroach on the natural drainage of Dublin Gulch; this will necessitate diversion of Dublin Gulch around the Heap Leach Facilities (Heap Leach Pad, Confining Embankment, and Events Pond).

In general, the Channel will redirect flow in Dublin Gulch to the south of the proposed Heap Leach Facility and then follow a portion of the path of Eagle Creek before discharging into Haggart Creek. The design of the Dublin Gulch Diversion Channel (DGDC) is presented in Appendix A.

The DGDC extends past the downstream end of the Events Pond and under the Haggart Creek Access Road. Two box culverts were designed to convey the flow from the 100-year 24 hour event safely under the road without overtopping. The DGDC is sized to convey the 100-year event with freeboard and the 500-year event without freeboard. Also, the channel lining is stable for the 500-year event. The DGDC will be temporarily lined with ArmorMax Turf Reinforcement Matting (TRM) for slopes less than 5 percent and Fabriform for slopes greater than 5 percent until viable on-site riprap sources are available.

6.0 HLF CONSTRUCTION PLAN

A detailed construction plan has been prepared for the Eagle Gold Heap Leach Facility (Appendix P). The plan covers the following aspects of construction:

- Construction staging;
- HLF pad foundation preparation;
- HLF confining embankment;
- Liner systems;
- Overliner drain fill;
- CQA testing;
- Borrow development; and
- Geotechnical instrumentation.

The construction plan includes the project technical specifications which set out the requirements and procedures necessary to complete the construction of earthwork, geosynthetics, and pipework for the HLF.

7.0 HEAP LEACH OPERATIONS

7.1 General

Design of the ore conveyance and stacking, barren solution delivery, and PLS and LDRS pumping systems is provided by others. The following provides a general overview of the HLF operation.

Ore will be crushed year round (350 days) at a nominal rate of 29,500 dry t/d. Ore placement on the HLF will occur over a 250 day period at a rate of 41,300 tpd and stored on a 100-day stockpile during the coldest time of the year (November to March). The HLF will be loaded using a grasshopper conveyor system that will run down a lined corridor in the initial phase of loading with a stacker. Ore will be stacked at an overall slope of 2.5:1 (H:V) with benches between angle of repose lifts. The ore heap will be stacked in nominal 10 m thick lifts. However, the first lifts at the pad's lowest point adjacent to the dam may need to be thicker to allow sufficient space for leaching. Loading will begin at the toe of the embankment and progressively work upgradient and will alternate to permit sufficient time for leaching prior to placement of subsequent overlying lifts of ore. Drip emitters will be trenched into the top layer of the heap. Solution will be applied at an approximate irrigation rate of 2,770 m^3/hour over an approximate area of 277,000 m^2 for a planned leaching cycle estimated at 150 days.

Proposed heap leach operations will involve crushing and stacking 10 Mt of ore during 250 days per year with ore leaching year-round with active leach areas being leached in the winter months. The ore placement will be ahead of the active leaching areas during summer operations, then the emitters will be buried at the start of winter for frost protection and leaching will continue to "catch up" with the ore placement.

7.2 OMS Manual

An Operation, Maintenance and Surveillance (OMS) Manual has been prepared for the Eagle Gold Project Heap Leach Facility (HLF). Since the HLF design incorporates a dam, the OMS Manual was prepared in accordance with the procedures outlined in the Mining Association of Canada's (MAC) current guidance document *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (MAC, 2011). This Manual is issued under separate cover (Tetra Tech 2014a) and provides a framework for actions and a basis for measuring performance and demonstrating due diligence for the HLF operations. As discussed in the 2011 MAC guidance document, key items and activities covered in the OMS Manual include the following:

- Roles and responsibilities of personnel assigned to OMS activities for the HLF;
- Description of the HLF including site conditions, key components, regulatory requirements, and design criteria;
- Facility operations including ore stacking, leaching, in-heap solution management, solution processing, environmental protection, and documentation and reporting;
- Facility maintenance including routine and event-driven maintenance, and documentation and reporting; and
- Facility surveillance including routine, event-driven and annual comprehensive inspections and documentation and reporting.

Emergency preparedness and response planning for the HLF is covered in a separate document (Tetra Tech 2014b).

7.3 FMEA

A Failure Mode and Effects Analysis (FMEA) was performed with input from a team of cross-disciplinary experts. The FMEA utilized reliability-based methodology which allows a balanced evaluation of the risks associated with various components of a system. To effectively and proactively manage the HLF, there is a need to have a broad understanding of all of the associated uncertainties, risks, and consequences. It is important that focusing on one risk component, such as slope failure, doesn't lead to other components being overlooked.

Appendix Q presents the FMEA participants, approach and results. Risk priority numbers were calculated for identified potential failure modes based on assigned values for severity, occurrence frequency, and ability to detect precursors of potential events. The results are summarized in a risk register table.

8.0 MATERIAL QUANTITIES

The material quantities for the construction of the Eagle Gold HLF phases including earthwork, geosynthetics and piping are presented in the table included in Appendix O. Material shrinkage or bulking was not considered in calculating the earthwork cut and fill quantities. A seven percent factor has been added to the geosynthetics take-offs for overlap and waste.

9.0 GENERAL INFORMATION

The project site information and characteristics was provided by various consultants as referenced and acknowledged herein.

9.1 Applicability

This report entitled “Eagle Gold Project, Heap Leach Facility Detailed Design Report” has been prepared for the exclusive use of StrataGold for purposes of assessing the scope, feasibility and cost of heap leaching operations for the Project. No other parties shall be entitled to use this report without the written consent of StrataGold and Tetra Tech. The use of this report and information contained herein shall be at the sole risk of the user regardless of any fault or negligence of StrataGold or Tetra Tech. The design, construction methodologies and operating procedures described in the report are also intended to assist others in assessing environmental impacts of the project and to serve as supporting documentation for permitting by regulatory agencies.

9.2 Acknowledgement of Key Internal Participants

The project engineering analyses and designs were conducted by several Tetra Tech staff members under the guidance of Mr. Troy Meyer, P.Eng., Geotechnical Engineer and Project Manager. Mr. David Hallman, P.E. provided input on the seismicity and liquefaction analyses.

9.3 Quality Statement and Affirmation of Limitations

This report has been prepared in accordance with standard engineering practices for the Eagle Gold HLF Project at the time of report preparation. Information in this report is intended to provide an assessment of possible geotechnical and construction conditions for the HLF Confining Embankment and pad. The report is based on a review of existing site information, much of which was developed by others, which includes field investigations of the site and subsurface conditions in question, as described in various BGC reports, and relies heavily on extrapolation of actual site data from available investigations in the Project area along with a general understanding of geological processes in the Project area, and past experience with similar conditions. Variations can and do occur in geological and constructed materials and departures from the conditions portrayed in this report are possible. No other use is intended or implied by the information, opinions, conclusions, and recommendations contained herein.

This work has been completed to the level of detail and within the limits presented in this report. To the best of our knowledge, the information presented in this report is accurate to the limits specified herein. The material in the report reflects Tetra Tech’s best judgment in the light of information available to us at the time of preparation. Our services were performed in a prudent and diligent manner using reasonable skill, care, modern techniques and sound professional practice and standards.

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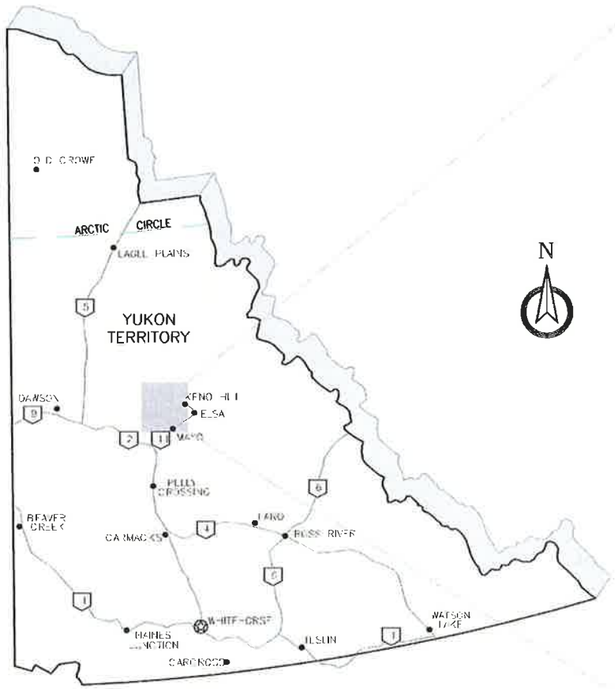
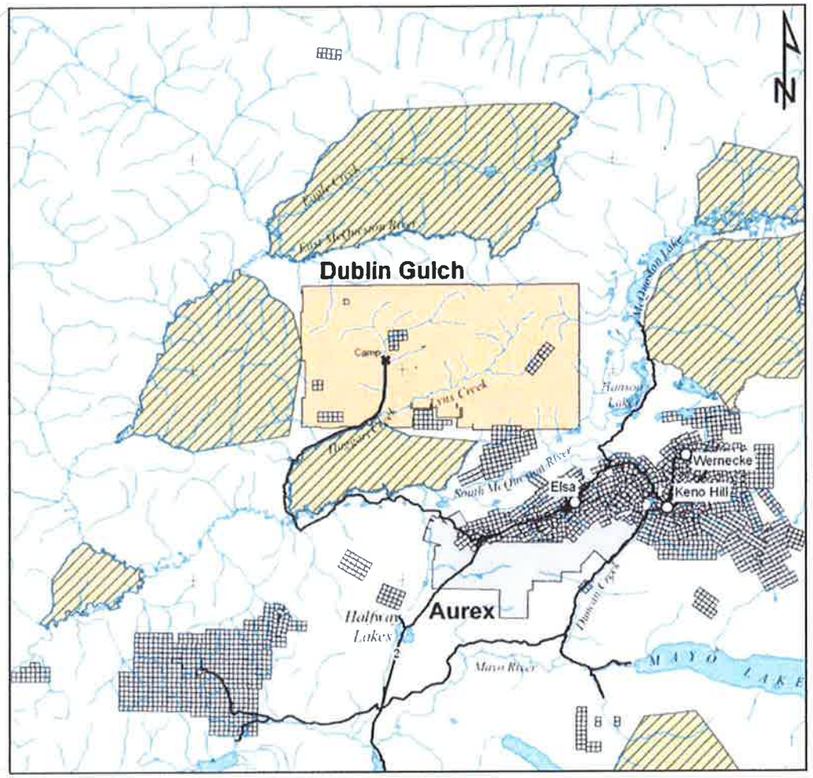
EAGLE GOLD PROJECT
HEAP LEACH FACILITY
PHASE 1 FINAL DESIGN



REGIONAL LOCATION MAP
N.T.S.



PROJECT LOCATION MAP
N.T.S.

DRAWING INDEX

DRAWING #	DRAWING TITLE
300-GT-001	TITLE SHEET AND DRAWING INDEX LOCATION MAP
300-GT-002	GENERAL NOTES & LEGEND
300-GT-003	GENERAL ARRANGEMENT
300-GT-004	SURVEY CONTROL PLAN
300-GT-005	SURFACE GEOLOGY MAP
300-GT-006	FILL DELINEATION MAP
300-GT-007	OVERALL LAYOUT PLAN
300-GT-008	PHASE 1 PAD GRADING PLAN
300-GT-009	PHASE 1 PAD GRADING SECTIONS
300-GT-010	PHASE 1 PAD GRADING SECTIONS
300-GT-011	LINER DETAILS
300-GT-012	CORRIDOR TYPICAL SECTIONS
300-GT-013	PHASE 1 TEMP. DIV. CHANNEL PLAN & PROFILE
300-GT-014	PHASE 1 TEMP. DIV. CHANNEL PLAN & PROFILE
300-GT-015	HLF UNDERDRAIN PIPING PLAN
300-GT-016	HLF UNDERDRAIN PIPING DETAILS
300-GT-017	EMBANKMENT PLAN VIEW
300-GT-018	EMBANKMENT SECTIONS
300-GT-019	EMBANKMENT DETAILS
300-GT-020	IN-HEAP SUMP DETAILS
300-GT-021	IN-HEAP SUMP SECTIONS
300-GT-022	PLS SUMP DETAILS
300-GT-023	PLS SUMP DETAILS
300-GT-024	LDRS & CLOSURE SUMP DETAILS
300-GT-025	CLOSURE PLAN AND PROFILE
300-GT-026	MONITORING VAULT DETAILS
300-GT-027	PLS RECOVERY PIPING PLAN VIEW
300-GT-028	PLS RECOVERY PIPING DETAILS
300-GT-029	PLS RECOVERY PIPING DETAILS
300-GT-030	EVENT POND PLAN VIEW
300-GT-031	EVENT POND SECTIONS
300-GT-032	EVENT POND DETAILS
300-GT-033	EVENT POND DETAILS
300-GT-034	EVENT POND SPILLWAY PLAN & PROFILE
300-GT-035	EVENT POND SPILLWAY SECTIONS & DETAILS
300-GT-036	IN-HEAP POND SPILLWAY PLAN & PROFILE
300-GT-037	IN-HEAP POND SPILLWAY SECTIONS
300-GT-038	IN-HEAP POND SPILLWAY BOX CULVERT DETAILS
300-GT-039	IN-HEAP POND SPILLWAY DETAILS
300-GT-040	PHASE 1 ORE PILE
300-GT-041	INSTRUMENTATION PLAN
300-GT-042	INSTRUMENTATION DETAILS
300-GT-043	STRUCTURAL GENERAL NOTES & DETAILS
300-GT-044	SPILLWAYS STRUCTURAL DETAILS
300-GT-045	BOX CULVERT STRUCTURAL DETAILS

PROFESSIONAL ENGINEER
YUKON
TROY LEE MEYER
TERRITORY
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY
TITLE SHEET AND
DRAWING INDEX
LOCATION MAP

PROJECT NO. 74010.01-02
DWG NO. 300-GT-001
REV NO. 3
DATE 4-22-13

File: G:\321\74010.01\03 Project Management\UFC DOC, mdh\Drawings\Title Sheet and Drawing Index.dwg LAST UPDATE: 4/24/2014 3:03 PM BY: DUSTIN

GENERAL NOTES:

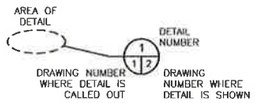
UNLESS OTHERWISE INDICATED ON THE DRAWINGS, THE FOLLOWING GENERAL NOTES SHALL APPLY:

1. ALL COORDINATES AND ELEVATIONS ARE SHOWN IN METERS, UNLESS NOTED OTHERWISE. COORDINATES AND TOPOGRAPHY ARE IN NAD83 (CSRS) UTM ZONE 8N COORDINATE SYSTEM. SURVEY PROVIDED BY UNDERHILL GEOMATICS LTD.
2. SURFICIAL GEOLOGY PROVIDED BY BGC.
3. EXISTING TOPOGRAPHY, COORDINATE SYSTEM AND BASE MAP INFORMATION OBTAINED FROM M3 ENGINEERING FROM 2011 LIDAR SURVEY.
4. ALL DIMENSIONS, STATIONING, AND SCALES ARE SI METRIC SYSTEM.
5. SITE INVESTIGATION BOREHOLES, TEST PITS, AND SEISMIC LINE LOCATIONS SHOWN ON THESE DRAWINGS ARE THE BASIS FOR INTERPRETATION OF SUBSURFACE CONDITIONS FOR DESIGN. SUBSURFACE CONDITIONS MAY VARY BETWEEN THE SITE INVESTIGATION LOCATIONS DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF ACTUAL SUBSURFACE CONDITIONS FOR CONSTRUCTION, AS WELL AS ANY CHANGES IN DESIGN GROUND LINES VERSUS EXISTING GROUND LINES BASED ON 2 METER CONTOUR INTERVAL TOPOGRAPHY.
6. TOPOGRAPHY AND MINE FACILITY LAYOUTS TAKEN FROM M3 DRAWINGS.
7. SAFETY BERM AND ROAD SURFACING TO BE CONSTRUCTED BY THE OWNER.
8. ROAD SURFACE TO BE SLOPED AND GRADED TO DRAIN. CULVERTS INSTALLED AS REQUIRED TO PREVENT PONDING.
9. FINAL DESIGN OF SITE-WIDE ACCESS ROADS BY OTHERS, OTHER THAN THAT SHOWN HEREIN.
10. OWNER WILL PROVIDE SITE SURVEYING CONTROL.
11. FINAL DESIGN OF THE PROCESS PLANT AND AGGLOMERATOR AND RELATED FACILITIES BY OTHERS.
12. FINAL DESIGN OF THE BARREN AND PREGNANT DELIVERY PIPELINES AND ASSOCIATED PUMPING AND DISTRIBUTION SYSTEMS, FRESH WATER SUPPLY PUMPS AND PIPELINES, MILL WATER PROCESS PIPELINES BY OTHERS.
13. ELECTRICAL UTILITIES BY OTHERS.
14. ALL FOUNDATIONS AND OTHER EXCAVATIONS SHALL BE INSPECTED BY THE OWNER'S ENGINEER PRIOR TO FILL PLACEMENT.
15. ALL DRILL HOLES SHALL BE PLUGGED WITH CEMENT OR BENTONITE (WITHIN LIMITS OF AFFECTED AREA).

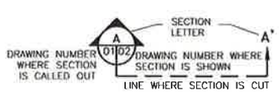
GENERAL LEGEND:

- 1020 — EXISTING CONTOURS (m)
- 1020 — PROPOSED GRADING CONTOURS (m)
- EXISTING FACILITIES
- PROPOSED FACILITIES
- HEAP EMBANKMENT
- EVENT PONDS
- DIVERSION CHANNEL
- SPILLWAY
- PHASE 1 PAD
- PHASE 2 PAD
- PHASE 3 PAD

DETAIL CALL-OUT



CROSS SECTION LOCATION



ABBREVIATIONS:

ADS – ADVANCED DRAINAGE SYSTEMS, INC.
AGRU – AGRU AMERICA, INC.
ASTM – AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWWA – AMERICAN WATER WORKS ASSOCIATION
BGC – BGC ENGINEERING INC.
℄ – CENTERLINE
CQA – CONSTRUCTION QUALITY ASSURANCE
CS – CARBON STEEL
DDC – DEEP DYNAMIC COMPACTION
DGDC – DUBLIN GULCH DIVERSION CHANNEL
DIA. – DIAMETER
E – EASTING (COORDINATE)
EL. – ELEVATION
EMBK. – EMBANKMENT
GCL – GEOSYNTHETIC CLAY LINER
GWL – GROUND WATER LEVEL
HDPE – HIGH-DENSITY POLYETHYLENE
HLF – HEAP LEACH FACILITY
I.D. – INSIDE DIAMETER
INV – INVERT
LDRS – LEAK DETECTION AND REMOVAL SYSTEM
LLDPE – LINEAR LOW-DENSITY POLYETHYLENE
M3 – M3 ENGINEERING & TECHNOLOGY CORPORATION
MAX. – MAXIMUM
MIN. – MINIMUM
N – NORTHING (COORDINATE)
NOM. – NOMINAL
NTS – NOT TO SCALE
O.C. – ON CENTER
O.D. – OUTSIDE DIAMETER
ODF – OVERLINER DRAIN FILL
OZ. – OUNCE
PLS – PREGNANT LEACH SOLUTION
PE – POLYETHYLENE
PVC – POLYVINYL CHLORIDE
SCH. – SCHEDULE
STA – STATION
S.S. – STAINLESS STEEL
TT – TETRA TECH
TYP. – TYPICAL
UV – ULTRAVIOLET
VWP – VIBRATING WIRE PIEZOMETER
WSE – WATER SURFACE ELEVATION
50m – DIMENSION IN METERS
2.5:1 – 2.5 HORIZONTAL TO 1 VERTICAL SLOPE
~ – APPROXIMATELY

FILL TYPES FOR CONSTRUCTION

FILL MATERIAL NAME	FILL DESCRIPTION	MOISTURE CONDITIONING	LOOSE LIFT THICKNESS	COMPACTION EFFORT
SITE GRADING FILL	SITE GRADING SOILS FROM REQUIRED EXCAVATIONS AND CUT/FILL ACTIVITIES	2% ± OF OPTIMUM	300mm MAX.	95% OF ASTM D698 COMPACTION
SEAL ZONE FILL	LOW PERMEABILITY MATERIALS FOR THE EMBANKMENT SEAL ZONE	−2% + 1 OF OPTIMUM	150mm MAX.	95% OF ASTM D698 COMPACTION
FILTER ZONE FILL	FILTER FILL BETWEEN THE EMBANKMENT ROCK FILL AND SEAL ZONE FILL	2% ± OF OPTIMUM	300mm MAX.	95% OF ASTM D698 COMPACTION
SELECT DRAIN FILL	CLEAN GRAVEL MATERIALS FOR UNDERDRAIN AND EMBANKMENT DRAIN SYSTEM	NONE	NONE REQUIRED	NONE REQUIRED EXCEPT FOR FINAL SURFACE
COMPACTED ROCK FILL	HIGH STRENGTH ROCK MATERIALS TAKEN FROM MINE PIT (NOTE 2)	AS REQUIRED	(NOTE 1)	LARGE SCALE TEST FILL REQUIRED (NOTE 1)
OVERLINER DRAIN FILL	CLEAN GRAVEL MATERIALS FOR HLF COVER DRAIN	NONE	1000mm	NONE REQUIRED
ROAD WEARING COURSE FILL	GRAVEL MATERIALS FOR ALL WEATHER ROAD SURFACING AS REQUIRED BY OWNER	NONE	100mm MIN.	NONE REQUIRED EXCEPT FOR FINAL SURFACE (NOTE 2)
RIP-RAP	COMPETENT ROCK FROM MINE PIT	NONE	NONE REQUIRED	NONE REQUIRED

FILL NOTES:

1) ROCK FILL THICKNESS AND COMPACTION DEPENDING ON AVAILABLE ROCK FILL MATERIALS AND RESULTS OF LARGE SCALE TEST FILLS CONDUCTED BY THE ENGINEER DURING CONSTRUCTION, AS REQUIRED BY THE SPECIFICATIONS.

2) COMPACTED ROCK FILL AND FILTER FILL MUST BE COMPETENT ROCK WITH ISRM HARDNESS RATING OF R2 OR HARDER.

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE: NONE		
DESIGNED BY	DEH	04/18/14
DRAWN BY	DAG	04/18/14
CHECKED BY		
PROJECT MGR.	TLM	04/18/14
CLIENT APPR.		

StrataGold Corporation

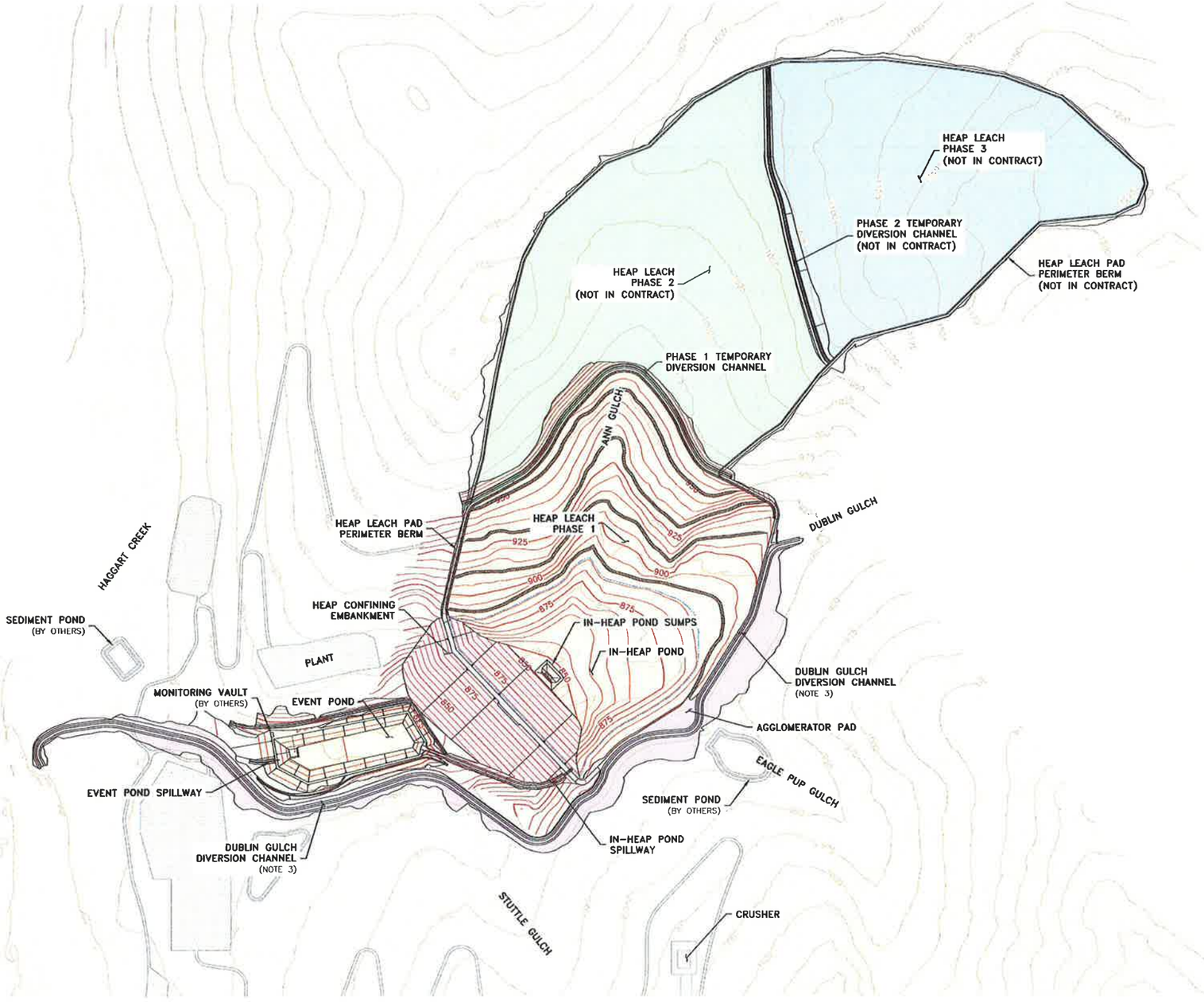
TETRA TECH
126 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 256-2562 (970) 241-5121 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY GENERAL NOTES & LEGEND

PROJECT NO.	7401L01-02
DWG NO.	300-GT-002
REV NO.	3
DATE	4-22-13

File: G:\2013\74015101\01 Project Management\LVE DGML data\Drawings\General Notes.dwg LAST UPDATE: 4/24/2014 9:55 AM BH DUSH



NOTES:

1. PHASE 2 AND 3 FACILITY LAYOUT IS PRELIMINARY AND CONSTRUCTION OF PHASE 2 AND 3 FACILITY IS NOT IN CONTRACT.
2. MINE PLANT, CRUSHER, CONVEYORS, AGGLOMERATOR, CAMP, MONITORING VAULT, SEDIMENT PONDS, ACCESS ROADS AND OTHER INFRASTRUCTURE BY OTHERS.
3. DUBLIN GULCH DIVERSION CHANNEL DESIGN DRAWINGS UNDER SEPARATE COVER.

N

SCALE

50m 0 150m

CONTOUR INTERVAL 5m

LEGEND

- EXISTING CONTOURS (m)
- 1020 PROPOSED GRADING CONTOURS (m)
- EXISTING FACILITY
- PROPOSED FACILITY
- DRAINAGE CHANNEL
- HEAP EMBANKMENT
- EVENT PONDS
- DIVERSION CHANNEL
- SPILLWAY
- PHASE 1 PAD
- PHASE 2 PAD
- PHASE 3 PAD

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2616

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE: NONE		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

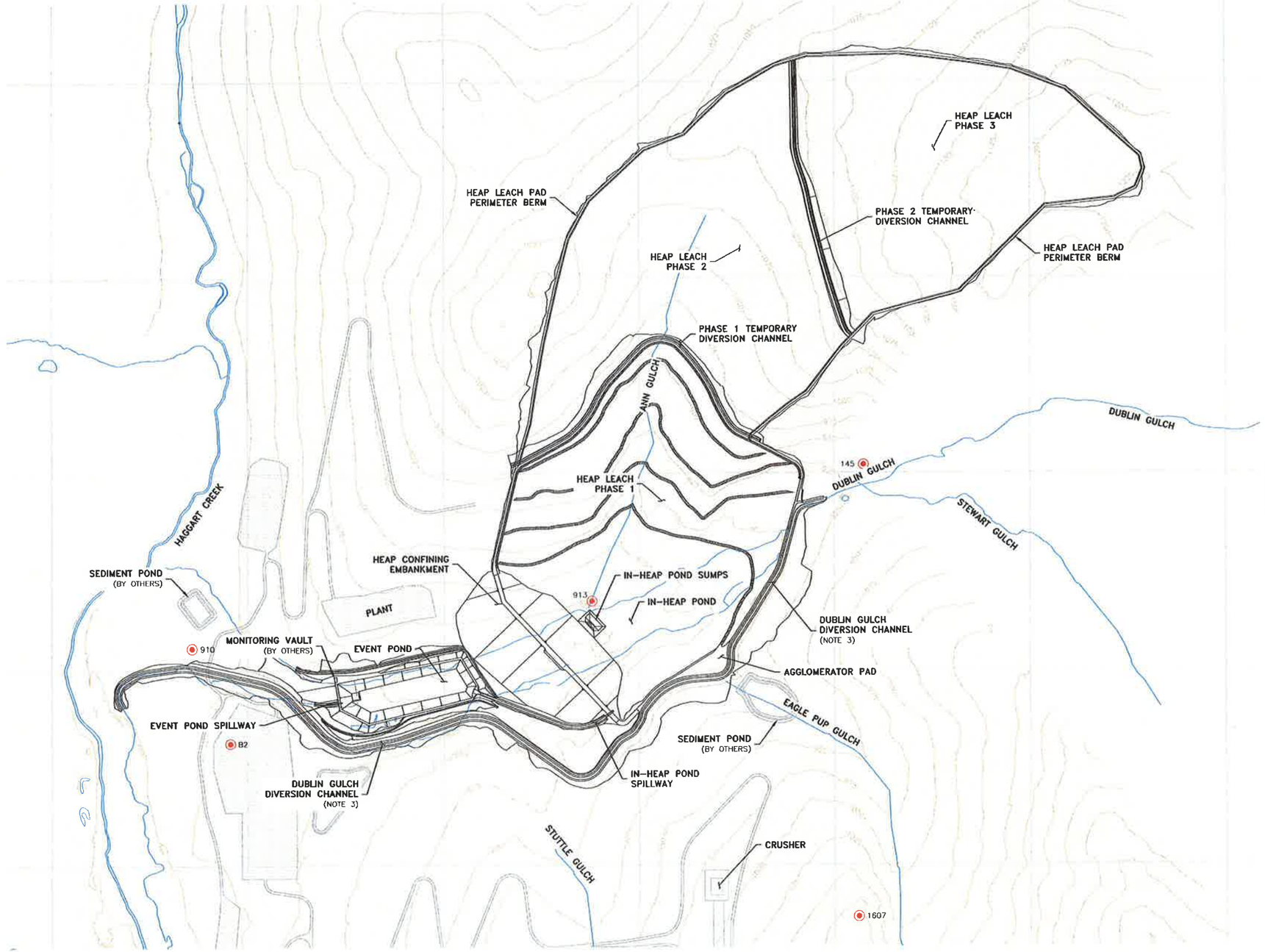
TETRA TECH

EAGLE GOLD PROJECT

HEAP LEACH FACILITY GENERAL ARRANGEMENT

PROJECT NO.	74010.01-02
DWG NO.	300-GT-003
REV NO.	3
DATE	4-22-13

File: G:\21\74010.01\10 Project Management\PE 2014\Drawings\General Facilities Arrangement.dwg LAST UPDATE: 4/24/2014 5:06 PM BY: DSTIN



NOTES:

1. PHASE 2 AND 3 FACILITY LAYOUT IS PRELIMINARY.
2. MINE PLANT, CRUSHER, CONVEYORS, AGGLOMERATOR, CAMP, MONITORING VAULT, SEDIMENT PONDS, ACCESS ROADS AND OTHER INFRASTRUCTURE BY OTHERS.
3. DUBLIN GULCH DIVERSION CHANNEL DESIGN DRAWINGS UNDER SEPARATE COVER.

N

SCALE

50m 0 150m

CONTOUR INTERVAL 5m

LEGEND

- EXISTING CONTOURS (m)
- 1020 PROPOSED GRADING CONTOURS (m)
- EXISTING FACILITY
- PROPOSED FACILITY
- DRAINAGE CHANNEL
- EXISTING SURVEY CONTROL POINT

EXISTING SURVEY CONTROL POINTS

CP#	NORTHING	EASTING	ELEV	COMMENT
133	7100604.346	463444.257	1430.153	FD. IRON BAR WITH TAG 133
145	7101520.961	460073.328	934.039	FD. BCLS IP WITH UGL TAG 145
491	7101002.196	462993.385	1379.561	FD. CLS 77 MARKED "1981", TAG 491
792	7099906.358	461400.731	1368.406	FOUND CLS 77 WITH UGL TAG 792
910	7101055.475	458358.152	794.955	IRON BAR IN GRAVEL BERN NEAR CAMP
911	7101238.469	462842.344	1353.462	BOLT IN BOULDER (DRILLED AND CEMENTED)
913	7101174.723	459378.881	856.340	
1604	7101033.307	461310.256	1217.534	FD. BCLS IP WITH UGL TAG 1604
1606	7099526.663	460089.352	1259.029	IRON BAR WITH UNDERHILL TAG 1606
1607	7100367.897	460061.596	1088.654	IRON BAR WITH UNDERHILL TAG 1607
1612	7099997.851	459355.967	1010.361	IRON BAR WITH UNDERHILL TAG 1612
1614	7098801.210	459897.531	1173.817	IRON BAR WITH UNDERHILL TAG 1614
1616	7097486.335	458209.066	744.246	FD. BCLS IP WITH UGL TAG 1616
1618	7102146.010	462652.727	1299.626	IRON BAR WITH UNDERHILL TAG 1618
1732	7098096.527	459516.604	1051.936	FD. CLS 77 MARKED "1732,1995", TAG 1732
B2	7100812.713	458455.627	816.149	IRON BAR TAG "B2" 1.5M TRIPOD

PROFESSIONAL ENGINEER YUKON TERRITORY TROY LEE MEYER #2019

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REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE: NONE		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH

EAGLE GOLD PROJECT

HEAP LEACH FACILITY SURVEY CONTROL PLAN

PROJECT NO. 74010.01-02

DWG NO. 300-GT-004

REV NO. 3

DATE 4-22-13

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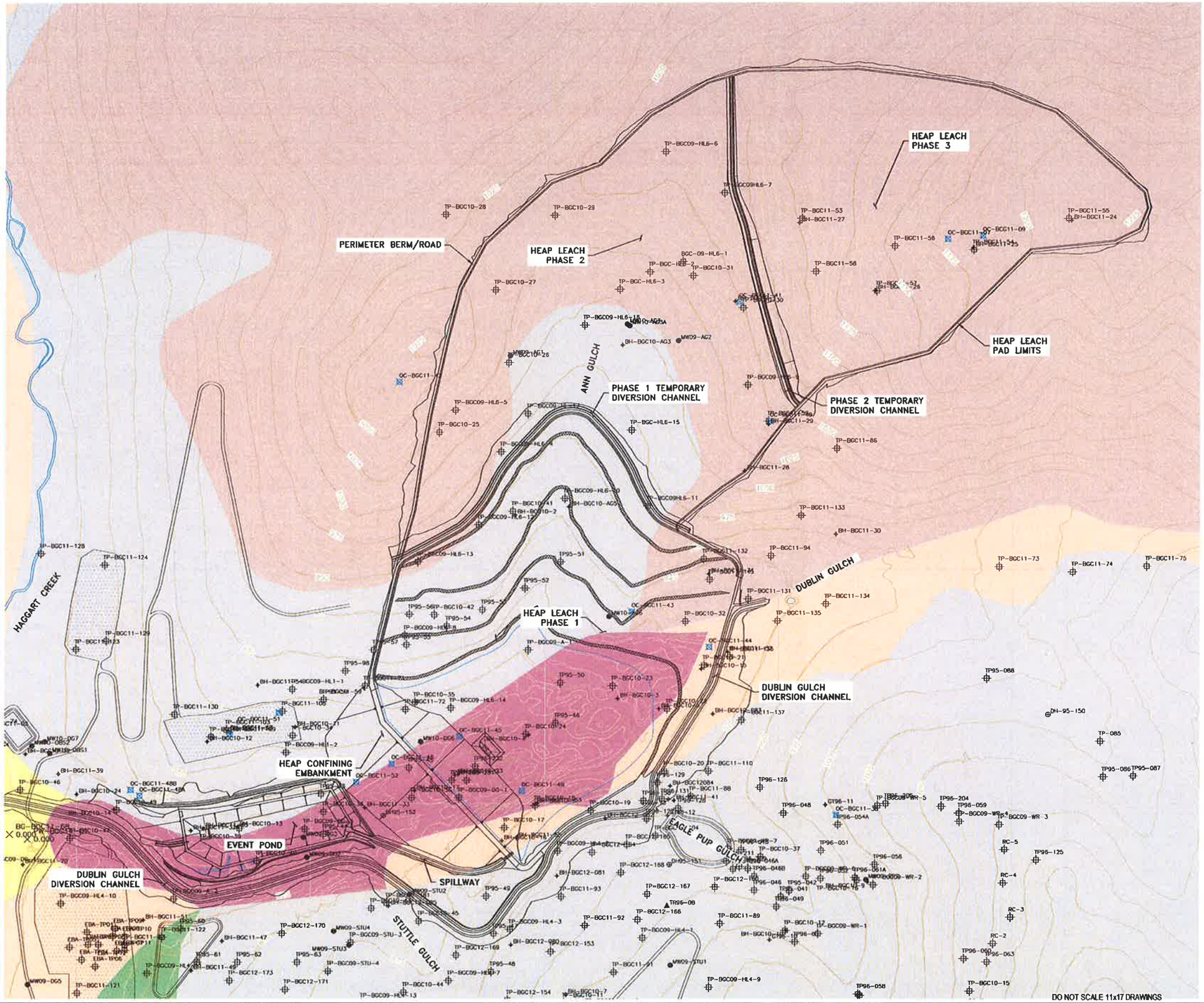


NOTES:

1. GEOLOGY MAPPING FROM BGC "2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", SURFICIAL GEOLOGY, DRAWING 04 (2012)

N

SCALE

40m 0 80m

CONTOUR INTERVAL 5m

LEGEND

- ALLUVIAL FAN
- BEDROCK WITH COLLUVIUM VENEER
- COLLUVIAL APRON OR BLANKET
- GLACIOFLUVIAL TERRACE
- OTHER ALLUVIAL DEPOSITS
- PLACER TAILINGS
- TILL BLANKET
- EXISTING CONTOURS (5m)
- EXISTING FACILITY
- PROPOSED FACILITY
- EXISTING DRAINAGE
- BORE HOLE
- DRILL HOLE
- MONITORING WELL
- TEST PIT

DO NOT SCALE 11x17 DRAWINGS

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2010

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D,G,D,C, & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:	1: 4000	DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

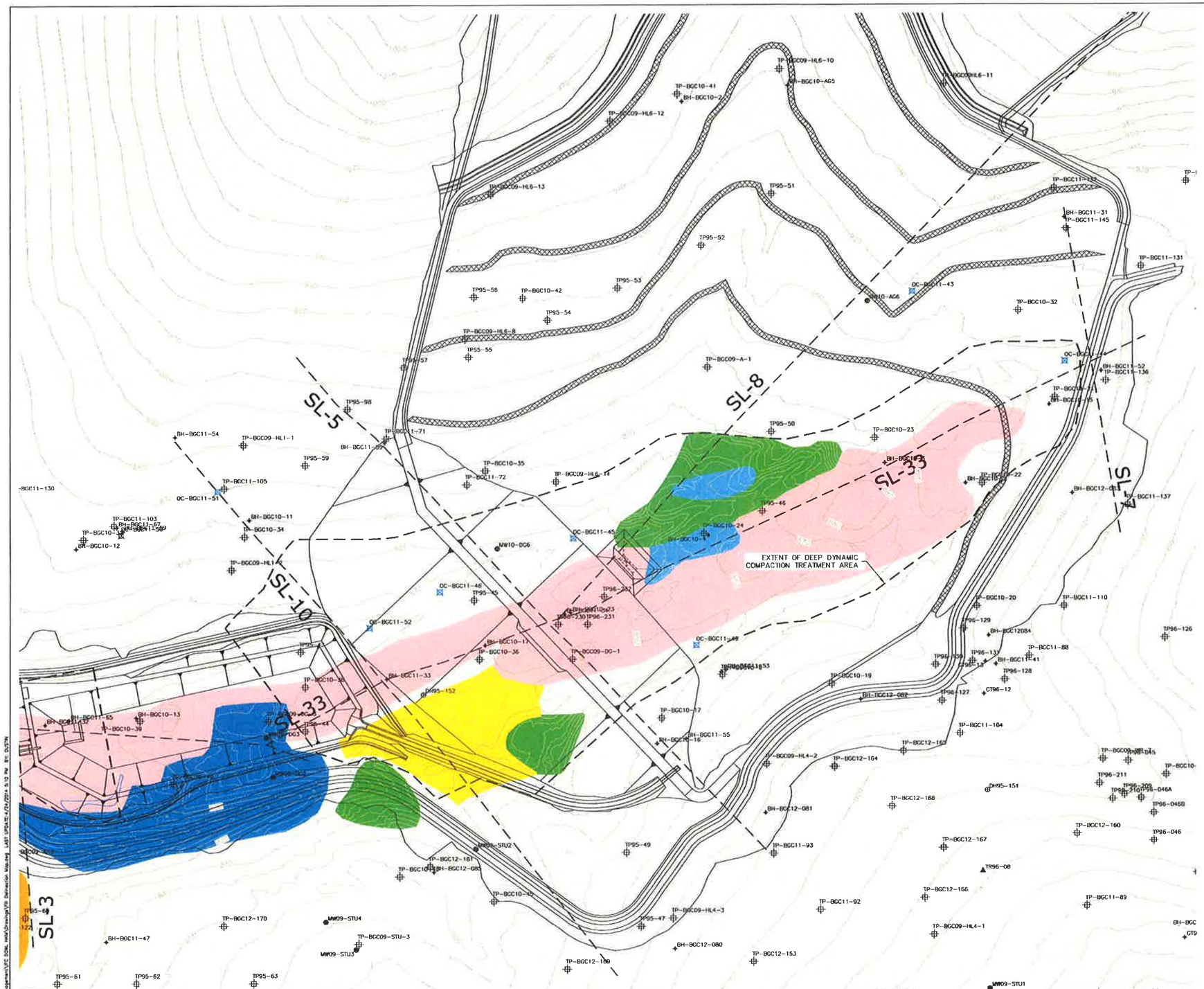
TETRA TECH

EAGLE GOLD PROJECT

HEAP LEACH FACILITY SURFACE GEOLOGY MAP

PROJECT NO.	7401L01-02
DWG NO.	300-GT-005
REV NO.	3
DATE	4-22-13

File: G:\371\740\01\01\Project Management\VE DOC, MSA\Drawings\Geology Mapping - LAST UPDATE: 4/24/2014 5:09 PM BY: DSTIN



N

SCALE

20m 0 40m

CONTOUR INTERVAL 5m

LEGEND

- EXISTING CONTOURS (5m)
- EXISTING FACILITY
- PROPOSED FACILITY
- SEISMIC SURVEY LINE
- BORE HOLE
- DRILL HOLE
- MONITORING WELL
- TEST PIT

MATERIAL GROUPS

1. SAND (SW)
   GRAVELLY, TRACE TO SOME SILT, TRACE COBBLES, WELL GRADED. LARGE CLASTS (COBBLES) ARE MAINLY EQUANT TO ELONGATED SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4). PARTICLES UP TO LARGE GRAVEL SIZE ARE A MIX OF WEAK TO STRONG (R2-R4) METASEDIMENTARY ROCK AND STRONG (R4) GRANODIORITE, MAINLY METASEDIMENTARY.
2. GRAVEL (GW)
   FINE TO COARSE, SANDY, TRACE TO SOME BOULDERS, TRACE COBBLES, TRACE SILT, WELL GRADED. LARGE CLASTS (COBBLES) ARE MAINLY EQUANT TO ELONGATED SUB-ROUNDED TO ROUNDED GRANODIORITE, MODERATELY STRONG TO STRONG (R3-R4).
3. GRAVEL (GP)
   COARSE AND COBBLES, SOME BOULDERS, TRACE SAND, GAP GRADED. CLASTS ARE MAINLY EQUANT SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
4. COBBLES AND BOULDERS
   SOME GRAVEL, TRACE SAND, GAP GRADED. CLASTS ARE MAINLY EQUANT SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
5. GRAVEL (GW)
   FINE TO COARSE, SANDY, COBBLEY, TRACE TO SOME BOULDERS, WELL GRADED. CLASTS ARE MAINLY SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
6. SILT (ML)
   SOME SAND, MAINLY FINE, TRACE CLAY, NON TO SLIGHTLY PLASTIC, BROWNISH GREY, MOIST, HOMOGENOUS, RAPID TO MODERATELY RAPID DILATANCY.

NOTES

1. MATERIAL GROUPS OBTAINED FROM BGC ENGINEERING INC. REPORT TITLED "EAGLE GOLD PROJECT 2010 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED NOVEMBER 2011 PREPARED FOR VICTORIA GOLD CORPORATION.
2. SEISMIC LINES (SL), BOREHOLES AND MASW LOCATIONS OBTAINED FROM "REPORT ON SEISMIC REFRACTION AND DOWNHOLE SEISMIC INVESTIGATION PROPOSED MINE SITE FACILITIES" EAGLE GOLD PROJECT, YUKON, DATED SEPTEMBER, 2011 PREPARED FOR BGC ENGINEERING INC.

PROFESSIONAL ENGINEER — YUKON — THOY LEE MEYER — TERRITORY — 2014

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D, D.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH

EAGLE GOLD PROJECT

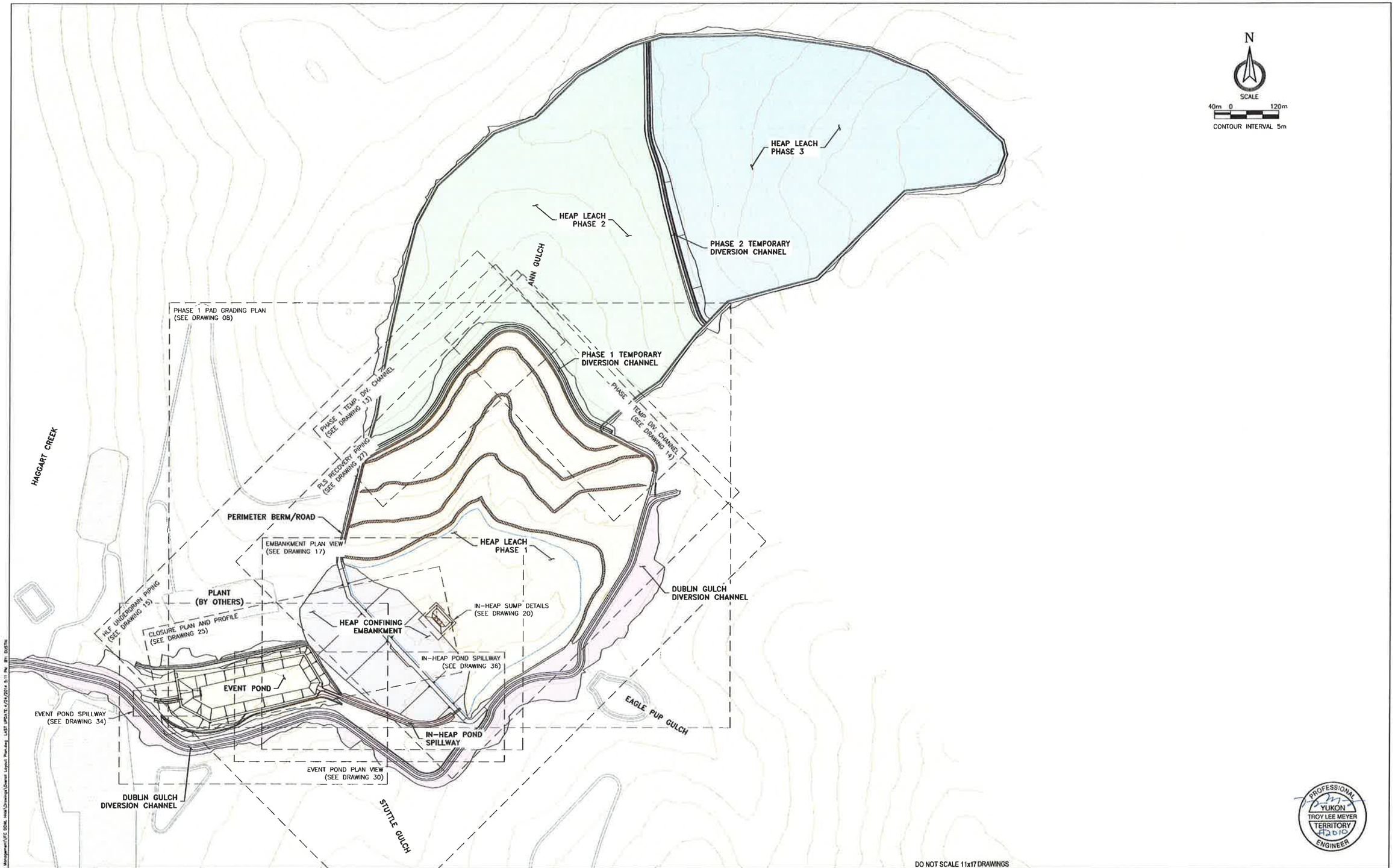
HEAP LEACH FACILITY FILL DELINEATION MAP

PROJECT NO. 74010.01-02

DWG NO. 300-GT-006

REV NO. 3 — DATE 4-22-13

File: G:\21\74010.01\GIS\Project Mxds\permit\EVC 2014_mxds\Drawings\Fill Delineation Map.mxd LAST UPDATE: 4/10/2014 9:13 PM BY: DSTEW



DO NOT SCALE 11x17 DRAWINGS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — 12010

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS						
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TJM	04/22/13	
2	ISSUED FOR REVIEW - REV. D,G,D.C. & IN-HEAP SUMPS	DAG	TJM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TJM	04/24/14	

SCALE:		DATE:
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TJM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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100 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 986-3303 (970) 314-3425 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY OVERALL LAYOUT PLAN

PROJECT NO.	740910.01-02
DWG NO.	300-GT-007
REV NO.	3
DATE	4-22-13

File: G:\237\740910.01 Project Management\LIVE DGN, and Drawings\Drainage Layout Plan.dwg LAST UPDATE: 4/24/2014 8:11 PM BY: DGTM

NOTES:

1. DUBLIN GULCH DIVERSION CHANNEL DESIGN DRAWINGS UNDER SEPARATE COVER.
2. ACTUAL DEEP DYNAMIC COMPACTION (DDC) GROUND TREATMENT AREA TO BE DETERMINED IN THE FIELD BY THE ENGINEER.
3. SEE PROJECT TECHNICAL SPECIFICATIONS FOR PAD GRADING AND DDC REQUIREMENTS.

N

SCALE
20m 0 60m

CONTOUR INTERVAL 2m

EL: 958.27
N: 7101817.916
E: 459509.188

10+80

EL: 959.30
N: 7101825.291
E: 459593.524

EL: 960.00
N: 7101775.482
E: 459639.051

PHASE 1 TEMPORARY DIVERSION CHANNEL (6 08|11)

EL: 960.65
N: 7101721.580
E: 459675.373

EL: 957.04
N: 7101728.984
E: 459425.695

EL: 956.48
N: 7101682.782
E: 459396.412

TEMPORARY DIVERSION CHANNEL
(FLOWS WEST AT 1% GRADE)
(SEE DRAWING 13)

EL: 955.30
N: 7101586.584
E: 459320.972

C 08|10

0+00

EL: 961.26
N: 7101667.730
E: 459700.520

950 BENCH

EL: 961.46
N: 7101649.670
E: 459710.145

PHASE 1 TEMPORARY DIVERSION CHANNEL BENCH

EL: 948.00
N: 7101547.732
E: 459854.021

EL: 962.00
N: 7101603.303
E: 459745.731

EL: 953.92
N: 7101520.675
E: 459199.960

6m WIDE BENCH (TYP.)

930m BENCH

EL: 962.66
N: 7101573.074
E: 459805.817

HEAP LEACH PAD PERIMETER BERM (10 08|12)

TEMPORARY DIVERSION CHANNEL
TO BE CONTINUED BY OTHERS

EL: 962.00
N: 7101566.360
E: 459818.588

EL: 930.29
N: 7101524.134
E: 459898.909

EL: 950.54
N: 7101500.054
E: 459185.019

EL: 923.00
N: 7101502.883
E: 459913.849

EL: 920.00
N: 7101483.727
E: 459913.343

910m BENCH

10+60

10+00

DUBLIN GULCH

EL: 934.00
N: 7101436.136
E: 459169.409

MAIN GULCH

HEAP LEACH PAD PERIMETER BERM (10 08|12)

HEAP LEACH PHASE 1

EL: 910.00
N: 7101416.824
E: 459895.901

890m BENCH

12 08|12 (TYP.)

EL: 916.00
N: 7101361.308
E: 459151.395

MAX. IN-HEAP POND WATER SURFACE ELEVATION = 886m

EL: 902.00
N: 7101343.097
E: 459874.555

EL: 899.67
N: 7101279.513
E: 459856.892

EL: 897.28
N: 7101291.082
E: 459134.498

IN-HEAP POND LIMITS

EL: 888.00
N: 7101255.628
E: 459135.373

DEEP DYNAMIC COMPACTION GROUND TREATMENT AREA

EL: 849.00
N: 7101152.878
E: 459373.397

EL: 899.29
N: 7101247.510
E: 459844.092

HEAP CONFINING EMBANKMENT LIMITS

DUBLIN GULCH DIVERSION CHANNEL (NOTE 1)

PLANT

EL: 847.00
N: 7101144.396
E: 459373.168

PLS, LDRS & CLOSURE SUMPS (20 08|20)

SEE SHEET 17 FOR EMBANKMENT GRADING PLAN

EL: 849.00
N: 7101123.855
E: 459342.763

EL: 849.00
N: 7101109.322
E: 459414.663

EL: 844.50
N: 7101121.792
E: 459360.214

EL: 847.00
N: 7101109.551
E: 459406.181

EL: 895.38
N: 7101063.603
E: 459706.400

EL: 897.24
N: 7101073.533
E: 459734.608

EL: 844.50
N: 7101097.836
E: 459382.910

EL: 895.50
N: 7101042.563
E: 459689.944

EL: 849.00
N: 7101080.299
E: 459384.028

EL: 894.99
N: 7100975.271
E: 459581.655

EL: 896.28
N: 7101061.064
E: 459721.712

AGGLOMERATOR PAD

EL: 894.39
N: 7100937.404
E: 459527.601

EVENT POND

DUBLIN GULCH DIVERSION CHANNEL

A 08|09

B 08|09

EL: 894.43
N: 7100898.916
E: 459492.104

IN-HEAP POND SPILLWAY

SEDIMENT POND (BY OTHERS)

9+40

C

EAGLE PUP GULCH

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
12010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES	
DWG. NO.	TITLE

REFERENCES	
DWG. NO.	TITLE

REVISIONS						
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS						
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D, D.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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1331 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 256-3581 (970) 241-3626 fax

EAGLE GOLD PROJECT

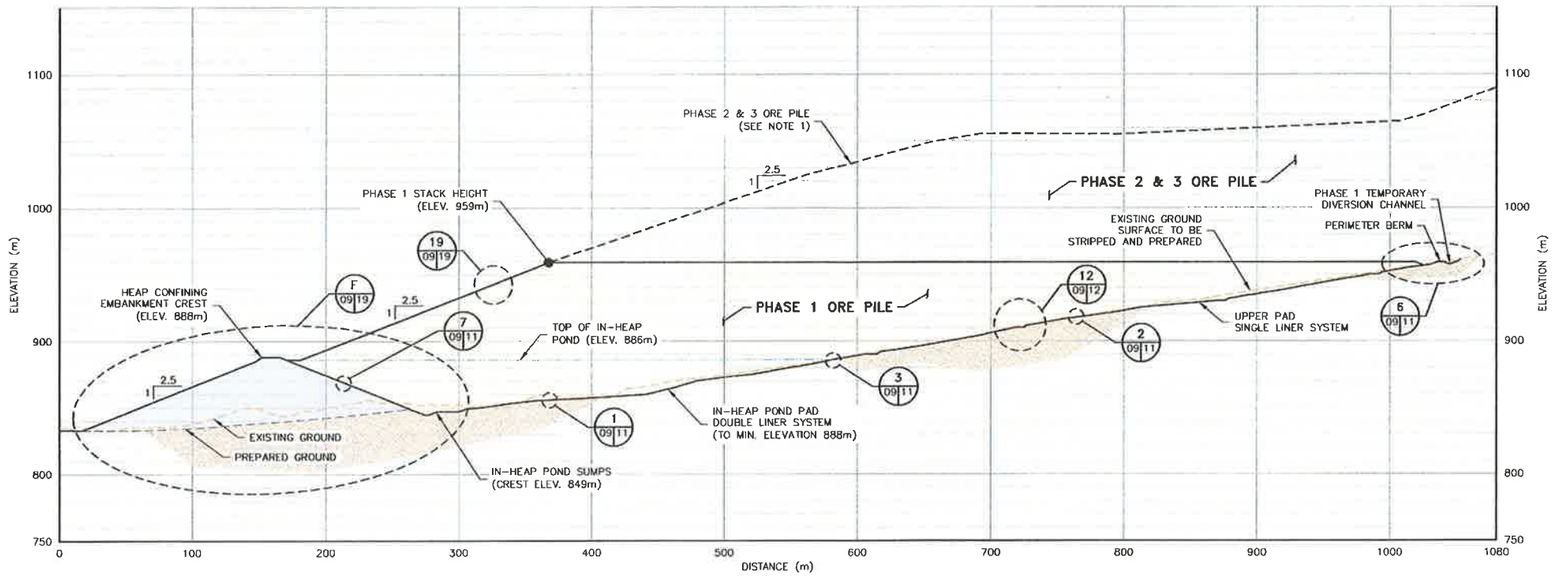
HEAP LEACH FACILITY PHASE 1 PAD GRADING PLAN

PROJECT NO. 74010.01-02
DWG NO. 300-GT-008
REV NO. 3
DATE 4-22-13

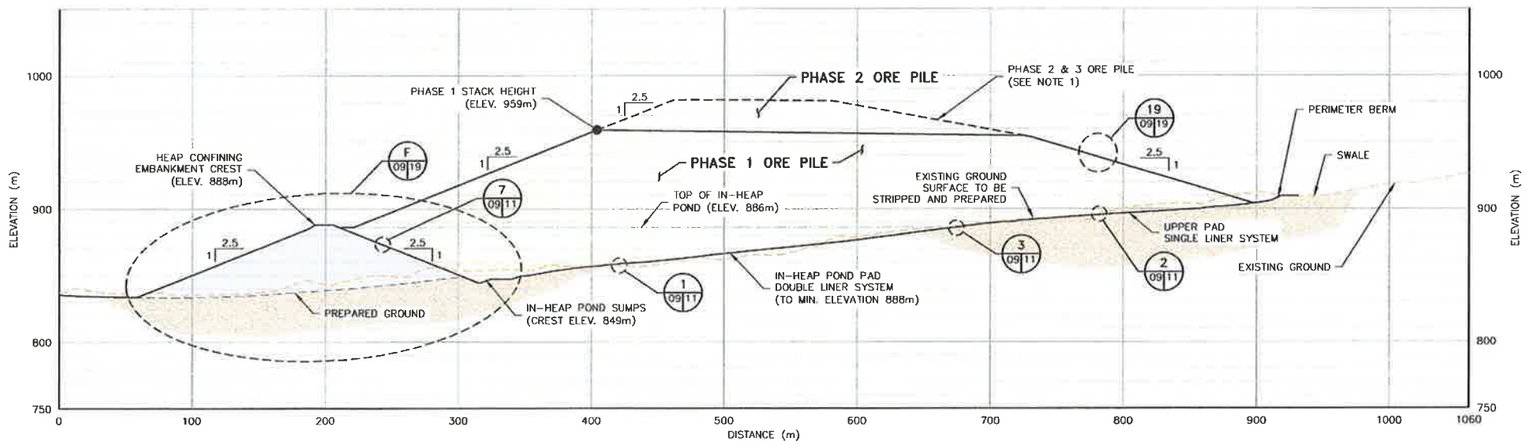
File: G:\GIS\MXD\GIS\Project Management\JUC 2014_mxd\Drawings\Phase 1 Pad Grading Plan.mxd LAST UPDATE: 4/21/2014 9:10 PM BY: DSTEW

NOTES:

1. PHASE 2 & 3 PAD AND ORE PILE ARE NOT DESIGNED IN THIS CONSTRUCTION PACKAGE AND ARE SHOWN FOR REFERENCE ONLY.
2. ORE HEAP PILE MAXIMUM LIMITS SHOWN.
3. ORE STACKING PLAN (BY OTHERS) MAY RESULT IN ORE HEAP PILE LIMITS DIFFERENT FROM SHOWN HERE.
4. REQUIRED CONVEYOR RAMPS ON ORE HEAP PILE NOT SHOWN.
5. MAXIMUM OVERALL HEAP ORE PILE OUTSLOPE OF 2.5H:1V SHOWN. ORE WILL BE STACKED AT ANGLE OF REPOSE WITH BENCHES NECESSARY TO ACHIEVE THE OVERALL MAXIMUM OUTSLOPE ANGLE.



A 08|09 **HEAP PAD SECTION**
NTS



B 08|09 **HEAP PAD SECTION**
NTS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2009

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH
139 West Park Drive, Suite 324
Grand Junction, Colorado 81505
(970) 250-3043 (970) 241-3175 fax

EAGLE GOLD PROJECT

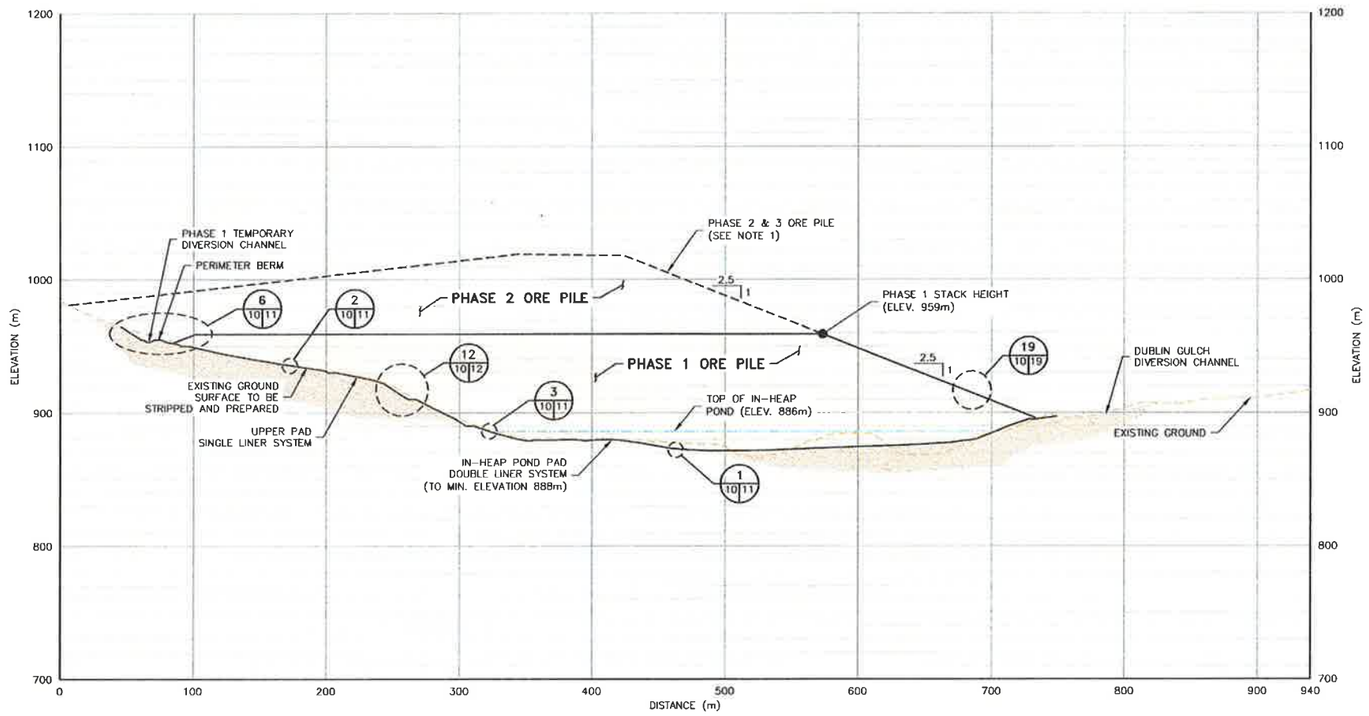
HEAP LEACH FACILITY PHASE 1 PAD GRADING SECTIONS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-009
REV NO.	3
DATE	4-22-13

File: G:\27\74010.01\01 Project Management\CAD\ 2006 mxd\Drawings\Phase 1 Pad Grading Plan.dwg LAST UPDATE: 4/24/2014 5:15 PM BY: DSTIN

NOTES:

1. PHASE 2 & 3 PAD AND ORE PILE ARE NOT DESIGNED IN THIS CONSTRUCTION PACKAGE AND ARE SHOWN FOR REFERENCE ONLY.
2. ORE HEAP PILE MAXIMUM LIMITS SHOWN.
3. ORE STACKING PLAN (BY OTHERS) MAY RESULT IN ORE HEAP PILE LIMITS DIFFERENT FROM SHOWN HERE.
4. REQUIRED CONVEYOR RAMPS ON ORE HEAP PILE NOT SHOWN.
5. MAXIMUM OVERALL HEAP ORE PILE OUTSLOPE OF 2.5H:1V SHOWN. ORE WILL BE STACKED AT ANGLE OF REPOSE WITH BENCHES NECESSARY TO ACHIEVE THE OVERALL MAXIMUM OUTSLOPE ANGLE.



C 08|10 HEAP PAD SECTION
NTS

DO NOT SCALE 11x17 DRAWINGS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

REFERENCES		REFERENCES		REVISIONS						REVISIONS								
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										3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14		CHECKED BY		
																PROJECT MGR	TLM	04/10/14
																CLIENT APPR.		

StrataGold Corporation

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130 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 256-7888 (970) 241-2158 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY PHASE 1 PAD GRADING SECTIONS

PROJECT NO.	74010.01-02	
DWG NO.	300-GT-010	
REV NO.	3	DATE 4-22-13

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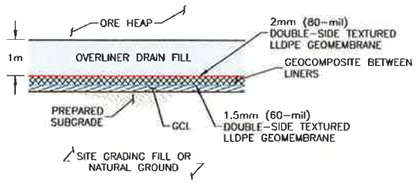
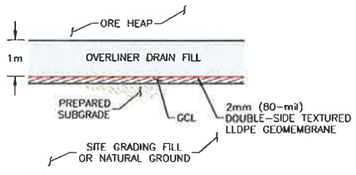


1 / 09|11 **PAD DOUBLE LINER DETAIL**
NOT TO SCALE



2 / 09|11 **PAD SINGLE LINER DETAIL**
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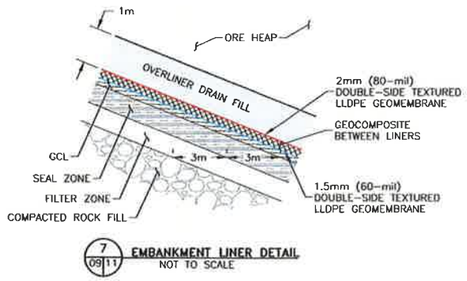

7 / 09|11 **EMBANKMENT LINER DETAIL**
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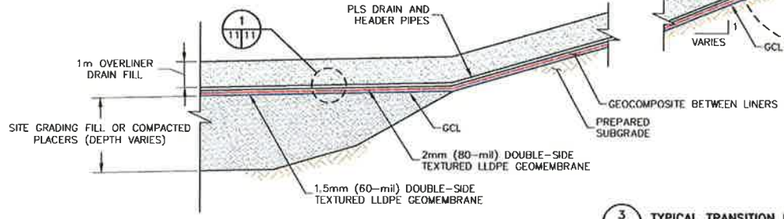
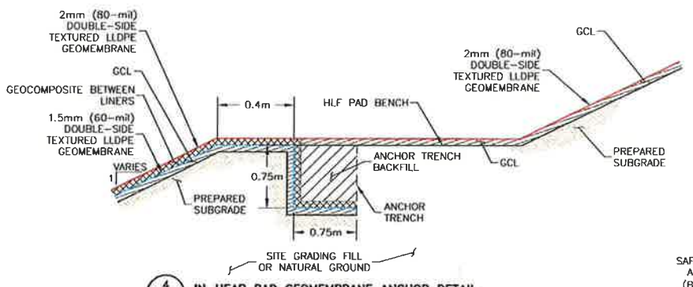
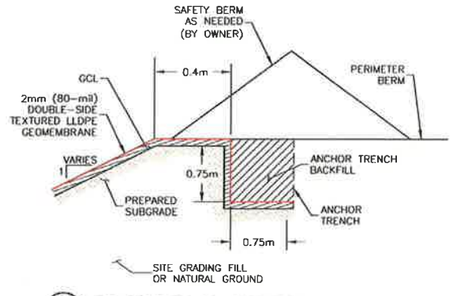


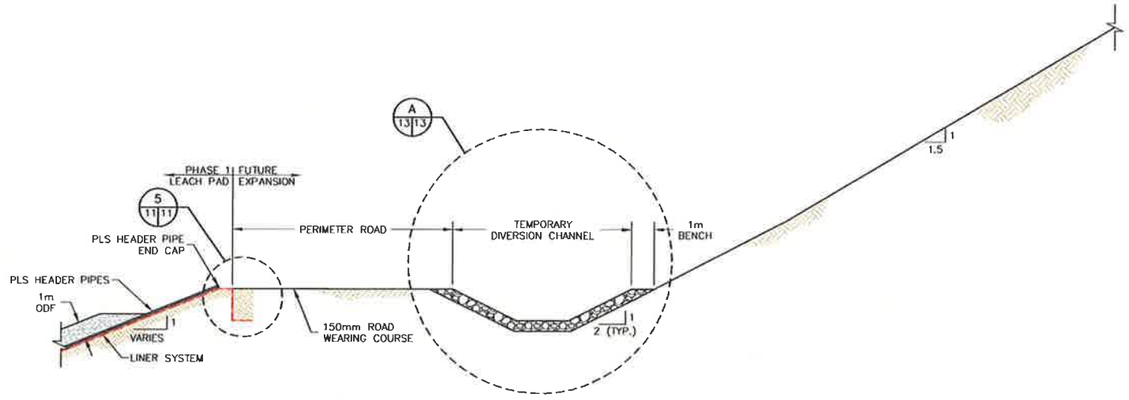
3 / 11|11 **TYPICAL TRANSITION FROM IN-HEAP STORAGE POND**
NOT TO SCALE



4 / 11|11 **IN-HEAP PAD GEOMEMBRANE ANCHOR DETAIL**
NOT TO SCALE



5 / 11|11 **PAD GEOMEMBRANE ANCHOR DETAIL**
NOT TO SCALE



6 / 09|11 **TYPICAL PHASE 1 PERIMETER ROAD W/ TEMPORARY DIVERSION CHANNEL**
NOT TO SCALE

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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2	ISSUED FOR REVIEW - REV. D,G,D,C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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Breckenridge, Colorado 80108
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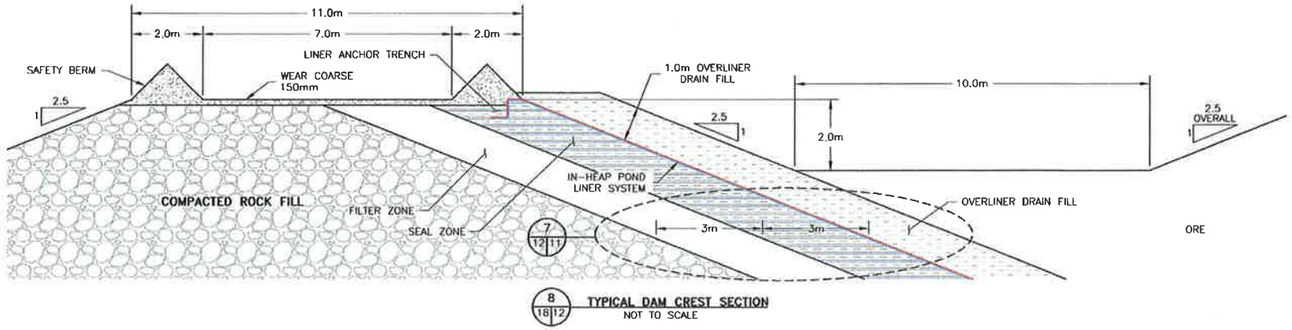
EAGLE GOLD PROJECT

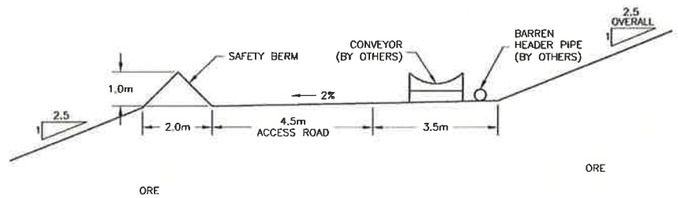
HEAP LEACH FACILITY LINER DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-011
REV NO.	3
DATE	4-22-13

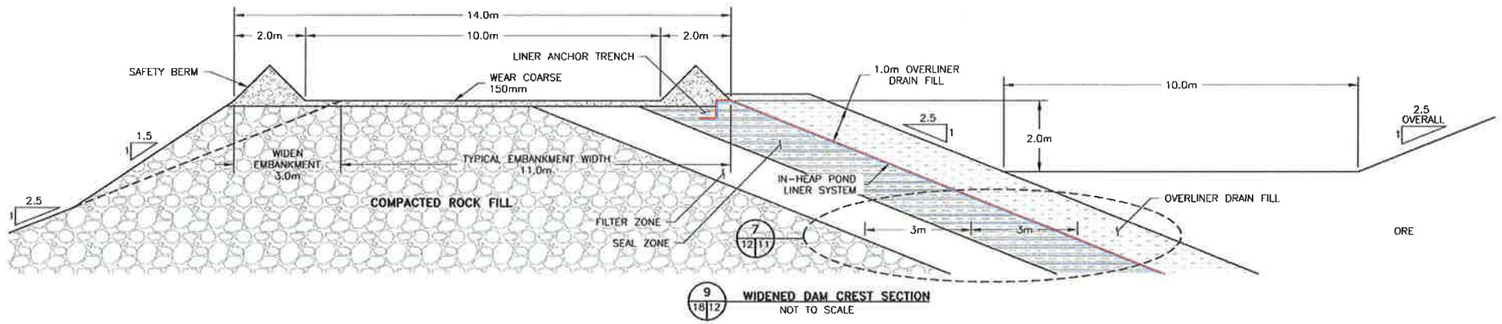
File: Q:\2014\4050\01\01 Project Management\PC DOC\ eng\Drawings\Liner Details.dwg LAST UPDATE: 4/22/2014 8:18 PM BY: DSTR



8 18|12 **TYPICAL DAM CREST SECTION**
NOT TO SCALE



11 12 **CONVEYOR ON ORE PILE SECTION**
NOT TO SCALE



9 18|12 **WIDENED DAM CREST SECTION**
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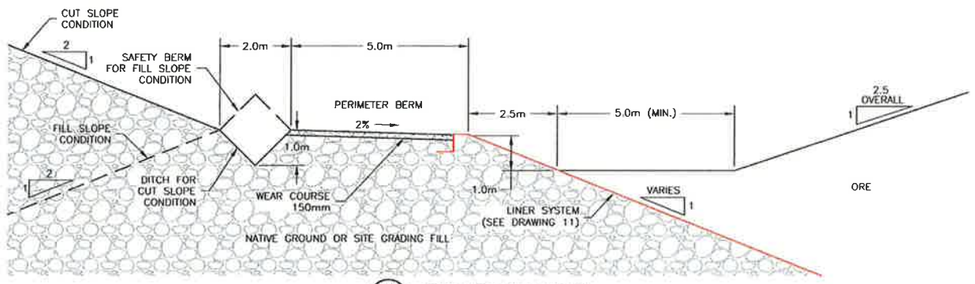
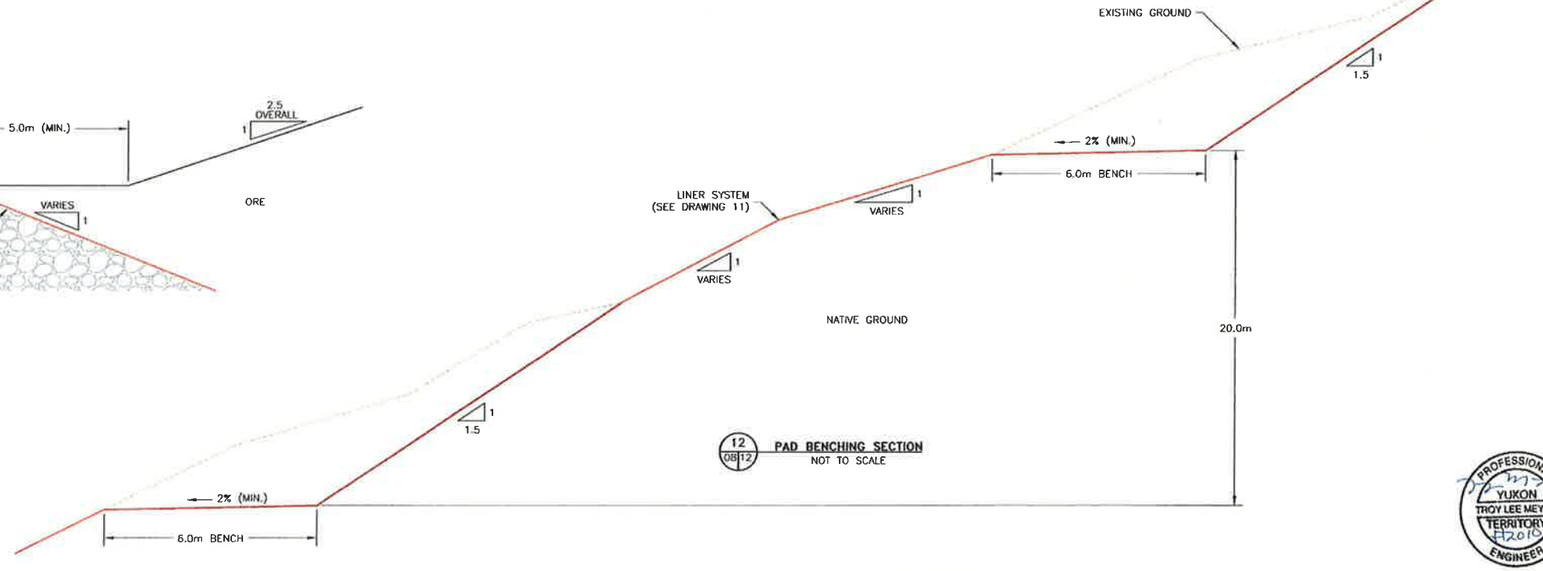


10 08|12 **PERIMETER BERM SECTION**
NOT TO SCALE



12 08|12 **PAD BENCHING SECTION**
NOT TO SCALE

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

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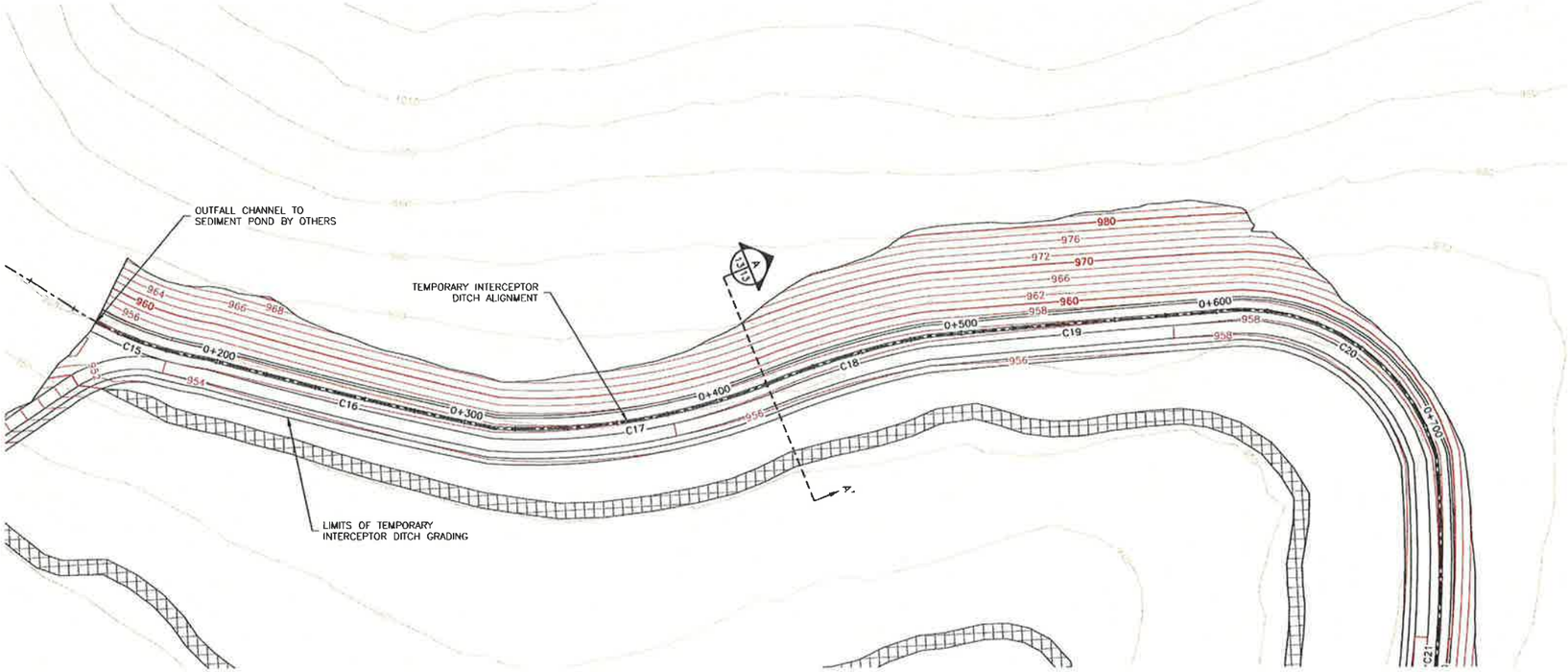
EAGLE GOLD PROJECT

HEAP LEACH FACILITY CORRIDOR TYPICAL SECTIONS

PROJECT NO. 74010.01-02
DWG NO. 300-GT-012
REV NO. 3
DATE 4-22-13

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY EH2010

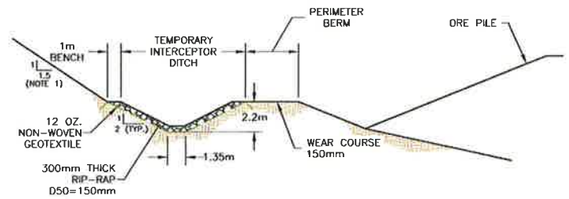
File: G:\23\74010.01\05 Project Management\CVE DOC, AMD\Drawings\Corridor Typical Sections.dwg LAST UPDATE: 4/24/2014 5:17 PM BY: DSTIH



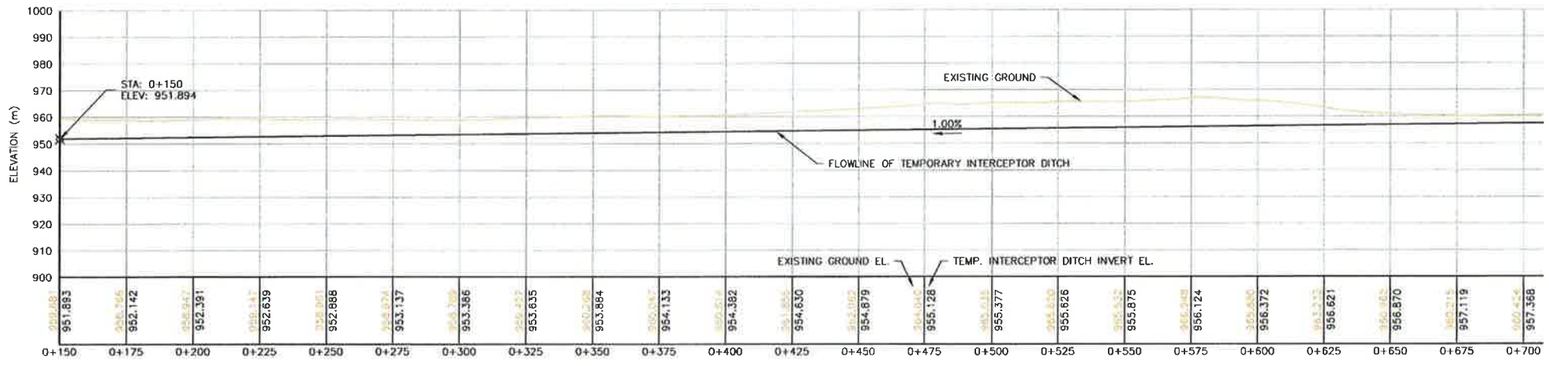
TEMPORARY INTERCEPTOR DITCH PLAN VIEW
SCALE: 1:1000

NOTES:

1. TEMPORARY SLOPE ABOVE PHASE 1 INTERCEPTOR DITCH SHALL BE MAXIMUM 1.5H:1V OR AS OTHERWISE DIRECTED BY THE OWNER'S ENGINEER BASED ON VISUAL OBSERVATION OF FIELD CONDITIONS DURING CONSTRUCTION.



A 13 13 **TYPICAL TEMPORARY INTERCEPTOR DITCH SECTION**
NTS



TEMPORARY INTERCEPTOR DITCH PROFILE

ALIGNMENT CURVE TABLE

CURVE #	RADIUS	LENGTH	DELTA	START POINT (N, E)	END POINT (N, E)
C15	134.665	58.950	25° 04' 53.04"	(7101518.767, 459160.450)	(7101539.737, 459215.041)
C16	1692.903	115.175	3° 53' 53.02"	(7101539.737, 459215.041)	(7101594.499, 459316.339)
C17	255.428	109.614	24° 35' 16.09"	(7101594.499, 459316.339)	(7101679.329, 459384.426)
C18	323.249	64.947	11° 30' 42.45"	(7101679.329, 459384.426)	(7101734.549, 459418.405)
C19	6806.057	113.089	0° 57' 07.30"	(7101734.549, 459418.405)	(7101817.084, 459495.716)
C20	78.876	113.492	82° 26' 25.62"	(7101817.084, 459495.716)	(7101833.035, 459598.437)
C21	449.442	155.174	19° 46' 54.80"	(7101833.035, 459598.437)	(7101710.209, 459692.003)
C22	392.572	78.876	11° 30' 42.84"	(7101710.209, 459692.003)	(7101639.581, 459726.818)
C23	97.530	40.169	23° 35' 52.57"	(7101639.581, 459726.818)	(7101609.349, 459752.835)
C24	606.819	35.621	3° 21' 47.85"	(7101609.349, 459752.835)	(7101593.243, 459784.601)
C25	322.055	28.527	5° 04' 30.46"	(7101593.243, 459784.601)	(7101581.038, 459810.375)
C26	52.021	18.992	20° 55' 02.01"	(7101500.729, 459068.601)	(7101502.688, 459087.385)

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — 2013

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE	REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
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DESIGNED BY	DEH	04/10/14
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CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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Grand Junction, Colorado 81503
(970) 263-7455 (970) 241-9170 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY
PHASE 1 TEMP. DIV. CHANNEL
PLAN & PROFILE
STA: 0+150 - 0+650

PROJECT NO. 74010.01-02
DWG NO. 300-GT-013
REV NO. 3
DATE 4-22-13

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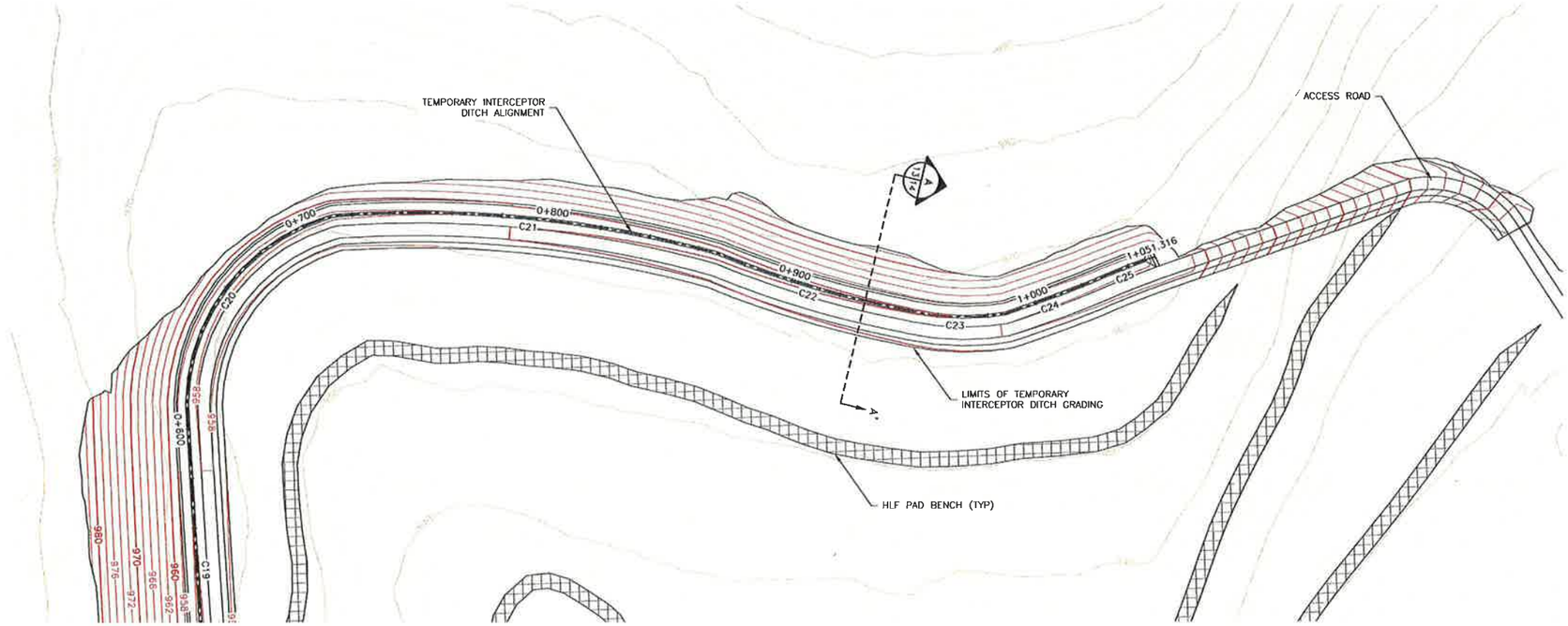
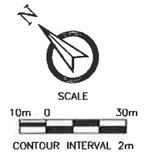
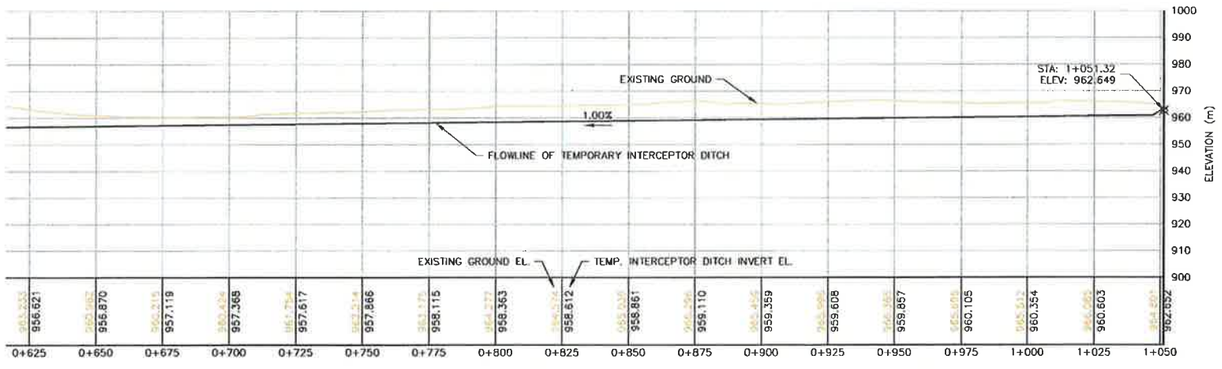




TEMPORARY INTERCEPTOR DITCH PLAN VIEW
SCALE: 1:1000



TEMPORARY INTERCEPTOR DITCH PROFILE

ALIGNMENT CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	START POINT (N, E)	END POINT (N, E)
C15	134.665	58.950	25° 04' 53.04"	(7101518.767, 459160.450)	(7101539.737, 459215.041)
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C17	255.428	109.614	24° 35' 16.09"	(7101594.499, 459316.339)	(7101679.329, 459384.426)
C18	323.249	64.947	11° 30' 42.45"	(7101679.329, 459384.426)	(7101734.549, 459418.405)
C19	6806.057	113.089	0° 57' 07.30"	(7101734.549, 459418.405)	(7101817.084, 459495.716)
C20	78.876	113.492	82° 26' 25.62"	(7101817.084, 459495.716)	(7101833.035, 459598.437)
C21	449.442	155.174	19° 46' 54.80"	(7101833.035, 459598.437)	(7101710.209, 459692.003)
C22	392.572	78.876	11° 30' 42.84"	(7101710.209, 459692.003)	(7101639.581, 459726.818)
C23	97.530	40.169	23° 35' 52.57"	(7101639.581, 459726.818)	(7101609.349, 459752.835)
C24	606.819	35.621	3° 21' 47.85"	(7101609.349, 459752.835)	(7101593.243, 459784.601)
C25	322.055	28.527	5° 04' 30.46"	(7101593.243, 459784.601)	(7101581.036, 459810.375)
C26	52.021	18.992	20° 55' 02.01"	(7101500.729, 459068.601)	(7101502.688, 459087.385)

DO NOT SCALE 11x17 DRAWINGS

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DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE: 1:1000		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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125 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 256-0955 (970) 241-3180 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY PHASE 1 TEMP. DIV. CHANNEL PLAN & PROFILE STA: 0+650 - END

PROJECT NO.	7401L01-02
DWG NO.	300-GT-014
REV NO.	3
DATE	4-22-13

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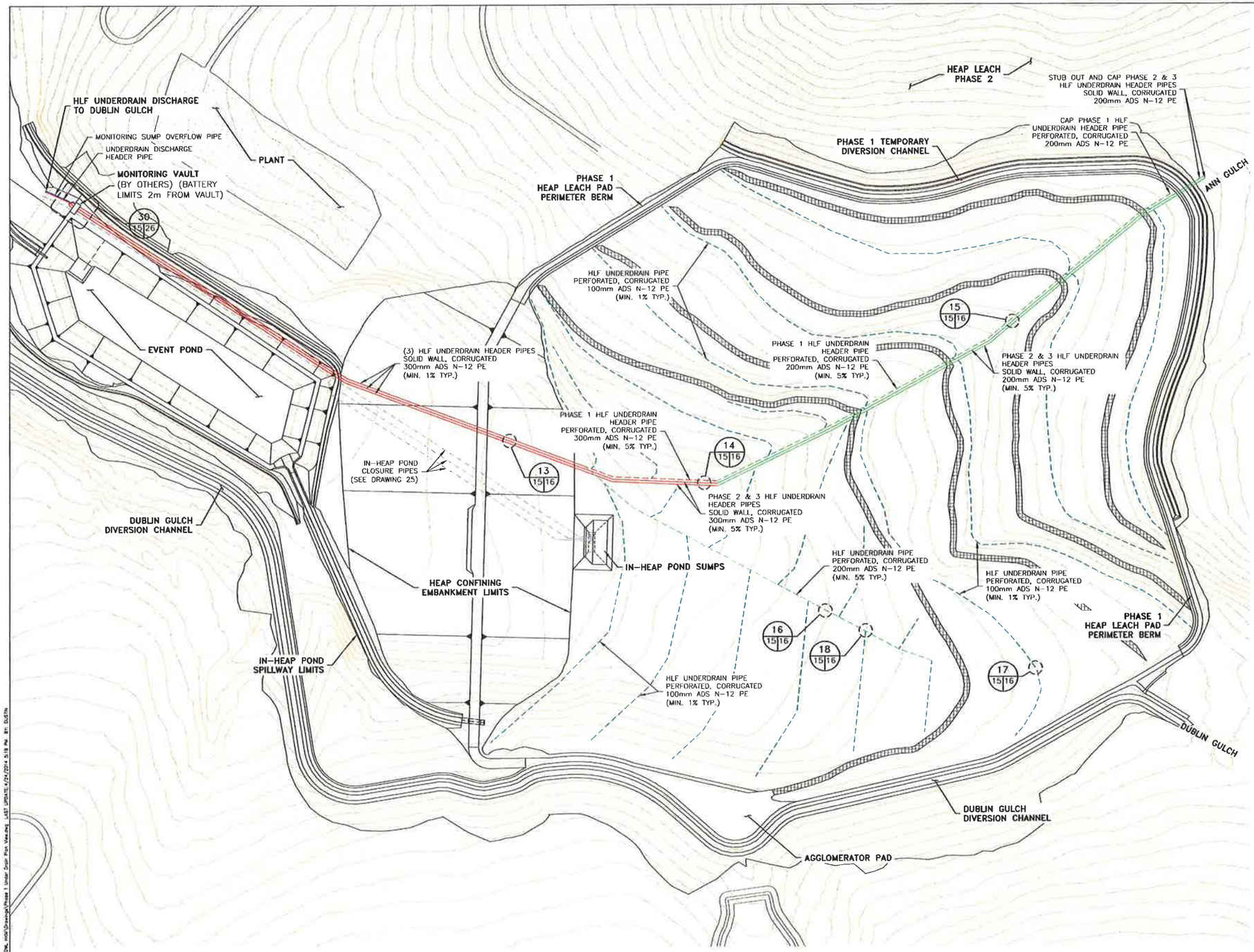


N

SCALE

20m 0 60m

CONTOUR INTERVAL 1m

NOTES:

1. HLF UNDERDRAINS TO BE CONSTRUCTED AS SHOWN WITH ADDITIONAL DRAINS EXTENDED TO SEEPAGE AREAS BASED ON FIELD OBSERVATIONS DURING CONSTRUCTION.

LEGEND

- HLF UNDERDRAIN HEADER PIPE CORRUGATED, PERFORATED 300mm ADS N-12 PE
- HLF UNDERDRAIN HEADER PIPE CORRUGATED, SOLID WALL 300mm ADS N-12 PE
- HLF UNDERDRAIN HEADER PIPE CORRUGATED, PERFORATED 200mm ADS N-12 PE
- HLF UNDERDRAIN HEADER PIPE CORRUGATED, SOLID WALL 200mm ADS N-12 PE
- HLF UNDERDRAIN PIPE CORRUGATED, PERFORATED 100mm ADS N-12 PE

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D, G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

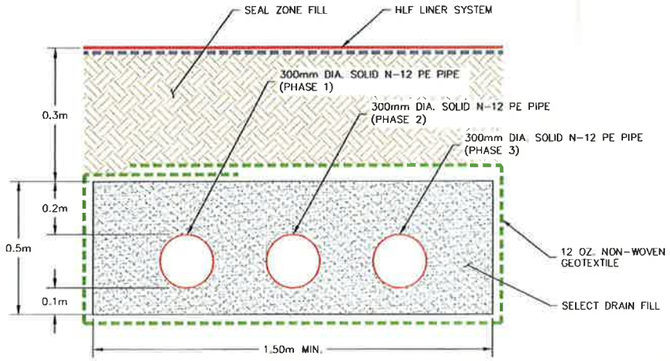
TETRA TECH

EAGLE GOLD PROJECT

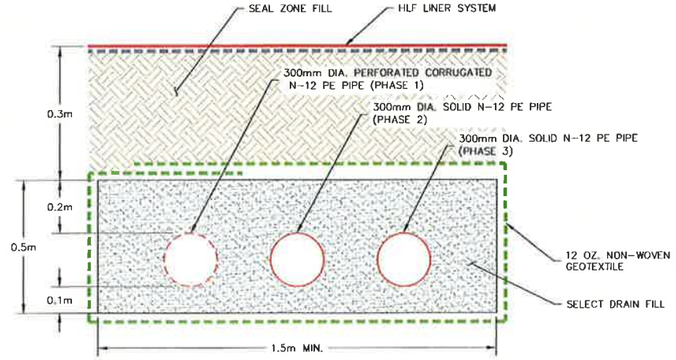
HEAP LEACH FACILITY HLF UNDERDRAIN PIPING PLAN

PROJECT NO.	7401001-02
DWG NO.	300-GT-015
REV NO.	3
DATE	4-22-13

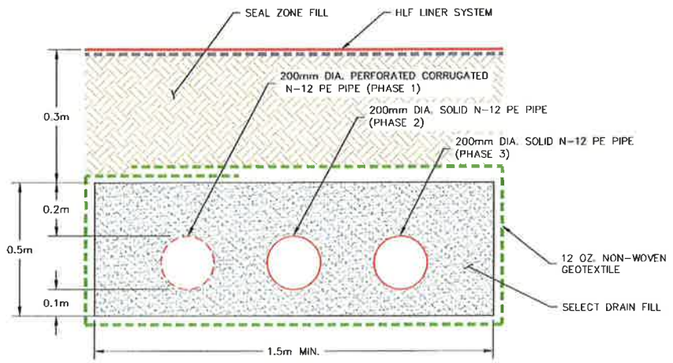
File: Q:\2013\401\01\Project Management\VFC 60%_HLF\Drawings\Phase 1 Under Drain Plan View.dwg, LAST UPDATE: 4/24/2014 5:18 PM, BY: DUSTIN



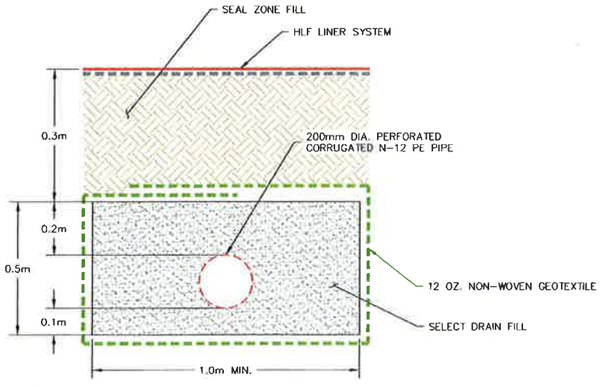
13/15/16 TYPICAL HLF PAD 300mm UNDERDRAIN DETAIL
NTS



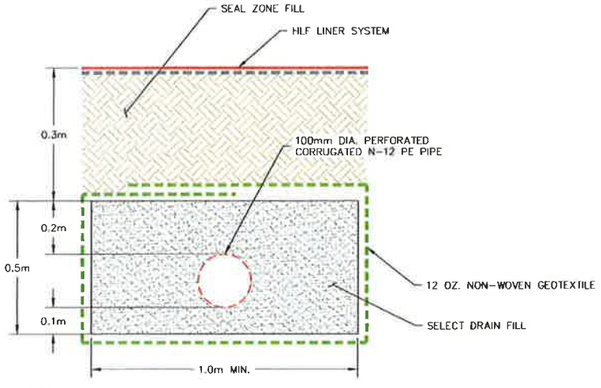
14/15/16 TYPICAL HLF PAD 300mm UNDERDRAIN DETAIL
NTS



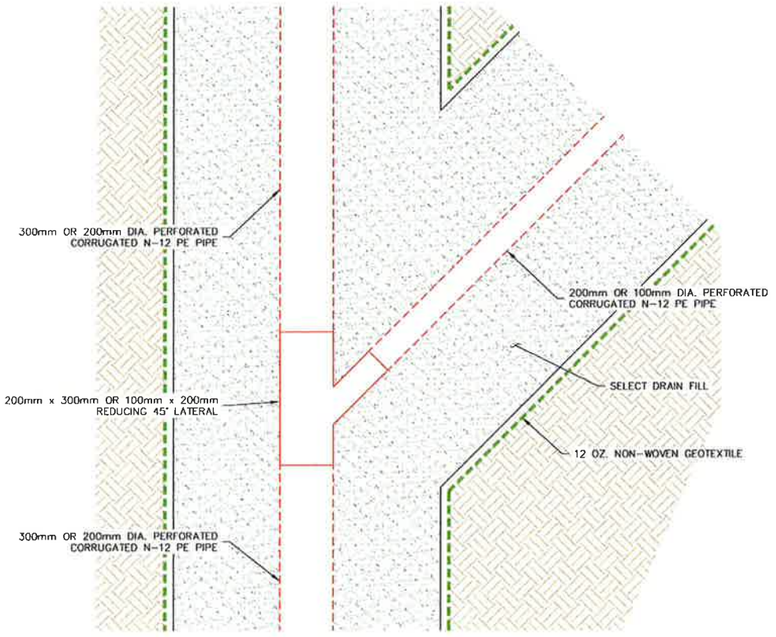
15/15/16 TYPICAL HLF PAD 200mm UNDERDRAIN DETAIL
NTS



16/15/16 TYPICAL HLF PAD 200mm UNDERDRAIN DETAIL
NTS



17/15/16 TYPICAL HLF PAD 100mm UNDERDRAIN DETAIL
NTS



18/15/16 TYPICAL HLF PAD UNDERDRAIN CONNECTION DETAIL
NTS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

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REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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130 West Pine Drive, Suite 204
Grand Junction, Colorado 81505
(970) 256-3263 (970) 241-0757 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY HLF UNDERDRAIN PIPING DETAILS

PROJECT NO. T4010.01-02
DWG NO. 300-GT-016
REV NO. 3
DATE 4-22-13

FILE: G:\237\T4010.01\01 Project Management\01C CAD\...\Underdrain Details.dwg LAST UPDATE: 4/24/2014 9:20 PM BY: DSTM

N

SCALE

10m 0 30m

CONTOUR INTERVAL 2m

NOTES:

1. ACTUAL DEEP DYNAMIC COMPACTION (DDC) GROUND TREATMENT AREA TO BE DETERMINED IN THE FIELD BY THE OWNER'S ENGINEER.
2. SEE PROJECT TECHNICAL SPECIFICATIONS FOR DDC REQUIREMENTS.

EL: 888.00
N: PAD PERIMETER BERM
E: 459135.18

EL: 875.00
N: 7101242.65
E: 459173.02

EL: 877.23
N: 7101239.70
E: 459100.92

EL: 888.00
N: 7101253.22
E: 459124.62

DEEP DYNAMIC COMPACTION AREA
(NOTES 1 & 2)

EL: 862.30
N: 7101209.57
E: 459215.73

EL: 850.00
N: 7101188.56
E: 459278.02

EL: 888.00
N: 7101176.67
E: 459158.42

EL: 888.00
N: 7101171.03
E: 459148.60

MAX. IN-HEAP POND WSE = 886m

11m CREST (TYP.)

EL: 840.00
N: 7101143.50
E: 459031.63

HLF CONFINING EMBANKMENT

HEAP PAD UNDERDRAIN SYSTEM
((4) 200mm PIPES @ 2.6m O.C. SPACING)

EL: 849.00
N: 7101152.88
E: 459373.40

IN-HEAP POND

EL: 847.00
N: 7101144.40
E: 459373.17

EL: 844.50
N: 7101099.21
E: 459384.36

EL: 847.00
N: 7101133.77
E: 459361.95

EL: 844.50
N: 7101123.17
E: 459361.67

IN-HEAP POND SUMPS (PREGNANT LEACH SOLUTION SUMP, LEAK DETECTION & RECOVERY SYSTEM SUMP, CLOSURE SUMP)

EL: 849.00
N: 7101109.32
E: 459414.66

EL: 847.00
N: 7101109.55
E: 459406.18

EL: 847.00
N: 7101098.93
E: 459394.96

EL: 849.00
N: 7101123.85
E: 459342.76

EL: 844.50
N: 7101121.79
E: 459360.21

EL: 844.50
N: 7101097.84
E: 459382.91

EL: 849.00
N: 7101080.30
E: 459384.03

EL: 827.66
N: 7101039.29
E: 459065.62

NORTH PERIMETER DRAINAGE SWALE TOE

EL: 888.00
N: 7101062.61
E: 459266.48

LDRS PUMP CASING
(TYP. 3 LOCATIONS)

PLS PUMP CASING
(TYP. 5 LOCATIONS)

EL: 850.00
N: 7101012.16
E: 459445.14

CLOSURE OUTLET SYSTEM
((3) 150mm PIPES @ 8m O.C. SPACING)

EL: 888.00
N: 7101055.04
E: 459258.50

CLOSURE DRILL CASING
(TYP. 2 LOCATIONS)

EL: 888.00
N: 7101007.44
E: 459318.75

EL: 888.00
N: 7101048.62
E: 459260.45

1.5:1 SLOPE AT
14m WIDE CREST

EL: 888.00
N: 7101002.16
E: 459304.46

BERM

EL: 888.00
N: 7100999.87
E: 459310.76

EL: 831.00
N: 7100960.04
E: 459152.20

EVENT POND

11m CREST (TYP.)

SPILLWAY BOX CULVERT INLET
(INVERT ELEV = 886m)
(SEE DRAWING 38)

EL: 893.85
N: 7100898.92
E: 459492.10

EL: 891.00
N: 7100875.54
E: 459469.11

DUBLIN GULCH DIVERSION CHANNEL

EL: 893.88
N: 7100891.97
E: 459499.49

EMBANKMENT CREST ELEV = 888m

EL: 855.00
N: 7100870.61
E: 459319.58

EL: 840.00
N: 7100863.82
E: 459274.36

EL: 888.00
N: 7100863.84
E: 459439.64

EMBANKMENT RAMP
(MAX. 12% GRADE)

EL: 888.00
N: 7100871.40
E: 459447.62

EL: 891.00
N: 7100868.01
E: 459477.03

EL: 889.09
N: 7100857.35
E: 459450.79

EL: 890.08
N: 7100858.30
E: 459464.73

EL: 889.00
N: 7100867.84
E: 459454.40

EL: 890.00
N: 7100869.15
E: 459462.03

IN-HEAP POND SPILLWAY
(SEE DRAWING 36)

DUBLIN GULCH DIVERSION CHANNEL

PROFESSIONAL ENGINEER
YUKON
TROY LEE MEYER
TERRITORY
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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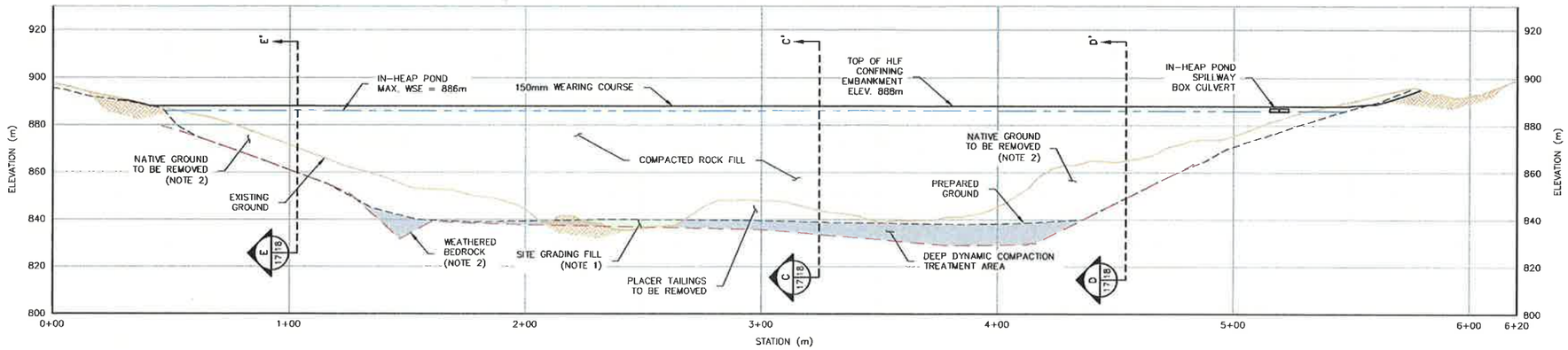
Grand Junction, Colorado, 81501
(970) 256-0125 (970) 241-3175 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY EMBANKMENT PLAN VIEW

PROJECT NO.	74010.01-02
DWG NO.	300-GT-017
REV NO.	3
DATE	4-22-13

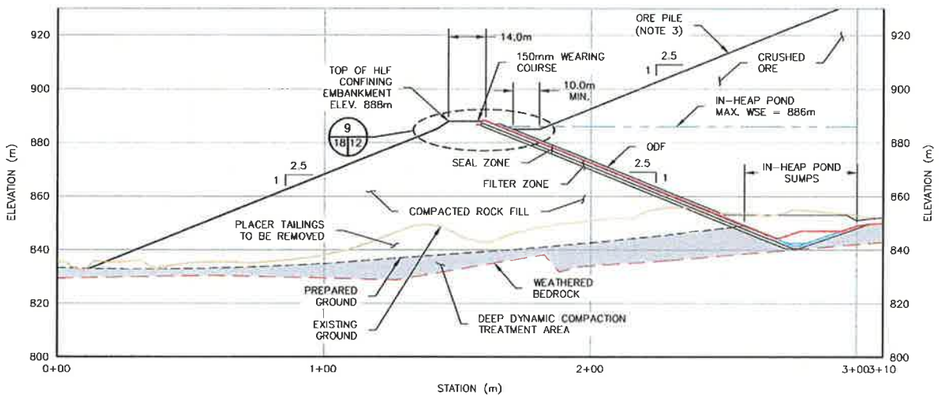
File: G:\21\74010.01\01 Project Management\VFC 2014_MWS\Drawings\Component Plan View.dwg Last Update: 4/24/2014 9:24 PM By: DJSha



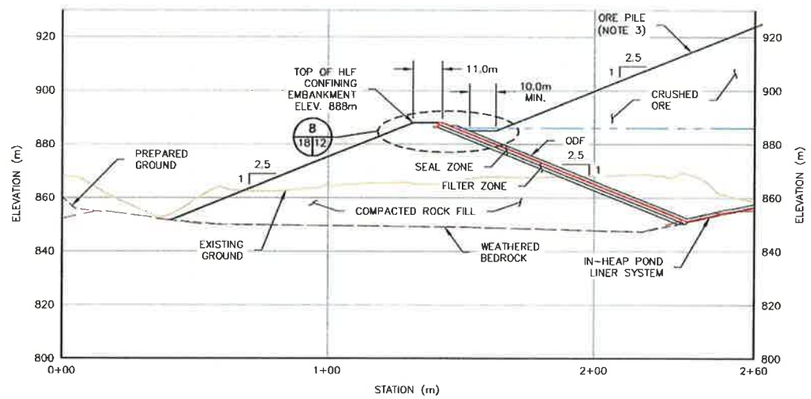
B 17|18 **CONFINING EMBANKMENT PROFILE**
NTS

NOTES:

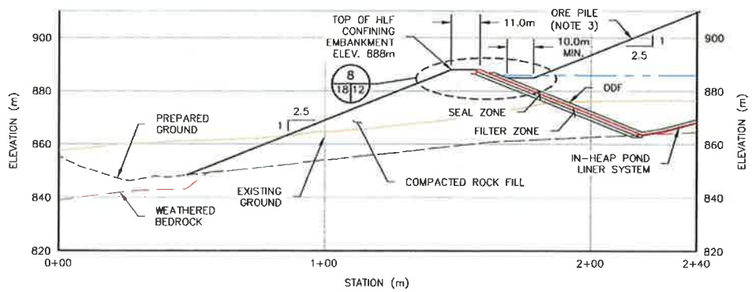
1. PLACE AND COMPACT SITE GRADING FILL OR PLACE PLACER TAILINGS AND TREAT WITH DEEP DYNAMIC COMPACTION PER PROJECT TECHNICAL SPECIFICATIONS.
2. EMBANKMENT ABUTMENT AREAS TO BE PREPARED BY EXCAVATION TO TYPE 3 (OR BETTER) BEDROCK PER PROJECT TECHNICAL SPECIFICATIONS. DEPTH TO TYPE 3 BEDROCK MAY VARY FROM THESE PLANS AND SHALL BE VERIFIED IN THE FIELD BY THE OWNER'S ENGINEER.
3. ORE PILE SLOPE IS 2.5:1 OVERALL BUT SHALL BE COMPRISED OF 10m LIFTS STACKED AT ANGLE OF REPOSE. SEE DETAIL 19 ON DRAWING 19.
4. SEE DRAWING 11 FOR IN-HEAP POND LINER DETAILS.
5. SEE DRAWING 19 FOR TYPICAL CONFINING EMBANKMENT SECTION.



C 17|18 **CONFINING EMBANKMENT SECTION**
NTS



D 17|18 **CONFINING EMBANKMENT SECTION**
NTS



E 17|18 **CONFINING EMBANKMENT SECTION**
NTS

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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2	ISSUED FOR REVIEW - REV. D, G, D, C, & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

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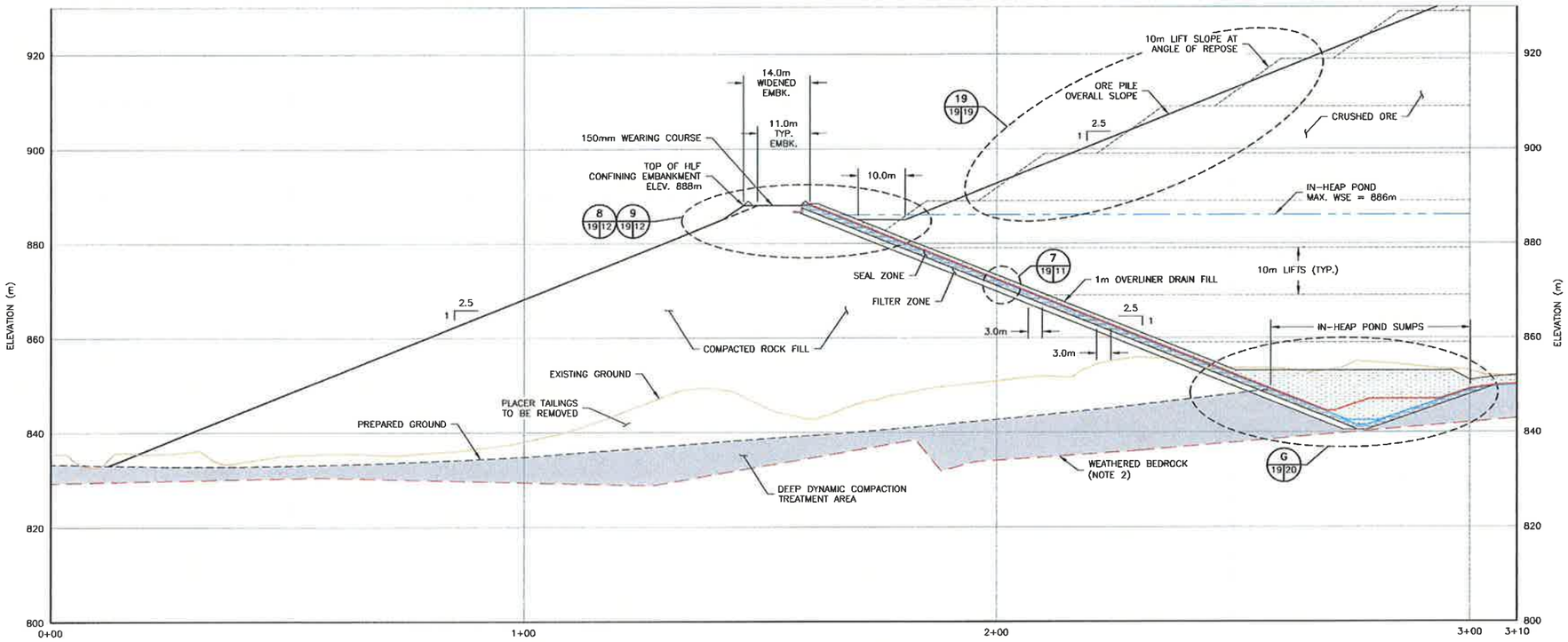
EAGLE GOLD PROJECT

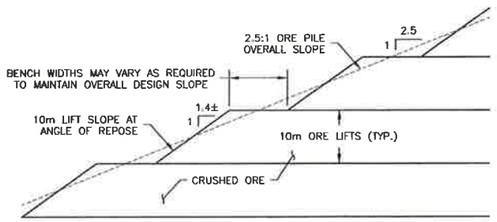
HEAP LEACH FACILITY EMBANKMENT SECTIONS

PROJECT NO. 74019.01-02
DWG NO. 300-GT-018
REV NO. 3
DATE 4-22-13

File: G:\GT\74019.01-02 Project Management\EC 2014_10\Drawings\Engineering Plan Working\GAT_GT018_1-3.dgn 4-22-14 8:24 PM BY: DEHN



F 18|19 **TYPICAL CONFINING EMBANKMENT DETAIL**
NTS



19 19|19 **TYPICAL ORE PILE SIDE SLOPE DETAIL**
NTS

NOTES:

1. PLACE AND COMPACT SITE GRADING FILL OR PLACE PLACER TAILINGS AND TREAT WITH DEEP DYNAMIC COMPACTION PER PROJECT TECHNICAL SPECIFICATIONS.
2. EMBANKMENT ABUTMENT AREAS TO BE PREPARED BY EXCAVATION TO TYPE 3 (OR BETTER) BEDROCK PER PROJECT TECHNICAL SPECIFICATIONS. DEPTH TO TYPE 3 BEDROCK MAY VARY FROM THESE PLANS AND SHALL BE VERIFIED IN THE FIELD BY THE OWNER'S ENGINEER.
3. ORE PILE SLOPE IS 2.5:1 OVERALL BUT SHALL BE COMPRISED OF 10m LIFTS STACKED AT ANGLE OF REPOSE. SEE DETAIL 19 THIS DRAWING.
4. SEE DRAWING 11 FOR IN-HEAP POND LINER DETAILS.

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY F2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
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DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

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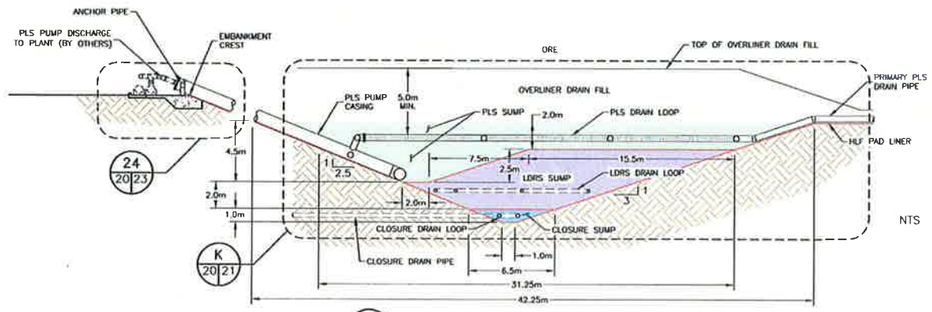
EAGLE GOLD PROJECT

HEAP LEACH FACILITY EMBANKMENT DETAILS

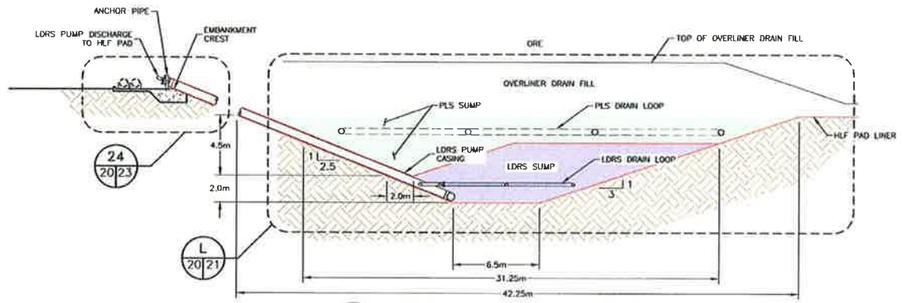
PROJECT NO.	74010.01-02
DWG NO.	300-GT-019
REV NO.	3
DATE	4-22-13

File: G:\27\74010.01\CAD Project Management\VE 2014, Mod\Drawings\Engineering Plan View.dwg LAST UPDATE: 4/24/2014 5:24 PM BY: DJSTN



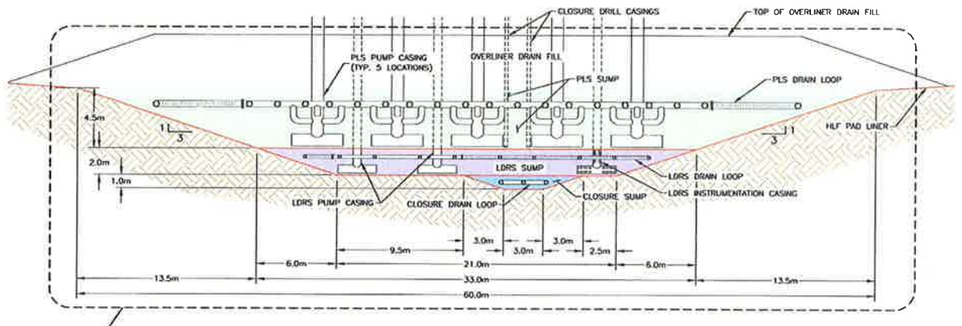
G 20 20 **TYPICAL IN-HEAP POND SUMP SECTION**

NTS



H 20 20 **TYPICAL IN-HEAP POND SUMP SECTION**

NTS

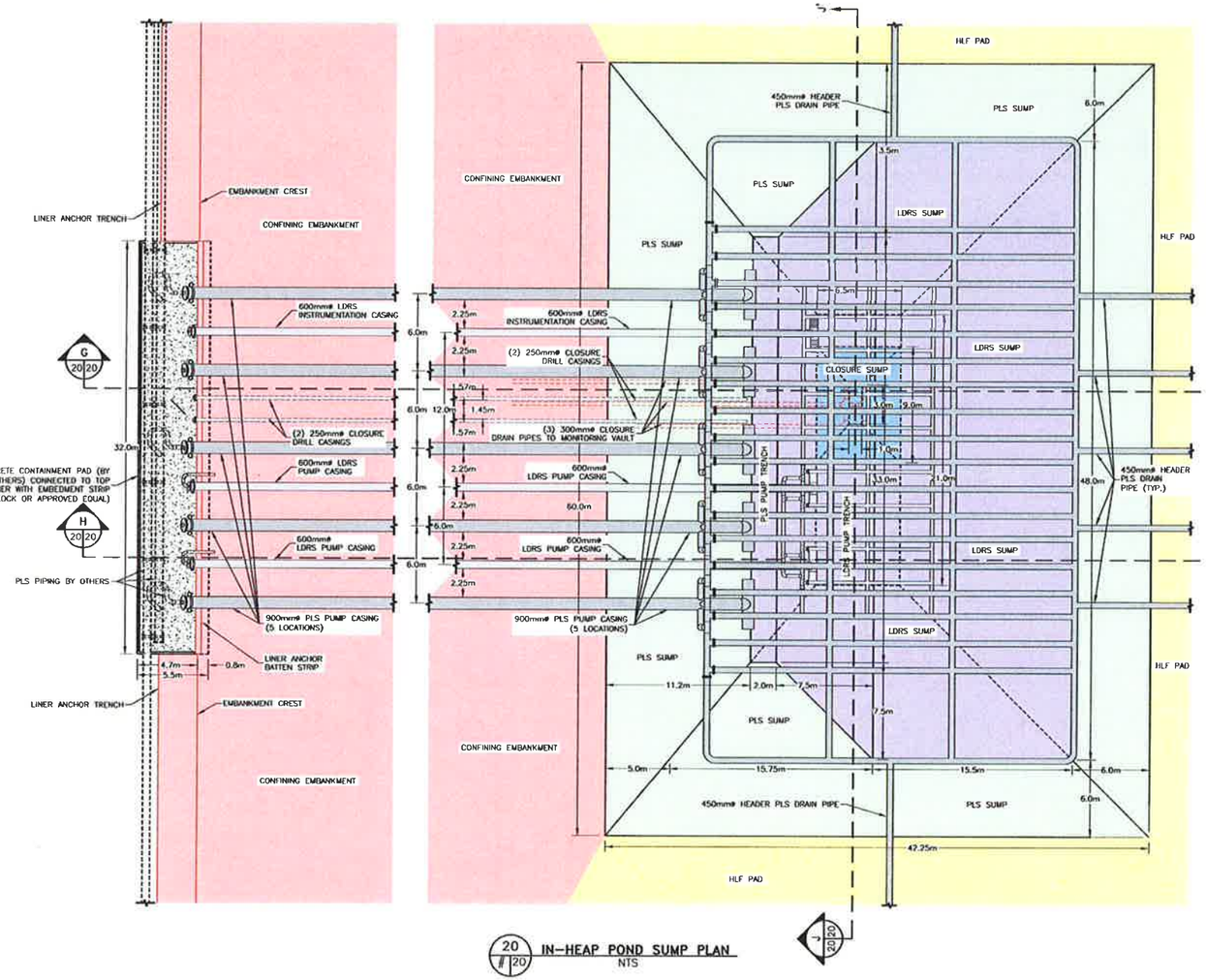


J 20 20 **TYPICAL IN-HEAP POND SUMP SECTION**

NTS

NOTES:

1. RUB SHEET SHALL BE INSTALLED UNDER EACH STEEL CASING WITH DIRECT CONTACT TO THE LINER. RUB SHEET SHALL CONSIST OF A 16 OZ. NON-WOVEN GEOTEXTILE AND AN ADDITIONAL LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED LLDPE GEOMEMBRANE PLACED BENEATH EACH PUMP CASING FOR LINER PROTECTION. TEMPORARILY SECURE RUB SHEET WITH SAND BAGS AS NEEDED.
2. 2m LONG CONCRETE FILLED STEEL PIPE ANCHOR POSTS (EACH SIDE OF PUMP CASING) EMBEDDED 0.9m INTO CONCRETE ANCHOR TO INHIBIT LATERAL MOVEMENT AND VERTICAL SETTLEMENT OF RISER.
3. ALL SOLID PIPE FITTINGS AND CONNECTIONS TO CONFORM TO AWWA C-906 STANDARDS.
4. INSTALL 12.5mm (0.5") THICK STEEL PLATES ON TOP OF LINER TO PROTECT DURING CLOSURE DRILLING. STEEL PLATES ARE TO BE UNDERLAIN WITH CONVEYOR BELT MATERIAL OR 16 OZ. NON-WOVEN GEOTEXTILE AND THE EDGES BEVELLED TO PREVENT PUNCTURING OF LINER. STEEL PLATE INSTALLED IN CLOSURE SUMP IS TO INCLUDE AN ANGLE AT THE BOTTOM TO IDENTIFY TERMINATION POINT FOR DRILLING. STEEL PLATES ARE TO BE SPACED 0.2m APART TO ALLOW ROOM FOR LINER SYSTEM BETWEEN THEM.
5. FREE-FLOATING (LOW FRICTION) PIPE SUPPORT TO BE INSTALLED AT TOP OF RISER TO ALLOW FOR THERMAL EXPANSION/CONTRACTION WHILE INHIBITING LATERAL MOVEMENT AND VERTICAL SETTLEMENT.
6. ALL CONNECTIONS BETWEEN PE AND STEEL PIPE (AND OTHER CONNECTIONS AS IDENTIFIED BY THE FIELD ENGINEER) SHALL BE COMPLETELY AND SECURELY WRAPPED WITH GEOCOMPOSITE TO AT LEAST 500mm ON BOTH SIDES OF THE CONNECTIONS.



20 // 20 **IN-HEAP POND SUMP PLAN**

NTS

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

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CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH

EAGLE GOLD PROJECT

HEAP LEACH FACILITY IN-HEAP SUMP DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-020
REV NO.	3
DATE	4-22-13

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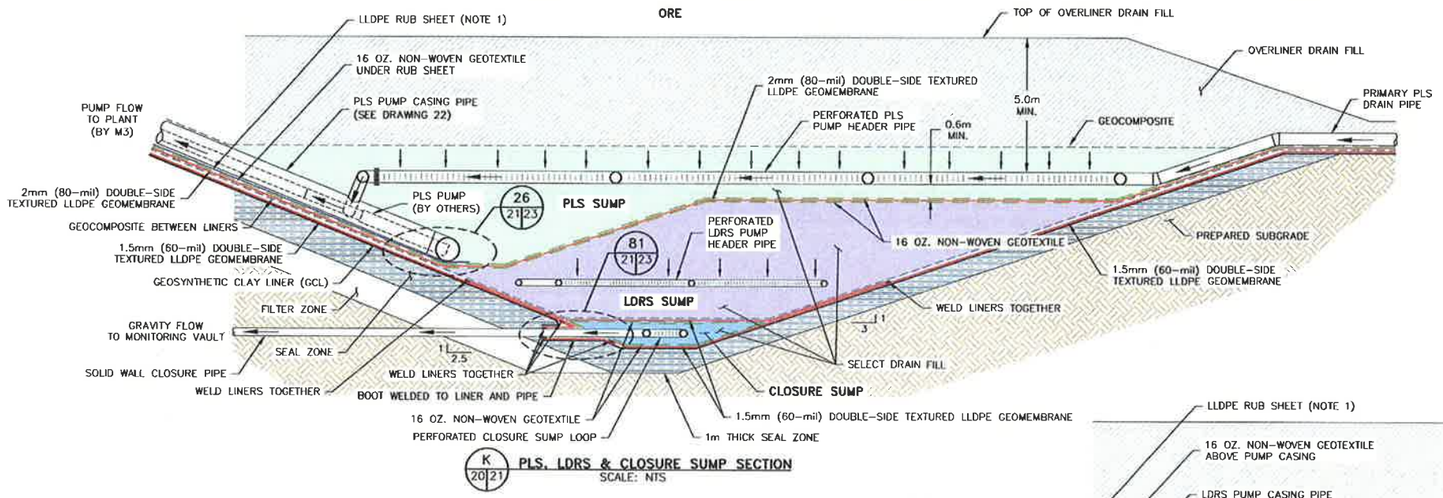
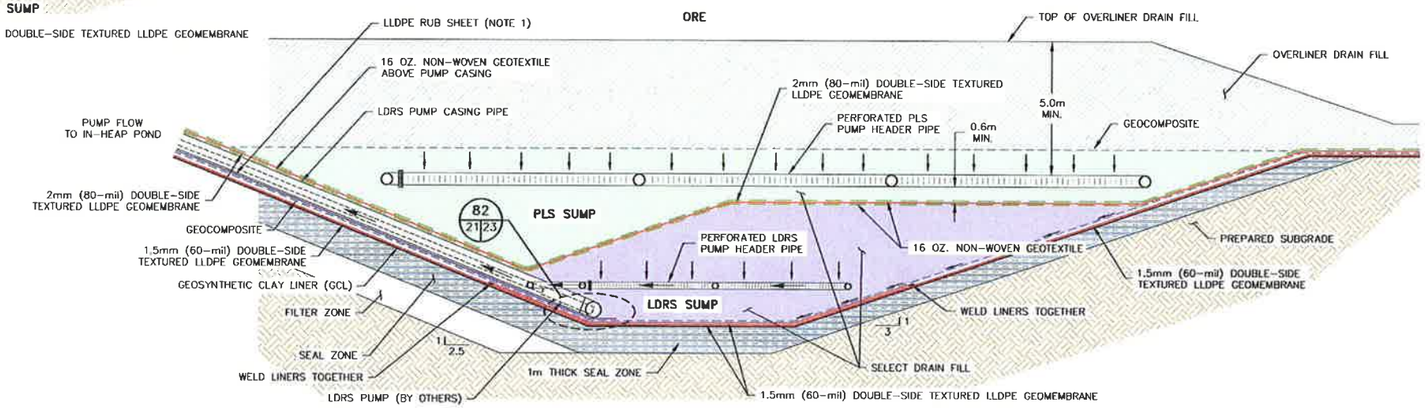


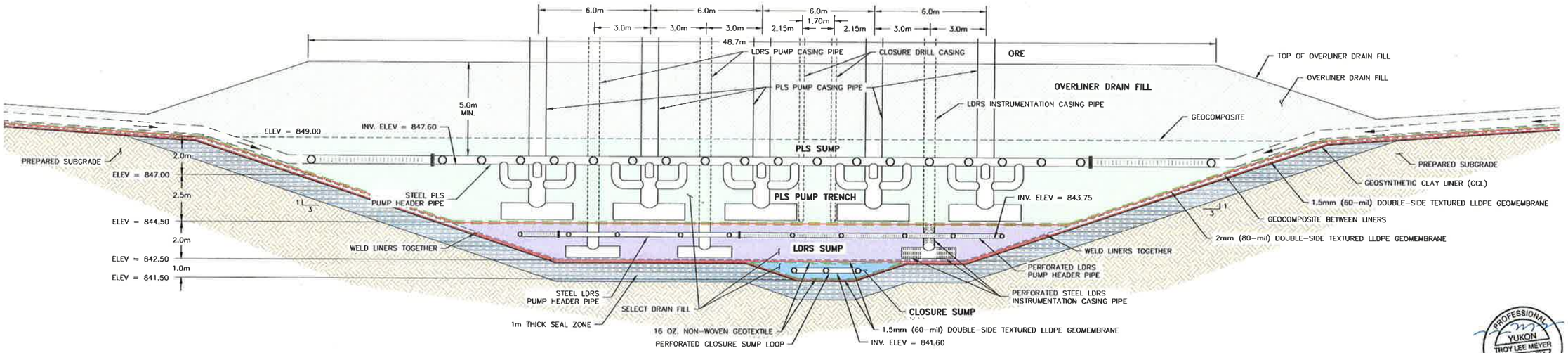
K 20|21 **PLS, LDRS & CLOSURE SUMP SECTION**
SCALE: NTS

NOTES:

1. RUB SHEET SHALL BE INSTALLED UNDER EACH STEEL CASING WITH DIRECT CONTACT TO THE LINER. RUB SHEET SHALL CONSIST OF A 16 OZ. NON-WOVEN GEOTEXTILE AND AN ADDITIONAL LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED LLDPE GEOMEMBRANE PLACED BENEATH EACH PUMP CASING FOR LINER PROTECTION. TEMPORARILY SECURE RUB SHEET WITH SAND BAGS AS NEEDED.
2. PLACE OVERLINER DRAIN FILL IN CONTROLLED EVEN LIFTS ON BOTH SIDES OF PUMP CASING AND HAND TAMP AS REQUIRED TO MAINTAIN STRAIGHT PIPE ALIGNMENT FROM SUMP TO EMBANKMENT CREST.
3. 2m LONG CONCRETE FILLED STEEL PIPE ANCHOR POSTS (EACH SIDE OF PUMP CASING) EMBEDDED 0.9m INTO CONCRETE ANCHOR TO INHIBIT LATERAL MOVEMENT AND VERTICAL SETTLEMENT OF RISER.
4. ALL SOLID PIPE FITTINGS AND CONNECTIONS TO CONFORM TO AWWA C-906 STANDARDS.
5. INSTALL 12.5mm (0.5") THICK STEEL PLATES ON TOP OF LINER TO PROTECT DURING CLOSURE DRILLING. STEEL PLATES ARE TO BE UNDERLAIN WITH CONVEYOR BELT MATERIAL OR 16 OZ. NON-WOVEN GEOTEXTILE AND THE EDGES BEVELLED TO PREVENT PUNCTURING OF LINER. STEEL PLATE INSTALLED IN CLOSURE SUMP IS TO INCLUDE AN ANGLE AT THE BOTTOM TO IDENTIFY TERMINATION POINT FOR DRILLING. STEEL PLATES ARE TO BE SPACED 0.2m APART TO ALLOW ROOM FOR LINER SYSTEM BETWEEN THEM.
6. FREE-FLOATING (LOW FRICTION) PIPE SUPPORT TO BE INSTALLED AT TOP OF RISER TO ALLOW FOR THERMAL EXPANSION/CONTRACTION WHILE INHIBITING LATERAL MOVEMENT AND VERTICAL SETTLEMENT.
7. ALL CONNECTIONS BETWEEN PE AND STEEL PIPE (AND OTHER CONNECTIONS AS IDENTIFIED BY THE FIELD ENGINEER) SHALL BE COMPLETELY AND SECURELY WRAPPED WITH GEOCOMPOSITE TO AT LEAST 500mm ON BOTH SIDES OF THE CONNECTIONS.



L 20|21 **PLS, LDRS & CLOSURE SUMP SECTION**
SCALE: NTS



M 20|21 **PLS, LDRS & CLOSURE SUMP SECTION**
SCALE: NTS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. O.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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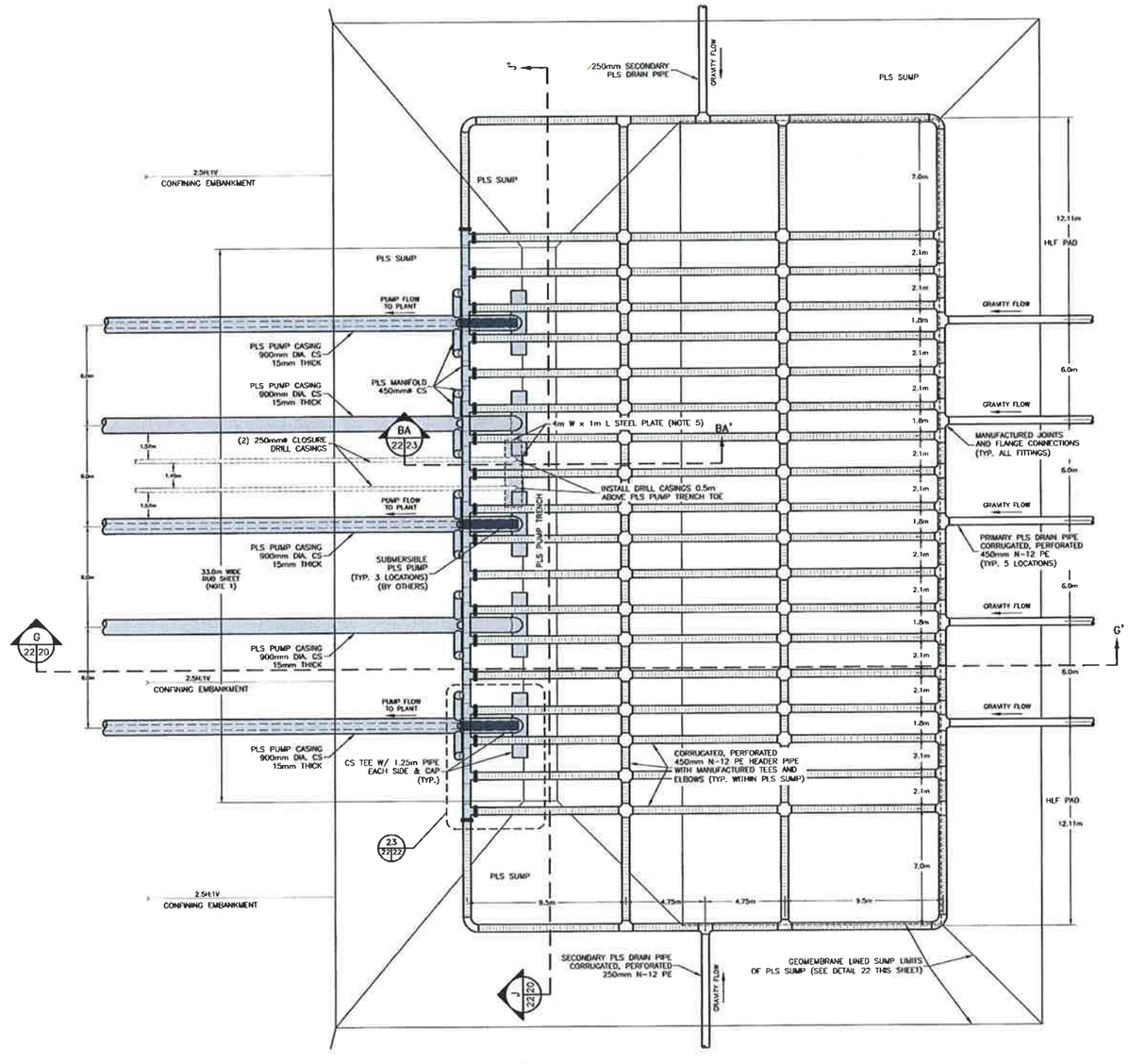
EAGLE GOLD PROJECT

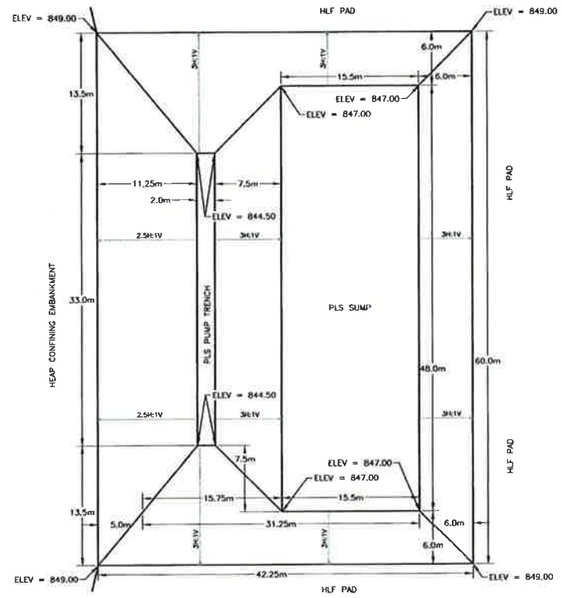
HEAP LEACH FACILITY IN-HEAP SUMP SECTIONS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-021
REV NO.	3
DATE	4-22-13

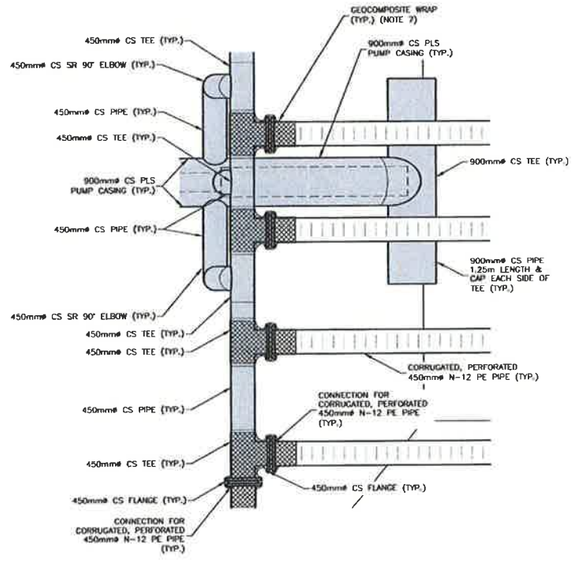
File: G:\2013\74010.01\01 Project Management\CVE 2014_new\Drawings\In-Heap Sump Sections.dwg LAST UPDATE: 11/7/2013 2:36 AM By: DUSTIN DEHART



21 X 22 **PLS SUMP & PIPING PLAN**
SCALE: NTS



22 22 22 **PLS SUMP GEOMETRY DETAIL**
SCALE: NTS



23 22 22 **PLS CASING & MANIFOLD DETAIL**
SCALE: NTS

NOTES:

1. RUB SHEET SHALL BE INSTALLED UNDER EACH STEEL CASING WITH DIRECT CONTACT TO THE LINER. RUB SHEET SHALL CONSIST OF A 16 OZ. NON-WOVEN GEOTEXTILE AND AN ADDITIONAL LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED LLDPE GEOMEMBRANE PLACED BENEATH EACH PUMP CASING FOR LINER PROTECTION. TEMPORARILY SECURE RUB SHEET WITH SAND BAGS AS NEEDED.
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4. ALL SOLID PIPE FITTINGS AND CONNECTIONS TO CONFORM TO AWWA C-906 STANDARDS.
5. INSTALL 12.5mm (0.5") THICK STEEL PLATES ON TOP OF LINER TO PROTECT DURING CLOSURE DRILLING. STEEL PLATES ARE TO BE UNDERLAIN WITH CONVEYOR BELT MATERIAL OR 16 OZ. NON-WOVEN GEOTEXTILE AND THE EDGES BEVELLED TO PREVENT PUNCTURING OF LINER. STEEL PLATE INSTALLED IN CLOSURE SUMP IS TO INCLUDE AN ANGLE AT THE BOTTOM TO IDENTIFY TERMINATION POINT FOR DRILLING. STEEL PLATES ARE TO BE SPACED 0.2m APART TO ALLOW ROOM FOR LINER SYSTEM BETWEEN THEM.
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PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

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CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY PLS SUMP DETAILS

PROJECT NO.	74010.0102
DWG NO.	300-GT-022
REV NO.	3
DATE	4-22-13

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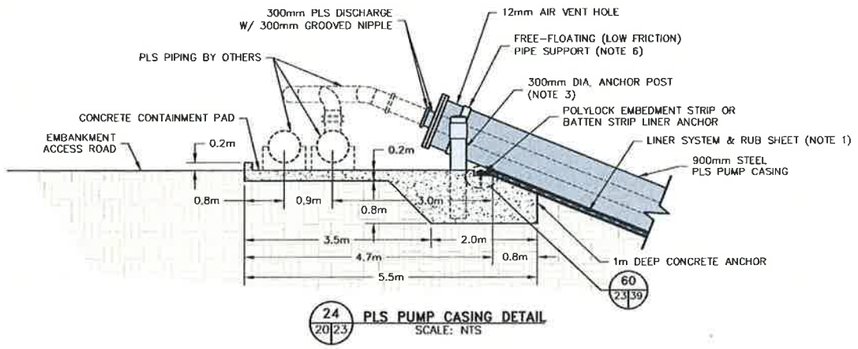
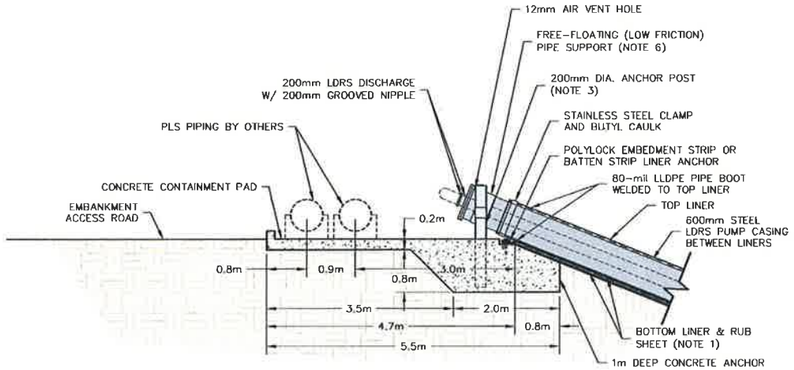


24 / 20 23 **PLS PUMP CASING DETAIL**
SCALE: NTS



25 / 20 23 **LDRS PUMP CASING DETAIL**
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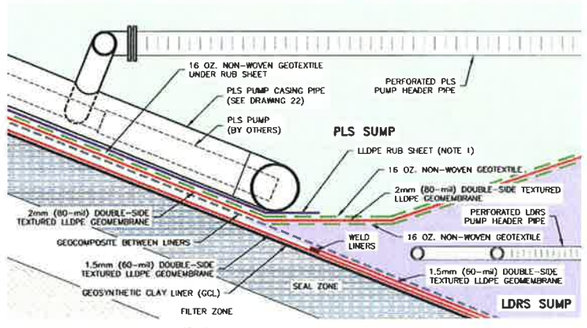
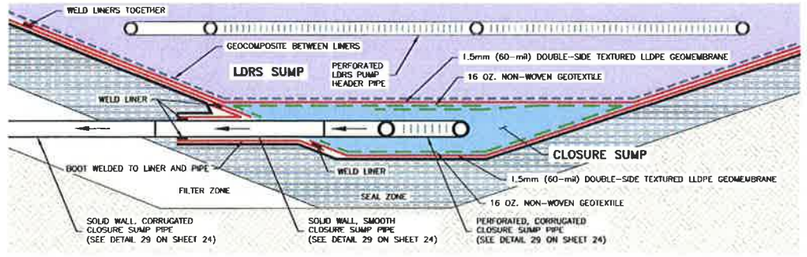
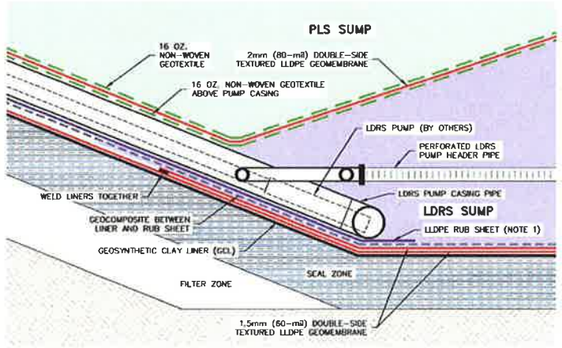


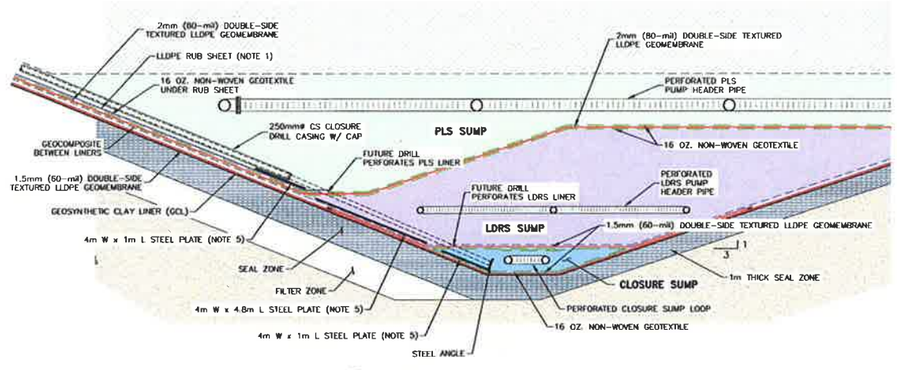
26 / 21 23 **PLS SUMP LINER DETAIL**
SCALE: NTS



81 / 21 23 **CLOSURE SUMP LINER DETAIL**
SCALE: NTS



82 / 21 23 **LDRS SUMP LINER DETAIL**
SCALE: NTS



BA / 22 23 **CLOSURE DRILL CASING DETAIL**
SCALE: NTS

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6.

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

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REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.D.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:			DATE
DESIGNED BY		DEH	04/10/14
DRAWN BY		DAR	04/10/14
CHECKED BY			
PROJECT MGR		TLM	04/10/14
CLIENT APPR.			

StrataGold Corporation

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY PLS SUMP DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-023
REV NO.	3
DATE	4-22-13

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NOTES:

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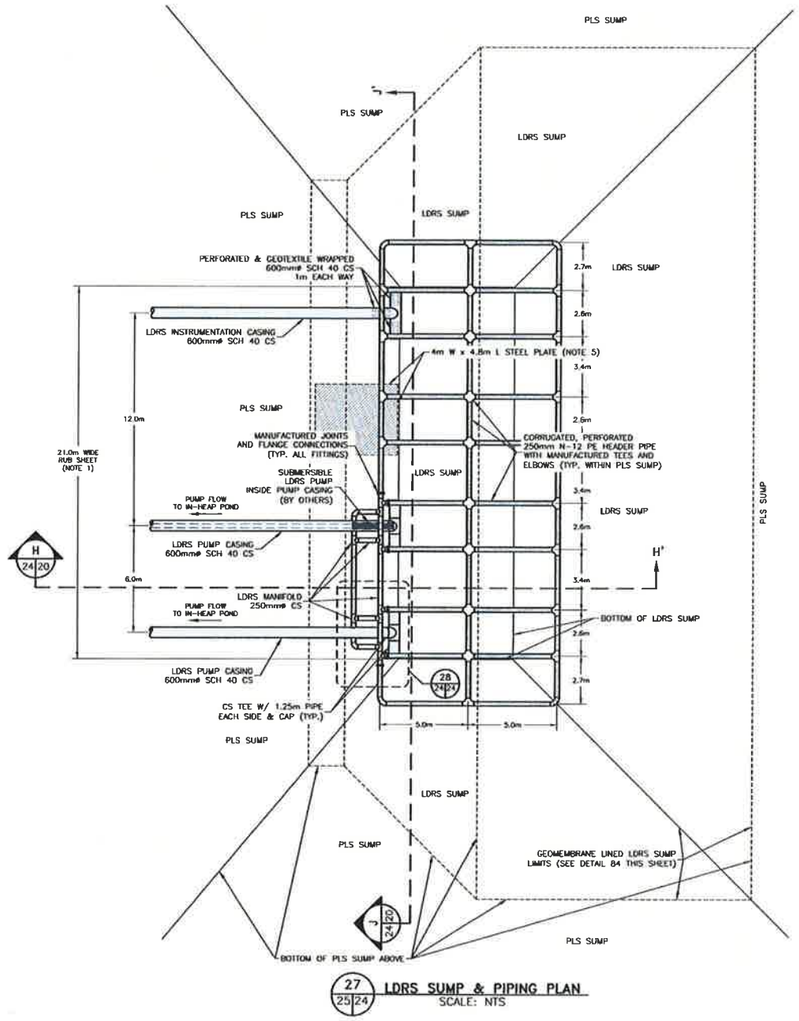
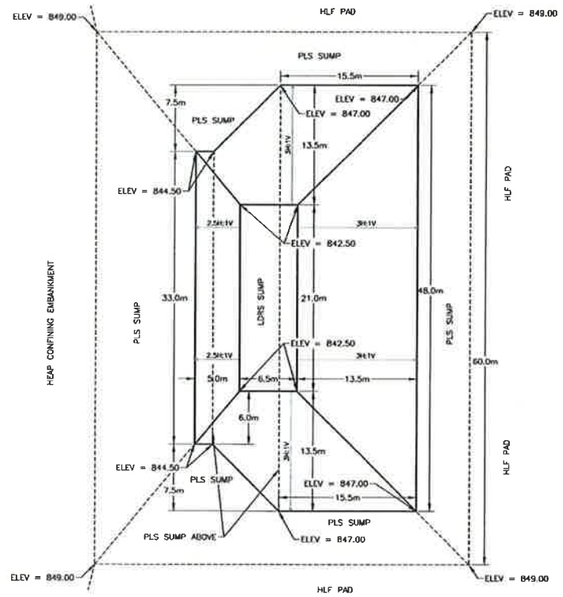
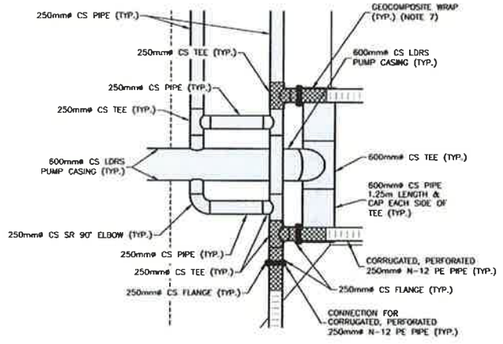


27 25|24 LDRS SUMP & PIPING PLAN
SCALE: NTS



84 24|24 LDRS SUMP GEOMETRY DETAIL
SCALE: NTS



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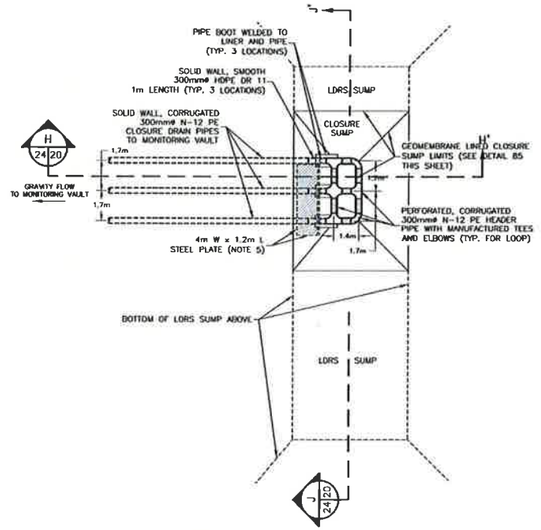
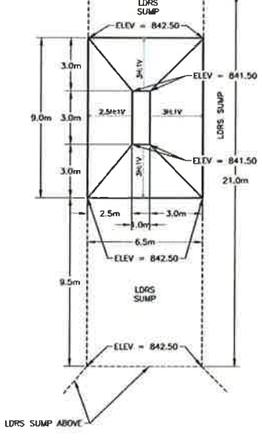
SCALE: NTS



29 24|24 CLOSURE SUMP & PIPING PLAN
SCALE: NTS



85 24|24 CLOSURE SUMP GEOMETRY DETAIL
SCALE: NTS

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY FY2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	TITLE

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CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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Grand Junction, Colorado 81505
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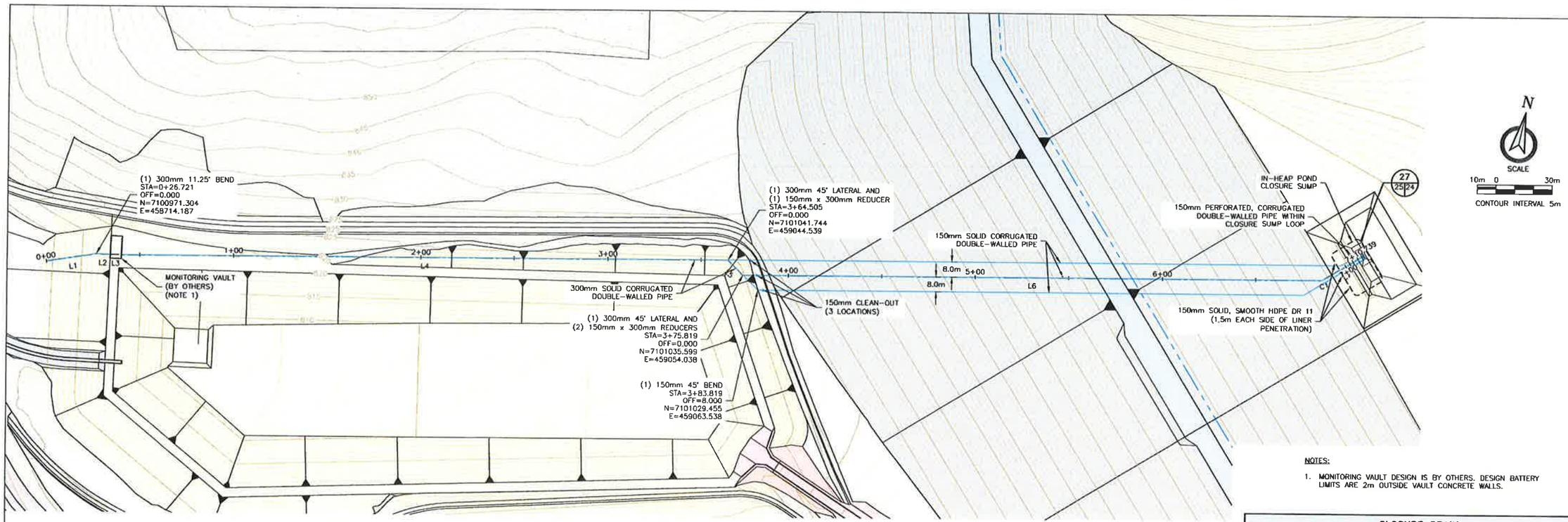
EAGLE GOLD PROJECT

HEAP LEACH FACILITY
LDRS & CLOSURE
SUMP DETAILS

PROJECT NO. 74010.01-02
DWG NO. 300-GT-024
REV NO. 2
DATE 4-22-13

File: G:\27\74010.01\05 Project Management\PE Docs\dwgs\LDRS & Closure Sump Details.dwg LAST UPDATED 11/7/2013 8:38 AM BY: DUSTIN.DEWITT

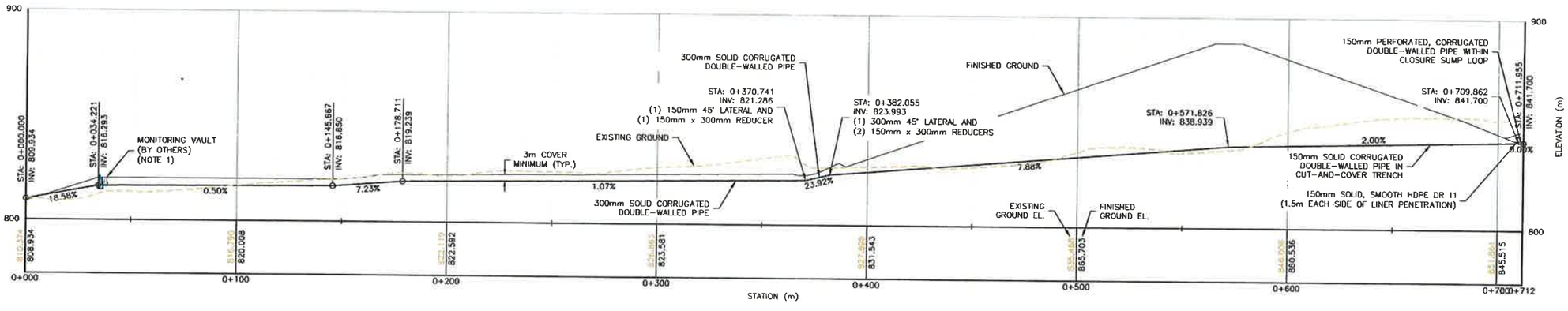


CLOSURE DRAIN PLAN VIEW
NTS

NOTES:

1. MONITORING VAULT DESIGN IS BY OTHERS. DESIGN BATTERY LIMITS ARE 2m OUTSIDE VAULT CONCRETE WALLS.

CLOSURE DRAIN						
ID	RADIUS	LENGTH	DELTA	STA.	START N,E	END N,E
L1		26.72m		0+000.00	7100961.69,458689.26	7100971.30,458714.19
L2		7.50m		0+026.72	7100971.30,458714.19	7100972.59,458721.58
L3		6.00m		0+034.22	7100972.59,458721.58	7100973.75,458727.46
L4		324.28m		0+040.22	7100973.75,458727.46	7101041.74,459044.54
L5		11.31m		0+364.51	7101041.74,459044.54	7101035.60,459054.04
L6		309.33m		0+375.82	7101035.60,459054.04	7101100.46,459356.49
C1	0.50	0.27m	31.35°	0+685.15	7101100.46,459356.49	7101100.58,459356.73
L7		25.32m		0+685.42	7101100.58,459356.73	7101118.00,459375.11



CLOSURE DRAIN PROFILE
NTS

DO NOT SCALE 11x17 DRAWINGS

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY CLOSURE PLAN AND PROFILE

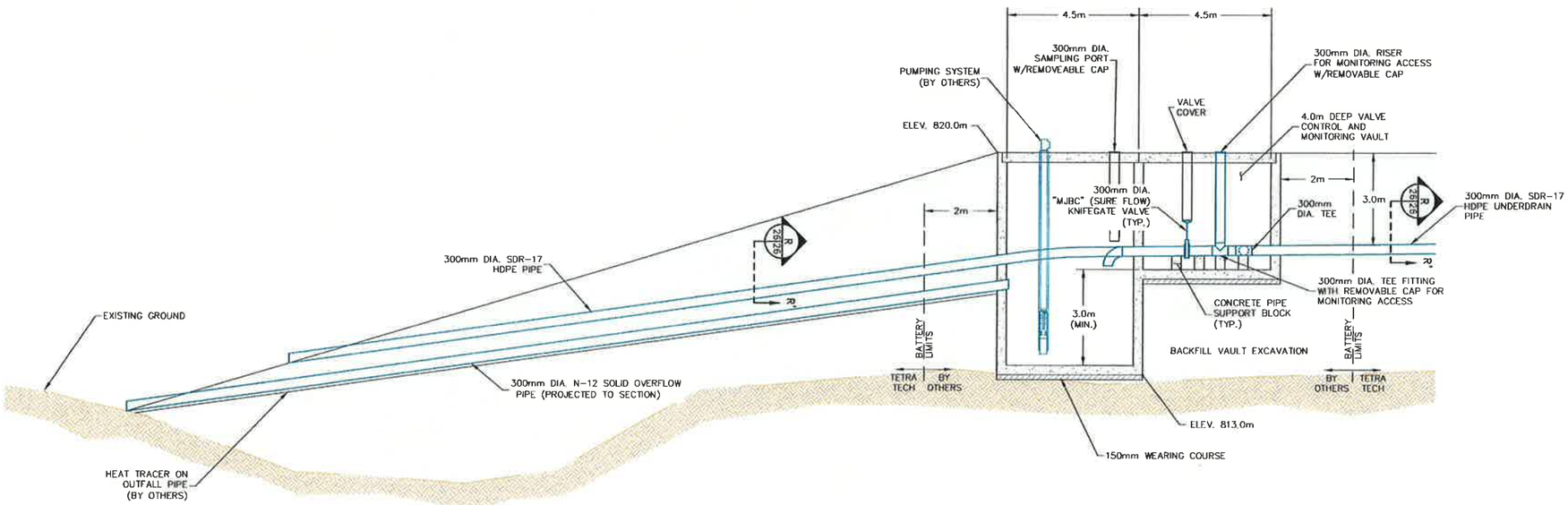
PROJECT NO. 74010.01-02
DWG NO. 300-GT-025
REV NO. 3
DATE 4-22-13

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

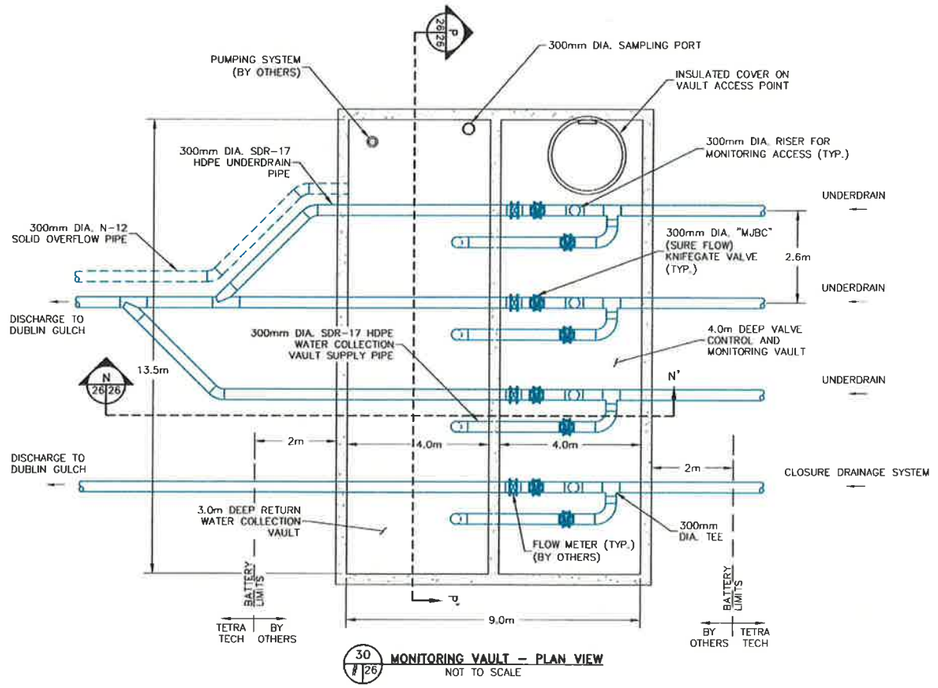
File: G:\237\74010.01\Project Management\AFC 2006, Mod\Drawings\Closure Plan and Profile.dwg LAST UPDATE: 4/24/2014 11:00 PM BY: DUSTIN

NOTES:

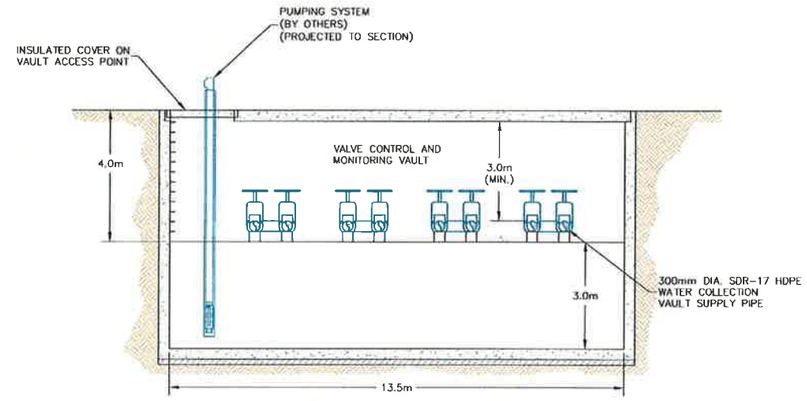
1. MONITORING VAULT TO BE DESIGNED BY OTHERS AND SHOWN HERE FOR REFERENCE ONLY. BATTERY LIMITS FOR TETRA TECH DESIGN ARE 2m FROM OUTSIDE OF MONITORING VAULT. DESIGN OUTSIDE TETRA TECH BATTERY LIMITS ARE FOR REFERENCE ONLY.



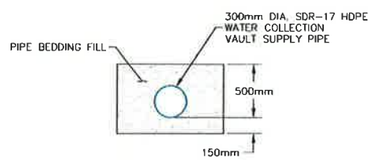
N 26/26 **MONITORING VAULT – PROFILE VIEW**
NOT TO SCALE



30 / 26 **MONITORING VAULT – PLAN VIEW**
NOT TO SCALE



P 26/26 **CLOSURE OUTLET VAULT PROFILE**
NOT TO SCALE



R 26/26 **TYPICAL PIPE TRENCH DETAIL**
NOT TO SCALE

PROFESSIONAL ENGINEER — YUKON TROY LEE MEYER TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH

Tt

EAGLE GOLD PROJECT

HEAP LEACH FACILITY MONITORING VAULT DETAILS

PROJECT NO.	74090.01-02
DWG NO.	300-GT-026
REV NO.	3
DATE	4-22-13

File: G:\297\74090\DWG\Project Management\EVC DWG Index\Drawings\Monitoring Vault Details.dwg LAST UPDATE: 4/22/2014 9:33 PM BY: DJSTN

HEAP LEACH PAD PERIMETER BERM

HEAP LEACH PAD PHASE 1

HEAP LEACH PAD PHASE 1

HEAP LEACH PAD PHASE 1

HEAP LEACH PAD PERIMETER BERM

HEAP LEACH PHASE 2

ANN GULCH

PHASE 1 TEMPORARY DIVERSION CHANNEL

HEAP CONFINING EMBANKMENT

IN-HEAP POND

IN-HEAP POND SPILLWAY

PLS SUMP

DUBLIN GULCH

DUBLIN GULCH DIVERSION CHANNEL

DUBLIN GULCH DIVERSION CHANNEL

AGGLOMERATOR PAD

100mm PRIMARY PLS DRAIN PIPES (TYP.)

250mm HEADER PLS DRAIN PIPE (TYP.)

250mm HEADER PLS DRAIN PIPE (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

250mm HEADER PLS DRAIN PIPE (TYP.)

(3) 450mm HEADER PLS DRAIN PIPES

250mm HEADER PLS DRAIN PIPE (TYP.)

HLF UNDERDRAIN PIPES (SEE DRAWING 15)

250mm HEADER PLS DRAIN PIPE (TYP.)

MAX. IN-HEAP POND WATER SURFACE ELEVATION = 886m

IN-HEAP POND CLOSURE PIPES (SEE DRAWING 25)

250mm HEADER PLS DRAIN PIPE (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

CLOSURE DRILL CASING (TYP. 2 LOCATIONS)

IN-HEAP POND PLS PUMP CASING (TYP. 5 LOCATIONS)

IN-HEAP POND LDRS PUMP CASING (TYP. 3 LOCATIONS)

250mm HEADER PLS DRAIN PIPE (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

25.0m (TYP.)

(2) 250mm HEADER PLS DRAIN PIPES (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

(2) 450mm HEADER PLS DRAIN PIPES

250mm HEADER PLS DRAIN PIPE (TYP.)

N: 7101549.35
E: 459253.21

N: 7101677.87
E: 459393.81

N: 7101644.71
E: 459406.69

N: 7101835.85
E: 459560.72

N: 7101787.71
E: 459548.93

N: 7101672.87
E: 459535.93

N: 7101527.93
E: 459253.16

N: 7101452.84
E: 459253.88

N: 7101359.17
E: 459273.16

N: 7101545.57
E: 459445.20

N: 7101602.55
E: 459558.84

N: 7101523.31
E: 459514.55

N: 7101497.44
E: 459463.71

N: 7101430.39
E: 459485.60

N: 7101545.65
E: 459523.07

N: 7101717.21
E: 459678.22

N: 7101681.48
E: 459639.88

N: 7101298.68
E: 459304.93

N: 7101414.66
E: 459482.52

N: 7101651.17
E: 459709.60

N: 7101505.61
E: 459634.01

N: 7101431.65
E: 459611.98

N: 7101603.63
E: 459676.34

N: 7101597.63
E: 459757.00

N: 7101174.86
E: 459417.71

N: 7101143.17
E: 459397.22

N: 7101536.71
E: 459760.52

N: 7101338.74
E: 459589.08

N: 7101493.16
E: 459771.07

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N: 7101436.33
E: 459771.19

N: 7101313.66
E: 459710.30

N: 7101262.86
E: 459644.92

N: 7101461.37
E: 459900.28

N: 7101301.93
E: 459755.06

N: 7101085.51
E: 459583.74

N: 7101232.58
E: 459731.51

N: 7101293.38
E: 459785.37

SCALE
15m 0 45m
CONTOUR INTERVAL 1m

LEGEND

HEADER PLS DRAIN PIPE
CORRUGATED, PERFORATED 450mm ADS N-12 PE

HEADER PLS DRAIN PIPE
CORRUGATED, PERFORATED 250mm ADS N-12 PE

PRIMARY PLS DRAIN PIPE
CORRUGATED, PERFORATED 100mm ADS N-12 PE

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

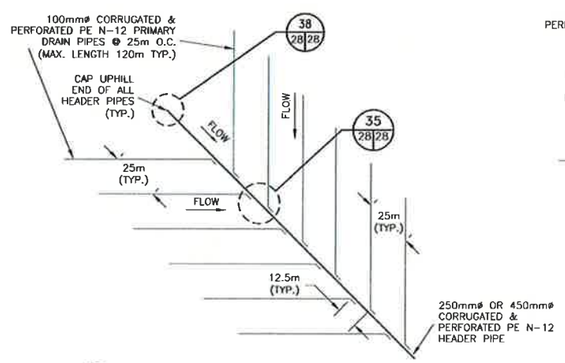
TETRA TECH

EAGLE GOLD PROJECT

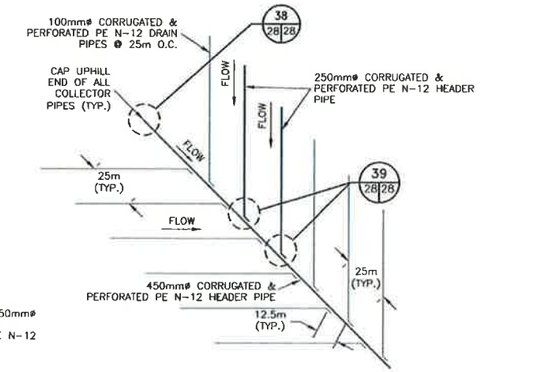
HEAP LEACH FACILITY PLS RECOVERY PIPING PLAN VIEW

PROJECT NO. 74010.01-02
DWG NO. 300-GT-027
REV NO. 3
DATE 4-22-13

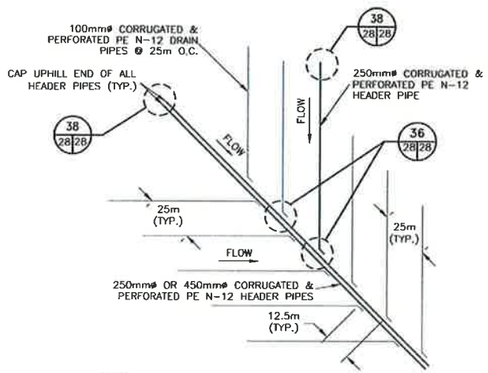
File: Q:\321\2402.0101\Project Management\VPC 2014\Drawings\Solution Recovery Plan View.dwg LAST UPDATE: 4/24/2014 10:04 PM BY: DSTH



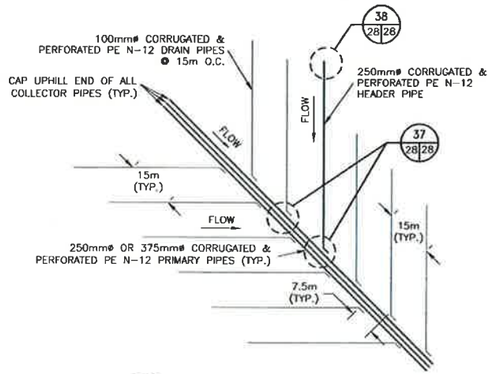
31 27|28 **TYPICAL PRIMARY 100mmø DRAIN PIPE LAYOUT**
N.T.S.



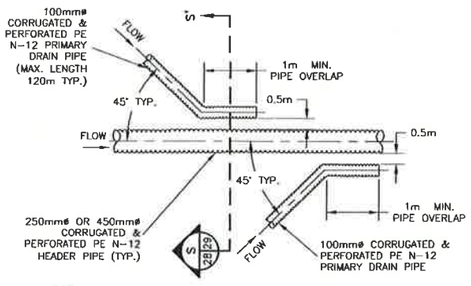
32 27|28 **TYPICAL 250mmø HEADER CONNECTION TO 450mmø HEADER PIPES LAYOUT**
N.T.S.



33 27|28 **TYPICAL DOUBLE HEADER PIPE LAYOUT**
N.T.S.



34 27|28 **TYPICAL MULTIPLE HEADER PIPE LAYOUT**
N.T.S.



35 28|28 **TYPICAL SINGLE HEADER PIPE PRIMARY DRAIN DETAIL**
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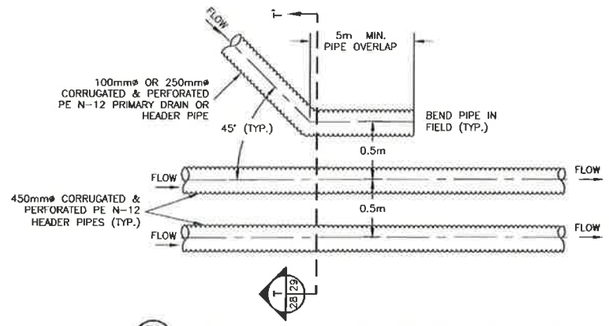
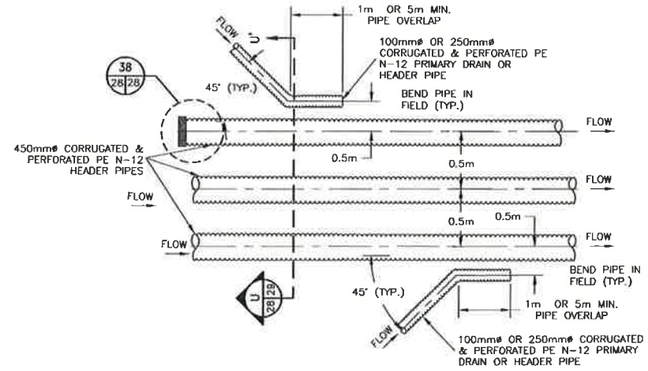
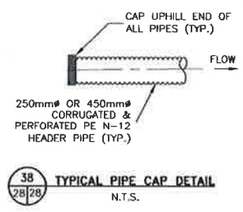


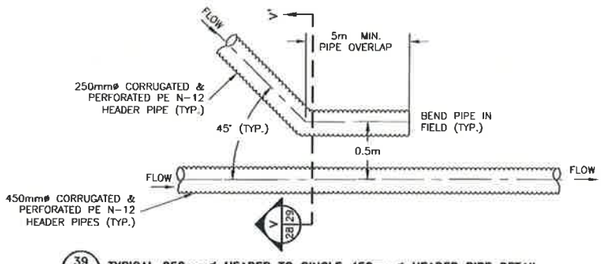
36 28|28 **TYPICAL 250mmø HEADER TO DOUBLE 450mmø HEADER PIPES DETAIL**
N.T.S.



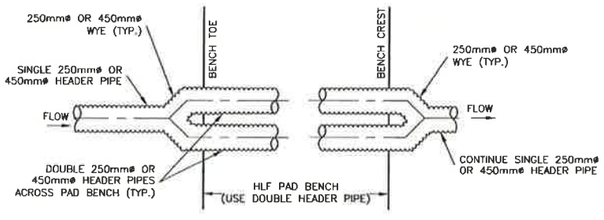
37 28|28 **TYPICAL MULTIPLE 450mmø HEADER PIPE DETAIL**
N.T.S.



38 28|28 **TYPICAL PIPE CAP DETAIL**
N.T.S.



39 28|28 **TYPICAL 250mmø HEADER TO SINGLE 450mmø HEADER PIPE DETAIL**
N.T.S.



40 27|28 **TYPICAL HEADER PIPE AT BENCH DETAIL**
N.T.S.

NOTES:

1. OVERLINER DRAIN FILL THICKNESS SHALL BE 1m (MINIMUM) WITH A MINIMUM OF 0.5m COVER DEPTH OVER TOP OF ALL PIPES.
2. CAP UPHILL END OF ALL PIPES.

PROFESSIONAL ENGINEER — YUKON — TROY LEE MEYER — TERRITORY — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
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REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

TETRA TECH
545 West Peary Drive, Suite 204
Grand Junction, Colorado 81505
(970) 986-3566 (970) 241-2123 fax

EAGLE GOLD PROJECT

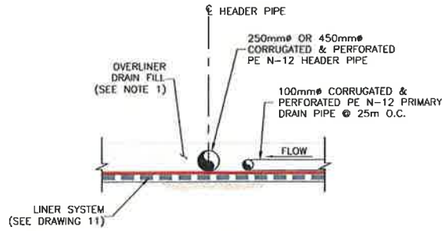
HEAP LEACH FACILITY PLS RECOVERY PIPING DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-028
REV NO.	3
DATE	4-22-13

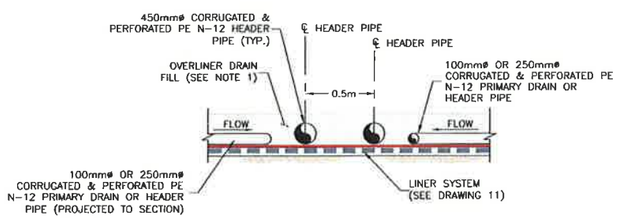
File: G:\2013\74010.01\01 Project Management\GPC 2006, new Drawings\Solution Recovery Details.dwg LAST UPDATE: 4/24/2014 8:38 PM BY: DEHN

NOTES:

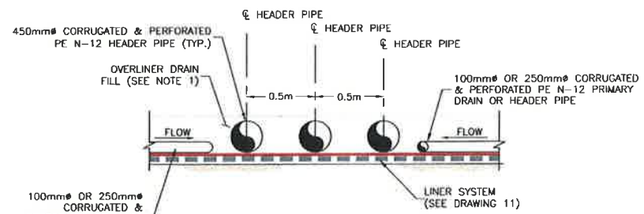
1. OVERLINER DRAIN FILL THICKNESS SHALL BE 1m (MINIMUM) WITH A MINIMUM OF 0.5m COVER DEPTH OVER TOP OF ALL PIPES.
2. CAP UPHILL END OF ALL PIPES.



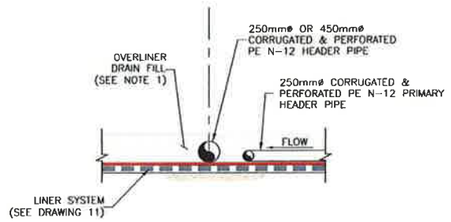
S 28|29 **SINGLE HEADER PIPE PRIMARY DRAIN CROSS SECTION**
N.T.S.



T 28|29 **MULTIPLE DRAIN PIPE CROSS SECTION**
N.T.S.



U 28|29 **MULTIPLE DRAIN PIPE CROSS SECTION**
N.T.S.



V 28|29 **250mmø HEADER TO 450mmø HEADER CROSS SECTION**
N.T.S.

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

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2	ISSUED FOR REVIEW - REV. D,G,D,C, & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

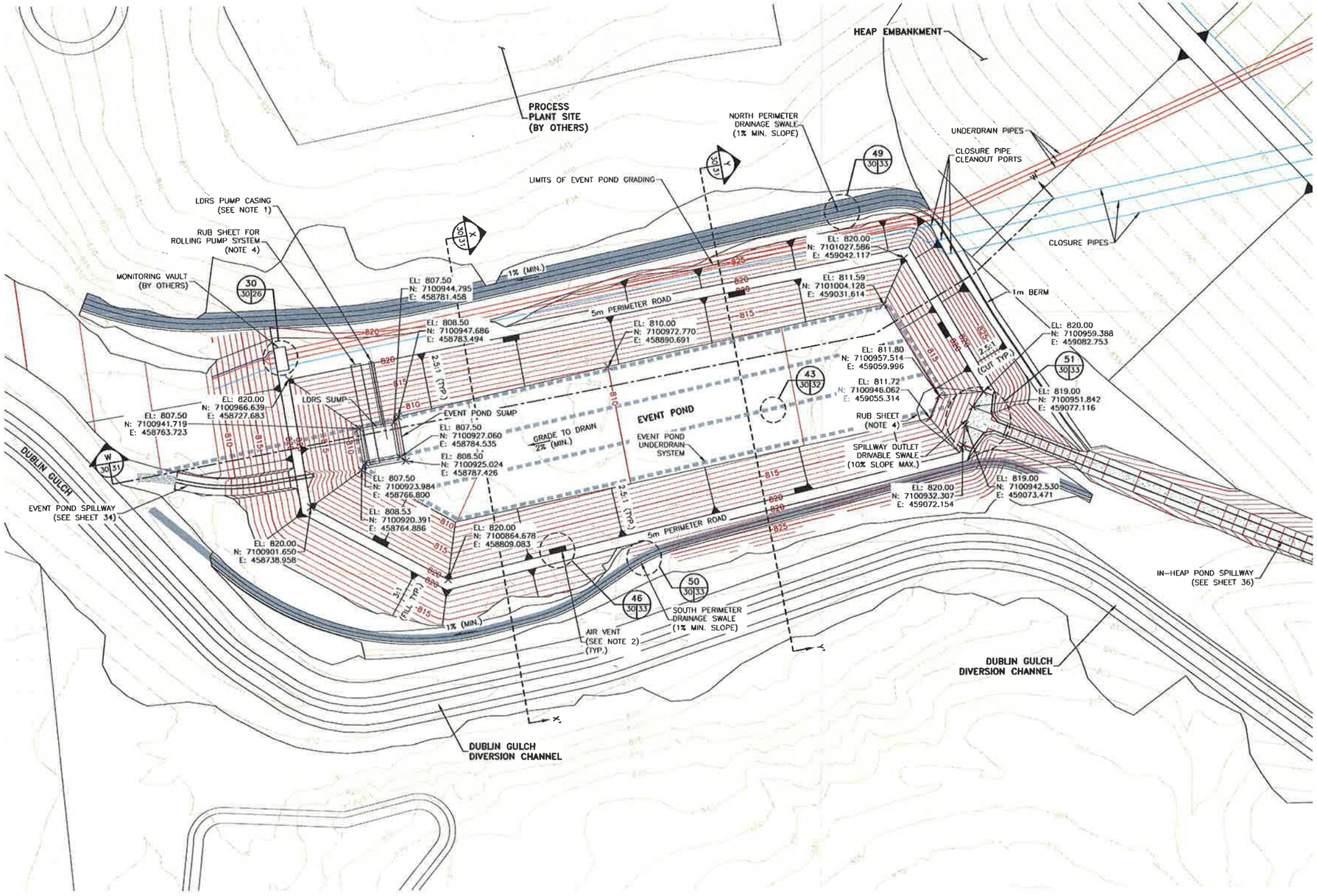
TETRA TECH
130 West Pro-Ed Drive, Suite 304
Grand Junction, Colorado 81505
(970) 243-3123 fax

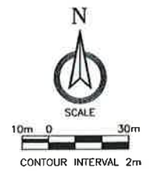
EAGLE GOLD PROJECT

HEAP LEACH FACILITY PLS RECOVERY PIPING DETAILS

PROJECT NO.	74018.01-02
DWG NO.	300-GT-029
REV NO.	3
DATE	4-22-13

File: G:\27\74018.01\GIS_Project_Management\EVC_DOML_mxd\Drawings\Solution Recovery Details 2.dwg LAST UPDATE: 4/24/2014 5:39 PM BY: DSTIN





NOTES:

1. LDRS PUMP AND MONITORING CASING TO BE PROTECTED AT POND CREST BY BOLLARDS (SEE DRAWING 32 FOR LDRS DETAILS).
2. AIR VENTS TO BE PLACED 600mm BELOW TOP OF CREST (SEE DRAWING 33 FOR DETAIL). NOT TO SCALE THIS DRAWING.
3. EVENT POND PUMPING AND PIPING BY OTHERS (NOT SHOWN).
4. RUB SHEET FOR LINER PROTECTION SHALL CONSIST OF A SINGLE LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED HDPE GEOMEMBRANE EXTRUSION WELDED TO TOP LINER OR LINER BENEATH LDRS PUMP CASING RESPECTIVELY.

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

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PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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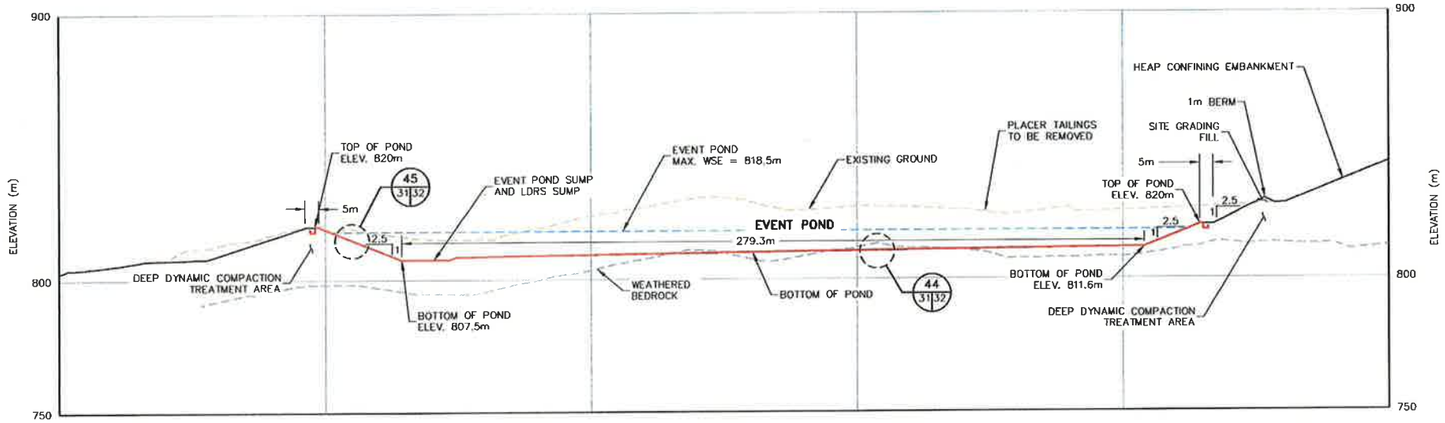
526 Wheaton Drive, Suite 214
Grand Junction, Colorado 81505
(970) 256-0503 (970) 241-3120 fax

EAGLE GOLD PROJECT

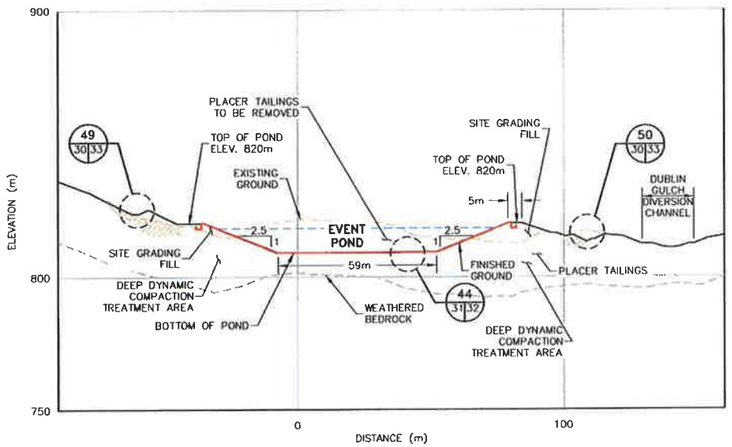
HEAP LEACH FACILITY EVENT POND PLAN VIEW

PROJECT NO. 74010-042
DWG NO. 300-GT-030
REV NO. 3
DATE 4-22-13

File: G:\27\74010.01\SF Project Management\GIS_CAD_AMW\Drawings\Event Pond Plan View.dwg LAST UPDATE: 4/24/2014 5:44 PM BY: DUSTIN



W 30|31 **EVENT POND SECTION**
SCALE: 1:1000



X 30|31 **EVENT POND SECTION**
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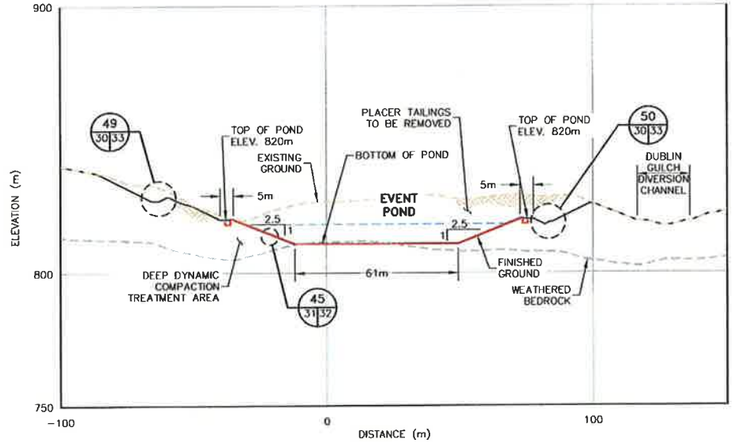

Y 30|31 **EVENT POND SECTION**
SCALE: 1:1000

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

DO NOT SCALE 11x17 DRAWINGS

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PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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1291 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 858-3565 (970) 241-3729 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY
EVENT POND SECTIONS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-031
REV NO.	3
DATE	4-22-13

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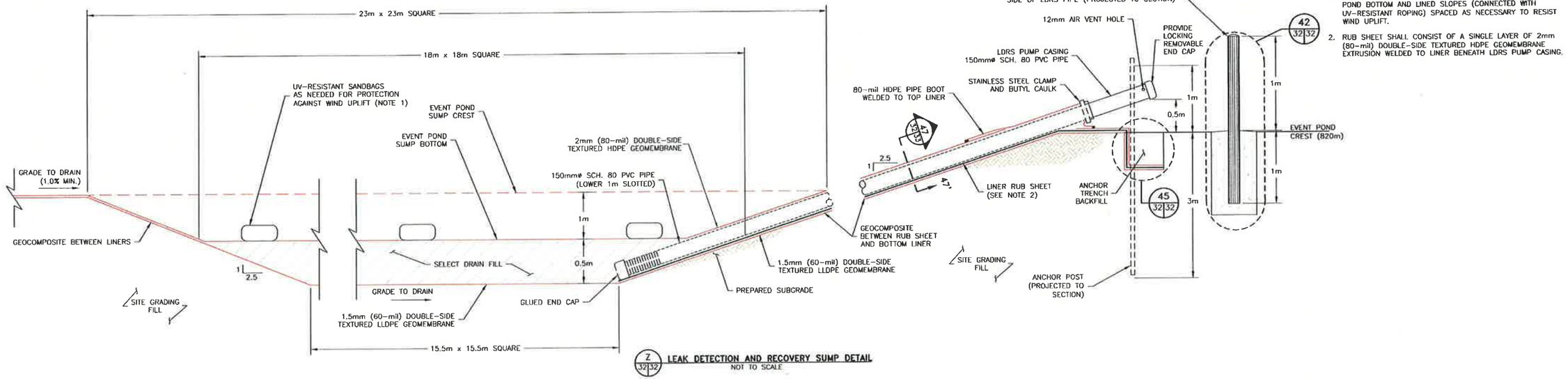
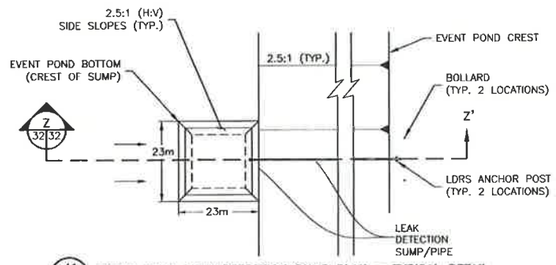


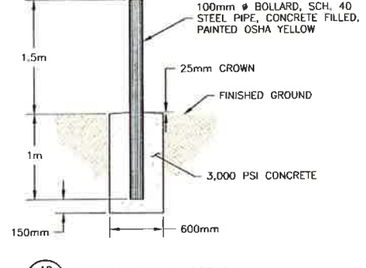
NOTES:

1. UV-RESISTANT SANDBAGS SHALL BE PLACED IN SUMP, POND BOTTOM AND LINED SLOPES (CONNECTED WITH UV-RESISTANT ROPING) SPACED AS NECESSARY TO RESIST WIND UPLIFT.
2. RUB SHEET SHALL CONSIST OF A SINGLE LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED HDPE GEOMEMBRANE EXTRUSION WELDED TO LINER BENEATH LDRS PUMP CASING.

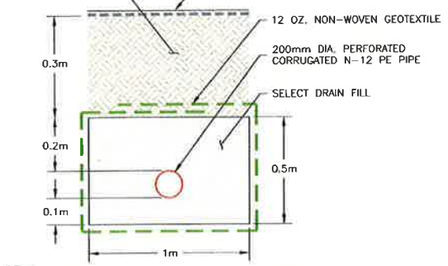
Z 32|32 **LEAK DETECTION AND RECOVERY SUMP DETAIL**
NOT TO SCALE



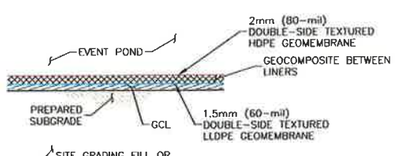
41 31|32 **EVENT POND LEAK DETECTION SUMP PLAN – TYPICAL DETAIL**
NOT TO SCALE



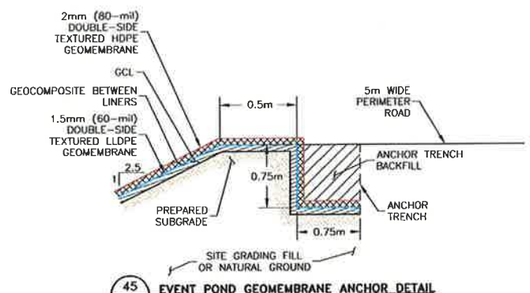
42 32|32 **TYPICAL BOLLARD DETAIL**
NOT TO SCALE



43 30|32 **TYPICAL EVENT POND UNDERDRAIN DETAIL**
NOT TO SCALE



44 32|32 **EVENT POND LINER DETAIL**
NOT TO SCALE



45 32|32 **EVENT POND GEOMEMBRANE ANCHOR DETAIL**
NOT TO SCALE

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — 17281 — 04/21/14

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		04/10/14
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

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EAGLE GOLD PROJECT

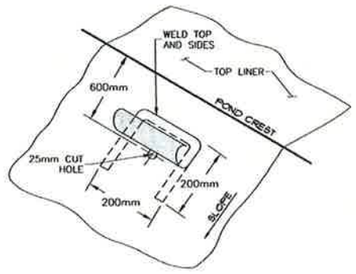
HEAP LEACH FACILITY EVENT POND DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-032
REV NO.	3
DATE	4-22-13

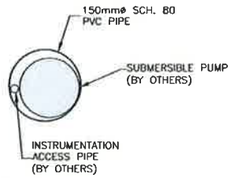
File: Q:\2014\2014-01\01 Project Management\WC 2014\Drawings\Event Pond Sections and Details.dwg LAST UPDATE: 4/24/2014 3:48 PM BY: DUSTIN

NOTES:

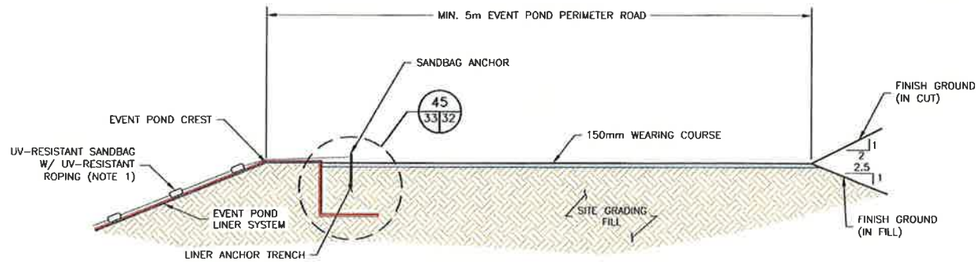
1. UV-RESISTANT SANDBAGS SHALL BE PLACED IN SUMP, POND BOTTOM AND LINED SLOPES (CONNECTED WITH UV-RESISTANT ROPING) SPACED AS NECESSARY TO RESIST WIND UPLIFT.
2. RUB SHEET SHALL CONSIST OF A SINGLE LAYER OF 2mm (80-mil) DOUBLE-SIDE TEXTURED HDPE GEOMEMBRANE EXTRUSION WELDED TO TOP LINER FOR LINER PROTECTION.



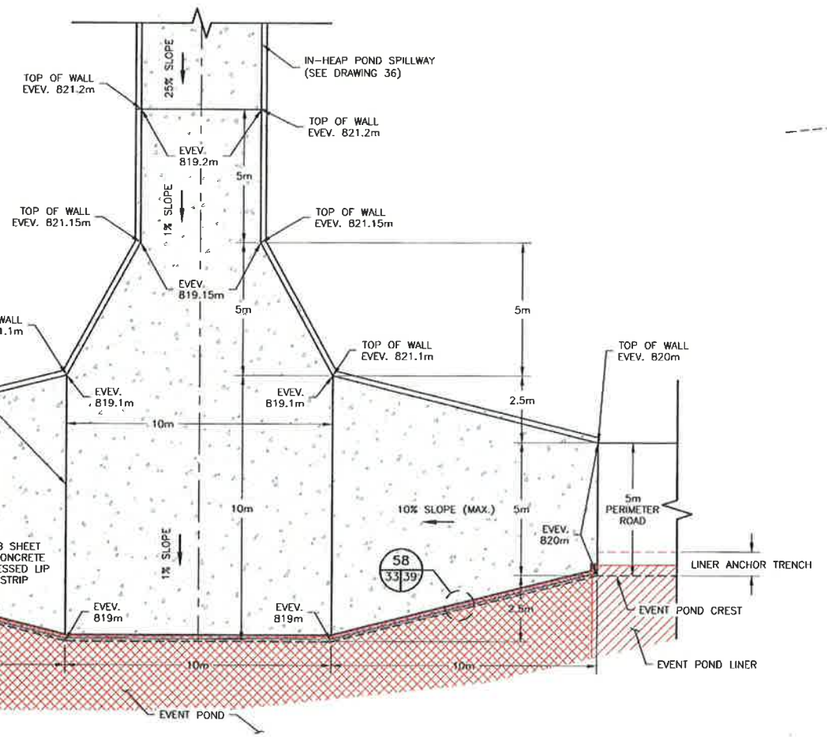
46 / 30|33 EVENT POND LINER AIR VENT DETAIL
NOT TO SCALE



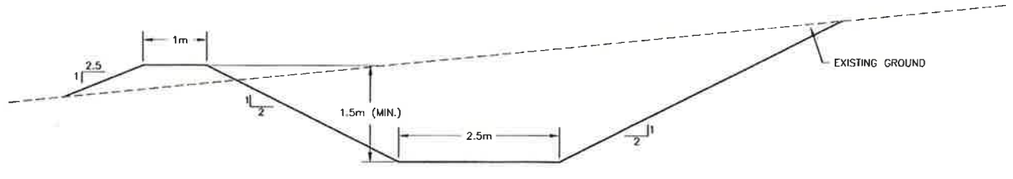
47 / 32|33 EVENT POND LDRS PUMP CASING
NOT TO SCALE



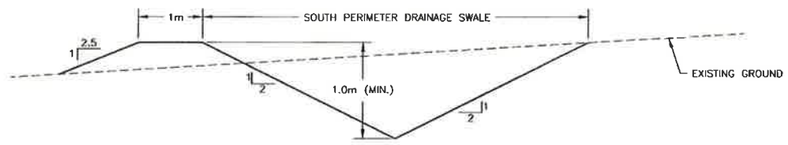
48 / 30|33 EVENT POND PERIMETER ROAD - TYPICAL SECTION
NOT TO SCALE



51 / 30|33 EVENT POND DRIVEABLE SWALE DETAIL
NOT TO SCALE



49 / 30|33 NORTH PERIMETER DRAINAGE SWALE - TYPICAL SECTION
NOT TO SCALE



50 / 30|33 SOUTH PERIMETER DRAINAGE SWALE - TYPICAL SECTION
NOT TO SCALE

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D, G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE:
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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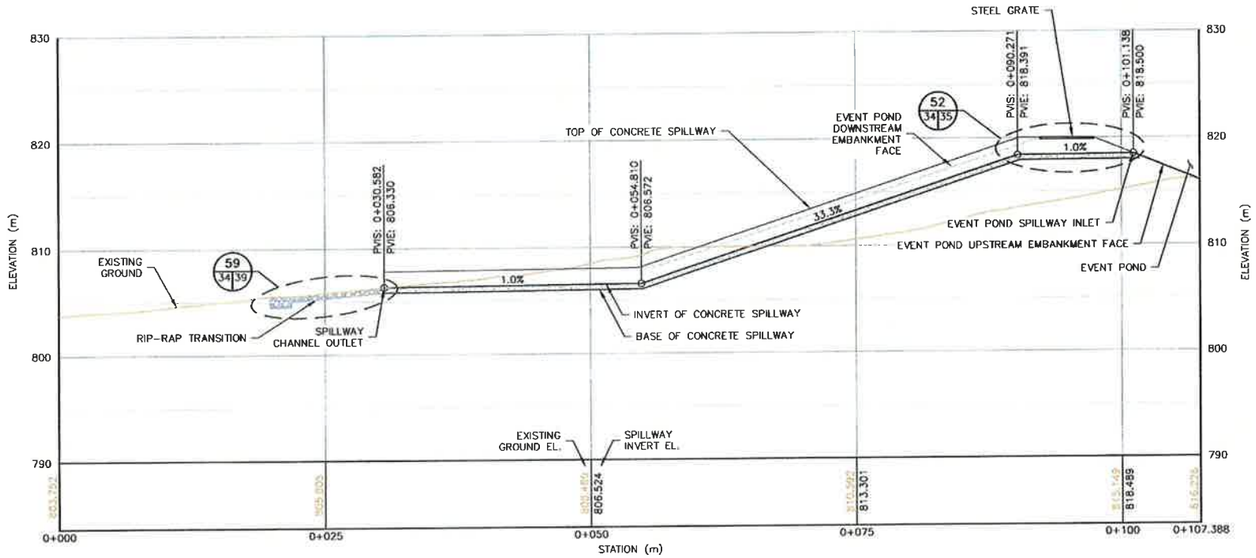
(970) 256-3565 (970) 241-3126 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY EVENT POND DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-033
REV NO.	3
DATE	4-22-13

File: O:\GTL\CAD\ENVT Project Management\EVC 2006 mine\Drawings\Event Pond Sections and Details.dwg LAST UPDATED: 4/24/2014 5:48 PM BY: DJOhn



EVENT POND SPILLWAY PROFILE

N

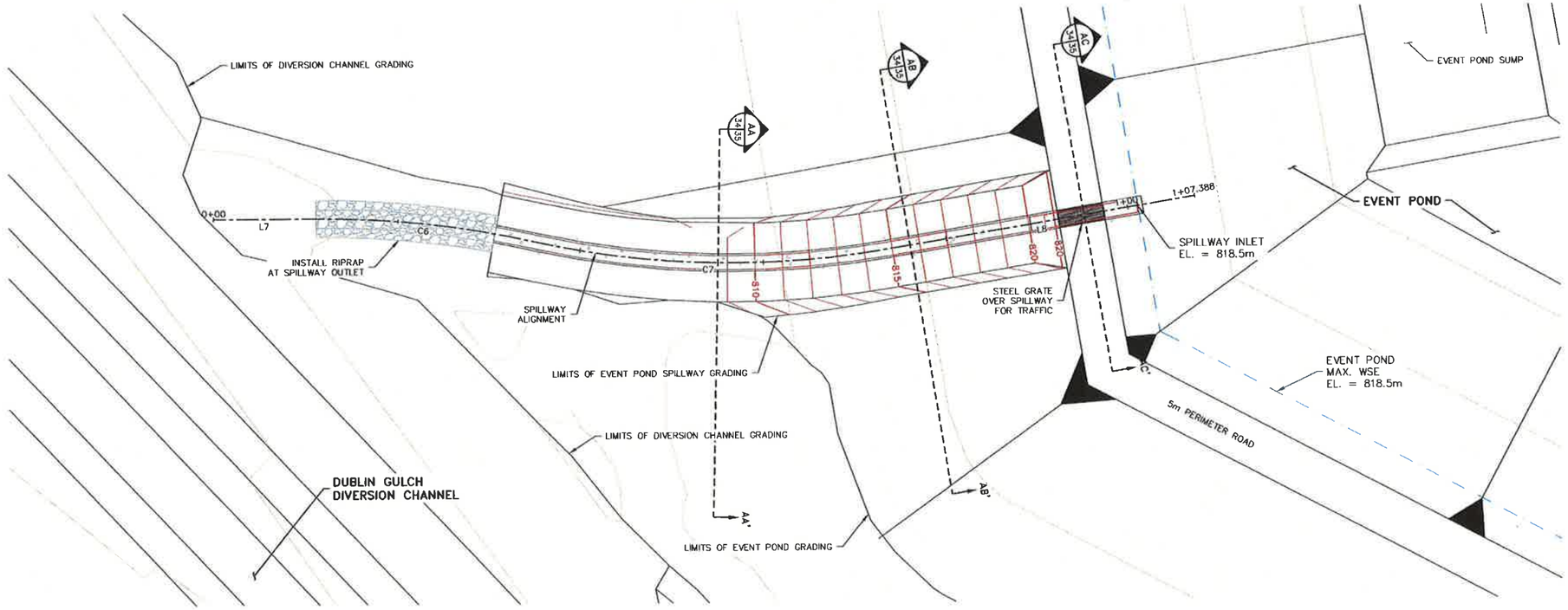
SCALE

2.5m 0 7.5m

CONTOUR INTERVAL 2m

ALIGNMENT LINE TABLE				
LINE #	LENGTH	BEARING	START POINT (N, E)	END POINT (N, E)
L7	11.135	N90° 00' 00.00"E	(7100916.919, 458639.654)	(7100916.919, 458650.789)
L8	33.882	N80° 33' 03.83"E	(7100913.248, 458712.707)	(7100918.810, 458746.130)

ALIGNMENT CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	START POINT (N, E)	END POINT (N, E)
C6	100.000	23.398	13° 24' 22.35"	(7100916.919, 458650.789)	(7100914.407, 458673.998)
C7	100.000	38.972	22° 19' 46.14"	(7100914.407, 458673.998)	(7100913.248, 458712.707)



EVENT POND SPILLWAY PLAN VIEW

SCALE: 1:250

PROFESSIONAL ENGINEER — YUKON TROY LEE MEYER TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D, G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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Grand Junction, Colorado 81505
(970) 256-3563 (970) 241-3178 fax

EAGLE GOLD PROJECT

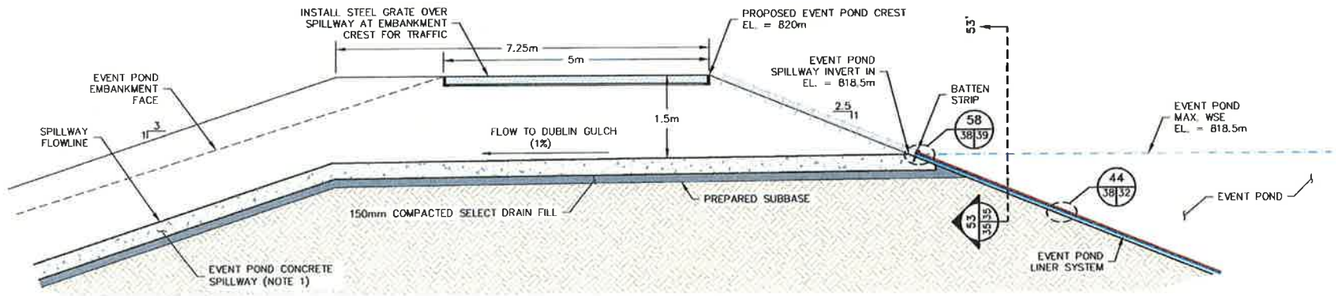
HEAP LEACH FACILITY EVENT POND SPILLWAY PLAN & PROFILE

PROJECT NO.	74010.01-02
DWG NO.	300-GT-034
REV NO.	3
DATE	4-22-13

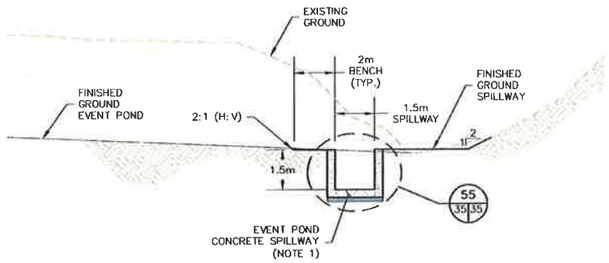
File: G:\237\400\01\01 Project Management\UFC 2014, HHA\Drawings\Submittals_PMP_Sections.dwg LAST UPDATE: 4/24/2014 8:32 PM BY: DJEN

NOTES:

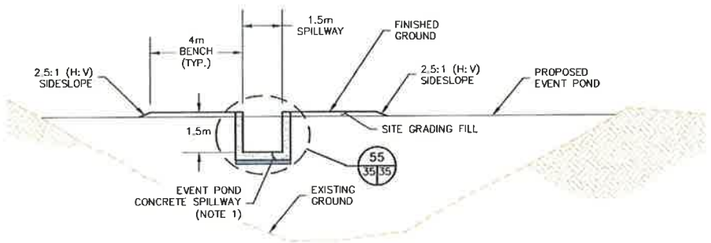
1. SEE DRAWING 44 FOR STRUCTURAL DETAILS FOR EVENT POND SPILLWAY CONCRETE, REINFORCING, NOTES AND SPECIFICATIONS.



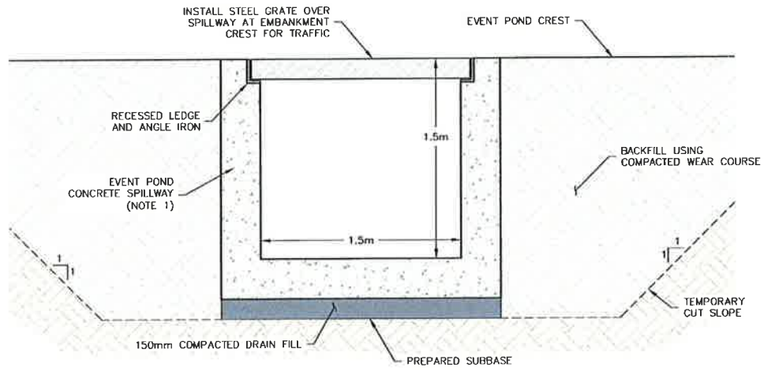
52 34|35 **EVENT POND SPILLWAY CREST SECTION**
NTS



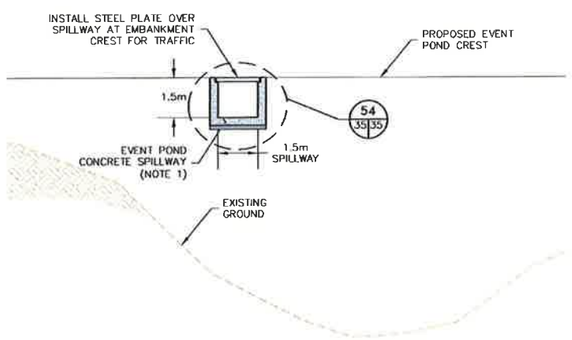
AA 34|35 **TYPICAL EVENT POND SPILLWAY CUT SECTION**
NTS



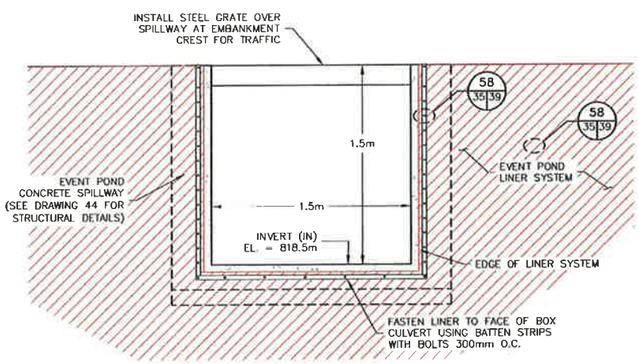
AB 34|35 **TYPICAL EVENT POND SPILLWAY FILL SECTION**
NTS



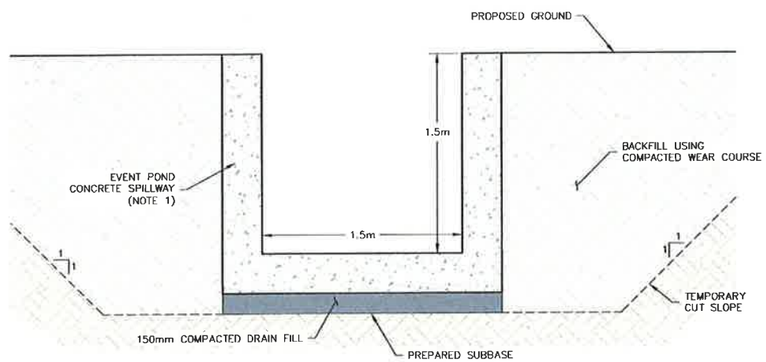
54 35|35 **EVENT POND SPILLWAY ℄ CREST TYPICAL SECTION**
NTS



AC 34|35 **TYPICAL EVENT POND SPILLWAY CREST SECTION**
NTS



53 35|35 **EVENT POND SPILLWAY LINER DETAIL**
NTS



55 35|35 **EVENT POND SPILLWAY TYPICAL SECTION**
NTS

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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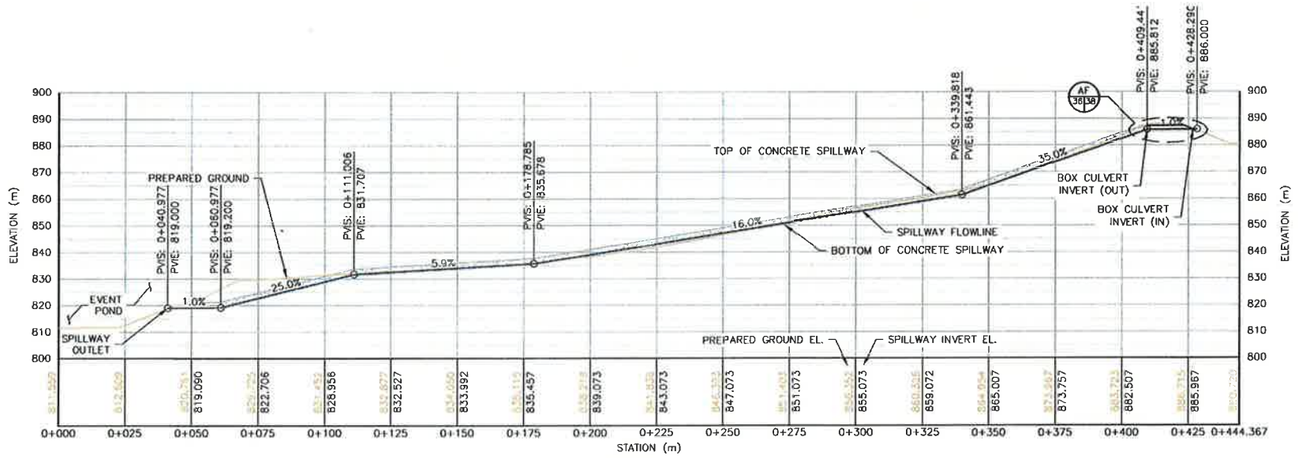
EAGLE GOLD PROJECT

HEAP LEACH FACILITY EVENT POND SPILLWAY SECTIONS & DETAILS

PROJECT NO.	740K0.01-02
DWG NO.	300-GT-035
REV NO.	3
DATE	4-22-13

File: G:\ZZY\740K0.01\GIS Project Management\WFC DGNs, MXDs\Drawings\Submittals_FAP_Sections.dwg LAST UPDATE: 4/24/2014 5:52 PM BY: DUSTIN



IN-HEAP POND SPILLWAY PROFILE

N

SCALE

10m 0 30m

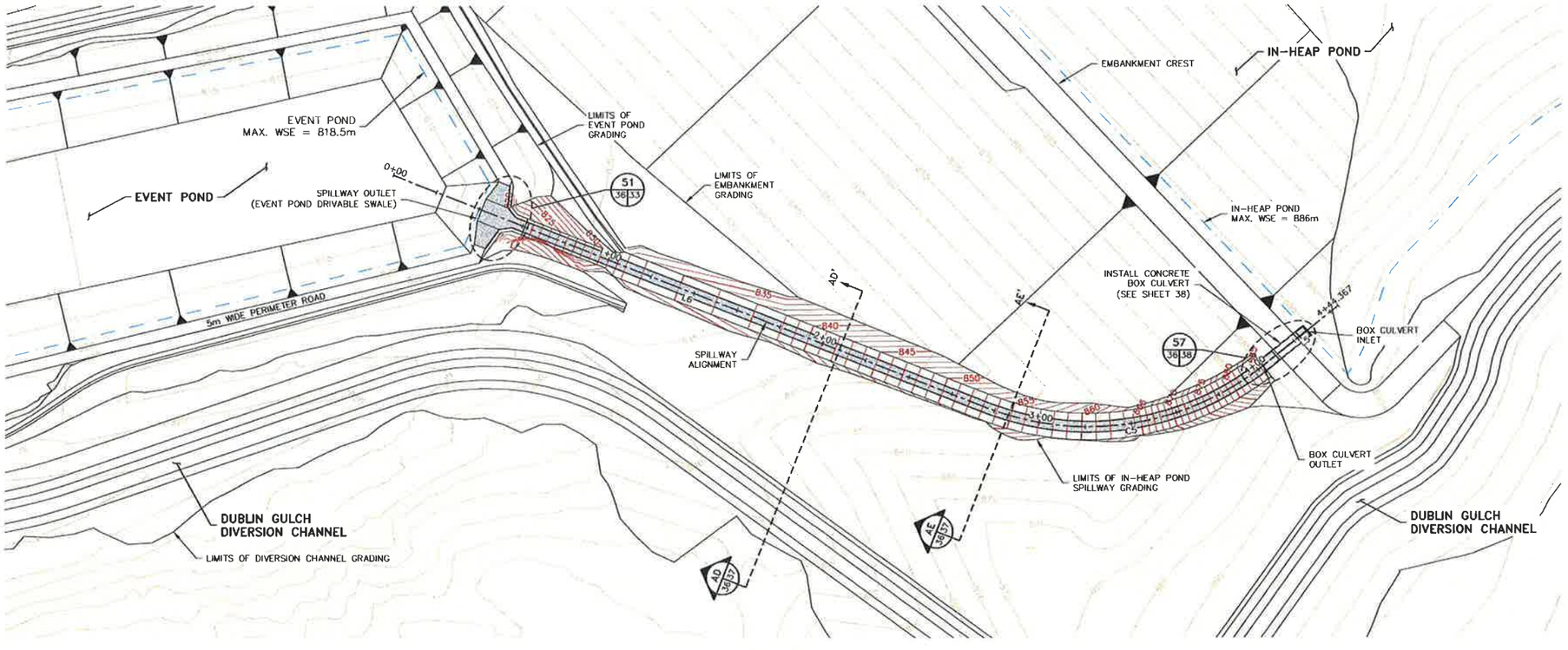
CONTOUR INTERVAL 1m

ALIGNMENT LINE TABLE

LINE #	LENGTH	BEARING	START POINT (N, E)	END POINT (N, E)
L5	41.422	N51° 26' 41.35"E	(7100879.592, 459414.026)	(7100905.409, 459446.418)
L6	276.093	S68° 37' 32.19"E	(7100962.121, 459037.134)	(7100861.496, 459294.237)

ALIGNMENT CURVE TABLE

CURVE #	RADIUS	LENGTH	DELTA	START POINT (N, E)	END POINT (N, E)
C5	121.277	126.852	59° 55' 46.46"	(7100861.496, 459294.237)	(7100879.592, 459414.026)



IN-HEAP POND SPILLWAY PLAN VIEW

SCALE: 1:1000

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D,G,D,C, & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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Grand Junction, Colorado 81505
(970) 242-3568 (970) 241-9120 fax

EAGLE GOLD PROJECT

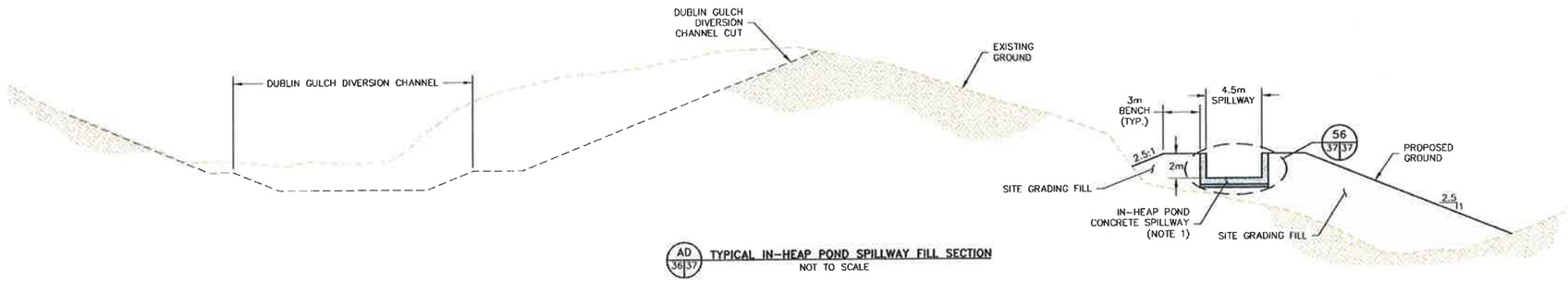
HEAP LEACH FACILITY IN-HEAP POND SPILLWAY PLAN & PROFILE

PROJECT NO.	74010.01-02
DWG NO.	300-GT-036
REV NO.	3
DATE	4-22-13

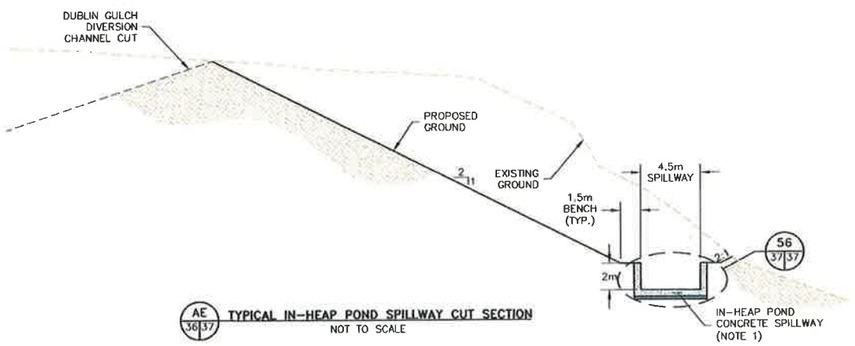
File: G:\27\74010.01\07 Project Management\EIC 2014, Heap\Drawings\Submittals_PEA_Sections.dwg LAST UPDATE: 4/24/2014 5:52 PM BY: DUSTIN

NOTES:

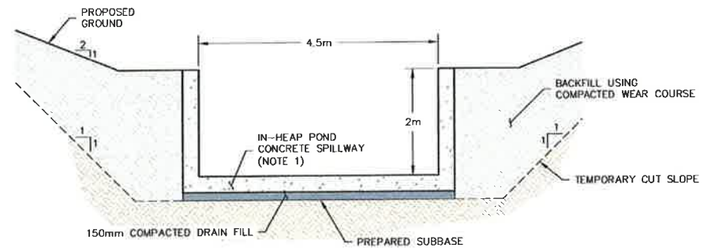
1. SEE DRAWING 44 FOR STRUCTURAL DETAILS FOR IN-HEAP POND SPILLWAY CONCRETE, REINFORCING, NOTES AND SPECIFICATIONS.



AD 36 37 TYPICAL IN-HEAP POND SPILLWAY FILL SECTION
NOT TO SCALE



AE 36 37 TYPICAL IN-HEAP POND SPILLWAY CUT SECTION
NOT TO SCALE



56 36 37 TYPICAL IN-HEAP POND SPILLWAY SECTION
NOT TO SCALE

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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125 West Park Drive, Suite 204
Grand Junction, Colorado 81505
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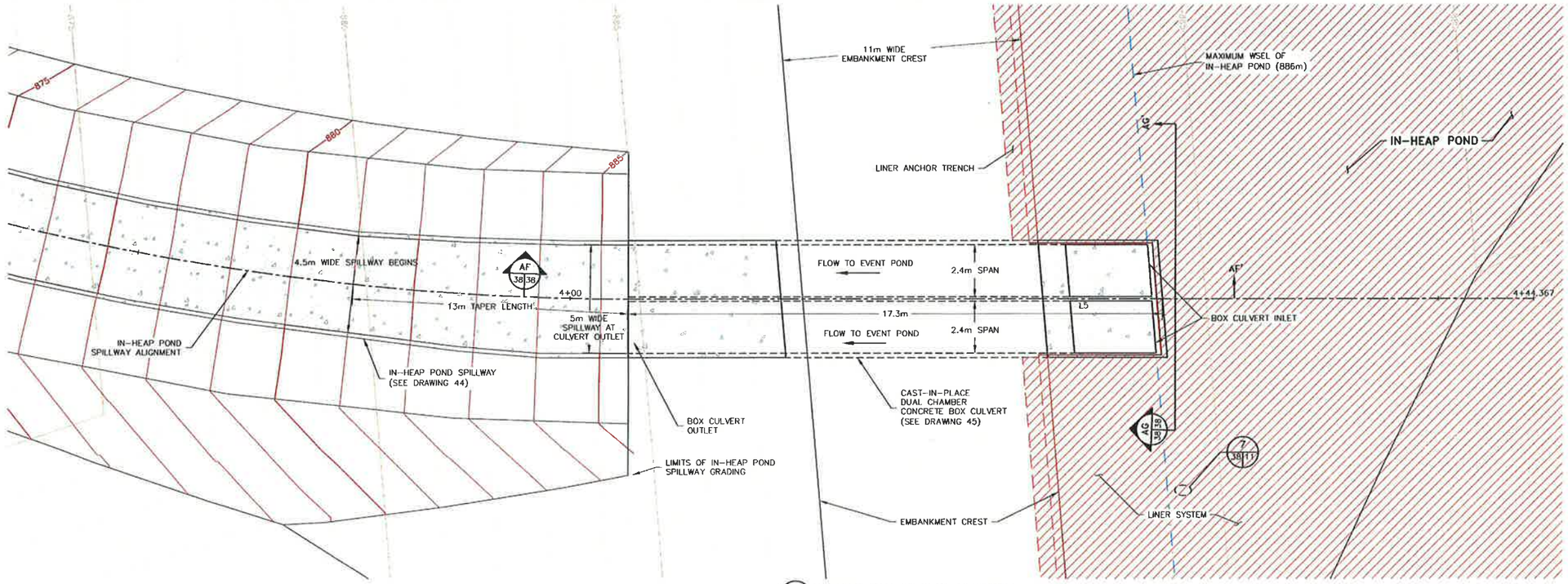
EAGLE GOLD PROJECT

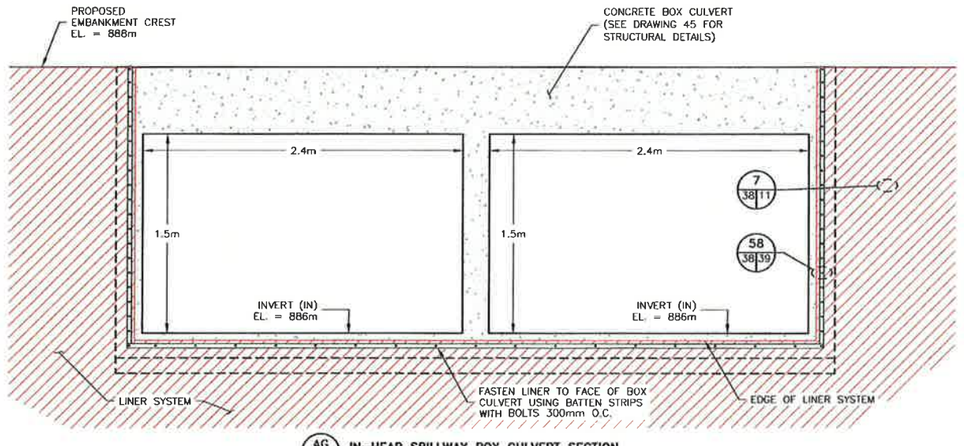
HEAP LEACH FACILITY IN-HEAP POND SPILLWAY SECTIONS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-037
REV NO.	3
DATE	4-22-13

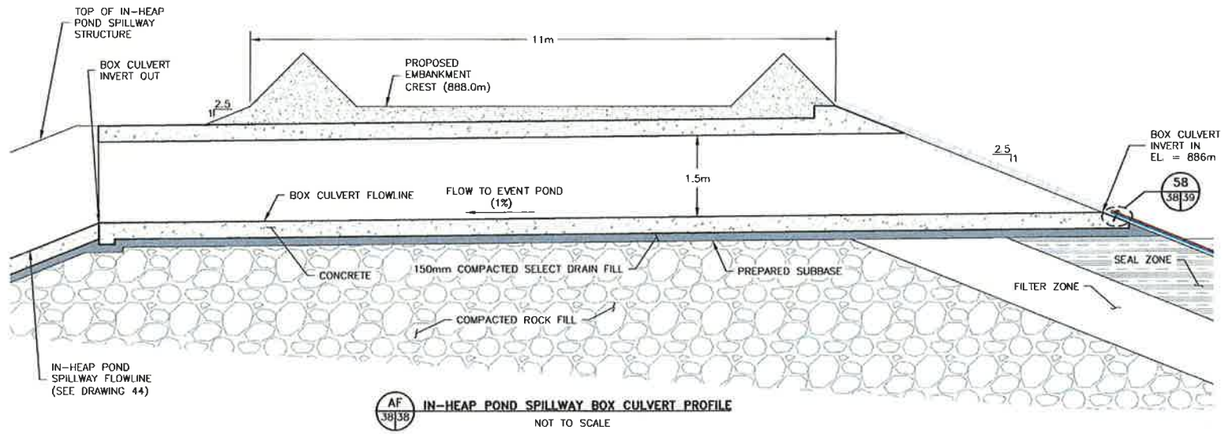
File: G:\27\74010.01\05 Project Management\EIC DGML HEAP\Drawings\Submittals_FAP_Sections4.dwg LAST UPDATE: 4/24/2014 5:52 PM BY: DUSTIN



57 38|38 **IN-HEAP POND SPILLWAY PLAN VIEW**
SCALE: 1:100



AG 38|38 **IN-HEAP SPILLWAY BOX CULVERT SECTION**
NOT TO SCALE



AF 38|38 **IN-HEAP POND SPILLWAY BOX CULVERT PROFILE**
NOT TO SCALE

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
1	ISSUED FOR CLIENT REVIEW	DAG	TLM	04/22/13	
2	ISSUED FOR REVIEW - REV. D G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

SCALE:		DATE
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

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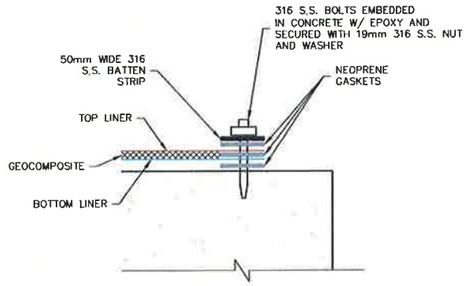
EAGLE GOLD PROJECT

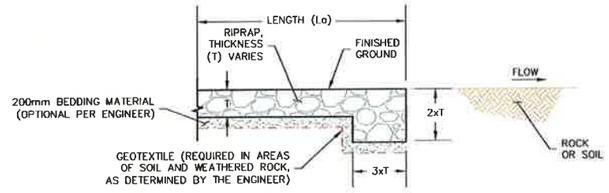
HEAP LEACH FACILITY IN-HEAP POND SPILLWAY BOX CULVERT DETAILS

PROJECT NO. T4010.01-02
DWG NO. 300-GT-038
REV NO. 3
DATE 4-22-13

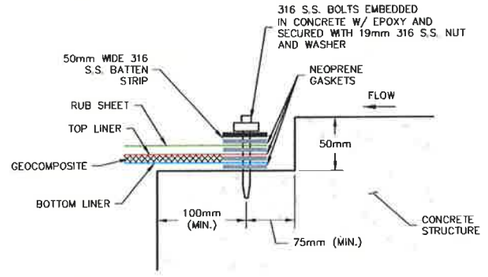
File: G:\2013\4010\01\01 Project Management\PC DOC. mat\Drawings\Spillways_Plan_Sections.dwg LAST UPDATE: 4/24/2014 9:32 PM BY: DSTIN



58 / 39|39 **BATTEN STRIP DETAIL**
SCALE: NTS



59 / 39|39 **RIPRAP TRANSITION TO ROCK CUT OR SOIL**
SCALE: NTS



60 / 33|39 **RECESSED BATTEN STRIP DETAIL**
SCALE: NTS

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE	REFERENCES DWG. NO.	REFERENCES TITLE

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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR.	TLM	04/10/14
CLIENT APPR.		

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY IN-HEAP POND SPILLWAY DETAILS

PROJECT NO. 74010.01-02
DWG NO. 300-GT-039
REV NO. 3
DATE 4-22-13

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
#2015

File: G:\GIS\74010.01\GIS Project Management\GIS Mapping\Spillway_Details.dwg LAST UPDATE: 4/24/2014 5:52 PM BY: DSTIN

NOTES:

1. ORE HEAP PILE MAXIMUM LIMITS SHOWN.
2. ORE STACKING PLAN (BY OTHERS) MAY RESULT IN ORE HEAP PILE LIMITS DIFFERENT FROM SHOWN HERE.
3. REQUIRED CONVEYOR RAMPS ON ORE HEAP PILE NOT SHOWN.
4. MAXIMUM OVERALL HEAP ORE PILE OUTSLOPE OF 2.5H:1V SHOWN. ORE WILL BE STACKED AT ANGLE OF REPOSE WITH BENCHES NECESSARY TO ACHIEVE THE OVERALL MAXIMUM OUTSLOPE ANGLE.

TEMPORARY DIVERSION CHANNEL

PHASE 1 ORE PILE (TOP ELEV. 959m)

OVERALL SLOPE 2.5:1

HEAP CONFINING EMBANKMENT

HEAP LEACH PAD LIMITS

PLANT

DUBLIN GULCH DIVERSION CHANNEL

EVENT POND

DUBLIN GULCH

STEWART GULCH

EAGLE PUP GULCH

E:458500 N:7102000

E:458500 N:7101000

E:460000 N:7101000

N

SCALE

25m 0 75m

CONTOUR INTERVAL 2m

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY

DO NOT SCALE 11x17 DRAWINGS

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DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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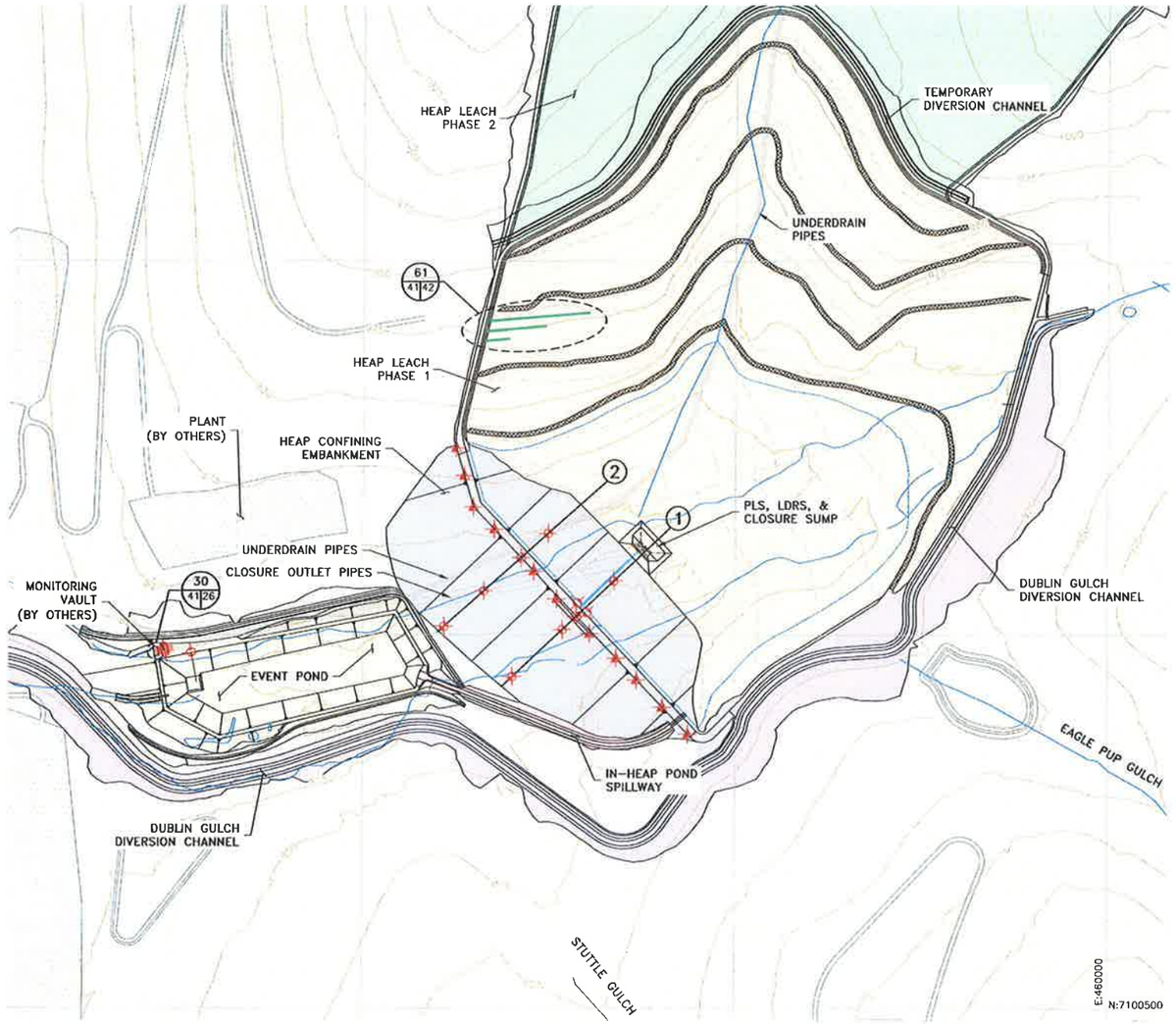
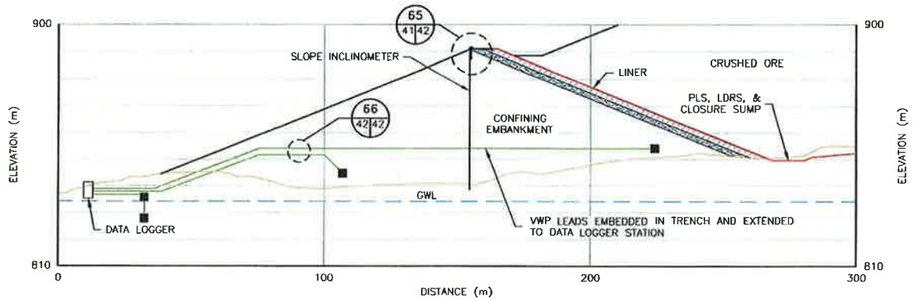
EAGLE GOLD PROJECT

HEAP LEACH FACILITY PHASE 1 ORE PILE

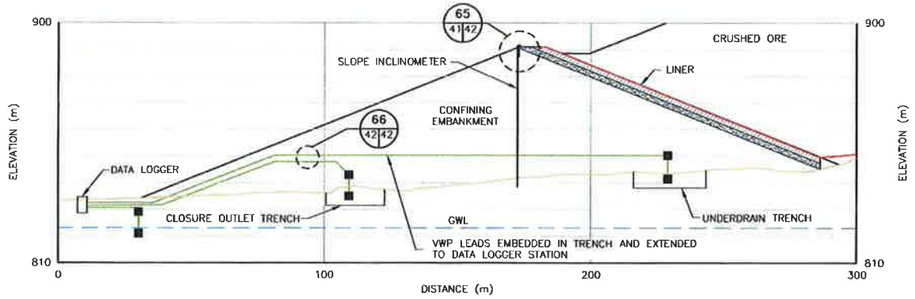
PROJECT NO.	74010.01-02
DWG NO.	300-GT-040
REV NO.	3
DATE	4-22-13

File: Q:\237\74010.01\D Project Management\AFE 0006_Heap\Drawings\Phase 1 HLF Plan.dwg LAST UPDATED: 4/24/2014 9:53 PM BY: DEH





1 SCHEMATIC OF EMBANKMENT STUDY SECTION
(SCHEMATIC - NO SCALE)



2 SCHEMATIC OF EMBANKMENT STUDY SECTION
(SCHEMATIC - NO SCALE)

NOTES:

1. ALL COORDINATES ARE SHOWN IN METRES AND DECIMALS THEREOF.
2. THE OWNERS ENGINEER SHALL OVERSEE INSTALLATION OF ALL INSTRUMENTATION AND SET-UP OF ALL RELAY AND DATALOGGER EQUIPMENT.

N

SCALE
35m 0 105m
CONTOUR INTERVAL 5m

LEGEND

- PLANNED SURVEY MONUMENT
- PLANNED EMBANKMENT PIEZOMETER
- SLOPE INCLINOMETER
- FLOW METER
- (1) STUDY SECTION NUMBER

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY #2016

DO NOT SCALE 11x17 DRAWINGS

REFERENCES DWG. NO.	REFERENCES TITLE

REFERENCES DWG. NO.	REFERENCES TITLE

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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		DATE
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CHECKED BY		
PROJECT MGR	TLM	04/10/14
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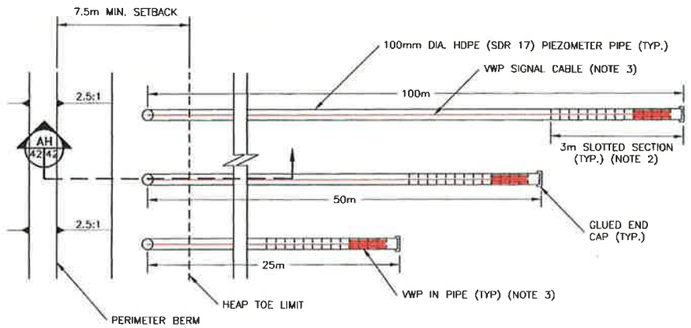
EAGLE GOLD PROJECT

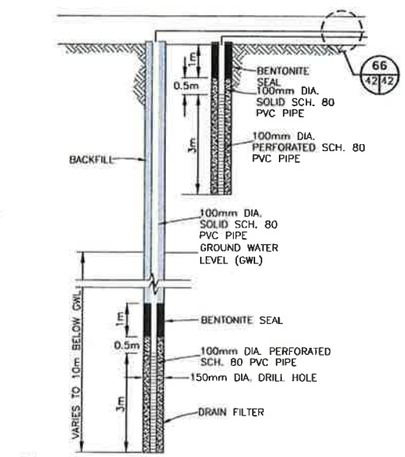
HEAP LEACH FACILITY INSTRUMENTATION PLAN

PROJECT NO. 74010.01-02
DWG NO. 300-GT-041
REV NO. 3
DATE 4-22-13

File: G:\GT\74010.01-02 Project Management\VPC Docs\Drawings\Instrumentation Plot.dwg LAST UPDATE: 4/24/2014 3:51 PM BY: DSTEIN



61 | 41|42 **PAD CELL PIEZOMETERS TYPICAL LAYOUT**
NOT TO SCALE
(NOTE 1)



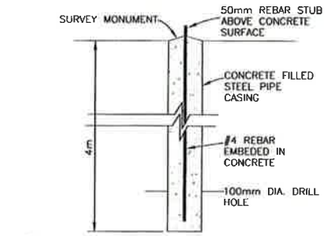
63 | 42|42 **EMBANKMENT MONITORING DETAIL**
NOT TO SCALE

NOTES:

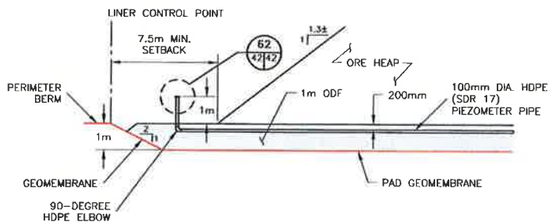
1) LOCATE PIEZOMETER PIPES WITH THE PIPE OUTLETS NEAR THE ACCESS ROAD. PIPES SHALL EXTEND INTO THE PAD ALONG ITS FLATTEST GRADE.

2) SLOTS SHALL BE AT CROWN OF PIPE AND SHALL BE EQUALLY SPACED AT 75mm CENTERS. SLOTS DIMENSIONS SHALL BE 3mm WIDE BY 38mm LONG.

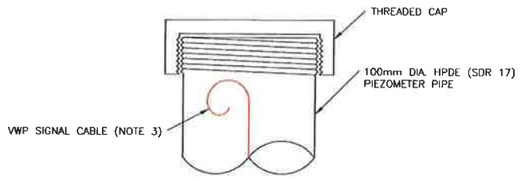
3) VIBRATING WIRE PIEZOMETERS (VWPs) SHALL BE SLOPE INDICATOR MODEL 52610520 (3.5 BAR) OR APPROVED EQUIVALENT. VWP SIGNAL CABLE SHALL BE SLOPE INDICATOR MODEL 50613586 OR APPROVED EQUIVALENT.



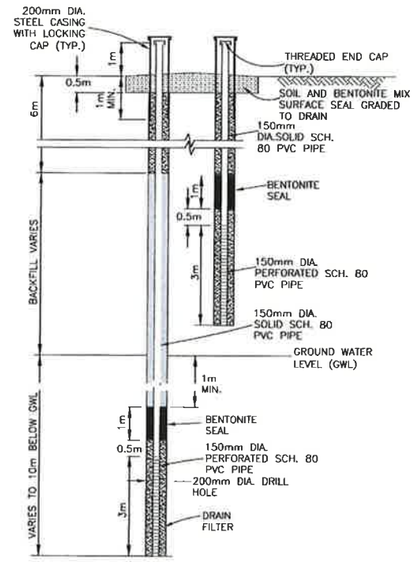
65 | 41|42 **SURVEY MONITORING DETAIL**
NOT TO SCALE



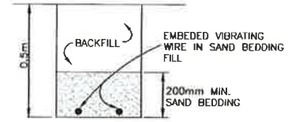
AH | 42|42 **PAD CELL PIEZOMETER PIPE SECTION**
NOT TO SCALE



62 | 42|42 **PIEZOMETER PIPE CAP DETAIL**
NOT TO SCALE



64 | 42|42 **WATER MONITORING DETAIL**
NOT TO SCALE



66 | 42|42 **PERIMETER TRENCH DETAIL**
NOT TO SCALE

PROFESSIONAL ENGINEER
YUKON
TROY LEE MEYER
TERRITORY
2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
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3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
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CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY INSTRUMENTATION DETAILS

PROJECT NO.	74610.01-02
DWG NO.	300-GT-042
REV NO.	3
DATE	4-22-13

File: G:\23\74610.01\07 Project Management\AFC DGNs\Drawings\Instrumentation Details.dwg LAST UPDATE: 4/24/2014 8:55 PM BY: Duane

STRUCTURAL GENERAL NOTES

1. THE STRUCTURAL GENERAL NOTES AND TYPICAL DETAILS ARE GENERAL AND APPLY TO THE ENTIRE PROJECT EXCEPT WHERE THERE ARE SPECIFIC INDICATIONS TO THE CONTRARY.

2. PROJECT SPECIFICATIONS SUPERSEDE THESE GENERAL NOTES, SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS. SPECIFIC NOTES AND DETAILS ON DRAWINGS TAKE PRECEDENCE OVER STRUCTURAL GENERAL NOTES AND TYPICAL DETAILS.

3. CONTRACTOR SHALL TAKE ADEQUATE PRECAUTIONS TO ENSURE THE SAFETY OF WORKERS AND VISITORS TO THE SITE, INCLUDING BUT NOT LIMITED TO SHORING, BRACING AND ACCESS RESTRICTION. COMPLY WITH ALL NATIONAL, TERRITORIAL AND/OR PROVINCIAL AND LOCAL SAFETY CODES AND STANDARDS.

4. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM TO THE 2005 NATIONAL BUILDING CODE OF CANADA (NBCC).

5. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS BEFORE STARTING WORK. DIMENSIONS OF EXISTING CONSTRUCTION WHERE SHOWN ON THESE DRAWINGS ARE NOMINAL AND SHOULD BE FIELD VERIFIED. SHOULD CONDITIONS EXIST WHICH ARE CONTRARY TO THOSE SHOWN ON THE PLANS, THE ENGINEER SHALL BE NOTIFIED IN WRITING BEFORE PROCEEDING WITH WORK.

6. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT ALL WORK IS ADEQUATELY BRACED AND SHORED DURING CONSTRUCTION. ALL BRACING/SHORING SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROVINCE WHERE THE PROJECT IS LOCATED AND HIRED BY THE CONTRACTOR. BRACING OF CONCRETE AND MASONRY WALLS AND COLUMNS SHALL REMAIN IN PLACE UNTIL ROOF AND FLOOR DIAPHRAGMS ARE COMPLETELY INSTALLED AND ATTACHED TO THEIR FRAMING SUPPORTS.

7. ALL WORK SHALL CONFORM TO THE PLANS AND SPECIFICATIONS IN ALL RESPECTS AND SHALL BE SUBJECT TO APPROVAL BY THE STRUCTURAL ENGINEER OF RECORD.

8. UNLESS DETAILED, SPECIFIED, OR INDICATED OTHERWISE, CONSTRUCTION SHALL BE AS INDICATED IN THE APPLICABLE TYPICAL DETAILS AND THESE GENERAL NOTES. TYPICAL DETAILS ARE MEANT TO APPLY EVEN THOUGH NOT REFERENCED AT SPECIFIC LOCATIONS ON DRAWINGS WHERE THEY OCCUR.

9. OBTAIN STRUCTURAL ENGINEER'S APPROVAL PRIOR TO MAKING ANY CHANGES TO THE ELEVATIONS, DETAILS OR REINFORCING AS SHOWN ON THE DRAWINGS.

10. FIELD VERIFY ALL DIMENSIONS PRIOR TO CONSTRUCTION. DO NOT SCALE THE DRAWINGS.

11. VERIFY ALL MECHANICAL AND ELECTRICAL OPENINGS WITH RESPECTIVE CONTRACTORS. VERIFY ANY MAJOR OPENINGS WHICH ARE REQUIRED, BUT NOT SHOWN ON THE DRAWINGS, WITH THE ENGINEER.

12. ALL FORCES AND LOADS SHOWN ARE UNFACTORED UNLESS NOTED OTHERWISE.

13. THE CONTRACT DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE, WORKERS AND PEDESTRIANS DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, TEMPORARY STRUCTURES, AND PARTIALLY COMPLETED WORK, ETC. OBSERVATION VISITS TO THE SITE BY THE STRUCTURAL ENGINEER SHALL NOT BE CONSIDERED AS INSPECTION OF SUCH ITEMS.

14. CONTRACTOR SHALL VERIFY LOCATION OF ALL SITE UTILITIES PRIOR TO STARTING WORK, BOTH ABOVE GROUND AND BELOW GROUND, WHICH MAY BE IMPACTED BY THE WORK SHOWN ON THESE DRAWINGS. ANY CONFLICTS SHALL BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER OF RECORD.

15. ALL ITEMS SHOWN ON THESE PLANS ARE NEW UNLESS NOTED (E), EXIST. OR EXISTING.

CONTRACTOR'S MEANS AND METHODS

16. THE STRUCTURAL DRAWINGS AND NOTES REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. FOR THIS REASON, DURING ERECTION OF THE STRUCTURE AND/OR THE DEMOLITION OF THE STRUCTURE OR PORTIONS OF THE STRUCTURE, THE CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY BRACING TO WITHSTAND ALL LOADS TO WHICH THE STRUCTURE MAY BE SUBJECTED, INCLUDING LATERAL LOADS, EXCAVATIONS, SHORING, STOCKPILES OF MATERIALS AND EQUIPMENT, IN ADDITION TO ANY WORKER SAFETY REQUIREMENTS. SUCH BRACING SHALL BE LEFT IN PLACE AS LONG AS IT MAY BE REQUIRED FOR SAFETY AND UNTIL ALL STRUCTURAL FRAMING AND DIAPHRAGMS ARE IN PLACE WITH CONNECTIONS COMPLETED.

17. DISCOVERY:
    17.1. DURING CONSTRUCTION, THE CONTRACTOR MAY ENCOUNTER EXISTING CONDITIONS OR AS BUILT DIMENSIONS WHICH ARE NOT NOW KNOWN OR ARE AT VARIANCE WITH PROJECT DOCUMENTATION (DISCOVERY). SUCH CONDITIONS MAY INTERFERE WITH CONSTRUCTION OR REQUIRE PROTECTION AND/OR SUPPORT OF EXISTING WORK DURING CONSTRUCTION, OR MAY CONSIST OF DAMAGE OR DETERIORATION TO THE STRUCTURAL MATERIALS OR COMPONENTS WHICH COULD JEOPARDIZE THE INTEGRITY OF THE STRUCTURE(S) PRIOR TO PROCEEDING WITH WORK RELATED TO SUCH DISCOVERIES.

    17.2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IMMEDIATELY NOTIFY THE STRUCTURAL ENGINEER OF ANY DISCOVERY HE OR SHE MAY INTERFERE WITH THE PROPER EXECUTION OF THE WORK OR JEOPARDIZE THE INTEGRITY OF THE STRUCTURE(S) PRIOR TO PROCEEDING WITH WORK RELATED TO SUCH DISCOVERIES.

CONTRACTOR'S COORDINATION

18. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS AND DETAILS BETWEEN ALL TRADES, SUBCONTRACTORS AND VENDOR SUPPLIED EQUIPMENT PRIOR TO COMMENCING ANY CONSTRUCTION. THE STRUCTURAL ENGINEER SHALL BE IMMEDIATELY NOTIFIED ANY INCONSISTENCIES RELATING TO THE STRUCTURE. FAILURE TO DO SO SHALL RELIEVE THE ENGINEER OF ALL CONSEQUENCES RELATED TO THE INCONSISTENCY.

19. SEE CIVIL, MECHANICAL, ELECTRICAL AND OTHER DISCIPLINE'S DRAWINGS FOR ADDITIONAL INFORMATION RELATING TO THE STRUCTURE.

DESIGN CRITERIA

20. GOVERNING BUILDING CODE
    2005 NATIONAL BUILDING CODE OF CANADA

21. DESIGN LIVE LOADS
    BUILDINGS .....4.8 KPA
    GRATING, CHECKERED PLATES AND HATCHES .....SAME LOADINGS AS ADJACENT FLOOR AREAS
    TRUCK TRAFFIC AREAS .....204.6 KN OR L-100 LOADING

22. WIND
    BASIC WIND SPEED .....10 MPS
    IMPORTANCE FACTOR (NORMAL).....I = 1.0

23. SNOW LOADS
    GROUND SNOW .....ULS = 1.52 kPa
    .....SLS = 1.71 kPa
    IMPORTANCE FACTOR (NORMAL).....I = 1.0

24. SEISMIC .....SDS = 0.16 / SD1 = 0.077
    SITE CLASSIFICATION .....B
    IMPORTANCE FACTOR (NORMAL).....I = 1.0

CIVIL WORK AND FOUNDATION CONSTRUCTION

25. FOUNDATION CONSTRUCTION AND SITE PREPARATION METHODS SHALL FOLLOW RECOMMENDATIONS OUTLINED IN GEOTECHNICAL REPORT BY BGC DATED 11 MAY 2011.

26. EXCAVATION AND BACKFILL:

    26.1. FOLLOW SPECIFIC RECOMMENDATIONS OUTLINED IN THE GEOTECHNICAL REPORT.

    26.2. STRUCTURAL BACKFILL SHALL CONSIST OF GRANULAR NON-EXPANSIVE SAND, GRAVEL AND SAND-GRAVEL MIXTURES. USE WEARING COURSE MATERIAL AS DESCRIBED IN THE SPECIFICATIONS (OR SIMILAR) FOR BACKFILL AND USE 150 mm COMPACTED SELECT DRAIN FILL MATERIAL AS DESCRIBED IN THE SPECIFICATIONS (OR SIMILAR) FOR SUB-BASE.

27. SUBGRADE CONDITIONS SHOULD BE INSPECTED BY A GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF ANY CONCRETE. STRUCTURAL FILL SHALL BE INSPECTED AND TESTED.

CONCRETE

28. ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF CSA A23.3 "DESIGN OF CONCRETE STRUCTURES" LATEST EDITION, AND TO CSA S304.1 "DESIGN OF MASONRY STRUCTURES". CONCRETE STRENGTH TEST SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF CSA A23.1.

29. CONCRETE AND REINFORCEMENT SHALL BE DESIGNED AND PLACED IN ACCORDANCE WITH CSA A23.1

30. CONCRETE PARAMETERS SHALL BE AS FOLLOWS:
    f'c = 28MPa
    Exposure Category = *F-2*
    Lean Concrete f' = 20 MPa.

31. AGGREGATES SHALL BE CRUSHED STONE CONFORMING TO "SPECIFICATION FOR CONCRETE AGGREGATES" ASTM C33.

32. WATER USED IN MIXING CONCRETE SHALL CONFORM TO ASTM C1602.

33. REINFORCING BARS SHALL BE DEFORMED, INTERMEDIATE GRADE NEW BILLET STEEL CONFORMING TO ASTM A615 INCLUDING SUPPLEMENTARY REQUIREMENTS, GRADE 60. FIELD SPLICES AND DEVELOPMENT LENGTH SHALL COMPLY WITH THE FOLLOWING SCHEDULE, U.O.N.

34. CONCRETE PROTECTION FOR REINFORCEMENT – CLEAR DISTANCE FROM FACE OF CONCRETE TO BAR SHALL BE AS FOLLOWS UNLESS NOTED;

    34.1. CONCRETE DEPOSITED AGAINST GROUND OR VOID FORM: 75mm
    34.2. BEAMS, GIRDERS, COLUMNS, AND PILES: 40 mm
    34.3. SLABS, WALLS, JOISTS, SHELLS, AND FOLDED PLATES: 40 mm
    34.4. RATIO OF COVER TO NOMINAL BAR DIAMETER: 1.5
    34.5. RATIO OF COVER TO NOMINAL MAXIMUM AGGREGATE SIZE: 1.5

35. EXPANSION JOINT MATERIAL FOR EXPANSION OR ISOLATION JOINTS SHALL BE PREMOLDED, BITUMINOUS IMPREGNATED FIBERBOARD CONFORMING TO ASTM D994.

36. JOINT SEALANT FOR ALL CONCRETE CONTROL, CONSTRUCTION AND ISOLATION JOINTS SHALL BE SIKAFLEX-1A BY SIKA CORP., OR APPROVED EQUAL.

37. GROUT USED FOR VARIOUS APPLICATIONS SHALL BE AS FOLLOWS:

    37.1. GROUT USED FOR STRUCTURAL STEEL / COLUMN BASE PLATES SHALL BE PREPACKED, HIGH-FLUIDITY NON-SHRINK NATURAL AGGREGATE GROUT SUCH AS "MASTERFLOW 713 PLUS" BY BASF (FORMERLY MASTER BUILDERS) OR APPROVED EQUAL. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION. SPACE BETWEEN THE ANCHOR BOLTS AND OVERSIZED HOLES IN THE BASE PLATE SHALL BE FULLY GROUTED WITH NON-SHRINK GROUT TO ASSURE PROPER SHEAR TRANSFER. GROUTING SHALL BE PERFORMED ONE BOLT AT A TIME, WHILE OTHER BASE PLATE BOLTS ARE FULLY TIGHTENED.

    37.2. GROUT USED FOR GROUTING COMPRESSORS, TURBINES, LARGE PUMPS AND OTHER RECIPROCATING OR ROTATING EQUIPMENT THAT REQUIRES EPOXY GROUTING SHALL BE "TIVE-STAR HP" EPOXY GROUT BY FIVE STAR PRODUCTS, INC., OR APPROVED EQUAL. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION.

    37.3. GROUT USED FOR DRILLED AND EPOXY GROUTED REBAR SHALL BE HILTI HIT RE500 EPOXY OR APPROVED EQUAL. FOLLOW MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION.

38. ALL WELDING PROCEDURES, INCLUDING STUD WELDING, AND QUALIFICATIONS SHALL BE IN ACCORDANCE WITH AWS D1.1.

39. ALL SLABS SHALL BE GIVEN A FLOAT FINISH AS DESCRIBED IN NBC OF CANADA (2005) SECTION 9.16.4.1. ALL WALKS AND SLABS SHALL BE BROOM FINISHED AFTER CONCRETE HAS RECEIVED A FLOAT FINISH.

40. EXPOSED CORNERS SHALL BE CHAMFERED 20 mm UNLESS NOTED.

41. CHECK ALL ELECTRICAL, MECHANICAL AND PIPING DRAWINGS FOR EMBEDDED ITEMS (PIPE, CONDUIT, ETC.) AND BLOCKOUTS BEFORE PLACING CONCRETE.

42. IF REINFORCING OR MESH IS FIELD CUT FOR SMALL OPENINGS, CONDUIT, ELECTRICAL BOXES, ETC., CUT REINFORCING SHALL BE REPLACED WITH AN EQUIVALENT AREA OF STEEL ALL SUCH BARS SHALL EXTEND 600 mm MINIMUM (OR MESH LAP 2") BEYOND CORNER OR EDGE OF OPENING IF NECESSARY. REINFORCING SHALL BE BENT TO PROVIDE THIS MINIMUM EMBEDMENT. MAKE ALL BARS CONTINUOUS AROUND CORNERS.

43. THE CONTRACTOR SHALL VERIFY ALL EQUIPMENT ANCHOR BOLT DIMENSIONS AGAINST THE CERTIFIED EQUIPMENT DRAWINGS BEFORE PLACING CONCRETE. TOLERANCES FOR ANCHOR BOLT LOCATIONS AND ELEVATIONS SHALL BE AS DEFINED IN THE CANADIAN STEEL ASSOCIATION CSA-S16 LIMIT STATES DESIGN OF STEEL STRUCTURES.

CONCRETE WATERPROOFING

44. PROVIDE 3/8" THICK x 6" WIDE POLYVINYL CHLORIDE (PVC) WATERSTOPS AT ALL CONSTRUCTION AND EXPANSION JOINTS IN CONTAINMENT AREAS AND SUMPS.

45. APPLY ONE COAT OF XYPEX CONCENTRATE AT 1.5 LBS/SQ. YD., PLUS ONE COAT OF XYPEX MODIFIED AT 1.5 LBS/SQ. YD. (OR APPROVED ALTERNATE) WHERE CONCRETE WATERPROOFING IS REQUIRED. APPLY IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS/SPECIFICATIONS.

PROFESSIONAL ENGINEER — YUKON — TROY LEE MEYER — TERRITORY #2010

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13	
3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14	

		DATE
SCALE:		
DESIGNED BY	DEH	04/10/14
DRAWN BY	DAG	04/10/14
CHECKED BY		
PROJECT MGR	TLM	04/10/14
CLIENT APPR.		

StrataGold Corporation

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY STRUCTURAL GENERAL NOTES & DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-043
REV NO.	3
DATE	4-29-13

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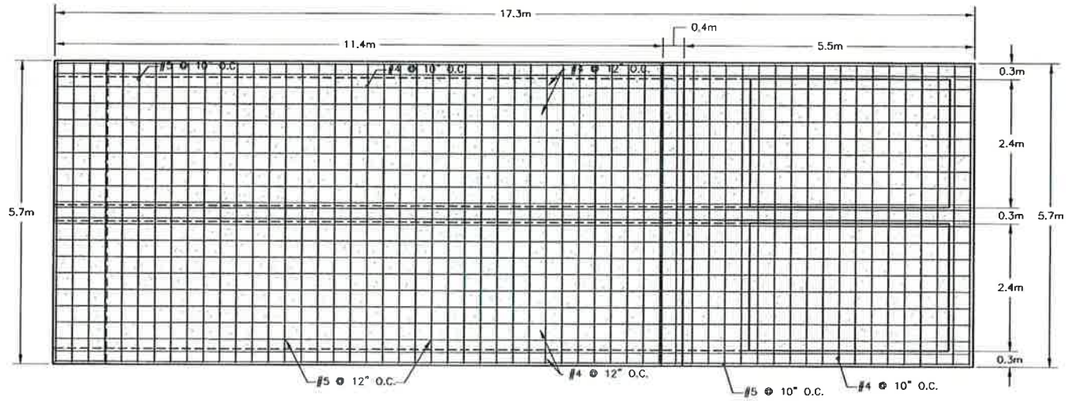

73 / 45 **IN-HEAP SPILLWAY BOX CULVERT PLAN VIEW**
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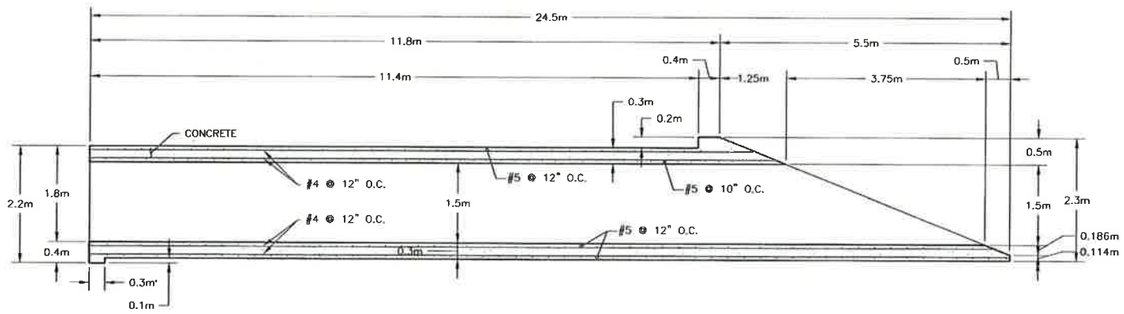

74 / 45 **IN-HEAP SPILLWAY BOX CULVERT PROFILE**
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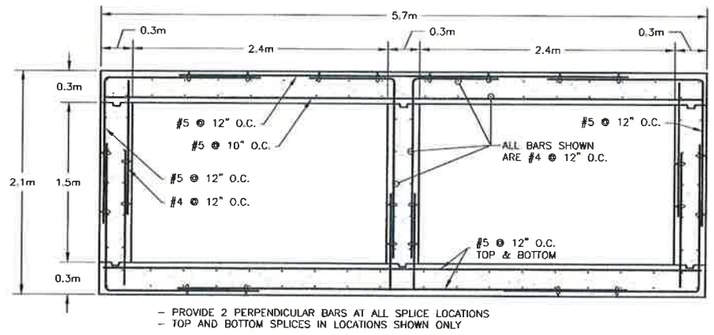

- PROVIDE 2 PERPENDICULAR BARS AT ALL SPLICE LOCATIONS
- TOP AND BOTTOM SPLICES IN LOCATIONS SHOWN ONLY

75 / 45 **IN-HEAP SPILLWAY BOX CULVERT SECTION**
1:50

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DO NOT SCALE 11x17 DRAWINGS

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										2	ISSUED FOR REVIEW - REV. D.G.D.C. & IN-HEAP SUMPS	DAG	TLM	11/05/13		DRAWN BY	DAG	04/10/14
										3	ISSUED FOR CONSTRUCTION	DAG	TLM	04/24/14		CHECKED BY		
																PROJECT MGR	TLM	04/10/14
																CLIENT APPR.		

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EAGLE GOLD PROJECT

HEAP LEACH FACILITY BOX CULVERT STRUCTURAL DETAILS

PROJECT NO.	74010.01-02
DWG NO.	300-GT-045
REV NO.	3
DATE	4-22-13

APPENDIX A – DUBLIN GULCH DIVERSION CHANNEL FINAL DESIGN REPORT

EAGLE GOLD PROJECT
HEAP LEACH FACILITY
DUBLIN GULCH DIVERSION CHANNEL
FINAL DESIGN REPORT

The following document has been prepared by the staff of Tetra Tech under the direct supervision of the **ENGINEER** of Record (Dan Evans) and is authorized by a duly licensed Professional Engineer of Yukon (Troy Meyer), whose seal and signature appear below.

The **INFORMATION** presented herein was prepared in accordance with generally accepted professional engineering principles and practices.

Yukon License #2010

Dublin Gulch Diversion Channel
Final Design Report

Eagle Gold Project

Prepared for:

StrataGold Corporation

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Tetra Tech Project No. 114-201087

April 23, 2013

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1.0 OVERVIEW

The Eagle Gold project site is located about 20 miles north-west of Keno Hill in Yukon Territory, Canada. The project vicinity map is shown in Figure 1. The project area is located within the drainage basins of Dublin Gulch, Eagle Creek, and Haggart Creek above the Lynx Creek confluence.

Tetra Tech was contracted for the final design of the Dublin Gulch diversion channel (DGDC) and the Heap Leach Facility (HLF) for the Eagle Gold Project. The final designs for DGDC and HLF are to be submitted in two separate design packages. This report mainly deals with the final design of the DGDC. The purpose of the DGDC for the Eagle Gold project is to re-route the flows in the existing Dublin Gulch (which now flow to Haggart Creek and eventually to the South McQuesten River) to the south of the proposed HLF, a portion of which will be located within the existing Dublin Gulch valley. A section of the lower portion of the DGDC will occupy the existing Eagle Creek channel. At the downstream end of the diversion and west of the HLF and event pond, the DGDC will join with the proposed Eagle Creek Fish Habitat Compensation Channel, which will ultimately flow into Haggart Creek approximately 1.6 km downstream of the existing Dublin Gulch-Haggart Creek confluence.

The final design of DGDC involved hydrologic analysis of the project site using the U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-HMS model, version 3.5 (HEC, 2010a), determining the alignment of DGDC, and establishing the DGDC sizes based on a hydraulic analysis using the U.S. Army Corps of Engineers Hydrologic Engineering Center's HEC-RAS model, version 4.1 (HEC, 2010b).

The proposed DGDC was intended to be a permanent channel with the capacity to safely convey the peak flow from the 500-year, 24-hour storm event without overtopping. The stable channel lining or armoring for segments adjacent to the proposed HLF was also designed based on the peak flow from the 500-year, 24-hour storm event. However, the channel lining for portions outside the proposed HLF was designed based on the 100-year, 24-hour storm event peak flow. These stability measures are intended to stabilize the channel temporarily over the life of the mine (10-15 years), after which more durable and natural riprap materials from the open pit development will be used to reinforce the channel for long-term stability.

The drainage basins have steep terrain with mean gradient of 18 percent, and well-vegetated slopes. Dublin Gulch, Eagle Creek, and Haggart Creek are perennial streams (KP, 2012). Several of the tributaries of these creeks/gulches are intermittent streams, which are streams that become dry at sections along the water course where flow is subsurface, or ephemeral streams, which are streams that have little to no groundwater storage and flow is in response to snowmelt or heavy rains.

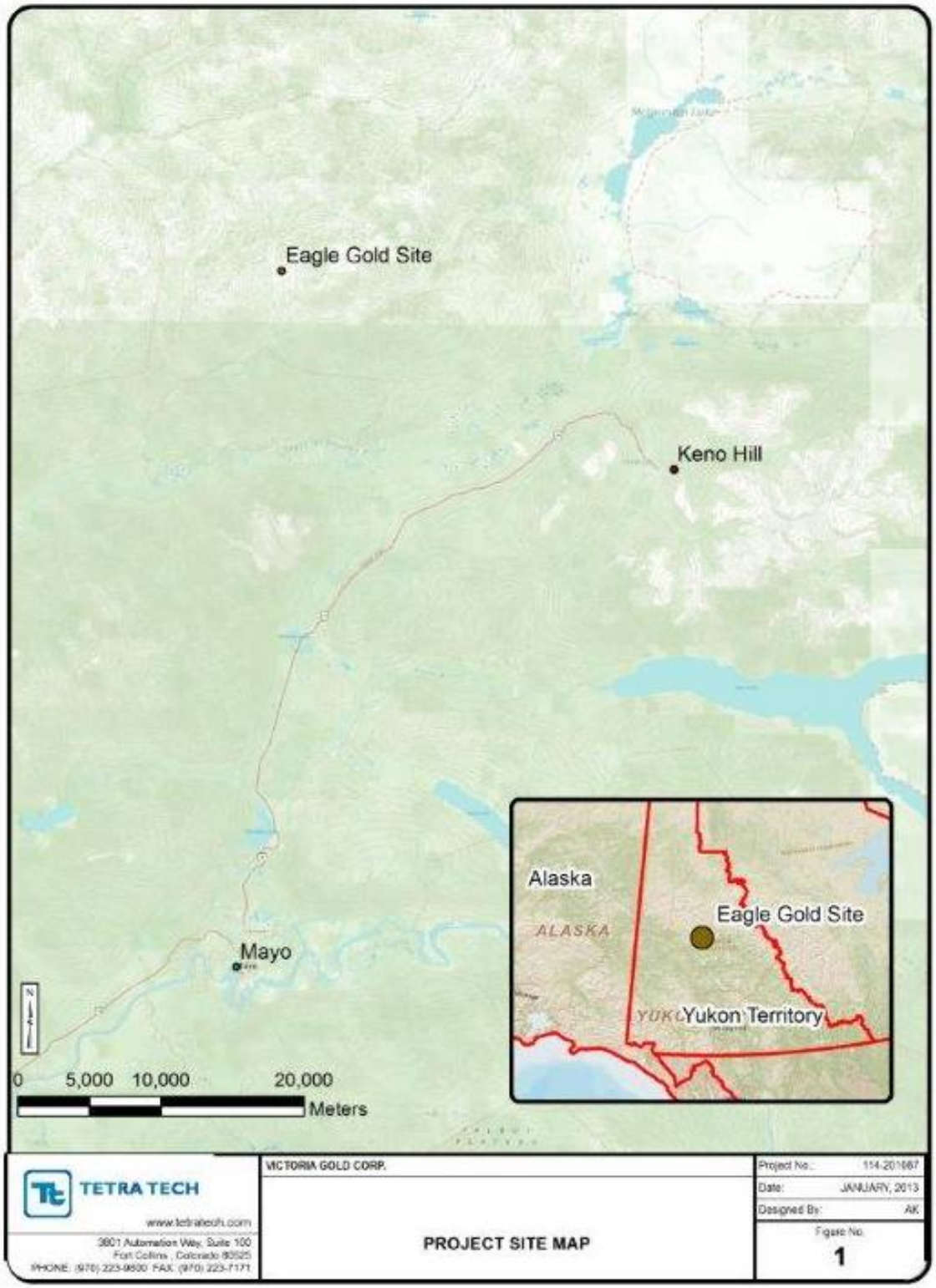

Figure 1. Project Site Location Map

2.0 DESIGN CRITERIA

As mentioned in the overview section above, the DGDC was designed to safely convey the peak flow from 100-year, 24-hour event with freeboard and the 500-year, 24-hour storm event without overtopping. Also the channel lining or armoring was designed to be erosionally stable for the peak flow from the 500-year, 24-hour storm event adjacent to the proposed HLF and the 100-year, 24-hour storm event downstream of the proposed HLF.

The hydrologic analysis presented in Section 3.0 is subject to the standards and procedures presented in the Manual of Operational Hydrology in British Columbia (Ministry of Environment, 1991), NRCS TR-55 (NRCS, 1986), Rainfall Frequency Atlas for Canada (Hogg and Carr, 1985), and HEC-HMS Model User's Manual (HEC, 2010a). Hydraulic analysis in Section 4.0 follows the standards and design criteria presented in HEC-RAS Model User's Manual (HEC, 2010b). Excerpts from aforementioned publications are contained in Appendix B.

3.0 HYDROLOGIC ANALYSIS

The main objective of the hydrologic analysis is to estimate the peak flow from the 100-year and 500-year 24-hour storm events at desired design points along the proposed DGDC.

3.1 Previous Studies

Previous hydrologic analyses were performed by Hallam Knight Piesold in 1996 for the feasibility study of the proposed HLF. In 2012, Knight Piesold revised the hydrologic analysis for the feasibility design of the HLF. These hydrologic studies are listed below:

- Hallam Knight Piesold, 1996. First Dynasty Mines, LTD., Dublin Gulch Project, Report on Feasibility of the Heap Leach Pad and Associated Structures, February 1996.
- Knight Piesold, 2012, Eagle Gold Project – Design Basis Peak Flows for the Dublin Gulch Diversion Channel Design, Technical Memorandum, 2012.
- Tetra Tech, HLF Feasibility Design, Eagle Gold Project, 2012.

Excerpts from these studies are included in Appendix B.

3.2 Topographic Data

A LiDAR survey and aerial photography was performed in the project area. The horizontal projection of the survey was in UTM Zone 8N projection. Topographical data at 10-meter contour intervals was available from ESRI and used to supplement the LiDAR data. The basins were delineated using both the LiDAR survey and the ESRI supplemented topography.

3.3 Assumptions and Limitations

Hydrologic modeling was performed using HEC-HMS model (HEC, 2010a). HEC-HMS simulates runoff from rainfall events only, and does not include runoff from snowmelt. The project site is located near the Arctic Circle in the Yukon Territory. The climate is characterized by long, cold, dry winters and short, warm, wet summers, with conditions varying according to altitude and aspect. Streamflow in the region is typically highest in May due to melting of the winter snowpack. Annual peak instantaneous flows commonly occur in this freshet period on larger river systems such as the South McQuesten River, but on smaller streams such as Dublin Gulch, they may also occur in summer or early autumn due to intense rain or rain on snow events. Flows decrease throughout the winter and minimum flows typically occur in March or April (Stantec 2012, Knight Piesold 2013).

Historic on-site rainfall records as well as on-site streamflow measurements show that about 76% of the rainfall occurs during the months of June through August. Almost 90% of the snowmelt occurs during May. In the months of June through August when the high intesity rainfall events occur, except for some of the very high elevations and some north-facing slopes, the snow is entirely melted (Knight Piesold, 2013). Analysis of the flow at gage W1, showed that the base flow is as high as 0.18 m^3/s. Therefore, a baseflow of 0.2 m^3/s is assumed to account for groundwater and interflow.

3.4 Precipitation

Tetra Tech obtained the 100-year 24-hour rainfall depths from the Draft *Hydrometeorology Report* prepared by Knight Piesold in March 2013 (KP, 2013). Knight Piesold also provided a spreadsheet that included 100-year rainfall depths for durations of 5 min-, 10-min, 15-min, 30-min, 1-hour, 2-hour, 6-hour, 12-hour and 24-hour. Tetra Tech confirmed that these rainfall depths were obtained from the Rainfall Frequency Atlas for Canada (Hogg and Carr, 1985). The rainfall depth for 3-hour duration was estimated by graphical interpolation. Tetra Tech added rainfall depths for identical durations for the 500-year storm event; and the rainfall depths were also obtained from Rainfall Frequency Atlas for Canada (Hogg and Carr, 1985).

Table 1. Rainfall Depths for Various Durations for the 100-Year and 500-Year Storm Events (in mm)

Duration	100-year	500-year
5 min	9.3	11.8
10 min	11.3	14.1
15 min	14.0	17.8
30 min	15.0	18.4
1 hour	21.1	26.2
2 hour	22.7	27.8
6 hour	33.8	37.1
12 hour	60.6	72.8
24 hour	71.6	87.0

Rainfall distribution in the project area was not available. For the 100-year and the 500-year events, rainfall depths for durations ranging form 5-min to 24-hours were used to generate the synthetic hyetographs using frequency storm method in the HEC-HMS model.

3.5 Description of Drainage Basins

LiDAR survey for the project site was provided by M3 Engineering and Technology. The areal coverage of the LiDAR was not sufficient to delineate the basin for Dublin Gulch and other tributary gulches. Therefore, the LiDAR survey was supplemented by the 10-meter contour interval topography available from ESRI. The basin delineation map is shown in Figure 2 as well as in Appendix C.

The basin for Dublin Gulch was subdivided into smaller sub-basins (noting that the sub-basins as defined herein were delineated for the purposes of modeling and include interfluvial areas and so do not necessarily match areal descriptions of sub-basins in previous reports): Dublin Gulch, North Dublin Gulch, Olive Gulch, Stewart Gulch, Suttles Gulch, Eagle Pup and Area 1. These sub-basins were delineated such that peak flows at key design points could be readily obtained. The peak flows from the hydrologic model were used for the design of DGDC. For the design of the DGDC, the basin contributing to the HLF was not included in this analysis.

The time of concentration for each sub-basin was calculated using Figure 1 in the Manual of Operational Hydrology in British Columbia (Ministry of Environment, 1991), which is provided in Appendix A. This graphical method, used for calculating time of concentration, takes into

consideration the area and the terrain of the basin. The Soil Conservation Service (SCS) unit hydrograph method was used to transform rainfall to runoff. Considering the limited availability of data, complexity due to snow cover at the site and the scope of the study, a site specific hydrograph was not developed; instead, an SCS unit hydrograph method was used. The lag time for each sub-basin was calculated as 0.6 times the time of concentration. The sub-basin areas along with lag times are provided in Table 2 below.

Table 2. Sub-basin Area and Lag Time Data

Sub-Basin Name	Area (km^2)	Lag Time (minutes)
Area 1	0.23	19.4
Dublin Gulch	3.27	72.0
Eagle Pup	1.39	47.5
North Dublin Gulch	0.65	34.2
Olive Gulch	2.80	64.8
Stewart Gulch	1.67	52.2
Stuttle Gulch	0.88	37.1

The lag times for the aforementioned sub-basins in Table 2 are shorter than the 180 minutes lag time for a larger basin contributing to the W1 gage, which is located near the junction of Stewart Gulch and Dublin Gulch, in Table 3 because of the difference in sizes of the basins. However, the lag time at W1 gage would be close to 180 minutes when the longest basin flow path within Dublin Gulch was considered for the analysis in this section.

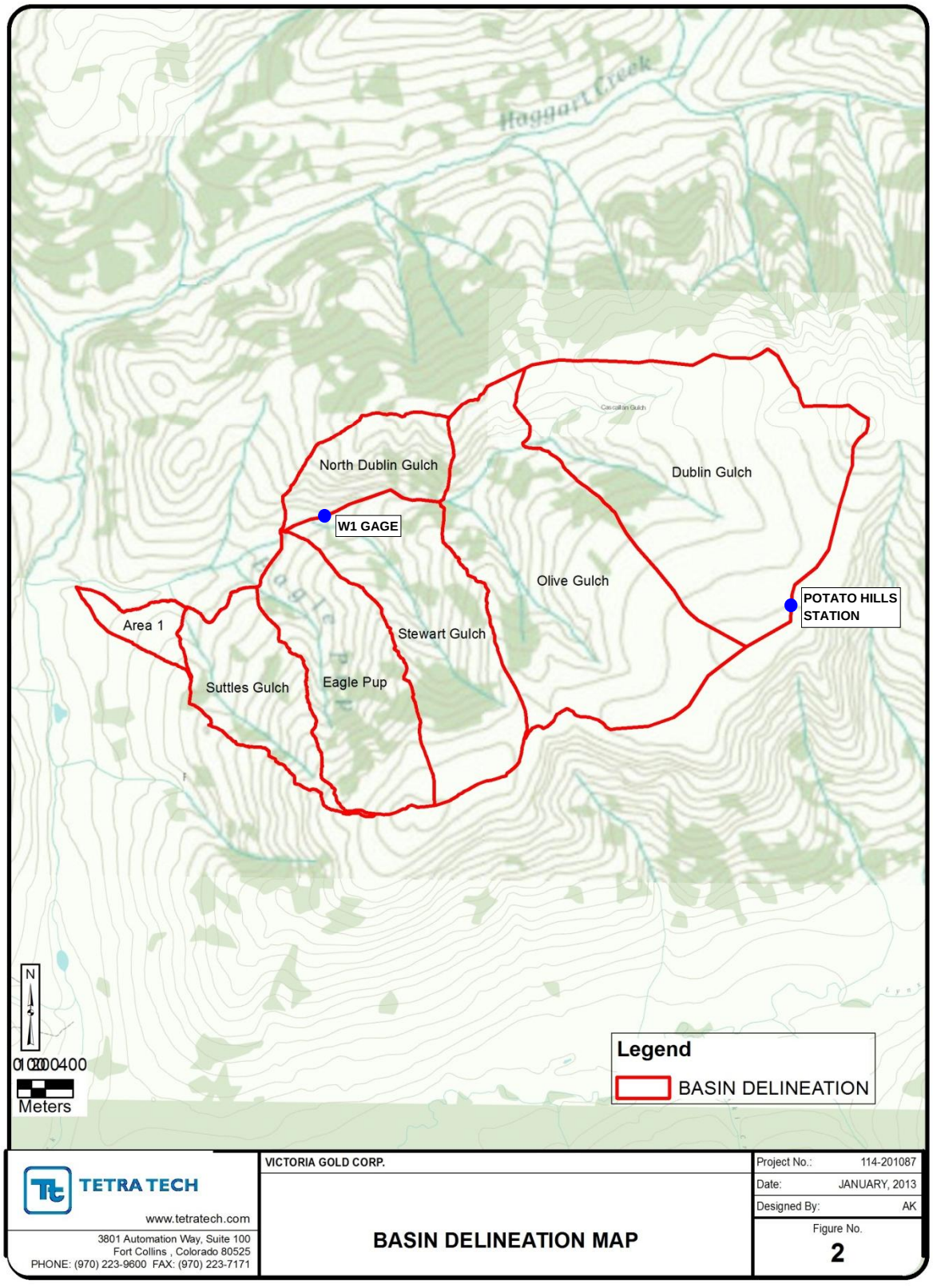

Figure 2. Basin Delineation Map

3.6 Infiltration

The basin is covered by discontinuous permafrost with an active zone that undergoes seasonal thawing and freezing, and likely varies between 0.5 and 1.5 m depending on aspect and organic/soil properties. Infiltration capacity is negligible during the winter, increases during spring break-up, and is greatest during the late summer when the thaw zone is at its maximum (where over permafrost) or has completely melted (where over talik zones).

Soils in the Dublin Gulch area are mapped as Orthic Eutric Brunisols and Dystric Brunisols, as well as various Turbic Cryosol subgroups, and several other lesser occurring soil types (Stantec 2011). These are generally classified as "imperfectly drained" soils. Soils classification define imperfectly drained soils as soils in which water is removed from the soil sufficiently slowly in relation to supply, which allows the soil to retain moisture for a significant part of the growing season. In this case, during rainfall and snowmelt periods, infiltrating water percolates slowly downward through these soils. In contrast, infiltration rate and water retention is increased by the porous organic tundra layer that lies directly above the soils, especially during the late summer when seasonal thawing is at its maximum. This description of soil type and infiltration is more or less equivalent to soil type D per the Natural Resources Conservation Service (NRCS) soil classification (NRCS, 1986).

3.7 Calibration of On-site Hydrometric Data

Hydrometeorological data have been collected within the project area using both automated and manual stations since August 2007 (Knight Piesold, 2013). Rainfall and stream flow data were provided by Knight Piesold (Erin Rainey, email communication, 2013) and then evaluated to help calibrate the HEC-HMS model. Rainfall data were collected every 15 minutes at the Potato Hills weather station, which is located at an elevation of 1420 masl in the upper portions of the Dublin Gulch drainage basin. Stream flow data were recorded continuously every 15 minutes at the W1 gage, which is situated just upstream of the confluence of Stewart Gulch and Dublin Gulch. The drainage area contributing to the W1 gage is approximately 7.0 square kilometers with a median basin elevation of 1303 masl (Knight Piesold, 2013). Thus, due to the strong orographic conditions in the area, the rainfall data at Potato Hills likely slightly overestimates the rainfall over the entire basin.

HEC-HMS was used to calibrate the measured rainfall and flow data to determine an average curve number (CN) for the drainage area contributing to the W1 gage. The SCS curve number method was used to estimate loss, SCS unit hydrograph method for the temporal rainfall runoff transformation, and constant monthly method for baseflow input. The shape of the unit hydrograph was selected to be Delmarva shape, which is generally related to the on-site measured flow hydrographs.

While some basin parameters can be obtained directly from topographic survey maps such as the basin area, other parameters such as baseflow and lag time can be estimated from field measurements directly. After a review of the measured data, it was determined that the lag time between the center of the rainfall hyetographs and peak of the flow hydrographs are approximately 180 minutes. Base flows were estimated based on stream flow measurements corresponding to individual rainfall events. Initial abstraction was conservatively assumed to be zero. The goal of the calibration was to modify the curve number values until the calculated flow hydrographs match the measured ones as closely as possible.

HEC-HMS calibration model graphs are located in Appendix C. These graphs show the measured rainfall hyetographs for each rainfall event along with the measured and calibrated flow hydrographs. A summary of the calibration results are included in Table 3 below.

Table 3. HEC-HMS Model Calibration Results

Rainfall Event	Area (km^2)	Curve Number	Lag Time (min)	Baseflow (m^3/s)	Calculated Peak Flow (m^3/s)	Measured Peak Flow (m^3/s)
Aug 2007	7.0	38	180	0.065	0.10	0.10
Jun 2009	7.0	32	180	0.035	0.10	0.10
Jun 2010	7.0	22	180	0.100	0.20	0.20
Aug 2011	7.0	69	180	0.180	0.30	0.30
Average	7.0	**40**	180	0.095	0.18	0.18

Only those rainstorm events that produced considerably high CN values or peak flows were used in this analysis. As shown in Table 3, HEC-HMS model calibration resulted in an average CN value of 40, which corresponds to a CN value for Antecedent Moisture Condition II (AMC II) corresponding to the average moisture conditions during summer months. However, the CN value was adjusted to AMC III to reflect more saturated conditions for the lower frequency events like the 100-year and 500-year events. The CN value for AMC III can be calculated using the following equation:

$$CN\ (III) = 23\,CN(II)/(10 + 0.13\,CN\ (II))$$

This equation results in a CN value of about 60 for AMC III which was used to calculate peak flows for the design of the DGDC.

3.8 Results

HEC-HMS model results for the 100- and 500-year storm events are included in Appendix C and summarized in Table 4 below. Results show that the maximum peak flows are 11.9 m^3/s and 17.2 m^3/s at the outlet of the DGDC for 100- and 500-year storm events, respectively.

Table 4. Summary of Hydrologic Analysis Results for 100- and 500-Year Storm Events

Basin/Junction Name	Contributing Area (km^2)	100-year Peak Flow (m^3/s)	500-year Peak Flow (m^3/s)	Notes
Dublin Gulch	3.27	3.7	5.2	
Olive Gulch	2.80	3.2	4.6	
Junction-1	6.07	6.8	9.7	Junction of Olive Gulch with Dublin Gulch
Stewart Gulch	1.67	2.2	3.2	
Junction-2	7.74	8.8	12.5	Junction of Dublin Gulch with Stewart Gulch
North Dublin Basin	0.65	1.2	1.7	
Junction-3	8.39	9.3	13.3	Junction of North Dublin Basin and Heap Leach Phase 2 with Dublin Gulch
Eagle Pup	1.39	2.0	2.8	

Basin/Junction Name	Contributing Area (km^2)	100-year Peak Flow (m^3/s)	500-year Peak Flow (m^3/s)	Notes
Junction-4	9.78	10.9	15.6	Junction of Eagle Pup with Dublin Gulch
Suttles Gulch	0.88	1.5	2.1	
Area 1	0.23	0.6	0.8	A small basin area downstream of the Suttles Gulch
Junction -5	10.89	11.9	17.2	Downstream End of DGDC

4.0 DGDC DESIGN

The main intent of the DGDC is to divert surface water runoff from Dublin Gulch away from the proposed HLF and other adjacent facilities as shown in the attached drawing set in Appendix E. The DGDC alignment and profile were determined based on the footprint of the Heap Leach Facility (HLF) and the route that would minimize the amount of excavation into the adjacent Dublin Gulch valley walls. The proposed alignment also meanders somewhat to follow natural topographic contours and mimic natural channel conditions as much as possible. The minimum horizontal curve radius for a meander was established at 30 meters to reduce the erosivity potential of the flowing water at critical bends; thus, minimizing the amount of lining or armoring material needed to protect the channel from erosion.

4.1 Hydraulic Analysis

The hydraulic model of the DGDC was performed using HEC-RAS model (HEC, 2010b). The limits of the HEC-RAS model along with cross section locations are shown in Appendix D. The most upstream cross section is located on Dublin Gulch about 50 m upstream of the connection with the DGDC. The most downstream cross section is positioned at the downstream end of the DGDC. Thereafter, the DGDC joins the Eagle Creek Fish Habitat Compensation Channel.

The peak flows used to design the DGDC are summarized in Table 5 below:

Table 5. DGDC Peak Design Flows

Junction Name	DGDC Station Range	100-year Peak Flow (m^3/s)	500-year Peak Flow (m^3/s)	Notes
Junction-3	1850-End	9.3	13.3	Junction of Dublin Gulch with DGDC
Junction-4	1200-1850	10.9	15.6	Junction of Eagle Pup Gulch with DGDC
Junction -5	Begin-1200	11.9	17.2	Downstream End of DGDC

The junction locations are shown in Appendix C in the HEC-HMS model results.

The DGDC is primarily in cut with the exception of a few fill areas as shown on the drawings in Appendix E and consists of the following three channel lining materials:

- ArmorMax® High Performance Turf Reinforcement Mat (HPTRM) in channel reaches with bed slopes less than 5 percent,
- Fabriform® UNIMAT at channel reaches with bed slopes greater than 5 percent and upstream and downstream of the culvert, and
- Riprap downstream of the culvert.

The DGDC was sized to convey the peak flow from the 500-year, 24-hour storm event without overtopping. The channel dimensions consist of a 1.25-meter deep trapezoidal channel section with 3H:1V side slopes, and a 0.25-meter deep triangular channel section at the bottom to create a low point along the channel centerline. The top width of the channel is 13.5 meters throughout the entire length of the DGDC. The typical channel cross sections are provided on sheets 15 and 16 of the drawing set in Appendix E.

The longitudinal or bed slopes of the DGDC range between 1 percent and roughly 22 percent as shown on the plan and profile sheets 10 through 13 of the drawing set in Appendix E.

A Manning's roughness coefficient (n-value) of 0.03 was used in main channel at all cross sections in the HEC-RAS model, which corresponds to typical n-values for Fabriform® UNIMAT, riprap and ArmorMax® HPTRM with no established vegetation based on the manufacturer's product data for each materials. Since the flow within the DGDC is mostly supercritical there wouldn't be substantial vegetation growth within the channel and the effect of vegetation can be neglected. Also, any sparse vegetation growth would be ineffective because the vegetation would be swept away or lay flat at the channel bottom during major storm events. Copies of the product data for Fabriform® and ArmorMax® are included in Appendix B. Any vegetation growth within the DGDC is assumed be secondary to the design to create additional stability. Therefore, the n values used in the HEC-RAS model do not account for any future vegetation growth within the channel since it is highly unlikely that there will be substantial vegetation growth because of the perennial nature of Dublin Gulch.

The DGDC follows a sinuous, gradually transitioning course, and was modeled using expansion and contraction coefficients of 0.1 and 0.3, respectively, to account for energy losses along the channel alignment. The expansion and contraction coefficients are 0.3 and 0.5, correspondingly, for sections immediately upstream and downstream of the culvert crossing. The future haul road bridge southeast of HLF is expected to span across the DGDC without encroaching into the DGDC; therefore, the expansion and contraction coefficients for sections immediately downstream and upstream of this bridge were not increased.

The peak flow from the 500-year, 24-hour storm event is contained within the 1.5-meter deep of the channel and average channel velocities range between 1.0 and 7.0 m/s for 100-year, 24-hour storm event and 0.7 and 7.8 m/s for 500-year, 24-hour storm event with Froude numbers ranging between 0.3 and 4.7 for 100-year storm event, and 0.2 and 4.7 for 500-year, 24-hour storm event. The results of the proposed conditions HEC-RAS model for the 100- and 500-year storm events are contained in Appendix D. Table 6 below provides a summary of the HEC-RAS model results.

Table 6. Summary of DGDC HEC-RAS Model Results

Channel Station (m)	100-year Flow (m^3/s)	500-year Flow (m^3/s)	100-year Water Surface Elevation (m)	500-year Water Surface Elevation (m)	100-year Average Channel Velocity (m/s)	500-year Average Channel Velocity (m/s)
2377.08	9.3	13.3	918.21	918.29	5.77	6.44
2374.68	9.3	13.3	918.05	918.11	5.21	5.95
2350	9.3	13.3	913.93	914	5.46	6.11
2323.05	9.3	13.3	909.44	909.51	5.34	6.06
2300	9.3	13.3	907.33	907.4	3.87	4.48
2285.83	9.3	13.3	905.92	906	4.47	4.97
2250	9.3	13.3	902.49	902.57	4.47	5.05
2214.48	9.3	13.3	899.08	899.16	4.48	5.03
2209.48	9.3	13.3	899.17	899.22	2.96	3.73
2204.48	9.3	13.3	899.28	899.37	2.06	2.5
2199.48	9.3	13.3	899.23	899.31	2.07	2.55
2194.48	9.3	13.3	899.18	899.24	2.07	2.62
2159.36	9.3	13.3	898.83	898.96	2.07	2.31
2130.28	9.3	13.3	898.54	898.68	2.06	2.29
2100	9.3	13.3	898.24	898.37	2.07	2.31
2050	9.3	13.3	897.74	897.88	2.06	2.29
2000	9.3	13.3	897.24	897.37	2.09	2.32

Channel Station (m)	100-year Flow (m^3/s)	500-year Flow (m^3/s)	100-year Water Surface Elevation (m)	500-year Water Surface Elevation (m)	100-year Average Channel Velocity (m/s)	500-year Average Channel Velocity (m/s)
1950	9.3	13.3	896.75	896.89	2.04	2.26
1924.78	9.3	13.3	896.49	896.62	2.09	2.33
1900	9.3	13.3	896.24	896.4	2.05	2.22
1874.5	9.3	13.3	896.11	896.28	1.64	1.78
1850	10.9	15.6	895.78	895.93	2.24	2.47
1812.06	10.9	15.6	895.53	895.69	1.79	2
1809.5	10.9	15.6	895.52	895.68	1.73	1.94
1790	Bridge					
1770.5	10.9	15.6	895.01	895.16	2.14	2.38
1754.86	10.9	15.6	894.84	894.99	2.18	2.43
1700	10.9	15.6	894.3	894.45	2.16	2.4
1650	10.9	15.6	893.79	893.94	2.19	2.43
1627.54	10.9	15.6	893.58	893.73	2.14	2.38
1600	10.9	15.6	893.29	893.44	2.19	2.44
1569.11	10.9	15.6	893	893.15	2.12	2.36
1527.82	10.9	15.6	892.57	892.71	2.21	2.45
1486.08	10.9	15.6	892.18	892.32	2.1	2.34
1450	10.9	15.6	891.78	891.93	2.24	2.47
1405.43	10.9	15.6	891.38	891.52	2.04	2.3
1390.09	10.9	15.6	891.17	891.32	2.28	2.49
1350	10.9	15.6	882	882.06	7.04	7.77
1300	10.9	15.6	871.12	871.18	5.38	6.35
1250	10.9	15.6	860.14	860.21	6.6	7.28
1193.9	11.9	17.2	847.91	847.97	6	6.95
1150	11.9	17.2	842.49	842.58	4.71	5.22
1106.73	11.9	17.2	837.02	837.1	5.54	6.21
1050	11.9	17.2	829.93	830.02	5.12	5.83
1000	11.9	17.2	823.66	823.74	5.4	6.05
972.09	11.9	17.2	820.17	820.25	5.26	5.96
950	11.9	17.2	819.31	819.37	2.79	3.6
900	11.9	17.2	816.64	816.75	4.25	4.59
850	11.9	17.2	814.2	814.29	3.6	4.22
805.21	11.9	17.2	811.92	812.03	4	4.41
750	11.9	17.2	809.18	809.28	3.81	4.34
700	11.9	17.2	806.67	806.77	3.93	4.38
648.26	11.9	17.2	804.08	804.19	3.87	4.36
600	11.9	17.2	801.67	801.78	3.9	4.37
550	11.9	17.2	799.17	799.28	3.88	4.37
500.41	11.9	17.2	796.69	796.8	3.89	4.37
450	11.9	17.2	794.17	794.28	3.89	4.37
400	11.9	17.2	791.67	792.87	3.89	1
394.86	11.9	17.2	792.14	792.88	1.13	0.78
389.86	11.9	17.2	792.14	792.88	1.07	0.75
384.86	11.9	17.2	792.14	792.88	1.01	0.72
379.86	11.9	17.2	792.14	792.88	0.96	0.7
374.86	11.9	17.2	792.13	792.85	1.02	0.92
347.12	Culvert					
318.25	11.9	17.2	790.78	790.93	2.83	3.07
298.25	11.9	17.2	790.68	790.84	2.33	2.54
257.75	11.9	17.2	788.36	788.47	4.29	4.72
237.75	11.9	17.2	787.41	787.51	3.74	4.29
223	11.9	17.2	786.65	786.75	3.89	4.36
190.35	11.9	17.2	785	785.1	3.91	4.38
150	11.9	17.2	782.96	783.06	3.91	4.38

Channel Station (m)	100-year Flow (m^3/s)	500-year Flow (m^3/s)	100-year Water Surface Elevation (m)	500-year Water Surface Elevation (m)	100-year Average Channel Velocity (m/s)	500-year Average Channel Velocity (m/s)
119.75	11.9	17.2	781.44	781.55	3.89	4.37
100	11.9	17.2	780.44	780.54	3.91	4.39
76.83	11.9	17.2	779.27	779.37	3.9	4.38
56.62	11.9	17.2	778.25	778.35	3.9	4.38
30	11.9	17.2	776.91	777.02	3.9	4.38
20	11.9	17.2	776.4	776.5	3.91	4.39
15	11.9	17.2	776.53	776.59	2.65	3.42
10	11.9	17.2	776.49	776.64	2.54	2.79
5	11.9	17.2	776.43	776.59	2.59	2.83
0	11.9	17.2	776.38	776.54	2.6	2.83

4.2 Channel Lining Selection Criteria

The channel lining or armoring requirement was determined based on the peak flows from the 500-year, 24-hour storm event for segments adjacent to the HLF and 100-year, 24-hour storm event for areas downstream of the HLF. Large and durable rock riprap with varying sizes is needed to protect the channel against erosion due to 100- and 500-year, 24-hour peak flows. Geotechnical data covering the project site has indicated that there is suitable rock material in the mine pit area that would be made available during pre-stripping and then during further open pit development. However, it is assumed that it will not be available during the construction of the DGDC, which has to be completed prior to mining, and there are no other readily available rock riprap sources nearby that meet the size and durability specifications for the channel. Other suitable channel linings such as Armorflex (Articulated Concrete Block) are too costly due to remote location of the project site. ArmorMax® HPTRM will be used to protect the channel sections that have longitudinal slopes less than or equal to 5 percent and Fabriform® UNIMAT will be used in channel segments that have longitudinal slopes greater than 5 percent to provide erosion protection. These stability measures are intended to stabilize the channel over the life of the mine (10-15 years), after which more durable riprap materials from the open pit development will be used to reinforce the channel for long-term conditions. The channel reach downstream of the culvert is designed to be lined with riprap; but, ArmorMax® HPTRM can be used instead if the required riprap material is not available during the construction of this reach.

4.3 Culvert Sizing

The culvert was designed to convey the 100-year storm flow with a maximum headwater to culvert rise ratio of 1.5. The HEC-RAS model results in Appendix D show that there is a need for two 2.13 meters wide by 1.22 meters high reinforced concrete box culverts (RCBC), details of which are provided on the last sheet of the drawing set in Appendix E. The culvert is approximately 52 meters long with a longitudinal slope of 1 percent.

5.0 CONCLUSION

The DGDC channel has been designed to convey the 100-year, 24-hour event with freeboard and to be erosionally stable during the 500-year, 24-hour storm event without overtopping based on the standards and criteria set forth in the publications listed in the References section below. The HEC-HMS hydrologic model was used to determine the design flows and the HEC-RAS hydraulic model was used to size the DGDC and verify if the channel lining was erosionally stable.

ArmorMax® HPTRM will be employed to protect the channel sections that have less than 5 percent bed slopes and Fabriform® UNIMAT will be applied in channel segments that have greater than 5 percent bed slopes to provide erosion protection through the life of mine. The channel armoring options recommended in this report (ArmorMax and Fabriform) were designed as short-term (life of mine) erosion control solutions due to the unavailability of more suitable riprap material which will become available later on in the project during open pit development.

6.0 REFERENCES

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APPENDIX A
GRAPH FOR TIME OF CONCENTRATION CALCULATION USING BRITISH COLUMBIA METHOD

7.5.3 Time of Concentration

Time of concentration (T_c) is the time required for surface runoff from the most remote part of the drainage basin to reach the point of consideration on the stream. For uniform rainfall intensity, this would be the time of equilibrium when all parts of the basin are contributing to streamflow and additional rainfall will not cause a greater peak flow but will just prolong the runoff period. For a given basin T_c is usually considered constant.

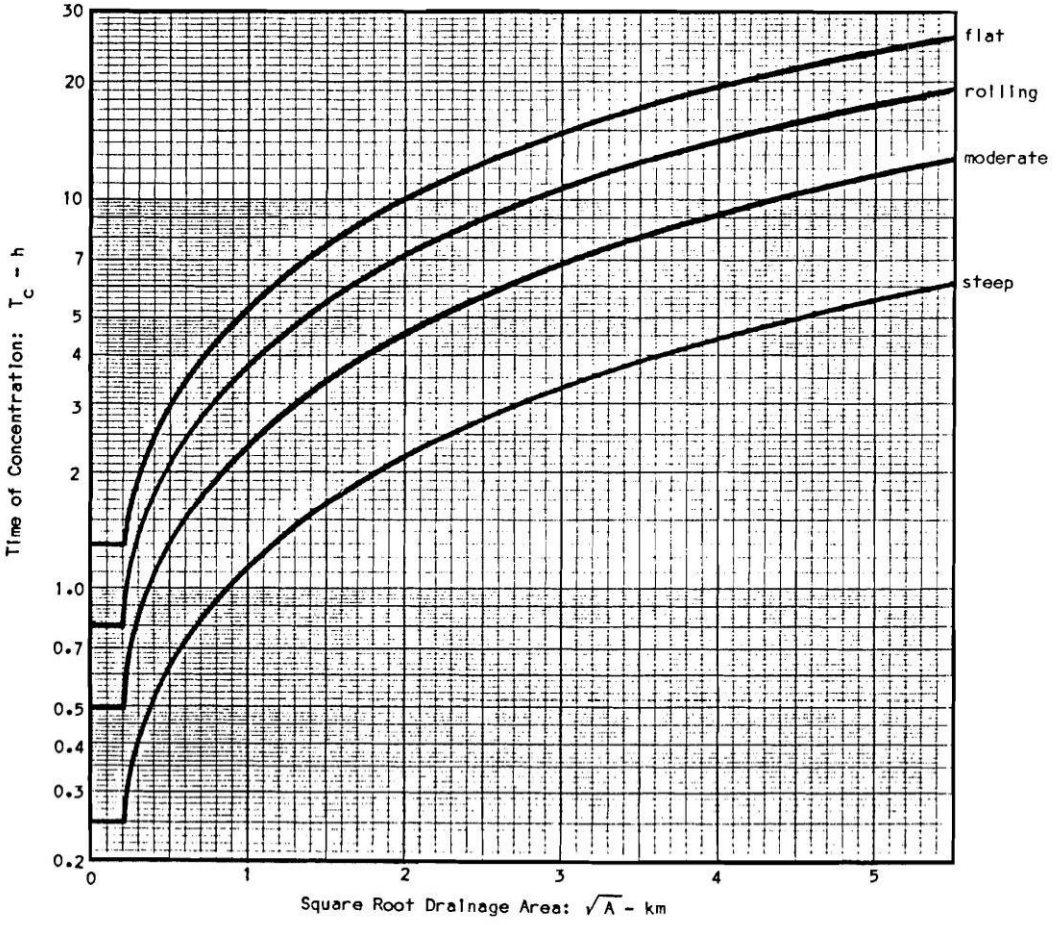


Figure 1. Time of Concentration (T_c)

Figure 1 provides estimates of T_c for forested, agricultural and rural basins. The top two curves (flat and rolling) can be used for agricultural and rural basins. A value for a given basin would lie somewhere between the two curves depending on basin slope. For forested watersheds the curves labelled rolling, moderate and steep should be used. For accurate determination of T_c the average basin slope should be determined.

The average basin slope is the elevation difference between the most remote point of the basin and the downstream point divided by the total stream length. In the graph rolling is a slope ≤ 0.01, moderate is a slope of 0.025 and steep is a slope ≥ 0.10.

The above procedure of estimating T_c is defined for a basin with a single main channel. If the basin in question has two or more dominant channels, each sub-basin should be considered separately.

Impermeable basins and urban basins (with large paved areas and roofs) would not be determined from the above curves. The time of concentration for such basins can be determined by use of empirical formulae such as those by Kirpich and Hathaway.

The Kirpich formula can be used to estimate T_c for small impermeable catchments, e.g., city storm drainages. The formula is expressed as:

$$T_c = \frac{L^{0.77}}{15\, S^{0.385}}$$

The Hathaway formula can be applied to small urban or agricultural catchments and to the small interior basins with a light forest. The formula is expressed as:

$$T_c = \frac{(nL)^{0.467}}{1.65\, S^{0.234}}$$

In both formulae:

- T_c is time of concentration in hours
- L is the total stream length from the most remote part of the basin as extended from the stream source to the divide in kilometres
- S is the average slope of the total stream length
- n is the roughness coefficient.

The roughness coefficient can be determined from Table 4.

APPENDIX B
REFERENCE MATERIALS

ARMORMAX®

Anchored Reinforced Vegetation System

ArmorMax® Anchored Reinforced Vegetation System is the most advanced flexible armoring technology available for severe erosion challenges. The ArmorMax system can be used in **non-structural applications** where additional factors of safety are required, including protecting earthen levees from storm surge and wave overtopping and stream, river and canal banks from scour and erosion. In addition, this system is ideally suited to protect storm water channels in arid and semi-arid environments where vegetation densities of less than 30% coverage are anticipated. For **structural applications**, the system can be engineered to provide surficial slope stabilization to resist shallow plane failures. Consisting of our woven three-dimensional High Performance Turf Reinforcement Mat (HPTRM) with X3® fiber technology and earth percussion anchors, you can count on the ArmorMax system to hold its ground.

DURABLE FLEXIBLE ARMORING SYSTEM

Lightweight protection layer securely anchored to the subgrade for long-term design life

WITHSTANDS EXTREME HYDRAULIC STRESSES

The HPTRM component of ArmorMax has been tested at CSU comparable to traditional armoring methods

RESISTS NON-HYDRAULIC EVENT DAMAGE

High strength survivability woven monolithic surface resists non-hydraulic stresses like debris flows and maintenance operations

SECURES NON-STRUCTURAL APPLICATIONS

In non-structural applications, the earth percussion anchors act as a tie-down mechanism securing the HPTRM firmly to the ground for additional factors of safety

STABILIZES STRUCTURAL APPLICATIONS

Engineered to provide surficial slope stabilization to resist shallow plane failures

OTHER FEATURES & BENEFITS

- Supports the EPA's Green Infrastructure initiative and is a recognized storm water Best Management Practice (BMP) and is proven to reduce erosion and reinforce vegetation for low-impact, sustainable design
- Easy to handle, lightweight components for rapid installation
- Use of lightweight equipment and unskilled labor facilitates installation with limited site access
- Aesthetically pleasing and more cost effective than conventional methods such as rock riprap and concrete paving

Outperforms and is more cost effective than conventional methods, including:

- Rock riprap
- Rock slope protection
- Gabions
- Concrete blocks or paving
- Fabric formed revetments

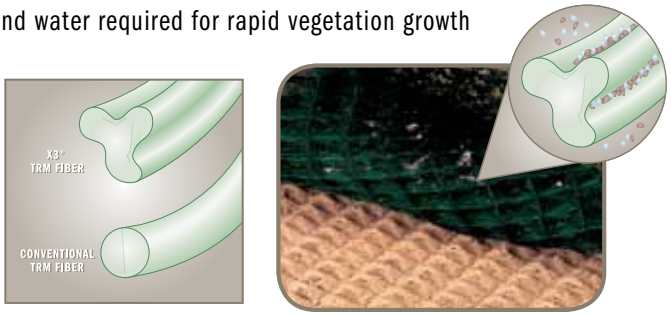
PROPEX® GEOSYNTHETICS | THE ADVANTAGE CREATORS.™

ARMORMAX®

Anchored Reinforced Vegetation System

WOVEN THREE-DIMENSIONAL HPTRM PROTECTION LAYER FEATURING X3® FIBER TECHNOLOGY

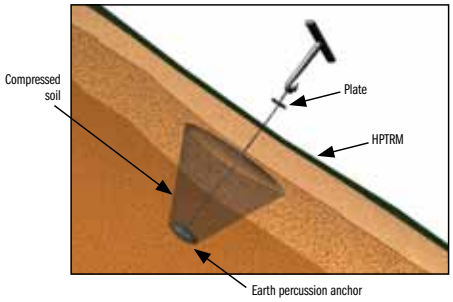
- Unique X3 fiber shape provides over 40% more surface area than conventional fibers to capture the moisture, soil and water required for rapid vegetation growth



- Exhibits extremely high tensile strength as well as superior interlock and reinforcement capacity with both soil and root systems
- Maximum ultraviolet protection for long-term design life
- Netless, rugged material construction stands up to the toughest erosion applications where high loading and/or high survivability conditions are required

EARTH PERCUSSION ANCHORS TO SECURE THE MAT TO THE GROUND

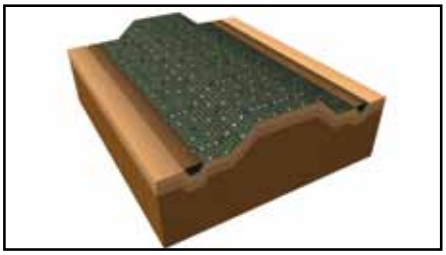
- Made of corrosion resistant aluminum alloy, gravity die cast and heat treated to give considerable increase in mechanical strength and curability both during installation and in service
- Connected to a threaded rod or stainless tendon to fully enhance corrosion resistance particularly at the soil/air interface



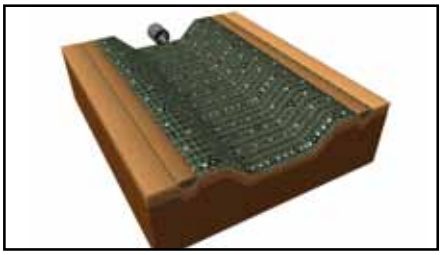
- As the load exerted on the soil by the ArmorMax system increases, a body of soil above the anchor is compressed and provides resistance to any further anchor movement – permanently securing the mat to the ground

ARMORMAX NON-STRUCTURAL APPLICATIONS

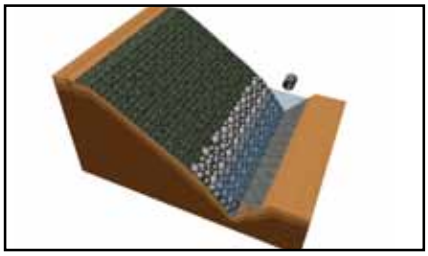
The figures below illustrate the ArmorMax system for non-structural applications. The system is comprised of the HPTRM and typically Type B1 earth percussion anchors.



LEVEE ARMORING



ARID/SEMI-ARID STORM WATER CHANNELS

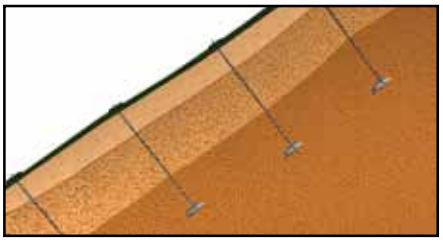


CANAL, STREAM AND RIVER BANK PROTECTION

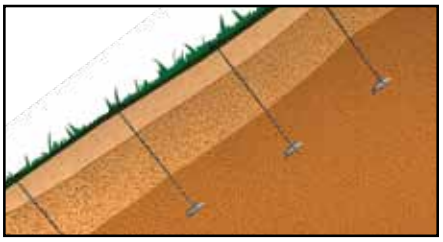
ARMORMAX STRUCTURAL APPLICATION

The figures below illustrate the use of ArmorMax in a structural application for surficial slope stabilization. The system is comprised of the HPTRM and Type B2 or B3 earth percussion anchors as specified by the project engineer.

SHALLOW PLANE FAILURE



APPLY ARMORMAX SYSTEM



VEGETATION GROWTH

KEY PHYSICAL PROPERTIES OF ARMORMAX®

- Material Composition: Patented ultraviolet protection package in HPTRM, stainless steel tendons and galvanized threaded rods provide long-term design assurance.
- Tensile Strength: HPTRM boasts 4000 x 3000 lb/ft (58.4 x 43.8 kN/m) of tensile strength, which exceeds the U.S. EPA's definition of a High Performance Turf Reinforcement Mat.
- Seedling Emergence: HPTRM features X3® fiber technology, which offers 40% more fiber surface area to capture the critical sediment and moisture needed to increase seed germination within the first 21 days.
- Flexibility: Allows the system to conform and maintain intimate contact with the prepared subgrade.
- Anchor Loading Capacity: Based on anchor size, rod depth and on-site soil parameters the anchor provides pull-out resistance up to 4,000 lbs (17.80 kN).

ARMORMAX PROPERTY TABLES[1] ENGLISH & METRIC VALUES

	PROPERTY	TEST METHOD	VALUE[2]	HPTRM
	HIGH PERFORMANCE TURF REINFORCEMENT MAT			
PHYSICAL	MASS/UNIT AREA	ASTM D-6566	MARV	13.5 oz/yd^2 455 g/m^2
PHYSICAL	THICKNESS	ASTM D-6525	MARV	0.4 in 10.2 mm
PHYSICAL	LIGHT PENETRATION (% Passing)	ASTM D-6567	TYPICAL	10%
PHYSICAL	COLOR	VISUAL	–	GREEN, TAN
MECHANICAL	TENSILE STRENGTH (Grab)	ASTM D-6818	MARV	4000 x 3000 lb/ft 58.4 x 43.8 kN/m
MECHANICAL	TENSILE ELONGATION	ASTM D-6818	MARV	25%
MECHANICAL	RESILIENCY	ASTM D-6524	MARV	80%
MECHANICAL	FLEXIBILITY/STIFFNESS	ASTM D-6575	TYPICAL	0.534 in-lbs 615,000 mg-cm
DURABILITY	UV RESISTANCE @ 6000 HOURS	ASTM D-4355	MINIMUM	90%
DURABILITY	ROLL SIZES	MEASURED	TYPICAL	8.5 ft x 90 ft 2.6 m x 27.4 m

	ANCHOR TYPE	Minimum Rod Depth	Minimum Drive Depth	Load Range Cohesive through Non Cohesive Soils
NON-STRUCTURAL	B1	3.0 ft 0.9 m	3.0 ft 0.9 m	Up to 550 lbs 2.45 kN
STRUCTURAL	B-2	5.0 ft 1.5 m	5.0 ft 1.5 m	2,000 to 3000 lbs 4.45 to 13.34 kN
STRUCTURAL	B-3	4.0 ft 1.2 m	7.0 ft 2.1 m	3,000 to 4,000 lbs 13.34 to 17.80 kN

NOTES: 1. The property values listed are effective 7/2009 and are subject to change without notice.
2. MARV indicates minimum average roll value calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any sample taken during quality assurance testing will exceed the value reported.

MODERATE			SEVERE
LANDLOK® STITCH-BONDED TRMS	**LANDLOK® WOVEN TRMS**	**PYRAMAT® WOVEN HPTRMS**	**ARMORMAX® SYSTEM**
▸ 1st generation turf reinforcement mats (TRMs) ▸ Moderate-flow channels, bank protection and steep soil slopes ▸ Up to 10 years*	▸ 2nd generation turf reinforcement mats (TRMs) ▸ Moderate-flow channels, bank protection, and steep soil slopes where greater loading and/or survivability is required ▸ Up to 25 years*	▸ High performance turf reinforcement mat (HPTRM) ▸ High-flow channels, extreme slopes, pipe inlets & outlets and other arid/semi-arid applications ▸ Up to 50 years*	▸ Anchored reinforced vegetation system consisting of HPTRM and earth percussion anchors ▸ Earthen levees and stream, river and canal banks ▸ Storm water channels in arid and semi/arid environments ▸ Surficial slope stabilization ▸ Up to 50 years or greater*

*Design life performance may vary depending upon field conditions and applications.

For downloadable documents like construction specifications, installation guidelines, case studies and other technical information, please visit our web site at **geotextile.com**. These documents are available in easy-to-use Microsoft® Word format.

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PYRAMAT® BY PROPEX

Product Data
PYRAMAT®

PYRAMAT® high performance turf reinforcement mat (HPTRM) is a three-dimensional, lofty, woven polypropylene geotextile that is available in green or tan which is specially designed for erosion control applications on steep slopes and vegetated waterways. The matrix is composed of polypropylene monofilament yarns ***featuring X3® technology*** woven into a uniform configuration of resilient pyramid-like projections. The material exhibits very high interlock and reinforcement capacity with both soil and root systems, demonstrates superior UV resistance, and enhances seedling emergence.

PYRAMAT conforms to the property values listed below[1] and is manufactured at a Propex facility having achieved ISO 9001:2000 certification. Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

PROPERTY	TEST METHOD	MARV[2] ENGLISH	MARV[2] METRIC
ORIGIN OF MATERIALS			
% U.S. Manufactured Inputs		100%	100%
% U.S. Manufactured		100%	100%
PHYSICAL			
Mass/Unit Area	ASTM D-6566	13.5 oz/yd²	457.7g/m²
Thickness	ASTM D-6525	0.4 in	10.2 mm
Light Penetration (% Passing)	ASTM D-6567	15% (Max)	15% (Max)
Color	Visual	Green or Tan	
MECHANICAL			
Tensile Strength (Grab)	ASTM D-6818	4000 x 3000 lb/ft	58.4 x 43.8 kN/m
Elongation	ASTM D-6818	40 x 35%	40 x 35%
Resiliency	ASTM D-6524	80%	80%
Flexibility	ASTM D-6575	0.534 in-lb (avg)	29.6 mg-cm (avg)
ENDURANCE			
UV Resistance % Retained 6000 hrs	ASTM D-4355	90%	90%
UV Resistance % Retained 10000 hrs	ASTM D-4355	85%	85%
PERFORMANCE			
Velocity[3] (Fully Vegetated)	Large Scale	20 ft/sec	6.1 m/sec
Velocity[3] (65 – 70% Vegetated)	Large Scale	16 ft/sec	4.9 m/sec
Velocity[3] (20 – 30% Vegetated)	Large Scale	12 ft/sec	3.7 m/sec
Shear Stress[3] (Fully Vegetated)	Large Scale	16 lb/ft²	766 Pa
Shear Stress[3] (65 – 70% Vegetated)	Large Scale	12 lb/ft²	575 Pa
Shear Stress[3] (20 – 30% Vegetated)	Large Scale	5 lb/ft²	239 Pa
Manning's "n"[4] (Unvegetated)	Calculated	0.028	0.028
Seedling Emergence[4]	ECTC Draft Method #4	296%	296%
ROLL SIZES		8.5 ft x 90 ft	2.6 m x 27.4 m

NOTES:

1. The property values listed are effective 04/2011 and are subject to change without notice.
2. MARV indicates minimum average roll value calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any sample taken during quality assurance testing will exceed the value reported.
3. Maximum permissible velocity and shear stress has been obtained through vegetated testing programs featuring specific soil types, vegetation classes, flow conditions, and failure criteria. These conditions may not be relevant to every project nor are they replicated by other manufacturers. Please contact Propex for further information.
4. Calculated as typical values from large-scale flexible channel lining test programs with a flow depth of 6 to 12 inches.

GEOTEXTILE SYSTEMS BY PROPEX

ENGINEERING EARTH
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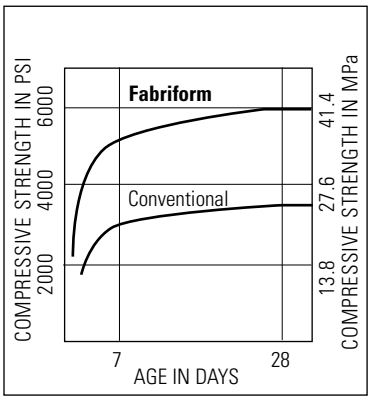
Fabriform® Technical Data: Performance

DESIGNS BASED ON OVER 35 YEARS OF EXPERIENCE

COMPRESSIVE STRENGTH

The fabric used in Fabriform construction has been designed to serve as a filter as well as a form. The highly fluid mortar pumped into the fabric forms will be mixed typically at a water/cement ratio in the 0.65 to 0.75 range. Excess mixing water is squeezed through the water permeable fabric causing a pronounced reduction in the water/cement ratio. Curves show actual compressive strength of Fabriform test specimens, averaged from ten widely separated jobs compared with tests on companion specimens cast with identical mortar in conventional molds.



DURABILITY OF FABRIC

Fabrics shall be woven with polyamide (nylon) continuous multifilament, heat and UV light resistant, industrial grade nylon fiber in which a minimum of 50% by weight shall be bulk textured fibers. Bulk textured fiber provides added bonding with the Fine Aggregate Concrete (ref. Fine Aggregate Concrete, Par. 2). Polyester fibers shall not be employed - calcium hydroxide (alkalinity) in the Fine Aggregate Concrete will result in the saponification of the ester. Staple yarns shall not be permitted. All fabrics may be affected by ultraviolet light and/or by abrasion. The utility of a FABRIFORM installation will not be impaired as evidenced by over 25 years service records. Where appearance is an important consideration, FABRIFORM revetment may be spray coated with colored acrylic emulsion to further protect the fabric nodules or crowns against UV light.

HYDRAULIC FRICTION

Carefully controlled tests conducted in England in 1972 indicated that, for 8" Filter Point revetment, the coefficient of hydraulic friction "n" as used in the Manning Formula varied from 0.023 to 0.030, depending on depth and velocity in a straight reach of trapezoidal channel. A value of 0.025 is suggested for design purposes. The "n" value of Unimat and AB revetment has not been determined experimentally. A value of 0.015 and 0.045 is suggested respectively.

STREAM VELOCITY

Water velocity over 8" Filter Point revetments at an installation in Columbia, Md., based on data from stream gauging stations, was determined to be about 13 ft./sec. (4 m/s). An installation near Bedford, Iowa, was designed for a maximum velocity of 20 ft. per second (6 m/s). Documented measurements during flood conditions at this site indicate a maximum flow of 7640 cu. ft./sec. (216 m3/s) and a velocity estimated to be in the range of 15 to 18 ft./sec. (4.5 to 5.4 m/s).

Observed Waves & Currents in Ship Channels

Site	H Wave		V Current	
	Ft.	m	FPS	m/s
Savannah R.	5	1.5	5	1.5
Thames R.	2	0.6	24	7.3

WAVES AND CURRENTS IN SHIP CHANNELS

Waves and currents generated by the piston effect of large vessels moving through ship channels represents one of the most severe challenges to the Fabriform erosion control system. Values shown here for an installation on the Savannah River were estimated by observers at the site. Wave and current data at the Thames River installation near Chatham, Ontario, are measured values.

Estimated max. wave on lakes

Site	Vw Wind		F Fetch		*H Wave	
	MPH	KPH	Mi	Km	Ft	m
Champlain	25	40	15	24	4	1.2
Allegheny	25	40	4	6	3	0.9

**H=0.17 VwF = 2.5-F*

LAKE WAVES

Actual measured maximum height of lake waves is rarely available and reported observations are often misleading. Values shown here are based on the Molitor formula using measured fetch and assumed maximum wind velocity.

EFFECT ON pH OF SURROUNDING WATER (ENVIRONMENTAL IMPACT)

Laboratory tests have demonstrated that cement lost through fabric will average about 1/4% of cement content with a maximum of 1/2%, equivalent to about 3000 gm of cement per cu. m. of mortar pumped. Tests have likewise demonstrated that the addition of 50 gms. of cement to a cubic meter of water will raise the pH value about 1.0, well within the normal range of pH variation in potable water - typically 7.0 to 9.5. From these facts it may be demonstrated the raise in pH will be limited to no more than 1.0 provided that: **1.** In stagnant water - total volume is at least 60 times the volume of concrete pumped. **2.** In moving water - the rate of concrete injection in cu. yds./hr. (m3/h) does not exceed the rate of water flow in cu. yds./min. (m3/min.)

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Technical Memorandum: **Installation**

I. ORDERING FABRIC

1. In making a preliminary estimate of the quantity of Filter Point fabric required, allow 21% in excess of protected area for contractions of the fabric assembly which occurs as a result of filling with mortar. Allow 8% for Unimat fabrics, 23% for 4" and 6" AB and 21 % for 8" AB fabrics.
2. A sketch depicting each different panel size will be prepared by the customer. From these sketches, Contech will prepare shop fabrication drawings. Customer approval of shop fabrication drawings is necessary prior to panel assembly or a firm lump sum quotation. A fee will be charged for revisions or additions to shop fabrication drawings necessitated by changes beyond the control of Contech.
3. Mill Width (MW) is the width of fabric as woven on the loom. Mill Yard (MY) is a piece of fabric 36" long by the mill width as woven. Fabric panels are assembled by sewing together parallel mill widths measuring approximately 70" (1.78 m) between seams. AB Fabric panels measure approximately 68" between seams where sewn. Panel widths must be a multiple of a full mill width. Panel length is assembled to the nearest 0.5 ft. (0.15 m).
4. Obtain a firm delivery date before scheduling installation. Delivery can generally be started within 10 working days after receipt of purchase order and approved drawings.

II. SLOPE PREPARATION

1. For the sake of appearance, revetments should be placed over relatively smooth surfaces. Minor irregularities are tolerable for the Filter Point or Articulated Block configuration, since their effect on appearance will be obscured by the deeply textured surface of the mat.
2. If backfilling is necessary, use compacted granular material. If soil contains over 20% sand or silt minus 200 mesh, it may be necessary to place a geotextile filter fabric underlayment. Consult the project engineer for approval of backfill materials.
3. Anchor and flank trench installation will be in accordance with project plans and specifications.
4. To minimize reworking surfaces to be protected, fabric should be placed and pumped immediately following slope preparation .

III. FABRIC PLACEMENT

1. To avoid field sewing as much as possible, prepare fabric assembly sketches in such detail that the great majority of the sewing can be done prior to delivery.
2. Fabric panels are joined in the field with a bag closer (portable sewing machine) using double stitches (2 passes). Lay out the first panel and fold back the leading edge. Invert the adjacent abutting panel. Join the top layers of fabric. Join the bottom layers of fabric. Fold the joined panels back on the bank with the seams down.
3. Position fabric loosely along the bank before grout injection. Stake fabric at predetermined locations to allow for fabric contraction. Do not approximate fabric locations. Measure dimensions on the bank and stake at about 20-ft. (6 m) centers. Seams should be generally perpendicular to the shoreline for best appearance.
4. Provide each job with a small quantity of uncut, unassembled fabric for special field tailoring.

IV. FINE AGGREGATE CONCRETE PREPARATION

1. Very fluid Fine Aggregate Concrete is used in all Fabriform revetment work. Air content of 5 to 8% will improve pumpability of the fluid mortar and freeze/thaw resistance of hardened mortar. Use a retarding admixture in hot weather. Substitution of pozzolanic quality fly ash for up to 20% of the cement is particularly recommended as an aid to pumpability.
2. Excess mixing water expelled through the permeable Fabriform fabric will reduce the volume of 27 cu. ft. of wet mortar to about 25 cu ft. of hardened mortar, thus rendering a denser mortar.
3. Fine Aggregate Concrete consistency should be in the 9-11 second range through the 3/4" orifice of the standard Flow Cone described in ASTM C-939 when using concrete sand. Fine Aggregate Concrete sample should be taken from the end of the grout hose. Use of concrete slump cone is not appropriate.

Range of Quantities as Delivered

Material	lb/cy	kg/m3
Cement	800-900	470-530
Sand	2030-2120	1200-1250
Water	540-550	320-325
Air	As Required	As Required

V. FINE AGGREGATE CONCRETE PUMPING

1. Insert the injection pipe through a small slit cut in the upper layer of fabric. Wrap a piece of burlap around the insert to act as a packer. Use care to avoid grout spillage.
2. First pump the upper edge of the mat which has been placed in the anchor trench, followed by injection into the lower edge, working back up the slope. Avoid overpressuring of the fabric.
3. In flowing water, pump the upstream edge of the mat first. Maximum allowable water velocity using routine installation procedures, is about 3 ft. (1 m) per second.
4. Do not walk on the mat for about one hour after pumping or when footprints will leave indentations.
5. Remove burlap from insert holes and smooth mortar by hand .
6. Clean up mortar spilled by hand or broom. Do not wash down mat with a water hose.
7. A typical crew consists of a foreman, pump operator, and three or four laborers. A diver may be necessary for injecting mortar under

VI. EQUIPMENT

1. Pumping capacity should be about 25 cu. yds. (19 m3) per hour. Equipment which has been successfully used includes the Olin Model 120525, the Mayco Model C-30 or Model 30HD. Use minimum 2 in. (50 mm) pipe or hose from the pump to the fabric.
2. Fischbein type portable sewing machines are recommended for use where field sewing of fabric is required. These machines are available in the electric model E or the air operated Model DR. Both machines use 1/2 lb. spools of nylon #138BST thread.

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APPENDIX C
HEC-HMS MODEL RESULTS

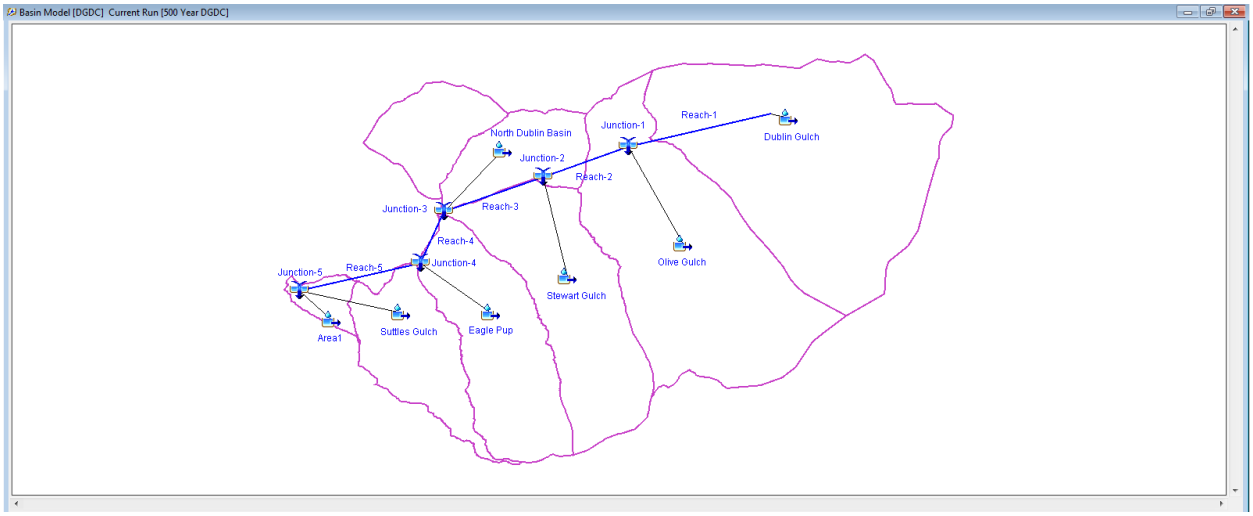
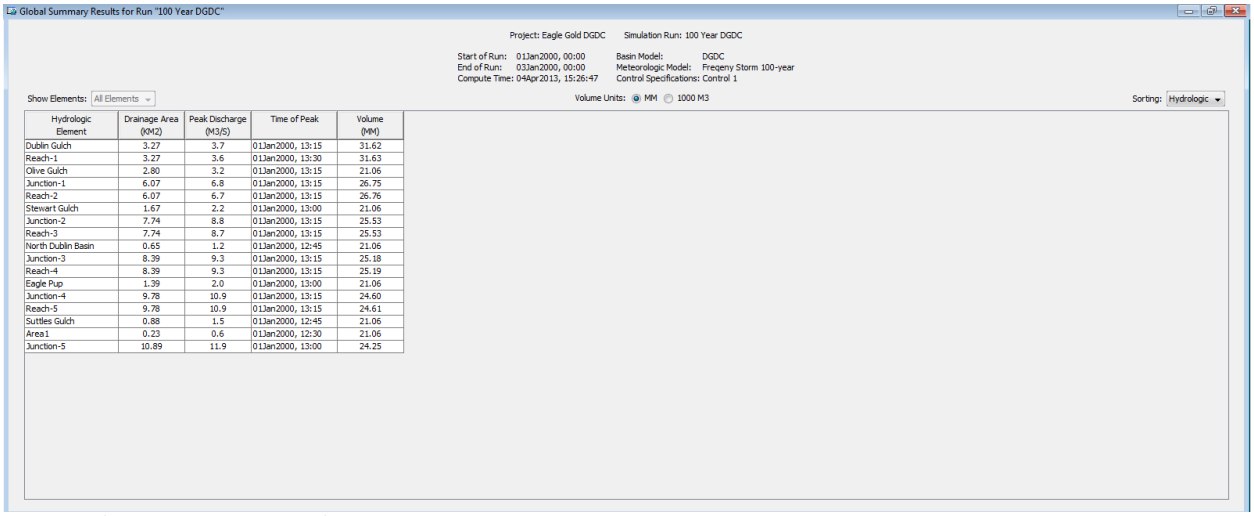


Figure: Schematic map for hydrologic modeling



Global Summary Results for Run "100 Year DGDC"

Project: Eagle Gold DGDC Simulation Run: 100 Year DGDC

Start of Run: 01Jan2000, 00:00
End of Run: 03Jan2000, 00:00
Compute Time: 04Apr2013, 15:26:47

Basin Model: DGDC
Meteorologic Model: Freqeny Storm 100-year
Control Specifications: Control 1

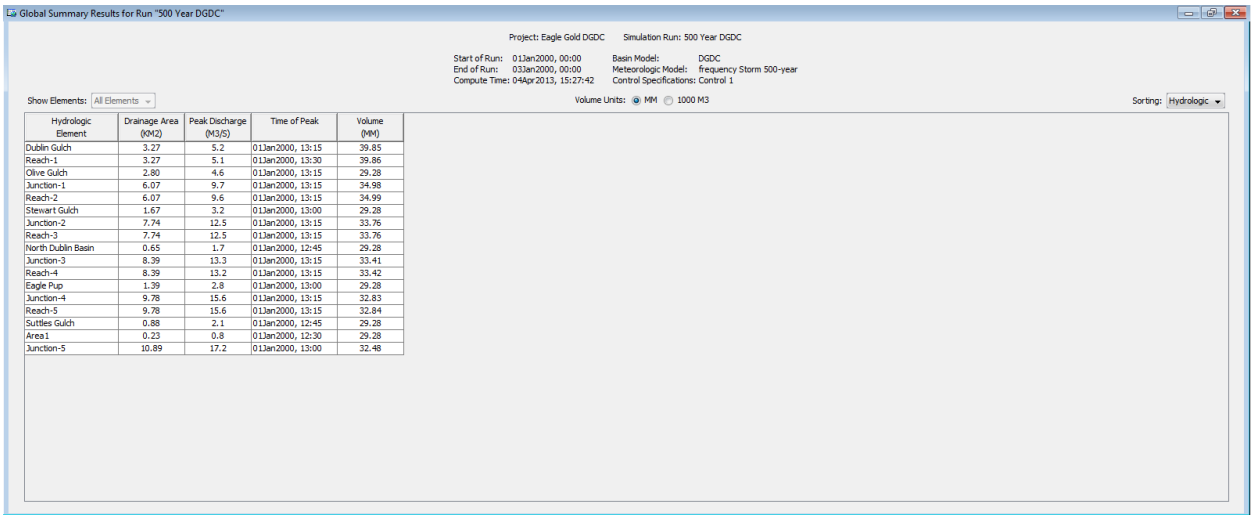
Show Elements: All Elements

Volume Units: MM 1000 M3

Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Dublin Gulch	3.27	3.7	01Jan2000, 13:15	31.62
Reach-1	3.27	3.6	01Jan2000, 13:30	31.63
Olive Gulch	2.80	3.2	01Jan2000, 13:15	21.06
Junction-1	6.07	6.8	01Jan2000, 13:15	26.75
Reach-2	6.07	6.7	01Jan2000, 13:15	26.76
Stewart Gulch	1.67	2.2	01Jan2000, 13:00	21.06
Junction-2	7.74	8.8	01Jan2000, 13:15	25.53
Reach-3	7.74	8.7	01Jan2000, 13:15	25.53
North Dublin Basin	0.65	1.2	01Jan2000, 12:45	21.06
Junction-3	8.39	9.3	01Jan2000, 13:15	25.18
Reach-4	8.39	9.3	01Jan2000, 13:15	25.19
Eagle Pup	1.39	2.0	01Jan2000, 13:00	21.06
Junction-4	9.78	10.9	01Jan2000, 13:15	24.60
Reach-5	9.78	10.9	01Jan2000, 13:15	24.61
Suttles Gulch	0.88	1.5	01Jan2000, 12:45	21.06
Area1	0.23	0.6	01Jan2000, 12:30	21.06
Junction-5	10.89	11.9	01Jan2000, 13:00	24.25

Results from 100-year rainfall event



Global Summary Results for Run "500 Year DGDC"

Project: Eagle Gold DGDC Simulation Run: 500 Year DGDC

Start of Run: 01Jan2000, 00:00
End of Run: 03Jan2000, 00:00
Compute Time: 04Apr2013, 15:27:42

Basin Model: DGDC
Meteorologic Model: frequency Storm 500-year
Control Specifications: Control 1

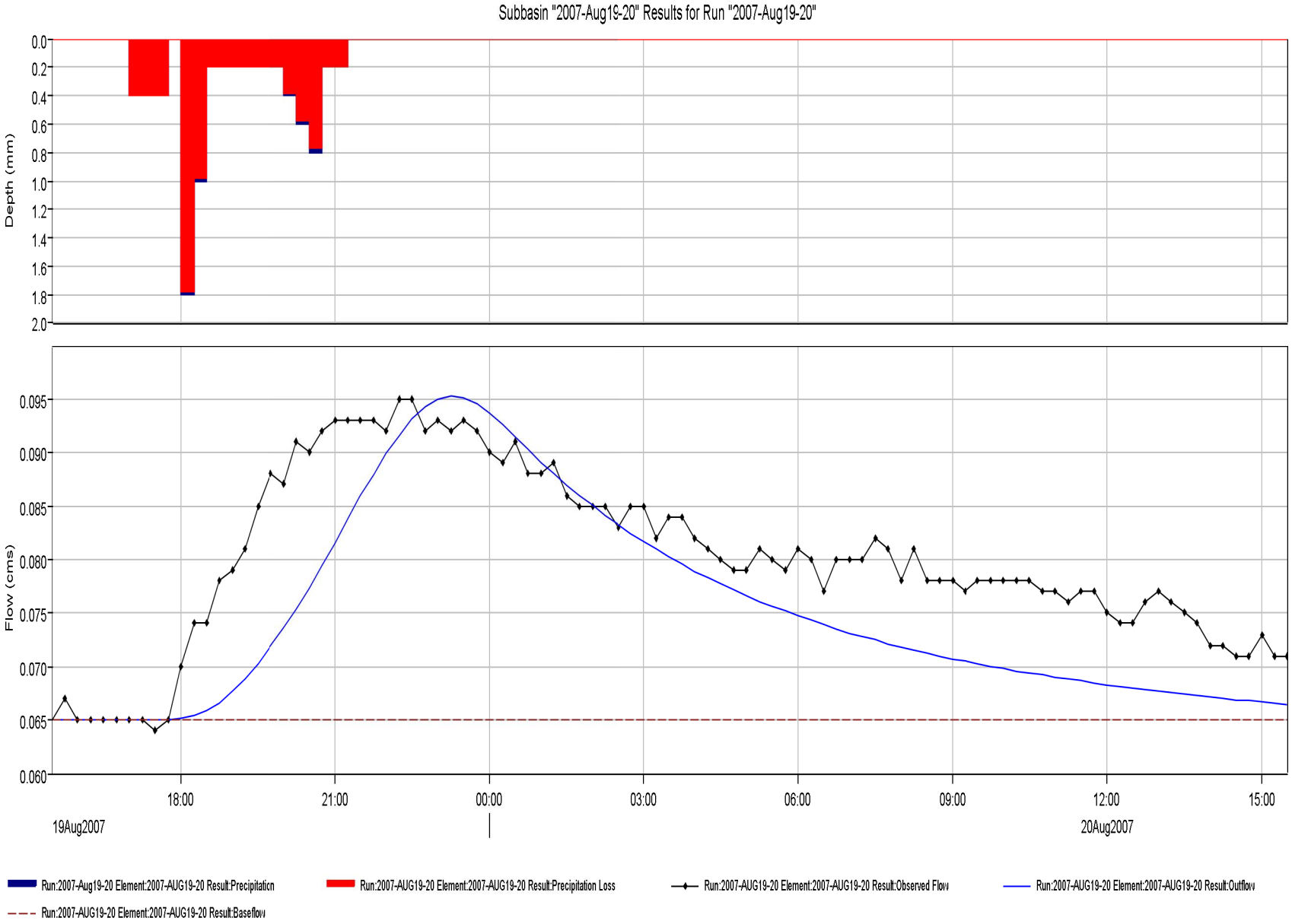
Show Elements: All Elements

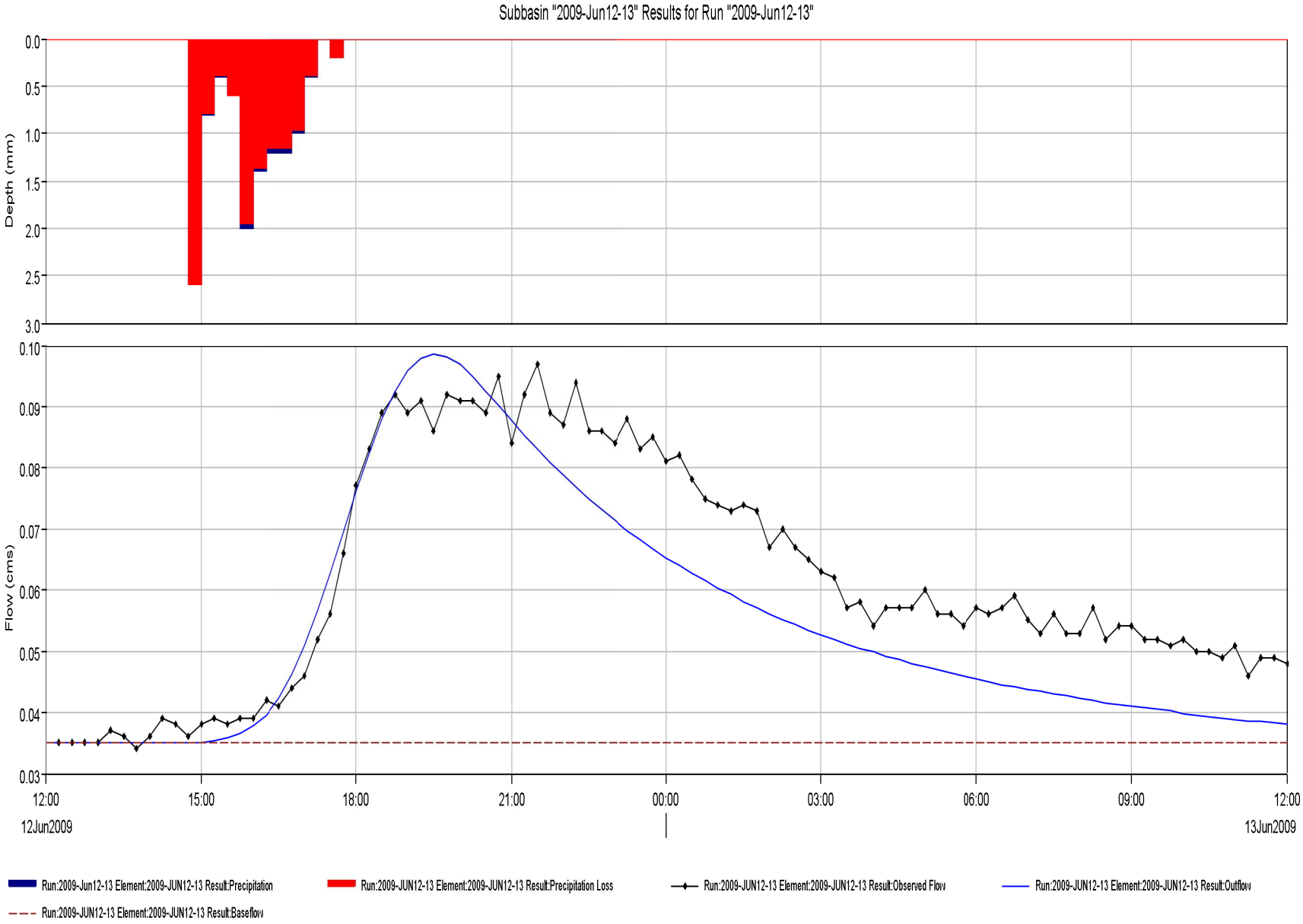
Volume Units: MM 1000 M3

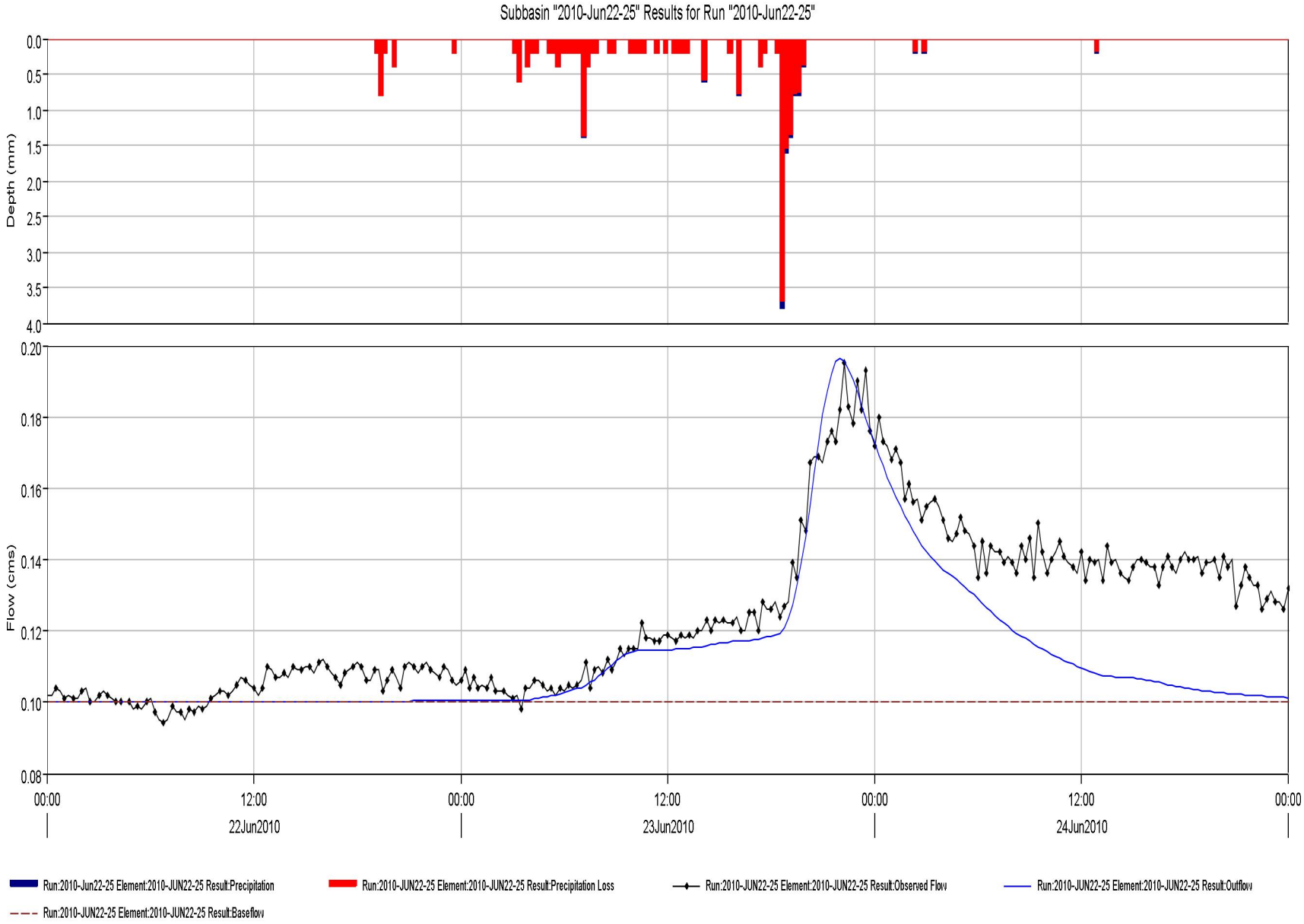
Sorting: Hydrologic

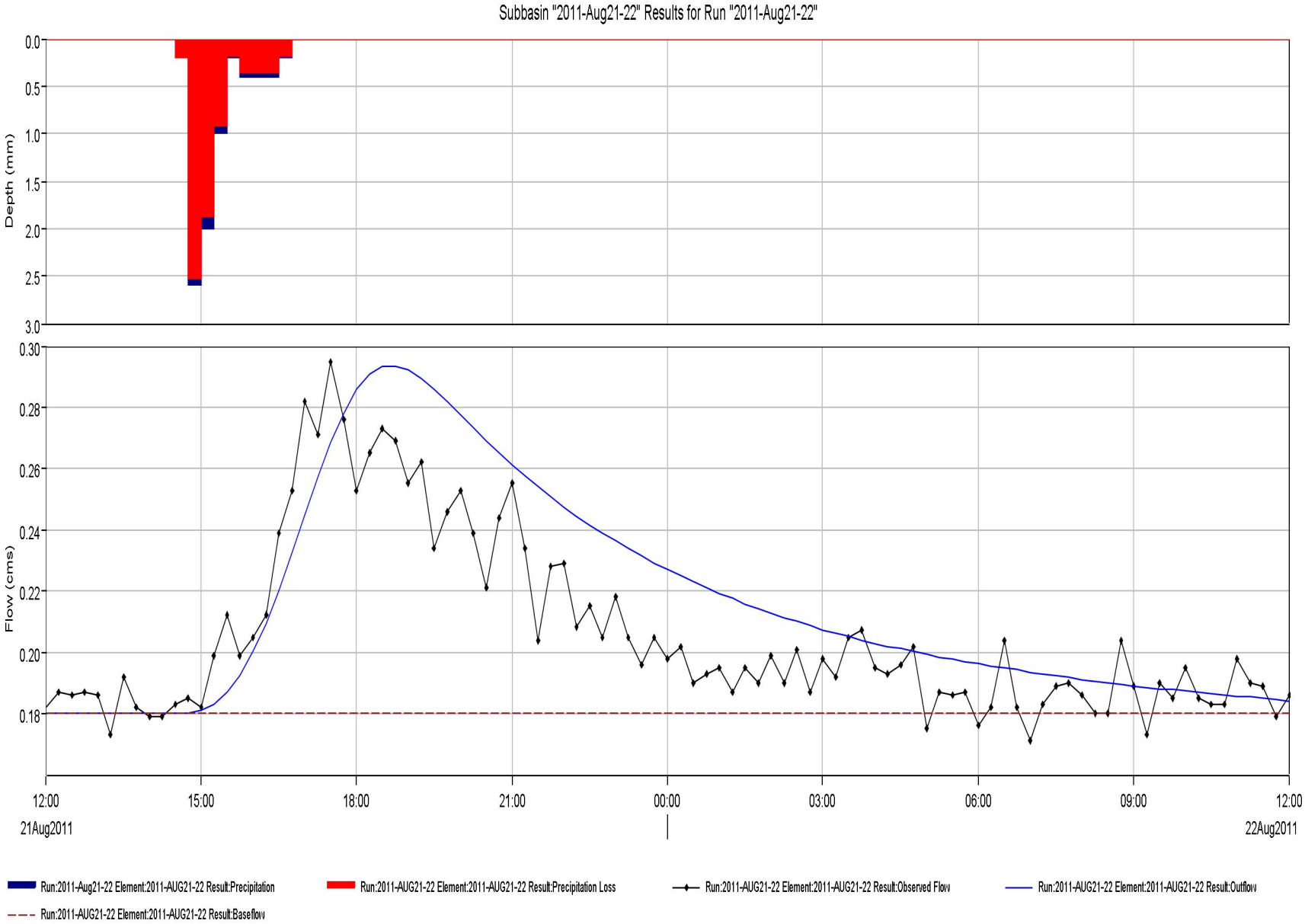
Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (MM)
Dublin Gulch	3.27	5.2	01Jan2000, 13:15	39.85
Reach-1	3.27	5.1	01Jan2000, 13:30	39.86
Olive Gulch	2.80	4.6	01Jan2000, 13:15	29.28
Junction-1	6.07	9.7	01Jan2000, 13:15	34.98
Reach-2	6.07	9.6	01Jan2000, 13:15	34.99
Stewart Gulch	1.67	3.2	01Jan2000, 13:00	29.28
Junction-2	7.74	12.5	01Jan2000, 13:15	33.76
Reach-3	7.74	12.5	01Jan2000, 13:15	33.76
North Dublin Basin	0.65	1.7	01Jan2000, 12:45	29.28
Junction-3	8.39	13.3	01Jan2000, 13:15	33.41
Reach-4	8.39	13.2	01Jan2000, 13:15	33.42
Eagle Pup	1.39	2.8	01Jan2000, 13:00	29.28
Junction-4	9.78	15.6	01Jan2000, 13:15	32.83
Reach-5	9.78	15.6	01Jan2000, 13:15	32.84
Suttles Gulch	0.88	2.1	01Jan2000, 12:45	29.28
Area1	0.23	0.8	01Jan2000, 12:30	29.28
Junction-5	10.89	17.2	01Jan2000, 13:00	32.48

Results from 500-year rainfall event


Subbasin "2007-Aug19-20" Results for Run "2007-Aug19-20"
Depth (mm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Flow (cms)
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
18:00
21:00
00:00
03:00
06:00
09:00
12:00
15:00
19Aug2007
20Aug2007
Run:2007-Aug19-20 Element:2007-AUG19-20 Result:Precipitation
Run:2007-AUG19-20 Element:2007-AUG19-20 Result:Precipitation Loss
Run:2007-AUG19-20 Element:2007-AUG19-20 Result:Observed Flow
Run:2007-AUG19-20 Element:2007-AUG19-20 Result:Outflow
Run:2007-AUG19-20 Element:2007-AUG19-20 Result:Baseflow

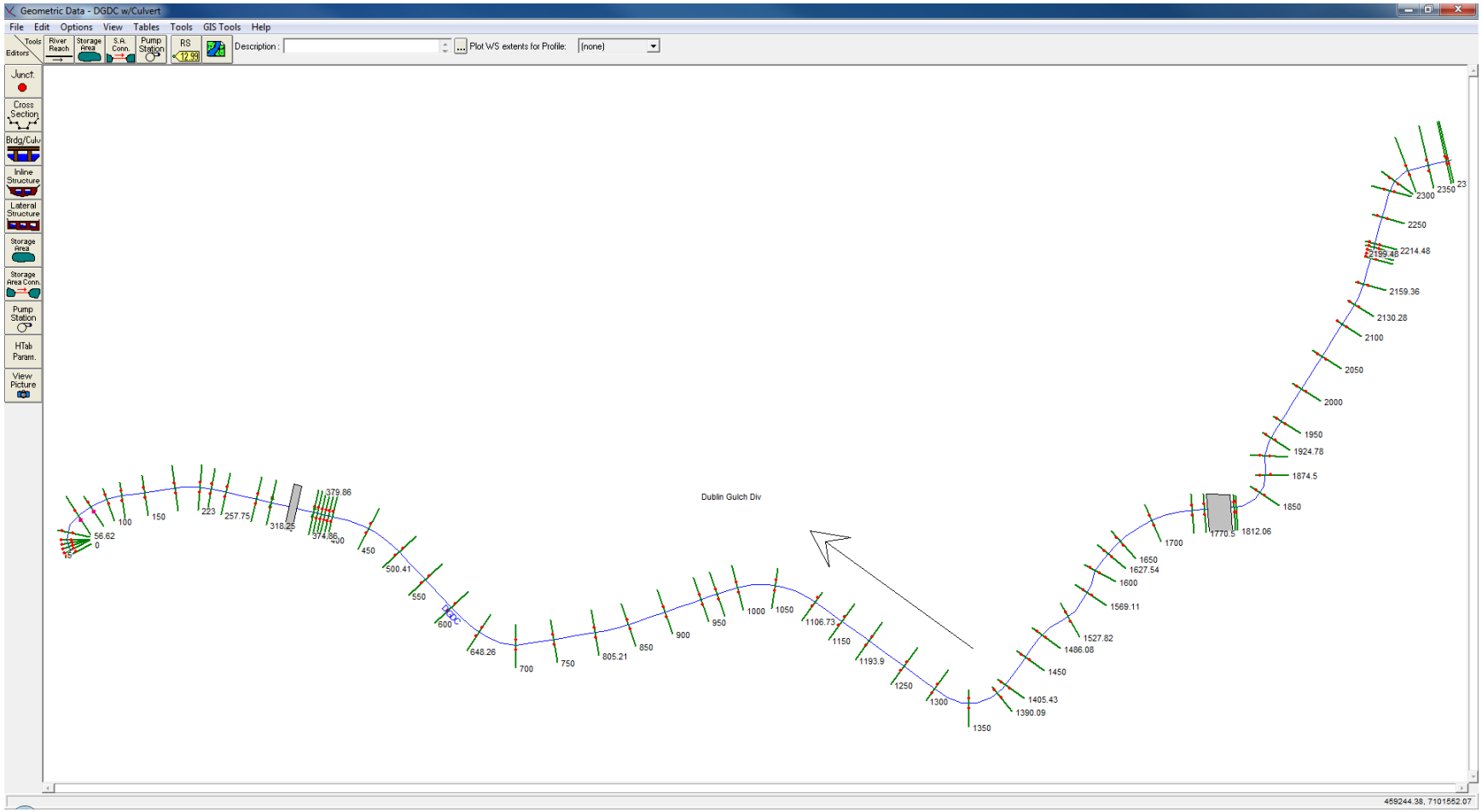

Subbasin "2009-Jun12-13" Results for Run "2009-Jun12-13"
Depth (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flow (cms)
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
12:00
15:00
18:00
21:00
00:00
03:00
06:00
09:00
12:00
12Jun2009
13Jun2009
Run:2009-Jun12-13 Element:2009-JUN12-13 Result:Precipitation
Run:2009-JUN12-13 Element:2009-JUN12-13 Result:Precipitation Loss
Run:2009-JUN12-13 Element:2009-JUN12-13 Result:Observed Flow
Run:2009-JUN12-13 Element:2009-JUN12-13 Result:Outflow
Run:2009-JUN12-13 Element:2009-JUN12-13 Result:Baseflow


Subbasin "2010-Jun22-25" Results for Run "2010-Jun22-25"
Depth (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Flow (cms)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
00:00
12:00
00:00
12:00
00:00
12:00
00:00
22Jun2010
23Jun2010
24Jun2010
Run:2010-Jun22-25 Element:2010-JUN22-25 Result:Precipitation
Run:2010-JUN22-25 Element:2010-JUN22-25 Result:Precipitation Loss
Run:2010-JUN22-25 Element:2010-JUN22-25 Result:Observed Flow
Run:2010-JUN22-25 Element:2010-JUN22-25 Result:Outflow
Run:2010-JUN22-25 Element:2010-JUN22-25 Result:Baseflow

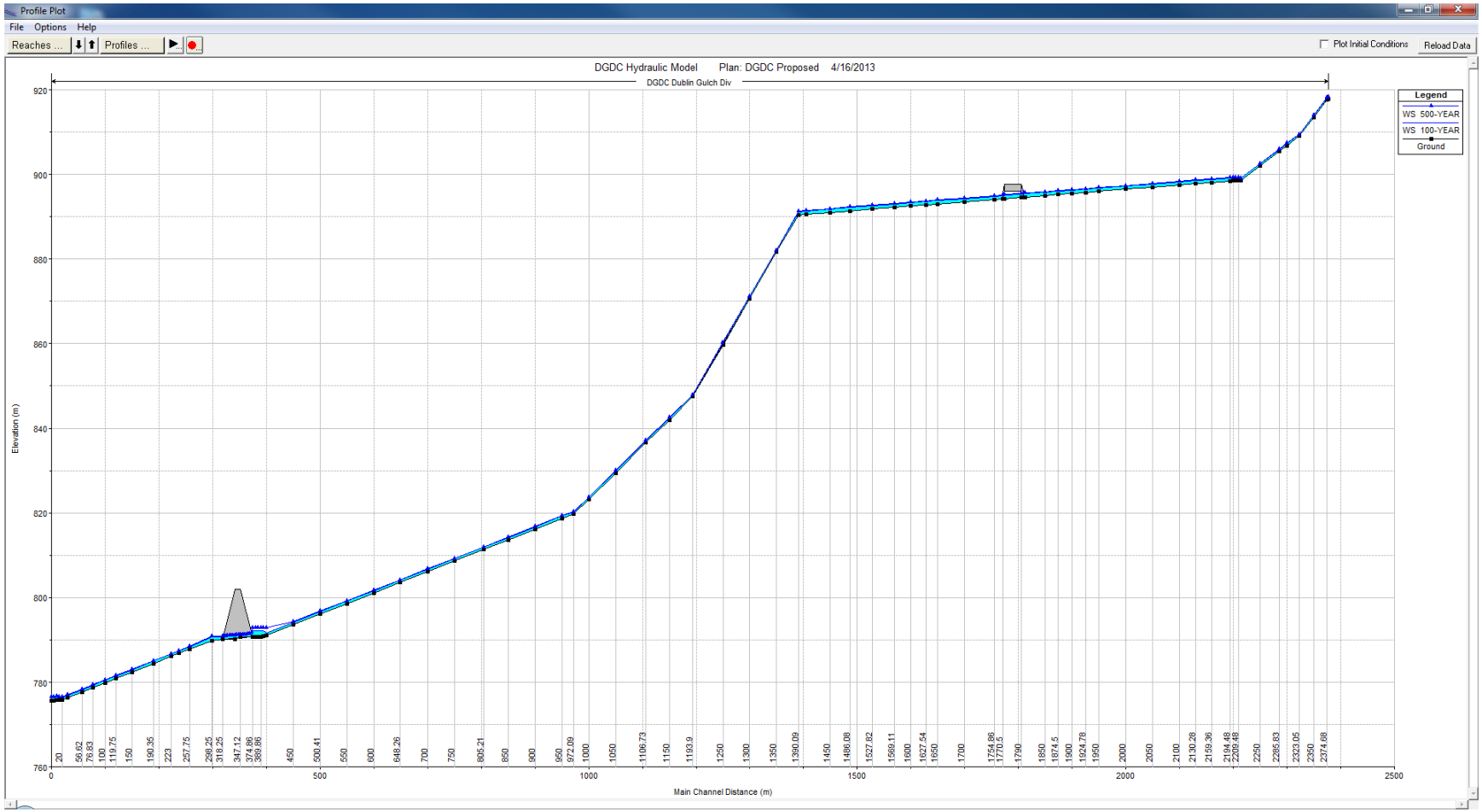

Subbasin "2011-Aug21-22" Results for Run "2011-Aug21-22"
Depth (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
Flow (cms)
0.30
0.28
0.26
0.24
0.22
0.20
0.18
12:00
15:00
18:00
21:00
00:00
03:00
06:00
09:00
12:00
21Aug2011
22Aug2011
Run:2011-Aug21-22 Element:2011-AUG21-22 Result:Precipitation
Run:2011-AUG21-22 Element:2011-AUG21-22 Result:Precipitation Loss
Run:2011-AUG21-22 Element:2011-AUG21-22 Result:Observed Flow
Run:2011-AUG21-22 Element:2011-AUG21-22 Result:Outflow
Run:2011-AUG21-22 Element:2011-AUG21-22 Result:Baseflow

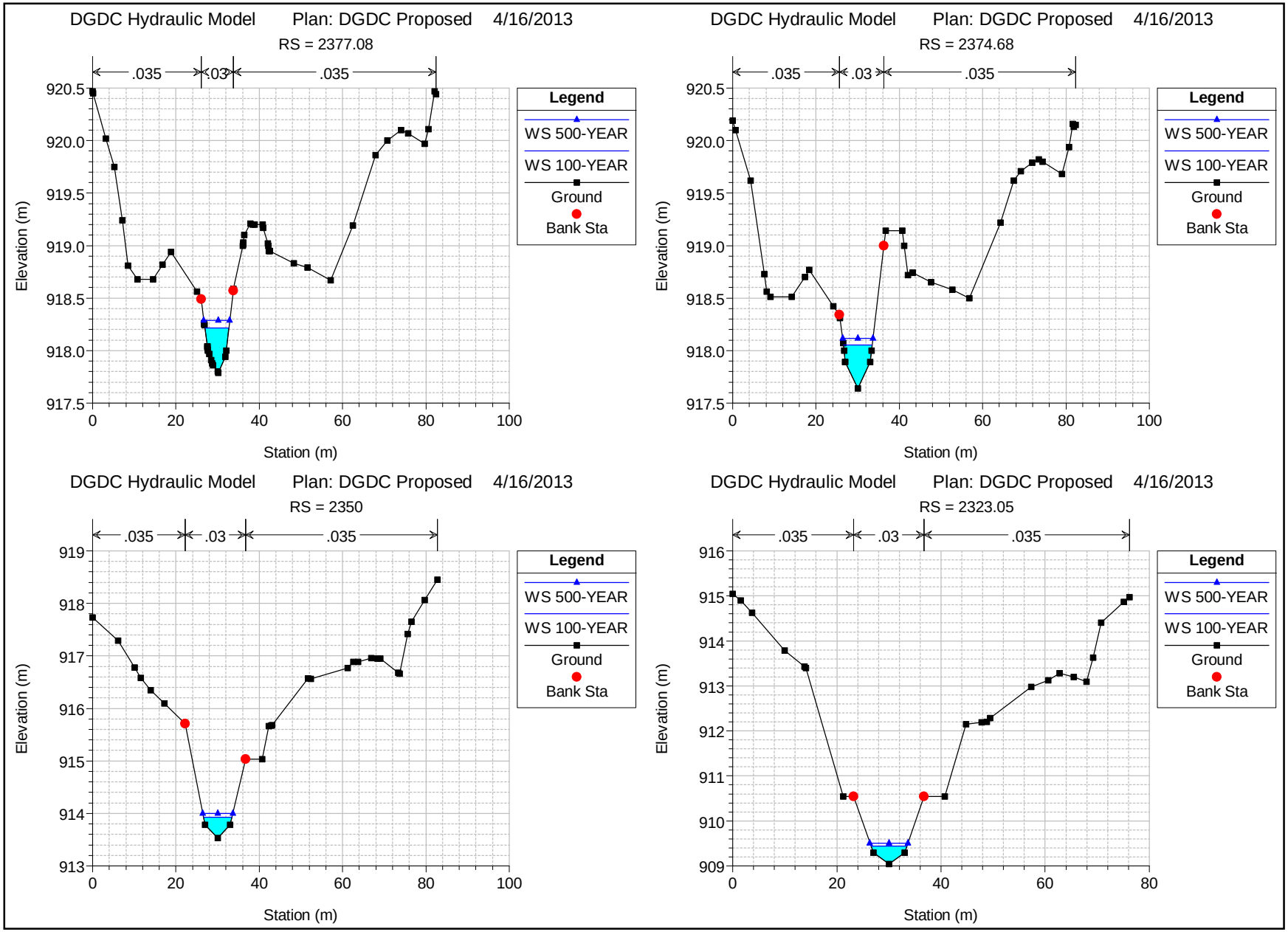
APPENDIX D
HEC-RAS MODEL RESULTS

DGDC Plan View in HEC-RAS Model



DGDC Profile View in HEC-RAS Model

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RS = 2377.08
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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2374.68
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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2350
.035
.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2323.05
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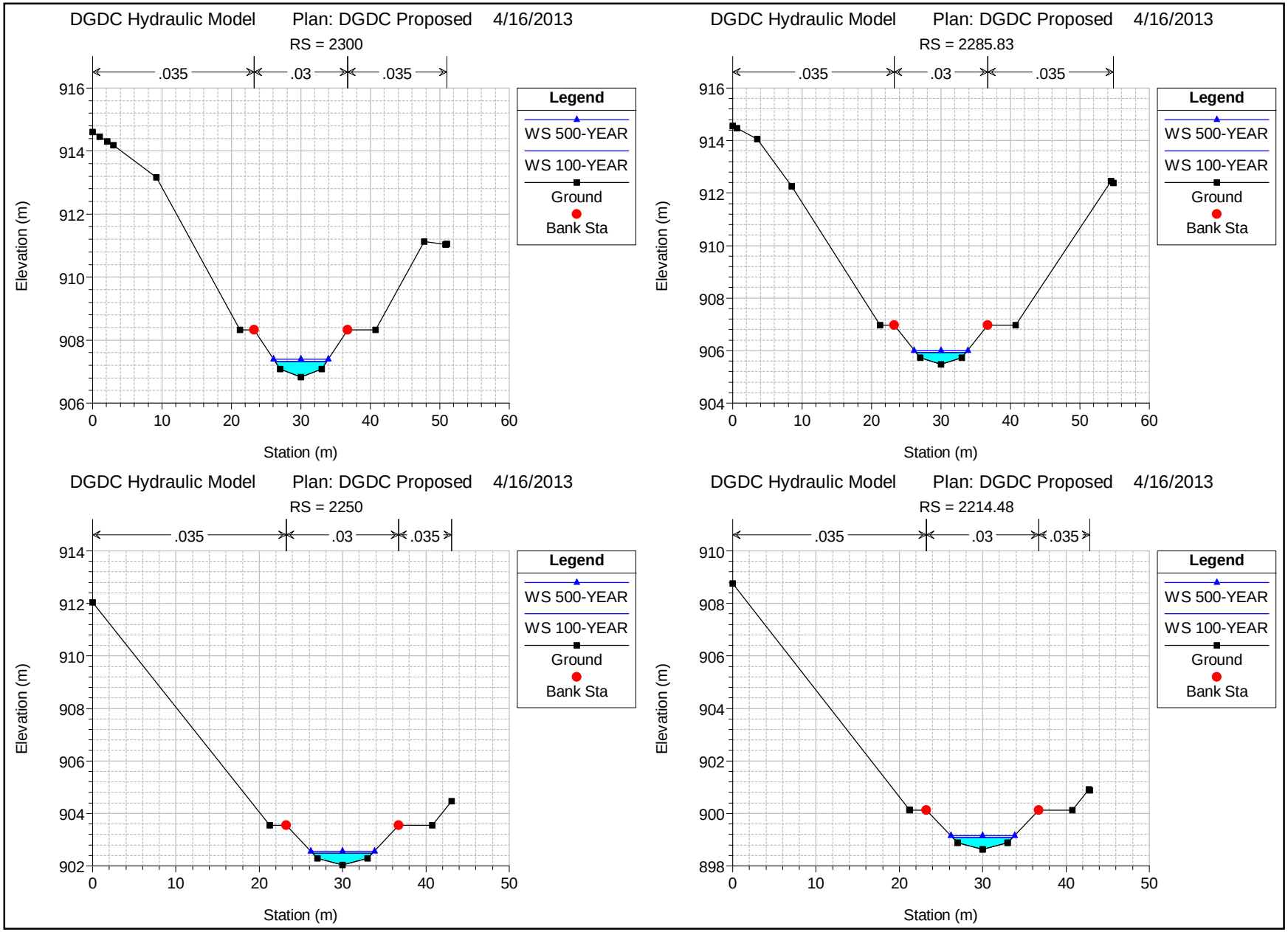
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2300
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Elevation (m)
Station (m)
Legend
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WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2285.83
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2250
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.03
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Elevation (m)
Station (m)
Legend
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WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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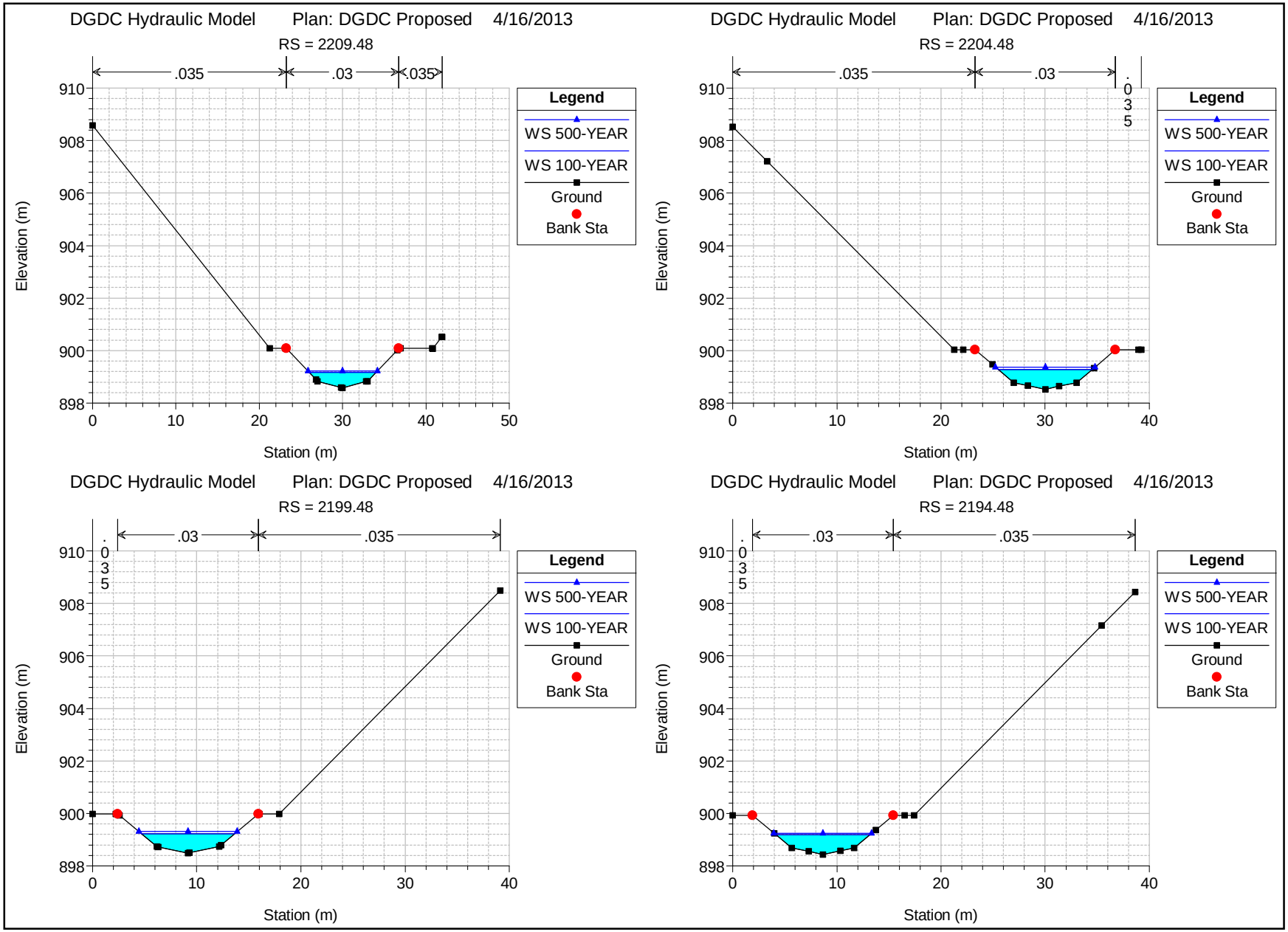
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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RS = 2209.48
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2204.48
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2199.48
.035
.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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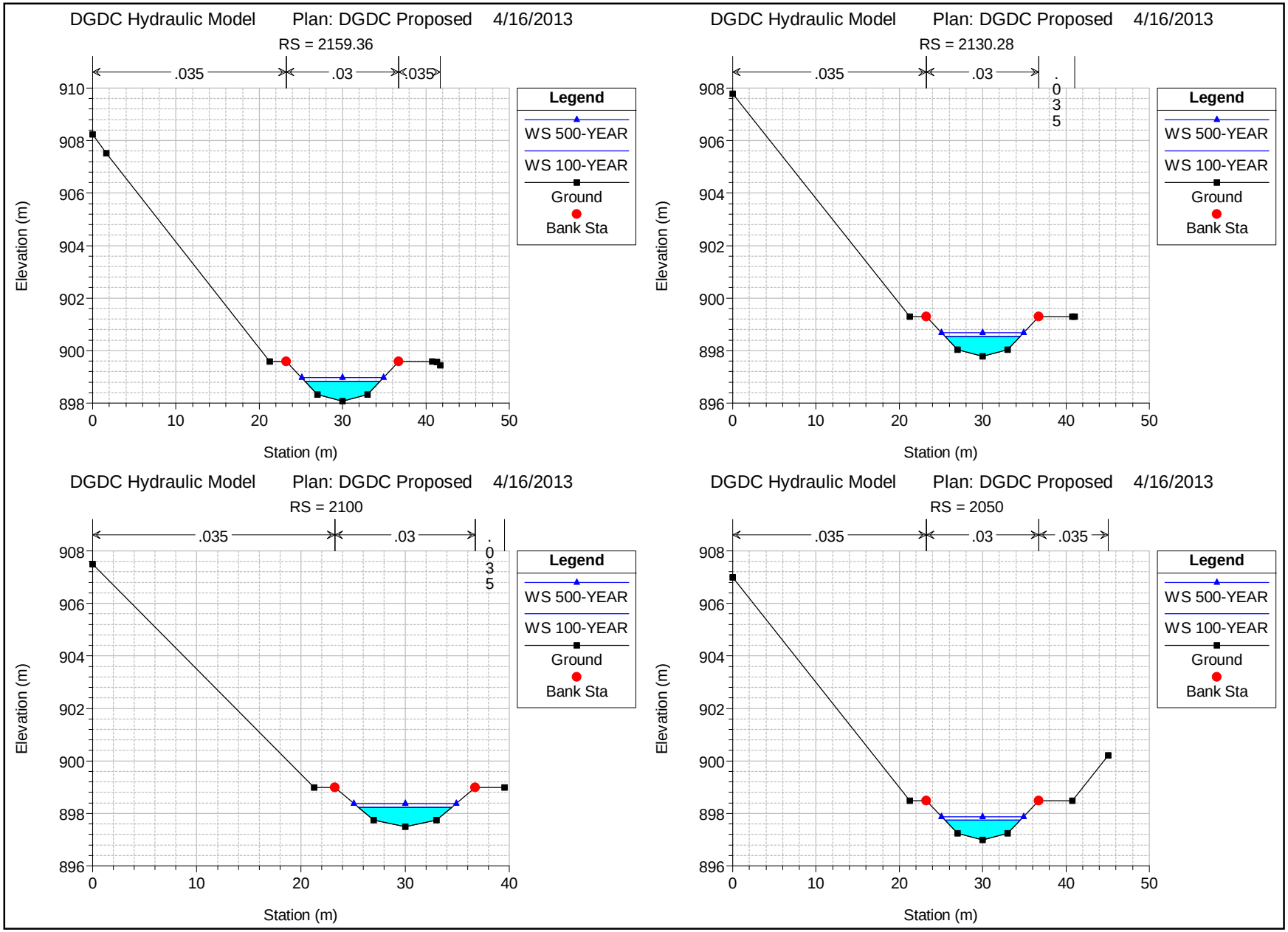
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2159.36
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2130.28
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 2100
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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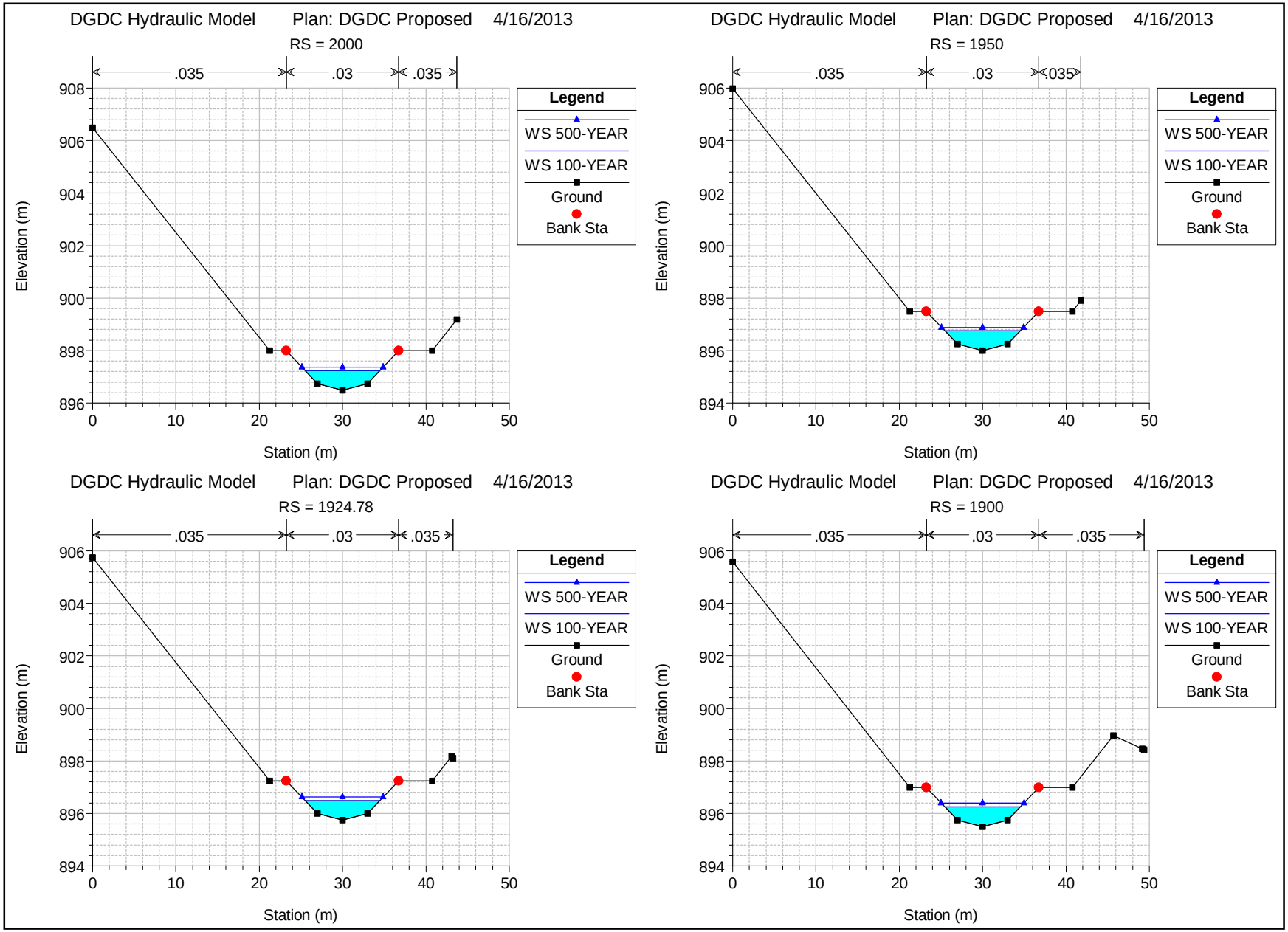
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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RS = 2000
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Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1950
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1924.78
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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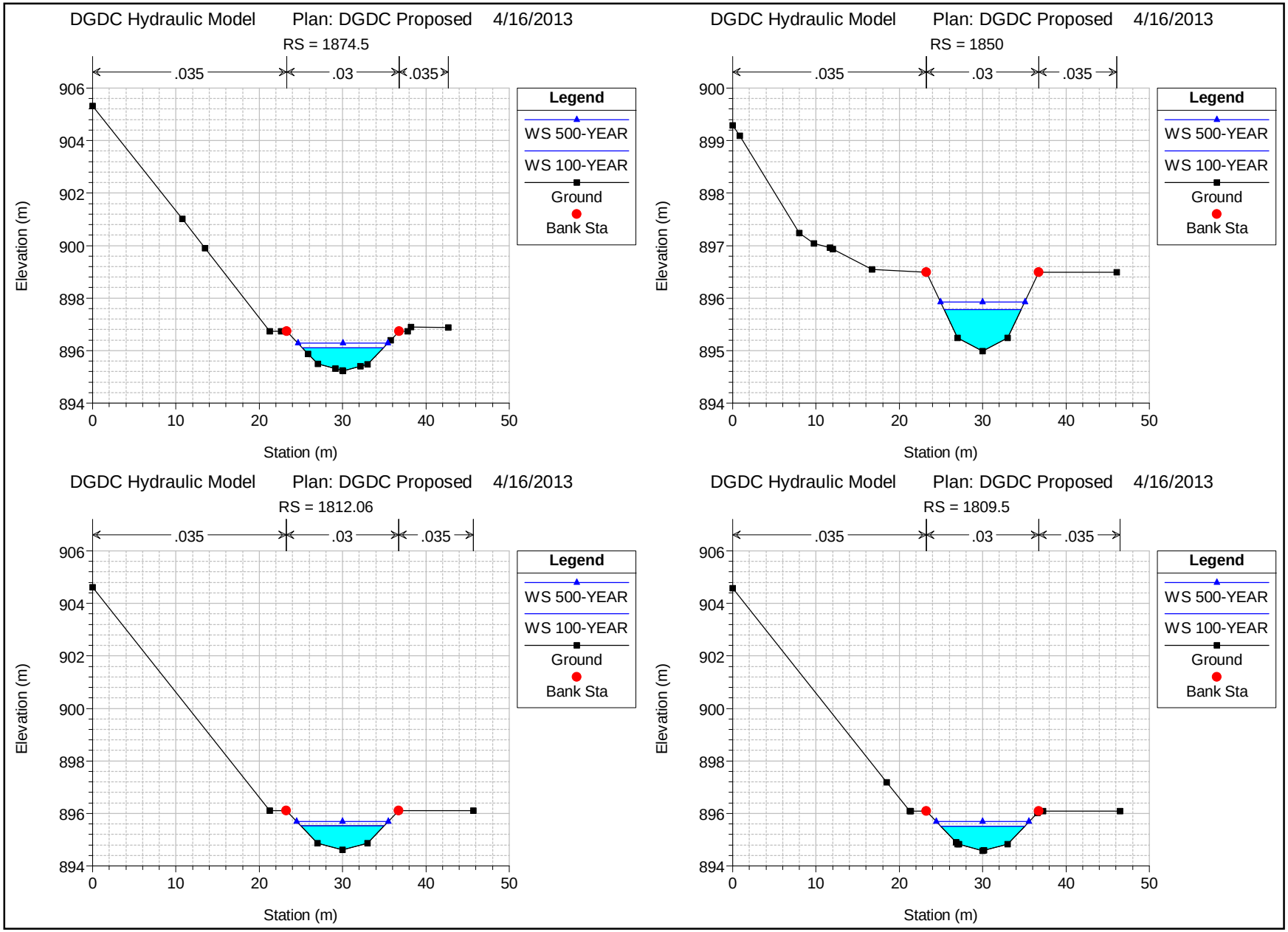
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1874.5
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Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1850
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1812.06
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1809.5
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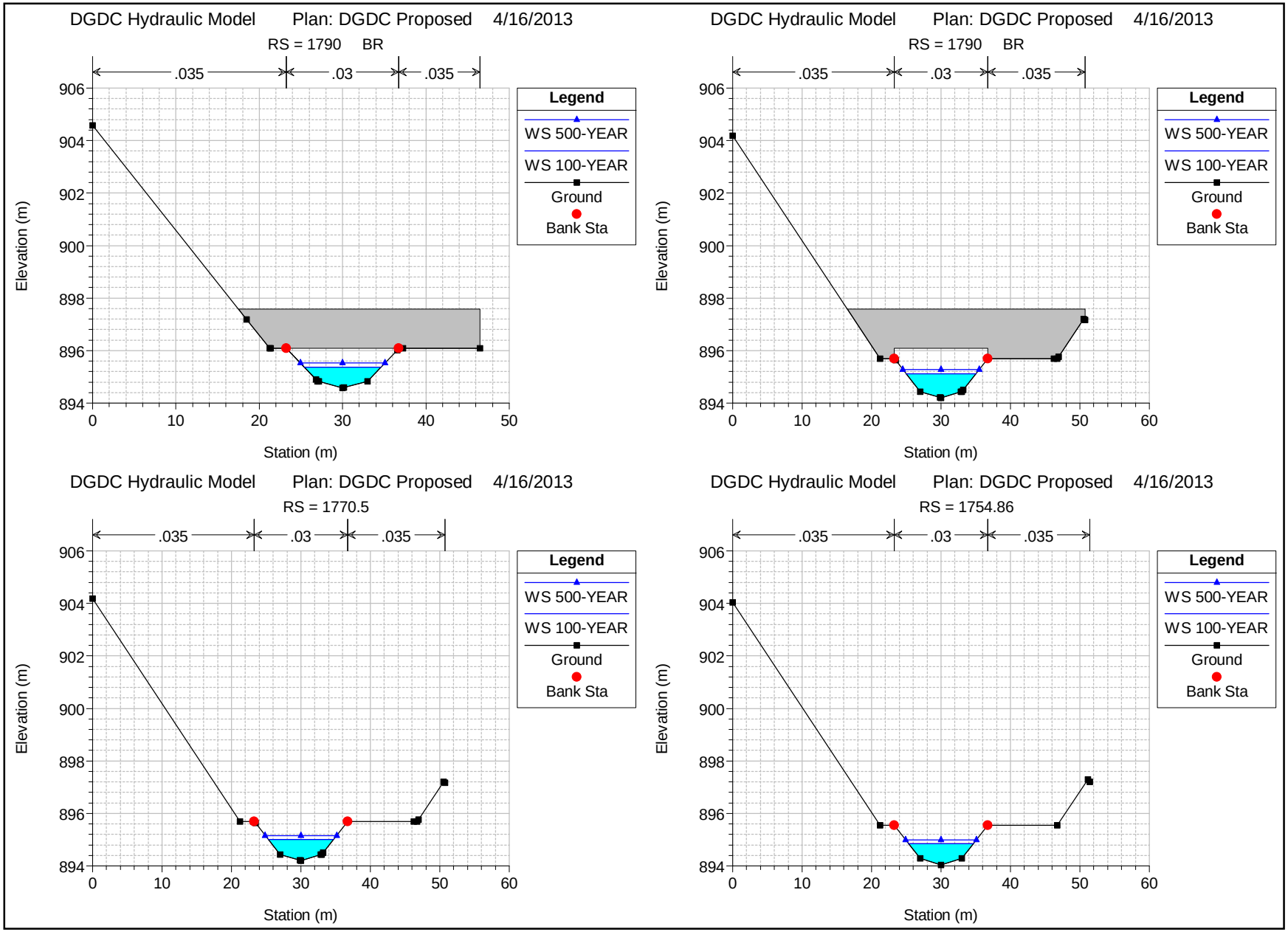
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1790 BR
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1790 BR
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1770.5
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1754.86
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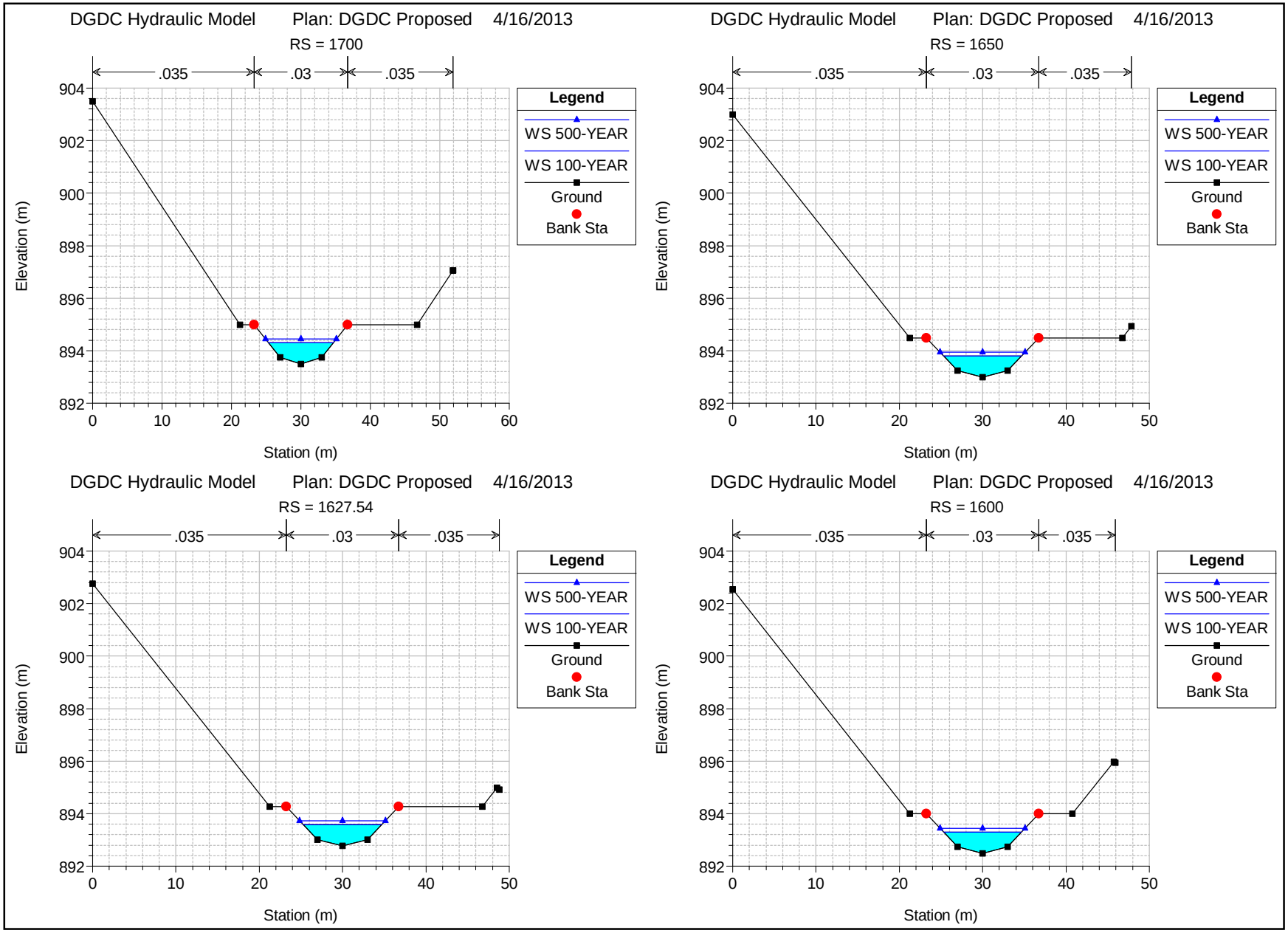
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1700
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1650
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1627.54
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1600
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.03
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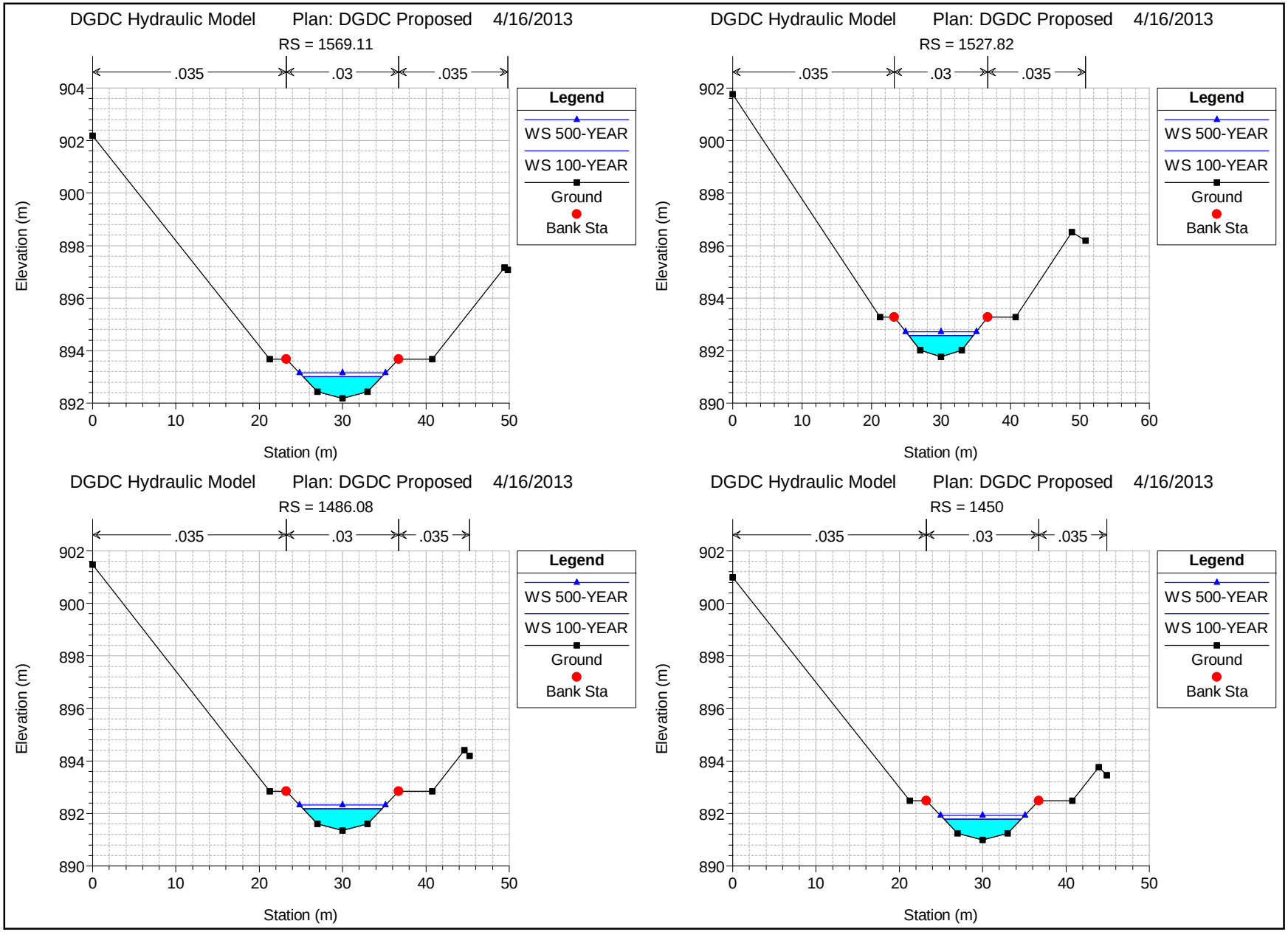
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1569.11
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.03
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Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
Elevation (m)
Station (m)
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1527.82
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.03
.035
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
Elevation (m)
Station (m)
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1486.08
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.03
.035
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
Elevation (m)
Station (m)
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1450
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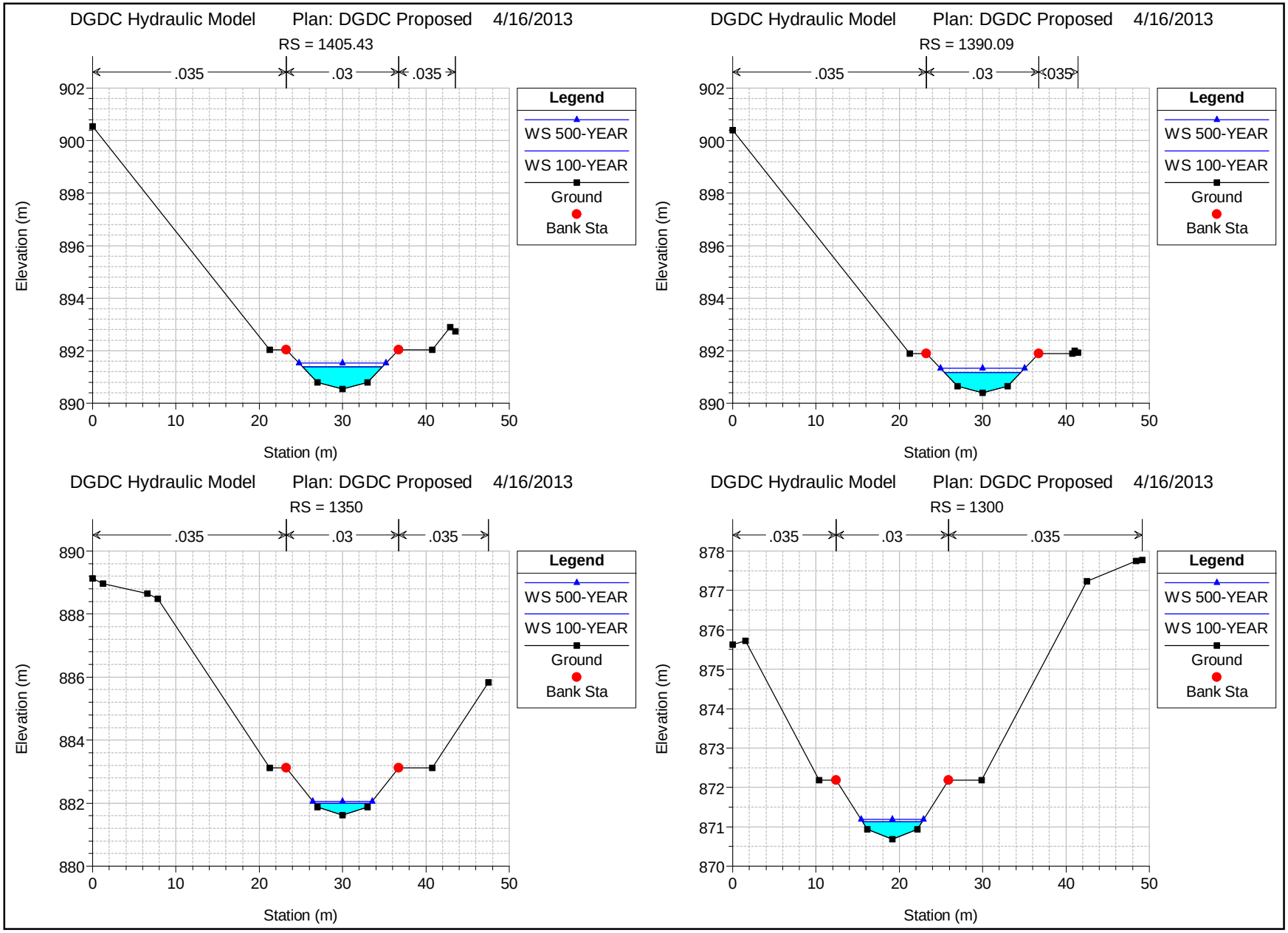
.035
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
Elevation (m)
Station (m)


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1405.43
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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1390.09
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.03
035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1350
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1300
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.03
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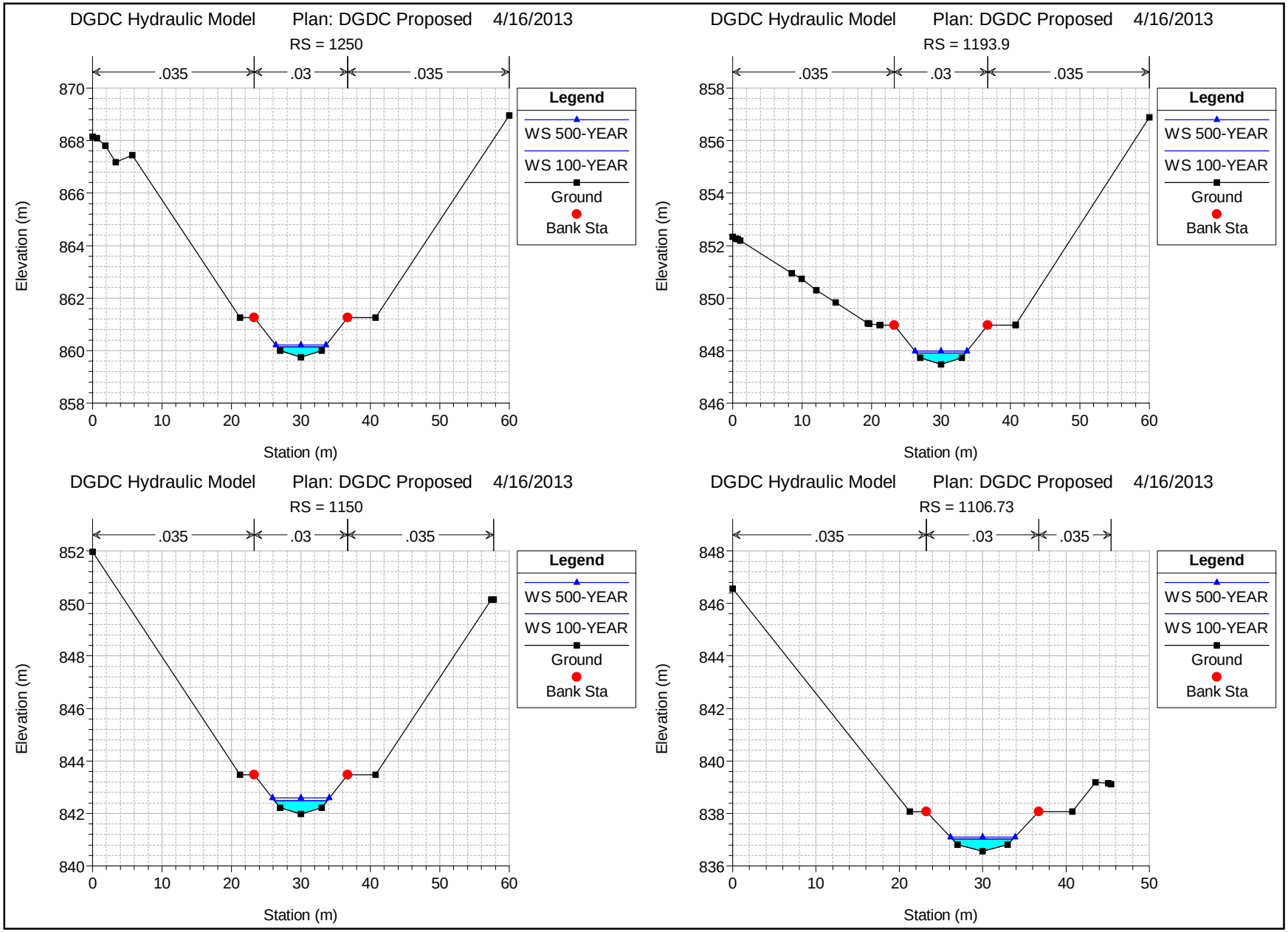
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1250
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1193.9
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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1150
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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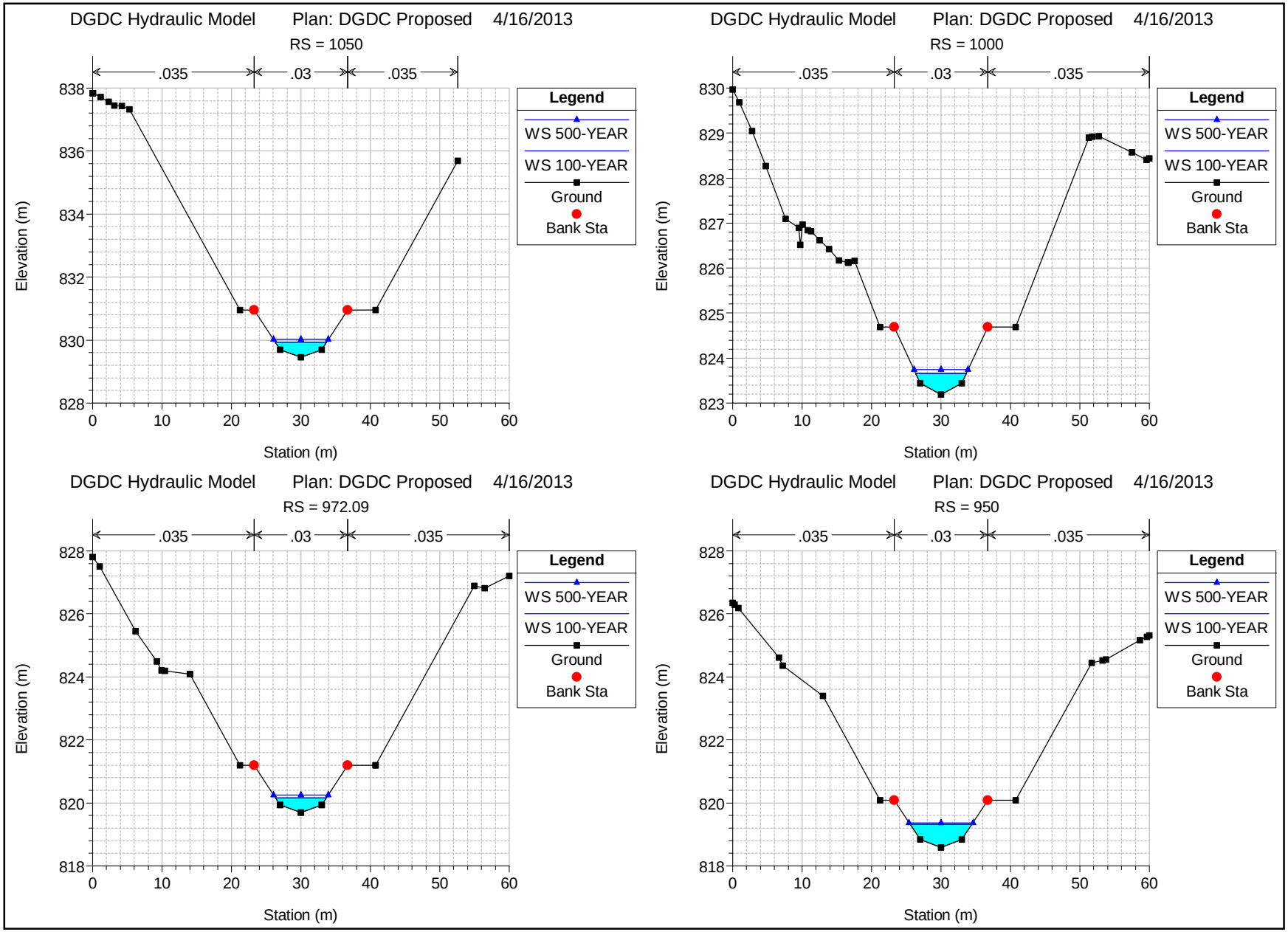
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1050
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 1000
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 972.09
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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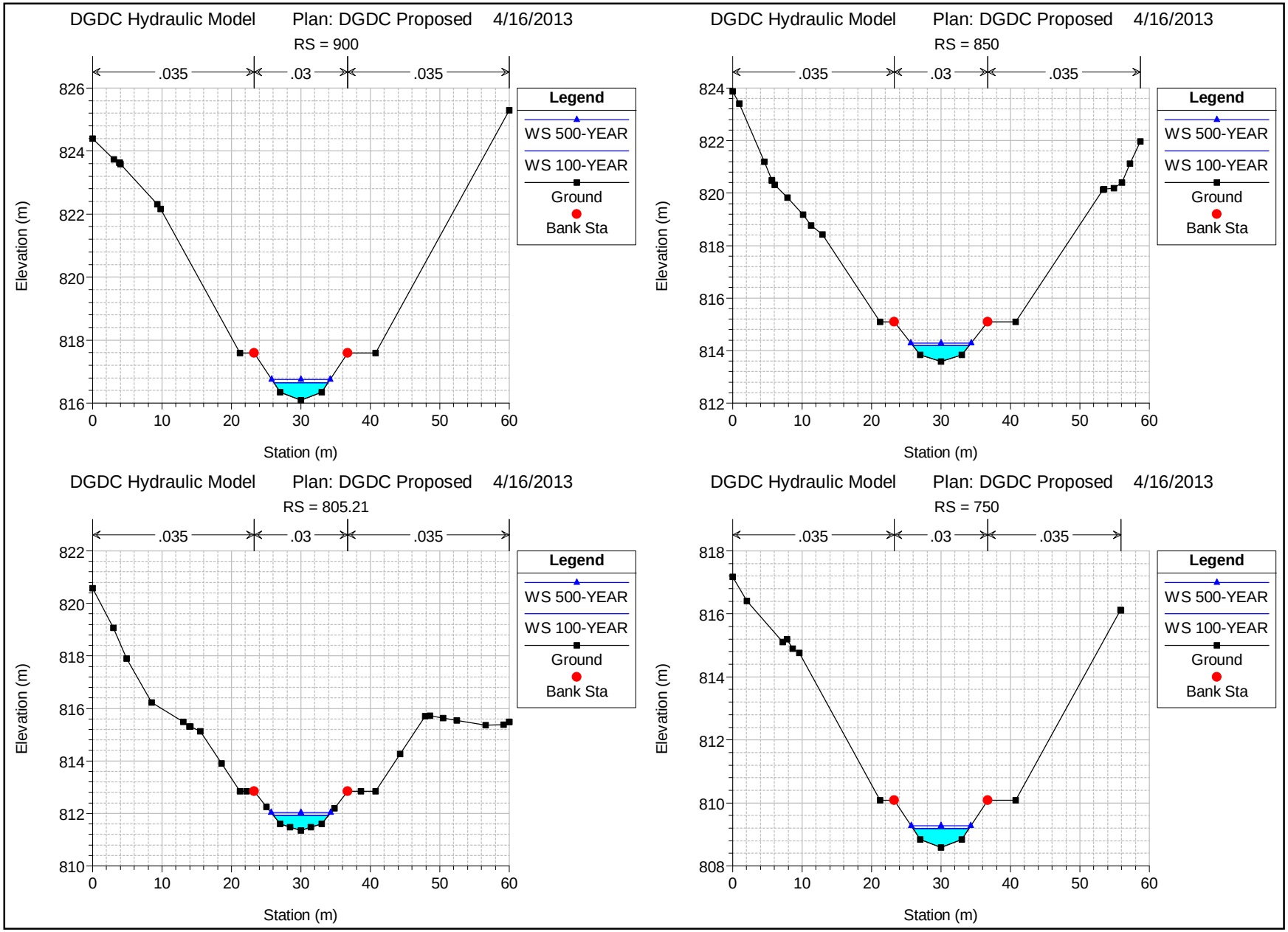
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
RS = 900
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
RS = 850
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
RS = 805.21
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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
RS = 750
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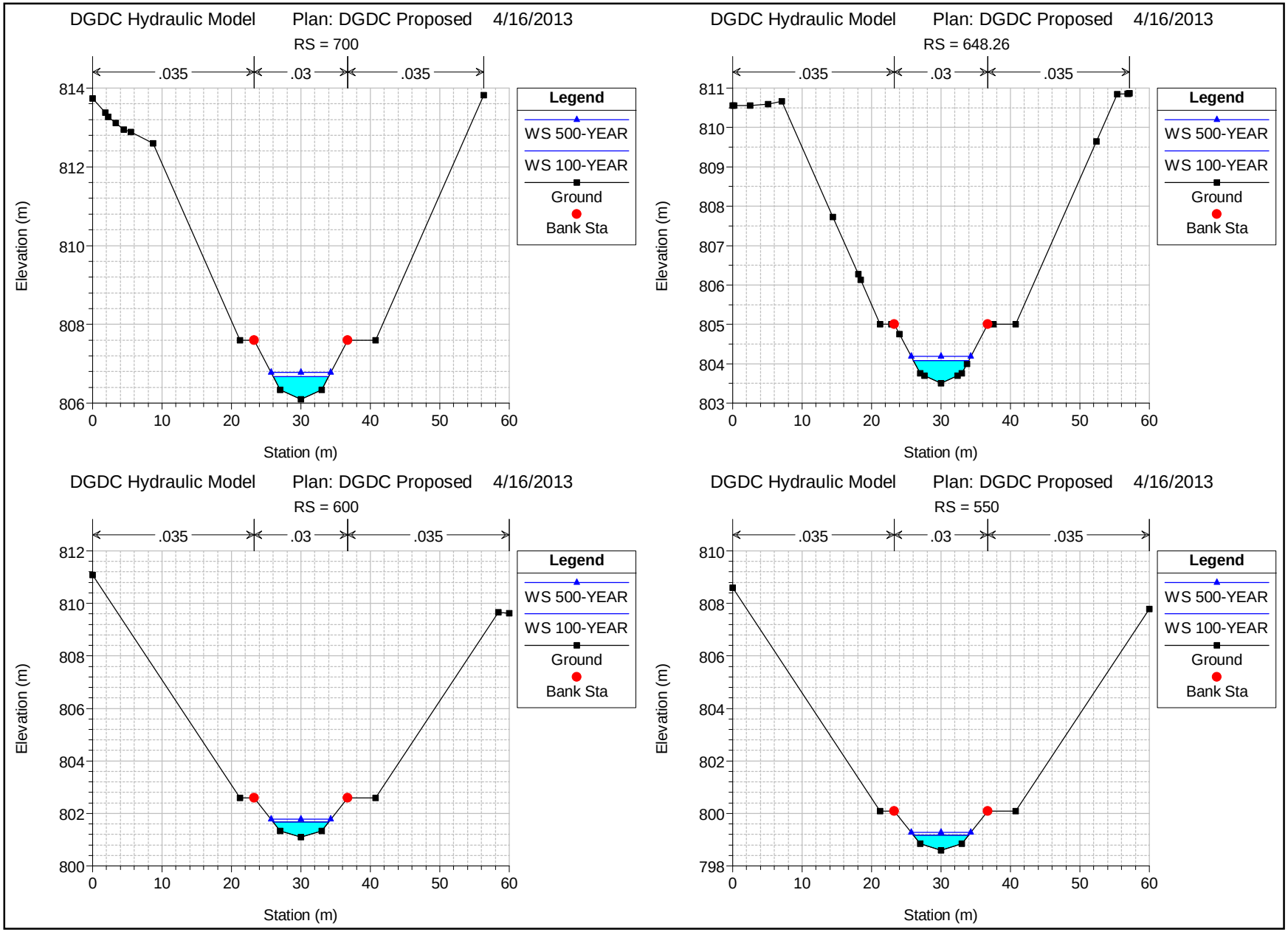
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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RS = 700
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 648.26
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 600
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 550
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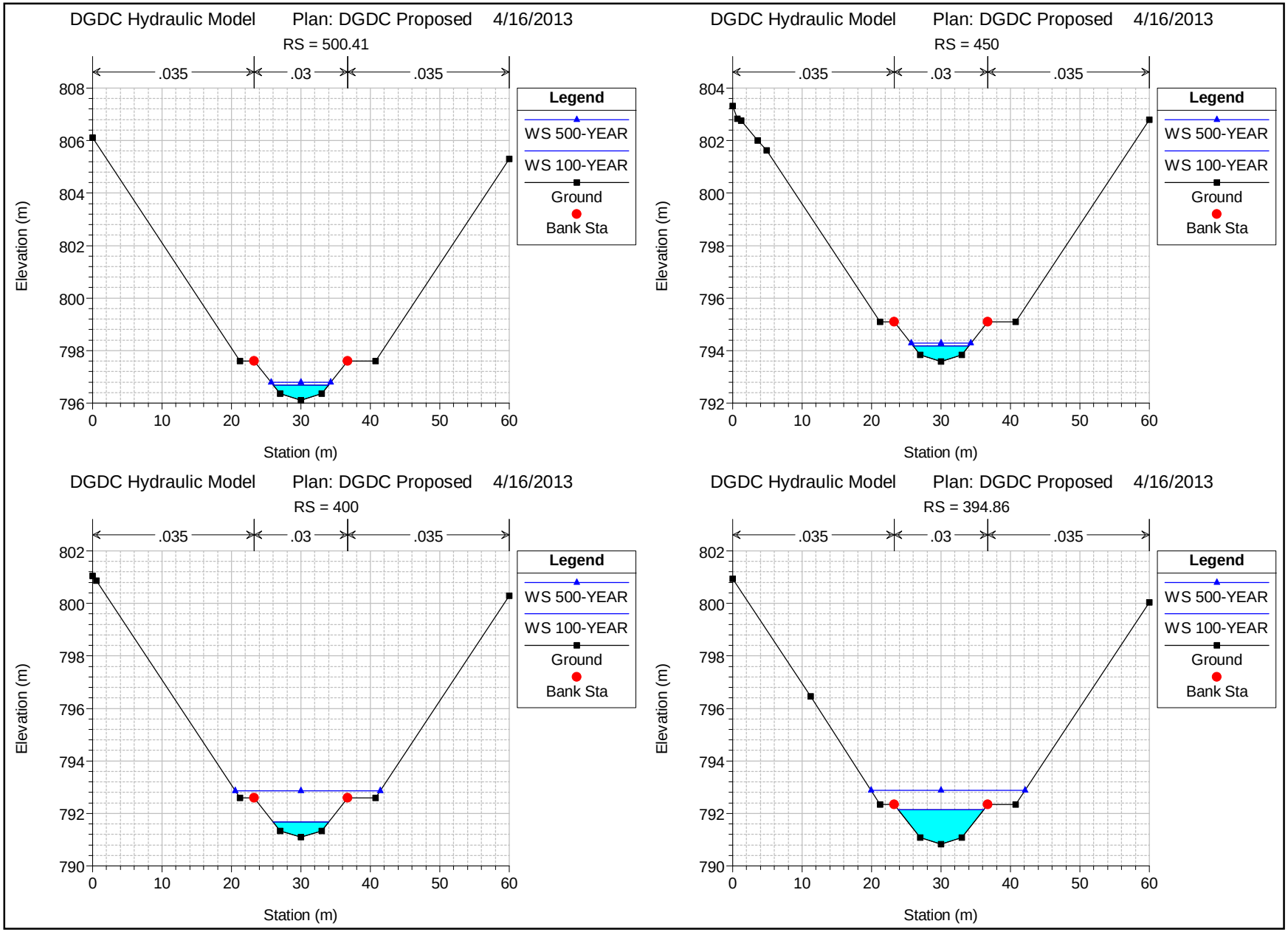
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 500.41
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 450
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 400
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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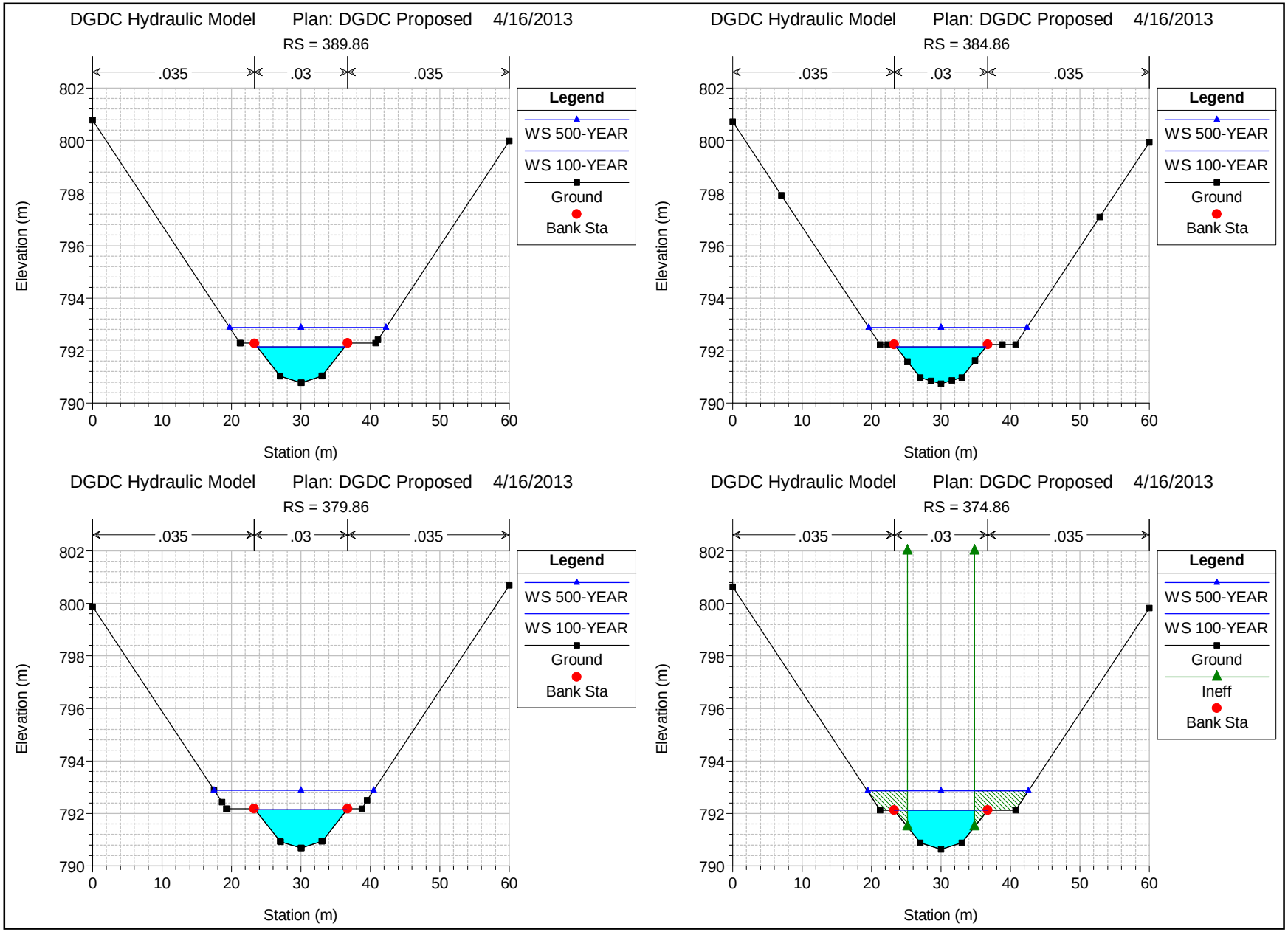
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 389.86
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 384.86
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 379.86
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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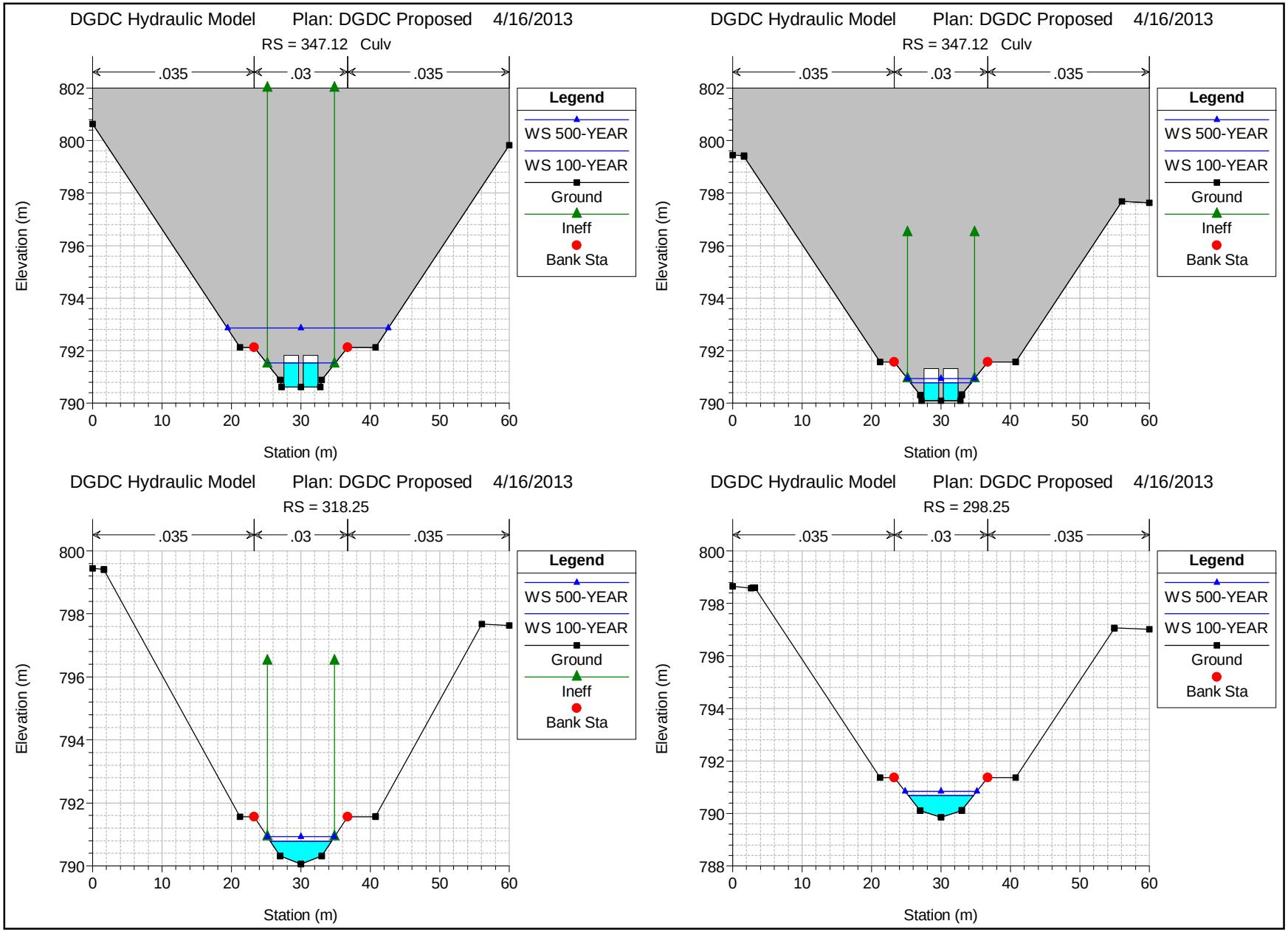
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Ineff
Bank Sta


DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 347.12 Culv
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.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Ineff
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 347.12 Culv
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Ineff
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 318.25
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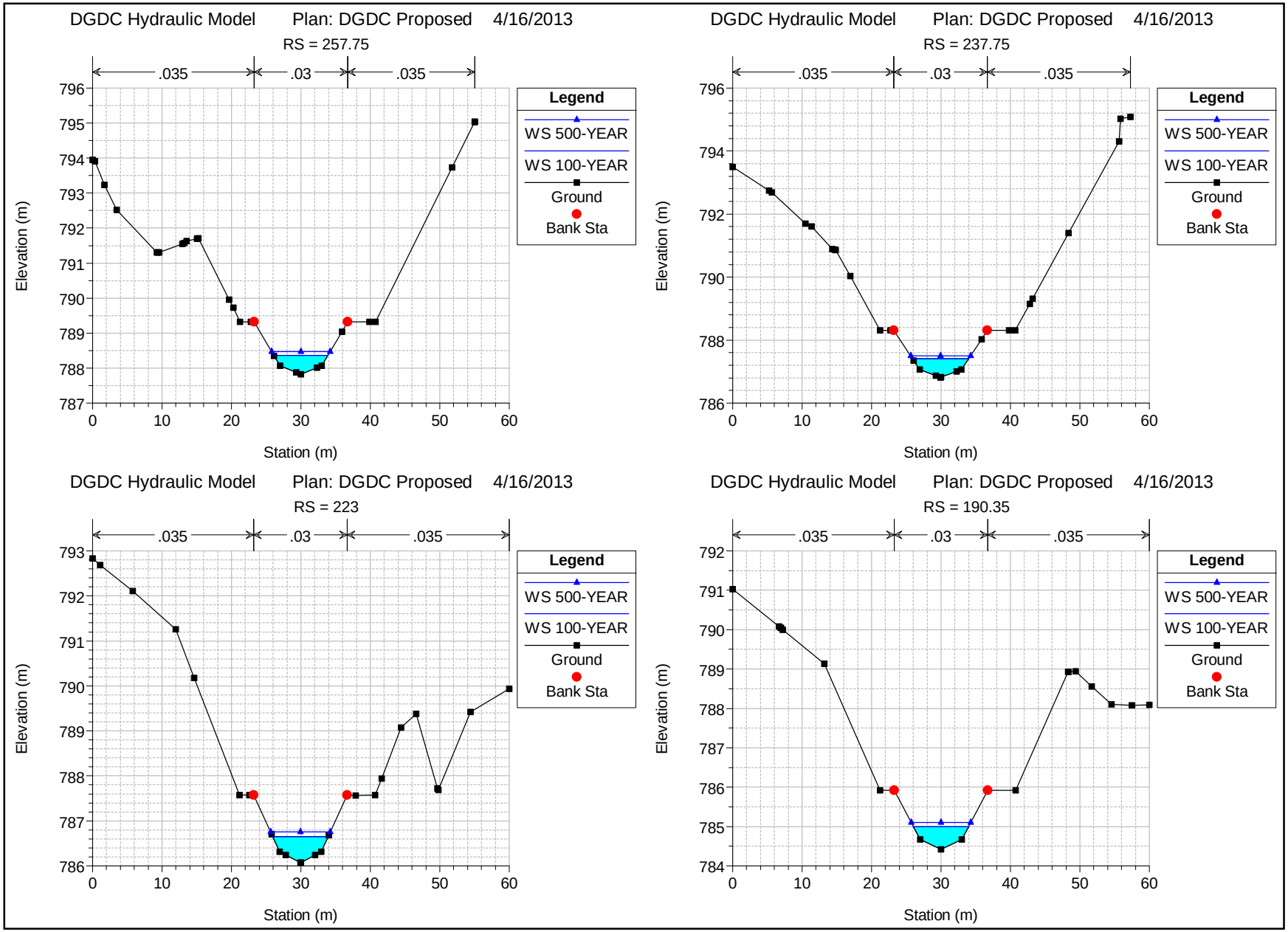
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Ineff
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 298.25
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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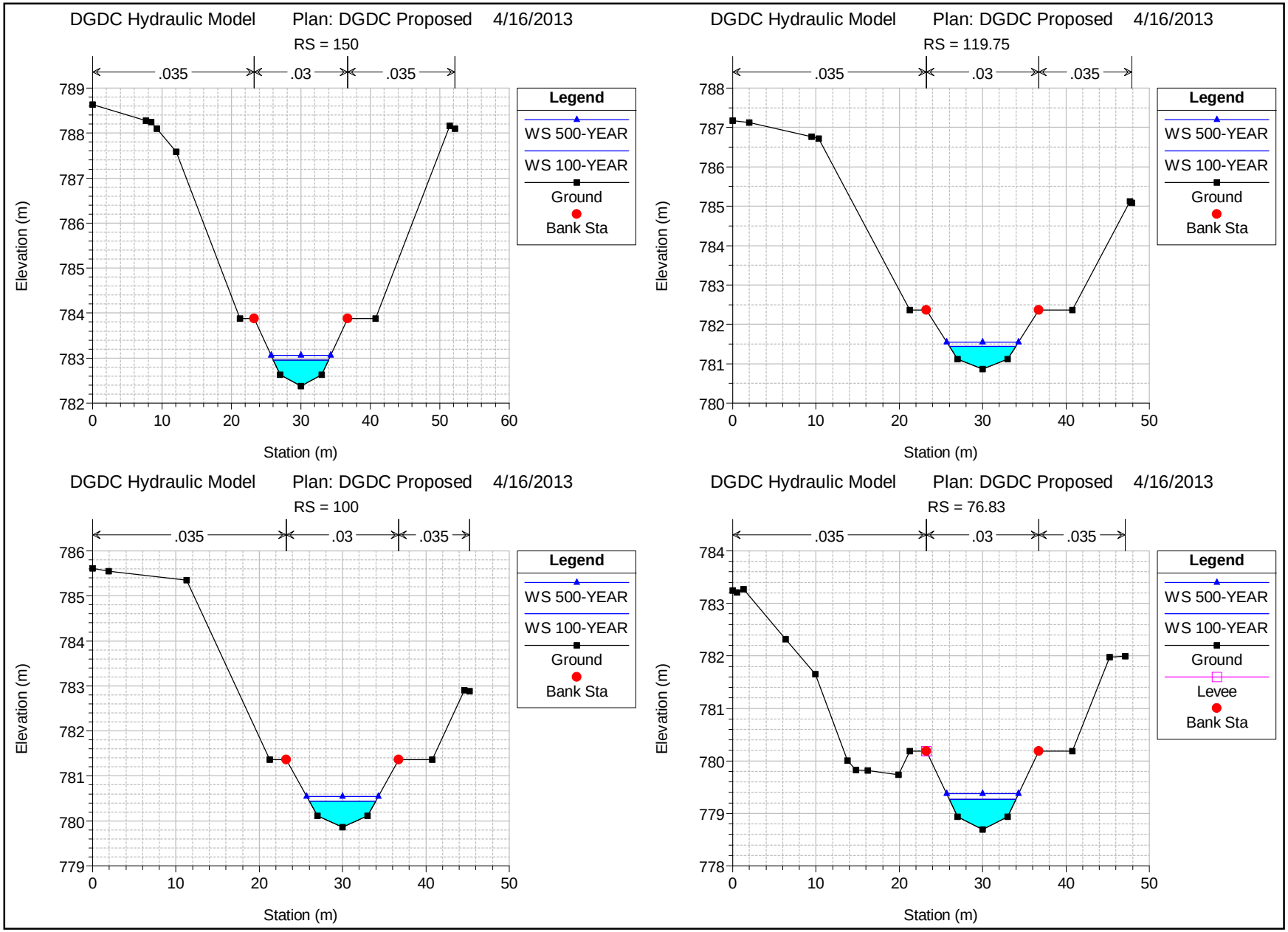
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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Station (m)
Legend
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WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 100
.035
.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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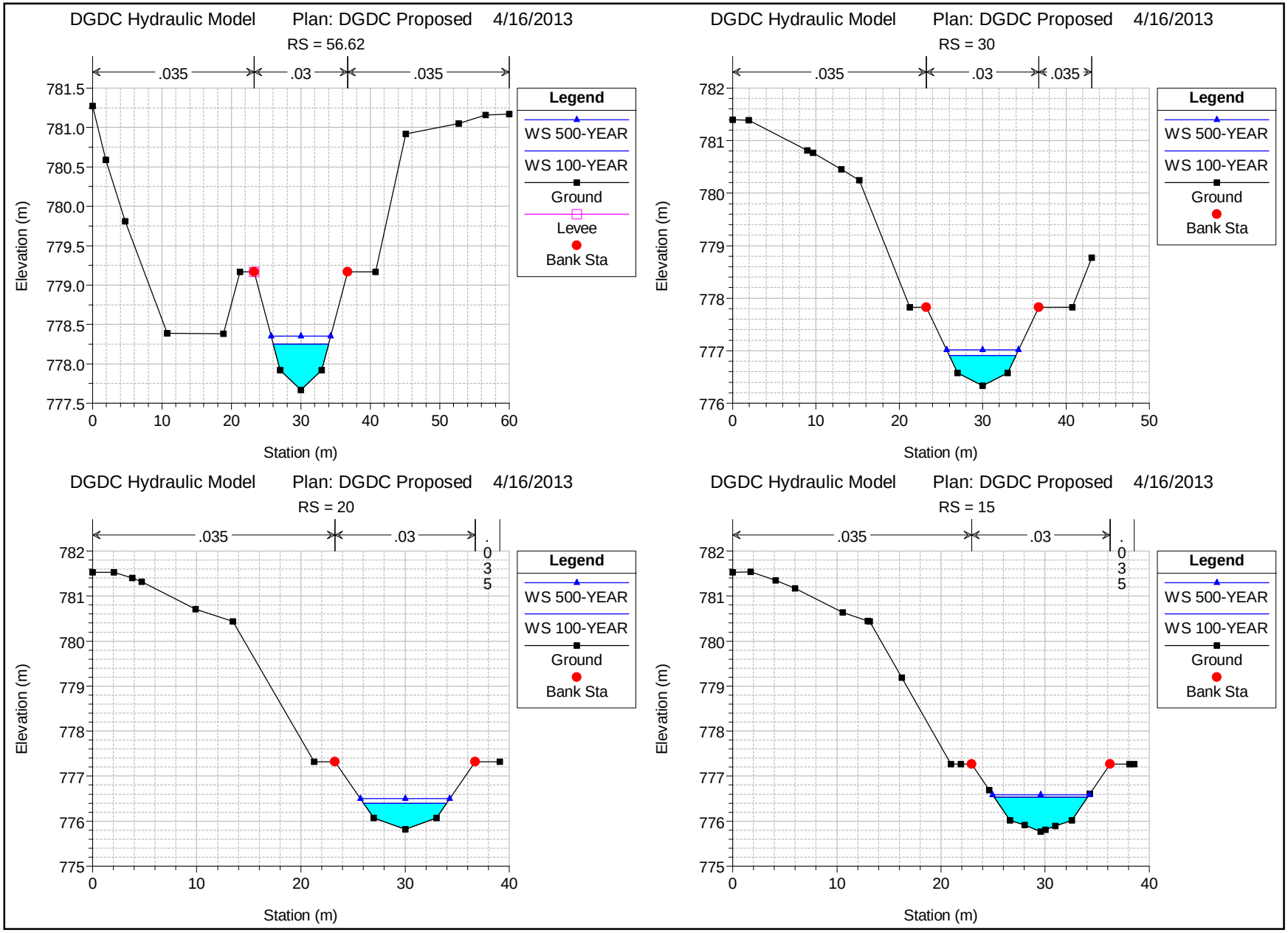
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Levee
Bank Sta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Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Levee
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 30
.035
.03
.035
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
RS = 20
.035
.03
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta
DGDC Hydraulic Model Plan: DGDC Proposed 4/16/2013
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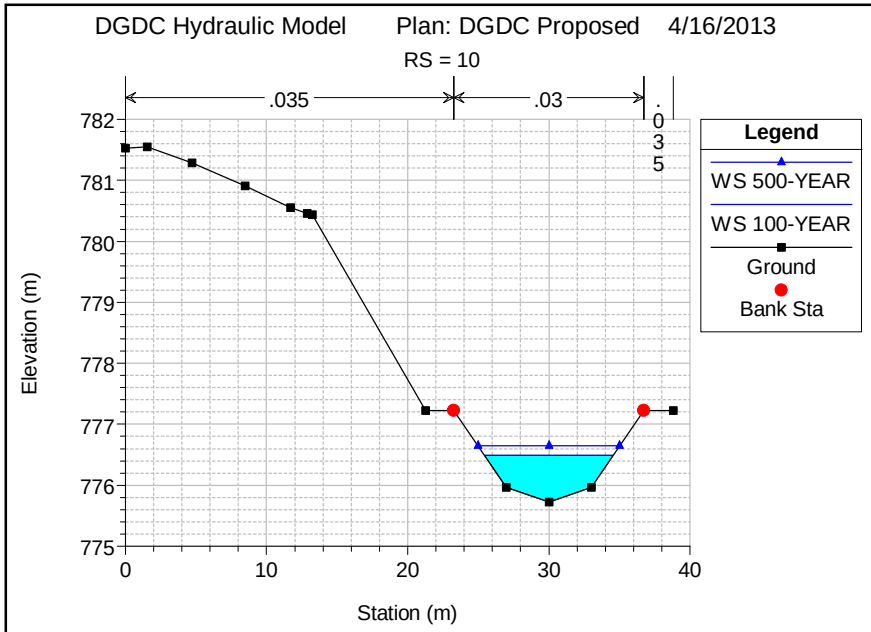
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta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Plan: DGDC Proposed
4/16/2013
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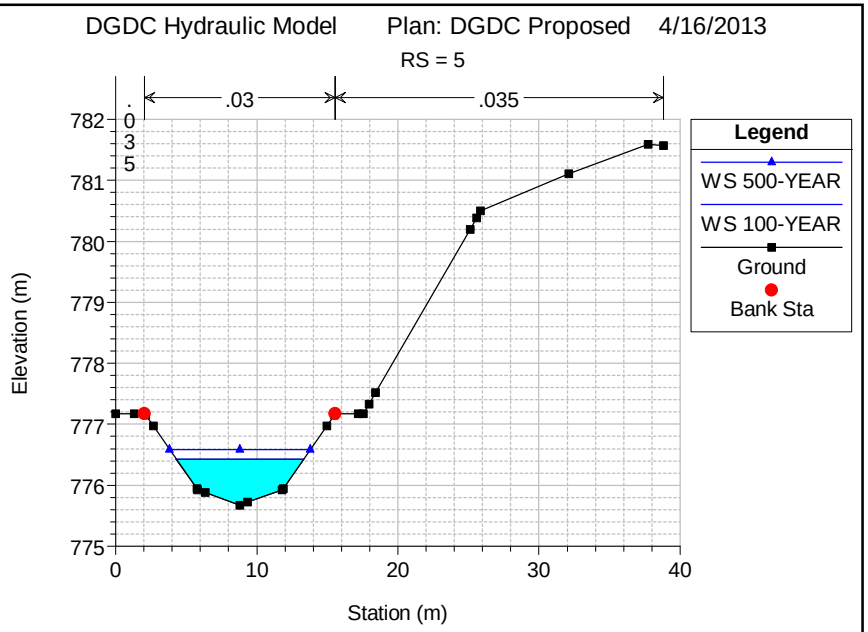
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
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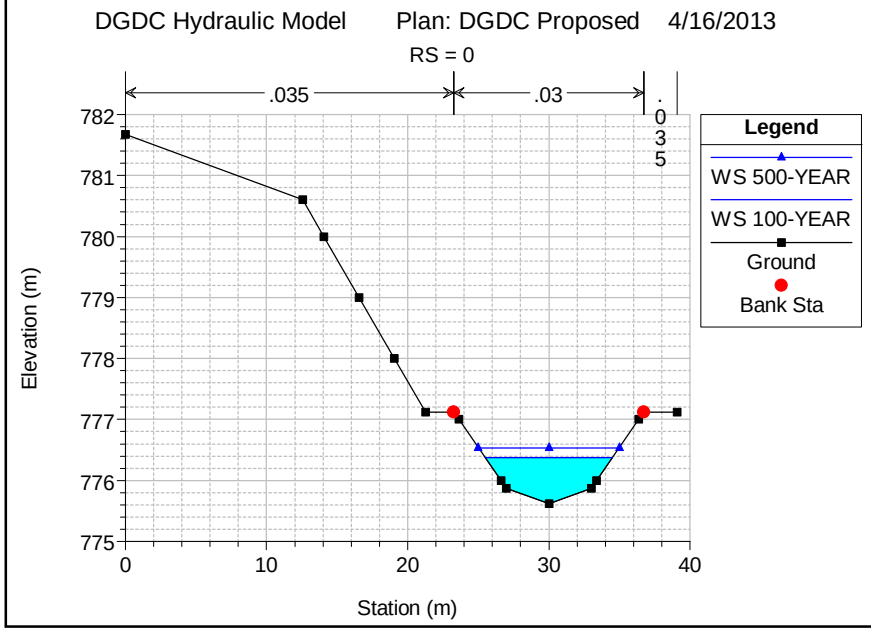
Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta


DGDC Hydraulic Model
Plan: DGDC Proposed
4/16/2013
RS = 0
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Elevation (m)
Station (m)
Legend
WS 500-YEAR
WS 100-YEAR
Ground
Bank Sta

HEC-RAS Plan: DGDC River: DGDC Reach: Dublin Gulch Div

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Invert Slope	Frctn Slope	Hydr Depth	Shear Total
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)			(m/m)	(m)	(N/m2)
Dublin Gulch Div	2377.08	100-YEAR	9.30	917.79	918.21	0.42	918.58	919.91	0.166961	5.77	1.61	5.75	3.48	0.0625		0.28	451.49
Dublin Gulch Div	2377.08	500-YEAR	13.30	917.79	918.29	0.50	918.83	920.40	0.166761	6.44	2.07	6.23	3.57	0.0625		0.33	531.97
Dublin Gulch Div	2374.68	100-YEAR	9.30	917.64	918.05	0.41	918.36	919.43	0.149560	5.21	1.79	6.87	3.26	0.1665	0.158261	0.26	376.66
Dublin Gulch Div	2374.68	500-YEAR	13.30	917.64	918.11	0.47	918.58	919.92	0.156321	5.95	2.24	7.27	3.42	0.1665	0.161541	0.31	464.88
Dublin Gulch Div	2350	100-YEAR	9.30	913.53	913.93	0.40	914.25	915.45	0.172532	5.46	1.70	6.82	3.48	0.1666	0.161046	0.25	418.46
Dublin Gulch Div	2350	500-YEAR	13.30	913.53	914.00	0.47	914.40	915.90	0.168463	6.11	2.18	7.19	3.55	0.1666	0.162392	0.30	493.34
Dublin Gulch Div	2323.05	100-YEAR	9.30	909.04	909.44	0.40	909.76	910.90	0.163574	5.34	1.74	6.92	3.40	0.0959	0.168053	0.25	399.67
Dublin Gulch Div	2323.05	500-YEAR	13.30	909.04	909.51	0.47	909.90	911.38	0.166576	6.06	2.20	7.30	3.53	0.0959	0.167520	0.30	485.10
Dublin Gulch Div	2300	100-YEAR	9.30	906.83	907.33	0.50	907.55	908.09	0.062299	3.87	2.40	7.47	2.18	0.0960	0.112936	0.32	193.84
Dublin Gulch Div	2300	500-YEAR	13.30	906.83	907.40	0.57	907.69	908.42	0.067990	4.48	2.97	7.92	2.33	0.0960	0.117283	0.38	246.40
Dublin Gulch Div	2285.83	100-YEAR	9.30	905.47	905.92	0.45	906.19	906.94	0.095908	4.47	2.08	7.21	2.66	0.0957	0.079103	0.29	268.15
Dublin Gulch Div	2285.83	500-YEAR	13.30	905.47	906.00	0.53	906.33	907.26	0.092451	4.97	2.68	7.69	2.69	0.0957	0.080220	0.35	311.12
Dublin Gulch Div	2250	100-YEAR	9.30	902.04	902.49	0.45	902.76	903.51	0.095612	4.47	2.08	7.21	2.65	0.0960	0.095760	0.29	267.53
Dublin Gulch Div	2250	500-YEAR	13.30	902.04	902.57	0.53	902.90	903.86	0.096844	5.05	2.64	7.66	2.75	0.0960	0.094647	0.34	322.24
Dublin Gulch Div	2214.48	100-YEAR	9.30	898.63	899.08	0.45	899.35	900.10	0.096212	4.48	2.08	7.19	2.66	0.0100	0.095912	0.29	269.10
Dublin Gulch Div	2214.48	500-YEAR	13.30	898.63	899.16	0.53	899.49	900.45	0.095500	5.03	2.65	7.65	2.73	0.0100	0.096172	0.35	319.16
Dublin Gulch Div	2209.48	100-YEAR	9.30	898.58	899.17	0.59	899.30	899.62	0.028346	2.96	3.14	8.04	1.51	0.0100	0.062279	0.39	106.72
Dublin Gulch Div	2209.48	500-YEAR	13.30	898.58	899.22	0.64	899.45	899.93	0.039986	3.73	3.56	8.35	1.82	0.0100	0.067743	0.43	164.35
Dublin Gulch Div	2204.48	100-YEAR	9.30	898.53	899.28	0.75	899.25	899.50	0.009937	2.06	4.50	9.01	0.93	0.0100	0.009991	0.50	47.73
Dublin Gulch Div	2204.48	500-YEAR	13.30	898.53	899.37	0.84	899.39	899.69	0.012575	2.50	5.33	9.54	1.07	0.0100	0.026281	0.56	67.32
Dublin Gulch Div	2199.48	100-YEAR	9.30	898.48	899.23	0.75	899.20	899.45	0.010045	2.07	4.49	8.99	0.94	0.0100	0.010007	0.50	48.16
Dublin Gulch Div	2199.48	500-YEAR	13.30	898.48	899.31	0.83	899.35	899.64	0.013322	2.55	5.22	9.47	1.10	0.0100	0.011839	0.55	70.45
Dublin Gulch Div	2194.48	100-YEAR	9.30	898.43	899.18	0.75	899.15	899.40	0.009969	2.07	4.50	9.01	0.93	0.0100	0.010012	0.50	47.85
Dublin Gulch Div	2194.48	500-YEAR	13.30	898.43	899.24	0.81	899.29	899.59	0.014388	2.62	5.08	9.39	1.14	0.0100	0.012249	0.54	74.73
Dublin Gulch Div	2159.36	100-YEAR	9.30	898.08	898.83	0.75	898.80	899.05	0.010054	2.07	4.48	8.99	0.94	0.0100	0.009925	0.50	48.20
Dublin Gulch Div	2159.36	500-YEAR	13.30	898.08	898.96	0.88	898.94	899.24	0.010051	2.31	5.76	9.80	0.96	0.0100	0.009905	0.59	56.60
Dublin Gulch Div	2130.28	100-YEAR	9.30	897.79	898.54	0.75	898.51	898.76	0.009796	2.06	4.52	9.02	0.93	0.0099	0.009914	0.50	47.24
Dublin Gulch Div	2130.28	500-YEAR	13.30	897.79	898.68	0.89	898.65	898.95	0.009760	2.29	5.82	9.84	0.95	0.0099	0.009929	0.59	55.33
Dublin Gulch Div	2100	100-YEAR	9.30	897.49	898.24	0.75	898.21	898.46	0.010033	2.07	4.49	8.99	0.94	0.0100	0.009925	0.50	48.12
Dublin Gulch Div	2100	500-YEAR	13.30	897.49	898.37	0.88	898.35	898.65	0.010098	2.31	5.75	9.80	0.96	0.0100	0.009935	0.59	56.81
Dublin Gulch Div	2050	100-YEAR	9.30	896.99	897.74	0.75	897.71	897.96	0.009818	2.06	4.52	9.01	0.93	0.0100	0.010012	0.50	47.32
Dublin Gulch Div	2050	500-YEAR	13.30	896.99	897.88	0.89	897.85	898.15	0.009771	2.29	5.82	9.84	0.95	0.0100	0.009995	0.59	55.37
Dublin Gulch Div	2000	100-YEAR	9.30	896.49	897.24	0.75	897.21	897.46	0.010207	2.09	4.46	8.97	0.94	0.0100	0.009923	0.50	48.76
Dublin Gulch Div	2000	500-YEAR	13.30	896.49	897.37	0.88	897.35	897.65	0.010219	2.32	5.73	9.78	0.97	0.0100	0.009858	0.59	57.34
Dublin Gulch Div	1950	100-YEAR	9.30	895.99	896.75	0.76	896.71	896.96	0.009640	2.04	4.55	9.03	0.92	0.0099	0.009926	0.50	46.66
Dublin Gulch Div	1950	500-YEAR	13.30	895.99	896.89	0.90	896.85	897.15	0.009497	2.26	5.88	9.88	0.94	0.0099	0.009906	0.60	54.16
Dublin Gulch Div	1924.78	100-YEAR	9.30	895.74	896.49	0.75	896.46	896.71	0.010211	2.09	4.46	8.97	0.94	0.0101	0.009963	0.50	48.78
Dublin Gulch Div	1924.78	500-YEAR	13.30	895.74	896.62	0.88	896.60	896.90	0.010315	2.33	5.71	9.77	0.97	0.0101	0.009657	0.58	57.76
Dublin Gulch Div	1900	100-YEAR	9.30	895.49	896.24	0.75	896.21	896.46	0.009715	2.05	4.54	9.02	0.92	0.0102	0.007439	0.50	46.94

HEC-RAS Plan: DGDC River: DGDC Reach: Dublin Gulch Div (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Invert Slope	Frctn Slope	Hydr Depth	Shear Total
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)			(m/m)	(m)	(N/m2)
Dublin Gulch Div	1900	500-YEAR	13.30	895.49	896.40	0.91	896.36	896.65	0.008999	2.22	5.99	9.94	0.91	0.0102	0.006913	0.60	51.94
Dublin Gulch Div	1874.5	100-YEAR	9.30	895.23	896.11	0.88		896.25	0.005163	1.64	5.66	9.74	0.69	0.0098	0.008064	0.58	28.76
Dublin Gulch Div	1874.5	500-YEAR	13.30	895.23	896.28	1.05		896.45	0.004827	1.78	7.47	10.79	0.68	0.0098	0.007753	0.69	31.92
Dublin Gulch Div	1850	100-YEAR	10.90	894.99	895.78	0.79	895.77	896.04	0.010966	2.24	4.86	9.24	0.99	0.0100	0.008382	0.53	55.40
Dublin Gulch Div	1850	500-YEAR	15.60	894.99	895.93	0.94	895.93	896.24	0.010678	2.47	6.31	10.14	1.00	0.0100	0.008275	0.62	63.66
Dublin Gulch Div	1812.06	100-YEAR	10.90	894.61	895.53	0.92		895.69	0.005798	1.79	6.08	10.00	0.73	0.0117	0.005531	0.61	33.77
Dublin Gulch Div	1812.06	500-YEAR	15.60	894.61	895.69	1.08		895.89	0.005872	2.00	7.80	10.98	0.76	0.0117	0.005636	0.71	39.86
Dublin Gulch Div	1809.5	100-YEAR	10.90	894.58	895.52	0.94	895.36	895.67	0.005264	1.73	6.29	10.12	0.70	0.0000	0.008396	0.62	31.31
Dublin Gulch Div	1809.5	500-YEAR	15.60	894.58	895.68	1.10	895.52	895.88	0.005400	1.94	8.04	11.12	0.73	0.0000	0.008017	0.72	37.31
Dublin Gulch Div	1790		Bridge														
Dublin Gulch Div	1770.5	100-YEAR	10.90	894.19	895.01	0.82	894.97	895.24	0.009582	2.14	5.09	9.39	0.93	0.0096	0.009861	0.54	49.90
Dublin Gulch Div	1770.5	500-YEAR	15.60	894.19	895.16	0.97	895.13	895.44	0.009609	2.38	6.55	10.28	0.95	0.0096	0.009867	0.64	58.61
Dublin Gulch Div	1754.86	100-YEAR	10.90	894.04	894.84	0.80	894.82	895.09	0.010140	2.18	4.99	9.32	0.95	0.0100	0.009982	0.54	52.14
Dublin Gulch Div	1754.86	500-YEAR	15.60	894.04	894.99	0.95	894.98	895.29	0.010125	2.43	6.43	10.21	0.98	0.0100	0.009966	0.63	61.07
Dublin Gulch Div	1700	100-YEAR	10.90	893.49	894.30	0.81	894.27	894.54	0.009824	2.16	5.05	9.36	0.94	0.0100	0.010003	0.54	50.88
Dublin Gulch Div	1700	500-YEAR	15.60	893.49	894.45	0.96	894.43	894.74	0.009807	2.40	6.50	10.25	0.96	0.0100	0.009995	0.63	59.57
Dublin Gulch Div	1650	100-YEAR	10.90	892.99	893.79	0.80	893.77	894.04	0.010182	2.19	4.99	9.32	0.95	0.0098	0.009906	0.54	52.31
Dublin Gulch Div	1650	500-YEAR	15.60	892.99	893.94	0.95	893.93	894.24	0.010184	2.43	6.42	10.20	0.98	0.0098	0.009895	0.63	61.35
Dublin Gulch Div	1627.54	100-YEAR	10.90	892.77	893.58	0.81	893.55	893.81	0.009630	2.14	5.09	9.40	0.93	0.0102	0.009952	0.54	50.03
Dublin Gulch Div	1627.54	500-YEAR	15.60	892.77	893.73	0.96	893.70	894.01	0.009607	2.38	6.56	10.30	0.95	0.0102	0.009922	0.64	58.55
Dublin Gulch Div	1600	100-YEAR	10.90	892.49	893.29	0.80	893.27	893.54	0.010274	2.19	4.97	9.31	0.96	0.0100	0.009811	0.53	52.67
Dublin Gulch Div	1600	500-YEAR	15.60	892.49	893.44	0.95	893.43	893.74	0.010237	2.44	6.41	10.19	0.98	0.0100	0.009808	0.63	61.60
Dublin Gulch Div	1569.11	100-YEAR	10.90	892.18	893.00	0.82	892.96	893.23	0.009348	2.12	5.14	9.42	0.92	0.0099	0.009942	0.55	48.96
Dublin Gulch Div	1569.11	500-YEAR	15.60	892.18	893.15	0.97	893.12	893.43	0.009378	2.36	6.61	10.31	0.94	0.0099	0.009914	0.64	57.53
Dublin Gulch Div	1527.82	100-YEAR	10.90	891.77	892.57	0.80	892.55	892.82	0.010536	2.21	4.93	9.28	0.97	0.0101	0.009779	0.53	53.71
Dublin Gulch Div	1527.82	500-YEAR	15.60	891.77	892.71	0.94	892.71	893.02	0.010449	2.45	6.36	10.16	0.99	0.0101	0.009822	0.63	62.59
Dublin Gulch Div	1486.08	100-YEAR	10.90	891.35	892.18	0.83	892.13	892.40	0.009022	2.10	5.20	9.46	0.90	0.0100	0.009993	0.55	47.63
Dublin Gulch Div	1486.08	500-YEAR	15.60	891.35	892.32	0.97	892.29	892.60	0.009194	2.34	6.65	10.34	0.93	0.0100	0.009950	0.64	56.64
Dublin Gulch Div	1450	100-YEAR	10.90	890.99	891.78	0.79	891.77	892.04	0.010964	2.24	4.86	9.24	0.99	0.0101	0.009638	0.53	55.39
Dublin Gulch Div	1450	500-YEAR	15.60	890.99	891.93	0.94	891.93	892.24	0.010705	2.47	6.31	10.13	1.00	0.0101	0.009731	0.62	63.79
Dublin Gulch Div	1405.43	100-YEAR	10.90	890.54	891.38	0.84	891.32	891.59	0.008311	2.04	5.35	9.55	0.87	0.0098	0.009894	0.56	44.69
Dublin Gulch Div	1405.43	500-YEAR	15.60	890.54	891.52	0.98	891.48	891.79	0.008756	2.30	6.77	10.40	0.91	0.0098	0.009826	0.65	54.52
Dublin Gulch Div	1390.09	100-YEAR	10.90	890.39	891.17	0.78	891.17	891.44	0.011476	2.28	4.78	9.19	1.01	0.2188	0.011496	0.52	57.38
Dublin Gulch Div	1390.09	500-YEAR	15.60	890.39	891.32	0.93	891.32	891.64	0.010896	2.49	6.27	10.11	1.01	0.2188	0.010880	0.62	64.67
Dublin Gulch Div	1350	100-YEAR	10.90	881.62	882.00	0.38	882.40	884.52	0.322060	7.04	1.55	6.75	4.70	0.2188	0.166770	0.23	717.49
Dublin Gulch Div	1350	500-YEAR	15.60	881.62	882.06	0.44	882.55	885.14	0.299897	7.77	2.01	7.15	4.68	0.2188	0.155396	0.28	816.61
Dublin Gulch Div	1300	100-YEAR	10.90	870.68	871.12	0.44	871.46	872.60	0.142238	5.38	2.03	7.16	3.23	0.2186	0.232149	0.28	390.13
Dublin Gulch Div	1300	500-YEAR	15.60	870.68	871.18	0.50	871.62	873.24	0.163904	6.35	2.46	7.52	3.54	0.2186	0.231900	0.33	518.47

HEC-RAS Plan: DGDC River: DGDC Reach: Dublin Gulch Div (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Invert Slope	Frctn Slope	Hydr Depth	Shear Total
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)			(m/m)	(m)	(N/m2)
Dublin Gulch Div	1250	100-YEAR	10.90	859.75	860.14	0.39	860.53	862.36	0.264247	6.60	1.65	6.84	4.29	0.2189	0.203243	0.24	619.45
Dublin Gulch Div	1250	500-YEAR	15.60	859.75	860.21	0.46	860.69	862.91	0.246589	7.28	2.14	7.26	4.28	0.2189	0.205246	0.30	705.14
Dublin Gulch Div	1193.9	100-YEAR	11.90	847.47	847.91	0.44	848.29	849.74	0.181344	6.00	1.98	7.13	3.63	0.1251	0.222796	0.28	489.05
Dublin Gulch Div	1193.9	500-YEAR	17.20	847.47	847.97	0.50	848.45	850.44	0.195448	6.95	2.47	7.53	3.87	0.1251	0.221018	0.33	621.18
Dublin Gulch Div	1150	100-YEAR	11.90	841.98	842.49	0.51	842.79	843.62	0.088193	4.71	2.53	7.60	2.61	0.1253	0.134769	0.33	283.79
Dublin Gulch Div	1150	500-YEAR	17.20	841.98	842.58	0.60	842.96	843.97	0.084447	5.22	3.29	8.18	2.63	0.1253	0.139947	0.40	327.94
Dublin Gulch Div	1106.73	100-YEAR	11.90	836.56	837.02	0.46	837.38	838.58	0.142429	5.54	2.15	7.26	3.25	0.1253	0.115311	0.30	408.07
Dublin Gulch Div	1106.73	500-YEAR	17.20	836.56	837.10	0.54	837.54	839.07	0.139700	6.21	2.77	7.76	3.32	0.1253	0.112073	0.36	481.85
Dublin Gulch Div	1050	100-YEAR	11.90	829.45	829.93	0.48	830.27	831.27	0.112908	5.12	2.32	7.41	2.92	0.1252	0.127669	0.31	342.64
Dublin Gulch Div	1050	500-YEAR	17.20	829.45	830.02	0.57	830.43	831.75	0.115894	5.83	2.95	7.90	3.04	0.1252	0.127797	0.37	418.11
Dublin Gulch Div	1000	100-YEAR	11.90	823.19	823.66	0.47	824.01	825.14	0.131689	5.40	2.21	7.31	3.14	0.1254	0.122299	0.30	384.70
Dublin Gulch Div	1000	500-YEAR	17.20	823.19	823.74	0.55	824.17	825.61	0.129282	6.05	2.84	7.82	3.20	0.1254	0.122588	0.36	454.31
Dublin Gulch Div	972.09	100-YEAR	11.90	819.69	820.17	0.48	820.51	821.58	0.122217	5.26	2.26	7.36	3.03	0.0498	0.126953	0.31	363.53
Dublin Gulch Div	972.09	500-YEAR	17.20	819.69	820.25	0.56	820.67	822.06	0.123816	5.96	2.89	7.85	3.14	0.0498	0.126549	0.37	439.51
Dublin Gulch Div	950	100-YEAR	11.90	818.59	819.31	0.72	819.41	819.71	0.018992	2.79	4.27	8.84	1.28	0.0500	0.070604	0.48	88.11
Dublin Gulch Div	950	500-YEAR	17.20	818.59	819.37	0.78	819.57	820.03	0.028592	3.60	4.78	9.19	1.59	0.0500	0.076204	0.52	142.95
Dublin Gulch Div	900	100-YEAR	11.90	816.09	816.64	0.55	816.91	817.56	0.064882	4.25	2.80	7.78	2.26	0.0500	0.041937	0.36	225.41
Dublin Gulch Div	900	500-YEAR	17.20	816.09	816.75	0.66	817.07	817.83	0.057835	4.59	3.75	8.48	2.21	0.0500	0.043214	0.44	245.93
Dublin Gulch Div	850	100-YEAR	11.90	813.59	814.20	0.61	814.41	814.86	0.039872	3.60	3.30	8.16	1.81	0.0500	0.052377	0.40	155.62
Dublin Gulch Div	850	500-YEAR	17.20	813.59	814.29	0.70	814.57	815.20	0.045244	4.22	4.08	8.71	1.97	0.0500	0.051539	0.47	203.67
Dublin Gulch Div	805.21	100-YEAR	11.90	811.35	811.92	0.57	812.17	812.74	0.054347	4.00	2.97	7.92	2.09	0.0500	0.047110	0.38	197.04
Dublin Gulch Div	805.21	500-YEAR	17.20	811.35	812.03	0.68	812.33	813.02	0.051538	4.41	3.90	8.59	2.09	0.0500	0.048391	0.45	225.12
Dublin Gulch Div	750	100-YEAR	11.90	808.59	809.18	0.59	809.41	809.92	0.046911	3.81	3.13	8.03	1.95	0.0500	0.050629	0.39	176.17
Dublin Gulch Div	750	500-YEAR	17.20	808.59	809.28	0.69	809.57	810.24	0.049014	4.34	3.97	8.64	2.04	0.0500	0.050276	0.46	216.60
Dublin Gulch Div	700	100-YEAR	11.90	806.09	806.67	0.58	806.91	807.45	0.051519	3.93	3.03	7.96	2.03	0.0501	0.049215	0.38	189.18
Dublin Gulch Div	700	500-YEAR	17.20	806.09	806.77	0.68	807.07	807.75	0.050393	4.38	3.93	8.61	2.07	0.0501	0.049704	0.46	221.26
Dublin Gulch Div	648.26	100-YEAR	11.90	803.50	804.08	0.58	804.32	804.84	0.049036	3.87	3.08	8.00	1.99	0.0499	0.050277	0.39	182.21
Dublin Gulch Div	648.26	500-YEAR	17.20	803.50	804.19	0.69	804.48	805.16	0.049861	4.36	3.94	8.62	2.06	0.0499	0.050127	0.46	219.46
Dublin Gulch Div	600	100-YEAR	11.90	801.09	801.67	0.58	801.91	802.44	0.050397	3.90	3.05	7.98	2.01	0.0500	0.049717	0.38	186.04
Dublin Gulch Div	600	500-YEAR	17.20	801.09	801.78	0.69	802.07	802.75	0.049981	4.37	3.94	8.62	2.06	0.0500	0.049921	0.46	219.87
Dublin Gulch Div	550	100-YEAR	11.90	798.59	799.17	0.58	799.41	799.94	0.049741	3.88	3.06	7.99	2.00	0.0500	0.050069	0.38	184.20
Dublin Gulch Div	550	500-YEAR	17.20	798.59	799.28	0.69	799.57	800.25	0.050052	4.37	3.94	8.62	2.06	0.0500	0.050017	0.46	220.11
Dublin Gulch Div	500.41	100-YEAR	11.90	796.11	796.69	0.58	796.93	797.46	0.050140	3.89	3.06	7.98	2.01	0.0500	0.049940	0.38	185.33
Dublin Gulch Div	500.41	500-YEAR	17.20	796.11	796.80	0.69	797.09	797.77	0.050054	4.37	3.94	8.62	2.06	0.0500	0.050053	0.46	220.12
Dublin Gulch Div	450	100-YEAR	11.90	793.59	794.17	0.58	794.41	794.94	0.049894	3.89	3.06	7.98	2.00	0.0500	0.050017	0.38	184.63
Dublin Gulch Div	450	500-YEAR	17.20	793.59	794.28	0.69	794.57	795.25	0.050038	4.37	3.94	8.62	2.06	0.0500	0.050046	0.46	220.06
Dublin Gulch Div	400	100-YEAR	11.90	791.09	791.67	0.58	791.91	792.44	0.050053	3.89	3.06	7.98	2.01	0.0506	0.049974	0.38	185.08
Dublin Gulch Div	400	500-YEAR	17.20	791.09	792.87	1.78	792.07	792.92	0.000702	1.00	18.57	20.89	0.29	0.0506	0.000517	0.89	5.96
Dublin Gulch Div	394.86	100-YEAR	11.90	790.83	792.14	1.31	791.65	792.21	0.001484	1.13	10.53	12.38	0.39	0.0100	0.001379	0.85	12.02

HEC-RAS Plan: DGDC River: DGDC Reach: Dublin Gulch Div (Continued)

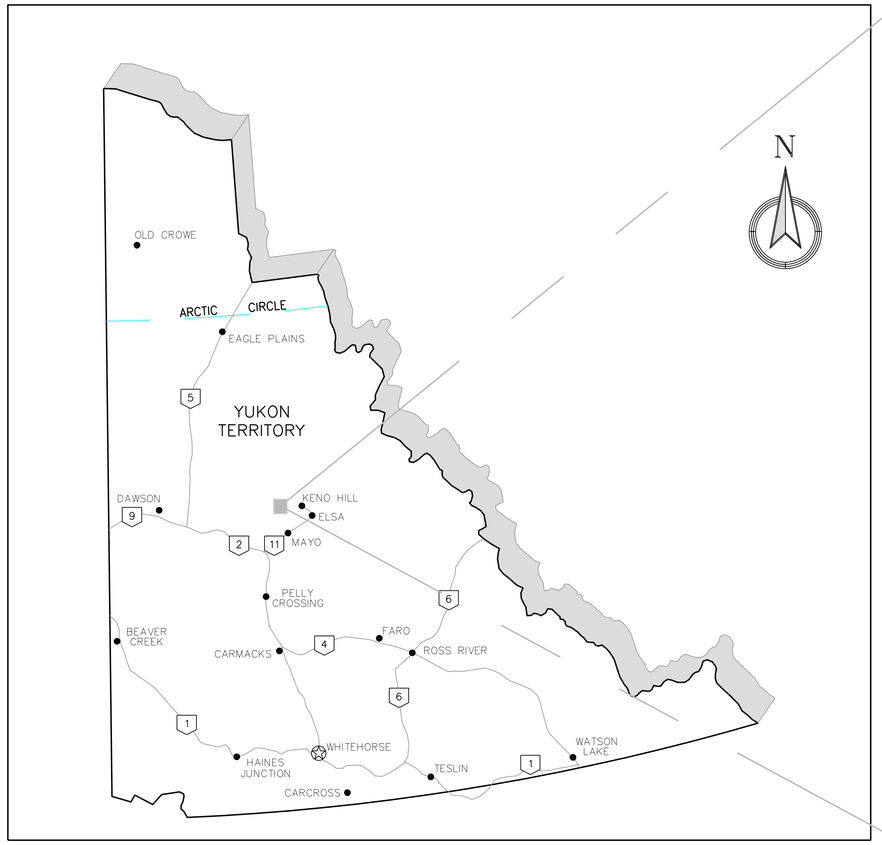
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Invert Slope	Frctn Slope	Hydr Depth	Shear Total
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)			(m/m)	(m)	(N/m2)
Dublin Gulch Div	394.86	500-YEAR	17.20	790.83	792.88	2.05		792.91	0.000333	0.78	24.40	22.22	0.20	0.0100	0.000313	1.10	3.49
Dublin Gulch Div	389.86	100-YEAR	11.90	790.78	792.14	1.36		792.20	0.001274	1.07	11.13	12.68	0.36	0.0100	0.001185	0.88	10.65
Dublin Gulch Div	389.86	500-YEAR	17.20	790.78	792.88	2.10		792.91	0.000294	0.75	25.54	22.50	0.19	0.0100	0.000277	1.13	3.18
Dublin Gulch Div	384.86	100-YEAR	11.90	790.73	792.14	1.41		792.19	0.001096	1.01	11.75	12.96	0.34	0.0101	0.001022	0.91	9.45
Dublin Gulch Div	384.86	500-YEAR	17.20	790.73	792.88	2.15		792.90	0.000261	0.72	26.67	22.75	0.18	0.0101	0.000246	1.17	2.91
Dublin Gulch Div	379.86	100-YEAR	11.90	790.68	792.14	1.46		792.19	0.000947	0.96	12.38	13.24	0.32	0.0100	0.000846	0.94	8.42
Dublin Gulch Div	379.86	500-YEAR	17.20	790.68	792.88	2.20		792.90	0.000232	0.70	27.82	22.99	0.17	0.0100	0.000278	1.21	2.67
Dublin Gulch Div	374.86	100-YEAR	11.90	790.63	792.13	1.50	791.45	792.18	0.000745	1.02	11.72	13.48	0.30	0.0101		1.21	8.61
Dublin Gulch Div	374.86	500-YEAR	17.20	790.63	792.85	2.22	791.60	792.90	0.000324	0.92	18.77	23.11	0.21	0.0101		1.93	5.99
Dublin Gulch Div	347.12		Culvert														
Dublin Gulch Div	318.25	100-YEAR	11.90	790.06	790.78	0.72	790.88	791.19	0.019734	2.83	4.21	8.79	1.30	0.0100		0.48	90.81
Dublin Gulch Div	318.25	500-YEAR	17.20	790.06	790.93	0.87	791.03	791.41	0.018233	3.07	5.60	9.69	1.29	0.0100		0.58	100.89
Dublin Gulch Div	298.25	100-YEAR	11.90	789.86	790.68	0.82	790.68	790.95	0.011325	2.33	5.11	9.39	1.01	0.0504		0.54	59.12
Dublin Gulch Div	298.25	500-YEAR	17.20	789.86	790.84	0.98	790.84	791.17	0.010690	2.54	6.76	10.39	1.01	0.0504	0.010698	0.65	66.52
Dublin Gulch Div	257.75	100-YEAR	11.90	787.82	788.36	0.54	788.64	789.30	0.066840	4.29	2.77	7.77	2.29	0.0505	0.039082	0.36	230.44
Dublin Gulch Div	257.75	500-YEAR	17.20	787.82	788.47	0.65	788.80	789.61	0.062658	4.72	3.64	8.41	2.29	0.0505	0.036658	0.43	261.44
Dublin Gulch Div	237.75	100-YEAR	11.90	786.81	787.41	0.60	787.63	788.12	0.044611	3.74	3.18	8.07	1.90	0.0502	0.055725	0.39	169.52
Dublin Gulch Div	237.75	500-YEAR	17.20	786.81	787.51	0.70	787.79	788.44	0.047542	4.29	4.01	8.67	2.01	0.0502	0.055100	0.46	211.54
Dublin Gulch Div	223	100-YEAR	11.90	786.07	786.65	0.58	786.88	787.42	0.049886	3.89	3.06	7.98	2.00	0.0505	0.047249	0.38	184.62
Dublin Gulch Div	223	500-YEAR	17.20	786.07	786.75	0.68	787.05	787.72	0.049744	4.36	3.94	8.62	2.06	0.0505	0.048643	0.46	219.09
Dublin Gulch Div	190.35	100-YEAR	11.90	784.42	785.00	0.58	785.24	785.78	0.050571	3.91	3.05	7.97	2.02	0.0505	0.050228	0.38	186.54
Dublin Gulch Div	190.35	500-YEAR	17.20	784.42	785.10	0.68	785.40	786.08	0.050576	4.38	3.92	8.61	2.07	0.0505	0.050160	0.46	221.89
Dublin Gulch Div	150	100-YEAR	11.90	782.38	782.96	0.58	783.20	783.74	0.050541	3.91	3.05	7.97	2.02	0.0502	0.050556	0.38	186.45
Dublin Gulch Div	150	500-YEAR	17.20	782.38	783.06	0.68	783.36	784.04	0.050479	4.38	3.93	8.61	2.07	0.0502	0.050528	0.46	221.55
Dublin Gulch Div	119.75	100-YEAR	11.90	780.86	781.44	0.58	781.68	782.21	0.050139	3.89	3.06	7.98	2.01	0.0506	0.050340	0.38	185.32
Dublin Gulch Div	119.75	500-YEAR	17.20	780.86	781.55	0.69	781.84	782.52	0.050170	4.37	3.93	8.61	2.07	0.0506	0.050325	0.46	220.51
Dublin Gulch Div	100	100-YEAR	11.90	779.86	780.44	0.58	780.68	781.22	0.050686	3.91	3.04	7.97	2.02	0.0505	0.050412	0.38	186.86
Dublin Gulch Div	100	500-YEAR	17.20	779.86	780.54	0.68	780.84	781.52	0.050623	4.39	3.92	8.61	2.07	0.0505	0.050397	0.46	222.04
Dublin Gulch Div	76.83	100-YEAR	11.90	778.69	779.27	0.58	779.51	780.05	0.050467	3.90	3.05	7.97	2.01	0.0505	0.050576	0.38	186.24
Dublin Gulch Div	76.83	500-YEAR	17.20	778.69	779.37	0.68	779.68	780.35	0.050513	4.38	3.92	8.61	2.07	0.0505	0.050568	0.46	221.66
Dublin Gulch Div	56.62	100-YEAR	11.90	777.67	778.25	0.58	778.49	779.03	0.050484	3.90	3.05	7.97	2.02	0.0503	0.050475	0.38	186.29
Dublin Gulch Div	56.62	500-YEAR	17.20	777.67	778.35	0.68	778.66	779.33	0.050527	4.38	3.92	8.61	2.07	0.0503	0.050520	0.46	221.71
Dublin Gulch Div	30	100-YEAR	11.90	776.33	776.91	0.58	777.15	777.68	0.050291	3.90	3.05	7.98	2.01	0.0510	0.050387	0.38	185.76
Dublin Gulch Div	30	500-YEAR	17.20	776.33	777.02	0.69	777.32	777.99	0.050299	4.38	3.93	8.61	2.07	0.0510	0.050413	0.46	220.95
Dublin Gulch Div	20	100-YEAR	11.90	775.82	776.40	0.58	776.64	777.18	0.050814	3.91	3.04	7.97	2.02	0.0100	0.050553	0.38	187.21
Dublin Gulch Div	20	500-YEAR	17.20	775.82	776.50	0.68	776.80	777.49	0.050728	4.39	3.92	8.60	2.08	0.0100	0.050513	0.46	222.39
Dublin Gulch Div	15	100-YEAR	11.90	775.77	776.53	0.76	776.59	776.89	0.016268	2.65	4.49	8.92	1.19	0.0100	0.033541	0.50	78.58
Dublin Gulch Div	15	500-YEAR	17.20	775.77	776.59	0.82	776.76	777.18	0.024500	3.42	5.03	9.28	1.48	0.0100	0.037614	0.54	127.44

HEC-RAS Plan: DGDC River: DGDC Reach: Dublin Gulch Div (Continued)

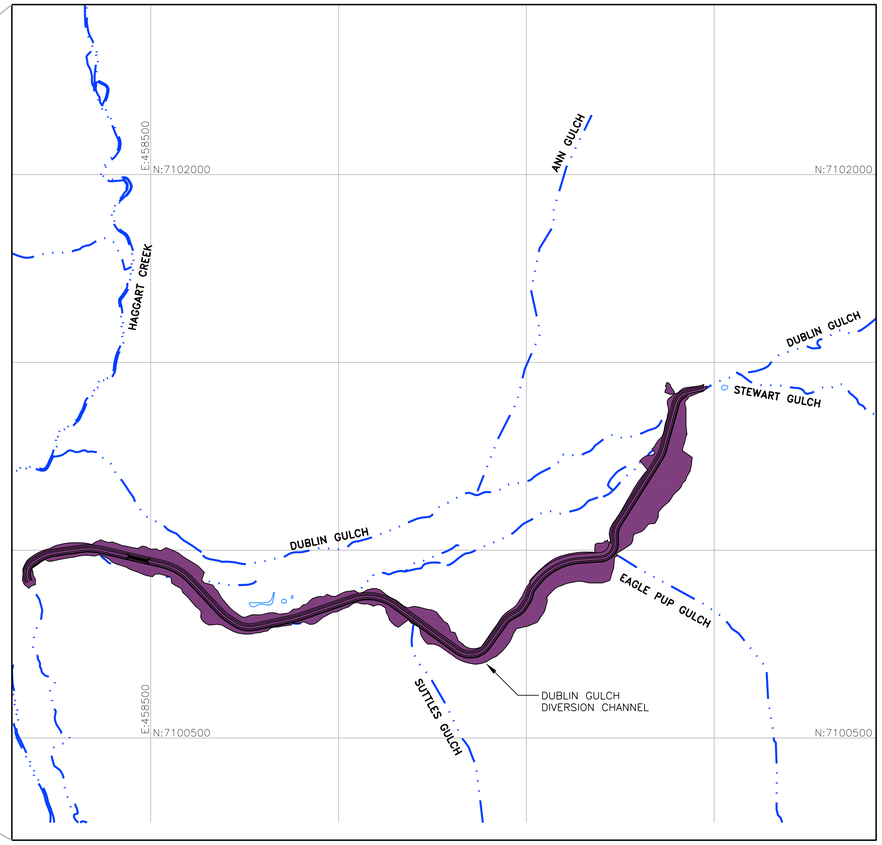
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Max Chl Dpth	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Invert Slope	Frctn Slope	Hydr Depth	Shear Total
			(m3/s)	(m)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)			(m/m)	(m)	(N/m2)
Dublin Gulch Div	10	100-YEAR	11.90	775.72	776.49	0.77	776.54	776.82	0.014444	2.54	4.69	9.13	1.13	0.0100	0.013761	0.51	71.34
Dublin Gulch Div	10	500-YEAR	17.20	775.72	776.64	0.92	776.70	777.04	0.013913	2.79	6.16	10.04	1.14	0.0100	0.017570	0.61	81.70
Dublin Gulch Div	5	100-YEAR	11.90	775.67	776.43	0.76	776.49	776.77	0.015356	2.59	4.59	9.07	1.16	0.0100	0.012870	0.51	74.77
Dublin Gulch Div	5	500-YEAR	17.20	775.67	776.59	0.92	776.65	777.00	0.014432	2.83	6.08	9.99	1.16	0.0100	0.012307	0.61	84.08
Dublin Gulch Div	0	100-YEAR	11.90	775.62	776.38	0.76	776.44	776.72	0.015587	2.60	4.57	9.05	1.17		0.013362	0.51	75.66
Dublin Gulch Div	0	500-YEAR	17.20	775.62	776.54	0.92	776.60	776.94	0.014406	2.83	6.08	10.00	1.16		0.012574	0.61	83.95

APPENDIX E
DRAWINGS

STRATAGOLD CORPORATION
EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL



REGIONAL LOCATION MAP
N.T.S.



PROJECT LOCATION MAP
N.T.S.

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02	GENERAL NOTES
03	EXISTING CONDITIONS AND SURVEY CONTROL
04	OVERVIEW MAP
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06	EROSION CONTROL PLAN
07	EROSION CONTROL DETAILS
08	OVERALL PLAN VIEW
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21	CROSS SECTIONS
22	CROSS SECTIONS

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER

StrataGold Corporation

REFERENCES		REFERENCES		REVISIONS						REVISIONS							
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	SCALE: NONE	DATE
										2	EXTERNAL REVIEW	DJM	DE	4/23/2013		DESIGNED BY SA	12/20/2013
										C	INTERNAL REVIEW	DJM	DE	4/5/2013		DRAWN BY DJM	12/20/2013
										1	EXTERNAL REVIEW	DJM	DE	2/15/2013		CHECKED BY DE	12/20/2013
										B	INTERNAL REVIEW	DJM	DE	2/12/2013		PROJECT MGR TROY MEYER	
				3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013		A	INTERNAL REVIEW	DJM	DE	2/08/2013		CLIENT APPR.	

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EAGLE GOLD PROJECT
EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
TITLE SHEET AND
DRAWING INDEX

PROJECT NO. TT 114-201087
DWG NO. 01
REV NO. 3
DATE 12/2013

GENERAL NOTES

1. EXISTING SURVEY MONUMENTS WHICH ARE DISTURBED OR DAMAGED DUE TO CONSTRUCTION OF THIS PROJECT SHALL BE REPLACED BY A LICENSED SURVEYOR USING STANDARD SURVEY TECHNIQUES AND IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPROPRIATE AGENCY AT THE CONTRACTOR'S EXPENSE.
2. ALL EXISTING STRUCTURES, FENCES, PROPERTY CORNER PINS AND IMPROVEMENTS DESTROYED, DAMAGED, OR REMOVED DUE TO CONSTRUCTION OF THIS PROJECT SHALL BE REPLACED OR RESTORED IN LIKE AND KIND AT CONTRACTOR'S EXPENSE, UNLESS OTHERWISE INDICATED.
3. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE CONSTRUCTION PLANS AND SPECIFICATIONS FOR THE PROJECT, AND ALL APPLICABLE PERMITS AT THE PROJECT SITE.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE ENGINEER AND THE OWNER. THE ENGINEER AND THE OWNER RESERVE THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFIRM TO ITS STANDARDS AND SPECIFICATIONS.
5. THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND THE OWNER A MINIMUM OF 48 HOURS AND A MAXIMUM OF 96 HOURS PRIOR TO STARTING CONSTRUCTION.
6. THE CONTRACTOR SHALL PROTECT ALL WORK AREAS AND FACILITIES FROM WATER AT ALL TIMES. AREAS AND FACILITIES SUBJECTED TO FLOODING, REGARDLESS OF THE SOURCE OF WATER SHALL BE PROMPTLY DEWATERED AND RESTORED AT NO COST TO THE OWNER.

CONSTRUCTION EARTHWORK NOTES:

1. ALL EARTHWORK SHALL COMPLY WITH THE REQUIREMENTS OF "EAGLE GOLD MINE GEOTECHNICAL REPORT" PREPARED BY BGC ENGINEERING INC., DATED OCTOBER 18, 2012.
2. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS INCLUDING BUT NOT LIMITED TO SURFACE TOPOGRAPHY, SUBSURFACE CONDITIONS, UNDERGROUND PIPES AND APPURTENANCES.
3. EXCAVATION AND TRENCHING ACTIVITIES SHALL CONFORM TO ALL APPLICABLE LOCAL, PROVINCIAL, AND NATIONAL CANADIAN SAFETY REGULATIONS, AND THE MOST RECENT EAGLE GOLD SITE SAFETY MANUAL.

GRADING, EROSION AND SEDIMENT CONTROL NOTES

1. ALL GRADING, EROSION AND SEDIMENT CONTROL MEASURES ARE SUBJECT TO THE GENERAL NOTES LISTED HERE.
2. TOTAL AREA OF THE SITE TO BE DISTURBED IS APPROXIMATELY 14.0 HECTARES.
3. AT ALL TIMES DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING AND CONTROLLING ON-SITE EROSION DUE TO WIND AND RUNOFF, AS WELL AS VEHICLE TRACKING. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL APPROVED TEMPORARY AND/OR PERMANENT EROSION AND SEDIMENT CONTROL FACILITIES SHOWN HERE.
4. ALL PERIMETER EROSION CONTROL MEASURES SHALL BE INSTALLED AND FUNCTIONAL PRIOR TO ANY OTHER EARTH DISTURBING ACTIVITY. ALL OTHER STRUCTURAL EROSION CONTROL MEASURES SHALL BE IMPLEMENTED AS SOON AS THE CONSTRUCTION ACTIVITIES, AROUND WHICH THEY ARE BASED, COMMENCE.
5. ANY EROSION CONTROL FACILITY DAMAGED OR DESTROYED PREMATURELY, BY ANY MEANS, SHALL BE IMMEDIATELY REPAIRED OR REPLACED BY THE CONTRACTOR.
6. THERE SHALL BE NO EARTH DISTURBING ACTIVITY OUTSIDE THE LIMITS DESIGNATED ON THESE PLANS.
7. TOPSOIL SHALL BE REMOVED AND STOCK PILED PRIOR TO GRADING OPERATIONS AT A SITE DESIGNATED BY THE ONSITE ENGINEER OR OWNER.
8. A WATER-FILLED TRUCK OR OPERATIONAL TRUCK SHALL BE KEPT ON SITE AT ALL TIMES DURING EARTHWORK ACTIVITIES FOR DUST ABATEMENT.
9. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE THROUGH THE CONCRETE WASHOUT AREA SHOWN ON THE PLANS. ADDITIONAL STABILIZED CONSTRUCTION ENTRANCES MAY BE ADDED WITH AUTHORIZATION FROM THE ENGINEER.
10. CONDITIONS IN THE FIELD MAY WARRANT EROSION CONTROL MEASURES IN ADDITION TO WHAT IS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL IMPLEMENT WHATEVER MEASURES ARE DETERMINED NECESSARY, AS DIRECTED BY THE ONSITE ENGINEER OR OWNER.
11. SILT AND SEDIMENT SHALL BE REMOVED AFTER EACH SUBSTANTIAL RAINFALL.
12. PERMANENT SOIL EROSION CONTROL MEASURES WILL INCLUDE EROSION CONTROL BLANKETS. PERMANENT SOIL EROSION CONTROL MEASURES SHALL BE UNDERTAKEN AS SOON AS POSSIBLE AFTER REMOVAL OF TOPSOIL MATERIAL AND GRADING, BUT NO LATER THAN THIRTY (30) DAYS AFTER COMPLETION OF CONSTRUCTION ACTIVITIES. PRIOR TO INSTALLATION OF PERMANENT EROSION CONTROL MEASURES, THE EXPOSED SOIL SHALL BE KEPT MOIST, AS NECESSARY, TO PREVENT WIND EROSION.
13. THE APPROVED EROSION CONTROL PLAN MAY REQUIRE CHANGES OR ALTERATIONS AFTER APPROVAL TO MEET CHANGING SITE OR PROJECT CONDITIONS OR TO ADDRESS INEFFICIENCIES IN DESIGN OR INSTALLATION. ANY VARIATION IN MATERIAL OR LOCATION OF EROSION AND SEDIMENT CONTROLS FROM THESE PLANS WILL REQUIRE WRITTEN APPROVAL FROM THE ENGINEER OR AN ACCOUNTABLE REPRESENTATIVE OF THE OWNER.
14. NEGATIVE IMPACTS TO DOWNSTREAM AREAS CAUSED BY THE GRADING ARE TO BE MONITORED AND CORRECTED BY THE CONTRACTOR. ANY OFF-SITE CLEANUP, DIRECTED BY THE ONSITE ENGINEER, (INCLUDING STREET CLEANING), SHALL BE COMPLETED WITHIN 24-HOURS OF WRITTEN INSTRUCTION, OR RISK CONSTRUCTION STOPPAGE.
15. SOILS THAT WILL BE STOCKPILED FOR MORE THAN THIRTY (30) DAYS SHALL BE MULCHED AND SEEDED WITH A TEMPORARY OR PERMANENT GRASS COVER WITHIN FOURTEEN (14) DAYS OF STOCKPILE CONSTRUCTION. NO STOCKPILES SHOULD BE WITHIN THIRTY (30) METERS OF A DRAINAGE WAY UNLESS APPROVED BY THE ENGINEER.
16. TEMPORARY EROSION CONTROL MEASURES SHALL NOT BE REMOVED, UNTIL SUCH TIME AS ALL TRIBUTARY DISTURBED AREAS ARE SUFFICIENTLY STABILIZED IN THE OPINION OF THE ONSITE ENGINEER, TO MINIMIZE EROSION POTENTIAL.
17. WHEN TEMPORARY EROSION CONTROL MEASURES ARE REMOVED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEANUP AND REMOVAL OF ALL SEDIMENT AND DEBRIS FROM ALL DRAINAGE AND OTHER FACILITIES.
18. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ACTUAL CONSTRUCTION. THE CONTRACTOR SHALL FIELD VERIFY SIZE AND HORIZONTAL AND VERTICAL LOCATIONS OF EXISTING FACILITIES PRIOR TO CONSTRUCTION, AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
19. ALL TRENCHES SHALL BE ADEQUATELY SUPPORTED AND THE SAFETY OF WORKERS PROVIDED FOR AS REQUIRED BY THE MOST RECENT MINE SAFETY REGULATIONS FOR CONSTRUCTION, AND THE MOST RECENT EAGLE GOLD MINE SITE SAFETY MANUAL.

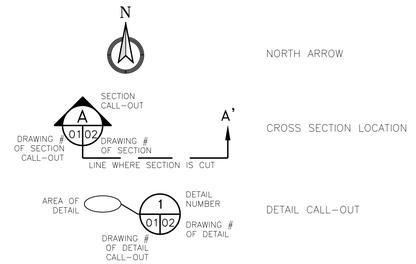
GENERAL ABBREVIATIONS

~	–	APPROXIMATELY
BMP	–	BEST MANAGEMENT PRACTICE
BH	–	BOREHOLE
℄	–	CENTERLINE
CD	–	CHECK DAM
CWA	–	CONCRETE WASHOUT AREA
CL	–	CREST LENGTH
C#	–	CURVE NUMBER
DIA.	–	DIAMETER
EL.	–	ELEVATION
ECB	–	EROSION CONTROL BLANKET
H:V	–	HORIZONTAL:VERTICAL
HPTRM	–	HIGH PERFORMANCE TURF REINFORCEMENT MAT
L#	–	LINE NUMBER
MAX.	–	MAXIMUM
m	–	METER
mm	–	MILLIMETER
MIN.	–	MINIMUM
MW	–	MONITOR WELL
NOM.	–	NOMINAL
(N,E)	–	(NORTHING, EASTING)
N.T.S.	–	NOT TO SCALE
#	–	NUMBER
OC	–	OUTCROP
O.C.	–	ON CENTER
PVIE	–	POINT OF VERTICAL INTERSECTION ELEVATION
PVIS	–	POINT OF VERTICAL INTERSECTION STATION
PVC	–	POLYVINYL CHLORIDE
RCBC	–	REINFORCED CONCRETE BOX CULVERT
ROM	–	RUN-OF-MINE
SL	–	SECTION LINE
TP	–	TEST PIT
TYP.	–	TYPICAL
UTM	–	UNIVERSAL TRANSVERSE MERCATOR
WT	–	WATTLE

GENERAL LEGEND

- EXISTING CONTOURS (1020)
- PROPOSED CONTOURS (1020)
- ROADS
- CHANNEL
- SURFACE FLOW DIRECTION & SLOPE (2.5:1)
- DIVERSION CHANNEL

GENERAL SYMBOLS



BMP LEGEND

- LIMITS OF GRADING
- CWA — CONCRETE WASHOUT AREA (SEE SHEET 07 FOR DETAILS)
- WT — WATTLE (SEE SHEET 07 FOR DETAILS)
- CD — ROCK CHECK DAM (SEE SHEET 07 FOR DETAILS)
- ECB — EROSION CONTROL BLANKET OR EQUIVALENT (SEE SHEET 07 FOR DETAILS)

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — 20 DEC 8

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
2	EXTERNAL REVIEW	DJM	DE	4/23/2013	
C	INTERNAL REVIEW	DJM	DE	4/5/2013	
1	EXTERNAL REVIEW	DJM	DE	2/15/2013	
B	INTERNAL REVIEW	DJM	DE	2/12/2013	
A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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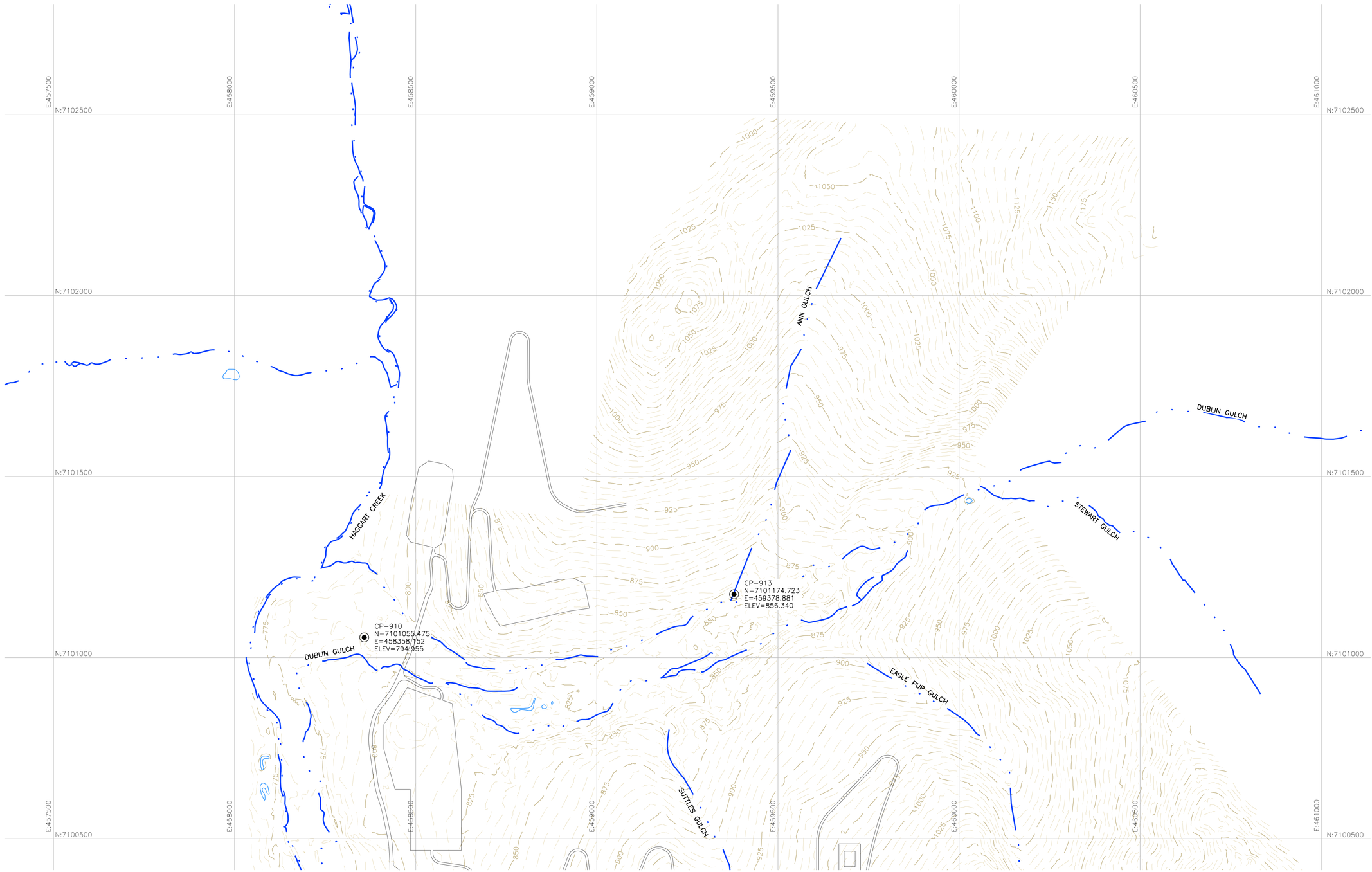
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
GENERAL NOTES

PROJECT NO. TT 114-201087
DWG NO. 02
REV NO. 3
DATE 12/2013



N

SCALE

50m 0 150m

1cm = 50m

CONTOUR INTERVAL 5m

GENERAL LEGEND

- 1020 EXISTING CONTOURS
- EXISTING DRAINAGE CHANNEL
- CONTROL POINT

NOTE:

1. SURVEY WAS DONE BY UNDERHILL GEOMATICS LTD.
2. COORDINATE SYSTEM HORIZONTAL PROJECTION IS NAD83 (CSRS) (ZONE 8, 135° WEST)

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
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C	INTERNAL REVIEW	DJM	DE	4/5/2013	
1	EXTERNAL REVIEW	DJM	DE	2/15/2013	
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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

SCALE:	NONE	DATE
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DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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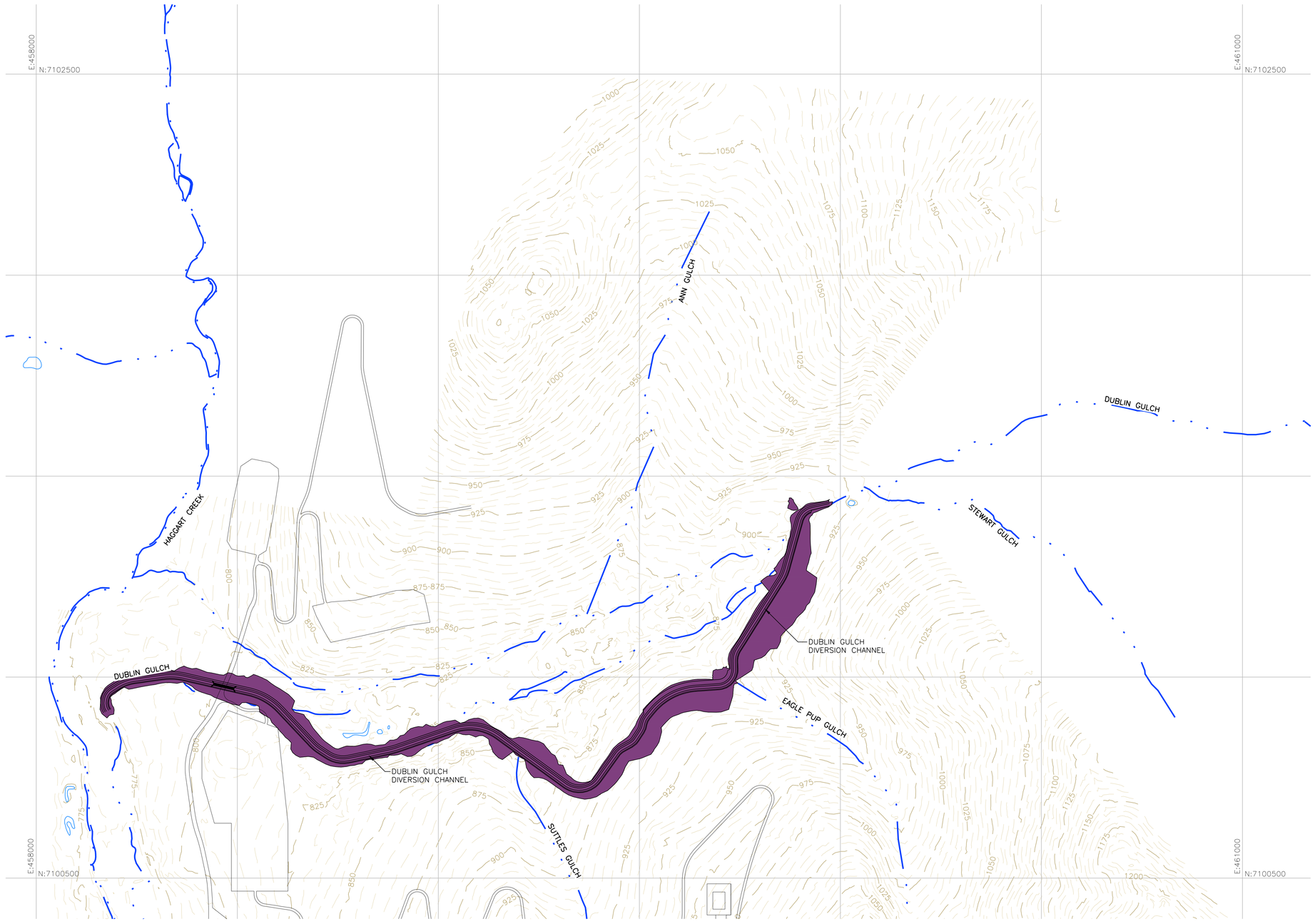
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
EXISTING CONDITIONS AND
SURVEY CONTROL

PROJECT NO.	TT 114-201087
DWG NO.	03
REV NO.	DATE
3	12/2013



N

SCALE

50m 0 150m

1cm = 50m

CONTOUR INTERVAL 5m

GENERAL LEGEND

- 1020 EXISTING CONTOURS
- 1020 PROPOSED CONTOURS
- ROADS
- CHANNEL
- DRAINAGE CHANNEL
- DIVERSION CHANNEL

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
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3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

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		DATE
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PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
OVERVIEW MAP

PROJECT NO.	TT 114-201087
DWG NO.	04
REV NO.	3
DATE	12/2013

N

SCALE

25m 0 75m

1cm = 25m

CONTOUR INTERVAL 1m

GENERAL LEGEND

- 1020 — PROPOSED CONTOURS
- COLLUVIAL APRON OR BLANKET
- OTHER ALLUVIAL DEPOSITS
- PLACER TAILINGS
- TILL BLANKET
- BEDROCK WITH COLUVIUM VENEER
- ALLUVIAL FAN
- TEST PIT
- BOREHOLE
- OUTCROP
- DRY WELL
- WEIR
- MONITORING WELL

NOTES:

1. STOCKPILES TO LOCATED BEFORE CONSTRUCTION BASED ON MATERIALS HANDLING PLAN.
2. TEST PITS AND BOREHOLE LOGS ARE PROVIDED IN EAGLE MINE GOLD GEOTECHNICAL REPORT (BGC, 2012).

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER — 26 DEC 8

StrataGold Corporation

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DWG. NO.	TITLE	DWG. NO.	TITLE

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NO.	DESCRIPTION	BY	APPD	DATE	CLIENT
3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

REVISIONS					
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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
GEOLOGY MAP

PROJECT NO. TT 114-201087
DWG NO. 05
REV NO. 3
DATE 12/2013

LEGEND:

- 5025 — PROPOSED CONTOUR MAJOR
- PROPOSED CONTOUR MINOR
- 5025 — EXISTING CONTOUR MAJOR
- EXISTING CONTOUR MINOR
- 2.5:1 — SURFACE FLOW DIRECTION & SLOPE

BMP LEGEND

- LIMITS OF GRADING
- CWA — CONCRETE WASHOUT AREA (SEE SHEET 07 FOR DETAILS)
- WT — WATTLE (SEE SHEET 07 FOR DETAILS)
- CD — ROCK CHECK DAM (SEE SHEET 07 FOR DETAILS)
- ECB — EROSION CONTROL BLANKET OR EQUIVALENT (SEE SHEET 07 FOR DETAILS)

NOTES:

1. ALL EROSION CONTROL MEASURES ARE SUBJECT TO THE EROSION CONTROL NOTES ON SHEETS 02 AND 07.
2. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS INCLUDING BUT NOT LIMITED TO SURFACE TOPOGRAPHY. GEOLOGIC AND SOIL CONDITIONS, SUBSURFACE CONDITIONS, UNDERGROUND PIPES AND APPURTENANCES.
3. EROSION CONTROL BLANKETS MAY BE REQUIRED ON SLOPES EXCEEDING 3:1 (H:V) BASED ON EXISTING SOIL CONDITIONS. FIELD VERIFICATION IS REQUIRED.
4. TOTAL AREA OF THE SITE TO BE DISTURBED IS APPROXIMATELY 14.0 HECTARES.

N

SCALE
25m 0 75m
1cm = 25m
CONTOUR INTERVAL 5m

DUBLIN GULCH
ANN GULCH
DUBLIN GULCH DIVERSION CHANNEL
EAGLE PUP GULCH
SUNLES GULCH

PROFESSIONAL ENGINEER — YUKON TERRITORY — TROY LEE MEYER

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
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CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
EROSION CONTROL PLAN

PROJECT NO.	TT 114-201087
DWG NO.	06
REV NO.	3
DATE	12/2013

CHECK DAM (CD) INSTALLATION NOTES:

1. SEE SHEET 06 FOR CHECK DAM (CD) INSTALLATION LOCATION(S).
2. CHECK DAMS SHALL BE INSTALLED AFTER CONSTRUCTION FENCE, BUT PRIOR TO ANY UPSTREAM LAND DISTURBING ACTIVITIES.
3. RIPRAP UTILIZED FOR CHECK DAMS SHOULD BE OF APPROPRIATE SIZE FOR THE APPLICATION. TYPICAL SIZES OF ROCK USED FOR CHECK DAMS RANGE BETWEEN 75mm AND 150mm.
4. RIPRAP PAD SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 300mm.
5. THE ENDS OF THE CHECK DAM SHALL BE A MINIMUM OF 500mm HIGHER THAN THE CENTER OF THE CHECK DAM.
6. NONWOVEN GEOTEXTILE SHALL BE INSTALLED BEFORE FILLING IN THE ROCK MATERIAL.

CONCRETE WASHOUT AREA (CWA) INSTALLATION NOTES:

1. SEE SHEET 06 FOR CONCRETE WASHOUT AREA (CWA) INSTALLATION LOCATION(S).
2. DO NOT LOCATE AN UNLINED (CWA) WITHIN 120m OF ANY NATURAL DRAINAGE PATH OR BODY OF WATER. DO NOT LOCATE WITHIN 300m OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE (CWA) MUST BE INSTALLED WITH AN IMPERMEABLE LINER (0.4mm THICKNESS) OR SURFACE STORAGE ALTERNATIVES SUCH AS PREFABRICATED CONCRETE WASHOUT DEVICES SHOULD BE USED.
3. THE (CWA) SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
4. (CWA) SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 2m BY 2m SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER AND AT LEAST 1m DEEP.
5. BERM SURROUNDING SIDES AND BACK OF THE (CWA) SHALL HAVE MINIMUM HEIGHT OF 300mm.
6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE (CWA).
7. SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE (CWA), AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE (CWA) TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

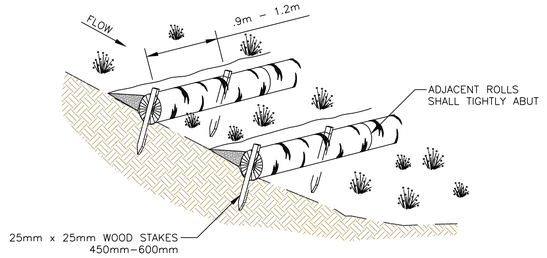
EROSION CONTROL BLANKET (ECB) INSTALLATION NOTES:

1. SEE SHEET 06 FOR EROSION CONTROL BLANKET (ECB) INSTALLATION LOCATION(S).
2. GRADE AND COMPACT AREA TO RECEIVE (EWB) AS DIRECTED AND APPROVED BY THE ENGINEER. SUBGRADE SHALL BE UNIFORM AND SMOOTH. REMOVE ALL ROCKS, CLODS, VEGETATION AND OBJECTS TO ENSURE (EWB) WILL HAVE DIRECT CONTACT WITH SOIL SURFACE.
3. IF SEEDING AND/OR AMENDMENTS ARE TO BE USED ON SOIL SURFACE, PREPARE SOIL AS DESCRIBED IN SPECIAL PROVISIONS. APPLY SEEDING TO SOIL SURFACE BEFORE INSTALLING BLANKET. DISTURBED AREAS SHALL BE RESEEDED.
4. EXCAVATE TRENCHES AT TOP AND TOE OF SLOPES TO BURY EDGES OF (EWB).
5. INSTALL BLANKET AT THE DOWNSTREAM END OF PREVAILING WINDS, PLACE ROLL END INTO TRENCH AND SECURE WITH STAPLING ADVICES, SPACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. POSITION ADJACENT ROLLS AND SECURE IN TRENCH IN SAME MANNER. BACKFILL AND COMPACT SOIL INTO TRENCH AS DIRECTED AND APPROVED BY ENGINEER. UNROLL BLANKET UP THE SLOPE OVER THE COMPACTED TRENCH. CONTINUE INSTALLATION AS DESCRIBED ABOVE, OVERLAPPING ADJACENT BLANKET ROLLS ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
6. SECURE BLANKET USING U-SHAPED STAPLES, 11 GAGE STEEL WIRE, 25mm x 150mm OR 50mm x 200mm. INSTALL STAPLES AT THE MANUFACTURER'S RECOMMENDED FREQUENCY AND PATTERN, PAYING CLOSE ATTENTION TO SLOPE LENGTH AND GRADE, WHICH MAY CHANGE STAPLE SPACING AND FREQUENCY.
7. STAPLE, BACKFILL AND COMPACT END OF BLANKET IN TRENCH AT TOE OF SLOPE.
8. METAL STAPLES SHALL BE DRIVEN FLUSH TO THE SOIL SURFACE AND HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT.
9. TRACKED EQUIPMENT SHALL NOT BE ALLOWED ON THE BLANKET.

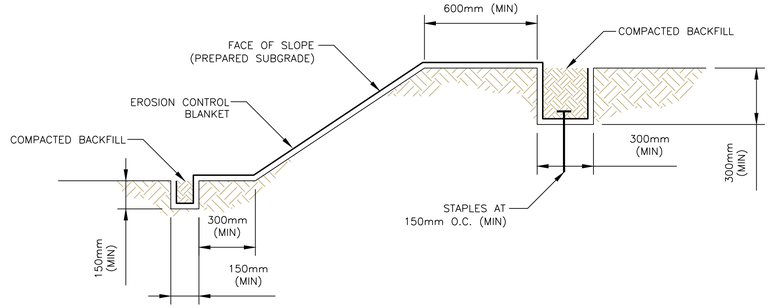
WATTLE (WT) INSTALLATION NOTES:

1. SEE SHEET 06 FOR WATTLE (WT) INSTALLATION LOCATION(S).
2. WHEN INSTALLING RUNNING LENGTHS OF WATTLES. BUTT THE SECOND WATTLE TIGHTLY AGAINST THE FIRST. DO NOT OVERLAP THE ENDS. STAKE THE WATTLES AT EACH END AND 1.2m ON CENTER, FOR EXAMPLE:
   - A 7.6m WATTLE USES 6 STAKES
   - A 6.1m WATTLE USES 5 STAKES
   - A 3.7m WATTLE USES 4 STAKES
3. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE WATTLE. LEAVING 50mm – 75mm OF THE STAKE PROTRUDING ABOVE THE WATTLE. A HEAVY SEDIMENT LOAD WILL TEND TO PICK THE WATTLE UP AND COULD PULL IT OFF THE STAKES IF THEY ARE DRIVEN DOWN TOO LOW. IT MAY BE NECESSARY TO MAKE A HOLE IN THE WATTLE WITH A PICK END OF YOUR MADDOX IN ORDER TO GET THE STAKE THROUGH THE STRAW. WHEN STRAW WATTLES ARE USED FOR FLAT GROUND APPLICATIONS, DRIVE THE STAKES STRAIGHT DOWN; WHEN INSTALLING WATTLES ON SLOPES, DRIVE THE STAKES PERPENDICULAR TO THE SLOPE.
4. DRIVE THE FIRST END STAKE OF THE SECOND WATTLE AT AN ANGLE TOWARD THE FIRST WATTLE IN ORDER TO HELP ABUT THEM TIGHTLY TOGETHER. IF YOU HAVE DIFFICULTY DRIVING THE STAKE INTO EXTREMELY HARD OR ROCKY SLOPES, A PILOT BAR MAY BE NEEDED TO BEGIN THE STAKE HOLE.
5. THE LOCATION AND LENGTH OF WATTLE IS DEPENDENT ON THE CONDITIONS OF EACH SITE.
6. WATTLES SHALL BE INSTALLED PRIOR TO ANY LAND-DISTURBING ACTIVITIES.
7. WATTLES SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
8. WATTLES SHALL NOT BE USED IN CONCENTRATED FLOW AREAS.
9. THE WATTLES SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 50mm.
10. WATTLES SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
11. ON SLOPES, WATTLES SHOULD BE INSTALLED ON CONTOUR WITH A SLIGHT DOWNWARD ANGLE AT THE END OF THE ROW IN ORDER TO PREVENT PONDING AT THE MID SECTION.
12. RUNNING LENGTHS OF WATTLES SHOULD BE ABUTTED FIRMLY TO ENSURE NO LEAKAGE AT THE ABUTMENTS.
13. SPACING – DOWNSLOPE:
    VERTICAL SPACING FOR SLOPE INSTALLATIONS SHOULD BE DETERMINED BY SITE CONDITIONS. SLOPE GRADIENT AND SOIL TYPE ARE THE MAIN FACTORS, A GOOD RULE OF THUMB IS:
    - 1:1 SLOPES = 3m APART
    - 2:1 SLOPES = 6m APART
    - 3:1 SLOPES = 9m APART
    - 4:1 SLOPES = 12m APART, ETC.

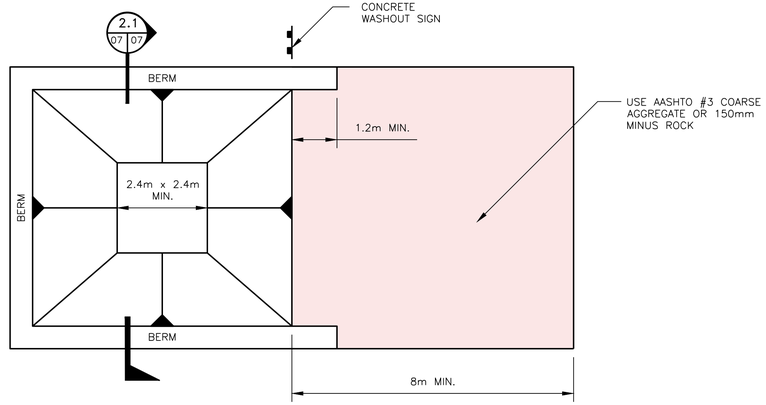
    HOWEVER, ADJUSTMENTS MAY HAVE TO BE MADE FOR THE SOIL TYPE: FOR SOFT, LOAMY SOILS – ADJUST THE ROWS CLOSER TOGETHER: FOR HARD, ROCKY SOILS – ADJUST THE ROWS FURTHER APART. A SECONDARY WATTLE PLACED BEHIND THE ABUTMENT OF TWO WATTLES IS ENCOURAGED ON STEEP SLOPES OR WHERE JOINTS HAVE FAILED IN THE PAST.
14. STAKING: USE WOOD STAKES TO SECURE THE WATTLES. 13mm TO 16mm REBAR IS ALSO ACCEPTABLE. BE SURE TO USE A STAKE THAT IS LONG ENOUGH TO PROTRUDE SEVERAL mm ABOVE THE WATTLE; 450mm IS A GOOD LENGTH FOR HARD, ROCKY SOIL, FOR SOFT LOAMY SOIL USE A 600mm STAKE.



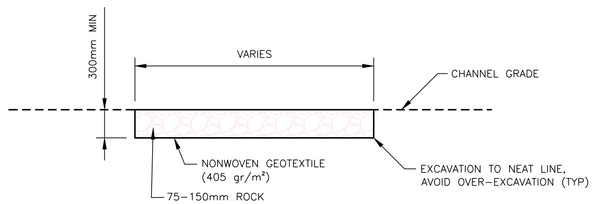
4 07 07 WATTLES DETAIL



3 07 07 EROSION CONTROL BLANKET



2 07 07 CONCRETE WASHOUT AREA PLAN



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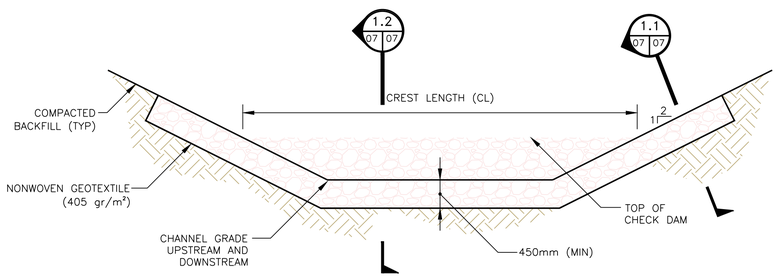

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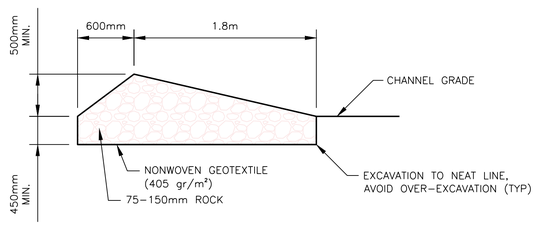

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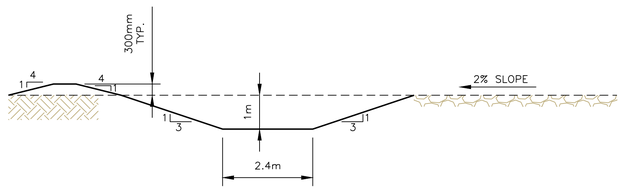

2.1 07 07 CONCRETE WASHOUT SECTION

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 25 082 B

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REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
2	EXTERNAL REVIEW	DJM	DE	4/23/2013	
C	INTERNAL REVIEW	DJM	DE	4/5/2013	
1	EXTERNAL REVIEW	DJM	DE	2/15/2013	
B	INTERNAL REVIEW	DJM	DE	2/12/2013	
A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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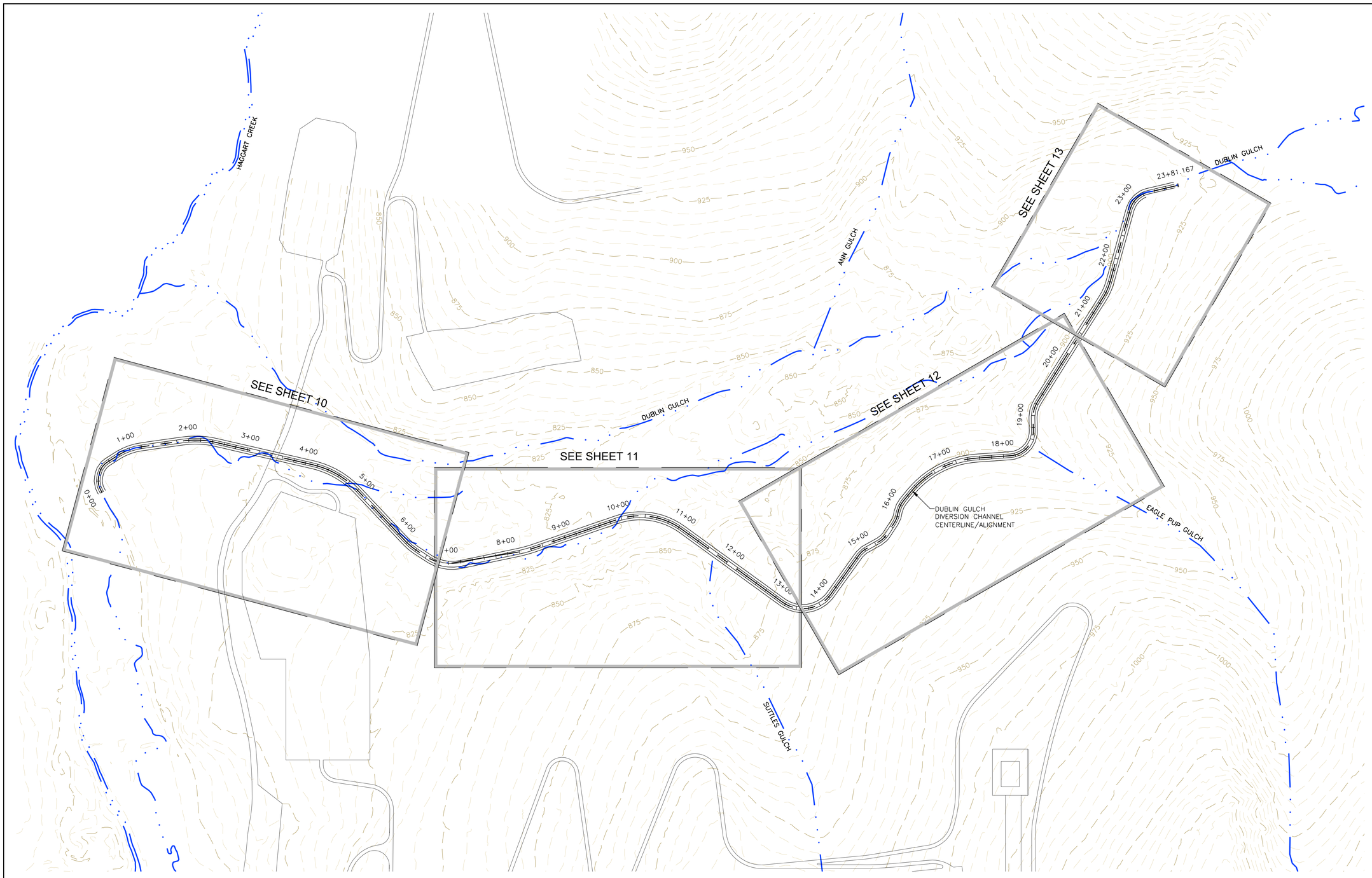
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
EROSION CONTROL DETAILS

PROJECT NO. TT 114-201087
DWG NO. 07
REV NO. 3
DATE 12/2013



PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES		REVISIONS						REVISIONS							
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										B	INTERNAL REVIEW	DJM	DE	2/12/2013		PROJECT MGR TROY MEYER	
				3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013		A	INTERNAL REVIEW	DJM	DE	2/08/2013		CLIENT APPR.	

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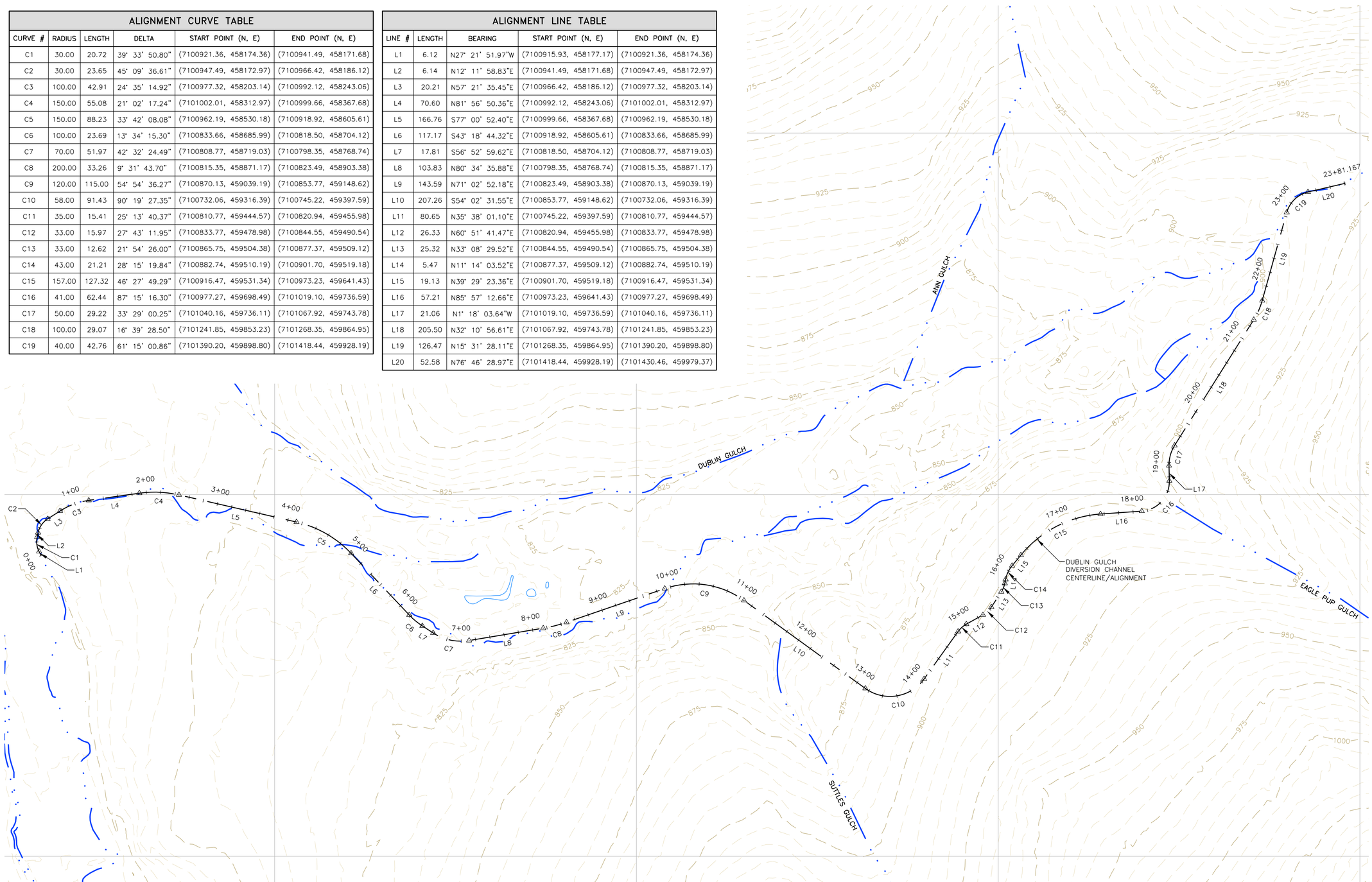
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
OVERALL PLAN VIEW

PROJECT NO. TT 114-201087
DWG NO. 08
REV NO. 3
DATE 12/2013

ALIGNMENT CURVE TABLE					
CURVE #	RADIUS	LENGTH	DELTA	START POINT (N, E)	END POINT (N, E)
C1	30.00	20.72	39° 33' 50.80"	(7100921.36, 458174.36)	(7100941.49, 458171.68)
C2	30.00	23.65	45° 09' 36.61"	(7100947.49, 458172.97)	(7100966.42, 458186.12)
C3	100.00	42.91	24° 35' 14.92"	(7100977.32, 458203.14)	(7100992.12, 458243.06)
C4	150.00	55.08	21° 02' 17.24"	(7101002.01, 458312.97)	(7100999.66, 458367.68)
C5	150.00	88.23	33° 42' 08.08"	(7100962.19, 458530.18)	(7100918.92, 458605.61)
C6	100.00	23.69	13° 34' 15.30"	(7100833.66, 458685.99)	(7100818.50, 458704.12)
C7	70.00	51.97	42° 32' 24.49"	(7100808.77, 458719.03)	(7100798.35, 458768.74)
C8	200.00	33.26	9° 31' 43.70"	(7100815.35, 458871.17)	(7100823.49, 458903.38)
C9	120.00	115.00	54° 54' 36.27"	(7100870.13, 459039.19)	(7100853.77, 459148.62)
C10	58.00	91.43	90° 19' 27.35"	(7100732.06, 459316.39)	(7100745.22, 459397.59)
C11	35.00	15.41	25° 13' 40.37"	(7100810.77, 459444.57)	(7100820.94, 459455.98)
C12	33.00	15.97	27° 43' 11.95"	(7100833.77, 459478.98)	(7100844.55, 459490.54)
C13	33.00	12.62	21° 54' 26.00"	(7100865.75, 459504.38)	(7100877.37, 459509.12)
C14	43.00	21.21	28° 15' 19.84"	(7100882.74, 459510.19)	(7100901.70, 459519.18)
C15	157.00	127.32	46° 27' 49.29"	(7100916.47, 459531.34)	(7100973.23, 459641.43)
C16	41.00	62.44	87° 15' 16.30"	(7100977.27, 459698.49)	(7101019.10, 459736.59)
C17	50.00	29.22	33° 29' 00.25"	(7101040.16, 459736.11)	(7101067.92, 459743.78)
C18	100.00	29.07	16° 39' 28.50"	(7101241.85, 459853.23)	(7101268.35, 459864.95)
C19	40.00	42.76	61° 15' 00.86"	(7101390.20, 459898.80)	(7101418.44, 459928.19)

ALIGNMENT LINE TABLE				
LINE #	LENGTH	BEARING	START POINT (N, E)	END POINT (N, E)
L1	6.12	N27° 21' 51.97"W	(7100915.93, 458177.17)	(7100921.36, 458174.36)
L2	6.14	N12° 11' 58.83"E	(7100941.49, 458171.68)	(7100947.49, 458172.97)
L3	20.21	N57° 21' 35.45"E	(7100966.42, 458186.12)	(7100977.32, 458203.14)
L4	70.60	N81° 56' 50.36"E	(7100992.12, 458243.06)	(7101002.01, 458312.97)
L5	166.76	S77° 00' 52.40"E	(7100999.66, 458367.68)	(7100962.19, 458530.18)
L6	117.17	S43° 18' 44.32"E	(7100918.92, 458605.61)	(7100833.66, 458685.99)
L7	17.81	S56° 52' 59.62"E	(7100818.50, 458704.12)	(7100808.77, 458719.03)
L8	103.83	N80° 34' 35.88"E	(7100798.35, 458768.74)	(7100815.35, 458871.17)
L9	143.59	N71° 02' 52.18"E	(7100823.49, 458903.38)	(7100870.13, 459039.19)
L10	207.26	S54° 02' 31.55"E	(7100853.77, 459148.62)	(7100732.06, 459316.39)
L11	80.65	N35° 38' 01.10"E	(7100745.22, 459397.59)	(7100810.77, 459444.57)
L12	26.33	N60° 51' 41.47"E	(7100820.94, 459455.98)	(7100833.77, 459478.98)
L13	25.32	N33° 08' 29.52"E	(7100844.55, 459490.54)	(7100865.75, 459504.38)
L14	5.47	N11° 14' 03.52"E	(7100877.37, 459509.12)	(7100882.74, 459510.19)
L15	19.13	N39° 29' 23.36"E	(7100901.70, 459519.18)	(7100916.47, 459531.34)
L16	57.21	N85° 57' 12.66"E	(7100973.23, 459641.43)	(7100977.27, 459698.49)
L17	21.06	N1° 18' 03.64"W	(7101019.10, 459736.59)	(7101040.16, 459736.11)
L18	205.50	N32° 10' 56.61"E	(7101067.92, 459743.78)	(7101241.85, 459853.23)
L19	126.47	N15° 31' 28.11"E	(7101268.35, 459864.95)	(7101390.20, 459898.80)
L20	52.58	N76° 46' 28.97"E	(7101418.44, 459928.19)	(7101430.46, 459979.37)



N

SCALE
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1cm = 25m
CONTOUR INTERVAL 5m

GENERAL LEGEND

- EXISTING CONTOURS
- ROADS
- DRAINAGE CHANNEL

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
25 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS							
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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REVISIONS							
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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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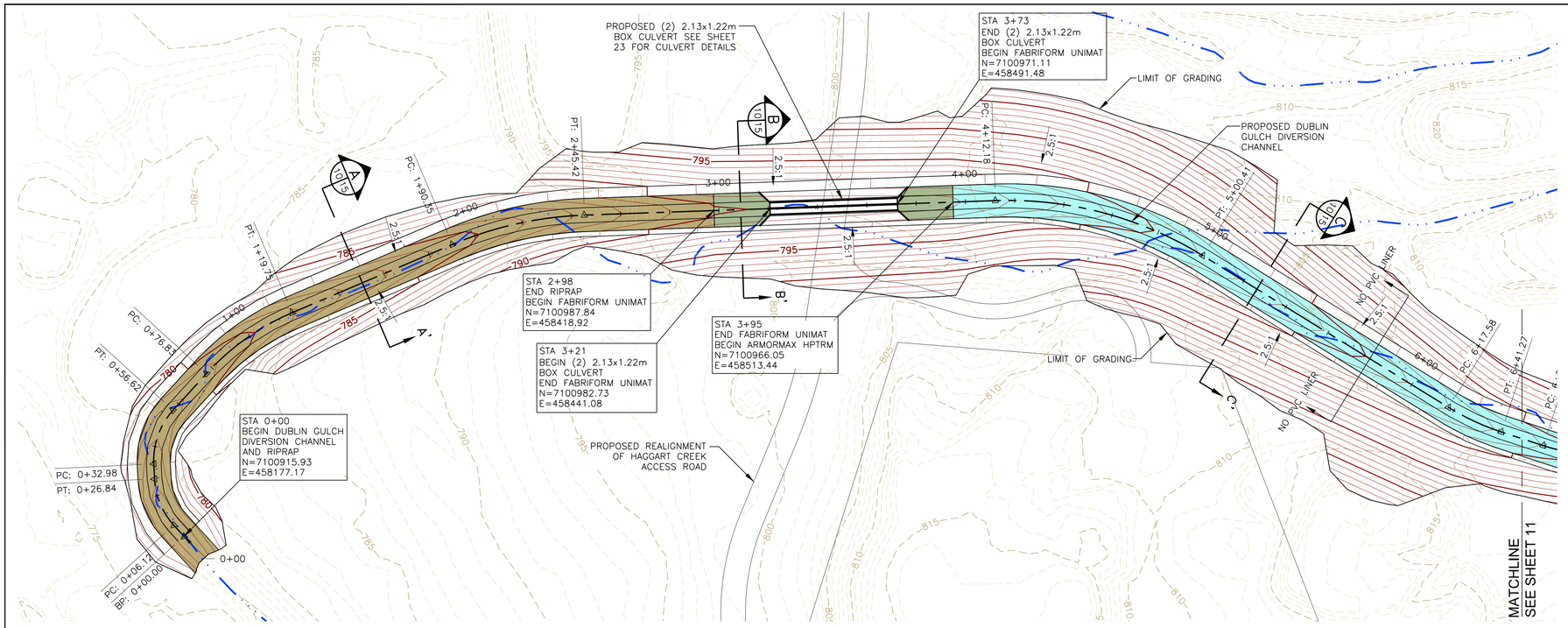
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
HORIZONTAL CONTROL PLAN

PROJECT NO.	TT 114-201087
DWG NO.	09
REV NO.	DATE
3	12/2013



SCALE

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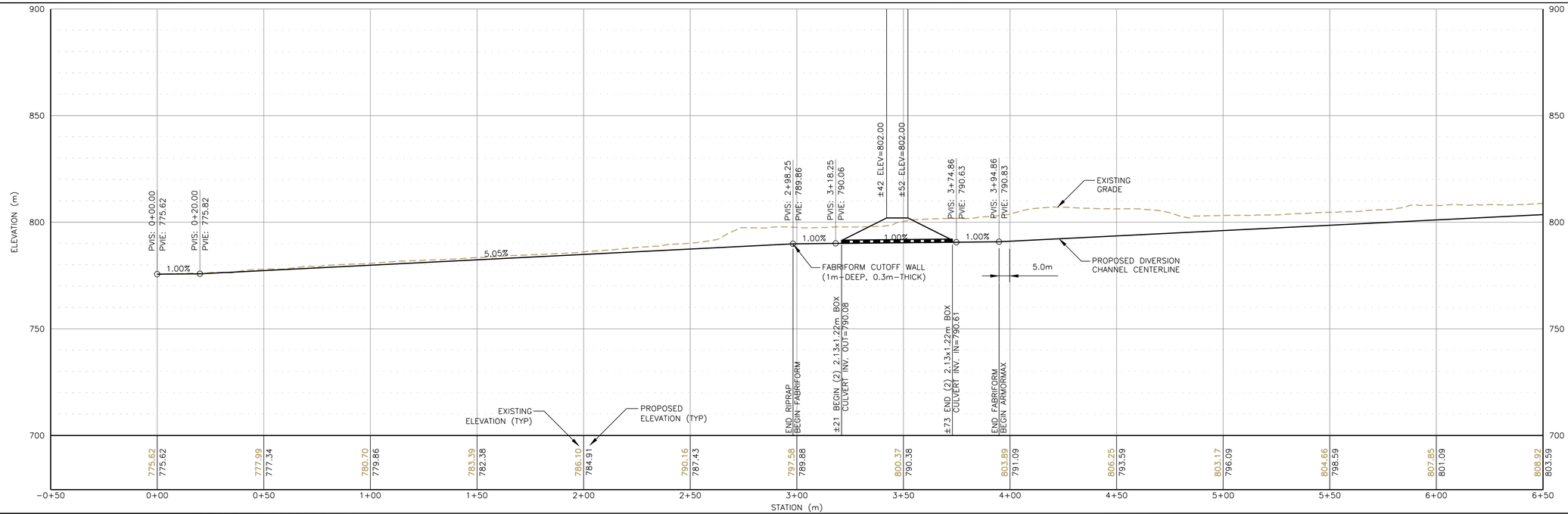
1cm = 10m

CONTOUR INTERVAL 1m

GENERAL LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- ROADS
- DRAINAGE CHANNEL
- FABRIFORM UNIMAT
- ARMORMAX HPTRM
- RIPRAP D_{50}=300mm



PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 20 DEC 13

StrataGold Corporation

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DWG. NO.	TITLE	DWG. NO.	TITLE

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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

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DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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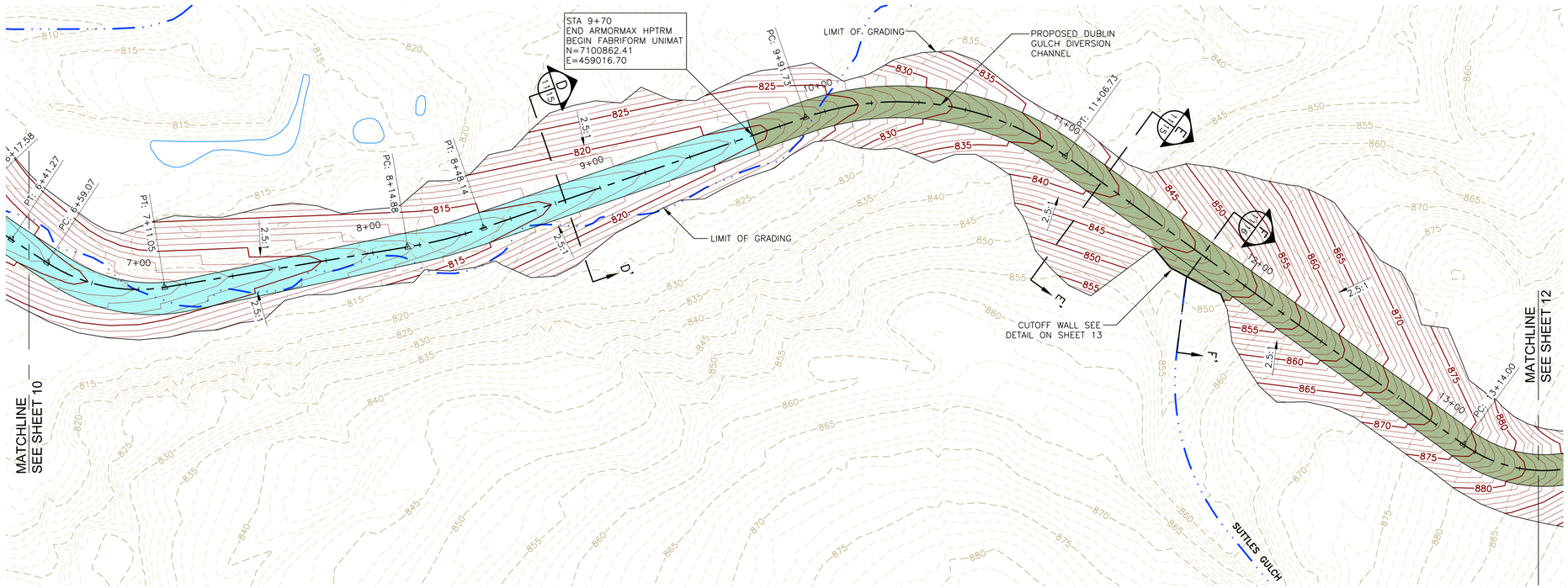
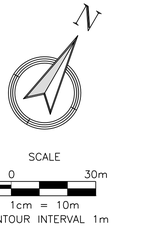
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
PLAN AND PROFILE

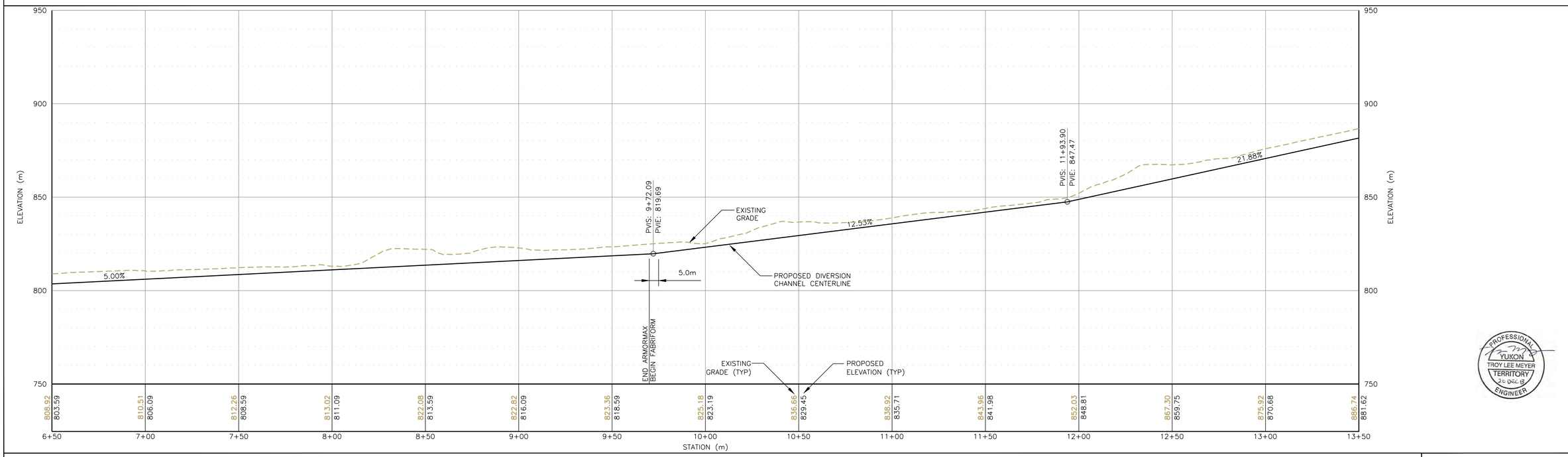
PROJECT NO.	TT 114-201087
DWG NO.	10
REV NO.	3
DATE	12/2013





GENERAL LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- ROADS
- DRAINAGE CHANNEL
- FABRIFORM UNIMAT
- ARMORMAX HPTRM



PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 21 DEC 8

StrataGold Corporation

REFERENCES		REFERENCES	
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		DATE
SCALE:	NONE	
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DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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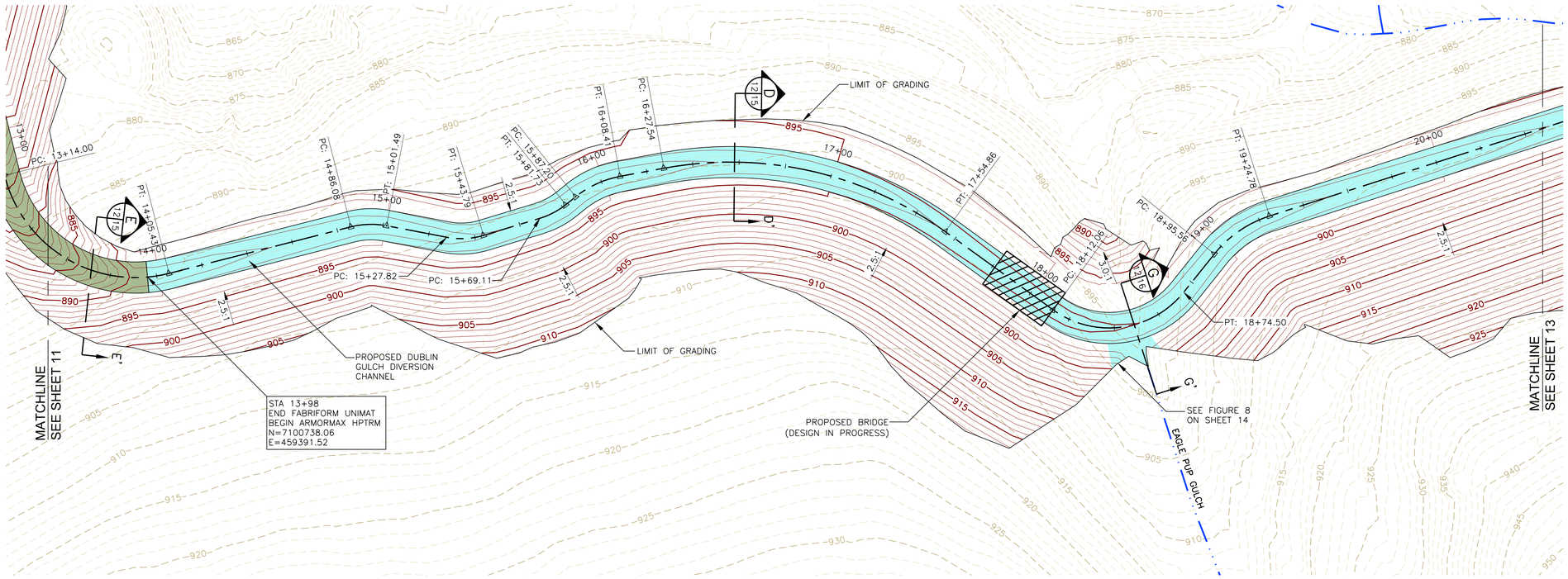
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
PLAN AND PROFILE

PROJECT NO. TT 114-201087
DWG NO. 11
REV NO. 3
DATE 12/2013



SCALE

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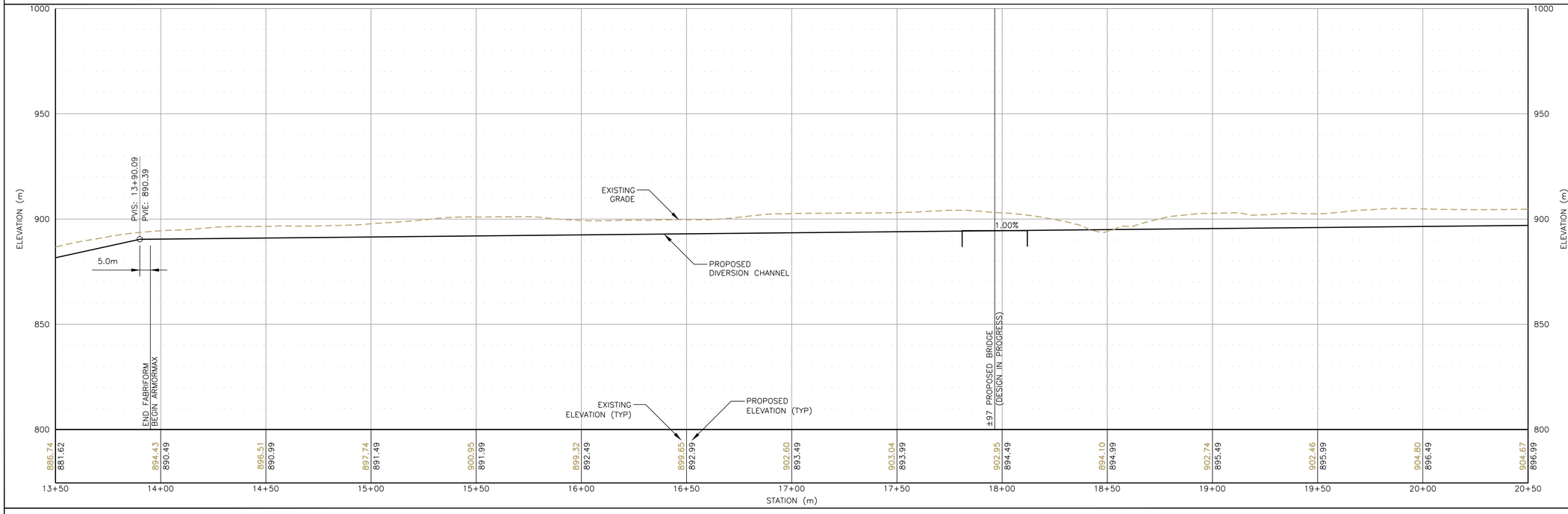
1cm = 10m

CONTOUR INTERVAL 1m

GENERAL LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS
- ROADS
- DRAINAGE CHANNEL
- FABRIFORM UNIMAT
- ARMORMAX HPTRM



PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
21 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

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CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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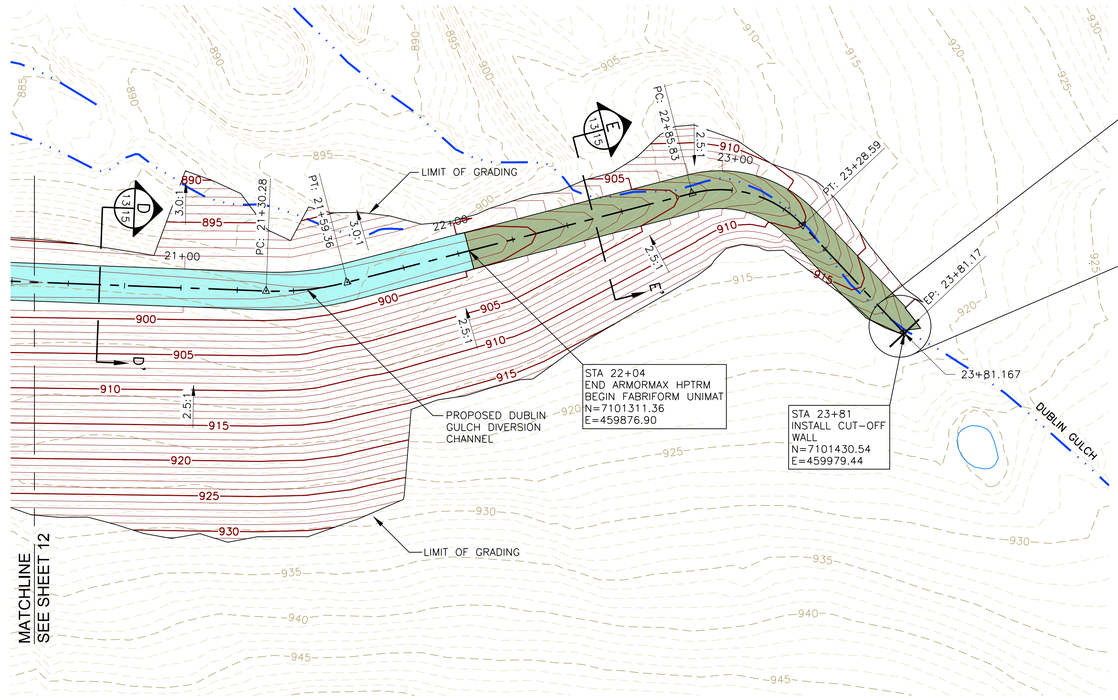
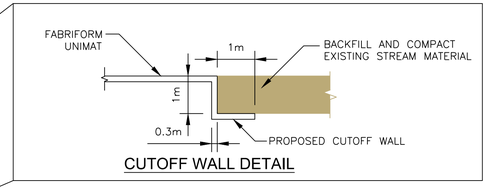
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
PLAN AND PROFILE

PROJECT NO.	TT 114-201087
DWG NO.	12
REV NO.	3
DATE	12/2013





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1cm = 10m
CONTOUR INTERVAL 1m

GENERAL LEGEND

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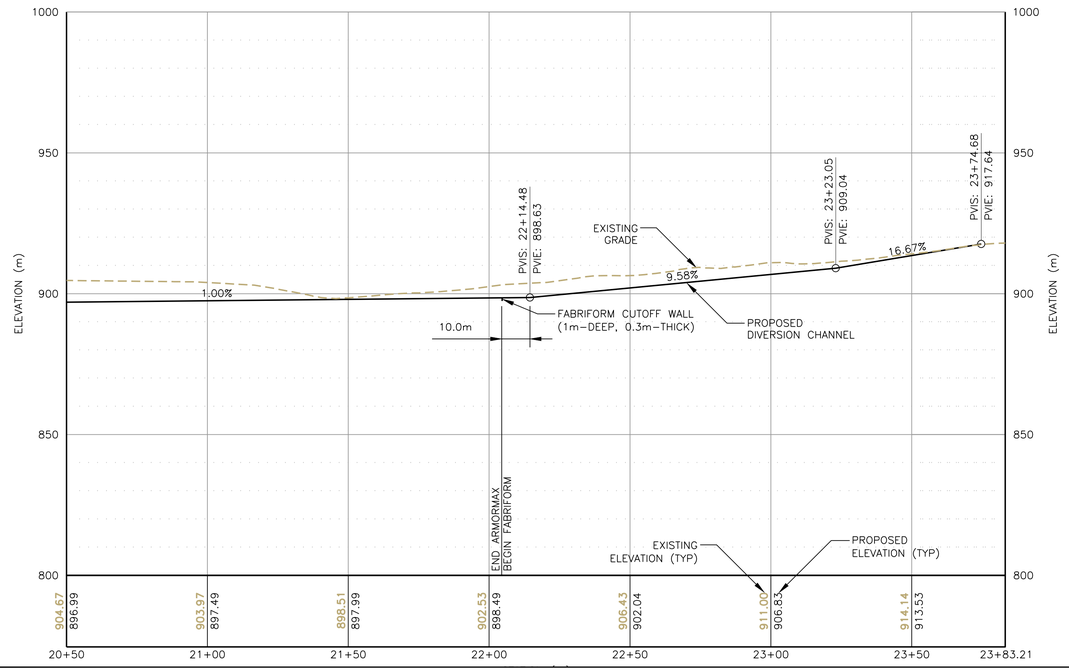
- PROPOSED CONTOURS
- ROADS
- DRAINAGE CHANNEL
- FABRIFORM UNIMAT
- ARMORMAX HPTRM



PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 2c DEC 8

StrataGold Corporation

REFERENCES		REFERENCES	
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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
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DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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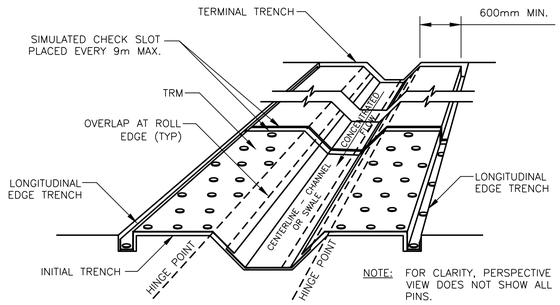
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
PLAN AND PROFILE

PROJECT NO.	TT 114-201087
DWG NO.	13
REV NO.	3
DATE	12/2013



PERSPECTIVE

FIGURE 1: OVERVIEW OF HPTRM IN CHANNEL

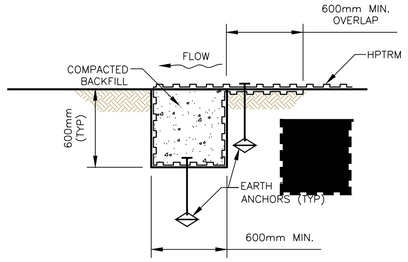


FIGURE 2: INITIAL TRENCH (DOWNSTREAM) DETAIL

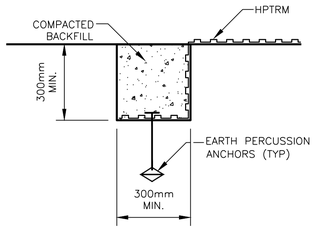
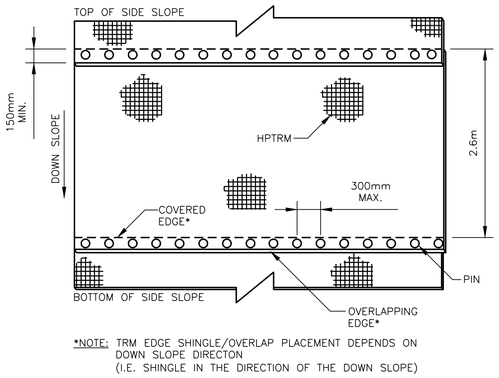


FIGURE 3: LONGITUDINAL EDGE TRENCH DETAIL



*NOTE: TRM EDGE SHINGLE/OVERLAP PLACEMENT DEPENDS ON DOWN SLOPE DIRECTON
(I.E. SHINGLE IN THE DIRECTION OF THE DOWN SLOPE)

FIGURE 4: HPTRM OVERLAP AT ROLL EDGE DETAIL

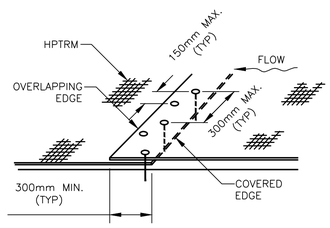


FIGURE 5: HPTRM OVERLAP AT ROLL END DETAIL

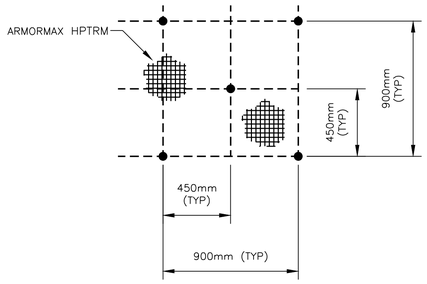


FIGURE 6: ANCHOR PATTERN DETAIL

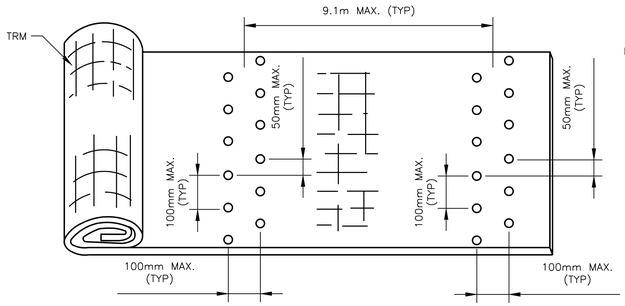


FIGURE 7: SIMULATED CHECK SLOT DETAIL

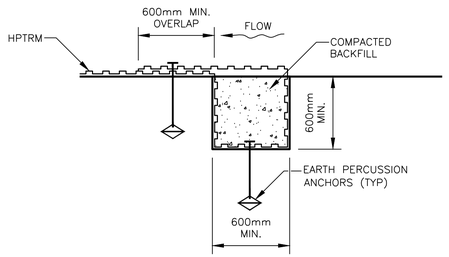


FIGURE 8: TERMINAL TRENCH (UPSTREAM) DETAIL

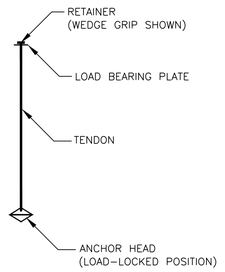


FIGURE 9: EARTH PERCUSSION ANCHOR DETAIL

ARMORMAX – HIGH PERFORMANCE TURF REINFORCEMENT MAT (HPTRM) IN CHANNEL

PRE-CONSTRUCTION

- A PRE-CONSTRUCTION MEETING SHOULD BE HELD WITH THE CONSTRUCTION TEAM AND A REPRESENTATIVE FROM PROPEX. THIS MEETING SHALL BE SCHEDULED BY THE CONTRACTOR WITH AT LEAST TWO WEEKS NOTICE. ALSO, PROPEX SUGGESTS THAT INSTALLATION MONITORING OF THE HPTRM BE PERFORMED BY A QUALIFIED INDEPENDENT THIRD PARTY.

SITE PREPARATION

- GRADE AND COMPACT AREA OF HPTRM INSTALLATION AS DIRECTED AND APPROVED BY ENGINEER. SUBGRADE SHALL BE UNIFORM AND SMOOTH. REMOVE ALL ROCKS, CLODS, VEGETATION OR OTHER OBJECTS SO THE INSTALLED MAT WILL HAVE DIRECT CONTACT WITH SOIL SURFACE.
- PREPARE SUBGRADE BY LOOSENING THE TOP 50-75mm MINIMUM OF SOIL.
- DO NOT MULCH AREAS WHERE MAT IS TO BE PLACED.

INSTALLATION IN DIVERSION CHANNEL

- FIGURE 1 SHOWS GENERAL INSTALLATION LAYOUT AND DETAILS FOR HPTRM IN DIVERSION CHANNEL.
- EXCAVATE AN INITIAL TRENCH 600mm WIDE x 600mm DEEP MINIMUM ACROSS THE CHANNEL AT DOWNSTREAM END OF PROJECT (SEE FIGURE 2). DEEPER INITIAL TRENCH AND/OR HARD ARMORING MAY BE REQUIRED IN CHANNELS THAT HAVE THE POTENTIAL FOR SCOUR.
- EXCAVATE A LONGITUDINAL EDGE TRENCH 300mm WIDE x 300mm DEEP MINIMUM ALONG BOTH SIDES OF THE INSTALLATION TO BURY EDGES OF MAT (SEE FIGURE 3). THE TRENCH SHALL BE LOCATED 600mm MINIMUM OVER CREST OF SLOPE.
- BEGINNING AT THE CENTERLINE OF THE CHANNEL, PLACE ROLL END INTO THE INITIAL TRENCH (WITH 600mm MINIMUM LAP) AND SECURE WITH ANCHORING DEVICES ON 300mm CENTERS (SEE FIGURE 2). POSITION ADJACENT ROLLS AND SECURE IN TRENCH IN SAME MANNER. BACKFILL AND COMPACT SOIL INTO TRENCH AS DIRECTED AND APPROVED BY ENGINEER.
- UNROLL MAT IN THE UPSTREAM DIRECTION OVER THE COMPACTED TRENCH.
- SECURE INITIAL TRENCH LAP WITH ANCHORING DEVICES ON 300mm CENTERS (SEE FIGURE 2).
- SECURE LONGITUDINAL EDGE TRENCH WITH ANCHORING DEVICES ON 300mm CENTERS (SEE FIGURE 3).
- CONTINUE INSTALLATION AS DESCRIBED ABOVE, OVERLAPPING ADJACENT ROLLS AS FOLLOWS:
  - A. ROLL EDGE OVERLAP: 150mm MINIMUM OVERLAP WITH UPSLOPE MAT ON TOP. SECURE WITH ONE ROW OF GROUND ANCHORING DEVICES ON 300mm CENTERS (SEE FIGURE 4).
  - B. ROLL END OVERLAP: 300mm MINIMUM OVERLAP WITH UPSTREAM MAT ON TOP. SECURE WITH TWO ROWS OF GROUND ANCHORING DEVICES STAGGERED 300mm APART ON 300mm CENTERS (SEE FIGURE 5).
- SECURE MAT USING SUGGESTED GROUND ANCHORING DEVICES FOR APPROPRIATE FREQUENCY AND PATTERN SHOWN ON THE ANCHOR PATTERN GUIDE (SEE FIGURE 6).
- FOR CHANNEL REACHES LONGER THAN 13.7m, INSTALL SIMULATED CHECK SLOTS PER FIGURE 7. THIS METHOD INCLUDES PLACING TWO STAGGERED ROWS OF ANCHORS ON 100mm CENTERS AT 9.1m INTERVALS (SEE FIGURE 7) OR ACROSS THE MIDPOINT OF THE CHANNEL FOR CHANNEL LENGTHS LESS THAN 18.2m.
- EXCAVATE TERMINAL TRENCH 600mm WIDE x 600mm DEEP MINIMUM ACROSS THE CHANNEL AT THE UPSTREAM END OF THE PROJECT (SEE FIGURE 8). DEEPER TERMINAL TRENCH AND/OR HARD ARMORING MAY BE REQUIRED IN CHANNELS THAT HAVE THE POTENTIAL FOR SCOUR.
- ANCHOR, BACKFILL AND COMPACT UPSTREAM END OF MAT IN TERMINAL TRENCH (SEE FIGURE 8). TERMINAL TRENCH ANCHORING DEVICES SHOULD BE SPACED ON 300mm CENTERS (SEE FIGURE 8). UNROLL MAT IN DOWNSTREAM DIRECTION OVER COMPACTED TRENCH WITH A MINIMUM 600mm LAP. SECURE LAP WITH ANCHORING DEVICES ON 300mm CENTERS.

GROUND ANCHORING DEVICES

- METAL ANCHORS SHOULD BE AT LEAST 5mm DIAMETER STEEL WITH A 38mm STEEL WASHER AT THE HEAD OF THE ANCHOR (SEE FIGURE 9). METAL ANCHORS SHOULD BE DRIVEN FLUSH TO THE SOIL SURFACE. ANCHORS SHOULD BE BETWEEN 150-600mm LONG AND HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. LONGER ANCHORS MAY BE REQUIRED FOR LOOSER SOILS. HEAVIER METAL STAKES MAY BE REQUIRED IN ROCKY SOILS. DEPENDING ON SOIL PH AND DESIGN LIFE OF THE ANCHOR, GALVANIZED OR STAINLESS STEEL ANCHORS MAY BE REQUIRED. CONSULT PROJECT PLANS AND/OR SPECIFICATIONS FOR TIE DOWN DEVICE DETAILS.

SPECIAL TRANSITIONS

- FOR APPLICATIONS THAT REQUIRE SPECIAL TRANSITIONS (I.E. CONNECTIONS TO RIPRAP, CONCRETE, HEADWALLS, ETC.), REFER TO PAGE 6 OF THE INSTALLATION GUIDELINES FOR LANDLOK TRMS AND ARMORMAX HPTRMS.

PROFESSIONAL ENGINEER YUKON TROY LEE MEYER TERRITORY 26 DEC. 13

StrataGold Corporation

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DWG. NO.	TITLE	DWG. NO.	TITLE

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SCALE:	N.T.S.	
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PROJECT MGR	TROY MEYER	
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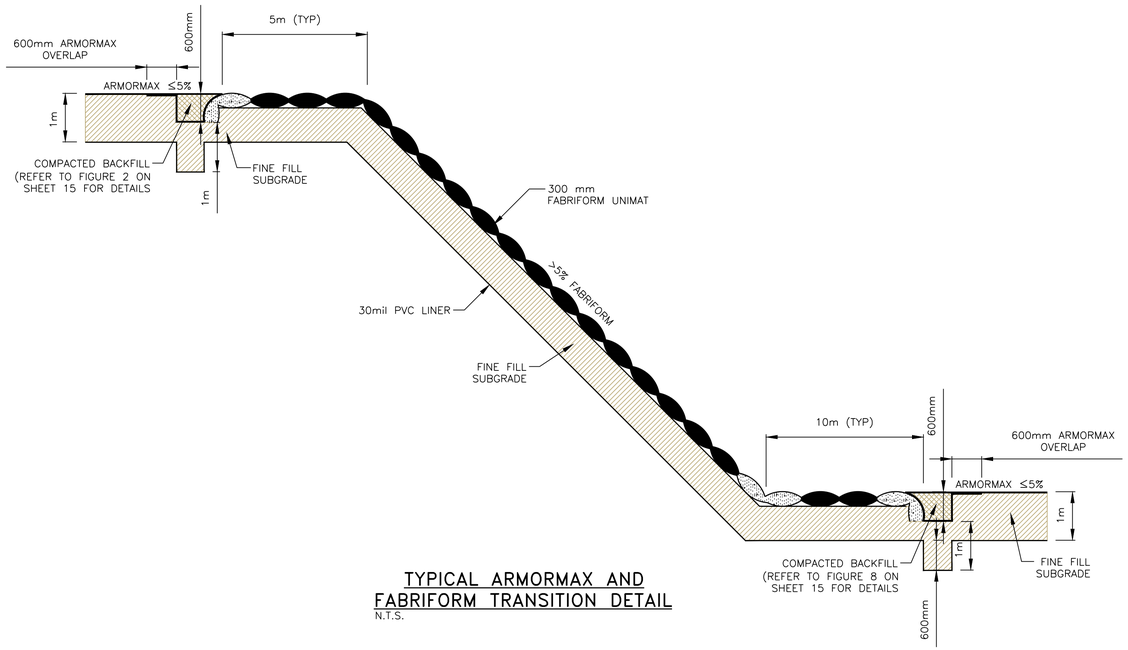
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
DIVERSION DETAILS

PROJECT NO.	TT 114-201087
DWG NO.	14
REV NO.	3
DATE	12/2013



TYPICAL ARMORMAX AND FABRIFORM TRANSITION DETAIL
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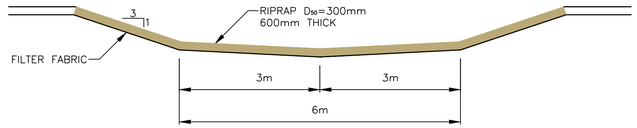

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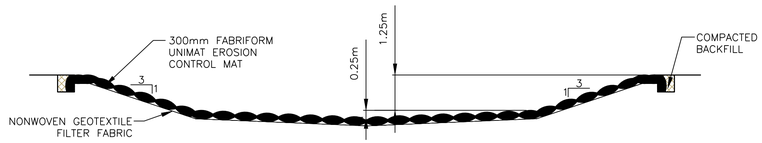

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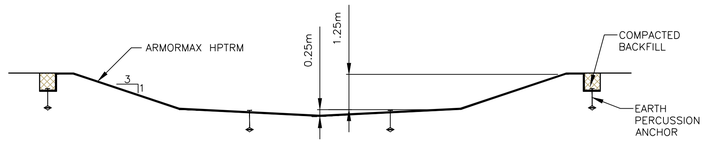

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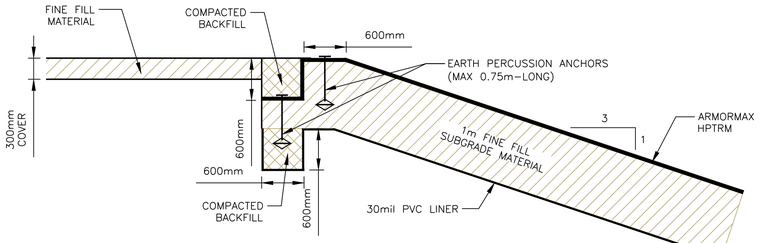

5 15|15 **ARMORMAX AND PVC LINER ANCHOR TRENCH DETAILS**
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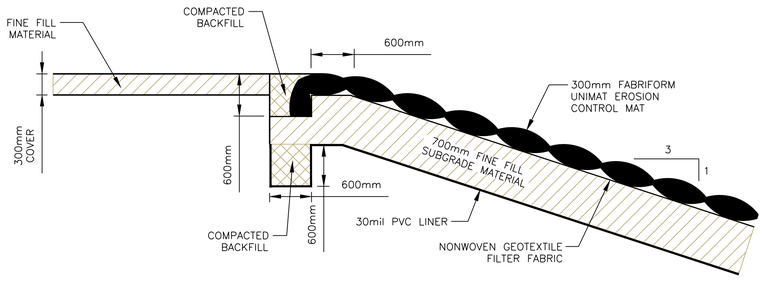

6 15|15 **FABRIFORM AND PVC LINER ANCHOR TRENCH DETAILS**
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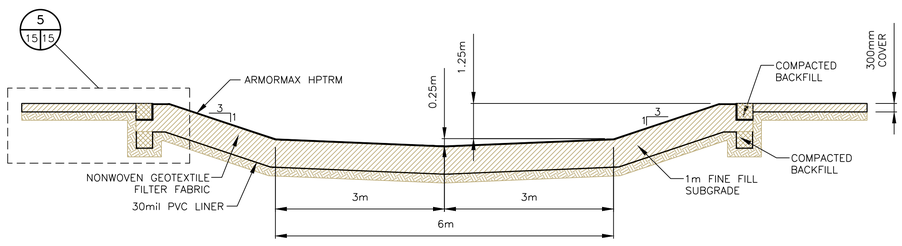

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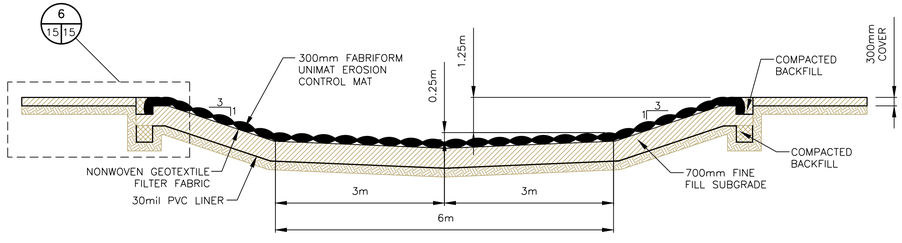

E 15|11,12,13 **TYPICAL FABRIFORM UNIMAT CROSS SECTION**
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PROJECT MGR	TROY MEYER	
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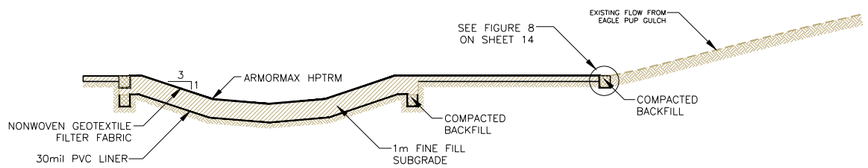
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
DIVERSION DETAILS

PROJECT NO.	TT 114-201087
DWG NO.	15
REV NO.	3
DATE	12/2013



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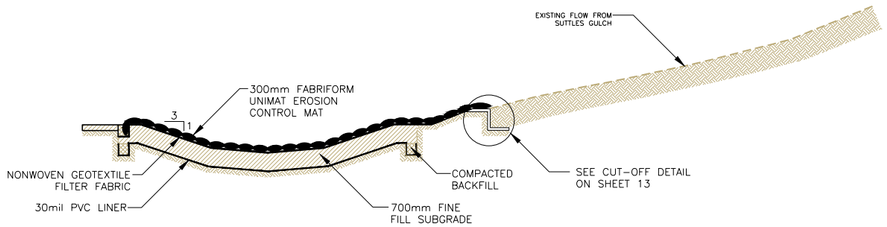

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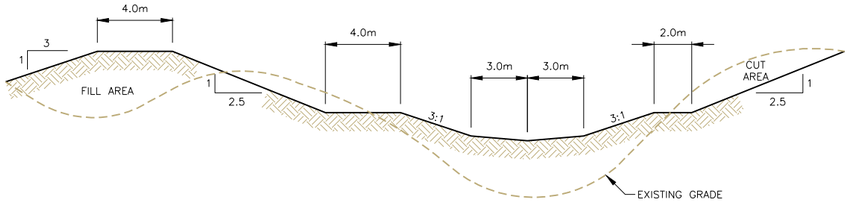

TYPICAL DIVERSION CHANNEL SECTION

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
4th Dec. 13

StrataGold Corporation

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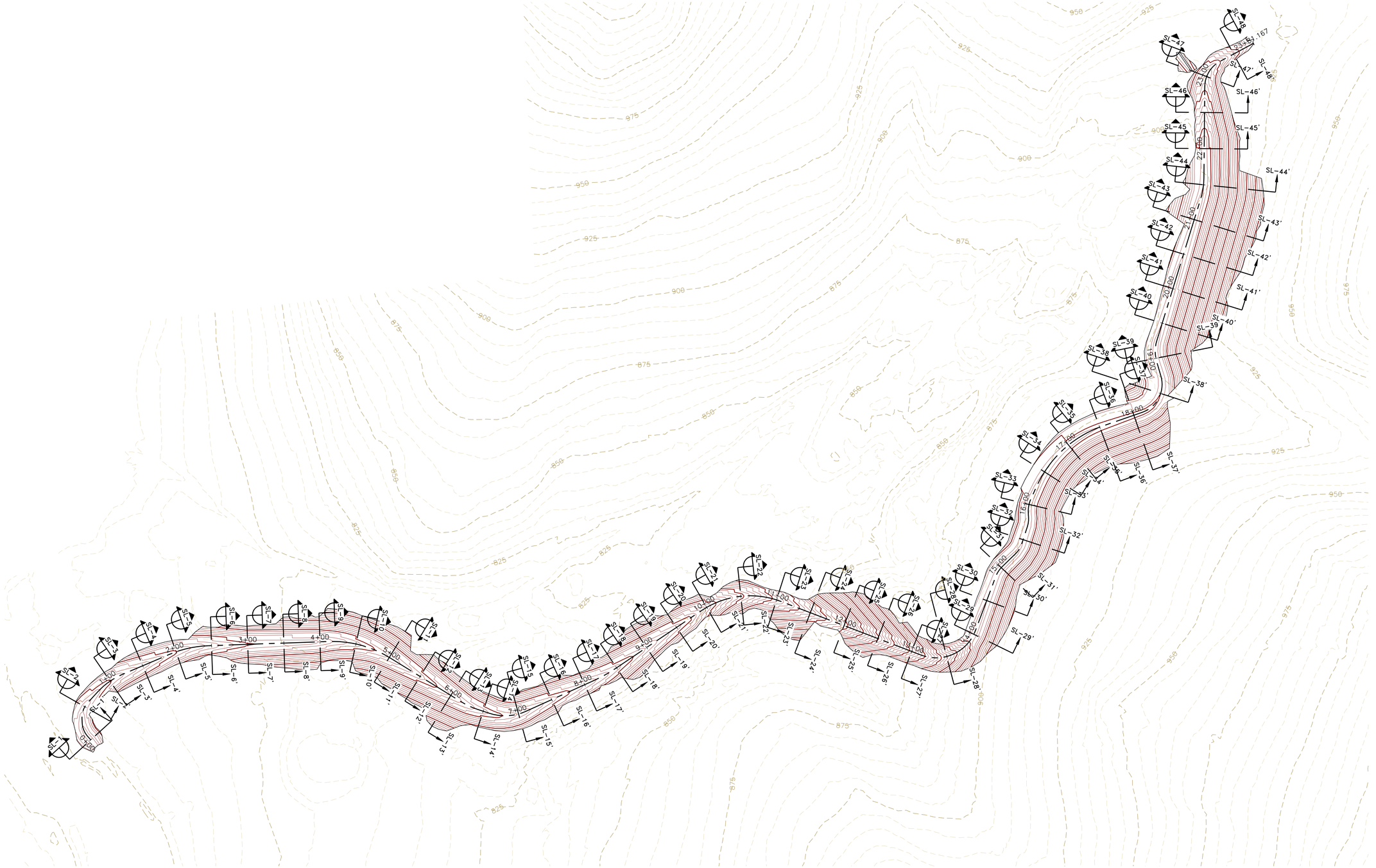
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
DIVERSION DETAILS

PROJECT NO.	TT 114-201087
DWG NO.	16
REV NO.	3
DATE	12/2013



PROFESSIONAL ENGINEER
YUKON
TROY LEE MEYER
TERRITORY
25 DEC 13

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DRAWN BY	DJM	12/20/2013
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PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
OVERALL CROSS SECTION SHEET

PROJECT NO.	TT 114-201087
DWG NO.	17
REV NO.	3
DATE	12/2013

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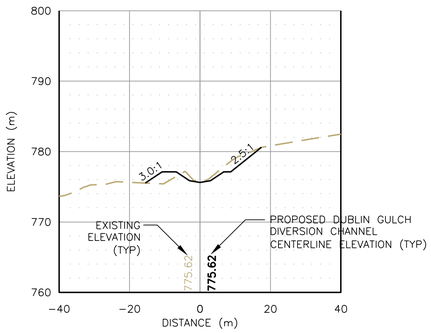

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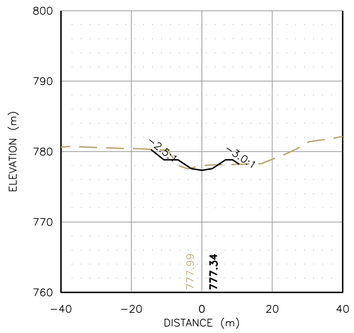

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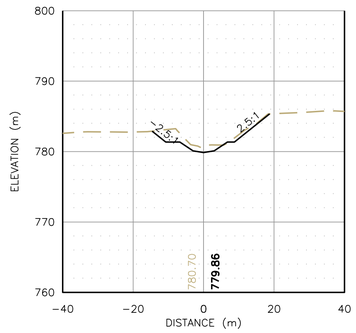

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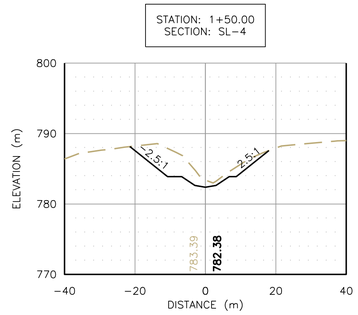
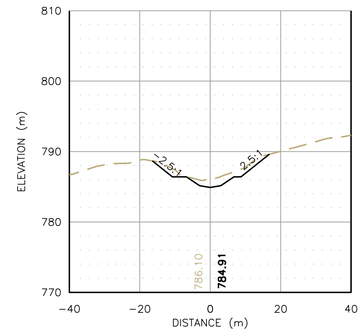


STATION: 2+00.00
SECTION: SL-5



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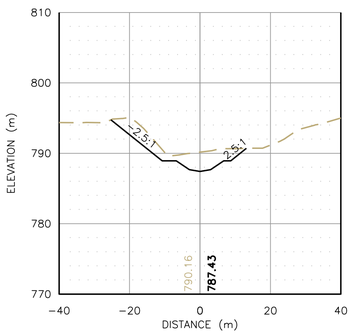
SECTION: SL-6



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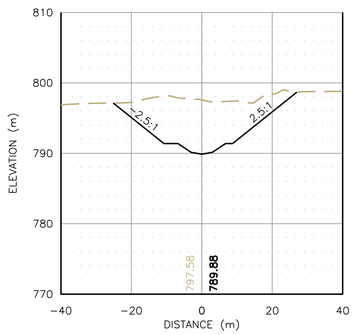
SECTION: SL-7



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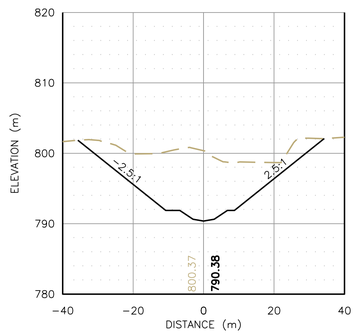
SECTION: SL-8



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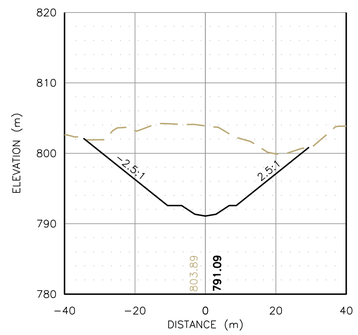
SECTION: SL-9



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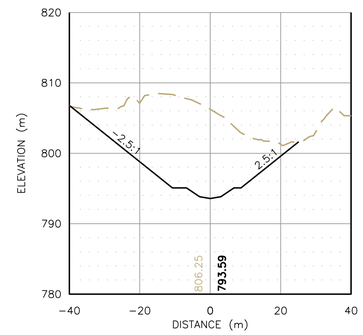
SECTION: SL-10



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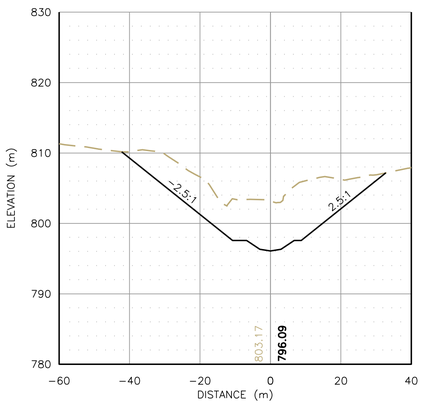
SECTION: SL-11



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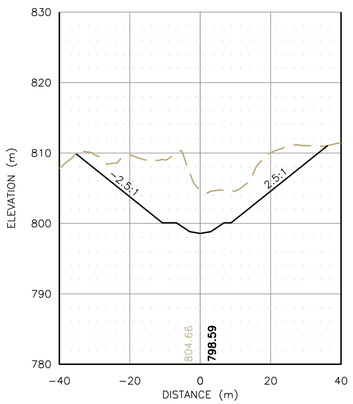
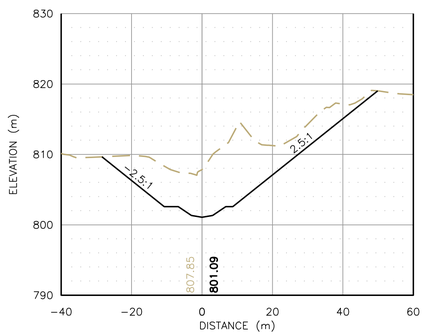
SECTION: SL-12



STATION: 6+00.00
SECTION: SL-13



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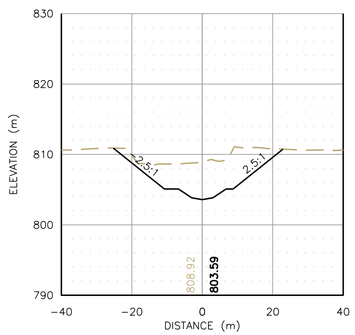
SECTION: SL-14



NOTE: ALL CROSS SECTIONS ARE SHOWN FACING UPSTREAM

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
21 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

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NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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B	INTERNAL REVIEW	DJM	DE	2/12/2013	
A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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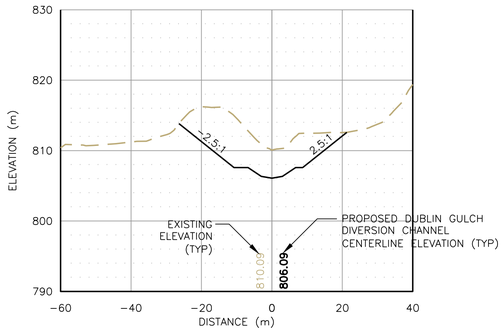
EAGLE GOLD PROJECT

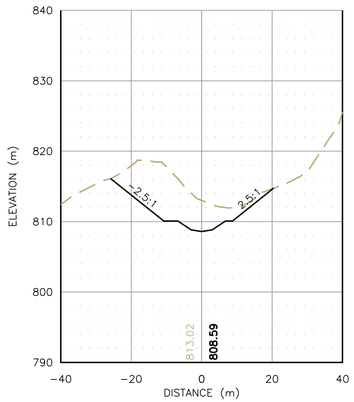
EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
CROSS SECTIONS

PROJECT NO.	TT 114-201087	
DWG NO.	18	
REV NO.	3	DATE 12/2013

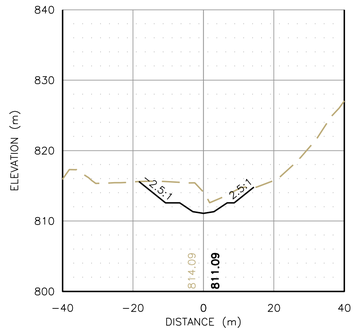
STATION: 7+00.00
SECTION: SL-15



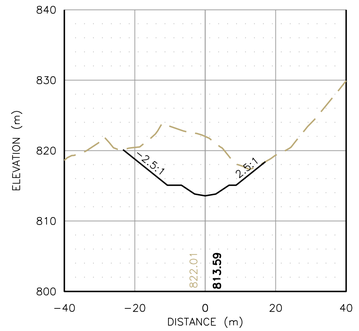
STATION: 7+50.00
SECTION: SL-16



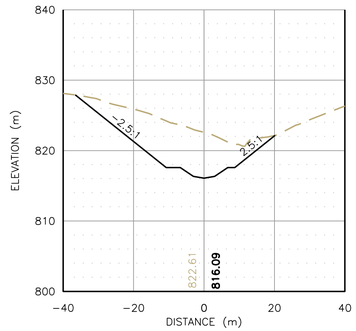
STATION: 8+00.00
SECTION: SL-17



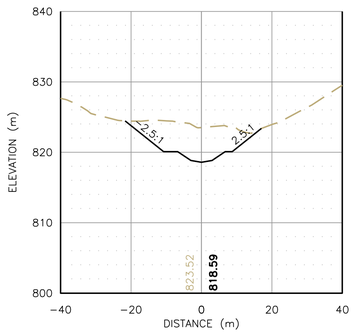
STATION: 8+50.00
SECTION: SL-18



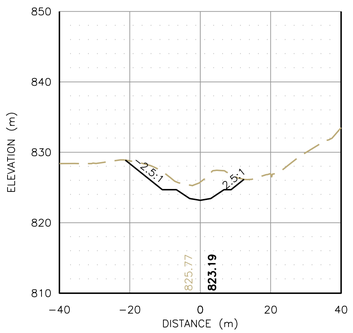
STATION: 9+00.00
SECTION: SL-19



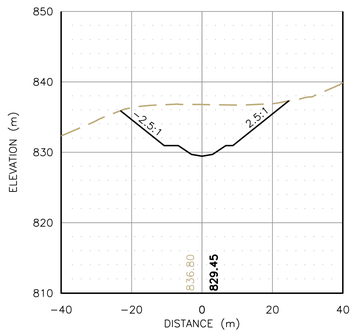
STATION: 9+50.00
SECTION: SL-20



STATION: 10+00.00
SECTION: SL-21



STATION: 10+50.00
SECTION: SL-22



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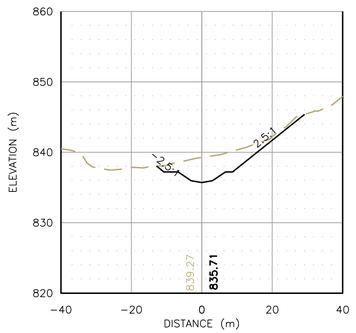
SECTION: SL-23



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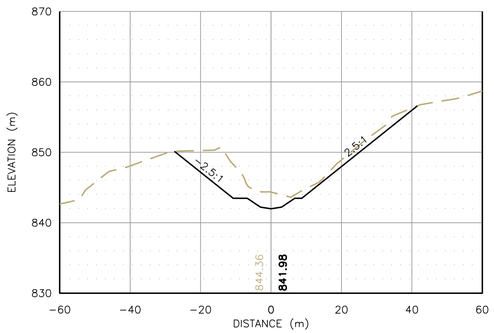
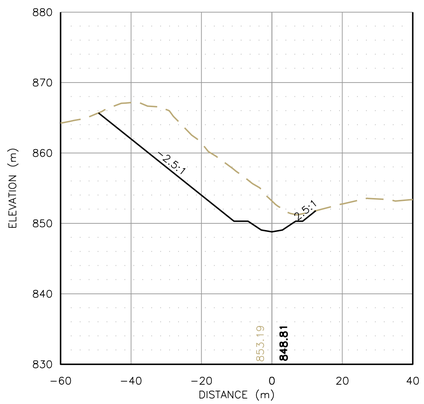
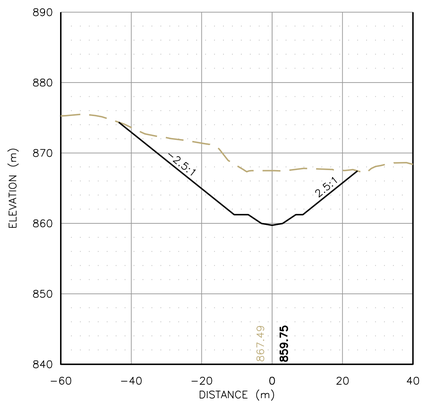


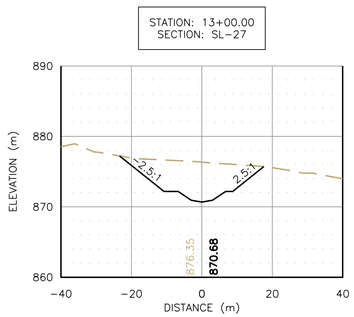
STATION: 12+00.00
SECTION: SL-25



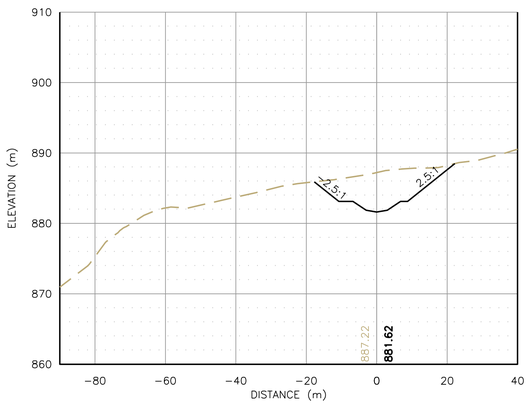
STATION: 12+50.00
SECTION: SL-26



STATION: 13+00.00
SECTION: SL-27



STATION: 13+50.00
SECTION: SL-28



NOTE: ALL CROSS SECTIONS ARE SHOWN FACING UPSTREAM

PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

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		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
CHECKED BY	DE	12/20/2013
PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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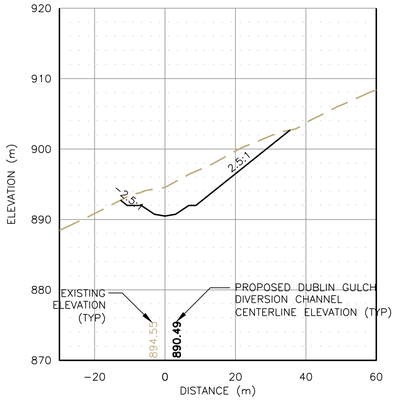
EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
CROSS SECTIONS

PROJECT NO.	TT 114-201087
DWG NO.	19
REV NO.	3
DATE	12/2013

STATION: 14+00.00
SECTION: SL-29



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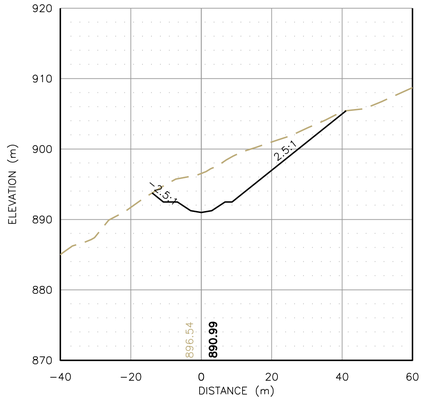
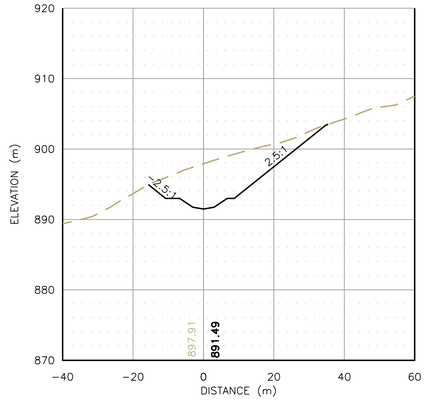
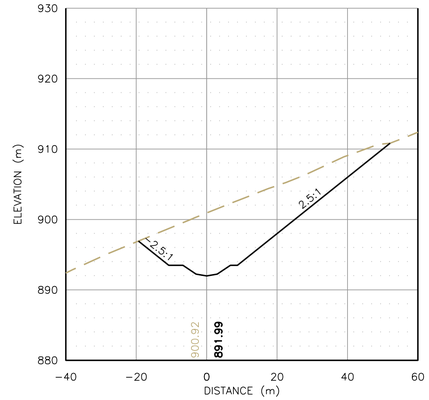
SECTION: SL-30



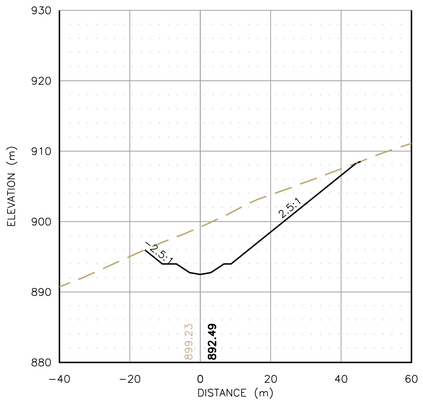
STATION: 15+00.00
SECTION: SL-31



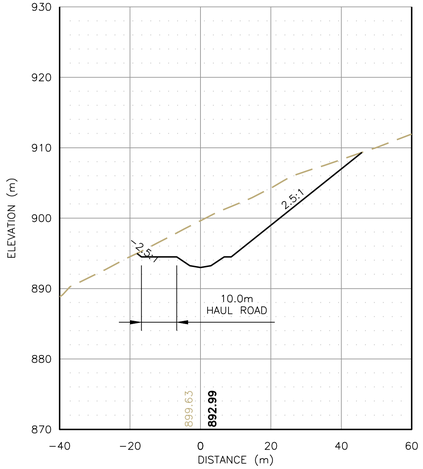
STATION: 15+50.00
SECTION: SL-32



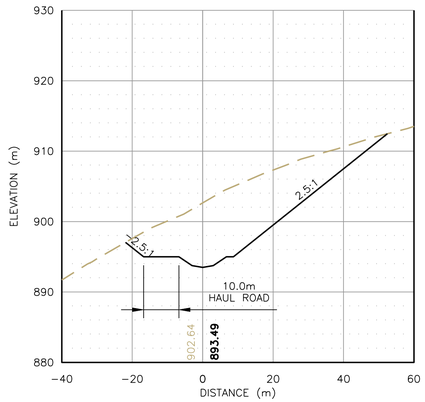
STATION: 16+00.00
SECTION: SL-33



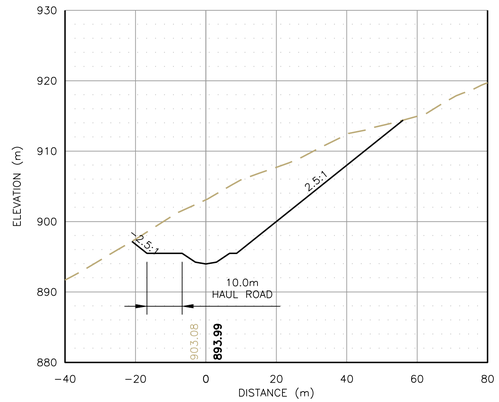
STATION: 16+50.00
SECTION: SL-34



STATION: 17+00.00
SECTION: SL-35



STATION: 17+50.00
SECTION: SL-36



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PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

SCALE: NONE	DATE
DESIGNED BY SA	12/20/2013
DRAWN BY DJM	12/20/2013
CHECKED BY DE	12/20/2013
PROJECT MGR TROY MEYER	
CLIENT APPR.	

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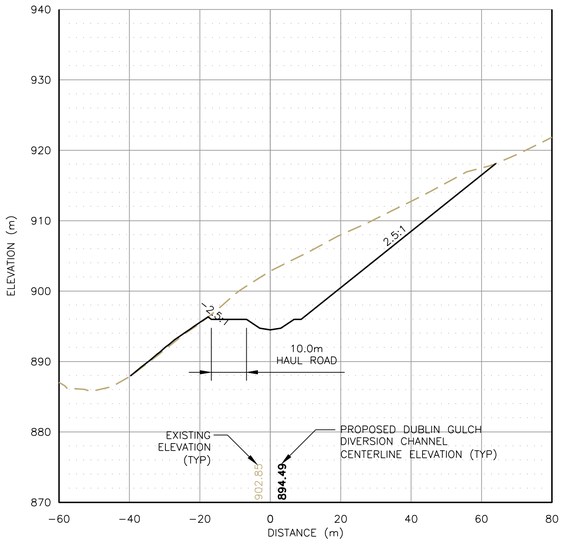
EAGLE GOLD PROJECT

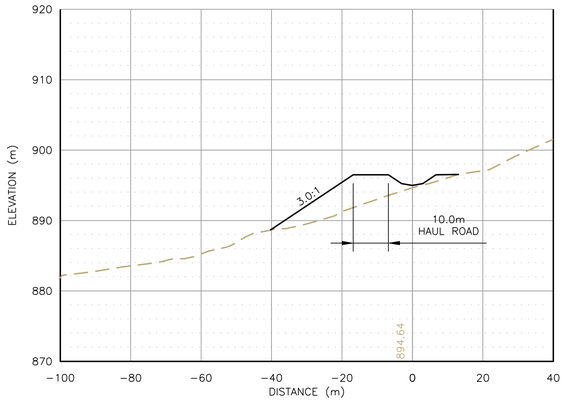
EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
CROSS SECTIONS

PROJECT NO.	TT 114-201087
DWG NO.	20
REV NO.	3
DATE	12/2013

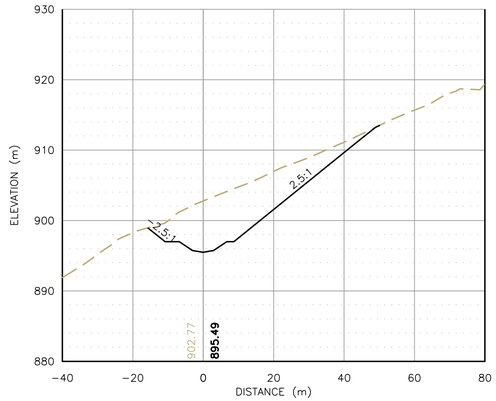
STATION: 18+00.00
SECTION: SL-37



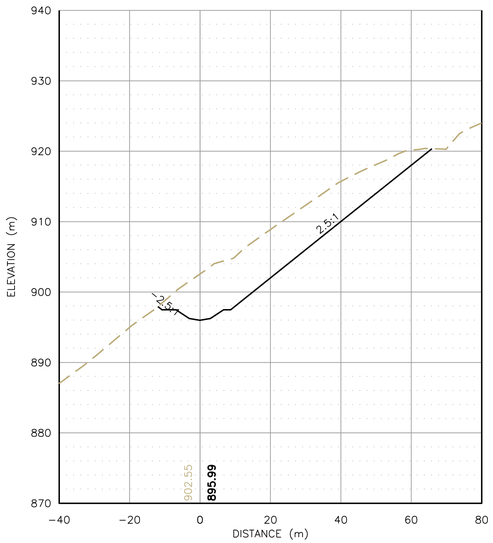
STATION: 18+50.00
SECTION: SL-38



STATION: 19+00.00
SECTION: SL-39

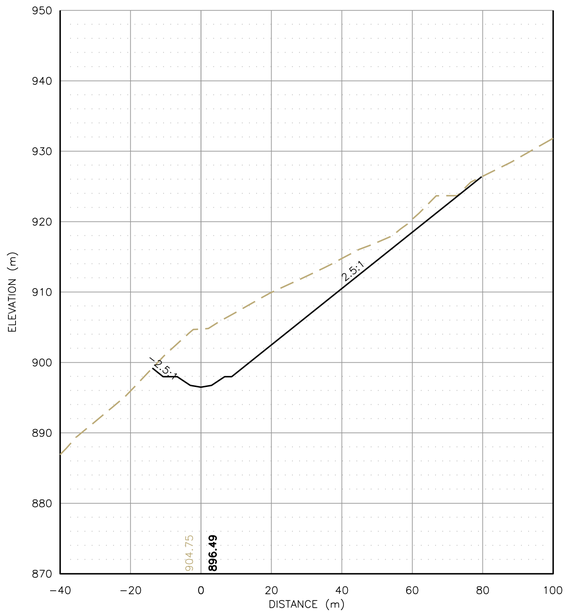


STATION: 19+50.00
SECTION: SL-40

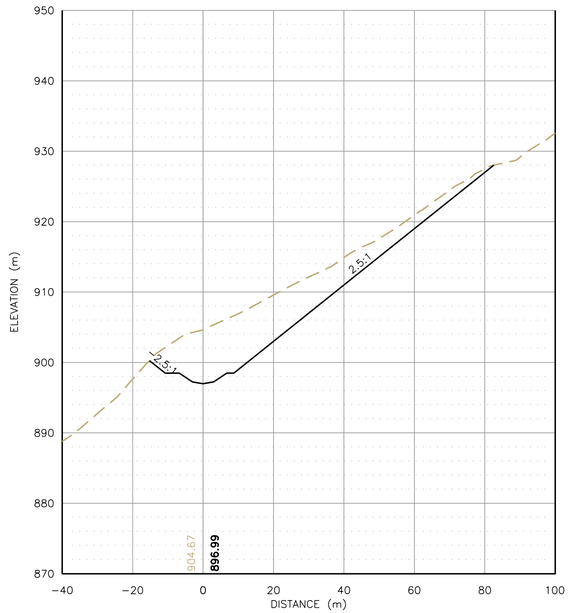


NOTE: ALL CROSS SECTIONS ARE SHOWN FACING UPSTREAM

STATION: 20+00.00
SECTION: SL-41



STATION: 20+50.00
SECTION: SL-42



PROFESSIONAL ENGINEER
YUKON TERRITORY
TROY LEE MEYER
26 DEC 13

StrataGold Corporation

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A	INTERNAL REVIEW	DJM	DE	2/08/2013	

SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
DRAWN BY	DJM	12/20/2013
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PROJECT MGR	TROY MEYER	
CLIENT APPR.		

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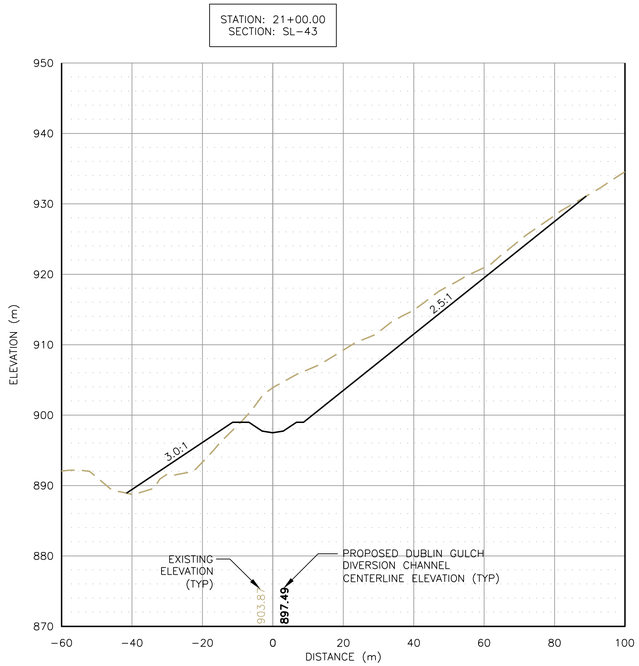
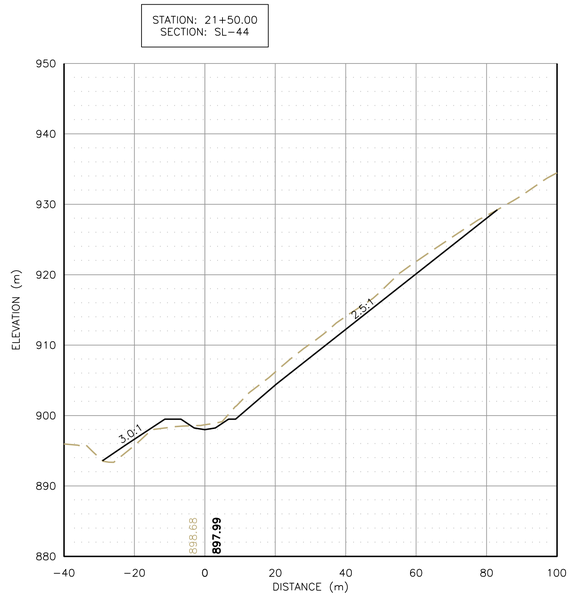
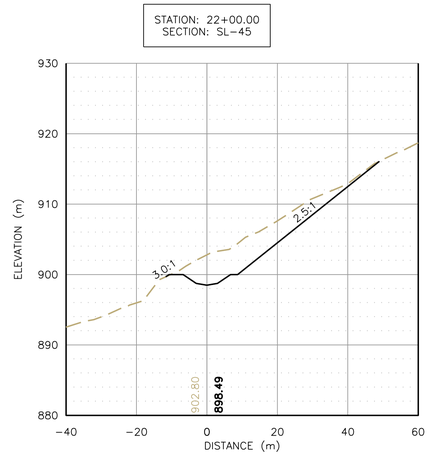
EAGLE GOLD PROJECT

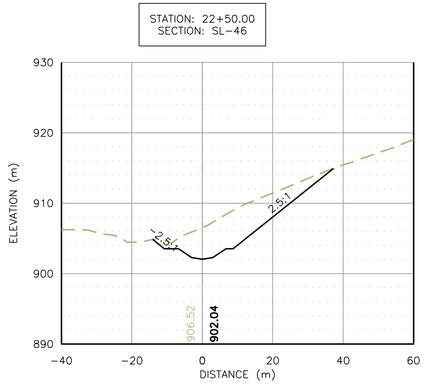
EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
CROSS SECTIONS

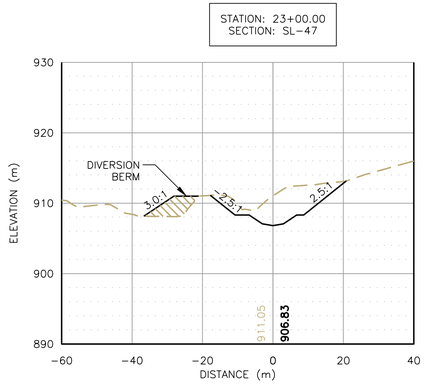
PROJECT NO.	TT 114-201087
DWG NO.	21
REV NO.	3
DATE	12/2013

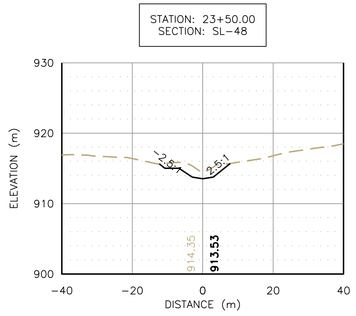












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PROFESSIONAL ENGINEER YUKON TERRITORY TROY LEE MEYER 2c DEC 13

StrataGold Corporation

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DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
3	ISSUED FOR CONSTRUCTION (IFC)	SA	DE	12/20/2013	

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT
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C	INTERNAL REVIEW	DJM	DE	4/5/2013	
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B	INTERNAL REVIEW	DJM	DE	2/12/2013	
A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
SCALE:	NONE	
DESIGNED BY	SA	12/20/2013
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PROJECT MGR	TROY MEYER	
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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
CROSS SECTIONS

PROJECT NO.	TT 114-201087
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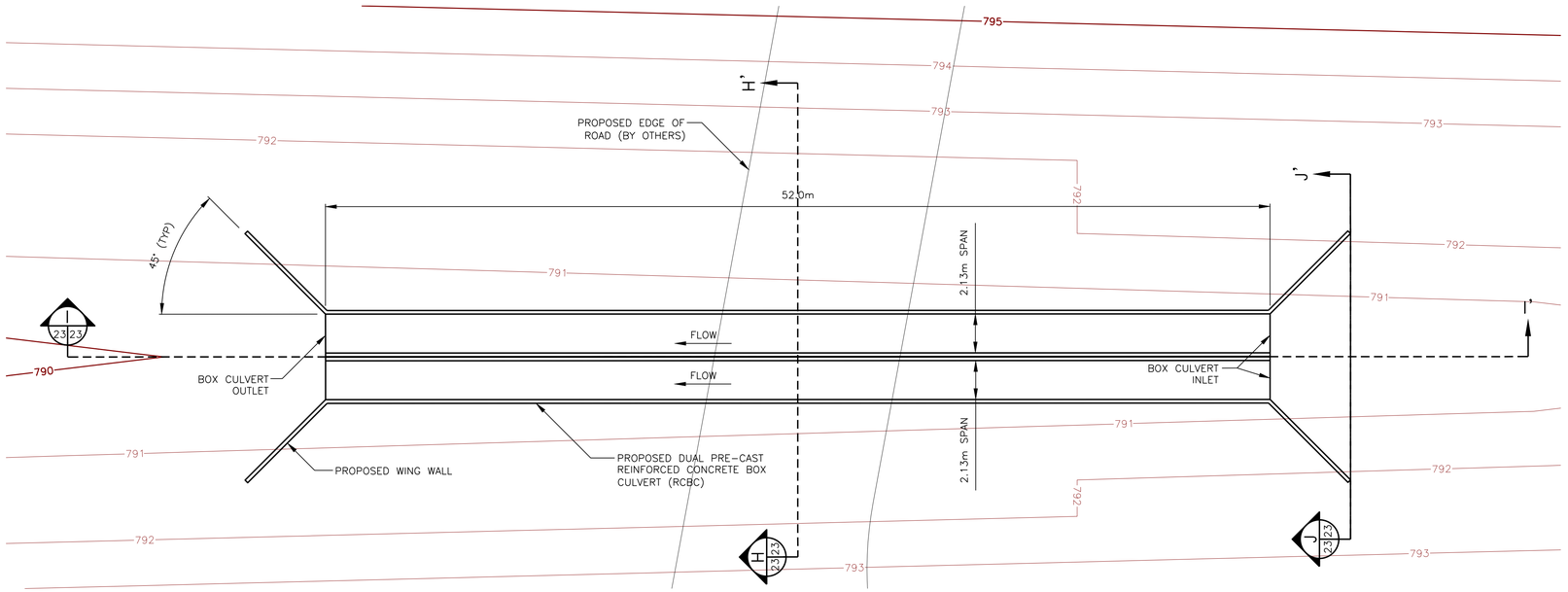
REV NO.	3
DATE	12/2013



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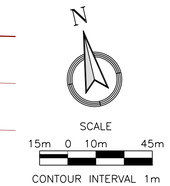

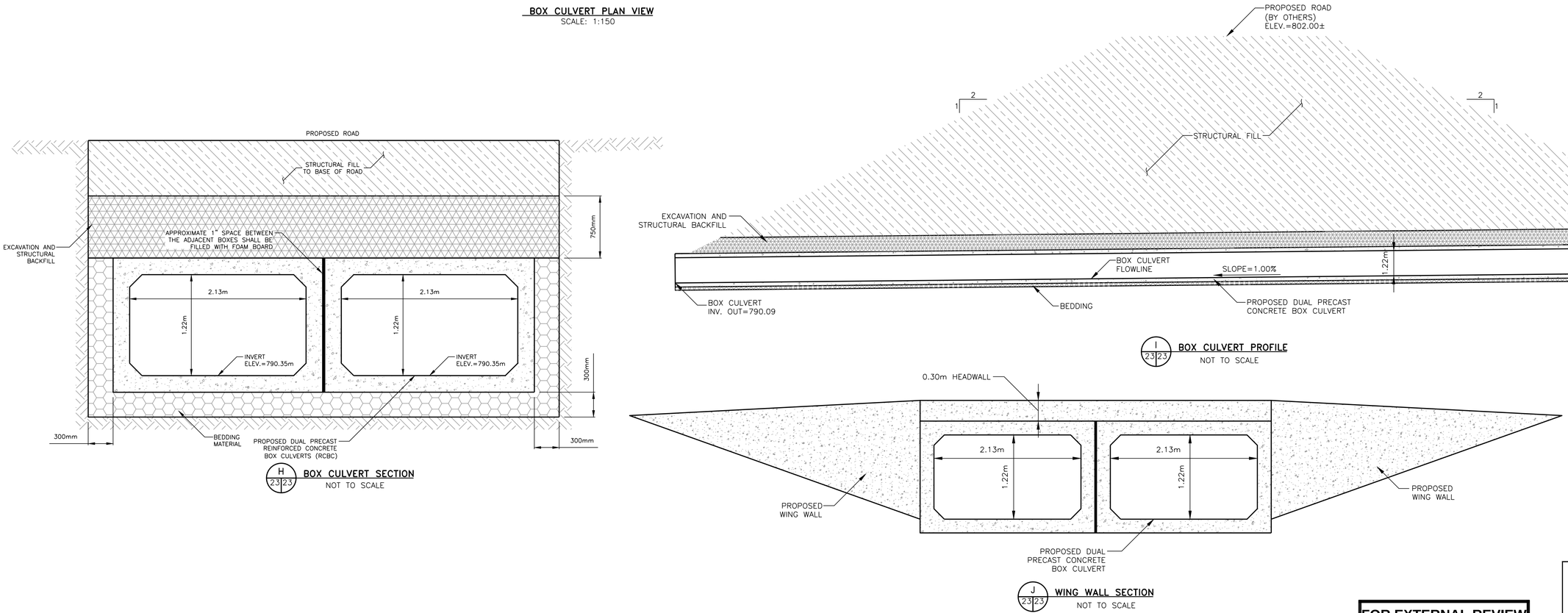

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REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

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REVISIONS					
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2	EXTERNAL REVIEW	DJM	DE	4/23/2013	
C	INTERNAL REVIEW	DJM	DE	4/5/2013	
1	EXTERNAL REVIEW	DJM	DE	2/15/2013	
B	INTERNAL REVIEW	DJM	DE	2/12/2013	
A	INTERNAL REVIEW	DJM	DE	2/08/2013	

		DATE
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DESIGNED BY	SA	4/23/2013
DRAWN BY	DJM	4/23/2013
CHECKED BY	DE	4/23/2013
PROJECT MGR	TROY MEYER	
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EAGLE GOLD PROJECT

EAGLE GOLD PROJECT
DUBLIN GULCH DIVERSION CHANNEL
BOX CULVERT PLAN AND SECTIONS

PROJECT NO.	TT 114-201087
DWG NO.	23
REV NO.	2
DATE	04/2013

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APPENDIX B – SUPPORTING INFORMATION BY OTHERS

1) *Eagle Gold Project – Dublin Gulch, Yukon – 2011 Geotechnical Investigation for Mine Site Infrastructure, Factual Data Report, Final,* BGC Engineering Inc., *20 January* 2012
2) *Eagle Gold – Heap Leach Pad, Water Diversion and Process Management Ponds DRAFT Foundation Report,* BGC Engineering Inc., 21 April 2011
3) Various Laboratory Testing Reports, Golder 2012.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

VICTORIA GOLD CORPORATION

EAGLE GOLD PROJECT
DUBLIN GULCH, YUKON

2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

PROJECT NO:	0792-006
DATE:	January 20, 2012
DOCUMENT NO:	

DISTRIBUTION:	
VICTORIA GOLD:	2 copies
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January 20, 2012
Project No: 0792-006

Mike Padula, Project Manager
Victoria Gold Corporation
584 – Bentall #4
1055 Dunsmuir Street, PO Box 49215
Vancouver, BC, V7X 1K8

Dear Mr. Padula,

Re: EAGLE GOLD PROJECT: 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

Please find attached the final version of the aforementioned report. Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours sincerely,

BGC ENGINEERING INC.
per:

Pete Quinn, Ph.D., P.Eng.
Senior Geotechnical Engineer

EXECUTIVE SUMMARY

This report summarizes the findings of geotechnical site investigation work conducted in the summer of 2011 at the Eagle Gold Project, at Dublin Gulch, located near Mayo, Yukon. Several areas on site were previously explored as part of a pre-feasibility study for development of an open pit heap leach gold mine. BGC is providing engineering recommendations for foundations, waste rock storage areas, open pit slopes and pit depressurization under separate cover. The present report addresses investigations conducted in 2011 in support of a Feasibility Study for proposed mine site infrastructure other than the open pit, including: the heap leach pad; waste rock storage areas; crushers and conveyors; water diversion structures; plant site buildings; solution and water management ponds; and other miscellaneous buildings and facilities.

The 2011 geotechnical investigation program involved the excavation of ninety-six test pits, advancement of forty-six drill holes (29 Diamond holes and 17 Auger holes), and mapping of fifty-nine outcrops (natural exposures, existing road cuts and drill pads cuts) to characterize subsurface conditions relevant for foundation and earthworks design. Samples were taken from select test pits and boreholes for index testing of soil and rock. Bulk samples of rock and placer tailings were also analyzed for a range of parameters related to the potential for re-use as select fill or aggregate. This report presents factual data only, and does not include any engineering interpretation of the data nor engineering recommendations in relation to the proposed mine facilities.

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LIMITATIONS

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1.0 INTRODUCTION

1.1. General

Victoria Gold Corporation (VIT), with assistance from Wardrop Engineering Inc. (WEI) is completing a feasibility study (FS) for development of the proposed Eagle Gold mine at Dublin Gulch, Yukon. BGC Engineering Inc. (BGC) was contracted by VIT to complete geotechnical investigations for mine site infrastructure. This report presents factual data resulting from geotechnical investigations performed between June and August 2011. This work was conducted to investigate subsurface conditions at the proposed locations for the mine site infrastructure, other than the open pit, including: the heap leach pad; waste rock storage areas; crushers and conveyors; water diversion structures; plant site buildings; solution and water management ponds; and other miscellaneous buildings and facilities.

1.2. Project description

The Eagle Gold property is located approximately 40 km north of Mayo, and 15 km northwest of Elsa, as illustrated in Drawing 01. The mine will comprise an open pit and heap leach pad; haul roads; waste rock storage areas; process plant; crushers and conveyors; truck shop; camp; water diversion structure; process water ponds; drainage ditches; sediment control structures and various ancillary facilities.

The current layout for the proposed mine facilities, as received from Wardrop on November 23, 2011, is illustrated in Drawing 02. The field investigation plan was made on the basis of an earlier general arrangement received from Wardrop on June 14, 2011, and was updated during execution of the field work as the layout was adjusted on August 10, 2011. Geotechnical engineering recommendations will be provided at a later date under separate cover in a foundation design report.

1.3. Previous Investigations

Site conditions at the Eagle Gold site have been partially described in several reports as follows, and Drawing 03 shows the location of all the historic holes within the area of interest:

- Report on 1995 Geotechnical Investigations for Four Potential Heap Leach Facility Site Alternatives, First Dynasty Mines, Dublin Gulch Property. (Knight Piésold, 1996a).
- Report on Feasibility Design of the Mine Waste Rock Storage Area, First Dynasty Mines, Dublin Gulch Property. (Knight Piésold, 1996b).
- Field Investigation Data Report, Dublin Gulch Project, New Millennium Mining. (Sitka Corp, 1996).
- Hydrogeological Characterization and Assessment, Dublin Gulch Project, New Millennium Mining. (GeoEnviro Engineering, 1996).
- BGC Engineering Inc. 2009. Site Facilities Geotechnical Investigation Factual Data Report. Eagle Gold Project, Victoria Gold Corporation.

- Stantec. 2010. Project Proposal for Executive Committee Review. Pursuant to the Yukon Environmental and Socio-Economic Assessment Act. Eagle Gold Project, Victoria Gold Corporation.
- BGC Engineering Inc. 2011a. 2010 Geotechnical Investigation for Mine Site Infrastructure, Factual Data Report. Eagle Gold Project, Victoria Gold Corporation.

Knight Piésold completed a feasibility level geotechnical study to evaluate the surficial materials and bedrock conditions at four potential heap leach pad locations, two potential waste rock storage areas, and the open pit. Groundwater wells and two thermistors were installed in selected drillholes at that time. Test pitting and diamond drilling were completed from June to September 1995 at upper Bawn Bay Gulch, lower Dublin Gulch, the north side of Lynx Creek, and at the confluence of Haggart and Lynx Creeks.

In 1996, Sitka Corp completed test pits and diamond drillholes in Bawn Bay Gulch, Eagle Pup, Stewart Gulch, and Platinum Gulch for preliminary design of the heap leach and waste rock facilities. Auger holes were drilled in Gill Gulch to evaluate it as a potential borrow source of silt material for use as a liner for the heap leach facility. Monitoring wells were installed in Bawn Bay Gulch and Eagle Pup. Eight thermistor strings were installed.

In 2009, BGC was engaged to gather factual data describing subsurface conditions at the proposed heap leach and waste rock storage facility locations. The work involved the excavation of sixty-nine test pits and advancement of seven boreholes. Thermistor strings were installed in three boreholes to gather temperature data. Dynamic cone penetration profiles were obtained at two borehole locations to obtain information about material density. Dynamic cone soundings were attempted in two other holes and met with refusal. Groundwater monitoring wells were installed by Stantec in two of the seven BGC boreholes. In addition, Stantec supervised the logging and installation of several other monitoring wells around the site.

In 2010, Stantec presented a Project Proposal which included general site conditions such as regional geology, physiography, drainage, climate and seismicity. Air-photo based terrain mapping and an evaluation of geological hazards affecting the project area were both also described in this report.

In 2010, BGC was engaged to develop a geotechnical site investigation program in support of the FS for proposed mine site infrastructure. A total of forty-nine test pits and twenty-five drill holes were completed to characterize the overburden material and bedrock conditions. Additionally, three cut slopes were logged for exposed soil and rock conditions, and core from one client-drilled condemnation hole was logged for geotechnical purposes. Laboratory testing was completed on selected samples for moisture content, and representative samples were also tested for Atterberg Limits and grain size analysis. Various other lab tests were also completed on bulk samples of placer tailings being considered for potential use as select fill or aggregate.

Several engineering reports were also issued in draft by BGC in early 2011, with preliminary foundation and earthworks recommendations for a number of key facilities.

1.4. Scope of Work

BGC was engaged to provide further geotechnical investigation work to address gaps in the data required in support of FS design for mine site infrastructure. The 2011 site investigation program was conducted between June and August 2011 and the field activities involved the excavation of ninety-six test pits, advancement of forty-six drill holes (29 Diamond holes and 17 Auger holes), and mapping of fifty-nine outcrops (natural exposures, existing road cuts and drill pads cuts) to characterize subsurface conditions relevant for foundation and earthworks design. Samples were taken from select test pits and boreholes for index testing of soil and rock. Bulk samples of rock and placer tailings were also analyzed for a range of parameters related to the potential for re-use as select fill or aggregate.

2.0 SITE CONDITIONS

2.1. Surficial Geology

The surficial geology of the Dublin Gulch area has been mapped by Bond (1998) and is illustrated in Drawing 04. Pleistocene and Holocene colluvial deposits are abundant in the project area and generally consist of diamicton, gravel, shattered bedrock, and lenses of sand and silt derived from bedrock and surficial materials by a variety of chemical and physical weathering processes. Transport of surface material occurs as creep, sheetwash, and mass wasting and is common on all slopes in the area.

Glacial till is infrequently observed because the valley is aligned transverse to the regional Cordilleran ice flow. Where till does occur, it is generally either a silty or sandy clay matrix with some proportion of larger clasts up to cobble size. The valley bottom is dominated by alluvium and placer mining tailings. The north facing uplands are covered by an apron or blanket of colluvium over bedrock, as compared with the southern facing uplands, where bedrock is nearer to surface and covered by a thinner veneer of colluvium. The Haggart Creek Valley to the west of the project site is filled with a mix of alluvial deposits and placer tailings. A till blanket has been mapped along the east side of Haggart Creek, south of its confluence with Dublin Gulch.

The project site is located in a region of discontinuous permafrost. Permafrost distribution within the project area is controlled by factors such as soil texture, soil moisture, aspect, vegetation and snow depth. Permafrost occurs typically on north- and east-facing slopes at higher elevations, and within poorly drained valley bottoms.

Frozen ground, when observed, is generally encountered immediately below the organic cover, although frozen organics are also encountered on north-facing slopes and under a dense spruce forest canopy. The distribution of frozen ground is highly variable across the site. Permafrost was confirmed with temperature measurements from thermistors installed on site by Knight Piesold, Sitka Corp and BGC. However, in all cases of confirmed permafrost, the measured ground temperatures showed the permafrost to be relatively warm, between 0°C and -1°C.

2.2. Bedrock Geology

The Eagle Gold mineral deposit is located in a granodiorite intrusion at the western limit of the Dublin Gulch property at its narrowest extent. It is hosted within Upper Proterozoic to Lower Cambrian aged metasedimentary rocks of the Hyland group. The metasedimentary clastic rocks consist of intercalated and deformed quartzites, and phyllites, and to a lesser degree, schists and carbonates. The dominant feature in the Dublin Gulch deposit area is the Potato Hills stock which outcrops above Haggart Creek and consists of a medium-grained phaneritic granodiorite intrusive dated at approximately 93 million years (Smit et al., 1995). The stock is elongated 70°E and is roughly 2 km wide by 5.5 km long. The long axis of the stock coincides with the axis of the Dublin Gulch anticline. Sheet-like sills of

granodiorite extend from the stock and cut the meta-sedimentary strata at low angles. The intrusive-meta-sedimentary contact dips shallowly to steeply to the north on the northern side of the intrusive, and steeply to the north or south along its southern margin.

The Dublin Gulch Property is located in the northern portion of the Selwyn Basin. The Selwyn Basin is a fault controlled epicratonic basin that is underlain by four main metasedimentary units. Dominantly clastic, these units are, from oldest to youngest, the Proterozoic Hyland Group, the Paleozoic Upper Schist, and the Mesozoic Lower Schist and Keno Hill Quartzites.

These units have been juxtaposed by Cretaceous-aged laterally extensive, northward directed thrust sheets. There are three main thrust sheets, from east to west: the Dawson, Tombstone and Robert Service.

Four generations of deformation are documented; however, two initial events are responsible for the dominant structural orientation. The first resulted in widespread development of foliation that was subsequently deformed by gentle, regional-scale folding. The second deformational event resulted in east-trending, south-plunging anticlines within the Dublin Gulch area which are the dominant structures at the Eagle Gold occurrence.

At least four periods of faulting have occurred in the Dublin Gulch area, including two low angle thrust and bedding plane faults, NW trending faults, NE trending faults, E trending faults, and N-S trending faults. It is the latter that may have the most significant impact on mineralization, which appears to displace the Dublin Gulch stock.

The Dublin Gulch area is characterized by four intrusive episodes. The most significant is the occurrence of Cretaceous aged granodiorite which has intruded the Hyland Group metasediments near their contact with the underlying Upper Schist. Quartz diorite, quartz monzonite, leucogranite and aplite comprise the younger intrusive phases that occur predominantly as dikes and sills, and cut both the granodiorite and surrounding country rocks.

The meta-sedimentary rocks are the product of greenschist-grade regional metamorphism, and proximal to the Dublin Creek area have undergone metasomatism and contact metamorphism. A hornfels thermal aureole surrounds the deposit and within which the coarse clastic components of the Hyland Group have been altered to quartz-biotite, the argillaceous components to sericite-biotite-chlorite schist, and the carbonates to marble, wollastonite-quartz skarn and pyroxenite skarn. The aureole extends from 800 to 2,000 m outward from the intrusive.

3.0 GEOTECHNICAL INVESTIGATION

3.1. Overview

The field work for this project was conducted between June and August, 2011. The site investigation involved a number of different components which are listed below and are described in detail in the following sub-sections and corresponding appendices:

- Mapping of natural cut slopes, existing cut roads and drill pad cuts;
- Excavation of test pits;
- Geotechnical borehole drilling using solid stem auger, hollow stem auger, CRREL barrel (Cold Regions Research and Engineering), and triple tube diamond drill coring;
- Field Testing:
  - Penetration testing;
  - Downhole geophysics;
  - Plate load testing;
  - Thermistors and ground ice classification;
  - Point load testing;
- Groundwater investigation:
  - Standpipe piezometers;
  - Vibrating wire piezometers (VWP);
  - Slug Testing;
  - Seep observations;
- Laboratory Testing:
  - Soil index testing;
  - Rock strength testing;
  - Modified Proctor and permeability testing;
  - Aggregate testing;

The geographic coordinates and elevations of most of the boreholes were surveyed with differential GPS by Underhill in September 2011. Boreholes BH-BGC11-39, -40A, -41, -61, -65 and -67 were not surveyed by Underhill and thus their location and ground elevation were estimated using a handheld GPS unit, as was also done with all test pits and outcrop mapping locations. This test hole location information should be considered approximate.

Visual classification and description of overburden materials was done according to the Unified Soil Classification System (USCS, ASTM D24887), frozen soils were classified according to ASTM D4083, and intact rock and rock mass characterization was done following ISRM (1981) and other industry recognized classification systems such as Rock Mass Rating (RMR, Bienawski, 1976) and Geological Strength Index (GSI, Hoek and

Marinos, 2000; Cai et al., 2004). Appendix A provides a basic legend describing most of the parameters observed during soil and rock description.

3.2. Outcrop Mapping

A total of fifty-nine natural outcrops, road cuts and platform cuts were mapped in detail and are presented in Appendix B. The location of these cut slopes is shown on Drawing 05 and Table B-1 summarizes the rock mass characteristics of the cut slopes.

Geological mapping on existing road cuts, drill pad cuts and natural slope cuts was undertaken to describe the exposed rock mass and characterize its expected engineering behavior according to the type and orientation of the structures and intact rock strength. The presence of mapped outcrops paired with drilled boreholes provides the opportunity to compare the rock mass as seen in the borehole with that of the nearby outcrop and give insights of its strength when recovery was poor near the surface. The information gathered during the outcrop mapping included an overburden characterization (soil description and classification) and detailed lithological and structural description of the bedrock, together with a rock mass characterization.

3.3. Test Pitting

In 2011 a total of ninety-six test pits were excavated throughout the project area using a 325D Cat excavator. All test pit locations are illustrated on Drawing 05 and test pit logs are included in Appendix C and are summarized in Table C-1. Selected test pit photographs are included in Appendix D.

The test pit program was designed to develop an understanding of the engineering properties of the overburden materials across the site and to allow collection of disturbed soil samples for laboratory testing. Paired test pits and boreholes were conducted in areas where poor recovery from the diamond holes was expected. Test pits were also tailored to provide additional data and samples within the proposed silt borrow areas. In addition, plate load tests were conducted at the bottom of two test pits in the proposed plant site.

Observations of material compactness were inferred from excavator performance and from penetration resistance of the side walls of shallow pits. All frozen ground encountered was classified for ice content in the field. All test pits were terminated due to refusal on bedrock or frozen ground, sloughing/collapse of side walls, or due to the limits of excavator reach.

3.4. Geotechnical Borehole Drilling

3.4.1. General

The borehole drilling program was planned to characterize overburden and bedrock conditions at selected key facility locations. The drilling was focused on determining depth to, and competence of, bedrock, as well as characterizing the nature of overburden soils with respect to bearing capacity and potential settlements, or for design of cut slopes. Two

different drilling methods were used; auger drilling tailored to the soil unit characterization, and diamond drilling tailored to the rock characterization.

3.4.2. Diamond Drilling

In 2011 a total of twenty-nine diamond drill holes were drilled within the proposed Heap Leach pad, the Dublin Gulch valley bottom, the proposed plant site, the proposed Eagle Pup Waste Rock Storage Area, the proposed Platinum Gulch Waste Rock Storage Area, and the Crushers. All diamond drill hole locations are illustrated on Drawing 05 and diamond borehole logs are included in Appendix E and summarized in Table E-1. Selected diamond drill core photographs are included in Appendix F.

Diamond drilling was conducted by Lyncorp of Smithers, BC using a skid mounted diamond drill rig equipped with HQ3 drill rods. During the program two different rigs were used, the CS10 (June-July) and the CS1000 (August). The drill used a triple-tube core barrel, in which the inner tube was isolated from the drill fluid and had a split (longitudinal) sleeve. The split sleeve allowed the core to be recovered and viewed in a relatively undisturbed state. The diamond holes were typically drilled with a mix of water and polymer as drilling fluid.

Previous investigations met significant challenges getting good core recovery in the overburden materials and highly weathered bedrock. The 2011 site investigation was planned to make best efforts to improve core recoveries. Where poor recoveries were anticipated, the diamond drill holes were paired with test pits to provide some information about the shallow overburden characteristics. The same idea was applied whenever an outcrop was mapped in the vicinity of a borehole, as detailed in section 3.2. Diamond drill holes ranged in completed depth from 20.1 m to 50.5 m.

Installations in completed diamond drill holes included slotted PVC pipe standpipe piezometers (seventeen boreholes), vibrating wire piezometer (one borehole) and solid PVC casing for down-hole geophysics (ten boreholes). Standpipe piezometers typically included 3 m slotted pipe screened intervals near the bottom of the hole, using coarse sand/fine gravel quartz as the sand pack material, plugged with bentonite, grouted to the surface using a cement-bentonite grout and capped with bentonite. PVC pipe for downhole geophysics was grouted in place using a cement-bentonite grout, with the grout mixture proportioned to achieve a finished stiffness in the grout similar to that of the surrounding formation. The typical grout mix was 0.3:1:2.5 (bentonite:cement:water) by weight. All piezometers and PVC pipe for downhole geophysics were 50 mm diameter PVC.

3.4.3. Auger Drilling

In 2011 a total of seventeen auger holes were drilled, located in the Dublin Gulch valley bottom, proposed silt borrow area, proposed truck shop, proposed Eagle Pup Waste Rock Storage Area, and the proposed Plant Site. All auger test hole locations are illustrated on Drawing 05 and auger logs are included in Appendix E and summarized in Table E-1. Selected auger hole photographs are included in Appendix F.

Auger drilling was conducted by Midnight Sun Drilling of Whitehorse, Yukon, using a MARL 4CT track-mounted rig. Three techniques, solid stem augering, hollow stem augering and coring with the CRREL barrel were used depending on the purpose of the drilling and nature of the formation. Solid stem was used for the majority of the drilling, with grab samples obtained from the auger flights. The hollow stem was used as casing to conduct standard penetration testing (SPT) testing or to install standpipe piezometers. The CRREL barrel was used for core sampling of frozen ground, and also to obtain core of completely weathered rock at one hole. Auger holes were advanced to the target depth, limits of drilling capability (i.e. the length of auger flights available) or to refusal on boulders or bedrock.

Holes ranged in completed depth from 9.2 m to 28.2 m, with three short holes of 2.7 m, 4.3 m and 6.9 m which were drilled either in weathered bedrock or placer tailings, and due to the coarse nature of the formation they met refusal at shallow depths. SPT was completed at selected intervals in the auger holes to obtain some measure of in-situ density of the soils. The tests were conducted in all the areas where auger drilling was conducted, with the exception of the proposed Eagle Pup waste rock storage area where frozen ground was encountered.

Soil identification was based on observations of material retained on the auger flights, in split spoon samples from the SPT, and extruded from the CRREL barrel. SPT samples were typically taken at 1.5 m to 3 m intervals. Auger flights, SPT samples, and CRRL barrel core samples were photographed and logged at the rig and selected samples were collected for laboratory testing. Auger drilling was typically completed in 1.5 m runs and CRREL barrel drilling was typically completed in 0.6 m to 0.75 m runs.

Installations in completed auger holes included slotted PVC pipe standpipe piezometers (four boreholes), vibrating wire piezometer (one borehole), solid PVC casing for down-hole geophysics (one borehole), and solid PVC casing for installation of thermistor strings (seven boreholes). Installations in the auger holes for downhole seismic and VWP followed the same methodology as described previously for the diamond holes. Installations for standpipe piezometers and thermistor strings were completed with bentonite chips use to backfill between the casing and the formation to the surface.

3.5. Field Testing

3.5.1. Penetration Testing

Three types of penetration testing were completed as part of the drilling and test pitting program. Standard Penetration Testing (SPT) was performed in twelve of the sixteen auger holes completed, Dynamic Cone Penetration Testing (DCPT) was completed in one location adjacent to BH-BGC11-67/69 at the proposed plant site, and Wildcat Penetrometer testing was completed at 23 locations, most of them within the Dublin Gulch valley bottom. Some SPT and DCPT tests were completed using an instrumented rod and SPT Energy Analyzer (Pile Dynamics Inc., Cleveland, Ohio) to measure the energy transferred (ETR) from the hammer to the rods, allowing corrections of field data to a standard energy value (N_{60}).

Appendix G contains a detailed description of the different tests, Table G-1 summarizes all penetration testing completed, and Drawing 06 illustrates the location of the different tests.

3.5.1.1. SPT N-blow count

SPT testing was completed at selected intervals in the auger holes to obtain some measure of in-situ density of the formation materials. SPT testing was completed from the auger rig using standard SPT equipment: 34.9 mm (1 3/8") diameter split spoon, 63.5 kg (140 lb) automatic trip hammer, and 762 mm (30") drop height.

Previous observations of the placer tailings, colluvium, and weathered bedrock indicated the presence of a large fraction of cobbles and boulders reducing the applicability of SPT testing. During the 2011 field investigation, in an attempt to identify interference by coarse materials, SPT blowcounts were typically recorded for each inch (25 mm) during the SPT tests. Coarse particles sometimes interfered with the tests, causing the tests to reach refusal before the end of the 450 mm test interval. In this situation, a 'corrected' N and consequently 'corrected' N_{60} value was estimated for the sandier portion of the test. For detailed information on the methodology followed to calculate corrected N-values, refer to Appendix G and Tables G-2 and G-3.

SPT tests were carried out in all boreholes where soil conditions allowed, with a total of 77 tests (Drawing 06). From the entire suite of tests completed, thirty were considered invalid either because they were performed in frozen ground (seven), recoveries were less than 150 mm (eighteen), or were influenced by coarse clasts (five).

3.5.1.2. Dynamic Cone Penetrometer (DCPT)

Dynamic cone penetration testing (DCPT) involves a cone driven into the formation at the base of a borehole. The number of blows needed to achieve this penetration is taken as an indicator of the density or consistency of the formation material. DCPT testing was completed with the auger rig and the same automatic trip hammer as was used for SPT testing. The DCPT tests were also monitored using the SPT energy analyzer. Blows were counted in 150 mm increments.

A total of four DCPT tests were completed adjacent to BH-BGC11-67/69 in the proposed plant site (Drawing 06). Refusal was met at 2.5 m, 3.2 m, 0.5 m and 0.6 m in the four tests. Refer to Appendix G and Table G-4 for detailed information on the DCPT testing.

3.5.1.3. Wildcat Penetrometer

Wildcat penetrometer testing is conducted with a hand operated penetration testing tool. The device consists of a safety hammer, rods, a sacrificial cone tip and a lubricating system. The falling portion of the hammer weighs 15.9 kg (35 lbs) and the drop height is 0.377 m (15 inches). The rods are 1 m long and 2.8 cm (1.1 inches) in diameter. The rods are grooved every 10 cm to allow blow counts to be recorded in 10 cm increments. Testing is completed when refusal is met (considered to be 50 blows in one 10 cm increment).

A total of 25 Wildcat penetrometer tests were completed mostly within Dublin Gulch and a few in the crusher area, 100 day Storage area and along the road to Platinum Gulch (Drawing 06). Of the 25 tests, three were terminated at the maximum length of rods available. The remaining tests were terminated at refusal. For detailed information on testing results and methodology followed refer to Appendix G and Tables G-5 and G-6.

3.5.2. Geophysics

Frontier Geosciences Inc. of Vancouver, B.C. was engaged to complete seismic refraction and down-hole seismic testing between August 24 and September 8, 2011. The surface investigation was supplemented with downhole surveys, including eleven compression wave and shear wave soundings in completed boreholes. A detailed summary of the geophysical investigation program and results (seismic refraction, shear and compression wave velocities) is presented in Appendix H.

3.5.2.1. Seismic Refraction

The work included approximately 5.4 km of seismic refraction surveying along and across the Dublin Gulch valley bottom, and to the east of Anne Gulch, up in the northern side of Dublin Gulch valley within the proposed Heap Leach footprint (Drawing 05).

Seismic refraction involves the use of small explosive charges to create a shock wave at one end of a series of geophones, which are placed on the ground surface at even intervals. The time taken for the shock wave to arrive at each geophone can be interpreted to make inferences of compression wave velocity with depth between instruments. This information can be used to infer the contact between different geological units, providing additional spatial information between (or in the absence of) test holes. The main purpose for this work was to identify the transition from overlying overburden to undisturbed bedrock within the Dublin Gulch valley and obtain an indication of material stiffness over an extended area.

3.5.2.2. Downhole Seismic Profiling

This work included shear wave (S-wave) and compressional wave (P-wave) profiling in eleven boreholes, all of them selected within key proposed facilities as follows: plant site (one), Dublin Gulch valley bottom (four), Heap Leach (three), and Crushers (three). Drawing 07 illustrates the location of all the boreholes where downhole seismic profiling was conducted.

The surveying was carried out in drillholes lined with PVC casing. Data was obtained at 0.5 m intervals for approximately the full depth of each borehole (ranging between 21.3 m to 50.3 m) using surface energy sources (typically a sledgehammer blow to the end of a heavy timber in firm contact with the ground surface) and a down-hole triaxial geophone package held to the wall of the casing by a spring steel carrier.

The main purpose of this work was to obtain S-wave velocity profiles, which provide an indirect indication of the shear strength of the formation. The P-wave velocity data can be used for other related purposes, for example estimating excavatability of rock.

3.5.3. Plate Load Testing

Plate load tests were carried out by BGC personnel in August 2011 to assess the stiffness properties of different exposed subgrade materials. Plate load tests were conducted in two excavated test pits located in the proposed plant site (TP-BGC11-103, TP-BGC11-105) and at one excavation in the proposed secondary crusher area (Drawing 08). Four different plate sizes were used: 1.2 m, 0.76 m, 0.53 m, and 0.3 m, and at each test location at least two different plate sizes were tested. The purpose of this testing program was to:

- Measure the modulus of subgrade reaction of different rock types; and,
- Test various diameters of plate to estimate the variation of material stiffness with bearing pressure and investigate the influence of plate size for extrapolation of results to full size footings.

A detailed description of the test methodology is presented in Appendix I and a summary of test locations, characteristics and results is presented on Tables I-1 to I-4.

3.5.4. Thermistors

Seven thermistor strings were installed during the site investigation program. The thermistors were located in areas where visible ice was observed during drilling and frozen ground conditions were expected to be found at depth (Drawing 07). The targeted areas were:

- Proposed silt borrow, two 10 m long thermistor strings (one broken) and one 25 m-long thermistor string;
- proposed truck shop, two 10 m long thermistor strings; and,
- ice-rich colluvium at Eagle Pup, two 25 m long thermistor strings.

For installation details and temperature readings refer to Appendix J and Tables J-1 and J-2.

3.6. Groundwater Investigation

3.6.1. Groundwater Levels

Groundwater observations were made throughout the site and consisted of: measuring water levels in standpipe and vibrating wire piezometers installed in 2009 and 2011 by BGC and installed by others in previous years; estimating the hydraulic conductivity of different soil units and weathered bedrock by means of slug testing in selected 2011 BGC standpipes; and, recording details of surface seepage locations throughout the site, when observed. Details of the groundwater investigation can be found in Appendix K and summary tables K-1 to K-5. Ground and surface water observations are illustrated in Drawing 09.

3.6.1.1. Standpipe Piezometers

Standpipe piezometers were installed to enable observations of groundwater elevations and also to support estimates of the hydraulic conductivity of formation materials through slug tests. During the 2011 investigation, twenty-two slotted PVC standpipe piezometers were installed in both auger and diamond drill holes (Drawings 07 and 09). Water levels in select standpipes installed by others were measured on July 3rd and July 4th, 2011. Water levels in standpipes installed by BGC in 2011 along with select standpipes installed by others were read between August 25th and August 29th, 2011.

3.6.1.2. Vibrating Wire Piezometers (VWP)

A total of two VWPs were installed during the 2011 site investigation, one in an auger hole in the proposed Eagle Pup Waste Rock Storage Area and the other in an inclined diamond hole in the proposed plant site (Drawings 07 and 09). Water levels in VWPs installed by BGC in 2011 were read between August 25th and August 29th, 2011.

3.6.2. Slug Testing

Five slug tests were conducted in selected boreholes in the Dublin Gulch valley bottom (BH-BGC11-32, -33, -34, -39 and -52) (Drawings 07 and 09). The hydraulic conductivity of weathered bedrock and placer tailings was assessed by conducting rising head tests in these monitoring wells. The tests were completed after water levels had stabilized following drilling and piezometer installation. Three iterations of a 1L rising head slug test were performed for each well; a standard 1L bailer was used to remove each slug. Water level measurements were recorded with a down-hole data logger, with manual observations as a check of instrument records. Data logger measurements were corrected with a barometric pressure logger.

3.6.3. Seep Observations

Within the area of interest, twenty-eight locations of surface seepage were observed. The spatial coordinates of each seep were noted and the approximate seepage rate was estimated if possible. A complete list of the observations can be found in Table K-5 in Appendix K, and the locations are shown in Drawing 09.

3.7. Sampling and Laboratory Testing

Laboratory testing conducted on select samples collected in 2011 included soil index testing, compaction testing and permeability testing, rock strength testing, and aggregate testing. Two labs were engaged: Golder Associates from Burnaby, BC, which conducted some of the soil index testing and all of the rock strength testing, and GeoNorth, from Prince George, BC, which conducted soil index testing, compaction testing and permeability testing, and aggregate testing. The original lab testing reports are included in Appendix L, and for summary plots and tables of tabulated test results refer to Appendix M.

3.7.1. Soil Testing

Samples for soil testing were recovered as SPT samples, auger grab samples, CRREL barrel core samples, and grab samples from test pit walls. Table 3-1 below provides a summary of soil tests performed in the work.

Table 3-1. Summary of Soil Samples Tested

Laboratory Test	Testing Standard	Number of Tests
Grain size	ASTM C136	147
Moisture Content	ASTM 2216	193
Hydrometer	ASTM 422	81
Atterberg Limits	ASTM 4318	93
Specific Gravity - Soil	ASTM 854	4
Soluble Sulphate in Soil	CSA A23.2-3B	3
Modified Proctor	ASTM 698	4
Permeability Testing	ASTM D5856	4

3.7.2. Rock Strength Testing

3.7.2.1. UCS and Brazilian Tensile Strength

Nine rock core samples from the proposed Heap Leach (BH-BGC11-29, -34), crushers (BH-BGC11-40A, -40B, -62), Plant Site (BH-BGC11-69), and Platinum Gulch Waste Rock Storage Area (BH-BGC11-43, -45, -46) were selected for laboratory testing to perform Unconfined Compressive Strength (UCS) testing with strain measurements, Brazilian tensile strength, and specific gravity. Table 3-2 provides a summary of tests performed on rock samples.

Table 3-2. Summary of Rock Samples Tested

Laboratory Test	Testing Standard	Number of Tests
UCS with Strain Measurement	ASTM D7012	8
Brazilian Tensile Strength	ASTM D3967	17
Specific Gravity - Rock	C127	9

3.7.2.2. Point Load Testing

During the 2011 Site Investigation Program a total of 320 core samples of rock were tested using a point load tester to estimate the intact rock strength of the metasedimentary and intrusive rock. These samples were taken from rock core obtained from twenty-seven boreholes at the site. From the 320 core samples, 117 were invalid, as outlined by ISRM (1985), due to incomplete development of the fracture surface. Therefore, 203 valid tests were performed. For more details on the point load testing procedure and a complete record of the samples tested refer to Appendix N and tables N-1 to N-28.

3.7.3. Borrow Source Testing

Several bulk samples were obtained from different locations identified as potential borrow areas suitable for construction material. The lab testing was tailored to aid in the characterization of the materials according to the requirements of each potential borrow source.

3.7.3.1. Silt Borrow

Fine grained soil materials may be required to construct liners for the heap leach facility or ponds. Previous investigations (see BGC 2011b) identified potential sources of silt borrow, and this component of the work was executed to determine if sufficient quantities of low permeability material are available on site. Five test pits (TP-BGC11-82, -119, -120, -121, and -122) and four boreholes (BH-BGC11-44, -47, -49, and -51) were sampled, with selected materials identified for testing for grain size, moisture content, Atterberg limits, Modified Proctor moisture-density relationship, and permeability testing (at 95 % Modified Proctor). Table 3-3 below summarizes the testing completed for potential silt borrow materials.

Table 3-3. Summary of tests conducted on potential silt borrow materials

Hole ID	Northing (m)	Easting (m)	Number of Soil Samples Tested					
			Grain Size	Moisture Content	Hydrometer	Atterberg Limit	Modified Proctor	Permeability Testing
			ASTM C136	ASTM 2216	ASTM 422	ASTM 4318	ASTM 698	ASTM D5856
Test Pits								
TP-BGC11-82	7100691	458604	5	5	2	5	--	--
TP-BGC11-119	7100548	458587	--	1	--	1	1	1
TP-BGC11-120	7100484	458511	--	1	--	1	1	1
TP-BGC11-121	7100588	458502	--	1	--	1	1	1
TP-BGC11-122	7100707	458684	--	1	--	1	1	1
Boreholes								
BH-BGC11-44	7100547	458690	5	10	5	8	--	--
BH-BGC11-47	7100699	458812	5	6	4	3	--	--
BH-BGC11-49	7100636	458747	5	6	5	5	--	--
BH-BGC11-51	7100744	458644	3	11	2	5	--	--

Notes:

1. Location for BGC test pits from handheld GPS measurements, and location of BGC boreholes from Underhill survey dated September, 2011.
2. Coordinates in UTM NAD 83, Zone 8N.

3.7.3.2. Aggregate Testing

Samples of silicified metasediments (5 x 20L pails) and granodiorite (5 x 20L pails) within the footprint of the open pit, grab samples of cobbles from the placer tailings (10 x 20L pails), and 1 x 20L pail with rock samples from the Steiner outcrop were obtained for the purpose of testing the material for potential use as concrete aggregate or other high quality aggregate. The samples from the open pit were combined and crushed to form one composite sample that was later tested; a similar procedure was followed with the samples from the placer tailings. Table 3-4 provides a summary of the aggregate testing.

Table 3-4. Summary of Aggregate testing

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Comments	Sample Testing
CONC-BGC11-01	7101270	459788	888	Single composite sample prepared by combining placer tailings oversize materials obtained from indicated locations	• Clay lumps (CSA A23.2-3A) • Low Density Granular Materials (CSA A23.2-4A) • Material Finer than 80 µm, fine aggregate (CSA A23.2-2A&5A) • $MgSO_4$ soundness of coarse aggregate (CSA A23.2-9A) • $MgSO_4$ soundness of fine aggregate (CSA A23.2-9A) • Flat and elongated particles (CSA A23.2-13A) • Micro-Deval, fine aggregate (CSA A23.2-23A) • Micro-Deval, coarse aggregate (CSA A23.2-29A) • Unconfined Freeze thaw (CSA A23.2-24A) • LA Abrasion, small size coarse aggregate (CSA A23.2-16A) • Relative Density SDD & Absorption, fine aggregate (CSA A23.2-6A) • Sulphate in soil (CSA A23.2-3B) • Detection of Alkali-Silica Reactive Aggregate by Accelerated Expansion of Mortar Bars (CSA A23.2-25A) • Petrographic No., coarse aggregate (CSA A23.2-15A)
CONC-BGC11-02	7101200	459716	886		
CONC-BGC11-03	7101160	459626	881		
CONC-BGC11-04	7101220	459484	859		
CONC-BGC11-16	7100940	458852	826		
CONC-BGC11-GRD	7099352	460190	1285	Single composite sample prepared by combining samples of granodiorite and quartzite clasts obtained from two indicated locations	• Clay lumps (CSA A23.2-3A) • Low Density Granular Materials (CSA A23.2-4A) • Material Finer than 80 µm (%), fine aggregate (CSA A23.2-2A&5A) • MgSO4 soundness of coarse aggregate (CSA A23.2-9A) • MgSO4 soundness of fine aggregate (CSA A23.2-9A) • Flat and elongated particles (CSA A23.2-13A) • Micro-Deval, fine aggregate (CSA A23.2-23A) • Micro-Deval, coarse aggregate (CSA A23.2-29A) • Unconfined Freeze thaw (CSA A23.2-24A) • Small coarse aggregate LA abrasion (CSA A23.2-16A) • Relative Density SDD & Absorption, fine aggregate (CSA A23.2-6A) • Sulphate in soil (CSA A23.2-3B) • Detection of Alkali-Silica Reactive Aggregate by Accelerated Expansion of Mortar Bars (CSA A23.2-25A) • Petrographic No., coarse aggregate (CSA A23.2-15A)
CONC-BGC11-SSED	7099338	460188	1284		
BGC-Steiner	7100278	459034	907	Single sample using material from the Steiner outcrop only	• Micro-Deval, coarse aggregate (CSA A23.2-29A) • Relative Density SDD & Absorption, fine aggregate (CSA A23.2-6A)

Notes:

1. Location for BGC samples from hand held GPS measurements.

2. Coordinates in UTM NAD 83, Zone 8N.

3.8. Placer Tailings Inventory

A visual reconnaissance of the reworked valley bottom placer tailings of Dublin Gulch and Haggart Creek was completed to develop opinions as to their potential for use as construction materials in development of the proposed mine. The placer tailings materials excavated in the course of foundation preparation may comprise a useful construction material, as a potential source for general fill, structural fill, concrete aggregate or heap overliner material, if suitably selected and processed through screening, crushing, and/or washing. Appendix O contains a description of the placer tailings encountered in Dublin Gulch and Haggart Creek, and Drawing 10 illustrates the locations of material observations per area. Visual observations of surficial materials in the Dublin Gulch valley bottom are summarized in Table O-1, and visual observations of surficial materials in the Haggart Creek valley bottom are summarized in Table O-2.

4.0 OBSERVED SUBSURFACE CONDITIONS

4.1. Summarized Data

Summary tables with key data results are tabulated below.

4.1.1. Penetration Data

Detailed observations of penetration resistance are presented in Appendix G, and raw blowcount data are displayed on the borehole logs in Appendix D. These results are summarized for the various geological units in Table 4-1, below.

Table 4-1. Summary of Penetration Data

Borehole	# of Valid Tests	Average N_{60}	Max N_{60}	Min N_{60}	Standard Deviation N_{60}
Placer Tailings					
BH-BGC11-39	11	39	67	1	20
BH-BGC11-65	5	27	36	17	7
Alluvium					
BH-BGC11-44	5	50	99	9	33
BH-BGC11-47	2	10	15	5	-
BH-BGC11-49	1	10	-	-	-
BH-BGC11-51	5	18	26	8	6
Till					
BH-BGC11-53	4	44	55	23	13
	Colluvium				
BH-BGC11-55	6	20	35	14	7
BH-BGC11-56	2	44	62	26	-
BH-BGC11-57	3	83	100	71	-
Weathered Metasedimentary Rock					
BH-BGC11-55	1	86	-	-	-
BH-BGC11-57	1	98	-	-	-

Notes:

BH-BGC11-58 and BH-BGC11-60 had no valid SPT tests.

BH-BGC11-57 has one SPT test where the calculated N60 value is 128, this is reported as 100 as N60 values are truncated at 100.

4.1.2. Plate Load Testing

Detailed results of the plate load testing are presented in Appendix I. Key results from the testing are summarized in Table 4-2, below.

Table 4-2. Summary of Plate Load Test Results

Location	Test #	Depth Below Grade (m)	Plate Diameter (m)	Vertical Subgrade Reaction Modulus (kPa/mm)	
				Virgin Curve, k_v	Rebound Curve, $k_{v(u-r)}$
Plant Site (TP-BGC11-103)	PT-BGC11-01	5.5	0.76	130	220
Plant Site (TP-BGC11-103)	PT-BGC11-02	5	0.76	140	310
Plant Site (TP-BGC11-103)	PT-BGC11-03	5	0.53	130	290
Plant Site (TP-BGC11-103)	PT-BGC11-04	5	0.3	540	1170
Plant Site (TP-BGC11-103)	PT-BGC11-05	5.5	0.53	130	250
Plant Site (TP-BGC11-105)	PT-BGC11-06	8.5	1.2	30	60
Plant Site (TP-BGC11-105)	PT-BGC11-07	8.5	0.76	40	80
Plant Site (TP-BGC11-105)	PT-BGC11-08	8.5	0.76	50	120
Plant Site (TP-BGC11-105)	PT-BGC11-09	8.5	0.53	40	120
Secondary Crusher	PT-BGC11-10	3.2	0.53	190	600
Secondary Crusher	PT-BGC11-11	3.2	0.3	640	1600
Secondary Crusher	PT-BGC11-12	3.2	0.53	200	500
Secondary Crusher	PT-BGC11-13	3.8	0.3	220	1000
Secondary Crusher	PT-BGC11-14	4.2	0.53	400	1040

4.1.3. Temperatures

Detailed observations of ground temperature measurements are presented in Appendix J. Key observations are summarized in Table 4-3, below.

Table 4-3. Summary of 2011 Thermistor Readings

Borehole	Location	Readings Dates	Depth of Frozen Ground (m)	Temperature of Frozen Ground (°C)
BH-BGC09-STU-3	Lower Stuttle Gulch	11 July 25-29 August	4 m to >10 m	0 to -0.3
BH-BGC09-STU-4	Lower Stuttle Gulch	11 July 25-29 August	4 m to >10 m	0 to -0.2
BH-BGC09-AG-3	Lower Ann Gulch/ Valley Bottom	7 July	10m	0.6
BH-BGC10-07[1]	Between Stuttle Gulch and Eagle Pup	11 July 29-30 August	10 m	0.0
BH-BGC11-42	Proposed Eagle Pup Waste Rock Storage Area	29-30 August	5 m to >25 m	-0.1 to -0.4
BH-BGC11-63	Proposed Eagle Pup Waste Rock Storage Area	29-30 August	1.2 m to >25	0 to -0.3
BH-BGC11-44	Proposed Silt Borrow Area	11 July 29-30 August	7 m to >10 m	0 to -0.1
BH-BGC11-47	Proposed Silt Borrow Area	11 July 29 August	7 m to >10 m	0 to -0.1
BH-BGC11-49	Proposed Silt Borrow Area	11 July	4 m to >10 m	0
BH-BGC11-51	Proposed Silt Borrow Area	26-29-30 August	15 m to >25 m	-0.1
BH-BGC11-57	Proposed Truck Shop	29-30 August	1.5 m to >10 m	-0.1 to -0.2
BH-BGC11-58	Proposed Truck Shop	30 August	1 m to >10 m	-0.1 to -0.7

[1]: Thermistor consisted of a single thermocouple at 10m depth

4.1.4. Groundwater Observations

Groundwater observations have been divided into groundwater level readings and permeability testing results.

4.1.4.1. Water Level

Detailed observations of groundwater have been presented in Appendix K. Groundwater elevations observed at selected monitoring well locations in summer 2011 are summarized in Table 4-4, below.

Table 4-4. Summary of Water Level Readings for data collected in 2011 site investigation

Hole ID	Elevation (masl)	Date Collected	Depth (mbgs)	Piezometer Type
BH-BGC11-26	1139.6	27-Aug-11	16.4	Standpipe
BH-BGC11-29	1045.3	27-Aug-11	7.8	Standpipe
BH-BGC11-30	952.0	27-Aug-11	16.3	Standpipe
BH-BGC11-32	818.7	24-Aug-11	10.8	Standpipe
BH-BGC11-33	833.0	26-Aug-11	4.2	Standpipe
BH-BGC11-34	848.3	24-Aug-11	8.3	Standpipe
BH-BGC11-35	986.3	27-Aug-11	24.6	Standpipe
BH-BGC11-36	1002.5	27-Aug-11	19.9	Standpipe
BH-BGC11-38	1013.0	25-Aug-11	26.3	Standpipe
BH-BGC11-39	804	24-Aug-11	9.8	Standpipe
BH-BGC11-40B	1049.8	25-Aug-11	8.5	Standpipe
BH-BGC11-45	1354.4	27-Aug-11	8.4	Standpipe
BH-BGC11-46	1246.1	27-Aug-11	15.3	Standpipe
BH-BGC11-48	1140.0	27-Aug-11	31.3	Standpipe
BH-BGC11-52	909.0	25-Aug-11	4.1	Standpipe
BH-BGC11-54	883.8	29-Aug-11	11.8	Vibrating Wire
BH-BGC11-55	881.0	27-Aug-11	dry	Standpipe
BH-BGC11-57	859.2	27-Aug-11	dry	Standpipe
BH-BGC11-59	883.7	27-Aug-11	29.4	Standpipe
BH-BGC11-60	859.2	27-Aug-11	dry	Standpipe
BH-BGC11-62	1017.9	27-Aug-11	20.2	Standpipe
BH-BGC11-63	1100.7	29-Aug-11	18.1	Vibrating Wire
GT96-26	n/a	3-Jul-11	30.1	Standpipe
GT96-35	n/a	27-Aug-11	3.4	Standpipe
MW09-AG1	1017	25-Aug-11	15.7	Standpipe
MW09-AG2	1009	27-Aug-11	12.7	Standpipe
MW09-DG1	840	4-Jul-11	1.8	Standpipe
MW09-DG1	840	27-Aug-11	2.3	Standpipe
MW09-DG2	824	4-Jul-11	0.9	Standpipe
MW09-DG4	787	4-Jul-11	5.6	Standpipe
MW09-DG5	810	27-Aug-11	10.7	Standpipe
MW09-OG2	1332	3-Jul-11	2.2	Standpipe

Hole ID	Elevation (masl)	Date Collected	Depth (mbgs)	Piezometer Type
MW09-OG3	1065	3-Jul-11	0.4	Standpipe
MW09-STU1	967	4-Jul-11	14.3	Standpipe
MW09-STU1	967	27-Aug-11	14.4	Standpipe
MW09-STU2	857	4-Jul-11	2.1	Standpipe
MW10-DG06	859	3-Jul-11	2.2	Standpipe
MW10-OBS1	796	4-Jul-11	7.2	Standpipe
MW10-OBS2	793	4-Jul-11	5.3	Standpipe
MW96-01	1398	3-Jul-11	23.1	Standpipe
MW96-02	1394	3-Jul-11	8.1	Standpipe
MW96-03a	1384	3-Jul-11	1.9	Standpipe
MW96-04	1373	3-Jul-11	4.6	Standpipe
MW96-05	1363	3-Jul-11	2.7	Standpipe
MW96-06a	1405	3-Jul-11	2.6	Standpipe
MW96-07b	n/a	3-Jul-11	0.0	Standpipe
MW96-08	1339	3-Jul-11	4.9	Standpipe
MW96-09a	1361	3-Jul-11	4.5	Standpipe
MW96-09b	1361	3-Jul-11	6.7	Standpipe
MW96-10a	1367	3-Jul-11	2.2	Standpipe
MW96-10b	1368	3-Jul-11	2.0	Standpipe
MW96-13a	984	3-Jul-11	5.3	Standpipe
MW96-13b	984	3-Jul-11	14.9	Standpipe
MW96-14a	976	3-Jul-11	dry	Standpipe
MW96-14a	976	27-Aug-11	dry	Standpipe
MW96-14b	976	27-Aug-11	3.6	Standpipe
MW96-14b	976	3-Jul-11	3.6	Standpipe
MW96-15a	943	4-Jul-11	0.8	Standpipe
MW96-15a	943	27-Aug-11	1.5	Standpipe
MW96-26	1316	3-Jul-11	6.5	Standpipe
MW96-27	1308	3-Jul-11	9.3	Standpipe

4.1.4.2. Permeability

A detailed discussion of the in-situ permeability testing is provided in Appendix K. Estimated hydraulic conductivities are summarized in Table 4-5, below.

Table 4-5. Summary of Hydraulic Conductivity Results by Tested Formation

Hole ID	Elevation (masl)	Formation/Unit	Top and Bottom of sand pack (mbgs)	Average conductivity, k (m/sec)
BH-BGC11-32	819	Placer Tailings and Weathered Bedrock[1]	19.5 – 23.6	2.5×10^{-6}
BH-BGC11-33	833	Weathered Bedrock	36.3 – 41.4	1.1×10^{-7}
BH-BGC11-34	848	Weathered Bedrock	30.1 – 34.4	2.6×10^{-6}
BH-BGC11-39	804	Placer Tailings	14.6 – 18.6	8.1×10^{-5}
BH-BGC11-52	909	Weathered Bedrock	18.3 – 22.6	9.7×10^{-6}

Note:

Screened section of pipe was installed across two units, therefore the conductivity (k) is not representative of a specific lithological unit.

4.1.5. Point Load Test

Detailed observations from point load tests are provided in Appendix N. A summary of completed and valid tests is provided in Table 4-6, below.

Table 4-6. Summary of Point Load Test Results by Rock Type

Hole ID	Metasedimentary Rock				Intrusive Rock			
	Number of Tests		Is_{50} Values (MPa)		Number of Tests		Is_{50} Values (MPa)	
	V	IN	Range	Mean	V	IN	Range	Mean
BH-BGC11-24	9	4	0.4 - 2.9	1	0	0	N/A	N/A
BH-BGC11-25	6	5	0.5 - 2.9	1.8	0	0	N/A	N/A
BH-BGC11-26	5	3	1.1 - 4.3	1.9	0	0	N/A	N/A
BH-BGC11-27	4	3	0.8 - 3.0	2.1	0	0	N/A	N/A
BH-BGC11-28	10	5	0.3 - 3.1	1.5	0	0	N/A	N/A
BH-BGC11-29	13	4	0.3 - 11.9	2.2	0	0	N/A	N/A
BH-BGC11-30	5	3	0.4 - 1.3	0.8	0	0	N/A	N/A
BH-BGC11-31	2	0	0.3	0.3	0	0	N/A	N/A
BH-BGC11-33	2	3	0.3 - 0.5	0.4	0	0	N/A	N/A
BH-BGC11-34	5	5	0.4 - 2.1	1	0	0	N/A	N/A
BH-BGC11-35	5	4	0.4 - 7	3	0	0	N/A	N/A
BH-BGC11-36	12	6	0.3 - 8.6	1.9	0	0	N/A	N/A
BH-BGC11-37	9	5	0.3 - 5.7	2.3	0	0	N/A	N/A
BH-BGC11-38	8	5	0.2 - 1.9	1.9	0	0	N/A	N/A
BH-BGC11-40A	10	6	0.5 - 9.6	2.5	0	0	N/A	N/A
BH-BGC11-40B	12	6	0.4 - 6.5	2.2	0	0	N/A	N/A
BH-BGC11-43	2	2	5.6 - 8.7	7.2	7	1	7.5 - 10.8	9.4
BH-BGC11-45	12	7	0.2 - 18.5	3.7	0	0	N/A	N/A
BH-BGC11-46	2	0	3.0 - 6.4	4.7	7	2	0.7 - 10.3	4.9
BH-BGC11-48	2	1	0.2 - 0.3	0.2	2	0	0.4 - 0.9	0.7
BH-BGC11-50	7	7	1.3 - 6.1	3.9	1	0	7.5	7.5
BH-BGC11-52	5	2	0.3 - 4.7	2	0	0	N/A	N/A
BH-BGC11-54	9	3	0.3 - 0.9	0.4	0	0	N/A	N/A
BH-BGC11-59	3	5	0.3 - 1.6	0.7	0	0	N/A	N/A
BH-BGC11-62	11	7	0.3 - 1.6	0.9	0	0	N/A	N/A
BH-BGC11-64	0	0	N/A	N/A	1	2	1.3	1.3
BH-BGC11-66	0	0	N/A	N/A	9	6	0.6 - 8.1	5.3
BH-BGC11-69	6	5	0.3 - 2.2	1.1	0	0	N/A	N/A
Total	**176**	**106**	**0.2 -18.5**	**2**	**27**	**11**	**0.4 - 10.8**	**4.8**

Notes:

(1) Range and mean values only consider the valid tests.

(2) V: valid test; IN: invalid test; N/A: not applicable.

4.1.6. Concrete Aggregate Testing results

Results of aggregate testing are summarized in Table 4-7. Both the pit aggregate and the placer tailings aggregate samples failed two test parameters typically used for evaluation of materials proposed for concrete aggregate. The pit aggregate sample failed Flat and Elongated Particles (CSA A23.2-13A) and Material Finer than 80 μm for Fine Aggregate (CSA A23.2-5A), and the placer tailings aggregate sample failed Micro-Deval for Coarse Aggregate (CSA A23.2-29A) and Material finer than 80 μm for Fine Aggregate (CSA A23.2-5A).

The petrographic examination for both pit and placer tailings composite samples revealed that the aggregate material contained rock types with mineralogy that may have a potential for alkali silica reactivity (ASR). Alkali-silica reactivity tests through mortar bar expansivity testing (CSA A23.2–25A) showed that both samples may be classified as “non-reactive.” Both samples were observed to have a petrographic number within the recommended limits for use as normal concrete aggregate.

Aggregate testing performed in the BGC Steiner sample included only Relative Density and Absorption for fine aggregate (CSA A23.2-6A) and Micro Deval for coarse aggregate (CSA A23.2-29A) due to the small size of the sample. The Steiner aggregate sample passed the abovementioned tests.

Additional study will be necessary to confirm suitability of these aggregate sources for use as concrete aggregate.

Table 4-7. Summary of Aggregate Testing Results

Test Type	Test Method	Pit Aggregate	Placer Tailings Aggregate	BGC Steiner	Maximum Allowable Value
Clay Lumps (%)	CSA A23.2-3A	0.0	0.0	N/A	1.0
Low Density Granular Materials (%)	CSA A23.2-4A	0.0	0.0	N/A	0.5
Material Finer than 80 μm (%), fine aggregate	CSA A23.2-5A	***4.8***	***3.6***	N/A	3.0
$MgSO_4$ Soundness Loss, fine aggregate (%)	CSA A23.2-9A	3.16	3.86	N/A	16
$MgSO_4$ Soundness Loss, coarse aggregate (%)	CSA A23.2-9A	0.97	0.27	N/A	12
Flat and Elongated Particles (%)	CSA A23.2-13A	***35***	19	N/A	20
Micro-Deval, Fine Aggregate (%)	CSA A23.2-23A	13.3	11.6	N/A	20
Micro-Deval, Coarse Aggregate (%)	CSA A23.2-29A	12.9	***26.9***	11.0	17
Unconfined Freeze-Thaw Test	CSA A23.2-24A	0.9	1.2	N/A	6
LA Abrasion (%), small size coarse aggregate	CSA A23.2-16A	13.7	29.9	N/A	50
Relative Density, fine aggregate	CSA A23.2-6A	2.657	2.704	2.718	-
Absorption (%), fine aggregate	CSA A23.2-6A	0.999	1.399	1.122	-
Sulphate in Soil (%)	CSA A23.2-3B	0.0008	0.0004	N/A	0.1
Detection of Alkali-Silica Reactive Aggregate by Accelerated Expansion of Mortar Bars	CSA A23.2-25A	0.14	0.11	N/A	0.15
Petrographic No., Coarse Aggregate	CSA A23.2-15A	121	117	N/A	140

Notes:

1. Cells are highlighted when results doesn't meet the specification.

2. N/A: not applicable, test was not performed

4.1.7. Material Testing Commissioned by Tetra Tech for the Heap Leah Facility

Some material samples were obtained for laboratory tests relative to the heap leach facility design; testing of these was commissioned by Tetra Tech Inc. Samples tested included durable rock, silt, colluvium, placer tailings, and weathered rock. Golder Associates performed a variety of tests, which are summarized in Table 4-8. Test results are included in Appendix L.

Table 4-8. Summary of Testing Commissioned by Tetra Tech for the Heap Leach Facility

SAMPLE DESCRIPTION	LAB CRUSH	SIEVE ANALYSIS	MIN./MAX. DENSITY	RELATIVE DENSITY & ABSORPTION					UNCONFINED FREEZE & THAW (2)	LAB ABRASION/MICRO-DEVAL	SLAKE DURABILITY	POINT LOAD	PROCTOR COMPACT	SPECIFIC GRAVITY	HYDROMETER	ATTERBERG LIMITS
				50X37.5MM	37.5X25MM	25X12.5MM	12.5X4.75MM	MINS 4.75MM								
SECTION 1 – DURABLE ROCK (1)																
ODF, as received		X														
ODF, minus 50mm crushed	X	X	X	X	X	X	X	X			O					
ODF, minus 37.5mm crushed	X	X	X					X		X						
ODF, minus 25mm crushed	X	X	X			X	X	O								
SECTION 2 – SILT													X	X	X	X
SECTION 3 – COLLUVIUM		X							O	X			X	X	X	X
SECTION 4 – PLACER TAILS		X								X	O		X	X	X	X
SECTION 5 - WEATHERED ROCK									O	O	X	X				
	X = completed															
	O = still to do															

Notes:
1. Completed using ASTM standard test method
2. Freeze-thaw test uses CSA 24A.

4.2. Material Descriptions

4.2.1. General

Subsurface conditions within the project area can be generalized as comprising a thin cover of organic soil and vegetation underlain by colluvium and variably thick, variably altered/weathered bedrock. Often, alluvial sediments, glacial till or placer tailings (fill) were encountered in or near the valley bottom close to Dublin Gulch. Ground conditions around the project site were found to be highly variable and influenced by the degree of bedrock weathering, slope angles, ground elevation, and presence/absence of frozen ground.

Frozen ground was observed at many test hole locations, and its presence was observed to vary considerably with respect to the depth to frozen ground, thickness, and ground ice content. Excess ice was observed in some locations. The spatial distribution of observed frozen ground is illustrated in Drawing 11.

Groundwater observations in the valley bottom near Dublin Gulch varied between 0.8 m and 10.8 m, however, at higher elevations groundwater was encountered between 0.4 m and 31.3 m, with the shallower readings typically observed near secondary drainages. Two dry wells were drilled in the truck shop area (BH-BGC11-57, -60), and one dry well was drilled in the south abutment of the proposed Heap Leach embankment (BH-BGC11-55).

4.2.2. Overburden

Several types of overburden materials were encountered within the project site, as discussed below.

4.2.2.1. Organics

A thin organic cover is widespread across the project site overlying the other overburden units and primarily consists of vegetative rootmat, moss, silt and sand, and other organic matter in varying proportions. The typical observed thickness was in the order of 0.2 to 0.3 m, and was not usually encountered in previously disturbed areas containing fill materials, such as the placer tailings in the valley bottom. Buried layers or lenses of peat and/or organic silt were observed in the site within other overburden types, such as colluvium or alluvium. The most common areas where buried organics were noted are the proposed camp site (depths between 1.0 m to 6.5 m in TP-BGC11-123, -124, -128, and -129), silt borrow area (depths between 1.0 m to 7.5 m in BH-BGC11-44, -47; TP-BGC11-82, -119, and -143), proposed truck shop (depths between 0.3 m and 0.5 m in TP-BGC11-135, -136), and proposed diversion channel embankment in Dublin Gulch (depths between 0.1 m and 3.5 m in TP-BGC11-135, -136).

4.2.2.2. Colluvium

Colluvial materials were generally encountered on sloping ground throughout the site at or near the ground surface, below the organic cover. Colluvium was not typically observed near the valley bottom or in the previously disturbed areas in Dublin Gulch.

The relative density of the colluvium was variable and generally ranged from loose to compact. The gradation and thickness of the colluvium was observed to be highly variable, predominantly ranging from boulders and cobbles with some silt and sand to silty sand with gravel and some cobbles. The colluvium is typically derived from transported weathered metasedimentary and/or intrusive bedrock. Gravel, cobbles, and boulders were generally observed to be angular to subangular. Finer grained colluvium characterized by silt with trace sand and gravel is generally only encountered on the lower flanks of the north and west-facing slopes such as at the vicinity of the proposed truck shop, proposed Platinum Gulch pond, south abutment of the proposed heap leach embankment and conveyors.

According to the 2011 test hole information, a typical average colluvium thickness for the site is 3.0 m; however in the vicinity of the proposed crushers it could be as thick as 7.0 m or more. It must be noted that this average thickness is likely understated since some test holes didn't penetrate through the full thickness of the colluvium layer. The colluvium may also include variable amounts of organics as noted in section 4.2.2.1, which are often observed in distinct layers or lenses within the colluvium.

A distinct colluvial unit was observed within a lobate landform in the Eagle Pup drainage area, at BH-BGC11-42 and BH-BGC11-63. This material contains completely weathered rock fragments mixed with excess ice, including frequent inclusions of massive ice. The lobate landform containing this ice-rich colluvium is approximately 1 ha in plan area, and is tentatively interpreted to be a relict rock glacier, or similar peri-glacial creep feature.

4.2.2.3. Fill

The surficial materials in the valley bottom near Dublin Gulch and Haggart Creek have been reworked by several decades of placer mining activities. Old sedimentation ponds and stockpiles of variable washed sand and gravels, with varying proportions of cobbles and boulders, are present throughout this area.

The placer tailings consist of highly variable materials, with a wide range of grain size and density. The materials range from isolated deposits of cobbles and boulders, to gravelly sand or sandy gravel, to loose silty sand or soft sandy silt. The latter materials appear to be confined to specific areas, which are inferred from aerial photographs to have been sediment control ponds. The observed thickness of placer tailings at eight test holes had a mean value of about 11 m, with a range between 1.7 m and 19.8 m. Drawing 10 shows a rough classification and distribution of materials surveyed from surface observations. Subsurface observations of these materials were conducted by auger drilling and test pitting, and grab samples were obtained from the ground surface.

4.2.2.4. Alluvium

Alluvial deposits were encountered within the proposed laydown area and potential silt borrow area. These materials comprise frozen and occasionally ice-rich stratified low plastic silts to silty sands with trace gravel and some interlayers of silty gravels. None of the test holes that encountered alluvial deposits in the laydown area fully penetrated the deposit. The deepest test hole in the area is auger hole BH-BGC11-51 which drilled through 24.9 m of frozen alluvium and reached the targeted depth without exploring the full thickness of the unit.

There is some uncertainty in the geological interpretation of the materials encountered within the proposed laydown area. It is possible that glacial till may have been encountered at depth below alluvium; however the contact between the two units is not clearly defined, due to sample disturbance associated with the auger drilling method.

4.2.2.5. Debris Flow Deposits

Materials tentatively classified as debris flow deposits were observed around the area where Stewart Gulch meets Dublin Gulch (BH-BGC11-31, -52 and TP-BGC11-131, -134, -136) and within the area of the south abutment of the proposed Heap Leach embankment (BH-BGC11-55 and OC-BGC11-49). The deposits were generally observed below shallow colluvium or fill, and typically consisted of subrounded to subangular cobbles and boulders embedded in a silty sand matrix.

4.2.2.6. Glacial Till

Glacial till had been observed in previous investigations on the lower flanks of north and south facing slopes above Dublin Gulch, and can be described as a compact well graded sand and gravel with some silt and trace to some cobbles. Interpretations of glacial till materials were generally made in the field on the basis of the absence of angularity of gravel and cobble size clasts, and presence of mixed lithology, subrounded to rounded clasts (i.e. both granodiorite and metasediments). Subrounded to rounded materials are indicative of glacially transported soils in contrast to more locally transported colluvium, which tends to be more angular, as described previously. Glacial till was observed in TP-BGC11-103 and -104. In TP-BGC11-103 the glacial till was observed beneath approximately 3.5 m of colluvium and above weathered bedrock, while in TP-BGC11-104 it was observed beneath approximately 0.7 m, also overlying completely weathered bedrock.

4.2.2.7. Highly to Completely Weathered Bedrock

Colluvium was typically observed to be underlain by a horizon of variably-weathered rock. The weathering profile varies substantially across the site, depending on parent rock type and other local factors.

The metasedimentary rock (e.g. quartzite, schist) nearest the ground surface was often observed to be completely weathered to silt with some to trace gravel or sand and gravel

with cobbles and trace to some silt and clay. The gravel and cobble clasts tended to be friable, platy and exhibit a 'soapy' film due to the weathering/alteration. The transition from highly or completely weathered rock to a more competent, unweathered rockmass is highly variable; unweathered rock was generally not observed in test pits, and usually not observed at shallow depths in drill holes.

The near-surface granodiorite intrusive rock was often observed to be either completely weathered to a silty sand, or sandy silt, or highly weathered to a poorly graded sand. The thickness of the weathered horizon was highly variable.

Weathered rock is considered to be part of the overburden where it is completed weathered (i.e. W5) or residual soil (i.e. W6). Less weathered rock, including highly weathered (i.e. W4) rock, is considered for the purposes of this report to be part of the bedrock.

4.2.3. Bedrock

Two major rock types were encountered at the site below the overburden soils: metasedimentary and intrusive. The metasedimentary bedrock type was the most predominant bedrock type encountered during the 2011 field program, since the intrusive stock extends across the uplands, which were not a primary focus of investigation. However, some intrusive rock was encountered in boreholes and at outcrops in the Platinum Gulch and Eagle Pup valleys.

Completely weathered rock is included as part of the overburden soils, as discussed previously. Less weathered rock is considered part of the bedrock, which has been subdivided into three broad categories, or types, for the purpose of engineering classification.

"Type 3" rock is the first "rock-like" material underlying the overburden materials, and is defined as being rock that is highly or less weathered (i.e. W4 or better), and has intact strength greater than R0 (i.e. minimum UCS strength 1 MPa). It is expected that Type 3 rock can be excavated with normal excavating equipment.

"Type 2" rock is defined as rock with Geological Strength Index (GSI, Hoek and Marinos, 2000) or Rock Mass Rating (RMR, Bieniawski, 1976) of 30 or greater, and core recovery during drilling of 50 % or greater. Alternatively, where GSI and RMR data are unavailable, average Rock Quality Designation (RQD) of 10 or greater serves as an equivalent criterion. It is expected that Type 2 rock will require ripping.

"Type 1" rock is defined as having GSI, RMR or average RQD exceeding 40. It is expected that Type 1 rock may require blasting.

The outcrop logs in Appendix B and borehole logs in Appendix E provide descriptive data that may be used to infer bedrock "type" as just described.

4.2.4. Frozen Ground

Frozen ground was encountered at 48 test locations (13 boreholes and 35 testpits) in the 2011 field program. Frozen soil was generally encountered immediately within the upper 2.0 m beneath the surficial organic cover; however, frozen ground was encountered to depths of up to 23 m below grade at the ice-rich colluvium lobate feature (BH-BGC11-42 and BH-BGC11-63) and the proposed silt borrow area (BH-BGC11-51). Observations of frozen ground are illustrated on Drawing 11, which also shows frozen ground observations from previous exploration programs. It should be noted that the presence of shallow frozen ground at the time of investigation does not automatically imply the presence of permafrost, since the maximum thaw may occur later in the year than the time of exploration; however, the presence of frozen ground does indicate that frost will likely persist at the observed locations until sometime late in the construction season.

5.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

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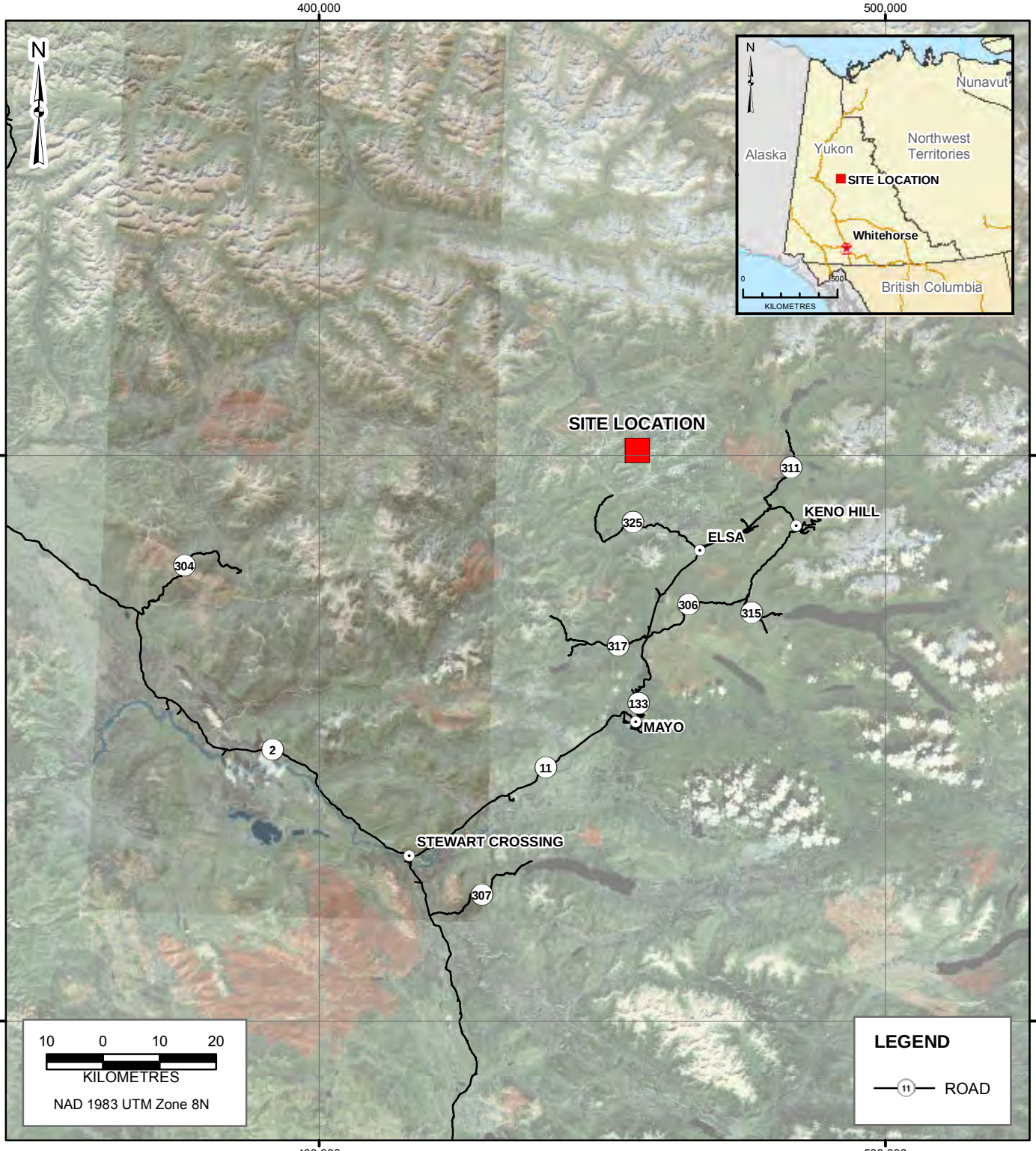
DRAWINGS



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SCALE:	1:1,000,000	DESIGNED:	DW
DATE:	JAN 2012	CHECKED:	DW
DRAWN:	LL	APPROVED:	PQ

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
VICTORIA GOLD CORPORATION

PROJECT:
EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE
FACTUAL DATA REPORT

TITLE:
GENERAL SITE LOCATION

PROJECT No.:	DWG No.:	REV.:
0792-006	01	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

X:\Projects\0792 Victoria Gold\006\Workspace\20111128_REPORT_2011_Geotechnical_Investigation_for_Minesite_Infrastructure_Factual_Data_Report\01_General_Site_Location.mxd Date: Wednesday, December 14, 2011 Time: 11:02 AM

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.
0	JAN 2012	ISSUED WITH FINAL REPORT	LL	DW	PQ
A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE:	1:15,000
DATE:	JAN 2012
DRAWN:	LL
DESIGNED:	DW
CHECKED:	DW
APPROVED:	PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: PROPOSED GENERAL ARRANGEMENT

PROJECT No.:	DWG No.:	REV.:
0792-006	02	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

7,103,000 | 7,102,000 | 7,101,000 | 7,100,000 | 7,099,000 | 7,098,000

461,000 | 460,000 | 459,000 | 458,000

N

LEGEND

- DIAMOND DRILL HOLE (2009 OR 2010)
- BGC AUGER HOLE (2009 OR 2010)
- BGC TEST PIT (2009 OR 2010)
- BOREHOLE BY OTHERS
- TESTPIT BY OTHERS
- PROPOSED INFRASTRUCTURE LAYOUT
- EXISTING ROAD
- STREAM
- 25 M CONTOUR

PROPOSED 99 Mt HEAP LEACH OUTLINE

99 Mt PIT OUTLINE

66 Mt PIT OUTLINE

EAGLE PUP WASTE ROCK STORAGE AREA

PLATINUM GULCH WASTE ROCK STORAGE AREA

PIT AREA

DUBLIN GULCH DIVERSION

HEAP LEACH FACILITY 66 Mt

HEAP EMBANKMENT

SECONDARY CRUSHER

PRIMARY CRUSHER

TERTIARY CRUSHER

CONVEYOR

100 DAY STORAGE

EXPLOSIVE MAGAZINES

PLANT SITE AREA

EVENTS PONDS

TRUCK SHOP AREA

LAYDOWN AREA

Eagle Rd

Dublin Gulch

Skate Gulch

Gill Gulch

Hyett Creek

Fefer Gulch

Return Gulch

Ethel Gulch

Oke Gulch

Stuart Gulch

Zeh Gulch

100 50 0 100 200 300

METRES

NAD 1983 UTM Zone 8N

NOTES:
1. GENERAL ARRANGEMENT RECEIVED FROM WARDROP NOV.23, 2011.

REV	DATE	REVISION NOTES	DRAWN	CHECK	APPR.
0	JAN 2012	ISSUED WITH FINAL REPORT	LL	DW	PQ
A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE: 1:5,000
DATE: JAN 2012
DRAWN: LL
DESIGNED: DW
CHECKED: DW
APPROVED: PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

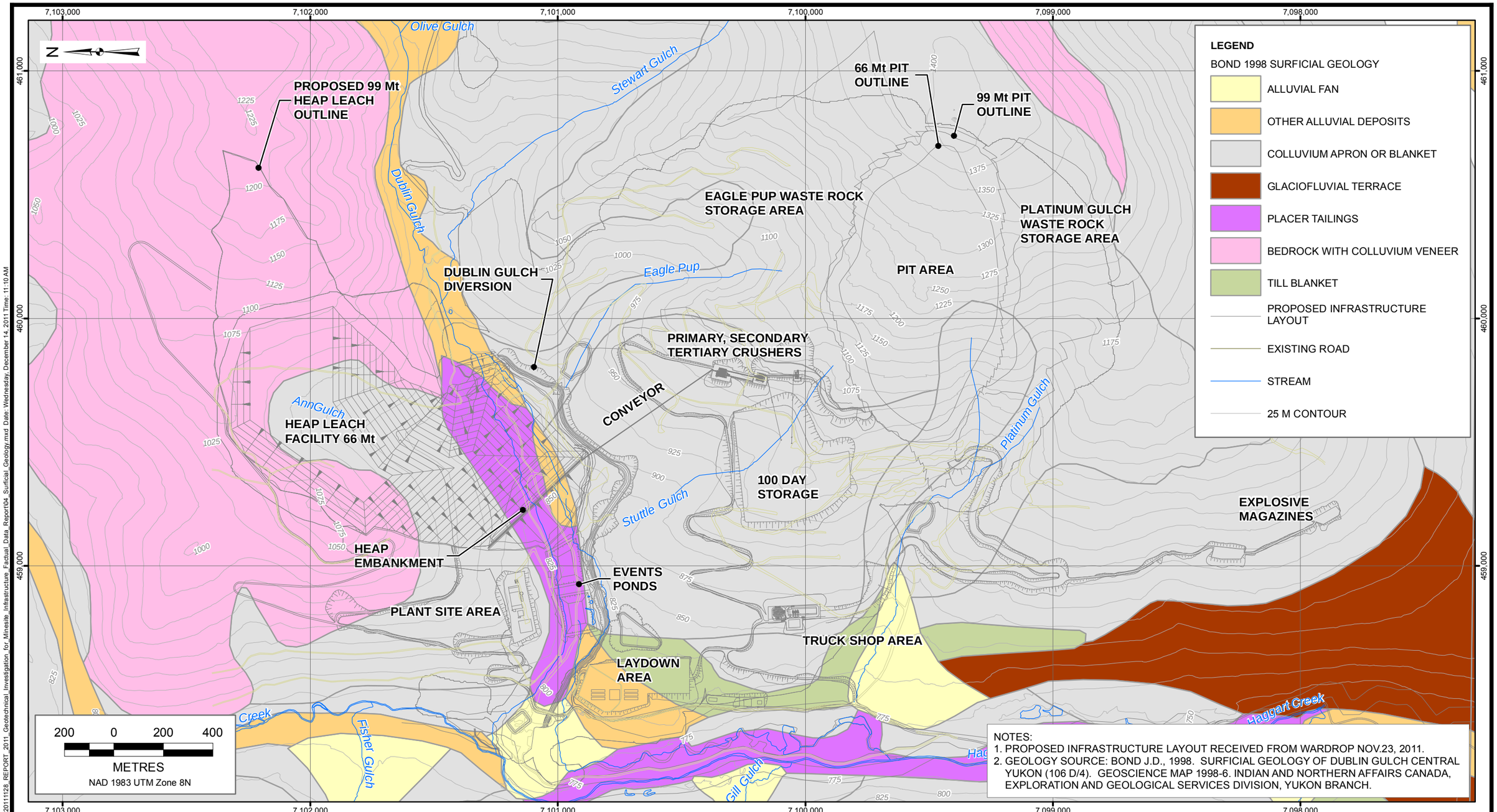
CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT 2011
GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: HISTORICAL FIELD INVESTIGATIONS (1995 TO 2010)

PROJECT No.: 0792-006
DWG No.: 03
REV.: 0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012



NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.
2. GEOLOGY SOURCE: BOND J.D., 1998. SURFICIAL GEOLOGY OF DUBLIN GULCH CENTRAL YUKON (106 D/4). GEOSCIENCE MAP 1998-6. INDIAN AND NORTHERN AFFAIRS CANADA, EXPLORATION AND GEOLOGICAL SERVICES DIVISION, YUKON BRANCH.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.
0	JAN 2012	ISSUED WITH FINAL REPORT	LL	DW	PQ
A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE:	1:15,000
DATE:	JAN 2012
DRAWN:	LL
DESIGNED:	DW
CHECKED:	DW
APPROVED:	PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: SURFICIAL GEOLOGY

PROJECT No.:	DWG No.:	REV.:
0792-006	04	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

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7,103,000 | 7,102,000 | 7,101,000 | 7,100,000 | 7,099,000 | 7,098,000

461,000 | 460,000 | 459,000 | 458,000

N

LEGEND

- BGC 2011 DIAMOND DRILL HOLE
- BGC 2011 AUGER HOLE
- BGC 2011 TEST PIT
- BGC OUTCROP

EXISTING TESTHOLES

- BGC BOREHOLE
- BGC TESTPIT
- BOREHOLE BY OTHERS
- TESTPIT BY OTHERS
- SEISMIC REFRACTION BY FRONTIER GEOPHYSICS
- PROPOSED INFRASTRUCTURE LAYOUT
- EXISTING ROAD
- STREAM
- 25 M CONTOUR

PROPOSED 99 Mt HEAP LEACH OUTLINE

99 Mt PIT OUTLINE

66 Mt PIT OUTLINE

EAGLE PUP WASTE ROCK STORAGE AREA

PLATINUM GULCH WASTE ROCK STORAGE AREA

PIT AREA

DUBLIN GULCH DIVERSION

SECONDARY CRUSHER

PRIMARY CRUSHER

TERTIARY CRUSHER

CONVEYOR

HEAP LEACH FACILITY 66 Mt

HEAP EMBANKMENT

100 DAY STORAGE

EXPLOSIVE MAGAZINES

PLANT SITE AREA

EVENTS PONDS

TRUCK SHOP AREA

LAYDOWN AREA

Eagle Gulch | Dublin Gulch | Skid Gulch | Ram Gulch | Hyland Creek | Gil Gulch | Am Gulch

100 50 0 100 200 300

METRES

NAD 1983 UTM Zone 8N

NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

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REV	DATE	REVISION NOTES	DRAWN	CHECK	APPR
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A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE: 1:5,000
DATE: JAN 2012
DRAWN: LL
DESIGNED: DW
CHECKED: DW
APPROVED: PQ

PROFESSIONAL SEAL:

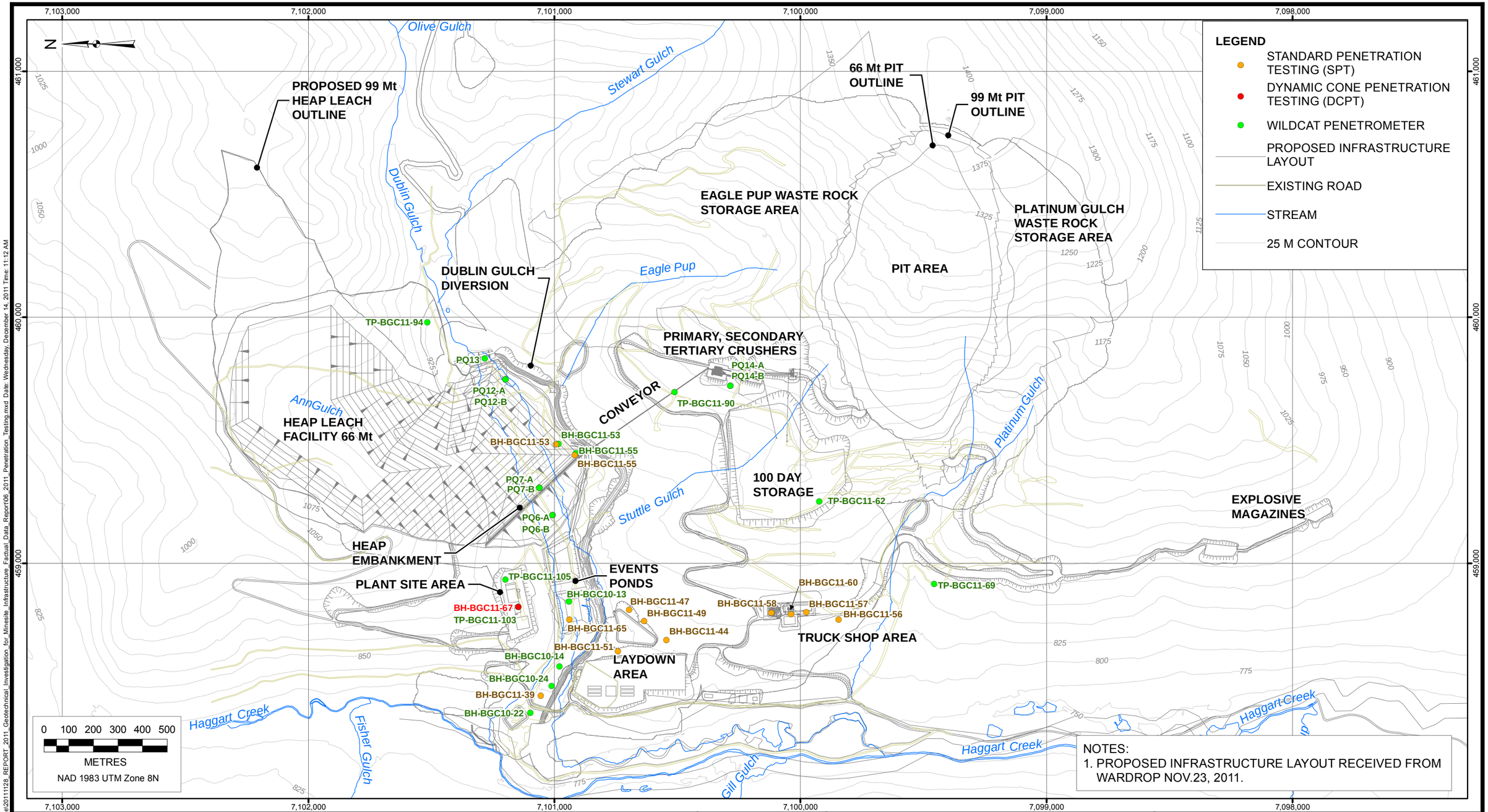
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT 2011
GEOTECHNICAL INVESTIGATION FOR MINE SITE
INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: TEST HOLE LOCATION PLAN

PROJECT No.: 0792-006 | DWG No.: 05 | REV.: 0



NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.

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A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE:	1:15,000
DATE:	JAN 2012
DRAWN:	LL
DESIGNED:	KH
CHECKED:	DW
APPROVED:	PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: 2011 PENETRATION TESTING

PROJECT No.:	DWG No.:	REV.:
0792-006	06	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

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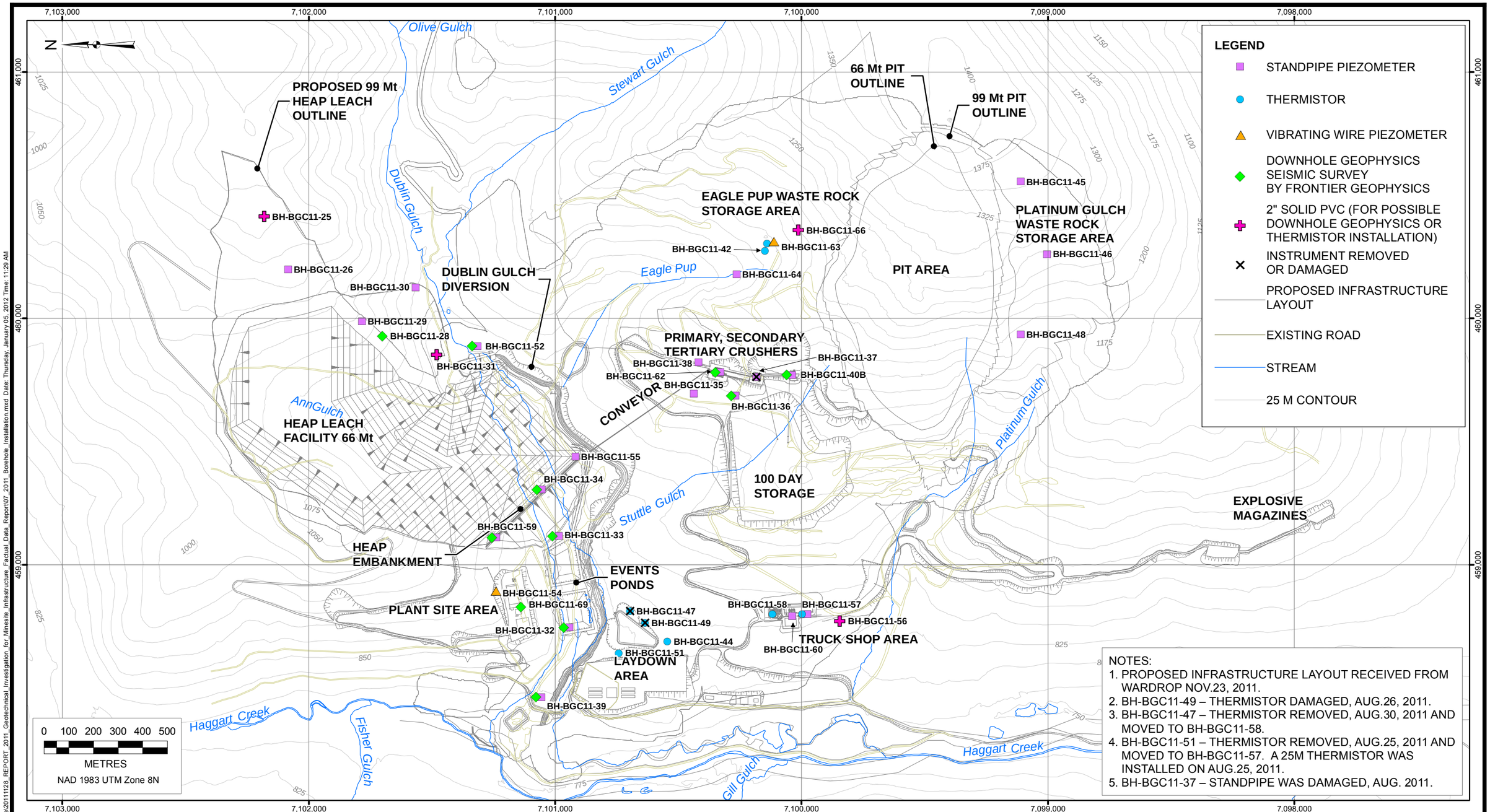

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0	JAN 2012	ISSUED WITH FINAL REPORT	LL	DW	PQ
A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE: 1:15,000
DATE: JAN 2012
DRAWN: LL
DESIGNED: KH
CHECKED: DW
APPROVED: PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: 2011 BOREHOLE INSTALLATIONS

PROJECT No.:	DWG No.:	REV.:
0792-006	07	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

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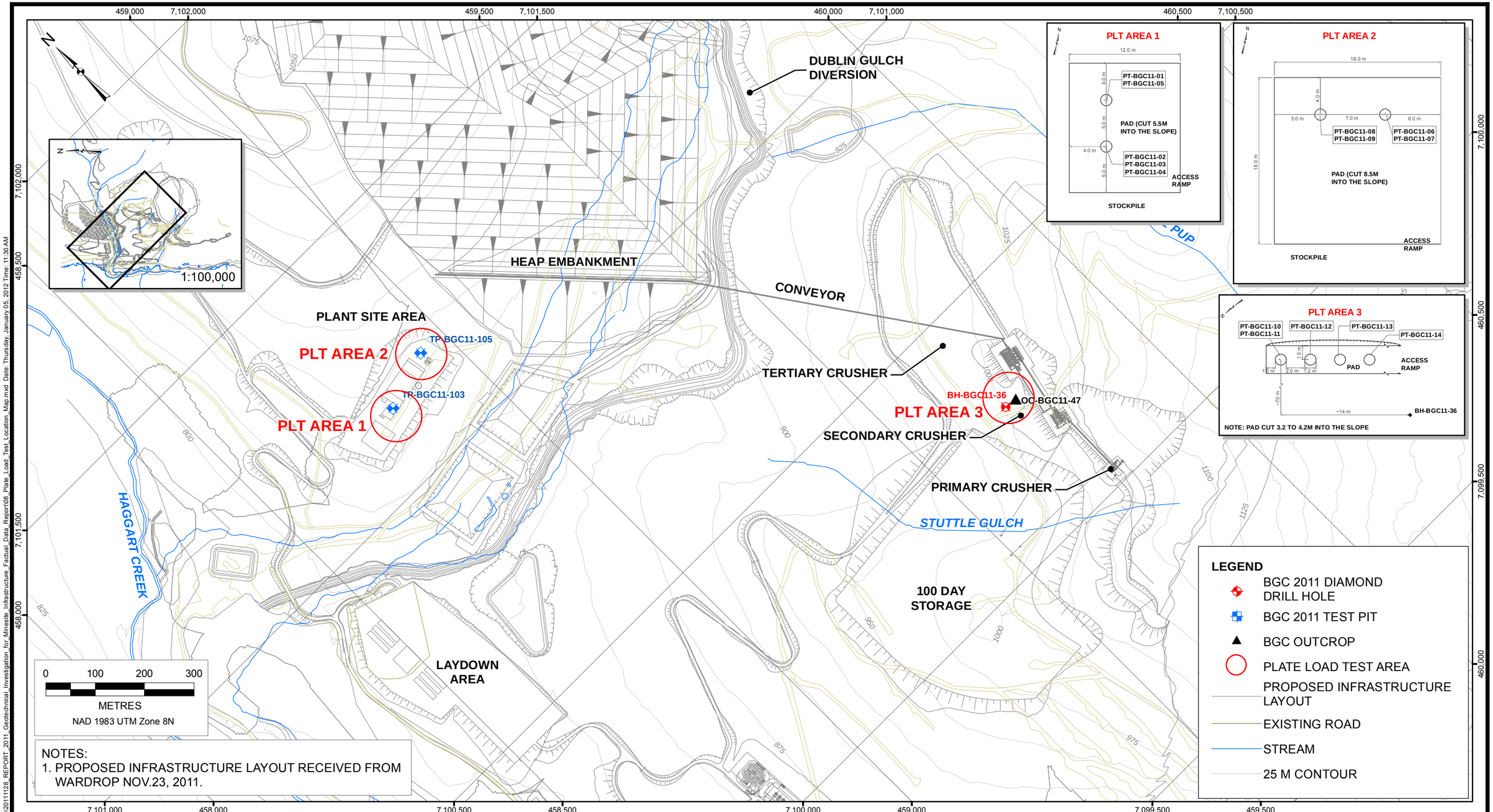

NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.
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A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE:	1:7,500
DATE:	JAN 2012
DRAWN:	LL
DESIGNED:	LT
CHECKED:	DW
APPROVED:	PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
VICTORIA GOLD CORPORATION

PROJECT:
EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE:
PLATE LOAD TEST LOCATION MAP

PROJECT No.:	DWG No.:	REV.:
0792-006	08	0

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

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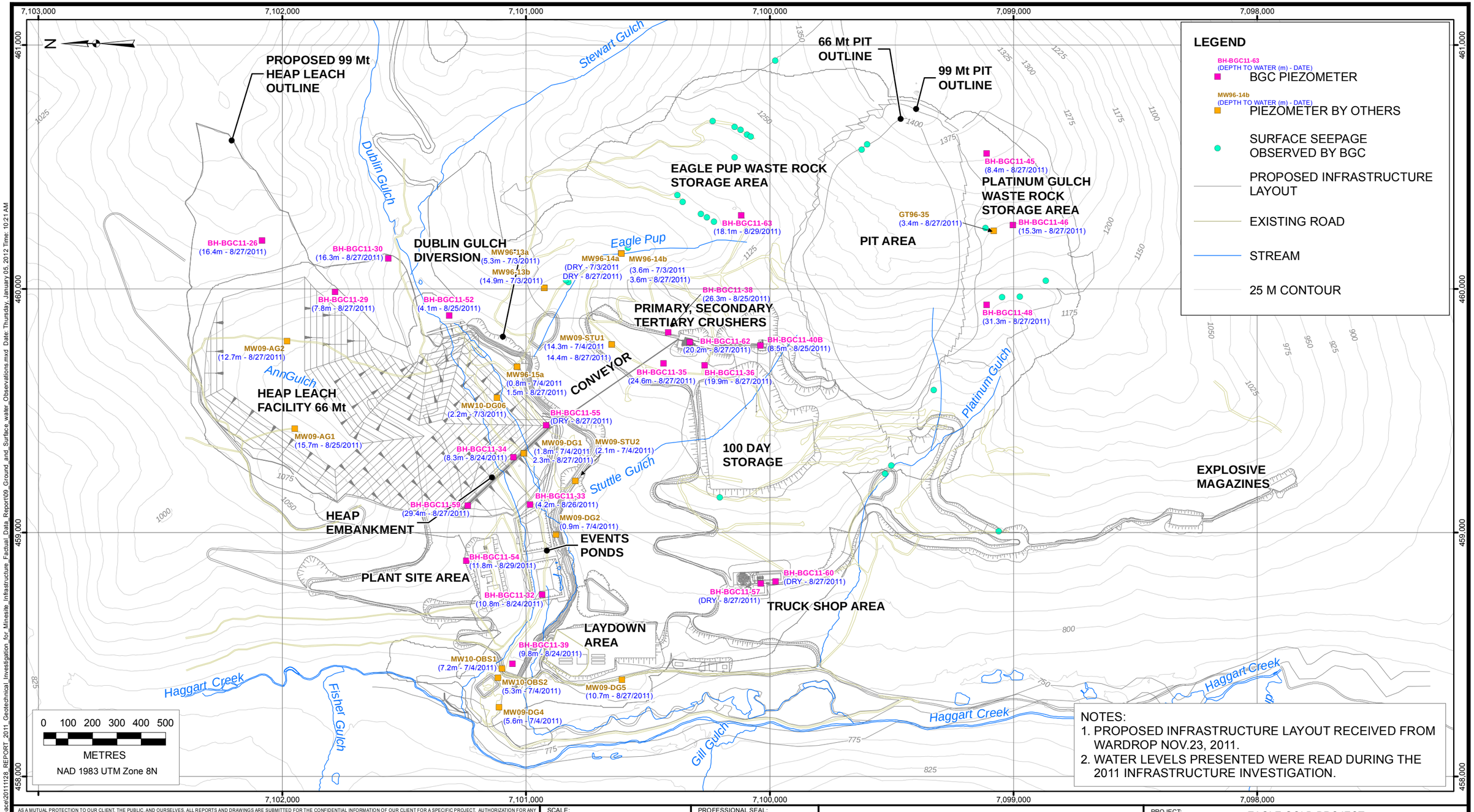

NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.
2. WATER LEVELS PRESENTED WERE READ DURING THE 2011 INFRASTRUCTURE INVESTIGATION.

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC, AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT. AUTHORIZATION FOR ANY USE AND/OR PUBLICATION OF THIS REPORT OR ANY DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS, THROUGH ANY FORM OF PRINT OR ELECTRONIC MEDIA, INCLUDING WITHOUT LIMITATION, POSTING OR REPRODUCTION OF SAME ON ANY WEBSITE, IS RESERVED PENDING BGC'S WRITTEN APPROVAL. IF THIS REPORT IS ISSUED IN AN ELECTRONIC FORMAT, AN ORIGINAL PAPER COPY IS ON FILE AT BGC ENGINEERING INC. AND THAT COPY IS THE PRIMARY REFERENCE WITH PRECEDENCE OVER ANY ELECTRONIC COPY OF THE DOCUMENT, OR ANY EXTRACTS FROM OUR DOCUMENTS PUBLISHED BY OTHERS.

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0	JAN 2012	ISSUED WITH FINAL REPORT	LL	DW	PQ
A	OCT 2011	ISSUED FOR COMMENT	LL	DW	PQ

SCALE:	1:15,000
DATE:	JAN 2012
DRAWN:	LL
DESIGNED:	KH
CHECKED:	DW
APPROVED:	PQ

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

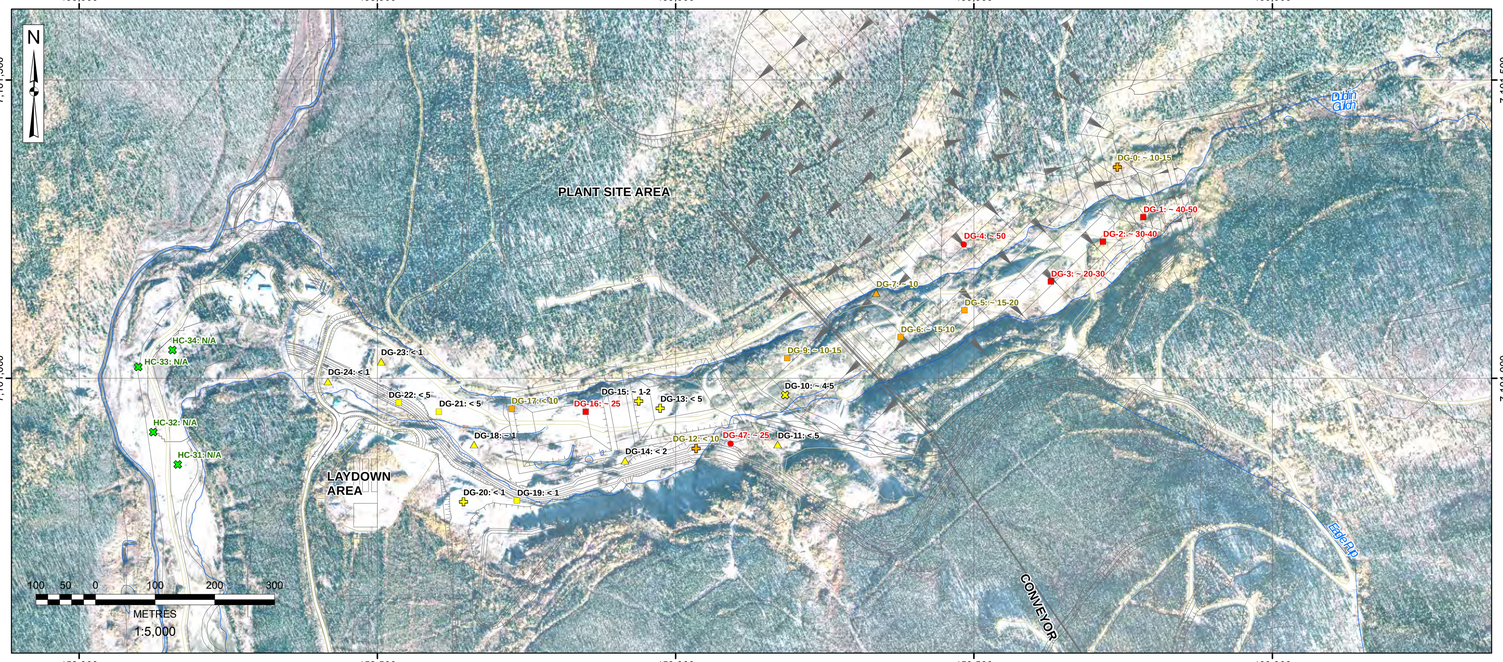
TITLE: GROUND AND SURFACE WATER OBSERVATIONS

PROJECT No.:	DWG No.:	REV.:
0792-006	09	0

X:\Projects\0792 Victoria Gold\006\Workspace\20111128_REPORT_2011_Geotechnical_Investigation_for_Mineslte_Infrastructure_Factual_Data_Report\09_Ground_and_Surface_water_Observations.mxd Date: Thursday, January 05, 2012 Time: 10:21 AM

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED JANUARY 2012

DUBLIN GULCH



LEGEND

ESTIMATED % OF OVERSIZE PARTICLES (>75 MM)

- N/A
- 0-5 %
- 5-20 %
- >20 %

SOIL CLASSIFICATION BY UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

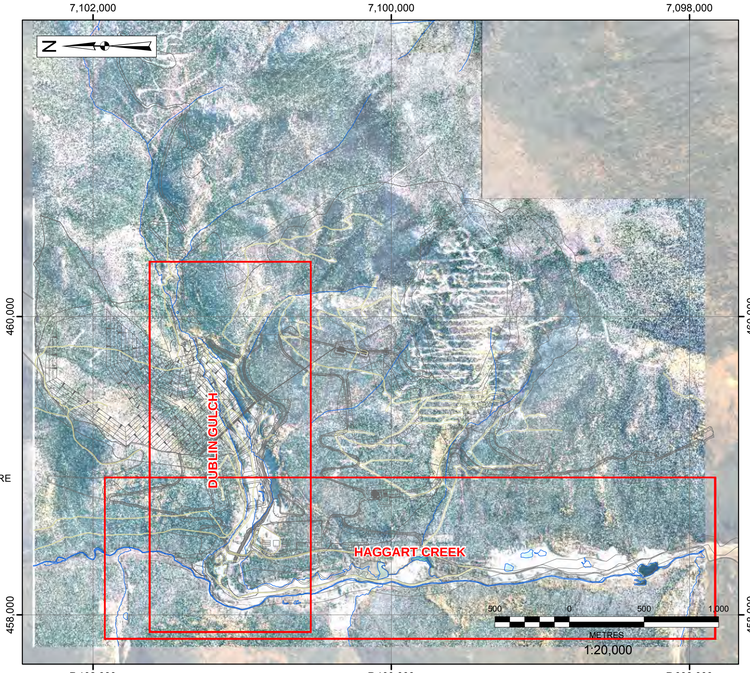
- GP - POORLY GRADED GRAVEL
- GW - WELL GRADED GRAVEL
- SM - SILTY SAND

EXAMPLE: HC-22: < 2

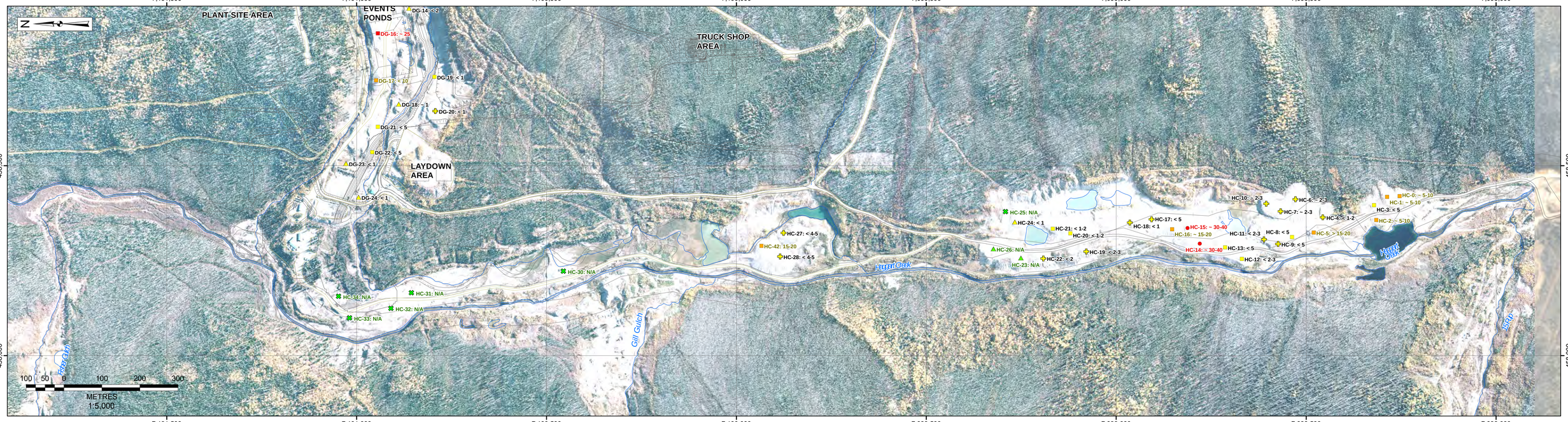
HAGGART CREEK SAMPLE N#22: <2% OF AGGREGATE IS GREATER THAN 75MM.

- PROPOSED INFRASTRUCTURE LAYOUT
- EXISTING ROAD
- STREAM

OVERVIEW MAP



HAGGART CREEK



NOTES:
1. PROPOSED INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP NOV.23, 2011.

NAD 1983 UTM Zone 8N

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PROJECT: EAGLE GOLD PROJECT 2011
GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: PLACER TAILINGS VISUAL CLASSIFICATION OF SURFICIAL MATERIALS

PROJECT No.:	DWG No.:	REV.:
0792-006	10	0

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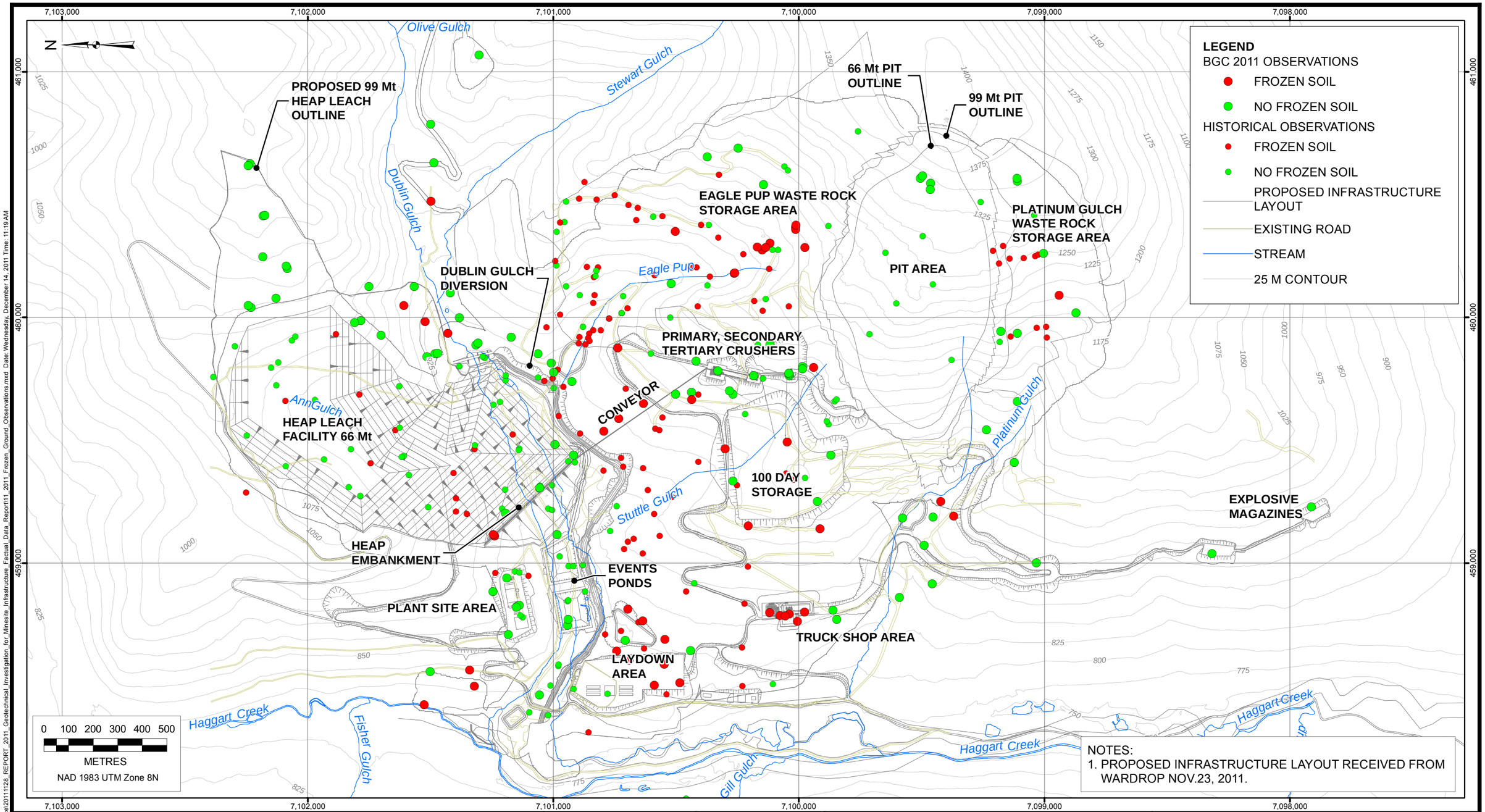

X:\Projects\0792 Victoria Gold\006\Workspace\20111128_REPORT_2011_Geotechnical_Investigation_for_Minesite_Infrastructure_Factual_Data_Report\11_2011_Frozen_Ground_Observations.mxd Date: Wednesday, December 14, 2011 Time: 11:19 AM

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PROJECT: EAGLE GOLD PROJECT
2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: 2011 FROZEN GROUND OBSERVATIONS

PROJECT No.:	DWG No.:	REV.:
0792-006	11	0

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APPENDIX A
TERMINOLOGY FOR OUTCROP MAPPING AND TEST HOLE LOGS

TERMINOLOGY FOR TEST HOLE AND OUTCROP MAPPING LOGS

1.0 INTRODUCTION

This appendix provides references used for describing the properties of soil and rock as they appear in the test hole and outcrop mapping logs included in Appendices B, C and E.

2.0 SOILS

The following section presents the references used for the classification of soils as described in the logs. The presented descriptors have been used for the logging of the soil portion of diamond drill holes, auger holes, test-pits and the overburden part of the outcrops/cut slopes. References in this section have been organized so as to follow typical order of description used in BGC's standard practice. It should be noted that descriptors for fine and coarse grained soil material have been combined and presented in their general order of appearance so as to avoid redundancy. Material is described as a soil if it is a transported soil, or if it is rock weathered in place with weathering grade greater than highly weathered (W4, Table 19) and with an extremely weak Unconfined Compressive Strength (UCS) (R0, Table 18).

Table 1. USCS Classification

Major Divisions			Group Symbol	Group Name
Coarse grained soils more than 50% retained on No.200 (0.075 mm) sieve	Gravel > 50% of coarse fraction retained on No.4 (4.75 mm) sieve	Clean gravel < 5% smaller than #200 sieve	GW	Well graded gravel, fine to coarse gravel
			GP	Poorly graded gravel
		Gravel with > 12% fines	GM	Silty gravel
			GC	Clayey gravel
	Sand ≥ 50% of coarse fraction passes No.4 sieve	Clean sand	SW	Well graded sand, fine to coarse sand
			SP	Poorly-graded sand
		Sand with >12% fines	SM	Silty sand
			SC	Clayey sand
Fine grained soils more than 50% passes No.200 sieve	Silt and clay liquid limit ≥ 50	Inorganic	ML	Silt
			CL	Clay
		Organic	OL	Organic silt, organic clay
	Silt and clay liquid limit ≥ 50	Inorganic	MH	Silt of high plasticity
			CH	Clay of high plasticity
		Organic	OH	Organic clay, organic silt
Highly organic soils			Pt	Peat

Table 2. Classification by Particle Size

Classification by Particle Size			
	Size Range		
		US Standard Sieve	
Name	(mm)	Retained	Passing
Boulders	> 200	8 inch	-
Cobbles	75-200	3 inch	8 inch
Gravel:			
Coarse	19 - 75	0.75 inch	3 inch
Fine	4.75 - 19	No. 4	0.75 inch
Sand:			
Coarse	2 - 4.75	No. 10	No. 4
Medium	0.43 - 2	No. 40	No. 10
Fine	0.075 – 0.43	No. 200	No. 40
Fines (silt or clay)	< 0.0.75	-	No. 200

Table 3. Proportion of Minor Components by Weight

Proportion of Minor Components by Weight	
“and”	40% - 50%
“y/ey”	25% - 40%
“some”	10$ - 25%
“trace”	0% - 10%

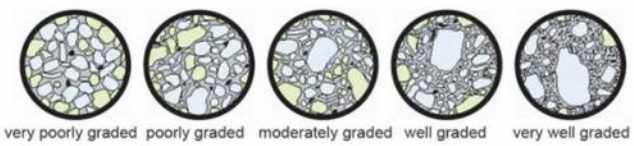


Figure 1. Gradation Classification

Table 4. Classification for Density of Granular Soils

Density of Granular Soils		
Description	**SPT "N"**	**Field Test/Identification**
V. Loose	0 – 4	None
Loose	4 – 10	Easily penetrated by 13 mm rod pushed by hand
Compact	10 – 30	Easily penetrated by 13 mm rod driven by hammer
Dense	30 – 50	Penetrated by 13 mm rod driven by hammer
V. Dense	> 50	Penetrated few cm's by 13 mm rod driven by hammer

Table 5. Classification for Consistency of Fine Soils

Strength of Cohesive Soils				
Grade	**Description**	**Field Identification**	**SPT "N"**	**Undrained Shear Strength (kPa)**
S1	Very soft	Easily penetrated several inches by fist	< 2	< 12
S2	Soft	Easily penetrated several inches by thumb	2 – 4	12 – 25
S3	Firm	Can be penetrated by thumb with moderate effort	4 – 8	25 – 50
S4	Stiff	Can be penetrated by thumb but penetrated only with great effort	8 – 15	50 – 100
S5	Very stiff	Readily indented by thumbnail	15 – 30	100 – 200
S6	Hard	Indented with difficulty by thumbnail	> 30	> 200

Table 6. Classification for Angularity of Coarse Grained Particles

Angularity of Coarse-Grained Particles	
Description	**Criteria**
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but have rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

Table 7. Classification for Particle shape

Particle Shape	
Flat	Particle width/thickness > 3
Elongated	Particles with length/width > 3
Flat and elongated	Particles meet criteria for both flat and elongated

Table 8. Classification for Plasticity of Soils

Plasticity of Cohesive Soils			
Description	**Silt**	**Clay**	**Criteria**
High	$W_L > 50$	$W_L > 50$	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit
Medium	-	$30 < W_L < 50$	The thread is easy to roll and not much time is required to reach the plastic limit. The lump crumbles when drier than the plastic limit.
Low	$W_L < 50$	$W_L < 30$	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Non-Plastic	NP	-	A 1/8 inch (3mm) thread cannot be rolled at any water content.

Where: W_L = Liquid Limit (%)

Table 9. Classification for Cementation of Soils

Cementation	
Description	**Criteria**
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

Table 10. Classification for Soil Structure

Description	Criteria
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick; note thickness
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick; note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

Table 11. Classification for Description of Dry Strength in Soils

None	Dry Specimen crumbles upon handling
Low	Crumbles into powder with some finger pressure
Medium	Crumbles with considerable finger pressure
High	Can't be broken with fingers; will break between thumb and hard surface
Very High	Cannot be broken between thumb and hard surface

Note: Assessed on natural soil pieces or moulded balls about 12 mm diameter that have been air-dried, or oven dried at less than 60 ^{o}C

Table 12. Classification for Dilatancy in Soil

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing

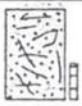
Table 13. Ice Description

Criteria	Descriptors
Colour	Colourless, white, stained, etc.
Clarity	Clear, transparent, cloudy, opaque, etc.
Bubble Content	Visually estimate percent
Bubble Size	In mm
Bubble Shape	Round, elongate, tubular Note: If the elongated bubbles have a preferential direction compared to the ground surface
Sediment inclusions or lenses	Visually estimate percent and thickness of lenses
Any other inclusions	Such as organics

Note: Massive ice description (ice greater than 1" or 2.5 cm)

Table 14. Classification for Description of Frozen Ground

ICE NOT VISIBLE

GROUP SYMBOL	SUBGROUP SYMBOLS	SUBGROUP DESCRIPTION	
N	Nf	Poorly bonded or friable	
	Nbn	No excess ice, well bonded	
	Nbe	Excess ice, well bonded	

VISIBLE ICE LESS THAN 2.5cm THICK

V	Vx	Individual ice crystals or inclusions	
	Vc	Ice coatings on particles	
	Vr	Random or irregularly oriented ice formations	
	Vs	Stratified or distinctly oriented ice formations	

VISIBLE ICE GREATER THAN 2.5cm THICK

ICE	ICE + soil type	Ice with soil inclusions	
	ICE	Ice without soil inclusions	

(Modified from Guide to Field Description of Permafrost for Engineering Purposes, NRC. Technical Memorandom 79)

NOTE 1) Dual symbols are used to indicate borderline or mixed ice classifications

2) Visual estimates of ice content as indicated on borehole logs are ± 5%

LEGEND Soil or Ice

Source: American Society for Testing and Materials. Standard D4083: Standard Practice for Description of Frozen Soils (Visual-Manual Procedure). Developed by Sub-Committee D18.03. West Conshohocken, PA. 6

Table 15 Symbols for Augering Techniques

Technique Acronym	Description
SSA	Solid Stem Auger
HSA	Hollow Stem Auger
CRREL	Coring barrel compatible with auger rigs originally designed by the Cold Regions Research and Engineering Laboratory for the purpose of coring and sampling frozen ground

3.0 ROCK

Rock logs were generated to present collected information for any untransported rock material that was described as highly weathered or less (<W5, Table 19) and of an Unconfined Compressive Strength (UCS) greater than extremely weak (R0, Table 18). Although not applicable in every case, the following rock descriptors were used for the diamond drillholes core logging, for the bottom of various test-pits and for the outcrops/cut slopes.

The general organization of this section follows the BGC standard logging order for lithological descriptions and is completed with details of measurements and criteria that apply to the rock structural mass description and cut slope logging.

Table 16. Classification for Grain Size: describes the grains size(s) present in the rock

Term	Particle Size	Examples
Very Coarse	> 60 mm	Porphyries – w/ measureable grains
Coarse	2 – 60 mm	Breccia, Gneiss – w/ measurable grains
Medium	0.06 – 2 mm	Sandstone, Granite, Schist – having clearly visible grains
Fine	0.002 – 0.06 mm	Tuff, Siltstone, Claystone, Mudstone, Basalt.
Very Fine	< 0.002 mm	

Table 17. Classification for Rock Structure

Igneous	Sedimentary	Metamorphic
Massive	Massive	Massive
Banded	Clast-Supported	Banded
Disturbed / Seamy	Matrix-Supported	Foliated
Disintegrated	Bedded	Disturbed / Seamy
	Laminated	Disintegrated
	Disturbed / Seamy	
	Disintegrated	

Table 18. Unconfined Compressive Strength / Hardness Classification for Rock (after CFEM 2006)

	Grade	Description	Field Identification	UCS (MPa)	Point Load Index (MPa)
Rock Hardness	R6	Extremely Strong	Specimen can only be chipped with flat end geological hammer.	> 250	> 10
	R5	Very Strong	Specimen requires many blows with flat end geological hammer to fracture.	100-250	4-10
	R4	Strong	Specimen requires more than one blow of flat end geological hammer to fracture.	50-100	2-4
	R3	Medium Strong	Cannot be scraped or peeled with pocket knife; can be fractured with single firm blow of flat end geological hammer.	25-50	1-2
	R2	Weak	Can be peeled by a pocket knife with difficulty; shallow indentation made by firm blow with point geologic hammer.	5-25	-
	R1	Very Weak	Crumbles under firm blows with point of geological hammer.	1-5	-
	R0	Extremely Weak	Indented by thumbnail.	< 1	-

Table 19. Classification for Weathering Grades of Rock

Grade	Description	Field Identification
A1 / W1	Fresh and Unweathered	Parent rock showing no discoloration, loss of strength or any other weathering effects.
		Strength may be increased by some alteration types.
A2 / W2	Slightly Weathered or Altered	Rock may be slightly discolored, particularly adjacent to discontinuities, which may be open and will have slightly discolored surfaces; the intact rock is may be weaker than the fresh rock.
A3 / W3	Moderately Weathered or Altered	Rock is discolored; discontinuities may be open and have discolored surfaces with alteration starting to penetrate inwards; intact rock is noticeably weaker than W1/A1 rock of the same unit.
A4 / W4	Highly Weathered or Altered	Rock is discolored; discontinuities may be open and have discolored surfaces, and the original fabric of the rock near the discontinuities may be altered; alteration penetrates deeply inwards. The ratio of original rock to weathered rock should be estimated where possible.
A5 / W5	Completely Weathered or Altered	Rock is discolored and decomposed/ friable or changed completely to a soil, but original fabric is visible. The properties of the soil depend in part on the nature of the parent rock.
A6 / W6	Residual Soil	Original rock fabric is completely destroyed.

Table 20. Classification for Description of Discontinuity Aperture in Rock

Aperture	Description	
< 0.1 mm 0.1 – 0.25 mm 0.25 – 0.5 mm	Very tight Tight Partly open	"Closed" features
0.5 – 2.5 mm 2.5 – 10 mm > 10 mm	Open Moderately wide Wide	"Gapped" features
1 – 10 cm 10 – 100 cm 1 m	Very wide Extremely wide Cavernous	"Open" features

Table 21. Codification for Discontinuity Infill Description in Rock

Code	Type	Description
BX	Broken Rock	Fractures ≤ 50 mm to 10 mm, rock fragments maintain intact rock strength
CX	Crushed Rock	Rock has been disintegrated
DX	Decomposed Rock	Clay altered and chemically weathered zones
CL	Clay	Very finely grained, cannot be brushed off hands when dry, no dilatancy, describe in comments
SM	Silt	Fine grained, can be brushed off hands when dry, dilates rapidly, estimate plasticity in comment form
SA	Sand	Non-cohesive infill; visible particles > 0.06 to 2 mm in diameter
FB	Fault Breccia	Clast supported, in matrix of gouge or mineral infill. Can be partially or completely healed
FG	Fault Gouge	Unconsolidated, matrix supported clay, sand and gravel sized rock fragments
ST	Surface Staining	* Record color
FE	Iron Oxides/ Staining	Red/orange/brown; can be scratched with a knife, may be slightly magnetic
TC	Talc	Typically white, slippery feel, lowest hardness (1); can be scratched with fingernail
CH	Chlorite	Green; low hardness (2-2.5) can be scratched with fingernail; non elastic; vitreous; streak colorless
SE	Sericite	White/grey/pale green, fine grained mica; variety of muscovite; occurs in small scales/flakes; silky luster
GY	Gypsum	Low hardness (2); can be scratched with fingernail; cleaves perfectly in one plane
CA	Calcite	Low hardness (3); cannot be scratched by fingernail, but can be scratched with a penny; 3 perfect cleavages; reacts strongly to acid without crushing
PY	Pyrite	White to yellow, shiny, may have block/cubic crystals
AN	Anhydrite	Semi hard (3-3.5); white, greyish, bluish, vitreous, rectangular cleavage fragments
KF	Potassium Feldspar	Light pink to red colour, associated with Potassic alteration, moderate hardness, can be scratched with steel knife with difficulty
QZ	Quartz	White to dark grey, glassy luster; moderate to high hardness (7); cannot be scratched with steel knife (hardness of 6.5); conchoidal fracture

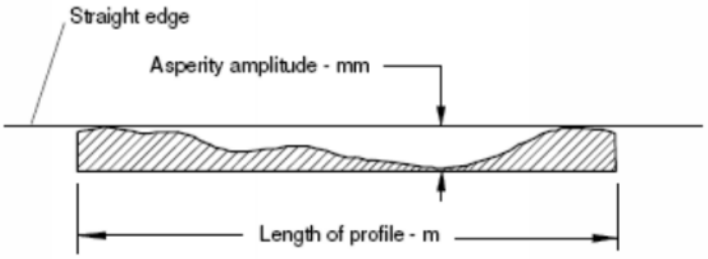


Figure 2. Descriptive Criteria for Joint Roughness Coefficient (JRC)

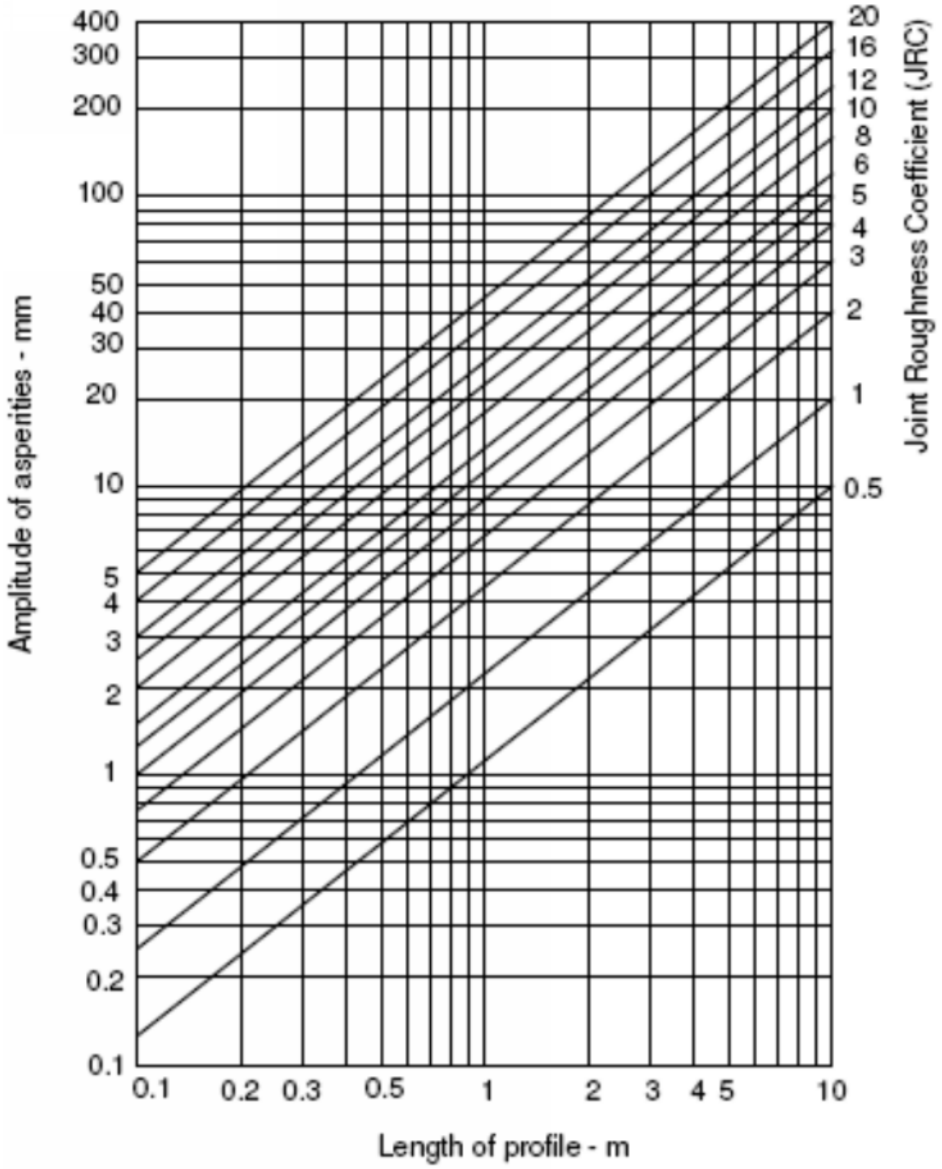


Figure 3. Chart for Determination of the Joint Roughness Coefficient (JRC) in Rock (after Barton et al., 1974)

Table 22. Classification for Discontinuity Spacing in Rock

Description	Discontinuity Spacing
Extremely Close Spacing	< 20 mm
Very Close Spacing	20 – 60 mm
Close Spacing	60 – 200 mm
Moderate Spacing	200 – 600 mm
Wide Spacing	600 – 2000 mm
Very Wide Spacing	2000 – 6000 mm
Extremely Wide Spacing	> 6000 mm

Table 23. Classification for Persistence of Structural Set in the Rock Mass

Description	Discontinuity Persistence
Very Low Persistence	< 1 m
Low Persistence	1 – 3 m
Medium Persistence	3 – 10 m
High Persistence	10 – 20 m
Very High Persistence	> 20 m

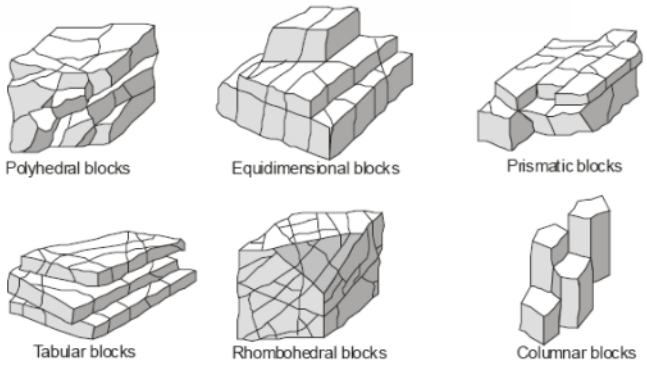


Figure 4. Classification for Block Shape in the Rock Mass Description

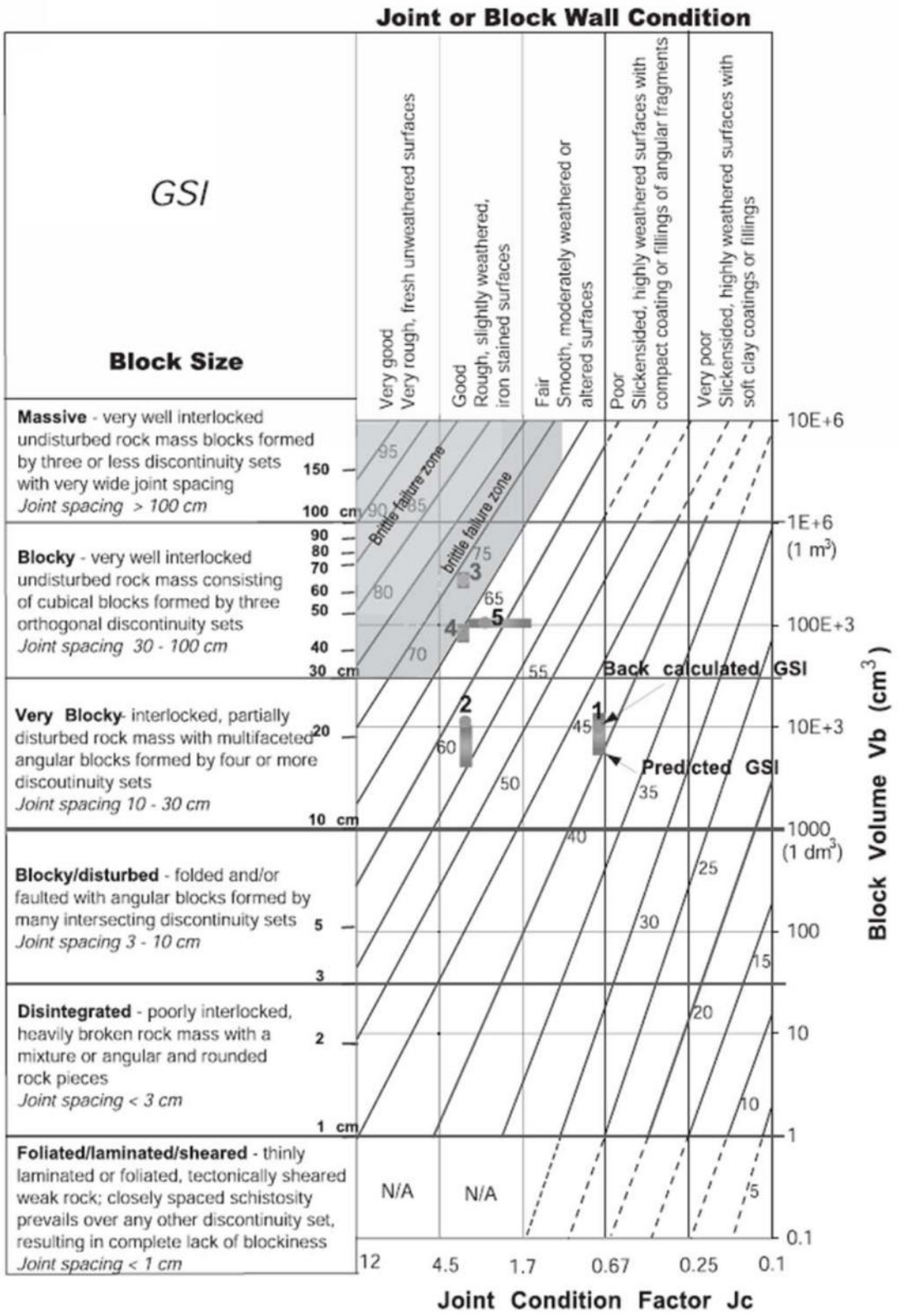


Figure 5. Chart for Geological Strength Index (GSI) Determination (after M. Cai, P.K. Kaiser, H. Uno, Y. Tasaka, M. Minami, International Journal of Rock Mechanics& Mining Sciences 41, 2004, p3-19)

Joint Wall Compressive Strength: Measure of how the strength of the joint wall compares to the intact strength of the rock and is based on the UCS intact hardness grade.

Rock Quality Designation (RQD):

$$RQD = \frac{\Sigma \text{ Length of core pieces} > 10 \text{ cm}}{\text{Total length of core run}} \times 100\%$$

Fracture Intercept (m): Fracture intercept is the average length between fractures in meters.

Natural Discontinuity No.: Number of discontinuities per drilling interval. When fault infill or broken rock zones were encountered, 1 extra discontinuity for each 10mm was counted. When intervals were found to have closely spaced discontinuities too numerous to count, (discs of core or rubble) the length of the zone was divided by the average particle size to obtain the number of discontinuities, for example a 30 cm zone with average 6 cm diameter rock fragments would add 5.

Rock Mass rating (RMR, Bieniawski, 1976):

The processing of the data highlighted two issues arising within the fractured and weathered rock intervals were the drilling process affected the recoveries: the fracture count became less consistent with the rest of the data and Rock Mass Strength values were being assigned to drilling intervals that were partly unknown. To support the reporting accuracy, RMR values were only calculated for drilling intervals with a core recovery greater than 50%.

Cut Slopes and Outcrops:

Slope Angle: average inclination angle to a horizontal plane.

Slope Direction: average dipping direction of the face of the cut slope or outcrop.

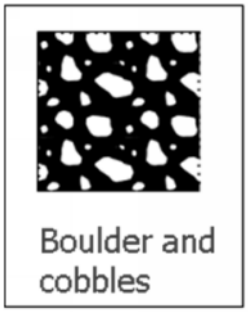
Dip: inclination angle of a rock structural set along the steepest line to a horizontal plane.

Dip direction: azimuth of the dip line, clockwise from North, local declination taken into account (23.5°E).

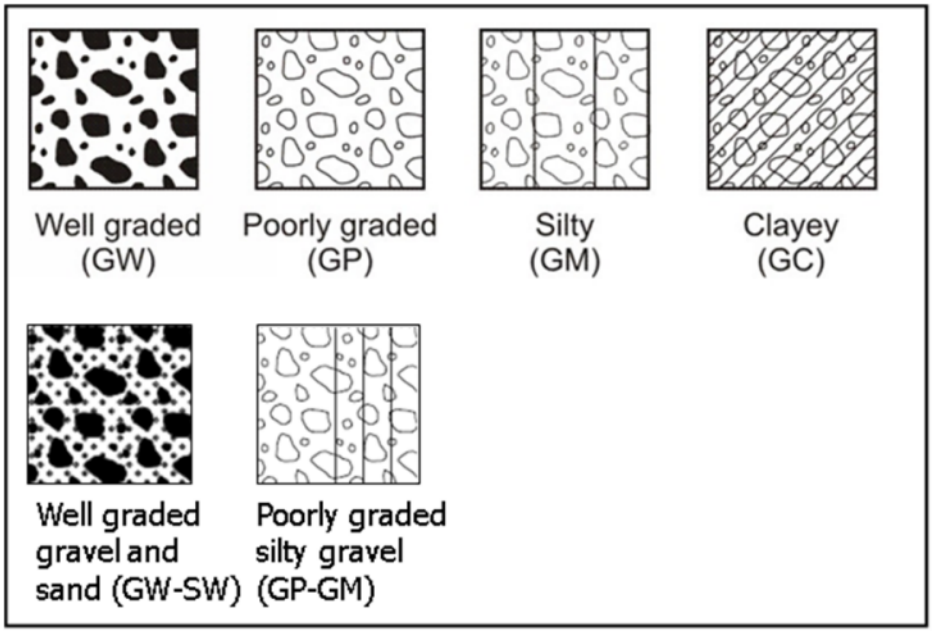
GRAPHIC SYMBOLS LEGEND FOR TEST HOLE LOGS

SOIL TYPES – COARSE-GRAINED

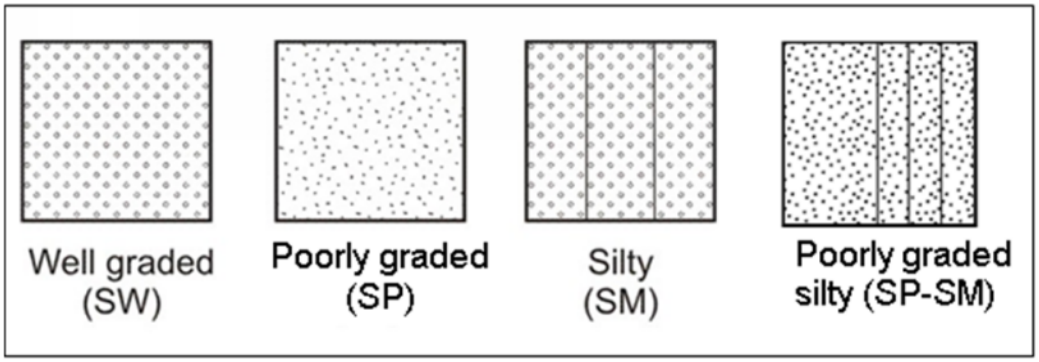
Boulders and cobbles



Gravel

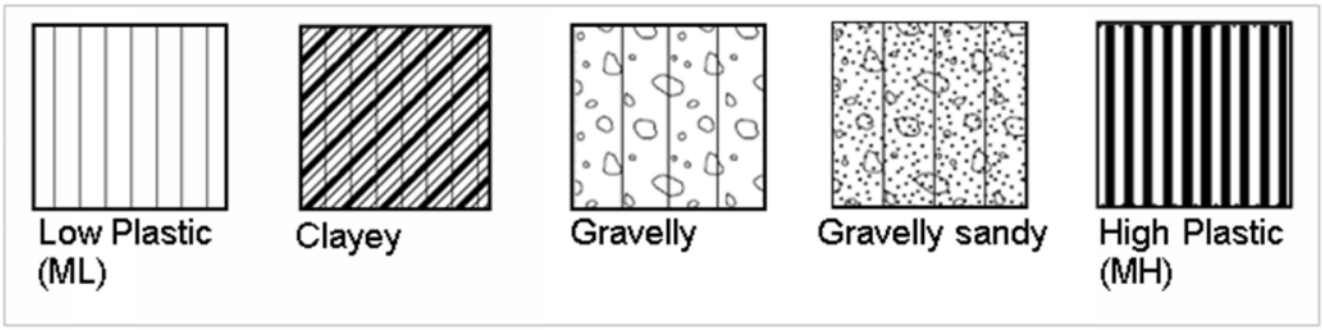


Sand

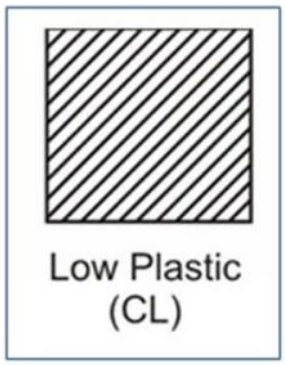


SOIL TYPES – FINE-GRAINED

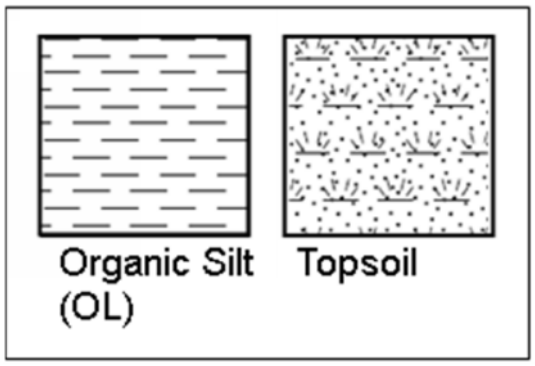
Silt



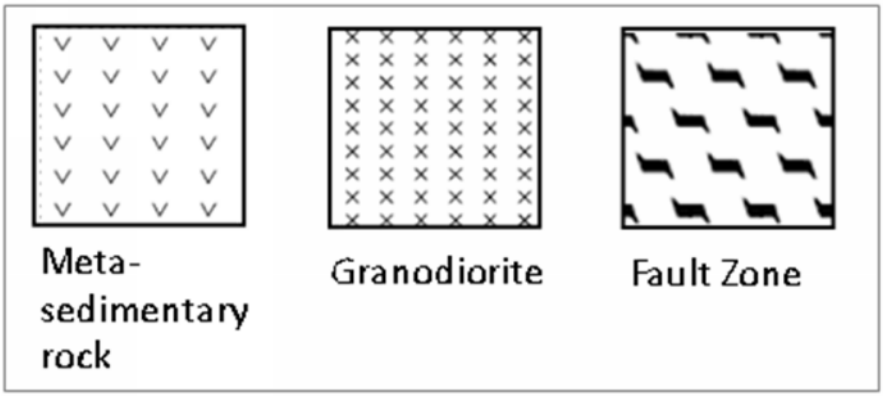
Clay



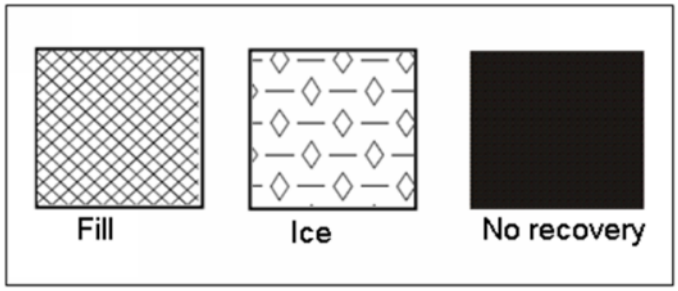
Organics



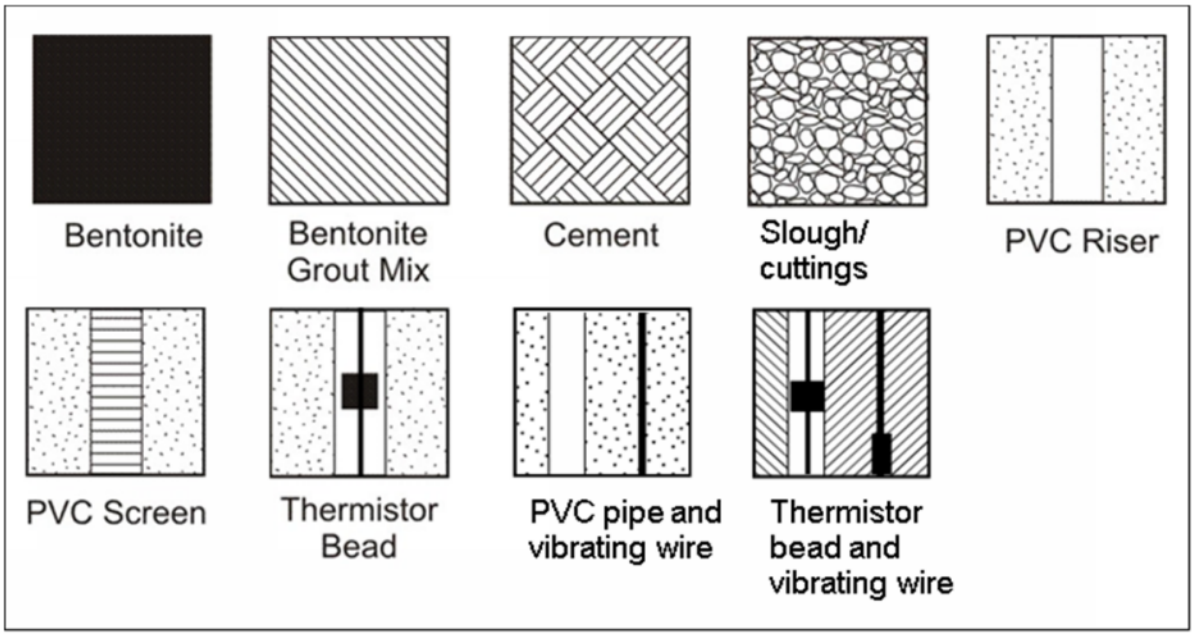
ROCK TYPES



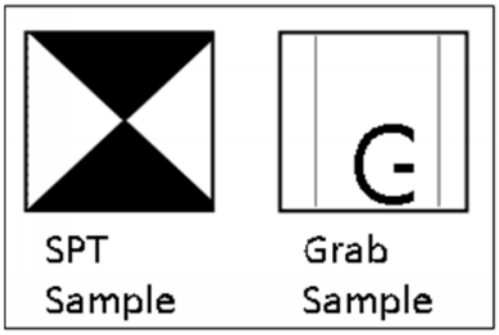
OTHERS



INSTALLATIONS



SAMPLES



APPENDIX B
OUTCROP MAPPING

OUTCROP MAPPING

Table B- 1: Summary of Outcrop Maps

Outcrop	Northing (m)	Easting (m)	Elevation (masl)	RockType	UCS Rock Strength (R)[3]	Weathering Grade (W)[4]	Avgerage Block Size (m)[4]	Average GSI[5]
OC-BGC11-01	7099238	459344	954	Intrusive	3	2.5	0.3	45
OC-BGC11-02	7099143	459342	1067	Intrusive	3.5	2	0.2	45
OC-BGC11-03	7099041	459553	1047	Quartzite	4.5	1.5	0.1	40
OC-BGC11-04	7099026	459019	1036	Quartzite	4	1.5	0.5	50
OC-BGC11-05	7099094	459678	1053	Intrusive	4.5	2	0.5	65
OC-BGC11-06	7099075	459709	1054	Quartzite	4	2	0.3	55
OC-BGC11-07	7102198	460361	1192	Quartzite	4	2	0.07	40
OC-BGC11-08	7102198	460361	1191	Quartzite	3.5	2	0.07	40
OC-BGC11-09	7102205	460436	1200	Quartzite	--	--	0.2	50
OC-BGC11-10	7099875	460024	1146	Quartzite	2	2	0.2	45
OC-BGC11-11	7099815	460157	1198	Intrusive	4.5	1.5	0.3	60
OC-BGC11-12	7099828	460151	1188	Intrusive	4.5	1.5	0.2	55
OC-BGC11-13	7099824	460176	1195	Intrusive	3	2	0.4	60
OC-BGC11-14	7101532	461754	1206	Intrusive	4.5	2	0.25	55
OC-BGC11-15	7101570	461526	1151	Quartzite	2	4	0.05	28.5
OC-BGC11-16	7099341	460701	1406	Quartzite	5	2	0.6	65
OC-BGC11-17	7099403	460865	1403	Quartzite	5	2	0.4	65

Outcrop	Northing (m)	Easting (m)	Elevation (masl)	RockType	UCS Rock Strength (R)[3]	Weathering Grade (W)[4]	Avgerage Block Size (m)[4]	Average GSI[5]
OC-BGC11-18	7099473	460332	1303	Quartzite	4.5	2	0.25	50
OC-BGC11-19	7099996	459794	1068	Quartzite	3	3	0.15	37.5
OC-BGC11-20	7100213	460060	1105	Quartzite	3	3	0.1	37.5
OC-BGC11-21	7099879	459852	1091	Quartzite	4	2	0.15	45
OC-BGC11-22	7099590	459880	1160	Intrusive	6	2	0.15	55
OC-BGC11-23	7100289	460110	1111	Quartzite	3.5	1.5	0.08	40
OC-BGC11-24	7100089	460221	1069	Intrusive	3	2	0.5	55
OC-BGC11-25	7100350	460142	1033	Quartzite	4.5	2	0.2	45
OC-BGC11-26	7099104	459656	1045	Quartzite	3	2	0.1	40
OC-BGC11-27	7099534	459343	971	Quartzite	3	2	0.07	42.5
OC-BGC11-28	7099610	459302	948	Quartzite	3.5	2	0.1	45
				Quartzite	2	2.5	0.03	35
OC-BGC11-29	7099512	459444	983	Quartzite	2.5	2.5	0.03	32
OC-BGC11-30	7099467	459387	947	Intrusive	4	2	0.2	55
				Intrusive	4	2	0.2	55
OC-BGC11-31	7099768	459788	1087	Quartzite	3.5	1.5	0.1	50
OC-BGC11-32	7099753	460179	1176	Intrusive	4.5	1.5	0.3	55
OC-BGC11-33	7099961	460143	1160	Quartzite	3.5	2	0.08	40
				Intrusive	3.5	2	0.15	55
OC-BGC11-34A	7099344	460193	1266	Quartzite	4.5	1.5	0.2	55
OC-BGC11-34B	7099344	460193	1266	Quartzite	4.5	1.5	0.2	55
OC-BGC11-35	7100175	459768	1023	Quartzite	3.5	2	0.15	50

Outcrop	Northing (m)	Easting (m)	Elevation (masl)	RockType	UCS Rock Strength (R)[3]	Weathering Grade (W)[4]	Avgerage Block Size (m)[4]	Average GSI[5]
OC-BGC11-36	7100272	459698	1009	Quartzite	3	2	0.1	45
OC-BGC11-37	7100383	460067	1052	Quartzite	3.5	2	0.25	52
OC-BGC11-38	7100968	460124	997	Quartzite	4	1.5	0.2	55
OC-BGC11-39	7100395	460382	1057	Quartzite	4.5	2	0.2	55
OC-BGC11-40	7101809	459981	1051	Phyllite	1	2.5	0.005	20
				Quartzite	2	2	0.05	35
OC-BGC11-41	7102064	459915	1048	Phyllite	0.5	3	0.005	15
				Quartzite	3	2	0.1	40
OC-BGC11-42	7101893	459188	1072	Phyllite	1	2	0.02	15
OC-BGC11-43	7101403	459686	913	Phyllite	2	2.5	0.05	30
OC-BGC11-44	7101327	459852	895	Quartzite	2.5	2	0.07	35
OC-BGC11-45	7101136	459318	848	Quartzite	3.5	2	0.07	43
OC-BGC11-46	7101078	459173	839	Quartzite	4	1.5	0.1	50
OC-BGC11-47	7100272	459725	993	Quartzite	2	3	0.05	30
OC-BGC11-48A	7101009	458635	807	Quartzite	3	2	0.05	35
OC-BGC11-48B	7101022	458616	805	Quartzite	3	2	0.1	45
OC-BGC11-49	7101020	459452	859	Soil	--	--	--	--
OC-BGC11-50	7101140	458828	859	Phyllite	2	2.5	0.02	25
OC-BGC11-51	7101187	458932	885	Quartzite	0.5	4	0.005	--
OC-BGC11-52	7101039	459097	849	Phyllite	2	3	0.05	25
OC-BGC11-53	7099996	459359	1009	Quartzite	4	1.5	0.15	55

Outcrop	Northing (m)	Easting (m)	Elevation (masl)	RockType	UCS Rock Strength (R)[3]	Weathering Grade (W)[4]	Avgerage Block Size (m)[4]	Average GSI[5]
OC-BGC11-54	7099871	460694	1288	Intrusive	5.5	1.5	0.7	65
OC-BGC11-55A	7100389	460728	1248	Intrusive	4.5	1.5	0.5	60
OC-BGC11-55B	7100373	460719	1239	Intrusive	4.5	1.5	0.4	60

NOTES:
1. Location from handheld GPS measurements.
2. Coordinates in UTM NAD 83, Zone 8N.
3. Unconfined Compressive Strength / Hardness Classification for Rock (after CFEM 2006) - Appendix A
4. See Appendix A.
5. Geological Strength Index - See Appendix A.

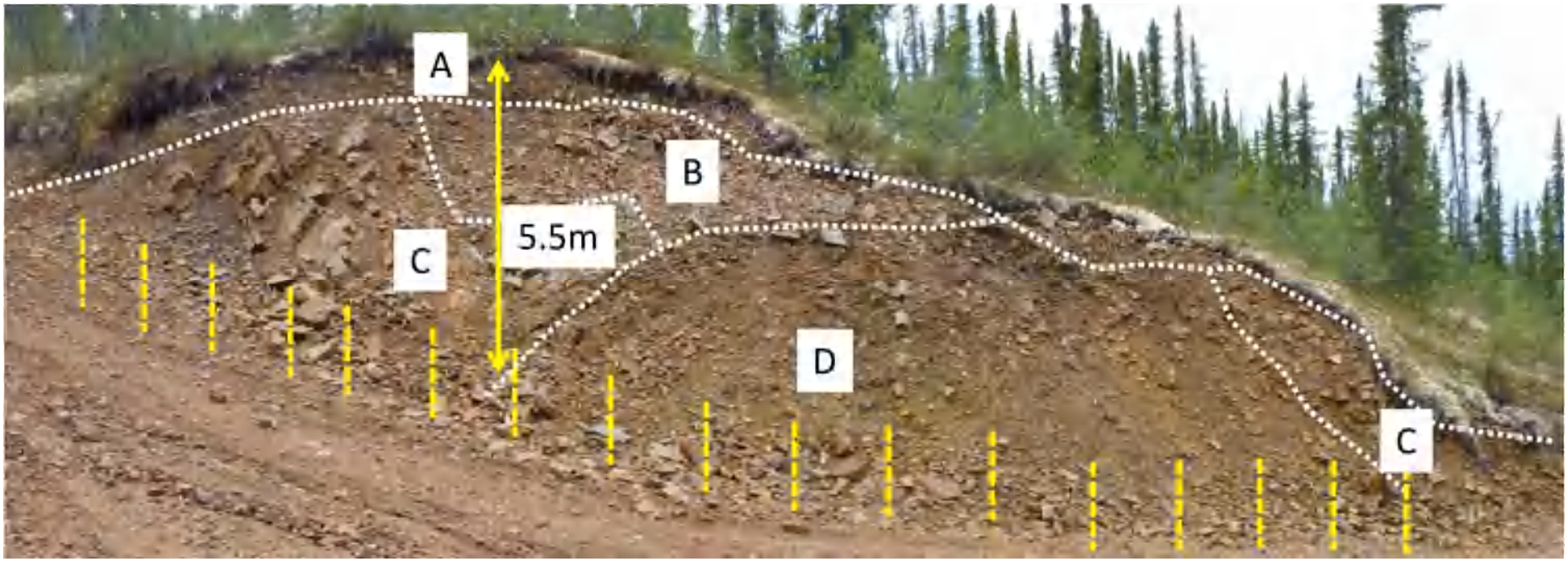
Outcrop OC-BGC11-01

Location: Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Man-made (Road cut)

Northing: 7099238
Easting: 459344
Elevation: 954 m
Survey type: Handheld GPS

Slope Angle:
Slope Direction:
Date logged: 6/26/2011
Logged by: LGT/SP

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: Sandy, some cobbles and trace silt (GW). Brown, moist, loose, nonplastic, and homogeneous. Clasts are granodiorite, R2-R3, angular, equidimensional to elongated, max particle size = 120 mm. [COLLUVIUM]

B: Pinkish brown, medium- to coarse-grained GRANODIORITE. Slightly to moderately weathered and iron-stained (W2.5), medium strong (R3). Blocks are polyhedral. GSI structure = blocky/disturbed, GSI surface = Good to Fair, GSI range = 40-50.

C: Pinkish grey, medium- to coarse-grained GRANODIORITE. Faintly weathered and iron-stained (W1.5), medium strong (R3). Blocks are rhombohedral.

D: Outcrop obscured by ravelled colluvium.

Outcrop OC-BGC11-01

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	34	232	1		6-15		0.15	2	J
2	48	82	1		6-15		0.15	2	J
3	50-75	314-344	1		6-15		0.15	2	J

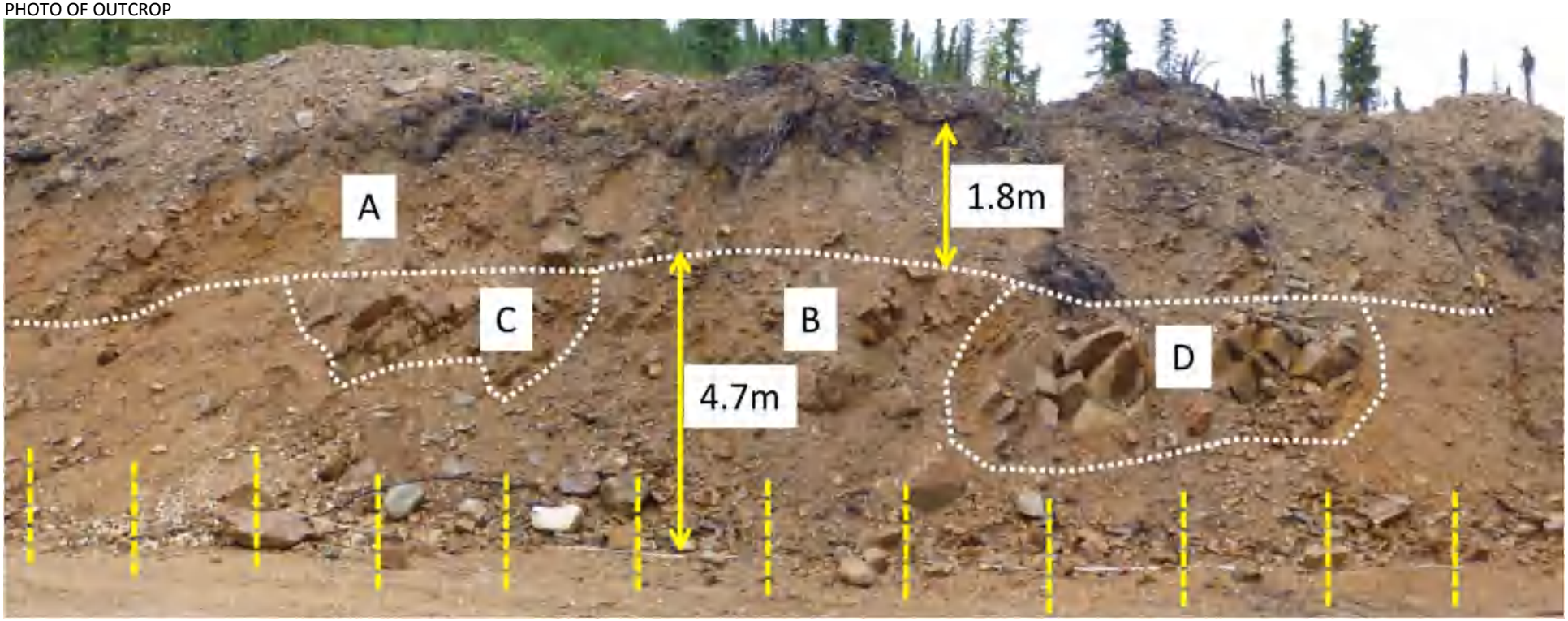
Outcrop OC-BGC11-02

Location: Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Man-made (Road cut)

Northing: 7099143
Easting: 459342
Elevation: 1067 m
Survey type: Handheld GPS

Slope Angle:
Slope Direction:
Date logged: 6/27/2011
Logged by: SP/LGT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: Sandy, some cobbles, well-graded (GP-SW). Non-plastic, brown, moist, loose, homogeneous. Sand is well-graded, fine to medium. Clasts are granodiorite and metasediments, R3-R4, angular, equidimensional to elongated, max particle size = 80 mm. [COLLUVIUM]

B: Ravelled COLLUVIUM covering face of outcrop.

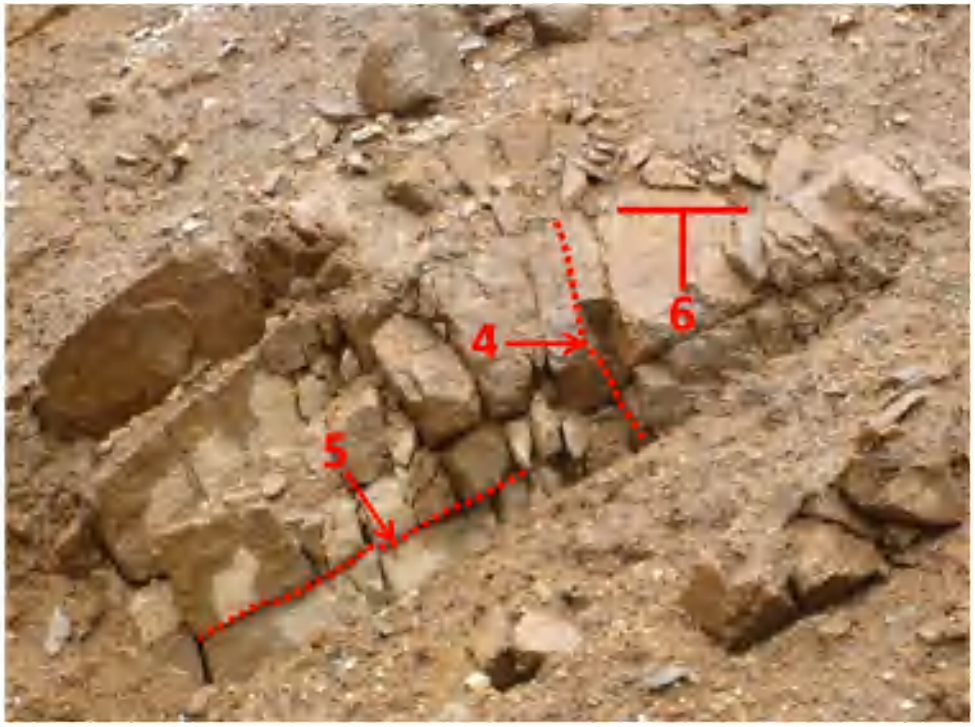
C: Brownish grey medium- to coarse-grained GRANODIORITE. Slightly to moderately weathered (W2-2.5), weak to medium strong (R2-R3). Blocks are rhombohedral. GSI structure = Blocky/disturbed, GSI surface = Good, GSI range = 35-45.

D: Medium- to coarse-grained orangish grey GRANODIORITE. Slightly weathered (W2), strong (R4). Blocks are rhombohedral, ~40 cm. GSI structure = Blocky, GSI surface = Good, GSI range = 50-60.

Outcrop OC-BGC11-02

PHOTO OF STRUCTURE – UNIT D

PHOTO OF STRUCTURE – UNIT C



DISCONTINUITY TABLE – UNITS C/D

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	51	34	2	SM-SA	4	3	0.3	>1.5m	J
2	42	59	2	SM-SA	4	3	0.4	>3.5m	J
3	68	144	2	SM-SA	5	3	0.4	>1.5m	J
4	29	76	2	SM-SA	14	3	0.1	>1m	J
5	88	333	3	SM-SA	14	3	0.1	>4m	J
6	54	280	3	SM-SA	14	3	0.1	>0.4m	J

Outcrop OC-BGC11-03

Location: Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Man-made (old road cut)

Northing: 7099041
Easting: 459553
Elevation: 1047 m
Survey type: Handheld GPS

Slope Angle:
Slope Direction:
Date logged: 6/28/2011
Logged by: LGT/SP

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SAND: Gravelly, some cobbles, trace silt, some boulders, well-graded (SW-GW). Non plastic, brown, moist, loose, homogeneous Clasts are metasedimentary with trace granodiorite, angular, elongated, medium strong (R3-R4); max particle size is 300 mm. [COLLUVIUM]

B: Brownish grey, fine to medium grained QUARTZITE. Foliated, faintly weathered (W1.5), strong to very strong (R4-5). Blocks are tabular to rhombohedral. GSI structure = Very Blocky to Blocky/disturbed, GSI surface = Fair, GSI range = 35-45.

Outcrop OC-BGC11-03

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	20	238	5	SM-SA-FE	6	4	0.1	>3m	JO
2	65	30	1	NV	12	4	0.4	>1.5m	J
3	83	168	4	SM-SA-FE	6	4	0.45	>0.5m	J

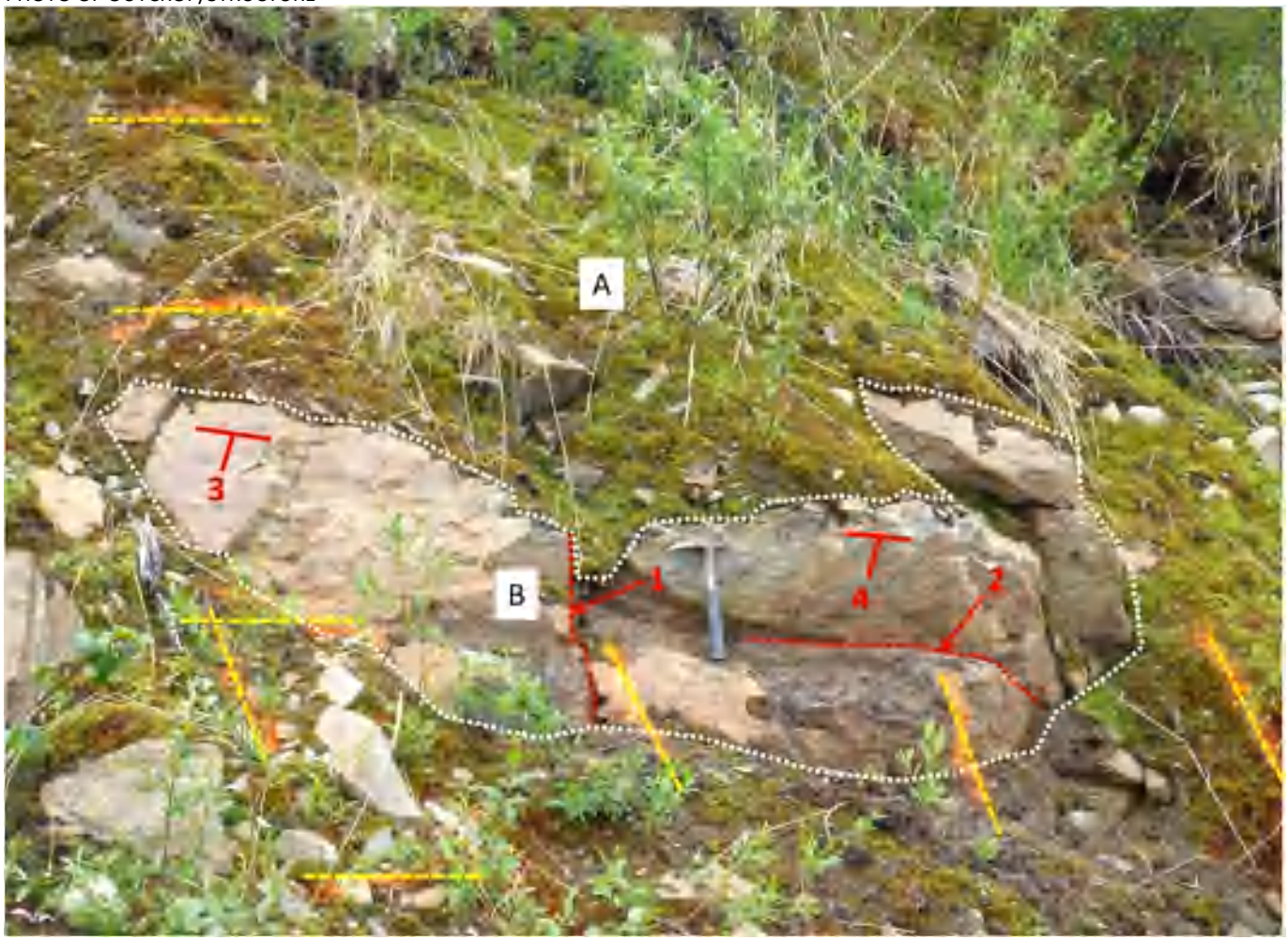
Outcrop OC-BGC11-04

Location: South of Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Man-made (Old road cut)

Northing: 7099026
Easting: 459019
Elevation: 1036 m
Survey type: Handheld GPS

Slope Angle: 50°
Slope Direction: 225°
Date logged: 6/28/2011
Logged by: LGT/SP

PHOTO OF OUTCROP/STRUCTURE



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-04

DESCRIPTION OF MATERIALS

A: SAND: Gravelly, some cobbles, trace silt (GW-SW). Non plastic, brown, moist to wet, and homogeneous. Clasts are metasedimentary with trace granodiorite, angular, elongated, medium strong (R3-R4), slightly weathered (W2). [COLLUVIUM]

B: Brownish grey, fine- to medium-grained QUARTZITE. Strong (R4), faintly to slightly weathered (W1.5-W2). Discontinuities moderately to widely spaced. GSI structure = massive, GSI surface = Good to Fair, GSI range = 55-65.

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	84	266	5	CX-SM-FE	14	4	1.2	>1m	J
2	10	308	NV	NV	8 (1m)	4	NV	>1m	J
3	50	10	NV	NV	8 (1m)	4	NV	>0.4m	J
4	88	317	0.5	SA-SM	6 (0.4m)	4	0.35	>0.7m	J

Outcrop OC-BGC11-05

Location: Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Natural

Northing: 7099094
Easting: 459678
Elevation: 1053 m
Survey type: Handheld GPS

Slope Angle: 65°
Slope Direction: 215°
Date logged: 6/28/2011
Logged by: LGT/SP

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: medium to coarse, sandy, some cobbles, trace silt, and trace boulders (GW). Sand is orange-brown, and moist. Clasts are angular, elongated, medium strong to strong (R3-R4), slightly weathered (W2). Max particle size= 350 mm. [COLLUVIUM]

B: Pinkish-brown, medium- to coarse-grained GRANODIORITE. Strong to very strong (R4-5), slightly to moderately weathered (W1.5-W2). Blocks are rhomboidal to tabular. GSI structure = Blocky, GSI surface = Good, GSI range = 60-70. Some evidence of contact with metasedimentary rock above the outcrop.

Outcrop OC-BGC11-05

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	26	3	50	FE	6 (1m)	4	0.5	>1.5	J
2	54	125	20	FE	6 (1m)	4	0.4	>1.5	J

Outcrop OC-BGC11-06

Location: Platinum Gulch
Facility: Platinum WRSA
Outcrop type: Natural

Northing: 7099075
Easting: 459709
Elevation: 1054 m
Survey type: Handheld GPS

Slope Angle: 46°
Slope Direction: 200°
Date logged: 6/28/2011
Logged by: SP/LGT

PHOTO OF OUTCROP

DESCRIPTION OF MATERIALS

A (3 to 10 m above base of outcrop): Grey to pinkish grey, fine- to medium-grained QUARTZITE. Faintly to slightly weathered (W1.5-W2), Strong (R4). Blocks are rhomboidal to tabular. GSI structure = Blocky, GSI surface = Good, GSI range = 55-65.

B (10 to 41 m above base of outcrop): Grey to pinkish grey, fine- to medium-grained QUARTZITE. Slightly weathered (W2), strong (R4). GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 45-55.

Outcrop OC-BGC11-06

PHOTOS OF STRUCTURE, UNITS A/B (NUMBERS ABOVE PHOTOS GIVE THEIR LOCATION IN TERMS OF HEIGHT ABOVE OUTCROP BASE)

32 to 41 m

27 to 32 m

10-18 m

3-8 m

DISCONTINUITY TABLE

Height from base of outcrop (m)	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
	83	170			10 to 20	4	NV		J
41	65	260			2 to 16	4	NV		J
	60	65			2 to 16	4	0.2 to 1	>4m	J
27	60	70			2 to 16	4	0.2 to 2	>4m	J
	82	302			10 to 20	4	1	>4m	J
18	80	180			10 to 20	4	1	>6m	J
	86	136			10 to 20	4	NV		J
13	46	255			2 to 16	4	1 to 1.4		J
	59	210			2 to 16	4	NV		J
	72	170	2 to 40	CX	10 to 20	4	0.25 to 1.2	>4m	J
7	74	290			10 to 20	4	NV		J

Outcrop OC-BGC11-07

Location: Ann Gulch
Facility: Heap leach pad
Outcrop type: Natural

Northing: 7102198
Easting: 460361
Elevation: 1192 m
Survey type: Handheld GPS

Slope Angle: 35°
Slope Direction: 145°
Date logged: 6/30/2011
Logged by: EB/SP/LGT

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Brownish grey, fine- to medium-grained QUARTZITE. Slightly weathered (W2), moderately strong to strong (R4). Blocks are rhombohedral; discontinuities are very closely spaced. GSI structure = Blocky/disturbed, GSI surface = Good to Fair, GSI range = 35-45.

Outcrop OC-BGC11-07

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	62	132	3-25	Bx-ML-SA	2-20 (1m)	4	0.1 to 0.4	1.5	J
2	88	280	2-10	Bx-ML-SA	2-20 (1m)	4		>1	J
3	58	210	0.2-0.5	Fe, Bx, SA	5 (0.1m)	4		>0.4	J
4	86	128	NV	NV		4			J

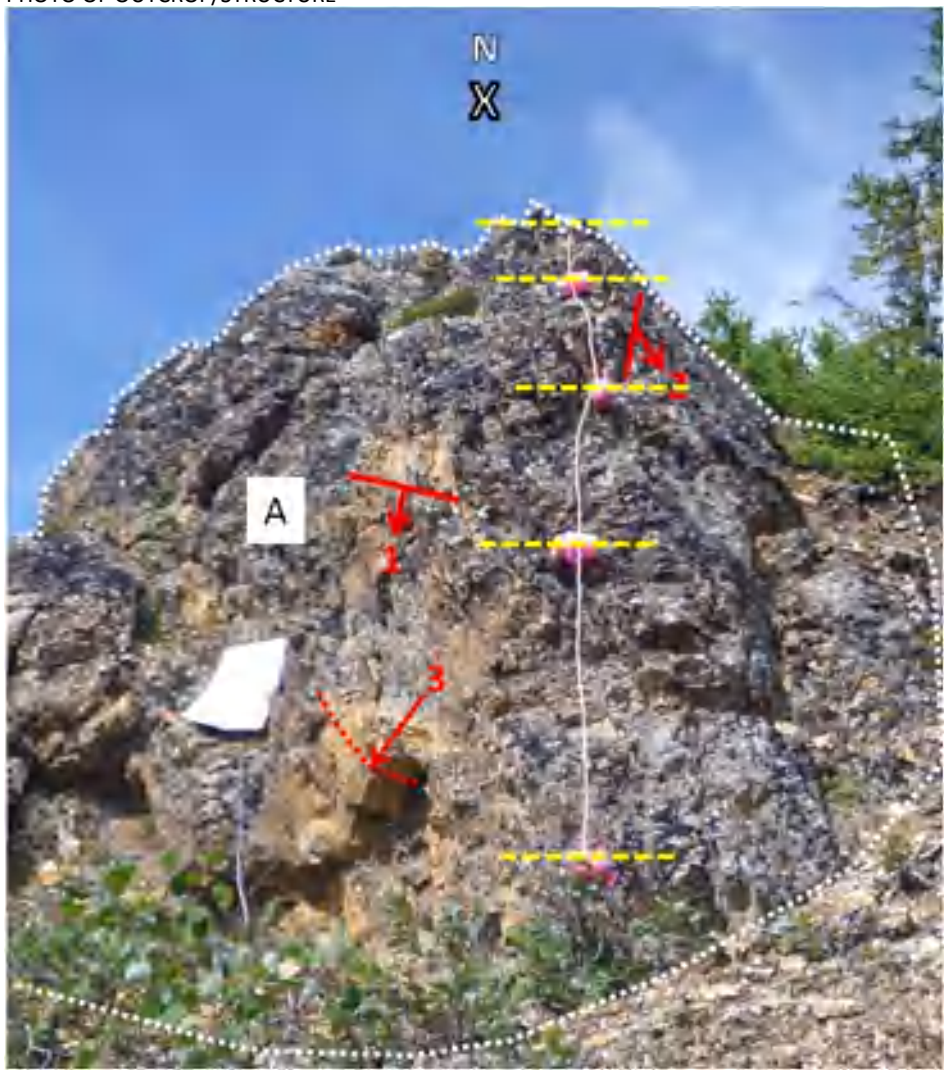
Outcrop OC-BGC11-08

Location: Ann Gulch
Facility: Heap leach pad
Outcrop type: Natural

Northing: 7102198
Easting: 460361
Elevation: 1191 m
Survey type: Handheld GPS

Slope Angle: 40°
Slope Direction: 145°
Date logged: 6/30/2011
Logged by: EB/SP/LGT

PHOTO OF OUTCROP/STRUCTURE



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-08

DESCRIPTION OF MATERIALS

A: Brownish grey, fine- to medium-grained QUARTZITE. Foliated, slightly weathered (W2), moderately strong to strong (R3 to R4). Blocks are polyhedral; discontinuities very closely spaced. GSI structure = Blocky/disturbed, GSI surface = Fair to Good, GSI range = 35-45.

DISCONTINUITY TABLE - UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	83	66	10	BX-FE	12	4	2	2.5	J
2	41	191	5	CX-FE	12	4	0.2	2	J
3	43	324	5	CX-ML-SA	10	4	0.2	0.5	J

Outcrop OC-BGC11-09

Location: Ann Gulch
Facility: Heap leach pad
Outcrop type: Natural

Northing: 7102205
Easting: 460436
Elevation: 1200 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 225°
Date logged: 6/30/2011
Logged by: EB/SP/LGT

PHOTO OF OUTCROP/STRUCTURE

1m spacing along outcrop surface between yellow dashed lines.

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	80	202			10	4		6	J
2	25	279	15	FE-CX	4	4	0.3	1	J
3	37	346	15	FE-CX	4	4	0.3	1	J
4	85	92	90	FE-CX	10	4	0.6	3	J

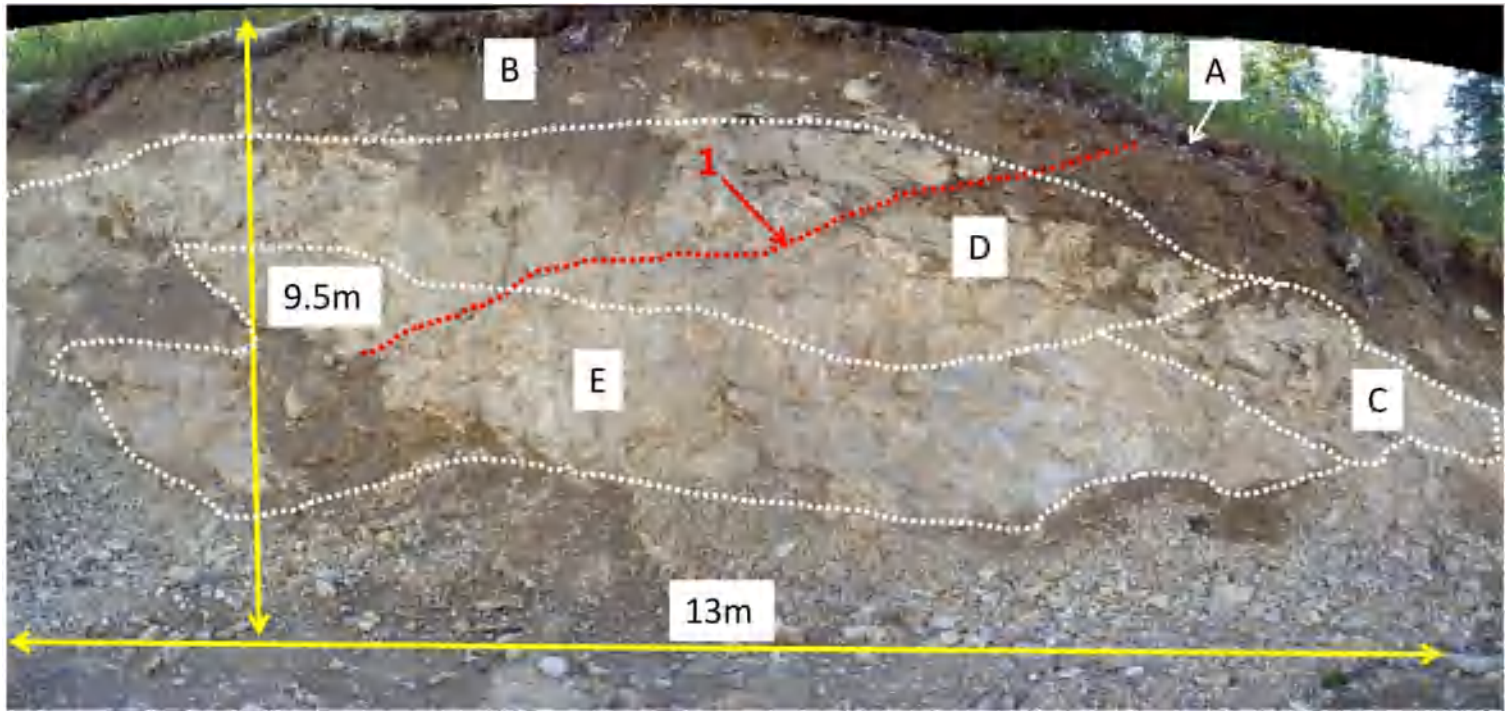
Outcrop OC-BGC11-10

Location: Pit area
Facility: Primary crusher
Outcrop type: Man-made (road cut)

Northing: 7099875
Easting: 460024
Elevation: 1146 m
Survey type: Handheld GPS

Slope Angle: 45-65°
Slope Direction: 285°
Date logged: 7/9/2011
Logged by: LGT

PHOTO OF OUTCROP



DESCRIPTION OF MATERIALS

A: Root mat and organic silt, 0.2 to 0.4m thick. [TOPSOIL]

B: SILT: Gravelly, some sand, trace cobbles and boulders (ML). Nonplastic, brown, moist, homogeneous. Maximum particle size is 300 mm. Clasts are elongated, angular, weak to strong (R2-R4). [COLLUVIUM]

C: Light brownish grey, fine-grained QUARTZITE. Faintly weathered (W1.5), very weak to weak (R1.5). Blocks are prismatic, with 3 main discontinuity sets (2,3 and 4). GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 35-45.

D: Brownish-grey, fine-grained QUARTZITE. Slightly to moderately weathered (W2-W3), very weak (R1), extremely closely fractured. GSI structure = Blocky/disturbed, GSI surface = Good to Fair, GSI range = 30-40.

E: Light brownish-grey, fine-grained QUARTZITE. Lightly weathered (W2); moderately strong (R3). Blocks are prismatic with 4 main sets (5 to 8). GSI structure = Very Blocky, GSI surface = Good, GSI range = 45-55.

Outcrop OC-BGC11-10

PHOTO OF STRUCTURE – UNIT C

DISCONTINUITY TABLE – UNITS C/D/E

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	28	78	78	SD-CX	20	R2		7	J
2	75	73	73	CX-SM	2	R3	0.15	2	J
2	63	69	69	CX-SM-SA	4	R3	0.3	2	J
3	60	322	322	FE-SM-SA	20	R3	0.3	3	J
4	24	300	300	FE-SM-SA	16	R3	0.3	3	J
5	45	150	150	SA	20	R3	0.25	1.5	J
6	59	305	305	FE-CX-SA	6	R3	0.4	4	J
7	25	235	235	FE-SM-SA	16	R3	0.12	1.5	JO
8	65	85	85	FE-SM-SD	8	R3	0.05	2	J

Outcrop OC-BGC11-11

Location: Pit area
Facility: Eagle Pup WRSA
Outcrop type: Natural, with road cut at its base

Northing: 7099815
Easting: 460157
Elevation: 1198 m
Survey type: Handheld GPS

Slope Angle: 35/65°
Slope Direction: 260-280°
Date logged: 7/10/2011
Logged by: LGT

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Light grey, black-speckled, medium- to coarse-grained GRANODIORITE. Faintly weathered (W1.5); strong to very strong (R4 to R5), fracture spacing 5 to 40cm. Open apertures 1 to 30cm reflect dilation due to toppling. GSI structure = blocky, GSI surface = Poor, GSI range = 40-50.

Outcrop OC-BGC11-11

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	75	154	20	CX-SM-SD	8	R4	0.3	1.5	J
2	87	236	25	CX-SM-SD	12	R4	0.45	6	J
3	12	267	18	CX-SM-SD	16	R4	0.45	1.5	J
4	75	200	10	CX-SD	20	R4	0.2	7	J
5	70	128	35	CX-SM-SD	12	R4	0.3	3	J
6	222	112	20	CX-SM-SD	20	R4	0.5	0.6	J
7	52	160	30	OG	7	R4	0.2	1.5	J
8	83	303	15	CX-SM-SD	20	R4	0.3	3	J

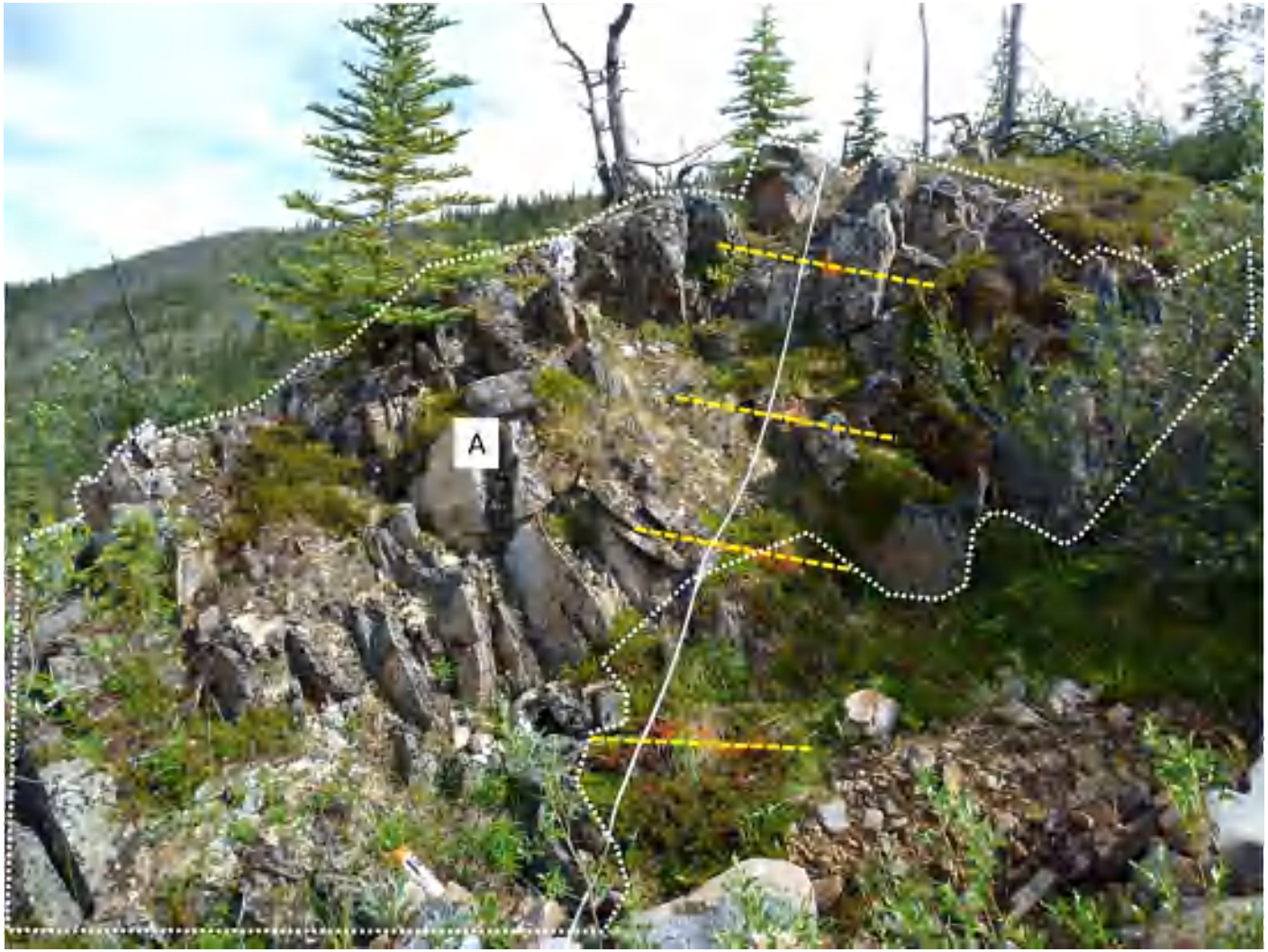
Outcrop OC-BGC11-12

Location: Pit area
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7099828
Easting: 460151
Elevation: 1188 m
Survey type: Handheld GPS

Slope Angle: 52°
Slope Direction: 305°
Date logged: 7/10/2011
Logged by: LGT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-12

DESCRIPTION OF MATERIALS

A: Light bluish grey medium- to coarse-grained GRANODIORITE. Slightly weathered (W1.5); strong to very strong (R4 to R5). Blocks are tabular, with closely to moderately spaced joints (1 main structural set). GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	65	160	250	QZ	20	R4	0.15	3	J
2	78	29	12	BX-CX-SM-SA	16	R4	0.2	2	J
3	80	332	20	CX-SM-SA	8	R4	0.15	3	J
3	87	316	5	SM-SA-OG	4	R4	0.15	3	J
4	45	199		CX-SM-SA	16	R4	0.25	0.5	J

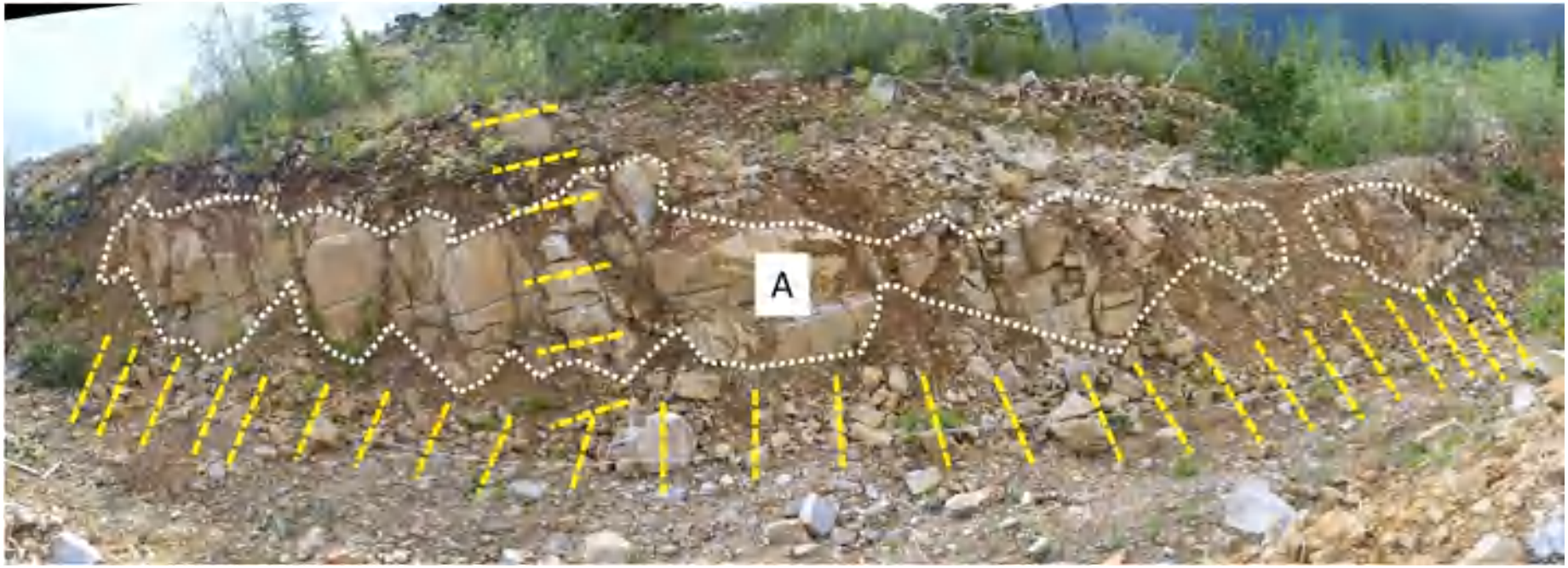
Outcrop OC-BGC11-13

Location: Pit area
Facility: Eagle Pup WRSA
Outcrop type: Man-made (exploaration trench)

Northing: 7099824
Easting: 460176
Elevation: 1195 m
Survey type: Handheld GPS

Slope Angle: 80°
Slope Direction: 080°
Date logged: 7/10/2011
Logged by: LGT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Grey, medium- to coarse-grained GRANODIORITE. Slightly weathered (W2); medium strong (R3). Blocks are rhombohedral; ~ 50cm. GSI structure = Blocky, GSI surface = Good, GSI range = 55-65.

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	80-88	230-236	4	FE-ML	4-8	R3	0.1-0.2	2.5	J
2	60-68	218-230	0-1	FE-ML	4-13	R3	0.14	0.8	J

Outcrop OC-BGC11-14

Location: Olive Gulch
Facility: Road/Explosive Storage area
Outcrop type: Man-made (old exploaration road cut)

Northing: 7101532
Easting: 461754
Elevation: 1206 m
Survey type: Handheld GPS

Slope Angle: 57°
Slope Direction: 301°
Date logged: 7/21/2011
Logged by: EC/EB

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Root mat and organic SILT. [TOPSOIL]

B: Grey-white (black grains), coarse-grained GRANODIORITE. Lightly to moderately weathered (W1.5 - W2); strong to very strong (R4-R5). Blocks are polyhedral. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

Outcrop OC-BGC11-14

PHOTO OF STRUCTURE

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	41-64	300-348	0.5-20	SA-GW-FE	14-18	R4	0.5	1.5	J
2	67-74	210-214	2-8	SA-GW-FE	8-16	R4	0.2	1.5	J
3	54-60	73-92	10-50	SA-GW-FE	12-16	R4	1	1.5	J
4	41-45	180-190	5-30	SA-GW-FE	6-10	R4	1	1.5	J

Outcrop OC-BGC11-15

Location: Olive Gulch
Facility: Road/Explosive Storage area
Outcrop type: Man-made (road cut)

Northing: 7101570
Easting: 461526
Elevation: 1151 m
Survey type: Handheld GPS

Slope Angle: 39°
Slope Direction: 054°
Date logged: 7/21/2011
Logged by: EC/EB

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: FILL, colluvium pushed over side for road. Not a natural feature.

B: Dark green to grey, fine-grained QUARTZITE. Foliated, highly weathered (W4) and heavily iron stained (some zones more so than others); weak(R1.5 to R2). Blocks equidimensional, ~ 0.05m. GSI structure = Blocky/Disturbed, GSI surface = Poor, GSI range = 22-35.

Outcrop OC-BGC11-15

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	32-42	308-325	5-10	FE-SA-SM	5-10	R1.5-R2	0.05	1	JO
2	51-67	177-182	1-3	FE-SA-SM	2-6	R1.5-R2	0.1	1	J
3	60-68	82-88	1-3	FE-SA-SM	2-6	R1.5-R2	0.15	1	J

Outcrop OC-BGC11-16

Location: Pit area
Facility: Open pit back wall
Outcrop type: Natural

Northing: 7099341
Easting: 460701
Elevation: 1406 m
Survey type: Handheld GPS

Slope Angle: 14°
Slope Direction: 217°
Date logged: 7/22/2011
Logged by: EC/EB

PHOTO OF OUTCROP

Outcrop OC-BGC11-16

DESCRIPTION OF MATERIALS

A: Sparse ORGANICS (<0.1m), mostly lichen, some moss, very dry.

B: Medium- to coarse-grained QUARTZITE. Heavily iron stained; colour is black with yellow-white lenses. Slightly weathered (W2); very strong to extremely strong (R5- R6). Blocks equidimensional, ~60 cm. GSI structure = Blocky, GSI surface = Good, GSI range = 55-75.

DISCONTINUITY TABLE – Unit B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	16-18	253-264	NA	None	16-18	R5	0.4	>4	JO
2	72-83	251-260	15-20	SM-SA	12-16	R5	0.6	>1	J
3	79-85	157-170	20	SM	8-10	R5	0.6	>0.7	J

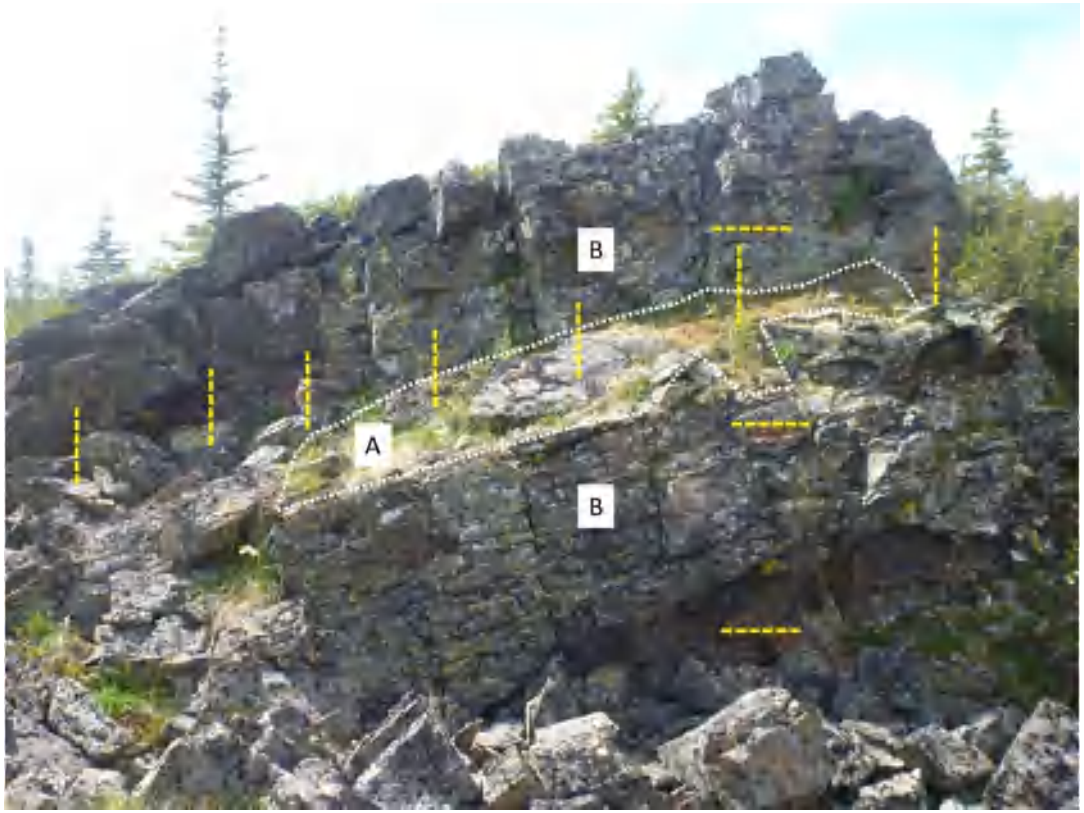
Outcrop OC-BGC11-17

Location: Eagle Pup
Facility: Open pit back wall
Outcrop type: Natural

Northing: 7099403
Easting: 460865
Elevation: 1403 m
Survey type: Handheld GPS

Slope Angle: 78°
Slope Direction: 082°
Date logged: 7/22/2011
Logged by: EC/EB

PHOTO OF OUTCROP



1m spacing between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Sparse ORGANICS, mostly lichen, some shrubs, some grass; very dry.

B: Medium to coarse-grained QUARTZITE. Heavily iron stained, coloured black with yellow-white lenses. Slightly weathered (W2); very strong to extremely strong (R5 to R6). Blocks equidimensional, ~ 40 cm. GSI structure = Blocky, GSI surface = Good, GSI range = 50-70.

Outcrop OC-BGC11-17

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	15-20	208-217	5-25	SM-SA	15-18	R5	0.4	3-10	JO
2	68-81	324-345	5-40	SA-SM	10-12	R5	0.3	>1	J
3	78-83	82-90	10-40	SA-SM	10-12	R5	0.4	NV	J

Outcrop OC-BGC11-18

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (exploration drill pad cut)

Northing: 7099473
Easting: 460332
Elevation:
Survey type: Handheld GPS

Slope Angle: 34°
Slope Direction: 259°
Date logged: 7/22/2011
Logged by: EC/EB

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Vegetation, moss, root mat, 0.2 m thick. [TOPSOIL]

B: BOULDERS and COBBLES: Silty, some coarse gravel, greyish brown. Clasts equidimensional, angular, moderately weathered (W3), strong (R4); max size = 450 mm. [COLLUVIUM]

C: Grey, coarse-grained QUARTZITE. Slightly weathered (W2), strong to very strong (R4-R5). Blocks rhomboidal, ~ 25 cm. GSI structure = Very Blocky, GSI surface = Good, GSI range = 45-55.

Outcrop OC-BGC11-18

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	62-63	270-273	NV	NV	10-12	R4-R5		NA	J
2	22-35	213-226	3-15	SA-SM	8-10	R4-R5	0.2	NA	JO
3	77-81	069-080	2-20	SA-SM	8-10	R4-R5	0.3	NA	J
4	76-81	324-352	1-20	SA-SM	8-10	R4-R5	0.2	NA	J

Outcrop OC-BGC11-19

Location: Stuttle Gulch
Facility: Primary crusher
Outcrop type: Man-made (drill pad for BH-BGC11-50)

Northing: 7099996
Easting: 459794
Elevation: 1068
Survey type: Handheld GPS

Slope Angle: 38°
Slope Direction: 270°
Date logged: 7/23/2011
Logged by: EC

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Vegetation, moss, root mat. [TOPSOIL]

B: SILT (ML). Gravelly, low plasticity, low dry strength, no dilatancy, medium brown, moist.

C: Brownish-grey, fine-grained QUARTZITE. Moderately weathered (W3), weak to strong (R2-R4). Blocks are rhomboidal, ~ 15 cm. GSI structure = Very Blocky, GSI surface = Poor, GSI range = 30-45.

Outcrop OC-BGC11-19

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	23-34	284-296	1-10	SA, SM	6-10	R3-R4	0.1	>0.5m	JO
2	85-86	154-162	1-5	SA, SM	2-4	R3-R4	0.2	>0.5m	J
3	66-71	088-090	1-10	SA, SM	4-8	R3-R4	0.3	>0.3m	J
4	72-78	219-222	1-10	SA, SM	14-16	R3-R4	0.3	>0.3m	J

Outcrop OC-BGC11-20

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Man-made (road cut)

Northing: 7100213
Easting: 460060
Elevation: 1105 m
Survey type: Handheld GPS

Slope Angle:
Slope Direction:
Date logged: 7/23/2011
Logged by: EC

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Vegetation, moss, root mat (0.05 m). [TOPSOIL]

B: Dark grey, fine- to medium-grained QUARTZITE. Moderately weathered (W3), medium strong to strong (R3 to R4). Blocks are tabular, ~ 0.1 m, with low fracture persistence. GSI structure = Blocky/disturbed, GSI surface = Fair, GSI range = 40-50.

Outcrop OC-BGC11-20

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	78-83	84-93	0.5-5	SA, SM	10-14	R3-R4	0.2	>0.2m	J
2	78-80	174-188	NV	SA, SM	12-16	R3-R4	0.05	>1.0m	JO
3	36-37	312-318	0.5-2	SA, SM	10-14	R3-R4		>0.2m	J

Outcrop OC-BGC11-21

Location: Stuttle Gulch
Facility: Primary crusher
Outcrop type: Man-made (Exploration drill pad cut)

Northing: 7099879
Easting: 459852
Elevation: 1091 m
Survey type: Handheld GPS

Slope Angle: 28°
Slope Direction: 332°
Date logged: 7/25/2011
Logged by: EB/EC

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

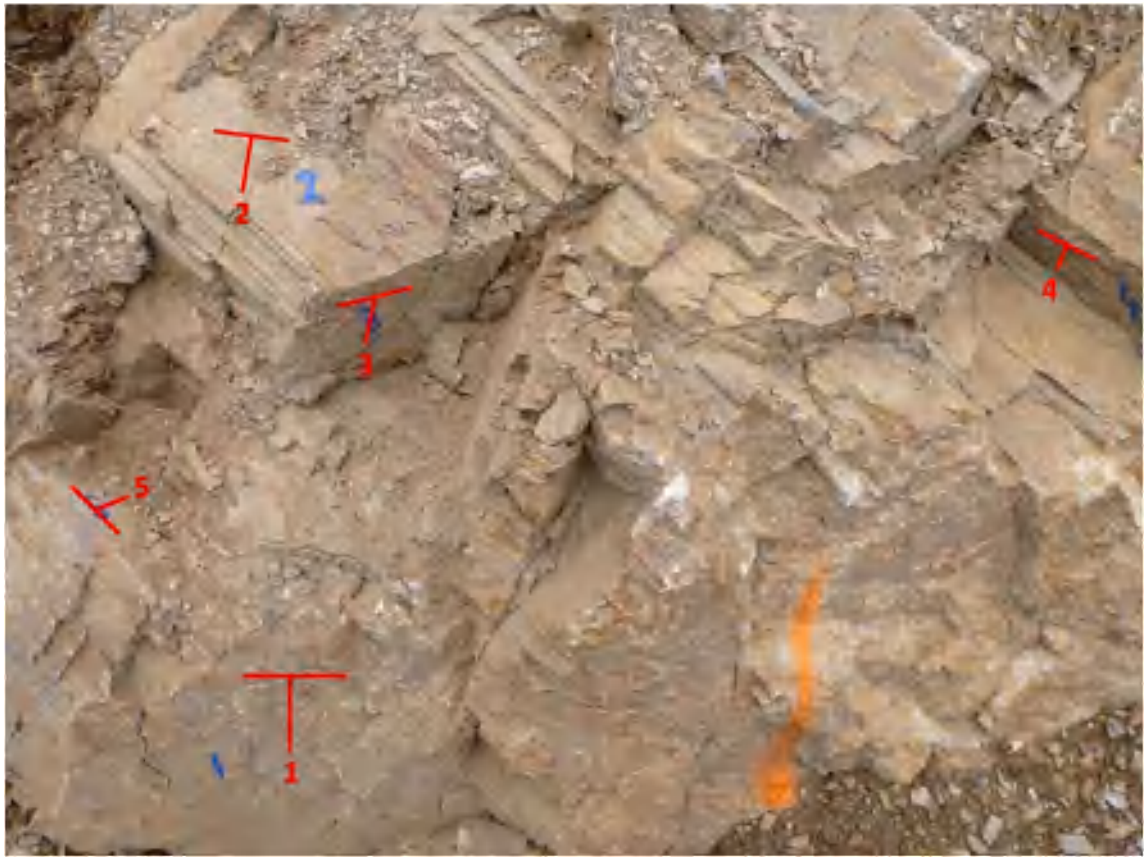
A: Reddish-brown fine-grained QUARTZITE. Foliated and containing quartz veins, slightly to moderately weathered (W2-W3), strong (R4). Blocks rhomboidal, ~ 15 cm. GSI structure = Very Blocky, GSI surface = Fair, GSI range = 40-50.

B: GRAVEL (GW): Cobbly, some silt, trace sand, trace boulders, reddish-brown. Moist and heavily FE-stained. Clasts elongate, angular, medium strong (R3). Max particle size = 85 cm. [COLLUVIUM]

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-21

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture (mm)	Infill	JRC	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	83-89	320-339	0.5	FE	8-12	R4	0.2	1m+	J
2	41-47	340-342	0.5-10	SA,SM	12-16	R4	0.1	1m+	J
3	68-72	114-125	0.5-2	SA,SM	8-12	R4	0.11	1m+	J
4	67-71	202-203	1	SA,SM	10-20	R4	0.15	1m+	J
5	30-37	238-250	0.5-2	SA,SM	12-14	R4	0.05	1m+	JO

Outcrop OC-BGC11-22

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (Exploration road cut)

Northing: 7099590
Easting: 459880
Elevation: 1160 m
Survey type: Handheld GPS

Slope Angle: 63°
Slope Direction: 252°
Date logged: 7/25/2011
Logged by: EB/EC

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Greyish-white, coarse-grained GRANODIORITE. Slightly weathered (W2); extremely strong (R6). Blocks ~ 15 cm; rhomboidal/polyhedral with low fracture persistence. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

B: SILT (ML): Cobbly, bouldery, dark brown. Clasts equidimensional, angular to subangular, extremely strong (R6). Max particle size ~ 400 mm. Filled with organics/rootlets. [TOPSOIL]

Outcrop OC-BGC11-22

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture (mm)	Infill	JRC	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	62-75	220-227	NV	FE	16-18	R6	NV	0.5m+	J
2	65-68	028-042	10	SA, SM	14-16	R6	0.2	NV	J
3	82-85	334-339	150	SA, SM	8-16	R6	0.25	NV	J
4	60-74	120-149	1-40	SA, SM	10-12	R6	0.12	NV	J
5	40-48	332-338	1-25	SA, SM	8-16	R6	0.12	NV	J

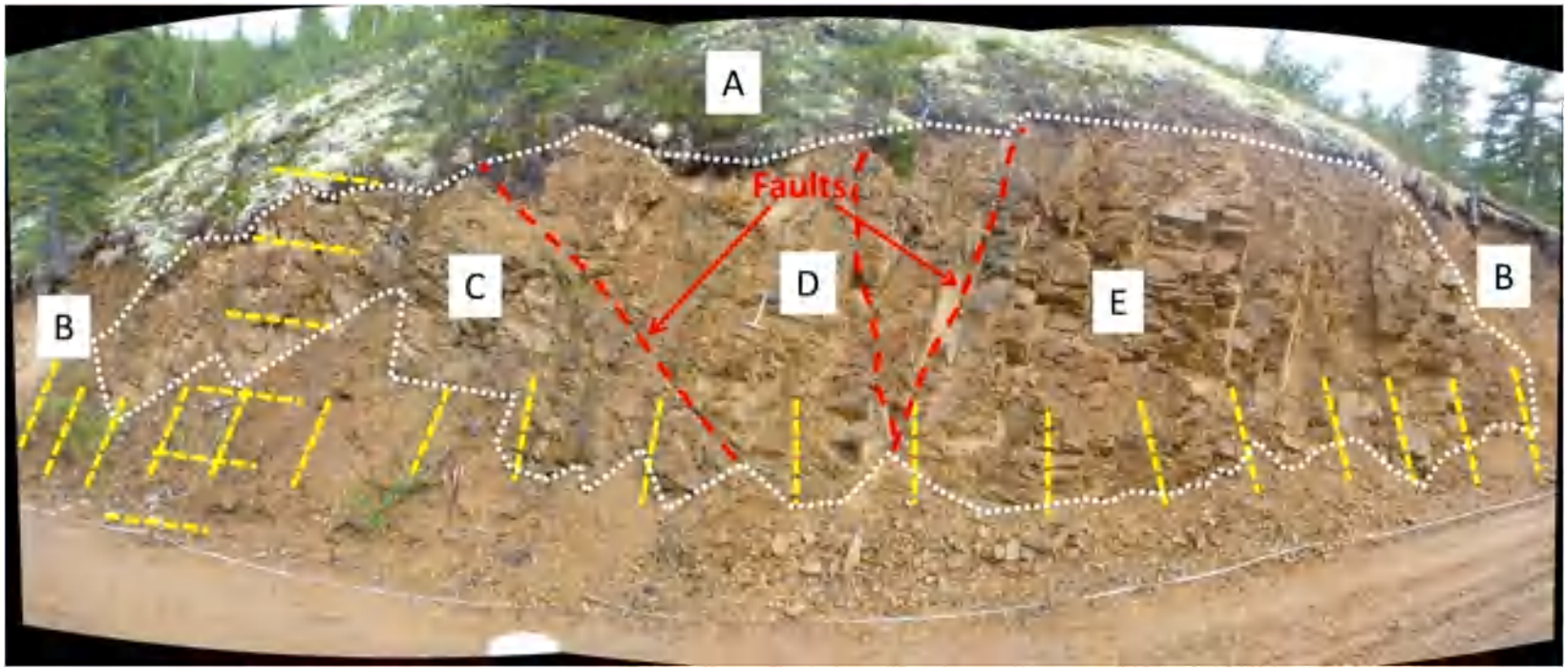
Outcrop OC-BGC11-23

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Man-made (road cut)

Northing: 7100289
Easting: 460110
Elevation: 1111 m
Survey type: Handheld GPS

Slope Angle: Natural 40° / Cut 80°
Slope Direction: 010°
Date logged: 8/1/2011
Logged by: LGT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Root mat and organic silt. [TOPSOIL]

B: GRAVEL (GW): Some sand, some, cobbles, well graded. Yellowish brown, moist, homogenous. Clasts are metasedimentary , flat & platy, angular; max particle size ~200 mm. [COMPLETELY WEATHERED METASEDIMENTARY ROCK]

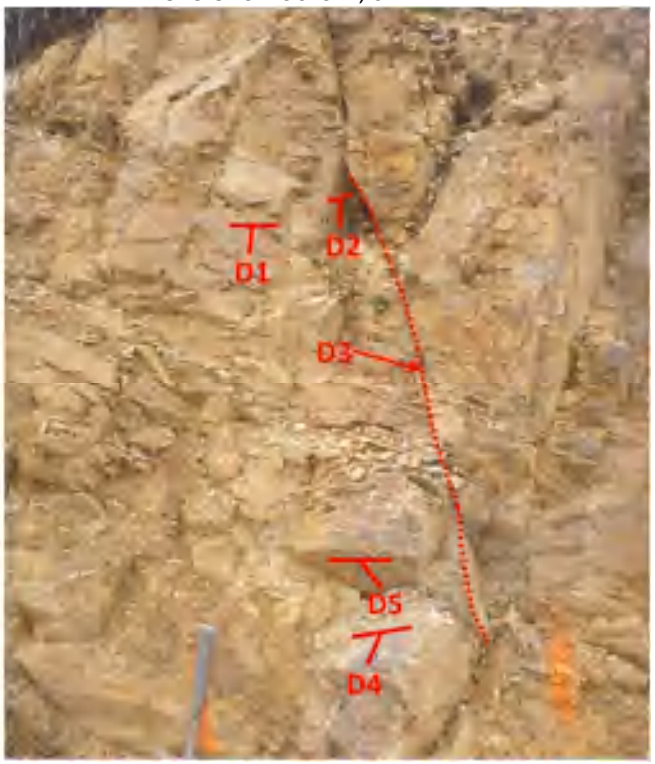
C: Yellowish-grey, fine-grained QUARTZITE. Faintly weathered (W1.5); medium strong to strong (R3-R4). Four main discontinuity sets spaced very to extremely closely; blocks are tabular. GSI structure = Blocky/disturbed, GSI surface = Good to Fair, GSI range = 30-50.

D/E: Same as above but pinkish yellow colour. D: Joints are extremely closely spaced, GSI 30-35. E: Joints are very closely spaced, good joint condition,GSI 40-50.

Outcrop OC-BGC11-23

PHOTO OF STRUCTURE, UNIT C

PHOTO OF STRUCTURE, UNIT D

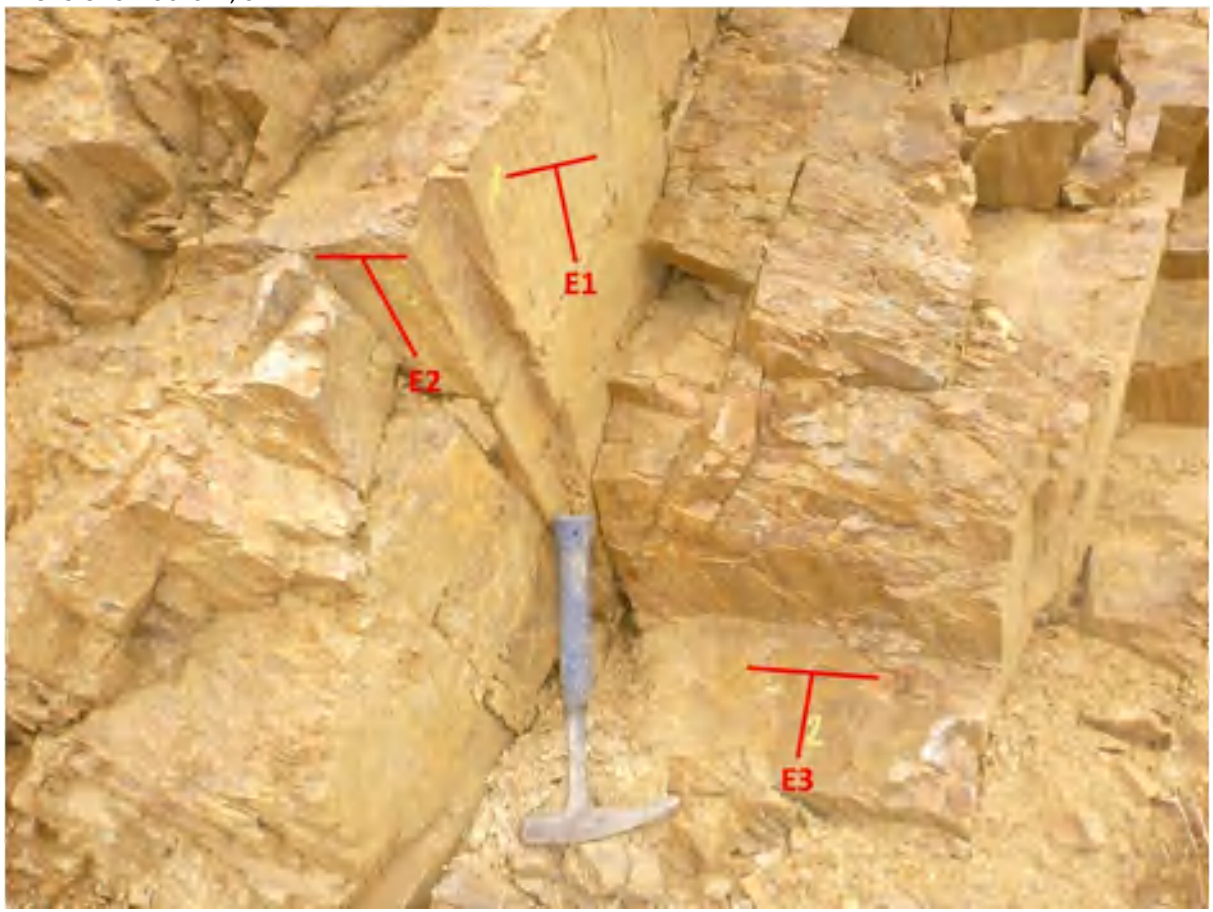


DISCONTINUITY TABLE, UNITS C/D

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
C1	25	260	0.1-15	CX, SA	20 (10 cm)	R3	0.1	>1m	JO
C2	59	093	1-2	CX, SA	6 (1m)	R4	0.3	1m	J
C3	75	061	NV	NV	20	R4		>1m	J
D1	71	231	NV	NV	20	R3		>4.9m	J
D2	76	170	0.2-4	CX	4	R4	0.2	1.5m	J
D3	74	335	5-15	CX	4	R4	0.3	>4m	J
D4	45	097	1	CX	16 (10 cm)	R4		>2.5m	J
D5	36	244	3-5	CX, SA	20 (10 cm)	R4	0.03	>1m	JO

Outcrop OC-BGC11-23

PHOTO OF STRUCTURE, UNIT E



DISCONTINUITY TABLE, UNIT E

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
E1	77	172	1-5	CX, None	4 (10 cm)	R4	0.2	>4.5m	J
E2	60	086	1-5	CX, SA	20 (10 cm)	R4	0.1	>2.5m	J
E3	38	267	0.5-1	CX	10 (10 cm)	R4	0.15	>1m	JO
E1 (Fault)	84	171	4	CX	1	R4		>4.5m	F

Outcrop OC-BGC11-24

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Man-made (road cut)

Northing: 7100089
Easting: 460221
Elevation: 1069 m
Survey type: Handheld GPS

Slope Angle: 48°
Slope Direction: 094°
Date logged: 7/31/2011
Logged by: SP

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Vegetation, moss, root mat (0.5 m). [TOPSOIL]

B: GRAVEL (GW). Well-graded. [COLLUVIUM]

C: Light brown to grey, medium- to coarse-grained GRANODIORITE. Lightly weathered and iron stained (W2); medium strong (R3). Blocks are rhomboidal, ~ 50 cm. GSI structure = Blocky, GSI surface = Good, GSI range = 55-65.

Outcrop OC-BGC11-24

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	78	261	0.1-5	CX, SA, FE	16 (1m)	R3		1m+	J
2	69	350	1-10	CX, BX, FE, SA	16 (10cm)	R3	0.5	0.5m+	J
3	32	156	10-100	BX, CX, SA, FE	12 (1m)	R3	0.6	1m+	J

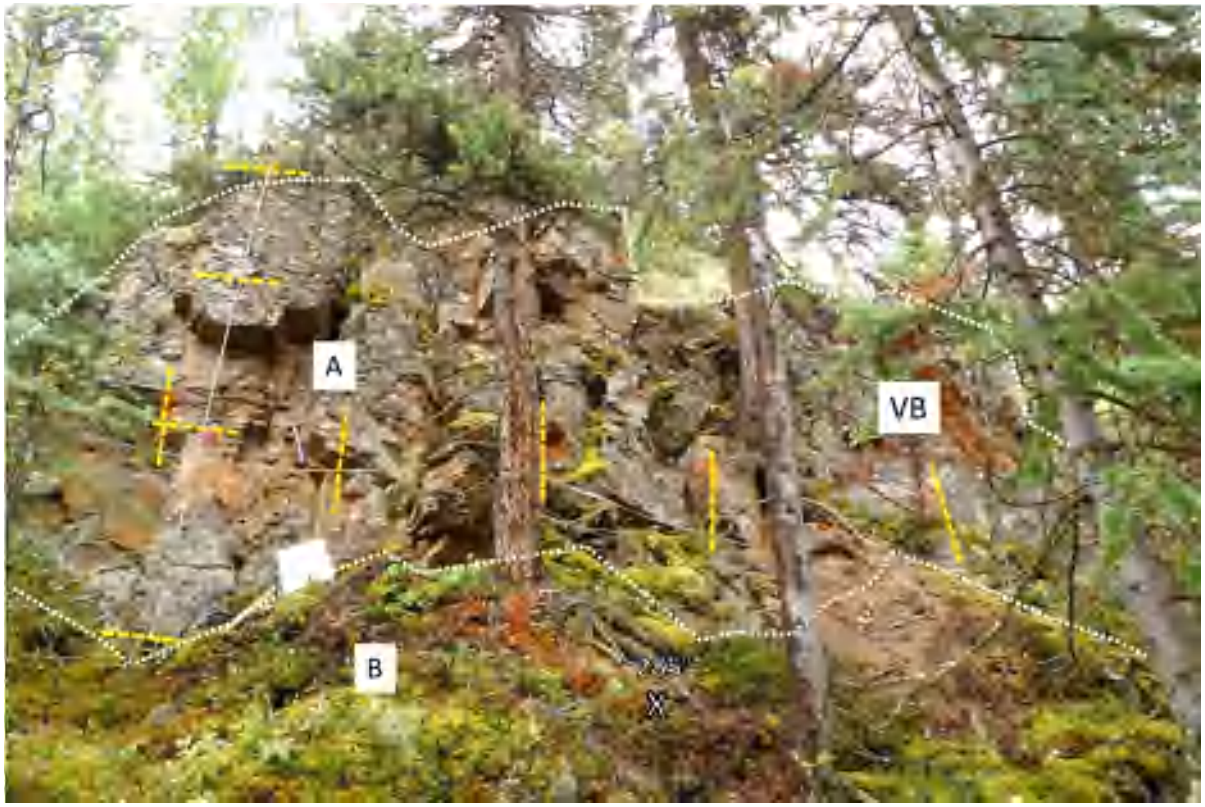
Outcrop OC-BGC11-25

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7100350
Easting: 460142
Elevation: 1033 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 081°
Date logged: 8/13/2011
Logged by: GH/LGT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Light brown, fine-grained QUARTZITE. Strong to Very Strong (R4-R5); lightly weathered (W2). Blocks tabular, ~ 20 cm. GSI structure = Blocky/disturbed (area marked VB = Very Blocky). Breaks readily on foliation. GSI surface condition = Fair, GSI = 40-50.

B: GRAVEL and organic silt with some sand (GM). Nonplastic, dark brown, soft, homogenous with organic odour. Clasts angular, medium strong (R3.5), flat and elongated, 20-100 mm; max particle size ~ 100 mm (200 mm under Very Blocky part of outcrop, marked VB). [COLLUVIUM]

Outcrop OC-BGC11-25

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC (scale)	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	74-80	163-184	0-5mm	None	8 (1 m)	R3.5	0.2	3m+	J
2	77-85	077-091	2 mm	None	6-8 (1 m)	R3.5	0.2	3m+	J
3	32-36	265-283	0-1mm	Mica on	12-14 (0.1 m)	R3.5	0.15	1m	JO
4	86-89	199-222	0-1mm	None	8 (1 m)	R3.5	0.5	1m	J

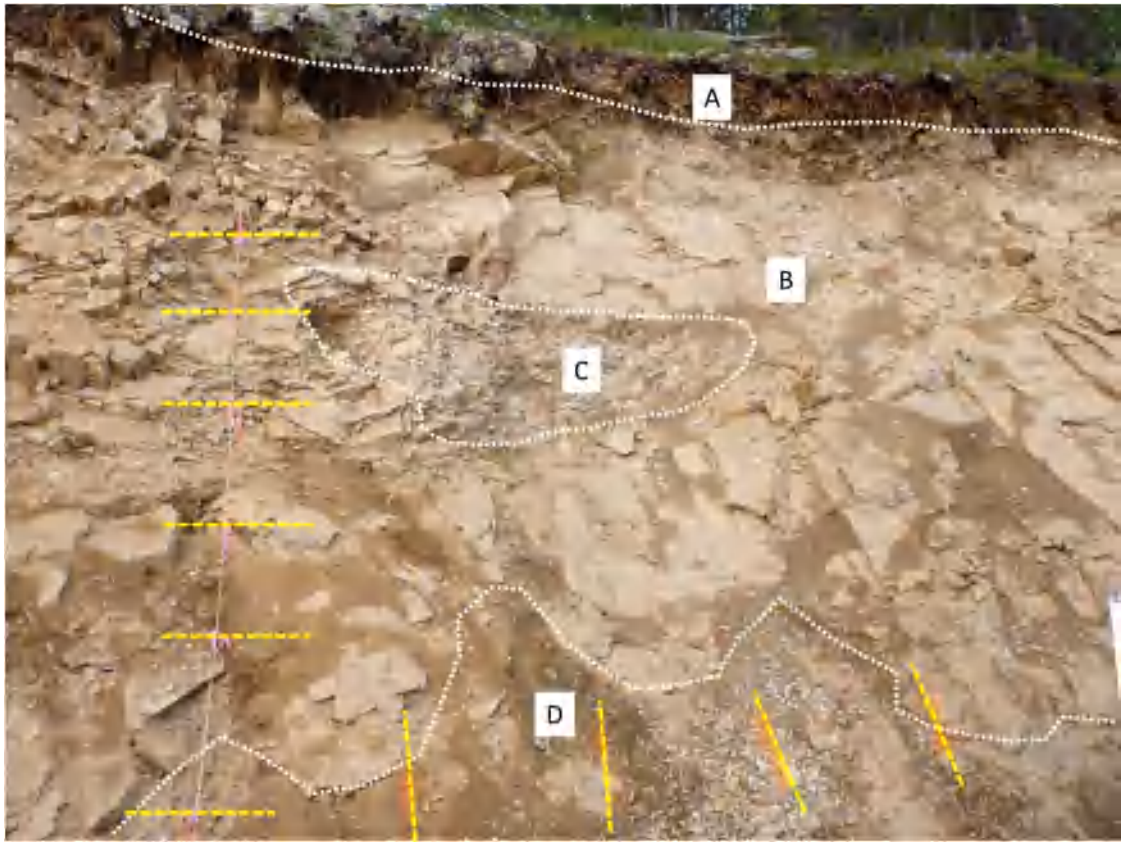
Outcrop OC-BGC11-26

Location: Platinum Gulch
Facility: Platinum Gulch WRSA
Outcrop type: Man-made (exploration road cut)

Northing: 7099104
Easting: 459656
Elevation: 1045 m
Survey type: Handheld GPS

Slope Angle:
Slope Direction:
Date logged: 8/2/2011
Logged by: SP

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Vegetation, moss, root mat. [TOPSOIL]

B: Light reddish brown QUARTZITE. Faintly to lightly weathered (W1.5-W2); medium strong (R3). Blocks rhombohedral; ~ 10 cm. GSI structure = Very Blocky, GSI surface = Fair, GSI range = 40-45.

C: Light grayish brown QUARTZITE. Moderately weathered (W3); weak (R2). Blocks rhomboidal; ~ 2 cm. GSI structure = Blocky/Distrubed to Disintegrated, GSI surface = Fair, GSI range = 25-35.

D: GRAVEL: Sandy, some cobbles, trace silt, well graded (GW). Nonplastic, dark reddish brown, moist, loose. Clasts angular to subangular, flat and elongated, medium strong (R2.5-R3); max particle size ~ 100 mm. [COLLUVIUM, SPALLED ROCK]

Outcrop OC-BGC11-26

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNITS B/C

Set	Orientation range		Aperture (mm)	Infill	JRC	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	53	259	1-10	SA, ML, FE	18	R3	0.3	1m+	JO
2	70	44	10-100	BX, ML, FE	12	R3	0.5	1m+	J
3	81	151	2-5	ML, SA, FE	10	R2.5-3	0.3	1m+	J

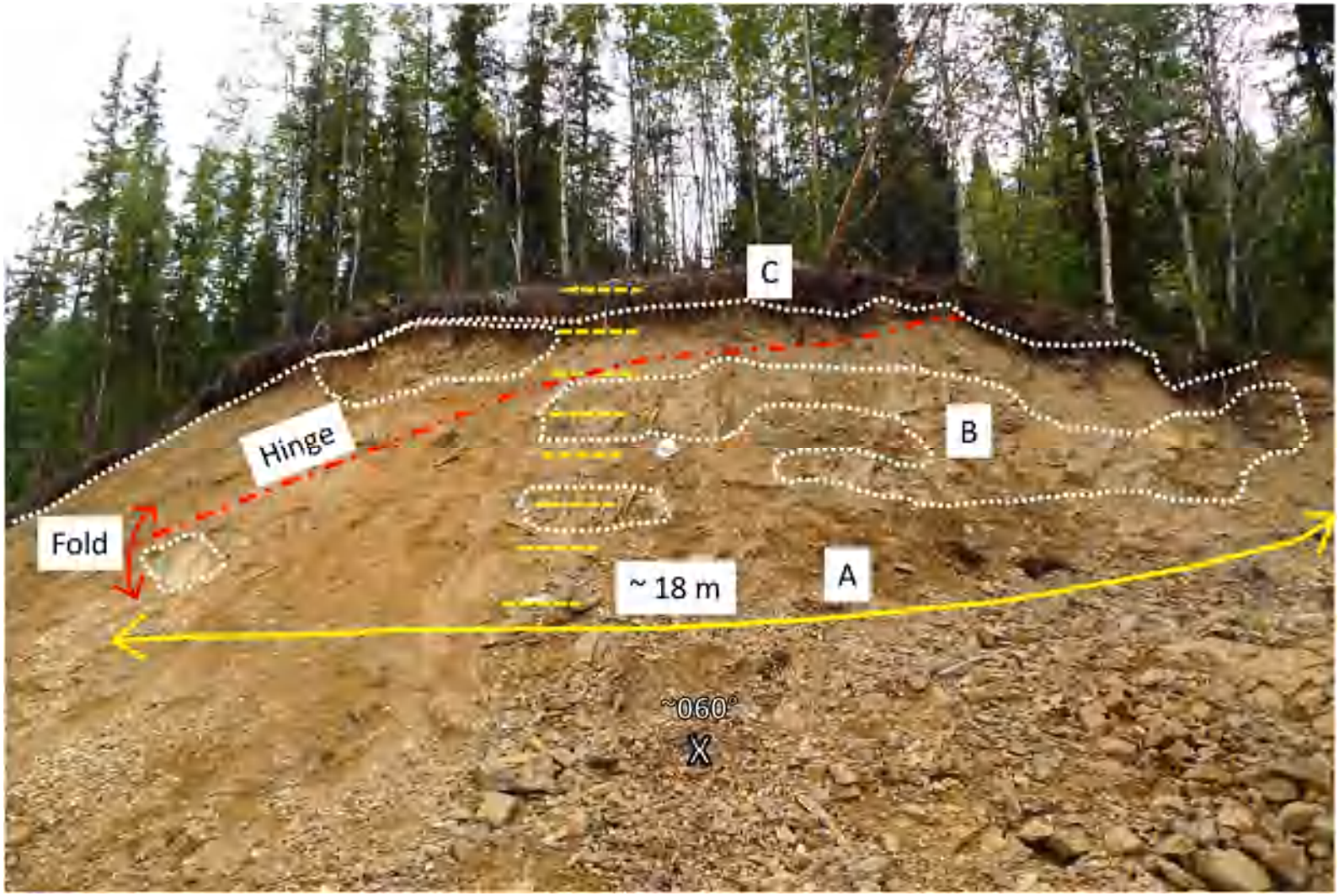
Outcrop OC-BGC11-27

Location: Platinum Gulch
Facility: Platinum Gulch WRSA
Outcrop type: Man-made (exploration drill pad cut)

Northing: 7099534
Easting: 459343
Elevation: 971 m
Survey type: Handheld GPS

Slope Angle: 41°
Slope Direction: 221-259°
Date logged: 8/13/2011
Logged by: GH/LT

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-27

PHOTO OF STRUCTURE – UNIT B (BELOW FOLD HINGE)

Outcrop OC-BGC11-27

DESCRIPTION OF MATERIALS

A: SAND and GRAVEL (SW). Well-graded, yellowish-brown, sand fine to medium. Clasts angular, flat/elongated , medium strong (R3). [COLLUVIUM]

B: Foliated, fissile fine-grained grey quartz schist, mostly weathered to yellowish brown.

	Above/near fold hinge:				Below fold hinge:	
Weathering	W3				W2	
Strength	R1				R3-R4	
Block size/shape	Crushed (5 cm to sand sized); tabular				5-10 cm; tabular	
GSI structure	Disintegrated				Lower Very Blocky	
GSI surface	Fair				Good-Fair	
GSI range	25-35				40-50	

C: Root mat and organic silt. [TOPSOIL]

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	79-88	331-338	1-3	none	8 (0.1m)	R3	0.1	2m+	J
2	67-77	236-245		none	12 (1m)	R3	0.05	1m	JO
3	33-54	024-065		none	12 (0.1m)	R3	0.2	0.5m+	J
4	42-44	137-162		none	4-8 (1 m)	R3	1	2.5m	J
5	36-58	341-005		none	8 (1 m)	R3	0.5	1m+	J
6	32-47	021-040		none			0.03		JO

Outcrop OC-BGC11-28/28B

Location: Platinum Gulch
Facility: Platinum Gulch WRSA
Outcrop type: Man-made (exploration road/drill pad cut)

Northing: 7099610
Easting: 459302
Elevation: 948 m
Survey type: Handheld GPS

Slope Angle: 50°
Slope Direction: Curves 252-276°
Date logged: 8/14/2011
Logged by: GH

LARGE SCALE OF OUTCROP 28/28B, SHOWING LOCATION OF FAULTS

Outcrop OC-BGC11-28

PHOTO OF OUTCROP 28

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Moss, root mat, and organic silt [TOPSOIL]

B: GRAVEL: Sandy, brown, poorly-graded (GP). Clasts: Meta-sedimentary, angular, flat/elongated, medium strong (R3); max particle size ~ 150 mm. [COLLUVIUM] from local outcrop.

C: Brown, fine-grained QUARTZITE. Medium strong to strong (R3-R4) and lightly to moderately weathered (W2-W2.5), depending on biotite content. Blocks tabular, ~ 10 cm. GSI structure = Very blocky to Blocky/Disturbed, GSI surface = Good to Fair, GSI range = 40-50.

Outcrop OC-BGC11-28

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	40-43	239-251	0-3	None	8-10 (1m)	R2.5	0.1	2	JO
2	84-87	338-344	1-10	Qz, Fe	2-4(1m)	R2.5	0.15	5+	J
3	65-67	069-101	0-5	None	16(1m)	R3	0.25	1.5	J
4	61-70	110-118	5-10	Qz	6(1m)	R3	1.5	5+	J

Outcrop OC-BGC11-28B

Supplement to OC-BGC11-28

Small outcrop below OC-BGC11-28 with discontinuity sets 1, 2, and 4 from OC-BGC11-28 present. More highly fractured. Average strength = R2 (weak). Blocks 1-5 cm, GSI structure = Disintegrated, GSI surface = Fair, GSI range = 30-40. Contains 2 brittle sandy faults (see example below).

PHOTOGRAPH OF FAULT #2

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	55	240	0-5	None	10 (1m)	R3	0.05	2m+	JO
Fault #1	75	202	400	CX		R2.5			F
Fault #2	76	175	250	CX		R3			F

Outcrop OC-BGC11-29

Location: Pit area
Facility: Platinum Gulch WRSA
Outcrop type: Man-made (exploration road cut)

Northing: 7099512
Easting: 459444
Elevation: 983 m
Survey type: Handheld GPS

Slope Angle: 44°
Slope Direction: 270°
Date logged: 8/14/2011
Logged by: GH

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Root mat organic silt. [TOPSOIL]

B: SAND: Gravelly/cobbly, some silt, trace boulders, trace rootlets (SW). Light brown, moist, homogenous. Clasts subangular to angular, equidimensional to elongated, medium strong to strong (R3-R4); max particle size ~ 400 mm. [COLLUVIUM]

C: Brown, fine-grained QUARTZITE. Slightly to moderately weathered (W2-W3); medium strong (R2-R3). Blocks tabular, 1-5 cm. GSI structure = Disintegrated, GSI surface = Fair, GSI range = 25-35.

D: Material ravelled from cut-slope. [COLLUVIUM]

Outcrop OC-BGC11-29

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	60-66	267-278	0-1	None	8-10 (0.1 m)	R2	0.03	2m+	JO
2	62-108	153-155	1-50	QZ	6-8 (1 m)	R2.5	0.1	2m+	J, V
3	36-39	078-089	0-2	None	10 (1 m)	R2.5	0.05	1m	J

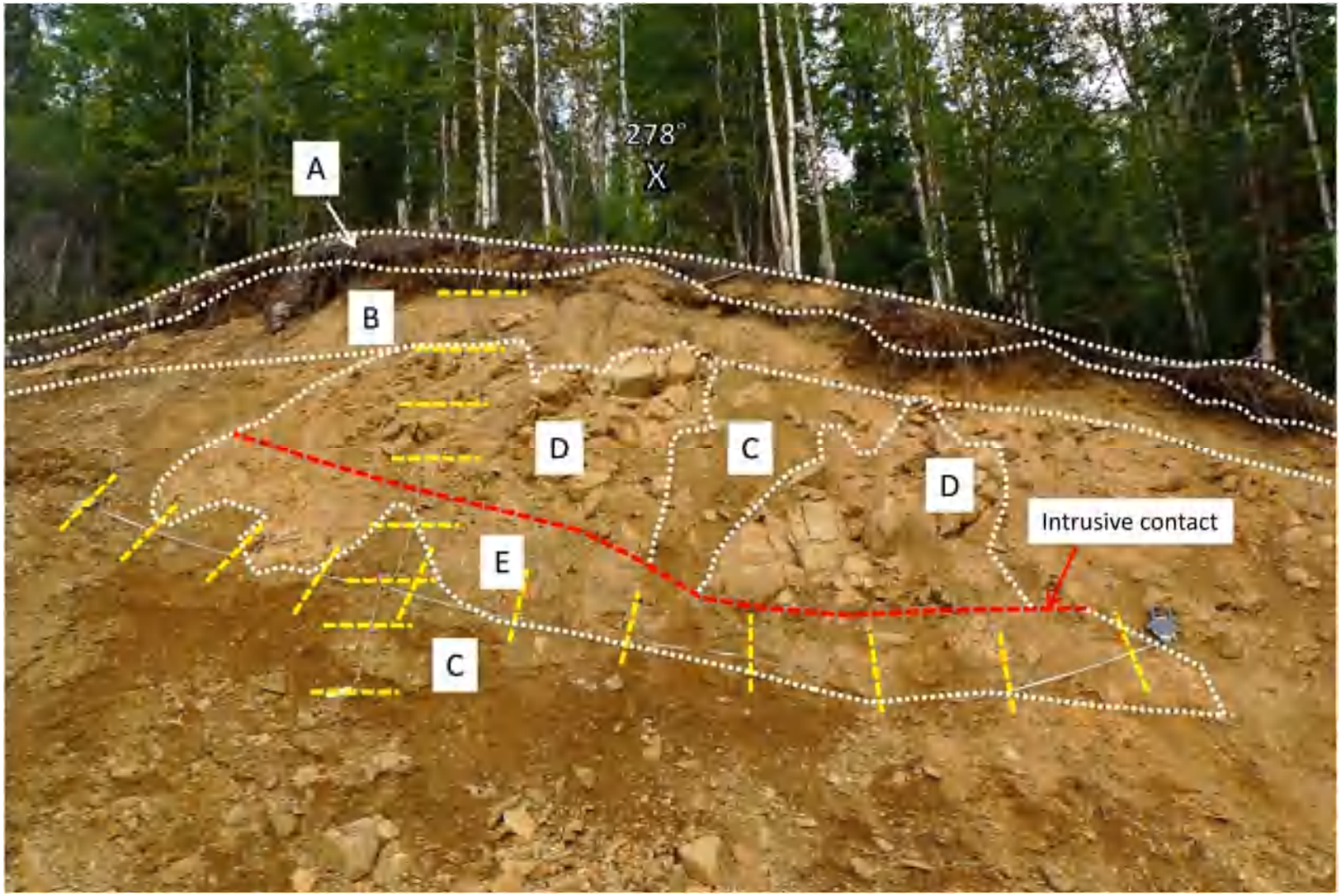
Outcrop OC-BGC11-30

Location: Pit area
Facility: Platinum Gulch WRSA
Outcrop type: Man-made (exploration road cut)

Northing: 7099467
Easting: 459387
Elevation: 947 m
Survey type: Handheld GPS

Slope Angle: 50°
Slope Direction: 259°
Date logged: 8/14/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-30

Photo of structure - Granodiorite

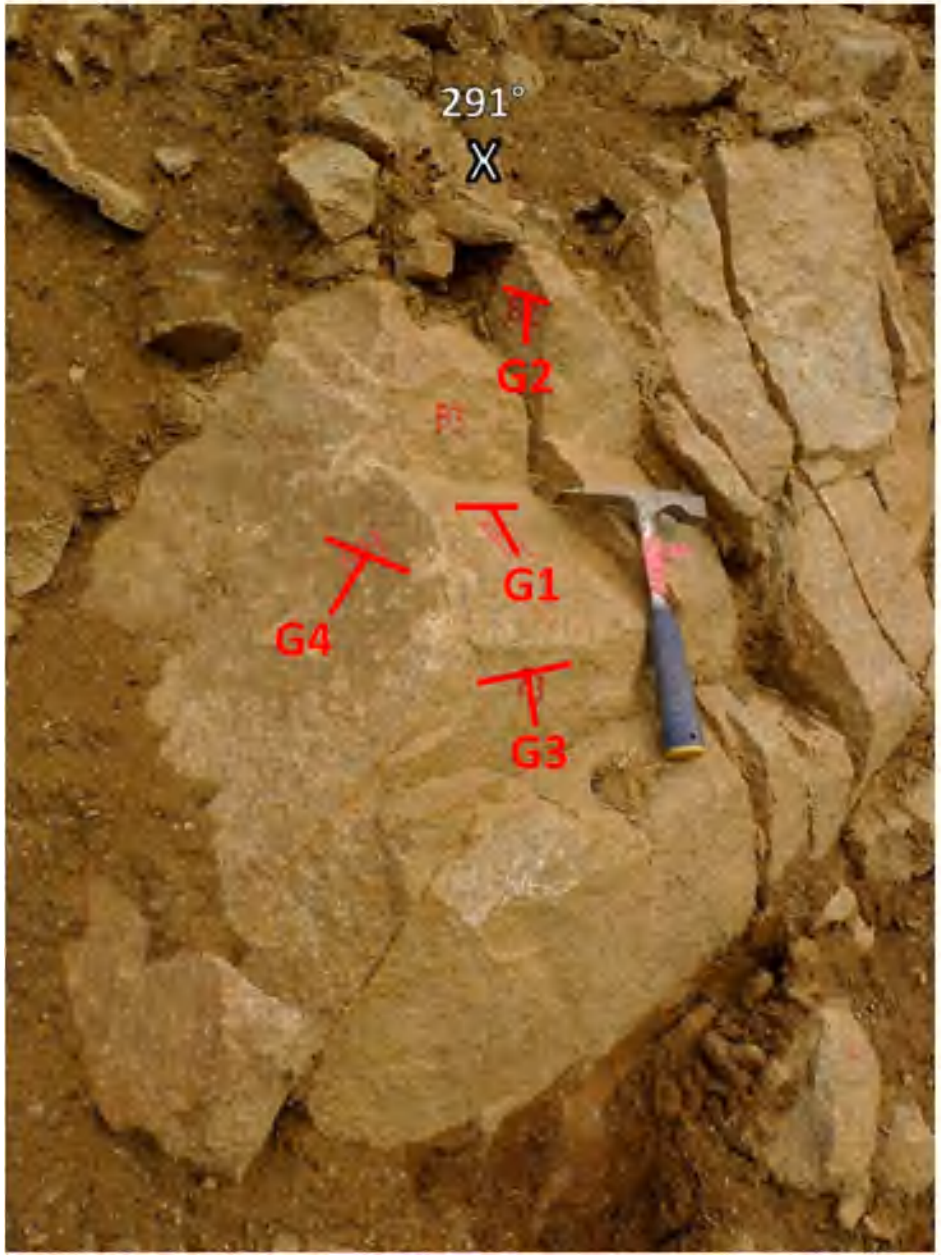
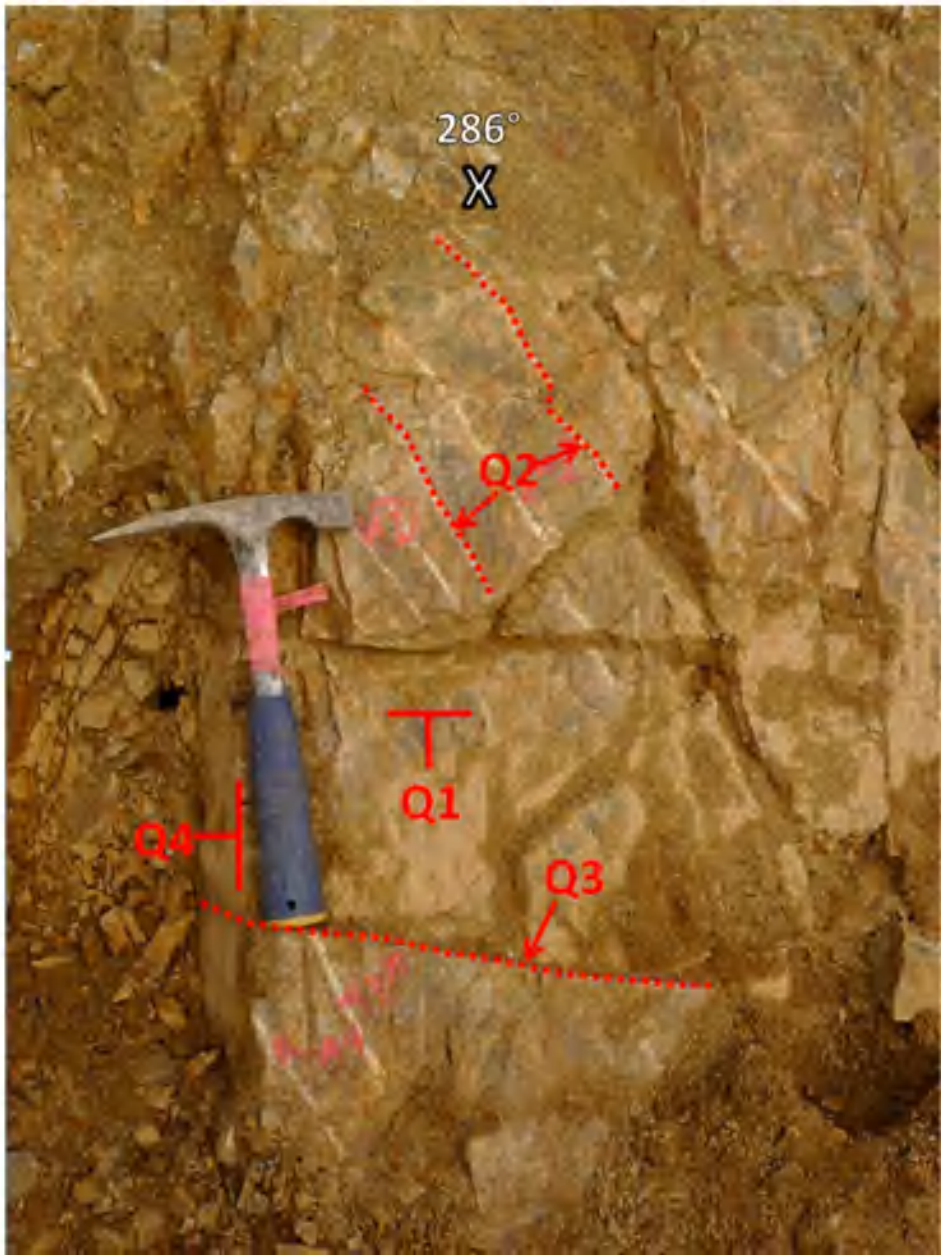


Photo of structure - Quartzite



Outcrop OC-BGC11-30

DESCRIPTION OF MATERIALS

A: Root mat and organic silt. [COLLUVIUM]

B: SAND with gravel and cobbles, well-graded (SW). Light brown, moist. Clasts granodiorite and meta-sedimentary, angular to sub-angular, equidimensional to tabular, strong (R3-R4); max particle size ~ 100 mm. [COLLUVIUM]

C: Ravelled material from outcrop.

D: Yellowish-grey medium-grained GRANODIORITE. Slightly weathered (W2); strong (R4). Blocks ~ 20cm, equidimensional to tabular. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

E: Dark grey, fine-grained QUARTZITE. Lightly weathered (W1.5-W2); strong (R3-R4). Blocks ~ 5 cm; tabular. GSI structure = Blocky/Disturbed, GSI surface = Good to Fair, GSI range = 40-50.

Lithological contact: 0.3-m-thick zone of reddish-grey medium sandy decomposed rock (DX) derived from the granodiorite unit. Minor clay present from alteration of feldspars.

DISCONTINUITY TABLE – UNITS D/E

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
G1	45-61	216-249	0	None	16 (1m)	R4	0.5	0.7m	J
G2	81-85	138-162	0-30	SA	10-12(1m)	R4	0.4	1.5m+	J
G3	71-82	072-073	0-1	None	6-8(1m)	R4	0.4	3m+	J
G4	55-65	306-320	0-1	FE	6-8(1m)	R3	1	1m+	J
Q1	54-62	257-269	0	None	8 (1m)	R3	0.05	1m+	JO
Q2	No broken surfaces		1-10	QZ	10(1m)	R3.5	0.1	2m+	J, V
Q3	33-71	075-136	2	None	4-6(1m)	R3.5	0.15	1m	J
Q4	64-68	325-348	0.2	None	6-8(1m)	R3.5	0.08	1.5m+	J

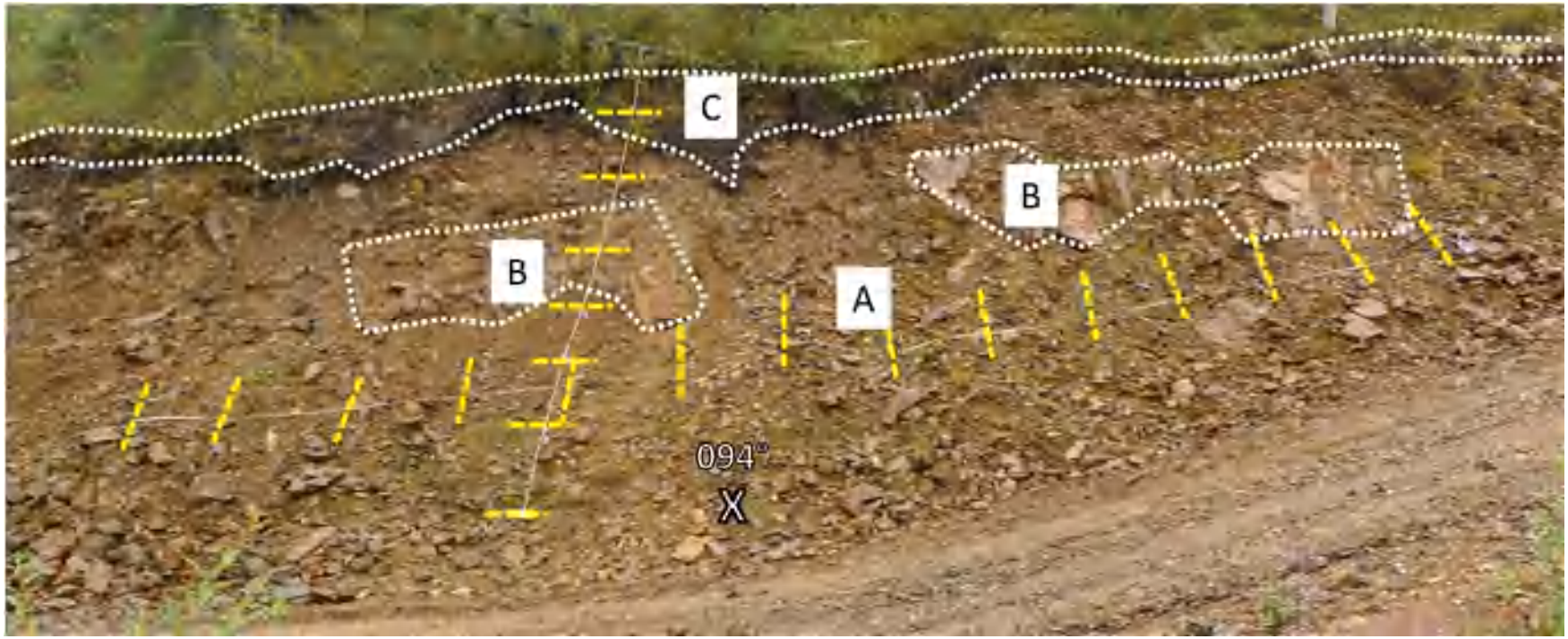
Outcrop OC-BGC11-31

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (road cut)

Northing: 7099768
Easting: 459788
Elevation: 1087 m
Survey type: Handheld GPS

Slope Angle: 51°
Slope Direction: 287°
Date logged: 8/15/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SILT: Gravelly, some sand (ML). Brown, soft, moist, and homogenous. Clasts: Meta-sedimentary, angular, flat/elongated, strong (R4). Fines have low plasticity, rapid dilatancy, low toughness. [COLLUVIUM]

B: Dark grey, fine-grained QUARTZITE. Faintly to lightly weathered (W1.5-W2); strong (R3-R4). Blocks ~ 10 cm; tabular. GSI structure = Blocky/Disturbed to Very Blocky, GSI surface = Good, GSI range = 45-55.

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-31

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	47-51	254-262	0	None	12-16	R3.5	0.1	1m+	JO
2	82-84	149-153	0-40	QZ	16	R4	0.3	1m+	J, V
3	33-50	087-118	0-2	None	12-20	R4	0.25	0.5m+	J
4	36-66	241-259	0-2	None	16	R4	0.4	1m+	J

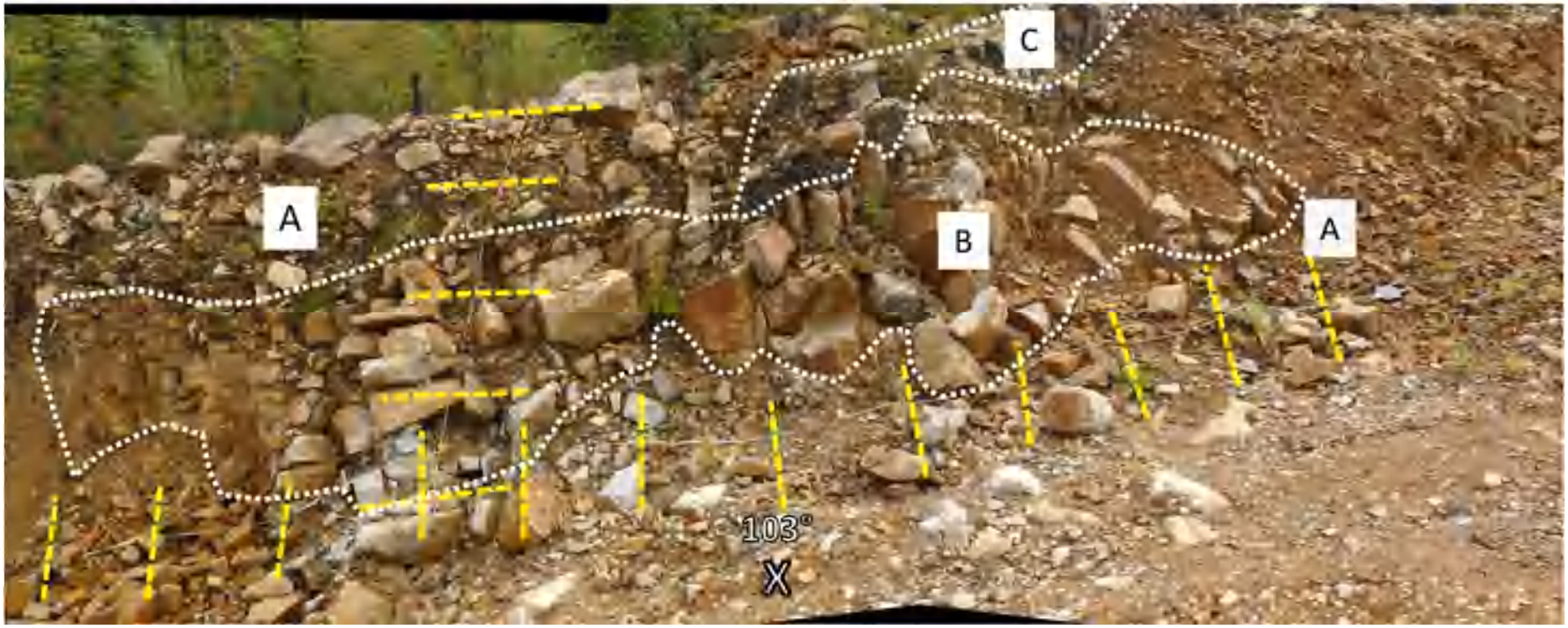
Outcrop OC-BGC11-32

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (exploration trench)

Northing: 7099753
Easting: 460179
Elevation: 1176 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 272°
Date logged: 8/15/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SAND: Some gravel, cobbles, and boulders, trace silt, well-graded (SW). Brown, moist, nonplastic. Clasts: Fine gravel to boulder-sized granodiorite; angular, equidimensional, strong (R4). [COLLUVIUM]

B: Grey, medium-grained GRANODIORITE. Faintly weathered (W1.5-W2); strength varies from R4-R5 with degree of weathering/alteration. Blocks ~ 30 cm; prismatic. Open fracture surfaces due to rock mass movement/dilation. GSI structure =Blocky to Very Blocky, GSI surface = Fair to Poor, GSI range = 45-55.

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-32

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	74-86	138-142	1-50	QZ	8(1m)	R4	0.3	2.5m+	J, V, S
2	78-89	231-238	2-20	None	10(1m)	R4.5	0.5	2.5m+	J
3	33-56	042-082	1-10	None	16(1m)	R4.5	0.4	1m+	J
4	38-51	260-270	NV	None	8(1m)	R4.5	0.4	1.5m+	J

Outcrop OC-BGC11-33

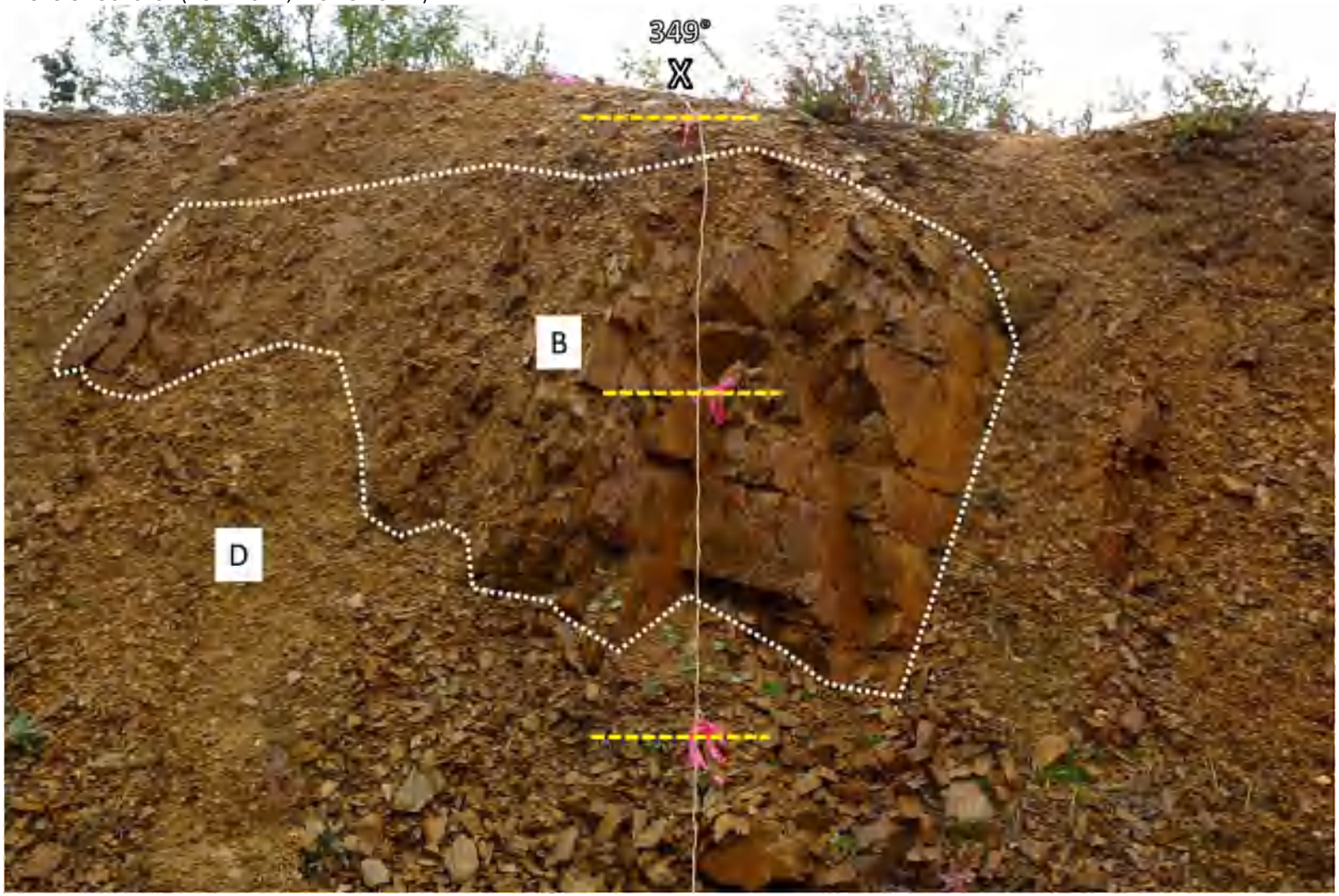
Location: Eagle Pup
Facility: Pit/Eagle Pup WRSA
Outcrop type: Man-made (exploration trench)

Northing: 7099961
Easting: 460143
Elevation: 1160 m
Survey type: Handheld GPS

Slope Angle: 70°
Slope Direction: 012°
Date logged: 8/15/2011
Logged by: GH

* Station comprises two outcrops (north and south) on either side of a deep ditch.

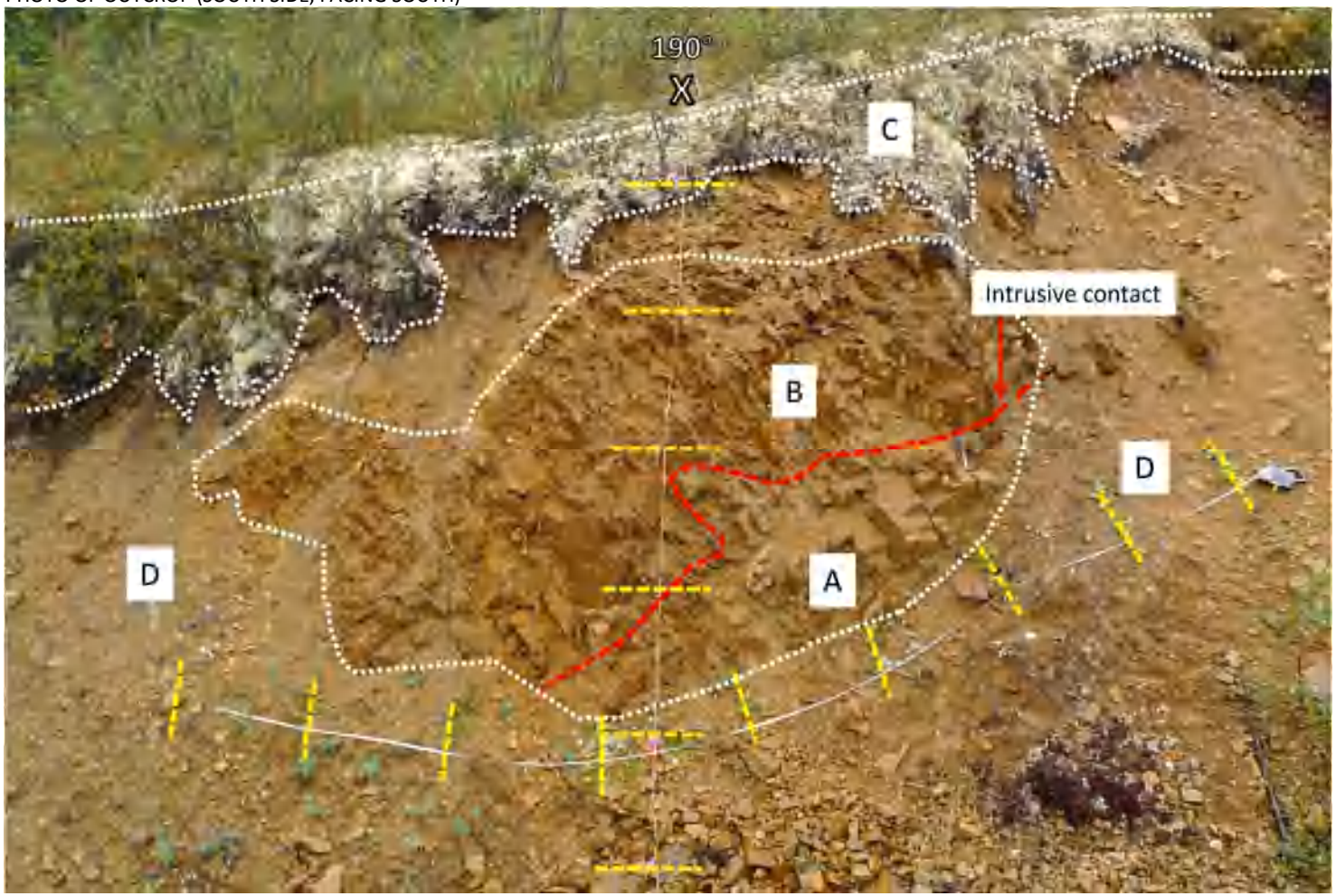
PHOTO OF OUTCROP (NORTH SIDE, FACING NORTH)



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-33

PHOTO OF OUTCROP (SOUTH SIDE, FACING SOUTH)



DESCRIPTION OF MATERIALS

A: Yellowish grey, medium-grained GRANODIORITE. Lightly weathered (W1.5-W2); strong (R3-R4). Blocks ~15 cm; equidimensional. GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 45-55.

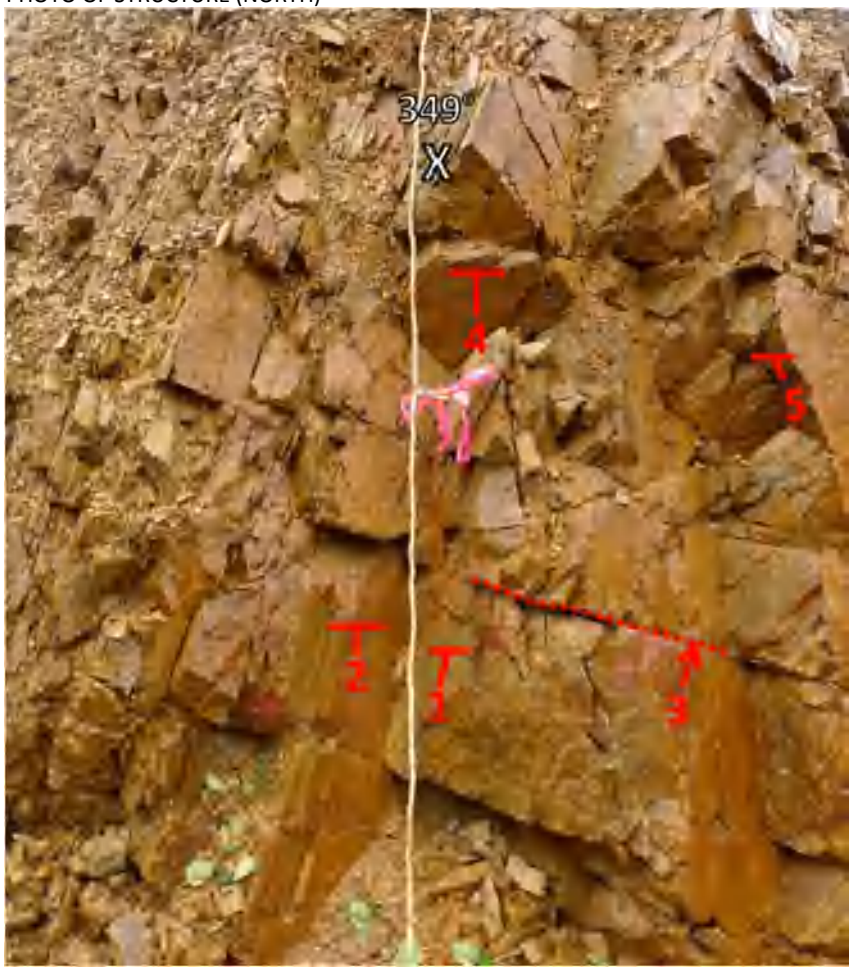
B: Light brown, fine-grained QUARTZITE. Lightly weathered (W1.5-W2); strong (R3-R4). Blocks ~ 8 cm; rhombohedral. GSI structure = Blocky/disturbed, GSI surface = Fair, GSI range = 35-45.

C: Root mat and organic silt. [TOPSOIL]

D: SAND: Fine to medium, some silt, some, gravel, well-graded (SW). Light brown, nonplastic, moist. Clasts composed of both granodiorite & metasedimentary rock, strong (R3-R4), angular. [COLLUVIUM]

Outcrop OC-BGC11-33

PHOTO OF STRUCTURE (NORTH)



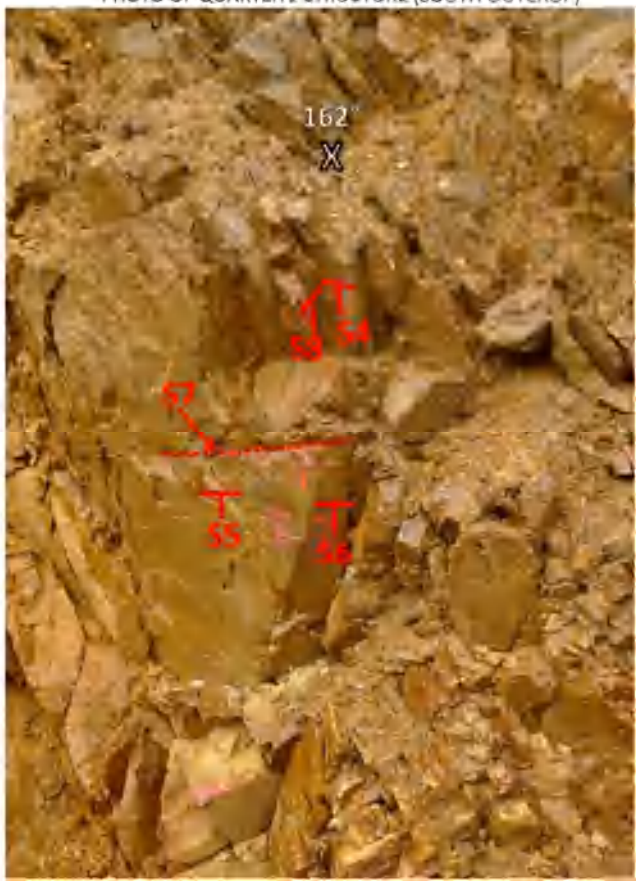
DISCONTINUITY TABLE (NORTH OUTCROP, UNIT B)

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
N1	61-65	231-248	0-5	None	8 (10cm)	R3	0.05	1m+	JO
N2	82-84	132-134	1-3	None	4 (1m)	R3	0.1	2m+	J
N3	20-29	026-052	1-5	None	4 (1m)	R3	0.25	1.5m+	J
N4	58-71	347-006	1-2	None	8 (10cm)	R3	0.4	0.5m	J
N5	61-79	033-047	0	None	12 (10cm)	R3	0.5	0.3m	J

Outcrop OC-BGC11-33

PHOTO OF GRANODIORITE STRUCTURE (SOUTH OUTCROP)

PHOTO OF QUARTZITE STRUCTURE (SOUTH OUTCROP)



DISCONTINUITY TABLE (SOUTH OUTCROP, UNITS B/A)

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
S1	69-76	225-228	2-30	BX, None	6-8(1m)	R4	0.2	1m+	J
S2	63-67	143-144	1-3	QZ	8-10(1m)	R3	0.15	1.5m+	J
S3	48	333-340	0	None	16(1m)	R4	0.2	0.5m	J
S4	46-65	194-238	0-2	None	4 (10cm)	R3	0.08	2m+	JO
S5	69-75	132-182	1	BX	12 (1m)	R3.5	NV	0.7m+	J
S6	64-66	133-138	2-5	None, BX	4 (1m)	R3.5	0.2	1m+	J
S7	16-30	240-269	0-2	None	4 (1m)	R3.5	0.3	1m+	J
S8	68-88	268-273	0.3	None	8 (10cm)	R3.5	NV	0.5m	J

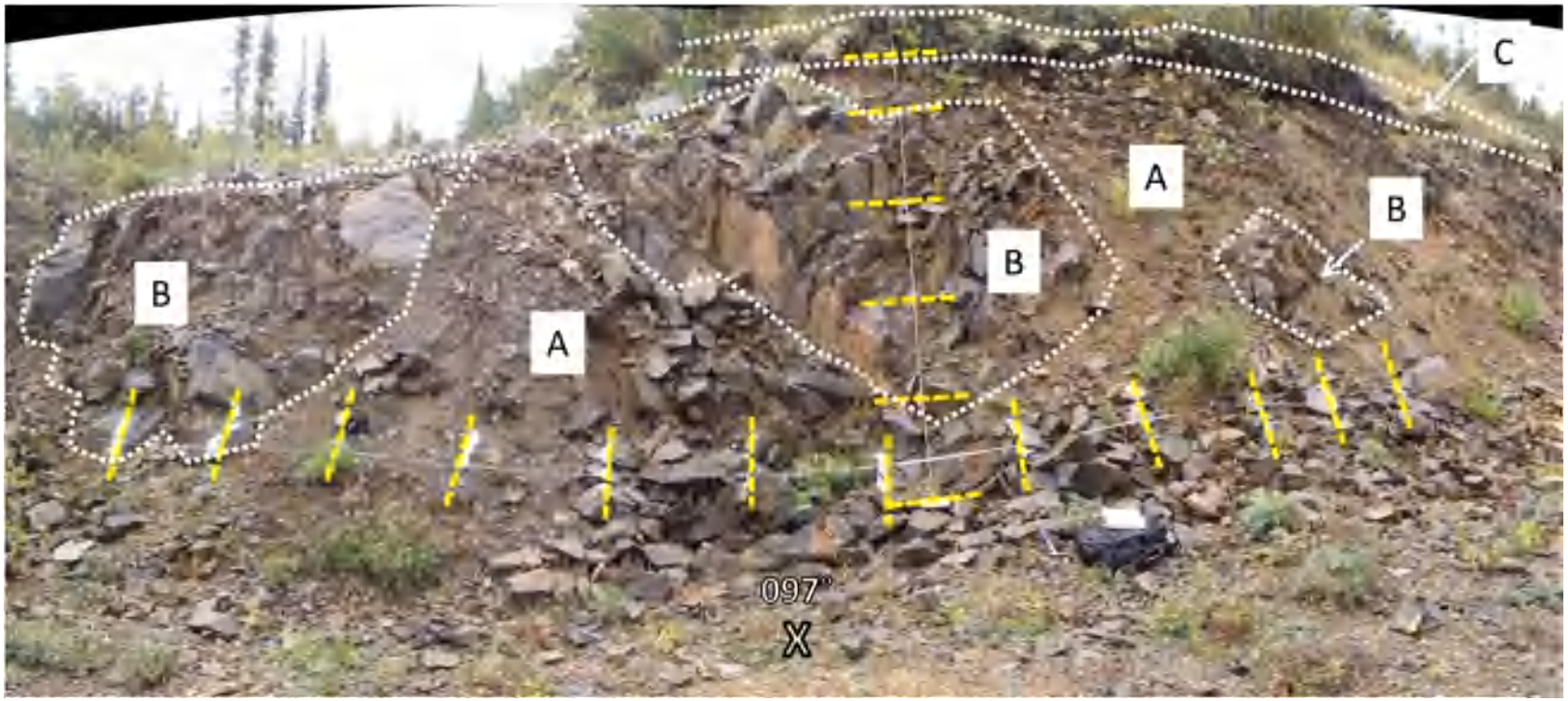
Outcrop OC-BGC11-34A

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (exploration road cut)

Northing: 7099344
Easting: 460193
Elevation: 1266 m
Survey type: Handheld GPS

Slope Angle: 61°
Slope Direction: 275°
Date logged: 8/16/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SAND: Gravelly, cobbly, some silt, well-graded (SW). Brown, nonplastic, moist, soft, homogenous. Clasts angular to sub-angular, equidimensional to flat, mostly intrusive lithology, weak to very strong (R2-R5, depending on degree of weathering). Max particle size ~ 200 mm. [COLLUVIUM]

B: Dark grey, fine-grained porphyritic igneous rock (possibly a DIKE). Groundmass of quartz & dark mafic minerals w/1-5mm plagioclase phenocrysts. Fresh with minor FE staining (W1-W1.5); very strong to extremely strong (R5-R6). Blocks ~ 30 cm; rhombohedral. GSI structure = Blocky to Very Blocky, GSI surface = Good, GSI range = 55-65.

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-34A

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	86-87	130-145	1	None	2-4 (1m)	R3	0.7m	3m+	J, S
2	80-85	058-079	0	None	6-8 (1m)	R4.5	0.3m	2m+	J
3	45-70	309-326	0	None	8-10 (1m)	R5	0.3m	1m	J
4	43-58	212-236	0	None	12-16 (1m)	R5	0.4m	2m	J

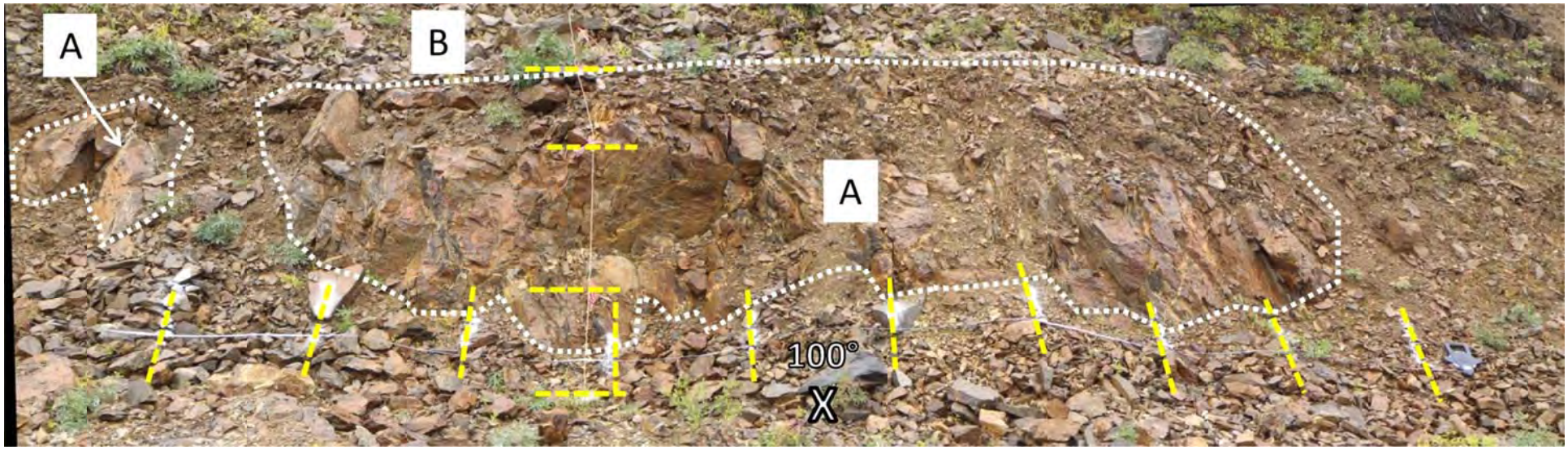
Outcrop OC-BGC11-34B

Location: Pit area
Facility: Open pit
Outcrop type: Man-made (exploration road cut)

Northing: 7099344
Easting: 460193
Elevation: 1266 m
Survey type: Handheld GPS

Slope Angle: 55°
Slope Direction: 283°
Date logged: 8/16/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

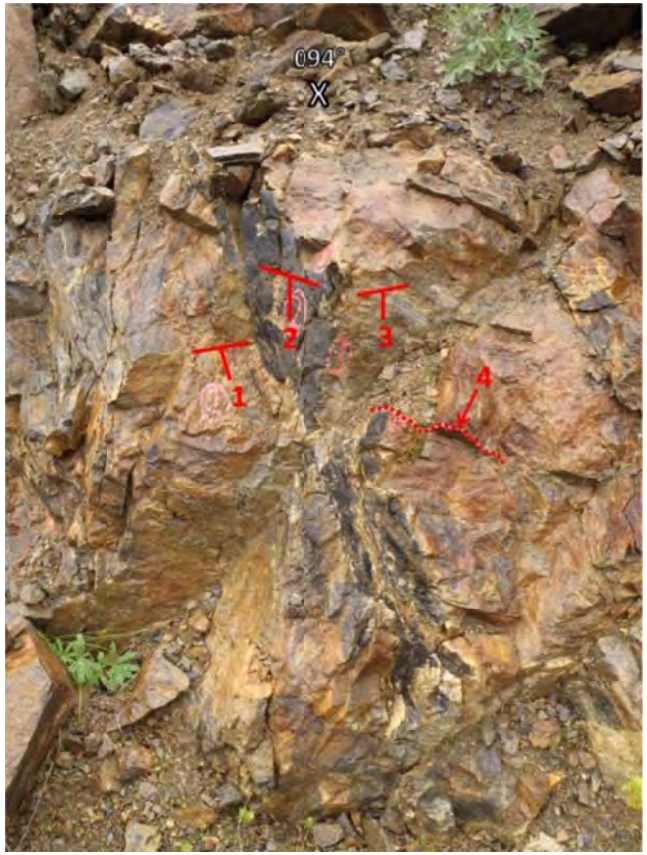
A: Dark grey, fine-grained QUARTZITE. Faintly weathered (W1.5); strong to very strong (R4-R5). Blocks rhomboidal; ~ 20 cm. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

B: GRAVEL: Cobbly, well-graded (GW). Greyish-brown, nonplastic, moist, homogenous. ~60% clasts (Fine gravel to boulders, mostly intrusive lithology, angular, equidimensional to flat, very strong, max particle size ~ 300 mm); 40% matrix (30% sand, 10% silt). [COLLUVIUM]

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-34B

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	54-71	226-242	0-2	None	12-16 (1m)	R4	0.2	1m+	JO
2	85-88	310-320	0	None	12-16 (1m)	R4	0.3	1m+	J, V
3	70-82	076-098	1-3	SA	10-12 (1m)	R4	0.4	3m+	J
4	39-49	100-107	0-2	None	10-12 (1m)	R4	0.5	1m	J
5	59-79	334-010	0	None	15 (10cm)	R4	0.3	0.5m	J

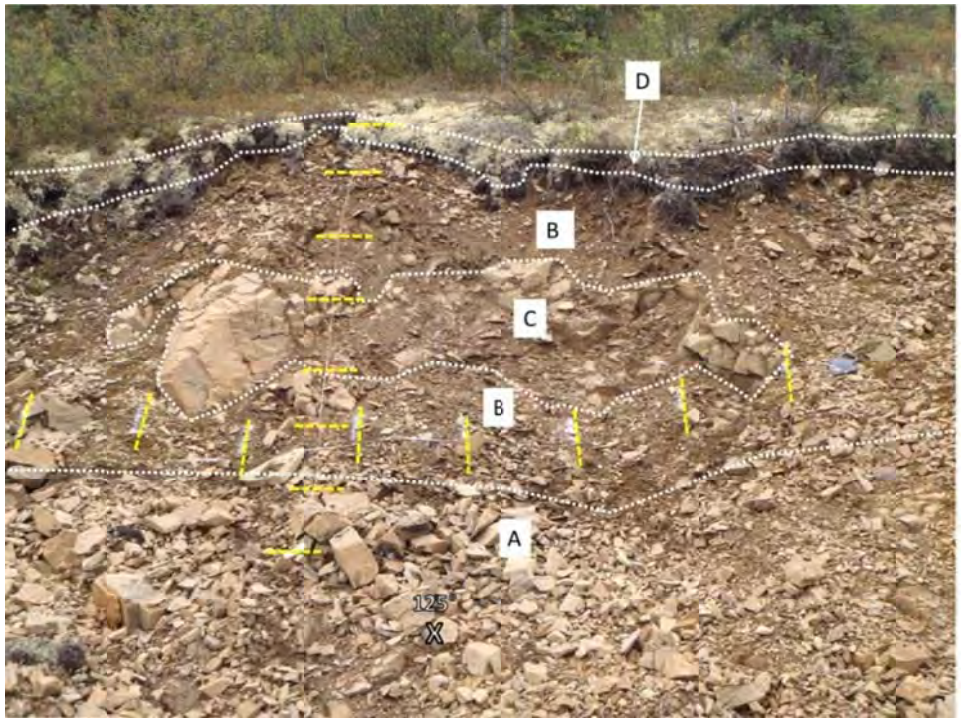
Outcrop OC-BGC11-35

Location: Stuttle Gulch
Facility: Secondary crusher
Outcrop type: Man-made (drill pad cut for BH-BGC11-37)

Northing: 7100175
Easting: 459768
Elevation: 1023 m
Survey type: Handheld GPS

Slope Angle: 50°
Slope Direction: 298°
Date logged: 8/16/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Blocky rubble derived from outcrop.

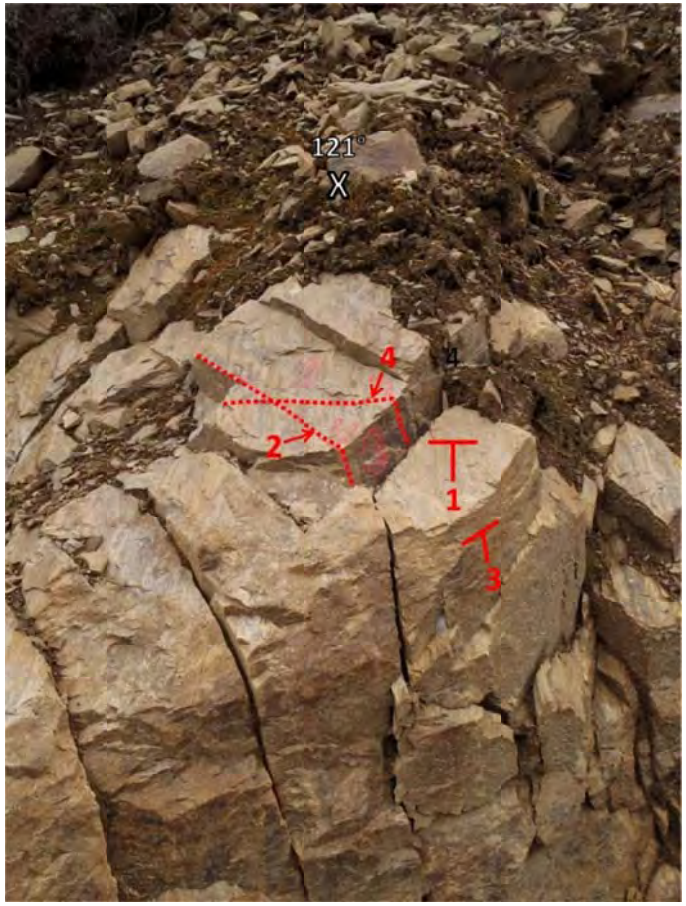
B: SAND: Fine to medium, gravelly, some silt, trace organic material, well-graded (SW-SM). Brown, nonplastic, moist, soft, and homogenous, with rapid dilatancy. Clasts are angular to sub-angular, meta-sedimentary, fine gravel to cobbles, flat and elongated, medium strong to strong (R3-R4). Max particle size ~ 200 mm. [COLLUVIUM]

C: Light brown, fine-grained QUARTZITE. Lightly weathered (W2); strong (R3-R4). Blocks ~ 15 cm; rhombohedral. GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 45-55.

D: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-35

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT C

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	40-52	298-325	0	None	12-20 (1m)	R3	0.2	1m+	JO
2	62-80	142-160	0-5	None	4 (1m)	R3	0.3	1m+	J
3	76-89	264-298	0-50	None, SA	20 (1m)	R3	0.3	2m+	J
4	66-77	095-102	0-1	None	12 (10cm)	R3	0.5	0.3m	J

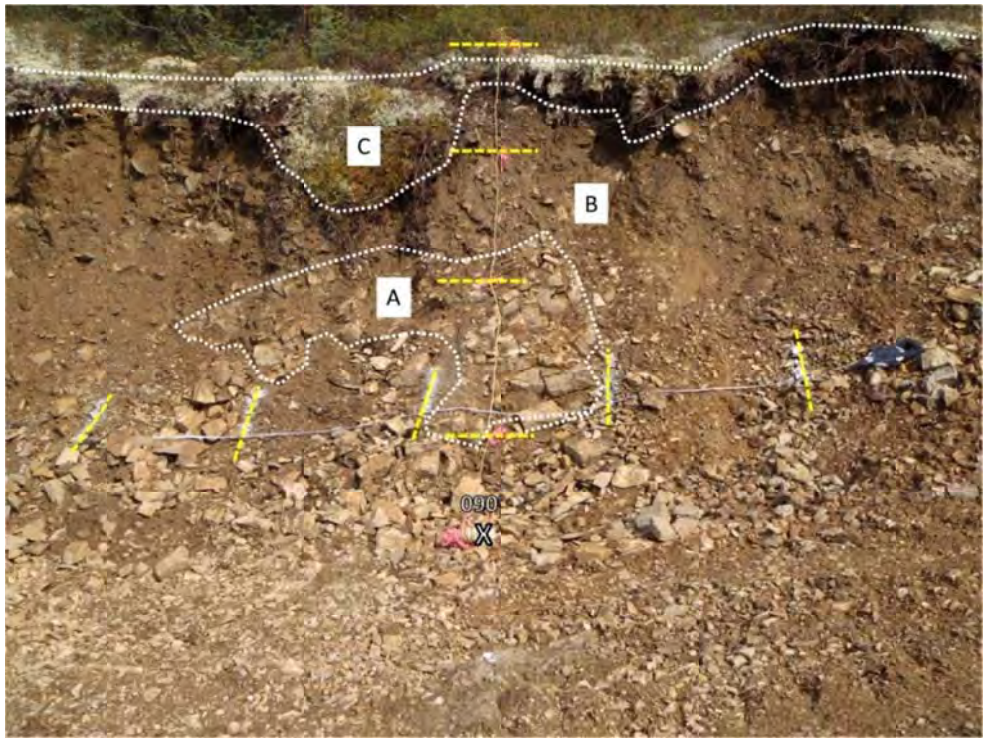
Outcrop OC-BGC11-36

Location: Stuttle Gulch
Facility: Secondary crusher
Outcrop type: Man-made (drill pad cut at BH-BGC11-36)

Northing: 7100272
Easting: 459698
Elevation: 1009 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 272°
Date logged: 8/16/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Yellowish-brown, fine-grained QUARTZITE. Lightly weathered (W2); medium strong (R3). Blocks ~ 10 cm; equidimensional. GSI structure = Very Blocky to Blocky/Disturbed, GSI surface = Good to Fair, GSI range = 40-50.

B: SAND: Silty, gravelly, trace cobbles, gap-graded (SM). Brown, nonplastic, no dry strength, rapid dilatancy, moist, firm. Silt content increases upwards; gravel increases downwards. Clasts: Metasedimentary lithology, angular to sub-angular, flat, medium strong (R3); max particle size ~ 100 mm. [COLLUVIUM]

C: Organic silt and root mat. [TOPSOIL]

Outcrop OC-BGC11-36

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC (scale)	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)				(m)	(m)	
1	32-51	290-322	0-10	SA-SM	12 (10cm)	R3	0.1	0.5m+	JO
2	73-75	186-192	1-5	SA-SM	4 (10cm)	R3	0.1	1m+	J
3	62-65	091-098	1-10	SA-SM	16 (10cm)	R3	0.15	1.5m+	J

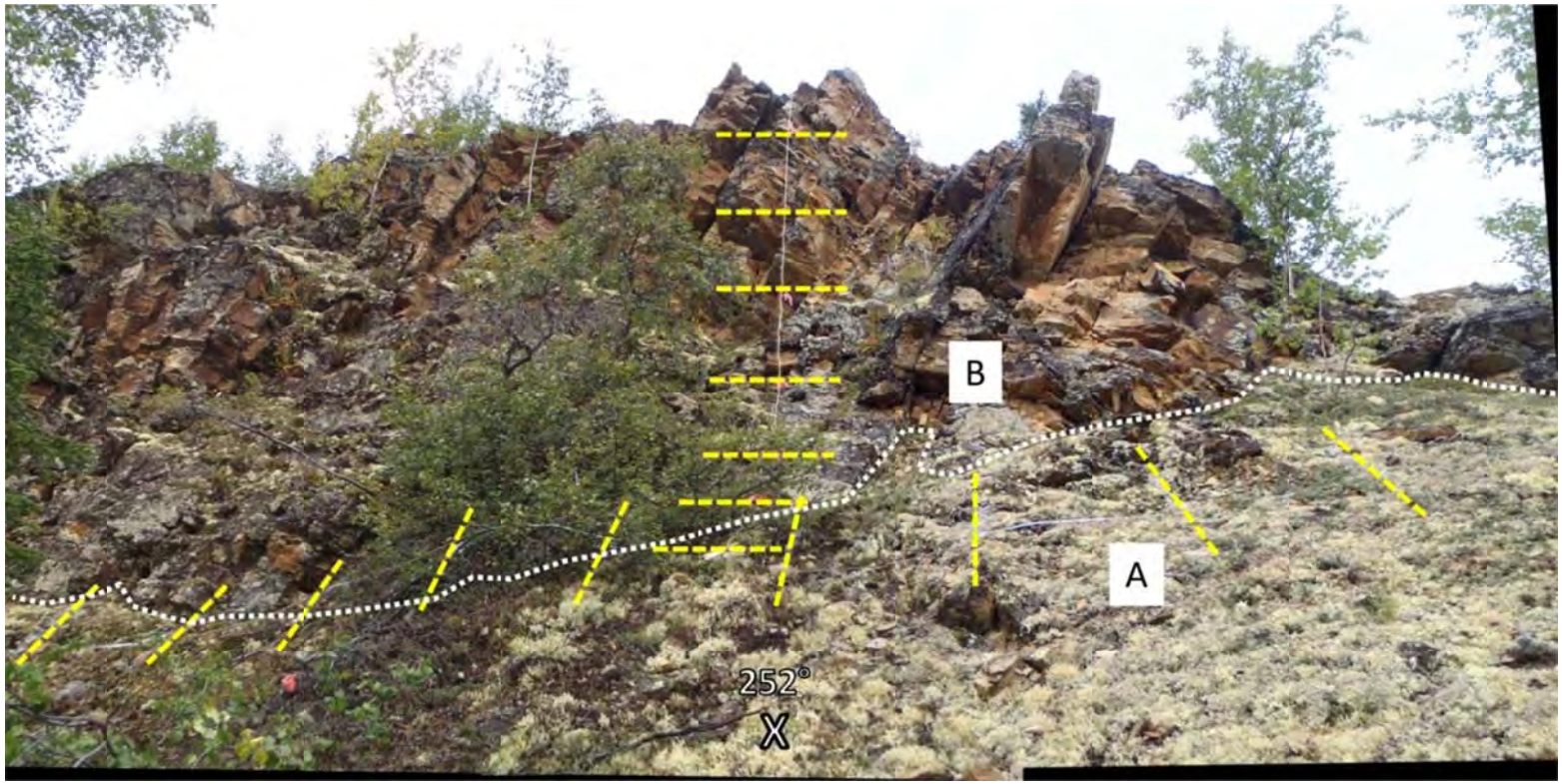
Outcrop OC-BGC11-37

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7100383
Easting: 460067
Elevation: 1052 m
Survey type: Handheld GPS

Slope Angle: 65°
Slope Direction: 088°
Date logged: 8/17/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: Some organic silt, some sand, trace cobbles, well-graded (GW-GM). Light brown, nonplastic, moist, firm to hard, and homogenous. Clasts are metasedimentary lithology derived from outcrop, flat, angular, medium strong (R3); max particle size ~ 200 mm. [COLLUVIUM]

B: Light brownish grey, fine-grained well-foliated QUARTZITE. Lightly weathered (W1.5-W2); strong (R3-R4; strength varies depending on pervasiveness of foliation planes & weathering). Blocks prismatic to rhombohedral; ~ 25 cm. GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 45-55.

Outcrop OC-BGC11-37

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	27-32	279-315	0-20	None	12-16 (1m)	R3.5	0.2	3m	JO
2	63-67	164-172	1-40	BX, None	10-12 (1m)	R4	0.2	6m+	J
3	66-84	074-105	0-10	BX, None	12-20 (1m)	R4	0.3	1m	J
4	60-74	183-204	0-2	None	10-12 (1m)	R4	1+	1m	J

Outcrop OC-BGC11-38

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Man-made (road cut)

Northing: 7100968
Easting: 460124
Elevation: 997 m
Survey type: Handheld GPS

Slope Angle: 62°
Slope Direction: 218°
Date logged: 8/17/2011
Logged by: GH

PHOTO OF OUTCROP

1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: Sandy, cobbly, trace silt, well-graded (GW). Brown, moist, soft, noplastic and homogenous. Clasts are metasedimentary, sub-angular to angular, flat to elongate, strong (R4), and fine jupwards from the base of the outcrop. Max particle size ~ 400 mm.

B: Grey, fine-grained QUARTZITE. Faintly weathered (W1.5); strong (R4). Blocks are prismatic; ~ 20 cm. GSI structure = Very Blocky, GSI surface = Good to Fair, GSI range = 50-60. Abundant small-scale (cm-scale) folds are present. A few blocks on outcrop surface are toppling outwards on discontinuity set 4.

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-38

PHOTO OF STRUCTURE

DISCONTINUITY TABLE - UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	29-35	252-330	0-5	None, SA-SM	10-20 (1m)	R3.5	0.2	4m+	JO
2	71-79	167	2-30	None, SA-SM	4 (1m)	R4	0.2	3m+	J
3	75-76	247-277	2-5	None, SA-SM	20 (1m)	R4	0.3	1m	J
4	71-73	059-076	0-100 (toppling)	None, SA-SM	20 (1m)	R4		1.5m	J

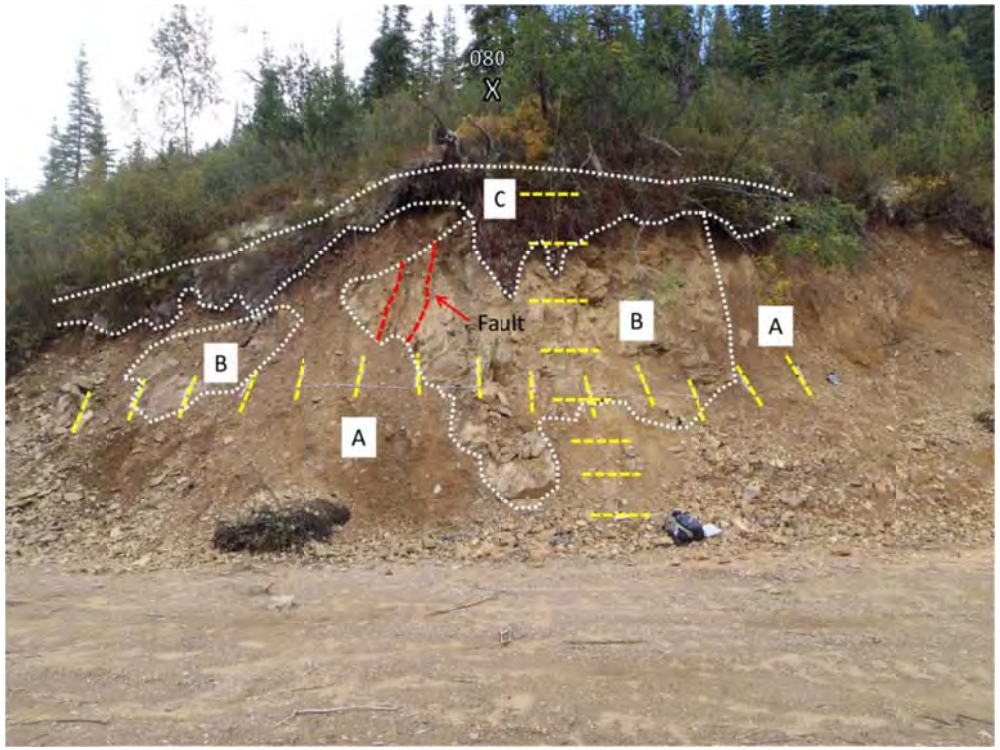
Outcrop OC-BGC11-39

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Man-made (drill pad cut)

Northing: 7100395
Easting: 460382
Elevation: 1057 m
Survey type: Handheld GPS

Slope Angle: 55°
Slope Direction: Curves 245-268° (convex)
Date logged: 8/17/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SAND, gravelly, trace to some silt, trace cobbles, well-graded (SW-SM). Brown, nonplastic, moist, firm, and homogenous with rapid dilatancy and low dry strength. Clasts are meta-sedimentary, equidimensional to flat, angular to subangular, and medium strong to strong (R3-R4). Max particle size ~ 100 mm. [COLLUVIUM]

B: Dark grey, fine-grained QUARTZITE with veins of calcite. Lightly weathered (W1.5-W2); strong to very strong (R4-R5). Blocks ~ 20 cm; rhombohedral. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

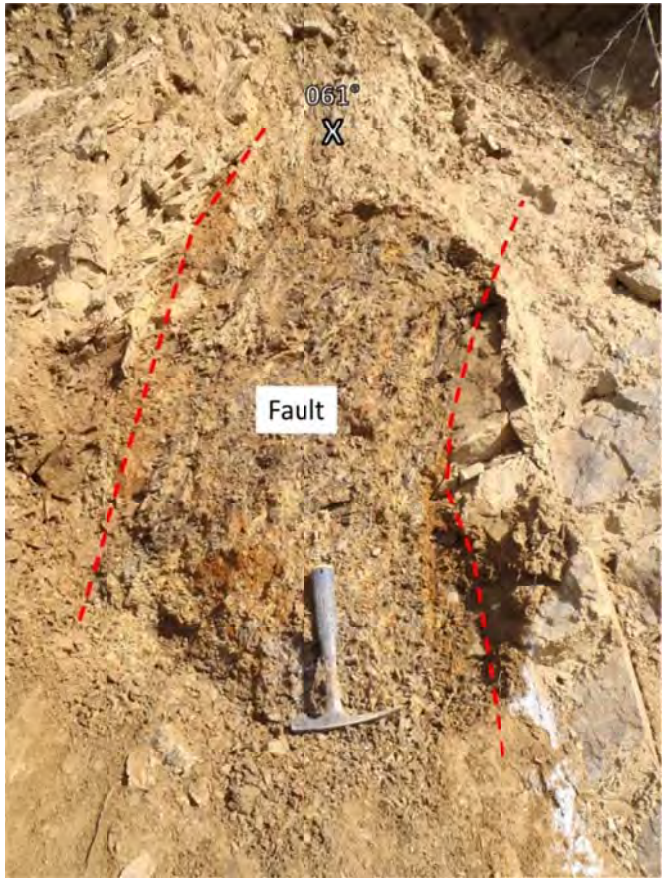
C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-39

PHOTO OF STRUCTURE

Outcrop OC-BGC11-39

PHOTO OF FAULT



DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	52-59	293-311	0-4	None	4-20 (1m)	R4	0.2	2m+	JO
2	45-70	044-091	0-15	None	8 (1m)	R4	0.3	2m+	J
3	72-87	335-360	0	None	12 (1m)	R4	0.5	2.5m+	J
4	63-71	189-215	0-2	None	4 (1m)	R4	0.5	1m+	J
5	78-88	030-056	0	None	12 (1m)	R4	0.7	1m+	J

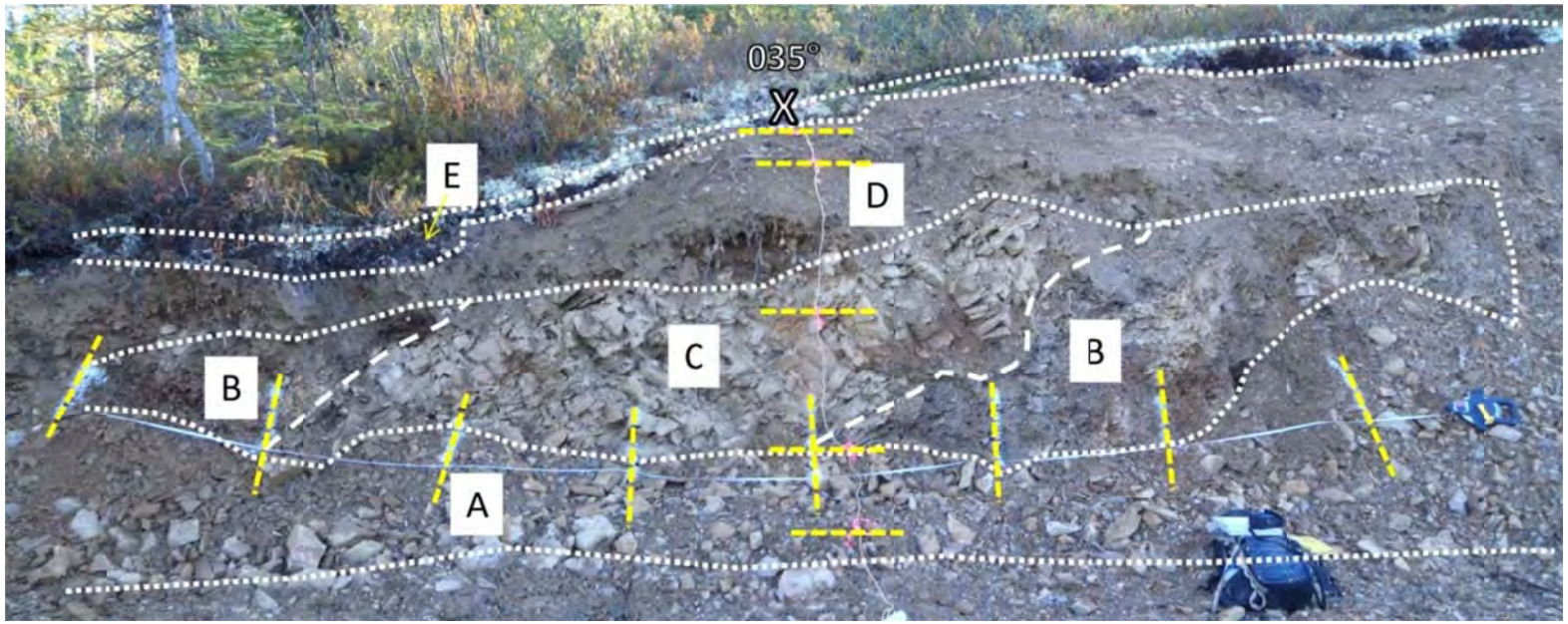
Outcrop OC-BGC11-40

Location: Ann Gulch
Facility: Heap leach pads
Outcrop type: Man-made (drill pad cut at BH-BGC11-29)

Northing: 7101809
Easting: 459981
Elevation: 1051 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 215°
Date logged: 8/18/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Fallen colluvium and rubble from outcrop.

B: Grey, fine-grained PHYLLITE interspersed with minor seams (~20%) of quartzite. Has brittly folded and crushed texture. Slightly to moderately weathered (W2-W3); very weak (R1). Blocks <1cm; tabular. GSI structure = Foliated/Laminated/Sheared, GSI surface = Fair to Very Poor, GSI range <20. NOTE: Rock mass quality possibly below the limit of GSI applicability.

C: Light brown, fine-grained QUARTZITE interspersed with micaceous phyllitic seams (~30%). Slightly weathered (W2); very weak to medium strong (R1-R3). Blocks ~ 5 cm; equidimensional to tabular. GSI structure = Blocky/Disturbed, GSI surface = Fair, GSI range = 30-40.

D: SILT: Some sand, trace fine to medium gravel, trace organics (ML). Brown, very soft, moist; low plasticity, rapid dilatancy, low toughness, no dry strength. Clasts angular to subangular, metasedimentary, flat, medium strong (R3). Max particle size ~ 5 cm. Grades into highly weathered bedrock at its base. [COLLUVIUM]

E: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-40

PHOTO OF STRUCTURE - UNIT C

DISCONTINUITY TABLE – UNITS B/C

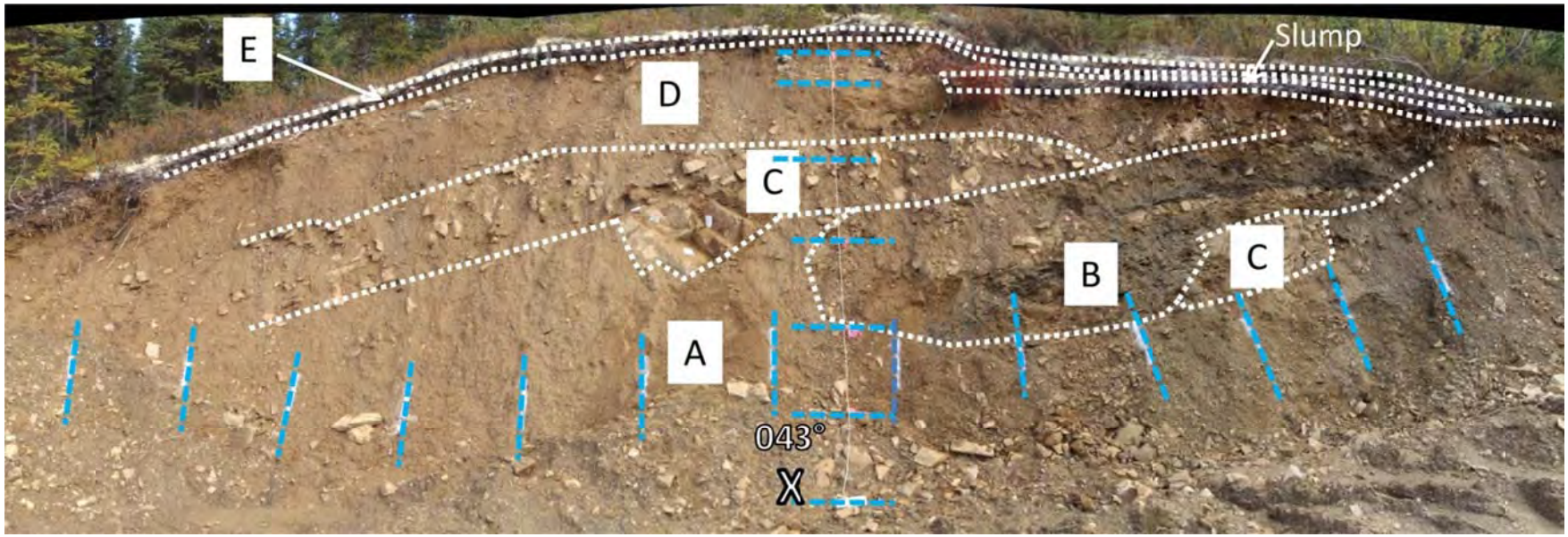
Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	29-33	278-316	1-3	None	8 (10cm)	R2	0.03	0.3m+	JO
2	55-72	158-167	1-3	None	8 (10cm)	R3	0.1	0.5m+	J
3	64-73	055-072	1-40	None, SM-SA	12 (10cm)	R3	0.08	0.3m+	J

Outcrop OC-BGC11-41

Location: Ann Gulch
Facility: Heap leach pad
Northing: 7102064
Easting: 459915
Elevation: 1048 m

Slope Angle: 50°
Slope Direction: Curves 200-241° (concave)
Date logged: 8/18/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing between blue dashed lines.

DESCRIPTION OF MATERIALS

A: Ravelled rock and colluvium draping outcrop.

B: Grey, fine-grained PHYLLITE with seams/blocks of interspersed quartzite (30%). Is sheared/weathered to a silty material in places. Lightly to highly weathered (W2-W4); extremely weak to very weak (R0-R1). Blocks tabular, <1 cm in size. GSI structure = Foliated/Laminated/Sheared, GSI surface = Poor, GSI range = <20. NOTE: rock mass quality below the limit of GSI applicability.

C: Brown, fine-grained QUARTZITE with micaceous foliation planes. Lightly weathered (W2); medium strong (R3). Blocks ~ 10 cm; rhombohedral. GSI structure = Blocky/Disturbed, GSI surface = Fair, GSI range = 35-45.

D: SILT: Sandy, trace gravel, trace organics (ML). Brown, moist, soft; low plasticity, rapid dilatancy, low toughness, no dry strength. Clasts meta-sedimentary, angular to subangular, medium strong (R3), flat. Max particle size ~ 7 cm. Coarsens downwards and grades into weathered bedrock.[COLLUVIUM]

E: Organic silt and root mat. [TOPSOIL]

Outcrop OC-BGC11-41

PHOTO OF STRUCTURE

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	37-44	358-012	0-5	None, CX, DX	13 (10cm)	R3		1m+	JO
2	31-54	162-188	0	None, SM-SA	12 (1m)	R3		1m	J
3	85-89	071-095	0-100	None, SM-SA	20 (1m)	R3		1m	J
4	NOT A SET (IS FOLIATION WHERE FOLDED)								
5	65-70	260-267	0-100	None, SM-SA	8 (10cm)	R3		0.3m+	J

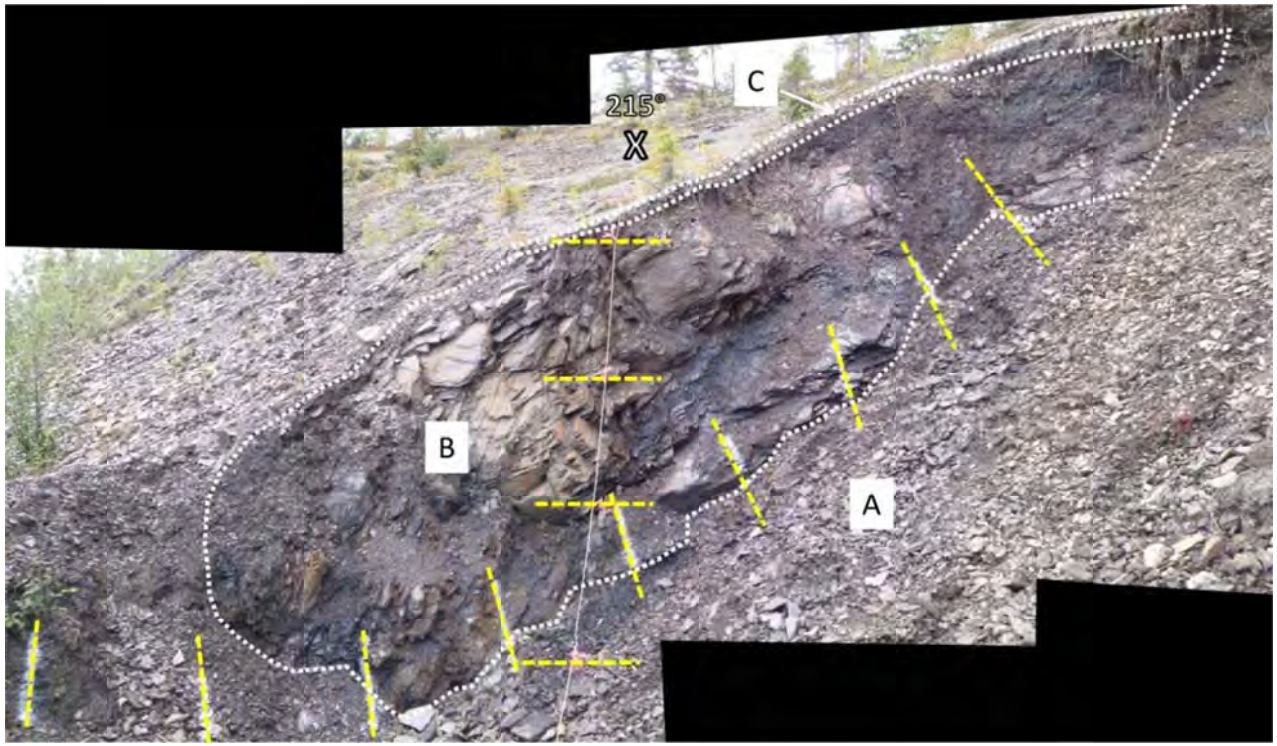
Outcrop OC-BGC11-42

Location: Ann Gulch
Facility: Heap leach pads
Outcrop type: Man-made (test pit wall)

Northing: 7101893
Easting: 459188
Elevation: 1072 m
Survey type: Handheld GPS

Slope Angle: 75°
Slope Direction: 041°
Date logged: 8/18/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing between blue dashed lines.

DESCRIPTION OF MATERIALS

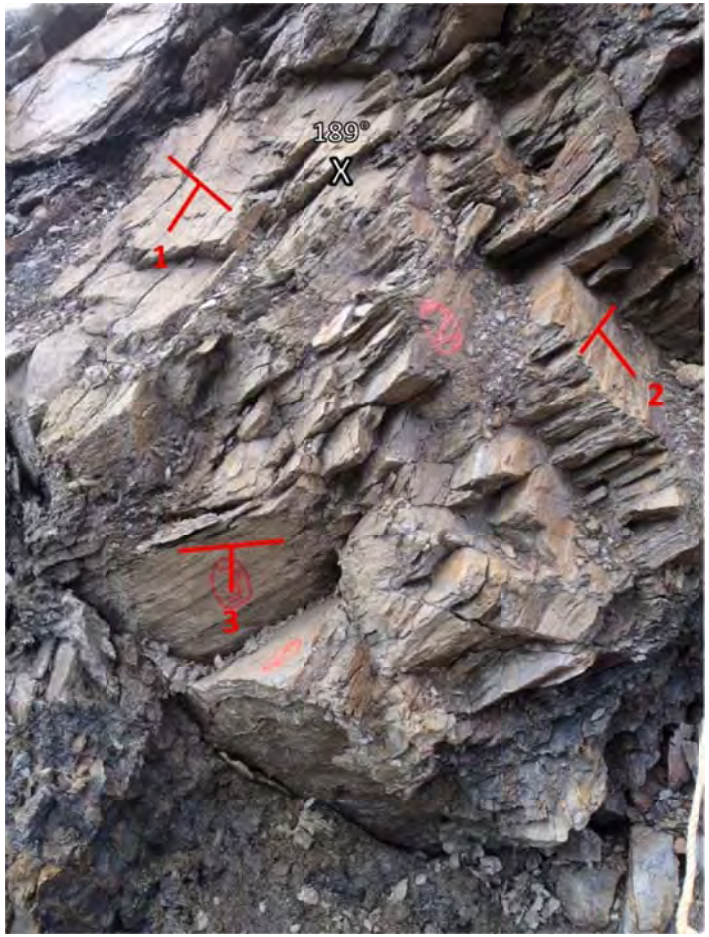
A: Rubble from excavation.

B: Dark grey, fine-grained PHYLLITE. Contains a few foliation-parallel 5-10 cm seams of graphitic material that are sheared and weathered to soil consistency. Lightly weathered (W2); extremely weak to weak (R0-R2). Blocks <1cm to ~ 10 cm where not sheared. GSI structure = Foliated/Laminated/Sheared, GSI surface = Poor, GSI range <20. NOTE: Rock mass quality below the limit of GSI applicability.

C: Colluvium, root mat and topsoil (~ 10 cm thick). [TOPSOIL]

Outcrop OC-BGC11-42

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	42-52	078-112	0-100	CX, SM, GP	20 (1m) - wavy	R1.5	0.01	3m+	JO
2	57-68	342-351	0.5-5	None	10 (1m) - wavy	R2	0.3	1m	J
3	50-62	193-222	0-3	None	20 (1m) - wavy	R2	0.3	1m	J

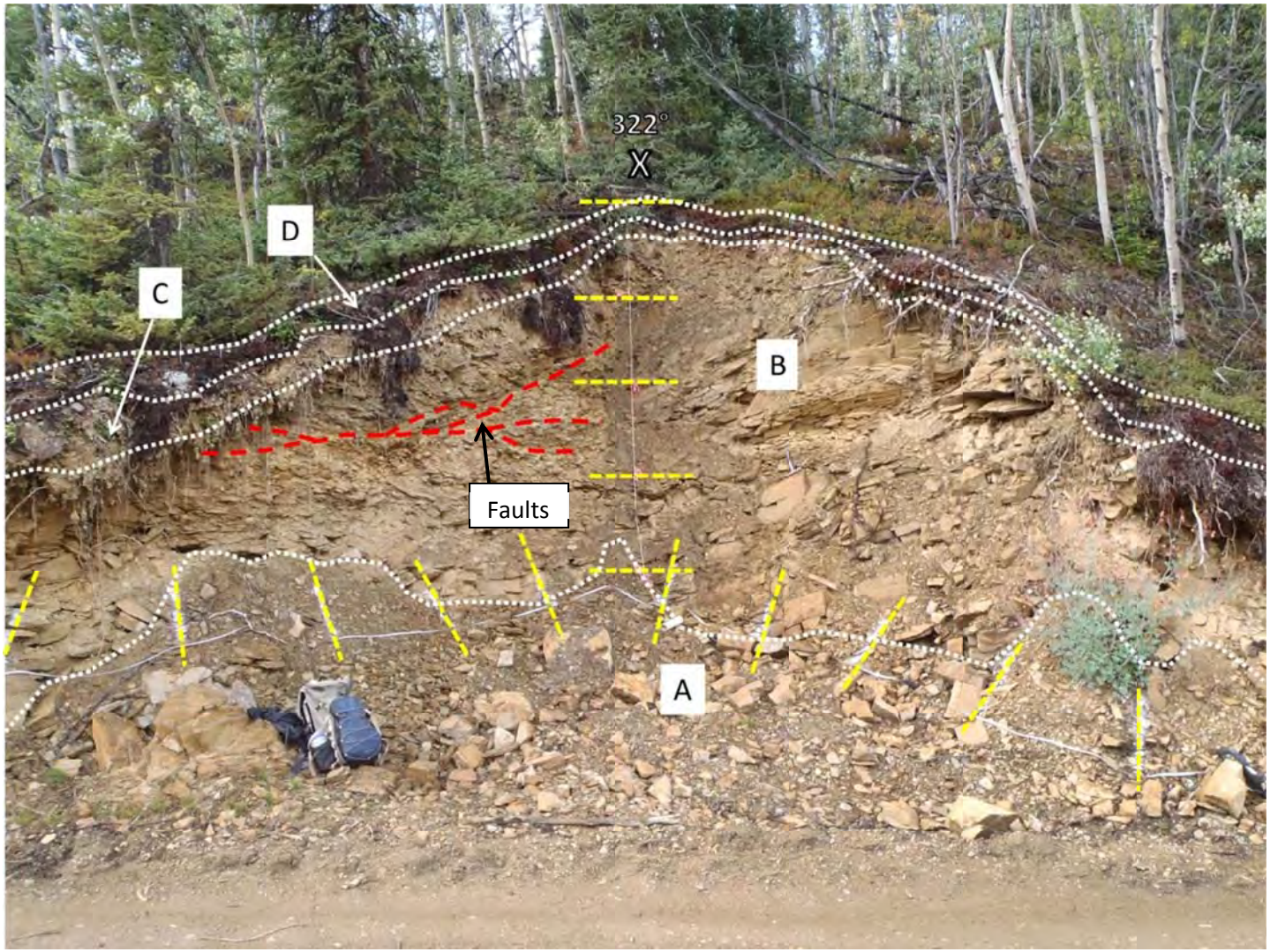
Outcrop OC-BGC11-43

Location: Middle reach Dublin Gulch
Facility: Heap leach pads
Outcrop type: Man-made (borrow cut next to road)

Northing: 7101403
Easting: 459686
Elevation: 913 m
Survey type: Handheld GPS

Slope Angle: 70-90°
Slope Direction: 095/181° (concave square corner cut into slope).
Date logged: 8/18/2011
Logged by: GH

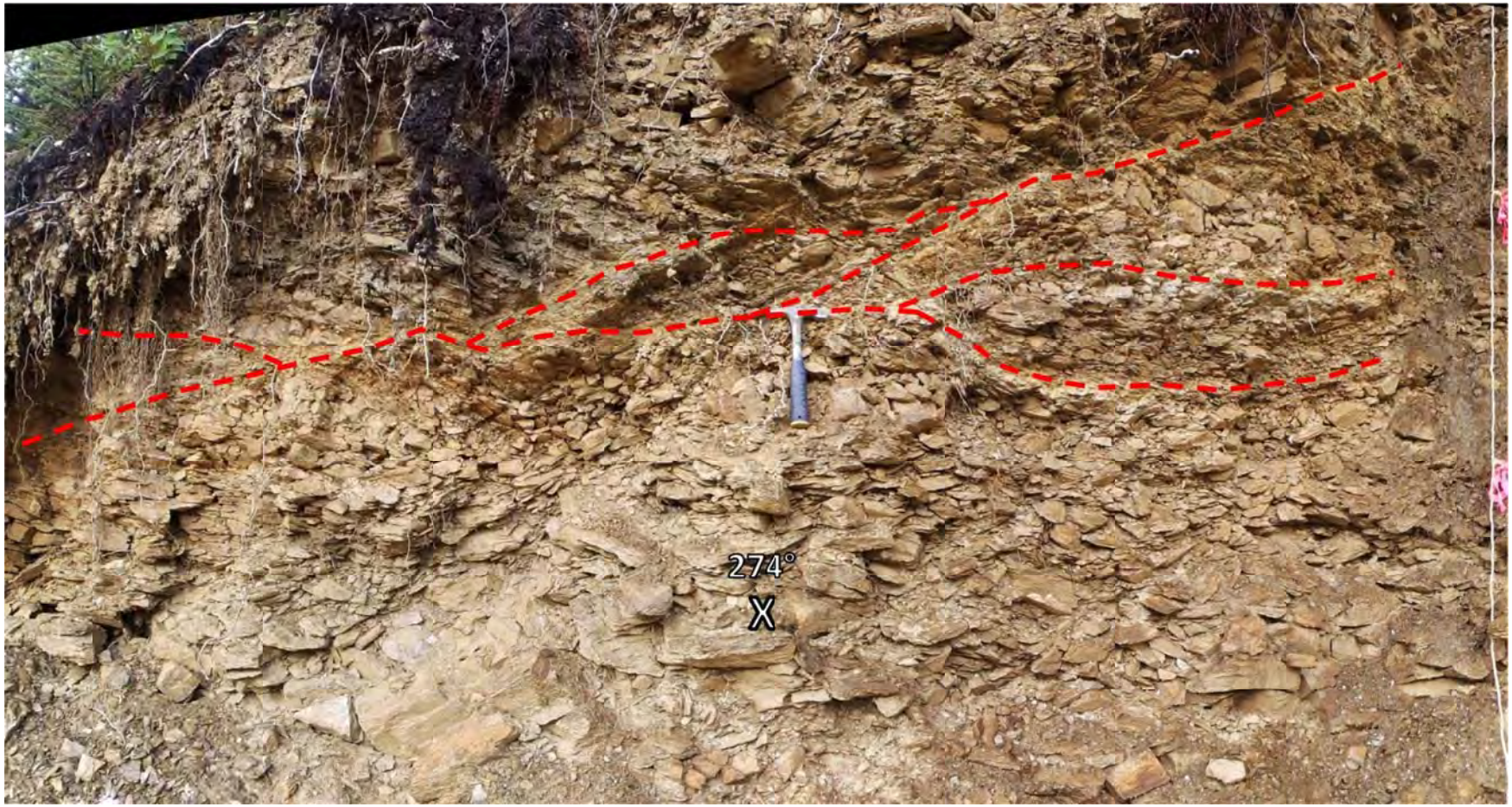
PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-43

PHOTO OF FAULTS



DESCRIPTION OF MATERIALS

A: Ravelled soil and blocks derived from the outcrop.

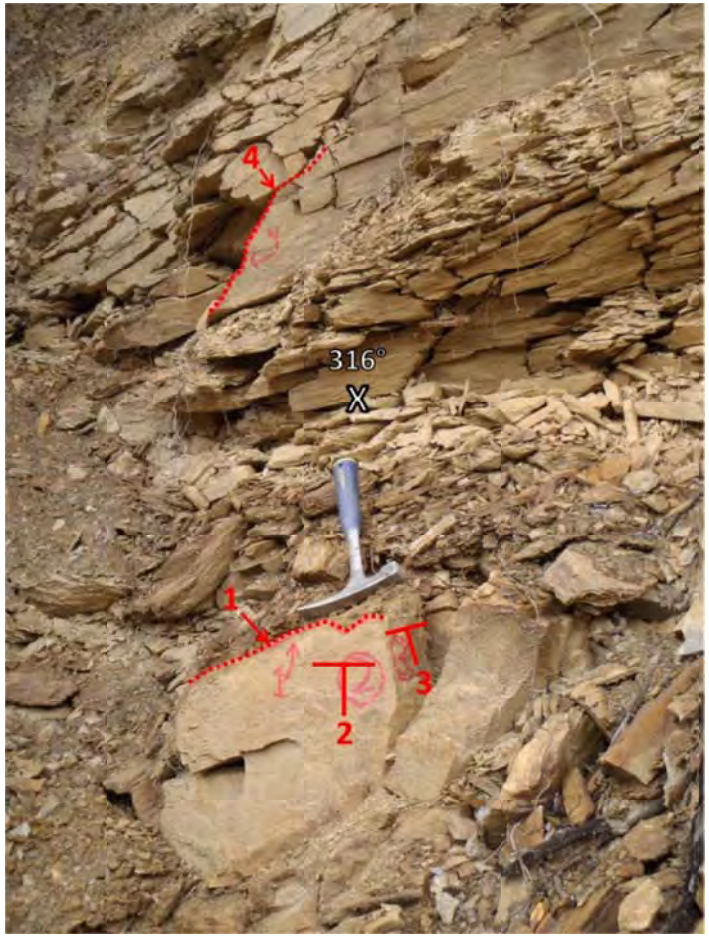
B: Brown to grey, fine-grained PHYLLITE (blockier material at base of outcrop = quartzite). Lightly to moderately weathered (W2-W3); very weak to medium strong (R1-R3), very dilated. Blocks ~ 5 cm (except 15 cm at base of outcrop); prismatic to tabular. GSI structure = Blocky/Disturbed to disintegrated, GSI surface = Poor, GSI range <25.

C: SAND: Silty, some gravel, some organics, well-graded (SM). Brown, dry, very soft, homogenous; low plasticity, rapid dilatancy, low toughness, and no dry strength. Clasts are metasedimentary, angular to sub-angular, flat, weak to medium strong (R2-R3). Max particle size ~ 100 mm. The lower contact grades downwards into weathered bedrock. [COLLUVIUM]

D: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-43

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	17-25	265-311	0-10	None, CX	6-10 (1m)	R2		2m+	JO
2	83-88	167-175	1-30	None, SA-SM	12-16 (1m)	R2.5		1m+	J
3	74-87	081-105	1-50	None, SA-SM	12 (10cm)	R2.5		1.5m+	J
4	49-72	218-244	2-15	None, SA-SM	20 (1m)	R2.5		1.5m	J
5	30-40	265-280	10-70	FB, CX	20 (1m)	R1		6m+	F

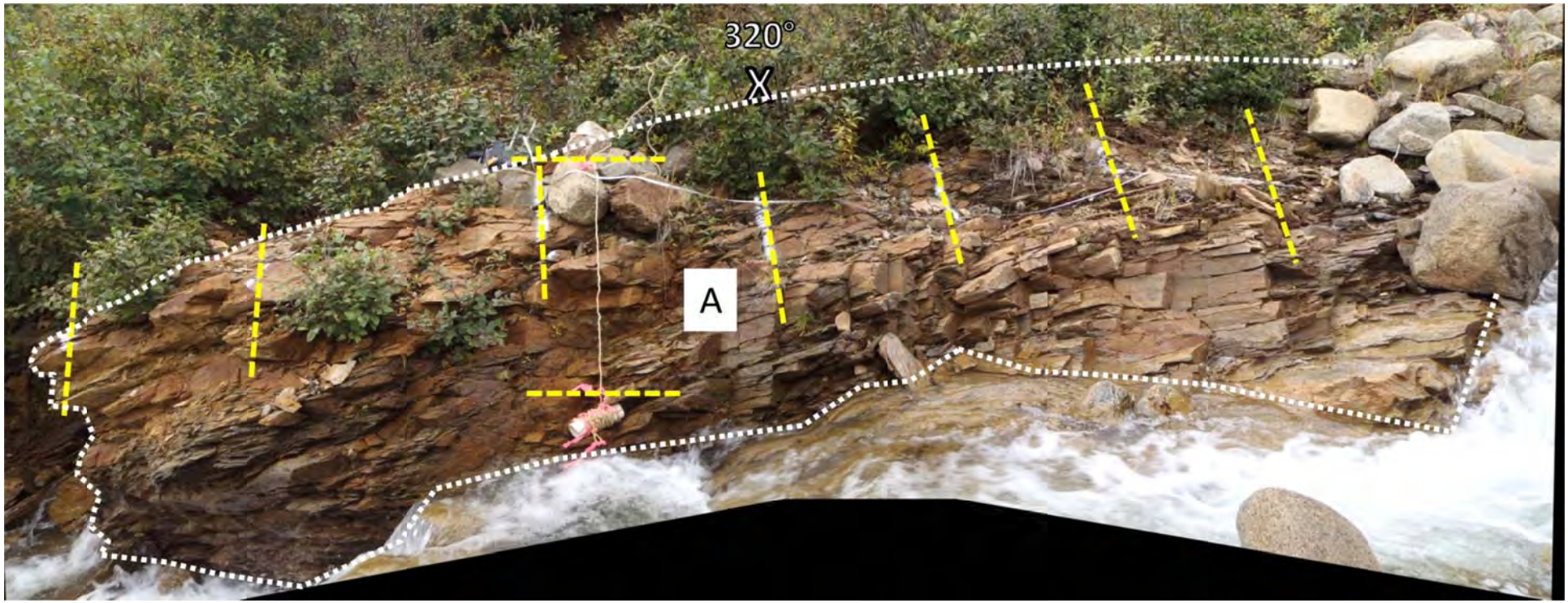
Outcrop OC-BGC11-44

Location: Middle reach Dublin Gulch
Facility: Heap leach pads
Outcrop type: Natural (stream channel)

Northing: 7101327
Easting: 459852
Elevation: 895 m
Survey type: Handheld GPS

Slope Angle: 60°
Slope Direction: 121°
Date logged: 8/19/2011
Logged by: GH

PHOTO OF OUTCROP



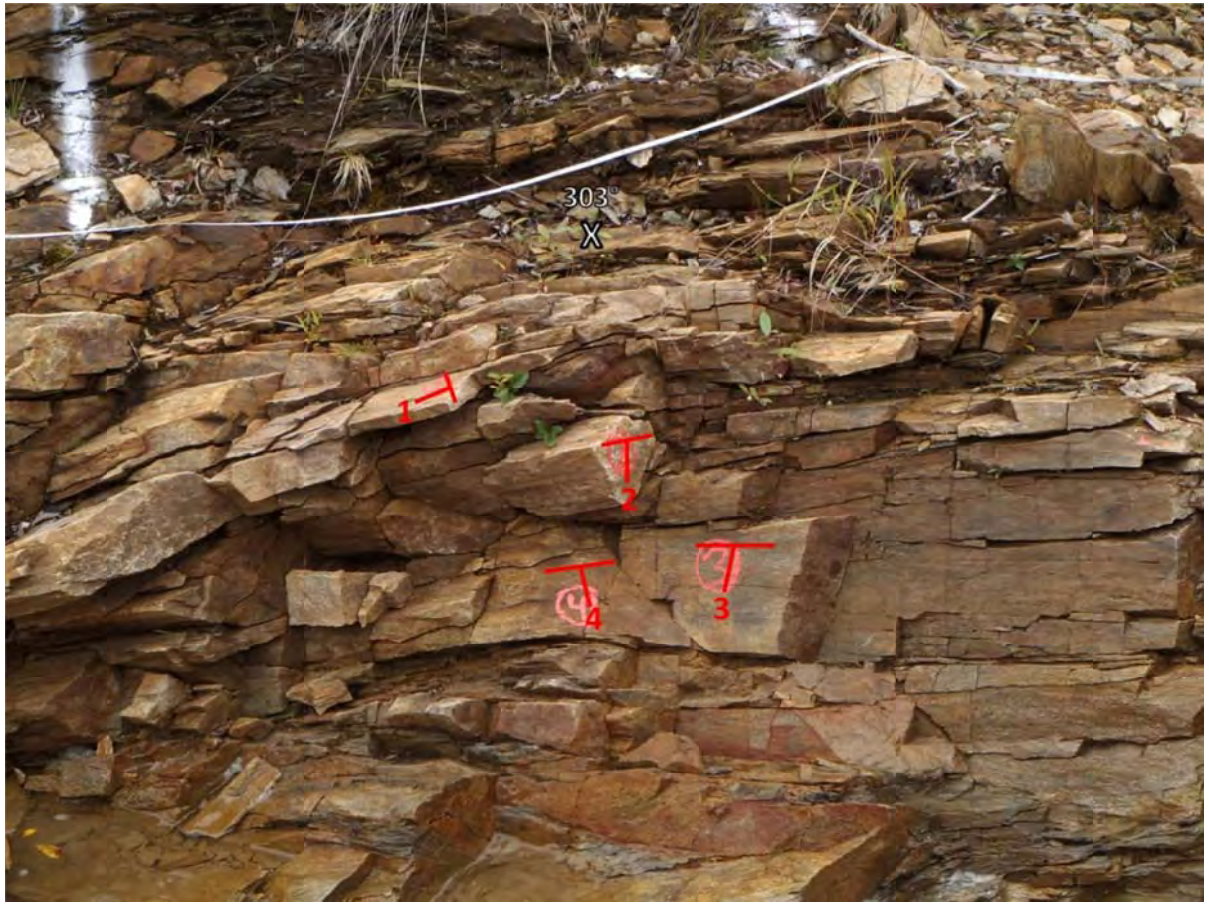
1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Brown, fine-grained QUARTZITE (60%) interbedded with seams of soft grey PHYLLITE (40%). Abundant small-scale tight folding apparent (cm to dm-scale) with axial planes oriented parallel to foliation. Lightly weathered (W2); weak (R2 - phyllite) to medium strong (R3 - quartzite). Blocks 5-10 cm; tabular (phyllite) to equidimensional (quartzite). GSI structure = Blocky/Disturbed, GSI surface = Fair, GSI range = 30-40.

Outcrop OC-BGC11-44

PHOTO OF STRUCTURE



DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	18-33	283-306	0-5	None	20 (1m)	R2.5	0.05	4m+	JO
2	72-79	080-097	0-2	None	8 (10cm)	R2.5	0.1	1m	J
3	62-69	165-169	0-3	None	4 (1m)	R2.5	0.2	1m	J
4	23-38	112-130	NV	NV	12 (10cm)	R2.5	0.8	0.6m	J

Outcrop OC-BGC11-45

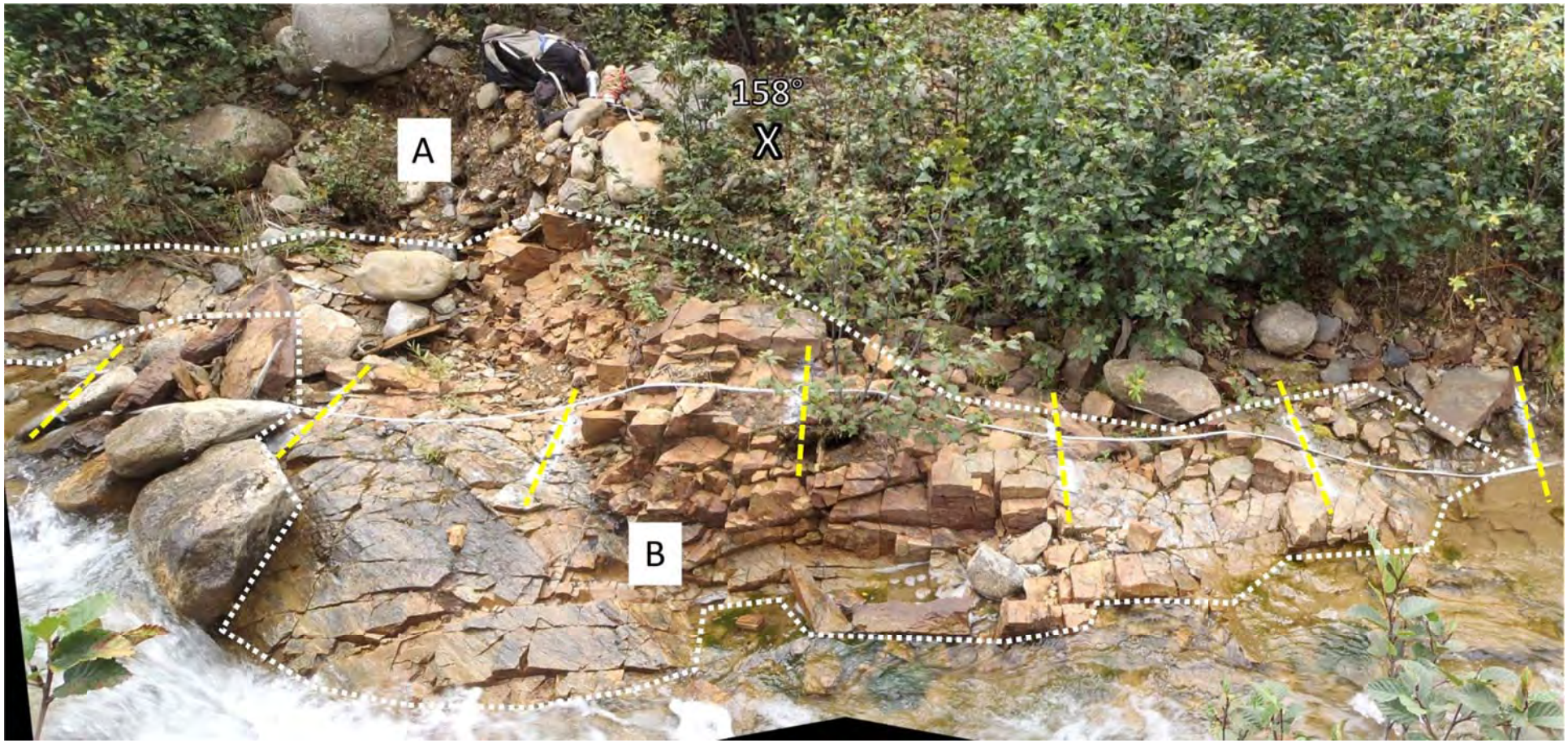
Location: Dublin Gulch valley bottom
Facility: Heap leach pads
Outcrop type: Natural (stream channel)

Northing: 7101136
Easting: 459318
Elevation: 848 m
Survey type: Handheld GPS

Slope Angle: 70°
Slope Direction: 245°
Date logged: 8/19/2011
Logged by: GH

* Station comprises two small outcrops (45 South and 45 North) on opposite sides of Dublin Creek.

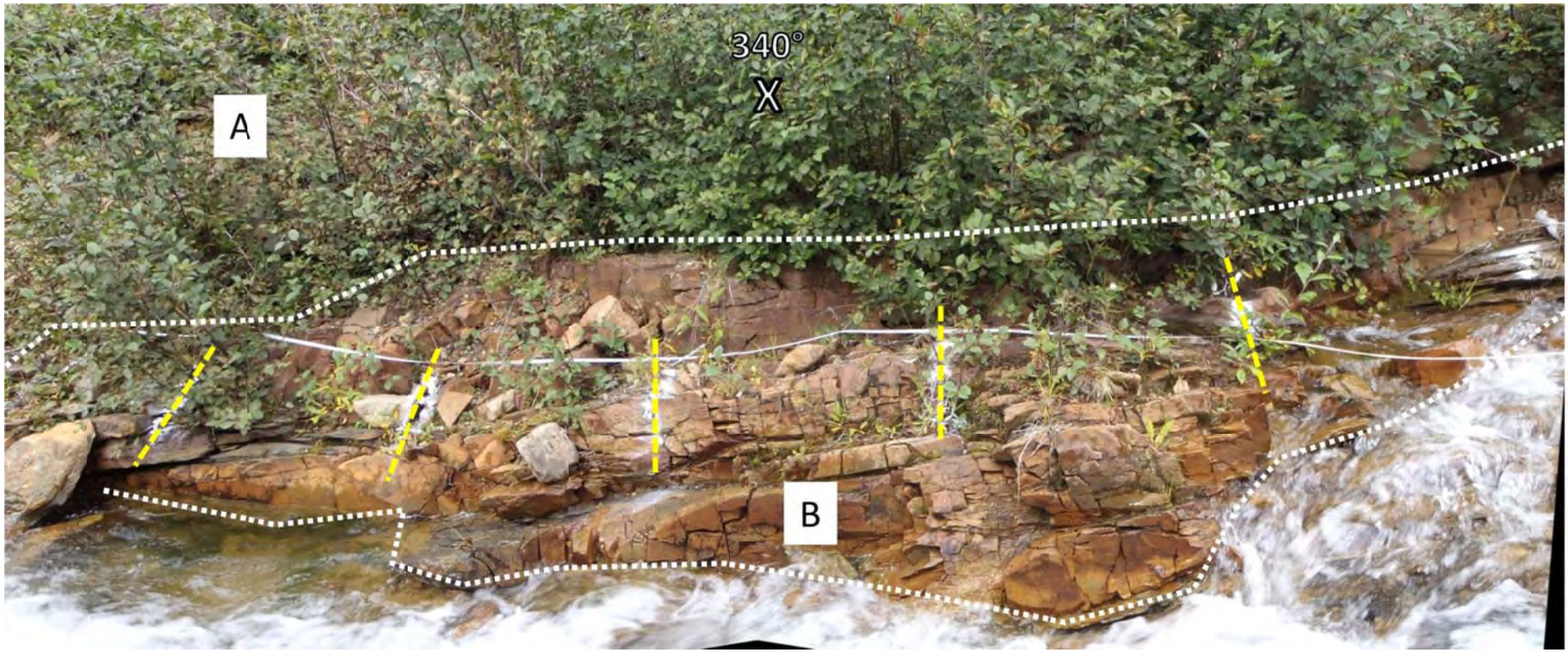
PHOTO OF OUTCROP 45 SOUTH



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-45

PHOTO OF OUTCROP 45 NORTH



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: SAND: Gravelly, some cobbles and boulders, well-graded (SW). Brown, nonplastic, moist, soft, and homogenous; No dilatancy, toughness or dry strength. Clasts are various lithologies, angular to rounded, all shapes, and max particle size ~500 mm. [PLACER TAILINGS]

B: Grey, fine-grained QUARTZITE with minor micaceous seams of PHYLLITE (~20%). Lightly weathered (W2); medium strong to strong (R3-R4). Blocks 5-10 cm; equidimensional to prismatic. GSI stucture = Blocky/Disturbed, GSI surface = Good to Fair, GSI range = 40-50.

Outcrop OC-BGC11-45

PHOTO OF STRUCTURE – 45 SOUTH

DISCONTINUITY TABLE – 45 SOUTH

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
S1	28	261	0-10	None	20 (1m)	R3	0.05	5m+	JO
S2	72-82	138-150	1-5	None, SU	16 (1m)	R3	0.07	4m+	J, V
S3	81-82	234-248	1-3	None	20 (1m)	R3	0.15	1m	J

Outcrop OC-BGC11-45

PHOTO OF STRUCTURE – 45 NORTH

DISCONTINUITY TABLE – 45 NORTH

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
N1	25-29	297-337	0-10	None	20 (1m)	R3	0.05	5m+	JO
N2	84-89	154-162	1-5	None, SU	16 (1m)	R3	0.07	4m+	J, V
N3	80-86	064-089	1-3	None	20 (1m)	R3	0.15	1m	J

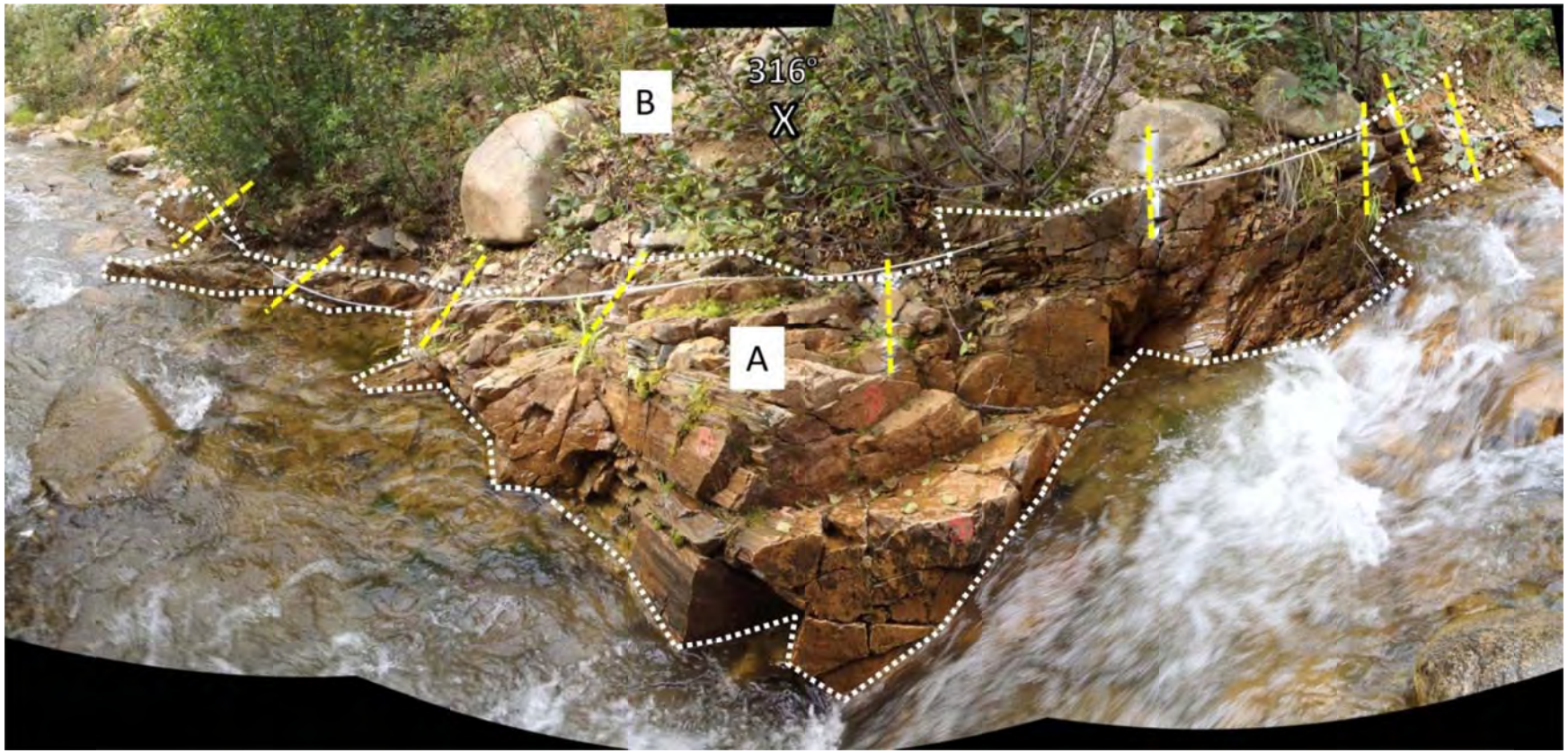
Outcrop OC-BGC11-46

Location: Dublin Gulch valley bottom
Facility: Heap leach pads
Outcrop type: Natural (stream channel)

Northing: 7101078
Easting: 459173
Elevation: 839 m
Survey type: Handheld GPS

Slope Angle: 45°
Slope Direction: Curves 158-177° (convex)
Date logged: 8/19/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Brown, fine-grained QUARTZITE. Faintly to lightly weathered (W1.5-W2); strong (R4). Blocks ~ 10 cm; prismatic. GSI structure = Very Blocky to Blocky/Disturbed, GSI surface = Good, GSI range = 45-55.

B:SAND: Gravelly, some cobbles and boulders, well-graded (SW). Brown, nonplastic firm, moist, and homogenous; no dilatancy or dry strength. Clasts are various lithologies, medium strong to very strong (R3-R5), angular to rounded, all shapes. Max particle size ~700 mm. [PLACER TAILINGS]

Outcrop OC-BGC11-46

PHOTO OF STRUCTURE

DISCONTINUITY TABLE (UNIT A)

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	27-45	309-348	0-5	None	20 (1m) - wavy	R4	0.1	1m+	JO
2	79-85	143-157	0-3	None	12 (1m)	R4	0.3	1.5m+	J
3	78-90	067-089	0-5	None	20 (1m)	R4	0.15	1.5m	J
4	64-79	198-212	NV	NV	10 (1m)	R4	NV	1m	J

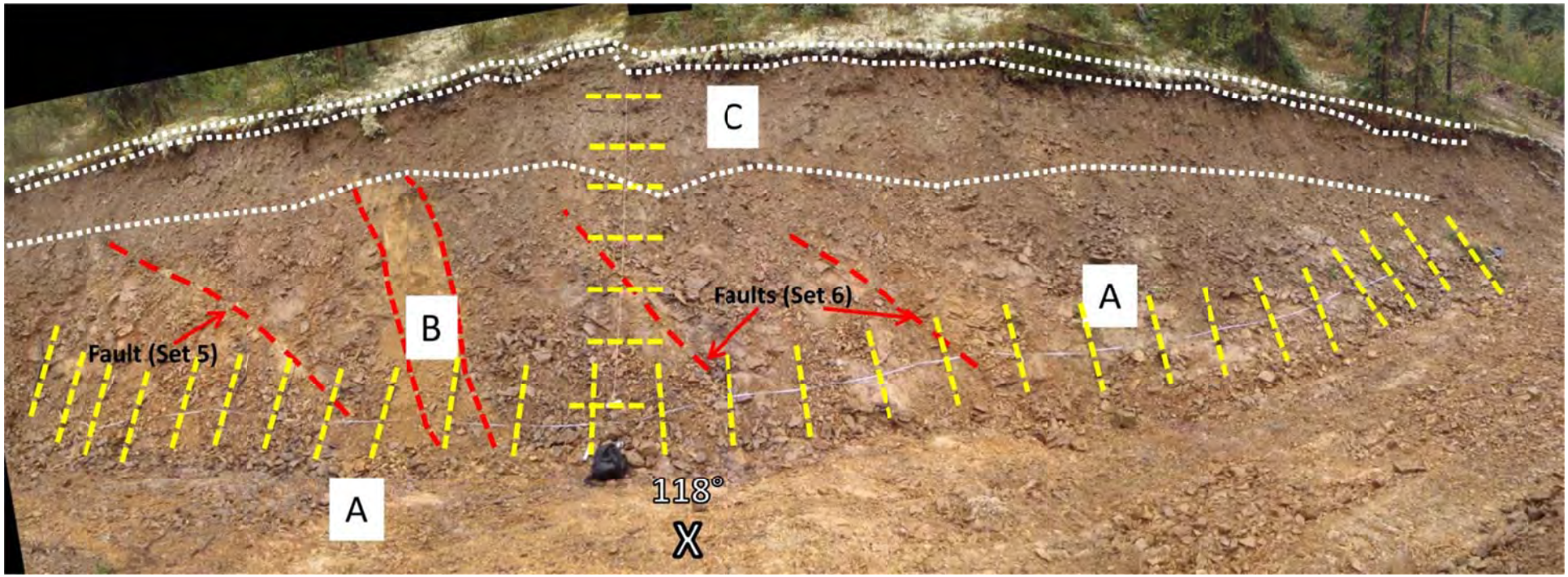
Outcrop OC-BGC11-47

Location: Stuttle Gulch
Facility: Secondary crusher
Outcrop type: Man-made (plate load test excavation cut)

Northing: 7100272
Easting: 459725
Elevation: 993 m
Survey type: Handheld GPS

Slope Angle: 50°
Slope Direction: 302°
Date logged: 8/20/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Fine-grained meta-sedimentary rock, mostly yellowish-brown, but altered to a purple-red color near the middle of the outcrop (QUARTZITE?). Moderately weathered (W3); weak to medium strong (R2-R3), except extremely to very weak (R0-R1) near faults and at sandy dike. Blocks ~ 0.05 m; tabular. GSI suraface = Poor, GSI structure = Disturbed, GSI range = 25-35.

B: Medium-grained yellow SAPROLITE (intrusive dike). Completely weathered (W5); extremely to very weak (R0-R1). Effectively medium sand with silt and clay (SM). Nonplastic. ~ 1 m wide.

C: [COLLUVIUM]. See test pit log for TP-BGC11-50.

D: Root mat and organic silt. [TOPSOIL] See test pit log for TP-BGC11-50.

Outcrop OC-BGC11-47

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	40-45	294-308	0-5	SA-SM	16 (1m)	R2	0.05	1.5m	JO
2	52-66	163-187	0-5	CX	12 (1m)	R2.5	0.15	2m+	J
3	54-71	072-094	0-5	SA-SM	8 (10cm)	R2.5	0.1	2m+	J
4	59-72	261-285	NV	SA-SM	12 (10cm)	R2.5	NV	0.5m+	J
5	41	247	100	FG	16 (1m)	R1		6m+	F
6	43-62	178-205	30	CX/DX	12 (1m)	R1		5m+	F

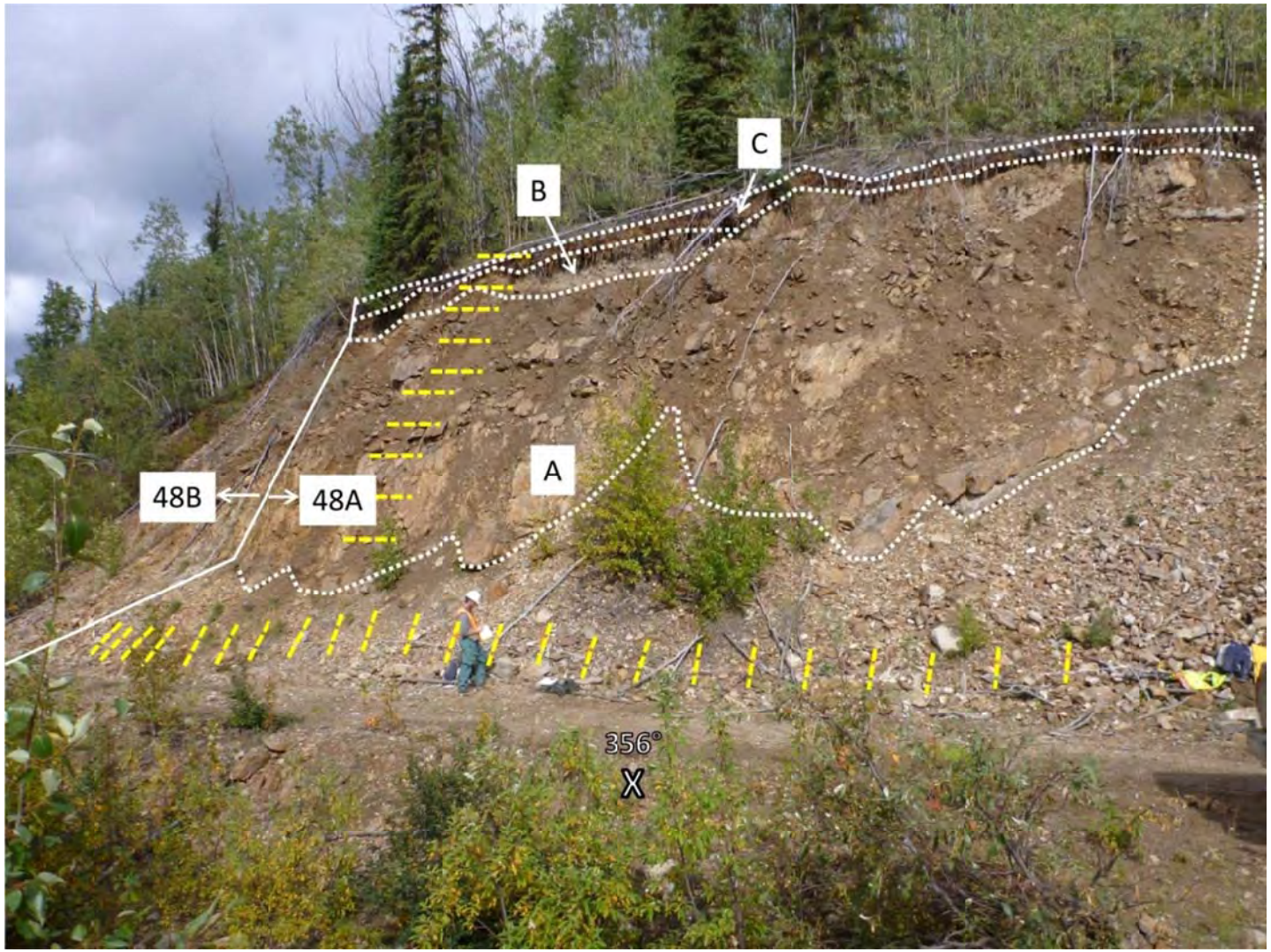
Outcrop OC-BGC11-48A

Location: Dublin Gulch valley bottom
Facility: Plant site
Outcrop type: Man-made (road cut)

Northing: 7101009
Easting: 458635
Elevation: 807 m
Survey type: Handheld GPS

Slope Angle: 68°
Slope Direction: Curves 192-219° (convex)
Date logged: 8/21/2011
Logged by: GH/LGT

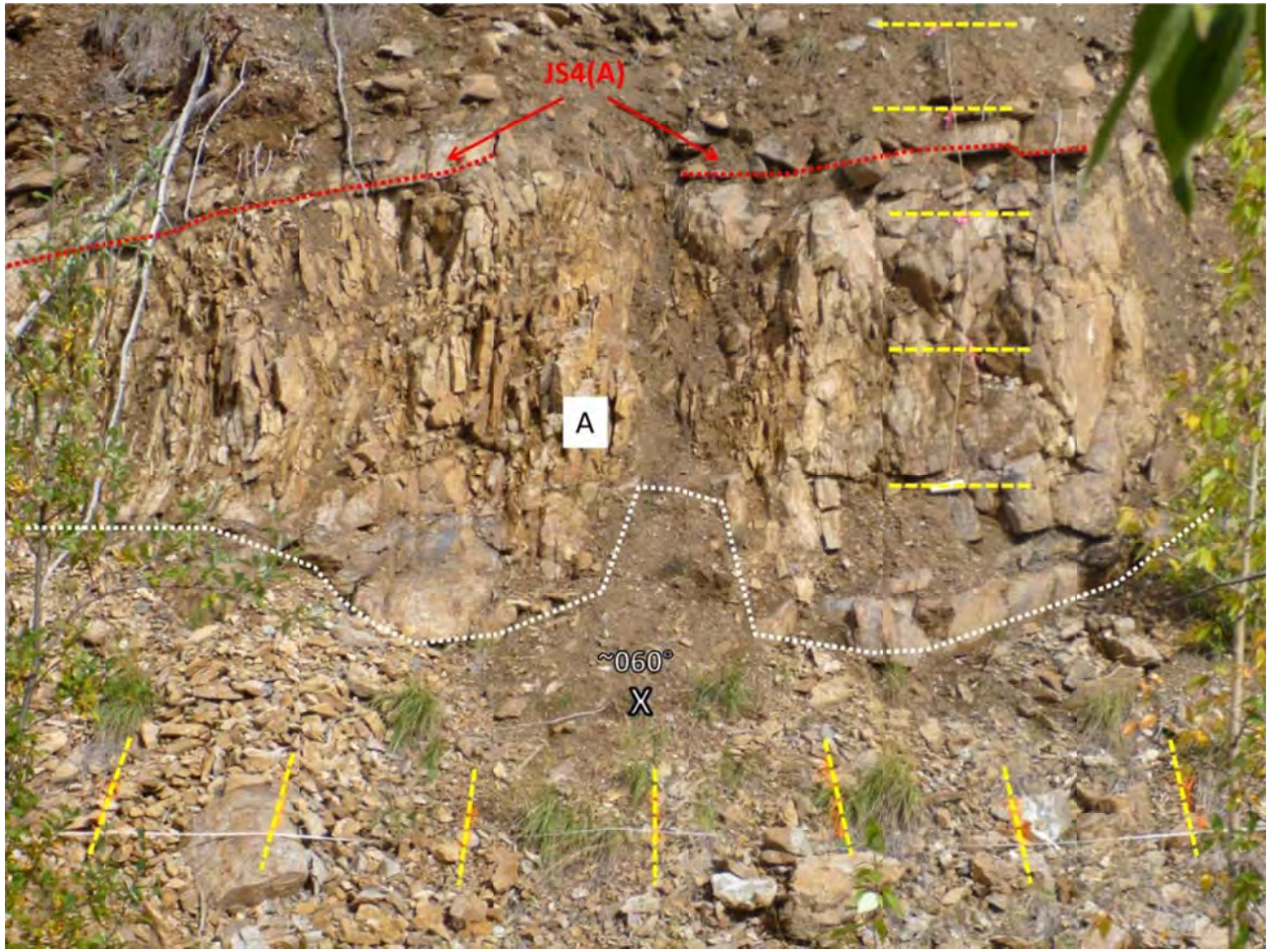
PHOTO #1 OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-48A

PHOTO #2 OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

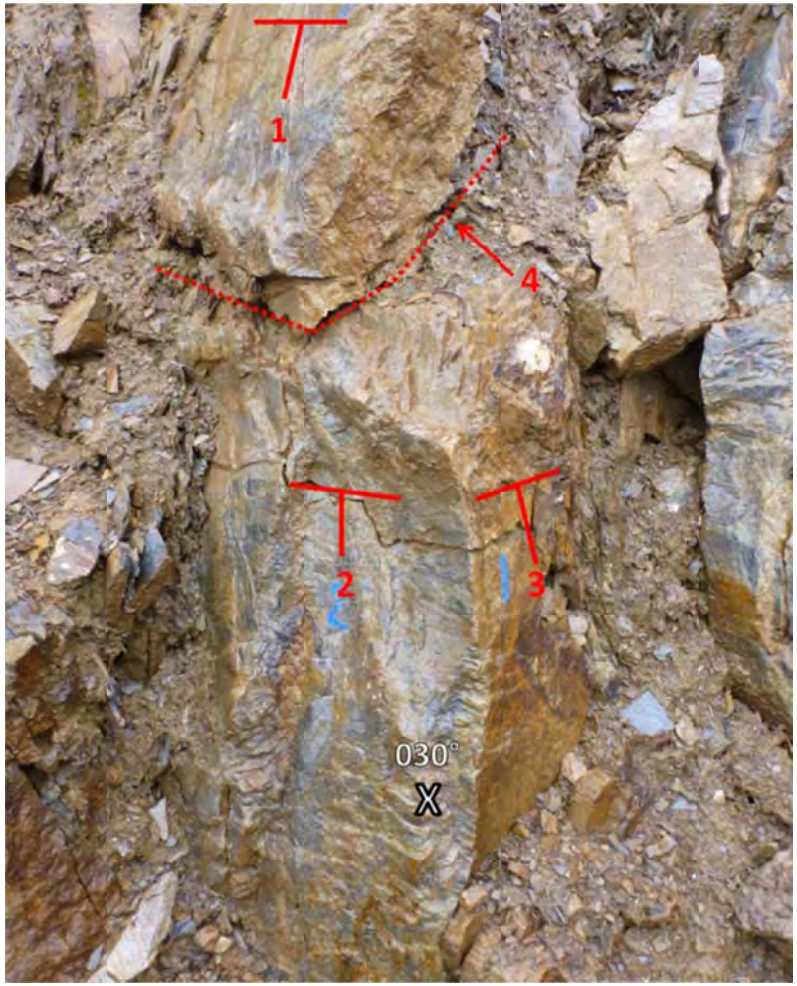
A: Reddish-brown, fine-grained QUARTZITE. Highly fractured at cm-scale - usually shatters when struck with a geological hammer. Lightly weathered (W2); medium strong (R3). Blocks rhombohedral; ~ 5 cm. GSI structure = Disturbed/Seamy, GSI surface = Fair, GSI range = 30-40.

B: GRAVEL: Some sand, trace silt, trace boulders, trace rootlets, well-graded (GW). Brown, dry to moist, homogenous, non-cemented. Clasts are flat to elongate, angular, metasedimentary, meduim strong to strong (R3-R4). Max particle size 400 mm. [HIGHLY WEATHERED ROCK]

C: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-48A

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	72-86	140-170	0-10	None	4 (0.3m)	R3	0.05	3m+	J
2	46-70	243-251	NV	None	12 (0.3m)	R3	1	1m	J
3	57-76	235-252	0-10	None	12 (0.3m)	R3	0.2	1m	JO
4	28-35	236-241	100	BX	16 (1m)	R3	NV	8m+	J, F

Outcrop OC-BGC11-48B

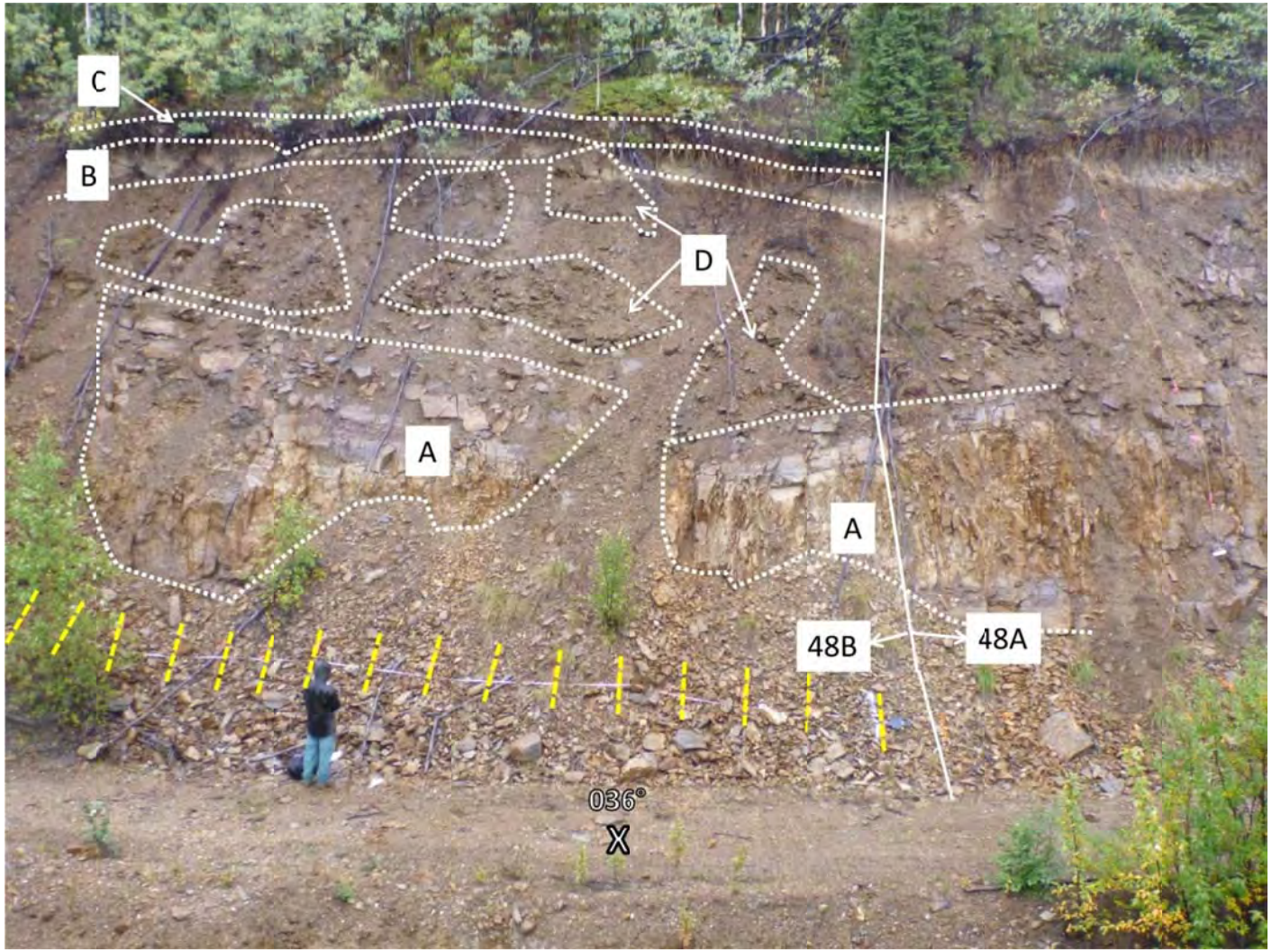
Location: Dublin Gulch valley bottom
Facility: Plant site
Outcrop type: Man-made (road cut)

Northing: 7101022
Easting: 458616
Elevation: 805 m
Survey type: Handheld GPS

Slope Angle: 55°
Slope Direction: 239°
Date logged: 8/21/2011
Logged by: GH/LGT

* Outcrop is immediately adjacent (west) of OC-BGC11-48A.

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-48B

DESCRIPTION OF MATERIALS

A: Yellowish-brown, fine-grained QAUARTZITE. Foliated, faintly to lightly weathered (W1.5-W2); medium strong (R3). Blocks are prismatic. Discontinuities are extremely close to closely spaced and are medium persistent. GSI structure = Blocky/Disturbed, GSI surface condition = Good, GSI range = 40-50.

B: GRAVEL: Some sand, trace cobbles and boulders, trace silt, well-graded (GW). Brown, dry to moist, homogenous, non-cemented. Clasts are flat to elongate, angular, metasedimentary, highly weathered (W4); medium strong to strong (R3-R4). Maximum particle size 400 mm. [HIGHLY WEATHERED ROCK]

C: Root mat and organic silt. [TOPSOIL]

D: Greyish-brown, fine-grained QUARTZITE. Moderately weathered (W3); medium strong (R3). 3 main discontinuity sets with loose apertures (rock mass is well-dialated) and infilled with CX or iron stained. GSI structure = disintegrated, GSI surface = Poor, GSI range <25.

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	82-87	231-247	0-5	None	20 (1m)	R3	0.05	2m+	JO
2	71-90	320-327	0-30	QZ, FE	12 (1m)	R3	0.1	4m+	J, S
3	47-54	215-233	3-100	BX, CX	20 (1m)	R3	0.5	10m	J, F
4	67-70	321-336	0-3	None	8 (10 cm)	R3	0.2	1m	J

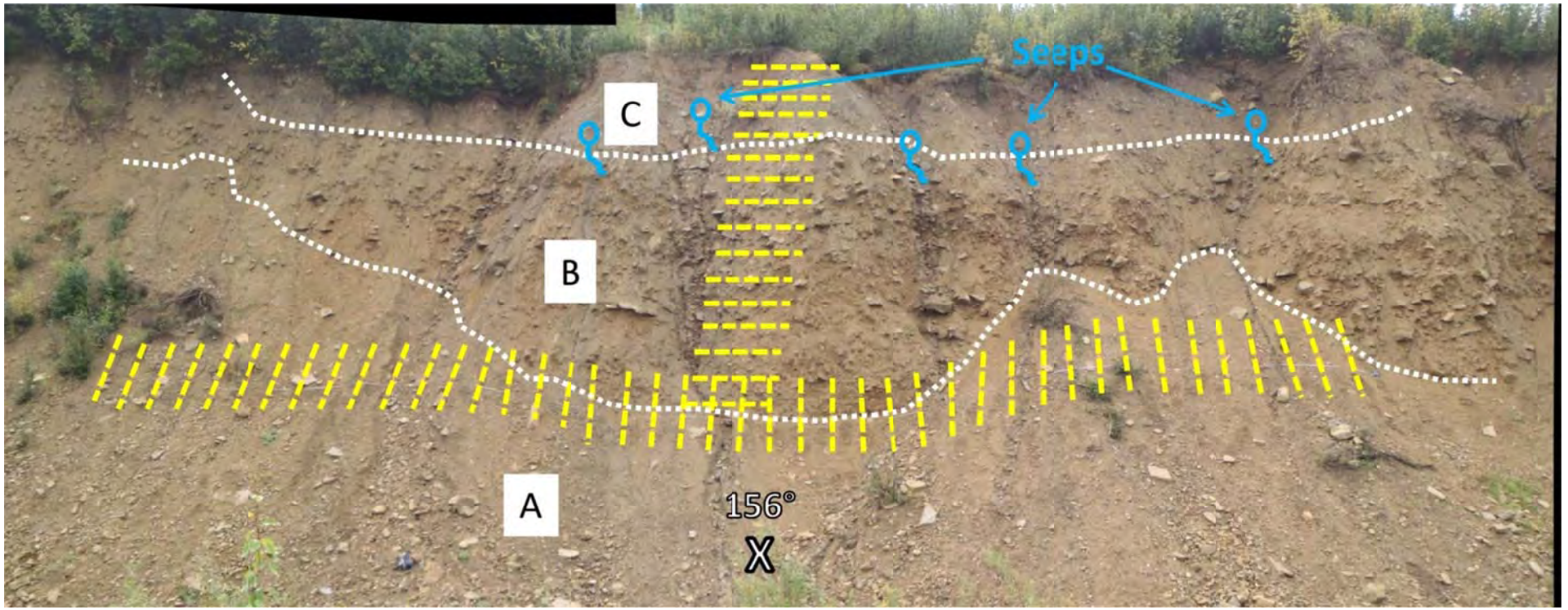
Outcrop OC-BGC11-49

Location: Dublin Gulch valley bottom
Facility: Heap leach pads
Outcrop type: Man-made (excavated by placer miners)

Northing: 7101020
Easting: 459452
Elevation: 859 m
Survey type: Handheld GPS

Slope Angle: 66° (unit B); 41° (unit A)
Slope Direction: 336°
Date logged: 8/22/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Ravelled material from scarp.

B: GRAVEL: Sandy (medium to coarse), cobbly, trace boulders, well-graded (GW). Brown, , nonplastic, firm, moist, homogenous (massive), and poorly consolidated. Fines notably absent. Clasts angular to subrounded, many lithologies (various types of metasedimentary or intrusive rock), weak to very strong (R2-R5), all shapes. Max particle size ~ 500 mm. Deposit contains layers of aligned cobbles dipping gradually to the west. This is suggestive of being the distal part of a debris fan originating further east along Dublin Gulch, where larger debris is found. This interpretation remains speculative for the time being. Other plausible interpretations include placer tailings (least likely) and till (lateral moraine, believed to be less likely than debris flow hypothesis).

C: SAND: Silty, some gravel, trace cobbles, well-graded (SM). Lensed with pockets of sandy silt 1-5 cm thick. Brown, moist, soft, nonplastic, with low dry strength, rapid dilatancy, low toughness. Clasts are angular to subrounded, all shapes, various lithologies, weak to strong (R2-R4). [FILL]

Outcrop OC-BGC11-49

PHOTO OF UNIT B

DISCONTINUITIES N/A (NO ROCK UNITS)

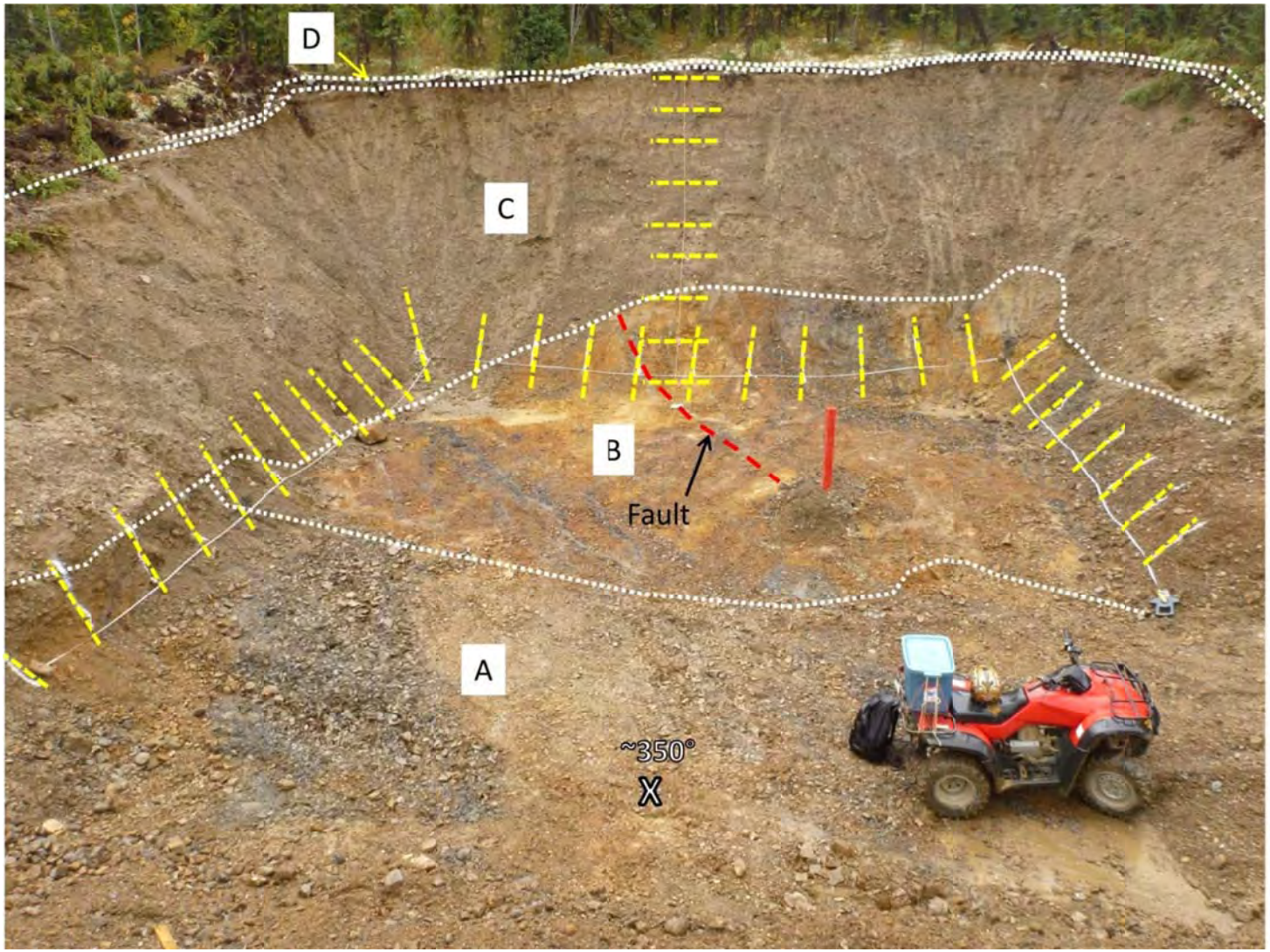
Outcrop OC-BGC11-50

Location: West flank Tin Dome
Facility: Plant site
Outcrop type: Man-made (plate load test excavation cut)

Northing: 7101140
Easting: 458828
Elevation: 859 m
Survey type: Handheld GPS

Slope Angle: 46°
Slope Direction: 172°
Date logged: 8/22/2011
Logged by: GH

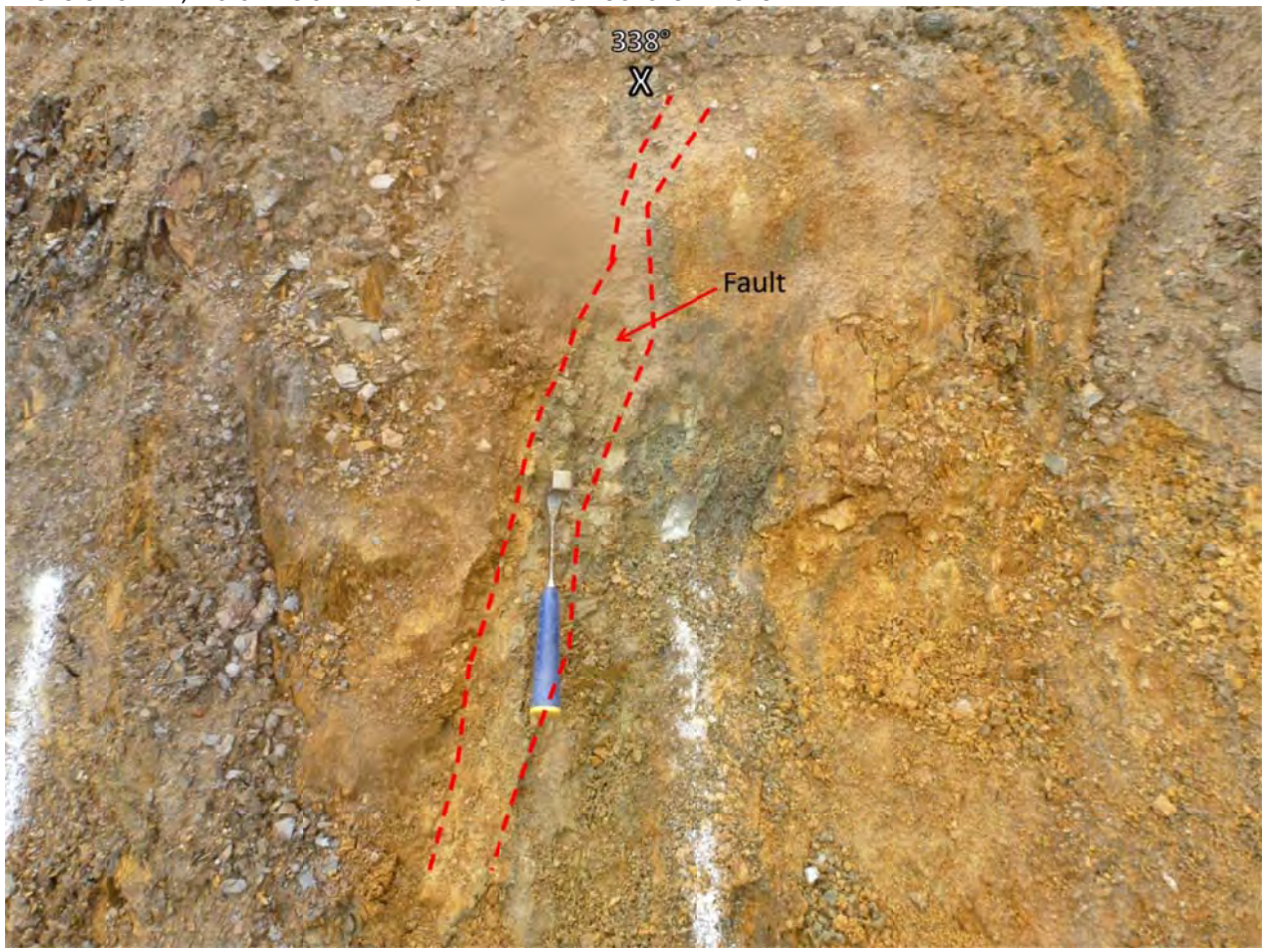
PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

Outcrop OC-BGC11-50

PHOTO OF UNIT B, INCLUDING CLAYEY FAULT INDICATED ON OUTCROP PHOTO



DESCRIPTION OF MATERIALS

A: Fine-grained brown/black SLATE/PHYLLITE and QUARTZITE. Lightly to moderately weathered (W2-W3); weak to medium strong (R2-R3). Blocks average 1-3 cm; are equidimensional to tabular. GSI structure = disintegrated, GSI surface = Fair to Poor, GSI range = 20-30. [LIGHTLY TO MODERATELY WEATHERED BEDROCK]

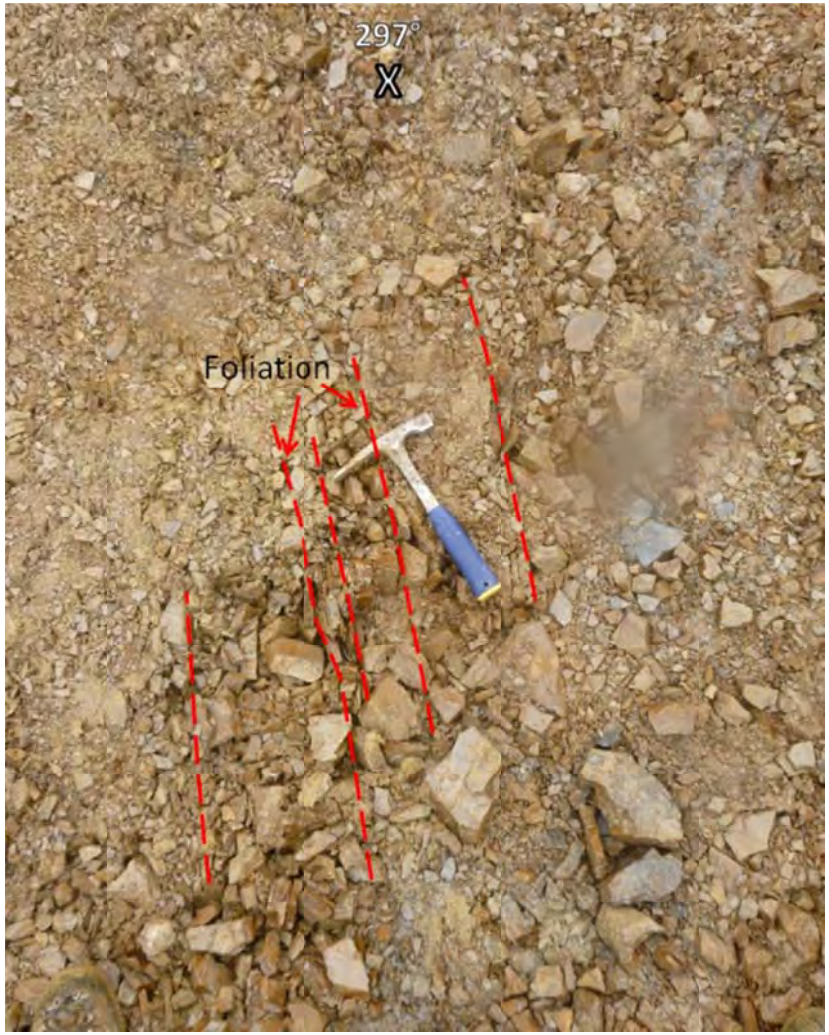
B: Highly weathered fine-grained yellow/black SLATE/PHYLLITE and QUARTZITE. Moderately to completely weathered (W3-W5); extremely to very weak (R0-R1). No significant blockiness; GSI not applicable. Quartzite weathered towards a sandy soil; slate /phyllite towards a slippery silty/clayey micaceous material. [MODERATELY TO COMPLETELY WEATHERED BEDROCK]

C: Gravelly sand - see test pit log for TP-BGC11-103. [TILL]

D: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-50

PHOTO OF STRUCTURE – UNIT A



DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
Foliation	72-83	206-223	0-100	None, CX, FG	8 (10cm)	R2.5	0.02	1m+	JO, F

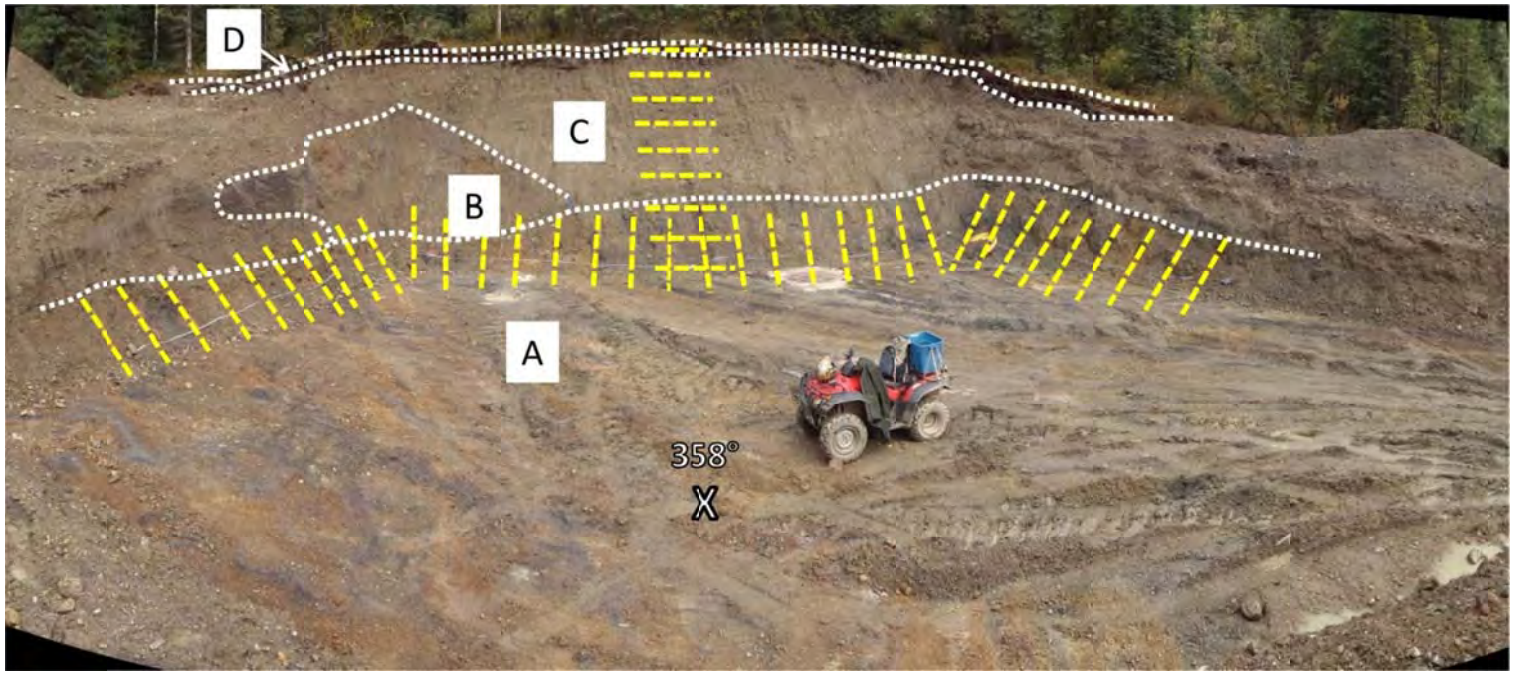
Outcrop OC-BGC11-51

Location: West flank Tin Dome
Facility: Plant site
Outcrop type: Man-made (plate load test excavation cut)

Northing: 7101187
Easting: 458932
Elevation: 885 m
Survey type: Handheld GPS

Slope Angle: 58°
Slope Direction: 165°
Date logged: 8/23/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: Fine-grained, brown to black meta-sedimentary rock. Mostly QUARTZITE (60%) with seams of PHYLLITE (35%) and quartz veins (5%). Moderately to completely weathered (W3-W5); extremely to very weak (R0-R1) except some small "floating" blocky zones. Weathering generally decreases with depth, but varies laterally as well. Phyllite is silty/clayey and slippery; quartzite mostly sandy/silty. Avg block size <1cm; GSI not applicable. [HIGHLY WEATHERED BEDROCK]

B: Highly dilated, rotated and displaced weathered bedrock with intermixed silty sand (SM) from soil above. Clasts moderately weathered (W2.5) and weak (R2.5); 1-5 cm in size. GSI not applicable. [DILATED, COMPLETELY WEATHERED BEDROCK AND SOIL]

C: [COLLUVIUM/TILL]. See testpit log for TP-BGC11-105.

D: Root mat and organic silt. [TOPSOIL]

Outcrop OC-BGC11-51

PHOTO OF UNIT B

Outcrop OC-BGC11-51

PHOTO OF UNIT A

DISCONTINUITY TABLE – UNIT A

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
Foliation	37-87	158-215	0-100	None, CX, FG	12 (10cm)	R0-R3	0.005-0.05	1m+	JO, F

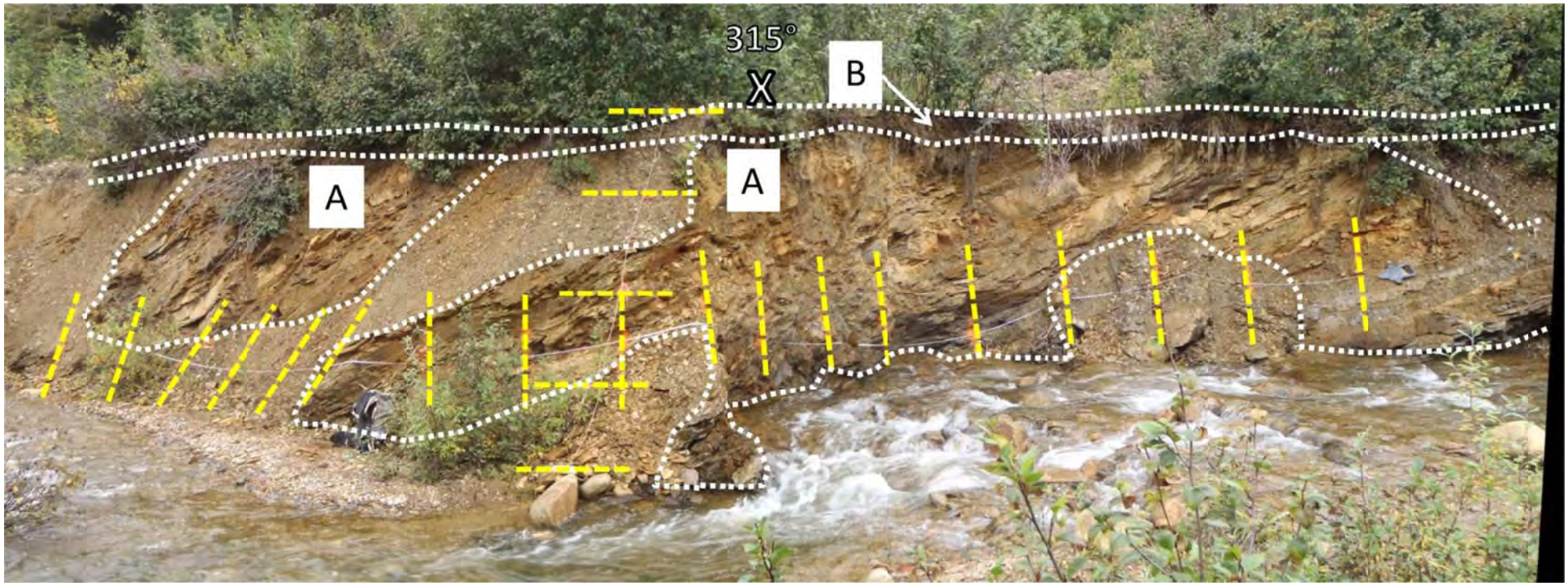
Outcrop OC-BGC11-52

Location: Dublin Gulch valley bottom
Facility: Heap leach pads / processing ponds
Outcrop type: Natural (stream channel)

Northing: 7101039
Easting: 459097
Elevation: 849 m
Survey type: Handheld GPS

Slope Angle: 65°
Slope Direction: Curves 116-172° (convex)
Date logged: 8/23/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

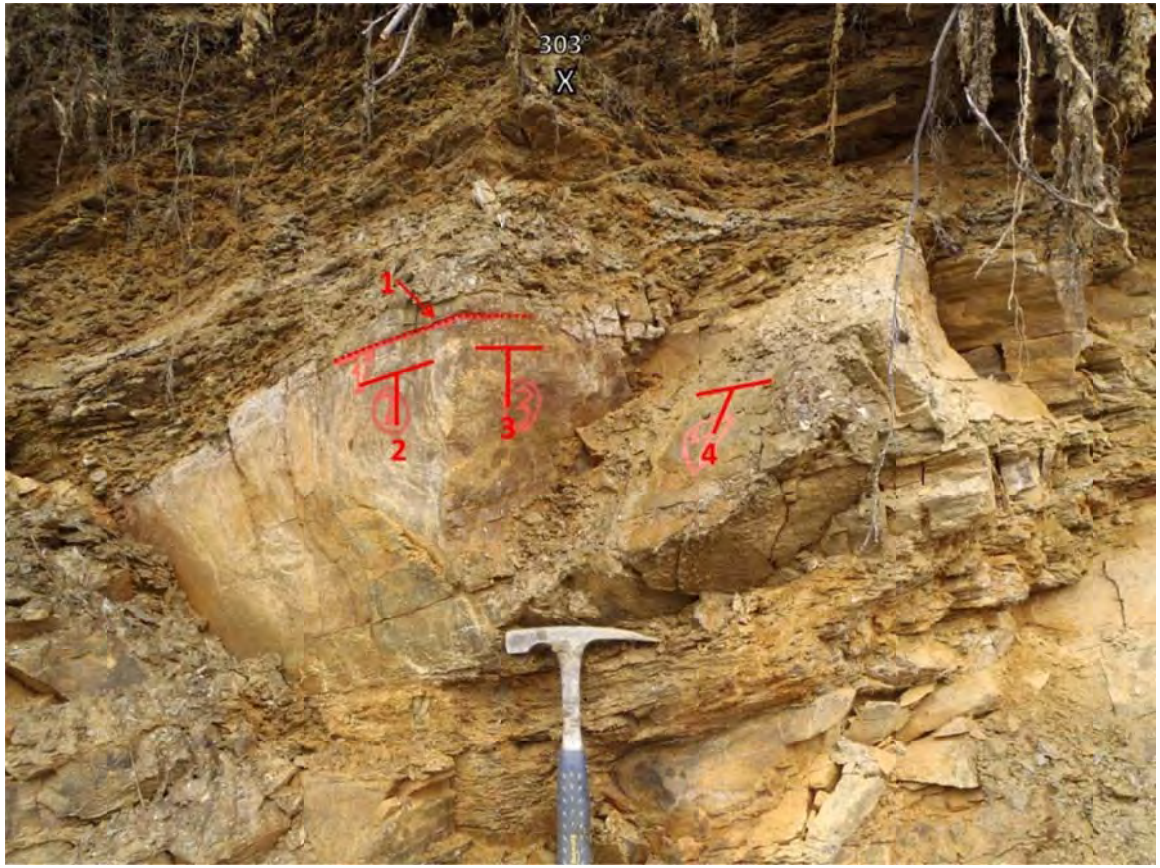
DESCRIPTION OF MATERIALS

A: Dark grey, fine-grained QUARTZITE (60%) interbedded with schistose seams of PHYLLITE (40%). Phyllite weathered to clayey residual soil in upper ~1m of outcrop. Slightly weathered to highly weathered (W2-W4); very weak (R1 - phyllite) to medium strong (R3 - quartzite). Blocks ~ 5 cm, equidimensional. GSI structure = Disturbed, GSI surface = Poor, GSI range = 20-30. Some beds in this outcrop may be calcareous, as indicated by (1) the presence of minor calcite precipitate on the outcrop surface, and (2) some of the blocky "quartzite" seams being softer than typical quartz according to a field hardness test.

B: SAND: Silty, some fine to medium gravel, well-graded (SM). Contains abundant rootlets. Brown, moist, loose, homogenous; nonplastic, no dry strength, rapid dilatancy. Clasts angular to subangular, weak to medium strong (R2-R3), flat, mostly metasedimentary. [COLLUVIUM with TOPSOIL].

Outcrop OC-BGC11-52

PHOTO OF STRUCTURE



DISCONTINUITY TABLE

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	24-30	211-250	0-10	DX	20 (1m)	R2	0.05 (marble), <0.01 (phyllite)	5m+	JO
2	74-81	335-344	1-10	DX, CA	6 (1m)	R2.5	0.1	4m+	J
3	72-88	076-099	1-5	DX, CA	8 (10cm)	R2.5	0.1	0.5m	J
4	56-65	180-197	NV	CA	12 (1m)	R2.5	0.5	1m+	J

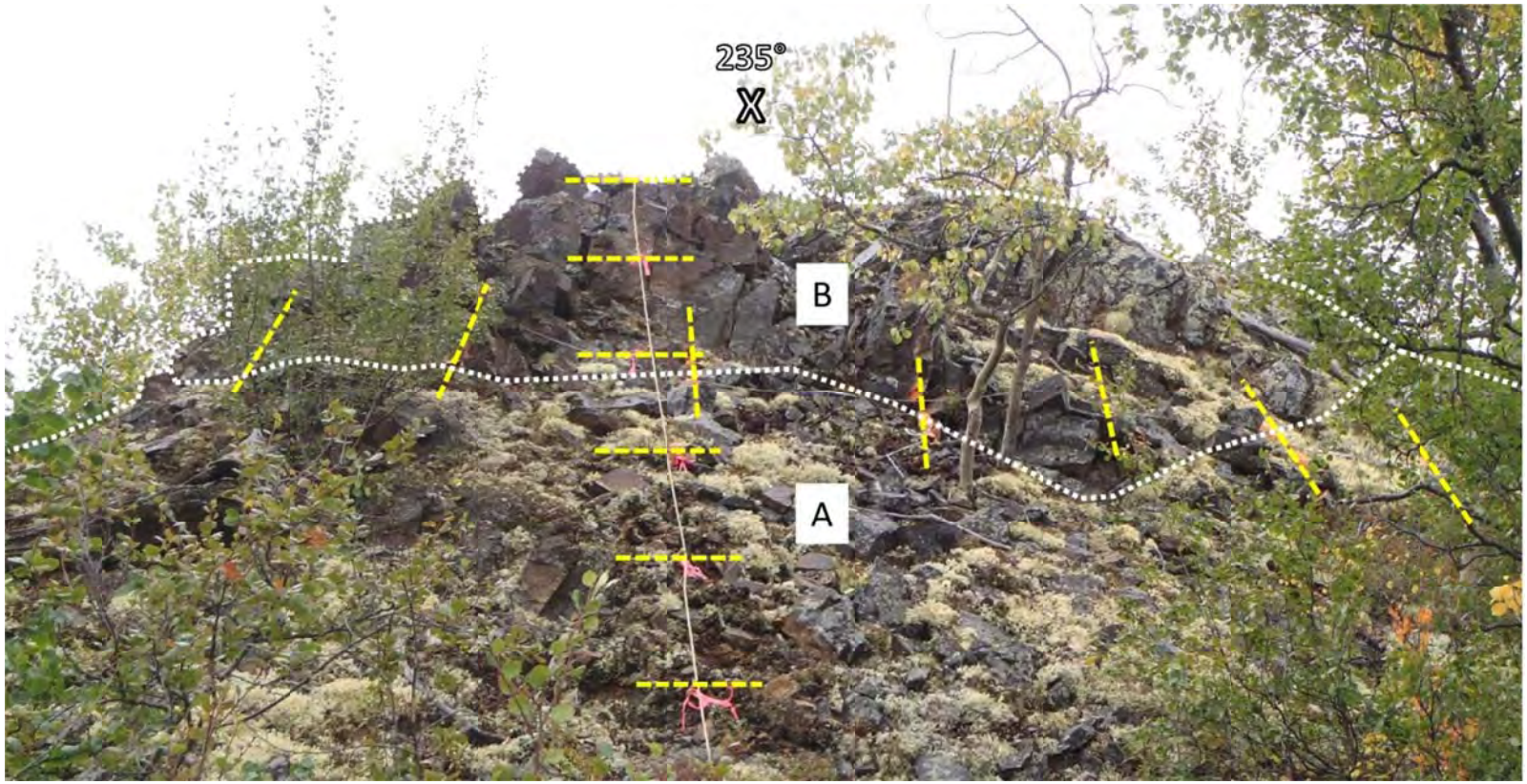
Outcrop OC-BGC11-53

Location: Stuttle Gulch
Facility: 100-day storage
Outcrop type: Natural

Northing: 7099996
Easting: 459359
Elevation: 1009 m
Survey type: Handheld GPS

Slope Angle: 45°
Slope Direction: 044°
Date logged: 8/23/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: GRAVEL: Cobbly, some sand, some organic silt, well-graded (GW). Fines moist, very soft; have low plasticity, rapid dilatancy, and no dry strength. Clasts are metasedimentary, angular, flat, and medium strong to strong (R3-R4). [COLLUVIUM] with thin cap of [TOPSOIL].

B: Dark grey, fine-grained QUARTZITE. Faintly weathered (W1.5); strong (R4). Blocks ~ 15 cm,; equidimensional. GSI structure = Very Blocky, GSI surface = Good, GSI range = 50-60.

Outcrop OC-BGC11-53

PHOTO OF STRUCTURE

DISCONTINUITY TABLE

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	29-32	271-294	0-5	None	8 (1m)	R4	0.15	1m+	JO
2	78-86	139-161	1-20	None, OG	8 (1m)	R4	0.15	2m+	J
3	69-86	060-089	1-10	None, OG	16 (1m)	R4	0.15	2m+	J

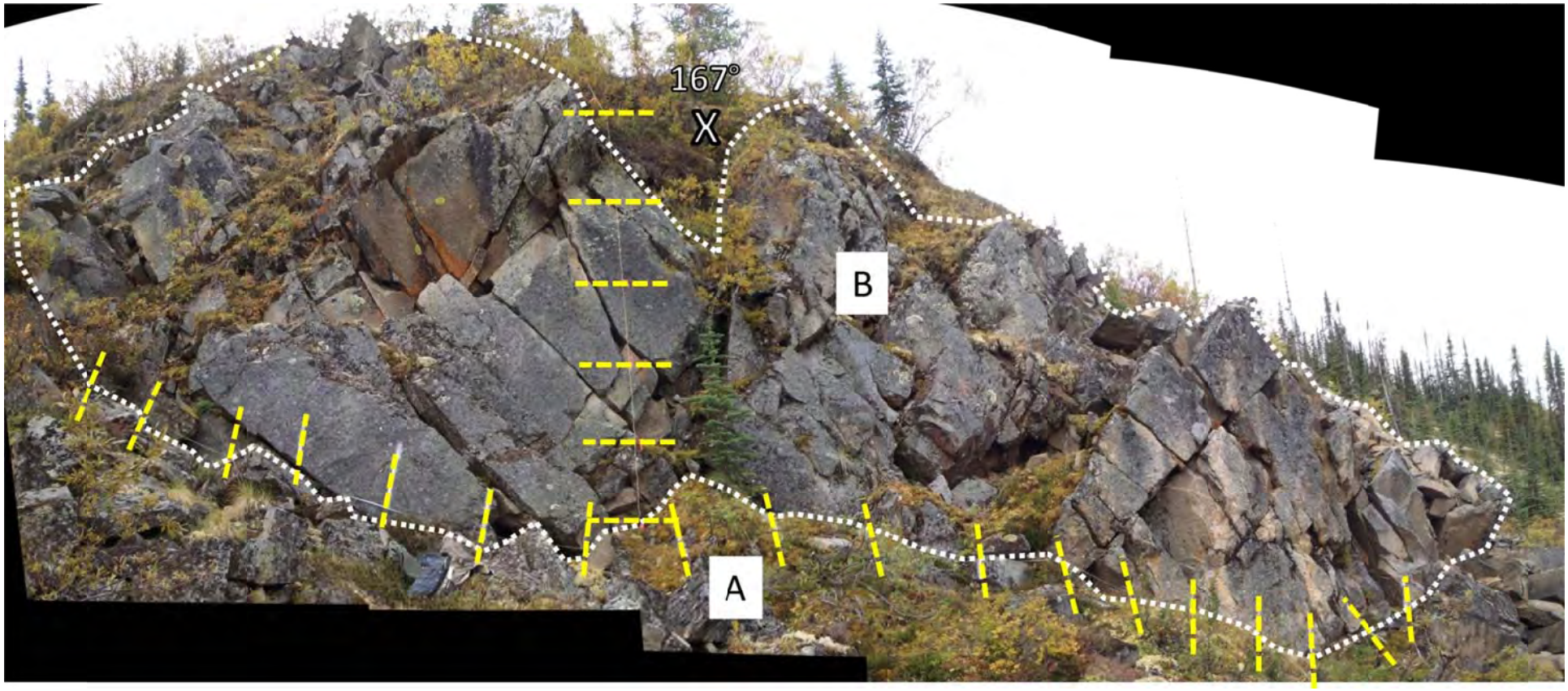
Outcrop OC-BGC11-54

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7099871
Easting: 460694
Elevation: 1288 m
Survey type: Handheld GPS

Slope Angle: 75°
Slope Direction: 142°
Date logged: 8/24/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

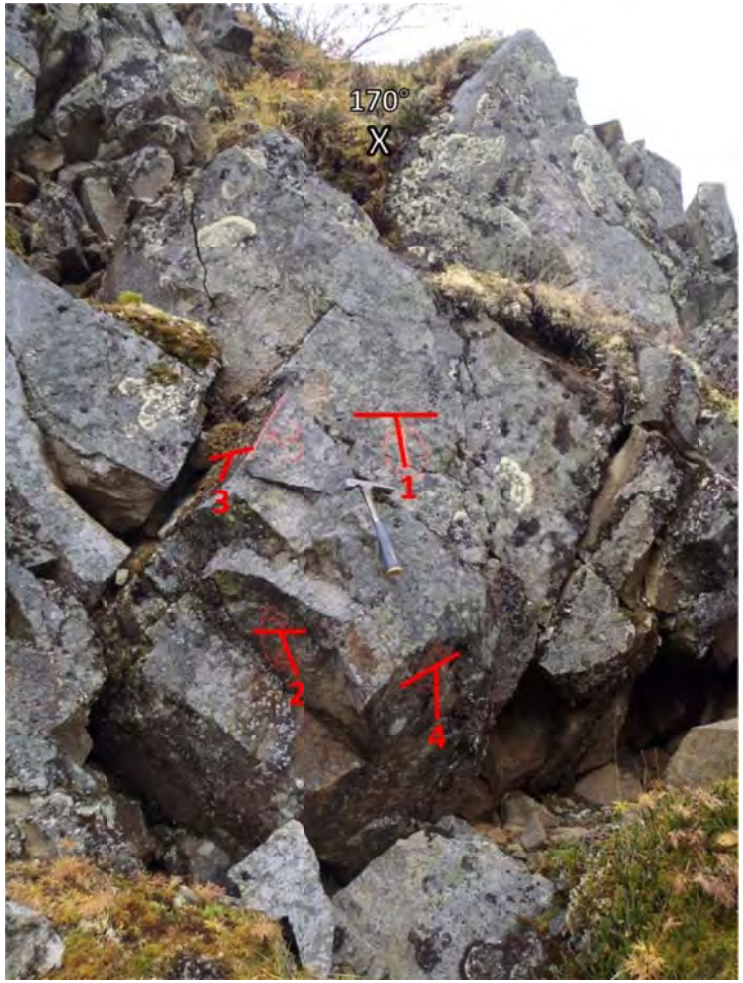
DESCRIPTION OF MATERIALS

A: BOULDERS: Some cobbles, some gravel, minor organics. Clasts angular, equidimensional to elongate, granodiorite, very strong to extremely strong (R5-R6). [FROST-SHATTERED BEDROCK]

B: Medium-grained grey GRANODIORITE. Faintly weathered (W1.5); very strong to extremely strong (R5-R6). Blocks ~ 0.7 m; rhombohedral. GSI structure = Blocky, GSI surface = Good, GSI range = 60-70.

Outcrop OC-BGC11-54

PHOTO OF STRUCTURE



DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	82-87	143-172	1-100	None	12 (1m)	R5	0.6	5m+	J
2	53-70	211-247	1-100	None	16 (1m)	R5	0.7	6m+	J
3	59-83	035-054	1-50	None	16 (1m)	R5	2	4m+	J
4	41-57	105-128	1-100	None	12 (1m)	R5	2	5m+	J

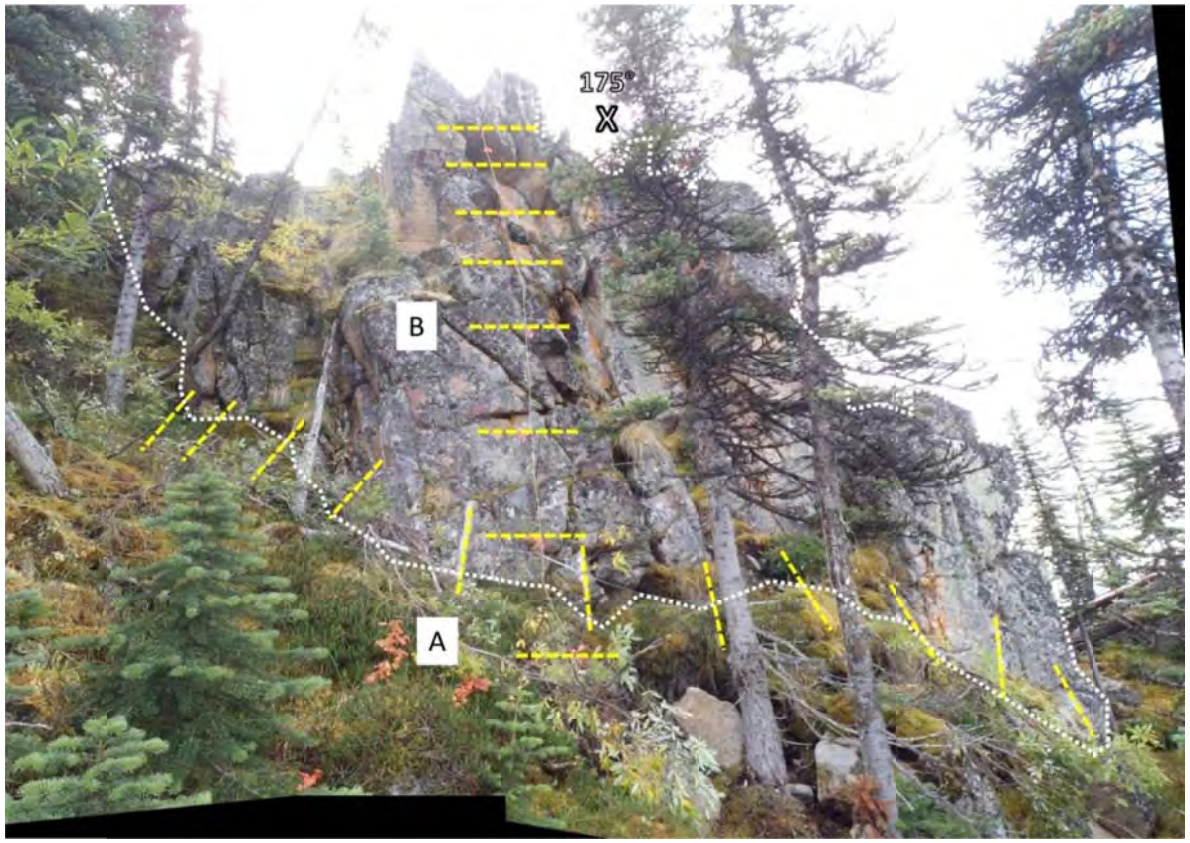
Outcrop OC-BGC11-55A

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7100389
Easting: 460728
Elevation: 1248 m
Survey type: Handheld GPS

Slope Angle: 78°
Slope Direction: 349°
Date logged: 8/24/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: BOULDERS and COBBLES covered by ~ 10 cm of TOPSOIL (moss/heather root mat and some organic silt). Clasts angular, equidimensional to elongate, granodiorite. [FROST-SHATTERED BEDROCK]

B: Grey, coarse-grained GRANODIORITE. Faintly weathered (W1.5); strong to very strong (R4-R5). Blocks ~ 0.5m; rhombohedral. GSI structure = Blocky, GSI surface = Good to Fair, GSI range = 55-65.

Outcrop OC-BGC11-55A

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture (mm)	Infill	JRC (scale)	JWCS	Spacing (m)	Persistence (m)	Type
	Dip°	DD°							
1	78-89	354-000	0-50	None	8 (1m)	R4	0.6	3.5m	J
2	80-82	252-280	0-50	None	12-16 (1m)	R4	0.7	3m	J
3	24-42	070-285	0-5	None	12 (1m)	R4	0.7	2m	J
4	52-62	252-275	0-40	None	12 (1m)	R4	1	2m	J

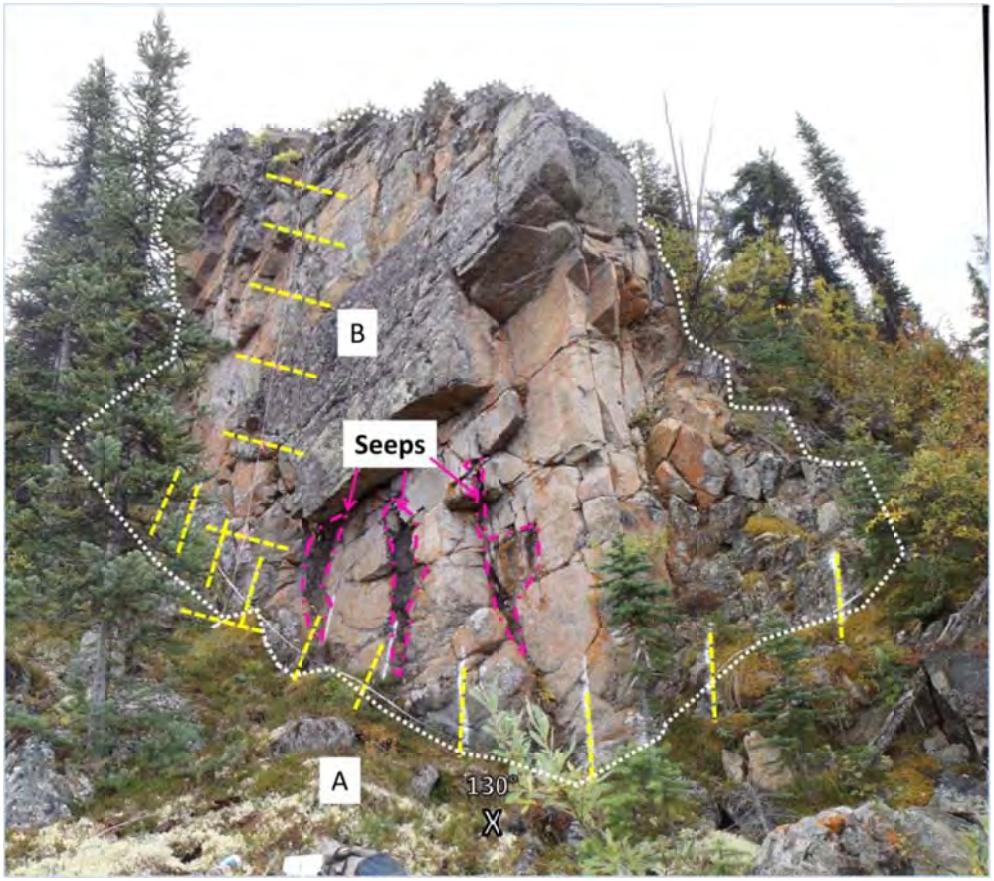
Outcrop OC-BGC11-55B

Location: Eagle Pup
Facility: Eagle Pup WRSA
Outcrop type: Natural

Northing: 7100373
Easting: 460719
Elevation: 1239 m
Survey type: Handheld GPS

Slope Angle: 85°
Slope Direction: 353°
Date logged: 8/24/2011
Logged by: GH

PHOTO OF OUTCROP



1m spacing along outcrop surface between yellow dashed lines.

DESCRIPTION OF MATERIALS

A: BOULDERS and COBBLES covered by ~ 10 cm of TOPSOIL (moss/heather/root mat and some organic silt). Angular, equidimensional to elongate, granodiorite. [FROST-SHATTERED BEDROCK]

B: Grey, coarse-grained GRANODIORITE. Faintly to lightly weathered (W1.5-W2); strong to very strong (R4-R5). Some zones of moderately weathered R3 rock near water seeps. Blocks ~ 0.4 m; rhombohedral. GSI structure = Blocky, GSI surface = Good to Fair, GSI range = 55-65.

Outcrop OC-BGC11-55B

PHOTO OF STRUCTURE

DISCONTINUITY TABLE – UNIT B

Set	Orientation range		Aperture	Infill	JRC	JWCS	Spacing	Persistence	Type
	Dip°	DD°	(mm)		(scale)		(m)	(m)	
1	83-89	352-357	0-3	None	10 (1m)	R4	0.4	8m+	J
2	78-90	252-286	0-40	None	16 (1m)	R4	0.5	4m	J
3	18-32	036-065	0-3	CA	20 (1m)	R4	0.4	2.5m	J
4	50-70	260-294	0-10	None	20 (1m)	R4	0.8	2m	J
5	57-70	160-165	1-3	CA	4-8 (1m)	R4	1	7m+	J

APPENDIX C
TEST PIT LOGS

TEST PIT LOGS

Table C- 1: Summary of Test Pits

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Final Length (m)
TP-BGC11-50	7100283	459702	1011	5.8
TP-BGC11-51	7100436	459665	972	4.7
TP-BGC11-52	7101809	459978	1051	5.0
TP-BGC11-53	7102242	460049	1103	4.0
TP-BGC11-54	7102175	460416	1178	2.0
TP-BGC11-55	7102242	460619	1209	2.0
TP-BGC11-56	7102183	460247	1158	2.0
TP-BGC11-57	7102087	460209	1144	5.0
TP-BGC11-58	7102129	460079	1118	5.0
TP-BGC11-59	7099985	459791	1065	2.6
TP-BGC11-60	7099940	459795	1067	2.7
TP-BGC11-61	7099870	459439	1008	5.0
TP-BGC11-62	7099924	459251	975	6.2
TP-BGC11-63	7099914	459139	940	4.6
TP-BGC11-64	7100206	459151	945	4.7
TP-BGC11-65	7099236	459542	986	8.0
TP-BGC11-66	7099178	459943	1134	7.5
TP-BGC11-67	7099861	458808	857	6.5
TP-BGC11-68	7099590	458859	849	6.5
TP-BGC11-69	7099457	458915	875	6.5
TP-BGC11-70	7099123	459409	983	3.0
TP-BGC11-71	7101244	459115	885	2.2
TP-BGC11-72	7101194	459202	874	4.3
TP-BGC11-73	7101498	460472	984	3.0
TP-BGC11-74	7101487	460629	1014	5.5
TP-BGC11-75	7101499	460786	1040	4.2
TP-BGC11-76	7101302	461068	1125	5.4
TP-BGC11-77	7101655	461364	1099	5.5
TP-BGC11-78	7101628	461728	1186	5.5
TP-BGC11-79	7101806	461903	1166	3.8
TP-BGC11-80	7101551	461753	1210	6.7
TP-BGC11-81	7101480	461711	1207	3.9
TP-BGC11-82	7100691	458604	815	7.5
TP-BGC11-83	7100077	458786	863	1.3
TP-BGC11-84	7100006	458763	863	2.6
TP-BGC11-85	7100055	458783	865	2.5
TP-BGC11-86	7101751	460124	894	7.5

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Final Length (m)
TP-BGC11-87	7100247	460690	1194	3.5
TP-BGC11-88	7101008	459813	922	6.0
TP-BGC11-89	7100737	459876	985	6.5
TP-BGC11-90	7100502	459686	981	6.5
TP-BGC11-91	7100633	459649	969	2.1
TP-BGC11-92	7100733	459587	933	1.7
TP-BGC11-93	7100794	459536	917	1.9
TP-BGC11-94	7101522	459983	930	5.0
TP-BGC11-95	7100135	460283	1109	3.2
TP-BGC11-96	7100170	460287	1103	2.0
TP-BGC11-97	7099463	460546	1353	4.0
TP-BGC11-98	7099465	460521	1342	2.2
TP-BGC11-99	7099496	460576	1352	2.5
TP-BGC11-100	7099505	460565	1345	3.5
TP-BGC11-101	7098940	460089	1180	2.4
TP-BGC11-102	7099111	460565	1361	4.6
TP-BGC11-103	7101150	458820	865	6.0
TP-BGC11-104	7100924	459738	832	5.6
TP-BGC11-105	7101190	458939	878	3.0
TP-BGC11-106	7100012	460375	1155	3.0
TP-BGC11-107	7100261	460182	1044	3.2
TP-BGC11-108	7099975	460285	1145	1.5
TP-BGC11-109	7100520	460137	977	5.3
TP-BGC11-110	7101062	459851	942	5.0
TP-BGC11-111	7100373	460653	1185	2.0
TP-BGC11-112	7100504	460350	1033	2.5
TP-BGC11-113	7099490	459071	878	2.5
TP-BGC11-114	7099369	459190	914	3.2
TP-BGC11-115	7099453	459187	899	5.7
TP-BGC11-116	7099423	459251	905	2.3
TP-BGC11-117	7099578	459184	896	8.0
TP-BGC11-118	7100268	459335	951	5.3
TP-BGC11-119	7100548	458587	824	2.1
TP-BGC11-120	7100484	458511	816	4.4
TP-BGC11-121	7100588	458502	815	3.3
TP-BGC11-122	7100707	458684	825	5.8
TP-BGC11-123	7101322	458498	808	2.4
TP-BGC11-124	7101502	458559	825	6.5
TP-BGC11-125	7100047	459492	995	2.5

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Final Length (m)
TP-BGC11-126	7100300	459464	946	3.1
TP-BGC11-127	7100117	459889	1096	2.5
TP-BGC11-128	7101526	458423	803	3.0
TP-BGC11-129	7101340	458563	822	6.8
TP-BGC11-130	7101183	458709	865	6.0
TP-BGC11-131	7101430	459934	921	3.5
TP-BGC11-132	7101515	459840	922	5.3
TP-BGC11-133	7101608	460048	984	4.4
TP-BGC11-134	7101419	460101	945	4.2
TP-BGC11-135	7101383	459998	931	3.5
TP-BGC11-136	7101306	459896	910	4.8
TP-BGC11-137	7101171	459920	943	5.0
TP-BGC11-138	7100041	459771	1050	6.3
TP-BGC11-139	7099033	459001	935	3.0
TP-BGC11-140	7097912	459228	954	4.5
TP-BGC11-141	7098871	460019	1154	5.0
TP-BGC11-142	7098318	459037	913	4.5
TP-BGC11-143	7100441	458644	838	4.0
TP-BGC11-144	7100144	460540	1158	1.0
TP-BGC11-145	7101471	459853	959	5.1

NOTES:
1. Location for BGC holes from handheld GPS measurements.
2. Coordinates in UTM NAD 83, Zone 8N.

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-50

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459702E, 7100283N
GROUND ELEVATION (m): 1011
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 29 Jun 11
FINISH DATE: 29 Jun 11
FINAL DEPTH OF PIT (m): 5.8
LOGGED BY: EB/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Lichen, moss, rootmat. [TOPSOIL]
1					SILT (ML) Gravelly, some clay, trace sand, low to medium plasticity, firm, yellowish brown, moist to damp, metasedimentary clasts are angular to subrounded, elongated, maximum particle size = 70 mm, weak to strong (R2 to R4). [COLLUVIUM]
2					GRAVEL (GW) Trace sand, well graded, angular, elongated, maximum particle size = 250 mm, weak to strong (R2 to R4), yellowy brown, moist, metasedimentary clasts. [COLLUVIUM]
3	G	1			GRAVEL (GM) Silty, trace sand, trace cobbles, trace boulders, well graded, angular, elongated, maximum particle size = 350 mm, weak to strong (R2 to R4), low plastic matrix, yellowish brown, moist, metasedimentary clasts. [COLLUVIUM] Below 0.65 m - Increasing silt and cobble content to the top of bedrock. 2.8 - 3.0 m - Sample 1, grain size analysis, 84% gravel, 11% sand, 5% fines. Specific gravity analysis, average specific gravity 2.8.
	G	2			3.3 - 3.6 m - Sample 2, grain size analysis, 67% gravel, 23% sand, 10% fines.
4			4.5		SAND (SM) Silty, some gravel, trace cobbles, trace boulders, well graded, subangular to angular, elongated, maximum particle size = 300 mm, metasedimentary clasts, weak (R2), yellow brown, moist. Silt content varies throughout the unit, forms lenses. Iron staining observed. [HIGHLY TO COMPLETELY WEATHERED BEDROCK]
5					
6					End of test pit at 5.8 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Logged from cut walls for drill pad for BH-BGC11-36 and excavated below pad surface.
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-51

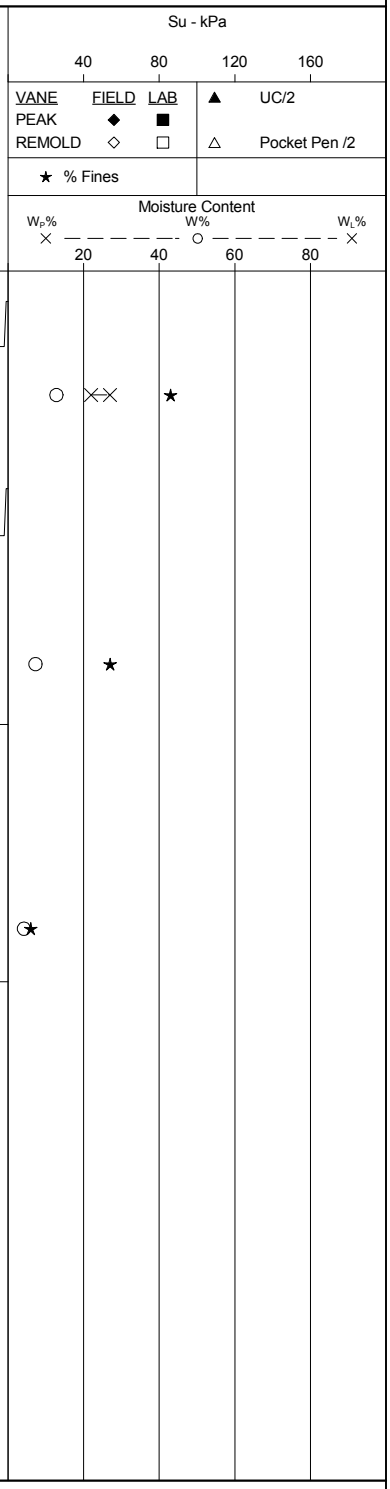
LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459665E, 7100436N
GROUND ELEVATION (m): 972
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 29 Jun 11
FINISH DATE: 29 Jun 11
FINAL DEPTH OF PIT (m): 4.7
LOGGED BY: EB/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Lichen, moss, rootmat, wet. [TOPSOIL]
1	G	1			GRAVEL (GM) Silty, trace to some sand, metasedimentary clasts are angular to subrounded, elongated, maximum particle size = 140 mm, weak (R2). Fines: low plasticity, hard, rapid dilatancy, yellow brown, white mottling and iron staining, wet when thawed. Frozen: Nbn. [COLLUVIUM] 0.2 - 1.44 m - Sample 1, grain size analysis, 32% gravel, 24% sand, 34% silt, 10% clay.
2	G	2			SAND (SM) Some gravel, some silt, trace cobbles well graded, angular to subangular elongated, maximum particle size = 140 mm, yellow brown, moist, metasedimentary clasts, weak to medium strong (R2 to R3). [COLLUVIUM] 2.4 - 2.8 m - Sample 2, grain size analysis, 50% gravel, 23% sand, 27% fines. Sulphate analysis, 0.13 % total sulphate ion content.
3					SAND AND GRAVEL (GM) Silty, trace cobbles, trace boulders, well graded, angular to subrounded, elongated, maximum particle size = 400 mm, yellowish brown, dry to moist, low plastic matrix, metasedimentary clasts, weak to strong (R2 to R4). [COLLUVIUM]
4	G	3			4.2 - 4.5 m - Sample 3, grain size analysis, 60% gravel, 34% sand, 6% fines.
5					End of test pit at 4.7 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 0.2-1.44 m. 5) Encountered resistance on boulders (weathered bedrock?) at bottom of excavation. 6) Logged from cut walls for drill pad for BH-BGC11-35 and excavated below pad surface.
6					
7					
8					



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-52

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459978E, 7101809N
GROUND ELEVATION (m): 1051
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 02 Jul 11
FINISH DATE: 02 Jul 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					GRAVEL (GM) Some silt, trace sand, trace cobbles, well graded, loose, maximum particle size = 200 mm, flat and elongated, angular, brown, moist, clasts: medium strong (R3), slightly weathered (W2). [COLLUVIUM]
2					METASEDIMENTARY ROCK Brown, iron staining, extremely to highly fractured, medium strong (R3), slightly weathered (W2). [SLIGHTLY WEATHERED BEDROCK]
3	G	1	2		3.3 - 3.5 m - Sample 1, grain size analysis, 30% cobbles, 63% gravel, 6% sand, 1% fines.
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at drill pad for BH-BGC11-29.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-53

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460049E, 7102242N
GROUND ELEVATION (m): 1103
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 02 Jul 11
FINISH DATE: 02 Jul 11
FINAL DEPTH OF PIT (m): 4.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
					SILT (ML) Trace sand, trace gravel, trace cobbles, low plasticity, firm to stiff, brown, moist. [COLLUVIUM] PP/2 = 100 kPa
1					GRAVEL (GM) Some silt, trace sand, trace cobbles, well graded, maximum particle size = 200 mm, flat and elongated, angular, iron staining. [MODERATELY WEATHERED METASEDIMENTARY BEDROCK]
2	G	1	3		2.0 - 2.2 m - Sample 1, grain size analysis, 79% gravel, 18% sand, 3% fines.
3					
4					End of test pit at 4.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at drill pad for BH-BGC11-27.
5					
6					
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-54

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460416E, 7102175N
GROUND ELEVATION (m): 1178
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 02 Jul 11
FINISH DATE: 02 Jul 11
FINAL DEPTH OF PIT (m): 2.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			GRAVEL (GM) Silty, some sand, trace cobbles, trace boulders, well graded, loose, maximum particle size = 250 mm, angular, iron staining. Fines: low plastic, firm to stiff, brown, moist, heterogeneous. [COLLUVIUM] 0.4 - 0.6 m - Sample 1, grain size analysis, 57% gravel, 18% sand, 19% silt, 6% clay.
1			2		METASEDIMENTARY ROCK Iron staining, highly fractured, blocky, angular, strong (R4), slightly weathered (W2). [SLIGHTLY WEATHERED BEDROCK]
2					End of test pit at 2.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at drill pad for BH-BGC11-25.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-55

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460619E, 7102242N
GROUND ELEVATION (m): 1209
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 02 Jul 11
FINISH DATE: 02 Jul 11
FINAL DEPTH OF PIT (m): 2.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			GRAVEL (GM) Silty, trace sand, trace cobbles. Fines: low plastic, firm, brown, moist, heterogeneous. [COLLUVIUM] 0.4 - 0.6 m - Sample 1, grain size analysis, 57% gravel, 19% sand, 20% silt, 4% clay.
1			3		METASEDIMENTARY ROCK Excavated as silty gravel, trace sand, trace cobbles, well graded, maximum particle size = 250 mm, angular, iron staining, moist. [MODERATELY WEATHERED METASEDIMENTARY BEDROCK]
2	G	2			1.9 - 2.0 m - Sample 2, grain size analysis, 80% gravel, 13% sand, 7% fines.
					End of test pit at 2.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at drill pad for BH-BGC11-24.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-56

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460247E, 7102183N
GROUND ELEVATION (m): 1158
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 04 Jul 11
FINISH DATE: 04 Jul 11
FINAL DEPTH OF PIT (m): 2.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
			3.5		METASEDIMENTARY ROCK Blocky to very blocky, poor joint wall condition, medium strong (R3), moderately to highly weathered (W3 to W4). [MODERATELY TO HIGHLY WEATHERED BEDROCK]
1			2		METASEDIMENTARY ROCK As above but slightly weathered. [SLIGHTLY WEATHERED BEDROCK]
2					End of test pit at 2.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) No sample taken.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-57

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460209E, 7102087N
GROUND ELEVATION (m): 1144
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 04 Jul 11
FINISH DATE: 04 Jul 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			GRAVEL (GM) Silty, some sand, trace cobbles, angular, iron staining, size increasing with depth. Fines: low plasticity, firm to very stiff, brown, moist. [COLLUVIUM] 0.5 - 1.1 m - Sample 1, grain size analysis, 50% gravel, 18% sand, 27% silt, 5% clay.
2					
3			3		METASEDIMENTARY ROCK Gravel and silt present when excavated, blocky, iron stained, maximum particle size = 300 mm, subangular to angular, medium strong (R3), moderately weathered (W3). [MODERATELY WEATHERED METASEDIMENTARY BEDROCK]
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Cut for drill pad for BH-BGC11-26 logged as part of test pit.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-58

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460079E, 7102129N
GROUND ELEVATION (m): 1118
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 04 Jul 11
FINISH DATE: 04 Jul 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			GRAVEL AND SAND (GM/SM) Silty, trace cobbles, trace clay. Fines: low plastic, firm, brown, moist, slow dilatancy. [COLLUVIUM] At 0.7 m - Sample 1, grain size analysis, 36% gravel, 37% sand, 23% silt, 4% clay.
1					
2	G	2			GRAVEL (GW) Fine to coarse, trace sand, trace silt, well graded, compact, maximum particle size = 50 mm, flat and elongated, angular, iron staining, moist, laminated, very weak (R1). [COLLUVIUM]
3			4		METASEDIMENTARY ROCK Blocky, iron stained, 300 mm blocks, angular to sub-angular, highly weathered (W4), medium strong (R3). Excavated as cobbles, gravel, and silt. [HIGHLY WEATHERED BEDROCK] At 2.0 m - Sample 2, grain size analysis, 69% gravel, 25% sand, 6% fines. Specific gravity analysis, 2.84 (average).
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-59

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459791E, 7099985N
GROUND ELEVATION (m): 1065
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 2.6
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
0.5	G	1			GRAVEL (GM) Fine to medium gravel, silty, some sand, some cobbles, trace boulders, elongated, angular, maximum particle size = 350 mm. Fines: non-plastic, soft, brown, homogeneous, moist. [COLLUVIUM] 0.4 - 0.6 m - Sample 1, grain size analysis, 67% gravel, 20% sand, 12% silt, 1% clay.
1					
2			3.5		METASEDIMENTARY ROCK Orange grey, very weak to weak (R1.5 to R2), moderately to highly weathered (W3 to W4), fine grained, disturbed, polyhedral structure, when excavated: gravel, with silt and sand. JS 1 - Dip/DipDir: 38/124 Ap: 30-150mm JRC: 14/0.3m JS 2 - Dip/DipDir: 85/194 Ap: 30-150mm JRC: 2-16/0.3m JS 3 - Dip/DipDir: 89/266 Ap: 30-150mm JRC: 16/0.1m [MODERATELY TO HIGHLY WEATHERED METASEDIMENTARY BEDROCK]
3					At 1.85m - Block size increases, slightly to moderately weathered (W2.5), medium strong to strong (R3 to R4).
4					End of test pit at 2.6 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at drill pad for BH-BGC11-50.
5					
6					
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-60

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459795E, 7099940N
GROUND ELEVATION (m): 1067
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 2.7
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Some sand, some gravel, trace cobbles, non-plastic, moist, brown-grey, soft, homogeneous, gravel and cobbles are angular and elongated. [COLLUVIUM] 0.65 - 1.0 m - Frozen: Vx, Vr (30%). 0.7 - 0.9 m - Sample 1, grain size analysis, 20% gravel, 25% sand, 53% silt, 2% clay. Sulphate analysis, 0.07% total sulphate ion content. 1.0 - 1.5 m - Frozen: Vx (5-10%).
2					SILT AND GRAVEL (ML/GM) Some sand. Frozen: Vx (10%). [COLLUVIUM]
					ORGANICS Dark black. Frozen: Nbn. [ORGANICS]
3					End of test pit at 2.7 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.65 m to bottom of excavation. 5) Test pit consists of road cut and 1 m of excavation.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-61

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459439E, 7099870N
GROUND ELEVATION (m): 1008
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Gravelly, sandy, trace cobbles, low plastic, brown, moist, homogeneous, medium dry strength, no dilatancy. Clasts: angular to subangular, iron staining, moderately weathered (W3) medium strong (R3). [COLLUVIUM] 0.7 - 0.8 m - Sample 1, grain size analysis, 30% gravel, 32% sand, 36% silt, 2% clay.
2	G	2	2.5		METASEDIMENTARY ROCK iron stained, medium strong (R3), slightly to moderately weathered, fine grained, blocky and disturbed, angular to subangular, dip 44°, dip dir. 266°, excavated as gravel, cobbley, some silt, trace sand. [SLIGHTLY TO MODERATELY WEATHERED METASEDIMENTARY BEDROCK] 1.7 - 1.9 m - Sample 2, grain size analysis, 55% gravel, 29% silt, 16% fines.
3					
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-62

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459251E, 7099924N
GROUND ELEVATION (m): 975
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 6.2
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Cobbley, gravelly, sandy, low plastic, soft, brown, moist, homogeneous, moderate dry strength, no dilatancy. [COLLUVIUM] 0.9 - 1.0 m - Sample 1, grain size analysis, 33% gravel, 23% sand, 40% silt, 4% clay.
2					SAND (SM) Silty, trace gravel, trace cobbles, compact to dense, brown, moist, homogeneous. [COLLUVIUM]
3					
4	G	2			3.5 - 3.7 m - Sample 2, grain size analysis, 33% gravel, 39% sand, 22% silt, 6% clay.
5					
6					
7					End of test pit at 6.2 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — ○ — — — × W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-63

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459139E, 7099914N
GROUND ELEVATION (m): 940
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 4.6
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1	4		GRAVEL (GM) Silty, trace cobbles (angular, maximum particle size = 250 mm), trace sand, brown, moist, homogeneous. Fines are low plastic, firm, medium dry strength, rapid dilatency. [COLLUVIUM] 0.5 - 0.7 m - Sample 1, grain size analysis, 53% gravel, 23% sand, 20% silt, 4% clay.
1					
2					METASEDIMENTARY ROCK Disintegrated, iron stained, highly weathered (W4), weak (R2). [HIGHLY WEATHERED BEDROCK]
			3		METASEDIMENTARY ROCK Iron stained, slightly to moderately weathered (W2.5 to W3), medium strong (R3), very blocky, polyhedral, excavated as cobbles, some gravel, some silt. [MODERATELY WEATHERED BEDROCK] 1.1 - 1.5 m - Frozen: Vx (1-2%).
3					
4					
5					End of test pit at 4.6 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 1.1-1.5 m. 5) Substantial sloughing.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — ○ — — — × W_L%

20 40 60 80

○ ★

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-64

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459151E, 7100206N
GROUND ELEVATION (m): 945
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 07 Jul 11
FINISH DATE: 07 Jul 11
FINAL DEPTH OF PIT (m): 4.7
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					SILT (SM) Some gravel, some sand, trace cobbles, non plastic, greyish brown. Frozen: Nf. [COLLUVIUM]
	G	1			SAND (SP) Trace silt, some gravel, trace cobbles, fine to medium, poorly graded, angular, greyish brown. Frozen: Nf. [COLLUVIUM] 1.5 - 1.6 m - Sample 1, grain size analysis, 26% gravel, 60% sand, 14% fines.
2			5		METASEDIMENTARY ROCK Disintegrated, orange brown, fine grained, completely weathered (W5), very weak (R1), excavated as gravel and sand. [COMPLETELY WEATHERED BEDROCK]
3			3		METASEDIMENTARY ROCK Very blocky, dark orange brown, angular to sub-angular, fine to coarse, moderately weathered (W3), medium strong to strong (R3 to R4), excavated as cobbles, sandy, gravelly. Visible set dipping downslope. [MODERATELY WEATHERED BEDROCK]
4					
5					End of test pit at 4.7 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 0.3-2.0 m.
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-65

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459542E, 7099236N
GROUND ELEVATION (m): 986
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Jul 11
FINISH DATE: 09 Jul 11
FINAL DEPTH OF PIT (m): 8.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
			4.5		SAND (SW) Gravelly, trace cobbles, trace silt, well graded, compact, maximum particle size = 150 mm, sub-angular to angular, light brown, moist, homogeneous. [COLLUVIUM] 0.4 - 0.5 m - Sample 1, grain size analysis, 49% gravel, 36% sand, 15% fines.
1					GRAVEL (GM) Silty, some sand, some cobbles, dark grey to brown. Clasts: metasedimentary, medium strong to strong (R3 to R4). [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY BEDROCK]
2					
			3		METASEDIMENTARY ROCK Iron stained, medium strong to strong (R3 to R4), moderately weathered (W3), very blocky, poor to fair joint condition, rhombohedral, iron stained, excavated as cobbles, some gravel, trace silt, trace sand. [MODERATELY WEATHERED BEDROCK]
3					
4					
5					
6			4		METASEDIMENTARY ROCK Light brown, medium strong (R3), highly weathered (W4), Blocky/disturbed, poor to fair joint condition, oxidized, excavated as cobbles (100 mm), sandy, some gravel. [HIGHLY WEATHERED BEDROCK]
7			3		METASEDIMENTARY ROCK Very blocky, poor to fair joint condition, rhombohedral, fine to coarse, angular, moderately weathered (W3), medium strong to strong (R3 to R4), excavated as cobbley, some gravel, trace sand. [MODERATELY WEATHERED BEDROCK]
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

(Continued on next page)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-65

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459542E, 7099236N
GROUND ELEVATION (m): 986
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Jul 11
FINISH DATE: 09 Jul 11
FINAL DEPTH OF PIT (m): 8.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					End of test pit at 8.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Excavation on side of steep slope along existing road cut. Approximately 5 m exposure above road surface.
9					
10					
11					
12					
13					
14					
15					
16					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-66

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459943E, 7099178N
GROUND ELEVATION (m): 1134
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Jul 11
FINISH DATE: 09 Jul 11
FINAL DEPTH OF PIT (m): 7.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat [TOPSOIL]
1					GRAVEL (GM) Silty, trace cobbles, compact, maximum particle size = 150 mm, subangular to angular, light brown, moist, homogeneous. [COLLUVIUM]
	G	1			SAND (SM) Silty, some gravel, fine to medium, well graded, dense, maximum particle size = 35 mm, angular to sub-angular, light to orangish brown, stratified. [COLLUVIUM]
2	G	2			At 1.3 m - Sample 1, grain size analysis, 12% gravel, 63% sand, 25% fines.
			4.5		SILT (ML) Sandy, some clay, trace gravel, low plastic, soft, light brown to grey, moist, homogeneous. [COLLUVIUM] PP/2 = 25 kPa
3					At 1.8 m - Sample 2, grain size analysis, 2% gravel, 32% sand, 51% silt, 15% clay.
			3		SAND AND GRAVEL (SW-GW) Iron staining. Clasts: metasedimentary, very weak to weak (R1 to R2). [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY BEDROCK]
4					METASEDIMENTARY ROCK Iron staining, medium strong (R3), moderately weathered (W3), very blocky, fair to poor joint condition, excavated as cobbles and gravel. [MODERATELY WEATHERED BEDROCK]
			2		METASEDIMENTARY ROCK Iron staining, medium strong to strong (R3 to R4), slightly weathered (W2), blocky, fair joint condition, excavated as cobbles and gravel. [SLIGHTLY WEATHERED BEDROCK]
5					
6					
7					
8					End of test pit at 7.5 m Notes: 1) Refusal on bedrock.

Su - kPa: 40, 80, 120, 160

VANE PEAK ◆ ■ ▲ UC/2
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content: W_P% × — ○ — × W_L%; 20, 40, 60, 80

(Continued on next page)

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-66

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459943E, 7099178N
GROUND ELEVATION (m): 1134
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Jul 11
FINISH DATE: 09 Jul 11
FINAL DEPTH OF PIT (m): 7.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated at old drill pad cut slope.
9					
10					
11					
12					
13					
14					
15					
16					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

TEST PIT # TP-BGC11-67

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006
LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458808E, 7099861N
GROUND ELEVATION (m): 857
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 10 Jul 11
FINISH DATE: 10 Jul 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			GRAVEL and SAND (GM/SM) Silty, trace cobbles, compact, maximum particle size = 200 mm, medium brown, moist, homogeneous. Clasts: angular to subangular. [COLLUVIUM] 0.7 - 0.9 m - Sample 1, grain size analysis, 45% gravel, 19% sand, 28% silt, 8% clay. Specific gravity analysis, 2.72 (average).
2					GRAVEL and SAND (GM/SM) As above, some cobbles, trace boulders, maximum particle size = 500 mm, dense. Cobbles and boulders very strong to extremely strong (R5 to R6). [COLLUVIUM/TILL?]
3					
4					
5					
6					
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-68

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458859E, 7099590N
GROUND ELEVATION (m): 849
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 10 Jul 11
FINISH DATE: 10 Jul 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Moss, vegetation, rootmat. [TOPSOIL]
1					**GRAVEL (GM)** Silty, some fine sand, trace cobbles, trace boulders, non plastic, compact, medium brown, moist, homogeneous. Clasts: angular to sub-angular, maximum particle size = 270 mm. [COLLUVIUM]
	G	1			1.6 - 1.8 m - Sample 1, grain size analysis, 44% gravel, 38% sand, 18% fines.
2					**SAND (SM)** Silty, cobbley, gravelly, trace boulders, dense, moist, medium brown, homogeneous, sub-angular to sub-rounded, maximum particle size = 400 mm, average cobble size = 100-150 mm, non plastic matrix. [COLLUVIUM]
3					
4					
5					
6					
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-69

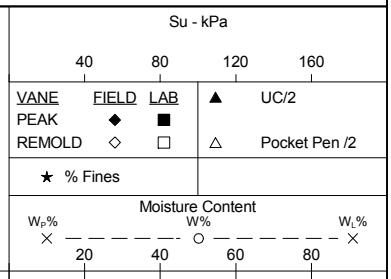
LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458915E, 7099457N
GROUND ELEVATION (m): 875
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 10 Jul 11
FINISH DATE: 10 Jul 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, root mat. [TOPSOIL]
1					SILT (ML) Trace to some sand, trace clay, firm to stiff, grey, moist, stratified, high dry strength, no dilatancy. [COLLUVIUM] PP/2 = 75 kPa
2	G	1			1.7 - 1.9 m - Sample 1, grain size analysis, 7% sand, 90% silt, 3% clay.
3	G	2			GRAVEL (GM) Silty, trace sand. Fines: stiff, light brown, moist, homogeneous. [COLLUVIUM] 2.8 - 2.9 - Sample 2, grain size analysis, 47% gravel, 31% sand, 19% silt, 3% clay.
4			5		GRAVEL (GM) Cobbley, some silt, some sand, elongated to equidimensional, subangular to subrounded, blue grey brown, heavy iron staining, very weak (R1), metasedimentary clasts. [COMPLETELY WEATHERED METASEDIMENTARY BEDROCK]
5			3		GRANODIORITE Iron staining, very strong to extremely strong (R5 to R6), moderately weathered (W3), very blocky, rhombohedral, fair joint condition. [MODERATELY WEATHERED BEDROCK]
6					
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Cut on upslope of exisiting road.
8					



EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-70

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459409E, 7099123N
GROUND ELEVATION (m): 983
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 10 Jul 11
FINISH DATE: 10 Jul 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1			2		GRANODIORITE Iron staining, very strong to extremely strong, slightly weathered, blocky, rhombohedral, sand and silt infilling. [SLIGHTLY WEATHERED BEDROCK]
2					
3					End of test pit at 3.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated adjacent to existing road cut.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-71

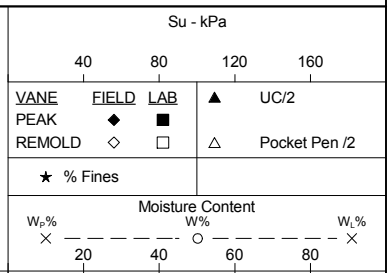
LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459115E, 7101244N
GROUND ELEVATION (m): 885
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jul 11
FINISH DATE: 11 Jul 11
FINAL DEPTH OF PIT (m): 2.2
LOGGED BY: EC/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Gravelly, some sand, trace clay, medium to high plasticity, brownish grey, slight organic odour, wet when thawed, maximum particle size = 40 mm, Frozen: Vx(10-20%). Clasts: metasedimentary, elongated and flat, angular to sub-angular, medium strong (R3). [COLLUVIUM]
2					SILT (ML) Gravelly, sandy, trace clay, medium to high plasticity, brownish grey, slight organic odour, wet when thawed, maximum particle size = 40 mm. Clasts: metasedimentary, elongated and flat, angular to sub-angular, medium strong (R3). Frozen: Vx (30%). [COLLUVIUM]
					1.3 - 1.6 m - Sample 1, grain size analysis, 28% gravel, 41% sand, 26% silt, 5% clay.
3					End of test pit at 2.2 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.25 m to bottom of excavation. 4) Test pit executed as a road cut was being undertaken.
4					
5					
6					
7					
8					



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-72

LOCATION: ANN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459202E, 7101194N
GROUND ELEVATION (m): 874
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jul 11
FINISH DATE: 11 Jul 11
FINAL DEPTH OF PIT (m): 4.3
LOGGED BY: EC/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	2			SILT (ML) Some gravel, some sand, low plastic, soft, dark grey brown, moist, homogeneous, slow dilatancy. Clasts: fine to medium grained, equidimensional to elongated, angular, metasedimentary. [COLLUVIUM]
2					GRAVEL (GM) Fine to medium gravel, silty, trace sand, trace clay, equidimensional to elongated, angular, metasedimentary clasts. Fines: low plastic, soft, light brown, moist, homogeneous, slow dilatency. [COLLUVIUM] 0.8 - 1.0 m - Sample 2, grain size analysis, 35% gravel, 46% sand, 12% silt, 7% clay.
3	G	1	3		METASEDIMENTARY ROCK Yellowish brown, fine grained, foliated, phyllitic, slightly to moderately weathered (W2.5), intact rock strength varies from very weak (R1) for small phyllitic clasts to strong (R4) for boulder size siltstone clasts. One main set observed (foliation): Dip 15°, dip direction 300°. [MODERATELY WEATHERED BEDROCK] 2.4 - 2.6 m - Sample 1, grain size analysis, 68% gravel, 25% sand, 7% fines.
4					
5					End of test pit at 4.3 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Excavated as road cut was being undertaken.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-73

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460472E, 7101498N
GROUND ELEVATION (m): 984
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jul 11
FINISH DATE: 11 Jul 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Sandy, some boulders, some cobbles, some gravel, non-plastic, medium brown, homogeneous, maximum particle size = 800 mm. Frozen 0.3-1.0m: Vx (<1%). Clasts: subangular to subrounded, strong to very strong (R4 to R5). [COLLUVIUM] 0.8 - 1.0 m - Sample 1, grain size analysis, 17% gravel, 50% sand, 31% silt, 2% clay.
2					BOULDERS AND COBBLES Silty, some gravel, trace sand, rounded to subrounded, moist, strong to very strong (R4 to R5) clasts, maximum particle size = 1200 mm. [COLLUVIUM]
3					End of test pit at 3.0 m. Notes: 1) Refusal on boulders. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 0.3-2.1 m.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

○ ★

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-74

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460629E, 7101487N
GROUND ELEVATION (m): 1014
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jul 11
FINISH DATE: 11 Jul 11
FINAL DEPTH OF PIT (m): 5.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			GRAVEL (GM) Silty, trace sand, trace cobbles, dense, grey to medium brown, moist, homogeneous, maximum particle size = 150 mm, angular to subangular, matrix non plastic. [COLLUVIUM] 1.2 - 1.4 m - Sample 1, grain size analysis, 39% gravel, 26% sand, 28% silt, 7% clay.
2					
3	G	2			SILT (ML) Trace gravel, trace sand, trace clay, low plastic, soft to firm, grey, moist to wet, homogeneous, low dry strength, rapid dilatancy. [COLLUVIUM] At 3.0 m - Sample 2, grain size analysis, 3% sand, 83% silt, 14% clay.
4					SAND (SM) Silty, some gravel, trace cobbles, trace clay, light brown, moist, angular, moderately weathered, iron staining, maximum particle size = 200 mm, low plastic matrix. [COLLUVIUM]
5	G	3			At 4.5 m - Sample 3, grain size analysis, 20% gravel, 30% sand, 44% silt, 6% clay.
6					End of test pit at 5.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage (wet layer at 2.5-3.0 m). 4) Not frozen. 5) Minor sloughing of pit walls.
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-75

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 460786E, 7101499N

GROUND ELEVATION (m): 1040

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 12 Jul 11

FINISH DATE: 12 Jul 11

FINAL DEPTH OF PIT (m): 4.2

LOGGED BY: EC

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
					GRAVEL (GM) Silty, some cobbles, trace sand, well graded, loose, maximum particle size = 200 mm, elongated and flat, angular, light brown, moist, stratified. [COLLUVIUM]
1					METASEDIMENTARY ROCK Iron staining, medium strong (R3), moderately weathered (W3), blocky, disturbed, disintegrated, tabular blocks, flat, poor joint condition, excavated as cobbles and gravel, some silt. Dominant joint set has dip/dir of 050°/118°, average spacing 80-150 mm, maximum block size = 300 mm, average joint roughness coefficient (JRC) of 5 mm/25 cm. [MODERATELY WEATHERED BEDROCK]
2			3		
3					
4					
					End of test pit at 4.2 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) No samples taken.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-76

LOCATION: STEWART GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461068E, 7101302N
GROUND ELEVATION (m): 1125
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 12 Jul 11
FINISH DATE: 12 Jul 11
FINAL DEPTH OF PIT (m): 5.4
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Moss, vegetation, rootlets. [TOPSOIL] 0.4 - 0.6 m - Sample 1, grain size analysis, 18% gravel, 20% sand, 54% silt, 8% clay.
1					SILT (ML) Some fine to coarse gravel, trace sand, trace clay, non plastic, soft, medium brown, moist, homogeneous, no dilatancy. [COLLUVIUM]
2					METASEDIMENTARY ROCK Medium strong (R3), moderately weathered (W3), disintegrated, polyhedral blocks, fair joint condition, non stained. Excavated as cobbles and gravels, silty, trace boulders, maximum particle size = 450 mm, average particle size: 50-200 mm. [MODERATELY WEATHERED BEDROCK]
3			3		
4					
5					
6					End of test pit at 5.4 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Sloughing at 5.4 m. 6) Easy excavating.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-77

LOCATION: OLIVE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461364E, 7101655N
GROUND ELEVATION (m): 1099
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 12 Jul 11
FINISH DATE: 12 Jul 11
FINAL DEPTH OF PIT (m): 5.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					GRAVEL (GM) Silty, trace cobbles, trace sand, well graded, compact, maximum particle size = 150 mm, angular to subangular, medium to dark brown, moist, homogeneous. [COLLUVIUM] 0.4 - 0.5 m - Sample 1, grain size analysis, 22% gravel, 34% sand, 31% silt, 13% clay.
2			4		METASEDIMENTARY ROCK Dark brown to grey (with iron staining), highly weathered (W4), weak to medium strong (R2 to R3). Disintegrated - excavated as silty gravel, some cobbles, trace boulders. [HIGHLY WEATHERED BEDROCK]
3			3.5		METASEDIMENTARY ROCK Iron stained, weak to medium strong (R2 to R3), moderately to highly weathered (some pockets of completely weathered orangish yellow material), blocky/disturbed, tabular blocks, excavated as gravel and cobbles, silty, trace boulders, maximum particle size = 350 mm, average size 50-100 mm. [MODERATELY TO HIGHLY WEATHERED BEDROCK]
4					
5					
6					End of test pit at 5.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-78

LOCATION: BAWN BOY GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461728E, 7101628N
GROUND ELEVATION (m): 1186
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 12 Jul 11
FINISH DATE: 12 Jul 11
FINAL DEPTH OF PIT (m): 5.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					GRAVEL (GM) Silty, trace cobbles, trace sand, well graded, compact, maximum particle size = 150 mm, moist, homogeneous, angular to subangular clasts, medium brown. [COLLUVIUM]
2					METASEDIMENTARY ROCK Brown to orange, iron staining, weak to medium strong (R2 to R3), moderately to highly weathered (W3 to W4), disintegrated to blocky and disturbed, polyhedral blocks, highly fractured, excavated as gravel and cobbles, some silt, trace sand, maximum particle size = 300 mm, average particle size = 80-150 mm. [MODERATELY TO HIGHLY WEATHERED BEDROCK]
3			3.5		3.5 - 4.0 m - Light to moderate seepage from all sides of pit.
4					
5					
6					End of test pit at 5.5 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) Light to moderate seepage from 3.5-4.0 m. 4) Not frozen. 5) No samples taken.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-79

LOCATION: BAWN BOY GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461903E, 7101806N
GROUND ELEVATION (m): 1166
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 12 Jul 11
FINISH DATE: 12 Jul 11
FINAL DEPTH OF PIT (m): 3.8
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			SAND (SW-SM) Some silt, some cobbles, some gravel, trace boulders (granodiorite), subangular to subrounded, maximum particle size = 300 mm. Fines: low plastic, brownish grey, wet, homogeneous. Frozen: Vs (30-40%), lenses approximately 4 cm thick. [COLLUVIUM?] 0.4 - 0.6 m - Sample 1, grain size analysis, 41% gravel, 48% sand, 8% silt, 3% clay.
1	G	2			
2			5.5		METASEDIMENTARY ROCK Orange to yellow, extremely weak (R0), residual soil to completely weathered (W6 to W5), fine grained, saturated, excavated as clay/silt/sand. Frozen: Nbn. [COMPLETELY WEATHERED BEDROCK] 1.2 - 1.3 m - Sample 2, grain size analysis, 1% gravel, 72% sand, 27% fines. 1.3 - 1.5 m - Seepage from southern corner of pit.
3					
4					End of test pit at 3.8 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Seepage from 1.3-1.5 m. 4) Frozen ground encountered below 0.2 m to bottom of excavation. 3) Slouging due to seepage.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-80

LOCATION: OLIVE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461753E, 7101551N
GROUND ELEVATION (m): 1210
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 13 Jul 11
FINISH DATE: 13 Jul 11
FINAL DEPTH OF PIT (m): 6.7
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Topsoil, rootmat. [TOPSOIL]
1					SILT (ML) Sandy, some gravel, trace clay, trace cobbles, trace boulders, low plastic, rapid dilatancy, brown, no odour, moist, soft, homogeneous. Clasts: elongated, angular (metasedimentary gravel), maximum particle size = 500 mm, granodiorite boulders, fresh to slightly weathered (W1.5) and very strong (R5). [COLLUVIUM]
2					GRAVEL (GW) Sandy, trace cobbles, well graded, maximum particle size = 55 mm, pinkish brown, moist. Clasts: metasedimentary, elongated, angular, weak (R2). [COLLUVIUM]
3					METASEDIMENTARY ROCK Dark reddish grey, medium strong (R3), slightly weathered (W2), fine grained, foliated, dominant joint set parallel to foliation (40°/278°) with secondary sets: (86°/197°) and (85°/61°), joint roughness (JRC) along foliation 30mm/0.45 m = 20, 0.25-1 mm aperture, infill is iron staining and crushed rock. Other sets JRC=10, similar infill and apertures. Foliation very closely spaced (20-100 mm apart). [SLIGHTLY WEATHERED BEDROCK]
4			2		
5					
6					
7					End of test pit at 6.7 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) Light seepage at base of test pit. 4) Not frozen. 5) Test pit is at an existing road cut.
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

W% 20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-81

LOCATION: OLIVE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 461711E, 7101480N
GROUND ELEVATION (m): 1207
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 13 Jul 11
FINISH DATE: 13 Jul 11
FINAL DEPTH OF PIT (m): 3.9
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Topsoil, rootmat [TOPSOIL]
1	G	1			SAND AND GRAVEL (SW/GW) Some cobbles, trace silt, some cobbles, well graded, loose, maximum particle size = 250 mm, light pinkish brown, no odour, moist, homogeneous, non-cemented. Clasts: mainly metasedimentary, weak (R2), slightly to moderately weathered (W2.5), equidimensional to elongated, angular to subangular. [COLLUVIUM]
2			2.5		GRAVEL (GW-GM) Sandy, some silt, trace clay, trace cobbles, trace boulders, equidimensional to elongated, angular to subangular, maximum particle size = 300 mm, Fines: low plastic, brown, moist, homogeneous, no odour, no cementation, rapid dilatency. [COLLUVIUM] 0.7 - 1.0 m - Sample 1, grain size analysis, 65% gravel, 24% sand, 10% silt, 1% clay. At 1.3 m - There is a 10 cm thick organic layer: roots, organic silt.
3					METASEDIMENTARY ROCK Light yellowish brown, fine grained, extremely closely fractured, foliated, very weak (R1), slightly to moderately weathered (W2.5), 1 recognizable set parallel to foliation (with a dip/dip direction of 85/159), typical aperture 1-4mm, infill is crushed rock, sand and iron staining, JRC= 4-15, spacing between foliation 20-120 mm. Clasts: medium strong to strong (R3 to R4), slightly weathered (W2). Quartz veins present. [SLIGHTLY TO MODERATELY WEATHERED BEDROCK]
4					End of test pit at 3.9 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Excavation was made as a refreshing of existing road cut.
5					
6					
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

★ ○

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-82

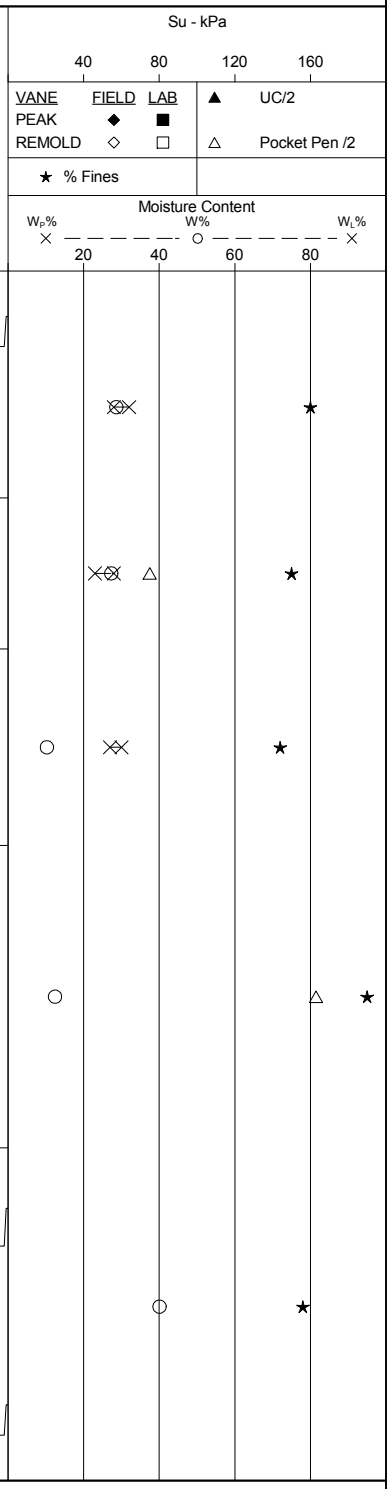
LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458604E, 7100691N
GROUND ELEVATION (m): 815
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jun 11
FINISH DATE: 11 Jun 11
FINAL DEPTH OF PIT (m): 7.5
LOGGED BY: DW
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Organics, rootmat. [TOPSOIL]
1	G	4			SILT (ML) Some medium to fine sand, trace gravel, compact, yellowish/beige, moist. Clasts: maximum particle size = 80 mm, subrounded elongated. [ALLUVIUM?] 0.7 - 1.1 m - Sample 4, grain size analysis, 20% sand, 80% fines.
2	G	5			SILT (ML) Sandy, low plasticity, firm to stiff, yellowish to brown, moist to wet. [ALLUVIUM] PP/2 = 75 kPa 1.9 - 2.1 m - Sample 5, grain size analysis, 25% sand, 75% fines.
3	G	2			SAND (SM) Medium to fine, silty, gravelly, compact to dense, maximum particle size = 100 mm, subrounded, brownish, reddish, moist, highly weathered gravel sized metasedimentary rock fragments. [ALLUVIUM] 3.0 - 3.3 m - Sample 2, grain size analysis, 7% gravel, 21% sand, 72% fines.
4					SILT (ML) Sandy, low plasticity, very stiff, brown, moist, some organics. [ALLUVIUM] PP/2 = 140-190 kPa
5	G	1			4.7 - 4.9 m - Sample 1, grain size analysis, 5% sand, 90% silt, 5% clay.
6					GRAVEL (GP) Some sand, gravel sized particles of highly weathered metasediments, maximum particle size = 170 mm. [ALLUVIUM]
7	G	3			SILT (ML) Sandy, clayey, low plasticity, still to very stiff, brown to black, moist to wet when thawed, some organics, soft, organic smell. Frozen: Vs-Vx (5-10%). [ALLUVIUM] PP/2: 90-140 kPa At 6.5 m - Exposed massive ice (approximately 0.6 x 0.3 m). 6.7 - 7.0 m - Sample 3, grain size analysis, 2% gravel, 20% sand, 74% silt, 4% clay.
8					End of test pit at 7.5 m.



(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-82

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458604E, 7100691N
GROUND ELEVATION (m): 815
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 11 Jun 11
FINISH DATE: 11 Jun 11
FINAL DEPTH OF PIT (m): 7.5
LOGGED BY: DW
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					Notes: 1) Completed at maximum reach of excavator. 2) Test pit corresponded with septic system excavation of 52 m x 53 m. 3) No seepage. 4) When excavation for septic system began June 8th, 2011, ground was frozen below 0.3 m. When test pit was excavated frozen ground encountered from 6.2 m to base of test pit.
9					
10					
11					
12					
13					
14					
15					
16					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-83

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458786E, 7100077N
GROUND ELEVATION (m): 863
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 13 Jul 11
FINISH DATE: 13 Jul 11
FINAL DEPTH OF PIT (m): 1.3
LOGGED BY: EC/JS
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, brown peat, vegetation, moss. [TOPSOIL]
	G	1			ORGANIC SILT Dark brown to black. Frozen: trace Vx. [ORGANICS]
1					SAND (SM) Fine sand, gravelly, silty, trace cobbles, trace boulders. Fines: inorganic silt, high plastic, brown to grey, wet. Frozen: trace Vx, Nbe, wet when thawed. [COLLUVIUM] 0.6 - 0.8 m - Sample 1, grain size analysis, 33% gravel, 29% sand, 31% silt, 7% clay.
2					End of test pit at 1.3 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.3 m to bottom of excavation. 4) Difficult to excavate, excavator resting on saturated soils.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-84

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458763E, 7100006N
GROUND ELEVATION (m): 863
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 13 Jul 11
FINISH DATE: 13 Jul 11
FINAL DEPTH OF PIT (m): 2.6
LOGGED BY: EC/JS
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			SILT (ML) Some sand, some gravel, trace cobbles, medium brown, moist, homogeneous. Clasts: angular to subangular clasts, loose. [COLLUVIUM] 0.4 - 0.6 m - Sample 1, grain size analysis, 20% sand, 34% silt, 46% clay. Sulphate analysis, 0.07% total sulphate ion content.
1					
2					SILT (ML) Sandy, fine, trace clay, mottled medium grey and orange brown. Frozen: Nbn, moist when thawed. Sand/gravel/cobble lenses until end of pit. [COLLUVIUM]
	G	2			2.3 - 2.5 m - Sample 2, grain size analysis, 2% gravel, 4% sand, 84% silt, 10% clay.
3					End of test pit at 2.6 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Slow seepage in north wall at 0.5 m. 4) Frozen ground encountered below 0.75 m to bottom of excavation. 5) Frozen material very difficult to excavate.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-85

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458783E, 7100055N
GROUND ELEVATION (m): 865
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 13 Jul 11
FINISH DATE: 13 Jul 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: EC/JS
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss, vegetation. [TOPSOIL]
					ORGANIC SILT Dark brown to black. Frozen: trace Vx. [ORGANICS]
1	G	1			SILT (ML) Sandy (fine), some gravel, trace cobbles, trace boulders, low to non-plastic, brown to grey, wet, occasional stratification of tan brown layer, angular clasts. Frozen: Vs (50%). [COLLUVIUM] 0.7 - 1.1 m - Sample 1, grain size analysis, 7% gravel, 42% sand, 40% silt, 11% clay.
2					SILT (ML) Sandy, fine, trace clay, non to low plastic. Frozen: Vs/Vr (20-25%), thin ice lenses, decreasing ice content with depth. [COLLUVIUM]
3					End of test pit at 2.5 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.3 m to bottom of excavation. 5) Very difficult to excavate.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-86

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 460124E, 7101751N

GROUND ELEVATION (m): 894

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 13 Jul 11

FINISH DATE: 13 Jul 11

FINAL DEPTH OF PIT (m): 7.5

LOGGED BY: EC

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					SAND (SM) Fine to medium, gravelly, silty, well graded, compact, maximum particle size = 60 mm, angular to subangular, yellowish brown, moist, homogeneous, rootlets and trace organics. [COLLUVIUM]
2					METASEDIMENTARY ROCK Foliated, yellowish brown, highly to completely weathered (W4 to W5), weak to medium strong (R2 to R3), maximum block size = 400 mm, excavated as gravel, some cobbles, some sand, trace silt, trace boulders, layered with different degrees of weathering and colour 0.5-1.5 m thick (yellow orange, grey, brown). [HIGHLY TO COMPLETELY WEATHERED BEDROCK]
3					
4			4.5		
5					
6					
7					
8					End of test pit at 7.5 m. Notes: 1) Completed at maximum reach of excavator.

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

W% 20 40 60 80

(Continued on next page)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-86

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 460124E, 7101751N

GROUND ELEVATION (m): 894

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 13 Jul 11

FINISH DATE: 13 Jul 11

FINAL DEPTH OF PIT (m): 7.5

LOGGED BY: EC

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Easy excavating (weak rock).
9					
10					
11					
12					
13					
14					
15					
16					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-87

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460690E, 7100247N
GROUND ELEVATION (m): 1194
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 14 Jul 11
FINISH DATE: 14 Jul 11
FINAL DEPTH OF PIT (m): 3.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
	G	1			ORGANIC SILT Gravelly, some sand, trace cobbles, non-plastic, very soft, dark brown to black, moist. [ORGANICS]
1					SAND (SP) Coarse, gravelly (fine), trace cobbles, poorly graded, very loose, largest particle size = 100 mm, stratified, angular to subangular, medium brown to brownish orange, moist to wet. [COLLUVIUM]
2					0.6 - 0.8 m - Sample 1, grain size analysis, 26% gravel, 68% sand, 6% fines. At 1.1 m - Light seepage.
			5		SAND (SW) Coarse sand, gravelly, some cobbles, angular, very dense, orangish brown, very weak to weak (R1 to R2), clasts are metasedimentary. Becomes cobbley and less weathered with depth. Cobbles: strong (R4). [COMPLETELY WEATHERED METASEDIMENTARY BEDROCK]
3			3		METASEDIMENTARY ROCK Same as above but stronger (R4) and moderately weathered (W3). [MODERATELY WEATHERED BEDROCK]
					End of test pit at 3.5 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) Seepage observed, along back of road, at 1.1 m. 4) Not frozen. 5) Excavated on upslope of road cut. 6) Excavation became extremely difficult at 3.3 m. 7) Heavy rain overnight may be contributing to seepage.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

★○

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-88

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459813E, 7101008N
GROUND ELEVATION (m): 922
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 14 Jul 11
FINISH DATE: 14 Jul 11
FINAL DEPTH OF PIT (m): 6.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

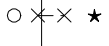
DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SAND (SM) Fine to coarse sand, silty, gravelly, trace cobbles, trace boulders, angular to subangular, maximum particle size = 500 mm. Fines: non-plastic, firm, light brown, moist, homogeneous. [COLLUVIUM] 1.5 - 1.8 m - Sample 1, grain size analysis, 27% gravel, 39% sand, 23% silt, 11% clay.
2					SAND (SW) Some cobbles, some gravel, fine to coarse, trace boulders, trace silt, well graded, dense, maximum particle size = 800 mm, light brown, dry to moist, homogeneous, cobbles and boulders are slightly weathered (W2), strong to very strong (R4 to R5), metasedimentary and granodiorite. Clasts: subangular to subrounded. [COLLUVIUM]
3					
4					COBBLES AND BOULDERS Sandy, trace gravel, trace silt, maximum particle size = 1100 mm, subrounded to subangular, light brown, dry. Clasts: slightly weathered (W2), medium strong to strong (R4 to R5), metasedimentary and granodiorite. [COLLUVIUM]
5					
6					End of test pit at 6.0 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Required moderate effort to excavate.
7					
8					

Su - kPa
40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-89

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459876E, 7100737N
GROUND ELEVATION (m): 985
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 14 Jul 11
FINISH DATE: 14 Jul 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1					GRAVEL (GW) Fine to medium, trace sand, trace cobbles, subangular to subrounded, well graded, very loose, maximum particle size = 150 mm, grey to brown, moist, homogeneous. [COLLUVIUM]
	G	2			0.4 - 0.6 m - Sample 1, grain size analysis, 78% gravel, 21% sand, 1% fines.
2					SAND (SM) Silty, some gravel, trace cobbles, trace boulders, firm, brown, moist, homogeneous. Clasts: subangular. 1.15 - 1.5 m - Frozen: Vx (<1%). [COLLUVIUM] 1.3 - 1.5 m - Sample 2, grain size analysis, 24% gravel, 32% sand, 36% silt, 8% clay.
3					
4					
5			5		METASEDIMENTARY ROCK Disintegrated to blocky/disturbed, grey to brown, completely weathered (W5), excavated as cobbles and gravel, sandy, trace silt, 30% of blocks weathered to clay. Extremely weak to weak (R0 to R2), some medium strong to strong clasts (R3 to R4). [COMPLETELY WEATHERED BEDROCK]
6					
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 1.15 - 4.5 m.
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-90

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459686E, 7100502N
GROUND ELEVATION (m): 981
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 14 Jul 11
FINISH DATE: 14 Jul 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss, vegetation. [TOPSOIL]
1	G	1			SAND (SM) Fine, silty, some gravel, trace cobbles, well-graded, dense, maximum particle size = 180 mm, medium brown, stratified, trace rootlets. Clasts: angular to subangular. [COLLUVIUM] 0.8 - 1. 0 m - Sample 1, grain size analysis, 11% gravel, 23% sand, 66% fines.
2					SILT (ML) Trace sand, some clay, low plastic, grey, moist, stiff, stratified, low dry strength, no dilatancy, layered with occasional fine brown sand, layers <10 cm thick. [COLLUVIUM]
3					
4	G	2			3.5 - 3.6 m - Sample 2, grain size analysis, 4% sand, 90% silt, 6% clay.
5					SAND (SP) Some gravel, fine to coarse, brown, subrounded to rounded, maximum particle size = 300 mm, dense, well graded, brown, moist to dry. Clasts: medium strong to strong (R3 to R4). [COLLUVIUM]
6					
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
8					

Su - kPa
40 80 120 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-91

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459649E, 7100633N
GROUND ELEVATION (m): 969
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 15 Jul 11
FINISH DATE: 15 Jul 11
FINAL DEPTH OF PIT (m): 2.1
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SAND (SM) Silty, some fine to medium gravel, trace cobbles, well graded, loose, medium to brown, wet, stratified, trace rootlets. Clasts angular, maximum particle size = 250 mm. [COLLUVIUM]
2	G	2			SILT (ML) Some sand, trace cobbles (quartz), trace gravel, trace clay, grey, angular particles, wet when thawed, stratified. Frozen: Vx (20%). [COLLUVIUM] 0.8 - 1.0 m - Sample 1, grain size analysis, 7% gravel, 23% sand, 60% silt, 10% clay.
3					GRAVEL (GM) Silty, some sand, some cobbles, trace clay, subangular to subrounded, grey to brown, quartz clasts. Frozen: Vx (10%). [COLLUVIUM] 1.6 - 1.8 m - Sample 2, grain size analysis, 52% gravel, 33% sand, 12% silt, 3% clay.
4					End of test pit at 2.05 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.55 m to bottom of excavation. 5) Extreme difficulty excavating (scraping).
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-92

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459587E, 7100733N
GROUND ELEVATION (m): 933
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 15 Jul 11
FINISH DATE: 15 Jul 11
FINAL DEPTH OF PIT (m): 1.7
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Vegetation, moss, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Some gravel, trace cobbles, trace sand, turns to slurry when thawed, grey. Clasts of quartz: angular to subangular. Frozen: Vx (20-50%). [COLLUVIUM] 0.25 - 0.5 m - Trace organic inclusions. 0.6 - 0.8 m - Sample 1, grain size analysis, 7% sand, 81% silt, 12% clay.
2					End of test pit at 1.7 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Seepage from west corner at 0.25 m. 4) Encountered frozen ground below 0.25 m to bottom of excavation. 5) Extreme difficulty excavating.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-93

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459536E, 7100794N
GROUND ELEVATION (m): 917
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 15 Jul 11
FINISH DATE: 15 Jul 11
FINAL DEPTH OF PIT (m): 1.9
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
					ORGANIC SILT (OL) Rootlets, brown/dark brown to black. [ORGANICS]
1					ICE Thin layer of silt, trace sand, fine, clear, transparent, <1% bubbles.
					SILT AND ICE (ML) Some gravel, trace sand, trace cobbles, brown to grey, homogeneous, quartz clasts. Frozen: Vx/Vs (40-60%), <1% bubbles, trace nodules <100 mm, turns to slurry when thawed. [COLLUVIUM]
2					End of test pit at 1.9 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Light seepage in NE corner at 0.4 m. 4) Encountered frozen ground below 0.4 m to bottom of excavation. 5) Extremely difficult to excavate (scraping).
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-94

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459983E, 7101522N
GROUND ELEVATION (m): 930
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 15 Jul 11
FINISH DATE: 15 Jul 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SILT (ML) Some gravel, sandy, trace boulders (angular), low plastic, medium brown. Frozen: Vx, (5-10%), occasional ice lenses, soft and wet when thawed. [COLLUVIUM] 1.2 - 1.3 m - Sample 1, grain size analysis, 22% gravel, 34% sand, 34% silt, 10% clay.
2	G	2			SAND (SP) Fine, some gravel, trace silt, trace cobbles, trace boulders, poorly graded, moist, homogeneous, medium to light brown. Clasts angular, maximum particle size = 200 mm. [COLLUVIUM] 2.3 - 2.5 m - Sample 2, grain size analysis, 21% gravel, 38% sand, 41% fines.
3					
4					At 4.2 m - Boulder content increases, subrounded to rounded.
5					End of test pit at 5.0 m. Notes: 1) Refusal on boulders. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered from 0.2-2 m.
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-95

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460283E, 7100135N
GROUND ELEVATION (m): 1109
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 26 Jul 11
FINISH DATE: 26 Jul 11
FINAL DEPTH OF PIT (m): 3.2
LOGGED BY: EC/SP
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, root mat. [TOPSOIL]
1	G	1	5		SAND (SW) Fine to medium, trace gravel, trace silt, trace clay, compact, maximum particle size = 250 mm, angular, moist. Disintegrated granodiorite. [COMPLETELY WEATHERED GRANODIORITE ROCK] 0.1 - 0.3 m - Orangish brown. 0.3 - 3.2 m - Light grayish brown - white stratified (0.5-10 cm). 0.9 - 1.1 m - Sample 1, grain size analysis, 10% gravel, 65% sand, 25% fines.
2	G	2	5		SAND (SW) Some clay, trace silt, trace gravel, maximum particle size = 250 mm, angular, light gray brown; disintegrated granodiorite. [COMPLETELY WEATHERED GRANODIORITE ROCK] 1.8 - 2.2 m - Frozen: Vx (<1%). 2.0 - 3.0 m - Sample 2, grain size analysis, 1% gravel, 75% sand, 24% fines. 2.2 - 3.2 m - Frozen: Vx (20-30%), white, granular.
3					End of test pit at 3.2 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 5) Frozen ground encountered below 1.8 m to bottom of excavation.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-96

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460287E, 7100170N
GROUND ELEVATION (m): 1103
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 26 Jul 11
FINISH DATE: 26 Jul 11
FINAL DEPTH OF PIT (m): 2.0
LOGGED BY: EC/SP
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, vegetation, rootmat. [TOPSOIL]
1	G	1			SAND (SW) Some gravel, some cobbles, loose, maximum particle size = 100 mm, angular, moist, stratified, trace rootlets, medium brown - gray. Clasts: granodiorite. [COMPLETELY WEATHERED BEDROCK]
	G	2			SAND (SW) Fine to medium, trace gravel, trace silt, maximum particle size = 45 mm, angular, compact, moist, stratified; layers: 1-10 cm. Clasts: granodiorite. [COMPLETELY WEATHERED BEDROCK]
2	G	3			0.7 - 0.9 m - Sample 1, grain size analysis, 26% gravel, 60% sand, 14% fines. SILT (ML) Clayey, trace gravel, trace sand, low plastic, grey and brown, moist to wet, stratified brown - grey layers, slow dilatancy. Frozen: Vx (< 1%). [COMPLETELY WEATHERED BEDROCK] 1.3 - 1.5 m - Sample 2, grain size analysis, 3% gravel, 32% sand, 54% silt, 11% clay.
3					SAND (SW) Some gravel, trace cobbles, trace silt, maximum particle size = 280 mm, angular, medium brown. Frozen: Vx (30-40%), cloudy, wet when thawed. [COMPLETELY WEATHERED BEDROCK] 1.8 - 2.0 m - Sample 3, grain size analysis, 36% gravel, 49% sand, 15% fines.
4					End of test pit at 2.0 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 1.25 m to bottom of excavation. 5) Extreme difficulty excavating 1.6-2.0 m.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-97

LOCATION: PIT AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460546E, 7099463N
GROUND ELEVATION (m): 1353
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 25 Jul 11
FINISH DATE: 25 Jul 11
FINAL DEPTH OF PIT (m): 4.0
LOGGED BY: EC
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			GRAVEL (GW) Cobbly, silty, sandy, trace boulders, maximum particle size = 500 mm, loose, damp, homogeneous. Clasts metasedimentary; angular. [COLLUVIUM]
3	G	2	4		METASEDIMENTARY ROCK Highly weathered, blocky/disturbed, fair joint condition, light to dark brown, heavily iron stained, very weak to weak (R1 to R2), excavated as cobbles and gravel - some sand. Some clasts: quartz, medium strong to strong (R2 to R3). [HIGHLY WEATHERED BEDROCK]
4					End of test pit at 4.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

20 40 60 80

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-98

LOCATION: PIT AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460521E, 7099465N
GROUND ELEVATION (m): 1342
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 25 Jul 11
FINISH DATE: 25 Jul 11
FINAL DEPTH OF PIT (m): 2.2
LOGGED BY: EC/PQ
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					GRAVEL AND COBBLES (GW) Silty, sandy, trace boulders, well-graded, loose, damp, homogeneous. Clasts metasedimentary, angular, medium to very strong (R3 to R5), maximum particle size = 500 mm. [COLLLUVIUM]
1	G	1			
2	G	2	2.5		METASEDIMENTARY ROCK Slightly to moderately weathered (W2 to W3), very blocky, angular, fair joint condition, brown to red to black, iron stained, medium to very strong (R3 to R5). [SLIGHTLY TO MODERATELY WEATHERED BEDROCK]
3					End of test pit at 2.2 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — ○ — — — — × W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-99

LOCATION: PIT AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460576E, 7099496N
GROUND ELEVATION (m): 1352
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 25 Jul 11
FINISH DATE: 25 Jul 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: EC/PQ
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					GRAVEL AND COBBLES (GW) Silty, sandy, trace boulders, well-graded, angular, medium to very strong (R3 to R5) metasedimentary clasts, maximum particle size = 500 mm, loose, damp. [COLLUVIUM]
2	G	1	4		METASEDIMENTARY ROCK Highly weathered, some quartz alteration, very blocky, angular, fair joint condition, light to dark orangish brown, heavily iron stained, medium strong to strong (R3 to R4). [HIGHLY WEATHERED BEDROCK]
3					End of test pit at 2.5 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-100

LOCATION: PIT AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460565E, 7099505N
GROUND ELEVATION (m): 1345
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 25 Jul 11
FINISH DATE: 25 Jul 11
FINAL DEPTH OF PIT (m): 3.5
LOGGED BY: EC/PQ
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					GRAVEL AND COBBLES (GW) Silty, sandy, trace boulders, well-graded, angular, medium strong to very strong (R3 to R5), metasedimentary clasts, maximum particle size = 500 mm, loose, damp. [COLLUVIUM]
3	G	1	4		METASEDIMENTARY ROCK Highly weathered, blocky/disturbed, angular, fair joint condition, light to dark brown, iron stained, very weak to weak (R1 to R2), trace strong to very strong material (R4 to R5). [HIGHLY WEATHERED BEDROCK]
3.5					End of test pit at 3.5 m. Notes: 1) Refusal on Bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-101

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460089E, 7098940N
GROUND ELEVATION (m): 1180
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 30 Jul 11
FINISH DATE: 30 Jul 11
FINAL DEPTH OF PIT (m): 2.4
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Rootmat. [TOPSOIL]
1	G	2			SILT (ML) Trace sand, non plastic, brown to dark brown, slight organic odour, wet, stratified. Frozen: Vr (5%), ice lenses 2-30 mm thick. [COLLUVIUM]
2					GRAVEL and SAND (GW/SW) Trace to some silt, trace cobbles and boulders, well graded, maximum particle size = 550 mm, brown. Clasts: metasedimentary, elongated, angular, medium strong to very strong (R3 to R5). Frozen: Vx (30-40%), wet when thawed. [COLLUVIUM]
3					End of test pit at 2.4 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.2 m to bottom of excavation. 5) Excavated on side of pad for planned exploration drill hole.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-102

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460565E, 7099111N
GROUND ELEVATION (m): 1361
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 01 Aug 11
FINISH DATE: 01 Aug 11
FINAL DEPTH OF PIT (m): 4.6
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Rootmat, organic silt. [TOPSOIL]
1			4		GRAVEL (GW) Silty, cobbly some fine sand, trace boulders, well graded, compact, particles are flat; angular, metasedimentary, strong (R4), brown, moist, homogeneous, non-cemented, no odour. [COLLUVIUM]
2					COBBLES AND BOULDERS Some silt, some sand, some gravel, brown, moist. Clasts: metasedimentary, flat, platy, angular, strong (R4). [HIGHLY WEATHERED METASEDIMENTARY ROCK]
3			2		METASEDIMENTARY ROCK Dark grey discoloured reddish brown, fine grained, foliated, weak to strong (R2 to R4), slightly weathered (W2). 3 Joint Sets: 25°/248° (foliation), 48°/350°, 89°/077° Fault along foliation (22°/250° fault with 35 mm gouge, chlorite, crushed/decomposed rock). [SLIGHTLY WEATHERED BEDROCK]
4					
5					End of test pit at 4.6 m. Notes: 1) Refusal on Bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Test pit excavated on drill pad for BH-BGC11-45.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-103

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458820E, 7101150N
GROUND ELEVATION (m): 865
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 05 Aug 11
FINISH DATE: 05 Aug 11
FINAL DEPTH OF PIT (m): 6.0
LOGGED BY: AKU
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Organic silt and rootmat. [TOPSOIL]
1					**SILT (ML)** Sandy, some gravel, trace cobbles, moist, low plastic, loose to compact, sub-angular to sub-rounded, flat, metasedimentary clasts, light brown. [COLLUVIUM]
2					
3					
4	G	1			**SAND AND GRAVEL (SW/GW)** Trace silt, trace cobbles, well graded, maximum particle size = 250 mm, subrounded, metasedimentary and granodiorite clasts (generally metasedimentary), compact, light brown. [TILL] 4.4 - 4.8 m - Sample 1, grain size analysis, 47% gravel, 48% sand, 5% fines.
5					
6			4.5		**METASEDIMENTARY ROCK** Orange and grey, fine grained, foliated, highly fractured, highly weathered (W4.5), very weak (R1). [HIGHLY WEATHERED BEDROCK]
7					End of test pit at 6.0 m. Notes: 1) Completed at target depth. 2) Test pit used for plate load testing. 3) No seepage. 4) Not frozen.
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-104

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459738E, 7100924N
GROUND ELEVATION (m): 832
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 23 Aug 11
FINISH DATE: 23 Aug 11
FINAL DEPTH OF PIT (m): 5.6
LOGGED BY: LGT /DW
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat and organic silt. 0.1 - 0.3 m - Light seepage directly below rootmat. [TOPSOIL]
1	G	1			SILT (ML) Gravelly, some sand, trace cobbles, non plastic, firm, brownish grey, no odour, moist, homogeneous, rapid dilatancy. Clasts: metasedimentary, equidimensional to flat, angular to sub-angular, medium strong to strong (R3 to R4), maximum particle size = 200 mm. [COLLUVIUM].
2					GRAVEL (GW) Sandy, some cobbles, trace boulders, well graded, loose to compact, maximum particle size = 500 mm, particles are equidimensional to elongated, rounded to angular, mix of medium to very strong (R3 to R5), granodiorite and medium strong to strong (R3 to R4), metasedimentary rock (90% metased clasts), pinkish brown, moist, homogeneous, non cemented. [TILL] 1.2 - 1.6 m - Sample 1, grain size analysis, 60% gravel, 33% sand, 7% fines.
3					
4			4		SILT (ML) Sandy, gravelly, trace clay, low plastic, firm to stiff, yellowish orange, no odour, moist, laminated/foliated: phyllitic rock that crumbles down to silt when disturbed, micaceous. [COMPLETELY WEATHERED METASEDIMENTARY BEDROCK]
5			4		GRAVEL (GW) Sandy, silty, trace clay, well graded, maximum particle size = 250 mm. Clasts: phyllite, platy, extremely to very weak (R0 to R1), yellowish brown/grey/orange, moist, foliated. [HIGHLY WEATHERED METASEDIMENTARY BEDROCK] At 4.4 m - 250 mm thick quartz vein.
6					End of test pit at 5.6 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) Light seepage from 0.1-0.3 m (directly beneath rootmat). 4) Not frozen. 5) Sloughing near bottom of test pit.
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-105

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458939E, 7101190N
GROUND ELEVATION (m): 878
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Aug 11
FINISH DATE: 09 Aug 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: AKU
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Root mat and organic silt. [TOPSOIL]
1					SAND (SM) Silty, some gravel, trace to some cobbles, moist, well graded, loose to compact, sub-angular, quartz pieces, light brown becoming grey with depth, metasedimentary clasts. [COLLUVIUM]
2					
			4		METASEDIMENTARY ROCK Grey, very weak to weak (R1.5), highly fractured, iron stained in places. [HIGHLY WEATHERED BEDROCK]
3					End of test pit at 3.0 m. Notes: 1) Completed at target depth. 2) Test pit used for plate load testing. 3) No seepage. 4) Not frozen.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-106

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460375E, 7100012N
GROUND ELEVATION (m): 1155
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 06 Aug 11
FINISH DATE: 06 Aug 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
					ORGANIC SILT (OL) Trace sand,non-plastic, wet, dark brown. [PEAT]
1	G	1			SAND (SW) Trace to some fine gravel, trace cobbles, maximum particle size = 80 mm, brown, wet. Clasts: elongate to equidimensional, angular to subangular, granodiorite, strong to very strong (R4 to R5). Frozen: Nbn. [COLLUVIUM]
2					GRAVEL (GW) Cobbley, sandy, some boulders, maximum particle size = 2.5 m, wet, yellowish brown, homogeneous. Clasts: elongated to equidimensional, angular to subangular, granodiorite, strong to very strong (R4 to R5), fresh to faintly weathered (W1 to W1.5). Frozen: Vx (20%), ice is colourless, cloudy to clear, up to 10% organic sediment inclusion. [COLLUVIUM]
3					1.4 - 1.9 m - Frozen: Vx (5-10%).
					End of test pit at 3.0 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.45 m to bottom of excavation. 5) Logged from cut made for drill pad for BH-BGC11-61 and BH-BGC11-66.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-107

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460182E, 7100261N
GROUND ELEVATION (m): 1044
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 16 Aug 11
FINISH DATE: 16 Aug 11
FINAL DEPTH OF PIT (m): 3.2
LOGGED BY: JD/KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, organic silt. [TOPSOIL]
1					SILT (ML) Gravelly, sandy, trace cobbles, low plastic, brown, no odour, wet when thawed, no cementation, homogeneous, rapid dilatancy, maximum particle size = 200 mm. Clasts: some flat clasts, angular, metasedimentary, slightly weathered (W2), weak to medium strong (R2 to R3). Frozen: Vx/Vr (5-15%), in lenses 0.5-5 mm thick and gravel-size crystals. [COLLUVIUM]
2					
3	G	1			Below 2.6 m - Grades to sand (SM), some silt, some sand. 2.8 - 3.0 m - Sample 1, grain size analysis, 25% gravel, 41% sand, 30% silt, 4% clay. Below 2.9 m - Excavation with ripper shank required.
4					End of test pit at 3.2 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.25 m to bottom of excavation. 4) Test pit excavated at drill pad for BH-BGC11-64.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_p% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-108

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460285E, 7099975N
GROUND ELEVATION (m): 1145
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 09 Aug 11
FINISH DATE: 09 Aug 11
FINAL DEPTH OF PIT (m): 1.5
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, organic soil. [TOPSOIL]
1	G	1			SILT (ML) Trace sand, trace boulder, (>10% of silt is organic), non plastic, homogeneous, rapid dilatancy, dark brown, organic odour, wet to moist, seams of yellowish brown sand (SW), maximum particle size = 600 mm, trace rootlets. Frozen: Nbn. [COLLUVIUM]
2					GRAVEL (GM) Silty, cobbley, sandy, well graded, maximum particle size = 350 mm, particles are elongated to equidimensional, angular, light brown, no odour, wet when thawed. Frozen: Vx (20-30%), ice is clear, colourless, granular. Clasts: granodiorite, strong to very strong (R4 to R5), fresh to slightly weathered (W1 to W2). [COLLUVIUM] 0.9 - 1.15 m - Sample 1, grain size analysis, 37% gravel, 37% sand, 26% fines.
3					End of test pit at 1.5 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.15 m to bottom of excavation. 5) Wet from thawing of excess ice.
4					
5					
6					
7					
8					

Su - kPa: 40, 80, 120, 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content: W_P% × — — — ○ — — — × W_L%; W%: 20, 40, 60, 80

○ ★

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-109

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460137E, 7100520N
GROUND ELEVATION (m): 977
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 16 Aug 11
FINISH DATE: 16 Aug 11
FINAL DEPTH OF PIT (m): 5.3
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS
					GRAVEL (FILL) Sandy, trace silt, trace cobbles, well graded, loose, mazimum particle size = 200 mm, flat, some elongated particles, angular, reddish brown, no odour, moist to wet, homogeneous, no cementation, gravel cobbles are metasedimentary rock. [FILL - DEBRIS FROM ADJACENT EXPLORATION TRENCH SPOIL PILE]
1	G	1			
2	G	2			SAND (SP) Primarily fine sand, some coarse sand, gravelly, trace silt, trace cobbles, poorly (gap) graded, loose to compact, maximum particle size = 200 mm, flat, subangular to subrounded, brown, some grey mottling in sand, no odour, moist, no cementation, gravel and cobbles are typically metasedimentary, trace granodiorite clasts. [COLLUVIUM]
3					
4					
5					GRAVEL (GW) Sandy, trace silt, trace cobbles, well graded, compact, maximum particle size = 200 mm, some flat clasts, angular, brown, no odour, moist, no cementation. Clasts: primarily metasedimentary, trace granodiorite clasts. [COLLUVIUM]
6					End of test pit at 5.3 m. Notes: 1) Refusal of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-110

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459851E, 7101062N
GROUND ELEVATION (m): 942
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 16 Aug 11
FINISH DATE: 16 Aug 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Lichen, rootmat, organic soil. [TOPSOIL]
1	G	1			SAND (SM) Gravelly, some silt, trace cobbles, well graded, loose to compact, maximum particle size = 100 mm, some flat gravel/cobbles, subangular to subrounded, light brown, no odour, moist, no cementation, gravel/cobbles are metasedimentary rock. [COLLUVIUM]
2					2.0 - 2.3 m - Reddish brown.
3					
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on moderately weathered metasedimentary bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-111

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460653E, 7100373N
GROUND ELEVATION (m): 1185
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 17 Aug 11
FINISH DATE: 17 Aug 11
FINAL DEPTH OF PIT (m): 2.0
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1	G	1			BOULDERS Angular to subangular, typically flat, maximum particle size = 800 mm, oriented approximately parallel to slope, granodiorite boulders. [COLLUVIUM]
2					BOULDERS Some cobbles, some coarse sand, some silt, trace gravel, poorly (gap graded), compact, maximum particle size = 800 mm, oversize typically flat, sand and gravel equidimensional, subangular to angular, brown sand/silt, grey/white oversize, no odour, moist, no cementation, sand/gravel and oversize are granodiorite. [COLLUVIUM]
					End of test pit at 2.0 m. Notes: 1) Refusal on boulders/cobbles. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-112

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460350E, 7100504N
GROUND ELEVATION (m): 1033
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 17 Aug 11
FINISH DATE: 17 Aug 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1					GRAVEL (GP) Cobbly, poorly (uniformly) graded, loose, flat, angular, brown, moist, metasedimentary clasts. [COLLUVIUM]
	G	1			GRAVEL (GM) Silty, trace cobbles, trace sand, well graded, maximum particle size = 100 mm, angular to subangular, some flat gravels, brown, no cementation, clasts are metasedimentary, low plastic fines. Frozen: Vx (10-20%). [COLLUVIUM] 1.3 - 1.4 m - Sample 1, grain size analysis, 48% gravel, 33% sand, 19% fines. Below 1.5 m - Colour changes to light brown.
2					
3					End of test pit at 2.5 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.6 m to bottom of excavation. 5) Frozen material also noted on lower half of access track cut by excavator from existing road down to test pit.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-113

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459071E, 7099490N
GROUND ELEVATION (m): 878
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 17 Aug 11
FINISH DATE: 17 Aug 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					SILT/FINE SAND [WASHOUT FROM DRILLPAD ABOVE]
1					SILT (ML) Some gravel, trace sand, trace cobbles, low plastic, soft to firm, light brown, grey mottling, no odour, moist, homogeneous, no cementation, maximum particle size = 200 mm, gravel and cobbles are primarily metasedimentary, trace granodiorite, angular to subangular. [COLLUVIUM] At 1.5 m - Seepage entering pit from downhill side.
2					
3					End of test pit at 2.5 m. Notes: 1) Terminated due to slouging of walls and seepage. 2) Backfilled to surface. 3) Seepage at 1.5 m. 4) Not frozen. 5) Pit located approximately 30 cm below natural ground (organics removed) and approximately 3 m downslope of existing drill pad.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-114

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459190E, 7099369N
GROUND ELEVATION (m): 914
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 17 Aug 11
FINISH DATE: 17 Aug 11
FINAL DEPTH OF PIT (m): 3.2
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS
					SAND (SW) Sand, some silt, some gravel, trace clay, trace cobbles, loose to compact, maximum particle size = 200 mm, subangular, dark brown, no odour, moist, no cementation, gravel & cobbles are metasedimentary and granodiorite. [COLLUVIUM] Below 0.7 m - Colour change to light brown.
2					GRAVEL (GW) Sandy (coarse), some clay, trace silt, trace cobbles, compact to dense, maximum particle size = 100 mm, moist, equidimensional, angular to subangular, light brown, no odour, moist, no cementation, granodiorite clasts. [COLLUVIUM?] Below 2.3 m - Frozen: Vx/Vc (<5%). Cobble content increases to some.
3					End of test pit at 3.2 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 2.3 m to bottom of excavation. 4) No samples taken.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-115

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459187E, 7099453N
GROUND ELEVATION (m): 899
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 17 Aug 11
FINISH DATE: 17 Aug 11
FINAL DEPTH OF PIT (m): 5.7
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			SILT (ML) Some coarse sand, some gravel, trace cobbles, low plastic, firm, light brown, no odour, moist, no cementation. Clasts: mostly metasedimentary, trace granodiorite, angular to subangular, some flat, maximum particle size = 150 mm. [COLLUVIUM]
1					
2					
2					Below 2.5 m - Cobble content increases to some.
3					
3					Below 3.7 m - Maximum particle size = 300 mm, some gravel to gravelley, trace boulders.
4					
5					
5					End of test pit at 5.7 m. Notes: 1) Completed at the maximum reach of excavator. 2) Backfilled to surface. 3) No seepage 4) Not frozen. 5) Test pit located on abandoned access road and located approximately 20 cm below natural ground surface.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-116

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459251E, 7099423N
GROUND ELEVATION (m): 905
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 2.3
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS At 0.2 m - Light seepage.
	G	1			SILT (ML) Gravelly, some sand, trace cobbles, low plasticity, soft to firm, light brown, no odour, moist, no cementation, maximum particle size = 200 mm. Clasts: metasedimentary, angular to subangular, some flat. [COLLUVIUM]
1					
					Below 1.5 m - Frozen: Vx/Vs/Vc (approximately 5-10%), coatings and lenses 1-3 mm thick and sand-sized crystals.
2	G	2			2.2 - 2.3 m - Sample 2, grain size analysis, 49% gravel, 36% sand, 15% fines.
					End of test pit at 2.3 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Light seepage at 0.2 m. 4) Frozen ground encountered below 1.5 m to bottom of excavation. 3) Unfrozen walls sloughing throughout excavation.
3					
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-117

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459184E, 7099578N
GROUND ELEVATION (m): 896
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 8.0
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	1			ORGANICS Rootmat. [TOPSOIL]
1					SAND (SP) Coarse sand, some gravel, trace cobbles, trace silt, poorly (gap) graded, loose to compact, maximum particle size = 150 mm, angular to subangular, some flat, colour varies throughout unit: brown, reddish, orange (colour variation occurs in horizontal lines), no odour, moist, metasedimentary clasts. [COLLUVIUM]
2					
3					
4					
5					
6					
7					At 7.0 m - Cobble content increases to some.
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

(Continued on next page)

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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-117

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459184E, 7099578N
GROUND ELEVATION (m): 896
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 8.0
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					End of test pit at 8.0 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Pit excavated at base of existing 2 m high cut slope, adjacent to historic hole: MW96-25.
9					
10					
11					
12					
13					
14					
15					
16					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-118

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459335E, 7100268N
GROUND ELEVATION (m): 951
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 5.3
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1					SAND (SP) Fine sand, trace coarse sand, gravelly, trace silt, trace cobbles, poorly (gap) graded, loose to compact, maximum particle size = 100 mm, some gravel/cobbles are flat, subangular, no odour, moist, no cementation. [COLLUVIUM]
			5		SAND (SP) Trace gravel, trace silt, poorly graded, compact, maximum particle size = 50 mm, some equidimensional, some flat, angular, light reddish brown, no odour, moist to wet, homogeneous, no cementation, metasedimentary clasts. [COMPLETELY WEATHERED METASEDIMENTARY ROCK]
2					SAND AND GRAVEL (SW/SW) Trace cobbles, dense, maximum particle size = 100 mm, flat, some elongated, angular, grey/brown/light orange, no odour, moist, foliated/bedded structure. Clasts: metasediments and very weak (R1). Cobble content increases to some with depth. [HIGHLY WEATHERED METASEDIMENTS]
3					
4			4		
5					
6					End of test pit at 5.3 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-119

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458587E, 7100548N
GROUND ELEVATION (m): 824
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 2.1
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss, organics. [TOPSOIL]
					SILT (OL) Low plastic, dark brown to black, moist, trace rootlets. [ORGANICS]
1	G	1			SILT (ML) Some fine sand, trace gravel, flat, angular, non-plastic, soft, rapid dilatancy, orange, wet when thawed, no cementation. [ALLUVIUM?] Below 0.45 m - Frozen: Vs (<2%), ice lenses 0.5-3 mm thick.
2					SILT (ML) Trace fine sand, low plasticity, orangey brown. Frozen: Vs (<2%), ice lenses 0.5 - 2 mm thick. [ALLUVIUM?] At 0.9 m - Ice lens: 30 mm thick. 0.9 - 1.1 m - Sample 1, modified proctor test, optimized dry density 1780 kg/m^3 at 13.5% moisture content. Permeability analysis, 4.2x10^-10 m/s. Below 1.1 m - Trace clay. At 2.0 m - Ice lens: 25 mm thick.
3					End of test pit at 2.05 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.45 m to bottom of excavation.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-120

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458511E, 7100484N
GROUND ELEVATION (m): 816
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 18 Aug 11
FINISH DATE: 18 Aug 11
FINAL DEPTH OF PIT (m): 4.4
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Rootmat, moss, organics. [TOPSOIL]
1					**SILT (ML)** Some fine sand, some gravel, trace clay, trace cobbles, low plastic, soft, brown, moist to wet, stratified, no cementation. Clasts: metasedimentary and granodiorite, slightly weathered (W1.5 to W2), medium strong (R3), subrounded to subangular, maximum particle size = 200 mm. [ALLUVIUM?] 0.35 - 1.0 m - Frozen: Nbn. At 0.9 m - Sand and gravel layer, 30 mm thick. 1.0 - 3.0 m - Frozen: Vs (5%), ice lenses 2-25 mm thick.
2					
3					**SILT (ML)** Some clay, trace gravel, trace cobbles, subrounded, low plastic, grey, firm. Frozen: Vs (10-20%), ice lenses 1-40 mm thick. [ALLUVIUM?]
4	G	1			3.8 - 4.0 m - Sample 1, modified proctor test, optimized dry density 1840 kg/m^3 at 13% moisture content. Permeability analysis, 6.5x10^-10 m/s.
					ICE 10-20% sediment inclusions.
5					End of test pit at 4.4 m. Notes: 1) Refusal on massive ice. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.35 m to bottom of excavation.
6					
7					
8					

Su - kPa: 40, 80, 120, 160

	FIELD	LAB	
VANE PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content: W_P% × — — — ○ — — — × W_L%; 20, 40, 60, 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-121

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458502E, 7100588N
GROUND ELEVATION (m): 815
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 3.3
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss, silt. [TOPSOIL]
1					SILT (ML) Trace fine sand, trace gravel, trace cobbles, trace boulders, low plastic, soft to firm, orangey brown, moist. Clasts: metasedimentary and granodiorite, medium strong to strong (R3 to R4), slightly weathered (W2), maximum particle size > 300 mm, elongated and flat, subangular. [ALLUVIUM?] Vs0.7 - 0.8 m - Frozen: 10 cm thick ice lens, granular ice. 0.8 - 1.2 m - Frozen: Vs (50%) in lenses 2-20 mm thick. 1.2 - 2.2 m - Vs (20%).
2					At 2.2 m - A 10 cm thick, darker brown, organic layer.
3	G	1			SILT (ML) Trace medium to coarse gravel, trace cobbles, trace boulders, low plastic, grey-brown, homogeneous. Clasts: metasedimentary and granodiorite, rounded to subangular, slightly weathered (W2), medium strong (R3). Frozen: Vs (1-5%). [ALLUVIUM?] 2.9 - 3.1 m - Sample 1, modified proctor test, optimized dry density 1940 kg/m^3 at 13.5% moisture content. Permeability analysis, 4x10^-10 m/s.
4					End of test pit at 3.3m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.7 m to bottom of excavation.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-122

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458684E, 7100707N
GROUND ELEVATION (m): 825
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 5.8
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Moss. [TOPSOIL]
1					SILT (ML) Trace sand, trace to some gravel, some cobbles, trace boulders, non-plastic, soft to firm, orangey brown, moist, rapid dilatancy. Clasts: sub rounded to subangular, flat to equidimensional, slightly weathered (W1.5 to W2), metasedimentary, medium strong to strong (R3 to R 4.5). [PLACER TAILINGS]
2					0.7 - 1.55 m - Zones of trace to some clay, medium plastic, grey-brown, no sand, some seams contain orangey brown, less plastic silt. 1.55 - 5.8 m - Made up of 50% grey-brown silt and approximately 50% orangey-brown less plastic silt. Not segregated into obvious layers. [PLACER TAILINGS]
3					
4					
5	G	1			At 5.4 m - An 800 mm boulder. 5.4 - 5.8 m - Sample 1, modified proctor test, optimized dry density 2110 kg/m^3 at 9% moisture content. Permeability analysis, 3.15x10^-10 m/s.
6					End of test pit at 5.8 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Some sloughing.
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-123

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458498E, 7101322N
GROUND ELEVATION (m): 808
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 2.4
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss, organics. [TOPSOIL]
1					SILT (ML) Some medium to coarse sand, gravelly, trace cobbles, non to low plastic, rapid dilatancy, firm, wet, orangey brown. Clasts: metasedimentary, angular, equidimensional, strong (R4), to slightly weathered (W1.5 to W2). [COLLUVIUM] 0.4 - 0.5 m - Frozen: massive ice, granular, 10% sediment inclusions. 0.5 - 1.3 m - Frozen: Vs, ice in lenses 1-15 mm thick, grades from 60% at 0.5 m to 15% at 1.3 m.
2	G	1			SILT (ML) Gravelly, sandy, some cobbles. Frozen: Vs (10-40%), ice lenses, 2-20 mm thick with trace organics. [COLLUVIUM]
3					End of test pit at 2.4 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.4 m to bottom of excavation.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-124

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458559E, 7101502N
GROUND ELEVATION (m): 825
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 6.5
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					SILT (ML) Gravelly,some sand, trace cobbles, trace boulders, low plastic, firm, orange brown, moist to wet, no cementation, rapid dilatancy, layered. Contains several organic layers and layers with iron staining 1-5 cm thick. Clasts: metasedimentary, subangular to angular, platey, faintly to slightly weathered (W1.5 to W2), medium strong to strong (R3 to R4), maximum particle size = 300 mm. [COLLUVIUM]
2					SILT (ML) Some gravel, some sand, trace cobbles non-plastic, soft, brown to dark brown, dry to moist, no cementation. Clasts: subangular to angular, platey to equidimensional, metasedimentary, slightly weathered (W1.5 to W2), medium strong (R3), trace organics. [COLLUVIUM]
3					
4					
5					At 5.5 m - Seepage.
6	G	1			6.2 - 6.4 m - Sample 1, grain size analysis, 21% gravel, 29% sand, 50% fines.
7					End of test pit at 6.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) Seepage at approximately 5.5 m. 4) Not frozen. 5) Significant sloughing.
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-125

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459492E, 7100047N
GROUND ELEVATION (m): 995
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Rootmat, organic silt. [TOPSOIL]
	G	1			**ORGANIC SILT (OL)** Trace sand, trace fine gravel, trace cobbles, low plastic, firm, light to dark brown, organic odour, moist to wet, no cementation, rapid dilatancy.
1					**SILT (ML)** Some sand, some gravel, trace cobbles, low plastic, dark brownish grey, slight organic odour, wet when thawed, rapid dilatancy. Frozen: Vx/Vs (15-25%). [COLLUVIUM] At 1. 5m - Sandy, trace boulders, yellowish brown. Frozen: Vx(5-10%). Clasts: metasedimentary, medium strong to strong (R3 to R4), faintly to slight weathered (W1.5 to W2), flat to elongated, angular.
2					
3					End of test pit at 2.5 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.55 m to bottom of excavation. 5) Used ripper shank to penetrate frozen ground.
4					
5					
6					
7					
8					

Su - kPa
40 80 120 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

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EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-126

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459464E, 7100300N
GROUND ELEVATION (m): 946
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 3.1
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Rootmat and organic silt. [TOPSOIL]
1					**SILT (ML)** Sandy, fine, gravelly, trace clay, low plastic, firm, brown, no odour, moist, homogeneous, no cementation, rapid dilatancy. [COLLUVIUM] At 0.5 m - A 120 mm thick dark brown organic silt layer. At 1.2 m - Thin bed (100 mm) of grey silt (ML-MH) some gravel, trace cobbles, non-plastic. Clasts: metasedimentary, flat to elongated, angular, medium strong to strong (R3 to R4), fresh to slightly weathered (W1.5), compact, maximum particle size = 130 mm, orangey brown, moist, homogeneous, non cemented.
2	G	1			**GRAVEL AND SAND (GW-SW)** Fine to coarse, silty, trace cobbles, well graded, compact, brown, wet, homogeneous, non cemented. Clasts: metasedimentary, elongate to equidimensional, angular to subangular. Sloughing due to moderate seepage. [COLLUVIUM] 1.7 - 2.2 m - Sample 1, grain size analysis, 52% gravel, 30% sand, 18% fines.
3					**GRAVEL (GM)** Silty, trace to some sand, poorly graded, dense, grey matrix, grey/brown clasts, wet. Frozen: Vx (10-20%). [COLLUVIUM]
4					End of test pit at 3.1 m. Notes: 1) Terminated due to sloughing, seepage and refusal on frozen ground. 2) Backfilled to surface. 3) Seepage below 1.5 m. 3) Frozen ground encountered below 2.5 m to bottom of excavation.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

× — — — — — ○ — — — — — ×

20 40 60 80

○ ★

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-127

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459889E, 7100117N
GROUND ELEVATION (m): 1096
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 2.5
LOGGED BY: LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1					SILT (ML) Gravelly, some cobbles, some sand, non plastic, firm, orange brown, no odour, moist, non cemented, no dry strength, rapid dilatancy. Clasts: metasedimentary, equidimensional to flat, angular, slightly weathered (W2), weak to medium strong (R2 to R3). [COLLUVIUM]
2			2		METASEDIMENTARY ROCK Orange brown, fine grained, foliated, very closely fractured, slightly weathered (W2), weak to medium strong (R2.5 to R3), 3 joint sets, iron stained, crushed rock infill, 0.1-0.5 mm aperture, 20-60 mm spacing, joint roughness (JRC) = 2-6. Foliation: 033°/326° (dip varies from 15°-35°) Set: 034°/175° Set: 062°/282° [SLIGHTLY WEATHERED BEDROCK]
3					End of test pit at 2.5 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) No samples taken. 6) Structural measurements: Dip/Dip direction.
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

	FIELD	LAB	
VANE			▲ UC/2
PEAK	◆	■	
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-128

LOCATION: HAGGART CREEK

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458423E, 7101526N
GROUND ELEVATION (m): 803
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 19 Aug 11
FINISH DATE: 19 Aug 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					SILT (ML) Gravelly, some sand, trace cobbles, non-plastic, rapid dilatancy, soft, wet, brown. Clasts: metasedimentary, subangular to angular, flat, medium strong to strong (R3 to R4), slightly weathered (W1.5 to W2). [COLLUVIUM] Below 0.6 m - Frozen: Vs/Vx (10-20%), ice lenses 2-20 mm thick.
2					At 1.8 m - Recovered one piece of ice and soil that is clear, 20 cm thick, has trace organics, and consists of approximately 60% ice. Below 1.8 m - Vs (1-10%).
3	G	1			2.5 - 3.0 m - Sample 1, grain size analysis, 7% gravel, 32% sand, 61% silt.
4					End of test pit at 3.0 m Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 0.6 m to bottom of excavation. 5) Sloughing of non-frozen upper layer.
5					
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-129

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458563E, 7101340N
GROUND ELEVATION (m): 822
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 20 Aug 11
FINISH DATE: 20 Aug 11
FINAL DEPTH OF PIT (m): 6.8
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss, organics. [TOPSOIL]
1					SILT (SM) Some medium to coarse sand, gravelly, trace cobbles, non plastic, firm, wet, orangey brown, maximum particle size = 140 mm, trace organics. Clasts: metasedimentary, subangular to angular, flat to equidimensional, slightly weathered (W2), medium strong to strong (R3 to R4). [COLLUVIUM] At 1.2 m - An orange layer, 10 cm thick, with greater iron staining. At 1.3 m - A brown layer, 5 cm thick, of mostly decomposed organics.
2					At 2.0 m - A brown layer, 5 cm thick, of mostly decomposed organics.
3	G	2			
4					SILT (ML) Trace medium to coarse sand, some gravel, trace cobbles, trace organics, low plastic, firm to stiff, moist, greyish brown. Clasts: metasedimentary, medium strong to strong (R3 to R4), subangular to angular, flat to equidimensional, fresh to slightly weathered (W1.5), metasedimentary, maximum particle size = 140 mm. [COLLUVIUM]
5					
6					
6.6	G	1			6.6 - 6.8 m - Sample 1, grain size analysis, 16% gravel, 31% sand, 53% fines. 6.7 - 6.8 m - Frozen: Vs (1-5%), ice lenses 2-5 mm thick, clear.
7					End of test pit at 6.8 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Frozen ground encountered below 6.7 m to bottom of excavation.
8					

Su - kPa: 40, 80, 120, 160

VANE PEAK ◆ FIELD ■ LAB ▲ UC/2
REMOLD ◇ FIELD □ LAB △ Pocket Pen /2

★ % Fines

Moisture Content: W_P% × — — — ○ — — — W_L% × ; W% 20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-129

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458563E, 7101340N
GROUND ELEVATION (m): 822
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 20 Aug 11
FINISH DATE: 20 Aug 11
FINAL DEPTH OF PIT (m): 6.8
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
8					5) Some sloughing at 1.2 m depth, extensive sloughing at 6.8 m depth.

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

9 10 11 12 13 14 15 16

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PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-130

LOCATION: WEST FLANK TIN DOME

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 458709E, 7101183N
GROUND ELEVATION (m): 865
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 20 Aug 11
FINISH DATE: 20 Aug 11
FINAL DEPTH OF PIT (m): 6.0
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, organics, moss. [TOPSOIL]
1					SILT (ML) Sandy, some gravel, trace cobbles, non plastic, brown, dry, firm, no to weak cementation. Clasts: subangular to angular, flat to equidimensional, metasedimentary, medium strong to very strong (R3 to R5), slightly weathered (W2), maximum particle size = 200 mm. [COLLUVIUM] Below 1.2 m - Trace boulders, maximum particle size = 600 mm.
2					
3					
4					4.0 - 4.5 m - Increased cobble content.
5					
6	G	1			5.8 - 6.0 m - Sample 1, grain size analysis, 35% gravel, 43% sand, 22% fines.
					End of test pit at 6.0 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
7					
8					

Su - kPa: 40, 80, 120, 160

VANE PEAK ◆ ■ ▲ UC/2
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content: W_P% × — — — ○ — — — × W_L%; W% 20, 40, 60, 80

○ ★

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EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-131

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459934E, 7101430N
GROUND ELEVATION (m): 921
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 20 Aug 11
FINISH DATE: 20 Aug 11
FINAL DEPTH OF PIT (m): 3.5
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					BOULDERS AND COBBLES Silty, some sand, some gravel, wet, brown. Clasts: mostly granodiorite with some metasedimentary and some quartz clasts, subangular, slightly weathered (W1.5 to W2), strong (R4), maximum particle size = 300 mm. [DEBRIS FLOW?]
2					SAND (SM) Silty, some gravel, trace cobbles, trace boulders, brown, wet, loose. Stratified: contains layers of upward-fining sequences. Clasts: subangular, flat, medium strong to strong (R3 to R4), slightly weathered (W1.5 to W2), maximum particle size = 700 mm. [DEBRIS FLOW?] 0.8 - 1.2 m - Frozen: Nbn. At 1.15 m - There is a 10 cm upwards-fining sequence of coarse sand and gravel.
3	G	1			3.2 - 3.5 m - Sample 1, grain size analysis, 45% gravel, 38% sand, 17% fines. 3.4 - 3.5 m - Heavy seepage.
4					End of test pit at 3.5 m. Notes: 1) Terminated due to sloughing and seepage. 2) Backfilled to surface. 3) Heavy seepage from 3.4-3.5 m. 4) Frozen ground encountered from 0.8-1.2 m.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_p% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-132

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 459840E, 7101515N

GROUND ELEVATION (m): 922

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 20 Aug 11

FINISH DATE: 20 Aug 11

FINAL DEPTH OF PIT (m): 5.3

LOGGED BY: JND

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					SILT (ML) Some gravel, some cobbles, trace coarse sand, trace boulders, non plastic, rapid dilatancy, firm, orangish brown, dry. Clasts: metasedimentary, weak to strong (R2 to R4), slightly weathered (W2), angular, maximum particle size = 300 mm. [COLLUVIUM]
			4		SILT(ML) Bouldery, some sand, some gravel, some cobbles, orangish brown, dry. Clasts: very weak to medium strong (R1 to R3), highly weathered (W4), metasedimentary, maximum particle size = 800 mm. [COLLUVIUM]
2					METASEDIMENTARY ROCK Very weak to medium strong (R1 to R3), highly weathered (W4), iron stained, metasedimentary, approximately 60% disintegrated to soil, orangish brown. [HIGHLY WEATHERED BEDROCK]
3			2.5		METASEDIMENTARY ROCK Orangish brown, metasedimentary, weak (R2), slightly to moderately weathered (W2 to W3), heavily jointed (spacing of 2-5 cm). [MODERATELY TO SLIGHTLY WEATHERED BEDROCK]
4			2		METASEDIMENTARY ROCK Orange-green brown, metasedimentary, weak to medium strong (R2 to R3), slightly weathered (W2), chlorite altered rock, blocky (approximately 50 cm). [SLIGHTLY WEATHERED BEDROCK]
5					
6					End of test pit at 5.3 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — ○ — — — — × W_L%

20 40 60 80

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-133

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 460048E, 7101608N

GROUND ELEVATION (m): 984

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 21 Aug 11

FINISH DATE: 21 Aug 11

FINAL DEPTH OF PIT (m): 4.4

LOGGED BY: JND

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					GRAVEL (GM) Silty, some sand, trace cobbles, loose, orangish brown, wet. Clasts: angular, flat, metasedimentary, maximum particle size = 220 mm, weak (R2), slightly weathered (W2). [COLLUVIUM]
2					SILT (ML) Some sand, some gravel, trace cobbles, low plastic, grey. Clasts: angular, flat, metasedimentary, slightly weathered (W2), weak (R2), maximum particle size = 240 mm. Frozen: Vs (10-20%), ice lenses 1-40 mm thick, clear. [COLLUVIUM]
3					GRAVEL (GM) Sandy, silty, trace cobbles, orangish brown. Clasts: metasedimentary, phyllitic, angular, flat, reddish brown, very weak to medium strong (R1 to R3), slightly to moderately weathered (W2 to W3). Frozen: Vx/Vs (10-20%), ice lenses 1-5 mm thick. [MODERATELY TO HIGHLY WEATHERED METASEDIMENTARY BEDROCK]
4	G	1			4.3 - 4.4 m - Sample 1, grain size analysis, 51% gravel, 34% sand, 15% fines.
					End of test pit at 4.4 m. Notes: 1) Refusal on frozen ground. 2) Backfilled to surface. 3) Some seepage and sloughing from top unfrozen layer 0.2-0.6 m. 4) Frozen ground encountered below 0.6 m to bottom of excavation.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — ○ — — — — × W_L%

20 40 60 80

○ ★

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-134

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460101E, 7101419N
GROUND ELEVATION (m): 945
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 21 Aug 11
FINISH DATE: 21 Aug 11
FINAL DEPTH OF PIT (m): 4.2
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					SILT (ML) Sandy, some gravel, trace cobbles, trace boulders, non plastic, rapid dilatancy, brown, moist. Clasts: metasedimentary and granodiorite, slightly weathered (W2), medium strong to strong (R3 to R4), subrounded to angular, stratified: contains upward fining sequences, maximum particle size = 400 mm. [DEBRIS FLOW?]
1					COBBLES Gravelly, some sand, some silt. Clasts: metasedimentary and granodiorite, flat, subrounded to angular, faintly to slightly weathered (W2), medium strong to strong (R3 to R4). Matrix non-plastic, brown, moist. [DEBRIS FLOW?]
2					BOULDERS Sandy, some gravel, some cobbles, trace silt, moist, brown. Clasts: granodiorite and metasedimentary, subrounded to subangular, medium strong to very strong (R3 to R5), slightly weathered (W2), maximum particle size = 1000 mm. [DEBRIS FLOW?] At 1.3 m - A 1700 by 1000 mm boulder.
3					
4	G	1			4.1 - 4.2 m - Moderate seepage.
					End of test pit at 4.2 m. Notes: 1) Terminated due to sloughing and seepage at base of pit. 2) Backfilled to surface. 3) Moderate seepage from 4.1-4.2 m. 4) Not frozen.
5					
6					
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-135

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459998E, 7101383N
GROUND ELEVATION (m): 931
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 21 Aug 11
FINISH DATE: 21 Aug 11
FINAL DEPTH OF PIT (m): 3.5
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1	G	1			SILT (ML) Trace sand, some gravel, trace organics, trace cobbles, low plastic, rapid dilatancy, greyish brown. Clasts: metasedimentary, reddish brown, medium strong (R3), slightly weathered (W2), subangular, flat, maximum particle size = 120 mm. [COLLUVIUM] At 0.5 m - Some seepage. Below 1.2 m - Some sand, trace boulders, non-plastic, orangish brown. Clasts: granodiorite and metasedimentary, medium strong to strong (R3 to R4), maximum particle size = 500 mm.
2					
3					
4					End of test pit at 3.5 m. Notes: 1) Refusal on boulders. 2) Backfilled to surface. 3) Some seepage at 0.5 m. 4) Not frozen. 5) Some sloughing.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-136

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459896E, 7101306N
GROUND ELEVATION (m): 910
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 21 Aug 11
FINISH DATE: 21 Aug 11
FINAL DEPTH OF PIT (m): 4.8
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1	G	1			SILT (ML) Trace to some sand, trace gravel to gravelly, trace cobbles, low plastic, moist, firm. Comprises alternating layers of 70% orange-brown material (gravelly, trace organics), and 30% grey-brown material 3-10 cm thick (few clasts, no organics). Clasts: metasedimentary, medium strong (R3), slightly weathered (W1.5 to W2), subangular to angular, platey to equidimensional. [PLACER TAILINGS]
2					2.1 - 2.5 m - Becomes trace sand, trace gravel, grey-brown.
3					SAND (SM) Silty, some gravel, trace cobbles, trace boulders, orangish brown, moist. Clasts: metasedimentary and granodiorite, medium strong to strong (R3 to R4), slightly weathered (W2), rounded to angular, maximum particle size = 500 mm. [DEBRIS FLOW?]
4					
5					End of test pit at 4.8 m. Notes: 1) Refusal on boulders. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Sloughing of pit walls due to rainy weather conditions. 6) Test pit excavated at drill pad for BH-BGC11-52
6					
7					
8					

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-137

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459920E, 7101171N
GROUND ELEVATION (m): 943
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 21 Aug 11
FINISH DATE: 21 Aug 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: JND
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					**ORGANICS** Rootmat, moss. [TOPSOIL]
	G	1			**SILT (ML)** Gravelly, some sand, trace cobbles, trace boulders, low plastic, rapid dilatancy, brown. Clasts: metasedimentary, weak to medium strong (R2 to R3), reddish brown and reddish grey, subangular to angular, flat to equidimensional, maximum particle size = 300 mm. [COLLUVIUM]
1					
			4.5		**METASEDIMENTARY ROCK** Brownish grey, extremely weak to weak (R0 to R2), highly to completely weathered (W4 to W5), phyllitic, crumbles into micaceous flakes under finger pressure. [HIGHLY TO COMPLETELY WEATHERED BEDROCK]
2					
			2.5		**METASEDIMENTARY ROCK** Reddish brown, 4 visible joint sets, weak to medium strong (R2 to R3), slightly to moderately weathered (W2 to W3). [SLIGHTLY TO MODERATELY WEATHERED BEDROCK]
3					
			3.5		**METASEDIMENTARY ROCK** Brownish grey, silver along foliation, highly fractured, phyllitic, very weak to weak (R1 to R2), moderately to highly weathered (W3 to W4). [MODERATELY TO HIGHLY WEATHERED BEDROCK]
4					
5					End of test pit at 5.0 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB	
PEAK	◆	■	▲ UC/2
REMOLD	◇	□	△ Pocket Pen /2

★ % Fines

Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-138

LOCATION: STUTTLE GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459771E, 7100041N
GROUND ELEVATION (m): 1050
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 24 Aug 11
FINISH DATE: 24 Aug 11
FINAL DEPTH OF PIT (m): 6.3
LOGGED BY: DW/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1	G	1			GRAVEL AND SAND (GM) Silty, well-graded, compact, flat and elongated, metasedimentary clasts, brown, moist, homogeneous, maximum particle size = 120 mm. [COLLUVIUM]
2			4		METASEDIMENTARY ROCK Brown, orangish, fine grained, foliated, weak to medium strong (R2 to R3), 3 main joint sets, hematite staining, crushed rock and silty sand infill, 0.5-5 mm aperture, JRC = 2-5. [HIGHLY WEATHERED BEROCK]
3			2		METASEDIMENTARY ROCK Brown, orangish/reddish, fine grained, foliated, medium strong (R3), slightly weathered (W2), hematite infill, 0.5 - 5 mm aperture, JRC = 2 - 5. Joint set 1: 17/74 Joint set 2: 84/244 Joint set 3: 78/345 [SLIGHTLY WEATHERED BEDROCK]
7					End of test pit at 6.3 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.

Su - kPa
40 80 120 160
VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2
★ % Fines
Moisture Content
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-139

LOCATION: SOUTH OF PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459001E, 7099033N
GROUND ELEVATION (m): 935
DATUM: UTM NAD 83

EXCAVATOR: Hand dug
OPERATOR: N/A

START DATE: 24 Aug 11
FINISH DATE: 24 Aug 11
FINAL DEPTH OF PIT (m): 3.0
LOGGED BY: DW/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1	G	1	5		GRAVEL AND SAND (GW/SW) Trace to some silt, trace cobbles, well graded, maximum particle size = 85 mm, loose to compact, flat and elongated, angular, yellowish/orangish brown, moist, homogeneous. [COLLUVIUM]
2			3		SAND (SW) Some fine to medium gravel, trace silt, well graded, loose to compact, maximum particle size = 30 mm, flat and elongated, angular, moist, orange to yellow, non cemented, relict bedding structures of the bedrock are visible as alternating orange/brown layers. [COMPLETELY WEATHERED BEDROCK]
3					METASEDIMENTARY ROCK Grey to orangish, fine grained, foliated, medium strong (R3), moderately weathered (W3), 3 joint sets, tabular blocks, hematite infill, aperture 0.5-3 mm, spacing of sets: Foliation: extremely to very closely spaced joints (225°/220°) Joint set 1: no exposure (70°/80°) Joint set 2: very closely to closely spaced joints (50°/344°) [MODERATELY WEATHERED BEDROCK]
4					End of test pit at 3.0 m. Notes: 1) Logged by hand digging the slope of an existing exploration trench. 2) No seepage. 3) Not frozen.
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-140

LOCATION: SOUTH OF PLATINUM GULCH

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 459228E, 7097912N

GROUND ELEVATION (m): 954

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 24 Aug 11

FINISH DATE: 24 Aug 11

FINAL DEPTH OF PIT (m): 4.5

LOGGED BY: DW/LGT

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat and organic silt. [TOPSOIL]
1	G	1			SILT (ML) Gravelly (fine to medium), some sand, trace cobbles, trace clay, trace rootlets, low plasticity, firm, no odour, moist, no cementation, rapid dilatancy. Clasts: metasedimentary, elongated, angular, medium strong (R3), faintly to slightly weathered (W1.5). [COLLUVIUM] PP/2 = 50 kPa. 1.0 - 1.2 m - Sample 1, grain size analysis, 21% gravel, 34% sand, 45% fines. At 1.2 m - Thin layer of sandy silt, brown, vesicular, rapid dilatancy, wet.
2					METASEDIMENTARY ROCK Phyllite, grey, bluish-grey, brownish-grey, fine grained, extremely closely spaced foliation planes, foliation is sub-horizontal, extremely weak (R1), slightly weathered (W2), mica rich, hematite staining on foliation plane, trace clay on foliation joint walls. [SLIGHTLY WEATHERED BEDROCK]
3			2		
4					At 3.7 m - Very difficult to excavate through quartzite beds (1-3 cm thick).
5					End of test pit at 4.5 m. Notes: 1) Refusal on bedrock. 2) Backfilled to surface. 3) No seepage. 4) Not frozen.
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-141

LOCATION: PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460019E, 7098871N
GROUND ELEVATION (m): 1154
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 24 Aug 11
FINISH DATE: 24 Aug 11
FINAL DEPTH OF PIT (m): 5.0
LOGGED BY: DW/LGT
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, organic silt. [TOPSOIL]
1					GRAVEL (GM) Silty, trace to some sand, trace rootlets, trace boulders, loose, maximum particle size = 1000 mm, dark brown, no odour, wet, no cementation. Clasts: metasedimentary, elongated, angular to subangular, medium strong (R3), slightly weathered (W2). [COLLUVIUM] At 1.0 m - Seepage.
2					1.9 - 2.5 m - Lenses of sand, 10-15 cm thick, fine, silty, trace gravel, fine to coarse, grey, moist.
3					
4	G	1			3.75 - 4.1 m - Lenses of sand, 10-15 cm thick, fine, silty, trace gravel, grey, moist.
5					End of test pit at 5.0 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) Seepage at 1.0 m. 4) Not frozen. 5) Some sloughing.
6					
7					
8					

Su - kPa
40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content
W_P% × — — — — ○ — — — — × W_L%
20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-142

LOCATION: SOUTH OF PLATINUM GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459037E, 7098318N
GROUND ELEVATION (m): 913
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 26 Aug 11
FINISH DATE: 26 Aug 11
FINAL DEPTH OF PIT (m): 4.5
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat, moss. [TOPSOIL]
1					SAND (SM) Some silt, some gravel, trace cobbles, well graded, loose to compact, maximum particle size = 100 mm, some clasts are flat and elongated, angular to subangular, brown, no odour, moist, no cementation, gravel and cobbles are metasedimentary. [COLLUVIUM]
2					
3			4		GRAVEL (GW) Fine to coarse, some sand to sandy, trace cobbles, well graded, compact, maximum particle size = 200 mm, most clasts are flat, some elongated, angular, orange and greyish black, no odour, moist, bedded/foliated structure, talc on some clasts surfaces. Clasts: typically very weak (R1) and break along foliation/bedding. [HIGHLY WEATHERED METASEDIMENTARY ROCK]
4					
5					End of test pit at 4.5 m. Notes: 1) Completed at maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) No samples taken.
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2
PEAK ◆ ■
REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-143

LOCATION: STEINER AREA

SURVEY METHOD: Handheld GPS

CO-ORDINATES (m): 458644E, 7100441N

GROUND ELEVATION (m): 838

DATUM: UTM NAD 83

EXCAVATOR: 325D Cat

OPERATOR: EWING

START DATE: 26 Aug 11

FINISH DATE: 26 Aug 11

FINAL DEPTH OF PIT (m): 4.0

LOGGED BY: KH/DW

REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1					SILT (ML) Sandy (fine), poorly (uniformly) graded, low plastic, firm, greyish brown, moist, slight organic odour, no cementation. [ALLUVIUM?] At 0.3 m - Light seepage.
2					SAND (SP) Medium to coarse sand, gravelly, trace cobbles, trace silt, poorly (gap) graded, loose to compact, maximum particle size = 100 mm, sand subrounded, gravel and cobbles rounded, grey, wet, primarily metasedimentary clasts, trace granodiorite clasts. [ALLUVIUM?] At 0.6 m - Light seepage.
					ORGANICS Brownish black.
3					SILT (ML) Some fine to coarse sand, some gravel, trace cobbles, low plastic, soft to firm, brown, no odour, moist, no cementation. Clasts: metasedimentary, subrounded to angular, typically flat. [ALLUVIUM?] At 1.7 m - Moderate seepage.
4					SILT (ML) Some sand, trace clay, low plastic, firm to stiff, light grey, no odour, dry to moist, no cementation. Clasts: metasedimentary, subrounded, maximum particle size = gravel sized. PP/2 = 60-150 kPa. [ALLUVIUM?]
5					End of test pit at 4.0 m. Notes: 1) Terminated due to sloughing. 2) Backfilled to surface. 3) Light seepage found at 0.3 and 0.6 m. Moderate seepage found at 1.7 m. 3) Not frozen. 4) Walls sloughing between 1.0 and 1.7 m.
6					
7					
8					

Su - kPa

40 80 120 160

VANE FIELD LAB ▲ UC/2

PEAK ◆ ■

REMOLD ◇ □ △ Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

△ (3 m)

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-144

LOCATION: EAGLE PUP

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 460540E, 7100144N
GROUND ELEVATION (m): 1158
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 27 Aug 11
FINISH DATE: 27 Aug 11
FINAL DEPTH OF PIT (m): 1.0
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					ORGANICS Rootmat. [TOPSOIL]
1					SAND (SW) Sand, some gravel, some silt, trace cobbles, well graded, loose, maximum particle size = 100 mm, sand is subrounded, gravels and cobbles are subangular to angular, grey, no odour, wet, homogeneous, no cementation, granodiorite clasts. Heavy seepage at organics/colluivum contact (0.4 m). [COLLUVIUM]
2					End of test pit at 1.0 m. Notes: 1) Terminated due to sloughing and seepage. 2) Backfilled to surface. 3) Heavy seepage at 0.4 m. 4) Not frozen.
3					
4					
5					
6					
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% W% W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

TEST PIT # TP-BGC11-145

LOCATION: MIDDLE REACH DUBLIN GULCH

SURVEY METHOD: Handheld GPS
CO-ORDINATES (m): 459853E, 7101471N
GROUND ELEVATION (m): 959
DATUM: UTM NAD 83

EXCAVATOR: 325D Cat
OPERATOR: EWING

START DATE: 27 Aug 11
FINISH DATE: 27 Aug 11
FINAL DEPTH OF PIT (m): 5.1
LOGGED BY: KH
REVIEWED BY: PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	WEATHERING GRADE	SYMBOL	LITHOLOGIC DESCRIPTION
0					DRILL PAD FILL
					ORGANICS
1					SAND (SM) Gravelly, some silt, trace cobbles, well graded, compact, maximum particle size = 100 mm, sand is equidimensional, subrounded to subangular, gravel and cobbles are typically flat, some elongated, subangular to angular, light brown, no odour, moist, no cementation, metasedimentary clasts. [COLLUVIUM]
2					
3					Below 2.5 m - Cobble content increases to some.
4					
5					Below 4.5 m - Trace boulders.
6					End of test pit at 5.1 m. Notes: 1) Completed to maximum reach of excavator. 2) Backfilled to surface. 3) No seepage. 4) Not frozen. 5) Slight sloughing. 6) Test pit excavated at drill pad for BH-BGC11-31.
7					
8					

Su - kPa

40 80 120 160

VANE	FIELD	LAB		
PEAK	◆	■	▲	UC/2
REMOLD	◇	□	△	Pocket Pen /2

★ % Fines

Moisture Content

W_P% × — — — — — ○ — — — — — × W_L%

20 40 60 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (TESTPIT) EGP_TESTPIT.GDL BGC.GDT 1/20/12

APPENDIX D
TEST PIT PHOTOS

TP-BGC11-50 – Site photo; drill pad of BH-BGC11-36.

TP-BGC11-50 – Cut slope from construction of drill pad.

TP-BGC11-50 – Pit back wall; pit completed at a depth of 5.8 m.

TP-BGC11-50 – Detail of an excavated bucket.

TP-BGC11-51 – Site photo.

TP-BGC11-51 – Cut slope from access construction; frozen ground.

TP-BGC11-51 – Pit back wall; pit completed at a depth of 4.7 m.

TP-BGC11-51 – Detail of spoil pile.

TP-BGC11-52 – Site photo; drill pad of BH-BGC11-29.

TP-BGC11-52 – Cut slope and test pit; pit completed at depth of 5.0 m.

TP-BGC11-52 – Detail of spoil pile.

TP-BGC11-52 – Detail of a bucket excavated from 3.30 m.

TP-BGC11-53 – Site photo; drill pad of BH-BGC11-27.

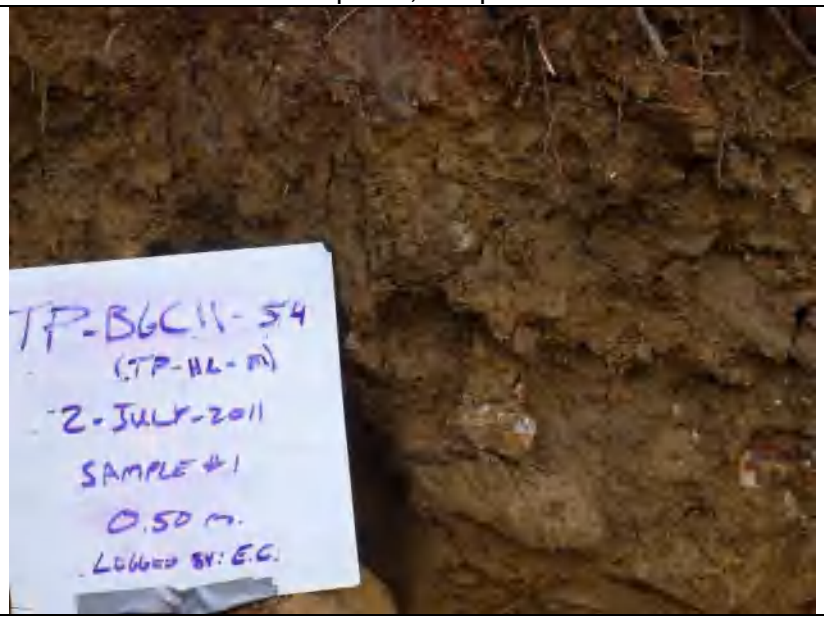
TP-BGC11-53 – Cut slope and test pit; pit completed at depth of 4.0 m.

TP-BGC11-53 – Detail of spoil pile.

TP-BGC11-53 – Detail of a bucket excavated from 2.0 m.

TP-BGC11-54 – Site photo; drill pad of BH-BGC11-25.

TP-BGC11-54 – Back wall of test pit; pit completed at depth of 2.0 m.

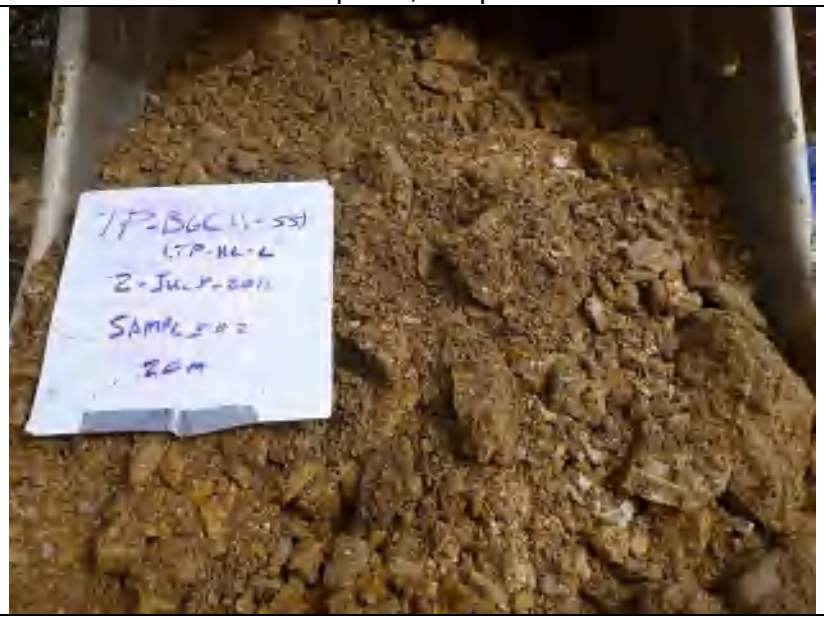


TP-BGC11-54 – Detail of pit wall at 0.5 m.

TP-BGC11-54 – Detail of pit wall at 2.0 m; bedrock at base.

TP-BGC11-55 – Site photo; drill pad of BH-BGC11-24.

TP-BGC11-55 – Back wall of test pit; pit completed at depth of 2.0 m.



TP-BGC11-55 – Detail of a bucket excavated from 2.0 m.

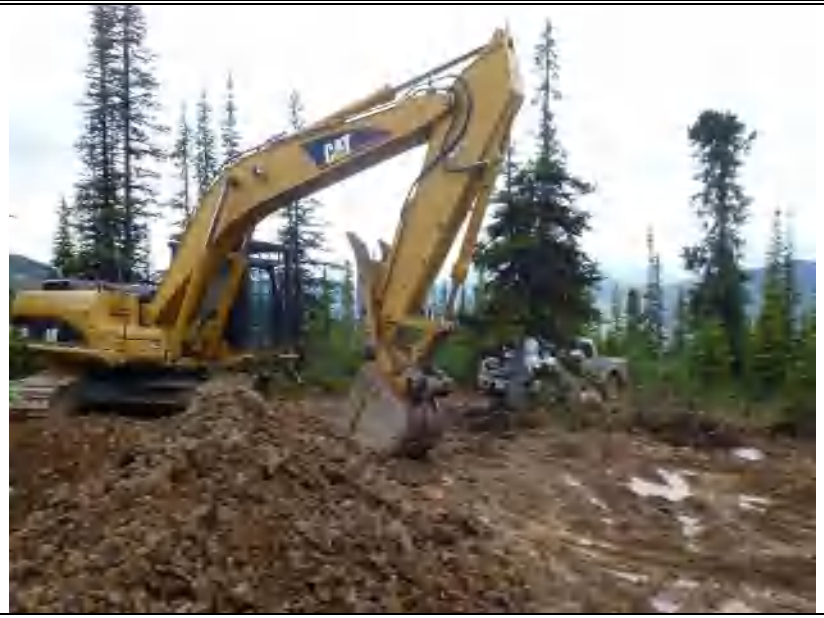
TP-BGC11-55 – Detail of pit wall at 0.5 m.

TP-BGC11-56 – Site photo.

TP-BGC11-56 – Back wall of test pit; pit completed at depth of 2.0 m.

TP-BGC11-56 – Detail of spoil pile.

TP-BGC11-56 – Detail of pit wall at 0.5 m.



TP-BGC11-57 – Site photo; drill pad of BH-BGC11-26.

TP-BGC11-57 – Back wall of test pit; pit completed at depth of 5.0 m.

TP-BGC11-57 – Detail of spoil pile; bedrock.

TP-BGC11-57 – Detail of pit wall at 1.0 m.

TP-BGC11-58 – Site photo.

TP-BGC11-58 – Back wall of test pit; pit completed at depth of 5.0 m.

TP-BGC11-58 – Detail of spoil pile; excavated from 2.0 m.

TP-BGC11-58 – Detail of pit wall.

TP-BGC11-59 – Site photo; drill pad of BH-BGC11-50.

TP-BGC11-59 – Cut slope and test pit; pit completed at depth of 2.6 m.

TP-BGC11-59 – Detail of pit wall at 0.5 m.

TP-BGC11-60 – Site photo.

TP-BGC11-60 – Cut slope and test pit; pit completed at depth of 2.7 m.

TP-BGC11-60 – Detail of spoil pile; frozen ground 0.7-0.9 m.

TP-BGC11-60 – Detail of pit wall.

TP-BGC11-61 – Site photo.

TP-BGC11-61 – Cut slope and test pit; pit completed at depth of 2.7 m.

TP-BGC11-61 – Detail of spoil pile.

TP-BGC11-61 – Detail of pit wall 0.7-0.8 m.

TP-BGC11-62 – Back wall of test pit.

TP-BGC11-62 – Bottom of test pit; pit completed at depth of 6.2 m.

TP-BGC11-62 – Detail of a bucket excavated from 3.5-3.7 m.

TP-BGC11-62 – Detail of pit wall from 0.9-1.0 m.

TP-BGC11-63 – Site photo.

TP-BGC11-63 – Back wall of test pit; pit completed at depth of 4.6 m.

TP-BGC11-63 – Detail of spoil pile.

TP-BGC11-63 – Detail of pit wall from 0.5-0.7 m.

TP-BGC11-64 – Site photo.

TP-BGC11-64 – Back wall of test pit; pit completed at depth of 4.7 m.

TP-BGC11-64 – Detail of spoil pile.

TP-BGC11-64 – Detail of pit wall from 1.5-1.6 m.

TP-BGC11-65 – Site photo.

TP-BGC11-65 – Back wall of test pit; pit completed at depth of 8.0 m.

TP-BGC11-65 – Detail of spoil pile.

TP-BGC11-65 – Detail of pit wall from 0.4-0.5 m.

TP-BGC11-66 – Site photo.

TP-BGC11-66 – Back wall of test pit; pit completed at depth of 7.5 m.

TP-BGC11-66 – Detail of spoil pile.

TP-BGC11-66 – Detail of pit wall from 0.0-2.0 m.

TP-BGC11-67 – Back wall of test pit; pit completed at depth of 6.5 m.

TP-BGC11-67 – Detail of spoil pile.

TP-BGC11-67 – Detail of pit wall from 0.7-0.9 m.

TP-BGC11-68 – Back wall of test pit; pit completed at depth of 6.5 m.

TP-BGC11-68 – Detail of spoil pile.

TP-BGC11-68 – Detail of pit wall from 1.6-1.8 m.

TP-BGC11-69 – Site photo.

TP-BGC11-69 – Back wall of test pit; pit completed at depth of 6.5 m.

TP-BGC11-69 – Detail of spoil pile.

TP-BGC11-69 – Detail of pit wall from 2.8-2.9 m.

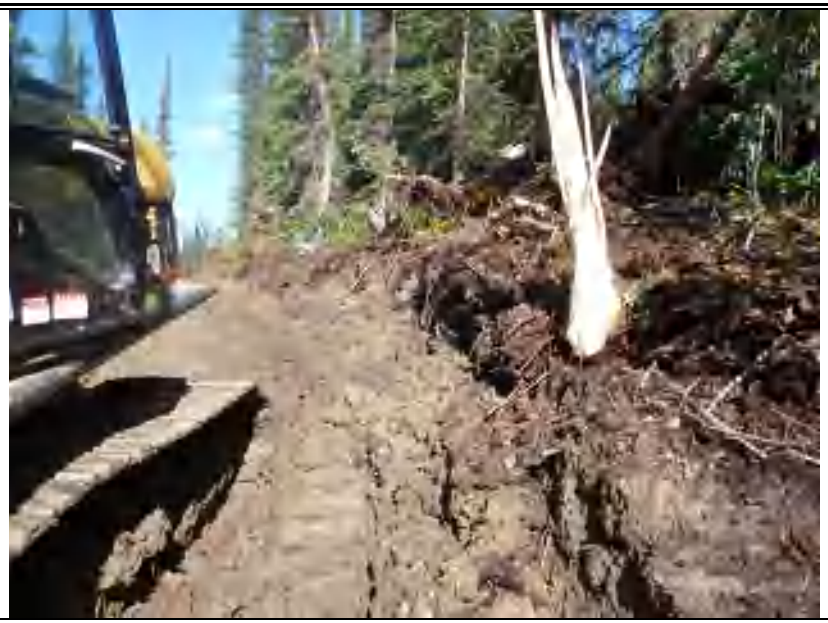
TP-BGC11-70 – Site photo.	TP-BGC11-70 – Cut slope wall; pit completed at depth of 3.0 m.

TP-BGC11-71 – Site photo; drill pad of BH-BGC11-59.

TP-BGC11-71 – Cut slope from access construction.

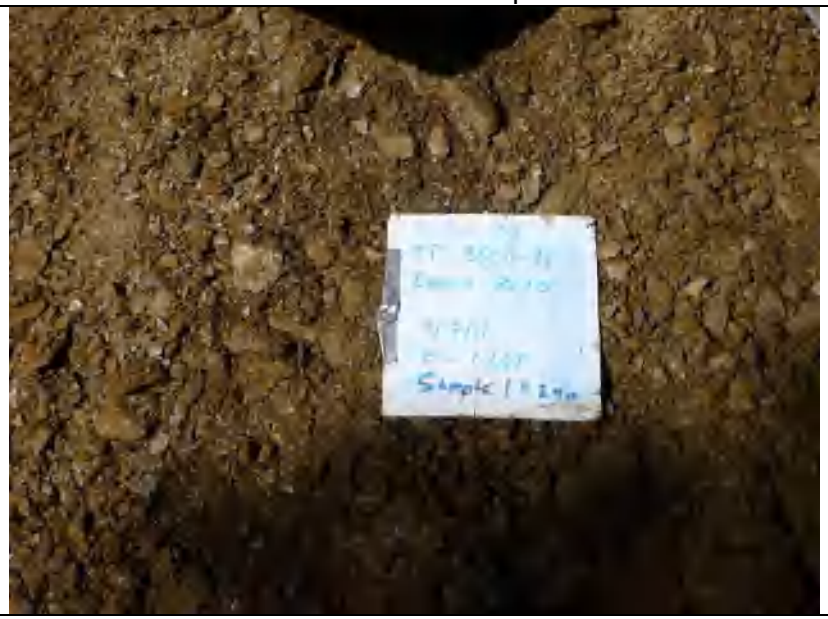
TP-BGC11-71 – Detail of pit wall 1.3-1.6 m.

TP-BGC11-71 – Detail of Vx (30%) in pit wall.



TP-BGC11-72 – Site photo.

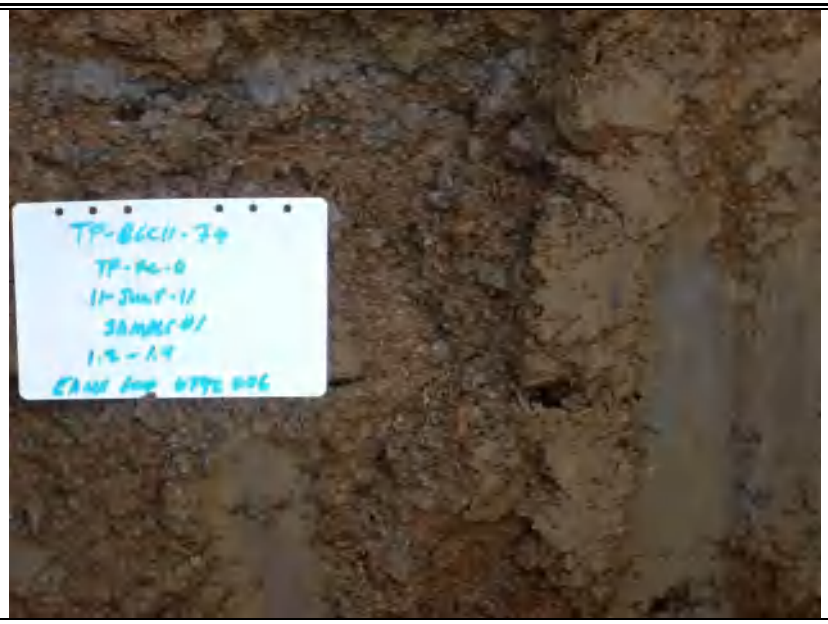
TP-BGC11-72 – Back wall of test pit; pit completed at depth of 4.3 m.



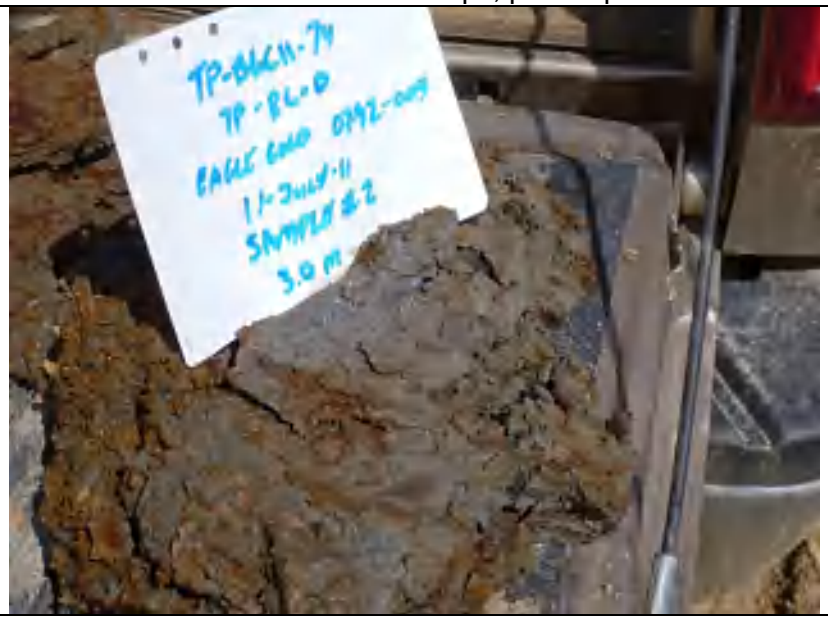
TP-BGC11-72 – Detail of spoil pile.

TP-BGC11-73 – Back wall of test pit; pit completed at depth of 3.0 m.	TP-BGC11-73 – Detail of pit wall from 0.8-1.0 m.

TP-BGC11-74 – Back wall of test pit; pit completed at 5.5 m.



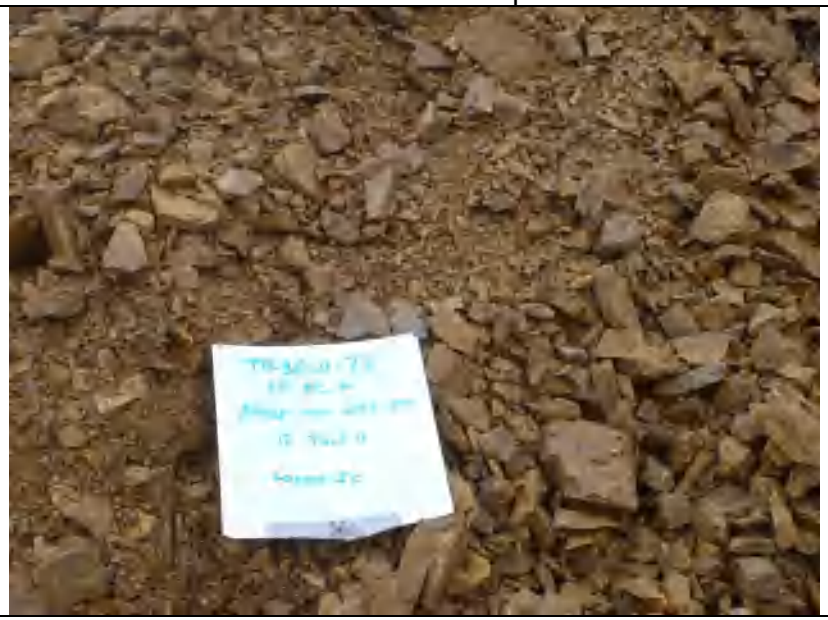
TP-BGC11-74 – Detail of pit wall 1.2-1.4 m.



TP-BGC11-74 – Detail of sample taken from 3.0 m.

TP-BGC11-75 – Site photo.

TP-BGC11-75 – Back wall of test pit; pit completed at a depth of 4.2 m.



TP-BGC11-75 – Detail of spoil pile.

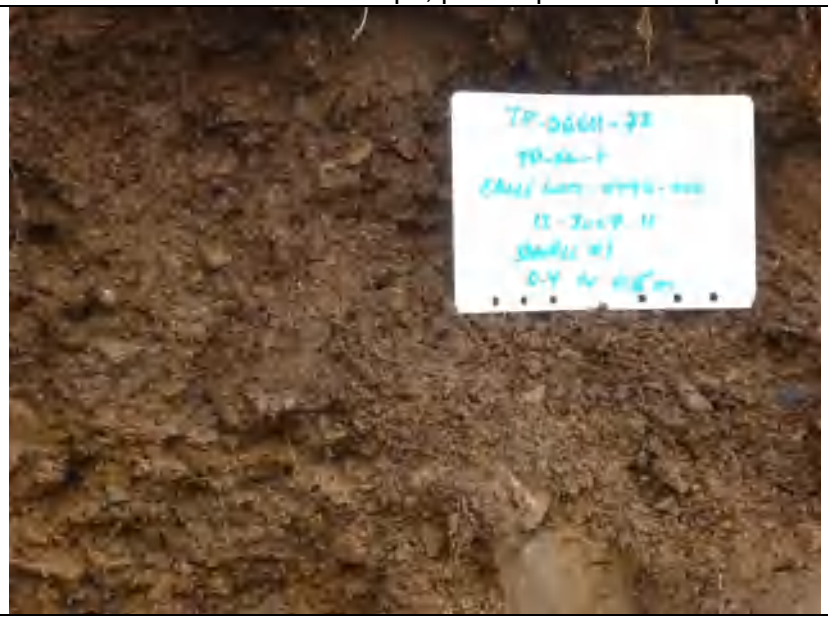
TP-BGC11-75 – Detail of pit wall 0.4-0.6 m.

TP-BGC11-76 – Back wall of test pit; pit completed at a depth of 5.4 m.	TP-BGC11-76 – Detail of spoil pile.

TP-BGC11-77 – Site photo.

TP-BGC11-77 – Back wall of test pit; pit completed at a depth of 5.5 m.

TP-BGC11-77 – Detail of spoil pile.



TP-BGC11-77 – Detail of pit wall 0.4-0.5 m.

TP-BGC11-78 – Site photo.

TP-BGC11-78 – Back wall of test pit; pit completed at a depth of 5.5 m.

TP-BGC11-78 – Detail of spoil pile.

TP-BGC11-78 – Water collected in pit from seepage through the walls.

TP-BGC11-79 – Site photo.

TP-BGC11-79 – Back wall of test pit; pit completed at a depth of 3.8 m.

TP-BGC11-79 – Detail of spoil pile.

TP-BGC11-79 – Detailed view of ice lenses beneath organic mat.

TP-BGC11-80 – Site photo.

TP-BGC11-80 – Back wall of test pit; pit completed at a depth of 6.7 m.

TP-BGC11-80 – Detail of spoil pile.

TP-BGC11-80 – Detail of pit wall.

TP-BGC11-81 – Site photo.

TP-BGC11-81 – Back wall of test pit; pit completed at a depth of 3.9 m.

TP-BGC11-81 – Detail of spoil pile.

TP-BGC11-81 – Detail of pit wall.

TP-BGC11-82 – Site photo; North wall.

TP-BGC11-82 – Site photo; East wall.

TP-BGC11-82 – Back wall of test pit; pit completed at a depth of 7.0 m.

TP-BGC11-82 – Exposed massive ice (ca.0.6m x 0.3m) at 6.5m depth.

TP-BGC11-83 – Site photo.

TP-BGC11-83 – Back wall of test pit; pit completed at a depth of 1.3 m.

TP-BGC11-83 – Detail of spoil pile.

TP-BGC11-83 – Detail of frozen soil sample taken from 0.6-0.8 m.

TP-BGC11-84 – Site photo.

TP-BGC11-84 – Back wall of test pit; pit completed at a depth of 2.6 m.

TP-BGC11-84 – Detail of pit wall 0.4-0.6 m.

TP-BGC11-84 – Detail of frozen soil sample taken from 2.5 m.

TP-BGC11-85 – Back wall of test pit; pit completed at a depth of 2.5 m.

TP-BGC11-85 – Detail of spoil pile.

TP-BGC11-85 – Detail of frozen soil sample taken from 1.0 m.

TP-BGC11-86 – Site photo.

TP-BGC11-86 – Back wall of test pit; pit completed at a depth of 7.5 m.

TP-BGC11-86 – Detail of spoil pile.

TP-BGC11-87 – Site photo.

TP-BGC11-87 – Back wall of test pit; pit completed at a depth of 3.5 m.

TP-BGC11-87 – Detail of spoil pile.

TP-BGC11-87 – Detail of pit wall at 0.6-0.8 m.

TP-BGC11-88 – Back wall of test pit; pit completed at a depth of 6.0 m.

TP-BGC11-88 – Detail of spoil pile.

TP-BGC11-88 – Detail of pit wall at 1.6-1.8 m.

TP-BGC11-89 – Back wall of test pit; pit completed at a depth of 6.5 m.

TP-BGC11-89 – Bottom of test pit; pit completed at a depth of 6.5 m.

TP-BGC11-89 – Detail of spoil pile.

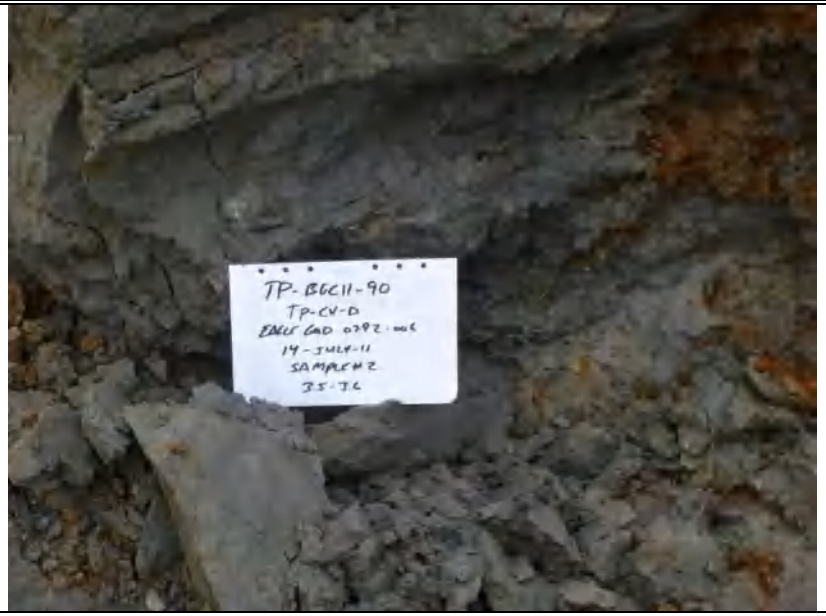
TP-BGC11-89 – Detail of pit wall at 1.3-1.5 m.

TP-BGC11-90 – Back wall of test pit; pit completed at a depth of 6.5 m.

TP-BGC11-90 – Bottom of test pit; pit completed at a depth of 6.5 m.

TP-BGC11-90 – Detail of spoil pile.

TP-BGC11-90 – Detail of pit wall at 0.8-1.0 m.

	
TP-BGC11-90 – Detail of pit wall at 3.5-3.6 m.	

TP-BGC11-91 – Back wall of test pit; pit completed at a depth of 2.05 m.

TP-BGC11-91 – Detail of spoil pile.

TP-BGC11-91 – Detail of sample taken from 0.8-1.0 m.

TP-BGC11-91 – Detail of sample taken from 1.6-1.8 m.

TP-BGC11-92 – Site photo.

TP-BGC11-92 – Back wall of test pit; pit completed at a depth of 1.65 m.

TP-BGC11-92 – Detail of spoil pile.

TP-BGC11-92 – Detail of frozen soil sample taken from 0.6-0.8 m.

TP-BGC11-93 – Site photo.

TP-BGC11-93 – Back wall of test pit; pit completed at a depth of 1.85 m.

TP-BGC11-93 – Detail of spoil pile.

TP-BGC11-93 – Detail of ice in pit wall at 0.4-0.7 m.

TP-BGC11-94 – Back wall of test pit; pit completed at a depth of 5.0 m.

TP-BGC11-94 – Detail of spoil pile.

TP-BGC11-94 – Detail of frozen soil sample taken from 1.2-1.3 m.

TP-BGC11-94 – Detail of soil sample taken from 2.3-2.5 m.

TP-BGC11-95 – Back wall of test pit; pit completed at a depth of 3.2 m.

TP-BGC11-95 – Detail of spoil pile.

TP-BGC11-95 – Detail of pit wall at 0.9-1.1 m.

TP-BGC11-95 – Detail of ice lens.

TP-BGC11-96 – Back wall of test pit; pit completed at a depth of 2.0 m.

TP-BGC11-96 – Detail of spoil pile.

TP-BGC11-96 – Detail of pit wall at 1.3-1.5 m.

TP-BGC11-96 – Detail of frozen soil sample taken from 1.8-2.0 m.

TP-BGC11-97 – Site photo.

TP-BGC11-97 – Trench.

TP-BGC11-97 – Back wall of test pit; pit completed at a depth of 4.0 m.

TP-BGC11-97 – Detail of spoil pile.

TP-BGC11-98 – Back wall of test pit; pit completed at a depth of 2.2 m.	TP-BGC11-98 – Detail of spoil pile.

TP-BGC11-99 – Back wall of test pit; pit completed at a depth of 2.5 m.	TP-BGC11-99 – Detail of pit wall.

TP-BGC11-100 – Back wall of test pit; pit completed at a depth of 3.5 m.	TP-BGC11-100 – Detail of spoil pile.

TP-BGC11-101 – Site photo.

TP-BGC11-101 – Back wall of test pit; pit completed at a depth of 2.4 m.

TP-BGC11-101 – Detail of visible ice in pit wall.

TP-BGC11-101 – Detail of visible ice in pit wall.

TP-BGC11-102 – Site photo; drill pad of BH-BGC11-45.

TP-BGC11-102 – Back wall of test pit; pit completed at a depth of 4.6 m.

TP-BGC11-102 – Detail of spoil pile.

TP-BGC11-102 – Detail of pit wall.

TP-BGC11-103 – Site photo; drill pad of BH-BGC11-67 and 69.

TP-BGC11-103 – Back wall of test pit; pit completed at a depth of 6.0 m.

TP-BGC11-103 – Detail of an excavated bucket.

TP-BGC11-104 – Back wall of test pit; pit completed at a depth of 5.55 m.

TP-BGC11-104 – Detail of spoil pile.

TP-BGC11-104 – Detail of an excavated bucket from below 3.45 m.

TP-BGC11-104 – Detail of pit wall.

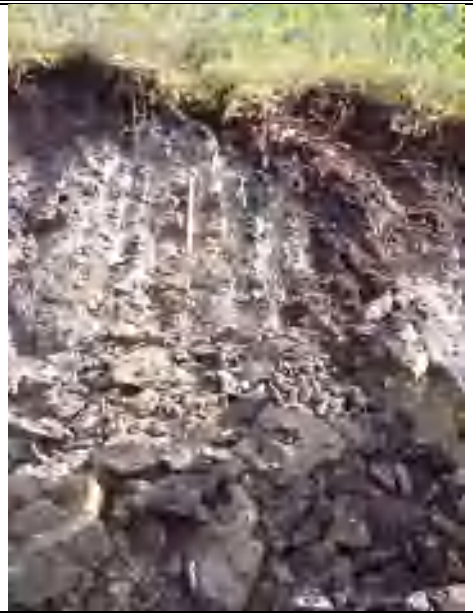
TP-BGC11-105 – Site photo.

TP-BGC11-105 – Back wall of test pit; pit completed at a depth of 3.0 m.

TP-BGC11-105 – Detail of pit wall.

TP-BGC11-105 – Detail of bottom of pit.

TP-BGC11-106 – Site photo; drill pad of BH-BGC11-61 and 66.



TP-BGC11-106 – Back wall of test pit; pit completed at a depth of 3.0 m.

TP-BGC11-106 – Detail of visible ice in pit wall.

TP-BGC11-107 – Back wall of test pit; pit completed at a depth of 3.2 m.

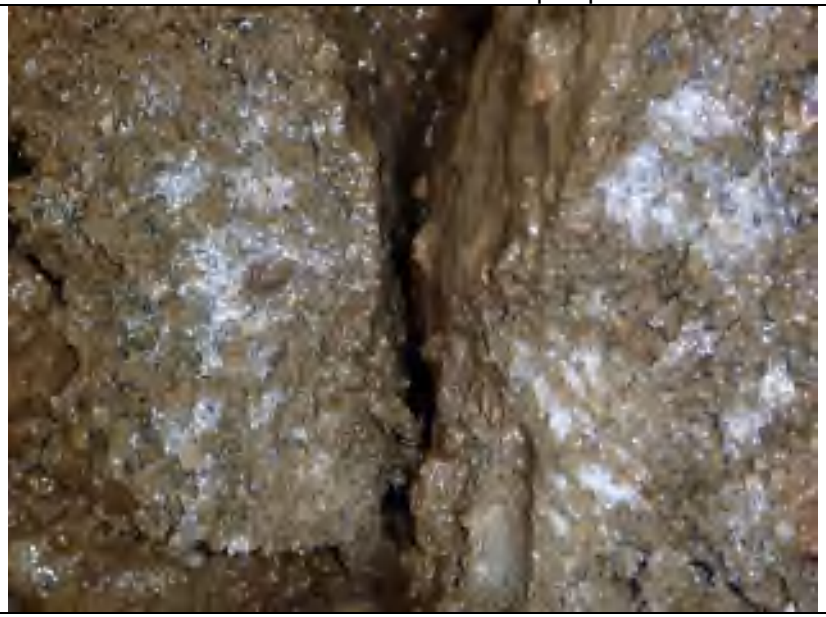
TP-BGC11-107 – Detail of spoil pile; excavated from 1.1 m.

TP-BGC11-107 – Detail of melting ice in pit wall.

TP-BGC11-108 – Back wall of test pit; pit completed at a depth of 1.5 m.

TP-BGC11-108 – Detail of spoil pile.

TP-BGC11-108 – Detail of scraped frozen ground.



TP-BGC11-108 – Detail of visible ice.

TP-BGC11-109 – Site photo.

TP-BGC11-109 – Back wall of test pit; pit completed at a depth of 5.3 m.

TP-BGC11-109 – Detail of a bucket excavated from 2.3 m.

TP-BGC11-109 – Detail of bottom of pit wall.

TP-BGC11-110 – Site photo.

TP-BGC11-110 – Back wall of test pit; pit completed at a depth of 5.0 m.

TP-BGC11-110 – Detail of a bucket excavated from 5.0 m.

TP-BGC11-110 – Detail of pit wall at 1.2 m.

TP-BGC11-111 – Site photo.

TP-BGC11-111 – Back wall of test pit; pit completed at a depth of 2.0 m.

TP-BGC11-111 – Detail of spoil pile from 2.0 m.

TP-BGC11-111 – Detail of bucket excavated from 2.0 m.

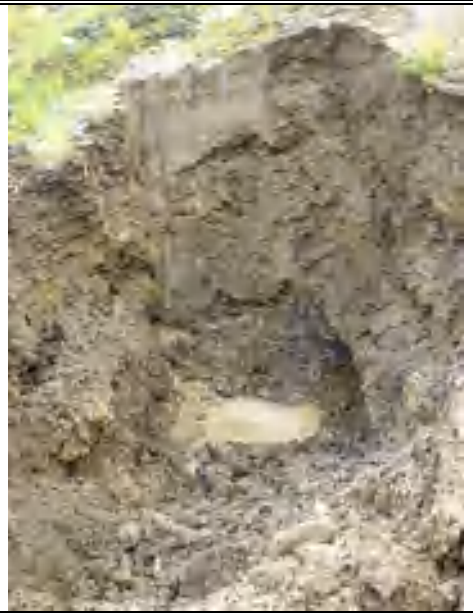
TP-BGC11-112 – Site photo.

TP-BGC11-112 – Back wall of test pit; pit completed at a depth of 2.5 m.

TP-BGC11-112 – Detail of a bucket excavated from 2.5 m.

TP-BGC11-112 – Detail of visible ice in pit wall near surface.

TP-BGC11-113 – Site photo.



TP-BGC11-113 – Back wall of test pit; pit completed at a depth of 2.5 m.

TP-BGC11-113 – Detail of a bucket excavated from 1.5 m.

TP-BGC11-113 – Detail of seepage collecting in pit below 1.5 m.

TP-BGC11-114 – Site photo.

TP-BGC11-114 – Back wall of test pit; pit completed at a depth of 3.2 m.

TP-BGC11-114 – Detail of a bucket excavated from 2.3 m.

TP-BGC11-114 – Detail of frozen material from 2.3 m.

TP-BGC11-115 – Site photo.

TP-BGC11-115 – Back wall of test pit; pit completed at a depth of 5.7 m.

TP-BGC11-115 – Detail of a bucket excavated from 2.5 m.

TP-BGC11-115 – Detail of material from 5.7 m.

TP-BGC11-116 – Back wall of test pit; pit completed at a depth of 2.3 m.

TP-BGC11-116 – Detail of pit wall at 1.3 m.

TP-BGC11-116 – Detail of seepage in pit wall.

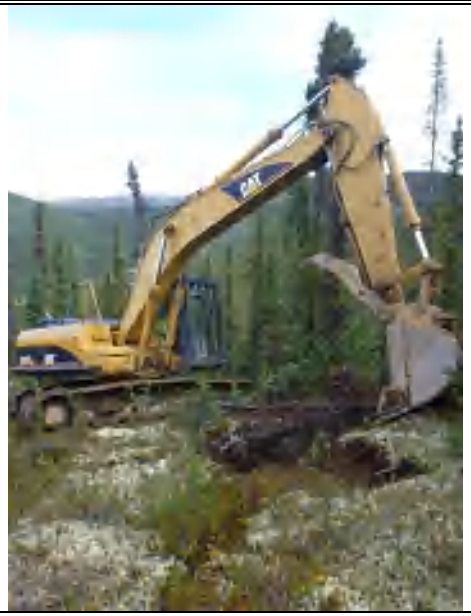
TP-BGC11-116 – Detail of frozen material.

TP-BGC11-117 – Pit completed at depth of 8.0 m.

TP-BGC11-117 – Cut slope wall above pit.

TP-BGC11-117 – Detail of pit wall at 2.3 m.

TP-BGC11-117 – Detail of cut slope wall.



TP-BGC11-118 – Site photo.

TP-BGC11-118 – Back wall of test pit; pit completed at a depth of 5.3 m.

TP-BGC11-118 – Detail of highly weathered bedrock in bucket from 2.3 m.

TP-BGC11-118 – Detail of pit wall at 1.2 m.

TP-BGC11-119 – Site photo.

TP-BGC11-119 – Back wall of test pit; pit completed at a depth of 2.05 m.

TP-BGC11-119 – Detail of spoil pile.

TP-BGC11-119 – Detail of pit wall.

TP-BGC11-120 – Site photo.

TP-BGC11-120 – Spoil pile.

TP-BGC11-120 – Detail of spoil pile.

TP-BGC11-121 – Site photo.

TP-BGC11-121 – Back wall of test pit; pit completed at a depth of 3.3 m.

TP-BGC11-121 – Detail of spoil pile.

TP-BGC11-121 – Detail of lensed ice in pit wall.

TP-BGC11-122 – Site photo.

TP-BGC11-122 – Back wall of test pit; pit completed at a depth of 5.8 m.

TP-BGC11-122 – Detail of a bucket excavated from 5.4-5.8 m.

TP-BGC11-122 – Detail of upper pit wall.

TP-BGC11-123 – Site photo.

TP-BGC11-123 – Back wall of test pit; pit completed at a depth of 2.4 m.

TP-BGC11-123 – Detail of a bucket excavated from 2.4 m.

TP-BGC11-123 – Detail of massive ice in pit wall.

TP-BGC11-124 – Site photo.

TP-BGC11-124 – Back wall of test pit; pit completed at a depth of 6.5 m.

TP-BGC11-124 – Detail of a bucket excavated from 6.2-6.4 m.

TP-BGC11-124 – Detail of pit wall.

TP-BGC11-125 – Site photo.

TP-BGC11-125 – Pit completed at a depth of 2.5 m.

TP-BGC11-125 – Detail of frozen soil chunks in spoil pile.

TP-BGC11-125 – Using ripper shank to penetrate frozen ground.

TP-BGC11-126 – Site photo.

TP-BGC11-126 – Back wall of test pit; pit completed at a depth of 3.1 m.

TP-BGC11-126 – Detail of spoil pile.

TP-BGC11-126 – Detail of topsoil.

TP-BGC11-127 – Site photo.

TP-BGC11-127 – Pit completed at a depth of 2.5 m.

TP-BGC11-127 – Detail of spoil pile.

TP-BGC11-127 – Detail of structure of bedrock unit at base of pit.

TP-BGC11-128 – Back wall of test pit; pit completed at a depth of 3.0 m.

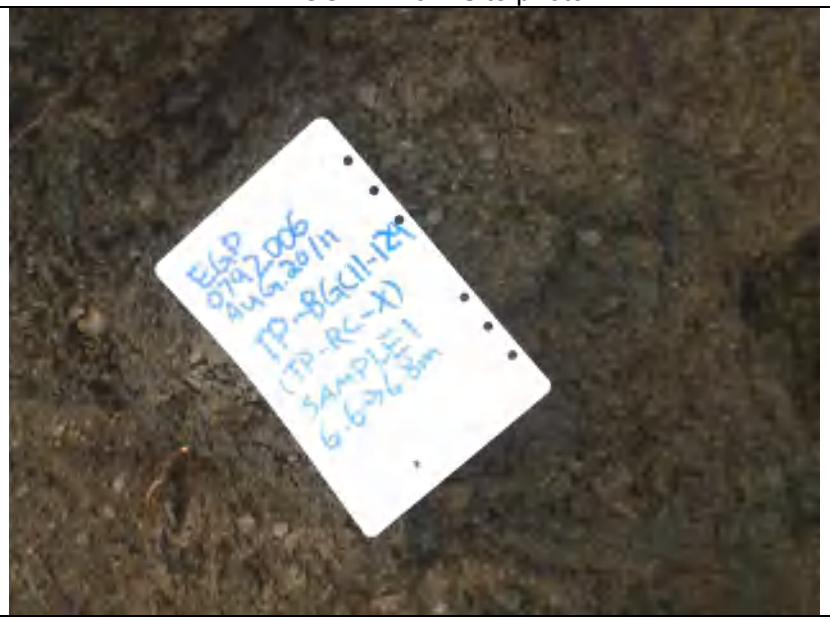
TP-BGC11-128 – Detail of spoil pile.

TP-BGC11-128 – Detail of pit wall.

TP-BGC11-128 – Chunk of intact ice recovered at 1.8 m.

TP-BGC11-129 – Site photo.

TP-BGC11-129 – Back wall of test pit; pit completed at a depth of 6.8 m.



TP-BGC11-129 – Detail of a bucket excavated from 6.6-6.8 m.

TP-BGC11-129 – Detail of upper pit wall.

TP-BGC11-130 – Site photo.

TP-BGC11-130 – Back wall of test pit; pit completed at a depth of 6.0 m.

TP-BGC11-130 – Detail of a bucket excavated from 5.8-6.0 m.

TP-BGC11-130 – Detail of upper pit wall.

TP-BGC11-131 – Site photo.

TP-BGC11-131 – Back wall of test pit; pit completed at a depth of 3.5 m.

TP-BGC11-131 – Detail of spoil pile.

TP-BGC11-131 – Detail of fluvial material in pit wall.

TP-BGC11-132 – Site photo after completion of test pit.

TP-BGC11-132 – Back wall of test pit; pit completed at a depth of 5.3 m.

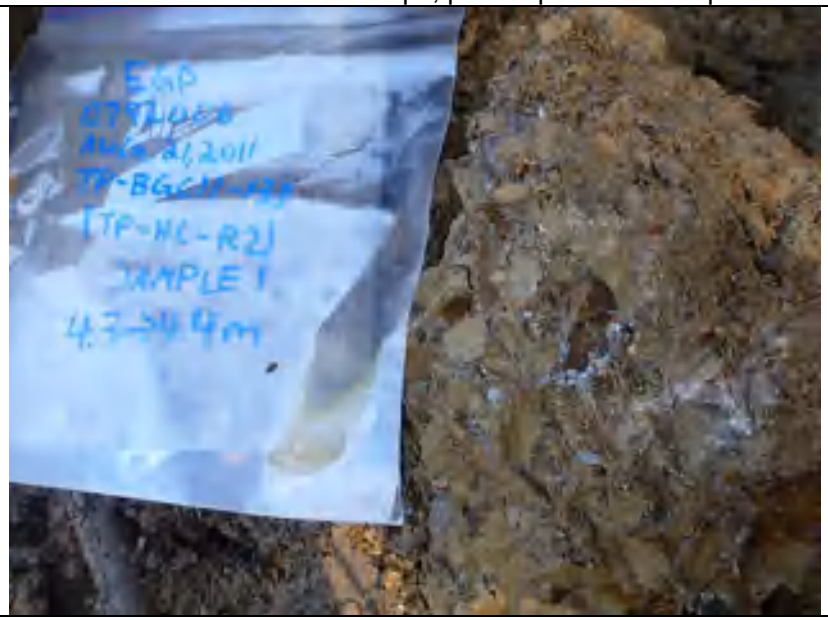
TP-BGC11-132 – Detail of spoil pile.

TP-BGC11-132 – Detail of pit wall.

TP-BGC11-133 – Site photo.

TP-BGC11-133 – Back wall of test pit; pit completed at a depth of 4.4 m.

TP-BGC11-133 – Detail of gravelly unit in upper pit wall.



TP-BGC11-133 – Detail of frozen gravel/silt material in bucket.

TP-BGC11-134 – Site photo.

TP-BGC11-134 – Back wall of test pit; pit completed at a depth of 4.2 m.

TP-BGC11-134 – Spoil pile (hammer for scale).

TP-BGC11-134 – Detail of pit wall.

TP-BGC11-135 – Back wall of test pit; pit completed at a depth of 3.5 m.

TP-BGC11-135 – Detail of spoil pile.

TP-BGC11-135 – Detail of upper pit wall to 1.5 m.

TP-BGC11-135 – Detail of base of pit at 3.5 m.

TP-BGC11-136 – Site photo; drill pad of BH-BGC11-52.

TP-BGC11-136 – Back wall of test pit; pit completed at a depth of 4.8 m.

TP-BGC11-136 – Detail of upper pit wall to 1.4 m.

TP-BGC11-136 – Detail of sample taken from 1.0-1.2 m.

TP-BGC11-137 – Site photo.

TP-BGC11-137 – Back wall completed to depth of 5.0 m.

TP-BGC11-137 – Gradational bedrock weathering in pit wall.

TP-BGC11-137 – Detail of weathered bedrock in spoil pile.

TP-BGC11-138 – Back wall of test pit; pit completed at a depth of 6.3 m.

TP-BGC11-138 – Detail of spoil pile at 5.9 m.

TP-BGC11-138 – Detail of pit wall at 5.5 m.

TP-BGC11-138 – Detail of bedrock structure at base of pit (2.0 m).

TP-BGC11-139 – Site photo; along wall of exploration trench.

TP-BGC11-139 – Dug areas along trench wall (3.0 m).

TP-BGC11-139 – Detail of highly weathered bedrock at 1.2 m.

TP-BGC11-139 – Detail of lightly weathered bedrock at base of trench.

TP-BGC11-140 – Site photo.

TP-BGC11-140 – Back wall of test pit; pit completed at a depth of 4.5 m.

TP-BGC11-140 – Detail of spoil pile.

TP-BGC11-140 – Detail of pit wall at 2.8 m.

TP-BGC11-141 – Site photo.

TP-BGC11-141 – Back wall of test pit; pit completed at a depth of 4.95 m.

TP-BGC11-141 – Detail of spoil pile at 4.0 m.

TP-BGC11-142 – Site photo.

TP-BGC11-142 – Back wall of test pit; pit completed at a depth of 4.1 m.

TP-BGC11-142 – Detail of a bucket from 2.6 m.

TP-BGC11-142 – Detail of pit wall at 0.5 m.

TP-BGC11-143 – Site photo at beginning of excavation (0.9 m).

TP-BGC11-143 – Back wall of test pit; pit completed at a depth of 2.2 m.

TP-BGC11-143 – Detail of a bucket excavated from 2.2 m.

TP-BGC11-143 – Detail of pit wall 0.0-0.5 m.

TP-BGC11-144 – Site photo; angular boulders on surface.

TP-BGC11-144 – Back wall of test pit; pit completed at a depth of 1.0 m.

TP-BGC11-144 – Detail of back wall; pit abandoned due to seepage.

TP-BGC11-144 – Seepage upslope from test pit.

TP-BGC11-145 – Site photo; drill pad of BH-BGC11-31.

TP-BGC11-145 – Back wall of test pit; pit completed at a depth of 1.5 m.

TP-BGC11-145 – Detail of wall at 0.5 m.

TP-BGC11-145 – Detail of wall at 1.2 m.

APPENDIX E
BOREHOLE LOGS

BOREHOLE LOGS

Table E- 1: Summary of Boreholes

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Drilling Method	Hole Depth (m)	Installation	Comments
BH-BGC11-24	7102237.7	460624.8	1208.4	Diamond	20.9	--	
BH-BGC11-25	7102179.3	460414.7	1182.8	Diamond	20.4	2" solid PVC	
BH-BGC11-26	7102088.1	460205.8	1150.0	Diamond	30.2	Standpipe piezometer	
BH-BGC11-27	7102232.5	460043.5	1100.2	Diamond	26.5	--	
BH-BGC11-28	7101702.7	459926.5	1010.6	Diamond	40.8	2" solid PVC	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-29	7101802.1	459977.8	1045.3	Diamond	41.2	Standpipe piezometer	
BH-BGC11-30	7101567.8	460122.0	952.0	Diamond	35.1	Standpipe piezometer	
BH-BGC11-31	7101483.0	459850.9	917.8	Diamond	35.1	2" solid PVC	
BH-BGC11-32	7100934.4	458745.2	818.7	Diamond	24.4	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-33	7100983.6	459115.7	833.0	Diamond	41.4	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-34	7101053.5	459308.5	848.3	Diamond	38.1	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-35	7100440.3	459695.7	986.3	Diamond	50.3	Standpipe piezometer	
BH-BGC11-36	7100274.7	459699.9	1002.5	Diamond	50.3	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-37	7100180.5	459762.8	1034.4	Diamond	43.6	Standpipe piezometer	Standpipe damaged, Jul 2011
BH-BGC11-38	7100416.0	459820.0	1013.0	Diamond	50.5	Standpipe piezometer	
BH-BGC11-39	7101056	458462	804	Auger	28.2	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-40A	7100038	459763	1050	Diamond	33.2	--	
BH-BGC11-40B	7100038.8	459767.0	1049.8	Diamond	45.7	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-41	7100999	459777	914	Auger	4.3	--	

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Drilling Method	Hole Depth (m)	Installation	Comments
BH-BGC11-42	7100150.1	460272.3	1098.7	Auger	28.2	25 m thermistor	
BH-BGC11-43	7099106.6	459658.1	1034.0	Diamond	23.8	--	
BH-BGC11-44	7100547.3	458690.4	830.0	Auger	14.7	10 m thermistor	
BH-BGC11-45	7099109.5	460556.2	1354.4	Diamond	20.7	Standpipe piezometer	
BH-BGC11-46	7099004.0	460262.7	1246.1	Diamond	20.1	Standpipe piezometer	
BH-BGC11-47	7100698.9	458811.9	841.8	Auger	16.0	10 m thermistor	
BH-BGC11-48	7099118.1	459936.0	1140.0	Diamond	32.9	Standpipe piezometer	
BH-BGC11-49	7100635.9	458746.5	835.1	Auger	16.0	10 m thermistor	Thermistor removed, Aug 2011
BH-BGC11-50	7099997.6	459791.3	1058.4	Diamond	41.2	--	
BH-BGC11-51	7100743.6	458643.5	818.4	Auger	25.2	25 m thermistor	
BH-BGC11-52	7101316.4	459891.2	909.0	Diamond	22.6	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-53	7100993.0	459483.6	875.7	Auger	14.5	--	
BH-BGC11-54	7101245.6	458886.2	883.8	Diamond	41.2	Vibrating wire piezometer	
BH-BGC11-55	7100918.4	459440.6	881.0	Auger	14.5	Standpipe piezometer	
BH-BGC11-56	7099822.7	458774.8	845.6	Auger	13.7	2" solid PVC	
BH-BGC11-57	7099978.2	458798.6	859.2	Auger	12.1	Standpipe piezometer and 10 m thermistor	
BH-BGC11-58	7100119.4	458799.8	859.0	Auger	10.8	10 m thermistor	
BH-BGC11-59	7101239.4	459113.1	883.7	Diamond	30.2	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-60	7100041.6	458795.6	859.2	Auger	9.2	Standpipe piezometer	
BH-BGC11-61	7100013	460367	1157	Auger	2.7	--	
BH-BGC11-62	7100334.1	459785.9	1017.9	Diamond	35.1	Standpipe piezometer	Conducted downhole seismic investigation, Aug 2011
BH-BGC11-63	7100114.1	460302.9	1100.7	Auger	26.7	Vibrating wire piezometer and 25 m thermistor	
BH-BGC11-64	7100262.9	460182.4	1044.1	Diamond	48.8	Standpipe piezometer	
BH-BGC11-65	7100939	458771	825	Auger	6.9	--	

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Drilling Method	Hole Depth (m)	Installation	Comments
BH-BGC11-66	7100011.1	460360.2	1151.9	Diamond	33.5	2" solid PVC	
BH-BGC11-67	7101148	458823	867	Auger	9.9	--	
BH-BGC11-69	7101144.3	458829.3	861.6	Diamond	21.3	2" solid PVC	Conducted downhole seismic investigation, Aug 2011

NOTES:
1. Holes surveyed in August and September 2011 using a differential GPS, with the exception of BH-BGC11-39,40A,41,61,65 and 67, which were surveyed by BGC staff using a handheld GPS.
2. Coordinates in UTM NAD 83, Zone 8N.

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-24

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m): 460,624.8E - 7,102,237.7N
GROUND ELEVATION (m) : 1,208.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 0.00

START DATE : 28 Jun 11
FINISH DATE : 29 Jun 11
FINAL DEPTH (m) : 20.9
DEPTH TO TOP OF ROCK (m) : 1.8
LOGGED BY : JND/SP/EB
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Silty, trace sand, maximum particle size = 60 mm, angular. Fines are low to medium plasticity, orange-brown, wet. Clasts are quartz, weak to strong (R2 to R4), iron stained. [COLLUVIUM]		
1				GRAVEL (GW) Trace silt, well graded, maximum particle size = 50 mm, weak (R2), wet. Clasts are slightly weathered iron stained. [COLLUVIUM]		
2				Rock encountered at 1.81 m depth. Refer to rock log.		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

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PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

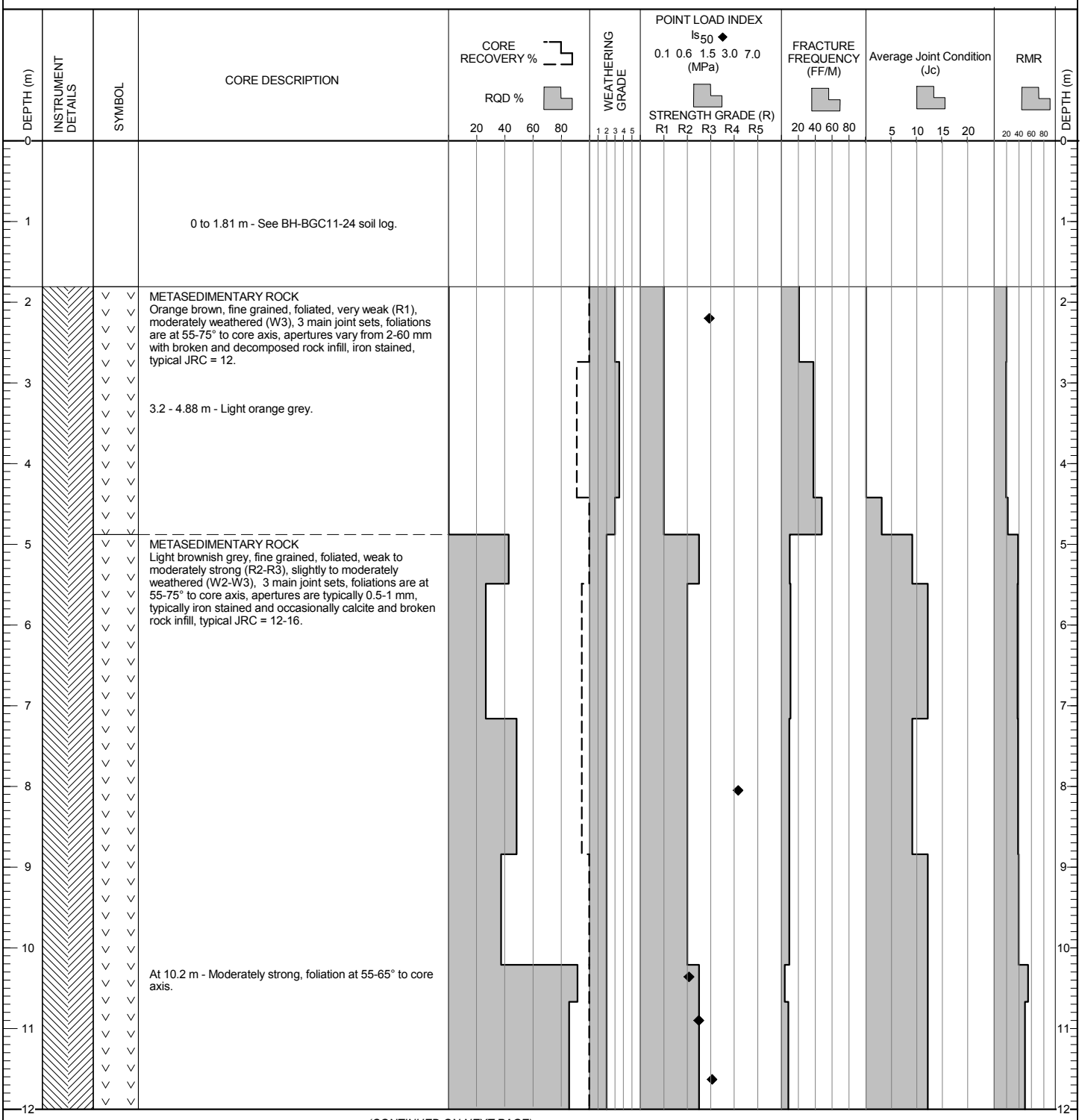
DRILL HOLE # BH-BGC11-24

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 460,624.8E - 7,102,237.7N
GROUND ELEVATION (m) : 1,208.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 0

START DATE : 28 Jun 11
FINISH DATE : 29 Jun 11
FINAL DEPTH (m) : 20.9
DEPTH TO TOP OF ROCK (m) : 1.8
LOGGED BY : JND/SP/EB
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-24

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 460,624.8E - 7,102,237.7N
GROUND ELEVATION (m) : 1,208.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 0

START DATE : 28 Jun 11
FINISH DATE : 29 Jun 11
FINAL DEPTH (m) : 20.9
DEPTH TO TOP OF ROCK (m) : 1.8
LOGGED BY : JND/SP/EB
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			12.2 - 20.88 m - Silica and quartz rich, grey streaked white.
13			
14			14 - 20.88 m - Grades to grey streaked dark grey and brown, moderately strong to very strong (R3.5), joints and foliations are mainly at 45-60° to core axis.
15			
16			
17			
18			
19			
20			
21			End of borehole at 20.9 m. Notes: 1) Hole completed at target depth. 2) TP-BGC11-55 is located on this drill pad.
22			
23			
24			

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)

STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

DEPTH (m)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-25

LOCATION : ANN GULCH

CO-ORDINATES (m): 460,414.7E - 7,102,179.3N
GROUND ELEVATION (m) : 1,182.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.05

START DATE : 29 Jun 11
FINISH DATE : 30 Jun 11
FINAL DEPTH (m) : 20.4
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SD/SP/EB
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Silty, some sand, trace cobbles, trace boulders, well graded, loose, maximum particle size = 250 mm, angular, iron staining. Fines: low plastic, firm to stiff, brown, moist, heterogeneous. [COLLUVIUM]		
0.9				Rock encountered at 0.90 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

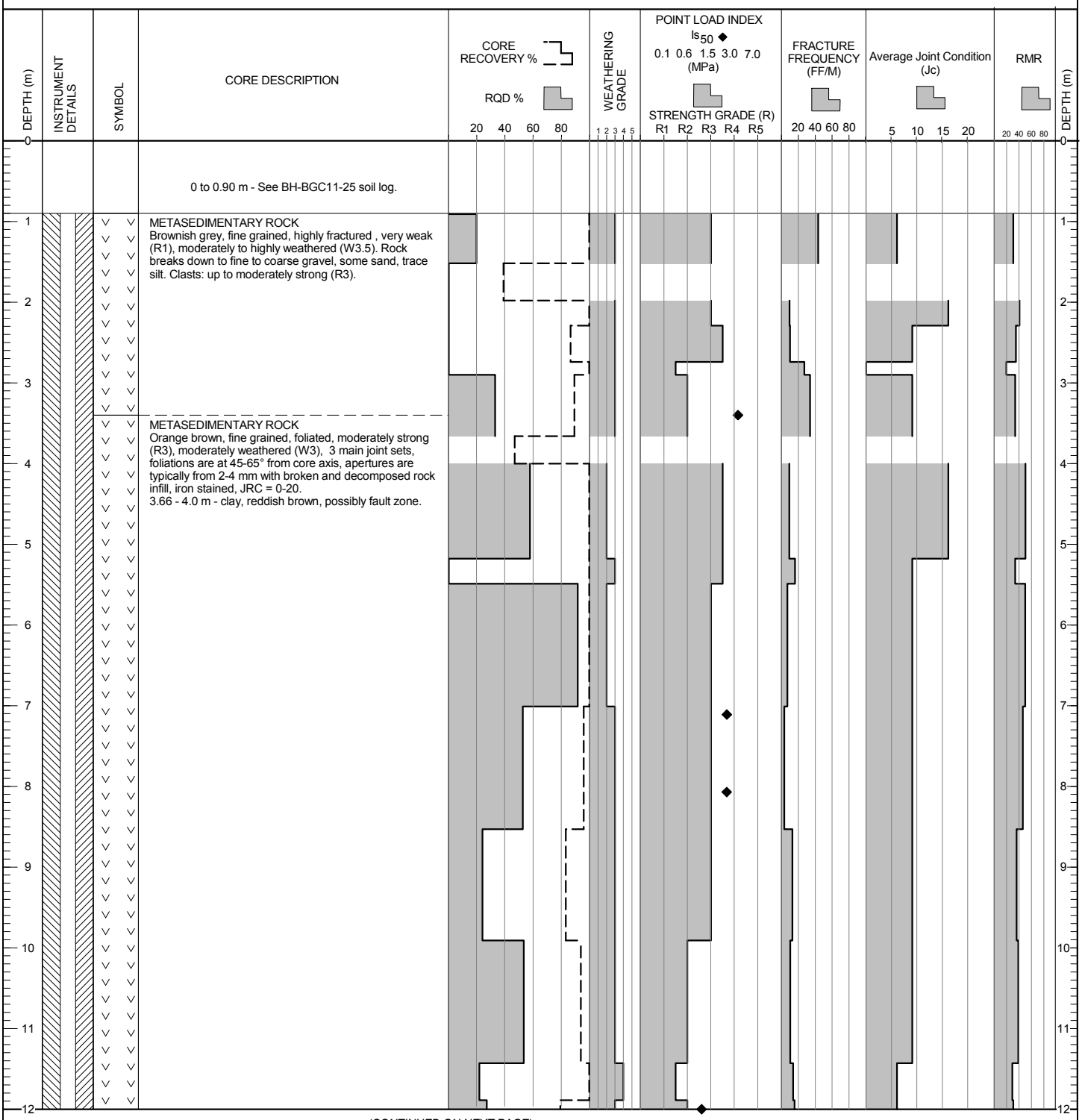
DRILL HOLE # BH-BGC11-25

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,414.7E - 7,102,179.3N
GROUND ELEVATION (m) : 1,182.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 29 Jun 11
FINISH DATE : 30 Jun 11
FINAL DEPTH (m) : 20.4
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SD/SP/EB
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

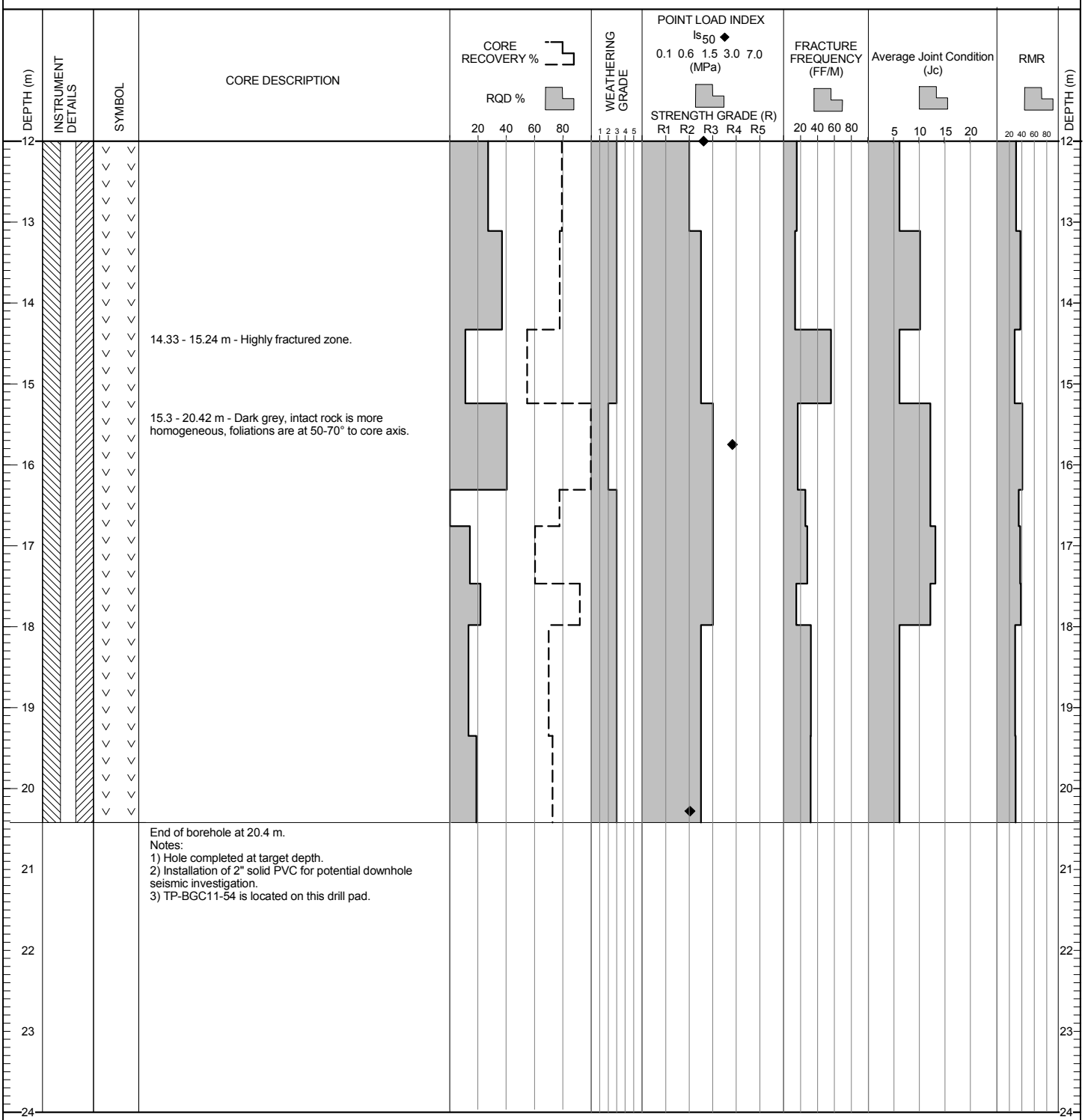
DRILL HOLE # BH-BGC11-25

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,414.7E - 7,102,179.3N
GROUND ELEVATION (m) : 1,182.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 29 Jun 11
FINISH DATE : 30 Jun 11
FINAL DEPTH (m) : 20.4
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SD/SP/EB
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

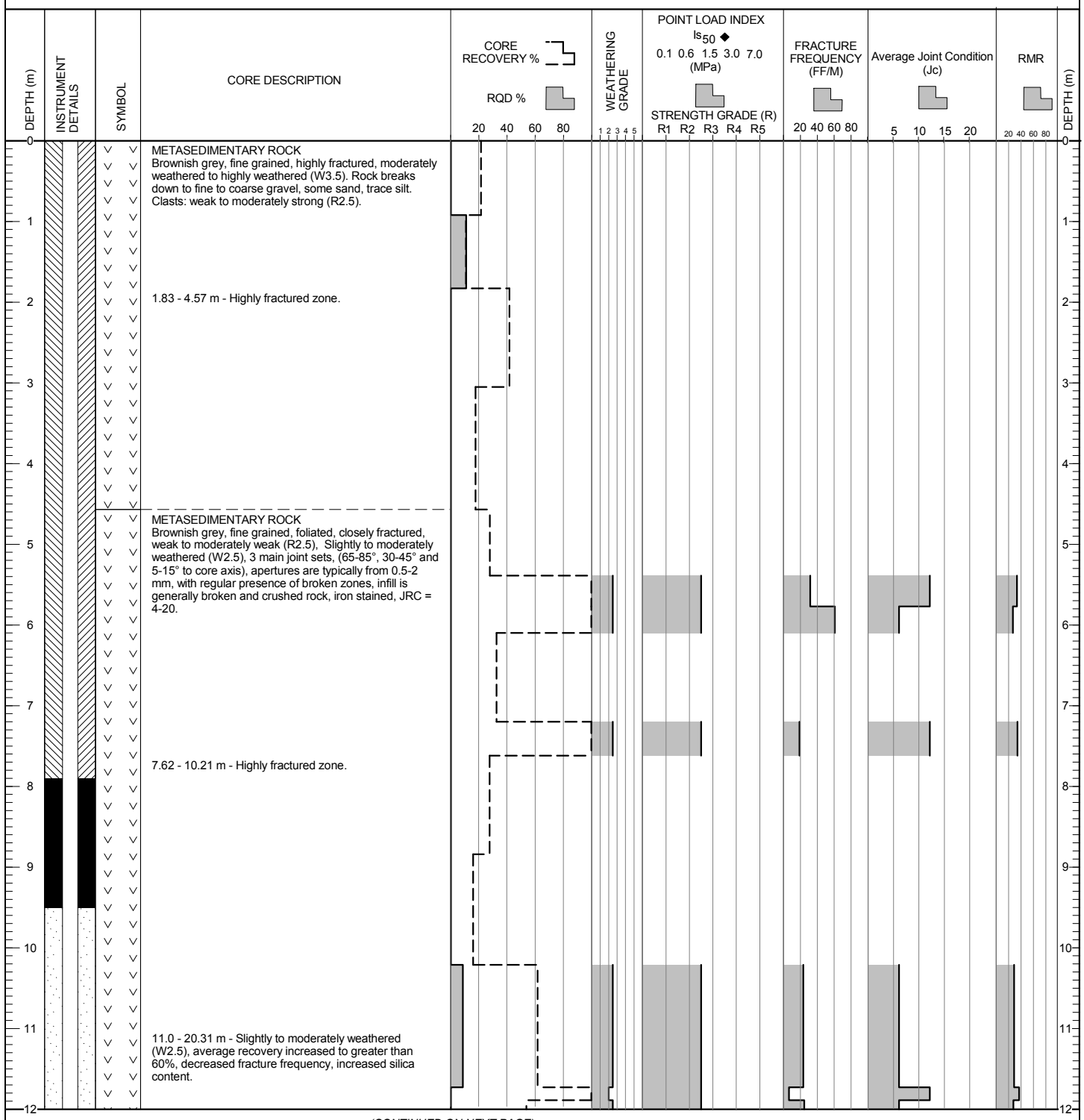
DRILL HOLE # BH-BGC11-26

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,205.8E - 7,102,088.1N
GROUND ELEVATION (m) : 1,139.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 01 Jul 11
FINISH DATE : 01 Jul 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

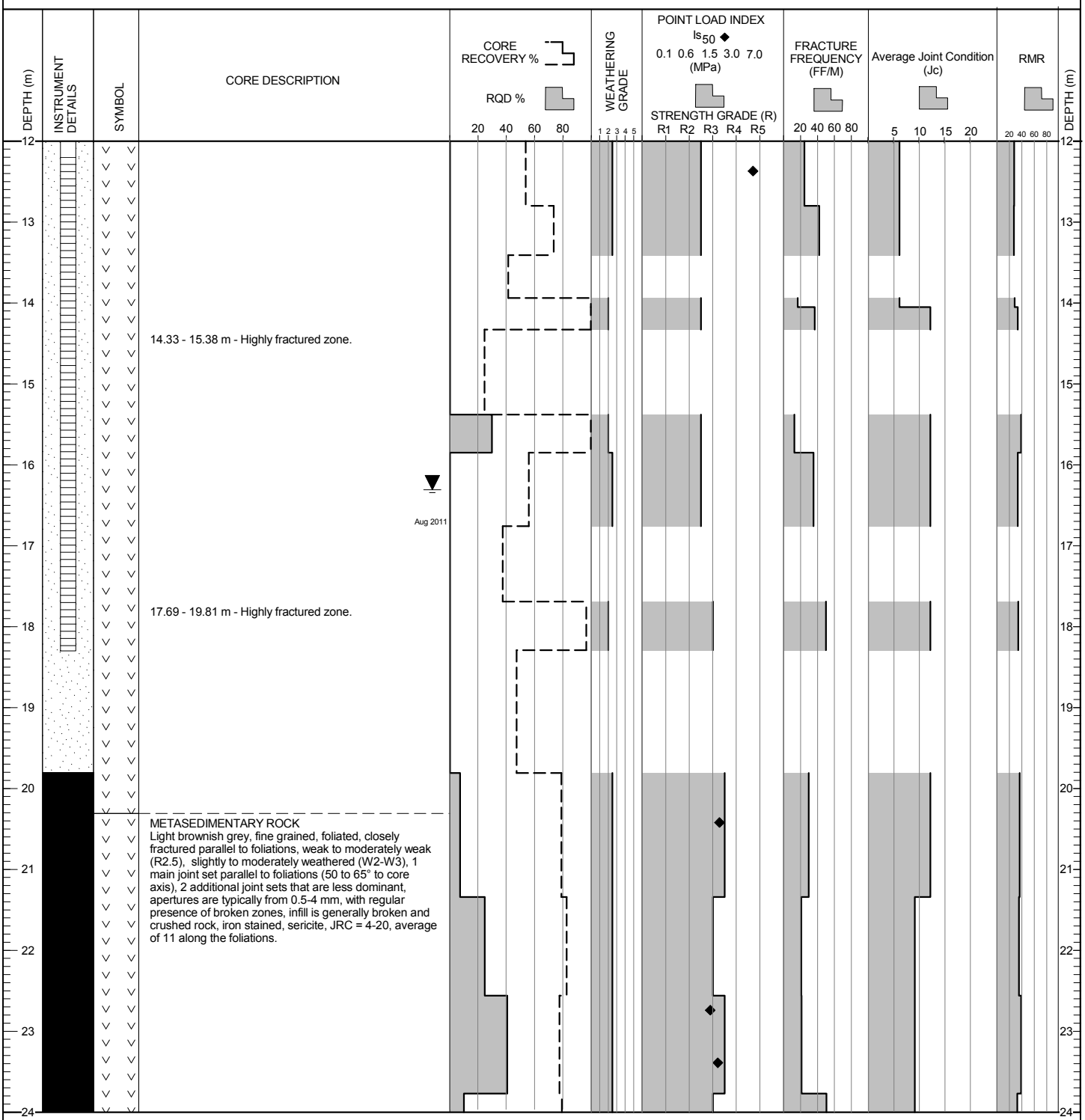
DRILL HOLE # BH-BGC11-26

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,205.8E - 7,102,088.1N
GROUND ELEVATION (m) : 1,139.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 01 Jul 11
FINISH DATE : 01 Jul 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-26

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,205.8E - 7,102,088.1N
GROUND ELEVATION (m) : 1,139.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 01 Jul 11
FINISH DATE : 01 Jul 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
24			
25			
26			25.91 - 26.82 m - Highly fractured zone.
27			
28			
29			28.62 - 29.52 m - Long highly broken zone, moderately weathered (W3), heavy iron staining.
30			At 29.75 m - Grades to light bluish grey.
31			End of borehole at 30.2 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" PVC for standpipe piezometer. 3) TP-BGC11-57 is located on this drill pad.
32			
33			
34			
35			
36			

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-27

LOCATION : ANN GULCH

CO-ORDINATES (m): 460,043.5E - 7,102,232.5N
GROUND ELEVATION (m) : 1,100.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 0.00

START DATE : 04 Jul 11
FINISH DATE : 05 Jul 11
FINAL DEPTH (m) : 26.5
DEPTH TO TOP OF ROCK (m) : 2.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Some silt, trace sand, trace cobbles, well graded, maximum particle size = 200 mm, flat and elongated, angular, iron staining. [HIGHLY WEATHERED METASEDIMENTARY ROCK]		
2				Rock encountered at 2.10 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-27

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,043.5E - 7,102,232.5N
GROUND ELEVATION (m) : 1,100.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 0

START DATE : 04 Jul 11
FINISH DATE : 05 Jul 11
FINAL DEPTH (m) : 26.5
DEPTH TO TOP OF ROCK (m) : 2.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0										0
1			0 to 2.10 m - See BH-BGC11-27 soil log.							1
2										2
3			METASEDIMENTARY ROCK Brownish grey, fine grained, highly fractured, very weak to strong (R1 to R3), moderately weathered to highly weathered (W3.5). Rock breaks down to fine to coarse gravel, some sand, trace silt. 2.13 - 7.62 m - Highly fractured zone, very low recovery.							3
4										4
5										5
6										6
7										7
8										8
9			9.14 - 13.11 m - Highly fractured zone.							9
10										10
11										11
12										12

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

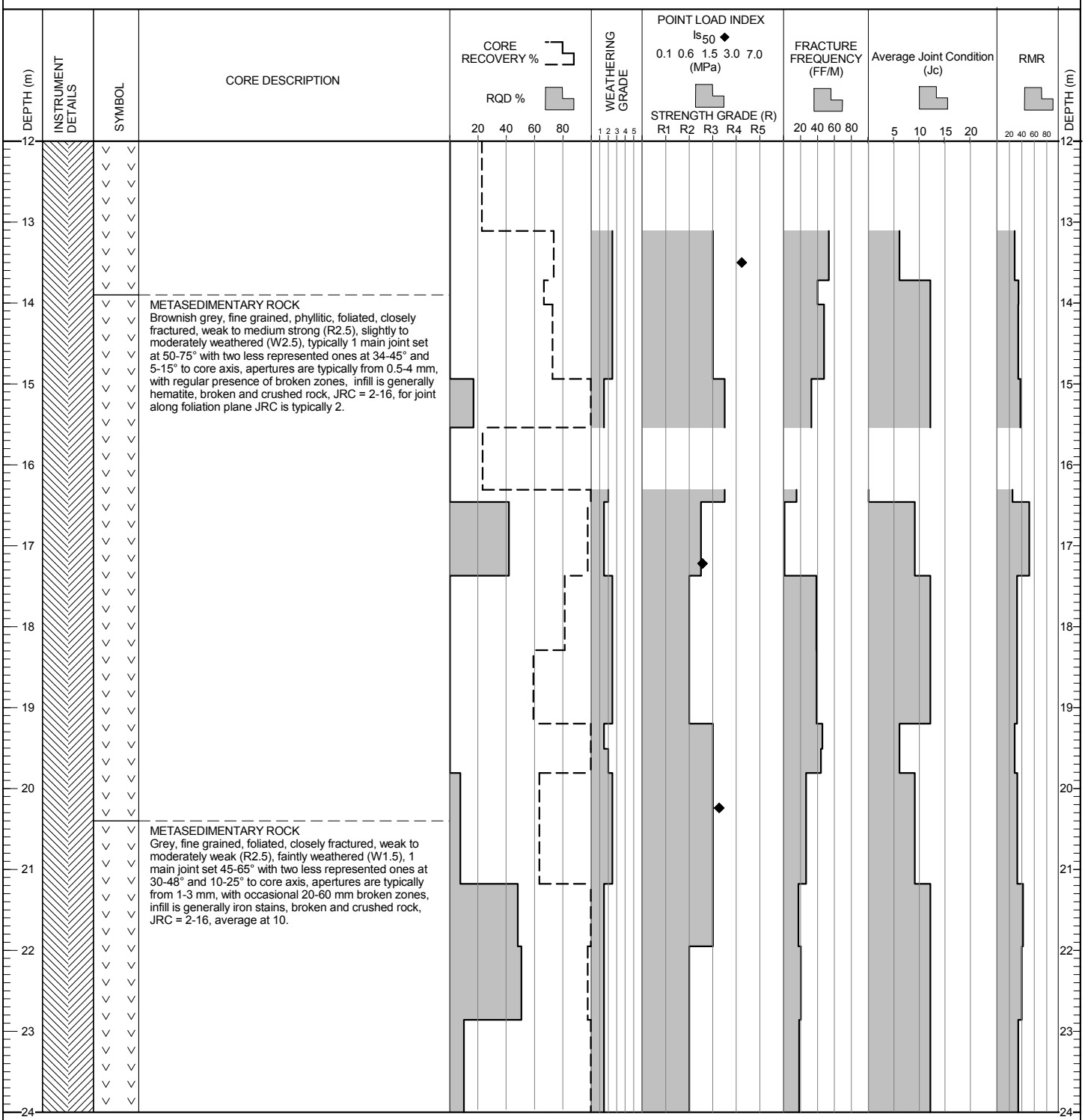
DRILL HOLE # BH-BGC11-27

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,043.5E - 7,102,232.5N
GROUND ELEVATION (m) : 1,100.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 0

START DATE : 04 Jul 11
FINISH DATE : 05 Jul 11
FINAL DEPTH (m) : 26.5
DEPTH TO TOP OF ROCK (m) : 2.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



METASEDIMENTARY ROCK
Brownish grey, fine grained, phyllitic, foliated, closely fractured, weak to medium strong (R2.5), slightly to moderately weathered (W2.5), typically 1 main joint set at 50-75° with two less represented ones at 34-45° and 5-15° to core axis, apertures are typically from 0.5-4 mm, with regular presence of broken zones, infill is generally hematite, broken and crushed rock, JRC = 2-16, for joint along foliation plane JRC is typically 2.

METASEDIMENTARY ROCK
Grey, fine grained, foliated, closely fractured, weak to moderately weak (R2.5), faintly weathered (W1.5), 1 main joint set 45-65° with two less represented ones at 30-48° and 10-25° to core axis, apertures are typically from 1-3 mm, with occasional 20-60 mm broken zones, infill is generally iron stains, broken and crushed rock, JRC = 2-16, average at 10.

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

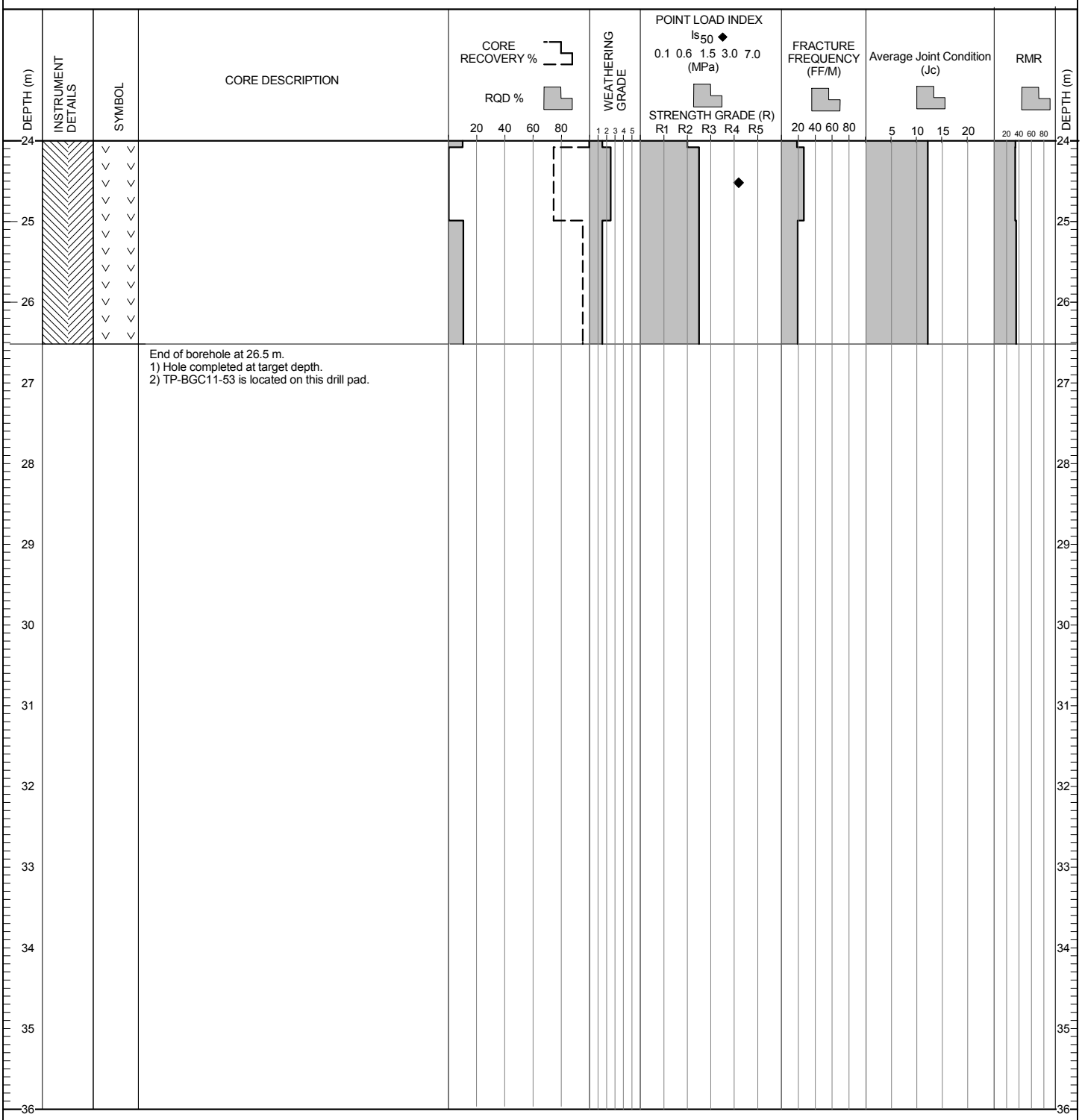
DRILL HOLE # BH-BGC11-27

LOCATION : ANN GULCH

CO-ORDINATES (m) 460,043.5E - 7,102,232.5N
GROUND ELEVATION (m) : 1,100.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 0

START DATE : 04 Jul 11
FINISH DATE : 05 Jul 11
FINAL DEPTH (m) : 26.5
DEPTH TO TOP OF ROCK (m) : 2.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-28

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,926.5E - 7,101,702.7N
GROUND ELEVATION (m) : 1,010.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 7.62

START DATE : 04 Jul 11
FINISH DATE : 06 Jul 11
FINAL DEPTH (m) : 40.8
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

METASEDIMENTARY ROCK
Brownish grey, fine grained, highly fractured, moderately weathered (W3). Rock breaks down to fine to coarse gravel, some sand, trace silt.

1.52 - 5.06 m - Highly fractured zone.

6.1 - 9.14 m - Highly fractured zone.

10.67 - 13.72 m - Highly fractured zone.

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BGC ENGINEERING INC.
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PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

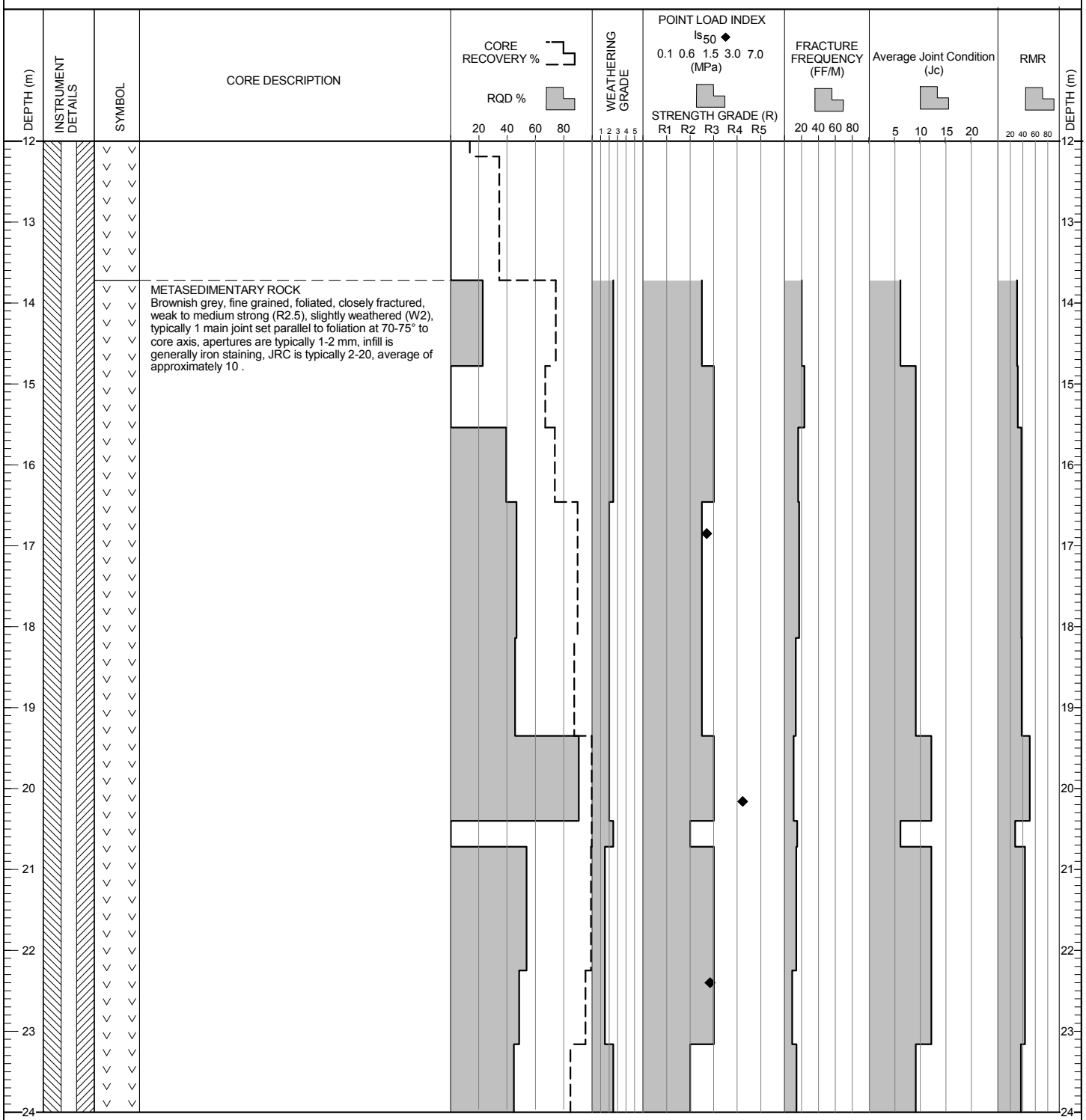
DRILL HOLE # BH-BGC11-28

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,926.5E - 7,101,702.7N
GROUND ELEVATION (m) : 1,010.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 7.62

START DATE : 04 Jul 11
FINISH DATE : 06 Jul 11
FINAL DEPTH (m) : 40.8
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

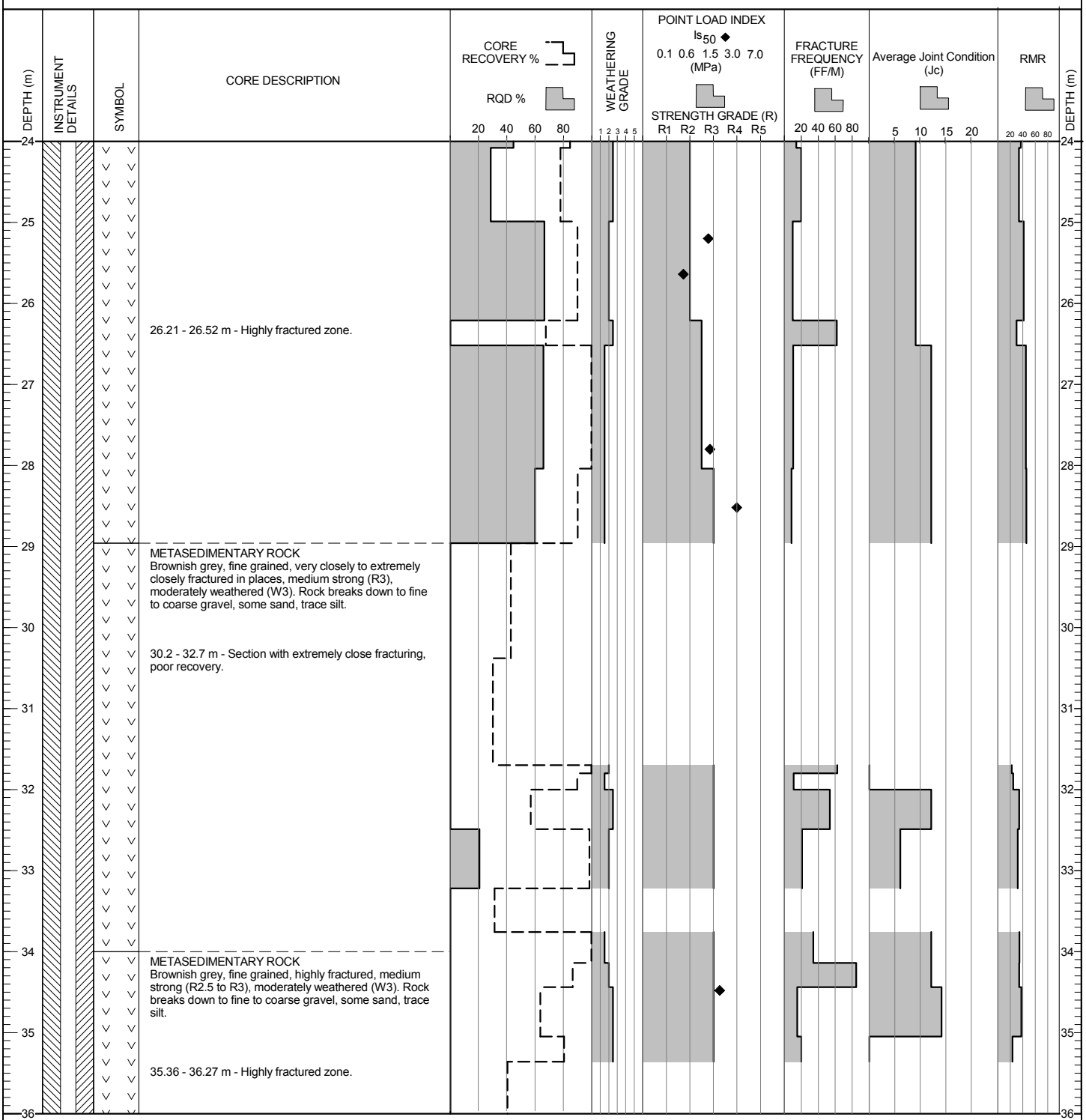
DRILL HOLE # BH-BGC11-28

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,926.5E - 7,101,702.7N
GROUND ELEVATION (m) : 1,010.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 7.62

START DATE : 04 Jul 11
FINISH DATE : 06 Jul 11
FINAL DEPTH (m) : 40.8
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

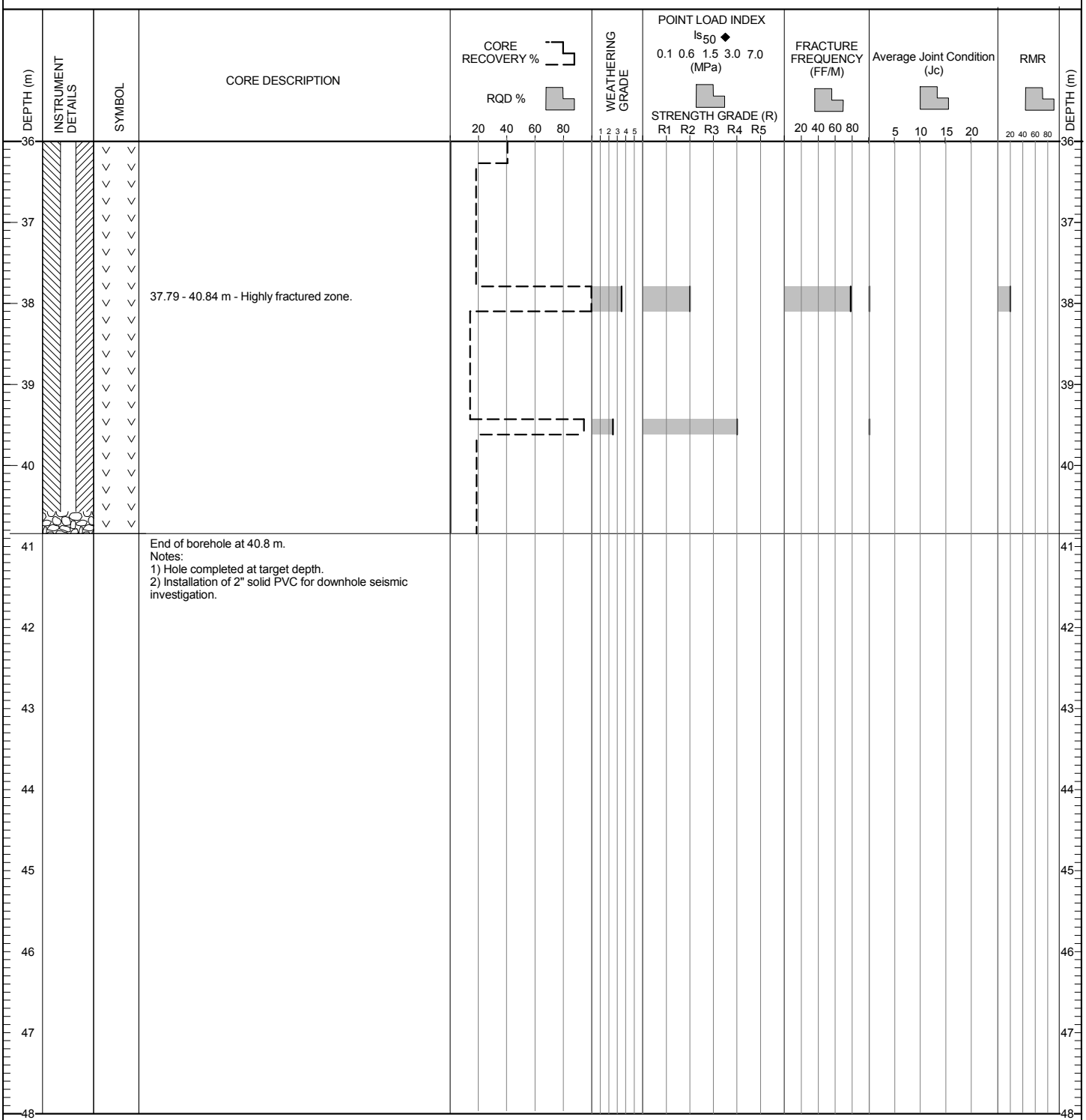
DRILL HOLE # BH-BGC11-28

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,926.5E - 7,101,702.7N
GROUND ELEVATION (m) : 1,010.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 7.62

START DATE : 04 Jul 11
FINISH DATE : 06 Jul 11
FINAL DEPTH (m) : 40.8
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-29

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,977.8E - 7,101,802.1N
GROUND ELEVATION (m) : 1,045.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Jul 11
FINISH DATE : 10 Jul 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

METASEDIMENTARY ROCK
Reddish brown, fine grained, highly fractured, recovered corestones are very weak to moderately strong (R1.5-R2.5), moderately to highly weathered (W3-W4). Rock breaks down to gravel, some sand, trace silt.
0.0 - 3.78 m - Highly fractured zone.

5.5 - 7.47 m - Highly fractured zone.

Aug 2011

9.14 - 10.67 m - Highly fractured zone.

METASEDIMENTARY ROCK
Quartzite, reddish brown, fine grained, foliated, extremely closely to very closely spaced fractures, recovered corestones are weak to moderately strong (R2.5), moderately weathered (W3), 3 main joint sets.

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-29

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,977.8E - 7,101,802.1N
GROUND ELEVATION (m) : 1,045.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Jul 11
FINISH DATE : 10 Jul 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} (0.1 0.6 1.5 3.0 7.0 MPa) / STRENGTH GRADE (R) (R1 R2 R3 R4 R5) | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

12.19 - 13.47 m - Highly fractured zone.

METASEDIMENTARY ROCK
Quartzite, light brownish grey, fine grained, foliated, phyllitic in places, closely fractured, weak to medium strong (R2 to R3), slightly to moderately weathered (W2-W3), 1 main joint set parallel to foliations at 45-65° to core axis, apertures are typically from 1-3 mm with some broken zones, infill is generally broken and decomposing rock with iron staining, JRC is 2-20 with an average of approximately 5, but ranges from 2 to 8 for the joint set along foliation plane.

17.37 - 18.59 m - Highly fractured zone.

METASEDIMENTARY ROCK
Grey, fine grained, some zones of close fractures, weak to strong (R2 to R4), faintly weathered (W1 to W1.5). Typically 1 main joint set parallel to foliations at 45-70° to core axis (75% of joints), apertures are typically from 1-3 mm, infill is generally talc, sericite and iron staining, JRC = 2-20, average of approximately 8, for joint along foliation plane, JRC ranges typically 2-20 with an average of approximately 9.

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

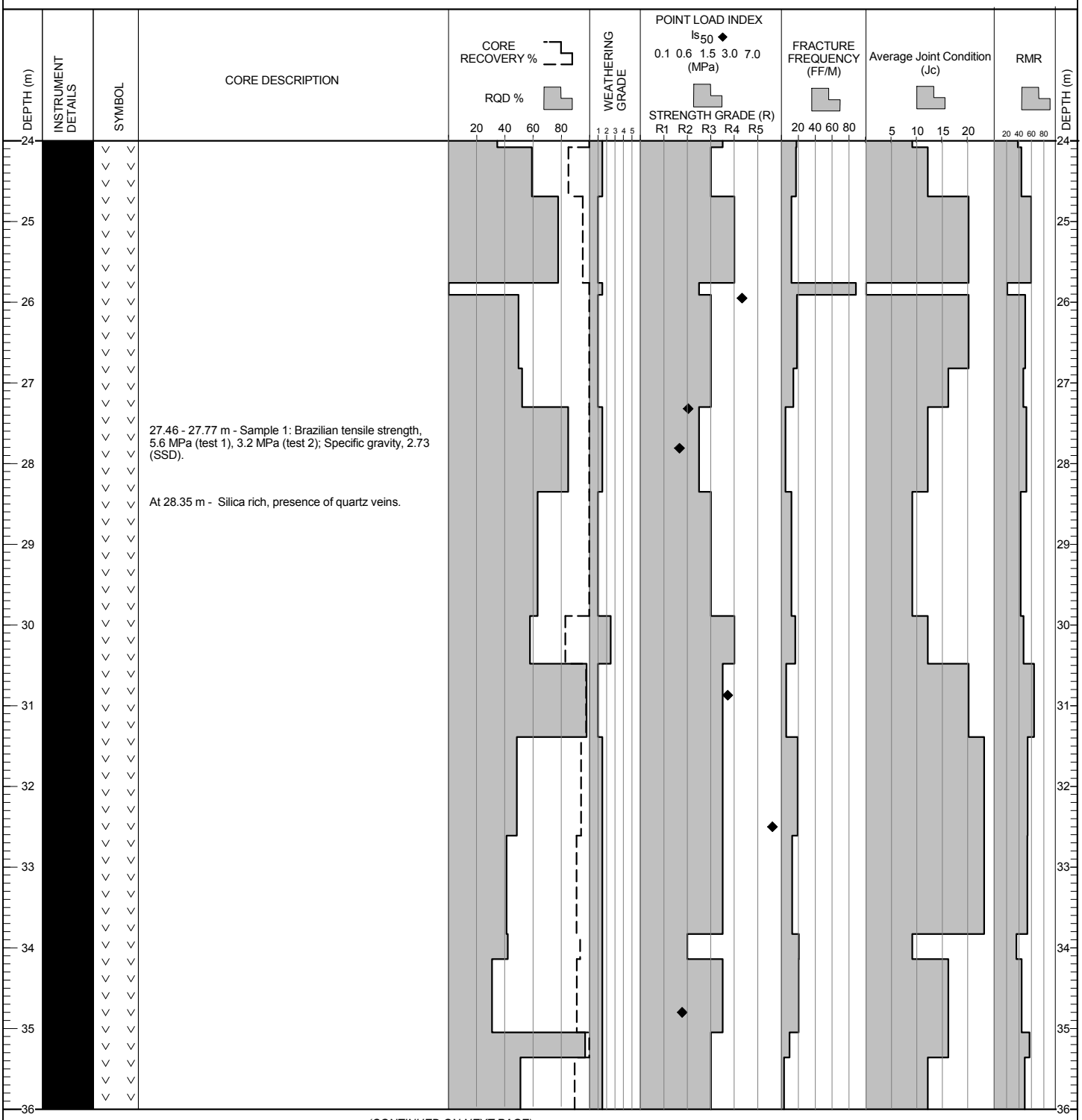
DRILL HOLE # BH-BGC11-29

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,977.8E - 7,101,802.1N
GROUND ELEVATION (m) : 1,045.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Jul 11
FINISH DATE : 10 Jul 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

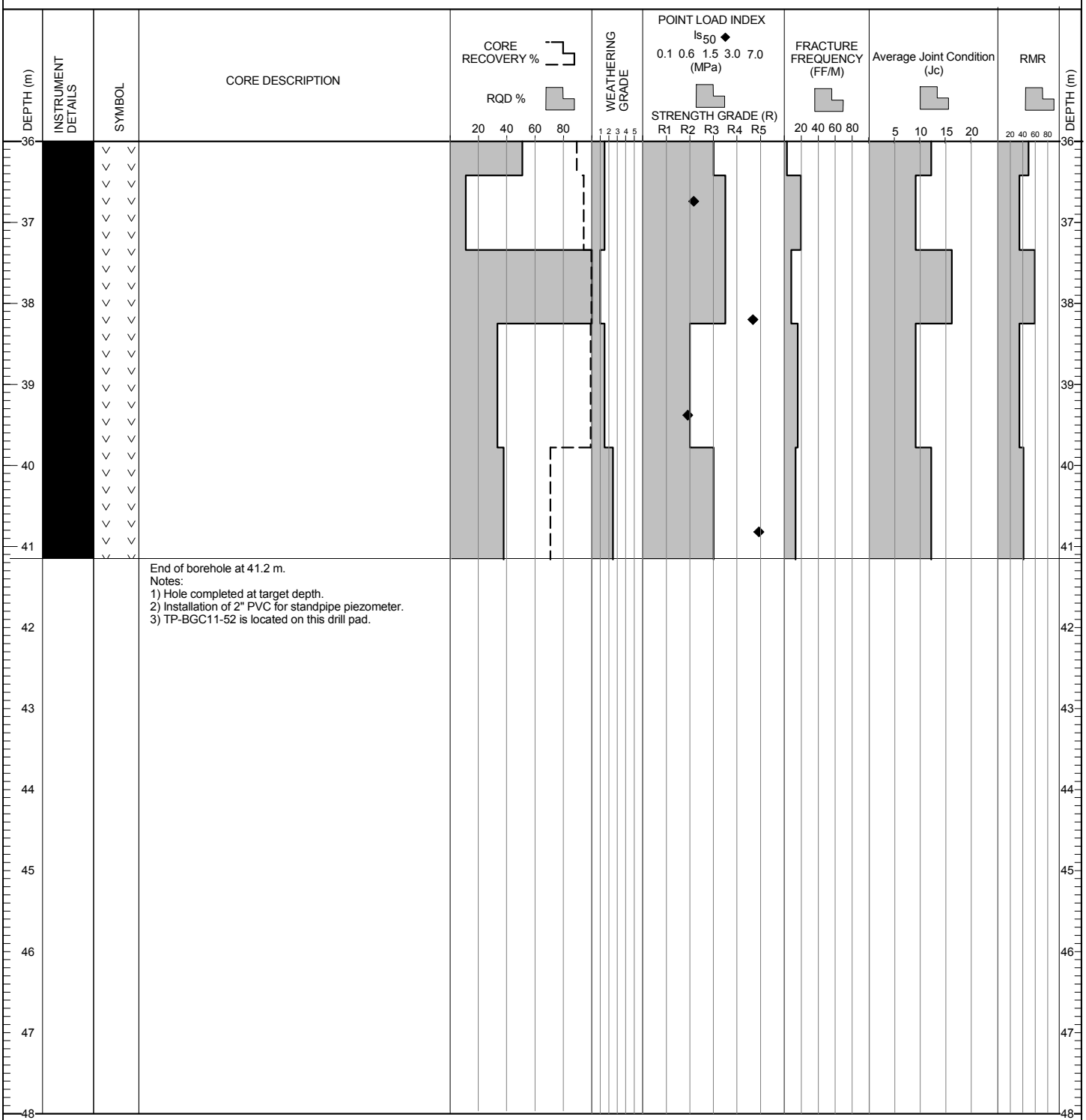
DRILL HOLE # BH-BGC11-29

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,977.8E - 7,101,802.1N
GROUND ELEVATION (m) : 1,045.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Jul 11
FINISH DATE : 10 Jul 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 0.0
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



End of borehole at 41.2 m.
Notes:
1) Hole completed at target depth.
2) Installation of 2" PVC for standpipe piezometer.
3) TP-BGC11-52 is located on this drill pad.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-30

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m): 460,122.0E - 7,101,567.8N
GROUND ELEVATION (m) : 952.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 9.14

START DATE : 07 Jul 11
FINISH DATE : 08 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Some cobbles, some sand, some silt, trace boulders, maximum particle size = 300 mm, subangular to subrounded, elongated to equidimensional, weak to medium strong (R2 to R3) clasts, light to medium brown, moist, non-plastic fines. Sampled at surface, not from core barrel. [COLLUVIUM]		
1						
				Rock encountered at 1.52 m depth. Refer to rock log.		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

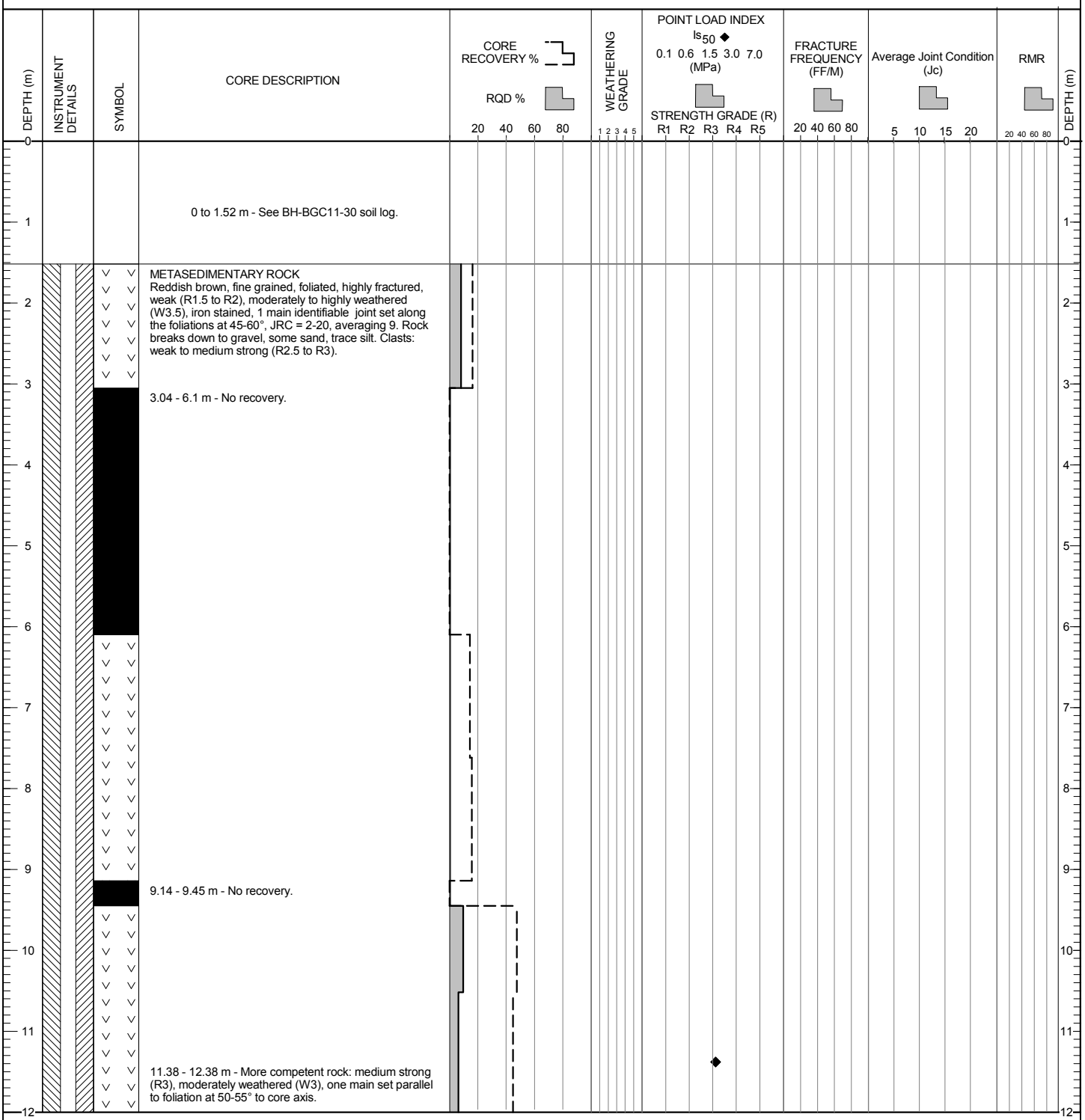
DRILL HOLE # BH-BGC11-30

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 460,122.0E - 7,101,567.8N
GROUND ELEVATION (m) : 952.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 07 Jul 11
FINISH DATE : 08 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

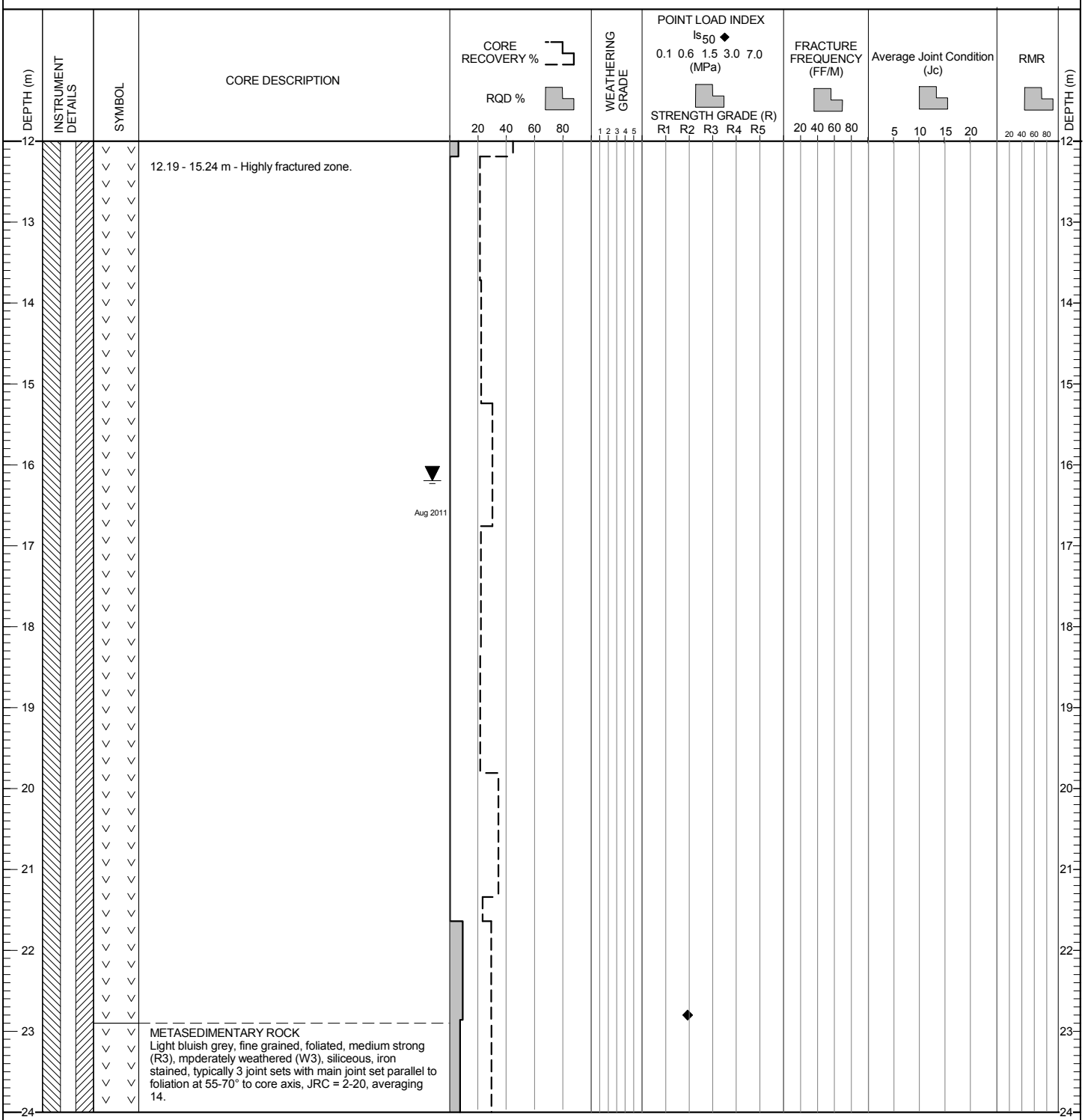
DRILL HOLE # BH-BGC11-30

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 460,122.0E - 7,101,567.8N
GROUND ELEVATION (m) : 952.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 07 Jul 11
FINISH DATE : 08 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

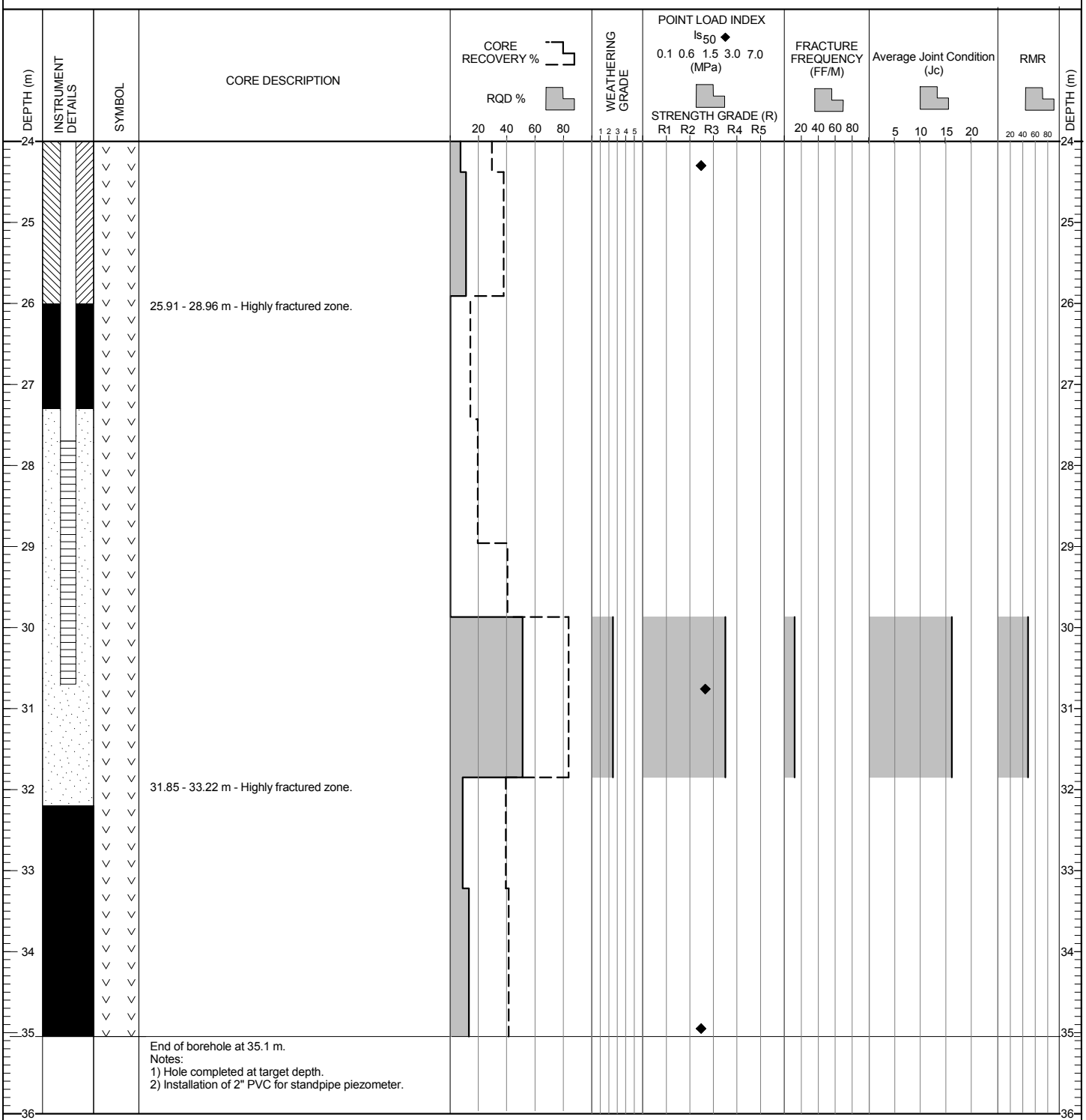
DRILL HOLE # BH-BGC11-30

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 460,122.0E - 7,101,567.8N
GROUND ELEVATION (m) : 952.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 07 Jul 11
FINISH DATE : 08 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-31

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m): 459,850.9E - 7,101,483.0N
GROUND ELEVATION (m) : 917.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 6.10

START DATE : 10 Jul 11
FINISH DATE : 11 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 16.8
LOGGED BY : EB/SD/KH
REVIEWED BY : PQ/DW

DEPTH (m) | SAMPLE TYPE | SAMPLE NO. | SYMBOL | LITHOLOGIC DESCRIPTION | INSTRUMENT DETAILS | SPT BLOWS PER 150mm

0 m

GRAVEL (GW)
Silty, some fine sand, some cobbles, trace boulders, well graded, maximum particle size = 250 mm, flat, subangular to angular, reddish brown, wet (from drilling fluid), roots. Clasts: metasedimentary, very weak to weak (R1 to R2).
[COLLUVIUM]

3.05 - 4.57 m - No recovery.

5 m

COBBLES
Some boulders, some gravel, trace coarse sand, poorly (gap) graded, maximum particle size = 350 mm, metasedimentary clasts are typically flat and subangular to angular, granodiorite clasts are subrounded to subangular and equidimensional, metasedimentary clasts are reddish brown, granodiorite grey and white, occasional discontinuities present in metasedimentary and granodiorite boulders, clast strength is typically R3 or greater. Sand/fines likely washed away by drilling process (observed in cuttings).
[DEBRIS FLOW]

12 m

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

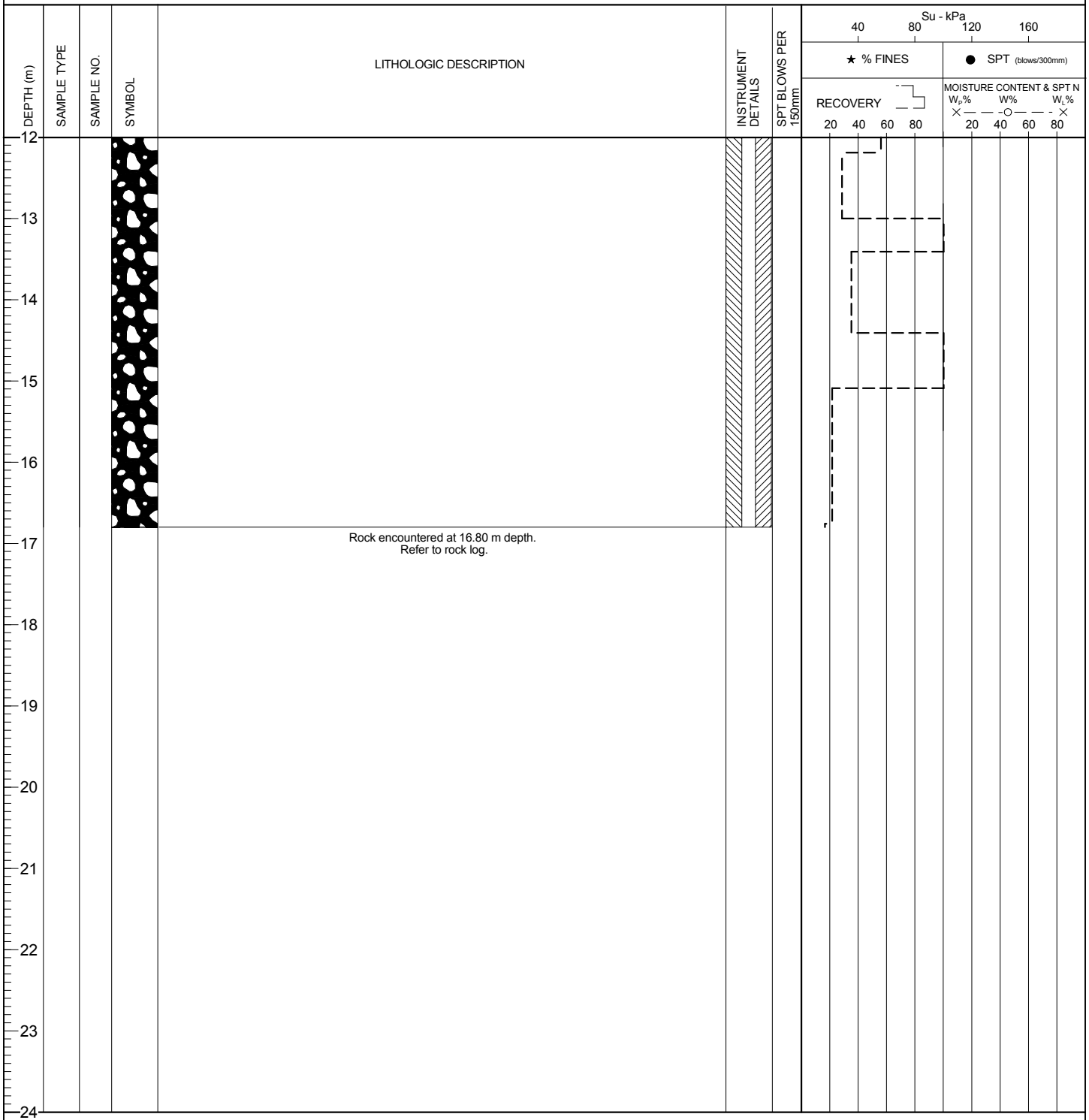
DRILL HOLE # BH-BGC11-31

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m): 459,850.9E - 7,101,483.0N
GROUND ELEVATION (m) : 917.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 6.10

START DATE : 10 Jul 11
FINISH DATE : 11 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 16.8
LOGGED BY : EB/SD/KH
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-31

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 459,850.9E - 7,101,483.0N
GROUND ELEVATION (m) : 917.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 10 Jul 11
FINISH DATE : 11 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 16.8
LOGGED BY : EB/SD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			0 to 16.80 m - See BH-BGC11-31 soil log.
17			METASEDIMENTARY ROCK Phyllite, light bluish grey with iron oxide staining, very weak to weak (R1-R2), highly weathered (W4), foliated/bedded texture, highly fractured core recovery, occasional random joints, generally parallel to bedding/foliation, infill is typically iron oxide staining, clay, broken and disintegrated rock, joints typically smooth and planar, typical fracture spacing <20 mm, much of recovery is coarse gravel-sized pieces.
20			19.81 - 21.34 m - Highly fractured zone.
23			22.86 - 30.48 m - Highly fractured zone.
24			

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-31

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 459,850.9E - 7,101,483.0N
GROUND ELEVATION (m) : 917.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 10 Jul 11
FINISH DATE : 11 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 16.8
LOGGED BY : EB/SD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
24			Below 24.0 m - Quartzite rich, minimal iron oxide staining.
25			
26			
27			
28			
29			
30			
31			
32			32.0 - 35.05 m - Highly fractured zone.
33			
34			
35			End of borehole at 35.1 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for potential downhole seismic investigation.
36			

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

DEPTH (m)

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-31

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 459,850.9E - 7,101,483.0N
GROUND ELEVATION (m) : 917.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 6.1

START DATE : 10 Jul 11
FINISH DATE : 11 Jul 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 16.8
LOGGED BY : EB/SD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
36			3) TP-BGC11-145 is located on this drill pad.
37			
38			
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

DEPTH (m)

BGC ENGINEERING INC.
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PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-32

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,745.2E - 7,100,934.4N
GROUND ELEVATION (m) : 818.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 14.63

START DATE : 12 Jul 11
FINISH DATE : 13 Jul 11
FINAL DEPTH (m) : 24.4
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				COBBLES AND BOULDERS Metasedimentary and granodiorite cobbles and boulders, some coarse gravel, maximum particle size = 150 mm, clasts are subangular to subrounded, elongated to equidimensional, weak to strong (R2 to R4), fines are non plastic, light reddish brown to dark bluish grey, wet (due to drilling). [PLACER TAILINGS]		
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11				Aug 2011 ▼		
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

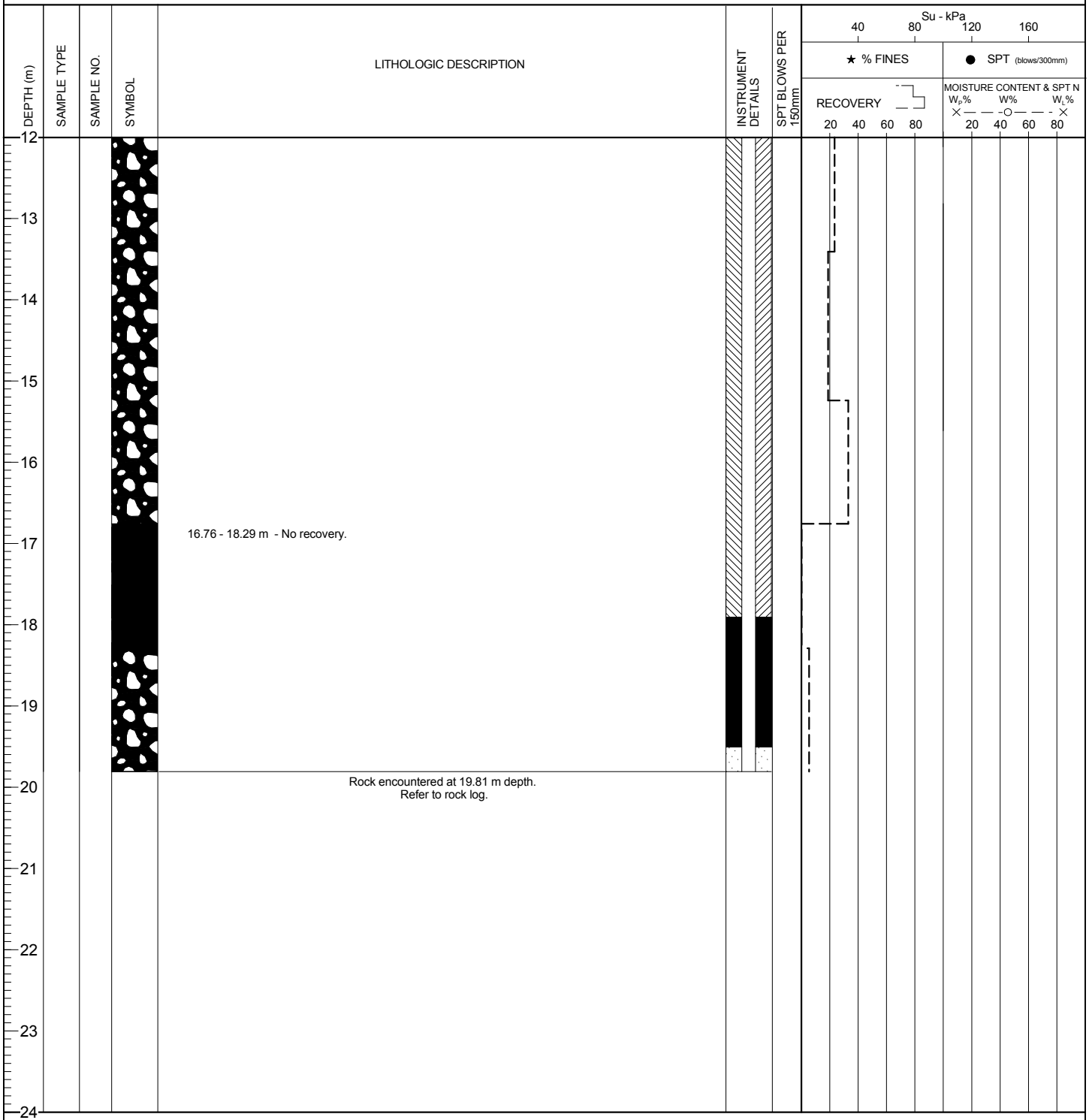
DRILL HOLE # BH-BGC11-32

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,745.2E - 7,100,934.4N
GROUND ELEVATION (m) : 818.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 14.63

START DATE : 12 Jul 11
FINISH DATE : 13 Jul 11
FINAL DEPTH (m) : 24.4
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-32

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 458,745.2E - 7,100,934.4N
GROUND ELEVATION (m) : 818.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 14.63

START DATE : 12 Jul 11
FINISH DATE : 13 Jul 11
FINAL DEPTH (m) : 24.4
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
12										12
13										13
14										14
15										15
16			0 to 19.81 m - See BH-BGC11-32 soil log.							16
17										17
18										18
19										19
20			METASEDIMENTARY ROCK Dark grey, fine grained, foliated, weak (R0.5 - R1), highly weathered (W4), siliceous, some carbonate alteration, typically 2 joint sets: foliation at 60 to 85° and joint at 24 to 45° to core axis, JRC = 2-20, averaging 12.							20
21			21.34 - 24.38 m - Highly fractured zone.							21
22										22
23										23
24										24

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-32

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 458,745.2E - 7,100,934.4N
GROUND ELEVATION (m) : 818.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 14.63

START DATE : 12 Jul 11
FINISH DATE : 13 Jul 11
FINAL DEPTH (m) : 24.4
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
24										24
			End of borehole at 24.4 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" PVC for standpipe piezometer and downhole seismic investigation.							
25										25
26										26
27										27
28										28
29										29
30										30
31										31
32										32
33										33
34										34
35										35
36										36

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-33

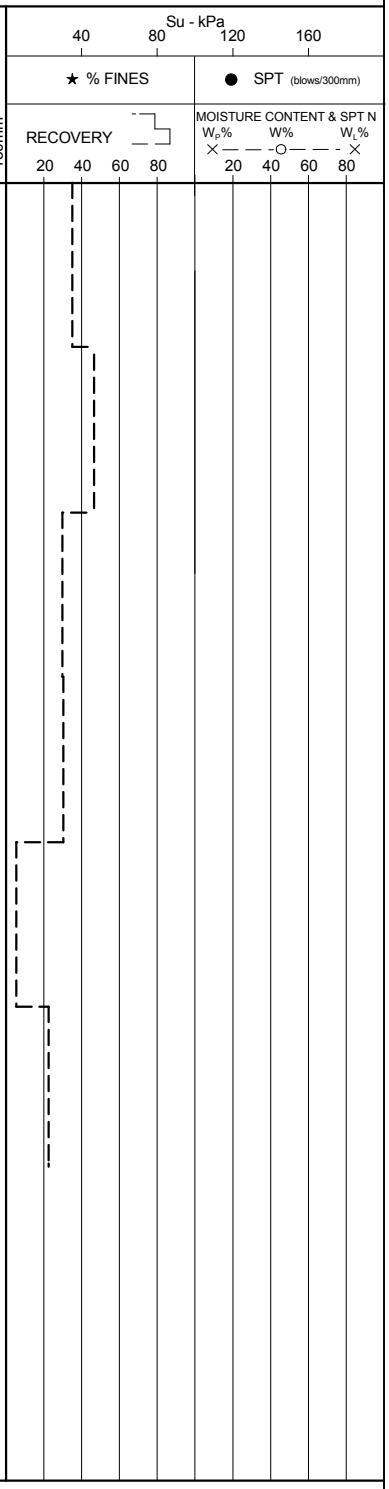
LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 459,115.7E - 7,100,983.6N
GROUND ELEVATION (m) : 833.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 11.58

START DATE : 13 Jul 11
FINISH DATE : 14 Jul 11
FINAL DEPTH (m) : 41.4
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL AND SAND (GW/SW) Some cobbles, trace boulders, trace silt, maximum particle size = 450 mm, greyish brown, moist, homogeneous, non cemented. Granodiorite clasts: rounded, equidimensional. Metasedimentary clasts: angular, elongated. [PLACER TAILINGS]		
4				Aug 2011		
9				Rock encountered at 9.10 m depth. Refer to rock log.		



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-33

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,115.7E - 7,100,983.6N
GROUND ELEVATION (m) : 833.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 11.58

START DATE : 13 Jul 11
FINISH DATE : 14 Jul 11
FINAL DEPTH (m) : 41.4
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0										0
1										1
2										2
3										3
4										4
5			0 to 9.10 m - See BH-BGC11-33 soil log.							5
6										6
7										7
8										8
9										9
10			METASEDIMENTARY ROCK Light grey, fine grained, foliated, pyrophyllite alteration, very weak to weak, moderately to highly weathered/altered, one main joint set parallel to foliations, running at 65-85° to core axis, apertures vary from 1 to 90 mm, infill is typically crushed and decomposed rock, sericite, clay. 9.14 - 18.29 m - Highly fractured zone. 10.67 - 12.19 m - Very low recovery, unable to determine representative joint condition and fracture frequency.							10
11										11
12										12

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PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-33

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,115.7E - 7,100,983.6N
GROUND ELEVATION (m) : 833.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 11.58

START DATE : 13 Jul 11
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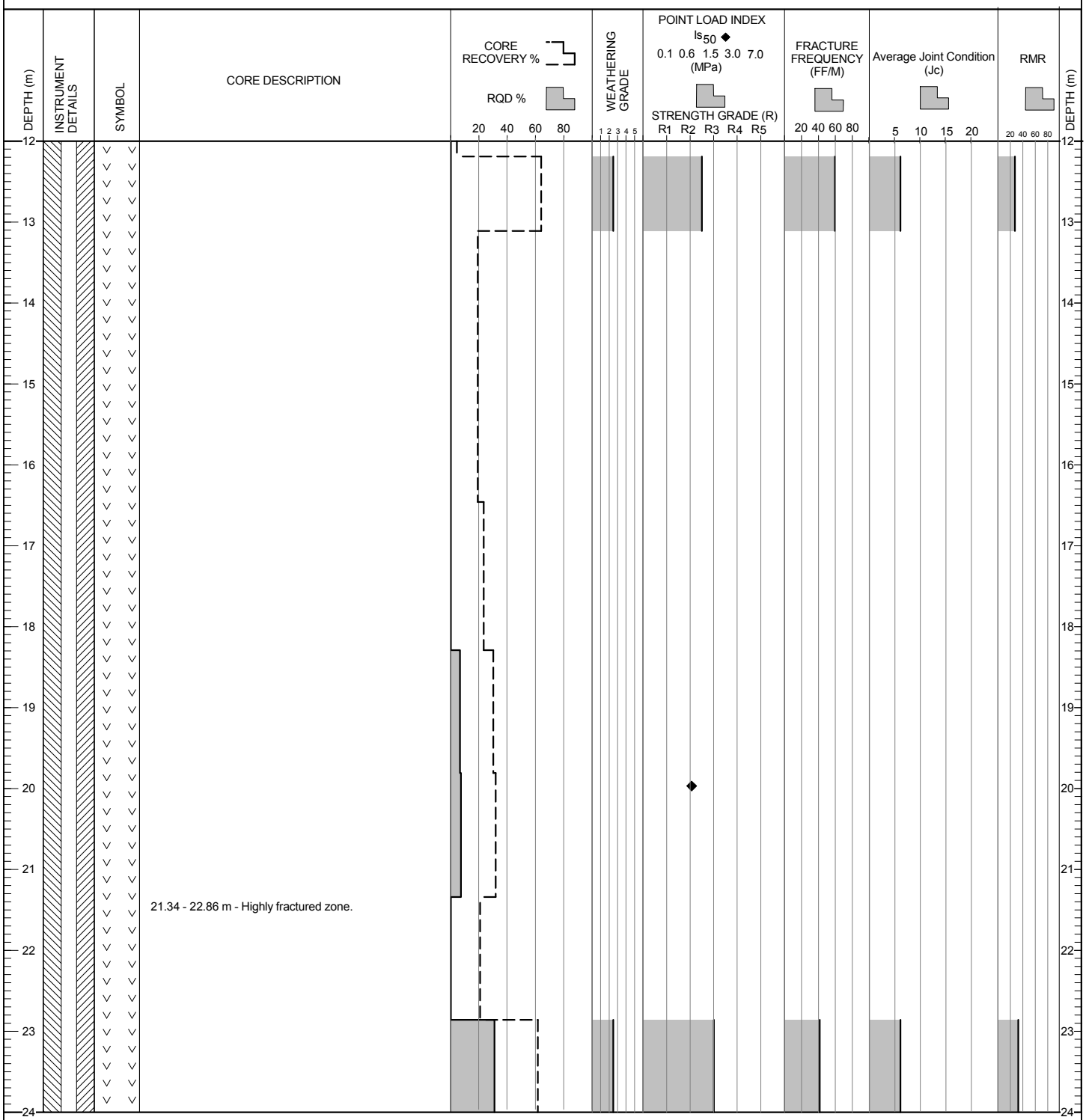

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

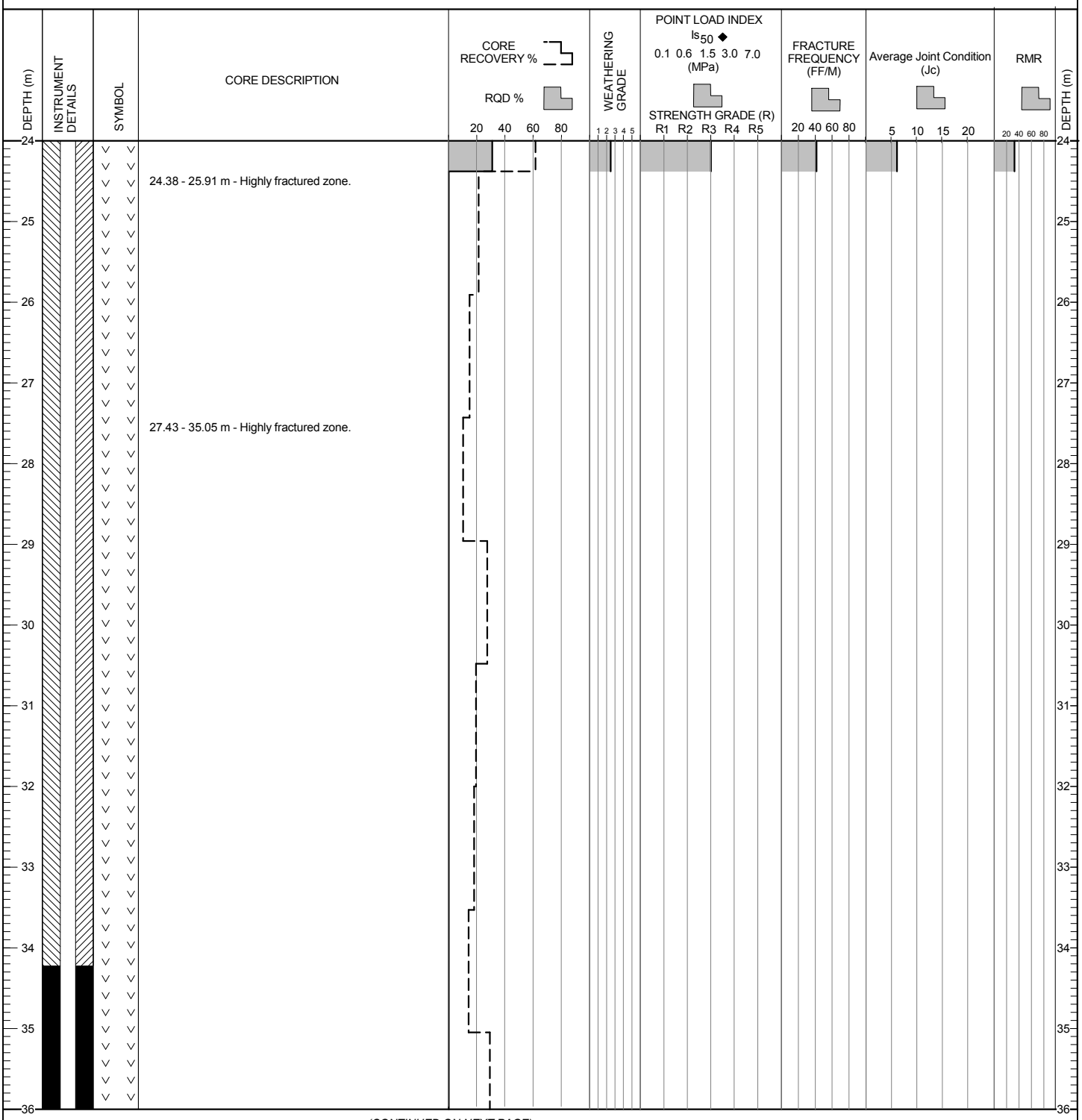
DRILL HOLE # BH-BGC11-33

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,115.7E - 7,100,983.6N
GROUND ELEVATION (m) : 833.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 11.58

START DATE : 13 Jul 11
FINISH DATE : 14 Jul 11
FINAL DEPTH (m) : 41.4
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

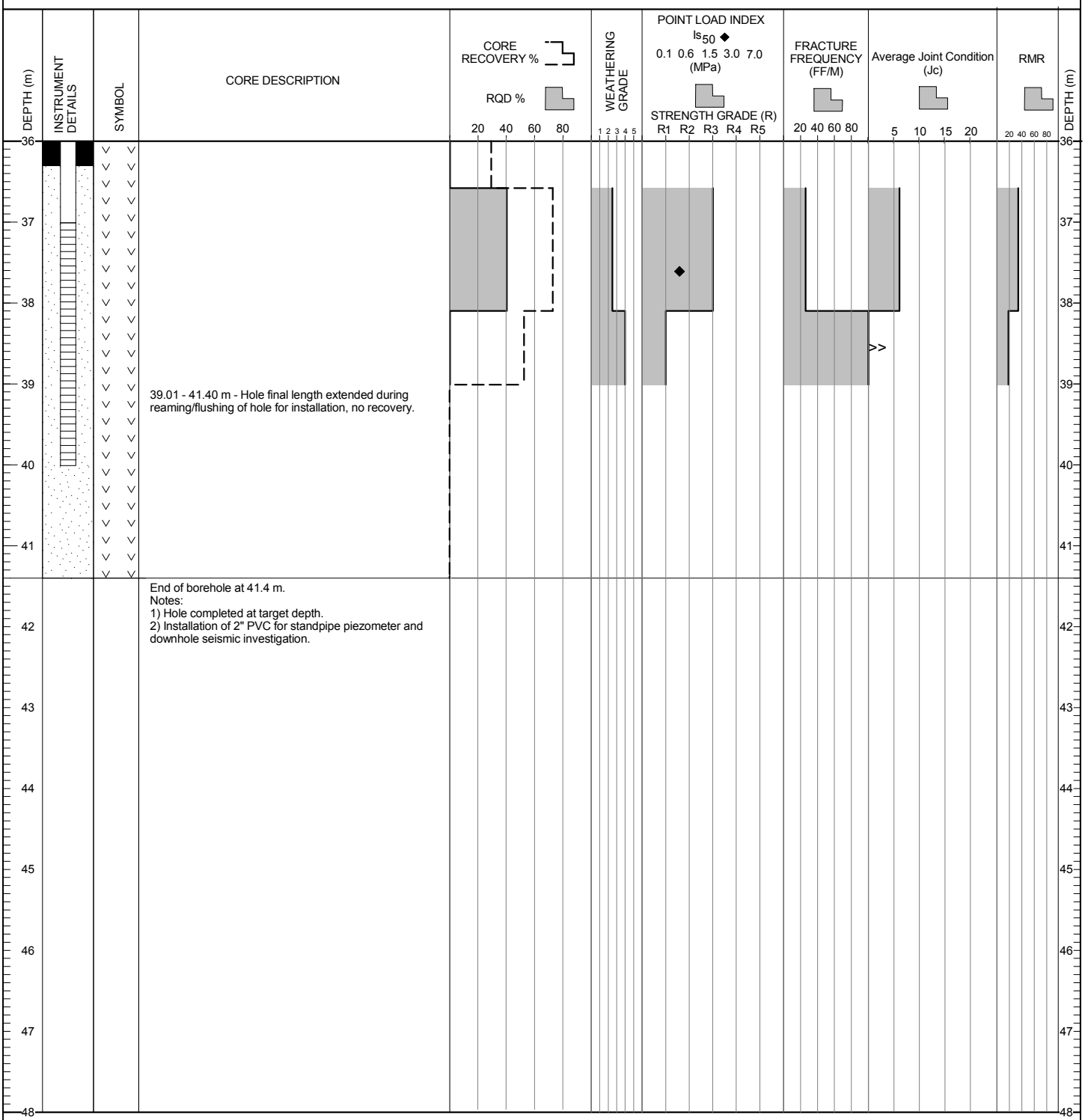
DRILL HOLE # BH-BGC11-33

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,115.7E - 7,100,983.6N
GROUND ELEVATION (m) : 833.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 11.58

START DATE : 13 Jul 11
FINISH DATE : 14 Jul 11
FINAL DEPTH (m) : 41.4
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-34

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 459,308.5E - 7,101,053.5N
GROUND ELEVATION (m) : 848.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 9.14

START DATE : 15 Jul 11
FINISH DATE : 16 Jul 11
FINAL DEPTH (m) : 38.1
DEPTH TO TOP OF ROCK (m) : 16.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | SAMPLE TYPE | SAMPLE NO. | SYMBOL | LITHOLOGIC DESCRIPTION | INSTRUMENT DETAILS | SPT BLOWS PER 150mm

Su - kPa: 40, 80, 120, 160
★ % FINES | ● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% | W% | W_L%: 20, 40, 60, 80

0

GRAVEL AND SAND (GW/SW)
Cobbley, trace boulders, trace silt, maximum particle size = 450 mm, greyish brown, moist, homogeneous, non cemented. Granodiorite clasts: rounded, equidimensional. Metasedimentary clasts: sub-angular, elongated.
[PLACER TAILINGS]

1.52 - 3.05 m - No recovery.

Aug 2011

10.67 - 10.97 m - No recovery.

12

(Continued on next page)

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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

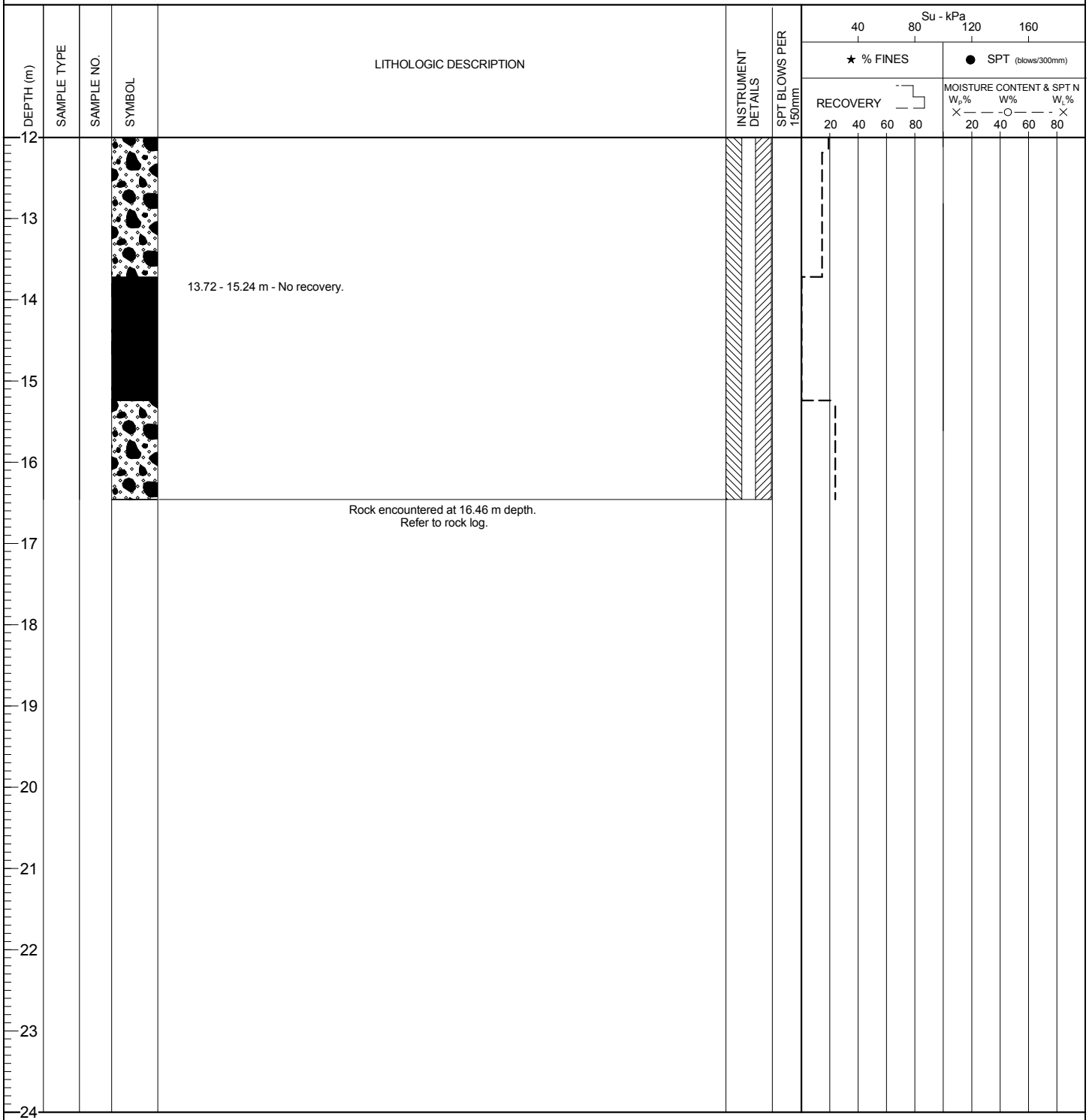
DRILL HOLE # BH-BGC11-34

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 459,308.5E - 7,101,053.5N
GROUND ELEVATION (m) : 848.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 9.14

START DATE : 15 Jul 11
FINISH DATE : 16 Jul 11
FINAL DEPTH (m) : 38.1
DEPTH TO TOP OF ROCK (m) : 16.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-34

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,308.5E - 7,101,053.5N
GROUND ELEVATION (m) : 848.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 15 Jul 11
FINISH DATE : 16 Jul 11
FINAL DEPTH (m) : 38.1
DEPTH TO TOP OF ROCK (m) : 16.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12 – 16			0 to 16.46 m - See BH-BGC11-34 soil log.
16 – 24			METASEDIMENTARY ROCK Light purplish grey, fine grained, foliated, very weak to weak (R1.5 to R2), moderately to highly weathered (W3 to W4), pyrophyllic alteration, one main joint set parallel to foliations, running at 45-85° to core axis, apertures vary from 1-80 mm, infill is typically crushed and decomposed rock, sericite, clay. 16.46 - 19.35 m - Highly fractured zone. 19.35 - 20.73 m - No recovery. 20.73 - 24.38 m - Highly fractured zone.

CORE RECOVERY % / RQD % (20 40 60 80)
WEATHERING GRADE (1 2 3 4 5)
POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5
FRACTURE FREQUENCY (FF/M) (20 40 60 80)
Average Joint Condition (Jc) (5 10 15 20)
RMR (20 40 60 80)

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

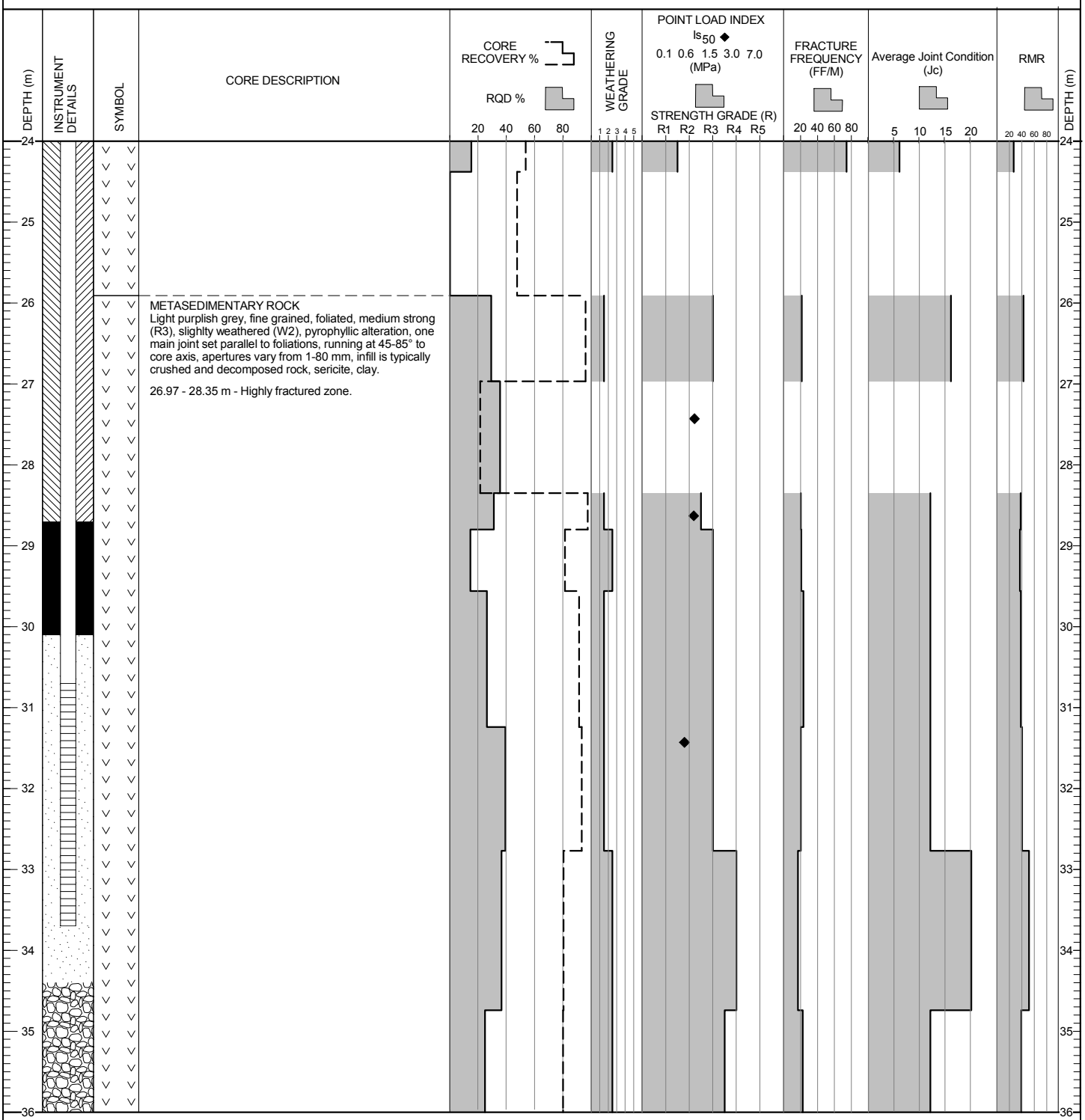
DRILL HOLE # BH-BGC11-34

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,308.5E - 7,101,053.5N
GROUND ELEVATION (m) : 848.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 15 Jul 11
FINISH DATE : 16 Jul 11
FINAL DEPTH (m) : 38.1
DEPTH TO TOP OF ROCK (m) : 16.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-34

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m) 459,308.5E - 7,101,053.5N
GROUND ELEVATION (m) : 848.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 15 Jul 11
FINISH DATE : 16 Jul 11
FINAL DEPTH (m) : 38.1
DEPTH TO TOP OF ROCK (m) : 16.5
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
36			
37			36.6 -36.86 m - Sample 1: UCS, 53.4 Mpa; Brazilian tensile strength, 9.2 MPa (test 1), 11.8 MPa (test 2); Specific gravity, 2.64 (SSD).
38			End of borehole at 38.1 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" PVC for standpipe piezometer and downhole seismic investigation.
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

DEPTH (m)

BGC ENGINEERING INC.
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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GW) Cobbley, some sand, medium to coarse, trace boulders, flat and elongated, subangular to subrounded, maximum particle size = 65 mm, light brown matrix, red-brown and blue-grey clasts, moist, clasts are metasedimentary quartz and intrusive. [COLLUVIUM]		
7.62				GRAVEL (GW) Cobbley, some sand, medium to coarse, trace boulders, flat and elongated, subangular to subrounded, light brown matrix, red-brown and blue-grey clasts, moist, clasts are metasedimentary. [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY ROCK] 7.62 - 9.14 m - No recovery.		
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

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BGC ENGINEERING INC.
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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

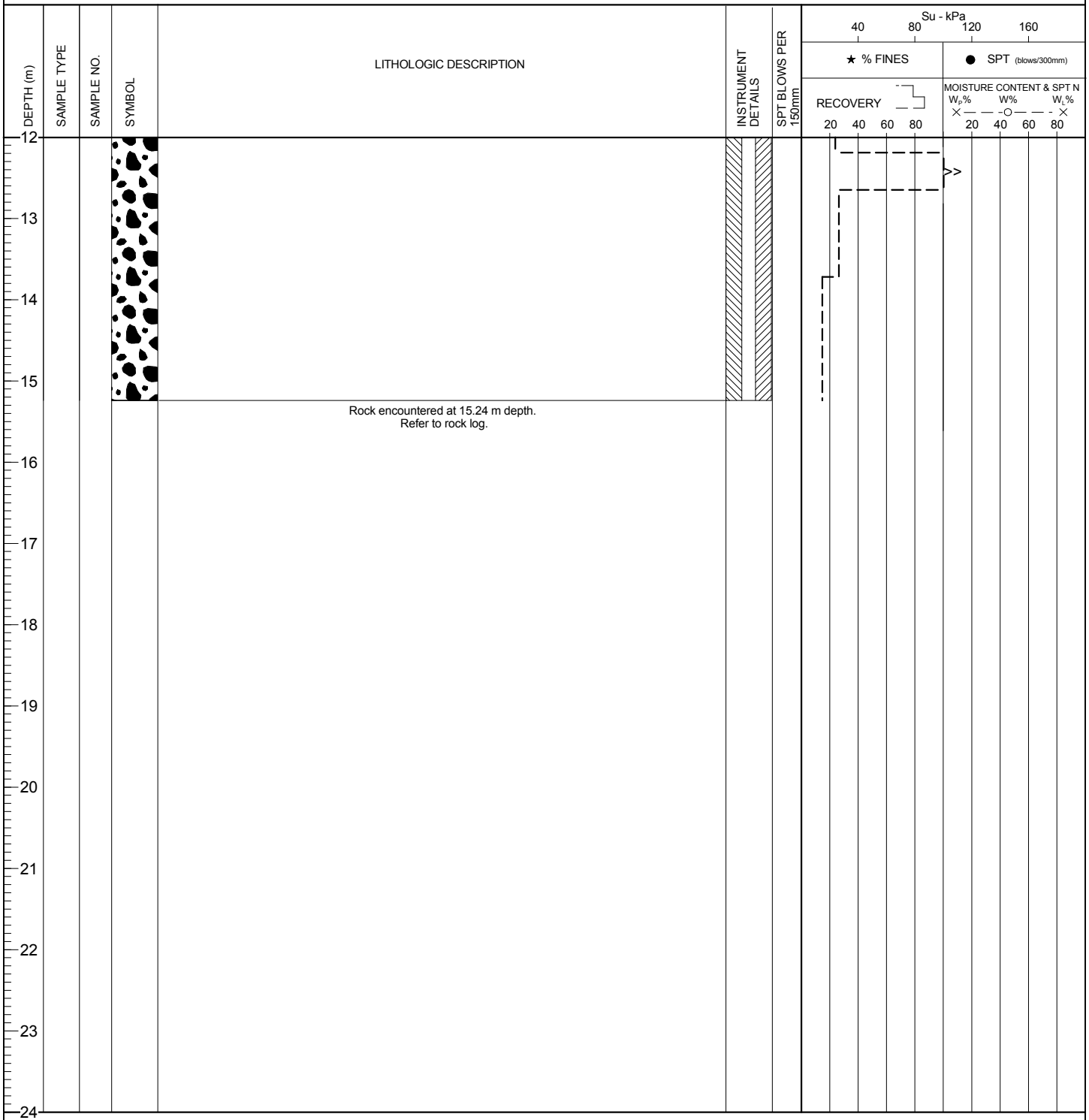
DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

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DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 15.24 m - See BH-BGC11-35 soil log.

METASEDIMENTARY ROCK
Light brownish grey, fine grained, foliated, very weak (R1), highly weathered (W4), phyllitic, siliceous, iron stained.
15.24 - 22.86 m - Highly fractured zone.

METASEDIMENTARY ROCK
Light grey, fine grained, foliated, weak to moderately strong (R2.5), moderately to highly weathered (W2.5 to W3.5), phyllitic, siliceous, iron stained, typically 2 joint sets: one sub-parallel to foliations at 20-35° from core axis and the other at 50-70° from core axis, JRC = 2-20, averaging 11.

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

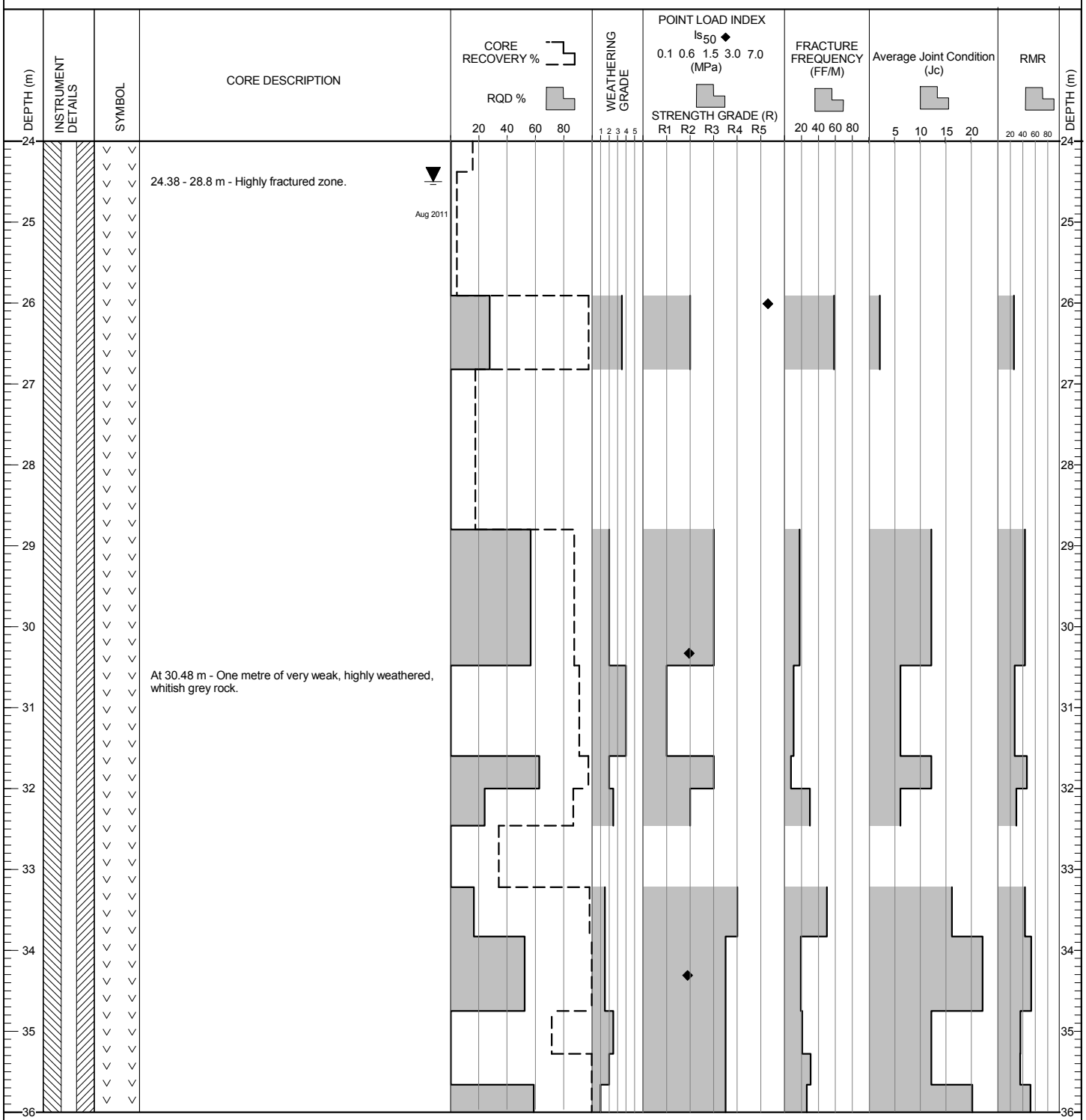
DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

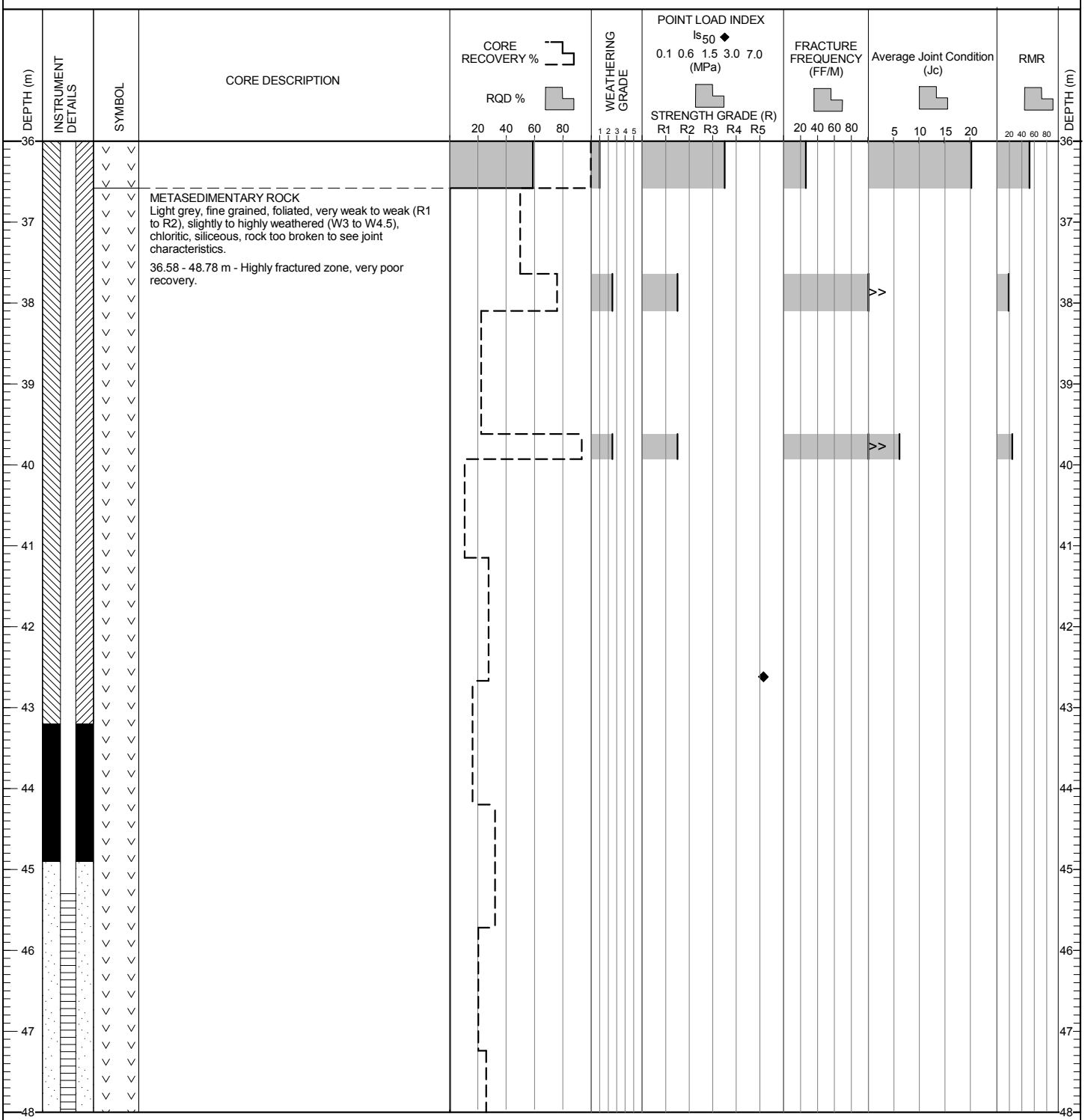
DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-35

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,695.7E - 7,100,440.3N
GROUND ELEVATION (m) : 986.3m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 9.14

START DATE : 17 Jul 11
FINISH DATE : 19 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 15.2
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
48										48
49										49
50										50
51			End of borehole at 50.3 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" PVC for standpipe piezometer. 3) TP-BGC11-51 is located on this drill pad.							51
52										52
53										53
54										54
55										55
56										56
57										57
58										58
59										59
60										60

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Coarse, silty, trace cobbles, trace boulders, well graded, angular, elongated, maximum particle size = 350 mm, yellowish brown, moist. Clasts: metasedimentary, weak to strong (R2 to R4). [COLLUVIUM]		
3				Rock encountered at 3.05 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160

★ % FINES ● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 3.05 m - See BH-BGC11-36 soil log.

METASEDIMENTARY ROCK
Brown and grey, fine grained, foliated, highly fractured, weak to medium strong (R2.5 to R3), slightly to moderately weathered (W2 to W3), apertures vary from 0.5 to 3mm with occasional broken zone up to 55 mm thick), infill is hematite and occasional broken rock, typically 3 sets: foliation at 60-75°, sub-vertical joint set at 0-15° from core axis and joint set diagonally intersecting foliation at 30-45° from core axis, JRC = 2-20, averaging 9.

9.14 - 11.13 m - Highly fractured zone.

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BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

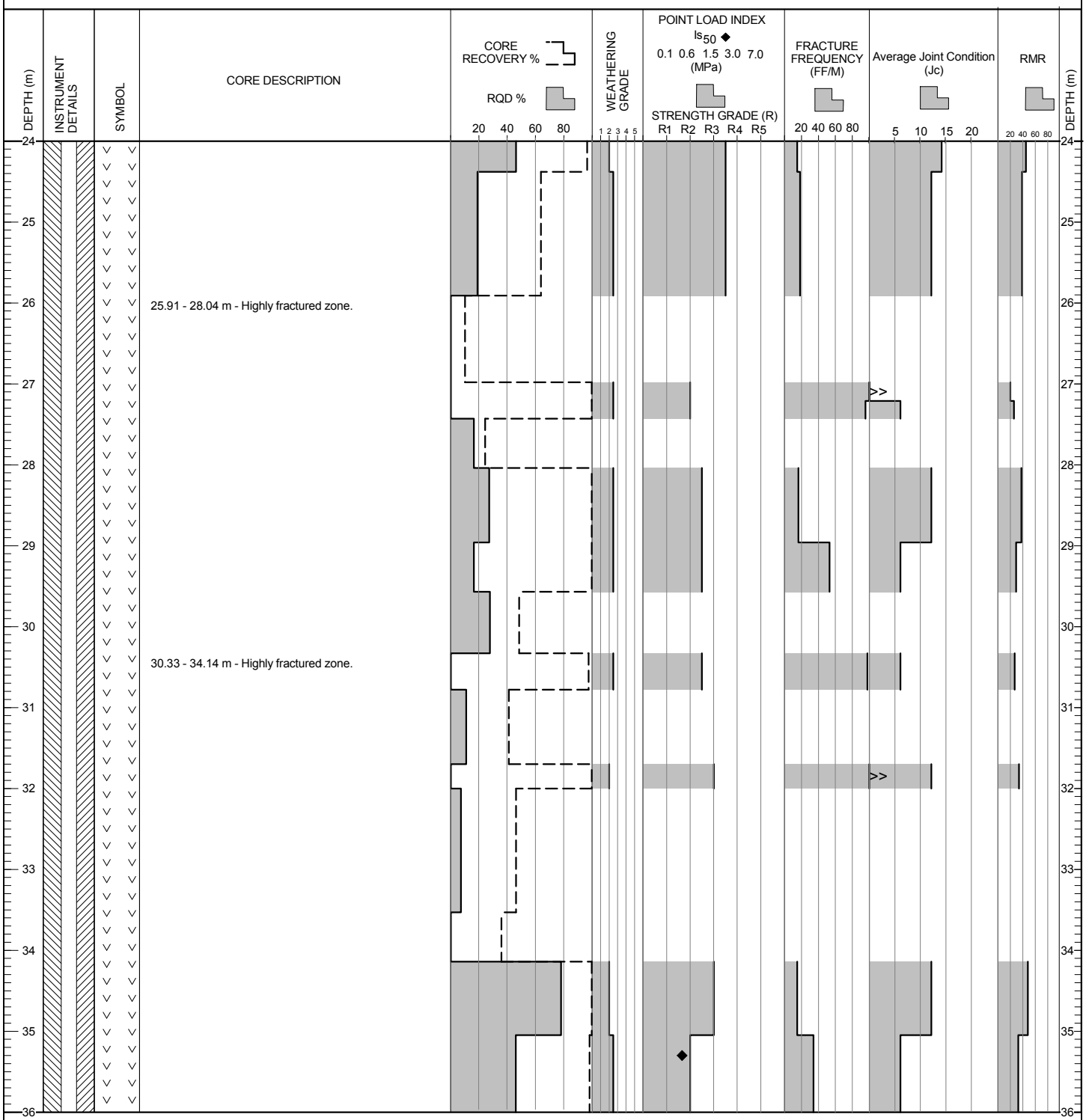
DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

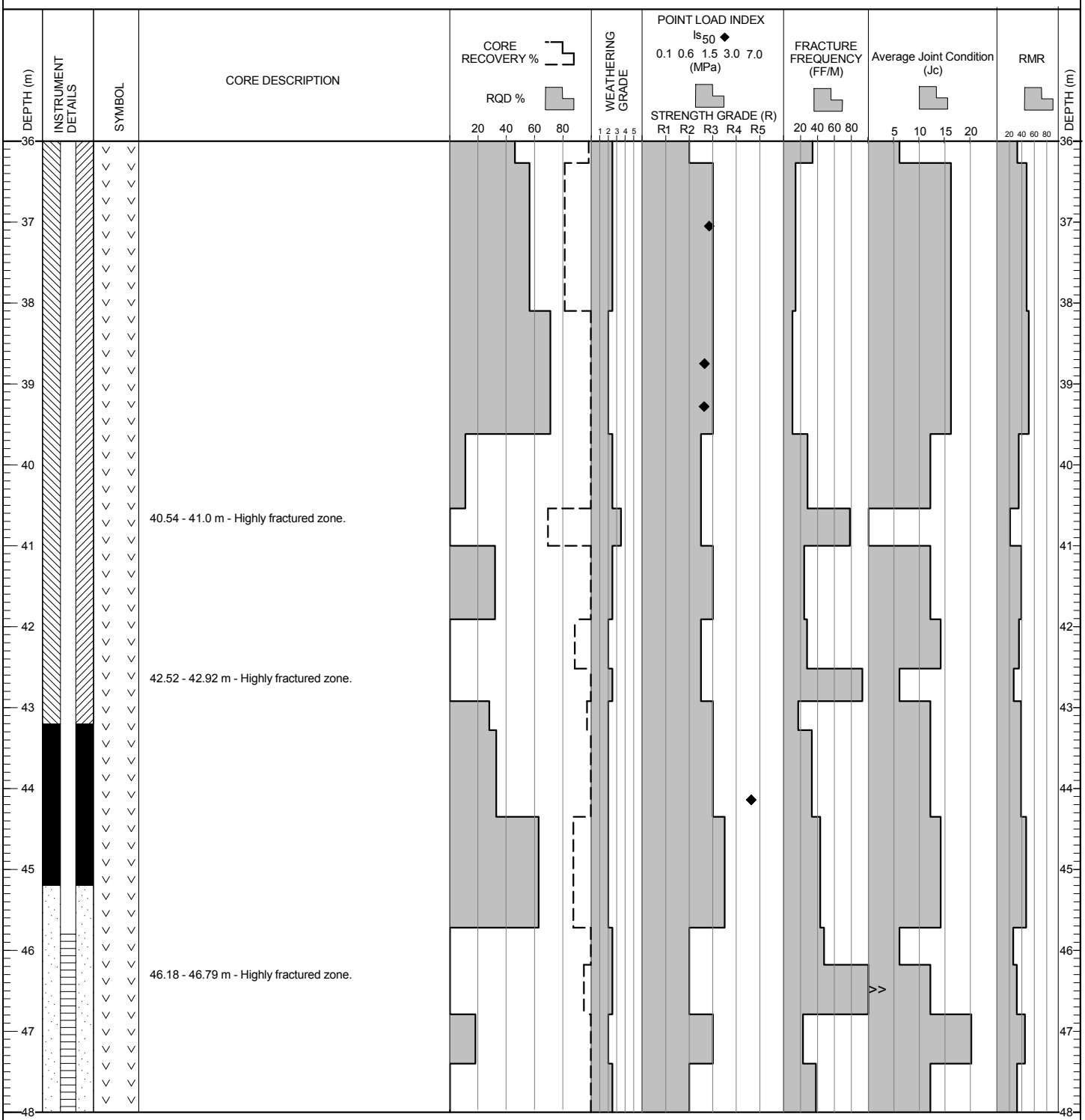
DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

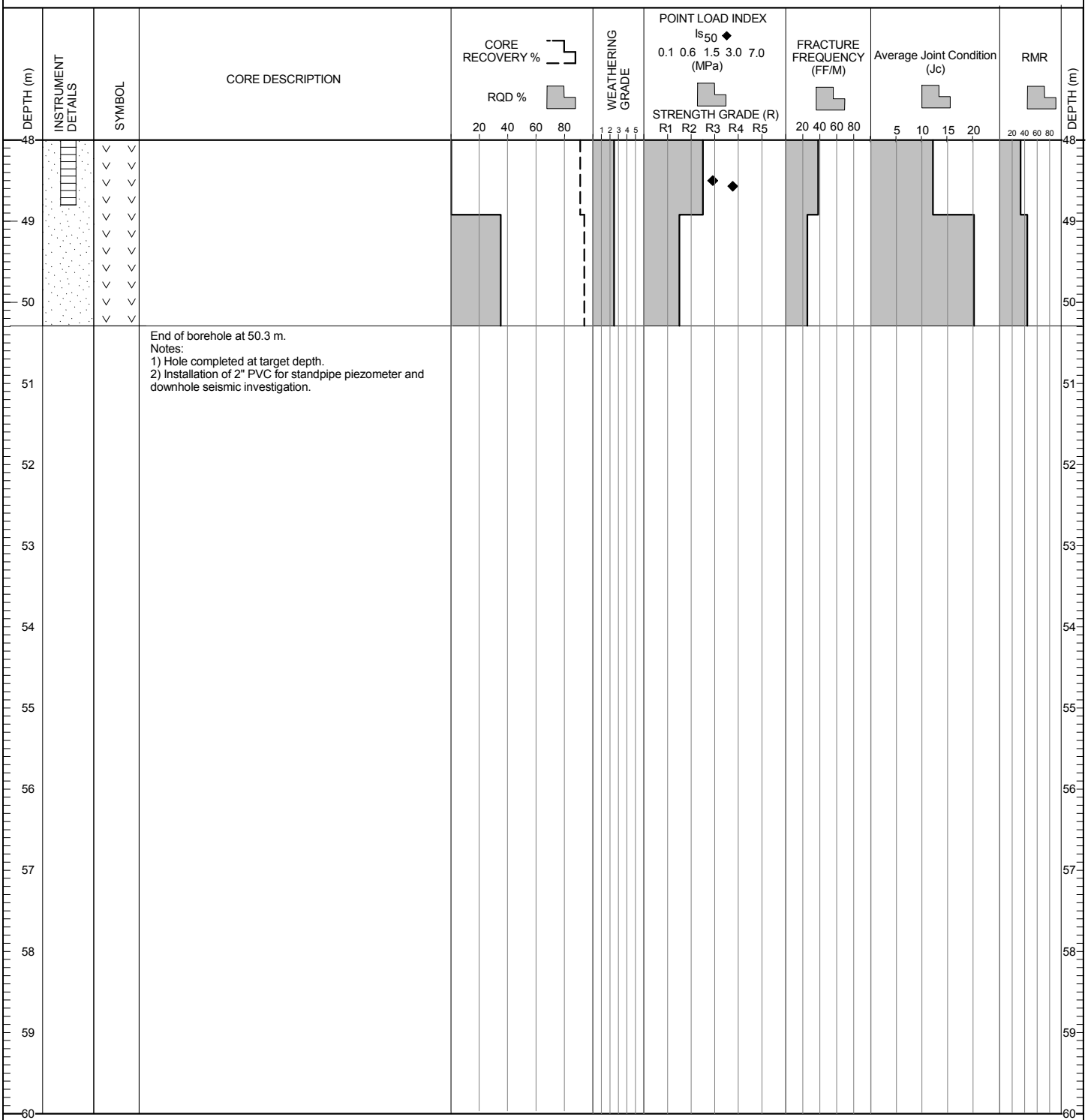
DRILL HOLE # BH-BGC11-36

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,699.9E - 7,100,274.7N
GROUND ELEVATION (m) : 1,002.5m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 19 Jul 11
FINISH DATE : 23 Jul 11
FINAL DEPTH (m) : 50.3
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-37

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,762.8E - 7,100,180.5N
GROUND ELEVATION (m) : 1,034.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.75

START DATE : 24 Jul 11
FINISH DATE : 26 Jul 11
FINAL DEPTH (m) : 43.6
DEPTH TO TOP OF ROCK (m) : 3.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GW) Some cobbles, some boulders, metasedimentary, angular, iron stained. Fractured clasts from fill for drill pad. [FILL]		
3.75				Rock encountered at 3.75 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-37

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,762.8E - 7,100,180.5N
GROUND ELEVATION (m) : 1,034.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.75

START DATE : 24 Jul 11
FINISH DATE : 26 Jul 11
FINAL DEPTH (m) : 43.6
DEPTH TO TOP OF ROCK (m) : 3.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 3.75 m - See BH-BGC11-37 soil log.

METASEDIMENTARY ROCK
Reddish brown-grey, fine grained, highly fractured, medium strong (R3.5), slightly to moderately weathered (W2 to W3), iron stained, typically 2 main joint sets: foliation at 46-60° and crossing joint set at 50-60° to core axis , JRC = 2-20, averaging 10.

5.79 - 6.25 m - Highly fractured zone.

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

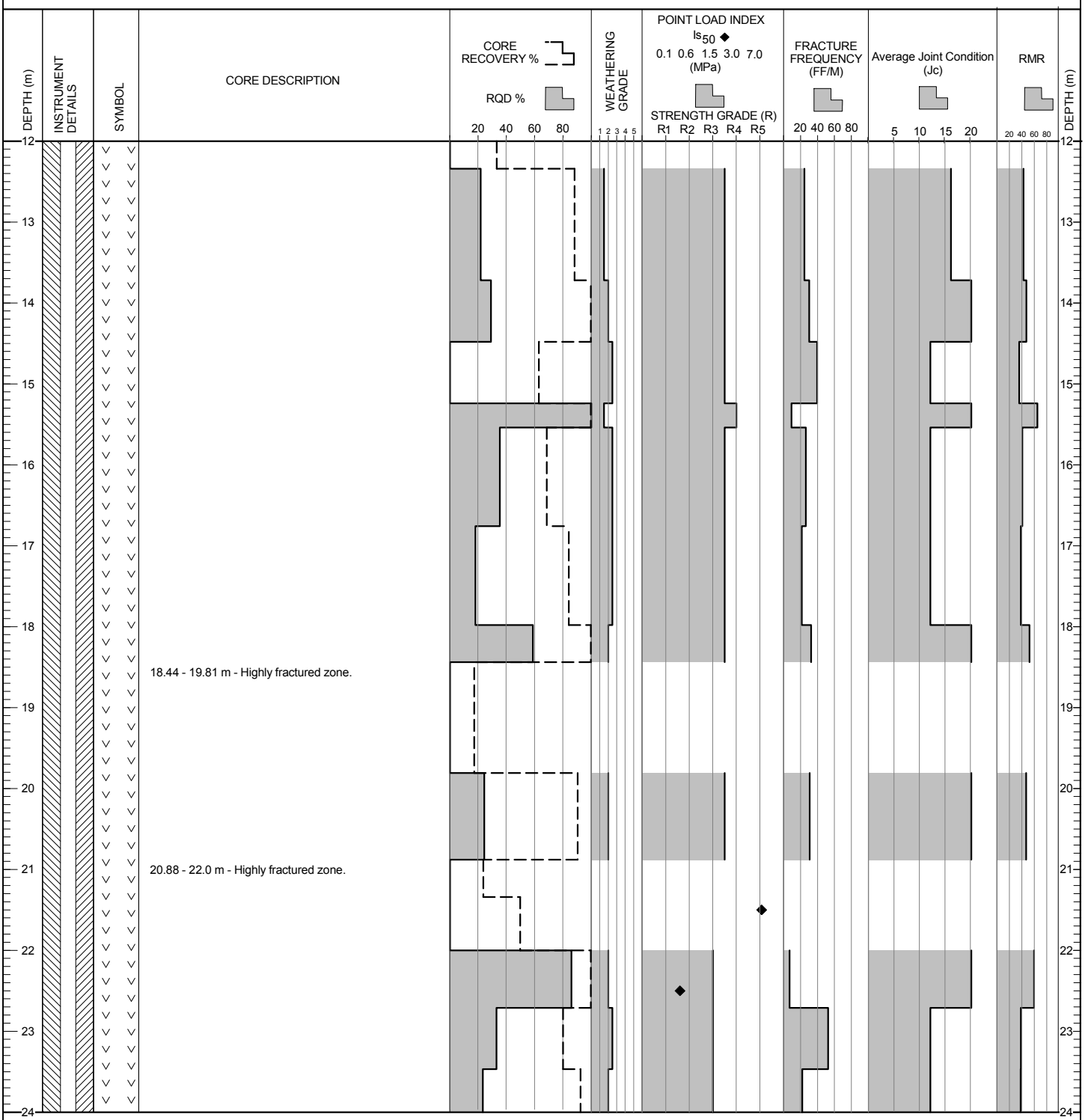
DRILL HOLE # BH-BGC11-37

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,762.8E - 7,100,180.5N
GROUND ELEVATION (m) : 1,034.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.75

START DATE : 24 Jul 11
FINISH DATE : 26 Jul 11
FINAL DEPTH (m) : 43.6
DEPTH TO TOP OF ROCK (m) : 3.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

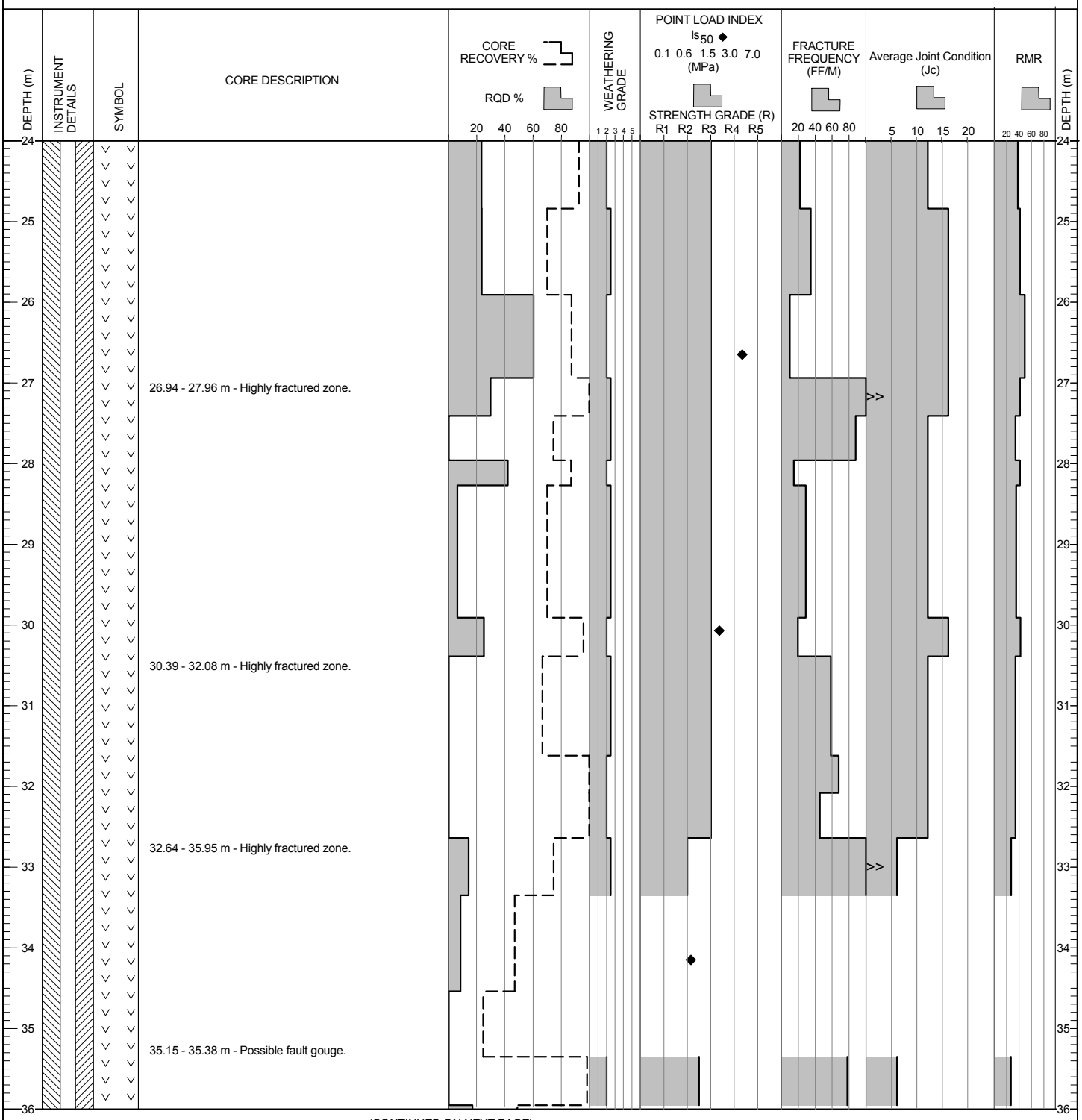
DRILL HOLE # BH-BGC11-37

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,762.8E - 7,100,180.5N
GROUND ELEVATION (m) : 1,034.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.75

START DATE : 24 Jul 11
FINISH DATE : 26 Jul 11
FINAL DEPTH (m) : 43.6
DEPTH TO TOP OF ROCK (m) : 3.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

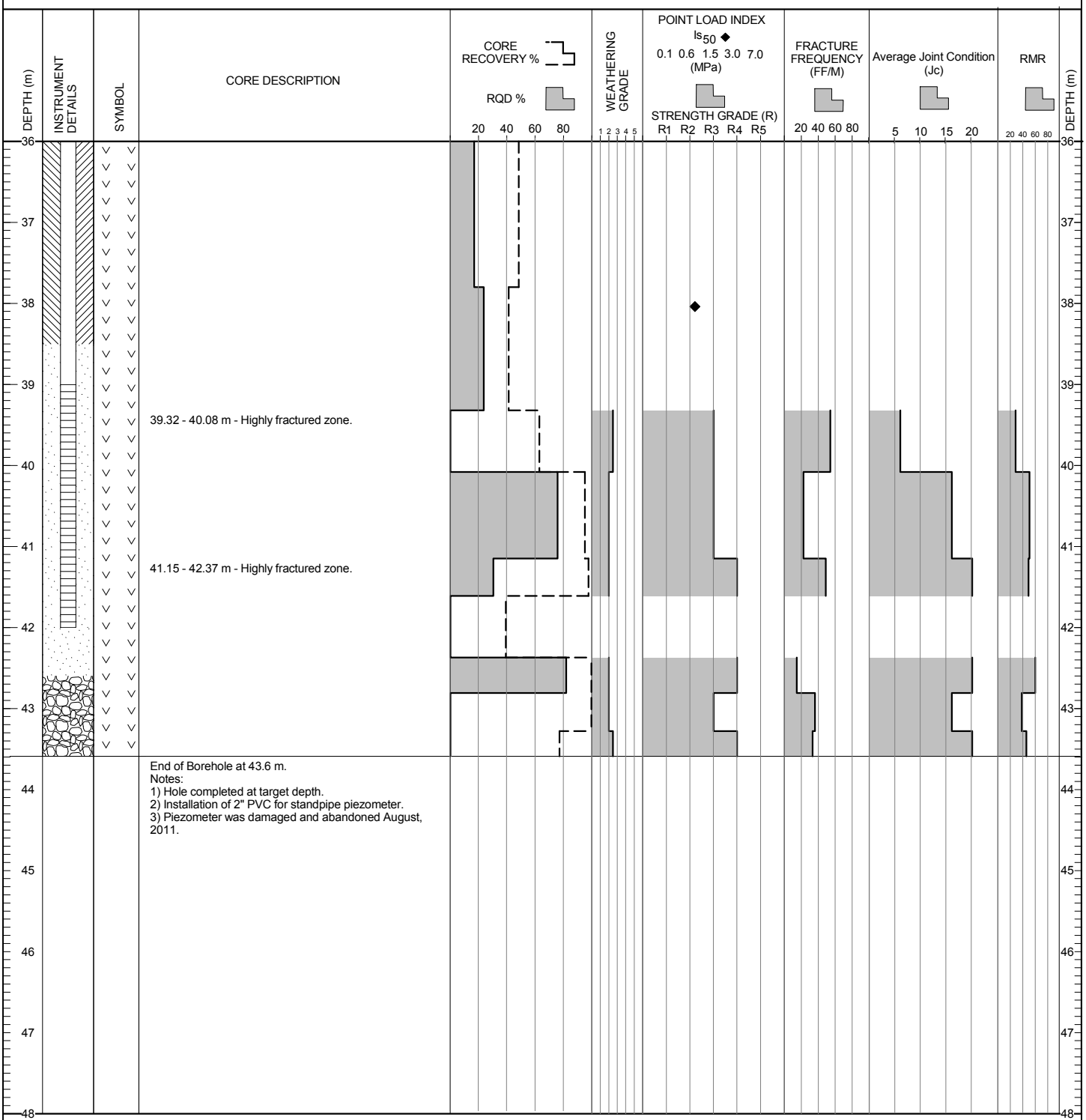
DRILL HOLE # BH-BGC11-37

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,762.8E - 7,100,180.5N
GROUND ELEVATION (m) : 1,034.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.75

START DATE : 24 Jul 11
FINISH DATE : 26 Jul 11
FINAL DEPTH (m) : 43.6
DEPTH TO TOP OF ROCK (m) : 3.8
LOGGED BY : EB/SD
REVIEWED BY : PQ/DW



End of Borehole at 43.6 m.
Notes:
1) Hole completed at target depth.
2) Installation of 2" PVC for standpipe piezometer.
3) Piezometer was damaged and abandoned August, 2011.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GW) Angular to subangular, maximum particle size=50mm, reddish brown. Clasts: metasedimentary, moderately strong (R3). [COLLUVIUM]		
5.35				5.35 - 11.58 m - Highly fractured zone. Rock encountered at 5.40 m depth. Refer to rock log.		
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD %	WEATHERING GRADE	POINT LOAD INDEX Is_{50} ◆ (MPa) / STRENGTH GRADE (R)	FRACTURE FREQUENCY (FF/M)	Average Joint Condition (Jc)	RMR	DEPTH (m)
0			0 to 5.40 m - See BH-BGC11-38 soil log.	20 40 60 80	1 2 3 4 5	0.1 0.6 1.5 3.0 7.0 / R1 R2 R3 R4 R5	20 40 60 80	5 10 15 20	20 40 60 80	0
1										1
2										2
3										3
4										4
5										5
6			METASEDIMENTARY ROCK Reddish brown-grey, fine grained, highly fractured, foliated, weak to medium strong (R2 to R3), slightly to moderately weathered (W2 to W3), iron stained, siliceous, typically 2 joints sets: foliation at 40-65° from core axis, subhorizontal joint and sets diaginal to foliation at 25-65° from core axis, JRC = 2-20, averaging 12.							6
7										7
8										8
9										9
10										10
11										11
12										12

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

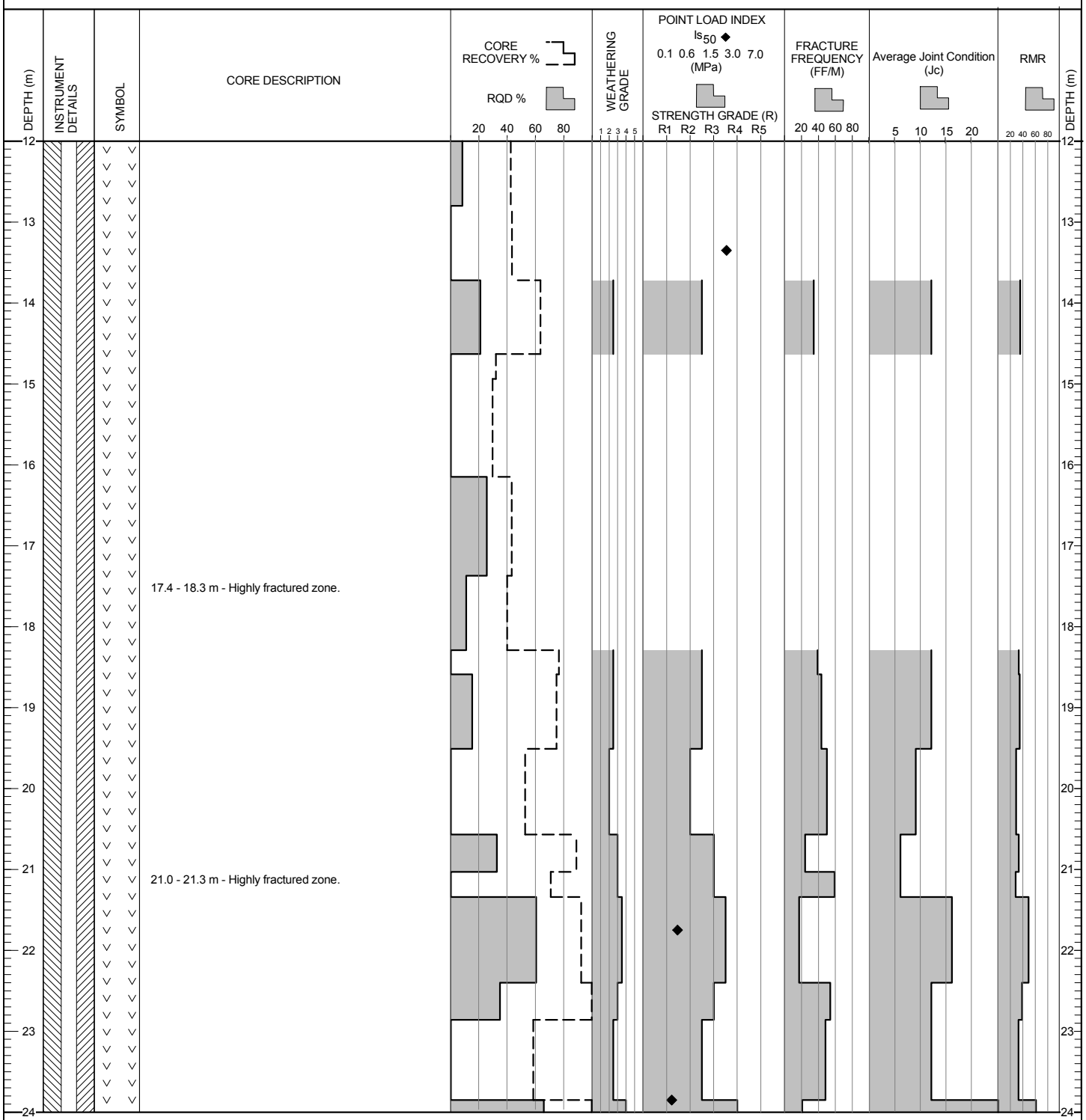
DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

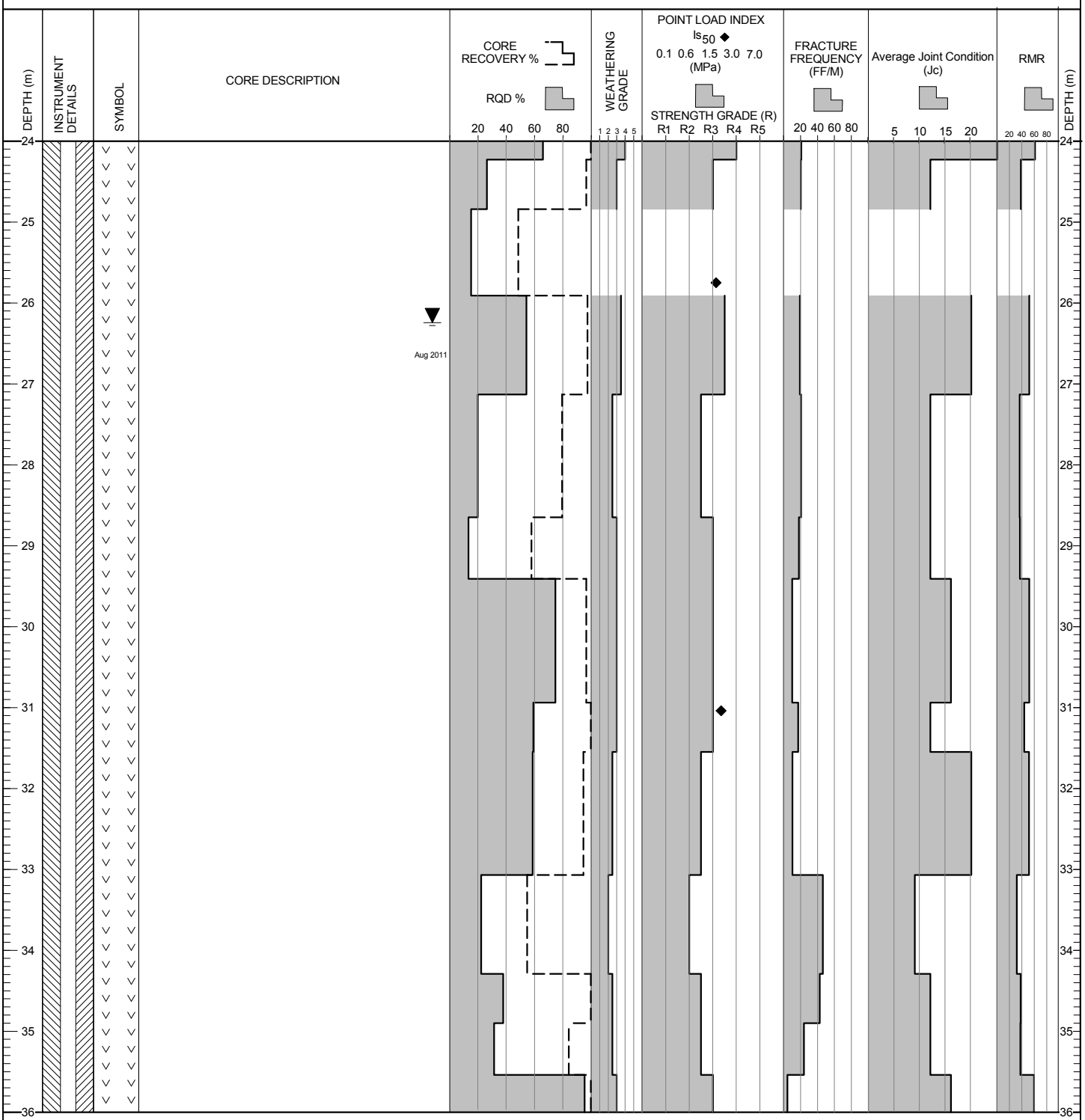
DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW



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PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

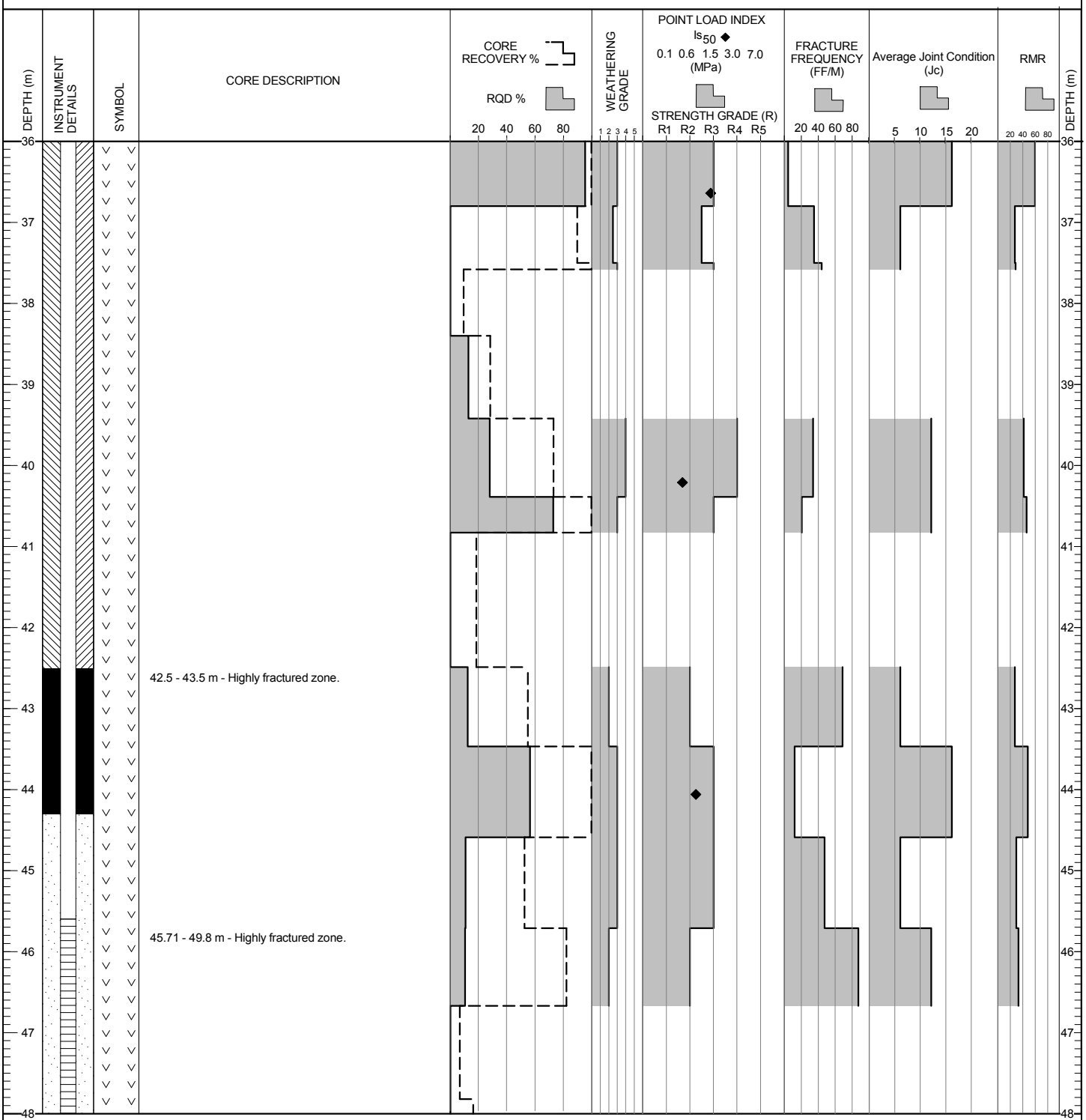
DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

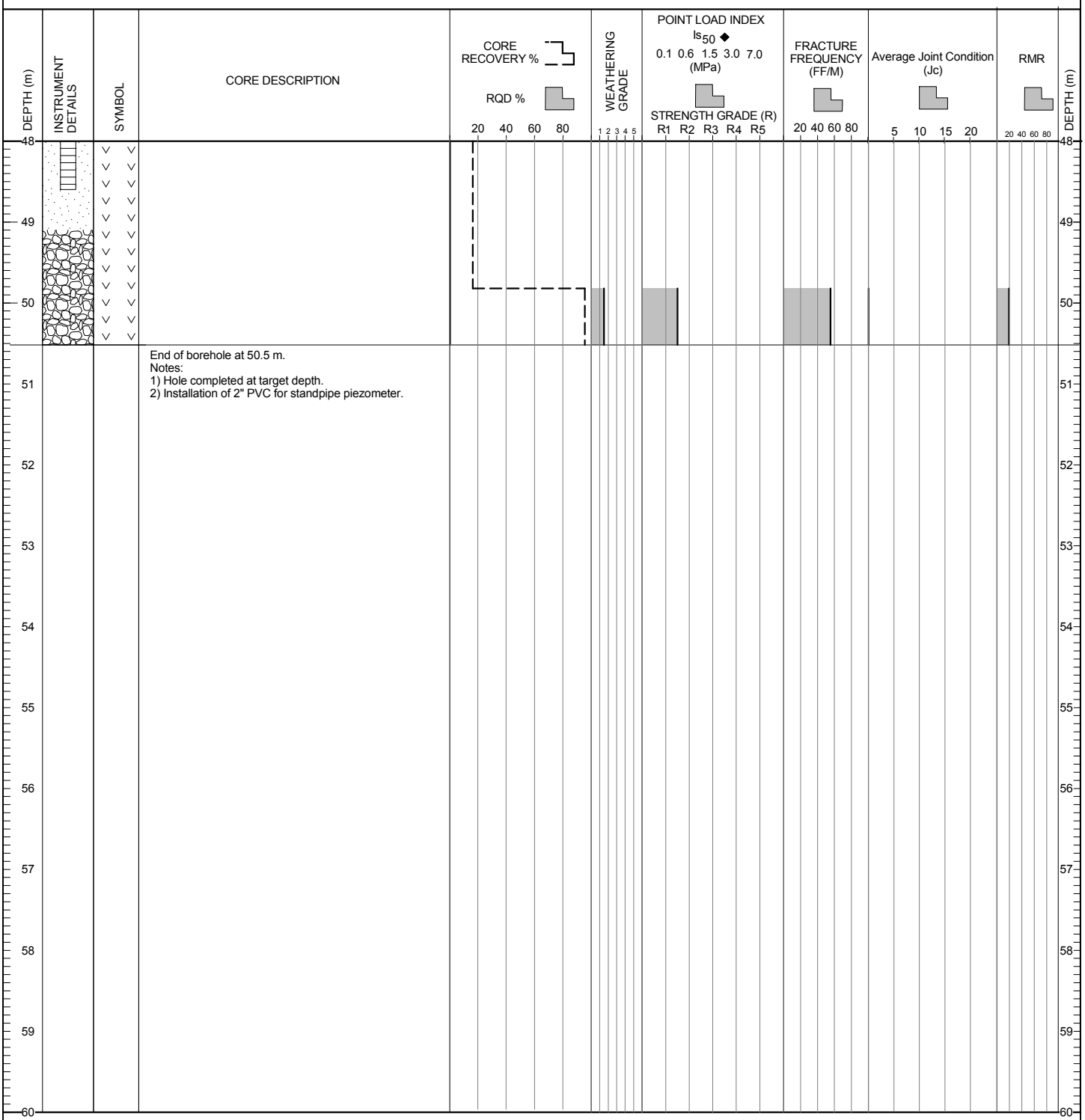
DRILL HOLE # BH-BGC11-38

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,820.0E - 7,100,416.0N
GROUND ELEVATION (m) : 1,013.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 8.53

START DATE : 26 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 50.5
DEPTH TO TOP OF ROCK (m) : 5.4
LOGGED BY : EB/SD/SP
REVIEWED BY : PQ/DW



End of borehole at 50.5 m.
Notes:
1) Hole completed at target depth.
2) Installation of 2" PVC for standpipe piezometer.

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

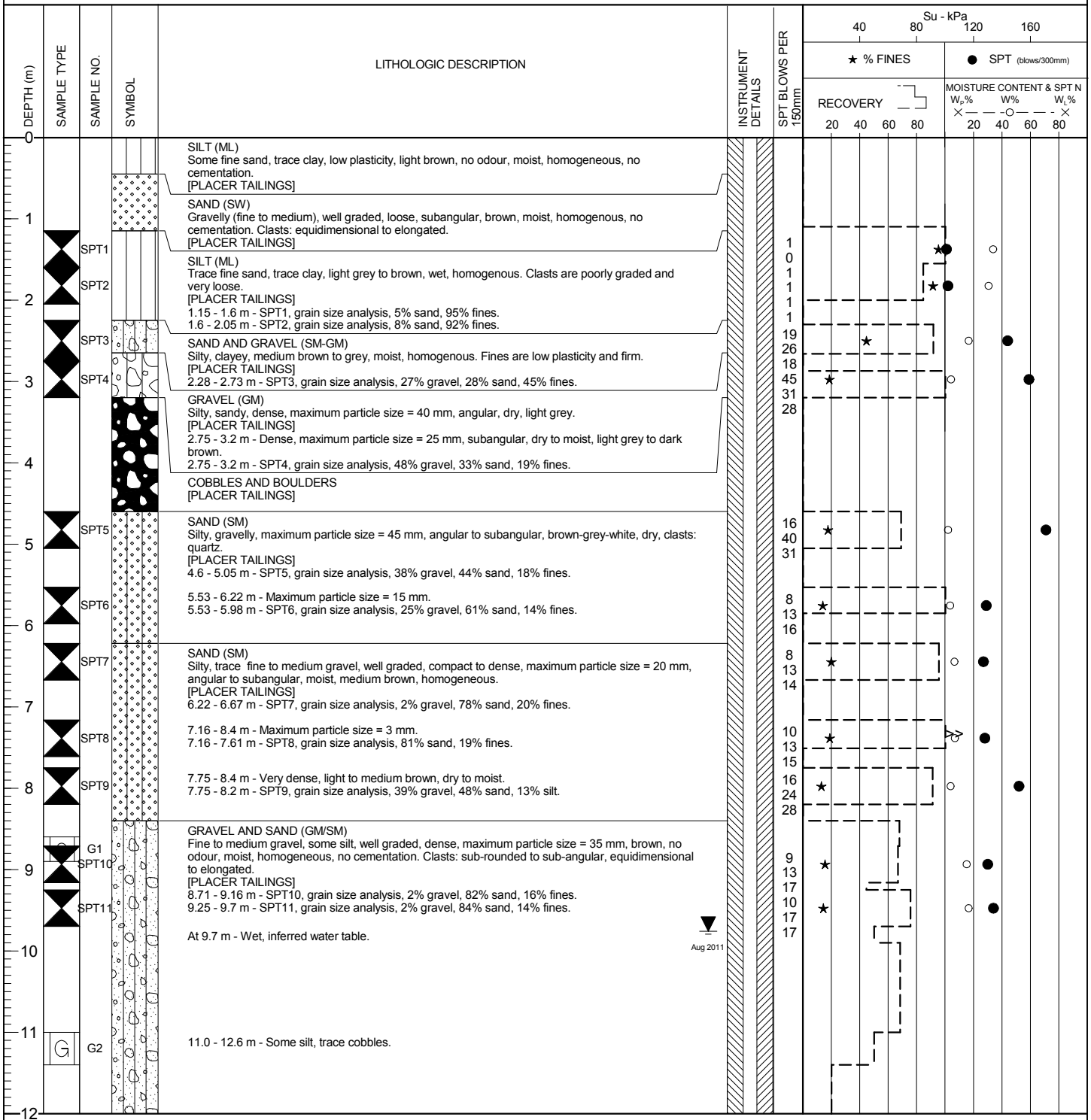
DRILL HOLE # BH-BGC11-39

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006
LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,462.0E - 7,101,056.0N
GROUND ELEVATION (m) : 797.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 27 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT/EC/SD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-39

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,462.0E - 7,101,056.0N
GROUND ELEVATION (m) : 797.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 27 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT/EC/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION
12				
13	G	G3		SAND (SM) Fine, silty, gravelly, poorly graded (gap), loose, maximum particle size = 15 mm, brown, wet. Clasts: equidimensional to elongated, sub-angular to sub-rounded. [PLACER TAILINGS]
14	G	G4		
	G	G5		SAND (SW) Gravelly, silty to some silt, loose, maximum particle size = 15 mm, brown, wet. Clasts: equidimensional to elongated, sub-angular to sub-rounded. [PLACER TAILINGS]
15				
16	G	G6		
17	G	G7		SILT(MH) Clayey, high plasticity, stiff, grey mottled orange brown, no odour, moist, stratified/mottled. [PLACER TAILINGS]
18				SILT (ML) Trace clay, trace gravel, low plasticity, orange brown, moist to wet, homogeneous. [PLACER TAILINGS]
19	G	G8		19.05 - 19.6 m - No recovery.
20	G	G9		GRAVEL (GP-GM) Silty, some sand, fine, trace clay, poorly graded, maximum particle size = 15 mm, equidimensional to elongated, sub-angular, matrix is low plastic, brown, wet. [PLACER TAILINGS]
21				20.4 - 21.7 m - No recovery.
22	G	G10		Silt (ML) Trace clay, trace gravel, low plasticity, stiff, light brown with orange brown lenses, wet, stratified. [PLACER TAILINGS]
23	G	G11		
24				

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

(Continued on next page)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation
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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-39

LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,462.0E - 7,101,056.0N
GROUND ELEVATION (m) : 797.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 27 Jul 11
FINISH DATE : 27 Jul 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT/EC/SD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
24						
25	G	G12		24.6 - 25.25 m - Gravelly, some sand, wet. Poor recovery.		
				25.25 - 28.22 m - No recovery. Material would wash from the flights during travel back up through the water and mud infilled hole. Drilling indicates the bit was in gravel.		
26						
27						
28				End of borehole at 28.2 m. Notes: 1) Hole completed due to refusal on cobbles, gravel or weathered rock. 2) Installation of 2" PVC for standpipe piezometer. 3) A separate hole was drilled in direct vicinity of this hole in attempt to auger deeper despite the heaving. This twin hole was used for the piezometer installation.		
29						
30						
31						
32						
33						
34						
35						
36						

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-40A

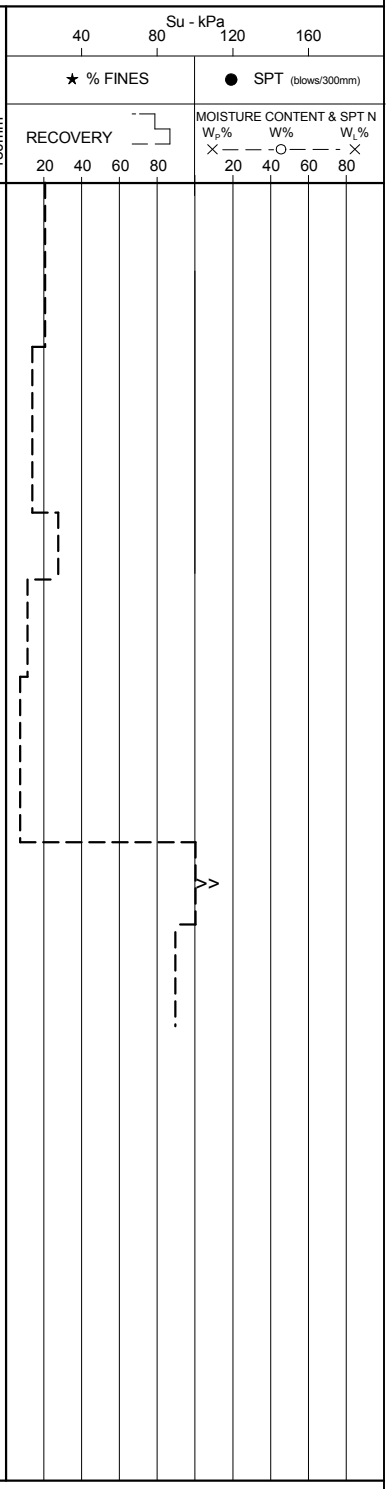
LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,763.0E - 7,100,038.0N
GROUND ELEVATION (m) : 1,050.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 12.19

START DATE : 29 Jul 11
FINISH DATE : 31 Jul 11
FINAL DEPTH (m) : 33.2
DEPTH TO TOP OF ROCK (m) : 7.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				SAND AND GRAVEL (SW/GW) Well graded, maximum particle size = 250 mm, particles are elongated, angular, brown, moist, homogeneous, non cemented. [FILL]		
1						
2				GRAVEL (GP) Some sand, trace silt, maximum particle size = 60 mm, elongated, subangular to subrounded, blue grey, iron staining, some cementation, clasts are metasedimentary. [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY ROCK]		
3						
4						
5						
6						
7						
8				Rock encountered at 7.80 m depth. Refer to rock log.		
9						
10						
11						
12						



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

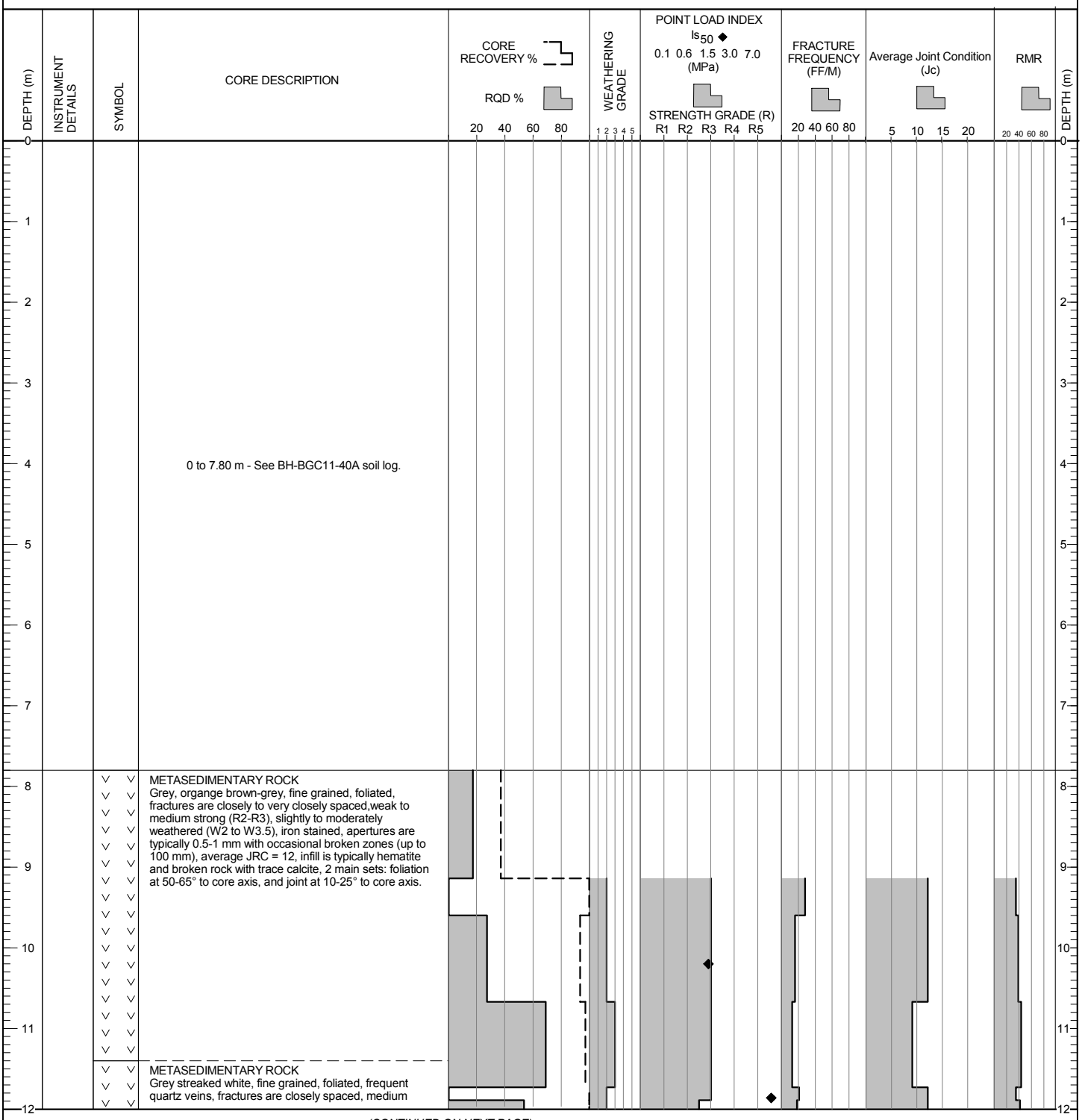
DRILL HOLE # BH-BGC11-40A

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,763.0E - 7,100,038.0N
GROUND ELEVATION (m) : 1,050.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 12.19

START DATE : 29 Jul 11
FINISH DATE : 31 Jul 11
FINAL DEPTH (m) : 33.2
DEPTH TO TOP OF ROCK (m) : 7.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-40A

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,763.0E - 7,100,038.0N
GROUND ELEVATION (m) : 1,050.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 12.19

START DATE : 29 Jul 11
FINISH DATE : 31 Jul 11
FINAL DEPTH (m) : 33.2
DEPTH TO TOP OF ROCK (m) : 7.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			strong (R3), faintly to slightly weathered (W1.5-W2), apertures are typically 0.5-1 mm with occasional broken zones (up to 100 mm), average JRC= 12, infill is typically hematite and broken rock with trace calcite, 3 main sets: foliation at 55-70° to core axis, and joint sets at 15-30° and 60-80° to core axis.
17			17.25 - 18.3 m - Fault zone, rock is yellowish brown, extremely closely fractured, very weak (R1), moderately to highly altered (A3 to A4), joint wall strength is weak (R2).
19			At 18.78 m - Fault, 120 mm aperture, infilled with gouge, broken rock and hematite, JRC = 8, alongside altered quartz vein, at 25° to core axis.
20			At 19.85 m - Rock is blue grey quartzite.
22			At 22.3m - Rock is blue grey, moderately strong (R3) faintly altered (A1.5).
24			

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)

STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

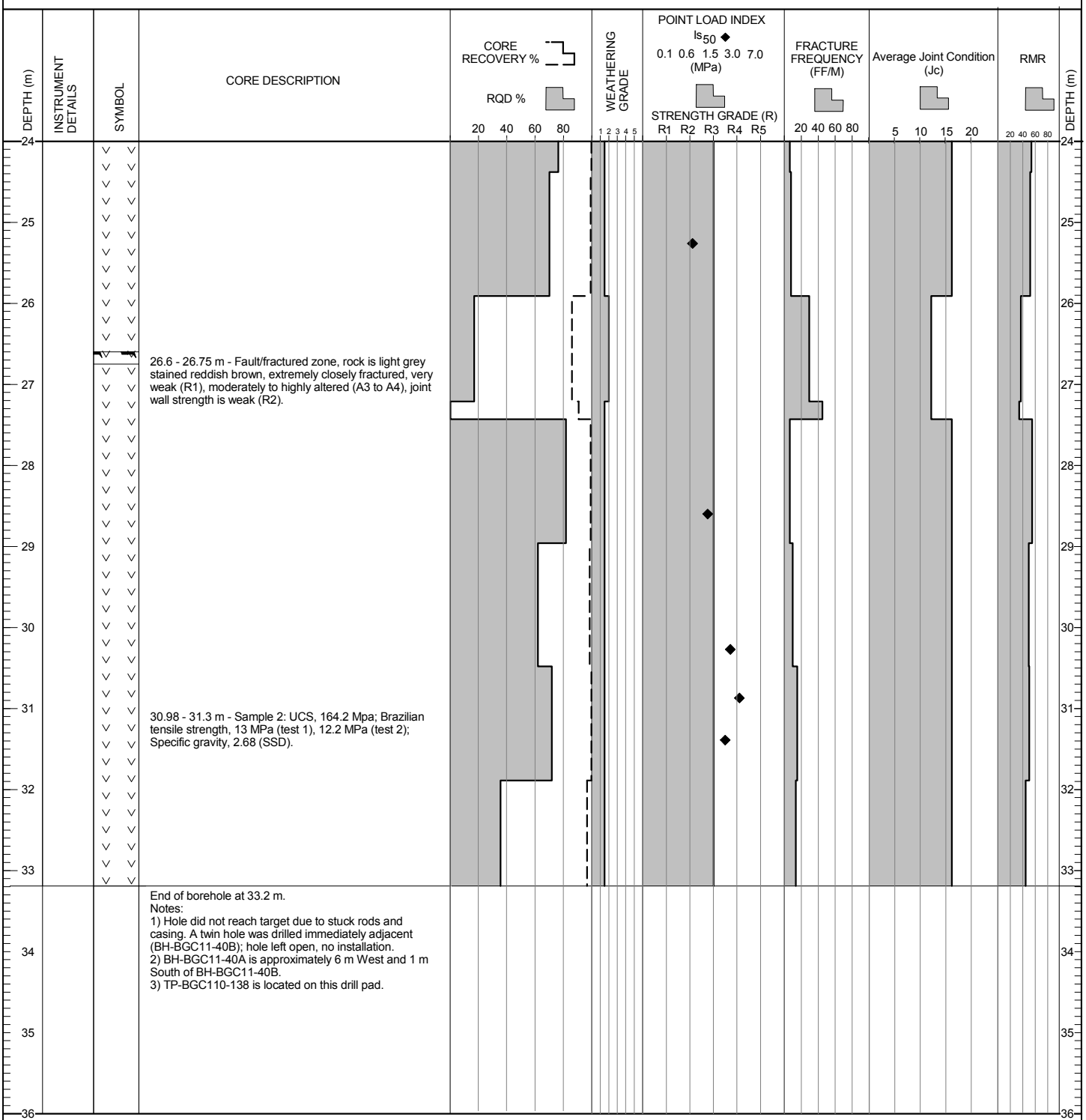
DRILL HOLE # BH-BGC11-40A

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,763.0E - 7,100,038.0N
GROUND ELEVATION (m) : 1,050.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 12.19

START DATE : 29 Jul 11
FINISH DATE : 31 Jul 11
FINAL DEPTH (m) : 33.2
DEPTH TO TOP OF ROCK (m) : 7.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-40B

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,767.0E - 7,100,038.8N
GROUND ELEVATION (m) : 1,049.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 31 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 45.7
DEPTH TO TOP OF ROCK (m) : 8.7
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 8.69 m - No recovery. For soil description please refer to TP-BGC11-138.		
8.69				Rock encountered at 8.69 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

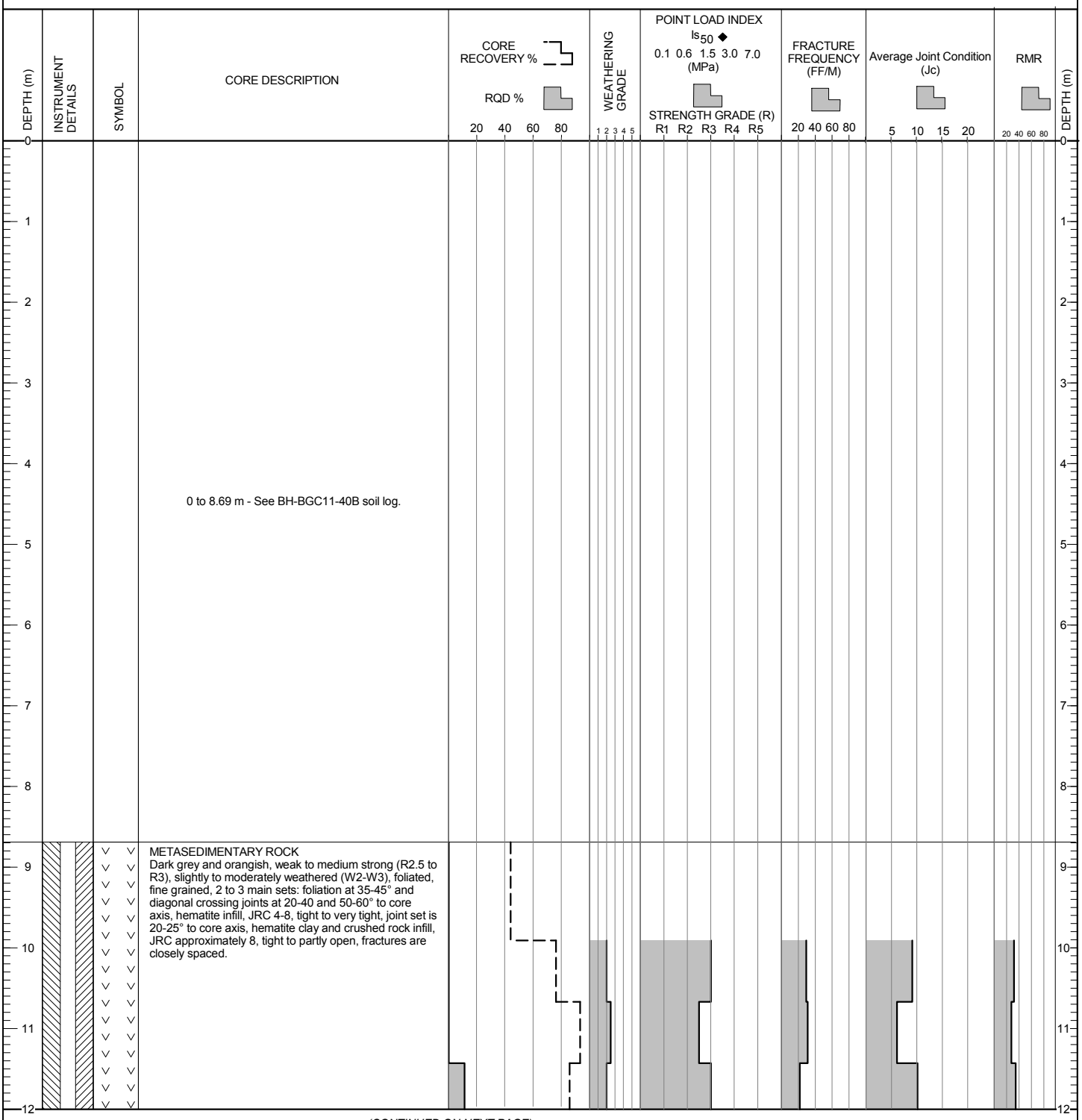
DRILL HOLE # BH-BGC11-40B

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,767.0E - 7,100,038.8N
GROUND ELEVATION (m) : 1,049.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 31 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 45.7
DEPTH TO TOP OF ROCK (m) : 8.7
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

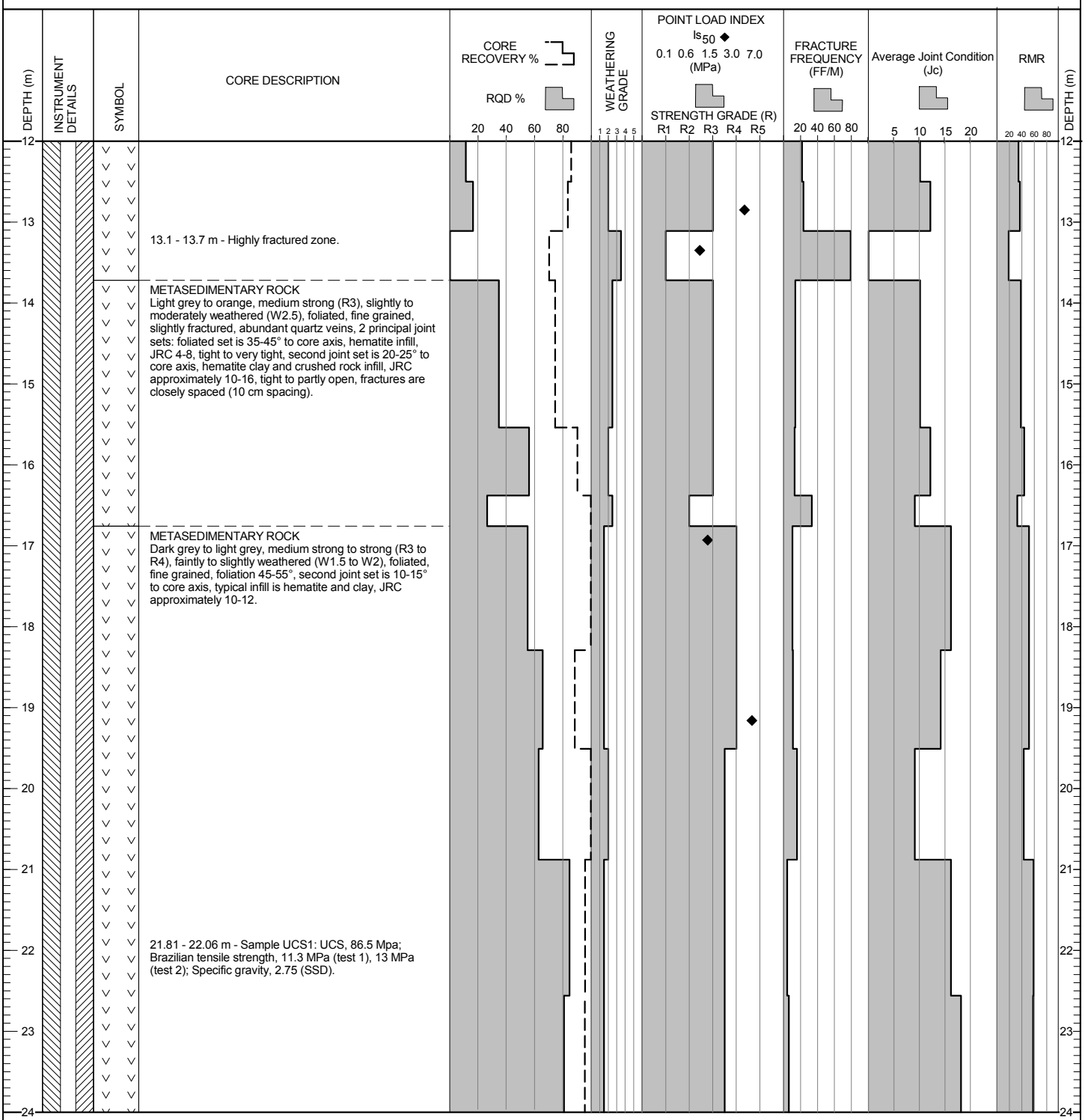
DRILL HOLE # BH-BGC11-40B

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,767.0E - 7,100,038.8N
GROUND ELEVATION (m) : 1,049.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 31 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 45.7
DEPTH TO TOP OF ROCK (m) : 8.7
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

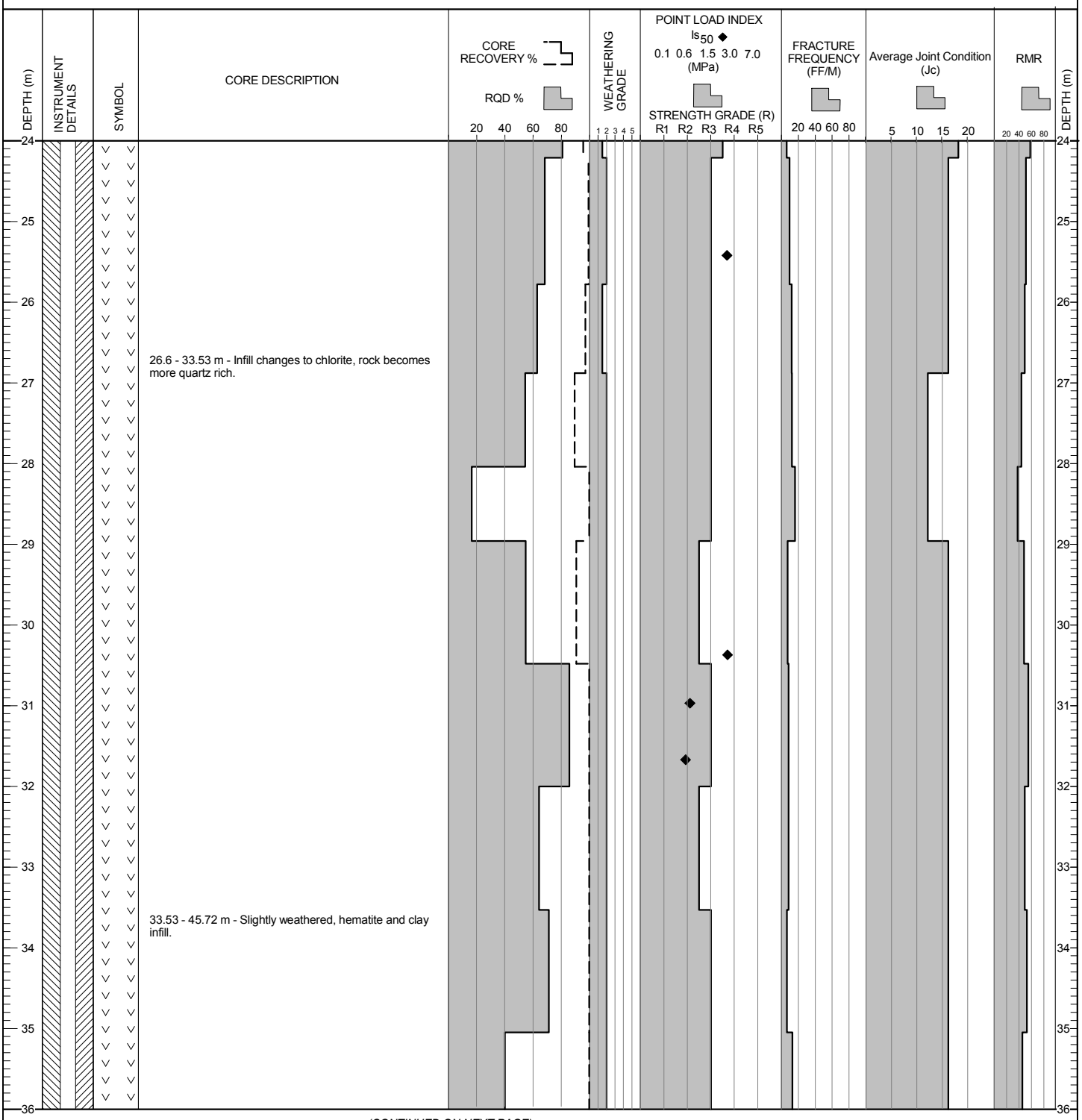
DRILL HOLE # BH-BGC11-40B

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,767.0E - 7,100,038.8N
GROUND ELEVATION (m) : 1,049.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 31 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 45.7
DEPTH TO TOP OF ROCK (m) : 8.7
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

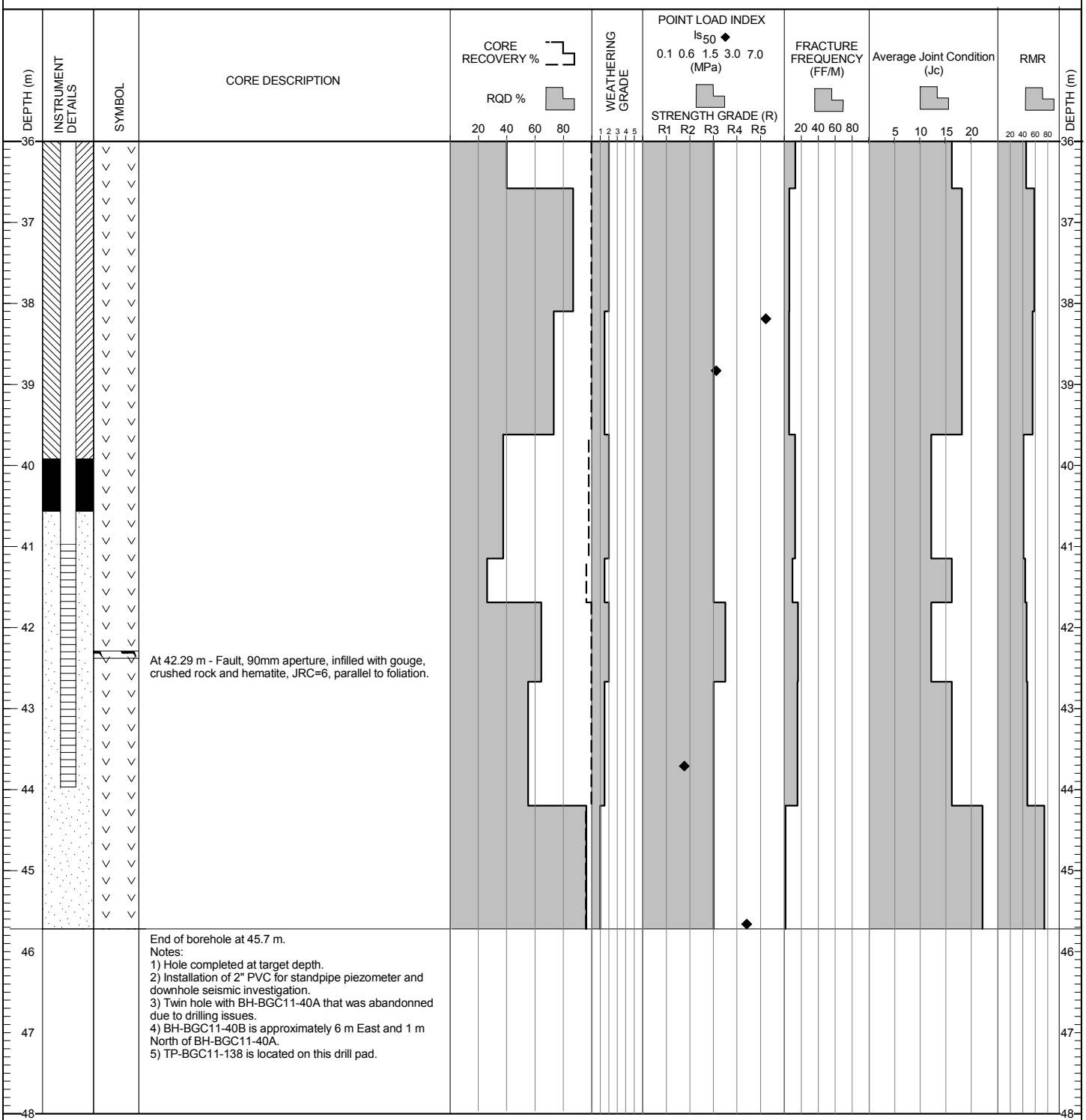
DRILL HOLE # BH-BGC11-40B

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,767.0E - 7,100,038.8N
GROUND ELEVATION (m) : 1,049.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-10
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 31 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 45.7
DEPTH TO TOP OF ROCK (m) : 8.7
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

DRILL HOLE # BH-BGC11-41

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

LOCATION : EAGLE PUP

CO-ORDINATES (m): 459,777.0E - 7,100,999.0N
GROUND ELEVATION (m) : 914.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 29 Jul 11
FINISH DATE : 29 Jul 11
FINAL DEPTH (m) : 4.3
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				ORGANICS Rootmat, silt and sand, some organics, moist, brown. [TOPSOIL]		
	G	1		SAND AND GRAVEL (SW/GW) Trace silt, trace cobbles, trace boulders, well graded, loose, maximum particle size = 350 mm, greyish brown, dry to moist, homogeneous. Clasts: elongated to equidimensional, sub-rounded to angular, metasediment and granodiorite (the boulders are granodiorite). Metasedimentary clasts: strong (R4). Granodiorite clasts: very strong (R5) and faintly weathered (W1.5). [COLLUVIUM]		
3				SAND (SW) Gravelly, well graded, compact, maximum particle size= 50 mm, equidimensional to elongated, subangular to angular, greyish brown, dry to moist, homogeneous. Clasts: medium strong to strong (R3 to R4). [MODERATELY TO HIGHLY WEATHERED ROCK]		
4				End of borehole at 4.3 m. Notes: 1) Refusal on bedrock. 2) Backfilled with cuttings. 3) No water encountered. 4) Attempted to drill deeper in four different spots, but couldn't exceed a depth of 4.3 m. 5) 0.0-2.8 m logged from existing cut slope above pad, 2.8-4.3 m logged from auger hole (2.8m BGL was the pad level).		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

DRILL HOLE # BH-BGC11-42

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006
LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,272.3E - 7,100,150.1N
GROUND ELEVATION (m) : 1,098.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 29 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0	G	1		ORGANICS Rootmat [TOPSOIL]		
1				SAND (SW) Some gravel, some silt, well graded, loose, maximum particle size = 40 mm, yellow brown, moist, homogeneous, no odour. Clasts: equidimensional to elongated, subangular to angular. [ICE RICH COLLUVIUM]		
2	G	2		SAND (SM) Some silt, trace fine to medium gravel, trace clay, well graded, compact, maximum particle size = 15 mm, yellowish to dark brown, faint organic odour, moist, homogeneous. Clasts: subrounded, equidimensional to elongated, completely weathered granoidiorite. Fines are low plasticity. Frozen: Nbn. [ICE RICH COLLUVIUM] 1.8 - 2.27 m - Sample 2, grain size analysis, 7% gravel, 59% sand, 24% silt, 10% clay.		
3	G	3				
4						
5	G	4		5.0 - 7.5 m - Sand is silty (SM), non to low plastic, trace fine gravel, well graded, maximum particle size = 15 mm, moderate dry strength. Frozen: Nbn.		
6						
7	G	5		6.4 - 6.84 m - Sample 5, grain size analysis, 6% gravel, 55% sand, 27% silt, 12% clay. Specific gravity analysis, average specific gravity 2.65. 7.5 - 11.6 m - Trace to some silt, maximum particle size = 7 mm. Frozen: Nbn.		
8	G	6		8.6 - 11.6 m - Frozen, less bonded.		
9						
10	G	7		9.4 - 9.88 m - Sample 7, grain size analysis, 5% gravel, 61% sand, 34% fines.		
11	G	8				
12	G	9				
	G	10		ICE Solid (100% Vx), no sediment inclusion.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-42

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,272.3E - 7,100,150.1N
GROUND ELEVATION (m) : 1,098.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 29 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	LITHOLOGIC DESCRIPTION
12			11.7 - 15.85 m - Drilled with CRREL barrel. 11.73 - 11.93 m - Bed of SAND (SW) Some silt, wet, brown. Frozen: Vx (20-30%), ice crystals, no sediment inclusions. 12.12 - 12.17 m - Ice with sediment inclusions (30-40%), presence of 2 subhorizontal fractures in the ice. 12.35 - 12.5 m - 0-2% sediment inclusions along subhorizontal beds. Below 12.9 m - Ice grades to ice with sediment inclusions (10-20%).
13	G	12	SAND AND GRAVEL (SM/GM) Some silt, well graded, maximum particle size = 60 mm, orange, wet, homogeneous. Clasts: equidimensional, subrounded, highly weathered granodiorite, very weak to weak (R1 to R2). Frozen: Vx (5-10%), occasional blocks of ice 30-50 mm thick, with 50% sediment inclusions. [ICE RICH COLLUVIUM]
14	G	13	13.3 - 13.65 m - Sample 12, grain size analysis, 31% gravel, 60% sand, 9% fines. At 13.86 m - A layer of Vx, 45 mm thick, <10% sediment inclusion. At 14.26 m - Vx (5-10%), large gravel size blocks of very weak granodiorite present. At 14.62 m - There is 170 mm of ICE, colourless, clear, no bubbles, organized in 3-5 mm subhorizontal lenses, <5% sediment inclusion. At 14.9 m - Frozen: Vx (5%).
15	G	15	SAND AND GRAVEL (SM/GM) Some silt, trace cobbles, well graded, maximum particle size = 80 mm, equidimensional to elongated, subrounded to angular, very weak to weak (R1 to R2) granodiorite, clasts are slightly to moderately weathered (W2.5 to W3), brownish grey, wet, homogeneous. Frozen: Nbn. [ICE RICH COLLUVIUM]
16	G	16	At 15.4 m - Frozen: Vx (5-10%), maximum particle size = 95 mm (granodiorite cobble, medium strong to strong (R3 to R4), slightly weathered (W2)). At 15.85 m - CRREL barrel refused on cobbles - switched to solid stem auger.
17	G	17	SAND (SM) Trace fine gravel, well graded, maximum particle size = 10 mm yellowish brown, wet, homogeneous. Clasts: granodiorite, subrounded, equidimensional, weak (R2), slightly to moderately weathered (W2.5). Frozen: Vx (5-10%). [ICE RICH COLLUVIUM] 17.53 - 18.3 m - Drilled with CRREL barrel.
18			At 17.9 m - Moderately weathered granodiorite boulder R0 to R1.
19			SAND AND GRAVEL (SM/GM) Fine to coarse, well graded, maximum particle size = 65 mm, pinkish brown, wet, homogeneous. Clasts: granodiorite, angular to subangular, weak (R2), slightly to moderately weathered (W2 to W2.5). Frozen: Vx (0-10%). [ICE RICH COLLUVIUM] At 19.0 m - Vx (<5%).
20	G	20	19.7 - 20.0 m - Sample 20, grain size analysis, 10% gravel, 64% sand, 16% silt, 10% clay.
	G	21	
21			
22	G	22	21.55 - 21.9 m - Sample 22, grain size analysis, 4% gravel, 66% sand, 18% silt, 12% clay. At 22.0 m - Not visible ice, penetration is more difficult for auger, disturbed.
23	G	23	
24			

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-42

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,272.3E - 7,100,150.1N
GROUND ELEVATION (m) : 1,098.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 29 Jul 11
FINISH DATE : 01 Aug 11
FINAL DEPTH (m) : 28.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
24						
25	G	S24		At 24.6 m - Vx (10%).		
				ICE		
26	G	S25				
27				SAND AND GRAVEL (SW/GW) Well graded, maximum particle size = 65 mm, pinkish brown, wet, homogeneous. Clasts: granodiorite, angular to subangular, weak (R2), slightly to moderately weathered (W2 to W2.5). Frozen: Nbn. [ICE RICH COLLUVIUM] 27.6 - 28.0 m - Sample S26, grain size analysis, 19% gravel, 59% sand, 22% fines.		
28	G	S26		End of borehole at 28.2 m. Notes: 1) Hole completed due to limits of auger. 2) Installation of 2" solid PVC for thermistor, serial #26.5-2, annulus not backfilled. 3) TP-BGC11-95 is located on this drill pad. 4) Sloughing in hole during install. 5) No groundwater encountered. 6) 25 m thermistor installed on Aug. 25, 2011.		
29						
30						
31						
32						
33						
34						
35						
36						

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-43

LOCATION : PLATINUM GULCH

CO-ORDINATES (m): 459,658.1E - 7,099,106.6N
GROUND ELEVATION (m) : 1,034.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 1.52

START DATE : 02 Aug 11
FINISH DATE : 02 Aug 11
FINAL DEPTH (m) : 23.8
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GP) Some sand, trace silt, maximum particle size = 60 mm, elongated, subangular to subrounded, blue grey, iron staining, some cementation, clasts are metasedimentary. [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY ROCK]		
1				Rock encountered at 0.90 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

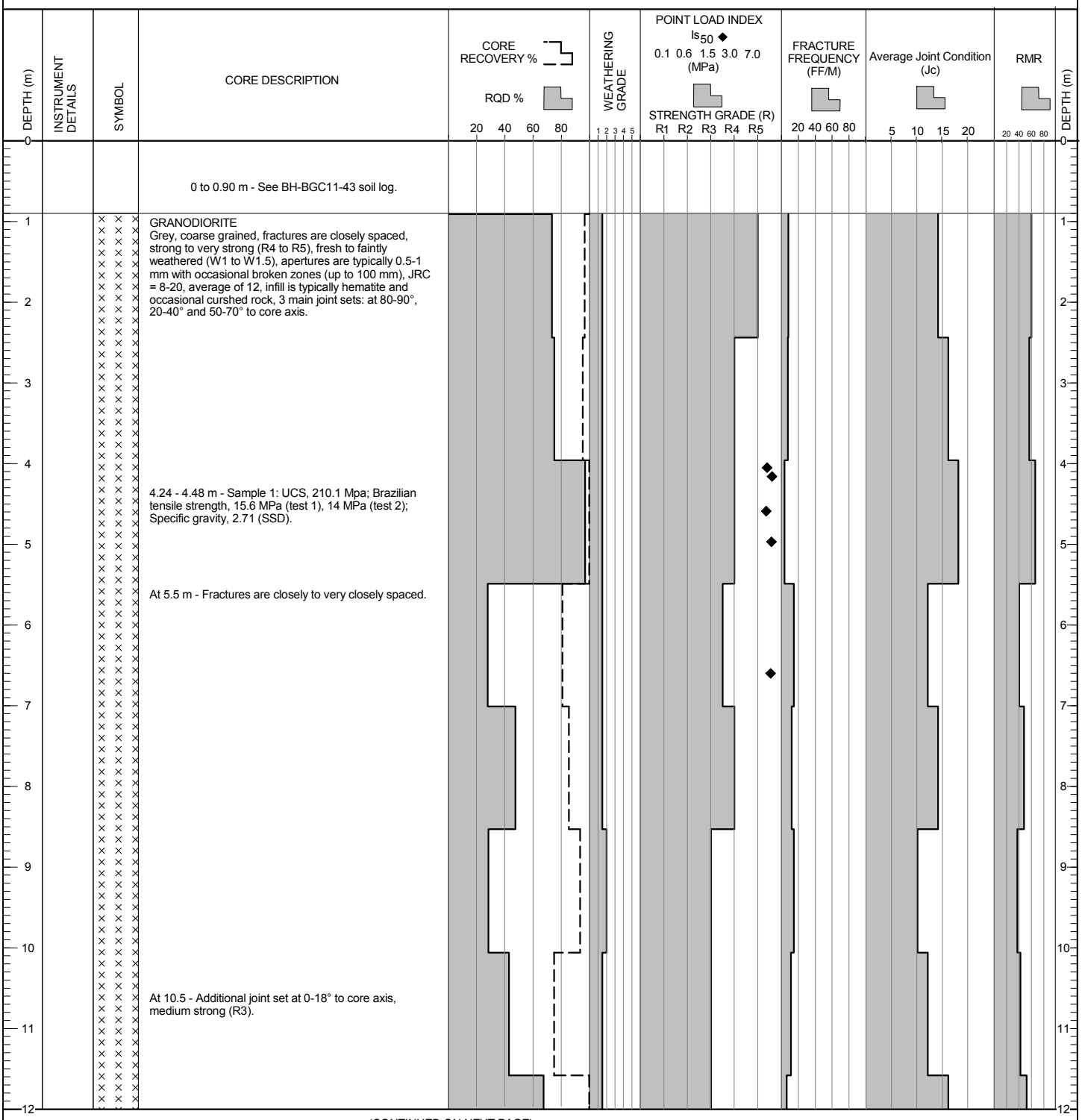
DRILL HOLE # BH-BGC11-43

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 459,658.1E - 7,099,106.6N
GROUND ELEVATION (m) : 1,034.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 1.52

START DATE : 02 Aug 11
FINISH DATE : 02 Aug 11
FINAL DEPTH (m) : 23.8
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

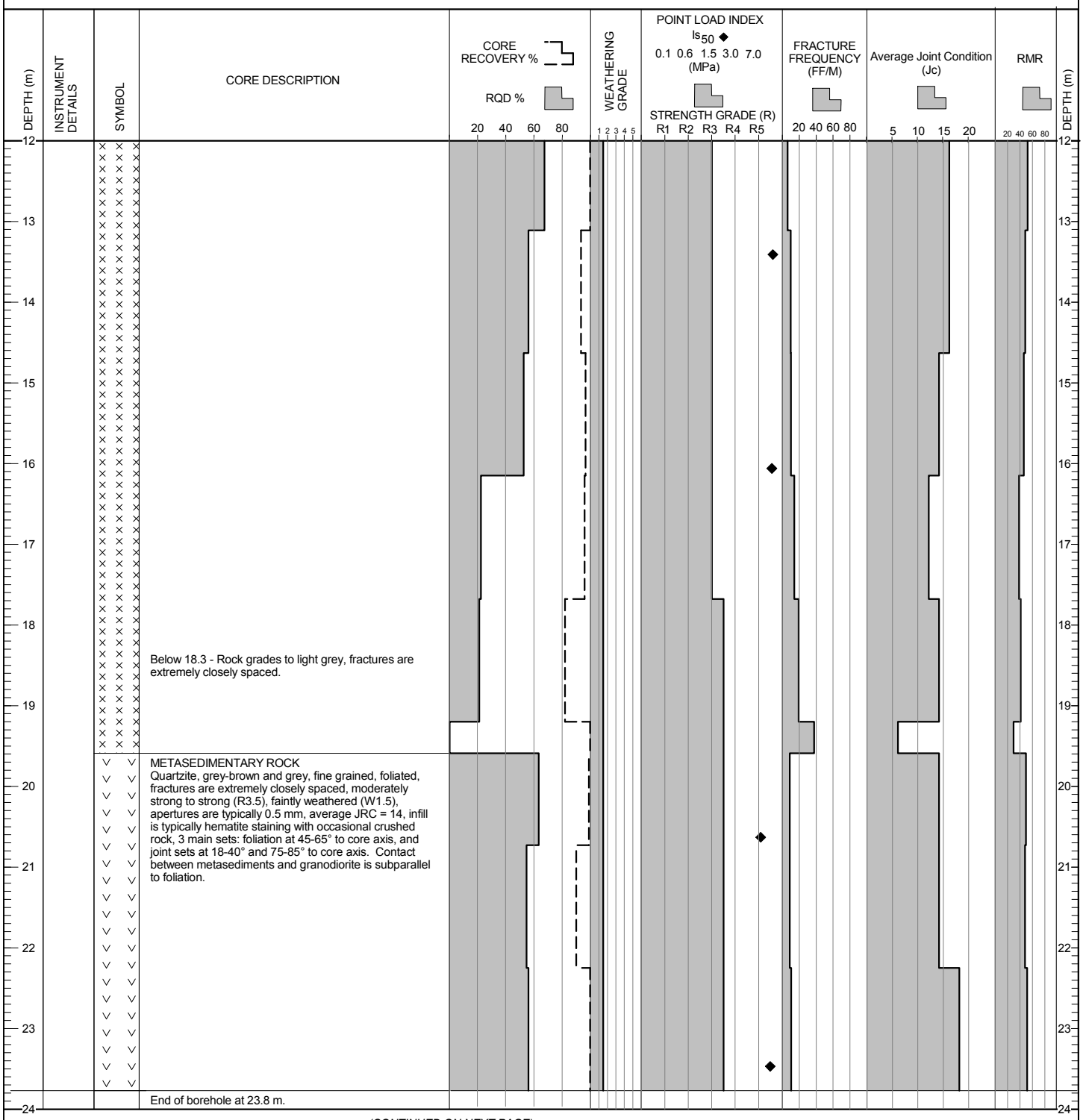
DRILL HOLE # BH-BGC11-43

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 459,658.1E - 7,099,106.6N
GROUND ELEVATION (m) : 1,034.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 1.52

START DATE : 02 Aug 11
FINISH DATE : 02 Aug 11
FINAL DEPTH (m) : 23.8
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-43

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 459,658.1E - 7,099,106.6N
GROUND ELEVATION (m) : 1,034.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 1.52

START DATE : 02 Aug 11
FINISH DATE : 02 Aug 11
FINAL DEPTH (m) : 23.8
DEPTH TO TOP OF ROCK (m) : 0.9
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
24			Notes: 1) Hole completed at target depth. 2) No installation, hole left open.							24
25										25
26										26
27										27
28										28
29										29
30										30
31										31
32										32
33										33
34										34
35										35
36										36

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

DRILL HOLE # BH-BGC11-44

PROJECT: Eagle Gold Project - Infrastructure

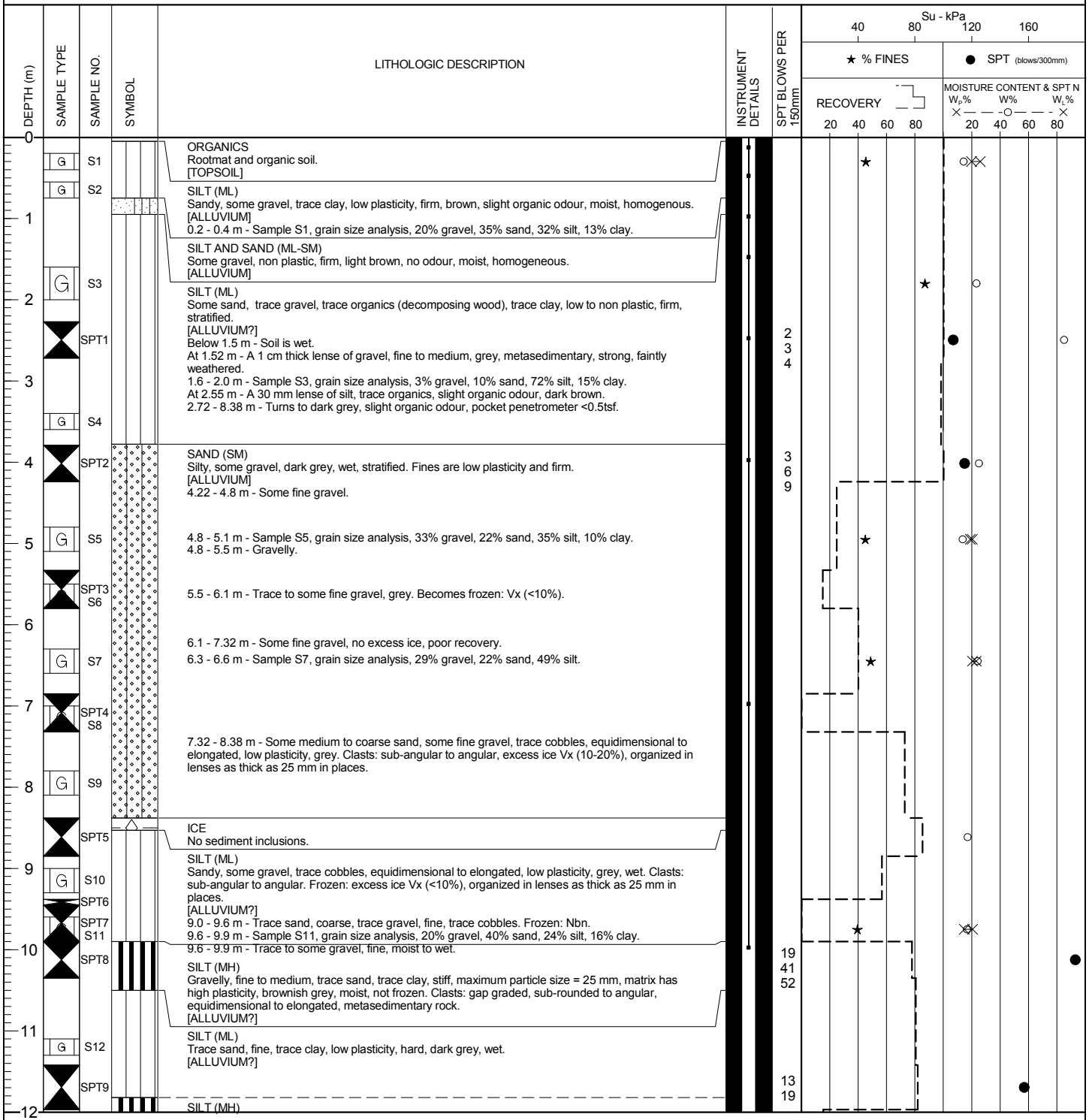
PROJECT NO.: 0792-006

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,690.4E - 7,100,547.3N
GROUND ELEVATION (m) : 830.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 03 Aug 11
FINISH DATE : 03 Aug 11
FINAL DEPTH (m) : 14.7
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-44

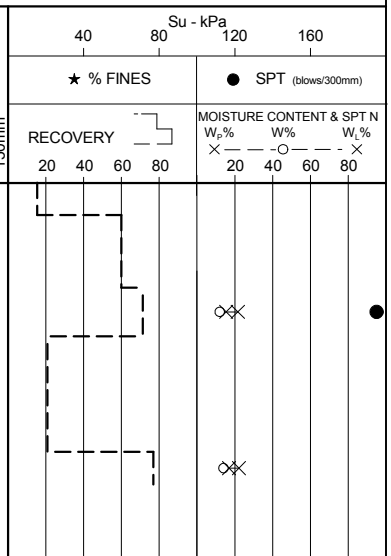
LOCATION : STEINER AREA

CO-ORDINATES (m): 458,690.4E - 7,100,547.3N
GROUND ELEVATION (m) : 830.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 03 Aug 11
FINISH DATE : 03 Aug 11
FINAL DEPTH (m) : 14.7
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
12				Some clay, high plasticity, hard, light brown, moist, homogeneous. [ALLUVIUM?]		38
	G	S13		SILT (ML) Some sand, some gravel, trace clay, low plasticity, hard, bownish grey, moist to wet. [ALLUVIUM?]		
13		SPT10				33
				At 13.4 m - Maximum particle size = 45mm, metasedimentary clasts.		42
						53
14	G	S14		At 14.0 m - Trace coarse gravel, trace cobbles. Frozen: NbN.		
		SPT11				
15				End of borehole at 14.7 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for thermistor, serial #11.5-3, annulus not backfilled. 3) 10 m thermistor installed on Aug. 10, 2011. Thermistor was damaged on Aug. 28, no longer serviceable.		
16						
17						
18						
19						
20						
21						
22						
23						
24						



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-45

LOCATION : PLATINUM GULCH

CO-ORDINATES (m): 460,556.2E - 7,099,109.5N
GROUND ELEVATION (m) : 1,354.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.05

START DATE : 03 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.7
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 3.05 m - No recovery. For soil description refer to log of TP-BGC11-102, excavated on this drill pad.		
3				Rock encountered at 3.05 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

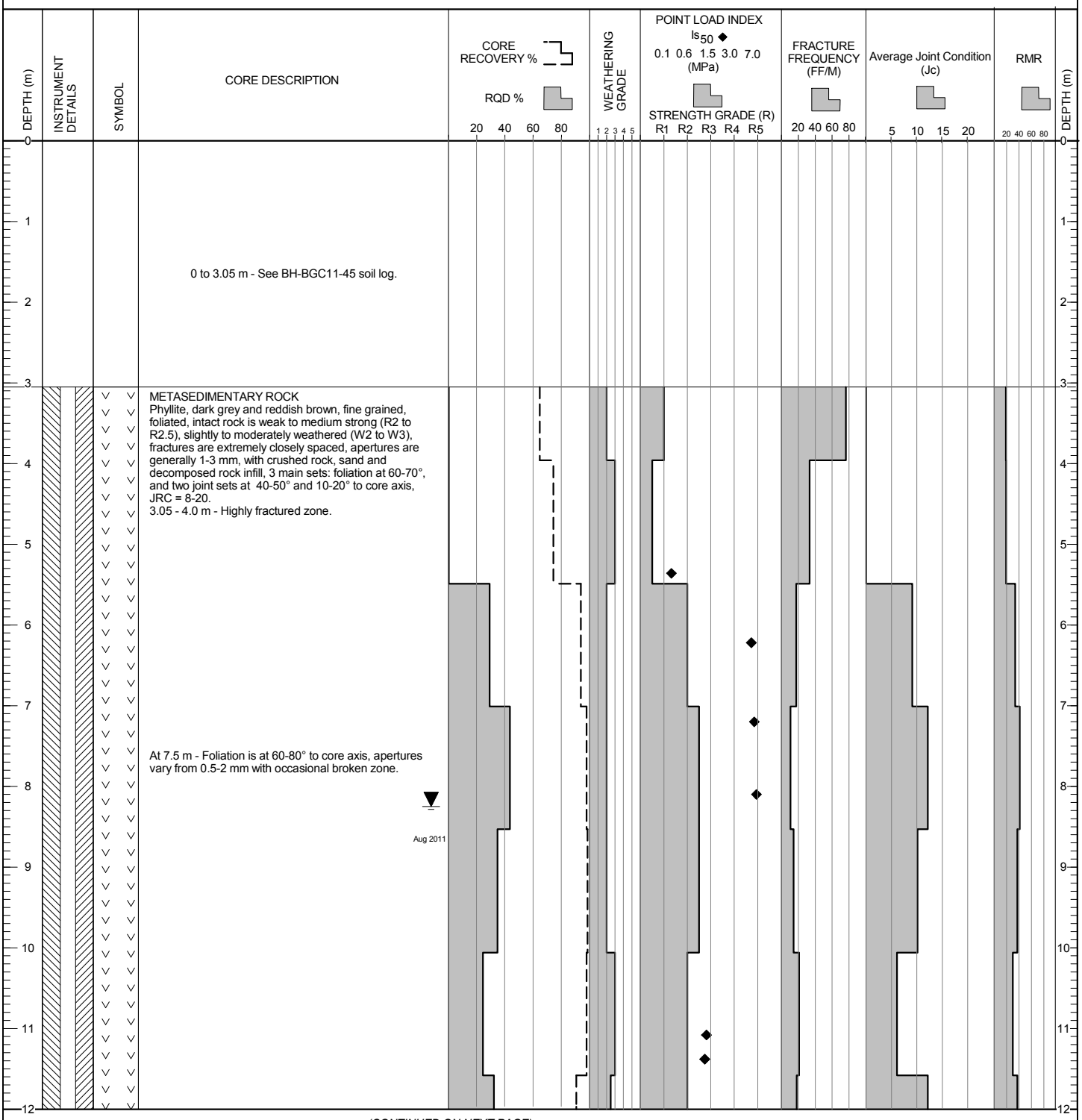
DRILL HOLE # BH-BGC11-45

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 460,556.2E - 7,099,109.5N
GROUND ELEVATION (m) : 1,354.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 03 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.7
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

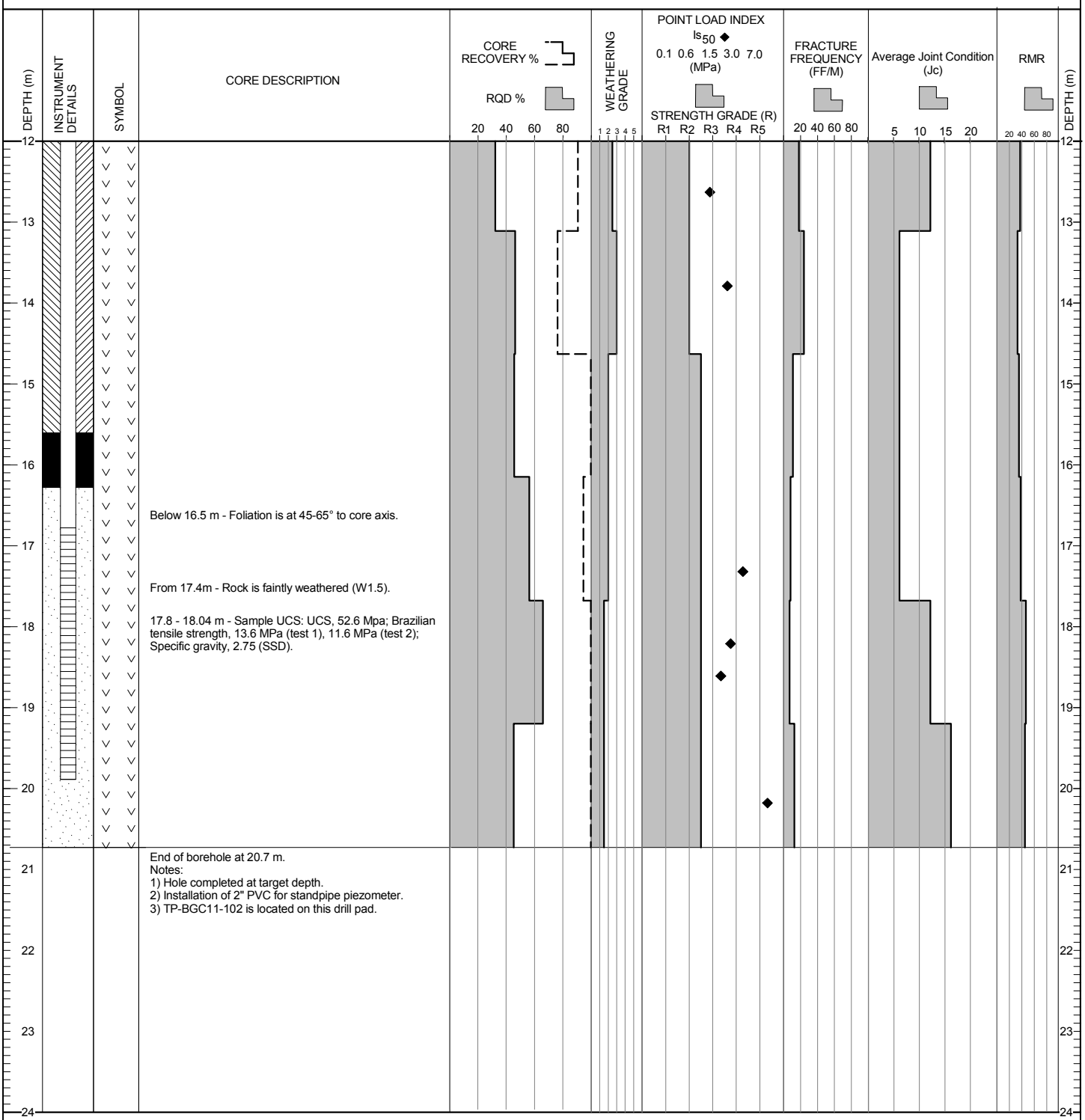
DRILL HOLE # BH-BGC11-45

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 460,556.2E - 7,099,109.5N
GROUND ELEVATION (m) : 1,354.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 03 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.7
DEPTH TO TOP OF ROCK (m) : 3.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-46

LOCATION : PLATINUM GULCH

CO-ORDINATES (m): 460,262.7E - 7,099,004.0N
GROUND ELEVATION (m) : 1,246.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 10.91

START DATE : 04 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.1
DEPTH TO TOP OF ROCK (m) : 2.4
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				COBBLES Granodiorite and quartzite cobbles. [FILL/COLLUVIUM?]		
2.44				Rock encountered at 2.44 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

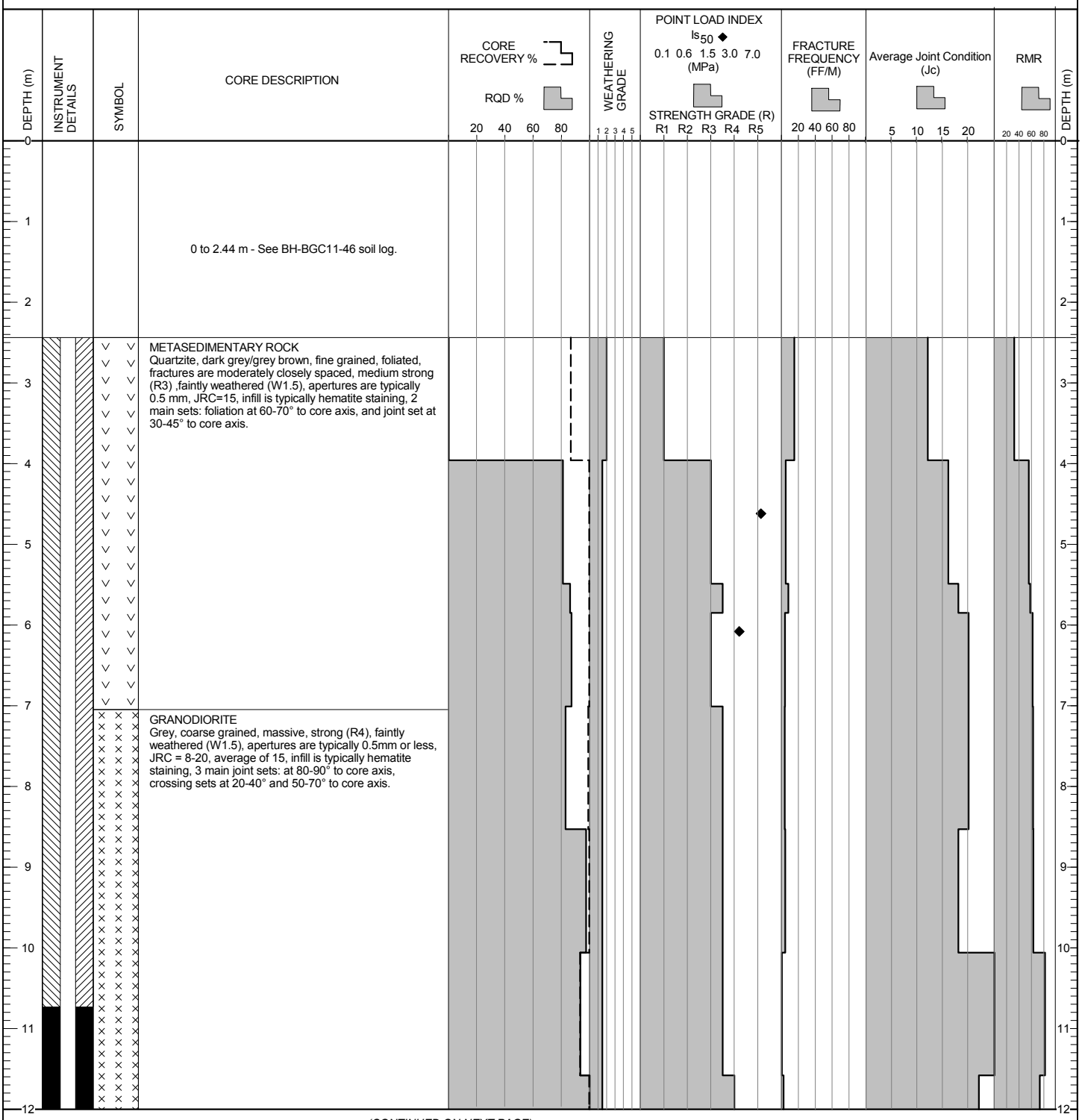
DRILL HOLE # BH-BGC11-46

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 460,262.7E - 7,099,004.0N
GROUND ELEVATION (m) : 1,246.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 10.91

START DATE : 04 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.1
DEPTH TO TOP OF ROCK (m) : 2.4
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

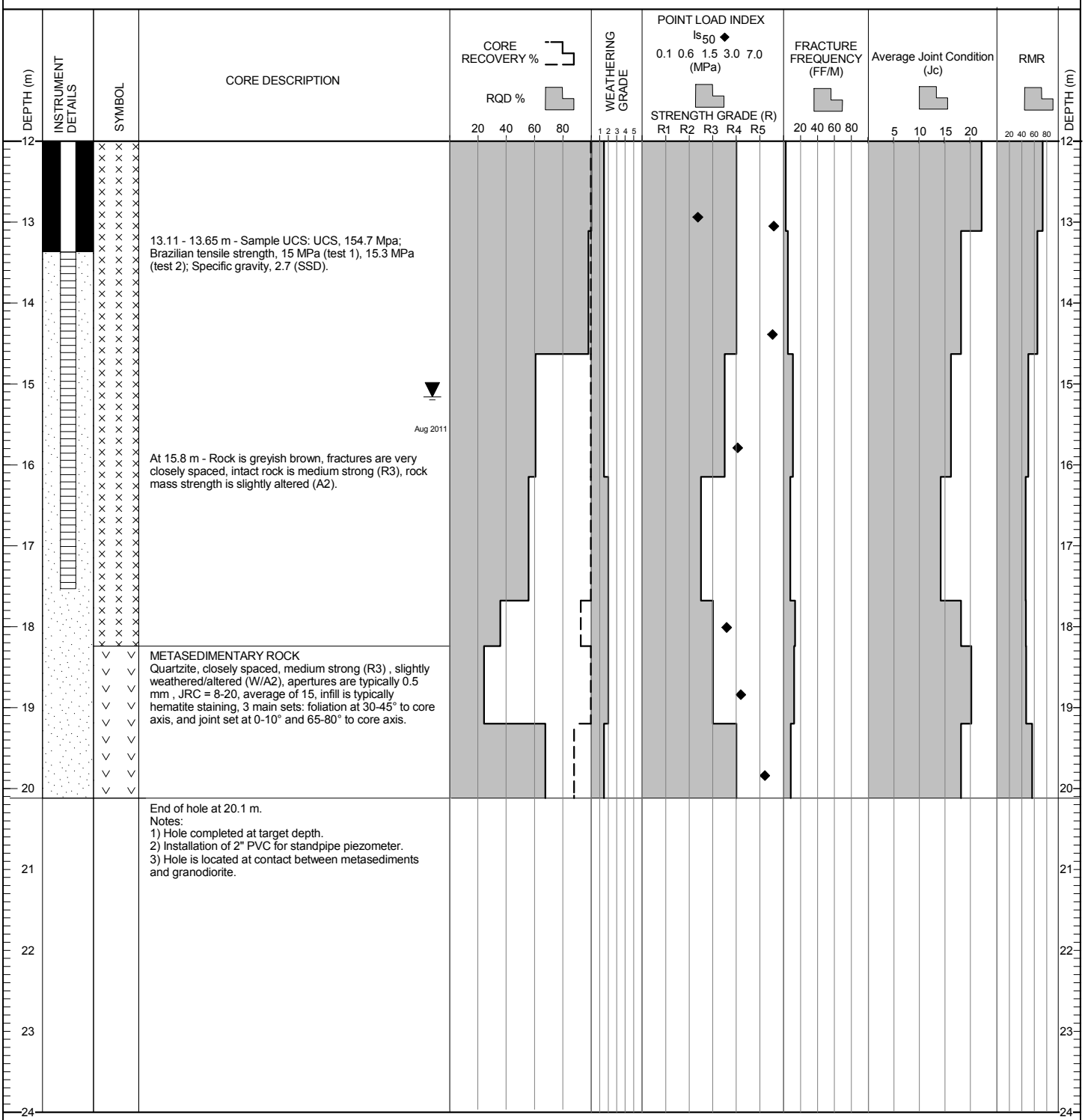
DRILL HOLE # BH-BGC11-46

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 460,262.7E - 7,099,004.0N
GROUND ELEVATION (m) : 1,246.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 10.91

START DATE : 04 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 20.1
DEPTH TO TOP OF ROCK (m) : 2.4
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-47

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,811.9E - 7,100,698.9N
GROUND ELEVATION (m) : 841.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/HSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 04 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 16.0
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT/AKU
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION
0				ORGANICS Rootmat, organic silt. [TOPSOIL]
	G	G1		SILT (ML) Trace sand, trace gravel, trace organics, non-plastic, soft, yellowish brown, moist, homogeneous. [ALLUVIUM?]
1		SPT1		At 0.4 m - Brownish grey with a brown laminated structure. 0.75 - 1.2 m - SPT 1, grain size analysis, 1% gravel, 8% sand, 91% silt. 0.95 - 1.8 m - Becomes frozen: Nbn. Trace organics (rootlets).
	G	G2		
2	G	G3		1.8 - 3.8 m - Brown, moist to wet, non frozen. 2.0 - 2.27 m - Sample G3, grain size analysis, 8% sand, 78% silt, 14% clay. At 2.27 m - PP/2 = 14-34 kPa
	G	G4		
3		SPT2		SAND (SW) Fine to coarse, gravelly, trace silt, well graded, compact, maximum particle size = 25 mm, yellowish brown, homogeneous, no odour, moist. Clasts: equidimensional to elongated, subangular to angular, metasedimentary. [ALLUVIUM?] 3.0 - 3.8 m - Maximum particle size = 105 mm, some cobbles.
4		SPT3		SILT (ML) Gravelly, some sand, soft to firm, non plastic, maximum particle size = 12 mm, elongated to equidimensional, angular to subangular, moist, homogeneous, non cemented, rapid dilatancy. [ALLUVIUM?]
	G	G5		SAND (SM) Silty, gravelly, wet, dark grey, maximum particle size = 20 mm, elongated to equidimensional, subangular. Fines are non-plastic and stiff. [ALLUVIUM?] At 4.9 m - Frozen: Nbn. 5.33 - 5.78 m - SPT 4, grain size analysis, 26% gravel, 45% sand, 29% fines. At 5.33 m - Freezing bond is lesser.
5		SPT4		
6	G	G6		SAND (SM) Silty, trace to some gravel, grey, no odour, moist to wet, homogeneous. Fines are low plasticity. Frozen: Nbn. [ALLUVIUM?]
7		SPT5		At 7.2 m - Quartz cobble (affected SPT), maximum particle size = 72 mm, frozen: less bonded.
	G	G7		
8		SPT6		8.38 - 8.58 m - SPT 6, grain size analysis, 13% gravel, 38% sand, 49% silt.
9				SAND (SW) Trace to some silt, trace gravel, well graded, maximum particle size = 8 mm, brownish grey, moist, homogeneous. Clasts: elongated, subangular. [ALLUVIUM?]
	G	G8		
10		SPT7		SILT (ML) Trace to some sand, trace gravel, trace cobbles, brownish grey, maximum particle size = 65 mm, homogeneous, clasts: subangular to angular, frozen: Nbn. [ALLUVIUM?]
11	G	G9		
		SPT8		
12	G			SAND (SM)

INSTRUMENT DETAILS

SPT BLOWS PER 150mm: 6 6 6 3 2 2 2

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-47

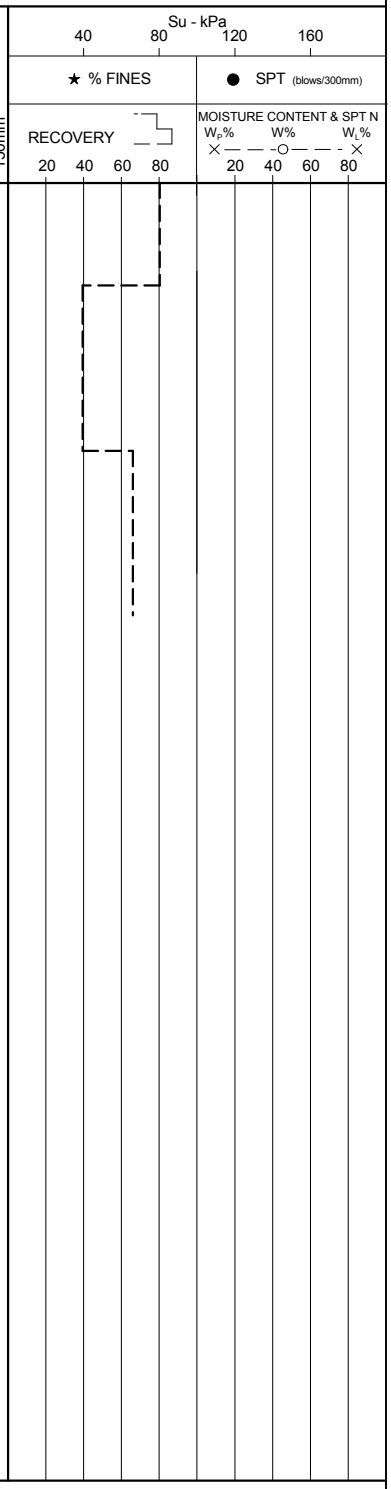
LOCATION : STEINER AREA

CO-ORDINATES (m): 458,811.9E - 7,100,698.9N
GROUND ELEVATION (m) : 841.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/HSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 04 Aug 11
FINISH DATE : 04 Aug 11
FINAL DEPTH (m) : 16.0
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : LGT/AKU
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
12	G	G10		Silty, some fine gravel, trace cobbles, brownish grey, maximum particle size = 75 mm, low plasticity. Clasts: subangular to angular. [ALLUVIUM?]		
	G	G11		11.8 - 12.1 m - Sample G10, grain size analysis, 15% gravel, 46% sand, 39% silt. Below 12.3 m - Sand content increases.		
13	G	G12		SILT (ML) Sandy, some fine gravel, trace cobbles, brownish grey, maximum particle size = 75 mm, low plasticity, clasts: subangular to angular. [ALLUVIUM?] At 13.0 m - Difficult to auger, machine stalls out.		
14	G	G13		SILT (ML) Sandy, gravelly, trace to some cobbles, grey, moist, frozen Nbn, clasts: gravel is subangular, cobbles are subrounded. [ALLUVIUM?] Below 13.5 m - Fine gravel and cobble content increases with depth.		
15	G	G14		SILT (ML) Sandy, subangular to angular, gravelly, trace to some cobbles, subrounded. Frozen: Nbn. [ALLUVIUM?]		
	G	G15				
16				End of borehole at 16.0 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for thermistor, serial #11.5-1, annulus not backfilled. 3) 10 m thermistor, serial #11.5-1, installed on Aug. 10, 2011. Thermistor removed from this hole on Aug. 28 for relocation to BH-BGC11-58.		
17						
18						
19						
20						
21						
22						
23						
24						



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-48

LOCATION : PLATINUM GULCH

CO-ORDINATES (m): 459,936.0E - 7,099,118.1N
GROUND ELEVATION (m) : 1,140.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.50

START DATE : 04 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 32.9
DEPTH TO TOP OF ROCK (m) : 13.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 5.49 m - No recovery.		
5.49				SILT (ML) Trace sand, some gravel, low to medium plasticity, stiff, orange, moist, no cementation, clasts are metasedimentary. [COMPLETELY WEATHERED METASEDIMENTARY ROCK]		
7.0				SILT AND SAND (ML/SW) Trace gravel, subangular to angular, non-plastic, loose, orange, wet, no cementation, clasts are metasedimentary. [COMPLETELY WEATHERED ROCK]		
8.5				SAND AND GRAVEL(SM/GM) Fine to medium gravel, silty, angular, weak to moderate cementation, compact to dense, silt is non to low plastic, orange. [COMPLETELY WEATHERED ROCK]		
12						

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% — W% — W_L%: 20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-48

LOCATION : PLATINUM GULCH

CO-ORDINATES (m): 459,936.0E - 7,099,118.1N
GROUND ELEVATION (m) : 1,140.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.50

START DATE : 04 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 32.9
DEPTH TO TOP OF ROCK (m) : 13.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
12						
13				Rock encountered at 13.10 m depth. Refer to rock log.		
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-48

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 459,936.0E - 7,099,118.1N
GROUND ELEVATION (m) : 1,140.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.5

START DATE : 04 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 32.9
DEPTH TO TOP OF ROCK (m) : 13.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 13.10 m - See BH-BGC11-48 soil log.

METASEDIMENTARY ROCK
Quartzite, light yellowish grey, fine grained, foliated/microfractured, extremely weak to weak (R1.5 to R2), highly weathered (W3 to W4), iron stained, fractures are extremely to very closely spaced, typically 4 joint sets with foliations at 24-40° and various sets at 0-5°, 45-65°, 10-30° to core axis, JRC = 12-20, averaging 14.
11.58 - 13.11 m - Highly fractured zone.

17.85 - 20.8 m - Rock strength grades to extremely to very weak rock (R0.5), highly weathered (W4), rock crumbles to fine to medium gravel.

At 20.8 m - Rock grades to very weak to weak (R1-R2), rock is moderately to highly weathered (W2.5 to W3), increased presence of sub-vertical joints, highly fractured zone to 22.0 m.

At 22.0 m - Rock progressively turns to bluish grey stained brownish orange.

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

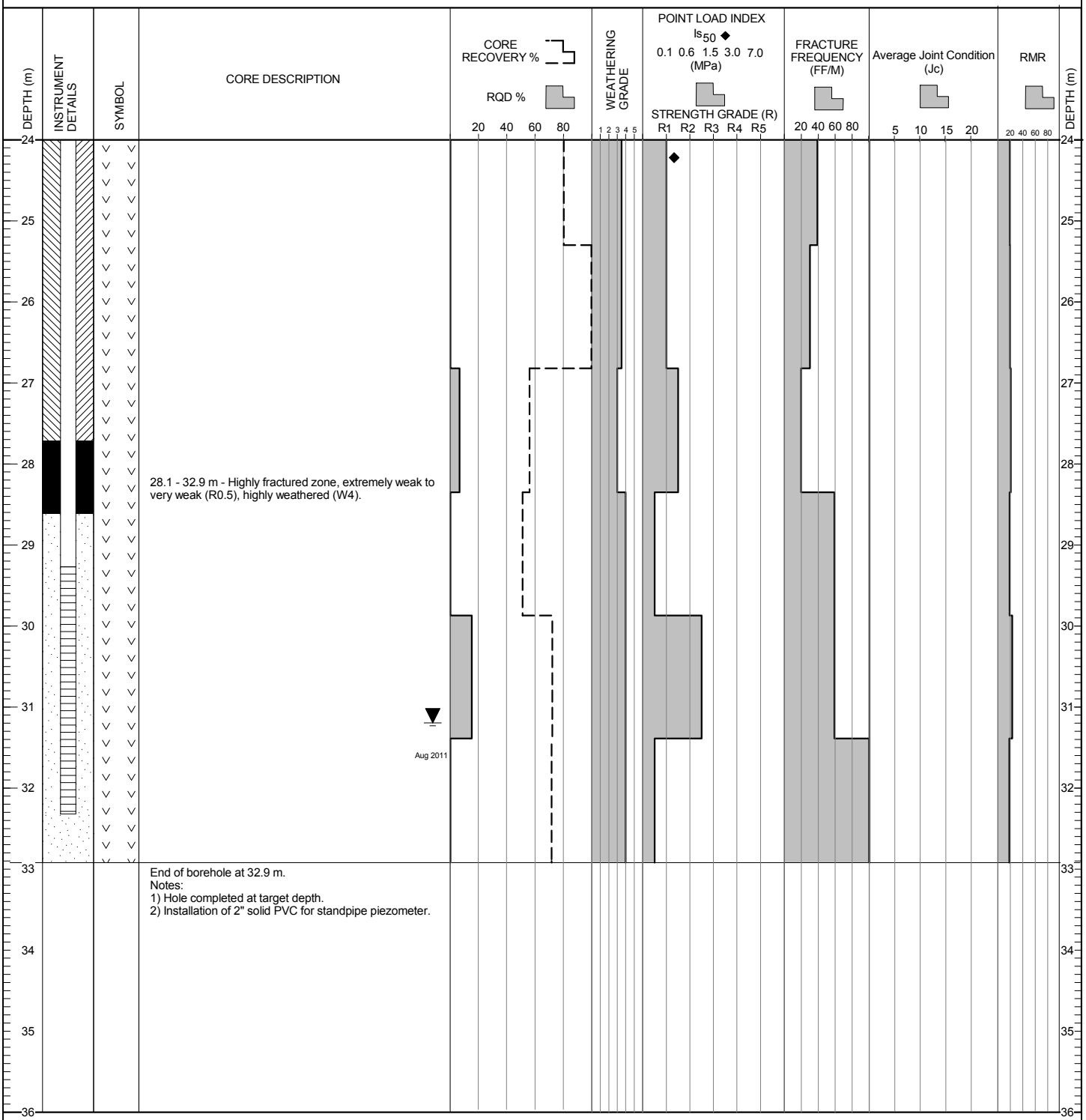
DRILL HOLE # BH-BGC11-48

LOCATION : PLATINUM GULCH

CO-ORDINATES (m) 459,936.0E - 7,099,118.1N
GROUND ELEVATION (m) : 1,140.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.5

START DATE : 04 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 32.9
DEPTH TO TOP OF ROCK (m) : 13.1
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-49

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,746.5E - 7,100,635.9N
GROUND ELEVATION (m) : 835.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 05 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 16.0
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	LITHOLOGIC DESCRIPTION	SPT BLOWS PER 150mm
0			ORGANIC SILT (OL) Trace to some sand, trace gravel, low plastic, firm, brown, organics black, moist, roots, rootlets.	
	G	G1	SILT (ML) Trace to some sand, trace gravel, low plastic, firm to stiff, brown, maximum particle size = 20 mm, gravel is angular, flat, metasedimentary pieces. [ALLUVIUM?]	
1	SPT	SPT1		2 3 9
2	G	G2	SAND (SW) Trace fine gravel, well graded, maximum particle size = 10 mm, elongated, subangular to angular, brownish grey, moist, metasedimentary clasts. [ALLUVIUM?]	
	SPT	SPT2	2.28 - 2.73 m - SPT2, grain size analysis, 7% gravel, 23% sand, 58% silt, 12% clay.	
	G	G3	SAND (SM) Silty, trace to some gravel, trace clay, brown, wet when thawed, low dry strength. Fines are low plasticity. Frozen: Nbe. [ALLUVIUM?]	
3	G	G4	Below 2.4m; non plastic, grey with red mottling, Vr/Vx 1-3%. 2.73 - 2.9 m - Drilled with CRREL barrel. Between 2.8-5.3m Nbn. Below 3m - Trace gravel, subangular to angular, multilithic. 3.4 - 3.6 m - Sample G4, grain size analysis, 28% gravel, 42% sand, 26% silt, 4% clay.	
4				
5	G	G5	Between 5.3-6.9m; Nbe.	
6				
	G	G6	6.4 - 6.6 m - Sample G6, grain size analysis, 33% gravel, 34% sand, 31% silt, 2% clay.	
7			Below 6.8m - Frozen: Vx (<3%).	
8	G	G7		
9				
	G	G8	9.4 - 9.9 m - Sample G8, grain size analysis, 6% gravel, 69% sand, 16% silt, 9% clay.	
10				
11	G	G9		
12				

INSTRUMENT DETAILS

Su - kPa: 40, 80, 120, 160

★ % FINES ● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-49

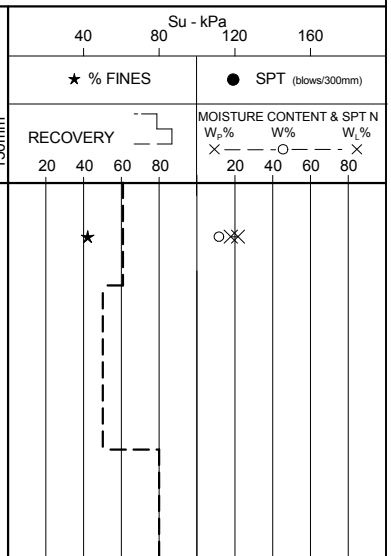
LOCATION : STEINER AREA

CO-ORDINATES (m): 458,746.5E - 7,100,635.9N
GROUND ELEVATION (m) : 835.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 05 Aug 11
FINISH DATE : 05 Aug 11
FINAL DEPTH (m) : 16.0
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
12	G	G10		12.4 - 12.6 m - Sample G10, grain size analysis, 22% gravel, 36% sand, 29% silt, 13% clay.		
13						
14	G	G11				
15				Below 15m - Semi-frozen.		
	G	G12				
16				End of borehole at 16.0 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for thermistor. 3) 10 m thermistor installed on Aug. 10, 2011, serial # 11.5-2, annulus of PVC not backfilled; thermistor damaged and removed on August 26, 2011.		
17						
18						
19						
20						
21						
22						
23						
24						



EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-50

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,791.3E - 7,099,997.6N
GROUND ELEVATION (m) : 1,058.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -69
TREND (°) : 89

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 4.57

START DATE : 06 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 5.2
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 3.66 m - No recovery. Drilled with casing. For soil description refer to log of TP-BGC11-59, excavated on this drill pad.		
4				GRAVEL (GW) Subrounded to subangular, medisedimentary. [COLLUVIUM]		
5				Rock encountered at 5.20 m depth. Refer to rock log.		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-50

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,791.3E - 7,099,997.6N
GROUND ELEVATION (m) : 1,058.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -69
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 4.57

START DATE : 06 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 5.2
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0 to 5.2			0 to 5.20 m - See BH-BGC11-50 soil log.
5.2 to 12			METASEDIMENTARY ROCK Dark bluish grey, weak (R2), moderately weathered (W3), foliated/bedded fabric, 2 joint sets: first set parallel to foliation at 70-80° to core axis, typically iron oxide infill with occasional broken rock, talc and calcite, joint surfaces typically planar and rough, second set at approximately 20-25° to core axis, typically iron oxide infill, joint surfaces typically planar and rough, occasionally stepped as breaks occurred perpendicular to foliation/bedding, some healed fractures parallel to this joint set, average fracture spacing approximatley 20 mm. Below 6.0 m - Average fracture spacing approximatley 50 mm. Below 7.0 m - Colour changes to light grey. 7.6 - 10.7 m - Zone of poor recovery, metasedimentary gravel and cobbles were recovered. 9.1 - 10.7 m - Highly fractured zone.

CORE RECOVERY %
RQD % (20 40 60 80)
WEATHERING GRADE (1 2 3 4 5)
POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5
FRACTURE FREQUENCY (FF/M) (20 40 60 80)
Average Joint Condition (Jc) (5 10 15 20)
RMR (20 40 60 80)

(CONTINUED ON NEXT PAGE)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

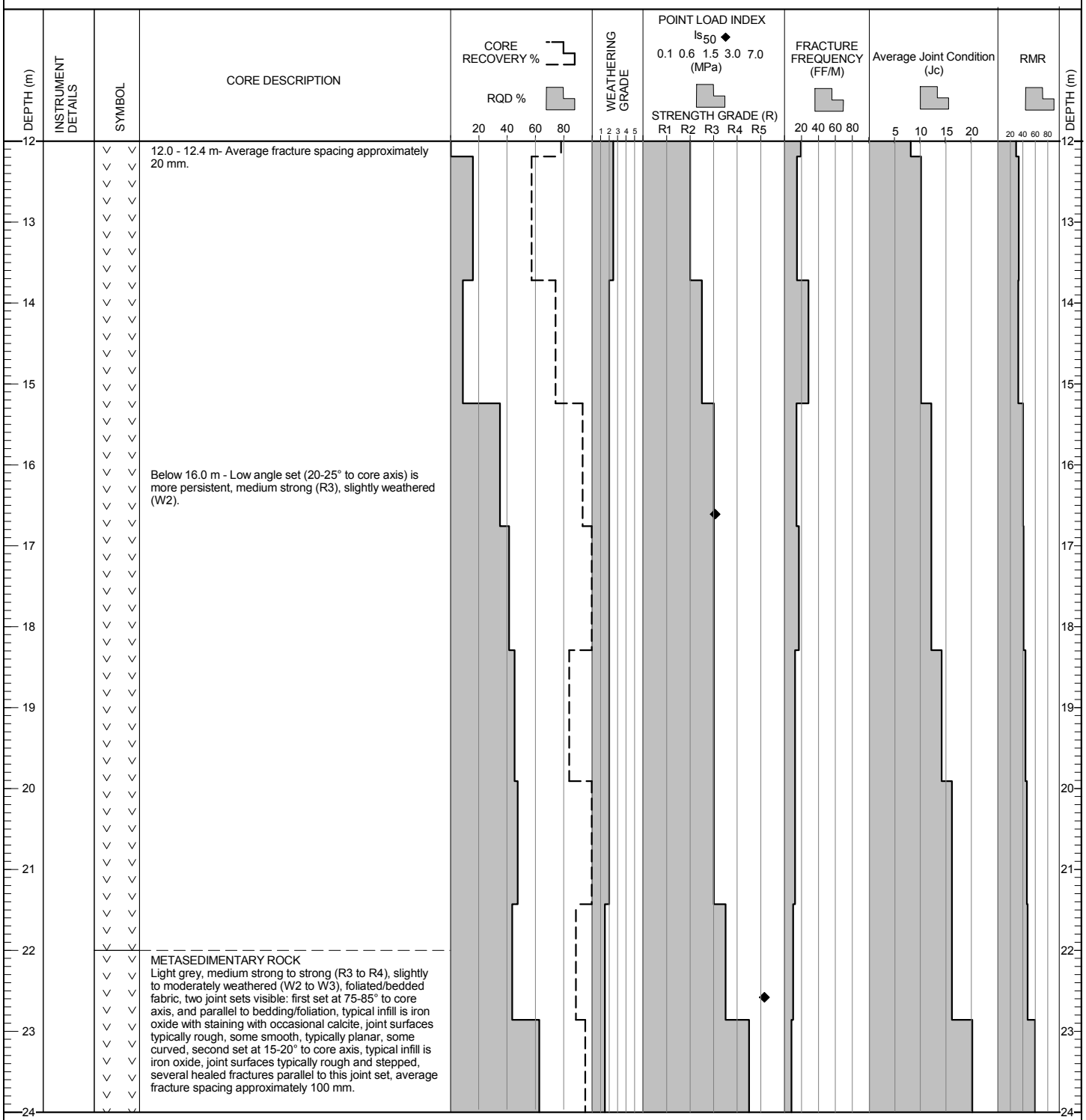
DRILL HOLE # BH-BGC11-50

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,791.3E - 7,099,997.6N
GROUND ELEVATION (m) : 1,058.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -69
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 4.57

START DATE : 06 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 5.2
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

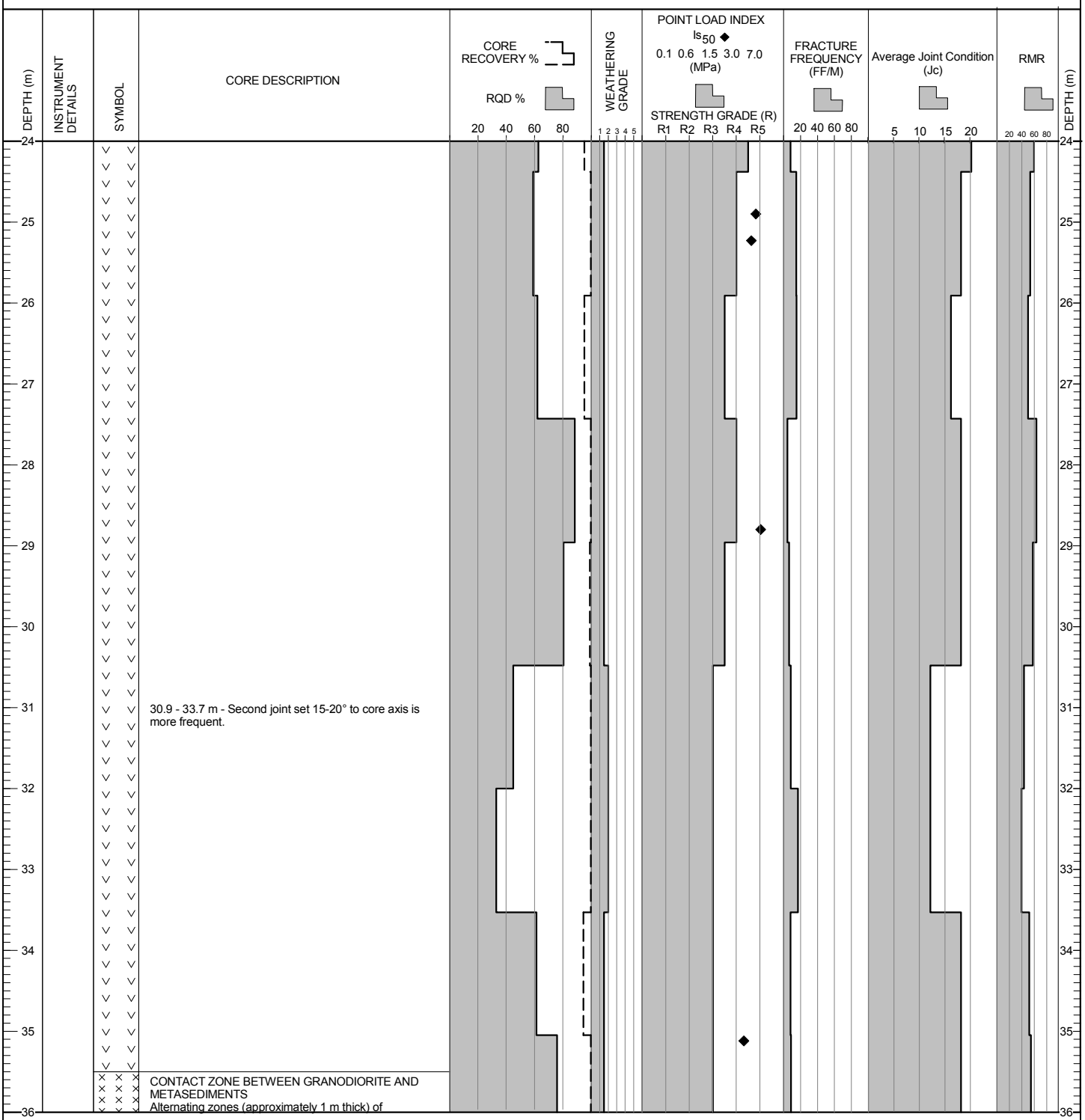
DRILL HOLE # BH-BGC11-50

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,791.3E - 7,099,997.6N
GROUND ELEVATION (m) : 1,058.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -69
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 4.57

START DATE : 06 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 5.2
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-50

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,791.3E - 7,099,997.6N
GROUND ELEVATION (m) : 1,058.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -69
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 4.57

START DATE : 06 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 5.2
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
36			granodiorite and metasediments as follows: GRANODIORITE: light grey, medium strong (R3), slightly weathered (W2), massive crystalline structure, sand sized crystals, two joint sets, set 1 at approximately 80° to core axis, typically infilled with calcite, iron oxide and some clay, joint surfaces are typically rough and planar, some stepped, set 2 at approximately 10° to core axis (less persistant), typically infilled with calcite and iron oxide, joint surfaces are typically rough and planar, average fracture spacing is approximately 50 mm, increasing to 200 mm with depth. METASEDIMENTS: reddish grey, weak to medium strong (R2-R3), slightly weathered (W2), bedded/foliated fabric, one joint set parallel to foliation at approximately 80° to core axis, typically no infill, joint surfaces planar and smooth, average fracture spacing approximately 50 mm, increasing to 200 mm with depth.
37			
38			
39			
40			
41			End of borehole at 41.2 m. Notes: 1) Hole completed at target depth. 2) Hole left open; no installation. 3) TP-BGC11-59 is located on this drill pad. 4) Orientation data obtained by using ACT tool.
42			
43			
44			
45			
46			
47			
48			

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)

STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

DEPTH (m)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-51

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,643.5E - 7,100,743.6N
GROUND ELEVATION (m) : 818.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 06 Aug 11
FINISH DATE : 06 Aug 11
FINAL DEPTH (m) : 25.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0	G	G1		SILT (ML) Trace to some gravel, trace clay, low plastic, firm, grey to brown, organic odour, dry to moist, no cementation, trace rootlets. [TOP SOIL]		
1		SPT1		SAND (SP) Fine, trace silt, trace gravel, uniformly graded, maximum particle size = 20 mm, rounded, greyish and yellowish brown, no odour, dry to moist, no cementation, gravel is multilithic. [ALLUVIUM]		9 7 7
				SILT (ML) Trace fine sand, trace clay, trace gravel, low plastic, stiff, brown with iron oxide staining, no odour, dry, no cementation. [ALLUVIUM]		
2	G	G2				
		SPT2		SAND (SP) Fine sand, silty, trace gravel, uniformly graded, loose, maximum particle size = 20 mm, rounded, greyish and yellowish brown, no odour, dry to moist, no cementation, gravel is multilithic. [ALLUVIUM] 2.3 - 2.75 m - Silt content reduced: trace silt.		4 3 3
3	G	G3		SILT (ML) Trace fine sand, non plastic, firm to stiff, grey to brown with iron oxide staining, no odour, dry, no cementation. [ALLUVIUM]		
4		SPT3				5 6 6
				SAND (SW) Trace to some gravel, trace silt, well graded, compact, maximum particle size = 30 mm, sub-rounded to sub-angular, greyish brown, no odour, dry to moist, no visible structure, no cementation. [ALLUVIUM]		
5	G	G4				
		SPT4				4 10 10
6	G	G5		SILT (ML) Some sand to sandy, trace to some gravel, low plastic, soft to firm, grey, no odour, dry to moist, no cementation, maximum particle size = 40 mm, gravel and sand are sub-angular to angular and multilithic. [ALLUVIUM]		
7						
8	G	G6		7.9 - 8.1 m - Sample G6, grain size analysis, 14% gravel, 27% sand, 50% silt, 9% clay.		
9	G	G7				
10		SPT5		9.9 - 10.25 m - SPT #5: three different materials, stratified: 1) non plastic fine sand and silt; 2) low plastic silt; and 3) well graded sand. At 10m - hole caving at this depth throughout drilling.		7 10 R
11	G	G8				
12		SPT6		11.4 - 11.6 m - Lens of sand, fine to coarse, primarily coarse, trace silt. Frozen: Vx (< 2%). 11.6 - 14.5 m - Frozen: Nbe.		

Su - kPa: 40, 80, 120, 160

★ % FINES ● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-51

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,643.5E - 7,100,743.6N
GROUND ELEVATION (m) : 818.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 06 Aug 11
FINISH DATE : 06 Aug 11
FINAL DEPTH (m) : 25.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION
12	G	G9		
13				
14	G	G10		SAND (SM) Coarse sand, silty, trace fine gravel, gap graded, loose, maximum particle size = 50 mm, elongated, angular, grey, multilithic gravel, no odour, moist when thawed, low plastic silt. Frozen: Nbe. [ALLUVIUM] 13.9 - 14.1 m - Sample G10, grain size analysis, 21% gravel, 53% sand, 26% silt.
15	G	G11		
16				Below 16.0 m - Nbn.
17	G	G12		
18	G	G13		SILT (ML) Some coarse sand, trace gravel, low plastic, firm, grey, no odour, moist, no visible structure, no cementation, maximum particle size = 10 mm, gravel is multilithic and angular. [ALLUVIUM]
19				SAND (SW) Silty, some gravel, well graded, loose, maximum particle size = 20 mm, sub-angular to sub-rounded, grey, no odour, moist, no visible structure, no cementation, multilithic gravel. [ALLUVIUM]
20	G	G14		20.1 - 20.3 m - Sample G14, grain size analysis, 11% gravel, 63% sand, 26% fines.
		SPT7		
21				SILT (ML) Sandy, low to non-plastic, soft to firm, grey, no odour, moist to wet, no cementation. [ALLUVIUM]
	G	G15		
22		SPT8		22.1 - 22.25 m - Frozen: Vx (approximately 5%). 22.25 - 23.6 m - Partially frozen: Nbn.
23	G	G16		SAND AND SILT (SM/ML) Trace gravel (angular and multilithic), well graded, loose, maximum particle size = 20 mm, sub-angular, grey, no odour, dry to moist, unfrozen, no cementation, low plastic silt. [ALLUVIUM]
24				

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-51

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,643.5E - 7,100,743.6N
GROUND ELEVATION (m) : 818.4m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 06 Aug 11
FINISH DATE : 06 Aug 11
FINAL DEPTH (m) : 25.2
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
24						
25	G	G17				
				End of borehole at 25.2 m. Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for thermistor. 3) 10 m thermistor installed on Aug. 10, 2011, serial #11.5-2, annulus not backfilled. Thermistor removed from this hole on Aug. 25 for relocation to BH-BGC11-57 and replaced with a 25 m thermistor, serail #26.5-2, annulus not backfilled.		
26						
27						
28						
29						
30						
31						
32						
33						
34						
35						
36						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-52

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m): 459,891.2E - 7,101,316.4N
GROUND ELEVATION (m) : 909.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 12.19

START DATE : 07 Aug 11
FINISH DATE : 08 Aug 11
FINAL DEPTH (m) : 22.6
DEPTH TO TOP OF ROCK (m) : 11.9
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 1.22 m - No recovery. For soil description refer to log of TP-BGC11-136, excavated on this drill pad.		
1				COBBLES Some gravel, trace boulders, poorly (uniformly) graded, maximum particle size = 250 mm, gravel subangular to subrounded, predominantly metasedimentary, cobbles and boulders predominantly granodiorite, sand/fines washed away by drilling process? [DEBRIS FLOW?]		
2						
3						
4					Aug 2011	
5						
6						
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

Rock encountered at 11.90 m depth.
Refer to rock log.

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PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-52

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 459,891.2E - 7,101,316.4N
GROUND ELEVATION (m) : 909.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 12.19

START DATE : 07 Aug 11
FINISH DATE : 08 Aug 11
FINAL DEPTH (m) : 22.6
DEPTH TO TOP OF ROCK (m) : 11.9
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0										0
1										1
2										2
3										3
4										4
5										5
6			0 to 11.90 m - See BH-BGC11-52 soil log.							6
7										7
8										8
9										9
10										10
11										11
12										12

(CONTINUED ON NEXT PAGE)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

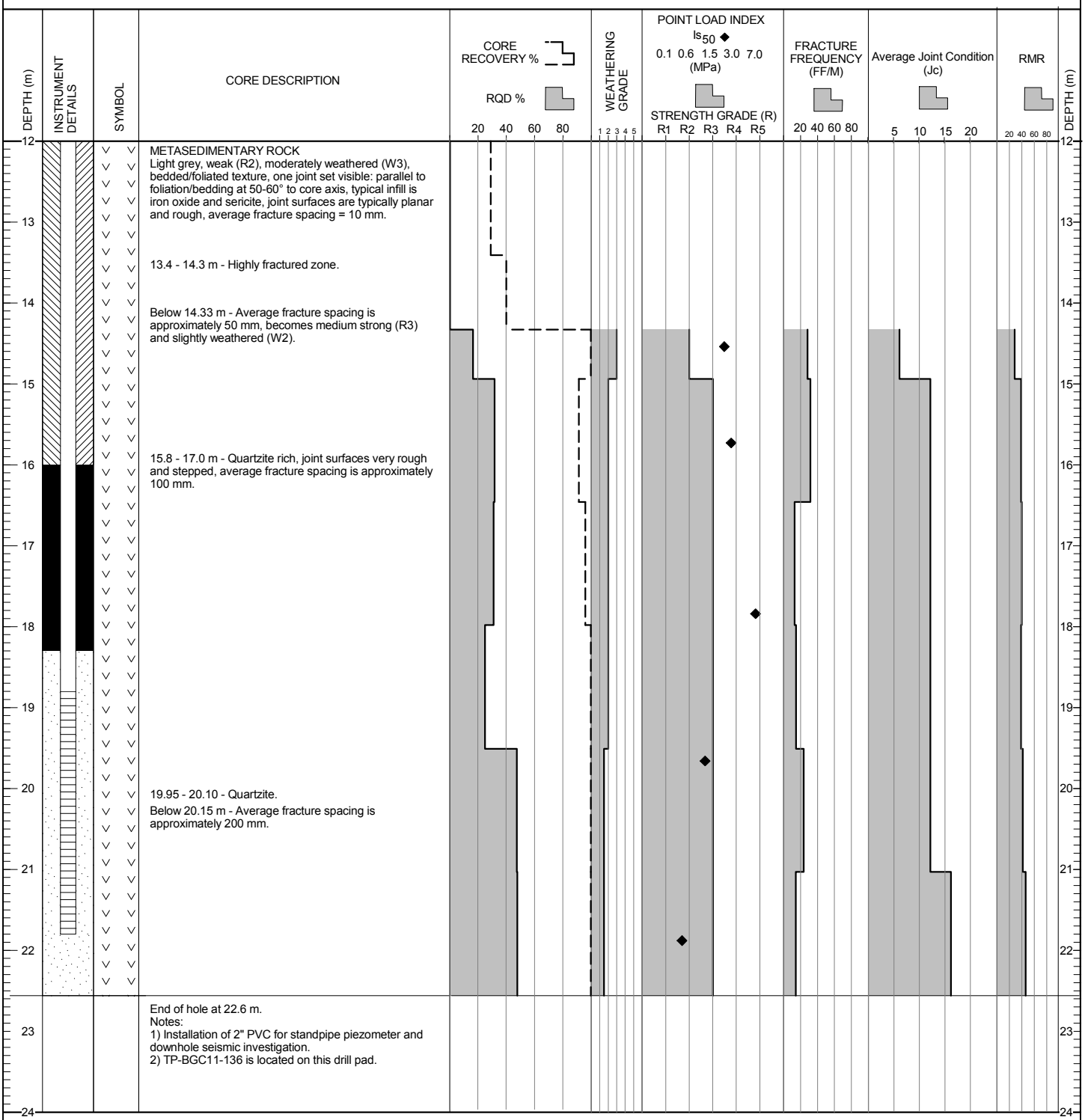
DRILL HOLE # BH-BGC11-52

LOCATION : MIDDLE REACH DUBLIN GULCH

CO-ORDINATES (m) 459,891.2E - 7,101,316.4N
GROUND ELEVATION (m) : 909.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 12.19

START DATE : 07 Aug 11
FINISH DATE : 08 Aug 11
FINAL DEPTH (m) : 22.6
DEPTH TO TOP OF ROCK (m) : 11.9
LOGGED BY : SP/JD/KH
REVIEWED BY : PQ/DW



METASEDIMENTARY ROCK
Light grey, weak (R2), moderately weathered (W3), bedded/foliated texture, one joint set visible: parallel to foliation/bedding at 50-60° to core axis, typical infill is iron oxide and sericite, joint surfaces are typically planar and rough, average fracture spacing = 10 mm.

13.4 - 14.3 m - Highly fractured zone.

Below 14.33 m - Average fracture spacing is approximately 50 mm, becomes medium strong (R3) and slightly weathered (W2).

15.8 - 17.0 m - Quartzite rich, joint surfaces very rough and stepped, average fracture spacing is approximately 100 mm.

19.95 - 20.10 - Quartzite.
Below 20.15 m - Average fracture spacing is approximately 200 mm.

End of hole at 22.6 m.
Notes:
1) Installation of 2" PVC for standpipe piezometer and downhole seismic investigation.
2) TP-BGC11-136 is located on this drill pad.

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-53

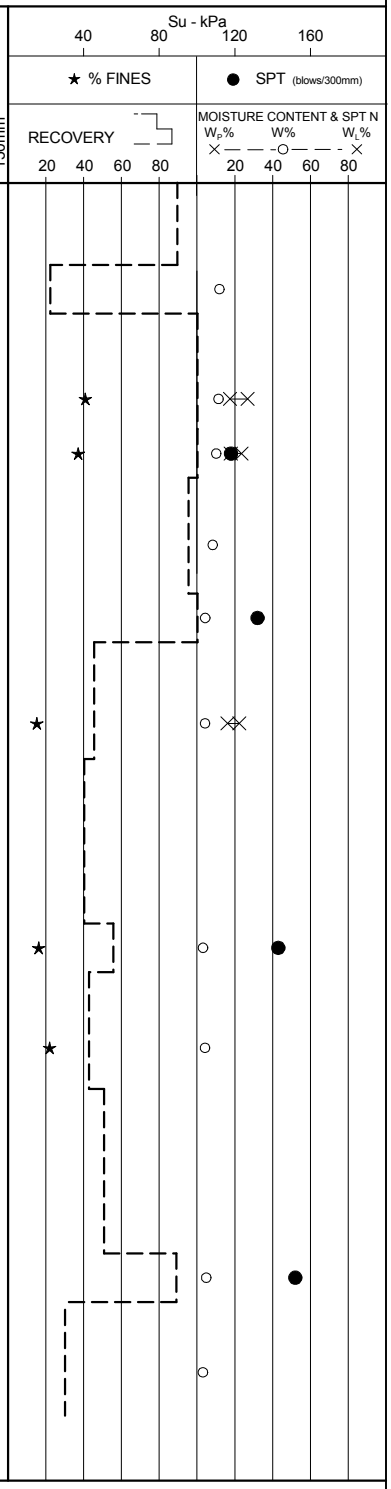
LOCATION : EAGLE PUP

CO-ORDINATES (m): 459,483.6E - 7,100,993.0N
GROUND ELEVATION (m) : 875.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 11.4
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0						
	G	G1		SAND (SM) Silty, some gravel, trace clay, angular, flat, elongated, maximum particle size = 20 mm metasedimentary clasts. Fines: low plastic, firm to stiff, brown, no odour, moist, no cementation. [TILL] 0.3 - 2.7 m - Gravelly.		
1		SPT1				
2	G	G2		1.9 - 2.1 m - Sample G2, grain size analysis, 19% gravel, 40% sand, 38% silt, 3% clay.		
		SPT2		2.28 - 2.73 m - SPT 2, grain size analysis, 22% gravel, 41% sand, 28% silt, 9% clay.		6 8 10
3	G	G3		2.7 - 3.8 m - Some sand, reddish brown.		
4		SPT3		SAND (SW) Some gravel, trace to some silt, well graded, dense, maximum particle size = 50 mm, sub-angular, to sub-rounded, reddish brown, no odour, moist, no visible structure, no cementation, sand and gravel are metasedimentary with occasional granodiorite clasts. [TILL]		16 15 17
5	G	G4		4.9 - 5.1 m - Sample G4, grain size analysis, 41% gravel, 44% sand, 14% silt, 1% clay.		
				5.3 - 6.9 m - Gravelly.		
6	G	G5				
7		SPT4		6.85 - 7.3 m - SPT4, grain size analysis, 8% gravel, 76% sand, 13% silt, 3% clay.		13 20 23
				7.3m - 8.4 m - Some silt, some gravel, brown.		
8	G	G6		7.9 - 8.1 m - Sample G6, grain size analysis, 31% gravel, 47% sand, 22% fines.		
9	G	G7				
10		SPT5				10 24 28
11	G	G8				
12				Rock encountered at 11.40 m depth. Refer to rock log.		



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-53

LOCATION : EAGLE PUP

CO-ORDINATES (m) 459,483.6E - 7,100,993.0N
GROUND ELEVATION (m) : 875.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 11.4
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0										0
1										1
2										2
3										3
4										4
5										5
6			0 to 11.40 m - See BH-BGC11-53 soil log.							6
7										7
8										8
9										9
10										10
11										11
12		V V V V V V	SAND (SM) Some silt, some gravel, angular, elongated, metasedimentary, well graded, dense, maximum particle							12

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-53

LOCATION : EAGLE PUP

CO-ORDINATES (m) 459,483.6E - 7,100,993.0N
GROUND ELEVATION (m) : 875.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 11.4
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			size = 20 mm, angular, orange, no odour, dry, no visible structure, no cementation, moderately weathered (W3) metasedimentary rock. Note - rock is broken down by drilling process and logged as soil.
13			
14			
			End of borehole at 14.5 m. Notes: 1) Hole completed at target depth. 2) Backfilled with cuttings.

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

DEPTH (m)

BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-54

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m): 458,886.2E - 7,101,245.6N
GROUND ELEVATION (m) : 883.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -75
TREND (°) : 4

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 4.57 m - No recovery.		
4.57				GRAVEL (GM) Sandy, silty to some silt, maximum particle size = 110 mm, subangular to subrounded, blue grey, heavy iron staining, some cementation, clasts are metasedimentary. [COMPLETELY WEATHERED METASEDIMENTARY ROCK]		
9.14				9.14 - 10.67 m - No recovery.		
12						

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

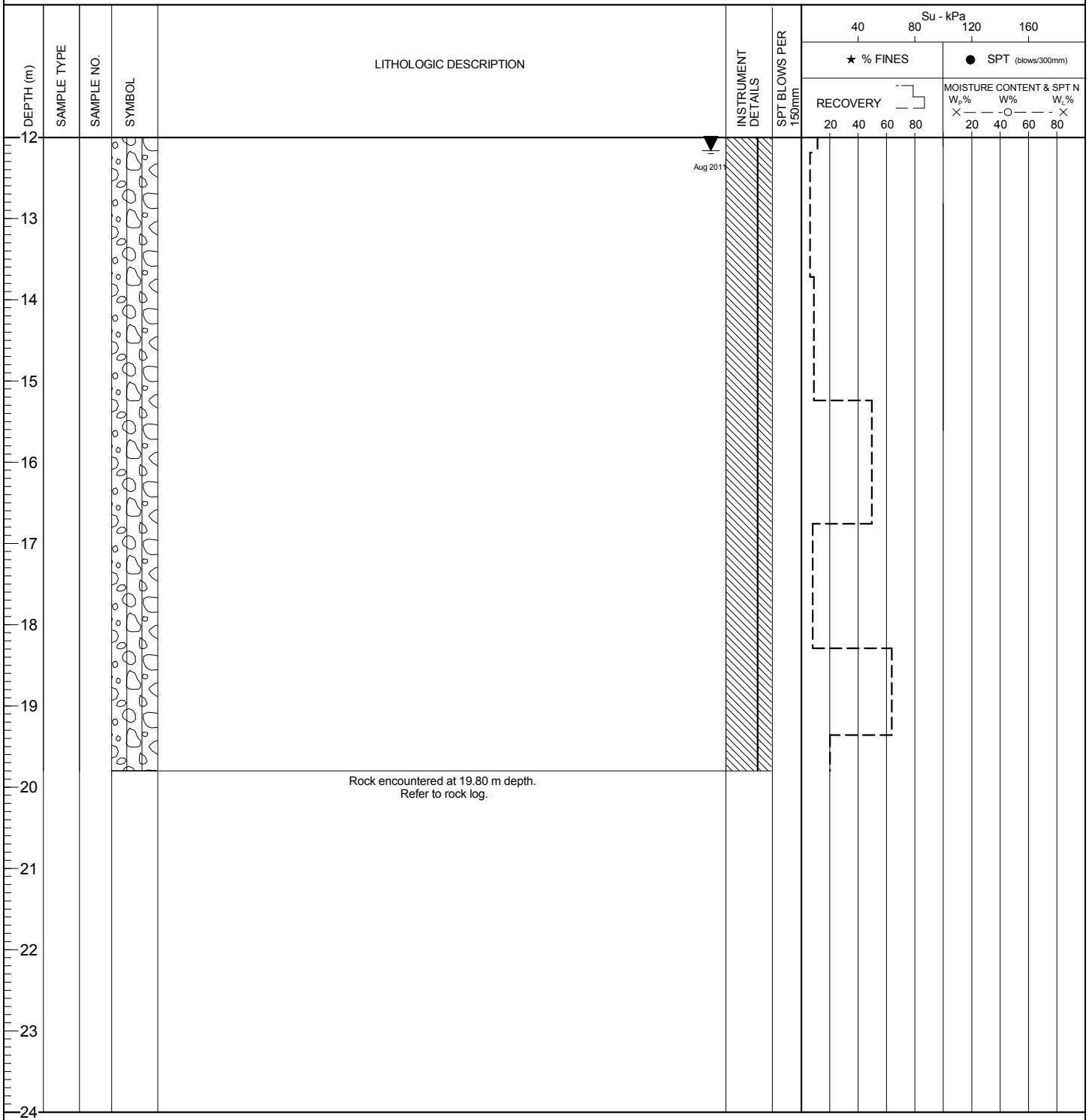
DRILL HOLE # BH-BGC11-54

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m): 458,886.2E - 7,101,245.6N
GROUND ELEVATION (m) : 883.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -75
TREND (°) : 4

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-54

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,886.2E - 7,101,245.6N
GROUND ELEVATION (m) : 883.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -75
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			Aug 2011
13–19			0 to 19.80 m - See BH-BGC11-54 soil log.
20–24			METASEDIMENTARY ROCK Quartzite, grey/greenish grey, fine grained, foliated, intact rock is very weak (R1), rockmass crumbles apart when disturbed, moderately weathered (W2.5), fractures are extremely closely to very closely spaced, apertures are generally 1-4 mm with broken zones, infill is typically crushed and decomposed rock with hematite staining, 3 main sets: 55-68° (foliation), and two joint sets at 40-50° and 15-21° to core axis, JRC typically = 12-20.

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

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BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-54

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,886.2E - 7,101,245.6N
GROUND ELEVATION (m) : 883.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -75
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

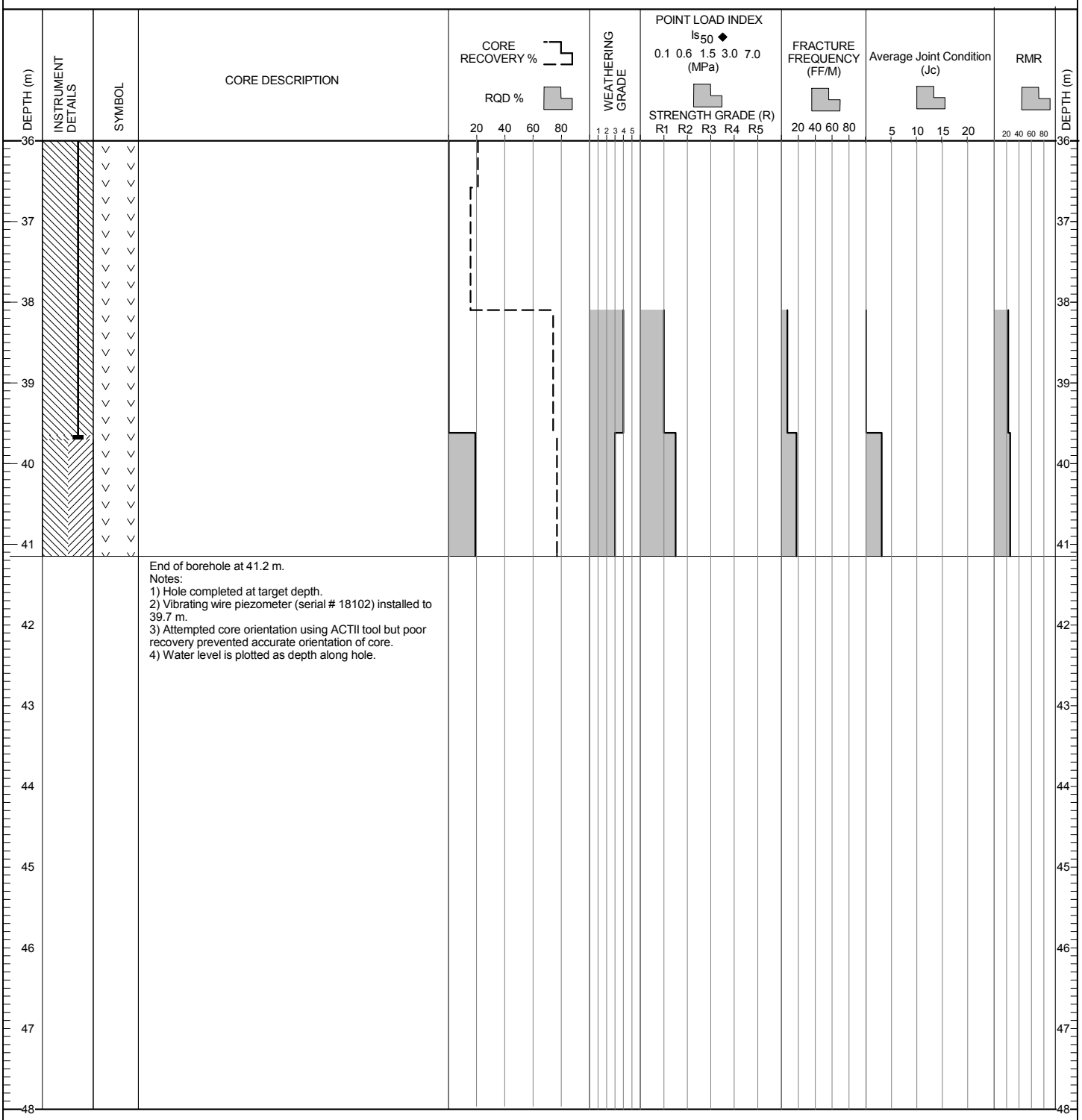
DRILL HOLE # BH-BGC11-54

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,886.2E - 7,101,245.6N
GROUND ELEVATION (m) : 883.8m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -75
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 41.2
DEPTH TO TOP OF ROCK (m) : 19.8
LOGGED BY : SP/JD
REVIEWED BY : PQ/DW



End of borehole at 41.2 m.

Notes:
1) Hole completed at target depth.
2) Vibrating wire piezometer (serial # 18102) installed to 39.7 m.
3) Attempted core orientation using ACTII tool but poor recovery prevented accurate orientation of core.
4) Water level is plotted as depth along hole.

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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-55

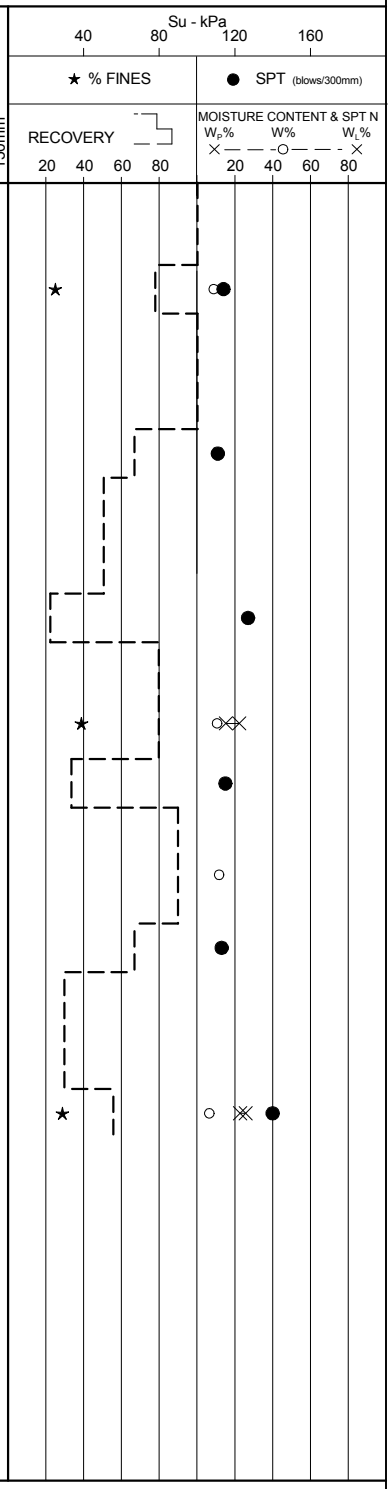
LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,440.6E - 7,100,918.4N
GROUND ELEVATION (m) : 881.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 8.8
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0	G	G1		GRAVEL (GM) Silty, sandy, trace clay, well graded, sub-angular to sub-rounded, metasedimentary clasts. Fines: low plastic, stiff, grey brown, no odour, moist, no cementation. [COLLUVIUM]		
1	SPT	SPT1		0.76 - 1.21 m - SPT 1, grain size analysis, 38% gravel, 37% sand, 25% fines. Below 1.2 m - Some sand.		3 6 8
2	G	G2				
	SPT	SPT2				5 4 7
3	G	G3		SAND (SM) Fine sand, silty, trace to some gravel, trace clay, gravel is angular and metasedimentary. Fines: low plastic, stiff to very stiff, grey, no odour, dry to moist, no cementation, low dry strength. [DEBRIS FLOW DEPOSIT]		
4	SPT	SPT3				4 14 13
5	G	G4		4.9 - 5.1 m - Sample G4, grain size analysis, 20% gravel, 41% sand, 36% silt, 3% clay.		
	SPT	SPT4				6 7 8
6	G	G5				
7	SPT	SPT5		7.3 - 8.8 m - Greyish black: possible buried organic layer.		2 6 7
8	G	G6				
	SPT	SPT6		8.38 - 8.83 m - SPT 6, grain size analysis, 31% gravel, 40% sand, 23% silt, 6% clay.		7 17 23
9				Rock encountered at 8.80 m depth. Refer to rock log.		
10						
11						
12						



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-55

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,440.6E - 7,100,918.4N
GROUND ELEVATION (m) : 881.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 8.8
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0 to 9			0 to 8.80 m - See BH-BGC11-55 soil log.
9 to 12			SILT (ML) Some sand to sandy, some gravel, low to non plastic, hard (based on auger difficulty), yellowish brown, no odour, dry, no cementation, moderately weathered (W3) metasedimentary rock. Clasts: metasedimentary, angular, elongated, talc present on clast surfaces. Note - rock is broken down by drilling process and logged as soil.

CORE RECOVERY %
RQD % — 20 40 60 80

WEATHERING GRADE — 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆
0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R)
R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) — 20 40 60 80

Average Joint Condition (Jc) — 5 10 15 20

RMR — 20 40 60 80

(CONTINUED ON NEXT PAGE)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-55

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,440.6E - 7,100,918.4N
GROUND ELEVATION (m) : 881.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 07 Aug 11
FINISH DATE : 07 Aug 11
FINAL DEPTH (m) : 14.5
DEPTH TO TOP OF ROCK (m) : 8.8
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

DRY
Aug 2011

End of borehole at 14.5 m.
Notes:
1) Hole completed at target depth.
2) Installation of 2" PVC for standpipe piezometer.

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PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-56

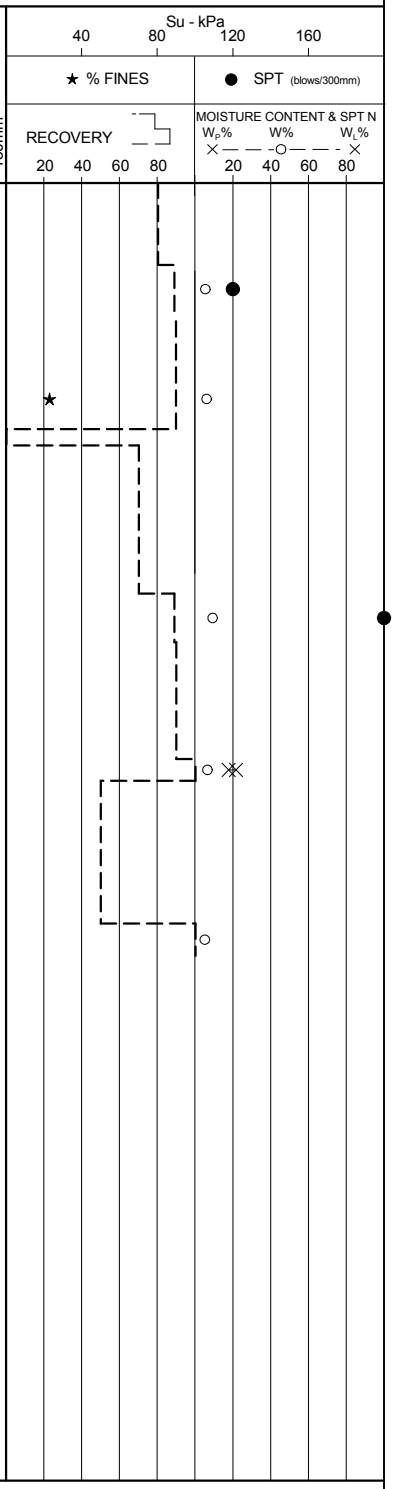
LOCATION : STEINER AREA

CO-ORDINATES (m): 458,774.8E - 7,099,822.7N
GROUND ELEVATION (m) : 845.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 13.7
DEPTH TO TOP OF ROCK (m) : 7.2
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	LITHOLOGIC DESCRIPTION	SPT BLOWS PER 150mm
0			ORGANICS	
	G	G1	SAND (SM) Gravelly, some silt, well graded, dense, maximum particle size = 30 mm, sub-angular to sub-rouded, brown, no odour, moist, no visible structure, no cementation. Clasts: typically elongated and metasedimentary rock. [COLLUVIUM]	
1		SPT1		12 11 9
2	G	G2	1.9 - 2.1 m - Sample G2, grain size analysis, 40% gravel, 37% sand, 23% silt.	
		SPT2	2.28 - 2.43 m - SPT #2: no recovery.	
3	G	G3		
4		SPT3	4.0 - 4.15 m - Silt (ML) layer, trace sand, fine, trace gravel, hard, low plastic, light brown.	18 23 R
5	G	G4		
		SPT4	5.3 - 5.5 m - Silt (ML) layer, sandy, trace gravel, low plastic, hard, light brown.	
6				
	G	G5		
7		SPT5		
			Rock encountered at 7.15 m depth. Refer to rock log.	
8				
9				
10				
11				
12				



INSTRUMENT DETAILS

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-56

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,774.8E - 7,099,822.7N
GROUND ELEVATION (m) : 845.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 13.7
DEPTH TO TOP OF ROCK (m) : 7.2
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0			0 to 7.15 m - See BH-BGC11-56 soil log.							0
7			SILT (ML) Sandy, trace gravel, low plastic, hard, light brown, no odour, dry, no visible structure, no cementation, sand and gravel are angular, and metasedimentary rock, moderately weathered (W3) metasedimentary rock. Note - rock is broken down by drilling process and logged as soil.							7
12										12

(CONTINUED ON NEXT PAGE)

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-56

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,774.8E - 7,099,822.7N
GROUND ELEVATION (m) : 845.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 08 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 13.7
DEPTH TO TOP OF ROCK (m) : 7.2
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
12										12
13										13
14			End of borehole at 13.7 m. Notes: 1) Hole therminated due to refusal of auger on rock. 2) Installation of 2" solid PVC for potential thermistor.							14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-57

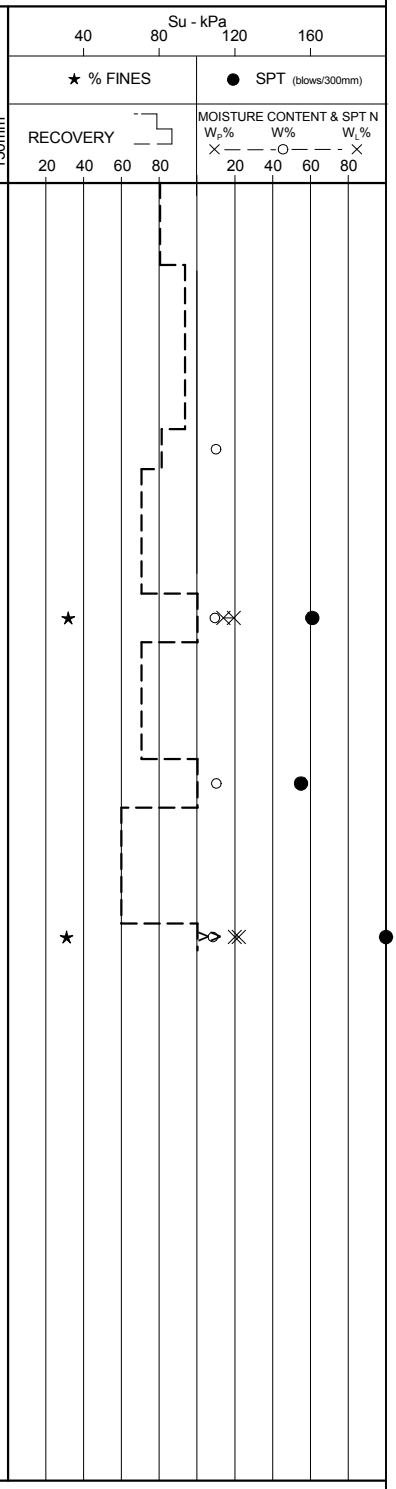
LOCATION : STEINER AREA

CO-ORDINATES (m): 458,798.6E - 7,099,978.2N
GROUND ELEVATION (m) : 859.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 09 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 12.1
DEPTH TO TOP OF ROCK (m) : 7.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				ORGANICS		
	G	G1		SILT (ML) Trace fine sand, trace gravel, low to non plastic, grey and iron oxide mottling, no odour, wet when thawed, no visible structure, no cementation, clasts are subrounded. Frozen: Vx (5-10%). [COLLUVIUM]		
1				SAND (SM) Fine sand, silty, some gravel, trace to some clay, gravel is sub-angular to sub-rounded and metasedimentary rock, maximum particle size = 30 mm. Fines: low plastic, light brown, no odour, moist, no visible structure, no cementation, frozen. [COLLUVIUM]		
2	G	G2				
		SPT1		2.3 - 4.3 m - Partially frozen zones of Nbe. At 2.45 m - One ice lens <5 mm thick, colourless, transparent, sand sized crystals.		
3	G	G3				
4		SPT2		3.8 - 4.25 m - SPT 2, grain size analysis, 19% gravel, 49% sand, 28% silt, 4% clay.		22 29 32
5	G	G4				
		SPT3				12 25 30
6				Below 5.8 m - Sandy.		
	G	G5				
7		SPT4		6.85 -7.1 m - SPT 4, grain size analysis, 27% gravel, 42% sand, 23% silt, 8% clay.		26 R
				Rock encountered at 7.10 m depth. Refer to rock log.		
8						
9						
10						
11						
12						



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-57

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,798.6E - 7,099,978.2N
GROUND ELEVATION (m) : 859.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 09 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 12.1
DEPTH TO TOP OF ROCK (m) : 7.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 7.10 m - See BH-BGC11-57 soil log.

SILT (ML)
Some sand, some gravel, low to non-plastic, hard (based on augering difficulty), light brown, no odour, dry to moist, no visible structure, no cementation, gravel and sand are angular metasedimentary rock, some break by finger pressure and others broken by SPT action, maximum particle size = 20 mm, moderately weathered (W3), metasedimentary rock.
Note - rock is broken down by drilling process and logged as soil.
Below 8.3 m - Dry.
8.33 m - 8.43 m - SPT #5, refusal in first six inches.

9.9 m - 10.2 m - SPT#6, 17/38/refusal in final six inches.
DRY Aug 2011
Below 10.2 m - Gravelly, some sand, flat and elongated.

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-57

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,798.6E - 7,099,978.2N
GROUND ELEVATION (m) : 859.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 09 Aug 11
FINISH DATE : 09 Aug 11
FINAL DEPTH (m) : 12.1
DEPTH TO TOP OF ROCK (m) : 7.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
12			End of borehole at 12.1 m. Notes: 1) Hole terminated due to refusal of auger. 2) Installation of 2" PVC for standpipe piezometer. 3) 10 m thermistor installed on Aug. 26, 2011, serial #11.5-2, annulus not backfilled.							12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-58

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,799.8E - 7,100,119.4N
GROUND ELEVATION (m) : 859.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 10 Aug 11
FINISH DATE : 10 Aug 11
FINAL DEPTH (m) : 10.8
DEPTH TO TOP OF ROCK (m) : 8.4
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				ORGANICS		
	G	G1		SAND (SM) Fine, silty, some clay, trace to some gravel, trace cobbles, light brown to grey with orange mottling, no odour, wet to moist when thawed, no visible structure, no cementation. Clasts are metasedimentary, angular, maximum particle size = 100 mm. Fines are low plasticity. Frozen: Vx (approximately 10%). [COLLUVIUM] 0.8 - 2.3 m - Frozen: Nbn and zones of Vx (1-3%).		
1						
2	G	G2		1.9 - 2.1 m - Sample G2, grain size analysis, 11% gravel, 44% sand, 40% silt, 5% clay.		
	G	G3		2.3 - 5.5 m - Drilled with CRREL barrel. 2.3 - 8.4 m - Frozen: Nbn.		
3	G	G4		2.9 - 3.0 m - Silt as between 0.1 and 2.3 m. 2.9 - 4.0 m - Frozen: Vs/Vx (1-3%). 3.2 - 3.6 m - Sample G4, grain size analysis, 23% gravel, 51% sand, 26% silt.		
4	G	G5				
	G	G6		4.4 - 4.6 m - Sample G6, grain size analysis, 29% gravel, 54% sand, 16% silt, 1% clay.		
	G	G7		4.6 - 4.9 m - Frozen: Vx (<1%).		
5	G	G8		4.9 - 5.5 m - Occasional granodiorite clasts.		
		SPT1		5.4 - 5.5 m - Sample G8, grain size analysis, 37% gravel, 35% sand, 26% silt, 2% clay. Below 5.5 m - Sandy, trace gravel, maximum particle size = 20 mm.		
6						
	G	G9				
7		SPT2				
8	G	G10		7.9 - 8.1 m - Sample G10, grain size analysis, 15% gravel, 51% sand, 32% silt, 2% clay.		
				Rock encountered at 8.40 m depth. Refer to rock log.		
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

DRILL HOLE # BH-BGC11-58

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,799.8E - 7,100,119.4N
GROUND ELEVATION (m) : 859.0m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 10 Aug 11
FINISH DATE : 10 Aug 11
FINAL DEPTH (m) : 10.8
DEPTH TO TOP OF ROCK (m) : 8.4
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0			0 to 8.40 m - See BH-BGC11-58 soil log.
8			SILT (ML) Some sand, trace gravel, low to non plastic, hard (based on augering difficulty), light brown, no odour, dry, no visible structure, no cementation, gravel and sand are metasedimentary and angular, slight powdery texture, moderately weathered (W3), metasedimentary rock. Note - rock is broken down by drilling process and logged as soil.
11			End of hole at 10.8 m. Notes: 1) Hole terminated due to refusal of auger. 2) Installation of 2" solid PVC for thermistor. 3) 10 m thermistor installed on Aug. 29, 2011, serial #11.5-1, annulus not backfilled.
12			

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-59

LOCATION : ANN GULCH

CO-ORDINATES (m): 459,113.1E - 7,101,239.4N
GROUND ELEVATION (m) : 883.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 5.79

START DATE : 10 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 5.8
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GM) Sandy, silty, maximum particle size = 40 mm, flat and elongated, angular to subangular, brown and orange, wet, homogeneous, non-cemented. Clasts: metasedimentary, extremely weak to medium strong (R0 to R3). Matrix is non plastic. [COLLUVIUM]		
1				At 1.2 m - Frozen: Vx (<1%). 1.22 - 2.74 m - No recovery.		
2						
3						
4						
5				GRAVEL (GW-GM) Sandy, silty to some silt, well graded, blue grey, heavy iron staining, some cementation, clasts are metasedimentary. [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY]		
6				Rock encountered at 5.80 m depth. Refer to rock log.		
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation
PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-59

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,113.1E - 7,101,239.4N
GROUND ELEVATION (m) : 883.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 5.79

START DATE : 10 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 5.8
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

0 to 5.80 m - See BH-BGC11-59 soil log.

METASEDIMENTARY ROCK
Brown-greyish, very weak to weak (R1.5 to R2), moderately to highly weathered (W3 to W4), foliated, fine grained, 2 joint sets: first set along foliation 70° from core axis, second set is 30° from core axis, hematite staining in joints and smooth and planar joint surfaces.
6.25 - 6.7 m - Highly fractured zone.

METASEDIMENTARY ROCK
Grey, weak (R2), slightly to moderately weathered (W2 to W3), foliated, fine grained, 2 joint sets: first set along foliation is approximately 70° from core axis, second set is approximately 35-45° from core axis, hematite infill, JRC 10-12.

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

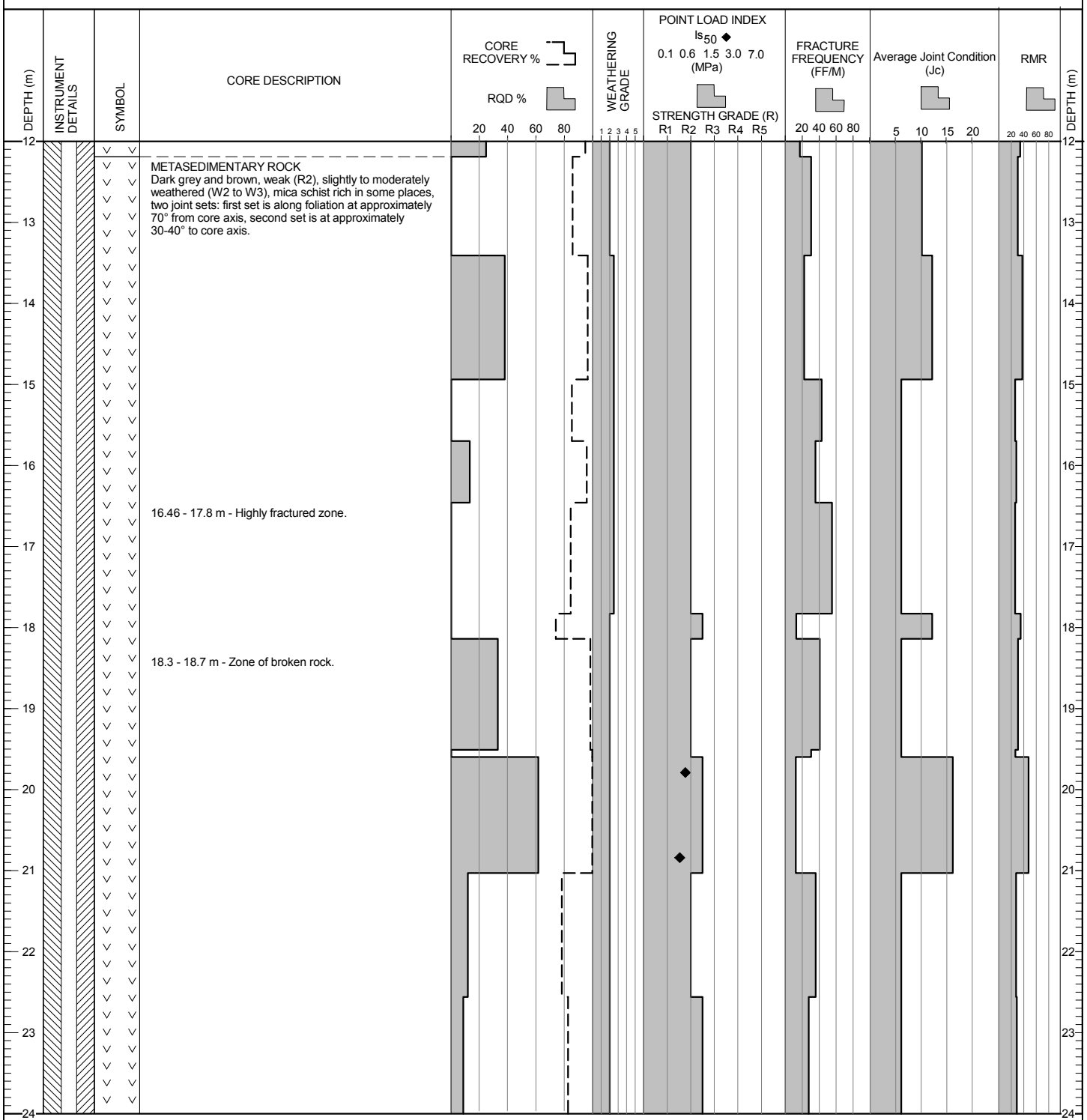
DRILL HOLE # BH-BGC11-59

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,113.1E - 7,101,239.4N
GROUND ELEVATION (m) : 883.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 5.79

START DATE : 10 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 5.8
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

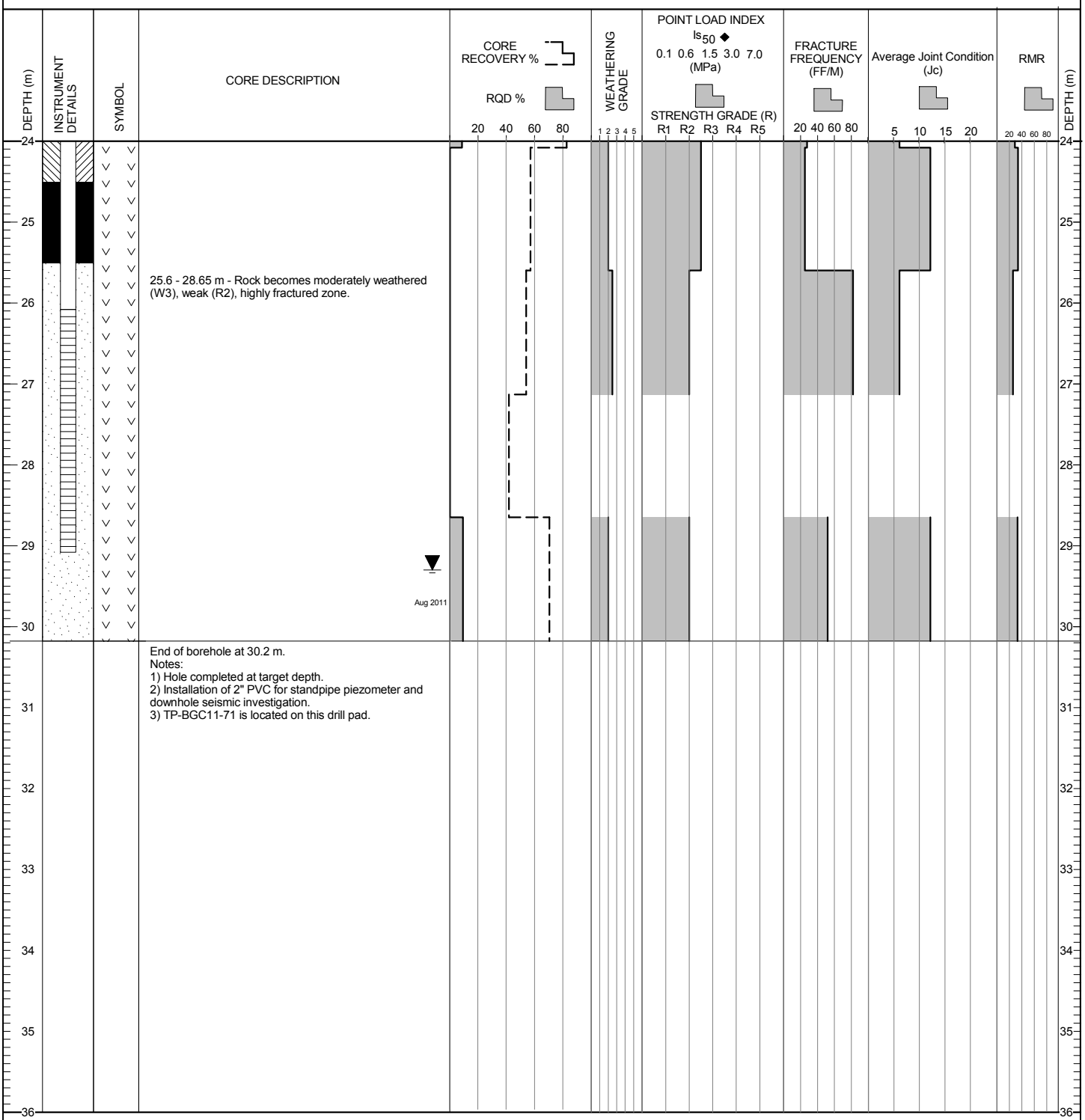
DRILL HOLE # BH-BGC11-59

LOCATION : ANN GULCH

CO-ORDINATES (m) 459,113.1E - 7,101,239.4N
GROUND ELEVATION (m) : 883.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 5.79

START DATE : 10 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 30.2
DEPTH TO TOP OF ROCK (m) : 5.8
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-60

LOCATION : STEINER AREA

CO-ORDINATES (m): 458,795.6E - 7,100,041.6N
GROUND ELEVATION (m) : 859.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 10 Aug 11
FINISH DATE : 10 Aug 11
FINAL DEPTH (m) : 9.2
DEPTH TO TOP OF ROCK (m) : 7.0
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	LITHOLOGIC DESCRIPTION
0			ORGANICS
	G	G1	SAND (SM) Silty, some clay, trace to some gravel. Fines: low plastic, grey, no odour, wet when thawed, no visible structure, no cementation. Frozen: Vx (approximately 5%), colourless, transparent, sand sized crystals. [COLLUVIUM?] Below 0.75 m - Frozen: Nbn.
2	G	G2	
			2.28 - 4.6 m - Drilled with CRREL barrel.
	G	G3	SILT (ML) Trace fine sand, trace gravel, low plastic, mottled grey and light brown, no odour, dry to moist when thawed, homogeneous, no cementation, metasedimentary clasts. Frozen: Nbn. [COLLUVIUM] 2.7 - 2.8 m - Sample G3, grain size analysis, 20% gravel, 42% sand, 25% silt, 13% clay. Below 2.8 m - Some sand, some gravel.
	G	G4	3.4 - 4.0 m - Trace Vx (<1%).
	G	G5	3.7 - 3.8 m - Sample G5, grain size analysis, 21% gravel, 45% sand, 25% silt, 9% clay.
4			Below 4.0 m - Unfrozen.
	SPT	SPT1	
5	G	G6	
6			
	G	G7	6.3 - 6.6 m - Sample G7, grain size analysis, 43% gravel, 30% sand, 17% silt, 10% clay.
7	SPT	SPT2	6.85 - 7.0 m - SPT 2, grain size analysis, 39% gravel, 31% sand, 19% silt, 11% clay.
			Rock encountered at 7.00 m depth. Refer to rock log.
8			
9			
10			
11			
12			

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-60

LOCATION : STEINER AREA

CO-ORDINATES (m) 458,795.6E - 7,100,041.6N
GROUND ELEVATION (m) : 859.2m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 10 Aug 11
FINISH DATE : 10 Aug 11
FINAL DEPTH (m) : 9.2
DEPTH TO TOP OF ROCK (m) : 7.0
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0			0 to 7.00 m - See BH-BGC11-60 soil log.
7			SILT (ML) Sandy, some gravel, low plastic, hard (based on augering difficulty), light reddish brown, no odour, dry, no visible structure, no cementation, talc present on clast surfaces, angular and metasedimentary rock clasts, moderately weathered (W3), metasedimentary rock. Note - rock is broken down by drilling process and logged as soil. DRY Aug 2011
9			End of borehole at 9.2 m. Notes: 1) Hole terminated due to refusal of auger. 2) Installation of 2" PVC for standpipe piezometer. 3) TP-BGC11-85 is located on this drill pad.

CORE RECOVERY %
RQD % 20 40 60 80

WEATHERING GRADE 1 2 3 4 5

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) 20 40 60 80

Average Joint Condition (Jc) 5 10 15 20

RMR 20 40 60 80

DEPTH (m)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-61

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,367.0E - 7,100,013.0N
GROUND ELEVATION (m) : 1,152.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 11 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 2.7
DEPTH TO TOP OF ROCK (m) : 0.8
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				DRILL PAD FILL		
	S	G1		SAND (SM) Some silt, some gravel, well graded, maximum particle size = 10 mm, subangular to subrounded, grey, wet when thawed, no cementation. Frozen: Vx (approximately 10%). [COLLUVIUM]		
1				Rock encountered at 0.75 m depth. Refer to rock log.		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-61

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,367.0E - 7,100,013.0N
GROUND ELEVATION (m) : 1,152.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 11 Aug 11
FINISH DATE : 11 Aug 11
FINAL DEPTH (m) : 2.7
DEPTH TO TOP OF ROCK (m) : 0.8
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0			0 to 0.75 m - See BH-BGC11-61 soil log.
1			SAND (SP) Fine sand, trace silt, trace gravel, maximum particle size = 20 mm, angular, light brown, no odour, dry, no cementation, granodiorite clasts, moderately weathered (W3) granodiorite. Note - rock is broken down by drilling process and logged as soil.
2			
3			End of borehole at 2.7 m. Notes: 1) Hole terminated due to refusal of auger. 2) Backfilled with cuttings. 3) TP-BGC11-106 and BH-BGC11-66 are located on this drill pad.

CORE RECOVERY %
RQD % (20 40 60 80)
WEATHERING GRADE (1 2 3 4 5)
POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5
FRACTURE FREQUENCY (FF/M) (20 40 60 80)
Average Joint Condition (Jc) (5 10 15 20)
RMR (20 40 60 80)

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-62

LOCATION : STUTTLE GULCH

CO-ORDINATES (m): 459,785.9E - 7,100,334.1N
GROUND ELEVATION (m) : 1,017.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 11 Aug 11
FINISH DATE : 12 Aug 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : JD/SP/KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GP) Some cobbles, poorly (uniformly) graded, subangular, metasedimentary clasts. [COLLUVIUM]		
1						
				Rock encountered at 1.50 m depth. Refer to rock log.		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

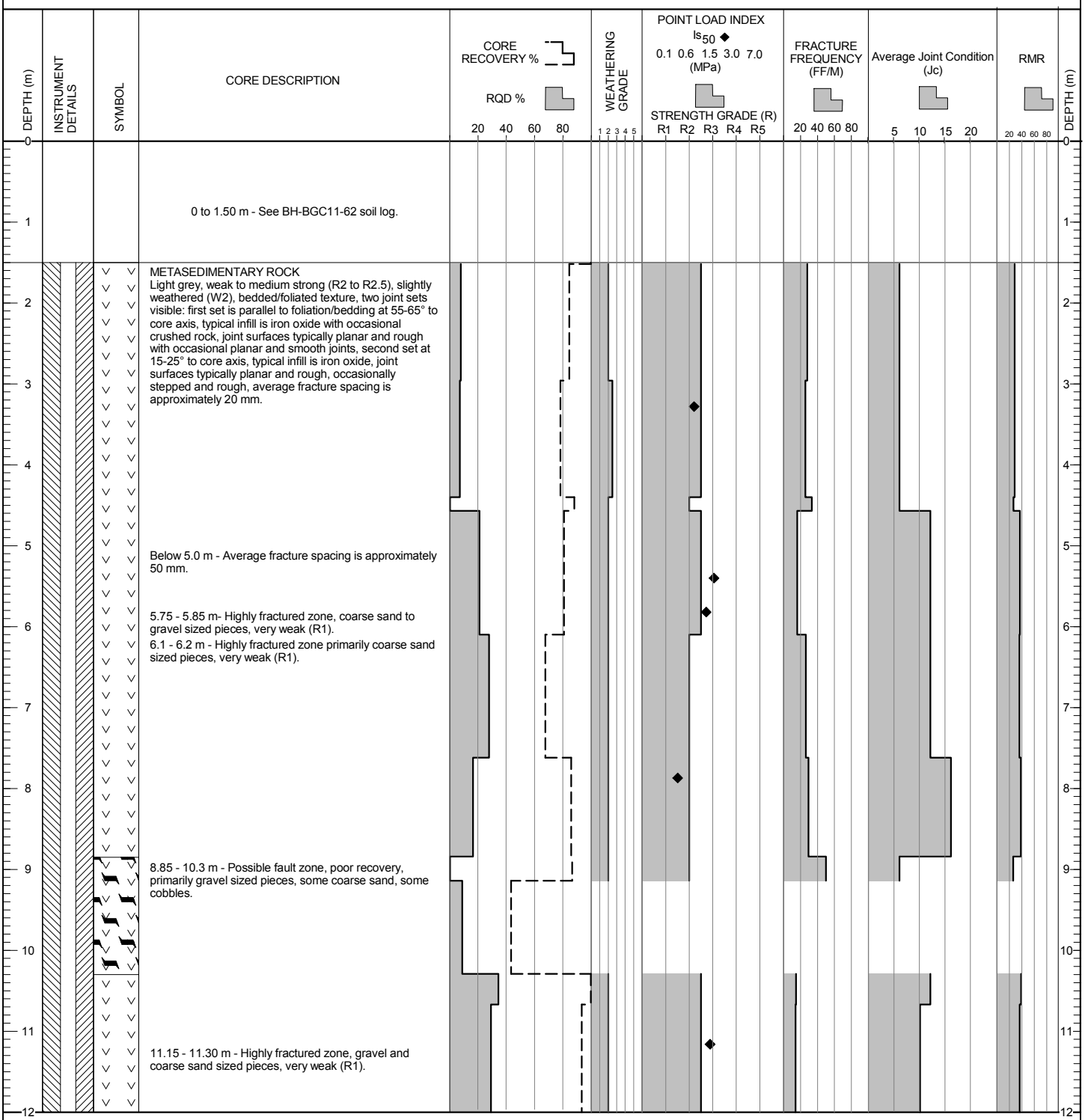
DRILL HOLE # BH-BGC11-62

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,785.9E - 7,100,334.1N
GROUND ELEVATION (m) : 1,017.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 11 Aug 11
FINISH DATE : 12 Aug 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : JD/SP/KH
REVIEWED BY : PQ/DW



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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-62

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,785.9E - 7,100,334.1N
GROUND ELEVATION (m) : 1,017.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 11 Aug 11
FINISH DATE : 12 Aug 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : JD/SP/KH
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

14.25 - 14.75 m - Fractured zone, gravel and cobble sized pieces.

18.6 - 18.7 m - Partially healed brecciated zone, coarse sand and fine gravel sized pieces of quartzite, trace silt, iron oxide staining.

19.45 - 19.55 m - Highly fractured zone, gravel and sand, trace silt.

19.8 - 20.2 - Highly fractured zone, gravel sized pieces very weak (R1).

20.15 - 20.65 m - Fractured zone, gravel and cobble sized pieces.

Aug 2011

22.15 - 22.25 m - Fractured zone, gravel sized pieces.

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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

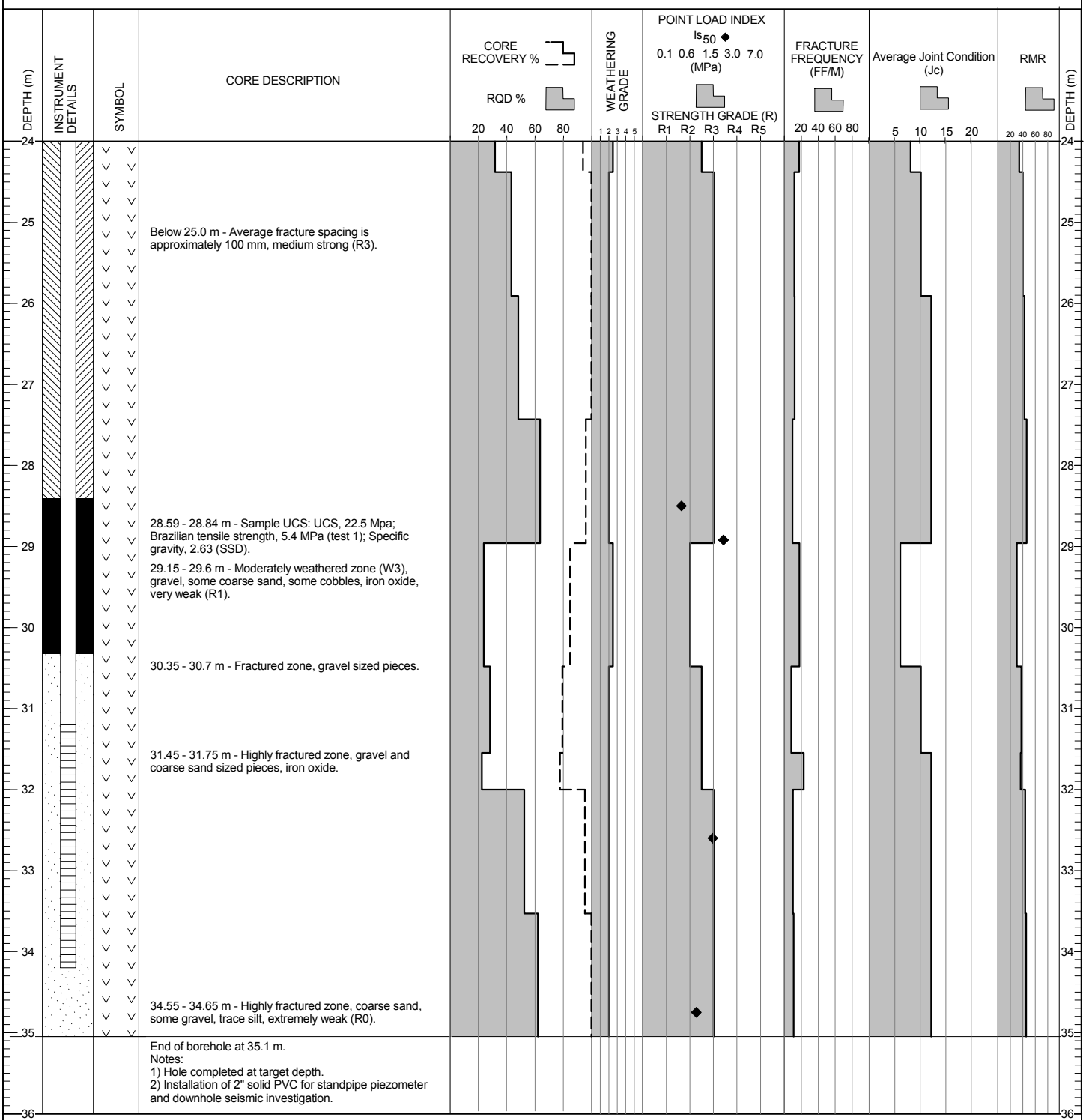
DRILL HOLE # BH-BGC11-62

LOCATION : STUTTLE GULCH

CO-ORDINATES (m) 459,785.9E - 7,100,334.1N
GROUND ELEVATION (m) : 1,017.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 11 Aug 11
FINISH DATE : 12 Aug 11
FINAL DEPTH (m) : 35.1
DEPTH TO TOP OF ROCK (m) : 1.5
LOGGED BY : JD/SP/KH
REVIEWED BY : PQ/DW



BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

DRILL HOLE # BH-BGC11-63

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006
LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,302.9E - 7,100,114.1N
GROUND ELEVATION (m) : 1,100.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 12 Aug 11
FINISH DATE : 13 Aug 11
FINAL DEPTH (m) : 26.7
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	LITHOLOGIC DESCRIPTION
0			ORGANICS
	G	G-1	SAND (SM) Silty, some gravel, maximum particle size = 20 mm, subangular, grey, no odour, no cementation, gravel is metasedimentary. Frozen: Nbe. [COLLUVIUM]
1			SAND (SM) Silty, trace gravel, trace clay, yellow, no odour, no cementation, completely weathered granodiorite? Fines are low plastic. Frozen: Vx (<1%). [ICE RICH COLLUVIUM]
2	G	G-2	1.9 - 2.1 m - Sample G-2, grain size analysis, 1% gravel, 54% sand, 25% silt, 20% clay. 2.3 - 14.1 m - Drilled with CRREL barrel. 2.3 - 3.0 m - Light yellowish brown with white mottling, ice -Nbn, coarse sand sized quartz clasts.
3	S	G-3	
	S	G-4	3.2 - 3.5 m - Sandy, some sand particles break down with finger pressure. Frozen: Vx (approximately 10%). 3.5 - 4.5 m - Frozen: Vx (approximately 30-40%), some silt inclusions.
4	S	G-5	3.9 - 4.0 m - Sample G-5, grain size analysis 54% sand, 33% silt, 13% clay.
			4.5 - 4.7 m - Primarily ICE with sand inclusions. 4.7 - 5.1 m - Frozen: Vx (approximatley 5%) occuring as sand sized crystals.
5			5.1 -5.3 m - Primarily ICE. 5.3 - 9.0 m - Frozen: Vx (approximately 20-30%), occurs as sand & gravel sized crystals within soil fabric.
6	G	G-6	6.2 - 6.4 m - Primarily ICE with silt & sand inclusions.
7	G	G-7	6.8 - 7.1 m - Less weathered granodiorite, mafic minerals still present.
			7.5 - 7.6 m - Primarily ICE with silt & sand inclusions.
8			At 8.1 m - 30mm ice lens, cloudy, white.
	S	G-8	
9			SAND (SM) Some silt, trace gravel, trace clay, yellowish brown, no odour, no visible structure, no cementation, completely weathered metasedimentary rock? Fines are low plastic. Frozen: Vx (approximately 10-30%), clear & colourless, occurs as sand and gravel sized crystals in soil fabric. [ICE RICH COLLUVIUM] 9.2 - 9.9 m - Primarily ICE, with silt and sand inclusions, cloudy and white.
10	S	G-9	10.15 - 10.25 m - Sample G-9, grain size analysis, 1% gravel, 57% sand, 20% silt, 22% clay.
11			11.0 - 11.5 m - Primarily ICE with silt inclusions.
12	S	G-10	

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa (40, 80, 120, 160)
★ % FINES
● SPT (blows/300mm)
RECOVERY (20, 40, 60, 80)
MOISTURE CONTENT & SPT N
W_P% W% W_L% (20, 40, 60, 80)

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-63

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,302.9E - 7,100,114.1N
GROUND ELEVATION (m) : 1,100.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 12 Aug 11
FINISH DATE : 13 Aug 11
FINAL DEPTH (m) : 26.7
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
12				At 12.3 m - 30mm ICE lens, silt and sand inclusions.		
13		G-11		13.2 - 13.6 m - Primarily ICE with silt and sand inclusions, ice breaks up easily with knife.		
14				At 13.8 m - 250 mm weathered metasedimentary boulder. 14.1 - 16.0 m - Drilled with solid stem auger, refusal of CRREL barrel.		
15				At 15.0 m - Sandy SILT (ML), grey/black, weathered metasedimentary boulder.		
16		G-12		16.0 - 19.8 m - Drilled with CRREL barrel. 16.0 - 16.7 m - Orange and black banding, Vx (approximately 5%). 16.2 - 16.3 m - Sample G-12, grain size analysis, 12% gravel, 59% sand, 19% silt, 10% clay.		
17				16.7 - 17.5 m - Frozen: Vx (approximately 15-20%), Vs (approximatley 1-3%), up to 5 mm thick, oriented perpendicular to core axis.		
18				17.9 - 18.0 m - Primarily ICE with silt inclusions.	▼ Aug 2011	
19				19.0 - 19.8 m - Frozen: Vs (approximately 40%), lenses approximately 10 mm thick oriented perpendicular to core axis.		
20				Below 19.8 m - Sandy, drilled with solid stem auger, refusal of CRREL barrel due CRREL barrel filling with water and preventing advancement. Water in hole likely from melting ice near surface and possibly from surface runoff (heavy rain during drilling).		
21						
22				22.1 - 23.6 m - May have drilled through massive ice as drilling was difficult, then got easier.		
23						
24						

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N: W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-63

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,302.9E - 7,100,114.1N
GROUND ELEVATION (m) : 1,100.7m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 12 Aug 11
FINISH DATE : 13 Aug 11
FINAL DEPTH (m) : 26.7
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
24						
25						
26				At 26.1 m - Possibly end of frozen material, final run is unfrozen and drilling difficulty decreased, SAND (SM) some silt, trace gravel, well graded, dry to moist.		
				At 26.7 m - Encountered flowing water.		
27				End of borehole at 26.7 m.		
28				Notes: 1) Hole completed at target depth. 2) Installation of 2" solid PVC for thermistor, serial #26.5-3, annulus not backfilled. 3) Vibrating wire piezometer, serial #18103, installed to 26.3 m. 4) 25 m thermistor installed on Aug. 25, 2011.		
29						
30						
31						
32						
33						
34						
35						
36						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

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EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL AND SAND (GW/SW) Medium to coarse, trace to some silt, well graded, compact, maximum particle size = 100 mm, flat and elongated, subangular to subrounded, light grey to brown, moist, homogeneous, non cemented. Clats: mixture of metasedimentary and granodiorite. Frozen: Vx<1%, up to 5.8m. [COLLUVIUM]		

Su - kPa: 40, 80, 120, 160
★ % FINES
● SPT (blows/300mm)
RECOVERY: 20, 40, 60, 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

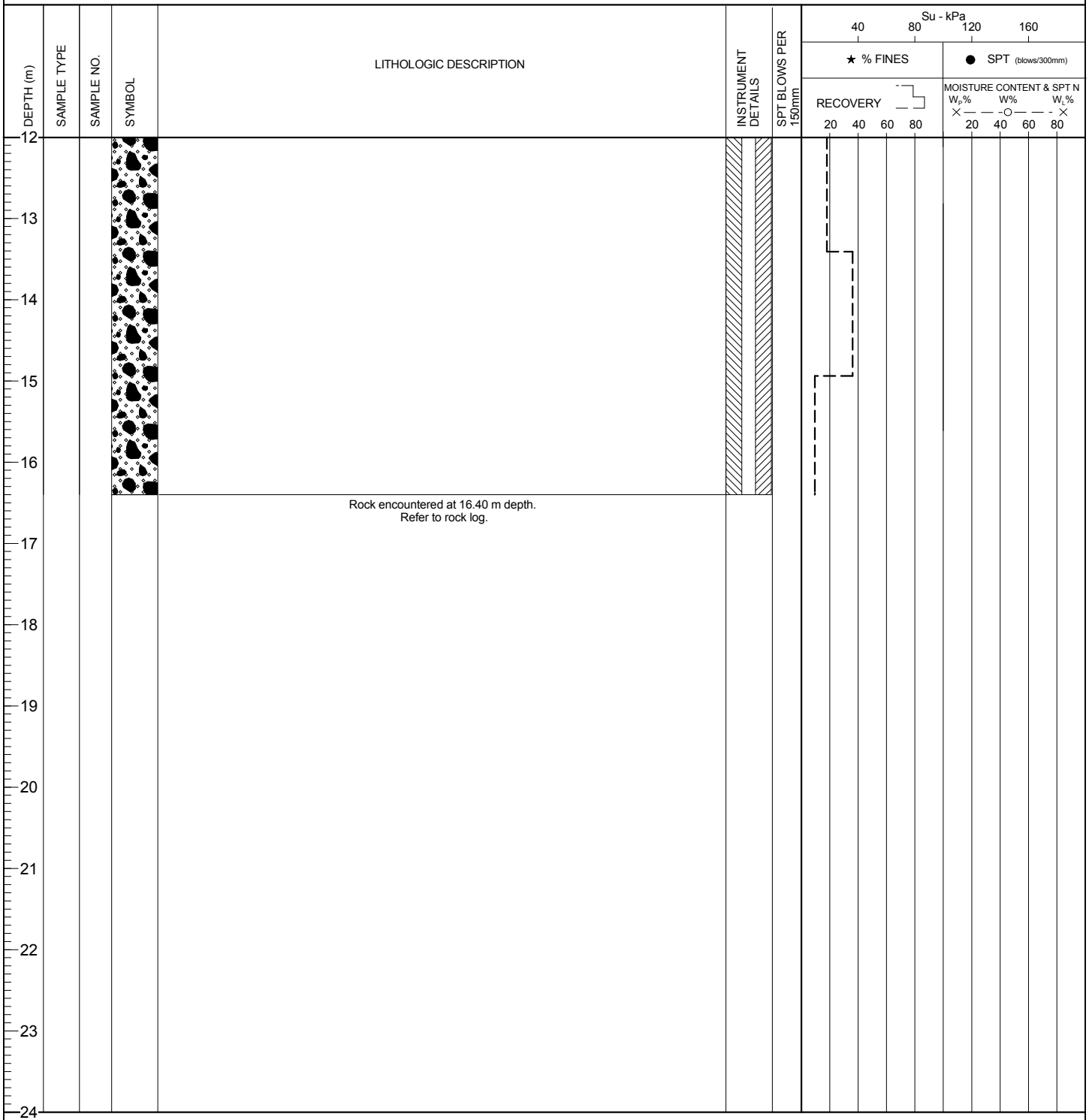
DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
12			0 to 16.40 m - See BH-BGC11-64 soil log.
16			GRANODIORITE ROCK Light grey, highly to completely altered/weathered (A4 to A5), extremely weak to weak (R0 to R1), massive, crystaline, medium grained, two joint sets: first set is approximately 50° to core axis, second set is approximately 90° to core axis, hematite and clay infill, JRC is approximately 2-4. 18.0 - 28.7 m - Highly fractured zone.
24			

CORE RECOVERY %
RQD % — 20 40 60 80

WEATHERING GRADE — 1 2 3 4 5

POINT LOAD INDEX
Is_{50} ◆
0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R)
R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) — 20 40 60 80

Average Joint Condition (Jc) — 5 10 15 20

RMR — 20 40 60 80

(CONTINUED ON NEXT PAGE)

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CLIENT: Victoria Gold Corporation
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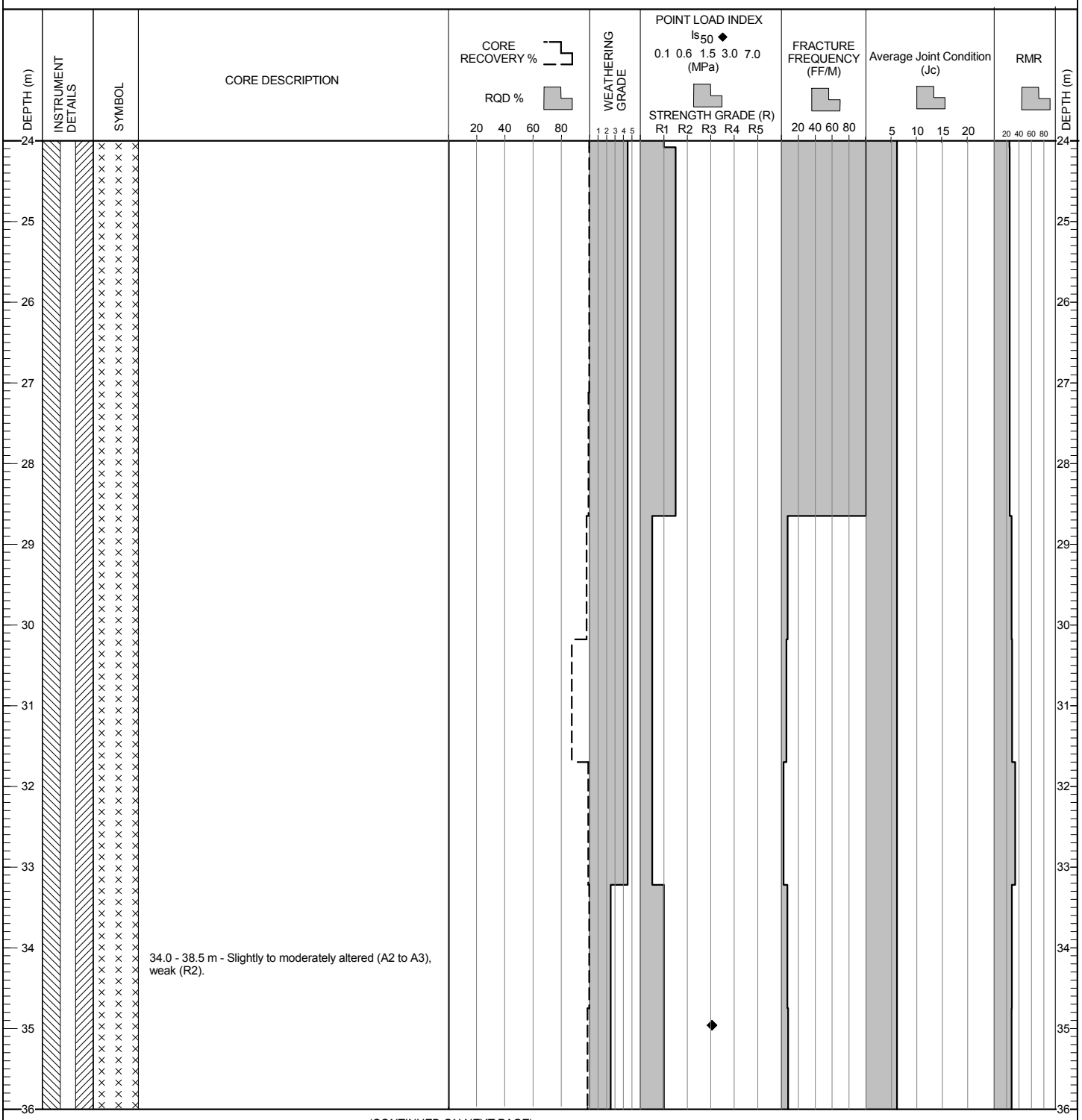
DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



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PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

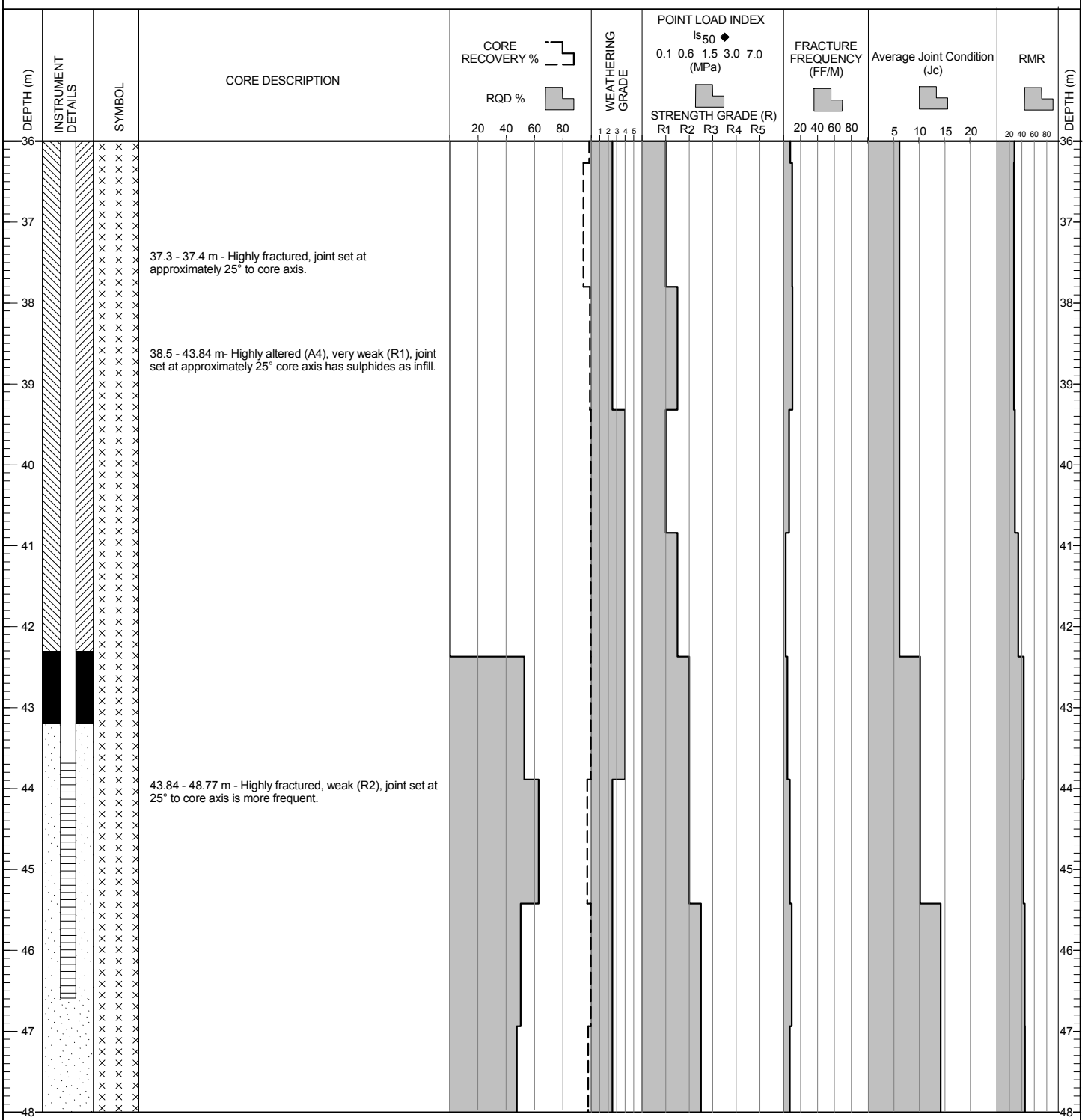
DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

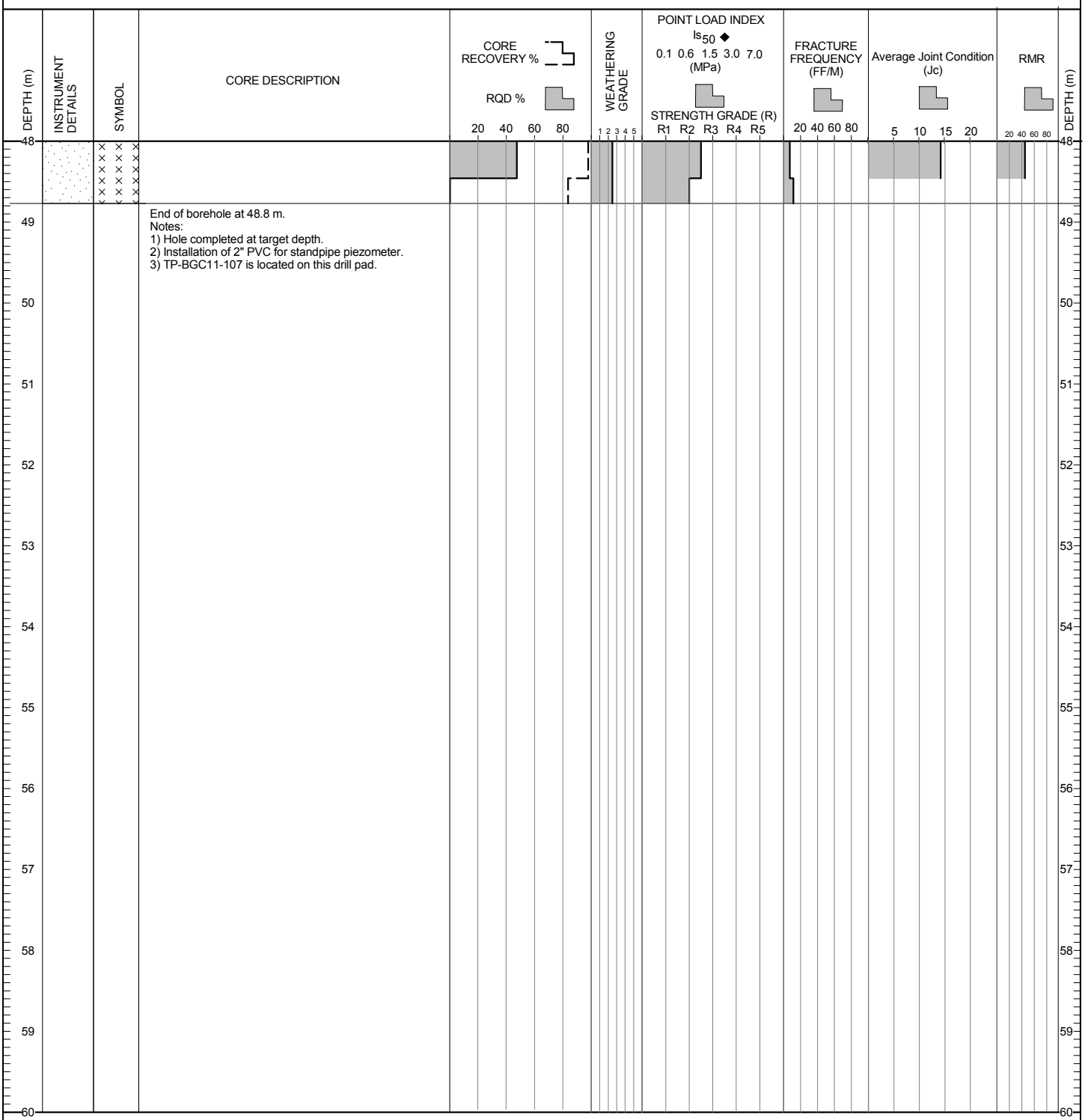
DRILL HOLE # BH-BGC11-64

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,182.4E - 7,100,262.9N
GROUND ELEVATION (m) : 1,044.1m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 13 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 48.8
DEPTH TO TOP OF ROCK (m) : 16.4
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

DRILL HOLE # BH-BGC11-65

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

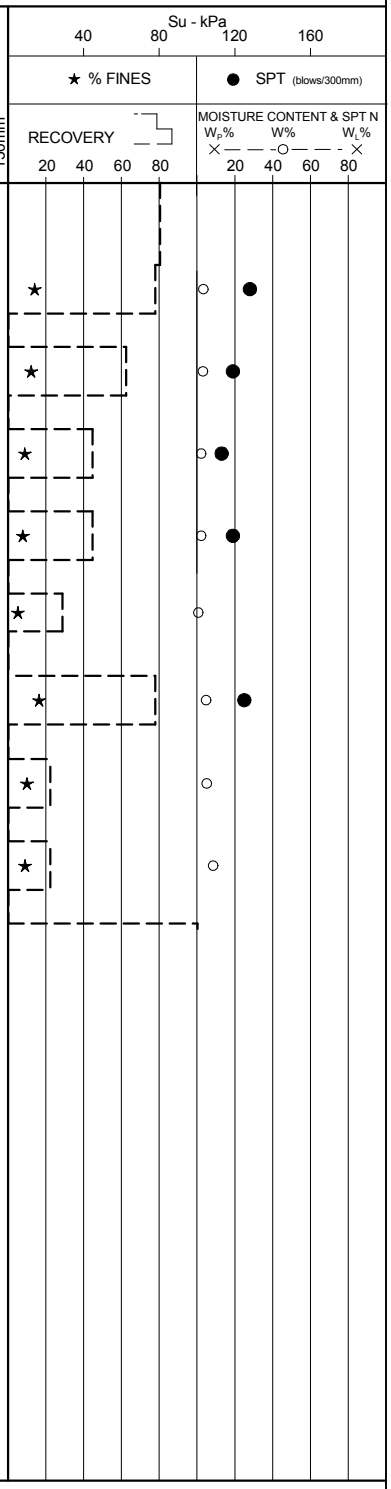
LOCATION : DUBLIN GULCH VALLEY BOTTOM

CO-ORDINATES (m): 458,771.0E - 7,100,939.0N
GROUND ELEVATION (m) : 825.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger HSA
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 14 Aug 11
FINISH DATE : 14 Aug 11
FINAL DEPTH (m) : 6.9
DEPTH TO TOP OF ROCK (m) :
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				SAND AND GRAVEL (SW-GW) Trace boulders, trace cobbles, trace to some silt, well graded, compact, maximum particle size = 400 mm, (visible on surface in area of drill pad), subangular to subrounded, greyish brown, dry to moist, no visible structure, no cementation, gravel/cobbles/boulders are metasedimentary and granodiorite. [PLACER TAILINGS]		
1		SPT1		0.76 - 1.21 m - SPT 1, grain size analysis, 26% gravel, 60% sand, 14% fines.		10 14 14
2		SPT2		1.52 - 1.97 m - SPT 2, grain size analysis, 40% gravel, 48% sand, 12% fines.		8 11 8
3		SPT3		2.28 - 2.73 m- SPT 3, grain size analysis, 53% gravel, 38% sand, 9% fines.		4 6 7
4		SPT4		3.04 - 3.49 m - SPT 4, grain size analysis, 63% gravel, 29% sand, 8% fines.		6 10 9
5		SPT5		3.8 - 4.25 m - SPT 5, grain size analysis, 76% gravel, 19% sand, 5% fines.		
6		SPT6		4.56 - 5.01 m - SPT 6, grain size analysis, 40% gravel, 44% sand, 16% fines.		15 13 12
7		SPT7		5.33 - 5.75 m - SPT 7, grain size analysis, 64% gravel, 26% sand, 10% fines. At 5.7 m - Wet; possibly groundwater level.		
8		SPT8		6.09 - 6.54 m - SPT 8, grain size analysis, 53% gravel, 38% sand, 9% fines.		
9		SPT9		End of borehole at 6.9 m. Notes: 1) Hole terminated due to refusal of augers & SPT. 2) Backfilled with cuttings. 3) A second attempt was made approximately 1.0 m west, refusal met at 3.8 m. 4) Adjacent diamond hole BH-BGC11-32, located approximately 10 m west and 2-3 m lower. 5) Description based on SPT recovery and material visible on drill pad. No recovery between SPTs as drilling was completed with hollow stem augers which were left in the ground as casing during SPT testing.		
10						
11						
12						



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-66

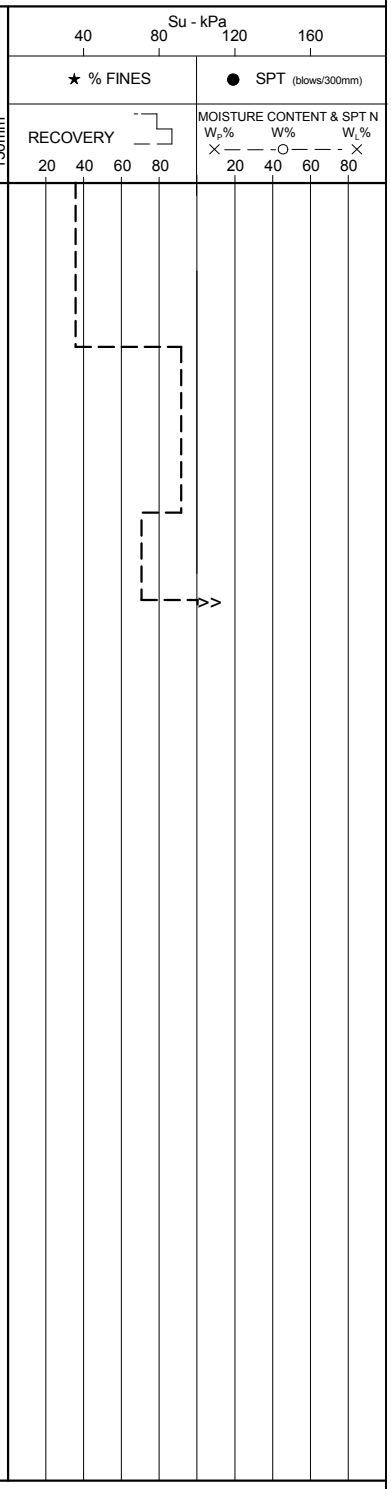
LOCATION : EAGLE PUP

CO-ORDINATES (m): 460,360.2E - 7,100,011.1N
GROUND ELEVATION (m) : 1,151.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) :

START DATE : 15 Aug 11
FINISH DATE : 16 Aug 11
FINAL DEPTH (m) : 33.5
DEPTH TO TOP OF ROCK (m) : 3.9
LOGGED BY : JD/SP
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				GRAVEL (GW) Cobbley, sandy, some boulders, wet, yellowish brown, homogeneous. Clasts: granodiorite, elongated to equidimensional, angular to subangular, strong to very strong (R4 to R5), fresh to faintly weathered (W1 to W1.5). Frozen: Vx. [COLLUVIUM]		
2				GRAVEL (GW) Sandy, maximum particle size = 50 mm. Clasts: elongated to equidimensional, angular to subangular, moderately weathered granodiorite, very weak to weak (R1 to R2), highly weathered (W4), wet when thawed, yellowish brown, stratified/laminated. Frozen: Vx with visible ice infilling some of the fractures. [HIGHLY TO COMPLETELY WEATHERED ROCK]		
4				Rock encountered at 3.90 m depth. Refer to rock log.		



BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

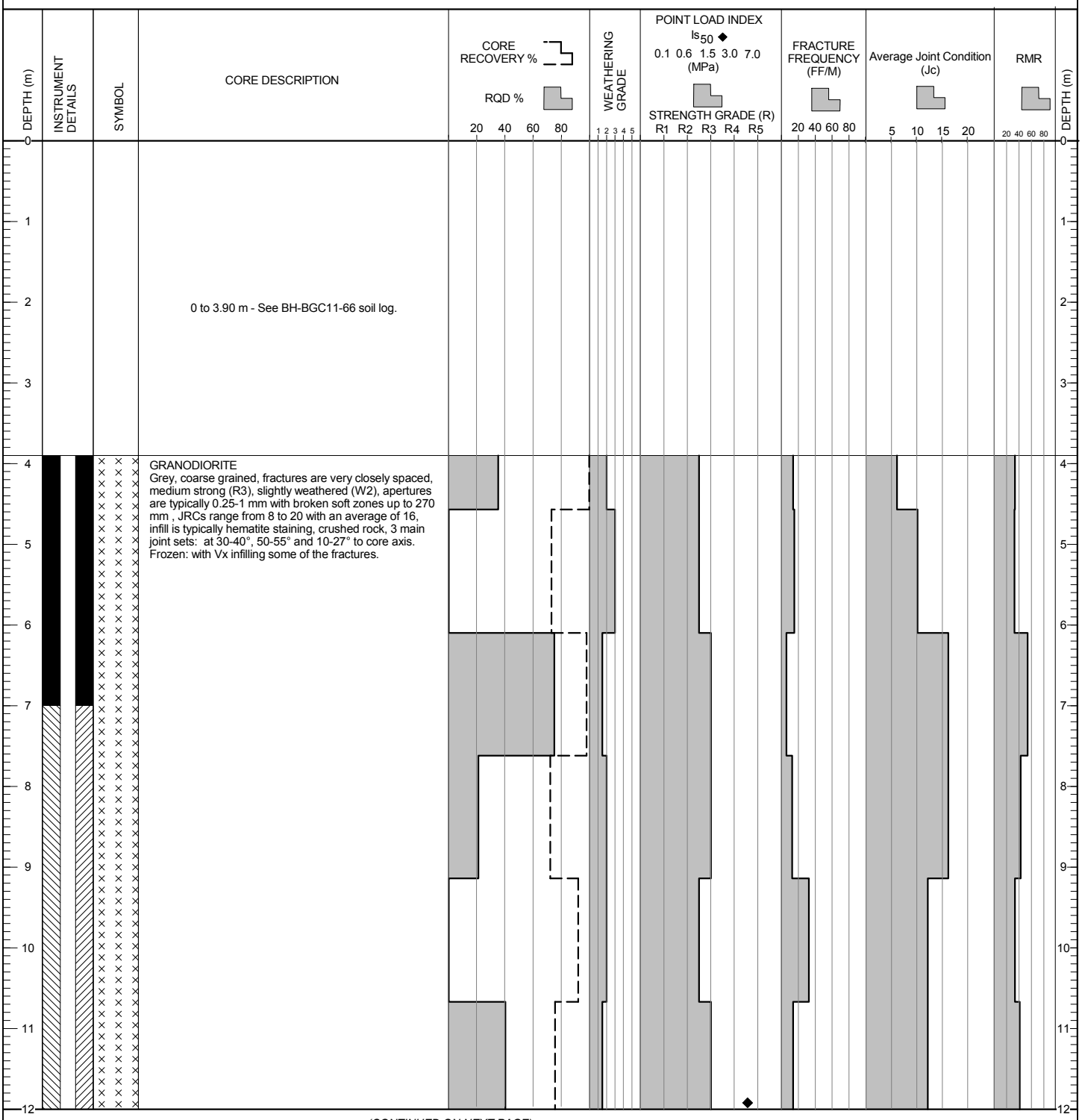
DRILL HOLE # BH-BGC11-66

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,360.2E - 7,100,011.1N
GROUND ELEVATION (m) : 1,151.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 15 Aug 11
FINISH DATE : 16 Aug 11
FINAL DEPTH (m) : 33.5
DEPTH TO TOP OF ROCK (m) : 3.9
LOGGED BY : JD/SP
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

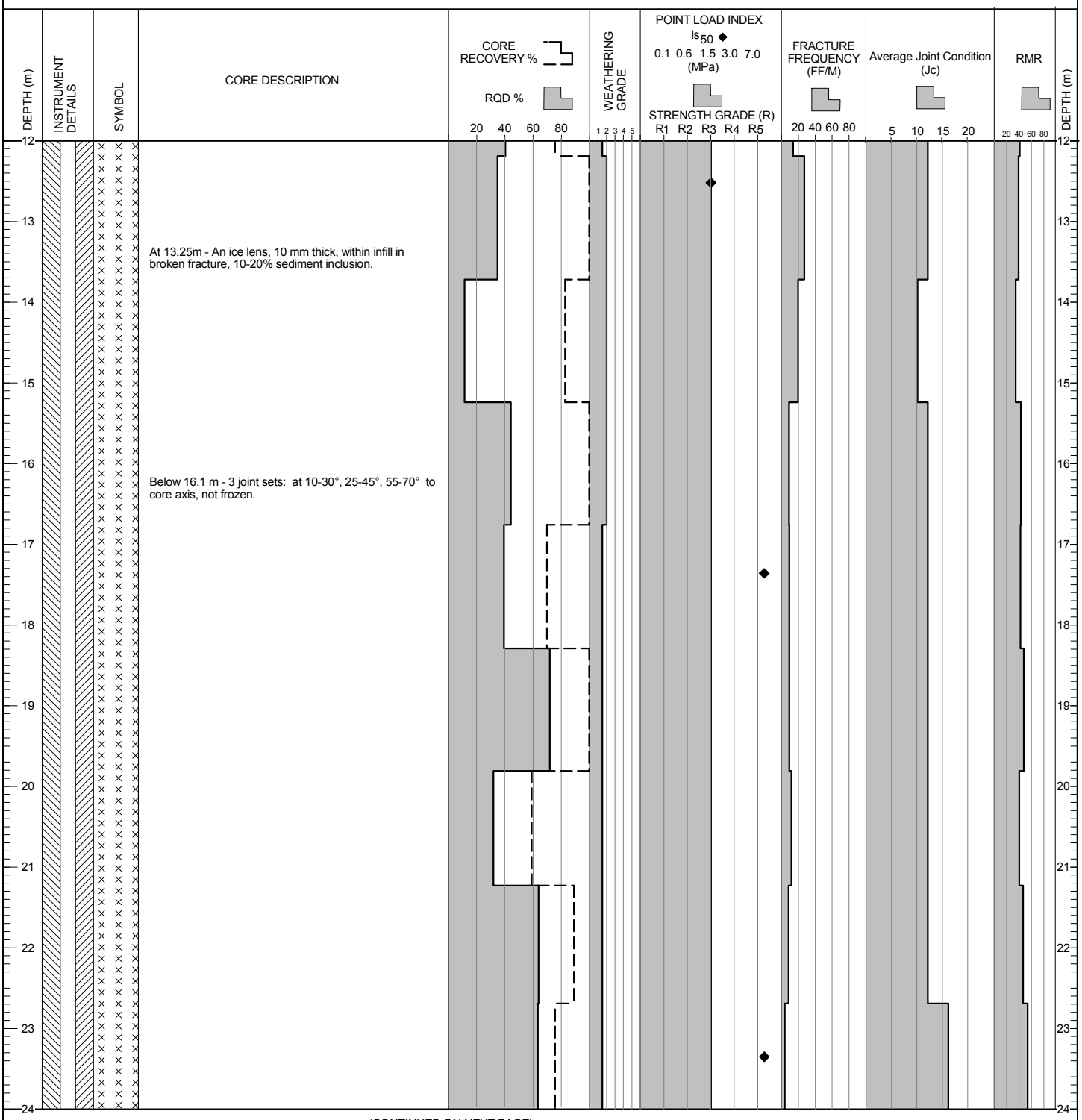
DRILL HOLE # BH-BGC11-66

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,360.2E - 7,100,011.1N
GROUND ELEVATION (m) : 1,151.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 15 Aug 11
FINISH DATE : 16 Aug 11
FINAL DEPTH (m) : 33.5
DEPTH TO TOP OF ROCK (m) : 3.9
LOGGED BY : JD/SP
REVIEWED BY : PQ/DW



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BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

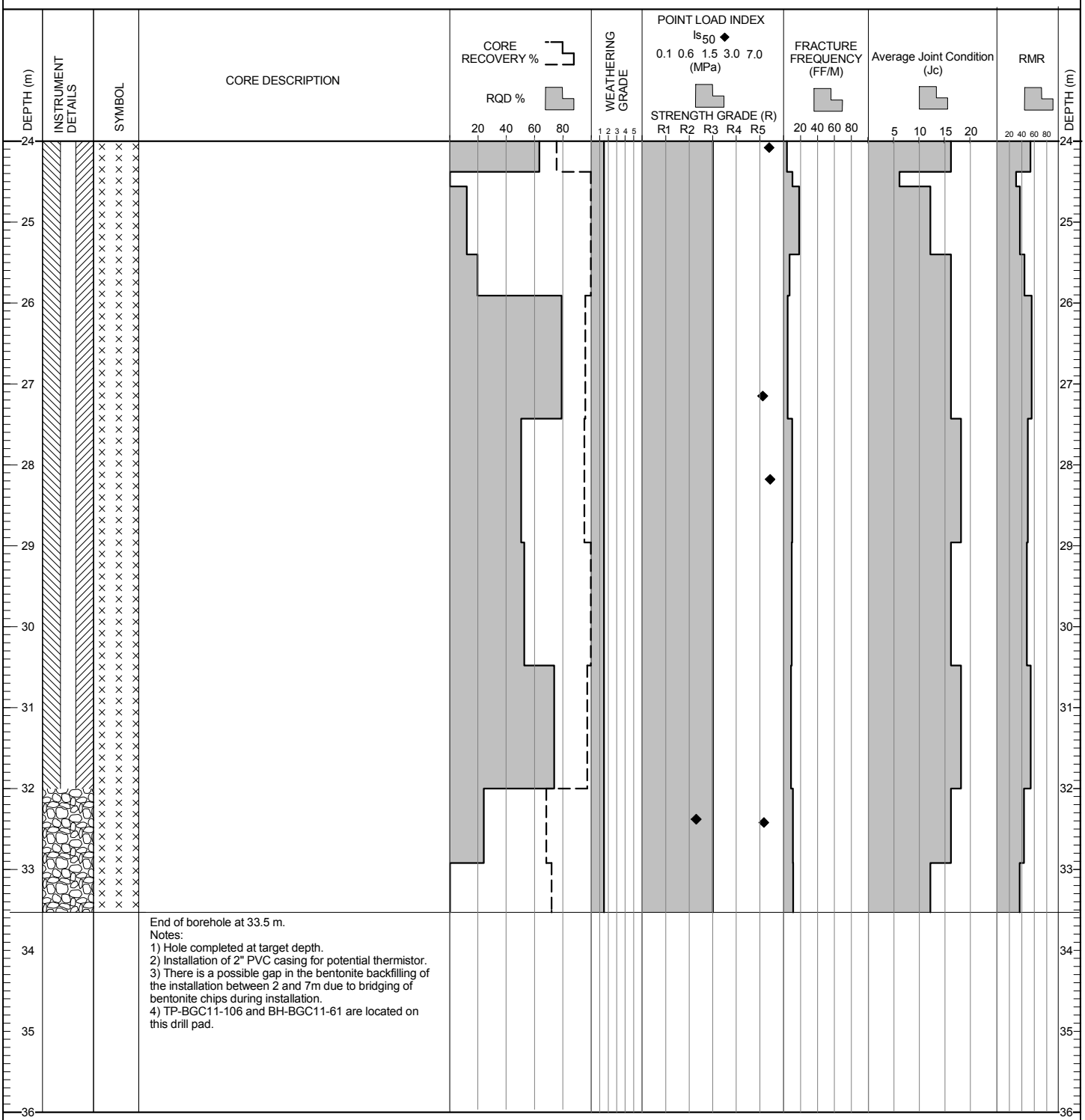
DRILL HOLE # BH-BGC11-66

LOCATION : EAGLE PUP

CO-ORDINATES (m) 460,360.2E - 7,100,011.1N
GROUND ELEVATION (m) : 1,151.9m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m):

START DATE : 15 Aug 11
FINISH DATE : 16 Aug 11
FINAL DEPTH (m) : 33.5
DEPTH TO TOP OF ROCK (m) : 3.9
LOGGED BY : JD/SP
REVIEWED BY : PQ/DW



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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure
PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-67

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m): 458,823.0E - 7,101,148.0N
GROUND ELEVATION (m) : 862.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE : N/A
FLUID : N/A
CASED TO (m) :

START DATE : 15 Aug 11
FINISH DATE : 15 Aug 11
FINAL DEPTH (m) : 9.9
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION
0	G	G-1		SAND (SM) Some silt to silty, trace gravel, well graded, dense, maximum particle size = 20 mm, angular, silt is orange (iron oxide?), sand and gravel are grey and red, no odour, dry, no visible structure, no cementation. [HIGHLY WEATHERED METASEDIMENTARY ROCK] 0.76 - 0.9 m - No recovery due to hole cleanout.
1				0.9 - 1.5 m - Drilled with CRREL barrel.
2				2.05 - 6.0 m - Drilled with CRREL barrel.
3		G-2		2.7 - 2.9 m - Black and grey. 2.9 - 3.2 m - SILT (ML), Trace sand, non plastic, very stiff/R0 rock, greenish grey to grey, no odour, dry, some banding visible, weak cementation, sheen when water added, talc present.
4				3.45 - 4.35 m - SILT (ML), Trace to some sand, non plastic, stiff?, grey/black and orange banding, some sections become slippery with added water - talc?.
5		G-3		4.35 - 4.75 m - SAND (SM), Trace to some silt, trace gravel, bands visible - white/yelow/reddish brown, extremely weak (R0). 5.05 - 5.25 m - SILT (ML), Trace to some sand, non plastic, very stiff?, grey/black and orange banding, some sections become slippery with added water - talc?.
6		G-4		5.6 - 6.0 m - SILT (ML), Trace to some sand, non plastic, very stiff/R0 rock, grey/black and orange banding, talc present on clast surfaces. Below 6.0 m - Drilled with solid stem auger, sample extraction difficult with CRREL barrel. 6.0 - 9.1 m - Brown; may be a blend of orange and grey/black as above but combined by augering process.
7				
8				
9				Rock encountered at 9.10 m depth. Refer to rock log.
10				
11				
12				

INSTRUMENT DETAILS

SPT BLOWS PER 150mm

Su - kPa
40 80 120 160
★ % FINES
● SPT (blows/300mm)
RECOVERY
20 40 60 80
MOISTURE CONTENT & SPT N
W_P% W% W_L%
20 40 60 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-67

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,823.0E - 7,101,148.0N
GROUND ELEVATION (m) : 862.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 15 Aug 11
FINISH DATE : 15 Aug 11
FINAL DEPTH (m) : 9.9
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION
0			0 to 9.10 m - See BH-BGC11-67 soil log.
9			SAND (SW) Trace silt, trace gravel, well graded, dense?, maximum particle size = 10 mm, angular, some flat gravel, light orange, no odour, dry, no visible structure, no cementation, slight powdery texture, moderately weathered (W3) metasedimentary rock. Note - rock is broken down by drilling process and logged as soil.
10			End of borehole at 9.9 m. Notes: 1) Hole terminated due to refusal of auger. 2) Backfilled with cuttings. 3) TP-BGC11-103 is located on this drill pad. 4) 4 DCPT tests completed within 4 m of this hole, met refusal at 2.5 m, 3.22m, 0.45 m and 0.6 m. 5) Drill pad approximately 5.0 m below ground surface in plate load testing pit (PT-BGC11-01), BH-BGC11-69
12			

CORE RECOVERY % / RQD % (20 40 60 80)

WEATHERING GRADE (1 2 3 4 5)

POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa)
STRENGTH GRADE (R) R1 R2 R3 R4 R5

FRACTURE FREQUENCY (FF/M) (20 40 60 80)

Average Joint Condition (Jc) (5 10 15 20)

RMR (20 40 60 80)

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BGC ENGINEERING INC.
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EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-67

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,823.0E - 7,101,148.0N
GROUND ELEVATION (m) : 862.0m
SURVEY METHOD : Handheld GPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : MARL 4CT
DRILLING CONTRACTOR : Midnight Sun Drilling
DRILL METHOD : Auger SSA/CRREL
CORE SIZE :
FLUID :
CASED TO (m):

START DATE : 15 Aug 11
FINISH DATE : 15 Aug 11
FINAL DEPTH (m) : 9.9
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : KH
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
12			(rotary diamond) was drilled adjacent to this hole.							12
13										13
14										14
15										15
16										16
17										17
18										18
19										19
20										20
21										21
22										22
23										23
24										24

BGC ENGINEERING INC.
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CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (ROCK) EGP_ROCK.GDL BGC.GDT 1/2012

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-69

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m): 458,829.3E - 7,101,144.3N
GROUND ELEVATION (m) : 861.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : N/A

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE : HQ3
FLUID : Water/Polymer
CASED TO (m) : 3.05

START DATE : 17 Aug 11
FINISH DATE : 17 Aug 11
FINAL DEPTH (m) : 21.3
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m)	SAMPLE TYPE	SAMPLE NO.	SYMBOL	LITHOLOGIC DESCRIPTION	INSTRUMENT DETAILS	SPT BLOWS PER 150mm
0				0.0 - 1.52 m - No recovery. For shallow subsurface conditions refer to log of TP-BGC11-103, excavated at this drill pad.		
1						
2				GRAVEL (GM) Some sand, some silt, subangular to subrounded, dark blue grey, heavy iron staining, some cementation, clasts are metasedimentary. [HIGHLY TO COMPLETELY WEATHERED METASEDIMENTARY ROCK]		
3				3.05 - 4.57 m - No recovery.		
4						
5						
6						
7						
8						
9				Rock encountered at 9.10 m depth. Refer to rock log.		
10						
11						
12						

Su - kPa: 40, 80, 120, 160

★ % FINES

● SPT (blows/300mm)

RECOVERY: 20, 40, 60, 80

MOISTURE CONTENT & SPT N
W_P% W% W_L%
20, 40, 60, 80

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: Victoria Gold Corporation

PRINT DATE: 1/20/2012

EGP (SOIL) EGP_SOIL.GDL BGC.GDT 1/20/12

PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-69

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,829.3E - 7,101,144.3N
GROUND ELEVATION (m) : 861.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 17 Aug 11
FINISH DATE : 17 Aug 11
FINAL DEPTH (m) : 21.3
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m)	INSTRUMENT DETAILS	SYMBOL	CORE DESCRIPTION	CORE RECOVERY % / RQD % (20 40 60 80)	WEATHERING GRADE (1 2 3 4 5)	POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5	FRACTURE FREQUENCY (FF/M) (20 40 60 80)	Average Joint Condition (Jc) (5 10 15 20)	RMR (20 40 60 80)	DEPTH (m)
0										0
1										1
2										2
3										3
4										4
5			0 to 9.10 m - See BH-BGC11-69 soil log.							5
6										6
7										7
8										8
9										9
10			METASEDIMENTARY ROCK Dark grey and brown, extremely weak to very weak (R0 to R1.5), moderately to highly weathered (W3 to W4), foliated, fine grained, 2 joint sets: one parallel to foliation at 45-50° from core axis, second set is at 20-25° from core axis. 10.0 - 12.26 m - Weak (R2), moderately weathered (W3).							10
11										11
12										12

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PROJECT: Eagle Gold Project - Infrastructure

PROJECT NO.: 0792-006

DRILL HOLE # BH-BGC11-69

LOCATION : WEST FLANK TIN DOME

CO-ORDINATES (m) 458,829.3E - 7,101,144.3N
GROUND ELEVATION (m) : 861.6m
SURVEY METHOD : DGPS
DATUM : UTM NAD 83
PLUNGE (°) : -90
TREND (°) : n/a

DRILL DESIGNATION : CS-1000
DRILLING CONTRACTOR : Lyncorp
DRILL METHOD : Rotary Diamond
CORE SIZE : HQ3
FLUID : Water/Polymer
CASED TO (m): 3.05

START DATE : 17 Aug 11
FINISH DATE : 17 Aug 11
FINAL DEPTH (m) : 21.3
DEPTH TO TOP OF ROCK (m) : 9.1
LOGGED BY : JD/SP/DW
REVIEWED BY : PQ/DW

DEPTH (m) | INSTRUMENT DETAILS | SYMBOL | CORE DESCRIPTION | CORE RECOVERY % / RQD % (20 40 60 80) | WEATHERING GRADE (1 2 3 4 5) | POINT LOAD INDEX Is_{50} ◆ 0.1 0.6 1.5 3.0 7.0 (MPa) / STRENGTH GRADE (R) R1 R2 R3 R4 R5 | FRACTURE FREQUENCY (FF/M) (20 40 60 80) | Average Joint Condition (Jc) (5 10 15 20) | RMR (20 40 60 80) | DEPTH (m)

METASEDIMENTARY ROCK

Quartzite, weak (R2), with layers of mica rich schist: very weak to weak (R1 to R2), bands are <10 cm thick, quartz rich bands are yellowish/light grey, foliation is at 40-60° to core axis, apertures vary from 0.5 to 3mm with occasional decomposed rock zones (up to 90mm thick), JRC vary from 2 to 12 on the micaceous joints and from 8 to 20 on the quartzite joint walls.

12.26 - 12.54 m - Sample UCS1: UCS, 45.1 Mpa; Brazilian tensile strength, 2.8 MPa (test 1), 6.3 MPa (test 2); Specific gravity, 2.59 (SSD).

15.24 - 17.22 m - More mica rich bands and fewer quartz rich layers.

16.76 - 17.22 m - No recovery.

Below 17.22 m - grades to more quartz rich, with layers of mica rich rock 25-35 cm thick.

At 18.29 m - Two joint sets: one is parallel to foliation at 60-70° from core axis, second set is a joint at 20° from core axis.

End of borehole at 21.3 m.

Notes:
1) Hole completed at target depth.
2) Installation of 2" solid PVC for downhole seismic investigation.
3) TP-BGC11-103 is located on this drill pad.
4) BH-BGC11-67 drilled adjacent to this hole.

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APPENDIX F
BOREHOLE PHOTOS

BH-BGC11-24 Box 1 – 0.00 m to 5.41 m

BH-BGC11-24 Box 2 – 5.41 m to 9.30 m

BH-BGC11-24 Box 3 – 9.30 m to 13.30 m

BH-BGC11-24 Box 4 – 13.30 m to 18.99 m

BH-BGC11-24 Box 5 – 18.99 m to 20.88 m

BH-BGC11-25 Box 1 – 0.00 m to 4.91 m

BH-BGC11-25 Box 2 – 4.91 m to 9.10 m

BH-BGC11-25 Box 3 – 9.10 m to 13.11 m

BH-BGC11-25 Box 4 – 13.11 m to 17.98 m

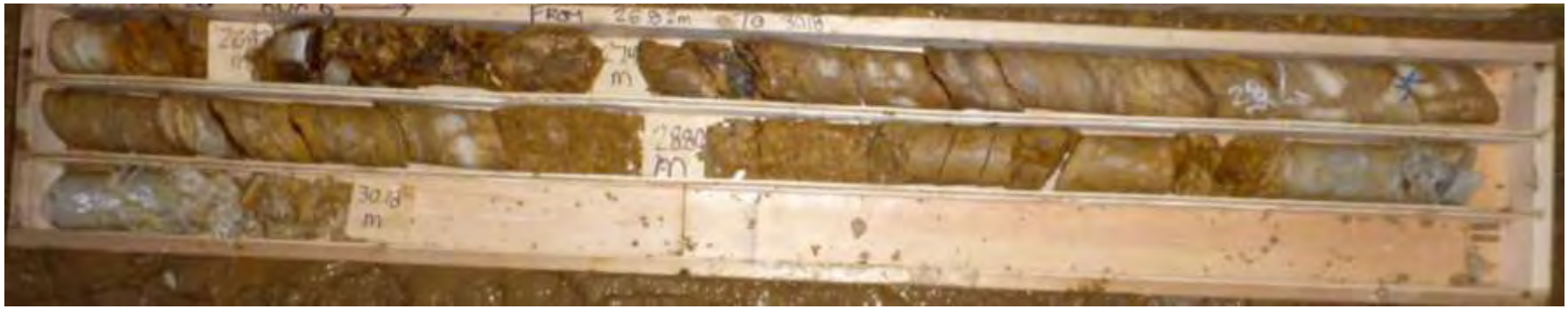
BH-BGC11-25 Box 5 – 17.98 m to 20.42 m

BH-BGC11-26 Box 1 – 0.00 m to 10.21 m

BH-BGC11-26 Box 2 – 10.21 m to 15.38 m

BH-BGC11-26 Box 3 – 15.38 m to 21.34 m

BH-BGC11-26 Box 4 – 21.34 m to 26.82 m



BH-BGC11-26 Box 5 – 26.82 m to 30.18 m

BH-BGC11-27 Box 1 – 0.00 m to 14.02 m

BH-BGC11-27 Box 2 – 14.02 m to 18.29 m

BH-BGC11-27 Box 3 – 18. 29 m to 22.30 m

BH-BGC11-27 Box 4 – 22.30 m to 26.52 m

BH-BGC11-28 Box 1 – 0.00 m to 12.19 m

BH-BGC11-28 Box 2 – 12.19 m to 18.14 m

BH-BGC11-28 Box 3 – 18.14 m to 22.10 m

BH-BGC11-28 Box 4 – 22.10 m to 26.21 m

BH-BGC11-28 Box 5 – 26.21 m to 32.00 m

BH-BGC11-28 Box 6 – 32.00 m to 40.84 m

BH-BGC11-29 Box 1 – 0.00 m to 15.54 m

BH-BGC11-29 Box 2 – 15.54 m to 22.83 m

BH-BGC11-29 Box 3 – 22.83 m to 26.72 m

BH-BGC11-29 Box 4 – 26.72 m to 30.69 m

. BH-BGC11-30 Box 1 – 0.00 m to 18.29 m

BH-BGC11-30 Box 2 – 18.29 m to 30.85 m

BH-BGC11-30 Box 3 – 30.85 m to 35.05 m

BH-BGC11-31 Box 1 – 0.00 m to 11.94 m

BH-BGC11-31 Box 2 – 11.94 m to 22.86 m

BH-BGC11-31 Box 3 – 22.86 m to 35.05 m

BH-BGC11-32 Box 1 – 0.00 m to 19.95 m

BH-BGC11-32 Box 2 – 19.95 m to 24.38 m

BH-BGC11-33 Box 1 – 0.00 m to 16.46 m

BH-BGC11-33 Box 2 – 16.46 m to 27.43 m

BH-BGC11-33 Box 3 – 27.43 m to 39.01 m

BH-BGC11-34 Box 1 – 0.00 m to 21.34 m

BH-BGC11-34 Box 2 – 21.34 m to 27.62 m

BH-BGC11-34 Box 3 – 27.62 m to 32.10 m

BH-BGC11-34 Box 4 – 32.10 m to 36.86 m

BH-BGC11-34 Box 5 – 36.86 m to 38.10 m

BH-BGC11-35 Box 1 – 0.00 m to 19.81 m

BH-BGC11-35 Box 2 – 19.81 m to 30.20 m

BH-BGC11-35 Box 3 – 30.20 m to 34.70 m

.

BH-BGC11-35 Box 4 – 34.70 m to 45.72 m

BH-BGC11-35 Box 5 – 45.72 m to 50.29 m

BH-BGC11-36 Box 1 – 0.00 m to 6.44 m

BH-BGC11-36 Box 2 – 6.44 m to 12.19 m

BH-BGC11-36 Box 3 – 12.19 m to 16.10 m

BH-BGC11-36 Box 4 – 16.10 m to 22.55 m

BH-BGC11-36 Box 5 – 22.55 m to 28.54 m

BH-BGC11-36 Box 6 – 28.54 m to 34.14 m

BH-BGC11-36 Box 7 – 34.14 m to 38.36 m

BH-BGC11-36 Box 8 – 38.36 m to 42.52 m

BH-BGC11-36 Box 9 – 42.52 m to 46.47 m

BH-BGC11-36 Box 10 – 46.47 m to 49.83 m

BH-BGC11-36 Box 11 – 49.83 m to 50.29 m

BH-BGC11-37 Box 1 – 0.00 m to 7.16 m

BH-BGC11-37 Box 2 – 7.16 m to 11.11 m

BH-BGC11-37 Box 3 – 11.11 m to 16.08 m

BH-BGC11-37 Box 4 – 16.08 m to 22.00 m

BH-BGC11-37 Box 5 – 22.00 m to 26.53 m

BH-BGC11-37 Box 6 – 26.53 m to 31.42 m

BH-BGC11-37 Box 7 – 31.42 m to 36.90 m

BH-BGC11-37 Box 8 – 36.90 m to 42.37 m

BH-BGC11-37 Box 9 – 42.37 m to 43.59 m

BH-BGC11-38 Box 1 – 0.00 m to 16.15 m

BH-BGC11-38 Box 2 – 16.15 m to 21.97 m

BH-BGC11-38 Box 3 – 21.97 m to 26.50 m

BH-BGC11-38 Box 4 – 26.50 m to 31.14 m

BH-BGC11-38 Box 5 – 31.14 m to 35.80 m

BH-BGC11-38 Box 6 – 35.80 m to 40.83 m

BH-BGC11-38 Box 7 – 40.83 m to 50.00 m

BH-BGC11-38 Box 8 – 50.00 m to 50.52 m

BH-BGC11-39 SPT 1 – 1.15 m to 1.60 m

BH-BGC11-39 SPT 2 – 1.60 m to 2.05 m

BH-BGC11-39 SPT 3 – 2.28 m to 2.73 m

BH-BGC11-39 SPT 4 – 2.75 m to 3.20 m

BH-BGC11-39 SPT 5 – 4.60 m to 5.05 m

BH-BGC11-39 SPT 6 – 5.53 m to 5.98 m

BH-BGC11-39 SPT 7 – 6.22 m to 6.67 m

BH-BGC11-39 SPT 8 – 7.16 m to 7.61 m

BH-BGC11-39 SPT 9 – 7.75 m to 8.20 m

BH-BGC11-39 SPT 10 – 8.71 m to 9.16 m

BH-BGC11-39 SPT 11 – 9.25 m to 9.70 m

BH-BGC11-40A Box 1 – 0.00 m to 9.48 m

BH-BGC11-40A Box 2 – 9.48 m to 13.53 m

BH-BGC11-40A Box 3 – 13.53 m to 17.56 m

BH-BGC11-40A Box 4 – 17.56 m to 21.90 m

BH-BGC11-40A Box 5 – 21.90 m to 25.82 m

BH-BGC11-40A Box 6 – 25.82 m to 29.88 m

BH-BGC11-40A Box 7 – 29.88 m to 33.19 m

BH-BGC11-40B Box 1 – 8.69 m to 13.72 m

BH-BGC11-40B Box 2 – 13.72 m to 18.29 m

BH-BGC11-40B Box 3 – 18.29 m to 22.56 m

BH-BGC11-40B Box 4 – 22.56 m to 26.77 m

BH-BGC11-40B Box 5 – 26.77 m to 30.80 m

BH-BGC11-40B Box 6 – 30.80 m to 34.73 m

BH-BGC11-40B Box 7 – 34.73 m to 38.70 m

BH-BGC11-40B Box 8 – 38.70 m to 42.67 m

BH-BGC11-40B Box 9 – 42.67 m to 45.72 m

BH-BGC11-41 Run 1 – 0.00 m to 1.53 m	

BH-BGC11-42 Run 1 – 0.0 m to 0.75 m

BH-BGC11-42 Run 2 – 0.75 m to 2.27 m

BH-BGC11-42 Run 3 – 2.27 m to 3.80 m

BH-BGC11-42 Run 4 – 3.80 m to 5.32 m

BH-BGC11-42 Run 5 – 5.32 m to 6.84 m

BH-BGC11-42 Run 6 – 6.84 m to 8.36 m

BH-BGC11-42 Run 7 – 8.36 m to 9.88 m

BH-BGC11-42 Run 8 – 9.88 m to 11.43 m

BH-BGC11-42 Run 9 – 11.43 m to 11.75 m

BH-BGC11-42 Run 10 – 11.75 m to 12.50 m

BH-BGC11-42 Run 11 – 12.50 m to 13.11 m

BH-BGC11-42 Run 12 – 13.11 m to 13.71 m

BH-BGC11-42 Run 13 – 13.71 m to 14.16 m

BH-BGC11-42 Run 14 – 14.16 m to 14.73 m

BH-BGC11-42 Run 15 – 14.73 m to 15.40 m

BH-BGC11-42 Run 16 – 15.40 m to 15.85 m

BH-BGC11-42 Run 17 – 15.85 m to 17.53 m

BH-BGC11-42 Run 18 – 17.53 m to 18.0 m

BH-BGC11-42 Run 19 – 18.0 m to 18.30 m

BH-BGC11-42 Run 20 – 18.30 m to 19.05 m

BH-BGC11-42 Run 21 – 19.05 m to 20.57 m	BH-BGC11-42 Run 21 – 20.57 m to 22.04 m
BH-BGC11-42 Run 23 – 22.04 m to 23.62 m	BH-BGC11-42 Run 24 – 23.62 m to 25.15 m

BH-BGC11-42 Run 25 – 25.15 m to 26.67 m	BH-BGC11-42 Run 26 – 26.67 m to 28.19 m

BH-BGC11-43 Box 1 – 0.00 m to 4.48 m

BH-BGC11-43 Box 2 – 4.48 m to 8.96 m

BH-BGC11-43 Box 3 – 8.96 m to 13.54 m

BH-BGC11-43 Box 4 – 13.54 m to 18.15 m

BH-BGC11-43 Box 5 – 18.15 m to 22.37 m

BH-BGC11-43 Box 6 – 22.37 m to 23.77 m

BH-BGC11-44 Run 1 – 0.0 m to 0.75 m	BH-BGC11-44 Run 2 – 0.75 m to 2.27 m
BH-BGC11-44 Run 3 – 2.72 m to 3.79 m	BH-BGC11-44 Run 4 – 4.24 m to 5.33 m

BH-BGC11-44 Run 5 – 5.80 m to 6.85 m	BH-BGC11-44 Run 6 – 7.32 m to 8.38 m
BH-BGC11-44 Run 7 – 8.85 m to 9.38 m	BH-BGC11-44 Run 8 – 9.38 m to 9.90 m

BH-BGC11-44 Run 9 – 10.35 m to 11.42 m

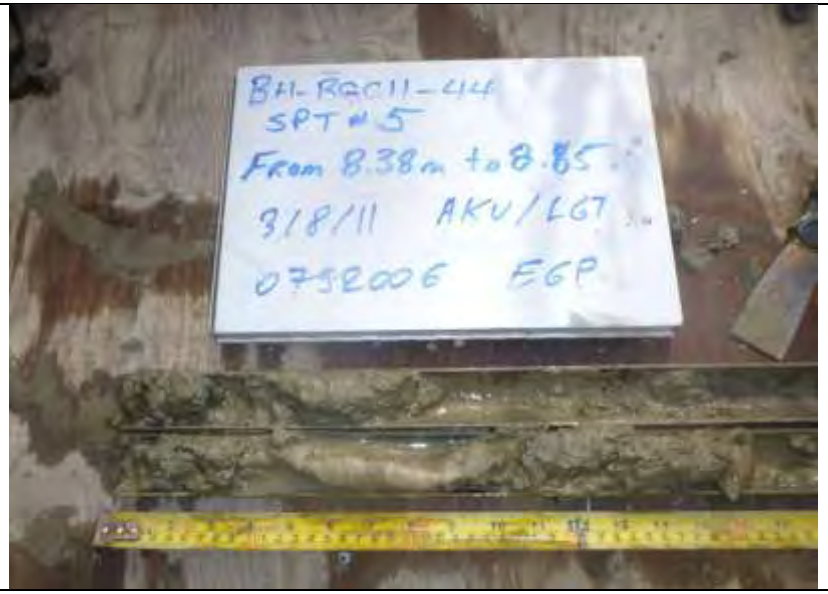
BH-BGC11-44 Run 10 – 11.97 m to 12.35 m

BH-BGC11-44 Run 11 – 13.42 m to 14.49 m

BH-BGC11-44 SPT 1 – 2.27 m to 2.72 m

BH-BGC11-44 SPT 2 – 3.79 m to 4.24 m

BH-BGC11-44 SPT 3 – 5.33 m to 5.80 m



BH-BGC11-44 SPT 5 – 8.38 m to 8.85 m

BH-BGC11-44 SPT 8 – 9.90 m to 10.35 m

BH-BGC11-44 SPT 9 – 11.42 m to 11.97 m

BH-BGC11-44 SPT 10 – 12.97 m to 13.42 m

BH-BGC11-44 SPT 11 – 14.49 m to 14.79 m

BH-BGC11-45 Box 1 – 3.05 m to 7.93 m

BH-BGC11-45 Box 2 – 7.93 m to 12.22 m

BH-BGC11-45 Box 3 – 12.22 m to 16.76 m

BH-BGC11-45 Box 4 – 16.76 m to 20.73 m

BH-BGC11-46 Box 1 – 0.00 m to 6.21 m

BH-BGC11-46 Box 2 – 6.21 m to 10.36 m

BH-BGC11-46 Box 3 – 10.36 m to 14.40 m

BH-BGC11-46 Box 4 – 14.40 m to 18.31 m

BH-BGC11-46 Box 5 – 18.31 m to 20.12 m

BH-BGC11-47 Run 1 – 0.00 m to 0.75 m

BH-BGC11-47 Box 1 – 1.2 m to 2.27 m

BH-BGC11-47 Run 2 – 2.30 m to 2.95 m

BH-BGC11-47 Run 4 – 2.95 m to 3.35 m

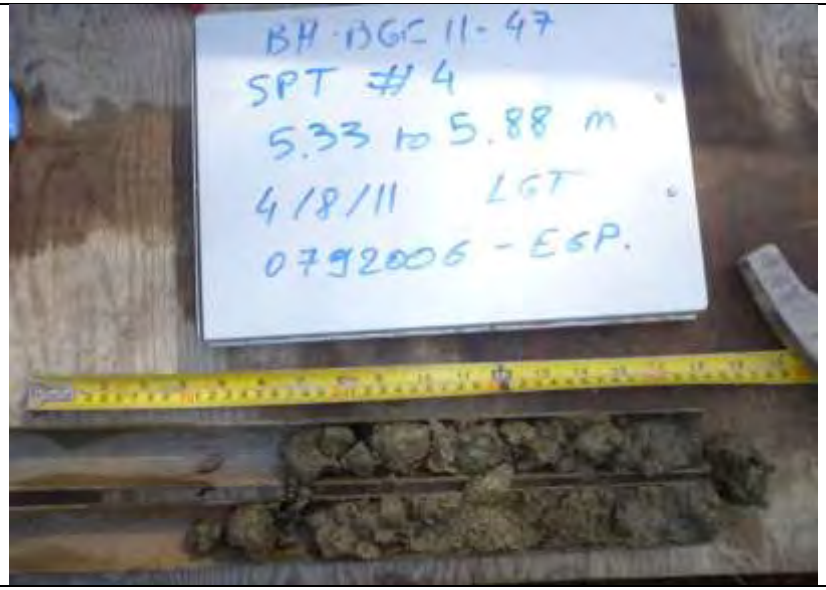
BH-BGC11-47 Run 5 – 4.25 m to 5.33 m	BH-BGC11-47 Run 6 – 5.78 m to 6.85 m
BH-BGC11-47 Run 7 – 7.30 m to 8.38 m	BH-BGC11-47 Run 9 – 8.58 m to 9.90 m

BH-BGC11-47 Run 10 – 10.05 m to 11.43 m	BH-BGC11-47 Run 11 – 11.60 m to 12.95 m
BH-BGC11-47 Run 12 – 12.95 m to 14.48 m	BH-BGC11-47 Run 13 – 14.48 m to 16.0 m

BH-BGC11-47 SPT 1 – 0.75 m to 1.20 m

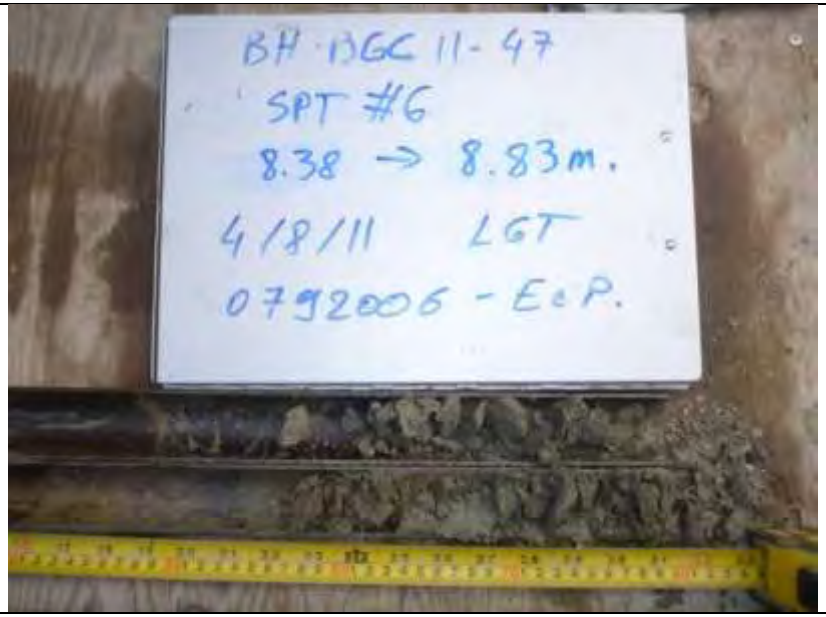
BH-BGC11-47 SPT 2 – 3.35 m to 3.80 m

BH-BGC11-47 SPT 3 – 3.80 m to 4.25 m



BH-BGC11-47 SPT 4 – 5.33 m to 5.88 m

BH-BGC11-47 SPT 5 – 6.85 m to 7.30 m



BH-BGC11-47 SPT 6 – 8.38 m to 8.83 m

BH-BGC11-47 SPT 7 – 9.90 m to 10.05 m

BH-BGC11-47 SPT 8 – 11.43 m to 11.70 m

BH-BGC11-48 Box 1 – 0.00 m to 13.11 m

BH-BGC11-48 Box 2 – 13.11 m to 18.96 m

BH-BGC11-48 Box 3 – 18.96 m to 23.38 m

BH-BGC11-48 Box 4 – 23.98 m to 28.00 m

BH-BGC11-48 Box 5 – 28.00 m to 32.92 m

BH-BGC11-49 Run 1 – 0.00 m to 0.76 m	BH-BGC11-49 Run 2 – 1.23 m to 2.28 m
BH-BGC11-49 Run 3 – 2.73 m to 2.90 m	BH-BGC11-49 Run 4 – 2.90 m to 3.80 m

BH-BGC11-49 Run 5 – 3.80 m to 5.33 m	BH-BGC11-49 Run 6 – 5.33 m to 6.85 m
BH-BGC11-49 Run 7 – 6.85 m to 8.38 m	BH-BGC11-49 Run 8 – 8.38 m to 9.90 m

BH-BGC11-49 Run 9 – 9.90 m to 11.43 m	BH-BGC11-49 Run 10 – 11.43 m to 12.95 m
BH-BGC11-49 Run 11 – 12.95 m to 14.47 m	BH-BGC11-49 Run 12 – 14.47 m to 16.0 m

BH-BGC11-49 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-49 SPT 2 – 2.28 m to 2.73 m

BH-BGC11-50 Box 1 – 3.66 m to 11.53 m

BH-BGC11-50 Box 2 – 11.53 m to 16.50 m

BH-BGC11-50 Box 3 – 16.50 m to 20.67 m

BH-BGC11-50 Box 4 – 20.67 m to 24.93 m

BH-BGC11-50 Box 5 – 24.93 m to 29.11 m

BH-BGC11-50 Box 6 – 29.11 m to 33.28 m

BH-BGC11-50 Box 7 – 33.28 m to 37.41 m

BH-BGC11-50 Box 8 – 37.41 m to 41.15 m

BH-BGC11-51 Run 1 – 0.00 m to 0.76 m	BH-BGC11-51 Run 2 – 1.21 m to 2.28 m
BH-BGC11-51 Run 3 – 2.73 m to 3.80 m	BH-BGC11-51 Run 4 – 4.25 m to 5.33 m

BH-BGC11-51 Run 5 – 5.78 m to 6.85 m	BH-BGC11-51 Run 6 – 6.85 m to 8.38 m
BH-BGC11-51 Run 7 – 8.38 m to 9.90 m	BH-BGC11-51 Run 8 – 10.25 m to 11.43 m

BH-BGC11-51 Run 9 – 11.58 m to 12.95 m

BH-BGC11-51 Run 10 – 12.95 m to 14.47 m

BH-BGC11-51 Run 11 – 14.47 m to 16.00 m

BH-BGC11-51 Run 12 – 16.00 m to 17.52 m

BH-BGC11-51 Run 13 – 17.52 m to 19.05 m

BH-BGC11-51 Run 14 – 19.05 m to 20.57 m

BH-BGC11-51 Run 15 – 20.62 m to 22.10 m

BH-BGC11-51 Run 16 – 22.25 m to 23.62 m

BH-BGC11-51 Run 17 – 23.62 m to 25.15 m

BH-BGC11-51 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-51 SPT 2 – 2.28 m to 2.73 m

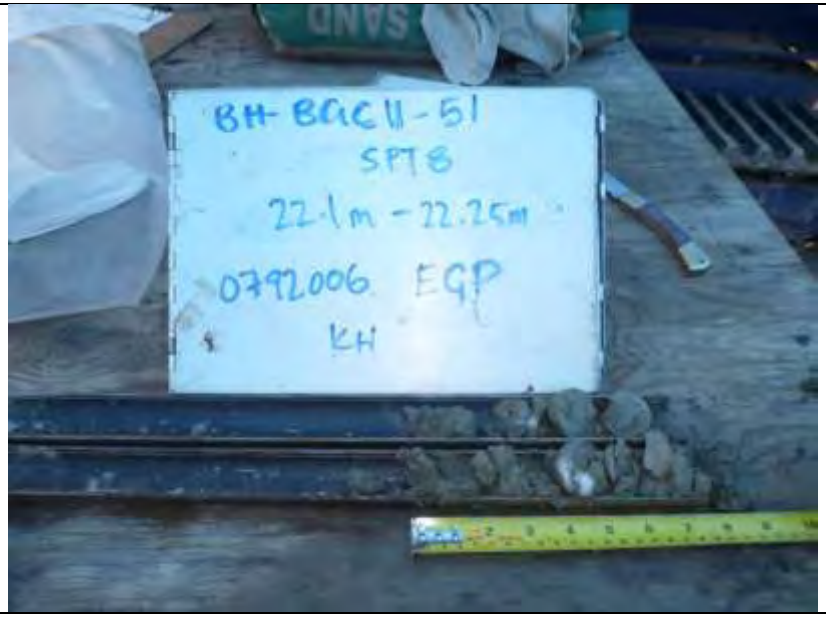
BH-BGC11-51 SPT 3 – 3.80 m to 4.25 m

BH-BGC11-51 SPT 4 – 5.33 m to 5.78 m

BH-BGC11-51 SPT 5 – 9.90 m to 10.25 m

BH-BGC11-51 SPT 6 – 11.43 m to 11.58 m

BH-BGC11-51 SPT 6 – 20.57 m to 20.62 m

	
BH-BGC11-51 SPT 8 – 22.1 m to 22.25 m	

BH-BGC11-52 Box 1 – 1.22 m to 11.09 m

BH-BGC11-52 Box 2 – 11.09 m to 16.85 m

BH-BGC11-52 Box 3 – 16.85 m to 21.03 m

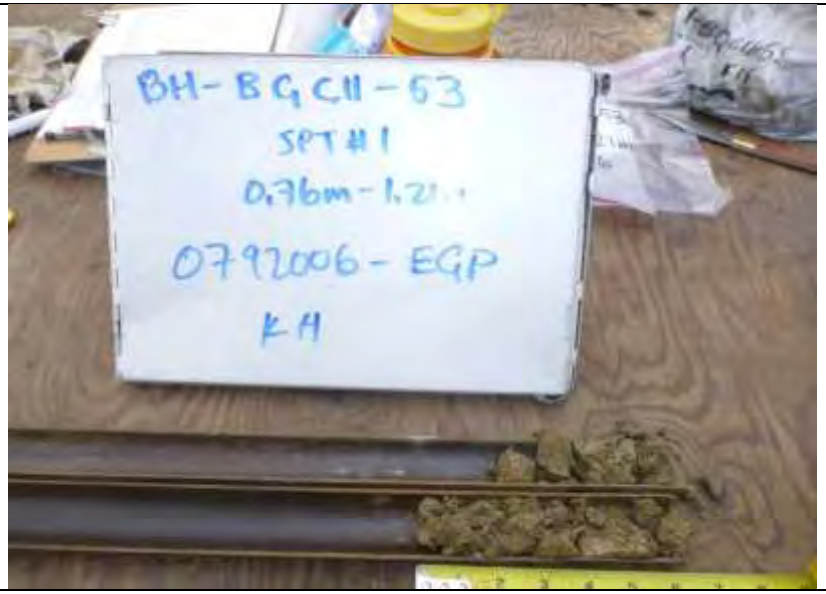
BH-BGC11-52 Box 4 – 21.03 m to 22.56 m

BH-BGC11-53 Run 1 – 0.00 m to 0.76 m	BH-BGC11-53 Run 2 – 1.21 m to 2.28 m
BH-BGC11-53 Run 3 – 2.73 m to 3.80 m	BH-BGC11-53 Run 4 – 4.25 m to 5.33 m

BH-BGC11-53 Run 5 – 5.33 m to 6.85 m	BH-BGC11-53 Run 6 – 7.30 m to 8.37 m
BH-BGC11-53 Run 7 – 8.37 m to 9.90 m	BH-BGC11-53 Run 8 – 10.35 m to 11.42 m

BH-BGC11-53 Run 9 – 11.42 m to 12.95 m

BH-BGC11-53 Run 10 – 12.95 m to 14.47 m



BH-BGC11-53 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-53 SPT 2 – 2.28 m to 2.73 m

BH-BGC11-53 SPT 3 – 3.80 m to 4.25 m

BH-BGC11-53 SPT 4 – 6.85 m to 7.3 m

BH-BGC11-53 SPT 5 – 9.90 m to 10.35 m

BH-BGC11-54 Box 1 – 0.00 m to 18.29 m

BH-BGC11-54 Box 2 – 18.29 m to 24.60 m

BH-BGC11-54 Box 3 – 24.60 m to 32.94 m

BH-BGC11-54 Box 4 – 32.94 m to 39.71 m

BH-BGC11-54 Box 5 – 39.71 m to 41.15 m

BH-BGC11-55 Run 1 – 0.00 m to 0.76 m	BH-BGC11-55 Run 2 – 1.21 m to 2.27 m
BH-BGC11-55 Run 3 – 2.73 m to 3.80 m	BH-BGC11-55 Run 4 – 4.25 m to 5.33 m

BH-BGC11-55 Run 5 – 5.78 m to 6.85 m

BH-BGC11-55 Run 6 – 7.30 m to 8.38 m

BH-BGC11-55 Run 7 – 8.83 m to 9.90 m

BH-BGC11-55 Run 8 – 10.35 m to 11.42 m

BH-BGC11-55 Run 9 – 11.42 m to 12.95 m

BH-BGC11-55 Box 1 – 12.95 m to 14.47 m

BH-BGC11-55 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-55 SPT 2 – 2.28 m to 2.73 m

BH-BGC11-55 SPT 3 – 3.80 m to 4.25 m

BH-BGC11-55 SPT 4 – 5.33 m to 5.78 m

BH-BGC11-55 SPT 5 – 6.85 m to 7.30 m

BH-BGC11-55 SPT 6 – 8.38 m to 8.83 m

BH-BGC11-55 SPT 7 – 9.90 m to 10.35 m	

BH-BGC11-56 Run 1 – 0.00 m to 0.76 m	BH-BGC11-56 Run 2 – 1.21 m to 2.28 m
BH-BGC11-56 Run 3 – 2.43 m to 3.80 m	BH-BGC11-56 Run 4 – 4.25 m to 5.33 m

BH-BGC11-56 Run 5 – 5.53 m to 6.85 m	BH-BGC11-56 Run 6 – 7.15 m to 8.38 m
BH-BGC11-56 Run 7 – 8.53 m to 9.90 m	BH-BGC11-56 Run 8 – 9.90 m to 11.42 m

BH-BGC11-56 Run 9 – 11.42 m to 12.95 m

BH-BGC11-56 Run 10 – 12.95 m to 13.70 m

BH-BGC11-56 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-56 SPT 2 – 2.28 m to 2.43 m

BH-BGC11-56 SPT 3 – 3.80 m to 4.25 m

BH-BGC11-56 SPT 4 – 5.33 m to 5.53 m

BH-BGC11-56 SPT 5 – 6.85 m to 7.15 m

BH-BGC11-56 SPT 6 – 8.38 m to 8.53 m

BH-BGC11-57 Run 1 – 0.00 m to 0.76 m	BH-BGC11-57 Run 2 – 0.76 m to 2.28 m
BH-BGC11-57 Run 3 – 2.65 m to 3.90 m	BH-BGC11-57 Run 4 – 4.25 m to 5.33 m

BH-BGC11-57 Run 5 – 5.78 m to 6.85 m	BH-BGC11-57 Run 6 – 7.10 m to 8.43 m
BH-BGC11-57 Run 7 – 8.53 m to 9.90 m	BH-BGC11-57 Run 8 – 10.20 m to 11.47 m

BH-BGC11-57 Run 9 – 11.47 m to 12.10 m

BH-BGC11-57 SPT 1 – 2.28 m to 2.65 m

BH-BGC11-57 SPT 2 – 3.80 m to 4.25 m

BH-BGC11-57 SPT 3 – 5.33 m to 5.78 m

BH-BGC11-57 SPT 4 – 6.85 m to 7.10 m

BH-BGC11-57 SPT 5 – 8.43 m to 8.53 m

BH-BGC11-57 SPT 6 – 9.90 m to 10.20 m

BH-BGC11-58 Run 1 – 0.00 m to 0.76 m

BH-BGC11-58 Run 2 – 0.76 m to 2.28 m

BH-BGC11-58 Run 3 – 2.28 m to 2.90 m

BH-BGC11-58 Run 4 – 2.90 m to 3.40 m

BH-BGC11-58 Run 5 – 3.40 m to 4.00 m

BH-BGC11-58 Run 6 – 4.00 m to 4.60 m

BH-BGC11-58 Run 7 – 4.60 m to 4.90 m

BH-BGC11-58 Run 8 – 4.90 m to 5.50 m

BH-BGC11-58 Run 9 – 5.50 m to 6.85 m

BH-BGC11-58 Run 10 – 6.90 m to 8.43 m

BH-BGC11-58 Run 11 – 8.43 m to 9.90 m

BH-BGC11-58 Run 12 – 9.90 m to 10.70 m

BH-BGC11-58 SPT 2 – 6.85 m to 6.90 m	

BH-BGC11-59 Box 1 – 0.00 m to 7.58 m

BH-BGC11-59 Box 2 – 7.58 m to 11.58 m

BH-BGC11-59 Box 3 – 11.58 m to 15.70 m

BH-BGC11-59 Box 4 – 15.70 m to 19.56 m

BH-BGC11-59 Box 5 – 19.56 m to 23.95 m

BH-BGC11-59 Box 6 – 23.95 m to 30.18 m

BH-BGC11-60 Run 1 – 0.00 m to 0.76 m

BH-BGC11-60 Run 2 – 0.76 m to 2.28 m

BH-BGC11-60 Run 3 – 2.28 m to 2.80 m

BH-BGC11-60 Run 4 – 2.80 m to 3.40 m

BH-BGC11-60 Run 5 – 3.40 m to 4.00 m

BH-BGC11-60 Run 6 – 4.00 m to 4.60 m

BH-BGC11-60 Run 7 – 4.75 m to 5.33 m

BH-BGC11-60 Run 8 – 5.33 m to 6.85 m

BH-BGC11-60 Run 9 – 7.00 m to 8.38 m

BH-BGC11-60 Run 10 – 8.38 m to 9.15 m

BH-BGC11-60 SPT 1 – 4.60 m to 4.75 m

BH-BGC11-60 SPT 2 – 6.85 m to 7.00 m

BH-BGC11-61 Run 1 – 0.00 m to 0.76m	BH-BGC11-61 Run 2 – 0.76m to 2.28 m
BH-BGC11-61 Run 3 – 2.28 m to 2.70 m	

BH-BGC11-62 Box 1 – 0.00 m to 5.47 m

BH-BGC11-62 Box 2 – 5.47 m to 10.32 m

BH-BGC11-62 Box 3 – 10.32 m to 14.78 m

BH-BGC11-62 Box 4 – 14.78 m to 19.33 m

BH-BGC11-62 Box 5 – 19.33 m to 24.59 m

BH-BGC11-62 Box 6 – 24.59 m to 28.84 m

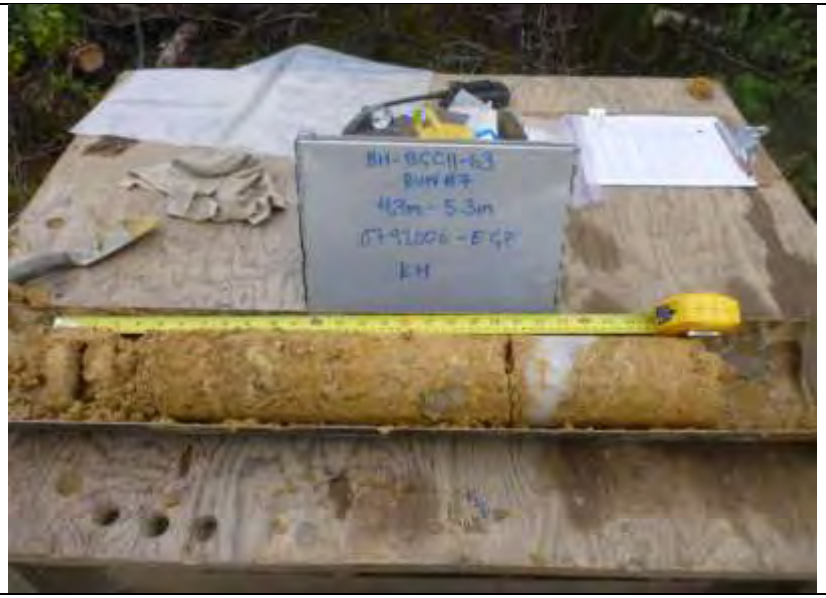
BH-BGC11-62 Box 7 – 28.84 m to 33.42 m

BH-BGC11-62 Box 8 – 33.42 m to 35.05 m

<table>
<tr><td> </td><td> </td></tr>
<tr><td>BH-BGC11-63 Run 1 – 0.00 m to 0.76 m</td><td>BH-BGC11-63 Run 2 – 0.76 m to 2.28 m</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>BH-BGC11-63 Run 3 – 2.28 m to 3.00 m</td><td>BH-BGC11-63 Run 4 – 3.00 m to 3.50 m</td></tr>
</table>

BH-BGC11-63 Run 5 – 3.50 m to 4.10 m

BH-BGC11-63 Run 6 – 4.10 m to 4.70 m



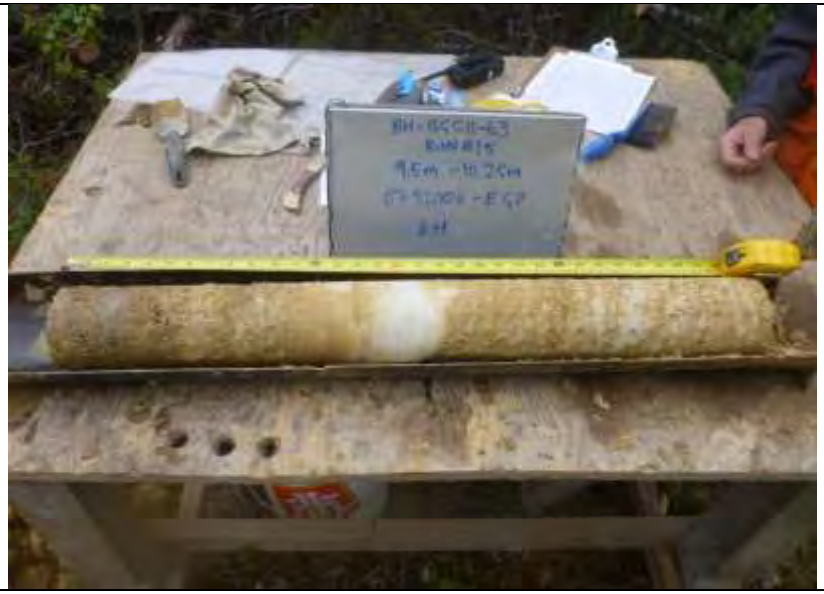
BH-BGC11-63 Run 7 – 4.70 m to 5.30 m

BH-BGC11-63 Run 8 – 5.30 m to 5.90 m

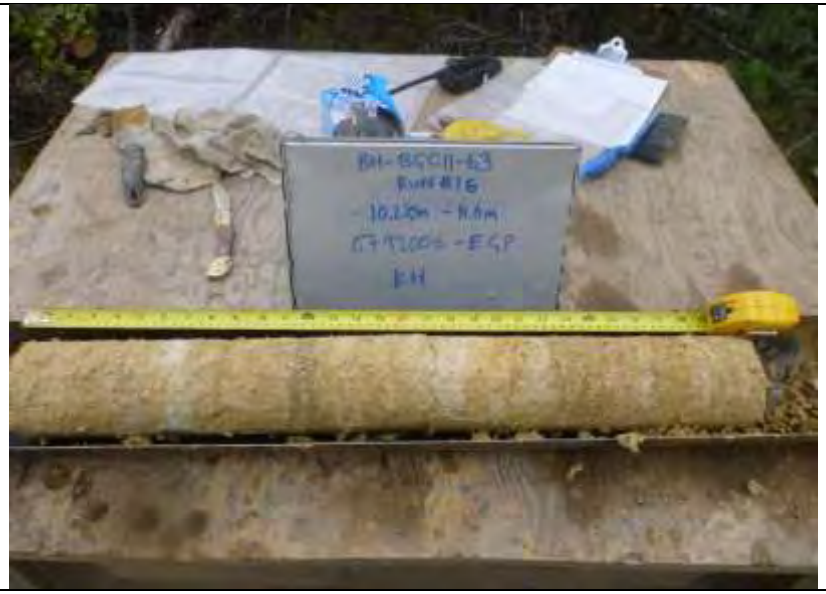
BH-BGC11-63 Run 9 – 5.90 m to 6.50 m	BH-BGC11-63 Run 10 – 6.50 m to 7.10 m
BH-BGC11-63 Run 11 – 7.10 m to 7.70 m	BH-BGC11-63 Run 12 – 7.70 m to 8.30 m

BH-BGC11-63 Run 13 – 8.30 m to 8.90 m

BH-BGC11-63 Run 14 – 8.90 m to 9.50 m

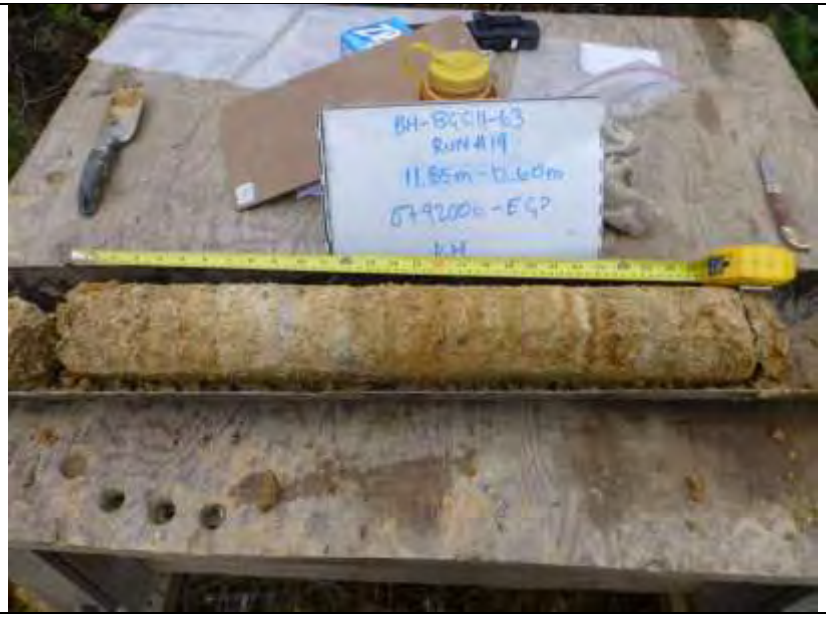


BH-BGC11-63 Run 15 – 9.50 m to 10.25 m



BH-BGC11-63 Run 16 – 10.25 m to 11.00 m

BH-BGC11-63 Run 17 –11.00 m to 11.75 m



BH-BGC11-63 Run 19 – 11.85 m to 12.60 m

BH-BGC11-63 Run 20 – 12.60 m to 13.30 m

BH-BGC11-63 Run 21 – 13.30 m to 14.10 m

BH-BGC11-63 Run 23 – 14.48 m to 16.00 m

BH-BGC11-63 Run 24 – 16.00 m to 16.70 m

BH-BGC11-63 Run 25 – 16.70 m to 17.45 m

BH-BGC11-63 Run 26 – 17.45 m to 17.85 m

BH-BGC11-63 Run 27 – 17.85 m to 18.45 m

BH-BGC11-63 Run 28 – 18.45 m to 19.00 m

BH-BGC11-63 Run 29 – 19.00 m to 19.75 m

BH-BGC11-63 Run 30 – 19.75 m to 20.57 m

BH-BGC11-63 Run 31 – 20.57 m to 22.10 m

BH-BGC11-63 Run 32 – 22.10 m to 23.62 m

BH-BGC11-63 Run 33 – 23.62 m to 25.15 m

BH-BGC11-63 Run 34 – 25.15 m to 26.67 m

BH-BGC11-64 Box 1 – 0.00 m to 6.40 m

BH-BGC11-64 Box 2 – 6.40 m to 16.46 m

BH-BGC11-64 Box 3 – 16.46 m to 20.97 m

BH-BGC11-64 Box 4 – 20.97 m to 24.91 m

BH-BGC11-64 Box 5 – 24.91 m to 28.65 m

BH-BGC11-64 Box 6 – 28.65 m to 32.99 m

BH-BGC11-64 Box 7 – 32.99 m to 36.75 m

BH-BGC11-64 Box 8 – 36.75 m to 40.84 m

BH-BGC11-64 Box 9 – 40.84 m to 44.74 m

BH-BGC11-64 Box 10 – 44.74 m to 48.77 m

BH-BGC11-65 Run 1 – 0.00 m to 0.76 m

BH-BGC11-65 SPT 1 – 0.76 m to 1.21 m

BH-BGC11-65 SPT 2 – 1.52 m to 1.97 m

BH-BGC11-65 SPT 3 – 2.28 m to 2.73 m

BH-BGC11-65 SPT 4 – 3.04 m to 3.49 m

BH-BGC11-65 SPT 5 – 3.80 m to 4.25 m

BH-BGC11-65 SPT 6 – 4.56 m to 5.01 m

BH-BGC11-65 SPT 7 – 5.33 m to 5.78 m

BH-BGC11-65 SPT 8 – 6.09 m to 6.54 m

BH-BGC11-65 SPT 9 – 6.85 m to 6.90 m

BH-BGC11-66 Box 1 – 0.00 m to 5.04 m

BH-BGC11-66 Box 2 – 5.04 m to 9.57 m

BH-BGC11-66 Box 3 – 9.57 m to 13.72 m

BH-BGC11-66 Box 4 – 13.72 m to 18.48 m

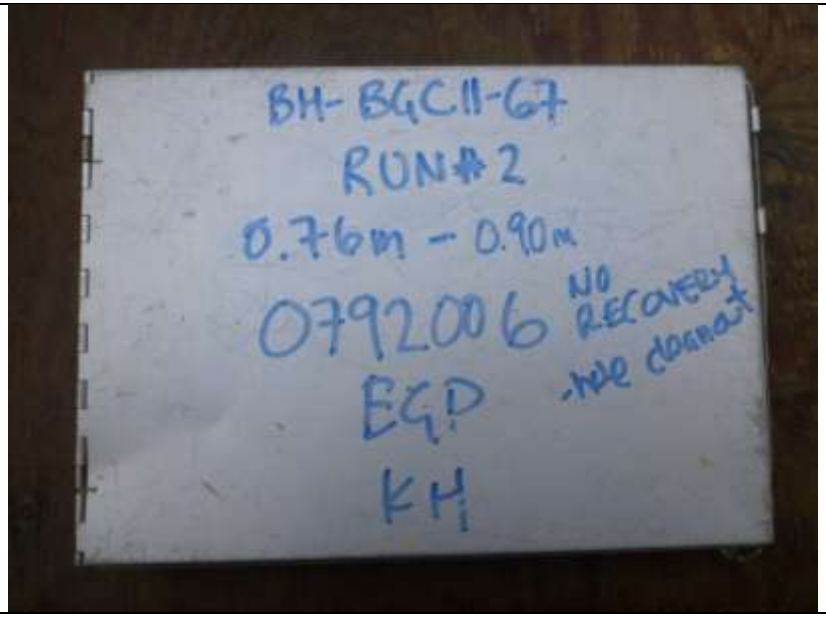
BH-BGC11-66 Box 5 – 18.48 m to 23.24 m

BH-BGC11-66 Box 6 – 23.24 m to 27.17 m

BH-BGC11-66 Box 7 – 27.17 m to 31.19 m

BH-BGC11-66 Box 8 – 31.19 m to 33.53 m

BH-BGC11-67 Run 1 – 0.00 m to 0.76 m



BH-BGC11-67 Run 2 – 0.76 m to 0.90 m

BH-BGC11-67 Run 3 – 0.90 m to 1.50 m

BH-BGC11-67 Run 4 – 1.50 m to 2.05 m

BH-BGC11-67 Run 5 – 2.05 m to 2.65 m

BH-BGC11-67 Run 6 – 2.65 m to 2.95 m

BH-BGC11-67 Run 7 – 2.95 m to 3.45 m

BH-BGC11-67 Run 8 – 3.45 m to 4.05 m

BH-BGC11-67 Run 9 – 4.05 m to 4.75 m

BH-BGC11-67 Run 10 – 4.75 m to 5.25 m

BH-BGC11-67 Run 11 – 5.25 m to 6.00 m

BH-BGC11-67 Run 13 – 6.00 m to 6.85 m

BH-BGC11-67 Run 14 – 6.85 m to 8.36 m	BH-BGC11-67 Run 15 – 8.36 m to 9.90 m

BH-BGC11-69 Box 1 – 0.00 m to 8.62 m

BH-BGC11-69 Box 2 – 8.62 m to 13.14 m

BH-BGC11-69 Box 3 – 13.14 m to 17.63 m

BH-BGC11-69 Box 4 – 17.63 m to 21.34 m

APPENDIX G
PENETRATION TESTING

PENETRATION TESTING

1.0 INTRODUCTION

This Appendix describes the methods and observations of three specific types of in-situ penetration testing completed in support of geotechnical investigations for mine site infrastructure.

2.0 TEST LOCATIONS

Three types of penetration testing were completed as part of the 2011 geotechnical investigation program. Standard Penetration Testing (SPT) was completed in 12 of the 16 auger holes completed. Dynamic Cone Penetration Testing (DCPT) was completed adjacent to BH-BGC11-67/69. Wildcat Penetrometer testing, which is completed using a hand-operated penetration testing device, was completed to depths of up to 5 m at 25 locations. Test locations are illustrated on Drawing 06, and Table G.1 summarizes all penetration testing completed.

Table G.1 Location of Penetration Testing

Location	Northing[1,2] (m)	Easting[1,2] (m)	Elevation[3] (masl)	Type of Penetration Testing
BH-BGC11-39	7101056	458462	804	SPT
BH-BGC11-44	7100547	458690	830	SPT
BH-BGC11-47	7100698	458811	841	SPT
BH-BGC11-49	7100635	458764	835	SPT
BH-BGC11-51	7100743	458643	818	SPT
BH-BGC11-53	7100993	459483	875	SPT
BH-BGC11-55	7100918	459440	881	SPT
BH-BGC11-56	7099822	458774	845	SPT
BH-BGC11-57	7099978	458798	859	SPT
BH-BGC11-58	7100119	458799	859	SPT
BH-BGC11-60	7100041	458795	859	SPT
BH-BGC11-65	7100939	458771	825	SPT
BH-BGC11-67/69	7101148	458823	867	DCPT
near TP-BGC11-90	7100513	459695	977	Wildcat Penetrometer
near BH-BGC10-24	7101012	458500	801	Wildcat Penetrometer
near BH-BGC10-13	7100942	458844	824	Wildcat Penetrometer
near BH-BGC10-14	7100980	458580	808	Wildcat Penetrometer
near BH-BGC10-22	7101098	458391	794	Wildcat Penetrometer
near TP-BGC11-62	7099924	459251	972	Wildcat Penetrometer
near TP-BGC11-69 (test A)	7099457	458915	878	Wildcat Penetrometer
near TP-BGC11-69 (test B)	7099457	458915	878	Wildcat Penetrometer
Placer Tailings (PQ12-A)	7101199	459747	891	Wildcat Penetrometer
Placer Tailings (PQ12-B)	7101199	459747	891	Wildcat Penetrometer
Placer Tailings (PQ13)	7101284	459832	902	Wildcat Penetrometer
Placer Tailings (PQ7-A)	7101061	459307	860	Wildcat Penetrometer
Placer Tailings (PQ7-B)	7101061	459307	860	Wildcat Penetrometer
Placer Tailings (PQ6-A)	7101008	459196	842	Wildcat Penetrometer
Placer Tailings (PQ6-B)	7101008	459196	842	Wildcat Penetrometer

Location	Northing[1,2] (m)	Easting[1,2] (m)	Elevation[3] (masl)	Type of Penetration Testing
near TP-BGC11-94 (test A)	7101517	459980	937	Wildcat Penetrometer
near TP-BGC11-94 (test B)	7101517	459980	937	Wildcat Penetrometer
near BH-BGC11-53	7100984	459486	890	Wildcat Penetrometer
near BH-BGC11-55 (test A)	7100913	459448	889	Wildcat Penetrometer
near BH-BGC11-55 (test B)	7100913	459448	889	Wildcat Penetrometer
near TP-BGC11-103 (test A)	7101147	458821	866	Wildcat Penetrometer
near TP-BGC11-103 (test B)	7101148	458828	866	Wildcat Penetrometer
near TP-BGC11-105	7101199	458935	878	Wildcat Penetrometer
PQ14 (test A)	7100285	459722	1009	Wildcat Penetrometer
PQ14 (test B)	7100285	459722	1009	Wildcat Penetrometer

1. Boreholes surveyed by Underhill in August and September 2011 using a differential GPS, with the exception of BH-BGC11-39, 65 and 67 and which were surveyed by BGC staff using a handheld GPS. Test pits and PQ locations were surveyed by BGC staff using a handheld GPS.
2. UTM coordinates in NAD 83, zone 8N.
3. masl – metres above sea level

3.0 SPT TESTING

Standard Penetration Test (SPT) sampling involves an open sample tube driven into the formation at the base of a borehole using repeated blows of a steel weight that impacts a jar assembly or anvil at the top of the drill rods to cause the sampler to penetrate a standard distance, usually 45 cm, into the formation. The number of blows needed to achieve this penetration is taken as an indicator of the density or consistency of the formation material. The standard procedure for penetration testing, i.e. the Standard Penetration Test (SPT), utilizes a sampler with an internal diameter of 34.9 mm (1 3/8") and divides the blowcount into three segments (150 mm each) and considers only the two last segments (final 300 mm) for calculation of the blowcount, or N value. The first 150 mm segment is ignored, as it often represents penetration of the sampler through sloughed or disturbed material at the bottom of the hole rather than intact in-situ materials. In geological formations containing a significant proportion of coarse fragments, the sampler will often meet refusal on a large clast, and the resulting high blowcount can lead to a false indication of a high density deposit.

The SPT-tested geological formations in the Eagle Gold project are known from past investigations to contain gravel, cobbles and boulders. In an attempt to identify interference by coarse materials, SPT blowcounts were typically recorded for each 25 mm interval during the SPT tests, rather than every 150 mm. Where interference was known to have occurred from observation of bouncing of the drill string, or as evidenced by low recovery in the sampler, the raw blowcounts are considered suspect, and estimated N values are extrapolated from the initial per 25 mm penetration values. In this situation, an 'equivalent' N value was estimated for the initial portion of the test by multiplying the sum of the meaningful per 25 mm blow counts over the selected test interval by a factor that yielded a projected blowcount for the full 300 mm. This methodology was followed only for samples with more than 150 mm of recovery and only blows within the last 300 mm were considered. All the SPT testing was done following the per 25 mm methodology except for three tests (BH-BGC11-51, SPT 3; BH-BGC11-51, SPT 6; and BH-BGC11-65, SPT 3) where materials were

too soft to allow per 25 mm blowcounts, and in these cases blowcounts were recorded over the standard 150 mm increments.

Energy measurements were made to determine the hammer efficiency. The sum of blows between 150 mm and 450 mm was corrected to 60% hammer efficiency to yield $(N)_{60}$.

SPT tests that were completed in frozen ground were omitted from the analysis.

The blow count details for all SPT tests, including blows per 25 mm, are shown in Table G.2. Plots of cumulative blowcounts versus recovery are found in Figures G-1 to G-10. Out of a total of 77 SPT tests, 46 are considered valid. Of the 77 tests, 7 were completed in frozen ground and are not considered valid, 19 tests had less than 150 mm of recovery and are not considered valid and 5 were influenced by coarse clasts prior to reaching 150 mm of penetration and are not considered valid. Raw blow counts for invalid tests are included below, but are not shown on borehole logs (Appendix E).

Table G.2 SPT Testing Results

				Blow Counts per 25 mm Increment																				
Hole	SPT #	Depth From (m)	Depth To (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	N - Raw	N – Corrected for Gravel Effects	N_{60}	Comments
BH-BGC11-39	SPT1	1.15	1.6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	
BH-BGC11-39	SPT2	1.6	2.05	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2	2	3	
BH-BGC11-39	SPT3	2.28	2.73	1	0	5	6	4	3	4	3	5	5	5	4	2	3	3	3	4	3	44	44	56	
BH-BGC11-39	SPT4	2.75	3.2	1	8	19	7	6	4	4	4	3	2	9	9	7	4	5	4	5	3	59	39	50	
BH-BGC11-39	SPT5	4.6	5.05	1	4	2	3	3	3	3	5	6	9	9	8	6	7	4	5	4	5	71	48	62	
BH-BGC11-39	SPT6	5.53	5.98	1	1	1	2	2	1	3	2	2	2	2	2	3	2	2	3	3	3	29	27	35	
BH-BGC11-39	SPT7	6.22	6.67	1	1	1	2	2	1	2	2	2	2	3	2	2	2	3	2	2	3	27	29	37	
BH-BGC11-39	SPT8	7.16	7.61	1	1	2	2	2	2	3	2	2	2	2	2	2	3	2	3	3	2	28	28	36	
BH-BGC11-39	SPT9	7.75	8.2	1	1	2	4	3	5	3	4	4	5	4	4	4	6	5	4	5	4	52	52	67	
BH-BGC11-39	SPT10	8.71	9.14	1	1	2	2	2	1	3	2	2	2	2	2	3	2	3	3	3	3	30	30	39	
BH-BGC11-39	SPT11	9.25	9.7	1	1	2	2	2	2	3	2	3	3	3	3	3	2	3	3	3	3	34	34	44	
BH-BGC11-44	SPT1	2.27	2.72	1	0	0	0	0	1	1	0	0	1	0	1	0	1	1	1	1	0	7	7	9	
BH-BGC11-44	SPT2	3.79	4.24	1	0	1	0	1	0	0	1	1	1	2	1	2	1	2	1	2	1	15	15	19	
BH-BGC11-44	SPT3	5.33	5.8	1	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	4	-	-	less than 150 mm recovery
BH-BGC11-44	SPT4	6.85	7.32	1	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	1	6	-	-	less than 150 mm recovery
BH-BGC11-44	SPT5	8.38	8.83	1	1	3	5	4	2	4	4	3	4	3	3	5	5	4	6	7	6	54	-	-	frozen - invalid test
BH-BGC11-44	SPT6	9.38	9.45	1	1	1	R															R	-	-	less than 150 mm recovery
BH-BGC11-44	SPT7	9.4	9.85	4	40	6	7	6	6	6	6	6	8	6	6	10	6	8	5	9	6	82	-	-	less than 150 mm recovery
BH-BGC11-44	SPT8	9.9	10.35	3	3	3	4	2	4	3	3	4	12	10	9	6	9	13	10	7	7	93	40	51	
BH-BGC11-44	SPT9	11.42	11.97	2	2	2	2	2	3	3	3	3	4	3	3	6	6	8	6	6	6	57	57	73	
BH-BGC11-44	SPT10	12.97	13.42	5	6	4	8	5	5	5	6	9	6	6	10	8	9	10	7	7	12	95	77	99	
BH-BGC11-44	SPT11	14.49	14.79	1	0	0	1	0	1	5	6	6	5	5	6	R						R	-	-	gravel effects at 150 mm
BH-BGC11-47	SPT1	0.75	1.2	1	0	0	1	0	0	1	0	0	1	2	2	1	2	2	1	1	2	15	-	-	Frozen
BH-BGC11-47	SPT2	3.35	3.8	1	1	2	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	12	12	15	
BH-BGC11-47	SPT3	3.8	4.25	1	1	0	1	0	0	1	0	0	0	1	0	0	1	0	1	0	0	4	4	5	
BH-BGC11-47	SPT4	5.33	5.88	1	0	1	1	1	1	1	1	0	1	1	1	1	0	1	2	1	1	11	-	-	Frozen
BH-BGC11-47	SPT5	6.85	7.3	1	2	1	3	2	2	4	6	5	4	4	5	4	10	10	11	8	8	79	-	-	Frozen
BH-BGC11-47	SPT6	8.38	8.58	1	2	2	3	7	7	11	13											R	-	-	gravel effects before 150 mm
BH-BGC11-47	SPT7	9.9	10.05	1	2	6	45	24	29													R	-	-	less than 150 mm recovery
BH-BGC11-47	SPT8	11.43	11.605	4	4	5	15	10	17	25												R	-	-	gravel effects before 150 mm
BH-BGC11-49	SPT1	0.76	1.22	1	0	0	0	1	0	0	1	0	1	0	1	1	1	1	2	2	2	12	8	10	
BH-BGC11-49	SPT2	2.28	2.73	2	2	4	4	4	6	4	4	3	2	2	2	3	3	3	3	3	2	34	-	-	Frozen
BH-BGC11-51	SPT1	0.76	1.21	1	2	1	2	1	2	1	2	1	1	1	1	1	1	1	2	1	1	14	14	18	
BH-BGC11-51	SPT2	2.28	2.73	1	1	0	1	0	1	1	0	0	0	1	1	0	1	0	1	1	0	6	6	8	
BH-BGC11-51	SPT3	3.8	4.25																			12	12	15	N=12, blow counts not recorded by 25 mm
BH-BGC11-51	SPT4	5.33	5.78	0	0	1	1	1	1	0	1	3	3	2	1	1	1	1	2	2	3	20	20	26	
BH-BGC11-51	SPT5	9.9	10.25	1	1	1	2	1	2	1	1	2	2	1	3	4	4	3	10			R	17	22	
BH-BGC11-51	SPT6	11.43	11.52																			R	-	-	N = R, blow counts not recorded by 25 mm, less than 150 mm of recovery
BH-BGC11-51	SPT7	20.57	20.62	1	2	R																R	-	-	less than 150 mm recovery
BH-BGC11-51	SPT8	22.1	22.25	15	R																	R	-	-	Frozen
BH-BGC11-53	SPT1	0.76	1.21	0	1	1	1	1	1	1	0	0	1	0	1	0	1	0	1	1	1	7	-	-	less than 150 mm recovery
BH-BGC11-53	SPT2	2.28	2.73	0	1	1	1	2	1	1	2	1	2	1	1	1	2	1	2	1	3	18	18	23	
BH-BGC11-53	SPT3	3.8	4.25	0	1	3	4	3	5	3	2	3	2	2	3	3	2	3	2	3	4	32	32	41	
BH-BGC11-53	SPT4	6.85	7.3	1	1	2	2	3	4	3	3	3	4	4	3	2	4	3	5	5	4	43	43	55	
BH-BGC11-53	SPT5	9.9	10.35	1	1	1	2	2	3	3	5	3	5	4	4	2	3	3	4	8	8	52	43	55	
BH-BGC11-55	SPT1	0.76	1.21	0	0	1	0	1	1	1	1	1	1	1	1	1	2	1	1	1	2	14	14	18	

				Blow Counts per 25 mm Increment																				
Hole	SPT #	Depth From (m)	Depth To (m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	N - Raw	N – Corrected for Gravel Effects	N_{60}	Comments
BH-BGC11-55	SPT2	2.28	2.73	1	0	1	1	1	1	0	1	1	0	1	1	1	1	1	2	1	1	11	11	14	
BH-BGC11-55	SPT3	3.8	4.25	0	1	0	1	1	1	1	1	2	4	2	4	2	2	2	2	2	3	27	27	35	
BH-BGC11-55	SPT4	5.33	5.78	1	0	1	2	1	1	2	1	1	1	1	1	2	1	1	1	2	1	15	15	19	
BH-BGC11-55	SPT5	6.85	7.3	0	0	0	1	0	1	0	1	0	1	2	2	1	1	1	1	1	2	13	13	17	
BH-BGC11-55	SPT6	8.38	8.83	1	1	1	2	1	1	1	1	3	4	4	4	4	4	4	4	4	3	40	12	15	
BH-BGC11-55	SPT7	9.9	10.35	1	1	1	3	4	6	6	6	3	5	6	6	7	7	6	5	5	5	67	67	86	
BH-BGC11-56	SPT1	0.76	1.21	2	2	2	2	2	2	2	2	1	3	2	1	2	1	2	1	1	2	20	20	26	
BH-BGC11-56	SPT2	2.28	2.43	1	1	1	2	1	R													R	-	-	less than 150 mm recovery
BH-BGC11-56	SPT3	3.8	4.25	1	1	3	5	5	3	4	4	4	6	3	2	4	4	5	R			R	48	62	
BH-BGC11-56	SPT4	5.33	5.53	1	3	3	4	4	7	7	R											R	-	-	gravel effects before 150 mm
BH-BGC11-56	SPT5	6.85	7.15	1	0	1	2	2	2	5	5	5	7	9	6	R						R	-	-	gravel effects before 150 mm
BH-BGC11-56	SPT6	8.38	8.53	0	1	1	7	10	R													R	-	-	less than 150 mm recovery
BH-BGC11-57	SPT1	2.28	2.65	0	0	0	2	1	2	3	7	7	4	5	6	6	5	R				R	-	-	frozen
BH-BGC11-57	SPT2	3.8	4.25	2	2	3	4	5	6	4	4	5	5	6	5	7	5	5	7	4	4	61	61	78	
BH-BGC11-57	SPT3	5.33	5.78	2	1	1	1	4	3	4	2	4	5	5	5	5	5	3	4	6	7	55	55	71	
BH-BGC11-57	SPT4	6.85	7.1	2	1	3	6	7	7	7	9	9	R									R	100	100	N_{60} maximum of 100, calculated N_{60} is 128
BH-BGC11-57	SPT5	8.43	8.53	1	1	2	4	R														R	-	-	less than 150 mm recovery
BH-BGC11-57	SPT6	9.9	10.2	0	1	1	2	4	9	5	5	8	5	7	8	R						R	76	98	gravelly sample
BH-BGC11-58	SPT1	5.5	5.5	1	R																	R	-	-	less than 150 mm recovery
BH-BGC11-58	SPT2	6.85	6.9	1	2	R																R	-	-	less than 150 mm recovery
BH-BGC11-60	SPT1	4.6	4.75	3	4	8	7	8	10	R												R	-	-	less than 150 mm penetration
BH-BGC11-60	SPT2	6.85	7	0	1	1	2	5	8	8	R											R	-	-	less than 150 mm recovery
BH-BGC11-65	SPT1	0.76	1.21	1	1	2	2	2	2	2	2	3	3	2	2	3	3	2	2	1	3	28	28	36	
BH-BGC11-65	SPT2	1.52	1.97	1	1	2	1	2	1	2	3	1	2	1	2	1	1	2	1	1	2	19	19	24	
BH-BGC11-65	SPT3	2.28	2.73																			13	13	17	N=13, blow counts not recorded by 25 mm
BH-BGC11-65	SPT4	3.04	3.49	1	1	1	1	1	1	1	2	1	2	2	2	2	1	1	2	2	1	19	19	24	
BH-BGC11-65	SPT5	3.8	4.15	2	2	2	3	2	1	1	2	6	7	7	7	10	R					R	-	-	less than 150 mm recovery
BH-BGC11-65	SPT6	4.56	5.01	4	4	2	1	2	2	2	3	2	2	2	2	2	2	2	2	2	2	25	25	32	
BH-BGC11-65	SPT7	5.33	5.78	3	3	2	2	1	3	3	2	2	1	2	1	1	1	2	1	1	2	19	-	-	less than 150 mm recovery
BH-BGC11-65	SPT8	6.09	6.54	3	5	5	3	3	4	3	2	3	3	1	2	3	3	3	3	2	4	32	-	-	less than 150 mm recovery
BH-BGC11-65	SPT9	6.85	6.9	1	2	R																R	-	-	less than 150 mm recovery

2.1 SPT Energy Measurements

All SPT testing was completed using the auger rig (MARL M4CT) which was equipped with an automatic trip hammer weighing 140 lbs (63.5 kg) and having a drop height of 30 inches (760 mm).

The SPT tests for BH-BGC11-65 were monitored for hammer impact energy using an SPT Analyzer manufactured by Pile Dynamics Inc (PDI) of Cleveland, Ohio. The analyzer system consisted of a short length of instrumented sampling rod inserted in the rod string just below the jar assembly, and a field data recorder. The instrumented rods included two strain gauges permanently bonded to the rod, and two accelerometers bolted to the rod. The signals collected from the strain transducers and accelerometers were then converted by the SPT Analyzer to force and velocity records. Every SPT energy measurement was done using an AW-size instrumented rod.

Force and velocity measurements were recorded for each blow, and the SPT analyzer instantly calculated an average Energy Transfer Ratio (ETR) using the force-velocity method (ASTM D 4633-05). The ETR is given as a percent of the theoretical free fall potential energy of the standard 63.5 kg SPT hammer. Energy data was averaged for every 150 mm SPT increment and the average energy values for the two increments over 150 mm to 450 mm were also averaged to give C_E, the hammer energy correction factor, to correct the blow count value to standard 60% hammer efficiency.

C_E was calculated using the following equation:

$$C_E = \frac{ETR}{60}$$

The average energy measurement for BH-BGC11-65 was 77% of the theoretical free fall potential energy for the SPT tests. Table G.3 summarizes the values obtained.

Table G.3 Measured SPT Energy Transfer Ratios

Test	Depth (m)	Energy Transfer Ratio (ETR)%	
		Mean	Standard Deviation
SPT 1	0.76 – 1.21	78.7	3.6
SPT 2	1.52 – 1.97	79.1	2.9
SPT 4	3.04 – 3.49	77	3.6
SPT 5	3.8 – 4.15	78.4	1.5
SPT 6	4.56 – 5.01	77	1.6
SPT 7	5.33 – 5.78	75	1.5
SPT 8	6.09 – 6.54	76.8	1.6
SPT 9	6.85 – 6.9	75.6	2.2
All SPTs		77.3	2.6

Since the same hammer and equipment were used for all SPT tests, the same energy correction factor was applied to all equivalent SPT N values to calculate SPT $(N)_{60}$ values. These values are shown in figures G-11 through G-20 and in Table G.2.

4.0 DYNAMIC CONE PENETRATION TESTING (DCPT)

Cone penetration testing is conducted using a 60 mm diameter cone driven into the formation at the base of a borehole using repeated blows of a steel weight that slides on the drill rods and impacts a jar assembly or anvil to cause the cone to penetrate a standard distance, usually 300 mm, into the formation. The number of blows needed to achieve this penetration is taken as an indicator of the density or consistency of the formation material.

DCPT testing was completed with the auger rig and the same automatic trip hammer as was used for SPT testing. The DCPT tests were also monitored using SPT analyzer. Blows were counted in 150 mm increments.

A total of four DCPT tests were completed adjacent to BH-BGC11-67/69 and plate load test PT-BGC11-01. Refusal was met in these four tests at 2.5 m, 3.2 m, 0.5 m and 0.6 m.

The average energy measurement for DCPT test A was 81%. The analyzer malfunctioned for the other three DCPT tests. All raw blow counts are presented in Figure G-21 and Table G.4.

Table G.4 DCPT data

Depth		Blows per 150 mm			
From (m)	To (m)	Test A	Test B	Test C	Test D
0.00	0.15	9	11	17	21
0.15	0.30	10	14	43	38
0.30	0.46	18	19	89	75
0.46	0.61	25	30	25 (for no advancement)	131
0.61	0.76	32	36		25 (for no advancement)
0.76	0.91	35	42		
0.91	1.07	51	35		
1.07	1.22	48	32		
1.22	1.37	42	51		
1.37	1.52	29	61		
1.52	1.68	36	60		
1.68	1.83	71	56		
1.83	1.98	59	*		
1.98	2.13	50	62		
2.13	2.29	62	23		
2.29	2.44	62	12		
2.44	2.59	45	19		
2.59	2.74	27 (for no advancement)	23		
2.74	2.90		35		
2.90	3.05		26		
3.05	3.20		31		
3.20	3.35		86		
3.35	3.51		105		

*Lost count of blows.

5.0 WILDCAT PENETROMETER TESTING

Wildcat penetrometer testing is conducted using a hand operated penetration testing tool manufactured by Triggs Technologies of Willoughby Hills, Ohio, USA (Triggs Technologies 2007). The device consists of a safety hammer, rods, a sacrificial cone tip and a lubricating system. The falling portion of the hammer weighs 15.9 kgs (35 lbs) and the drop height is 0.377 m (15 inches). The rods are 1 m long and 2.8 cm (1.1 inches) in diameter. The rods are grooved every 10 cm to allow blow counts to be recorded in 10 cm increments. The sacrificial cone tip is 3.5 cm (1.4 inches) in diameter, has a 90° apex and 10 cm^2 projected area. The lubrication system allows polymer to fill the annulus between the rods and the soil, limiting the hammer energy lost to friction.

Wildcat penetration tests are completed by driving the sacrificial tip into the ground, using the safety hammer. Blows are counted for each 10 cm increment. Additional rods are added to the assembly as penetration continues. Polymer slurry is injected into the assembly or the directly into the annulus between the rods and the ground throughout testing to limit friction between the rods and the ground. Testing is completed when refusal is met (considered to be 50 blows in one 10 cm increment).

A total of 25 Wildcat penetrometer tests were completed (Table G.5). Of the 23 tests, 22 were terminated at refusal and three were terminated at the maximum length of rods available (5 m). Blow counts with depth are plotted in figures G-22 to G-38 and tabulated in Table G.6.

Table G.5 Wildcat Penetrometer Test Locations

Test Number	Test Location	Northing (m)	Easting (m)	Elevation (m)	Test Date	Tested By	Final Depth of Test (m)	Reason for End of Test	Comments
1	near TP-BGC11-90	7100513	459695	977	15/07/2011	LT	3	Refusal	
2	near BH-BGC10-24	7101012	458500	801	15/07/2011	LT/EB	5	Maximum length of rods	0.5 m of granular material present above natural ground as a result of drill pad construction
3	near BH-BGC10-13	7100942	458844	824	17/07/2011	EC	0.3	Refusal on cobbles/boulders	
4	near BH-BGC10-14	7100980	458580	808	17/07/2011	EC	1.3	Refusal	
5	near BH-BGC10-22	7101098	458391	794	17/07/2011	EC	4.9	Maximum length of rods	
6	near TP-BGC11-62	7099924	459251	972	19/07/2011	EC/EB	2.47	Refusal	removed 0.2 m of organics prior to testing
7	near TP-BGC11-69 (test A)	7099457	458915	878	19/07/2011	EC	1	Refusal	
8	near TP-BGC11-69 (test B)	7099457	458915	878	19/07/2011	EC	4.21	Refusal on cobbles/boulders	removed 0.2 m of organics prior to testing
9	Placer Tailings (PQ12-A)	7101199	459747	891	23/07/2011	EC	0.3	Refusal on cobbles/boulders	
10	Placer Tailings (PQ12-B)	7101199	459747	891	23/07/2011	EC	0.3	Refusal on cobbles/boulders	
11	Placer Tailings (PQ13)	7101284	459832	902	23/07/2011	EC	4.9	Maximum length of rods	
12	Placer Tailings (PQ7-A)	7101061	459307	860	23/07/2011	EC	0.1	Refusal on cobbles/boulders	

Test Number	Test Location	Northing (m)	Easting (m)	Elevation (m)	Test Date	Tested By	Final Depth of Test (m)	Reason for End of Test	Comments
13	Placer Tailings (PQ7-B)	7101061	459307	860	23/07/2011	EC	0.3	Refusal on cobbles/boulders	
14	Placer Tailings (PQ6-A)	7101008	459196	842	23/07/2011	EC	0.1	Refusal on cobbles/boulders	
15	Placer Tailings (PQ6-B)	7101008	459196	842	23/07/2011	EC	0.14	Refusal on cobbles/boulders	
16	near TP-BGC11-94 (test A)	7101517	459980	937	23/07/2011	EC	0.7	Refusal on cobbles/boulders	removed 0.25 m of organics prior to testing, frozen ground between 0.1 m and 2.0 m
17	near TP-BGC11-94 (test B)	7101517	459980	937	23/07/2011	EC	2.3	Refusal	removed 0.25 m of organics prior to testing, frozen ground between 0.1 m and 2.0 m
18	near BH-BGC11-53	7100984	459486	890	15/08/2011	LT	1.6	Refusal	
19	near BH-BGC11-55 (test A)	7100913	459448	889	15/08/2011	LT	1.1	Refusal	
20	near BH-BGC11-55 (test B)	7100913	459448	889	15/08/2011	LT	0.87	Refusal	
21	near TP-BGC11-103 (test A)	7101147	458821	866	15/08/2011	LT	0.35	Refusal	
22	near TP-BGC11-103 (test B)	7101148	458828	866	15/08/2011	LT	0.9	Refusal	
23	near TP-BGC11-105	7101199	458935	878	15/08/2011	LT	1	Refusal	

Test Number	Test Location	Northing (m)	Easting (m)	Elevation (m)	Test Date	Tested By	Final Depth of Test (m)	Reason for End of Test	Comments
24	PQ-14 (test A)	7100285	459722	1009	25/08/2011	PQ	0.01	Refusal	near Plate Load Test area 3 at proposed secondary crushers
25	PQ-14 (test B)	7100285	459722	1009	25/08/2011	PQ	0.01	Refusal	near Plate Load Test area 3 at proposed secondary crushers

Table G.6 Wildcat Penetrometer Blow Counts

Test #	1	2	3	4	5
Location	**Near TP-BGC11-90**	**Near BH-BGC10-24**	**Near BH-BGC10-13**	**Near BH-BGC10-14**	**Near BH-BGC10-22**
Material Tested	0.15 m to 1.15 m SAND (SP), 1.15 m to 4 m SILT (MH)	Placer Tailings	Placer Tailings, GRAVEL and SAND (GW/SW)	Placer Tailings, 0 m to 2 m GRAVEL and SAND (GW/SW), 2 m to 9.5 m SILT and SAND	Placer Tailings, 0 m to 4.7 m SAND and SILT (SM/ML)
Depth (m)	Blows per 100 mm				
0.1	4	1	3	7	2
0.2	5	7	20	8	4
0.3	4	9	50	13	6
0.4	4	10		15	6
0.5	9	9		22	7
0.6	9	9		16	5
0.7	9	7		21	5
0.8	11	4		20	6
0.9	8	3		20	5
1	9	3		19	4
1.1	10	2		30	3
1.2	7	2		50	2
1.3	8	2		50	4
1.4	11	2			3
1.5	10	2			4
1.6	9	2			3
1.7	6	1			3
1.8	8	2			4
1.9	8	3			3
2	7	3			3
2.1	11	2			4
2.2	13	3			3
2.3	13	4			4
2.4	10	2			6
2.5	9	2			4
2.6	10	3			4
2.7	9	3			5
2.8	6	3			5
2.9	11	3			5
3	25	2			5
3.1		1			5
3.2		4			4
3.3		4			5
3.4		4			4
3.5		4			5
3.6		5			5
3.7		4			5
3.8		4			6
3.9		4			5
4		2			6
4.1		5			4
4.2		4			5
4.3		4			5
4.4		4			5
4.5		5			5
4.6		4			4
4.7		5			4
4.8		6			4
4.9		8			4
5		12			

Test #	6	7	8	9	10
Location	**Near TP-BGC11-62**	**Near TP-BGC11-69 (test A)**	**Near TP-BGC11-69 (test B)**	**Placer Tailings PQ-12 (test A)**	**Placer Tailings PQ-12 (test B)**
Material Tested	0.2 m to 1 m Cobbly Silt, 1 m to 6.2 m Sandy Silt,	0.2 m to 2.6 m Silt, 2.6 m to 3.2 m Gravelly silt, 3.2 m to 4 m disintegrated bedrock, 4 m t0 6.5 m very blocky bedrock		Placer Tailings	
Depth (m)	Blows per 100 mm				
0.1	1	1	1	11	16
0.2	1	1 blow for 20 cm	1	12	8
0.3	2	2	1	17	Refusal
0.4	3	1	1		
0.5	6	2	1		
0.6	5	3	4		
0.7	6	7	2		
0.8	7	14	12		
0.9	11	12	10		
1	15	45	11		
1.1	14		8		
1.2	27		9		
1.3	20		7		
1.4	24		5		
1.5	25		8		
1.6	15		15		
1.7	11		12		
1.8	14		15		
1.9	12		27		
2	17		15		
2.1	18		14		
2.2	15		8		
2.3	25		8		
2.4	42		8		
2.5	51		9		
2.6			9		
2.7			13		
2.8			23		
2.9			22		
3			23		
3.1			20		
3.2			23		
3.3			23		
3.4			20		
3.5			20		
3.6			22		
3.7			25		
3.8			26		
3.9			19		
4			21		
4.1			35		
4.2			25		
4.3			40		

Test #	11	12	13	14	15
Location	**Placer Tailings PQ-13**	**Placer Tailings PQ-7 (test A)**	**Placer Tailings PQ-7 (test B)**	**Placer Tailings PQ-6 (test A)**	**Placer Tailings PQ-6 (test B)**
Material Tested	0.15 m to 1.15 m SAND (SP), 1.15 m to 4 m SILT (MH)	Placer Tailings		Placer Tailings	
Depth (m)	Blows per 100 mm				
0.1	1	5	12	50	37
0.2	2		15		35
0.3	2		20		
0.4	1				
0.5	1				
0.6	2				
0.7	2				
0.8	2				
0.9	5				
1	2				
1.1	3				
1.2	1				
1.3	3				
1.4	4				
1.5	3				
1.6	3				
1.7	7				
1.8	9				
1.9	4				
2	2				
2.1	4				
2.2	3				
2.3	4				
2.4	3				
2.5	4				
2.6	2				
2.7	4				
2.8	4				
2.9	3				
3	3				
3.1	7				
3.2	4				
3.3	6				
3.4	4				
3.5	5				
3.6	8				
3.7	10				
3.8	6				
3.9	6				
4	9				
4.1	10				
4.2	8				
4.3	8				
4.4	10				
4.5	10				
4.6	10				
4.7	15				
4.8	13				
4.9	14				

Test #	**16**	**17**	**18**	**19**	**20**
Location	**Near TP-BGC11-94 (test A)**	**Near TP – BGC11-94 (test B)**	**Near BH-BGC11-53**	**Near BH-BGC11-55 (test A)**	**Near BH-BGC11-55 (test B)**
Material Tested	0.2 m to 2.0 m Silt, 2.0 m to 5.0 m fine Sand		0 m to 3.8 m Silt	0 m to 8.8 m Silt	
Depth (m)	Blows per 100 mm				
0.1	16	5	1	1	0
0.2	25	21	3	3	0
0.3	22	43	1	2	0
0.4	23	54	4	2	2
0.5	19	70	8	3	4
0.6	66	50	5	3	13
0.7	48	69	5	6	10
0.8		67	4	6	36
0.9		34	6	5	50
1		24	5	29	
1.1		35	22	45+	
1.2		8	18		
1.3		8	24		
1.4		7	19		
1.5		10	16		
1.6		15	50		
1.7		18			
1.8		30			
1.9		22			
2		18			
2.1		21			
2.2		25			
2.3		22			
2.4		14			
2.5		12			
2.6		90			

Test #	**21**	**22**	**23**	**24**	**25**
Location	**Near TP-BGC11-103 (test A)**	**Near TP – BGC11-103 (test B)**	**Near TP-BGC11-105**	**PQ14 (test A)**	**PQ14 (test B)**
Material Tested	0.2 m to 3.5 m Silt		0.2 m to 2.5 m Sand	Metasedimentary Rock	
Depth (m)	Blows per 100 mm				
0.1	13	50	7	50	50
0.2	18		15		
0.3	20		29		
0.4	50		30		
0.5			30		
0.6			36		
0.7			28		
0.8			28		
0.9			25		
1			50		

6.0 REFERENCES

ASTM D 4633-05. Standard Test Method for Energy Measurement for Dynamic Penetrometers.

Triggs Technologies Inc. Manual 14 for the Wildcat Dynamic Cone Penetrometer. May 4, 2007.

FIGURES

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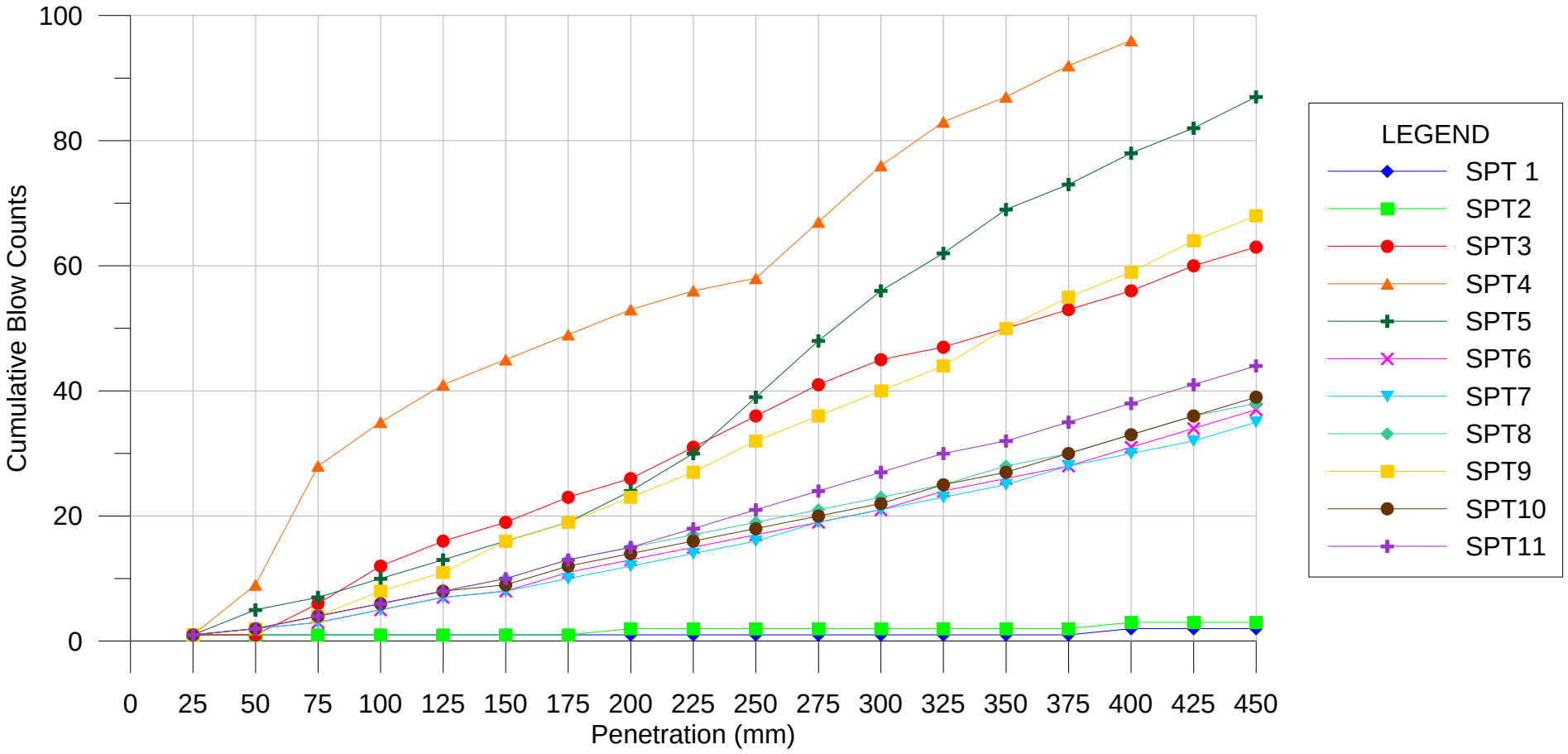

Note: Cumulative blow counts greater than 100 are not plotted.

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-39

CLIENT: VICTORIA GOLD CORP.

PROJECT No. 0792-006

FIG No. G-01

REV. 0

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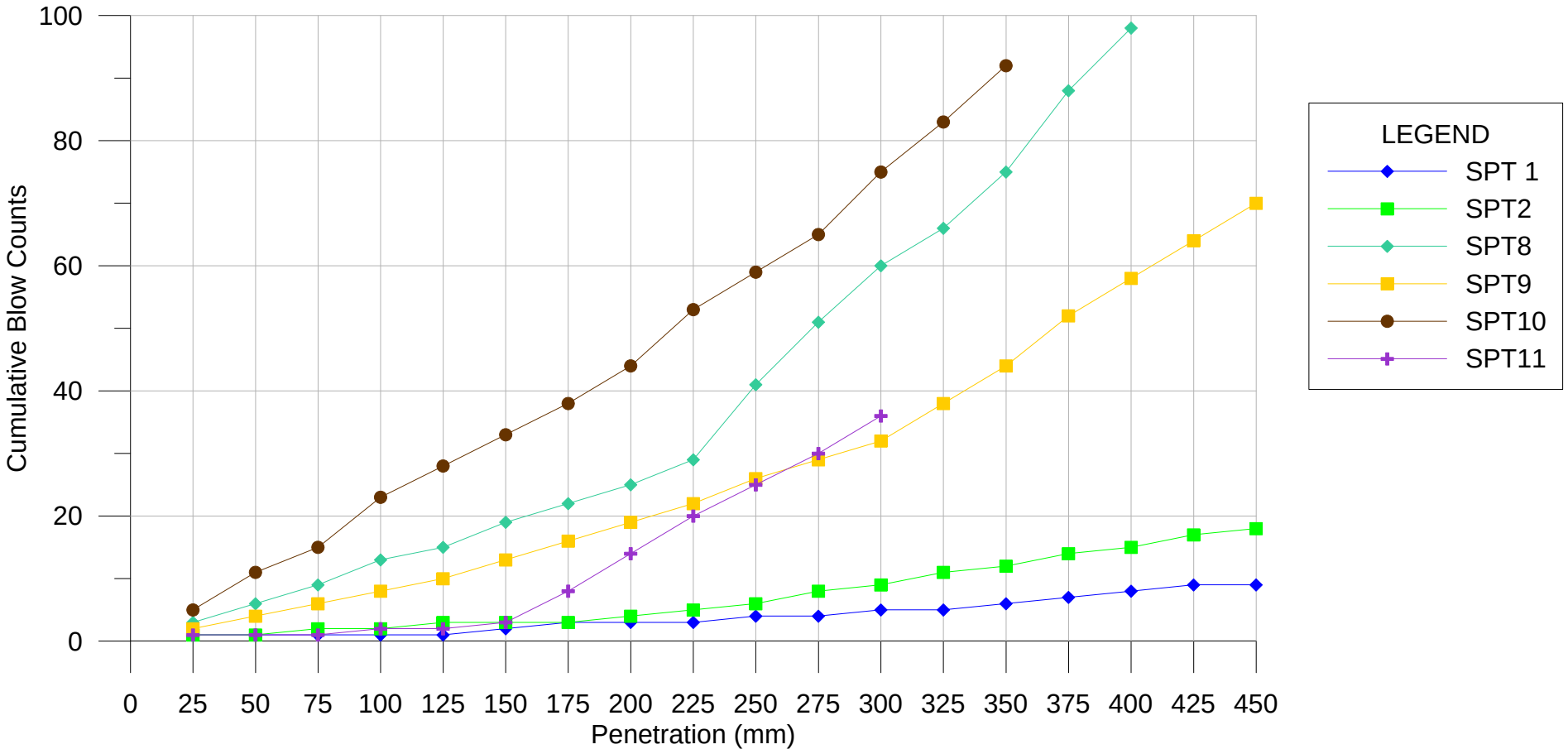

NOTE: SPT 3, 4, 6 and 7 had less than six inches of recovery and are not considered.
NOTE: SPT 5 was frozen and is not considered.
NOTE: Cumulative blow counts greater than 100 are not plotted.

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-44

CLIENT:	PROJECT No.	FIG No.	REV.
VICTORIA GOLD CORP.	0792-006	G-02	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.

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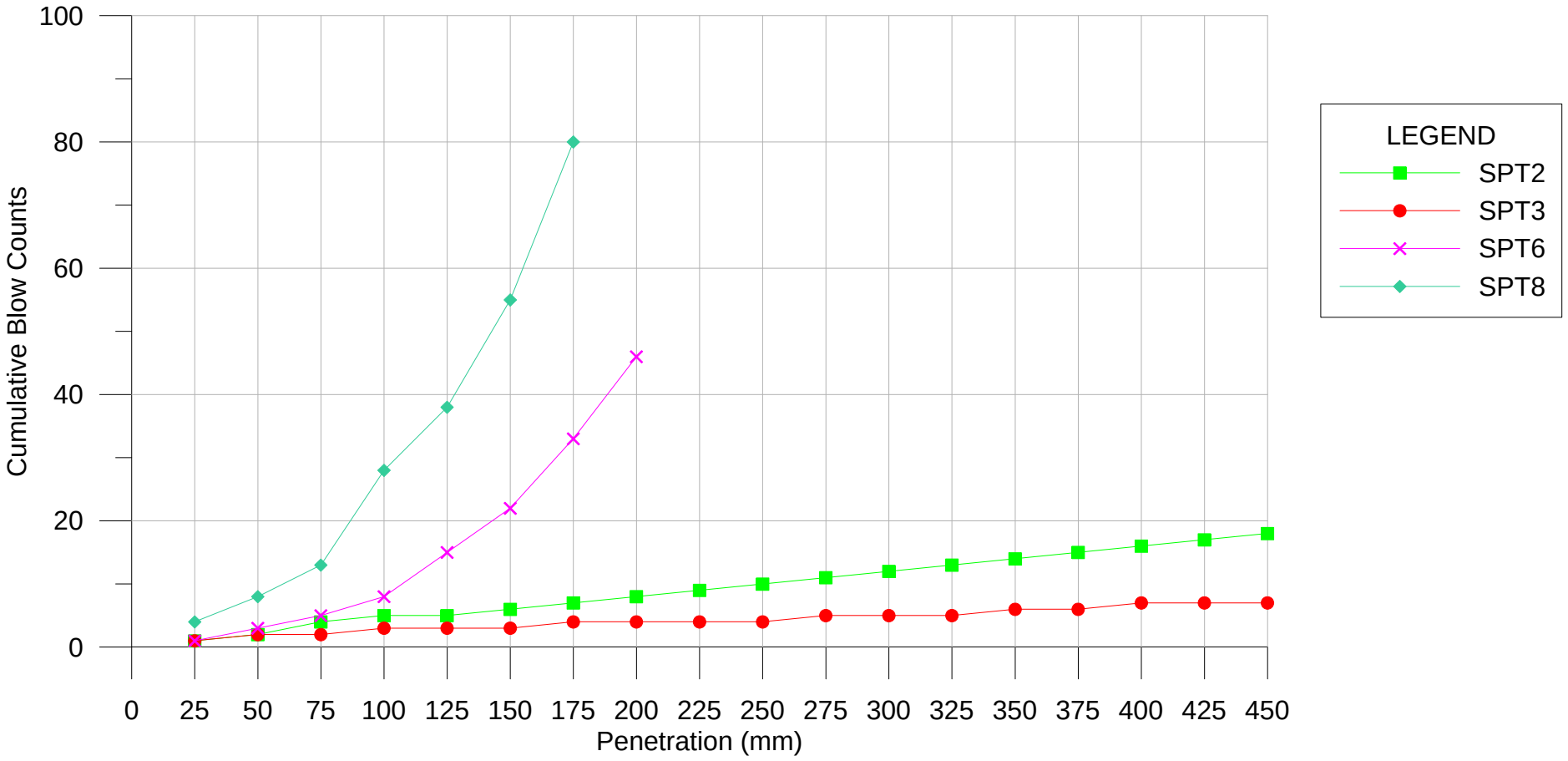

Note: SPT 1, 4 and 5 were frozen and are not considered.
Note: SPT 7 had less than six inches of recovery and is not considered.

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-47

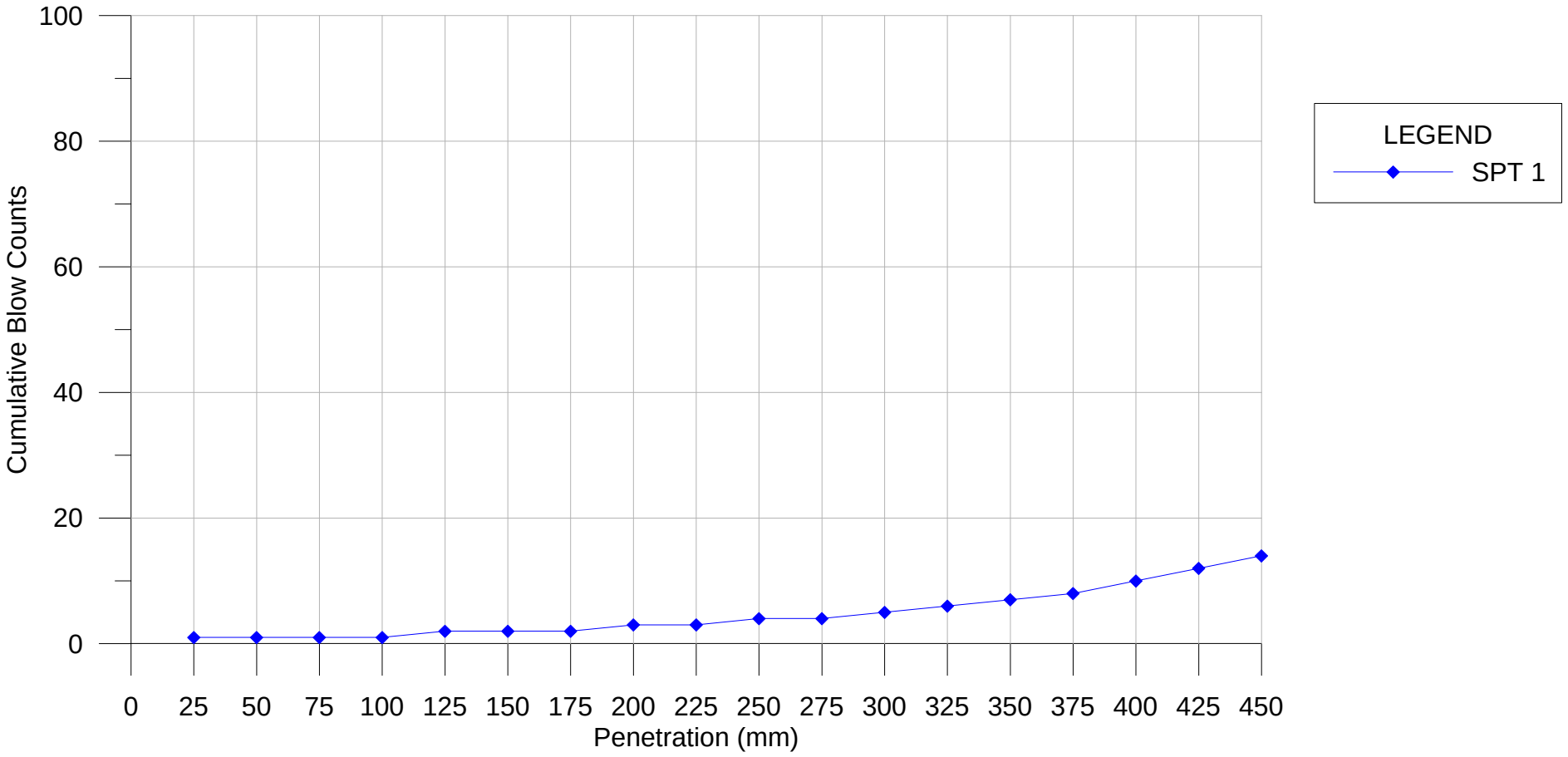
CLIENT: VICTORIA GOLD CORP.

PROJECT No. 0792-006

FIG No. G-03

REV. 0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.



Note: SPT 2 was frozen and is not considered.

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-49

CLIENT: VICTORIA GOLD CORP.

PROJECT No. 0792-006

FIG No. G-04

REV. 0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.

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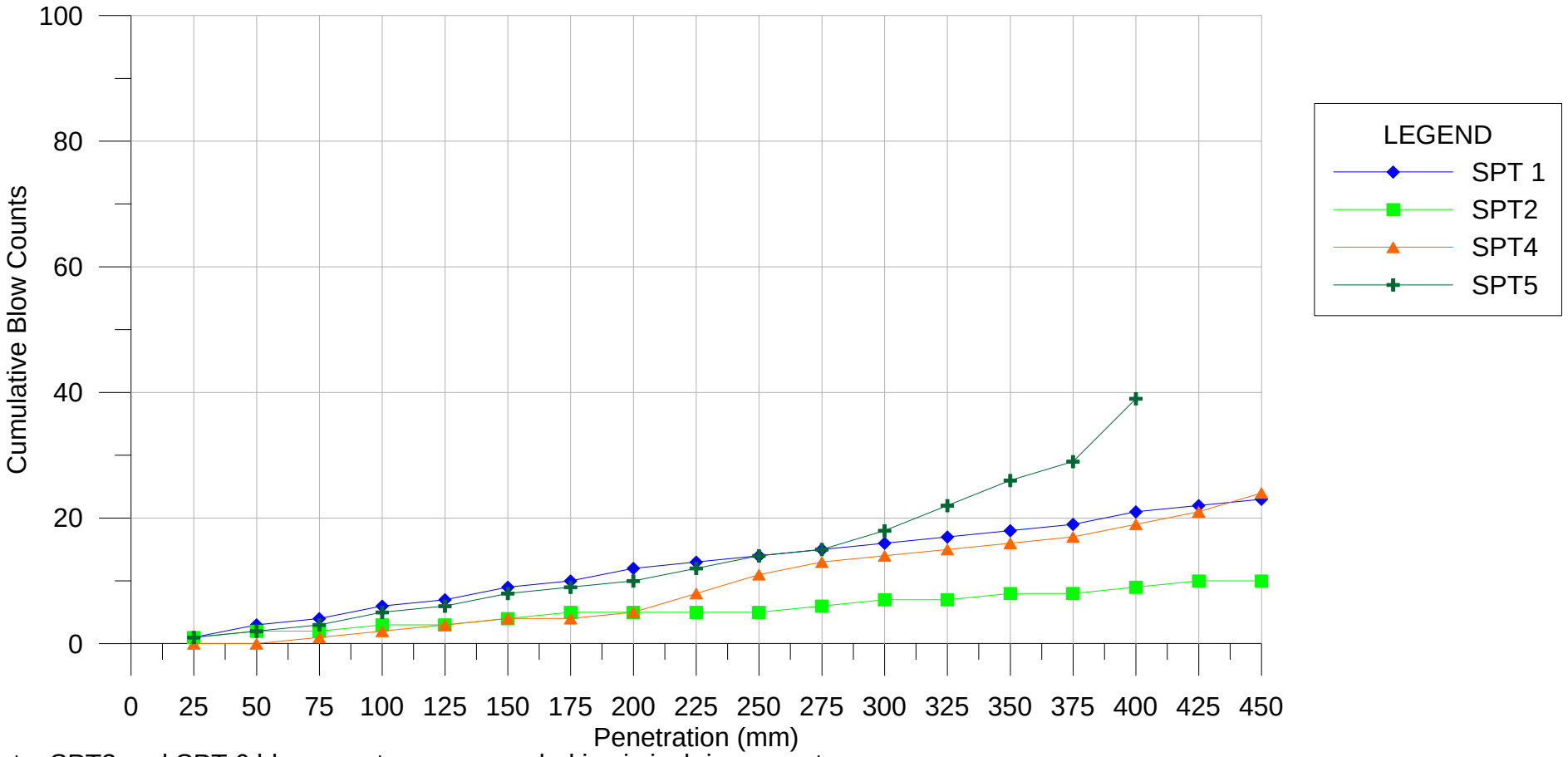

Note: SPT3 and SPT 6 blow counts were recorded in six inch increments.
Note: SPT7 had less than six inches of recovery and is not considered.
Note: SPT8 was completed in frozen material and is not considered.

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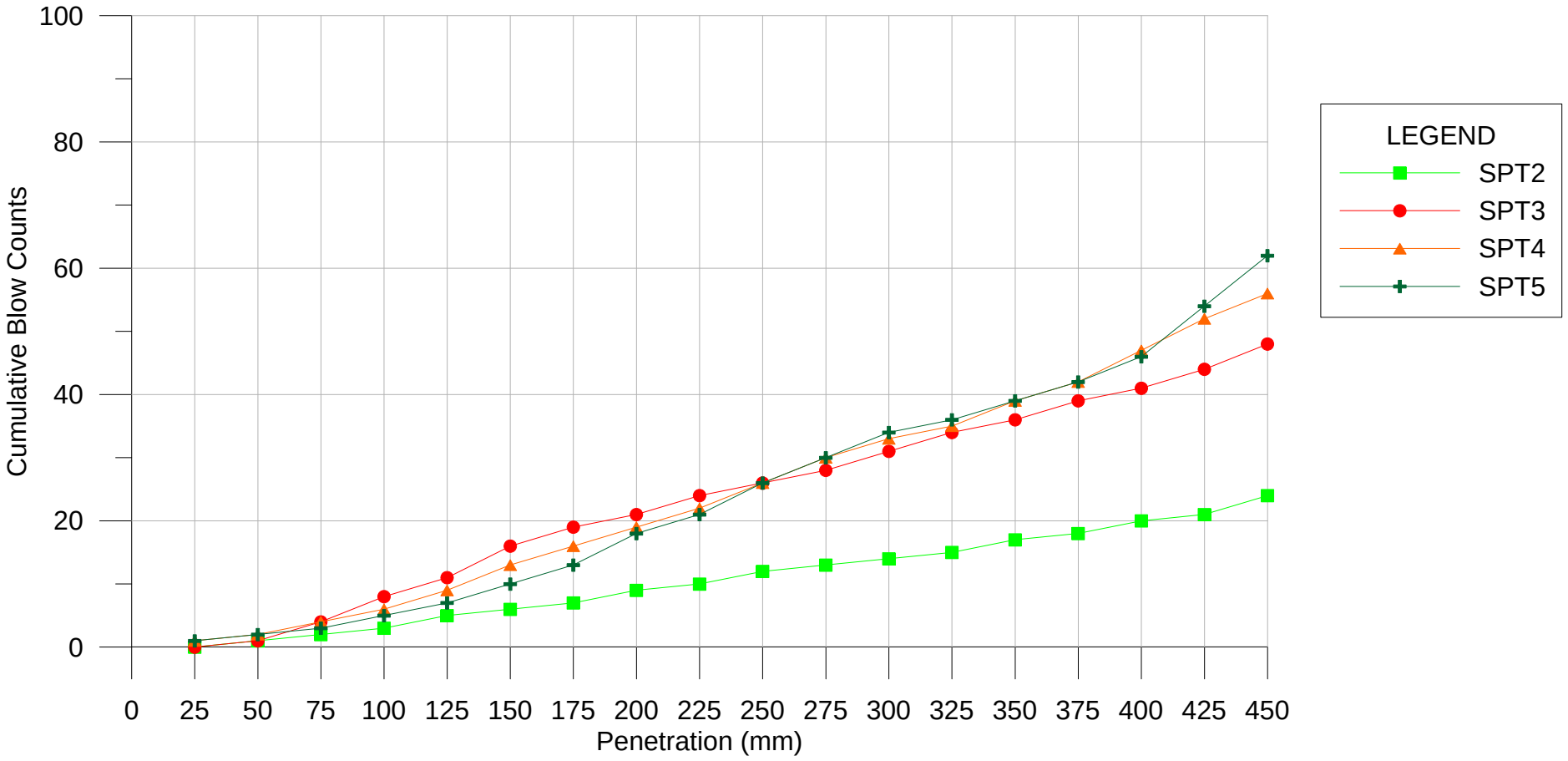
TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-51

CLIENT: VICTORIA GOLD CORP.

PROJECT No.	FIG No.	REV.
0792-006	G-05	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.



Note: SPT 1 had less than six inches of recovery and is not considered.

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-53

CLIENT: VICTORIA GOLD CORP.

PROJECT No.	FIG No.	REV.
0792-006	G-06	0

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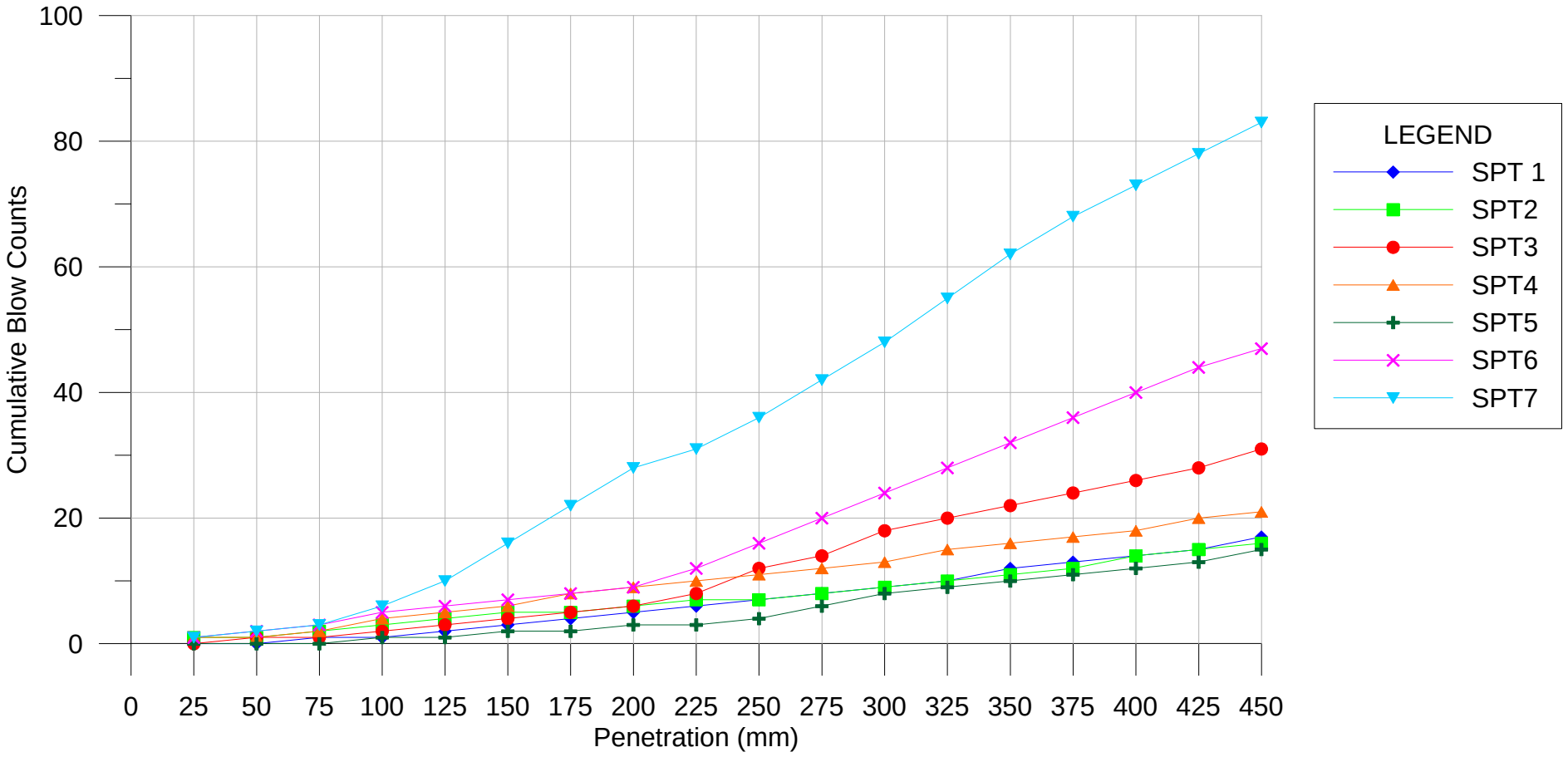

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TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-55

CLIENT: VICTORIA GOLD CORP.

PROJECT No. 0792-006

FIG No. G-07

REV. 0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.

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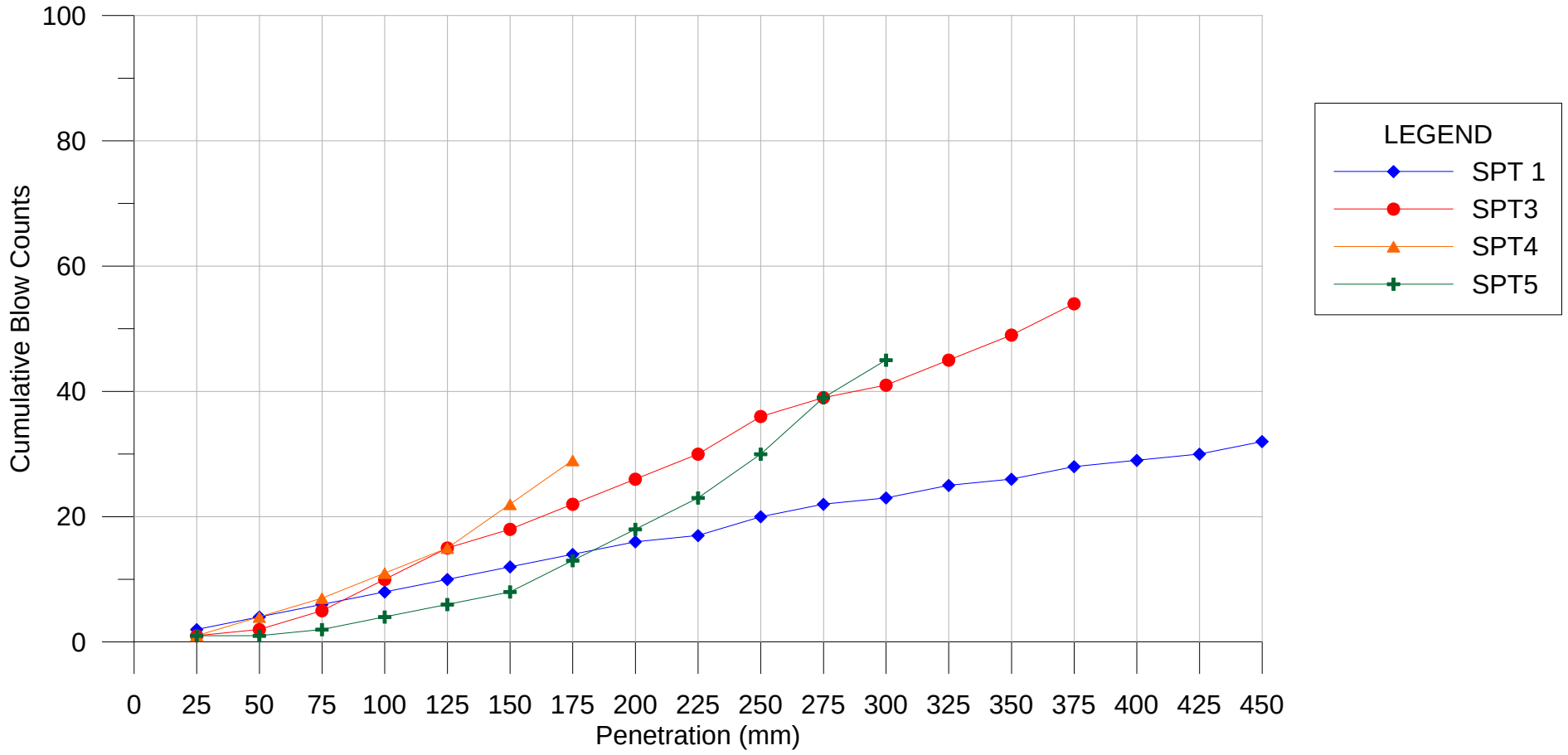

Note: SPT2 had no recovery and is not considered.
Note: SPT6 had less than six inches of recovery and is not considered.

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NTS	JAN 2012	KH	KH	DW	PQ

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Vancouver, BC
Phone: (604) 684 5900

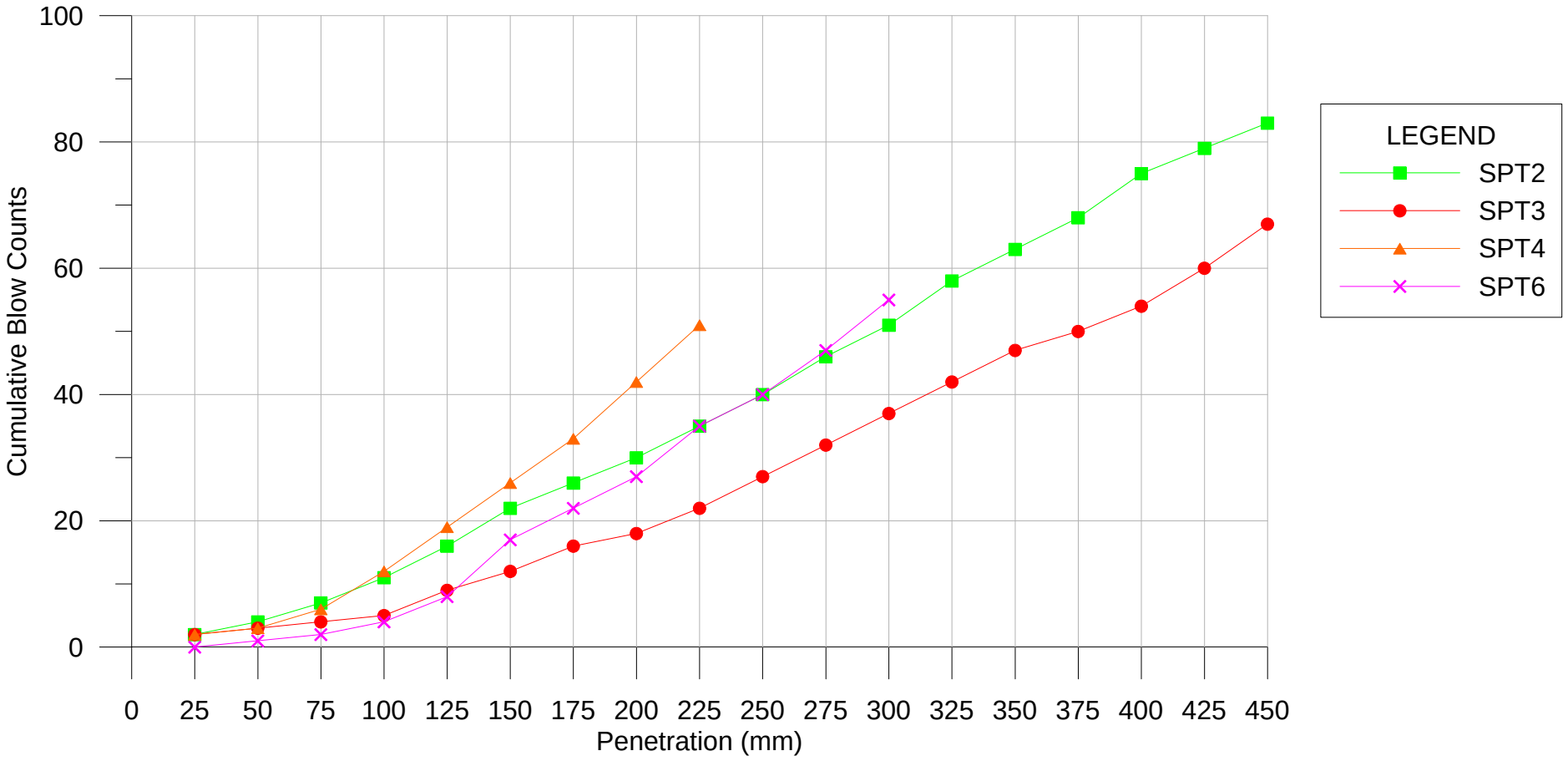
PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-56

CLIENT: VICTORIA GOLD CORP.

PROJECT No.	FIG No.	REV.
0792-006	G-08	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.



Note: SPT1 was frozen and is not considered.
Note: SPT5 had less than six inches of penetration so is not considered.

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NTS	JAN 2012	KH	KH	DW	PQ

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PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-57

CLIENT: VICTORIA GOLD CORP.

PROJECT No. 0792-006

FIG No. G-09

REV. 0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.

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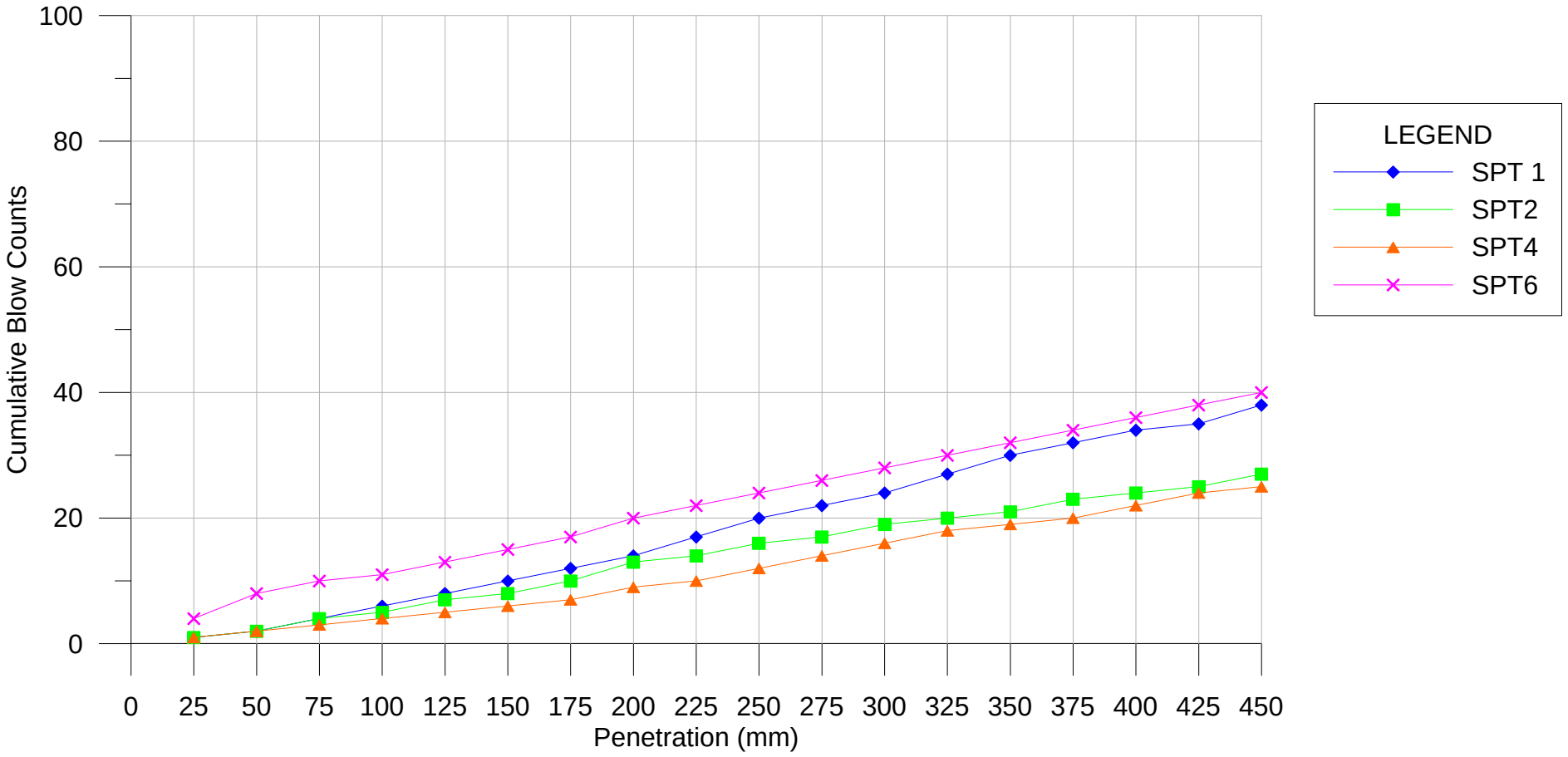

Note: SPT3 blow counts were recorded in six inch increments are not included in this plot.
Note SPT 5, 7, 8 and 9 had less than six inches of recovery and are not considered.

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NTS	JAN 2012	KH	KH	DW	PQ

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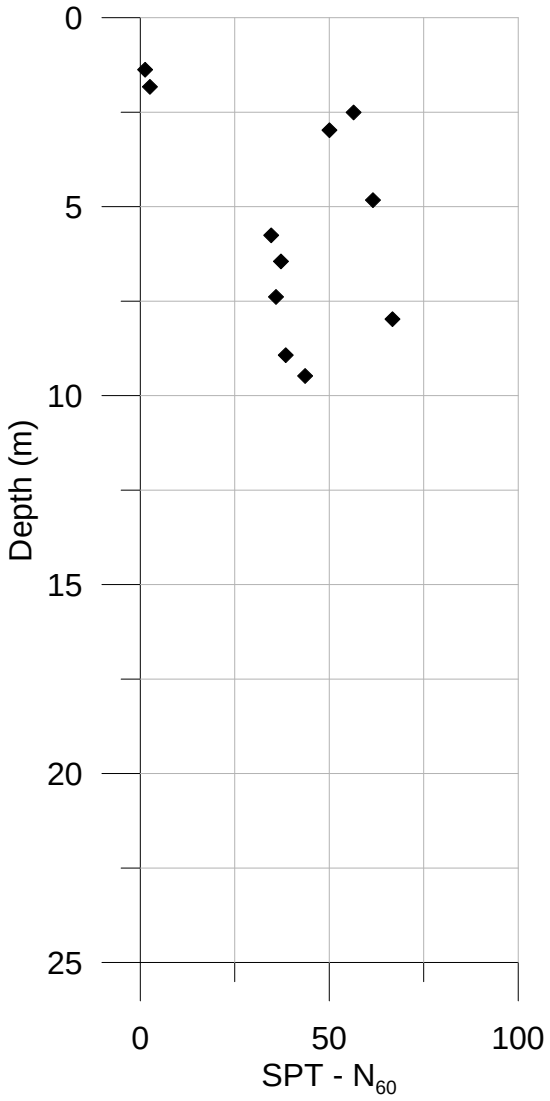
PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: CUMULATIVE SPT BLOW COUNTS BH-BGC11-65

CLIENT: VICTORIA GOLD CORP.

PROJECT No.	FIG No.	REV.
0792-006	G-10	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT". DATED JAN 2012.



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DRAWN:	KH	APPROVED:	PQ

CLIENT:
VICTORIA GOLD CORP.

PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE:
SPT N_{60} BH-BGC11-39

PROJECT No.	FIG No.	REV.
0792-006	G-11	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTN60 plots

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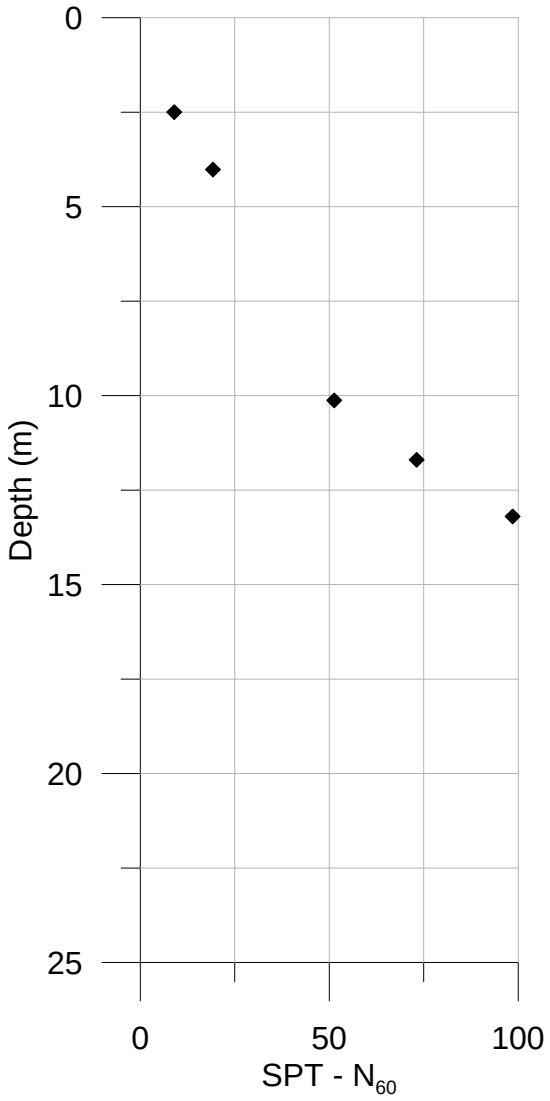

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CLIENT:
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PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE:
SPT N_{60} BH-BGC11-44

PROJECT No.	FIG No.	REV.
0792-006	G-12	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTNN60 plots

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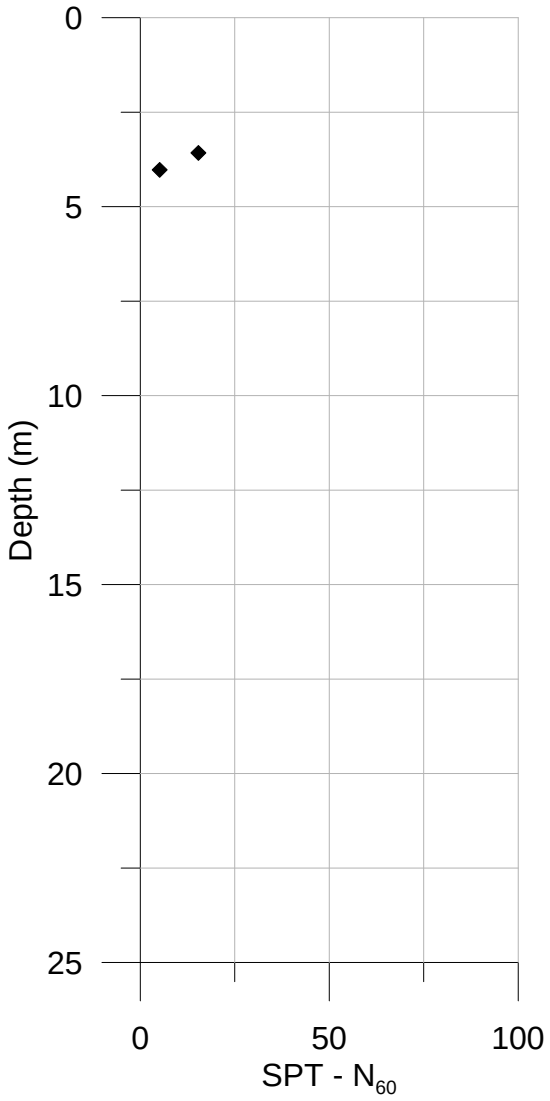

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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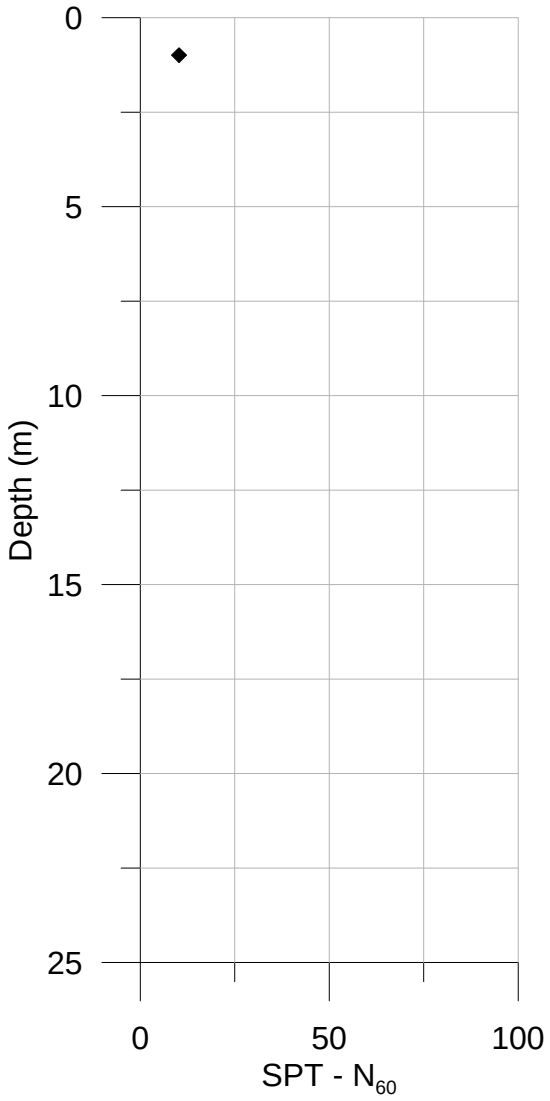
TITLE: SPT N_{60} BH-BGC11-47

PROJECT No.	FIG No.	REV.
0792-006	G-13	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTN60 plots

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.



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PROJECT:
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BGC ENGINEERING INC.
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TITLE:
SPT N_{60} BH-BGC11-49

PROJECT No.	FIG No.	REV.
0792-006	G-14	0

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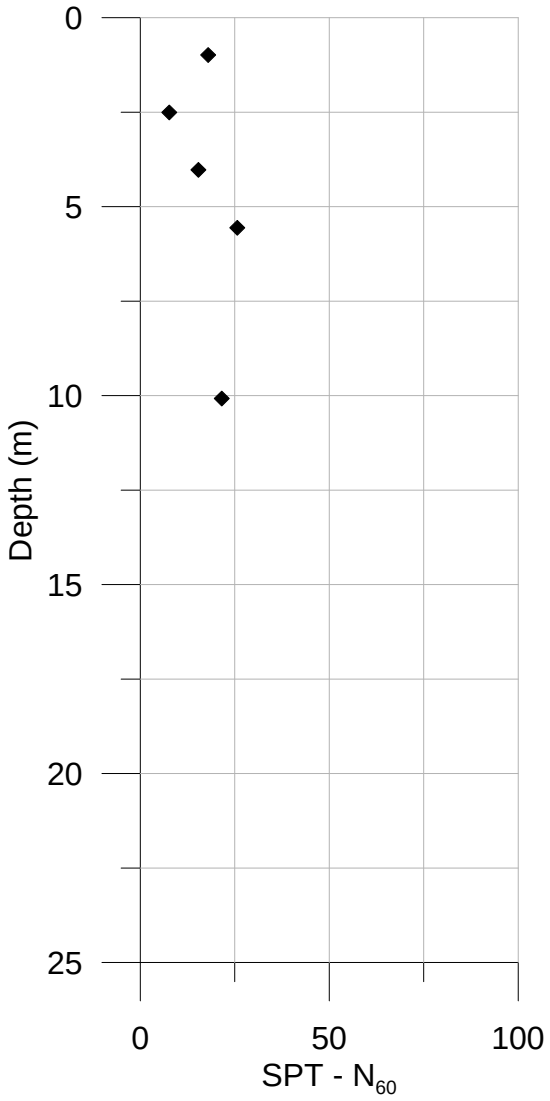

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CLIENT:
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PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE:
SPT N_{60} BH-BGC11-51

PROJECT No.	FIG No.	REV.
0792-006	G-15	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTN60 plots

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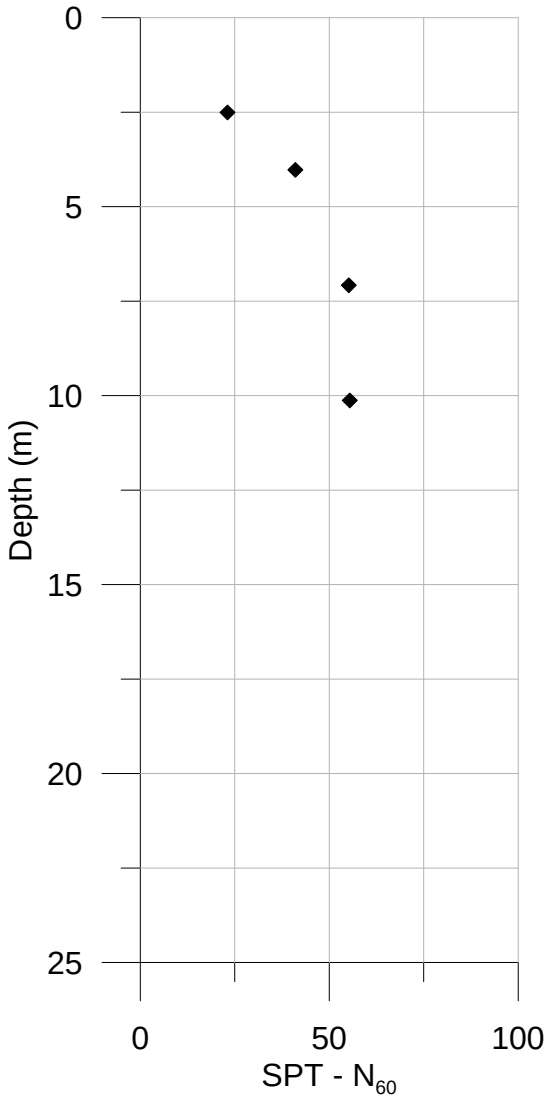

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DRAWN:	KH	APPROVED:	PQ

CLIENT:
VICTORIA GOLD CORP.

PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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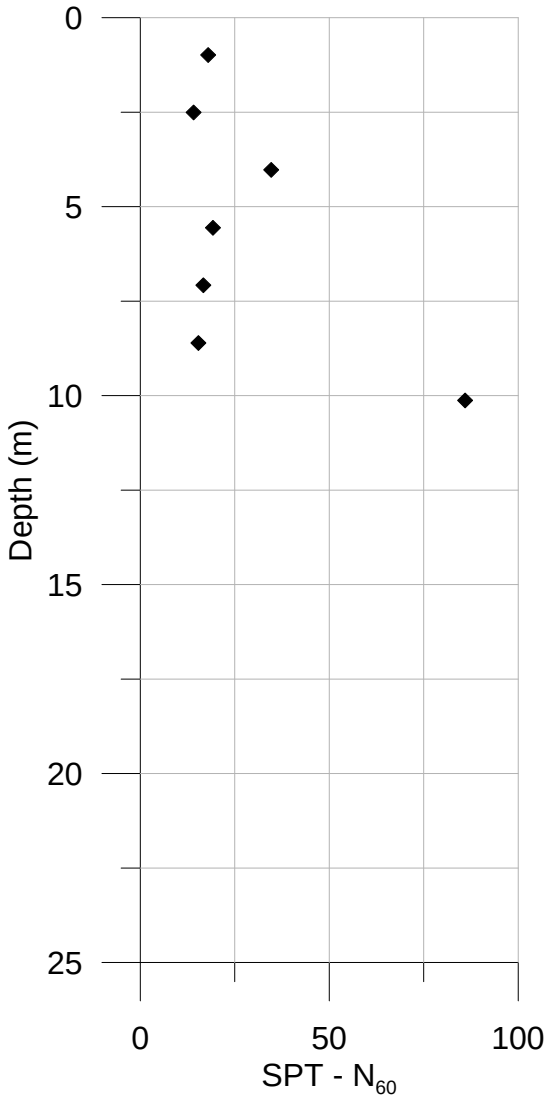
TITLE:
SPT N_{60} BH-BGC11-53

PROJECT No.	FIG No.	REV.
0792-006	G-16	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTNN60 plots

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.



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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE: SPT N_{60} BH-BGC11-55

PROJECT No.	FIG No.	REV.
0792-006	G-17	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTN60 plots

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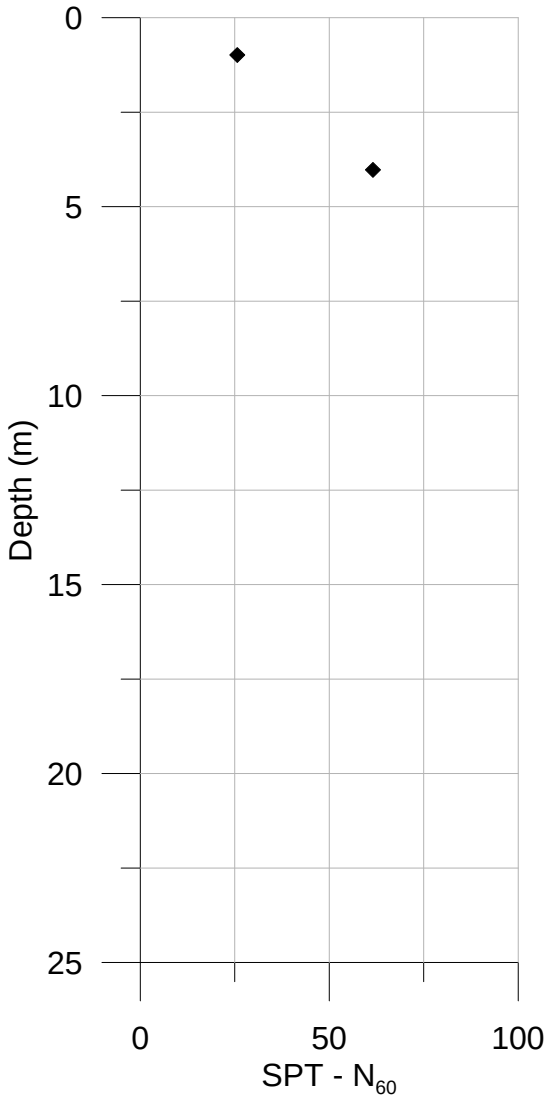

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE: SPT N_{60} BH-BGC11-56

PROJECT No.	FIG No.	REV.
0792-006	G-18	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTNN60 plots

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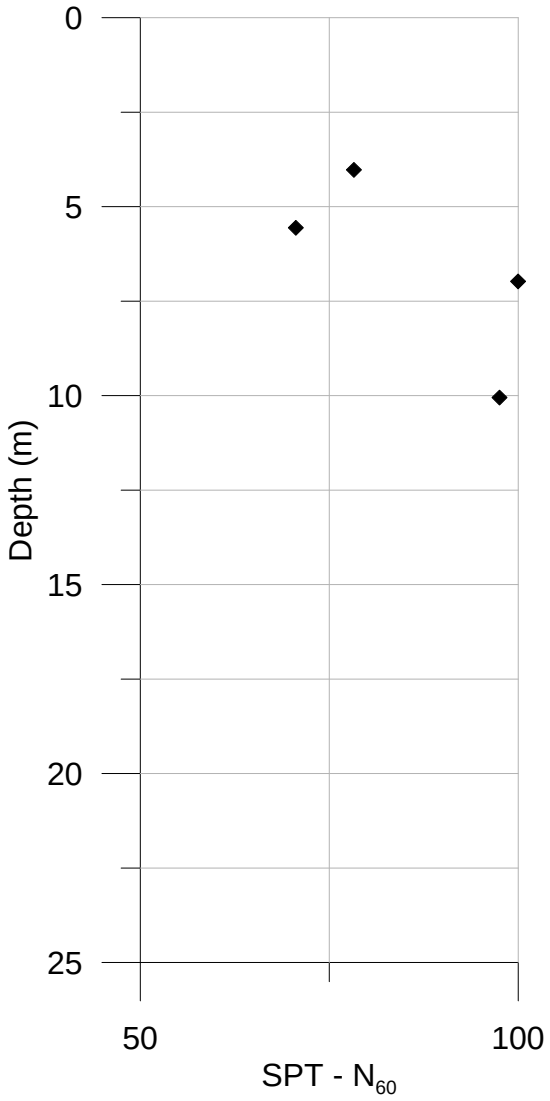

Note: Calculated N_{60} values exceeding 100 are truncated to 100.

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE: SPT N_{60} BH-BGC11-57

PROJECT No.	FIG No.	REV.
0792-006	G-19	0

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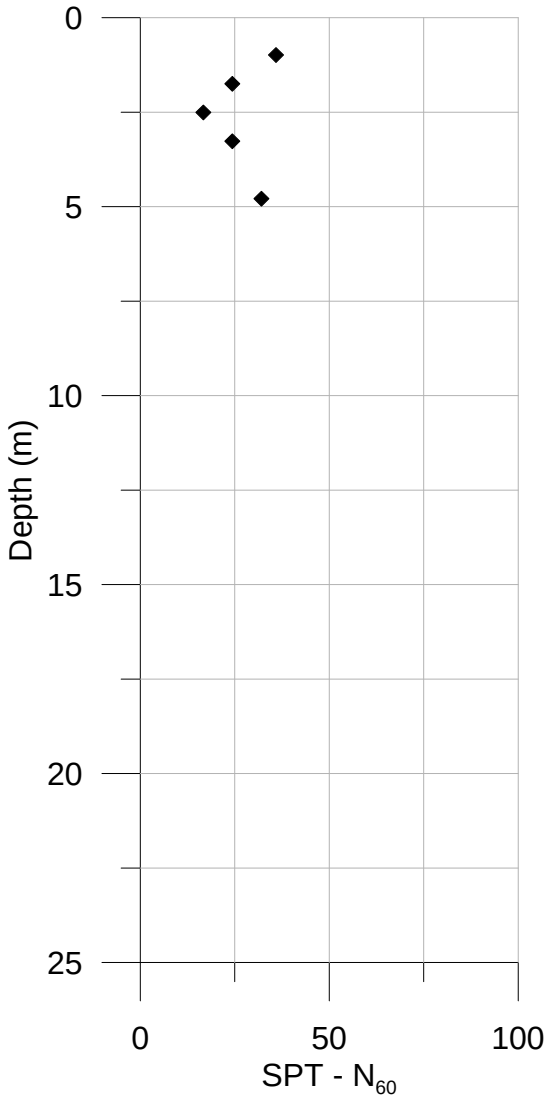

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SCALE:	NTS	DESIGN:	KH
DATE:	JAN 2012	CHECKED:	DW
DRAWN:	KH	APPROVED:	PQ

CLIENT:
VICTORIA GOLD CORP.

PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

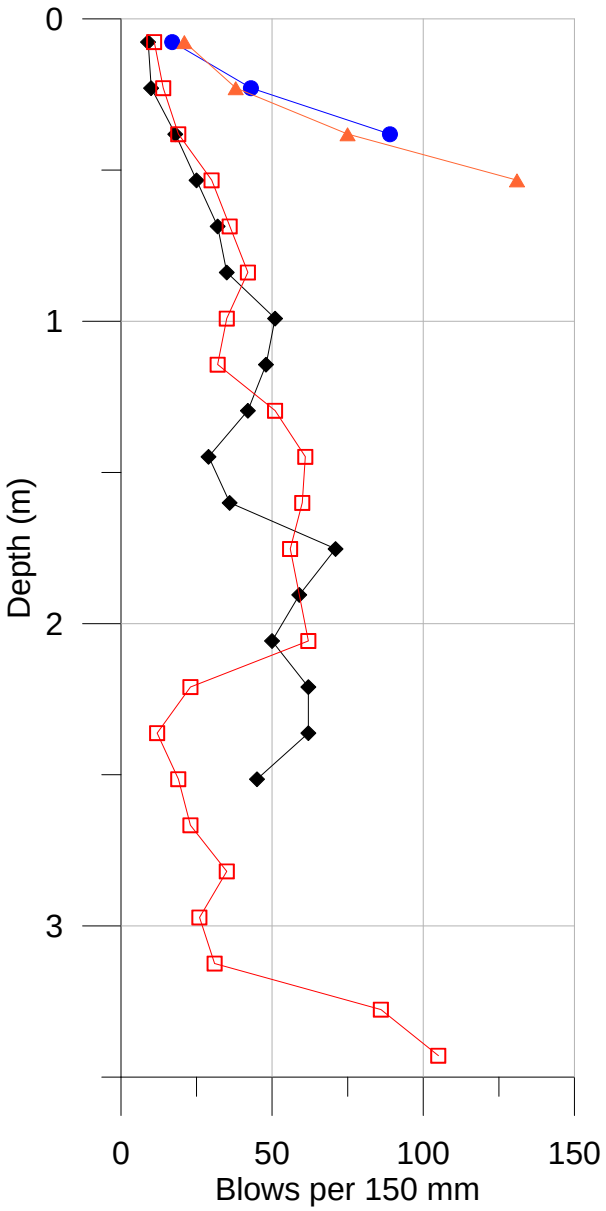
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

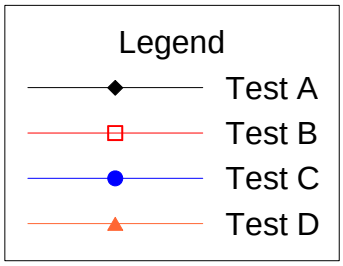
TITLE:
SPT N_{60} BH-BGC11-65

PROJECT No.	FIG No.	REV.
0792-006	G-20	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\SPTN60 plots

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.





Notes:
1. Tests conducted within 3 m of each other adjacent to BH-BGC11-67.
2. Located adjacent to plate load test PT-BGC11-01 and BH-BGC11-69.

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

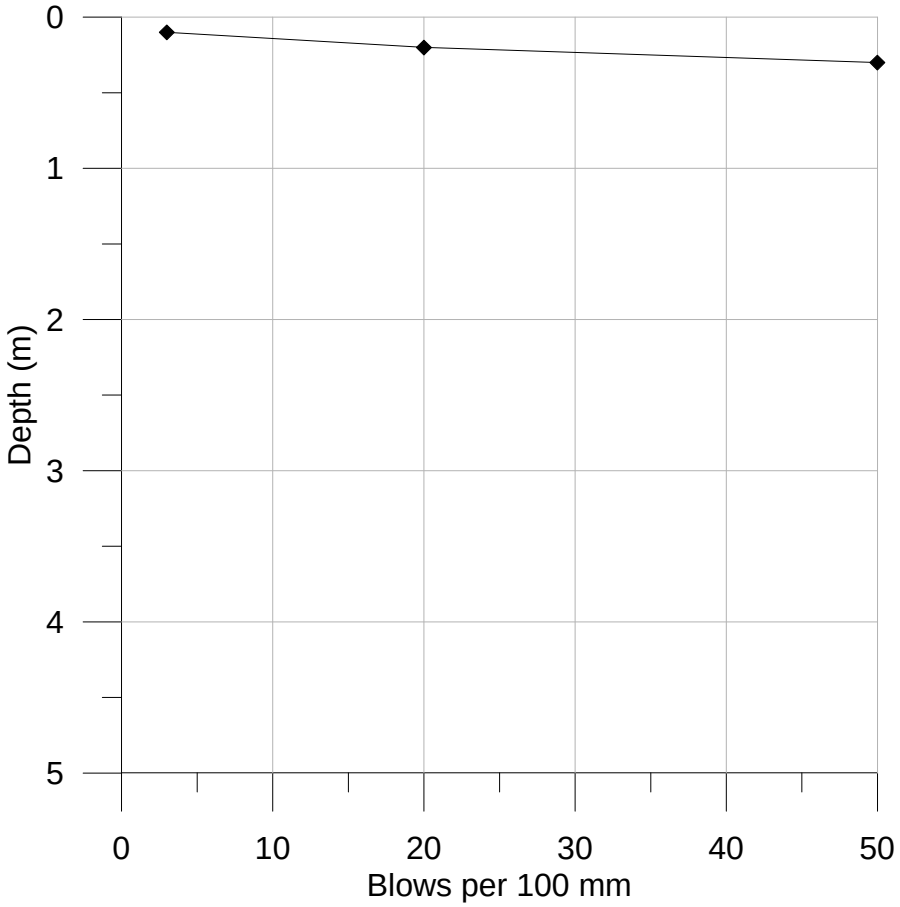
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: DCPT TESTING AT BH-BGC11-67

PROJECT No.	FIG No.	REV.
0792-006	G-21	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\DCPT

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.



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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC10-13

PROJECT No.	FIG No.	REV.
0792-006	G-22	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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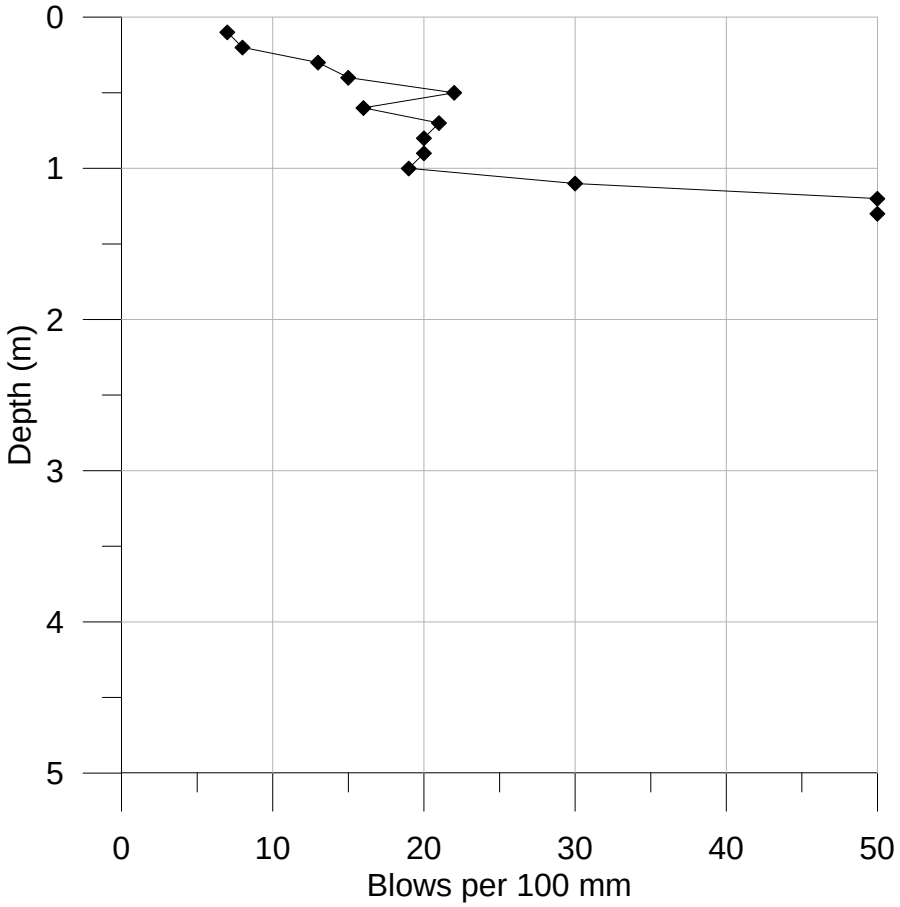

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DRAWN:	KH	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC10-14

PROJECT No.	FIG No.	REV.
0792-006	G-23	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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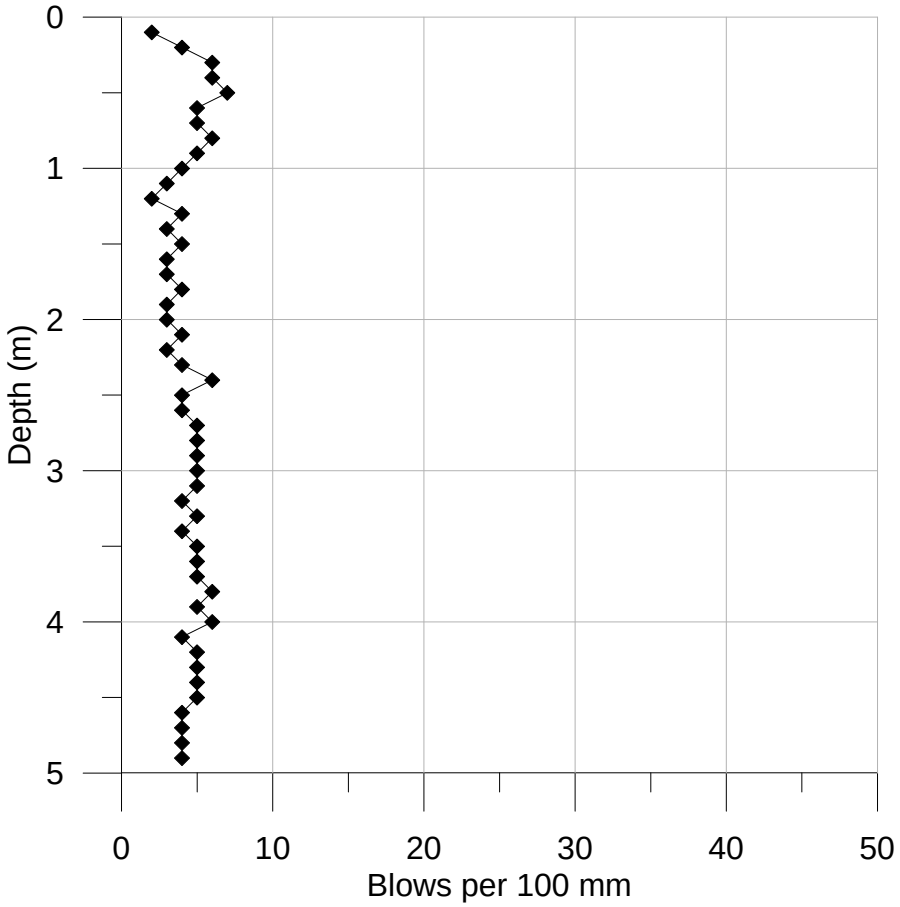

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DRAWN:	KH	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC10-22

PROJECT No.	FIG No.	REV.
0792-006	G-24	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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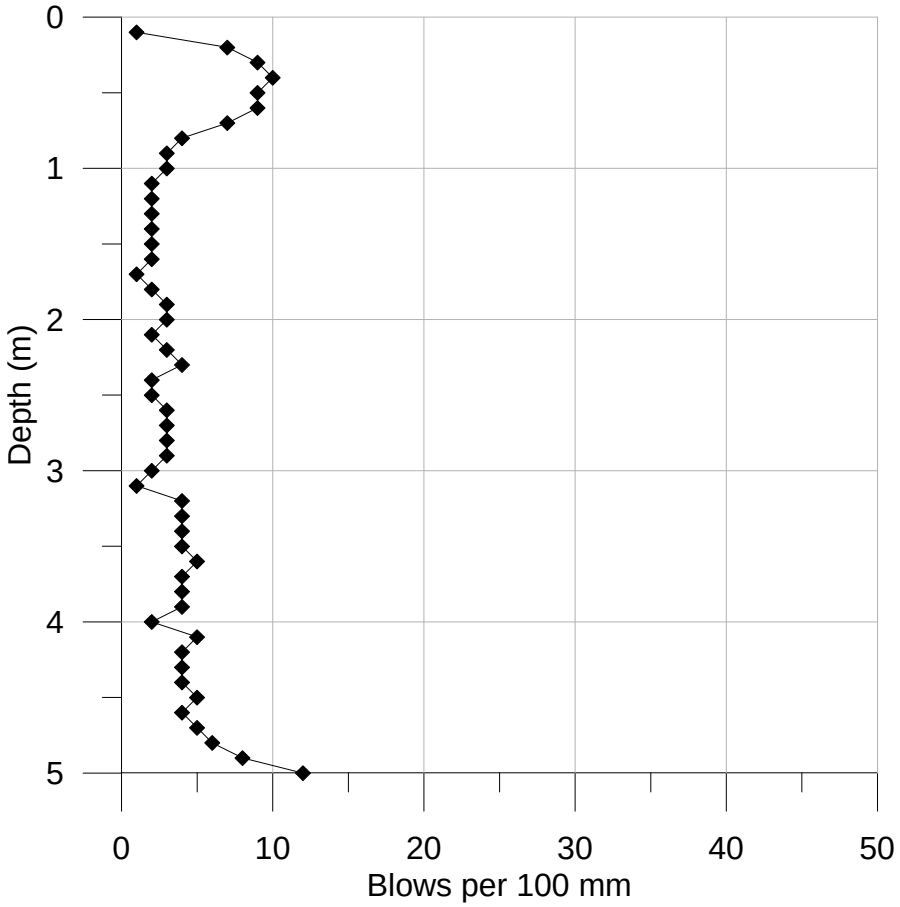

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC10-24

PROJECT No.	FIG No.	REV.
0792-006	G-25	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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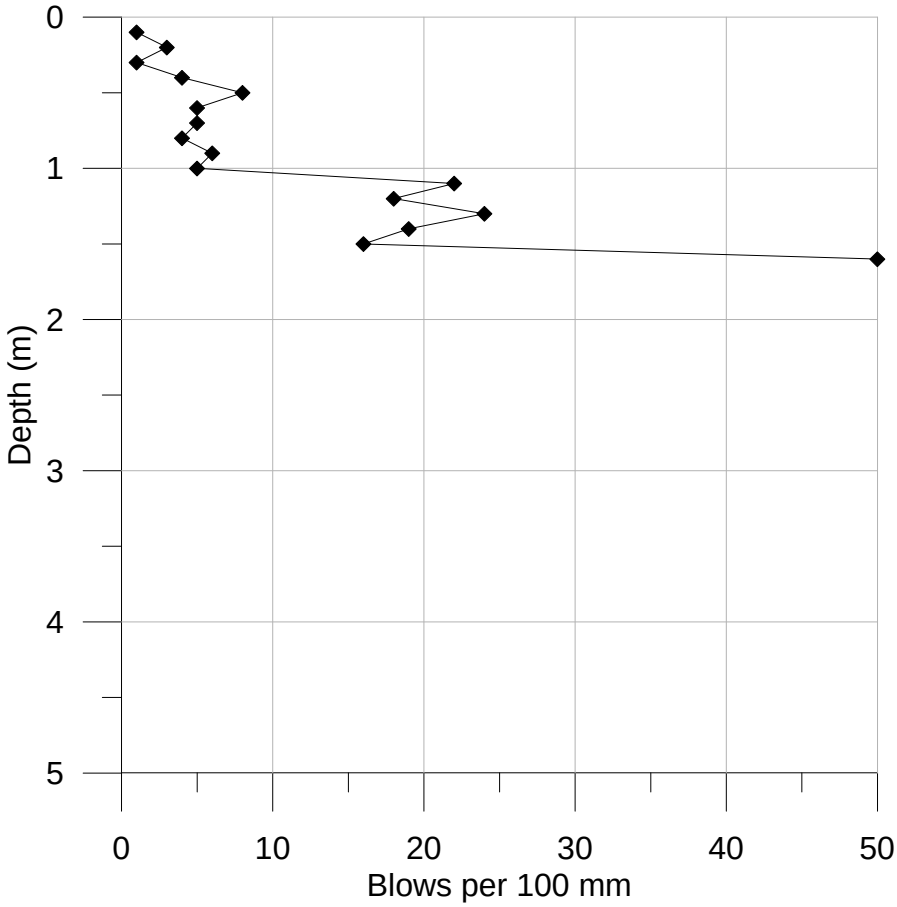

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

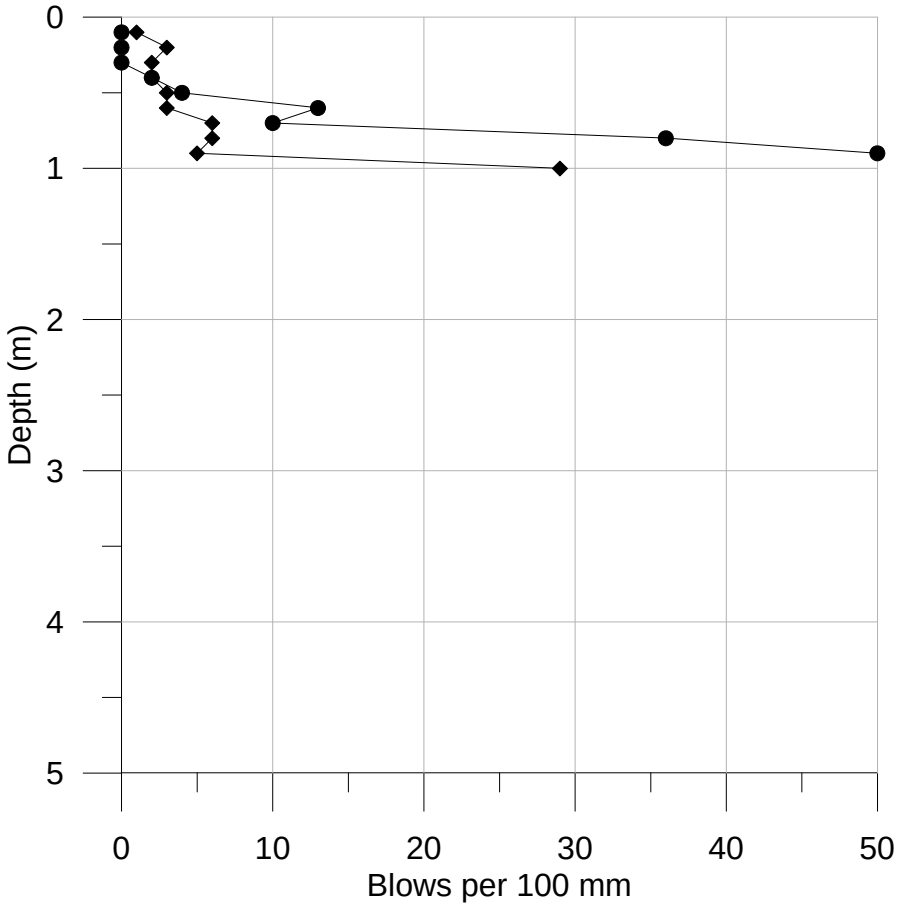
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC11-53

PROJECT No.	FIG No.	REV.
0792-006	G-26	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.



LEGEND

BH-BGC11-55 (TEST A)

BH-BGC11-55 (TEST B)

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near BH-BGC11-55

PROJECT No.	FIG No.	REV.
0792-006	G-27	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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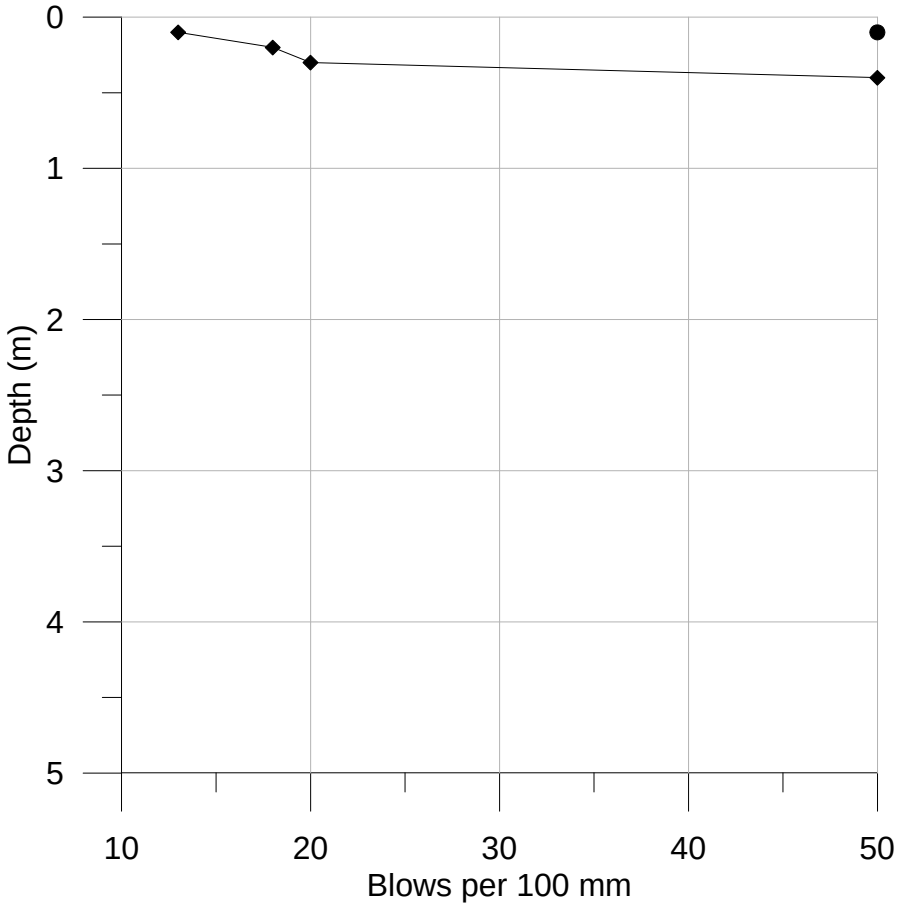

LEGEND

TP-BGC11-103 (TEST A)

TP-BGC11-103 (TEST B)

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

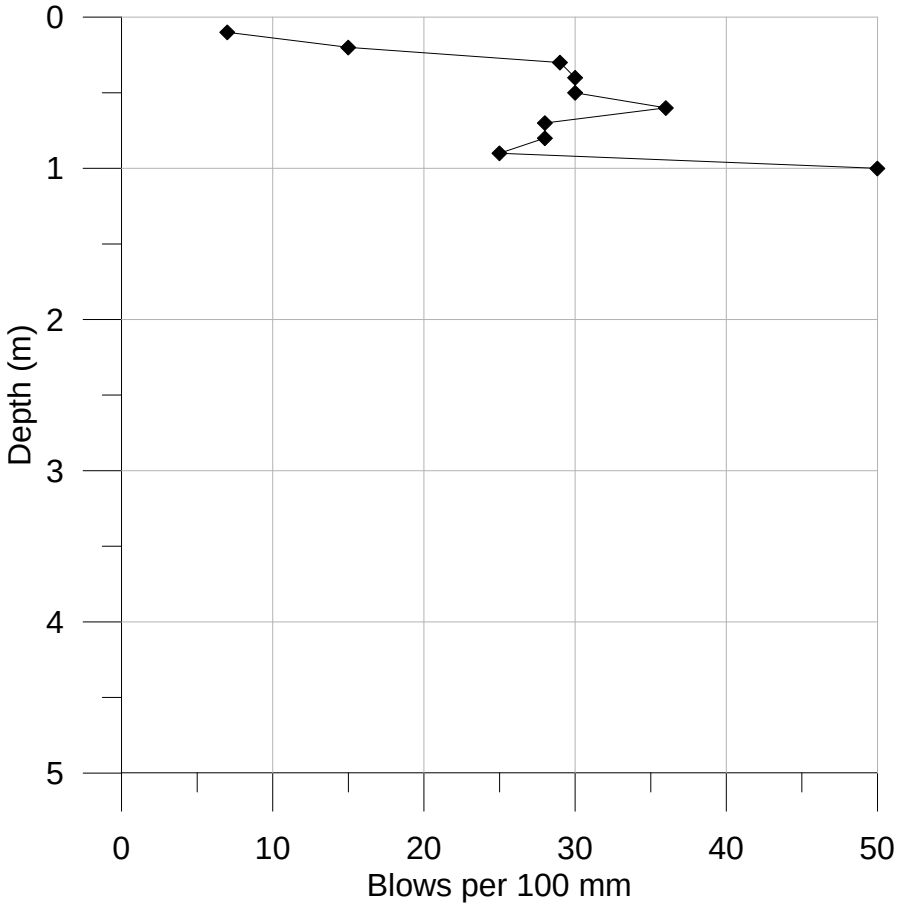
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near TP-BGC11-103

PROJECT No.	FIG No.	REV.
0792-006	G-32	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.



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CLIENT:
VICTORIA GOLD CORP.

PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

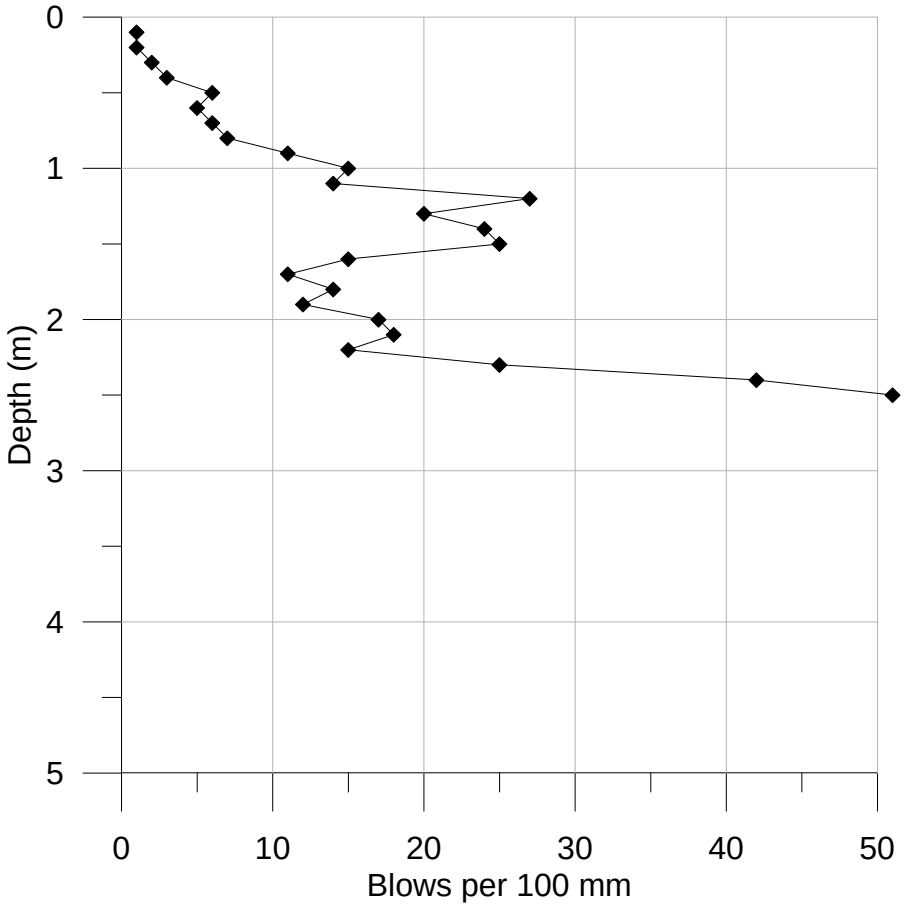
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE:
Wildcat Penetrometer Testing
near TP-BGC11-105

PROJECT No.	FIG No.	REV.
0792-006	G-33	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.

J:\0863 Cerro Casale\0863-003 Plantsite\05 Reporting\REV A Plant Site Report\3_Appendices\J_Settlement Calcs\Figures\Settlement-scenarios.pdf



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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near TP-BGC11-62

PROJECT No.	FIG No.	REV.
0792-006	G-28	0

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots

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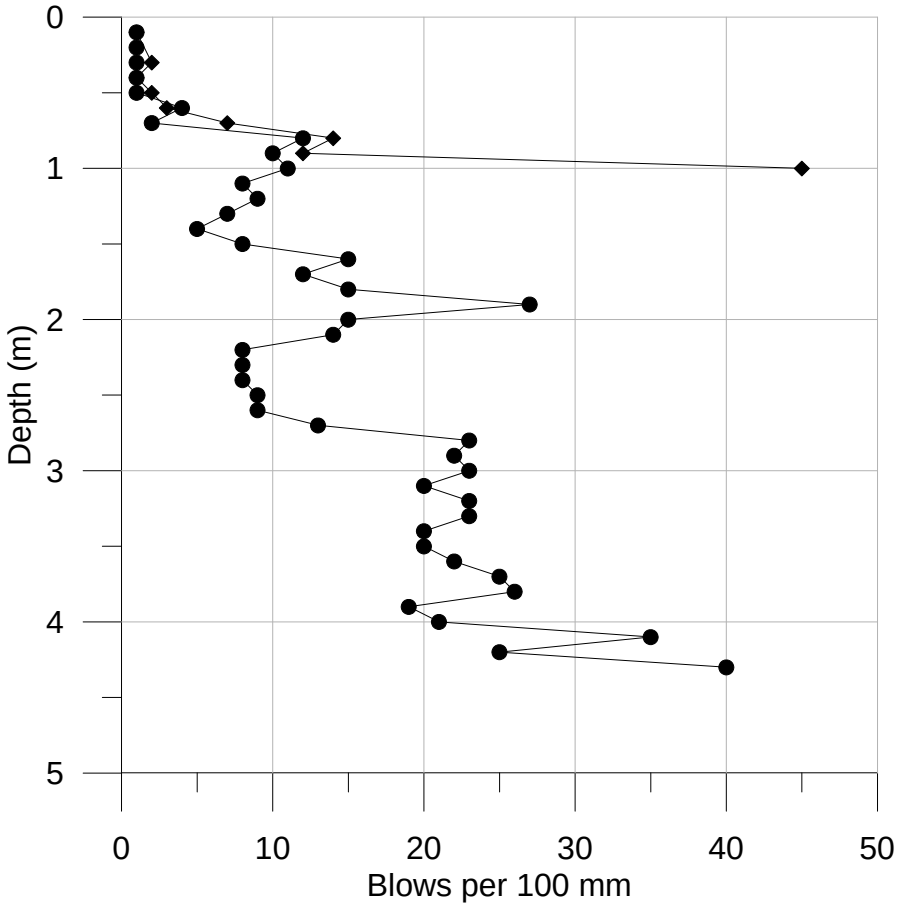

LEGEND

TP-BGC11-69 (TEST A)

TP-BGC11-69 (TEST B)

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DRAWN:	KH	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

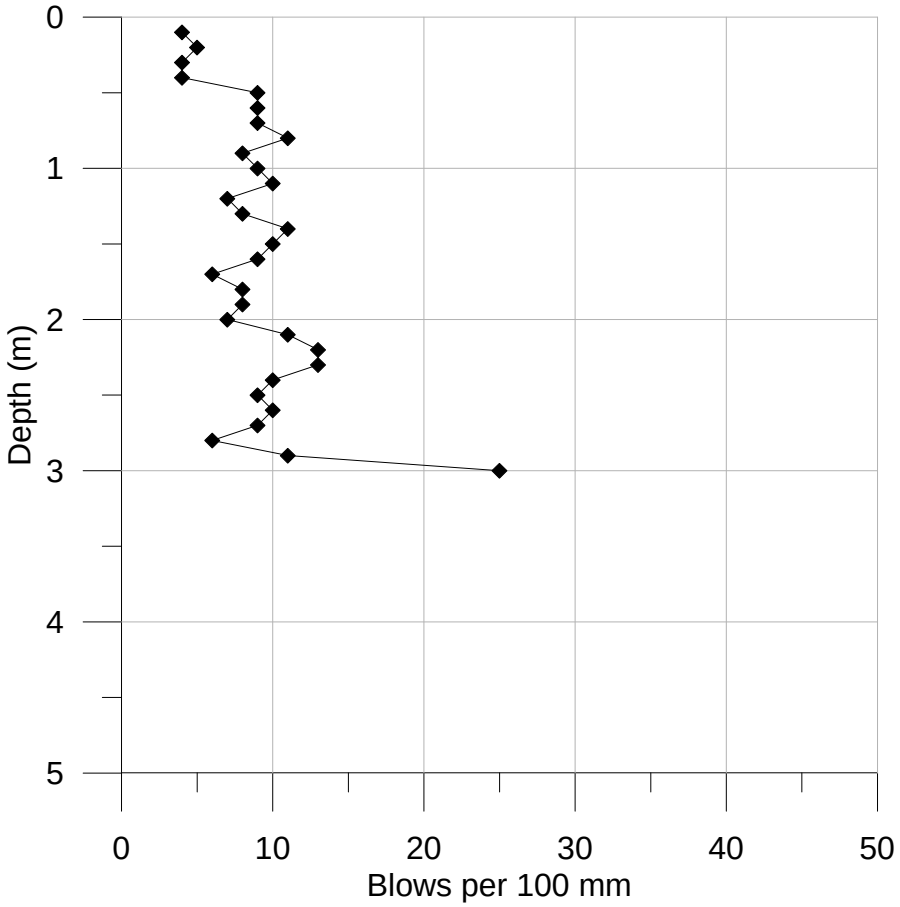
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near TP-BGC11-69

PROJECT No.	FIG No.	REV.
0792-006	G-29	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT", DATED JAN 2012.

N:\BGC\Projects\0792 Victoria Gold\0006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix G Penetration Testing\WildCat\grapher plots



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CLIENT:
VICTORIA GOLD CORP.

PROJECT:
2011 GEOTECHNICAL SITE INVESTIGATIONS FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE:
Wildcat Penetrometer Testing
near TP-BGC11-90

PROJECT No.	FIG No.	REV.
0792-006	G-30	0

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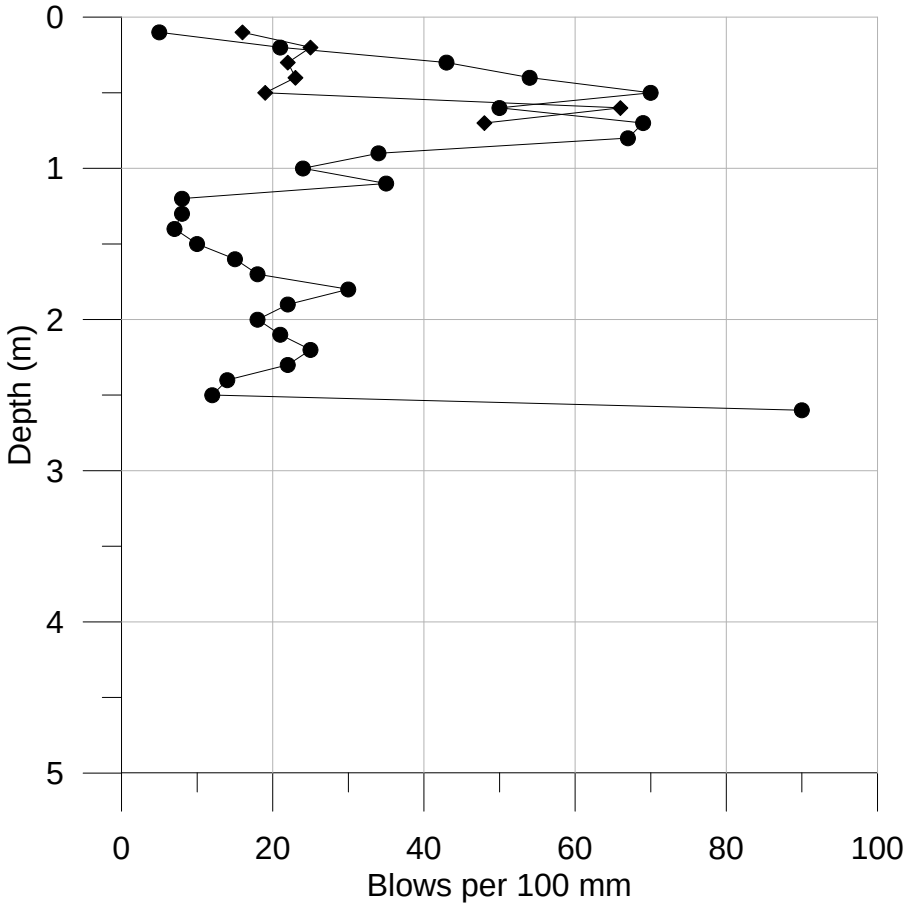
Note:
Frozen ground present between 0.1 m to 2.0 m.



LEGEND
TP-BGC11-94 (TEST A)
TP-BGC11-94 (TEST B)

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TITLE:
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PROJECT No.	FIG No.	REV.
0792-006	G-31	0

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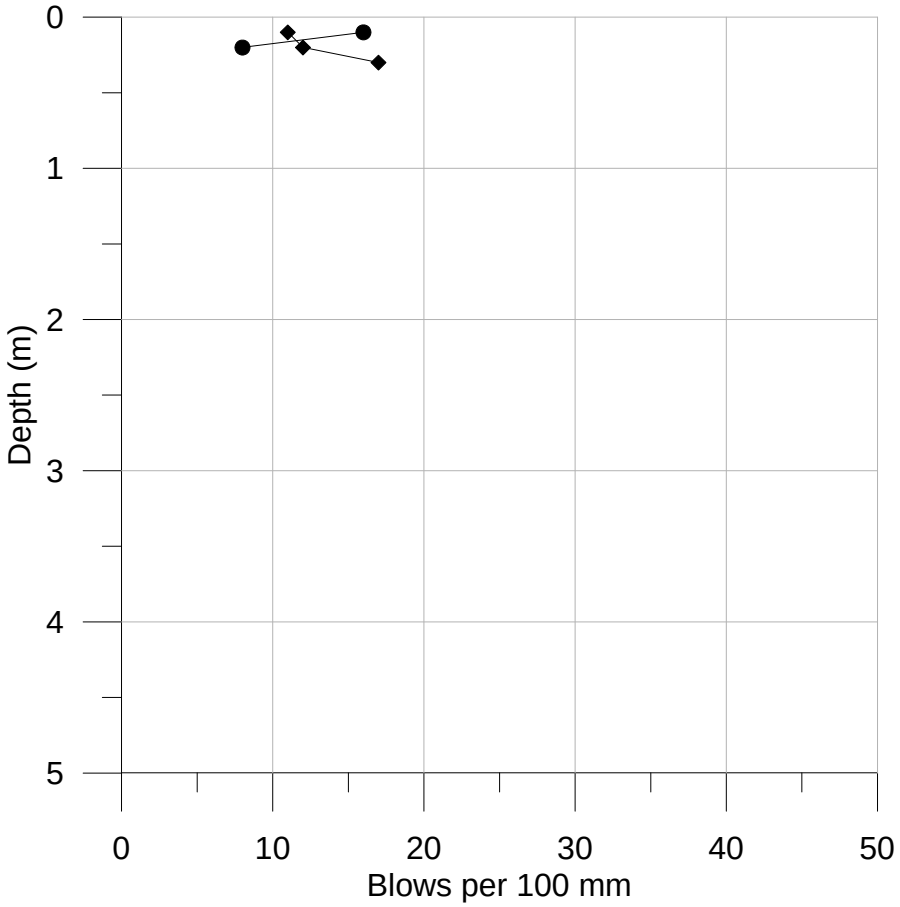

LEGEND

Placer Tailings (PQ12-A)

Placer Tailings (PQ12-B)

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing
Placer Tailings (PQ12)

PROJECT No.	FIG No.	REV.
0792-006	G-36	0

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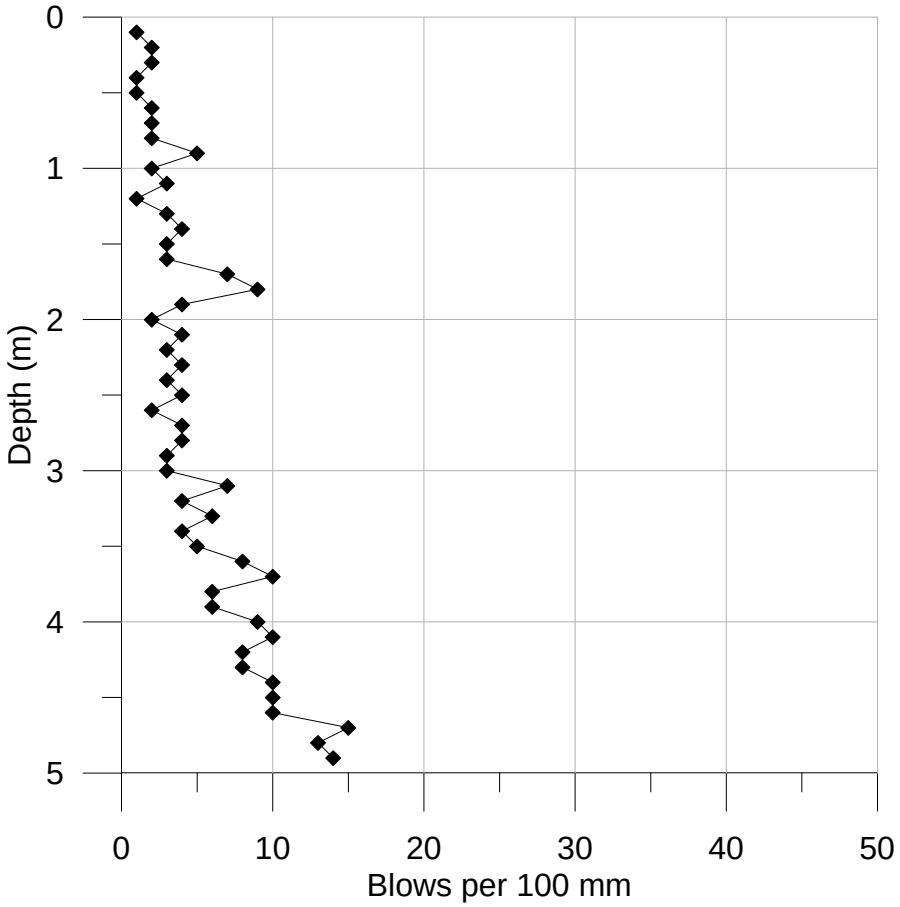

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing near Placer Tailings (PQ13)

PROJECT No.	FIG No.	REV.
0792-006	G-37	0

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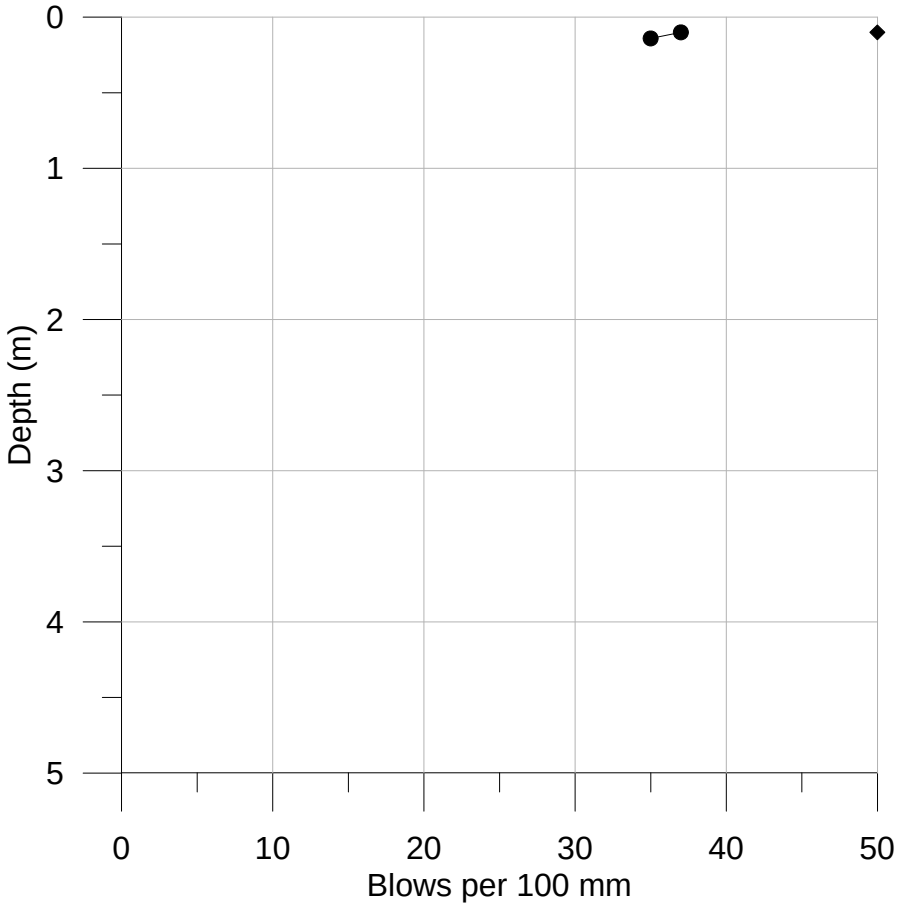

LEGEND

Placer Tailings (PQ6-A)

Placer Tailings (PQ6-B)

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BGC ENGINEERING INC.
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TITLE: Wildcat Penetrometer Testing
Placer Tailings (PQ6)

PROJECT No.	FIG No.	REV.
0792-006	G-34	0

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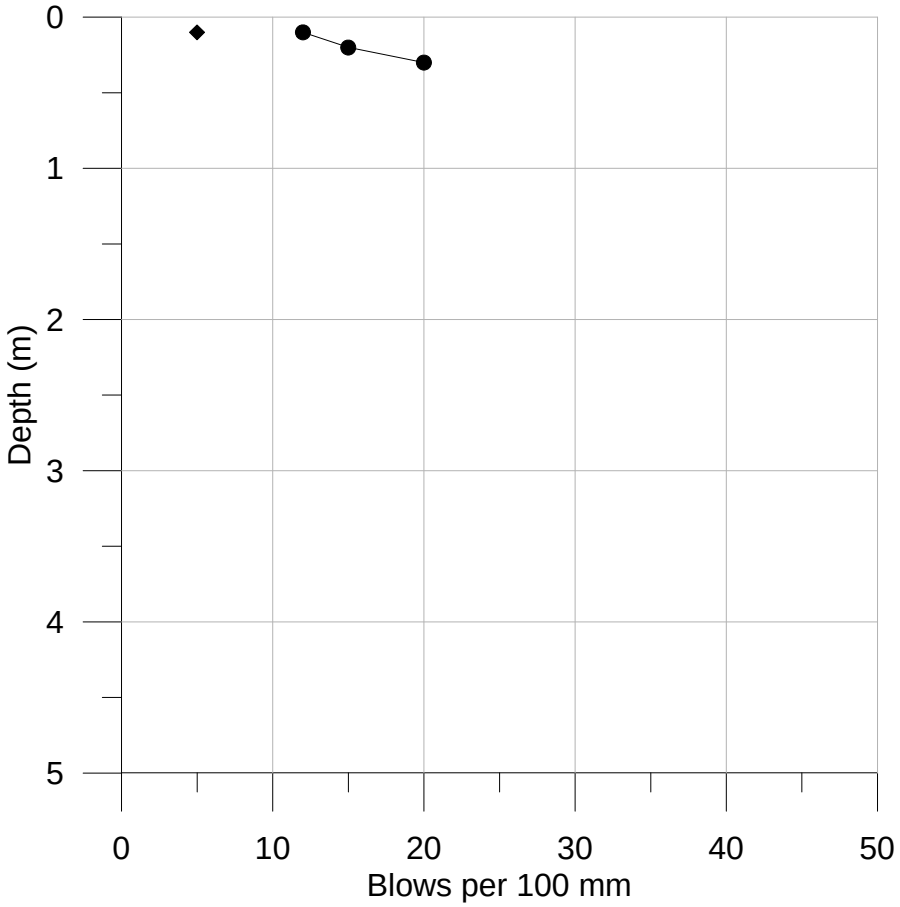

LEGEND

Placer Tailings (PQ7-A)

Placer Tailings (PQ7-B)

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TITLE: Wildcat Penetrometer Testing
Placer Tailings (PQ7)

PROJECT No.	FIG No.	REV.
0792-006	G-35	0

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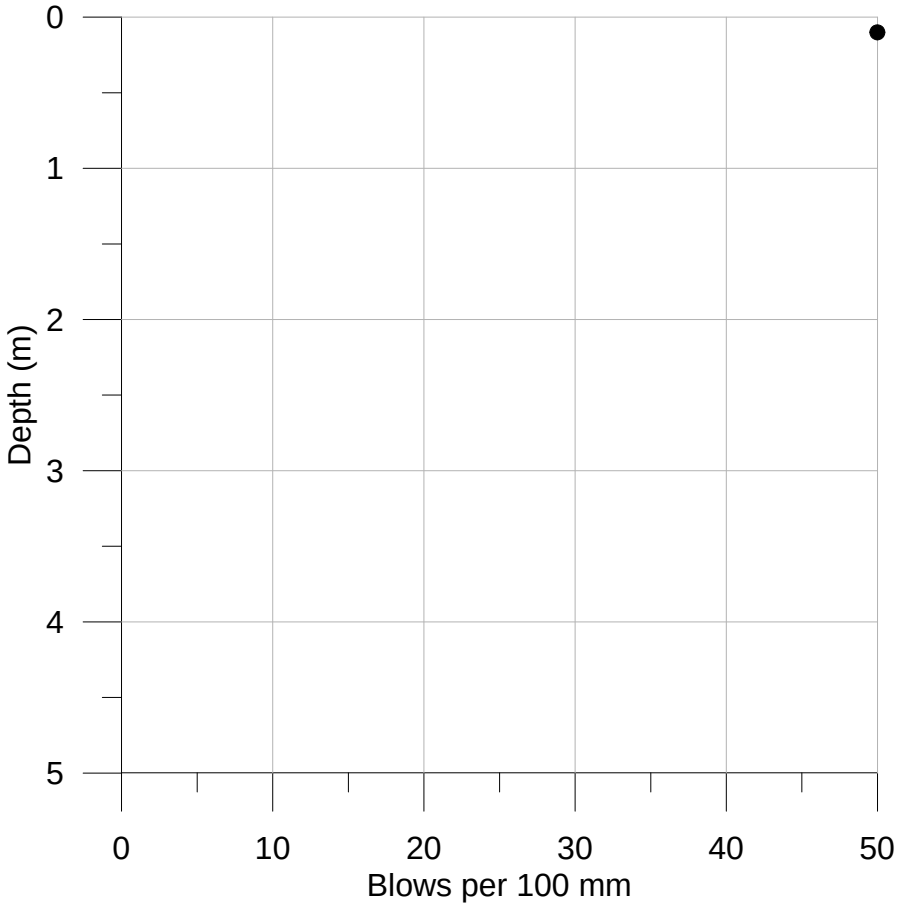

LEGEND

PQ14 (TEST B)

PQ14 (TEST B)

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AN APPLIED EARTH SCIENCES COMPANY

TITLE: Wildcat Penetrometer Testing
PQ14

PROJECT No.	FIG No.	REV.
0792-006	G-38	0

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APPENDIX H
GEOPHYSICS

BGC ENGINEERING INC.

REPORT ON

SEISMIC REFRACTION AND

DOWNHOLE SEISMIC INVESTIGATION

PROPOSED MINE SITE FACILITIES

EAGLE GOLD PROJECT

YUKON

by

Alex Smith, M.Sc.

Russell Hillman, P.Eng.

September, 2011 **PROJECT FGI-1216**

Frontier Geosciences Inc. 237 St. Georges Avenue, North Vancouver, B.C., Canada V7L 4T4
Tel: 604.987.3037 Fax: 604.984.3074

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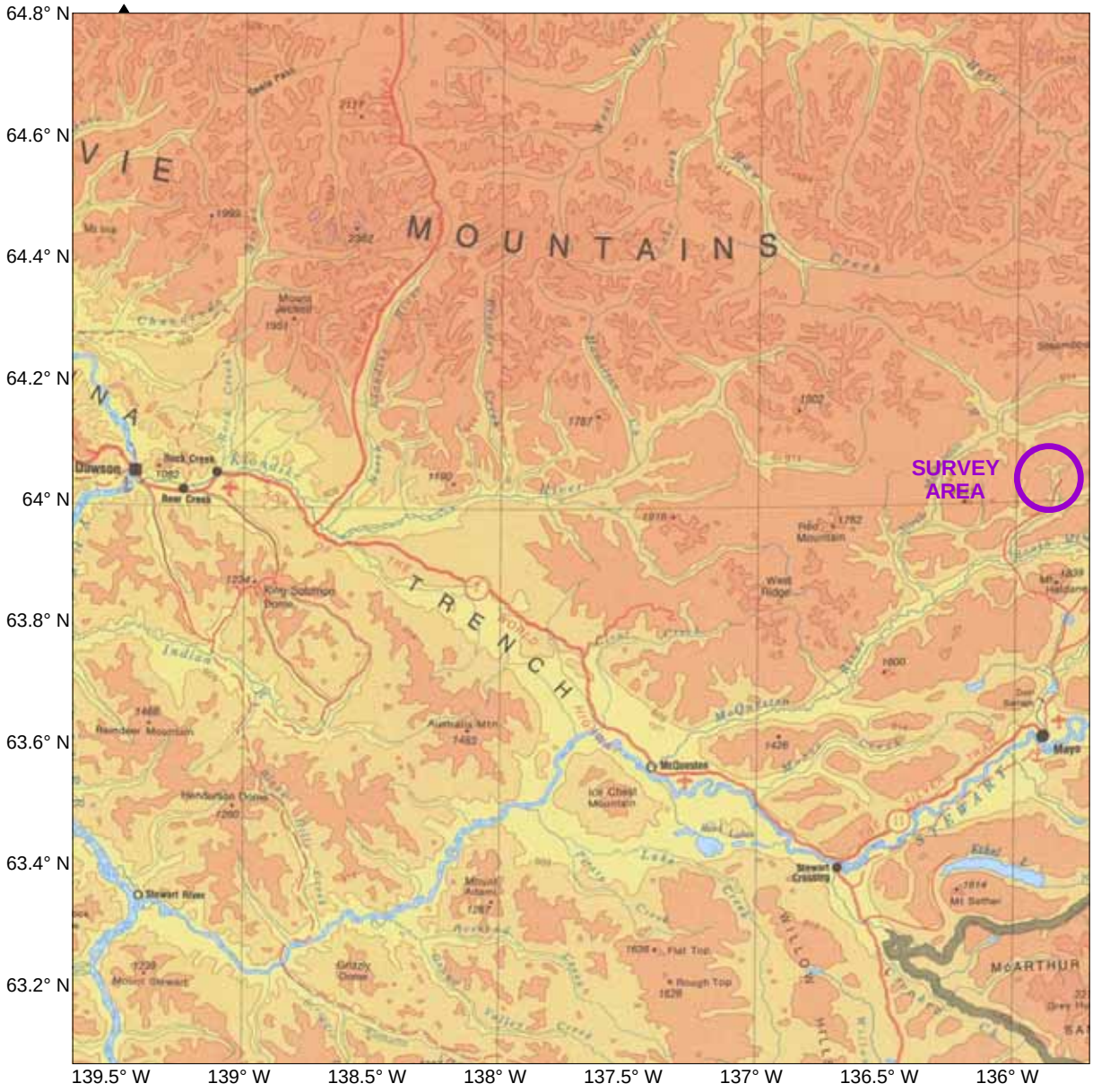
1. INTRODUCTION

During the period August 24 to September 8, 2011, Frontier Geosciences Inc. carried out a seismic refraction and downhole compressional and shear wave investigation for BGC Engineering Inc. at Victoria Gold Corporation's Eagle Gold Project in the Tintina Gold Belt, central Yukon. The site is located approximately 50 kilometres north of the town of Mayo, at the intersection of Dublin Gulch and Haggart Creek. A Survey Location Plan of the area is shown at a scale of 1:1,250,000 in Figure 1.

The purpose of the seismic refraction and downhole surveys was to determine geological conditions at the proposed Heap Leach Embankment, Events Ponds and Plant Site Area. In addition, shear and compressional downhole surveys were conducted in three boreholes in the vicinity of the proposed Crusher site. A Site Plan of the survey area is presented at 1:10,000 scale in Figure 2 in the Appendix.

In all, 10 separate seismic traverses and 11 downhole compressional and shear wave surveys were completed at the proposed mine site. A total of approximately 5335 metres of detailed seismic refraction surveying was carried out in the investigation on 51 separate seismic spreads.



0 12.5 25 37.5 50

KILOMETRES

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
SURVEY LOCATION PLAN		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2011	SCALE 1:1,250,000	FIG. 1

2. THE SEISMIC REFRACTION SURVEY METHOD

2.1 Equipment

The seismic refraction investigation was carried out using a Geometrics, Geode, 24 channel, signal enhancement seismograph and Mark Products Ltd., 48 Hz geophones. Geophone intervals along the multi-cored seismic cables were maintained at 5 metres in order to produce high resolution data on subsurface layering as well as to ensure adequate coverage of the basal layer. The zero delay or instantaneous blasting caps in the small explosive charges used for energy input, were detonated electrically with a Geometrics, HVB-1, high voltage, capacitor type blaster.

2.2 Survey Procedure

For each spread, the seismic cable was stretched out in a straight line and the geophones implanted. Six separate 'shots' were then initiated: one at either end of the geophone array, two at intermediate locations along the seismic cable, and one off each end of the line to ensure adequate coverage of the basal layer. The shots were detonated individually and arrival times for each geophone were recorded digitally in the seismograph. Data recorded during field surveying operations was generally of good to excellent quality.

Throughout the survey, notes were recorded regarding seismic line positions in relation to topographic and geological features, and survey stations in the area. Relative elevations on the seismic lines were recorded by chain and inclinometer with absolute elevations taken from a digital elevation model provided by BGC Engineering Inc.

2.3 Interpretive Method

The final interpretation of the seismic data was arrived at using the method of differences technique. This method utilises the time taken to travel to a geophone from shotpoints located to either side of the geophone. Using the total time, a small vertical time is computed which represents the time taken to travel from the refractor up to the ground surface. This time is then multiplied by the velocity of each overburden layer to obtain the thickness of each layer at that point.

3. THE DOWNHOLE SEISMIC SURVEY

3.1 Equipment

The downhole seismic survey was carried out with the Geometrics, Geode, 24 channel, signal enhancement seismograph which was also used for digital storage of the data. The receiver package employed was a Sercel GS14-L3 triaxial, downhole geophone package. The two horizontal geophones in the package are optimal for recording the down-going, horizontally polarised, shear wave generated at the ground surface. The package was held against the casing wall by a spring steel carrier which was acoustically decoupled from the suspending cable and the weight that draws the carrier down the drillhole.

The shear wave source was a large wooden beam approximately 2 metres in length which was secured against the ground for good shear wave transmission. Force was applied to both ends of the beam with a sledge hammer to provide both positive and negative wave directions. The compressional wave source was produced by applying the sledge hammer to a steel impact plate on the ground surface. In both the shear wave and the compressional wave surveys, an electric circuit was switched-closed with the impact of the sledgehammer, to trigger the record and provide accurate zero times.

3.2 Survey Procedure

Field procedure consisted of lowering the geophone package to the measuring point in the hole and ensuring firm coupling of the geophones to the drillhole wall. The holes were tested every 0.5 metres. The secured wood beam was then struck horizontally from one end with the sledge hammer to produce a shock wave rich in shear wave energy. The horizontal geophones in the downhole triaxial package are sensitive to horizontally polarised shear wave arrivals. After recording of the first impact, the source beam was struck horizontally from the opposite end. The shear wave recorded downhole from the second impact produced an opposite polarity to the initial impact. By recording impacts from each end at every depth location, the oppositely polarised shear waves were plotted to optimise the arrival times of the horizontal shear waves.

A compressional wave was also produced by striking the steel impact plate with the hammer. This produced a well defined compressional wave from the point of impact that penetrated the depth of the holes. This compressional wave was recorded by the vertical geophone in the triaxial package

3.3 Post-Processing Data Reduction

Initial analysis of the shear wave downhole data was conducted on site directly after data acquisition. Observations were made to ensure data quality and validity. Following data acquisition, the overlapping opposite direction blows for each depth station were plotted on a single baseline. This enabled recognition of the phase of the arrival from one depth station to the next.

Initial monitoring and analysis of the compressional wave downhole data was also conducted on site to confirm data quality and validity.

The picking of the first arrival times involved identification of the shear wave break on the basis of polarity, increase in amplitude and abrupt change in frequency. An evaluation of the location of the first break was made on the location of the departure from the baseline of oppositely polarised data. This was also facilitated by comparison with data recorded both above and below the data point and by knowledge that arrival times must increase with depth. The same procedure was followed for the picking of the first arrivals of the compressional wave with the exception of polarity change.

4. GEOPHYSICAL RESULTS

4.1 General

The majority of the 10 seismic profiles were conducted along the placer deposits in Dublin Gulch and across the Gulch at the proposed location of the Heap Leach Embankment. The results of the seismic interpretations for these lines are presented at 1:500 scale in Figures 3 through 20 of the Appendix. Compressional and shear wave velocity profiles for the surveyed boreholes within the proposed Plant site, Event Ponds, Heap Leach Facility and Crusher site are shown in Figures 21 through 31 in the Appendix.

4.2 Discussion

4.2.1 Heap Leach Embankment and Placer Tailings

A primary focus of the survey was to determine depths to bedrock and geological conditions within the previously deposited placer tailings and the proposed location of the Heap Leach Embankment.

Seismic lines SL-12, SL-2 and SL-33 were surveyed from west to east along the placer tailings deposits within Dublin Gulch. The seismic refraction data indicate the area is underlain by three or four velocity layers. In many areas, the deeper intermediate velocity layer is associated with a layer of highly weathered bedrock.

The surficial layer with compressional (P) wave velocities ranging from 305 m/s to 650 m/s, averages approximately 3.5 metres in thickness across the three traverses. This layer correlates to shallow shothole and drillhole intersections of cobbles, gravel, sand, silt and clay.

The surficial layer is underlain by one or two intermediate layers exhibiting significant variations in compressional wave velocities. Line SL-12 contains two intermediate layers with the shallower intermediate layer displaying (P-wave) velocities of 675 m/s to 1000 m/s. This narrow range in velocities is consistent with more compact silt, sand and silty sand. This shallow intermediate layer is underlain by a second intermediate layer with velocities varying from 1400 m/s to 1750 m/s. With an average thickness of 19.5 metres, the velocities suggest this layer is composed of very compact, saturated placer tailings. There exists however, the possibility that the base of this layer may be highly weathered bedrock.

The majority of line SL-2 is interpreted to be underlain by three velocity layers with the onset of a fourth layer at approximate station 420E. This intermediate layer with velocities from 700 m/s to 1700 m/s, correlates with drill log intersections of silt, sand, gravel, cobbles and boulders. Higher velocities are likely associated with localized zones of coarser or denser material. The deeper intermediate layer from 420E to the east end of the line, has a compressional wave velocity of approximately 1900 m/s. Borehole intersections of bedrock at a depth of 11.6 metres in DH-BGC09-DG-3, indicate this layer is highly weathered bedrock. Intersections of granodiorite boulders intermixed with gravel and cobbles immediately above the bedrock may account for the two metre discrepancy between the interpreted bedrock surface and the borehole intersection.

There is good agreement between the interpreted bedrock surface and the intersection of bedrock in borehole BH-BGC11-32. Downhole shear wave velocities for BH-BGC11-32 indicate the surficial materials have a shear wave velocity of 120 m/s. Velocities vary from 265 m/s to 480 m/s throughout the thick sequence of cobbles and boulders and increase to a value of 670 m/s at the onset of the highly weathered bedrock. Compressional wave velocities determined from the downhole survey are elevated when compared with values from seismic refraction analysis. This discrepancy may be associated with the downhole pressure wave preferentially travelling through the grout column.

Seismic line SL-33 was located between borehole DH-BGC09-DG-3 and a point north and east of borehole BH-BGC11-52. This traverse is underlain by four layers to station 560ENE, where the interpreted weathered bedrock layer pinches out against the basal, competent bedrock. The shallow intermediate layer exhibits compressional wave velocities ranging from 500 m/s to 1600 m/s. With an average thickness of 6.9 metres, the velocities generally increase to the east along the traverse. This correlates well with an increase in coarse materials observed in geotechnical investigations in the site area. The deeper intermediate layer is likely associated with the onset of weathered bedrock as observed in boreholes DH-BGC09-DG-3 and BH-BGC11-33. In the approximate station interval 300ENE to 440ENE, this layer may be associated with lower compressional wave sands and gravels. Black dashed lines on the sections indicate possible transitions from weathered bedrock to tailings material within this velocity layer. Basal layer velocities from 3075 m/s to 4240 m/s, denote the competent metasedimentary bedrock surface.

Shear wave velocity surveying of BH-BGC11-33 yielded values from 205 m/s to 510 m/s in the initial 8.5 metres of the borehole. There is a noticeable increase to 800 m/s at the onset of the weathered bedrock. Similarly, borehole BH-BGC11-34 exhibits shear wave velocities of

205 m/s to 510 m/s in the initial 15 metres of the hole. Below 15 metres, the shear wave velocity increases to 800 m/s. This velocity increase correlates reasonably well with the onset of weathered bedrock at a depth of 16.3 metres.

Seismic line SL-8 was situated between borehole BH-BGC11-34 to a point roughly 125 metres northeast of BH-BGC11-28. This traverse, with the exception of a segment from 290NE to 390NE, is believed to be underlain by four velocity layers. The surficial layer averages only 2.2 metres in thickness and exhibits compressional wave velocities of 305 m/s to 375 m/s. Consistent with loose soils, sands and gravels, this layer is underlain by a more compact layer of sands and gravels with velocities of 550 m/s to 1375 m/s. Borehole BH-BGC11-28 located approximately 11 metres off the line, indicates this layer may in places, be comprised of highly weathered bedrock. This shallower intermediate layer is underlain by a weathered bedrock layer with velocities ranging from 1350 m/s to 2450 m/s. The interpreted thicknesses of the weathered bedrock layer vary from 2 m to 28.7 metres, and average 14.6 metres. The basal layer with velocities from 3100 m/s to 4350 m/s is the interpreted competent bedrock surface.

Borehole BH-BGC11-28 has a calculated shear wave velocity of 210 m/s for the surficial 3.5 metres of moderately weathered bedrock. The velocity increases significantly to 880 m/s in the depth interval, 3.5 m to 17 metres. Velocities vary from 650 m/s to 1130 m/s below 17 metres depth, consistent with slightly to moderately weathered bedrock.

Seismic lines SL-1 and SL-3 cut across the placer tailings deposits in the western part of the survey area. Seismic line SL-1 has surficial layer velocities of 300 m/s to 445 m/s, which coincide with borehole intersections of silts and sands. This surficial layer is underlain by a thicker section of sands, gravels, cobbles and boulders exhibiting compressional wave velocities of 500 m/s to 1000 m/s. A deeper intermediate layer with velocities of 1500 to 1600 m/s coincides with the borehole intersection of sands, silts and gravels. This layer and the corresponding higher velocities is in good agreement with saturated conditions and the expected water table. The basal layer is interpreted to be competent bedrock, although there are two zones with abnormally low compressional wave velocities. From 45NNE to 110NNE and from 215NNE to 255NNE, compressional wave velocities varying from 2050 m/s to 2300 m/s were computed for the basal refractor These velocities likely reflect either highly weathered bedrock or significant shear zones in the bedrock.

Borehole BH-BGC11-39 located approximately 2 metres off line SL-1 shows good agreement with the interpreted seismic section. Saturated overburden velocities are observed

at approximately 10 metres depth. Shear wave velocities obtained from the borehole survey are approximatley 130 m/s in the surficial 3 metres of loose silts and sands. Velocities increase significantly to 325 m/s, at the onset of a layer of gravel, cobbles and boulders.

Seismic line SL-3 is interpreted to consist of three distinct layers, with compressional wave velocities for the surficial layer varying from 375 m/s to 420 m/s. Surficial layer thicknesses range from 0.1 metres to 8.1 metres, with the thinnest section located near the middle of the traverse. The surficial layer is underlain by a thick intermediate layer with P-wave velocities of 950 m/s to 1500 m/s. Higher velocities indicate the presence of coarser materials and possibly, increased water content. Basal velocities vary from 2125 m/s to 3630 m/s and are interpreted to be metasedimentary bedrock with varying degrees of weathering. The 2125 m/s velocity zone at the north end of the line may be indicative of either highly weathered bedrock or a shear zone in the bedrock

Parallel seismic lines SL-10 and SL-5 were oriented southeast to northwest, with line SL-5 located on the proposed heap embankment and line SL-10 running along the edge of the embankment up to the proposed Plant Site. Both lines are interpreted to be underlain by 3 or 4 velocity layers. Typically, the surficial layer is associated with loose sands and gravels with compressional wave velocities varying from 290 m/s to 550 m/s.

A thin layer of surficial material overlying weathered bedrock with compressional wave velocities of 2700 m/s to 2900 m/s, is present on the southern end of both traverses. The weathered bedrock in turn overlies more competent bedrock. The weathered bedrock layer is no longer discernible at approximately 100NW on lines SL-5 and SL-10, as indicated by the dashed black lines on the sections.

From station 110NW on line SL-10 and station 145NW on line SL-5, the interpreted sections consist of four layers. The shallow intermediate layer exhibits velocities ranging from 600 m/s to 1900 m/s. This layer is correlated in boreholes with gravel, and gravel with sand. This layer is underlain by a thicker intermediate layer with velocities of 1050 m/s to 2100 m/s. This intermediate layer is consistent with denser sands, gravels, cobbles and boulders as observed in BH-BGC11-34 on line SL-5, and highly weathered bedrock intersected in borehole BH-BGC11-33 on line SL-10. The deeper intermediate layer pinches out at the elevation low associated with the creek at 460NW on line SL-10B and 400NW on line SL-5B. Northwest of the creek, line SL-5 consists of 3 layers, with the intermediate layer varying in velocity from 750 m/s to 1900 m/s. Seismic line SL-10 has a thick intermediate layer with velocities ranging from 715 m/s to 1250 m/s from 460NW to the end of the

traverse. From station 635NW, this layer is underlain by a deeper intermediate layer with a velocity of 2050 m/s. This deeper layer is likely consistent with highly weathered bedrock.

Basal layer velocities on both lines vary from 1635 m/s to 4800 m/s, with low velocity zones observed at 495NW to 525NW and 665NW to 700NW on line SL-5, and 110NW to 120NW on line SL-10. The higher velocities are interpreted as competent metasedimentary bedrock. The three low velocity zones with values of 1635 m/s to 1900 m/s are believed to be indicative of highly weathered rock or shear zones.

Located approximately 5 metres off SL-5, borehole BH-BGC11-59 exhibits good agreement between the interpreted basal layer and the intersection of weathered bedrock. Shear wave velocities also show a noticeable increase from 290 m/s to 570 m/s at the onset of the bedrock. Inconsistent with some boreholes, the compressional wave velocities for BH-BGC11-59 compare reasonably well with the refraction results, with velocities of 2045 m/s in the frozen overburden and 3085 m/s in the slightly to moderately weathered bedrock.

The final section SL-7, is located at the eastern end of the survey area. Line SL-7 was oriented south to north and consists of 3 distinct velocity layers. The surficial layer varies in thickness from 0.3 to 4.5 metres, with an average thickness of 2.2 metres. Velocities ranging from 300 m/s to 380 m/s are consistent with loose, surficial, sands and gravels. The surficial layer is underlain by a thick layer of more compact sands, gravels and cobbles. Compressional wave velocities for this layer range from 650 m/s to 1150 m/s.

The interpreted basal layer is in good agreement with moderately weathered metasedimentary bedrock observed in borehole BH-BGC11-52. Depths to bedrock vary from 6.1 to 24.4 metres, with an average depth of 13.2 metres. Calculated basal layer velocities range from 2445 m/s to 4670 m/s. The lower velocity zone of 2445 m/s at the southern end of the line likely indicates highly to moderately weathered bedrock.

Downhole shear and compressional wave testing in borehole BH-BGC11-52 shows similar results to other boreholes, with low shear wave velocity of 115 m/s to 210 m/s in the shallow overburden materials. An increase in shear wave velocities at 4.5 metres depth to 475 m/s, coincides well with an increase in compressional wave velocities apparent on seismic line SL-7 at approximately 4 metres depth. Shear wave velocities increase again to 665 m/s at the onset of the metasedimentary rock..

4.2.2 Crusher Site Boreholes

Boreholes BH-BGC11-36, BH-BGC11-40B and BH-BGC11-62 are all located within the proposed crusher site. The boreholes all contain a thin section of overburden material overlying relatively shallow bedrock. Bedrock ranges from slightly to moderately weathered. Shear wave velocities typically exceed 800 m/s at or near, the surface of the bedrock. Shear wave testing in borehole BH-BGC11-36 resulted in one of the thickest, continuous shear wave zones in bedrock. The 1290 m/s zone is approximately 30 m thick and is underlain at a depth of about 40 m, by a 1745 m/s velocity zone that extends to the bottom of the hole.

4.2.3 Supplementary MASW Profiles.

The Multichannel analysis of surface wave (MASW) method was applied to surface seismic data within the vicinity of boreholes BH-BGC11-32, BH-BGC11-33, BH-BGC11-34 and BH-BGC11-52. The MASW profiles are presented at a vertical scale of 1:250 in Figures 32 to 37 of the Appendix. Each profile indicates the seismic line number and the distance along the traverse. Also shown at the lower left hand corner of the plots is the closest geotechnical borehole. The MASW results show general agreement with the downhole shear wave velocities calculated from borehole seismic logging.

5. LIMITATIONS

The depths to subsurface boundaries derived from seismic refraction surveys are generally accepted as accurate to within ten percent of the true depths to the boundaries. In some cases, unusual geological conditions may produce false or misleading data points with the result that computed depths to subsurface boundaries may be less accurate. In seismic refraction surveying difficulties with a 'hidden layer' or a velocity inversion may produce erroneous depths. The first condition is caused by the inability to detect the existence of a layer because of insufficient velocity contrasts or layer thicknesses. A velocity inversion exists when an underlying layer has a lower velocity than the layer directly above it. The interpreted depths shown on drawings are to the closest interface location, which may not be vertically below the measurement point if the refractor dip direction departs significantly from the survey line location.

In downhole seismic surveys, individual values taken at discrete depth points may precede or lag the anticipated arrival due to 'zero time', timing errors in the circuitry. These errors are generally quite small and average velocities taken over a broader zone are good representations of in situ shear wave and compressional wave velocities in a layer.

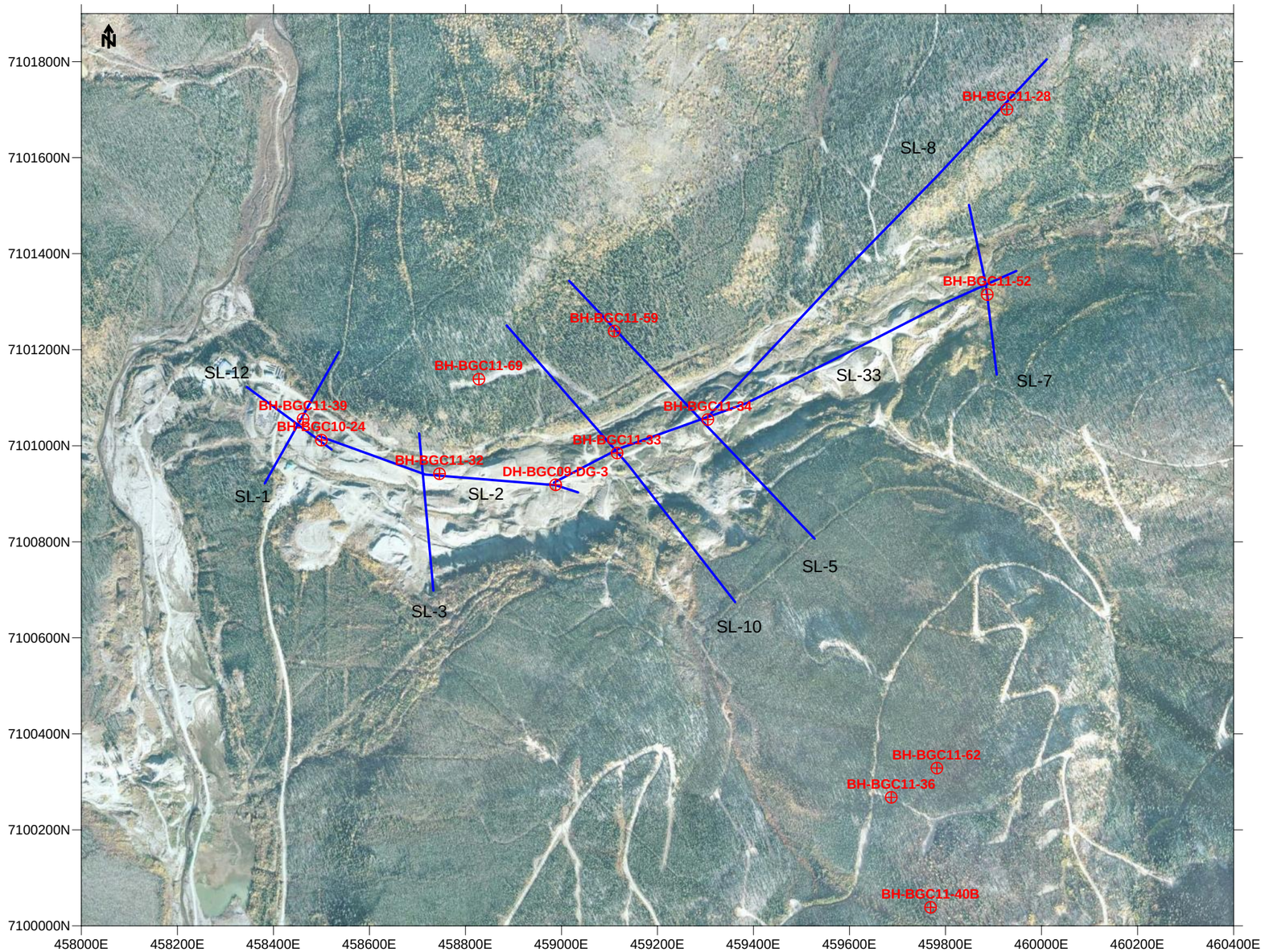
In this survey, some difficulty was encountered in downhole logging due to seismic energy travelling in the grout surrounding the plastic casing. This difficulty was generally overcome by careful picking of later seismic arrivals subsequent to the arrival of the grout wave.

The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the seismic refraction and downhole seismic methods.

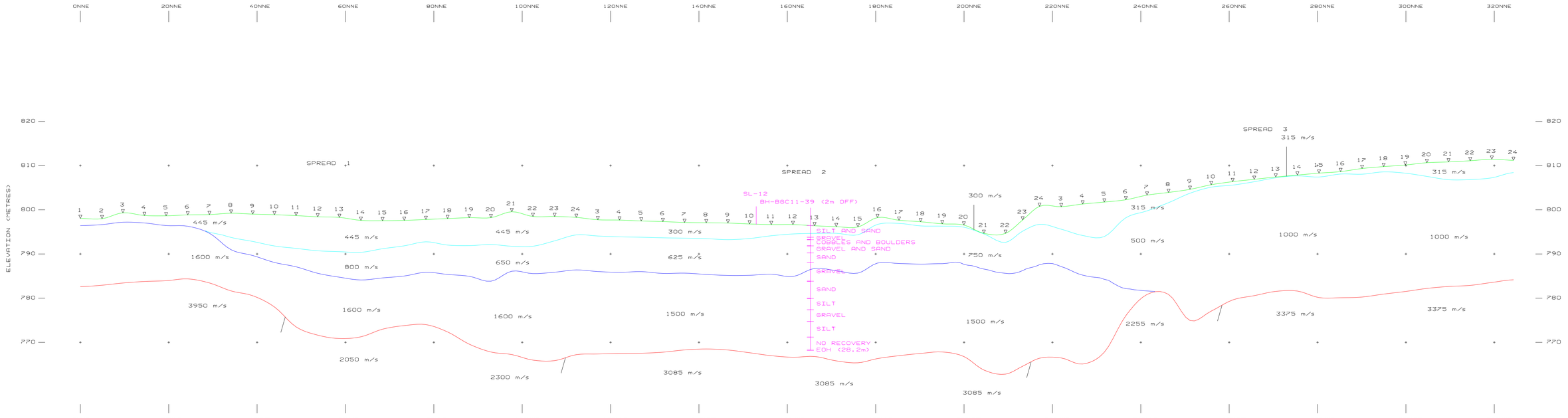
For: Frontier Geosciences Inc.

Alex Smith, M.Sc.

Russell Hillman, P.Eng.



BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
SITE PLAN		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT 2011	SCALE 1:10,000	FIG. 2



SEISMIC LINE SL-1

INSTRUMENT: GEOMETRICS GEODE

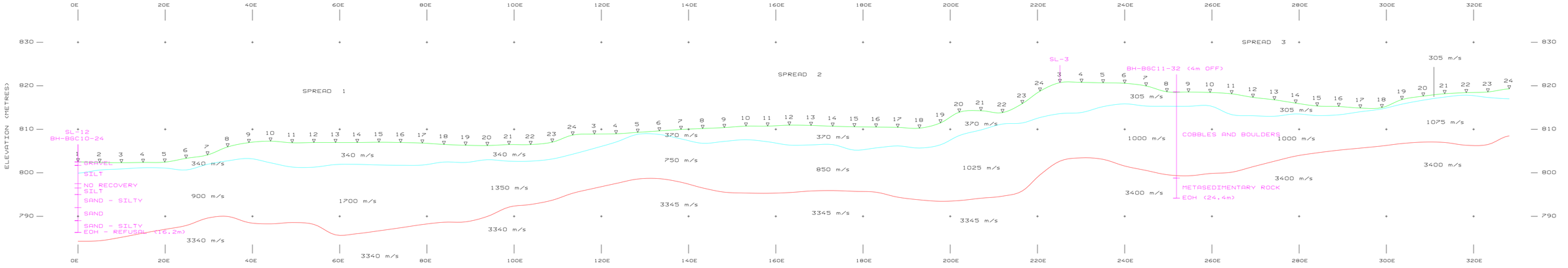
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-1

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 3



SEISMIC LINE SL-2A

INSTRUMENT: GEOMETRICS GEODE

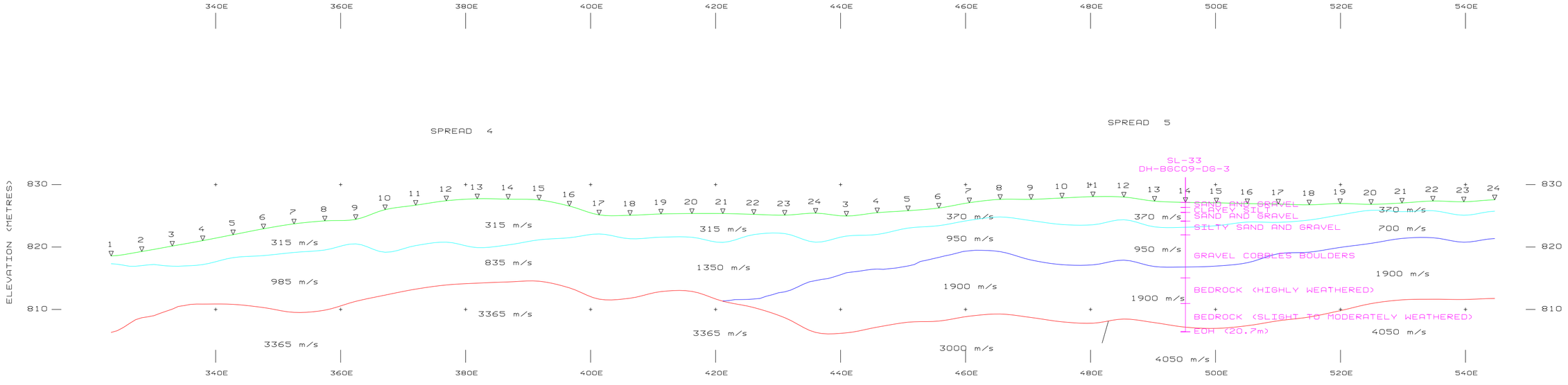
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-2A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 4



SEISMIC LINE SL-2B

INSTRUMENT: GEOMETRICS GEODE

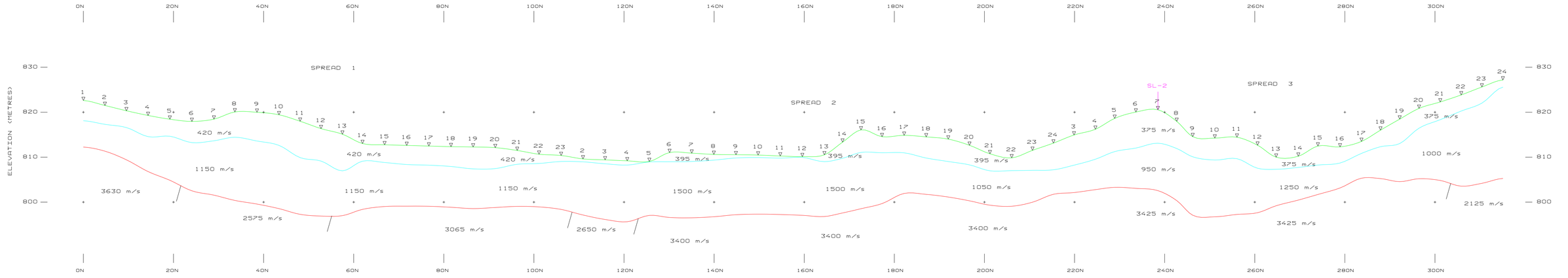
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-2B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 5



SEISMIC LINE SL-3

INSTRUMENT: GEOMETRICS GEODE

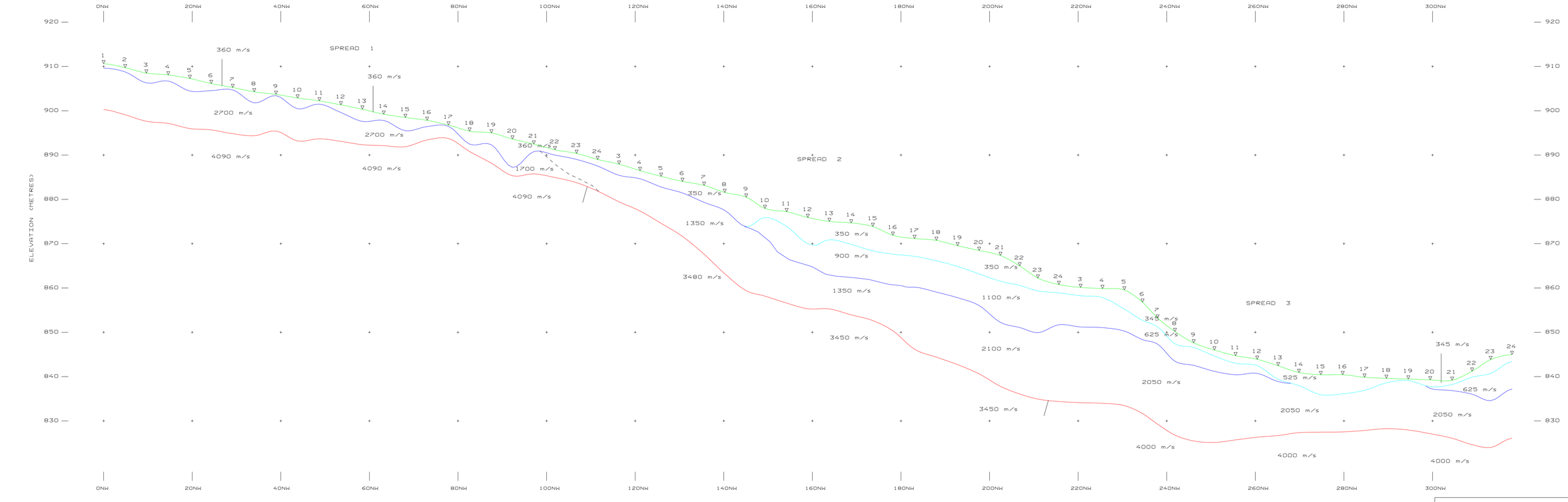
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-3

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 6



SEISMIC LINE SL-5A

INSTRUMENT: GEOMETRICS GEODE

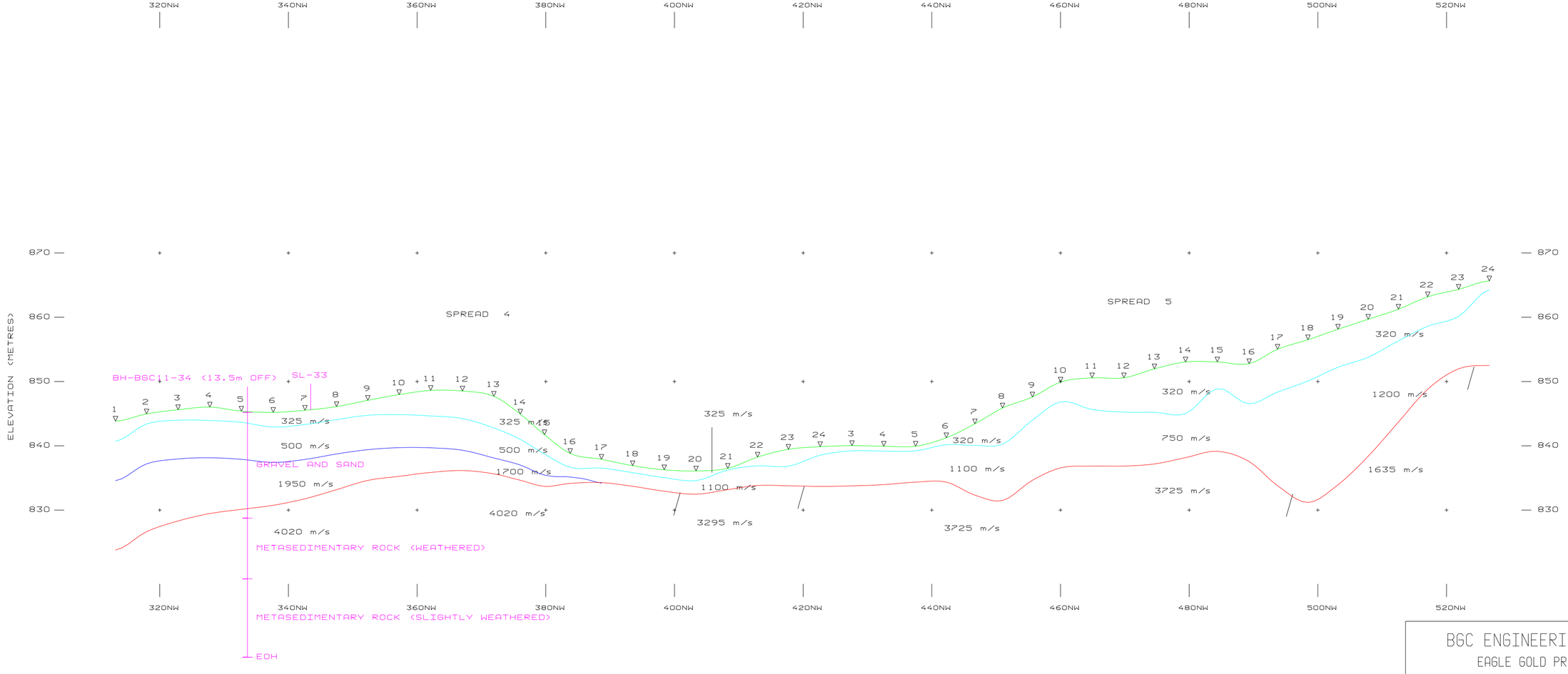
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 7



SEISMIC LINE SL-5B

INSTRUMENT: GEOMETRICS GEODE

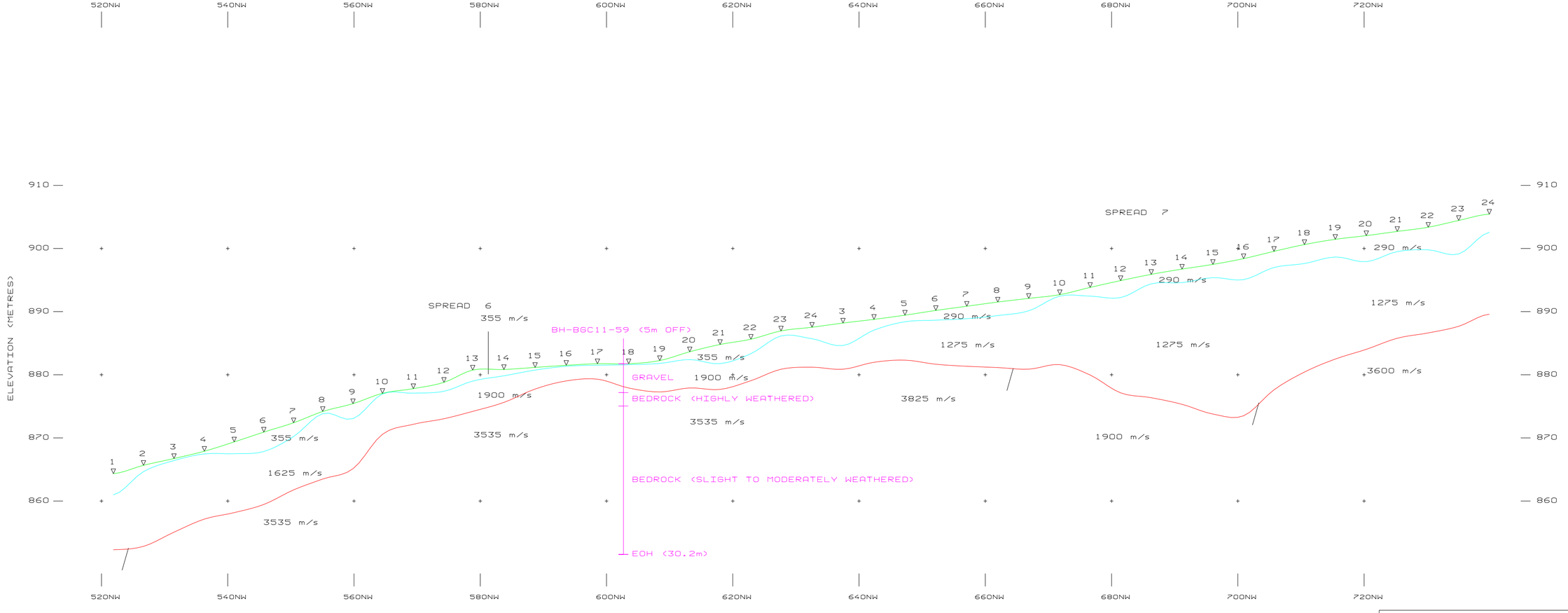
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 8



SEISMIC LINE SL-5C

INSTRUMENT: GEOMETRICS GEODE

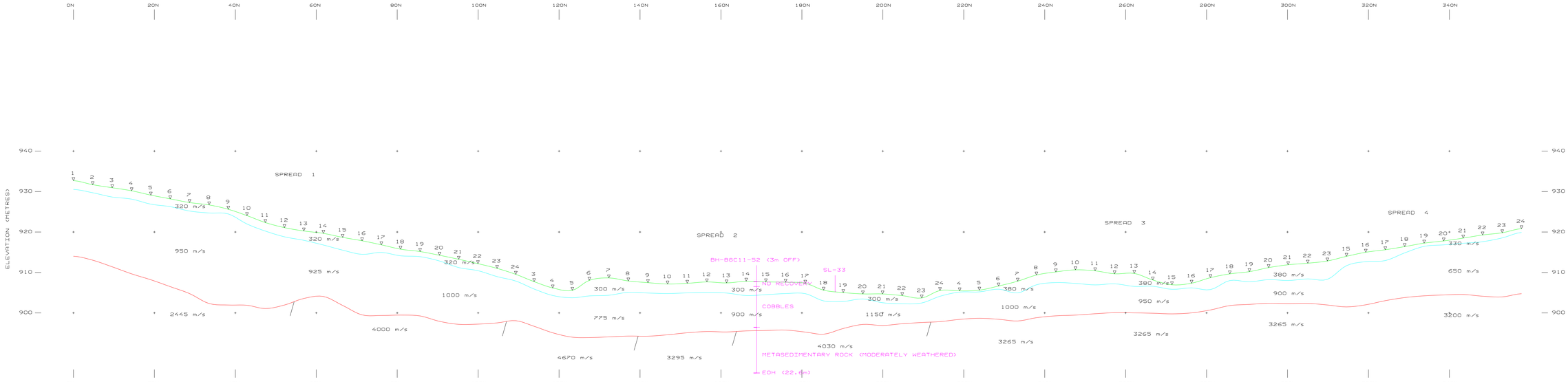
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 9



SEISMIC LINE SL-7

INSTRUMENT: GEOMETRICS GEODE

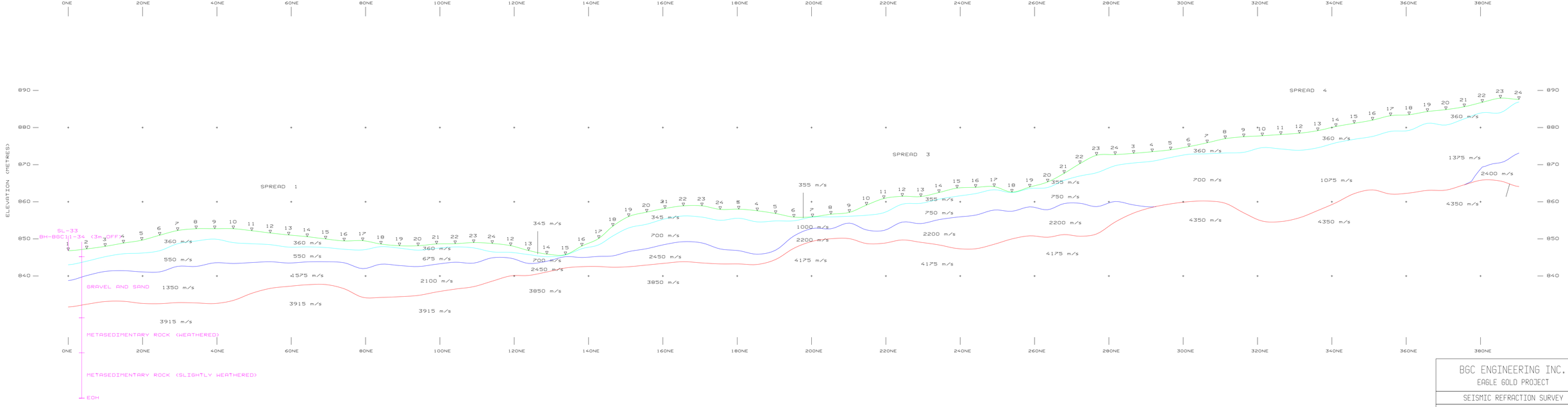
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-7

FRONTIER GEOSCIENCES INC.

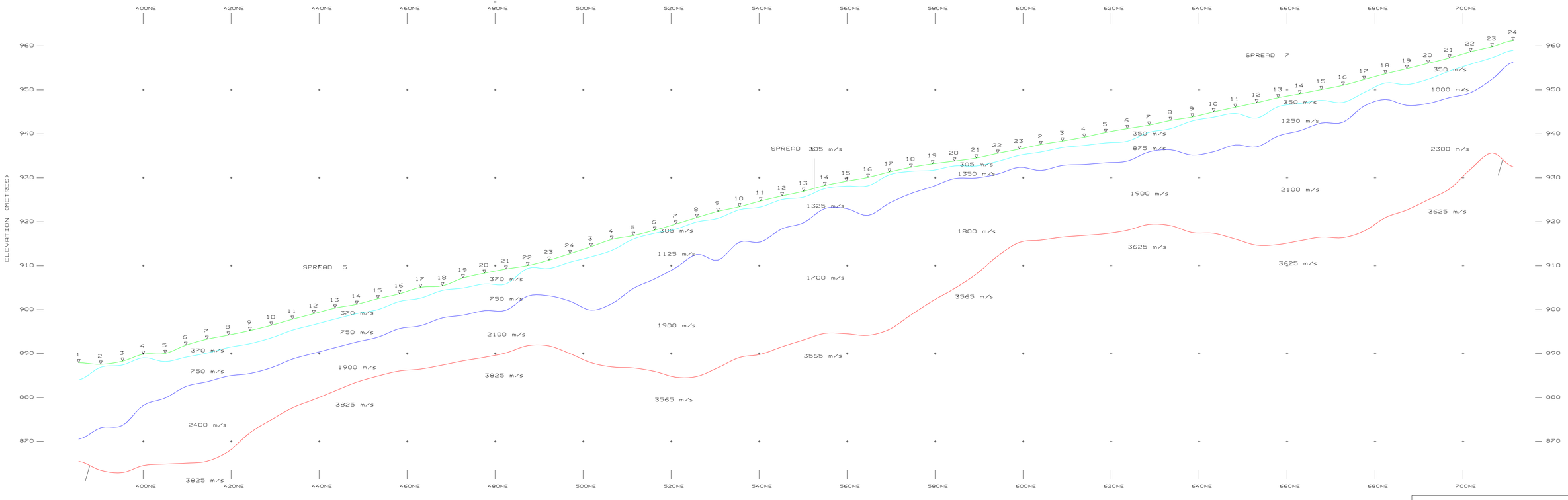
DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 10



SEISMIC LINE SL-8A

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.
EAGLE GOLD PROJECT
SEISMIC REFRACTION SURVEY
INTERPRETED DEPTH SECTION SL-8A
FRONTIER GEOSCIENCES INC.
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 11



SEISMIC LINE SL-8B

INSTRUMENT: GEOMETRICS GEODE

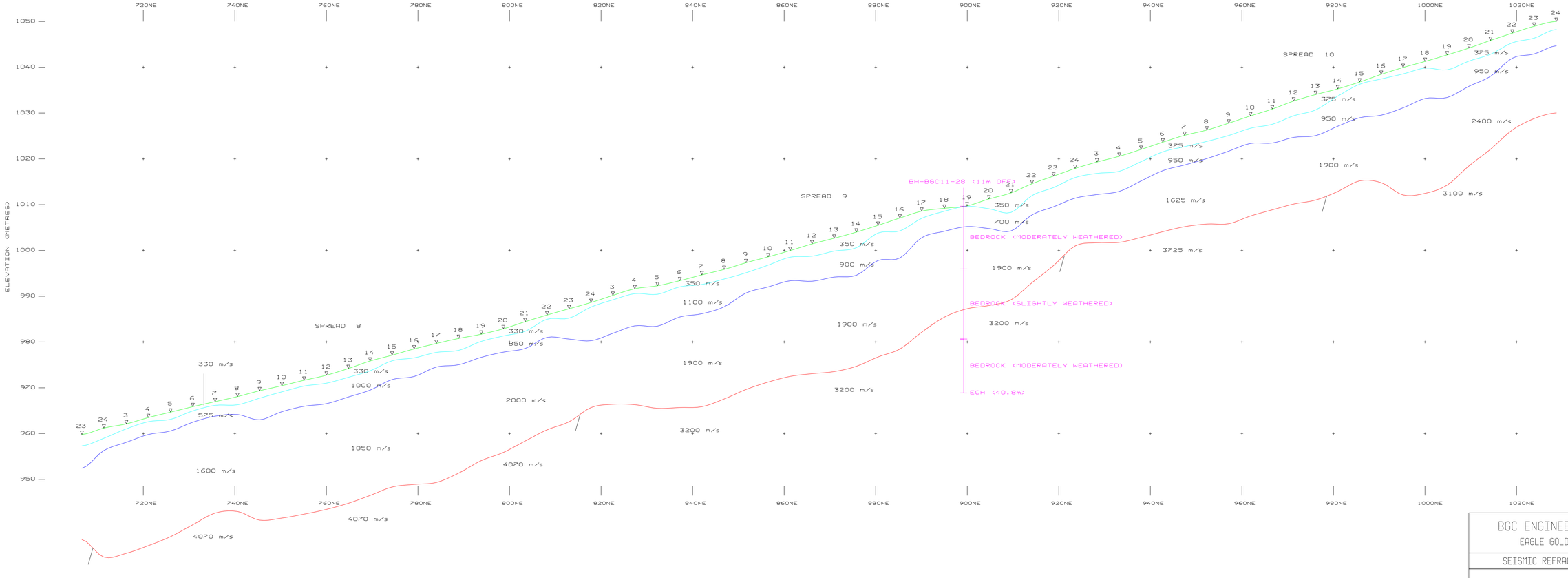
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-8B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 12



SEISMIC LINE SL-8C

INSTRUMENT: GEOMETRICS GEODE

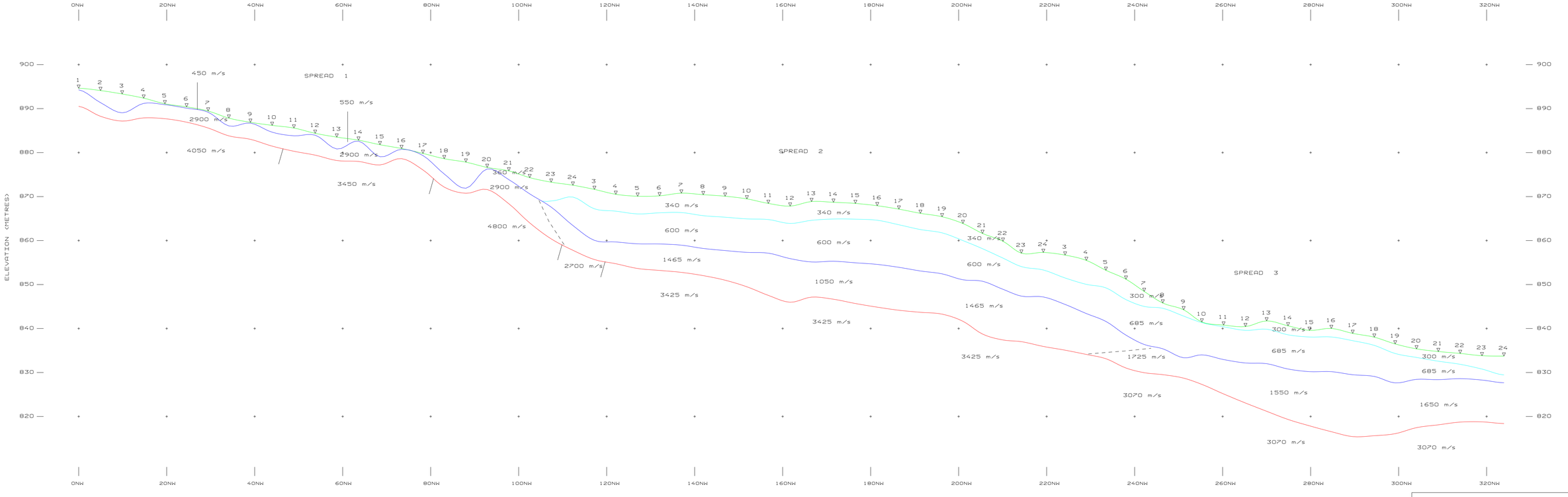
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-8C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 13



SEISMIC LINE SL-10A

INSTRUMENT: GEOMETRICS GEODE

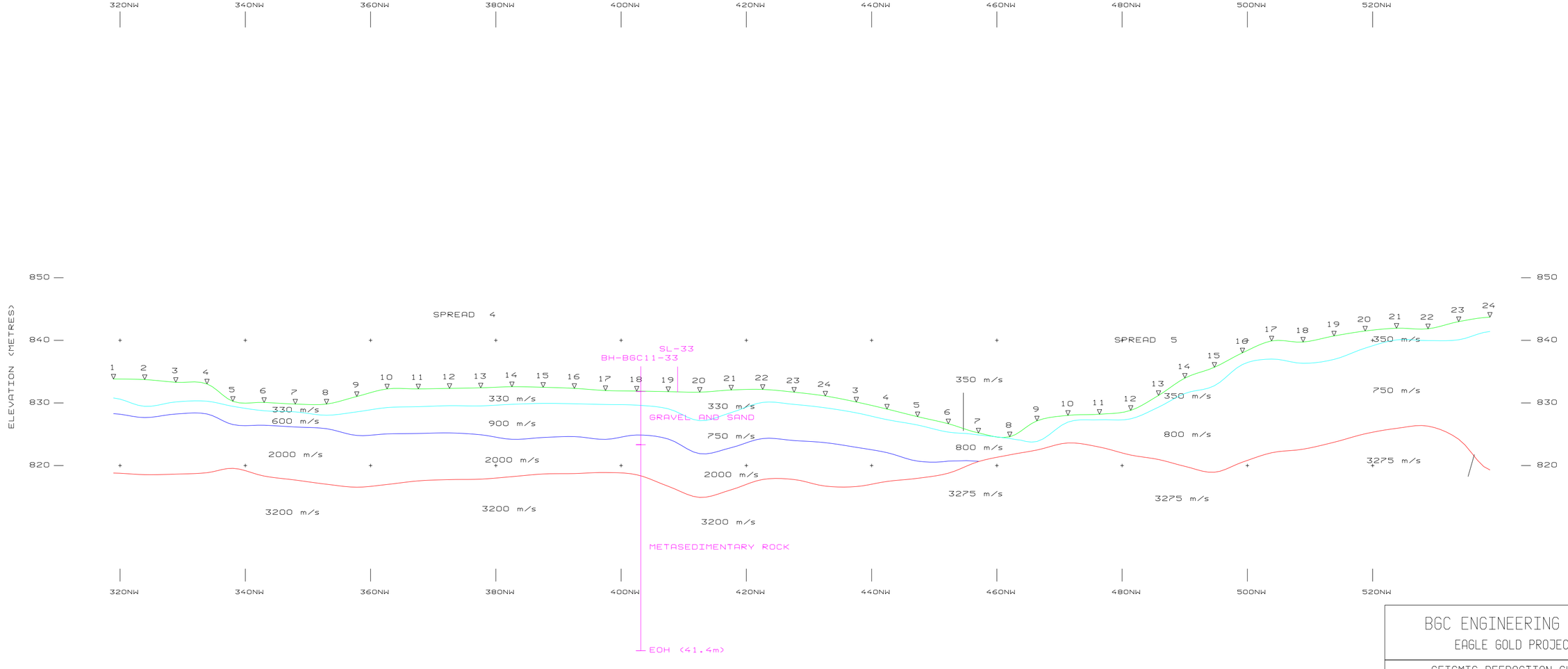
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 14



SEISMIC LINE SL-10B

INSTRUMENT: GEOMETRICS GEODE

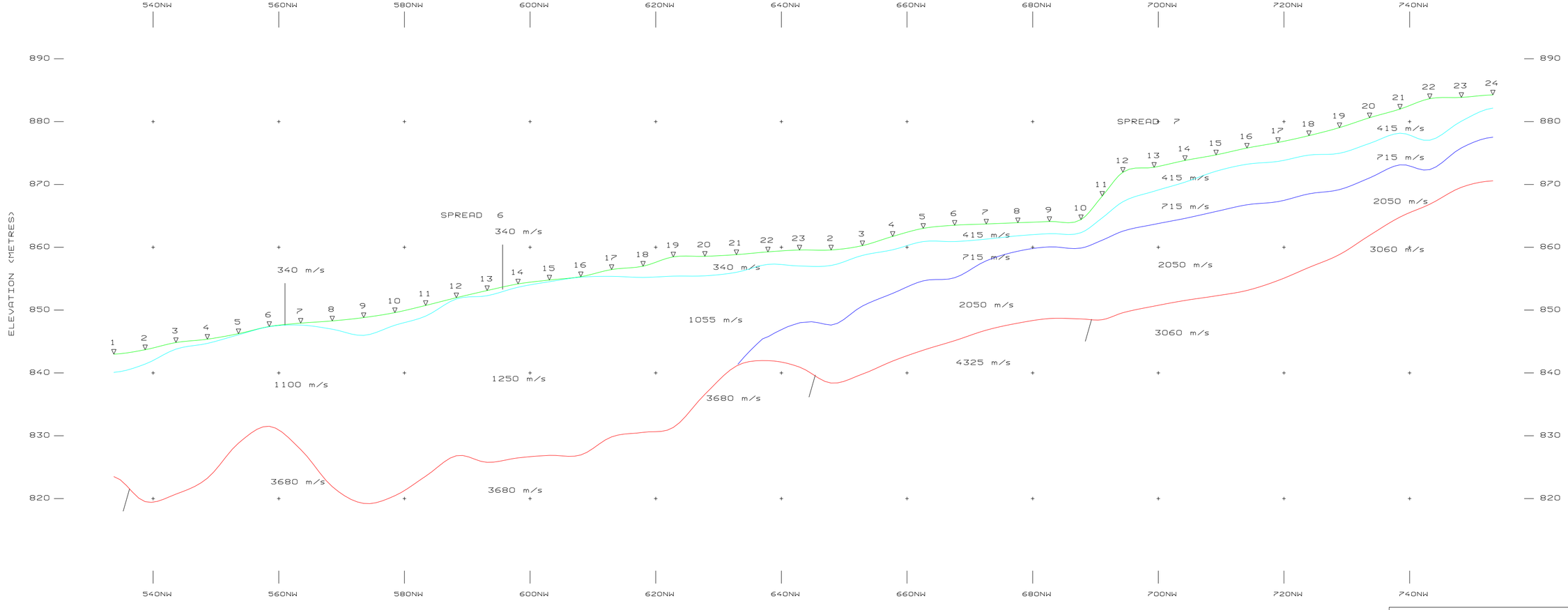
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 15



SEISMIC LINE SL-10C

INSTRUMENT: GEOMETRICS GEODE

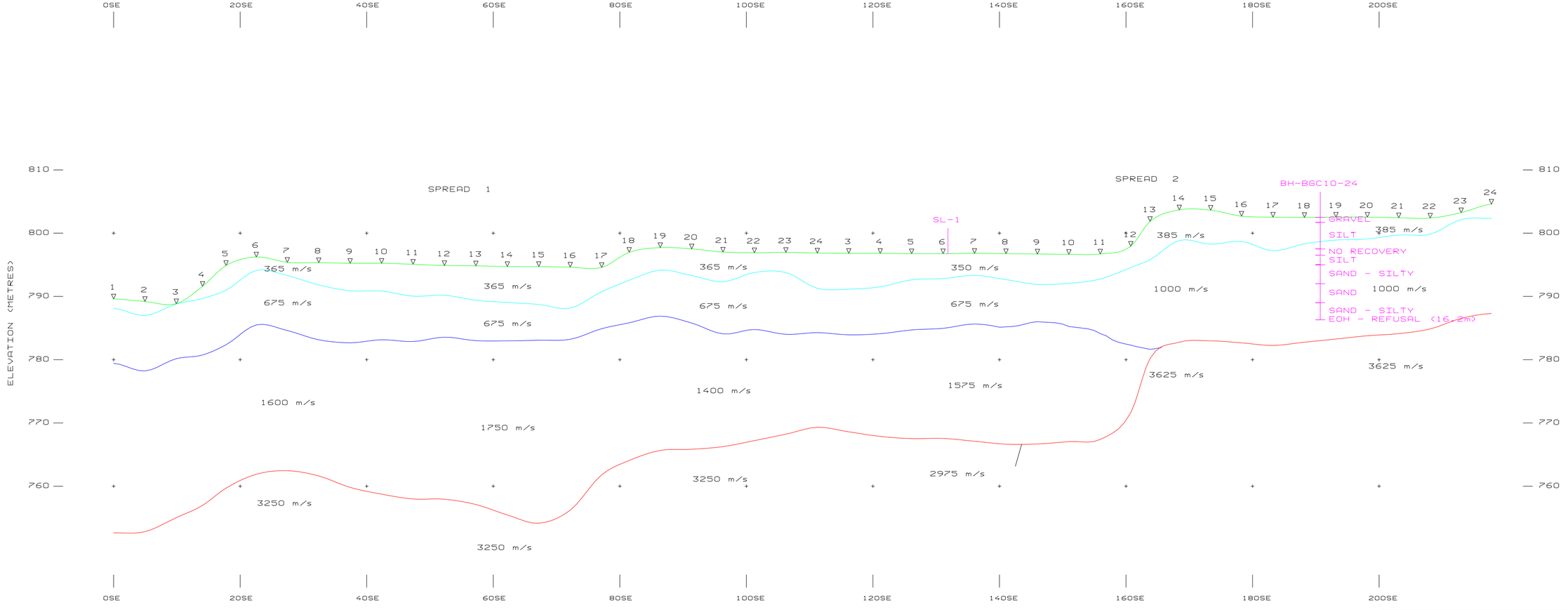
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 16



SEISMIC LINE SL-12

INSTRUMENT: GEOMETRICS GEODE

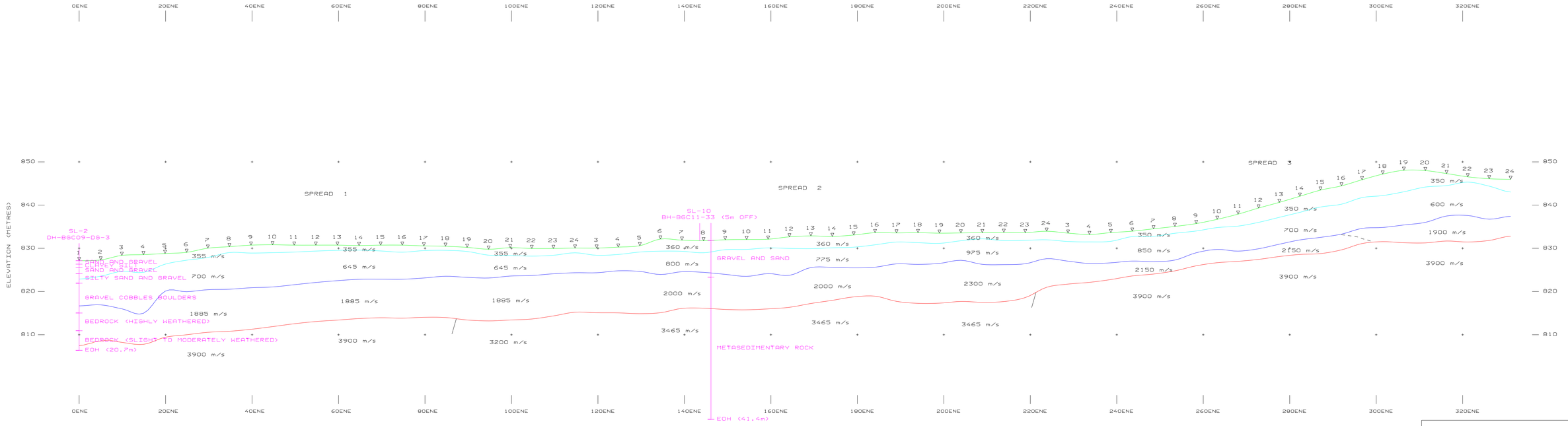
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-12

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 17



SEISMIC LINE SL-33A

INSTRUMENT: GEOMETRICS GEODE

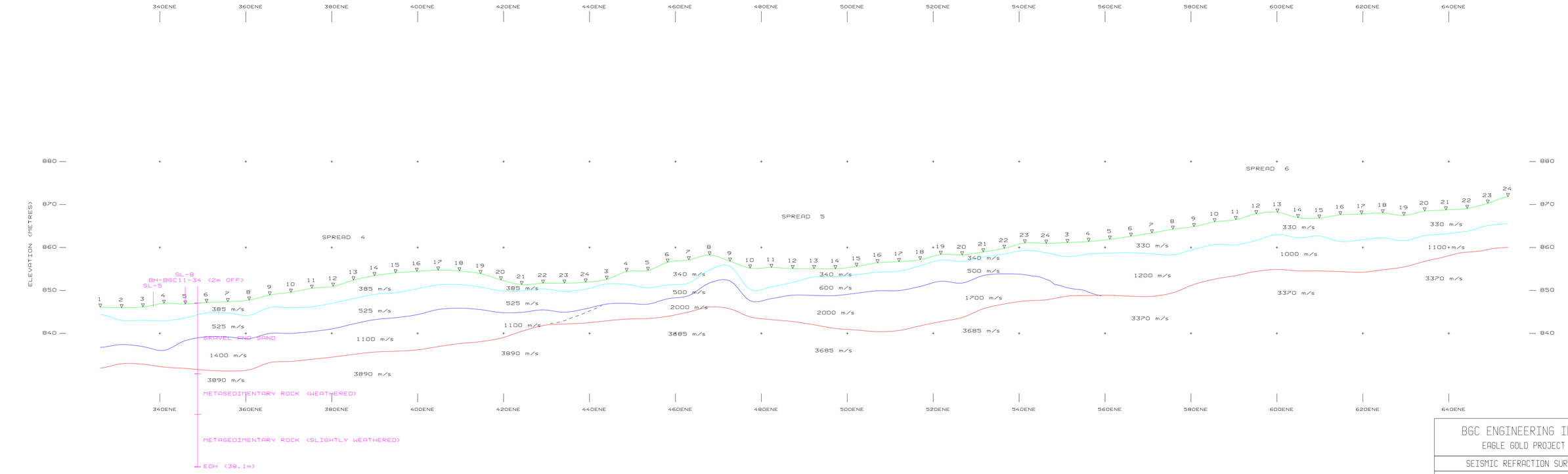
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-33A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 18



SEISMIC LINE SL-33B

INSTRUMENT: GEOMETRICS GEODE

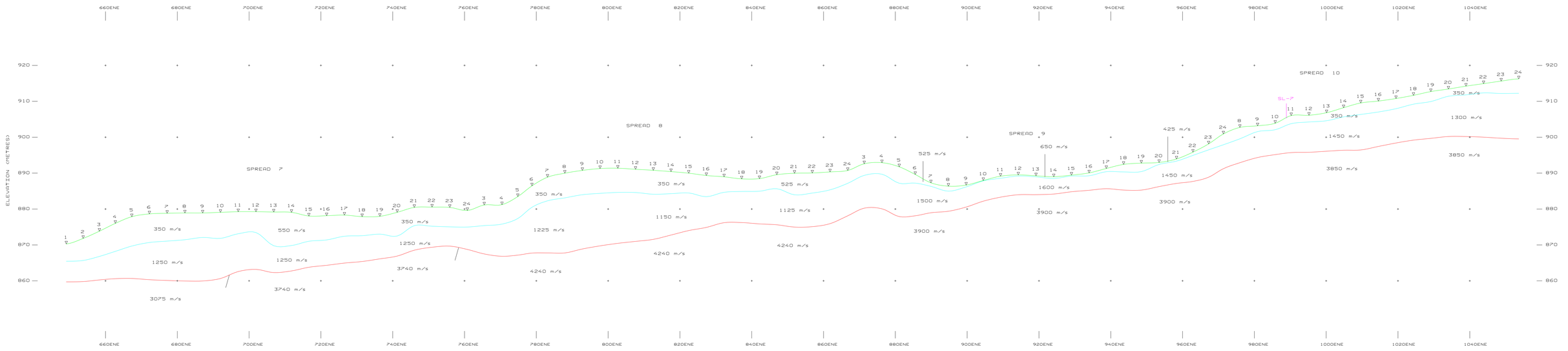
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-33B

FRONTIER GEOSCIENCES INC.

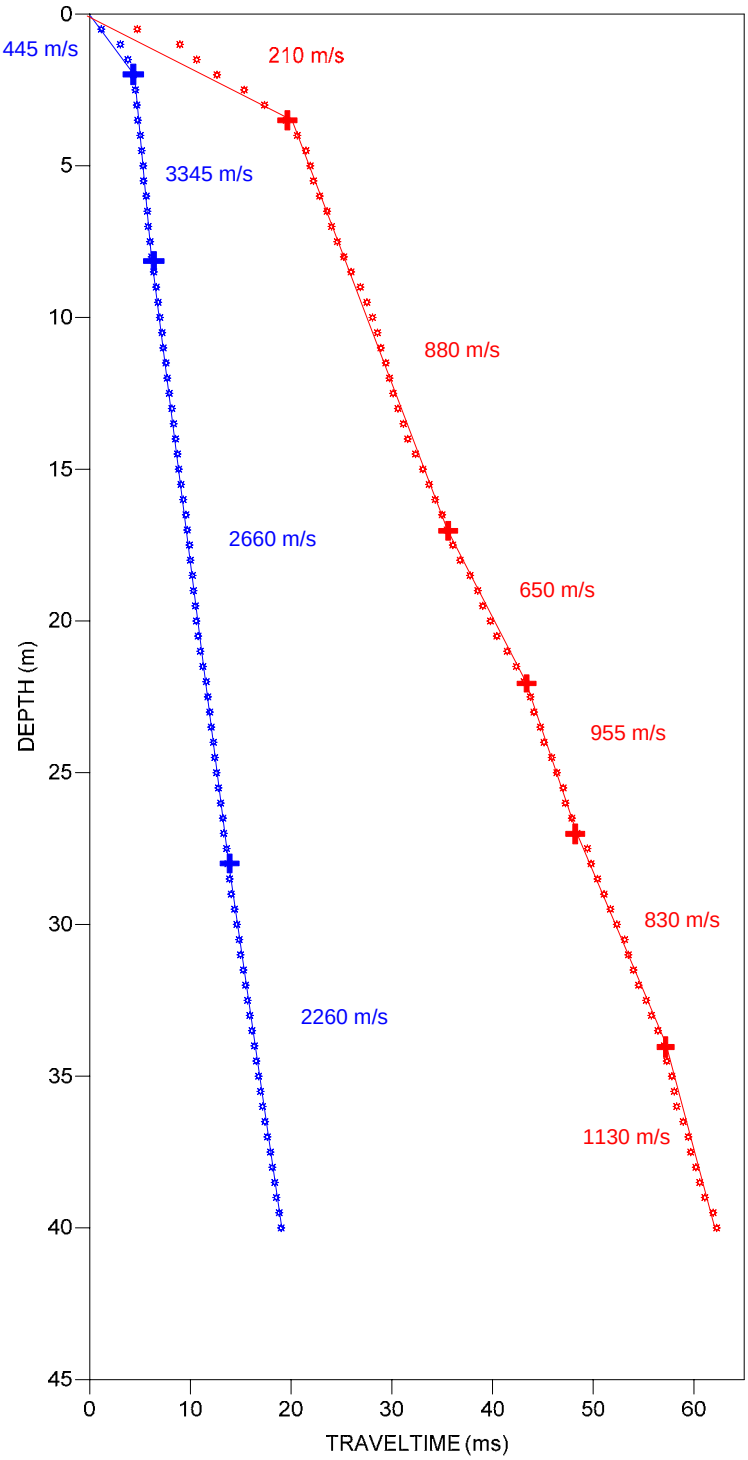
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 19

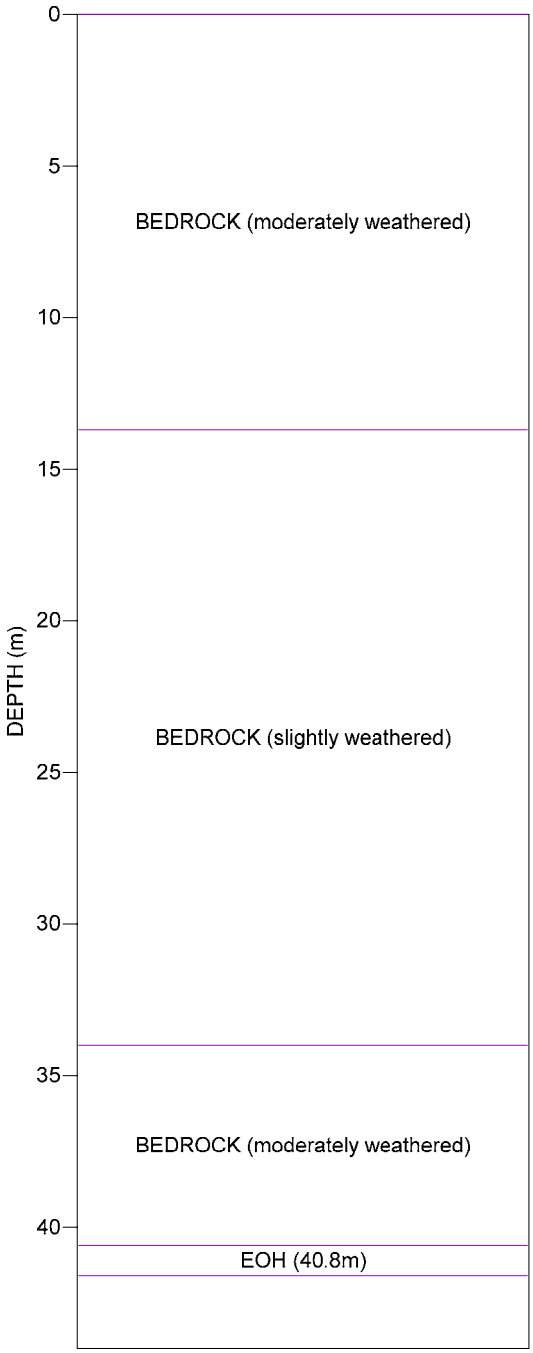


SEISMIC LINE SL-33C

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.
EAGLE GOLD PROJECT
SEISMIC REFRACTION SURVEY
INTERPRETED DEPTH SECTION SL-33C
FRONTIER GEOSCIENCES INC.
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 20





LEGEND

DATA POINTS

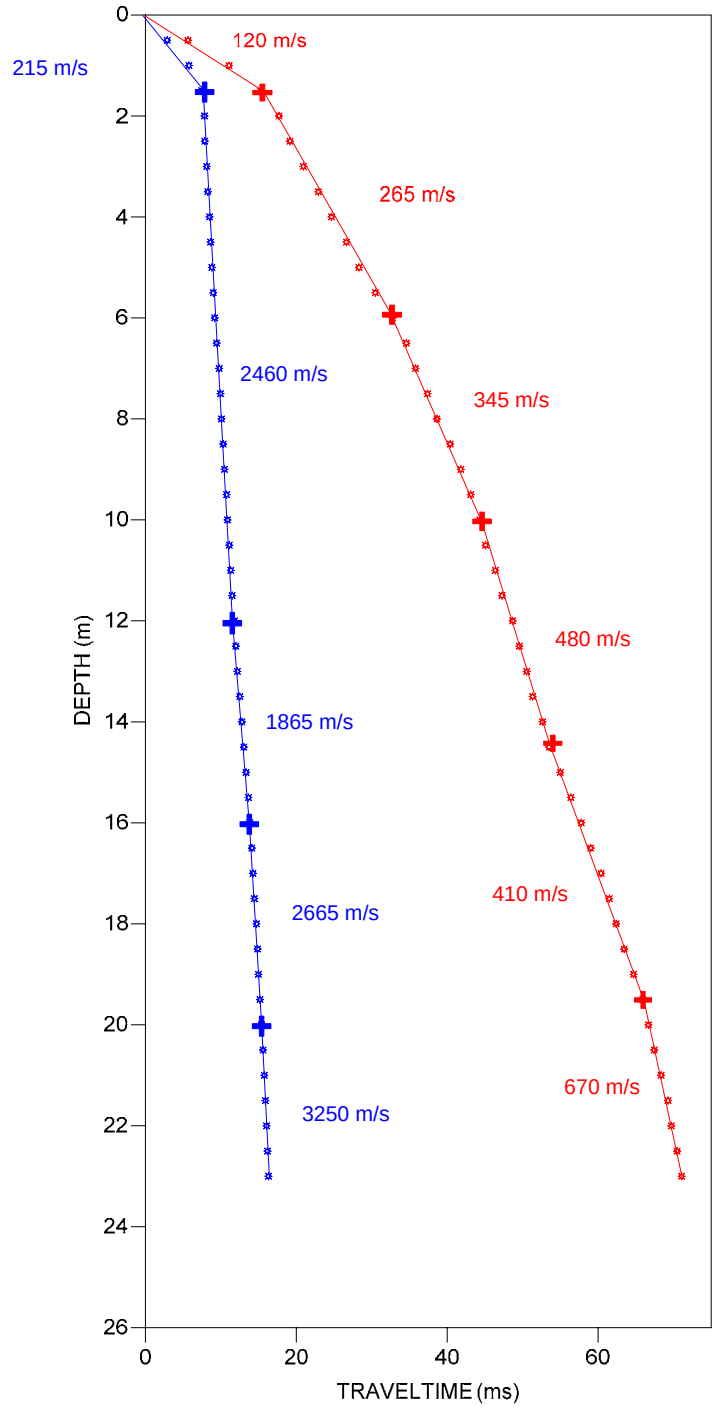
VELOCITY CHANGE

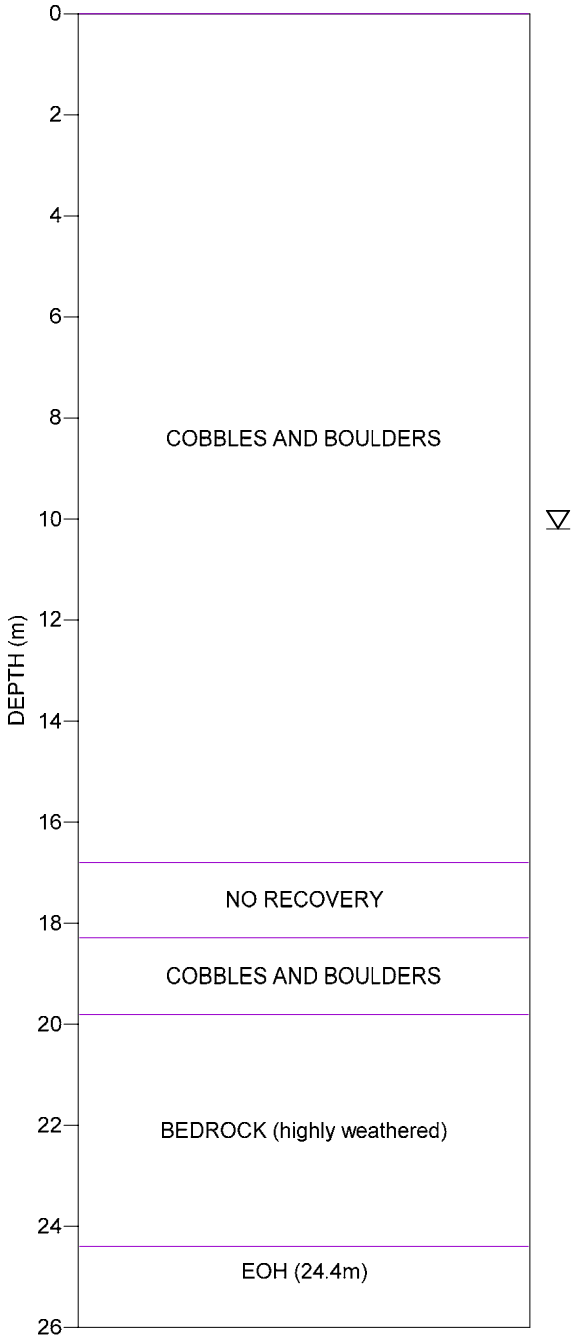
P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC. EAGLE GOLD PROJECT
DOWNHOLE SEISMIC SURVEY
BOREHOLE BH11-28 P AND S WAVE VELOCITIES
FRONTIER GEOSCIENCES INC.
DATE: SEPT. 2011 | VSCALE 1:250 | FIG. 21





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

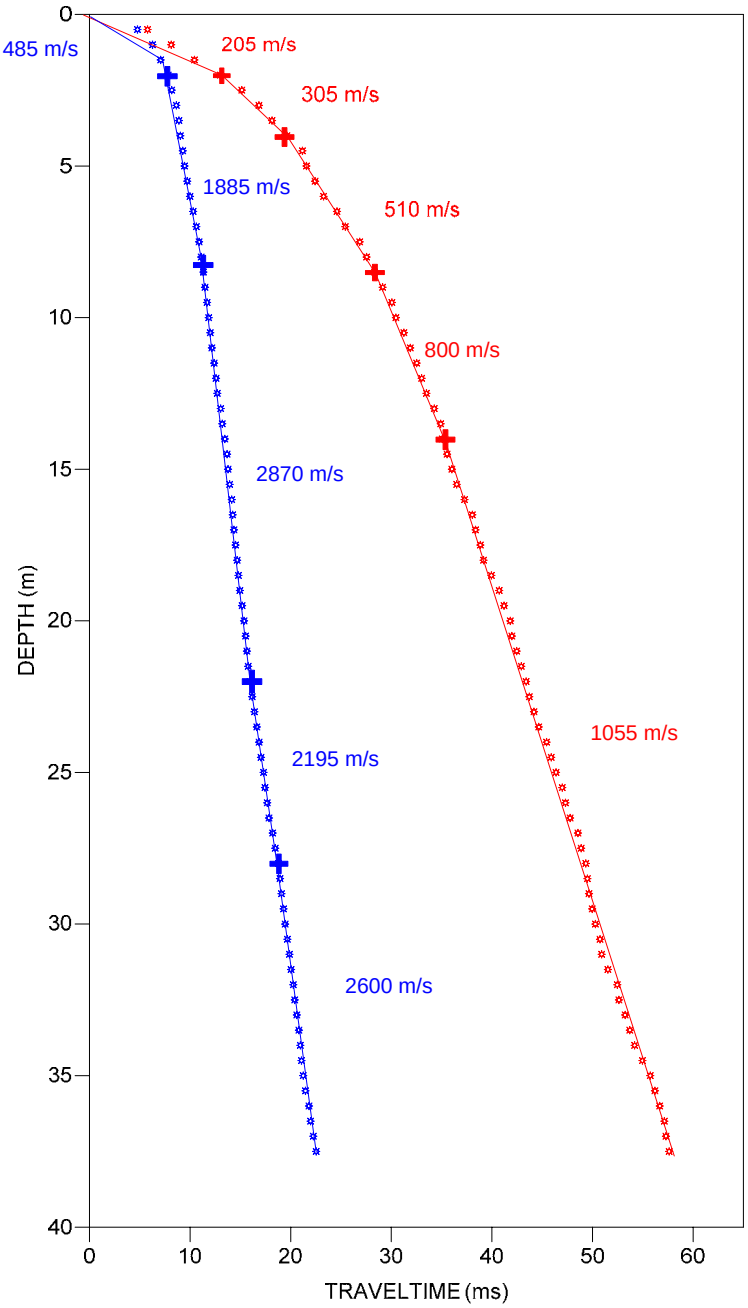
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

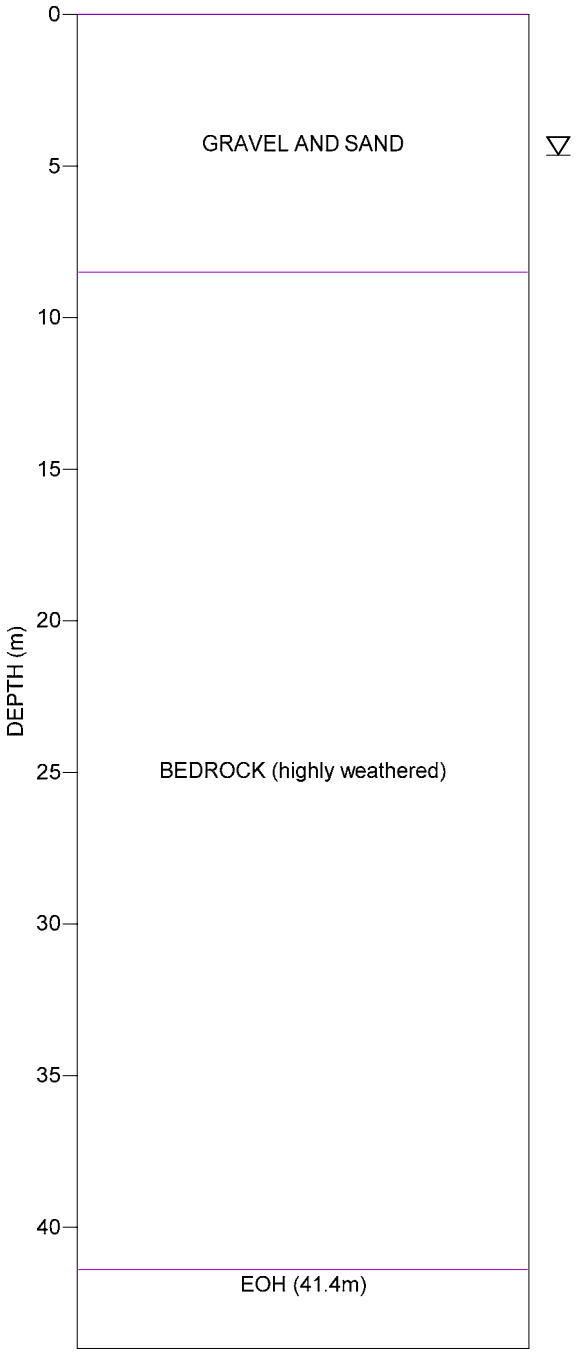
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-32
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 22





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

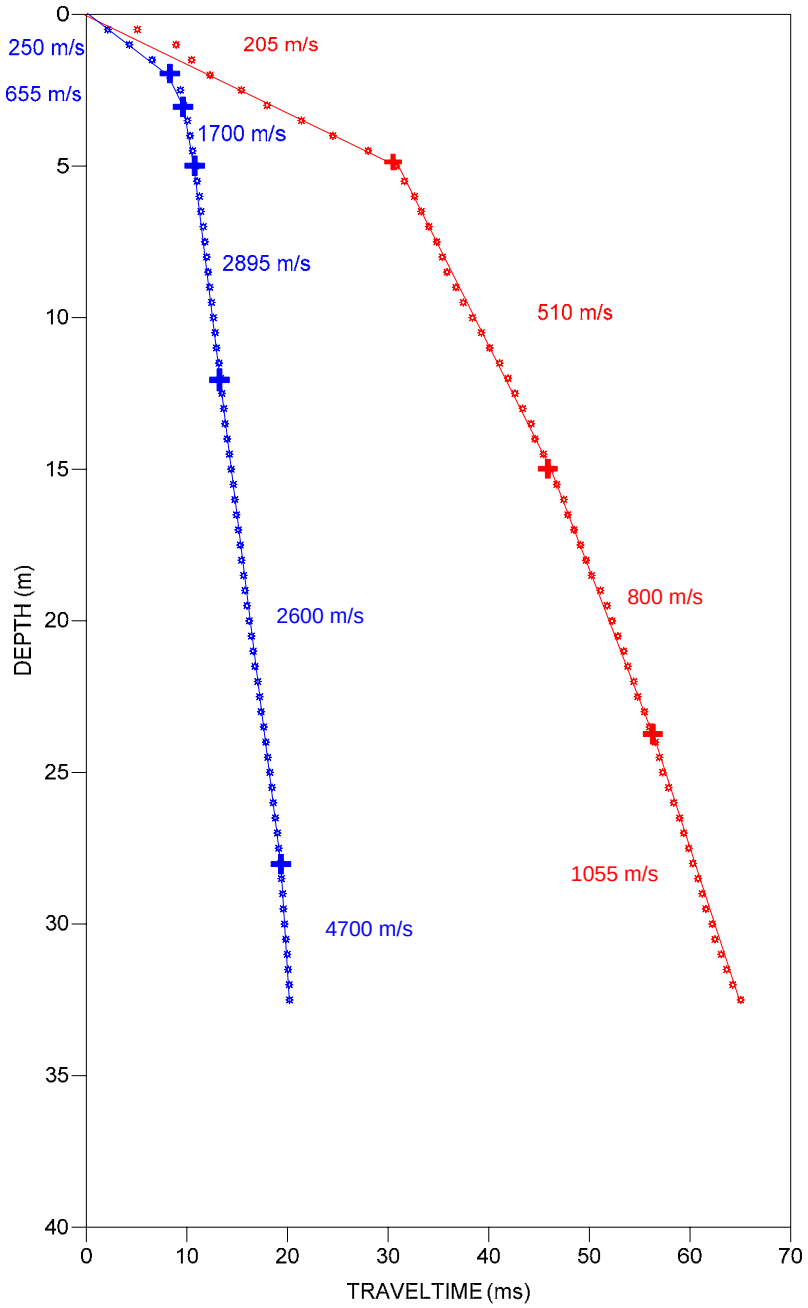
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

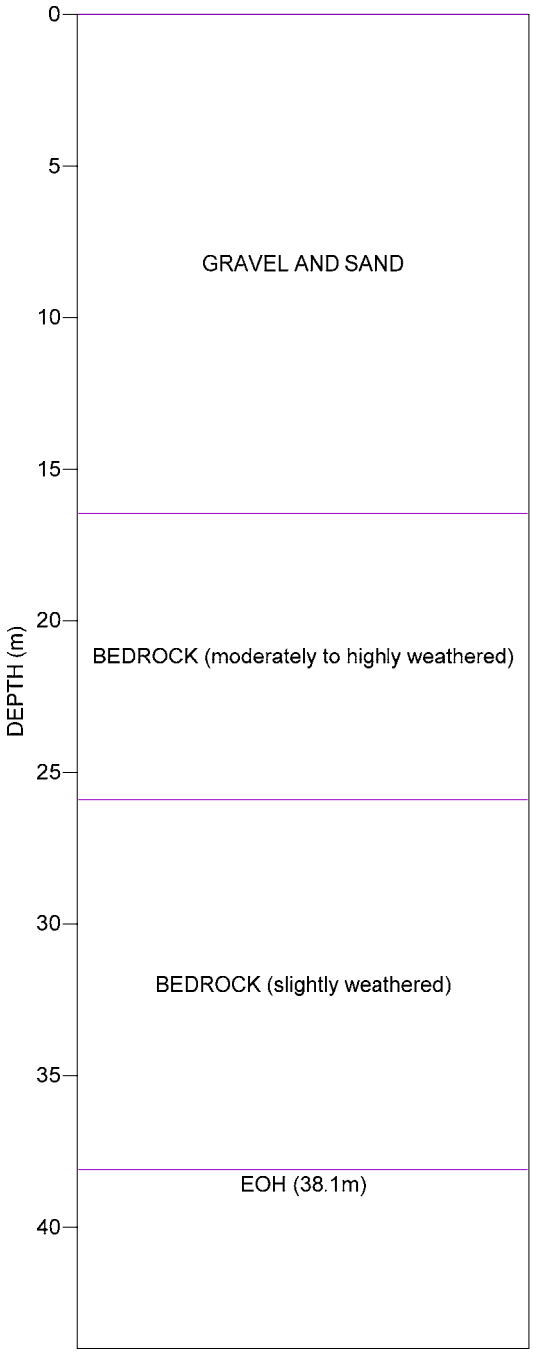
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-33
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 23





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

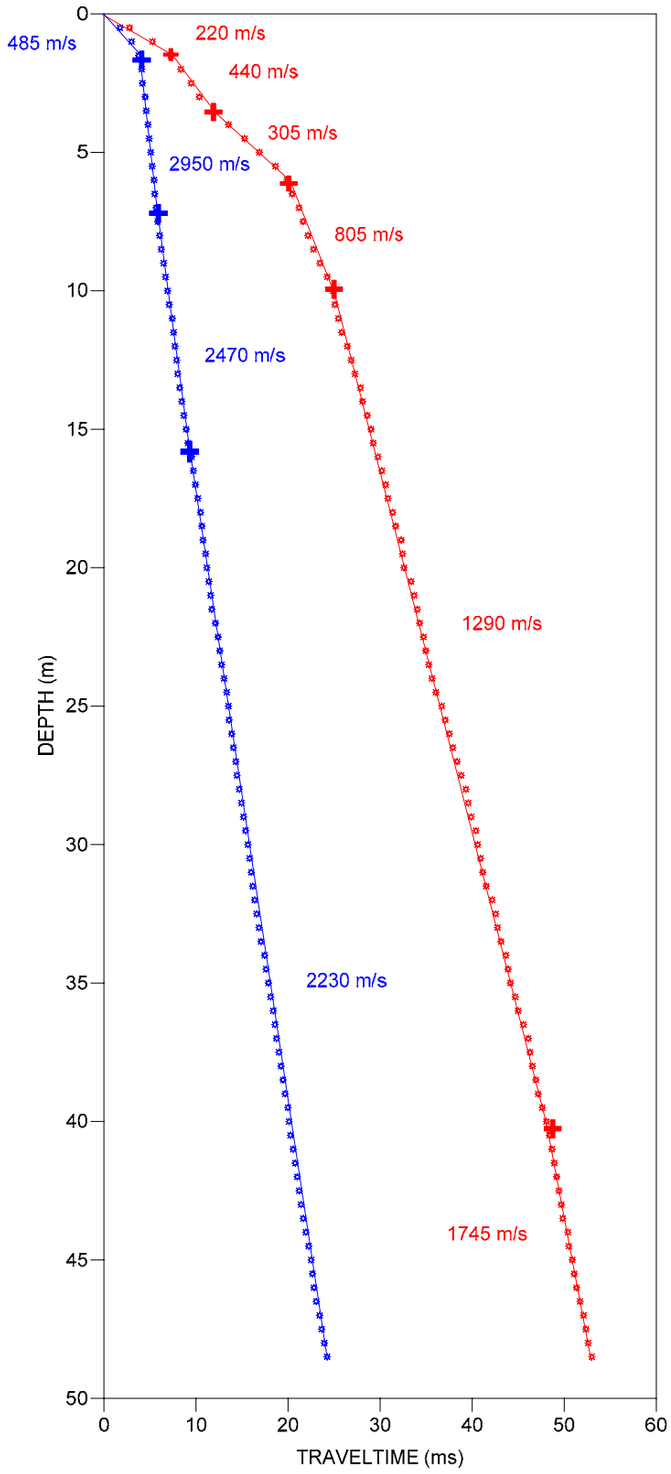
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

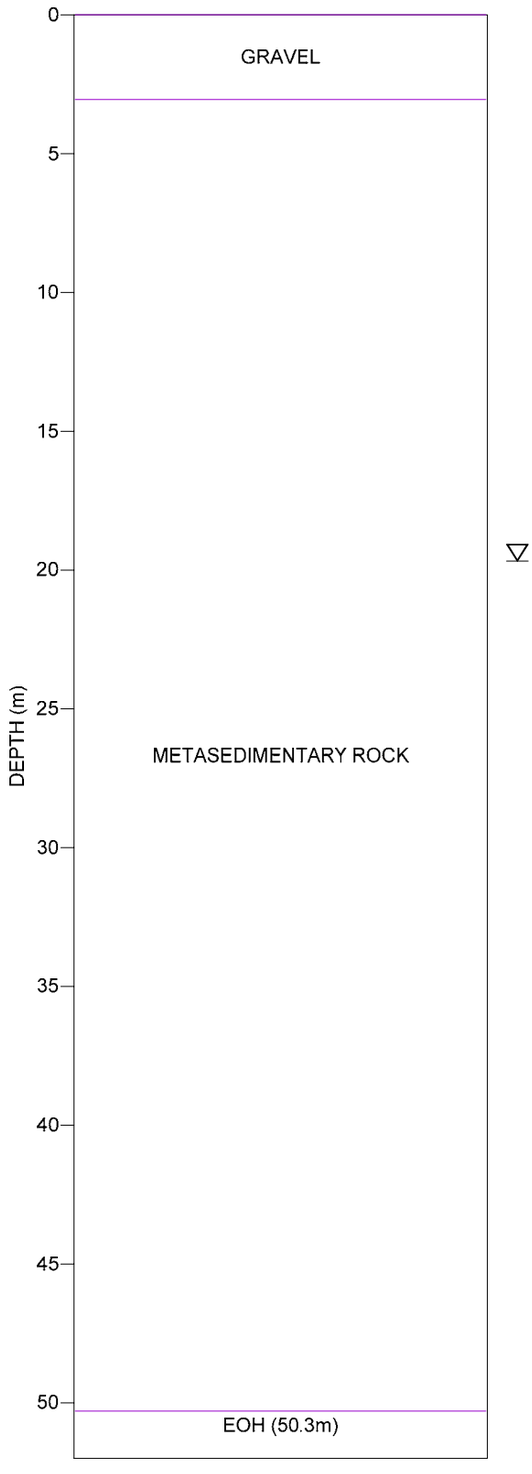
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-34
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 24





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

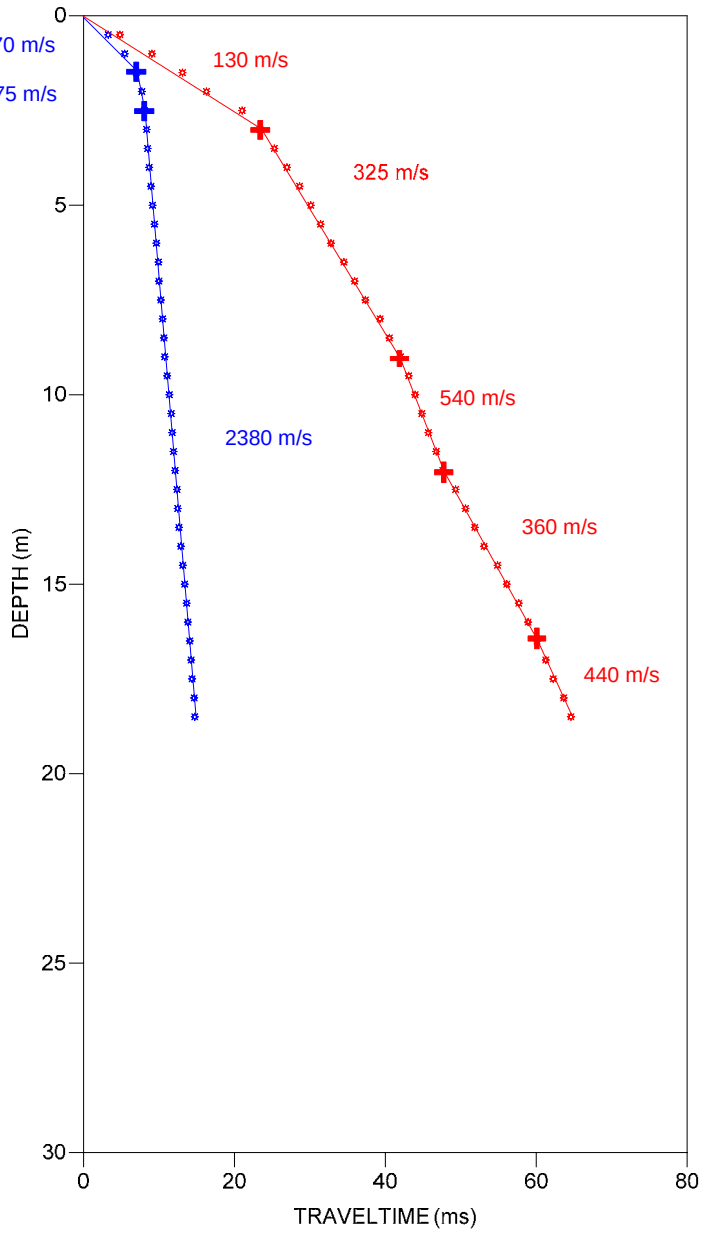
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

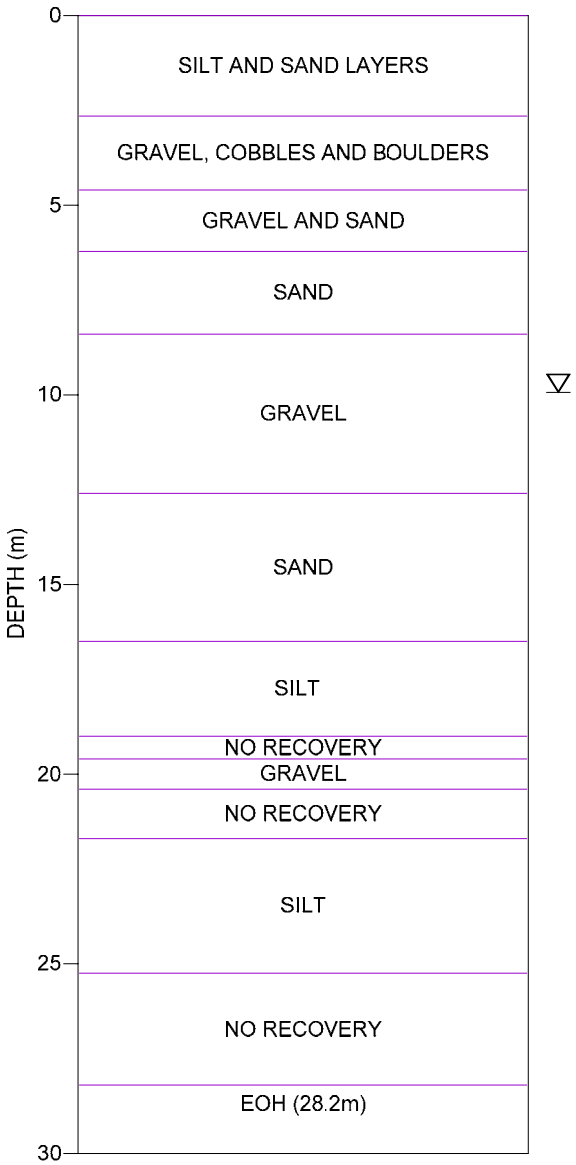
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-36
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 25





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

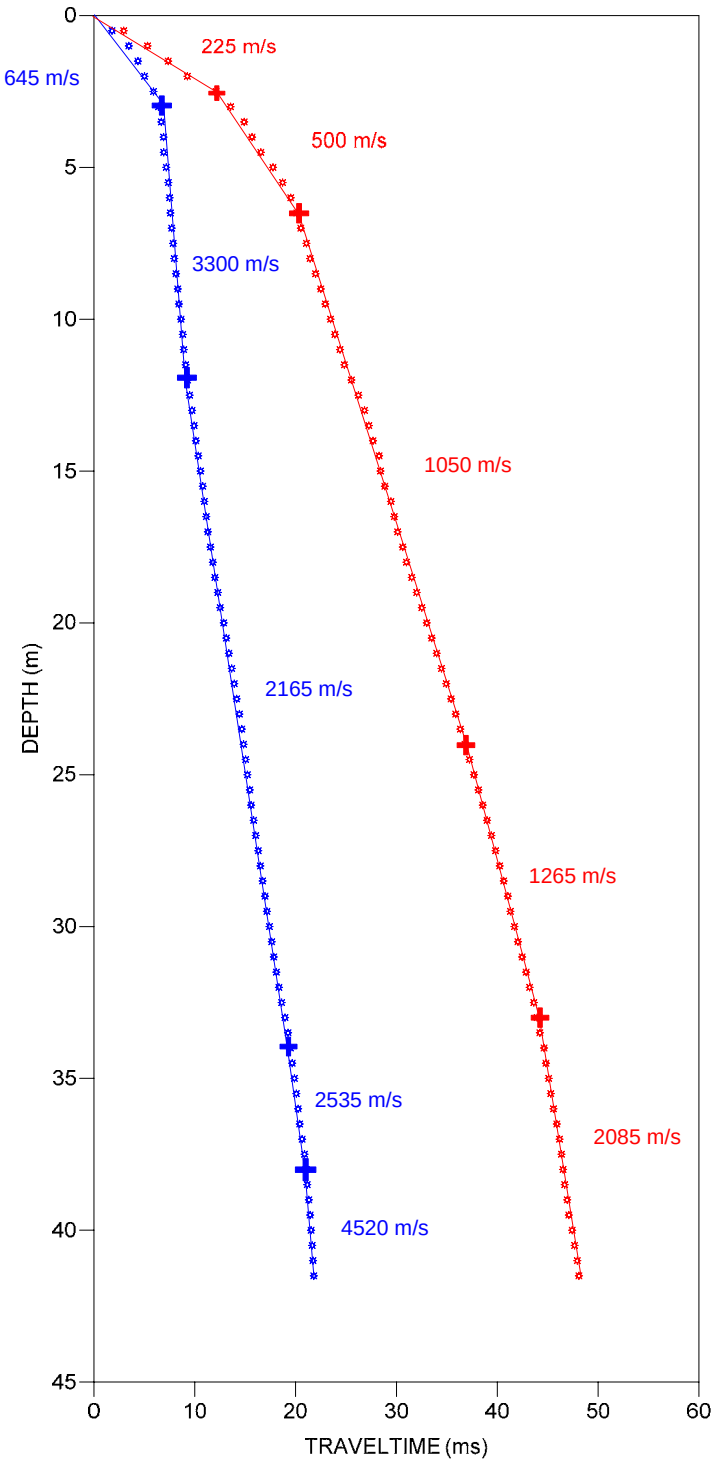
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

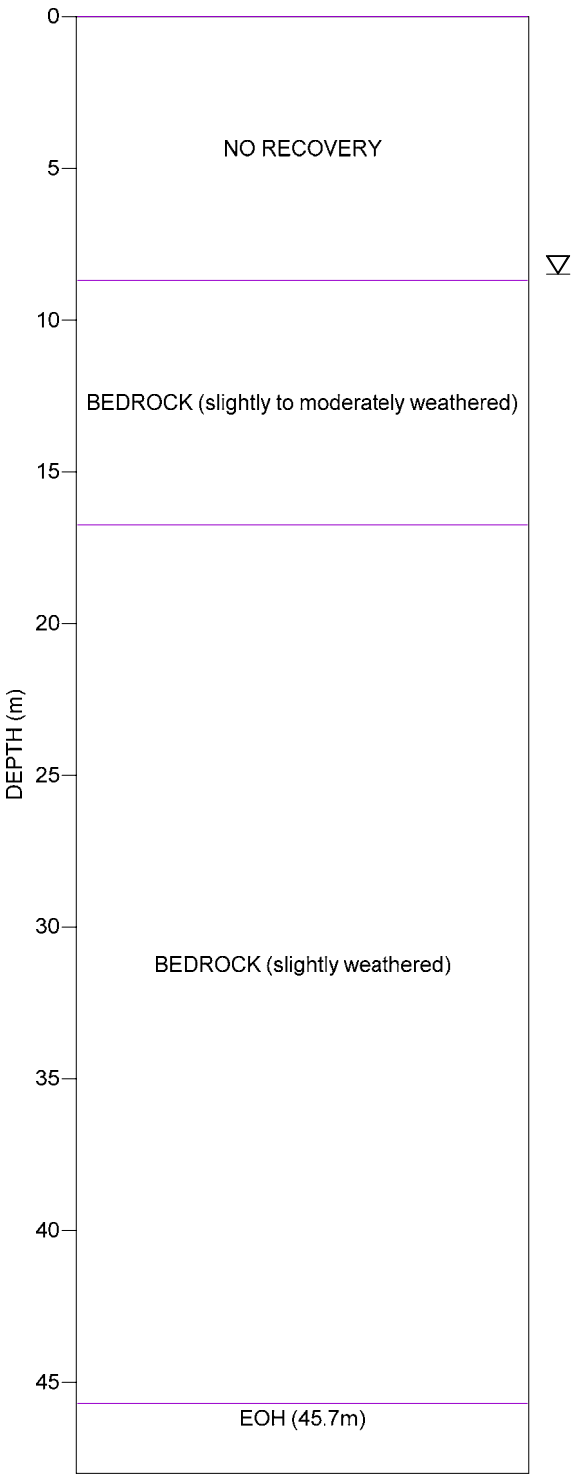
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-39
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:200	FIG. 26





LEGEND

- DATA POINTS
- VELOCITY CHANGE
- P WAVE
- S WAVE
- LAYER BOUNDARIES

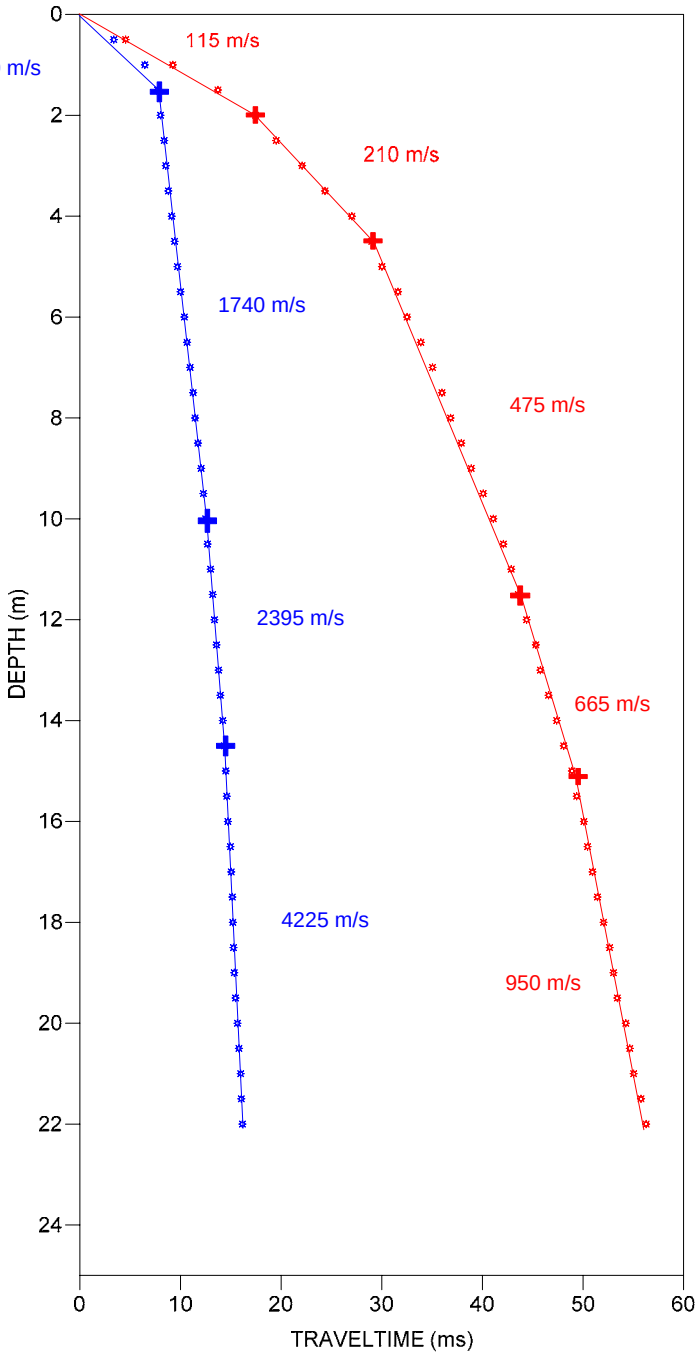
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

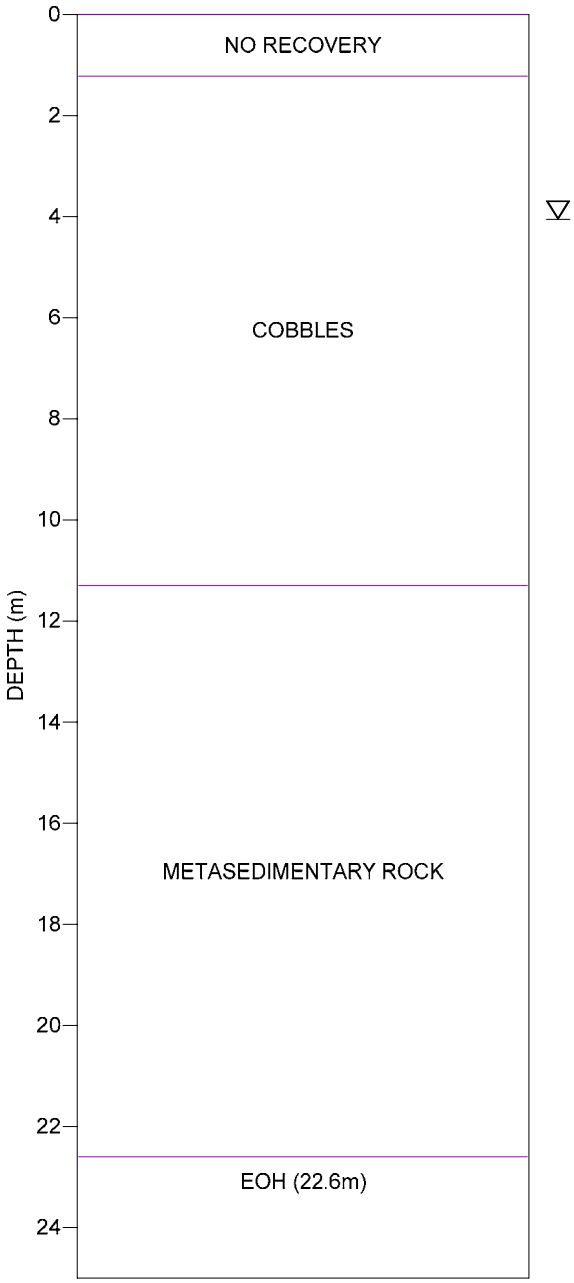
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-40B
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 27





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

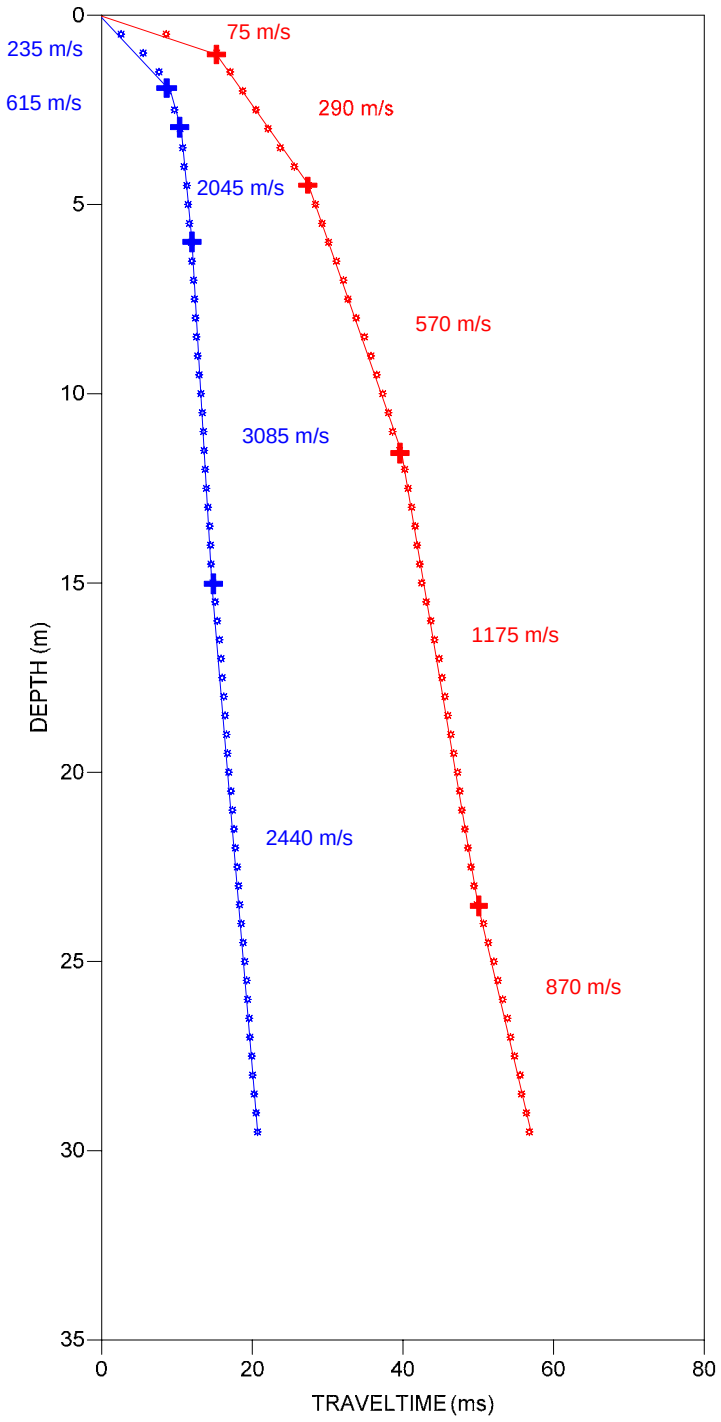
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

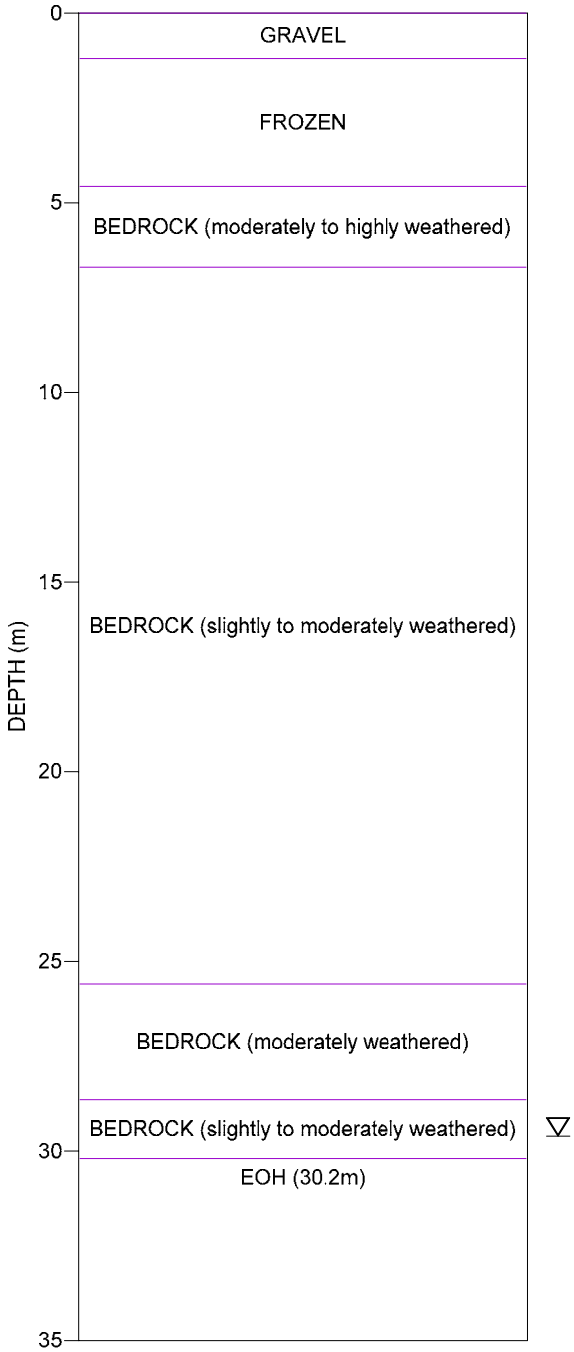
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-52
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 28





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

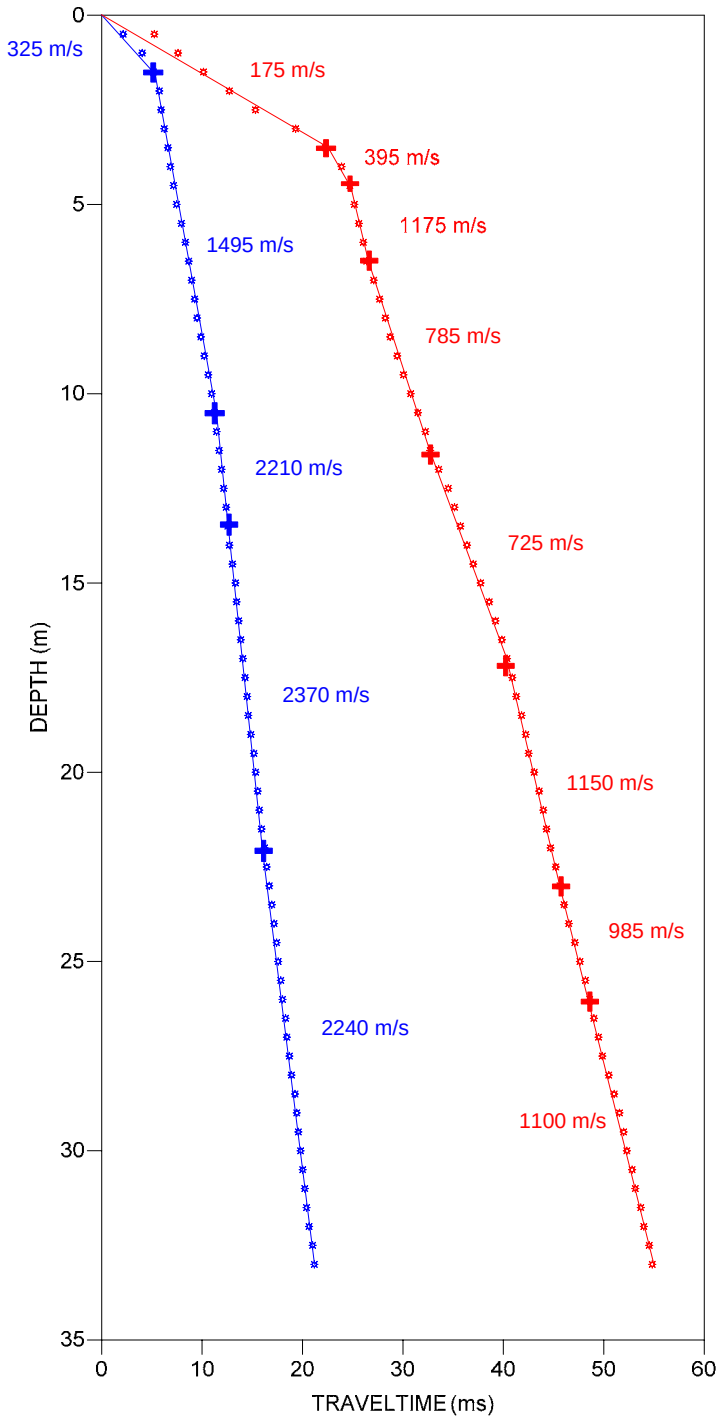
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

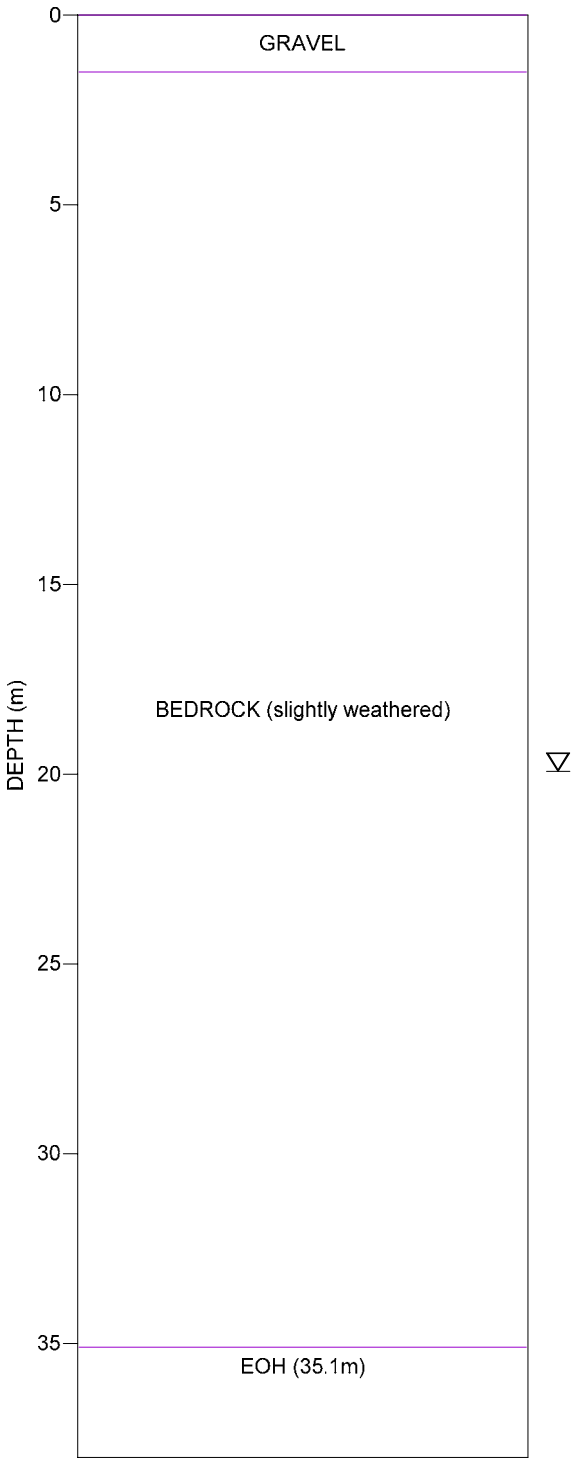
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-59
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:200	FIG. 29





LEGEND

DATA POINTS

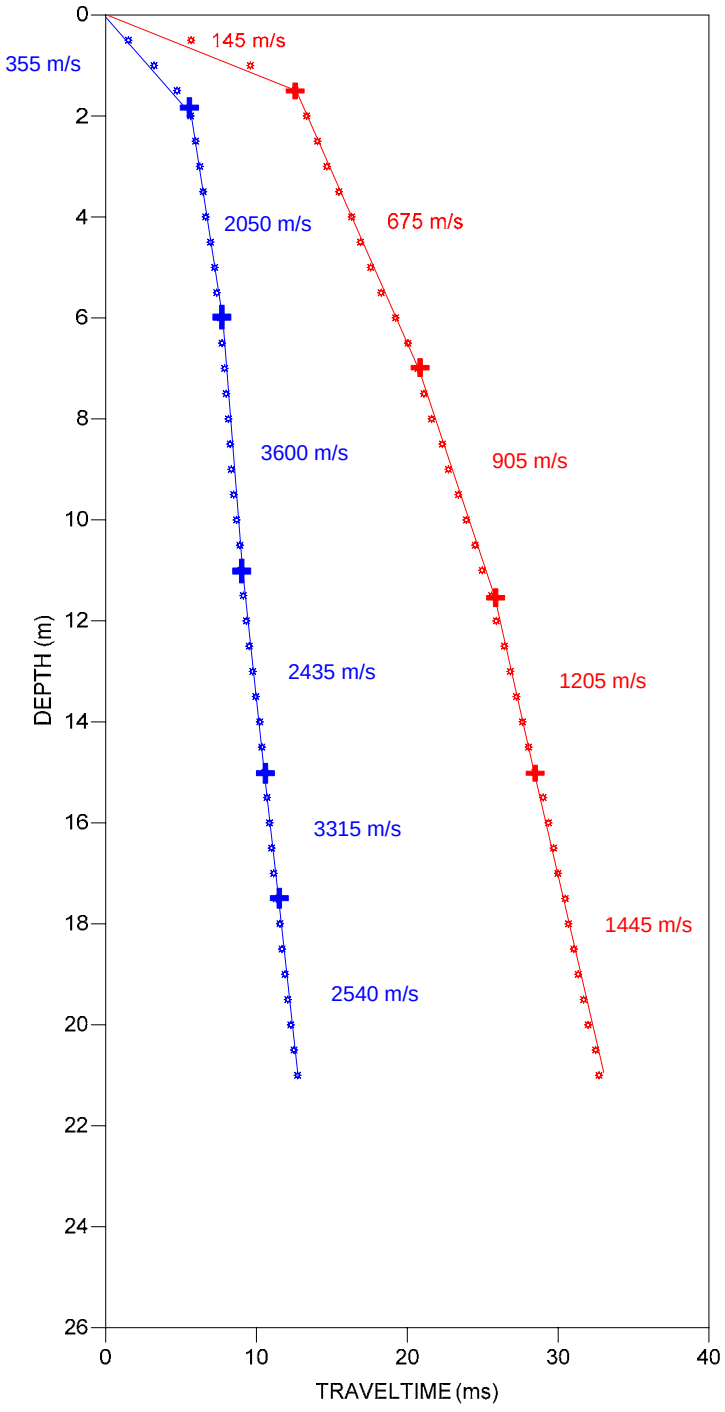
VELOCITY CHANGE

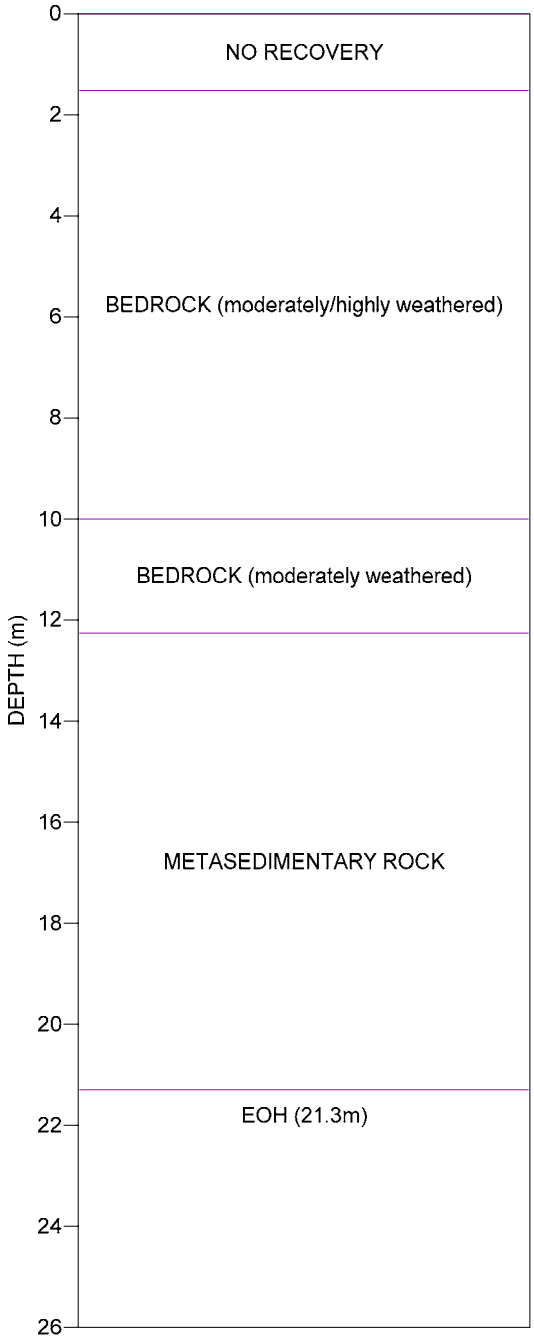
P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC. EAGLE GOLD PROJECT
DOWNHOLE SEISMIC SURVEY
BOREHOLE BH11-62 P AND S WAVE VELOCITIES
FRONTIER GEOSCIENCES INC.
DATE: SEPT. 2011 | VSCALE 1:200 | FIG. 30





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC.
EAGLE GOLD PROJECT

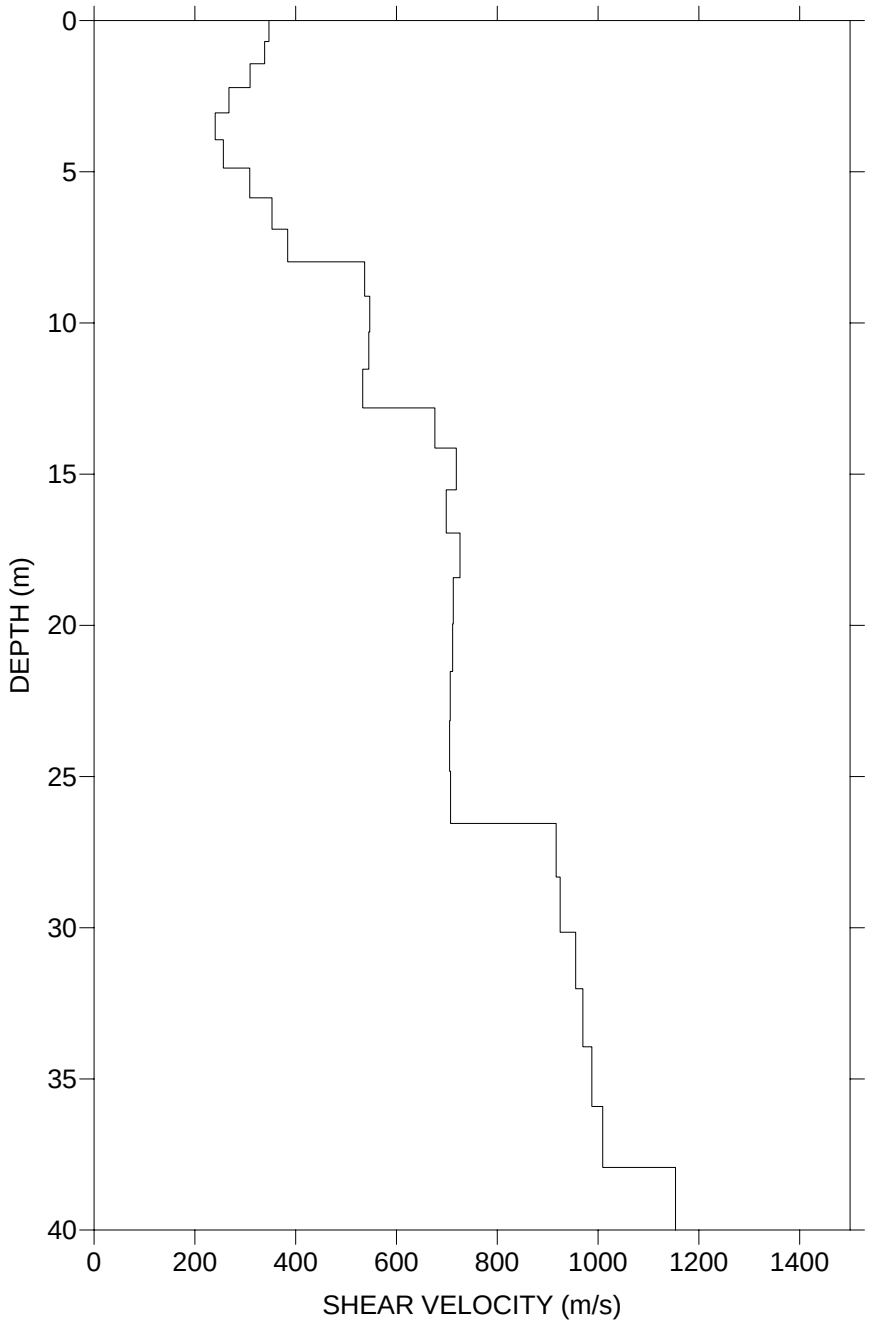
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-69
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 31

MASW PROFILE SL-2 STATION 300m

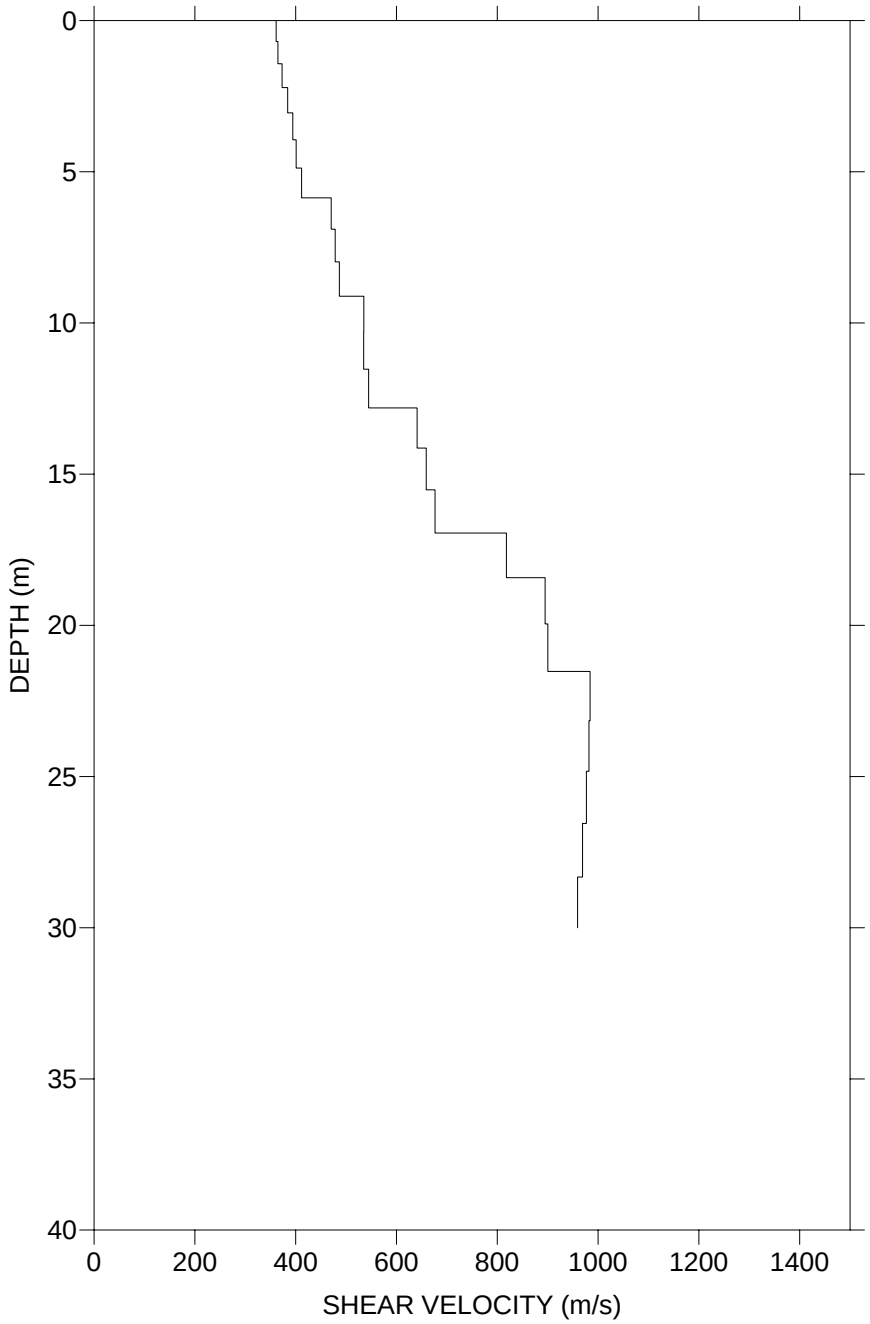


BH-BGC11-32

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-2 STATION 300M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 32

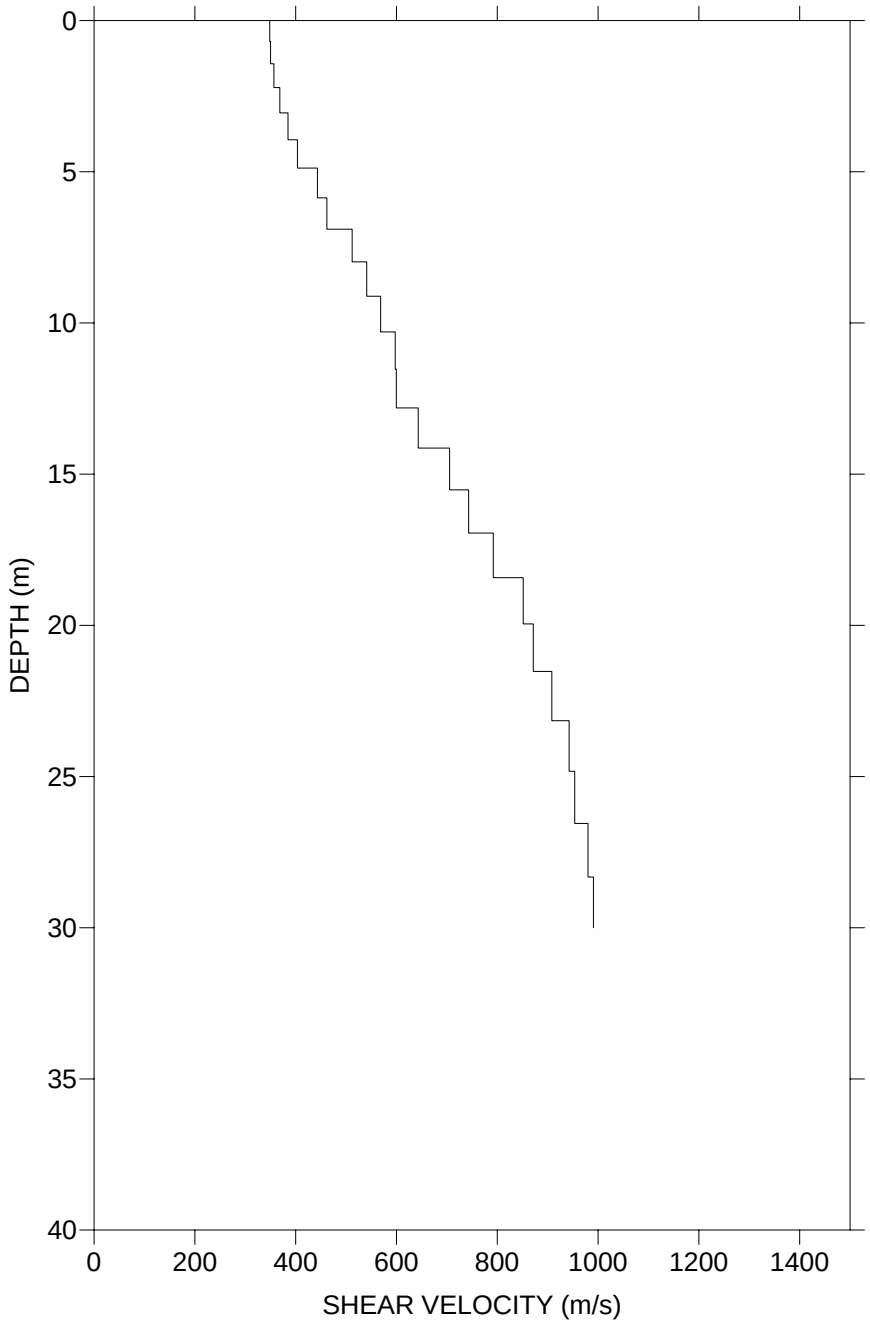
MASW PROFILE SL-7 STATION 155m



BH-BGC11-52

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
MASW PROFILE SL-7 STATION 155M		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT 2011	SCALE 1:250	FIG. 33

MASW PROFILE SL-7 STATION 185m

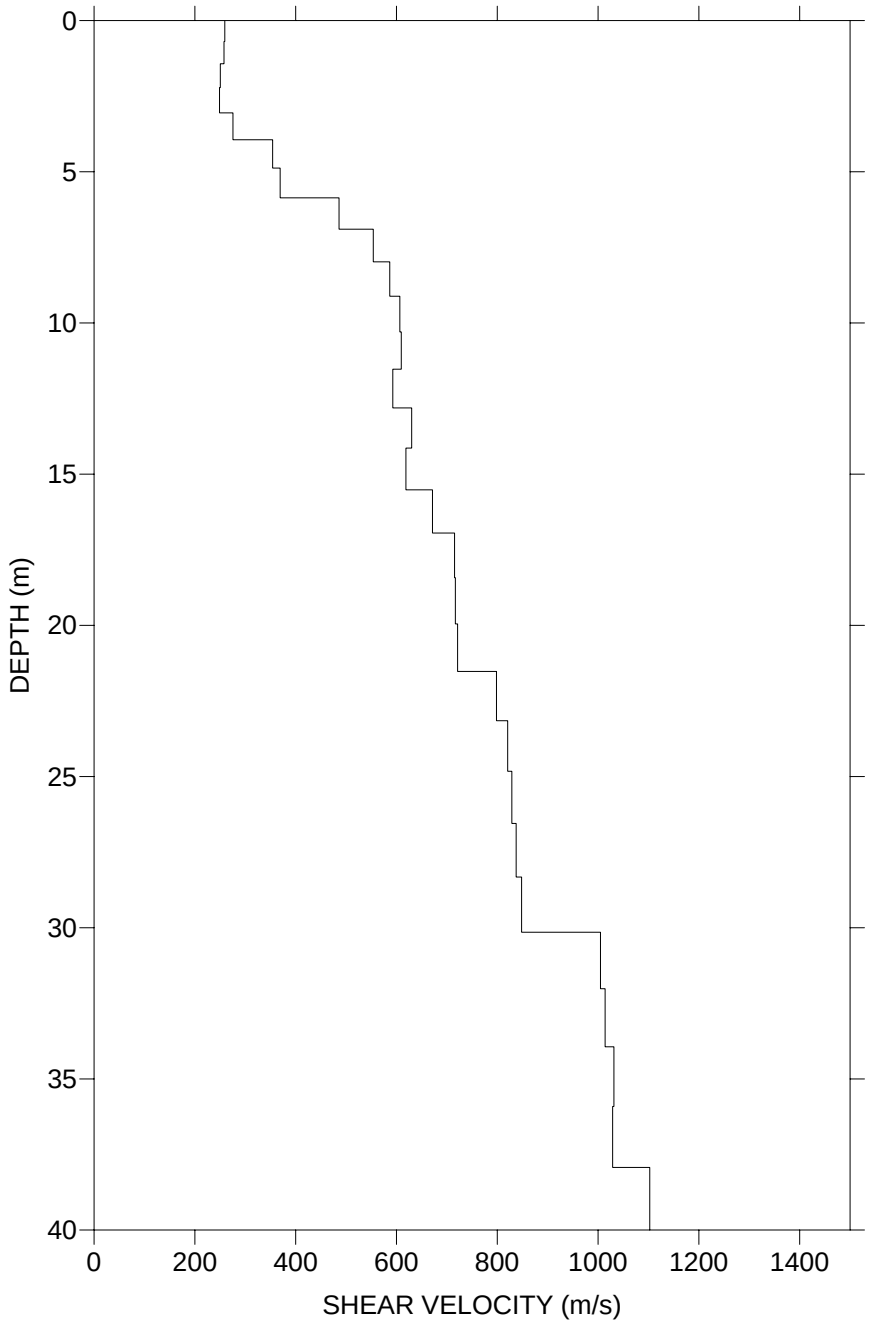


BH-BGC11-52

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-7 STATION 185M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 34

MASW PROFILE SL-33 STATION 165m

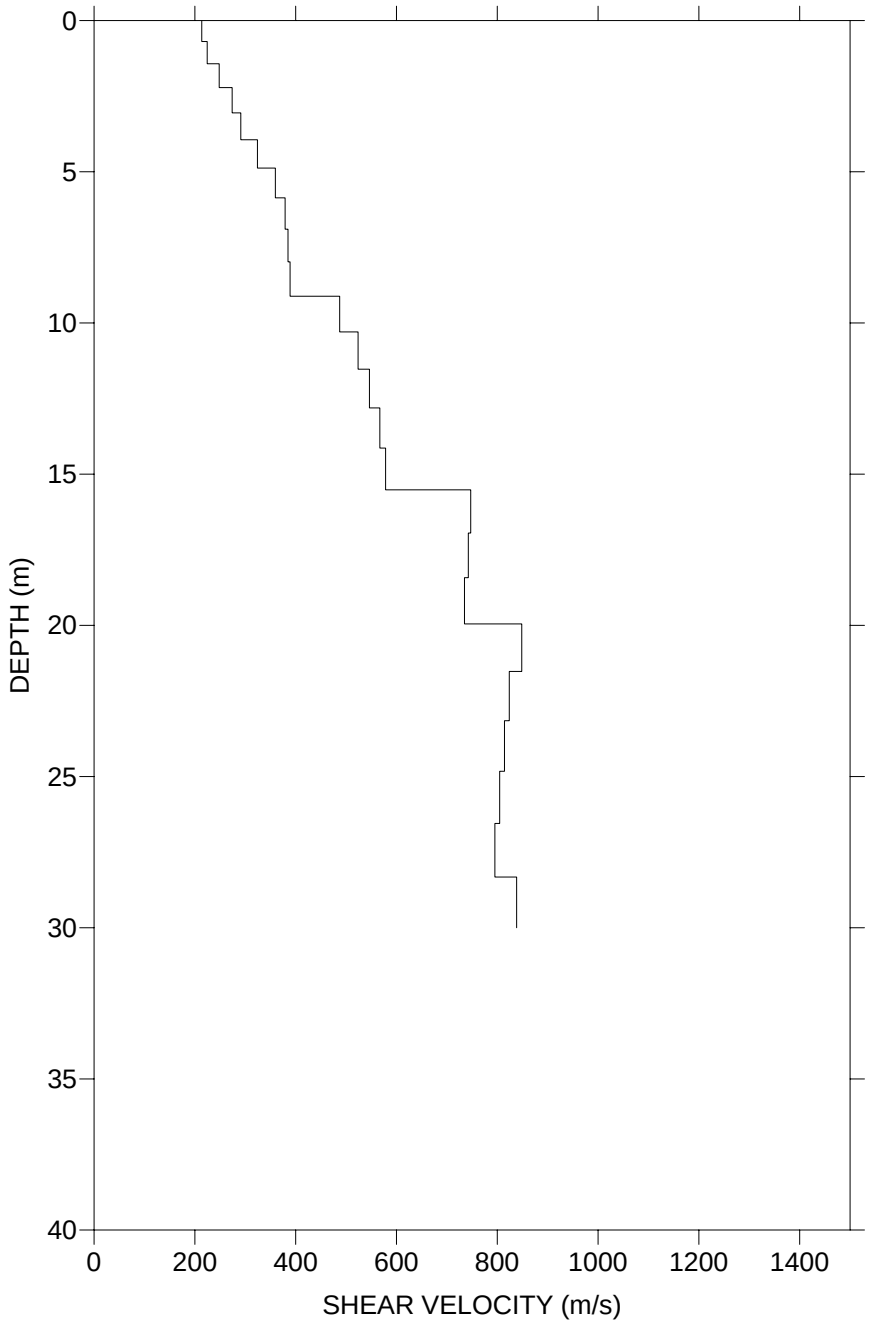


BH-BGC11-33

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-33 STATION 165M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 35

MASW PROFILE SL-33 STATION 360m

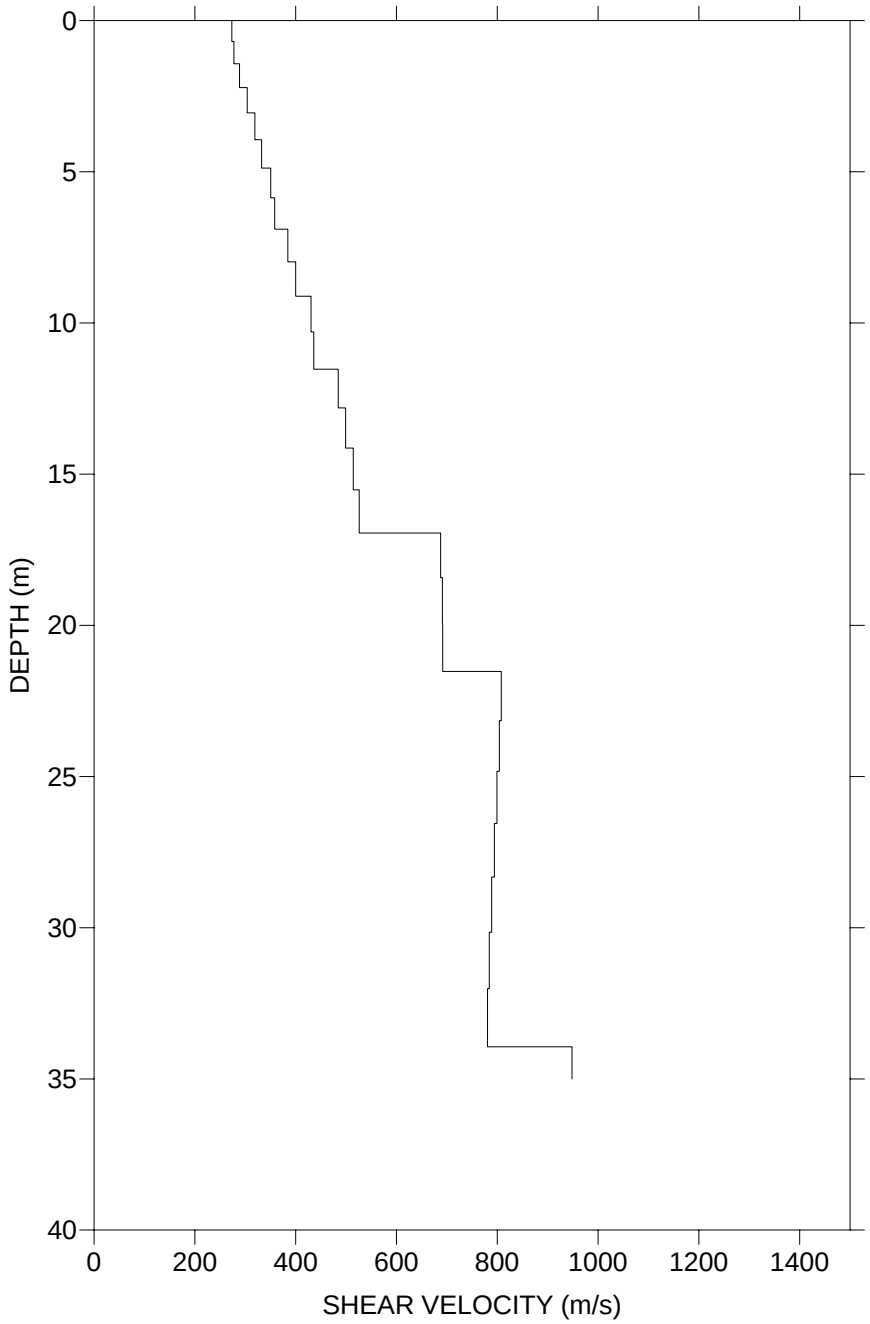


BH-BGC11-34

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-33 STATION 360M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 36

MASW PROFILE SL-33 STATION 380m



BH-BGC11-34

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
MASW PROFILE SL-33 STATION 380M		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT 2011	SCALE 1:250	FIG. 37

APPENDIX I
PLATE LOAD TESTS

1.0 INTRODUCTION

This Appendix documents the methods and results of plate load testing undertaken during the summer 2011 geotechnical investigations for mine site infrastructure.

Plate load tests were carried out by BGC personnel in August 2011 to assess the stiffness of exposed subgrade materials at or near selected proposed building pads. The aims of this testing program were to:

- Estimate the modulus of subgrade reaction of exposed subgrade materials.
- Estimate the yield stress pressure when possible.
- Test various diameters of plate to estimate the variation of material stiffness with bearing pressure and investigate the influence of plate size for extrapolation of results to full size footings.

2.0 PLATE LOAD TEST PROCESS DESCRIPTION

2.1. Test Locations

The tests were conducted in three excavated pits: two located within the proposed Plant Site footprint and one in the proximity of the proposed Secondary Crusher. The test areas were chosen for their proximity to the footprint of high bearing load structures and for their expected shallow occurrence of targeted rock formation. The pads were cautiously cut into undisturbed ground with an excavator under the supervision of BGC staff.

Tables I-1 and I-2 summarize the locations and characteristics of the tests performed. Refer to Drawing 07 for details of the layout of the plate load tests.

2.2. Installation

Specific test locations where identified in undisturbed representative subgrade and their surfaces were smoothed manually. For each location, the surface was cleaned of loose materials and a transition layer of clean coarse silica sand was placed at the test area to create a continuous and even contact between the base and the plates.

The plates where positioned parallel to the base of the rear differential of a D9H bulldozer that provided the approximately 48t reaction force for the test. A 25t hydraulic jack powered by a hand pump was used to apply the load to the ground and a 10,000 psi gauge was used to set and monitor the pressure increments. Refer to Photo 1 for a general arrangement of the test set up.

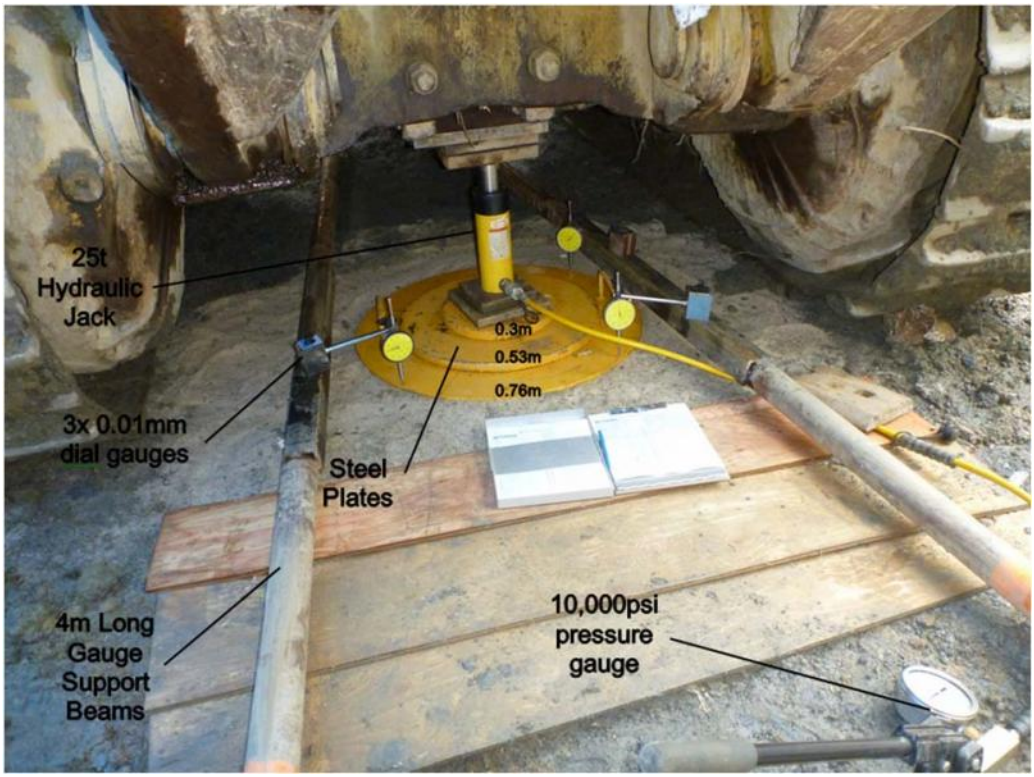


Photo 1. Details of the Instrumentation Set Up

2.3. Settlement monitoring and load increments

Vertical plate movements were measured to 0.01 mm resolution using three dial gauges positioned as shown in Photo 1.

The dial gauges were mounted on two 4m horizontal reference beams with supporting legs resting on the ground beyond the area of influence of the test. The load pattern was selected to obtain roughly 10 to 20 increments between the start and the maximum available pressure. The maximum pressure was limited by the capacity of the jack to 10,000 psi. After an intermediate load was reached, pressure was incrementally decreased and then re-increased, inducing an unload-reload cycle. Each load increment was maintained until the measured movements dropped to less than 0.01 mm/5 min.

2.4. Plate Sizes

Different plate sizes were tested at different locations to estimate variation of material stiffness with bearing pressure, and to investigate the influence of the load applied to different surface areas (plate diameters) on settlement and stiffness. Four different plate sizes were used in the plate load tests: 0.3 m, 0.53 m, 0.76 m and 1.2 m. All plates were 25mm thick and made of high grade steel.

2.5. Instruments Calibration

After completion of the field testing, the hydraulic gear was calibrated by an accredited laboratory (Acuren Group Inc, Richmond, BC). Loads estimated during testing and presented in this appendix have been corrected accordingly. The compression load calibration results are attached in the Calibration Report following the figures at the end of this appendix.

Table I-1. Summary of Plate Load Tests at the Plant Site

Location	Test #	Date	Approximate UTM Coordinates (NAD 84)		Depth (m) Below Grade	Plate Diameter (m)	Max. Pressure Applied (kPa)	Max. Gauge Deformation (mm)
			N (m)	E (m)				
TP-BGC11-103	PT-BGC11-01	10/08/11	7101124	458820	5.5	0.76	280	1.9
	PT-BGC11-02	11/08/11			5.0	0.76	390	2.8
	PT-BGC11-03	12/08/11			5.0	0.53	980	2.0
	PT-BGC11-04	13/08/11			5.0	0.3	3100	9.6
	PT-BGC11-05	14/08/11			5.5	0.53	780	4.7
TP-BGC11-105	PT-BGC11-06	15/08/11	7101190	458939	8.5	1.2	190	6.9
	PT-BGC11-07	16/08/11			8.5	0.76	480	14.4
	PT-BGC11-08	17/08/11			8.5	0.76	480	12.9
	PT-BGC11-09	22/08/11			8.5	0.53	490	14.2

Table I-2. Summary of Plate Load Test at the Secondary Crusher Area

Location	Test #	Date	UTM Coordinates (NAD 84)		Depth (m) Below Grade	Plate Diameter (m)	Max. Pressure Applied (kPa)	Max. Gauge Deformation (mm)
			N (m)	E (m)				
Between OC-BGC11-47 and BH-BGC11-36	PT-BGC11-10	23/08/11	7100285	459722	3.2	0.53	880	4.1
	PT-BGC11-11	24/08/11			3.2	0.3	2790	5.0
	PT-BGC11-12	25/08/11	7100288	459722	3.2	0.53	960	4.8
	PT-BGC11-13	26/08/11	7100291	459722	3.8	0.3	2160	14.7
	PT-BGC11-14	27/08/11	7100295	459722	4.2	0.53	980	2.1

3.0 DATA RESULTS AND ANALYSIS

The applied plate pressures and recorded movements for each dial gauge were plotted to produce plate load test curves.

The vertical subgrade reaction moduli for the virgin curve, k_v, and for the rebound curve, $k_{v(u-r)}$, were determined for every plate load test curve. From the load/settlement relationship, the vertical subgrade reaction modulus for the virgin curve is calculated as $k_v = dP/d\delta$, derivative of the tangent line that was most reflective of the ground behavior post immediate settlement (>60 KPa) and prior to occurrence of yield behavior (when applicable). The vertical subgrade reaction modulus for the rebound curve is calculated as $k_{v(u-r)} = dP_{(u-r)}/d\delta$, derivative of the tangent to the most representative section of the reload section of the unload/reload loop, before the virgin loading gradient of the load/settlement relationship is recovered. Figures I-1 to I-14 illustrates the plate load test curves for each individual test.

Results and test details are summarized in Table I-3 and Table I-4 for the plant site area and the secondary crusher area, respectively.

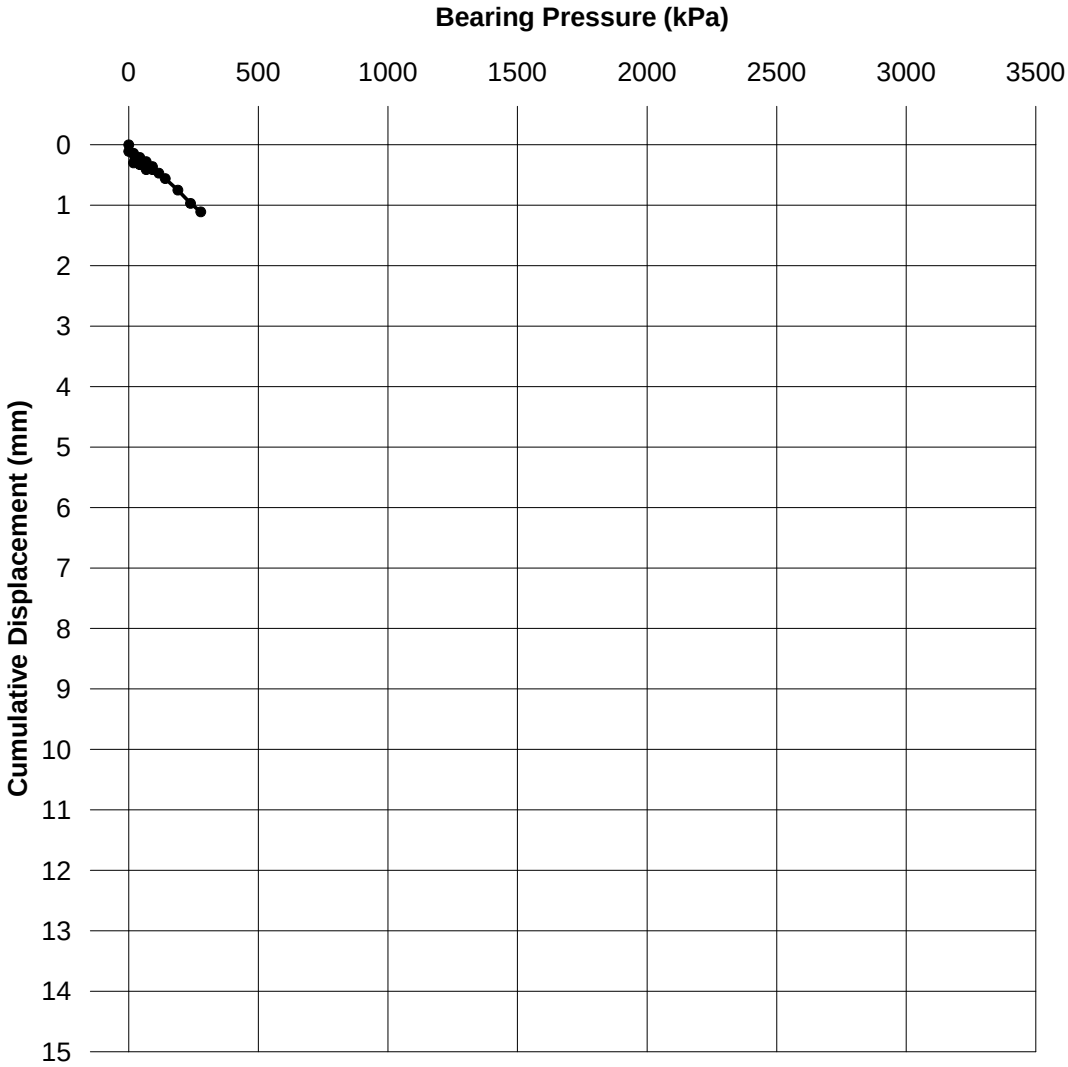
Table I-3. Summary of Subgrade Reaction Modulus from Plate Load Tests at the Plant Site

Location	Test #	Depth Below Grade (m)	Plate Diameter (m)	Vertical Subgrade Reaction Modulus (kPa/mm³)	
				Virgin Curve, kv	Rebound Curve, kv(u-r)
TP-BGC11-103	PT-BGC11-01	5.5	0.76	130	220
TP-BGC11-103	PT-BGC11-02	5	0.76	140	310
TP-BGC11-103	PT-BGC11-03	5	0.53	130	290
TP-BGC11-103	PT-BGC11-04	5	0.3	540	1170
TP-BGC11-103	PT-BGC11-05	5.5	0.53	130	250
TP-BGC11-105	PT-BGC11-06	8.52	1.2	30	60
TP-BGC11-105	PT-BGC11-07	8.52	0.76	40	80
TP-BGC11-105	PT-BGC11-08	8.52	0.76	50	120
TP-BGC11-105	PT-BGC11-09	8.52	0.53	40	120

Table I-4. Summary of Subgrade Reaction Modulus from Plate Load Tests at the Secondary Crusher

Location	Test #	Depth Below Grade (m)	Plate Diameter (m)	Vertical Subgrade Reaction Modulus (kPa/mm³)	
				Virgin Curve, kv	Rebound Curve, kv(u-r)
Between OC-BGC11-47 and BH-BGC11-36	PT-BGC11-10	3.2	0.53	190	600
	PT-BGC11-11	3.2	0.3	640	1600
	PT-BGC11-12	3.2	0.53	200	500
	PT-BGC11-13	3.8	0.3	220	1000
	PT-BGC11-14	4.2	0.53	400	1040

FIGURES



NOTES:
Test: PT-BGC11-01
Depth: 5.5 m
Plate Diameter: 0.76 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 130 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 220 kPa/mm

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DATE: JANUARY 2012	CHECKED: PQ
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CLIENT: VICTORIA GOLD CORP.

PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

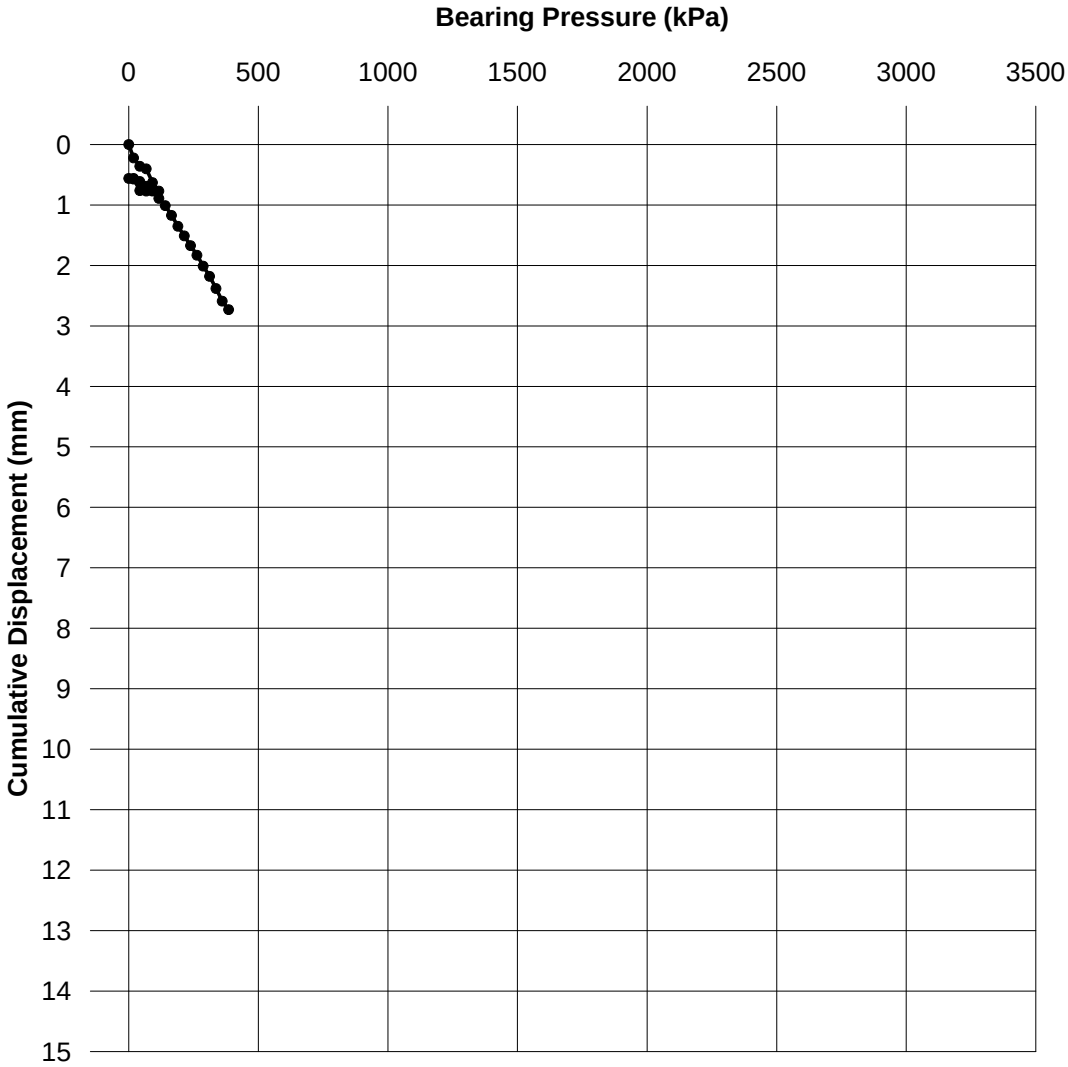
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: PLATE TEST RESULTS PT-BGC11-01

PROJECT No.	FIG No.	REV.
0792-006	I-1	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix I Plate Load Testing\Figures\Grapher plots for report

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



NOTES:
Test: PT-BGC11-02
Depth: 5 m
Plate Diameter: 76 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 140 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 310 kPa/mm

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CLIENT: VICTORIA GOLD CORP.

PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

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AN APPLIED EARTH SCIENCES COMPANY

TITLE: PLATE TEST RESULTS PT-BGC11-02

PROJECT No.	FIG No.	REV.
0792-006	I-2	0

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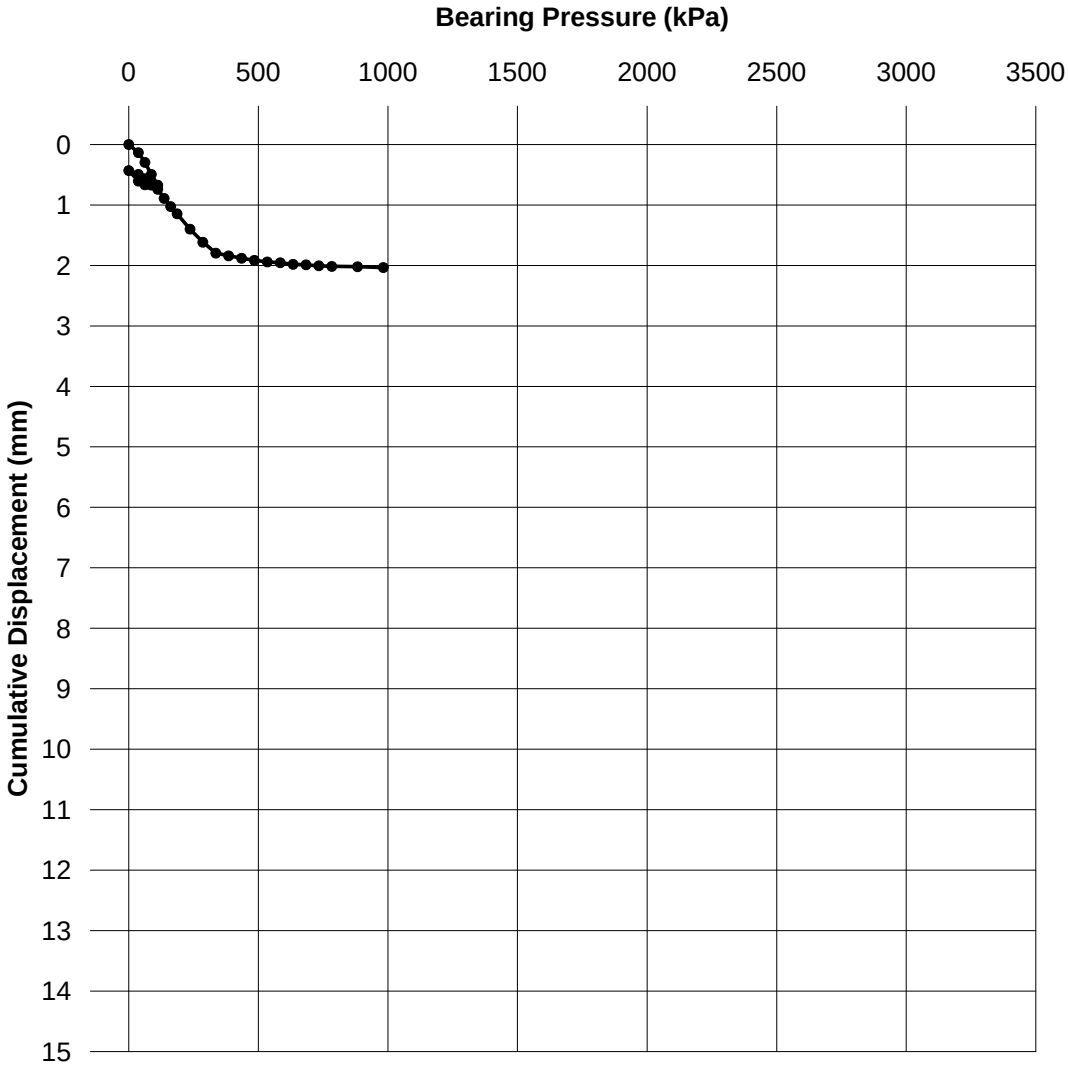

NOTES:
Test: PT-BGC11-03
Depth: 5 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 130 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 290 kPa/mm

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PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE: PLATE TEST RESULTS PT-BGC11-03

PROJECT No.	FIG No.	REV.
0792-006	I-3	0

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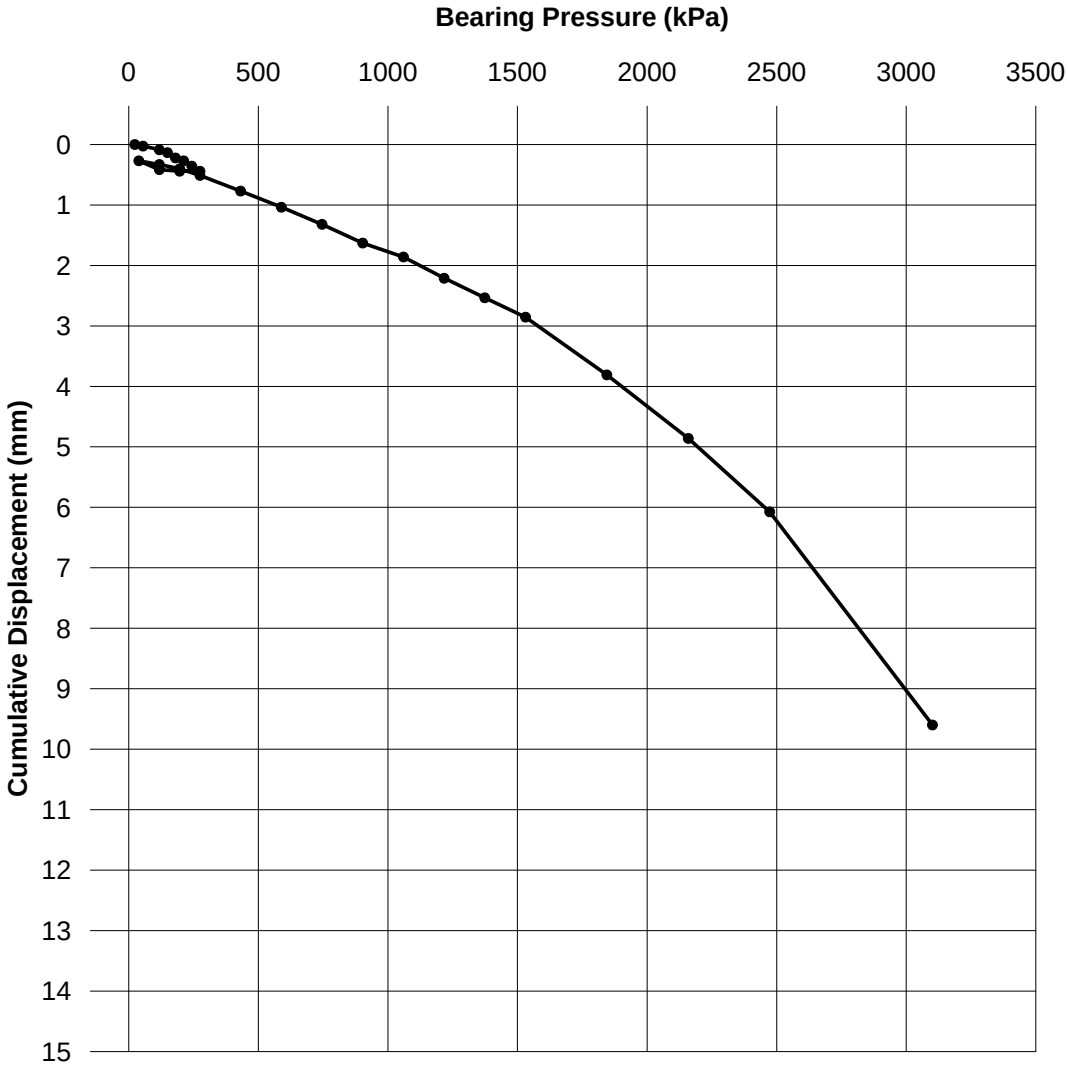

NOTES:
Test: PT-BGC11-04
Depth: 5 m
Plate Diameter: 30 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 540 kPa/mm
Reboud Curve $k_{v(u-r)}$ = 1170 kPa/mm

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PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

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TITLE: PLATE TEST RESULTS PT-BGC11-04

PROJECT No.	FIG No.	REV.
0792-006	I-4	0

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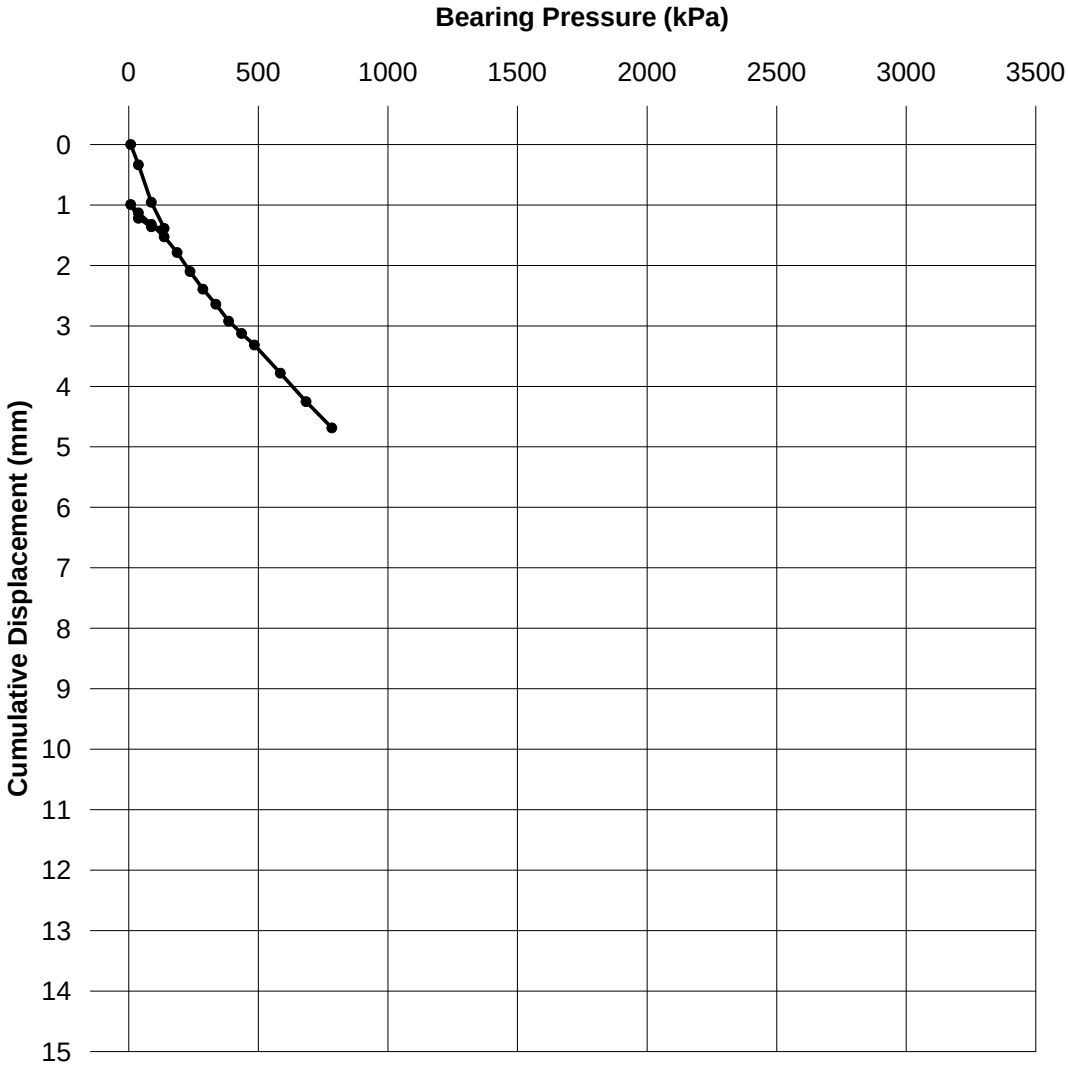

NOTES:
Test: PT-BGC11-05
Depth: 5.5 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 130 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 250 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-05

PROJECT No.	FIG No.	REV.
0792-006	I-5	0

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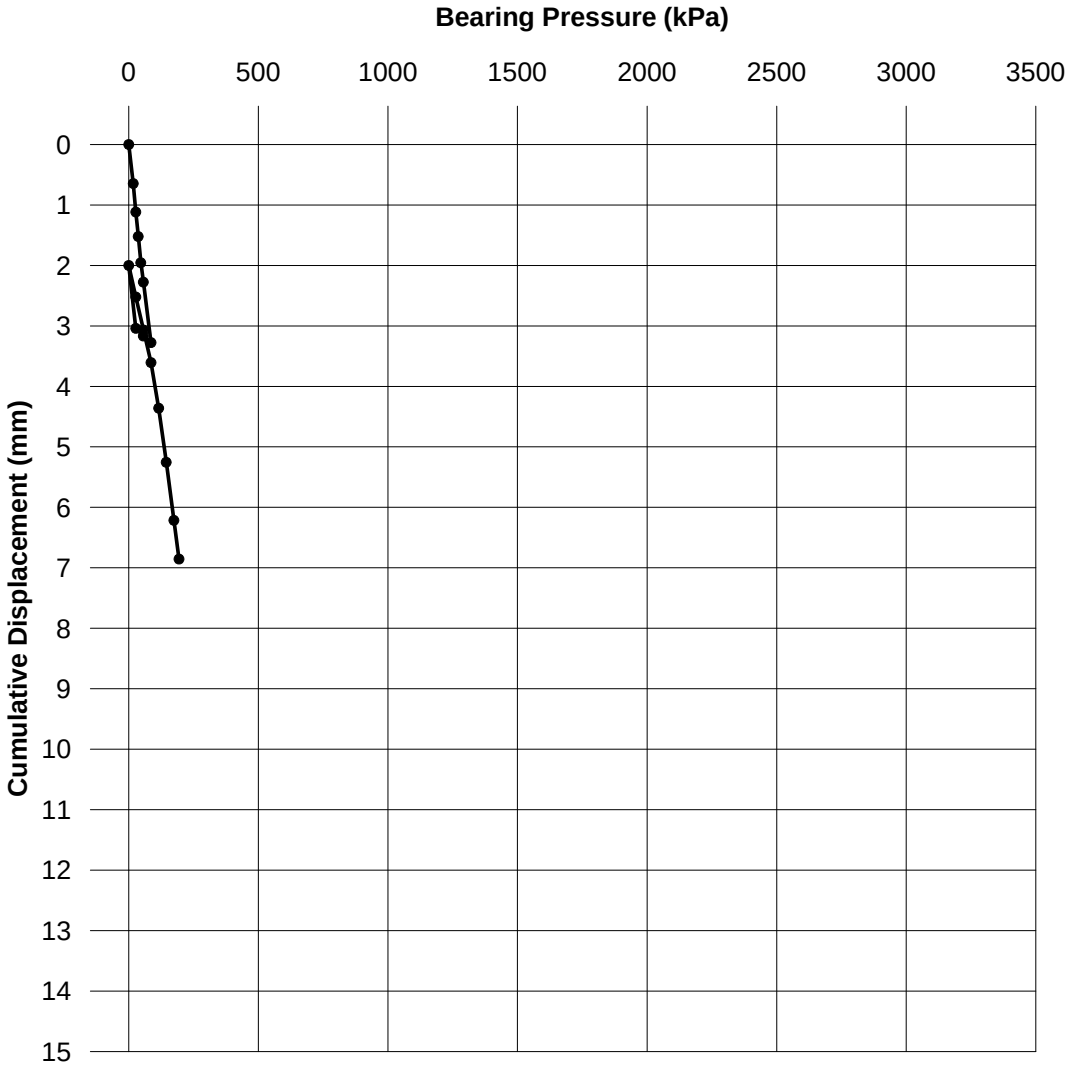

NOTES:
Test: PT-BGC11-06
Depth: 8.52 m
Plate Diameter: 120 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 30 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 60 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-06

PROJECT No.	FIG No.	REV.
0792-006	I-6	0

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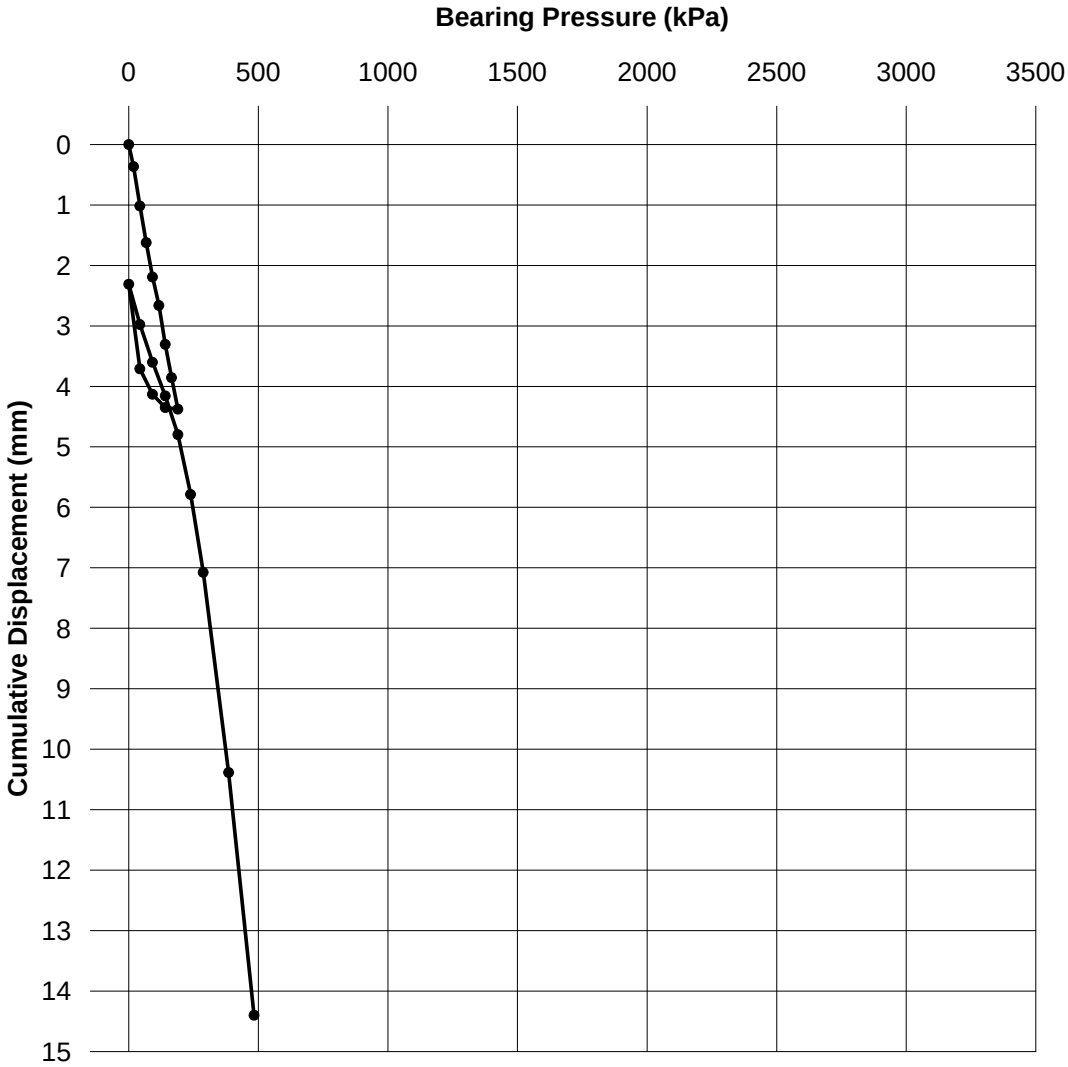

NOTES:
Test: PT-BGC11-07
Depth: 8.52 m
Plate Diameter: 76 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 40 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 80 kPa/mm

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PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

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TITLE: PLATE TEST RESULTS PT-BGC11-07

PROJECT No.	FIG No.	REV.
0792-006	I-7	0

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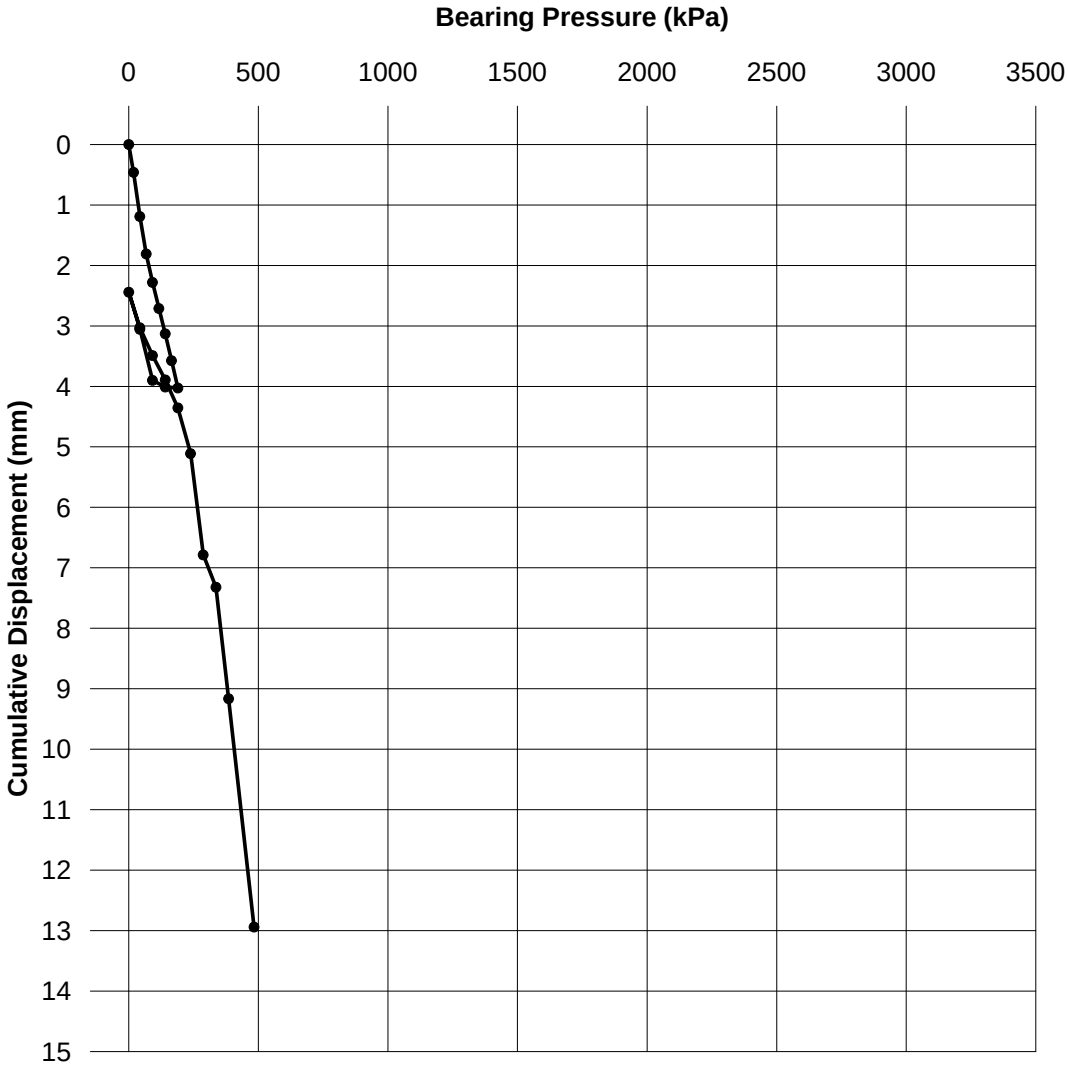

NOTES:
Test: PT-BGC11-08
Depth: 8.52 m
Plate Diameter: 76 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 50 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 120 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-08

PROJECT No.	FIG No.	REV.
0792-006	I-8	0

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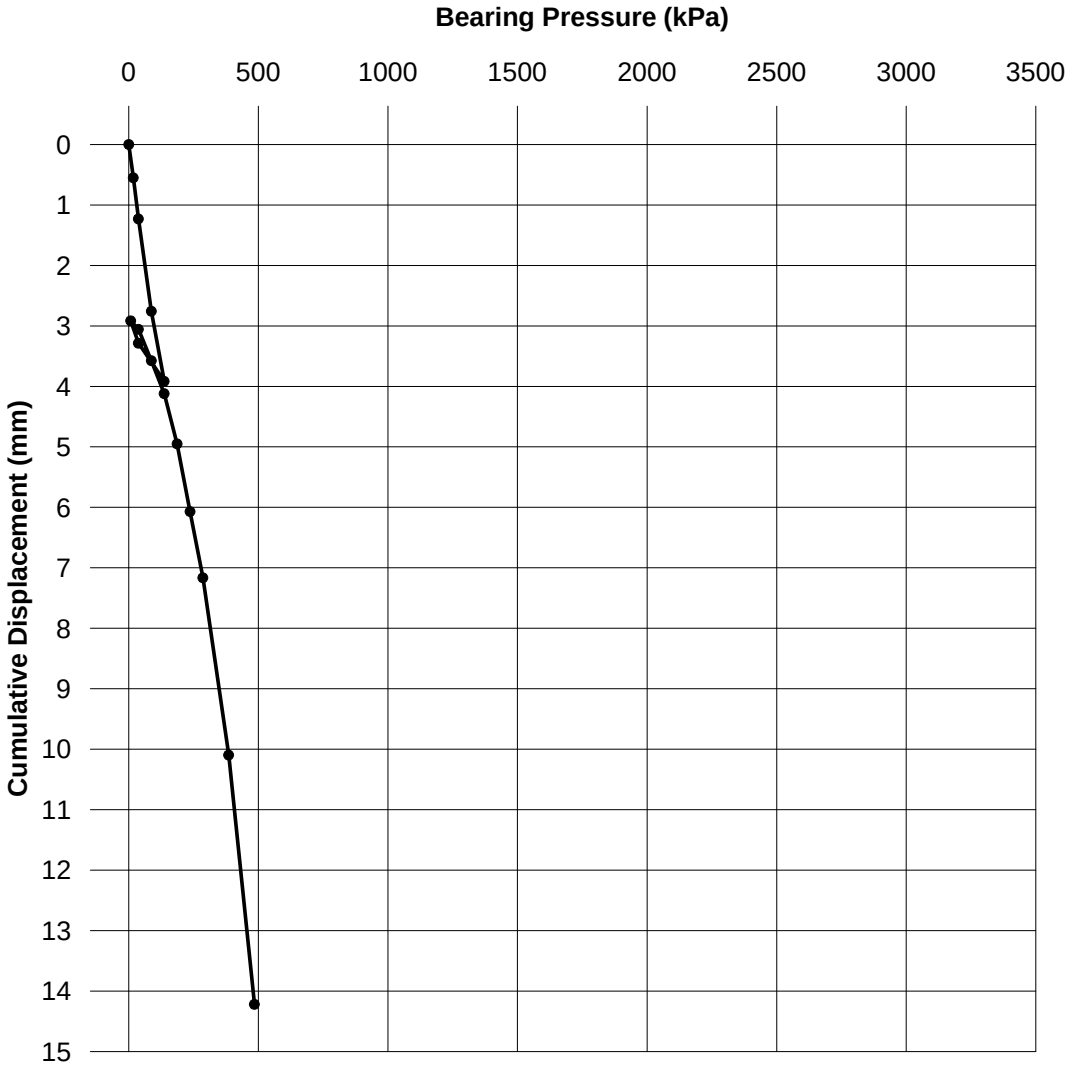

NOTES:
Test: PT-BGC11-09
Depth: 8.52 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 40 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 120 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-09

PROJECT No.	FIG No.	REV.
0792-006	I-9	0

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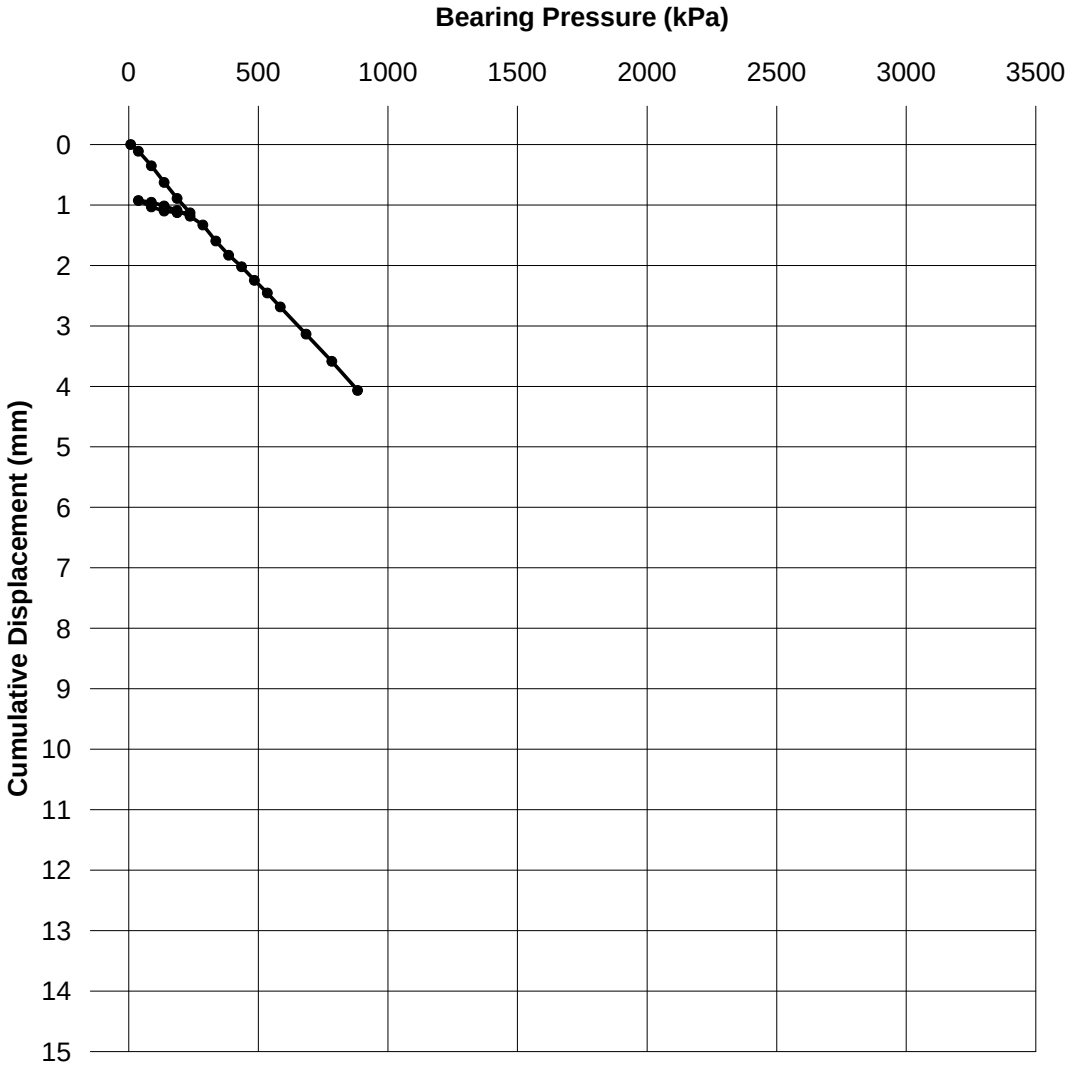

NOTES:
Test: PT-BGC11-10
Depth: 3.2 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 190 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 600 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-10

PROJECT No.	FIG No.	REV.
0792-006	I-10	0

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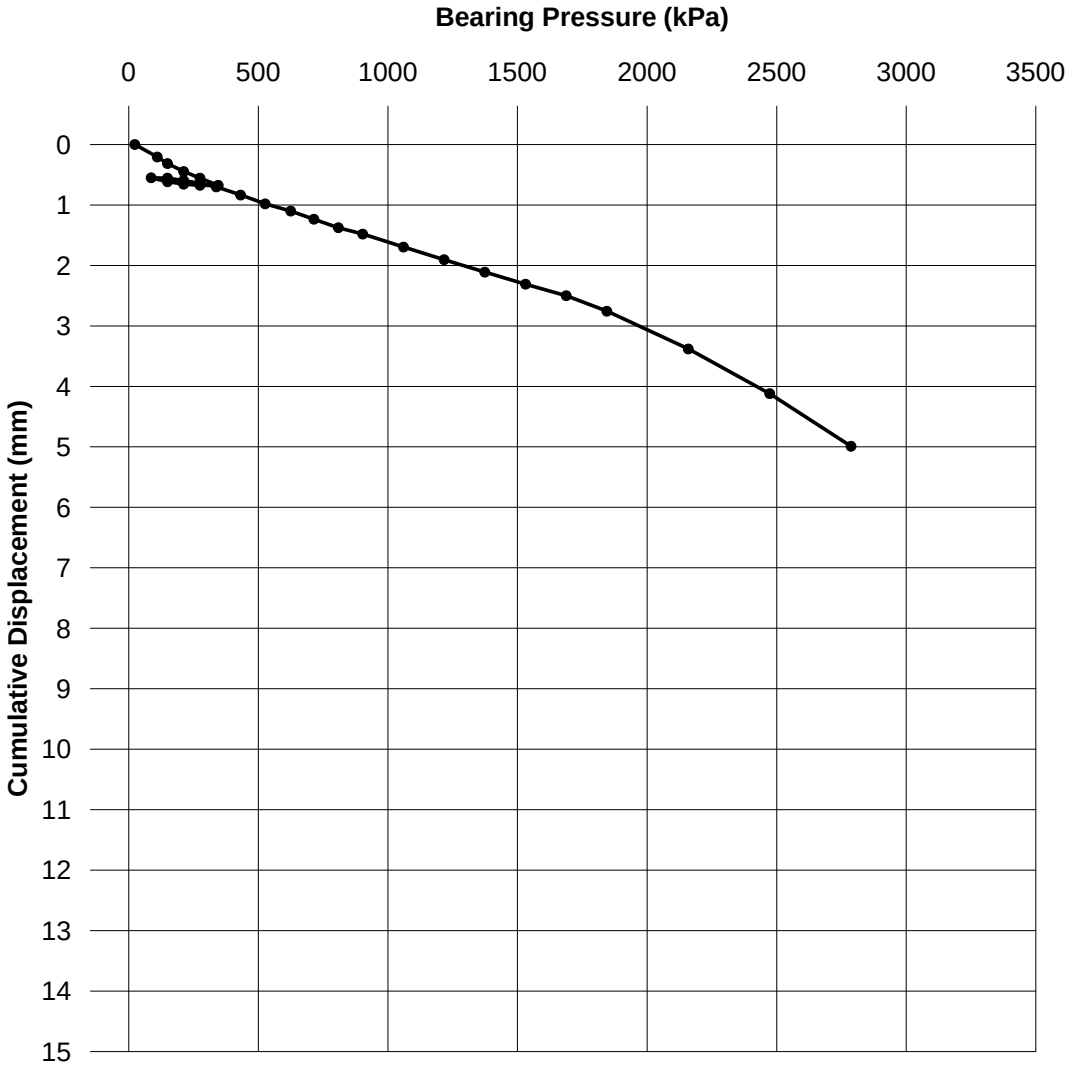

NOTES:
Test: PT-BGC11-11
Depth: 3.2 m
Plate Diameter: 30 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 642 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 1600 kPa/mm

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TITLE: PLATE TEST RESULTS PT-BGC11-11

PROJECT No.	FIG No.	REV.
0792-006	I-11	0

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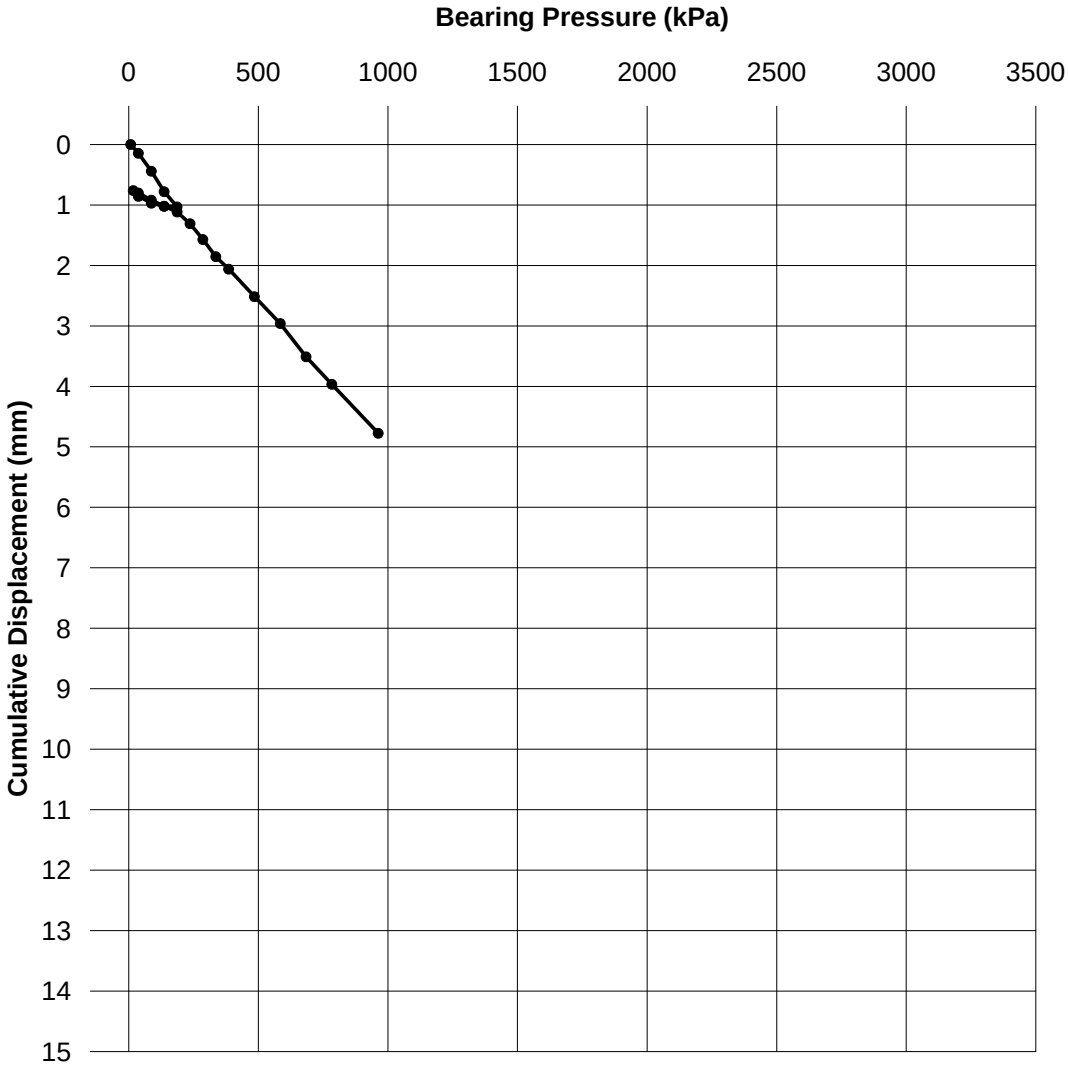

NOTES:
Test: PT-BGC11-12
Depth: 3.2 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 200 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 500 kPa/mm

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DATE: JANUARY 2012	CHECKED: PQ
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CLIENT: VICTORIA GOLD CORP.

PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

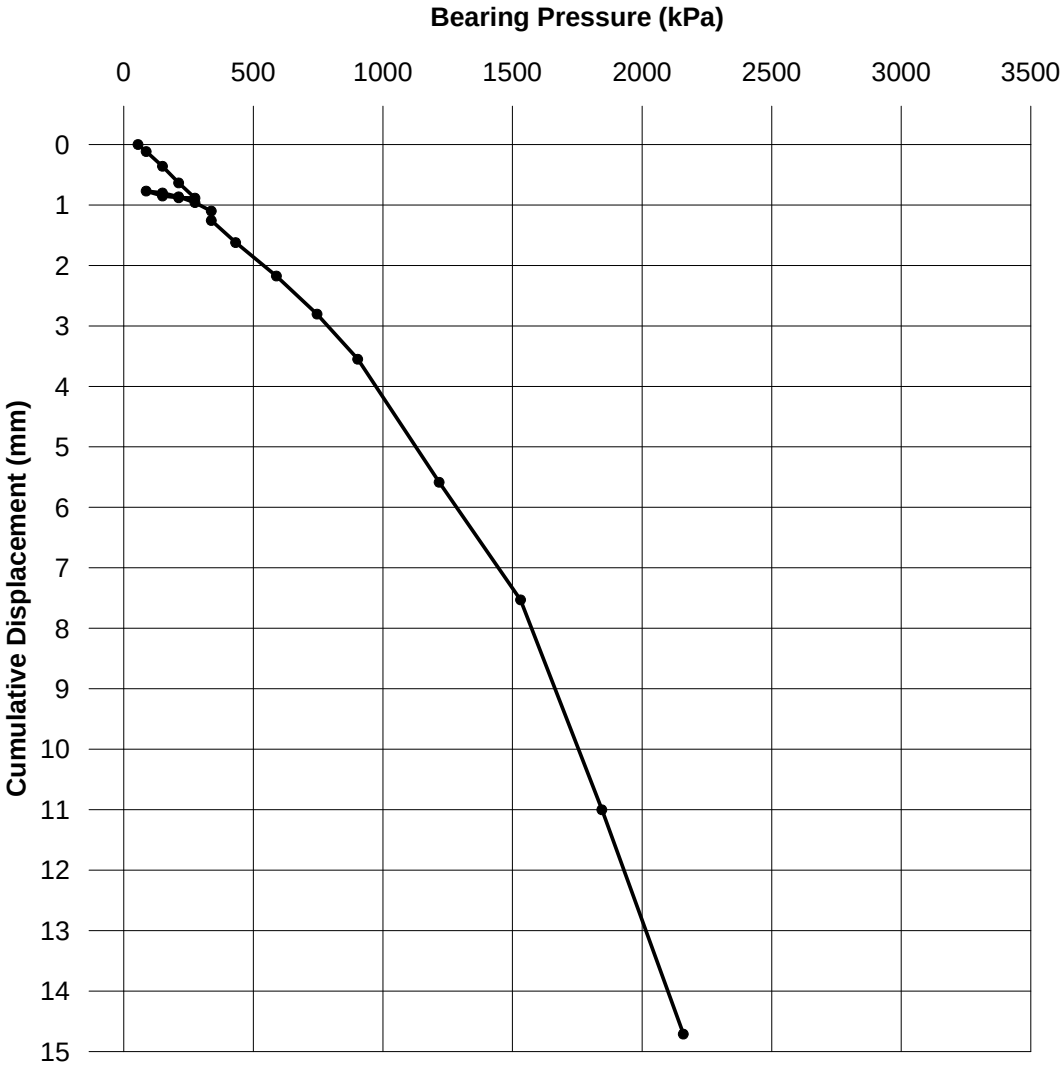
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: PLATE TEST RESULTS PT-BGC11-12

PROJECT No.	FIG No.	REV.
0792-006	I-12	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix I Plate Load Testing\Figures\Grapher plots for report

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



NOTES:
Test: PT-BGC11-13
Depth: 3.8 m
Plate Diameter: 30 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 220 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 1000 kPa/mm

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CLIENT: VICTORIA GOLD CORP.

PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: PLATE TEST RESULTS PT-BGC11-13

PROJECT No.	FIG No.	REV.
0792-006	I-13	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix I Plate Load Testing\Figures\Grapher plots for report

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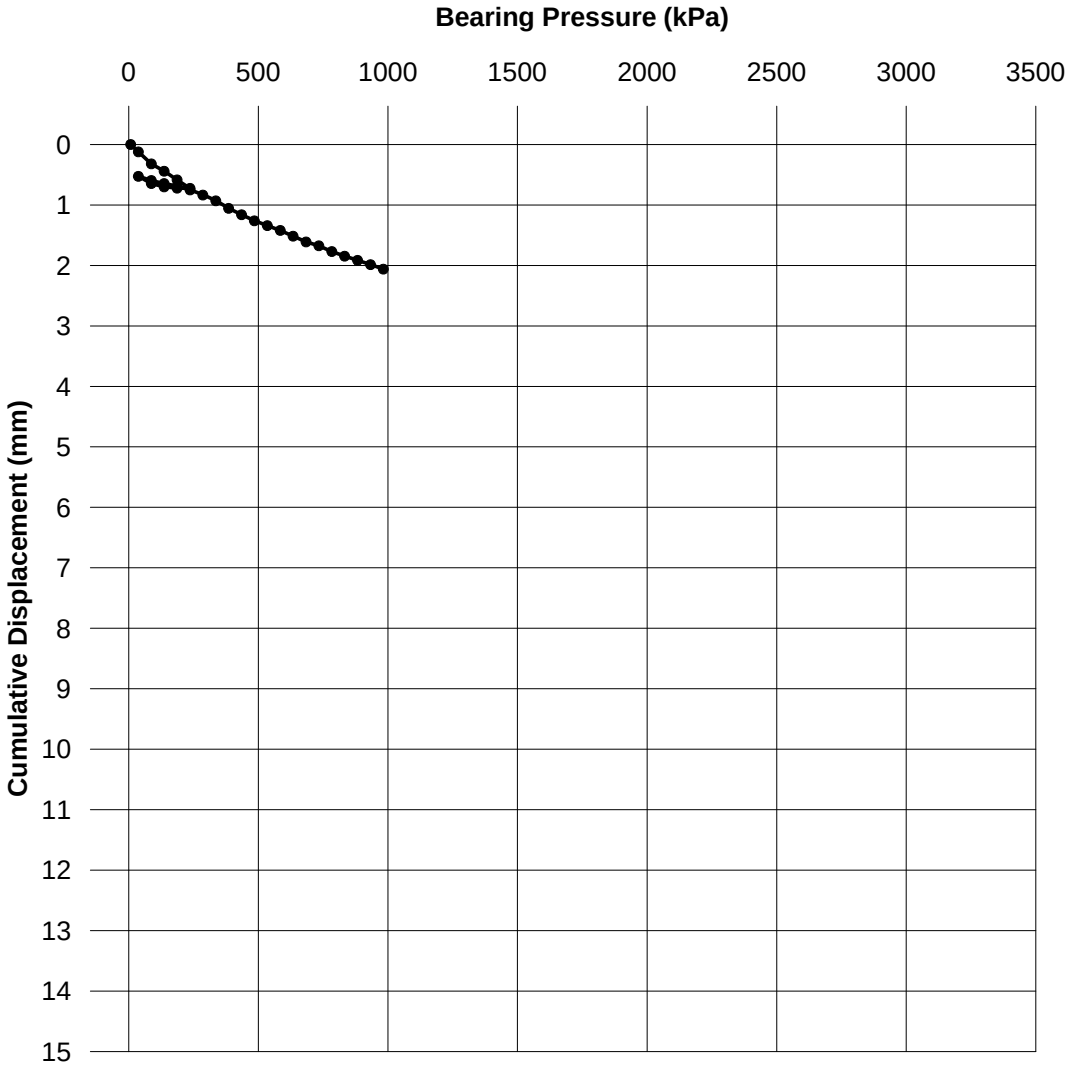

NOTES:
Test: PT-BGC11-14
Depth: 4.2 m
Plate Diameter: 53.3 cm

Subgrade Reaction Modulus Summary:

Virgin Curve: k_v = 400 kPa/mm
Rebound Curve $k_{v(u-r)}$ = 1040 kPa/mm

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CLIENT: VICTORIA GOLD CORP.

PROJECT: EAGLE GOLD PROJECT 2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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TITLE: PLATE TEST RESULTS PT-BGC11-14

PROJECT No.	FIG No.	REV.
0792-006	I-14	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix I Plate Load Testing\Figures\Grapher plots for report

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.

CALIBRATION REPORT

Acuren Group Inc.
12271 Horseshoe Way
Richmond, BC, Canada V7A 4V4
www.acuren.com

Phone: 604.275.3800
Fax: 604.274.7235

NDT, Inspection and Materials Engineering
a Rockwood Company

CALIBRATION REPORT

BGC ENGINEERING INC.
SUITE 500 - 1045 HOWE STREET
VANCOUVER BC
V6Z 2A9

Attention: LUC TOUSSAINT

Date: September 21, 2011
File No.: 6057329
P.O. No.: VISA
Report No.: 1

Description: 25 Ton ENERPAC Ram for Compression Load Calibration
Model: RC256

Calibration Date: September 21, 2011

Testing Machine ID: SATEC Universal Testing Machine, Serial 120HVL-1164

Calibration Data

Gauge Reading (psi)	Run #1 (lbf)	Run #2 (lbf)	Test Machine Reading (Average Load) (lbf)
100	0	0	0
1000	4393	4426	4410
2000	9489	9459	9474
3000	14246	14220	14233
4000	19262	19015	19139
5000	24160	24213	24187
6000	29126	29045	29086
7000	34284	34172	34228
8000	39274	39348	39311
9000	44477	44418	44448

* Test machine calibrated to ASTM E4 and CSA A23.2-9C specifications

Reviewed by: Alex Wong, AScT

Reviewed by: Bill Johnson, AScT

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ENERPAC RC256 COMPRESSION LOAD CALIBRATION GRAPH- 6057329
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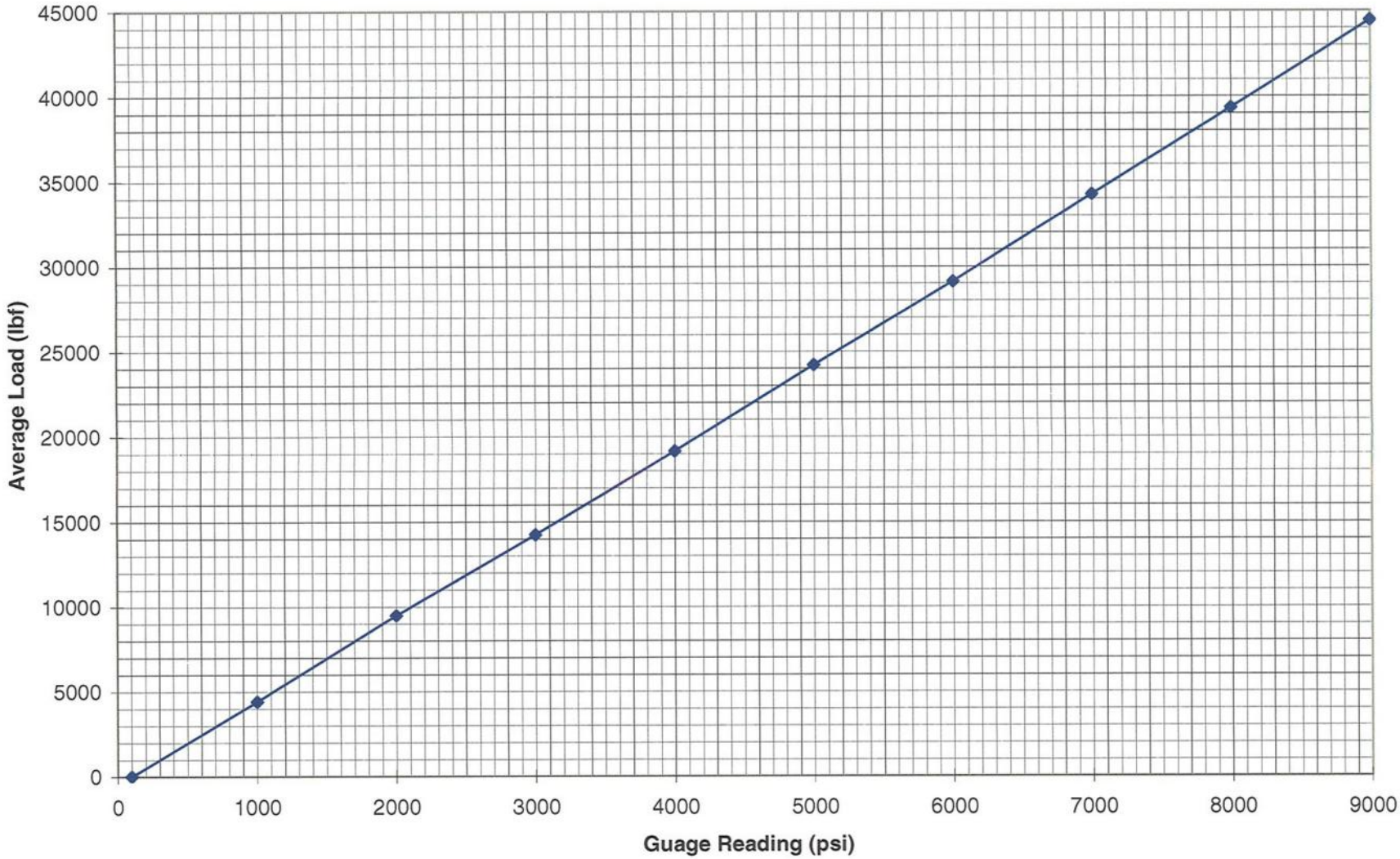


APPENDIX J
THERMISTORS

THERMISTORS

1.0 INTRODUCTION

Thermistors were installed in eight new boreholes to measure ground temperatures and determine the presence of frozen ground and thickness of the active layer. In addition, four thermistors had been previously installed in boreholes in 2009 and 2010. This appendix describes the thermistor work and presents initial temperature data obtained from these instruments in summer 2011.

2.0 THERMISTOR INSTALLATIONS

Thermistors installed in 2011 were manufactured by M-squared Instruments of Cochrane, Alberta. Thermistors were installed in 2" diameter schedule 80 PVC pipe. The annulus between the thermistor and the PVC was not backfilled, but the top of the pipe was sealed to prevent air circulation. The annulus between the PVC pipe and the borehole wall was backfilled with grout in diamond drill holes and with bentonite chips in auger holes. Selected installed thermistors were subsequently moved to different holes to balance the distribution of subsurface temperature measurements at appropriate areas of the site where the data are expected to be of most interest. Three 25 m long thermistors with eight thermocouple beads and four 10 m long thermistors with eight thermocouple beads were installed in 2011. Thermistors installed in 2009 and 2010 were manufactured by EBA Engineering Consultants Ltd. The thermistor installations are summarized in Table J.1.

Table J.1 Thermistor Installation Details

Hole	Facility/Area	Lithology	Date Installed	Hole Depth (m)	Length of Thermistor (m)	Installation details	Thermistor Cable ID #	Number of sensors	Manufacturer	Model	Comments
DH-BGC09-STU-3	Lower Stuttle Gulch	Sand and gravel to 6.1, then silt with, clay sand and gravel	24/08/2009	31.09	10 (plus 2m lead)		EBA#2194	6	EBA Engineering Consultants Ltd		
DH-BGC09-STU-4	Lower Stuttle Gulch	Silty sand and gravel to 7.5m, then gravelly clay (till) to 18.29m	24/08/2009	18.29m	10 (plus 2m lead)		EBA#2193	6	EBA Engineering Consultants Ltd		
DH-BGC09-AG3	Lower Ann Gulch	Sand and gravel to 2.8, silty sand to 7.6m, slightly to moderately weathered quartzite to 13.7	25/08/2009	13.7	10 (plus 2m lead)		EBA#2192	1	EBA Engineering Consultants Ltd		One bead working at 10m
BH-BGC10-07	Previously proposed location of tertiary crusher, south side of Dublin Gulch between Stuttle Gulch and Eagle Pup	Sand Gravel, low recovery to 18.0 (colluvium? Completely weathered rock?)	17/08/2010	29.95	10 (plus 2m lead)	50mm diameter sched 80 PVC casing to 10.1m backfilled with sand, bentonite plug at the top.	EBA#2256	6	EBA Engineering Consultants Ltd	W12101148	
BH-BGC11-42	In ice-rich colluvium located in the Eagle Pup WRSA area	Sand (SW), some silt, some gravel, frozen Vx with 1.3m thick pure ice encountered	25/08/2011	28.19	25 (plus 1.5m lead)	26.9m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	26.5-2	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	
BH-BGC11-63	In ice-rich colluvium in the Eagle Pup WRSA area	Silt (ML), frozen Vx (assumed Colluvium)	25/08/2011	26.7	25 (plus 1.5m lead)	26.7m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	26.5-3	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Vibrating wire piezometer also installed in the hole
BH-BGC11-47	Silt borrow area	Silt (ML) with occasional sand bed, trace fine gravel	10/08/2011	16	10 (plus 1.5m lead)	14.6m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	11.5-1	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Thermistor was moved from this hole to BH-BGC11-58 on Aug 28th
BH-BGC11-44	Silt borrow area	Silt (ML and MH) with occasional silt and gravel layer, potentially frozen to bottom of hole	10/08/2011	14.68	10 (plus 1.5m lead)	12.4m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	11.5-3	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Thermistor got damaged on Aug 28 2011
BH-BGC11-49	Silt borrow area	Silt (ML) with occasional sand bed, trace fine gravel	10/08/2011	16	10 (plus 1.5m lead)	14.95m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	11.5-4	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	

Hole	Facility/Area	Lithology	Date Installed	Hole Depth (m)	Length of Thermistor (m)	Installation details	Thermistor Cable ID #	Number of sensors	Manufacturer	Model	Comments
BH-BGC11-57	Truck shop area	Silt (ML), some sand, trace to some gravel, frozen to 6.5-7.0m?	26/08/2011	12.1	10 (plus 1.5m lead)	Standpipe piezo 2" casing screening from 6.6 to 9.9m	11.5-2	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Thermistor relocated to this hole from BH-BGC11-51
BH-BGC11-58	Truck shop area	Silt (ML), some sand, trace to some gravel, frozen to Nbn and Vx to 4.9m?	29/08/2011	10.8	10 (plus 1.5m lead)	10.8m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	11.5-1	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Thermistor relocated to this hole from BH-BGC11-47
BH-BGC11-51	Silt borrow area	Interbedded silts and sand, frozen from approx 6.0 to 17.0m	25/08/2011	25.15	25 (plus 1.5m lead)	24.39m long 2" threaded sched 40 PVC casing, outer backfilled with bentonite chips, no infill of casing around cable. Steel monument at collar	26.5-1	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	
BH-BGC11-51			10/08/2011	25.15	10 (plus 1.5m lead)		11.5-2	8	M-Squared Instruments, Cochrane, AB	Termination: MS3106E20-29P Thermistor Type: YSI44007	Thermistor was removed from this hole on Aug 25th and transferred to BH-BGC11-57

3.0 THERMISTOR READINGS

Thermistors were read on six different days in July and August. In July, thermistors installed in 2009 and 2010 were read. In August, the new thermistors were installed and read in new boreholes. Selected 2009 thermistors were also read in August.

Thermistor readings are taken using a handheld ohmmeter and a converter box used to control which thermistor bead is being read. Readings are recorded as resistance in kiloohms (kΩ). Resistance readings are converted to temperatures using a polynomial function for thermistors manufactured by EBA and a table of conversions for thermistors manufactured by M-squared instruments.

Thermistor readings are tabulated in Table J.2 and shown graphically in Figures J-1 through J-13.

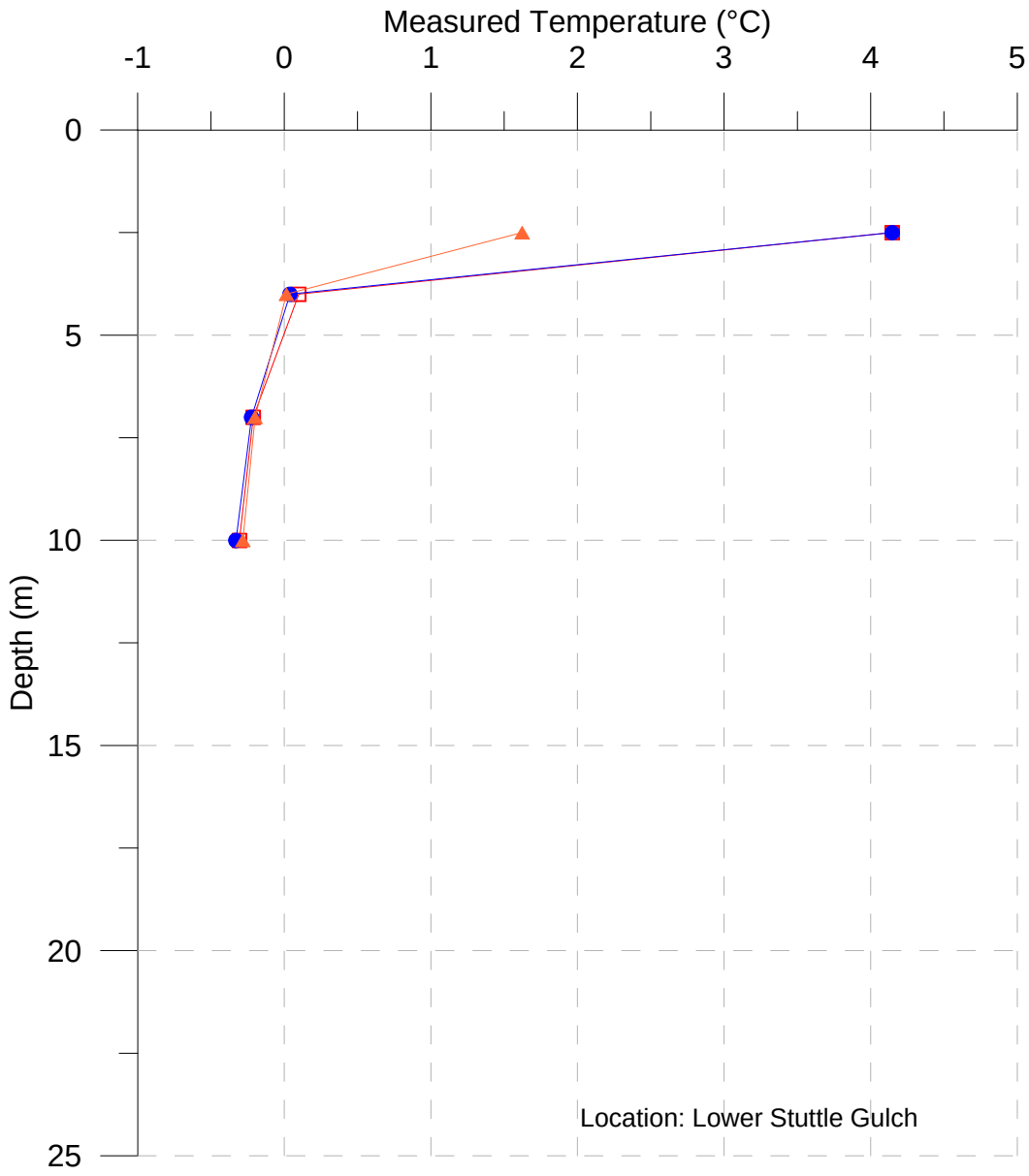
Table J.2 Thermistor Readings

Hole (Cable ID#)	Bead number	Depth of Bead BGL (m)	Date installed	07/11/2011		08/11/2011		08/25/2011		08/26/2011		08/29/2011		08/30/2011	
				Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)
DH-BGC09-STU-3 (EBA#2194)	1	0.5	2009	9.21	11.6			10.12	9.6			10.62	8.6		
	2	1.5		11.71	6.6			11.42	7.1			11.5	7.0		
	3	2.5		15.03	1.6			13.24	4.1			13.24	4.1		
	4	4		16.31	0.0			16.29	0.0			16.24	0.1		
	5	7		16.49	-0.2			16.51	-0.2			16.5	-0.2		
	6	10		16.56	-0.3			16.6	-0.3			16.58	-0.3		
DH-BGC09-STU-4 (EBA#2193)	1	0.5	2009	9.5	10.9			10.5	8.9			11.02	7.9		
	2	1.5		14.1	2.9			12.64	5.1			12.92	4.6		
	3	2.5		16.2	0.1			15.12	1.5			15.15	1.5		
	4	4		16.42	-0.1			16.33	0.0			16.4	-0.1		
	5	7		16.48	-0.2			16.48	-0.2			16.48	-0.2		
	6	10		16.52	-0.2			16.51	-0.2			16.52	-0.2		
DH-BGC09-AG-3 (EBA#2192)	1	10	2009	15.8	0.6										
BH-BGC10-07 (EBA#2256)	1	0.5	17/08/2010	8.89	12.3							9.86	10.2	9.98	9.9
	2	1.5		10.89	8.1							10.15	9.6	10.18	9.5
	3	2.5		12.83	4.8							10.78	8.3	10.78	8.3
	4	4		15.09	1.5							12.26	5.7	12.28	5.7
	5	7		16.18	0.2							15.27	1.3	15.26	1.3
	6	10		16.32	0.0							16.3	0.0	16.29	0.0
BH-BGC11-42 (26.5-2)	1	0.30	25/08/2011									11.02	7.9	11.13	7.7
	2	0.60										12.34	5.6	12.42	5.4
	3	1.20										13.55	3.7	13.63	3.6
	4	2.00										15.47	1.1	15.41	1.1
	5	5.00										16.55	-0.3	16.47	-0.2
	6	10.00										16.56	-0.3	16.46	-0.2
	7	15.00										16.67	-0.4	16.56	-0.3
	8	25.00										16.58	-0.3	16.45	-0.1

Hole	Bead number	Depth of Bead BGL (m)	Date installed	07/11/2011		08/11/2011		08/25/2011		08/26/2011		08/29/2011		08/30/2011	
				Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)
BH-BGC11-63 (26.5-3)	1	0.30	25/08/2011									12.48	5.4	12.98	4.6
	2	0.60										14.76	2.0	14.92	1.8
	3	1.20										16.5	-0.2	16.5	-0.2
	4	2.00										16.53	-0.2	16.52	-0.2
	5	5.00										16.46	-0.2	16.46	-0.2
	6	10.00										16.54	-0.2	16.54	-0.2
	7	15.00										16.56	-0.3	16.56	-0.3
	8	25.00										16.35	0.0	16.35	0.0
BH-BGC11-47 (11.5-1)	1	0.15	10/08/2011			10.71	8.5					12.06	6.0	Removed	
	2	0.50				12.2	5.8					12.54	5.3		
	3	1.00				15.19	1.4					14.61	2.2		
	4	1.50				16.12	0.3					16.21	0.1		
	5	2.50				15.95	0.5					16.08	0.3		
	6	4.00				16.19	0.2					16.26	0.1		
	7	7.00				16.27	0.1					16.36	0.0		
	8	10.00				16.31	0.0					16.42	-0.1		
BH-BGC11-44 (11.5-3)	1	0.15	10/08/2011			9.08	11.9					11.44	7.1	10.76	8.4
	2	0.50				10.51	8.9					11.24	7.5	11.49	7.0
	3	1.00				11.36	7.3					11.56	6.9	11.63	6.8
	4	1.50				12.73	5.0					12.54	5.3	12.53	5.3
	5	2.50				14.64	2.2					14.12	2.9	14.09	2.9
	6	4.00				15.87	0.6					15.54	1.0	15.54	1.0
	7	7.00				16.32	0.0					16.35	0.0	16.35	0.0
	8	10.00				16.37	0.0					16.41	-0.1	16.41	-0.1
BH-BGC11-49 (11.5-4)	1	0.15	10/08/2011			8.62	13.0			Thermistor Damaged					
	2	0.50				11.1	7.7								
	3	1.00				13.34	4.0								
	4	1.50				15.5	1.0								
	5	2.50				16.26	0.1								
	6	4.00				16.34	0.0								
	7	7.00				16.29	0.0								
	8	10.00				16.31	0.0								

Hole	Bead number	Depth of Bead BGL (m)	Date installed	07/11/2011		08/11/2011		08/25/2011		08/26/2011		08/29/2011		08/30/2011	
				Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)	Field reading (KΩ)	Corrected Temperature (°C)
BH-BGC11-57 (11.5-2)	1	0.15	26/08/2011									10.14	9.6	11.43	7.1
	2	0.50										13.15	4.3	13.48	3.8
	3	1.00										15.16	1.5	15.29	1.3
	4	1.50										16.42	-0.1	16.44	-0.1
	5	2.50										16.44	-0.1	16.45	-0.1
	6	4.00										16.5	-0.2	16.52	-0.2
	7	7.00										16.48	-0.2	16.48	-0.2
	8	10.00										16.41	-0.1	16.41	-0.1
BH-BGC11-58 (11.5-1)	1	0.15	29/08/2011											12.46	5.4
	2	0.50												15.14	1.5
	3	1.00												16.42	-0.1
	4	1.50												16.61	-0.3
	5	2.50												16.75	-0.5
	6	4.00												16.91	-0.7
	7	7.00												16.91	-0.7
	8	10.00												16.84	-0.6
BH-BGC11-51 (26.5-1)	1	0.30	25/08/2011							7.4	16.3	6.35	19.6	7.37	16.4
	2	0.60								8.78	12.6	9.4	11.2	9.39	11.2
	3	1.20								9.4	11.2	9.57	10.8	9.73	10.5
	4	2.00								9.8	10.3	9.87	10.2	9.9	10.1
	5	5.00								14.3	2.6	14.26	2.7	14.24	2.7
	6	10.00								16.26	0.1	16.25	0.1	16.26	0.1
	7	15.00								16.39	-0.1	16.39	-0.1	16.4	-0.1
	8	25.00								16.45	-0.1	16.45	-0.1	16.45	-0.1
BH-BGC11-51 (11.5-2)	1	0.15	10/08/2011			7.91	14.8	8.24	14.0	Removed					
	2	0.50				8.58	13.1	9.31	11.4						
	3	1.00				8.82	12.5	9.54	10.9						
	4	1.50				9.28	11.5	9.77	10.4						
	5	2.50				11.07	7.8	11.03	7.9						
	6	4.00				13.74	3.4	13.62	3.6						
	7	7.00				16.63	-0.4	15.8	0.6						
	8	10.00				16.18	0.2	16.31	0.0						

FIGURES



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 19/08/09
3) Thermistor brand: EBA, ID#: EBA#2194, installed on 24/08/09

DH-BGC09-STU-3

- 29/08/2011
- 25/08/2011
- 07/07/2011

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC, AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT. AUTHORIZATION FOR ANY USE AND/OR PUBLICATION OF THIS REPORT OR ANY DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS, THROUGH ANY FORM OF PRINT OR ELECTRONIC MEDIA, INCLUDING WITHOUT LIMITATION, POSTING OR REPRODUCTION OF SAME ON ANY WEBSITE, IS RESERVED PENDING BGC'S WRITTEN APPROVAL. IF THIS REPORT IS ISSUED IN AN ELECTRONIC FORMAT, AN ORIGINAL PAPER COPY IS ON FILE AT BGC ENGINEERING INC. AND THAT COPY IS THE PRIMARY REFERENCE WITH PRECEDENCE OVER ANY ELECTRONIC COPY OF THE DOCUMENT, OR ANY EXTRACTS FROM OUR DOCUMENTS PUBLISHED BY OTHERS.

SCALE:	NTS	DESIGN:	LGT
DATE:	JAN 2012	CHECKED:	PQ
DRAWN:	LGT	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

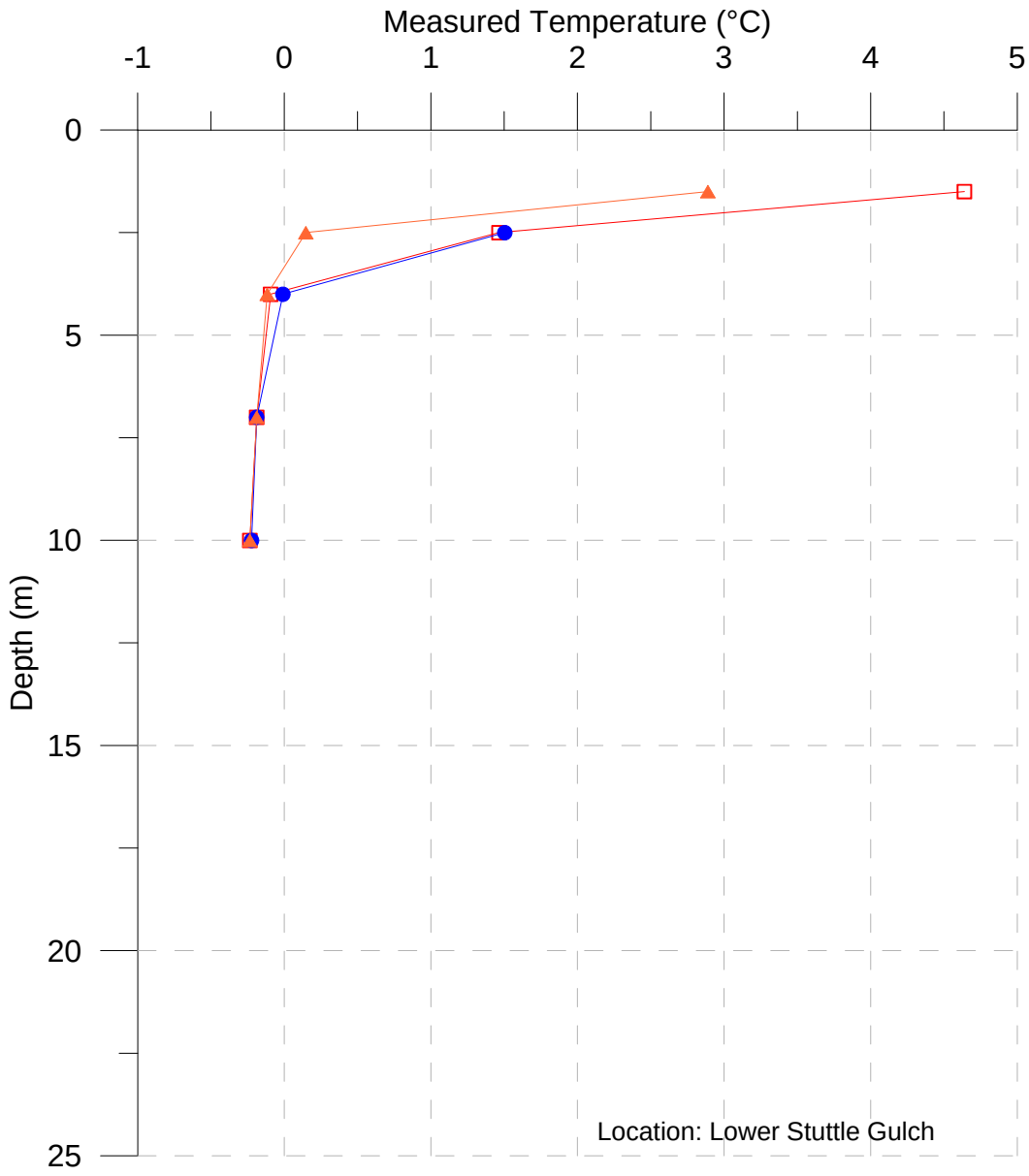
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, DH-BGC09-STU-3

PROJECT No.	FIG No.	REV.
0792-006	J-1	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 21/08/09
3) Thermistor brand: EBA, ID#: EBA#2193, installed on 24/08/09

DH-BGC09-STU-4
- 07/07/2011
- 25/08/2011
- 29/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

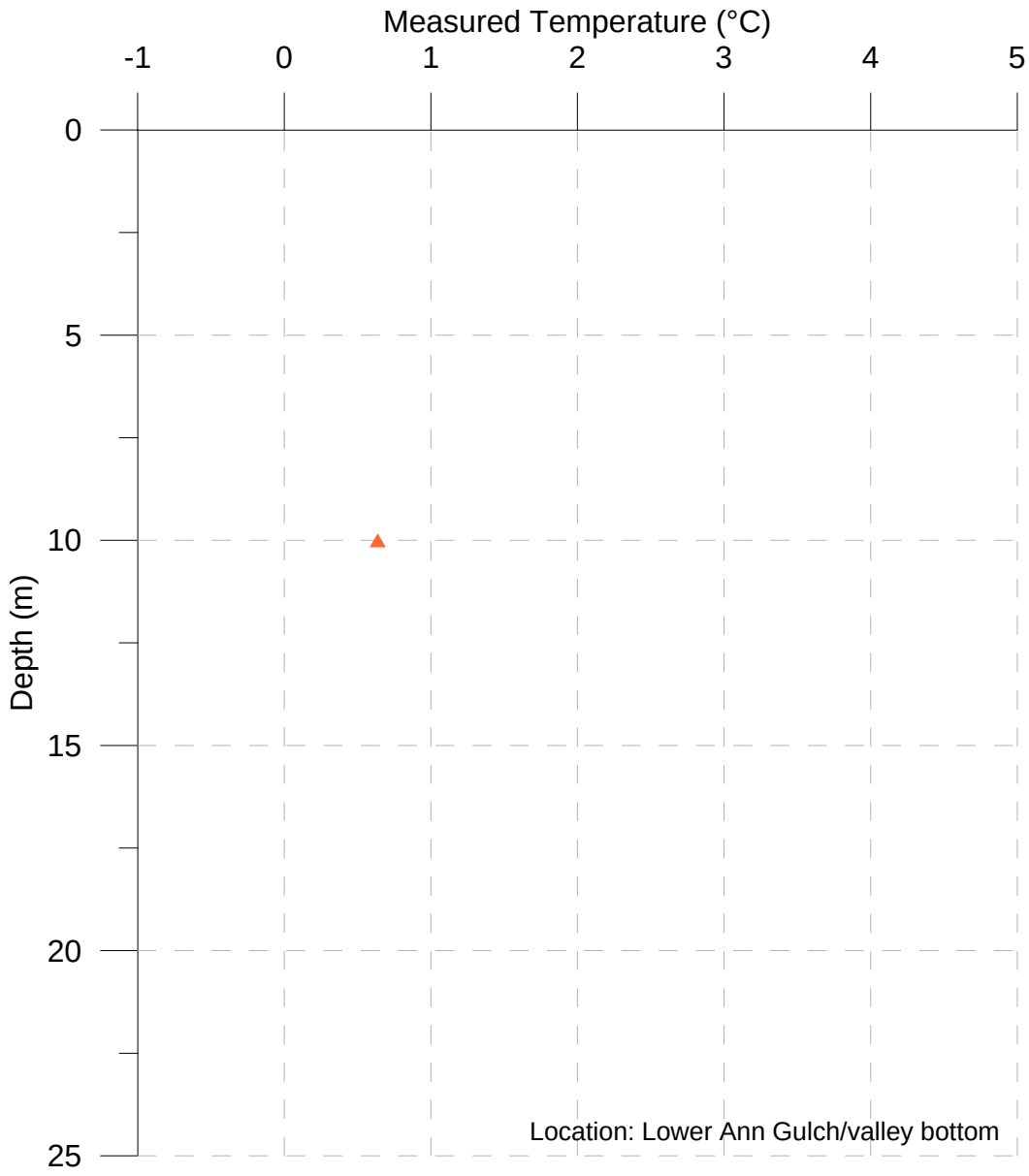
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILE, DH-BGC09-STU-4

PROJECT No.	FIG No.	REV.
0792-006	J-2	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 23/08/09
3) Thermistor brand: EBA, ID#: EBA#2192, installed on 25/08/09
4) Thermistor consisted of a single thermocouple bead at 10 m depth

DH-BGC09-AG-3
07/11/2011

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SCALE:	NTS	DESIGN:	LGT
DATE:	JAN 2012	CHECKED:	PQ
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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION
FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

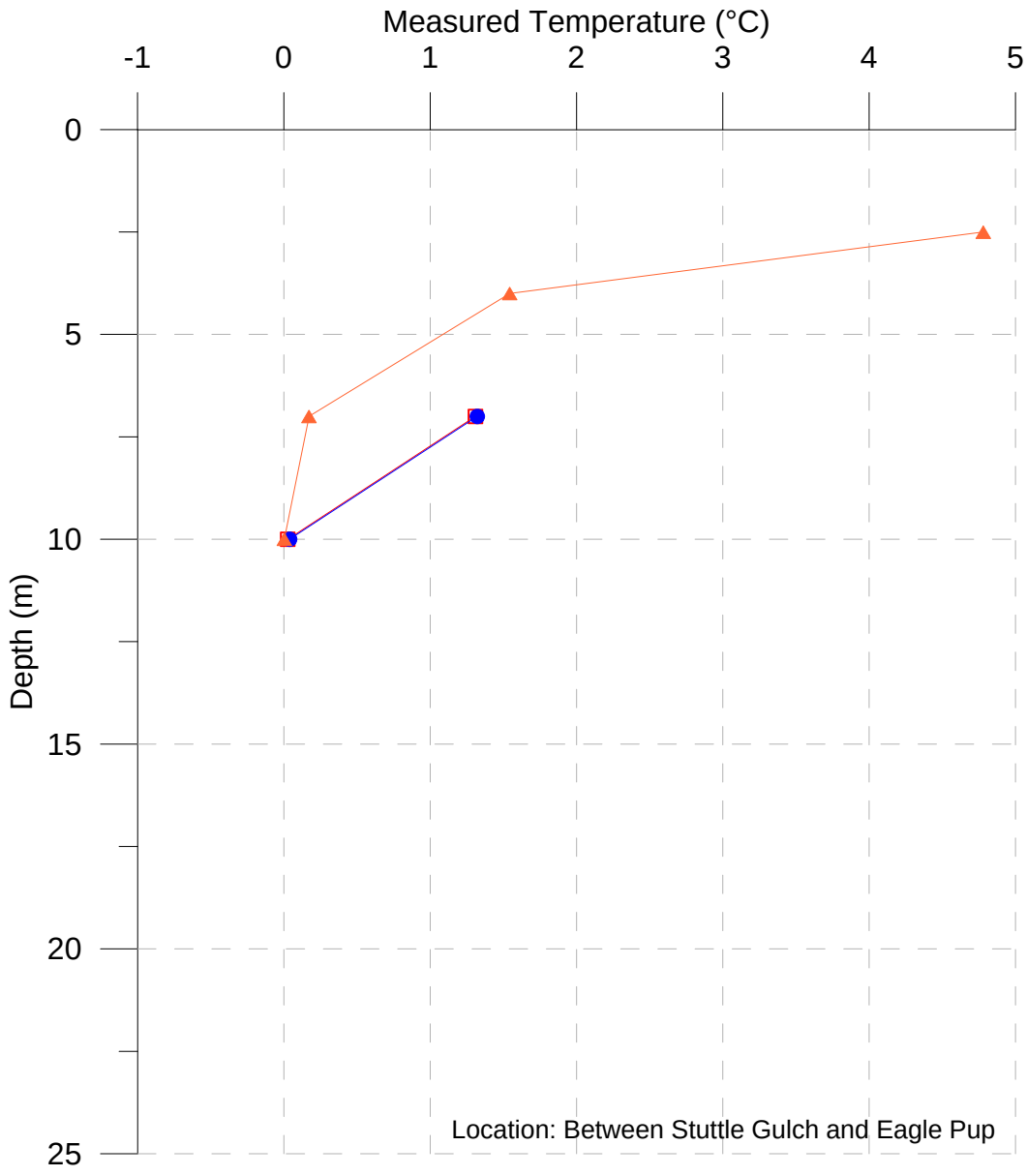
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, DH-BGC09-AG-3

PROJECT No.	FIG No.	REV.
0792-006	J-3	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 17/08/10
3) Thermistor brand: EBA, Model: W12101148, ID#:EBA#2256 installed on 17/08/10

BH-BGC10-07

- 07/11/2011
- 29/ 08/2011
- 30/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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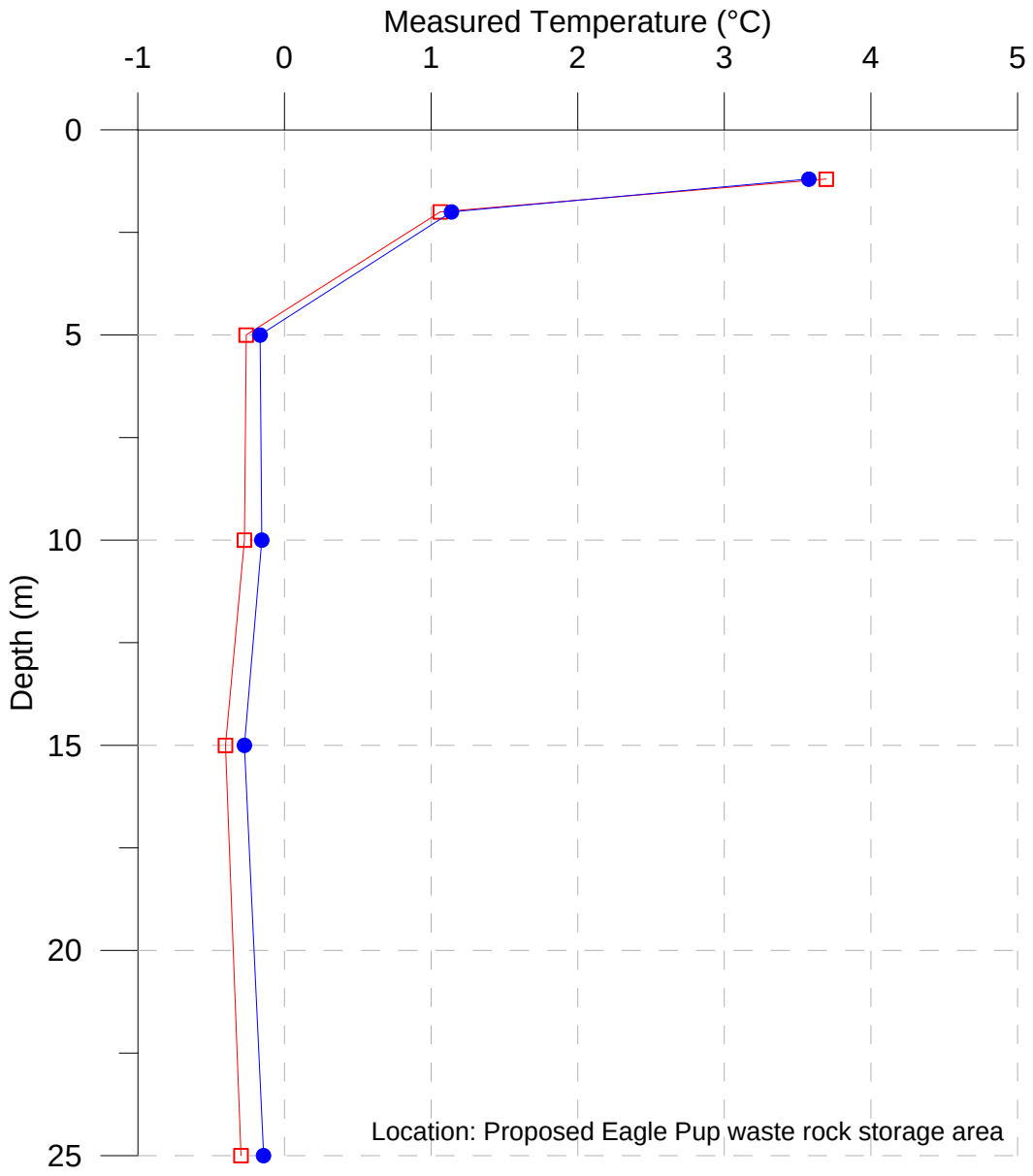
TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC10-07

PROJECT No.	FIG No.	REV.
0792-006	J-4	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 01/08/11
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#: 26.5-2, installed on 25/08/11

BH-BGC11-42
29/08/2011
30/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

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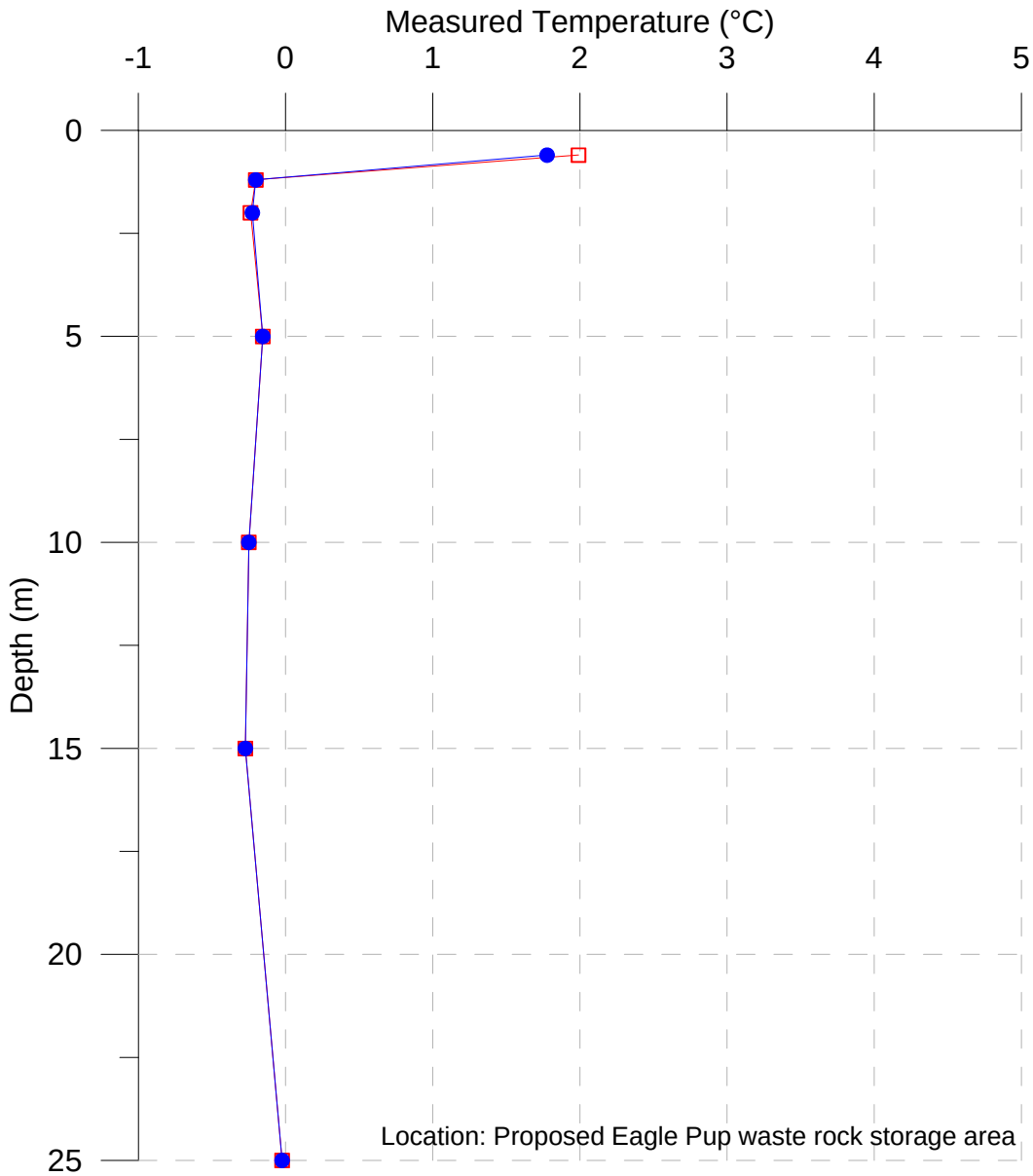
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-42

PROJECT No.	FIG No.	REV.
0792-006	J-5	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 13/08/11
3) Thermistor brand: M^2,Termination: MS3106E20-29P, Type: YSI44007, ID#: 26.5-3, installed on 25/08/11
4) Vibrating wire piezometer also installed in the drillehole casing

BH-BGC11-63

29/08/2011

30/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

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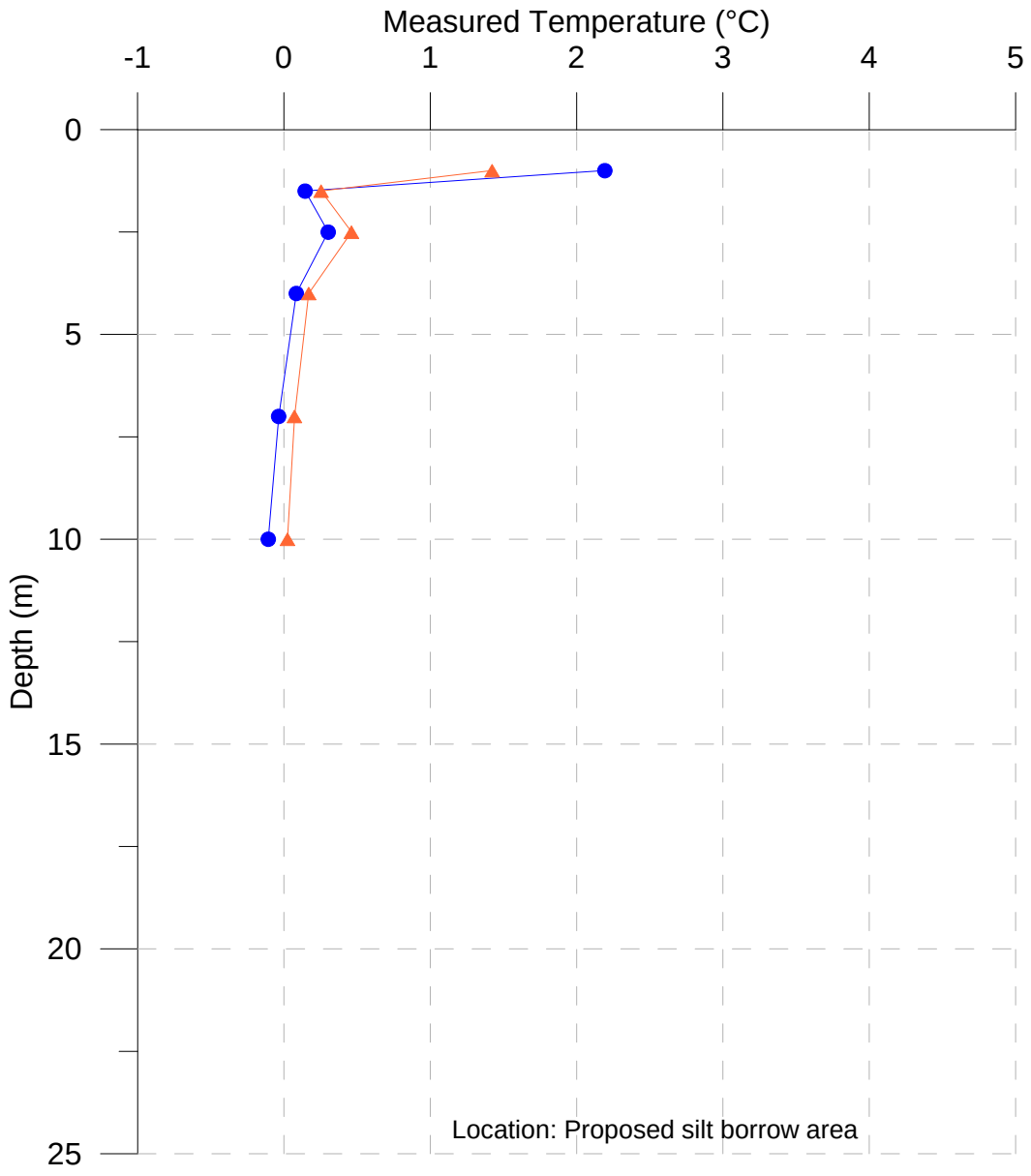
TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-63

PROJECT No.	FIG No.	REV.
0792-006	J-6	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 04/08/11
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#: 11.5-1, installed on 10/08/11
4) Thermistor moved to BH-BGC11-58 on 28/08/11

BH-BGC11-47
11/08/2011
29/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
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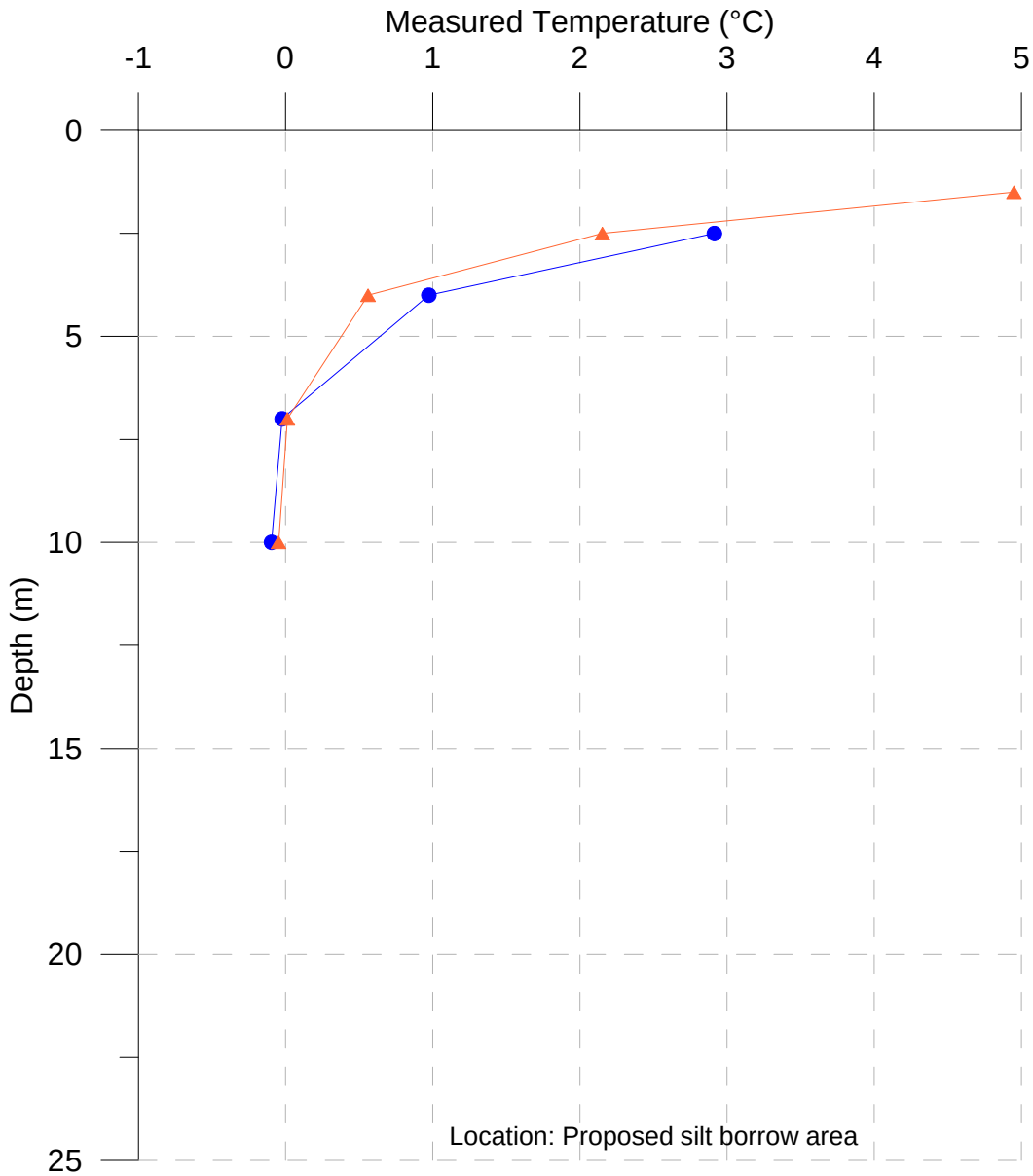
TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-47

PROJECT No.	FIG No.	REV.
0792-006	J-7	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



BH-BGC11-44

- 11/08/2011
- 29/08/2011
- 30/08/2011

Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 03/08/11
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#:11.5-3, installed on 10/08/11
4) Instrument got damaged and removed on 28/08/11

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

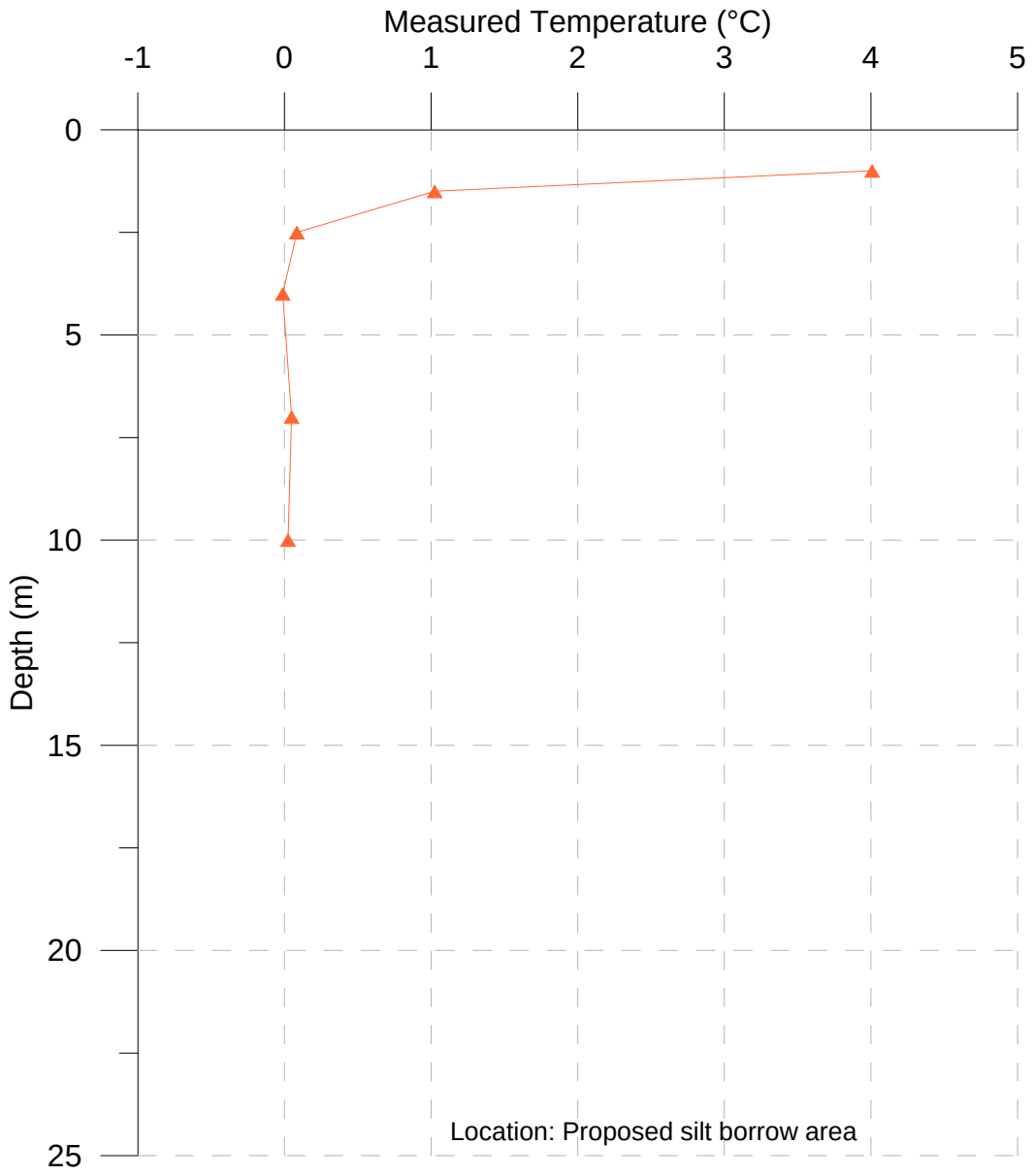
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-44

PROJECT No.	FIG No.	REV.
0792-006	J-8	0

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 05/08/11
3) Thermistor brand: M^2,Termination: MS3106E20-29P, Type: YSI44007, ID#:11.5-4 installed on 10/08/11

BH-BGC11-49

11/08/2011

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

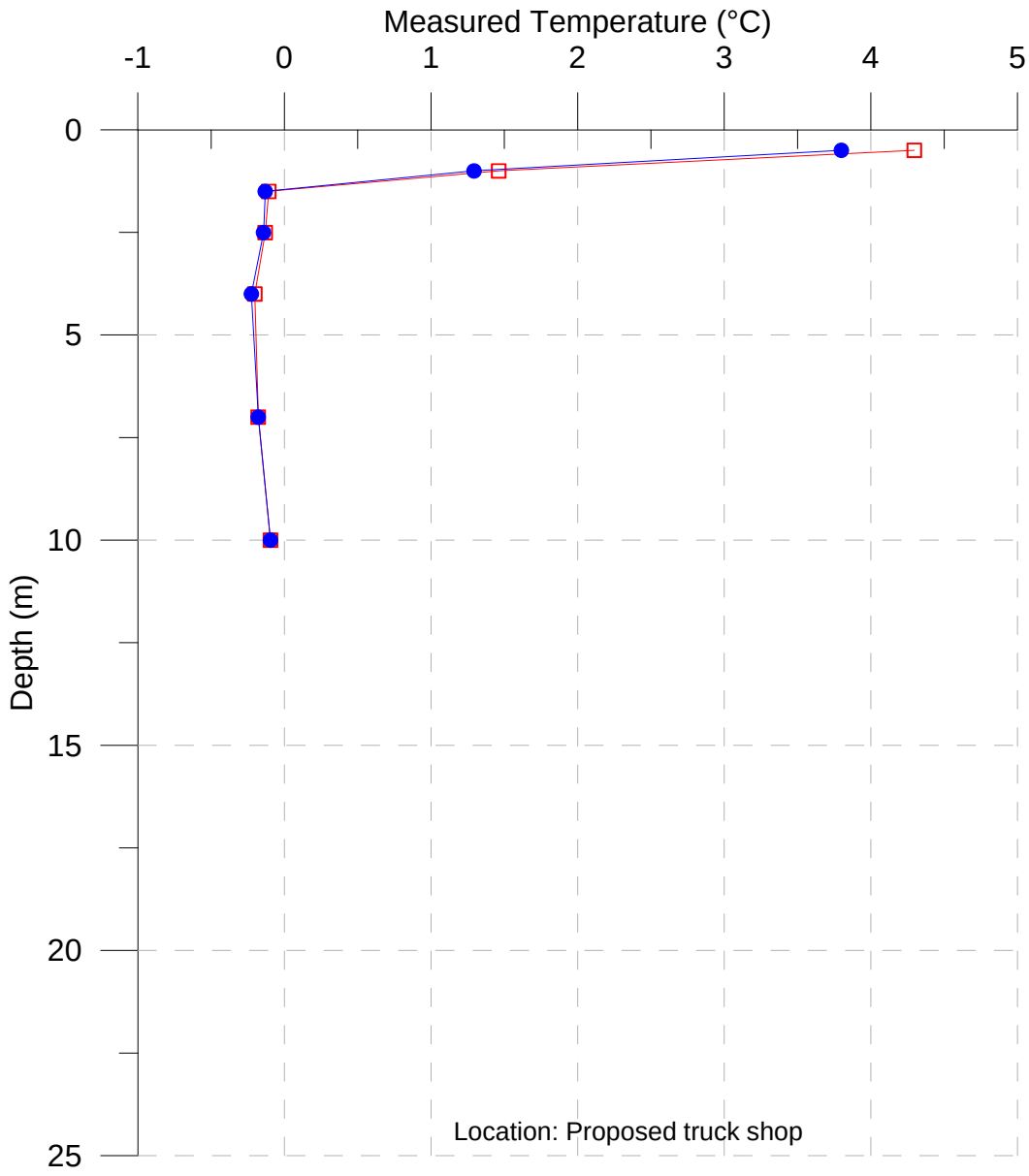
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-49

PROJECT No.	FIG No.	REV.
0792-006	J-9	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 10/08/11
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#:11.5-2, installed on 26/08/11

BH-BGC11-57
29/08/2011
30/08/2011

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DRAWN:	LGT	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

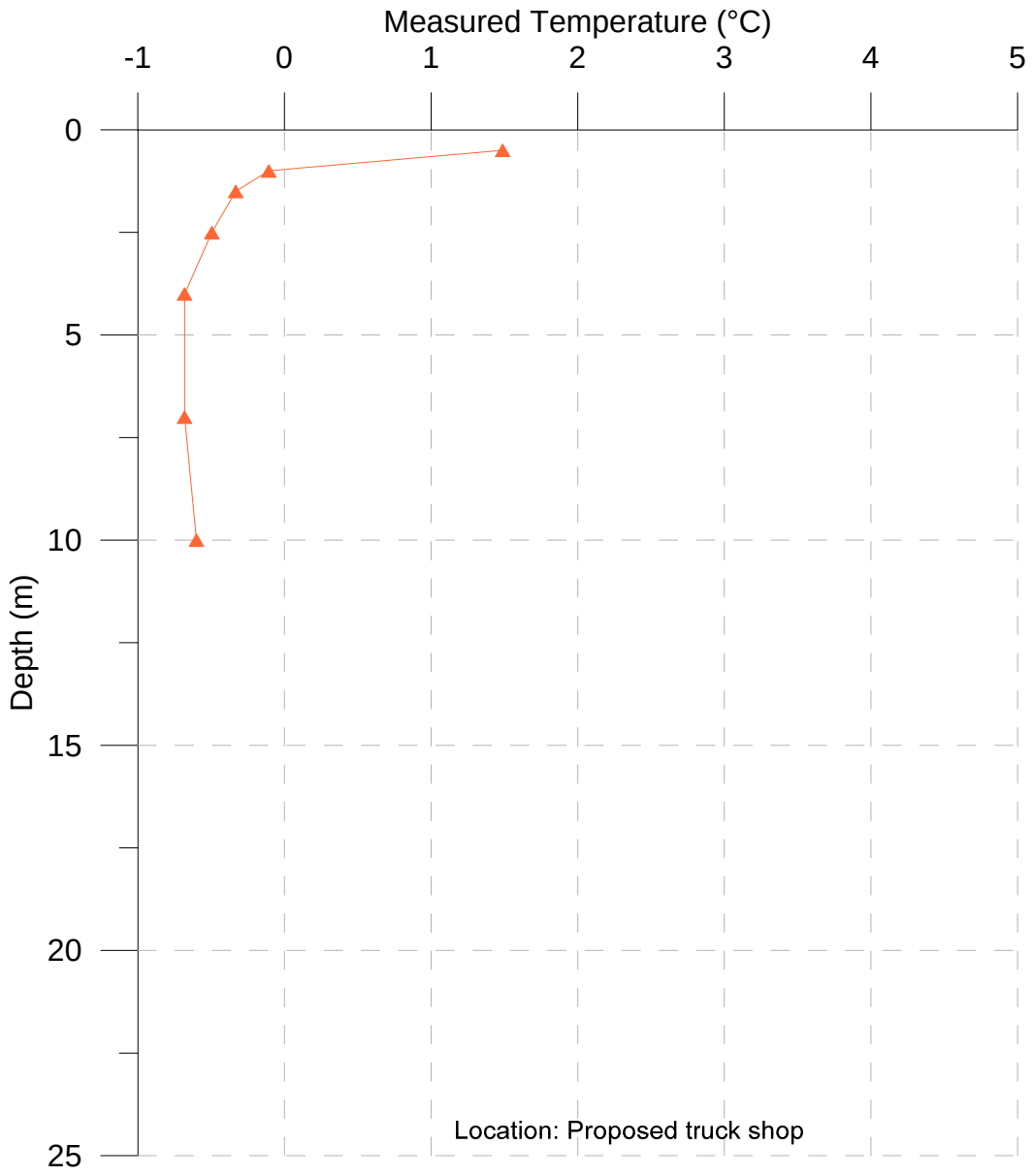
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-57

PROJECT No.	FIG No.	REV.
0792-006	J-10	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 10/08/11
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#:11.5-1, installed on 29/08/11

BH-BGC11-58

30/08/2011

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SCALE:	NTS	DESIGN:	LGT
DATE:	JAN 2012	CHECKED:	PQ
DRAWN:	LGT	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

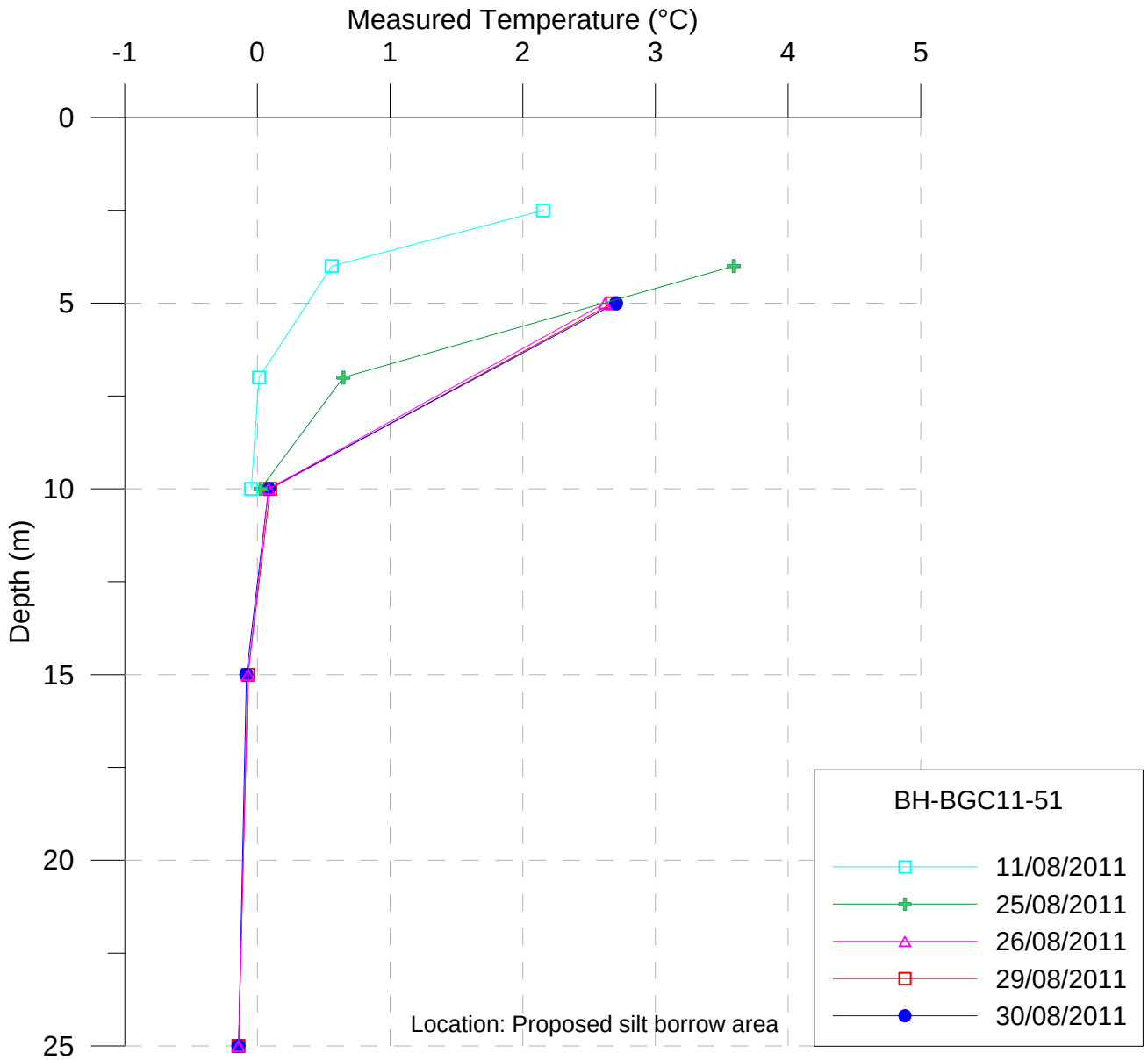
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-58

PROJECT No.	FIG No.	REV.
0792-006	J-11	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Notes:

1) Measured temperatures warmer than 5°C not shown for clarity
2) Drillhole completed on 06/08/11.
3) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#: 11.5-2, installed on 10/08/11 was removed on 25/08/11
4) Thermistor brand: M^2, Termination: MS3106E20-29P, Type: YSI44007, ID#: 26.5-2, installed on 25/08/11

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CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

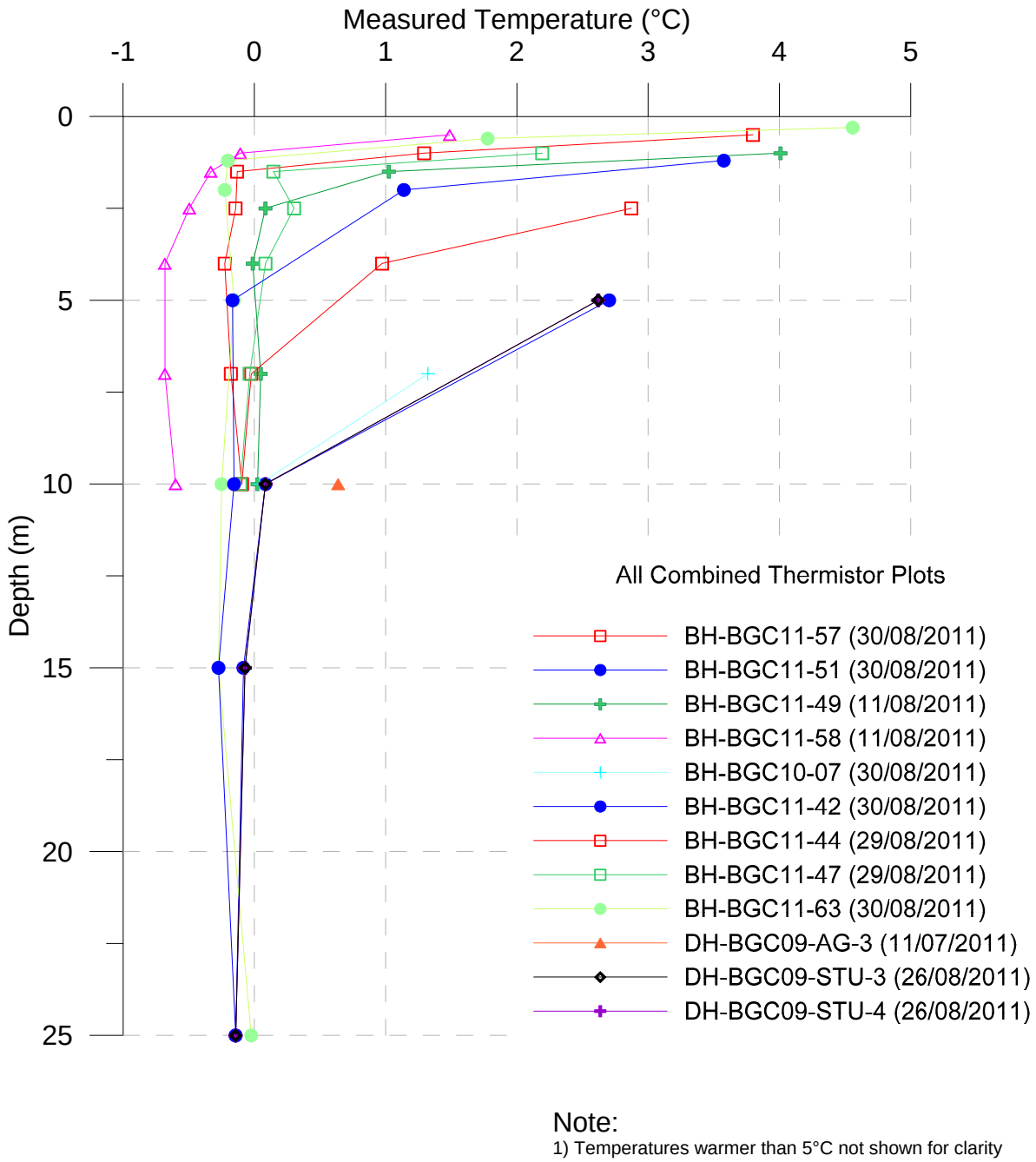
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES, BH-BGC11-51

PROJECT No.	FIG No.	REV.
0792-006	J-12	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.



Note:
1) Temperatures warmer than 5°C not shown for clarity

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SCALE:	NTS	DESIGN:	LGT
DATE:	JAN 2012	CHECKED:	PQ
DRAWN:	LGT	APPROVED:	PQ

CLIENT: VICTORIA GOLD CORP.

PROJECT: 2011 GEOTECHNICAL SITE INVESTIGATION
FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

TITLE: MEASURED GROUND TEMPERATURE PROFILES
ALL INSTRUMENTS END OF AUGUST 2011

PROJECT No.	FIG No.	REV.
0792-006	J-13	0

N:\BGC\Projects\0792 Victoria Gold\006 EG Infrastructure 2011\06 Reporting\01 Data Report\03 Working Appendices\Appendix J Thermistors

FIGURE TO BE READ WITH BGC REPORT TITLED "2011 GEOTECHNICAL SITE INVESTIGATION FOR MINE SITE INFRASTRUCTRE FACTUAL DATA REPORT", DATED JAN 2012.

APPENDIX K
GROUNDWATER INVESTIGATIONS

GROUNDWATER

1.0 INTRODUCTION

Groundwater observations were made as one component of the 2011 site investigation program. The work consisted of measuring static water levels in standpipe piezometers and obtaining readings of piezometric head from vibrating wire piezometers. The program also included slug testing in selected 2011 BGC standpipes to estimate hydraulic conductivity of selected geological units. Finally, observations were made of surface seepage locations throughout the site as and when encountered during the summer site investigation.

BGC completed a separate program of groundwater investigation for pit depressurization, and for groundwater supply. Those programs will be reported under separate cover.

2.0 PIEZOMETER INSTALLATIONS

A total of 22 standpipe piezometers were installed in auger and diamond drill holes during the 2011 geotechnical site investigation for mine site infrastructure. Two vibrating wire piezometers were installed; one in an auger hole and the other in a diamond drill hole. Piezometer installation details are summarized in Table K-1 and Table K-2, and illustrated graphically on the borehole logs in Appendix D. Piezometer locations are shown on Drawing 09.

Standpipe piezometers typically consisted of 2 inch diameter schedule 80 PVC with 3 m (10 ft) slotted screens. One piezometer with a 6 m (20 ft) screen was installed. Piezometers were either installed at the bottom of the hole or, the hole was backfilled with bentonite to the desired elevation prior to placing the piezometer. Sand packs in the screened zone of the piezometers used medium silica sand. For piezometers installed in diamond drill holes, a bentonite seal of typically 0.5 m to 2 m thick was installed above the sand pack, and the remainder of the hole grouted to surface using a cement-bentonite grout. For piezometers installed in auger holes, the hole was backfilled with bentonite above the sand pack, with the exception of BH-BGC11-55 where a bentonite seal was installed above the sand pack and the hole was backfilled with grout to allow for downhole geophysics.

The vibrating wire piezometer installed in the diamond drill hole (BH-BGC11-54) was taped to a PVC tremmie tube, lowered down the hole and grouted to surface using the sacrificial PVC tremmie. The grout was a cement-bentonite grout mix. The vibrating wire piezometer installed in the auger hole (BH-BGC11-63) was taped to 2 inch solid PVC pipe to be used for a thermistor installation. There was running water at the bottom of BH-BGC11-63 and sandy material from above the bottom of the hole had collapsed into the bottom of the hole. The vibrating wire was pushed through the sloughed material and bentonite chips were used to backfill the hole to surface.

Table K-1 Standpipe Piezometer Installation Details

Hole	Northing (m)	Easting (m)	Elevation (masl)	PVC Diameter (mm)	Bottom of Sand Pack (mbgs)	Bottom of Screen (mbgs)	Top of Screen (mbgs)	Top of Sand Pack (mbgs)	Height of Stickup (m)
BH-BGC11-26	7102088.1	460205.8	1139.6	51	19.8	18.3	12.2	9.5	0.14
BH-BGC11-29	7101802.1	459977.8	1045.3	51	20.24	20	17	16.2	0.79
BH-BGC11-30	7101567.8	460122.0	952.0	51	32.2	30.7	27.7	27.32	0.85
BH-BGC11-32	7100934.4	458745.2	818.7	51	23.6	23.1	20.1	19.5	0.81
BH-BGC11-33	7100983.6	459115.7	833.0	51	41.4	40.01	37.01	36.3	0.56
BH-BGC11-34	7101053.5	459308.5	848.3	51	34.4	33.7	30.7	30.1	0.82
BH-BGC11-35	7100440.3	459695.7	986.3	51	49	48.3	45.3	44.9	0.97
BH-BGC11-36	7100274.7	459699.9	1002.5	51	50.29	48.8	45.8	45.2	0.93
BH-BGC11-37	7100180.5	459762.8	1034.4	51	42.6	42	39	38.5	0.21
BH-BGC11-38	7100416.0	459820.0	1013.0	51	49.1	48.6	45.6	44.3	1.35
BH-BGC11-39	7101056	458462	804	51	19.1	18.59	15.55	14.6	0.68
BH-BGC11-40B	7100038.8	459767.0	1049.8	51	45.36	43.97	40.97	40.57	0.94
BH-BGC11-45	7099109.5	460556.2	1354.4	51	20.73	19.89	16.89	16.28	0.92
BH-BGC11-46	7099004.0	460262.7	1246.1	51	20.12	17.53	14.53	13.37	1.15
BH-BGC11-48	7099118.1	459936.0	1140.0	51	32.92	32.32	29.27	28.61	0.97
BH-BGC11-52	7101316.4	459891.2	909.0	51	22.56	21.8	18.8	18.3	1
BH-BGC11-55	7100918.4	459440.6	881.0	51	13.1	12.65	9.65	8.5	0.92
BH-BGC11-57	7099978.2	458798.6	859.2	51	10	9.9	6.9	6.1	0.97
BH-BGC11-59	7101239.4	459113.1	883.7	51	30.18	29.08	26.08	25.5	0.93
BH-BGC11-60	7100041.6	458795.6	859.2	51	8.85	8.6	5.6	4.9	0.78
BH-BGC11-62	7100334.1	459785.9	1017.9	51	35.05	34.2	31.2	30.32	0.71
BH-BGC11-64	7100262.9	460182.4	1044.1	51	48.77	46.69	43.6	43.2	1.13

1. Holes surveyed by Underhill in August and September 2011 using a differential GPS, with the exception of BH-BGC11-39, which was surveyed by BGC staff using a handheld GPS.
2. Coordinates are in UTM NAD 83, Zone 8N.
3. Depths are recorded in meters below ground surface (mbgs).

Table K-2 Vibrating Wire Piezometer Installation Details

Hole	Northing (m)	Easting (m)	Elevation (masl)	Serial Number	Manufacturer	Tip Northing (m)	Tip Easting (m)	Tip Elevation (masl)	Tip Depth (mbgs)
BH-BGC11-54	7101245.6	458886.2	883.8	VW18102	RST Instruments	7101245.6	458886.2	846	39.7
BH-BGC11-63	7100114.1	460302.9	1100.7	VW18103	RST Instruments	7100114.1	460302.9	1076	26.3

1. Holes surveyed by Underhill in August and September 2011 using a differential GPS.
2. Coordinates are in UTM NAD 83, Zone 8N.
3. Depths are recorded in meters below ground surface (mbgs).

3.0 WATER LEVEL OBSERVATIONS

Water level measurements in standpipe piezometers and vibrating wire piezometers were made in two separate campaigns. Water levels in select standpipes installed by others in previous years were measured on July 3rd and July 4th, 2011. Water levels in standpipes and vibrating wires installed by BGC in 2011 along with select standpipes installed by others were read between August 25th and August 29th, 2011. Table K-3 summarizes the observed ground water depths.

Table K-3 Groundwater Level Observations

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Date Collected	Depth (mbgs)	Piezometer Type
BH-BGC11-26	7102088.1	460205.8	1139.6	27-Aug-11	16.4	Standpipe
BH-BGC11-29	7101802.1	459977.8	1045.3	27-Aug-11	7.8	Standpipe
BH-BGC11-30	7101567.8	460122.0	952.0	27-Aug-11	16.3	Standpipe
BH-BGC11-32	7100934.4	458745.2	818.7	24-Aug-11	10.8	Standpipe
BH-BGC11-33	7100983.6	459115.7	833.0	26-Aug-11	4.2	Standpipe
BH-BGC11-34	7101053.5	459308.5	848.3	24-Aug-11	8.3	Standpipe
BH-BGC11-35	7100440.3	459695.7	986.3	27-Aug-11	24.6	Standpipe
BH-BGC11-36	7100274.7	459699.9	1002.5	27-Aug-11	19.9	Standpipe
BH-BGC11-38	7100416.0	459820.0	1013.0	25-Aug-11	26.3	Standpipe
BH-BGC11-39	7101056	458462	804	24-Aug-11	9.8	Standpipe
BH-BGC11-40B	7100038.8	459767.0	1049.8	25-Aug-11	8.5	Standpipe
BH-BGC11-45	7099109.5	460556.2	1354.4	27-Aug-11	8.4	Standpipe
BH-BGC11-46	7099004.0	460262.7	1246.1	27-Aug-11	15.3	Standpipe
BH-BGC11-48	7099118.1	459936.0	1140.0	27-Aug-11	31.3	Standpipe
BH-BGC11-52	7101316.4	459891.2	909.0	25-Aug-11	4.1	Standpipe
BH-BGC11-54	7101245.6	458886.2	883.8	29-Aug-11	11.8	Vibrating Wire
BH-BGC11-55	7100918.4	459440.6	881.0	27-Aug-11	dry	Standpipe
BH-BGC11-57	7099978.2	458798.6	859.2	27-Aug-11	dry	Standpipe
BH-BGC11-59	7101239.4	459113.1	883.7	27-Aug-11	29.4	Standpipe
BH-BGC11-60	7100041.6	458795.6	859.2	27-Aug-11	dry	Standpipe
BH-BGC11-62	7100334.1	459785.9	1017.9	27-Aug-11	20.2	Standpipe
BH-BGC11-63	7100114.1	460302.9	1100.7	29-Aug-11	18.1	Vibrating Wire
GT96-26	7101825	462617	n/a	3-Jul-11	30.1	Standpipe
GT96-35	7099081	460238	n/a	27-Aug-11	3.4	Standpipe
MW09-AG1	7101949	459425	1017	25-Aug-11	15.7	Standpipe
MW09-AG2	7101981	459785	1009	27-Aug-11	12.7	Standpipe
MW09-DG1	7101009	459325	840	4-Jul-11	1.8	Standpipe
MW09-DG1	7101009	459325	840	27-Aug-11	2.3	Standpipe
MW09-DG2	7100877	458992	824	4-Jul-11	0.9	Standpipe

Hole ID	Northing (m)	Easting (m)	Elevation (masl)	Date Collected	Depth (mbgs)	Piezometer Type
MW09-DG4	7101111	458284	787	4-Jul-11	5.6	Standpipe
MW09-DG5	7100607	458397	810	27-Aug-11	10.7	Standpipe
MW09-OG2	7100599	462221	1332	3-Jul-11	2.2	Standpipe
MW09-OG3	7101552	461223	1065	3-Jul-11	0.4	Standpipe
MW09-STU1	7100648	459771	967	4-Jul-11	14.3	Standpipe
MW09-STU1	7100648	459771	967	27-Aug-11	14.4	Standpipe
MW09-STU2	7100799	459212	857	4-Jul-11	2.1	Standpipe
MW10-DG06	7101120	459552	859	3-Jul-11	2.2	Standpipe
MW10-OBS1	7101100	458443	796	4-Jul-11	7.2	Standpipe
MW10-OBS2	7101116	458405	793	4-Jul-11	5.3	Standpipe
MW96-01	7100965	463763	1398	3-Jul-11	23.1	Standpipe
MW96-02	7101047	463679	1394	3-Jul-11	8.1	Standpipe
MW96-03a	7101135	463597	1384	3-Jul-11	1.9	Standpipe
MW96-04	7101229	463508	1373	3-Jul-11	4.6	Standpipe
MW96-05	7101301	463429	1363	3-Jul-11	2.7	Standpipe
MW96-06a	7101636	463913	1405	3-Jul-11	2.6	Standpipe
MW96-07b	7101670	463596	n/a	3-Jul-11	0.0	Standpipe
MW96-08	7101458	463252	1339	3-Jul-11	4.9	Standpipe
MW96-09a	7101244	463076	1361	3-Jul-11	4.5	Standpipe
MW96-09b	7101252	463073	1361	3-Jul-11	6.7	Standpipe
MW96-10a	7101121	462939	1367	3-Jul-11	2.2	Standpipe
MW96-10b	7101132	462936	1368	3-Jul-11	2.0	Standpipe
MW96-13a	7100925	460003	984	3-Jul-11	5.3	Standpipe
MW96-13b	7100925	460003	984	3-Jul-11	14.9	Standpipe
MW96-14a	7100609	460145	976	3-Jul-11	dry	Standpipe
MW96-14a	7100609	460145	976	27-Aug-11	dry	Standpipe
MW96-14b	7100609	460145	976	27-Aug-11	3.6	Standpipe
MW96-14b	7100609	460145	976	3-Jul-11	3.6	Standpipe
MW96-15a	7101037	459679	943	4-Jul-11	0.8	Standpipe
MW96-15a	7101037	459679	943	27-Aug-11	1.5	Standpipe
MW96-26	7101516	462873	1316	3-Jul-11	6.5	Standpipe
MW96-27	7101562	462876	1308	3-Jul-11	9.3	Standpipe

1. Holes surveyed in August and September 2011 using a differential GPS, with the exception of BH-BGC11-39, which was surveyed by BGC staff using a handheld GPS.
2. Coordinates in UTM NAD 83, Zone 8N.
3. Depths are recorded in meters below ground surface (mbgs).
4. Linear calibration used for vibrating wire piezometers.

4.0 SLUG TESTS

Five single well response tests (slug tests) were conducted in the holes BH-BGC11-32, -33, -34, -39 and -52, all of which are located in the Dublin Gulch valley bottom. Three iterations of a 0.9 L rising head slug test were performed for each well, however in one of the iterations in borehole BH-BGC11-39 problems occurred with the data logger and the results were not analyzed. The water level response was induced by removing a single bailer (0.9 L) full of water. The water level response was recorded with Solinist's 3001 Levelogger Gold submersible pressure transducers and data loggers, as well as manually, for an in-field QA/QC. The data loggers were set to record water level recovery versus time on a reading per second or reading per half-second interval.

The testing results were reviewed and interpreted using the Hvorslev method of analysis as implemented in AQTESOLVE Pro Version 4.50.002 to calculate hydraulic conductivity. Hvorslev (1951) developed a semi-analytical method for the analysis of an overdamped slug test in a fully or partially penetrating well in a homogeneous, anisotropic confined aquifer. The Hvorslev method employs a quasi-steady-state model that ignores elastic storage in the aquifer. Well response data and calculated hydraulic conductivity results are summarized in Table K-4. Detailed calculation results are provided in the figures at the end of this Appendix.

5.0 SURFACE SEEPAGE OBSERVATIONS

When observed, locations of surface seepage were recorded. The location was noted and approximate seepage rate was estimated where possible. The list of surface seepage locations in Table K-5 is not an exhaustive list of surface seepage locations at the site, but rather a list of surface seepage locations observed by BGC staff on an opportunity basis throughout the course of the site investigation program. Seeps were typically observed while marking bore hole or test pit locations, investigating access to bore hole or test pit locations or while completing test pits and mapping outcrops. Photos of selected surface seepage observations are included below.

Table K-4 Summary of hydraulic conductivities

Hole ID	Elevation (masl)	Formation/Unit	Top and Bottom of sand pack (mbgs)	Average conductivity, k (m/sec)
BH-BGC11-32	819	Placer Tailings and Weathered Bedrock[1]	19.5 – 23.6	2.5×10^{-6}
BH-BGC11-33	833	Weathered Bedrock	36.3 – 41.4	1.1×10^{-7}
BH-BGC11-34	848	Weathered Bedrock	30.1 – 34.4	2.6×10^{-6}
BH-BGC11-39	804	Placer Tailings	14.6 – 18.6	8.1×10^{-5}
BH-BGC11-52	909	Weathered Bedrock	18.3 – 22.6	9.7×10^{-6}

Note:
1) Screened pipe was installed over two units, therefore the conductivity (k) cannot be representative of any one unit.

Table K-5 Surface Seepage Observations

Seep Number	Northing (m)	Easting (m)	Elevation (masl)	Date	Approximate flow rate (L/min)	Photo taken	Trending (°)	Comments
1	7100826	460028	941	10-Jul-11	-	Y	-	Moderate seep on side of the Eagle Pup road
2	7098974	459969	1144	11-Jul-11	-	-	-	
3	7100583	460169	982	11-Jul-11	-	-	-	
4	7099527	459241	899	16-Jul-11	4.5	Y	40	Seeping from two locations 20 m apart beneath topsoil
5	7099502	459276	907	16-Jul-11	13.6-18.2	Y	-	40 m east of seep #4, seeping from under moss
6	7099327	459584	986	16-Jul-11	13.6-18.2	Y	28	Seep through 2 m bank, 6 m wide
7	7100205	459144	936	22-Jul-11	0.5	-	-	Very minor seep at side of road beside TP; a second small seep ~10 m to the North
8	7099601	460594	1334	27-Jul-11	-	-	-	2 very small seeps ~10 m apart on an old drill pad
9	7099623	460571	1330	27-Jul-11	-	-	-	Small seep on road below previous seeps
10	7099978	460937	1320	27-Jul-11	0.5	-	-	Very small seep at old drill pad at top of Stewart Gulch,
11	7101520	461754	1209	27-Jul-11	0.25	-	-	Second small seep ~25m North (~.75L/min)
12	7100836	460035	942	23-Jul-11	< 1	-	-	2-3 coalescing seeps along side of road
13	7100379	460384	1069	23-Jul-11	< 5	-	-	Moderate seep beside drill pad
14	7100358	460356	1067	23-Jul-11	> 5-10	-	-	Large seep along old access road
15	7100283	460307	1067	23-Jul-11	< 1	-	-	Small seep along access road

Seep Number	Northing (m)	Easting (m)	Elevation (masl)	Date	Approximate flow rate (L/min)	Photo taken	Trending (°)	Comments
16	7100259	460295	1068	23-Jul-11	< 5	-	-	Moderate seep
17	7100230	460277	1068	23-Jul-11	< 100	-	-	Very small creek
18	7100234	460688	1204	23-Jul-11	1-5	-	-	Moderate seep along road cut
19	7100144	460664	1207	23-Jul-11	< 1	-	-	Small seep along road cut
20	7100120	460652	1208	23-Jul-11	< 1	-	-	Small seep along road cut
21	7100094	460633	1208	23-Jul-11	< 0.5	-	-	Very small seep along road cut
22	7100078	460624	1208	23-Jul-11	< 1	-	-	Very small seep at old drill pad ct
23	7099047	459965	1125	29-Jul-11	-	-	-	
24	7099116	460250	1264	31-Jul-11	-	-	-	Large seep along existing access road
25	7098868	460034	1162	29-Jul-11	-	-	-	
26	7099061	459007	922	17-Aug-11	-	-	-	
27	7101806	461903	1166	12-Jul-11	-	-	-	Logged at test pit TP-BGC11-79
28	7100144	460540	1158	27-Aug-11	-	Y	-	Coordinates are for test pit TP-BGC11-144. Several seeps noted along access trail to the test pit.

1. Location for BGC holes from handheld GPS measurements.
2. Coordinates in UTM NAD 83, Zone 8N.

Seep 1

Seep 4

Seep 5

Seep 6 – View A

Seep 6 – View B

Seep 28 – Seep found at TP-BGC11-144

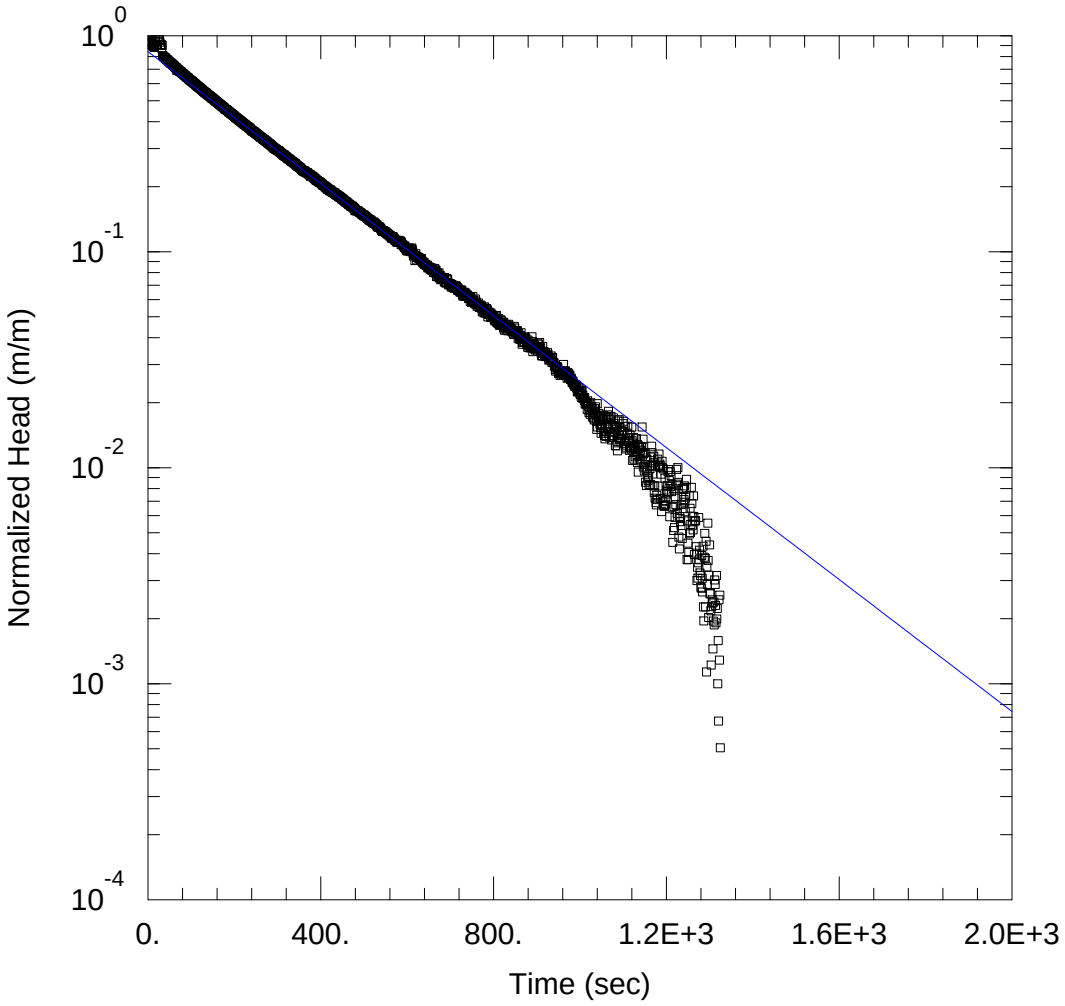
6.0 REFERENCES

Hvorslev, M.J., 1951. Time Lag and Soil Permeability in Ground-Water Observations, Bull. No. 36, Waterways Exper. Sta. Corps of Engrs, U.S. Army, Vicksburg, Mississippi, pp. 1-50.

FIGURES

BH-BGC11-32 Test 1

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-32 Test 1.aqt
Date: 10/18/11 Time: 11:36:23

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.564E-6 m/sec y0 = 0.3743 m

AQUIFER DATA

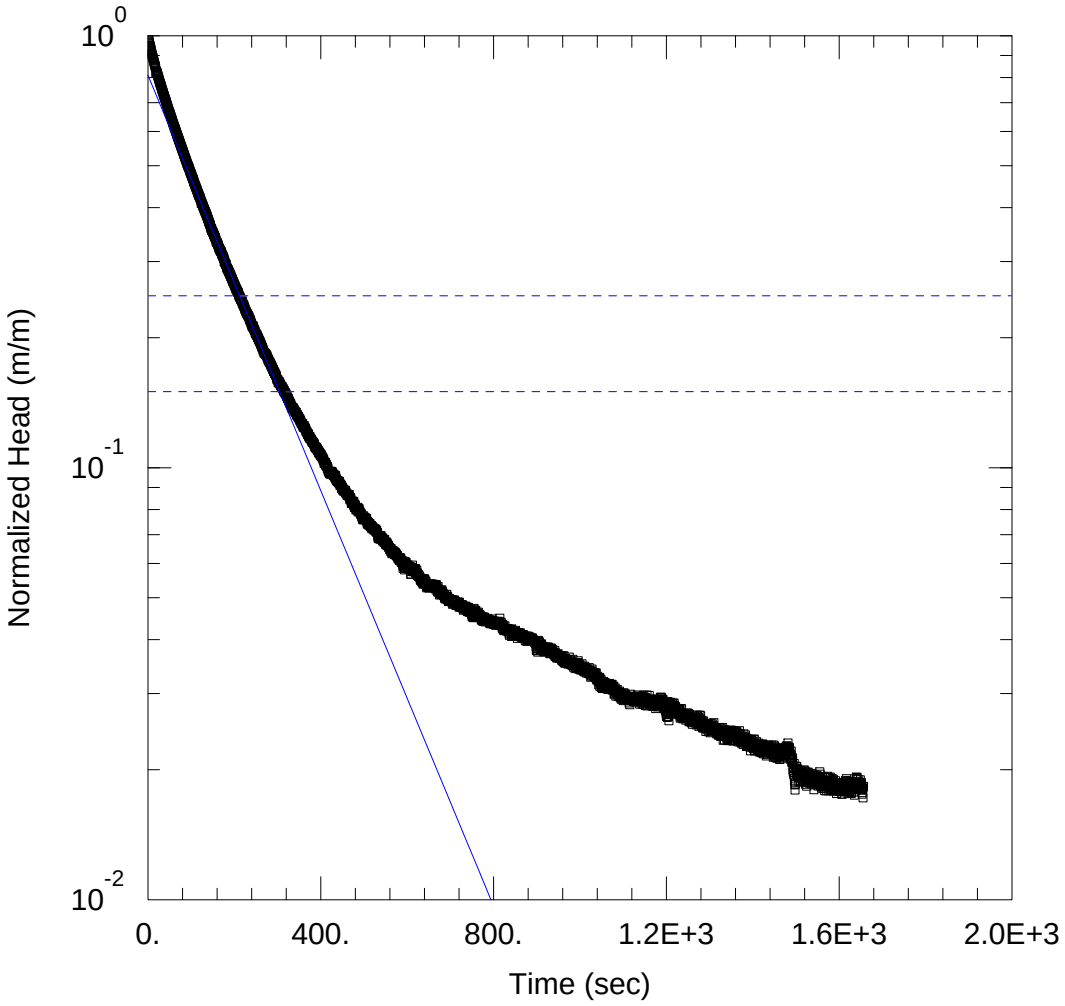
Saturated Thickness: 3.5 rAnisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-32)

Initial Displacement: 0.4436 m
Static Water Column Height: 12.29 m
Total Well Penetration Depth: 3.3 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-32 Test 2

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-32 Test 2.aqt
Date: 10/18/11 Time: 11:39:58

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 2.873E-6 m/sec y0 = 0.4243 m

AQUIFER DATA

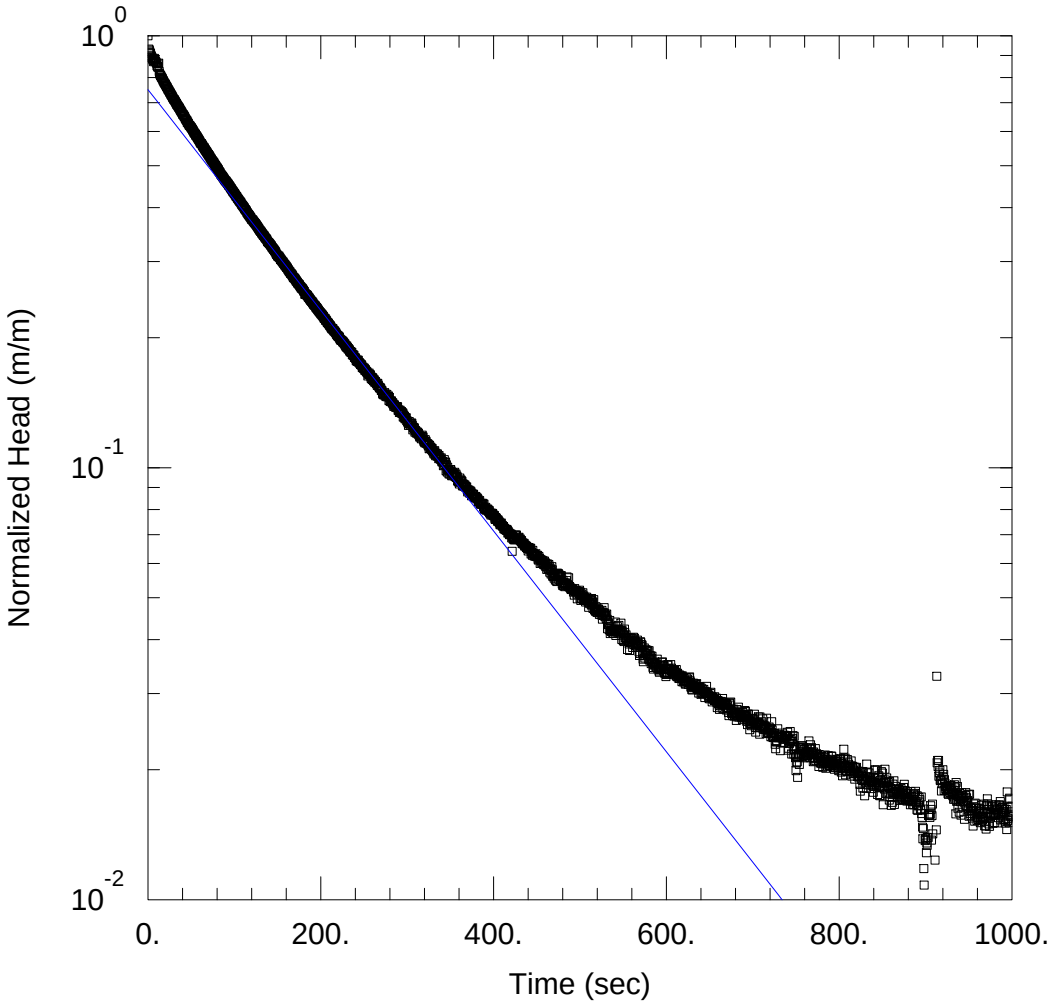
Saturated Thickness: 3.3 rAnisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-32)

Initial Displacement: 0.5241 m
Static Water Column Height: 12.31 m
Total Well Penetration Depth: 3.3 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-32 Test 3

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-32 Test 3.aqt
Date: 10/18/11 Time: 11:42:04

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 3.054E-6 m/sec y0 = 0.3856 m

AQUIFER DATA

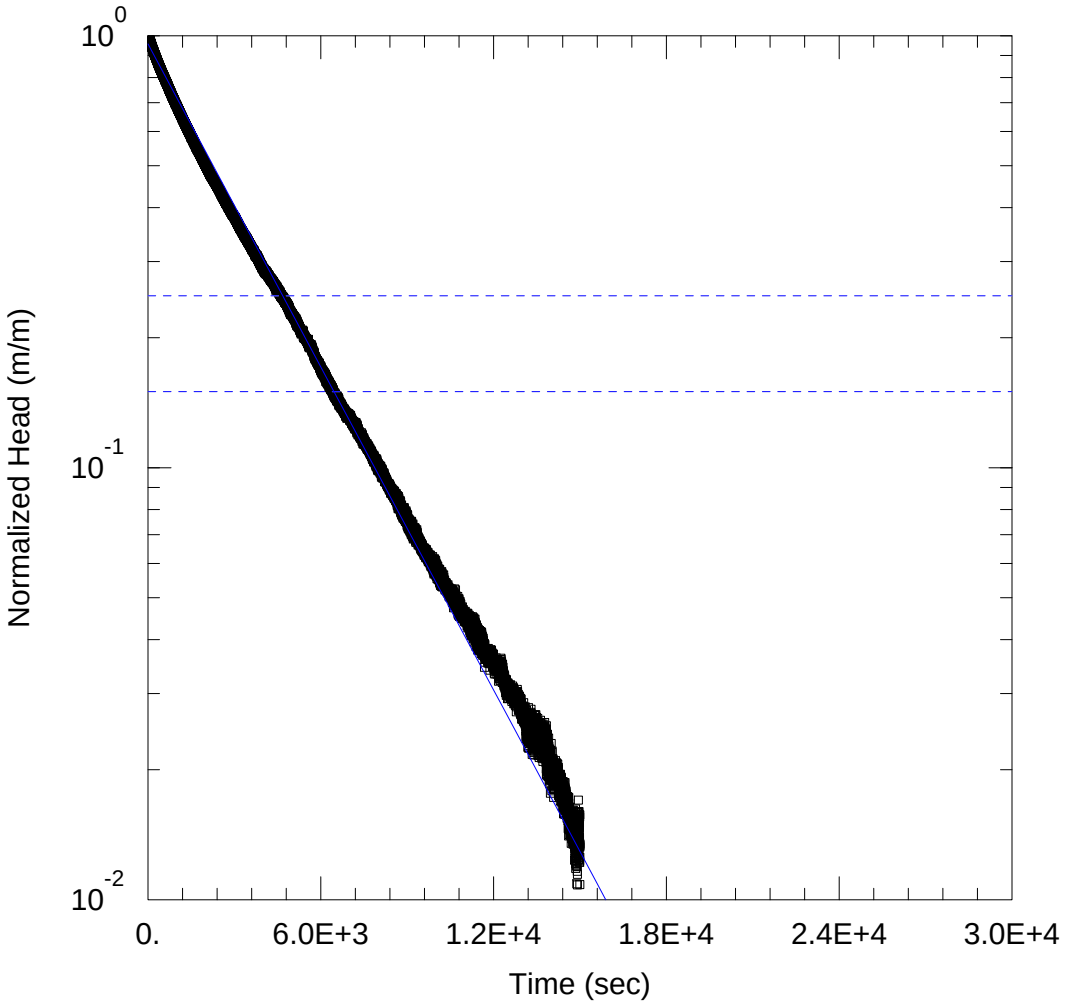
Saturated Thickness: 3.3 rAnisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-32)

Initial Displacement: 0.514 m
Static Water Column Height: 12.31 m
Total Well Penetration Depth: 3.3 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-33 Test 1

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-33 Test 1.aqt
Date: 10/18/11 Time: 13:19:19

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.276E-7 m/sec y0 = 0.4767 m

AQUIFER DATA

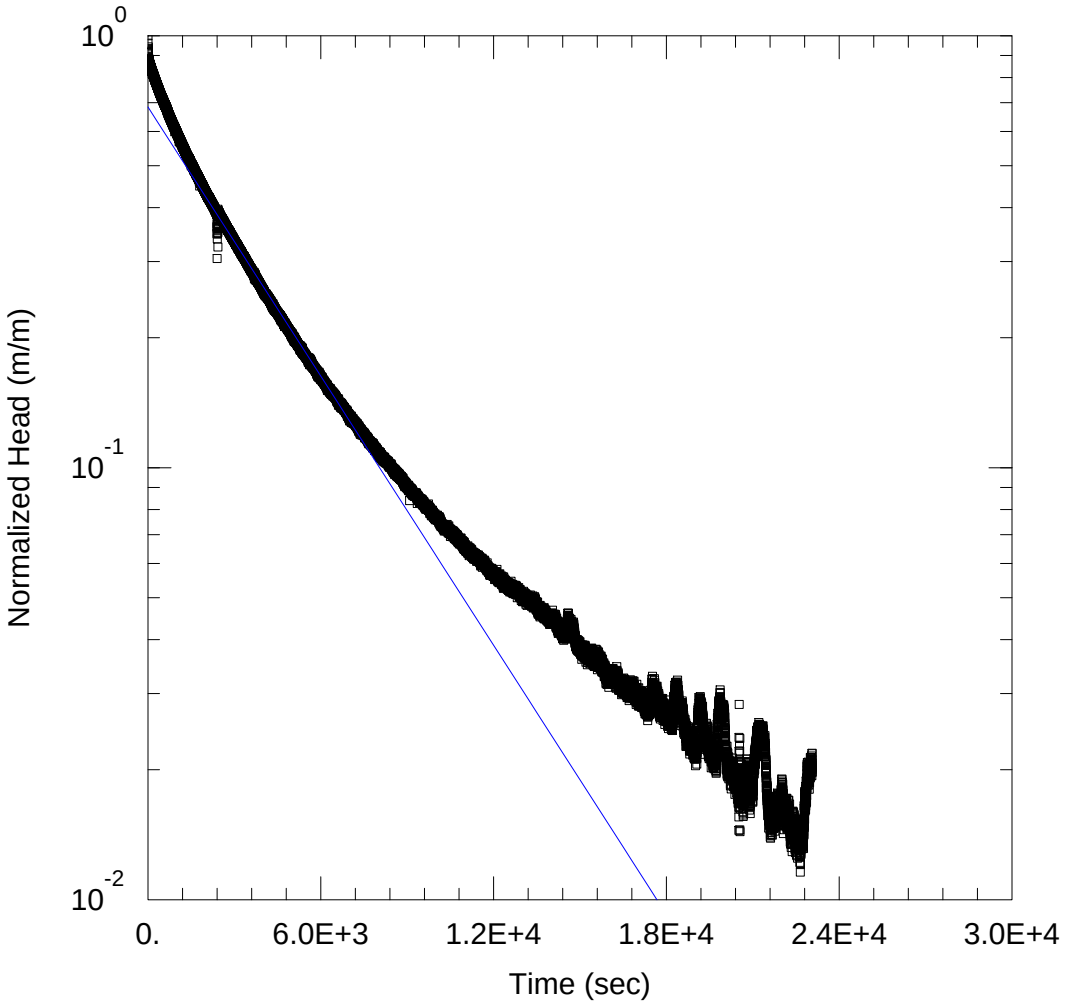
Saturated Thickness: 29.6 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-33)

Initial Displacement: 0.498 m
Static Water Column Height: 33.98 m
Total Well Penetration Depth: 28.95 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-33 Test 2

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-33 Test 2.aqt
Date: 10/18/11 Time: 11:55:48

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.063E-7 m/sec y0 = 0.3466 m

AQUIFER DATA

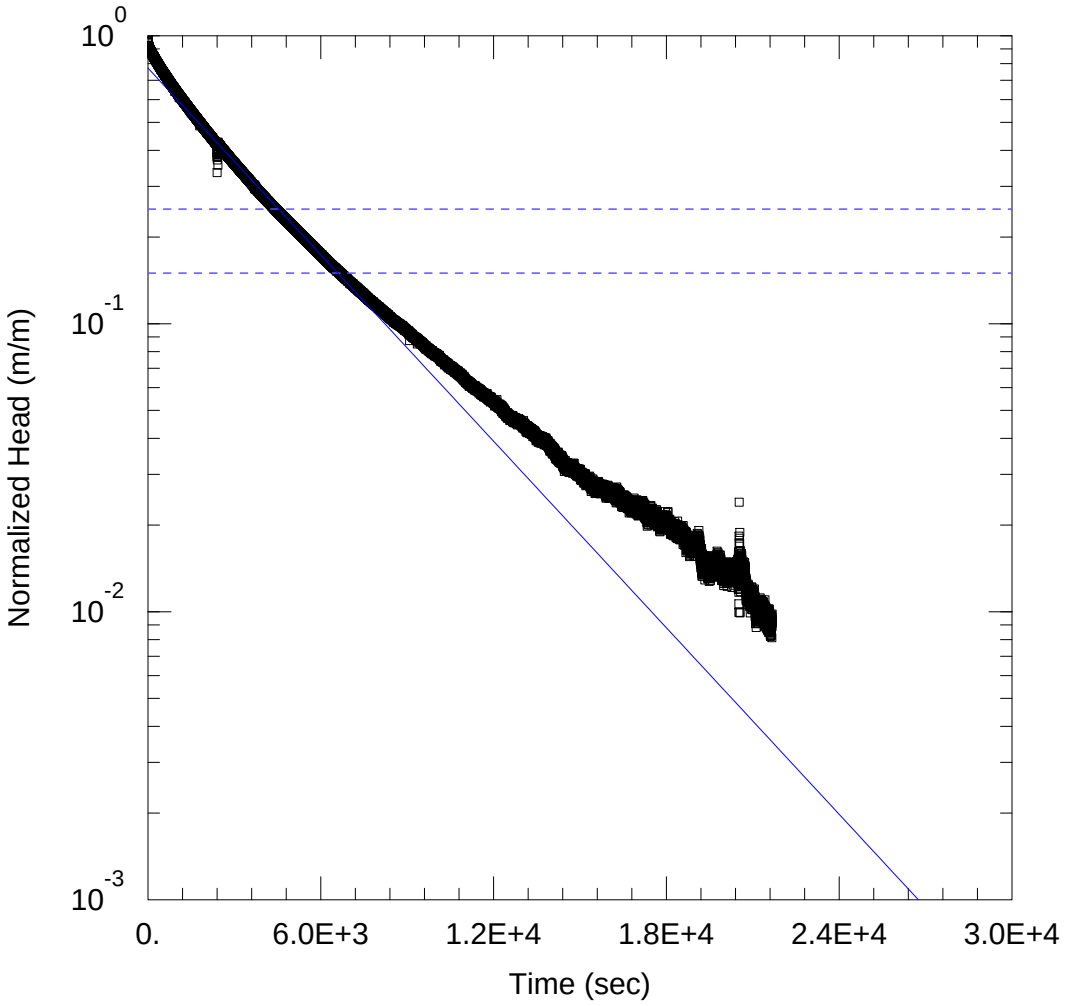
Saturated Thickness: 29.6 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-33)

Initial Displacement: 0.507 m
Static Water Column Height: 34. m
Total Well Penetration Depth: 28.95 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-33 Test 3

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-33 Test 3.aqt
Date: 10/18/11 Time: 11:58:19

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.105E-7 m/sec y0 = 0.3905 m

AQUIFER DATA

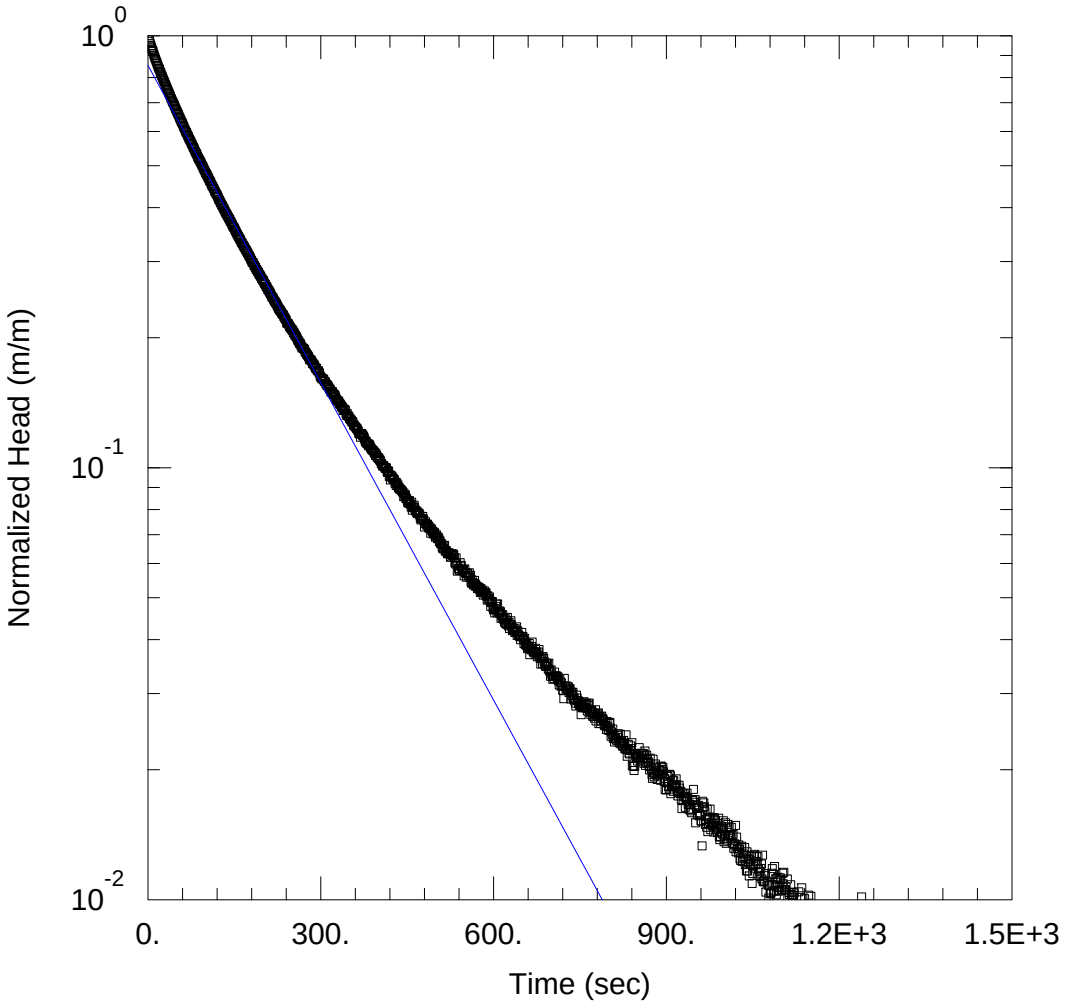
Saturated Thickness: 29.6 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-33)

Initial Displacement: 0.506 m
Static Water Column Height: 34. m
Total Well Penetration Depth: 28.95 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-34 Test 1

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-34 Test 1.aqt
Date: 10/18/11 Time: 12:58:00

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 2.507E-6 m/sec y0 = 0.455 m

AQUIFER DATA

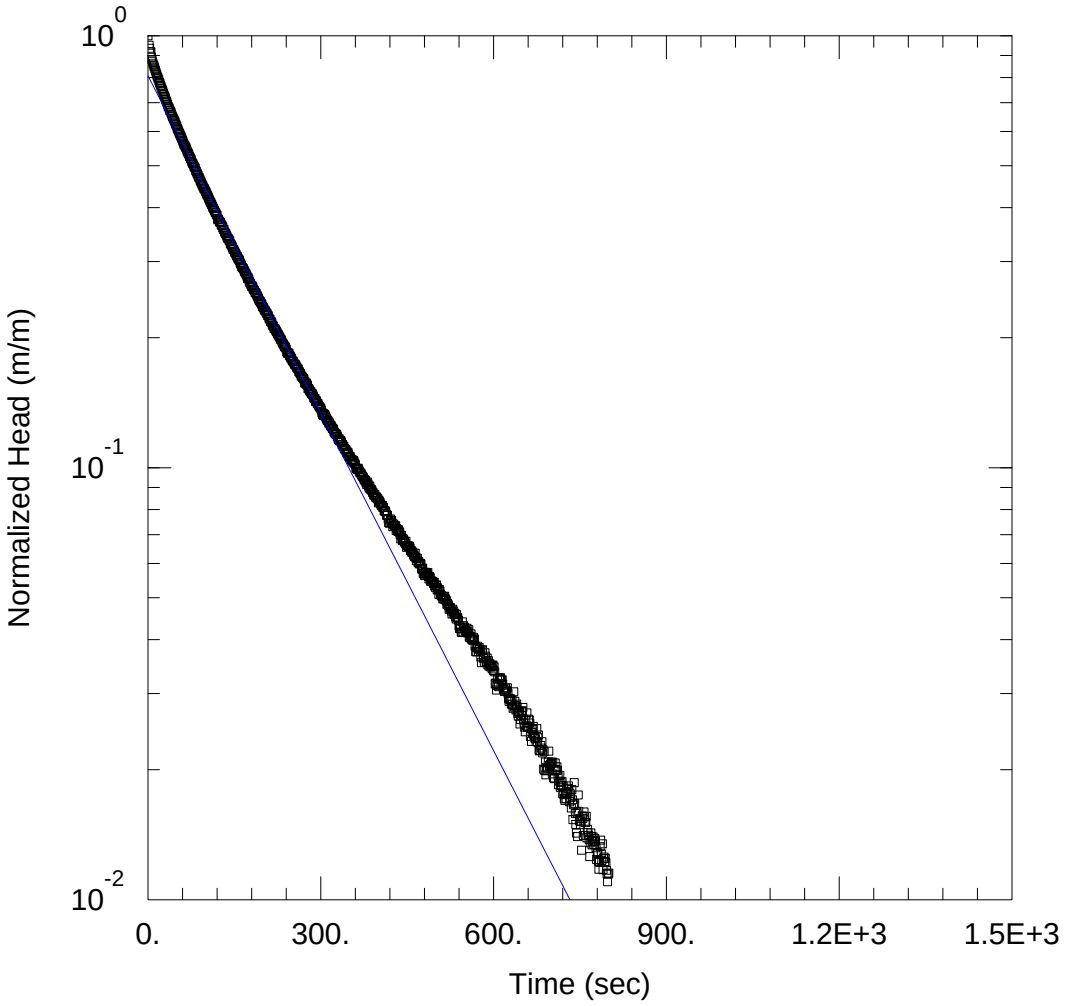
Saturated Thickness: 16.3 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-34)

Initial Displacement: 0.533 m
Static Water Column Height: 24.48 m
Total Well Penetration Depth: 15.75 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-34 Test 2

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-34 Test 2.aqt
Date: 10/18/11 Time: 12:59:56

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 2.666E-6 m/sec y0 = 0.4499 m

AQUIFER DATA

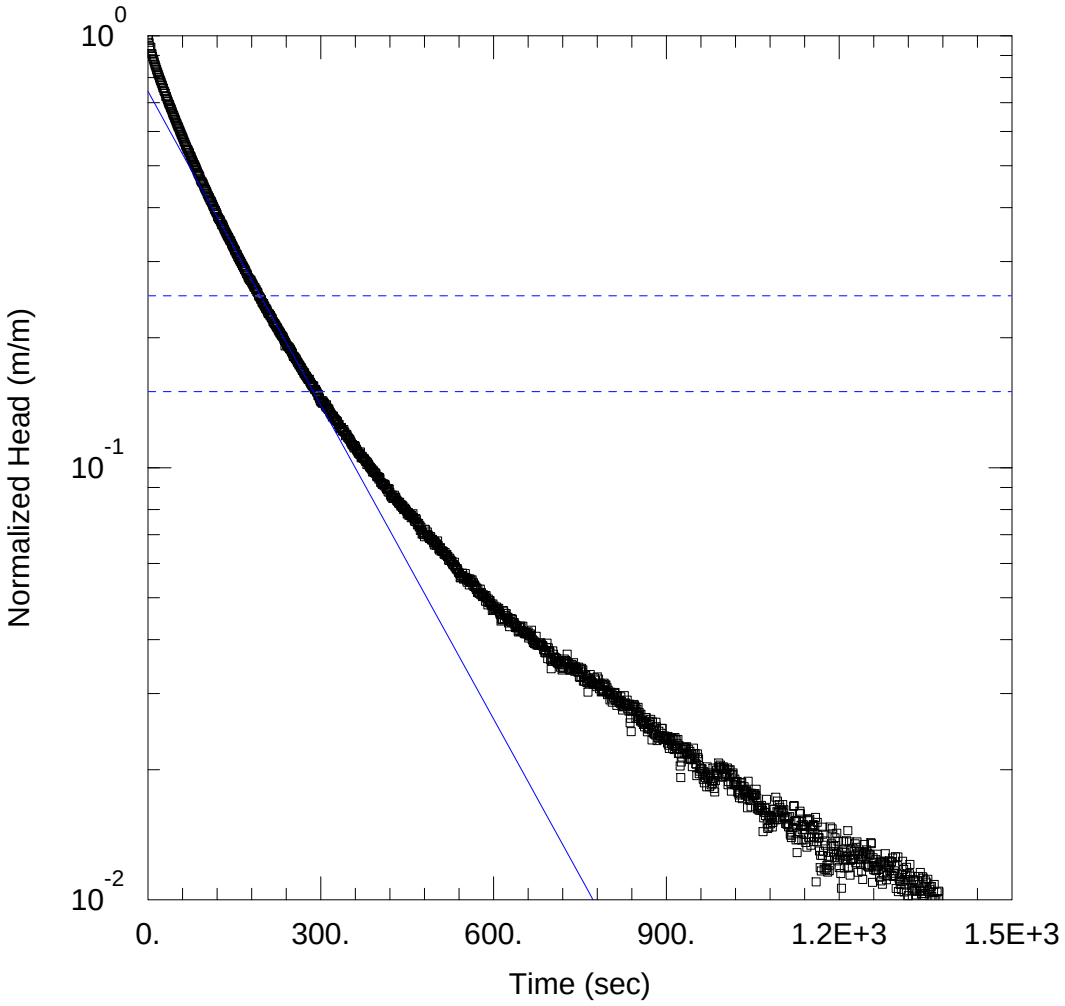
Saturated Thickness: 16.3 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-34)

Initial Displacement: 0.557 m
Static Water Column Height: 24.48 m
Total Well Penetration Depth: 15.75 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-34 Test 3

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-34 Test 3.aqt
Date: 10/18/11 Time: 13:16:59

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 2.479E-6 m/sec y0 = 0.3887 m

AQUIFER DATA

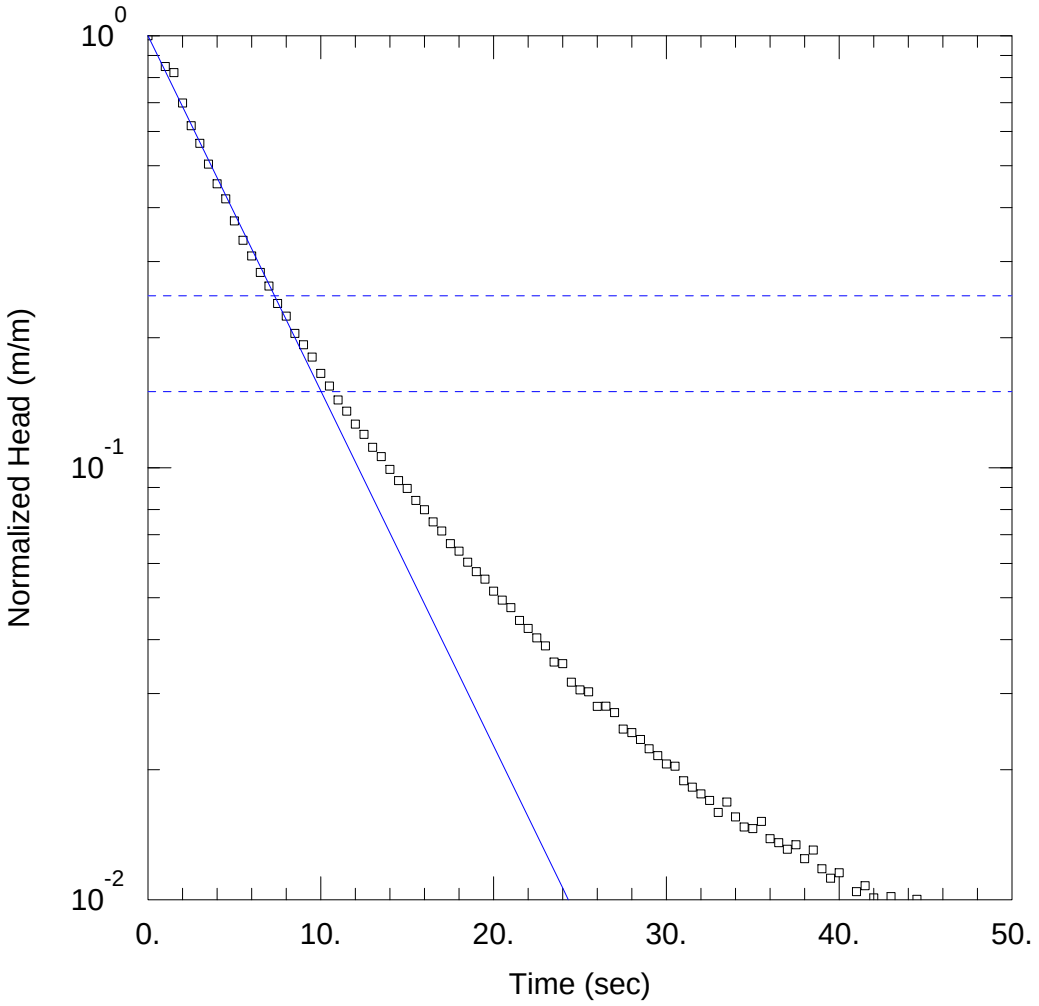
Saturated Thickness: 16.3 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-34)

Initial Displacement: 0.523 m
Static Water Column Height: 24.49 m
Total Well Penetration Depth: 15.75 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-39 Test 1

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-39 Test 1_twc_CaseA.aqt
Date: 10/18/11 Time: 14:17:36

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.0001074 m/sec y0 = 0.4792 m

AQUIFER DATA

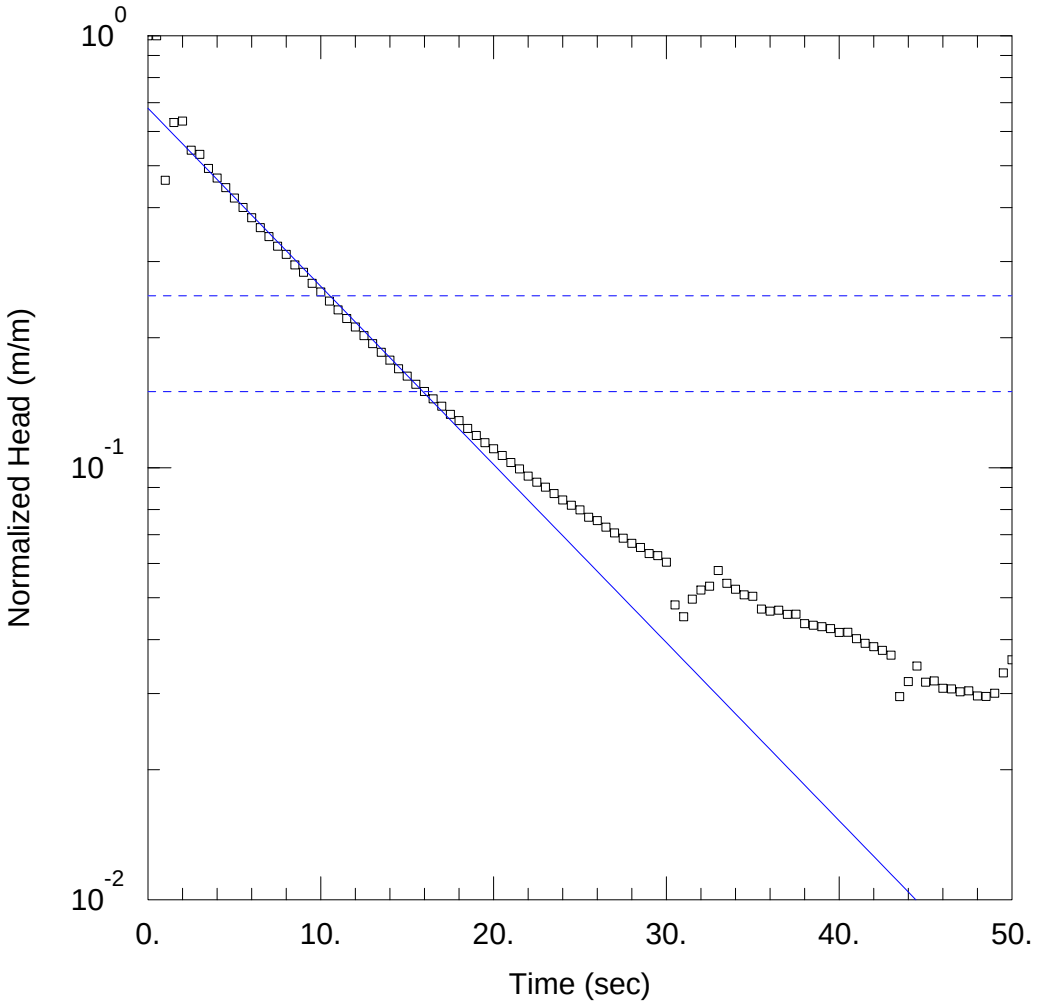
Saturated Thickness: 8.84 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-39)

Initial Displacement: 0.479 m
Static Water Column Height: 9.73 m
Total Well Penetration Depth: 6.74 m
Screen Length: 1.8 m
Casing Radius: 0.0254 m
Well Radius: 0.076 m

BH-BGC11-39 Test 2

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-39 Test 2twc_CaseA.aqt
Date: 10/18/11 Time: 13:38:47

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 5.387E-5 m/sec y0 = 0.4056 m

AQUIFER DATA

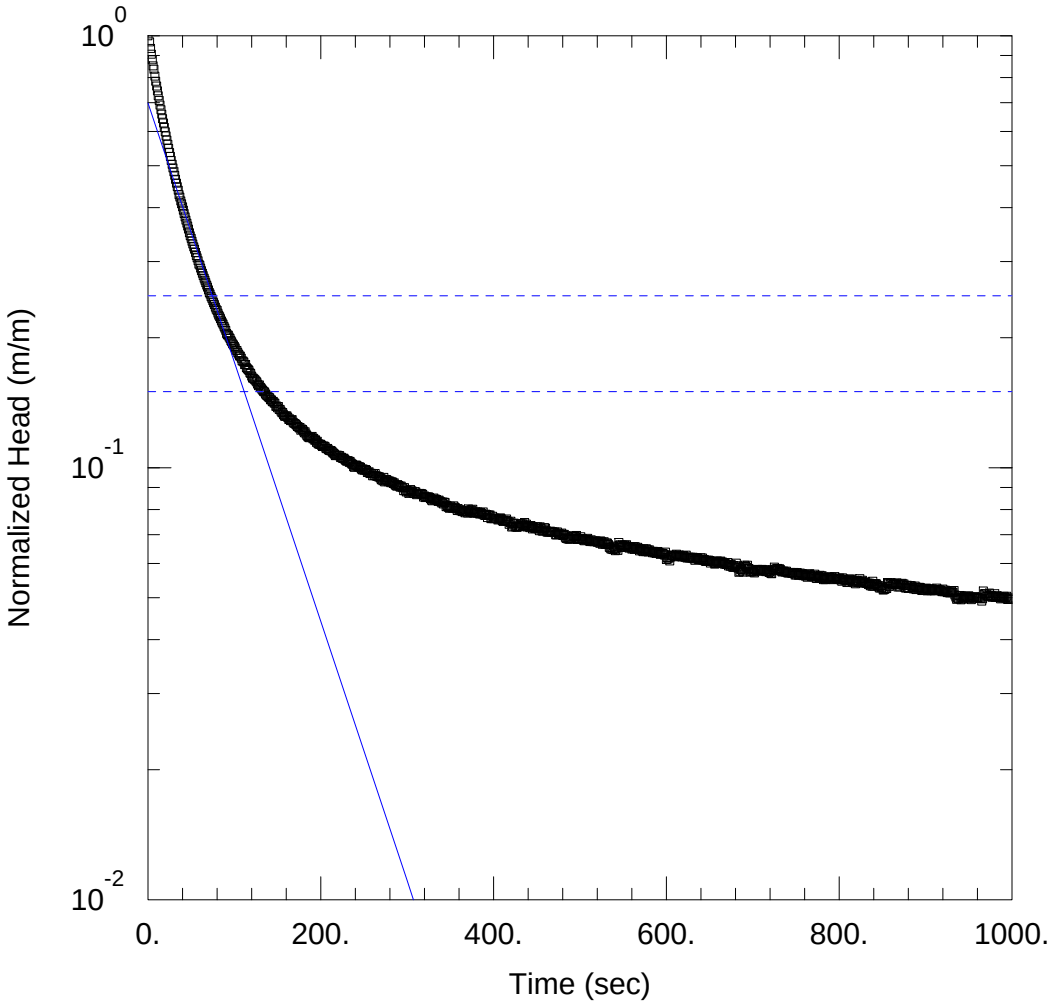
Saturated Thickness: 8.82 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-39)

Initial Displacement: 0.597 m
Static Water Column Height: 9.78 m
Total Well Penetration Depth: 6.72 m
Screen Length: 1.8 m
Casing Radius: 0.0254 m
Well Radius: 0.076 m

BH-BGC11-52 Test 1

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-52 Test 1.aqt
Date: 10/18/11 Time: 14:06:37

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 7.174E-6 m/sec y0 = 0.376 m

AQUIFER DATA

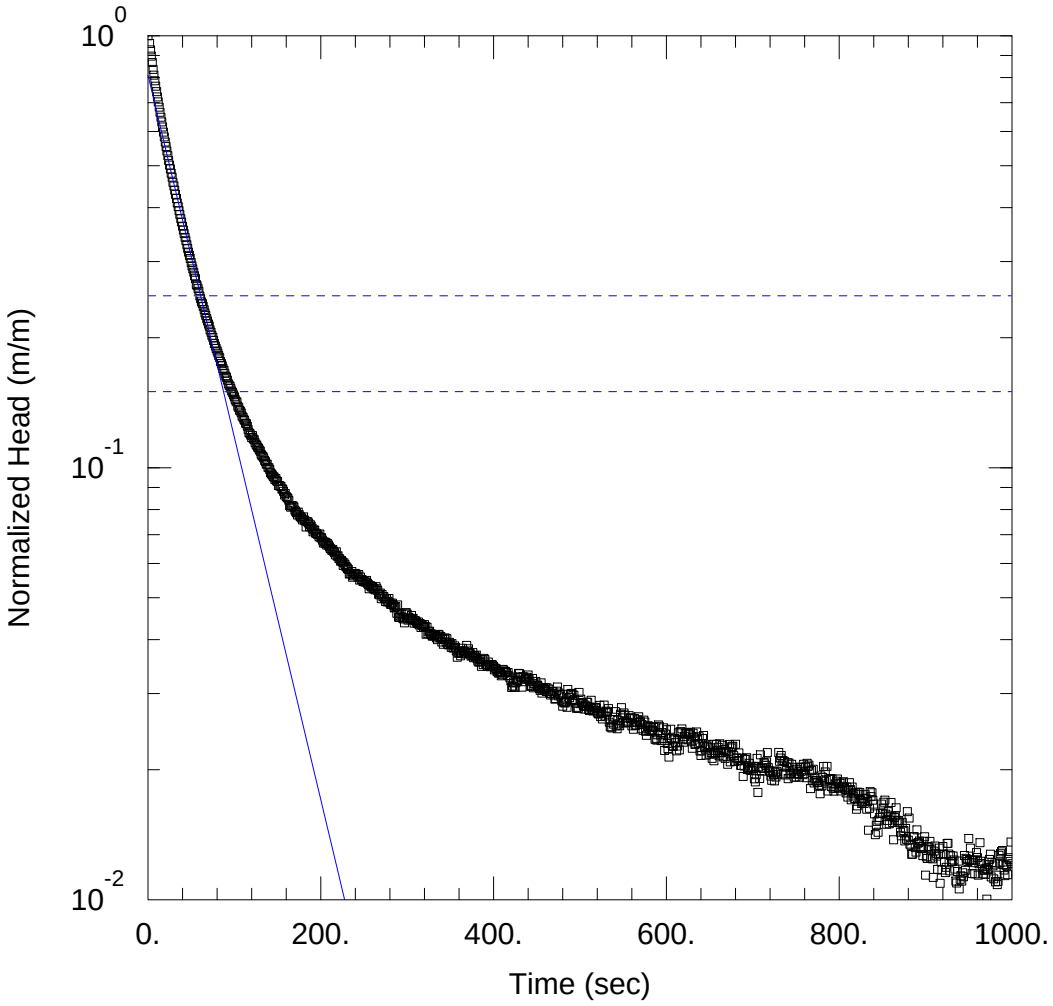
Saturated Thickness: 10.5 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-52)

Initial Displacement: 0.538 m
Static Water Column Height: 17.72 m
Total Well Penetration Depth: 10.5 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-52 Test 2

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-52 Test 2.aqt
Date: 10/18/11 Time: 14:09:38

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.003E-5 m/sec y0 = 0.4369 m

AQUIFER DATA

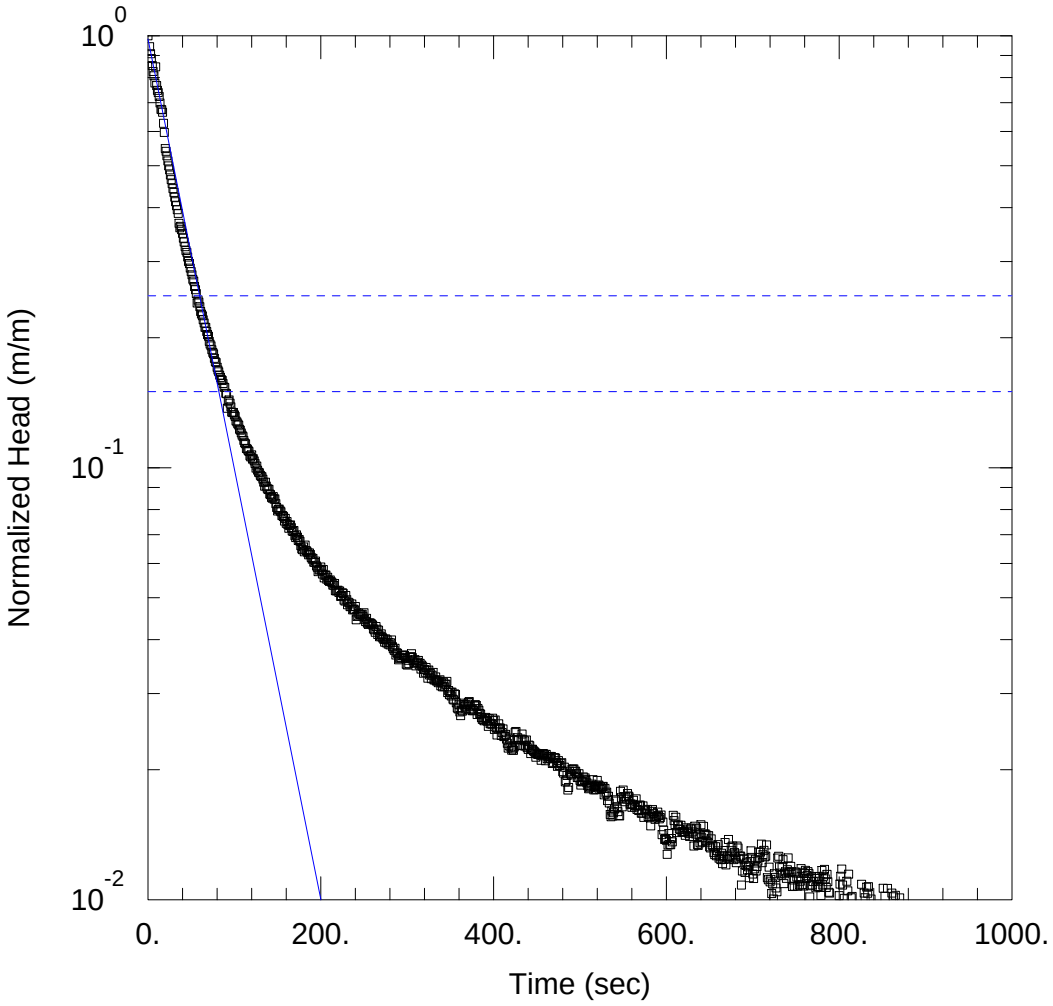
Saturated Thickness: 10.5 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-52)

Initial Displacement: 0.539 m
Static Water Column Height: 17.67 m
Total Well Penetration Depth: 10.5 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

BH-BGC11-52 Test 3

Prepared By:	Prepared For:
BGC Engineering	Victoria Gold Corp.
Project:	**Location:**
0792006	Dublin Gulch, YT



Data Set: N:\...\BH-BGC11-52 Test 3.aqt
Date: 10/18/11 Time: 14:12:10

SOLUTION

Aquifer Model: Confined
Solution Method: Hvorslev

K = 1.19E-5 m/sec y0 = 0.5338 m

AQUIFER DATA

Saturated Thickness: 10.5 Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BH-BGC11-52)

Initial Displacement: 0.543 m
Static Water Column Height: 17.66 m
Total Well Penetration Depth: 10.5 m
Screen Length: 3. m
Casing Radius: 0.0254 m
Well Radius: 0.048 m

APPENDIX L
LABORATORY REPORTS

PARTICLE SIZE ANALYSIS OF SOILS

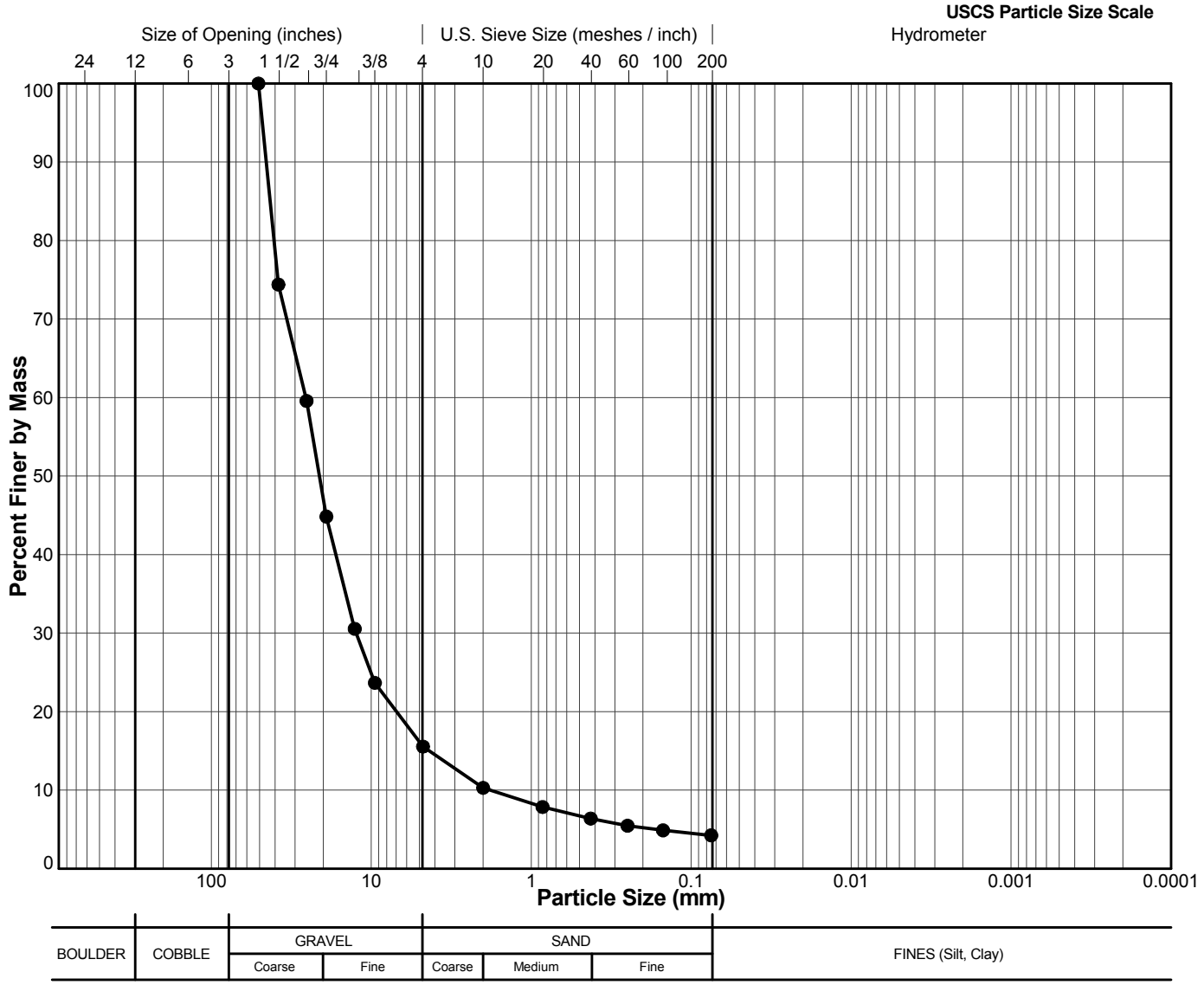
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-50**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.80 to 3.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	14/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

Golder Associates Ltd.
500 - 4260 Still Creek Drive Burnaby, British Columbia Canada V5C 6C6
Tel: (604) 296 4200 Fax: (604) 298 5253 www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

PARTICLE SIZE ANALYSIS OF SOILS

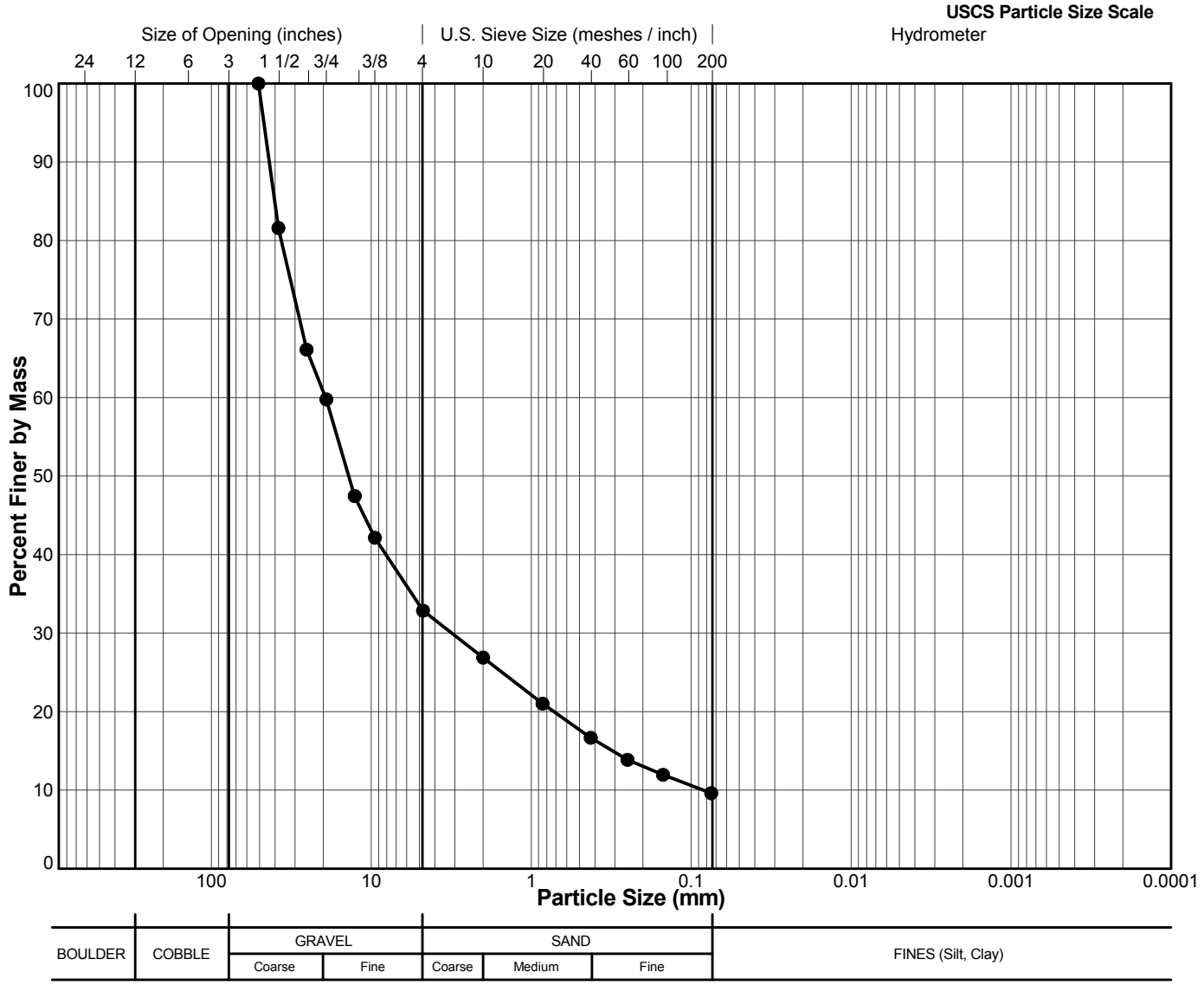
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-50**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.30 to 3.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	04/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

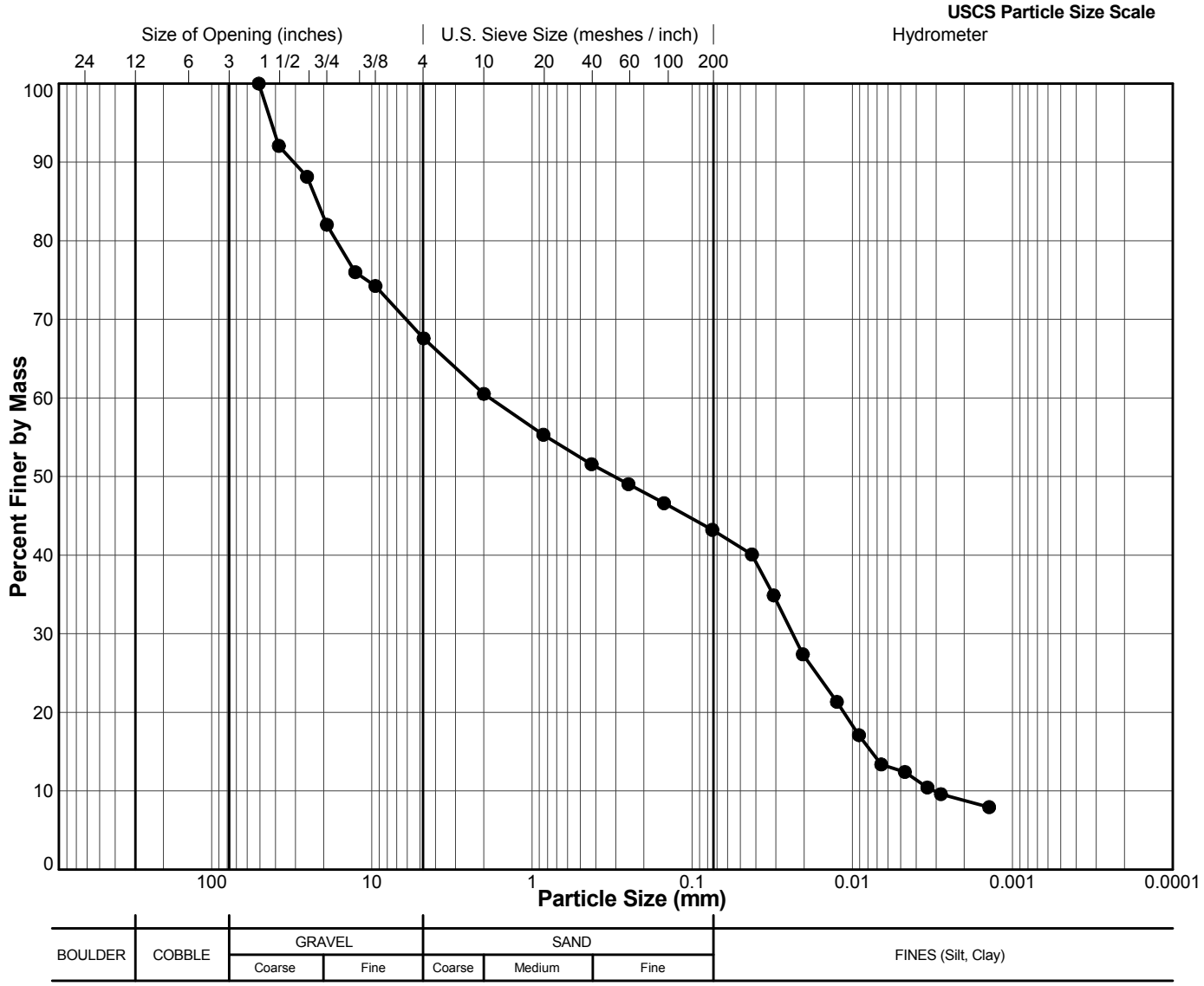
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-51**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.20 to 1.44
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

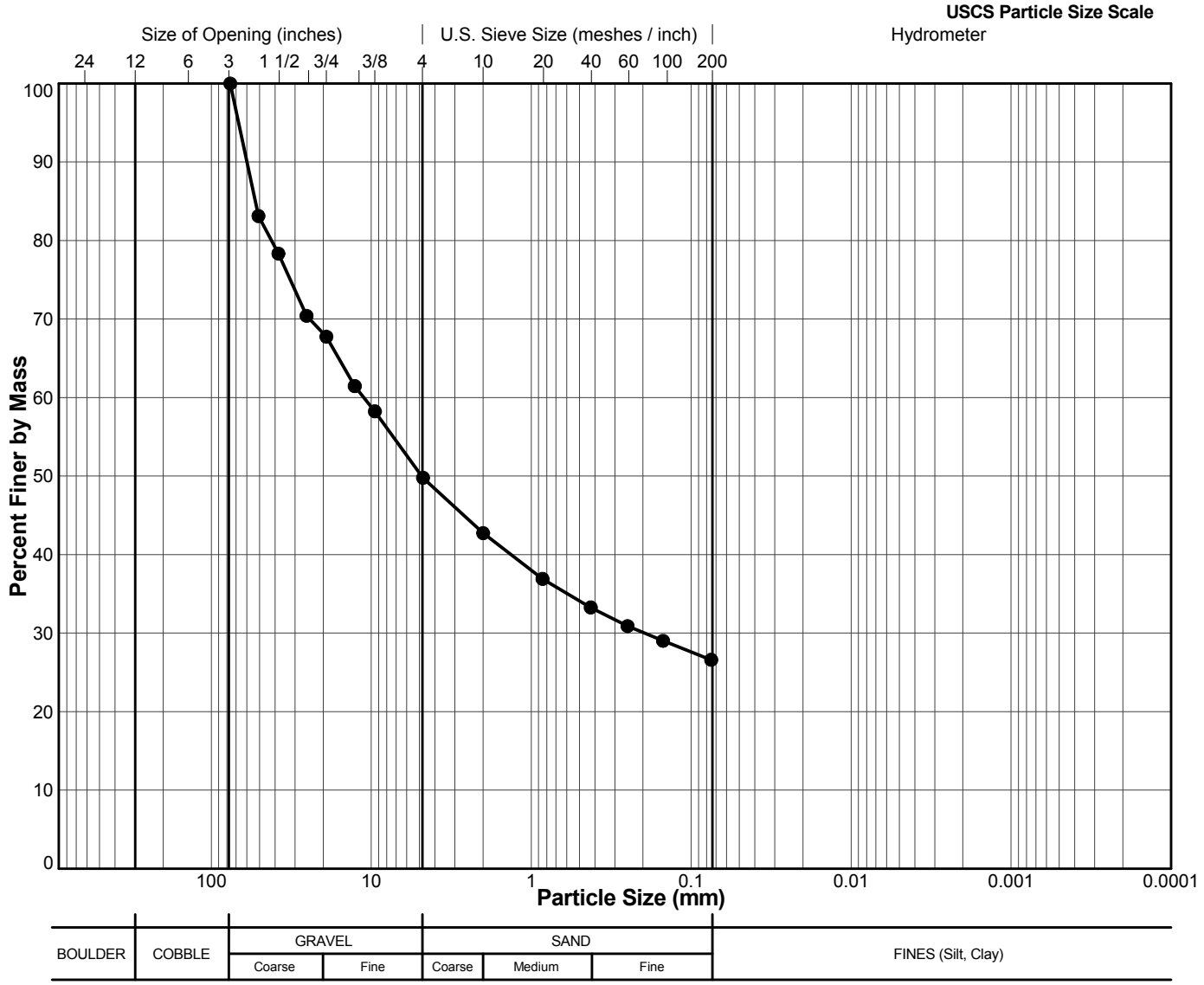
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-51**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.40 to 2.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



RS	27/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

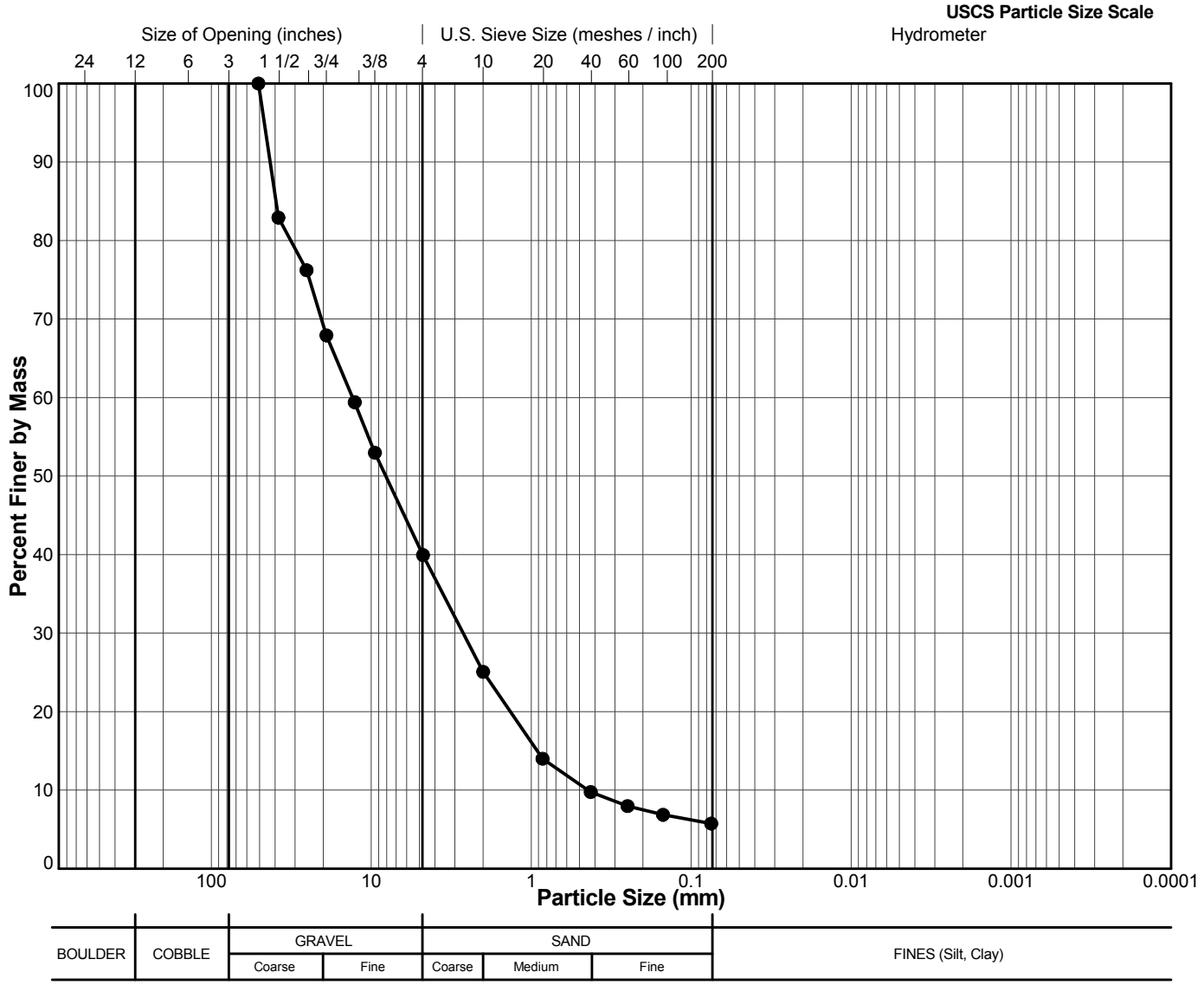
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-51**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 4.20 to 4.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

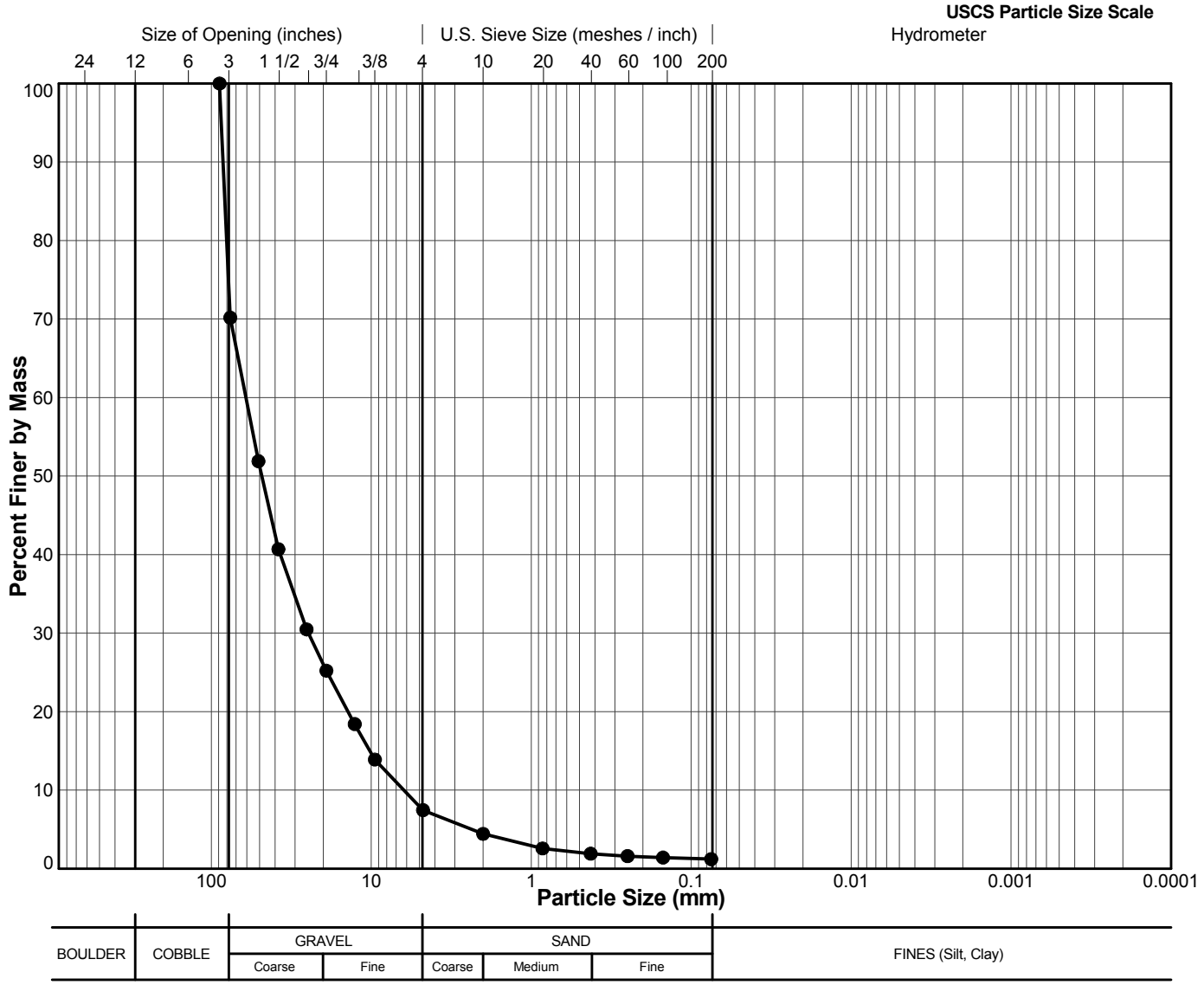
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-52**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.30 to 3.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 88.9	

Method: Split, Washed



SK	**06/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

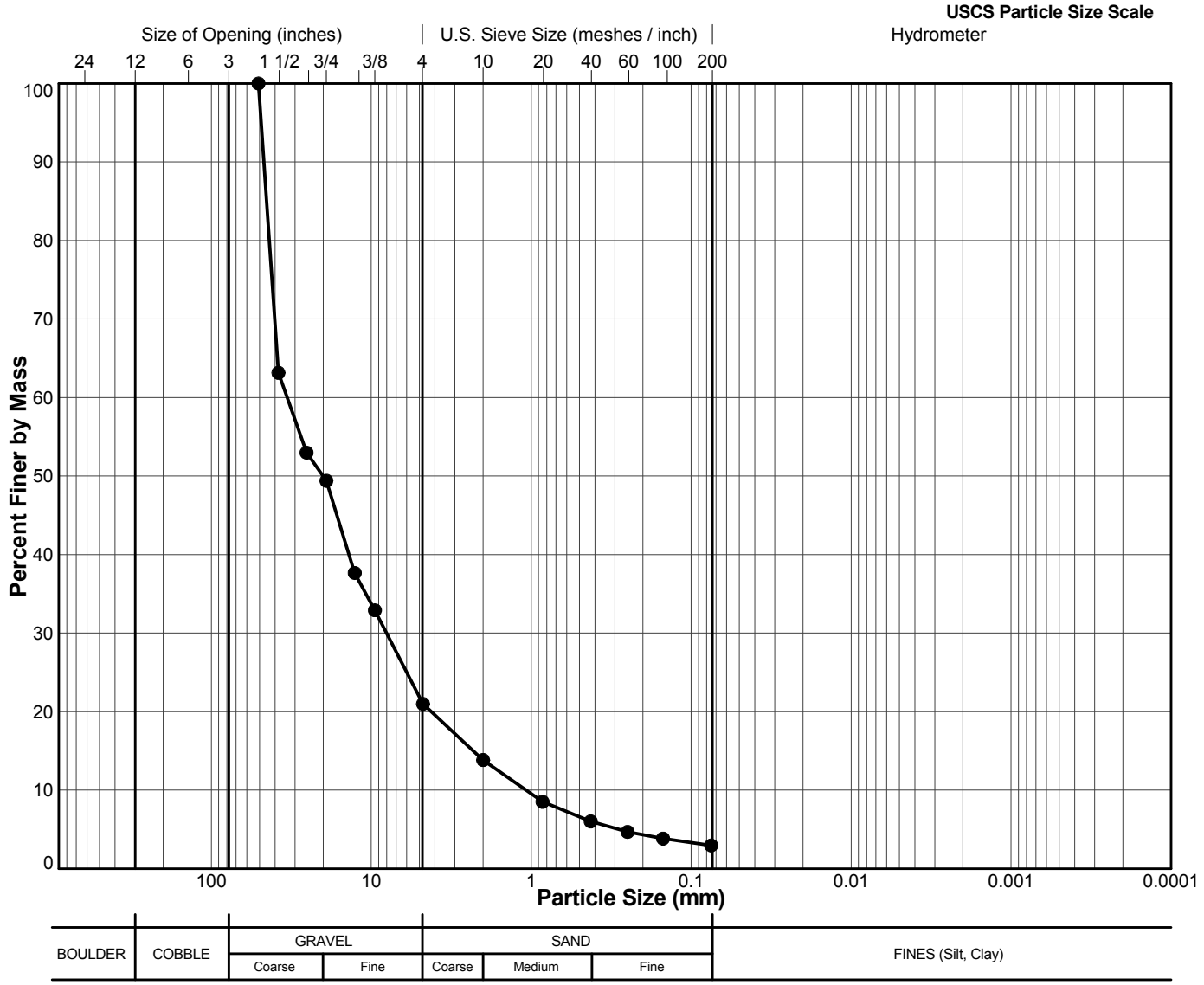
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-53**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.00 to 2.20
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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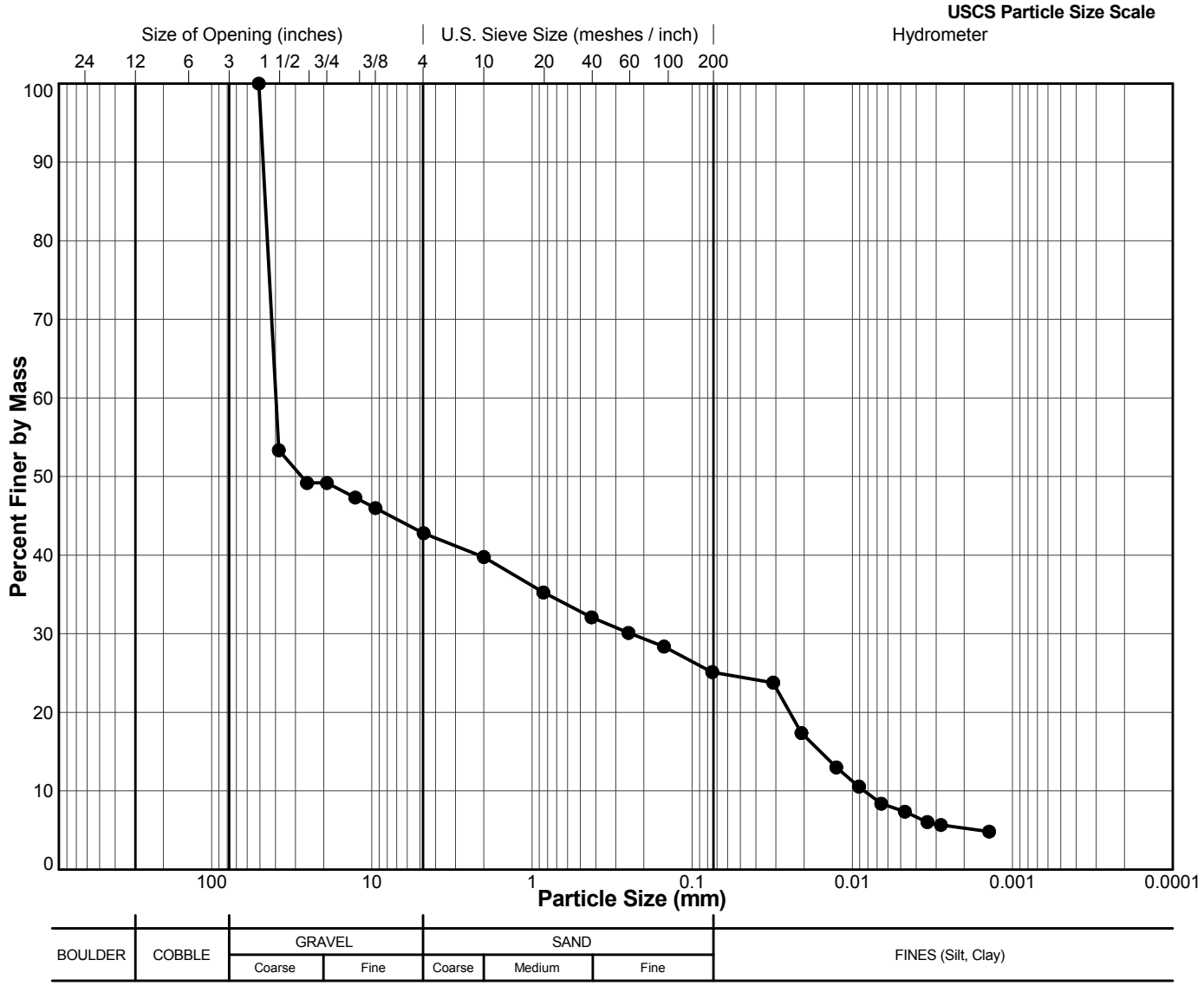
PARTICLE SIZE ANALYSIS OF SOILS

Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-54**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**
Hydrometer ID: BURNABY - 87024	



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

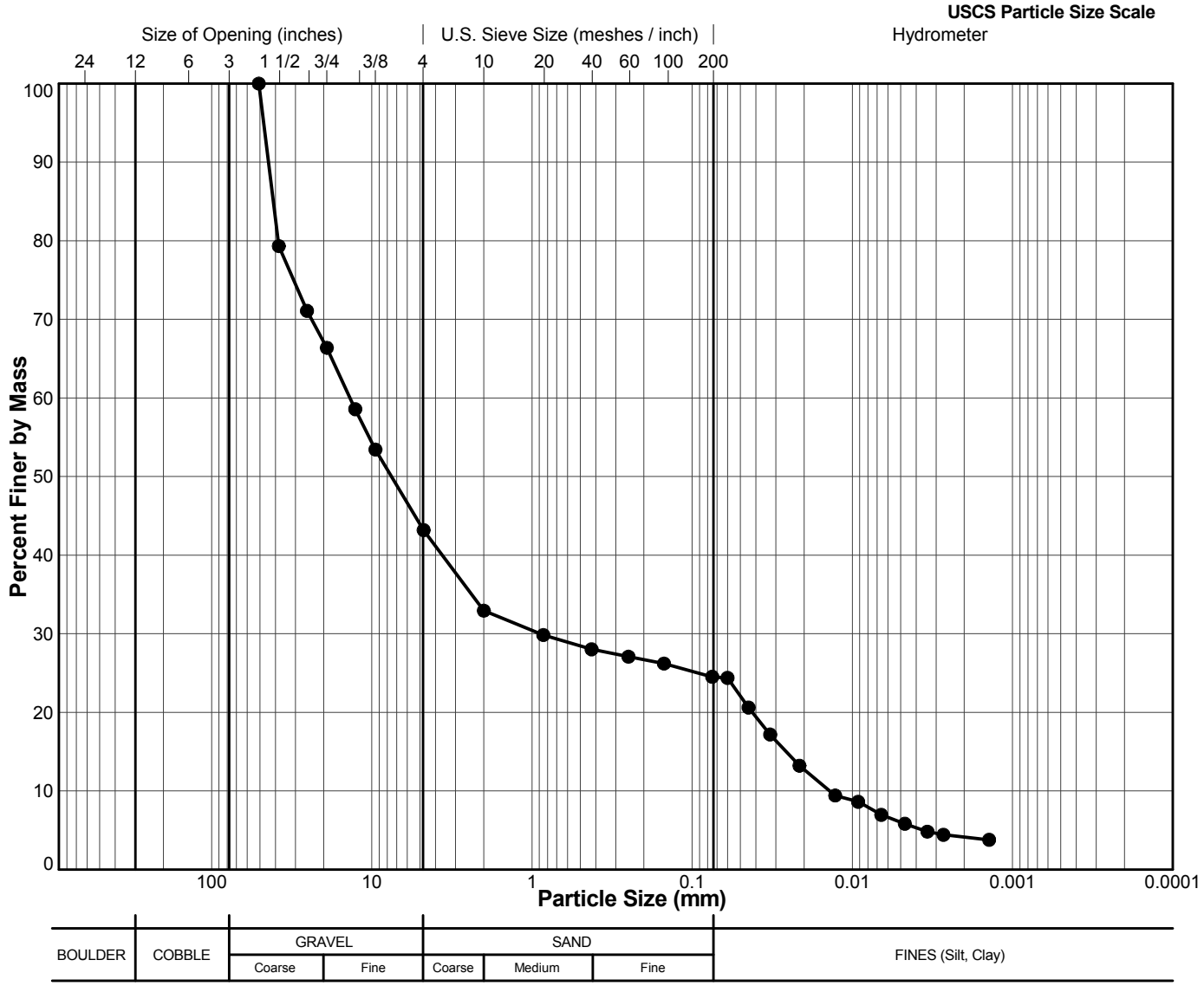
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-55**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

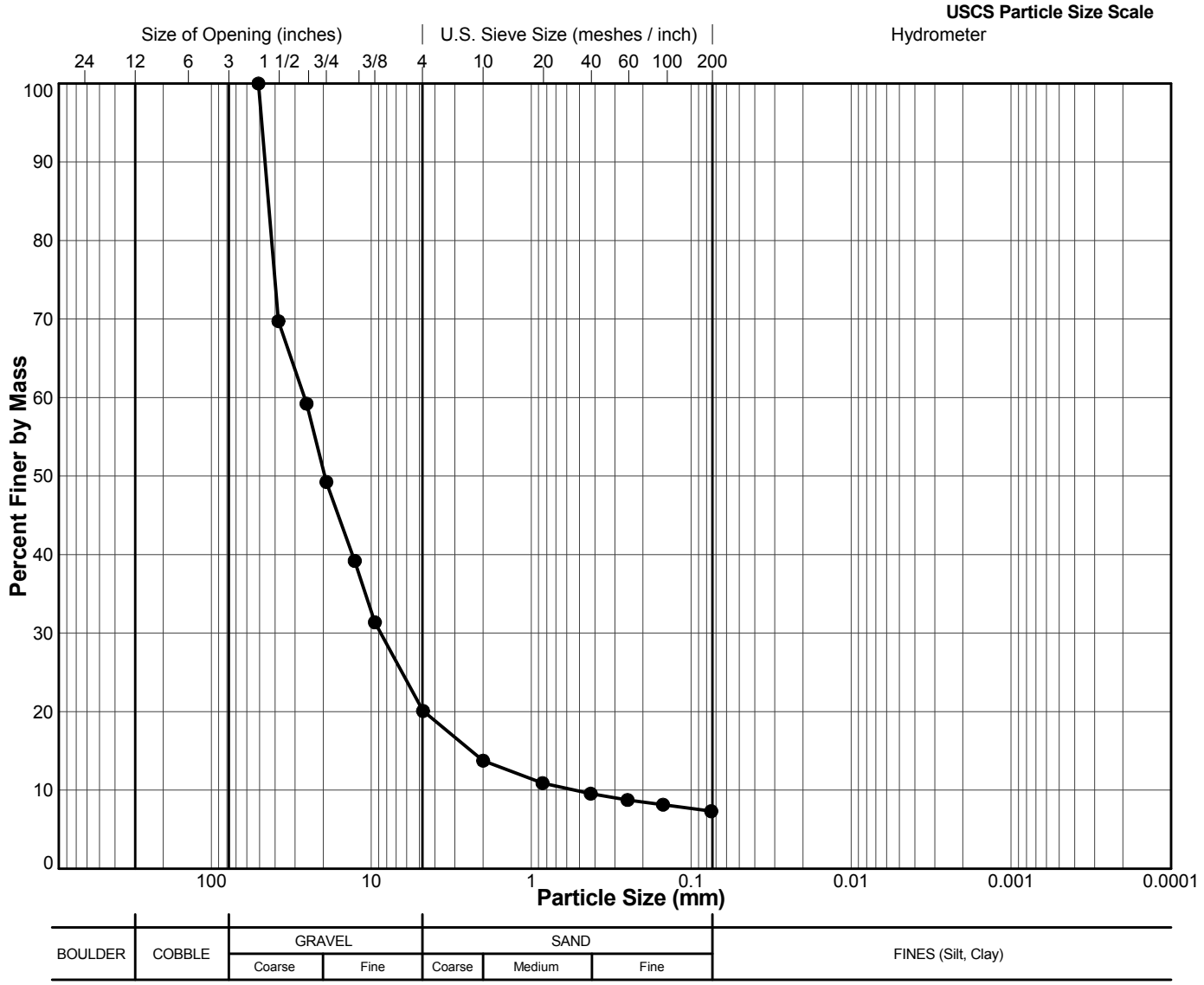
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-55**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.90 to 2.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



SK	**26/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

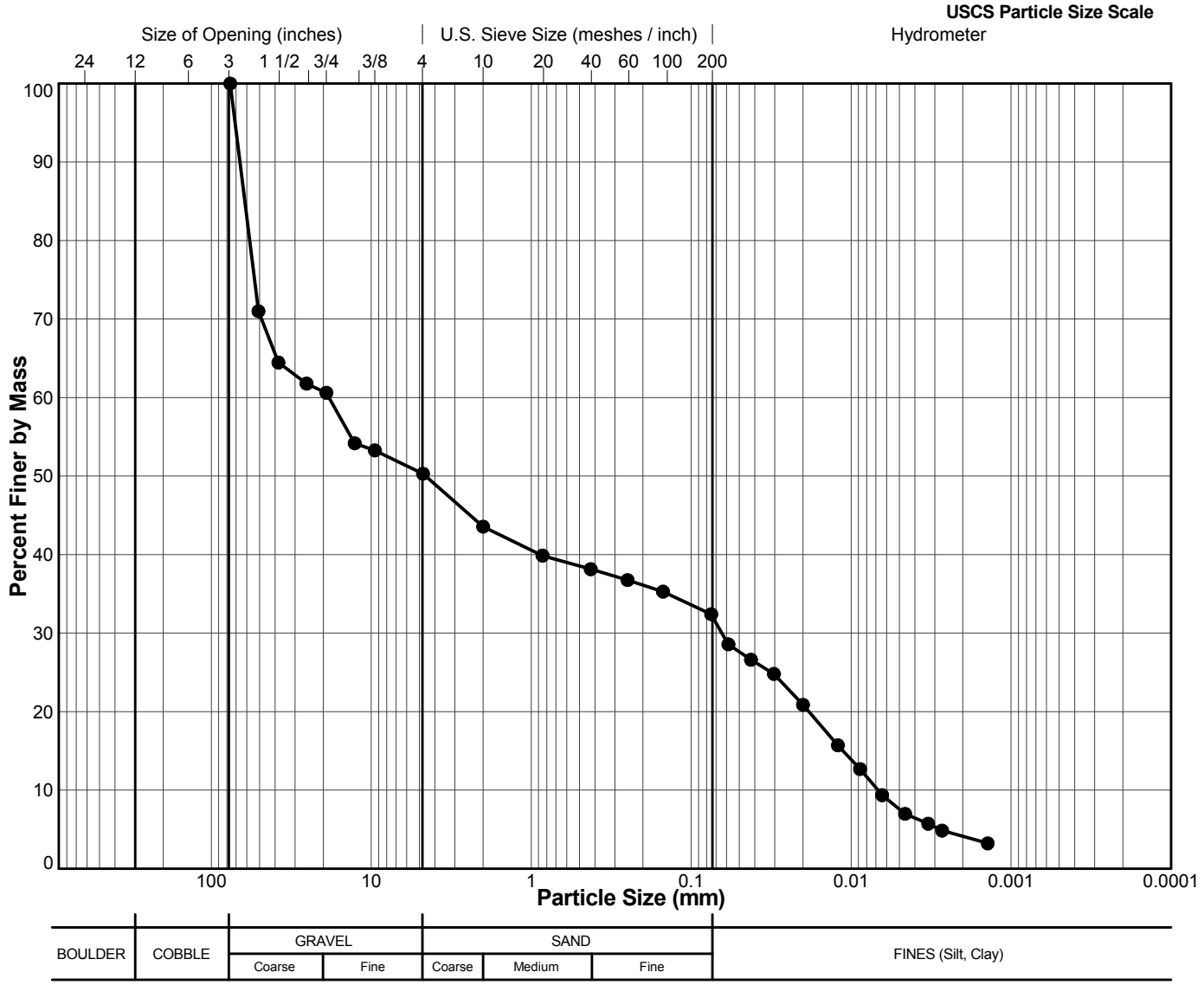
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-57**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**04/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

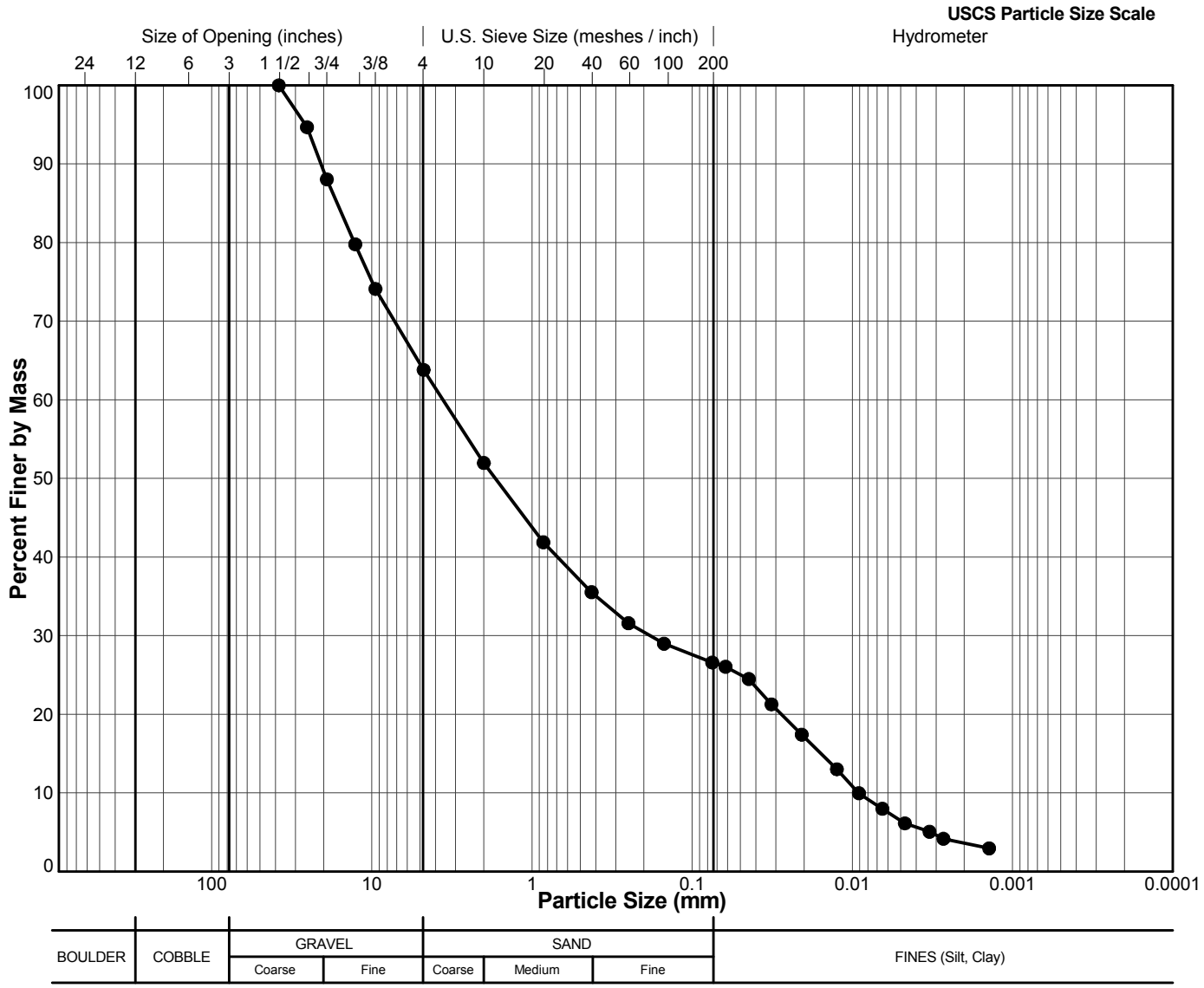
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-58**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

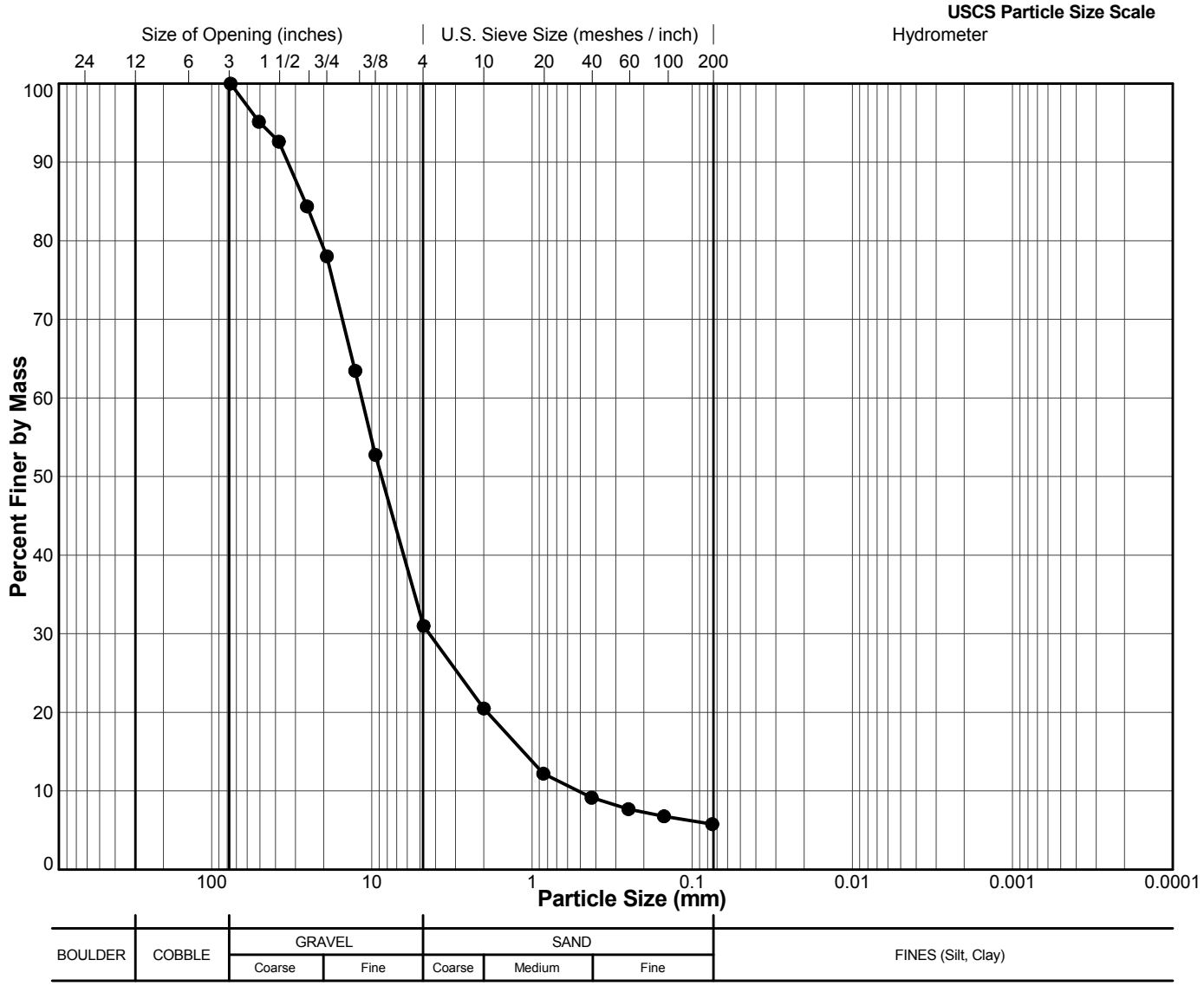
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-58**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.90 to 1.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



SK	**06/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

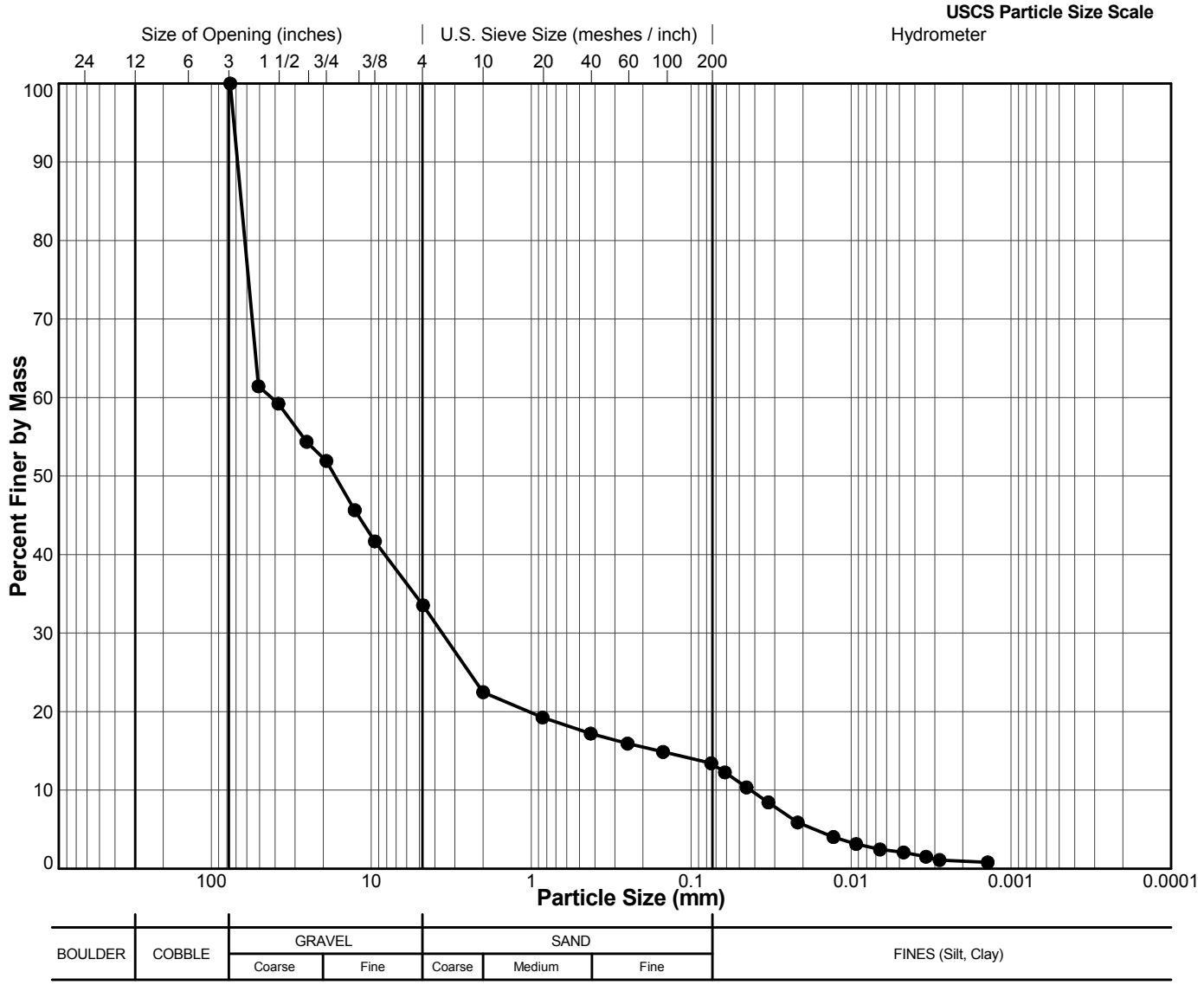
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-59**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**07/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

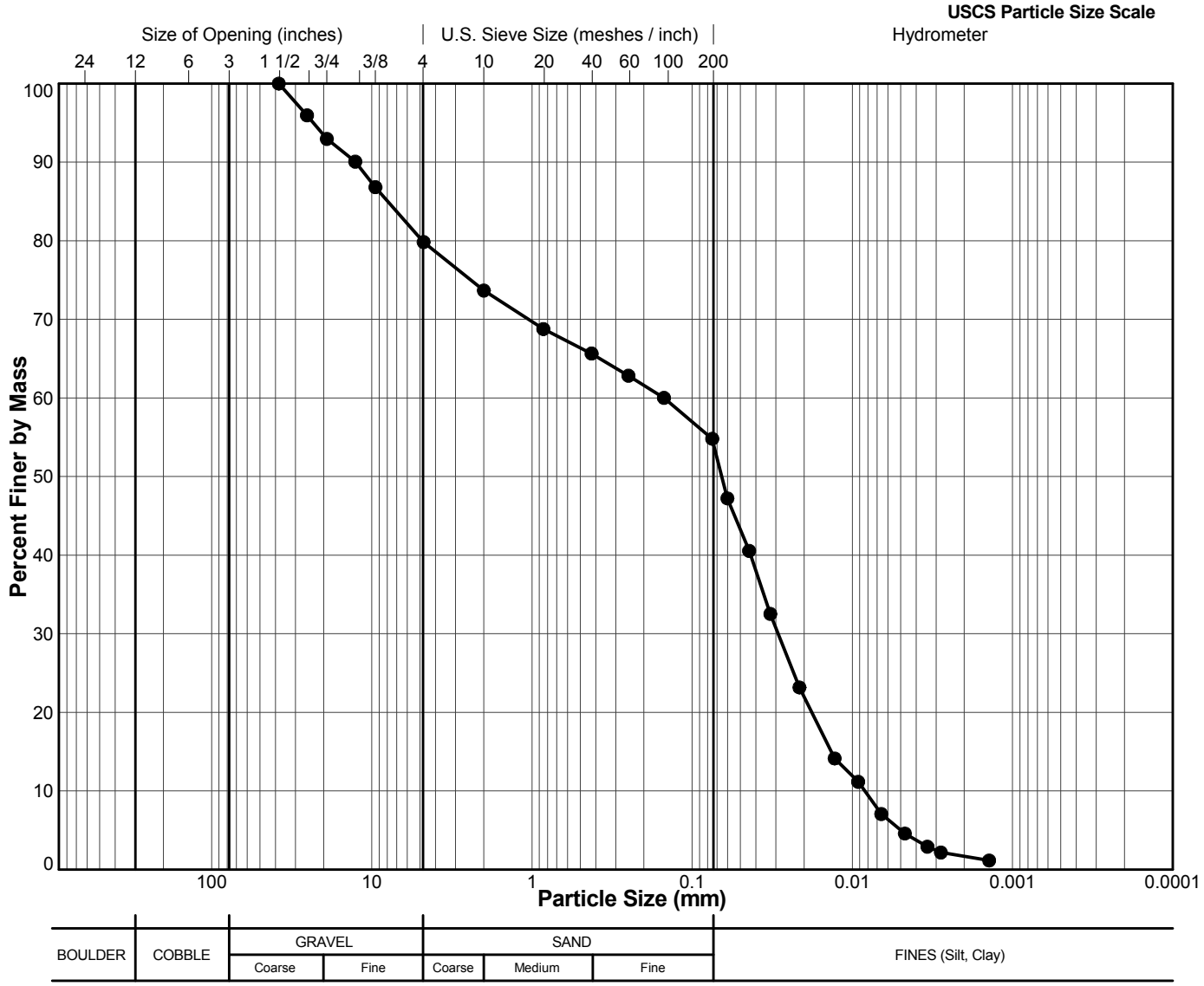
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-60**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**03/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

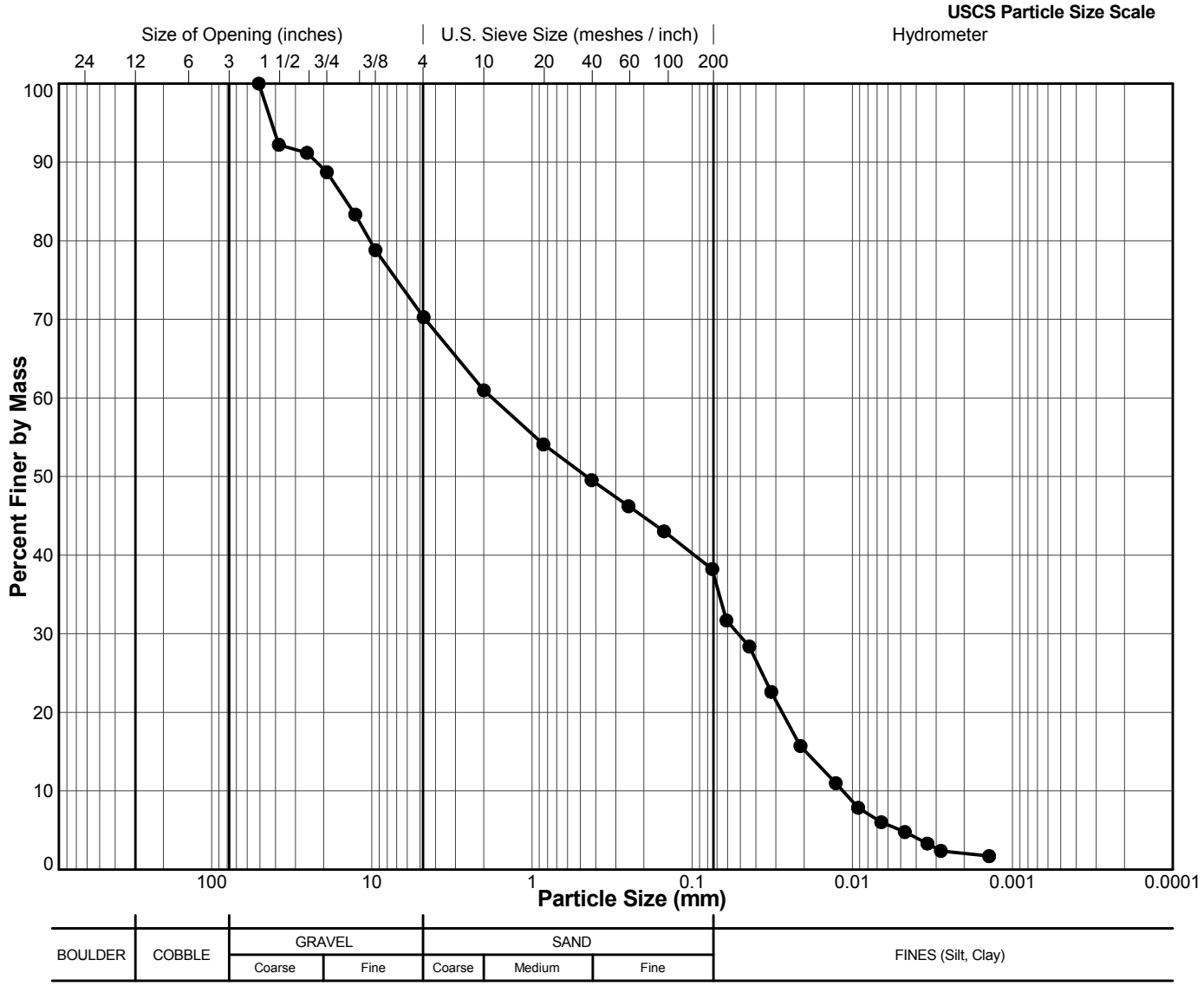
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-61**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

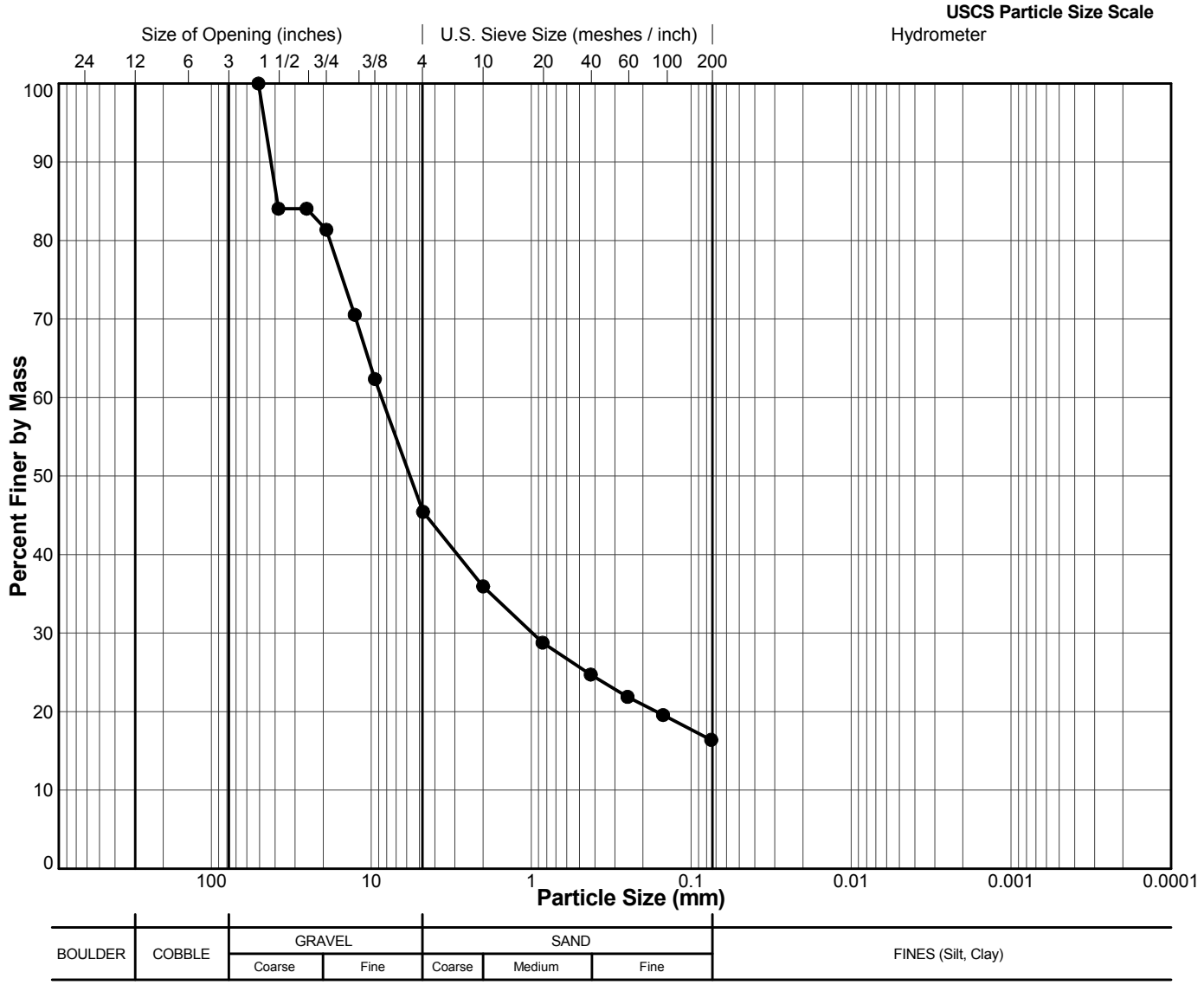
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-60**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.70 to 1.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



SK	**26/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

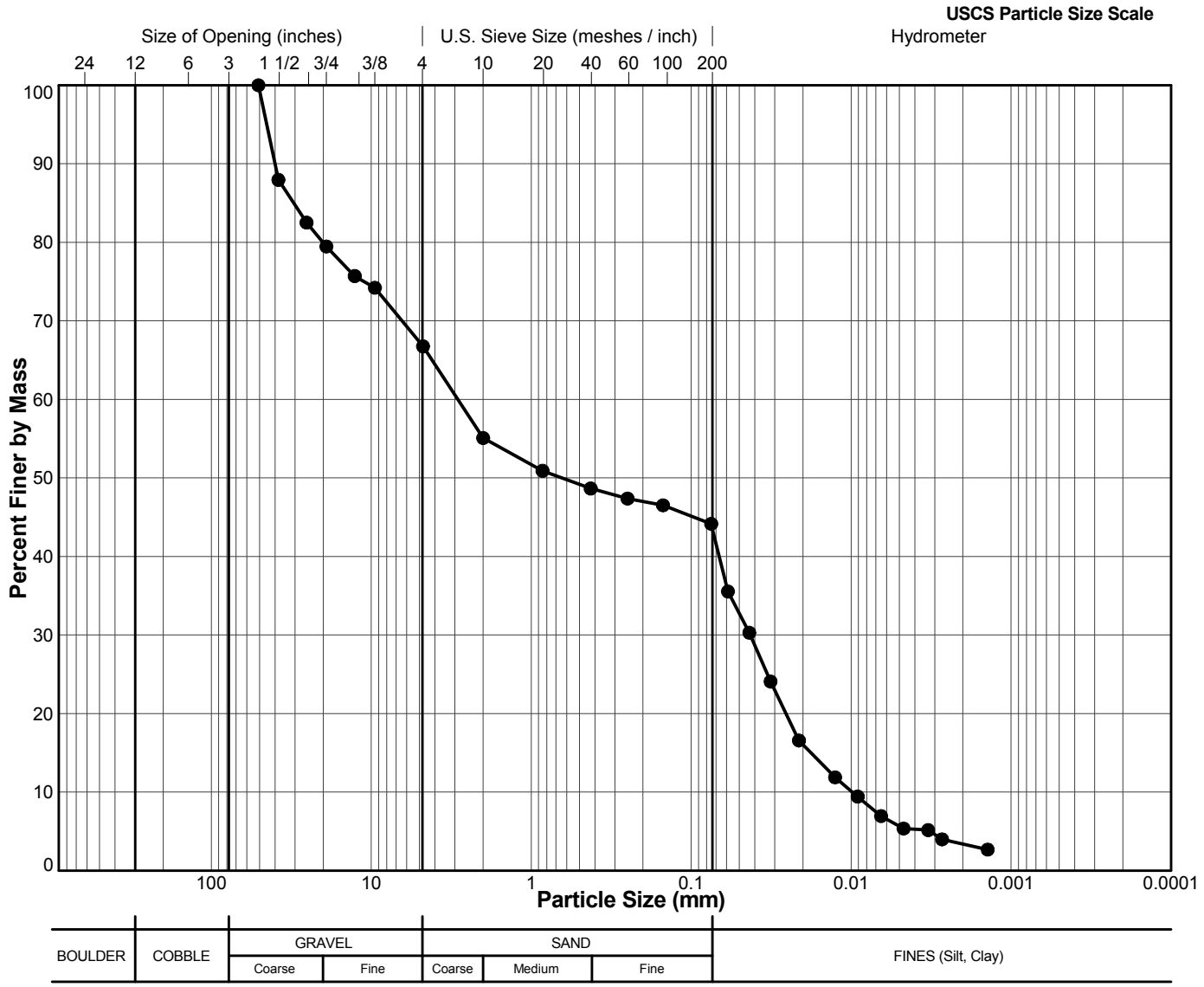
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-62**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

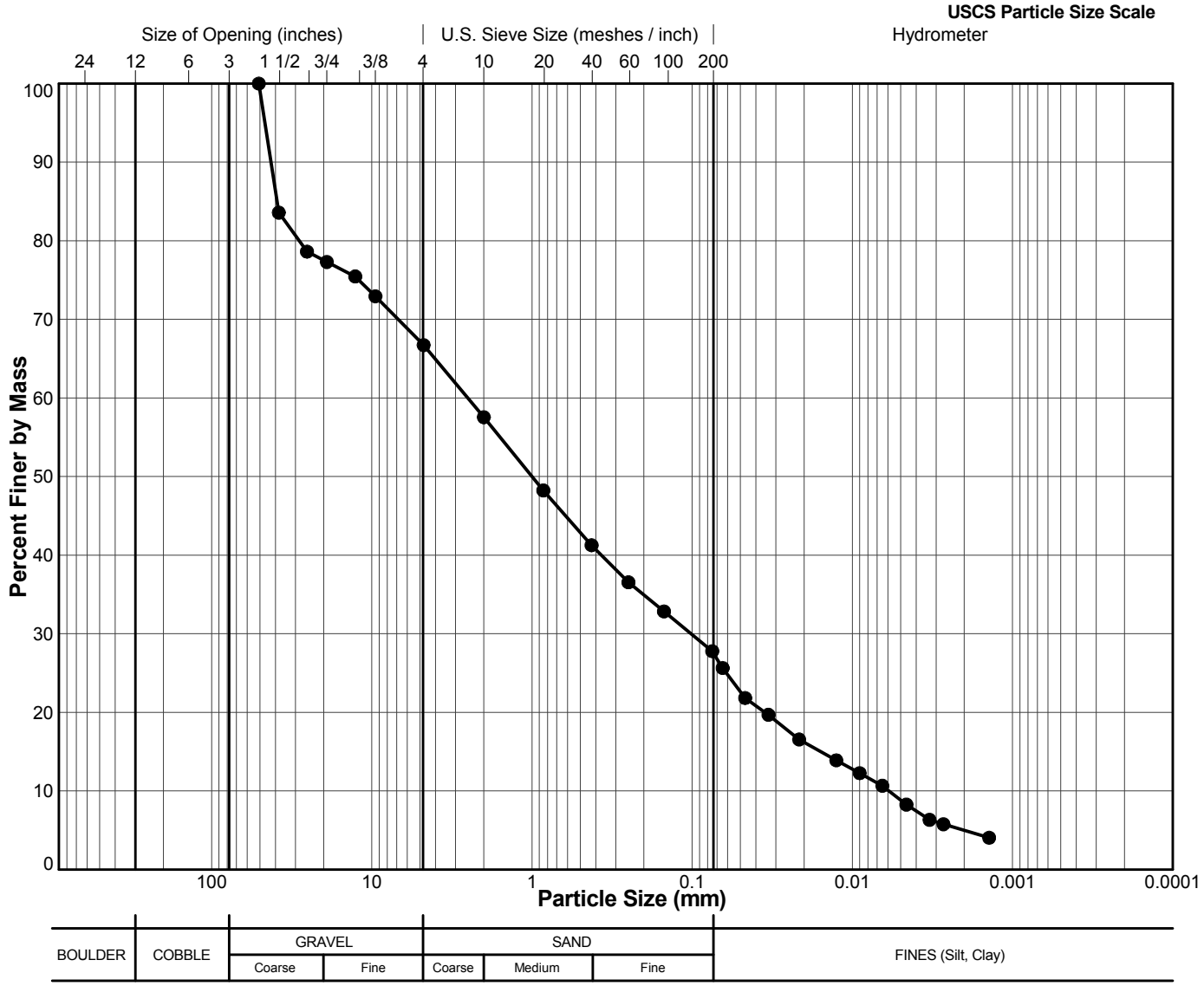
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-62**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**03/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

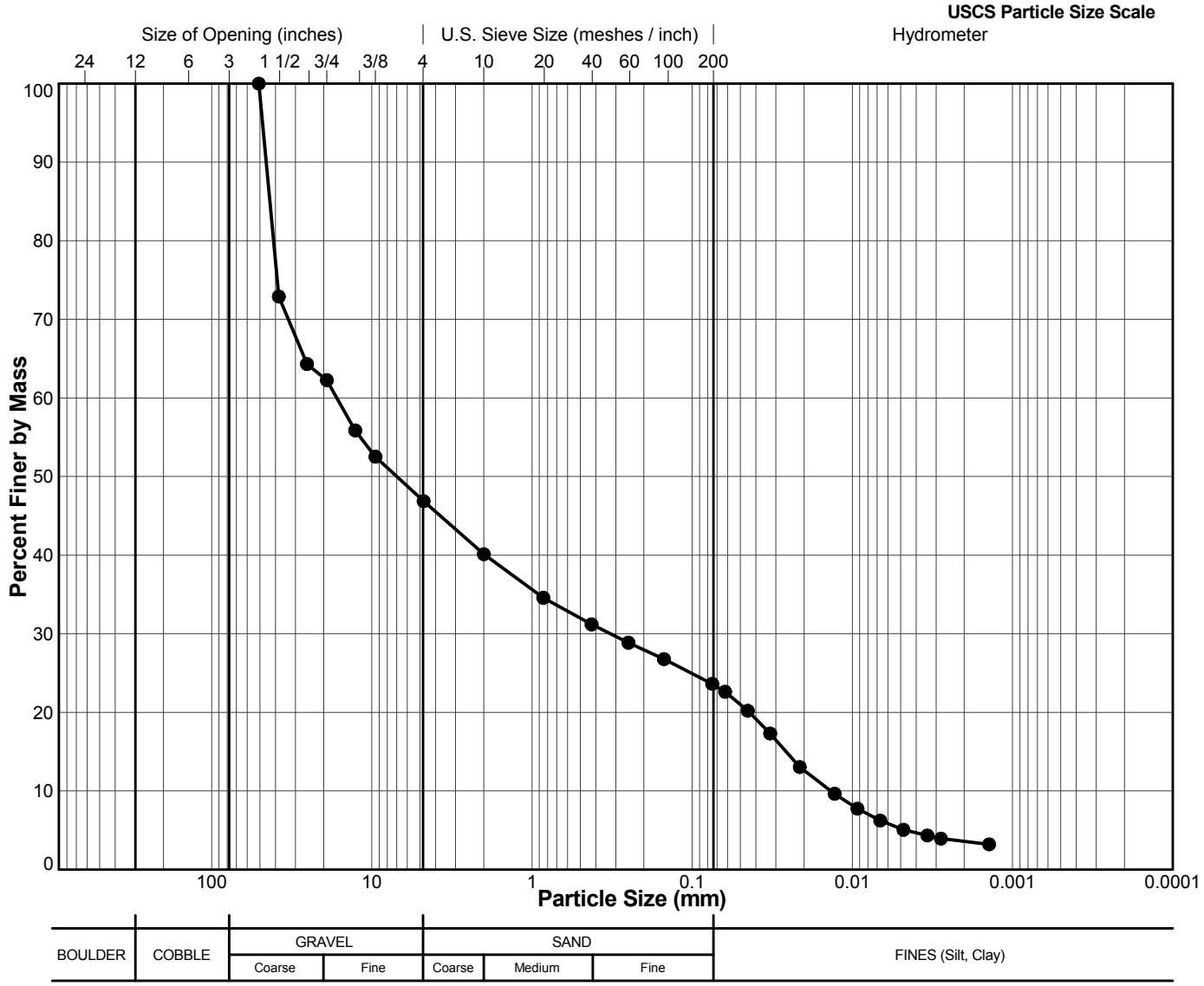
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-63**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

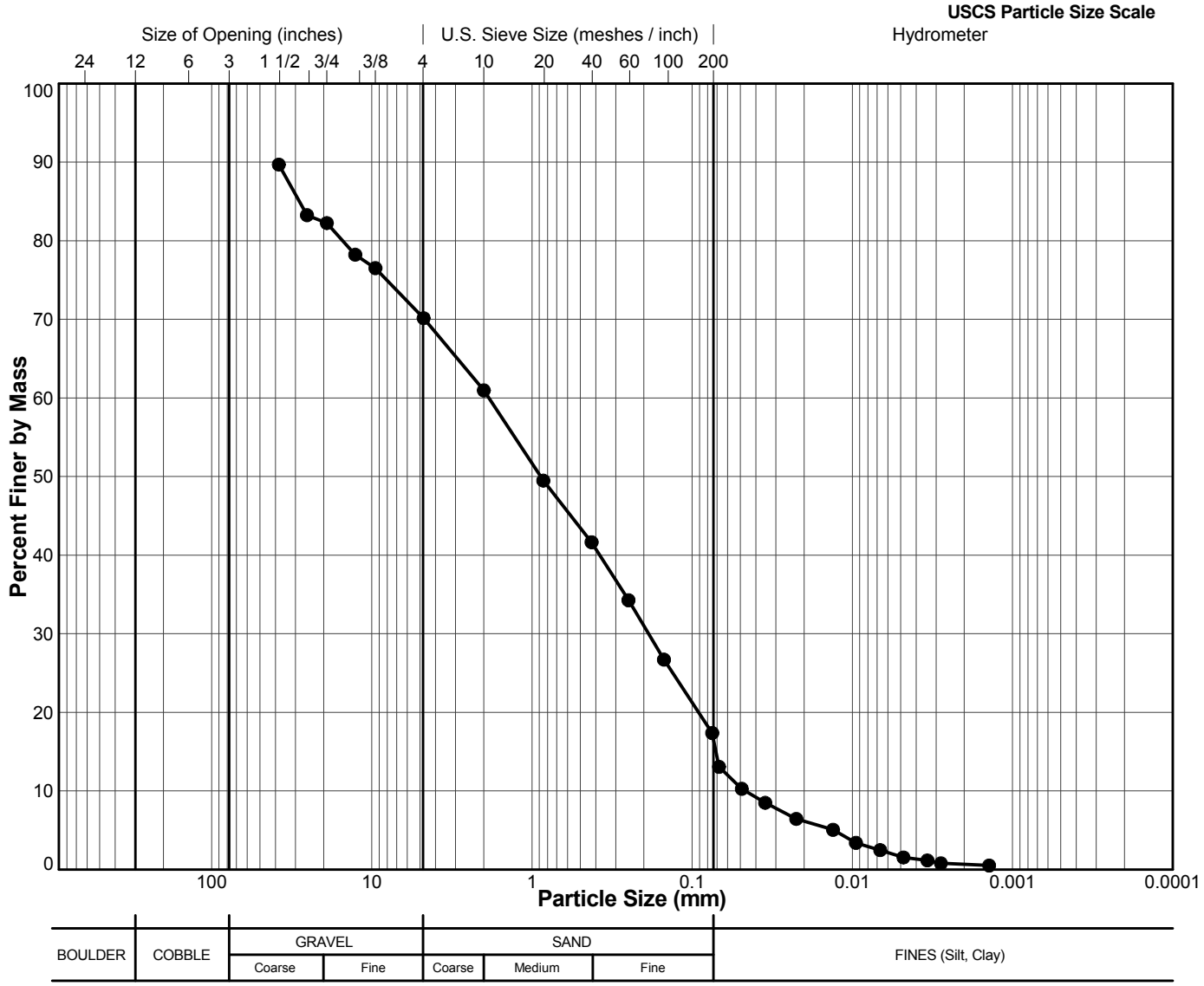
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-64**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm):	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

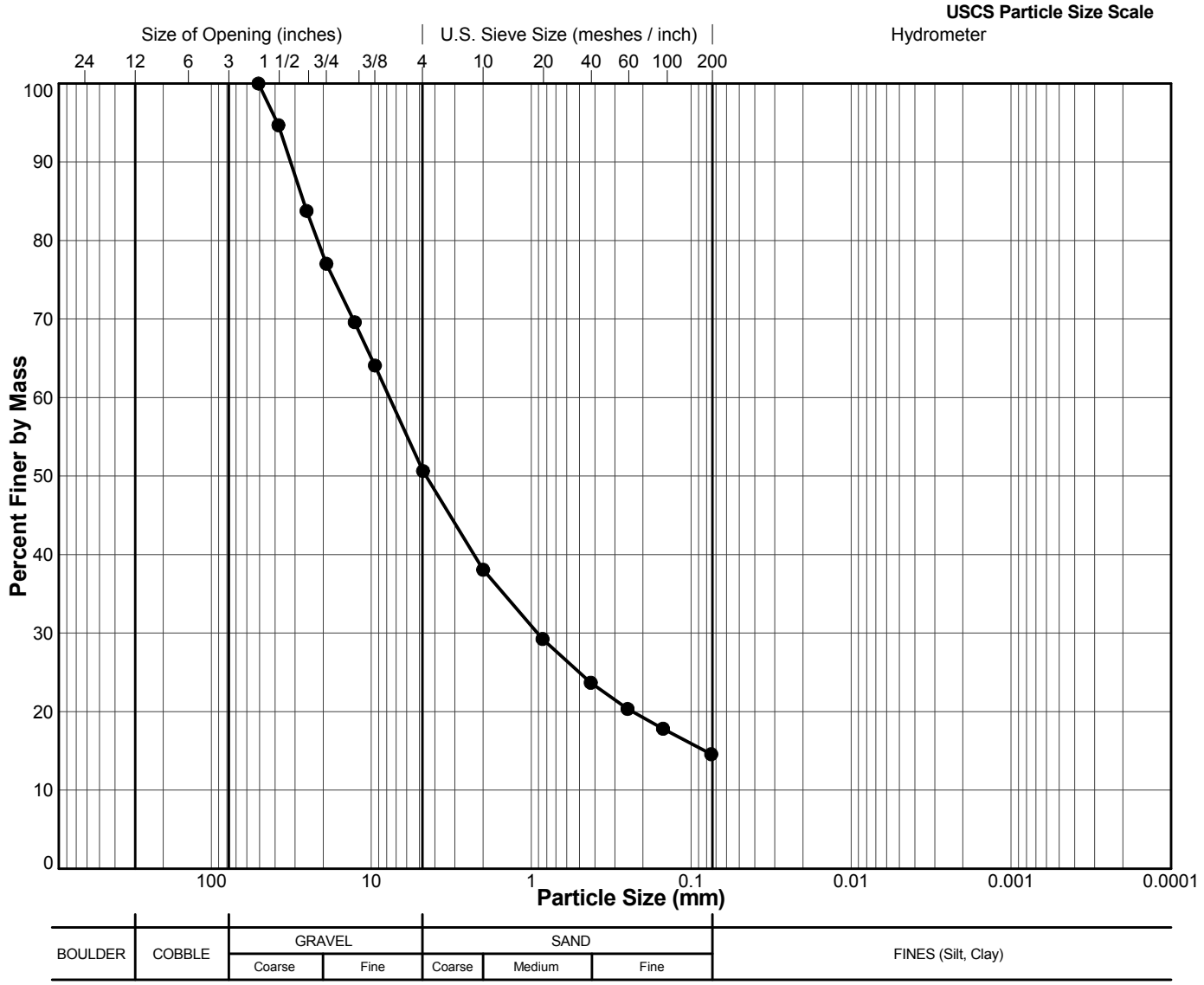
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-65**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	07/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

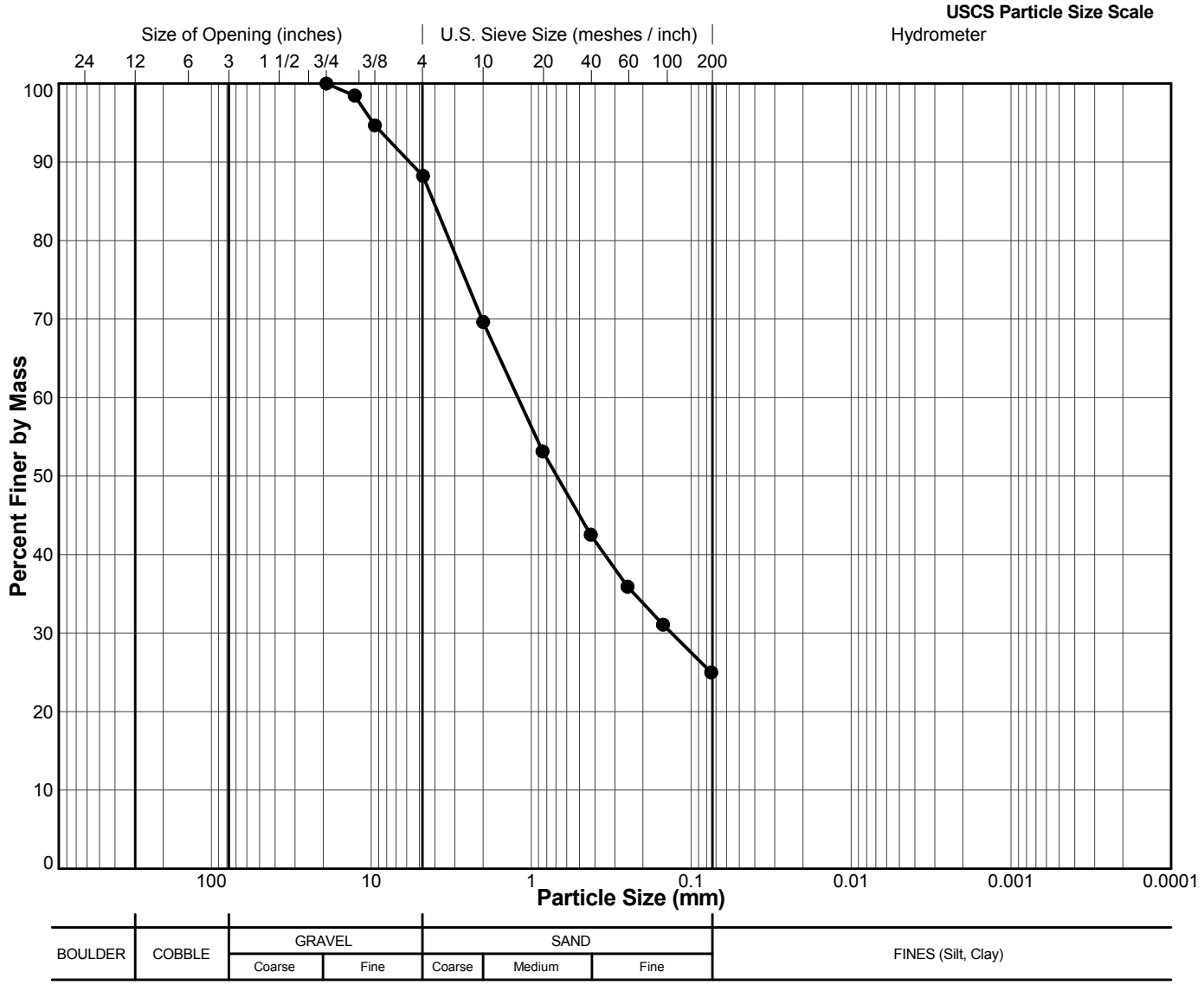
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-66**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	

Method: Split, Washed



RS	14/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

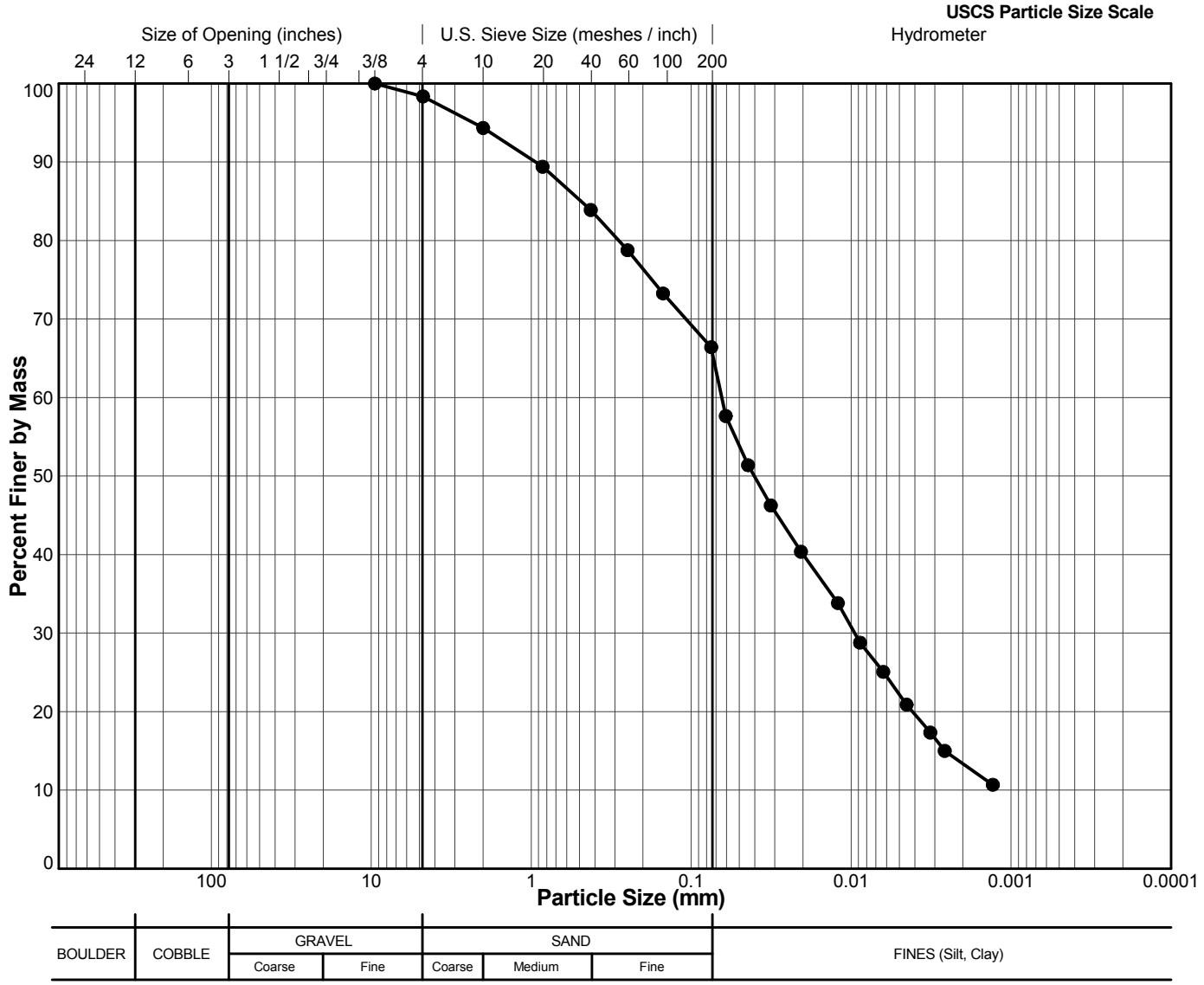
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-66**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.80 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 9.5	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	26/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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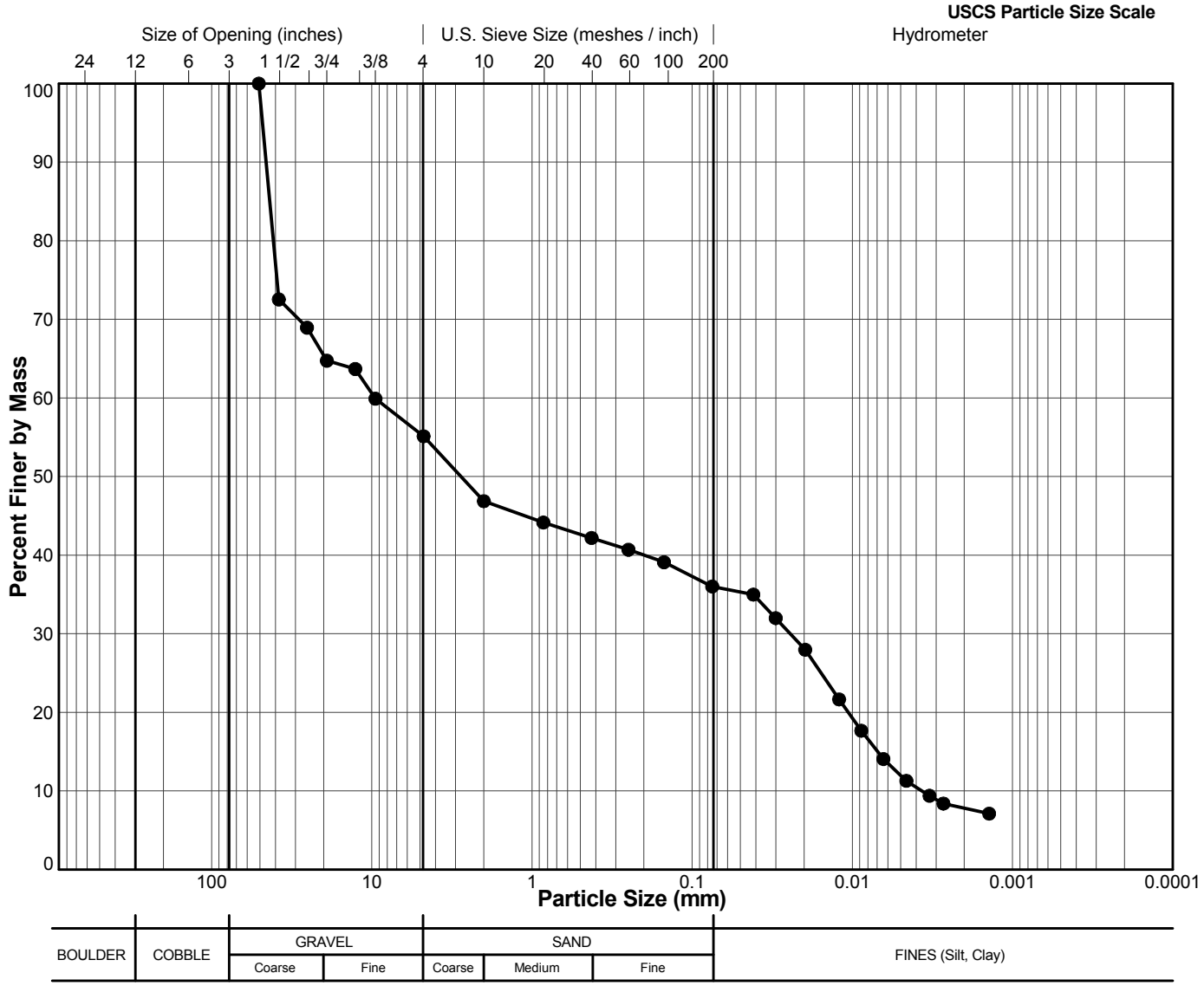
PARTICLE SIZE ANALYSIS OF SOILS

Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-67**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**
Hydrometer ID: BURNABY - 87024	



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

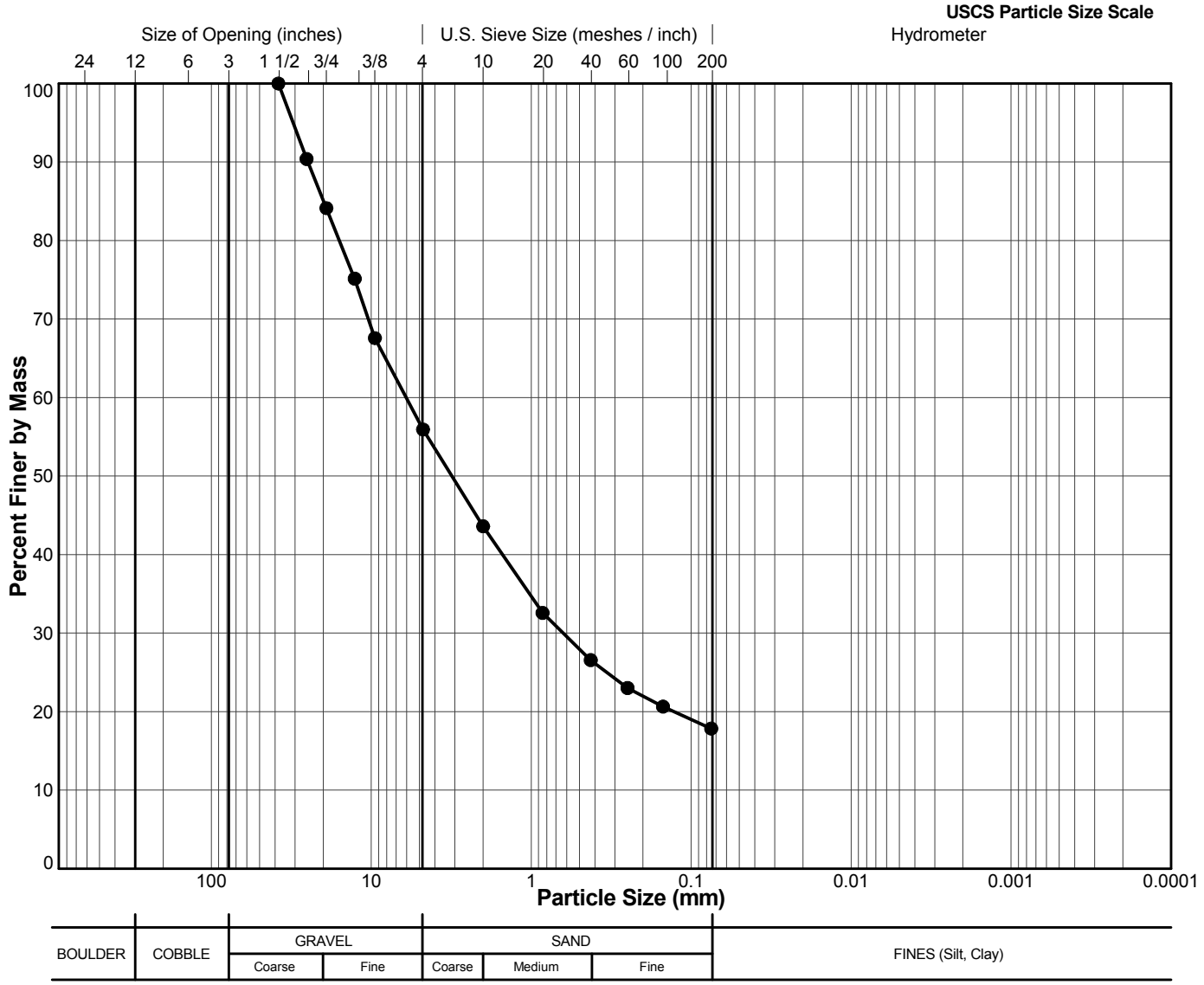
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-68**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.60 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	

Method: Split, Washed



SK	**26/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

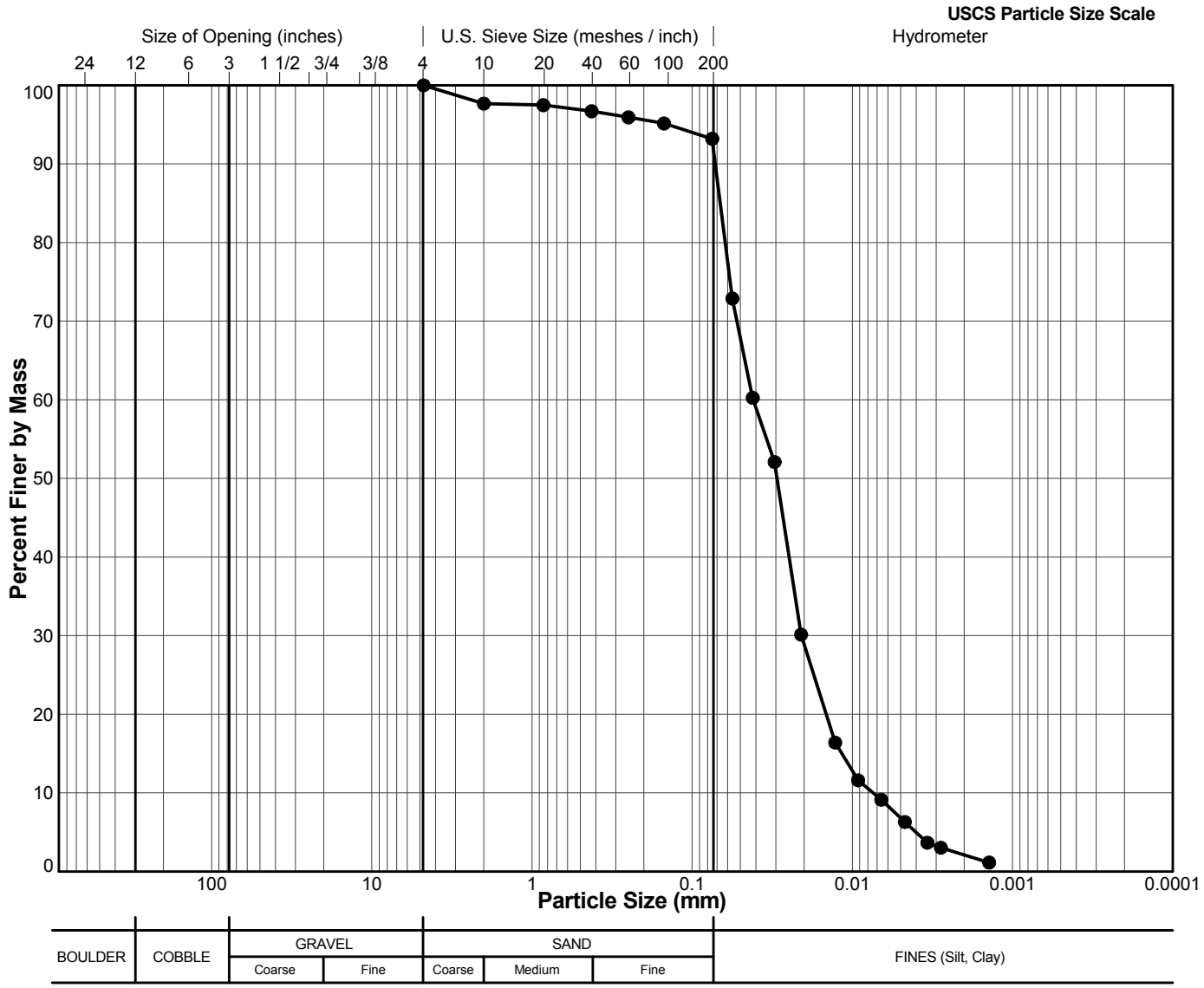
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 4.75	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

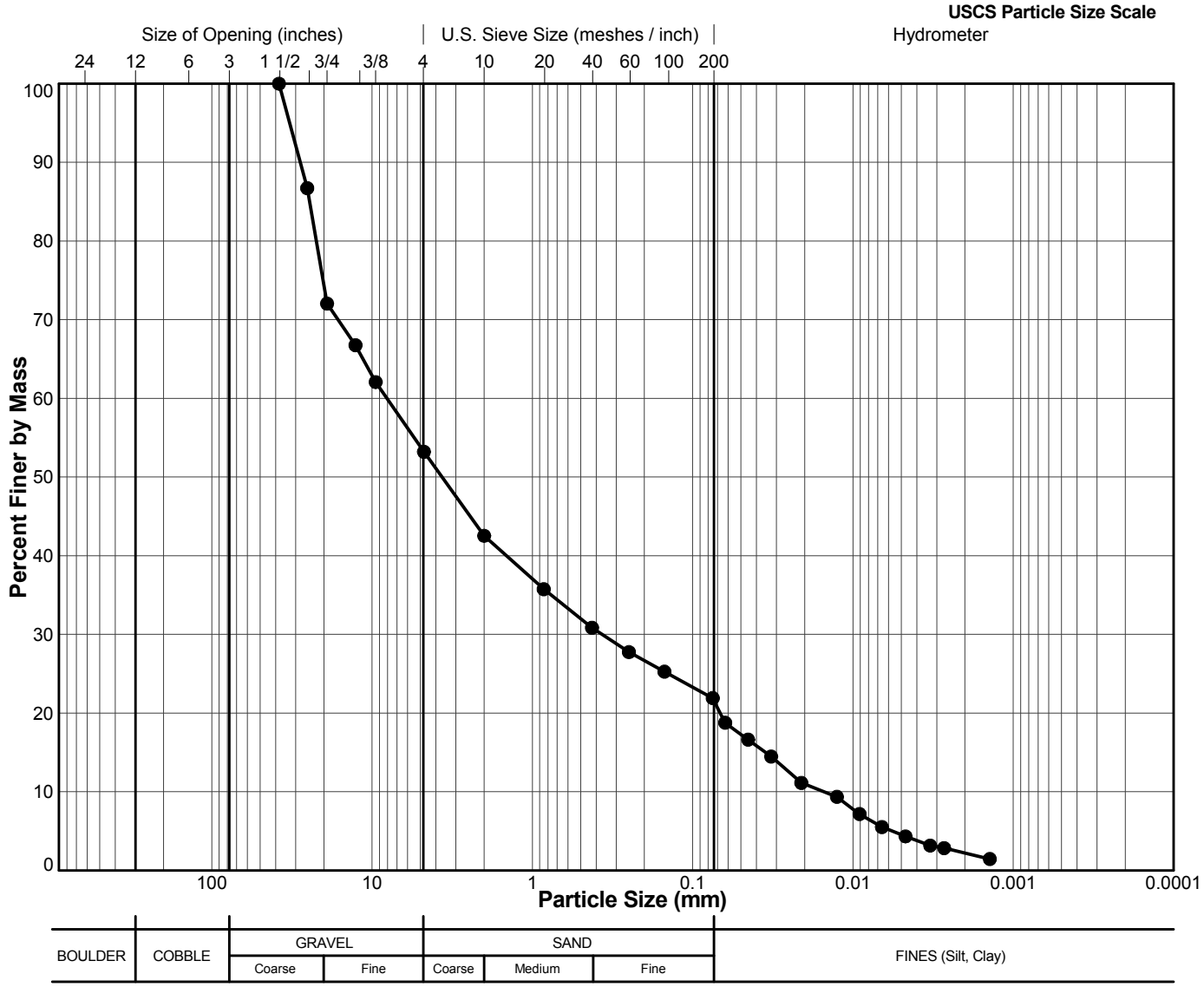
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.80 to 2.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

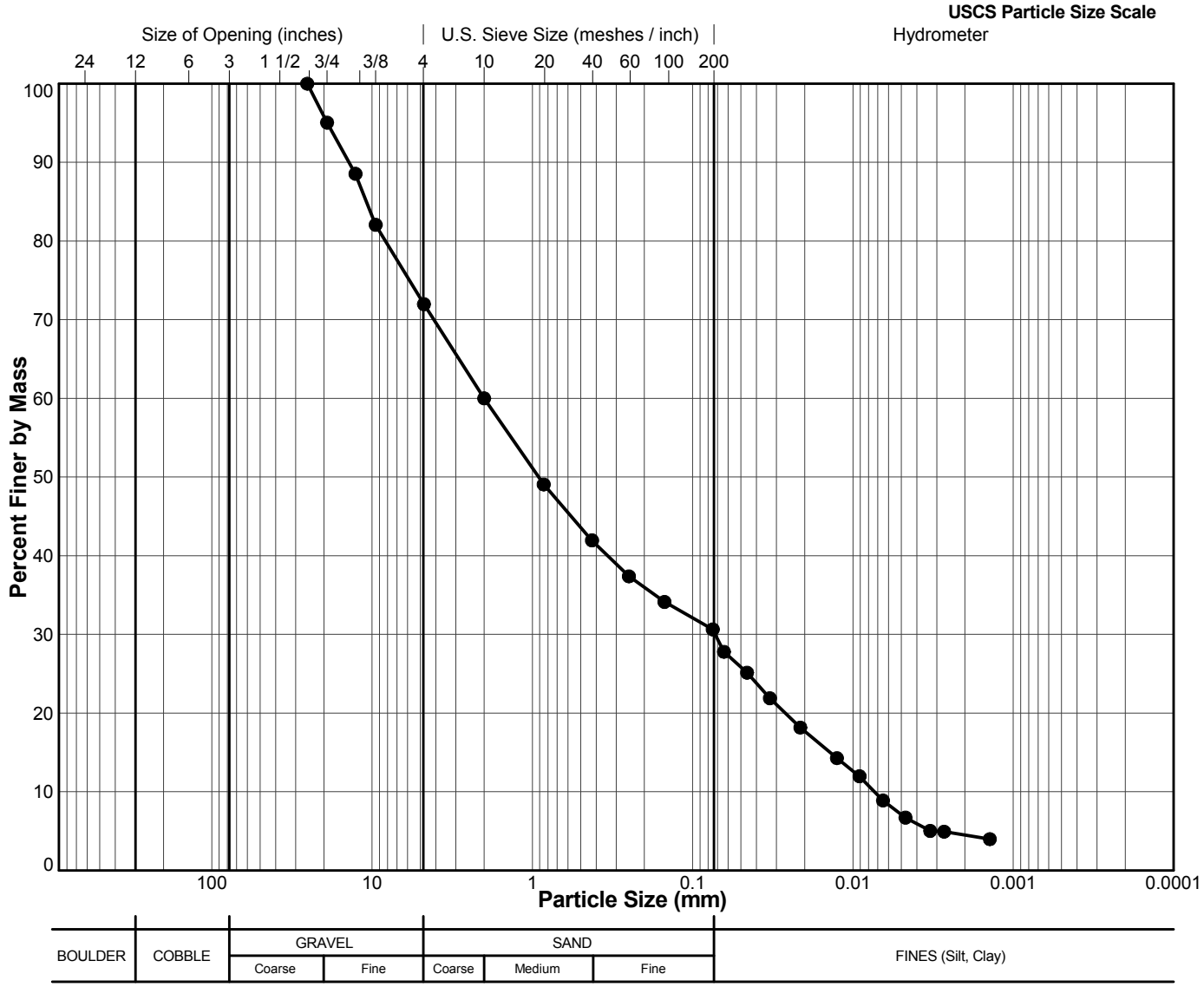
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-71**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

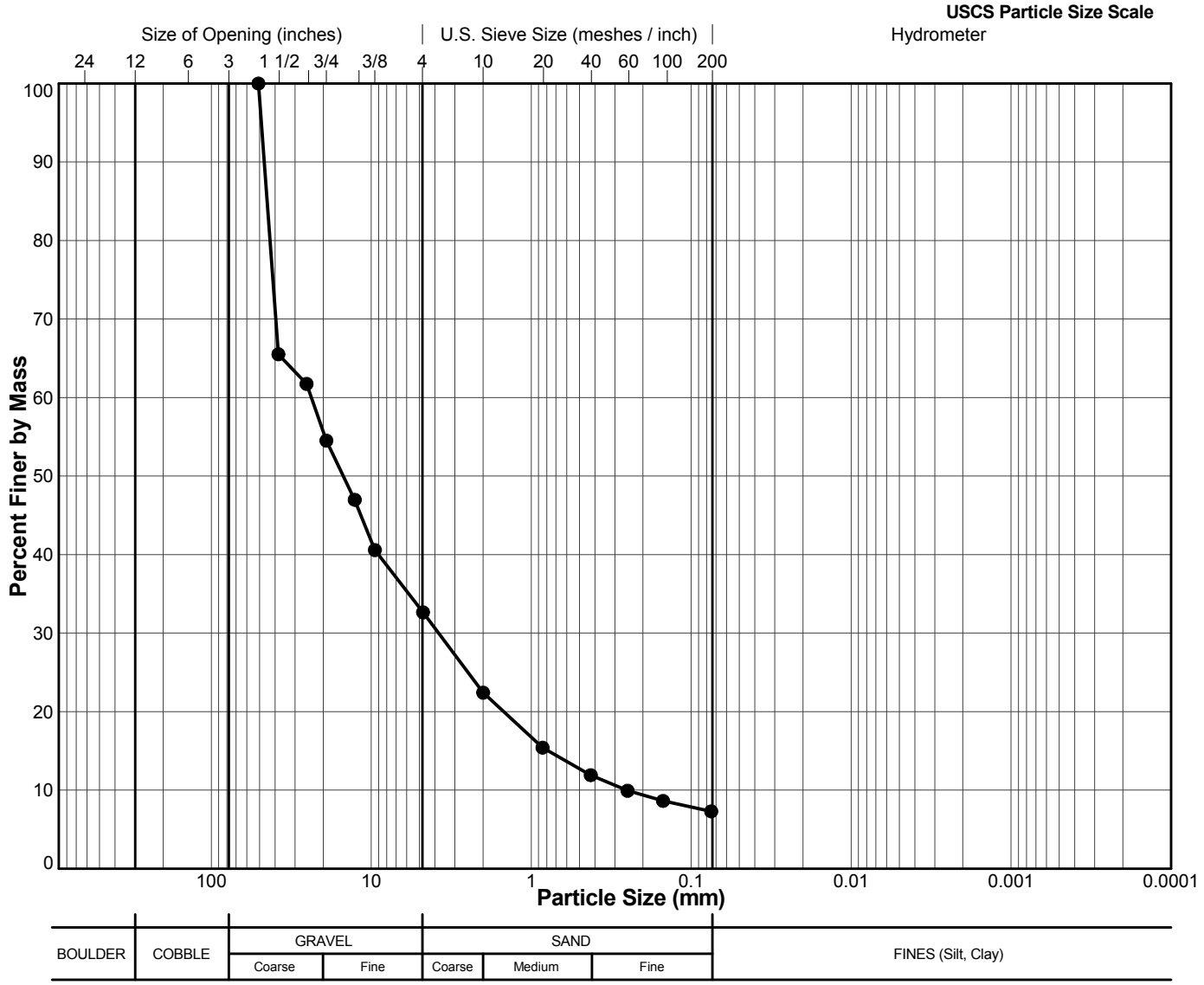
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-72**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.40 to 2.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

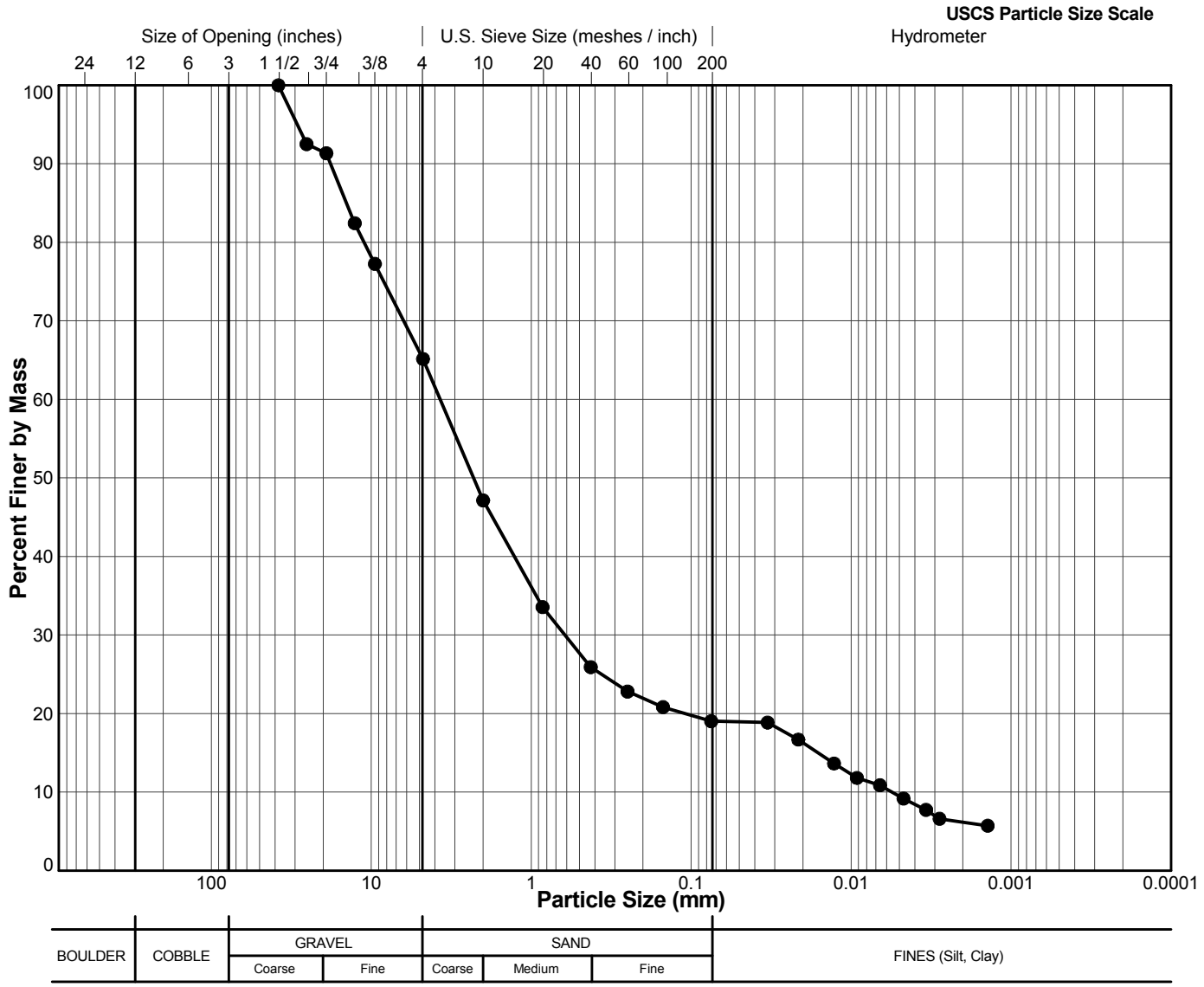
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-72**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

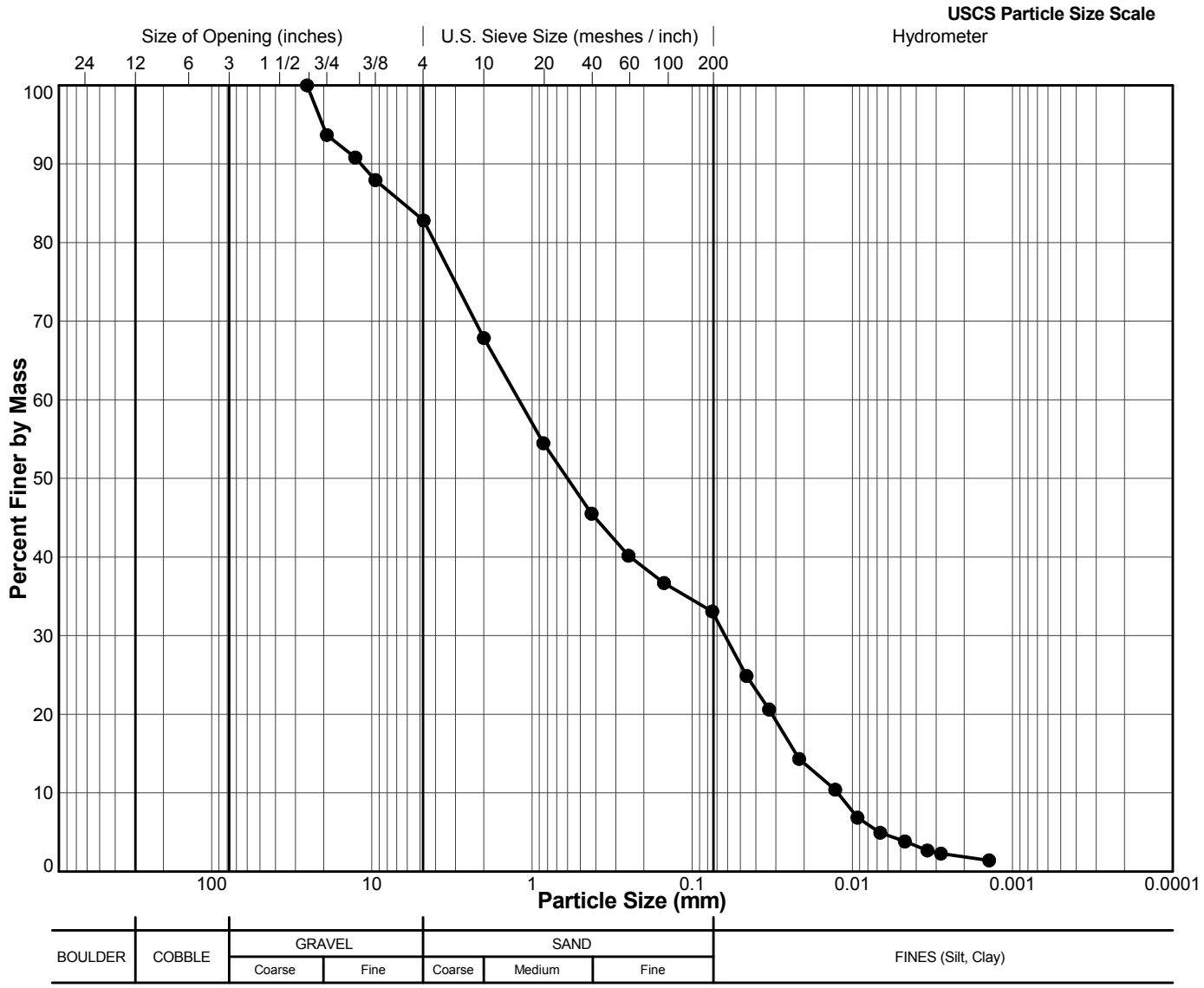
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-73**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

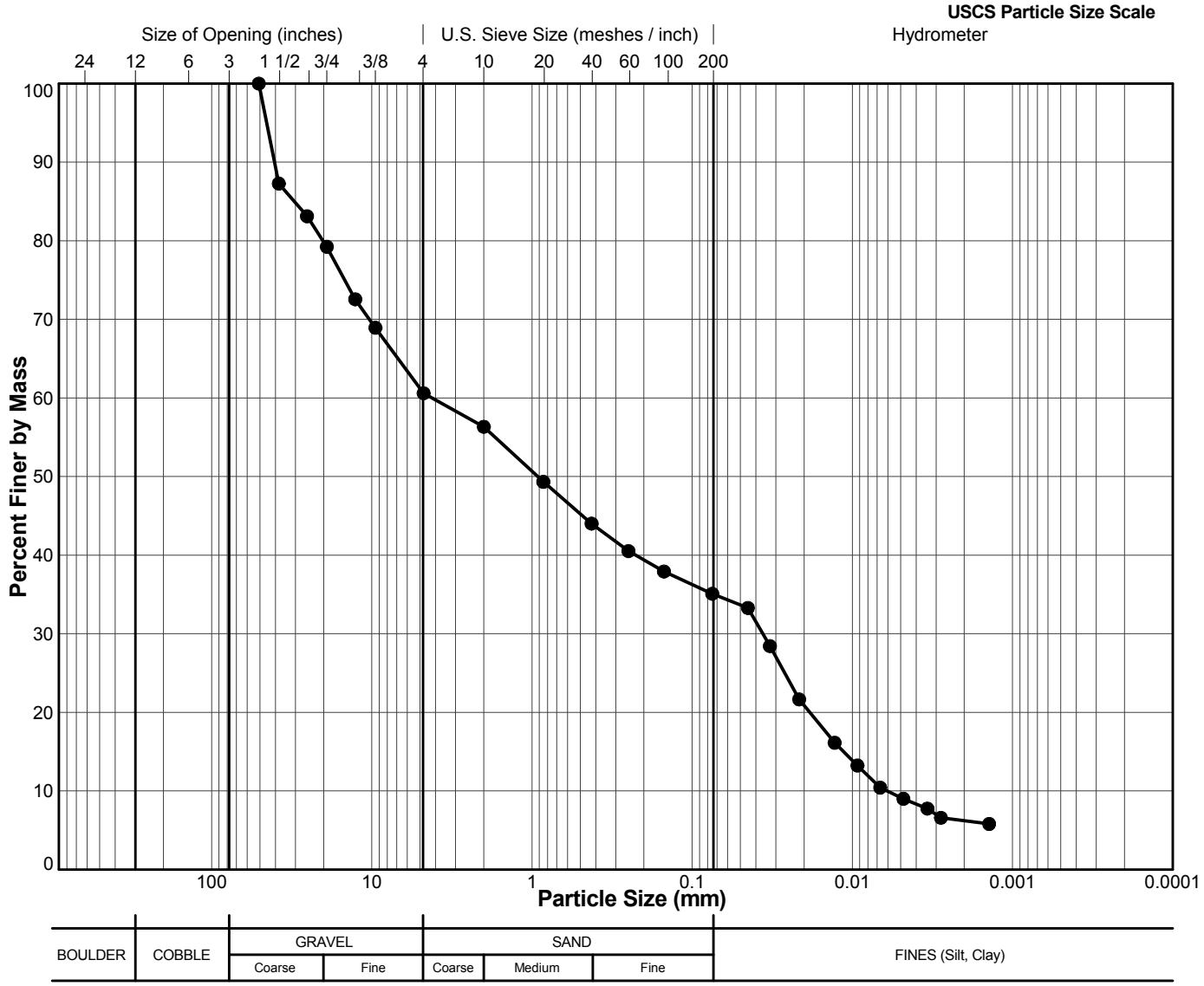
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.40
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**21/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

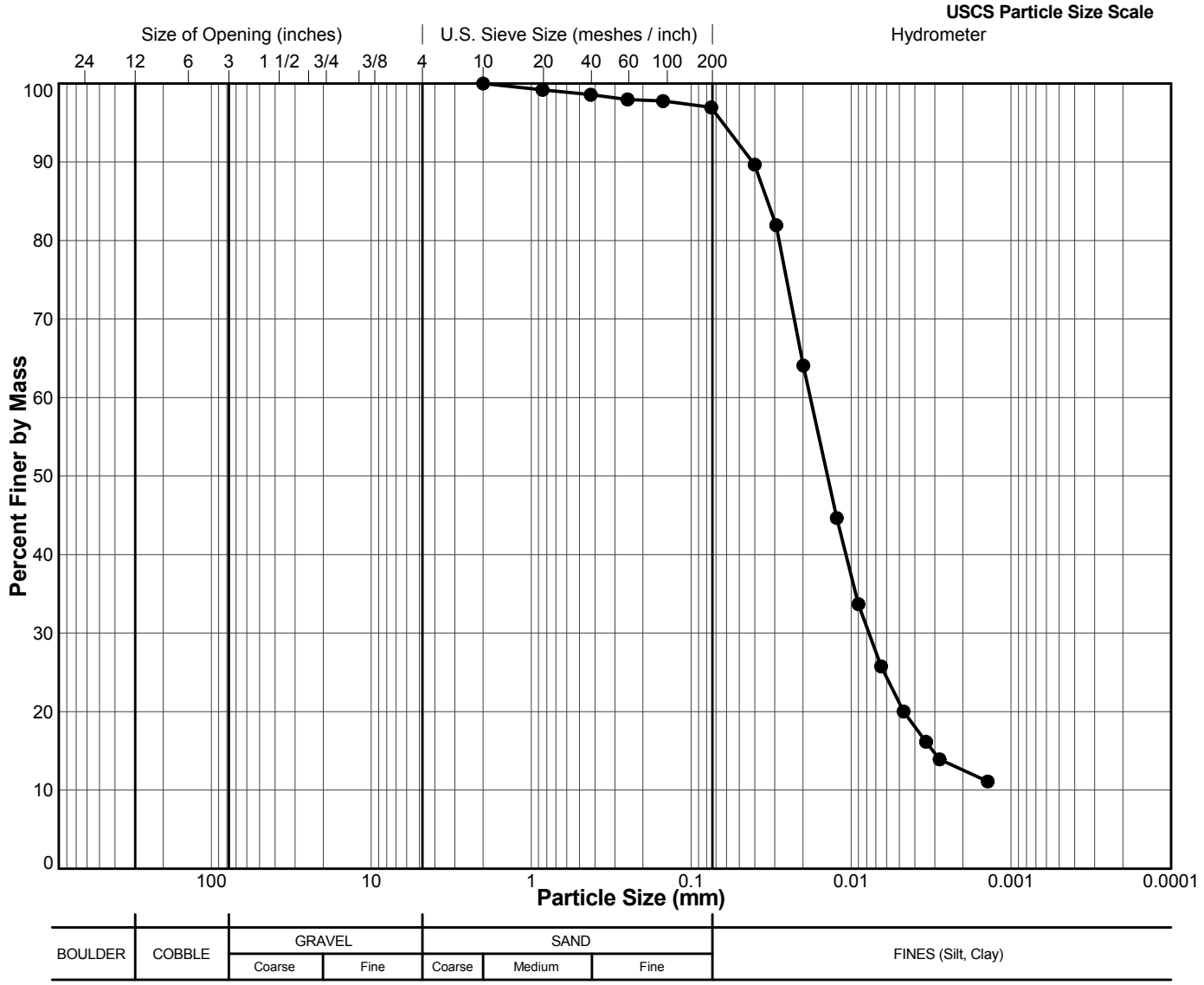
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**21/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

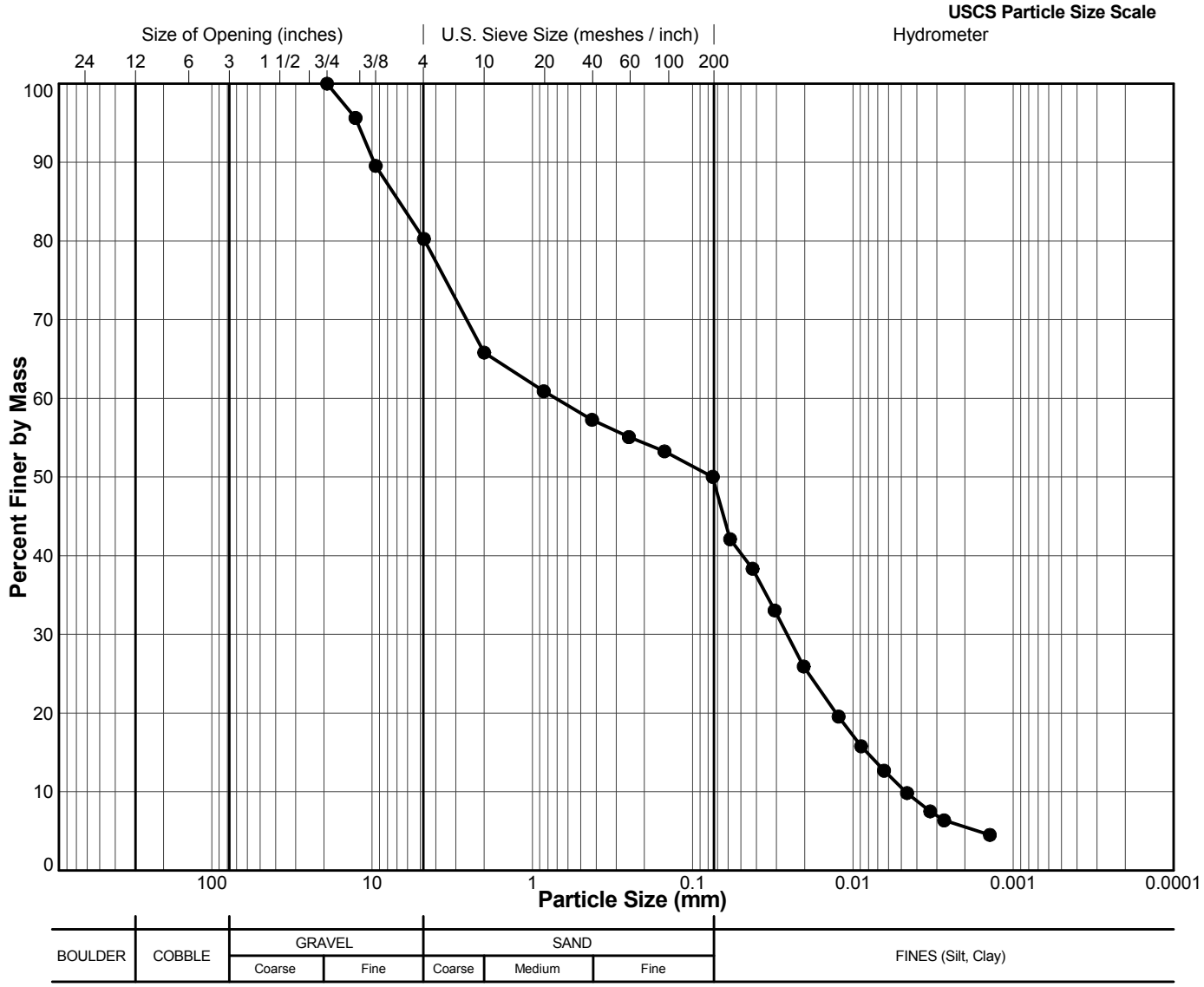
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 4.50 to 4.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

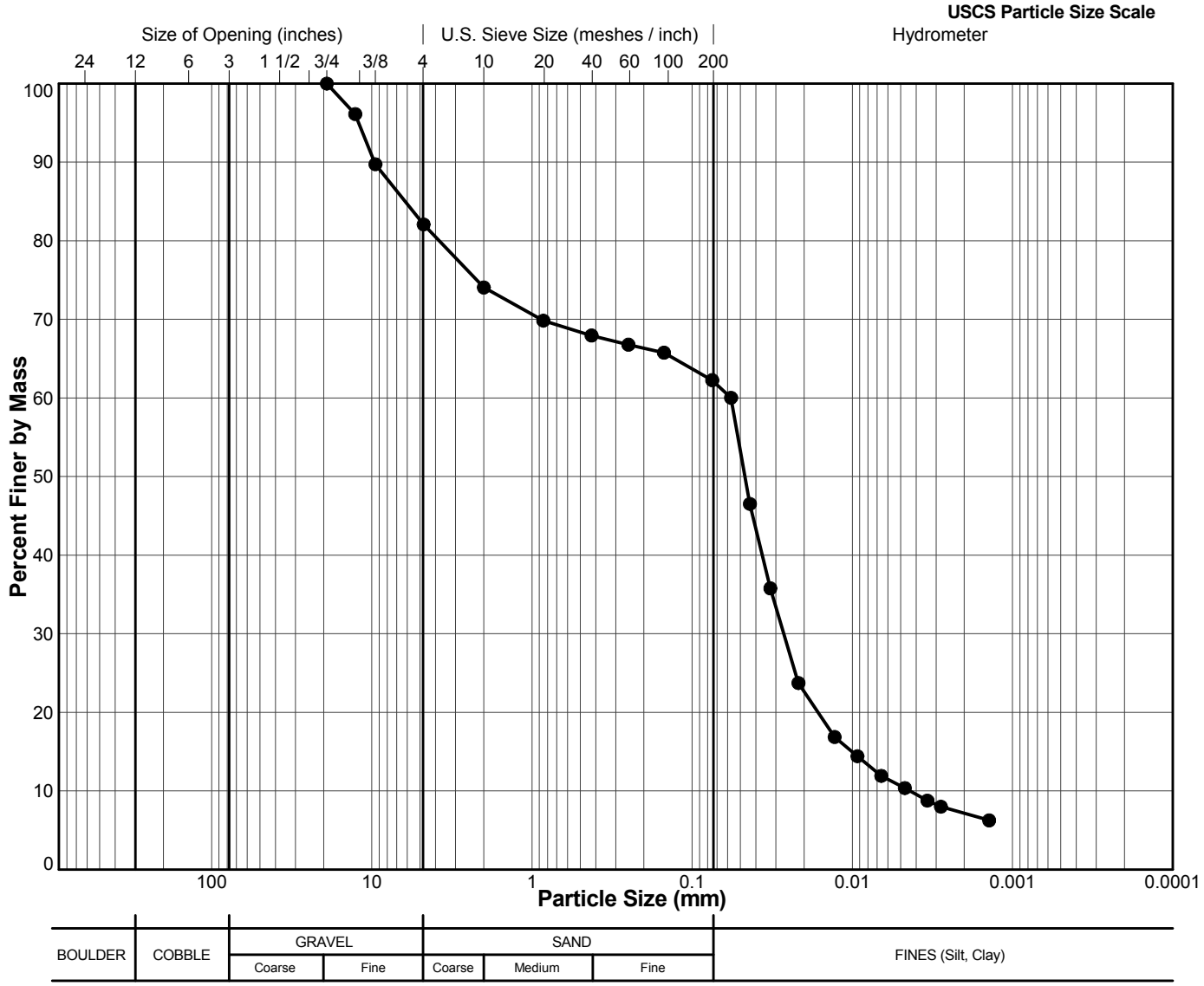
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-76**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	20/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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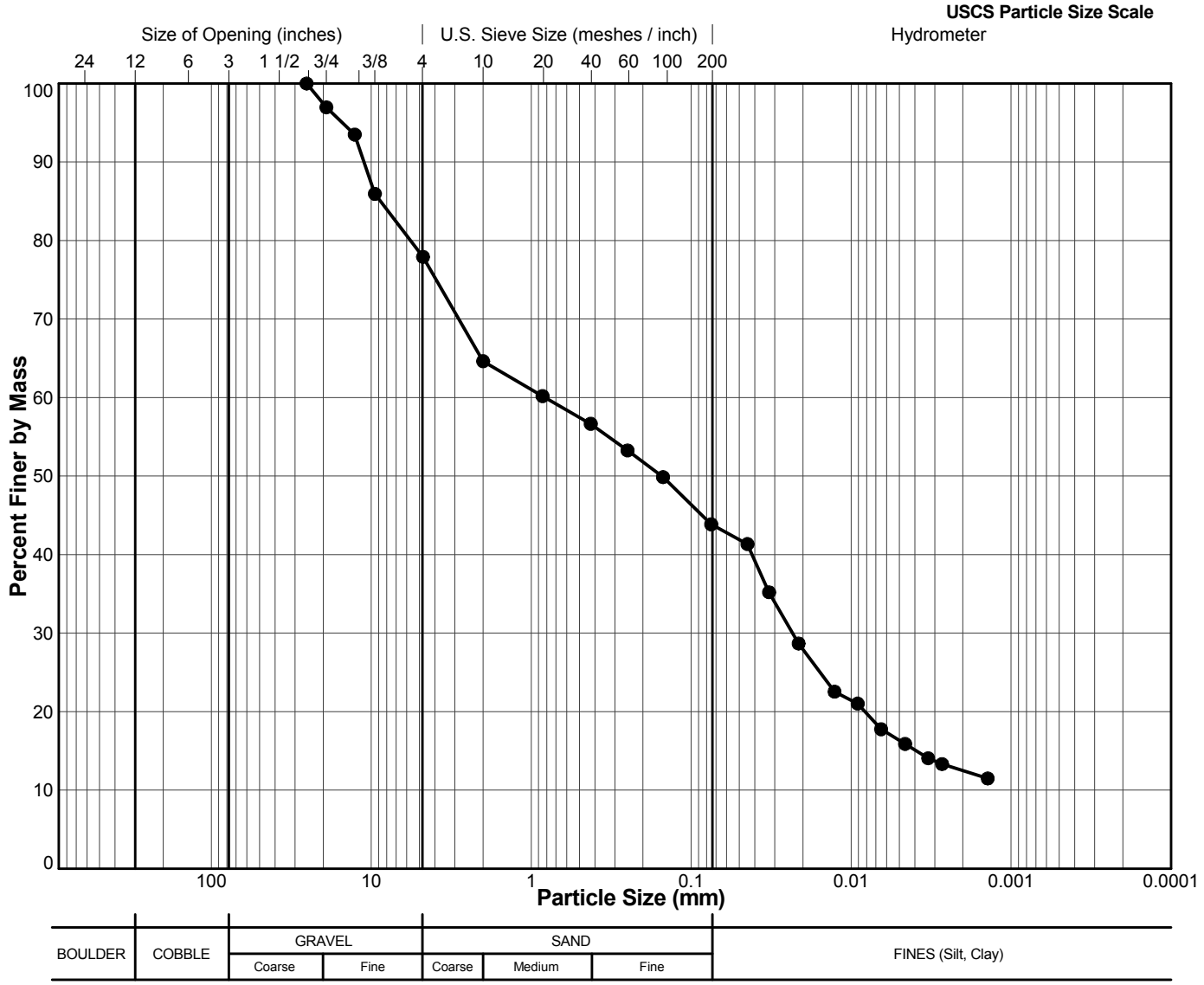
PARTICLE SIZE ANALYSIS OF SOILS

Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-77**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**
Hydrometer ID: BURNABY - 87024	



RS	03/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

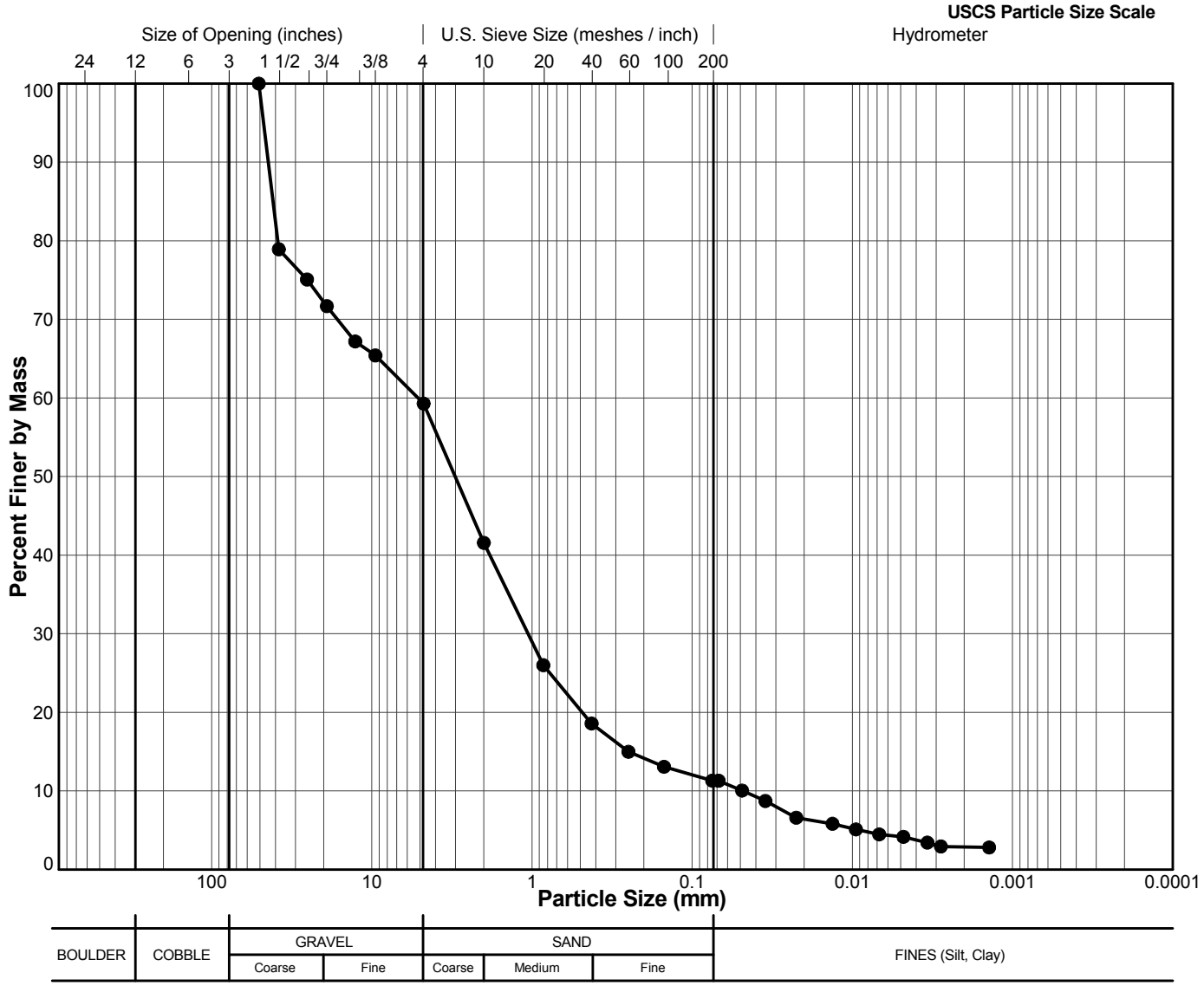
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-79**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

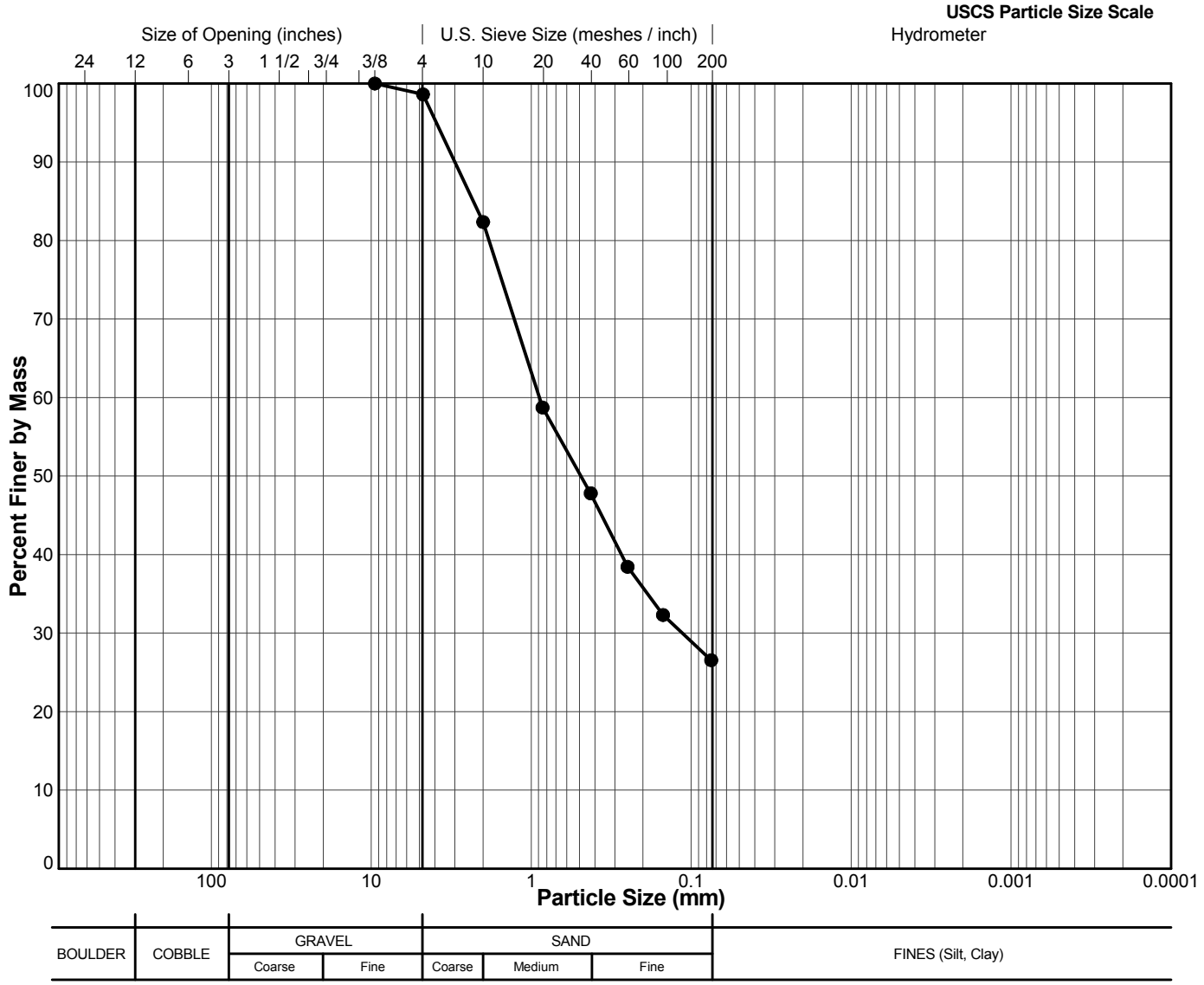
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-79**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 9.5	

Method: Split, Washed



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

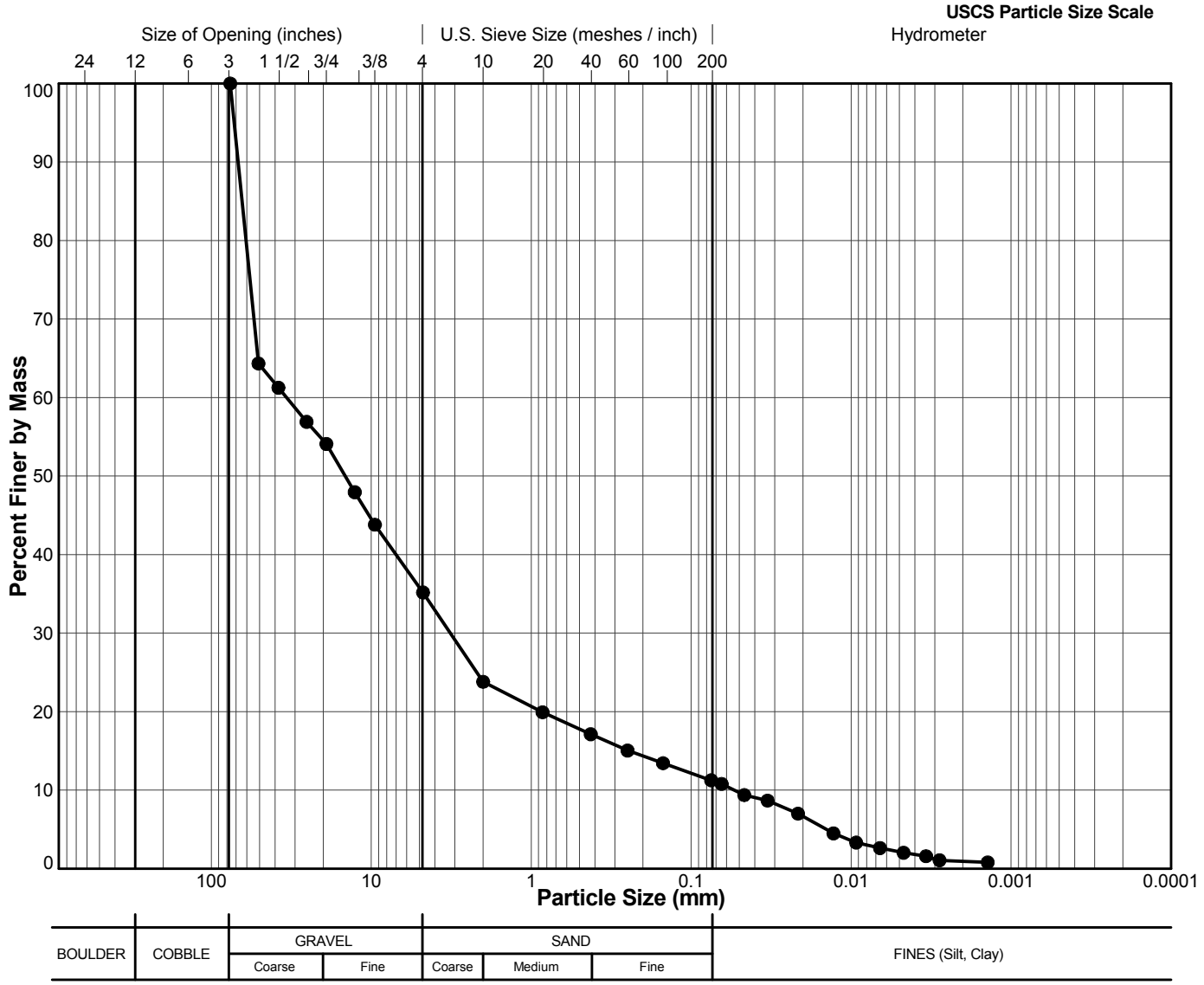
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-81**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**07/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

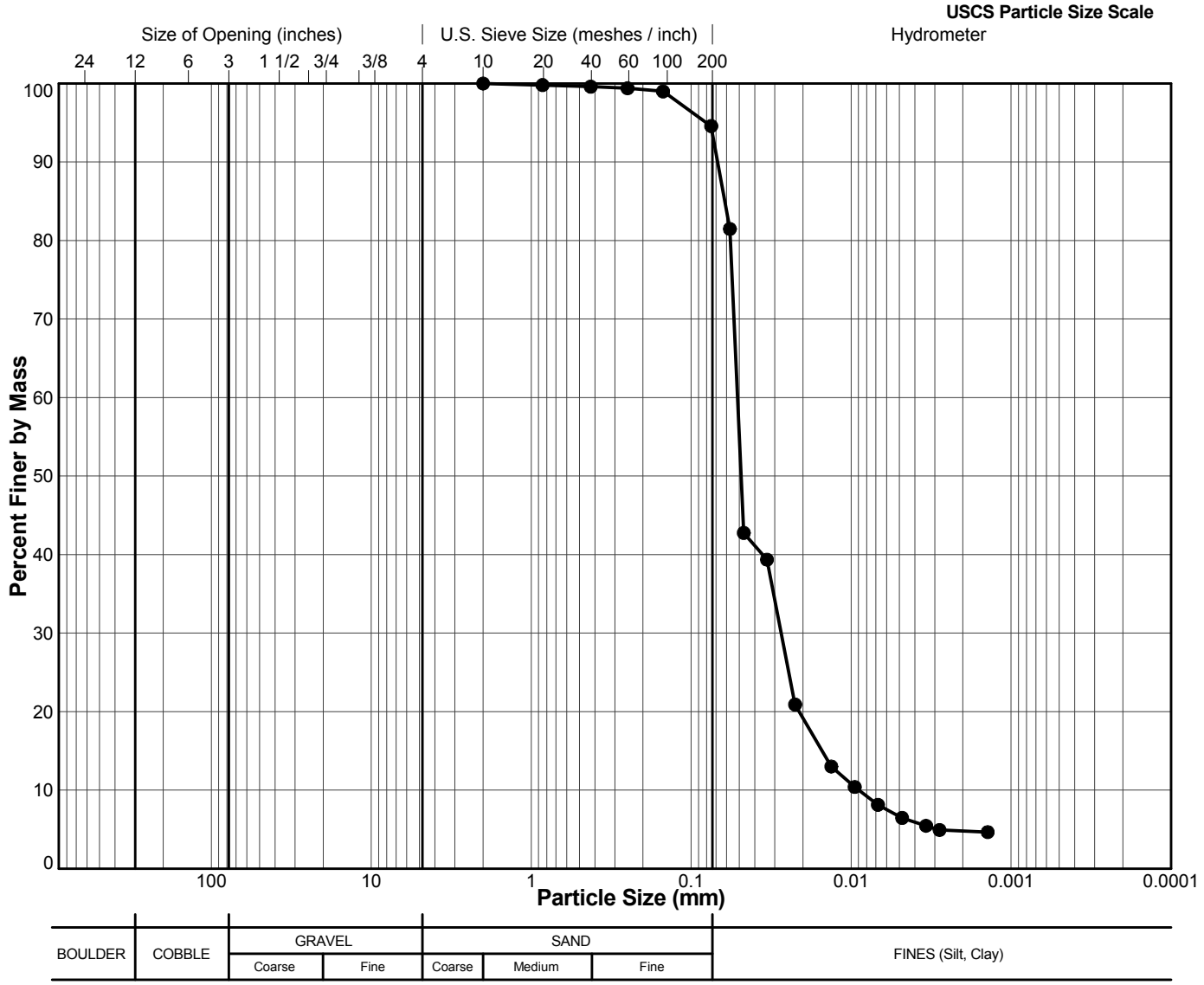
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 4.70 to 4.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024 (2006)



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

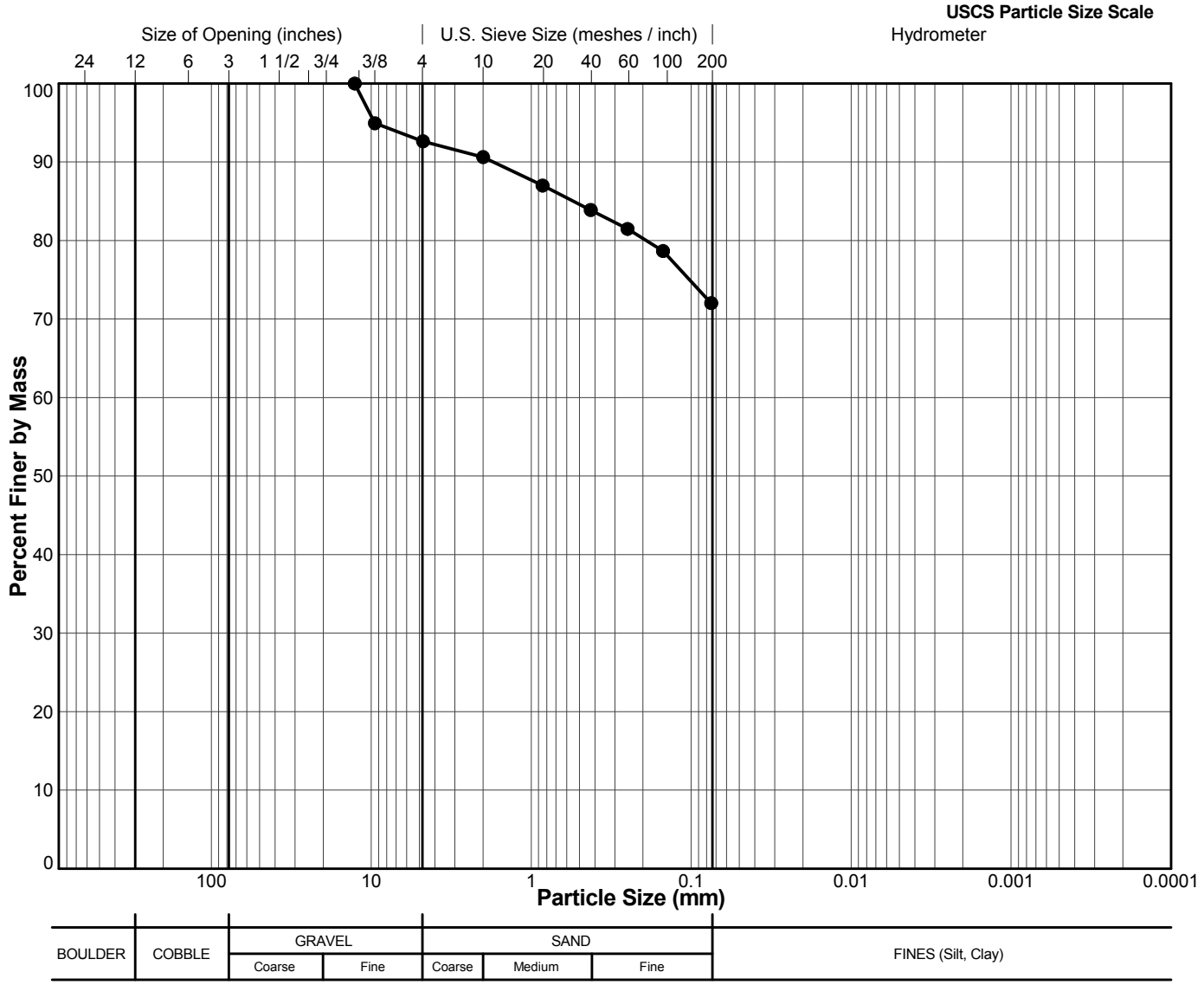
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 12.7	

Method: Split, Washed



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

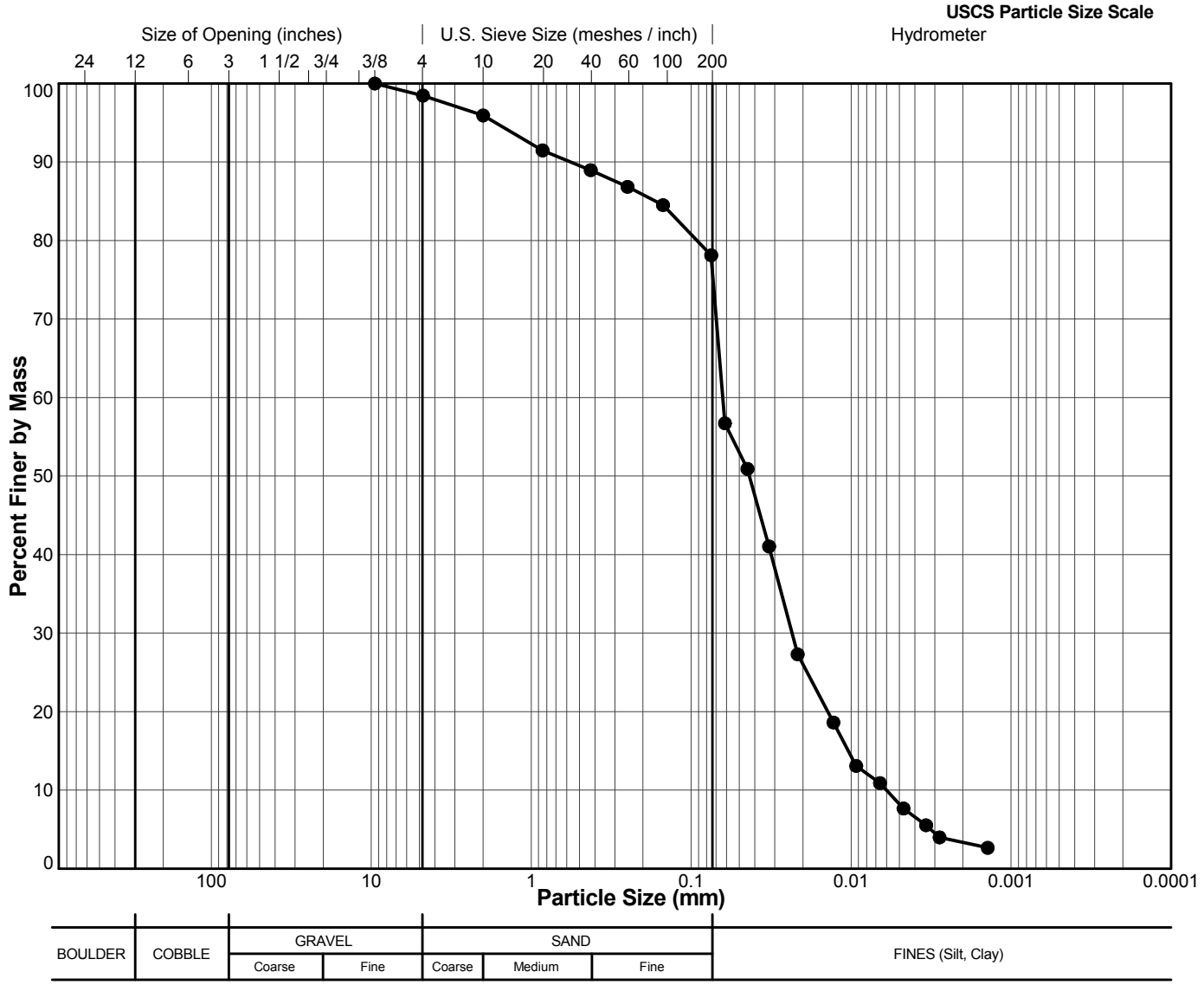
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 6.70 to 7.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 9.5	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



RS	26/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

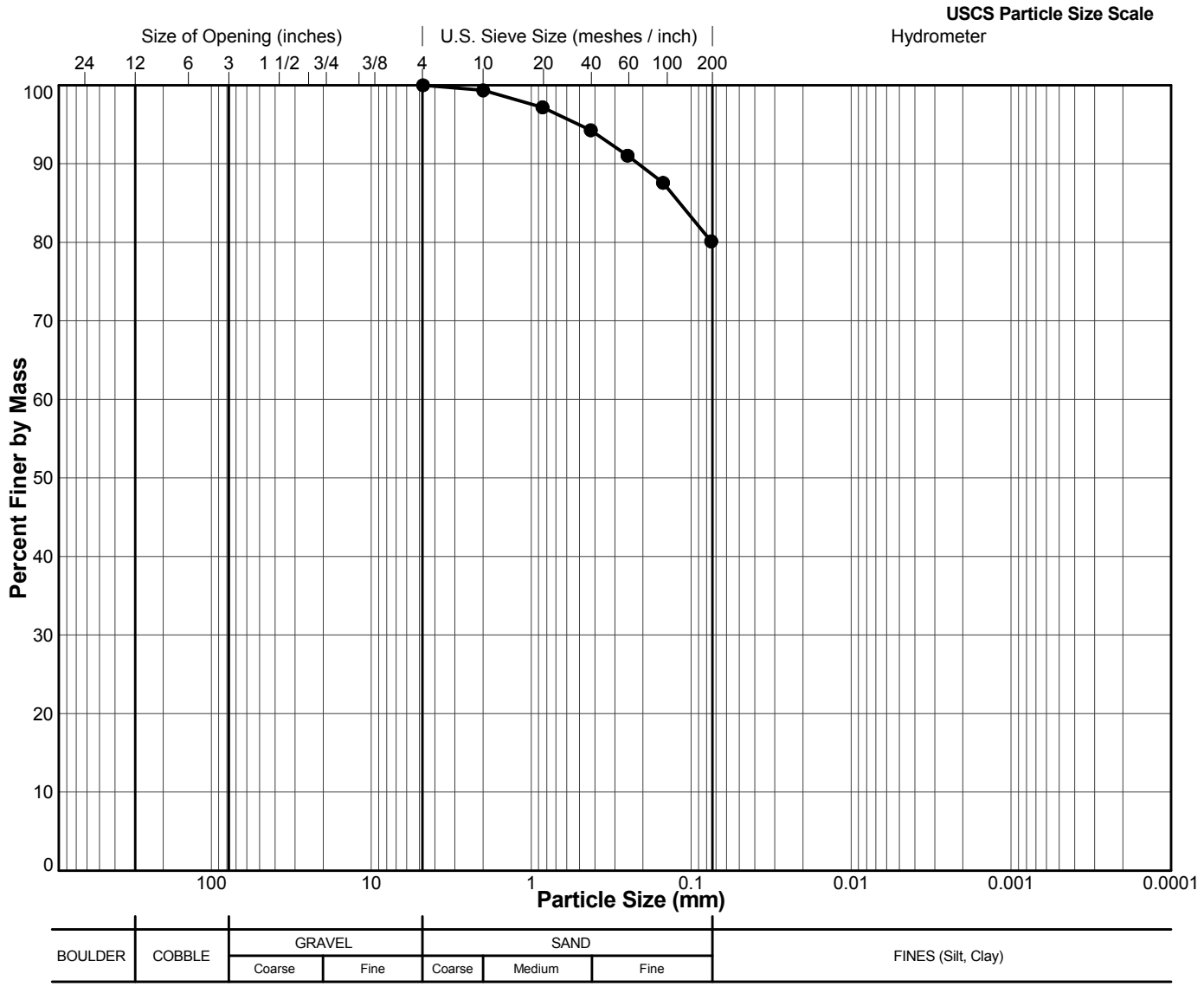
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M4**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 1.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 4.75	

Method: Split, Washed



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

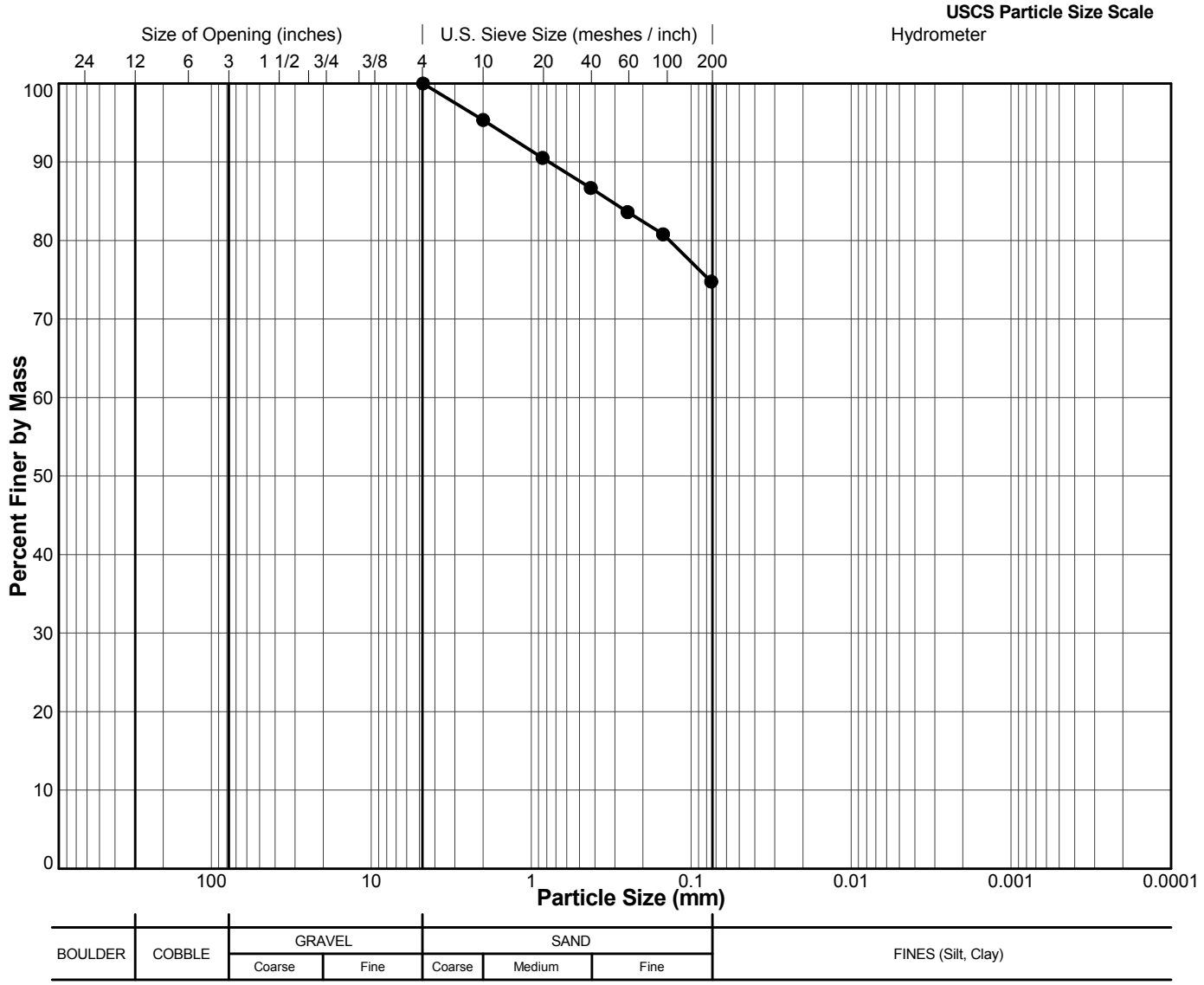
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M5**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.90 to 2.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 4.75	

Method: Split, Washed



RS	**22/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

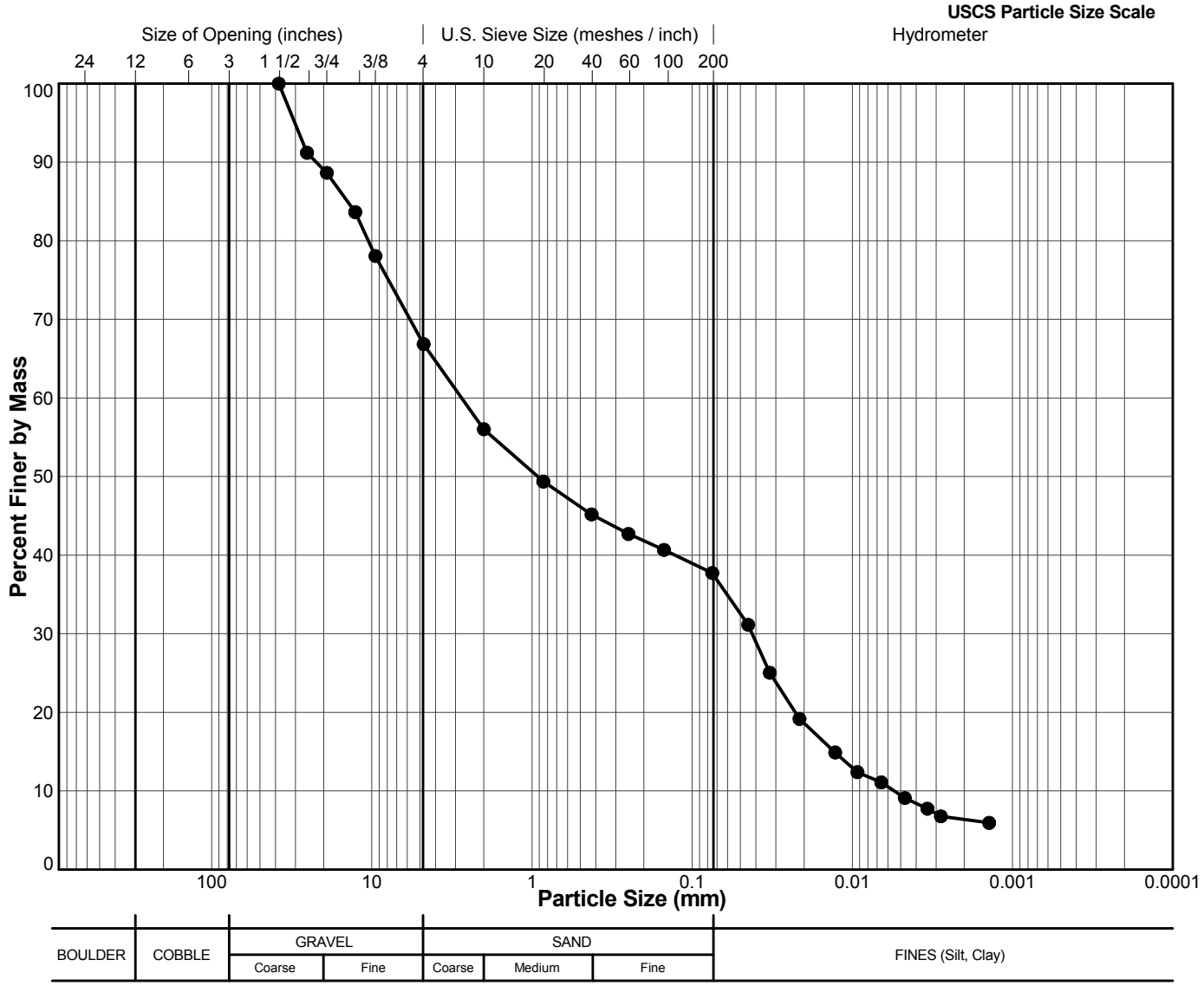
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-83**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

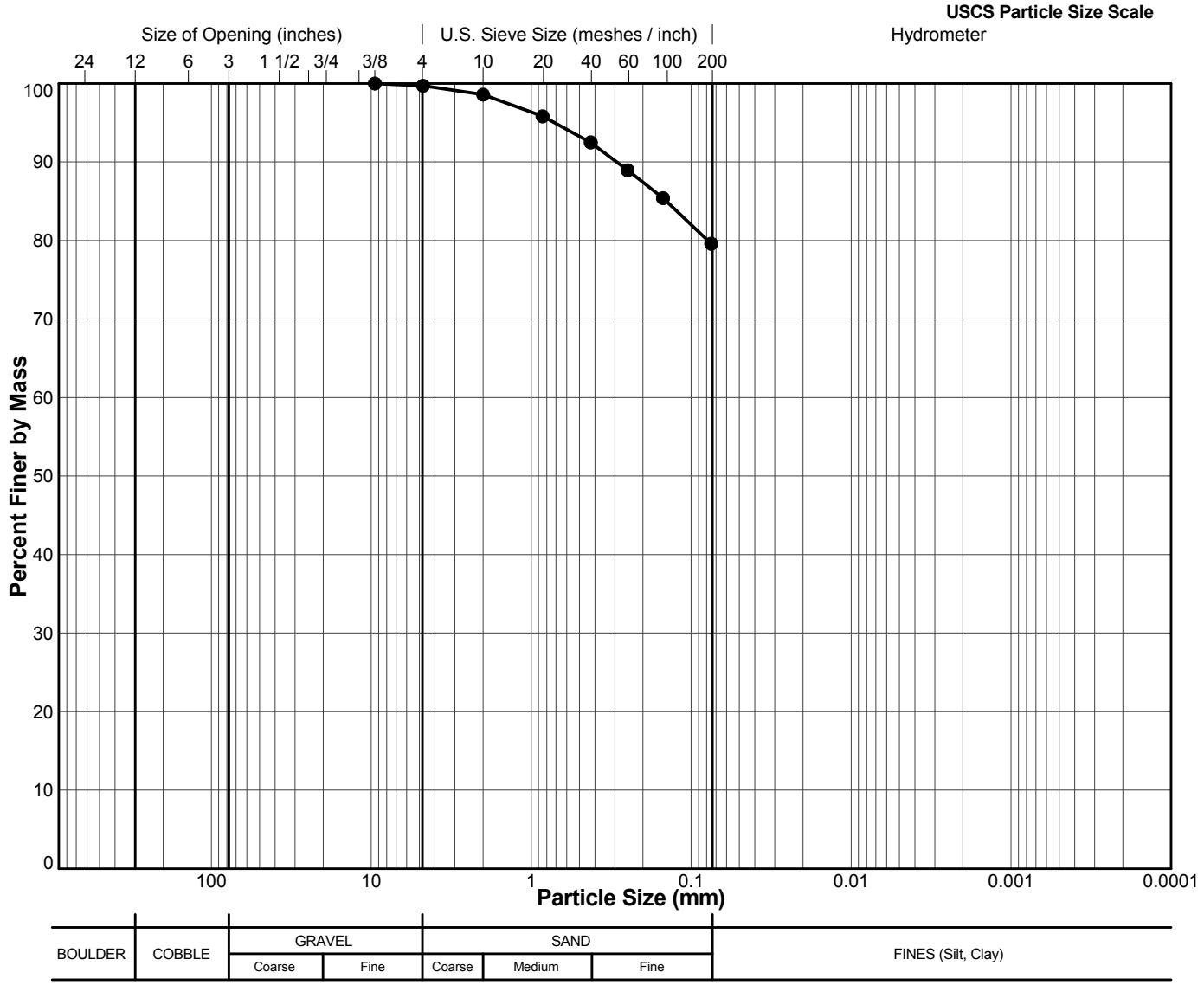
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-84**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 9.5	

Method: Split, Washed



RS	27/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

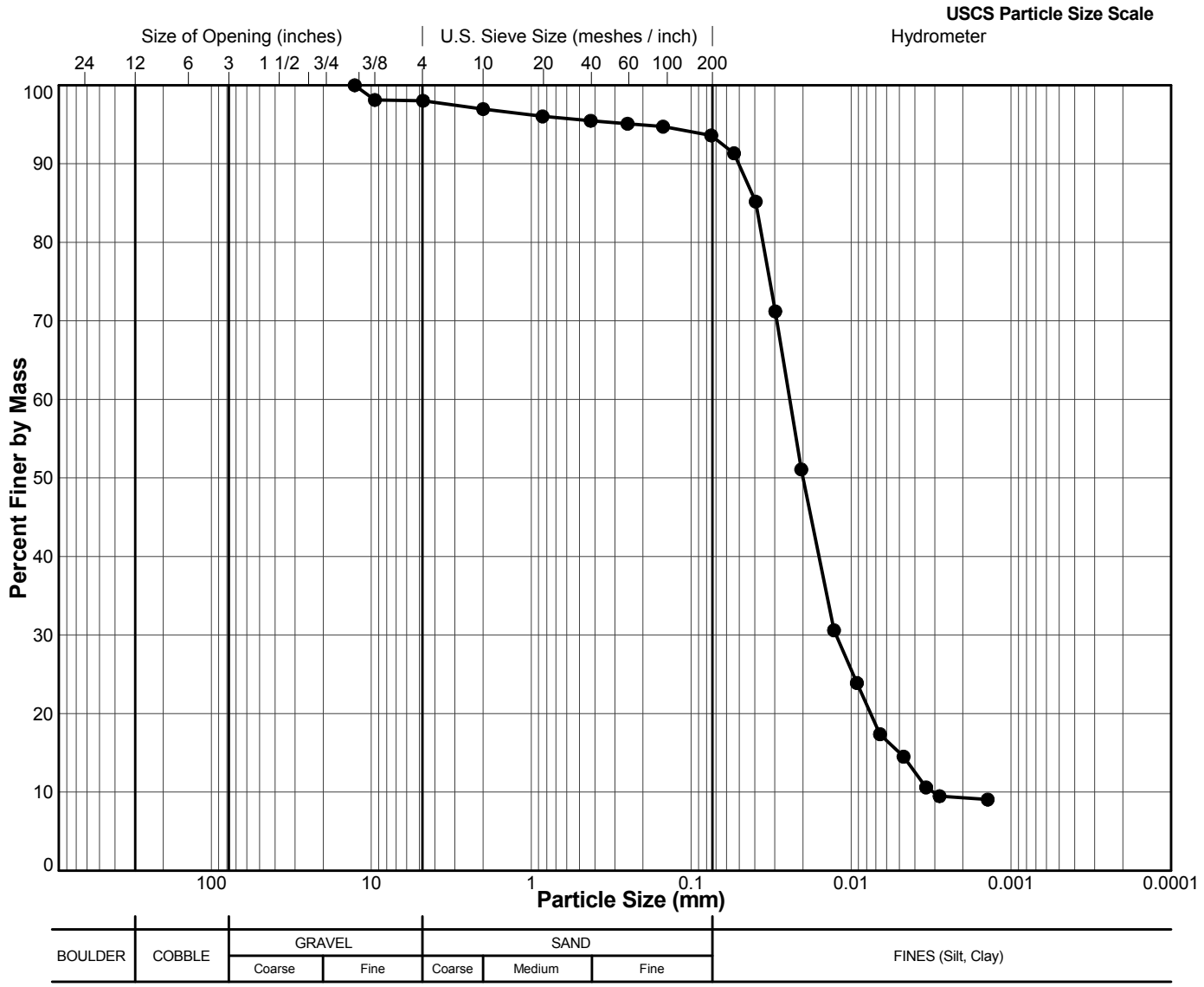
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-84**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.50 to 2.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 12.7	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**03/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

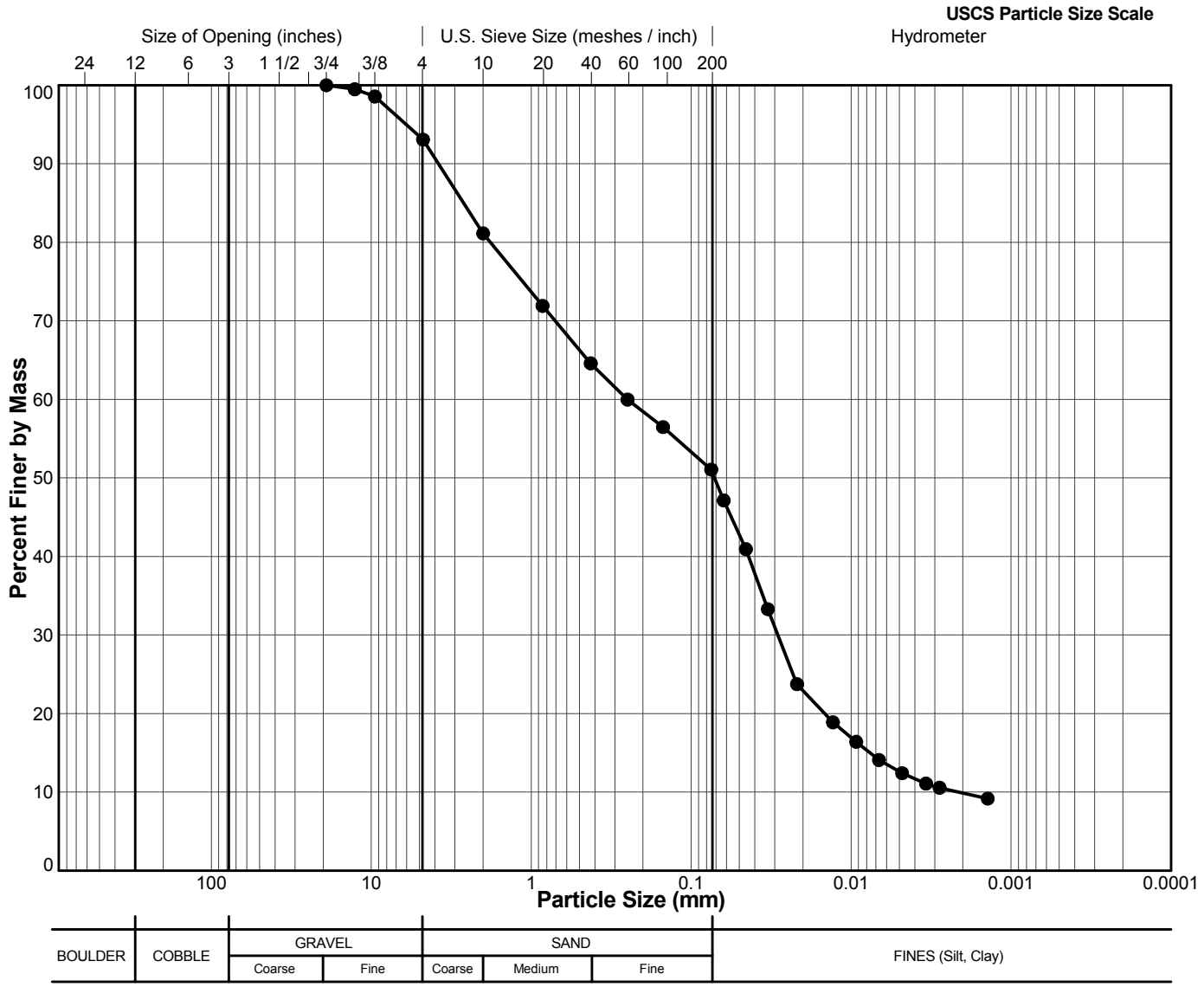
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-85**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

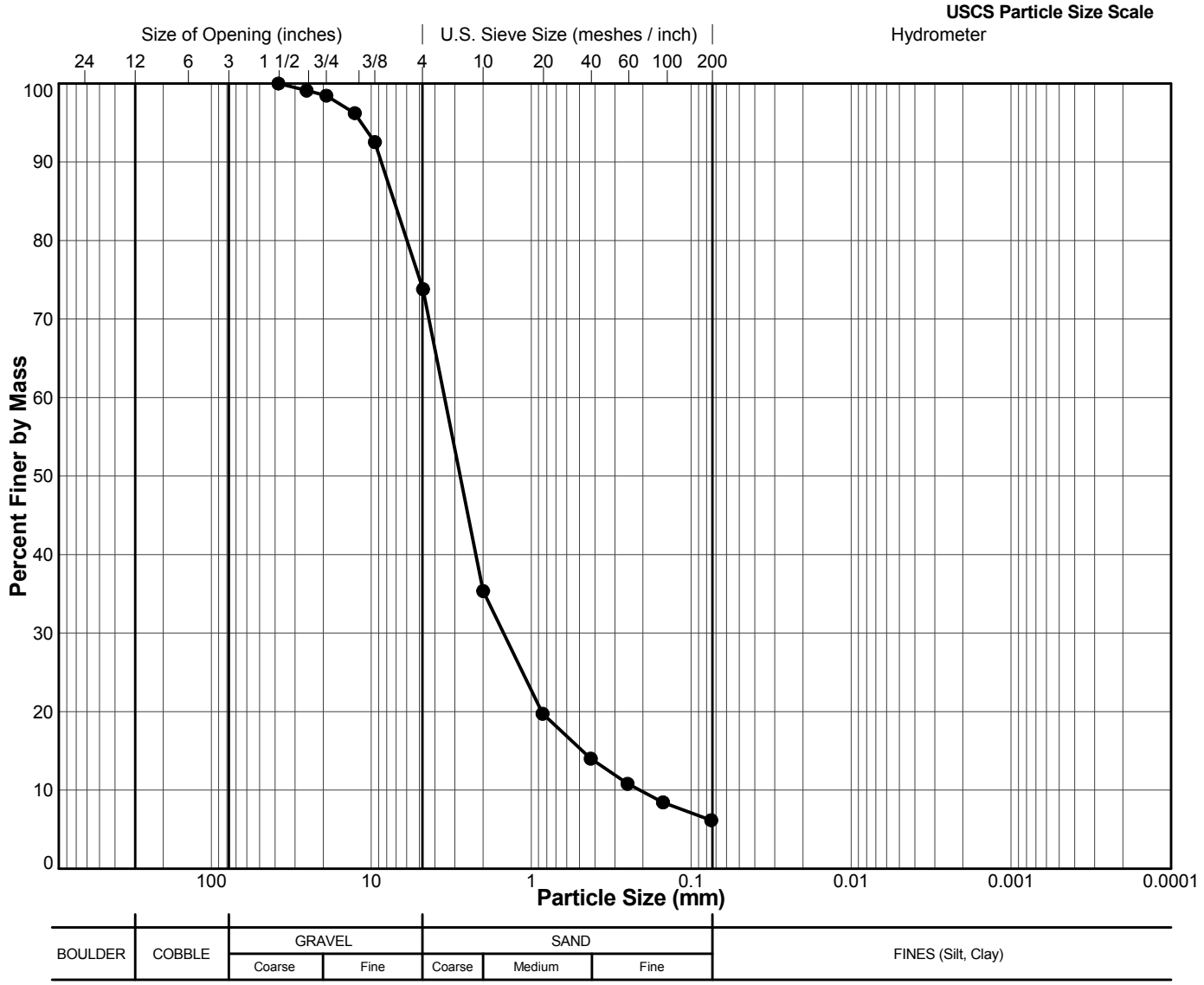
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-87**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	

Method: Split, Washed



RS	16/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

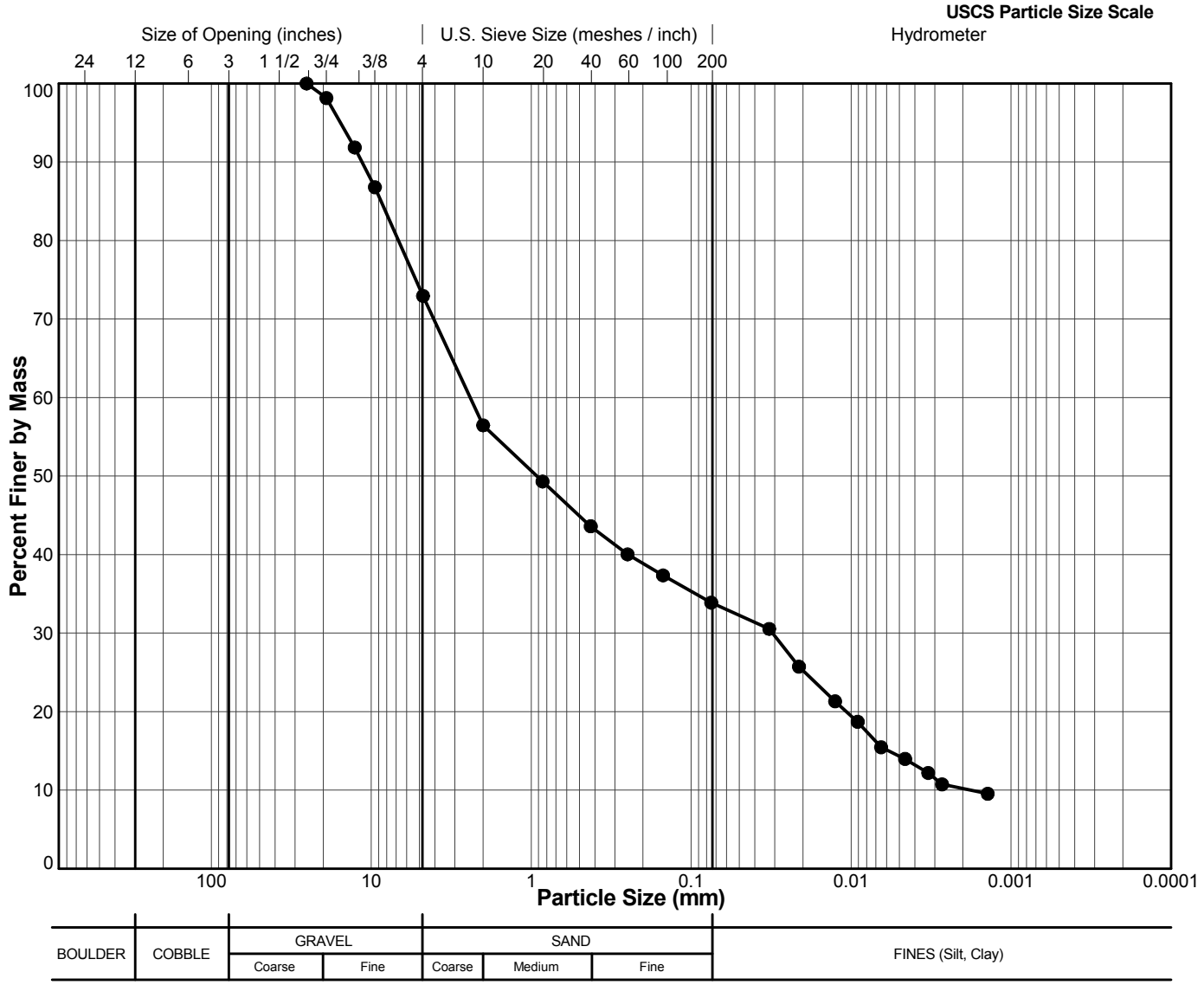
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-88**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**04/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

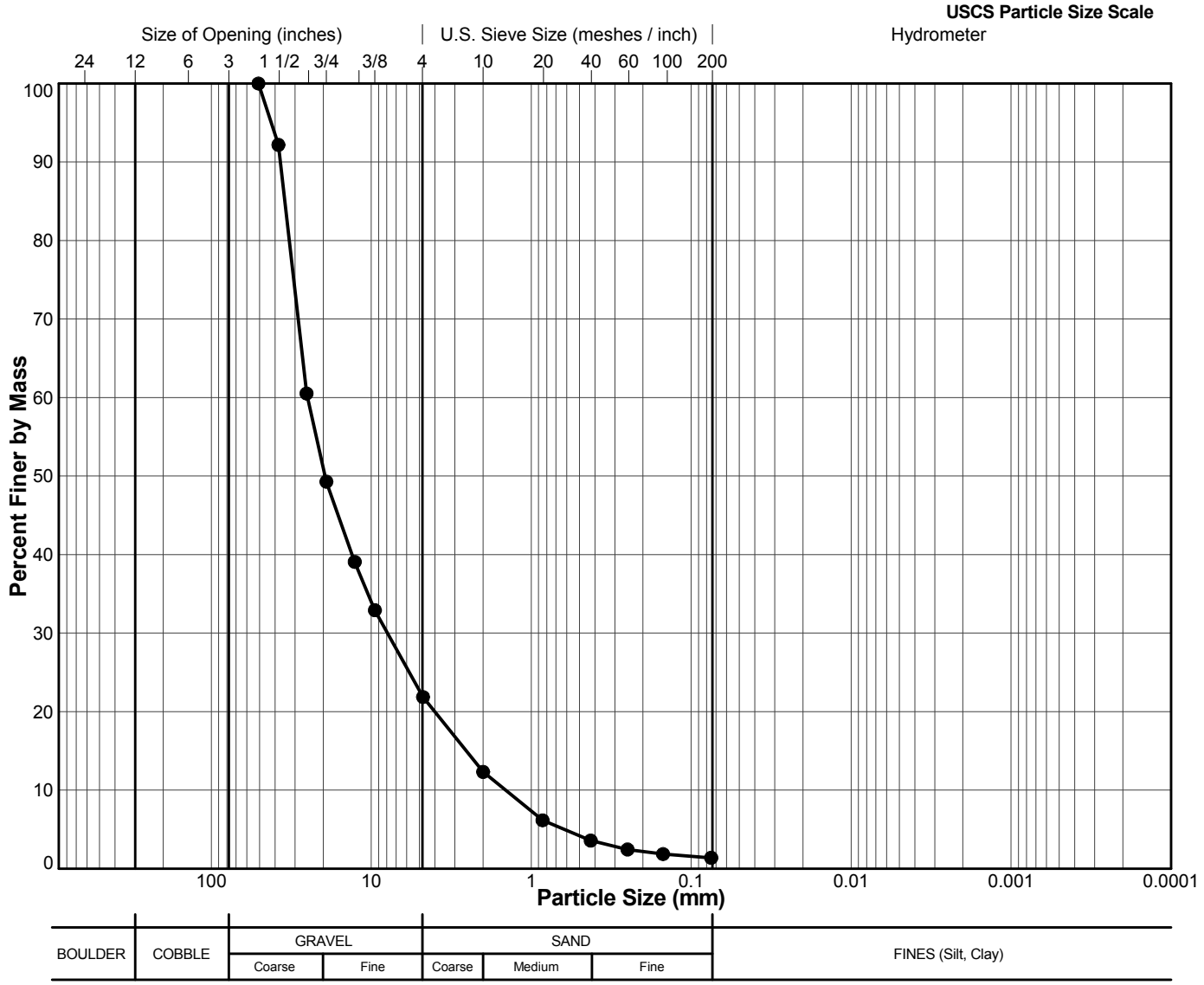
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-89**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



RS	22/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

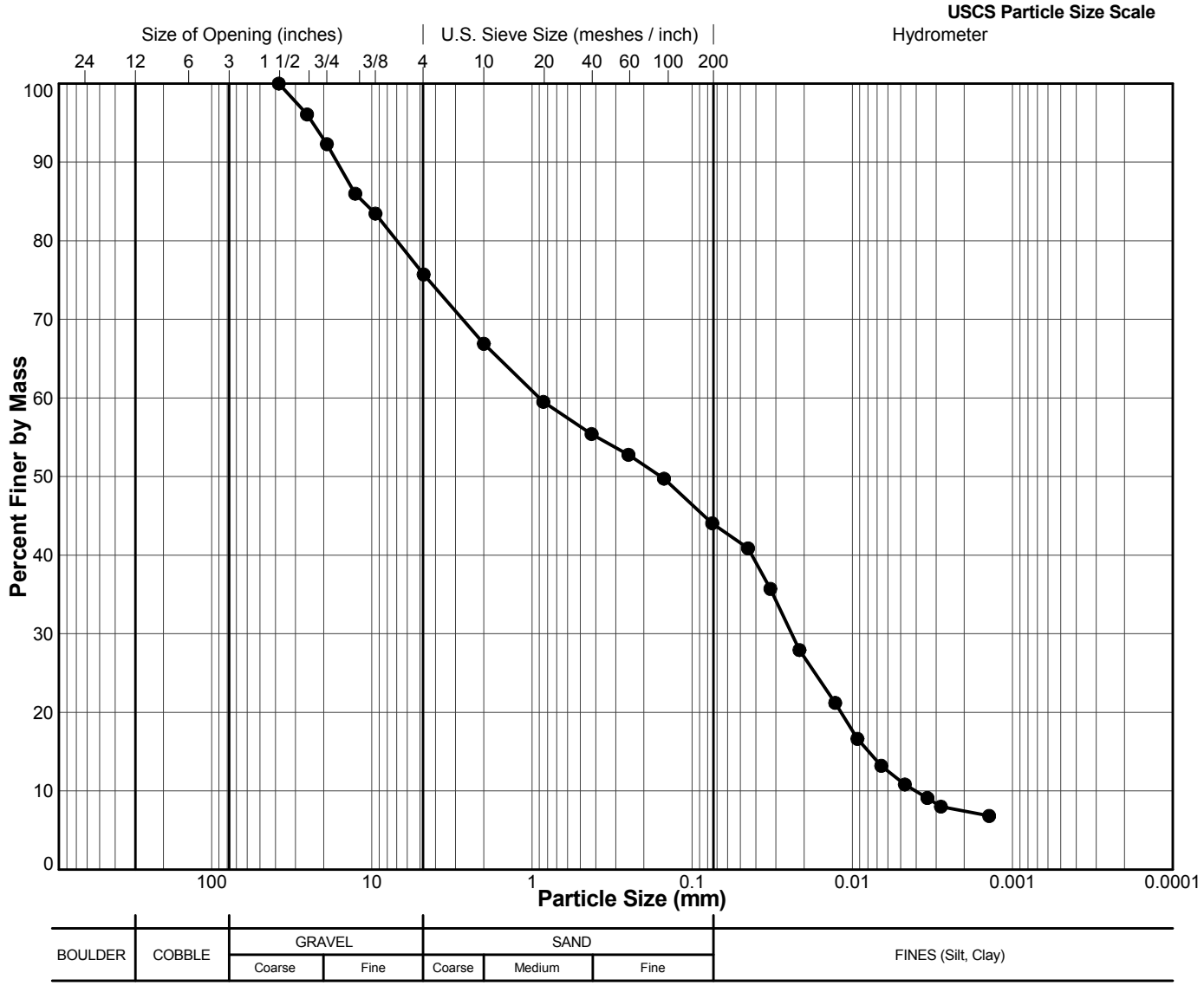
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-89**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 38.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

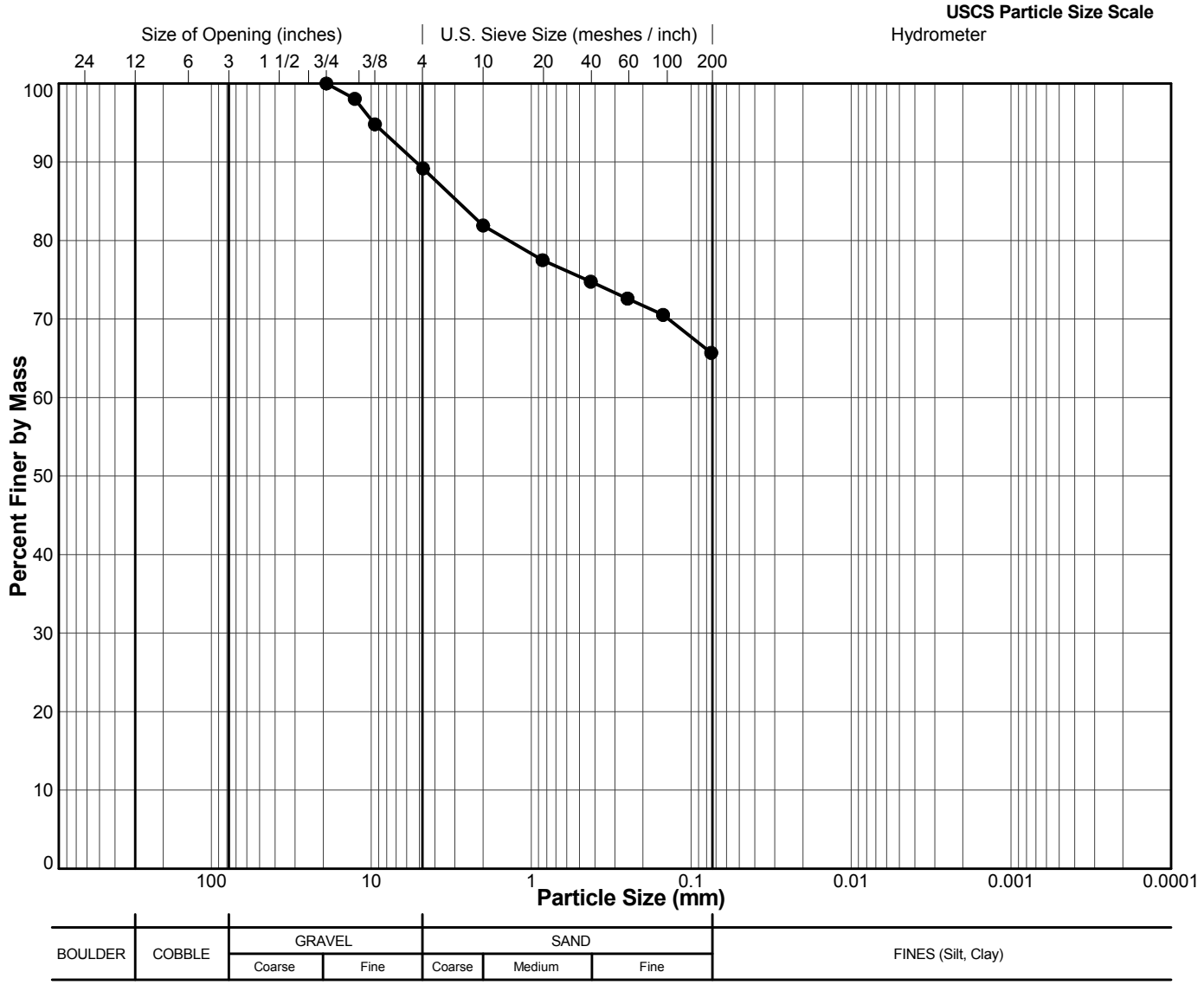
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-90**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	

Method: Split, Washed



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

PARTICLE SIZE ANALYSIS OF SOILS

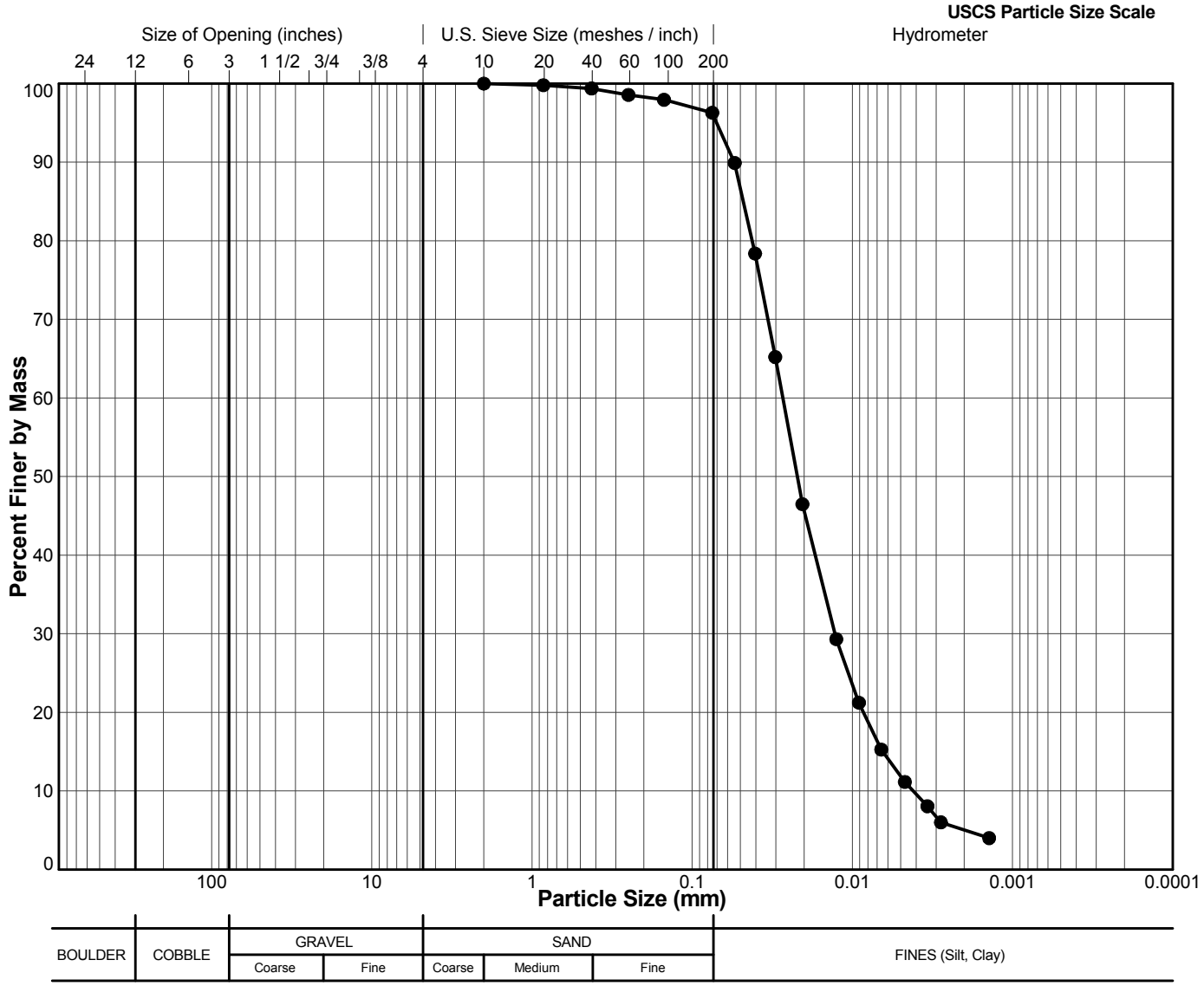
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-90**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 541360



SK	**04/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

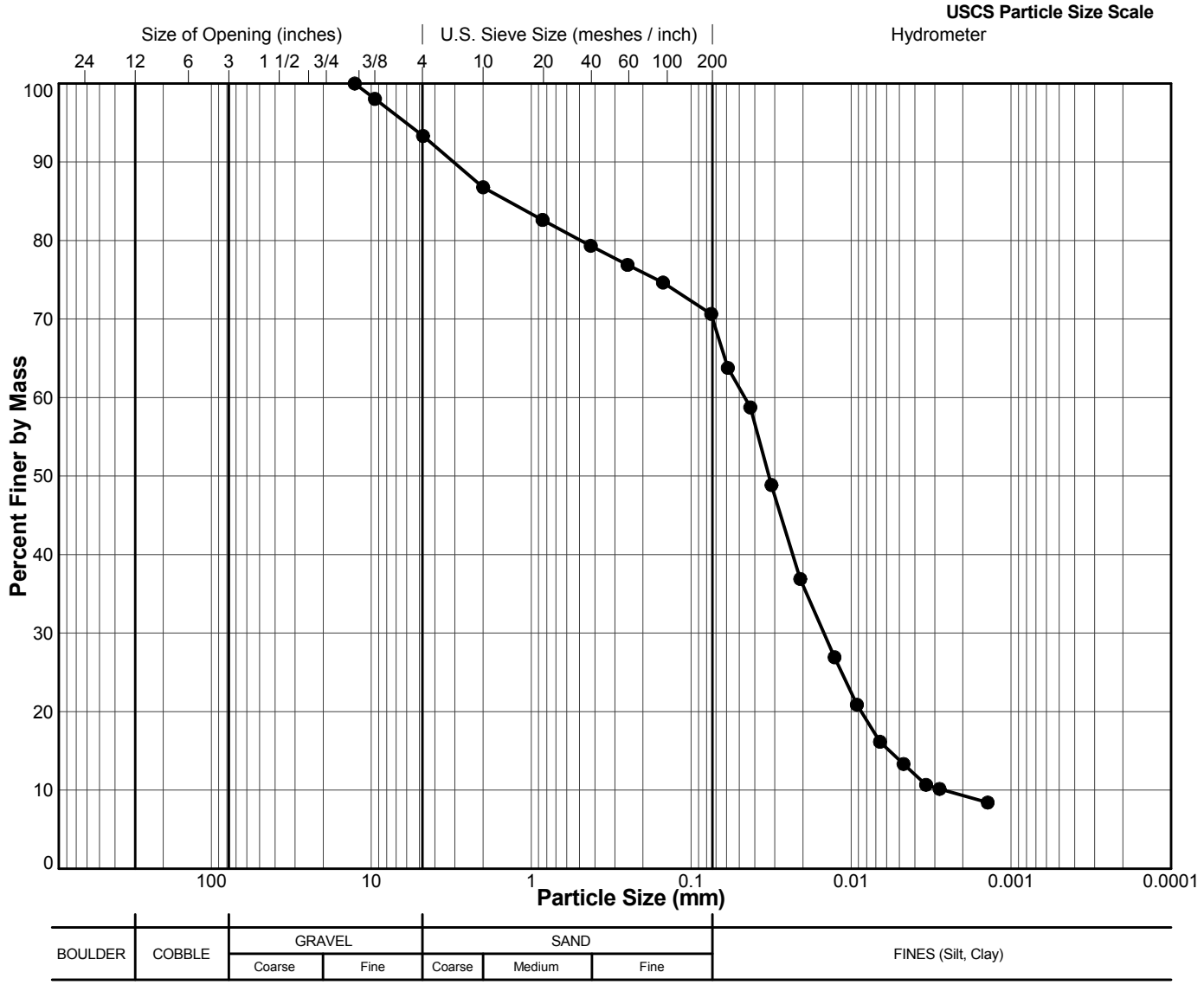
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 12.7	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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PARTICLE SIZE ANALYSIS OF SOILS

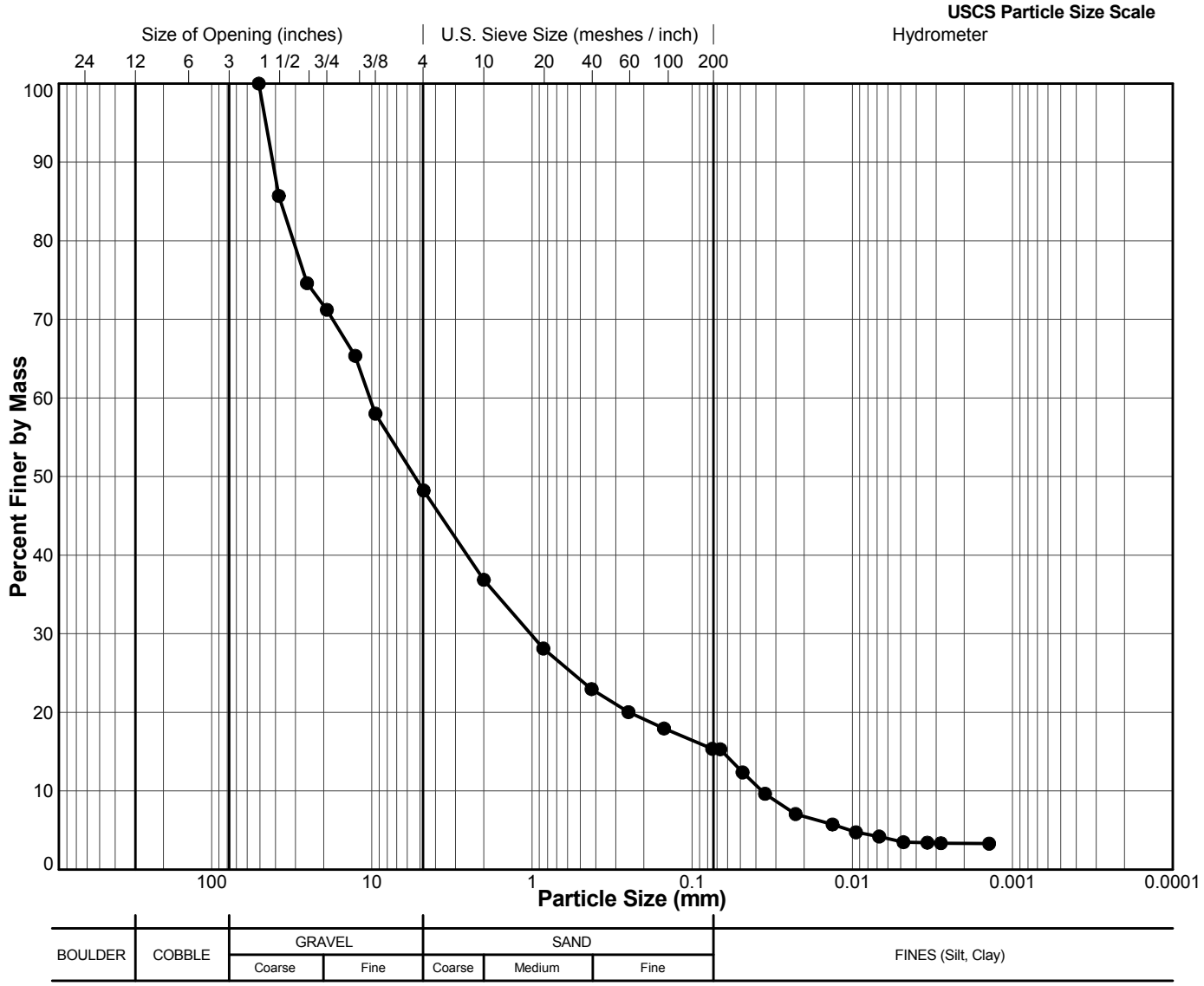
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.60 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



RS	21/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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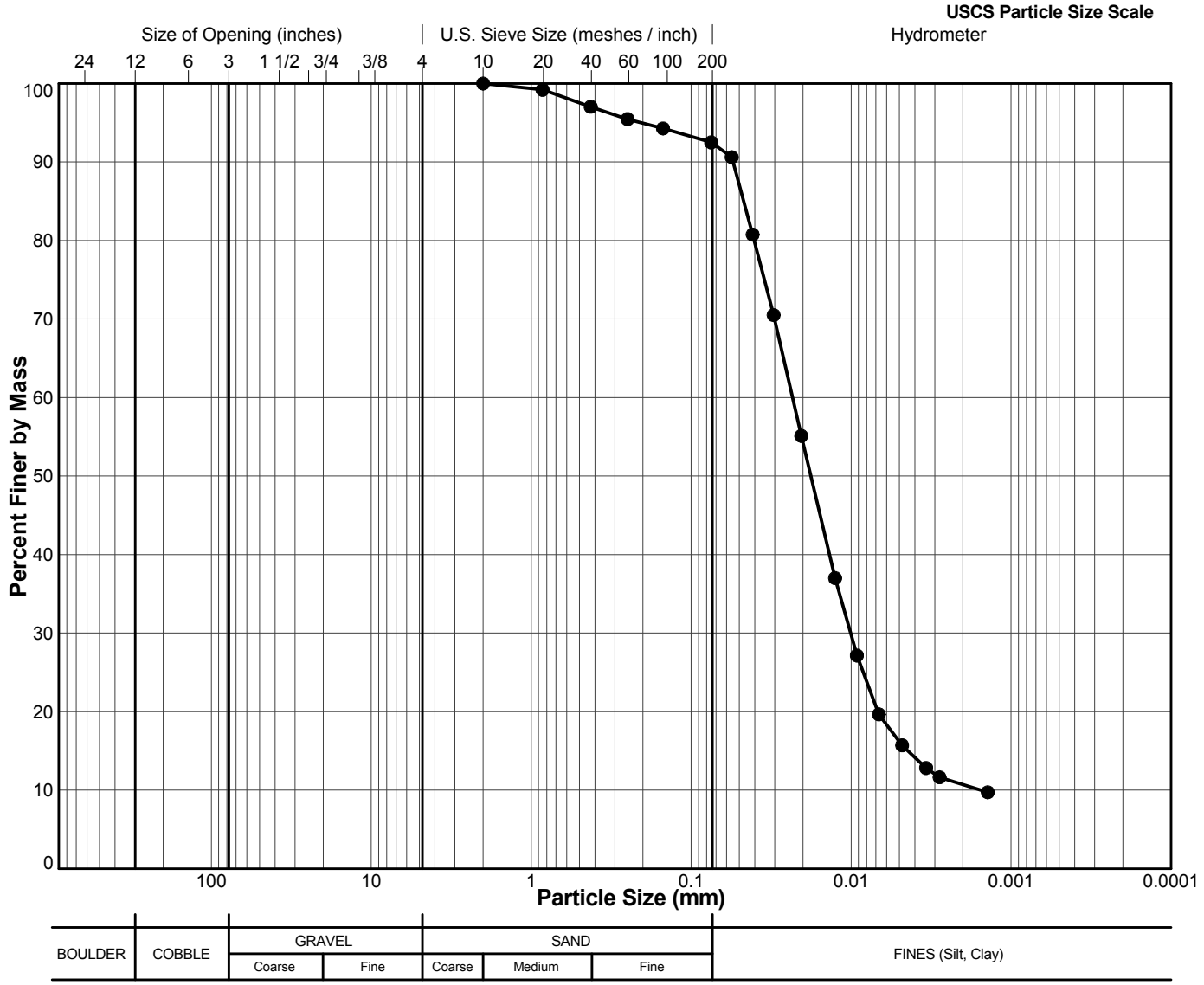
PARTICLE SIZE ANALYSIS OF SOILS

Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-92**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**
Hydrometer ID: BURNABY - 87024	



SK	**04/10/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

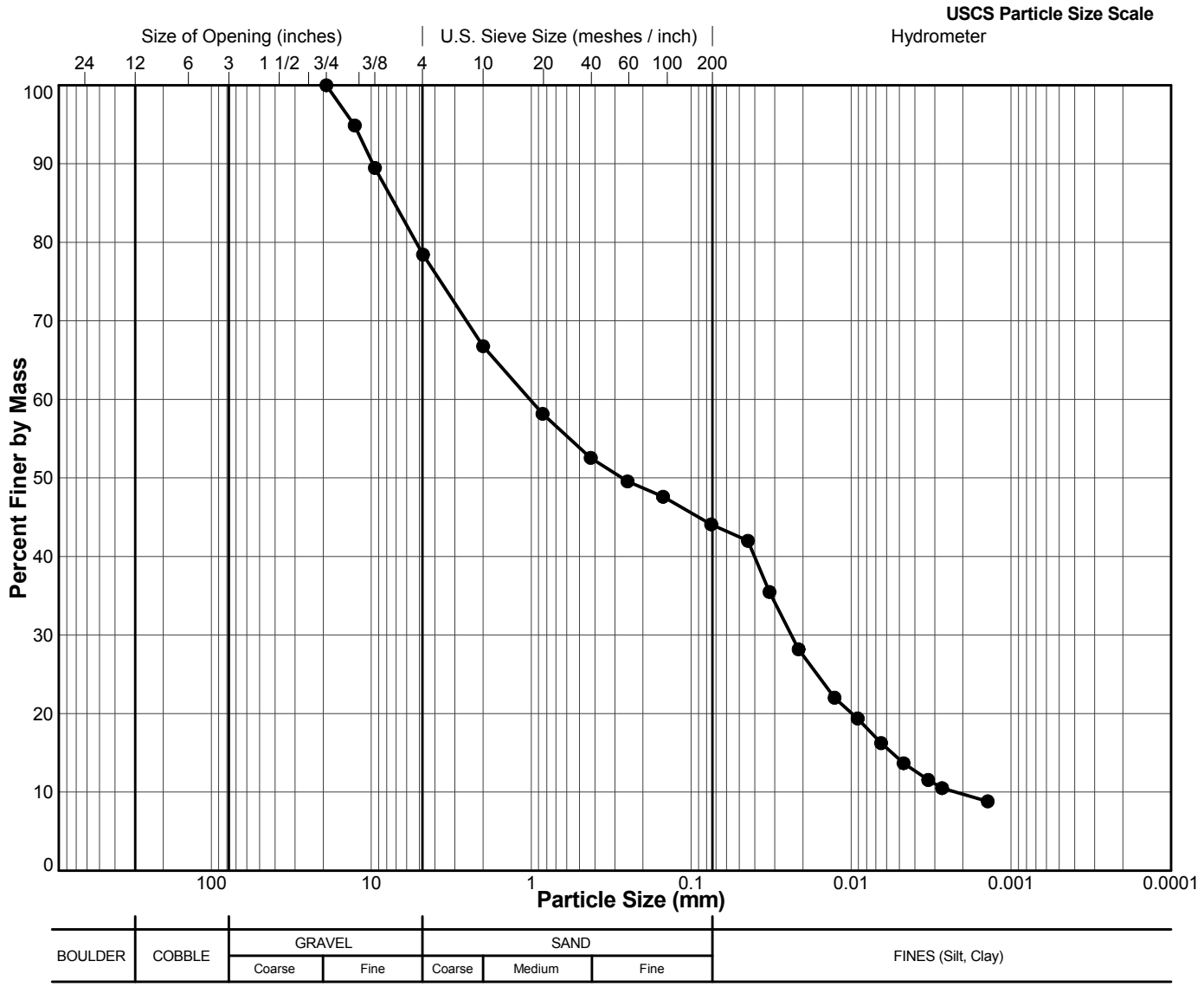
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-94**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**27/09/2011**	**LP**	**15/10/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

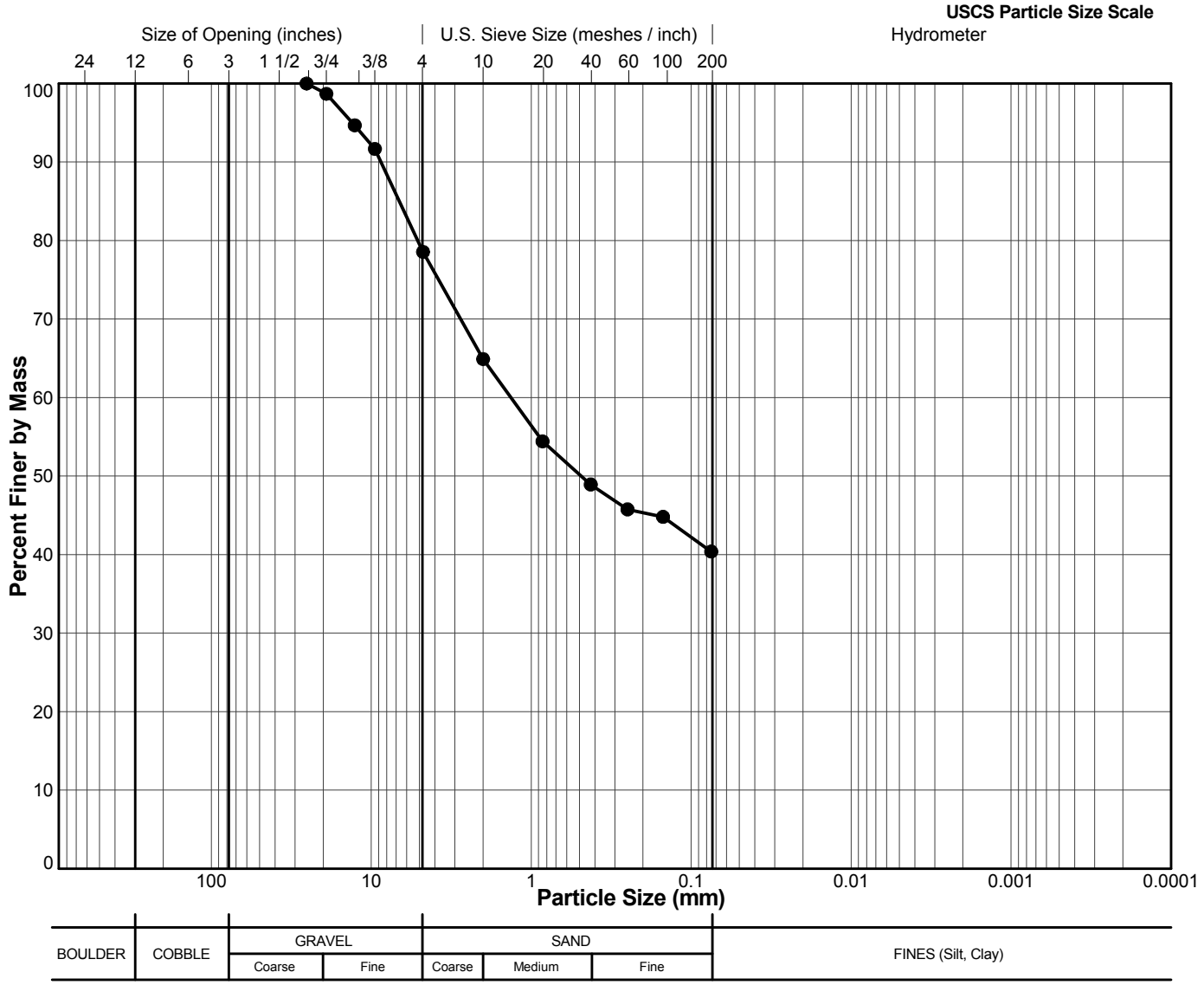
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-94**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.30 to 2.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	

Method: Split, Washed



RS	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

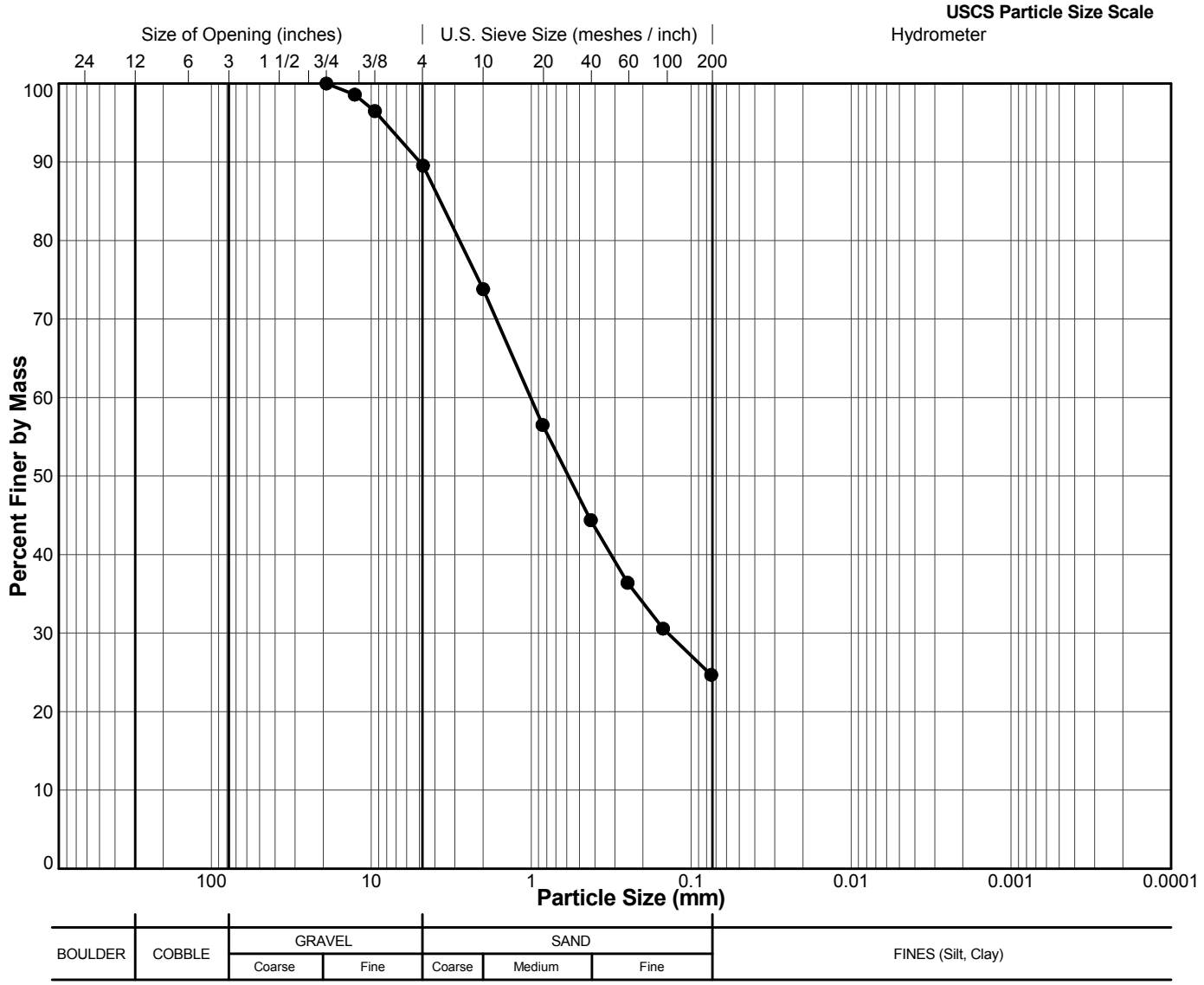
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-95**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	

Method: Split, Washed



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

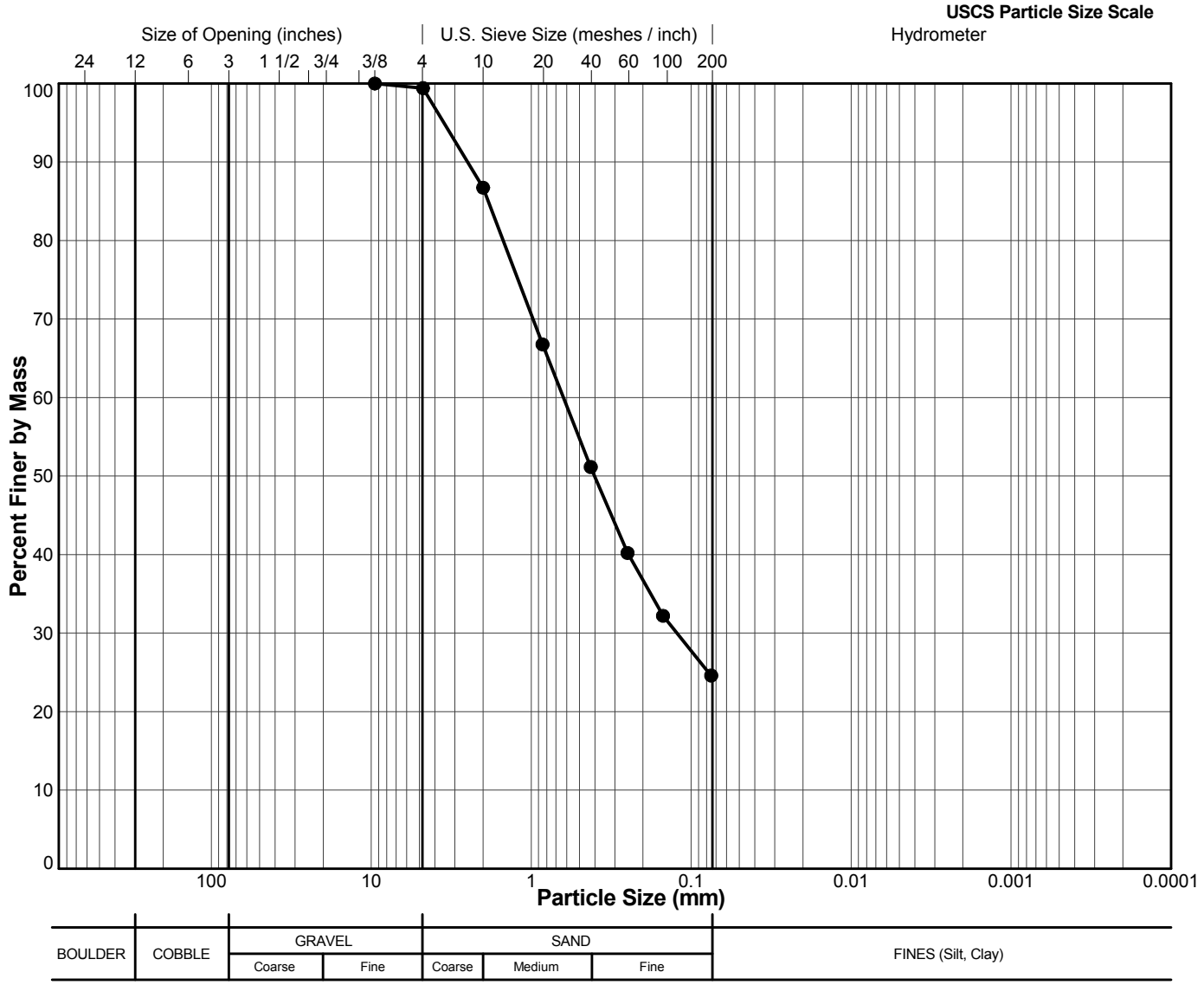
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-95**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.00 to 3.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 9.5	

Method: Split, Washed



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

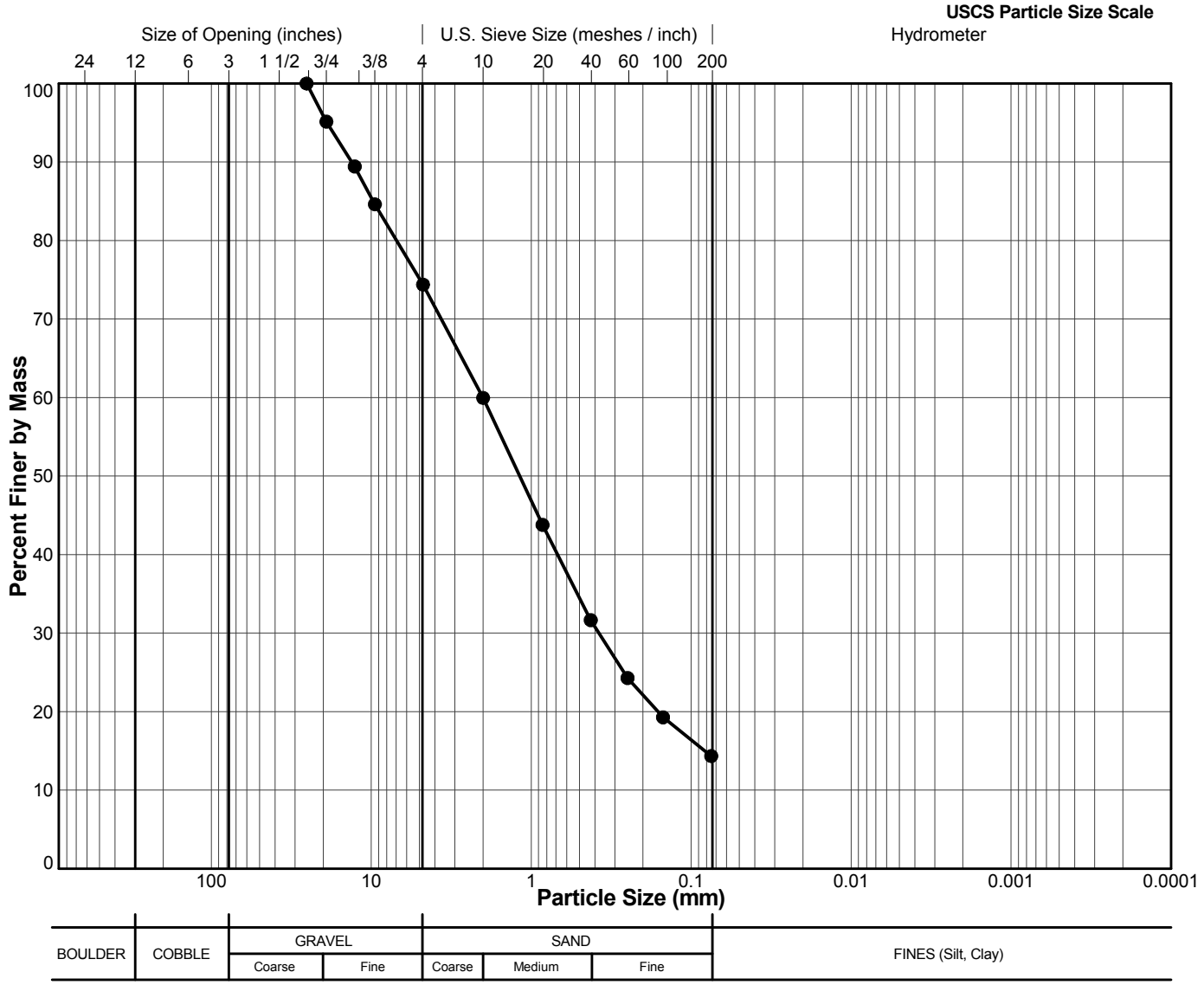
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-96**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 25.4	

Method: Split, Washed



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

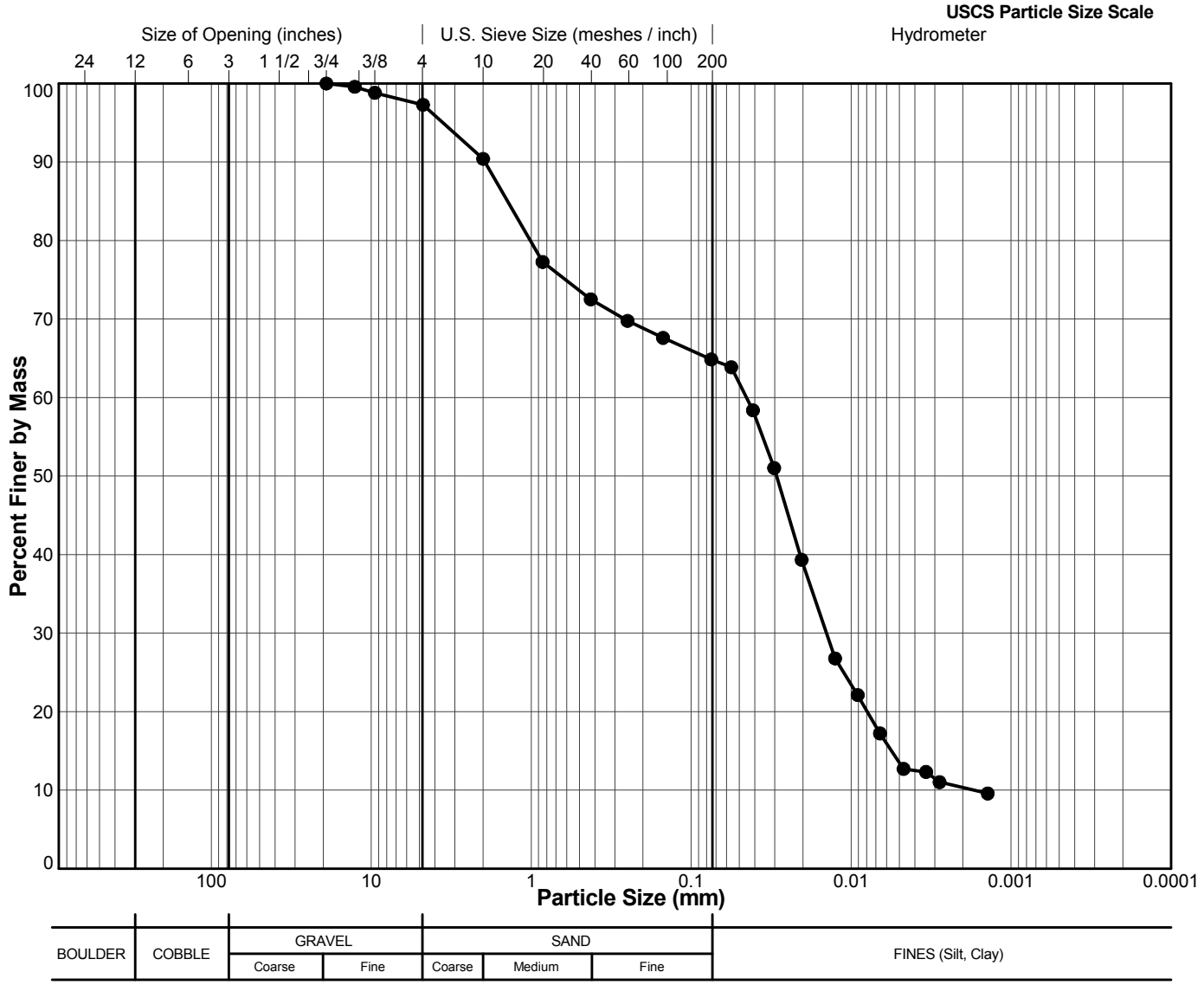
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-96**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 19.1	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

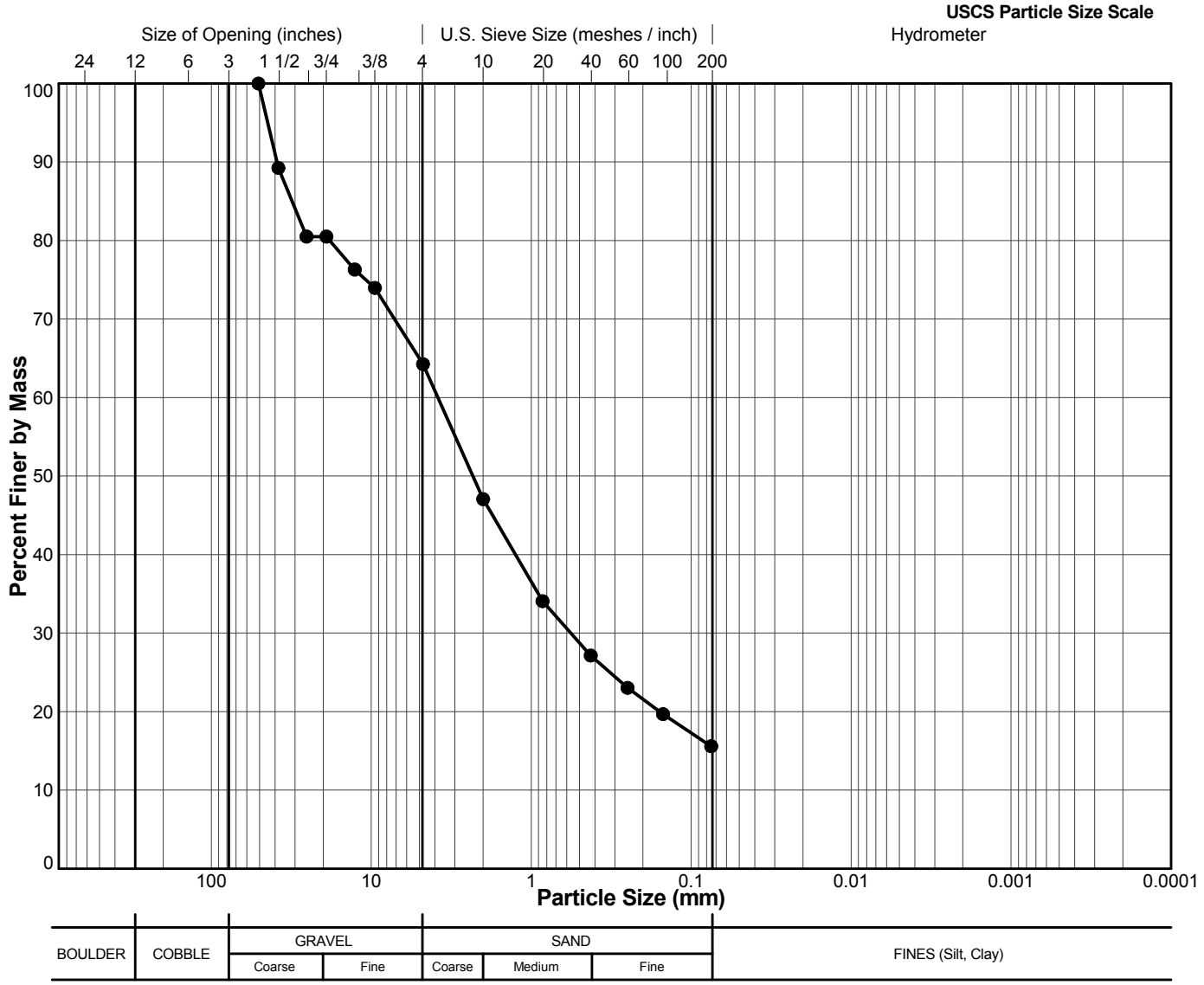
Reference(s)
ASTM D 422-63 (2007)

Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-96**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.80 to 2.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



SK	**01/11/2011**	**LP**	**03/11/2011**
Tech	Date	Checked	Date

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GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

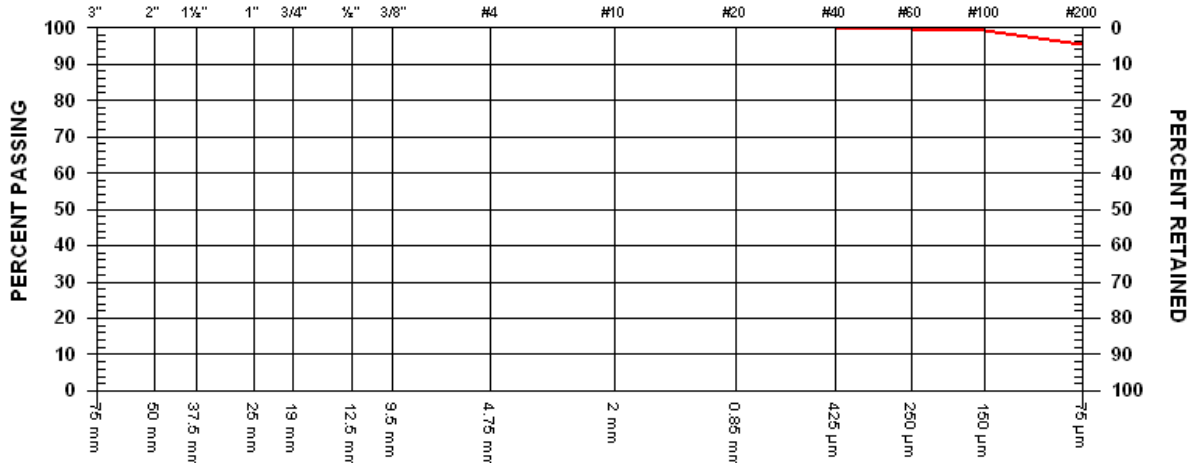
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 26 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT1 @ 1.15 - 1.60m
SPECIFICATION
MATERIAL TYPE Sand

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm		

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm		
No. 10	2.00 mm	100.0	
No. 20	850 µm	99.9	
No. 40	425 µm	99.9	
No. 60	250 µm	99.8	
No. 100	150 µm	99.4	
No. 200	75 µm	95.4	

COMMENTS

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

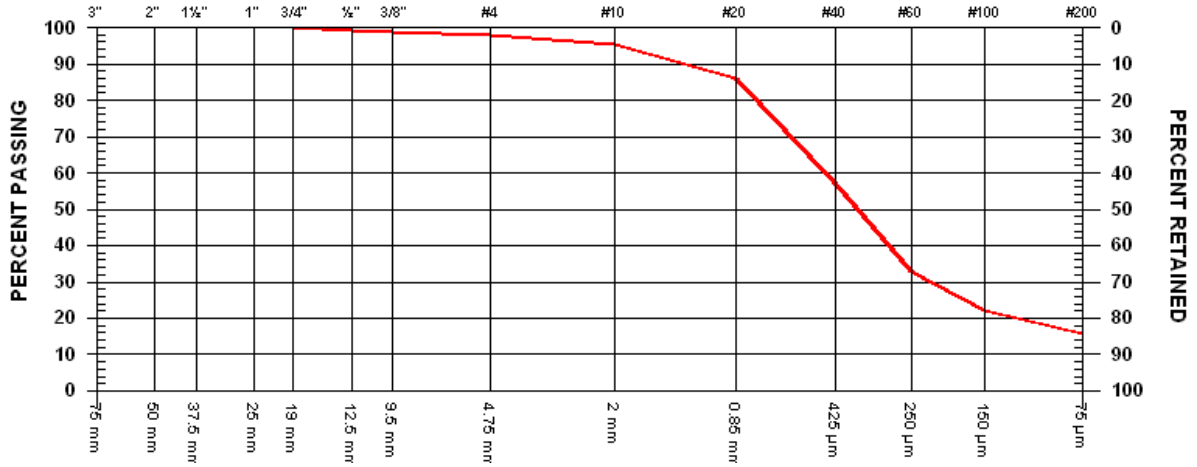
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 35 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT10 @ 8.71 - 9.16m
SPECIFICATION
MATERIAL TYPE Sand,gravelly

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	99.1	
3/8"	9.5 mm	98.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	97.8	
No. 10	2.00 mm	95.3	
No. 20	850 µm	86.2	
No. 40	425 µm	56.9	
No. 60	250 µm	32.6	
No. 100	150 µm	22.3	
No. 200	75 µm	15.6	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

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BGC Engineering Inc.
Suite 500 - 1045 Howe Street
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ATTN: Peter Quinn

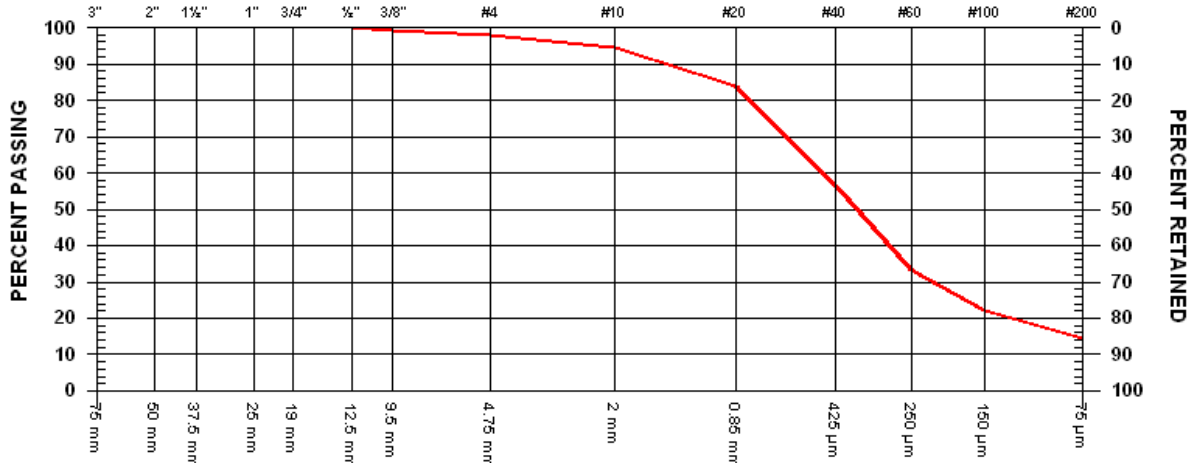
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 36 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT11 @ 9.25 - 9.70m
SPECIFICATION
MATERIAL TYPE Sand

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm	100.0	
3/8"	9.5 mm	99.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	98.1	
No. 10	2.00 mm	94.7	
No. 20	850 µm	84.0	
No. 40	425 µm	56.7	
No. 60	250 µm	33.4	
No. 100	150 µm	22.0	
No. 200	75 µm	14.4	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

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Suite 500 - 1045 Howe Street
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V6Z 2A9

ATTN: Peter Quinn

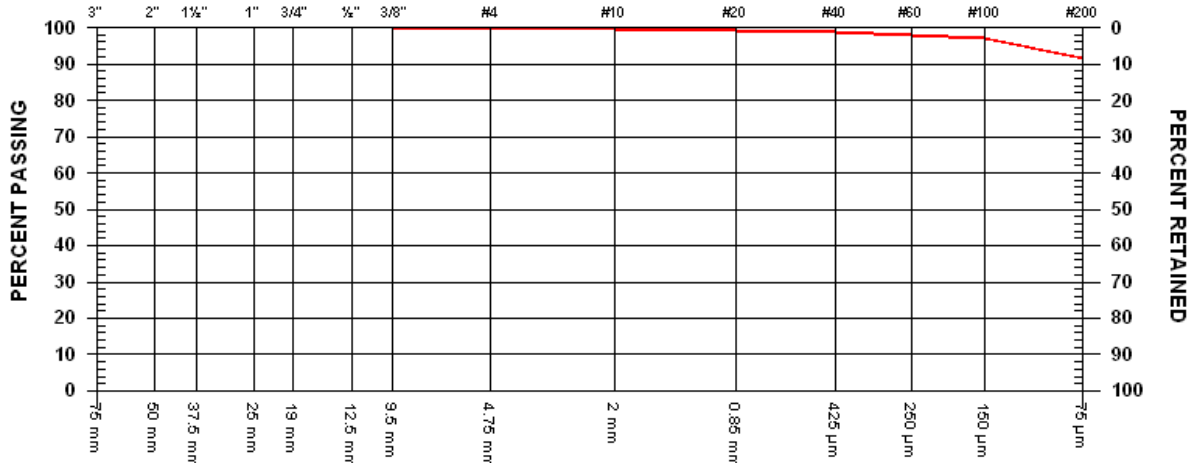
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 27 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT2 @ 1.60 - 2.05m
SPECIFICATION
MATERIAL TYPE Sand

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	99.8	
No. 10	2.00 mm	99.6	
No. 20	850 µm	99.2	
No. 40	425 µm	98.8	
No. 60	250 µm	98.1	
No. 100	150 µm	97.0	
No. 200	75 µm	91.5	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

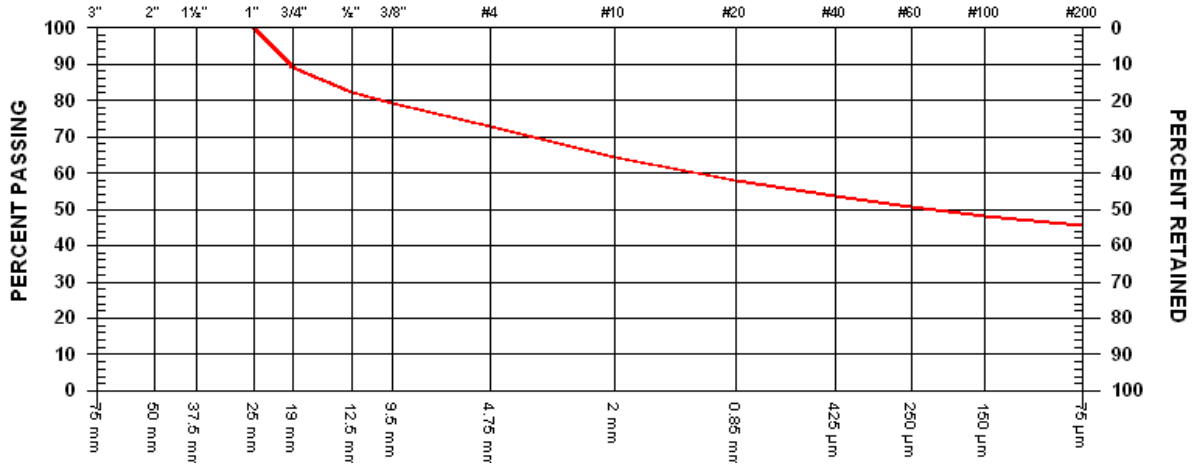
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 28 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT3 @ 2.28 - 2.73m
SPECIFICATION
MATERIAL TYPE Gravel, sandy

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	88.9	
1/2"	12.5 mm	82.3	
3/8"	9.5 mm	79.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	72.7	
No. 10	2.00 mm	64.3	
No. 20	850 µm	57.9	
No. 40	425 µm	53.5	
No. 60	250 µm	50.5	
No. 100	150 µm	48.3	
No. 200	75 µm	45.4	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
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BGC Engineering Inc.
Suite 500 - 1045 Howe Street
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V6Z 2A9

ATTN: Peter Quinn

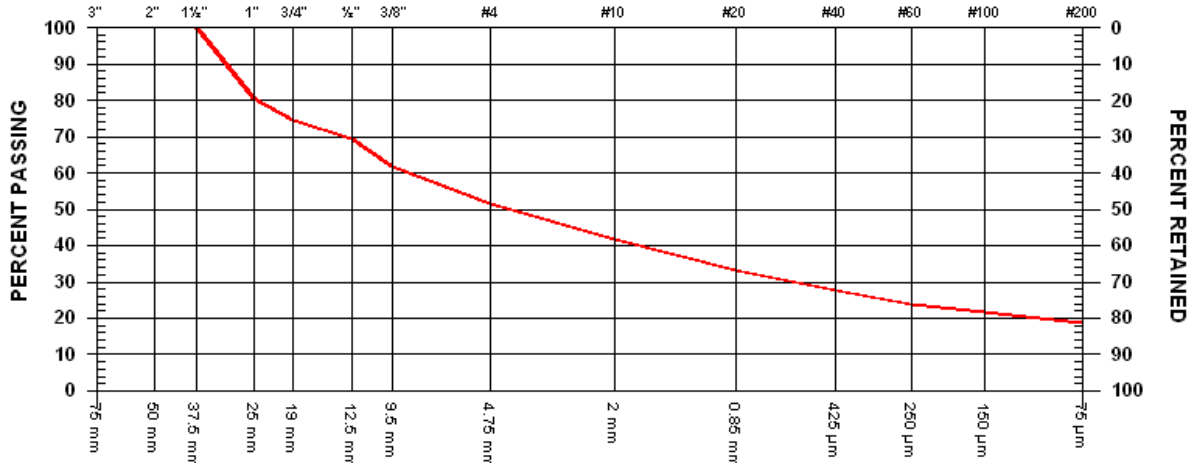
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 29 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT4 @ 2.75 - 3.20m
SPECIFICATION
MATERIAL TYPE Gravel, sandy

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	80.5	
3/4"	19 mm	74.5	
1/2"	12.5 mm	69.4	
3/8"	9.5 mm	61.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	51.6	
No. 10	2.00 mm	41.7	
No. 20	850 µm	33.2	
No. 40	425 µm	27.6	
No. 60	250 µm	24.0	
No. 100	150 µm	21.7	
No. 200	75 µm	18.7	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

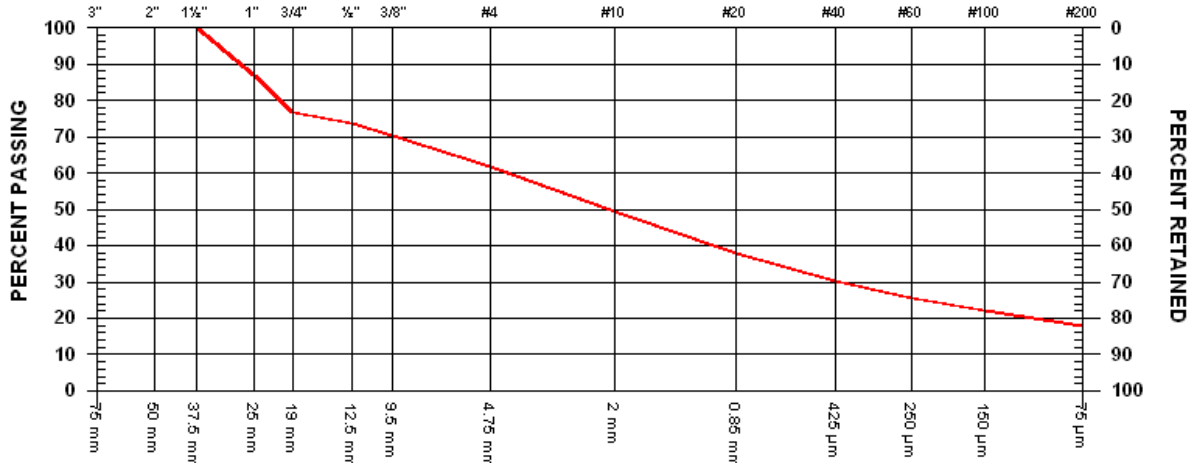
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 30 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT5 @ 4.6 - 5.05m
SPECIFICATION
MATERIAL TYPE Gravel, sandy

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	86.9	
3/4"	19 mm	76.7	
1/2"	12.5 mm	73.7	
3/8"	9.5 mm	70.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	61.6	
No. 10	2.00 mm	49.2	
No. 20	850 µm	37.9	
No. 40	425 µm	30.4	
No. 60	250 µm	25.7	
No. 100	150 µm	22.2	
No. 200	75 µm	17.7	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
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ATTN: Peter Quinn

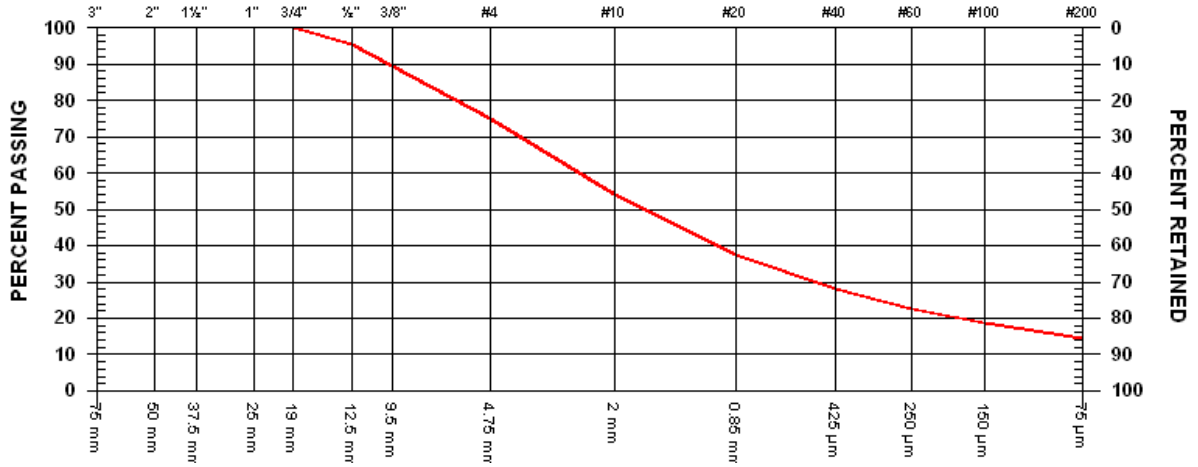
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 31 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT6 @ 5.53 - 5.98m
SPECIFICATION
MATERIAL TYPE Silt

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	95.5	
3/8"	9.5 mm	89.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	75.1	
No. 10	2.00 mm	54.2	
No. 20	850 µm	37.6	
No. 40	425 µm	27.9	
No. 60	250 µm	22.5	
No. 100	150 µm	18.8	
No. 200	75 µm	14.5	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

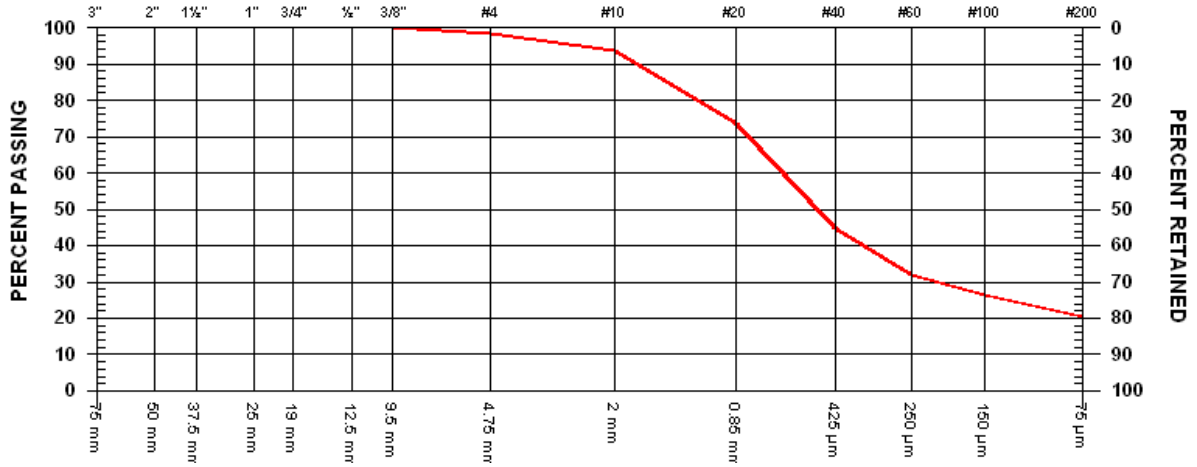
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 32 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT7 @ 6.22 - 6.67m
SPECIFICATION
MATERIAL TYPE Sand

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	98.3	
No. 10	2.00 mm	93.5	
No. 20	850 µm	73.6	
No. 40	425 µm	44.5	
No. 60	250 µm	31.9	
No. 100	150 µm	26.3	
No. 200	75 µm	20.5	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
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ATTN: Peter Quinn

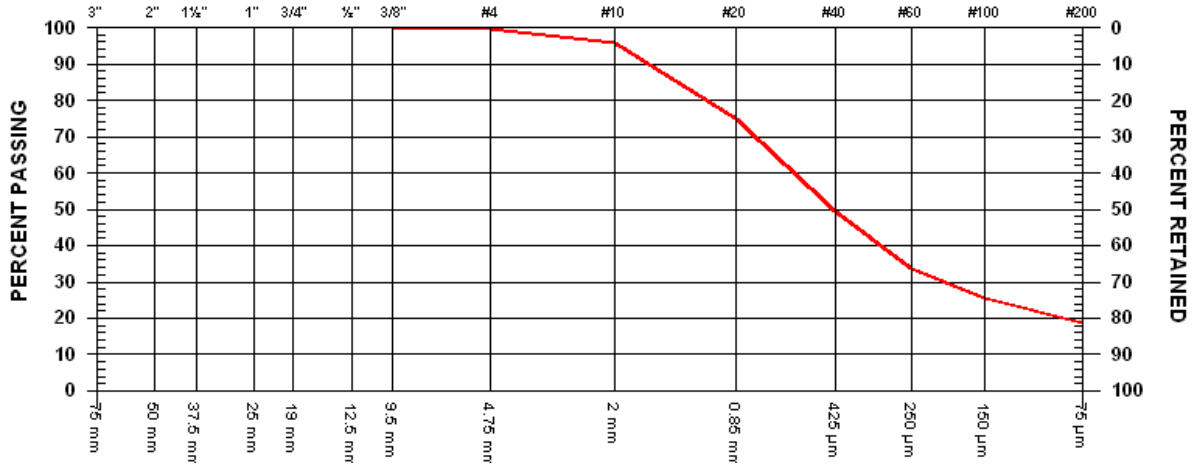
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 33 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT8 @ 7.16 - 7.61m
SPECIFICATION
MATERIAL TYPE Sand

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm		
1/2"	12.5 mm		
3/8"	9.5 mm	100.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	99.7	
No. 10	2.00 mm	96.0	
No. 20	850 µm	74.9	
No. 40	425 µm	49.4	
No. 60	250 µm	33.5	
No. 100	150 µm	25.5	
No. 200	75 µm	18.9	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

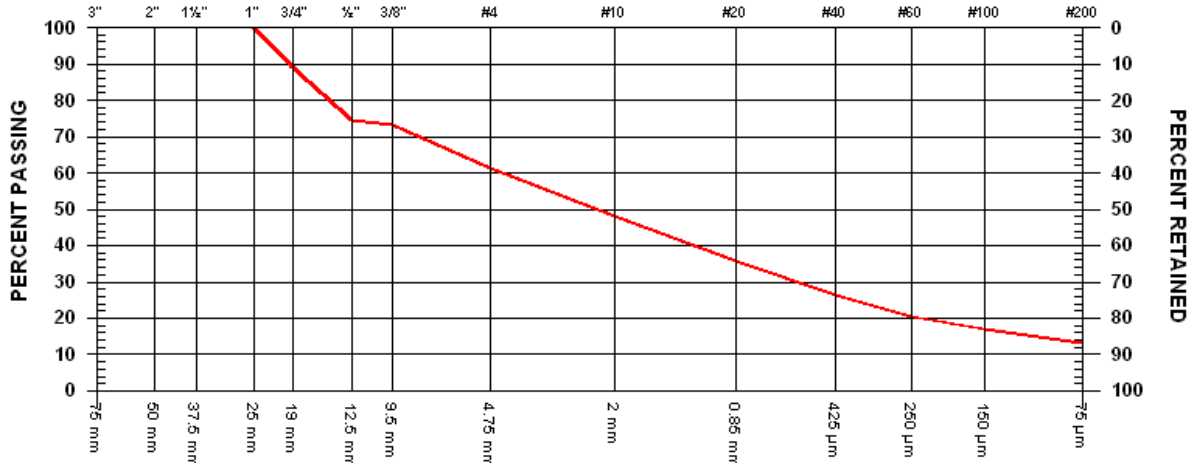
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 34 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Jul.27

SUPPLIER BH-BGC11-39
SOURCE SPT9 @ 7.75 - 8.20m
SPECIFICATION
MATERIAL TYPE Sand, gravelly

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



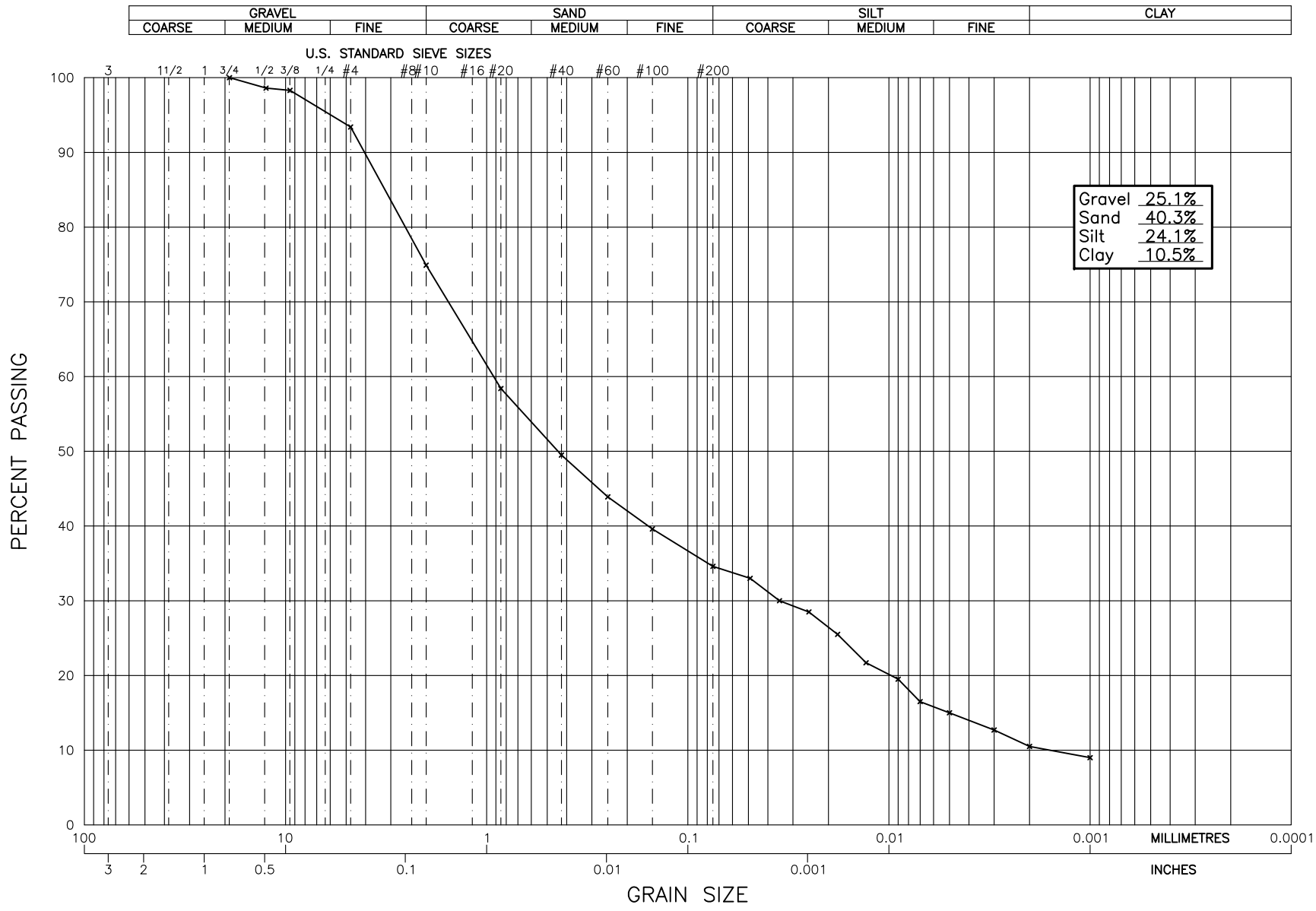
GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	88.9	
1/2"	12.5 mm	74.7	
3/8"	9.5 mm	73.4	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	61.4	
No. 10	2.00 mm	48.3	
No. 20	850 µm	35.6	
No. 40	425 µm	26.2	
No. 60	250 µm	20.5	
No. 100	150 µm	16.9	
No. 200	75 µm	13.0	

COMMENTS

 2011.Nov.11 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George



GeoNorth Engineering Ltd.
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Prince George, B.C. V2N 1B2
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-42-S2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH42-S2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

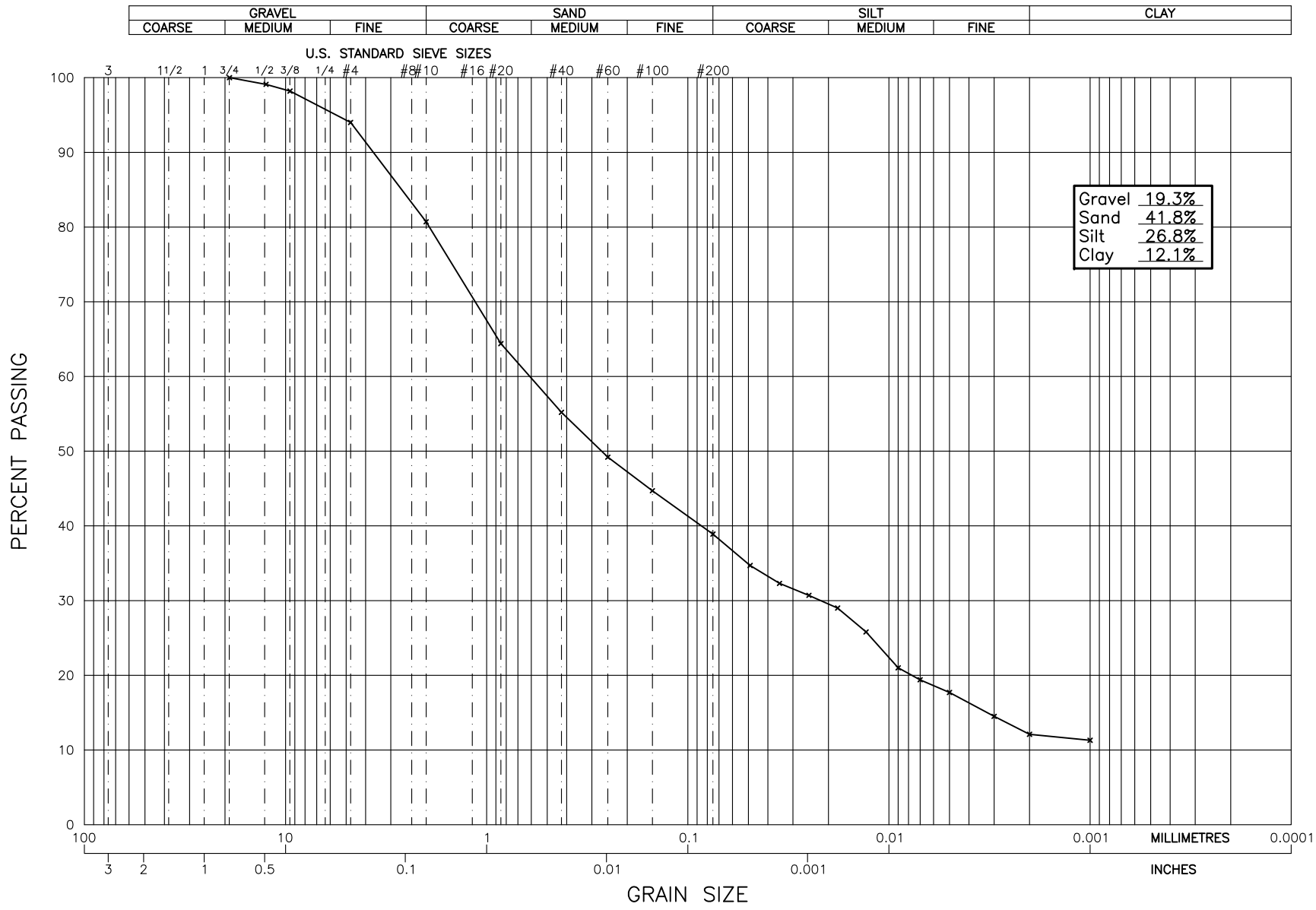
Client: BGC Engineering Ltd.				Date: November 8, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand, gravelly,silty, trace clay
Sample #: **2**	Test #:	**Hole #: BH-BGC11-42**	**Depth: 1.8 - 2.27m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: July 29, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.7, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**74.9**
Wet Wt. & Tare	1350.5	25.4				20	11.0	39.0	78.0	**58.4**
Dry Wt. & Tare	1180.8	19.0		984.0	**100.0**	40	6.0	33.0	66.0	**49.5**
Water Wt.	169.7	12.5	14.2	969.8	**98.6**	60	3.7	29.3	58.6	**43.9**
Tare Wt.	196.8	9.5	2.1	967.7	**98.3**	100	2.9	26.4	52.8	**39.6**
Wt. Of Dry Soil	984.0	4.75	48.3	919.4	**93.4**	200	3.3	23.1	46.2	**34.6**
Moisture Content %	**17.2**	10	182.1	737.3	**74.9**	Pan	23.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	984.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.749	0.5	30.0	20.0	0.01365	23.0	12.5	5.000	0.068	46.0	**34.5**
50.0	0.749	1	29.0	20.0	0.01365	22.0	12.7	3.559	0.049	44.0	**33.0**
50.0	0.749	2	27.0	20.0	0.01365	20.0	13.0	2.549	0.035	40.0	**30.0**
50.0	0.749	4	26.0	20.0	0.01365	19.0	13.2	1.814	0.025	38.0	**28.5**
50.0	0.749	8	24.0	20.0	0.01365	17.0	13.5	1.299	0.018	34.0	**25.5**
50.0	0.749	15	21.5	20.0	0.01365	14.5	13.9	0.963	0.013	29.0	**21.7**
50.0	0.749	30	20.0	20.0	0.01365	13.0	14.2	0.687	0.009	26.0	**19.5**
50.0	0.749	60	18.0	20.0	0.01365	11.0	14.5	0.491	0.007	22.0	**16.5**
50.0	0.749	120	17.0	21.0	0.01348	10.0	14.6	0.349	0.005	20.0	**15.0**
50.0	0.749	240	15.5	21.0	0.01348	8.5	14.9	0.249	0.003	17.0	**12.7**
50.0	0.749	480	14.0	21.0	0.01348	7.0	15.1	0.178	0.002	14.0	**10.5**
50.0	0.749	1440	13.0	21.0	0.01348	6.0	15.3	0.103	0.001	12.0	**9.0**

Hydrometer #: 932452	Graduate #: 5	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



GEONORTH ENGINEERING LTD.
3975 18th Avenue
Prince George, B.C. V2N 1B2
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-42-S5

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH42-S5

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Ltd.				Date: November 8, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand,silty,some gravel and clay
Sample #: **5**	Test #:	**Hole #: BH-BGC11-42**	**Depth: 6.4 - 6.84m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: July 29, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.7, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**80.7**
Wet Wt. & Tare	1265.1	25.4				20	10.1	39.9	79.8	**64.4**
Dry Wt. & Tare	1136.5	19.0		945.4	**100.0**	40	5.7	34.2	68.4	**55.2**
Water Wt.	128.6	12.5	8.4	937.0	**99.1**	60	3.7	30.5	61.0	**49.2**
Tare Wt.	191.1	9.5	8.7	928.3	**98.2**	100	2.8	27.7	55.4	**44.7**
Wt. Of Dry Soil	945.4	4.75	39.3	889.0	**94.0**	200	3.6	24.1	48.2	**38.9**
Moisture Content %	**13.6**	10	126.3	762.7	**80.7**	Pan	24.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	945.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.807	0.5	31.0	20.0	0.01365	24.0	12.3	4.967	0.068	48.0	**38.7**
50.0	0.807	1	28.5	20.0	0.01365	21.5	12.7	3.570	0.049	43.0	**34.7**
50.0	0.807	2	27.0	20.0	0.01365	20.0	13.0	2.549	0.035	40.0	**32.3**
50.0	0.807	4	26.0	20.0	0.01365	19.0	13.2	1.814	0.025	38.0	**30.7**
50.0	0.807	8	25.0	20.0	0.01365	18.0	13.3	1.291	0.018	36.0	**29.0**
50.0	0.807	15	23.0	20.0	0.01365	16.0	13.7	0.954	0.013	32.0	**25.8**
50.0	0.807	30	20.0	20.0	0.01365	13.0	14.2	0.687	0.009	26.0	**21.0**
50.0	0.807	60	19.0	20.0	0.01365	12.0	14.3	0.488	0.007	24.0	**19.4**
50.0	0.807	120	18.0	21.0	0.01348	11.0	14.5	0.347	0.005	22.0	**17.7**
50.0	0.807	240	16.0	21.0	0.01348	9.0	14.8	0.248	0.003	18.0	**14.5**
50.0	0.807	480	14.5	21.0	0.01348	7.5	15.1	0.177	0.002	15.0	**12.1**
50.0	0.807	1440	14.0	21.0	0.01348	7.0	15.1	0.103	0.001	14.0	**11.3**

Hydrometer #: 932452	Graduate #: 4	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

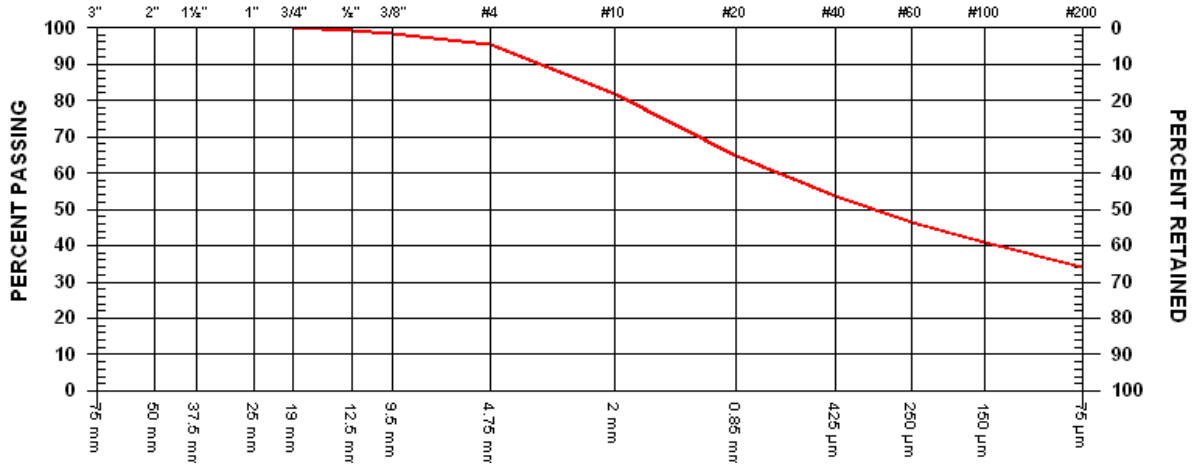
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 8 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.02 DATE SAMPLED 2011.Jul.07

SUPPLIER BH-BGC11-42
SOURCE SA#7 @ 9.4 - 9.88m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	99.3	
3/8"	9.5 mm	98.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	95.2	
No. 10	2.00 mm	81.7	
No. 20	850 µm	64.9	
No. 40	425 µm	53.7	
No. 60	250 µm	46.3	
No. 100	150 µm	40.8	
No. 200	75 µm	33.9	

COMMENTS

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

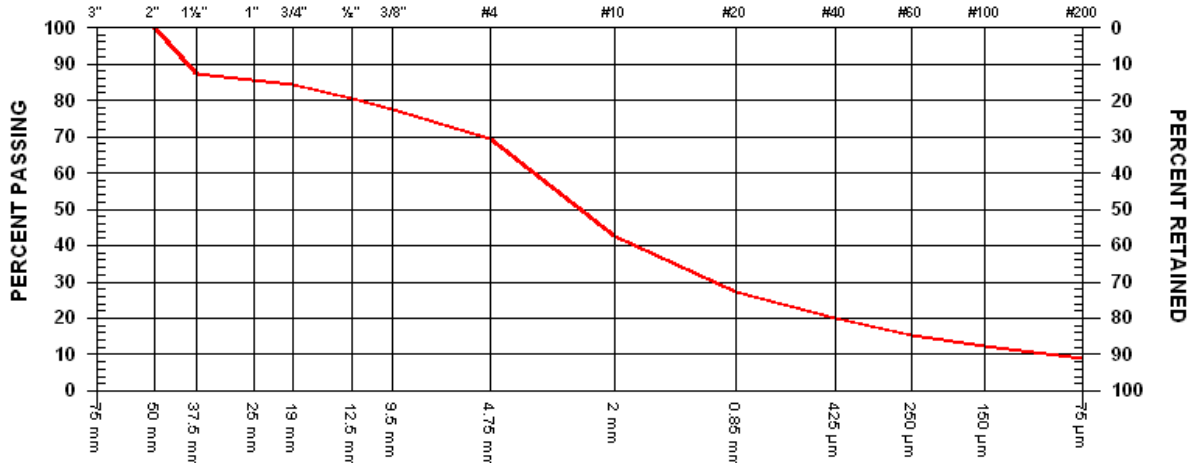
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 9 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.02 DATE SAMPLED 2011.Jul.30

SUPPLIER BH-BGC11-42
SOURCE SA#12 @ 13.3 - 13.65m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



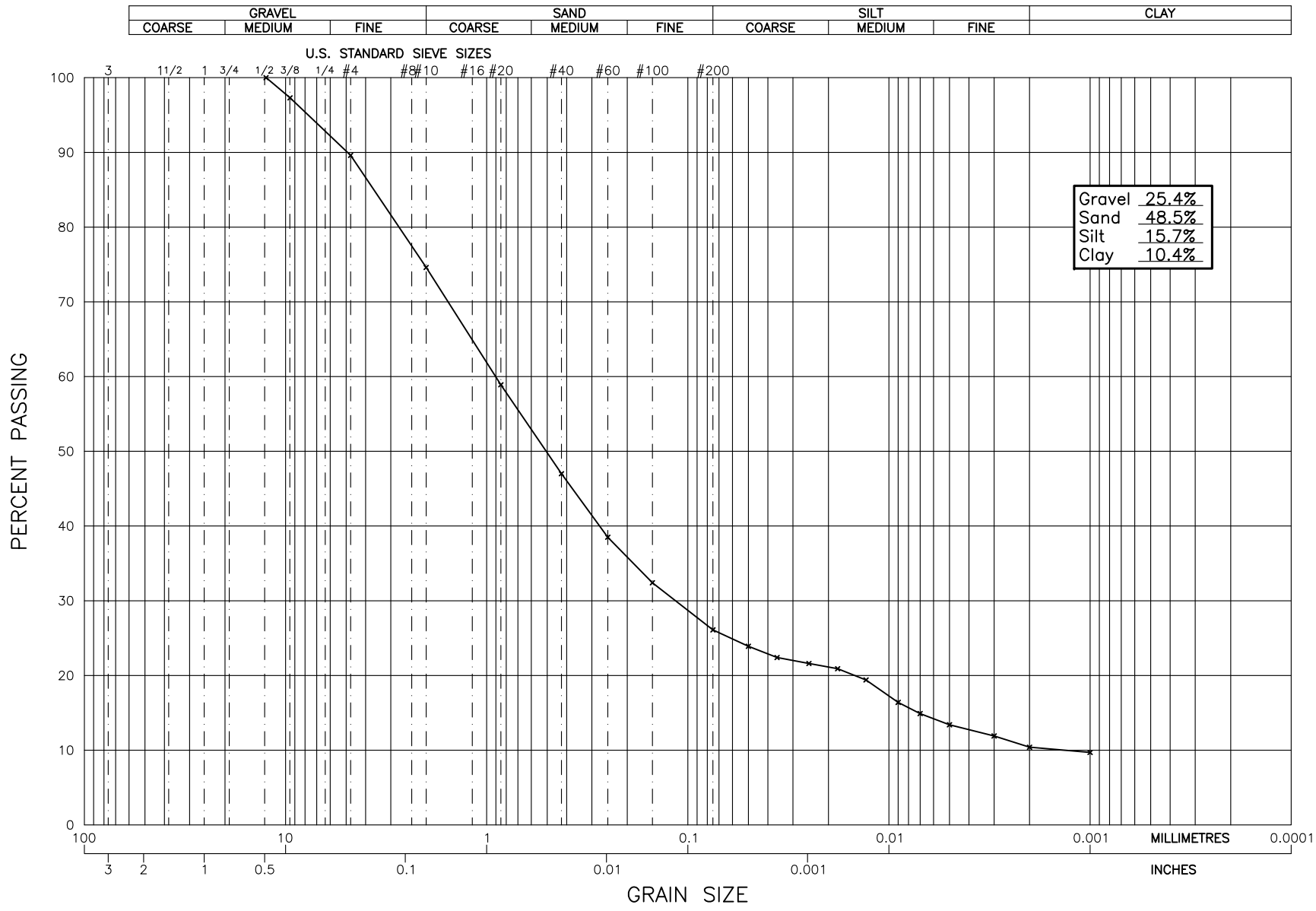
GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	87.1	
1"	25 mm		
3/4"	19 mm	84.1	
1/2"	12.5 mm	80.5	
3/8"	9.5 mm	77.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	69.2	
No. 10	2.00 mm	42.5	
No. 20	850 µm	27.1	
No. 40	425 µm	19.8	
No. 60	250 µm	15.4	
No. 100	150 µm	12.3	
No. 200	75 µm	8.8	

COMMENTS

 2011.Nov.04 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-42-S20

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH42-S20

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

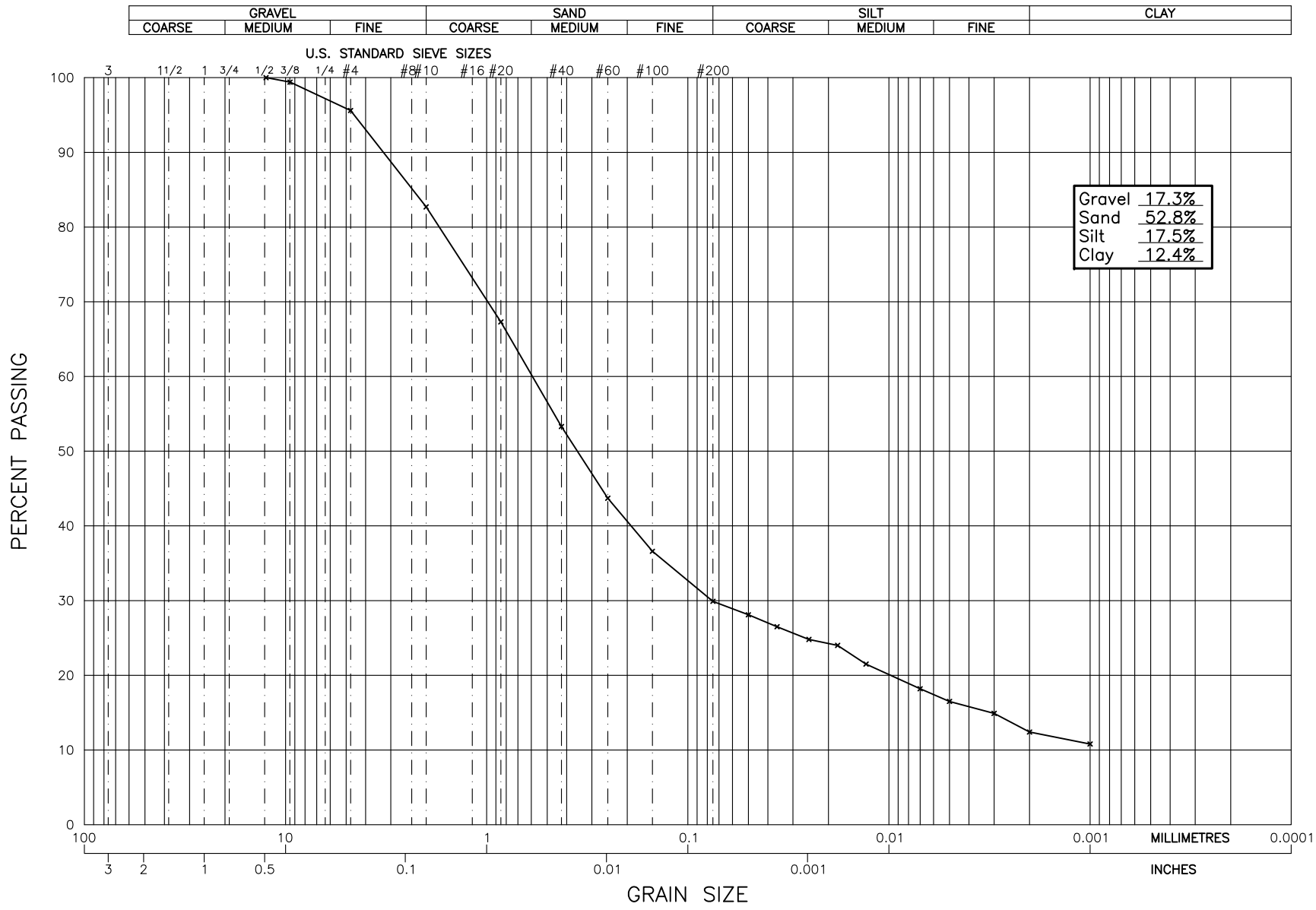
Client: BGC Engineering Ltd.				Date: November 8, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand,gravelly,some silt and clay
Sample #: **20**	Test #:	**Hole #: BH-BGC11-42**	**Depth: 19.7 - 20.0m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: July 30, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.8, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**74.6**
Wet Wt. & Tare	597.3	25.4				20	10.5	39.5	79.0	**58.9**
Dry Wt. & Tare	532.7	19.0				40	8.0	31.5	63.0	**47.0**
Water Wt.	64.6	12.5		353.5	**100.0**	60	5.7	25.8	51.6	**38.5**
Tare Wt.	179.2	9.5	9.6	343.9	**97.3**	100	4.1	21.7	43.4	**32.4**
Wt. Of Dry Soil	353.5	4.75	27.1	316.8	**89.6**	200	4.2	17.5	35.0	**26.1**
Moisture Content %	**18.3**	10	53.2	263.6	**74.6**	Pan	17.5			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	353.5			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.746	0.5	24.5	20.0	0.01365	17.5	13.4	5.178	0.071	35.0	**26.1**
50.0	0.746	1	23.0	20.0	0.01365	16.0	13.7	3.695	0.050	32.0	**23.9**
50.0	0.746	2	22.0	20.0	0.01365	15.0	13.8	2.629	0.036	30.0	**22.4**
50.0	0.746	4	21.5	20.0	0.01365	14.5	13.9	1.864	0.025	29.0	**21.6**
50.0	0.746	8	21.0	20.0	0.01365	14.0	14.0	1.322	0.018	28.0	**20.9**
50.0	0.746	15	20.0	20.0	0.01365	13.0	14.2	0.971	0.013	26.0	**19.4**
50.0	0.746	30	18.0	20.0	0.01365	11.0	14.5	0.695	0.009	22.0	**16.4**
50.0	0.746	60	17.0	20.0	0.01365	10.0	14.6	0.494	0.007	20.0	**14.9**
50.0	0.746	120	16.0	21.0	0.01348	9.0	14.8	0.351	0.005	18.0	**13.4**
50.0	0.746	240	15.0	21.0	0.01348	8.0	15.0	0.250	0.003	16.0	**11.9**
50.0	0.746	480	14.0	21.0	0.01348	7.0	15.1	0.178	0.002	14.0	**10.4**
50.0	0.746	1440	13.5	21.0	0.01348	6.5	15.2	0.103	0.001	13.0	**9.7**

Hydrometer #: 932452	Graduate #: 3	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



GEONORTH ENGINEERING LTD.
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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-42-S22

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH42-S22

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Ltd.				Date: November 8, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand, some gravel,silt,clay
Sample #: **22**	Test #:	**Hole #: BH-BGC11-42**	**Depth: 21.55 - 21.90m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: July 30, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.7, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**82.7**
Wet Wt. & Tare	653.2	25.4				20	9.3	40.7	81.4	**67.3**
Dry Wt. & Tare	576.8	19.0				40	8.5	32.2	64.4	**53.3**
Water Wt.	76.4	12.5		395.6	**100.0**	60	5.8	26.4	52.8	**43.7**
Tare Wt.	181.2	9.5	2.5	393.1	**99.4**	100	4.3	22.1	44.2	**36.6**
Wt. Of Dry Soil	395.6	4.75	14.8	378.3	**95.6**	200	4.0	18.1	36.2	**29.9**
Moisture Content %	**19.3**	10	51.1	327.2	**82.7**	Pan	18.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	395.6			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.827	0.5	25.0	20.0	0.01365	18.0	13.3	5.162	0.070	36.0	**29.8**
50.0	0.827	1	24.0	20.0	0.01365	17.0	13.5	3.673	0.050	34.0	**28.1**
50.0	0.827	2	23.0	20.0	0.01365	16.0	13.7	2.613	0.036	32.0	**26.5**
50.0	0.827	4	22.0	20.0	0.01365	15.0	13.8	1.859	0.025	30.0	**24.8**
50.0	0.827	8	21.5	20.0	0.01365	14.5	13.9	1.318	0.018	29.0	**24.0**
50.0	0.827	15	20.0	20.0	0.01365	13.0	14.2	0.971	0.013	26.0	**21.5**
50.0	0.827	30	20.0	20.0	0.01365	13.0	14.2	0.687	0.009	26.0	**21.5**
50.0	0.827	60	18.0	20.0	0.01365	11.0	14.5	0.491	0.007	22.0	**18.2**
50.0	0.827	120	17.0	21.0	0.01348	10.0	14.6	0.349	0.005	20.0	**16.5**
50.0	0.827	240	16.0	21.0	0.01348	9.0	14.8	0.248	0.003	18.0	**14.9**
50.0	0.827	480	14.5	21.0	0.01348	7.5	15.1	0.177	0.002	15.0	**12.4**
50.0	0.827	1440	13.5	21.0	0.01348	6.5	15.2	0.103	0.001	13.0	**10.8**

Hydrometer #: 932452	Graduate #: 2	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

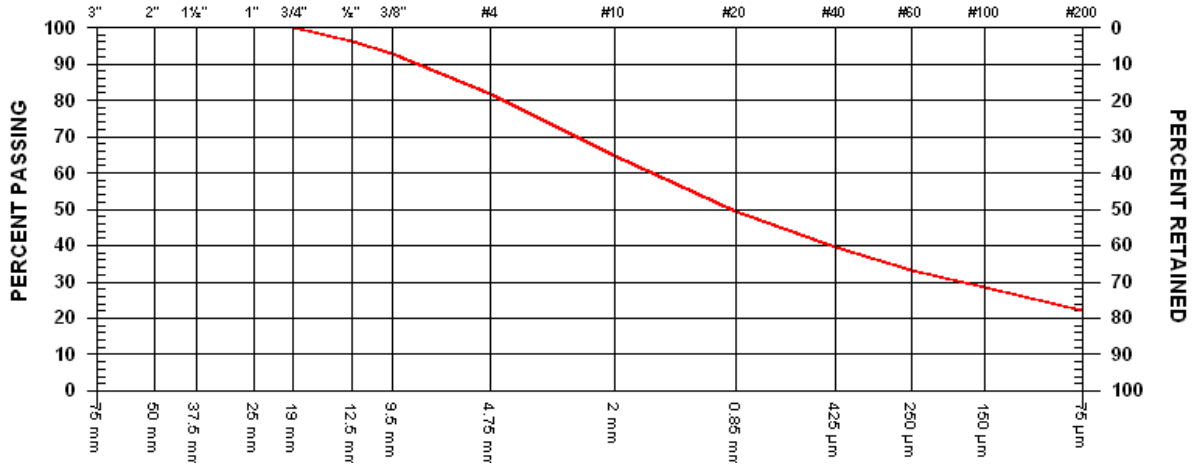
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 10 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.02 DATE SAMPLED 2011.Jul.30

SUPPLIER BH-BGC11-42
SOURCE SA#26 @ 27.60 - 28.0m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



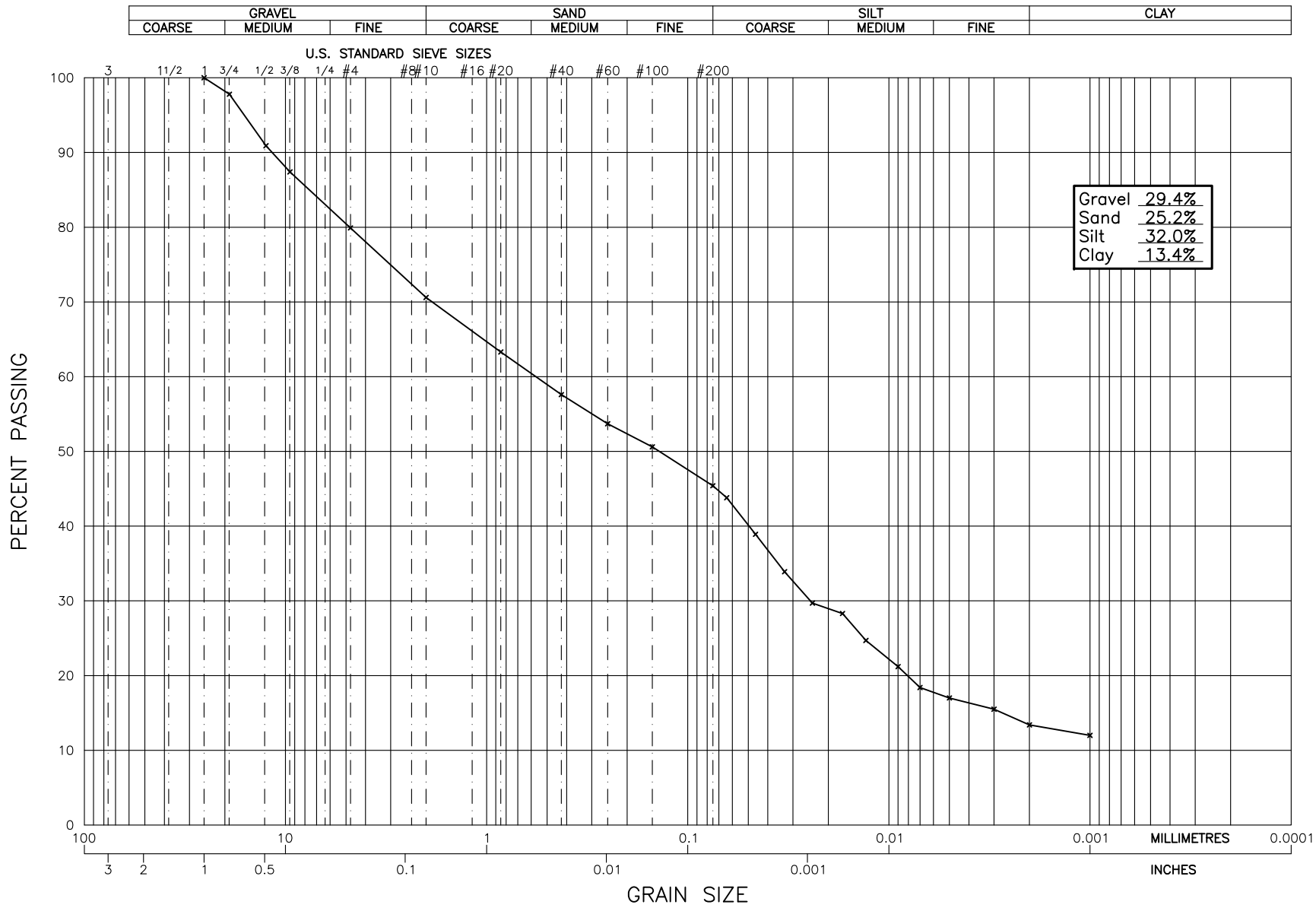
GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	96.4	
3/8"	9.5 mm	92.7	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	81.6	
No. 10	2.00 mm	64.9	
No. 20	850 µm	49.4	
No. 40	425 µm	39.7	
No. 60	250 µm	33.4	
No. 100	150 µm	28.5	
No. 200	75 µm	22.3	

COMMENTS

 2011.Nov.04 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George



GEONORTH ENGINEERING LTD.
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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-44-S1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH44-S1

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

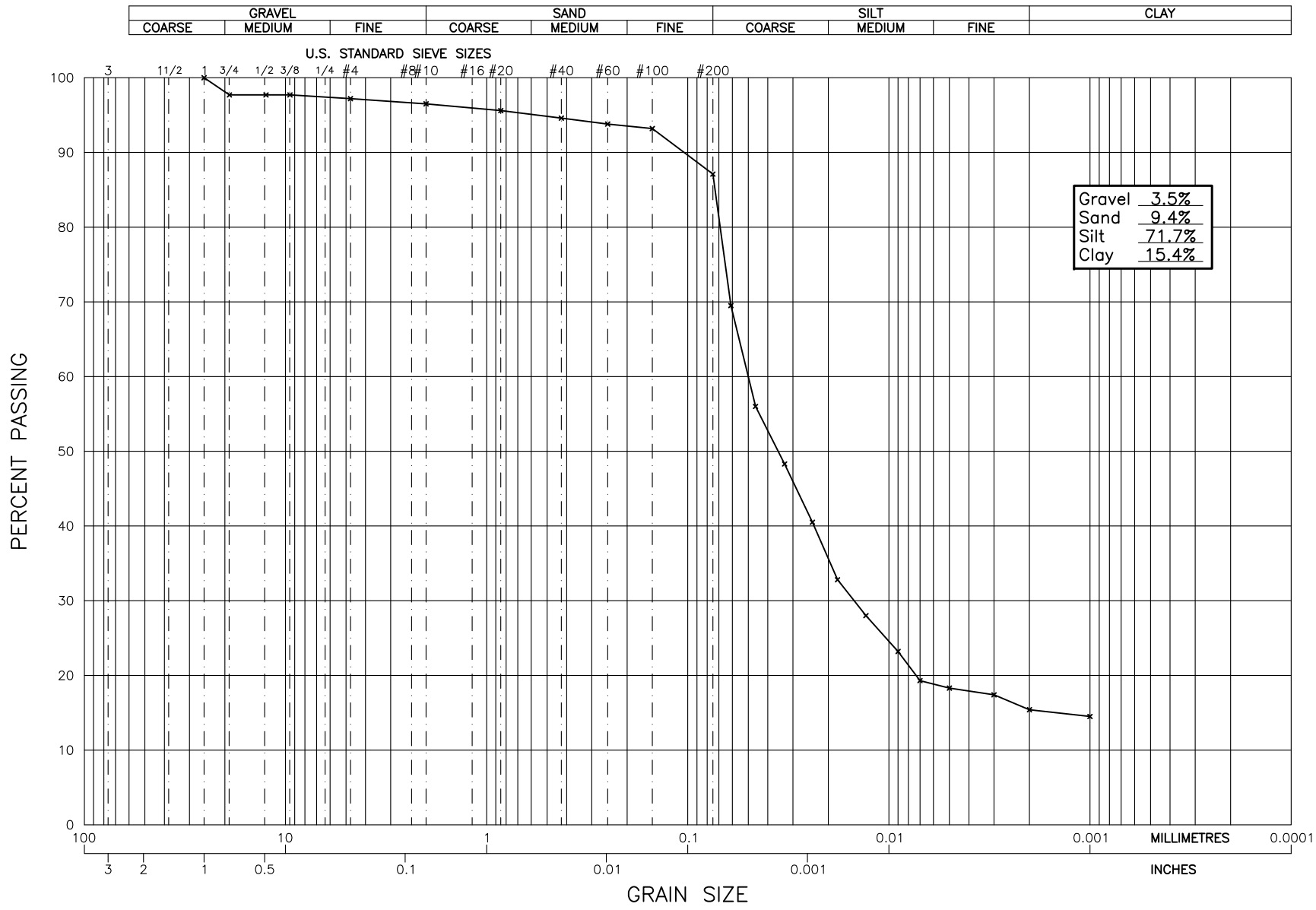
Client: BGC Engineering Inc.				Date: Sept.28, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt/Gravel/Sand,some clay
Sample #: **S1**	Test #:	**Hole #: BH-BGC11-44**	**Depth: 0.2 - 0.4m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 3, 2011	Date Received: September 13, 2011			Date Tested: Sept.27, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**70.6**
Wet Wt. & Tare	976.4	25.4		696.3	**100.0**	20	5.2	44.8	89.6	**63.3**
Dry Wt. & Tare	876.8	19.0	15.1	681.2	**97.8**	40	4.0	40.8	81.6	**57.6**
Water Wt.	99.6	12.5	48.2	633.0	**90.9**	60	2.8	38.0	76.0	**53.7**
Tare Wt.	180.5	9.5	24.5	608.5	**87.4**	100	2.2	35.8	71.6	**50.6**
Wt. Of Dry Soil	696.3	4.75	51.9	556.6	**79.9**	200	3.7	32.1	64.2	**45.4**
Moisture Content %	**14.3**	10	64.7	491.9	**70.6**	Pan	32.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	696.3			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.706	0.5	38.0	21.0	0.01348	31.0	11.2	4.729	0.064	62.0	**43.8**
50.0	0.706	1	34.5	21.0	0.01348	27.5	11.8	3.429	0.046	55.0	**38.9**
50.0	0.706	2	31.0	21.0	0.01348	24.0	12.3	2.483	0.033	48.0	**33.9**
50.0	0.706	4	28.0	21.0	0.01348	21.0	12.8	1.791	0.024	42.0	**29.7**
50.0	0.706	8	27.0	21.0	0.01348	20.0	13.0	1.275	0.017	40.0	**28.3**
50.0	0.706	15	24.5	21.0	0.01348	17.5	13.4	0.945	0.013	35.0	**24.7**
50.0	0.706	30	22.0	21.0	0.01348	15.0	13.8	0.679	0.009	30.0	**21.2**
50.0	0.706	60	20.0	21.0	0.01348	13.0	14.2	0.486	0.007	26.0	**18.4**
50.0	0.706	120	19.0	21.0	0.01348	12.0	14.3	0.345	0.005	24.0	**17.0**
50.0	0.706	240	18.0	21.0	0.01348	11.0	14.5	0.246	0.003	22.0	**15.5**
50.0	0.706	480	16.0	22.0	0.01332	9.5	14.7	0.175	0.002	19.0	**13.4**
50.0	0.706	1440	15.0	22.0	0.01332	8.5	14.9	0.102	0.001	17.0	**12.0**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-44-S3

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH44-S3

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

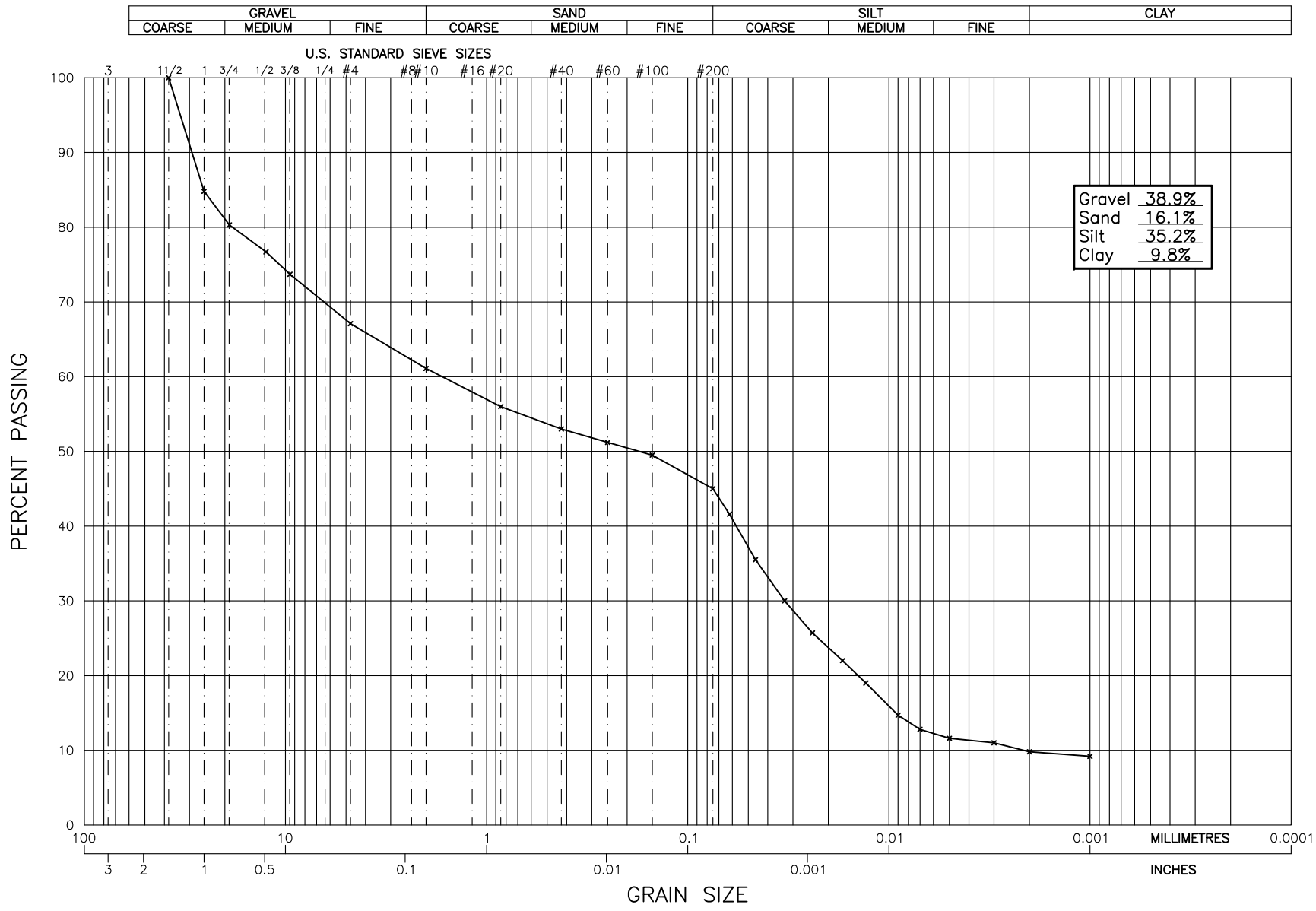
Client: BGC Engineering Inc.				Date: Sept.28, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt,clayey
Sample #: **S3**	Test #:	**Hole #: BH-BGC11-44**	**Depth: 1.6 - 2.0m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 3, 2011	Date Received: September 13, 2011			Date Tested: Sept.27, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**96.5**
Wet Wt. & Tare	1044.3	25.4		680.4	**100.0**	20	0.5	49.5	99.0	**95.6**
Dry Wt. & Tare	885.5	19.0	15.6	664.8	**97.7**	40	0.5	49.0	98.0	**94.6**
Water Wt.	158.8	12.5	0.0	664.8	**97.7**	60	0.4	48.6	97.2	**93.8**
Tare Wt.	205.1	9.5	0.0	664.8	**97.7**	100	0.3	48.3	96.6	**93.2**
Wt. Of Dry Soil	680.4	4.75	3.7	661.1	**97.2**	200	3.2	45.1	90.2	**87.1**
Moisture Content %	**23.3**	10	4.3	656.8	**96.5**	Pan	45.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	680.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.965	0.5	43.0	21.0	0.01348	36.0	10.4	4.551	0.061	72.0	**69.5**
50.0	0.965	1	36.0	21.0	0.01348	29.0	11.5	3.393	0.046	58.0	**56.0**
50.0	0.965	2	32.0	21.0	0.01348	25.0	12.2	2.467	0.033	50.0	**48.3**
50.0	0.965	4	28.0	21.0	0.01348	21.0	12.8	1.791	0.024	42.0	**40.5**
50.0	0.965	8	24.0	21.0	0.01348	17.0	13.5	1.299	0.018	34.0	**32.8**
50.0	0.965	15	21.5	21.0	0.01348	14.5	13.9	0.963	0.013	29.0	**28.0**
50.0	0.965	30	19.0	21.0	0.01348	12.0	14.3	0.691	0.009	24.0	**23.2**
50.0	0.965	60	17.0	21.0	0.01348	10.0	14.6	0.494	0.007	20.0	**19.3**
50.0	0.965	120	16.5	21.0	0.01348	9.5	14.7	0.350	0.005	19.0	**18.3**
50.0	0.965	240	16.0	21.0	0.01348	9.0	14.8	0.248	0.003	18.0	**17.4**
50.0	0.965	480	14.5	22.0	0.01332	8.0	15.0	0.177	0.002	16.0	**15.4**
50.0	0.965	1440	14.0	22.0	0.01332	7.5	15.1	0.102	0.001	15.0	**14.5**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-44-S5

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH44-S5

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

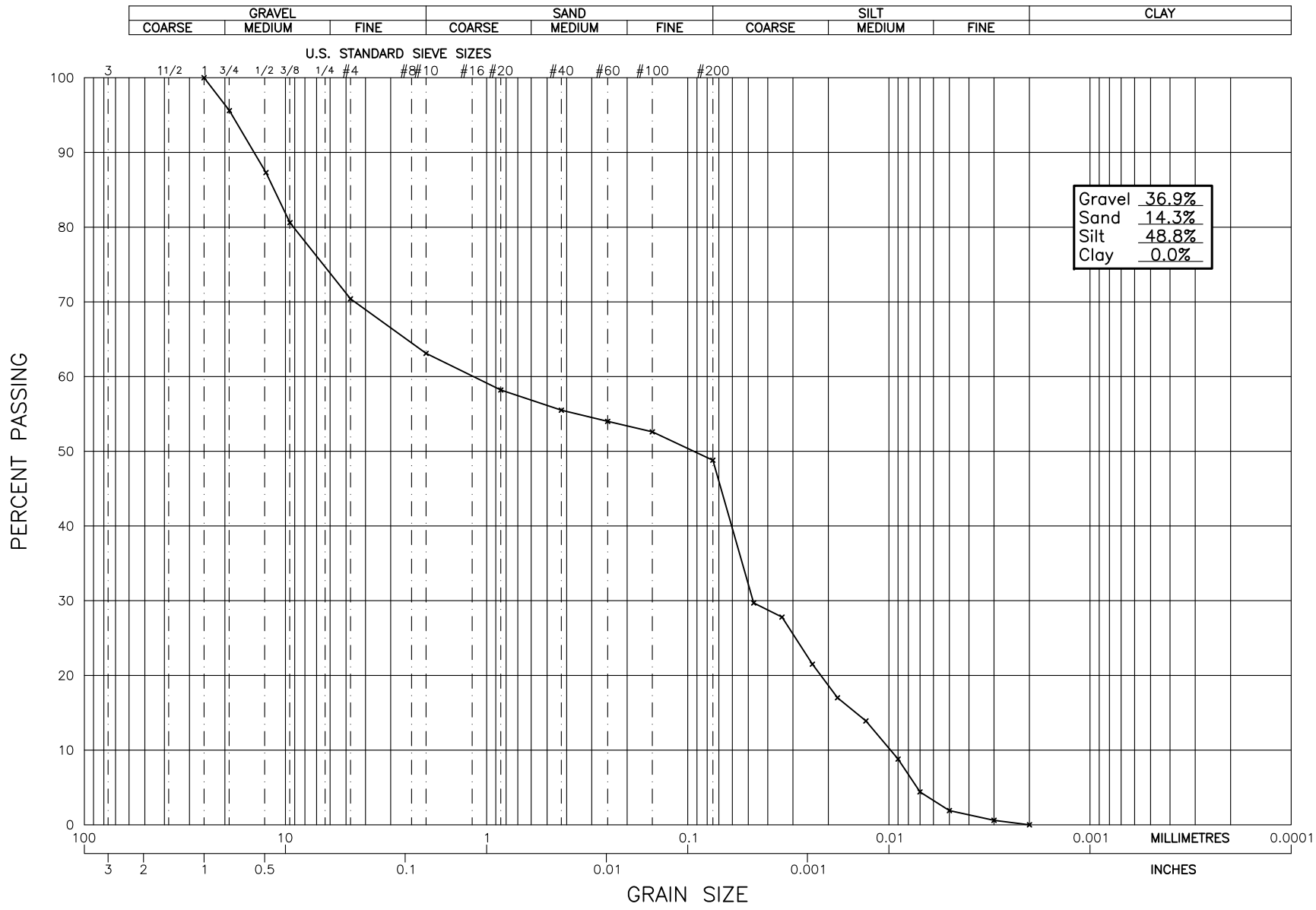
Client: BGC Engineering Inc.				Date: Sept.28, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel,silty
Sample #: **S5**	Test #:	**Hole #: BH-BGC11-44**	**Depth: 4.8 - 5.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 3, 2011	Date Received: September 13, 2011			Date Tested: Sept.27, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		1268.4	**100.0**	10		50.0	100.0	**61.1**
Wet Wt. & Tare	1634.4	25.4	193.1	1075.3	**84.8**	20	4.2	45.8	91.6	**56.0**
Dry Wt. & Tare	1461.3	19.0	57.0	1018.3	**80.3**	40	2.5	43.3	86.6	**53.0**
Water Wt.	173.1	12.5	45.6	972.7	**76.7**	60	1.4	41.9	83.8	**51.2**
Tare Wt.	192.9	9.5	37.9	934.8	**73.7**	100	1.4	40.5	81.0	**49.5**
Wt. Of Dry Soil	1268.4	4.75	83.5	851.3	**67.1**	200	3.7	36.8	73.6	**45.0**
Moisture Content %	**13.6**	10	75.7	775.6	**61.1**	Pan	36.8			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1268.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.611	0.5	41.0	21.0	0.01348	34.0	10.7	4.623	0.062	68.0	**41.6**
50.0	0.611	1	36.0	21.0	0.01348	29.0	11.5	3.393	0.046	58.0	**35.5**
50.0	0.611	2	31.5	21.0	0.01348	24.5	12.3	2.475	0.033	49.0	**30.0**
50.0	0.611	4	28.0	21.0	0.01348	21.0	12.8	1.791	0.024	42.0	**25.7**
50.0	0.611	8	25.0	21.0	0.01348	18.0	13.3	1.291	0.017	36.0	**22.0**
50.0	0.611	15	22.5	21.0	0.01348	15.5	13.7	0.957	0.013	31.0	**19.0**
50.0	0.611	30	19.0	21.0	0.01348	12.0	14.3	0.691	0.009	24.0	**14.7**
50.0	0.611	60	17.5	21.0	0.01348	10.5	14.6	0.493	0.007	21.0	**12.8**
50.0	0.611	120	16.5	21.0	0.01348	9.5	14.7	0.350	0.005	19.0	**11.6**
50.0	0.611	240	16.0	21.0	0.01348	9.0	14.8	0.248	0.003	18.0	**11.0**
50.0	0.611	480	14.5	22.0	0.01332	8.0	15.0	0.177	0.002	16.0	**9.8**
50.0	0.611	1440	14.0	22.0	0.01332	7.5	15.1	0.102	0.001	15.0	**9.2**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-44-S7

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH44-S7

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

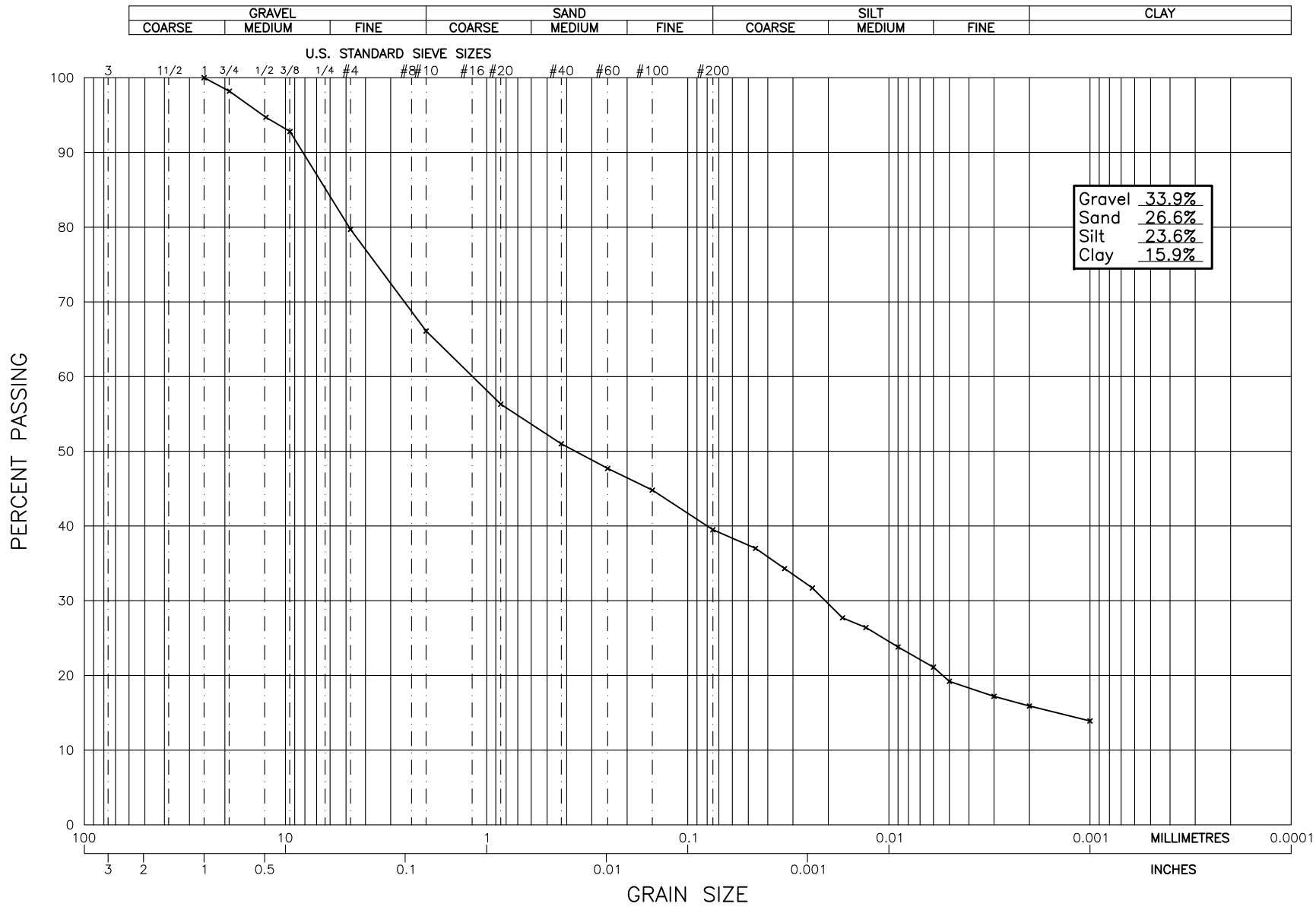
Client: BGC Engineering Inc.				Date: Sept.29, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt/Gravel,some sand
Sample #: **S7**	Test #:	**Hole #: BH-BGC11-44**	**Depth: 6.3 - 6.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 3, 2011	Date Received: September 13, 2011			Date Tested: Sept.28, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**63.1**
Wet Wt. & Tare	1543.7	25.4		1089.2	**100.0**	20	3.9	46.1	92.2	**58.2**
Dry Wt. & Tare	1280.7	19.0	48.1	1041.1	**95.6**	40	2.1	44.0	88.0	**55.5**
Water Wt.	263.0	12.5	90.3	950.8	**87.3**	60	1.2	42.8	85.6	**54.0**
Tare Wt.	191.5	9.5	72.9	877.9	**80.6**	100	1.1	41.7	83.4	**52.6**
Wt. Of Dry Soil	1089.2	4.75	110.6	767.3	**70.4**	200	3.0	38.7	77.4	**48.8**
Moisture Content %	**24.1**	10	80.1	687.2	**63.1**	Pan	38.7			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1089.2			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.631	0.5	35.0	22.0	0.01332	28.5	11.6	4.815	0.064	57.0	**36.0**
50.0	0.631	1	30.0	22.0	0.01332	23.5	12.4	3.524	0.047	47.0	**29.7**
50.0	0.631	2	28.5	22.0	0.01332	22.0	12.7	2.516	0.034	44.0	**27.8**
50.0	0.631	4	23.5	22.0	0.01332	17.0	13.5	1.836	0.024	34.0	**21.5**
50.0	0.631	8	20.0	22.0	0.01332	13.5	14.1	1.326	0.018	27.0	**17.0**
50.0	0.631	15	17.5	22.0	0.01332	11.0	14.5	0.983	0.013	22.0	**13.9**
50.0	0.631	30	13.5	22.0	0.01332	7.0	15.1	0.710	0.009	14.0	**8.8**
50.0	0.631	60	10.0	22.0	0.01332	3.5	15.7	0.512	0.007	7.0	**4.4**
50.0	0.631	120	8.0	22.0	0.01332	1.5	16.0	0.366	0.005	3.0	**1.9**
50.0	0.631	240	6.5	24.0	0.01301	0.5	16.2	0.260	0.003	1.0	**0.6**
50.0	0.631	480	6.0	24.0	0.01301	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.631	1440	6.0	24.0	0.01301	0.0	16.3	0.106	0.001	0.0	**0.0**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-44-S11

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH44-S11

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

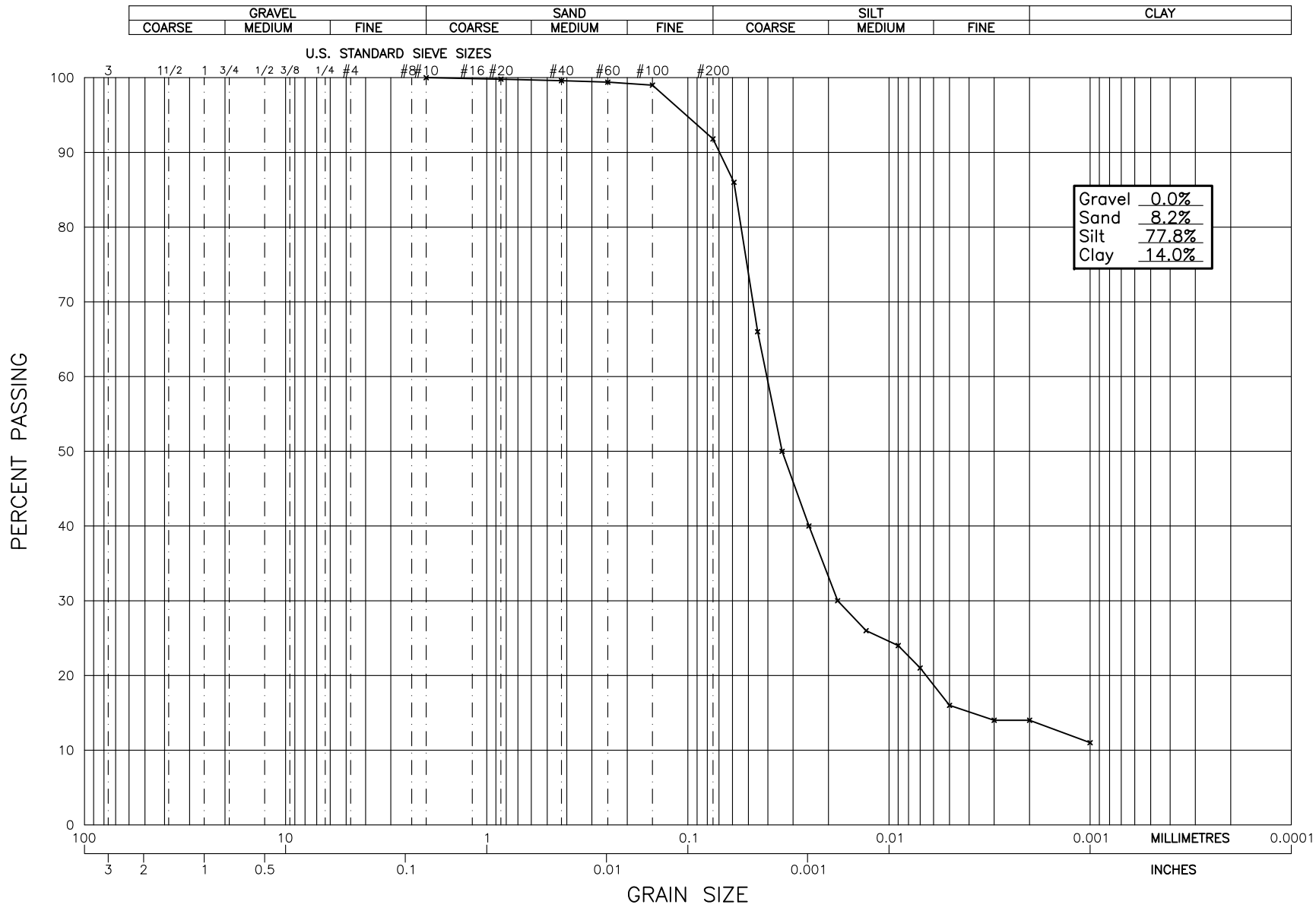
Client: BGC Engineering Inc.				Date: Sept.28, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:Gravel,sandy,silty,some clay
Sample #: **S11**	Test #:	**Hole #: Bh-BGC11-44**	**Depth: 9.6 - 9.9m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 3, 2011	Date Received: September 13, 2011			Date Tested: Sept.27, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**66.1**
Wet Wt. & Tare	1079.5	25.4		771.2	**100.0**	20	7.4	42.6	85.2	**56.3**
Dry Wt. & Tare	950.9	19.0	13.7	757.5	**98.2**	40	4.0	38.6	77.2	**51.0**
Water Wt.	128.6	12.5	27.1	730.4	**94.7**	60	2.5	36.1	72.2	**47.7**
Tare Wt.	179.7	9.5	14.6	715.8	**92.8**	100	2.2	33.9	67.8	**44.8**
Wt. Of Dry Soil	771.2	4.75	101.2	614.6	**79.7**	200	4.0	29.9	59.8	**39.5**
Moisture Content %	**16.7**	10	105.2	509.4	**66.1**	Pan	29.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	771.2			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.661	0.5	36.5	21.0	0.01348	29.5	11.4	4.781	0.064	59.0	**39.0**
50.0	0.661	1	35.0	21.0	0.01348	28.0	11.7	3.417	0.046	56.0	**37.0**
50.0	0.661	2	33.0	21.0	0.01348	26.0	12.0	2.450	0.033	52.0	**34.3**
50.0	0.661	4	31.0	21.0	0.01348	24.0	12.3	1.756	0.024	48.0	**31.7**
50.0	0.661	8	28.0	21.0	0.01348	21.0	12.8	1.266	0.017	42.0	**27.7**
50.0	0.661	15	27.0	21.0	0.01348	20.0	13.0	0.931	0.013	40.0	**26.4**
50.0	0.661	30	25.0	21.0	0.01348	18.0	13.3	0.666	0.009	36.0	**23.8**
50.0	0.661	60	23.0	21.0	0.01348	16.0	13.7	0.477	0.006	32.0	**21.1**
50.0	0.661	120	21.5	21.0	0.01348	14.5	13.9	0.340	0.005	29.0	**19.2**
50.0	0.661	240	20.0	21.0	0.01348	13.0	14.2	0.243	0.003	26.0	**17.2**
50.0	0.661	480	18.5	22.0	0.01332	12.0	14.3	0.173	0.002	24.0	**15.9**
50.0	0.661	1440	17.0	22.0	0.01332	10.5	14.6	0.101	0.001	21.0	**13.9**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-47-G4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH47-G3

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

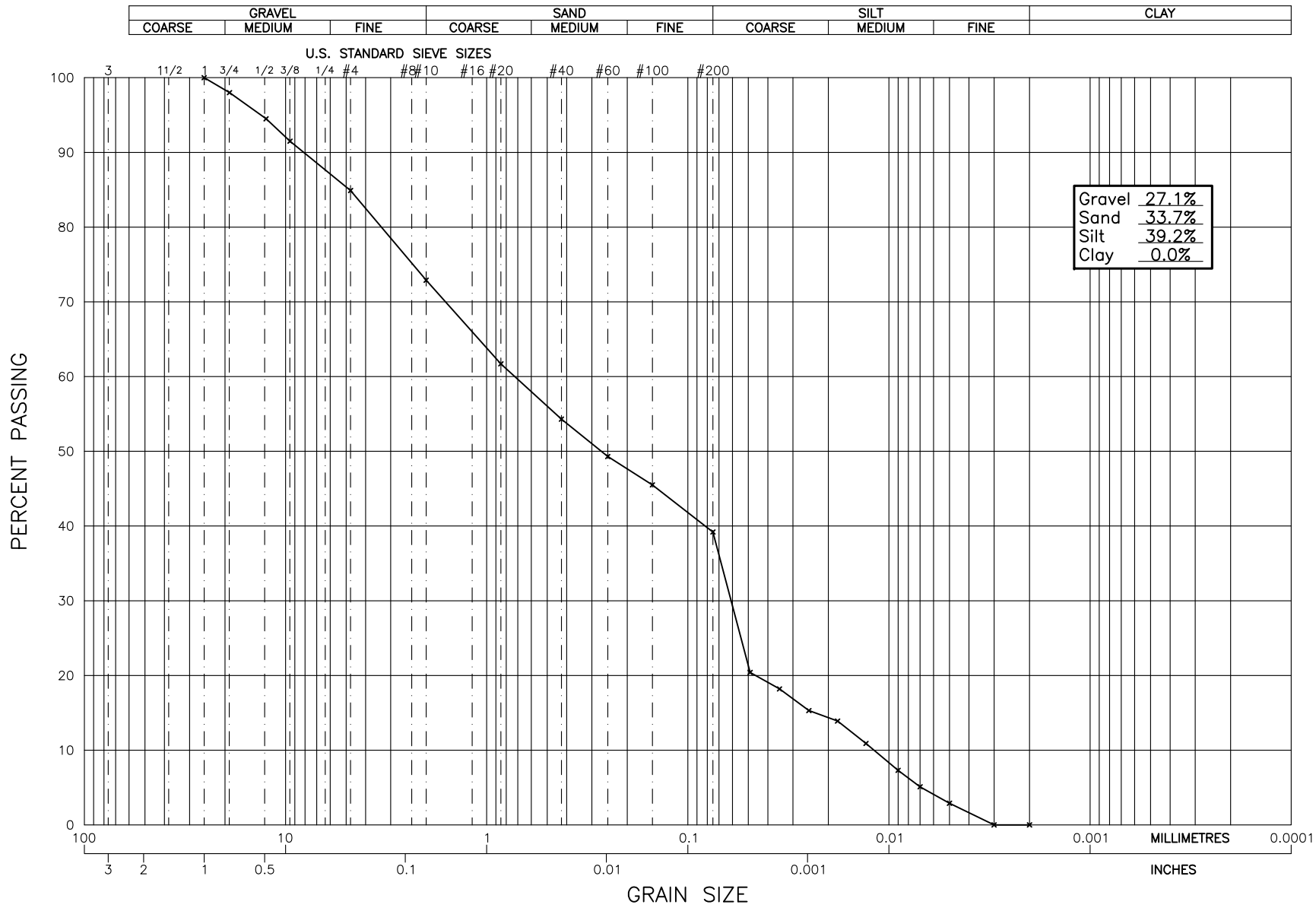
Client: BGC Engineering Ltd.				Date: Sept. 27, 2011
Project Name: Eagle Gold Soil and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt, some clay
Sample #: **G3**	Test #:	**Hole #: BH-BGC11-47**	**Depth: 2.0 - 2.27m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 4, 2011	Date Received: September 13, 2011			Date Tested: Sept.26, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**100.0**
Wet Wt. & Tare	924.7	25.4				20	0.1	49.9	99.8	**99.8**
Dry Wt. & Tare	764.9	19.0				40	0.1	49.8	99.6	**99.6**
Water Wt.	159.8	12.5				60	0.1	49.7	99.4	**99.4**
Tare Wt.	181.1	9.5				100	0.2	49.5	99.0	**99.0**
Wt. Of Dry Soil	583.8	4.75				200	3.6	45.9	91.8	**91.8**
Moisture Content %	**27.4**	10		583.8	**100.0**	Pan	45.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	583.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	1.000	0.5	50.0	20.0	0.01365	43.0	9.2	4.290	0.059	86.0	**86.0**
50.0	1.000	1	40.0	20.0	0.01365	33.0	10.9	3.294	0.045	66.0	**66.0**
50.0	1.000	2	32.0	20.0	0.01365	25.0	12.2	2.467	0.034	50.0	**50.0**
50.0	1.000	4	27.0	20.0	0.01365	20.0	13.0	1.802	0.025	40.0	**40.0**
50.0	1.000	8	22.0	20.0	0.01365	15.0	13.8	1.314	0.018	30.0	**30.0**
50.0	1.000	15	20.0	20.0	0.01365	13.0	14.2	0.971	0.013	26.0	**26.0**
50.0	1.000	30	19.0	20.0	0.01365	12.0	14.3	0.691	0.009	24.0	**24.0**
50.0	1.000	60	17.5	20.0	0.01365	10.5	14.6	0.493	0.007	21.0	**21.0**
50.0	1.000	120	15.0	20.0	0.01365	8.0	15.0	0.353	0.005	16.0	**16.0**
50.0	1.000	240	14.0	20.0	0.01365	7.0	15.1	0.251	0.003	14.0	**14.0**
50.0	1.000	480	13.0	23.0	0.01317	7.0	15.1	0.178	0.002	14.0	**14.0**
50.0	1.000	1440	12.5	21.0	0.01348	5.5	15.4	0.103	0.001	11.0	**11.0**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-47-G10

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH47-G10

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

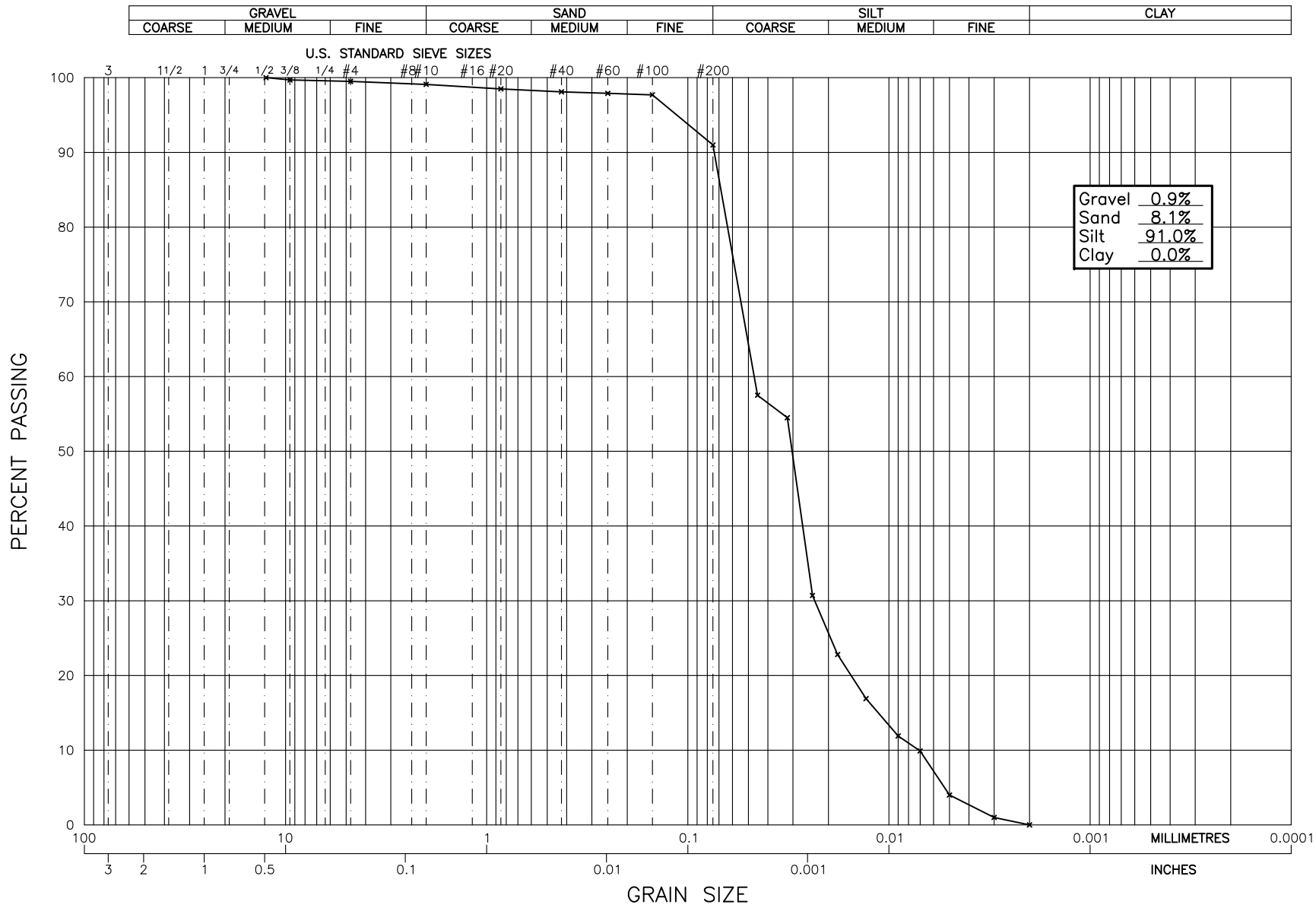
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt/Sand/Gravel
Sample #: **G10**	Test #:	**Hole #: BH-BGC11-47**	**Depth: 11.8 - 12.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 4, 2011	Date Received: September 13, 2011			Date Tested: Sept. 23, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**72.9**
Wet Wt. & Tare	1089.1	25.4		814.4	**100.0**	20	7.7	42.3	84.6	**61.7**
Dry Wt. & Tare	995.9	19.0	15.9	798.5	**98.0**	40	5.1	37.2	74.4	**54.3**
Water Wt.	93.2	12.5	29.1	769.4	**94.5**	60	3.4	33.8	67.6	**49.3**
Tare Wt.	181.5	9.5	23.9	745.5	**91.5**	100	2.6	31.2	62.4	**45.5**
Wt. Of Dry Soil	814.4	4.75	54.0	691.5	**84.9**	200	4.3	26.9	53.8	**39.2**
Moisture Content %	**11.4**	10	97.6	593.9	**72.9**	Pan	26.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	814.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.729	0.5	25.0	23.0	0.01317	19.0	13.2	5.130	0.068	38.0	**27.7**
50.0	0.729	1	20.0	23.0	0.01317	14.0	14.0	3.740	0.049	28.0	**20.4**
50.0	0.729	2	18.5	23.0	0.01317	12.5	14.2	2.668	0.035	25.0	**18.2**
50.0	0.729	4	16.5	23.0	0.01317	10.5	14.6	1.908	0.025	21.0	**15.3**
50.0	0.729	8	15.5	23.0	0.01317	9.5	14.7	1.357	0.018	19.0	**13.9**
50.0	0.729	15	13.5	23.0	0.01317	7.5	15.1	1.002	0.013	15.0	**10.9**
50.0	0.729	30	11.0	23.0	0.01317	5.0	15.5	0.718	0.009	10.0	**7.3**
50.0	0.729	60	9.5	23.0	0.01317	3.5	15.7	0.512	0.007	7.0	**5.1**
50.0	0.729	120	8.0	23.0	0.01317	2.0	16.0	0.365	0.005	4.0	**2.9**
50.0	0.729	240	6.0	23.0	0.01317	0.0	16.3	0.261	0.003	0.0	**0.0**
50.0	0.729	480	6.0	23.0	0.01317	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.729	1469	6.0	23.0	0.01317	0.0	16.3	0.105	0.001	0.0	**0.0**

Hydrometer #: 932452	23	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-47-SPT1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH47-SPT1

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

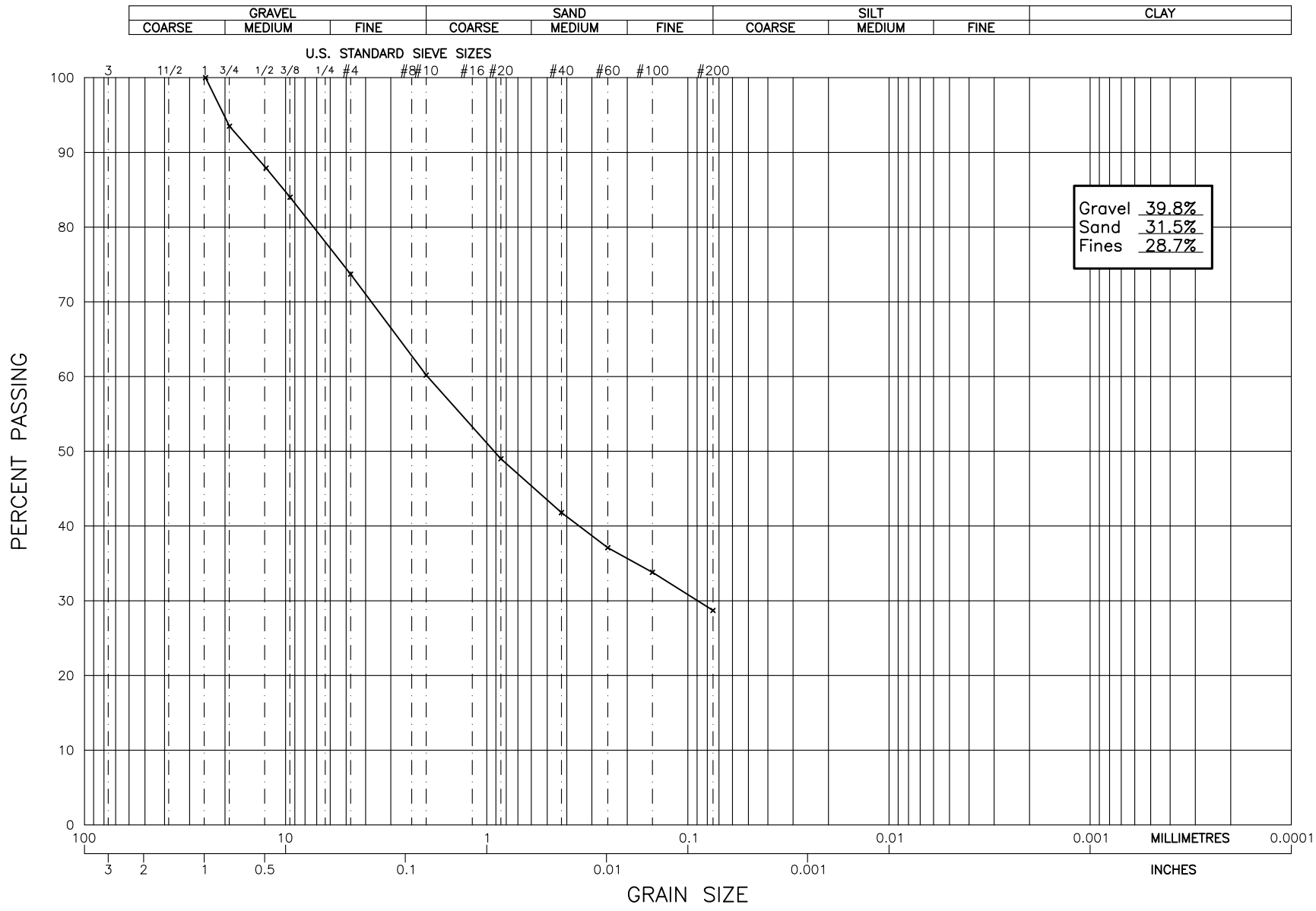
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soil and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt
Sample #: SPT1	Test #:	**Hole #: BH-BGC11-47**	**Depth: 0.75 - 1.2m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 4, 2011	Date Received: September 13, 2011			Date Tested: Sept.23, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**99.1**
Wet Wt. & Tare	894.6	25.4				20	0.3	49.7	99.4	**98.5**
Dry Wt. & Tare	747.3	19.0				40	0.2	49.5	99.0	**98.1**
Water Wt.	147.3	12.5		566.9	**100.0**	60	0.1	49.4	98.8	**97.9**
Tare Wt.	180.4	9.5	1.7	565.2	**99.7**	100	0.1	49.3	98.6	**97.7**
Wt. Of Dry Soil	566.9	4.75	1.4	563.8	**99.5**	200	3.4	45.9	91.8	**91.0**
Moisture Content %	**26.0**	10	1.8	562.0	**99.1**	Pan	45.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	566.9			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.991	0.5	42.0	23.0	0.01317	36.0	10.4	4.551	0.060	72.0	**71.4**
50.0	0.991	1	35.0	23.0	0.01317	29.0	11.5	3.393	0.045	58.0	**57.5**
50.0	0.991	2	33.5	23.0	0.01317	27.5	11.8	2.425	0.032	55.0	**54.5**
50.0	0.991	4	21.5	23.0	0.01317	15.5	13.7	1.853	0.024	31.0	**30.7**
50.0	0.991	8	17.5	23.0	0.01317	11.5	14.4	1.342	0.018	23.0	**22.8**
50.0	0.991	15	14.5	23.0	0.01317	8.5	14.9	0.996	0.013	17.0	**16.9**
50.0	0.991	30	12.0	23.0	0.01317	6.0	15.3	0.714	0.009	12.0	**11.9**
50.0	0.991	60	11.0	23.0	0.01317	5.0	15.5	0.508	0.007	10.0	**9.9**
50.0	0.991	120	8.0	23.0	0.01317	2.0	16.0	0.365	0.005	4.0	**4.0**
50.0	0.991	240	6.5	23.0	0.01317	0.5	16.2	0.260	0.003	1.0	**1.0**
50.0	0.991	480	6.0	23.0	0.01317	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.991	1464	6.0	23.0	0.01317	0.0	16.3	0.106	0.001	0.0	**0.0**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-47-SPT4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH47-SPT4

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 630 - 1718 Argyle Street
Halifax, Nova Scotia
B3J 3N6

ATTN: Peter Quinn

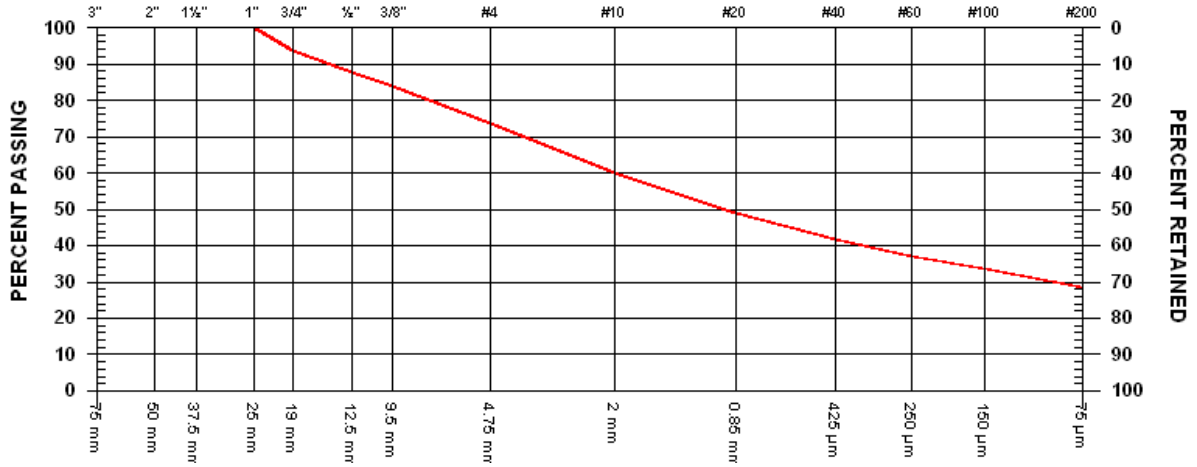
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 3 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.21 DATE SAMPLED 2011.Aug.04

SUPPLIER BH-BGC11-47-SPT4
SOURCE 5.33 - 5.88m
SPECIFICATION
MATERIAL TYPE Sand/Silt

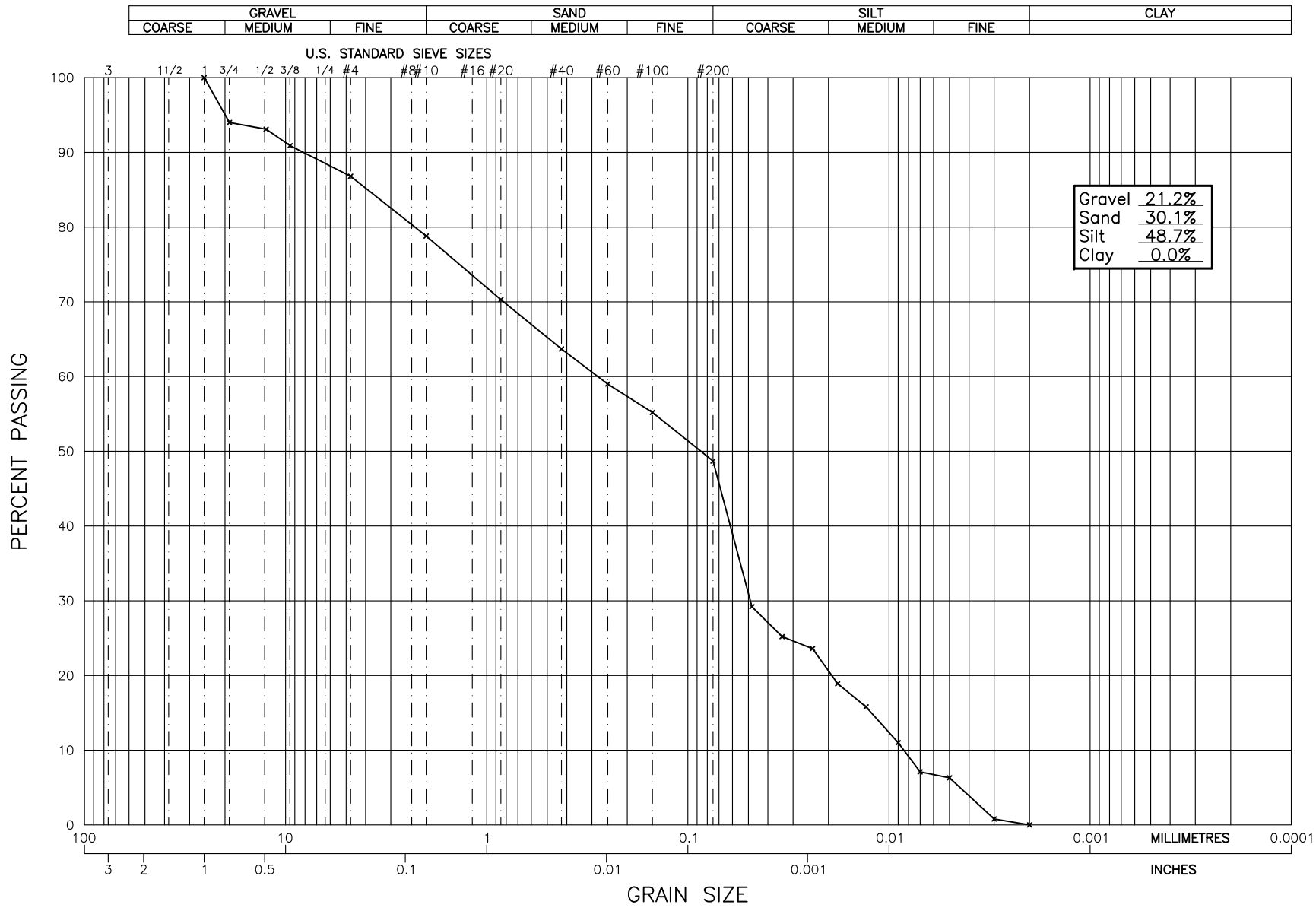
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	93.5	
1/2"	12.5 mm	87.9	
3/8"	9.5 mm	84.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	73.7	
No. 10	2.00 mm	60.2	
No. 20	850 µm	49.0	
No. 40	425 µm	41.8	
No. 60	250 µm	37.1	
No. 100	150 µm	33.8	
No. 200	75 µm	28.7	

COMMENTS



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-47-SPT6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH47-SPT6

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

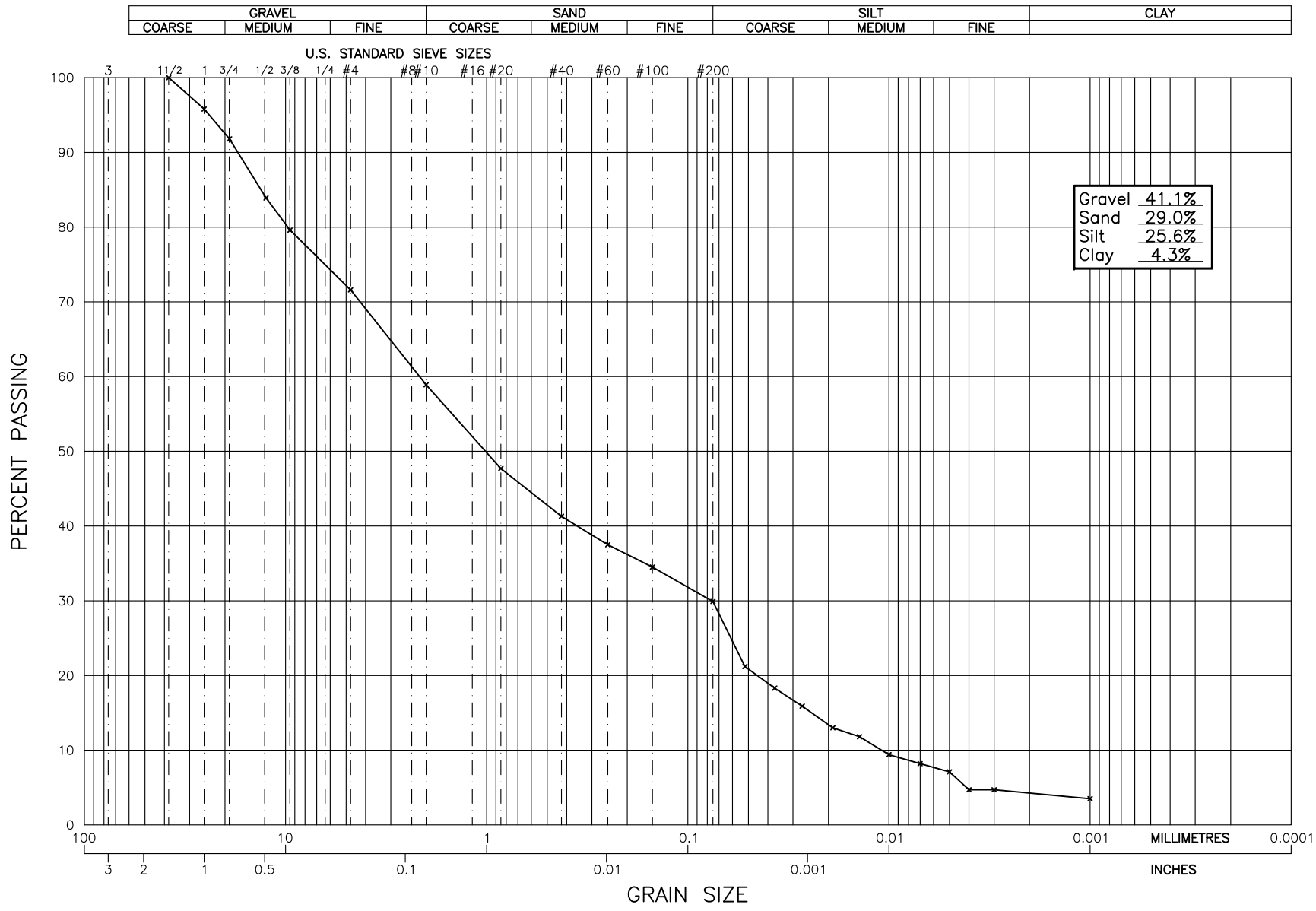
Client: BGC Engineering Ltd.				Date: Sept.26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt and Sand, gravelly
Sample #: SPT6	Test #:	**Hole #: BH-BGC11-47**	**Depth: 8.38 - 8.58m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 4, 2011	Date Received: September 13, 2011			Date Tested: Sept.21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**78.8**
Wet Wt. & Tare	583.9	25.4		349.8	**100.0**	20	5.4	44.6	89.2	**70.3**
Dry Wt. & Tare	542.7	19.0	21.0	328.8	**94.0**	40	4.2	40.4	80.8	**63.7**
Water Wt.	41.2	12.5	3.1	325.7	**93.1**	60	3.0	37.4	74.8	**59.0**
Tare Wt.	192.9	9.5	7.7	318.0	**90.9**	100	2.4	35.0	70.0	**55.2**
Wt. Of Dry Soil	349.8	4.75	14.5	303.5	**86.8**	200	4.1	30.9	61.8	**48.7**
Moisture Content %	**11.8**	10	27.8	275.7	**78.8**	Pan	30.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	349.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.788	0.5	28.0	23.0	0.01317	22.0	12.7	5.033	0.066	44.0	**34.7**
50.0	0.788	1	24.5	23.0	0.01317	18.5	13.2	3.639	0.048	37.0	**29.2**
50.0	0.788	2	22.0	23.0	0.01317	16.0	13.7	2.613	0.034	32.0	**25.2**
50.0	0.788	4	21.0	23.0	0.01317	15.0	13.8	1.859	0.024	30.0	**23.6**
50.0	0.788	8	18.0	23.0	0.01317	12.0	14.3	1.338	0.018	24.0	**18.9**
50.0	0.788	15	16.0	23.0	0.01317	10.0	14.6	0.988	0.013	20.0	**15.8**
50.0	0.788	30	13.0	23.0	0.01317	7.0	15.1	0.710	0.009	14.0	**11.0**
50.0	0.788	60	10.5	23.0	0.01317	4.5	15.6	0.509	0.007	9.0	**7.1**
50.0	0.788	120	10.5	22.0	0.01332	4.0	15.6	0.361	0.005	8.0	**6.3**
50.0	0.788	240	7.0	22.0	0.01332	0.5	16.2	0.260	0.003	1.0	**0.8**
50.0	0.788	480	6.5	22.0	0.01332	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.788	1440	6.5	22.0	0.01332	0.0	16.3	0.106	0.001	0.0	**0.0**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-49-G4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH49-G4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

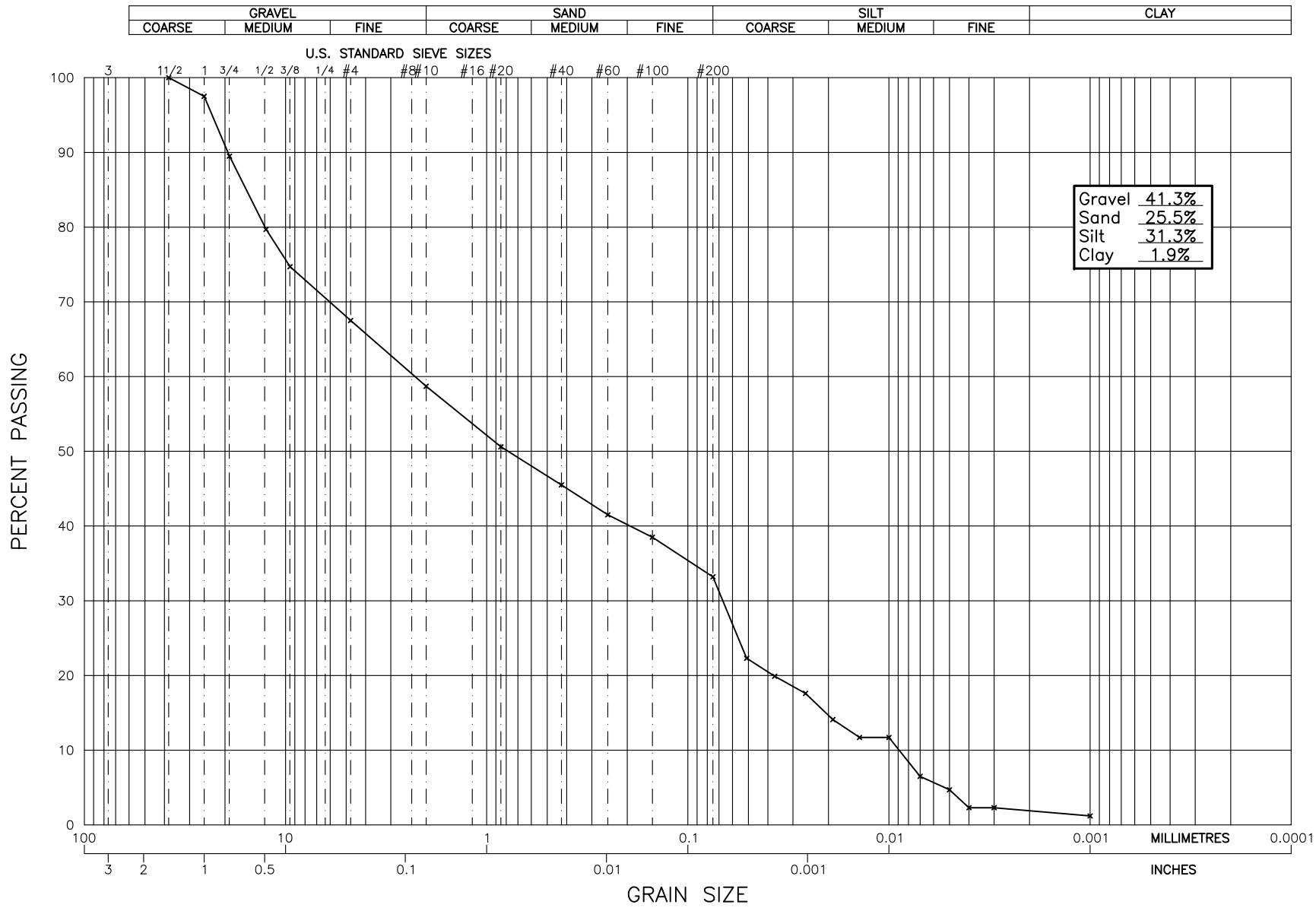
Client: BGC Engineering Inc.				Date: November 15, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel,sandy and silty
Sample #: **G4**	Test #:	**Hole #: BH-BGC11-49**	**Depth: 3.4 - 3.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.14, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		1449.0	**100.0**	10		50.0	100.0	**58.9**
Wet Wt. & Tare	1798.8	25.4	60.3	1388.7	**95.8**	20	9.5	40.5	81.0	**47.7**
Dry Wt. & Tare	1630.5	19.0	57.8	1330.9	**91.8**	40	5.4	35.1	70.2	**41.3**
Water Wt.	168.3	12.5	115.2	1215.7	**83.9**	60	3.3	31.8	63.6	**37.5**
Tare Wt.	181.5	9.5	62.0	1153.7	**79.6**	100	2.5	29.3	58.6	**34.5**
Wt. Of Dry Soil	1449.0	4.75	116.7	1037.0	**71.6**	200	3.9	25.4	50.8	**29.9**
Moisture Content %	**11.6**	10	183.6	853.4	**58.9**	Pan	25.4			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1449.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.589	0.5	32.0	17.0	0.01417	23.0	12.5	5.000	0.071	46.0	**27.1**
50.0	0.589	1	27.0	17.0	0.01417	18.0	13.3	3.650	0.052	36.0	**21.2**
50.0	0.589	2	24.5	17.0	0.01417	15.5	13.7	2.621	0.037	31.0	**18.3**
50.0	0.589	4	22.5	17.0	0.01417	13.5	14.1	1.875	0.027	27.0	**15.9**
50.0	0.589	8	20.0	17.0	0.01417	11.0	14.5	1.345	0.019	22.0	**13.0**
50.0	0.589	15	19.0	17.0	0.01417	10.0	14.6	0.988	0.014	20.0	**11.8**
50.0	0.589	30	17.0	17.0	0.01417	8.0	15.0	0.707	0.010	16.0	**9.4**
50.0	0.589	60	16.0	17.0	0.01417	7.0	15.1	0.502	0.007	14.0	**8.2**
50.0	0.589	120	15.0	17.0	0.01417	6.0	15.3	0.357	0.005	12.0	**7.1**
50.0	0.589	240	13.0	17.0	0.01417	4.0	15.6	0.255	0.004	8.0	**4.7**
50.0	0.589	480	12.0	18.0	0.01399	4.0	15.6	0.180	0.003	8.0	**4.7**
50.0	0.589	1440	11.0	18.0	0.01399	3.0	15.8	0.105	0.001	6.0	**3.5**

Hydrometer #: 932452	Graduate #: 2	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-49-G6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH49-G6

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

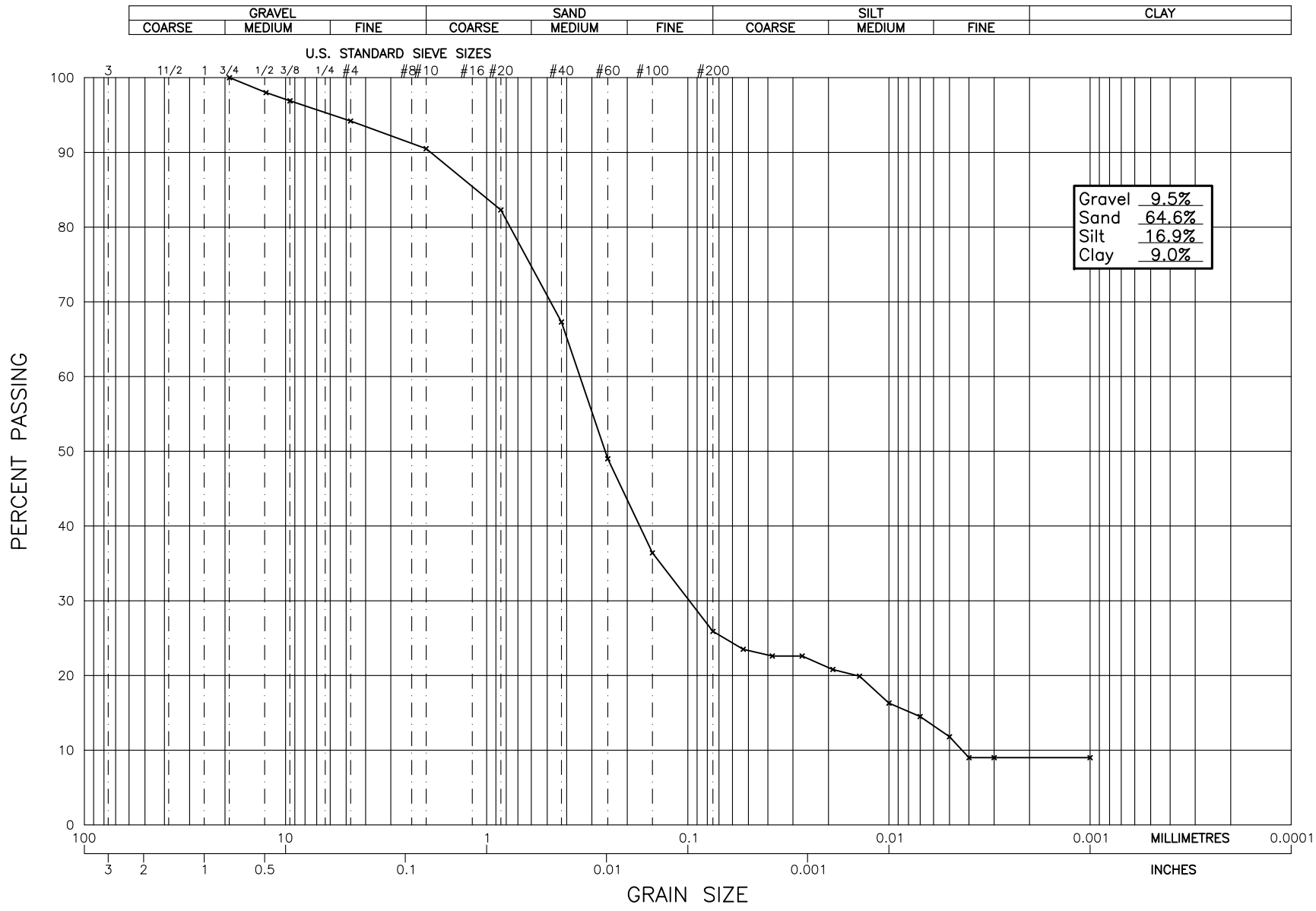
Client: BGC Engineering Inc.				Date: November 15, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel and Silt, sandy
Sample #: **G6**	Test #:	**Hole #: BH-BGC11-49**	**Depth: 6.4 - 6.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.14, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		938.3	**100.0**	10		50.0	100.0	**58.7**
Wet Wt. & Tare	1241.4	25.4	23.9	914.4	**97.5**	20	6.9	43.1	86.2	**50.6**
Dry Wt. & Tare	1118.7	19.0	74.9	839.5	**89.5**	40	4.3	38.8	77.6	**45.5**
Water Wt.	122.7	12.5	92.1	747.4	**79.7**	60	3.4	35.4	70.8	**41.5**
Tare Wt.	180.4	9.5	46.5	700.9	**74.7**	100	2.6	32.8	65.6	**38.5**
Wt. Of Dry Soil	938.3	4.75	67.4	633.5	**67.5**	200	4.5	28.3	56.6	**33.2**
Moisture Content %	**13.1**	10	83.0	550.5	**58.7**	Pan	28.3			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	938.3			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.587	0.5	33.0	17.0	0.01417	24.0	12.3	4.967	0.070	48.0	**28.2**
50.0	0.587	1	28.0	17.0	0.01417	19.0	13.2	3.628	0.051	38.0	**22.3**
50.0	0.587	2	26.0	17.0	0.01417	17.0	13.5	2.597	0.037	34.0	**19.9**
50.0	0.587	4	24.0	17.0	0.01417	15.0	13.8	1.859	0.026	30.0	**17.6**
50.0	0.587	8	21.0	17.0	0.01417	12.0	14.3	1.338	0.019	24.0	**14.1**
50.0	0.587	15	19.0	17.0	0.01417	10.0	14.6	0.988	0.014	20.0	**11.7**
50.0	0.587	30	19.0	17.0	0.01417	10.0	14.6	0.699	0.010	20.0	**11.7**
50.0	0.587	60	14.5	17.0	0.01417	5.5	15.4	0.506	0.007	11.0	**6.5**
50.0	0.587	120	13.0	17.0	0.01417	4.0	15.6	0.361	0.005	8.0	**4.7**
50.0	0.587	240	11.0	17.0	0.01417	2.0	16.0	0.258	0.004	4.0	**2.3**
50.0	0.587	480	10.0	18.0	0.01399	2.0	16.0	0.182	0.003	4.0	**2.3**
50.0	0.587	1440	9.0	18.0	0.01399	1.0	16.1	0.106	0.001	2.0	**1.2**

Hydrometer #: 932452	Graduate #: 3	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-49-G8

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH49-G8

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

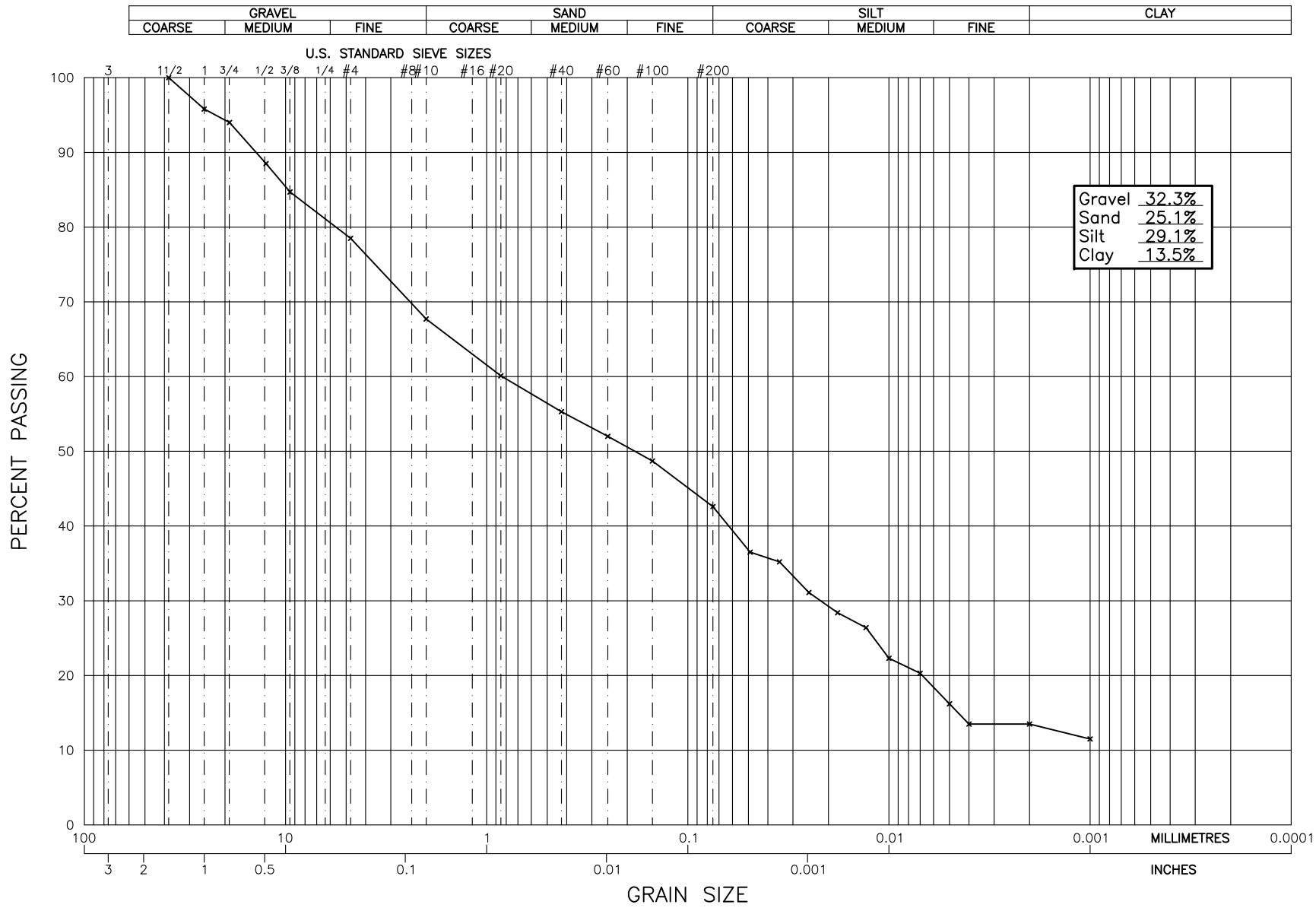
Client: BGC Engineering Inc.				Date: November 15, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand, silty, trace gravel and clay
Sample #: **G8**	Test #:	**Hole #: BH-BGC11-49**	**Depth: 9.4 - 9.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.14, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**90.5**
Wet Wt. & Tare	1302.8	25.4				20	4.5	45.5	91.0	**82.3**
Dry Wt. & Tare	1072.7	19.0		891.9	**100.0**	40	8.3	37.2	74.4	**67.3**
Water Wt.	230.1	12.5	17.5	874.4	**98.0**	60	10.1	27.1	54.2	**49.0**
Tare Wt.	180.8	9.5	10.4	864.0	**96.9**	100	7.0	20.1	40.2	**36.4**
Wt. Of Dry Soil	891.9	4.75	23.9	840.1	**94.2**	200	5.8	14.3	28.6	**25.9**
Moisture Content %	**25.8**	10	33.3	806.8	**90.5**	Pan	14.3			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	891.9			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.905	0.5	23.0	17.0	0.01417	14.0	14.0	5.289	0.075	28.0	**25.3**
50.0	0.905	1	22.0	17.0	0.01417	13.0	14.2	3.762	0.053	26.0	**23.5**
50.0	0.905	2	21.5	17.0	0.01417	12.5	14.2	2.668	0.038	25.0	**22.6**
50.0	0.905	4	21.5	17.0	0.01417	12.5	14.2	1.886	0.027	25.0	**22.6**
50.0	0.905	8	20.5	17.0	0.01417	11.5	14.4	1.342	0.019	23.0	**20.8**
50.0	0.905	15	20.0	17.0	0.01417	11.0	14.5	0.983	0.014	22.0	**19.9**
50.0	0.905	30	18.0	17.0	0.01417	9.0	14.8	0.703	0.010	18.0	**16.3**
50.0	0.905	60	17.0	17.0	0.01417	8.0	15.0	0.500	0.007	16.0	**14.5**
50.0	0.905	120	15.5	17.0	0.01417	6.5	15.2	0.356	0.005	13.0	**11.8**
50.0	0.905	240	14.0	17.0	0.01417	5.0	15.5	0.254	0.004	10.0	**9.0**
50.0	0.905	480	13.0	18.0	0.01399	5.0	15.5	0.180	0.003	10.0	**9.0**
50.0	0.905	1440	13.0	18.0	0.01399	5.0	15.5	0.104	0.001	10.0	**9.0**

Hydrometer #: 932452	Graduate #: 4	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-49-G10

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH49-G10

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

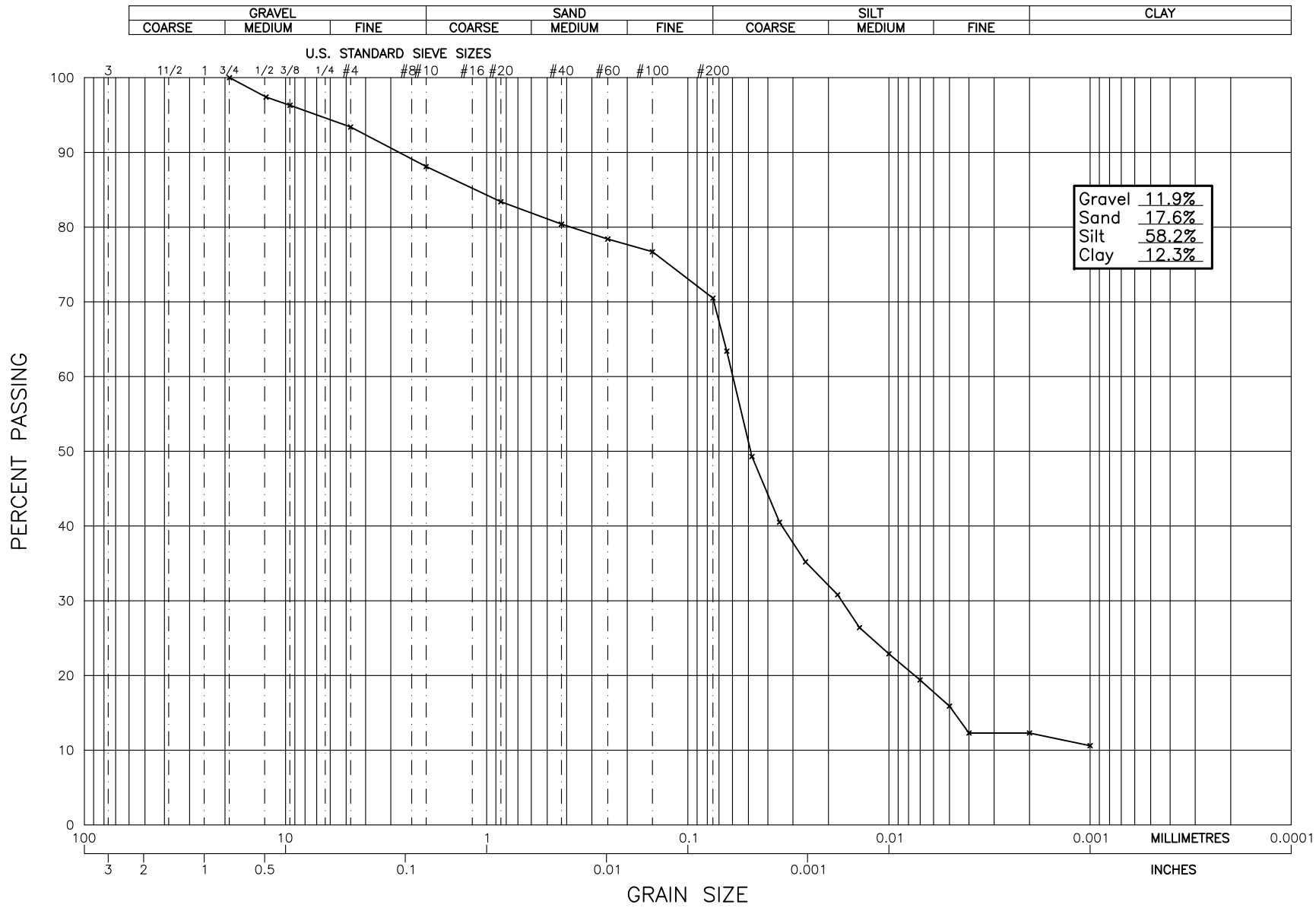
Client: BGC Engineering Inc.				Date: November 15, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel, silty and sandy, some clay
Sample #: **G10**	Test #:	**Hole #: BH-BGC11-49**	**Depth: 12.4 - 12.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.14, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		928.1	**100.0**	10		50.0	100.0	**67.7**
Wet Wt. & Tare	1240.8	25.4	38.8	889.3	**95.8**	20	5.6	44.4	88.8	**60.1**
Dry Wt. & Tare	1133.3	19.0	17.1	872.2	**94.0**	40	3.5	40.9	81.8	**55.3**
Water Wt.	107.5	12.5	51.0	821.2	**88.5**	60	2.5	38.4	76.8	**52.0**
Tare Wt.	205.2	9.5	35.3	785.9	**84.7**	100	2.4	36.0	72.0	**48.7**
Wt. Of Dry Soil	928.1	4.75	57.0	728.9	**78.5**	200	4.5	31.5	63.0	**42.6**
Moisture Content %	**11.6**	10	101.0	627.9	**67.7**	Pan	31.5			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	928.1			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.677	0.5	40.0	17.0	0.01417	31.0	11.2	4.729	0.067	62.0	**41.9**
50.0	0.677	1	36.0	17.0	0.01417	27.0	11.8	3.441	0.049	54.0	**36.5**
50.0	0.677	2	35.0	17.0	0.01417	26.0	12.0	2.450	0.035	52.0	**35.2**
50.0	0.677	4	32.0	17.0	0.01417	23.0	12.5	1.768	0.025	46.0	**31.1**
50.0	0.677	8	30.0	17.0	0.01417	21.0	12.8	1.266	0.018	42.0	**28.4**
50.0	0.677	15	28.5	17.0	0.01417	19.5	13.1	0.934	0.013	39.0	**26.4**
50.0	0.677	30	25.5	17.0	0.01417	16.5	13.6	0.673	0.010	33.0	**22.3**
50.0	0.677	60	24.0	17.0	0.01417	15.0	13.8	0.480	0.007	30.0	**20.3**
50.0	0.677	120	21.0	17.0	0.01417	12.0	14.3	0.345	0.005	24.0	**16.2**
50.0	0.677	240	19.0	17.0	0.01417	10.0	14.6	0.247	0.004	20.0	**13.5**
50.0	0.677	480	18.0	18.0	0.01399	10.0	14.6	0.175	0.002	20.0	**13.5**
50.0	0.677	1440	16.5	18.0	0.01399	8.5	14.9	0.102	0.001	17.0	**11.5**

Hydrometer #: 932452	Graduate #: 5	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-49-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH49-SPT2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

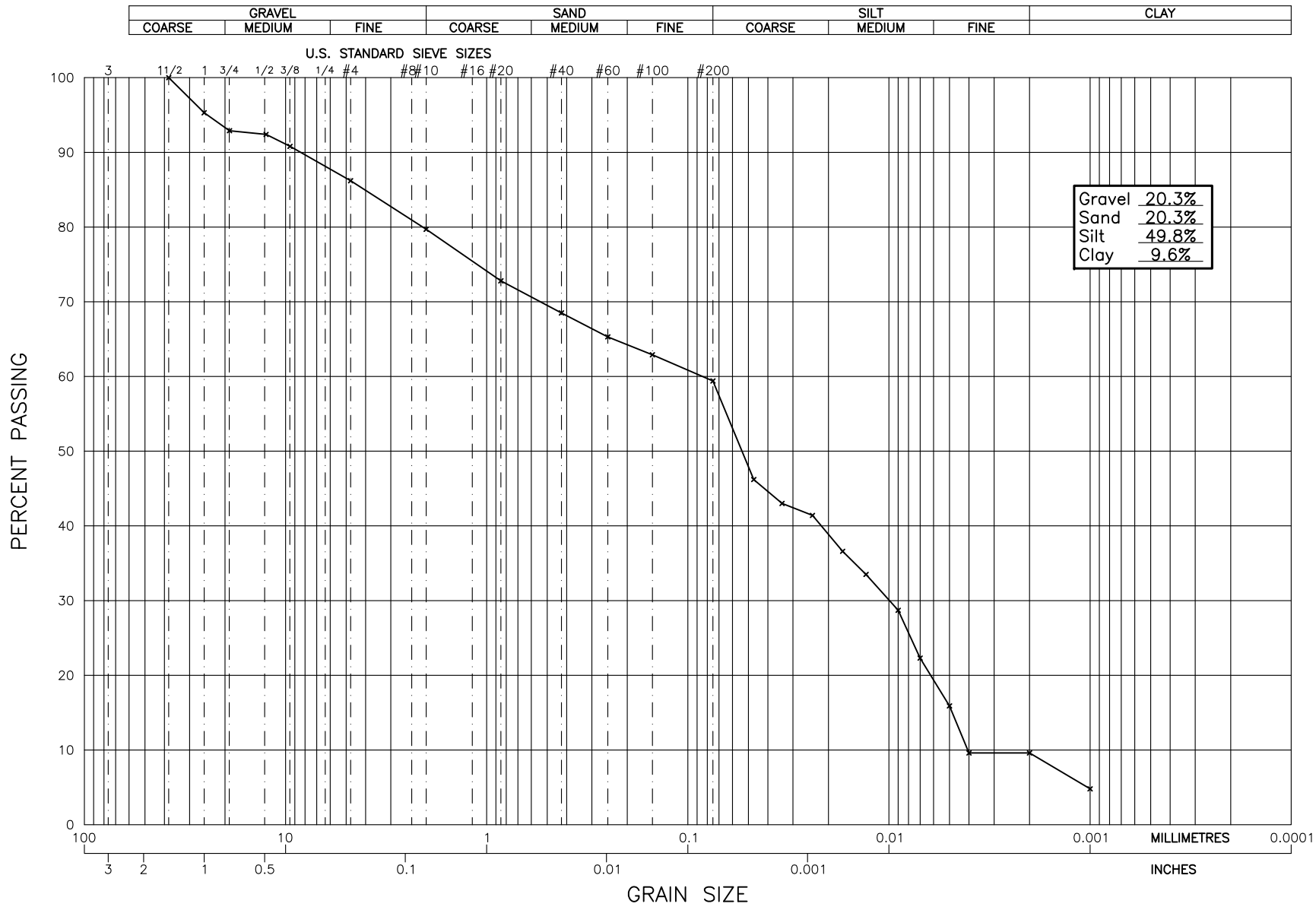
Client: BGC Engineering Inc.				Date: November 15, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt, some sand,clay and gravel
Sample #: **SPT2**	Test #:	**Hole #: BH-BGC11-49**	**Depth: 2.28 - 2.73m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.14, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**88.1**
Wet Wt. & Tare	855.1	25.4				20	2.7	47.3	94.6	**83.4**
Dry Wt. & Tare	742.8	19.0		550.0	**100.0**	40	1.7	45.6	91.2	**80.4**
Water Wt.	112.3	12.5	14.3	535.7	**97.4**	60	1.1	44.5	89.0	**78.4**
Tare Wt.	192.8	9.5	6.2	529.5	**96.3**	100	1.0	43.5	87.0	**76.7**
Wt. Of Dry Soil	550.0	4.75	15.7	513.8	**93.4**	200	3.5	40.0	80.0	**70.5**
Moisture Content %	**20.4**	10	29.2	484.6	**88.1**	Pan	40.0			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	550.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.881	0.5	45.0	17.0	0.01417	36.0	10.4	4.551	0.064	72.0	**63.4**
50.0	0.881	1	37.0	17.0	0.01417	28.0	11.7	3.417	0.048	56.0	**49.3**
50.0	0.881	2	32.0	17.0	0.01417	23.0	12.5	2.500	0.035	46.0	**40.5**
50.0	0.881	4	29.0	17.0	0.01417	20.0	13.0	1.802	0.026	40.0	**35.2**
50.0	0.881	8	26.5	17.0	0.01417	17.5	13.4	1.295	0.018	35.0	**30.8**
50.0	0.881	15	24.0	17.0	0.01417	15.0	13.8	0.960	0.014	30.0	**26.4**
50.0	0.881	30	22.0	17.0	0.01417	13.0	14.2	0.687	0.010	26.0	**22.9**
50.0	0.881	60	20.0	17.0	0.01417	11.0	14.5	0.491	0.007	22.0	**19.4**
50.0	0.881	120	18.0	17.0	0.01417	9.0	14.8	0.351	0.005	18.0	**15.9**
50.0	0.881	240	16.0	17.0	0.01417	7.0	15.1	0.251	0.004	14.0	**12.3**
50.0	0.881	480	15.0	18.0	0.01399	7.0	15.1	0.178	0.002	14.0	**12.3**
50.0	0.881	1440	14.0	18.0	0.01399	6.0	15.3	0.103	0.001	12.0	**10.6**

Hydrometer #: 932452	Graduate #: 6	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-51-G6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH51-G6

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

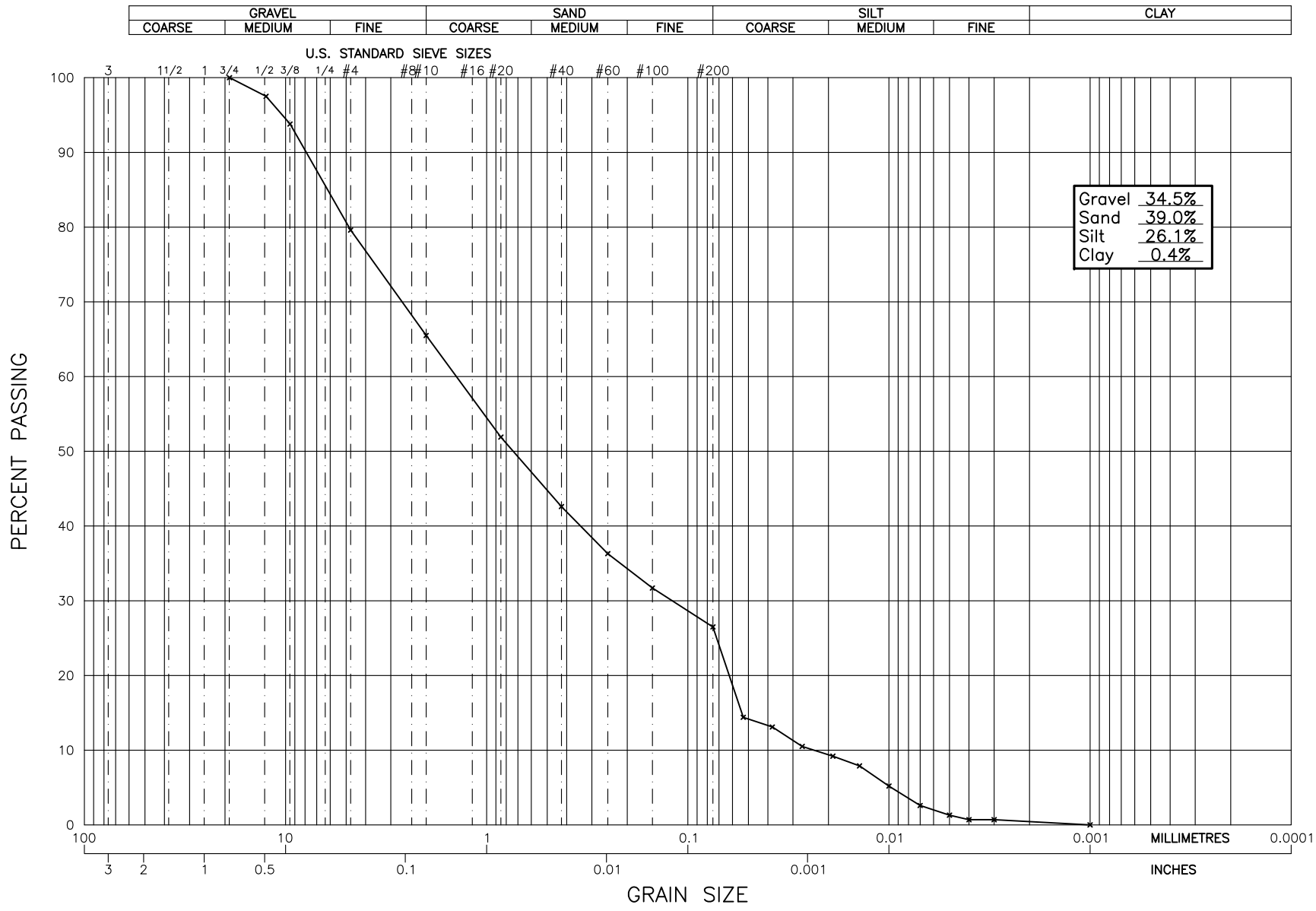
Client: BGC Engineering Inc.				Date: November 16, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt, gravelly and sandy
Sample #: **G6**	Test #:	**Hole #: BH-BGC11-51**	**Depth: 7.9 - 8.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.5, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.15, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		875.6	**100.0**	10		50.0	100.0	**79.7**
Wet Wt. & Tare	1208.8	25.4	41.1	834.5	**95.3**	20	4.3	45.7	91.4	**72.8**
Dry Wt. & Tare	1057.0	19.0	20.9	813.6	**92.9**	40	2.7	43.0	86.0	**68.5**
Water Wt.	151.8	12.5	4.8	808.8	**92.4**	60	2.0	41.0	82.0	**65.3**
Tare Wt.	181.4	9.5	13.7	795.1	**90.8**	100	1.5	39.5	79.0	**62.9**
Wt. Of Dry Soil	875.6	4.75	40.2	754.9	**86.2**	200	2.2	37.3	74.6	**59.4**
Moisture Content %	**17.3**	10	57.3	697.6	**79.7**	Pan	37.3			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	875.6			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.797	0.5	39.0	18.0	0.01399	31.0	11.2	4.729	0.066	62.0	**49.4**
50.0	0.797	1	37.0	18.0	0.01399	29.0	11.5	3.393	0.047	58.0	**46.2**
50.0	0.797	2	35.0	18.0	0.01399	27.0	11.8	2.433	0.034	54.0	**43.0**
50.0	0.797	4	34.0	18.0	0.01399	26.0	12.0	1.732	0.024	52.0	**41.4**
50.0	0.797	8	31.0	18.0	0.01399	23.0	12.5	1.250	0.017	46.0	**36.6**
50.0	0.797	15	29.0	18.0	0.01399	21.0	12.8	0.925	0.013	42.0	**33.5**
50.0	0.797	30	26.0	18.0	0.01399	18.0	13.3	0.666	0.009	36.0	**28.7**
50.0	0.797	60	22.0	18.0	0.01399	14.0	14.0	0.483	0.007	28.0	**22.3**
50.0	0.797	120	18.0	18.0	0.01399	10.0	14.6	0.349	0.005	20.0	**15.9**
50.0	0.797	240	14.0	18.0	0.01399	6.0	15.3	0.253	0.004	12.0	**9.6**
50.0	0.797	480	12.0	23.0	0.01317	6.0	15.3	0.179	0.002	12.0	**9.6**
50.0	0.797	1440	11.0	18.0	0.01399	3.0	15.8	0.105	0.001	6.0	**4.8**

Hydrometer #: 932452	Graduate #: 8	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-51-G10

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH51-G10

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Inc.				Date: November 16, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand and Gravel, silty
Sample #: **G10**	Test #:	**Hole #: BH-BGC11-51**	**Depth: 13.9 - 14.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.6, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.15, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		948.8	**100.0**	10		**50.0**	100.0	**65.5**
Wet Wt. & Tare	1181.4	25.4		948.8	**100.0**	20	10.4	**39.6**	79.2	**51.9**
Dry Wt. & Tare	1080.3	19.0		948.8	**100.0**	40	7.1	**32.5**	65.0	**42.6**
Water Wt.	101.1	12.5	23.3	925.5	**97.5**	60	4.8	**27.7**	55.4	**36.3**
Tare Wt.	131.5	9.5	35.7	889.8	**93.8**	100	3.5	**24.2**	48.4	**31.7**
Wt. Of Dry Soil	948.8	4.75	134.9	754.9	**79.6**	200	4.0	**20.2**	40.4	**26.5**
Moisture Content %	**10.7**	10	133.3	621.6	**65.5**	Pan	20.2			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	948.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.655	0.5	22.0	18.0	0.01399	14.0	14.0	5.289	**0.074**	28.0	**18.3**
50.0	0.655	1	19.0	18.0	0.01399	11.0	14.5	3.805	**0.053**	22.0	**14.4**
50.0	0.655	2	18.0	18.0	0.01399	10.0	14.6	2.706	**0.038**	20.0	**13.1**
50.0	0.655	4	16.0	18.0	0.01399	8.0	15.0	1.935	**0.027**	16.0	**10.5**
50.0	0.655	8	15.0	18.0	0.01399	7.0	15.1	1.376	**0.019**	14.0	**9.2**
50.0	0.655	15	14.0	18.0	0.01399	6.0	15.3	1.010	**0.014**	12.0	**7.9**
50.0	0.655	30	12.0	18.0	0.01399	4.0	15.6	0.722	**0.010**	8.0	**5.2**
50.0	0.655	60	10.0	18.0	0.01399	2.0	16.0	0.516	**0.007**	4.0	**2.6**
50.0	0.655	120	9.0	18.0	0.01399	1.0	16.1	0.367	**0.005**	2.0	**1.3**
50.0	0.655	240	8.5	18.0	0.01399	0.5	16.2	0.260	**0.004**	1.0	**0.7**
50.0	0.655	480	7.5	20.0	0.01365	0.5	16.2	0.184	**0.003**	1.0	**0.7**
50.0	0.655	1440	7.0	20.0	0.01365	0.0	16.3	0.106	**0.001**	0.0	**0.0**

Hydrometer #: 932452	Graduate #: 7	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

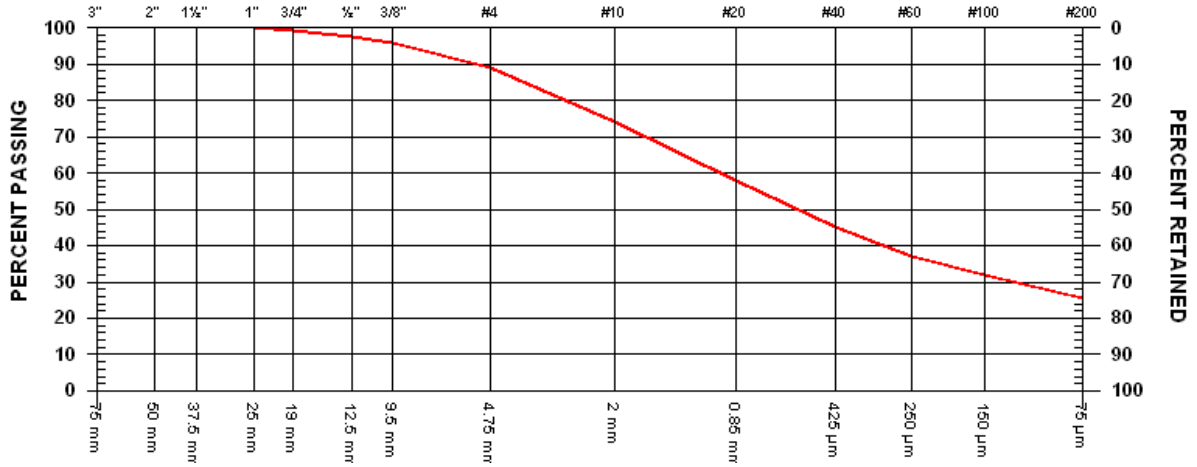
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 39 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.14 DATE SAMPLED 2011.Aug.06

SUPPLIER BH-BGC11-51
SOURCE G14 @ 20.1 - 20.3m
SPECIFICATION
MATERIAL TYPE Crush

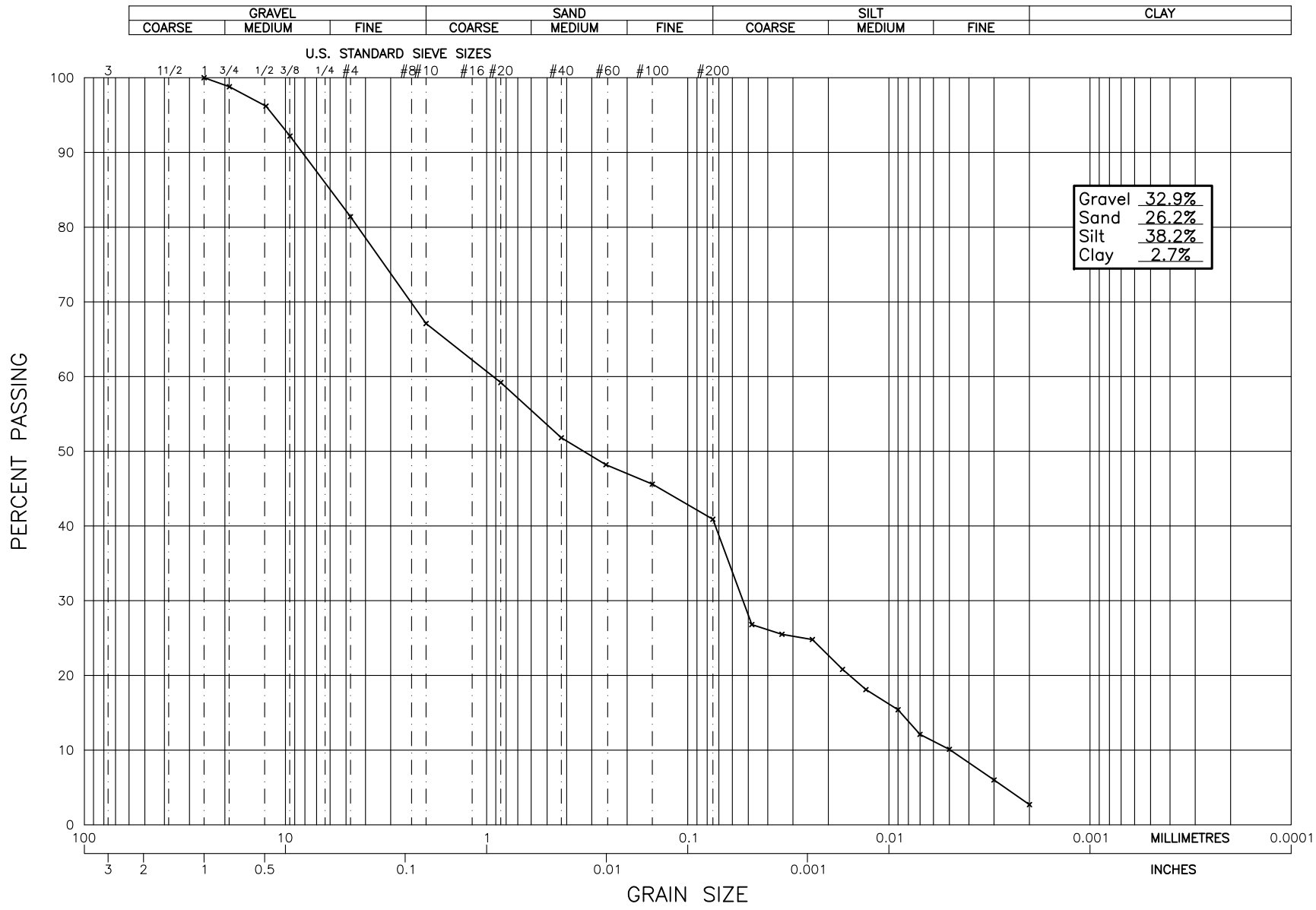
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	99.3	
1/2"	12.5 mm	97.4	
3/8"	9.5 mm	95.7	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	88.8	
No. 10	2.00 mm	74.2	
No. 20	850 µm	57.8	
No. 40	425 µm	45.0	
No. 60	250 µm	37.1	
No. 100	150 µm	31.9	
No. 200	75 µm	25.7	

COMMENTS



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-53-G2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH53-G2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

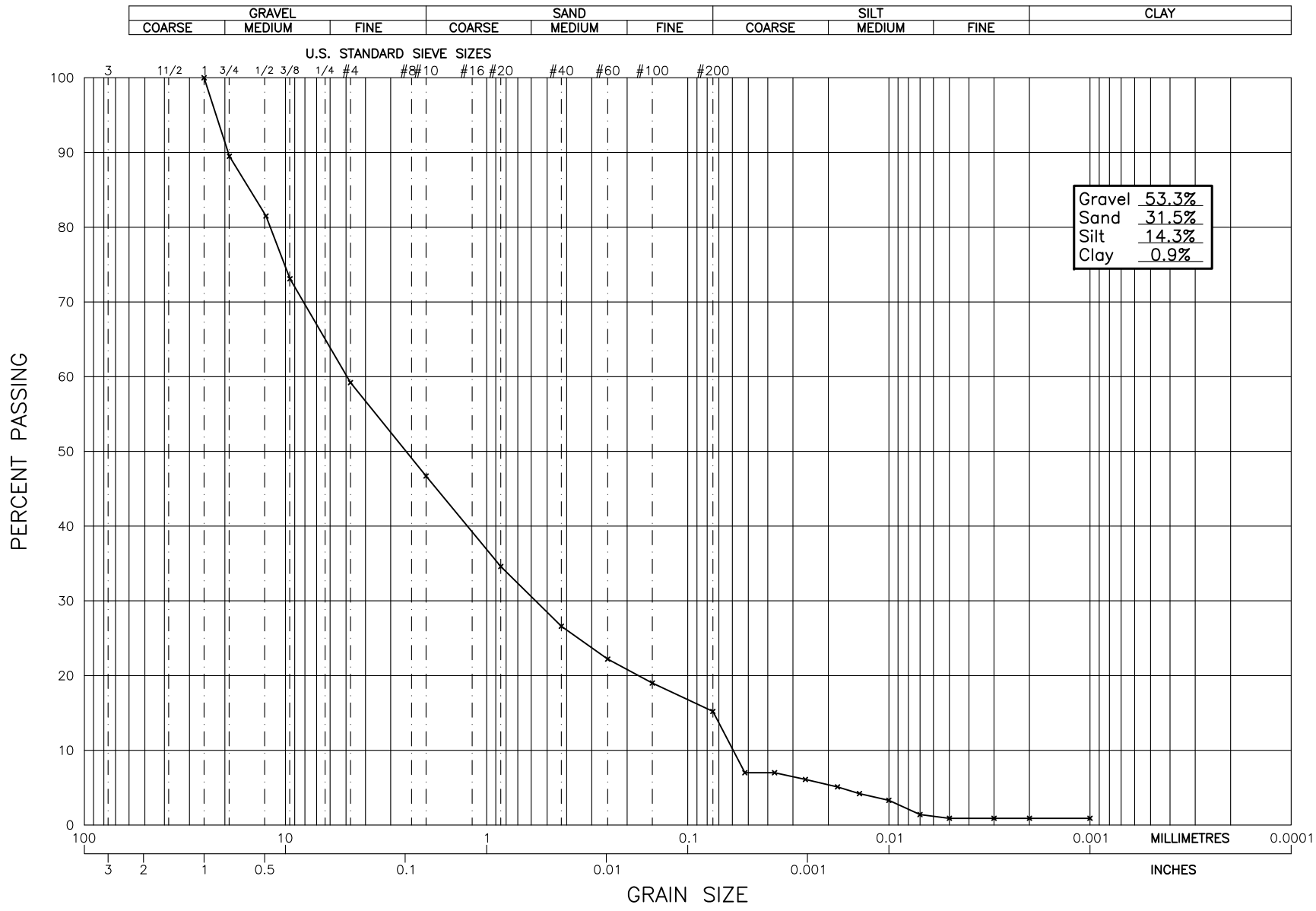
Client: BGC Engineering Inc.				Date: Sept.29, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt/Gravel,sandy
Sample #: **G2**	Test #:	**Hole #: BH-BGC11-53**	**Depth: 1.9 - 2.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Sept.28, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**67.1**
Wet Wt. & Tare	1347.3	25.4		1038.0	**100.0**	20	5.9	44.1	88.2	**59.2**
Dry Wt. & Tare	1229.1	19.0	12.1	1025.9	**98.8**	40	5.5	38.6	77.2	**51.8**
Water Wt.	118.2	12.5	27.8	998.1	**96.2**	60	2.7	35.9	71.8	**48.2**
Tare Wt.	191.1	9.5	41.0	957.1	**92.2**	100	1.9	34.0	68.0	**45.6**
Wt. Of Dry Soil	1038.0	4.75	112.0	845.1	**81.4**	200	3.5	30.5	61.0	**40.9**
Moisture Content %	**11.4**	10	148.9	696.2	**67.1**	Pan	30.5			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1038.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.671	0.5	30.0	22.0	0.01332	23.5	12.4	4.983	0.066	47.0	**31.5**
50.0	0.671	1	26.5	22.0	0.01332	20.0	13.0	3.605	0.048	40.0	**26.8**
50.0	0.671	2	25.5	22.0	0.01332	19.0	13.2	2.565	0.034	38.0	**25.5**
50.0	0.671	4	25.0	22.0	0.01332	18.5	13.2	1.820	0.024	37.0	**24.8**
50.0	0.671	8	22.0	22.0	0.01332	15.5	13.7	1.310	0.017	31.0	**20.8**
50.0	0.671	15	20.0	22.0	0.01332	13.5	14.1	0.968	0.013	27.0	**18.1**
50.0	0.671	30	18.0	22.0	0.01332	11.5	14.4	0.693	0.009	23.0	**15.4**
50.0	0.671	60	15.5	22.0	0.01332	9.0	14.8	0.497	0.007	18.0	**12.1**
50.0	0.671	120	14.0	22.0	0.01332	7.5	15.1	0.354	0.005	15.0	**10.1**
50.0	0.671	240	10.5	24.0	0.01301	4.5	15.6	0.255	0.003	9.0	**6.0**
50.0	0.671	480	8.0	24.0	0.01301	2.0	16.0	0.182	0.002	4.0	**2.7**
50.0	0.671	1440	8.0	24.0	0.01301	2.0	16.0	0.105	0.001	4.0	**2.7**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-53-G4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH53-G4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

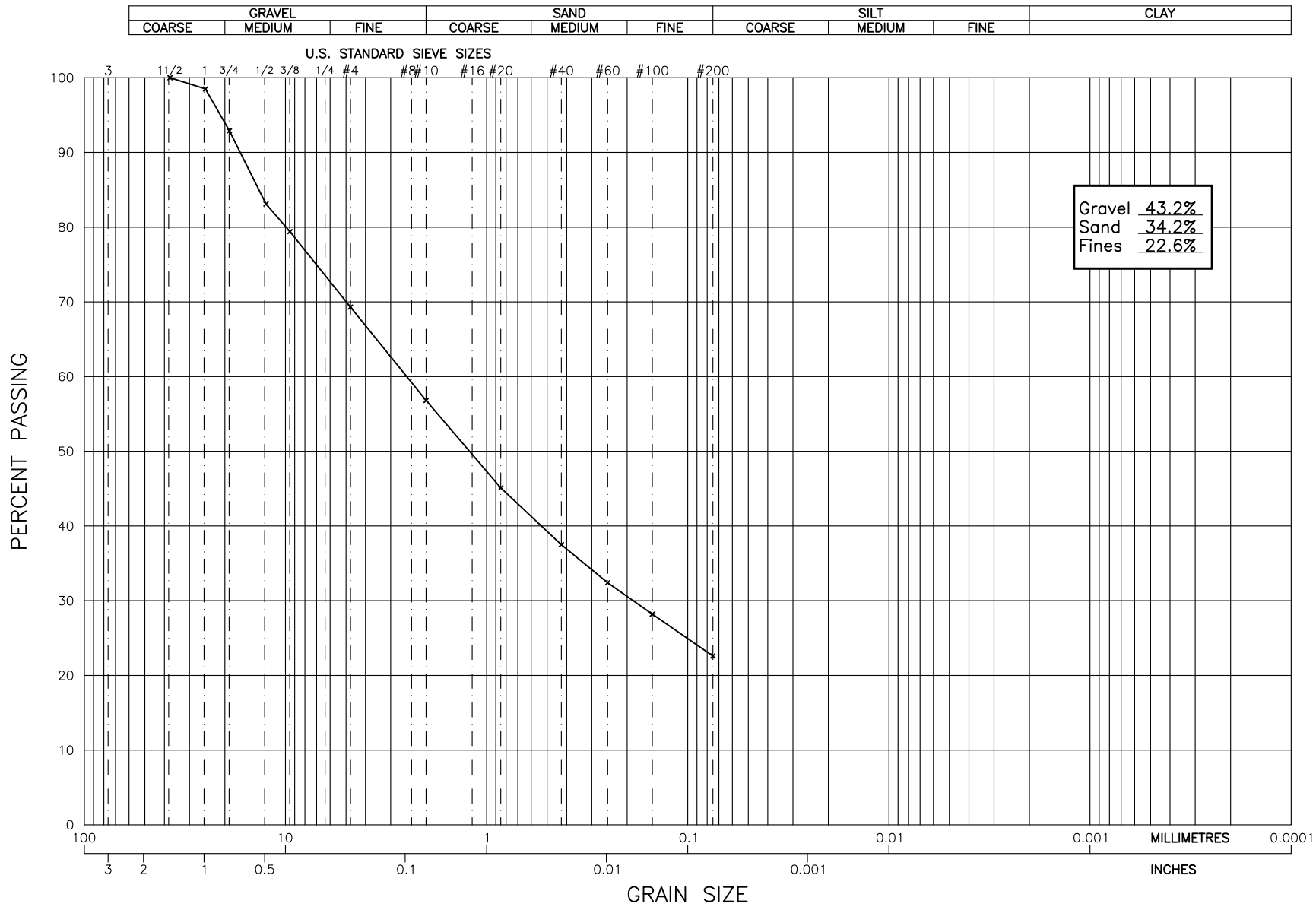
Client: BGC Engineering Inc.				Date: Sept.29, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel,sandy,some silt
Sample #: **G4**	Test #:	**Hole #: BH-BGC11-53**	**Depth: 4.9 - 5.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Sept.28, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**46.7**
Wet Wt. & Tare	1239.1	25.4		1016.0	**100.0**	20	13.0	37.0	74.0	**34.6**
Dry Wt. & Tare	1195.8	19.0	106.9	909.1	**89.5**	40	8.5	28.5	57.0	**26.6**
Water Wt.	43.3	12.5	81.0	828.1	**81.5**	60	4.7	23.8	47.6	**22.2**
Tare Wt.	179.8	9.5	85.6	742.5	**73.1**	100	3.5	20.3	40.6	**19.0**
Wt. Of Dry Soil	1016.0	4.75	140.8	601.7	**59.2**	200	4.0	16.3	32.6	**15.2**
Moisture Content %	**4.3**	10	127.0	474.7	**46.7**	Pan	16.3			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1016.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.467	0.5	17.0	22.0	0.01332	10.5	14.6	5.397	0.072	21.0	**9.8**
50.0	0.467	1	14.0	22.0	0.01332	7.5	15.1	3.880	0.052	15.0	**7.0**
50.0	0.467	2	14.0	22.0	0.01332	7.5	15.1	2.744	0.037	15.0	**7.0**
50.0	0.467	4	13.0	22.0	0.01332	6.5	15.2	1.951	0.026	13.0	**6.1**
50.0	0.467	8	12.0	22.0	0.01332	5.5	15.4	1.387	0.018	11.0	**5.1**
50.0	0.467	15	11.0	22.0	0.01332	4.5	15.6	1.018	0.014	9.0	**4.2**
50.0	0.467	30	10.0	22.0	0.01332	3.5	15.7	0.724	0.010	7.0	**3.3**
50.0	0.467	60	8.0	22.0	0.01332	1.5	16.0	0.517	0.007	3.0	**1.4**
50.0	0.467	120	7.5	22.0	0.01332	1.0	16.1	0.367	0.005	2.0	**0.9**
50.0	0.467	240	7.0	24.0	0.01301	1.0	16.1	0.259	0.003	2.0	**0.9**
50.0	0.467	480	7.0	24.0	0.01301	1.0	16.1	0.183	0.002	2.0	**0.9**
50.0	0.467	1440	7.0	24.0	0.01301	1.0	16.1	0.106	0.001	2.0	**0.9**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-53-G6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH53-G6

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

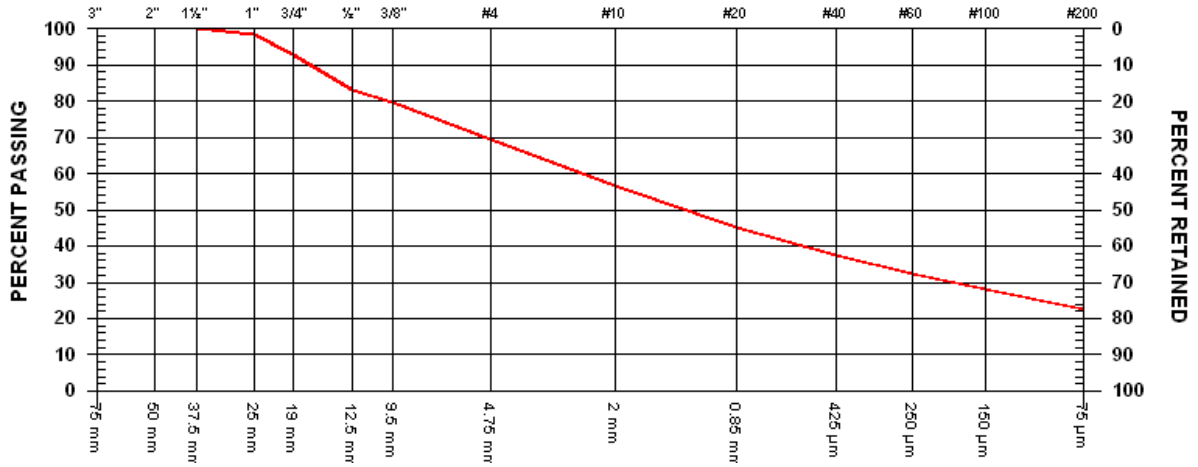
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 5 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.29 DATE SAMPLED 2011.Aug.07

SUPPLIER BH-BGC11-53
SOURCE G6 @ 7.9 - 8.1m
SPECIFICATION
MATERIAL TYPE Gravel

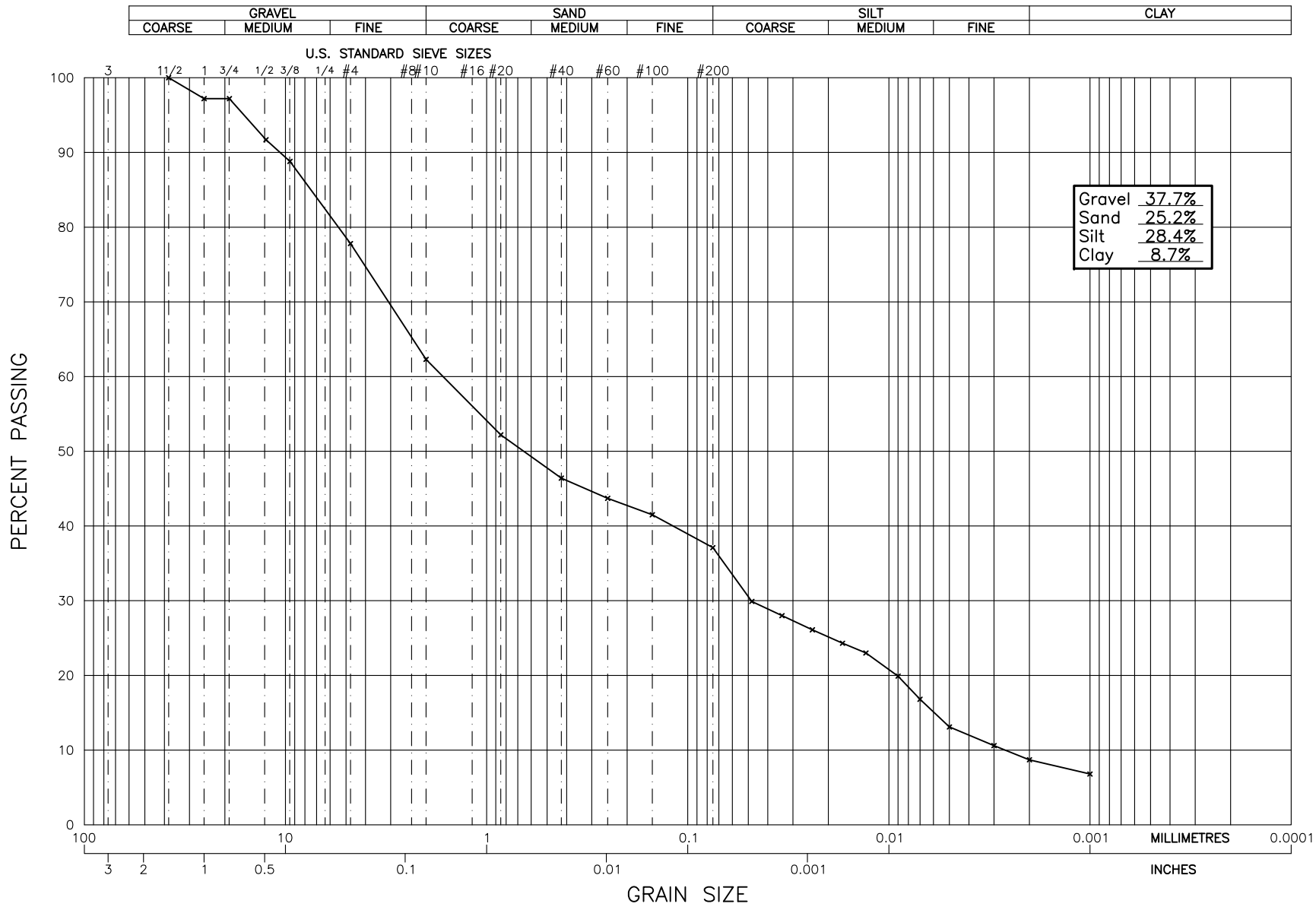
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	98.5	
3/4"	19 mm	92.9	
1/2"	12.5 mm	83.1	
3/8"	9.5 mm	79.4	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	69.3	
No. 10	2.00 mm	56.8	
No. 20	850 µm	45.1	
No. 40	425 µm	37.5	
No. 60	250 µm	32.4	
No. 100	150 µm	28.2	
No. 200	75 µm	22.6	

COMMENTS



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-53-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH53-SPT2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

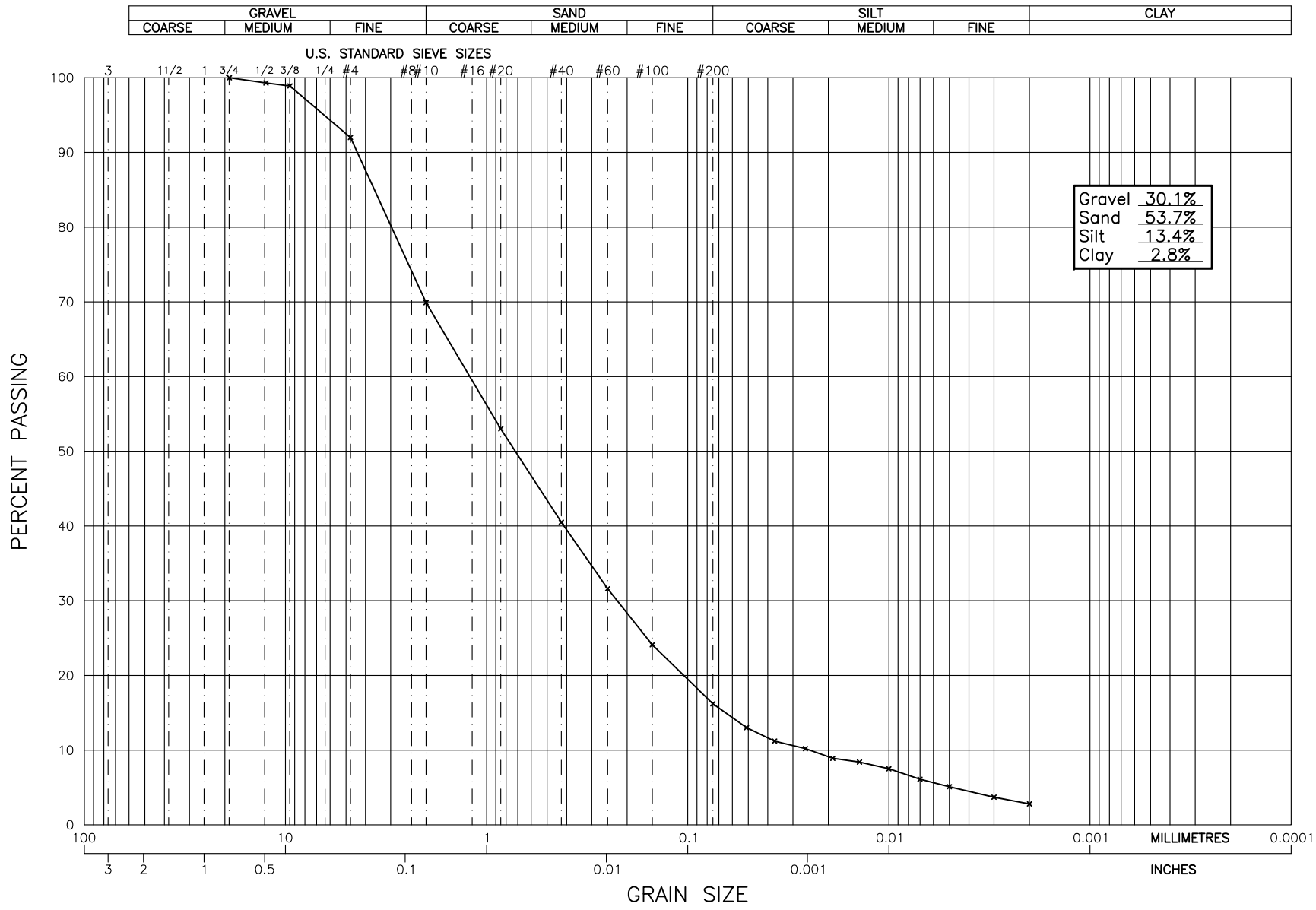
Client: BGC Engineering Inc.				Date: Oct.6, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel,silty,sandy
Sample #: **SPT2**	Test #:	**Hole #: BH-BGC11-53**	**Depth: 2.28 - 2.73m**	Time:
Sampled By: Client	Tested By: MM			Checked By: DJ
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Oct.4, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		649.4	**100.0**	10		50.0	100.0	**62.3**
Wet Wt. & Tare	896.1	25.4	18.4	631.0	**97.2**	20	8.1	41.9	83.8	**52.2**
Dry Wt. & Tare	830.2	19.0	0.0	631.0	**97.2**	40	4.6	37.3	74.6	**46.4**
Water Wt.	65.9	12.5	35.7	595.3	**91.7**	60	2.2	35.1	70.2	**43.7**
Tare Wt.	180.8	9.5	18.9	576.4	**88.8**	100	1.8	33.3	66.6	**41.5**
Wt. Of Dry Soil	649.4	4.75	71.0	505.4	**77.8**	200	3.5	29.8	59.6	**37.1**
Moisture Content %	**10.1**	10	101.1	404.3	**62.3**	Pan	29.8			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	649.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.623	0.5	35.0	20.0	0.01365	28.0	11.7	4.832	0.066	56.0	**34.9**
50.0	0.623	1	31.0	20.0	0.01365	24.0	12.3	3.512	0.048	48.0	**29.9**
50.0	0.623	2	29.5	20.0	0.01365	22.5	12.6	2.508	0.034	45.0	**28.0**
50.0	0.623	4	28.0	20.0	0.01365	21.0	12.8	1.791	0.024	42.0	**26.1**
50.0	0.623	8	26.5	20.0	0.01365	19.5	13.1	1.279	0.017	39.0	**24.3**
50.0	0.623	15	25.5	20.0	0.01365	18.5	13.2	0.940	0.013	37.0	**23.0**
50.0	0.623	30	23.0	20.0	0.01365	16.0	13.7	0.675	0.009	32.0	**19.9**
50.0	0.623	60	20.5	20.0	0.01365	13.5	14.1	0.484	0.007	27.0	**16.8**
50.0	0.623	120	17.5	21.0	0.01348	10.5	14.6	0.348	0.005	21.0	**13.1**
50.0	0.623	240	15.5	21.0	0.01348	8.5	14.9	0.249	0.003	17.0	**10.6**
50.0	0.623	480	14.0	21.0	0.01348	7.0	15.1	0.178	0.002	14.0	**8.7**
50.0	0.623	1440	12.5	20.0	0.01365	5.5	15.4	0.103	0.001	11.0	**6.8**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-53-SPT4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH53-SPT4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

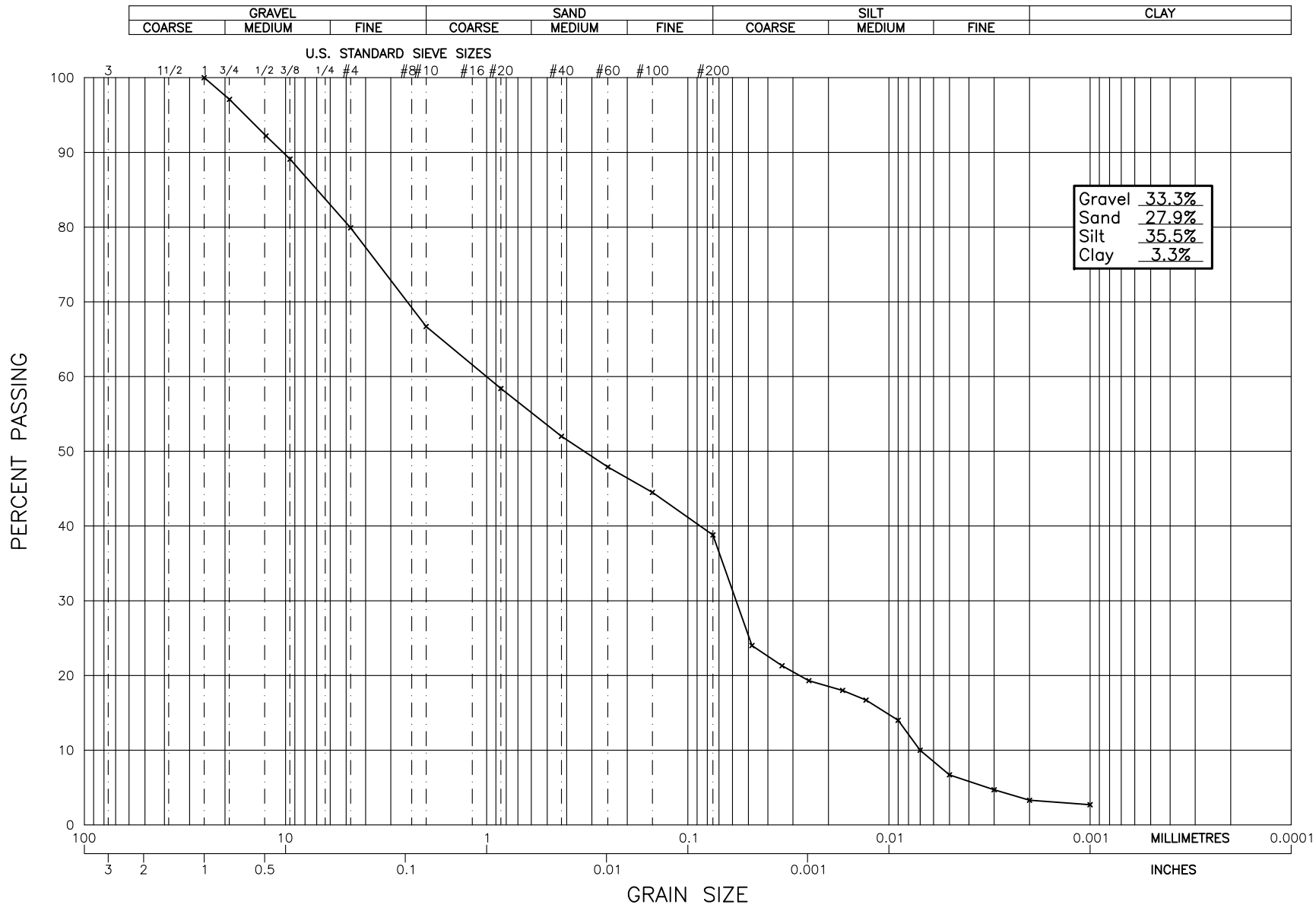
Client: BGC Engineering Inc.				Date: Oct. 6, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand,gravelly,some silt
Sample #: **SPT4**	Test #:	**Hole #: BH-BGC11-53**	**Depth: 6.85 - 7.30m**	Time:
Sampled By: Client	Tested By: MM			Checked By:
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Oct.4, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		75.0	100.0	**69.9**
Wet Wt. & Tare	661.4	25.4				20	18.1	56.9	75.9	**53.0**
Dry Wt. & Tare	646.7	19.0		464.3	**100.0**	40	13.4	43.5	58.0	**40.5**
Water Wt.	14.7	12.5	3.2	461.1	**99.3**	60	9.6	33.9	45.2	**31.6**
Tare Wt.	182.4	9.5	2.1	459.0	**98.9**	100	8.0	25.9	34.5	**24.1**
Wt. Of Dry Soil	464.3	4.75	31.9	427.1	**92.0**	200	8.5	17.4	23.2	**16.2**
Moisture Content %	**3.2**	10	102.7	324.4	**69.9**	Pan	17.4			
Dry Wt. Of Sample from Initial Moisture						Total	75.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	464.3			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
75.0	0.699	0.5	24.0	20.0	0.01365	17.0	13.5	5.194	0.071	22.7	**15.8**
75.0	0.699	1	21.0	20.0	0.01365	14.0	14.0	3.740	0.051	18.7	**13.0**
75.0	0.699	2	19.0	20.0	0.01365	12.0	14.3	2.675	0.037	16.0	**11.2**
75.0	0.699	4	18.0	20.0	0.01365	11.0	14.5	1.903	0.026	14.7	**10.2**
75.0	0.699	8	16.5	20.0	0.01365	9.5	14.7	1.357	0.019	12.7	**8.9**
75.0	0.699	15	16.0	20.0	0.01365	9.0	14.8	0.994	0.014	12.0	**8.4**
75.0	0.699	30	15.0	20.0	0.01365	8.0	15.0	0.707	0.010	10.7	**7.5**
75.0	0.699	60	13.5	20.0	0.01365	6.5	15.2	0.504	0.007	8.7	**6.1**
75.0	0.699	120	12.5	21.0	0.01348	5.5	15.4	0.358	0.005	7.3	**5.1**
75.0	0.699	240	11.0	21.0	0.01348	4.0	15.6	0.255	0.003	5.3	**3.7**
75.0	0.699	480	10.0	21.0	0.01348	3.0	15.8	0.181	0.002	4.0	**2.8**
75.0	0.699	1440	10.0	20.0	0.01365	3.0	15.8	0.105	0.001	4.0	**2.8**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-55-G4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH55-G4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

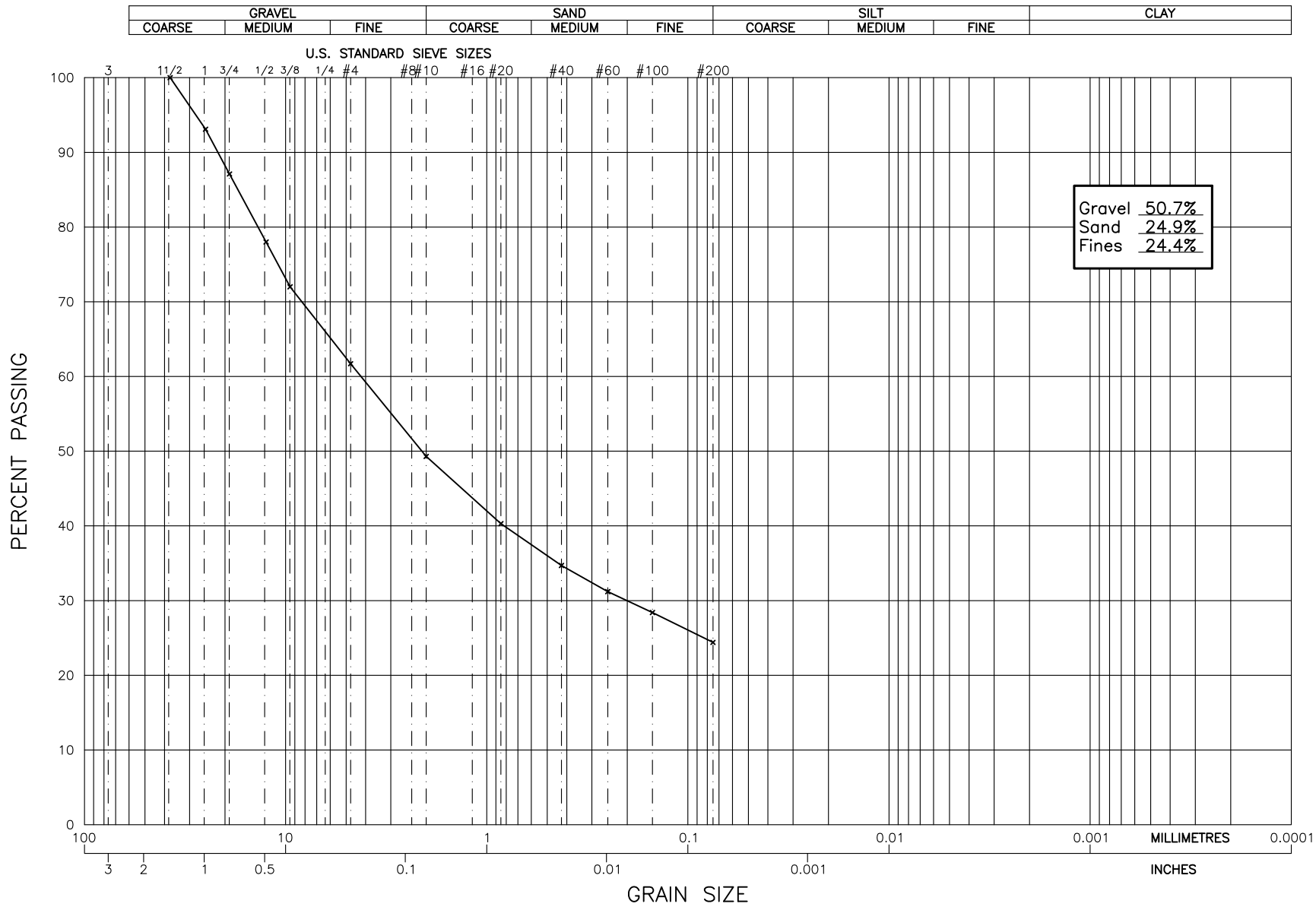
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soil and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt/Gravel/Sand
Sample #: **G4**	Test #:	**Hole #: BH-BGC11-55**	**Depth: 4.9 - 5.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Sept. 23, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**66.7**
Wet Wt. & Tare	1345.5	25.4		1054.1	**100.0**	20	6.2	43.8	87.6	**58.4**
Dry Wt. & Tare	1234.1	19.0	30.1	1024.0	**97.1**	40	4.8	39.0	78.0	**52.0**
Water Wt.	111.4	12.5	52.6	971.4	**92.2**	60	3.1	35.9	71.8	**47.9**
Tare Wt.	180.0	9.5	32.6	938.8	**89.1**	100	2.5	33.4	66.8	**44.5**
Wt. Of Dry Soil	1054.1	4.75	96.3	842.5	**79.9**	200	4.3	29.1	58.2	**38.8**
Moisture Content %	**10.6**	10	139.6	702.9	**66.7**	Pan	29.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1054.1			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.667	0.5	29.0	23.0	0.01317	23.0	12.5	5.000	0.066	46.0	**30.7**
50.0	0.667	1	24.0	23.0	0.01317	18.0	13.3	3.650	0.048	36.0	**24.0**
50.0	0.667	2	22.0	23.0	0.01317	16.0	13.7	2.613	0.034	32.0	**21.3**
50.0	0.667	4	20.5	23.0	0.01317	14.5	13.9	1.864	0.025	29.0	**19.3**
50.0	0.667	8	19.5	23.0	0.01317	13.5	14.1	1.326	0.017	27.0	**18.0**
50.0	0.667	15	18.5	23.0	0.01317	12.5	14.2	0.974	0.013	25.0	**16.7**
50.0	0.667	30	16.5	23.0	0.01317	10.5	14.6	0.697	0.009	21.0	**14.0**
50.0	0.667	60	13.5	23.0	0.01317	7.5	15.1	0.501	0.007	15.0	**10.0**
50.0	0.667	120	11.0	23.0	0.01317	5.0	15.5	0.359	0.005	10.0	**6.7**
50.0	0.667	240	9.5	23.0	0.01317	3.5	15.7	0.256	0.003	7.0	**4.7**
50.0	0.667	480	8.5	23.0	0.01317	2.5	15.9	0.182	0.002	5.0	**3.3**
50.0	0.667	1450	8.0	23.0	0.01317	2.0	16.0	0.105	0.001	4.0	**2.7**

Hydrometer #: 932452	23	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-55-SPT1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH55-SPT1

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 630 - 1718 Argyle Street
Halifax, Nova Scotia
B3J 3N6

ATTN: Peter Quinn

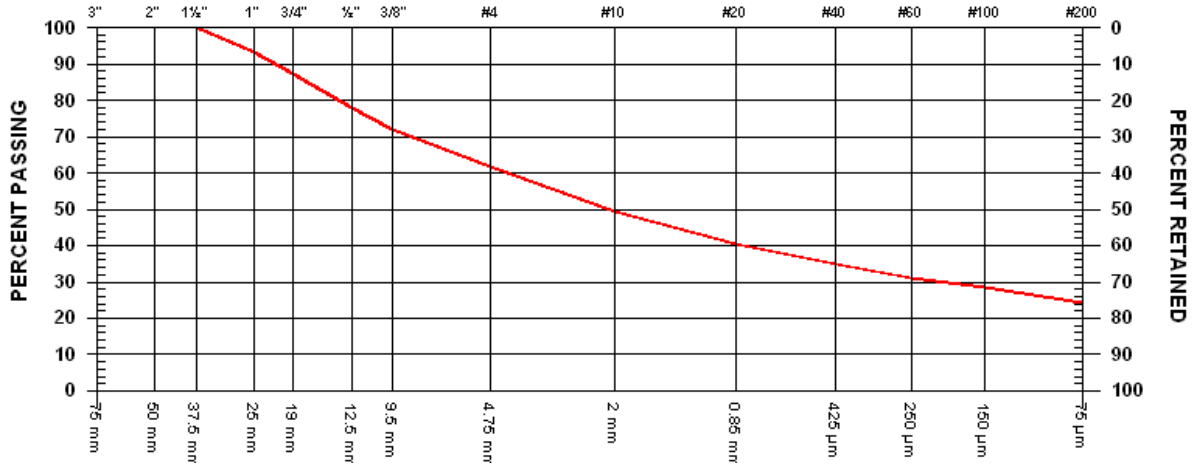
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 2 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.21 DATE SAMPLED 2011.Aug.07

SUPPLIER BH-BGC11-55-SPT1
SOURCE 0.76 - 1.21m
SPECIFICATION
MATERIAL TYPE Gravel

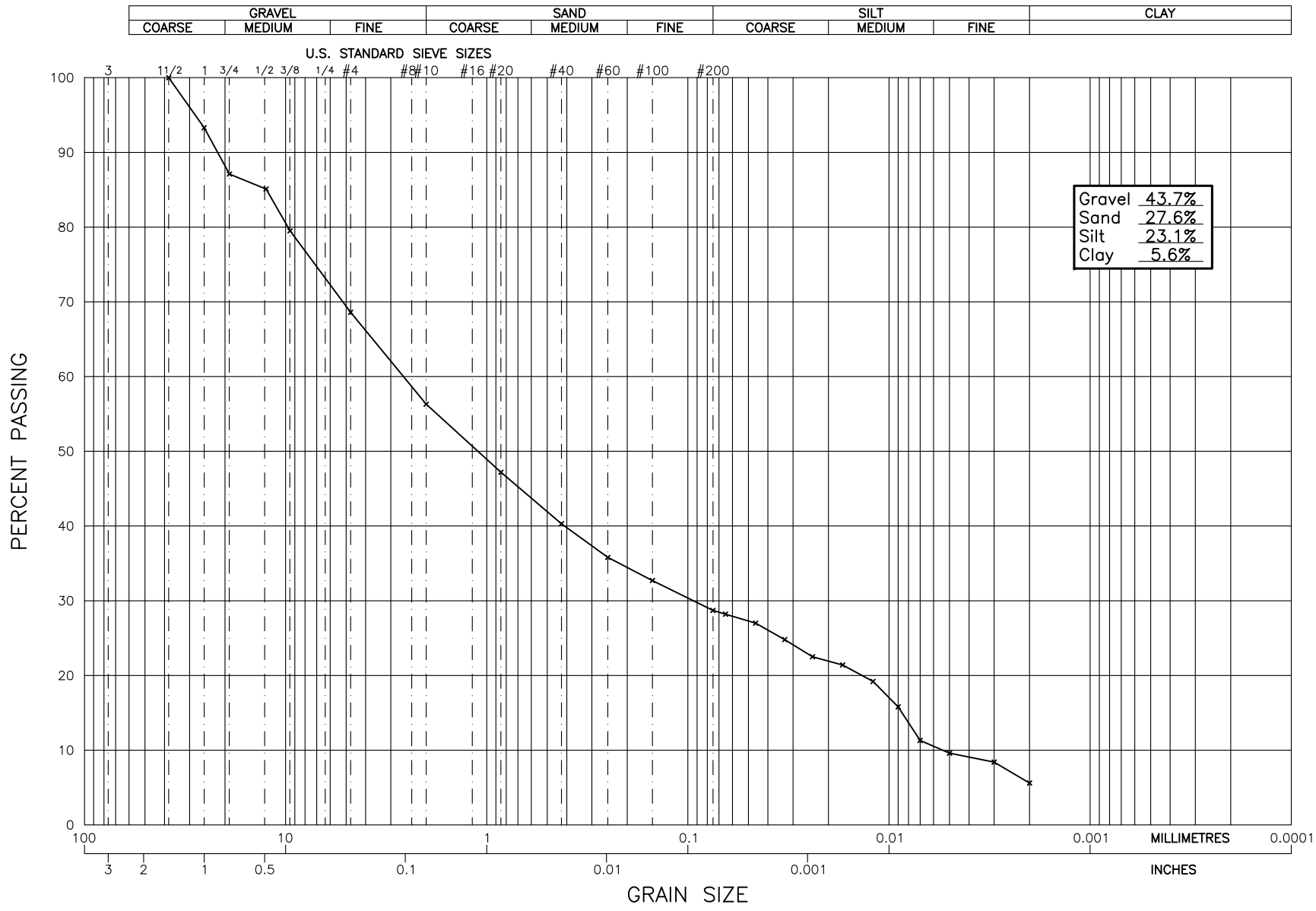
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	93.1	
3/4"	19 mm	87.1	
1/2"	12.5 mm	78.0	
3/8"	9.5 mm	72.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	61.7	
No. 10	2.00 mm	49.3	
No. 20	850 µm	40.3	
No. 40	425 µm	34.7	
No. 60	250 µm	31.2	
No. 100	150 µm	28.4	
No. 200	75 µm	24.4	

COMMENTS



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-55-SPT6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH55-SPT6

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

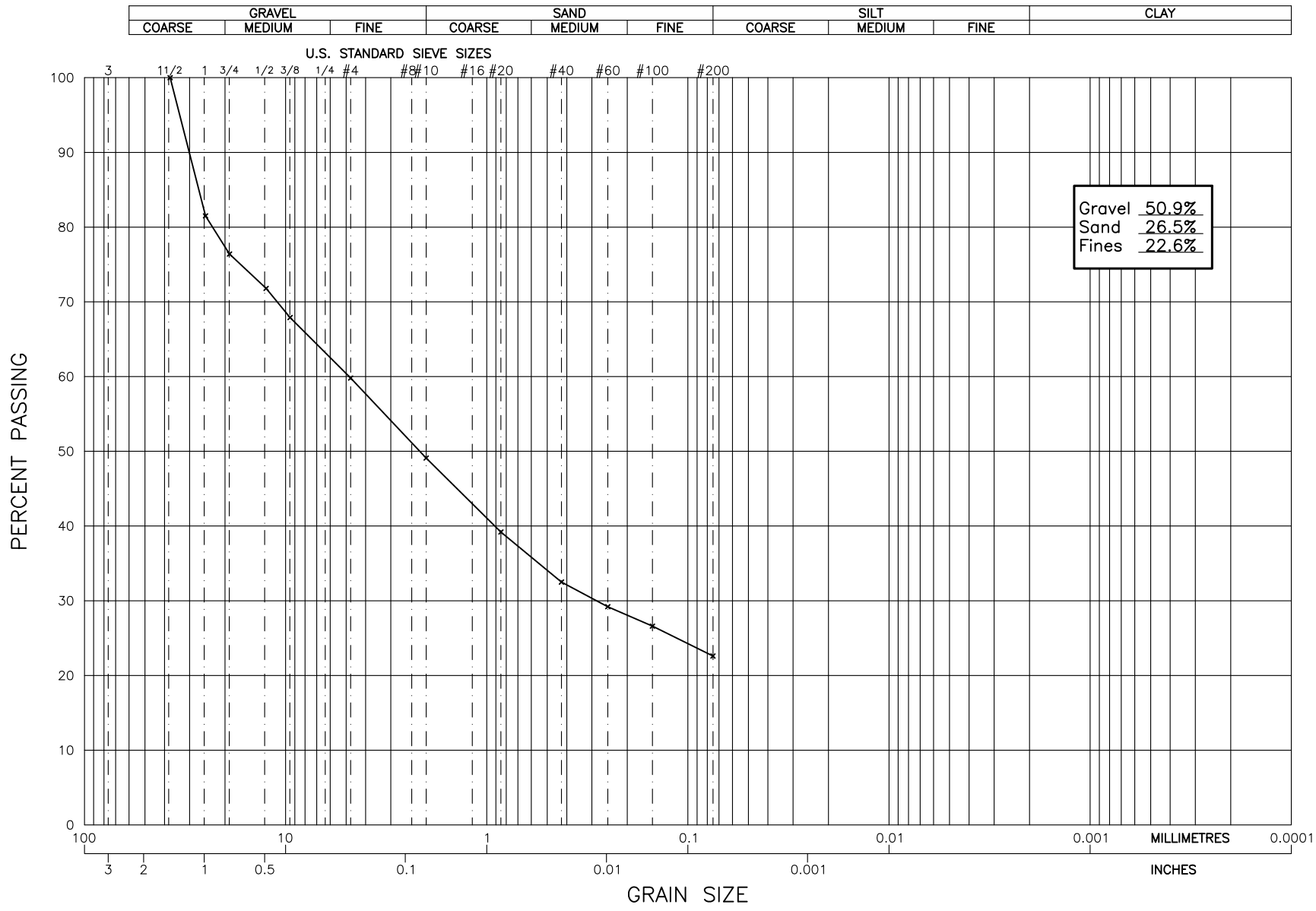
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel,sandy/silty
Sample #: **SPT 6**	Test #:	**Hole #: BH-BGC11-55**	**Depth: 8.38 - 8.83m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 7, 2011	Date Received: September 13, 2011			Date Tested: Sept. 21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		407.6	**100.0**	10		50.0	100.0	**56.3**
Wet Wt. & Tare	613.9	25.4	27.3	380.3	**93.3**	20	8.1	41.9	83.8	**47.2**
Dry Wt. & Tare	587.3	19.0	25.4	354.9	**87.1**	40	6.1	35.8	71.6	**40.3**
Water Wt.	26.6	12.5	8.1	346.8	**85.1**	60	4.0	31.8	63.6	**35.8**
Tare Wt.	179.7	9.5	22.7	324.1	**79.5**	100	2.8	29.0	58.0	**32.7**
Wt. Of Dry Soil	407.6	4.75	44.3	279.8	**68.6**	200	3.5	25.5	51.0	**28.7**
Moisture Content %	**6.5**	10	50.2	229.6	**56.3**	Pan	25.5			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	407.6			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.563	0.5	31.0	23.0	0.01317	25.0	12.2	4.934	0.065	50.0	**28.2**
50.0	0.563	1	30.0	23.0	0.01317	24.0	12.3	3.512	0.046	48.0	**27.0**
50.0	0.563	2	28.0	23.0	0.01317	22.0	12.7	2.516	0.033	44.0	**24.8**
50.0	0.563	4	26.0	23.0	0.01317	20.0	13.0	1.802	0.024	40.0	**22.5**
50.0	0.563	8	25.0	23.0	0.01317	19.0	13.2	1.283	0.017	38.0	**21.4**
50.0	0.563	15	23.0	23.0	0.01317	17.0	13.5	0.948	0.012	34.0	**19.2**
50.0	0.563	30	20.0	23.0	0.01317	14.0	14.0	0.683	0.009	28.0	**15.8**
50.0	0.563	60	16.0	23.0	0.01317	10.0	14.6	0.494	0.007	20.0	**11.3**
50.0	0.563	120	15.0	22.0	0.01332	8.5	14.9	0.352	0.005	17.0	**9.6**
50.0	0.563	240	14.0	22.0	0.01332	7.5	15.1	0.250	0.003	15.0	**8.4**
50.0	0.563	480	12.0	21.0	0.01348	5.0	15.5	0.180	0.002	10.0	**5.6**
50.0	0.563	1440	11.0	23.0	0.01317	5.0	15.5	0.104	0.001	10.0	**5.6**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-56-G2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH56-G2

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

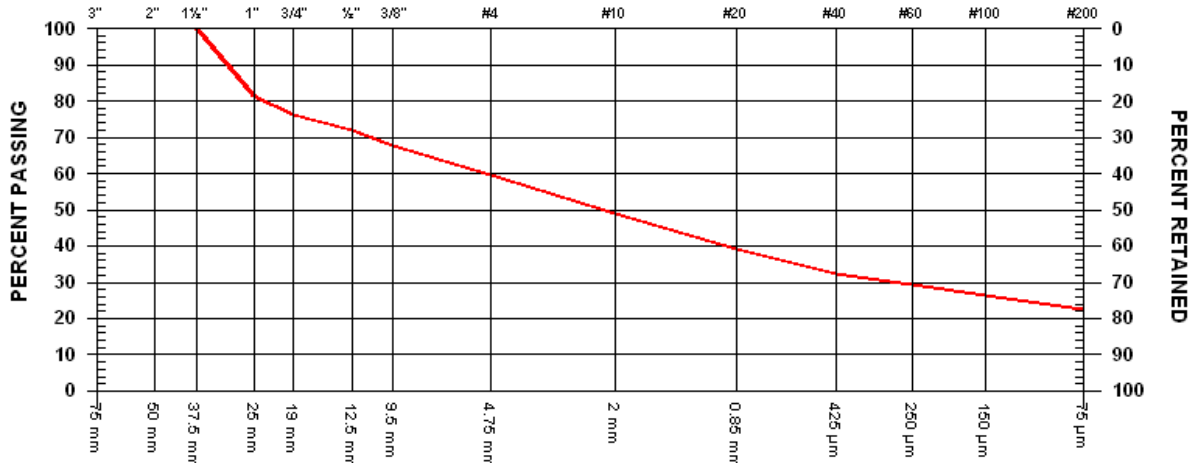
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 7 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.30 DATE SAMPLED 2011.Aug.08

SUPPLIER BH-BGC11-56
SOURCE G2 @ 1.9 - 2.1m
SPECIFICATION
MATERIAL TYPE Gravel

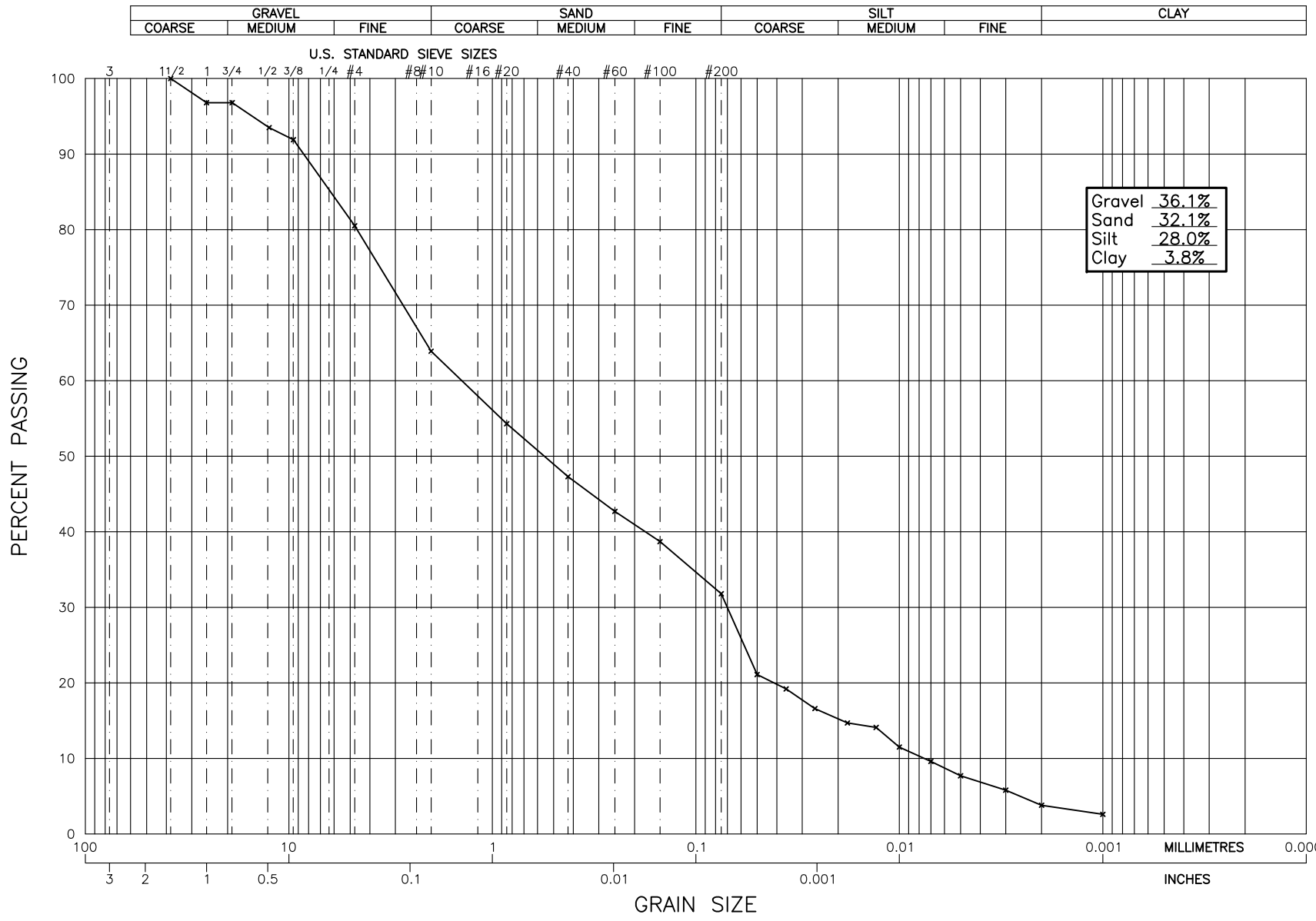
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	81.5	
3/4"	19 mm	76.4	
1/2"	12.5 mm	71.8	
3/8"	9.5 mm	67.9	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	59.8	
No. 10	2.00 mm	49.1	
No. 20	850 µm	39.2	
No. 40	425 µm	32.5	
No. 60	250 µm	29.2	
No. 100	150 µm	26.6	
No. 200	75 µm	22.6	

COMMENTS



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-57-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH57-SPT2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

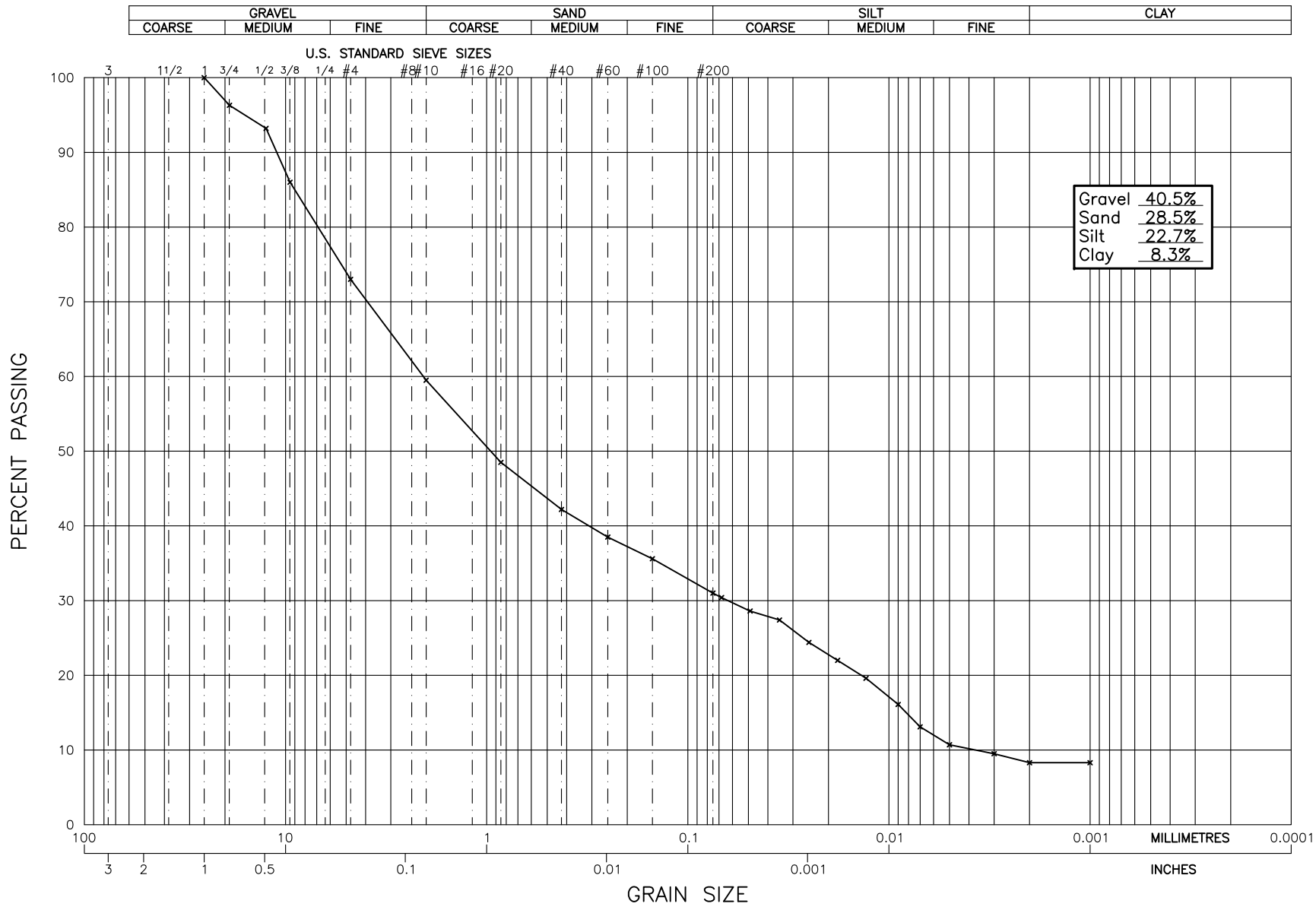
Client: BGC Engineering Inc.				Date: Oct.11, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **SPT2**	Test #:	**Hole #: BH-BGC11-57**	**Depth: 3.8 - 4.25m**	Time:
Sampled By: Client	Tested By: MM			Checked By: DJ
Date Sampled: August 9, 2011	Date Received: September 13, 2011			Date Tested: Oct.4, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		839.7	**100.0**	10		50.0	100.0	**63.9**
Wet Wt. & Tare	1100.1	25.4	26.7	813.0	**96.8**	20	7.5	42.5	85.0	**54.3**
Dry Wt. & Tare	1020.9	19.0	0.0	813.0	**96.8**	40	5.5	37.0	74.0	**47.3**
Water Wt.	79.2	12.5	28.1	784.9	**93.5**	60	3.6	33.4	66.8	**42.7**
Tare Wt.	181.2	9.5	13.6	771.3	**91.9**	100	3.1	30.3	60.6	**38.7**
Wt. Of Dry Soil	839.7	4.75	95.5	675.8	**80.5**	200	5.4	24.9	49.8	**31.8**
Moisture Content %	**9.4**	10	139.0	536.8	**63.9**	Pan	24.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	839.7			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.639	0.5	29.0	20.0	0.01365	22.0	12.7	5.033	0.069	44.0	**28.1**
50.0	0.639	1	23.5	20.0	0.01365	16.5	13.6	3.684	0.050	33.0	**21.1**
50.0	0.639	2	22.0	20.0	0.01365	15.0	13.8	2.629	0.036	30.0	**19.2**
50.0	0.639	4	20.0	20.0	0.01365	13.0	14.2	1.881	0.026	26.0	**16.6**
50.0	0.639	8	18.5	20.0	0.01365	11.5	14.4	1.342	0.018	23.0	**14.7**
50.0	0.639	15	18.0	20.0	0.01365	11.0	14.5	0.983	0.013	22.0	**14.1**
50.0	0.639	30	16.0	20.0	0.01365	9.0	14.8	0.703	0.010	18.0	**11.5**
50.0	0.639	60	14.5	20.0	0.01365	7.5	15.1	0.501	0.007	15.0	**9.6**
50.0	0.639	120	13.0	21.0	0.01348	6.0	15.3	0.357	0.005	12.0	**7.7**
50.0	0.639	240	11.5	21.0	0.01348	4.5	15.6	0.255	0.003	9.0	**5.8**
50.0	0.639	480	10.0	21.0	0.01348	3.0	15.8	0.181	0.002	6.0	**3.8**
50.0	0.639	1440	9.0	20.0	0.01365	2.0	16.0	0.105	0.001	4.0	**2.6**

Hydrometer #: 932452	Graduate #: 6	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

Noelco



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-57-SPT4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH57-SPT4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

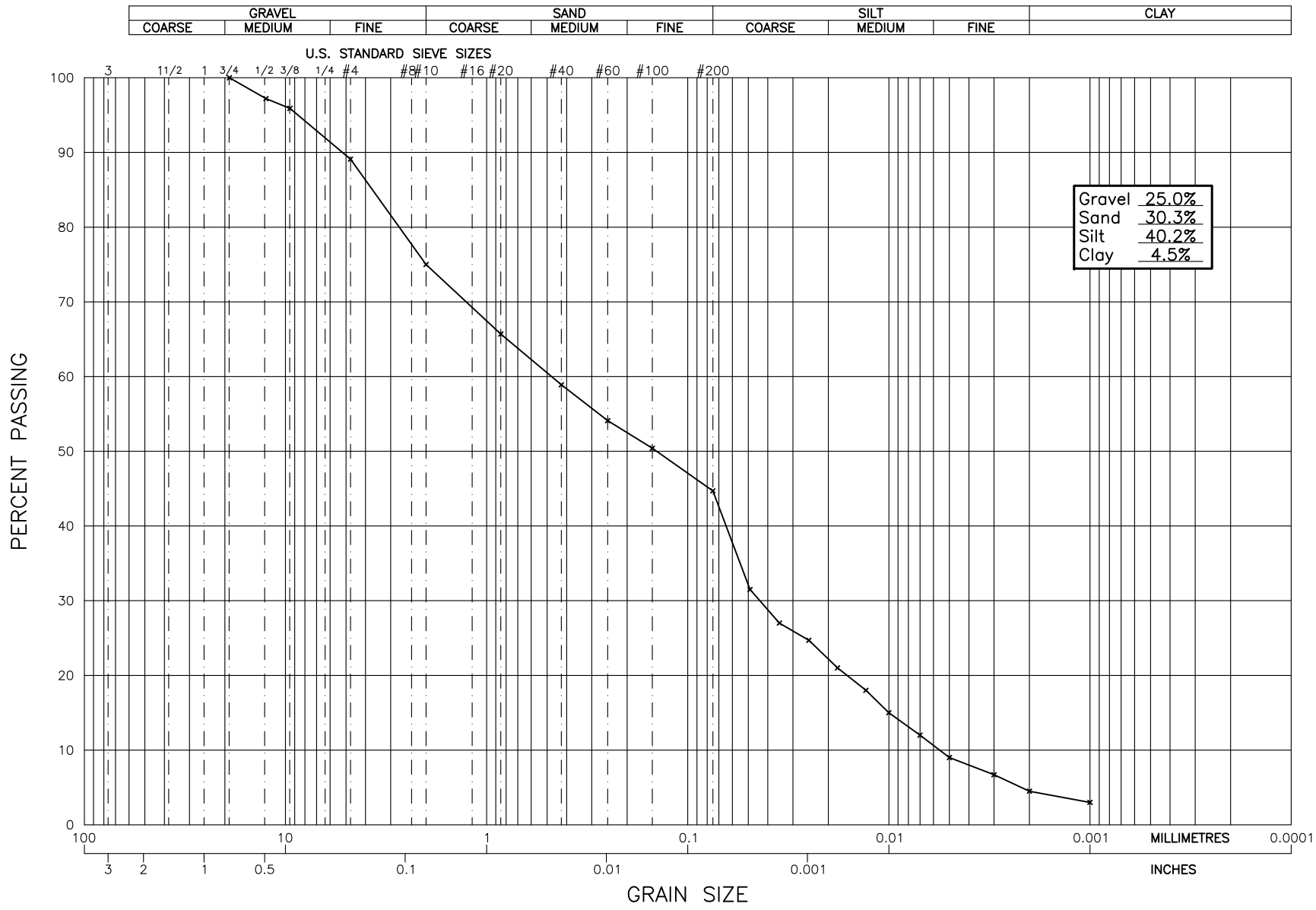
Client: BGC Engineering Inc.				Date: Oct.12, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **SPT4**	Test #:	**Hole #: BH-BGC11-57**	**Depth: 6.85 - 7.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 9, 2011	Date Received: September 13, 2011			Date Tested: Oct.11, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**59.5**
Wet Wt. & Tare	687.8	25.4		456.5	**100.0**	20	9.3	40.7	81.4	**48.5**
Dry Wt. & Tare	649.4	19.0	16.8	439.7	**96.3**	40	5.3	35.4	70.8	**42.2**
Water Wt.	38.4	12.5	14.3	425.4	**93.2**	60	3.1	32.3	64.6	**38.5**
Tare Wt.	192.9	9.5	32.8	392.6	**86.0**	100	2.4	29.9	59.8	**35.6**
Wt. Of Dry Soil	456.5	4.75	59.2	333.4	**73.0**	200	3.9	26.0	52.0	**31.0**
Moisture Content %	**8.4**	10	61.6	271.8	**59.5**	Pan	26.0			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	456.5			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.595	0.5	33.5	19.0	0.01382	25.5	12.1	4.917	0.068	51.0	**30.4**
50.0	0.595	1	32.0	19.0	0.01382	24.0	12.3	3.512	0.049	48.0	**28.6**
50.0	0.595	2	31.0	19.0	0.01382	23.0	12.5	2.500	0.035	46.0	**27.4**
50.0	0.595	4	28.5	19.0	0.01382	20.5	12.9	1.797	0.025	41.0	**24.4**
50.0	0.595	8	26.5	19.0	0.01382	18.5	13.2	1.287	0.018	37.0	**22.0**
50.0	0.595	15	24.5	19.0	0.01382	16.5	13.6	0.951	0.013	33.0	**19.6**
50.0	0.595	30	21.5	19.0	0.01382	13.5	14.1	0.685	0.009	27.0	**16.1**
50.0	0.595	60	19.0	19.0	0.01382	11.0	14.5	0.491	0.007	22.0	**13.1**
50.0	0.595	120	17.0	19.0	0.01382	9.0	14.8	0.351	0.005	18.0	**10.7**
50.0	0.595	240	15.0	20.0	0.01365	8.0	15.0	0.250	0.003	16.0	**9.5**
50.0	0.595	480	14.0	20.0	0.01365	7.0	15.1	0.178	0.002	14.0	**8.3**
50.0	0.595	1440	14.0	20.0	0.01365	7.0	15.1	0.103	0.001	14.0	**8.3**

Hydrometer #: 932452	Graduate #: 2	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-58-G2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH58-G2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

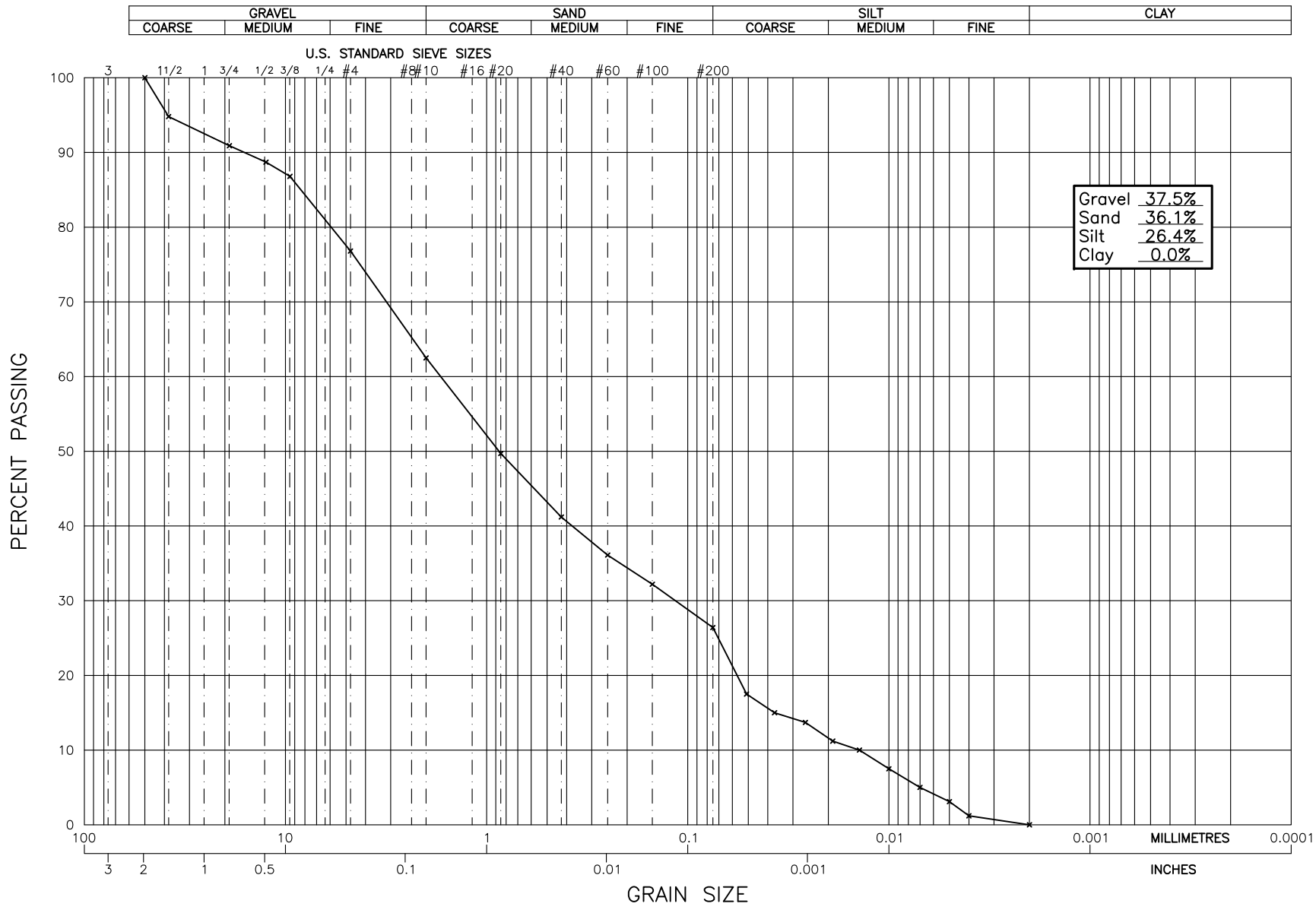
Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt,sandy
Sample #: **G2**	Test #:	**Hole #: BH-BGC11-58**	**Depth: 1.9-2.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.10, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**75.0**
Wet Wt. & Tare	1615.8	25.4				20	6.2	43.8	87.6	**65.7**
Dry Wt. & Tare	1404.2	19.0		1221.7	**100.0**	40	4.5	39.3	78.6	**58.9**
Water Wt.	211.6	12.5	34.3	1187.4	**97.2**	60	3.2	36.1	72.2	**54.1**
Tare Wt.	182.5	9.5	15.2	1172.2	**95.9**	100	2.5	33.6	67.2	**50.4**
Wt. Of Dry Soil	1221.7	4.75	83.3	1088.9	**89.1**	200	3.8	29.8	59.6	**44.7**
Moisture Content %	**17.3**	10	173.1	915.8	**75.0**	Pan	29.8			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1221.7			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.750	0.5	32.0	20.0	0.01365	25.0	12.2	4.934	0.067	50.0	**37.5**
50.0	0.750	1	28.0	20.0	0.01365	21.0	12.8	3.582	0.049	42.0	**31.5**
50.0	0.750	2	25.0	20.0	0.01365	18.0	13.3	2.581	0.035	36.0	**27.0**
50.0	0.750	4	23.5	20.0	0.01365	16.5	13.6	1.842	0.025	33.0	**24.7**
50.0	0.750	8	21.0	20.0	0.01365	14.0	14.0	1.322	0.018	28.0	**21.0**
50.0	0.750	15	19.0	20.0	0.01365	12.0	14.3	0.977	0.013	24.0	**18.0**
50.0	0.750	30	17.0	20.0	0.01365	10.0	14.6	0.699	0.010	20.0	**15.0**
50.0	0.750	60	15.0	20.0	0.01365	8.0	15.0	0.500	0.007	16.0	**12.0**
50.0	0.750	120	13.0	20.0	0.01365	6.0	15.3	0.357	0.005	12.0	**9.0**
50.0	0.750	240	11.5	20.0	0.01365	4.5	15.6	0.255	0.003	9.0	**6.7**
50.0	0.750	480	10.0	21.0	0.01348	3.0	15.8	0.181	0.002	6.0	**4.5**
50.0	0.750	1440	10.0	18.0	0.01399	2.0	16.0	0.105	0.001	4.0	**3.0**

Hydrometer #: 932452	Graduate #: 7	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-58-G4

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH58-G4

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

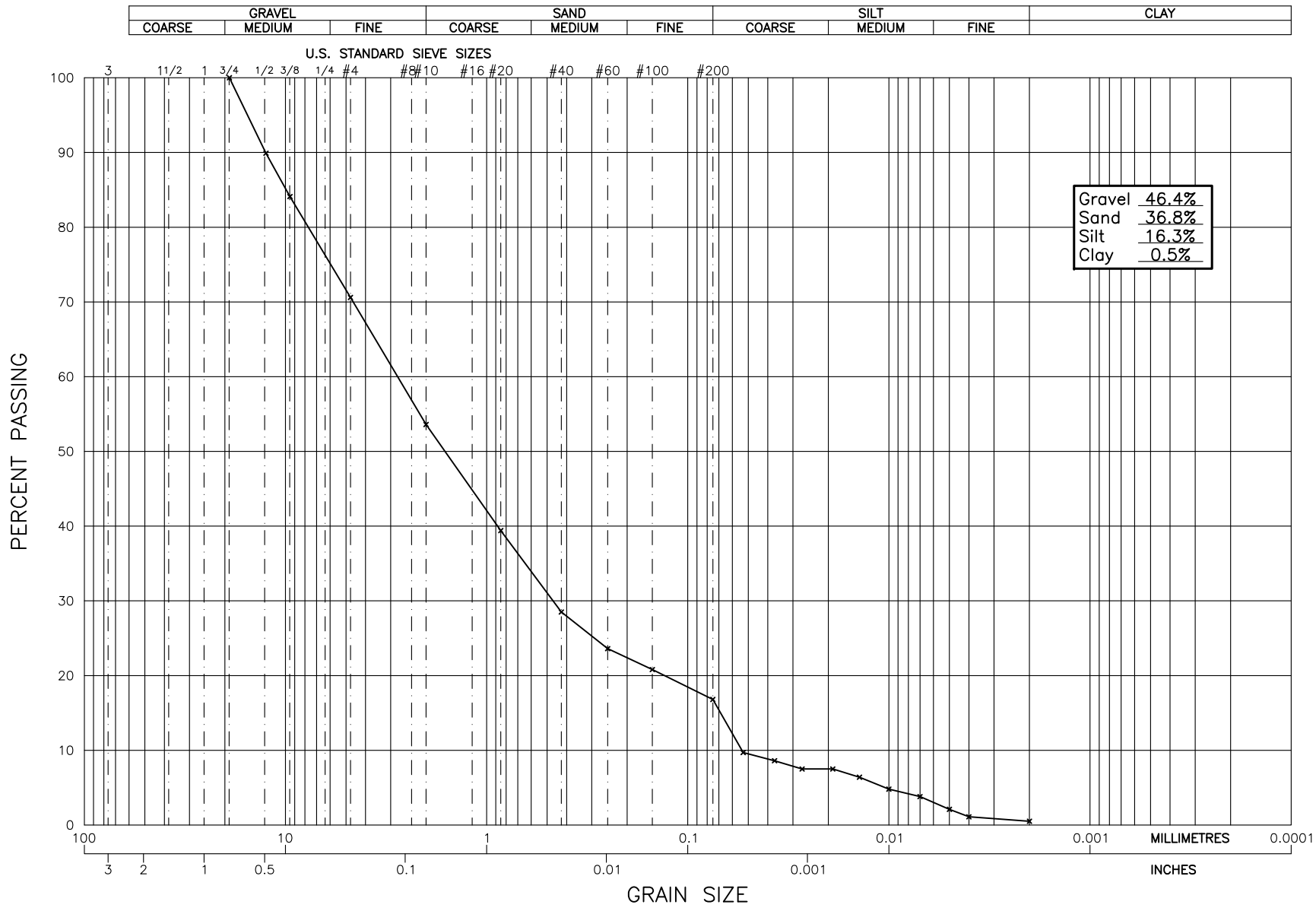
Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel and Sand, silty
Sample #: **G4**	Test #:	**Hole #: BH-BGC11-58**	**Depth: 3.2-3.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.10, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1	78.8	1442.7	**94.8**	10		50.0	100.0	**62.5**
Wet Wt. & Tare	1822.2	25.4	0.0	1442.7	**94.8**	20	10.2	39.8	79.6	**49.7**
Dry Wt. & Tare	1653.0	19.0	59.7	1383.0	**90.9**	40	6.8	33.0	66.0	**41.2**
Water Wt.	169.2	12.5	33.2	1349.8	**88.7**	60	4.1	28.9	57.8	**36.1**
Tare Wt.	131.5	9.5	28.8	1321.0	**86.8**	100	3.1	25.8	51.6	**32.2**
Wt. Of Dry Soil	1521.5	4.75	152.9	1168.1	**76.8**	200	4.7	21.1	42.2	**26.4**
Moisture Content %	**11.1**	10	217.7	950.4	**62.5**	Pan	21.1			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1521.5			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.625	0.5	23.0	20.0	0.01365	16.0	13.7	5.226	0.071	32.0	**20.0**
50.0	0.625	1	21.0	20.0	0.01365	14.0	14.0	3.740	0.051	28.0	**17.5**
50.0	0.625	2	19.0	20.0	0.01365	12.0	14.3	2.675	0.037	24.0	**15.0**
50.0	0.625	4	18.0	20.0	0.01365	11.0	14.5	1.903	0.026	22.0	**13.7**
50.0	0.625	8	16.0	20.0	0.01365	9.0	14.8	1.361	0.019	18.0	**11.2**
50.0	0.625	15	15.0	20.0	0.01365	8.0	15.0	0.999	0.014	16.0	**10.0**
50.0	0.625	30	13.0	20.0	0.01365	6.0	15.3	0.714	0.010	12.0	**7.5**
50.0	0.625	60	11.0	20.0	0.01365	4.0	15.6	0.510	0.007	8.0	**5.0**
50.0	0.625	120	9.5	20.0	0.01365	2.5	15.9	0.364	0.005	5.0	**3.1**
50.0	0.625	240	8.0	20.0	0.01365	1.0	16.1	0.259	0.004	2.0	**1.2**
50.0	0.625	480	7.0	21.0	0.01348	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.625	1440	7.0	20.0	0.01365	0.0	16.3	0.106	0.001	0.0	**0.0**

Hydrometer #: 932452	Graduate #: 8	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-58-G6

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH58-G6

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

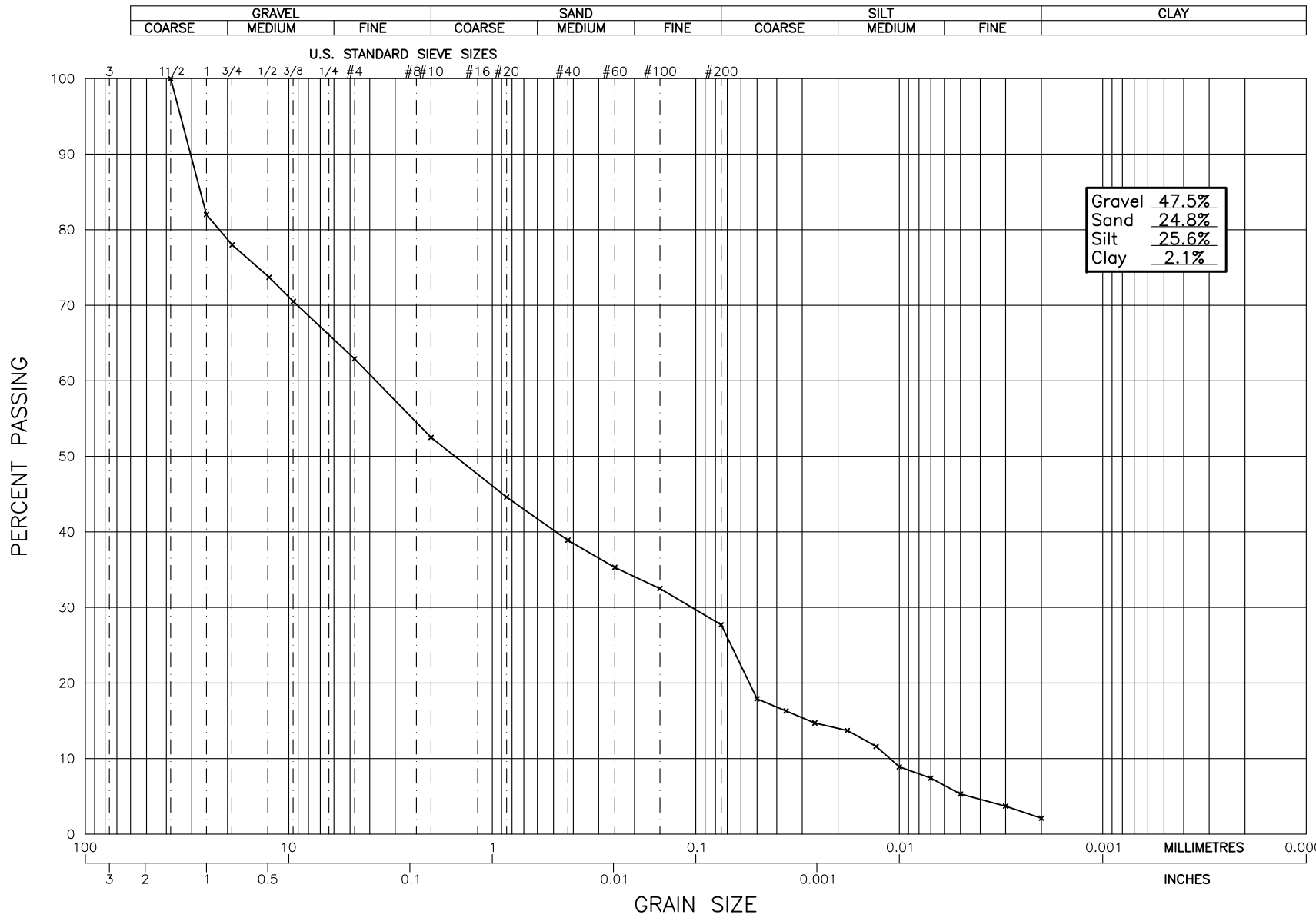
Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel/Sand,some silt
Sample #: **G6**	Test #:	**Hole #: BH-BGC11-58**	**Depth: 4.4 - 4.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.10, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**53.6**
Wet Wt. & Tare	1566.8	25.4				20	13.3	36.7	73.4	**39.4**
Dry Wt. & Tare	1426.7	19.0		1246.8	**100.0**	40	10.1	26.6	53.2	**28.5**
Water Wt.	140.1	12.5	125.9	1120.9	**89.9**	60	4.6	22.0	44.0	**23.6**
Tare Wt.	179.9	9.5	72.0	1048.9	**84.1**	100	2.6	19.4	38.8	**20.8**
Wt. Of Dry Soil	1246.8	4.75	168.7	880.2	**70.6**	200	3.7	15.7	31.4	**16.8**
Moisture Content %	**11.2**	10	211.3	668.9	**53.6**	Pan	15.7			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	1246.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.536	0.5	19.0	20.0	0.01365	12.0	14.3	5.351	0.073	24.0	**12.9**
50.0	0.536	1	16.0	20.0	0.01365	9.0	14.8	3.848	0.053	18.0	**9.7**
50.0	0.536	2	15.0	20.0	0.01365	8.0	15.0	2.736	0.037	16.0	**8.6**
50.0	0.536	4	14.0	20.0	0.01365	7.0	15.1	1.946	0.027	14.0	**7.5**
50.0	0.536	8	14.0	20.0	0.01365	7.0	15.1	1.376	0.019	14.0	**7.5**
50.0	0.536	15	13.0	20.0	0.01365	6.0	15.3	1.010	0.014	12.0	**6.4**
50.0	0.536	30	11.5	20.0	0.01365	4.5	15.6	0.720	0.010	9.0	**4.8**
50.0	0.536	60	10.5	20.0	0.01365	3.5	15.7	0.512	0.007	7.0	**3.8**
50.0	0.536	120	9.0	20.0	0.01365	2.0	16.0	0.365	0.005	4.0	**2.1**
50.0	0.536	240	8.0	20.0	0.01365	1.0	16.1	0.259	0.004	2.0	**1.1**
50.0	0.536	480	7.5	21.0	0.01348	0.5	16.2	0.184	0.002	1.0	**0.5**
50.0	0.536	1440	7.5	20.0	0.01365	0.5	16.2	0.106	0.001	1.0	**0.5**

Hydrometer #: 932452	Graduate #: 2	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-58-G8

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH58-G8

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

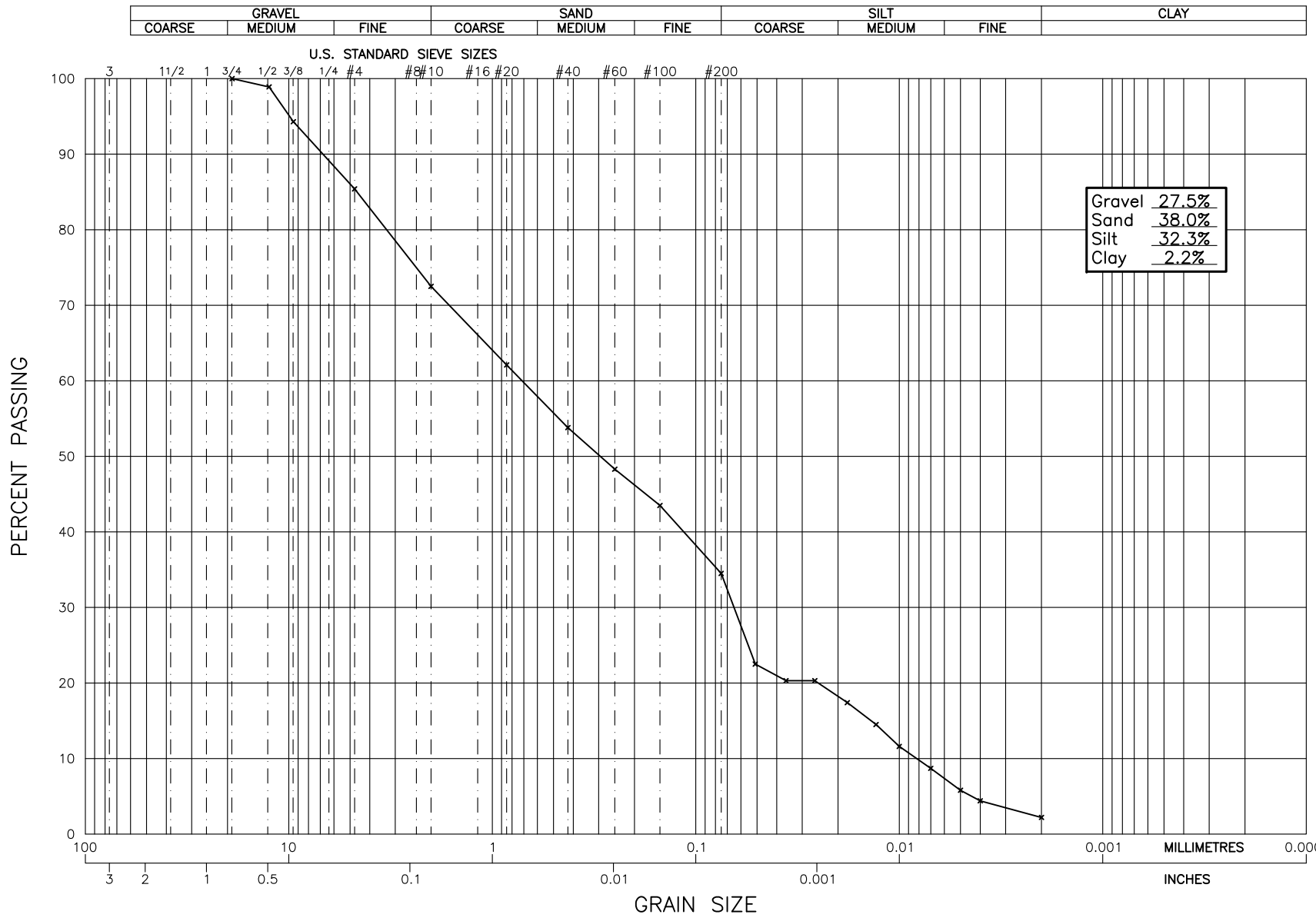
Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Gravel,sandy,silty
Sample #: **G8**	Test #:	**Hole #: BH-BGC11-58**	**Depth: 5.4 - 5.5m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.10, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1		830.1	**100.0**	10		50.0	100.0	**52.5**
Wet Wt. & Tare	1065.0	25.4	149.5	680.6	**82.0**	20	7.6	42.4	84.8	**44.6**
Dry Wt. & Tare	1011.5	19.0	33.5	647.1	**78.0**	40	5.4	37.0	74.0	**38.9**
Water Wt.	53.5	12.5	35.3	611.8	**73.7**	60	3.4	33.6	67.2	**35.3**
Tare Wt.	181.4	9.5	26.5	585.3	**70.5**	100	2.7	30.9	61.8	**32.5**
Wt. Of Dry Soil	830.1	4.75	62.9	522.4	**62.9**	200	4.5	26.4	52.8	**27.7**
Moisture Content %	**6.4**	10	86.2	436.2	**52.5**	Pan	26.4			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	830.1			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.525	0.5	28.0	20.0	0.01365	21.0	12.8	5.066	0.069	42.0	**22.1**
50.0	0.525	1	24.0	20.0	0.01365	17.0	13.5	3.673	0.050	34.0	**17.9**
50.0	0.525	2	22.5	20.0	0.01365	15.5	13.7	2.621	0.036	31.0	**16.3**
50.0	0.525	4	21.0	20.0	0.01365	14.0	14.0	1.870	0.026	28.0	**14.7**
50.0	0.525	8	20.0	20.0	0.01365	13.0	14.2	1.330	0.018	26.0	**13.7**
50.0	0.525	15	18.0	20.0	0.01365	11.0	14.5	0.983	0.013	22.0	**11.6**
50.0	0.525	30	15.5	20.0	0.01365	8.5	14.9	0.705	0.010	17.0	**8.9**
50.0	0.525	60	14.0	20.0	0.01365	7.0	15.1	0.502	0.007	14.0	**7.4**
50.0	0.525	120	12.0	20.0	0.01365	5.0	15.5	0.359	0.005	10.0	**5.3**
50.0	0.525	240	10.5	20.0	0.01365	3.5	15.7	0.256	0.003	7.0	**3.7**
50.0	0.525	480	9.0	21.0	0.01348	2.0	16.0	0.182	0.002	4.0	**2.1**
50.0	0.525	1440	9.0	20.0	0.01365	2.0	16.0	0.105	0.001	4.0	**2.1**

Hydrometer #: 932452	Graduate #: 3	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-58-G10

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH58-G10

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

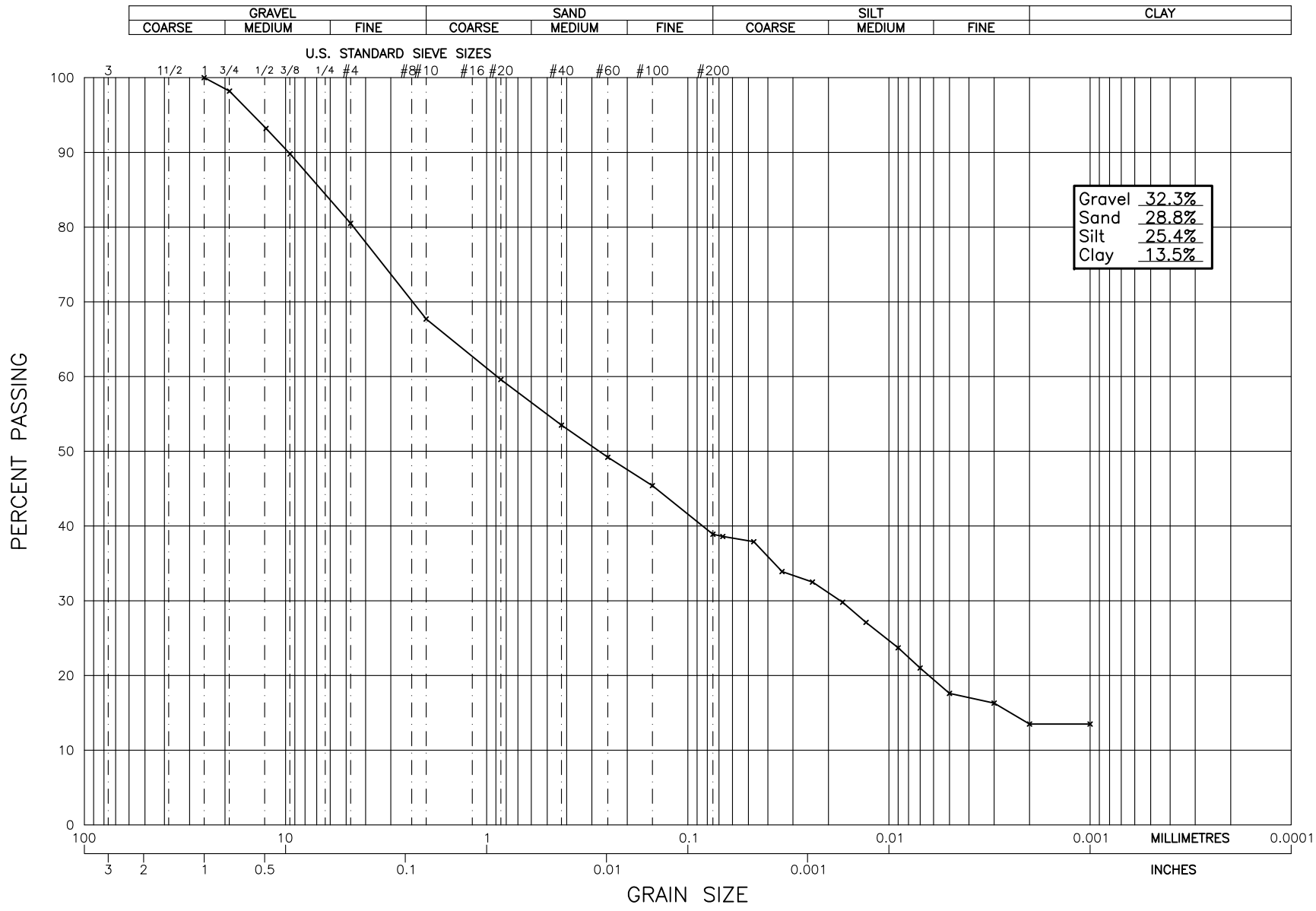
Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand and Silt, gravelly
Sample #: **G10**	Test #:	**Hole #: BH-BGC11-58**	**Depth: 7.9 - 8.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.10, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**72.5**
Wet Wt. & Tare	837.6	25.4				20	7.2	42.8	85.6	**62.1**
Dry Wt. & Tare	785.5	19.0		605.0	**100.0**	40	5.7	37.1	74.2	**53.8**
Water Wt.	52.1	12.5	6.6	598.4	**98.9**	60	3.8	33.3	66.6	**48.3**
Tare Wt.	180.5	9.5	27.9	570.5	**94.3**	100	3.3	30.0	60.0	**43.5**
Wt. Of Dry Soil	605.0	4.75	53.7	516.8	**85.4**	200	6.2	23.8	47.6	**34.5**
Moisture Content %	**8.6**	10	78.0	438.8	**72.5**	Pan	23.8			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	605.0			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.725	0.5	27.0	20.0	0.01365	20.0	13.0	5.098	0.070	40.0	**29.0**
50.0	0.725	1	22.5	20.0	0.01365	15.5	13.7	3.706	0.051	31.0	**22.5**
50.0	0.725	2	21.0	20.0	0.01365	14.0	14.0	2.644	0.036	28.0	**20.3**
50.0	0.725	4	21.0	20.0	0.01365	14.0	14.0	1.870	0.026	28.0	**20.3**
50.0	0.725	8	19.0	20.0	0.01365	12.0	14.3	1.338	0.018	24.0	**17.4**
50.0	0.725	15	17.0	20.0	0.01365	10.0	14.6	0.988	0.013	20.0	**14.5**
50.0	0.725	30	15.0	20.0	0.01365	8.0	15.0	0.707	0.010	16.0	**11.6**
50.0	0.725	60	13.0	20.0	0.01365	6.0	15.3	0.505	0.007	12.0	**8.7**
50.0	0.725	120	11.0	20.0	0.01365	4.0	15.6	0.361	0.005	8.0	**5.8**
50.0	0.725	240	10.0	20.0	0.01365	3.0	15.8	0.257	0.004	6.0	**4.4**
50.0	0.725	480	8.5	21.0	0.01348	1.5	16.0	0.183	0.002	3.0	**2.2**
50.0	0.725	1440	8.5	20.0	0.01365	1.5	16.0	0.106	0.001	3.0	**2.2**

Hydrometer #: 932452	Graduate #: 4	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-60-G3

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH60-G3

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Inc.				Date: Oct.12, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **G3**	Test #:	**Hole #: BH-BGC11-60**	**Depth: 2.7 - 2.8m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 10, 2011	Date Received: September 13, 2011			Date Tested: Oct.11, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**67.7**
Wet Wt. & Tare	897.0	25.4		654.4	**100.0**	20	6.0	44.0	88.0	**59.6**
Dry Wt. & Tare	834.2	19.0	11.9	642.5	**98.2**	40	4.5	39.5	79.0	**53.5**
Water Wt.	62.8	12.5	32.6	609.9	**93.2**	60	3.2	36.3	72.6	**49.2**
Tare Wt.	179.8	9.5	22.4	587.5	**89.8**	100	2.8	33.5	67.0	**45.4**
Wt. Of Dry Soil	654.4	4.75	60.8	526.7	**80.5**	200	4.8	28.7	57.4	**38.9**
Moisture Content %	**9.6**	10	83.6	443.1	**67.7**	Pan	28.7			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	654.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.677	0.5	36.5	19.0	0.01382	28.5	11.6	4.815	0.067	57.0	**38.6**
50.0	0.677	1	36.0	19.0	0.01382	28.0	11.7	3.417	0.047	56.0	**37.9**
50.0	0.677	2	33.0	19.0	0.01382	25.0	12.2	2.467	0.034	50.0	**33.9**
50.0	0.677	4	32.0	19.0	0.01382	24.0	12.3	1.756	0.024	48.0	**32.5**
50.0	0.677	8	30.0	19.0	0.01382	22.0	12.7	1.258	0.017	44.0	**29.8**
50.0	0.677	15	28.0	19.0	0.01382	20.0	13.0	0.931	0.013	40.0	**27.1**
50.0	0.677	30	25.5	19.0	0.01382	17.5	13.4	0.669	0.009	35.0	**23.7**
50.0	0.677	60	23.5	19.0	0.01382	15.5	13.7	0.478	0.007	31.0	**21.0**
50.0	0.677	120	21.0	19.0	0.01382	13.0	14.2	0.343	0.005	26.0	**17.6**
50.0	0.677	240	19.0	20.0	0.01365	12.0	14.3	0.244	0.003	24.0	**16.3**
50.0	0.677	480	17.0	20.0	0.01365	10.0	14.6	0.175	0.002	20.0	**13.5**
50.0	0.677	1440	17.0	20.0	0.01365	10.0	14.6	0.101	0.001	20.0	**13.5**

Hydrometer #: 932452	Graduate #: 3	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

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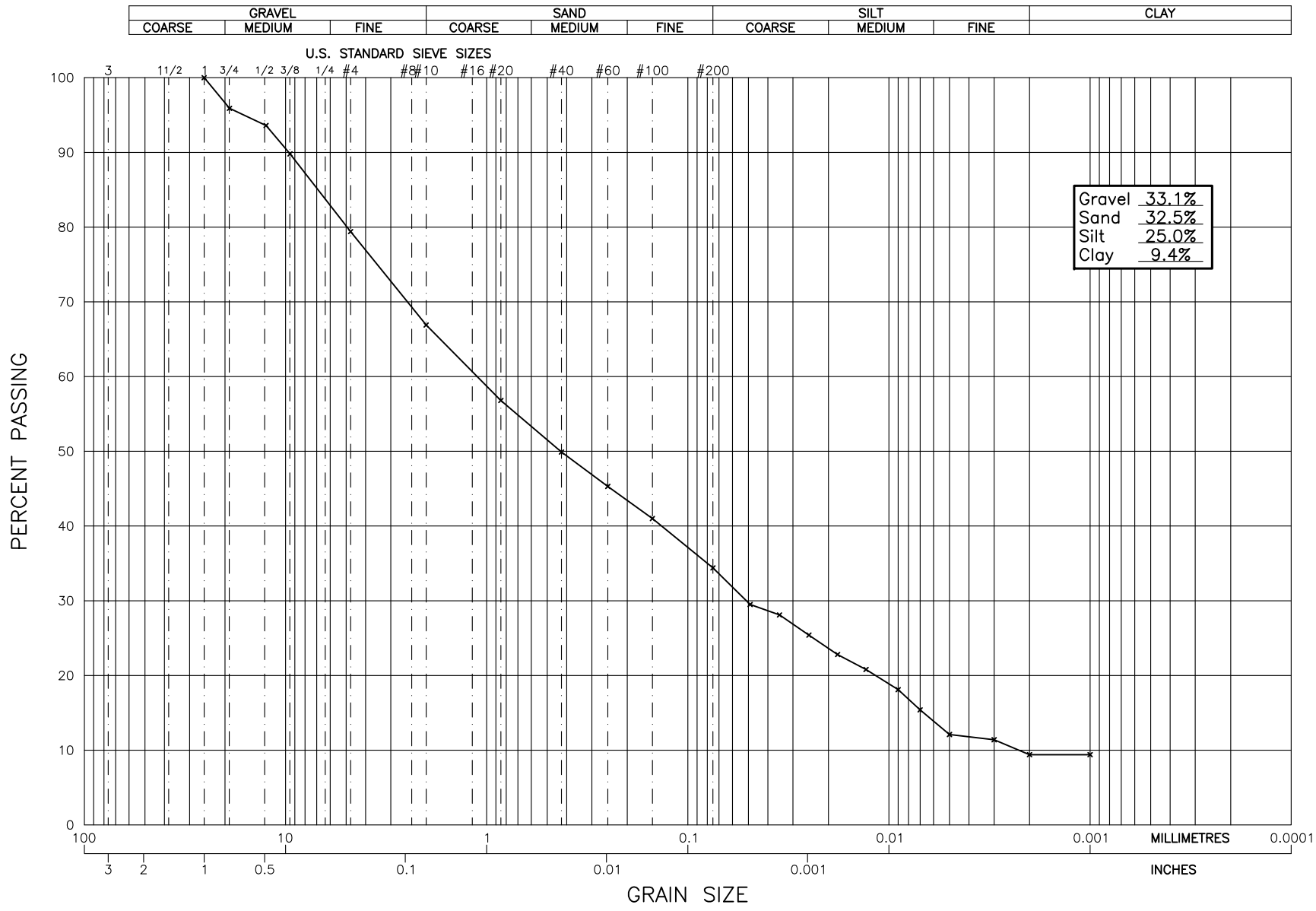

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DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-60-G5

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH60-G5

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

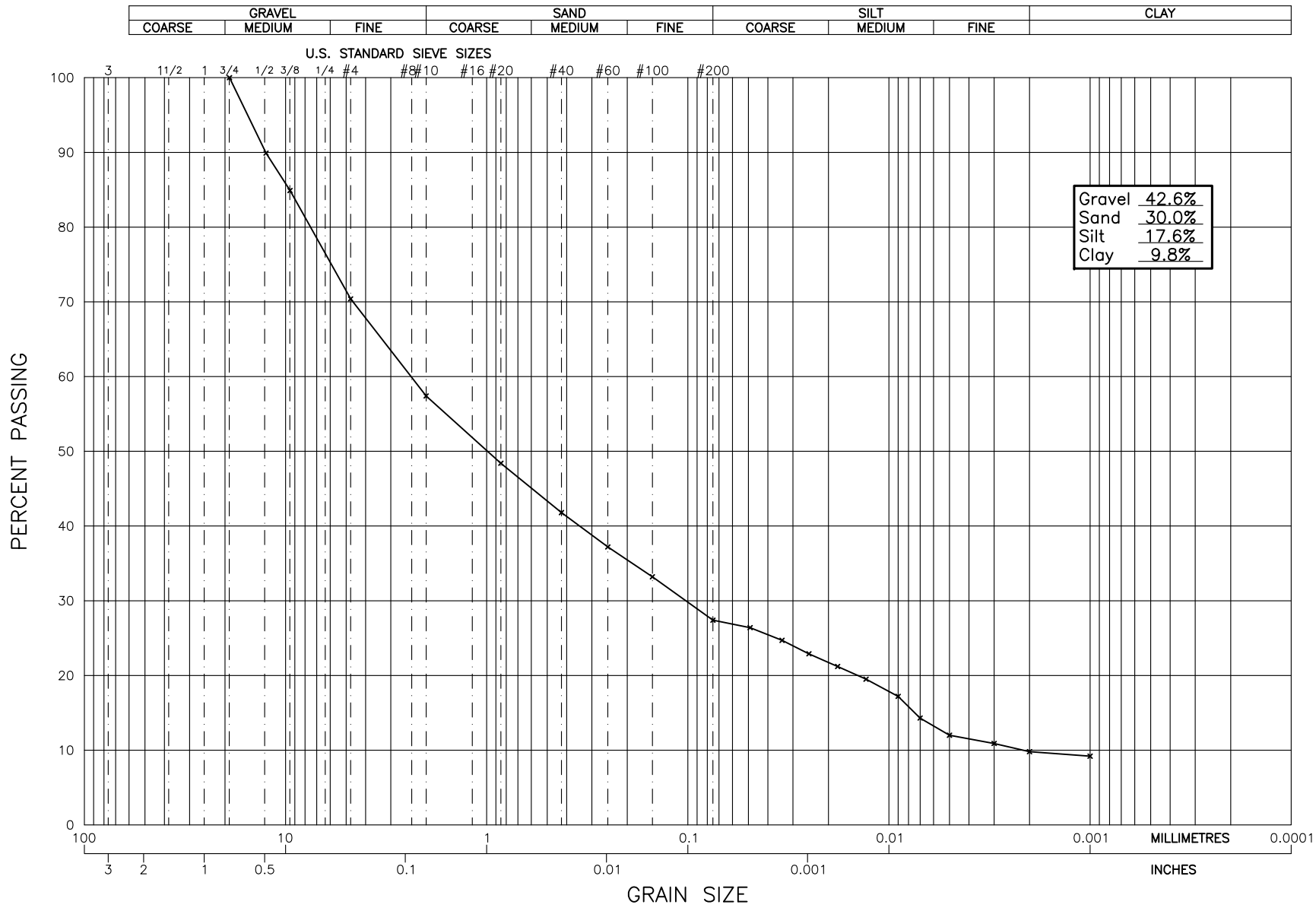
Client: BGC Engineering Inc.				Date: Oct.12, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **G5**	Test #:	**Hole #: BH-BGC11-60**	**Depth: 3.7 - 3.8m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 10, 2011	Date Received: September 13, 2011			Date Tested: Oct.11, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**66.9**
Wet Wt. & Tare	1032.3	25.4		771.5	**100.0**	20	7.6	42.4	84.8	**56.8**
Dry Wt. & Tare	963.2	19.0	31.6	739.9	**95.9**	40	5.1	37.3	74.6	**49.9**
Water Wt.	69.1	12.5	18.0	721.9	**93.6**	60	3.5	33.8	67.6	**45.3**
Tare Wt.	191.7	9.5	29.1	692.8	**89.8**	100	3.2	30.6	61.2	**41.0**
Wt. Of Dry Soil	771.5	4.75	80.3	612.5	**79.4**	200	4.9	25.7	51.4	**34.4**
Moisture Content %	**9.0**	10	96.0	516.5	**66.9**	Pan				
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	771.5			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.669	0.5	33.5	19.0	0.01382	25.5	12.1	4.917	0.068	51.0	**34.1**
50.0	0.669	1	30.0	19.0	0.01382	22.0	12.7	3.559	0.049	44.0	**29.5**
50.0	0.669	2	29.0	19.0	0.01382	21.0	12.8	2.533	0.035	42.0	**28.1**
50.0	0.669	4	27.0	19.0	0.01382	19.0	13.2	1.814	0.025	38.0	**25.4**
50.0	0.669	8	25.0	19.0	0.01382	17.0	13.5	1.299	0.018	34.0	**22.8**
50.0	0.669	15	23.5	19.0	0.01382	15.5	13.7	0.957	0.013	31.0	**20.8**
50.0	0.669	30	21.5	19.0	0.01382	13.5	14.1	0.685	0.009	27.0	**18.1**
50.0	0.669	60	19.5	19.0	0.01382	11.5	14.4	0.490	0.007	23.0	**15.4**
50.0	0.669	120	17.0	19.0	0.01382	9.0	14.8	0.351	0.005	18.0	**12.1**
50.0	0.669	240	15.5	20.0	0.01365	8.5	14.9	0.249	0.003	17.0	**11.4**
50.0	0.669	480	14.0	20.0	0.01365	7.0	15.1	0.178	0.002	14.0	**9.4**
50.0	0.669	1440	14.0	20.0	0.01365	7.0	15.1	0.103	0.001	14.0	**9.4**

Hydrometer #: 932452	Graduate #: 4	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-60-G7

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH60-G7

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

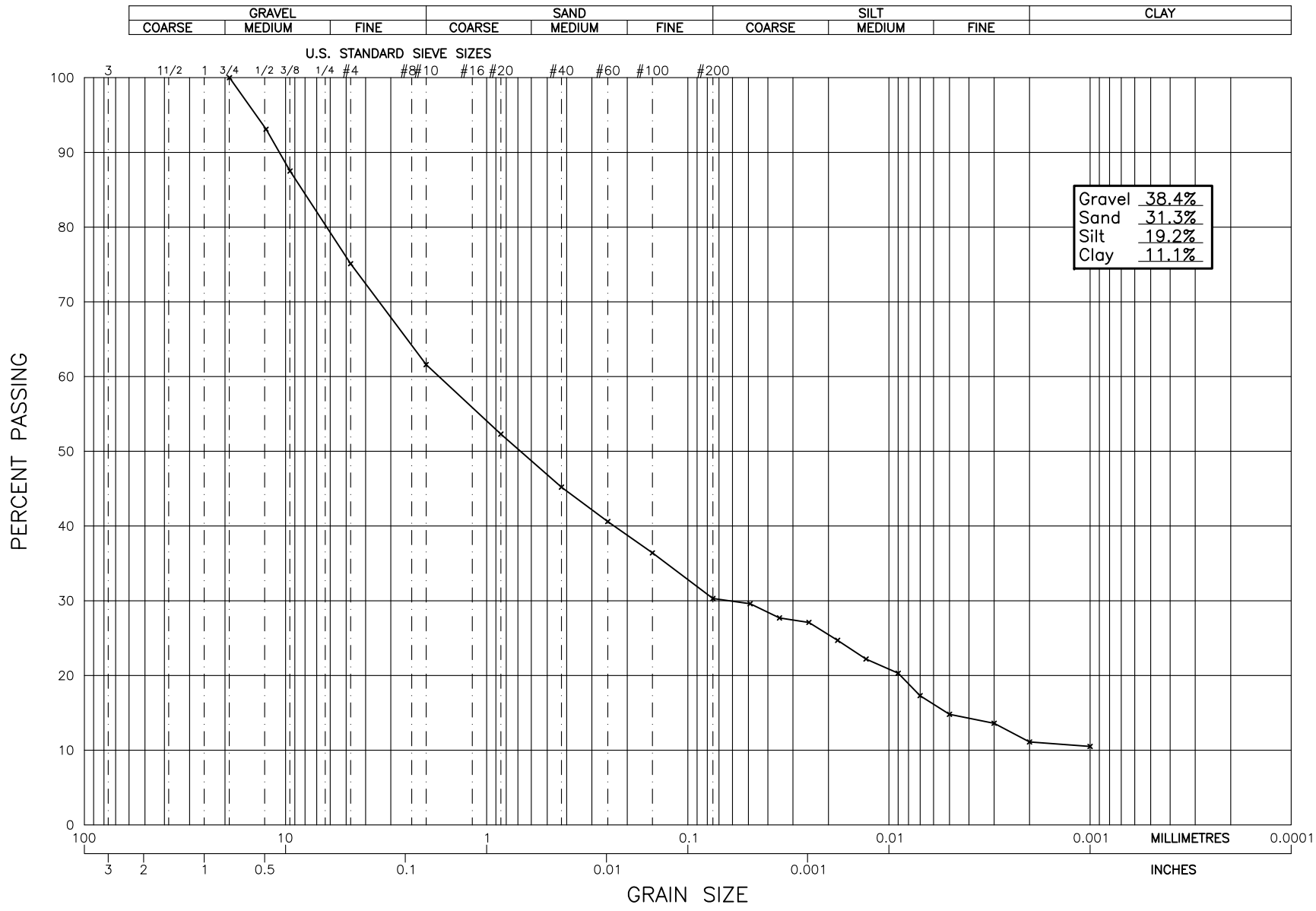
Client: BGC Engineering Inc.				Date: Oct.12, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **G7**	Test #:	**Hole #: BH-BGC11-60**	**Depth: 6.3 - 6.6m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 10, 2011	Date Received: September 13, 2011			Date Tested: Oct.11, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**57.4**
Wet Wt. & Tare	941.7	25.4				20	7.8	42.2	84.4	**48.4**
Dry Wt. & Tare	895.0	19.0		689.4	**100.0**	40	5.8	36.4	72.8	**41.8**
Water Wt.	46.7	12.5	69.5	619.9	**89.9**	60	4.0	32.4	64.8	**37.2**
Tare Wt.	205.6	9.5	34.7	585.2	**84.9**	100	3.5	28.9	57.8	**33.2**
Wt. Of Dry Soil	689.4	4.75	99.7	485.5	**70.4**	200	5.0	23.9	47.8	**27.4**
Moisture Content %	**6.8**	10	90.0	395.5	**57.4**	Pan	23.9			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	689.4			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.574	0.5	31.5	19.0	0.01382	23.5	12.4	4.983	0.069	47.0	**27.0**
50.0	0.574	1	31.0	19.0	0.01382	23.0	12.5	3.536	0.049	46.0	**26.4**
50.0	0.574	2	29.5	19.0	0.01382	21.5	12.7	2.525	0.035	43.0	**24.7**
50.0	0.574	4	28.0	19.0	0.01382	20.0	13.0	1.802	0.025	40.0	**22.9**
50.0	0.574	8	26.5	19.0	0.01382	18.5	13.2	1.287	0.018	37.0	**21.2**
50.0	0.574	15	25.0	19.0	0.01382	17.0	13.5	0.948	0.013	34.0	**19.5**
50.0	0.574	30	23.0	19.0	0.01382	15.0	13.8	0.679	0.009	30.0	**17.2**
50.0	0.574	60	20.5	19.0	0.01382	12.5	14.2	0.487	0.007	25.0	**14.3**
50.0	0.574	120	18.5	19.0	0.01382	10.5	14.6	0.348	0.005	21.0	**12.0**
50.0	0.574	240	16.5	20.0	0.01365	9.5	14.7	0.248	0.003	19.0	**10.9**
50.0	0.574	480	15.5	20.0	0.01365	8.5	14.9	0.176	0.002	17.0	**9.8**
50.0	0.574	1440	15.0	20.0	0.01365	8.0	15.0	0.102	0.001	16.0	**9.2**

Hydrometer #: 932452	Graduate #: 5	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-60-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH60-SPT2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

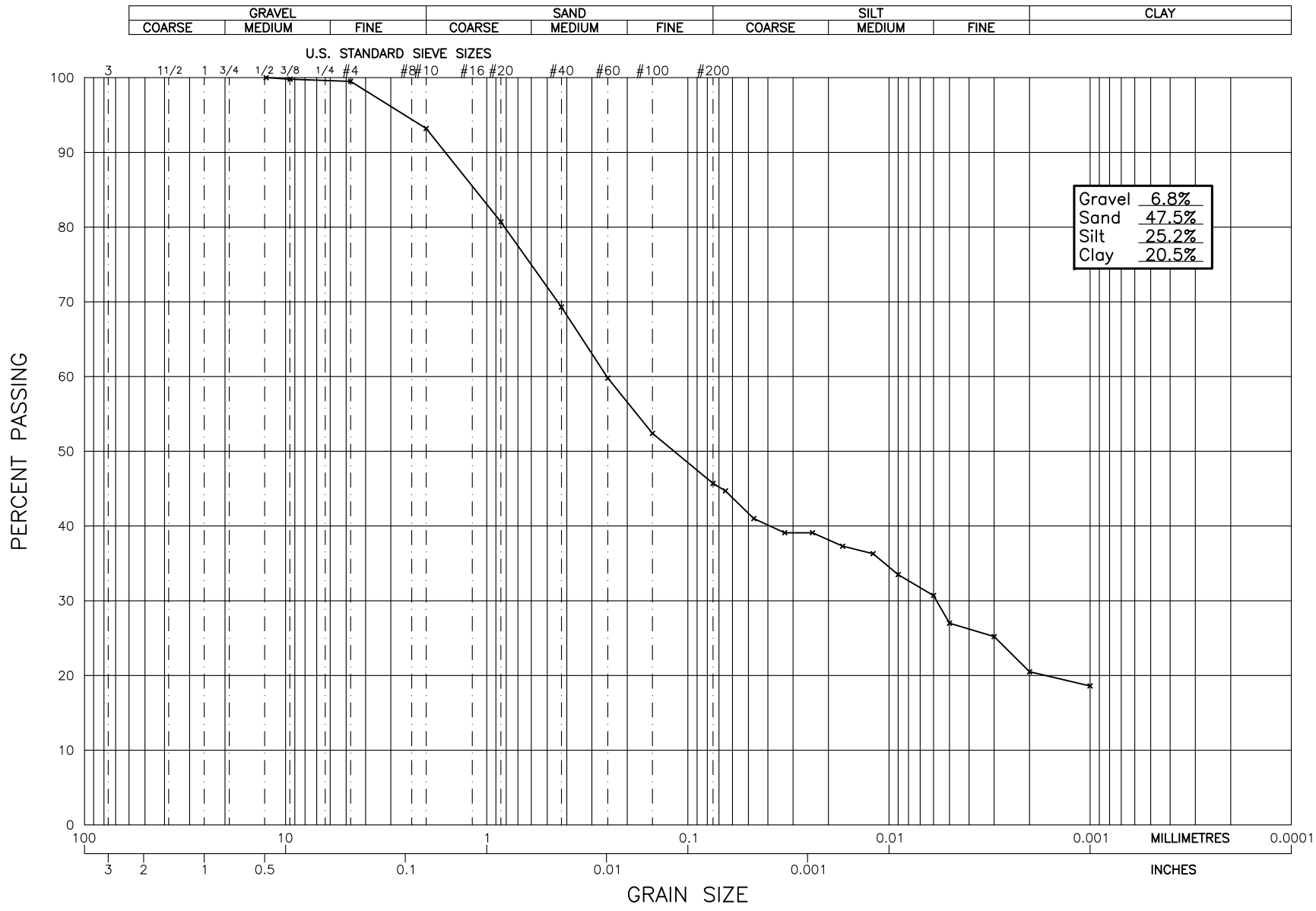
Client: BGC Engineering Inc.				Date: Oct.12, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type:
Sample #: **SPT2**	Test #:	**Hole #: BH-BGC11-60**	**Depth: 6.85 - 7.0**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: August 10, 2011	Date Received: September 13, 2011			Date Tested: Oct.11, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**61.6**
Wet Wt. & Tare	312.9	25.4				20	7.6	42.4	84.8	**52.3**
Dry Wt. & Tare	302.1	19.0		181.2	**100.0**	40	5.7	36.7	73.4	**45.2**
Water Wt.	10.8	12.5	12.5	168.7	**93.1**	60	3.8	32.9	65.8	**40.6**
Tare Wt.	120.9	9.5	10.2	158.5	**87.5**	100	3.4	29.5	59.0	**36.4**
Wt. Of Dry Soil	181.2	4.75	22.5	136.0	**75.1**	200	4.9	24.6	49.2	**30.3**
Moisture Content %	**6.0**	10	24.3	111.7	**61.6**	Pan	24.6			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	181.2			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.616	0.5	32.5	19.0	0.01382	24.5	12.3	4.950	0.068	49.0	**30.2**
50.0	0.616	1	32.0	19.0	0.01382	24.0	12.3	3.512	0.049	48.0	**29.6**
50.0	0.616	2	30.5	19.0	0.01382	22.5	12.6	2.508	0.035	45.0	**27.7**
50.0	0.616	4	30.0	19.0	0.01382	22.0	12.7	1.779	0.025	44.0	**27.1**
50.0	0.616	8	28.0	19.0	0.01382	20.0	13.0	1.275	0.018	40.0	**24.7**
50.0	0.616	15	26.0	19.0	0.01382	18.0	13.3	0.943	0.013	36.0	**22.2**
50.0	0.616	30	24.5	19.0	0.01382	16.5	13.6	0.673	0.009	33.0	**20.3**
50.0	0.616	60	22.0	19.0	0.01382	14.0	14.0	0.483	0.007	28.0	**17.3**
50.0	0.616	120	20.0	19.0	0.01382	12.0	14.3	0.345	0.005	24.0	**14.8**
50.0	0.616	240	18.0	20.0	0.01365	11.0	14.5	0.246	0.003	22.0	**13.6**
50.0	0.616	480	16.0	20.0	0.01365	9.0	14.8	0.176	0.002	18.0	**11.1**
50.0	0.616	1440	15.5	20.0	0.01365	8.5	14.9	0.102	0.001	17.0	**10.5**

Hydrometer #: 932452	Graduate #: 6	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-63-G2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH63-G2

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

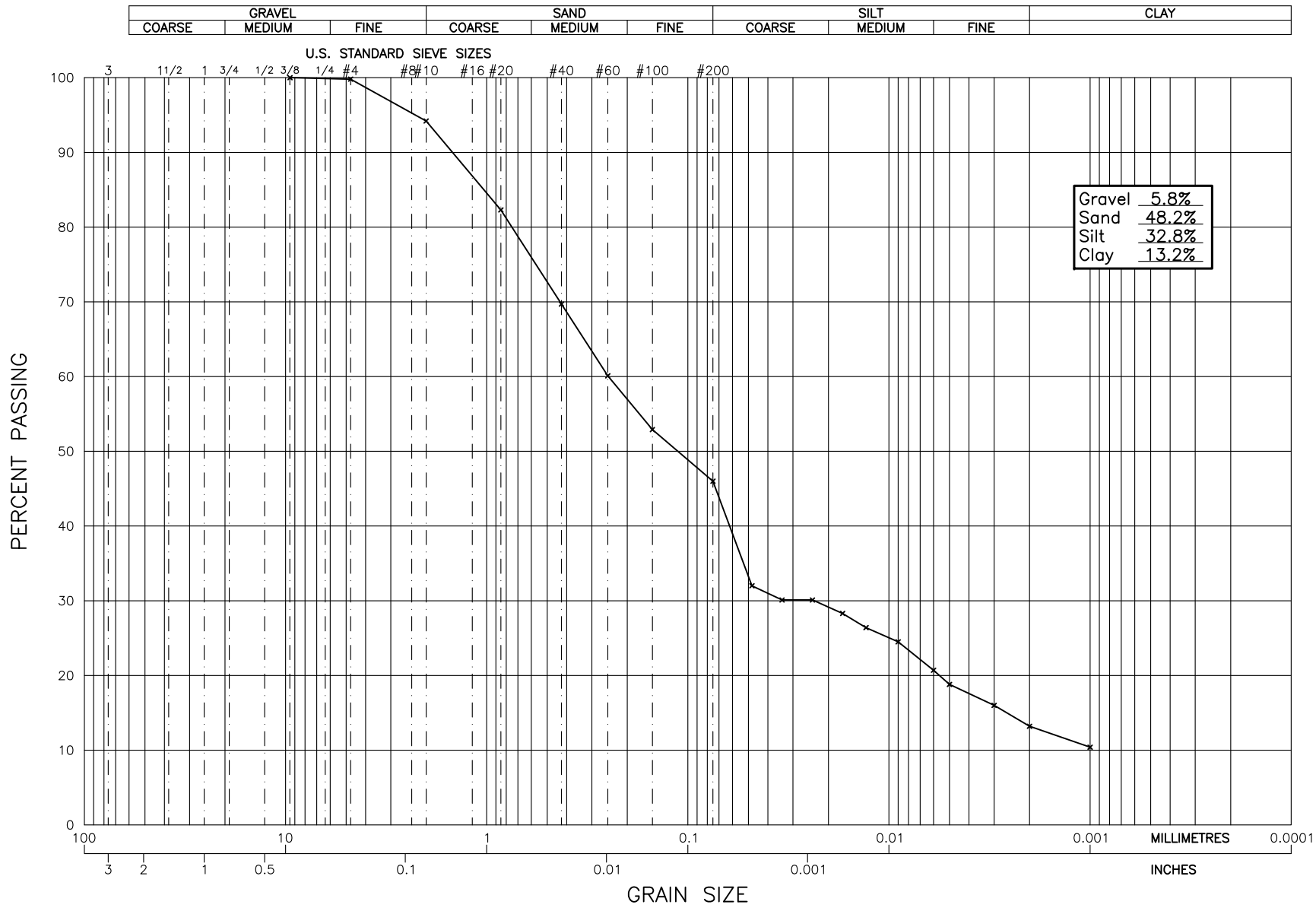
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand,silty/clayey
Sample #: **G2**	Test #:	**Hole #: BH-BGC11-63**	**Depth: 1.9 - 2.1m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 11, 2011	Date Received: September 13, 2011			Date Tested: Sept.21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**93.2**
Wet Wt. & Tare	860.5	25.4				20	6.7	43.3	86.6	**80.7**
Dry Wt. & Tare	725.4	19.0				40	6.1	37.2	74.4	**69.3**
Water Wt.	135.1	12.5		546.2	**100.0**	60	5.1	32.1	64.2	**59.8**
Tare Wt.	179.2	9.5	1.3	544.9	**99.8**	100	4.0	28.1	56.2	**52.4**
Wt. Of Dry Soil	546.2	4.75	1.5	543.4	**99.5**	200	3.6	24.5	49.0	**45.7**
Moisture Content %	**24.7**	10	34.5	508.9	**93.2**	Pan	24.5			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	546.2			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.932	0.5	30.0	23.0	0.01317	24.0	12.3	4.967	0.065	48.0	**44.7**
50.0	0.932	1	28.0	23.0	0.01317	22.0	12.7	3.559	0.047	44.0	**41.0**
50.0	0.932	2	27.0	23.0	0.01317	21.0	12.8	2.533	0.033	42.0	**39.1**
50.0	0.932	4	27.0	23.0	0.01317	21.0	12.8	1.791	0.024	42.0	**39.1**
50.0	0.932	8	26.0	23.0	0.01317	20.0	13.0	1.275	0.017	40.0	**37.3**
50.0	0.932	15	25.5	23.0	0.01317	19.5	13.1	0.934	0.012	39.0	**36.3**
50.0	0.932	30	24.0	23.0	0.01317	18.0	13.3	0.666	0.009	36.0	**33.5**
50.0	0.932	60	22.5	23.0	0.01317	16.5	13.6	0.476	0.006	33.0	**30.7**
50.0	0.932	120	21.0	22.0	0.01332	14.5	13.9	0.340	0.005	29.0	**27.0**
50.0	0.932	240	20.0	22.0	0.01332	13.5	14.1	0.242	0.003	27.0	**25.2**
50.0	0.932	480	18.0	21.0	0.01348	11.0	14.5	0.174	0.002	22.0	**20.5**
50.0	0.932	1440	16.0	23.0	0.01317	10.0	14.6	0.101	0.001	20.0	**18.6**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-63-G5

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH63-G5

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

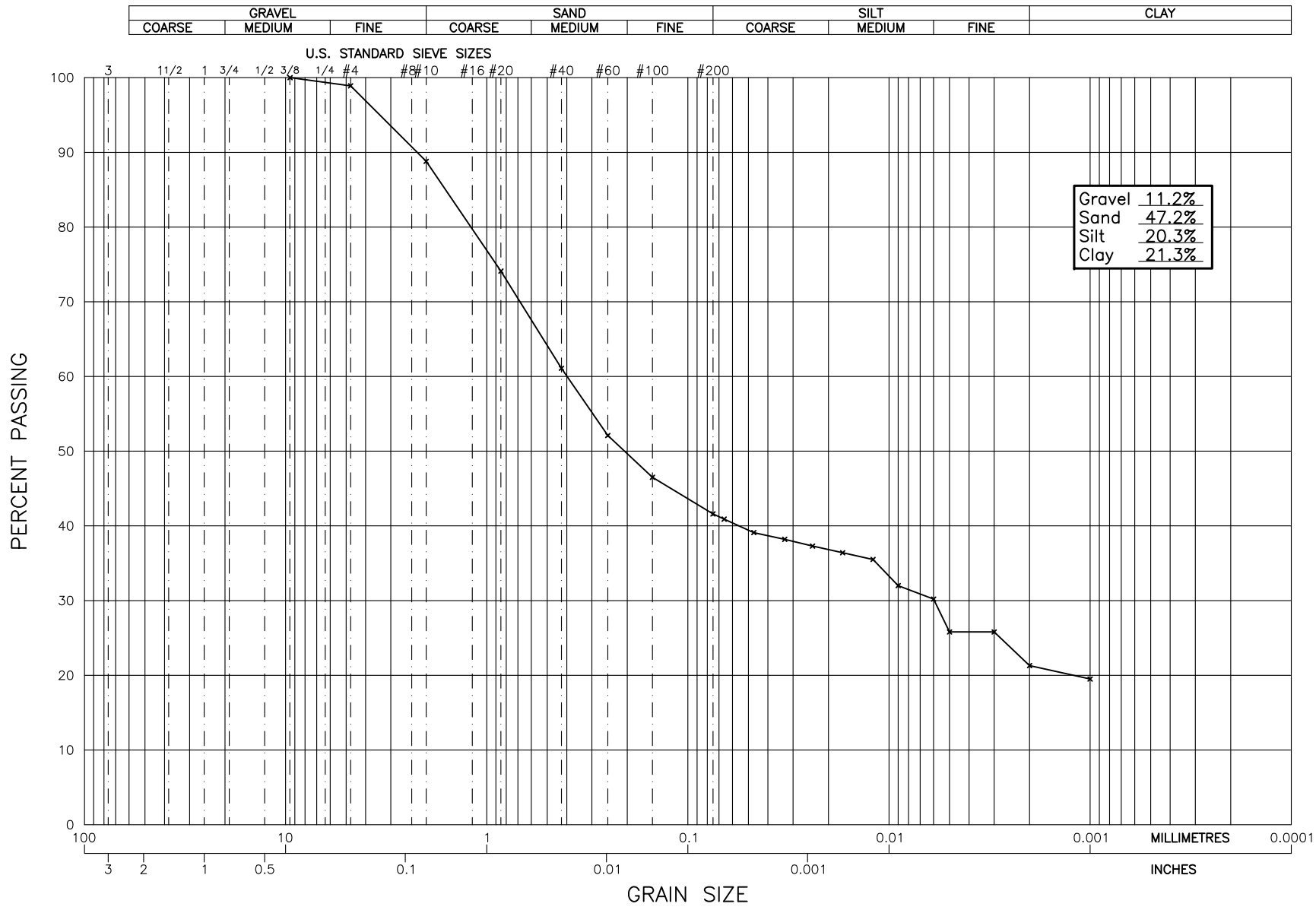
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand,silty some clay
Sample #: **G5**	Test #:	**Hole #: BH-BGC11-63**	**Depth: 3.9 - 4.0m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 11, 2011	Date Received: September 13, 2011			Date Tested: Sept.21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**94.2**
Wet Wt. & Tare	867.8	25.4				20	6.3	43.7	87.4	**82.3**
Dry Wt. & Tare	711.3	19.0				40	6.7	37.0	74.0	**69.7**
Water Wt.	156.5	12.5				60	5.1	31.9	63.8	**60.1**
Tare Wt.	131.6	9.5		579.7	**100.0**	100	3.8	28.1	56.2	**52.9**
Wt. Of Dry Soil	579.7	4.75	1.3	578.4	**99.8**	200	3.7	24.4	48.8	**46.0**
Moisture Content %	**27.0**	10	32.5	545.9	**94.2**	Pan	24.4			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	579.7			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.942	0.5	24.0	23.0	0.01317	18.0	13.3	5.162	0.068	36.0	**33.9**
50.0	0.942	1	23.0	23.0	0.01317	17.0	13.5	3.673	0.048	34.0	**32.0**
50.0	0.942	2	22.0	23.0	0.01317	16.0	13.7	2.613	0.034	32.0	**30.1**
50.0	0.942	4	22.0	23.0	0.01317	16.0	13.7	1.848	0.024	32.0	**30.1**
50.0	0.942	8	21.0	23.0	0.01317	15.0	13.8	1.314	0.017	30.0	**28.3**
50.0	0.942	15	20.0	23.0	0.01317	14.0	14.0	0.966	0.013	28.0	**26.4**
50.0	0.942	30	19.0	23.0	0.01317	13.0	14.2	0.687	0.009	26.0	**24.5**
50.0	0.942	60	17.0	23.0	0.01317	11.0	14.5	0.491	0.006	22.0	**20.7**
50.0	0.942	120	16.5	22.0	0.01332	10.0	14.6	0.349	0.005	20.0	**18.8**
50.0	0.942	240	15.0	22.0	0.01332	8.5	14.9	0.249	0.003	17.0	**16.0**
50.0	0.942	480	14.0	21.0	0.01348	7.0	15.1	0.178	0.002	14.0	**13.2**
50.0	0.942	1440	11.5	23.0	0.01317	5.5	15.4	0.103	0.001	11.0	**10.4**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-63-G9

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH63-G9

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand, silty/clayey some gravel
Sample #: **G9**	Test #:	**Hole #: BH-BGC11-63**	**Depth: 10.15 - 10.25m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 11, 2011	Date Received: September 13, 2011			Date Tested: Sept. 21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**88.8**
Wet Wt. & Tare	688.9	25.4				20	8.3	41.7	83.4	**74.1**
Dry Wt. & Tare	576.3	19.0				40	7.3	34.4	68.8	**61.1**
Water Wt.	112.6	12.5				60	5.1	29.3	58.6	**52.1**
Tare Wt.	182.5	9.5		393.8	**100.0**	100	3.1	26.2	52.4	**46.5**
Wt. Of Dry Soil	393.8	4.75	4.5	389.3	**98.9**	200	2.8	23.4	46.8	**41.6**
Moisture Content %	**28.6**	10	39.5	349.8	**88.8**	Pan	23.4			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	393.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.888	0.5	29.0	23.0	0.01317	23.0	12.5	5.000	0.066	46.0	**40.9**
50.0	0.888	1	28.0	23.0	0.01317	22.0	12.7	3.559	0.047	44.0	**39.1**
50.0	0.888	2	27.5	23.0	0.01317	21.5	12.7	2.525	0.033	43.0	**38.2**
50.0	0.888	4	27.0	23.0	0.01317	21.0	12.8	1.791	0.024	42.0	**37.3**
50.0	0.888	8	26.5	23.0	0.01317	20.5	12.9	1.270	0.017	41.0	**36.4**
50.0	0.888	15	26.0	23.0	0.01317	20.0	13.0	0.931	0.012	40.0	**35.5**
50.0	0.888	30	24.0	23.0	0.01317	18.0	13.3	0.666	0.009	36.0	**32.0**
50.0	0.888	60	23.0	23.0	0.01317	17.0	13.5	0.474	0.006	34.0	**30.2**
50.0	0.888	120	21.0	22.0	0.01332	14.5	13.9	0.340	0.005	29.0	**25.8**
50.0	0.888	240	21.0	22.0	0.01332	14.5	13.9	0.241	0.003	29.0	**25.8**
50.0	0.888	480	19.0	21.0	0.01348	12.0	14.3	0.173	0.002	24.0	**21.3**
50.0	0.888	1440	17.0	23.0	0.01317	11.0	14.5	0.100	0.001	22.0	**19.5**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

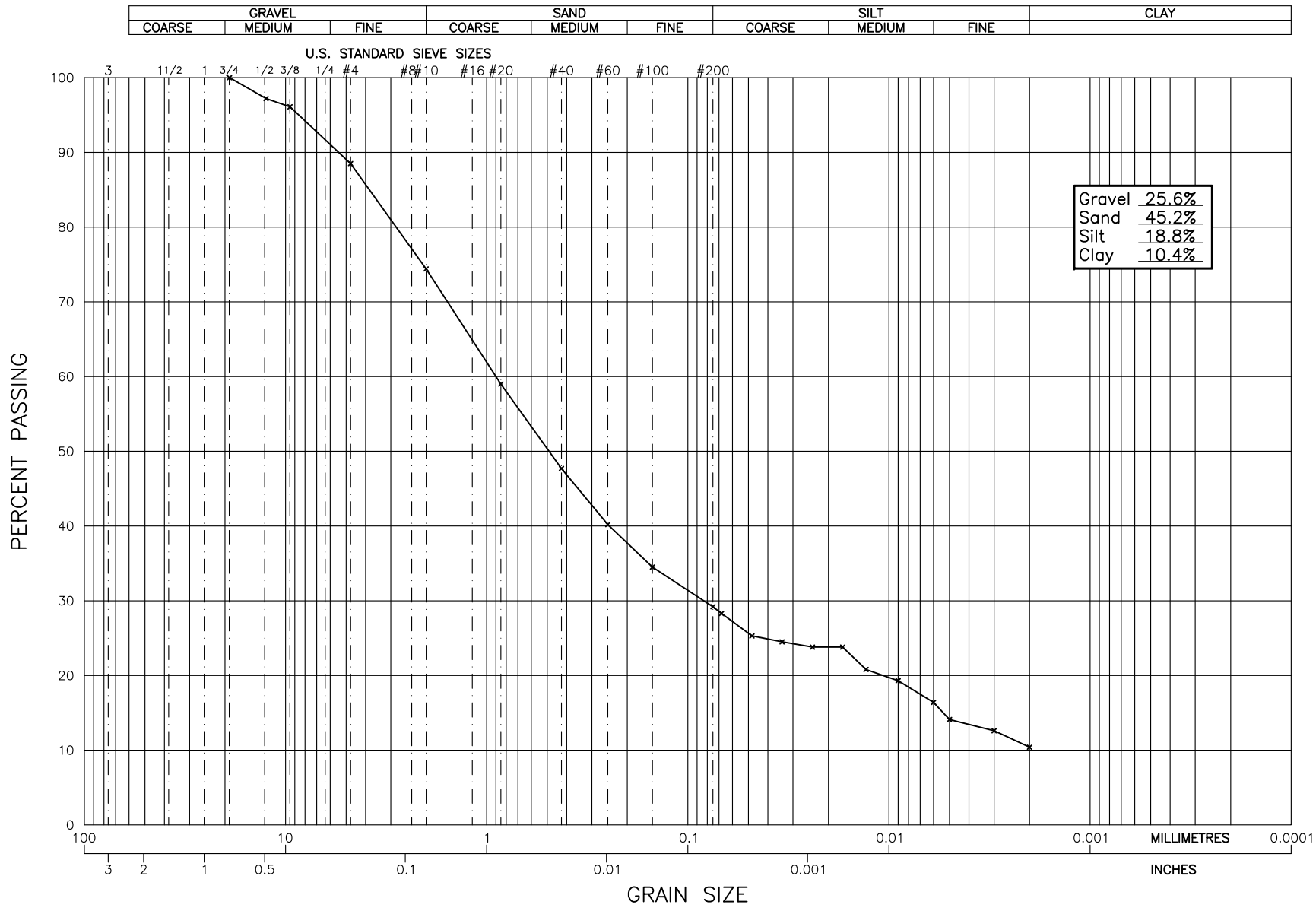
Client: BGC Engineering Ltd.				Date: Sept. 26, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #:K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Sand, gravelly some silt and clay
Sample #: G12	Test #:	**Hole #: BH-BGC11-63**	**Depth: 16.2 - 16.3m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 11, 2011	Date Received: September 13, 2011			Date Tested: Sept. 21, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**74.4**
Wet Wt. & Tare	985.9	25.4				20	10.3	39.7	79.4	**59.0**
Dry Wt. & Tare	825.8	19.0		646.1	**100.0**	40	7.6	32.1	64.2	**47.7**
Water Wt.	160.1	12.5	17.9	628.2	**97.2**	60	5.1	27.0	54.0	**40.2**
Tare Wt.	179.7	9.5	7.0	621.2	**96.1**	100	3.8	23.2	46.4	**34.5**
Wt. Of Dry Soil	646.1	4.75	49.6	571.6	**88.5**	200	3.6	19.6	39.2	**29.2**
Moisture Content %	**24.8**	10	91.1	480.5	**74.4**	Pan	19.6			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	646.1			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.744	0.5	25.0	23.0	0.01317	19.0	13.2	5.130	0.068	38.0	**28.3**
50.0	0.744	1	23.0	23.0	0.01317	17.0	13.5	3.673	0.048	34.0	**25.3**
50.0	0.744	2	22.5	23.0	0.01317	16.5	13.6	2.605	0.034	33.0	**24.5**
50.0	0.744	4	22.0	23.0	0.01317	16.0	13.7	1.848	0.024	32.0	**23.8**
50.0	0.744	8	22.0	23.0	0.01317	16.0	13.7	1.306	0.017	32.0	**23.8**
50.0	0.744	15	20.0	23.0	0.01317	14.0	14.0	0.966	0.013	28.0	**20.8**
50.0	0.744	30	19.0	23.0	0.01317	13.0	14.2	0.687	0.009	26.0	**19.3**
50.0	0.744	60	17.0	23.0	0.01317	11.0	14.5	0.491	0.006	22.0	**16.4**
50.0	0.744	120	16.0	22.0	0.01332	9.5	14.7	0.350	0.005	19.0	**14.1**
50.0	0.744	240	15.0	22.0	0.01332	8.5	14.9	0.249	0.003	17.0	**12.6**
50.0	0.744	480	14.0	21.0	0.01348	7.0	15.1	0.178	0.002	14.0	**10.4**
50.0	0.744	1440	13.0	23.0	0.01317	7.0	15.1	0.103	0.001	14.0	**10.4**

Hydrometer #: 932452	Graduate #:	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO



GEONORTH ENGINEERING LTD.
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Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-63-G12

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH63-G12

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

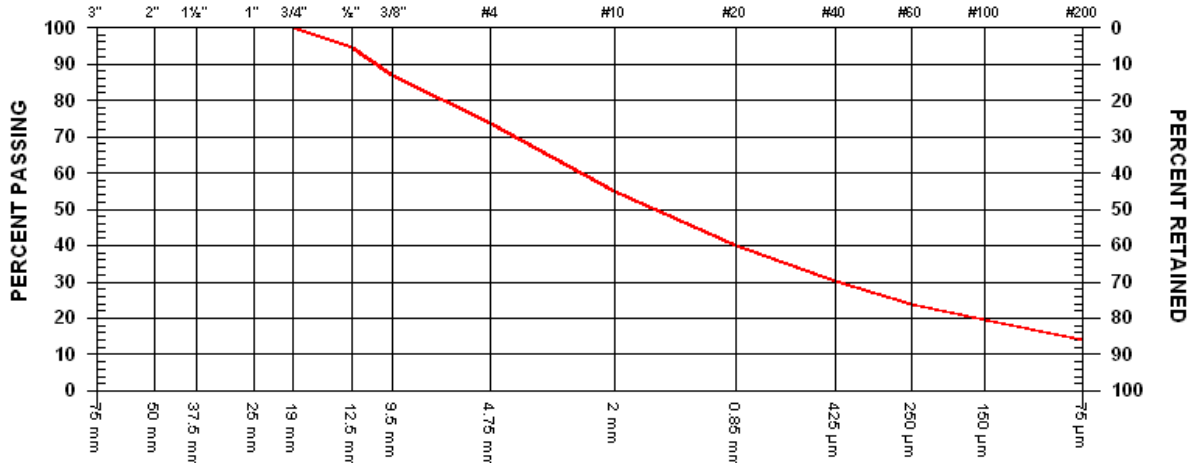
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 11 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 1 @ 0.76 - 1.21m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm		
3/4"	19 mm	100.0	
1/2"	12.5 mm	94.4	
3/8"	9.5 mm	86.9	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	73.7	
No. 10	2.00 mm	55.0	
No. 20	850 µm	40.0	
No. 40	425 µm	30.1	
No. 60	250 µm	23.8	
No. 100	150 µm	19.4	
No. 200	75 µm	14.1	

COMMENTS

GeoNorth Engineering Ltd.
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

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BGC Engineering Inc.
Suite 500 - 1045 Howe Street
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ATTN: Peter Quinn

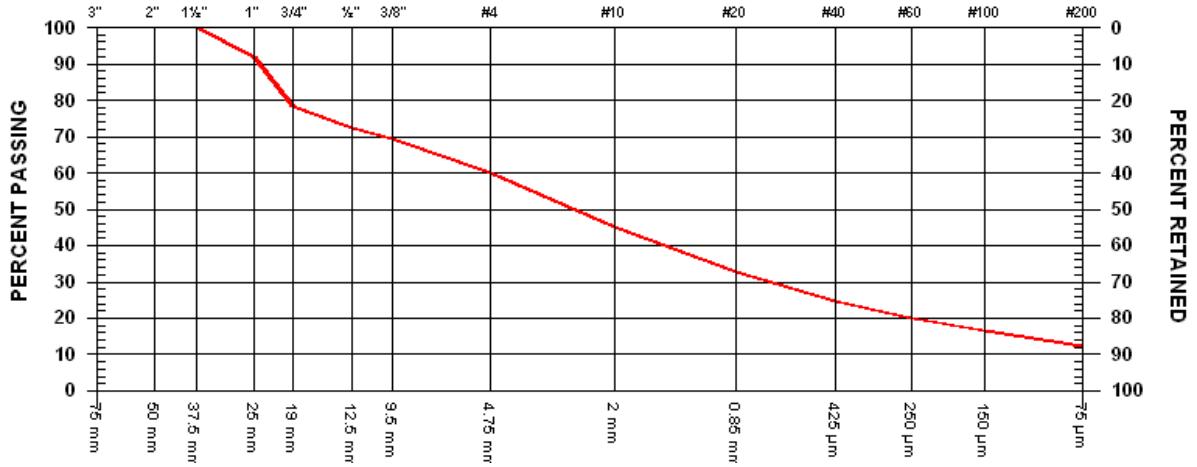
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 12 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 2 @ 1.52 - 1.97m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	92.1	
3/4"	19 mm	78.2	
1/2"	12.5 mm	72.5	
3/8"	9.5 mm	69.4	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	60.2	
No. 10	2.00 mm	45.0	
No. 20	850 µm	32.6	
No. 40	425 µm	24.8	
No. 60	250 µm	19.9	
No. 100	150 µm	16.4	
No. 200	75 µm	12.2	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

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BGC Engineering Inc.
Suite 500 - 1045 Howe Street
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V6Z 2A9

ATTN: Peter Quinn

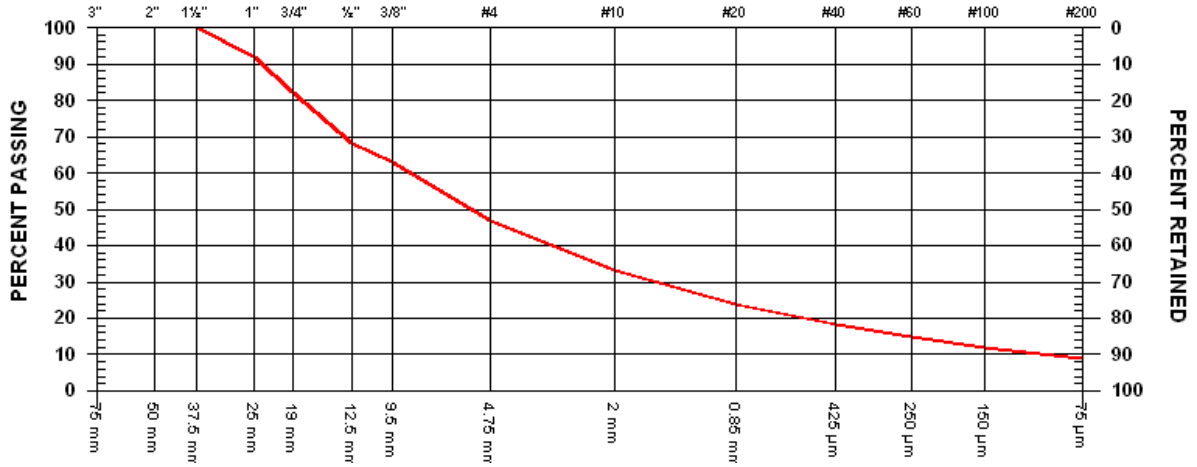
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 13 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 3 @ 2.28 - 2.73m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	92.1	
3/4"	19 mm	82.2	
1/2"	12.5 mm	68.0	
3/8"	9.5 mm	63.1	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	47.0	
No. 10	2.00 mm	33.1	
No. 20	850 µm	24.0	
No. 40	425 µm	18.3	
No. 60	250 µm	14.7	
No. 100	150 µm	12.0	
No. 200	75 µm	8.9	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

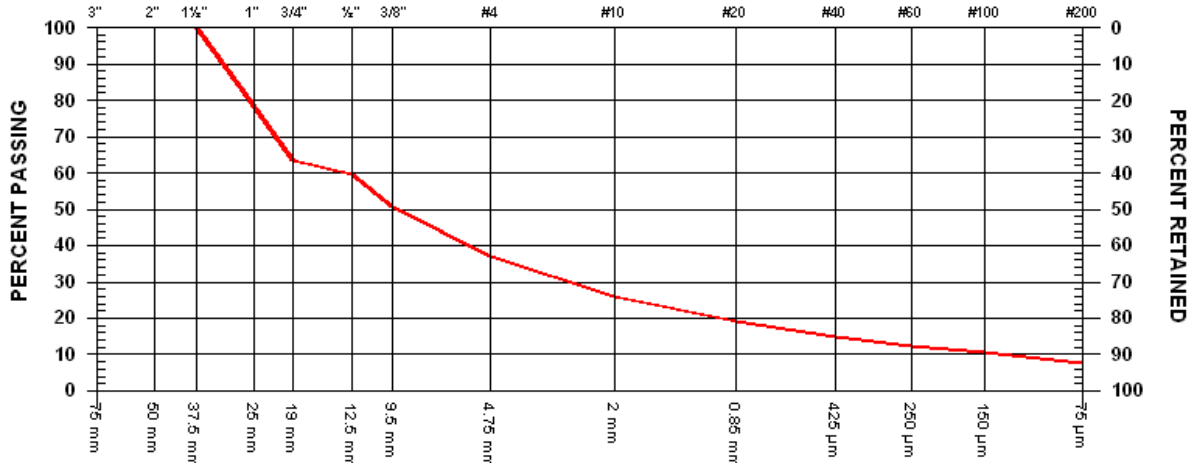
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 14 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 4 @ 3.04 - 3.49m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	78.5	
3/4"	19 mm	63.3	
1/2"	12.5 mm	59.6	
3/8"	9.5 mm	50.7	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	36.9	
No. 10	2.00 mm	26.1	
No. 20	850 µm	19.2	
No. 40	425 µm	15.1	
No. 60	250 µm	12.5	
No. 100	150 µm	10.5	
No. 200	75 µm	7.8	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
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Suite 500 - 1045 Howe Street
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ATTN: Peter Quinn

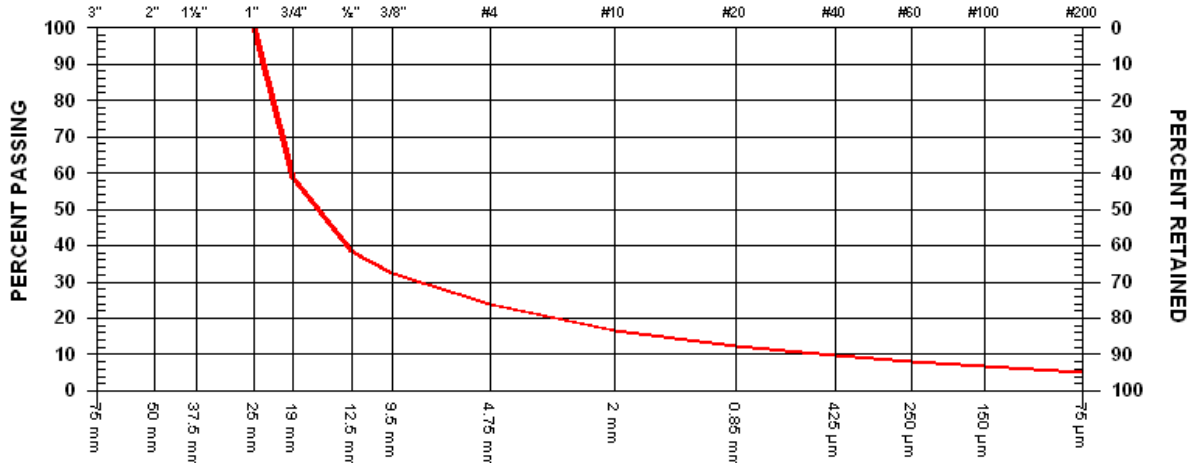
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 15 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 5 @ 3.80 - 4.25m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	58.9	
1/2"	12.5 mm	38.5	
3/8"	9.5 mm	32.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	24.0	
No. 10	2.00 mm	16.7	
No. 20	850 µm	12.2	
No. 40	425 µm	9.6	
No. 60	250 µm	8.0	
No. 100	150 µm	6.7	
No. 200	75 µm	5.2	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
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Vancouver, BC
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ATTN: Peter Quinn

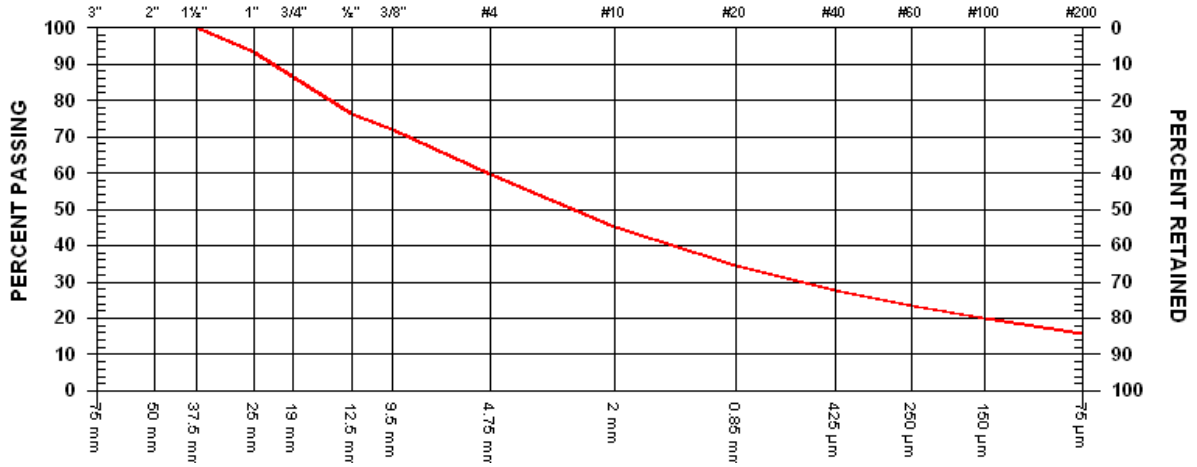
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 16 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 6 @ 4.56 - 5.01m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	93.3	
3/4"	19 mm	86.4	
1/2"	12.5 mm	76.3	
3/8"	9.5 mm	72.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	59.5	
No. 10	2.00 mm	45.1	
No. 20	850 µm	34.3	
No. 40	425 µm	27.6	
No. 60	250 µm	23.3	
No. 100	150 µm	20.2	
No. 200	75 µm	15.9	

COMMENTS

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
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BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

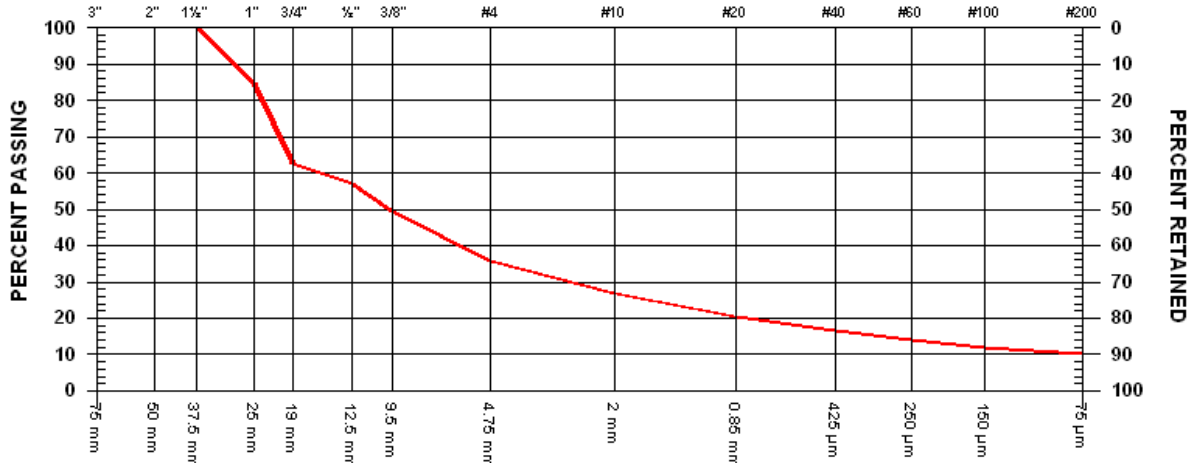
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 17 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 7 @ 5.33 - 5.78m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	84.7	
3/4"	19 mm	62.4	
1/2"	12.5 mm	57.2	
3/8"	9.5 mm	49.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	35.9	
No. 10	2.00 mm	26.9	
No. 20	850 µm	20.6	
No. 40	425 µm	16.5	
No. 60	250 µm	13.9	
No. 100	150 µm	12.1	
No. 200	75 µm	10.0	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

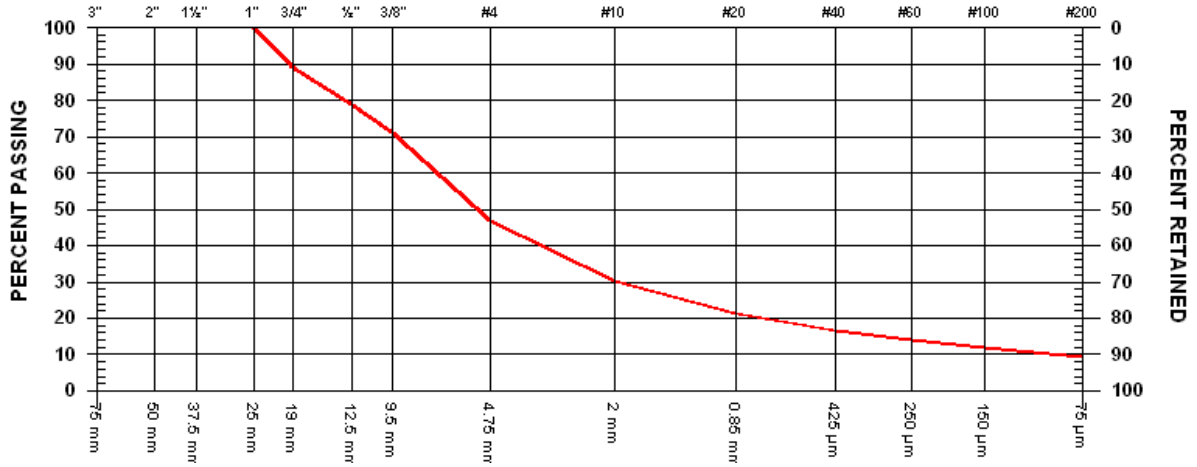
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 18 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.04 DATE SAMPLED 2011.Aug.14

SUPPLIER BH-BGC11-65
SOURCE SPT 8 @ 6.09 - 6.54m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm		
1"	25 mm	100.0	
3/4"	19 mm	89.0	
1/2"	12.5 mm	78.6	
3/8"	9.5 mm	70.9	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	47.0	
No. 10	2.00 mm	30.4	
No. 20	850 µm	21.4	
No. 40	425 µm	16.7	
No. 60	250 µm	14.0	
No. 100	150 µm	12.0	
No. 200	75 µm	9.5	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

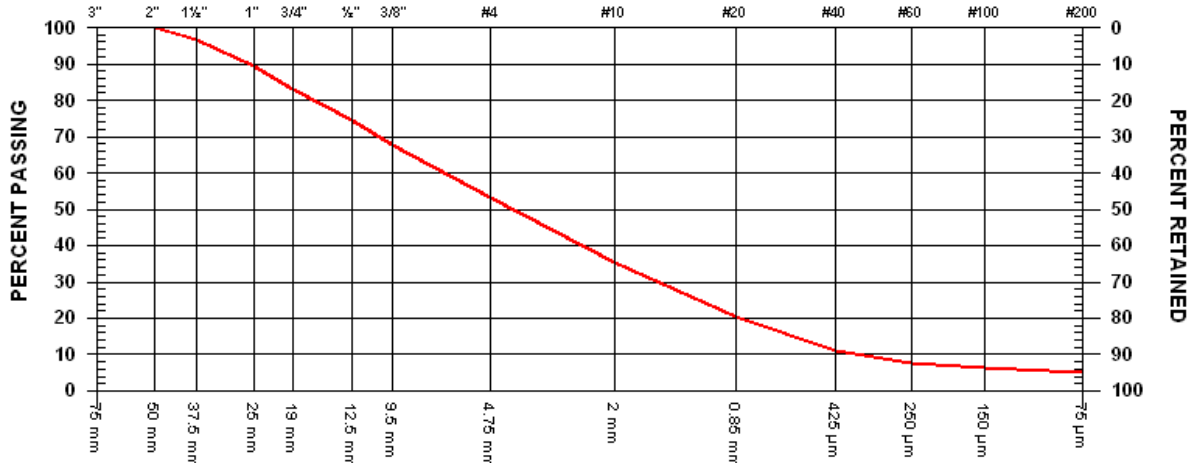
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 37 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.10 DATE SAMPLED 2011.Aug.05

SUPPLIER TP-BGC11-103
SOURCE G1 @ 4.5m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	96.6	
1"	25 mm	89.6	
3/4"	19 mm	83.1	
1/2"	12.5 mm	74.7	
3/8"	9.5 mm	67.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	53.2	
No. 10	2.00 mm	35.4	
No. 20	850 µm	20.6	
No. 40	425 µm	11.0	
No. 60	250 µm	7.7	
No. 100	150 µm	6.4	
No. 200	75 µm	5.3	

COMMENTS

GeoNorth Engineering Ltd.
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

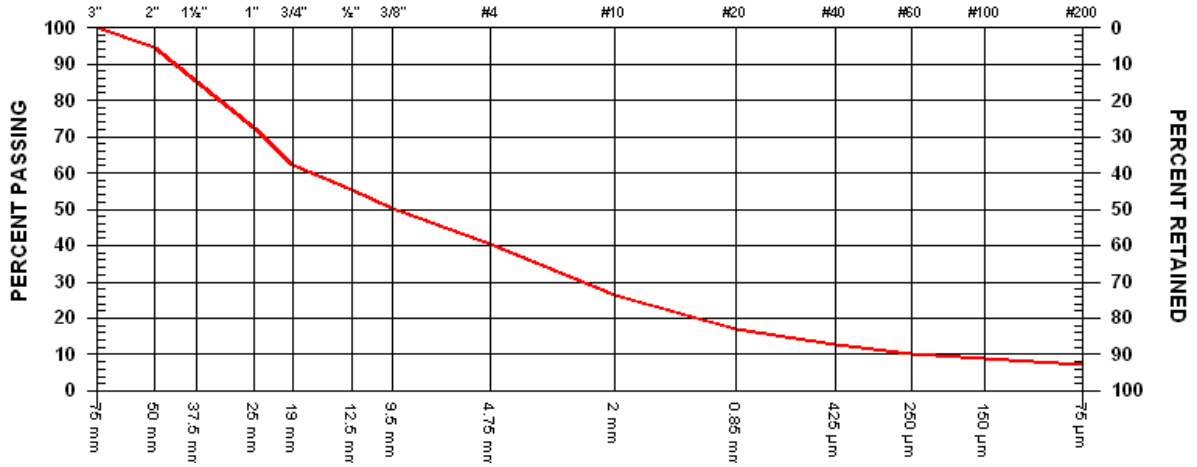
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 21 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.08 DATE SAMPLED 2011.Aug.23

SUPPLIER TP-BGC11-104
SOURCE G1 @ 1.2-1.6m
SPECIFICATION
MATERIAL TYPE Gravel

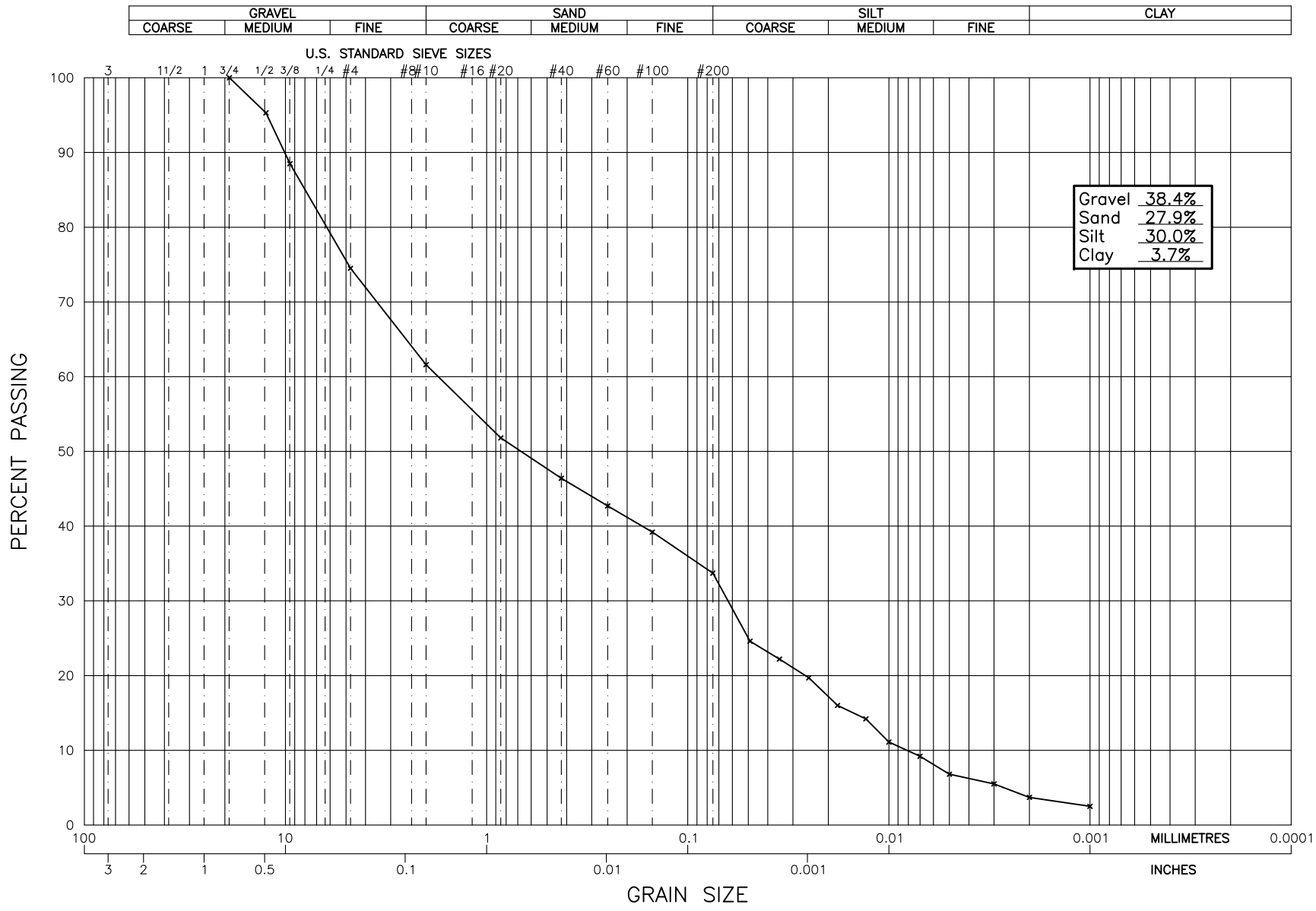
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	94.7	
1 1/2"	37.5 mm	85.2	
1"	25 mm	72.2	
3/4"	19 mm	62.2	
1/2"	12.5 mm	55.4	
3/8"	9.5 mm	50.3	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	40.4	
No. 10	2.00 mm	26.5	
No. 20	850 µm	17.1	
No. 40	425 µm	12.9	
No. 60	250 µm	10.4	
No. 100	150 µm	8.9	
No. 200	75 µm	7.3	

COMMENTS



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Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF TP-BGC11-107-G1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-TP107-G1

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Ltd.				Date: November 10, 2011
Project Name: Eagle Gold Soils and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Gravel, silty and sandy
Sample #: **G1**	Test #:	**Hole #: TP-BGC11-107**	**Depth: 2.8 - 3.0m**	Time:
Sampled By: Client	Tested By: DJ			Checked By: DJ
Date Sampled: Aug.16, 2011	Date Received: Sept.13, 2011			Date Tested: Nov.9, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**61.6**
Wet Wt. & Tare	1009.0	25.4				20	7.9	42.1	84.2	**51.8**
Dry Wt. & Tare	889.5	19.0		709.8	**100.0**	40	4.4	37.7	75.4	**46.4**
Water Wt.	119.5	12.5	33.6	676.2	**95.3**	60	3.0	34.7	69.4	**42.7**
Tare Wt.	179.7	9.5	48.0	628.2	**88.5**	100	2.9	31.8	63.6	**39.2**
Wt. Of Dry Soil	709.8	4.75	99.7	528.5	**74.5**	200	4.4	27.4	54.8	**33.7**
Moisture Content %	**16.8**	10	91.5	437.0	**61.6**	Pan	27.4			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	709.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.616	0.5	28.5	20.0	0.01365	21.5	12.7	5.049	0.069	43.0	**26.5**
50.0	0.616	1	27.0	20.0	0.01365	20.0	13.0	3.605	0.049	40.0	**24.6**
50.0	0.616	2	25.0	20.0	0.01365	18.0	13.3	2.581	0.035	36.0	**22.2**
50.0	0.616	4	23.0	20.0	0.01365	16.0	13.7	1.848	0.025	32.0	**19.7**
50.0	0.616	8	20.0	20.0	0.01365	13.0	14.2	1.330	0.018	26.0	**16.0**
50.0	0.616	15	18.5	20.0	0.01365	11.5	14.4	0.980	0.013	23.0	**14.2**
50.0	0.616	30	16.0	20.0	0.01365	9.0	14.8	0.703	0.010	18.0	**11.1**
50.0	0.616	60	14.5	20.0	0.01365	7.5	15.1	0.501	0.007	15.0	**9.2**
50.0	0.616	120	12.5	20.0	0.01365	5.5	15.4	0.358	0.005	11.0	**6.8**
50.0	0.616	240	11.5	20.0	0.01365	4.5	15.6	0.255	0.003	9.0	**5.5**
50.0	0.616	480	10.0	21.0	0.01348	3.0	15.8	0.181	0.002	6.0	**3.7**
50.0	0.616	1440	10.0	19.0	0.01382	2.0	16.0	0.105	0.001	4.0	**2.5**

Hydrometer #: 932452	Graduate #: 6	Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

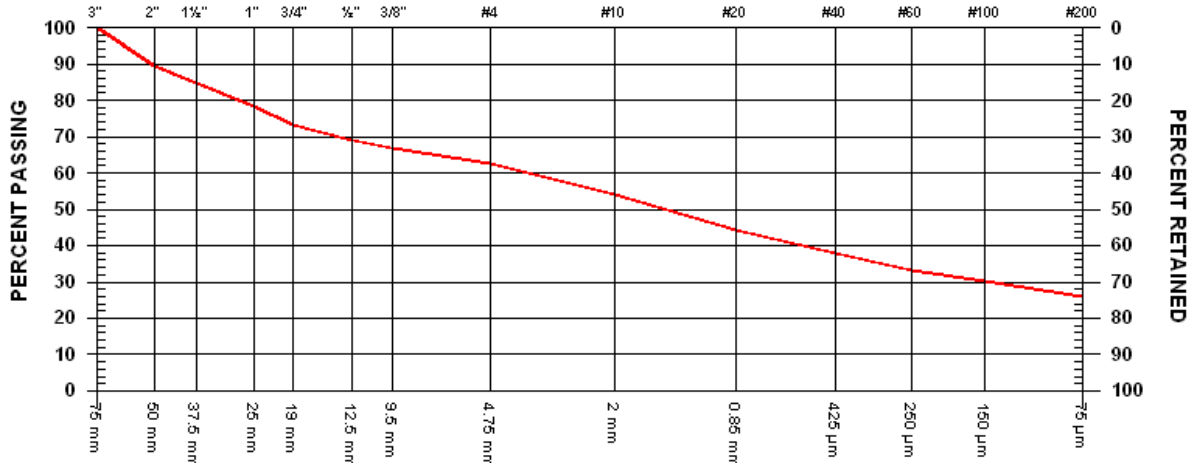
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 22 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.08 DATE SAMPLED 2011.Sep.08

SUPPLIER TP-BGC11-108
SOURCE G1 @ 0.9-1.15m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	89.3	
1 1/2"	37.5 mm	84.9	
1"	25 mm	78.2	
3/4"	19 mm	73.1	
1/2"	12.5 mm	69.1	
3/8"	9.5 mm	67.0	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	62.6	
No. 10	2.00 mm	54.2	
No. 20	850 µm	44.2	
No. 40	425 µm	37.8	
No. 60	250 µm	33.4	
No. 100	150 µm	30.1	
No. 200	75 µm	25.9	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

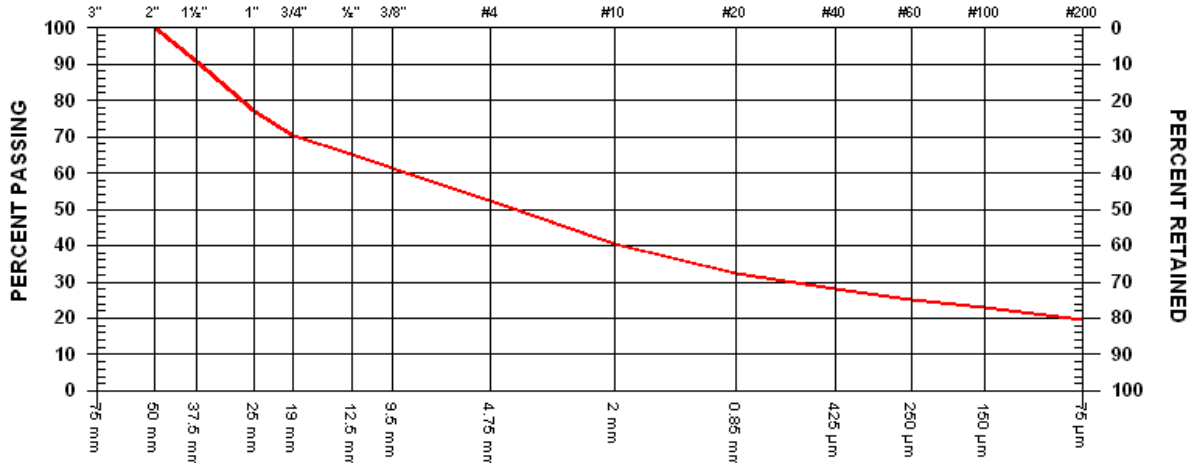
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 23 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.08 DATE SAMPLED 2011.Aug.17

SUPPLIER TP-BGC11-112
SOURCE G1 @ 1.3-1.4m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED

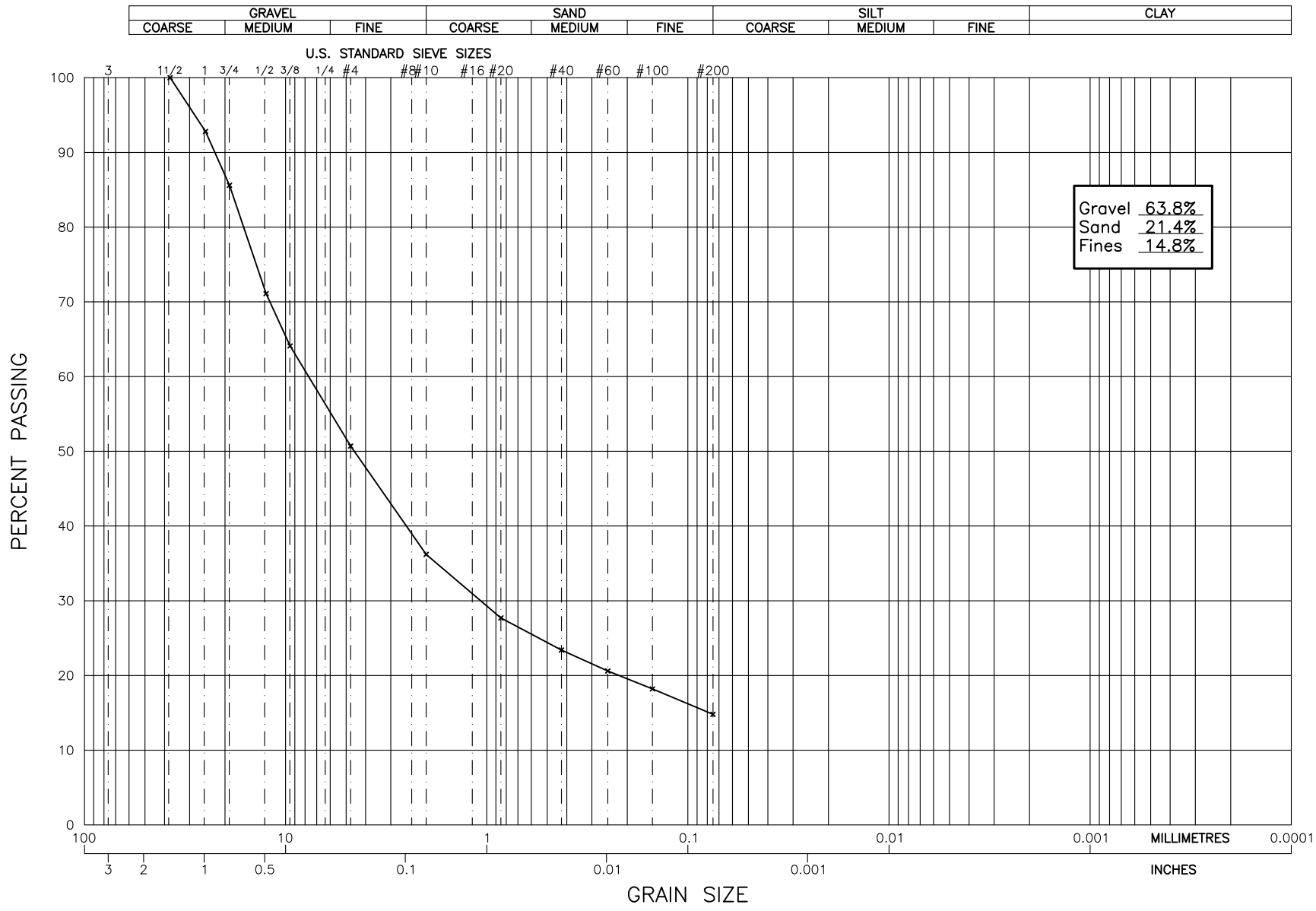


GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	90.7	
1"	25 mm	77.1	
3/4"	19 mm	70.3	
1/2"	12.5 mm	65.3	
3/8"	9.5 mm	61.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	52.2	
No. 10	2.00 mm	40.5	
No. 20	850 µm	32.3	
No. 40	425 µm	27.9	
No. 60	250 µm	25.1	
No. 100	150 µm	22.8	
No. 200	75 µm	19.5	

COMMENTS

Report System Software Registered to: GeoNorth Engineering, Prince George



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF BH-BGC11-116-G2

PROJECT NO.
K-3300

PLATE NO.
3300-GS-BH116-G2

GeoNorth Engineering Ltd.
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

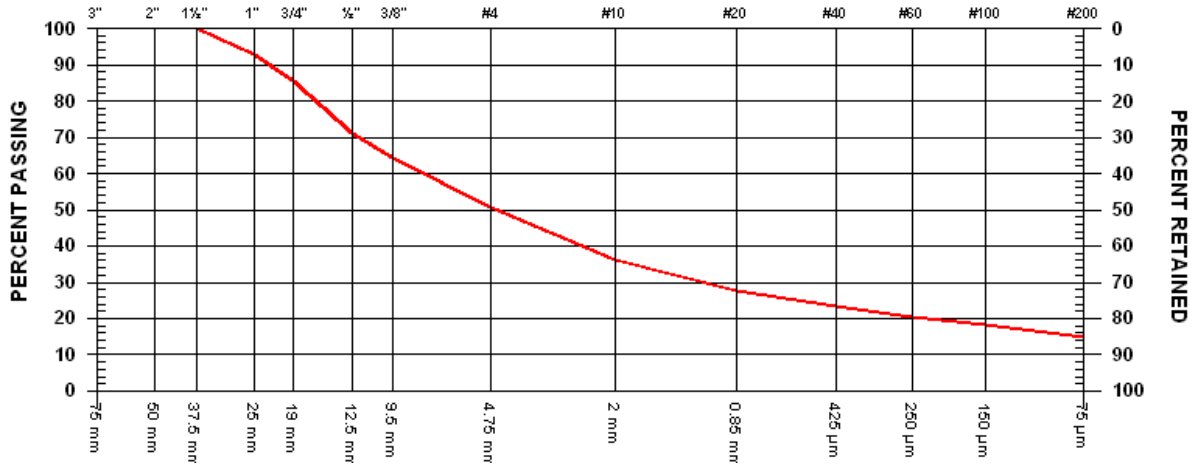
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 6 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.30 DATE SAMPLED 2011.Aug.18

SUPPLIER TP-BGC11-116
SOURCE G2 @ 2.2 - 2.3m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	92.8	
3/4"	19 mm	85.6	
1/2"	12.5 mm	71.1	
3/8"	9.5 mm	64.1	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	50.7	
No. 10	2.00 mm	36.2	
No. 20	850 µm	27.7	
No. 40	425 µm	23.4	
No. 60	250 µm	20.6	
No. 100	150 µm	18.2	
No. 200	75 µm	14.8	

COMMENTS

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SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

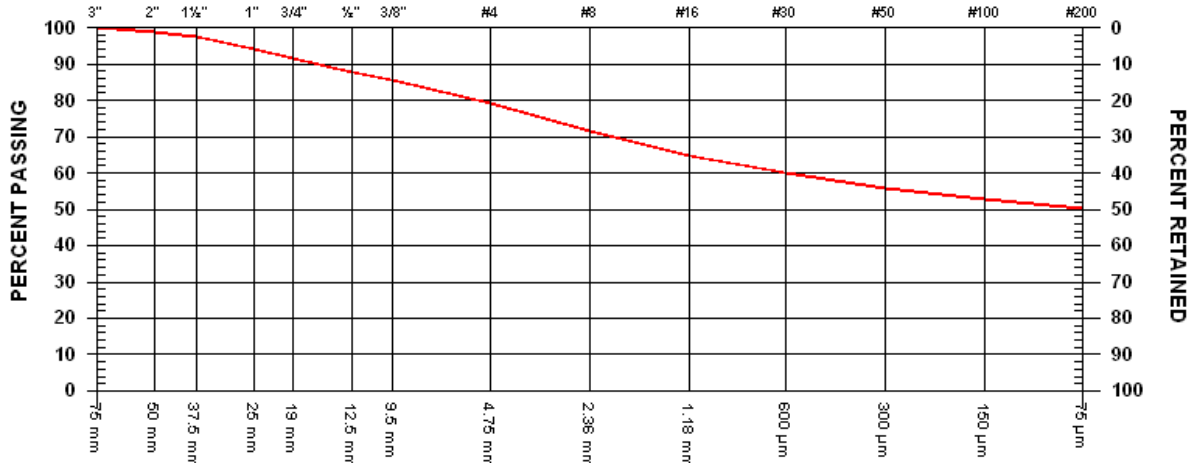
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 41 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.14 DATE SAMPLED 2011.Aug.19

SUPPLIER TP-BGC11-124
SOURCE G1 @ 6.2 - 6.4m
SPECIFICATION
MATERIAL TYPE Silt,sandy

SAMPLED BY Client
TESTED BY RO
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	98.8	
1 1/2"	37.5 mm	97.4	
1"	25 mm	94.1	
3/4"	19 mm	91.5	
1/2"	12.5 mm	87.5	
3/8"	9.5 mm	85.6	

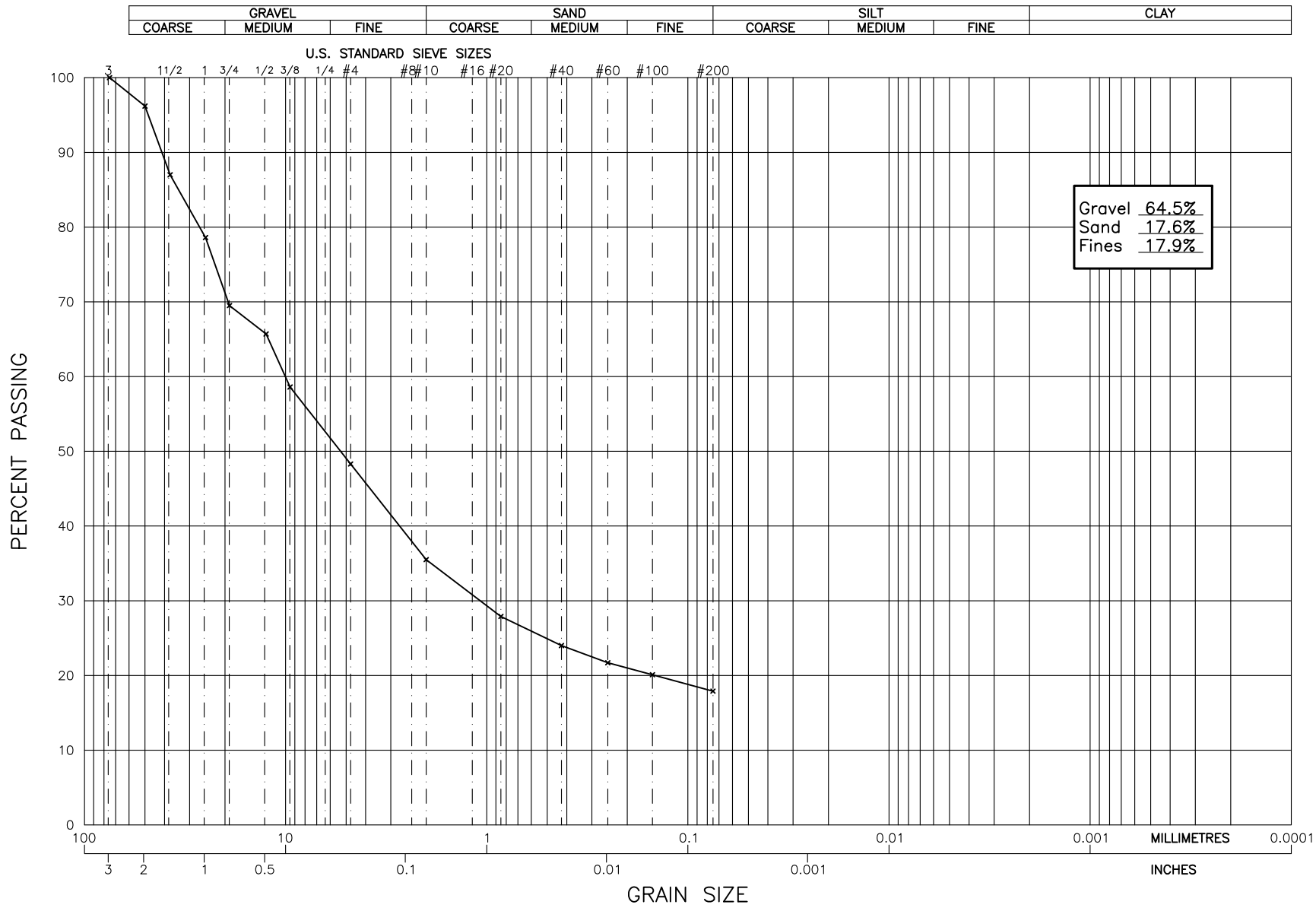
SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	79.0	
No. 8	2.36 mm	71.5	
No. 16	1.18 mm	64.8	
No. 30	600 µm	59.9	
No. 50	300 µm	55.8	
No. 100	150 µm	52.9	
No. 200	75 µm	50.3	

MOISTURE CONTENT 23.7%

COMMENTS

 2011.Nov.15 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF TP-BGC11-126

PROJECT NO.
K-3300

PLATE NO.
3300-GS-TP126

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
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SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 630 - 1718 Argyle Street
Halifax, Nova Scotia
B3J 3N6

ATTN: Peter Quinn

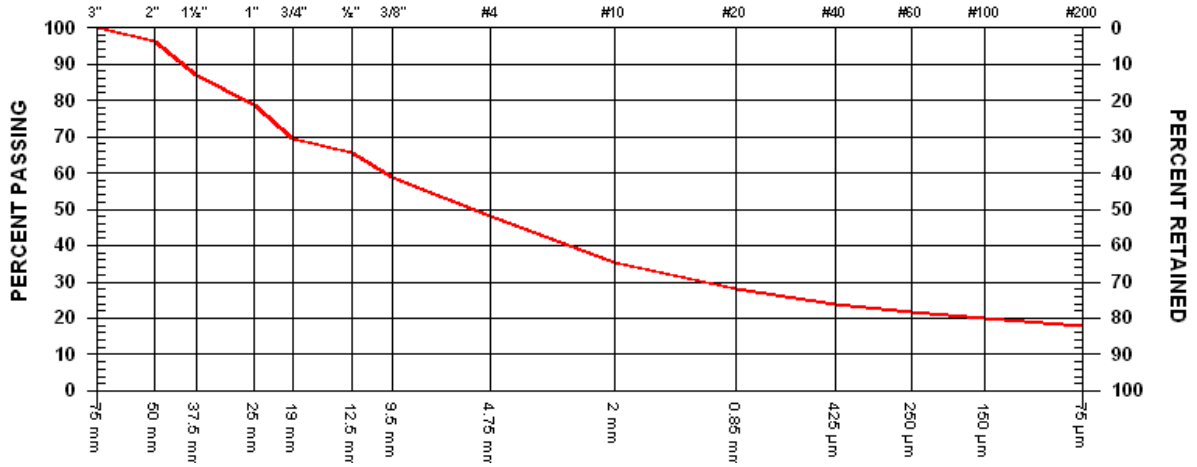
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 1 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.21 DATE SAMPLED 2011.Aug.19

SUPPLIER TP-BGC11-126
SOURCE 1.7m - 2.2m
SPECIFICATION
MATERIAL TYPE Gravel

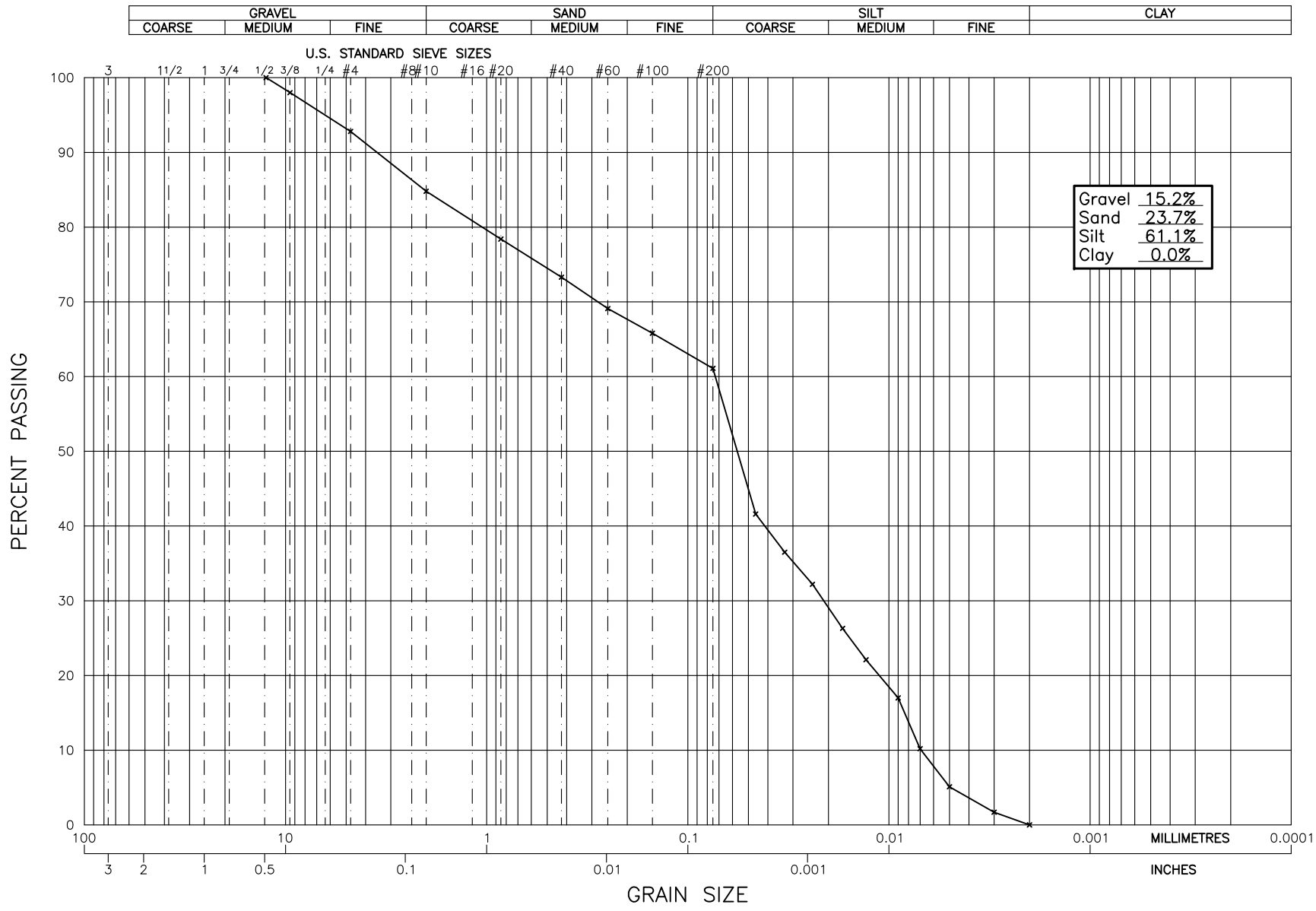
SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	96.2	
1 1/2"	37.5 mm	87.0	
1"	25 mm	78.6	
3/4"	19 mm	69.5	
1/2"	12.5 mm	65.7	
3/8"	9.5 mm	58.6	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	48.3	
No. 10	2.00 mm	35.5	
No. 20	850 µm	27.9	
No. 40	425 µm	24.0	
No. 60	250 µm	21.7	
No. 100	150 µm	20.1	
No. 200	75 µm	17.9	

COMMENTS



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF TP-BGC11-128-G1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-TP128-G1

GeoNorth Engineering

Hydrometer Analysis

Test Designation: ASTM D-422

Client: BGC Engineering Ltd.				Date: Sept.26, 2011
Project Name: Eagle Gold Soil and Aggregate Testing				**Project #: K-3300**
Source/Location: Dublin Gulch, Yukon				Type: Silt,sandy
Sample #: **G1**	Test #:	**Hole #: TP-BGC11-128**	**Depth: 2.5 - 3.0m**	Time:
Sampled By: Client	Tested By: DJ			Checked By:
Date Sampled: August 19, 2011	Date Received: September 13, 2011			Date Tested: Sept. 23, 2011

Initial Moisture Content		**Sieve Analysis**				**Hydrometer Sieve Analysis**				
		Sieve No.	**Weight Retained**	**Total Wt. Passing**	**% Finer Than Orig. Samp.**	**Sieve No.**	**Weight Retained**	**Total Wt. Finer Than**	**% Finer Than**	**% Finer Than Orig Samp.**
Tare No.		38.1				10		50.0	100.0	**84.8**
Wet Wt. & Tare	879.4	25.4				20	3.8	46.2	92.4	**78.4**
Dry Wt. & Tare	726.5	19.0				40	3.0	43.2	86.4	**73.3**
Water Wt.	152.9	12.5		545.8	**100.0**	60	2.5	40.7	81.4	**69.1**
Tare Wt.	180.7	9.5	11.0	534.8	**98.0**	100	1.9	38.8	77.6	**65.8**
Wt. Of Dry Soil	545.8	4.75	28.2	506.6	**92.8**	200	2.8	36.0	72.0	**61.1**
Moisture Content %	**28.0**	10	43.5	463.1	**84.8**	Pan	36.0			
Dry Wt. Of Sample from Initial Moisture						Total	50.0			
=(100xWet Soil Wt.)/(100 + Initial Moisture) =						Unwashed Wt.=				
		Total	545.8			Tare		Wt. Passing #200 = _____		

Starting Wt. (g)	**% - #10**	**Elapsed Time (min)**	**Reading R**	**Temp (0C)**	**K**	**Corr. Reading R`**	**Zr (cm)**	**SQRT(Zr)/T (min)**	**D (mm)**	**N (%)**	**N*(%-#10)**
50.0	0.848	0.5	36.0	23.0	0.01317	30.0	11.3	4.763	0.063	60.0	**50.9**
50.0	0.848	1	30.5	23.0	0.01317	24.5	12.3	3.500	0.046	49.0	**41.6**
50.0	0.848	2	27.5	23.0	0.01317	21.5	12.7	2.525	0.033	43.0	**36.5**
50.0	0.848	4	25.0	23.0	0.01317	19.0	13.2	1.814	0.024	38.0	**32.2**
50.0	0.848	8	21.5	23.0	0.01317	15.5	13.7	1.310	0.017	31.0	**26.3**
50.0	0.848	15	19.0	23.0	0.01317	13.0	14.2	0.971	0.013	26.0	**22.1**
50.0	0.848	30	16.0	23.0	0.01317	10.0	14.6	0.699	0.009	20.0	**17.0**
50.0	0.848	60	12.0	23.0	0.01317	6.0	15.3	0.505	0.007	12.0	**10.2**
50.0	0.848	120	9.0	23.0	0.01317	3.0	15.8	0.363	0.005	6.0	**5.1**
50.0	0.848	240	7.0	23.0	0.01317	1.0	16.1	0.259	0.003	2.0	**1.7**
50.0	0.848	480	6.0	23.0	0.01317	0.0	16.3	0.184	0.002	0.0	**0.0**
50.0	0.848	1446	6.0	23.0	0.01317	0.0	16.3	0.106	0.001	0.0	**0.0**

Hydrometer #: 932452		Dispersing Agent: Sodium Hex	Amount: 125ml
Density of Solids:			
Description of Sample:			

NOELCO

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

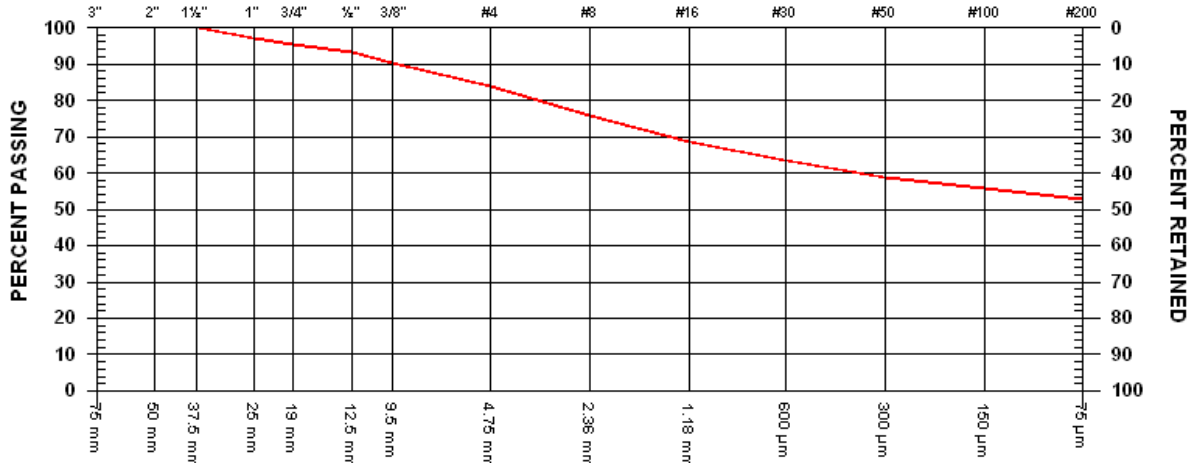
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 40 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.14 DATE SAMPLED 2011.Aug.20

SUPPLIER TP-BGC11-129
SOURCE G1 @ 6.6 - 6.8m
SPECIFICATION
MATERIAL TYPE Silt some sand

SAMPLED BY Client
TESTED BY RO
TEST METHOD WASHED



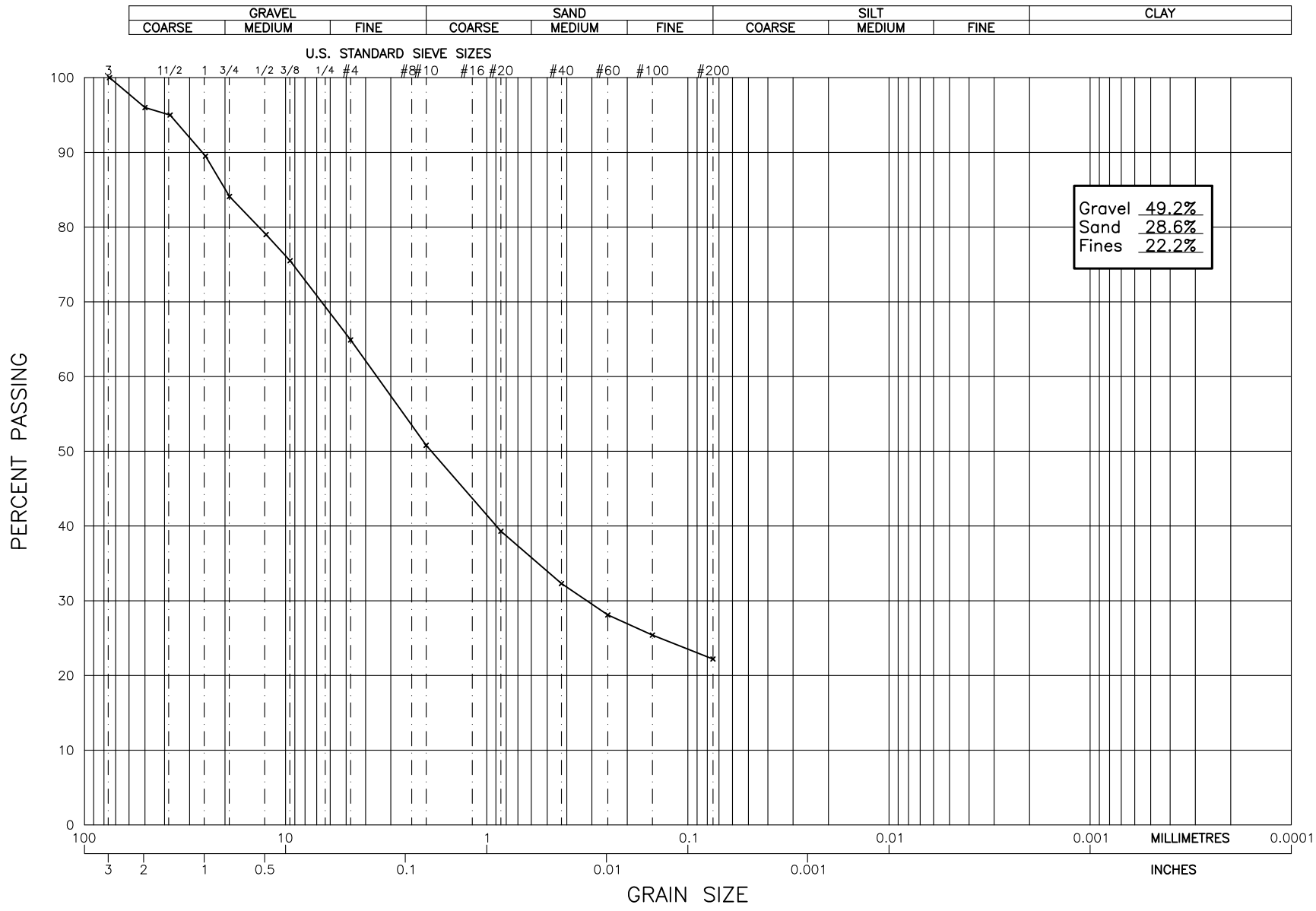
GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	97.1	
3/4"	19 mm	95.4	
1/2"	12.5 mm	93.2	
3/8"	9.5 mm	90.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	83.9	
No. 8	2.36 mm	75.9	
No. 16	1.18 mm	68.6	
No. 30	600 µm	63.4	
No. 50	300 µm	58.8	
No. 100	150 µm	55.7	
No. 200	75 µm	52.7	

MOISTURE CONTENT 18.2%

COMMENTS

 2011.Nov.15 GeoNorth Engineering Ltd. PER. _____



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
GRAIN SIZE ANALYSIS OF TP-BGC11-130-G1

PROJECT NO.
K-3300

PLATE NO.
3300-GS-TP130-G1

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 630 - 1718 Argyle Street
Halifax, Nova Scotia
B3J 3N6

ATTN: Peter Quinn

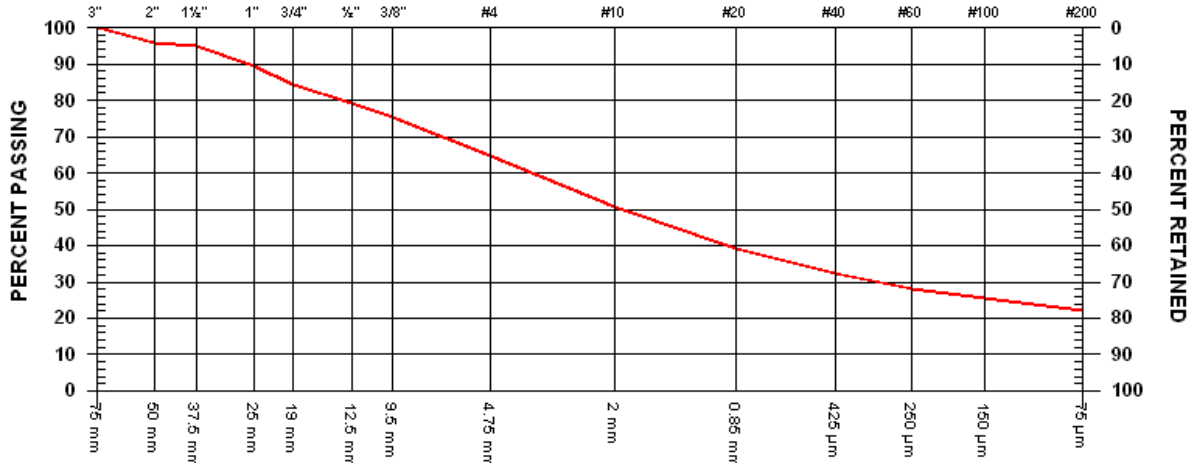
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 4 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Sep.21 DATE SAMPLED 2011.Aug.20

SUPPLIER TP-BGC11-130-G1
SOURCE 5.8 - 6.0m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY MM
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	96.0	
1 1/2"	37.5 mm	95.0	
1"	25 mm	89.5	
3/4"	19 mm	84.1	
1/2"	12.5 mm	79.0	
3/8"	9.5 mm	75.5	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	64.9	
No. 10	2.00 mm	50.8	
No. 20	850 µm	39.3	
No. 40	425 µm	32.3	
No. 60	250 µm	28.1	
No. 100	150 µm	25.4	
No. 200	75 µm	22.2	

COMMENTS

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

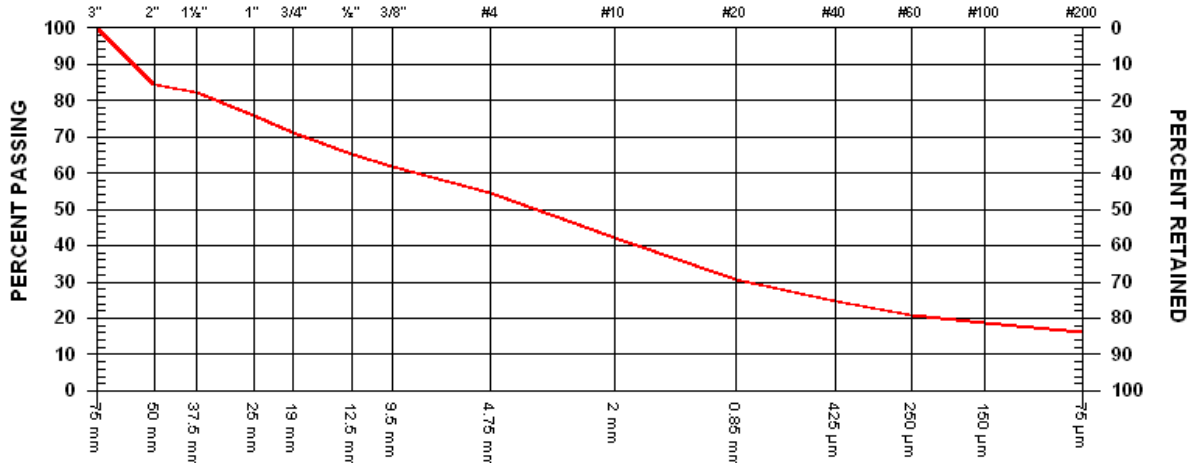
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 24 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.08 DATE SAMPLED 2011.Aug.20

SUPPLIER TP-BGC11-131
SOURCE G1 @ 3.2-3.5m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm	100.0	
2"	50 mm	84.1	
1 1/2"	37.5 mm	82.0	
1"	25 mm	76.0	
3/4"	19 mm	70.9	
1/2"	12.5 mm	65.2	
3/8"	9.5 mm	61.8	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	54.5	
No. 10	2.00 mm	42.2	
No. 20	850 µm	30.8	
No. 40	425 µm	24.6	
No. 60	250 µm	21.0	
No. 100	150 µm	18.7	
No. 200	75 µm	16.0	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
10 20 40 60 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

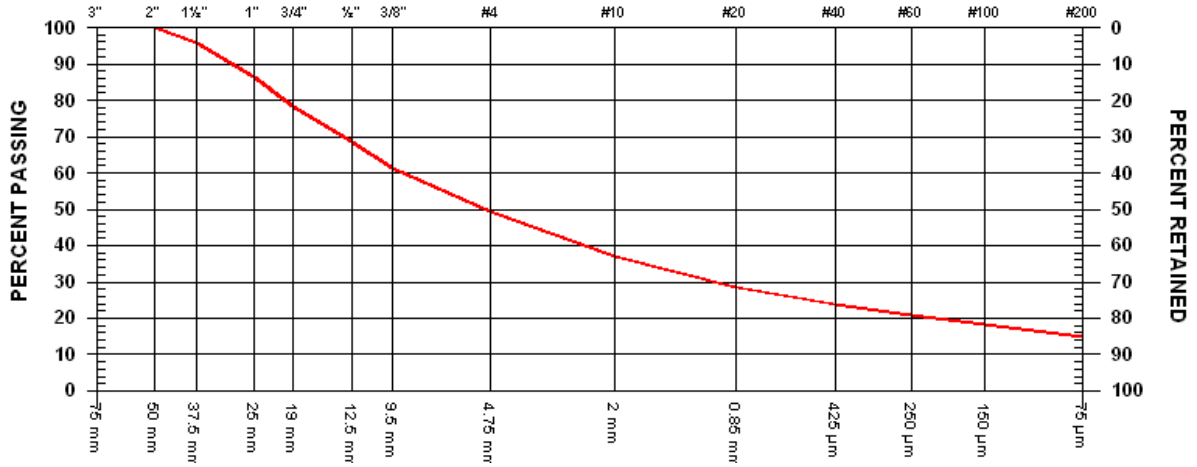
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 25 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.08 DATE SAMPLED 2011.Aug.21

SUPPLIER TP-BGC11-133
SOURCE G1 @ 4.3-4.4m
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY DJ
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	95.6	
1"	25 mm	86.6	
3/4"	19 mm	78.5	
1/2"	12.5 mm	68.4	
3/8"	9.5 mm	61.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	49.3	
No. 10	2.00 mm	36.9	
No. 20	850 µm	28.6	
No. 40	425 µm	23.8	
No. 60	250 µm	20.8	
No. 100	150 µm	18.5	
No. 200	75 µm	15.1	

COMMENTS

 2011.Nov.09 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

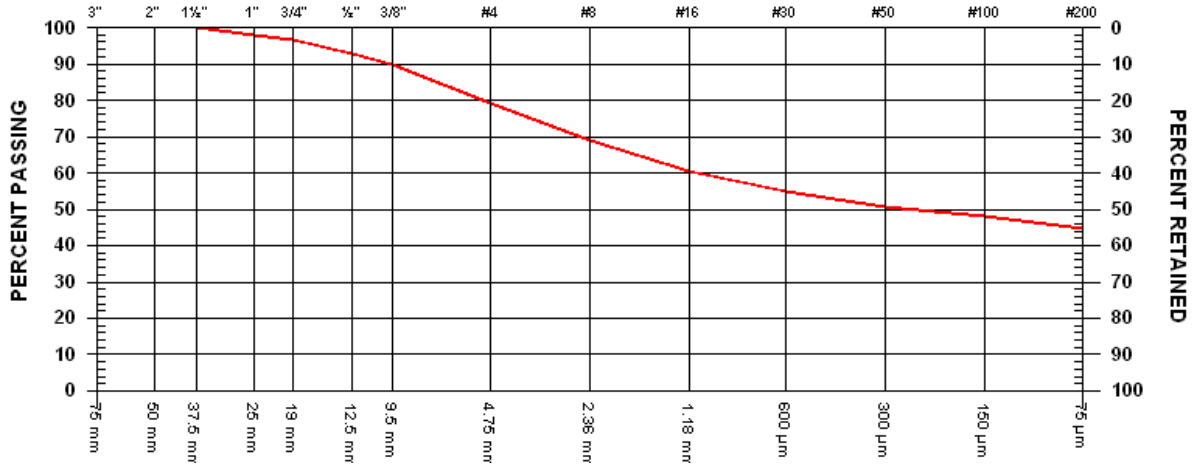
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 42 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.14 DATE SAMPLED 2011.Aug.24

SUPPLIER TP-BGC11-140
SOURCE G1 @ 1 - 1.2m
SPECIFICATION
MATERIAL TYPE Sand,silty

SAMPLED BY Client
TESTED BY RO
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm		
1 1/2"	37.5 mm	100.0	
1"	25 mm	98.1	
3/4"	19 mm	96.5	
1/2"	12.5 mm	92.8	
3/8"	9.5 mm	89.7	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	79.2	
No. 8	2.36 mm	68.8	
No. 16	1.18 mm	60.4	
No. 30	600 µm	54.9	
No. 50	300 µm	50.8	
No. 100	150 µm	48.2	
No. 200	75 µm	44.8	

MOISTURE CONTENT 67.3%

COMMENTS

 2011.Nov.15 GeoNorth Engineering Ltd. PER. _____

Report System Software Registered to: GeoNorth Engineering, Prince George

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

SIEVE ANALYSIS REPORT
8 16 30 50 SERIES

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

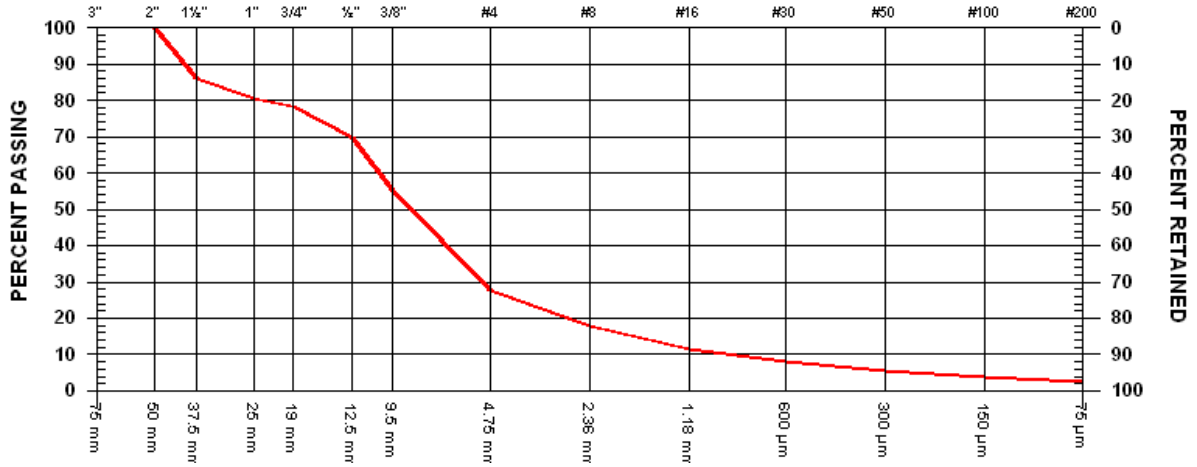
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

SIEVE TEST NO. 38 DATE RECEIVED 2011.Sep.13 DATE TESTED 2011.Nov.11 DATE SAMPLED 2011.Jul.22

SUPPLIER BGC11-Stiener-01
SOURCE Stiener Outcrop
SPECIFICATION
MATERIAL TYPE Gravel

SAMPLED BY Client
TESTED BY LT
TEST METHOD WASHED



GRAVEL SIZES		PERCENT PASSING	GRADATION LIMITS
3"	75 mm		
2"	50 mm	100.0	
1 1/2"	37.5 mm	86.0	
1"	25 mm	80.3	
3/4"	19 mm	78.2	
1/2"	12.5 mm	70.0	
3/8"	9.5 mm	55.2	

SAND SIZES AND FINES		PERCENT PASSING	GRADATION LIMITS
No. 4	4.75 mm	27.7	
No. 8	2.36 mm	17.7	
No. 16	1.18 mm	11.5	
No. 30	600 µm	7.9	
No. 50	300 µm	5.4	
No. 100	150 µm	3.8	
No. 200	75 µm	2.6	

COMMENTS

WATER CONTENT DETERMINATION

Reference(s)
ASTM D 4959

Client:	BGC (Proj 0792-006-04)	**Project No.:** 11-1415-0029 **Phase:** 7000	
Project:	Eagle Gold Mine Site Infra FS SI	**Lab Schedule No.:** 141	
Location:	Dublin Gulch, Yukon		

Sample Location	Sample No.	Sample Interval		Water Content (%)
		Depth (m)	Bottom (m)	
TP-BGC11-50	**1**	2.80	3.00	**6.1**
TP-BGC11-50	**2**	3.30	3.60	**7.3**
TP-BGC11-51	**1**	0.20	1.44	**12.8**
TP-BGC11-51	**2**	2.40	2.80	**7.3**
TP-BGC11-51	**3**	4.20	4.50	**4.2**
TP-BGC11-52	**1**	3.30	3.50	**3.2**
TP-BGC11-53	**1**	2.00	2.20	**5.8**
TP-BGC11-54	**1**	0.40	0.60	**9.5**
TP-BGC11-55	**1**	0.40	0.60	**7.2**
TP-BGC11-55	**2**	1.90	2.00	**5.7**
TP-BGC11-57	**1**	0.90	1.10	**8.5**
TP-BGC11-58	**1**	0.70	0.70	**9.5**
TP-BGC11-58	**2**	1.90	1.90	**6.5**
TP-BGC11-59	**1**	0.40	0.60	**7.3**
TP-BGC11-60	**1**	0.70	0.90	**24.8**
TP-BGC11-60	**2**	1.70	1.90	**20.5**
TP-BGC11-61	**1**	0.80	0.90	**11.8**
TP-BGC11-62	**1**	0.90	1.00	**10.5**
TP-BGC11-62	**2**	3.50	3.70	**8.8**
TP-BGC11-63	**1**	0.40	0.60	**7.4**
TP-BGC11-64	**1**	1.50	1.60	**4.7**
TP-BGC11-65	**1**	0.40	0.50	**6.5**
TP-BGC11-66	**1**	1.30	1.30	**11.5**
TP-BGC11-66	**2**	1.80	1.80	**16.7**
TP-BGC11-67	**1**	0.70	0.90	**6.5**
TP-BGC11-68	**1**	1.60	1.80	**8.5**
TP-BGC11-69	**1**	1.50	1.70	**30.5**
TP-BGC11-69	**2**	2.80	2.90	**6.8**
TP-BGC11-71	**1**	1.30	1.60	**13.8**
TP-BGC11-72	**2**	0.80	1.00	**13.7**
TP-BGC11-72	**1**	2.40	2.60	**5.4**
TP-BGC11-73	**1**	0.80	1.00	**8.5**
TP-BGC11-74	**1**	1.20	1.40	**11.8**
TP-BGC11-74	**2**	3.00	3.00	**35.9**

LP	18/10/2011
Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_WATER CONTENT (REPORT) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

WATER CONTENT DETERMINATION

Reference(s)
ASTM D 4959

Client:	BGC (Proj 0792-006-04)	**Project No.:** 11-1415-0029 **Phase:** 7000	
Project:	Eagle Gold Mine Site Infra FS SI	**Lab Schedule No.:** 141	
Location:	Dublin Gulch, Yukon		

Sample Location	Sample No.	Sample Interval		Water Content (%)
		Depth (m)	Bottom (m)	
TP-BGC11-74	**3**	4.50	4.50	**15.0**
TP-BGC11-76	**1**	0.40	0.60	**16.1**
TP-BGC11-77	**1**	0.40	0.50	**26.6**
TP-BGC11-79	**1**	0.40	0.60	**10.1**
TP-BGC11-79	**2**	1.20	1.30	**15.7**
TP-BGC11-81	**1**	0.70	1.00	**16.6**
TP-BGC11-82	**M4**	0.70	1.10	**28.6**
TP-BGC11-82	**M5**	1.90	2.10	**27.3**
TP-BGC11-82	**M2**	3.00	3.30	**10.3**
TP-BGC11-82	**M1**	4.70	4.90	**12.4**
TP-BGC11-82	**M3**	6.70	7.00	**40.1**
TP-BGC11-83	**1**	0.60	0.80	**20.1**
TP-BGC11-84	**1**	0.40	0.60	**17.9**
TP-BGC11-84	**2**	2.50	2.50	**28.5**
TP-BGC11-85	**1**	0.60	0.80	**16.6**
TP-BGC11-87	**1**	0.60	0.80	**10.5**
TP-BGC11-88	**1**	1.50	1.80	**12.7**
TP-BGC11-89	**1**	0.40	0.60	**2.0**
TP-BGC11-89	**2**	1.30	1.50	**14.3**
TP-BGC11-90	**1**	0.80	1.00	**13.2**
TP-BGC11-90	**2**	3.50	3.60	**23.3**
TP-BGC11-91	**1**	0.80	1.00	**49.5**
TP-BGC11-91	**2**	1.60	1.80	**6.1**
TP-BGC11-92	**1**	0.60	0.80	**63.6**
TP-BGC11-94	**1**	1.20	1.30	**16.4**
TP-BGC11-94	**2**	2.30	2.50	**11.4**

	LP	18/10/2011
	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_WATER CONTENT (REPORT) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

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WATER CONTENT DETERMINATION

Reference(s)
ASTM D 4959

Client:	BGC (Proj 0792-006-04)	**Project No.:** 11-1415-0029 **Phase:** 7000	
Project:	Eagle Gold Mine Site Infra FS SI	**Lab Schedule No.:** 141	
Location:	Dublin Gulch, Yukon		

Sample Location	Sample No.	Sample Interval		Water Content (%)
		Depth (m)	Bottom (m)	
TP-BGC11-95	**1**	0.90	1.10	**13.1**
TP-BGC11-95	**2**	2.00	3.00	**22.4**
TP-BGC11-96	**1**	0.70	0.90	**7.9**
TP-BGC11-96	**2**	1.30	1.50	**19.8**
TP-BGC11-96	**3**	1.80	2.00	**9.3**

	LP	04/11/2011
	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_WATER CONTENT (REPORT) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 04/11/11

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GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Ltd.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing** **Date:** **11-Nov-11**

Hole Number	BBGC11-39								
Depth	1.15-1.60m	1.60-2.05m	2.28-2.73m	2.75-3.20m	4.6-5.05m	5.53-5.98m	6.22-6.67m	7.16-7.61m	7.75-8.20m
Sample No.	**SPT1**	**SPT2**	**SPT3**	**SPT4**	**SPT5**	**SPT6**	**SPT7**	**SPT8**	**SPT9**
Wet Weight and Tare	894.2	711.6	812.3	559.7	531.8	638.3	789.9	763.8	783.1
Dry Weight and Tare	714.6	591.0	723.9	544.5	524.6	622.4	752.4	723.2	760.3
Washed Weight and Tare									
Weight of Tare	183.1	196.7	191.0	179.0	179.6	179.8	180.5	131.5	181.4
Weight of Water	179.6	120.6	88.4	15.2	7.2	15.9	37.5	40.6	22.8
Weight of minus #200									
Dry Weight	531.5	394.3	532.9	365.5	345.0	442.6	571.9	591.7	578.9
Percent Moisture	**33.8**	**30.6**	**16.6**	**4.2**	**2.1**	**3.6**	**6.6**	**6.9**	**3.9**
Percent minus #200									
Comments									

Hole Number	BH-BGC11-39		TP-103	BH-BGC11-49			
Depth	8.71-9.16m	9.25-9.70m	4.5m	3.4-3.6m	6.4-6.6m	9.4-9.6m	12.4-12.6m
Sample No.	**SPT10**	**SPT11**	**G1**	**G4**	**G6**	**G8**	**G10**
Wet Weight and Tare	1008.0	1104.0	2709.5	1798.8	1241.4	1302.8	1240.8
Dry Weight and Tare	898.4	972.3	2637.0	1630.5	1118.7	1072.7	1133.3
Washed Weight and Tare							
Weight of Tare	179.6	181.1	365.3	181.5	180.4	180.8	205.2
Weight of Water	109.6	131.7	72.5	168.3	122.7	230.1	107.5
Weight of minus #200							
Dry Weight	718.8	791.2	2271.7	1449.0	938.3	891.9	928.1
Percent Moisture	**15.2**	**16.6**	**3.2**	**11.6**	**13.1**	**25.8**	**11.6**
Percent minus #200							
Comments							

Hole Number	BH-BGC11-49	
Depth	0.76-1.21	2.28-2.73m
Sample No.	**SPT1**	**SPT2**
Wet Weight and Tare	353.0	855.1
Dry Weight and Tare	339.2	742.8
Washed Weight and Tare		
Weight of Tare	211.9	192.8
Weight of Water	13.8	112.3
Weight of minus #200		
Dry Weight	127.3	550.0
Percent Moisture	**10.8**	**20.4**
Percent minus #200		
Comments		

Hole Number
Depth
Tare Number
Wet Weight and Tare
Dry Weight and Tare
Washed Weight and Tare
Weight of Tare
Weight of Water
Weight of minus #200
Dry Weight
Percent Moisture
Percent minus #200
Comments

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Inc.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing, Dublin Gulch, Yukon** **Date:** **11-Oct-11**

Hole Number	BH-40A	BH-54	TP-111	TP-116		BH-57		
Depth	18.78-18.83m	29.97-30.04m	.9-1.1m	2.2-2.3m	2.28-2.65m	3.8-4.25m	5.33-5.78m	6.85-7.1m
Sample Number	1	G1	G1	G2	SPT1	SPT2	SPT3	SPT4
Wet Weight and Tare	250.0	556.9	384.9	1098.2	353.0	1100.1	340.3	687.8
Dry Weight and Tare	238.5	528.3	351.3	1027.6	334.3	1020.9	322.8	649.4
Washed Weight and Tare								
Weight of Tare	147.9	181.5	151.9	180.7	148.1	181.2	151.9	192.9
Weight of Water	11.5	28.6	33.6	70.6	18.7	79.2	17.5	38.4
Weight of minus #200								
Dry Weight	90.6	346.8	199.4	846.9	186.2	839.7	170.9	456.5
Percent Moisture	**12.7**	**8.2**	**16.9**	**8.3**	**10.0**	**9.4**	**10.2**	**8.4**
Percent minus #200								
Comments								

Hole Number			BH-56		
Depth	0.76-1.21m	1.9-2.1m	3.8-4.25m	5.33-5.53m	6.85-7.15m
Sample Number	SPT1	G2	SPT3	SPT4	SPT5
Wet Weight and Tare	307.7	2069.1	495.9	536.3	365.0
Dry Weight and Tare	299.6	1988.8	469.0	515.0	354.3
Washed Weight and Tare					
Weight of Tare	151.9	679.6	179.8	191.1	147.9
Weight of Water	8.1	80.3	26.9	21.3	10.7
Weight of minus #200					
Dry Weight	147.7	1309.2	289.2	323.9	206.4
Percent Moisture	**5.5**	**6.1**	**9.3**	**6.6**	**5.2**
Percent minus #200					
Comments					

Hole Number			BH-60		
Depth	2.7-2.8m	3.7-3.8m	4.9-5.1m	6.3-6.6m	6.85-7.0m
Sample Number	G3	G5	G6	G7	SPT2
Wet Weight and Tare	897.0	1032.3	352.3	941.7	312.9
Dry Weight and Tare	834.2	963.2	339.5	895.0	302.1
Washed Weight and Tare					
Weight of Tare	179.8	191.7	148.6	205.6	120.9
Weight of Water	62.8	69.1	12.8	46.7	10.8
Weight of minus #200					
Dry Weight	654.4	771.5	190.9	689.4	181.2
Percent Moisture	**9.6**	**9.0**	**6.7**	**6.8**	**6.0**
Percent minus #200					
Comments					

Hole Number
Depth
Tare Number
Wet Weight and Tare
Dry Weight and Tare
Washed Weight and Tare
Weight of Tare
Weight of Water
Weight of minus #200
Dry Weight
Percent Moisture
Percent minus #200
Comments

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Ltd.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing** **Date:** **8-Nov-11**

Hole Number	BH-BGC11-42								
Depth	1.8 - 2.27m	5.0 - 5.32m	6.4 - 6.84m	9.4 - 9.88m	10.6-11.0m	13.3-13.65m	15.25-15.4m	15.6-15.8m	19.7-20.0m
Sample No.	**SA#2**	**SA#4**	**SA#5**	**SA#7**	**SA#8**	**SA#12**	**SA#15**	**SA#16**	**SA#20**
Wet Weight and Tare	1350.5	304.4	1265.1	1568.2	243.4	2585.1	246.4	259.9	597.3
Dry Weight and Tare	1180.8	283.4	1136.5	1436.3	228.7	2355.6	239.4	249.8	532.7
Washed Weight and Tare									
Weight of Tare	196.8	137.1	191.1	367.0	136.9	366.4	136.9	136.9	179.2
Weight of Water	169.7	21.0	128.6	131.9	14.7	229.5	7.0	10.1	64.6
Weight of minus #200									
Dry Weight	984.0	146.3	945.4	1069.3	91.8	1989.2	102.5	112.9	353.5
Percent Moisture	**17.2**	**14.4**	**13.6**	**12.3**	**16.0**	**11.5**	**6.8**	**8.9**	**18.3**
Percent minus #200									
Comments									

Hole Number	BH-BGC11-42			BH-BGC11-65				
Depth	21.55-21.9m	23.0-23.4m	27.6-28.0m	0.76-1.21m	1.52-1.97m	2.28-2.73m	3.04-3.49m	3.8-4.25m
Sample No.	**SA#22**	**SA#23**	**SA#26**	**SPT 1**	**SPT 2**	**SPT 3**	**SPT 4**	**SPT 5**
Wet Weight and Tare	653.2	292.3	2312.3	970.9	805.7	456.4	548.9	355.7
Dry Weight and Tare	576.8	271.7	2067.5	951.3	792.4	450.4	539.8	354.5
Washed Weight and Tare								
Weight of Tare	181.2	138.3	380.4	365.0	368.0	179.7	131.6	180.6
Weight of Water	76.4	20.6	244.8	19.6	13.3	6.0	9.1	1.2
Weight of minus #200								
Dry Weight	395.6	133.4	1687.1	586.3	424.4	270.7	408.2	173.9
Percent Moisture	**19.3**	**15.4**	**14.5**	**3.3**	**3.1**	**2.2**	**2.2**	**0.7**
Percent minus #200								
Comments								

Hole Number	BH-BGC11-65		
Depth	4.56-5.01m	5.33-5.78m	6.09-6.54m
Sample No.	**SPT 6**	**SPT 7**	**SPT 8**
Wet Weight and Tare	908.0	433.8	378.6
Dry Weight and Tare	882.9	421.4	363.1
Washed Weight and Tare			
Weight of Tare	361.5	179.7	181.5
Weight of Water	25.1	12.4	15.5
Weight of minus #200			
Dry Weight	521.4	241.7	181.6
Percent Moisture	**4.8**	**5.1**	**8.5**
Percent minus #200			
Comments			

Hole Number
Depth
Sample No.
Wet Weight and Tare
Dry Weight and Tare
Washed Weight and Tare
Weight of Tare
Weight of Water
Weight of minus #200
Dry Weight
Percent Moisture
Percent minus #200
Comments

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Inc.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing, Dublin Gulch, Yukon** **Date:** **29-Sep-11**

Hole Number	BH-BGC11-44								
Depth	0.2 - 0.4m	1.6 - 2.0m	4.8 - 5.1m	6.3 - 6.6m	9.6 - 9.9m	2.27-2.72m	3.79-4.24m	8.35-8.85m	12.97-13.42m
Sample Number	S1	S3	S5	S7	S11	SPT1	SPT2	SPT5	SPT10
Wet Weight and Tare	976.4	1044.3	1634.4	1543.7	1079.5	266.0	887.5	339.5	962.3
Dry Weight and Tare	876.8	885.5	1461.3	1280.7	950.9	211.7	748.9	312.1	878.3
Washed Weight and Tare									
Weight of Tare	180.5	205.1	192.9	191.5	179.7	147.9	196.8	151.9	179.2
Weight of Water	99.6	158.8	173.1	263.0	128.6	54.3	138.6	27.4	84.0
Weight of minus #200									
Dry Weight	696.3	680.4	1268.4	1089.2	771.2	63.8	552.1	160.2	699.1
Percent Moisture	**14.3**	**23.3**	**13.6**	**24.1**	**16.7**	**85.1**	**25.1**	**17.1**	**12.0**
Percent minus #200									
Comments									

Hole Number	BH-BGC11-44	BH-BGC11-53						
Depth	14.49-14.79m	0.76-1.21m	2.28-2.73m	3.8-4.25m	6.85-7.3m	9.9-10.35m	1.9-2.1m	3.2-3.5m
Sample Number	SPT11	SPT1	SPT2	SPT3	SPT4	SPT5	G2	G3
Wet Weight and Tare	591.0	264.1	896.1	242.8	661.4	304.5	1347.3	295.7
Dry Weight and Tare	534.6	252.2	830.1	238.4	646.7	297.4	1229.1	282.1
Washed Weight and Tare								
Weight of Tare	131.7	151.8	180.8	136.6	182.4	152.1	191.1	118.2
Weight of Water	56.4	11.9	66.0	4.4	14.7	7.1	118.2	13.6
Weight of minus #200								
Dry Weight	402.9	100.4	649.3	101.8	464.3	145.3	1038.0	163.9
Percent Moisture	**14.0**	**11.9**	**10.2**	**4.3**	**3.2**	**4.9**	**11.4**	**8.3**
Percent minus #200								
Comments								

Hole Number	BH-BGC11-53		
Depth	4.9-5.1m	7.9-8.1m	10.9-11.1m
Sample Number	G4	G6	G8
Wet Weight and Tare	1239.1	1948.0	389.3
Dry Weight and Tare	1195.8	1896.1	382.1
Washed Weight and Tare			
Weight of Tare	179.8	667.3	151.9
Weight of Water	43.3	51.9	7.2
Weight of minus #200			
Dry Weight	1016.0	1228.8	230.2
Percent Moisture	**4.3**	**4.2**	**3.1**
Percent minus #200			
Comments			

Hole Number
Depth
Tare Number
Wet Weight and Tare
Dry Weight and Tare
Washed Weight and Tare
Weight of Tare
Weight of Water
Weight of minus #200
Dry Weight
Percent Moisture
Percent minus #200
Comments

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Inc.** **File No.** **K-3300**

Project Name: **Eagle Gold Soilsand Aggregate Testing** **Date:** **15-Nov-11**

Hole Number	BH-BGC11-51					
Depth	7.9 - 8.1m	10.9-11.1m	13.9-14.1m	17.0-17.2m	20.1-20.3m	24.7-24.9m
Sample No.	G6	G8	G10	G12	G14	G17
Wet Weight and Tare	1208.8	254.9	1181.4	241.6	1977.7	223.2
Dry Weight and Tare	1057.0	240.3	1080.3	231.4	1845.3	217.6
Washed Weight and Tare						
Weight of Tare	181.4	137.1	131.5	136.6	595.8	136.7
Weight of Water	151.8	14.6	101.1	10.2	132.4	5.6
Weight of minus #200						
Dry Weight	875.6	103.2	948.8	94.8	1249.5	80.9
Percent Moisture	**17.3**	**14.1**	**10.7**	**10.8**	**10.6**	**6.9**
Percent minus #200						
Comments						

Hole Number	BH-BGC11-51				
Depth	0.76-1.21m	2.28-2.73m	3.8-4.25m	5.33-5.78m	9.9-10.25m
Sample No.	SPT1	SPT2	SPT3	SPT4	SPT5
Wet Weight and Tare	630.5	225.8	831.1	253.7	257.1
Dry Weight and Tare	580.8	217.8	683.6	244.6	236.8
Washed Weight and Tare					
Weight of Tare	179.6	138.4	180.4	137.2	136.9
Weight of Water	49.7	8.0	147.5	9.1	20.3
Weight of minus #200					
Dry Weight	401.2	79.4	503.2	107.4	99.9
Percent Moisture	**12.4**	**10.1**	**29.3**	**8.5**	**20.3**
Percent minus #200					
Comments					

Hole Number	TP124	TP129	TP140
Depth	6.2-6.4m	6.6-6.8m	1.0-1.2m
Sample No.	G1	G1	G1
Wet Weight and Tare	1315.7	1148.1	2131.5
Dry Weight and Tare	1116.8	969.8	1865.3
Washed Weight and Tare			
Weight of Tare	179.7	179.2	179.9
Weight of Water	198.9	178.3	266.2
Weight of minus #200			
Dry Weight	937.1	790.6	1685.4
Percent Moisture	**21.2**	**22.6**	**15.8**
Percent minus #200			
Comments			

Hole Number	
Depth	
Tare Number	
Wet Weight and Tare	
Dry Weight and Tare	
Washed Weight and Tare	
Weight of Tare	
Weight of Water	
Weight of minus #200	
Dry Weight	
Percent Moisture	
Percent minus #200	
Comments	

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Ltd.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing** **Date:** **9-Nov-11**

Hole Number	BH-BGC11-58				
Depth	**1.9-2.1m**	**3.2-3.6m**	**4.4-4.6m**	**5.4-5.5m**	**7.9-8.1m**
Sample No.	**G2**	**G4**	**G6**	**G8**	**G10**
Wet Weight and Tare	1615.8	1822.2	1566.8	1065.0	837.6
Dry Weight and Tare	1404.2	1653.0	1426.7	1011.5	785.5
Washed Weight and Tare					
Weight of Tare	182.5	131.5	179.9	181.4	180.5
Weight of Water	211.6	169.2	140.1	53.5	52.1
Weight of minus #200					
Dry Weight	1221.7	1521.5	1246.8	830.1	605.0
Percent Moisture	**17.3**	**11.1**	**11.2**	**6.4**	**8.6**
Percent minus #200					
Comments					

Hole Number	**TP-104**	**TP-107**	**TP-108**	**TP-112**	**TP-119**
Depth	**1.2-1.6m**	**2.8-3.0m**	**0.9-1.15m**	**1.3-1.4m**	**0.9-1.1m**
Sample No.	**G1**	**G1**	**G1**	**G1**	**G1**
Wet Weight and Tare	2228.9	1009.0	2015.0	2883.2	942.7
Dry Weight and Tare	2112.5	889.5	1865.1	2607.7	770.5
Washed Weight and Tare					
Weight of Tare	358.8	179.7	366.1	679.3	180.5
Weight of Water	116.4	119.5	149.9	275.5	172.2
Weight of minus #200					
Dry Weight	1753.7	709.8	1499.0	1928.4	590.0
Percent Moisture	**6.6**	**16.8**	**10.0**	**14.3**	**29.2**
Percent minus #200					
Comments	**Sieve**		**Sieve**	**Sieve**	

Hole Number	**TP-120**	**TP-121**	**TP-122**	**TP-131**	**TP-133**
Depth	**3.8-4.0m**	**2.9-3.1m**	**5.4-5.8m**	**3.2-3.5m**	**4.3-4.4m**
Sample No.	**G1**	**G1**	**G1**	**G1**	**G1**
Wet Weight and Tare	1840.4	1154.5	985.7	8663.5	5033.5
Dry Weight and Tare	1509.9	964.4	856.8	8105.4	4644.0
Washed Weight and Tare					
Weight of Tare	361.5	191.8	180.2	1263.6	365.0
Weight of Water	330.5	190.1	128.9	558.1	389.5
Weight of minus #200					
Dry Weight	1148.4	772.6	676.6	6841.8	4279.0
Percent Moisture	**28.8**	**24.6**	**19.1**	**8.2**	**9.1**
Percent minus #200					
Comments				**Sieve**	**Sieve**

Hole Number	
Depth	
Sample No.	
Wet Weight and Tare	
Dry Weight and Tare	
Washed Weight and Tare	
Weight of Tare	
Weight of Water	
Weight of minus #200	
Dry Weight	
Percent Moisture	
Percent minus #200	
Comments	

GEONORTH ENGINEERING LTD. **MOISTURE / % PASSING WORKSHEET**

Client: **BGC Engineering Ltd.** **File No.** **K-3300**

Project Name: **Eagle Gold Soils and Aggregate Testing** **Date:** **26-Sep-11**

Hole Number	**TP-126**	**TP-106**	**TP-128**	**TP-130**	**BH-55**	**BH-55**	**BH-55**	**BH-55**	**BH-55**
Depth	**1.7 - 2.2m**	**0.8 - 1.5m**	**2.5 - 3.0m**	**5.8 - 6.0m**	**0.76-1.21m**	**2.28-2.73m**	**4.9-5.1m**	**6.3-6.5m**	**8.38-8.83m**
Tare Number									
Wet Weight and Tare	365.6	379.9	349.1	1492.8	680.7	294.5	1345.5	278.8	613.9
Dry Weight and Tare	342.6	356.5	307.4	1404.7	641.0	280.0	1234.1	263.9	587.3
Washed Weight and Tare									
Weight of Tare	148.0	151.9	152.2	181.5	191.6	136.9	180.0	136.6	179.7
Weight of Water	23.0	23.4	41.7	88.1	39.7	14.5	111.4	14.9	26.6
Weight of minus #200									
Dry Weight	194.6	204.6	155.2	1223.2	449.4	143.1	1054.1	127.3	407.6
Percent Moisture	**11.8**	**11.4**	**26.9**	**7.2**	**8.8**	**10.1**	**10.6**	**11.7**	**6.5**
Percent minus #200									
Comments									

Hole Number	**BH-63**	**BH-63**	**BH-63**	**BH-63**	**BH-63**	**BH-63**	**BH-63**
Depth	**1.9-2.1m**	**2.9-3.0m**	**3.9-4.0m**	**5.9-6.1m**	**10.15-10.25m**	**11.6-11.7m**	**16.2-16.3m**
Tare Number							
Wet Weight and Tare	860.5	291.6	867.8	294.4	688.9	333.5	985.9
Dry Weight and Tare	725.4	267.0	711.3	261.3	576.3	307.2	825.8
Washed Weight and Tare							
Weight of Tare	179.2	138.2	131.6	138.3	182.5	148.5	179.7
Weight of Water	135.1	24.6	156.5	33.1	112.6	26.3	160.1
Weight of minus #200							
Dry Weight	546.2	128.8	579.7	123.0	393.8	158.7	646.1
Percent Moisture	**24.7**	**19.1**	**27.0**	**26.9**	**28.6**	**16.6**	**24.8**
Percent minus #200							
Comments							

Hole Number	**BH-47**	**BH-47**	**BH-47**	**BH-47**	**BH-47**	**BH-47**	**BH-47**
Depth	**0.75-1.2m**	**2.0-2.27m**	**2.8-2.95m**	**5.33-5.88m**	**6.85-7.3m**	**8.38-8.58m**	**11.8-12.1m**
Tare Number							
Wet Weight and Tare	894.6	924.7	306.4	712.3	259.8	583.9	1089.1
Dry Weight and Tare	747.3	764.9	298.3	663.4	245.4	542.7	995.9
Washed Weight and Tare							
Weight of Tare	180.4	181.1	138.3	180.5	136.8	192.9	181.5
Weight of Water	147.3	159.8	8.1	48.9	14.4	41.2	93.2
Weight of minus #200							
Dry Weight	566.9	583.8	160.0	482.9	108.6	349.8	814.4
Percent Moisture	**26.0**	**27.4**	**5.1**	**10.1**	**13.3**	**11.8**	**11.4**
Percent minus #200							
Comments							

Hole Number
Depth
Tare Number
Wet Weight and Tare
Dry Weight and Tare
Washed Weight and Tare
Weight of Tare
Weight of Water
Weight of minus #200
Dry Weight
Percent Moisture
Percent minus #200
Comments

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

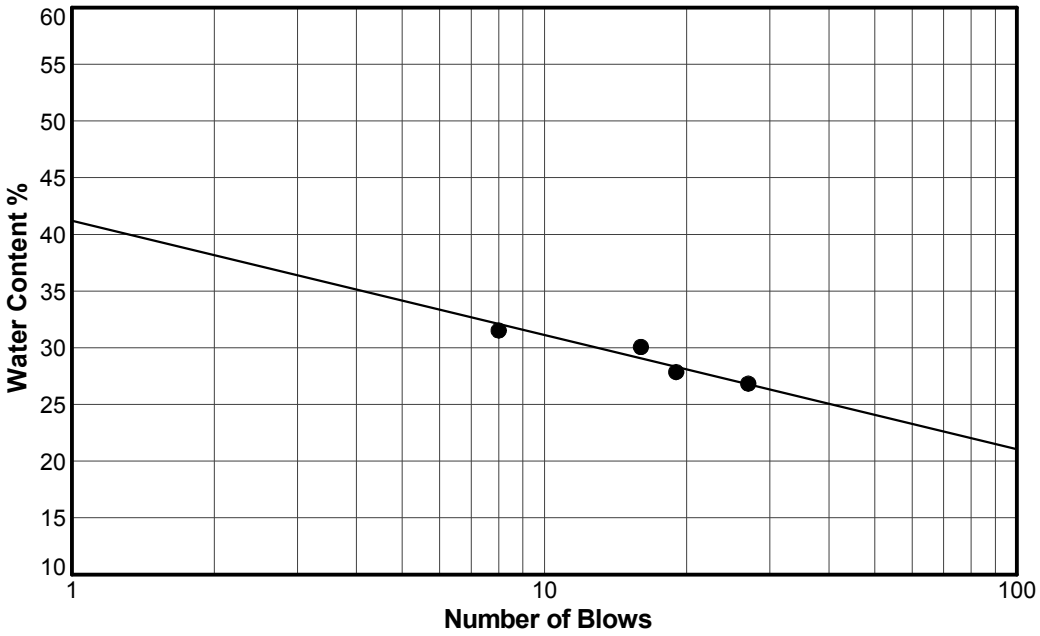
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-51**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.20 to 1.44	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**52**
Liquid Limit	**27**
Plastic Limit	**22**
Plasticity Index	**5**
Natural Water Content (%)	**12.8**
Liquidity Index	**-1.8**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

TM	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_ATTERBERG LIMITS (REPORT) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

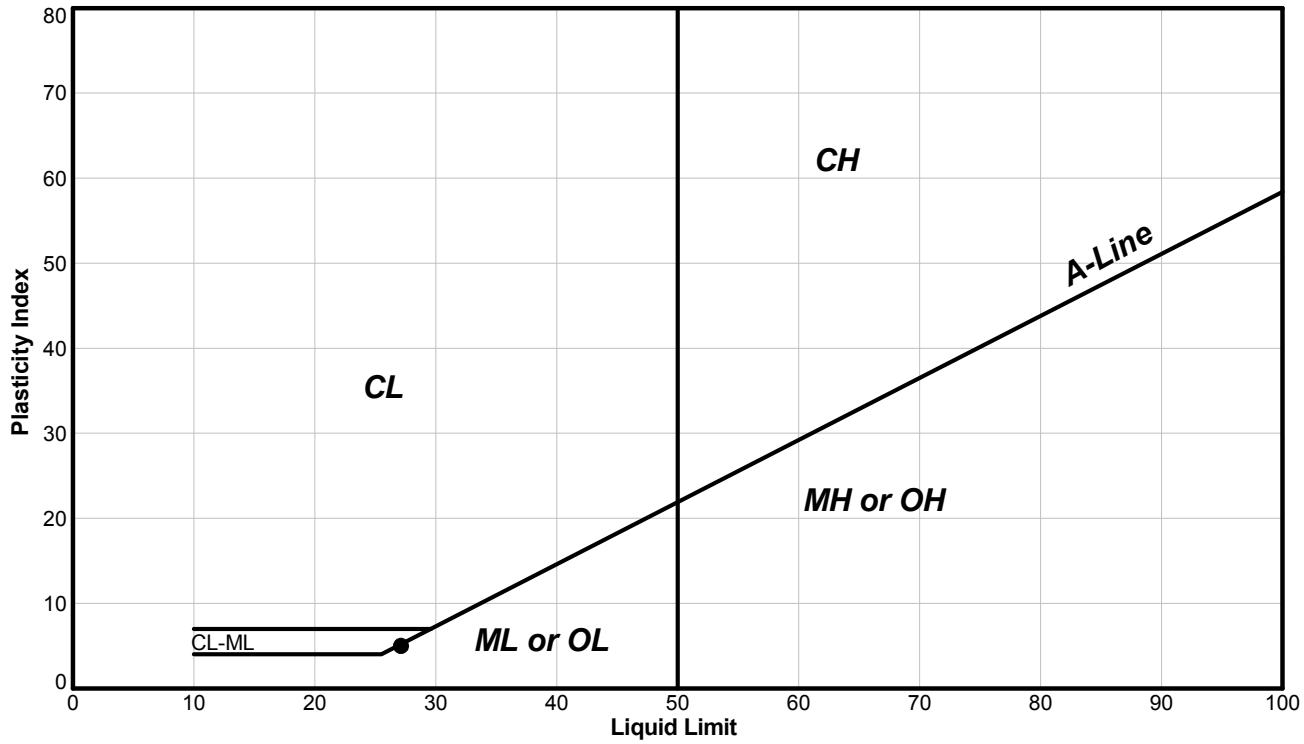
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-51**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.20 to 1.44
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-51	1	0.20	1.44	52	27	22	5	12.8	-1.8

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

TM	13/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

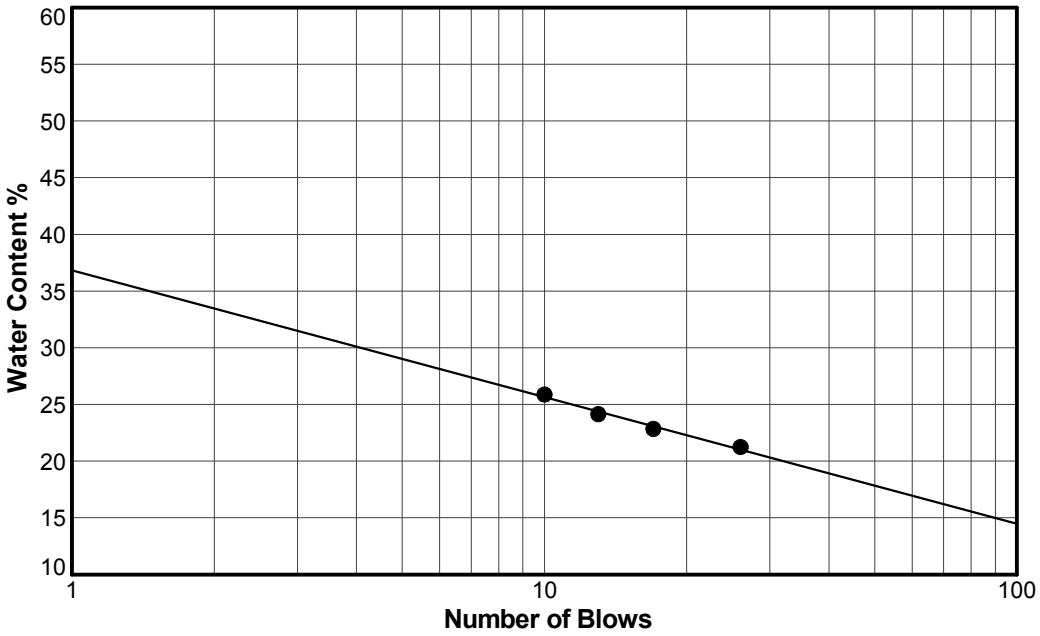
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-54**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**32**
Liquid Limit	**21**
Plastic Limit	**20**
Plasticity Index	**1**
Natural Water Content (%)	**9.5**
Liquidity Index	**-10.5**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

		LP	15/10/2011
Tech	Date	Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0029\PHASE 7000\11-1415-0029 EAGLE GOLD.GPJ Output Form: _LAB_ATTERBERG LIMITS (REPORT) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/10/11

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

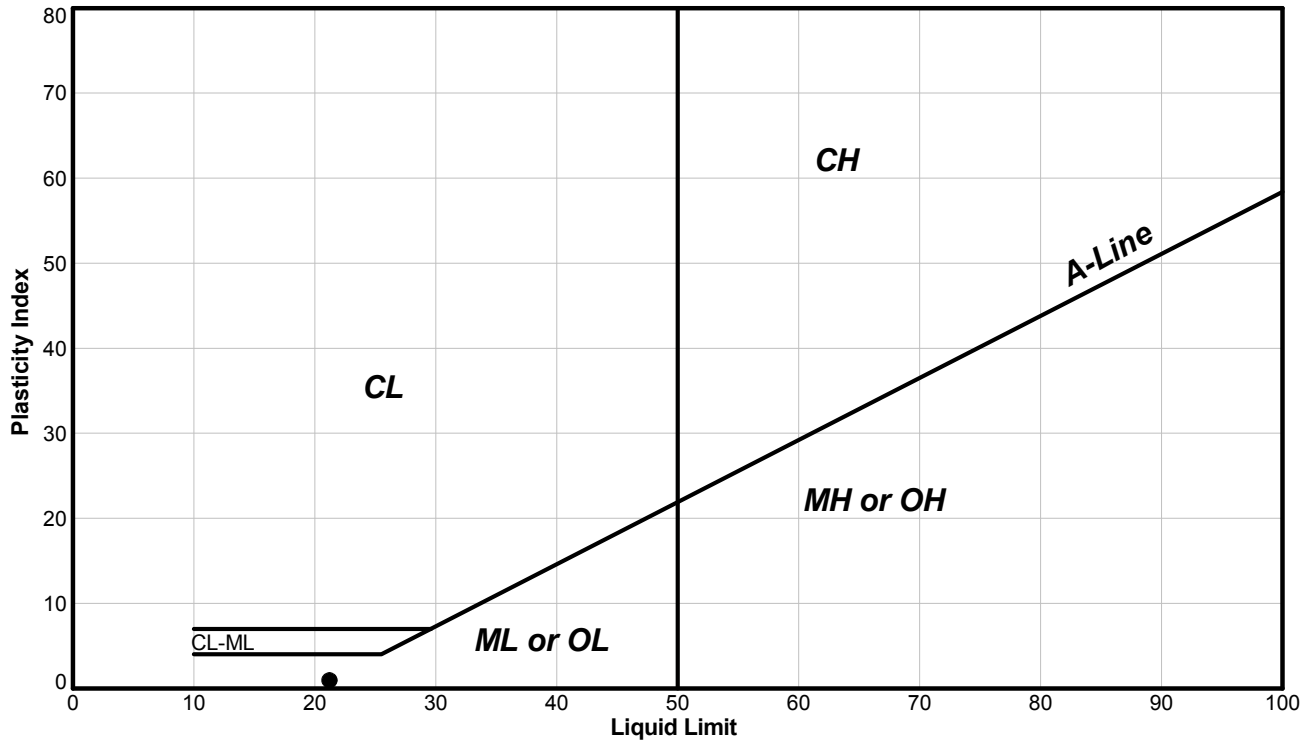
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-54**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-54	1	0.40	0.60	32	21	20	1	9.5	-10.5

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

		LP	**15/10/2011**
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

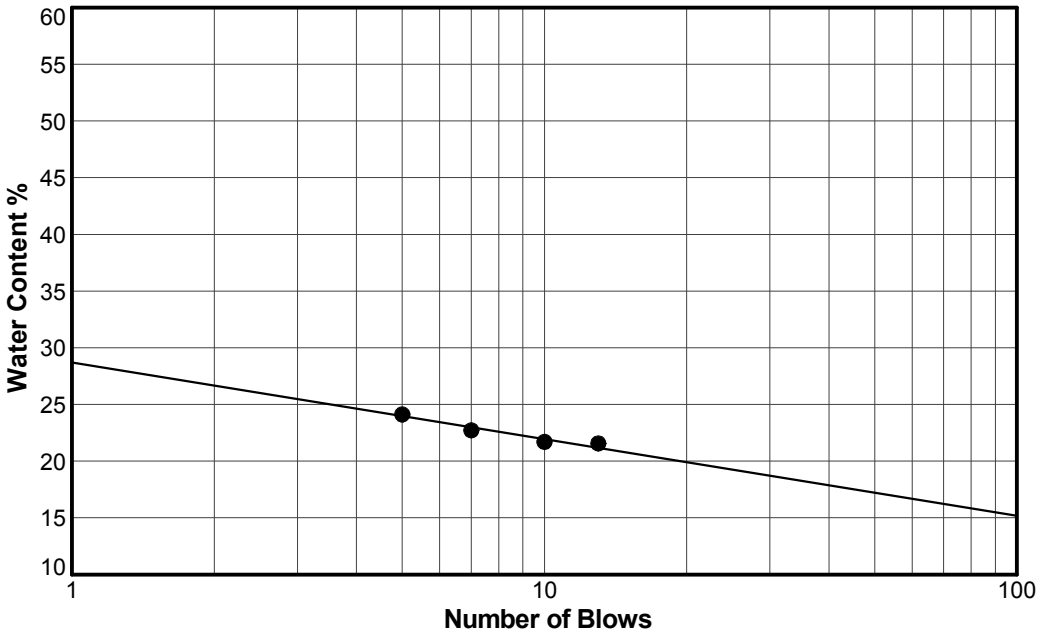
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-55**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**28**
Liquid Limit	**NP**
Plastic Limit	**NP**
Plasticity Index	**NP**
Natural Water Content (%)	**7.2**
Liquidity Index	**NP**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

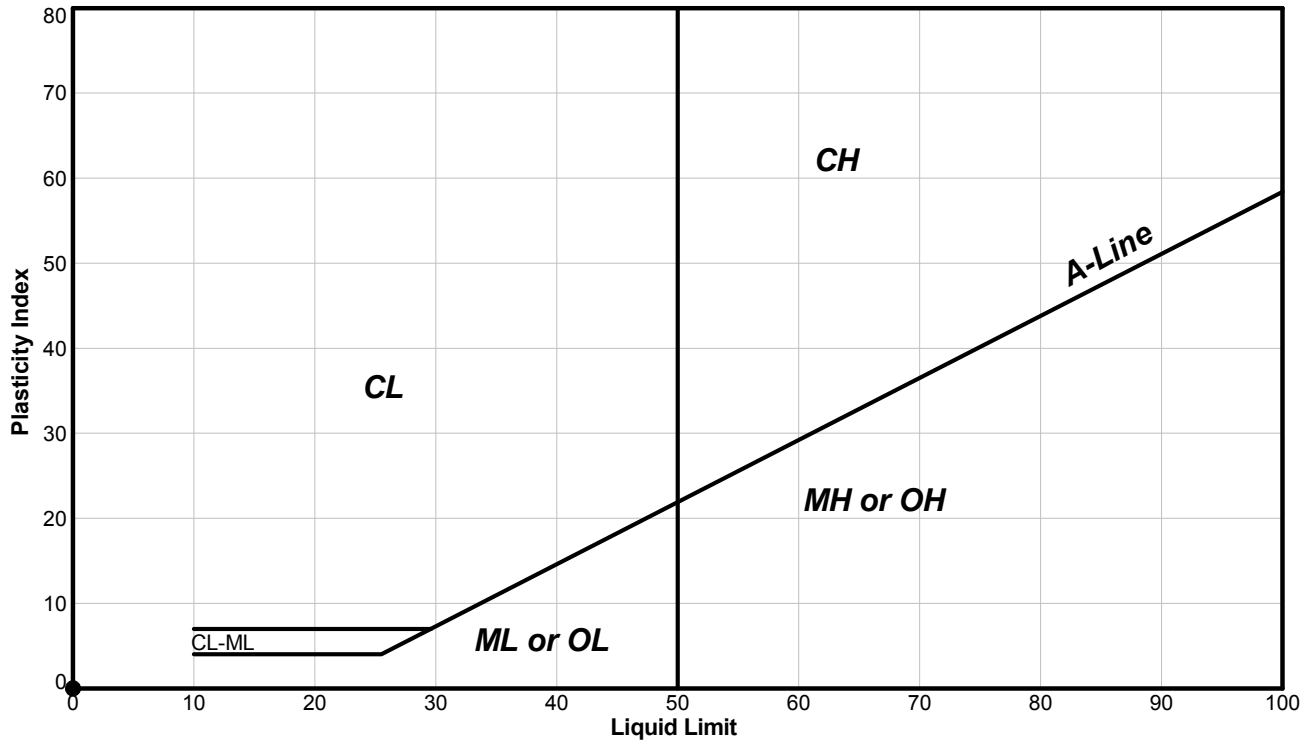
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-55**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-55	1	0.40	0.60	28	NP	NP	NP	7.2	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

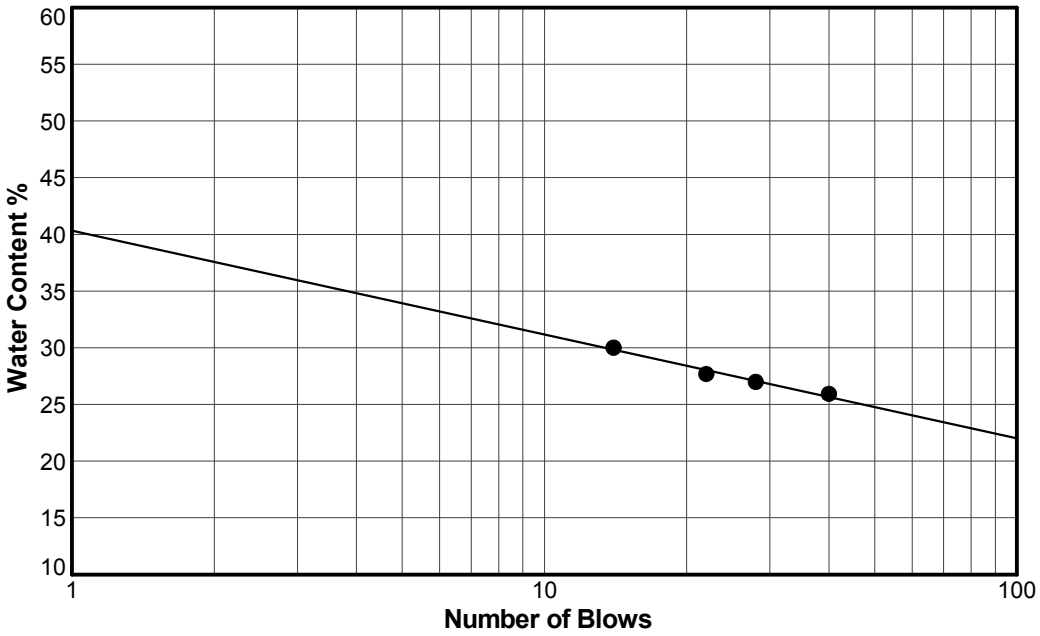
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-57**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.10	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**38**
Liquid Limit	**28**
Plastic Limit	**23**
Plasticity Index	**5**
Natural Water Content (%)	**8.5**
Liquidity Index	**-2.9**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

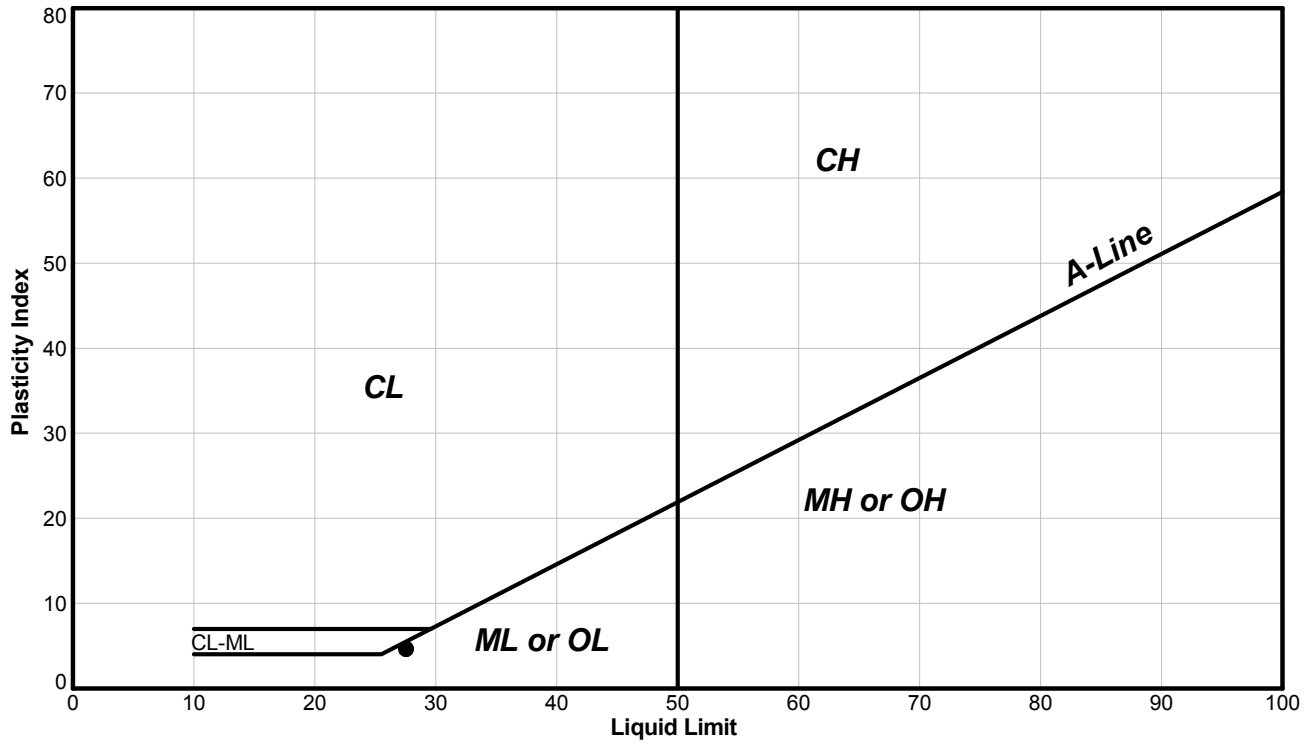
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-57**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-57	1	0.90	1.10	38	28	23	5	8.5	-2.9

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

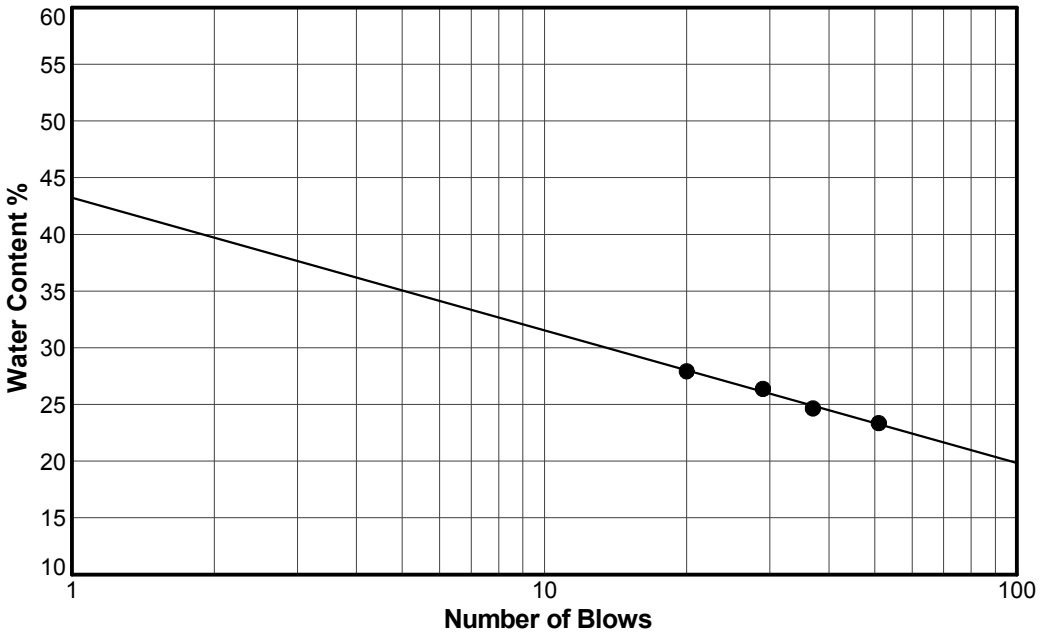
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-58**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.70	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**35**
Liquid Limit	**27**
Plastic Limit	**23**
Plasticity Index	**4**
Natural Water Content (%)	**9.5**
Liquidity Index	**-3.4**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

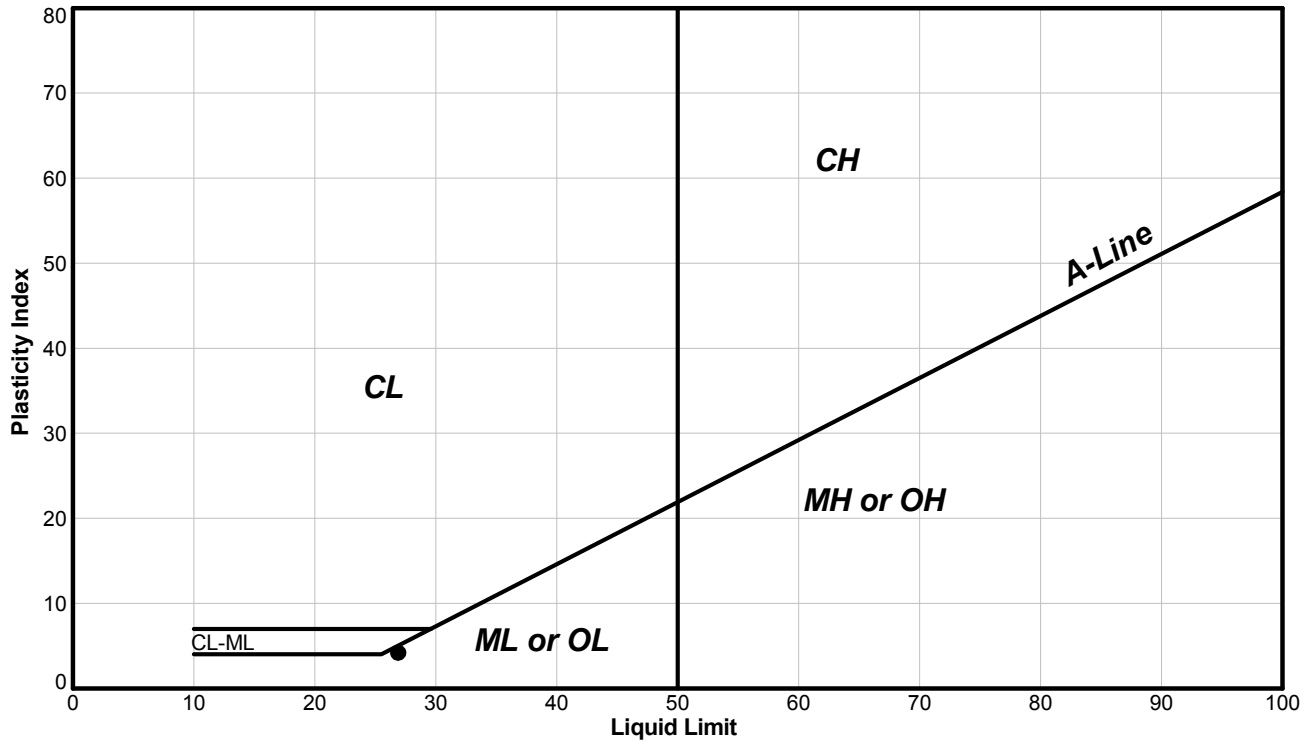
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-58**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-58	1	0.70	0.70	35	27	23	4	9.5	-3.4

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	16/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-59**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**17**
Liquid Limit	**24**
Plastic Limit	**23**
Plasticity Index	**1**
Natural Water Content (%)	**7.3**
Liquidity Index	**-15.7**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

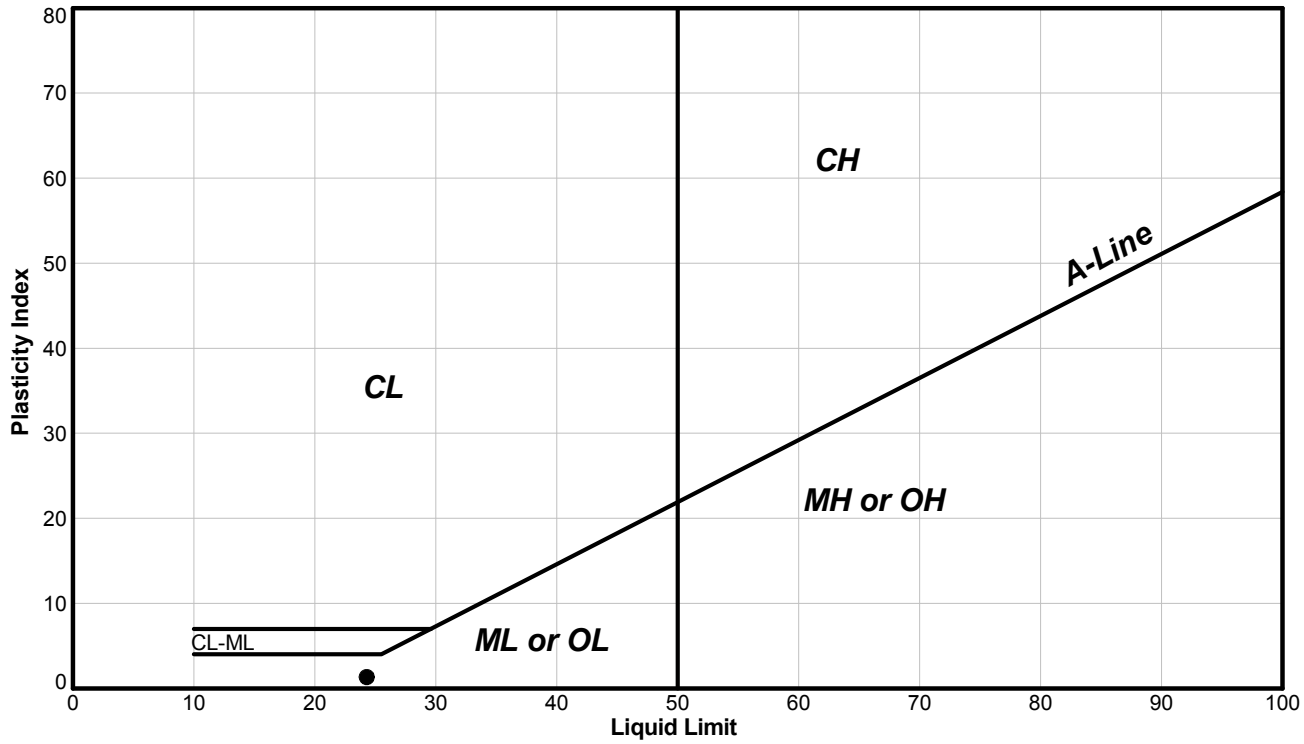
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-59**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-59	1	0.40	0.60	17	24	23	1	7.3	-15.7

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-60**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.90	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**66**
Liquid Limit	**27**
Plastic Limit	**26**
Plasticity Index	**1**
Natural Water Content (%)	**24.8**
Liquidity Index	**-1.2**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

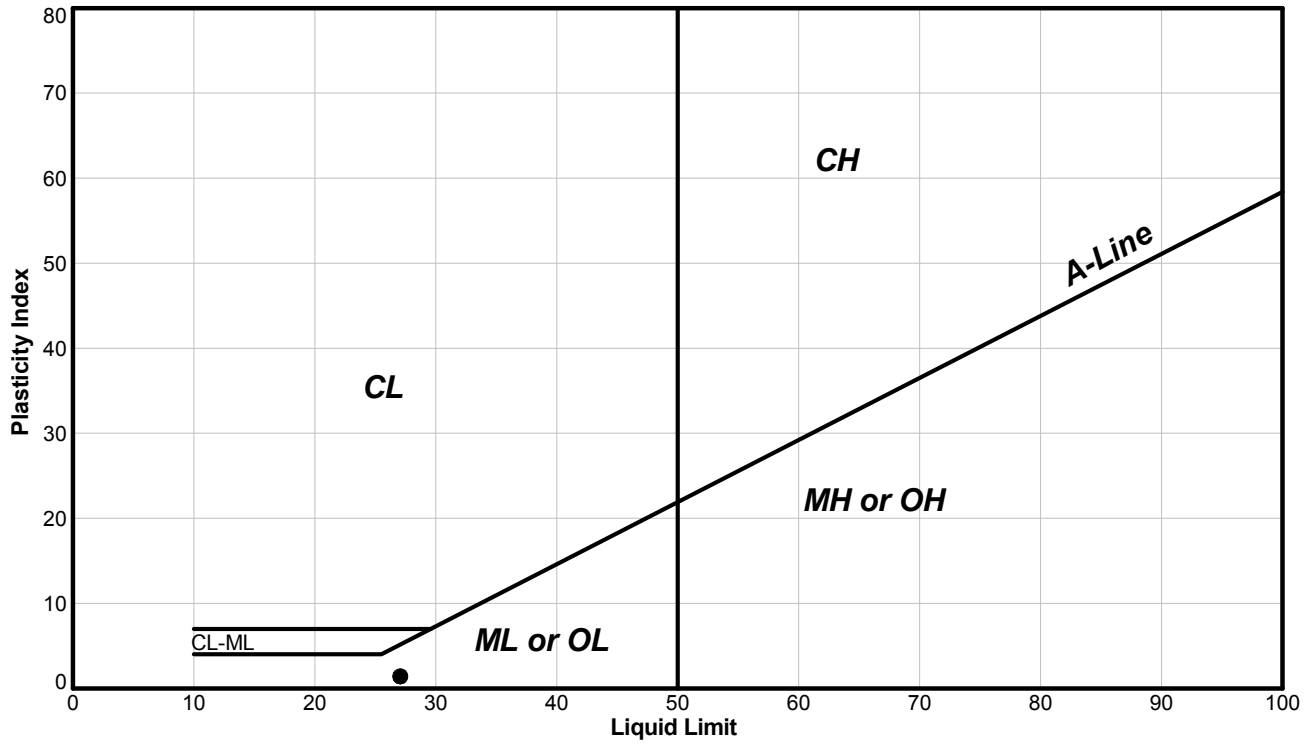
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-60**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-60	1	0.70	0.90	66	27	26	1	24.8	-1.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

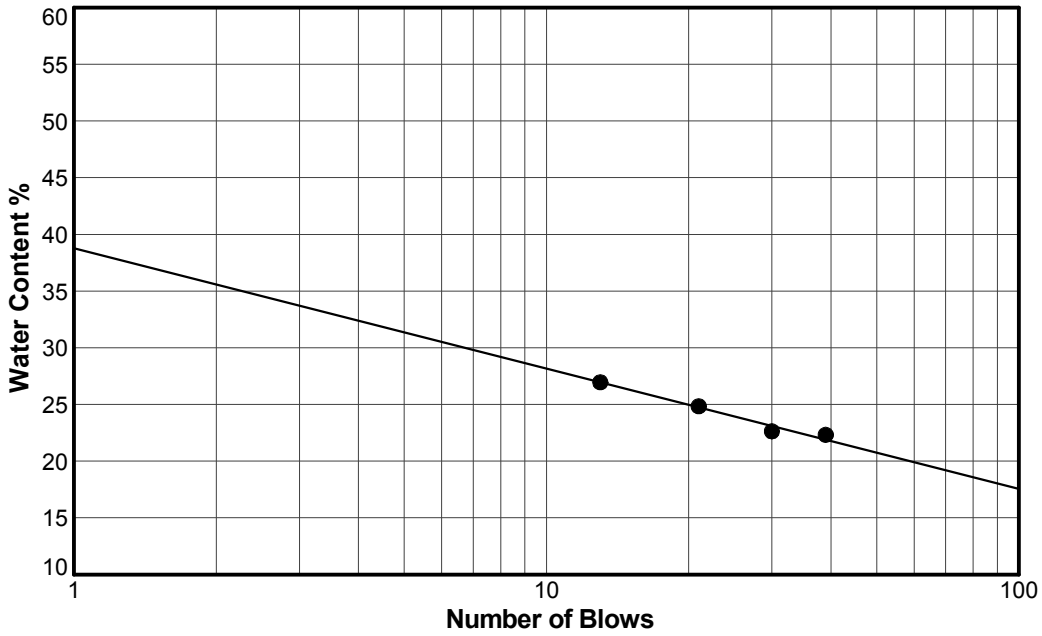
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-61**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 0.90	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**49**
Liquid Limit	**24**
Plastic Limit	**21**
Plasticity Index	**3**
Natural Water Content (%)	**11.8**
Liquidity Index	**-3.1**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	12/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

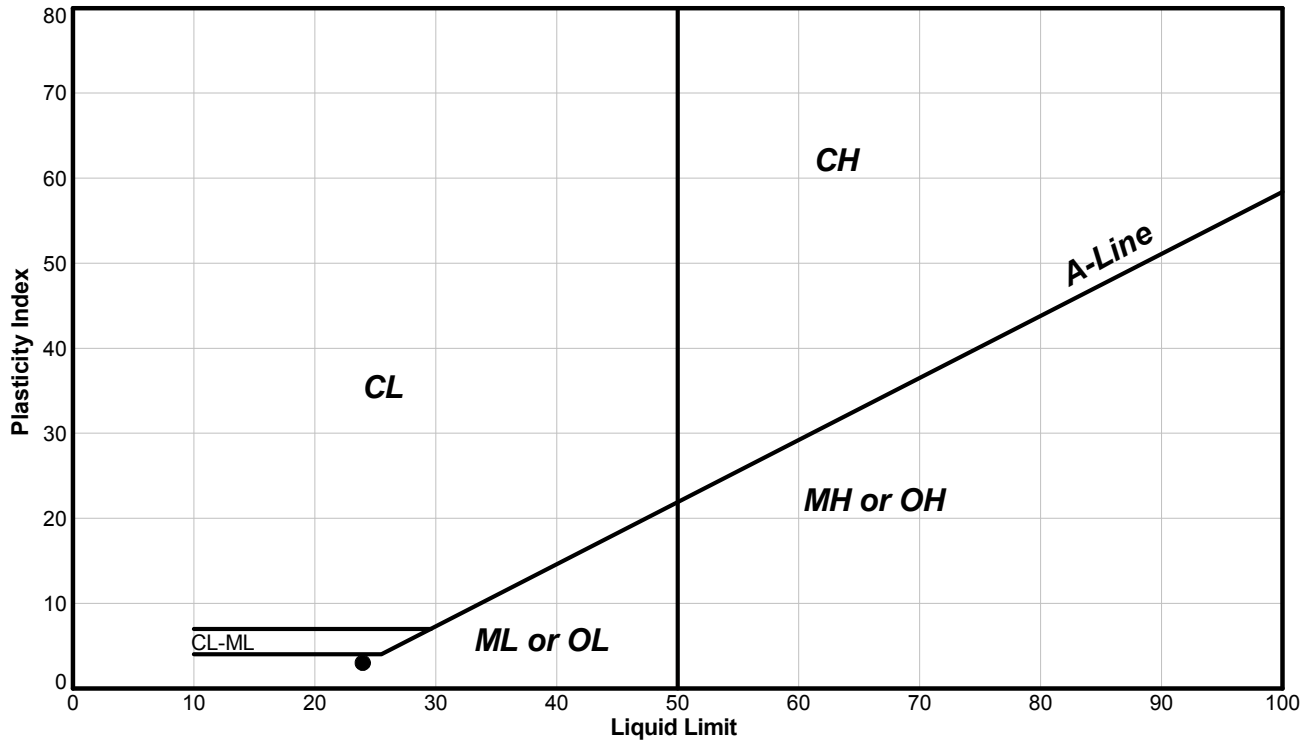
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-61**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 0.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-61	1	0.80	0.90	49	24	21	3	11.8	-3.1

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	12/09/2011	LP	15/10/2011
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

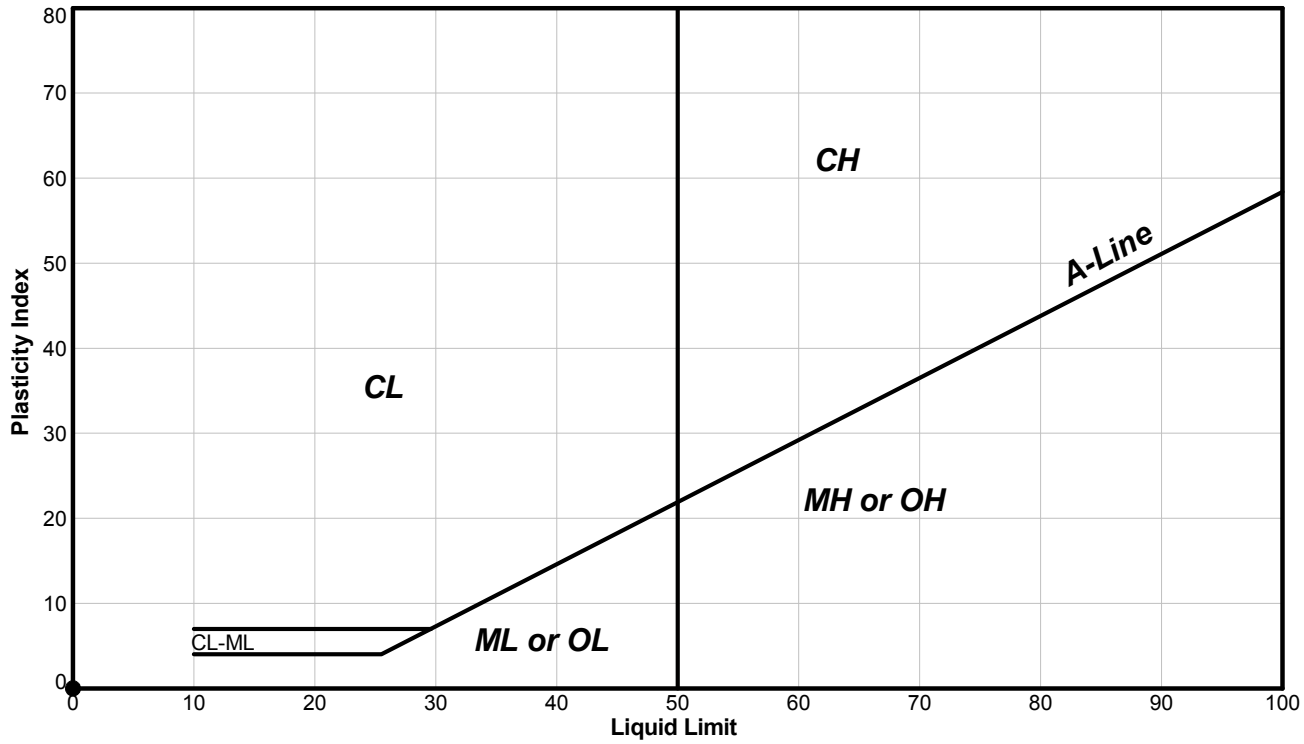
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-62**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.90 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-62	1	0.90	1.00	49	NP	NP	NP	10.5	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

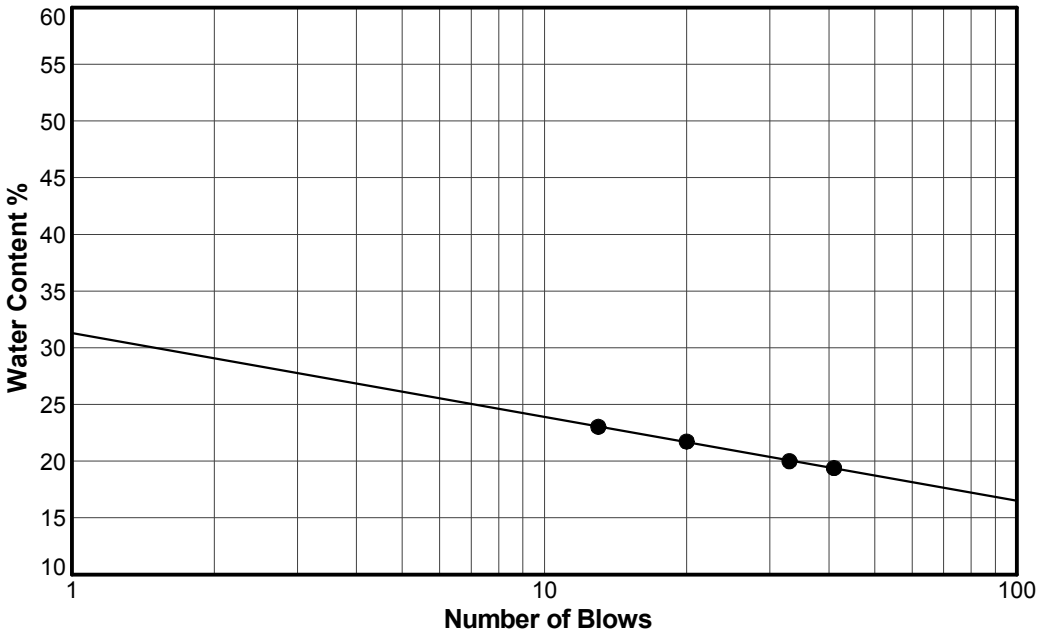
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-62**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.70	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**41**
Liquid Limit	**21**
Plastic Limit	**16**
Plasticity Index	**5**
Natural Water Content (%)	**8.8**
Liquidity Index	**-1.4**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

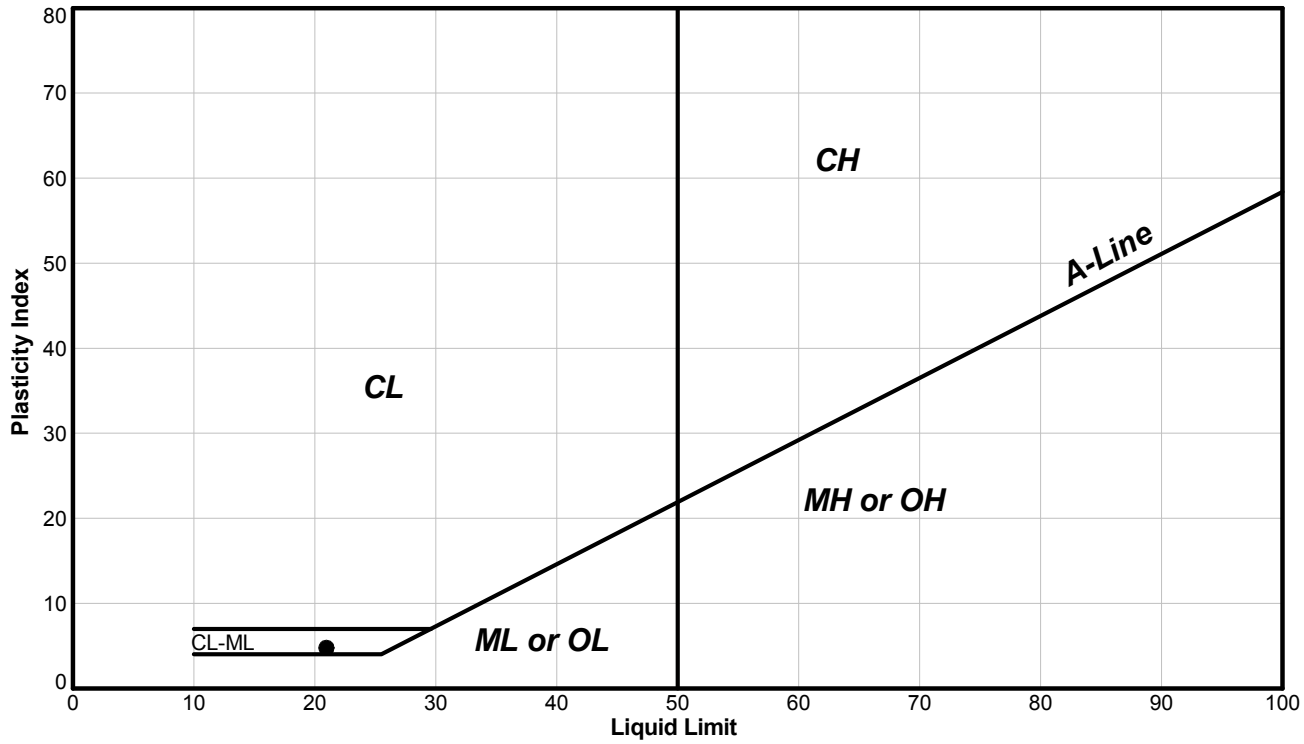
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-62**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-62	2	3.50	3.70	41	21	16	5	8.8	-1.4

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

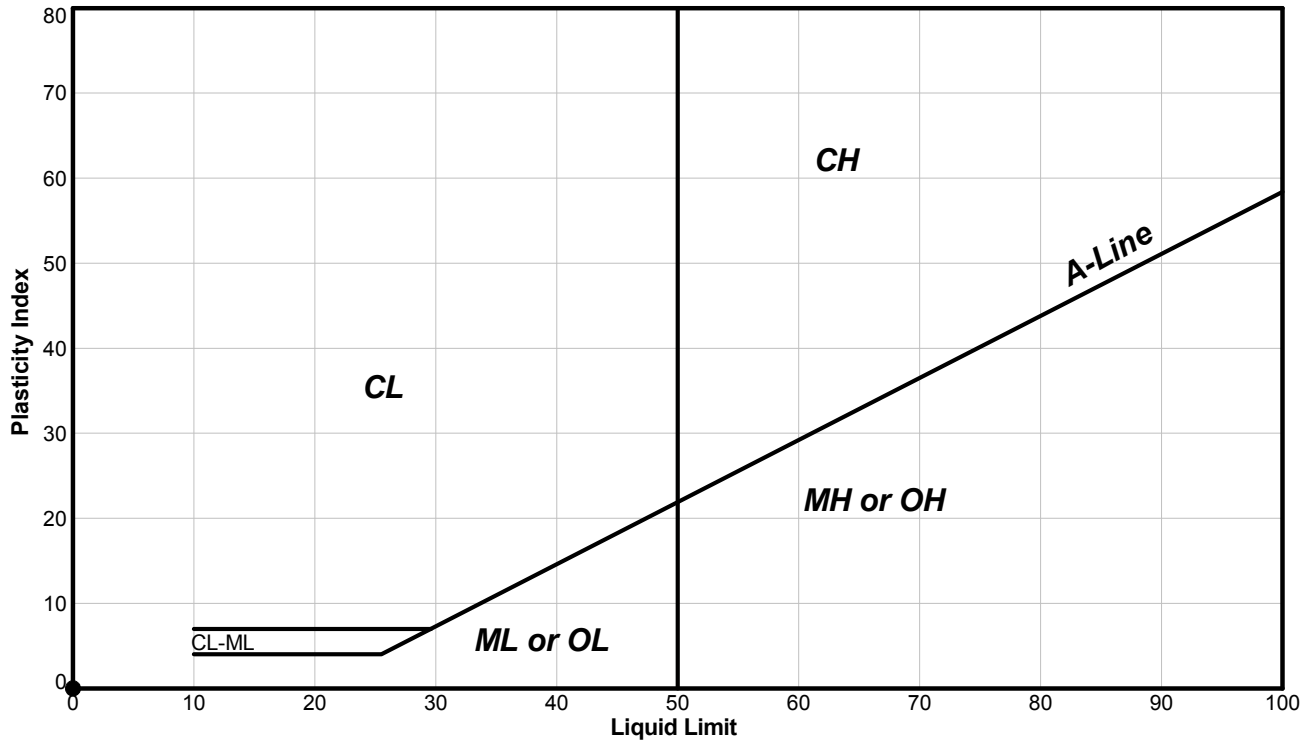
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-63**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-63	1	0.40	0.60	31	NP	NP	NP	7.4	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

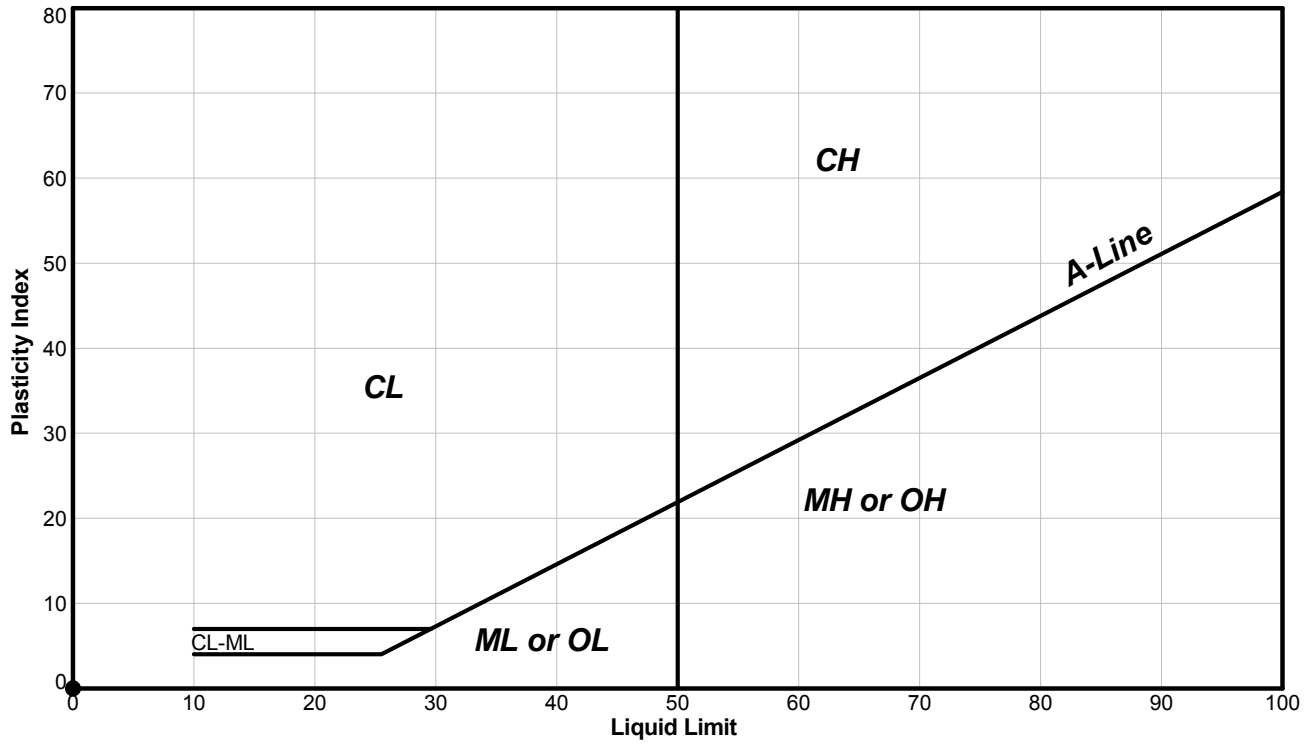
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-64**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-64	1	1.50	1.60	41	NP	NP	NP	4.7	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

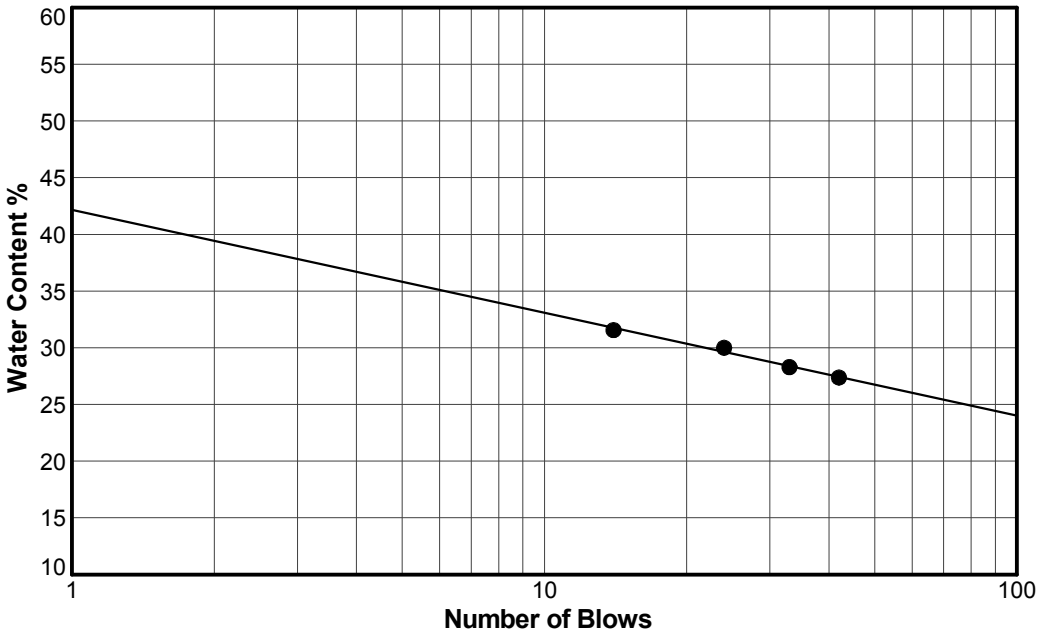
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-66**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.80 to 1.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**84**
Liquid Limit	**29**
Plastic Limit	**19**
Plasticity Index	**10**
Natural Water Content (%)	**16.7**
Liquidity Index	**-0.2**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

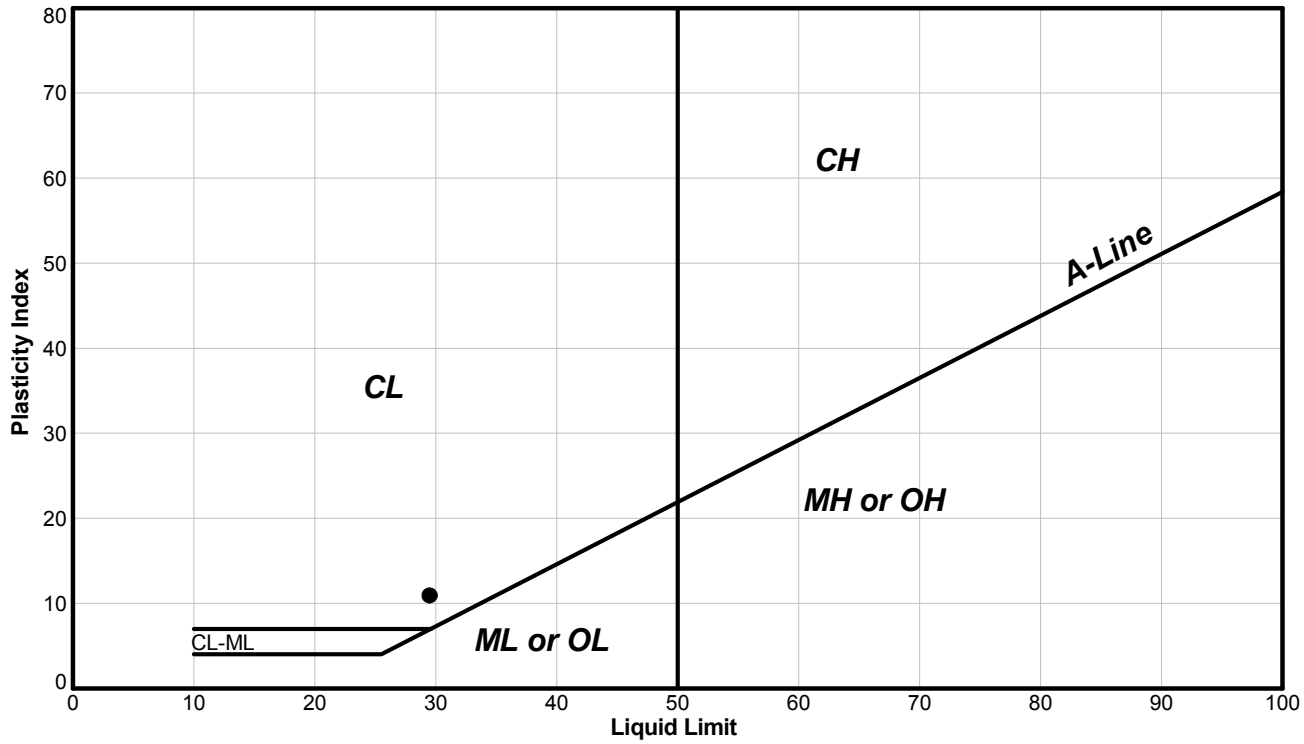
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-66**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.80 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL - Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-66	2	1.80	1.80	84	29	19	10	16.7	-0.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

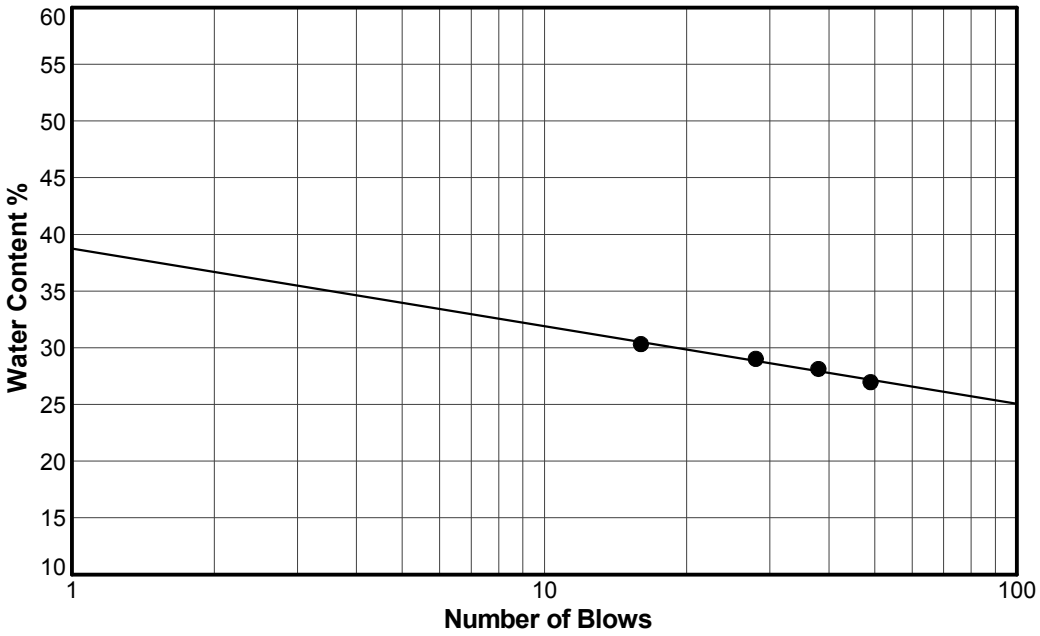
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.70	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**97**
Liquid Limit	**NP**
Plastic Limit	**NP**
Plasticity Index	**NP**
Natural Water Content (%)	**30.5**
Liquidity Index	**NP**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

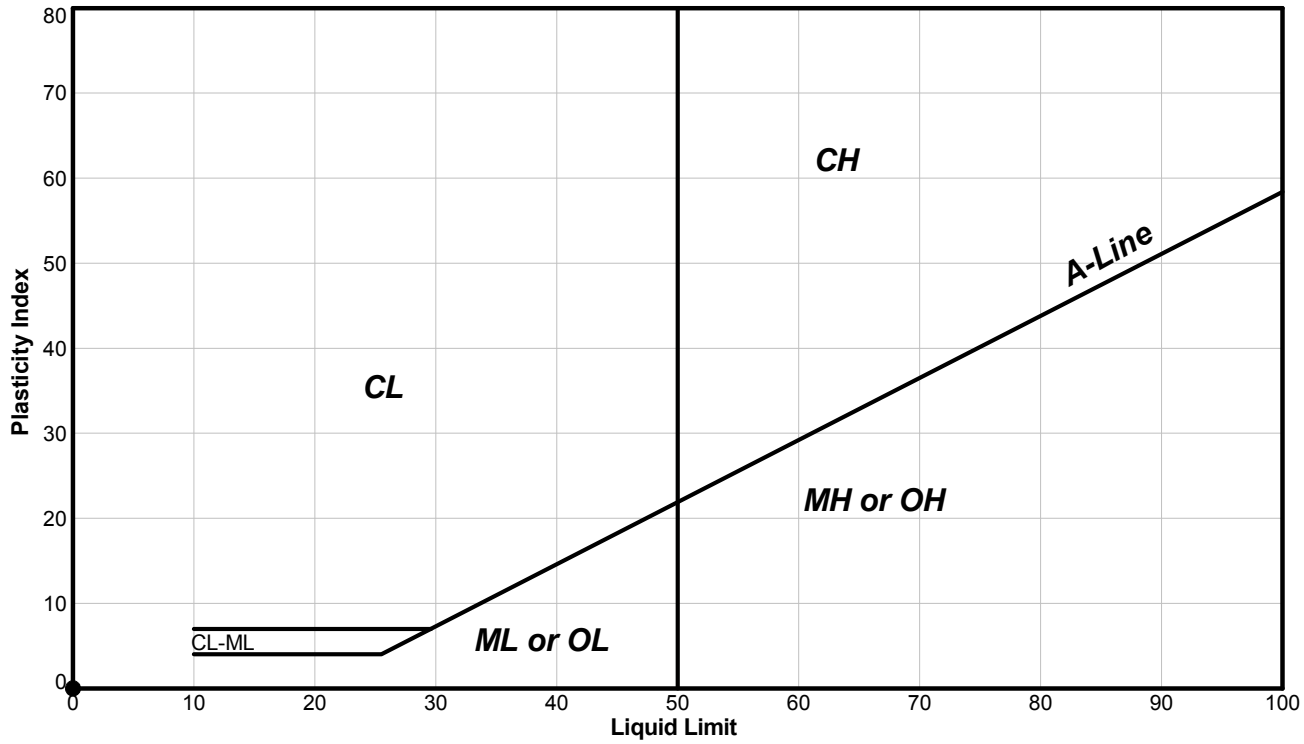
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.70
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-69	1	1.50	1.70	97	NP	NP	NP	30.5	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 2.80 to 2.90	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**31**
Liquid Limit	**23**
Plastic Limit	**17**
Plasticity Index	**6**
Natural Water Content (%)	**6.8**
Liquidity Index	**-1.7**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	14/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

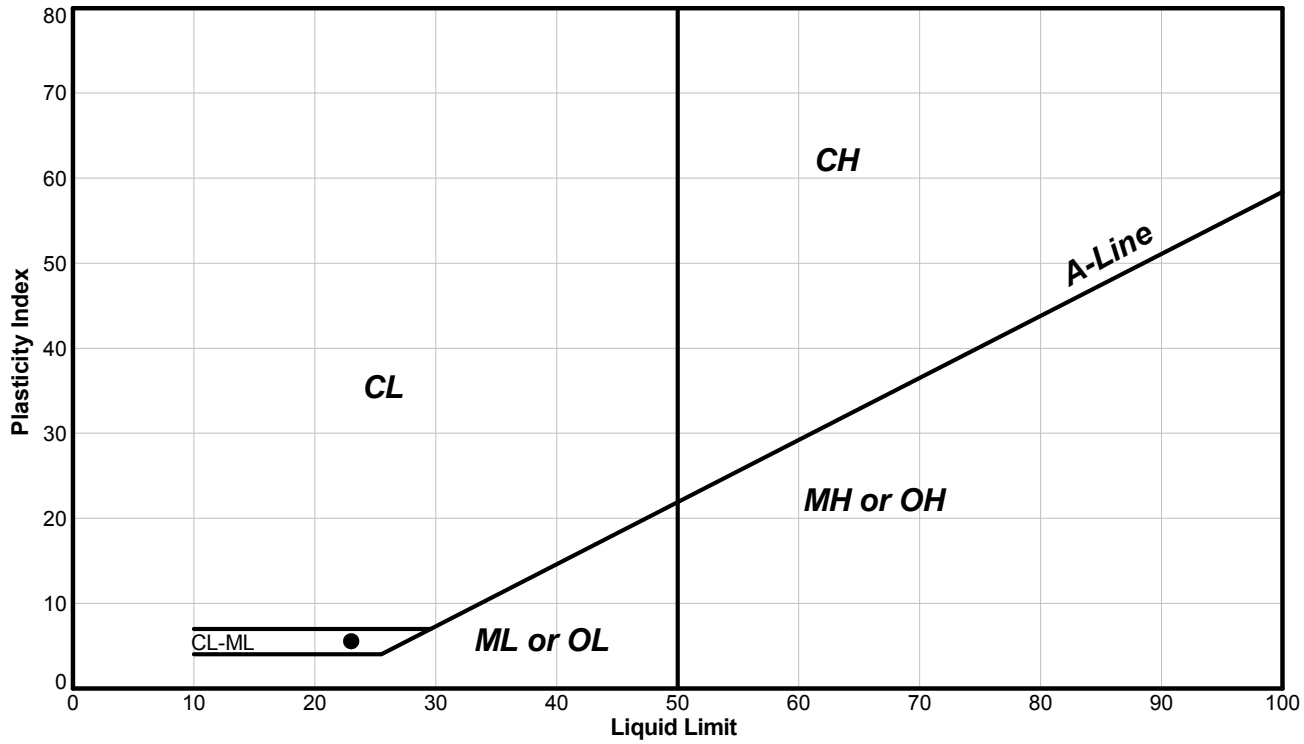
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-69**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.80 to 2.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-69	2	2.80	2.90	31	23	17	6	6.8	-1.7

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	14/09/2011	LP	15/10/2011
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

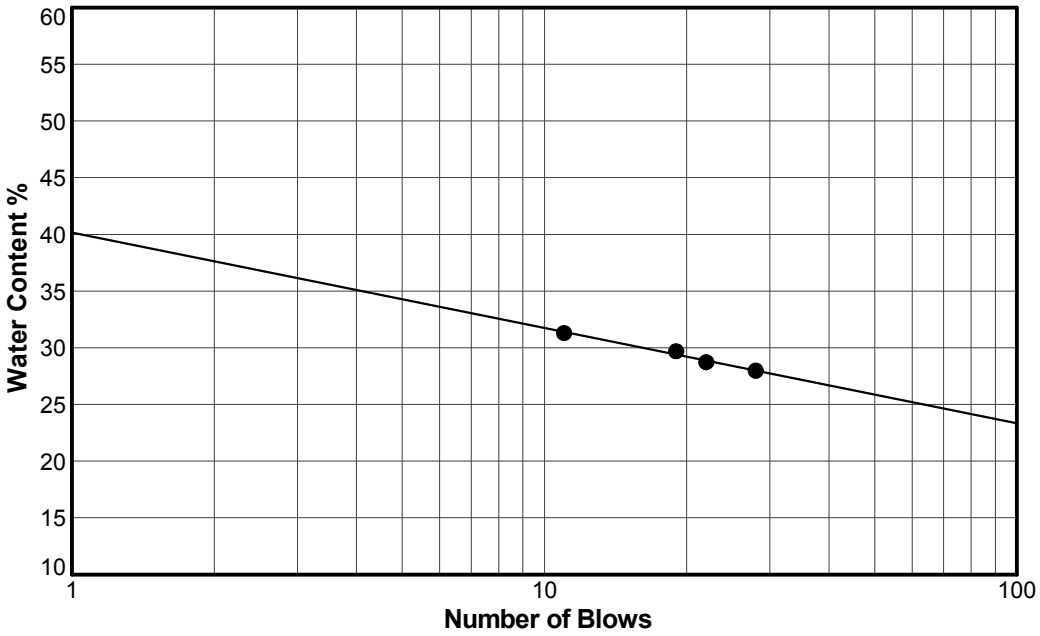
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-71**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**42**
Liquid Limit	**28**
Plastic Limit	**22**
Plasticity Index	**6**
Natural Water Content (%)	**13.8**
Liquidity Index	**-1.4**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

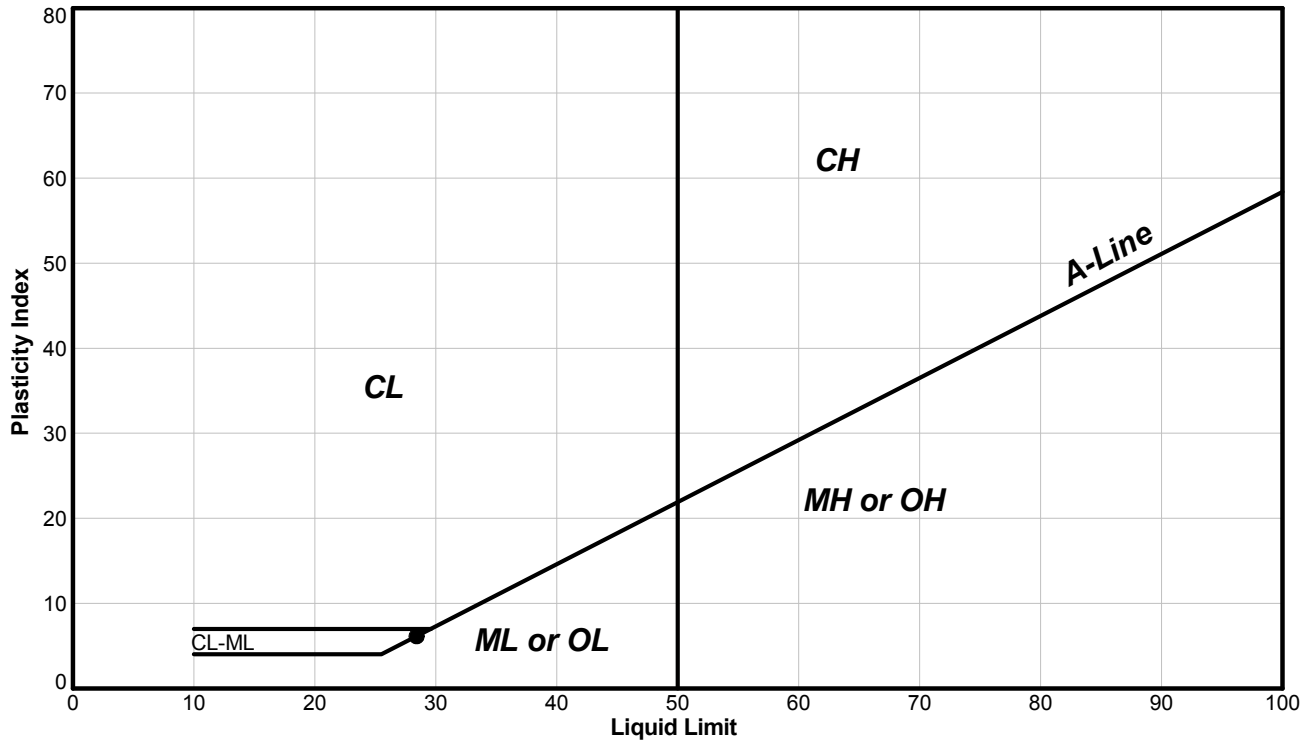
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-71**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-71	1	1.30	1.60	42	28	22	6	13.8	-1.4

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

		LP	**15/10/2011**
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

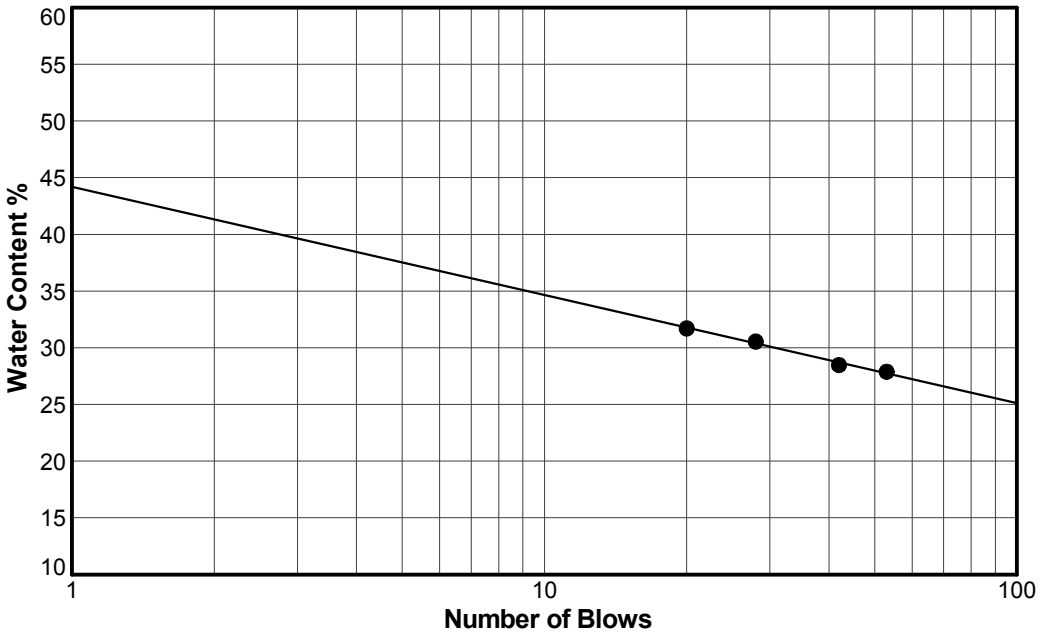
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-72**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**26**
Liquid Limit	**31**
Plastic Limit	**24**
Plasticity Index	**7**
Natural Water Content (%)	**13.7**
Liquidity Index	**-1.5**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

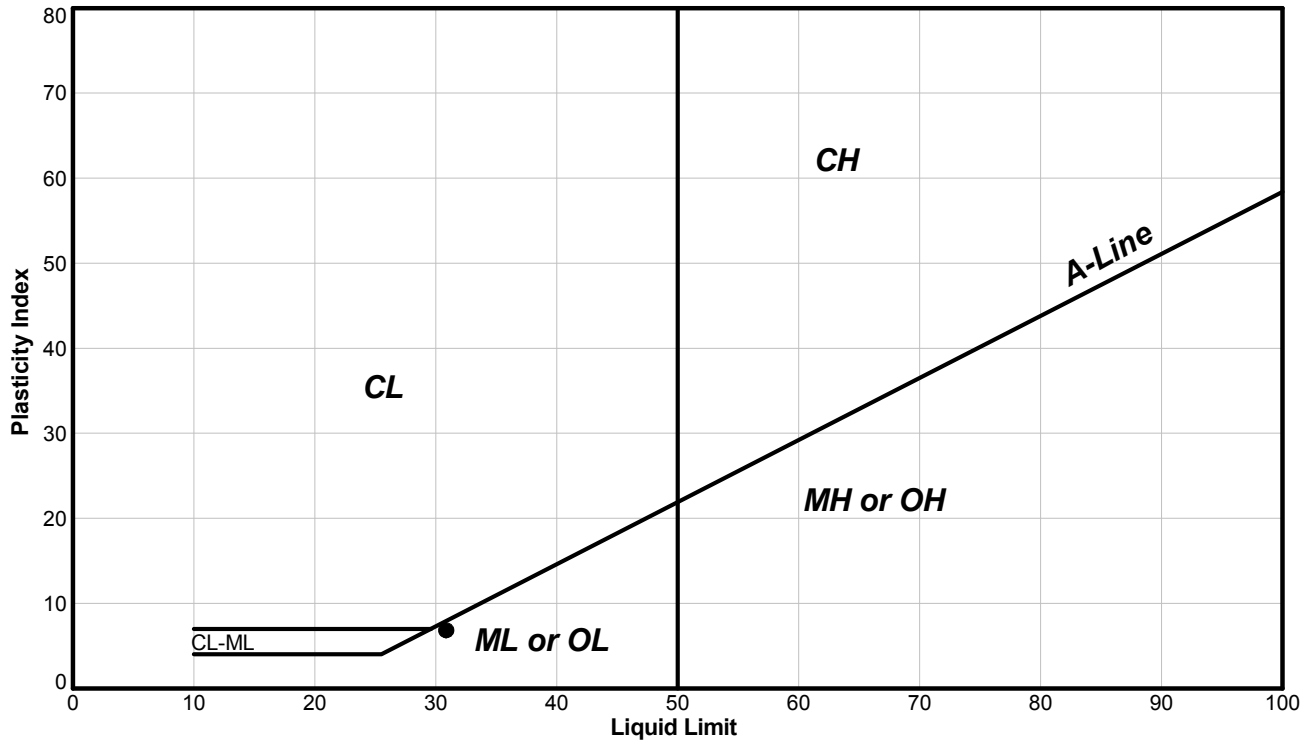
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-72**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-72	2	0.80	1.00	26	31	24	7	13.7	-1.5

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

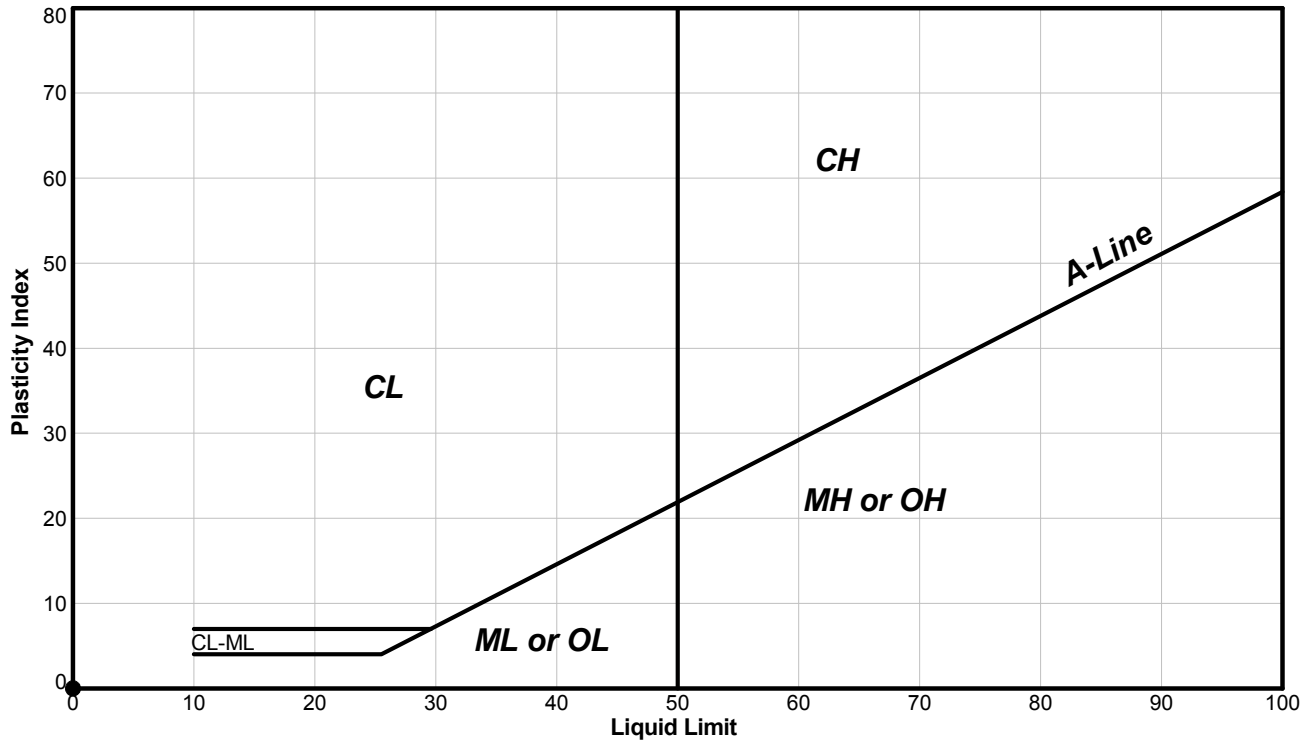
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-73**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-73	1	0.80	1.00	45	NP	NP	NP	8.5	NP

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

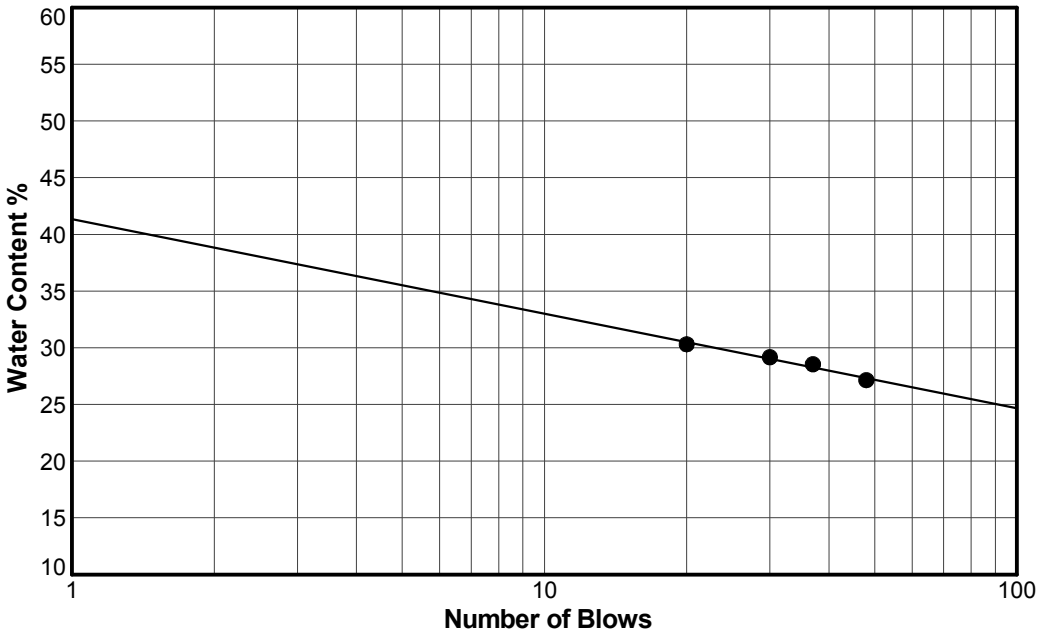
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.40	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**44**
Liquid Limit	**30**
Plastic Limit	**25**
Plasticity Index	**5**
Natural Water Content (%)	**11.8**
Liquidity Index	**-2.6**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

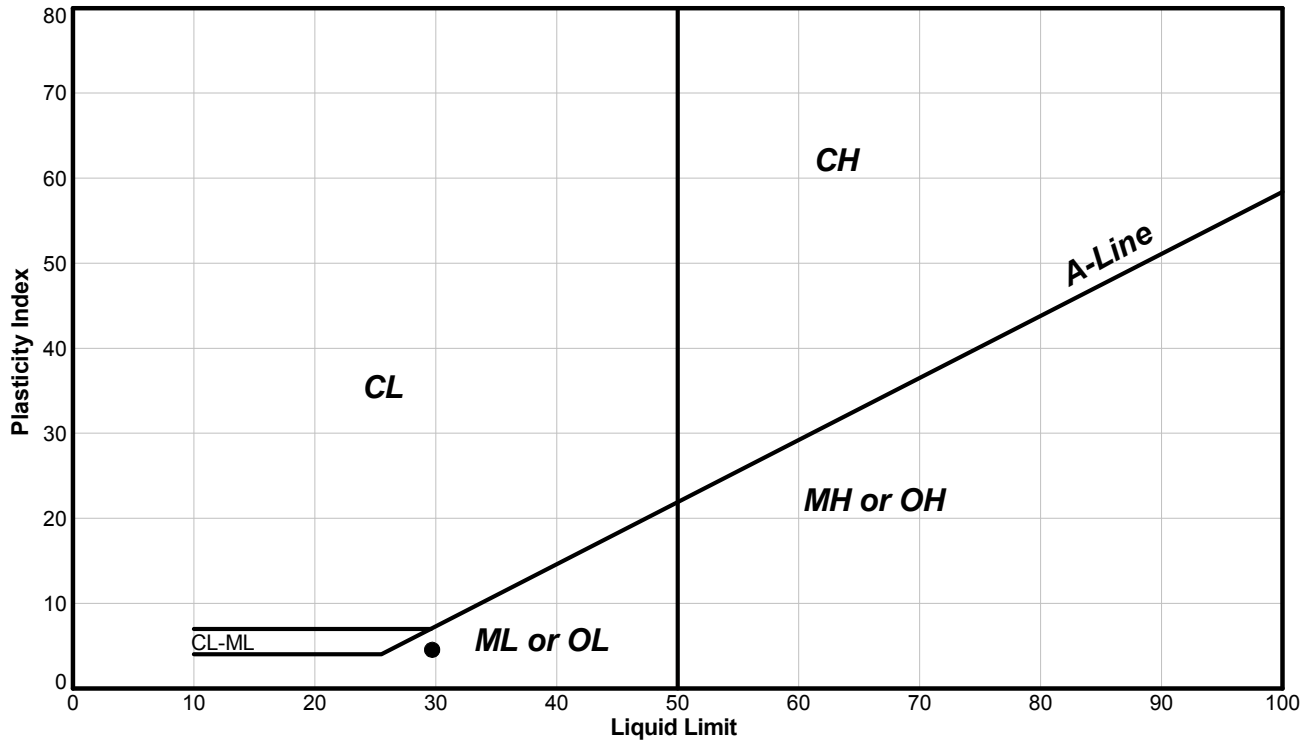
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.40
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-74	1	1.20	1.40	44	30	25	5	11.8	-2.6

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

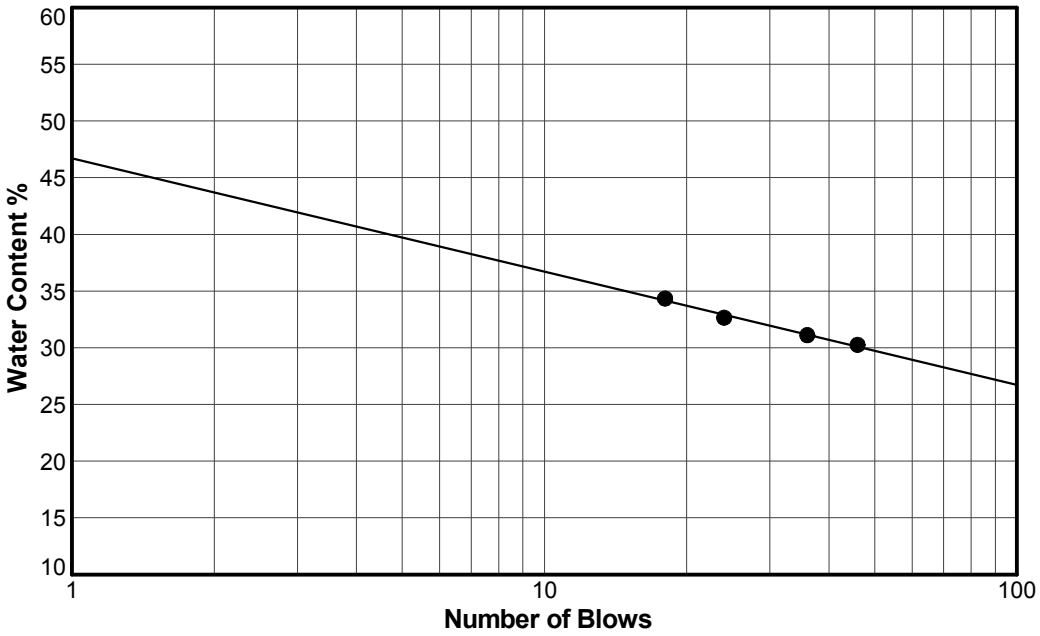
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.00	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**99**
Liquid Limit	**33**
Plastic Limit	**30**
Plasticity Index	**3**
Natural Water Content (%)	**35.9**
Liquidity Index	**2.0**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

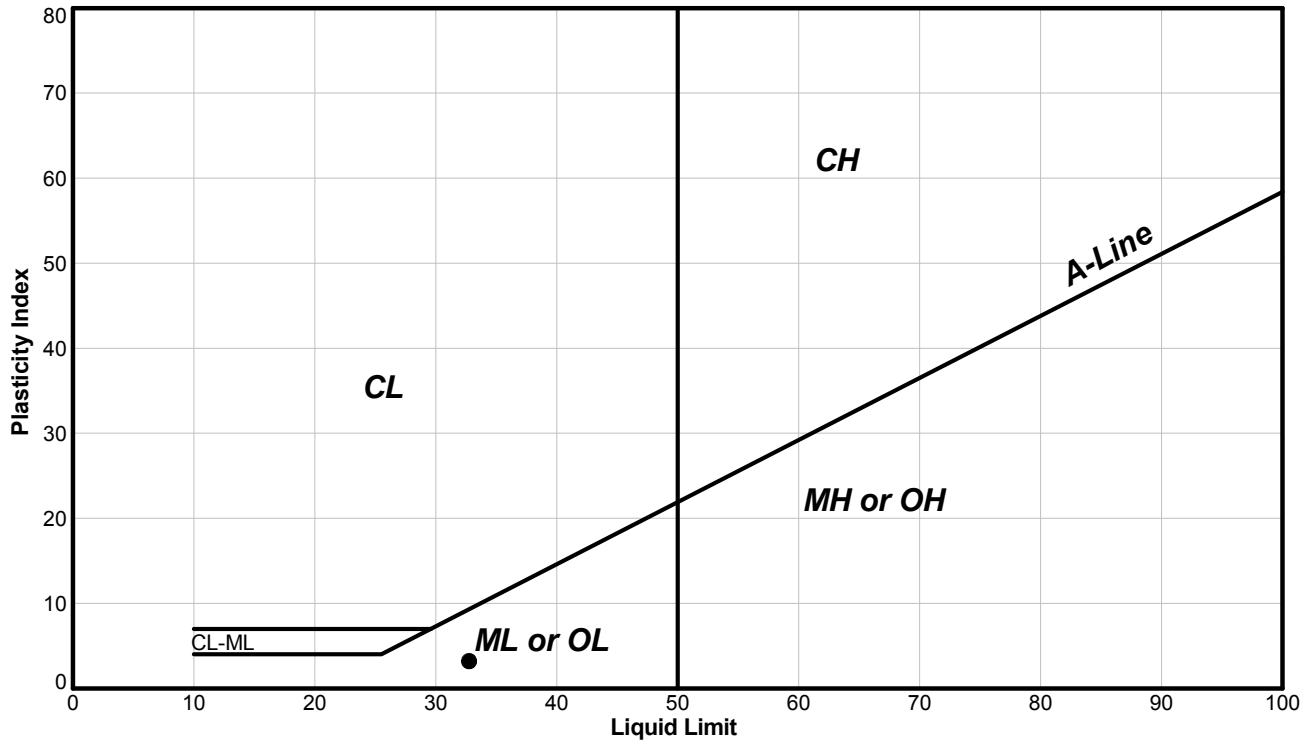
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-74	2	3.00	3.00	99	33	30	3	35.9	2.0

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

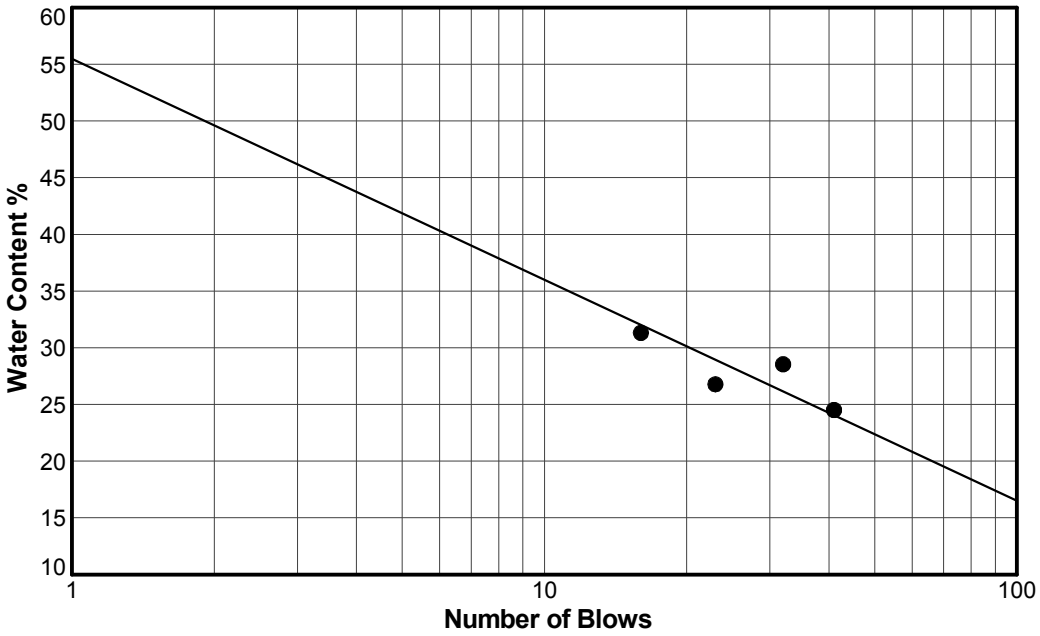
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 3**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 4.50 to 4.50	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**57**
Liquid Limit	**28**
Plastic Limit	**22**
Plasticity Index	**6**
Natural Water Content (%)	**15.0**
Liquidity Index	**-1.2**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

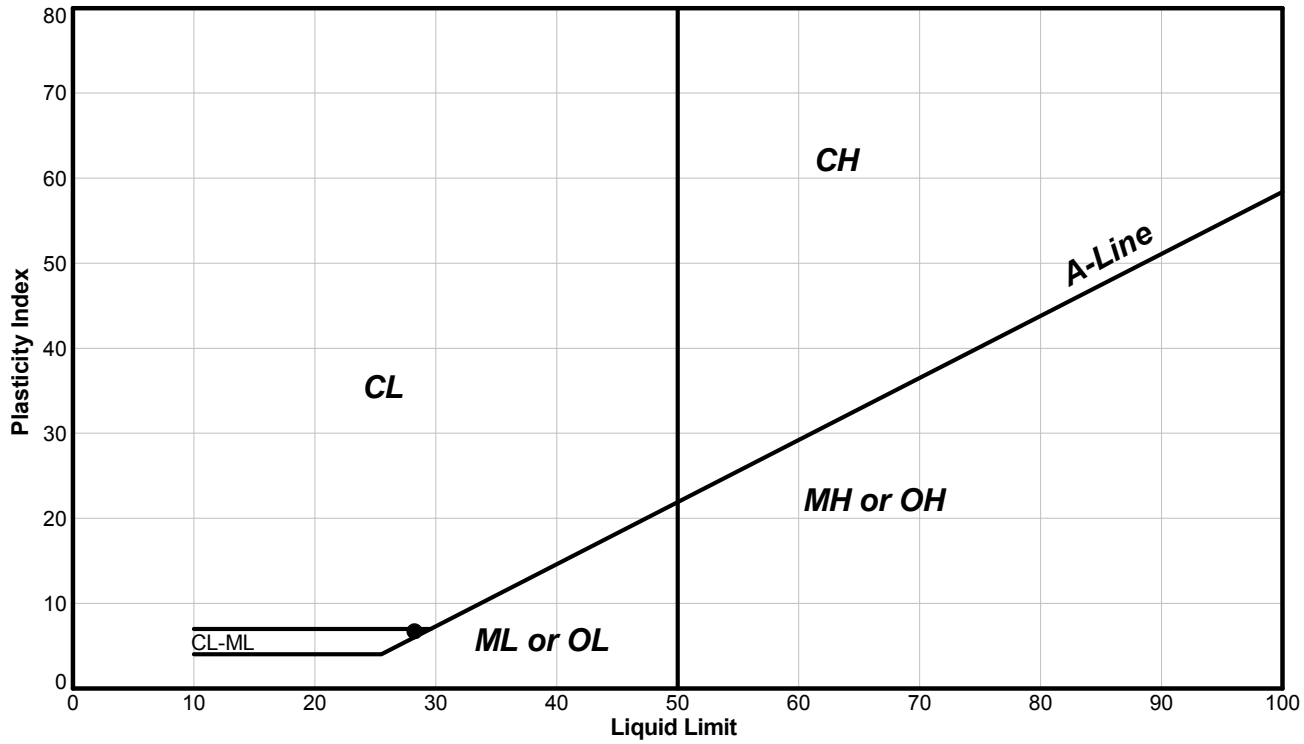
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-74**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 4.50 to 4.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-74	3	4.50	4.50	57	28	22	6	15.0	-1.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

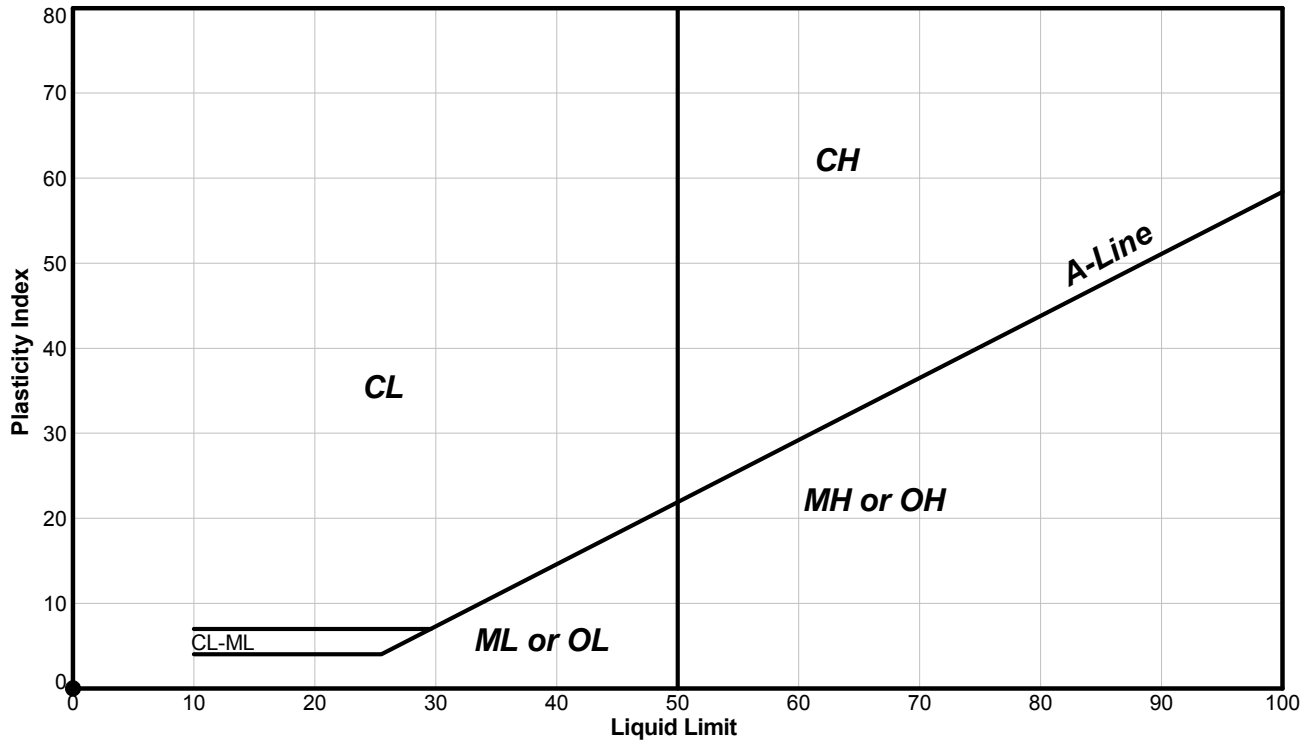
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-76**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-76	1	0.40	0.60	68	NP	NP	NP	16.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

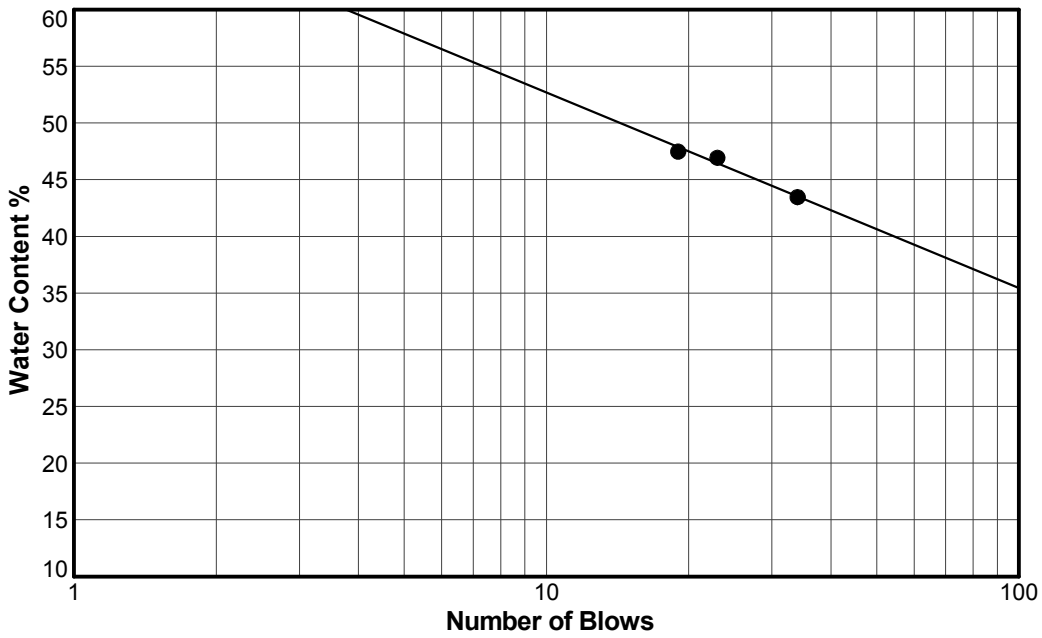
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-77**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.50	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**57**
Liquid Limit	**46**
Plastic Limit	**29**
Plasticity Index	**17**
Natural Water Content (%)	**26.6**
Liquidity Index	**-0.1**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

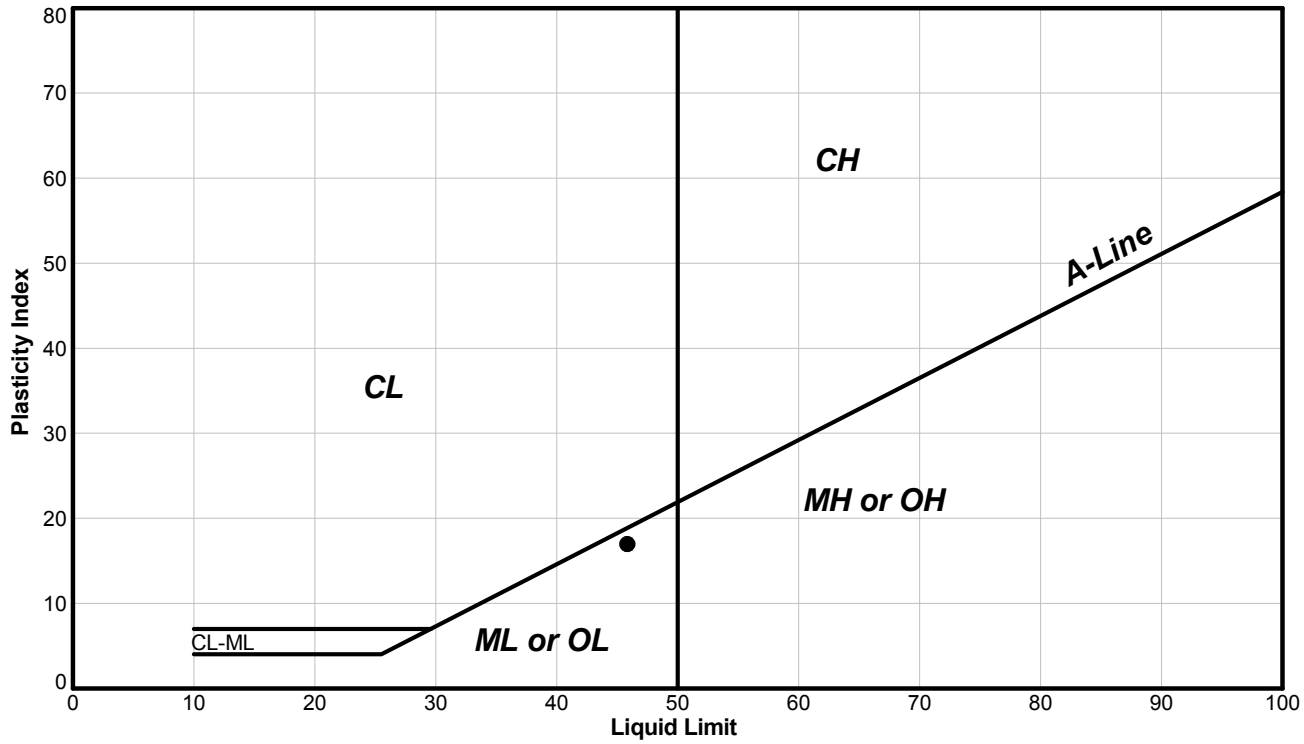
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-77**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-77	1	0.40	0.50	57	46	29	17	26.6	-0.1

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

		LP	**15/10/2011**
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

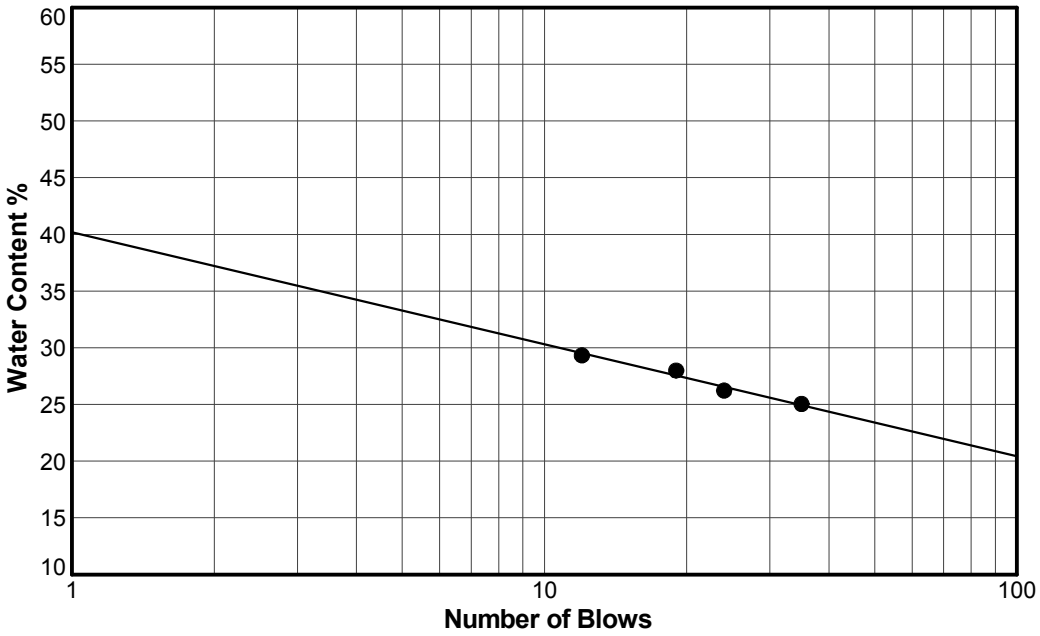
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-79**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**18**
Liquid Limit	**26**
Plastic Limit	**25**
Plasticity Index	**1**
Natural Water Content (%)	**10.1**
Liquidity Index	**-14.9**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

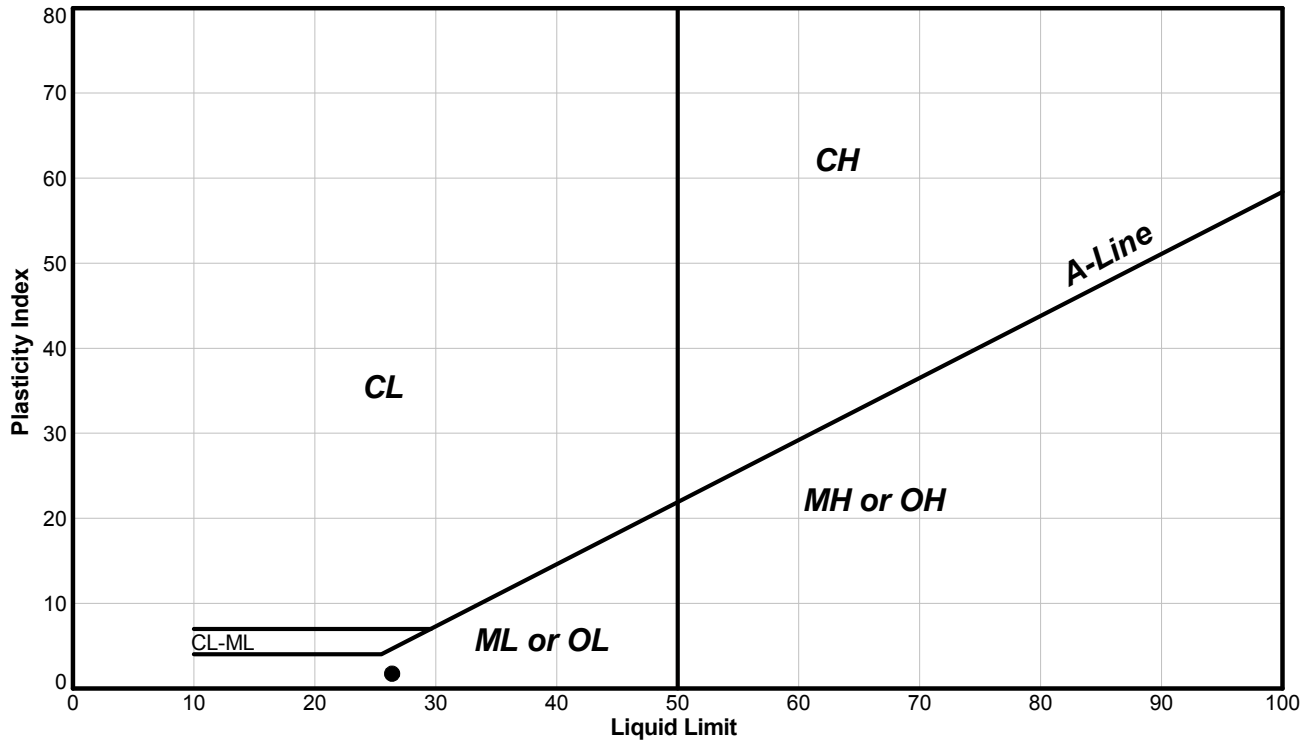
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-79**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.40 to 0.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-79	1	0.40	0.60	18	26	25	1	10.1	-14.9

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

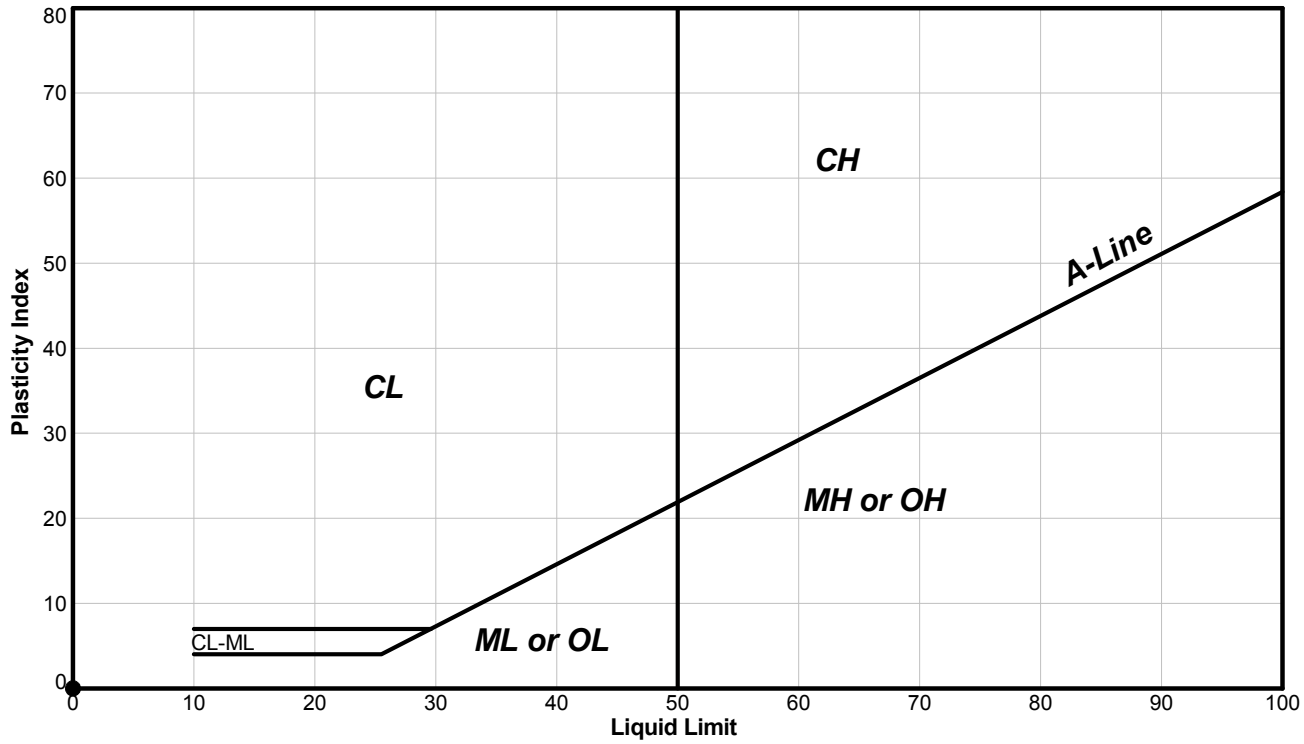
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-81**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-81	1	0.70	1.00	17	NP	NP	NP	16.6	NP

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

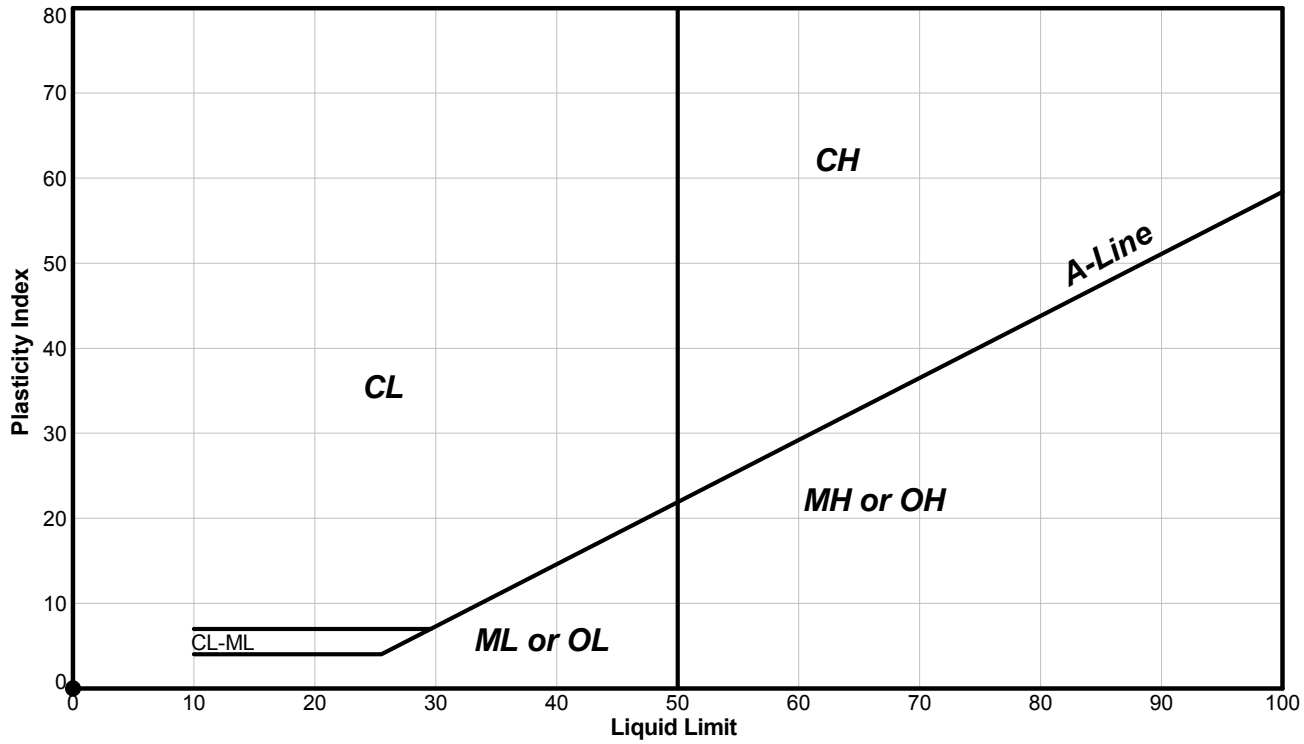
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 4.70 to 4.90
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-82	M1	4.70	4.90	100	NP	NP	NP	12.4	NP

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

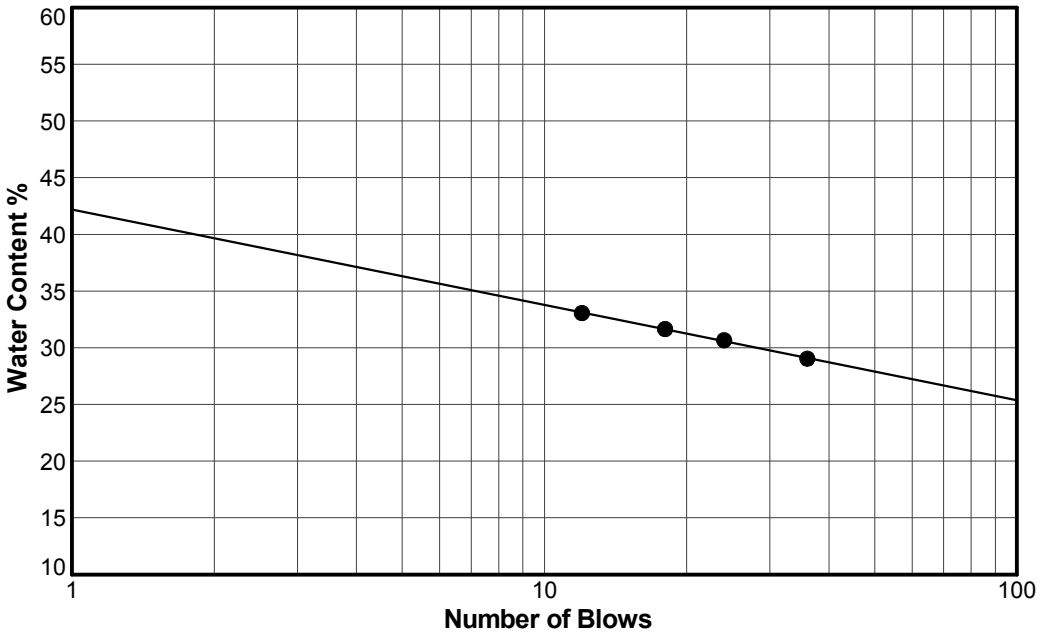
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: M2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.30	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**84**
Liquid Limit	**30**
Plastic Limit	**27**
Plasticity Index	**3**
Natural Water Content (%)	**10.3**
Liquidity Index	**-5.6**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

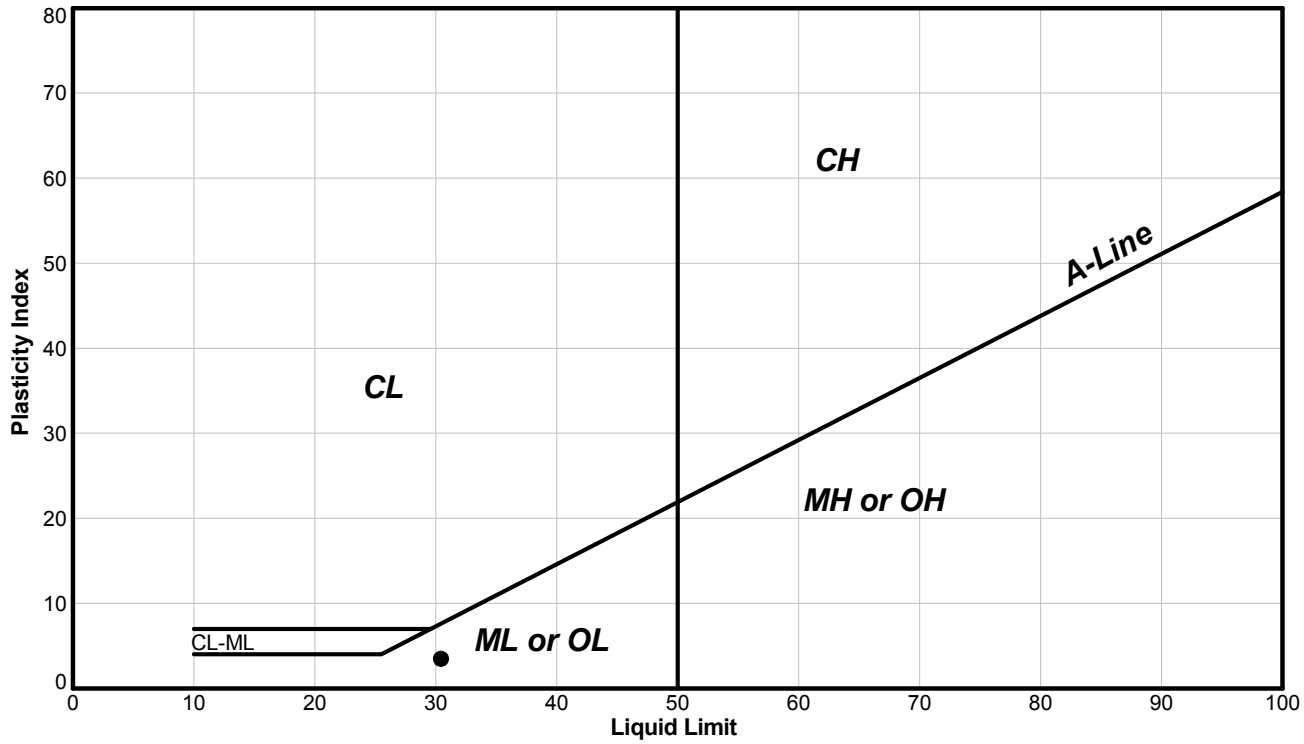
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.00 to 3.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-82	M2	3.00	3.30	84	30	27	3	10.3	-5.6

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

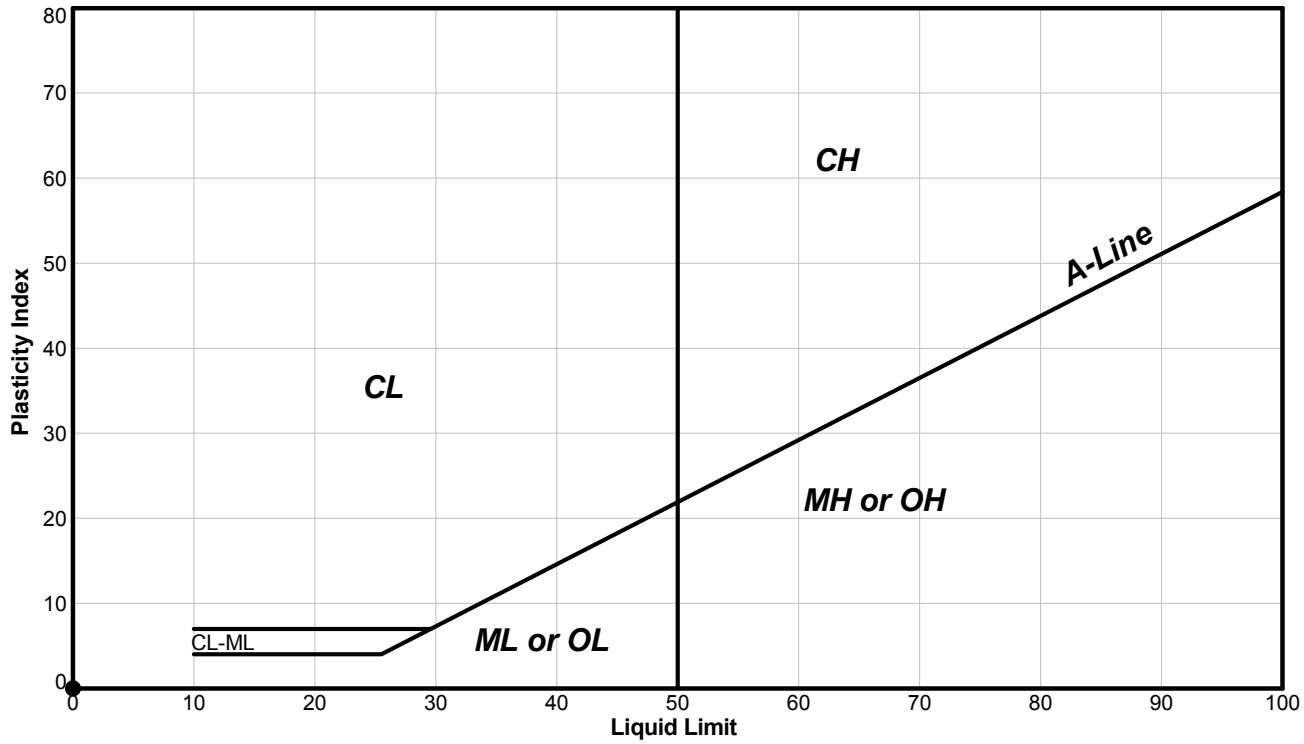
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M3**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 6.70 to 7.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-82	M3	6.70	7.00	89	NP	NP	NP	40.1	NP

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

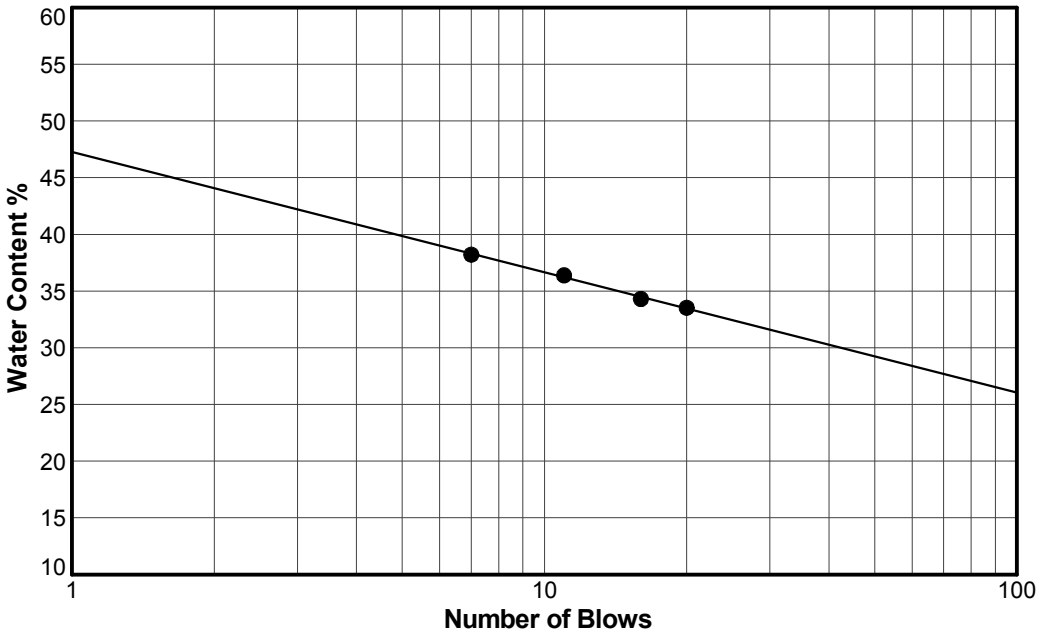
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: M4**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 1.10	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**94**
Liquid Limit	**32**
Plastic Limit	**28**
Plasticity Index	**4**
Natural Water Content (%)	**28.6**
Liquidity Index	**0.2**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

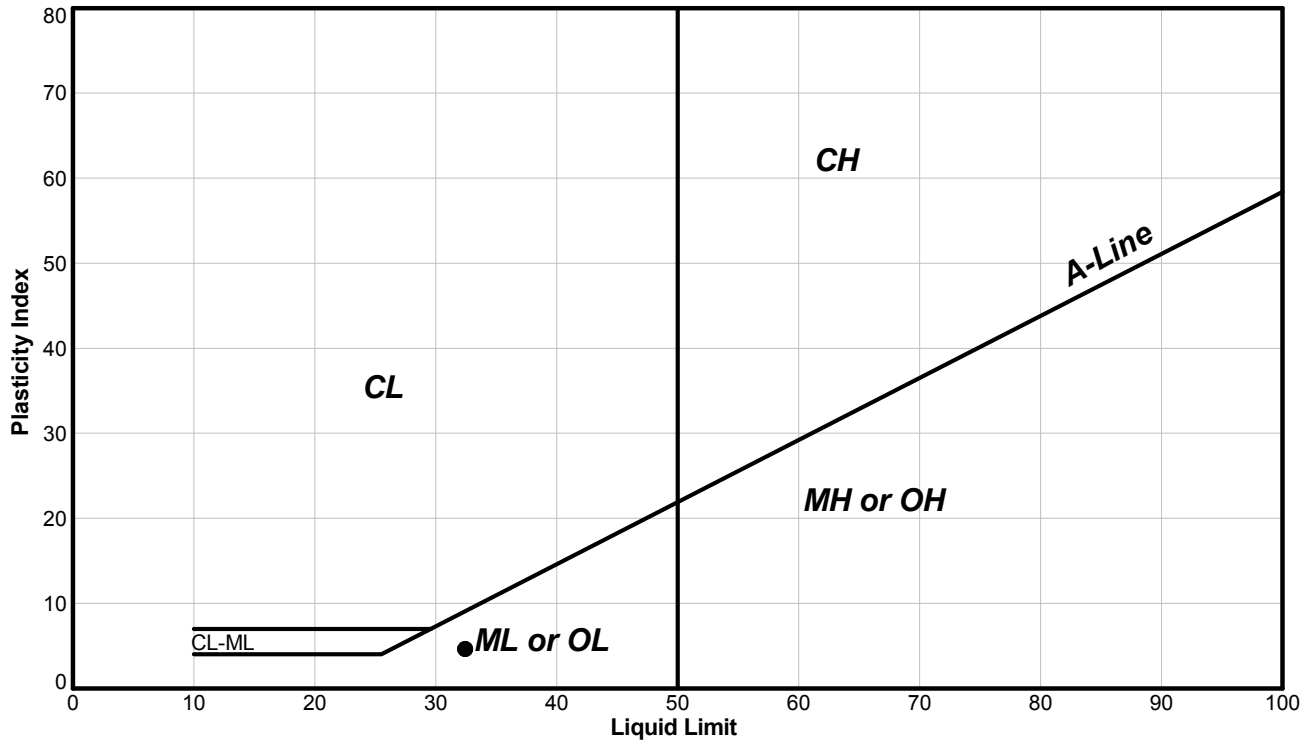
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M4**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.70 to 1.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-82	M4	0.70	1.10	94	32	28	4	28.6	0.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

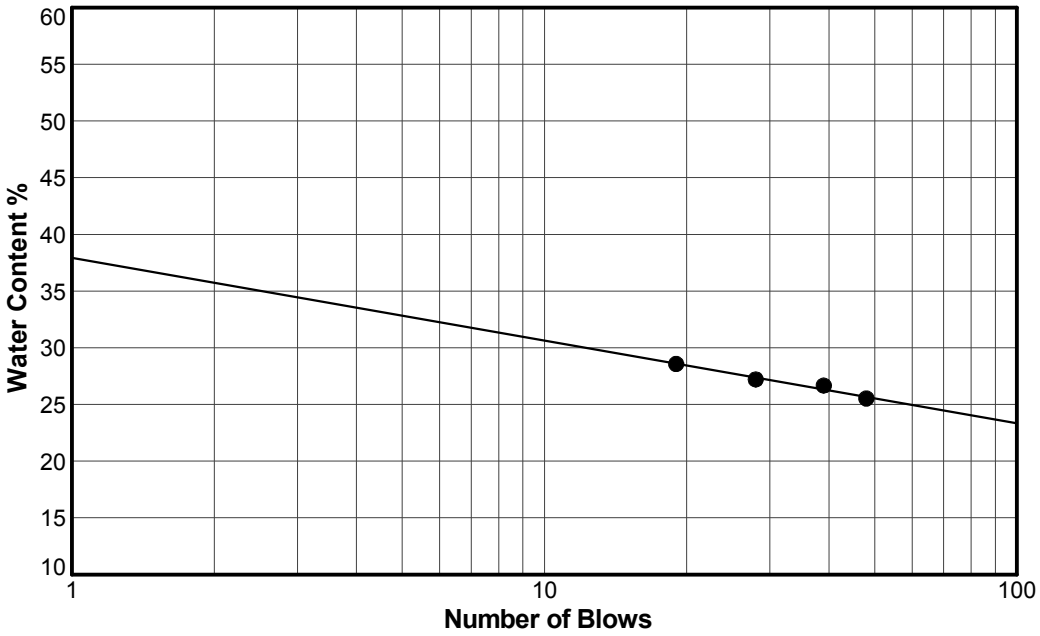
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: M5**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.90 to 2.10	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**87**
Liquid Limit	**28**
Plastic Limit	**23**
Plasticity Index	**5**
Natural Water Content (%)	**27.3**
Liquidity Index	**0.9**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

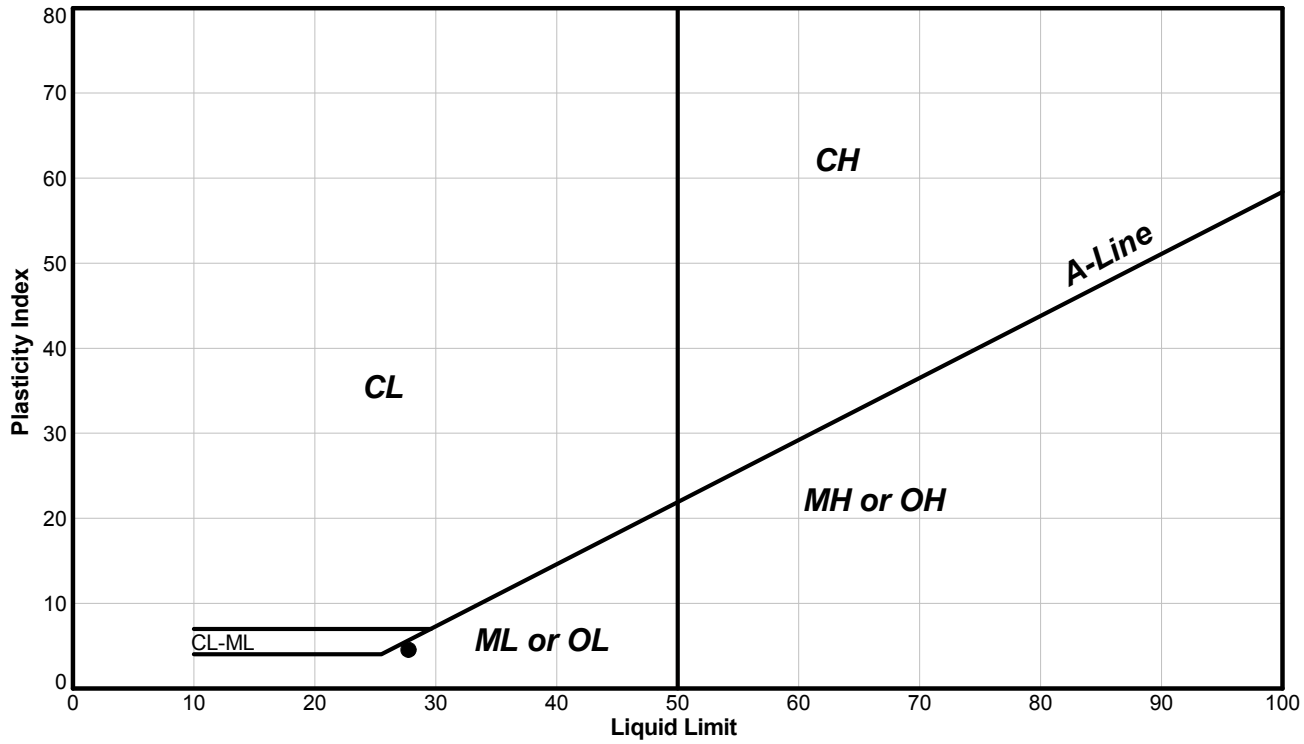
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-82**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: M5**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.90 to 2.10
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-82	M5	1.90	2.10	87	28	23	5	27.3	0.9

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

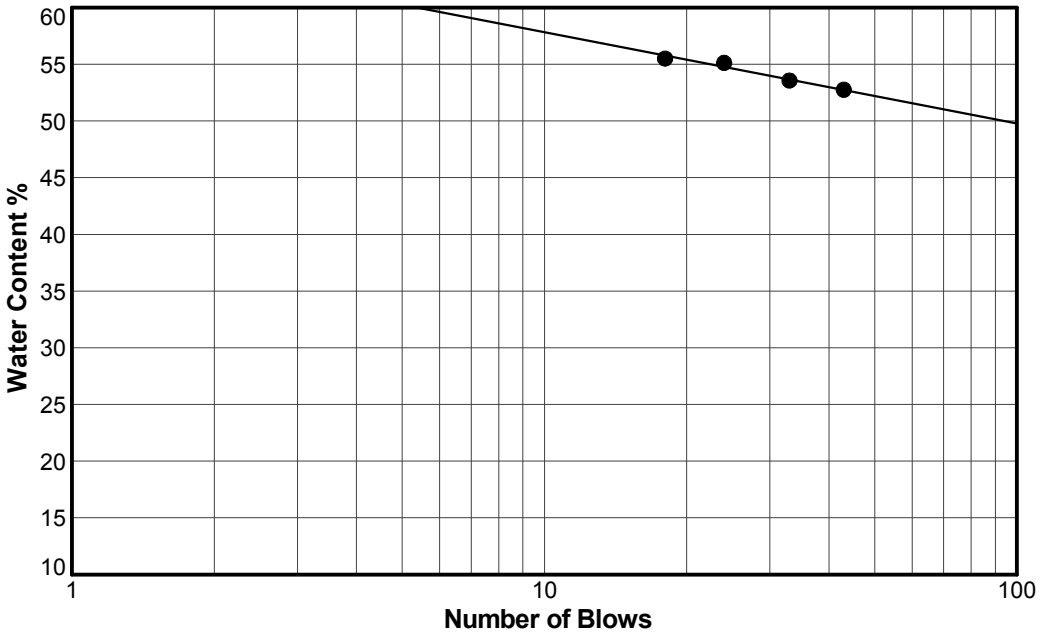
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-83**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: MH - Inorganic silts, micaeous or diatomaceous fine sandy or silty soils, elastic silts.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**45**
Liquid Limit	**55**
Plastic Limit	**44**
Plasticity Index	**11**
Natural Water Content (%)	**20.1**
Liquidity Index	**-2.2**



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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

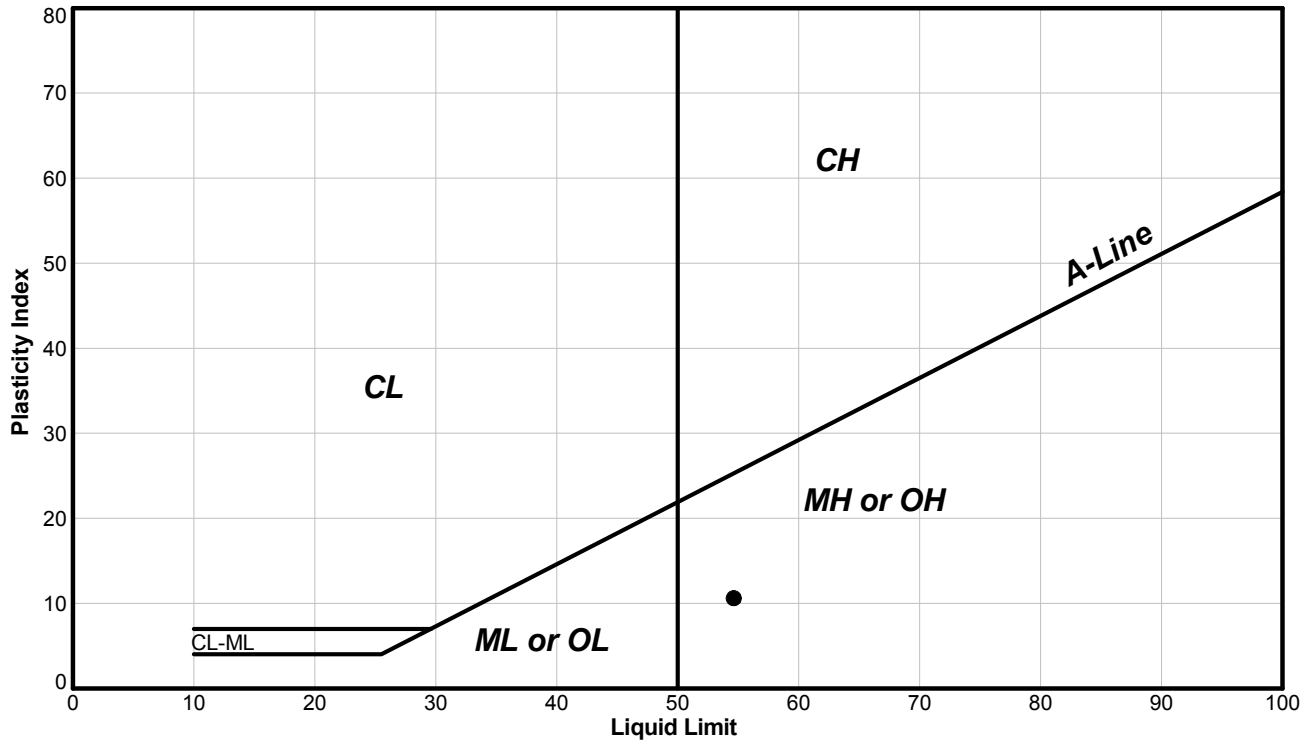
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-83**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: MH - Inorganic silts, micaeous or diatomaceous fine sandy or silty soils, elastic silts.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-83	1	0.60	0.80	45	55	44	11	20.1	-2.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-84**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 2.50 to 2.50	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**95**
Liquid Limit	**29**
Plastic Limit	**26**
Plasticity Index	**3**
Natural Water Content (%)	**28.5**
Liquidity Index	**0.8**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	04/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

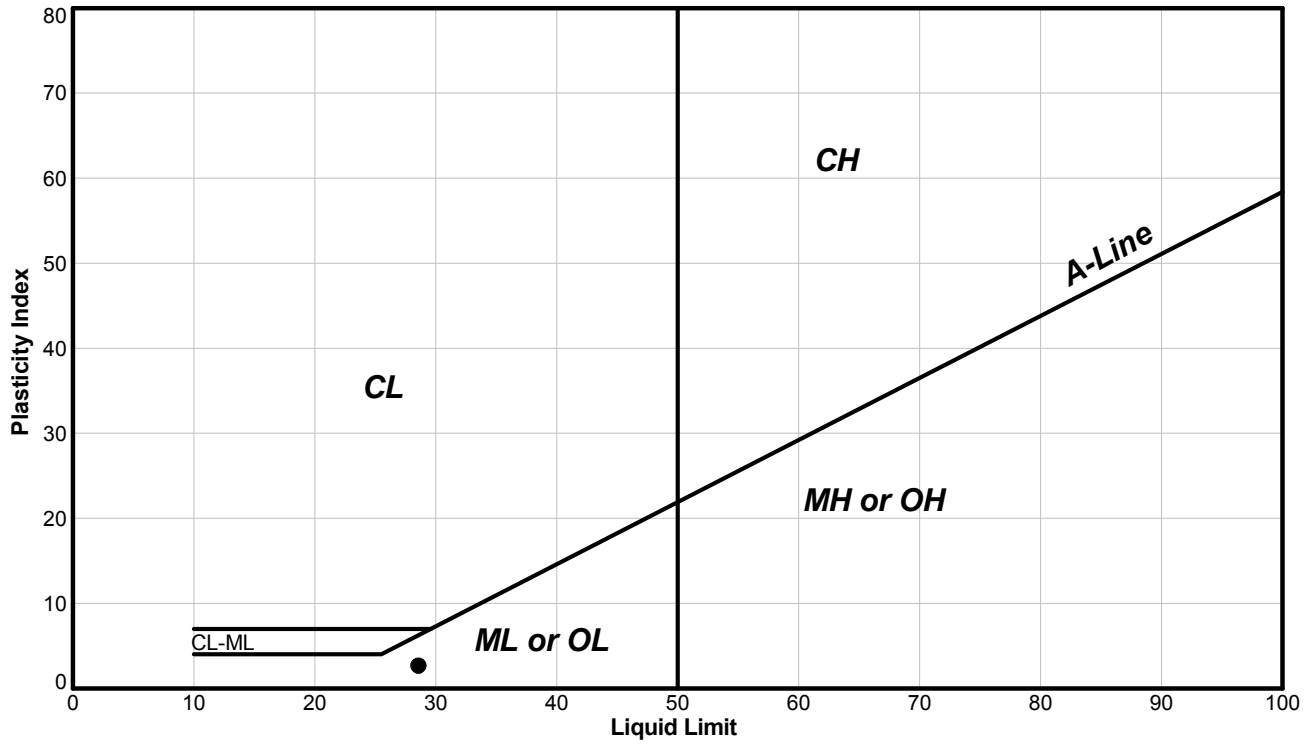
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-84**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 2.50 to 2.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-84	2	2.50	2.50	95	29	26	3	28.5	0.8

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

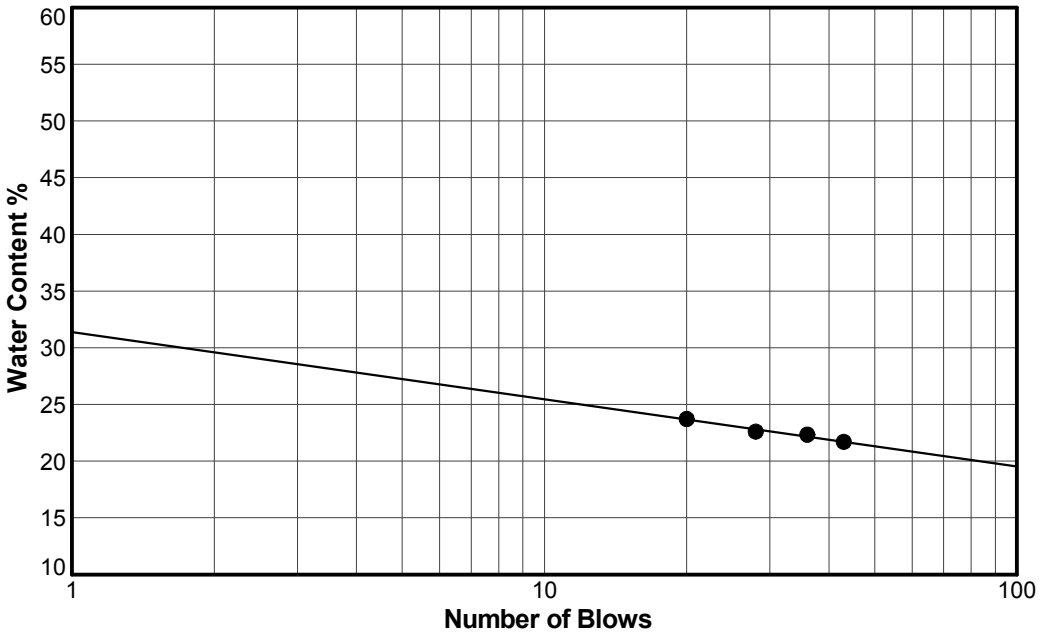
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-85**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**64**
Liquid Limit	**23**
Plastic Limit	**22**
Plasticity Index	**1**
Natural Water Content (%)	**16.6**
Liquidity Index	**-5.4**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

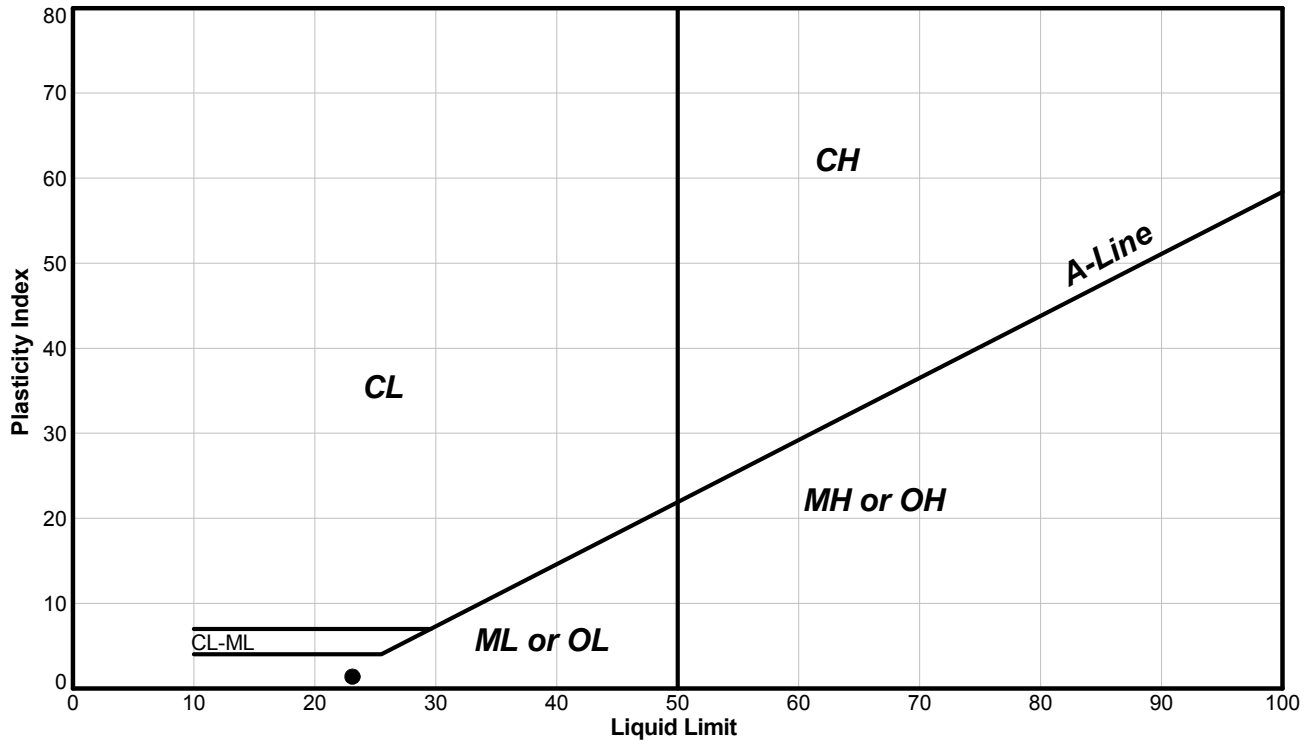
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-85**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-85	1	0.60	0.80	64	23	22	1	16.6	-5.4

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-88**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**44**
Liquid Limit	**26**
Plastic Limit	**19**
Plasticity Index	**7**
Natural Water Content (%)	**12.7**
Liquidity Index	**-0.9**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

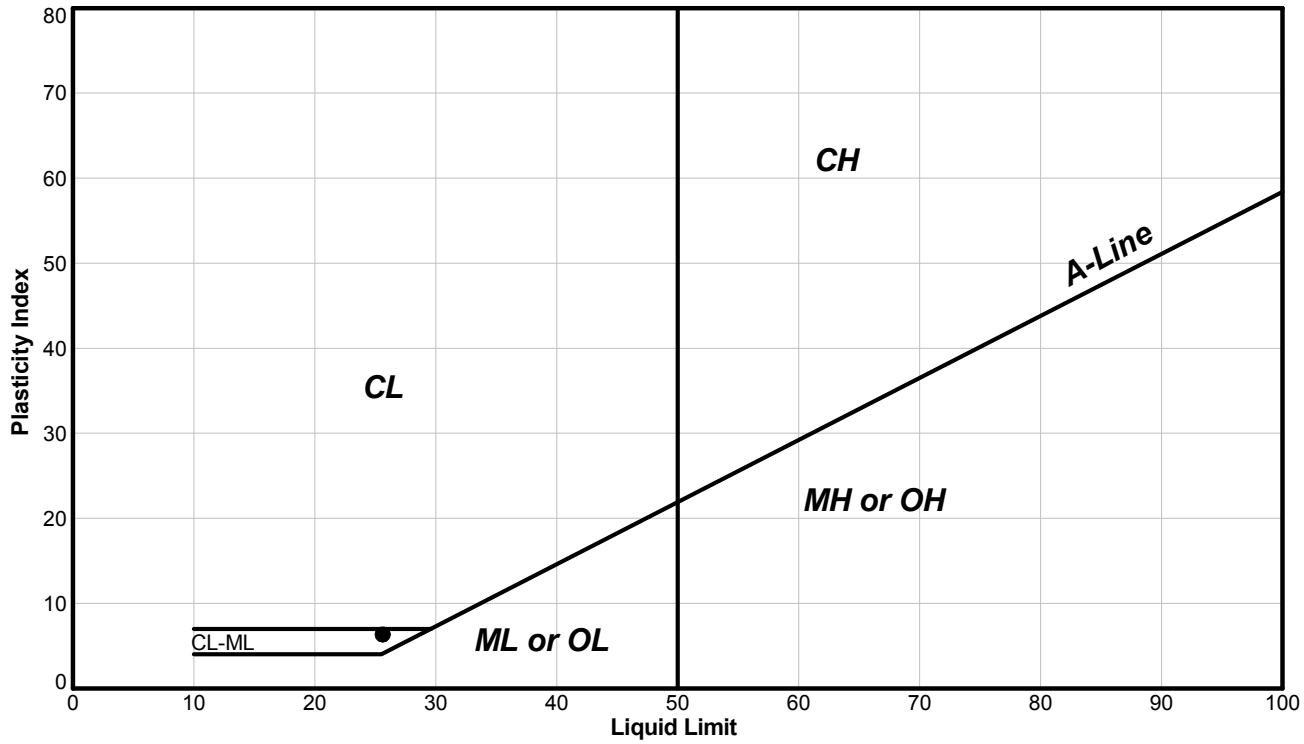
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-88**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.50 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: CL-ML - Inorganic clays of low to medium plasticity --- Inorganic silts and very fine sands, clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-88	1	1.50	1.80	44	26	19	7	12.7	-0.9

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-89**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**55**
Liquid Limit	**23**
Plastic Limit	**21**
Plasticity Index	**2**
Natural Water Content (%)	**14.3**
Liquidity Index	**-3.3**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	26/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

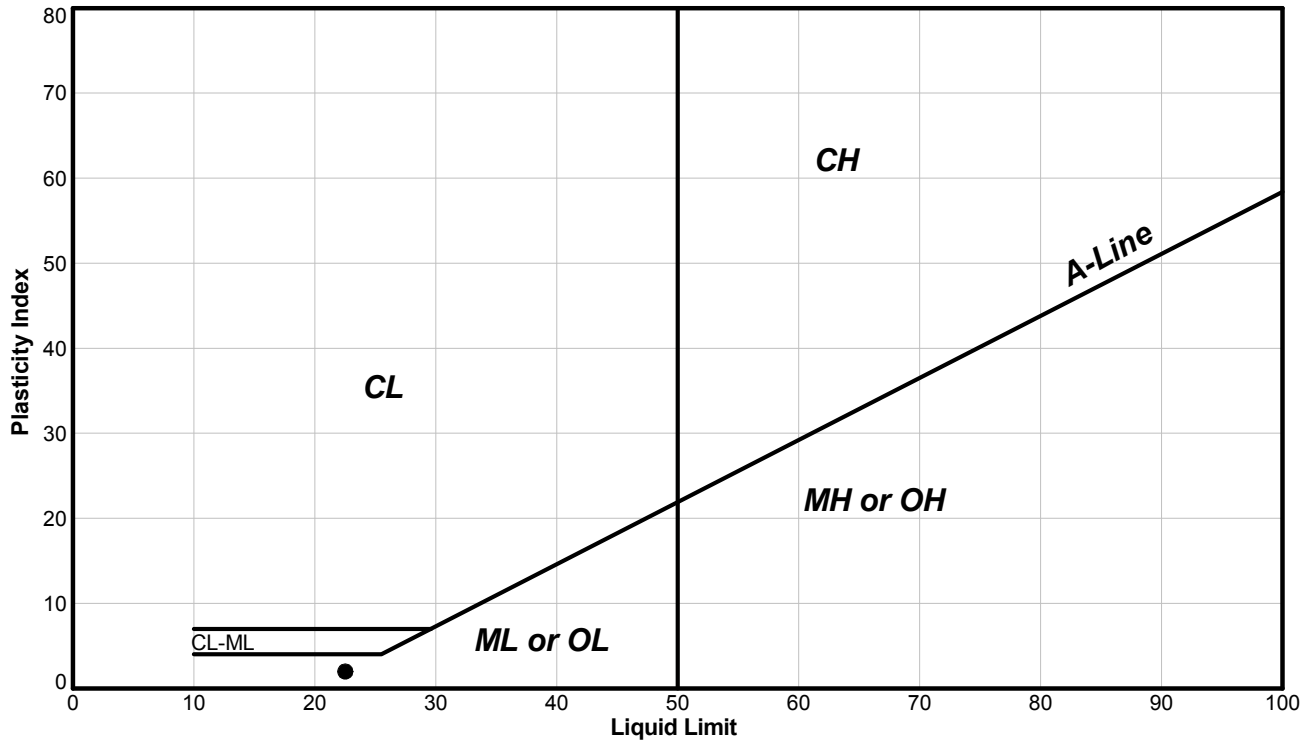
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-89**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-89	2	1.30	1.50	55	23	21	2	14.3	-3.3

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-90**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.60	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**99**
Liquid Limit	**24**
Plastic Limit	**22**
Plasticity Index	**2**
Natural Water Content (%)	**23.3**
Liquidity Index	**0.7**

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

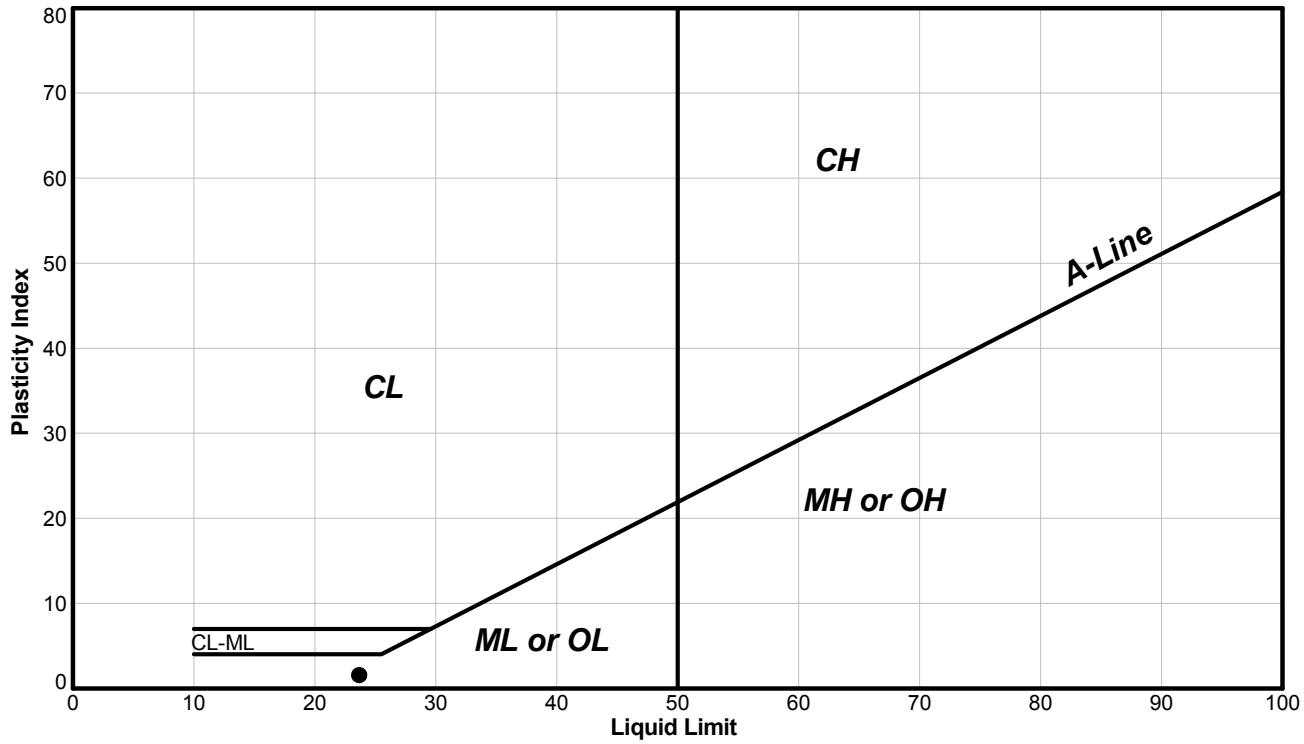
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-90**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 3.50 to 3.60
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-90	2	3.50	3.60	99	24	22	2	23.3	0.7

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

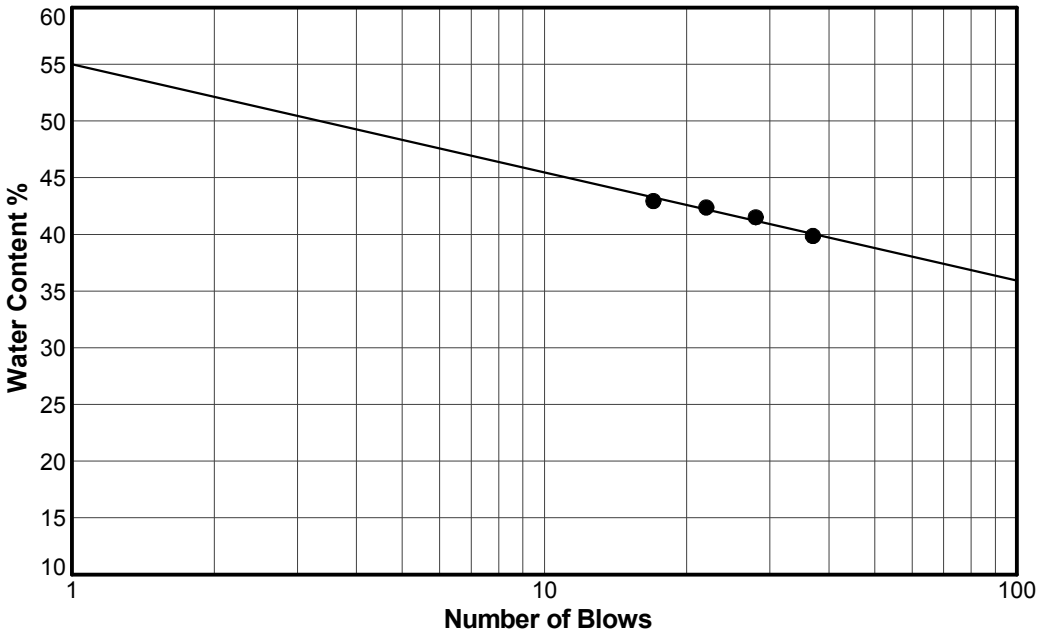
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**79**
Liquid Limit	**42**
Plastic Limit	**35**
Plasticity Index	**7**
Natural Water Content (%)	**49.5**
Liquidity Index	**2.1**



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		LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

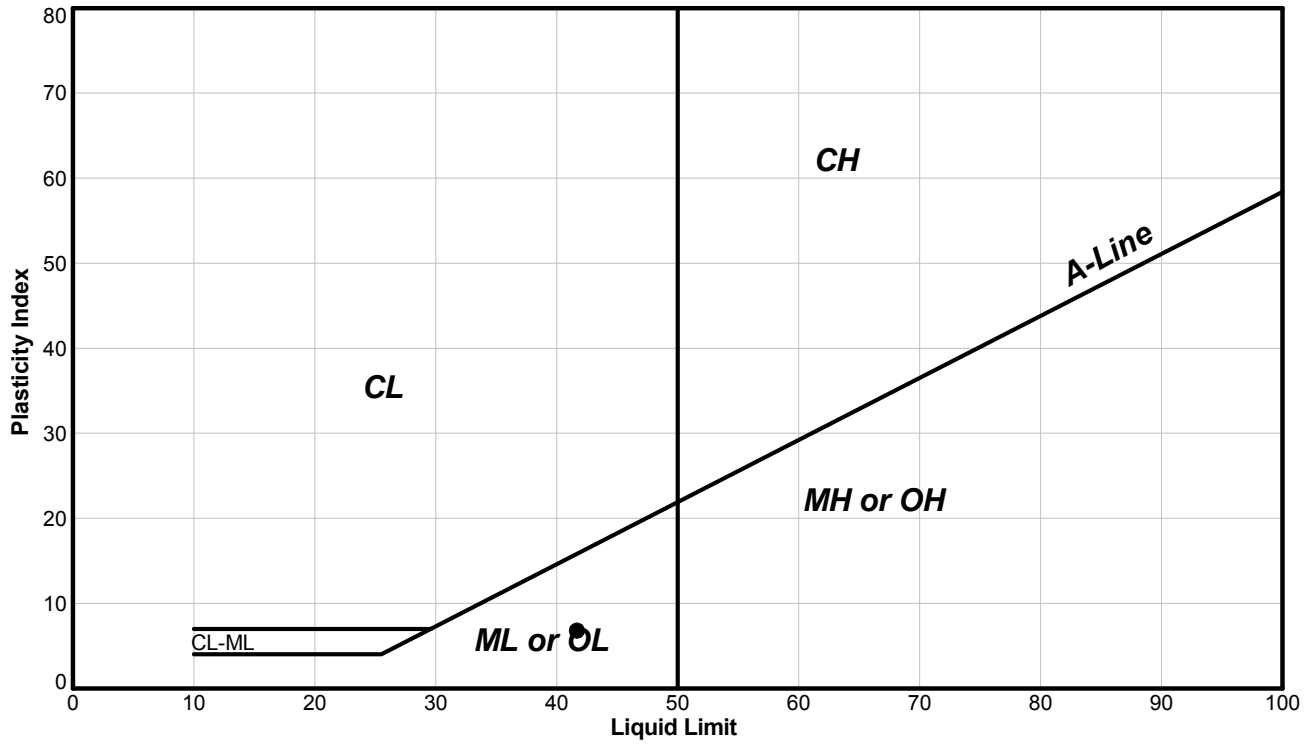
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.80 to 1.00
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-91	1	0.80	1.00	79	42	35	7	49.5	2.1

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

		LP	**15/10/2011**
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

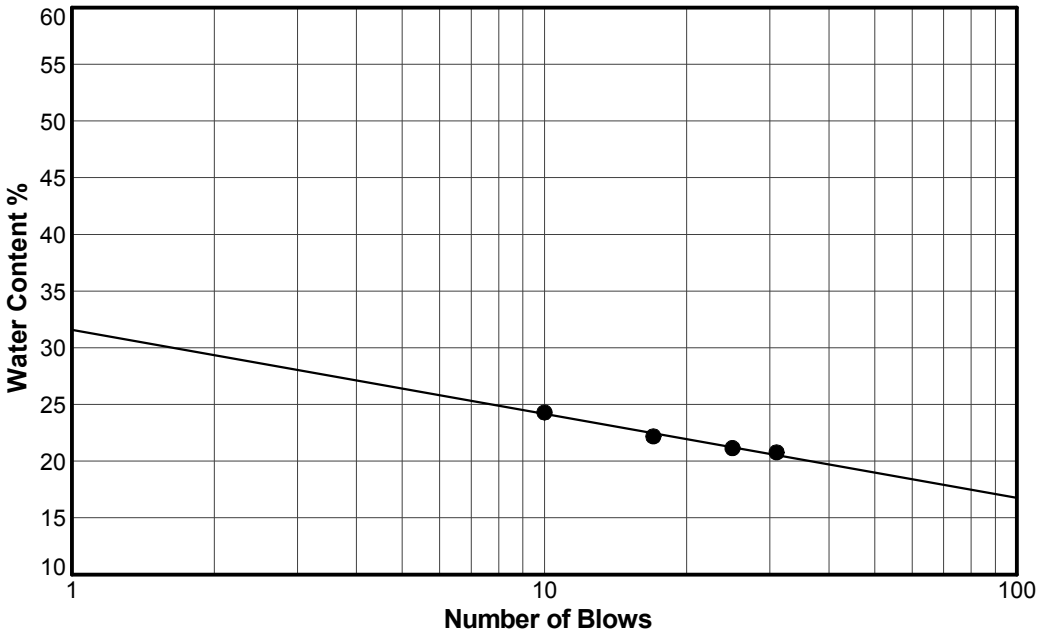
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.60 to 1.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**23**
Liquid Limit	**NP**
Plastic Limit	**NP**
Plasticity Index	**NP**
Natural Water Content (%)	**6.1**
Liquidity Index	**NP**



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SK	28/09/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

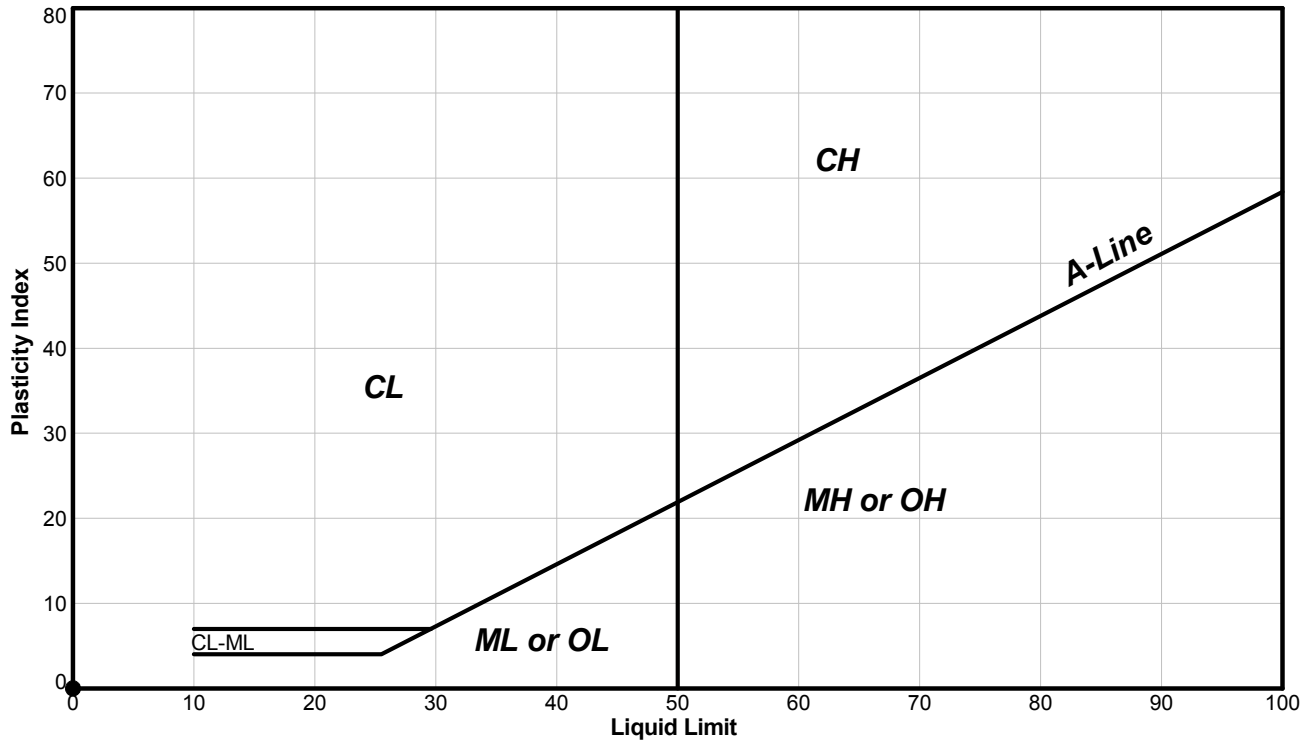
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-91**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.60 to 1.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-91	2	1.60	1.80	23	NP	NP	NP	6.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	28/09/2011	LP	15/10/2011
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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

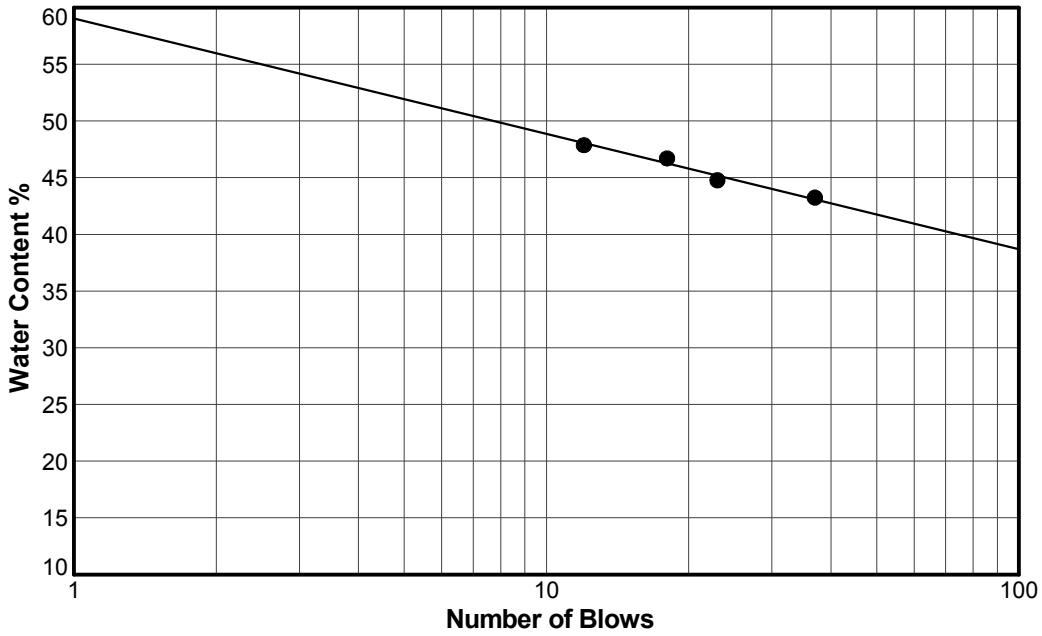
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-92**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**97**
Liquid Limit	**45**
Plastic Limit	**42**
Plasticity Index	**3**
Natural Water Content (%)	**63.6**
Liquidity Index	**7.2**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	05/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

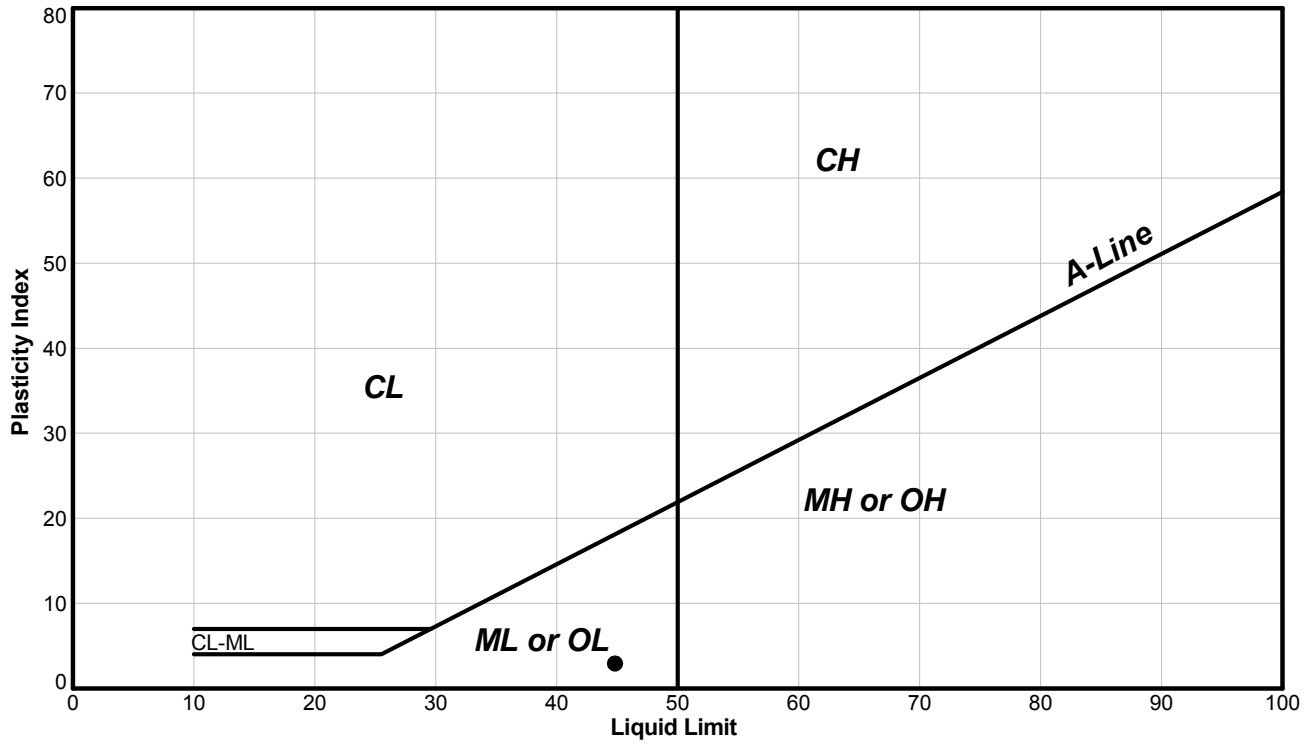
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-92**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 0.60 to 0.80
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-92	1	0.60	0.80	97	45	42	3	63.6	7.2

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

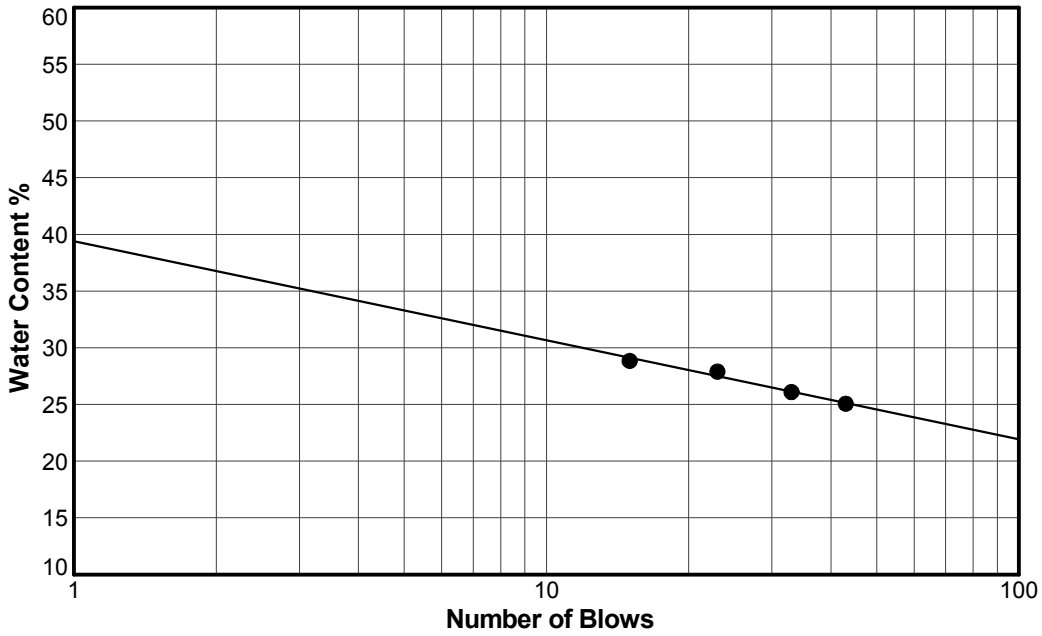
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-94**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.30	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**52**
Liquid Limit	**27**
Plastic Limit	**24**
Plasticity Index	**3**
Natural Water Content (%)	**16.4**
Liquidity Index	**-2.5**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	04/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

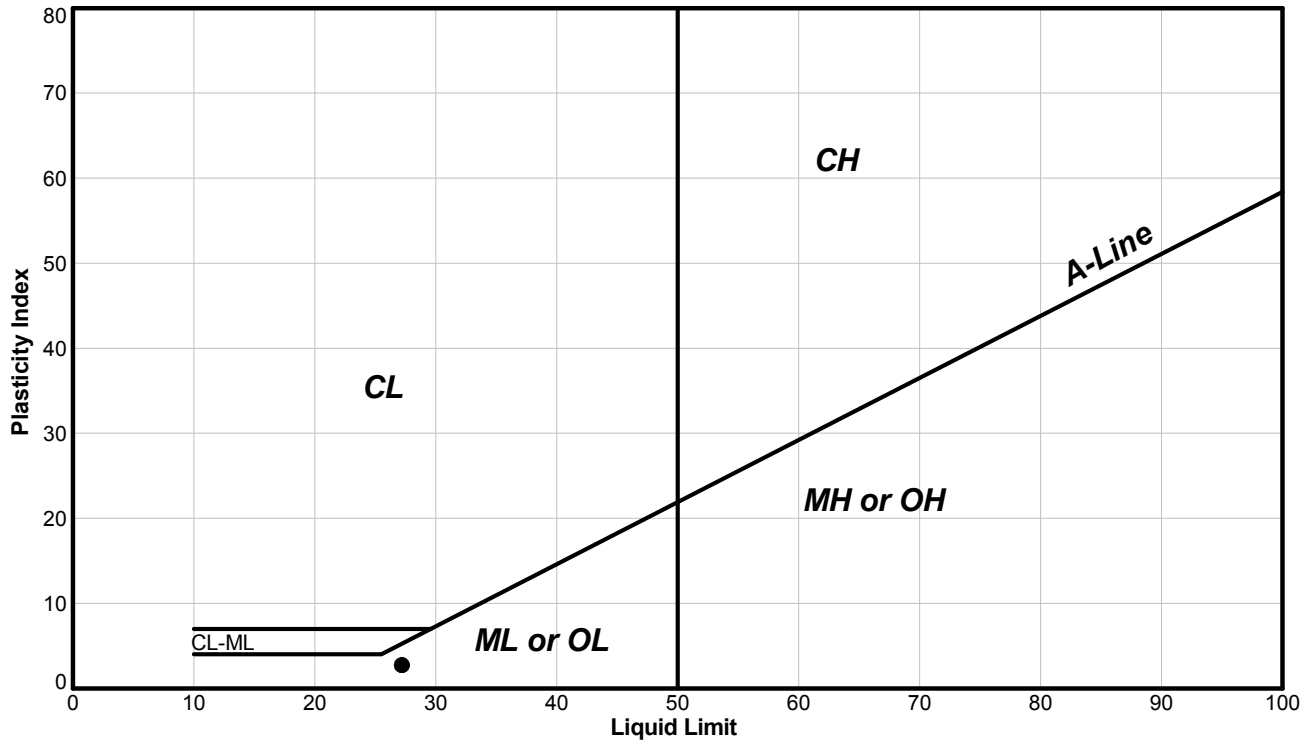
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-94**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 1**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.20 to 1.30
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-94	1	1.20	1.30	52	27	24	3	16.4	-2.5

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	04/10/2011	LP	15/10/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

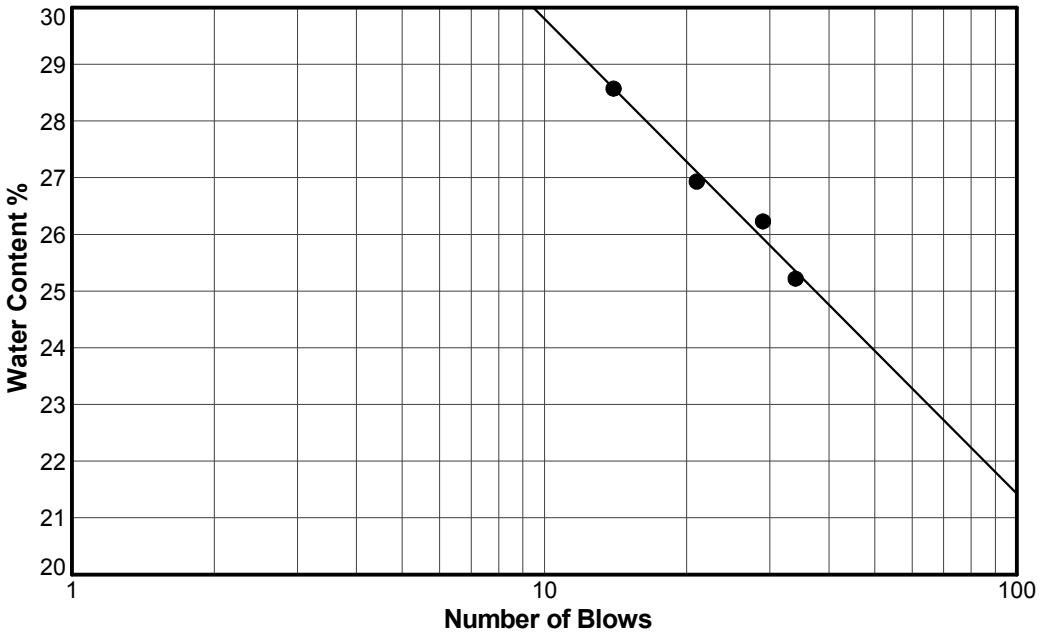
Client:	BGC (Proj 0792-006-04)	**ID: TP-BGC11-96**	
Project:	Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**	
Location:	Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50	
Project No.:	11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141	

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

SUMMARY	
Percent Passing #40 Sieve (%)	**72**
Liquid Limit	**26**
Plastic Limit	**22**
Plasticity Index	**4**
Natural Water Content (%)	**19.8**
Liquidity Index	**-0.6**



Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	03/11/2011	LP	03/11/2011
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

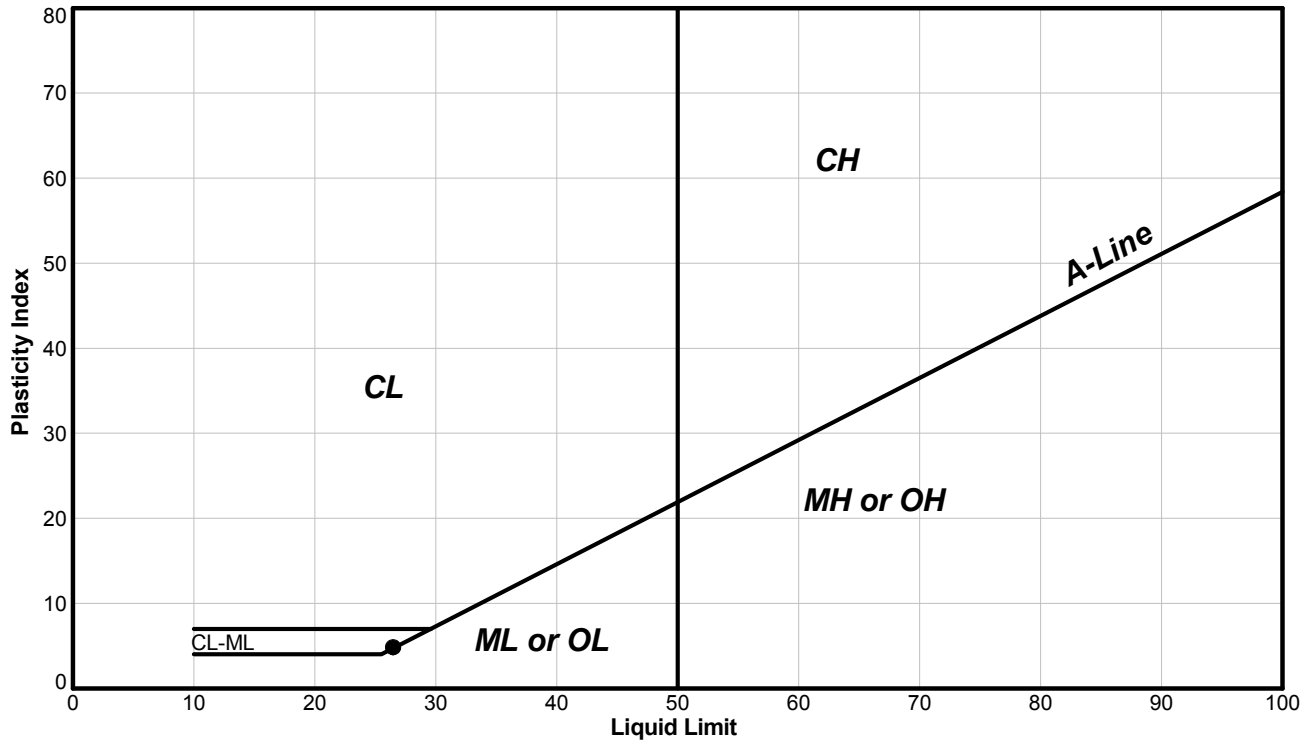
Client: BGC (Proj 0792-006-04)	**ID: TP-BGC11-96**
Project: Eagle Gold Mine Site Infra FS SI	**Sample No.: 2**
Location: Dublin Gulch, Yukon	**Depth Interval (m):** 1.30 to 1.50
Project No.: 11-1415-0029 **Phase:** 7000	**Lab Schedule No.:** 141

Classification and Definition: ML - Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	TP-BGC11-96	2	1.30	1.50	72	26	22	4	19.8	-0.6

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

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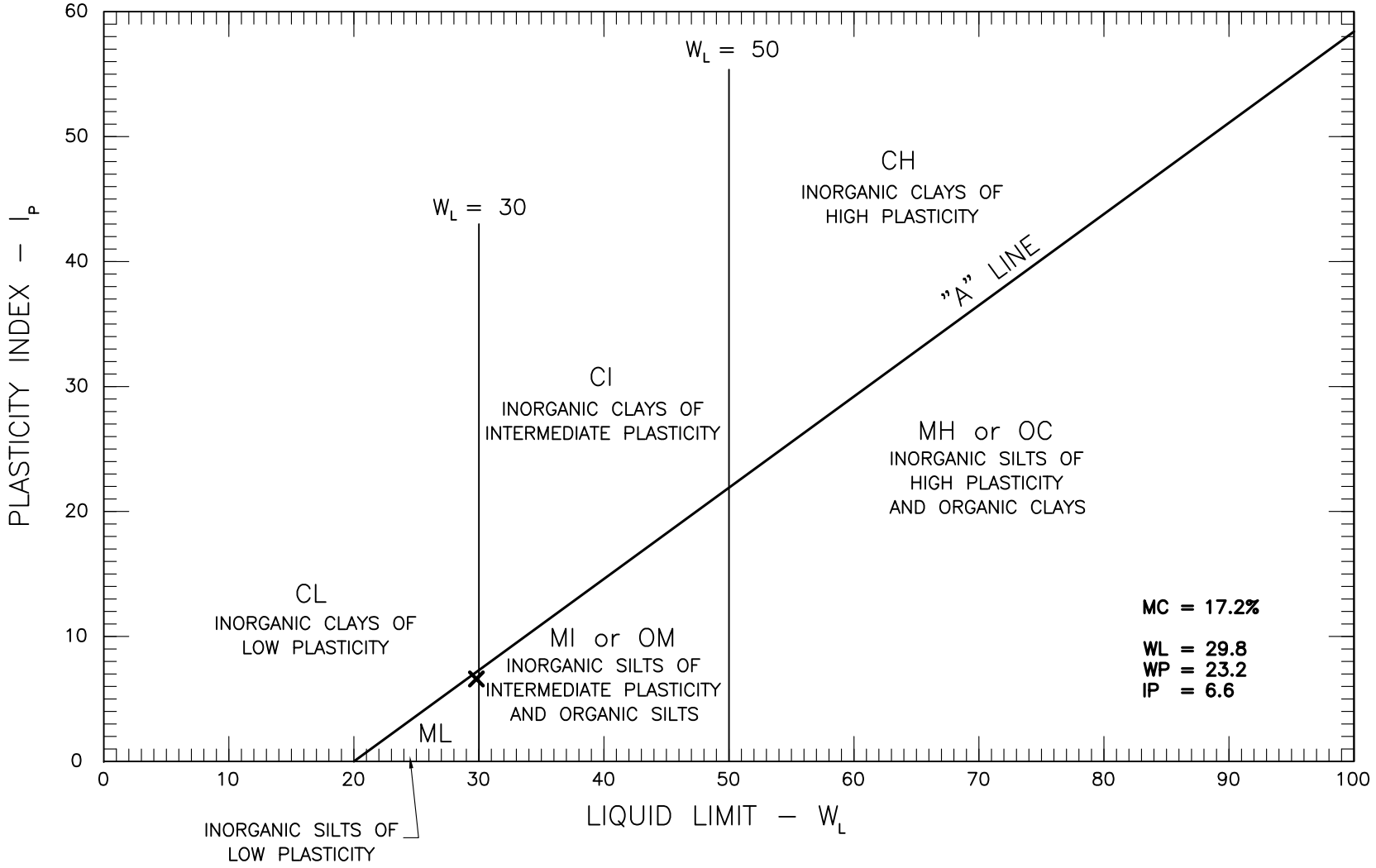

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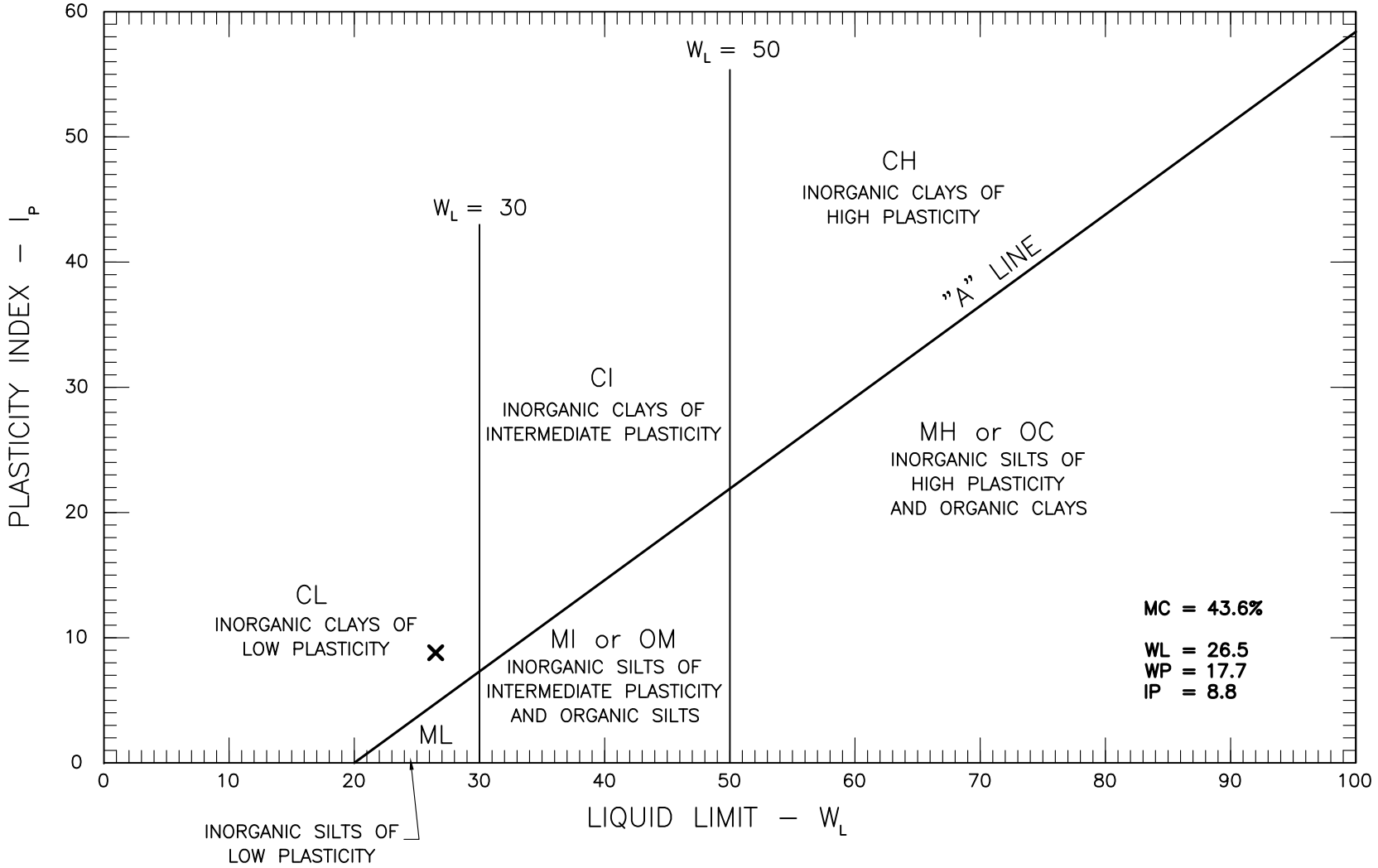
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-42-S2

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH42-S2



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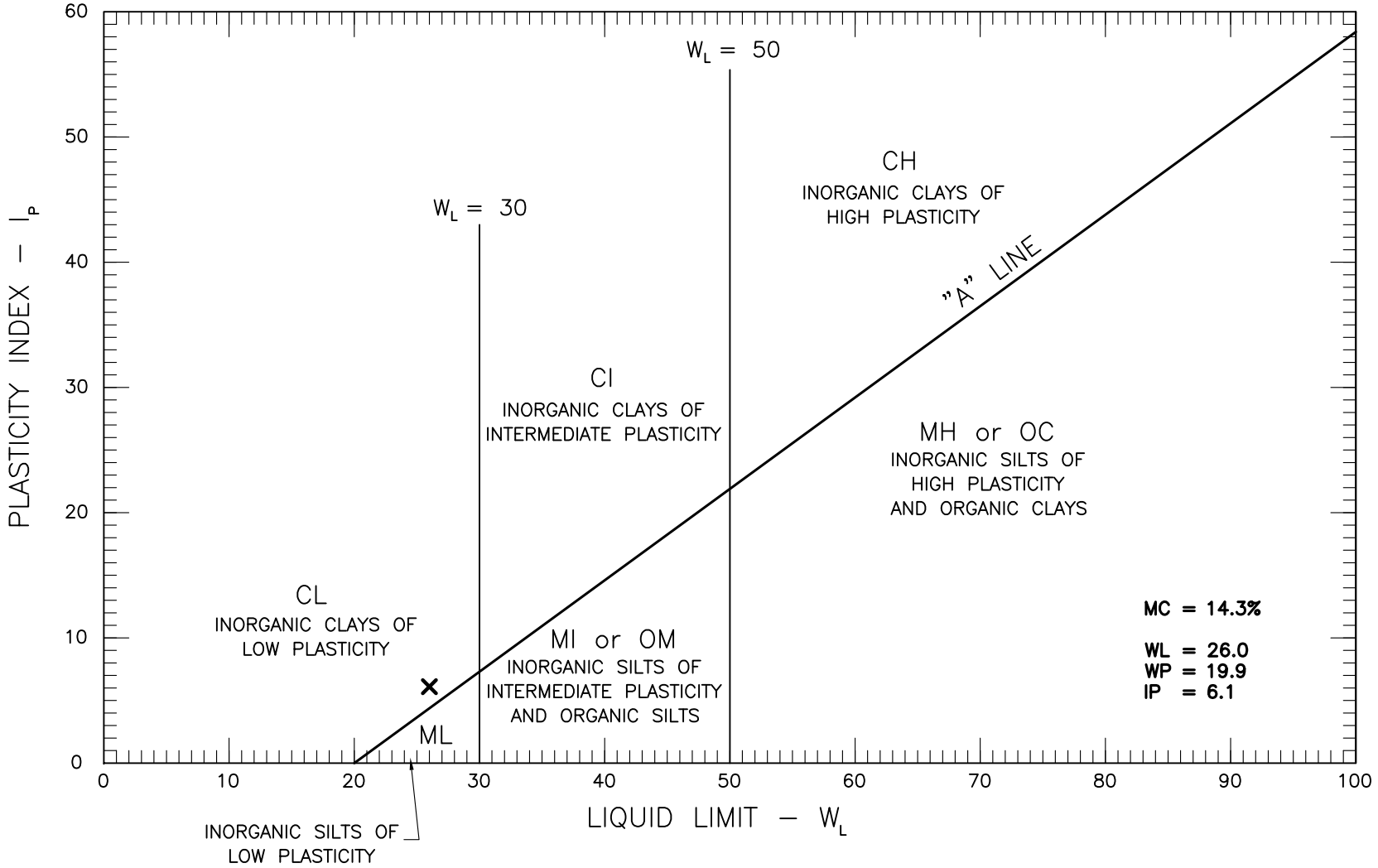
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S5

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH42-S5



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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S1

PROJECT NO.
K-3300

PLATE NO.
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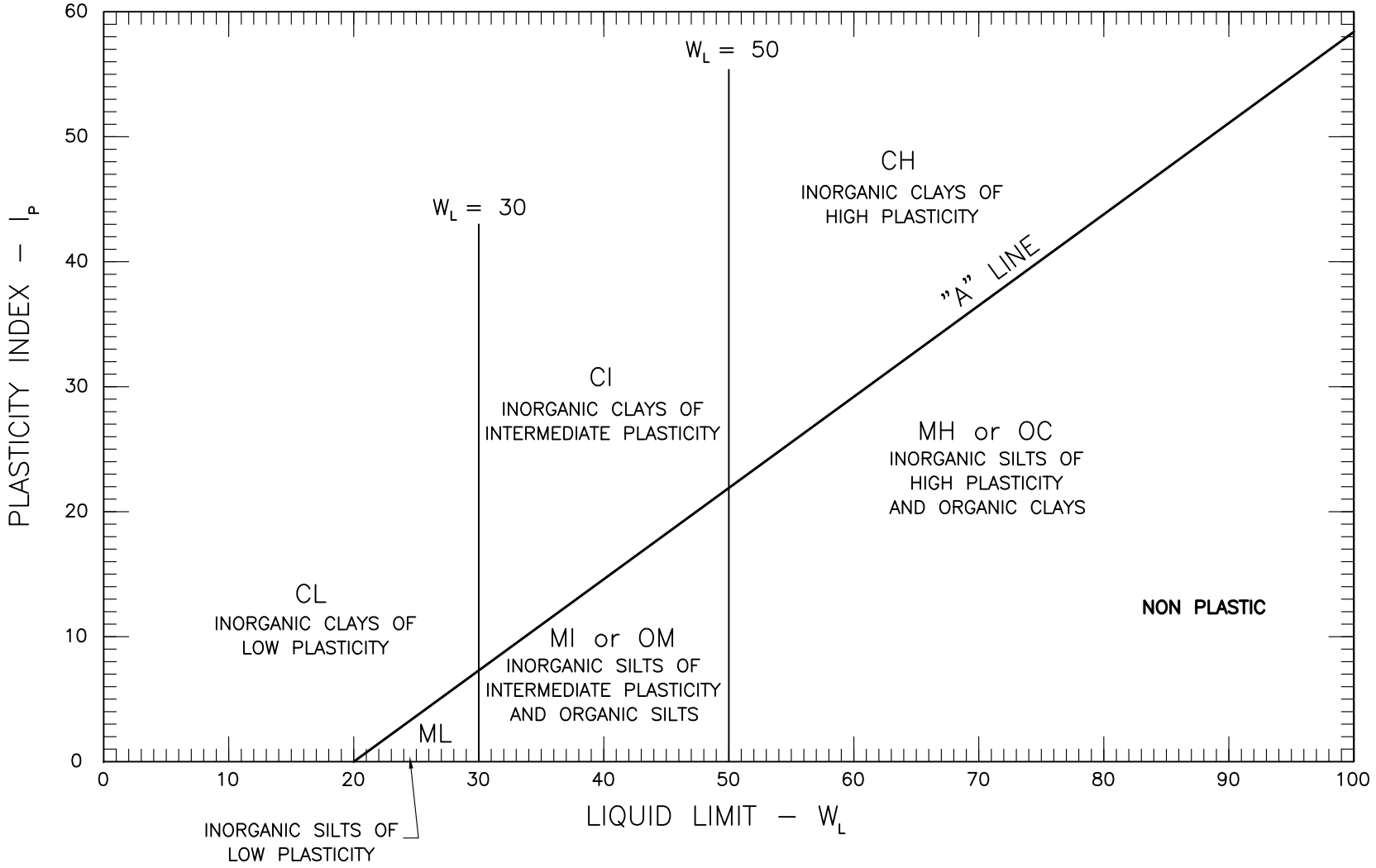

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S3

PROJECT NO.
K-3300

PLATE NO.
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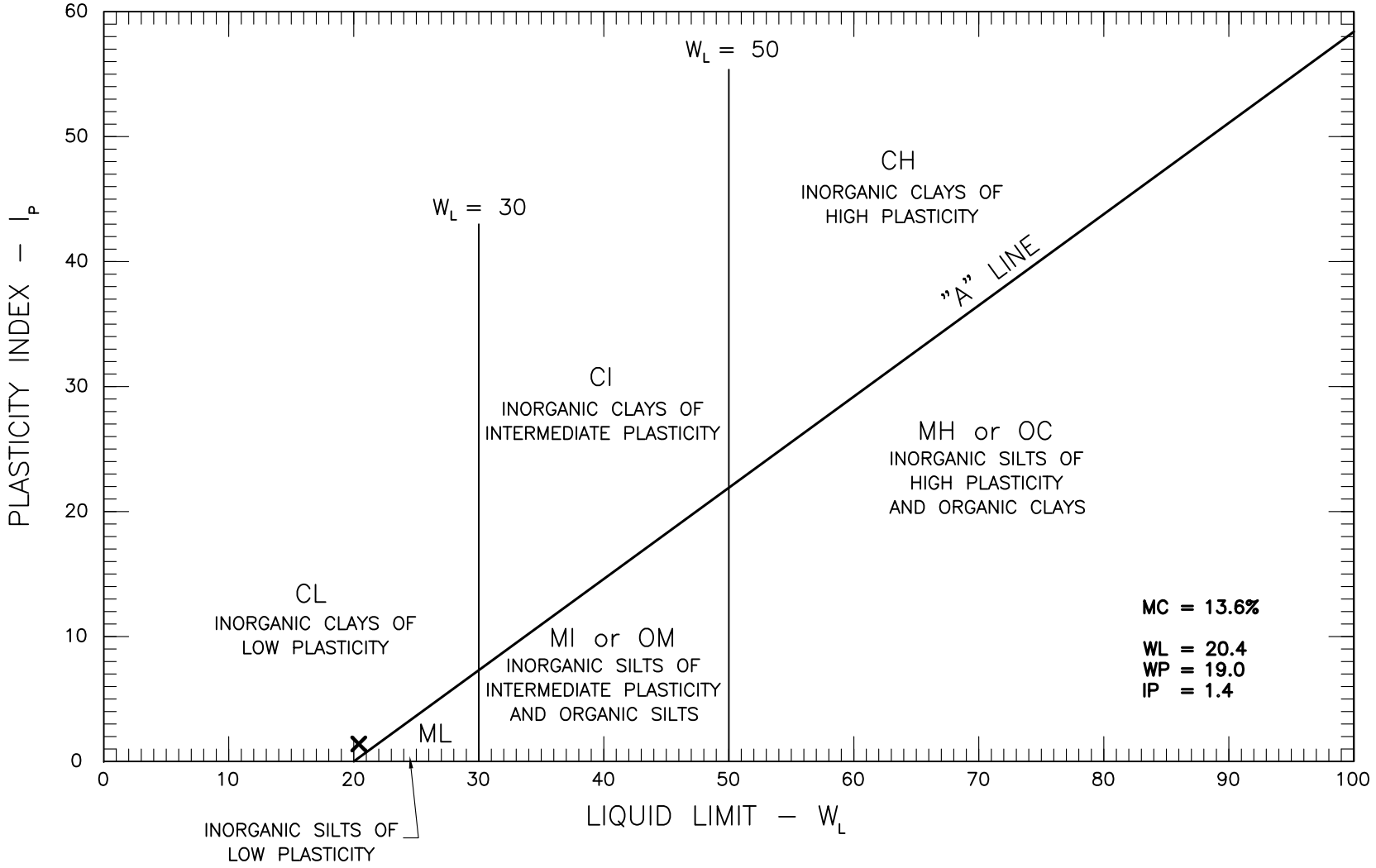

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S5

PROJECT NO.
K-3300

PLATE NO.
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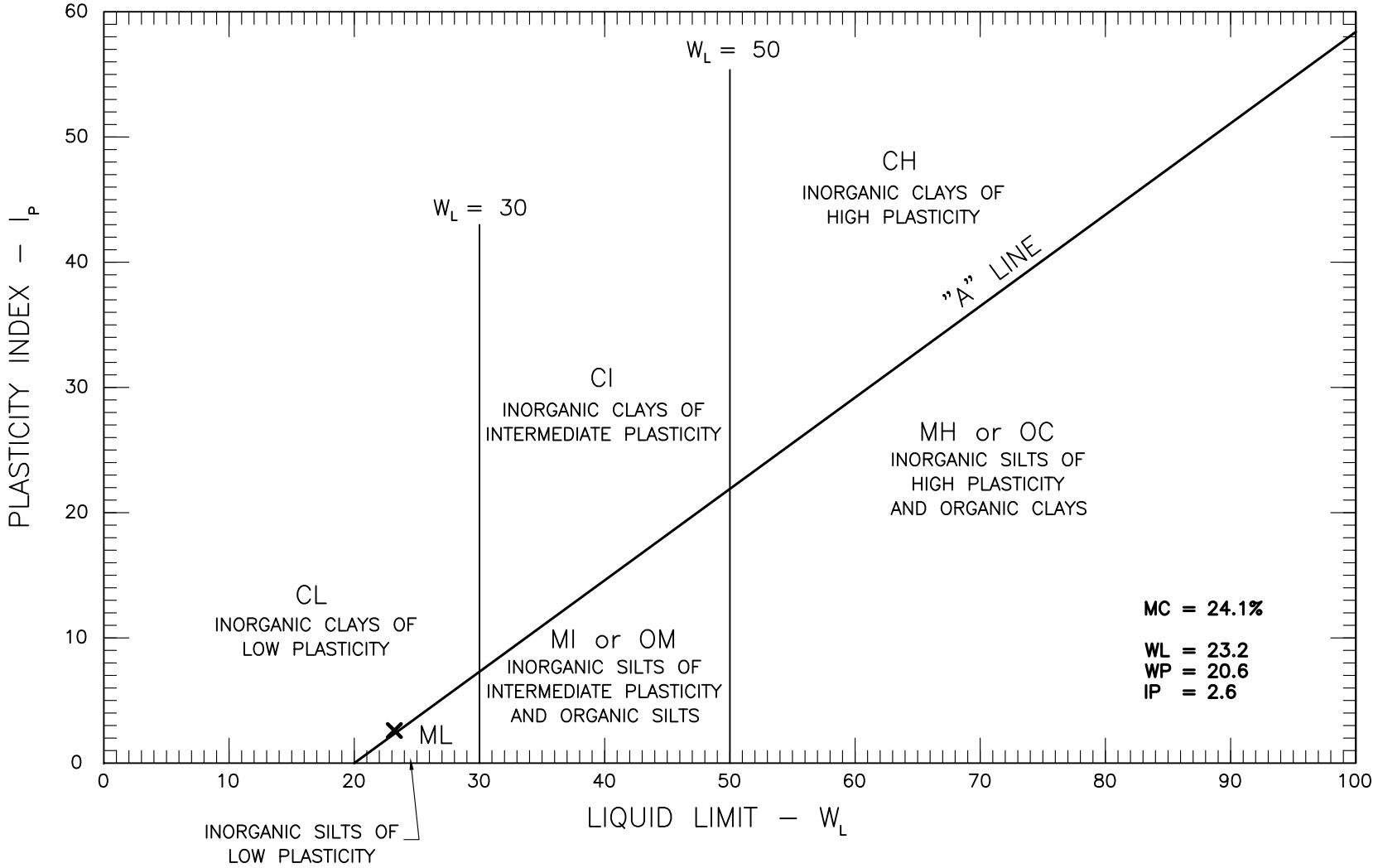

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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S7

PROJECT NO.
K-3300

PLATE NO.
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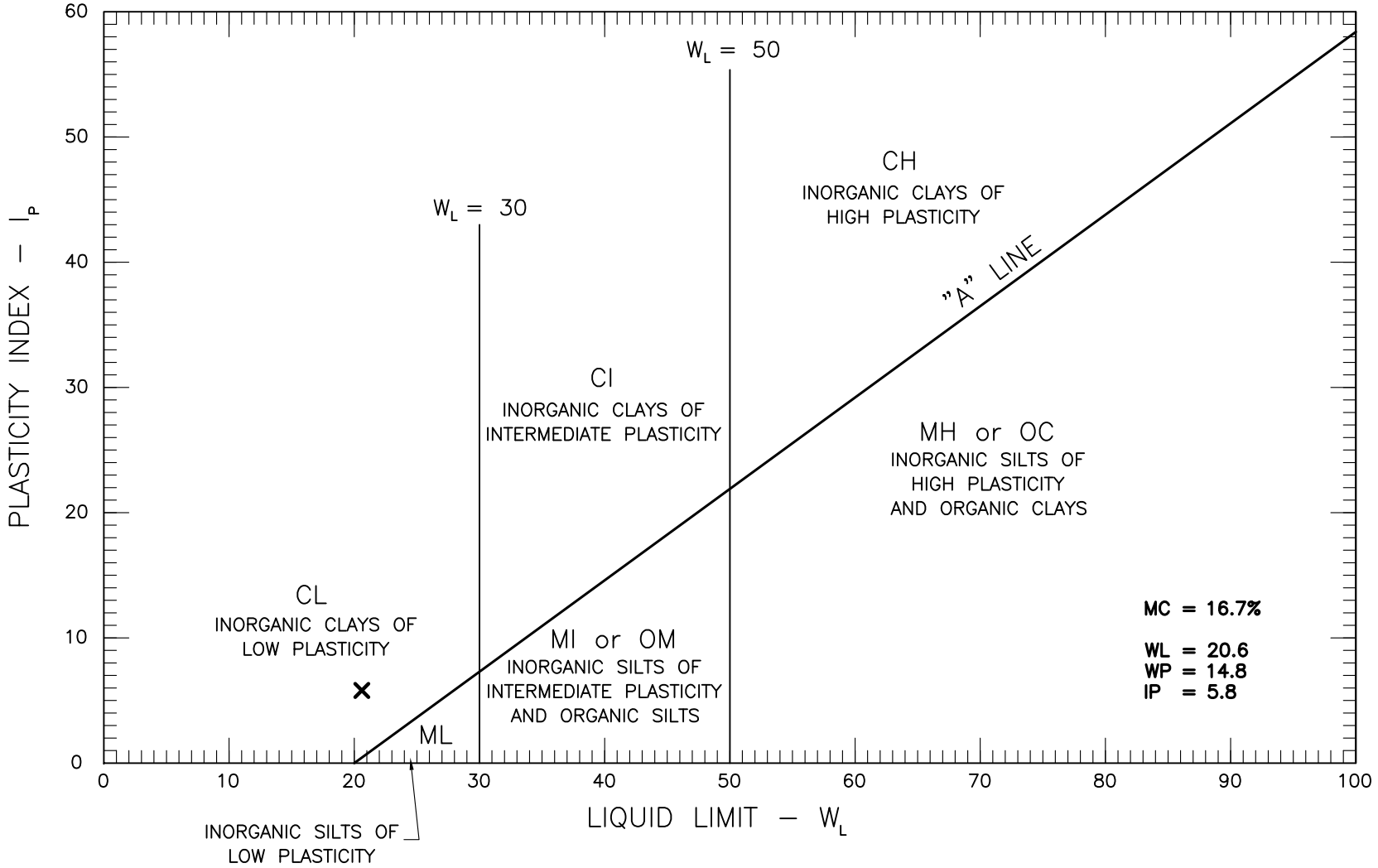

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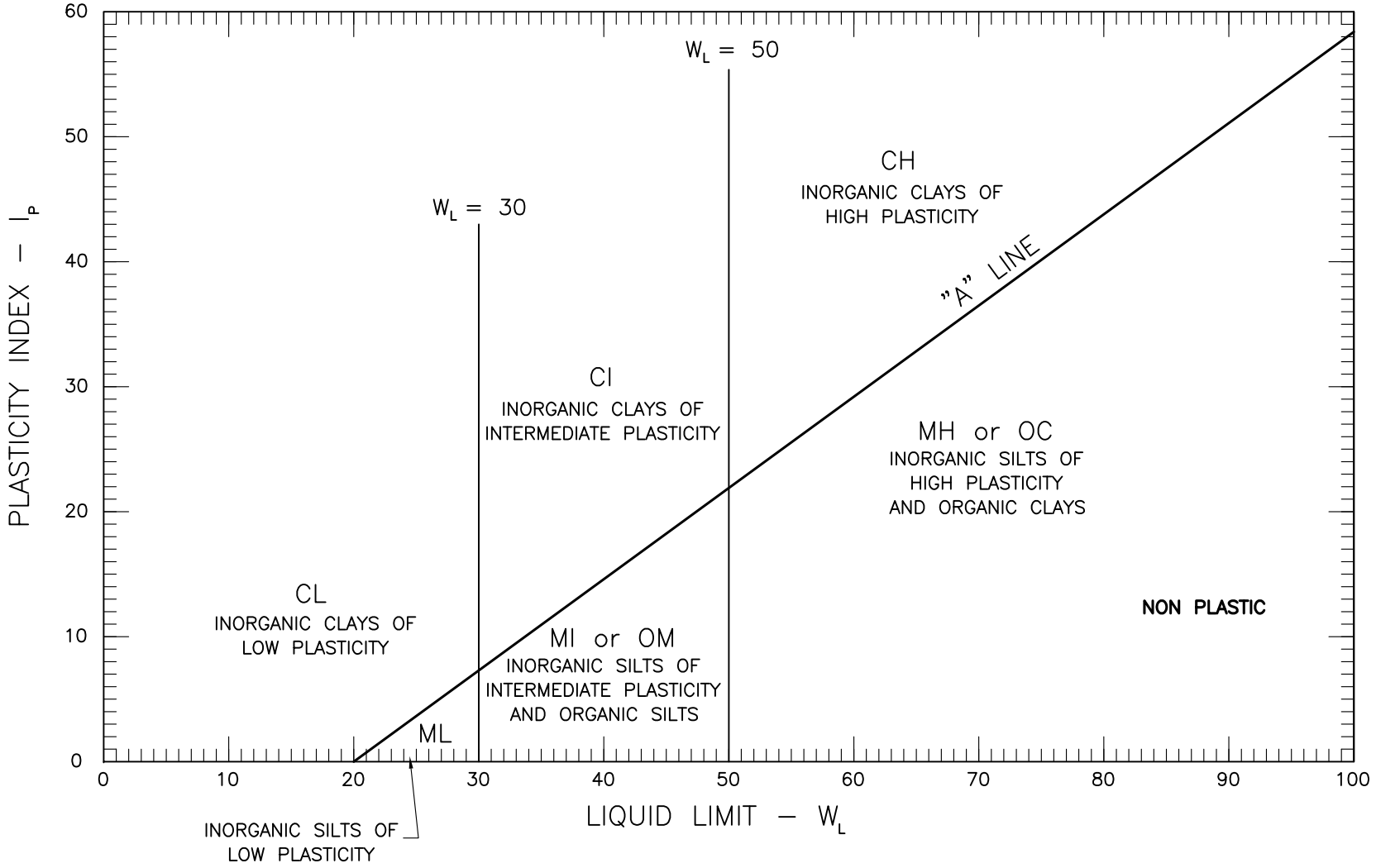
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-S11

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH44-S11



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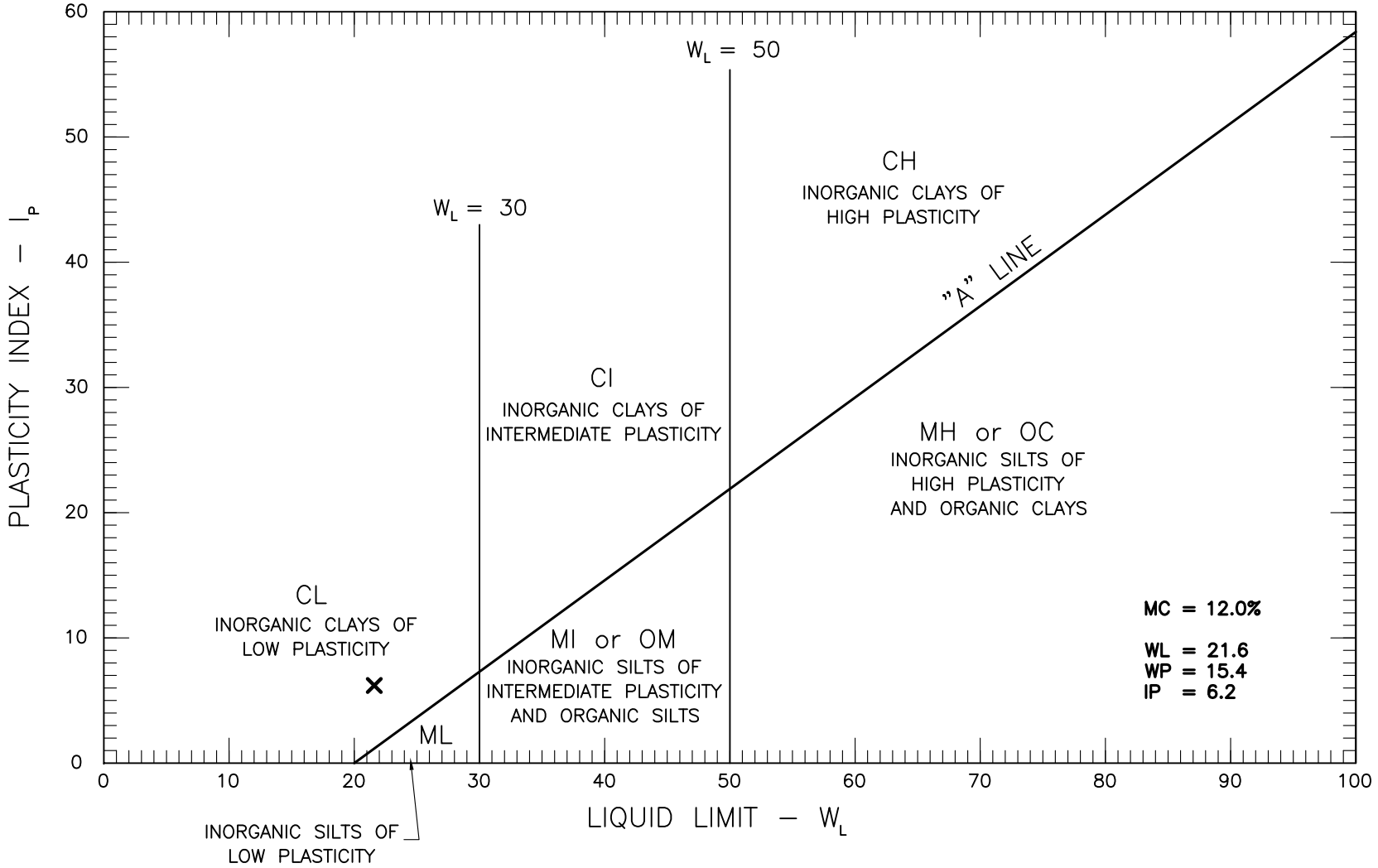
ATTERBERG LIMITS OF BH-BGC11-44-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH44-SPT2



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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-SPT10

PROJECT NO.
K-3300

PLATE NO.
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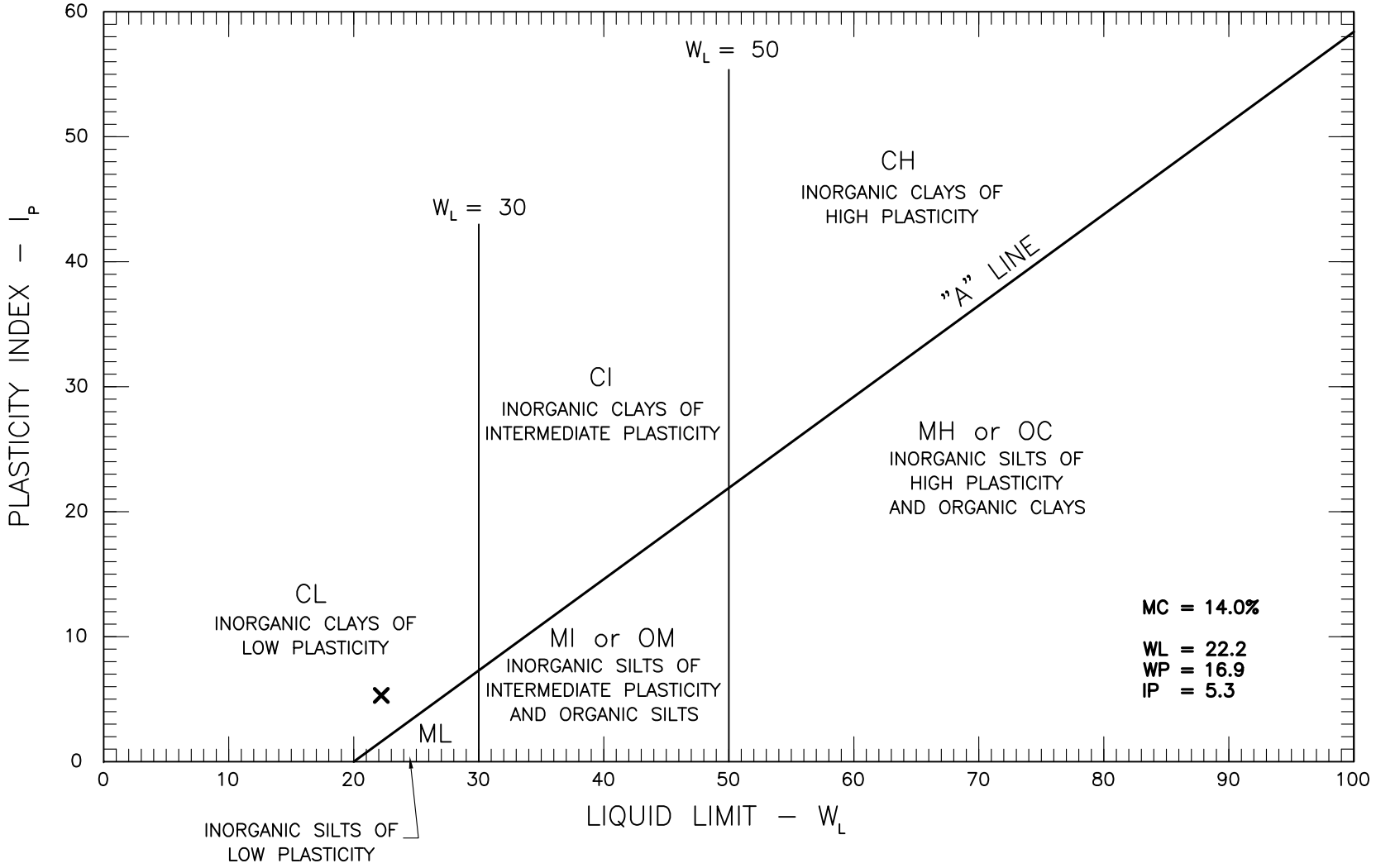

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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-44-SPT11

PROJECT NO.
K-3300

PLATE NO.
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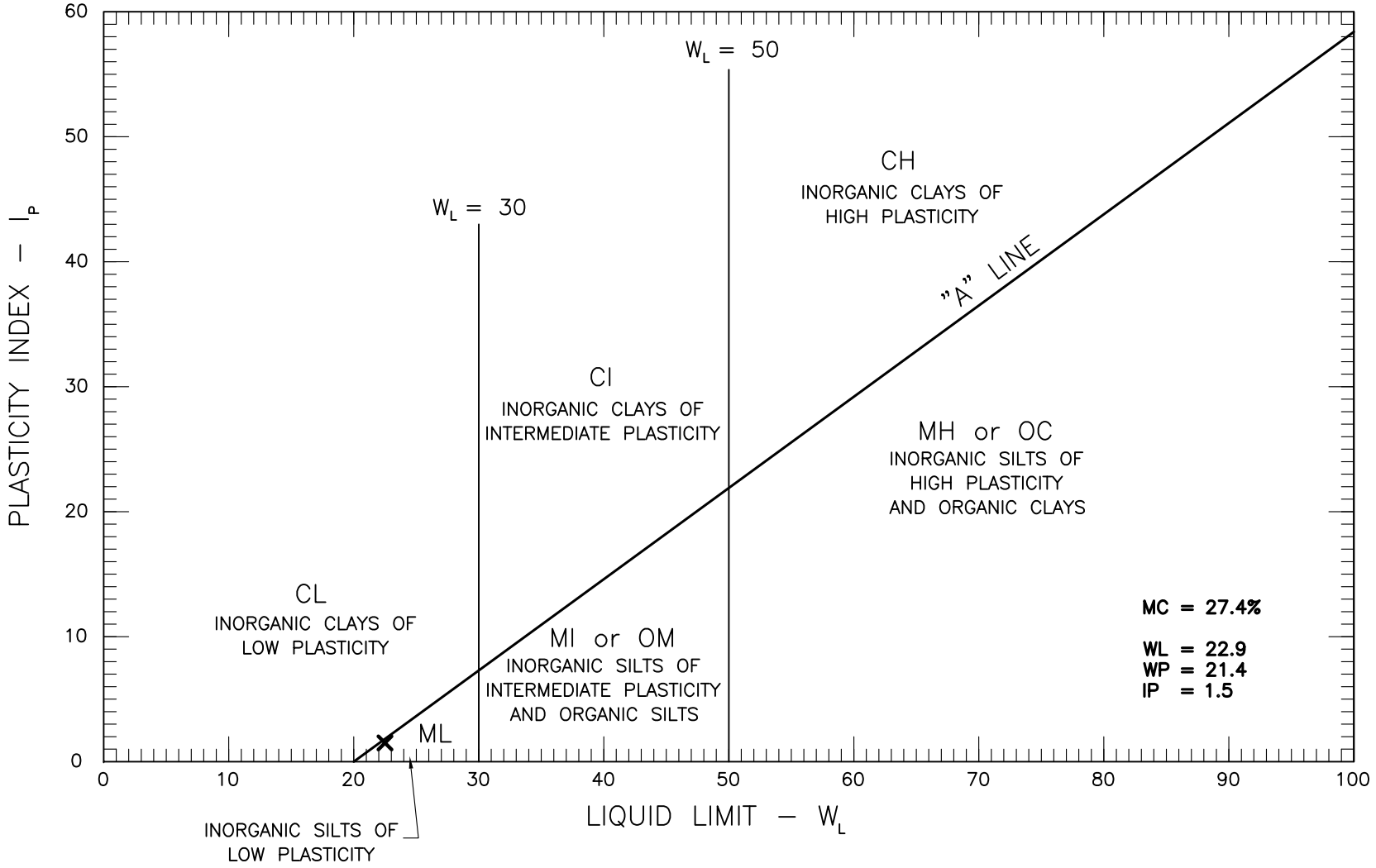

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EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-47-G3

PROJECT NO.
K-3300

PLATE NO.
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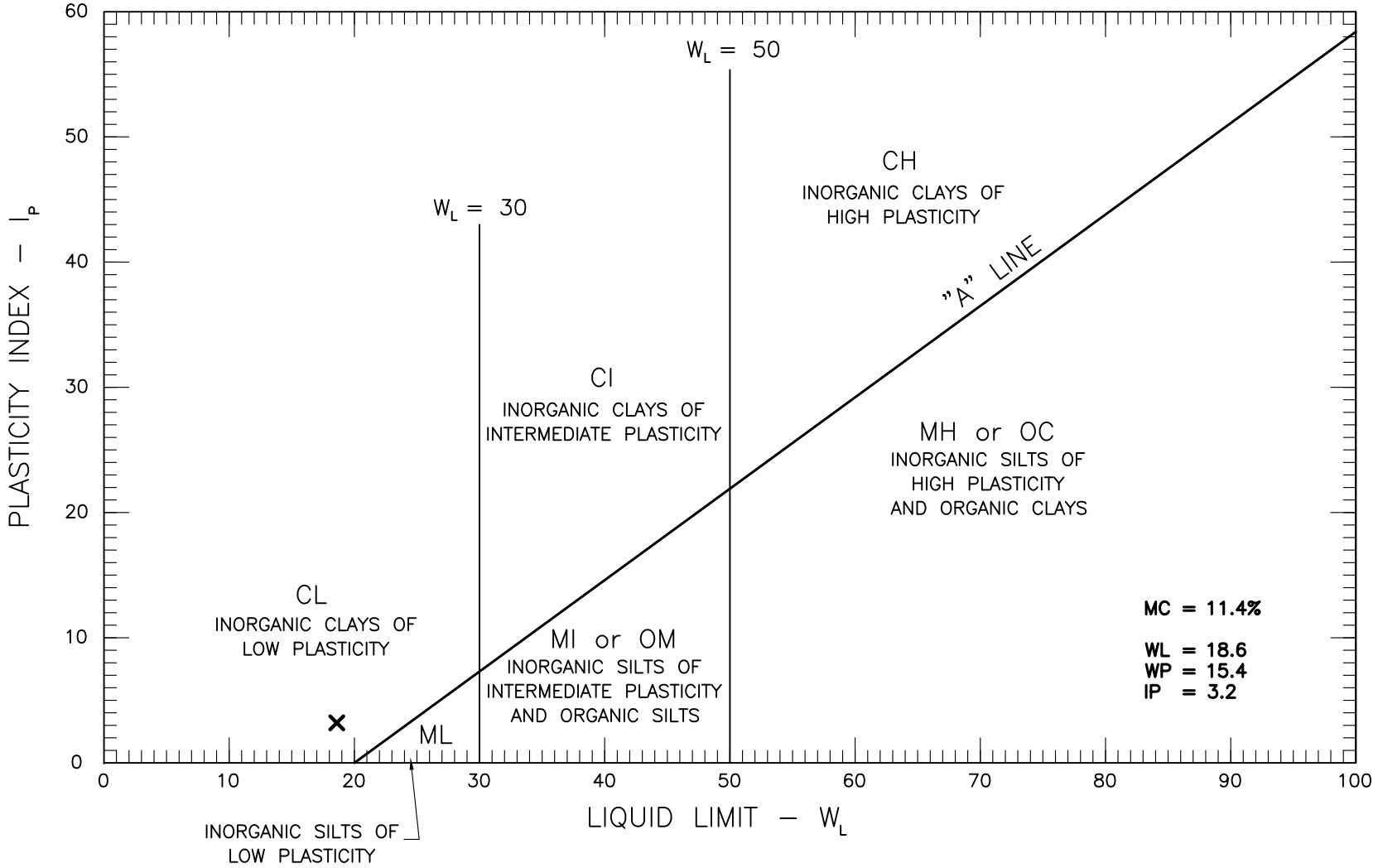

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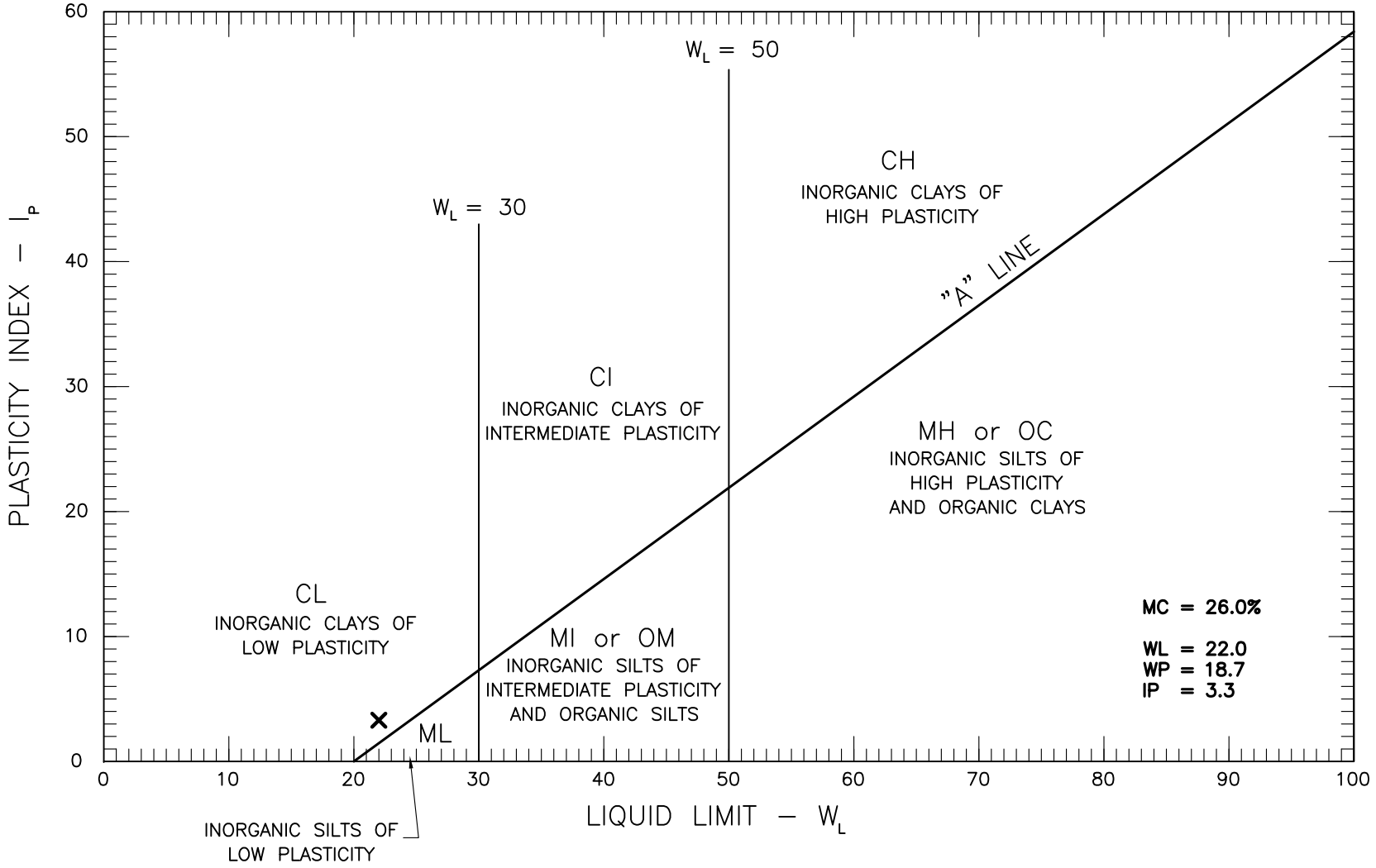
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-47-G10

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH47-G10



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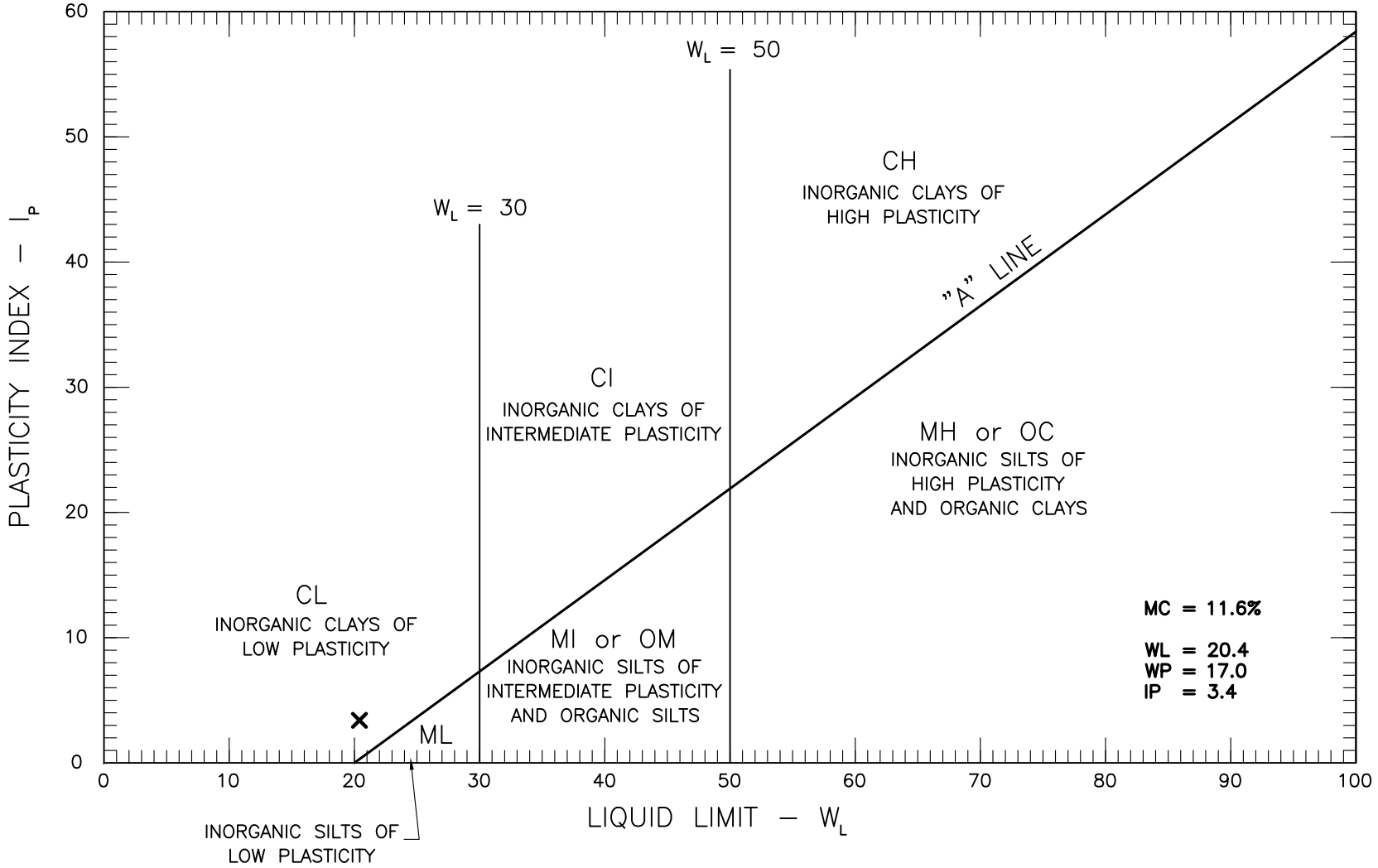
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-47-SPT1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH47-SPT1



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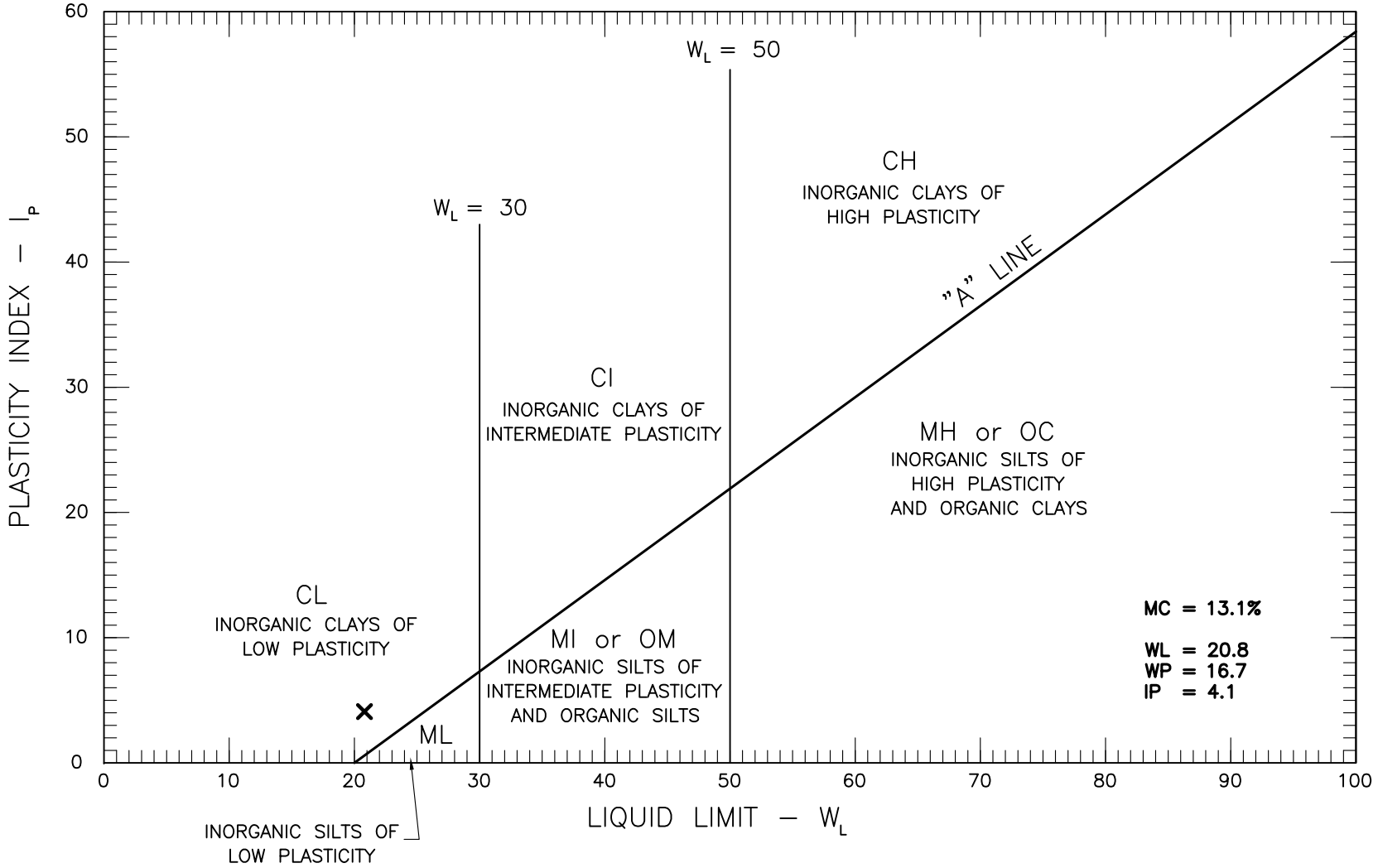
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-49-G4

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH49-G4



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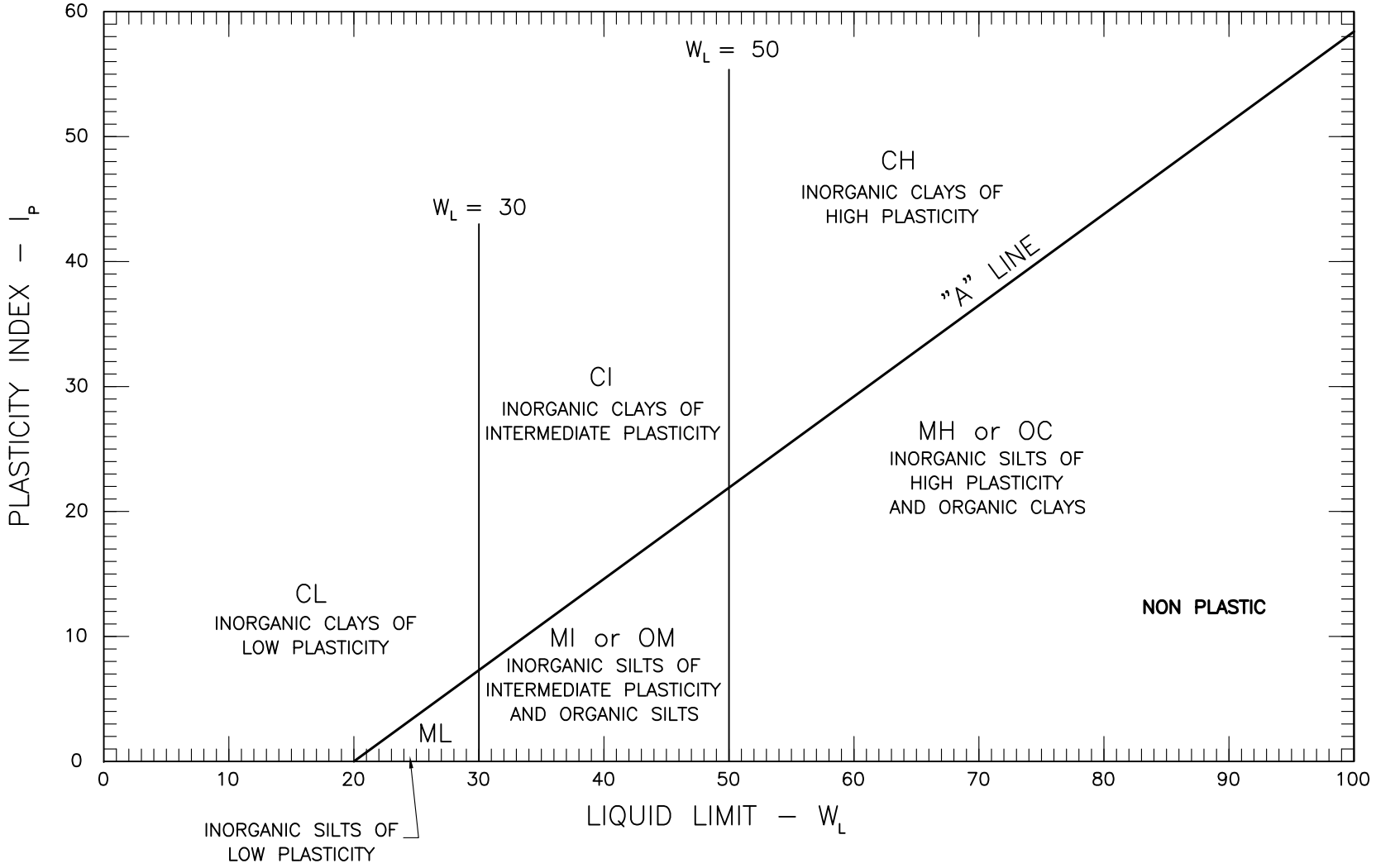
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-49-G6

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH49-G6



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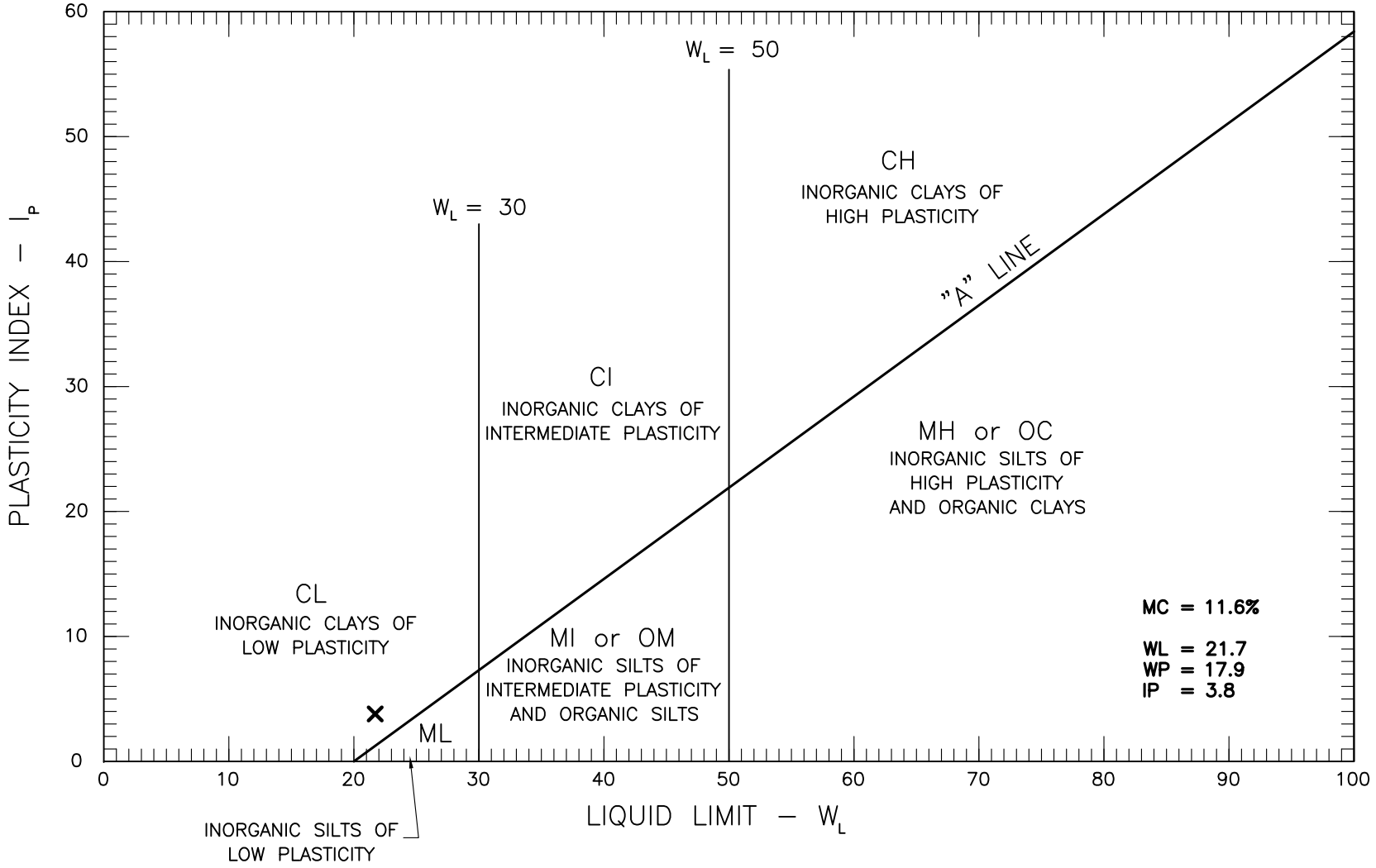
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-49-G8

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH49-G8



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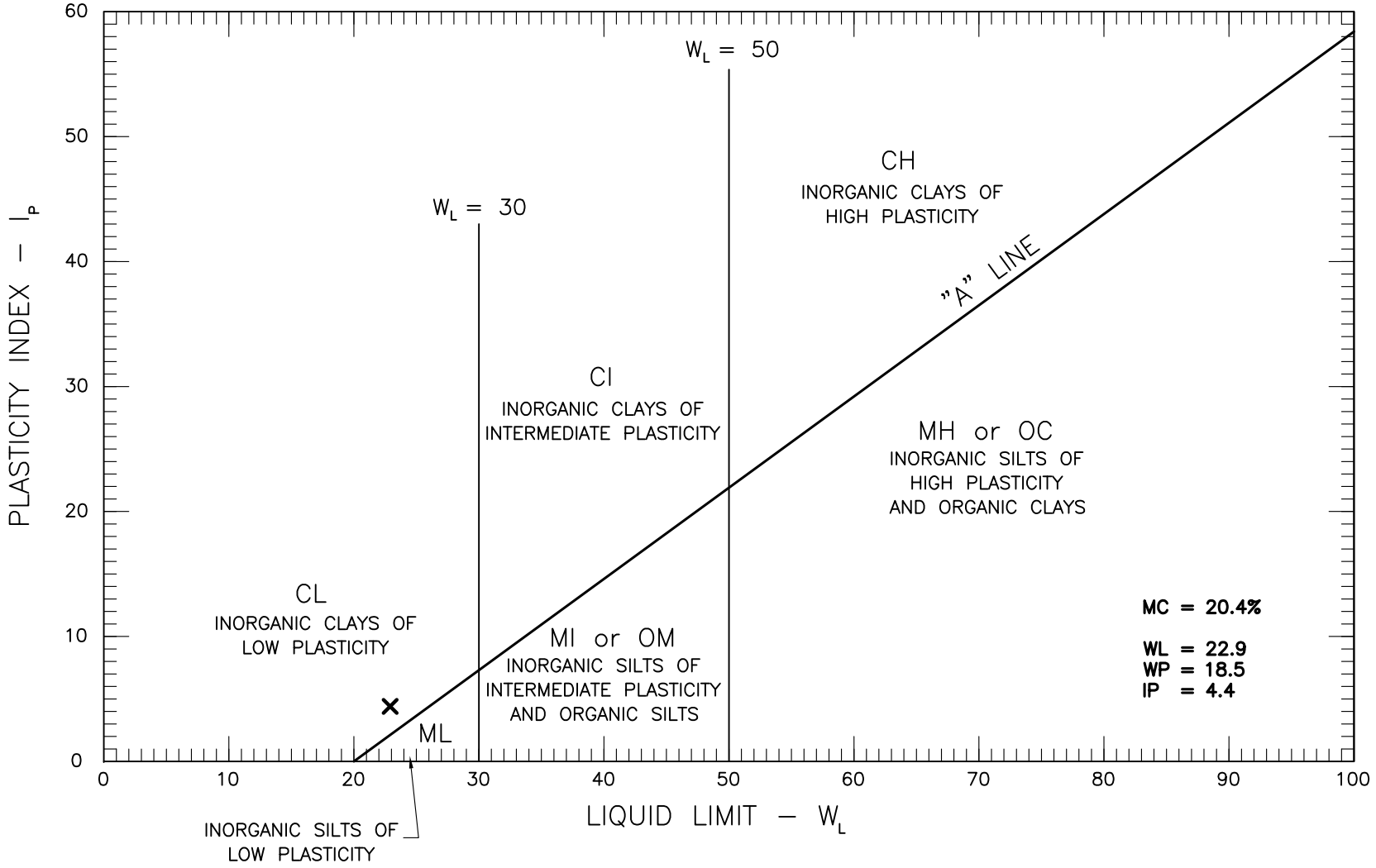
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-49-G10

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH49-G10



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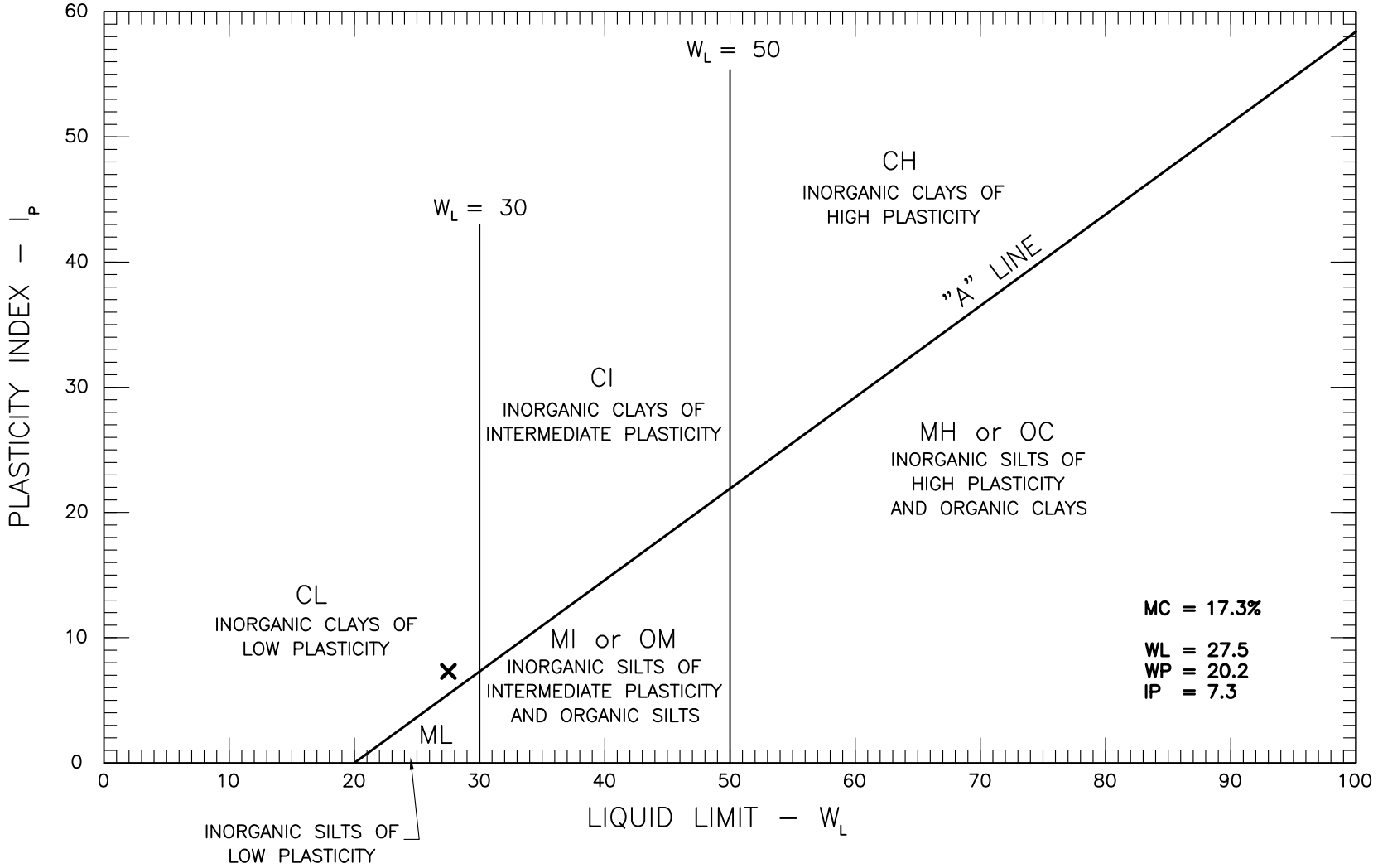
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-49-SPT2

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH49-SPT2



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-51-G6

PROJECT NO.
K-3300

PLATE NO.
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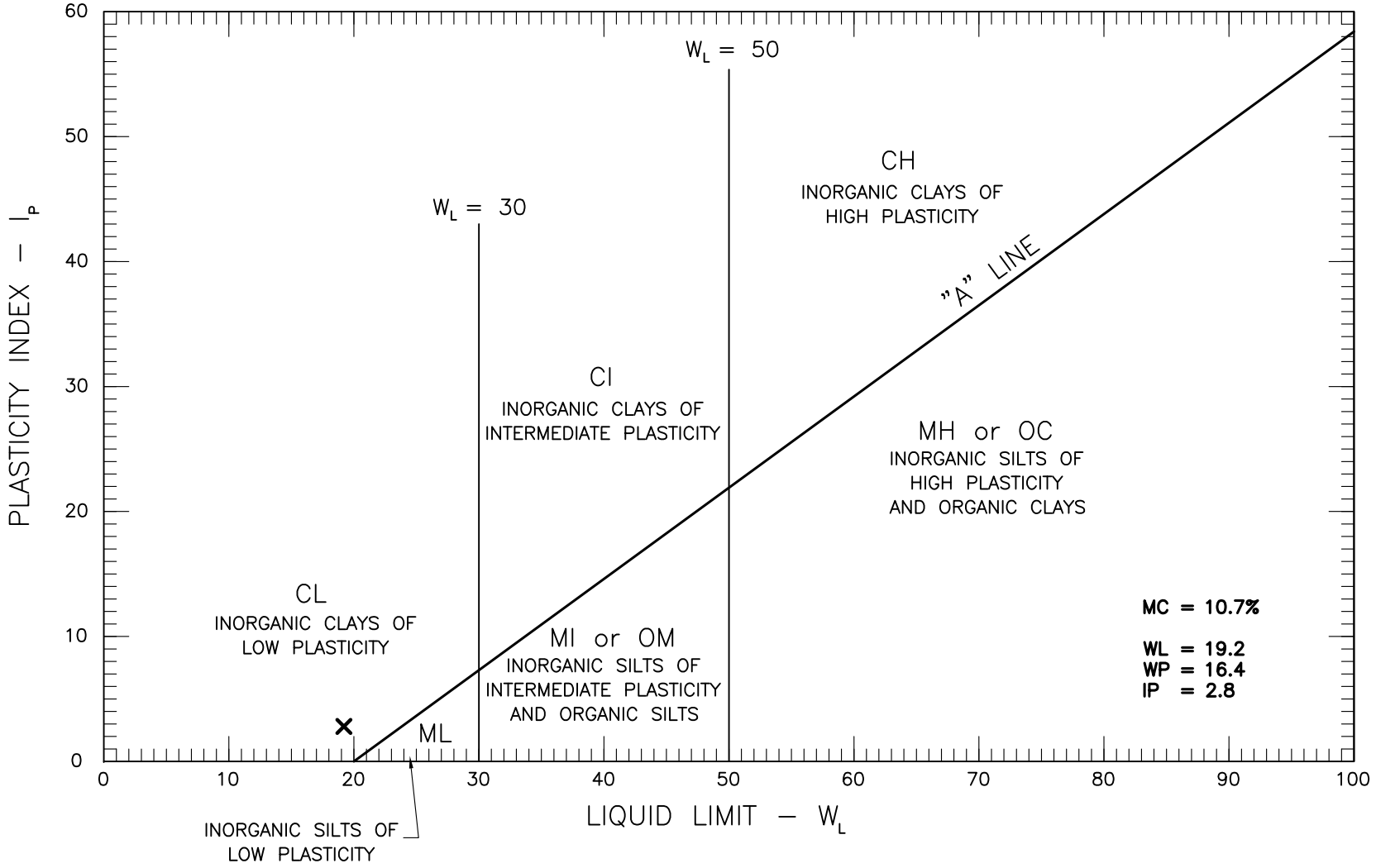

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BGC ENGINEERING INC.
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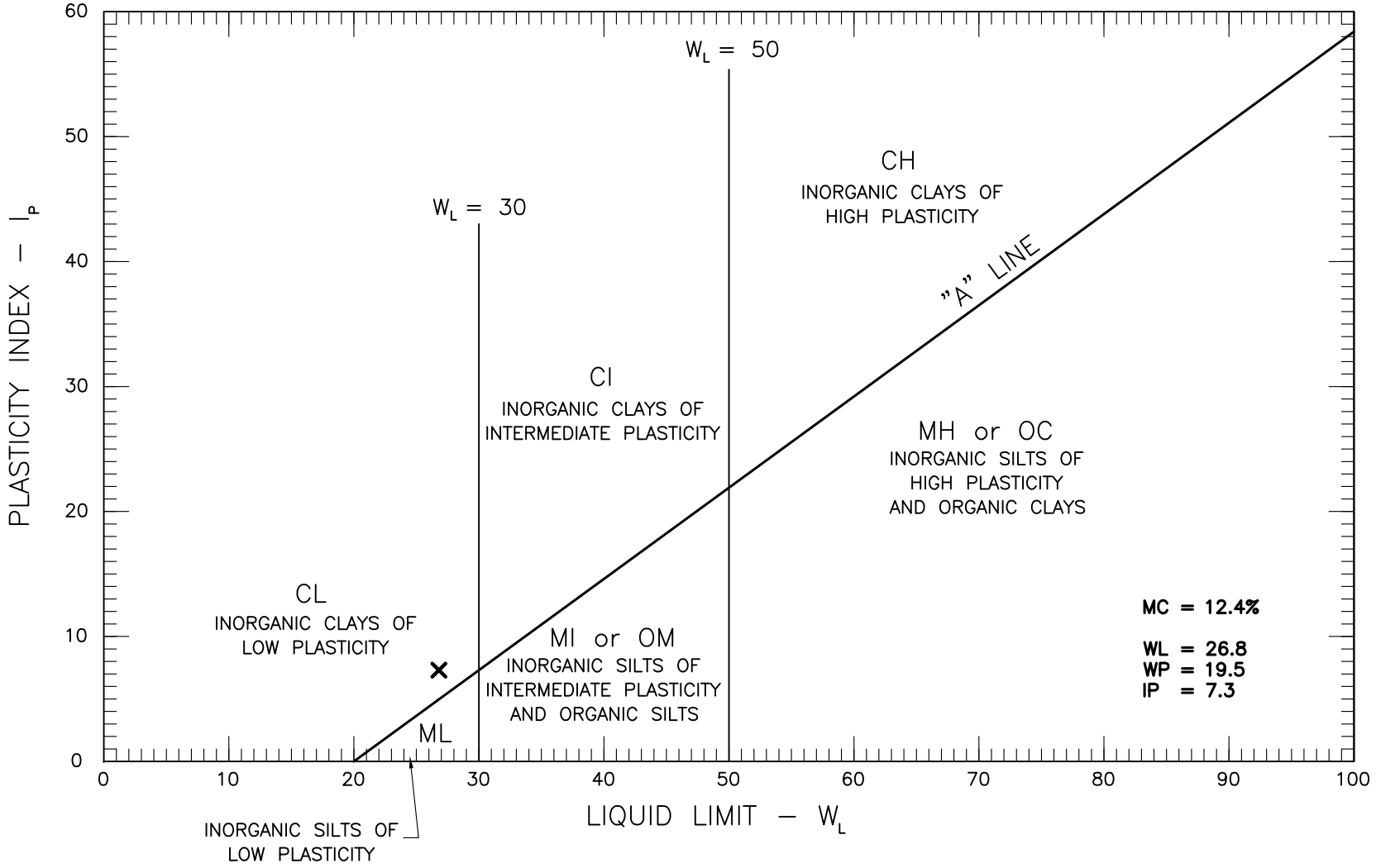
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-51-G10

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH51-G10



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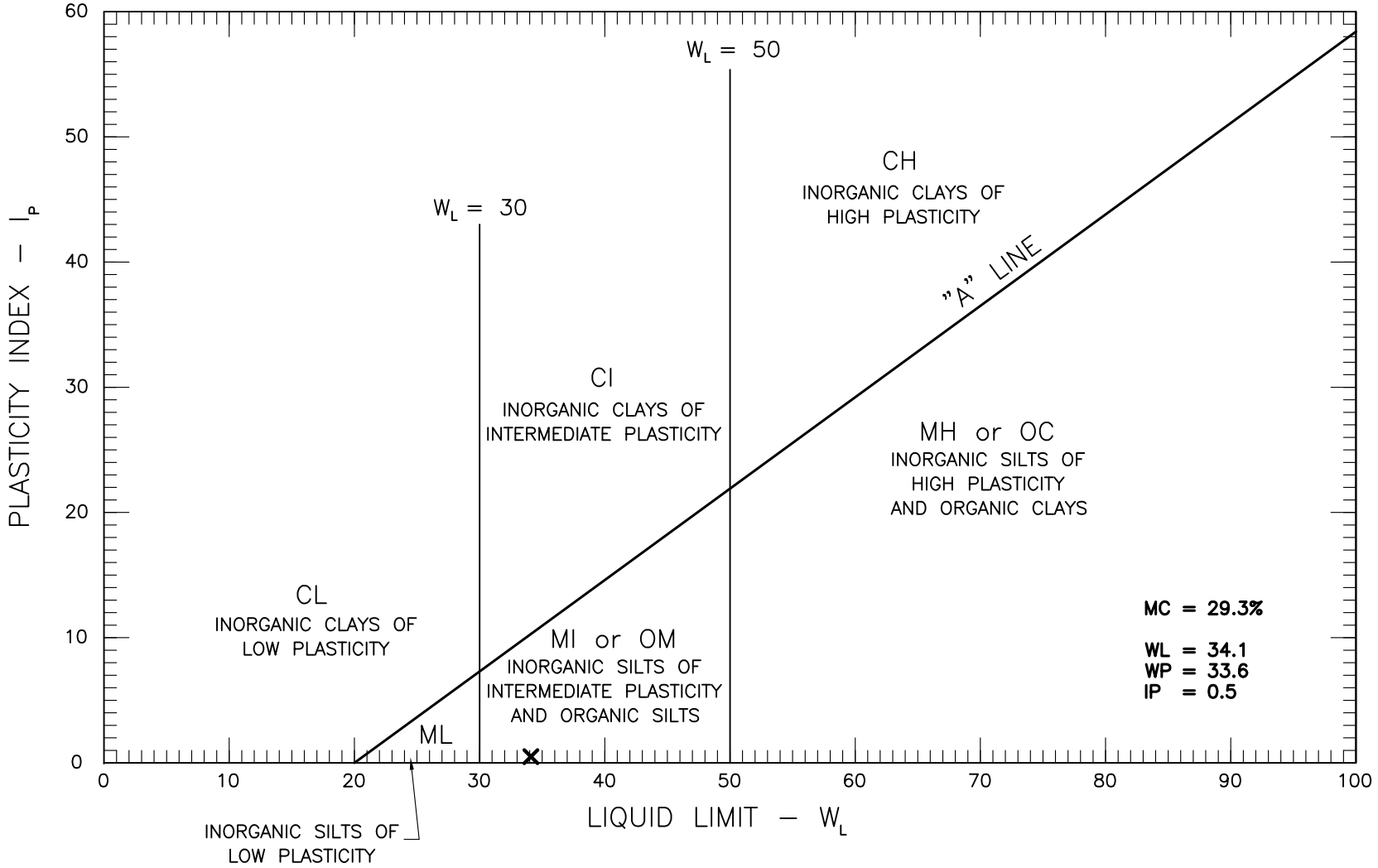
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-51-SPT1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH51-SPT1



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BGC ENGINEERING INC.
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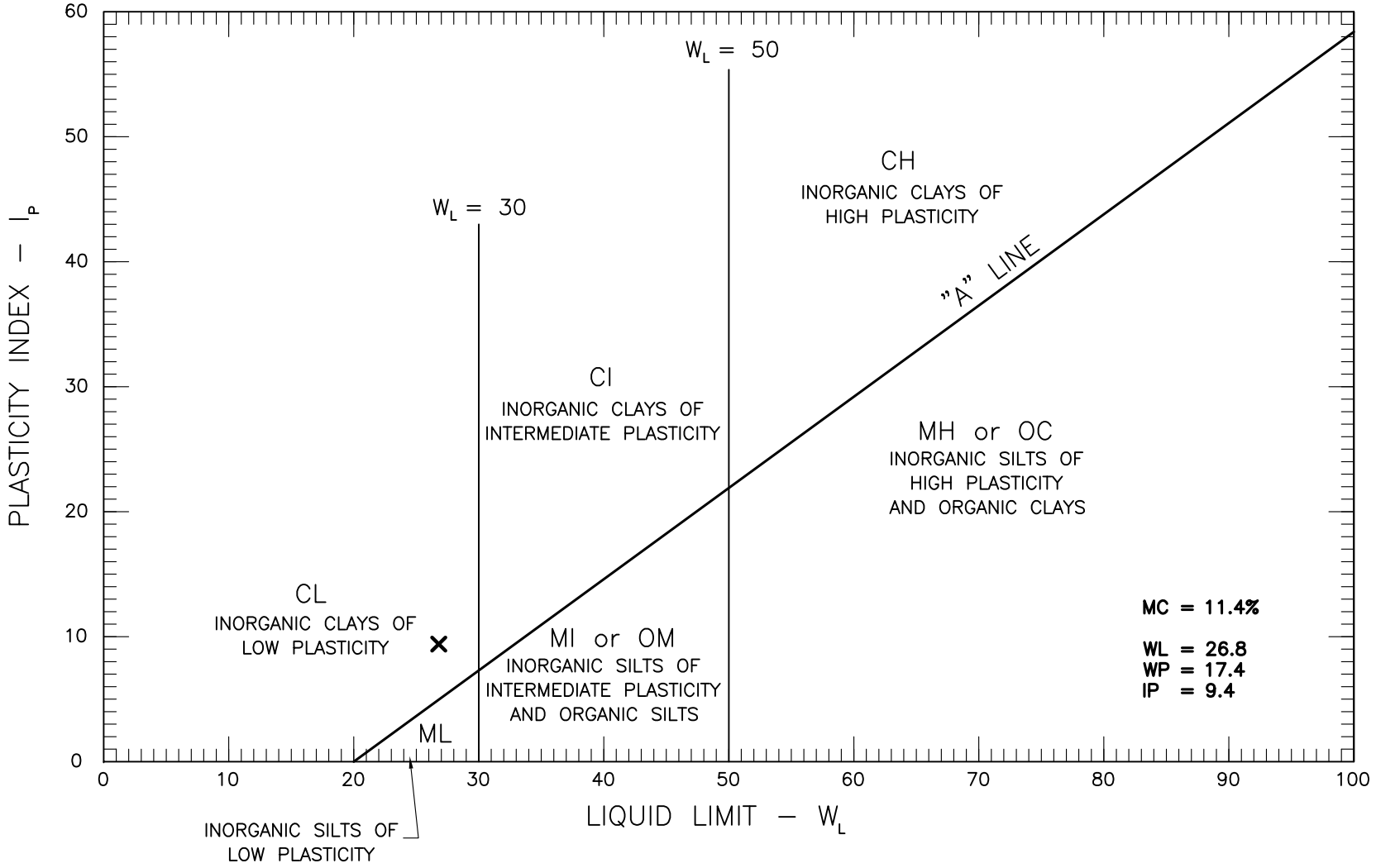
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-51-SPT3

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH51-SPT3



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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-53-G2

PROJECT NO.
K-3300

PLATE NO.
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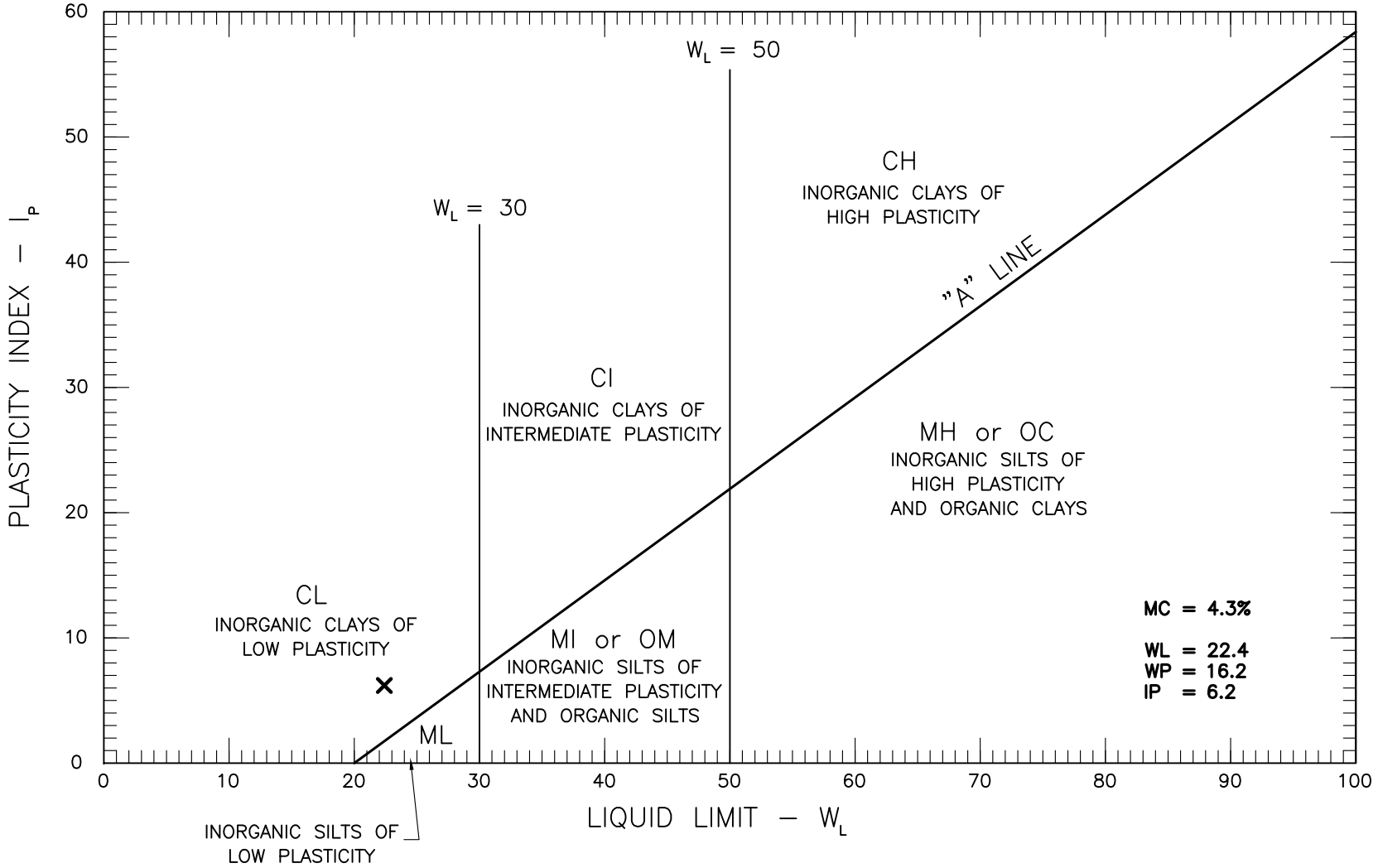

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-53-G4

PROJECT NO.
K-3300

PLATE NO.
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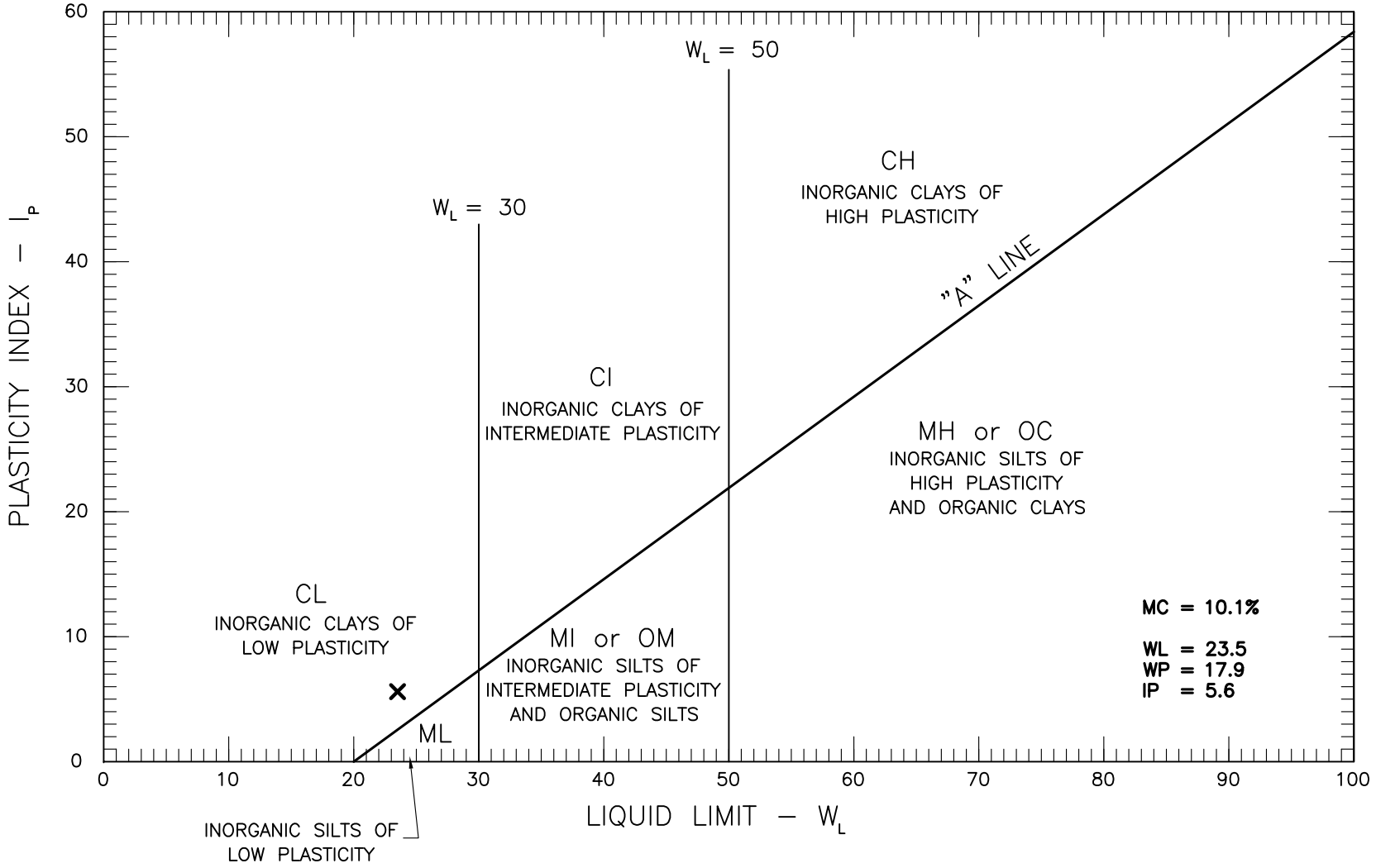

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-53-SPT2

PROJECT NO.
K-3300

PLATE NO.
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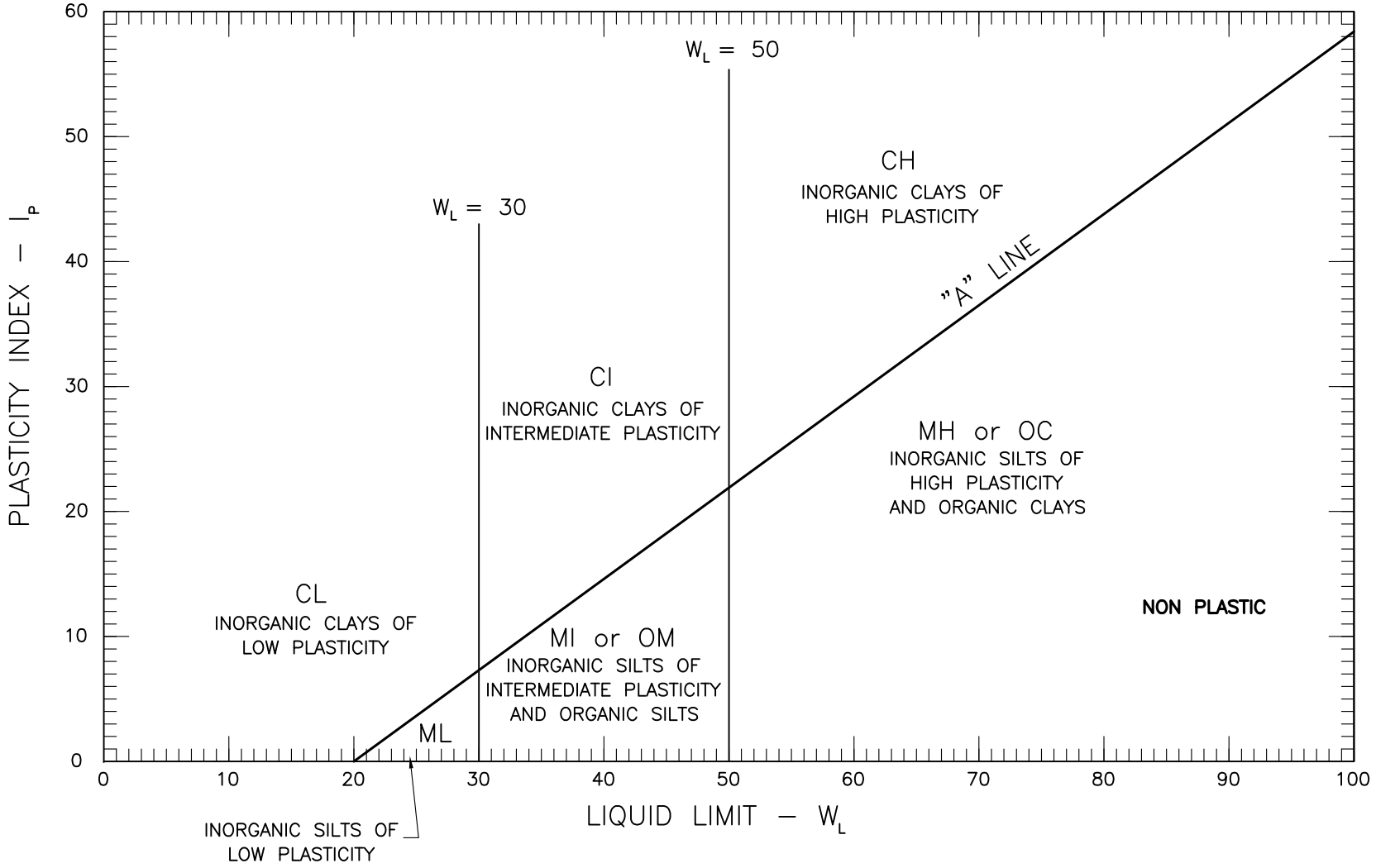

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-53-SPT4

PROJECT NO.
K-3300

PLATE NO.
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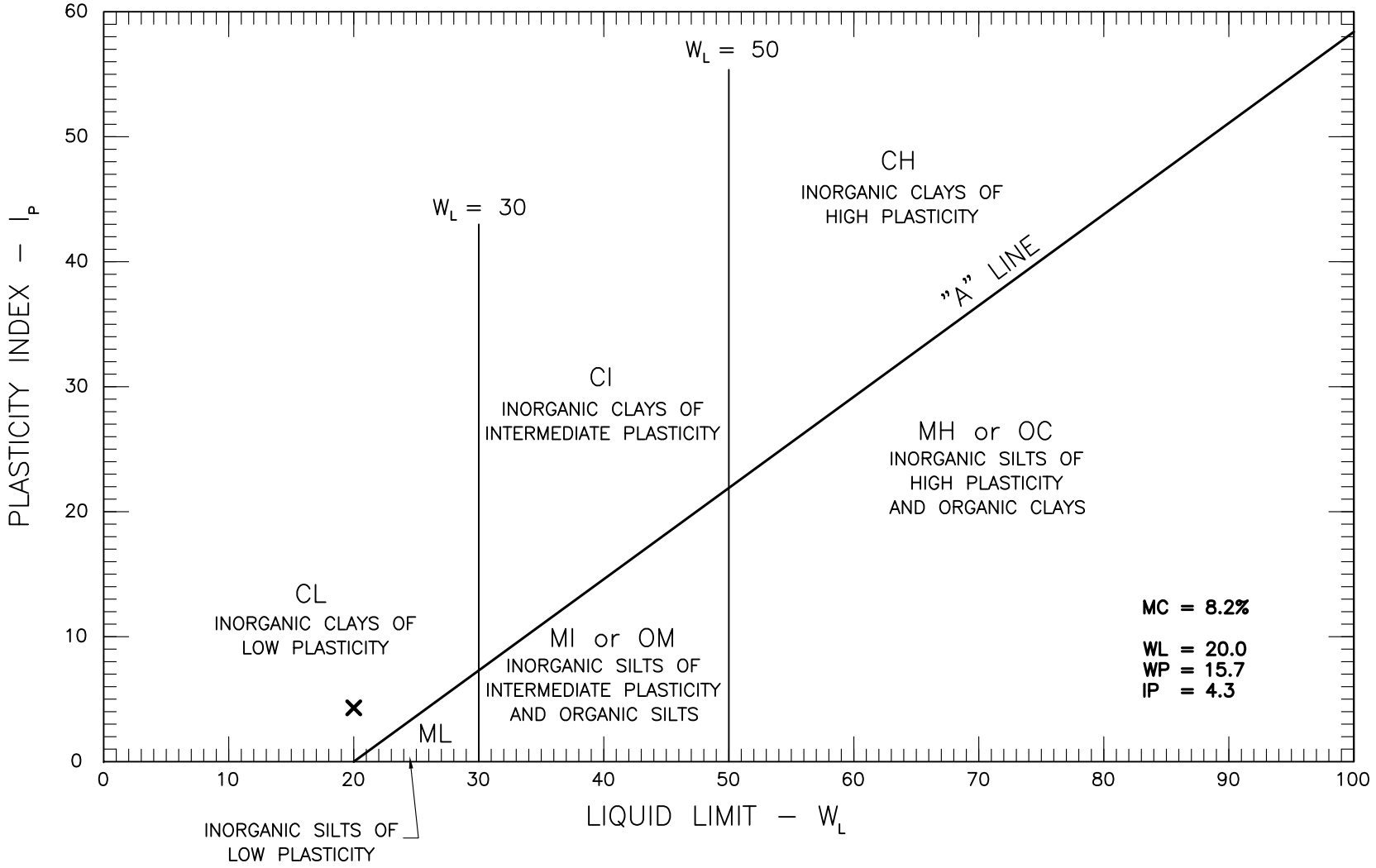

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BGC ENGINEERING INC.
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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-54-G1

PROJECT NO.
K-3300

PLATE NO.
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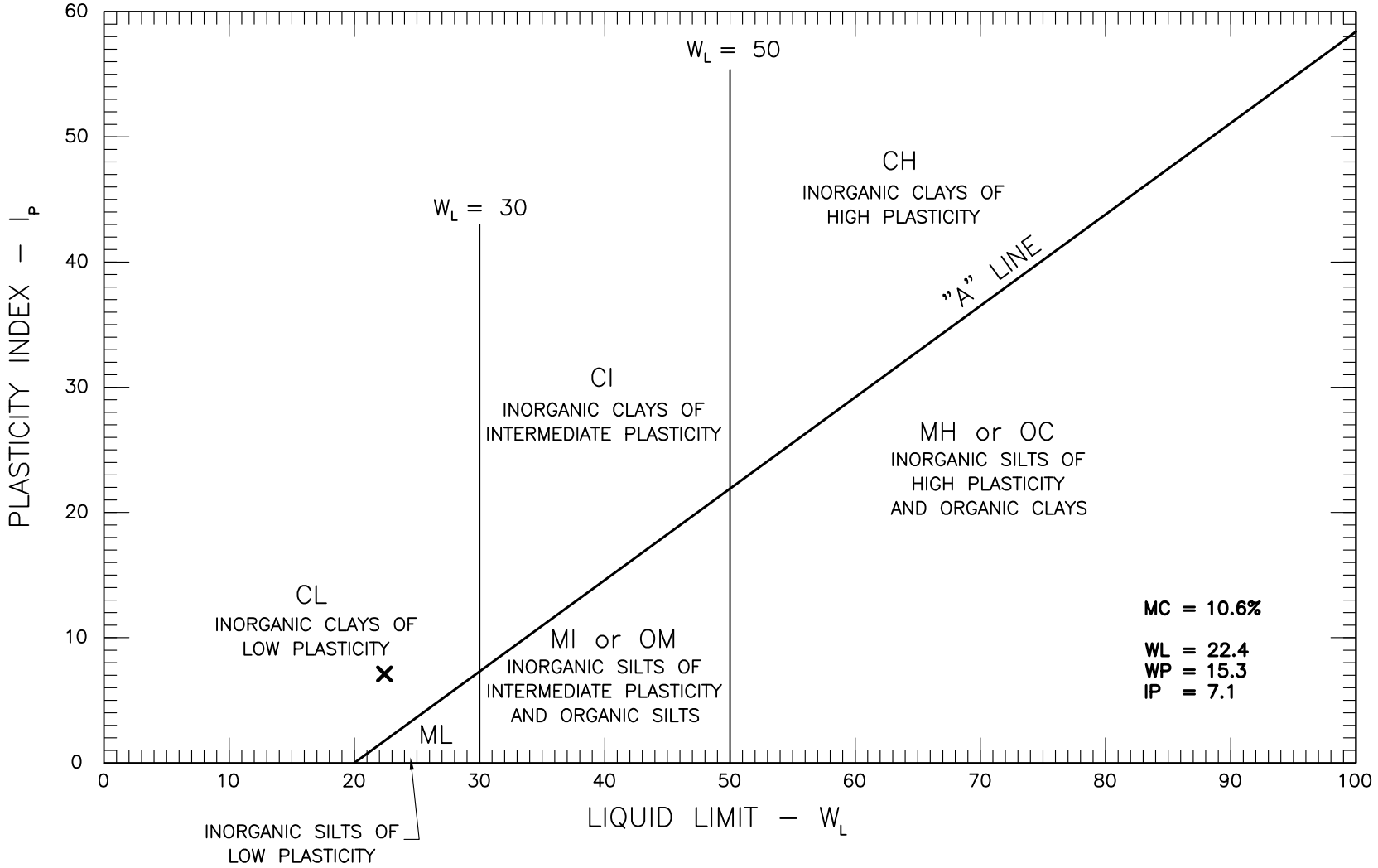

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-55-G4

PROJECT NO.
K-3300

PLATE NO.
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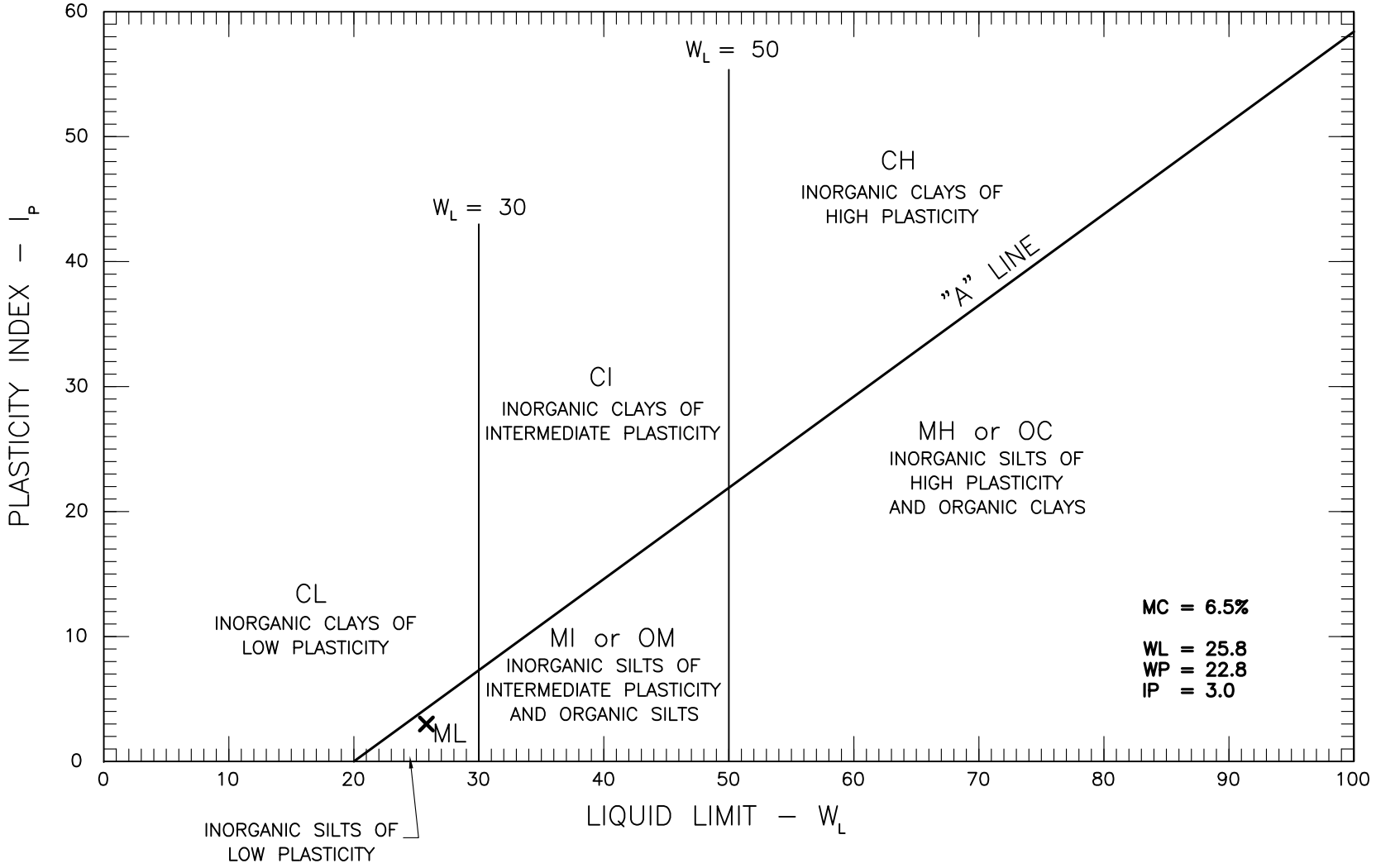

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-55-SPT6

PROJECT NO.
K-3300

PLATE NO.
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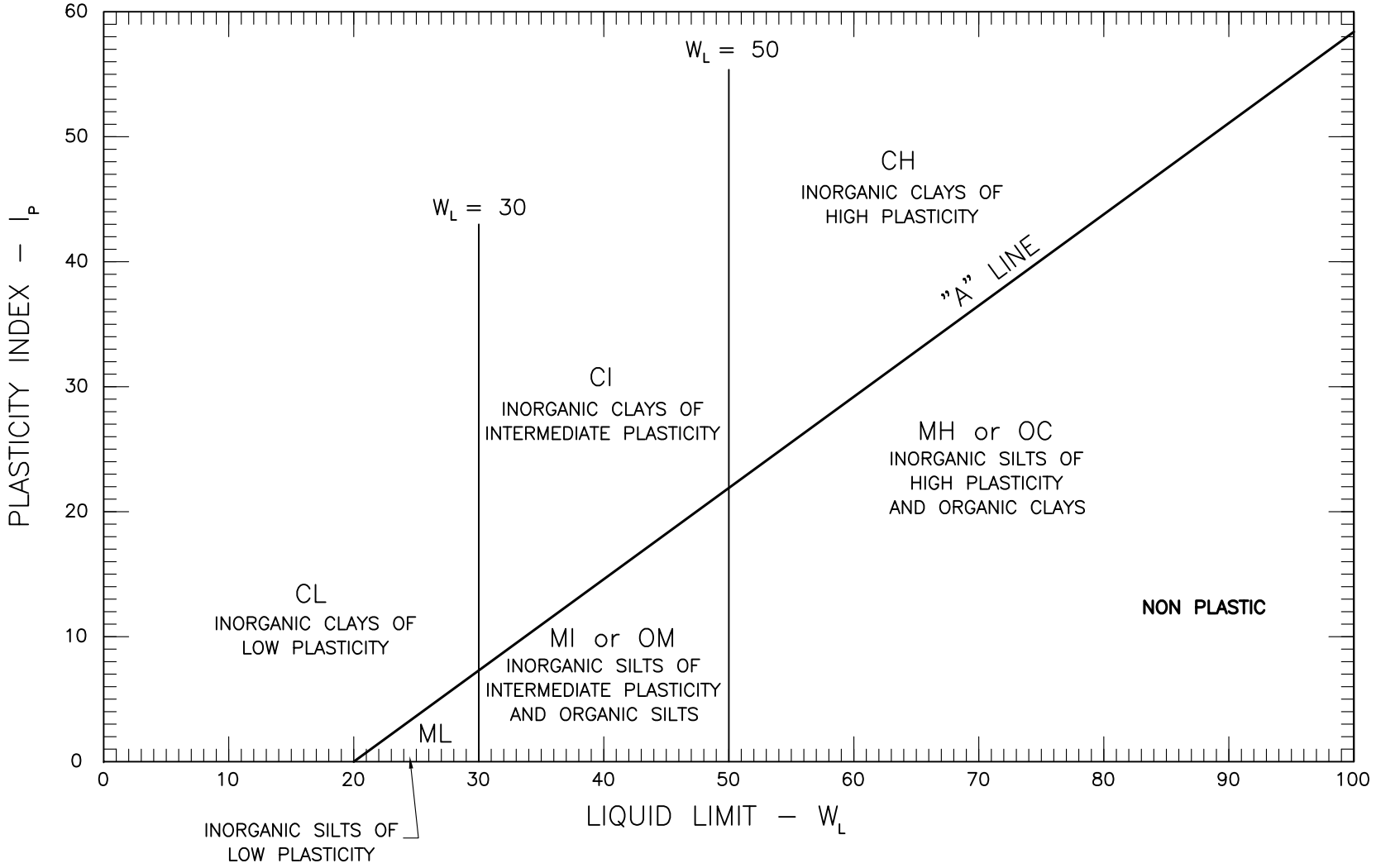

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-56-SPT3

PROJECT NO.
K-3300

PLATE NO.
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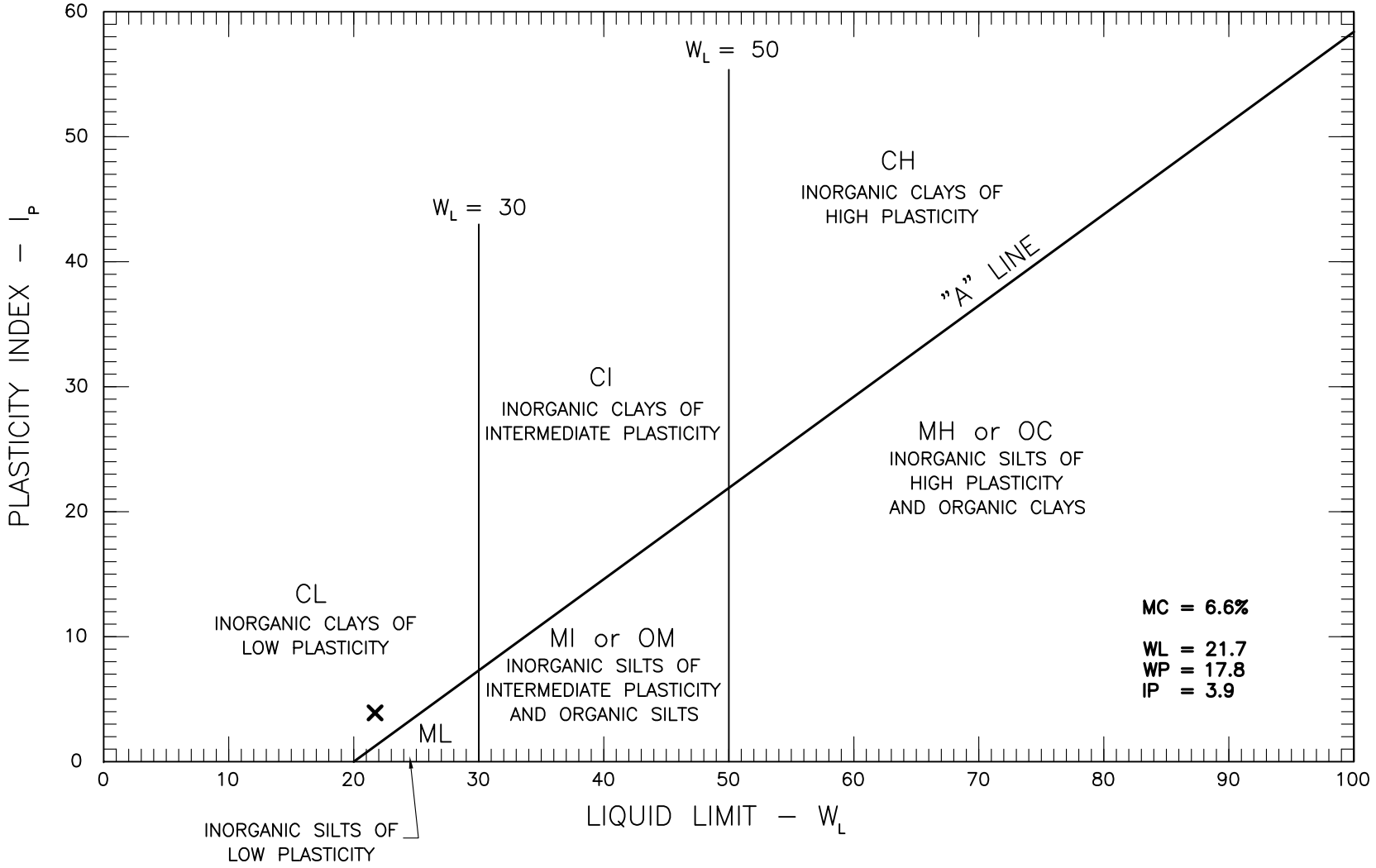

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-56-SPT4

PROJECT NO.
K-3300

PLATE NO.
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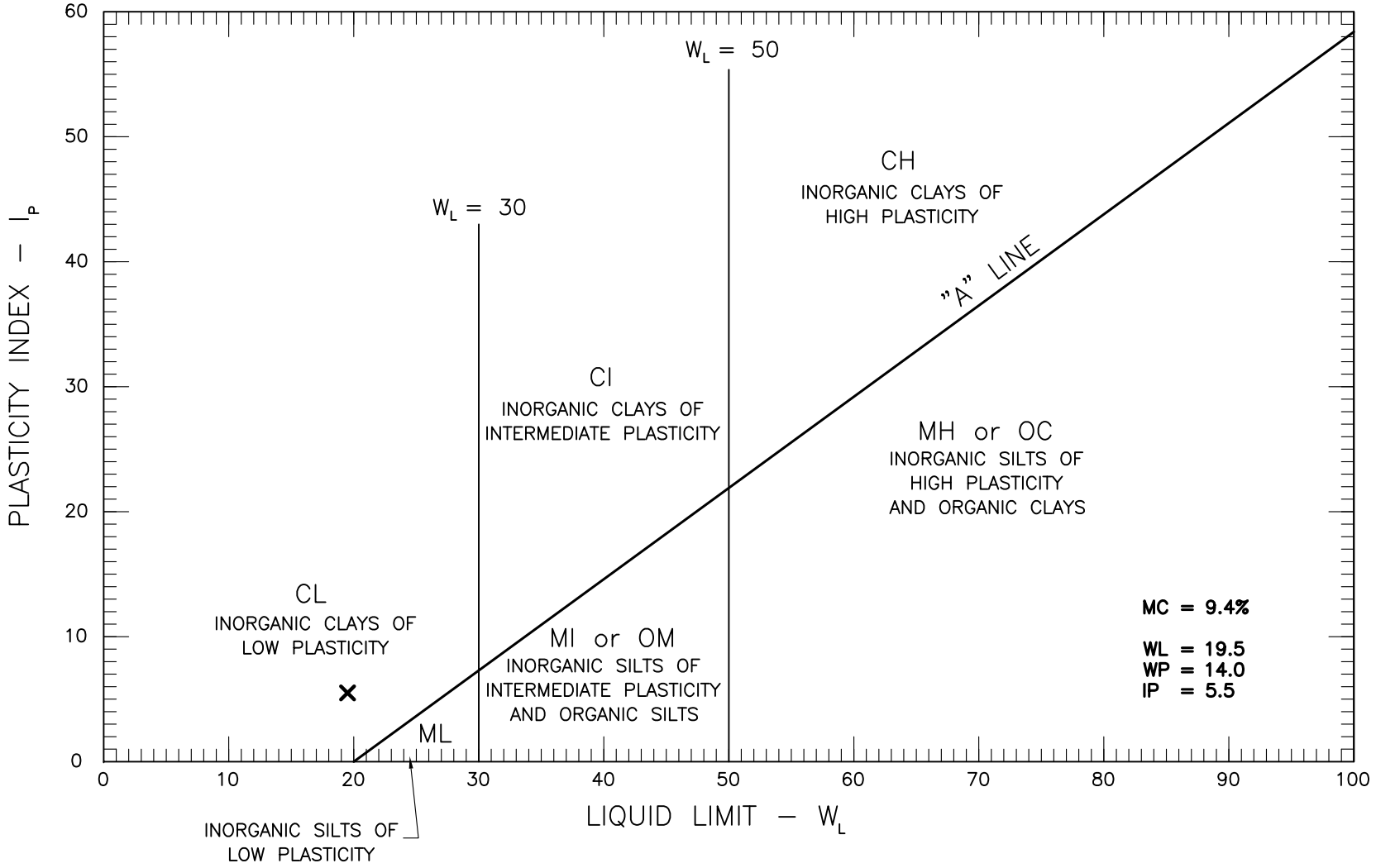

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-57-SPT2

PROJECT NO.
K-3300

PLATE NO.
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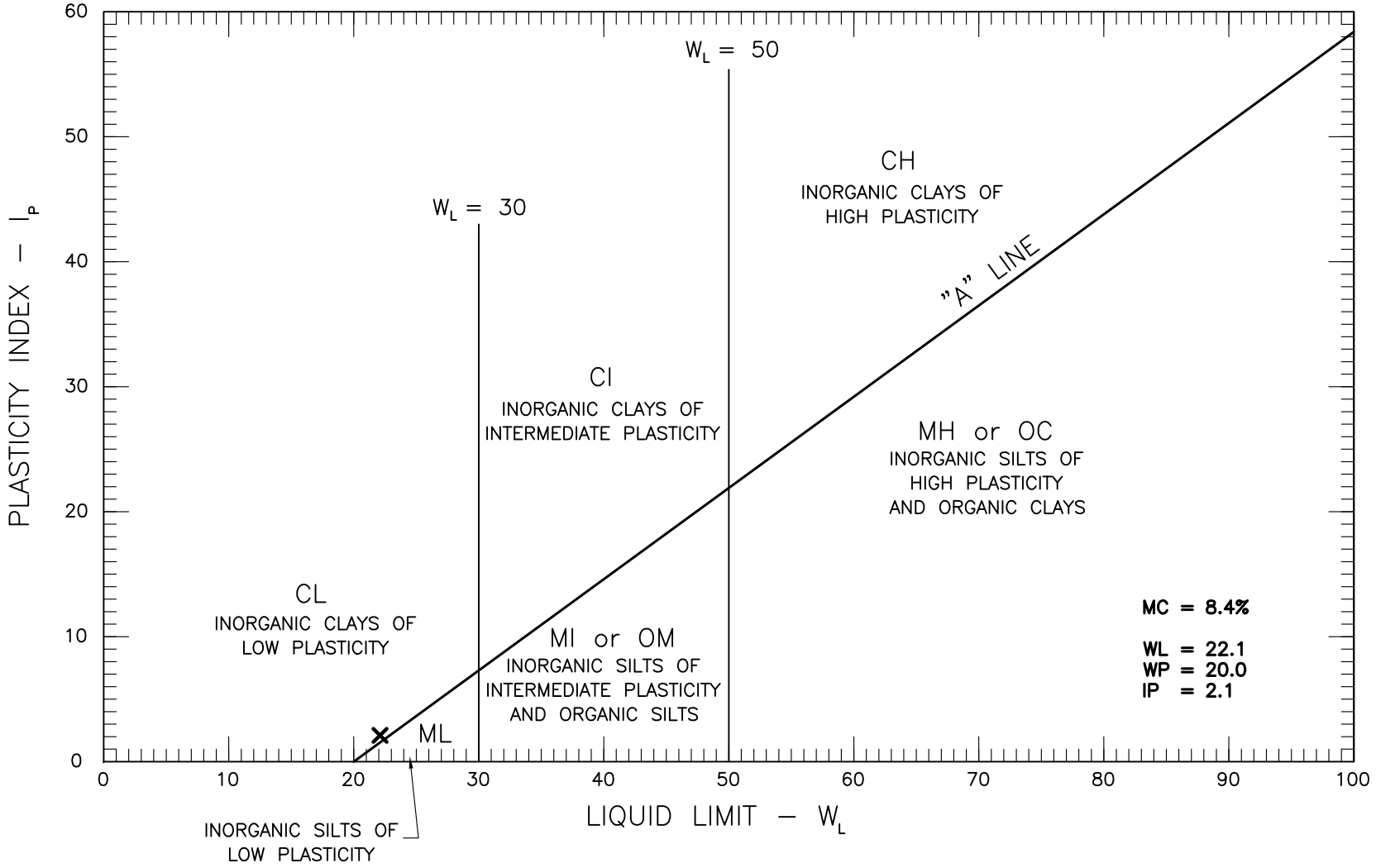

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ATTERBERG LIMITS OF BH-BGC11-57-SPT4

PROJECT NO.
K-3300

PLATE NO.
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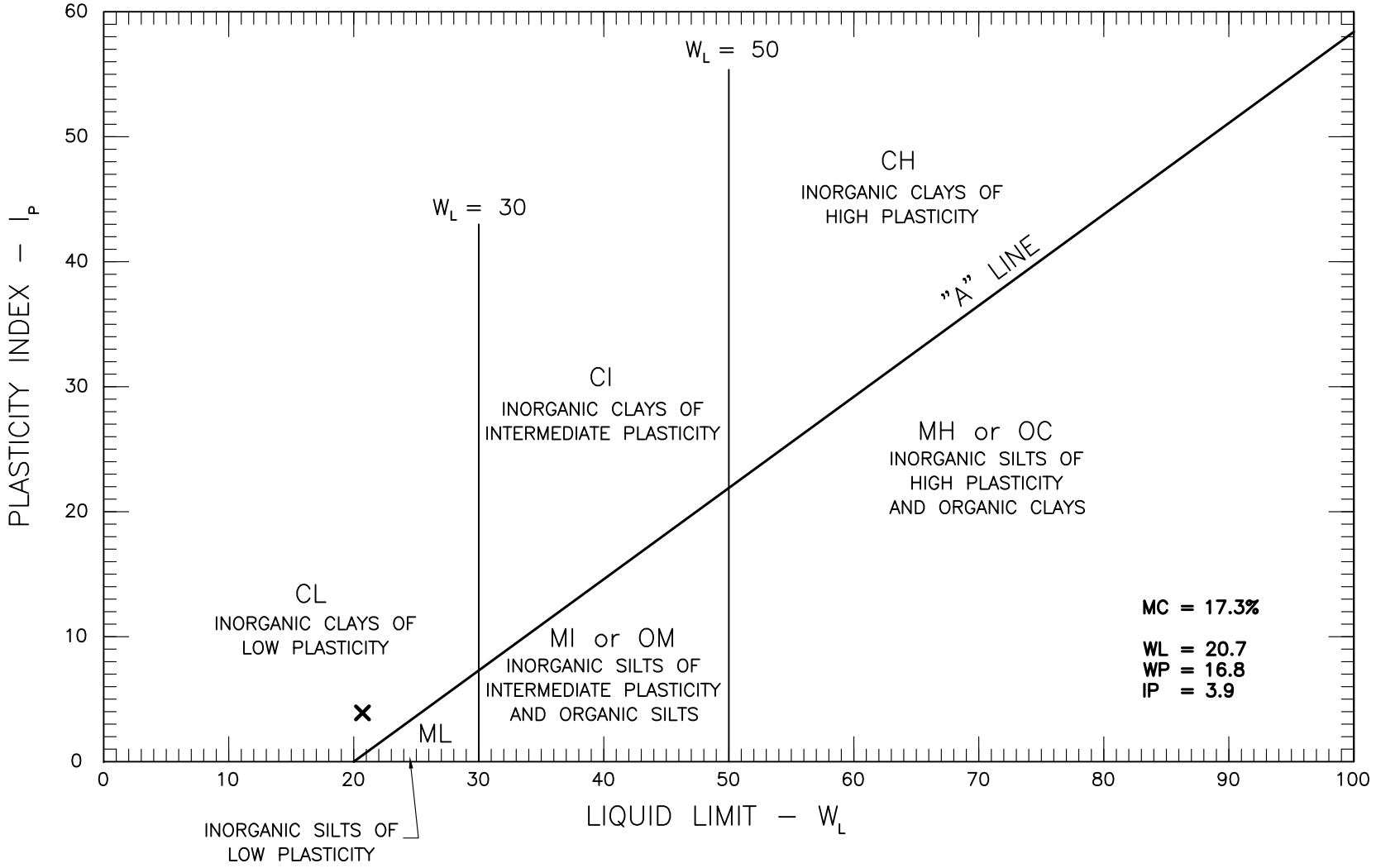

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-58-G2

PROJECT NO.
K-3300

PLATE NO.
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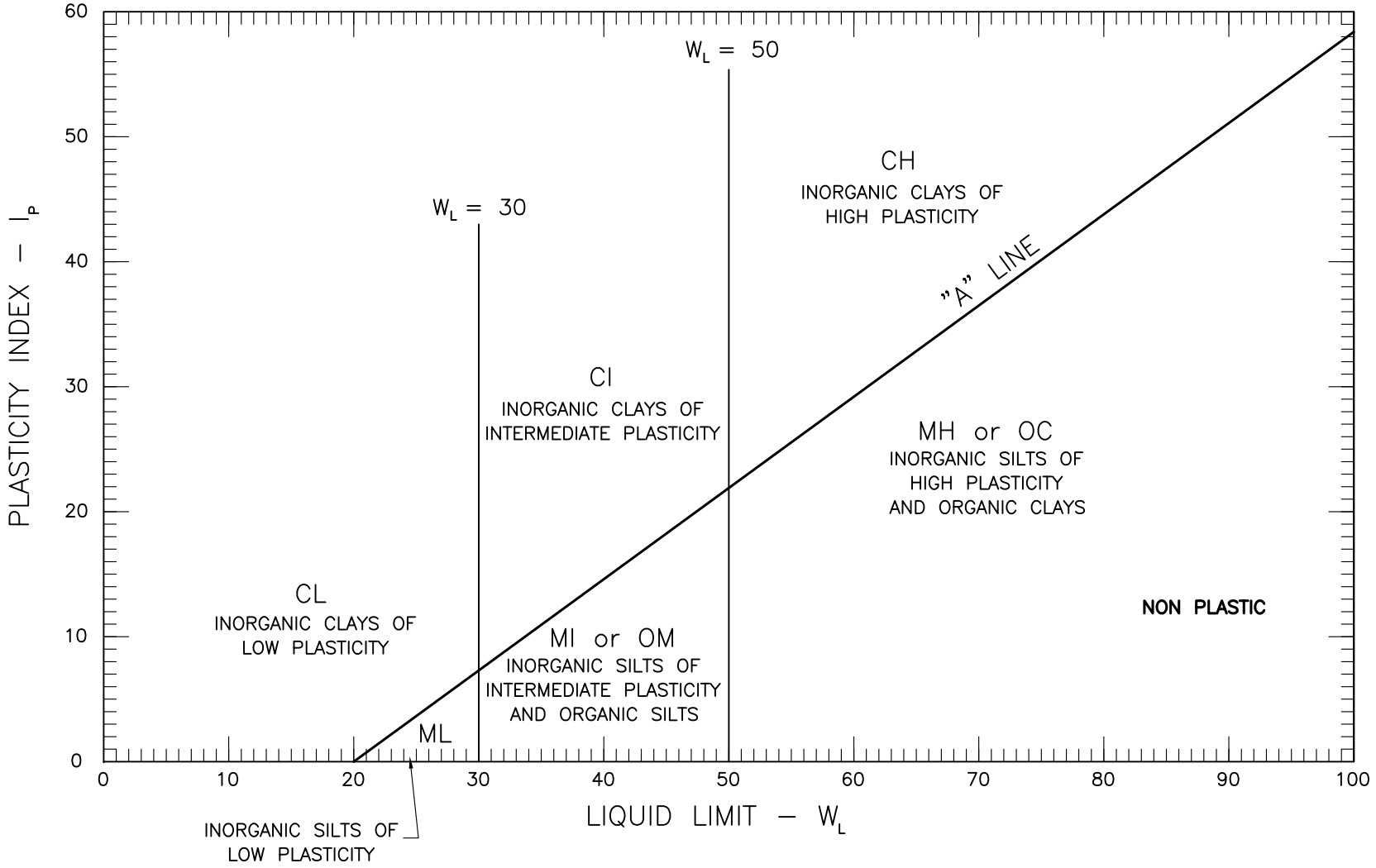

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-58-G4

PROJECT NO.
K-3300

PLATE NO.
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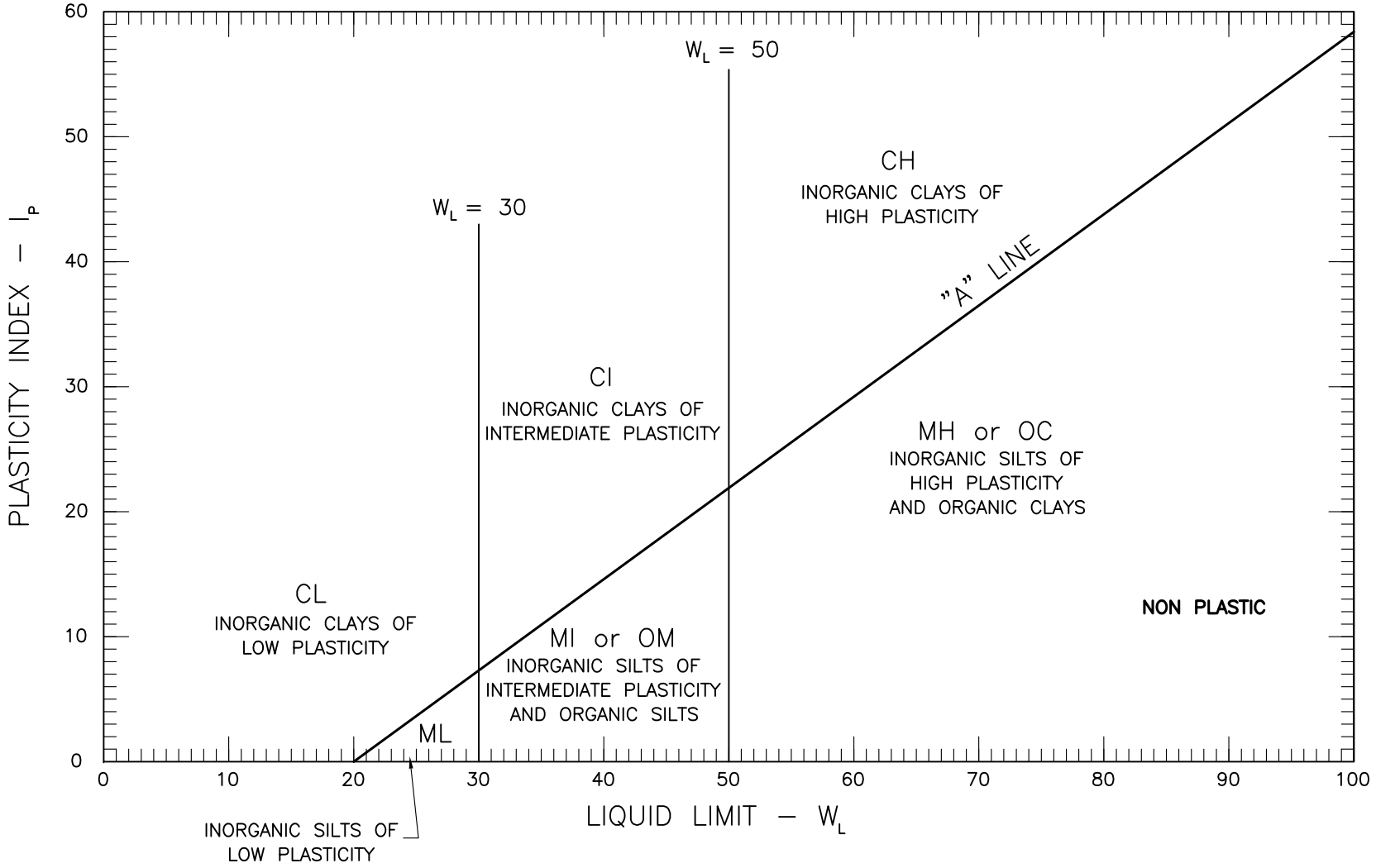

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-58-G6

PROJECT NO.
K-3300

PLATE NO.
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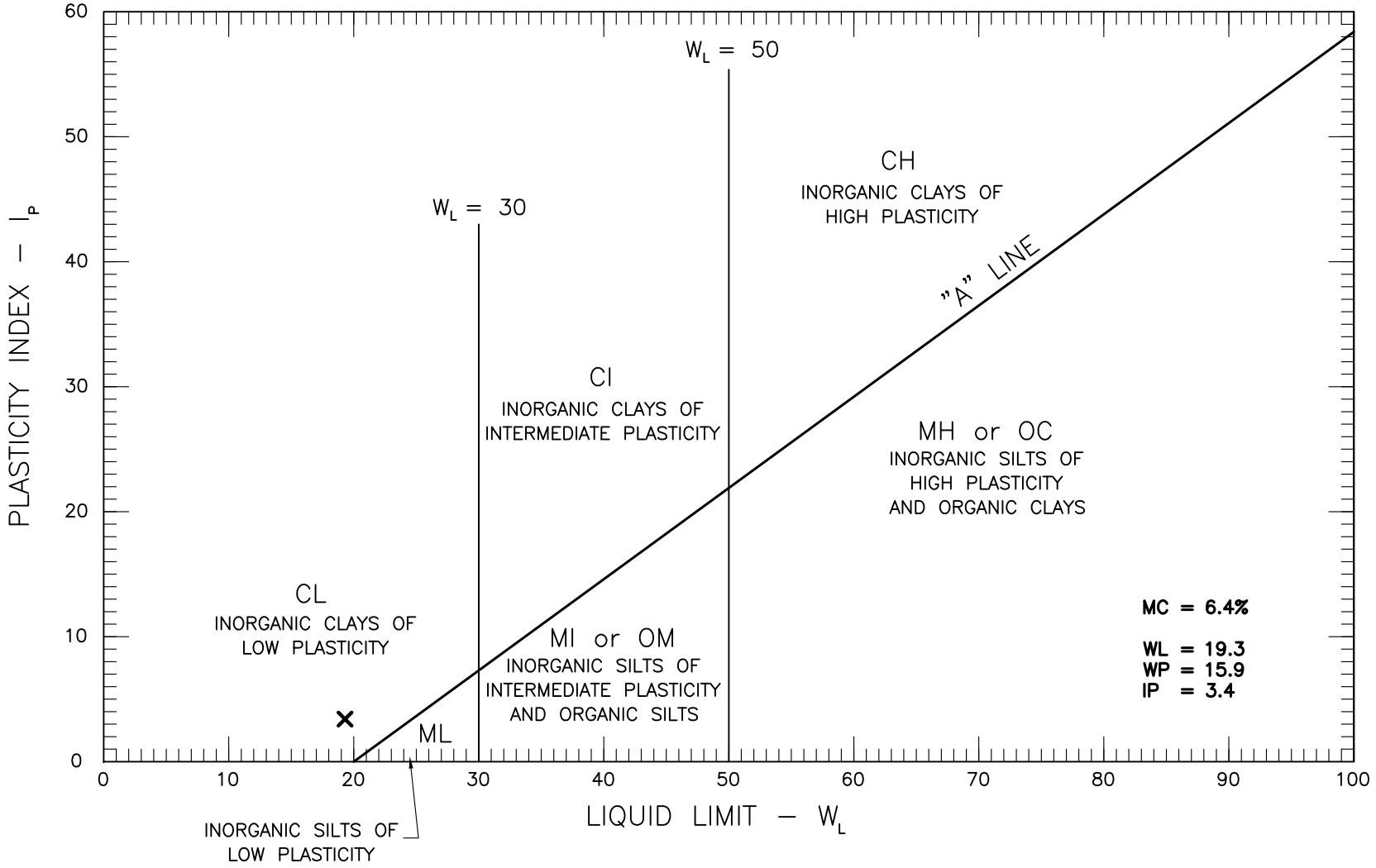

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DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-58-G8

PROJECT NO.
K-3300

PLATE NO.
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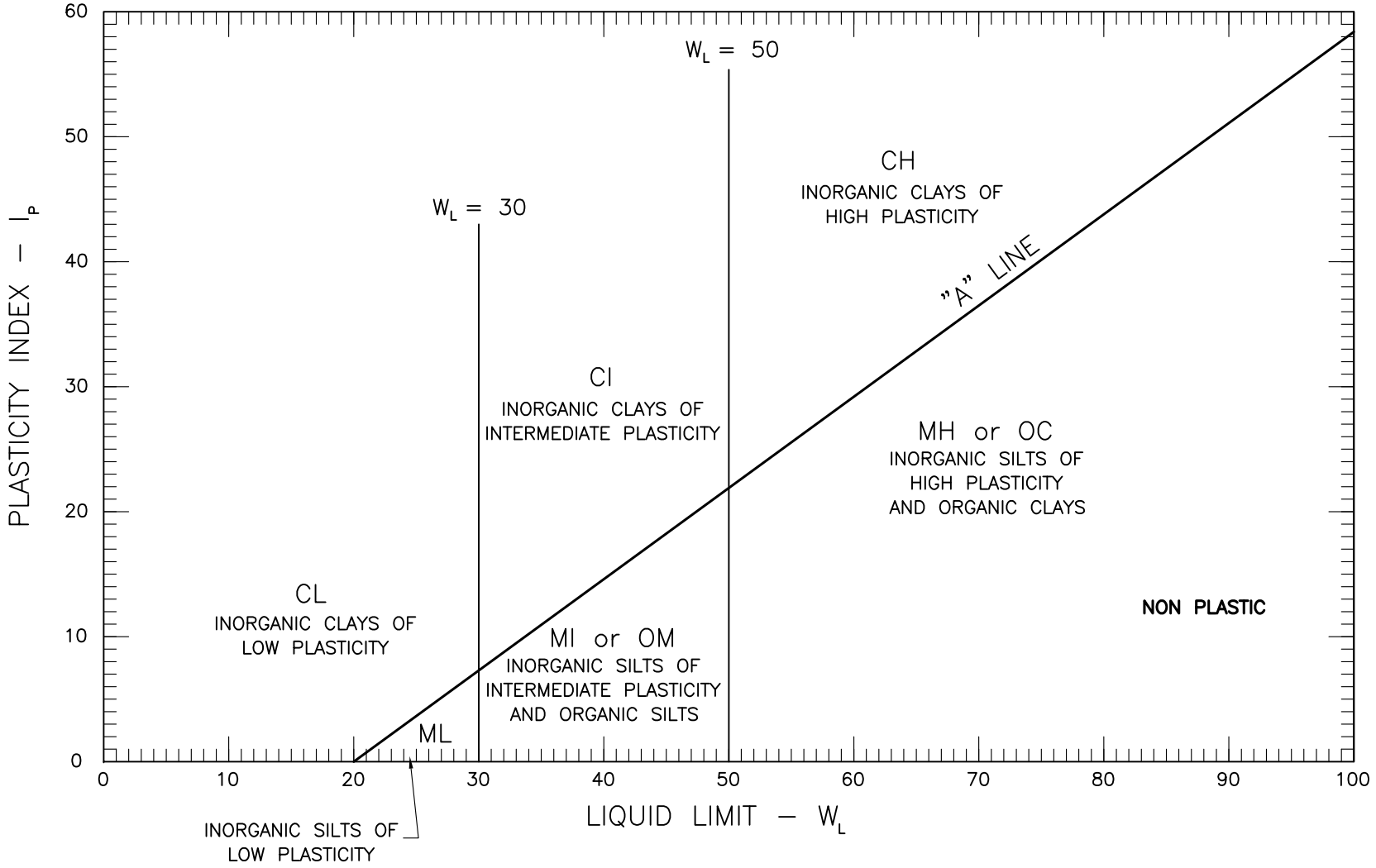

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BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-58-G10

PROJECT NO.
K-3300

PLATE NO.
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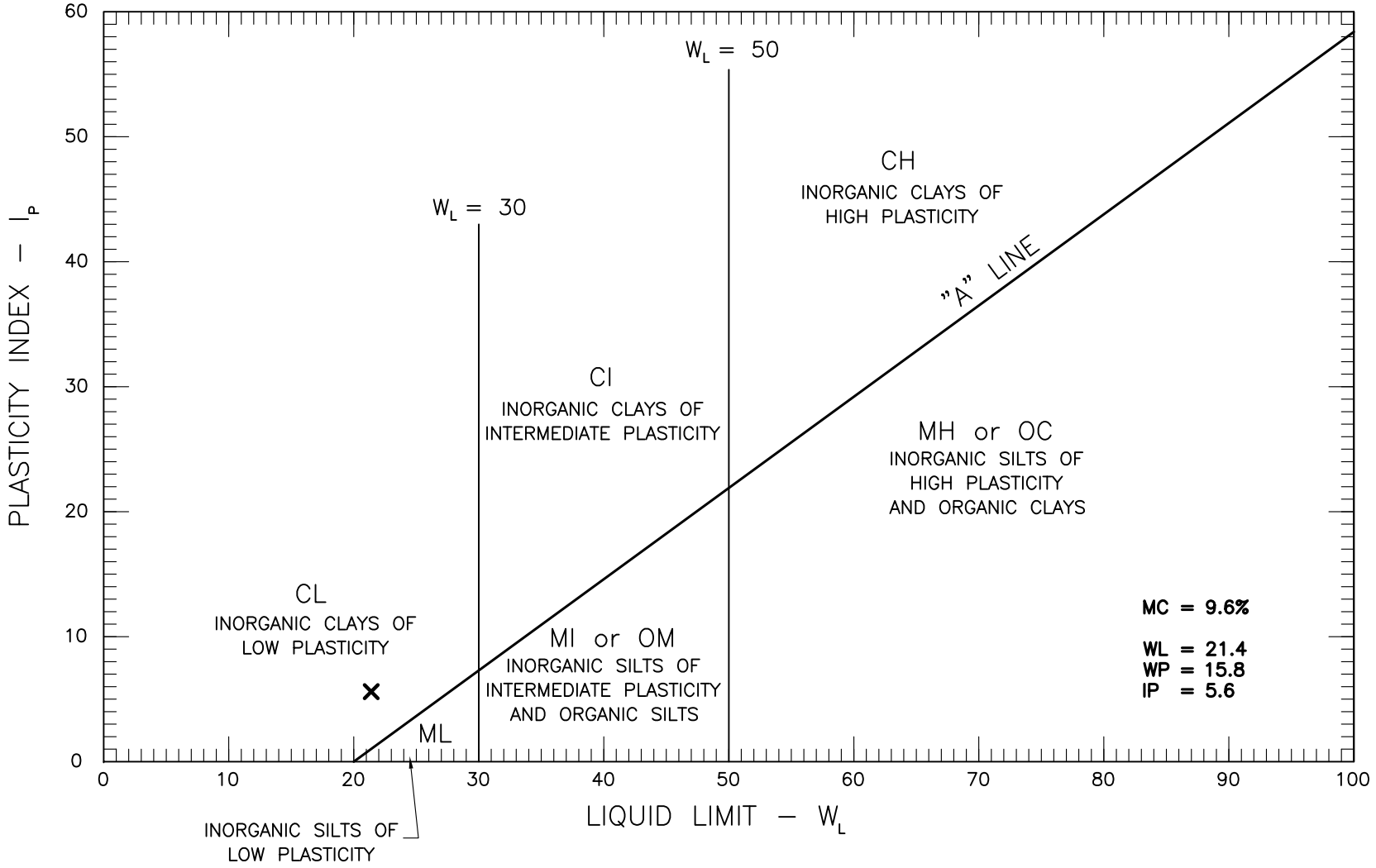

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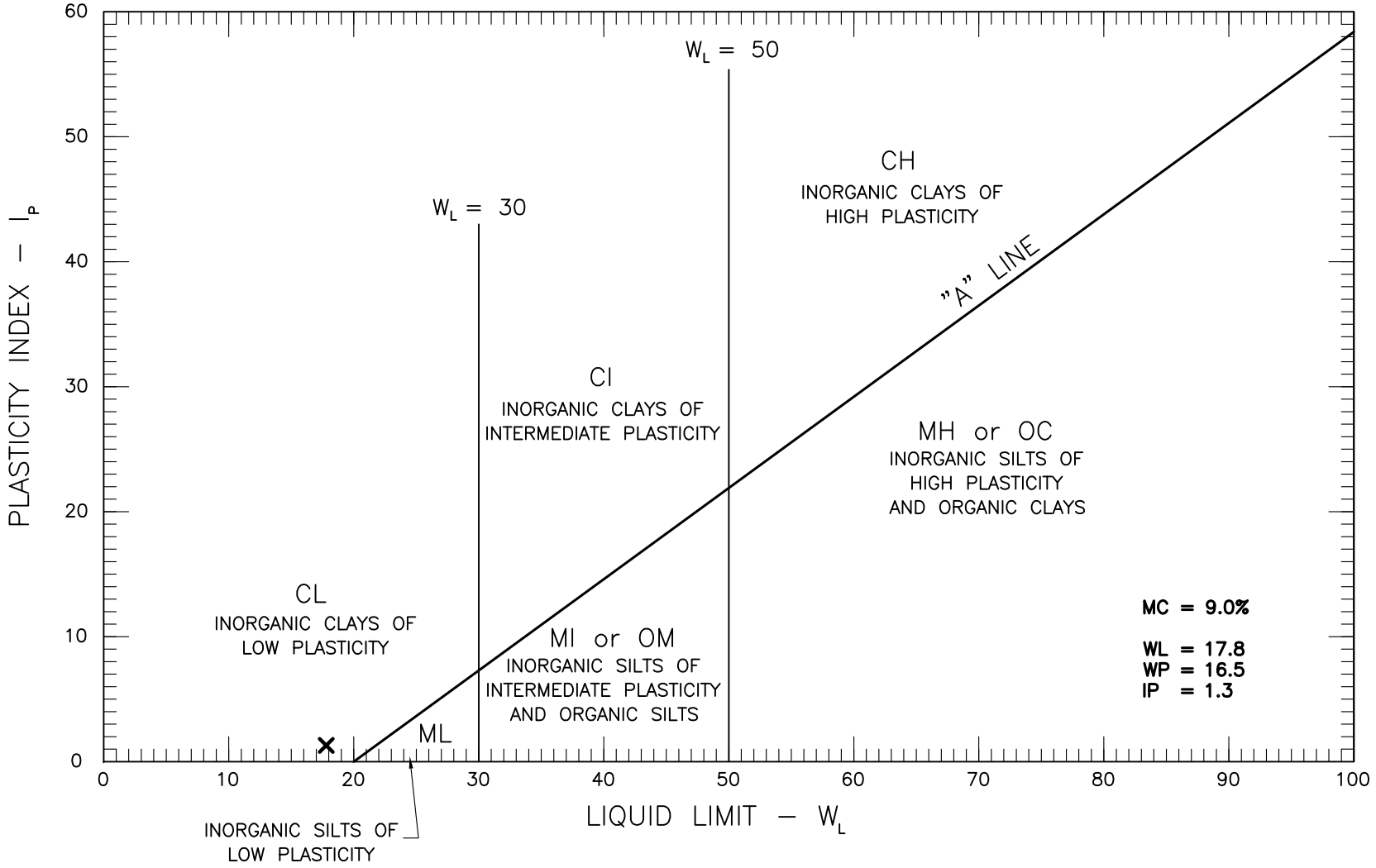
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-60-G3

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH60-G3



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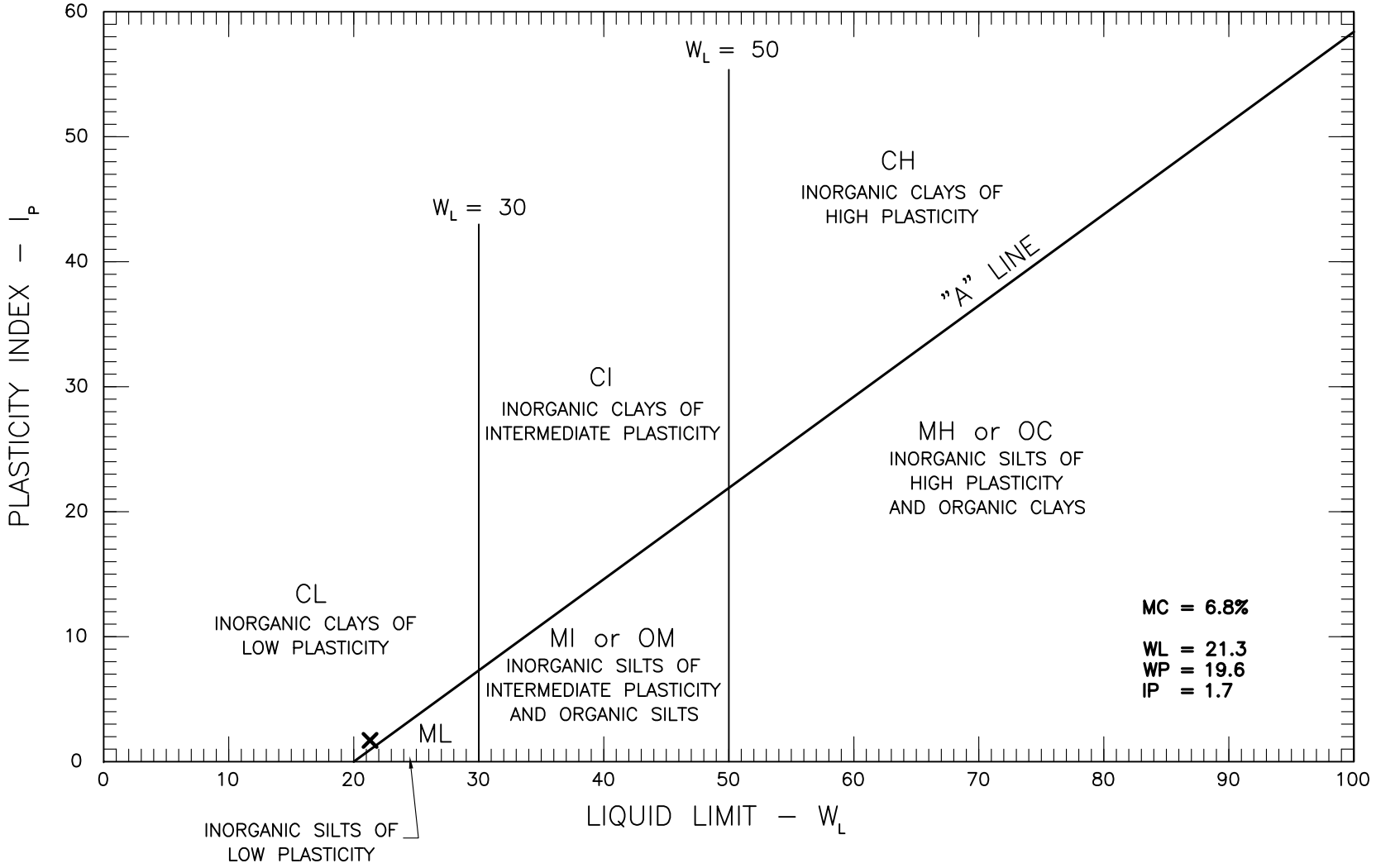
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-60-G5

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH60-G5



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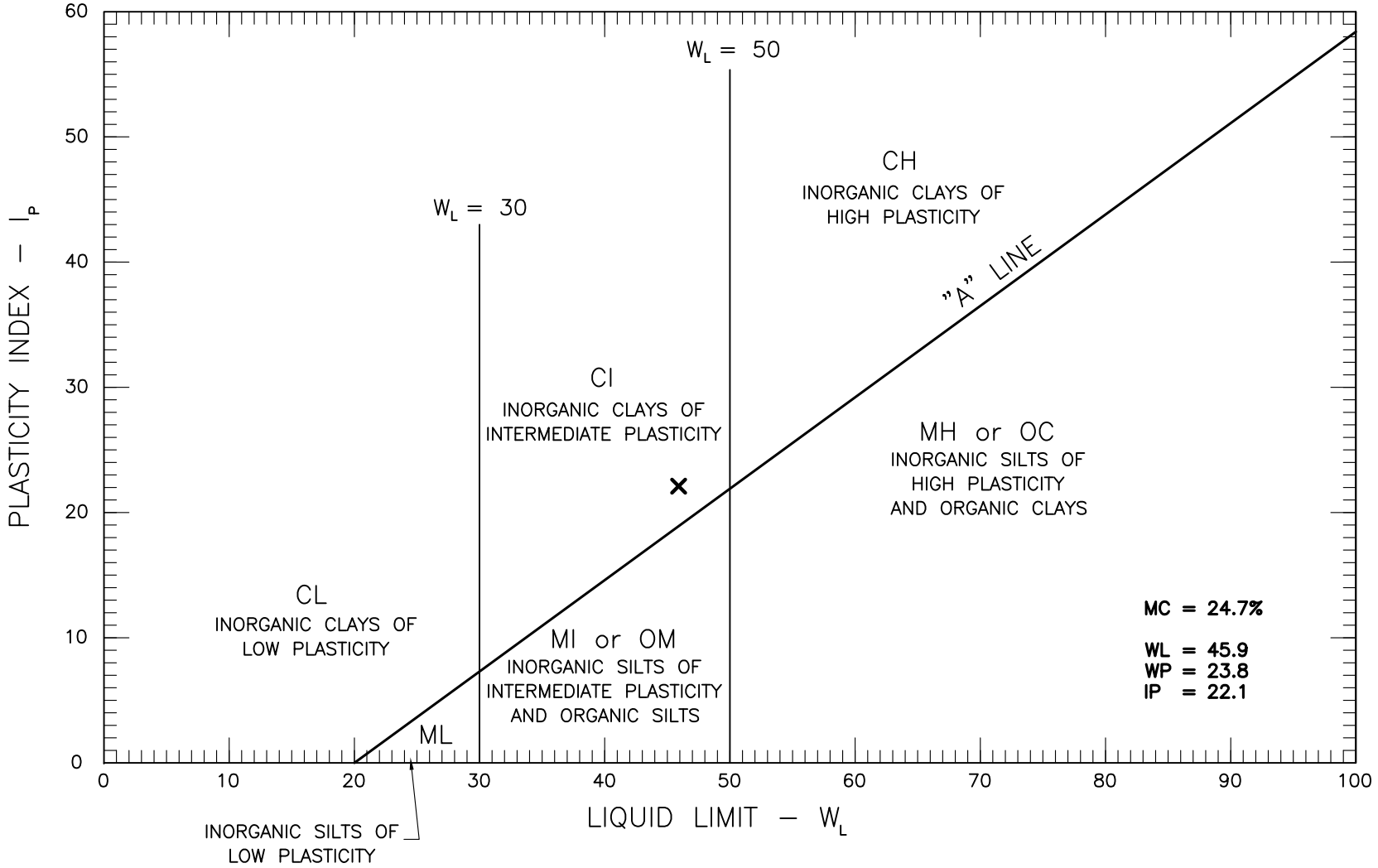
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-60-G7

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH60-G7



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BGC ENGINEERING INC.
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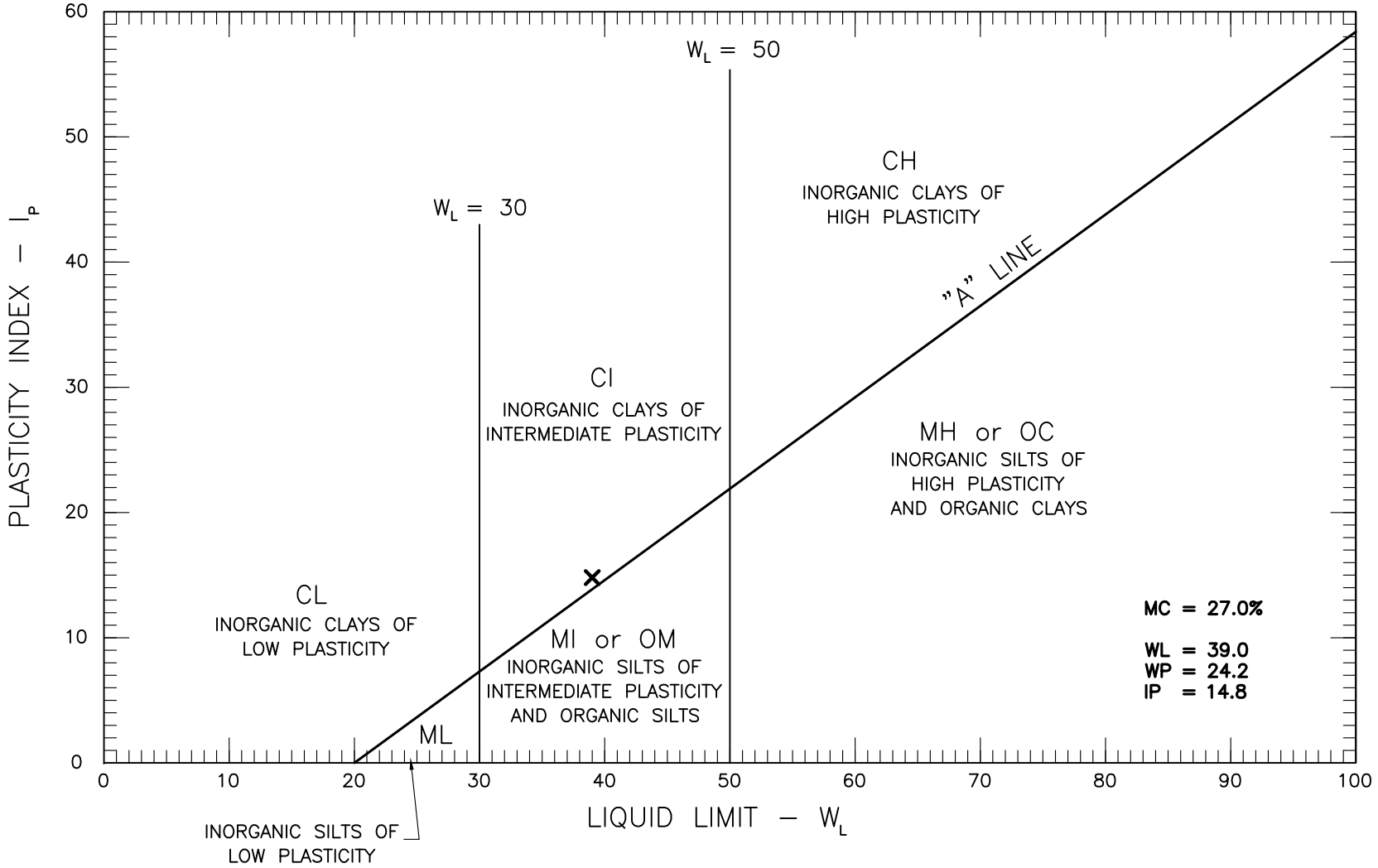
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-63-G2

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH63-G2



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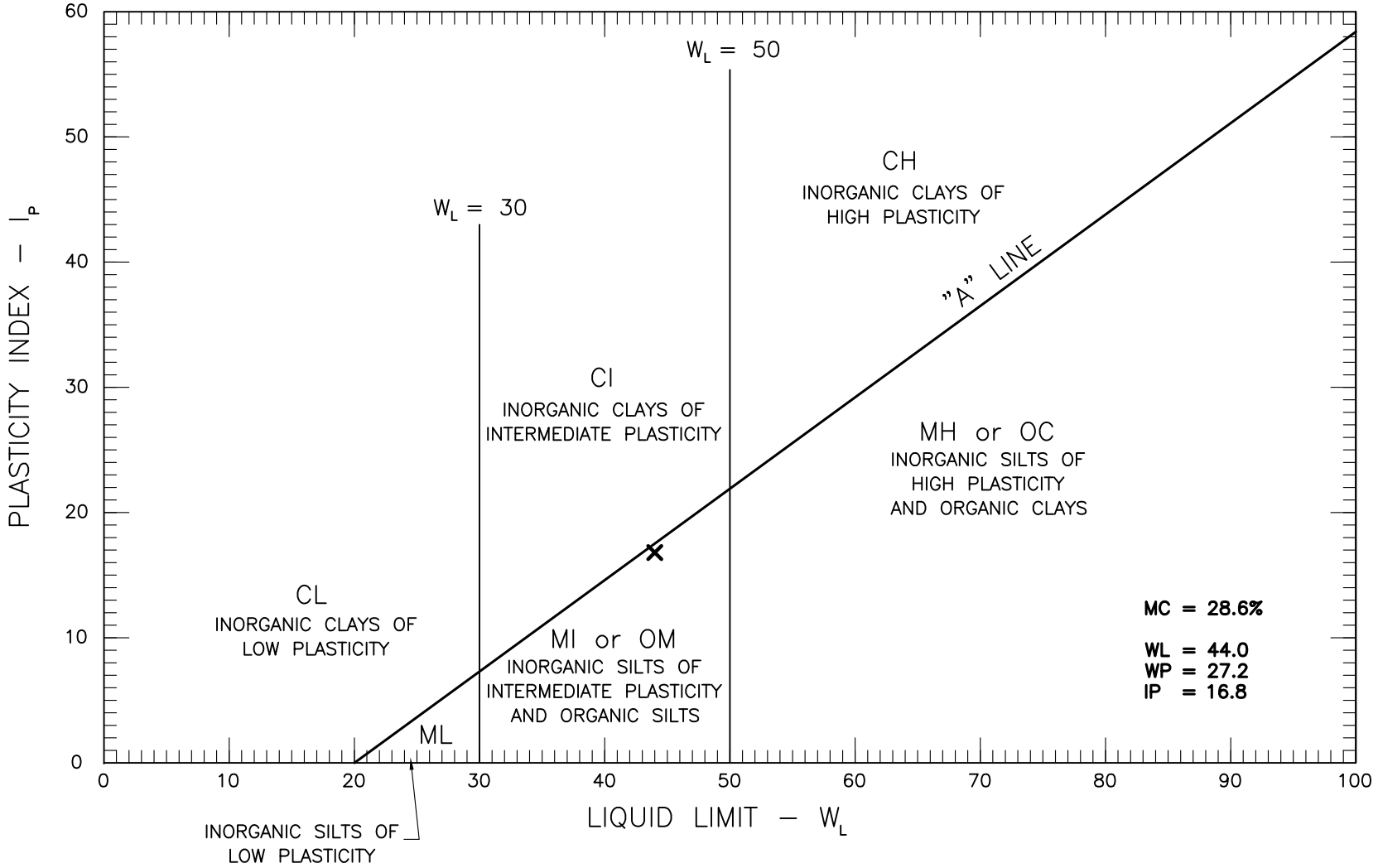
ATTERBERG LIMITS OF BH-BGC11-63-G5

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH63-G5

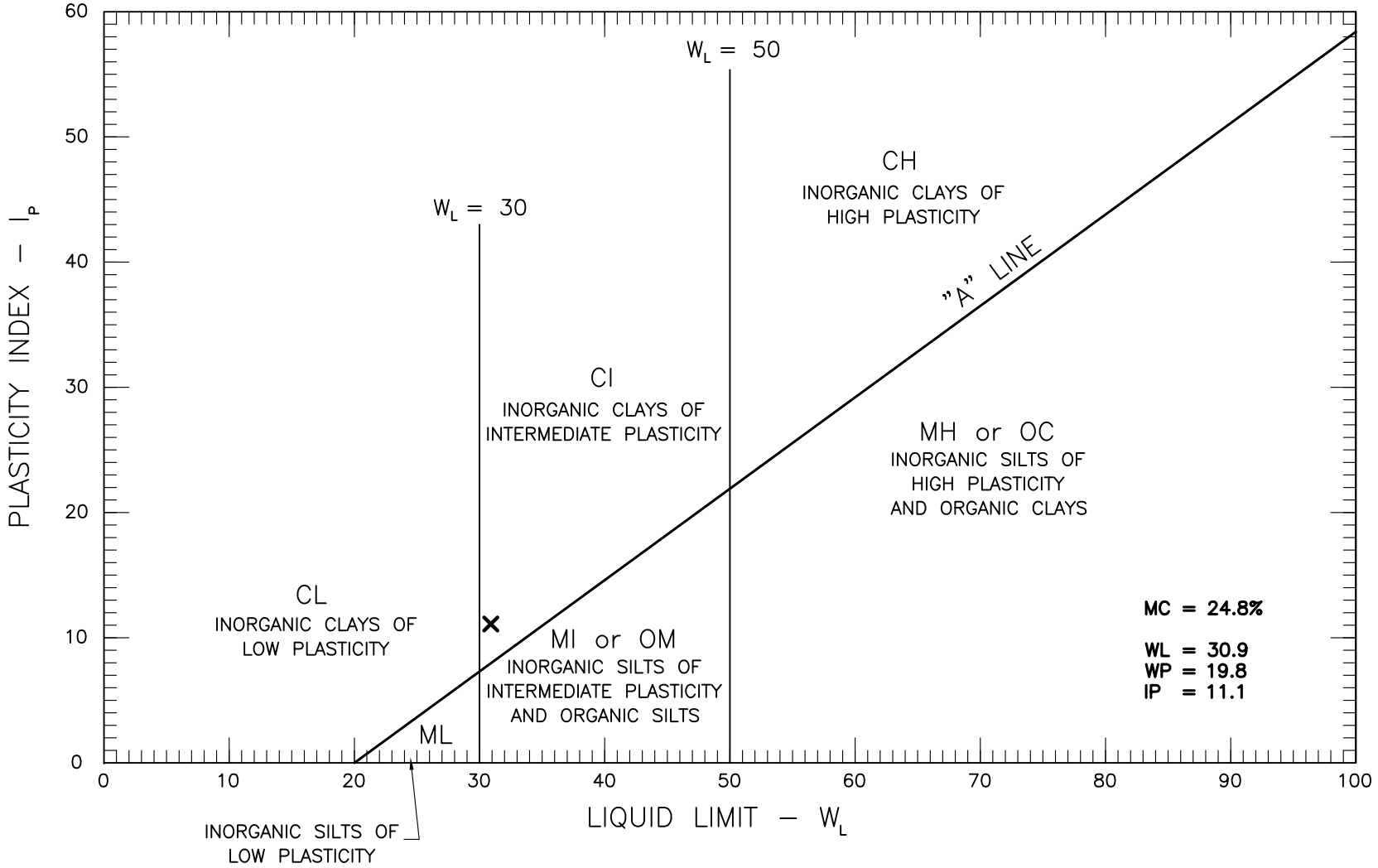


GeoNorth Engineering Ltd.
3975 18th Avenue
Prince George, B.C. V2N 1B2
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-63-G9

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH63-G9



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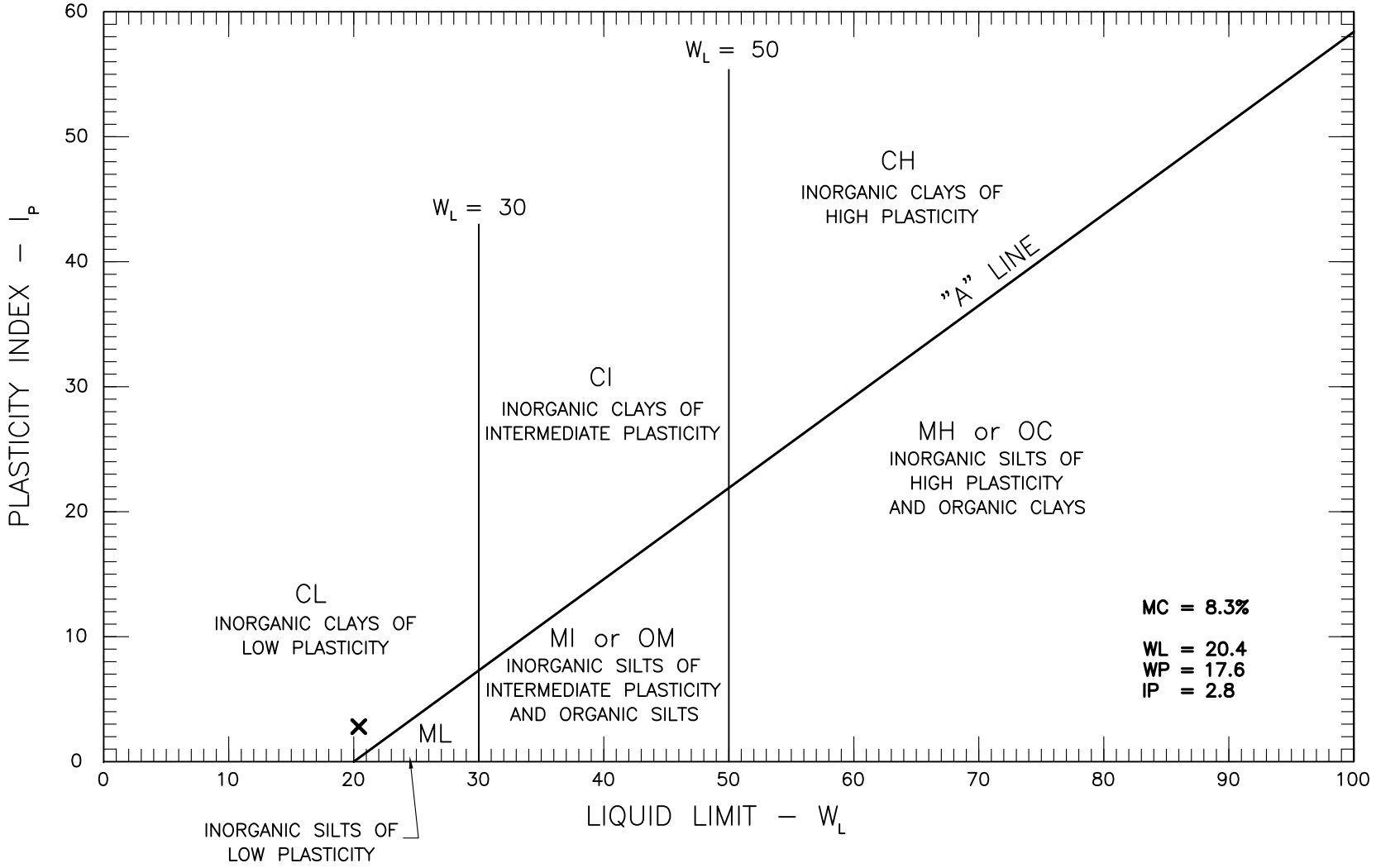
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-63-G12

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH63-G12



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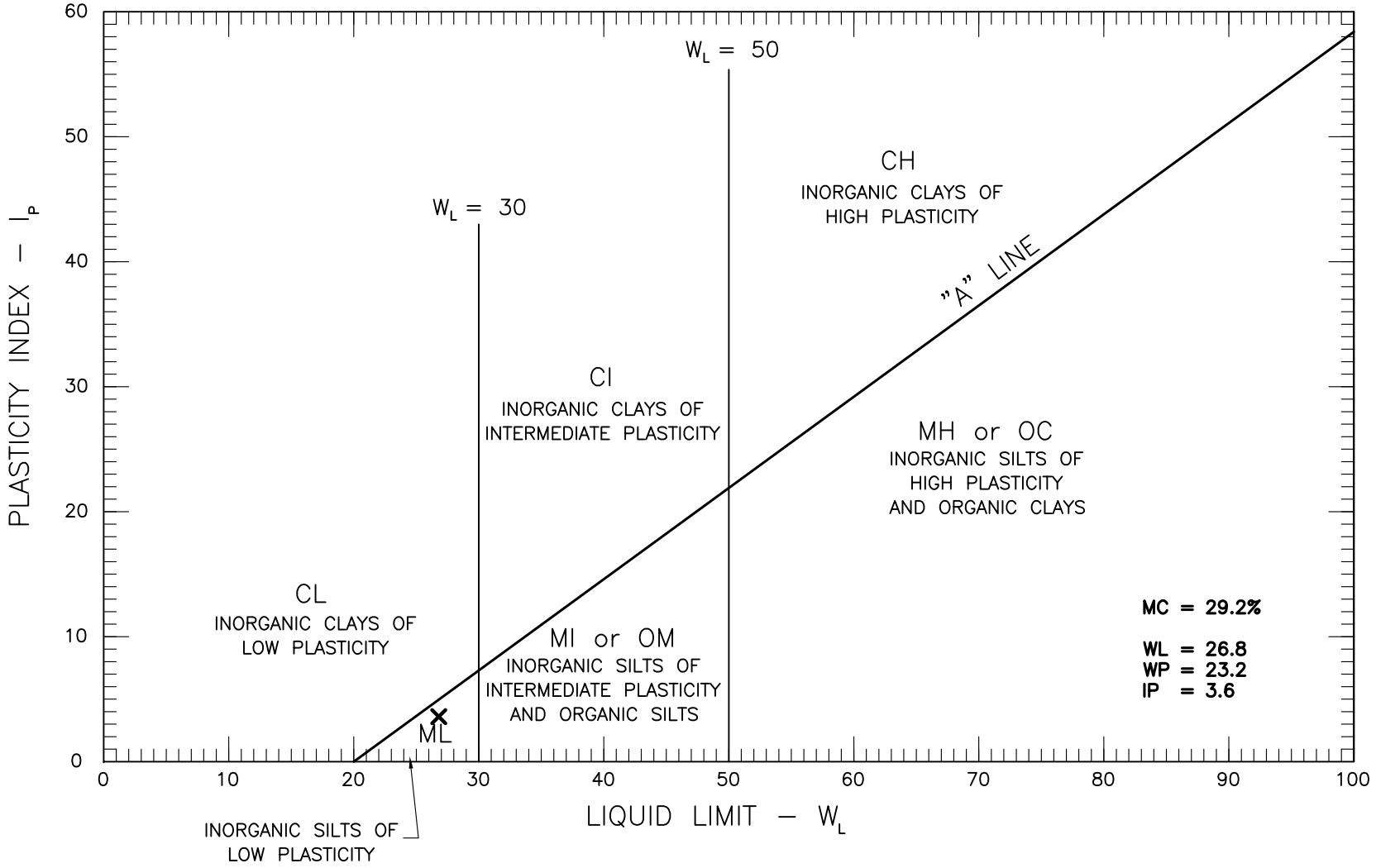
3975 18th Avenue
Prince George, B.C. V2N 1B2
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF BH-BGC11-116-G2

PROJECT NO.
K-3300

PLATE NO.
3300-AL-BH116-G2



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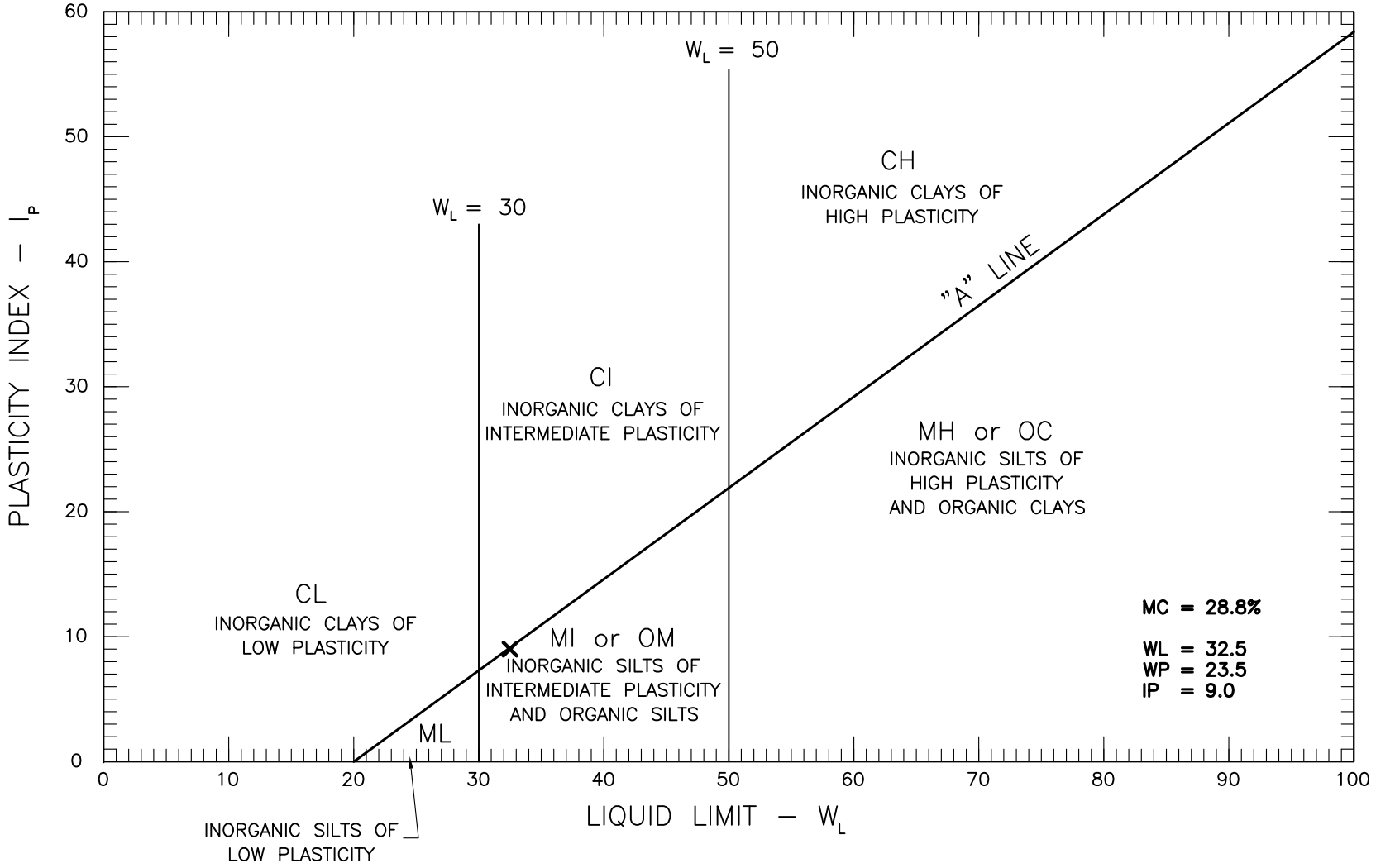
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-119-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP119-G1



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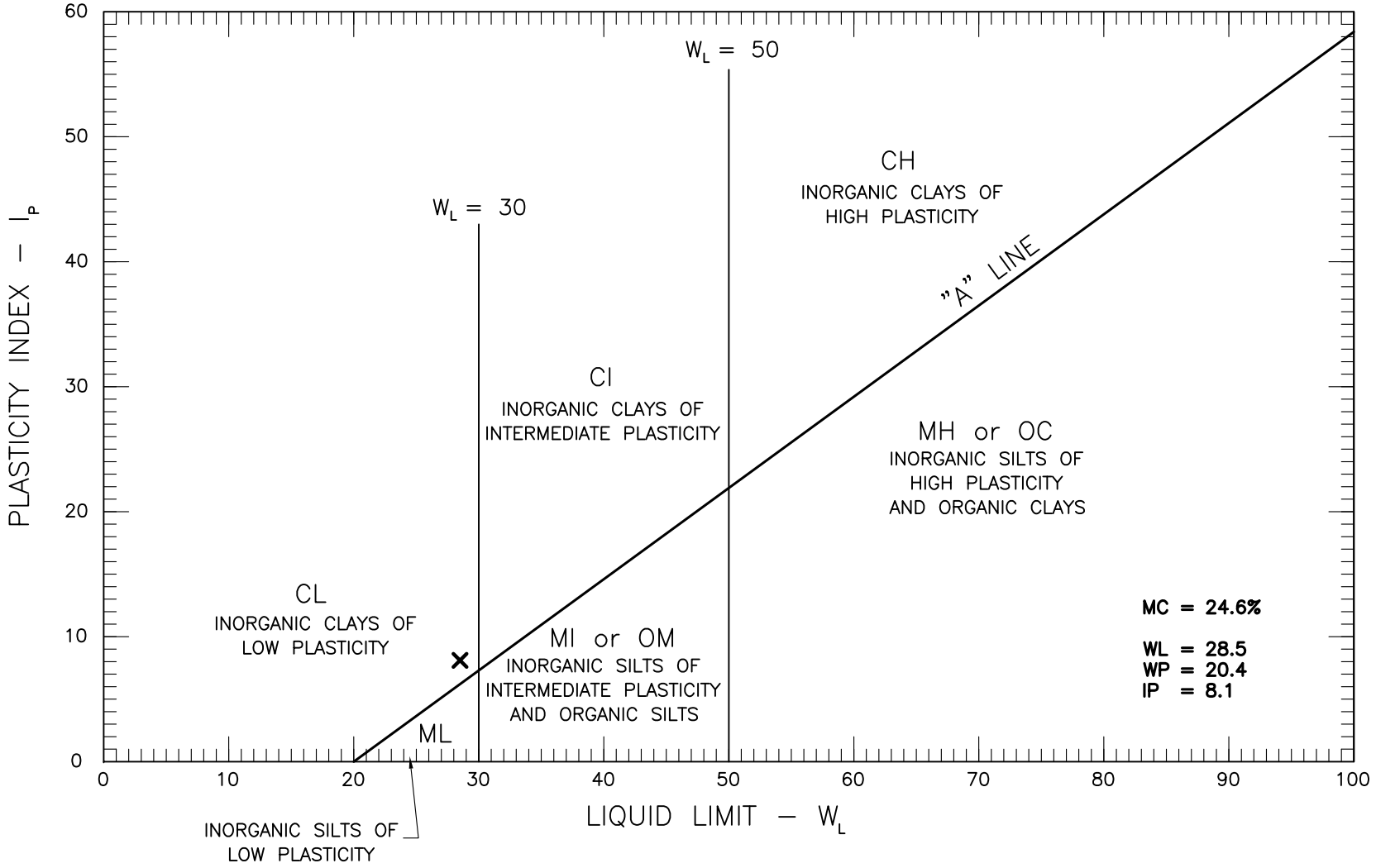
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-120-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP120-G1



GeoNorth Engineering Ltd.
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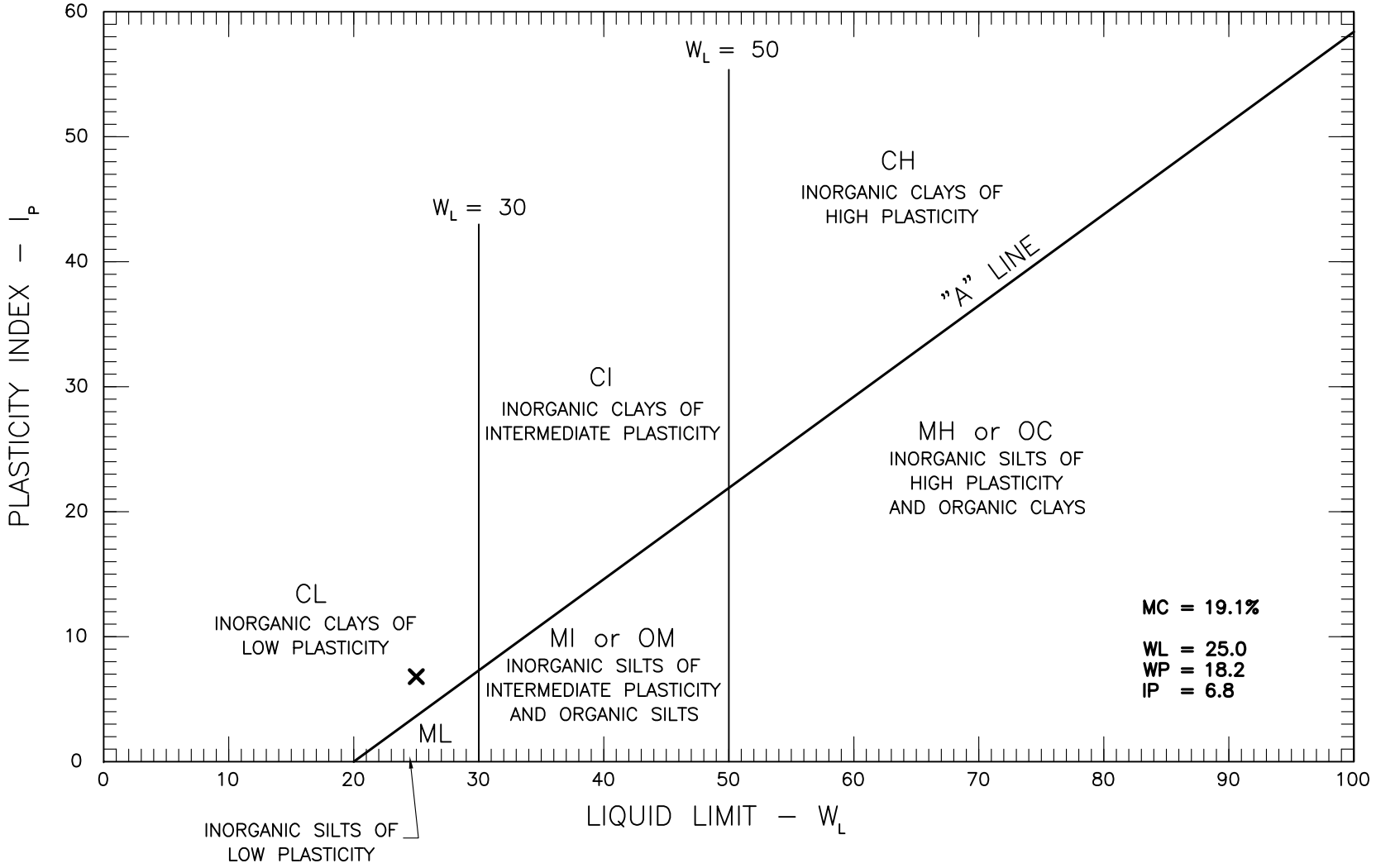
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-121, 2.9-3.1 m DEPTH

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP121



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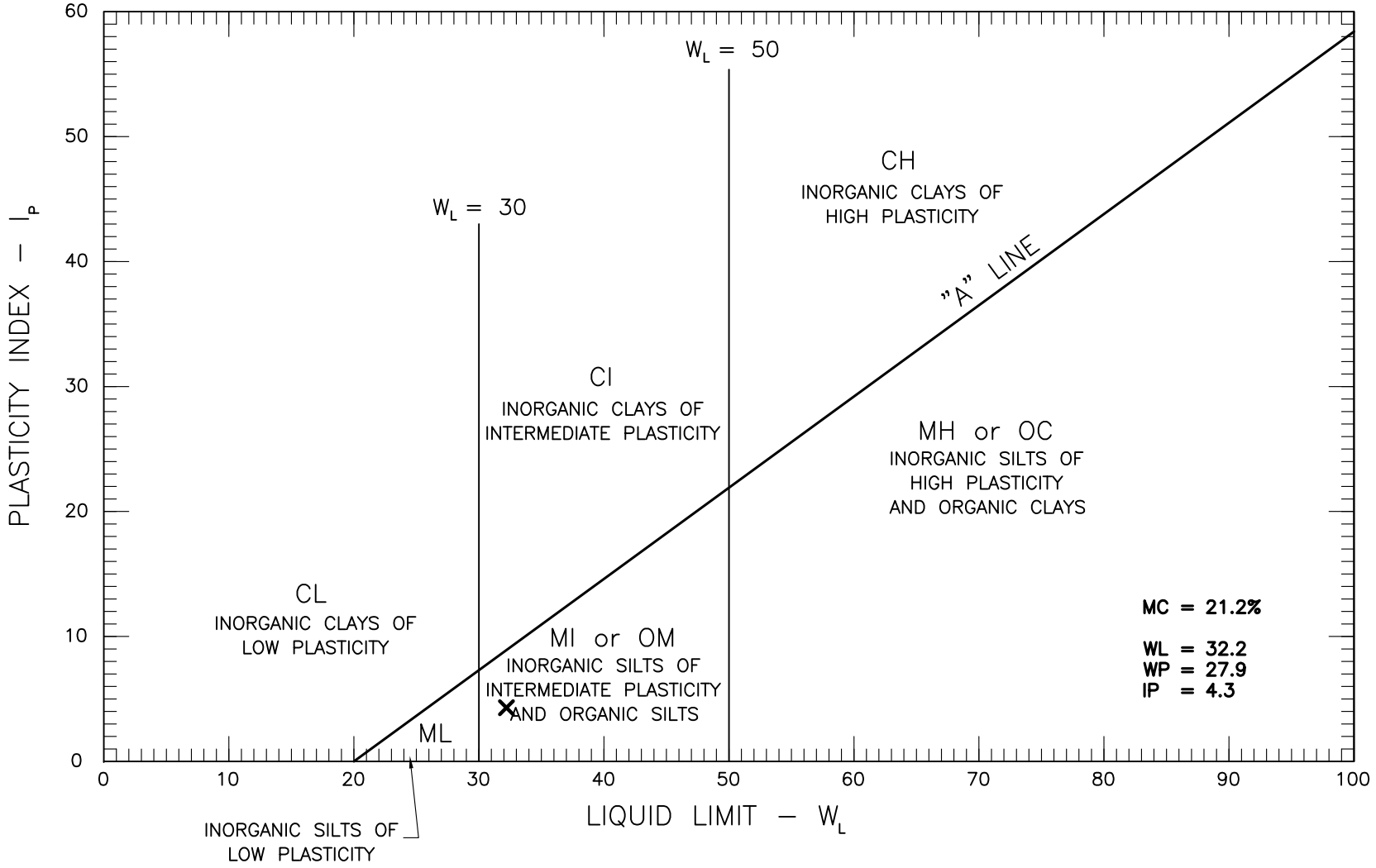
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-122, 5.4-5.8 m DEPTH

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP122



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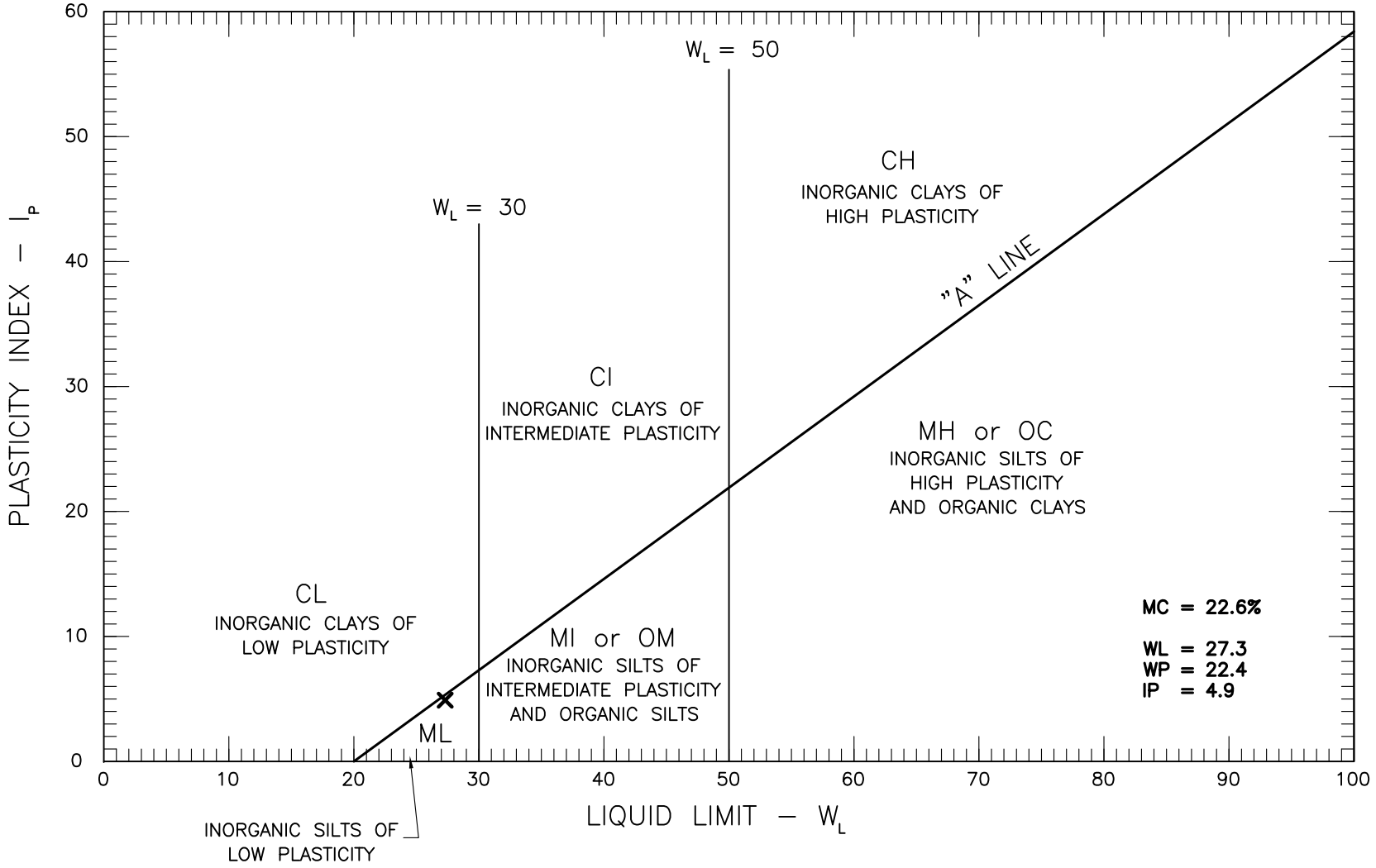
Prince George, B.C. V2N 1B2
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-124-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP124-G1



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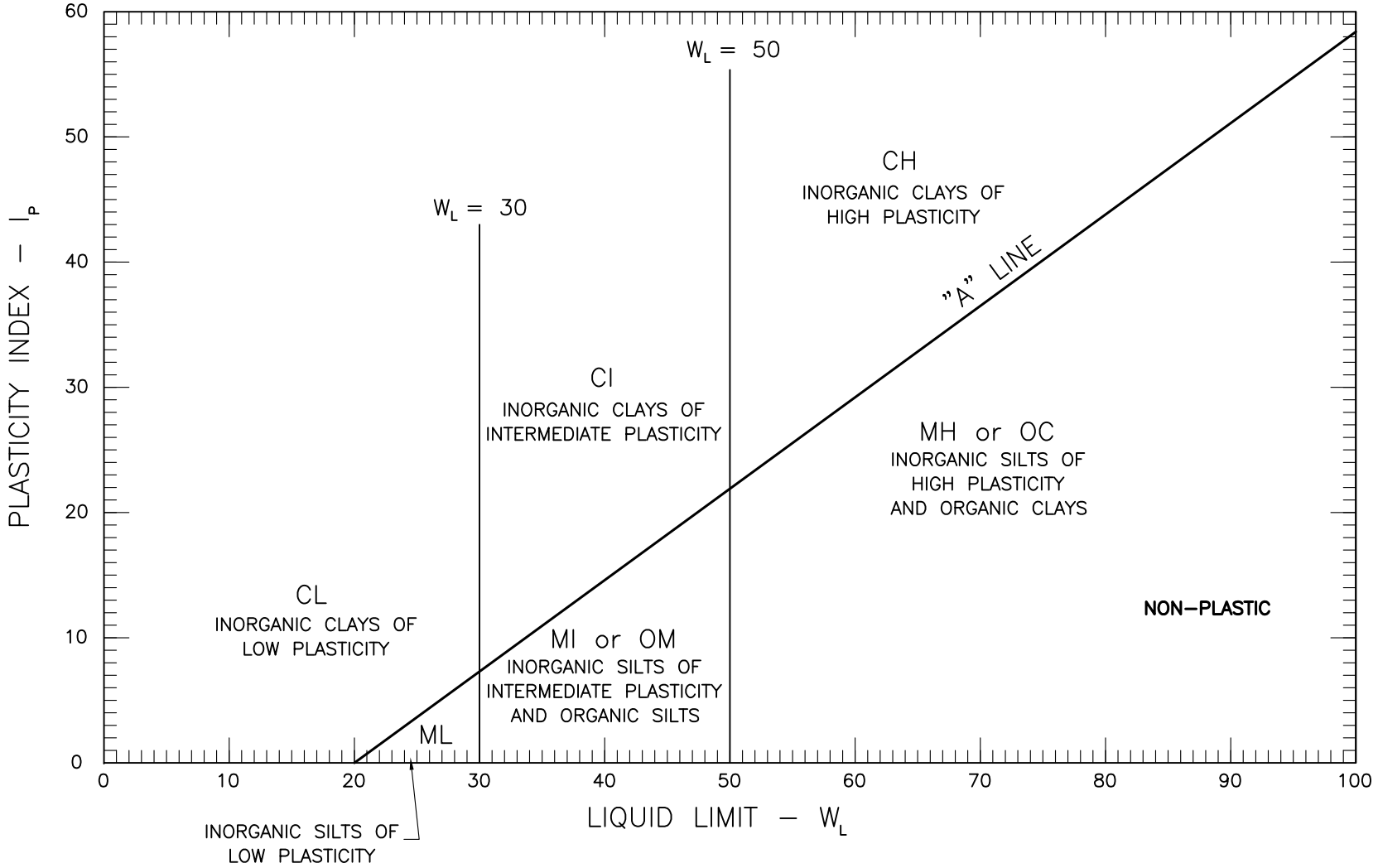
BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-129-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP129-G1



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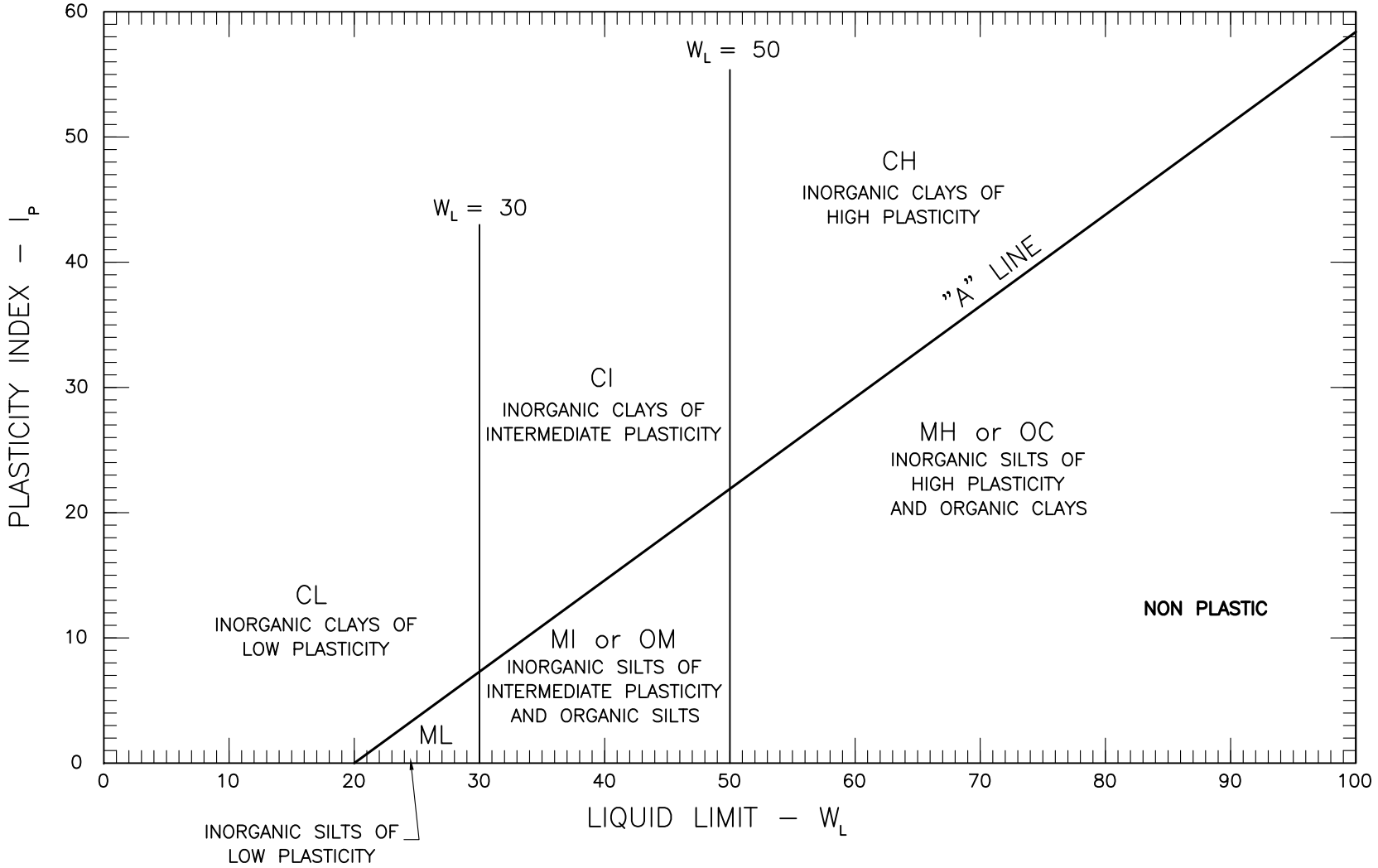
Tel. 250–564–4304 Fax 250–564–9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP–BGC11–130, 5.8–6.0 m DEPTH

PROJECT NO.
K–3300

PLATE NO.
3300–AL–TP130



GeoNorth Engineering Ltd.
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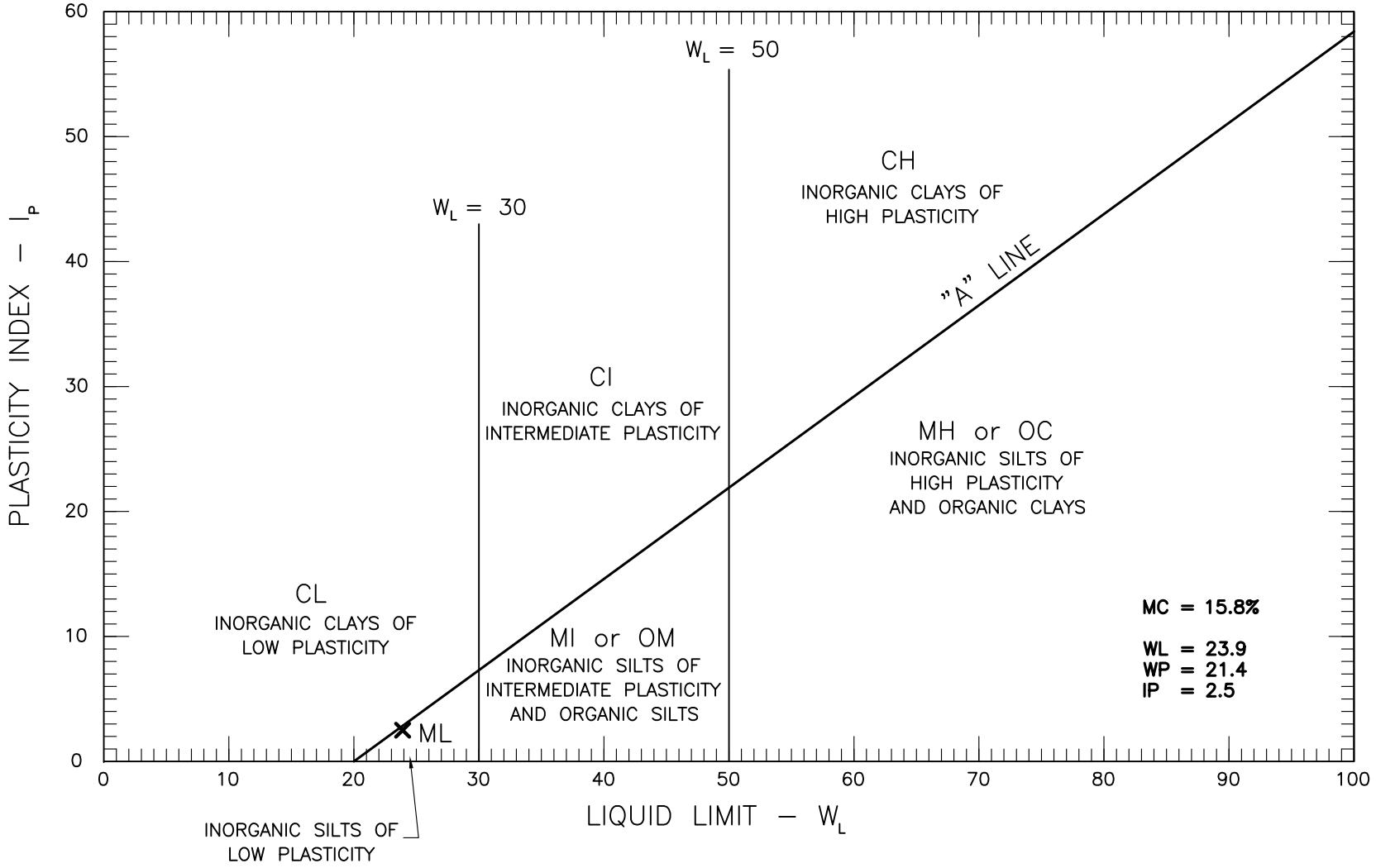
Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-131-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP131-G1



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Tel. 250-564-4304 Fax 250-564-9323

BGC ENGINEERING INC.
EAGLE GOLD SOILS AND AGGREGATE TESTING
DUBLIN GULCH, YUKON
ATTERBERG LIMITS OF TP-BGC11-140-G1

PROJECT NO.
K-3300

PLATE NO.
3300-AL-TP140-G1

Specific Gravity and Absorption of Rock For Erosion Control

ASTM D6473-99(2005)

Project #:	11-1415-0029/7000
Short Title:	Eagle Gold Mine Site Infra FS SI
Client	BGC (Proj 0792-006-04)
Location	Dublin Gulch,Yukon
Lab ID	141

Borehole	BH-BGC-29	BH-BGC-34				
Sample Number	1	1				
Depth (m)	27.46-27.77	26.60-36.96				
Bulk G_S (Oven Dry)	2.71	2.56				
Bulk G_S (SSD)	2.73	2.64				
Apparent G_S	2.77	2.78				
% Absorption	0.79	3.14				

Borehole						
Sample Number						
Depth (m)						
Bulk G_S (Oven Dry)						
Bulk G_S (SSD)						
Apparent G_S						
% Absorption						

Borehole						
Sample Number						
Depth (m)						
Bulk G_S (Oven Dry)						
Bulk G_S (SSD)						
Apparent G_S						
% Absorption						

Borehole						
Sample Number						
Depth (m)						
Bulk G_S (Oven Dry)						
Bulk G_S (SSD)						
Apparent G_S						
% Absorption						

G. Patton	September 19, 2011	LPerrey	October 27,2011
TESTED BY	DATE TESTED	CHECKED BY	DATE CHECKED

Golder Associates Ltd.
500 - 4260 Still Creek Drive, Burnaby, British Columbia, Canada V5C 6C6
Tel: +1 (604) 296 4200 Fax: +1 (604) 298 5253 www.golder.com

* The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

Specific Gravity and Absorption of Rock For Erosion Control

ASTM D6473-99(2005)

Project #:	11-1415-0029/7000
Short Title:	Eagle Gold
Client	BGC Engineering Inc.
Location	Yukon
Lab ID	141

Borehole	BH-BGC11-40A	BH-BGC11-40B	BH-BGC11-43	BH-BGC11-45	BH-BGC11-46	BH-BGC11-62
Sample Number	2	UCS 1	1	UCS	UCS	UCS
Depth (m)	30.98-31.30	21.81-22.06	4.24-4.48	17.80-18.04	13.11-13.65	28.59-28.84
Bulk G_S (Oven Dry)	2.67	2.74	2.71	2.76	2.69	2.59
Bulk G_S (SSD)	2.68	2.75	2.71	2.78	2.70	2.63
Apparent G_S	2.70	2.78	2.73	2.81	2.72	2.69
% Absorption	0.36	0.54	0.30	0.61	0.48	1.33

Borehole	BH-BGC11-69					
Sample Number	UCS 1					
Depth (m)	12.26-12.54					
Bulk G_S (Oven Dry)	2.52					
Bulk G_S (SSD)	2.59					
Apparent G_S	2.70					
% Absorption	2.64					

Borehole						
Sample Number						
Depth (m)						
Bulk G_S (Oven Dry)						
Bulk G_S (SSD)						
Apparent G_S						
% Absorption						

Borehole						
Sample Number						
Depth (m)						
Bulk G_S (Oven Dry)						
Bulk G_S (SSD)						
Apparent G_S						
% Absorption						

G. Patton	September 19, 2011	LP	October 7,2011
TESTED BY	DATE TESTED	CHECKED BY	DATE CHECKED

Golder Associates Ltd.
500 - 4260 Still Creek Drive, Burnaby, British Columbia, Canada V5C 6C6
Tel: +1 (604) 296 4200 Fax: +1 (604) 298 5253 www.golder.com

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Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0029/7000	**Borehole**	**TP-BGC11-50**
Client:	BGC (Proj 0792-006-04)	**Sample No.:**	SA1
Project:	Eagle Gold Mine Site Infra FS SI	**Depth (m):**	N/A
Location:	Dublin Gulch,Yukon	**Lab Sch No:**	141

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		15.54		
Test Number		1		2
Flask Number		6		7
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		173.40		171.33
Mass of Flask + Dry Soil (g)	M_P	271.20		262.18
Mass of Dry Soil (g)		97.64		90.59
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	734.09		727.40
Test Temperature (g)	T_t	20.50		20.50
Mass of Flask + Water (g)	$M_{\rho w,t}$	671.34		669.18
Mass of Dish + Dry Soil (g)		467.92		443.84
Mass of Dish (g)		370.28		353.25
Mass of Oven Dry Soil (g)	M_S	97.64		90.59
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.80		2.80
Specific Gravity at Test Temperature	G_t	2.80		2.80
Specific Gravity at 20ºC	$G_{20°C}$	2.80		2.80
AVERAGE SPECIFIC GRAVITY		**2.80**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		84.46
Mass of Sample in Water (g)	A	457.51
Mass of Sample @ SSD (g)	B	718.88
Mass of Oven Dryed Sample (g)	C	682.7
Bulk G (Oven Dry)	C/(B-A)	2.61
Bulk G (SSD)	B/(B-A)	2.75
Apparent	C/(C-A)	3.03
Absorbtion (%)	(B-C)/C	5.30

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	2.99

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK	September 28, 2011	LP	October 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0029/7000	**Borehole**	**TP-BGC11-58**
Client:	BGC (Proj 0792-006-04)	**Sample No.:**	SA2
Project:	Eagle Gold	**Depth (m):**	1.9-2.0
Location:	Dublin Gulch, Yukon	**Lab Sch No:**	141

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		100		
Test Number		1		2
Flask Number		6		7
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		173.41		171.35
Mass of Flask + Dry Soil (g)	M_P	277.90		273.49
Mass of Dry Soil (g)		104.10		101.83
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	738.77		734.87
Test Temperature (g)	T_t	21.70		21.50
Mass of Flask + Water (g)	$M_{\rho w,t}$	671.22		669.08
Mass of Dish + Dry Soil (g)		466.51		472.53
Mass of Dish (g)		362.41		370.70
Mass of Oven Dry Soil (g)	M_S	104.10		101.83
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.85		2.83
Specific Gravity at Test Temperature	G_t	2.85		2.83
Specific Gravity at 20ºC	$G_{20°C}$	2.85		2.83
AVERAGE SPECIFIC GRAVITY		**2.84**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		
Mass of Sample in Water (g)	A	0
Mass of Sample @ SSD (g)	B	0
Mass of Oven Dryed Sample (g)	C	0
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	
Apparent	C/(C-A)	
Absorbtion (%)	(B-C)/C	

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	Gavg @20°C	

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK	November 1, 2002	LP	NOVEMBER 3,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0029/7000	**Borehole**	**TP-BGC11-67**
Client:	BGC (Proj 0792-006-04)	**Sample No.:**	SA1
Project:	Eagle Gold	**Depth (m):**	0.7-0.9
Location:	Dublin Gulch, Yukon	**Lab Sch No:**	141

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		100		
Test Number		1		2
Flask Number		4		5
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		172.75		174.83
Mass of Flask + Dry Soil (g)	M_P	272.17		278.92
Mass of Dry Soil (g)		99.45		104.02
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	733.82		738.64
Test Temperature (g)	T_t	21.60		21.80
Mass of Flask + Water (g)	$M_{\rho w,t}$	671.06		672.89
Mass of Dish + Dry Soil (g)		452.55		461.38
Mass of Dish (g)		353.10		357.36
Mass of Oven Dry Soil (g)	M_S	99.45		104.02
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.71		2.72
Specific Gravity at Test Temperature	G_t	2.72		2.72
Specific Gravity at 20ºC	$G_{20°C}$	2.72		2.72
AVERAGE SPECIFIC GRAVITY		**2.72**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		
Mass of Sample in Water (g)	A	0
Mass of Sample @ SSD (g)	B	0
Mass of Oven Dryed Sample (g)	C	0
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	
Apparent	C/(C-A)	
Absorbtion (%)	(B-C)/C	

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	Gavg @20°C	

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK	November 1, 2002	LP	NOVEMBER 3,2011
TESTED BY	DATE	CHECKED BY	DATE

GEONORTH ENGINEERING LTD.

3975 18th Avenue
Prince George, B.C., V2N 1B2
Phone 250-564-4304
Fax 250-564-9323
E-mail mail@geonorth.ca

December 7, 2011

K-3300

BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC V6Z 2A9

Attention: Pete Quinn

Dear Sirs:

Re:Eagle Gold BH-BGC11-42 Sample 5 Specific Gravity Test Results

Listed below are results for the specific gravity test that you requested for the above mentioned sample.

Bulk Specific Gravity:	2.533
Bulk Specific Gravity Saturated Surface Dry	2.577
Apparent Specific Gravity	2.649
Absorption	1.718%

If you require any further information, please do not hesitate to call me at our office at (250) 564-4304.

Yours truly,

GeoNorth Engineering Ltd.

Per: Hans Jorgensen
Supervisor, Technical Services

DETERMINATION OF TOTAL OR WATER-SOLUBLE SULPHATE ION CONTENT OF SOIL

CSA A23.2-3B

October 27, 2011
Project Number: 11-1415-0029-7000

BGC Engineering Inc.
500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTENTION: Mr. Peter Quinn, Ph.D, P.Eng.

PROJECT: Eagle Gold Mine Site Infra FS S1, Dublin Gulch, Yukon

Date Tested: October 25, 2011

Sample ID	Date Sampled	Total Sulphate Ion Content %	Water-Soluble Sulphate Ion Content %
TP-BGC11-51 SA2 2.4-2.8 m	29 June 2011	0.13	Not Applicable *
TP-BGC11-60 SA1 0.7-0.9 m	7 July 2011	0.07	Not Applicable *
TP-BGC11-84 SA1 0.4-0.6 m	13 July 2011	0.07	Not Applicable *

Note:
1. * Per Clause 5.1.4, the water-soluble sulphate ion content need not be tested when the total sulphate ion content is less than 0.20%
2. Detection limit for the test is 0.005%

Tested by: S. John, AScT

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the samples provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

MOISTURE - DENSITY RELATIONSHIP REPORT

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

ATTN: Peter Quinn

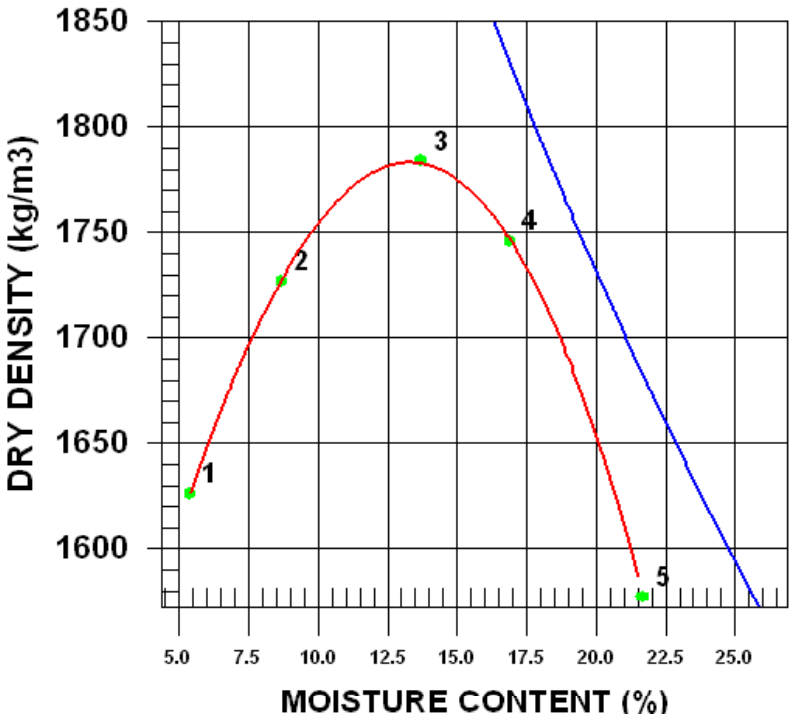
PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

PROCTOR NO. 3 DATE TESTED 2011.Nov.10 DATE RECEIVED 2011.Sep.13 DATE SAMPLED 2011.Aug.18

INSITU MOISTURE N/A %
SAMPLED BY Client
TESTED BY MM
SUPPLIER TP-BGC11-119
SOURCE G1 @ 0.9 - 1.1m
MATERIAL IDENTIFICATION
MAJOR COMPONENT Silt
SIZE 4.75mm
DESCRIPTION
ROCK TYPE

COMPACTION STANDARD Modified Proctor, ASTM D1557
COMPACTION PROCEDURE A: 101.6mm Mold, Passing 4.75mm
RAMMER TYPE Automatic
PREPARATION Moist
OVERSIZE CORRECTION METHOD None
RETAINED 4.75mm SCREEN %
OVERSIZE SPECIFIC GRAVITY
TOTAL NUMBER OF TRIALS 5



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1714	1626	5.4
2	1877	1727	8.7
3	2028	1784	13.7
4	2041	1746	16.9
5	1919	1577	21.7

ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.65	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED OVERSIZE CORRECTED	1780	13.5

COMMENTS
Permeability at 95% MPD (Over Optimum Moisture Conditions): 4.2 x 10^-8 cm/s

GeoNorth Engineering Ltd.
3975 18th Avenue Prince George, BC V2N 1B2
Phone (250)564-4304; Fax (250)564-9323

MOISTURE - DENSITY RELATIONSHIP REPORT

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

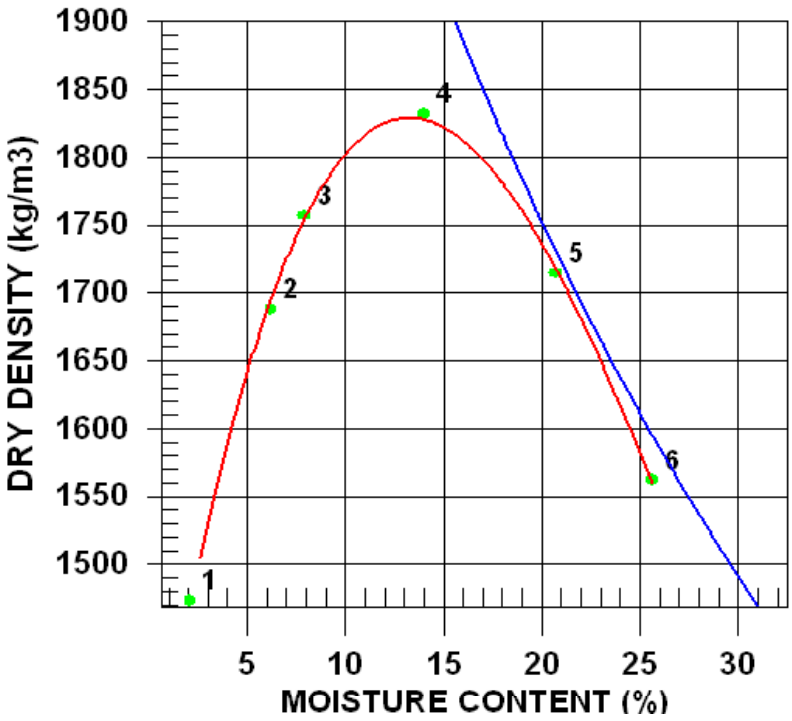
ATTN: Peter Quinn

PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

PROCTOR NO. 4 DATE TESTED 2011.Nov.10 DATE RECEIVED 2011.Sep.13 DATE SAMPLED 2011.Aug.18

INSITU MOISTURE	N/A %	COMPACTION STANDARD	Modified Proctor, ASTM D1557
SAMPLED BY	Client	COMPACTION PROCEDURE	A: 101.6mm Mold, Passing 4.75mm
TESTED BY	MM	RAMMER TYPE	Automatic
SUPPLIER	TP-BGC11-120	PREPARATION	Moist
SOURCE	G1 @ 3.8 - 4.0m	OVERSIZE CORRECTION METHOD	ASTM 4718
MATERIAL IDENTIFICATION		RETAINED 4.75mm SCREEN	2.4 %
MAJOR COMPONENT	Silt	OVERSIZE SPECIFIC GRAVITY	2.65
SIZE	25 mm	TOTAL NUMBER OF TRIALS	6
DESCRIPTION			
ROCK TYPE			



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	1504	1473	2.1
2	1793	1688	6.2
3	1896	1757	7.9
4	2089	1832	14.0
5	2070	1715	20.7
6	1962	1562	25.6

ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.70	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1830	13.5
OVERSIZE CORRECTED	1840	13.0

COMMENTS
Permeability at 95% MPD (Over Optimum Moisture Conditions): 6.5 x 10^-8 cm/s

GeoNorth Engineering Ltd.
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MOISTURE - DENSITY RELATIONSHIP REPORT

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

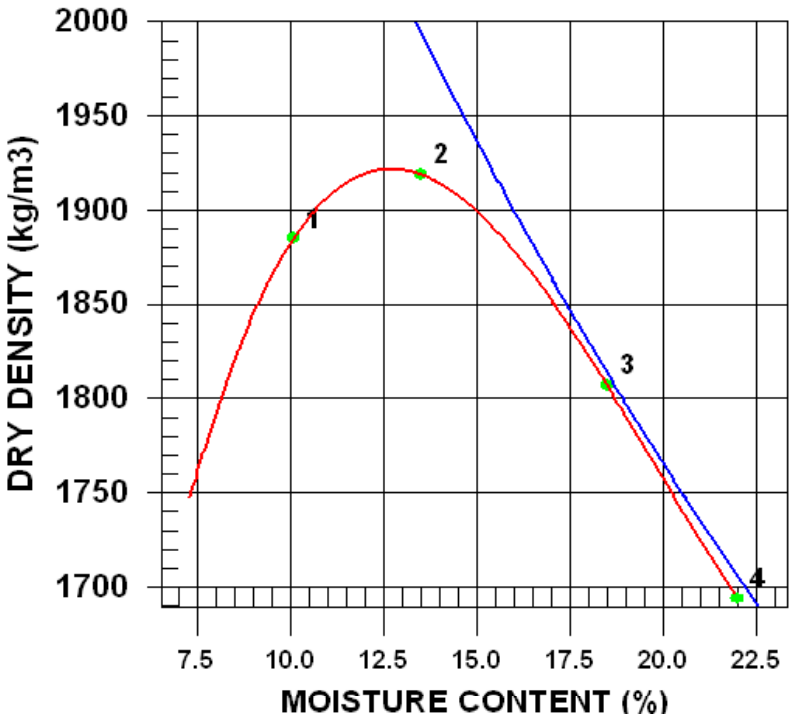
ATTN: Peter Quinn

PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

PROCTOR NO. 1 DATE TESTED 2011.Nov.09 DATE RECEIVED 2011.Sep.13 DATE SAMPLED 2011.Aug.18

INSITU MOISTURE	N/A %	COMPACTION STANDARD	Modified Proctor, ASTM D1557
SAMPLED BY	Client	COMPACTION PROCEDURE	A: 101.6mm Mold, Passing 4.75mm
TESTED BY	RO	RAMMER TYPE	Automatic
SUPPLIER	TP-BGC11-121	PREPARATION	Moist
SOURCE	G1 @ 2.9-3.1m	OVERSIZE CORRECTION METHOD	ASTM 4718
MATERIAL IDENTIFICATION		RETAINED 4.75mm SCREEN	4.3 %
MAJOR COMPONENT	Silt, sandy	OVERSIZE SPECIFIC GRAVITY	2.65
SIZE	37.5mm	TOTAL NUMBER OF TRIALS	4
DESCRIPTION			
ROCK TYPE			



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	2075	1885	10.1
2	2178	1919	13.5
3	2141	1807	18.5
4	2067	1694	22.0

ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.73	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	1920	12.5
OVERSIZE CORRECTED	1940	12.0

COMMENTS
Permeability at 95% MPD (Over Optimum Moisture Conditions): 4.0 x 10^-8 cm/s

GeoNorth Engineering Ltd.
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MOISTURE - DENSITY RELATIONSHIP REPORT

PROJECT NO. K-3300
CLIENT BGC Engineering Inc.
C.C.

TO
BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC
V6Z 2A9

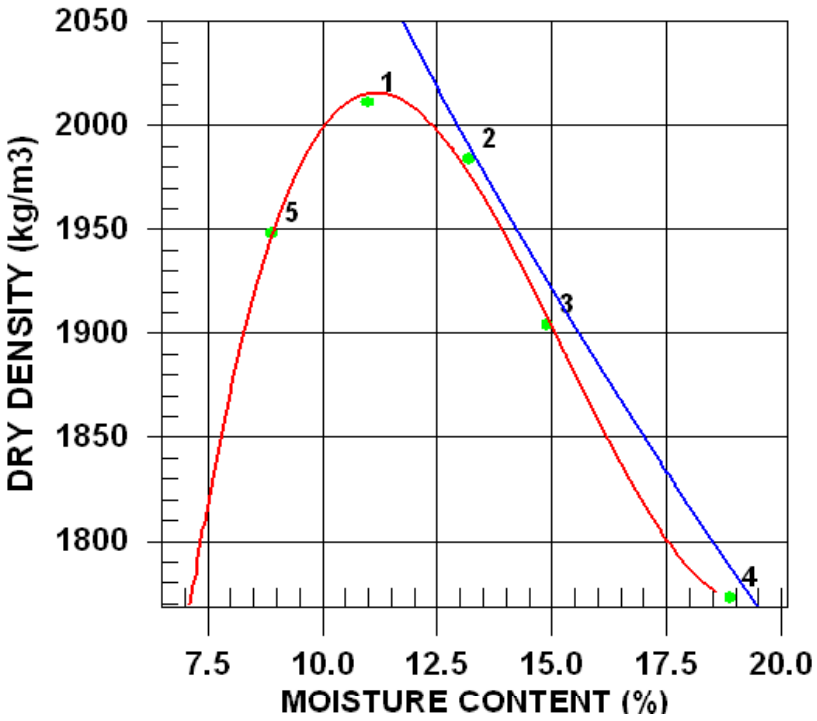
ATTN: Peter Quinn

PROJECT Eagle Gold Soils and Aggregate Testing
Dublin Gulch, Yukon

CONTRACTOR

PROCTOR NO. 2 DATE TESTED 2011.Nov.09 DATE RECEIVED 2011.Sep.13 DATE SAMPLED 2011.Aug.18

INSITU MOISTURE	N/A %	COMPACTION STANDARD	Modified Proctor, ASTM D1557
SAMPLED BY	Client	COMPACTION PROCEDURE	A: 101.6mm Mold, Passing 4.75mm
TESTED BY	RO	RAMMER TYPE	Automatic
SUPPLIER	TP-BGC11-122	PREPARATION	Moist
SOURCE	G1 @ 5.4-5.8m	OVERSIZE CORRECTION METHOD	ASTM 4718
MATERIAL IDENTIFICATION		RETAINED 4.75mm SCREEN	17.8 %
MAJOR COMPONENT	Silt, sandy	OVERSIZE SPECIFIC GRAVITY	2.65
SIZE	75 mm	TOTAL NUMBER OF TRIALS	5
DESCRIPTION			
ROCK TYPE			



TRIAL NUMBER	WET DENSITY (kg/m3)	DRY DENSITY (kg/m3)	MOISTURE CONTENT (%)
1	2232	2011	11.0
2	2246	1984	13.2
3	2188	1904	14.9
4	2108	1773	18.9
5	2121	1948	8.9

ZERO AIR VOIDS CURVE FOR ESTIMATED SPECIFIC GRAVITY OF 2.70	MAXIMUM DRY DENSITY (kg/m3)	OPTIMUM MOISTURE CONTENT (%)
CALCULATED	2020	11.0
OVERSIZE CORRECTED	2110	9.0

COMMENTS
Permeability at 95% MPD (Over Optimum Moisture Conditions): 3.15 x 10^-8 cm/s

 2011.Dec.05 GeoNorth Engineering Ltd. PER. _____

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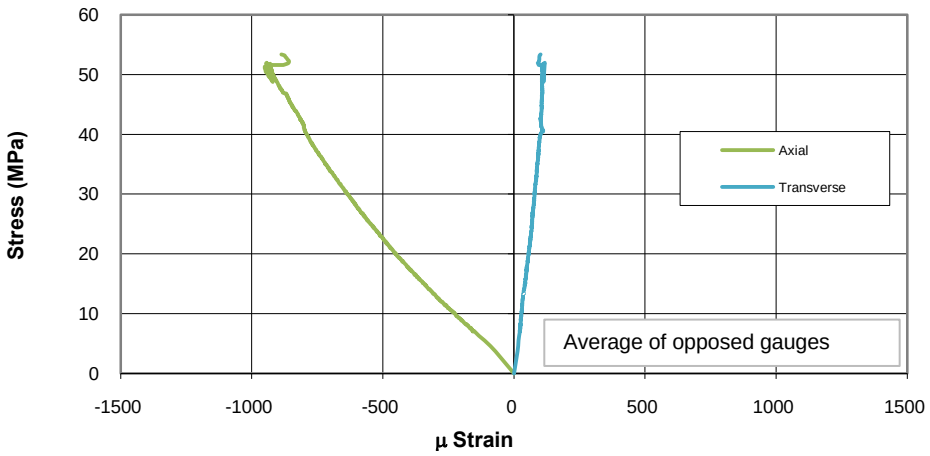

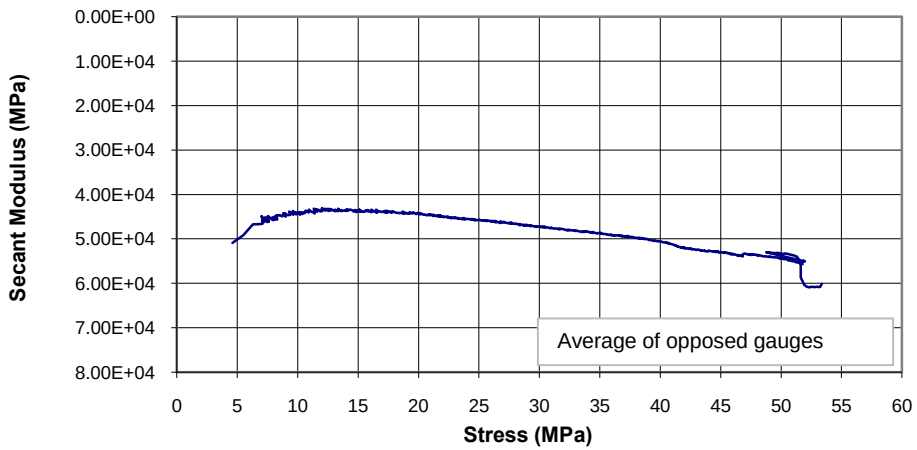

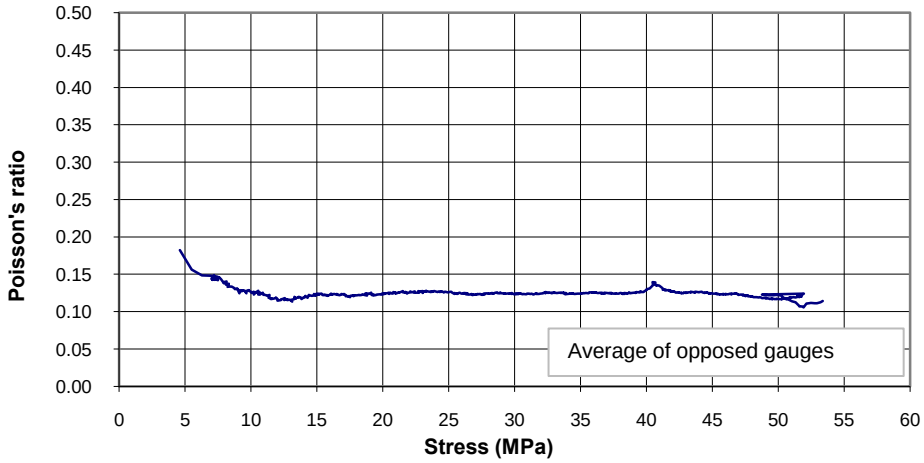

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	53.4	MPa	Borehole:	BH-BGC11-34	Project No.:	11-1415-0029/7000
Secant Modulus, ε_{50}	46.3	GPa	Sample:	UCS	Project:	Eagle Gold Mine Site Infra FS SI
Poisson's Ratio, ν_{50}	0.12		Depth (m):	36.60-36.96	Location	Dublin Gulch,Yukon
Height:	126.80	mm	Tested By:	G. Patton	Client	BGC (Proj 0792-006-04)
Diameter:	60.83	mm	Reviewed By	LPerrey		
Failure Mode:	Along Discontinuities					

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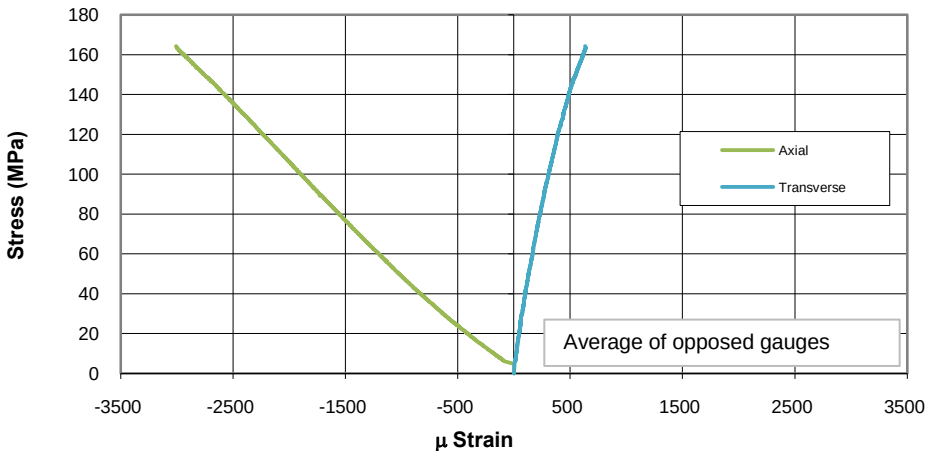

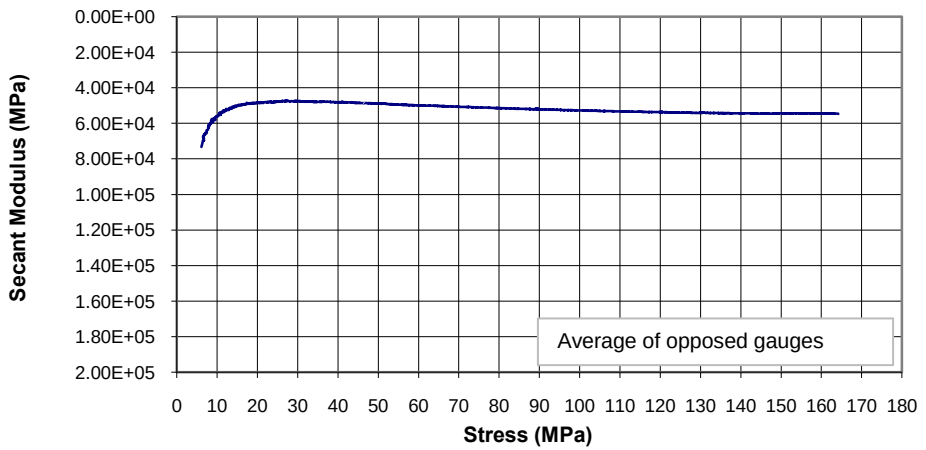

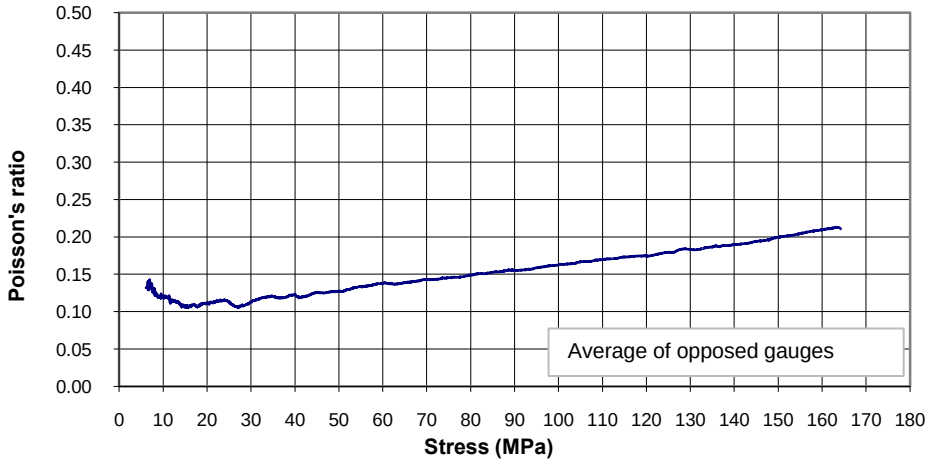

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	164.2	MPa				
Secant Modulus, ε_{50}	51.6	GPa	Borehole:	BH-BGC11-40A	Project No.:	11-1415-0029/7000
Poisson's Ratio, ν_{50}	0.15		Sample:	2	Project:	Eagle Gold
Height:	122.85	mm	Depth (m):	30.98-31.30	Location	Yukon
Diameter:	60.62	mm	Tested By:	G. Patton	Client	BGC Engineering Inc.
Failure Mode:	Shear 33°		Reviewed By	EK		

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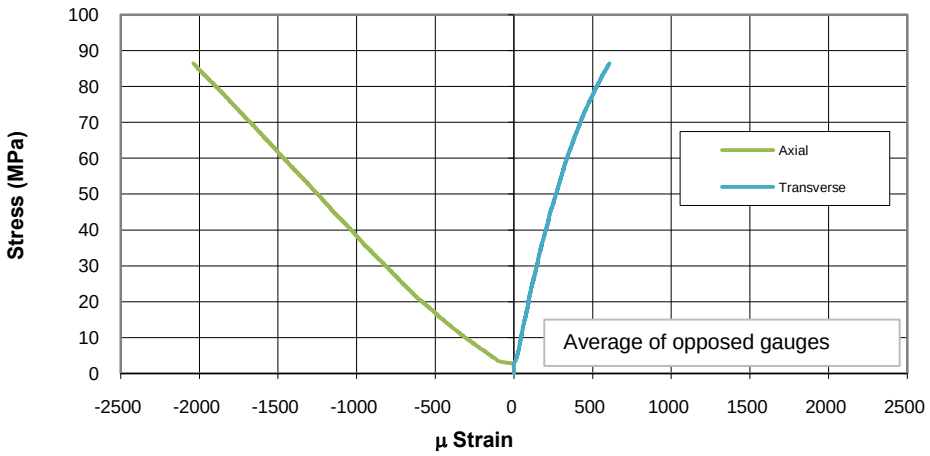

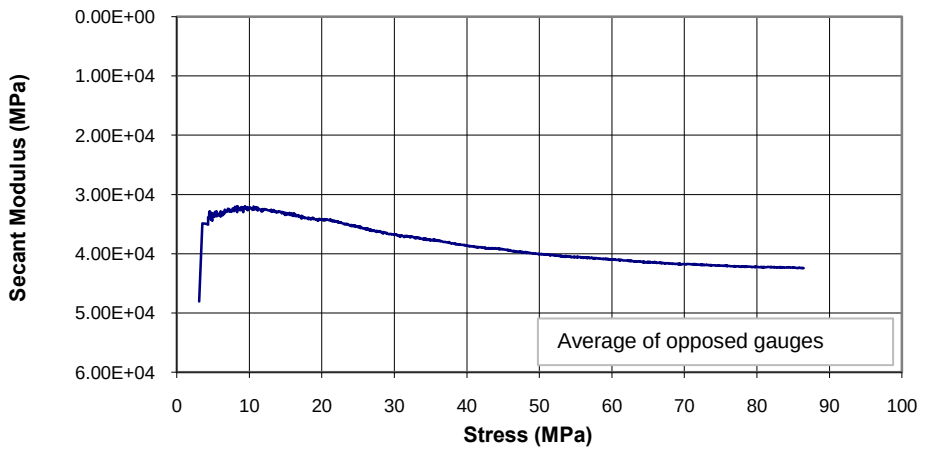

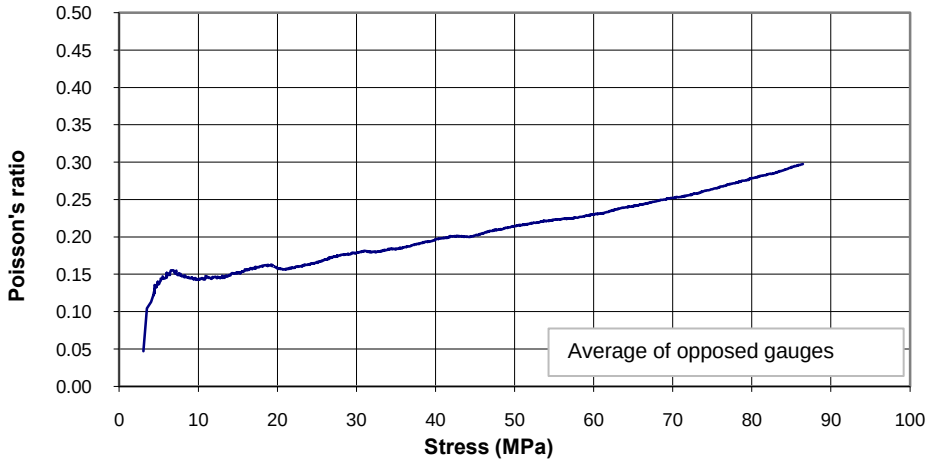

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	86.5	MPa				
Secant Modulus, ε_{50}	3.9	GPa	Borehole:	BH-BGC11-40B	Project No.:	11-1415-0029/7000
Poisson's Ratio, ν_{50}	0.20		Sample:	UCS 1	Project:	Eagle Gold
Height:	125.77	mm	Depth (m):	21.81-22.06	Location	Yukon
Diameter:	61.05	mm	Tested By:	G. Patton	Client	BGC Engineering Inc.
Failure Mode:	Shear along foliation 30°		Reviewed By	EK		

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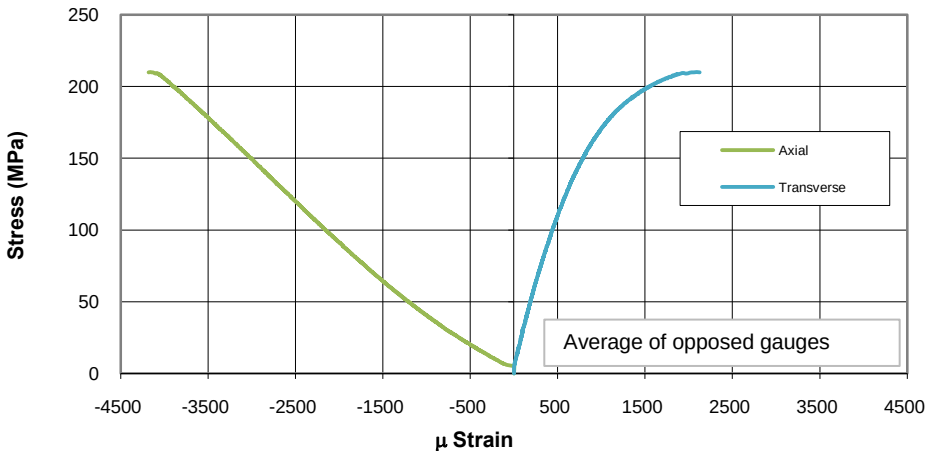

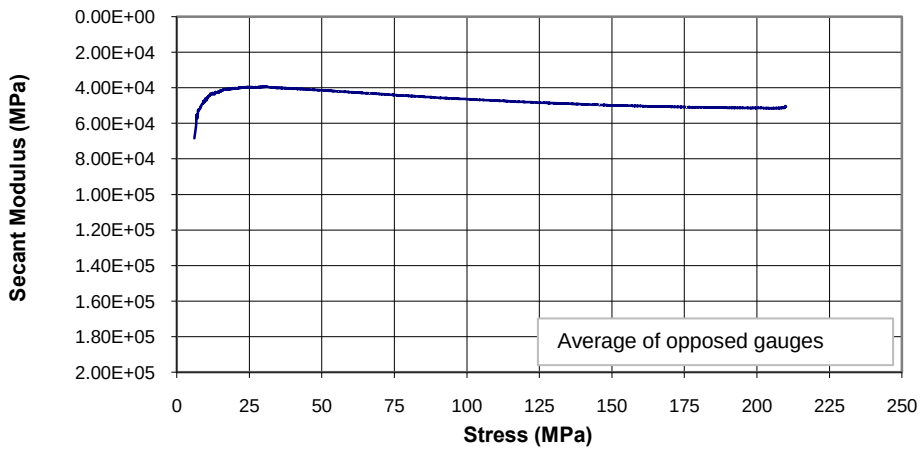

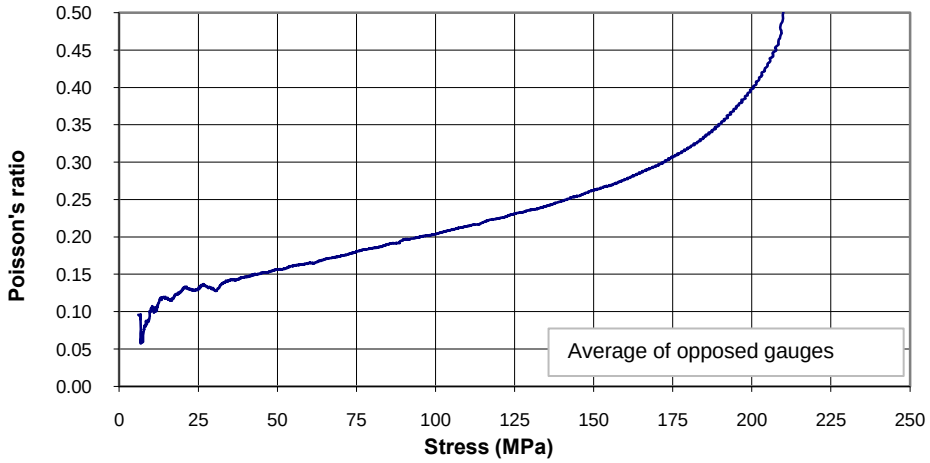

Before Test

After Test

Test Summary		
Peak Stress σ_{peak}	210.1	MPa
Secant Modulus, ε_{50}	46.8	GPa
Poisson's Ratio, ν_{50}	0.21	
Height:	126.25	mm
Diameter:	60.95	mm
Failure Mode:	Shear 27°	

ASTM D7012-07 Method D Modulus in Uniaxial Compression	
Borehole:	BH-BGC11-43
Sample:	1
Depth (m):	4.24-4.48
Tested By:	G. Patton
Reviewed By	EK

Project Details	
Project No.:	11-1415-0029/7000
Project:	Eagle Gold
Location	Yukon
Client	BGC Engineering Inc.

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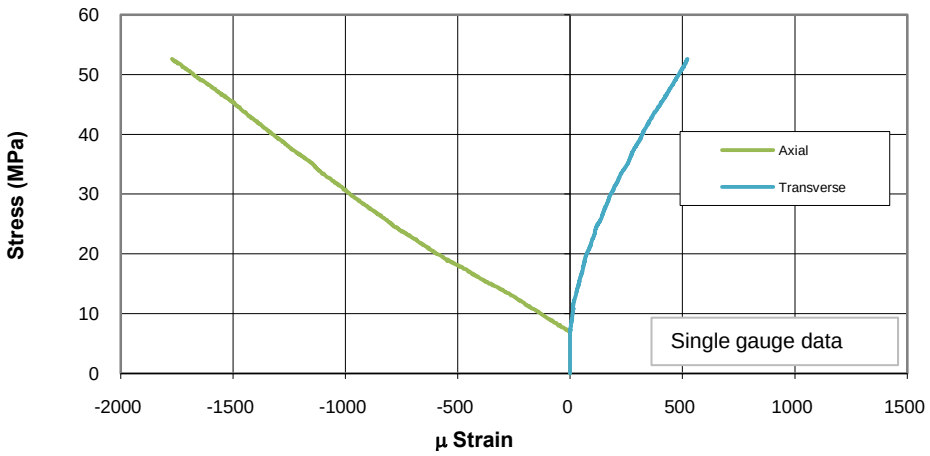

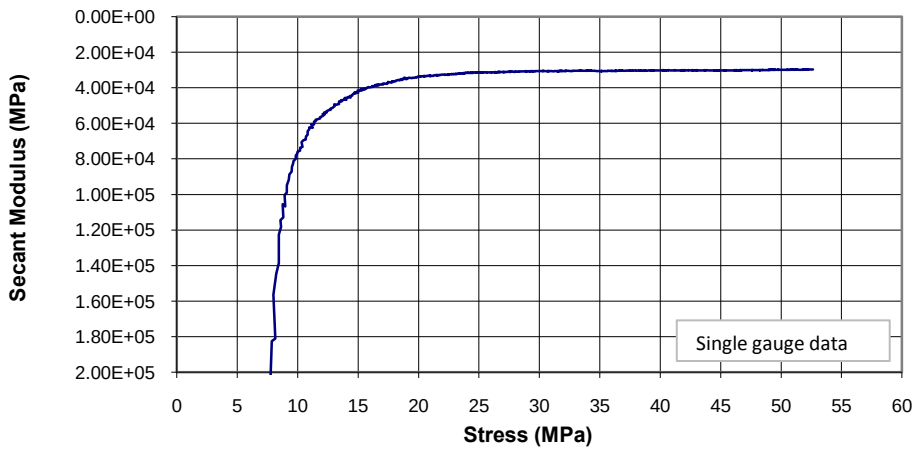

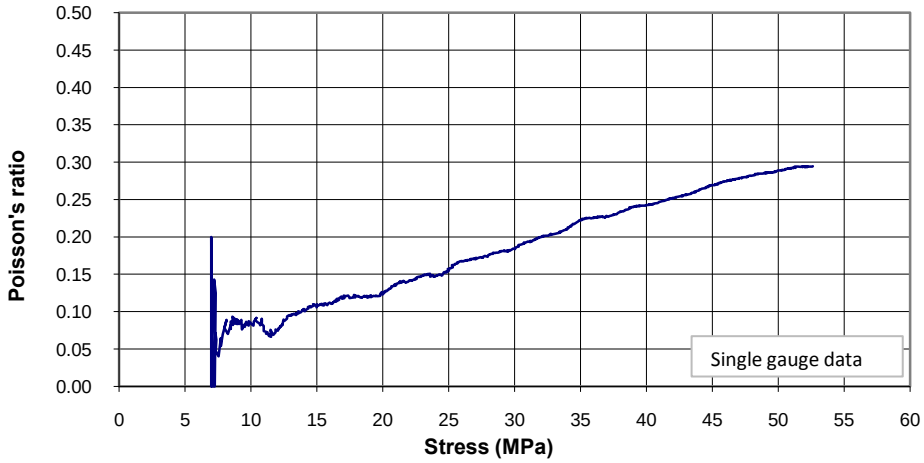

Before Test

After Test

Test Summary		
Peak Stress σ_{peak}	52.6	MPa
Secant Modulus, ε_{50}	31.1	GPa
Poisson's Ratio, ν_{50}	0.17	
Height:	123.14	mm
Diameter:	60.77	mm
Failure Mode:	Shear along foliation 33°	

ASTM D7012-07 Method D Modulus in Uniaxial Compression	
Borehole:	BH-BGC11-45
Sample:	UCS
Depth (m):	17.80-18.04
Tested By:	G. Patton
Reviewed By	EK

Project Details	
Project No.:	11-1415-0029/7000
Project:	Eagle Gold
Location	Yukon
Client	BGC Engineering Inc.

The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.

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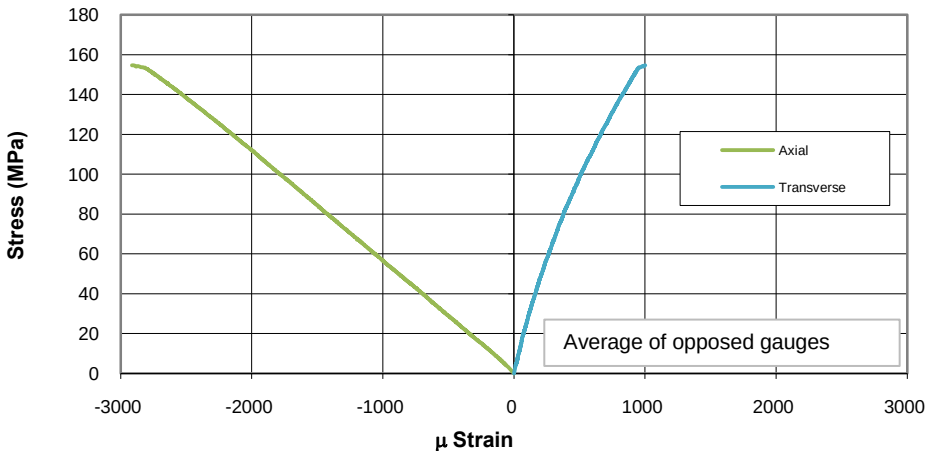

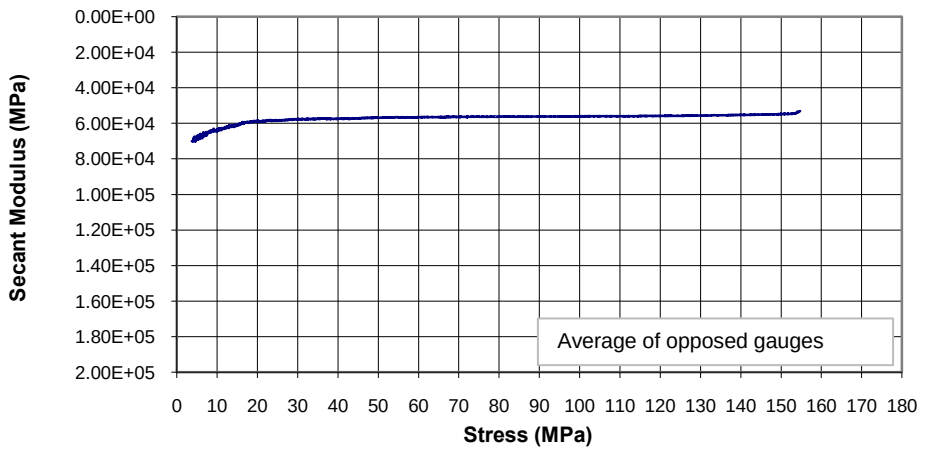

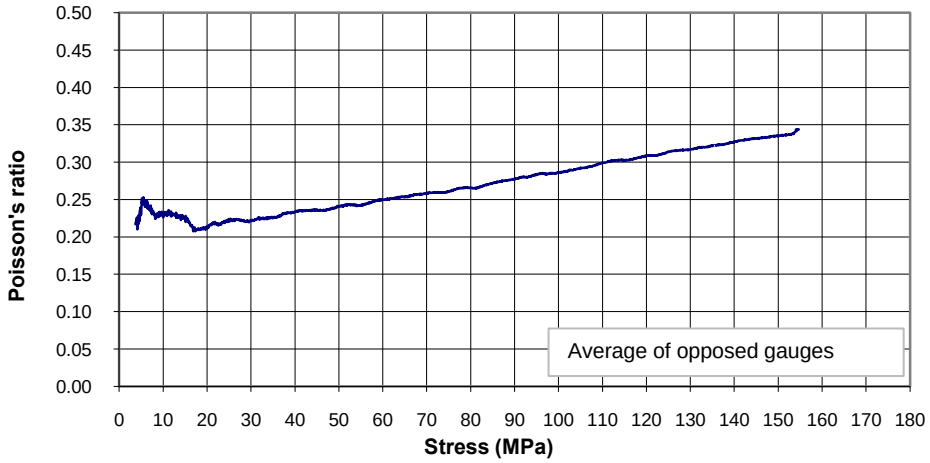

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	154.7	MPa				
Secant Modulus, ε_{50}	56.3	GPa	Borehole:	BH-BGC11-46	Project No.:	11-1415-0029/7000
Poisson's Ratio, ν_{50}	0.27		Sample:	UCS	Project:	Eagle Gold
Height:	126.37	mm	Depth (m):	13.11-13.65	Location	Yukon
Diameter:	60.80	mm	Tested By:	G. Patton	Client	BGC Engineering Inc.
Failure Mode:	Multi-Vertical		Reviewed By	EK		

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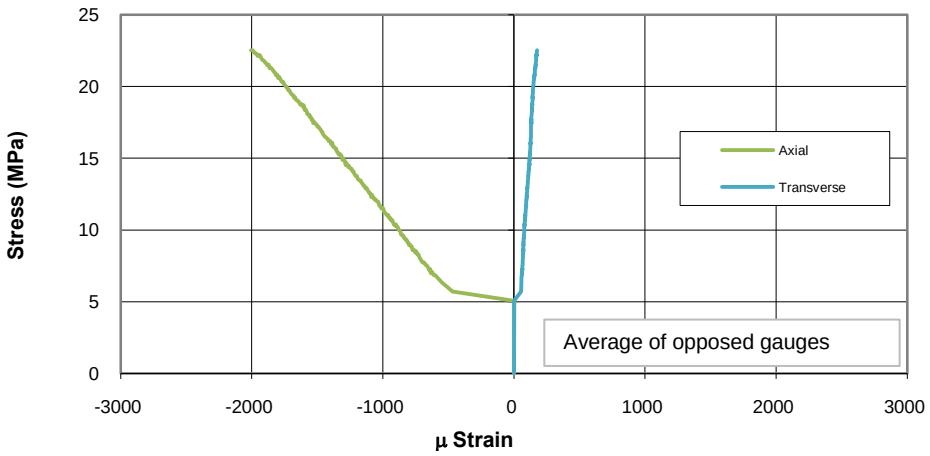

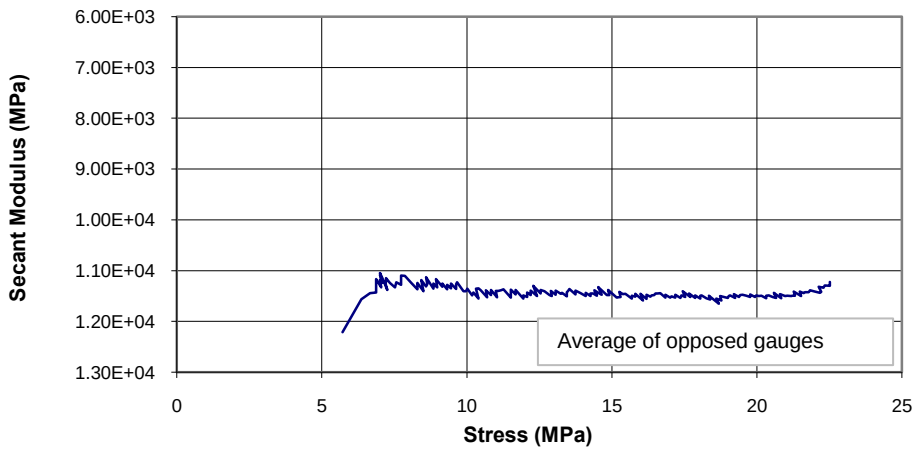

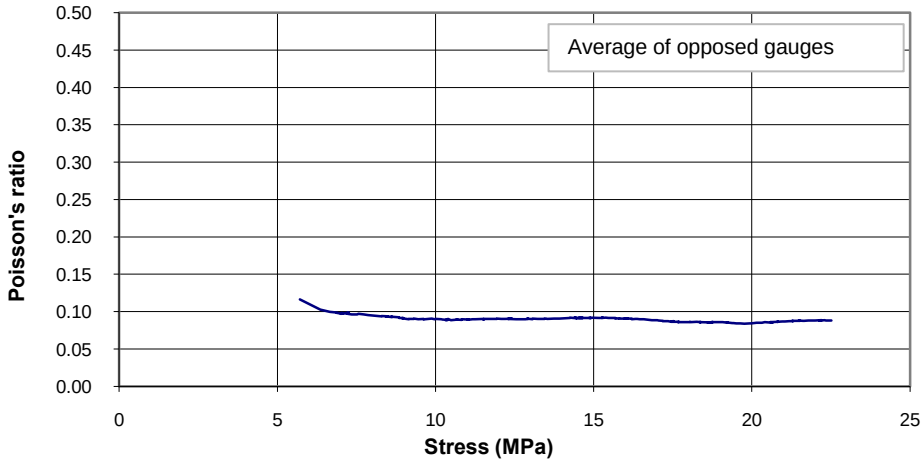

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	22.5	MPa				
Secant Modulus, ε_{50}	11.4	GPa	Borehole:	BH-BGC11-62	Project No.:	11-1415-0029/7000
Poisson's Ratio, ν_{50}	0.09		Sample:	UCS	Project:	Eagle Gold
Height:	122.75	mm	Depth (m):	28.59-28.84	Location	Yukon
Diameter:	60.89	mm	Tested By:	G. Patton	Client	BGC Engineering Inc.
Failure Mode:	Shear along folitaion 38°		Reviewed By	EK		

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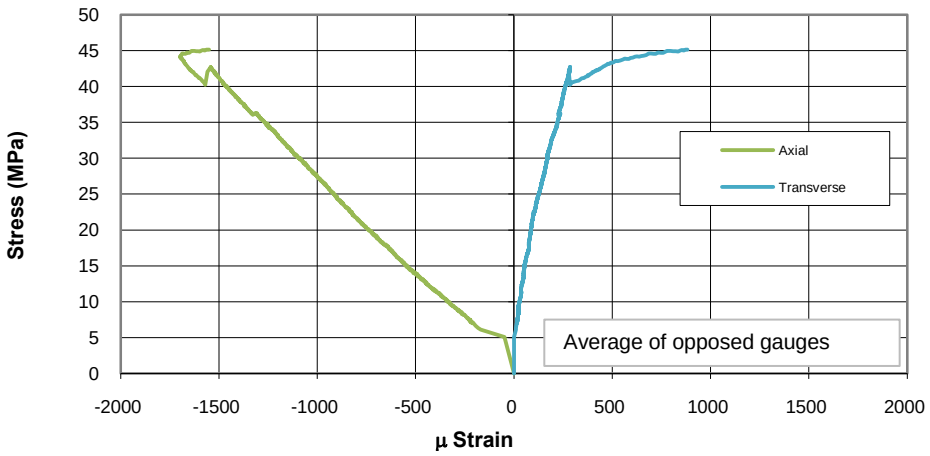

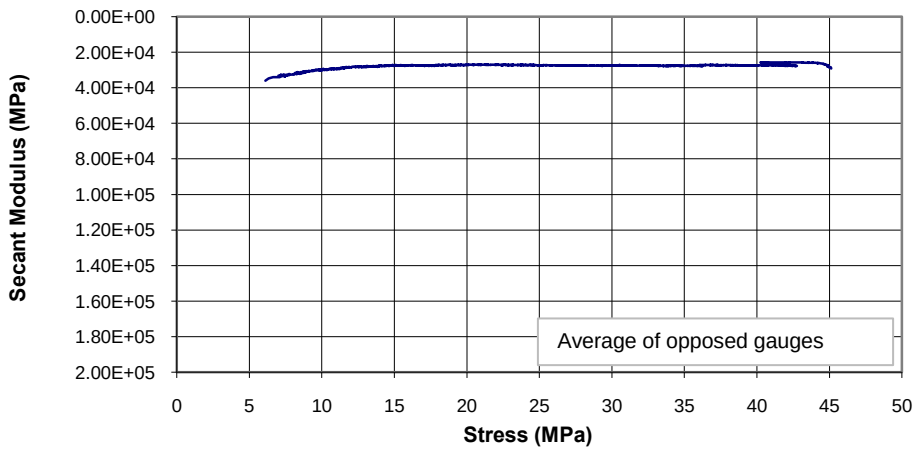

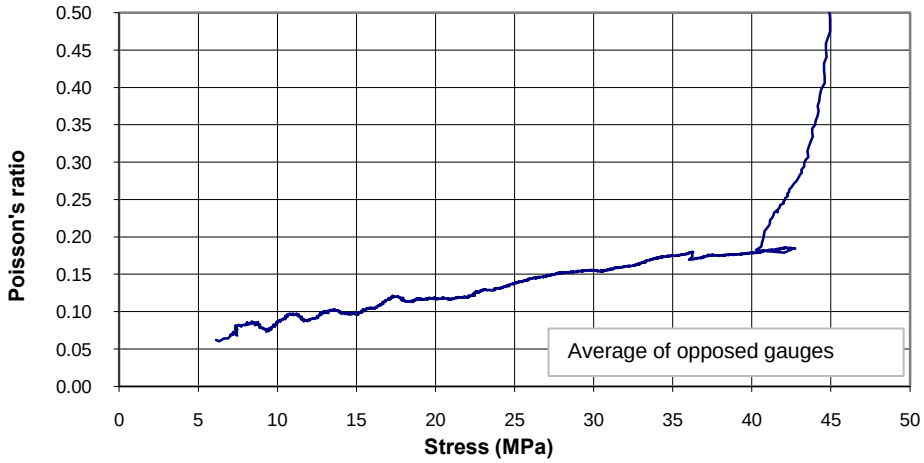

Before Test

After Test

Test Summary			ASTM D7012-07 Method D Modulus in Uniaxial Compression		Project Details	
Peak Stress σ_{peak}	45.1	MPa				
Secant Modulus, ε_{50}	27.1	GPa	Borehole:	BH-BGC11-69	Project No.:	11-1415-0029/7000
Poisson's Ratio, ν_{50}	0.13		Sample:	UCS 1	Project:	Eagle Gold
Height:	123.03	mm	Depth (m):	12.26-12.54	Location	Yukon
Diameter:	60.83	mm	Tested By:	G. Patton	Client	BGC Engineering Inc.
Failure Mode:	Shear 14°		Reviewed By	EK		

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Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-29**
Project:	Eagle Gold Mine Site Infra FS SI	**Sample Number:**	Sa 1 BTS 1
Location:	Dublin Gulch, Yukon	**Depth (m):**	27.46-27.77
Client:	BGC (Proj 0792-006-04)	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0163**
Tensile Stress (MPa)	**5.6**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.93
Thickness (mm)	30.64
Area (cm^2)	29.16
Volume (cm^3)	89.34
Mass (g)	232.70
Moisture Content (%)	1.05
Wet Density (Kg/m^3)	2604.69
Dry Density (Kg/m^3)	2577.62

Failure Mode

Type: Along Discontinuities

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

G. Patton	October 24, 2011	LPerrey	October 27,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
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Burnaby, B.C. Canada V5C 6C6

Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-29**
Project:	Eagle Gold Mine Site Infra FS SI	**Sample Number:**	Sa 1 BTS 2
Location:	Dublin Gulch, Yukon	**Depth (m):**	27.46-27.77
Client:	BGC (Proj 0792-006-04)	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0087**
Tensile Stress (MPa)	**3.2**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.87
Thickness (mm)	28.35
Area (cm^2)	29.10
Volume (cm^3)	82.50
Mass (g)	215.90
Moisture Content (%)	1.05
Wet Density (Kg/m^3)	2617.00
Dry Density (Kg/m^3)	2589.80

Failure Mode

Type: Along Discontinuities

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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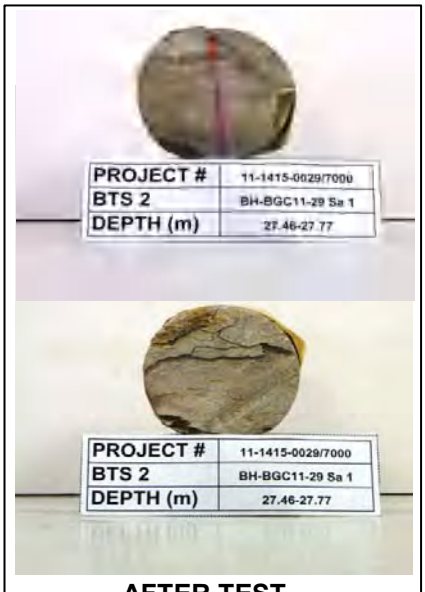
BEFORE TEST



AFTER TEST

G. Patton	October 24, 2011	LPerrey	October 27,2011
TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-34**
Project:	Eagle Gold Mine Site Infra FS SI	**Sample Number:**	UCS BTS 1
Location:	Dublin Gulch, Yukon	**Depth (m):**	36.60-36.96
Client:	BGC (Proj 0792-006-04)	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0246**
Tensile Stress (MPa)	**9.2**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.81
Thickness (mm)	27.92
Area (cm^2)	29.04
Volume (cm^3)	81.09
Mass (g)	212.20
Moisture Content (%)	0.32
Wet Density (Kg/m^3)	2616.92
Dry Density (Kg/m^3)	2608.57

Failure Mode

Type: Shear

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

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TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-34**
Project:	Eagle Gold Mine Site Infra FS SI	**Sample Number:**	UCS BTS 2
Location:	Dublin Gulch, Yukon	**Depth (m):**	36.60-36.96
Client:	BGC (Proj 0792-006-04)	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0379**
Tensile Stress (MPa)	**11.8**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.76
Thickness (mm)	33.54
Area (cm^2)	29.00
Volume (cm^3)	97.25
Mass (g)	261.30
Moisture Content (%)	0.32
Wet Density (Kg/m^3)	2686.90
Dry Density (Kg/m^3)	2678.33

Failure Mode

Type: Shear

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

TESTED BY	DATE	CHECKED BY	DATE
G. Patton	October 24, 2011	LPerrey	October 27,2011

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-40A**
Project:	Eagle Gold	**Sample Number:**	Sa 1 BTS 1
Location:	Yukon	**Depth (m):**	30.98-31.30
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0389**
Tensile Stress (MPa)	**13.0**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.66
Thickness (mm)	31.32
Area (cm^2)	28.90
Volume (cm^3)	90.51
Mass (g)	239.70
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2648.20
Dry Density (Kg/m^3)	2645.56

Failure Mode

Type: Along Discontinuity

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-40A**
Project:	Eagle Gold	**Sample Number:**	Sa 1 BTS 2
Location:	Yukon	**Depth (m):**	30.98-31.30
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0333**
Tensile Stress (MPa)	**12.2**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.64
Thickness (mm)	28.58
Area (cm^2)	28.88
Volume (cm^3)	82.54
Mass (g)	219.90
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2664.13
Dry Density (Kg/m^3)	2661.46

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-40B**
Project:	Eagle Gold	**Sample Number:**	UCS 1 BTS 1
Location:	Yukon	**Depth (m):**	21.81-22.06
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0334**
Tensile Stress (MPa)	**11.3**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	61.02
Thickness (mm)	30.92
Area (cm^2)	29.24
Volume (cm^3)	90.42
Mass (g)	253.10
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2799.10
Dry Density (Kg/m^3)	2796.30

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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BEFORE TEST

AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-40B**
Project:	Eagle Gold	**Sample Number:**	UCS 1 BTS 2
Location:	Yukon	**Depth (m):**	21.81-22.06
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0374**
Tensile Stress (MPa)	**13.0**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	61.05
Thickness (mm)	29.88
Area (cm^2)	29.27
Volume (cm^3)	87.47
Mass (g)	237.50
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2715.32
Dry Density (Kg/m^3)	2712.61

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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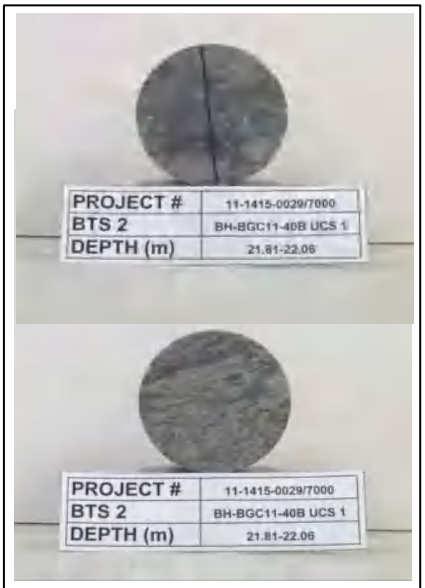

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-43**
Project:	Eagle Gold	**Sample Number:**	Sa 1 BTS 1
Location:	Yukon	**Depth (m):**	4.24-4.48
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0444**
Tensile Stress (MPa)	**15.6**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.91
Thickness (mm)	29.66
Area (cm^2)	29.14
Volume (cm^3)	86.42
Mass (g)	233.50
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2701.77
Dry Density (Kg/m^3)	2699.07

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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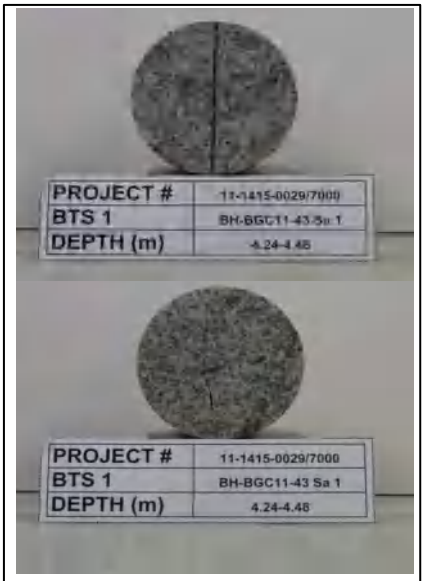
BEFORE TEST



AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-43**
Project:	Eagle Gold	**Sample Number:**	Sa 1 BTS 2
Location:	Yukon	**Depth (m):**	4.24-4.48
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0421**
Tensile Stress (MPa)	**14.0**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.95
Thickness (mm)	31.28
Area (cm^2)	29.18
Volume (cm^3)	91.26
Mass (g)	244.80
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2682.30
Dry Density (Kg/m^3)	2679.62

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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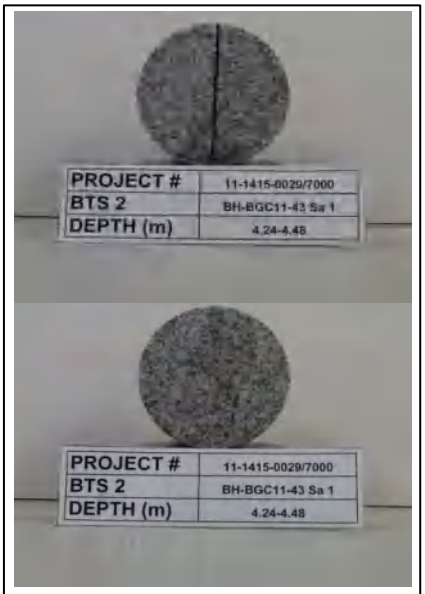

BEFORE TEST

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G. Patton	September 20, 2011	EK	OCTOBER 7,2011
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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-45**
Project:	Eagle Gold	**Sample Number:**	UCS BTS 1
Location:	Yukon	**Depth (m):**	17.80-18.04
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0381**
Tensile Stress (MPa)	**13.6**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.77
Thickness (mm)	29.24
Area (cm^2)	29.00
Volume (cm^3)	84.81
Mass (g)	232.80
Moisture Content (%)	0.20
Wet Density (Kg/m^3)	2744.97
Dry Density (Kg/m^3)	2739.49

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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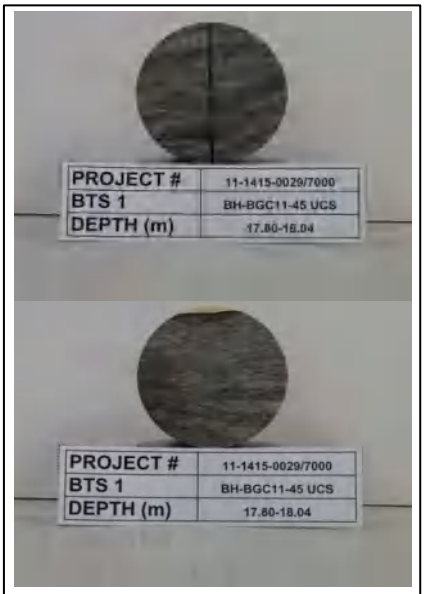
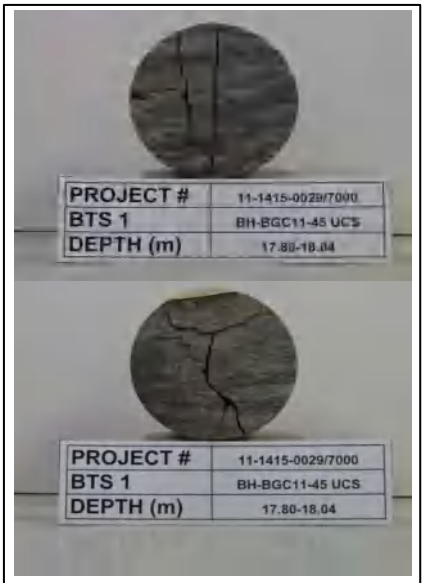


BEFORE TEST



AFTER TEST

TESTED BY	DATE	CHECKED BY	DATE
G. Patton	September 20, 2011	EK	OCTOBER 7,2011

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-45**
Project:	Eagle Gold	**Sample Number:**	UCS BTS 2
Location:	Yukon	**Depth (m):**	17.80-18.04
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0375**
Tensile Stress (MPa)	**11.6**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.79
Thickness (mm)	33.81
Area (cm^2)	29.02
Volume (cm^3)	98.13
Mass (g)	271.20
Moisture Content (%)	0.20
Wet Density (Kg/m^3)	2763.70
Dry Density (Kg/m^3)	2758.18

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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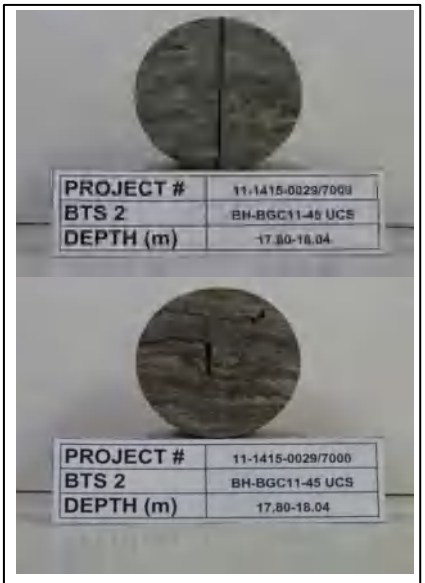
BEFORE TEST



AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-46**
Project:	Eagle Gold	**Sample Number:**	UCS BTS 1
Location:	Yukon	**Depth (m):**	13.11-13.65
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0402**
Tensile Stress (MPa)	**15.0**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.81
Thickness (mm)	28.04
Area (cm^2)	29.04
Volume (cm^3)	81.44
Mass (g)	217.60
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2672.03
Dry Density (Kg/m^3)	2669.36

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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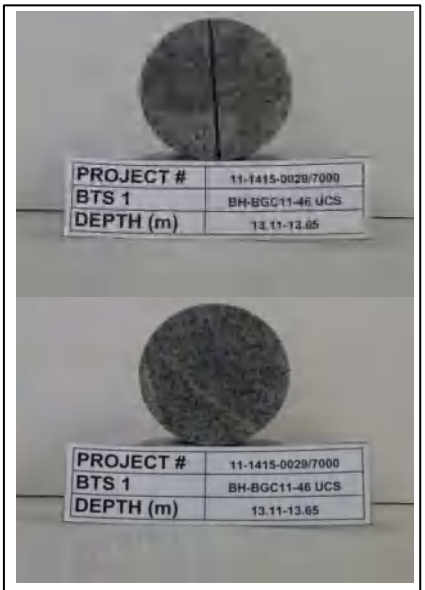

BEFORE TEST

AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-46**
Project:	Eagle Gold	**Sample Number:**	UCS BTS 2
Location:	Yukon	**Depth (m):**	13.11-13.65
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0431**
Tensile Stress (MPa)	**15.3**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.80
Thickness (mm)	29.42
Area (cm^2)	29.03
Volume (cm^3)	85.42
Mass (g)	229.30
Moisture Content (%)	0.10
Wet Density (Kg/m^3)	2684.51
Dry Density (Kg/m^3)	2681.82

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

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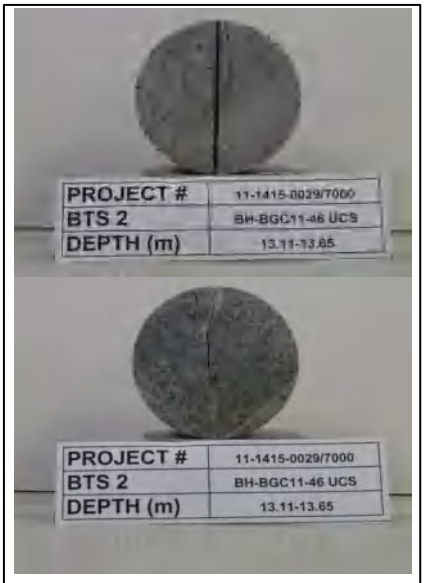
BEFORE TEST



AFTER TEST

TESTED BY	DATE	CHECKED BY	DATE
G. Patton	September 20, 2011	EK	OCTOBER 7,2011

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Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-62**
Project:	Eagle Gold	**Sample Number:**	UCS BTS 1
Location:	Yukon	**Depth (m):**	28.59-28.84
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0167**
Tensile Stress (MPa)	**5.4**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.97
Thickness (mm)	32.31
Area (cm^2)	29.20
Volume (cm^3)	94.33
Mass (g)	242.30
Moisture Content (%)	0.50
Wet Density (Kg/m^3)	2568.59
Dry Density (Kg/m^3)	2555.81

Failure Mode

Type: Along Discontinuities

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

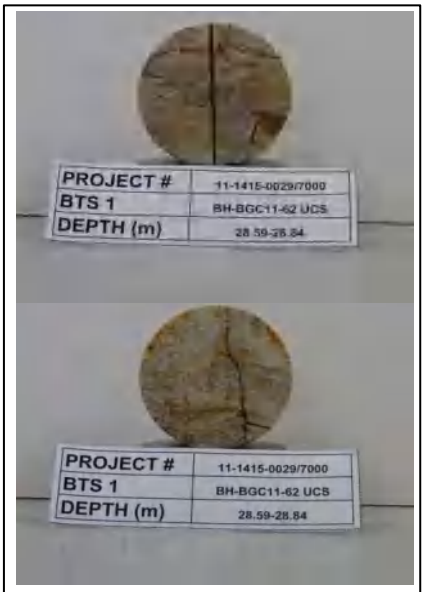
Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

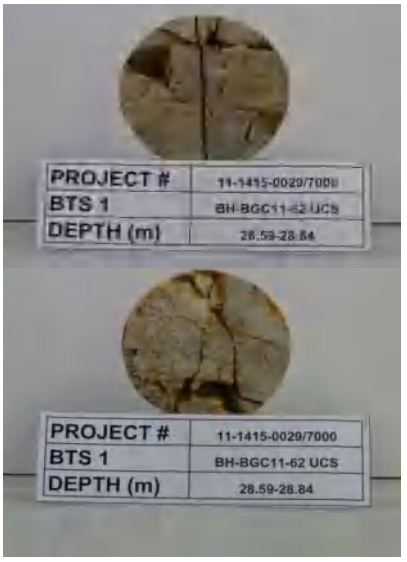
Comments

Lithology: Not Provided

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*



BEFORE TEST



AFTER TEST

TESTED BY	DATE	CHECKED BY	DATE
G. Patton	September 20, 2011	EK	OCTOBER 7,2011

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-69**
Project:	Eagle Gold	**Sample Number:**	UCS 1 BTS 1
Location:	Yukon	**Depth (m):**	12.26-12.54
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0082**
Tensile Stress (MPa)	**2.8**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.77
Thickness (mm)	31.03
Area (cm^2)	29.00
Volume (cm^3)	90.00
Mass (g)	229.50
Moisture Content (%)	0.40
Wet Density (Kg/m^3)	2549.96
Dry Density (Kg/m^3)	2539.80

Failure Mode

Type: Along Discontinuities

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

Comments

Lithology: Not Provided

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Tensile Strength By The Brazil Test

Reference
ISRM 1981 (p120-121)

Project No.:	11-1415-0029/7000	**Borehole:**	**BH-BGC11-69**
Project:	Eagle Gold	**Sample Number:**	UCS 1 BTS 2
Location:	Yukon	**Depth (m):**	12.26-12.54
Client:	BGC Engineering Inc.	**Lab ID No:**	141

Testing Results

Max Load (MN)	**0.0180**
Tensile Stress (MPa)	**6.3**
Rate of Loading (kN/s)	0.5

Sample Measurements

Diameter (mm)	60.87
Thickness (mm)	29.92
Area (cm^2)	29.10
Volume (cm^3)	87.07
Mass (g)	220.90
Moisture Content (%)	0.40
Wet Density (Kg/m^3)	2537.10
Dry Density (Kg/m^3)	2526.99

Failure Mode

Type: Vertical Splitting

Load Orientation

Direction of loading axis with respect to bedding or foliation plane in degrees: 90

Calibration

Machine ID	ELE
Transducer ID	N/A
Ram Area cm^2	N/A
Data Logger	N/A

BEFORE TEST

AFTER TEST

Comments

Lithology: Not Provided

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	September 20, 2011	EK	OCTOBER 7,2011
TESTED BY	DATE	CHECKED BY	DATE

METRO TESTING GROUP
Materials Testing & Engineering Services
CCIL & CSA Certified Company
Innovative Quality Solutions

METROTESTING LABORATORIES LTD.
6991 Curragh Avenue, Burnaby, B.C. V5J 4V6
Tel.: (604) 436-9111 Fax.: (604) 436-9050

TO: GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BC
V2N 1B2

ATTN: Mr. Barry Tessmer

TEST METHOD FOR THE RESISTANCE OF UNCONFINED COARSE AGGREGATE TO FREEZING AND THAWING

(CSA A23.2-24A)

Project No:	15585
Project:	Aggregate Suitability Test for Concrete
Scope:	Aggregate Testing
Source:	Placer Trailings
Type of sample:	40mm Crushed Stone
Sample by:	Client
Date Sampled:	n/a
Date Received:	9-Nov-2011
Test No:	1
Tested by:	Mimi
Date Tested:	November 15 - 23, 2011
Report Date	24-Nov-2011

COARSE AGGREGATE

SIEVE SIZES	SUGGESTED WEIGHTS OF TEST SAMPLES	MASS OF TEST FRACTIONS BEFORE TEST	MASS OF TEST FRACTIONS AFTER TEST	FREEZE THAW LOSS	PERCENT LOSS	GRADING OF COARSE PORTION	D LOSS	WEIGHTED LOSS OF CONTROL AGGREGATE
	(grams)	(grams)	(grams)	(grams)	(%)	(%)	(%)	(%)
80mm to 28mm	4500.0	4750.5	4730.3	20.2	0.4	13.8	**0.06**	0.3
28mm to 20mm	2500.0	2509.5	2496.3	13.2	0.5	4.3	**0.02**	0.8
20mm to14mm	1250.0	1263.5	1250.3	13.2	1.0	3.5	**0.04**	4.2
14mm to 10mm	1000.0	1055.0	1034.8	20.2	1.9	10	**0.19**	3.7
10mm to 5mm	500.0	567.4	550.9	16.5	2.9	30.8	**0.90**	5.5
(-) 5mm						37.6		
						100	**1.2%**	**14.5**

Comment:
Weighted sample loss of 1.2% meets the CSA requirement of 6% max. for concrete exposed to freezing and thawing.
Weighted loss of control aggregates is 14.5% which is within the specified limits of 8.5% - 15.3% (Drain Quarry)

Per:

Mimi Baraquio, AScT
Laboratory Technologist

Reviewed by:

Prakash Joshi, AScT, Eng.L.
Senior Materials Engineering Technologist

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING LICENSEE
Limited Licence 31356

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Engineering interpretation or evaluation of test results is provided only on written request.

METRO TESTING LABORATORIES LTD.
6991 Curragh Avenue, Burnaby B.C., V5J 4V6
Tel: (604) 436-9111 Fax: (604) 436-9050

SIEVE ANALYSIS REPORT
SI Standard SERIES

PROJECT NO. 15585
CLIENT GEONORTH ENGINEERING LTD.
C.C.

TO
GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BRITISH COLUMBI
V2N 1B2

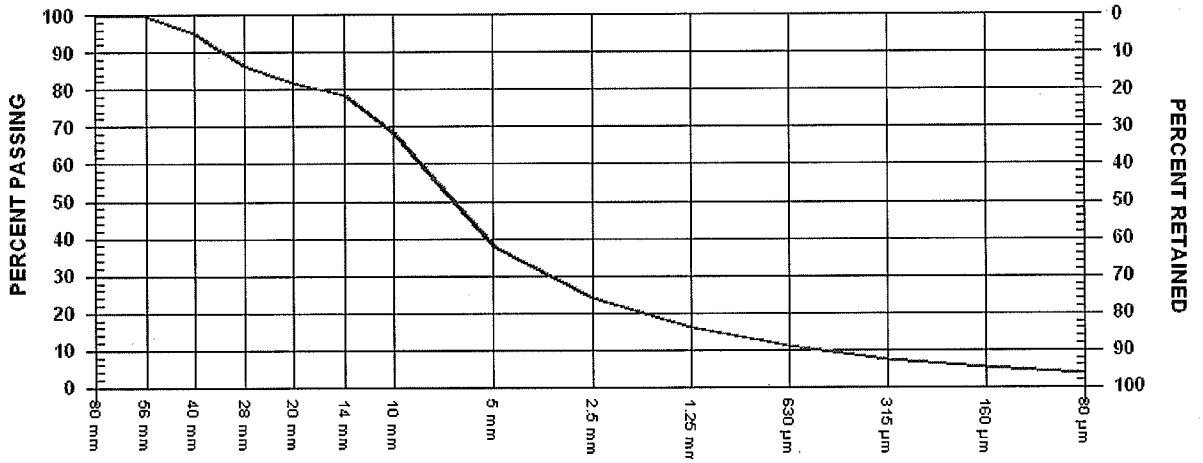
ATTN: BARRY TESSMER

PROJECT SUITABILITY OF AGGREGATE FOR CONCRTE
CONCRETE
CONTRACTOR GEONORTH ENGINEERING LTD.

SIEVE TEST NO. 1 DATE RECEIVED 2011.Nov.09 DATE TESTED 2011.Nov.09 DATE SAMPLED 2011.Nov.08

SUPPLIER
SOURCE PLACER TAILING
SPECIFICATION
MATERIAL TYPE CRUSHED STONE

SAMPLED BY CLIENT
TESTED BY AP
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
80 mm	100.0	
56 mm	99.5	
40 mm	95.0	
28 mm	86.2	
20 mm	81.9	
14 mm	78.4	
10 mm	68.4	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
5 mm	37.6	
2.5 mm	24.1	
1.25 mm	16.1	
630 µm	11.1	
315 µm	7.6	
160 µm	5.3	
80 µm	3.6	

COMMENTS

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING LICENSEE
Limited Licence

 2011.Nov.14 METRO TESTING LABORATORIES LTD. PER. _____

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METRO TESTING GROUP
Materials Testing & Engineering Services
CCIL & CSA Certified Company
Innovative Quality Solutions

TO: GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BC
V2N 1B2

ATTN: Mr. Barry Tessmer

PROJECT: Suitability of Aggregate for Concrete
SCOPE: Aggregate Testing

LOG No.: 112
PROJECT No: 15585
TESTED BY: Andrey

Resistance to Degradation of Small Size Coarse Aggregate by Abrasion & Impact in the Los Angeles Machine

CSA A23.2-16A

SAMPLE DATA		TEST DATA		
Sample I.D.	N/A	**Number of Revolutions:**	500	
Sample Sourse:	Placer Tailing	**Number of Spheres:**	8	
Sample Type:	40mm Crushed Stone	**Mass of Spheres:**	3334.0	grams
Date Sampled:	N/A	**Mass of Sample Tested:**	5001.8	grams
Date Received:	09-Nov-11	**Grading Catergory:**	C	
Date Tested:	14-Nov-11	**Date Reported**	14-Nov-11	

TESTED SAMPLE DATA					CSA A23.2-16A, SPECIFIED TEST REQUIREMENTS				
					CSA A23.2-16A, Table 1: Numbers of Sphere and Mass				
Sieve Sizes		**Tested Sample**	**After 500 Revolutions**		A	B	C	D	E
					12 Balls	11 Balls	**8 Balls**	6 Balls	
					5000+/- 25 g	4584+/- 25 g	**3330+/- 20 g**	2500+/- 15 g	
Passing	**Retained**	**(Grams)**	**+1.8mm (Grams)**	**-1.8mm (Grams)**	CSA A23.2-16A, Table 2: Suggested Gradings of Test Samples				
					(Grams)	(Grams)	(Grams)	(Grams)	(Grams)
40.0 mm	- 28.0 mm				1250+/-25				
28.0 mm	- 20.0 mm				1250+/-25				
20.0 mm	- 14.0 mm				1250+/-10	2500+/-10			
14.0 mm	- 10.0 mm	**2501.8**			1250+/-10	2500+/-10	**2500+/-10**		
10.0 mm	- 5.0 mm	**2500.0**					**2500+/-10**	5000+/-10	
5.0 mm	- 2.5 mm								5000+/-10
	Totals	**5001.8**	**3506.8**	**1495.0**	5000+/-10	5000+/-10	**5000+/-10**	5000+/-10	5000+/-10

Loss at 500 Revolutions	**29.9%**
Comments:	
* For concrete exposed to freezing and thawing or for other exposure conditions.	

APPLICABLE REQUIREMENTS			
Standard	**Section**	**Reference**	**Max Limit**
CSA A23.1		Table 12	50

Per:

Tatyana Tsvetkova, AScT
Laboratory Supervisor

Reviewed by:

Cengiz Guldemet, P.Eng
Materials Engineer

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Engineering interpretation or evaluation of test results is provided only on written request

METRO TESTING GROUP
Materials Testing & Engineering Services
CCIL & CSA Certified Company
Innovative Quality Solutions

METROTESTING LABORATORIES LTD.
6991 Curragh Avenue, Burnaby, B.C. V5J 4V6
Tel.: (604) 436-9111 Fax.: (604) 436-9050

TO: GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BC
V2N 1B2

ATTN: Mr. Barry Tessmer

TEST METHOD FOR THE RESISTANCE OF UNCONFINED COARSE AGGREGATE TO FREEZING AND THAWING

(CSA A23.2-24A)

Project No:	15585
Project:	Aggregate Suitability Test for Concrete
Scope:	Aggregate Testing
Source:	Pit Outcrop
Type of sample:	40mm Crushed Stone
Sample by:	Client
Date Sampled:	n/a
Date Received:	9-Nov-2011
Test No:	1
Tested by:	Mimi
Date Tested:	November 15 - 23, 2011
Report Date	24-Nov-2011

COARSE AGGREGATE

SIEVE SIZES	SUGGESTED WEIGHTS OF TEST SAMPLES	MASS OF TEST FRACTIONS BEFORE TEST	MASS OF TEST FRACTIONS AFTER TEST	FREEZE THAW LOSS	PERCENT LOSS	GRADING OF COARSE PORTION	D LOSS	WEIGHTED LOSS OF CONTROL AGGREGATE
	(grams)	(grams)	(grams)	(grams)	(%)	(%)	(%)	(%)
80mm to 28mm	4500.0	4690.3	4670.3	20.0	0.4	16.5	**0.07**	0.3
28mm to 20mm	2500.0	2520.5	2510.3	10.2	0.4	5.1	**0.02**	0.8
20mm to14mm	1250.0	1283.6	1260.4	23.2	1.8	4.7	**0.08**	4.2
14mm to 10mm	1000.0	1067.0	1047.5	19.5	1.8	14.2	**0.26**	3.7
10mm to 5mm	500.0	579.9	570.9	9.0	1.6	28.5	**0.44**	5.5
(-) 5mm						31		
						100	**0.9%**	**14.5**

Comment:
Weighted sample loss of 0.9% meets the CSA requirement of 6% max. for concrete exposed to freezing and thawing.
Weighted loss of control aggregates is 14.5% which is within the specified limits of 8.5% - 15.3% (Drain Quarry)

Per:

Mimi Baraquio, AScT
Laboratory Technologist

Reviewed by:

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING LICENSEE
Limited Licence 181356

Prakash Joshi, AScT, Eng.L
Senior Materials Engineering Technologist

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METRO TESTING LABORATORIES
6991 Curragh Avenue, Burnaby B.C., V5J 4V6
Tel: (604) 436-9111 Fax: (604) 436-9050

SIEVE ANALYSIS REPORT
CSA SIEVES SERIES

PROJECT NO. 15585
CLIENT GEONORTH ENGINEERING LTD.
C.C.

TO
GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BRITISH COLUMBI
V2N 1B2

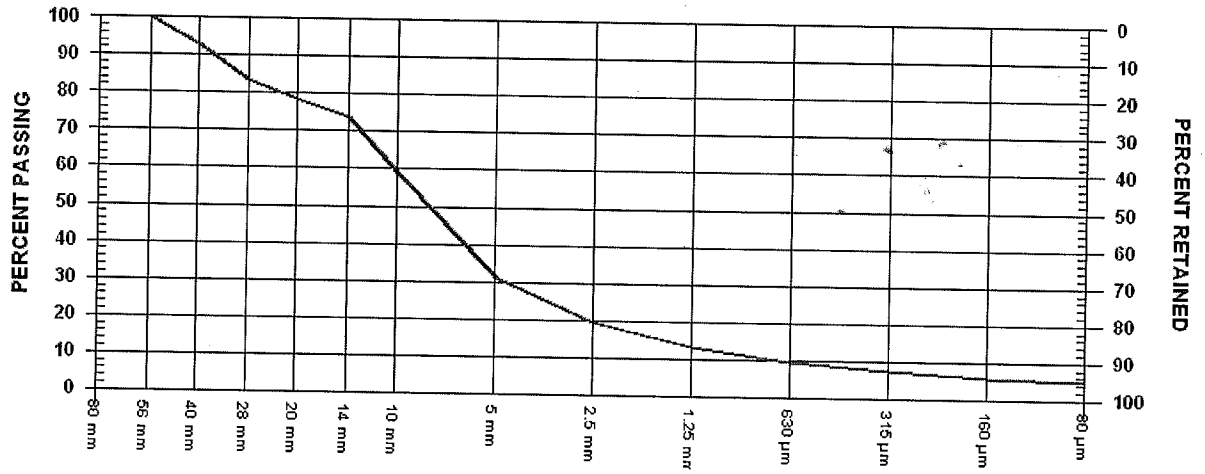
ATTN: BARRY TESSMER

PROJECT SUITABILITY OF AGGREGATE FOR CONCRTE
CONCRETE
CONTRACTOR GEONORTH ENGINEERING LTD.

SIEVE TEST NO. 2 DATE RECEIVED 2011.Nov.09 DATE TESTED 2011.Nov.14 DATE SAMPLED 2011.Nov.08

SUPPLIER
SOURCE PIT OUTCROP
SPECIFICATION
MATERIAL TYPE CRUSHED STONE

SAMPLED BY CLIENT
TESTED BY AP
TEST METHOD WASHED



GRAVEL SIZES	PERCENT PASSING	GRADATION LIMITS
80 mm		
56 mm	100.0	
40 mm	93.0	
28 mm	83.5	
20 mm	78.4	
14 mm	73.7	
10 mm	59.5	

SAND SIZES AND FINES	PERCENT PASSING	GRADATION LIMITS
5 mm	31.0	
2.5 mm	19.7	
1.25 mm	13.3	
630 µm	9.6	
315 µm	7.3	
160 µm	5.9	
80 µm	4.8	

COMMENTS

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING
Limited Licence
131355

 2011.Nov.14 METRO TESTING LABORATORIES PER. _____

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METRO TESTING GROUP
Materials Testing & Engineering Services
CCIL & CSA Certified Company
Innovative Quality Solutions

TO: GEONORTH ENGINEERING LTD.
3975 18TH AVENUE
PRINCE GEORGE, BC
V2N 1B2

ATTN: Mr. Barry Tessmer

PROJECT: Suitability of Aggregate for Concrete
SCOPE: Aggregate Testing

LOG No.: 112
PROJECT No: 15585
TESTED BY: Andrey

Resistance to Degradation of Small Size Coarse Aggregate by Abrasion & Impact in the Los Angeles Machine

CSA A23.2-16A

SAMPLE DATA	
Sample I.D.	N/A
Sample Sourse:	Pit Outcrop
Sample Type:	40mm Crushed Stone
Date Sampled:	N/A
Date Received:	09-Nov-11
Date Tested:	14-Nov-11

TEST DATA		
Number of Revolutions:	500	
Number of Spheres:	8	
Mass of Spheres:	3333.6	grams
Mass of Sample Tested:	5001.0	grams
Grading Catergory:	C	
Date Reported	14-Nov-11	

TESTED SAMPLE DATA				CSA A23.2-16A, SPECIFIED TEST REQUIREMENTS				
				CSA A23.2-16A, Table 1: Numbers of Sphere and Mass				
				A	B	C	D	E
				12 Balls	11 Balls	**8 Balls**	6 Balls	
				5000+/- 25 g	4584+/- 25 g	**3330+/- 20 g**	2500+/- 15 g	
Sieve Sizes		**Tested Sample**	**After 500 Revolutions**	CSA A23.2-16A, Table 2: Suggested Gradings of Test Samples				
Passing	**Retained**	**(Grams)**	**+1.8mm (Grams)** / **-1.8mm (Grams)**	**(Grams)**	**(Grams)**	**(Grams)**	**(Grams)**	**(Grams)**
40.0 mm	- 28.0 mm			1250+/-25				
28.0 mm	- 20.0 mm			1250+/-25				
20.0 mm	- 14.0 mm			1250+/-10	2500+/-10			
14.0 mm	- 10.0 mm	**2500.0**		1250+/-10	2500+/-10	**2500+/-10**		
10.0 mm	- 5.0 mm	**2501.0**				**2500+/-10**	5000+/-10	
5.0 mm	- 2.5 mm							5000+/-10
	Totals	**5001.0**	**4316.4** / **684.6**	5000+/-10	5000+/-10	**5000+/-10**	5000+/-10	5000+/-10

Loss at 500 Revolutions	**13.7%**
Comments:	
* For concrete exposed to freezing and thawing or for other exposure conditions.	

APPLICABLE REQUIREMENTS			
Standard	**Section**	**Reference**	**Max Limit**
CSA A23.1		Table 12	50

Per:

Tatyana Tsvetkova, AScT
Laboratory Supervisor

Reviewed by:

Cengiz Guldemet, P.Eng
Materials Engineer

Reporting of these test results constitutes a testing service only.
Engineering interpretation or evaluation of test results is provided only on written request

VALLEY
TESTING SERVICES LTD

Consulting Engineering

Inspection & Testing

Materials Technology

Geoscience Environmental

#18 – 3275 McCallum Rd,
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- Salmon Arm
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  (250) 296-4118
- Fort St. John
  (250) 261-6615
- Dawson Creek
  (250) 261-6615

VALLEY TESTING SERVICES LTD 20 YEARS 1990-2010

INNOVATION QUALITY SOLUTIONS

GeoNorth Engineering Ltd.

Preliminary Source Acceptance Testing

Project: Aggregate Quality Assessment
Examination of Coarse Aggregate
50mm to 9.5mm Fraction
Samples From "Placer Tailings" and "Pit Outcrop"

Petrographic Examination in accordance with:
CSA A23.2-04 15A Petrographic Examination Of Aggregates

Submitted To:

Metro Testing Laboratories Ltd.
Burnaby, BC

Submitted By:

Valley Testing Services Ltd.
Abbotsford, BC

December 2, 2011

MTL 15585

December 2, 2011

Metro Testing Laboratories Ltd.
6992 Curragh Avenue
Burnaby, British Columbia

Attention: Mr. Prakash Joshi

RE: Petrographic Examination Of Coarse Aggregate
Examination of Coarse Aggregate
Samples From "Placer Tailings" and "Pit Outcrop"

Dear Sir:

As requested Valley Testing Services Ltd. (Valley Testing) has examined two samples of material as supplied by GeoNorth Engineering Ltd from the above-mentioned locations. The material supplied is summarized in the table below. The purpose of the examination is to determine the suitability of the material for concrete applications.

Table 1.

Sample ID	Material Type	Source	Petrographic Grade	Intended Use
Placer Tailings	crushed rock	tailings pile	117	concrete
Pit outcrop	crushed rock	outcrop	121	concrete

The petrographic examination carried out is based on CSA A23.2-04 15A *Petrographic Examination of Aggregates,* and the MOT SS Section 202, Appendix 2 test method. The worksheet "MTO LS609" in the appendix A is derived from the Ontario test method LS609 for coarse aggregates. The examination assigns a "Petrographic Number" (PN) to the material, which correlates to classifications such as Good, Fair, Poor or Deleterious.

Summary

Placer Tailings: The examination was performed on a screened crushed rock aggregate. The material has been assigned a grade of "Good" with a PN of 117. Medium-hard to hard granodiorite and siliceous sheared rocks dominated the sample with minor amounts of medium hard mafic phyllite, and quartz vein. Particles ranged in size from 55mm to dust; estimated fracture count was 100%. Particles were angular and generally cubic. Slight to moderate weathering was observed, with some intense weathering noted in some sheared rock particles. The porosity of the sample is considered low to medium.

This coarse aggregate material is deemed physically and mechanically suitable for use in ready mix concrete and asphalt.

Pit Outcrop: The examination was performed on a screened crushed rock aggregate. The material has been assigned a grade of "Good" with a PN of 121. Medium-hard to hard sheared rocks dominated the sample with a moderate amount of medium hard diorite. Particles ranged in size from 50mm to dust; estimated fracture count was 100%. Particles were angular and generally cubic. Slight to moderate weathering was observed (mostly surface weathering), with some intense weathering noted in some sheared rock particles. The porosity of the sample is considered low to medium.

This coarse aggregate material is deemed physically and mechanically suitable for use in some construction materials including concrete and asphalt.

Method

As stated previously the basis for the examination was the CSA A23.2-04 15A test method and the MOT test method described in Appendix 2 of Section 202 of their Standard Specifications. The aggregate samples were prepared according to the procedures as outlined in the MOT test method[1]. The resulting coarse fraction material, comprised of aggregate between the 19mm and 9.5mm screens, was washed and analysed. Due to the mass of this fraction the larger particles were re-introduced to produce a large enough sample. Fracture count was estimated, and then the material was examined for its physical and mechanical properties.

Using a hand lens (16X) and microscope, as well as a magnet, steel nail and knife, and dilute HCl, the material was classified by rock type and physical condition. Classifications for the aggregate was noted on the analysis sheets in Appendix A.

Discussion of Coarse Aggregates

Placer Tailings: The material used for this examination was a 55mm-9.5mm coarse fraction of a crushed rock aggregate from the "Placer Tailings" source. The coarse fraction material used was comprised of 19mm to 9.5mm material as per the MOT test method as outlined in Appendix 2 of Section 202 (with larger material re-introduced as mentioned above).

The sample material was generally found to be medium hard to hard, moderately tough with minor to moderate surface weathering. The porosity of the rock types were generally low to moderate, with minor amounts of highly porous sheared material. The majority of the sample was composed of granodiorite and sheared rocks with minor amounts of mafic phyllite, and quartz vein. Much of the sheared rock has rusty limonite surfaces does not appear to have excessive deleterious effects on the aggregate. No significant amounts of flat or elongated particles were observed.

The rock types identified were (in order of magnitude):

Granodiorite: no organics or coatings were noted, shape was angular and generally cubic, medium grain size, crystalline grain arrangement, low porosity, mineralogy dominated by

1 MOT SS Section 202 Appendix 2, page 202 (11 of 12)

feldspar, quartz and biotite, structure of the particles was massive with uneven fracturing, particles were fresh with some surface weathered particles, Mohs hardness ranged from 5.0 - 5.5, color was specked black & white or gray overall.

Sheared Rock: no organics or coatings were noted, shape was very angular and generally cubic (minor flat particles), fine to medium grain size, cryptocrystalline grain arrangement, low to moderate porosity, mineralogy dominated by feldspar, quartz and muscovite, particle structure showed moderate to strong foliation, minor jointing with uneven fracturing, mainly surface weathered with minor deeply weathered particles, Mohs hardness ranged from 5.0 - >5.5, color was pale gray to yellowish gray with brown rusty limonite surfaces.

Mafic Phyllite: no organics or coatings were noted, shape was angular and generally cubic (minor elongated particles), fine to coarse grain size, crystalline and cryptocrystalline grain arrangement, low to moderate porosity, mineralogy dominated by hornblende, calcite, feldspar, and biotite, particle structure showed weak to moderate foliation with uneven fracturing, mainly fresh and surface weathered particles, Mohs hardness ranged from 5.0 - 5.5, color was dark gray to black.

Quartz Vein: no organics or coatings were noted, shape was angular and generally cubic (minor flat particles), fine grain size, cryptocrystalline grain arrangement, low porosity, mineralogy dominated by quartz with some limonite, particle structure massive with concoidal fracturing, mainly fresh particles, Mohs hardness was >5.5, color was white with minor rusty limonite.

Pit Outcrop: The material used for this examination was a 50mm-9.5mm coarse fraction of a crushed rock aggregate from the "Pit Outcrop" source. The coarse fraction material used was comprised of 19mm to 9.5mm material as per the MOT test method as outlined in Appendix 2 of Section 202 (with larger material re-introduced as mentioned above).

The sample material was generally found to be medium hard to hard, moderately tough with minor to moderate weathering. The porosity of the rock types were generally low to moderate, with minor amounts of highly porous sheared material. The majority of the sample was composed of sheared rock with moderate amounts of diorite. Much of the sheared rock has rusty limonite surfaces does not appear to have excessive deleterious effects on the aggregate. No significant amounts of flat or elongated particles were observed.

The rock types identified were (in order of magnitude):

Sheared Rock: no organics or coatings were noted, shape was very angular and generally cubic (minor flat particles), fine to medium grain size, cryptocrystalline grain arrangement, low to moderate porosity, mineralogy dominated by feldspar, hornblende, biotite (minor quartz), particle structure showed moderate to strong foliation, minor jointing with uneven fracturing, mainly surface weathered particles, Mohs hardness ranged from 5.0 - >5.5, color was rusty brown to dark gray.

Diorite: no organics or coatings were noted, shape was very angular to angular and generally cubic (minor flat and elongated particles), fine to medium grain size, crystalline grain

arrangement, low porosity, mineralogy dominated by feldspar, quartz and biotite, structure of the particles was massive with uneven fracturing, particles were fresh with some surface weathered particles, Mohs hardness ranged from 5.0 - 5.5, color was specked black & white or gray overall.

Alkali Aggregate Reactivity

Alkali Silica Reactivity

The petrographic examination revealed that the aggregate material contained rock types with mineralogy that may have a potential for alkali silica reactivity (ASR). These include particular types of quartz mineralogy found in the sheared rocks. Historical usage of similar material as well as ASR evaluations of similar material should be taken into account when assessing the potential for expansive reactivity in Portland cement.

This is a reaction between the hydroxide ions associated with the dissolved salts of sodium and potassium and the silica molecules of certain imperfectly crystallized siliceous rocks and minerals, such as opal, chert, and cristobalite, or highly siliceous volcanic glasses or highly strained or granulated siliceous rocks, such as the metaquartzites, other stressed silicates, and exceptionally fine-grained siliceous rocks (such as siltstone and argillite). The reaction produces a silica gel that will expand in the presence of moisture. The expanding gel causes cracks in the aggregate and paste. The cracks allow more moisture to enter and expansive gel to fill the cracks and cause more expansion.

The aggregate material, once processed for use, should be evaluated for ASR in accordance with CSA A23.2-27A prior to being used in ready mix concrete. If the aggregate will be used as concrete aggregate before any ASR testing can be done (e.g. CSA A23.2-25A) then the ready mix supplier should reference A23.2-27A, Tables 1 to 6 for "Measures to Avoid Deleterious Expansion in Concrete" using supplementary cementing materials such as fly ash and silica fume.

Conclusions

Placer Tailings: PN= 117 *Pit Outcrop:* PN= 121

This aggregate material is physically and mechanically suitable for asphalt and concrete applications. In particular, aggregates with petrographic numbers at or below 125 are considered suitable for all classes of ready mix concrete. Aggregates with petrographic numbers below 140 are suitable for most classes of concrete with the exception of Class C1, C2, and F1 (these are concrete mixes that have entrained air and may be exposed to freeze/thaw) (CSA A23.2 – 15A).

As noted earlier in this report, the potential exists for alkali aggregate reactivity. If the aggregate material has not been evaluated for AAR, this is a recommended action.

As many of the aggregate particles have an oxidized rusty surface, there is the chance that this oxidation could find its way to the surface and cause rusty streaks to form on the surface of the concrete.

I trust this report meets your needs. Please do not hesitate to call if you require any further services or information.

Yours truly,

John Burton, P.Geo
Senior Geoscientist

References

CSA A23.2-04 15A Petrographic Examination Of Aggregates
MTO LS 609 Test Method
Best, Igneous and Metamorphic Petrology, 1982
MOT Standard Specifications for Highway Construction 2009

Appendix A

Aggregate Worksheets

Coarse Aggregate Petrographic Analysis- MTO LS609

Client Name: GeoNorth Engineering

Source: Placer Tailings **Project Name:** Aggregate Qualification

Date: 02-Dec-11 **Fraction:** 30-9.5mm **Sample ID** crush rock **Analyst:** J. Burton

Type	Type No.	Mass (g)	%
Carbonate [hard; silty, hard]	01		
Carbonate [surface weathered; silty, surface weathered; medium hard: silty medium hard]	20		
Carbonate [sandy, hard or medium hard]	02		
Carbonate [slightly cherty; <5% chert]	21		
Chert [hard or medium hard]	23		
Conglomerate-Sandstone-Arkose [hard]	03		
Conglomerate-Sandstone-Arkose [medium hard]	22		
Greywacke-Argillite [hard or medium hard]	06		
Gneiss-Amphibolite-Schist [hard]	04	694.9	46.4
Quartzite [hard]	05		
Granite-Diorite-Gabbro [hard]	08	639.6	42.7
Volcanic [hard or medium hard]	07		
Minerals [hard/medium]	09		
Quartz vein	10	36.6	2.4
Total Good Aggregate		**1371.1**	**91.5**
Carbonate [soft; silty soft; slightly shaley]	35		
Carbonate [soft, pitted]	41		
Carbonate [deeply weathered; silty, deeply weathered]	42		
Carbonate [sandy, soft]	40		
Marble [brittle]	24		
Chert-Cherty Carbonate [<20% leached chert]	26		
Conglomerate-Sandstone-Arkose [brittle]	30		
Greywacke [brittle]	29		
Quartzite [slightly weathered]	52		
Gneiss-Amphibolite-Schist [brittle]	25	100.5	6.7
Minerals [soft]	34		
Granite-Diorite-Gabbro [brittle]	27	26.7	1.8
Volcanic [soft]	28		
Total Fair Aggregate		**127.2**	**8.5**
Carbonate [shaley; clayey; silty, clayey]	43		
Carbonate [ochreous: sandy ochreous]	44		
Marble [friable]	49		
Chert-Cherty Carbonate [>20% leached chert]	45		
Conglomerate-Sandstone-Arkose [friable]	46		
Siltstone	56		
Cementation [partial]	53		
Cementation [total]	54		
Gneiss-Amphibolite [friable]	50		
Schist [soft]	55		
Granite-Diorite-Gabbro [friable]	51		
Volcanic [very soft, porous]	48		
Total Poor Aggregate		**0**	**0.0**
Ochre	60		
Carbonate/Shale	61		
Clay	62		
Volcanic-Gneiss Schist [decomposed]	63		
Total Deleterious Aggregate		**0**	**0.0**

% GOOD	91.5	x 1 =	91.5
% FAIR	8.5	x 3 =	25.5
% POOR	0.0	x 6 =	0.0
% DELETERIOUS	0.0	x 10 =	0.0

Estimated % Crushed: 100%

Estimated % Flat and Elongated: <3%

Asphalt and Ready-Mix Concrete PN: 117

Coarse Aggregate Petrographic Analysis- MTO LS609

Client Name: GeoNorth Engineering

Source: Pit Outcrop **Project Name:** Aggregate Qualification

Date: 02-Dec-11 **Fraction:** 30-9.5mm **Sample ID** crush rock **Analyst:** J. Burton

Type	Type No.	Mass (g)	%
Carbonate [hard; silty, hard]	01		
Carbonate [surface weathered; silty, surface weathered; medium hard: silty medium hard]	20		
Carbonate [sandy, hard or medium hard]	02		
Carbonate [slightly cherty; <5% chert]	21		
Chert [hard or medium hard]	23		
Conglomerate-Sandstone-Arkose [hard]	03		
Conglomerate-Sandstone-Arkose [medium hard]	22		
Greywacke-Argillite [hard or medium hard]	06		
Gneiss-Amphibolite-Schist [hard]	04	974.2	64.5
Quartzite [hard]	05		
Granite-Diorite-Gabbro [hard]	08	397.3	26.3
Volcanic [hard or medium hard]	07		
Minerals [hard/medium]	09		
Quartz vein	10		
Total Good Aggregate		**1371.5**	**90.8**
Carbonate [soft; silty soft; slightly shaley]	35		
Carbonate [soft, pitted]	41		
Carbonate [deeply weathered; silty, deeply weathered]	42		
Carbonate [sandy, soft]	40		
Marble [brittle]	24		
Chert-Cherty Carbonate [<20% leached chert]	26		
Conglomerate-Sandstone-Arkose [brittle]	30		
Greywacke [brittle]	29		
Quartzite [slightly weathered]	52		
Gneiss-Amphibolite-Schist [brittle]	25	96.3	6.4
Minerals [soft]	34		
Granite-Diorite-Gabbro [brittle]	27	29.9	2.0
Volcanic [soft]	28		
Total Fair Aggregate		**126.2**	**8.4**
Carbonate [shaley; clayey; silty, clayey]	43		
Carbonate [ochreous: sandy ochreous]	44		
Marble [friable]	49		
Chert-Cherty Carbonate [>20% leached chert]	45		
Conglomerate-Sandstone-Arkose [friable]	46		
Siltstone	56		
Cementation [partial]	53		
Cementation [total]	54		
Gneiss-Amphibolite [friable]	50		
Schist [soft]	55	12.3	0.8
Granite-Diorite-Gabbro [friable]	51		
Volcanic [very soft, porous]	48		
Total Poor Aggregate		**12.3**	**0.8**
Ochre	60		
Carbonate/Shale	61		
Clay	62		
Volcanic-Gneiss Schist [decomposed]	63		
Total Deleterious Aggregate		**0**	**0.0**

% GOOD	90.8	x 1 =	90.8	Estimated % Crushed:	100%
% FAIR	8.4	x 3 =	25.1	Estimated % Flat and Elongated:	<5%
% POOR	0.8	x 6 =	4.9		
% DELETERIOUS	0.0	x 10 =	0.0		

Asphalt and Ready-Mix Concrete PN: 121

Exova
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W: www.exova.com

Analytical Report

Bill To:	GeoNorth Engineering Inc.	Project:	
Report To:	GeoNorth Engineering Inc.	ID:	K-3300
	3975 18 Avenue	Name:	
	Prince George, BC, Canada	Location:	
	V2N 1B2	LSD:	
Attn:	Hans Jorgensen	P.O.:	
Sampled By:		Acct code:	
Company:			

Lot ID:	**837489**
Control Number:	
Date Received:	Nov 9, 2011
Date Reported:	Nov 17, 2011
Report Number:	1528815

Reference Number		837489-1	837489-2
Sample Date			
Sample Time			
Sample Location			
Sample Description		Placer Tailings	Pit Outcrop
Matrix		Soil	Soil

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Available Nutrients						
Sulfate-S	Available	mg/kg	4	8		1

Approved by:

Darlene Lintott, MSc
Consulting Scientist

Exova
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Edmonton, Alberta
T6B 3J4, Canada

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W: www.exova.com

Methodology and Notes

Bill To:	GeoNorth Engineering Inc.	Project:	
Report To:	GeoNorth Engineering Inc.	ID:	K-3300
	3975 18 Avenue	Name:	
	Prince George, BC, Canada	Location:	
	V2N 1B2	LSD:	
Attn:	Hans Jorgensen	P.O.:	
Sampled By:		Acct code:	
Company:			

Lot ID:	**837489**
Control Number:	
Date Received:	Nov 9, 2011
Date Reported:	Nov 17, 2011
Report Number:	1528815

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Sulfate in General Soil	McKeague	* Sulfate Extractable by 0.1M CaCl2, 4.47	10-Nov-11	Exova Edmonton

** Reference Method Modified*

References

McKeague — Manual on Soil Sampling and Methods of Analysis

Comments:

Please direct any inquiries regarding this report to our Client Services group.
Results relate only to samples as submitted.
The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: www.exova.ca/terms&conditions

GEONORTH ENGINEERING LTD.

3975 18th Avenue
Prince George, B.C., V2N 1B2
Phone 250-564-4304
Fax 250-564-9323
E-mail mail@geonorth.ca

November 15, 2011

K-3300

BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC V6Z 2A9

Attention: Pete Quinn

Dear Sirs:

Re: Eagle Gold Concrete Aggregate Test Results, Pit Outcrop

Listed below are the tests that you requested on your proposed concrete aggregate to determine their conformation to CSA A23.2 specification:

		Results
CSA A23.2-3A	Clay lumps in Aggregate (5mm-10mm)	0.0%
CSA A23.2-4A	Low Density Granular Materials	0.0%
CSA A23.2-12A	Relative Density SSD (Fine Agg)	2.657
	Absorption	0.999
CSA A23.2-13A	Flat & Elongated 4:1 Ratio	35.0%
CSA A23.2-23A	Micro-Deval (Fine Agg)	13.3% Loss
CSA A23.2-29A	Micro-Deval (Coarse Agg)	12.9% Loss

If you require any further information, please do not hesitate to call me at our office at (250) 564-4304.

Yours truly,

GeoNorth Engineering Ltd.

Per: Hans Jorgensen
Manager, Technical Services

GEONORTH ENGINEERING LTD.

3975 18th Avenue
Prince George, B.C., V2N 1B2
Phone 250-564-4304
Fax 250-564-9323
E-mail mail@geonorth.ca

November 15, 2011

K-3300

BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC V6Z 2A9

Attention: Pete Quinn

Dear Sirs:

Re: Eagle Gold Concrete Aggregate Test Results, Placer Tailings

Listed below are the tests that you requested on your proposed concrete aggregate to determine their conformation to CSA A23.2 specification:

		Results
CSA A23.2-3A	Clay lumps in Aggregate (5mm-10mm)	0.0%
CSA A23.2-4A	Low Density Granular Materials	0.0%
CSA A23.2-12A	Relative Density SSD (Fine Agg)	2.704
	Absorption	1.399%
CSA A23.2-13A	Flat & Elongated 4:1 Ratio	19.0%
CSA A23.2-23A	Micro-Deval (Fine Agg)	11.6% Loss
CSA A23.2-29A	Micro-Deval (Coarse Agg)	26.9% Loss

If you require any further information, please do not hesitate to call me at our office at (250) 564-4304.

Yours truly,

GeoNorth Engineering Ltd.

Per: Hans Jorgensen
Manager, Technical Services

GeoNorth Engineering Ltd.

3975 18 th Avenue
Prince George, B.C., V2N 1B2

Soundness of Aggregate
Sulphate Test Report

Project No.:	K-3300
Date:	11/15/2011
P.O.:	
cc:	

Project: Eagle Gold Aggregate Testing		
Source: Pit Outcrop	Type of Sample: Crushed Rock	Sampled By: Client
Date Sampled: 8/23/2011	Date Received: 9/13/2011	Date Tested: 11/6/2011

Solution: $MgSO_4$ Number of Cycles: 5

Coarse Aggregate				Fine Aggregate			
Sieve Size		Original Grading Percent	Weighed Average Percent Loss	Sieve Size		Original Grading Percent	Weighed Average Percent Loss
Passing	Retained			Passing	Retained		
80 mm	56 mm						
56 mm	40 mm	12.43	0.00	5 mm	2.5 mm	37.3	0.22
40 mm	28 mm	9.22	0.00	2.5 mm	1.25 mm	19.7	0.63
28 mm	20 mm	7.54	0.01	1.25 mm	630 μm	11.3	0.46
20 mm	14 mm	6.15	0.54	630 μm	315 μm	7.4	0.18
14 mm	10 mm	22.35	0.28	315 μm	160 μm	4.6	1.66
10 mm	5 mm	42.32	0.13	160 μm		19.7	
Totals		100.0	0.97	Totals		100.0	3.16

Size Fraction	No. Particles	Qualitative Examination of Plus 20 mm Material.
80 mm - 56 mm	Original	
	Final	
56 mm - 40 mm	Original	
	Final	
40 mm - 28 mm	Original	
	Final	
28 mm - 20 mm	Original	
	Final	

Tested in accordance with CSA A23.2 - 9A

Noelco

COMMENTS:

Certified:

Reporting of test results constitutes a testing service only. Engineering evaluation of the test results is provided only on request.

GeoNorth Engineering Ltd.

3975 18 th Avenue
Prince George, B.C., V2N 1B2

Soundness of Aggregate
Sulphate Test Report

Project No.:	K-3300
Date:	11/15/2011
P.O.:	
cc:	

Project: Eagle Gold Aggregate Testing		
Source: Placer Tailings	Type of Sample: Crushed Rock	Sampled By: Client
Date Sampled: 8/23/2011	Date Received: 9/13/2011	Date Tested: 11/6/2011

Solution: $MgSO_4$ Number of Cycles: 5

Coarse Aggregate				Fine Aggregate			
Sieve Size		Original Grading Percent	Weighed Average Percent Loss	Sieve Size		Original Grading Percent	Weighed Average Percent Loss
Passing	Retained			Passing	Retained		
80 mm	56 mm						
56 mm	40 mm	9.53	0.00	5 mm	2.5 mm	34.2	0.50
40 mm	28 mm	10.28	0.00	2.5 mm	1.25 mm	22.4	0.76
28 mm	20 mm	5.23	0.03	1.25 mm	630 μm	14.6	1.03
20 mm	14 mm	5.42	0.02	630 μm	315 μm	9.2	0.94
14 mm	10 mm	15.14	0.10	315 μm	160 μm	6.0	0.64
10 mm	5 mm	54.4	0.12	160 μm		13.5	
Totals		100.0	0.27	Totals		100.0	3.86

Size Fraction	No. Particles	Qualitative Examination of Plus 20 mm Material.
80 mm - 56 mm	Original	
	Final	
56 mm - 40 mm	Original	
	Final	
40 mm - 28 mm	Original	
	Final	
28 mm - 20 mm	Original	
	Final	

Tested in accordance with CSA A23.2 - 9A

Noelco

COMMENTS:

Certified:

Reporting of test results constitutes a testing service only. Engineering evaluation of the test results is provided only on request.

METRO TESTING LABORATORIES LTD.
6991 Curragh Avenue, Burnaby, BC V5J 4V6
Tel: (604) 436-9111 Fax: (604) 436-9050

Detection of Alkali-silica Reactive Aggregate by Accelerated Expansion of Mortar Bars

(CSA A23.2 - 25A)

GeoNorth Engineering Ltd.
3975 18th Avenue
Prince George, BC V2N 1B2

Attn: Hans Jorgensen

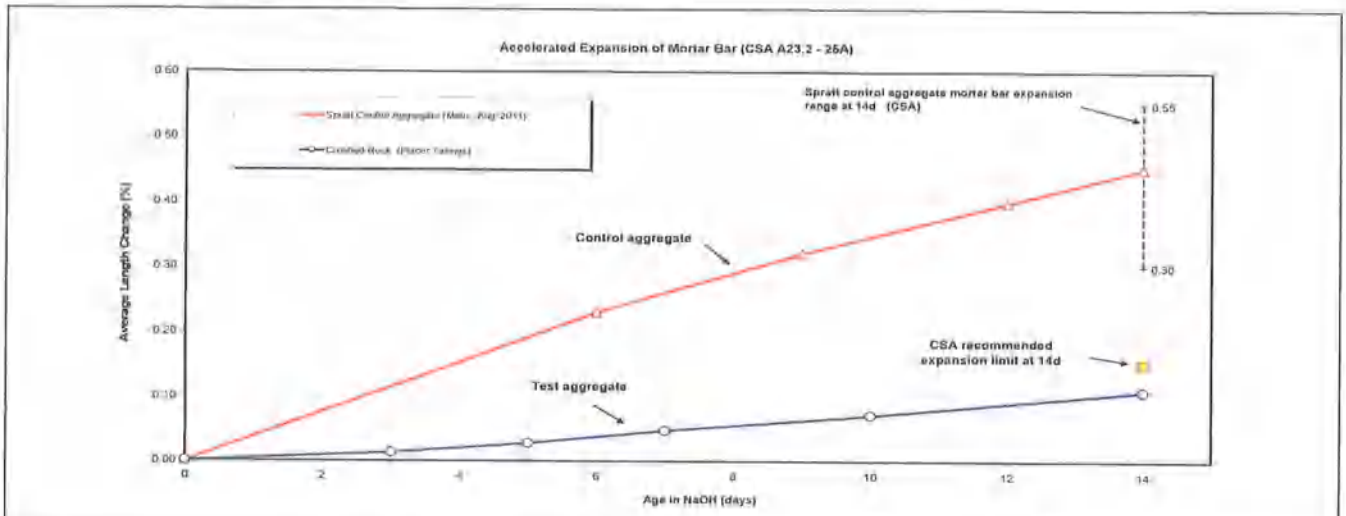
Date: 16 December 2011

Our File: 15585 Set 2

PROJECT: Suitability of Aggregate for Concrete

Sample	Crushed Rock (Source: Placer Tailings)

Date sample received: 9 Nov. 2011
Date specimens cast: 30 Nov. 2011
Sampled by: Client
Water/Cement Ratio: 0.50
Portland Cement: Essroc type GU, alkali content of 0.94% Na_2O_{eq}.
Test method: CSA A23.2-25A, Test Method for Detection of Alkali-silica Reactive Aggregate by Accelerated Expansion of Mortar Bars



Mortar bar specimens	Expansion, % (age in NaOH solution, days)				
	3	5	7	10	14
1	0.014	0.029	0.050	0.073	0.111
2	0.015	0.029	0.050	0.074	0.112
3	0.011	0.028	0.047	0.072	0.109
4	0.012	0.025	0.043	0.066	0.102
Average	0.013	0.028	0.047	0.071	0.108
CSA recommended limit for deleterious expansion					**0.15**
Spratt control aggregate test results (Metro, Aug' 11)					0.45
Observation: White spots on mortar bars were observed at 7 days test age. Hairline cracks were observed at 14 days test age.					

Comments: Sample meets CSA maximum limit of 0.15% expansion at 14 days. According to CSA A23.2 – 27A, Table 2, the degree of alkali-silica reactivity of the aggregate may be classified as "**Non-reactive**".

Metro Testing Laboratories Ltd.

Des Guo, M.Eng., P.Eng.
Materials Engineer

Reviewed by:

Prakash V. Joshi, ASCT, Eng.L
Senior Materials Engineering Technologist

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING TECHNOLOGIST
Limited Licence
[illegible]

Reporting of these test results constitutes a testing service only.
Engineering interpretation or evaluation of test results is provided only on written request.

METRO TESTING LABORATORIES LTD.
6991 Curragh Avenue, Burnaby, BC V5J 4V6
Tel: (604) 436-9111 Fax: (604) 436-9050

Detection of Alkali-silica Reactive Aggregate by Accelerated Expansion of Mortar Bars

(CSA A23.2 - 25A)

GeoNorth Engineering Ltd.
3975 18th Avenue
Prince George, BC V2N 1B2

Date: 16 December 2011

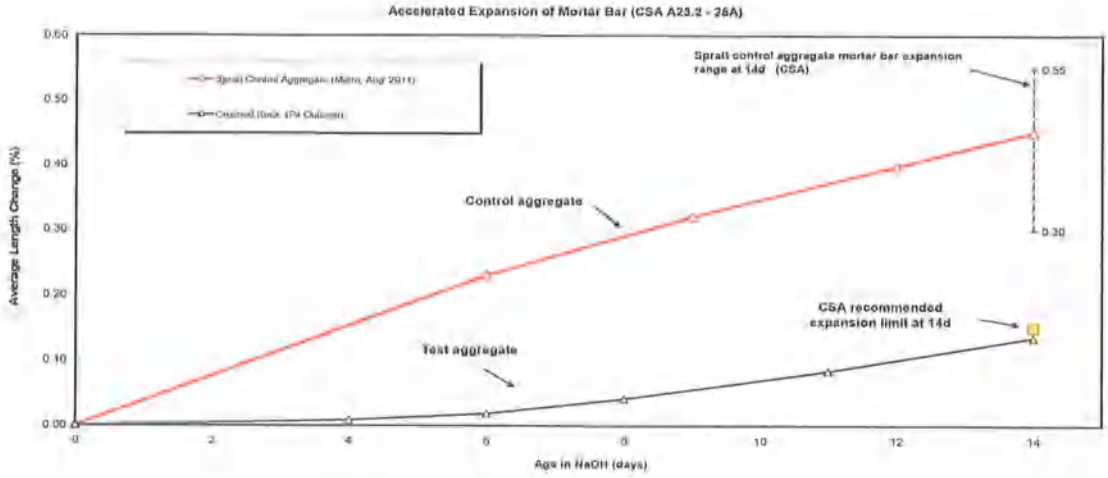
Our File: 15585 Set 1

Attn: Hans Jorgensen

PROJECT: **Suitability of Aggregate for Concrete**

Sample	**Crushed Rock (Source: Pit Outcrop)**

Date sample received: 9 Nov. 2011
Date specimens cast: 29 Nov. 2011
Sampled by: Client
Water/Cement Ratio: 0.50
Portland cement: Essroc type GU, alkali content of 0.94% Na_2O_{eq}.
Test method: CSA A23.2-25A, Test Method for Detection of Alkali-silica Reactive Aggregate by Accelerated Expansion of Mortar Bars



Mortar bar specimens	Expansion, % (age in NaOH solution, days)				
	4	6	8	11	14
1	0.008	0.017	0.040	0.081	0.136
2	0.008	0.016	0.040	0.080	0.139
3	0.009	0.017	0.039	0.083	0.131
4	0.008	0.022	0.042	0.088	0.133
Average	0.009	0.018	0.040	0.083	0.135
CSA recommended limit for deleterious expansion					**0.15**
Spratt control aggregate test results (Metro, Aug' 11)					0.45
Observation: White spots on mortar bars were observed at 8 days test age.					

Comments: Sample meets CSA maximum limit of 0.15% expansion at 14 days. According to CSA A23.2 – 27A, Table 2, the degree of alkali-silica reactivity of the aggregate may be classified as "**Non-reactive**".

Metro Testing Laboratories Ltd.

Des Guo, M.Eng., P.Eng.
Materials Engineer

Reviewed by:

Prakash V. Joshi, ASCT, Eng.L
Senior Materials Engineering Technologist

Association of Professional Engineers and Geoscientists of the Province of British Columbia
P. V. JOSHI
ENGINEERING TECHNOLOGIST
Limited Licence 131356

Reporting of these test results constitutes a testing service only.
Engineering interpretation or evaluation of test results is provided only on written request.

GEONORTH ENGINEERING LTD.

3975 18th Avenue
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Phone 250-564-4304
Fax 250-564-9323
E-mail mail@geonorth.ca

January, 10 2012

K-3300

BGC Engineering Inc.
Suite 500 - 1045 Howe Street
Vancouver, BC V6Z 2A9

Attention: Pete Quinn

Dear Sirs:

Re: Eagle Gold Aggregate Test Results, Placer Steiner Outcrop

Listed below are the tests that you requested on your proposed concrete aggregate to determine their conformation to CSA A23.2 specification:

		Results
CSA A23.2-6A	Relative Density SSD (Fine Agg)	2.718
	Absorption	1.122%
CSA A23.2-29A	Micro-Deval (Coarse Agg)	11.0% Loss

If you require any further information, please do not hesitate to call me at our office at (250) 564-4304.

Yours truly,

GeoNorth Engineering Ltd.

Per: Hans Jorgensen
Supervisor, Technical Services

LABORATORY TESTS COMMISSIONED BY TETRA TECH

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

November 4, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

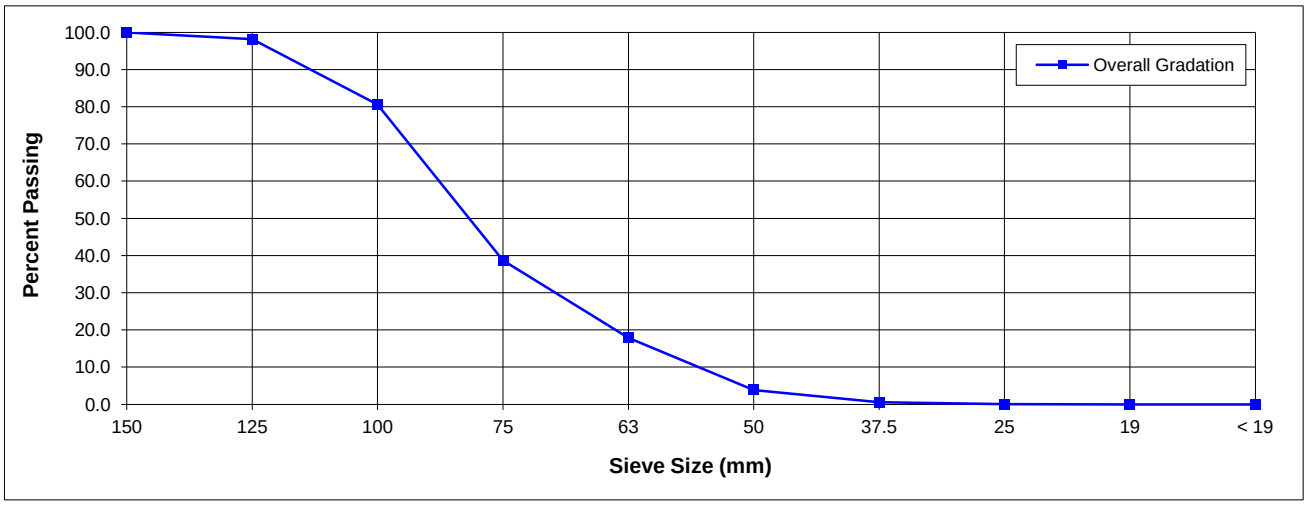
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF , As Received**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: November 4, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)		
			+ < 19	- < 19	
150	0.0	100.0	0.0		
125	1.8	98.2	1.8		
100	17.6	80.6	17.6		
75	41.9	38.7	41.9		
63	20.8	17.9	20.8		
50	14.0	3.9	14.0		
37.5	3.3	0.6	3.3		
25	0.5	0.0	0.5		
19	0.0	0.0	0.0		
< 19	0.0	0.0	0.0		
Total	100.0		100.0		



Remarks: Entire sample received sieved; total mass: 174928 g

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

November 4, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

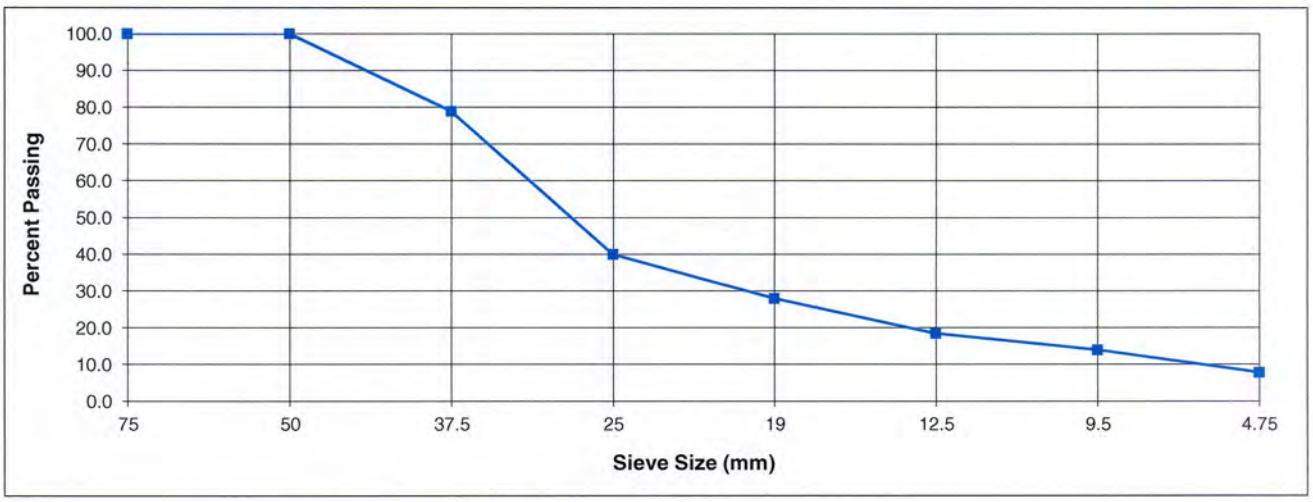
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 50mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: November 7, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)		
			+ 4.75	- 4.75	
75	0.0	100.0	0.0		
50	0.0	100.0	0.0		
37.5	21.1	78.9	22.9		
25	38.9	40.0	42.2		
19	12.0	28.0	13.0		
12.5	9.6	18.4	10.4		
9.5	4.5	14.0	4.8		
4.75	6.1	7.9	6.7		
PAN	7.9			100.0	
Total	100.0		100.0	100.0	



Remarks: Combined Sample(BGC-GD-1, 2,3,4,5 and BGC-MS-1, 2,3,4,5)
Sample crushed to 50mm minus by lab jaw crusher.

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: December 21, 2011

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1755	1764	1400
2	--	--	--
AVERAGE	**1755**	**1764**	**1400**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF COARSE AGGREGATE

ASTM C 127

December 12, 2011
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50mm minus crushed, Coarse Portions**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: November 30, 2011

Date received: November 3, 2011
Tested by: DC

Size Fractions	Relative Density (oven dry basis) g/cm^3	Relative Density (SSD basis) g/cm^3	Relative Density (Apparent) g/cm^3	Absorption (%)
50 x 37.5mm	2.661	2.683	2.722	0.84
37.5 x 25.0mm	2.643	2.665	2.702	0.82
25.0 x 12.5mm	2.634	2.659	2.701	0.94
12.5 x 4.75mm	2.603	2.638	2.697	1.33

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

December 12, 2011
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50mm minus crushed, Passing 4.75mm Portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: November 30, 2011

Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.452	2.545	2.704	3.79
2	2.458	2.550	2.707	3.73
AVERAGE	**2.455**	**2.548**	**2.705**	**3.76**

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

January 12, 2012
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

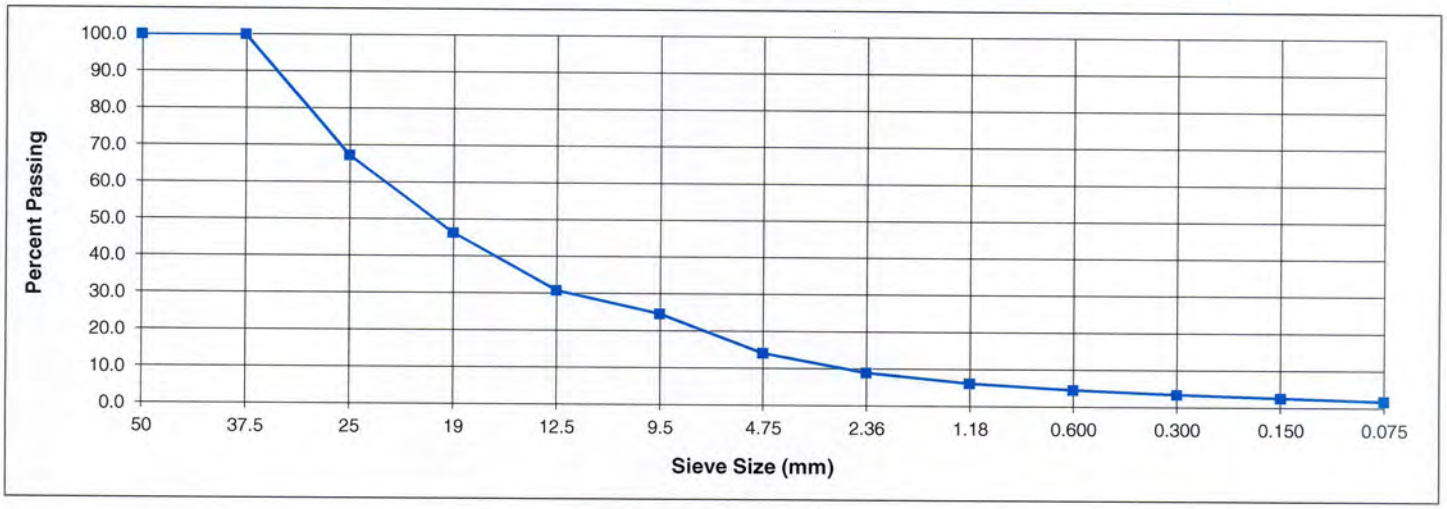
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 37.5mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: December 20, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
50	0.0	100.0	0.0			
37.5	0.0	100.0	0.0			
25	32.7	67.3	38.1			
19	21.0	46.3	24.4			
12.5	15.5	30.8	18.1			
9.5	6.2	24.6	7.2			
4.75	10.4	14.2	12.2			
2.36	5.2	9.0		36.5		
1.18	2.7	6.3		19.3		
0.600	1.6	4.6		11.4		
0.300	1.2	3.5		8.2		
0.150	0.8	2.7		5.8		
0.075	0.8	1.8		5.9		
PAN	1.8	0		12.9		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 5, 2012

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1854	1908	1553
2	1891	--	1532
AVERAGE	**1872**	**1908**	**1543**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5mm minus lab crushed, passing 4.75mm portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: December 21, 2011

Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.609	2.637	2.683	1.05
2	2.610	2.635	2.678	0.97
AVERAGE	**2.610**	**2.636**	**2.681**	**1.01**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE TO DEGRADATION OF SMALL-SIZE COARSE AGGREGATE BY ABRASION & IMPACT IN THE LOS ANGELES MACHINE

ASTM C 131

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 9, 2012

Date received: November 3, 2011
Tested by: DC

Grading	**A**
Number of revolutions	500
Loss after 500 revolutions (%)	**28.4**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

January 12, 2012
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

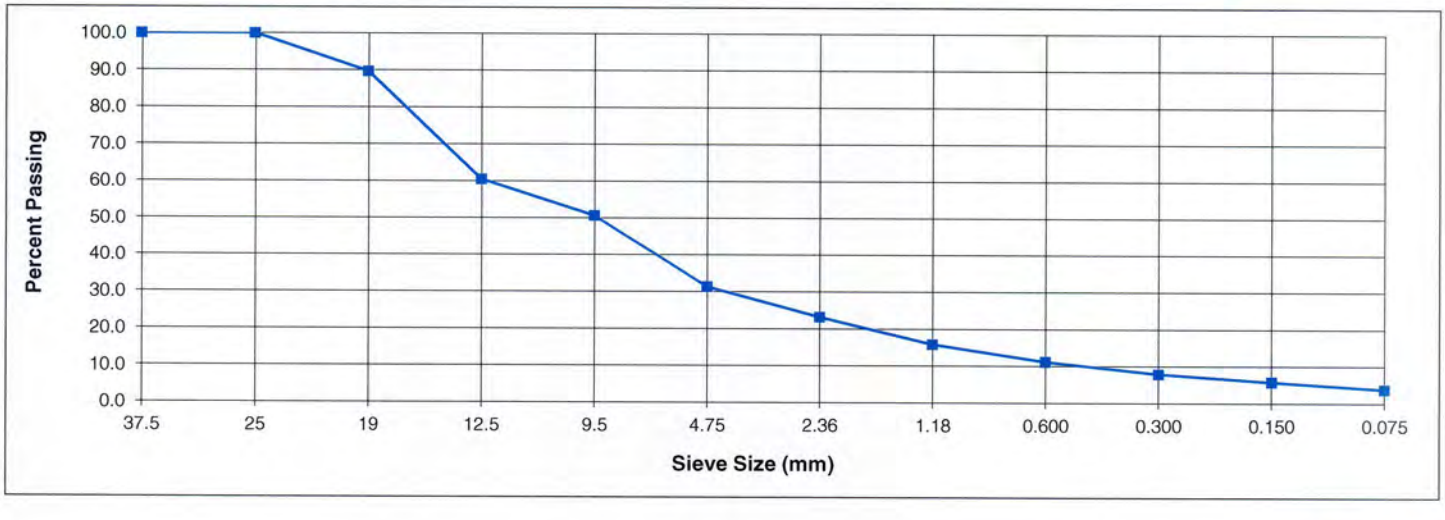
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 25mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: January 9, 2012

SAMPLED BY: BGC
TESTED BY: DC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
37.5	0.0	100.0	0.0			
25	0.0	100.0	0.0			
19	10.3	89.7	15.1			
12.5	29.2	60.5	42.5			
9.5	9.8	50.7	14.3			
4.75	19.3	31.4	28.1			
2.36	8.2	23.2		26.0		
1.18	7.3	16.0		23.1		
0.600	4.7	11.3		15.0		
0.300	3.3	8.0		10.5		
0.150	2.1	5.8		6.8		
0.075	2.0	3.8		6.4		
PAN	3.8	0		12.2		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 25 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 11, 2012

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1991	2108	1620
2	1984	--	1634
AVERAGE	**1988**	**2108**	**1627**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF COARSE AGGREGATE

ASTM C 127

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr. Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 25mm minus crushed, retain on 4.75mm portions**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 10, 2012
Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.638	2.661	2.699	0.87
2	2.634	2.658	2.700	0.93
AVERAGE	**2.636**	**2.660**	**2.700**	**0.90**

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 25mm minus lab crushed, passing 4.75mm portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 10, 2012

Date received: November 3, 2011
Tested by: IC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.601	2.639	2.704	1.48
2	2.610	2.646	2.708	1.39
AVERAGE	**2.605**	**2.643**	**2.706**	**1.43**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

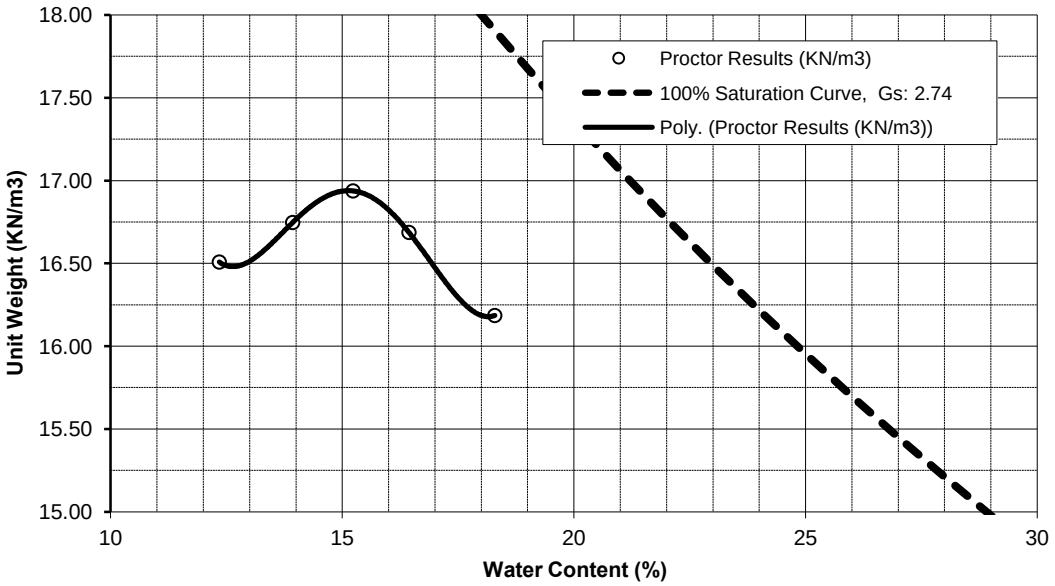
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 2 Silt
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	A	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.000945
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	16.51	16.75	16.94	16.19	16.7
Water Content (%):	12.3	13.9	15.2	18.3	16.4



Uncorrected Optimum w (%):	15.2	**Uncorrected Unit Weight (KN/m^3)**	16.93

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	25	**Sieve Size (mm):**	4.75
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	0.0	**Percent Test Fraction (%):**	100.0
Gsc (calculated):	2.74	**Gsf (calculated):**	2.74
Water Content of Oversized (%):	16.3	**Water Content of Test (%):**	15.2

Final Results

Corrected Optimum w (%):	15.2	**Corrected Unit Weight (KN/m^3)**	16.93
		Corrected Dry Density (Kg/m3)	1726

SK	December-09-11	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 2 Silt**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		100		
Test Number		1		2
Flask Number		5		6
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		174.83		173.41
Mass of Flask + Dry Soil (g)	M_P	248.33		251.02
Mass of Dry Soil (g)		73.37		77.76
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	719.75		720.71
Test Temperature (g)	T_t	18.50		18.40
Mass of Flask + Water (g)	$M_{\rho w,t}$	673.08		671.53
Mass of Dish + Dry Soil (g)		252.00		424.26
Mass of Dish (g)		178.63		346.50
Mass of Oven Dry Soil (g)	M_S	73.37		77.76
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.75		2.72
Specific Gravity at Test Temperature	G_t	2.75		2.72
Specific Gravity at 20ºC	$G_{20°C}$	2.75		2.73
AVERAGE SPECIFIC GRAVITY		**2.74**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		0
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	
Apparent	C/(C-A)	
Absorbtion (%)	(B-C)/C	

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK/RS	December 5, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

December 16, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

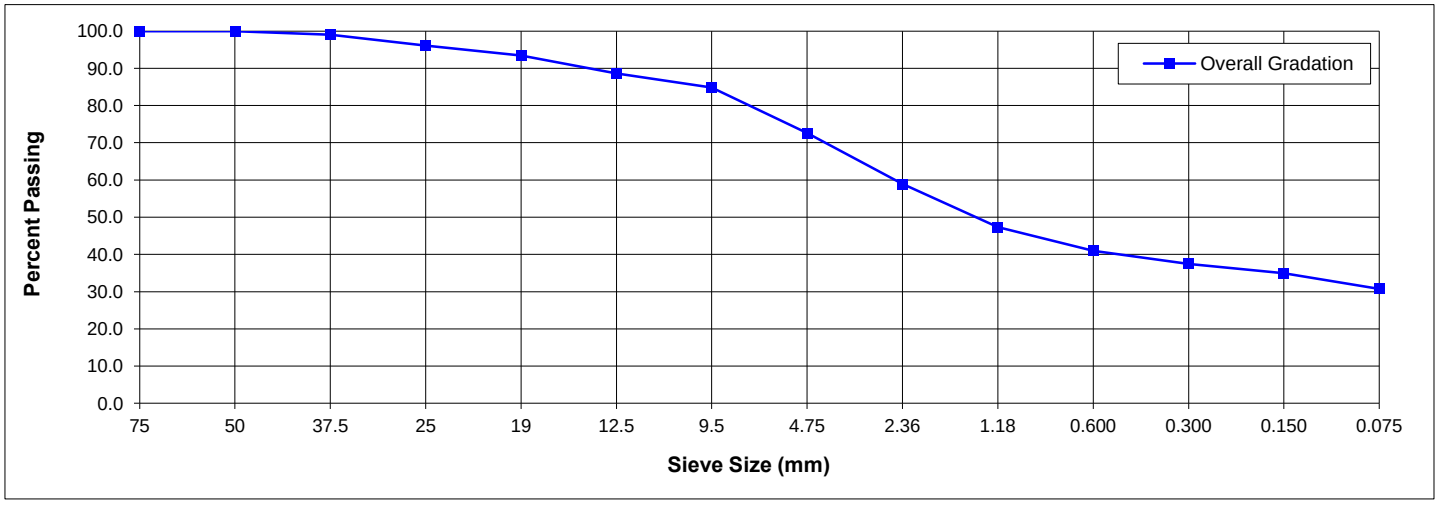
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 3 Colluvium**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: December 15, 2011
DATE TESTED: December 16, 2012

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
75	0.0	100.0	0.0			
50	0.0	100.0	0.0			
37.5	0.9	99.1	3.5			
25	2.9	96.1	10.7			
19	2.7	93.4	9.8			
12.5	4.8	88.6	17.5			
9.5	3.8	84.8	13.9			
4.75	12.2	72.6	44.7			
2.36	13.7	58.9		18.8		
1.18	11.6	47.3		15.9		
0.600	6.3	41.0		8.7		
0.300	3.5	37.5		4.8		
0.150	2.5	34.9		3.5		
0.075	4.2	30.7		5.8		
PAN	30.7	0		42.4		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS

ASTM D 6928

January 18, 2012
Project number: 11-1415-0013/1000

TETRA TECH
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
U.S.A.

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 3 Colluvium**
Source:	**Eagle Gold, Yukon**

Date sampled: Not Given
Date tested: January 16, 2012

Sampled by: Client
Tested by: VN

Grading	Section 8.2 – 19x16, 16x12.5, 12.5x9.5mm
Loss at conclusion of test (%)	**16.6**

Validation Test Data: Control Aggregate (Drain Bros. stone)	
Test date	January 10, 2012
Percent loss	12.7%
Valid range	11.4 – 14.8%

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

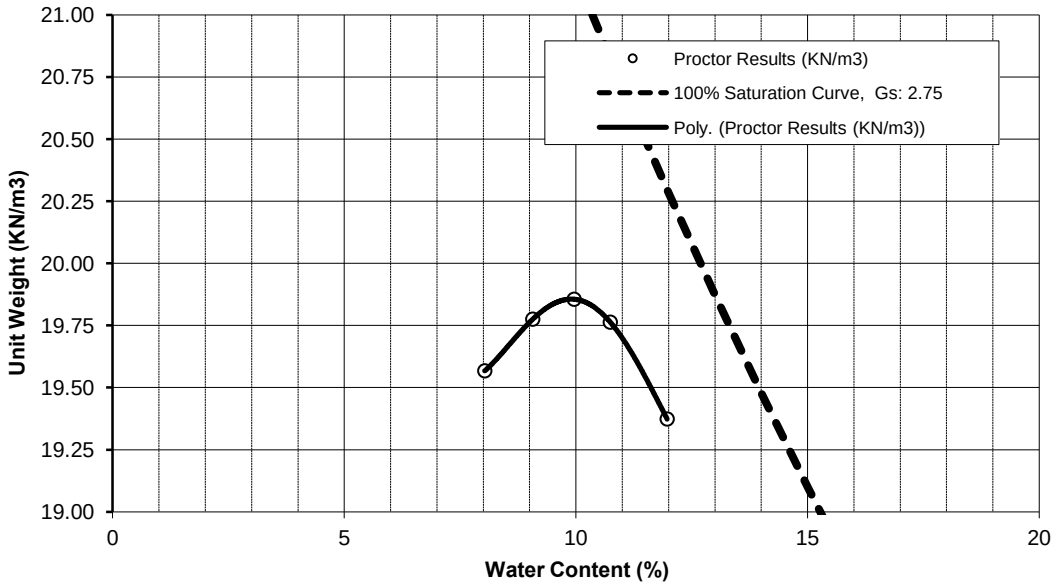
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	C	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.002122
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	19.57	19.78	19.86	19.76	19.4
Water Content (%):	8.0	9.1	10.0	10.7	12.0



Uncorrected Optimum w (%):	10.0	**Uncorrected Unit Weight (KN/m^3)**	19.86

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	25	**Sieve Size (mm):**	4.75
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	17.0	**Percent Test Fraction (%):**	83.0
Gsc (calculated):	2.75	**Gsf (calculated):**	2.75
Water Content of Oversized (%):	16.3	**Water Content of Test (%):**	10.0

Final Results

Corrected Optimum w (%):	11.1	**Corrected Unit Weight (KN/m^3)**	20.79
		Corrected Dry Density (Kg/m3)	2119

SK	December-13-11	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 3 Colluvium**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		65.82		
Test Number		1		2
Flask Number		5		6
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		174.83		173.38
Mass of Flask + Dry Soil (g)	M_P	266.76		270.74
Mass of Dry Soil (g)		91.66		97.03
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	731.54		733.22
Test Temperature (g)	T_t	19.40		19.40
Mass of Flask + Water (g)	$M_{\rho w,t}$	673.04		671.44
Mass of Dish + Dry Soil (g)		202.22		207.55
Mass of Dish (g)		110.56		110.52
Mass of Oven Dry Soil (g)	M_S	91.66		97.03
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.76		2.75
Specific Gravity at Test Temperature	G_t	2.77		2.76
Specific Gravity at 20ºC	$G_{20°C}$	2.77		2.76
AVERAGE SPECIFIC GRAVITY		**2.76**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		31.39
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	2.54
Apparent	C/(C-A)	2.71
Absorbtion (%)	(B-C)/C	4.09

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	2.75

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SK/RS	November 15, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

December 16, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

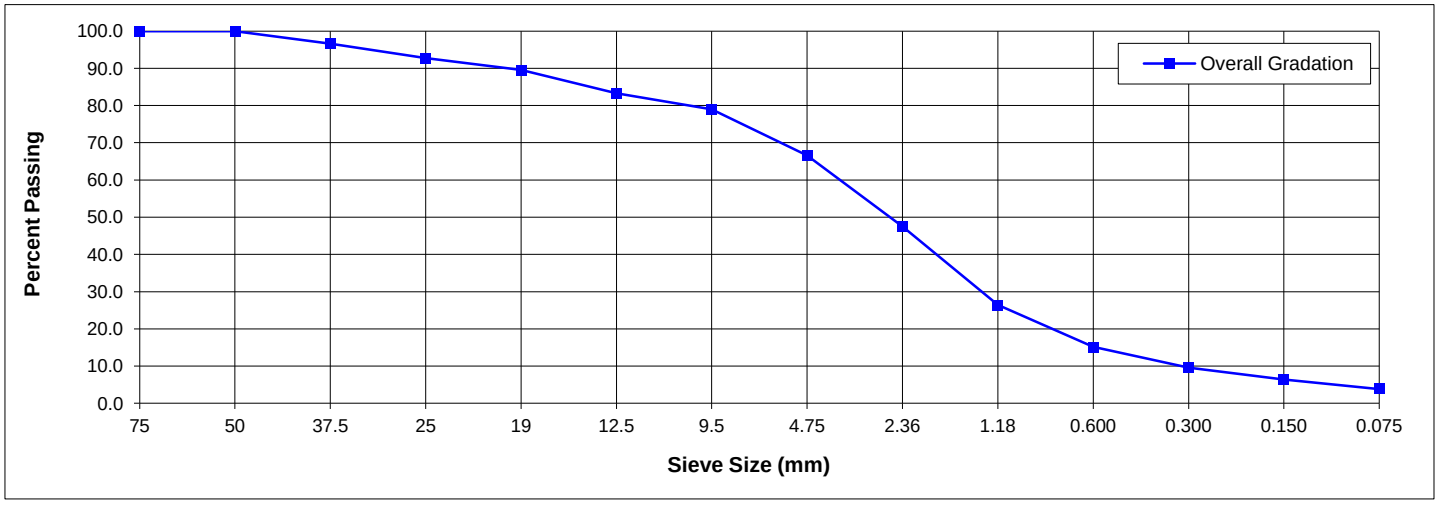
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 4 Placer Tails**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: December 15, 2011
DATE TESTED: December 16, 2012

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
75	0.0	100.0	0.0			
50	0.0	100.0	0.0			
37.5	3.4	96.6	10.1			
25	3.9	92.7	11.7			
19	3.2	89.5	9.6			
12.5	6.2	83.3	18.6			
9.5	4.3	79.0	12.9			
4.75	12.4	66.6	37.2			
2.36	19.1	47.5		28.6		
1.18	21.1	26.4		31.7		
0.600	11.3	15.1		16.9		
0.300	5.6	9.6		8.3		
0.150	3.2	6.4		4.8		
0.075	2.5	3.9		3.8		
PAN	3.9	0		5.8		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS

ASTM D 6928

January 18, 2012
Project number: 11-1415-0013/1000

TETRA TECH
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
U.S.A.

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 4 Placer Tails**
Source:	**Eagle Gold, Yukon**

Date sampled: Not Given
Date tested: January 16, 2012

Sampled by: Client
Tested by: VN

Grading	Section 8.2
Loss at conclusion of test (%)	**32.1**

Validation Test Data: Control Aggregate (Drain Bros. stone)	
Test date	January 10, 2012
Percent loss	12.7%
Valid range	11.4 – 14.8%

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

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Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

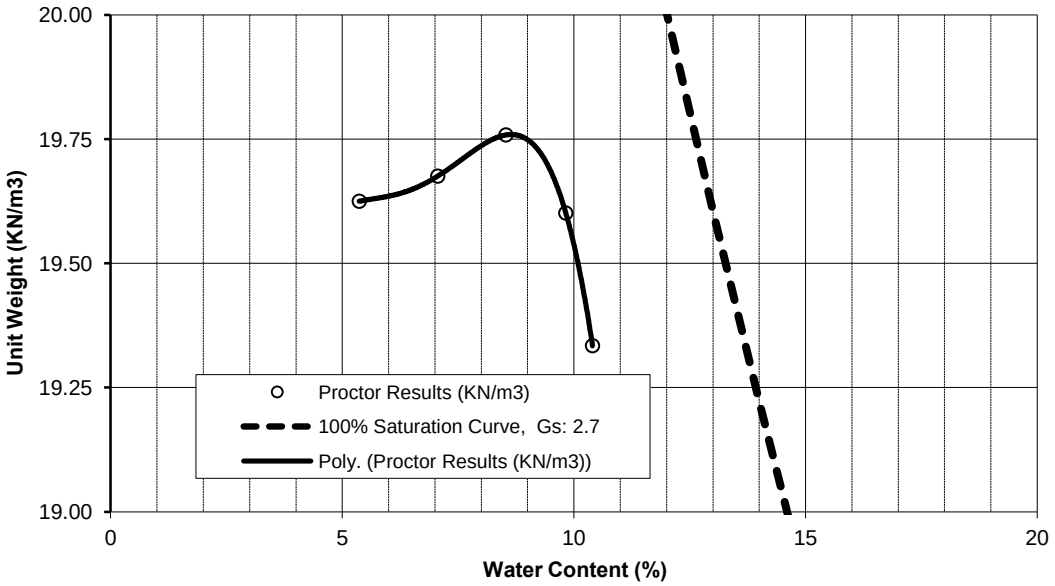
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 4 - Placer Tails
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	C	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.002122
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	19.63	19.68	19.76	19.60	19.3
Water Content (%):	5.4	7.1	8.5	9.8	10.4



Uncorrected Optimum w (%):	8.5	**Uncorrected Unit Weight (KN/m^3)**	19.80

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	20	**Sieve Size (mm):**	20.00
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	30.0	**Percent Test Fraction (%):**	70.0
Gsc (calculated):	2.70	**Gsf (calculated):**	2.70
Water Content of Oversized (%):	1.5	**Water Content of Test (%):**	8.5

Final Results

Corrected Optimum w (%):	6.4	**Corrected Unit Weight (KN/m^3)**	21.42
		Corrected Dry Density (Kg/m^3)	2183

SK, RS	December-15-11	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 4 Placer Tails**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		62.99		
Test Number		1		2
Flask Number		4		3
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		172.71		173.97
Mass of Flask + Dry Soil (g)	M_P	286.80		285.41
Mass of Dry Soil (g)		113.77		111.24
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	742.87		742.45
Test Temperature (g)	T_t	19.00		18.90
Mass of Flask + Water (g)	$M_{\rho w,t}$	671.38		672.50
Mass of Dish + Dry Soil (g)		480.30		221.58
Mass of Dish (g)		366.53		110.34
Mass of Oven Dry Soil (g)	M_S	113.77		111.24
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.69		2.69
Specific Gravity at Test Temperature	G_t	2.70		2.70
Specific Gravity at 20ºC	$G_{20°C}$	2.70		2.70
AVERAGE SPECIFIC GRAVITY		**2.70**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		31.39
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	2.63
Apparent	C/(C-A)	2.70
Absorbtion (%)	(B-C)/C	1.65

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	2.70

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK/RS	November 15, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Slake Durability of Shales and Similar Weak Rocks

Reference
ASTM D4644-08

Project No.:	11-1415-0013/1000	**Borehole:**	**Weathered Rock**
Project:	Aggregate Testing	**Sample Number:**	N/A
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Client:	Tetra Tech	**Lab ID No:**	211

Test Results

I_{d1} = Slake Durability index after 1st Cycle	97.6	%
I_{d2} = Slake Durability index after 2nd Cycle	95.6	%
I_{d3} = Slake Durability index after 3rd Cycle	94.1	%

Initial Sample Description	Final Description of Fragments in Drum
10 irregular lumps of weathered rock	I_{d1} Type II - Retained pieces consists of large and small pieces
	I_{d2} Type II - Retained pieces consists of large and small pieces
	I_{d3} Type II - Retained pieces consists of large and small pieces

Temperature ° C		Calibration	
Max	**22.2**	Machine ID	BUR010002
Min	**18.1**	Drum ID	A
Average	**20.1**	Thermometer ID	FB61328

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE

AFTER

G. Patton	December 19, 2011	LP	December 23,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

POINT LOAD STRENGTH INDEX TEST

Reference
ASTM D5731 - 08

Project No	11-1415-0013/1000	Sch. #	211
Client	Tetra Tech	Machine ID	BUR010024
Project	Aggregate Testing		
Location	Eagle Gold, Yukon		

Lump Test

Test #	Borehole No.	Sa#	Depth m	D mm	W mm	Guage Reading kN	Load P MN	$D_e^2 = D^2$ mm^2	$I_s = P/D_e^2$ MPa	$F = (D_e/50)^{0.45}$	$I_{s(50)}$ MPa	Type	Direction	Remarks
1	Section 5	1	Combined	30.00	52.40	2.053	0.00205	900.0	2.28	0.795	**1.81**	L	p	
2	Section 5	2	Combined	38.32	71.01	21.987	0.02199	1468.4	14.97	0.887	**13.28**	L	p	Sample was very strong - hard to cut into block shape
3	Section 5	3	Combined	31.19	51.98	4.253	0.00425	972.8	4.37	0.809	**3.54**	L	p	
4	Section 5	4	Combined	30.99	58.98	5.113	0.00511	960.4	5.32	0.806	**4.29**	L	p	
5	Section 5	5	Combined	39.69	59.61	5.130	0.00513	1575.3	3.26	0.901	**2.94**	L	p	
6	Section 5	6	Combined	32.81	48.90	2.289	0.00229	1076.5	2.13	0.827	**1.76**	L	p	
7	Section 5	7	Combined	32.62	69.34	1.428	0.00143	1064.1	1.34	0.825	**1.11**	L	p	
8	Section 5	8	Combined	48.39	61.74	1.48	0.00148	2341.4	0.63	0.985	**0.62**	L	\\	
9	Section 5	9	Combined	33.27	56.93	2.63	0.00263	1106.9	2.38	0.833	**1.98**	L	p	
10	Section 5	10	Combined	32.11	62.75	3.83	0.00383	1031.1	3.71	0.819	**3.04**	L	p	
11	Section 5	11	Combined	27.85	81.18	4.97	0.00497	775.6	6.41	0.768	**4.92**	L	\\	

$I_{s\,(50)}$ = Size Corrected Point Load Strength
$I_{s(50)} = FI_s$

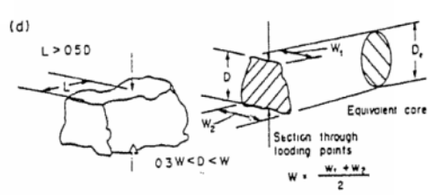
I_s = Uncorrected Point Load Strength
$I_s = P/D_e^2$

F = Size Correction Factor
$F = (D_e/50)^{0.45}$

D_e = equivalent core diameter (mm)
$D_e^2 = D^2$ (mm^2)

Direction
\\ = parallel
p = perpendicular to planes of weakness

Lump Test



G. Patton	1/5/2012	LP	January 17,2012
Tested By	Date	Checked By	Date

PARTICLE SIZE ANALYSIS OF SOILS

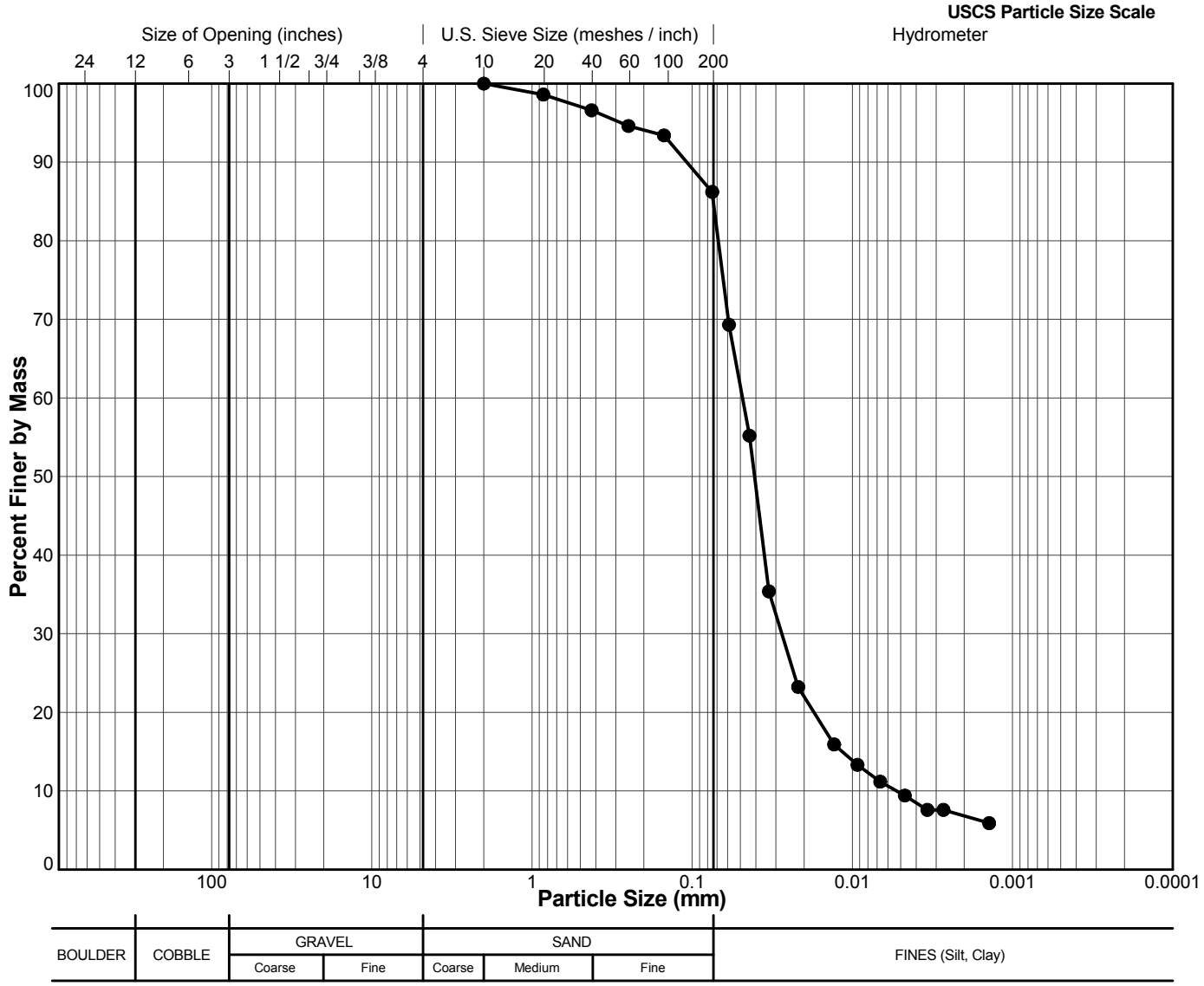
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 2 Silt**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**05/12/2011**	**LP**	**21/12/2011**
Tech	Date	Checked	Date

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500 - 4260 Still Creek Drive Burnaby, British Columbia Canada V5C 6C6
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PARTICLE SIZE ANALYSIS OF SOILS

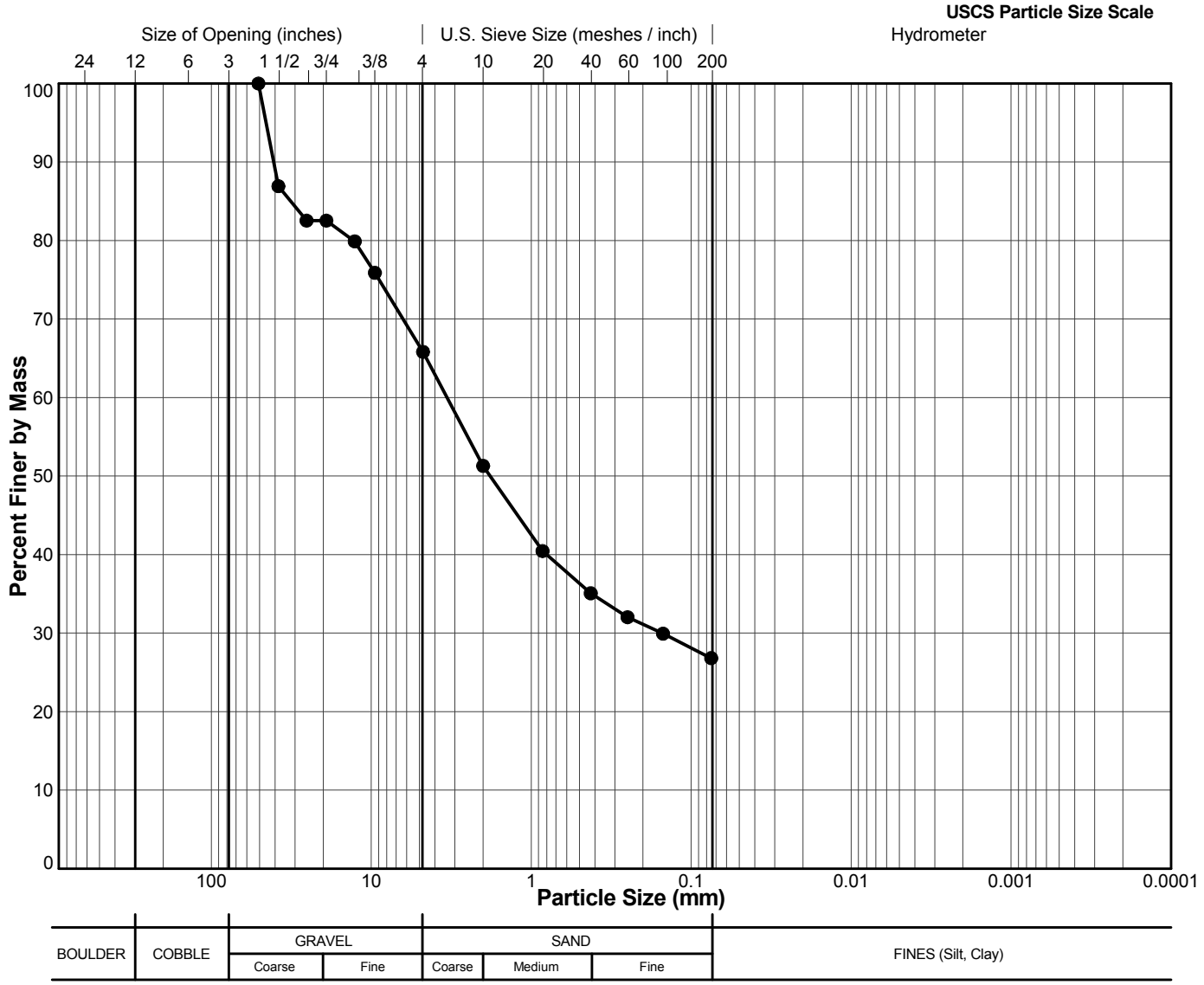
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 3 Colluvium**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



SK	**08/12/2011**	**LP**	**21/12/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

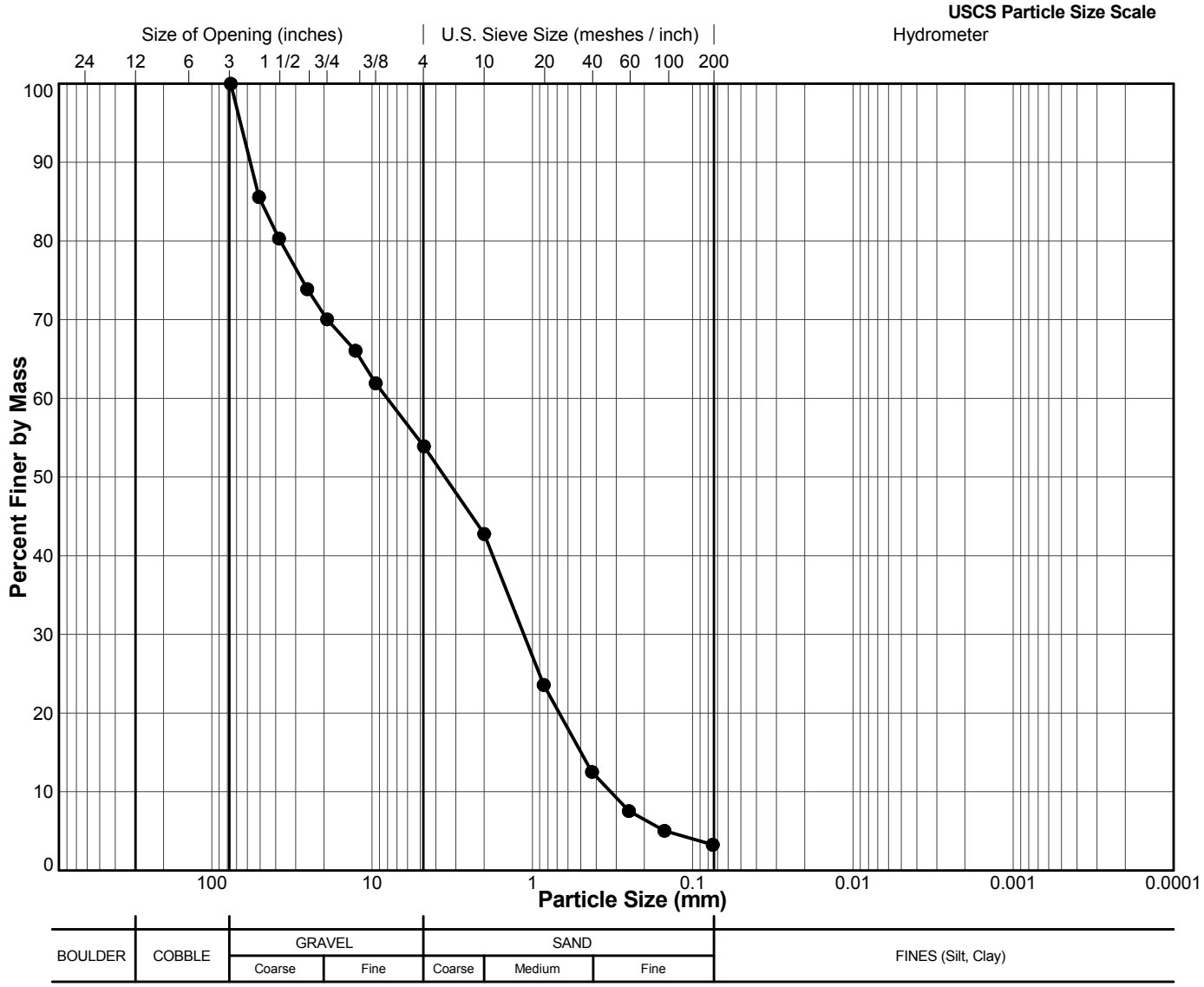
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 4 Placer Tails**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



		LP	**21/12/2011**
Tech	Date	Checked	Date

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PARTICLE SIZE ANALYSIS OF SOILS

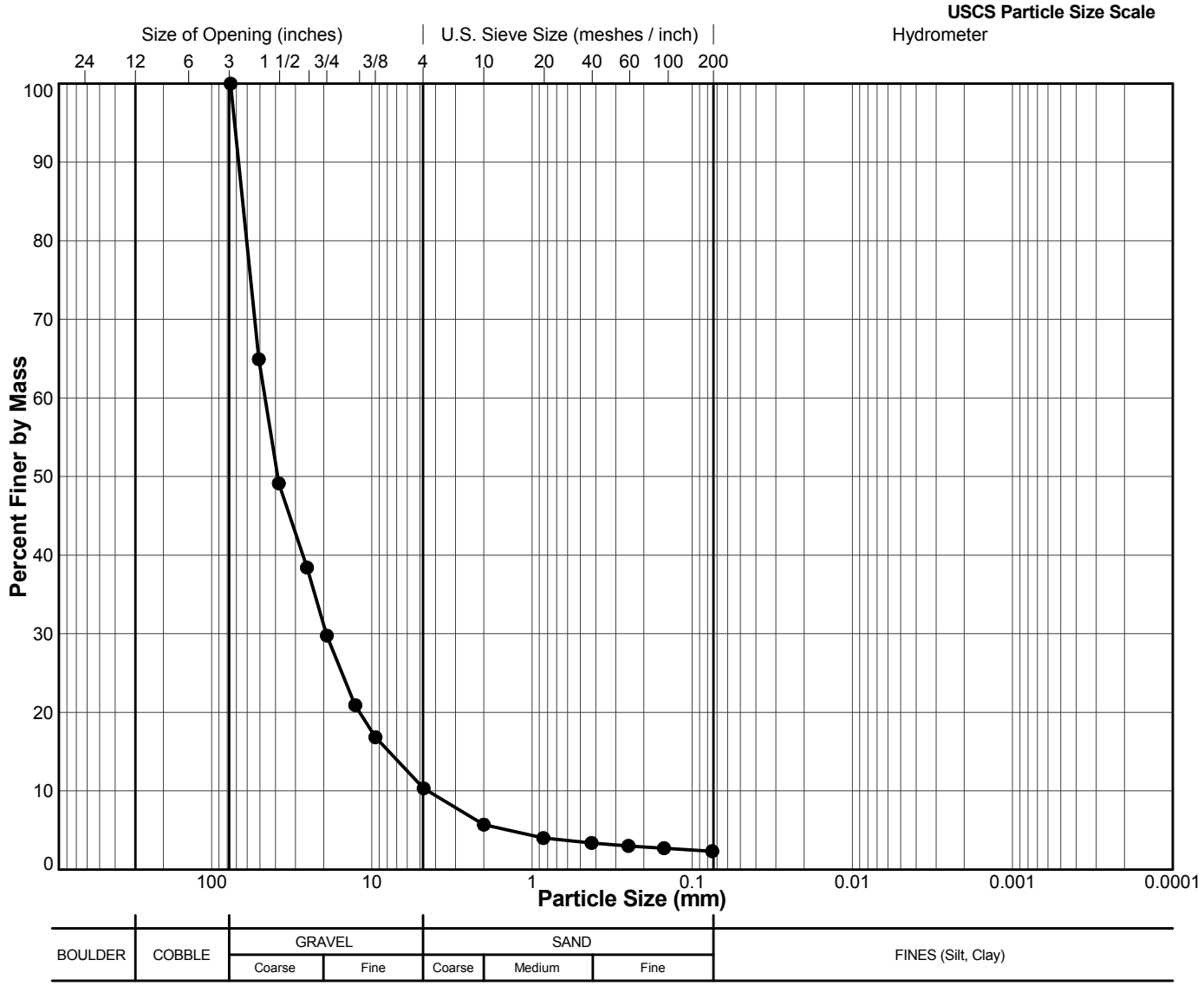
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 5 Weathered Rock**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



SK	**15/12/2011**	**LP**	**21/12/2011**
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

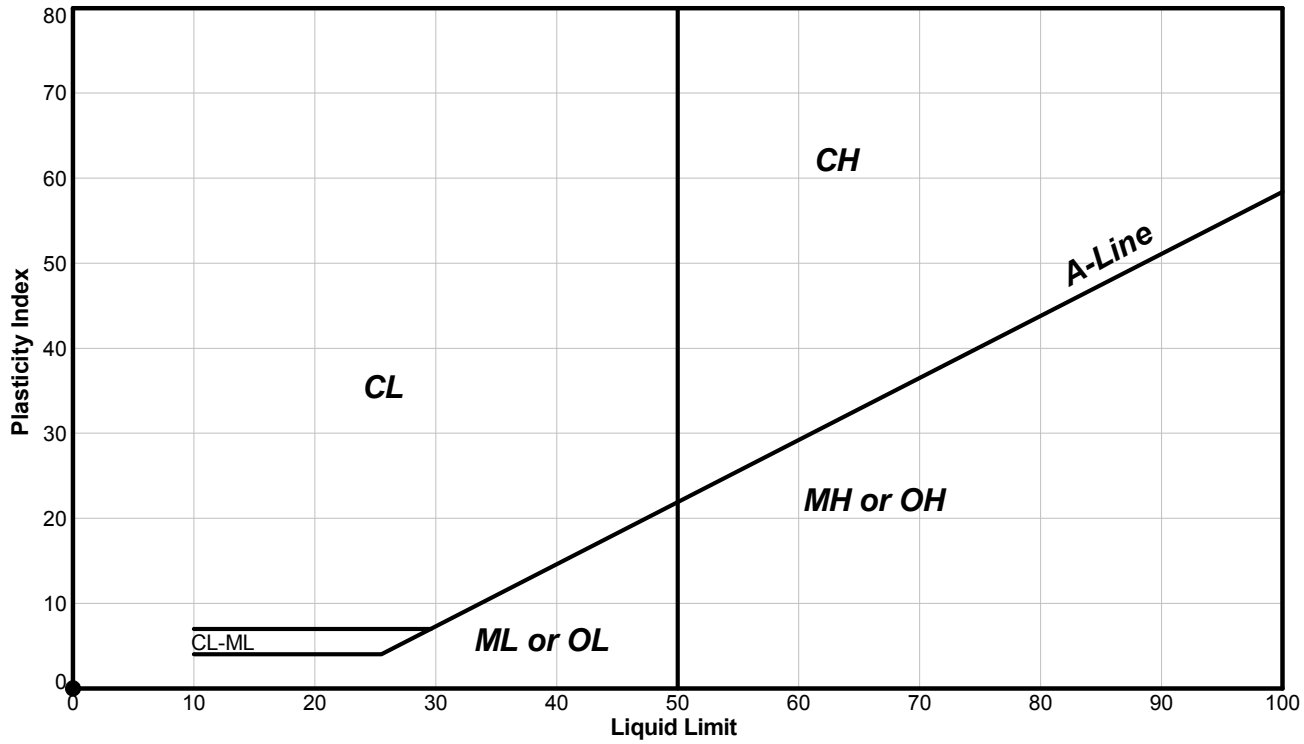
Client: Tetra Tech	**ID: Section 2 Silt**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 2 Silt	N/A	0.00	0.00	97	NP	NP	NP	21.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	05/12/2011	LP	21/12/2011
Tech	Date	Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_ATTERBERG CASAGRANDE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/12/11

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

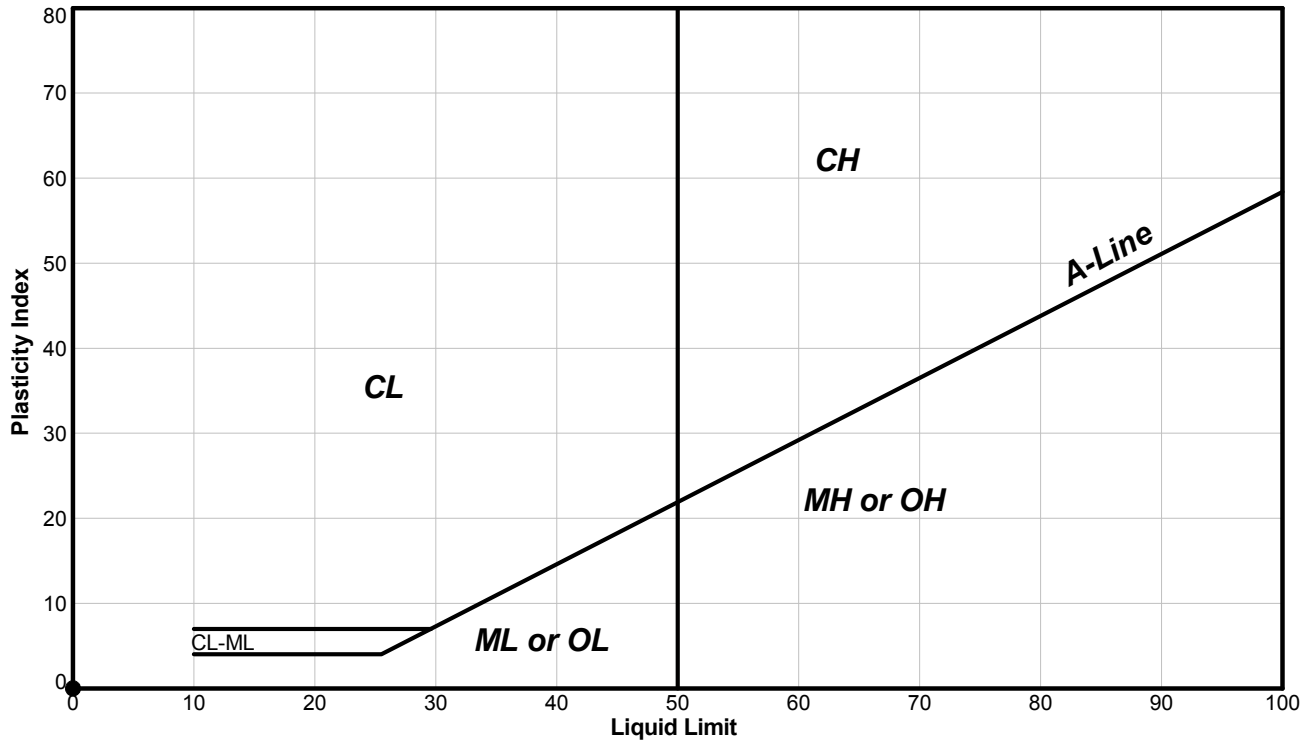
Client: Tetra Tech	**ID: Section 3 Colluvium**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 3 Colluvium	N/A	0.00	0.00	35	NP	NP	NP	6.8	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	05/12/2011	LP	21/12/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_ATTERBERG CASAGRANDE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/12/11

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

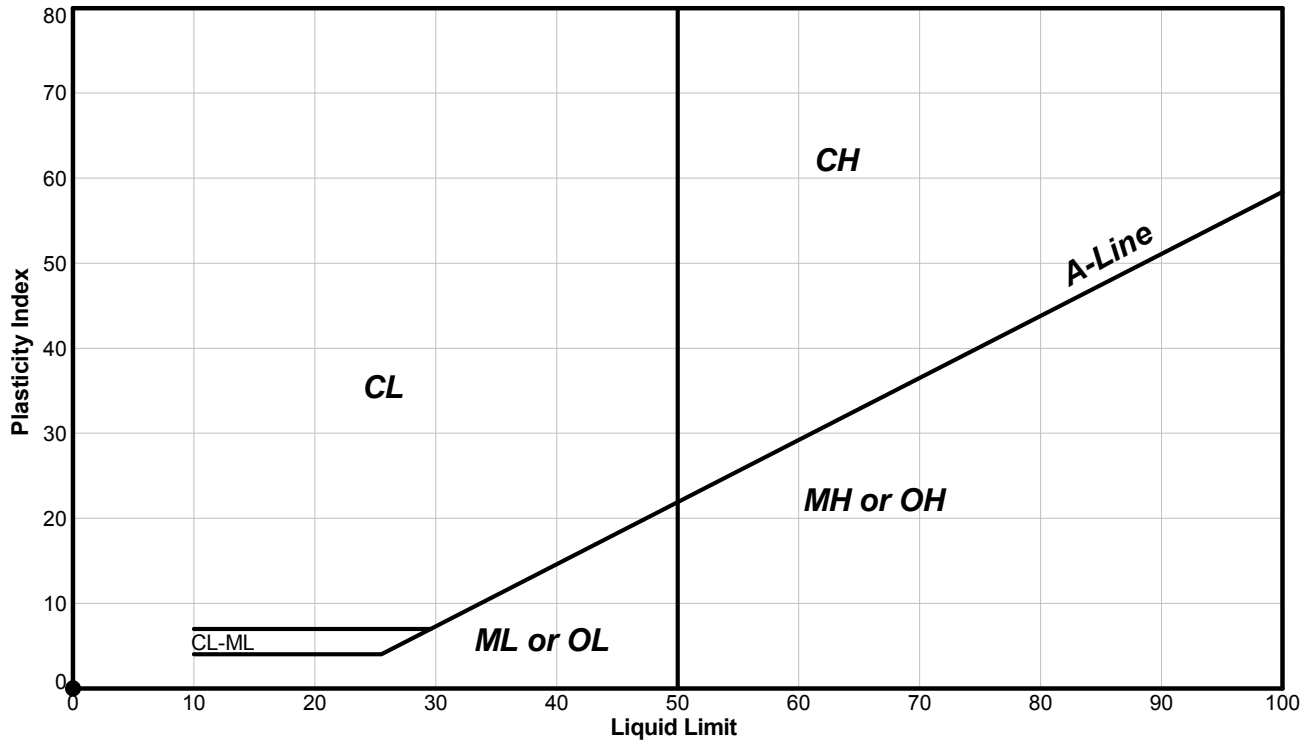
Client: Tetra Tech	**ID: Section 4 Placer Tails**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point	**Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 4 Placer Tails	N/A	0.00	0.00	12	NP	NP	NP	2.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	05/12/2011	LP	21/12/2011
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_ATTERBERG CASAGRANDE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB SKim 21/12/11

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APPENDIX M
LABORATORY TESTING RESULTS PLOTS AND TABLES

LABORATORY TESTING SUMMARIES

1.0 INTRODUCTION

Laboratory testing was completed on selected samples to characterize both soil and rock materials. Soil testing included index testing (moisture content, Atterberg limits, grain size and specific gravity) as well as proctor testing and permeability testing on potential borrow materials, and aggregate testing on potential aggregate sources. Rock testing included both, unconfined compressive strength (UCS) testing and Brazilian tensile strength (BTS) testing.

Rock testing was completed by Golder Associates of Burnaby, BC. Soil testing was completed by Golder Associates and GeoNorth Engineering Ltd, of Prince George, BC. Aggregate testing was completed by GeoNorth Engineering, Metro Testing Group of Burnaby, BC and Exova, of Edmonton, AB.

2.0 REQUESTED TESTING

The soil tests requested are tabulated in Table M-1, the rock tests requested are tabulated in Table M-2 and the aggregate tests requested are tabulated in Table M-3.

3.0 TESTING RESULTS

The grain size and hydrometer results are tabulated in Table M-4. The moisture content results are tabulated in Table M-5. The Atterberg limit results are tabulated in Table M-6. The specific gravity results are tabulated in Table M-7. The sulphate ion results are tabulated in Table M-8. The modified proctor and permeability results are tabulated in Table M-9. The UCS and BTS results are tabulated in Table M-10.

Plasticity charts for colluvium and other overburden soil samples are shown in figures M-1 and M-2 respectively.

Table M-1. Soil Samples Requested for Testing

Hole ID	Sample Number	Sample Depth From (m)	Sample Depth To (m)	Sample Type	Moisture Content	3" Minus Grain Size	Hydrometer	Atterberg Limits	Specific Gravity - soil	Modified Proctor	Permeability Testing	Sulphate in Soil
					ASTM 2216	ASTM C136	ASTM 422	ASTM 4318	ASTM 854	ASTM 698	ASTM D5856	CSA A23.2-3B
Test Pits												
TP-BGC11-50	1	2.8	3.0	GB	1	1	-	-	1	-	-	-
TP-BGC11-50	2	3.3	3.9	GB	1	1	-	-	-	-	-	-
TP-BGC11-51	1	0.2	1.44	GB	1	1	1	1	-	-	-	-
TP-BGC11-51	2	2.4	2.8	GB	1	1	-	-	-	-	-	1
TP-BGC11-51	3	4.2	4.5	GB	1	1	-	-	-	-	-	-
TP-BGC11-52	1	3.3	3.5	GB	1	1	-	-	-	-	-	-
TP-BGC11-53	1	2	2.2	GB	1	1	-	-	-	-	-	-
TP-BGC11-54	1	0.4	0.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-55	1	0.4	0.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-55	2	1.9	2.0	GB	1	1	-	-	-	-	-	-
TP-BGC11-57	1	0.5	1.1	GB	1	1	1	1	-	-	-	-
TP-BGC11-58	1	0.7	0.7	GB	1	1	1	1	-	-	-	-
TP-BGC11-58	2	2	2.0	GB	1	1	-	-	1	-	-	-
TP-BGC11-59	1	0.4	0.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-60	1	0.7	0.9	GB	1	1	1	1	-	-	-	1
TP-BGC11-61	1	0.7	0.8	GB	1	1	1	1	-	-	-	-
TP-BGC11-61	2	1.7	1.9	GB	1	1	-	-	-	-	-	-
TP-BGC11-62	1	0.9	1.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-62	2	3.5	3.7	GB	1	1	1	1	-	-	-	-
TP-BGC11-63	1	0.5	0.7	GB	1	1	1	-	-	-	-	-
TP-BGC11-64	1	1.5	1.6	GB	1	1	-	1	-	-	-	-
TP-BGC11-65	1	0.4	0.5	GB	1	1	-	-	-	-	-	-
TP-BGC11-66	1	1.3	1.3	GB	1	1	-	-	-	-	-	-
TP-BGC11-66	2	1.8	1.8	GB	1	1	1	1	-	-	-	-
TP-BGC11-67	1	0.7	0.9	GB	1	1	1	-	1	-	-	-
TP-BGC11-68	1	1.6	1.8	GB	1	1	-	-	-	-	-	-
TP-BGC11-69	1	1.7	1.9	GB	1	1	1	1	-	-	-	-
TP-BGC11-69	2	2.8	2.9	GB	1	1	1	1	-	-	-	-
TP-BGC11-71	1	1.3	1.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-72	1	2.4	2.6	GB	1	1	-	-	-	-	-	-
TP-BGC11-72	2	0.8	1.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-73	1	0.8	1.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-74	1	1.2	1.4	GB	1	1	1	1	-	-	-	-
TP-BGC11-74	2	3	3.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-74	3	4.5	4.5	GB	1	1	1	1	-	-	-	-
TP-BGC11-76	1	0.4	0.6	GB	1	1	1	-	-	-	-	-
TP-BGC11-77	1	0.4	0.5	GB	1	1	1	1	-	-	-	-
TP-BGC11-79	1	0.4	0.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-79	2	1.2	1.3	GB	1	1	-	-	-	-	-	-
TP-BGC11-81	1	0.7	1.0	GB	1	1	1	-	-	-	-	-
TP-BGC11-82	1	4.7	4.9	GB	1	1	1	1	-	-	-	-
TP-BGC11-82	2	3	3.3	GB	1	1	-	1	-	-	-	-
TP-BGC11-82	3	6.7	7.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-82	4	0.7	1.1	GB	1	1	-	1	-	-	-	-
TP-BGC11-82	5	1.9	2.1	GB	1	1	-	1	-	-	-	-
TP-BGC11-83	1	0.6	0.8	GB	1	1	1	1	-	-	-	-
TP-BGC11-84	1	0.4	0.6	GB	1	1	1	-	-	-	-	1
TP-BGC11-84	2	2.5	2.5	GB	1	1	1	1	-	-	-	-
TP-BGC11-85	1	1	1.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-87	1	0.6	0.8	GB	1	1	-	-	-	-	-	-
TP-BGC11-88	1	1.5	1.8	GB	1	1	1	1	-	-	-	-
TP-BGC11-89	1	0.4	0.6	GB	1	1	-	-	-	-	-	-
TP-BGC11-89	2	1.3	1.5	GB	1	1	1	1	-	-	-	-
TP-BGC11-90	1	0..8	1.0	GB	1	1	-	-	-	-	-	-
TP-BGC11-90	2	3.5	3.6	GB	1	1	1	1	-	-	-	-
TP-BGC11-91	1	0.8	1.0	GB	1	1	1	1	-	-	-	-
TP-BGC11-91	2	1.6	1.8	GB	1	1	1	1	-	-	-	-
TP-BGC11-94	1	1.2	1.3	GB	1	1	1	1	-	-	-	-

Hole ID	Sample Number	Sample Depth From (m)	Sample Depth To (m)	Sample Type	Moisture Content	3" Minus Grain Size	Hydrometer	Atterberg Limits	Specific Gravity - soil	Modified Proctor	Permeability Testing	Sulphate in Soil
					ASTM 2216	ASTM C136	ASTM 422	ASTM 4318	ASTM 854	ASTM 698	ASTM D5856	CSA A23.2-3B
TP-BGC11-95	1	0.9	1.1	GB	1	1	-	-	-	-	-	-
TP-BGC11-95	2	2	3.0	GB	1	1	-	-	-	-	-	-
TP-BGC11-96	1	0.7	0.9	GB	1	1	-	-	-	-	-	-
TP-BGC11-96	2	1.3	1.5	GB	1	1	1	1	-	-	-	-
TP-BGC11-96	3	1.8	2.0	GB	1	1	-	-	-	-	-	-
TP-BGC11-103	1	4.5	4.5	GB	1	1	-	-	-	-	-	-
TP-BGC11-104	1	1.2	1.6	GB	1	1	-	-	-	-	-	-
TP-BGC11-106	1	0.8	1.5	GB	1	-	-	-	-	-	-	-
TP-BGC11-107	1	2.8	3.0	GB	1	1	1	-	-	-	-	-
TP-BGC11-108	1	0.9	1.2	GB	1	1	-	-	-	-	-	-
TP-BGC11-111	1	0.9	1.1	GB	1	-	-	-	-	-	-	-
TP-BGC11-112	1	1.3	1.4	GB	1	1	-	-	-	-	-	-
TP-BGC11-116	2	2.2	2.3	GB	1	1	-	1	-	-	-	-
TP-BGC11-119	1	0.9	1.1	GB	1	-	-	1	-	1	1	-
TP-BGC11-120	1	3.8	4.0	GB	1	-	-	1	-	1	1	-
TP-BGC11-121	1	2.9	3.1	GB	1	-	-	1	-	1	1	-
TP-BGC11-122	1	5.4	5.8	GB	1	-	-	1	-	1	1	-
TP-BGC11-124	1	6.2	6.4	GB	1	1	-	1	-	-	-	-
TP-BGC11-126	1	1.7	2.2	GB	1	1	-	-	-	-	-	-
TP-BGC11-128	1	2.5	3.0	GB	1	1	1	-	-	-	-	-
TP-BGC11-129	1	6.6	6.8	GB	1	1	-	1	-	-	-	-
TP-BGC11-130	1	5.8	6.0	GB	1	1	-	1	-	-	-	-
TP-BGC11-131	1	3.2	3.5	GB	1	1	-	1	-	-	-	-
TP-BGC11-133	1	4.3	4.4	GB	1	1	-	-	-	-	-	-
TP-BGC11-140	1	1	1.2	GB	1	1	-	1	-	-	-	-
Boreholes												
BH-BGC11-39	SPT1	1.15	1.6	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT2	1.6	2.1	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT3	2.25	2.75	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT4	2.75	3.2	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT5	4.6	5.05	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT6	5.53	5.98	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT7	6.22	6.67	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT8	7.16	7.61	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT9	7.75	8.20	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT10	8.71	9.16	SPT	1	1	-	-	-	-	-	-
BH-BGC11-39	SPT11	9.25	9.70	SPT	1	1	-	-	-	-	-	-
BH-BGC11-40A	1	18.78	18.83	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	2	1.8	2.27	GB	1	1	1	1	-	-	-	-
BH-BGC11-42	4	5	5.32	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	5	6.4	6.84	GB	1	1	1	1	1	-	-	-
BH-BGC11-42	7	9.4	9.88	GB	1	1	-	-	-	-	-	-
BH-BGC11-42	8	10.6	11.0	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	12	13.3	13.65	GB	1	1	-	-	-	-	-	-
BH-BGC11-42	15	15.25	15.4	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	16	15.6	15.80	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	20	19.7	20.0	GB	1	1	1	-	-	-	-	-
BH-BGC11-42	22	21.55	21.9	GB	1	1	1	-	-	-	-	-
BH-BGC11-42	23	23	23.4	GB	1	-	-	-	-	-	-	-
BH-BGC11-42	S26	27.6	28.0	SPT	1	1	-	-	-	-	-	-
BH-BGC11-44	S1	0.2	0.4	GB	1	1	1	1	-	-	-	-
BH-BGC11-44	S3	1.6	2.0	GB	1	1	1	1	-	-	-	-
BH-BGC11-44	S5	4.8	5.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-44	S7	6.3	6.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-44	S11	9.6	9.9	GB	1	1	1	1	-	-	-	-
BH-BGC11-44	SPT1	2.27	2.72	SPT	1	-	-	-	-	-	-	-
BH-BGC11-44	SPT2	3.79	4.24	SPT	1	-	-	1	-	-	-	-
BH-BGC11-44	SPT5	8.38	8.85	SPT	1	-	-	-	-	-	-	-
BH-BGC11-44	SPT11	14.49	14.79	SPT	1	-	-	1	-	-	-	-
BH-BGC11-47	G3	2	2.3	GB	1	1	1	1	-	-	-	-

Hole ID	Sample Number	Sample Depth From (m)	Sample Depth To (m)	Sample Type	Moisture Content	3" Minus Grain Size	Hydrometer	Atterberg Limits	Specific Gravity - soil	Modified Proctor	Permeability Testing	Sulphate in Soil
					ASTM 2216	ASTM C136	ASTM 422	ASTM 4318	ASTM 854	ASTM 698	ASTM D5856	CSA A23.2-3B
BH-BGC11-47	G10	11.8	12.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-47	SPT1	0.75	1.2	SPT	1	1	1	1	-	-	-	-
BH-BGC11-47	SPT4	5.33	5.9	SPT	1	1	-	-	-	-	-	-
BH-BGC11-47	SPT5	6.85	7.3	SPT	1	-	-	-	-	-	-	-
BH-BGC11-47	SPT6	8.38	8.6	SPT	1	1	1	-	-	-	-	-
BH-BGC11-49	G4	3.4	3.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-49	G6	6.4	6.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-49	G8	9.4	9.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-49	G10	12.4	12.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-49	SPT1	0.76	1.2	GB	1	-	-	-	-	-	-	-
BH-BGC11-49	SPT2	2.28	2.7	GB	1	1	1	1	-	-	-	-
BH-BGC11-51	G6	7.9	8.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-51	G8	10.9	11.1	GB	1	-	-	-	-	-	-	-
BH-BGC11-51	G10	13.9	14.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-51	G12	17	17.2	GB	1	-	-	-	-	-	-	-
BH-BGC11-51	G14	20.1	20.3	GB	1	1	-	-	-	-	-	-
BH-BGC11-51	G17	24.7	24.9	GB	1	-	-	-	-	-	-	-
BH-BGC11-51	SPT1	0.76	1.2	SPT	1	-	-	1	-	-	-	-
BH-BGC11-51	SPT2	2.28	2.7	SPT	1	-	-	-	-	-	-	-
BH-BGC11-51	SPT3	3.8	4.3	SPT	1	-	-	1	-	-	-	-
BH-BGC11-51	SPT5	9.9	10.3	SPT	1	-	-	-	-	-	-	-
BH-BGC11-51	SPT4	5.33	5.8	SPT	1	-	-	-	-	-	-	-
BH-BGC11-53	G2	1.9	2.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-53	G3	3.2	3.5	GB	1	-	-	-	-	-	-	-
BH-BGC11-53	G4	4.9	5.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-53	G6	7.9	8.1	GB	1	1	-	-	-	-	-	-
BH-BGC11-53	G8	10.9	11.1	GB	1	-	-	-	-	-	-	-
BH-BGC11-53	SPT1	0.76	1.2	SPT	1	-	-	-	-	-	-	-
BH-BGC11-53	SPT2	2.28	2.7	SPT	1	1	1	1	-	-	-	-
BH-BGC11-53	SPT3	3.8	4.3	SPT	1	-	-	-	-	-	-	-
BH-BGC11-53	SPT4	6.85	7.3	SPT	1	1	1	1	-	-	-	-
BH-BGC11-53	SPT5	9.9	10.4	SPT	1	-	-	-	-	-	-	-
BH-BGC11-54	G1	29.97	30.0	Gouge	1	-	-	1	-	-	-	-
BH-BGC11-55	G4	4.9	5.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-55	G5	6.3	6.5	GB	1	-	-	-	-	-	-	-
BH-BGC11-55	SPT1	0.76	1.2	SPT	1	1	-	-	-	-	-	-
BH-BGC11-55	SPT2	2.28	2.7	SPT	1	-	-	-	-	-	-	-
BH-BGC11-55	SPT6	8.38	8.8	SPT	1	-	-	1	-	-	-	-
BH-BGC11-56	G2	1.9	2.1	GB	1	1	-	-	-	-	-	-
BH-BGC11-56	SPT1	0.76	1.2	SPT	1	-	-	-	-	-	-	-
BH-BGC11-56	SPT3	3.8	4.3	SPT	1	-	-	1	-	-	-	-
BH-BGC11-56	SPT4	5.33	5.5	SPT	1	-	-	1	-	-	-	-
BH-BGC11-56	SPT5	6.85	7.2	SPT	1	-	-	-	-	-	-	-
BH-BGC11-57	SPT1	2.28	2.7	SPT	1	-	-	-	-	-	-	-
BH-BGC11-57	SPT2	3.8	4.3	SPT	1	1	1	1	-	-	-	-
BH-BGC11-57	SPT3	5.33	5.8	SPT	1	-	-	-	-	-	-	-
BH-BGC11-57	SPT4	6.85	7.1	SPT	1	1	1	1	-	-	-	-
BH-BGC11-58	G2	1.9	2.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-58	G4	3.2	3.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-58	G6	4.4	4.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-58	G8	5.4	5.5	GB	1	1	1	1	-	-	-	-
BH-BGC11-58	G10	7.9	8.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-60	G3	2.7	2.8	GB	1	1	1	1	-	-	-	-
BH-BGC11-60	G5	3.7	3.8	GB	1	1	1	1	-	-	-	-
BH-BGC11-60	G6	4.9	5.1	GB	1	-	-	-	-	-	-	-
BH-BGC11-60	G7	6.3	6.6	GB	1	1	1	1	-	-	-	-
BH-BGC11-60	SPT2	6.85	7.0	SPT	1	1	1	-	-	-	-	-
BH-BGC11-63	G-2	1.9	2.1	GB	1	1	1	1	-	-	-	-
BH-BGC11-63	G-5	3.9	4.0	GB	1	1	1	1	-	-	-	-
BH-BGC11-63	G-6	5.9	6.1	GB	1	-	-	-	-	-	-	-

Hole ID	Sample Number	Sample Depth From (m)	Sample Depth To (m)	Sample Type	Moisture Content	3" Minus Grain Size	Hydrometer	Atterberg Limits	Specific Gravity - soil	Modified Proctor	Permeability Testing	Sulphate in Soil
					ASTM 2216	ASTM C136	ASTM 422	ASTM 4318	ASTM 854	ASTM 698	ASTM D5856	CSA A23.2-3B
BH-BGC11-63	G-10	11.6	11.7	GB	1	-	-	-	-	-	-	-
BH-BGC11-63	G-12	16.2	16.3	GB	1	1	1	1	-	-	-	-
BH-BGC11-65	SPT1	0.76	1.2	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT2	1.52	2.0	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT3	2.28	2.7	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT4	3.04	3.5	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT5	3.8	4.2	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT6	4.56	5.0	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT7	5.33	5.8	SPT	1	1	-	-	-	-	-	-
BH-BGC11-65	SPT8	6.09	6.5	SPT	1	1	-	-	-	-	-	-
Steiner Outcrop												
BGC-Steiner	-	-	-	-	-	1	-	-	-	-	-	-

Table M-2. Rock Samples Requested for Testing

Final Test Hole Number	Sample Number	Sample Depth From (m)	Sample Depth to (m)	UCS with Strain Measurement	Brazilian Tensile Strength	Specific Gravity - Rock
				ASTM D7012	ASTM D3967	C127
BH-BGC11-29	1	27.46	27.77	-	2	1
BH-BGC11-34	1	36.6	36.86	1	2	1
BH-BGC11-40A	2	30.98	31.3	1	2	1
BH-BGC11-40B	UCS1	21.81	22.06	1	2	1
BH-BGC11-43	1	4.24	4.48	1	2	1
BH-BGC11-45	UCS	17.8	18.04	1	2	1
BH-BGC11-46	UCS	13.11	13.65	1	2	1
BH-BGC11-62	UCS	28.59	28.84	1	1	1
BH-BGC11-69	UCS1	12.26	12.54	1	2	1

Table M-3. Aggregate Samples Requested for Testing

Final Test Hole Number	Sample Number	SOIL TYPE	Relative Density and Absorption, fine aggregate	Sulphate in Soil	Petrographic No. Coarse	Clay Lumps	Low Density Material	Material Finer than 80 µm, fine aggregate	Flat and Elongated Particles	Micro Deval		Freeze Thaw	LA Abrasion	$MgSO_4$ Soundness		Detection of Alkali-Silica Reactive Aggregate by Accelerated Expansion of Mortar Bars
										Coarse Aggregate	Fine Aggregate		Small Coarse Aggregate	Coarse Aggregate	Fine Aggregate	
			CSA A23.2-6A	CSA A23.2-3B	CSA A23.2-15A	CSA A23.2-3A	CSA A23.2-4A	CSA A23.2-2A &5A	CSA A23.2-13A	CSA A23.2-29A	CSA A23.2-23A	CSA A23.2-24A	CSA A23.2-16A	CSA A23.2-9A	CSA A23.2-9A	CSA A23.2-25A
CONC-BGC11-GRD	S1	Form one aggregate sample from these 10 buckets. Sample need to be combined, then crushed and/or screened to produce fine and coarse aggregate for testing	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CONC-BGC11-GRD	S2															
CONC-BGC11-GRD	S3															
CONC-BGC11-GRD	S4															
CONC-BGC11-GRD	S5															
CONC-BGC11-SSED	S1															
CONC-BGC11-SSED	S2															
CONC-BGC11-SSED	S3															
CONC-BGC11-SSED	S4															
CONC-BGC11-SSED	S5															
CONC-BGC11-01	S1	Form one aggregate sample from these 10 buckets. Sample need to be combined, then crushed and/or screened to produce fine and coarse aggregate for testing	1	1	1	1	1	1	1	1	1	1	1	1	1	1
CONC-BGC11-01	S2															
CONC-BGC11-02	S1															
CONC-BGC11-02	S2															
CONC-BGC11-03	S1															
CONC-BGC11-03	S2															
CONC-BGC11-04	S1															
CONC-BGC11-04	S2															
CONC-BGC11-16	S1															
CONC-BGC11-16	S2															
BGC Steiner			1	0	0	0	0	0	0	1	0	0	0	0	0	0

Table M-4. Grain Size and Hydrometer Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Cobbles (%)[1]	Gravel (%)[2]	Sand (%)[3]	Silt (%)[4]	Clay (%)[5]	Fines (%)	USCS Classification	Lithology Unit
Test Pits											
TP-BGC11-50	1	2.8	3.0	-	84	11	-	-	5	GW	COLLUVIUM
TP-BGC11-50	2	3.3	3.6	-	67	23	-	-	10	GW-GM/SW-SM	COLLUVIUM
TP-BGC11-51	1	0.2	1.4	-	32	24	34	10	44	GM-SM	COLLUVIUM
TP-BGC11-51	2	2.4	2.8	-	50	23	-	-	27	GM/SM	COLLUVIUM
TP-BGC11-51	3	4.2	4.5	-	60	34	-	-	6	GW-GM	COLLUVIUM
TP-BGC11-52	1	3.3	3.5	30	63	6	-	-	1	GW	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-53	1	2.0	2.2	-	79	18	-	-	3	GW	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-54	1	0.4	0.6	-	57	18	19	6	25	GM	COLLUVIUM
TP-BGC11-55	1	0.4	0.6	-	57	19	20	4	24	GM	COLLUVIUM
TP-BGC11-55	2	1.9	2.0	-	80	13	-	-	7	GW-GM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-57	1	0.5	1.1	-	50	18	27	5	32	GM	COLLUVIUM
TP-BGC11-58	1	0.7	0.8	-	36	37	23	4	27	SM-GM	COLLUVIUM
TP-BGC11-58	2	2.0	2.1	-	69	25	-	-	6	GW-GM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-59	1	0.4	0.6	-	67	20	12	1	13	GM	COLLUVIUM
TP-BGC11-59	1	0.4	0.6	-	67	20	12	1	13	GM	COLLUVIUM
TP-BGC11-60	1	0.7	0.9	-	20	25	53	2	55	ML	COLLUVIUM
TP-BGC11-61	1	0.7	0.8	-	30	32	36	2	38	SM-GM	COLLUVIUM
TP-BGC11-61	2	1.7	1.9	-	55	29	-	-	16	GM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-62	1	0.9	1.0	-	33	23	40	4	44	GM-SM	COLLUVIUM
TP-BGC11-62	2	3.5	3.7	-	33	39	22	6	28	SM-GM/SC-GC	COLLUVIUM
TP-BGC11-63	1	0.5	0.7	-	53	23	20	4	24	GM	COLLUVIUM
TP-BGC11-64	1	1.5	1.6	-	26	60	-	-	14	SM	COLLUVIUM
TP-BGC11-65	1	0.4	0.5	-	49	36	-	-	15	GM-SM	COLLUVIUM
TP-BGC11-66	1	1.3	1.4	-	12	63	-	-	25	SM-GM	COLLUVIUM
TP-BGC11-66	2	1.8	1.9	-	2	32	51	15	66	CL	COLLUVIUM
TP-BGC11-67	1	0.7	0.9	-	45	19	28	8	36	GM-SM	COLLUVIUM
TP-BGC11-68	1	1.6	1.8	-	44	38	-	-	18	GM?	COLLUVIUM
TP-BGC11-69	1	1.7	1.9	-	-	7	90	3	93	ML	COLLUVIUM
TP-BGC11-69	2	2.8	2.9	-	47	31	19	3	22	GM-SM	COLLUVIUM
TP-BGC11-71	1	1.3	1.6	-	28	41	26	5	31	SM	COLLUVIUM
TP-BGC11-72	1	2.4	2.6	-	68	25	-	-	7	GW-GM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-72	2	0.8	1.0	-	35	46	12	7	19	SM-GM	COLLUVIUM
TP-BGC11-73	1	0.8	1.0	-	17	50	31	2	33	SM	COLLUVIUM
TP-BGC11-74	1	1.2	1.4	-	39	26	28	7	35	GM-SM	COLLUVIUM
TP-BGC11-74	2	3.0	3.1	-	-	3	83	14	97	ML	COLLUVIUM
TP-BGC11-74	3	4.5	4.6	-	20	30	44	6	50	SM	COLLUVIUM
TP-BGC11-76	1	0.4	0.6	-	18	20	54	8	62	ML	COLLUVIUM
TP-BGC11-77	1	0.4	0.5	-	22	34	31	13	44	SM	COLLUVIUM
TP-BGC11-79	1	0.4	0.6	-	41	48	8	3	11	SW-SM/GW-GM	COLLUVIUM?
TP-BGC11-79	2	1.2	1.3	-	1	72	-	-	27	SM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-81	1	0.7	1.0	-	65	24	10	1	11	GW-GM	COLLUVIUM
TP-BGC11-82	1	4.7	4.9	-	-	5	90	5	95	ML	ALLUVIUM
TP-BGC11-82	2	3.0	3.3	-	7	21	-	-	72	ML-SM	ALLUVIUM
TP-BGC11-82	3	6.7	7.0	-	2	20	74	4	78	ML	ALLUVIUM
TP-BGC11-82	4	0.7	1.1	-	-	20	-	-	80	ML	ALLUVIUM?
TP-BGC11-82	5	1.9	2.1	-	-	25	-	-	75	ML	ALLUVIUM
TP-BGC11-83	1	0.6	0.8	-	33	29	31	7	38	GM-SM	COLLUVIUM
TP-BGC11-84	1	0.4	0.6	-	-	20	34	46	80	ML	COLLUVIUM
TP-BGC11-84	2	2.3	2.5	-	2	4	84	10	94	ML	COLLUVIUM
TP-BGC11-85	1	0.7	1.1	-	7	42	40	11	51	ML	COLLUVIUM
TP-BGC11-87	1	0.6	0.8	-	26	68	-	-	6	SP-SW	COLLUVIUM
TP-BGC11-88	1	1.5	1.8	-	27	39	23	11	34	SM	COLLUVIUM
TP-BGC11-89	1	0.4	0.6	-	78	21	-	-	1	GW	COLLUVIUM
TP-BGC11-89	2	1.3	1.5	-	24	32	36	8	44	SM	COLLUVIUM
TP-BGC11-90	1	0.8	1.0	-	11	23	-	-	66	ML	COLLUVIUM
TP-BGC11-90	2	3.5	3.6	-	-	4	90	6	96	ML	COLLUVIUM
TP-BGC11-91	1	0.8	1.0	-	7	23	60	10	71	ML	COLLUVIUM
TP-BGC11-91	2	1.6	1.8	-	52	33	12	3	15	GM	COLLUVIUM
TP-BGC11-92	1	0.6	0.8	-	-	7	81	12	93	ML	COLLUVIUM

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Cobbles (%)[1]	Gravel (%)[2]	Sand (%)[3]	Silt (%)[4]	Clay (%)[5]	Fines (%)	USCS Classification	Lithology Unit
TP-BGC11-94	1	1.2	1.3	-	22	34	34	10	44	SM	COLLUVIUM
TP-BGC11-94	2	2.3	2.5	-	21	38	-	-	41	SM	COLLUVIUM
TP-BGC11-95	1	0.9	1.1	-	10	65	-	-	25	SM	WEATHERED INTRUSIVE ROCK
TP-BGC11-95	2	2.0	3.0	-	1	75	-	-	24	SM	WEATHERED INTRUSIVE ROCK
TP-BGC11-96	1	0.7	0.9	-	26	60	-	-	14	SM	WEATHERED INTRUSIVE ROCK
TP-BGC11-96	2	1.3	1.5	-	3	32	54	11	65	ML	WEATHERED INTRUSIVE ROCK
TP-BGC11-96	3	1.8	2.0	-	36	49	-	-	15	SM/GM	WEATHERED INTRUSIVE ROCK
TP-BGC11-103	1	4.4	4.8	-	36	48	-	-	5	SW/GW	TILL
TP-BGC11-104	1	1.2	1.6	-	60	33	-	-	7	GW	TILL
TP-BGC11-107	1	2.7	3.0	-	25	41	30	4	34	SM	COLLUVIUM
TP-BGC11-108	1	0.9	1.2	-	37	37	-	-	26	GM-SM	COLLUVIUM
TP-BGC11-112	1	1.3	1.4	-	48	33	-	-	19	GM-SM	COLLUVIUM
TP-BGC11-116	2	2.2	2.3	-	49	36	-	-	15	GC	COLLUVIUM
TP-BGC11-124	1	6.2	6.4	-	21	29	-	-	50	ML	COLLUVIUM
TP-BGC11-126	1	1.7	2.2	-	52	30	-	-	18	GC-SC/GM-SM	COLLUVIUM
TP-BGC11-128	1	2.5	3.0	-	7	32	61	0	61	ML	COLLUVIUM
TP-BGC11-129	1	6.6	6.8	-	16	31	-	-	53	ML	COLLUVIUM
TP-BGC11-130	1	5.8	6.0	-	35	43	-	-	22	SM-GM/SC-GC	COLLUVIUM
TP-BGC11-131	1	3.2	3.5	-	45	38	-	-	17	GM-SM	DEBRIS FLOW?
TP-BGC11-133	1	4.3	4.4	-	51	34	-	-	15	GM	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-140	1	1.0	1.2	-	21	34	-	-	45	ML	COLLUVIUM
Boreholes											
BH-BGC11-39	SPT1	1.2	1.6	-	0	5	-	-	95	ML	PLACER TAILINGS
BH-BGC11-39	SPT2	1.6	2.1	-	0	8	-	-	92	ML	PLACER TAILINGS
BH-BGC11-39	SPT3	2.3	2.8	-	27	28	-	-	45	SM-GM	PLACER TAILINGS
BH-BGC11-39	SPT4	2.8	3.2	-	48	33	-	-	19	GM	PLACER TAILINGS
BH-BGC11-39	SPT5	4.6	5.1	-	38	44	-	-	18	SM	PLACER TAILINGS
BH-BGC11-39	SPT6	5.5	6.0	-	25	61	-	-	14	SM	PLACER TAILINGS
BH-BGC11-39	SPT7	6.2	6.7	-	2	78	-	-	20	SM	PLACER TAILINGS
BH-BGC11-39	SPT8	7.2	7.6	-	0	81	-	-	19	SM	PLACER TAILINGS
BH-BGC11-39	SPT9	7.8	8.2	-	39	48	-	-	13	SM	PLACER TAILINGS
BH-BGC11-39	SPT10	8.7	9.2	-	2	82	-	-	16	SM	PLACER TAILINGS
BH-BGC11-39	SPT11	9.3	9.7	-	2	84	-	-	14	SM	PLACER TAILINGS
BH-BGC11-42	2	1.8	2.3	-	7	59	24	10	34	SM	ICE RICH COLLUVIUM
BH-BGC11-42	5	6.4	6.8	-	6	55	27	12	39	SM	ICE RICH COLLUVIUM
BH-BGC11-42	7	9.4	9.9	-	5	61	-	-	34	SM	ICE RICH COLLUVIUM
BH-BGC11-42	12	13.3	13.7	-	31	60	-	-	9	SW-GW	ICE RICH COLLUVIUM
BH-BGC11-42	20	19.7	20.0	-	10	64	16	10	26	SM	ICE RICH COLLUVIUM
BH-BGC11-42	22	21.6	21.9	-	4	66	18	12	30	SM	ICE RICH COLLUVIUM
BH-BGC11-42	S26	27.6	28.0	-	19	59	-	-	22	SM	ICE RICH COLLUVIUM
BH-BGC11-44	S1	0.2	0.4	-	20	35	32	13	45	SM	ALLUVIUM
BH-BGC11-44	S3	1.6	2.0	-	3	10	72	15	87	ML	ALLUVIUM
BH-BGC11-44	S5	4.8	5.1	-	33	22	35	10	45	GC-SC	ALLUVIUM
BH-BGC11-44	S7	6.3	6.6	-	29	22	49	0	49	GC-SC/GM-SM	ALLUVIUM
BH-BGC11-44	S11	9.6	9.9	-	20	40	24	16	40	GC-SC	ALLUVIUM?
BH-BGC11-47	G3	2.0	2.3	-	0	8	78	14	92	ML	ALLUVIUM?
BH-BGC11-47	G10	11.8	12.1	-	15	46	39	0	39	SC	ALLUVIUM?
BH-BGC11-47	SPT1	0.8	1.2	-	1	8	91	0	91	CL	ALLUVIUM?
BH-BGC11-47	SPT4	5.3	5.9	-	26	45	-	-	29	SM-GM	ALLUVIUM?
BH-BGC11-47	SPT6	8.4	8.6	-	13	38	49	0	49	SM	ALLUVIUM?
BH-BGC11-49	G4	3.4	3.6	-	28	42	26	4	30	SM	ALLUVIUM?
BH-BGC11-49	G6	6.4	6.6	-	33	34	31	2	33	SM-GM	ALLUVIUM?
BH-BGC11-49	G8	9.4	9.6	-	6	69	16	9	25	SM	ALLUVIUM?
BH-BGC11-49	G10	12.4	12.6	-	22	36	29	13	42	SM	ALLUVIUM?
BH-BGC11-49	SPT2	2.3	2.7	-	7	23	58	12	70	CL	ALLUVIUM?
BH-BGC11-51	G6	7.9	8.1	-	14	27	50	9	59	ML	ALLUVIUM
BH-BGC11-51	G10	13.9	14.1	-	21	53	26	0	26	SM	ALLUVIUM
BH-BGC11-51	G14	20.1	20.3	-	11	63	-	-	26	SW	ALLUVIUM
BH-BGC11-53	G2	1.9	2.1	-	19	40	38	3	41	SC	TILL
BH-BGC11-53	G4	4.9	5.1	-	41	44	14	1	15	SC-GC	TILL
BH-BGC11-53	G6	7.9	8.1	-	31	47	-	-	22	SM	TILL

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Cobbles (%)[1]	Gravel (%)[2]	Sand (%)[3]	Silt (%)[4]	Clay (%)[5]	Fines (%)	USCS Classification	Lithology Unit
BH-BGC11-53	SPT2	2.3	2.7	-	22	41	28	9	37	SC	TILL
BH-BGC11-53	SPT4	6.9	7.3	-	8	76	13	3	16	SC-GC	TILL
BH-BGC11-55	G4	4.9	5.1	-	20	41	36	3	39	SC	DEBRIS FLOW
BH-BGC11-55	SPT1	0.8	1.2	-	38	37	-	-	25	GM-SM	COLLUVIUM
BH-BGC11-56	G2	1.9	2.1	-	40	37	-	-	23	GM-SM	COLLUVIUM
BH-BGC11-57	SPT2	3.8	4.3	-	19	49	28	4	32	SC	COLLUVIUM
BH-BGC11-57	SPT4	6.9	7.1	-	27	42	23	8	31	SC-SM	COLLUVIUM
BH-BGC11-58	G2	1.9	2.1	-	11	44	40	5	45	SM	COLLUVIUM
BH-BGC11-58	G4	3.2	3.6	-	23	51	26	0	26	SM	COLLUVIUM
BH-BGC11-58	G6	4.4	4.6	-	29	54	16	1	17	SM	COLLUVIUM
BH-BGC11-58	G8	5.4	5.5	-	37	35	26	2	28	GM-SM	COLLUVIUM
BH-BGC11-58	G10	7.9	8.1	-	15	51	32	2	34	SM	COLLUVIUM
BH-BGC11-60	G3	2.7	2.8	-	20	42	25	13	38	SC	COLLUVIUM
BH-BGC11-60	G5	3.7	3.8	-	21	45	25	9	34	SC	COLLUVIUM
BH-BGC11-60	G7	6.3	6.6	-	43	30	17	10	27	SC	COLLUVIUM
BH-BGC11-60	SPT2	6.9	7.0	-	39	31	19	11	30	SC	COLLUVIUM
BH-BGC11-63	G-2	1.9	2.1	-	1	54	25	20	45	SC	ICE RICH COLLUVIUM
BH-BGC11-63	G-5	3.9	4.0	-	0	54	33	13	46	SC	ICE RICH COLLUVIUM
BH-BGC11-63	G-9	10.2	10.3	-	1	57	20	22	42	SM	ICE RICH COLLUVIUM
BH-BGC11-63	G-12	16.2	16.3	-	12	59	19	10	29	SC	ICE RICH COLLUVIUM
BH-BGC11-65	SPT1	0.8	1.2	-	26	60	-	-	14	SM	PLACER TAILINGS
BH-BGC11-65	SPT2	1.5	2.0	-	40	48	-	-	12	SM	PLACER TAILINGS
BH-BGC11-65	SPT3	2.3	2.7	-	53	38	-	-	9	GW-SW	PLACER TAILINGS
BH-BGC11-65	SPT4	3.0	3.5	-	63	29	-	-	8	GW-SW	PLACER TAILINGS
BH-BGC11-65	SPT5	3.8	4.2	-	76	19	-	-	5	GW-SW	PLACER TAILINGS
BH-BGC11-65	SPT6	4.6	5.0	-	40	44	-	-	16	SM-GM	PLACER TAILINGS
BH-BGC11-65	SPT7	5.3	5.8	-	64	26	-	-	10	GW-SW	PLACER TAILINGS
BH-BGC11-65	SPT8	6.1	6.5	-	53	38	-	-	9	GW-SW	PLACER TAILINGS
Steiner Outcrop											
BGC-Steiner	-	-	-	-	72	25	-	-	3	GW	AGGREGATE

NOTES:
1. Cobbles is considered to be particles larger than 3 inches (76.2 mm).
2. Gravel is considered to be particles smaller than 3 inches (76.2 mm) and larger than the #4 sieve (4.75 mm).
3. Sand is considered to be particles smaller than the #4 sieve (4.75 mm) and larger than the #200 sieve (0.075 mm).
4. Silt is considered to be particles smaller than the #200 sieve (0.075 mm) and larger than 0.002 mm.
5. Clay is considered to be any particles smaller than 0.002 mm.

Table M-5. Moisture Content Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Moisture Content (%)	Lithology Unit
Test Pits					
TP-BGC11-50	1	2.8	3.0	6	COLLUVIUM
TP-BGC11-50	2	3.3	3.6	7	COLLUVIUM
TP-BGC11-51	1	0.2	1.4	13	COLLUVIUM
TP-BGC11-51	2	2.4	2.8	7	COLLUVIUM
TP-BGC11-51	3	4.2	4.5	4	COLLUVIUM
TP-BGC11-52	1	3.3	3.5	3	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-53	1	2.0	2.2	6	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-54	1	0.4	0.6	9	COLLUVIUM
TP-BGC11-55	1	0.4	0.6	7	COLLUVIUM
TP-BGC11-55	2	1.9	2.0	6	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-57	1	0.5	1.1	8	COLLUVIUM
TP-BGC11-58	1	0.7	0.8	9	COLLUVIUM
TP-BGC11-58	2	2.0	2.1	6	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-59	1	0.4	0.6	7	COLLUVIUM
TP-BGC11-60	1	0.7	0.9	25	COLLUVIUM
TP-BGC11-61	1	0.7	0.8	12	COLLUVIUM
TP-BGC11-61	2	1.7	1.9	21	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-62	1	0.9	1.0	11	COLLUVIUM
TP-BGC11-62	2	3.5	3.7	9	COLLUVIUM
TP-BGC11-63	1	0.5	0.7	7	COLLUVIUM
TP-BGC11-64	1	1.5	1.6	5	COLLUVIUM
TP-BGC11-65	1	0.4	0.5	7	COLLUVIUM
TP-BGC11-66	1	1.3	1.4	11	COLLUVIUM
TP-BGC11-66	2	1.8	1.9	17	COLLUVIUM
TP-BGC11-67	1	0.7	0.9	7	COLLUVIUM
TP-BGC11-68	1	1.6	1.8	9	COLLUVIUM
TP-BGC11-69	1	1.7	1.9	30	COLLUVIUM
TP-BGC11-69	2	2.8	2.9	7	COLLUVIUM
TP-BGC11-71	1	1.3	1.6	14	COLLUVIUM
TP-BGC11-72	1	2.4	2.6	5	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-72	2	0.8	1.0	14	COLLUVIUM
TP-BGC11-73	1	0.8	1.0	8	COLLUVIUM
TP-BGC11-74	1	1.2	1.4	12	COLLUVIUM
TP-BGC11-74	2	3.0	3.1	36	COLLUVIUM
TP-BGC11-74	3	4.5	4.6	15	COLLUVIUM
TP-BGC11-76	1	0.4	0.6	16	COLLUVIUM
TP-BGC11-77	1	0.4	0.5	27	COLLUVIUM
TP-BGC11-79	1	0.4	0.6	10	COLLUVIUM?
TP-BGC11-79	2	1.2	1.3	16	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-81	1	0.7	1.0	17	COLLUVIUM
TP-BGC11-82	1	4.7	4.9	12	ALLUVIUM
TP-BGC11-82	2	3.0	3.3	10	ALLUVIUM
TP-BGC11-82	3	6.7	7.0	40	ALLUVIUM
TP-BGC11-82	4	0.7	1.1	29	ALLUVIUM?
TP-BGC11-82	5	1.9	2.1	27	ALLUVIUM
TP-BGC11-83	1	0.6	0.8	20	COLLUVIUM
TP-BGC11-84	1	0.4	0.6	18	COLLUVIUM
TP-BGC11-84	2	2.3	2.5	29	COLLUVIUM
TP-BGC11-85	1	0.7	1.1	17	COLLUVIUM
TP-BGC11-87	1	0.6	0.8	11	COLLUVIUM
TP-BGC11-88	1	1.5	1.8	13	COLLUVIUM
TP-BGC11-89	1	0.4	0.6	2	COLLUVIUM
TP-BGC11-89	2	1.3	1.5	14	COLLUVIUM
TP-BGC11-90	1	0.8	1.0	13	COLLUVIUM
TP-BGC11-90	2	3.5	3.6	23	COLLUVIUM
TP-BGC11-91	1	0.8	1.0	49	COLLUVIUM
TP-BGC11-91	2	1.6	1.8	6	COLLUVIUM
TP-BGC11-92	1	0.6	0.8	64	COLLUVIUM
TP-BGC11-94	1	1.2	1.3	16	COLLUVIUM
TP-BGC11-94	2	2.3	2.5	11	COLLUVIUM
TP-BGC11-95	1	0.9	1.1	13	WEATHERED INTRUSIVE ROCK
TP-BGC11-95	2	2.0	3.0	22	WEATHERED INTRUSIVE ROCK

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Moisture Content (%)	Lithology Unit
TP-BGC11-96	1	0.7	0.9	8	WEATHERED INTRUSIVE ROCK
TP-BGC11-96	2	1.3	1.5	20	WEATHERED INTRUSIVE ROCK
TP-BGC11-96	3	1.8	2.0	9	WEATHERED INTRUSIVE ROCK
TP-BGC11-103	1	4.4	4.8	3	TILL
TP-BGC11-104	1	1.2	1.6	7	TILL
TP-BGC11-106	1	0.8	1.5	11	COLLUVIUM
TP-BGC11-107	1	2.7	3.0	17	COLLUVIUM
TP-BGC11-108	1	0.9	1.2	10	COLLUVIUM
TP-BGC11-111	1	0.9	1.1	17	COLLUVIUM
TP-BGC11-112	1	1.3	1.4	14	COLLUVIUM
TP-BGC11-116	2	2.2	2.3	8	COLLUVIUM
TP-BGC11-119	1	0.9	1.1	29	ALLUVIUM?
TP-BGC11-120	1	3.8	4.0	29	ALLUVIUM?
TP-BGC11-121	1	2.9	3.1	25	ALLUVIUM?
TP-BGC11-122	1	5.4	5.8	19	PLACER TAILINGS
TP-BGC11-124	1	6.2	6.4	21	COLLUVIUM
TP-BGC11-126	1	1.7	2.2	12	COLLUVIUM
TP-BGC11-128	1	2.5	3.0	27	COLLUVIUM
TP-BGC11-129	1	6.6	6.8	23	COLLUVIUM
TP-BGC11-130	1	5.8	6.0	7	COLLUVIUM
TP-BGC11-131	1	3.2	3.5	8	DEBRIS FLOW?
TP-BGC11-133	1	4.3	4.4	9	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-140	1	1.0	1.2	16	COLLUVIUM
Boreholes					
BH-BGC11-39	SPT1	1.2	1.6	34	PLACER TAILINGS
BH-BGC11-39	SPT2	1.6	2.1	31	PLACER TAILINGS
BH-BGC11-39	SPT3	2.3	2.8	17	PLACER TAILINGS
BH-BGC11-39	SPT4	2.8	3.2	4	PLACER TAILINGS
BH-BGC11-39	SPT5	4.6	5.1	2	PLACER TAILINGS
BH-BGC11-39	SPT6	5.5	6.0	4	PLACER TAILINGS
BH-BGC11-39	SPT7	6.2	6.7	7	PLACER TAILINGS
BH-BGC11-39	SPT8	7.2	7.6	7	PLACER TAILINGS
BH-BGC11-39	SPT9	7.8	8.2	4	PLACER TAILINGS
BH-BGC11-39	SPT10	8.7	9.2	15	PLACER TAILINGS
BH-BGC11-39	SPT11	9.3	9.7	17	PLACER TAILINGS
BH-BGC11-40A	1	18.8	18.8	13	FAULT ZONE
BH-BGC11-42	2	1.8	2.3	17	ICE RICH COLLUVIUM
BH-BGC11-42	4	5.0	5.3	14	ICE RICH COLLUVIUM
BH-BGC11-42	5	6.4	6.8	14	ICE RICH COLLUVIUM
BH-BGC11-42	7	9.4	9.9	12	ICE RICH COLLUVIUM
BH-BGC11-42	8	10.6	11.0	16	ICE RICH COLLUVIUM
BH-BGC11-42	12	13.3	13.7	12	ICE RICH COLLUVIUM
BH-BGC11-42	15	15.3	15.4	7	ICE RICH COLLUVIUM
BH-BGC11-42	16	15.6	15.8	9	ICE RICH COLLUVIUM
BH-BGC11-42	20	19.7	20.0	18	ICE RICH COLLUVIUM
BH-BGC11-42	22	21.6	21.9	19	ICE RICH COLLUVIUM
BH-BGC11-42	23	23.0	23.4	15	ICE RICH COLLUVIUM
BH-BGC11-42	S26	27.6	28.0	15	ICE RICH COLLUVIUM
BH-BGC11-44	S1	0.2	0.4	14	ALLUVIUM
BH-BGC11-44	S3	1.6	2.0	23	ALLUVIUM
BH-BGC11-44	S5	4.8	5.1	14	ALLUVIUM
BH-BGC11-44	S7	6.3	6.6	24	ALLUVIUM
BH-BGC11-44	S11	9.6	9.9	17	ALLUVIUM?
BH-BGC11-44	SPT1	2.3	2.7	85	ALLUVIUM?
BH-BGC11-44	SPT2	3.8	4.2	25	ALLUVIUM?
BH-BGC11-44	SPT5	8.4	8.9	17	ALLUVIUM?
BH-BGC11-44	SPT10	13.0	13.4	12	ALLUVIUM?
BH-BGC11-44	SPT11	14.5	14.8	14	ALLUVIUM?
BH-BGC11-47	G3	2.0	2.3	27	ALLUVIUM?
BH-BGC11-47	G4	2.8	3.0	5	ALLUVIUM?
BH-BGC11-47	G10	11.8	12.1	11	ALLUVIUM?
BH-BGC11-47	SPT1	0.8	1.2	26	ALLUVIUM?
BH-BGC11-47	SPT4	5.3	5.9	10	ALLUVIUM?
BH-BGC11-47	SPT5	6.9	7.3	13	ALLUVIUM?
BH-BGC11-47	SPT6	8.4	8.6	12	ALLUVIUM?
BH-BGC11-49	G4	3.4	3.6	12	ALLUVIUM?
BH-BGC11-49	G6	6.4	6.6	13	ALLUVIUM?

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Moisture Content (%)	Lithology Unit
BH-BGC11-49	G8	9.4	9.6	26	ALLUVIUM?
BH-BGC11-49	G10	12.4	12.6	12	ALLUVIUM?
BH-BGC11-49	SPT1	0.8	1.2	11	ALLUVIUM?
BH-BGC11-49	SPT2	2.3	2.7	20	ALLUVIUM?
BH-BGC11-51	G6	7.9	8.1	17	ALLUVIUM
BH-BGC11-51	G8	10.9	11.1	14	ALLUVIUM
BH-BGC11-51	G10	13.9	14.1	11	ALLUVIUM
BH-BGC11-51	G12	17.0	17.2	11	ALLUVIUM
BH-BGC11-51	G14	20.1	20.3	11	ALLUVIUM
BH-BGC11-51	G17	24.7	24.9	7	ALLUVIUM
BH-BGC11-51	SPT1	0.8	1.2	12	ALLUVIUM
BH-BGC11-51	SPT2	2.3	2.7	10	ALLUVIUM
BH-BGC11-51	SPT3	3.8	4.3	29	ALLUVIUM
BH-BGC11-51	SPT4	5.3	5.8	9	ALLUVIUM
BH-BGC11-51	SPT5	9.9	10.3	20	ALLUVIUM
BH-BGC11-53	G2	1.9	2.1	11	TILL
BH-BGC11-53	G3	3.2	3.5	8	TILL
BH-BGC11-53	G4	4.9	5.1	4	TILL
BH-BGC11-53	G6	7.9	8.1	5	TILL
BH-BGC11-53	G8	10.9	11.1	3	TILL
BH-BGC11-53	SPT1	0.8	1.2	12	TILL
BH-BGC11-53	SPT2	2.3	2.7	10	TILL
BH-BGC11-53	SPT3	3.8	4.3	4	TILL
BH-BGC11-53	SPT4	6.9	7.3	3	TILL
BH-BGC11-53	SPT5	9.9	10.4	5	TILL
BH-BGC11-54	G1	30.0	30.0	8	WEATHERED METASEDIMENTARY ROCK
BH-BGC11-55	G4	4.9	5.1	11	DEBRIS FLOW
BH-BGC11-55	G5	6.3	6.5	12	DEBRIS FLOW
BH-BGC11-55	SPT1	0.8	1.2	9	COLLUVIUM
BH-BGC11-55	SPT2	2.3	2.7	10	COLLUVIUM
BH-BGC11-55	SPT6	8.4	8.8	7	DEBRIS FLOW
BH-BGC11-56	G2	1.9	2.1	6	COLLUVIUM
BH-BGC11-56	SPT1	0.8	1.2	5	COLLUVIUM
BH-BGC11-56	SPT3	3.8	4.3	9	COLLUVIUM
BH-BGC11-56	SPT4	5.3	5.5	7	COLLUVIUM
BH-BGC11-56	SPT5	6.9	7.2	5	COLLUVIUM
BH-BGC11-57	SPT1	2.3	2.7	10	COLLUVIUM
BH-BGC11-57	SPT2	3.8	4.3	9	COLLUVIUM
BH-BGC11-57	SPT3	5.3	5.8	10	COLLUVIUM
BH-BGC11-57	SPT4	6.9	7.1	8	COLLUVIUM
BH-BGC11-58	G2	1.9	2.1	17	COLLUVIUM
BH-BGC11-58	G4	3.2	3.6	11	COLLUVIUM
BH-BGC11-58	G6	4.4	4.6	11	COLLUVIUM
BH-BGC11-58	G8	5.4	5.5	6	COLLUVIUM
BH-BGC11-58	G10	7.9	8.1	9	COLLUVIUM
BH-BGC11-60	G3	2.7	2.8	10	COLLUVIUM
BH-BGC11-60	G5	3.7	3.8	9	COLLUVIUM
BH-BGC11-60	G6	4.9	5.1	7	COLLUVIUM
BH-BGC11-60	G7	6.3	6.6	7	COLLUVIUM
BH-BGC11-60	SPT2	6.9	7.0	6	COLLUVIUM
BH-BGC11-63	G-2	1.9	2.1	25	ICE RICH COLLUVIUM
BH-BGC11-63	G-3	2.9	3.0	19	ICE RICH COLLUVIUM
BH-BGC11-63	G-5	3.9	4.0	27	ICE RICH COLLUVIUM
BH-BGC11-63	G-6	5.9	6.1	27	ICE RICH COLLUVIUM
BH-BGC11-63	G-9	10.2	10.3	29	ICE RICH COLLUVIUM
BH-BGC11-63	G-10	11.6	11.7	17	ICE RICH COLLUVIUM
BH-BGC11-63	G-12	16.2	16.3	25	ICE RICH COLLUVIUM
BH-BGC11-65	SPT1	0.8	1.2	3	PLACER TAILINGS
BH-BGC11-65	SPT2	1.5	2.0	3	PLACER TAILINGS
BH-BGC11-65	SPT3	2.3	2.7	2	PLACER TAILINGS
BH-BGC11-65	SPT4	3.0	3.5	2	PLACER TAILINGS
BH-BGC11-65	SPT5	3.8	4.2	1	PLACER TAILINGS
BH-BGC11-65	SPT6	4.6	5.0	5	PLACER TAILINGS
BH-BGC11-65	SPT7	5.3	5.8	5	PLACER TAILINGS
BH-BGC11-65	SPT8	6.1	6.5	9	PLACER TAILINGS

Table M-6. Atterberg Limit Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Fines Classification	Lithology Unit
Test Pits								
TP-BGC11-51	1	0.2	1.4	27	22	5	ML	COLLUVIUM
TP-BGC11-54	1	0.4	0.6	21	20	1	ML	COLLUVIUM
TP-BGC11-55	1	0.4	0.6	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-57	1	0.5	1.1	28	23	5	ML	COLLUVIUM
TP-BGC11-58	1	0.7	0.8	27	23	4	ML	COLLUVIUM
TP-BGC11-59	1	0.4	0.6	24	23	1	ML	COLLUVIUM
TP-BGC11-60	1	0.7	0.9	27	26	1	ML	COLLUVIUM
TP-BGC11-61	1	0.7	0.8	24	21	3	ML	COLLUVIUM
TP-BGC11-62	1	0.9	1.0	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-62	2	3.5	3.7	21	16	5	CL-ML	COLLUVIUM
TP-BGC11-64	1	1.5	1.6	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-66	2	1.8	1.9	29	19	10	CL	COLLUVIUM
TP-BGC11-69	1	1.7	1.9	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-69	2	2.8	2.9	23	17	6	CL-ML	COLLUVIUM
TP-BGC11-71	1	1.3	1.6	28	22	6	CL-ML	COLLUVIUM
TP-BGC11-72	2	0.8	1.0	31	24	7	ML	COLLUVIUM
TP-BGC11-73	1	0.8	1.0	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-74	1	1.2	1.4	30	25	5	ML	COLLUVIUM
TP-BGC11-74	2	3.0	3.1	33	30	3	ML	COLLUVIUM
TP-BGC11-74	3	4.5	4.6	28	22	6	CL-ML	COLLUVIUM
TP-BGC11-77	1	0.4	0.5	46	29	17	ML	COLLUVIUM
TP-BGC11-79	1	0.4	0.6	26	25	1	ML	COLLUVIUM?
TP-BGC11-82	1	4.7	4.9	-	-	-	Non-plastic	ALLUVIUM
TP-BGC11-82	2	3.0	3.3	30	27	3	ML	ALLUVIUM
TP-BGC11-82	3	6.7	7.0	-	-	-	Non-plastic	ALLUVIUM
TP-BGC11-82	4	0.7	1.1	32	28	4	ML	ALLUVIUM?
TP-BGC11-82	5	1.9	2.1	28	23	5	ML	ALLUVIUM
TP-BGC11-83	1	0.6	0.8	55	44	11	MH	COLLUVIUM
TP-BGC11-84	2	2.3	2.5	29	26	3	ML	COLLUVIUM
TP-BGC11-85	1	0.7	1.1	23	22	1	ML	COLLUVIUM
TP-BGC11-88	1	1.5	1.8	26	19	7	CL-ML	COLLUVIUM
TP-BGC11-89	2	1.3	1.5	23	21	2	ML	COLLUVIUM
TP-BGC11-90	2	3.5	3.6	24	22	2	ML	COLLUVIUM
TP-BGC11-91	1	0.8	1.0	42	35	7	ML	COLLUVIUM
TP-BGC11-91	2	1.6	1.8	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-92	1	0.6	0.8	45	42	3	ML	COLLUVIUM
TP-BGC11-94	1	1.2	1.3	27	24	3	ML	COLLUVIUM
TP-BGC11-96	2	1.3	1.5	26	22	4	ML	WEATHERED INTRUSIVE ROCK
TP-BGC11-116	2	2.2	2.3	20	18	3	CL	COLLUVIUM
TP-BGC11-119	1	0.9	1.1	27	23	4	ML	ALLUVIUM?
TP-BGC11-120	1	3.8	4.0	33	24	9	ML	ALLUVIUM?
TP-BGC11-121	1	2.9	3.1	29	20	8	CL	ALLUVIUM?
TP-BGC11-122	1	5.4	5.8	25	18	7	CL	PLACER TAILINGS
TP-BGC11-124	1	6.2	6.4	32	28	4	ML	COLLUVIUM
TP-BGC11-129	1	6.6	6.8	27	22	5	ML	COLLUVIUM
TP-BGC11-130	1	5.8	6.0	-	-	-	Non-plastic	COLLUVIUM
TP-BGC11-131	1	3.2	3.5	-	-	-	Non-plastic	DEBRIS FLOW?
TP-BGC11-140	1	1.0	1.2	24	21	2	ML	COLLUVIUM
Boreholes								
BH-BGC11-42	2	1.8	2.3	30	23	7	ML	ICE RICH COLLUVIUM
BH-BGC11-42	5	6.4	6.8	27	18	9	CL	ICE RICH COLLUVIUM
BH-BGC11-44	S1	0.2	0.4	26	20	6	CL	ALLUVIUM
BH-BGC11-44	S3	1.6	2.0	-	-	-	Non-plastic	ALLUVIUM
BH-BGC11-44	S5	4.8	5.1	20	19	1	CL	ALLUVIUM
BH-BGC11-44	S7	6.3	6.6	23	21	3	CL	ALLUVIUM
BH-BGC11-44	S11	9.6	9.9	21	15	6	CL	ALLUVIUM?
BH-BGC11-44	SPT2	3.8	4.2	-	-	-	Non-plastic	ALLUVIUM?
BH-BGC11-44	SPT10	13.0	13.4	22	15	6	CL	ALLUVIUM?
BH-BGC11-44	SPT11	14.5	14.8	22	17	5	CL	ALLUVIUM?
BH-BGC11-47	G3	2.0	2.3	23	21	2	ML	ALLUVIUM?

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Fines Classification	Lithology Unit
BH-BGC11-47	G10	11.8	12.1	19	15	3	CL	ALLUVIUM?
BH-BGC11-47	SPT1	0.8	1.2	22	19	3	CL	ALLUVIUM?
BH-BGC11-49	G4	3.4	3.6	20	17	3	CL	ALLUVIUM?
BH-BGC11-49	G6	6.4	6.6	21	17	4	CL	ALLUVIUM?
BH-BGC11-49	G8	9.4	9.6	-	-	-	Non-plastic	ALLUVIUM?
BH-BGC11-49	G10	12.4	12.6	22	18	4	CL	ALLUVIUM?
BH-BGC11-49	SPT2	2.3	2.7	23	19	4	CL	ALLUVIUM?
BH-BGC11-51	G6	7.9	8.1	28	20	7	CL	ALLUVIUM
BH-BGC11-51	G10	13.9	14.1	19	16	3	CL	ALLUVIUM
BH-BGC11-51	SPT1	0.8	1.2	27	20	7	CL	ALLUVIUM
BH-BGC11-51	SPT3	3.8	4.3	34	34	0	ML	ALLUVIUM
BH-BGC11-53	G2	1.9	2.1	27	17	9	CL	TILL
BH-BGC11-53	G4	4.9	5.1	22	16	6	CL	TILL
BH-BGC11-53	SPT2	2.3	2.7	24	18	6	CL	TILL
BH-BGC11-53	SPT4	6.9	7.3	-	-	-	Non-plastic	TILL
BH-BGC11-54	G1	30.0	30.0	20	16	4	CL	WEATHERED METASEDIMENTARY ROCK
BH-BGC11-55	G4	4.9	5.1	22	15	7	CL	DEBRIS FLOW
BH-BGC11-55	SPT6	8.4	8.8	26	23	3	ML	DEBRIS FLOW
BH-BGC11-56	SPT3	3.8	4.3	-	-	-	Non-plastic	COLLUVIUM
BH-BGC11-56	SPT4	5.3	5.5	22	18	4	CL	COLLUVIUM
BH-BGC11-57	SPT2	3.8	4.3	20	14	6	CL	COLLUVIUM
BH-BGC11-57	SPT4	6.9	7.1	22	20	2	CL	COLLUVIUM
BH-BGC11-58	G2	1.9	2.1	21	17	4	CL	COLLUVIUM
BH-BGC11-58	G4	3.2	3.6	-	-	-	Non-plastic	COLLUVIUM
BH-BGC11-58	G6	4.4	4.6	-	-	-	Non-plastic	COLLUVIUM
BH-BGC11-58	G8	5.4	5.5	19	16	3	CL	COLLUVIUM
BH-BGC11-58	G10	7.9	8.1	-	-	-	Non-plastic	COLLUVIUM
BH-BGC11-60	G3	2.7	2.8	21	16	6	CL	COLLUVIUM
BH-BGC11-60	G5	3.7	3.8	18	17	1	CL	COLLUVIUM
BH-BGC11-60	G7	6.3	6.6	21	20	2	CL	COLLUVIUM
BH-BGC11-63	G-2	1.9	2.1	46	24	25	CI[1]	ICE RICH COLLUVIUM
BH-BGC11-63	G-5	3.9	4.0	39	24	15	CI[1]	ICE RICH COLLUVIUM
BH-BGC11-63	G-9	10.2	10.3	44	27	17	ML	ICE RICH COLLUVIUM
BH-BGC11-63	G-12	16.2	16.3	31	20	11	CI[1]	ICE RICH COLLUVIUM

NOTES:

"CI" values reported by GeoNorth for 30<Liquid Limit<50.

Table M-7. Specific Gravity Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Specific Gravity Rock			Specific Gravity Soil				Lithology Unit
				Oven Dry	SSD[1]	Apparent	Oven Dry (Coarse)	SSD[1] (Coarse)	Apparent (Coarse)	Average (Fine)	
TP-BGC11-50	1	2.8	3.0	-	-	-	2.61	2.75	3.03	2.8	COLLUVIUM
TP-BGC11-58	2	2.0	2.1	-	-	-	-	-	-	2.84	WEATHERED METASEDIMENTARY ROCK
TP-BGC11-67	1	0.7	0.9	-	-	-	-	-	-	2.72	COLLUVIUM
BH-BGC11-29	1	27.5	27.8	2.71	2.73	2.77	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-34	1	36.6	36.9	2.56	2.64	2.78	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-40A	2	31.0	31.3	2.67	2.68	2.7	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-40B	UCS1	21.8	22.1	2.74	2.75	2.78	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-43	1	4.2	4.5	2.71	2.71	2.73	-	-	-	-	INTRUSIVE ROCK
BH-BGC11-45	UCS	17.8	18.0	2.76	2.78	2.81	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-46	UCS	13.1	13.7	2.69	2.7	2.72	-	-	-	-	INTRUSIVE ROCK
BH-BGC11-62	UCS	28.6	28.8	2.59	2.63	2.69	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-69	UCS1	12.3	12.5	2.52	2.59	2.7	-	-	-	-	METASEDIMENTARY ROCK
BH-BGC11-42	5	6.4	6.8	-	-	-	2.53	2.58	2.65	-	ICE RICH COLLUVIUM

NOTES:

SSD = Saturated surface dry.

Table M-8. Sulphate Ion Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Total Sulphate Ion Content (%)	Lithology Unit
TP-BGC11-51	2	2.4	2.8	0.13	COLLUVIUM
TP-BGC11-60	1	0.7	0.9	0.07	COLLUVIUM
TP-BGC11-84	1	0.4	0.6	0.07	COLLUVIUM

NOTES:
1. Detection limit for the test is 0.005%.

Table M-9. Modified Proctor and Permeability Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	Permeability (m/s)	Modified Proctor		Lithology Unit
					Maximum Dry Density (kg/m^3)	Optimum Moisture Content (%)	
TP-BGC11-119	1	0.9	1.1	4.2E-10	1780	13.5	ALLUVIUM?
TP-BGC11-120	1	3.8	4	6.5E-10	1840	13	ALLUVIUM?
TP-BGC11-121	1	2.9	3.1	4E-10	1940	12	ALLUVIUM?
TP-BGC11-122	1	5.4	5.8	3.15E-10	2110	9	PLACER TAILINGS

Table M-10. Unconfined Compressive Strength Test and Brazilian Tensile Strength Test Results

Hole ID	Sample Number	Depth From (m)	Depth To (m)	UCS (MPa)	Young's Modulus (GPa)	Poisson Ratio	Brazilian Tensile		Lithology Unit
							Test 1 (MPa)	Test 2 (MPa)	
BH-BGC11-29	1	27.5	27.8	-	-	-	5.6	3.2	METASEDIMENTARY ROCK
BH-BGC11-34	1	36.6	36.9	53.4	46.3	0.12	9.2	11.8	METASEDIMENTARY ROCK
BH-BGC11-40A	2	31.0	31.3	164.2	51.6	0.15	13	12.2	METASEDIMENTARY ROCK
BH-BGC11-40B	UCS1	21.8	22.1	86.5	3.9	0.2	11.3	13	METASEDIMENTARY ROCK
BH-BGC11-43	1	4.2	4.5	210.1	46.8	0.21	15.6	14	INTRUSIVE ROCK
BH-BGC11-45	UCS	17.8	18.0	52.6	31.1	0.17	13.6	11.6	METASEDIMENTARY ROCK
BH-BGC11-46	UCS	13.1	13.7	154.7	56.3	0.27	15	15.3	INTRUSIVE ROCK
BH-BGC11-62	UCS	28.6	28.8	22.5	11.4	0.09	5.4	-	METASEDIMENTARY ROCK
BH-BGC11-69	UCS1	12.3	12.5	45.1	27.1	0.13	2.8	6.3	METASEDIMENTARY ROCK

FIGURES

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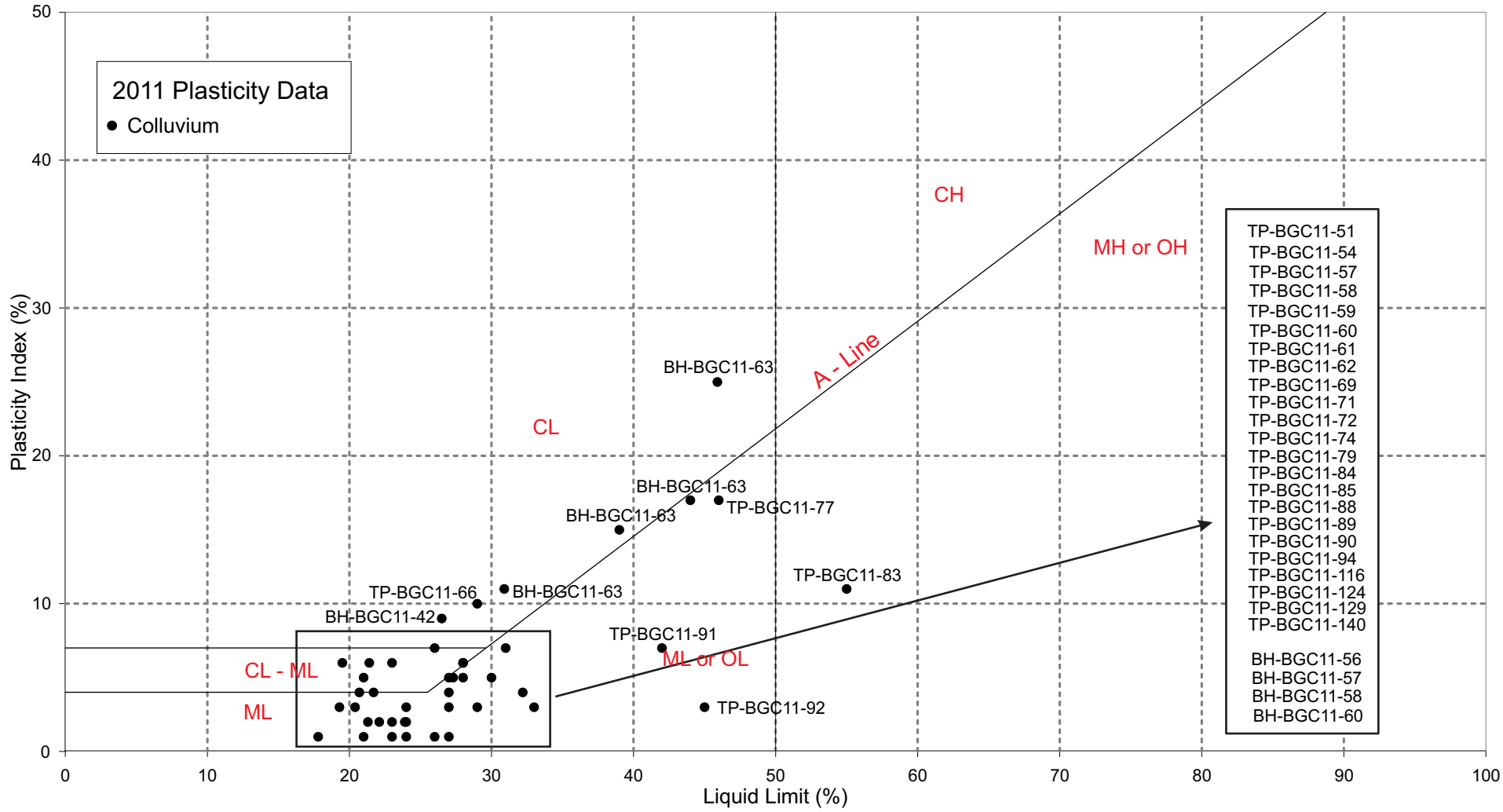

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TITLE: Plasticity Chart
Colluvium samples from 2011 field program

CLIENT: VICTORIA GOLD CORP.

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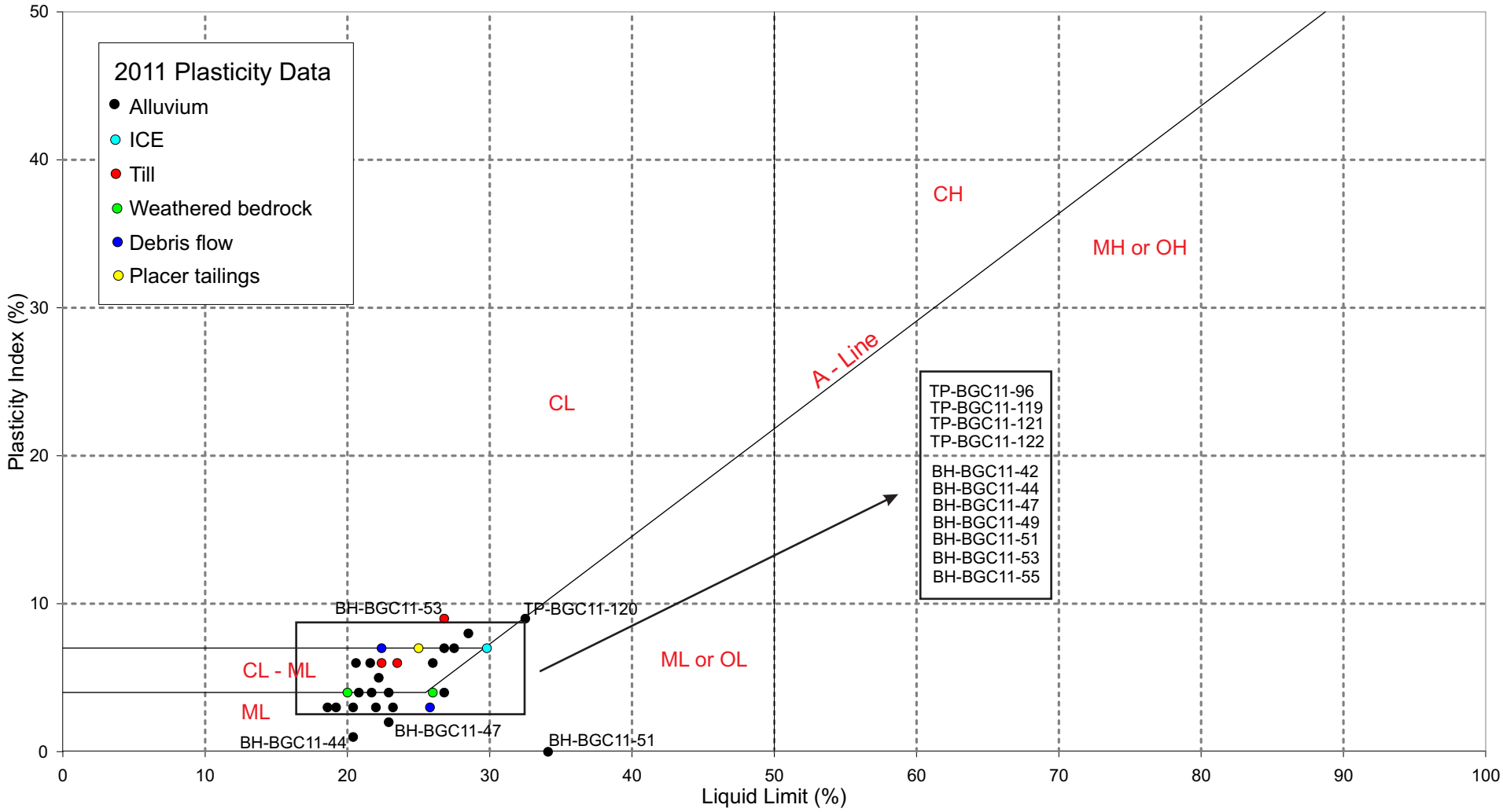

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2011 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT

TITLE: Plasticity Chart
Other overburden soils from 2011 field program

CLIENT: VICTORIA GOLD CORP.

PROJECT No.: 0792-006

DWG No.: M-2

REV.: 0

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APPENDIX N
POINT LOAD TESTING

POINT LOAD TESTING

1.0 INTRODUCTION

Point load testing was carried out during the site investigation program to estimate the intact rock strength of the Metasedimentary and Intrusive bedrock. This appendix documents the findings of the point load testing undertaken during the 2011 mine site infrastructure geotechnical investigations for the Eagle Gold project.

2.0 TESTING DETAILS

All point load tests were carried out by BGC personnel on site, at the Dublin Gulch exploration camp, using a PIL-7 model point load tester manufactured by Roctest. The suggested method for determining point load strength (ISRM, 1985) was followed for all tests. Three hundred and twenty core samples of rock obtained by diamond drilling were tested; of those tests, 117 were invalid, as outlined by ISRM (1985), due to incomplete development of the fracture surface. Therefore, 203 valid tests were performed.

The details of all point load tests are reported in Tables N-1 to N-27.

3.0 REFERENCES

International Society for Rock Mechanics (ISRM). 1985. Suggested Method for Determining Point Load Strength. Int. J. Rock Mech. Min. Sci. & Geomech. Abstr. Vol 22, No. 2, pp. 51-60.

Table N-1: BH-BGC11-24 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
2.2	SSED	D	130	61.1	63.5	4.4	0.00417	63.5	--	1.03	1.11	1.2	V	
5.12	SSED	D	220	61.1	63.5	6.7	0.00635	63.5	--	1.58	1.11	1.8	IN	Not through platens
8.05	SSED	D	130	61.1	63.5	11.14	0.01056	63.5	--	2.62	1.11	2.9	V	
8.72	SSED	D	120	61.1	63.5	2.2	0.00209	63.5	--	0.52	1.11	0.6	IN	5 mm offset from platens
10.36	SSED	D	145	61.1	63.5	1.94	0.00184	63.5	--	0.46	1.11	0.5	V	
10.9	SSED	D	240	61.1	63.5	2.96	0.00281	63.5	--	0.70	1.11	0.8	V	
11.63	SSED	D	230	61.1	63.5	4.86	0.00461	63.5	--	1.14	1.11	1.3	V	
11.81	SSED	A	33.5	63.5	33.5	2.83	0.00268	--	52.0	0.99	1.02	1.0	IN	Not through platens
12.87	SSED	D	120	61.1	63.5	1.44	0.00137	63.5	--	0.34	1.11	0.4	V	
13.64	SSED	A	57.5	63.5	57.5	18.55	0.01759	--	68.2	3.78	1.15	4.3	IN	Not through platens
15.75	SSED	D	130	61.1	63.5	4.84	0.00459	63.5	--	1.14	1.11	1.3	V	
16.67	SSED	D	160	61.1	63.5	2.12	0.00201	63.5	--	0.50	1.11	0.6	V	
19.88	SSED	D	220	61.1	63.5	1.72	0.00163	63.5	--	0.40	1.11	0.5	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-2: BH-BGC11-25 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
3.4	SSED	D	260	61.1	63.5	11.08	0.01050	63.5	--	2.60	1.11	2.9	V	
4.01	SSED	D	140	61.1	63.5	7.48	0.00709	63.5	--	1.76	1.11	2.0	IN	Fracture 10 mm from platens
6.33	SSED	D	120	61.1	63.5	7.69	0.00729	63.5	--	1.81	1.11	2.0	IN	Fracture off platens
7.11	SSED	D	100	61.1	63.5	7.86	0.00745	63.5	--	1.85	1.11	2.1	V	
8.07	SSED	D	190	61.1	63.5	7.82	0.00741	63.5	--	1.84	1.11	2.0	V	
9.98	SSED	D	120	61.1	63.5	0.74	0.00070	63.5	--	0.17	1.11	0.2	IN	Fracture to eskers
10.88	SSED	A	48	63.5	48	3.89	0.00369	--	62.3	0.95	1.10	1.0	IN	Fracture 10 mm from platens
12	SSED	D	100	61.1	63.5	3.3	0.00313	63.5	--	0.78	1.11	0.9	V	
13.43	SSED	A	48	63.5	48	4.13	0.00392	--	62.3	1.01	1.10	1.1	IN	Fracture off platens
15.75	SSED	D	100	61.1	63.5	8.8	0.00834	63.5	--	2.07	1.11	2.3	V	
20.28	SSED	A	44	63.5	44	1.73	0.00164	--	59.6	0.46	1.08	0.5	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-3: BH-BGC11-26 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_S=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{S(50)}=F(I_S)$ [MPa] (note 8)	Invalid/Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
0.95	SSED	A	58	63.5	58	10.72	0.01016	--	68.5	2.17	1.15	2.5	IN	3 mm offset from platen
12.37	SSED	D	83	61.1	63.5	16.49	0.01563	63.5	--	3.88	1.11	4.3	V	
19.56	SSED	A	390	63.5	39	8.14	0.00772	--	56.2	2.45	1.05	2.6	IN	8 mm offset from platen
20.42	SSED	A	51.5	63.5	51.5	5.93	0.00562	--	64.5	1.35	1.12	1.5	V	
20.61	SSED	A	58	63.5	58	15.62	0.01481	--	68.5	3.16	1.15	3.6	IN	Did not line up with platen
22.74	SSED	A	59.5	63.5	59.5	4.67	0.00443	--	69.4	0.92	1.16	1.1	V	
23.39	SSED	D	300	61.1	63.5	5.51	0.00522	63.5	--	1.30	1.11	1.4	V	
28.26	SSED	D	118	61.1	63.5	4.34	0.00411	63.0	--	1.04	1.11	1.1	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_S= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{S(50)}$ = Corrected point load strength.

Table N-4: BH-BGC11-27 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid/Valid	Comments
13.5	SSED	A	55	63.5	55	12.34	0.01170	--	66.7	2.63	1.14	3.0	V	
14.67	SSED	A	51	63.5	51	13.25	0.01256	--	64.2	3.05	1.12	3.4	IN	
17.22	SSED	D	95	63.5	63.5	3.17	0.00301	63.5	--	0.75	1.11	0.8	V	
20.24	SSED	A	52	63.5	52	5.91	0.00560	--	64.8	1.33	1.12	1.5	V	
22.05	SSED	D	230	63.5	63.5	2.83	0.00268	63.5	--	0.67	1.11	0.7	IN	
24.52	SSED	A	56	63.5	56	12.05	0.01142	--	67.3	2.52	1.14	2.9	V	
25.64	SSED	D	65	63.5	63.5	5.2	0.00493	63.5	--	1.22	1.11	1.4	IN	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-5: BH-BGC11-28 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								D_e=D [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
5.57	SSED	D	88	63.5	63.5	1.19	0.00113	63.5	--	0.28	1.11	0.3	V	
8.25	SSED	A	58	63.5	58	4.56	0.00432	--	68.5	0.92	1.15	1.1	IN	
10.64	SSED	D	112	63.5	63.5	11.92	0.01130	63.5	--	2.80	1.11	3.1	V	
16.85	SSED	D	180	63.5	63.5	3.6	0.00341	63.5	--	0.85	1.11	0.9	V	
17.75	SSED	A	63.5	54	54	2.54	0.00241	--	60.9	0.65	1.09	0.7	IN	
20.16	SSED	D	155	63.5	63.5	11.68	0.01107	63.5	--	2.75	1.11	3.1	V	
21.62	SSED	A	52	63.5	52	4.5	0.00427	--	64.8	1.01	1.12	1.1	IN	
22.4	SSED	D	138	63.5	63.5	4.07	0.00386	63.5	--	0.96	1.11	1.1	V	
25.2	SSED	D	147	63.5	63.5	3.85	0.00365	63.5	--	0.91	1.11	1.0	V	
25.55	SSED	A	48	63.5	63.5	1.83	0.00173	--	71.7	0.34	1.18	0.4	IN	
25.64	SSED	D	112	63.5	63.5	1.28	0.00121	63.5	--	0.30	1.11	0.3	V	
27.8	SSED	D	244	63.5	63.5	4.1	0.00389	63.5	--	0.96	1.11	1.1	V	
28.52	SSED	D	87	63.5	63.5	9.83	0.00932	63.5	--	2.31	1.11	2.6	V	
33.08	SSED	D	125	63.5	63.5	18.85	0.01787	63.5	--	4.43	1.11	4.9	IN	
34.48	SSED	D	88	63.5	63.5	5.74	0.00544	63.5	--	1.35	1.11	1.5	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-6: BH-BGC11-29 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
14.85	SSED	D	68	63.5	63.5	7.69	0.00729	63.5	--	1.81	1.11	2.0	V	
17.25	SSED	D	96	63.5	62.5	13.43	0.01273	62.5	--	3.26	1.11	3.6	IN	Broke 1 cm away from second platen
19.82	SSED	A	48	63.5	48	2.15	0.00204	--	62.3	0.53	1.10	0.6	V	Broke along existing microfissure
21.8	SSED	D	128	63.5	63.5	5.04	0.00478	63.5	--	1.18	1.11	1.3	V	
23.24	SSED	D	113	63.5	63.5	3.48	0.00330	63.5	--	0.82	1.11	0.9	V	Split along ??? And vertically
25.95	SSED	D	115	63.5	63.5	12.53	0.01188	63.5	--	2.95	1.11	3.3	V	
27.32	SSED	D	102	63.5	63.5	1.87	0.00177	63.5	--	0.44	1.11	0.5	V	
27.81	SSED	D	79	63.5	63.5	1.19	0.00113	63.5	--	0.28	1.11	0.3	V	
30.87	SSED	D	220	63.5	63.5	8.08	0.00766	63.5	--	1.90	1.11	2.1	V	
32.5	SSED	D	140	63.5	63.5	45.5	0.04313	63.5	--	10.70	1.11	11.9	V	Picked out of SIL altered axis
34.8	SSED	A	78	63.5	63.5	3.5	0.00332	--	71.7	0.65	1.18	0.8	IN	Foliation bed would break the one after the other by sheet
34.8	SSED	D	72	63.5	80	1.78	0.00169	63.5	--	0.42	1.24	0.3	V	
36.74	SSED	D	89	63.5	63.5	2.14	0.00203	63.5	--	0.50	1.11	0.6	V	
38.2	SSED	A	69	63.5	69	24.88	0.02359	--	74.7	4.23	1.20	5.1	IN	
38.2	SSED	D	69	63.5	63.5	16.1	0.01526	63.5	--	3.79	1.11	4.2	V	
39.38	SSED	D	150	63.5	63.5	1.62	0.00154	63.5	--	0.38	1.11	0.4	V	
40.82	SSED	A	55	63.5	55	20.55	0.01948	--	66.7	4.38	1.14	5.0	IN	Chipped out

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-7: BH-BGC11-30 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
2.95	SSED	A	81	62.5	81	6.19	0.00587	--	80.3	0.91	1.24	1.1	IN	Wedge slipped out along foliation plane
11.38	SSED	D	95	63.5	63.5	5.13	0.00486	63.5	--	1.21	1.11	1.3	V	Slight offset with plattens alignment due to shape of foliation
22.8	SSED	D	97	63	61.5	1.6	0.00152	61.5	--	0.40	1.10	0.4	V	
22.83	SSED	A	54	63.5	54	5.27	0.00500	--	66.1	1.14	1.13	1.3	IN	Chipped out along foliation plane
24.3	SSED	D	110	63.5	63.5	2.92	0.00277	63.5	--	0.69	1.11	0.8	V	
30.76	SSED	D	185	63.5	63.5	3.45	0.00327	63.5	--	0.81	1.11	0.9	V	
31.5	SSED	D	215	63.5	63.5	6.75	0.00640	63.5	--	1.59	1.11	1.8	IN	Offset between plattens/fracture planes
34.95	SSED	D	95	63.5	63.5	2.92	0.00277	63.5	--	0.69	1.11	0.8	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-8: BH-BGC11-31 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
28.65	SSED	D	65	61.5	61.5	0.95	0.00090	61.5	--	0.24	1.10	0.3	V	
28.86	SSED	D	70	61	61	1.07	0.00101	61	--	0.27	1.09	0.3	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-9: BH-BGC11-33 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
19.97	SSED	D	97	63.5	62.8	1.9	0.00200	62.8	--	0.51	1.11	0.5	V	
24.33	SSED	D	105	63.5	63.5	4.46	0.00400	63.50000	--	0.99	1.11	1.2	IN	Offset between plattens alignment and failure plane
37.03	SSED	A	46	63.5	46	1.09	0.00100	--	61.0	0.27	1.09	0.3	IN	Chipped out
37.61	SSED	D	102	63.5	63.5	1.07	0.00100	63.50000	--	0.25	1.11	0.3	V	
38	SSED	A	48	63.5	48.5	1.09	0.00100	--	62.6	0.26	1.11	0.3	IN	Chipped out/slid along foliation

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-10: BH-BGC11-34 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
23.96	SSED	D	110	63.5	63.5	0.86	0.00082	63.5	--	0.20	1.11	0.2	IN	
27.43	SSED	D	100	63.5	63.5	2.27	0.00215	63.5	--	0.53	1.11	0.6	V	
28.63	SSED	D	150	63.5	63.5	2.2	0.00209	63.5	--	0.52	1.11	0.6	V	
30.22	SSED	A	63.5	40	40	5.13	0.00486	--	45.1	2.39	0.95	2.3	IN	
31.43	SSED	D	110	63.5	63.5	1.41	0.00134	63.5	--	0.33	1.11	0.4	V	
33.17	SSED	D	230	63.5	63.5	1.69	0.00160	63.5	--	0.40	1.11	0.4	IN	Fractured 2.5 cm away from platen along vein
36.42	SSED	D	160	63.5	63.5	5.3	0.00502	63.5	--	1.25	1.11	1.4	V	
36.58	SSED	A	63.5	20	20	5.8	0.00550	--	22.6	10.80	0.70	7.5	IN	Chipped out
36.98	SSED	D	180	63.5	63.5	7.86	0.00745	63.5	--	1.85	1.11	2.1	V	
37.58	SSED	A	63.5	20	20	44.14	0.04184	--	22.6	82.16	0.70	57.4	IN	Breaking upper rock disks

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-11: BH-BGC11-35 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
12.36	SSED	D	71	61.1	63.5	1.45	0.00137	63.5	--	0.34	1.11	0.4	IN	4 mm off
26.01	SSED	D	158	61.1	63.5	26.83	0.02543	63.5	--	6.31	1.11	7.0	V	High quartz content, surrounding materials much weaker
29.49	SSED	D	117	61.1	63.5	1.34	0.00127	63.5	--	0.32	1.11	0.4	IN	Way off
30.33	SSED	D	164	61.1	63.5	1.71	0.00162	63.5	--	0.40	1.11	0.4	V	
19.87	SSED	A	63.5	52	52	3.21	0.00304	--	58.7	0.88	1.07	0.9	V	
31.77	SSED	D	129	61.1	63.5	3.28	0.00311	63.5	--	0.77	1.11	0.9	IN	18 mm off
34.31	SSED	D	86	61.1	63.5	1.58	0.00150	63.5	--	0.37	1.11	0.4	V	
36.32	SSED	A	63.5	50	50	4.51	0.00428	--	56.4	1.34	1.06	1.4	IN	Edges chipped off
42.62	SSED	D	97	61.1	63.5	23.34	0.02213	63.5	--	5.49	1.11	6.1	V	High in quartz, poor recover in this area so likely this is not representative

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-12: BH-BGC11-36 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) $D_e=D$ [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
5.18	SSED	D	82	61.1	63.5	3.29	0.00312	63.5	--	0.77	1.11	0.9	V	
6.96	SSED	D	105	61.1	63.5	3.49	0.00331	63.5	--	0.82	1.11	0.9	IN	
7.43	SSED	A	63.5	53	53	30.05	0.02849	--	59.8	7.97	1.08	8.6	V	
11.63	SSED	A	63.5	55.5	55.5	2.44	0.00114	--	63.5	0.28	1.11	0.3	IN	Corner chipped off
11.38	SSED	D	96	61.1	63.5	1.2	0.00231	63.5	--	0.57	1.11	0.7	V	
14.47	SSED	D	118	61.1	63.5	3.01	0.00285	63.5	--	0.71	1.11	0.8	IN	2 mm off
17.39	SSED	D	95	61.1	63.5	2.09	0.00198	63.5	--	0.49	1.11	0.5	V	
23.08	SSED	D	149	61.1	63.5	4.64	0.00440	63.5	--	1.09	1.11	1.2	V	
28.28	SSED	D	115	61.1	63.5	1.76	0.00167	63.5	--	0.41	1.11	0.5	IN	Edge crumbled
28.97	SSED	D	120	61.1	63.5	2.51	0.00238	63.5	--	0.59	1.11	0.7	IN	12 mm off
31.7	SSED	A	63.5	54.5	54.5	6.4	0.00607	--	61.5	1.60	1.10	1.8	IN	Chipped off
35.3	SSED	D	134	63.5	63.5	1.18	0.00112	63.5	--	0.28	1.11	0.3	V	
37.05	SSED	D	215	63.5	63.5	4.08	0.00387	63.5	--	0.96	1.11	1.1	V	
38.75	SSED	D	174	63.5	63.5	3.43	0.00325	63.5	--	0.81	1.11	0.9	V	
39.28	SSED	D	210	63.5	63.5	3.38	0.00320	63.5	--	0.79	1.11	0.9	V	Failed along existing microfacture
44.14	SSED	D	87	63.5	63.5	15.57	0.01476	63.5	--	3.66	1.11	4.1	V	Slightly offset between platen alignment and failure plane
48.5	SSED	A	63.5	42.5	42.5	3.18	0.00301	--	48.0	1.31	0.98	1.3	V	Failed along mechanical fracture
48.57	SSED	D	66	63.5	63.5	8.36	0.00793	63.5	--	1.97	1.11	2.2	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-13: BH-BGC11-37 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
4.1	SSED	A	75	63.5	75	6.43	0.00610	--	77.9	1.01	1.22	1.2	IN	Failed along existing fracture
5.47	SSED	D	76	63.5	63.5	5.73	0.00543	63.5	--	1.35	1.11	1.5	V	
7.65	SSED	D	143	63.5	63.5	18.43	0.01747	63.5	--	4.33	1.11	4.8	V	
8.5	SSED	A	35	63.5	35	6.81	0.00646	--	53.2	2.28	1.03	2.3	IN	Failed along existing fracture
11.3	SSED	A	50	63.5	50	9.8	0.00929	--	63.6	2.30	1.11	2.6	V	
15.34	SSED	D	82	63.5	63.5	9.85	0.00934	63.5	--	2.32	1.11	2.6	IN	Offset between platen alignment and failure plane
16.19	SSED	D	195	63.5	63.5	12.46	0.01181	63.5	--	2.93	1.11	3.3	IN	Offset between platen alignment and failure plane
21.5	SSED	D	69	63.5	63.5	21.94	0.02080	63.5	--	5.16	1.11	5.7	V	Formented but runs through both platens
22.5	SSED	D	135	63.5	63.5	1.1	0.00104	63.5	--	0.26	1.11	0.3	V	
25.95	SSED	A	61.5	63.5	61.5	10.4	0.00986	--	70.5	1.98	1.17	2.3	IN	Chipped out
26.65	SSED	D	160	63.5	63.5	12.6	0.01194	63.5	--	2.96	1.11	3.3	V	
30.07	SSED	A	41	63.5	41	5.54	0.00525	--	57.6	1.58	1.07	1.7	V	
34.15	SSED	D	104	63.5	63.5	2.11	0.00200	63.5	--	0.50	1.11	0.6	V	
38.04	SSED	D	142	63.5	63.5	2.26	0.00214	63.5	--	0.53	1.11	0.6	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-14: BH-BGC11-38 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
13.35	SSED	D	180	63.5	63.5	7.09	0.00672	63.5	--	1.67	1.11	1.9	V	
21.75	SSED	D	130	63.5	63.5	0.9	0.00085	63.5	--	0.21	1.11	0.2	V	Failed along foliation
23.85	SSED	D	110	63.5	63.5	0.603	0.00057	63.5	--	0.14	1.11	0.2	V	
25.75	SSED	D	170	63.5	63.5	5.2	0.00493	63.5	--	1.22	1.11	1.4	V	
31.04	SSED	D	140	63.5	63.5	6.15	0.00583	63.5	--	1.45	1.11	1.6	V	
36.64	SSED	D	210	63.5	63.5	4.22	0.00400	63.5	--	0.99	1.11	1.1	V	Failed along foliation
36.86	SSED	D	230	63.5	63.5	5.36	0.00508	63.5	--	1.26	1.11	1.4	IN	
40.21	SSED	D	100	63.5	63.5	1.22	0.00116	63.5	--	0.29	1.11	0.3	V	
44.65	SSED	D	120	63.5	63.5	2.82	0.00267	63.5	--	0.66	1.11	0.7	IN	Along foliation
43.87	SSED	D	190	63.5	63.5	5.33	0.00505	63.5	--	1.25	1.11	1.4	IN	Along foliation
44.06	SSED	D	100	63.5	63.5	2.35	0.00223	63.5	--	0.55	1.11	0.6	V	Failed along foliation
14.99	SSED	A	60	63.5	60	2.14	0.00203	--	69.6	0.42	1.16	0.5	IN	Partly along foliation
21.68	SSED	A	65	63.5	65	2.18	0.00207	--	72.5	0.39	1.18	0.5	IN	Crumbled, pieces broke off

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-15: BH-BGC11-40A Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
7.62	SSED	D	150	63.5	63.5	5.4	0.00512	63.5	--	1.27	1.11	1.4	IN	Broke along joint, not all the way though sample
10.2	SSED	D	175	63.5	62	4.16	0.00394	62.0	--	1.03	1.10	1.1	V	
11.86	SSED	A	74	63.5	58	41.14	0.03900	--	68.5	8.32	1.15	9.6	V	Failure plane very rough but running through platens
12.39	SSED	D	160	63.5	63.5	14.275	0.01353	63.5	--	3.36	1.11	3.7	V	
15.96	SSED	D	140	63.5	63.5	16.3	0.01545	63.5	--	3.83	1.11	4.3	IN	Broke along fracture parallel to axis, not through whole diameter
18.5	SSED	D	110	63.5	63.5	14.39	0.01364	63.5	--	3.38	1.11	3.8	IN	12mm offset between failure plane and platen axis
21.53	SSED	D	135	63.5	63.5	1.72	0.00163	63.5	--	0.40	1.11	0.5	V	
22.49	SSED	D	135	63.5	63.5	7.66	0.00726	63.5	--	1.80	1.11	2.0	V	
23.8	SSED	A	49	63.5	44	17.13	0.01624	--	59.6	4.56	1.08	4.9	IN	Chipepd out
25.26	SSED	D	25.26	63.5	63.5	2.03	0.00192	63.5	--	0.48	1.11	0.5	V	
26.2	SSED	D	112	63.5	63.5	1.04	0.00099	63.5	--	0.24	1.11	0.3	IN	Offest between platens axis and failure plane
27.77	SSED	A	49	63.5	49	1.74	0.00165	--	62.9	0.42	1.11	0.5	IN	Chipped out
28.6	SSED	D	130	63.5	63.5	3.78	0.00358	63.5	--	0.89	1.11	1.0	V	
30.27	SSED	D	148	63.5	63.5	8.07	0.00765	63.5	--	1.90	1.11	2.1	V	
30.87	SSED	D	190	63.5	63.5	10.67	0.01012	63.5	--	2.51	1.11	2.8	V	
31.39	SSED	D	137	63.5	63.5	6.86	0.00650	63.5	--	1.61	1.11	1.8	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-16: BH-BGC11-40B

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
12.85	SSED	D	75	63.5	63.5	12.7	0.01204	63.5	--	2.99	1.11	3.3	V	
12.92	SSED	A	55	63.5	63.5	21.43	0.02032	--	71.7	3.96	1.18	4.7	IN	Chipped out
13.35	SSED	D	105	63.5	63.5	2.85	0.00270	63.5	--	0.67	1.11	0.7	V	
16.93	SSED	D	141	63.5	63.5	3.85	0.00365	63.5	--	0.91	1.11	1.0	V	Broke along foliation and along existing microfracture
19.16	SSED	D	197	63.5	63.5	15.94	0.01511	63.5	--	3.75	1.11	4.2	V	
21.68	SSED	D	225	63.5	63.5	19.5	0.01849	63.5	--	4.58	1.11	5.1	IN	Broke 3cm away from axis of platens
22.11	SSED	D	110	63.5	63.5	4.55	0.00431	63.5	--	1.07	1.11	1.2	IN	Broke along existing microfracture
25	SSED	A	47	63.5	63.5	3.96	0.00375	--	71.7	0.73	1.18	0.9	IN	Chipped
25.42	SSED	D	170	63.5	63.5	7.9	0.00749	63.5	--	1.86	1.11	2.1	V	
30.37	SSED	D	195	63.5	63.5	8.04	0.00762	63.5	--	1.89	1.11	2.1	V	
30.97	SSED	D	180	63.5	63.5	2.03	0.00192	63.5	--	0.48	1.11	0.5	V	Along foliation
31.67	SSED	A	80	63.5	80	2.13	0.00202	--	80.4	0.31	1.24	0.4	V	Failed in three pieces
37.47	SSED	A	70	63.5	70	2.08	0.00197	--	75.2	0.35	1.20	0.4	IN	Layer slipped off along foliation plane
38.19	SSED	D	190	63.5	63.5	24.92	0.02362	63.5	--	5.86	1.11	6.5	V	Half is intrusive, still foliated
38.83	SSED	D	170	63.5	63.5	5.1	0.00483	63.5	--	1.20	1.11	1.3	V	Failed along foliation
39.75	SSED	A	60	63.5	60	0.96	0.00091	--	69.6	0.19	1.16	0.2	IN	Piece slid off along foliation
43.71	SSED	D	150	63.5	63.5	1.35	0.00128	63.5	--	0.32	1.11	0.4	V	Along foliation
45.66	SSED	D	140	63.5	63.5	13.29	0.01260	63.5	--	3.12	1.11	3.5	V	Along foliation

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-17: BH-BGC11-43 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								$D_e=D$ [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
4.05	SINT	D	165	63.5	63.5	29.55	0.02801	63.5	--	6.95	1.11	7.7	V	
4.16	SINT	D	140	63.5	63.5	41.37	0.03922	63.5	--	9.73	1.11	10.8	V	
4.59	SINT	D	125	63.5	63.5	28.48	0.02700	63.5	--	6.70	1.11	7.5	V	
4.97	SINT	D	140	63.5	63.5	38.6	0.03659	63.5	--	9.08	1.11	10.1	V	
6.6	SINT	D	175	63.5	63.5	35.96	0.03409	63.5	--	8.45	1.11	9.4	V	
13.41	SINT	D	210	63.5	63.5	40.66	0.03855	63.5	--	9.56	1.11	10.6	V	
14.95	SINT	D	160	63.5	63.5	21.69	0.02056	63.5	--	5.10	1.11	5.7	IN	Broke along axis after chipping several times
16.06	SINT	D	185	63.5	63.5	37.03	0.03510	63.5	--	8.71	1.11	9.7	V	
20.63	SSED	A	50	63.5	56	23.55	0.02233	--	67.3	4.93	1.14	5.6	V?	Load axis wasn't along center of core, but break was along load axis
20.65	SSED	D	150	63.5	63.5	12.47	0.01182	63.5	--	2.93	1.11	3.3	IN	Along foliation
22.17	SSED	D	165	63.5	63.5	12.89	0.01222	63.5	--	3.03	1.11	3.4	IN	Along foliation
23.47	SSED	D	185	63.5	63.5	33.29	0.03156	63.5	--	7.83	1.11	8.7	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-18: BH-BGC11-45 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
5.36	SSED	D	97	63.5	63.5	0.72	0.00068	63.5	--	0.17	1.11	0.2	V	
5.7	SSED	A	43	63.5	43.5	3.47	0.00329	--	59.3	0.94	1.08	1.0	IN	Did not break through platten, chipped out
6.22	SSED	D	65	63.5	63.5	16.7	0.01583	63.5	--	3.93	1.11	4.4	V	
7.2	SSED	D	84	63.5	63.5	18.34	0.01739	63.5	--	4.31	1.11	4.8	V	
8.1	SSED	D	260	63.5	63.5	19.72	0.01869	63.5	--	4.64	1.11	5.2	V	
8.43	SSED	A	60	63.5	57	13.44	0.01274	--	67.9	2.76	1.15	3.2	IN	Chipped out parallel to fabric
10.99	SSED	A	55	63.5	55	6.81	0.00646	--	66.7	1.45	1.14	1.7	IN	Chipped out at bottom
11.08	SSED	D	120	63.5	63.5	3.97	0.00376	63.5	--	0.93	1.11	1.0	V	
11.38	SSED	D	150	63.5	63.5	3.73	0.00354	63.5	--	0.88	1.11	1.0	V	
11.42	SSED	A	77	63.5	77	8.23	0.00780	--	78.9	1.25	1.23	1.5	IN	Chipped out at top
12.63	SSED	D	170	63.5	63.5	4.19	0.00397	63.5	--	0.99	1.11	1.1	V	
13.79	SSED	A	60	63.5	47	7.26	0.00688	--	61.6	1.81	1.10	2.0	V	
14.09	SSED	D	120	63.5	63.5	4.2	0.00398	63.5	--	0.99	1.11	1.1	IN	
17.32	SSED	D	120	63.5	63.5	12.1	0.01147	63.5	--	2.84	1.11	3.2	V	UCS sample 17.38 to 17.64
18.21	SSED	A	80	63.5	63.5	9.48	0.00899	--	71.7	1.75	1.18	2.1	V	
18.61	SSED	D	160	63.5	63.5	6.09	0.00577	63.5	--	1.43	1.11	1.6	V	
19.96	SSED	A	45	63.5	44.5	20.26	0.01921	--	60.0	5.34	1.09	5.8	IN	Maxed out, no more travel
20.18	SSED	D	80	63.5	63.5	70.6	0.06693	63.5	--	16.60	1.11	18.5	V	
20.3	SSED	A	66	63.5	56	13.97	0.01324	--	67.3	2.93	1.14	3.3	IN	Chipped out at top

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-19: BH-BGC11-46 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
4.62	INT	D	120	63.5	63.5	23.09	0.02189	63.5	--	5.43	1.11	6.0	V	40% of break surface stained
6.08	INT	D	220	63.5	63.5	11.53	0.01093	63.5	--	2.71	1.11	3.0	V	40% of break surface stained
7.68	INT	D	138	63.5	63.5	28.57	0.02708	63.5	--	6.72	1.11	7.5	IN	Did not break
10.18	INT	D	198	63.5	63.5	21.48	0.02036	63.5	--	5.05	1.11	5.6	IN	Chipped at platen
12.94	INT	D	303	63.5	63.5	2.63	0.00249	63.5	--	0.62	1.11	0.7	V	Break along plane of weakness
13.05	INT	D	147	63.5	63.5	39.38	0.03733	63.5	--	9.26	1.11	10.3	V	Broke in intact
14.39	INT	D	153	63.5	63.5	35.44	0.03360	63.5	--	8.33	1.11	9.3	V	
15.79	INT	D	252	63.5	63.5	10.33	0.00979	63.5	--	2.43	1.11	2.7	V	60% iron staining on surface of break
18.01	INT	D	196	63.5	63.5	7.35	0.00697	63.5	--	1.73	1.11	1.9	V	Along iron infilled joint 2mm thick
18.84	SSED	D	138	63.5	63.5	11.36	0.01077	63.5	--	2.67	1.11	3.0	V	80% iron staining along surface of break
19.84	SSED	D	183	63.5	63.5	24.61	0.02333	63.5	--	5.79	1.11	6.4	V	Fresh break

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-20: BH-BGC11-48 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
13.41	SINT	D	82	63.5	63.5	1.45	0.00137	63.5	--	0.34	1.11	0.4	V	Broke along plane 25 degrees, 100% red iron staining
13.69	SINT	D	113	63.5	63.5	3.54	0.00336	63.5	--	0.83	1.11	0.9	V	100% iron stained face
17.11	SSED	D	263	63.5	63.5	1.06	0.00100	63.5	--	0.25	1.11	0.3	V	Broke along 3 paths, all valid
24.22	SSED	D	156	63.5	63.5	0.73	0.00069	63.5	--	0.17	1.11	0.2	V	Broke along 3 paths, all valid
30.47	SSED	D	228	63.5	63.5	2.45	0.00232	63.5	--	0.58	1.11	0.6	IN	Broke and slipped along plane of weakness

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_S= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-21: BH-BGC11-50 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
16.61	SSED	D	130	63.5	63.5	4.88	0.00463	63.5	--	1.15	1.11	1.3	V	Along foliation
18.1	SSED	D	135	63.5	63.5	2.13	0.00202	63.5	--	0.50	1.11	0.6	IN	Along foliation
18.19	SSED	A	34	63.5	34	4.42	0.00419	--	52.4	1.52	1.02	1.6	IN	Crumbled at point of load
22.58	SSED	D	150	63.5	63.5	23.44	0.02222	63.5	--	5.51	1.11	6.1	V	
24.9	SSED	D	195	63.5	63.5	18.09	0.01715	63.5	--	4.25	1.11	4.7	V	
25.23	SSED	D	220	63.5	63.5	15.65	0.01484	63.5	--	3.68	1.11	4.1	V	Along foliation
26.93	SSED	D	175	63.5	63.5	9.26	0.00878	63.5	--	2.18	1.11	2.4	IN	Along foliation
28.8	SSED	D	120	63.5	63.5	21.18	0.02008	63.5	--	4.98	1.11	5.5	V	
30.32	SSED	D	160	63.5	63.5	12.37	0.01173	63.5	--	2.91	1.11	3.2	IN	Fracture 3 mm offset from bottom platen
30.64	SSED	D	173	63.5	63.5	13.29	0.01260	63.5	--	3.12	1.11	3.5	IN	Fracture 7mm offset from bottom platen
34.43	SSED	D	180	63.5	63.5	17.31	0.01641	63.5	--	4.07	1.11	4.5	IN	Along foliation
35.12	SSED	D	165	63.5	63.5	12.43	0.01178	63.5	--	2.92	1.11	3.3	V	Along foliation
36.5	SSED	D	145	63.5	63.5	4.87	0.00462	63.5	--	1.14	1.11	1.3	IN	Along foliation
38.76	SSED	D	135	63.5	63.5	8.35	0.00792	63.5	--	1.96	1.11	2.2	V	Along foliation
40.49	SINT	D	200	63.5	63.5	28.56	0.02707	63.5	--	6.71	1.11	7.5	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-22: BH-BGC11-52 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
14.54	SSED	A	63	63.5	56	7.26	0.00688	--	67.3	1.52	1.14	1.7	V	
15.73	SSED	D	109	63.5	63.5	8.45	0.00801	63.5	--	1.99	1.11	2.2	V	
17.84	SSED	D	248	63.5	63.5	17.88	0.01695	63.5	--	4.20	1.11	4.7	V	
17.87	SSED	A	46	63.5	46	21.09	0.01999	--	61.0	5.38	1.09	5.9	IN	Break almost to bottom platen (4mm)
19.66	SSED	D	83	63.5	63.5	3.5	0.00332	63.5	--	0.82	1.11	0.9	V	
21.37	SSED	A	57	63.5	53	5.83	0.00553	--	65.5	1.29	1.13	1.5	IN	Chipped out
21.88	SSED	D	162	63.5	63.5	1.23	0.00117	63.5	--	0.29	1.11	0.3	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-23: BH-BGC11-54 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
7.62	SSED	D	124	63.5	63.5	3.76	0.00356	63.5	--	0.88	1.11	1.0	IN	Broke along oblique existing fracture
8.93	SSED	A	55	63.5	51.5	3.65	0.00346	--	64.5	0.83	1.12	0.9	V	Ran through plattens but followed step ped plane along existing fracs
21.08	SSED	A	51	63.5	51	1.05	0.00100	--	64.2	0.24	1.12	0.3	IN	Chipped off
22.2	SSED	D	75	63.5	63.5	1.06	0.00100	63.5	--	0.25	1.11	0.3	V	
23.9	SSED	D	155	63.5	63.5	1.13	0.00107	63.5	--	0.27	1.11	0.3	V	
27.91	SSED	D	77	63.5	61	1.41	0.00134	61.0	--	0.36	1.09	0.4	V	
32.36	SSED	D	91	63.5	61	0.94	0.00089	61.0	--	0.24	1.09	0.3	V	
34.92	SSED	D	98.5	63.5	60.5	0.97	0.00092	60.5	--	0.25	1.09	0.3	V	Along foliation
38.03	SSED	D	75	62	62	1.73	0.00164	62.0	--	0.43	1.10	0.5	IN	Broke along existing microfracture
39.21	SSED	D	93.7	62.5	62.5	0.96	0.00091	62.5	--	0.23	1.11	0.3	V	
40.3	SSED	D	140	61	61	1.09	0.00103	61.0	--	0.28	1.09	0.3	V	
40.65	SSED	D	91	61	61	0.95	0.00090	61.0	--	0.24	1.09	0.3	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_S= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-24: BH-BGC11-59 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
7.02	SSED	A	40	63.5	36	4.74	0.00449	--	54.0	1.54	1.03	1.6	V	Broke into several pieces - difficult to tell if broke at platens
11.06	SSED	D	190	63.5	63.5	1.4	0.00133	63.5	--	0.33	1.11	0.4	IN	Along foliation; 6mm offset from one of the platens
12	SSED	D	150	63.5	63.5	3.13	0.00297	63.5	--	0.74	1.11	0.8	IN	Along foliation; 15mm offset from one platen, FE stained fracture
18.9	SSED	D	210	63.5	63.5	4.82	0.00457	63.5	--	1.13	1.11	1.3	IN	Partially along foliation
19.79	SSED	D	230	63.5	63.5	1.36	0.00129	63.5	--	0.32	1.11	0.4	V	Along foliation
20.84	SSED	D	130	63.5	63.5	0.99	0.00094	63.5	--	0.23	1.11	0.3	V	Along healed fracture
21.01	SSED	A	40	63.5	35	3.63	0.00344	--	53.2	1.22	1.03	1.3	IN	Crumbled at platens
29.13	SSED	D	125	63.5	63.5	1.37	0.00130	63.5	--	0.32	1.11	0.4	IN	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_S= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-25: BH-BGC11-62 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								D_e=D [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
3.28	SSED	D	86	63.5	63.5	2.24	0.00212	63.5	--	0.53	1.11	0.6	V	Along foliation
5.4	SSED	D	97	63.5	63.5	4.84	0.00459	63.5	--	1.14	1.11	1.3	V	Along foliation
5.82	SSED	D	85	63.5	63.5	3.65	0.00346	63.5	--	0.86	1.11	1.0	V	Along foliation
7.05	SSED	A	54	63.5	52.5	3.21	0.00304	--	65.15107	0.72	1.13	0.8	IN	Chipped off the side
7.84	SSED	A	55	63.5	55	2.82	0.00267	--	66.68425	0.60	1.14	0.7	IN	4 mm offset between failure plane and area of platen
7.87	SSED	D	140	63.5	60	0.9	0.00085	60.0	--	0.24	1.09	0.3	V	Along foliation
11.16	SSED	D	84	63.5	63.5	4.22	0.00400	63.5	--	0.99	1.11	1.1	V	
13.46	SSED	A	52	63.5	52	4.62	0.00438	--	64.84009	1.04	1.12	1.2	V	
15.51	SSED	D	130	63.5	63.5	4.37	0.00414	63.5	--	1.03	1.11	1.1	IN	Along foliation 1 cm offset
17.55	SSED	A	54	63.5	54	6.51	0.00617	--	66.07525	1.41	1.13	1.6	IN	Chipped off the side
22.55	SSED	A	72	63.5	72	6.03	0.00572	--	76.29712	0.98	1.21	1.2	IN	Rough stepped failure path by side
23.47	SSED	D	142	63.5	63.5	2.35	0.00223	63.5	--	0.55	1.11	0.6	V	Along foliation
24.95	SSED	D	91	63.5	63.5	1.63	0.00155	63.5	--	0.38	1.11	0.4	IN	Chipped off along foliation
28.5	SSED	D	162	63.5	63.5	1.15	0.00109	63.5	--	0.27	1.11	0.3	V	Rock also crumbled on one side
28.92	SSED	A	63	63.5	59	7.12	0.00675	--	69.06658	1.41	1.16	1.6	V	All foliation beds sheared under compressive stress
32.6	SSED	D	126	63.5	63.5	4.53	0.00429	63.5	--	1.07	1.11	1.2	V	
33.44	SSED	A	50	63.5	48	18.18	0.01723	--	62.29634	4.44	1.10	4.9	IN	Chipped off the side
34.75	SSED	D	105	63.5	63.5	2.39	0.00227	63.5	--	0.56	1.11	0.6	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-26: BH-BGC11-64 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
16.66	INT	D	140	63.5	61.7	2.05	0.00194	61.7	--	0.51	1.10	0.6	IN	Broke in many pieces
34.96	INT	D	145	63.5	63.5	4.84	0.00459	63.5	--	1.14	1.11	1.3	V	
46.36	INT	D	110	63.5	63.9	2.22	0.00210	63.9	--	0.52	1.12	0.6	IN	Broke along other weakness plane

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_S= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{S(50)}$ = Corrected point load strength.

Table N-27: BH-BGC11-66 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D) D_e=D [mm] (note 4)	Axial Test (Type A) $D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
6.4	INT	D	150	63.5	63.5	2.39	0.00227	63.5	--	0.56	1.11	0.6	IN	Broke along existing micro fractures
6.74	INT	D	185	63.5	63.5	9.81	0.00930	63.5	--	2.31	1.11	2.6	IN	Offset
11.92	INT	D	180	63.5	63	14.72	0.01395	63	--	3.52	1.11	3.9	V	
12.52	INT	D	74	63.5	62	4.55	0.00431	62	--	1.12	1.10	1.2	V	Broke in multiple pieces
15.32	INT	D	140	63.5	63.5	20.79	0.01971	63.5	--	4.89	1.11	5.4	IN	Chipped by lower platen
17.36	INT	D	250	63.5	63.5	26.11	0.02475	63.5	--	6.14	1.11	6.8	V	
18.72	INT	D	196	63.5	63.5	14.99	0.01421	63.5	--	3.52	1.11	3.9	IN	Broke along existing fracture
18.76	INT	D	196	63.5	63.5	20.73	0.01965	63.5	--	4.87	1.11	5.4	IN	Chipped by lower platen
23.35	INT	D	150	63.5	63.5	26.18	0.02482	63.5	--	6.16	1.11	6.9	V	
24.08	INT	D	205	63.5	63.5	29.48	0.02795	63.5	--	6.93	1.11	7.7	V	
27.15	INT	D	106	63.5	63.5	22.77	0.02159	63.5	--	5.35	1.11	6.0	V	
28.18	INT	D	212	63.5	63.5	30.89	0.02928	63.5	--	7.26	1.11	8.1	V	
30.72	INT	D	145	63.5	63.5	22.56	0.02139	63.5	--	5.30	1.11	5.9	IN	Chipped out
32.38	INT	D	220	63.5	63.5	2.45	0.00232	63.5	--	0.58	1.11	0.6	V	Along existing fracture plane
32.42	INT	D	105	63.5	63.5	23.78	0.02254	63.5	--	5.59	1.11	6.2	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

Table N-28: BH-BGC11-69 Point Load Tests

Sample Depth	Rock Type[1]	Test Type[2]	Sample Length, L [mm]	Sample Width, W [mm]	Distance between platens, D [mm]	Gauge Reading [MPa]	Failure Load, P [MN] (note 3)	Diametral Test (Type D)	Axial Test (Type A)	$I_s=P/D_e^2$ [MPa] (note 6)	$F=(D_e/50)^{0.45}$ (note 7)	$I_{s(50)}=F(I_s)$ [MPa] (note 8)	Invalid /Valid	Comments
								D_e=D [mm] (note 4)	$D_e=\sqrt{(4A/\pi)}$ [mm] (notes 4 and 5)					
6.05	SSED	D	80	63.5	63.5	1.48	0.00140	63.5	--	0.35	1.11	0.4	IN	Broke along existing fracture
6.85	SSED	A	43.5	63.5	43.5	1.81	0.00172	--	59.3	0.49	1.08	0.5	IN	Chipped off side
7.4	SSED	D	124	63.5	63.5	3.53	0.00335	63.5	--	0.83	1.11	0.9	V	Rough surface
11.6	SSED	D	212	63.5	63.5	3.47	0.00329	63.5	--	0.82	1.11	0.9	IN	Broke along existing fracture
12.13	SSED	D	129	63.5	63.5	2.94	0.00279	63.5	--	0.69	1.11	0.8	IN	Chipped at top
12.68	SSED	D	201	63.5	63.5	3.05	0.00289	63.5	--	0.72	1.11	0.8	V	
13.33	SSED	D	175	63.5	63.5	4.03	0.00382	63.5	--	0.95	1.11	1.1	IN	Chipped at top
15.36	SSED	D	115	63.5	63.5	1.44	0.00137	63.5	--	0.34	1.11	0.4	V	
18.78	SSED	A	48	63.5	42.5	7.32	0.00694	--	58.6	2.02	1.07	2.2	V	
18.95	SSED	D	196	63.5	63.5	6.85	0.00649	63.5	--	1.61	1.11	1.8	V	
21	SSED	D	100	63.5	63.5	1.15	0.00109	63.5	--	0.27	1.11	0.3	V	

1. Rock types: SSED: Surface weathered metasedimentary rocks; SINT: Surface weathered intrusive rocks; INT: Intrusive rocks.
2. Test types: D=Diametral, A=Axial, L=Lump.
3. P = Gauge reading in MPa * 0.000948.
4. D_e= Equivalent core diameter.
5. A=W*D.
6. I_s= Uncorrected point load strength.
7. F= Size correction factor.
8. $I_{s(50)}$ = Corrected point load strength.

APPENDIX O
PLACER TAILINGS INVENTORY

1.0 INTRODUCTION

1.1. Purpose

This appendix describes a visual reconnaissance of the reworked valley bottom materials ("placer tailings") in the vicinity of the Eagle Gold project. These materials were examined to develop opinions as to their potential for use as construction materials in development of the proposed mine.

1.2. Background

The Eagle Gold project area has been exploited by placer mining since about 1897. This historical activity has resulted in substantial volumes of reworked overburden materials (placer tailings) in valley bottoms in the region. A significant proportion of the Dublin Gulch valley bottom is filled with placer tailings, which are in places over 20 m thick. Similarly, the reach of Haggart Creek immediately adjacent to, and south of, the project area contains deposits of placer tailings.

The placer tailings consist of highly variable materials, with a wide range of grain size and density. The materials range from isolated deposits of cobbles and boulders, to gravelly sand or sandy gravel, to loose silty sand or soft sandy silt. The latter materials appear to be confined to specific areas, which are inferred from aerial photographs to have been sediment control ponds.

The placer tailings present potential constraints to development, since they are variably loose and potentially liquefiable where they exist below the water table, and are therefore not a suitable foundation for heavy structures. However, the placer tailings materials excavated in the course of foundation preparation may comprise a useful construction material, as a potential source for general fill, structural fill, concrete aggregate or heap overliner material, if suitably selected and processed through screening, crushing, and/or washing.

Suitability of the placer tailings for use as a select fill material will depend, largely, on grain size, and to a lesser degree on mineralogy and associated durability. Placer tailings with excessive fines (i.e. silt and clay) are not expected to be economically suitable for re-use. Where fines content is lower, the sand and gravel fraction is expected to be generally suitable for use as general fill, and potentially suitable for structural fill. The oversize fraction, defined in this section as all clasts greater than 75 mm, are frequently comprised of sound, durable rock. It is expected that this oversize fraction, if screened from the tailings, can be crushed to produce structural fill, and, pending the completion of laboratory testing, to also serve as a durable material for concrete aggregate and/or heap overliner.

This appendix documents a reconnaissance level survey of the placer tailings in Dublin Gulch and within the Haggart Creek valley from its confluence with Dublin Gulch to approximately 3 km south. This appendix presents visual observations of material texture as inferred from the ground surface. Intrusive investigation would be required to confirm the vertical extent of observed materials, and laboratory testing is required to confirm material properties. Some

subsurface data are available for the placer tailings in Dublin Gulch, as reported by BGC (2009 and 2011). Additional subsurface data at select test hole locations within the Dublin Gulch placer tailings are presented elsewhere in this report. There are no subsurface data available for the Haggart Creek placer tailings.

2.0 VISUAL RECONNAISSANCE

2.1. Spatial Limits of Reconnaissance

This component of the 2011 field investigations focused on placer tailings within a reasonable haul distance of the primary components of the planned project (i.e. up to about 2 km from the proposed truck shop pad). Exposed materials were classified visually at discrete, pre-selected points, including 26 locations in the Dublin Gulch valley bottom, and 34 in the Haggart Creek valley bottom. The locations of observation points are shown in Drawing 10.

2.2. Visual Classification of Surficial Materials

The observation points were selected at a number of locations, uniformly distributed across areas containing disturbed materials, as evident in available high resolution aerial photography. At each selected observation point, surficial materials were classified in accordance with standard soil descriptions, and further classified according to the Unified Soil Classification System (USCS). Finally, the approximate proportion of materials that would be retained on a 75 mm screen was estimated at each location.

Note that the classification is based on materials exposed at the immediate ground surface or at shallow depth as exposed by shallow digging. The observed texture may be different than that at depth.

3.0 DATA RESULTS

3.1. Dublin Gulch Area and Haggart Creek Placer Tailings

Visual observations of surficial materials in the Dublin Gulch valley bottom are summarized in Table O-1, and visual observations of surficial materials in the Haggart Creek valley bottom are summarized in Table O-2, below.

Table O-1. Material Observations in the Dublin Gulch Valley Bottom

Observation Point	Northing (m)	Easting (m)	Soil Description	USCS	Estimated % >75 mm
DG-0	7101354	459740	SAND, gravelly, trace to some silt, trace to some cobbles and boulders	SW	10-15
DG-1	7101270	459784	SAND and GRAVEL, cobbly, some boulders, trace silt	GW	40-50
DG-2	7101229	459716	SAND and GRAVEL, cobbly, some boulders, trace silt	GW	30-40
DG-3	7101162	459629	GRAVEL, sandy, cobbly, trace to some boulders, trace silt	GW	20-30
DG-4	7101225	459483	BOULDERS, mixed with silty sand, trace gravel	GP	50
DG-5	7101114	459484	GRAVEL, sandy, some cobbles and boulders, trace silt	GW	15-20
DG-6	7101069	459377	GRAVEL, sandy, some cobbles and boulders, trace silt	GW	15-10
DG-7	7101143	459336	SAND, silty, trace gravel, trace to some cobbles	SM	10
DG-9	7101034	459187	GRAVEL, sandy, some cobbles and boulders	GW	10-15
DG-10	7100972	459183	Area overgrown with brush; several boulders protruding at surface of inferred gravelly sand matrix	N/A	4-5
DG-11	7100889	459171	SAND, silty, trace gravel	SM	< 5
DG-12	7100883	459034	SAND, gravelly, some silt, occasional cobbles and boulders	SW	< 10

DG-13	7100950	458974	SAND, some silt, some gravel, trace cobbles and boulders	SW	< 5
DG-14	7100862	458915	SAND, silty, some gravel	SM	< 2
DG-15	7100962	458938	SAND, gravelly, trace silt	SW	1-2
DG-16	7100944	458849	GRAVEL, sandy, cobbly, occasional boulders, trace silt	GW	25
DG-17	7100949	458725	SAND and GRAVEL, trace silt, trace to some cobbles and boulders	GW	< 10
DG-18	7100889	458662	SAND, silty, some gravel	SM	1
DG-19	7100795	458734	GRAVEL, sandy, trace to some silt	GW	< 1
DG-20	7100793	458644	SAND and GRAVEL, silty	SW	< 1
DG-21	7100944	458603	SAND and GRAVEL, trace to some silt, occasional cobbles and boulders	GW	< 5
DG-22	7100959	458536	SAND, gravelly, trace silt, occasional cobbles and boulders	GW	< 5
DG-23	7101028	458506	SAND, silty, trace gravel	SM	< 1
DG-24	7100995	458417	SAND, silty, trace gravel	SM	< 1
DG-42	7099934	458289	GRAVEL, sandy, trace silt	GW	15-20
DG-47	7100891	459092	GRAVEL, cobbly, occasional boulders	GP	25

Table O-2. Material Observations in the Haggart Creek Valley Bottom.

Observation Point	Northing (m)	Easting (m)	Soil Description	USCS	Estimated % >75 mm
HC-0	7098254	458420	GRAVEL, sandy, trace to some silt, trace cobbles and boulders	GW	5-10
HC-1	7098287	458418	GRAVEL, sandy, trace to some silt, trace cobbles and boulders	GW	5-10
HC-2	7098315	458357	GRAVEL, sandy, trace to some silt, trace cobbles and boulders	GW	5-10
HC-3	7098321	458396	GRAVEL, sandy, trace to some silt, trace cobbles and boulders	GW	< 5
HC-4	7098456	458364	SAND, gravelly, trace silt, trace cobbles and boulders	SW	< 1-2
HC-5	7098480	458324	GRAVEL, sandy, cobbly, trace boulders	GW	> 15-20
HC-6	7098528	458412	SAND and GRAVEL, trace to some silt, trace cobbles and boulders	SW	2-3
HC-7	7098567	458380	SAND and GRAVEL, trace to some silt, trace cobbles and boulders	SW	2-3
HC-8	7098537	458312	GRAVEL, sandy, trace silt, trace cobbles and boulders	GW	< 5
HC-9	7098574	458294	SAND, gravelly, trace silt, trace cobbles and boulders	SW	< 5
HC-10	7098605	458400	SAND and GRAVEL, trace to some silt, trace cobbles and boulders	SW	2-3
HC-11	7098611	458306	SAND, gravelly, trace silt, trace cobbles and boulders	SW	< 2-3
HC-12	7098669	458255	GRAVEL, sandy, trace silt, trace cobbles and boulders	GW	< 2-3

HC-13	7098713	458285	GRAVEL, sandy, trace silt, trace cobbles and boulders	GW	< 5
HC-14	7098780	458295	GRAVEL, cobbly, trace boulders	GP	30-40
HC-15	7098812	458336	GRAVEL, cobbly, trace boulders	GP	30-40
HC-16	7098853	458333	GRAVEL, cobbly, some sand, trace boulders	GW	15-20
HC-17	7098907	458359	SAND, gravelly, trace silt, trace cobbles and boulders	SW	< 5
HC-18	7098964	458350	SAND, gravelly, trace to some silt	SW	< 1
HC-19	7099079	458274	SAND and GRAVEL, some silt, trace cobbles and boulders	SW	< 2-3
HC-20	7099121	458322	GRAVEL and SAND, some silt	GW	< 1-2
HC-21	7099167	458334	GRAVEL and SAND, some silt	GW	< 1-2
HC-22	7099192	458256	SAND, gravelly, some silt to silty	SW	< 2
HC-23	7099251	458257	SAND and SILT, gravelly, trace cobbles and boulders	SM	N/A
HC-24	7099267	458352	SAND, silty, some gravel	SM	< 1
HC-25	7099292	458379	no suitable materials; only thin cover of reworked silty material over undisturbed till	N/A	N/A
HC-26	7099323	458281	SAND and SILT, gravelly, trace cobbles and boulders	SM	N/A
HC-27	7099876	458323	SAND and GRAVEL, trace to some silt, trace cobbles and boulders	SW	< 4-5

HC-28	7099885	458261	SAND and GRAVEL, trace to some silt, trace cobbles and boulders	SW	< 4-5
HC-30	7100456	458222	negligible exploitable material	N/A	N/A
HC-31	7100856	458165	negligible exploitable material	N/A	N/A
HC-32	7100910	458124	in floodplain, not exploitable	N/A	N/A
HC-33	7101019	458099	not exploitable due to low elevation and proximity to Haggart Creek	N/A	N/A
HC-34	7101048	458156	not exploitable due to low elevation and proximity to Haggart Creek	N/A	N/A

4.0 PHOTOGRAPHS

Selected photographs of surficial materials within the Dublin Gulch and Haggart Creek valley bottoms are presented in the following pages. The photograph captions indicate the USCS classification of the observed material, as follows:

- SM – silty sand;
- SW – well graded sand;
- GP – poorly graded gravel; and
- GW – well graded gravel.

5.0 REFERENCES

BGC Engineering Inc. 2010. Site Facilities Geotechnical Investigation Factual Data Report. Eagle Gold Project, Victoria Gold Corporation.

BGC Engineering Inc. 2011. Eagle Gold Project 2010 Geotechnical Investigation for Mine Site Infrastructure Factual Data Report, Victoria Gold Corporation.

DG-0 - SW.

DG-1 - GW

DG-2 - GW

DG-3 - GW

DG-4 - GP

DG-5 – GW

DG-6 - GW

DG-7 - SM

DG-9 - GW

DG-11 – SM

DG-12 - SW

DG-13 - SW

DG-14 - SM

DG-15 - SW

DG-16 - GW

DG-17 - SW

DG-18 - SW

DG-19 - SW

DG-20 - SW

DG-21 - GW

DG-22 - GW

DG-23 - SM

DG-24 - SM

DG-47 - GP

HC-0 - GW

HC-1 - GW

HC-2 - GW

HC-3 - GW

HC-4 - SW

HC-5 - GW

HC-6 - SW

HC-7 - SW

HC-8 - GW

HC-9 - SW

HC-10 - SW

HC-11 - SW

HC-12 - GW

HC-13 - GW

HC-14 - GP

HC-15 - GP

HC-16 - GW

HC-17 - SW

HC-18 - SW

HC-19 - sw

HC-20 - GW

HC-21 - GW

HC-22 - SW

HC-23 - SM

HC-24 - SM

HC-26 – SM

HC-27 - SW

HC-28 - SW

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BGC Project Memorandum

To:	**Victoria Gold**	**Doc. no:**	**0792-004-M5-2011**
Attention:	**Mike Padula**	**cc:**	**Marten Regan, Wardrop** **Glen Barr, Stantec**
From:	**Pete Quinn**	**Date:**	**21 April 2011**
Subject:	**Eagle Gold – Heap Leach Pad, Water Diversion and Process Management Ponds DRAFT Foundation Report**		
Project no:	**0792-004**		

1.0 INTRODUCTION

1.1. General

BGC Engineering has been retained by Victoria Gold Corp. (Victoria) to complete geotechnical investigations for the open pit and mine site infrastructure for the Eagle Gold project at Dublin Gulch, Yukon.

Ore will be extracted from an open pit located on the ridge line above Dublin Gulch to the south, and between the headwaters of Eagle Pup and Platinum Gulch. Gold is to be extracted from the ore by heap leaching using a valley fill heap located in a small valley drained by Ann Gulch, spanning over and partially filling the middle reach of Dublin Gulch.

The project will involve a number of other important facilities, including: two primary waste rock storage areas (one in Eagle Pup, and one at the top of Platinum Gulch); a water diversion system to carry surface water from the upper reach of Dublin Gulch around the heap leach pad; process water ponds for management of heap solution; a process plant; crushers, conveyors and stockpiles; borrow pits; temporary spoil stockpiles; and miscellaneous other facilities, including truck shop, offices, warehouse space, fuel and water tanks, power and water transmission facilities; and explosives management facilities.

The Heap Leach Facility (HLF), the subject of this memo, comprises several major components, including:

- Heap leach pad, including a large containment dike;

- Dublin Gulch water diversion, including a rock fill diversion dike, diversion channel and energy dissipation structure; and,
- Process management ponds.

An initial design for the HLF was presented in the prefeasibility study (PFS) by Scott Wilson RPA (SWRPA, 2010). The Feasibility Study (FS), currently in progress by Wardrop Engineering Inc. (WEI), includes a proposed expansion of the HLF towards the east, as described in WEI Memo No. 1154860100-MEM-R0002-00 dated April 14, 2011. This amendment to the PFS design will result in changes to the proposed location of some of the HLF structures, specifically the diversion system and sediment control pond, and the eastern and northern extent of the heap leach pad. The HLF facilities are being designed by WEI and/or Tetra Tech.

This memorandum presents geotechnical recommendations for use in the FS planning and design of the HLF, including: the heap leach pad, water diversion facilities and process management ponds.

1.2. Proposed Facilities and Foundation Requirements

1.2.1. General

The most recent General Arrangement provided by Wardrop on 14 March 2011 shows the following primary components considered in this report:

- Heap leach pad to be constructed in Ann Gulch and across part of the valley bottom of Dublin Gulch (Drawing M5-01). The heap leach pad will have the following components:
    - Rockfill containment dike, consisting of an embankment approximately 50 m high spanning Dublin Gulch and forming one side of the in-heap pond;
    - In-heap pond for collection of pregnant solution, and associated solution removal wells;
    - Engineered liners, leachate detection and recovery systems. A triple liner system is proposed below the in-heap pond, and a double liner system is proposed elsewhere above the pond;
    - Stacked ore, reaching a final elevation of approximately 1080 m above sea level; and
        - Cover for closure.
- Dublin Gulch water diversion (Drawing M5-02), consisting of:
    - Rockfill diversion berm and energy dissipater pond;
    - Diversion channel and energy dissipater / drop structure; and
    - Sediment control pond(s).

- Process management ponds (Drawing M5-03), to be located west of the proposed heap leach pad.

The proposed layouts are illustrated in plan view in Drawings M5-01, M5-02 and M5-03. It is noted that these layouts are preliminary and are expected to change as the FS evolves. For example the diversion layout does not consider planned the heap leach pad expansion. The present report makes assumptions about proposed layouts based on the PFS drawings and preliminary input from WEI. These assumptions should be treated as conceptual only, subject to review upon further development of layouts.

2.0 SITE CONDITIONS

2.1. Background Reports

Site conditions at the Eagle Gold site are described in several reports:

- Report on 1995 Geotechnical Investigations for Four Potential Heap Leach Facility Site Alternatives, First Dynasty Mines, and Dublin Gulch Property. (Knight Piesold, 1996a).
- Report on Feasibility Design of the Mine Waste Rock Storage Area, First Dynasty Mines, and Dublin Gulch Property. (Knight Piesold, 1996b).
- Field Investigation Data Report, Dublin Gulch Project, New Millennium Mining. (Sitka Corp., 1996.).
- Hydrogeological Characterization and Assessment, Dublin Gulch Project, New Millennium Mining. (GeoEnviro Engineering, 1996).
- BGC Engineering Inc. 2009. Site Facilities Geotechnical Investigation Factual Data Report. Eagle Gold Project, Victoria Gold Corporation.
- Stantec. 2010. Project Proposal for Executive Committee Review. Pursuant to the Yukon Environmental and Socio-Economic Assessment Act. Eagle Gold Project, Victoria Gold Corporation.
- BGC Engineering Inc. 2011a. 2010 Geotechnical Investigation for Mine Site Infrastructure, Factual Data Report. Eagle Gold Project, Victoria Gold Corporation.

General overviews of regional geology, physiography, drainage, climate, seismicity and other general site conditions are also described in these reports. The Project Proposal (Stantec 2010) also includes air-photo based terrain mapping, and an evaluation of geological hazards affecting the project area.

2.2. Generalized Site Conditions in the Heap Leach and Process Management Ponds

2.2.1. General Site Conditions

The site topography involves moderate to high relief, with ground elevation varying from approximately 800 to 1400 masl.

Ground conditions are highly variable across the site. Further, due to poor drill recovery and the evolution of the general arrangement, there is limited information and significant uncertainty in the subsurface conditions at many areas of the site.

Groundwater was observed at varying depths across the site, generally close to the elevation of streams in the valley bottoms (i.e. less than 2 to 3 m below grade), and often below the depth of test pit excavation (i.e. often 5 to 6 m depth) on the hillsides.

Permafrost is present in the area, and is warm (i.e. typically 0 to -1 degrees Celsius), discontinuous and occasionally contains excess ground ice. Although not specifically controlled by slope aspect, permafrost is found more frequently in the north and west-facing lower slopes above Dublin Gulch (Drawing M5-04).

Seismic design parameters (i.e. uniform hazard spectra) applicable for buildings were presented in BGC (2009). Additional commentary on the selection of seismic design parameters for earthworks structures was provided by BGC (2011b). It is understood that a site specific seismic hazard assessment is being completed by Tetra Tech to support the finalization of seismic design parameters.

2.2.2. Typical Subsurface Conditions

Overburden soils encountered on the sloping ground at the mine site typically consist of a veneer of organic soils overlying a blanket of colluvium, which overlies weathered bedrock. Glacial till is generally only encountered on the lower flanks of the north and west-facing slopes located north and west of the proposed open pit, above Dublin Gulch and Haggart Creek. The till is often overlain by colluvium. Placer tailings (fill) cover most of the valley bottom of Dublin Gulch and Haggart Creek. Alluvial soils are occasionally encountered along undisturbed valley-bottom areas.

The bedrock encountered in the mine site area is generally classified as metamorphosed sedimentary rock, with a variably deep weathering profile. The intact rock strength of the encountered rock types is highly variable, with strength ranging between R0 class (i.e. corresponding to < 1 MPa Unconfined Compressive Strength, UCS) and R4 (50-100 MPa UCS). The average intact strength is estimated to be approximately R2 (5-25 MPa) in the metasedimentary rock, depending upon the degree of weathering, but with significant variability across the site.

Rock Mass Rating (RMR, Bieniawski, 1976) values calculated from retrieved rock core generally range between 20 to 40 in the metasedimentary rock. These values compare reasonably well with Geological Strength Index (GSI, Hoek, 2007; Hoek and Marinos, 2000) values estimated from the recovered core and surface or near surface field mapping observations. The estimated GSI ranges approximately between 30 and 40 in the metasedimentary rocks.

The inferred rockmass quality (as quantified by GSI) can be used to derive estimated stiffness and Hoek-Brown strength parameters for stability analysis of slopes, and for bearing capacity and settlement calculations of the proposed foundations.

Bedrock at the mine site has been subdivided into three broad categories – Type 1, Type 2 and Type 3 – on the basis of rockmass quality and inferred engineering behavior, with Type 1 being the highest quality, and Type 3 being the lowest quality. Typical characteristics of these three bedrock types are categorized in accordance with indices noted above. Further background on rock classification is provided in the Canadian Foundation Engineering Manual (CGS 2006). The typical characteristics of the three rock types are summarized in Table 1.

Table 1. Rock Type Typical Characteristics.

Parameter	Type 1	Type 2	Type 3
Unconfined Compressive Strength	> 25 MPa	5 to 25 MPa	1 to 5 MPa
Geological Strength Index	> 20	15 to 25	15 to 25
Weathering Grade	Slightly to Moderately Weathered	Moderately to Highly Weathered	Highly Weathered

Type 3 bedrock, the lowest quality rockmass considered to behave as rock (rather than as a soil), can be recognized in the field by a qualified geotechnical engineer/geologist on the basis of evident preserved fabric of the parent rock within the highly weathered rockmass, and the requirement for moderate effort to excavate with heavy excavators. Types 1 and 2 bedrock are of generally better rockmass quality. The transition from Type 3 to Type 2 can be inferred where it becomes necessary to rip the rock. Type 1 bedrock will require the use of hydraulic hammers and/or drilling and blasting to excavate.

2.3. Subsurface Conditions at the Proposed Heap Leach Pad, Water Diversion and Process Management Ponds

2.3.1. Heap Leach Pad

2.3.1.1. General

Drawing M5-01 shows the distribution of test holes located in the vicinity of the proposed heap leach pad. Detailed test pit and borehole logs are available in the source documents listed in sub-section 2.1, and are not included in this report. The data suggest that this area can be divided into three zones with distinct overburden conditions: Heap Leach Upland, Heap Leach Valley Bottom, and Heap Leach Southern Edge above Valley Bottom. The test hole observations from these three zones are summarized in Tables 2a, 2b, and 2c, respectively.

Table 2a. Summary Subsurface Observations in Proposed Heap Leach Pad Area - Upland

Test Hole ID	Approx. Elev[1]. (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC09-A1	884	0.2	1.1	0.9	-	-	-	2.2	0.5 - >2.2
TP-BGC09-HL6-1	1038	0.1	2.4	-	-	2.5	-	6.5	-
TP-BGC09-HL6-2	1024	0.1	0.6	-	-	0.7	-	4.4	-
TP-BGC09-HL6-3	1010	0.2	3.0	-	-	3.2	-	6.2	-
TP-BGC09-HL6-4	981	0.2	3.8	-	-	4.0	-	4.8	2.8
TP-BGC09-HL6-5	1022	0.1	0.6	-	-	0.7	-	4.0	-
TP-BGC09-HL6-6	1062	0.2	1.5	-	-	1.7	-	5.5	-
TP-BGC09-HL6-7	1072	0.2	2.3	-	-	2.5	-	5.4	-
TP-BGC09-HL6-8	920	0.4	> 2.2	-	-	-	-	2.6	1.2 – 2.0
TP-BGC09-HL6-9	1042	0.2	0.6	-	-	0.8	-	3.8	1.2 - 1.5
TP-BGC09-HL6-10	939	0.2	1.0	-	-	1.2	-	4.8	2.0
TP-BGC09-HL6-11	976	0.2	0.5	-	-	0.7	-	2.8	-
TP-BGC09-HL6-12	957	0.1	> 5.9	-	-	-	-	6.0	-
TP-BGC09-HL6-13	959	0.1	1.5	-	-	1.6	-	2.4	-
TP-BGC09-HL6-14	870	0.2	5.6	-	-	6.0	-	6.2	-
TP-BGC09-HL6-15	979	0.2	4.7	-	-	4.9	-	5.3	0.2 - 1.4

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Test Hole ID	Approx. Elev[1]. (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC09-HL6-16	999	0.1	-	-	-	0.1	-	5.3	-
TP-BGC09-HL6-17	984	0.2	1.1	-	-	1.3	-	3.3	-
TP-BGC10-26	1023	0.1	1.6	-	-	1.7	-	5.3	-
TP-BGC10-27	1045	0.2	1.5	-	-	1.7	4.5	5.3	-
TP-BGC10-28	1027	0.3	> 0.2	-	-	-	-	0.5	0.4 - >0.5
TP-BGC10-29	1049	0.2	1.0	-	-	1.2	-	3.0	-
TP-BGC10-30	1060	0.2	3.8	-	-	4.0	-	5.5	-
TP-BGC10-31	1048	0.2	3.0	-	-	3.2	-	5.3	-
TP-BGC10-35	880	0.4	2.0	-	-	-	2.5	5.5	-
TP-BGC10-41	942	0.2	4.0	-	-	4.3	-	6.1	-
TP-BGC10-42	917	0.3	> 3.2	-	-	-	-	3.5	0.7 - >3.5
DH-BGC09-AG3	884	1.2	6.4	-	-	-	7.6	13.7	-
BH-BGC10-1	1057	NR				-	1.8	20.4	-
BH-BGC10-2	949	NR				7.3	-	20.4	-
MW10-AG3	997	0.2	4.5	-	-	4.7	-	11.8	-
MW10-AG5	934	0.2	0.9	-	-	1.1	-	16.1	-
MW10-AG6	906	0.3	4.1	-	-	4.4	9.0	17.7	-
TP95-51	912	-	> 5.5	-	-	-	-	5.5	-

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Test Hole ID	Approx. Elev[1]. (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP95-52	899	0.2	-	-	-	0.2	3.0	3.0	-
TP95-53	917	0.4	> 1.2	-	-	-	-	1.6	0.4 - 1.2
TP95-54	911	-	6.4	-	-	6.4	-	7.3	-
TP95-55	904	0.2	> 5.2	-	-	-	-	5.5	-
TP95-56	920	-	> 6.0	-	-	-	-	6.1	-
TP95-57	902	2.7	-	-	-	2.7	5.5	5.5	-
TP95-58	889	1.8	5.5	-	-	-	-	7.3	6.7 - 7.0
TP95-59	871	1.2	4.9	-	-	-	-	6.1	-

Notes:

(1) Approximate ground elevation is inferred from available digital elevation model based on assumed approximate horizontal position.
(2) "NR" = no recovery
(3) – not observed or not applicable
(4) Frozen ground observations from older test pits (TP95-XX or TP96-XX) may not reflect current conditions
(5) Stantec monitoring wells MW09-AG1 and MW09-AG2 have been excluded from the table since they do not provide any soil information.

Table 2b. Summary Subsurface Observations in Proposed Heap Leach Pad Area – Valley Bottom

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC09-DG1	923	-	-	-	> 2.5	-	-	2.5	-
TP-BGC10-17[4]	873	0.1		>1.5	4.4	-	-	6.0	-
TP-BGC10-18[4]	877	0.2	0.3	>7.0	-	-	-	7.5	-
TP-BGC10-21[3]	895	0.1	-	-	>6.4	-	-	6.5	-
TP-BGC10-22[4]	884	0.1	0.8	-	-	0.9	1.5	5.3	-

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC10-23[4]	880	-	-	-	> 5.0	-	-	5.0	-
TP-BGC10-24	858	0.1	-	-	>2.9	-	-	3.0	-
TP-BGC10-32[4]	902	0.1	-	-	7.9	-	-	8.0	-
TP-BGC10-36	837	-	-	-	>4.5	-	-	4.5	-
DH-BGC09-DG1	923	-	-	-	6.1	6.1	7.6	12.8	-
BH-BGC10-3	878	-	0.9	-	7.2	-	8.1	50.7	-
BH-BGC10-4	858	-	-	-	8.7	-	8.7	31.0	-
BH-BGC10-5[4]	884	-	-	-	4.3	-	4.3	21.0	-
BH-BGC10-6[4]	876	-	-	16.4	-	-	16.4	28.9	-
BH-BGC10-15[4]	893	NR				-	8.8	21.0	-
BH-BGC10-16[4]	878	NR				8.4	9.9	28.0	-
BH-BGC10-17	836	-	-	-	7.3	-	7.3	37.3	-
BH-BGC10-23	849	-	-	-	>6.0	-	-	6.0	-
TP95-45	838	-	-	-	5.5	-	-	5.5	-
TP95-46	867	-	-	-	2.5	2.5	-	3.1	-
TP95-50	872	-	-	-	2.5	3.7	-	3.7	-
TP96-230	845	-	-	-	>1.5	-	-	1.5	-
TP96-231	843	-	-	-	>3.5	-	-	3.5	-
TP96-232	851	-	-	-	>3.7	-	-	3.7	-

Notes:

(1) Approximate ground elevation is inferred from available digital elevation model based on assumed approximate horizontal position.

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(2) "NR" = no recovery
(3) – not observed or not applicable
(4) Also considered in the proposed velocity reduction pond and rockfill diversion structures analysis
(5) Frozen ground observations from older test pits (TP95-XX or TP96-XX) may not reflect current conditions
(6) Stantec monitoring wells MW09-DG1 has been excluded from the table since it did not provide any soil information.

Table 2c. Summary Subsurface Observations in Proposed Heap Leach Pad Area – Southern Edge of Proposed Heap above Valley Bottom

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC10-17[5]	873	0.1		>1.5	4.4	-	-	6.0	-
TP-BGC10-18[5]	877	0.2	0.3	>7.0	-	-	-	7.5	-
BH-BGC10-6[5]	876	-	-	16.4	-	-	16.4	28.9	-
BH-BGC10-16[5]	878	NR				8.4	9.9	28.0	-

Notes:
(1) Approximate ground elevation is inferred from available digital elevation model based on assumed approximate horizontal position.
(2) "NR" = no recovery
(3) – not observed or not applicable
(4) Frozen ground observations from older test pits (TP95-XX or TP96-XX) may not reflect current conditions
(5) Also considered in the proposed velocity reduction pond and rockfill diversion structures analysis

It should be noted that the current plan in the evolving FS designs is to expand the footprint of the HLF to the east. No subsurface data have been collected within this proposed expanded footprint, therefore, further investigations will be required to support design of this proposed expansion.

2.3.1.2. Overburden

Overburden soil conditions are distinctly different in the Dublin Gulch valley bottom from those encountered above the valley bottom in Ann Gulch and south of Dublin Gulch along the southern edge of the proposed heap.

In the Uplands above the valley bottom, the upper soil unit consists of a thin horizon of organic soil, rootlets, woody debris and plant matter ranging from 0.1 to 2.8 m thickness and averaging approximately 0.4 m (Table 2a). The organic cover above the valley bottom overlies colluvium ranging in thickness from 0.2 to 6.4 m, and averaging approximately 2.9 m (Table 2a). The colluvium consists of loose to compact angular gravel with occasional cobbles in a silt and sand matrix, derived from transported weathered metasedimentary bedrock. The colluvium may also include variable amounts of organics, which are often observed in distinct layers within the colluvium.

The overburden soils in the valley bottom have been reworked by historical placer mining activities. Placer tailings (fill) are observed from the ground surface to bedrock, with thicknesses ranging between 1.5 m and 8.7 m, and an average thickness of approximately 4.9 m (Table 2b). The material encountered is generally a well graded, loose to dense, silty sand and gravel, ranging to sand and gravel with some silt and occasional cobbles and boulders. Loose and moist zones have been encountered within the placer tailings. There is little to no vegetative cover on the placer tailings.

The placer tailings in the valley bottom have highly variable particle size distribution and density, and are generally saturated. Recorded Standard Penetrometer (SPT) blowcounts, N, are summarized in section 2.3.3.2, Table 7 for the placer tailings within the footprint of the proposed process management ponds. No blowcount data are available within the footprint of the heap leach pad, but the placer tailings (fill) materials are expected to have a similar extreme variability in penetration resistance and associated strength and stiffness.

The overburden at the southern edge of the proposed HLF includes 4.4 m of placer tailings at TP-BGC10-17, and a variable thickness of till ranging between 1.5 m to 16.4 m (Table 2c). The till is a compact to dense sandy silt to silty sand with some gravel. It must be noted that in borehole BH-BGC10-16 there was no soil recovery, so the contact between fill and undisturbed till has only been inferred from observations in the adjacent test pit TP-BGC10-17.

2.3.1.3. Bedrock

Drawing M5-01 shows the plan view of the Heap Leach Pad and includes all the existing test holes in the area. Bedrock was observed in the uplands above Dublin Gulch immediately below colluvium at depths ranging between 0.1 and 7.6 m below existing grade (average depth to bedrock at 2.5 m where observed). It is noted that borehole BH-BGC10-2 was excluded from the above-mentioned range since there was no recovery for the top 7.3 m depth.

Bedrock was observed in the valley bottom at depths ranging between 2.5 and 8.7 m below existing grade, with an average depth to bedrock at 5.8 m where observed. Borehole BH-BGC10-15 was excluded from the above-mentioned range since there was no recovery of overburden soil, thus the depth to bedrock is uncertain.

The very limited amount of data at the southern edge of the HLF suggests that bedrock is relatively deep (i.e. greater than 8 m).

Observed bedrock consisted of highly to completely weathered metasedimentary rock (i.e. Type 3 rock) or moderately to highly weathered rock (i.e. Type 2 rock). The metasediments in general are observed as strongly foliated yellowish brown to dark grey phyllites interbedded with quartzites. The quartzites are variably gritty, micaceous, and massive. Phyllitic metasediments are composed of muscovite-sericite and chlorite.

The rock mass quality and characteristics have been inferred from observations in boreholes BH-BGC10-01, -03, -04, -05, -06, -15, -16, -17, MW10AG3, and -AG5, which were drilled

within the heap leach pad footprint. Rock Mass Rating (RMR, Bienawski, 1976) values of 20 to 30 were determined from the observed rock core to about 10 m depth, then increased to about 45 to 50 at most locations.

Geological mapping of structural features was carried out along road cuts, valley cuts and outcrops within and around the heap leach pad footprint by Victoria Gold field geologists during 2009 and 2010. The foliation/lineation/fault features are presented below in stereonets showing structures encountered in the upper portion of the HLF, between Tin Dome and the eastern edge of the heap leach pad, and in the valley bottom, between the proposed rock fill diversion berm and velocity reduction pond to the east, and the proposed process management ponds to the west. These data are plotted in Figures 01 to 03, and the spatial distribution of the field observation locations is shown in Drawing M5-05.

In the upper part of the HLF the structural mapping included 27 data points and shows two sets of structures plus random discontinuities. The first set ranges from east to south-east with an average strike/dip of 114^{o} / 51^{o}, while the second set ranges from north to north-east with an average strike/dip of 013^{o} / 71^{o} (see Figure 01 and Stereonet A in Drawing M5-05). In the valley bottom, 18 data points in the vicinity of the Dublin Gulch diversion berm and velocity reduction pond are divided in two sets, one trending south to south-west with an average strike/dip of 193^{o} / 78^{o}, and the other one trending north-east to east with an average strike/dip of 074^{o} / 67^{o} (see Figure 02 and Stereonet B in Drawing M5-05). For the west part of the valley bottom, between the heap containment embankment and the process management ponds, 51 data points are distributed in two sets, one trending north to north-west with an average strike/dip of 171^{o} / 22^{o}, and the other one trending north-east to east with an average strike/dip of 066^{o} / 86^{o} (Figure 03 and Stereonet C in Drawing M5-05).

Observations from test pits and road cuts indicate that the bedrock structure is highly variable at the local scale due to folding and local undulations of the foliation. However, in general at a larger scale, two major structural sets are identified, one trending NNE – SSW dipping to either E or W and compatible with the regional features sub parallel to Ann Gulch, and the other one trending ENE – ESE dipping to the S, compatible with the regional structure running parallel to Dublin Gulch.

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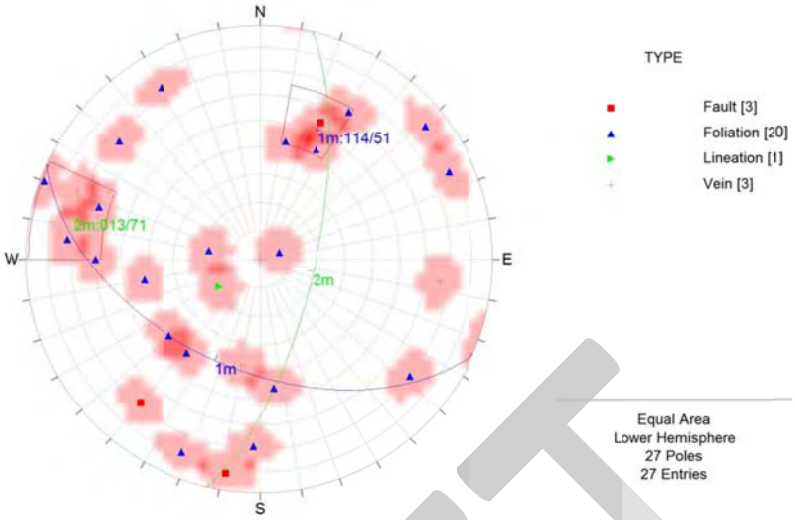

Figure 1. Structural data (interpreted with inclusion of field mapping data provided by Victoria Gold) near the proposed Heap Leach Facility, Upland.

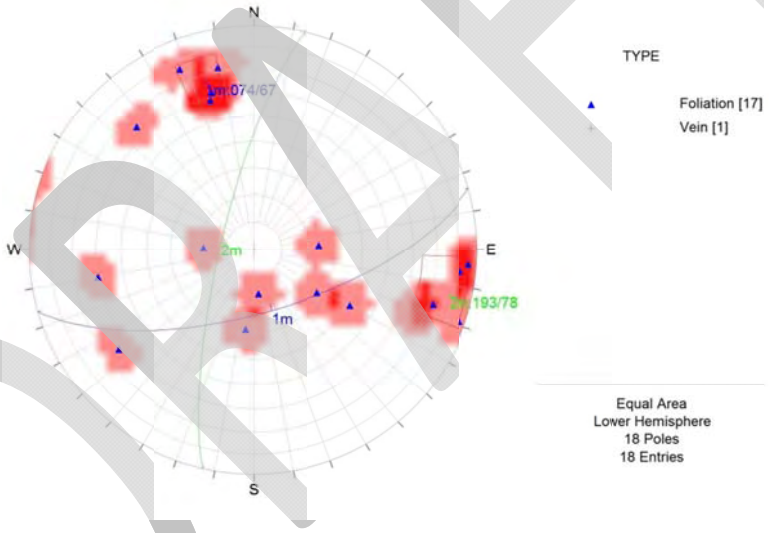

Figure 2. Structural data (interpreted with inclusion of field mapping data provided by Victoria Gold) near the proposed Heap Leach Facility, Valley Bottom East.

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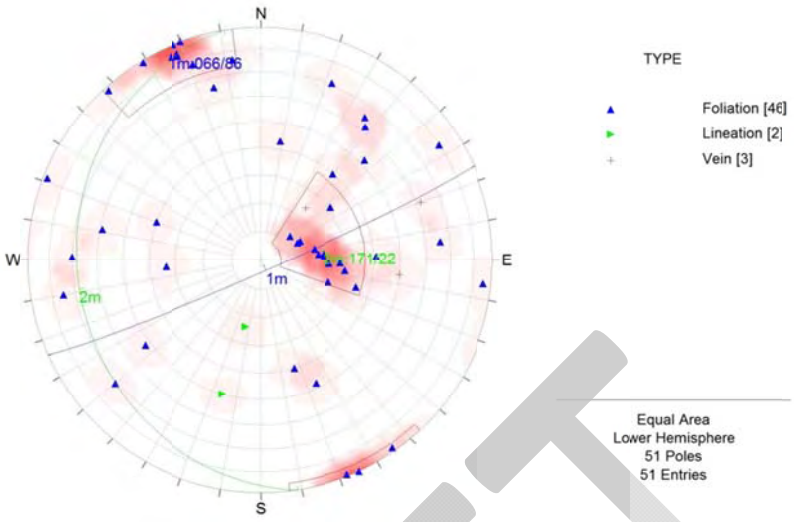

Figure 3. Structural data (interpreted with inclusion of field mapping data provided by Victoria Gold) near the proposed Heap Leach Facility, Valley Bottom West.

2.3.1.4. Groundwater

Groundwater seepage was noted at approximately 2.6 m below ground surface in test pit TP-BGC09-HL6-8, located within the footprint of the proposed heap containment dike. Within the valley bottom, a number of test pits (TP-BGC09-DG1, TP-BGC10-21, -22, TP95-45, -46, -50, TP96-230, -231, -232) encountered groundwater seepage at depths below ground surface varying between 1.5 and 5.0 m. A number of groundwater wells have been installed across the project site, as documented by Stantec (2010), and as illustrated in Drawings M5-01, M5-02 and M5-03. Typical groundwater observations for the area around the HLF are compiled in Table 3.

Table 3 Groundwater Observations in the General Area of the Proposed Heap Leach Pad (data compiled from Stantec 2010)

Location	Well ID	Typical Groundwater Depth (m below ground surface)
Upland	MW09-AG1[1]	14.4
	MW09-AG2[1]	15.5
	MW10-AG3a[2]	9.9
	MW10-AG5[2]	6.7
	MW10-AG6[2]	12.4
Valley Bottom	MW09-DG1[1]	2.6
	MW09-DG2[1]	2.5

Notes:
(1) Groundwater level measured in October 2009
(2) Groundwater level measured in May 2010

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The observed groundwater depths on the open slopes in the upper Ann Gulch valley range from 6.7 m below grade close to the middle of Ann Gulch to 15.5 m in the headwaters of Ann Gulch. Water levels are typically about 2.5 m below ground surface in the Dublin Gulch valley bottom, but can be expected to be closer to ground surface near streams and deeper below piles of tailings. It is anticipated that these levels will vary seasonally.

For preliminary design, it may be assumed that the natural groundwater table will be encountered at approximately 10-15 m depth below grade in the uplands, and at close to the elevation of existing drainage courses in the valley bottom. However, groundwater can be expected to be encountered locally at shallower depths, specifically when approaching the main drainages. This variability should be considered in planning, design and construction.

2.3.1.5. Permafrost

Frozen ground was encountered in the upper part of the HLF footprint (i.e. Upland area) in test pits TP-BGC09-A1, TP-BGC09-HL6-04, -09, -10, -15, TP-BGC10-28, -42, TP95-53 and -58. When observed in a plan view, many of the test pits are located on the eastern slope of Ann Gulch, and all except for TP-BGC10-28 align in a NE trend, covering the entire HLF footprint, from its most eastern edge to its western end at the heap leach containment dike. The reason for this connection between the frozen ground observations is unknown and might simply correspond to sporadic disconnected patches; nevertheless the continuity of the linear feature may deserve to be studied in more detail and accounted for during site preparation and construction. Frozen ground was typically encountered within colluvial gravels and gravels and sands with depths varying between 0.6 m to 2.8 m, and occasionally included excess ice. Test pit TP95-58 describes visible ice encountered between 6.7 m to 7.3 m depth.

Frozen ground was not encountered in the valley bottom nor on the southern edge of the proposed heap leach pad, but localized pockets of frozen ground may be present in these areas.

2.3.1.6. Geological Hazards

Around the HLF, geological hazards as determined by Stantec (2010) mainly include permafrost processes in the west-facing slopes at the upper part of the valley and surface seepage at the bottom of the valley between the rockfill diversion berm and rockfill embankment (Drawing M5-04). Some of the south-facing lower and steeper slopes above Dublin Gulch are affected by rockfall and rockslide hazards (Drawing M5-04). If the HLF is to be extended to the east as proposed, these hazards will need to be accounted for in planning, designing and constructing grades for the pad in that area.

2.3.2. Water Diversion Structure

2.3.2.1. General

The water diversion system consists of a rockfill diversion dike and velocity reduction pond which will divert water coming from Dublin Gulch into the first segment of a diversion

channel. Approximately half way down the diversion channel at Stuttle Gulch is an energy dissipater/drop structure which will then divert water down toward a second, lower, segment of the diversion channel. The second segment carries water adjacent to the process management ponds down Dublin Gulch into sediment control ponds before discharging into Haggart Creek.

Overburden conditions encountered along the proposed diversion channel alignment before the energy dissipater/drop structure, east of Stuttle Gulch, are generally different than those encountered further west in the valley bottom. The first segment is located at a higher elevation containing primarily colluvium and till; whereas, the second segment is underlain by placer tailings (fill) (see Drawing M5-03). The ground conditions for the second (lower) segment of the diversion channel and sediment ponds are discussed in section 2.3.3 Process Management Ponds.

Ground conditions at the proposed Dublin Gulch diversion berm and velocity reduction pond are similar to that encountered at the valley bottom component of the heap leach pad.

Subsurface conditions in the area of the proposed Dublin Gulch diversion to the Stuttle Gulch energy dissipation structure are summarized below in Table 4.

Table 4 Summary Subsurface Observations in Proposed Dublin Gulch Diversion Area

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC09-HL4-2[5]	910	0.30	2.00	-	-	-	-	2.3	0.3 - >2.3
TP-BGC09-HL4-3[5]	913	0.20	-	4.80	-	-	-	5.0	0.5 - >5.0
TP-BGC09-HL4-7[5,6]	894	0.25	2.50	-	-	-	-	2.8	0.8 - >2.8
TP-BGC09-HL4-14[5]	910	0.30	1.60	-	-	-	-	1.9	0.2 - >1.9
TP-BGC10-17[5]	873	0.05	-	1.55	4.45	-	-	6.1	-
TP-BGC10-18[5]	877	0.20	0.30	7.00	-	-	-	7.5	-
TP-BGC10-19[5]	899	0.15	7.35	-	-	-	-	7.5	1.8 - >7.5
TP-BGC10-20[5]	905	0.20	0.40	-	-	-	0.60	3.2	-
TP-BGC10-21[4]	895	0.10	-	-	6.40	-	-	6.5	-

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
TP-BGC10-22[5]	884	0.10	0.80	-	-	0.90	1.50	5.3	-
TP-BGC10-32[4]	902	0.1	-	-	7.9	-	-	8.0	-
TP-BGC10-43[6]	861	0.1	0.3	6.1	-	-	-	6.5	-
TP-BGC10-44[6]	892	0.3	5.7	-	-	-	-	6.0	3.0 - >6.0
TP-BGC10-45[6]	867	0.1	6.7	-	-	-	-	6.7	-
BH-BGC10-5[5]	884	-	-	-	4.3	-	4.3	21.0	-
BH-BGC10-6[5]	876	-	-	16.4	-	-	16.4	28.9	-
BH-BGC10-15[4]	893	-	-	-	-	-	8.8	21.0	-
BH-BGC10-16[5]	878	NR				8.38	9.9	28.0	-
TP96-129[5]	904	0.2	-	-	4.9	-	-	5.1	1.2 - 5.1
TP96-130[5]	893	-	-	-	1.4	-	1.4	1.8	-
TP95-47[5]	897	0.2	5.3	-	-	-	-	5.5	-
TP95-48[5]	903	0.2	0.7	-	-	-	-	0.9	0.6 - >0.9
TP95-49[5]	886	-	4.9	-	-	-	-	4.9	4.3 - 4.9
DH95-152[6]	865	-				-	12.2	30.2	-

Notes:

(1) Approximate ground elevation is inferred from available digital elevation model based on assumed approximate horizontal position.
(2) "NR" = no recovery
(3) – not observed or not applicable
(4) Test holes relevant to the proposed velocity reduction pond and rockfill diversion structure
(5) Test holes relevant to the proposed first segment of the diversion channel
(6) Test holes relevant to the proposed energy dissipation structure
(7) Frozen ground observations from older test pits (TP95-XX or TP96-XX) may not reflect current conditions

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(8) Stantec monitoring wells MW09-STU2, MW09-STU3, MW09-STU4 have been excluded from the table since they do not provide any soil information.

2.3.2.2. Overburden

The current diversion dike arrangement, as shown in Drawing M5-02 and proposed in the PFS report, is located entirely within the approximate extent of placer tailings. There is a thin organic layer approximately 0.1 m thick underlain by placer tailings with thickness varying between 6.4 m to 7.9 m and an average of 7.2 m. The tailings are generally loose to compact silty sands and gravels and soft to firm sandy silts. Recorded Standard Penetrometer (SPT) blowcounts, N, are summarized in section 2.3.3.2, Table 7 for the placer tailings within the footprint of the proposed process management ponds.

Note that the proposed heap expansion may require a relocation of the diversion berm to the east into an area where no subsurface data are currently available.

The first segment of the diversion channel runs along the north facing slope, south of Dublin Gulch, at an elevation of approximately 900 m, and is generally outside the extent of placer tailings. The overburden consists of a thin horizon of organic soil ranging from 0.05 to 0.30 m thick and averaging approximately 0.20 m. The organic cover is underlain by colluvium ranging in thickness from 0.3 m to 7.4 m, with an average thickness of approximately 2.6 m. Colluvium is described as a loose to compact gravelly sand with some silt to gravelly silt with some sand. Glacial till is observed locally close to the western end of the upper segment of the diversion channel. The observed thickness of the till unit varied between 1.6 m to 16.4 m, with an average thickness of at least 7.4 m. In this area till is described as being a firm to stiff (or compact to dense) silt and sand with some gravel.

The overburden at the energy dissipater structure consists of a thin layer of organic soil from 0.05 to 0.3 m thick with an average of 0.18 m. The organic cover is underlain by colluvium with a thickness ranging from 0.3 m to 6.7 m and an average of approximately 3.8 m. Colluvium is described as loose to compact silty sand with some gravel, ranging to sandy silt. Test pit TP-BGC10-43 encountered 6.1 m of till underlying the colluvium, described as compact silty sand with some gravel and cobbles.

2.3.2.3. Bedrock

The bedrock near the diversion berm was observed at a maximum depth of 8.8 m in borehole BH-BGC10-15 (no recovery for the first 8.8 m). The rock is described as slightly to moderately weathered metasedimentary rock (W2 – W3), weak to medium strong (R2 – R3), and with very closely spaced discontinuities. The rock mass rating (RMR ’76) ranges from 13 to 50 with an average rating of about 40. For the mapped geological structures in this area refer to Figure 2 and Drawing M5-05.

Close to the east end of the proposed diversion channel, bedrock was encountered within the first 1.5 m below ground surface, where test pits met refusal on bedrock in test pits TP-BGC10-20, -22 and TP96-130. However, boreholes drilled approximately 100 m to the north of the proposed diversion channel (BH-BGC10-05, -06 and -16) showed a depth to

weathered bedrock between 4.3 m and 16.4 m. Rock Mass Rating (RMR, Bienawski, 1976) values of 20 to 30 were determined from the observed rock core to about 10 m depth and then increased to about 30 to 50.

At the proposed energy dissipation structure, bedrock was not encountered in test pits, which met refusal on frozen ground. One borehole drilled by Knight Piesold, DH95-152, encountered moderately weathered bedrock (W2-W3) at 12.2 m.

2.3.2.4. Groundwater

Groundwater has been observed in several test pits along the water diversion alignment (TP-BGC09-HL4-14, TP-BGC10-19, -21, -22 and TP96-130), where seepage caused sloughing of some test pit walls. Depths of groundwater seepage below ground surface varied between 1.5 and 3.0 m.

Table 5 shows a summary of water levels for two boreholes within the energy dissipater structure area.

Table 5 Groundwater Observations within the Proposed Energy Dissipation Structure Area (data compiled from Stantec 2010)

Well ID	Typical Groundwater Depth (mbgs)
DH95-152[1]	4.61
DH95-152[2]	4.19
DH95-152[3]	4.42
DH95-152[4]	4.58
DH95-152[5]	4.53
MW09-STU2[5]	0.65

Notes:
(1) Groundwater level measured in Sept 1995
(2) Groundwater level measured in Nov 1995
(3) Groundwater level measured in Jul 2009
(4) Groundwater level measured in Aug 2009
(5) Groundwater level measured in Oct 2009

Groundwater levels at DH95-152 were observed at an average depth of 4.5 m in 1995 and 2009. Data from monitoring well MW09-STU2, located proximal to Stuttle Gulch, showed an average value out of three readings of 0.65 m below ground surface.

It may be assumed for preliminary design that the groundwater table will be encountered near the energy dissipater area at up to approximately 4 m depth below grade, although there may be areas along the diversion where groundwater will be encountered at shallower depths.

2.3.2.5. Permafrost

Frozen ground was encountered in two test pits TP-BGC10-19 and TP-BGC09-HL4-2, located the valley bottom to the south of the proposed diversion channel. The depth to frozen ground ranged 0.3 m to > 2.3 m (refusal on frozen ground). Excess ice was observed in both test pits.

2.3.2.6. Geological Hazards

As shown in Drawing M5-04, the geological hazards identified by Stantec (2010) that might affect the construction of the diversion berm and part of the energy dissipater include surface seepage within the footprint of the placer tailings. Due to the sandy, and in numerous cases, moist and loose nature of these materials, liquefaction might be an issue under a seismic loading scenario.

For the upper segment of the diversion channel, the presence of permafrost may affect construction and operation, while surface seepage in creek crossings will need to be accounted for as well.

2.3.3. Process Management Ponds

2.3.3.1. General

The proposed process management ponds are located immediately downstream (west) of the heap leach pad and below (south of) the process plant (Drawing M5-03), and are to be constructed in the Dublin Gulch valley bottom, between Stuttle Gulch in the east and Haggart Creek to the west. The ponds are distributed in a linear series, as follows (higher to lower elevation):

- Events ponds to accommodate excess solution and rainfall/snowmelt when hydrological events exceed the storage capacity of the heap. These will operate on an infrequent basis.
- Polishing ponds to provide detention and precipitation of suspended solids coming from the effluent treatment plant. After polishing, water will be pumped to the sedimentation pond below before discharge.
- Sediment control pond to prevent runoff loaded with sediments generated during construction of the facilities and during mine operations from impacting the environment.

The overburden soil encountered in the vicinity of the proposed process management ponds area mainly comprises placer tailings and occasional colluvium or till. Subsurface conditions in the area are summarized below in Table 4.

Table 6 Summary Subsurface Observations in Proposed Process Management Ponds Area

Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
BH-BGC10-13	824	-	1.1	-	11.0	-	12.1	19.5	-
BH-BGC10-14	808	-	-	-	20.7	-	-	20.7	-
BH-BGC10-22	793	-	-	-	18.9	-	-	-	-
BH-BGC10-24	800	-	-	-	16.2	-	-	16.2	-
DH-BGC09-DG2	828	-	-	-	14.6	-	14.6	16.3	-
DH-BGC09-DG3	844	-	-	-	12.1	12.1	16.2	20.7	-
TP-BGC09-A2	823	-	-	4.5	-	-	-	4.5	2.0 – 2.5
TP-BGC09-DG3	837	-	-	-	5.0	-	-	5.0	-
TP-BGC10-37	930	-	-	3.5	5.5	-	-	9.0	-
TP-BGC10-38	830	-	-	-	4.8	-	-	4.8	-
TP-BGC10-39	825	-	-	-	5.5	-	-	5.5	-
TP-BGC10-40	816	-	-	-	5.5	-	-	5.5	-
TP-BGC10-46	795	-	-	-	6.7	-	-	6.7	-
TP-BGC10-47	806	-	-	-	5.3	-	-	5.3	-
TP-BGC10-48	793	-	-	-	3.5	-	-	3.5	-
TP-BGC10-49	808	-	-	-	5.5	-	-	5.5	-

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Test Hole ID	Approx. Elev.[1] (m)	Overburden thickness (m)				Depth to Completely-Highly Weathered Rock (m)	Depth to Moderately-Slightly Weathered Rock (m)	Total Depth (m)	Frozen Ground (depth in m where noted)
		Organics	Colluvium	Till	Fill				
MW10-DG7	795	-	-	-	35.0	-	-	35.0	-
MW10-OBS1	796	-	-	-	15.2	-	-	15.2	-
MW10-OBS2	793	-	-	-	15.2	-	-	15.2	-
TP95-43	822				5.5	-	-	5.5	-
TP95-44	828	-	-	-	5.5	-	-	5.5	-

Notes:

(1) Approximate ground elevation is inferred from available digital elevation model based on assumed approximate horizontal position.
(2) "NR" = no recovery
(3) – not observed or not applicable
(4) Test holes relevant to the proposed velocity reduction pond and rockfill diversion structure
(5) Test holes relevant to the proposed first segment of the diversion channel
(6) Test holes relevant to the proposed energy dissipation structure
(7) Frozen ground observations from older test pits (TP95-XX or TP96-XX) may not reflect current conditions
(8) Stantec monitoring wells MW09-DG2, MW09-DG3, MW09-DG4 have been excluded from the table since they do not provide any soil information.

2.3.3.2. Overburden

The placer tailings within the footprint of the proposed process management ponds and lower segment of the proposed diversion channel, above Dublin Gulch, generally vary in thickness from 3.5 to 20 m with an average thickness of 10.9 m. Note that 35 m of overburden was encountered at one hole, Stantec monitoring well MW10-DG7. Till was observed in two test holes, TP-BGC10-37 and TP-BGC09-A2. The till was observed to be compact silty sand to sandy silt with varying proportions of gravel.

The placer tailings encountered within the footprint of the event ponds are generally a well graded, loose to compact, sand and gravel with some fines and some cobbles. Further downstream, below the footprint of the polishing ponds and up to the sediment pond, the placer tailings are finer grained, consisting of loose to compact silt and sand, gravelly to some gravel, and ranging to a soft to firm sandy silt with some gravel. Moist to wet fine-grained soils are frequently encountered in this area.

The high degree of variability of particle size distribution and density of the placer tailings within the ponds area is illustrated by the associated variability in Standard Penetration Test (SPT) N-values. Table 7 below summarizes the available SPT N-value for the boreholes within the area of the proposed process management ponds. Detailed records of recorded N values can be found on the borehole logs in BGC's 2010 site investigation data report (BGC 2011a).

Table 7 Summary of Standard Penetration Test N-values for the placer tailings within the Process Management Ponds Footprint

Borehole ID	Depth Interval tested (m)	USCS	Number of Tests Meeting Refusal	N-value (raw blowcount, blows / 300 mm)	
				Average	Standard Deviation
BH-BGC10-13	0.8 – 5.0	GW, trace SW	1	30	8
BH-BGC10-14	1.5 – 20.7	SW/SM – GW/GM	4	32	20
BH-BGC10-14B	1.5 – 5.7	SW - GP	1	4	4
BH-BGC10-22	1.5 – 18.8	SW/SM – ML, trace GW	1	27	28

The overall average N-value for tests performed on placer tailings within the process management ponds footprint is 23 ± 15. For these calculations, even though refused SPTs are considered valid tests, they were not included based on the influence the gravelly soils, which include cobbles and boulders, would have in the results. SPT results in cobbles and boulders cannot be relied on for indicators of density.

2.3.3.3. Bedrock

Bedrock was encountered underlying the placer tailings within the footprints of the proposed events ponds in boreholes BH-BGC09-DG2, -DG3, and BH-BGC10-13 (Drawing M5-03). Depth to bedrock ranged between 12.1 and 14.6 m below existing grade, averaging 13.0 m.

Observed bedrock consisted of moderately to highly weathered metasedimentary rock (i.e. Type 2 rock as described in Table 1) or slightly to moderately weathered rock (i.e. Type 1 rock). The metasediments are moderately to strongly foliated and fractured due to folding. Structures are oriented subparallel to foliation. Structural information relevant to the proposed process management ponds can be obtained from Figure 3 and Drawing M5-05.

2.3.3.4. Groundwater

Groundwater was observed in most of the testpits within the valley bottom (TP-BGC09-DG3, TP-BGC10-40, -48, and -49), where seepage caused sloughing of some test pit walls. Recorded depths to groundwater seepage vary between 2.0 and 5.5 m. Table 8 shows a summary of water levels for the boreholes within the proposed process management ponds. Groundwater levels at these three monitoring well locations were observed to be 2 to 3 m deeper in October 2010 than in May 2010.

Table 8 Groundwater Observations within the Proposed Process Management Ponds (data compiled from Stantec 2010)

Well ID	Elevation (m above sea level)	Groundwater Depth (m below ground surface)
MW09-DG2[1]	824	2.71
MW09-DG2[3]		2.55
MW09-DG2[4]		2.49
MW10-DG7[1]	795	10.27
MW10-DG7[2]		7.30
MW10-OBS1[1]	796	10.69
MW10-OBS1[2]		8.36
MW10-OBS2[1]	793	8.13
MW10-OBS2[2]		6.06

Notes:
(1) Groundwater level measured in Oct 2010
(2) Groundwater level measured in May 2010
(3) Groundwater level measured in Aug 2009
(4) Groundwater level measured in Oct 2009

Groundwater levels at MW09-DG2, located adjacent to the footprint of the proposed lower segment of the diversion channel, were observed at an average depth of 2.6 m between October 2009 and October 2010. Groundwater levels for MW10-DG7 for the period between May and October 2010 averaged 8.8 m below ground surface, while MW10-OBS1 averaged 9.5 m below grade and for MW-OBS2 the average was 7.1 m.

It may be assumed for preliminary design that the groundwater table will be at shallow depths near the event ponds at approximately 2 to 3 m depth below current grade, and that for the sediment control ponds the water level will be at about 7 to 9 m below current grade.

2.3.3.5. Permafrost

Only test pit TP-BGC09-A2 encountered frozen ground within a sandy silt glacial till between 2.0 and 2.5 m below grade. While frozen ground was not often observed within the placer tailings in the valley bottom, isolated patches of permafrost may be encountered.

2.3.3.6. Geological Hazards

The geological hazards identified by Stantec (2010) that might affect the construction of the process management ponds are limited to surface seepage within the footprint of the placer tailings (Drawing M5-04). Due to the sandy, and in numerous cases, moist and loose nature of these materials, liquefaction may be an issue under a seismic loading scenario. Faults have been identified in the project area, as illustrated in Drawing M5-05; however, there is no indication these are active.

3.0 RECOMMENDATIONS

3.1. General

There are a number of significant ground-related challenges to construction of earthworks and buildings at the overall mine site. These are discussed in greater detail in other engineering memos, but include, generally:

- Presence of discontinuous permafrost, including some areas with excess ground ice;
- Relatively short "traditional" (i.e. spring/summer/fall) construction season, with specific challenges and limitations during other parts of the year (e.g. poor trafficability and material workability on hillsides before mid-summer; and long, harsh winter);
- Uncertain quality and quantity of required borrow materials;
- Presence of significant quantities of existing random fill (placer tailings);
- Presence of steep slopes and associated geological hazards; and
- Limitations of data quality or completeness from prior field investigations, resulting in some uncertainties in the interpretation of subsurface conditions.

The uncertainties may be reduced through further field investigation, and to some degree the costs risks can be managed through use of contracts that allow for changing site conditions. Adequate contingencies should be carried in cost estimates to cover the uncertainty and variability, specifically if the HLF will be extended to the east where to date no subsurface information is available.

The following sub-sections contain a number of general recommendations for earthworks construction, to assist Tetra Tech with geotechnical design. These recommendations are provided to be consistent with recommendations provided for development at other areas of the site. More specific recommendations for particular facilities can be provided on request.

3.2. Site Preparation

The shallow overburden materials, including fill, organic soils and colluvium, should be removed to expose the undisturbed weathered bedrock as a subgrade for all settlement sensitive facilities. Organic soils should be removed and stockpiled for reuse in reclamation work. Unfrozen colluvium free of organics may be considered for use as subgrade fill for areas in the heap where some differential settlements can be tolerated without damaging the liner system or without incurring excessive distortion of the leachate detection/collection or internal drainage systems. Where colluvial soils are exposed as heap subgrade, they should be proof-rolled to identify soft or weak zones for removal and replacement.

In the uplands above the Dublin Gulch valley bottom, the overburden soils contain a significant percentage of silt, clay, and fine sand such that their consistency may be sensitive to moisture and freezing temperatures. Care should be taken in working with these materials, particularly during wet periods and spring melt.

Stripped materials should be segregated under the direction of an experienced geotechnical engineer. The excavated colluvium materials may be suitable for re-use as general grading fill (General Fill), provided that they do not contain deleterious materials, such as organic inclusions or significant quantities of excess ice. Materials containing excess ice may become usable if they are stripped frozen, stockpiled and thawed and allowed to drain before use.

Selected poor quality colluvial soils may need to be wasted, at the discretion of the geotechnical engineer. These soils may also degrade to slurry-like consistency when subjected to construction traffic or otherwise disturbed in wet conditions. It is recommended that defined construction roads be used for repetitive construction traffic to minimize disturbance at prepared areas. Trafficability will be poor on recently thawed ground, particularly where excess ice is encountered.

Discontinuous permafrost is present in patches in the area, and soils that seasonally thaw may remain frozen late into the summer. Some of these materials will contain excess ice and will therefore become wet when thawed. Care should be taken to segregate and safely stockpile frozen materials removed during site grading activities. Frozen materials containing excess should be removed from the proposed HLF subgrade and replaced as necessary with a material of equivalent stiffness to the surrounding subgrade.

Construction activities may be conducted during periods of cold weather, where soils may be subjected to freezing conditions. Fill should not be placed upon frozen material, snow or ice. Fill placement should be temporarily suspended if freezing conditions exist. It is recommended that if the ambient air temperature is less than zero degrees Celsius for more than four (4) hours over the preceding twenty-four (24) hours, the temperature of the fill should be measured to determine if the fill is frozen. If frozen, Structural Fill should be removed and replaced. To help protect the fill surface from freezing during periods of shutdown it is recommended that placed fills be covered with a loose (sacrificial) fill, or blankets, to help insulate the fill from freezing temperatures.

The placer tailings in the Dublin Gulch valley bottom have variable gradation and density, and are expected to be prone to excessive settlements under load, and may be locally susceptible to seismic or static liquefaction. The placer tailings are therefore considered to be unsuitable in their current state to support heavy structures such as the heap containment dike and stacked ore, the Dublin Gulch diversion dike, and process management ponds that will contain solution. It is recommended that all placer tailings be removed from all foundation subgrades to expose a subgrade of Type 3 (or better) rock or intact till, which can be built up to required grades by placement of Structural Fill or Rock Fill. Excavation of the tailings is discussed in Sections 3.3.7 and 3.3.9.

3.3. Site Grading and Fill Materials

3.3.1. General

Site grading, as described in this section, includes all major excavations and fills necessary to bring the site to the proposed design elevations.

It is expected that the surficial organic soils, colluvium, placer tailings and shallow Type 3 bedrock (i.e. highly to completely weathered bedrock) can be excavated with conventional earth moving construction equipment. If excavations extend into the stronger weathered bedrock (i.e. Types 1 or 2, expected at approximately 3 to 4 m depth below grade in the valley slopes, and 7 to 8 m depth below grade in the valley bottom), excavation will likely require ripping. Use of hydraulic breakers, and potentially localized blasting, may be required deeper in the weathered bedrock.

3.3.2. Structural Fill

Structural fill is defined as engineered fill used for the support of facilities requiring low foundation settlements under load. It may be considered for use in components of the heap containment dike or Dublin Gulch diversion dike.

Structural fill should consist of well graded sand and gravel (maximum particle size of 75 mm) with durable particles and containing less than 8 % fines (% passing the No. 200 sieve by weight), and less than 30 % by weight larger than 19 mm. The Structural Fill should be placed and compacted to at least 100% of Standard Proctor Maximum Dry Density (SPMDD, ASTM D-698) in maximum of 200 mm lifts with equipment suitable to achieve the required density.

Structural fill should not be placed upon frozen material, snow or ice. The placed fill should also be free of frozen materials and protected from the weather during freezing conditions. A layer of insulating fill or insulated blankets may be required when working in freezing or near-freezing conditions.

3.3.3. Rock Fill

Material containing more than 30 percent of particles above 19 mm (3/4 inch) size (Rock Fill) may be considered for use as fill in areas for select applications where frost susceptibility and drainage are less important. It is understood that the heap containment dike and the Dublin Gulch diversion dike are planned be constructed of Rock Fill.

It will likely be necessary to use relatively weak, non-durable rock for construction of rock fill. Rock Fill derived from weak rock will have high fines content, and therefore will not be suitable in applications where subsurface drainage is important, or where frost susceptibility is a concern. The construction of a Rock Fill developed with weak source rock will require careful quality control. Further advice can be provided as required.

The construction of a Rock Fill using locally derived metasediments will require the use of heavy vibratory rollers, use of thin lifts (i.e. 300 mm loose lifts) and application of water,

similar to construction of an earth fill. Compaction control requirements for a Rock Fill may be determined based on the results of a test fill. The test fill should be constructed and monitored in accordance with the U. S. Army Corps of Engineers' (USACE) guidelines for test fill construction (USACE EM 1110-2-2301). In the event a source of higher quality rock is located capable of producing hard, durable rock particles, as expected from some of the waste rock derived from the open pit, the Rock Fill can be constructed in 1 m lifts and compacted by heavy construction traffic. Additional information regarding construction of Rock Fill using either high or poor quality source rock is provided by Cooke (1990).

3.3.4. General Fill

General fill is defined as a fill material used for general purposes where differential movements due to settlement of fills or frost heaving are of limited concern. General fill is intended as bulk grading fill in laydown or parking areas, as road grading fill below sub base, or for similar applications. General fill may be compacted by compaction equipment or by heavy construction traffic to a minimum of 95 % SPMDD, or to an acceptable level as determined by proof-rolling with a heavily loaded dump truck.

General fill should consist of unfrozen mineral soil with no deleterious materials such as organic or frozen inclusions. General fill should not contain particles exceeding 200 mm, and should contain less than 20 % fines by weight. Materials with oversize or excess fines may be considered for specific applications upon review by a qualified geotechnical engineer.

3.3.5. Permanent Cut Slopes

The PFS drawings (SWRPA 2010) show that the diversion channel involves a permanent cut of up to approximately 15 m height, with a 5 m buffer zone at the toe of the slope adjacent to the diversion channel. The proposed cut will be made through overburden materials and bedrock, which may be Type 3 or Type 2 rock, and can be expected to vary in depth and quality along the length of the diversion. Similar cuts may be required along the sides of the energy dissipater. The eastern expansion of the heap leach pad is expected to require a significant excavation of unknown depth into the adjacent bedrock to achieve acceptable grades.

Cuts in the colluvium and organic overburden above weathered rock can be made at slope angles of 2.5H:1V (22 degrees), provided adequate drainage is provided to keep the overburden drained. Preliminary analysis suggests that cuts of up to 15-20 m height in bedrock (overall cut face height) and with an overall slope angle in the rock of 1.5H:1V from crest to toe will have an adequate factor of safety against overall deep-seated slope failure (including seismic loading). It can be expected that this cut slope will ravel over time, with some accumulation of debris in the 5 m wide buffer.

Frozen ground will be encountered in places near the existing ground surface along the cut slope face to variable depths within the overburden and bedrock. Where excess ice is observed in the overburden materials above bedrock, local overexcavation may be required to reduce the occurrence of thaw-related slumping of the overburden.

The side slopes alongside the energy dissipater should be made at 3H:1V or flatter, as required for adequate erosion protection design.

The excavation for the eastern heap expansion will require additional detail to support design. For preliminary design, it may be assumed that this cut may be made safely with an overall slope angle of 3H:1V or flatter. Consideration of steeper grades will require additional drilling data at the FS stage, prior to initiation of detailed design.

3.3.6. Engineered Fill Slopes

Engineered slopes constructed of Structural Fill may be made at 2H:1V or flatter. Buildings constructed near the proposed earthworks facilities, if required, should be set back a minimum of 10 m from the crest of fill slopes.

Where a structural fill is to be constructed adjacent to an existing natural slope, the fill should be keyed into the natural slope by excavating steps into the slope at the edge of successive lifts of structural fill.

3.3.7. Temporary Excavations

3.3.7.1. General

Construction may require temporary excavations into native soil and weathered bedrock. Safe, stable construction slopes should be made the responsibility of the contractor and will depend on the groundwater and soil and rock conditions encountered at the time of construction.

A review of the PFS designs suggests the following temporary excavations will be required: excavation, removal and recompaction of the placer tailings for foundation preparation for the process management ponds; excavation for foundation preparation at the heap containment dike and rockfill diversion berm, including excavations for preparation of the abutments; and, excavation and removal of unsuitable foundation materials elsewhere within the footprint of the HLF components.

BGC can provide further advice on temporary cut slopes at the Detailed Design stage; however, it is recommended that the design of temporary slopes be left with the Contractor.

3.3.8. Subgrade Preparation

Care should be taken to avoid disturbing subgrade materials that will remain in place. Areas of weathered rock, colluvium or till subgrade that become softened or loosened during construction should be removed and replaced with compacted engineered fill (Structural Fill or Rock Fill). The base of all excavations should be dry and free of loose soils at the time of placement of liner materials or other construction components. Exposed frozen soil with excess ice should be removed to provide a thaw stable subgrade.

3.3.9. Water Control and Construction Dewatering

It will likely be necessary to remove and/or replace most of the existing placer tailings in the valley bottom, and these are largely below the groundwater table. It will be necessary to dewater the excavations. It may be most effective to dam the valley above and pump water around the HLF construction footprint, with additional sumps and pumps as required within the main construction area. The excavation of placer tailings will require careful consideration of scheduling, dewatering, stockpiling and processing of the placer tailings. Dewatering on the scale required will require a plan to avoid or mitigate impacting water in Haggart Creek and Eagle Creek where there are existing fisheries. This will be a major activity requiring further discussion and consideration of construction methods and schedule.

Construction dewatering should be made the responsibility of the contractor. BGC can provide further advice if specifically required.

3.4. Recommendations for Further Investigation

The cut slope designs are based on certain assumptions regarding bedrock quality and structure. These design assumptions may be confirmed through additional site investigation including test pit/trench excavations, mapping, and monitoring of the exposed cut faces, and borehole drilling along proposed cut slopes. Alternatively, the construction contracts may be structured to account for the anticipated variability in subsurface conditions.

There is presently no subsurface information within the footprint of the expanded heap, east of the area identified in the PFS (SWRPA 2010) for the HLF. It is imperative to obtain additional test pit and borehole data to support Detailed Design. If steeper grades are required in this area than recommended in this memorandom, additional subsurface data will be required to support the FS.

3.5. Review of Design and Construction

Details of the design and specifications related to geotechnical aspects of the construction should be reviewed by a qualified geotechnical engineer prior to construction.

All recommendations presented in this memorandum are made with the implicit assumption that an adequate level of monitoring (i.e. full-time monitoring, inspection and testing by suitably qualified persons) will be provided during construction, and that all construction will be carried out by suitably qualified contractors, experienced in earthworks and foundation construction in the north.

3.6. Work to Support Detailed Design

The information and recommendations provided in this report have been prepared to support the development of designs at the FS level. In some cases, sufficient data do not exist to support the development of FS level designs to a normal degree of certainty, due either to observed material variability, or due to the lack of subsurface information. Adequate cost contingencies should be carried in the FS design to address these uncertainties, and consideration should be given to obtaining additional data where warranted.

BGC can provide further geotechnical advice at the Detailed Design stage, if requested. Additional field data will be necessary to support the development of Detailed Design. Tetra Tech should identify geotechnical data gaps that require further investigation either as part of FS development or to support Detailed Design. BGC can assist in this effort if requested.

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4.0 CLOSURE

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DRAWINGS

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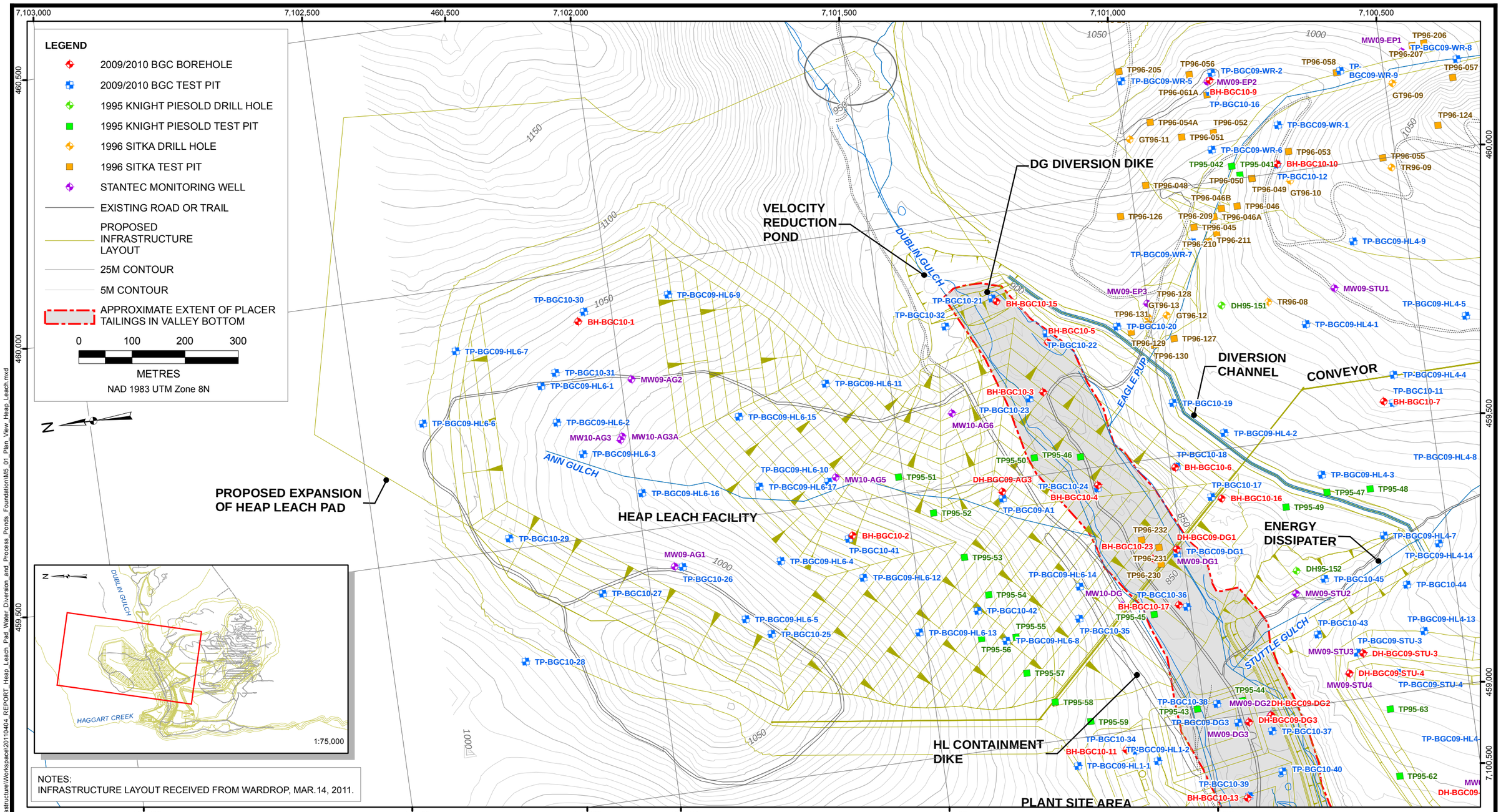

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DATE:	APR 2011
DRAWN:	LL
DESIGNED:	LGT
CHECKED:	AKU
APPROVED:	PQ

PROFESSIONAL SEAL:

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AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
VICTORIA GOLD CORPORATION

PROJECT:
EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT

TITLE:
PLAN VIEW - HEAP LEACH

PROJECT No.:	DWG No.:	REV.:
0792-004	M5 - 01	A

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT" DATED APR 2011

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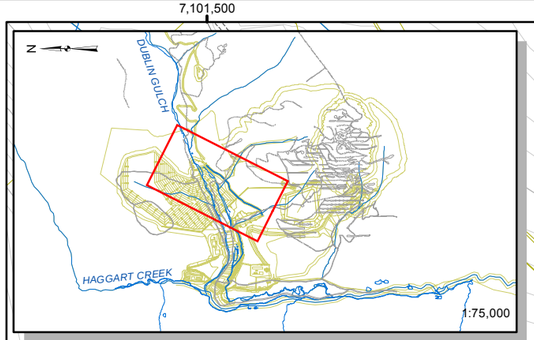

VELOCITY REDUCTION POND

DG DIVERSION DIKE

HEAP LEACH FACILITY

DIVERSION CHANNEL

CONVEYOR

ENERGY DISSIPATER

ORE STOCKPILE

EAGLE PUP

DUBLIN GULCH

STUTTLE GULCH

TP96-046 TP96-046B TP96-048 TP96-046A TP96-209 TP96-045 TP96-211 TP96-210 TP96-126 TP-BGC09-WR-7

TP-BGC09-HL4-9 TP-BGC09-HL4-5 MW09-STU1 TR96-08 TP-BGC09-HL4-1 DH95-151 TP-BGC09-HL4-4 TP-BGC10-11 BH-BGC10-7 TP-BGC09-HL4-8

MW09-EP3 TP96-128 GT96-12 GT96-13 TP96-131 TP96-129 TP96-127 TP-BGC10-20 TP96-130

BH-BGC10-15 TP-BGC10-21 TP-BGC10-22 BH-BGC10-5 TP-BGC10-32 TP-BGC10-19 TP-BGC09-HL4-2 TP-BGC09-HL4-3 TP95-48 TP95-47

BH-BGC10-3 TP-BGC10-23 TP-BGC10-18 BH-BGC10-6 TP95-49 TP-BGC09-HL4-14 TP-BGC09-HL4-7

TP95-46 BH-BGC10-16 TP-BGC10-17 MW10-AG6 TP-BGC09-HL6-11 BH-BGC10-4 TP95-50 TP-BGC10-24 TP-BGC10-44

DH95-152 TP-BGC10-45 TP-BGC09-HL4-13

DH-BGC09-DG1 TP96-231 TP96-232 MW09-DG1 TP-BGC09-DG1 MW09-STU2 DH-BGC09-AG3 TP-BGC09-A1 BH-BGC10-23 TP96-230

TP-BGC10-43 TP-BGC09-STU-3 DH-BGC09-STU-3 MW09-STU3 MW09-STU4 TP-BGC09-STU-4 DH-BGC09-STU-4

TP95-51 TP95-52 MW10-AG5 TP-BGC09-HL6-10 TP-BGC10-36 BH-BGC10-17

TP-BGC09-HL6-14 TP95-45 MW10-DG TP95-53 TP95-63

TP-BGC10-41 BH-BGC10-2 TP-BGC10-35

1000 950 900 850 850

7,101,500 7,101,000 460,000 7,100,500 459,500 7,100,500 459,000 460,000 7,102,000

LEGEND

- 2009/2010 BGC BOREHOLE
- 2009/2010 BGC TEST PIT
- 1995 KNIGHT PIESOLD DRILL HOLE
- 1995 KNIGHT PIESOLD TEST PIT
- 1996 SITKA DRILL HOLE
- 1996 SITKA TEST PIT
- STANTEC MONITORING WELL
- EXISTING ROAD OR TRAIL
- PROPOSED INFRASTRUCTURE LAYOUT
- 25M CONTOUR
- 5M CONTOUR
- APPROXIMATE EXTENT OF PLACER TAILINGS IN VALLEY BOTTOM

0 50 100 150

METRES

NAD 1983 UTM Zone 8N

NOTES:
INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP, MAR.14, 2011.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.
A	2011/04/21	ISSUED FOR CLIENT REVIEW	LL	DW	PQ

SCALE: 1:4,000
DATE: APR 2011
DRAWN: LL
DESIGNED: LGT
CHECKED: AKU
APPROVED: PQ

PROFESSIONAL SEAL:

DRAFT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT

TITLE: PLAN VIEW - DIVERSION CHANNEL

PROJECT No.:	DWG No.:	REV.:
0792-004	M5 - 02	A

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT" DATED APR 2011

X:\Projects\0792 Victoria Gold\004_EG_FS_Infrastructure\Workspace\20110404_REPORT_Heap_Leach_Pad_Water_Diversion_and_Process_Ponds_Foundation\M5_02_PlanView_Diversion_Channel.mxd

458,000 458,500 459,000

7,101,000

N

1:75,000

DUBLIN GULCH

HAGGART CREEK

CAMP/ RECREATIONAL AREA

HEAP LEACH AREA

HL CONTAINMENT DIKE

PROCESS MANAGEMENT PONDS

LAYDOWN AREA

ENERGY DISSIPATER

STUTTLE GULCH

SEDIMENT CONTROL PONDS

POLISHING PONDS

EVENT PONDS

WATER TREATMENT PLANT

ASSAY LAB

PROCESS BUILDING

DETOX AREA

TP95-53 TP95-56 TP-BGC10-42 TP95-54 TP-BGC09-HL6-8 TP95-55 TP95-57 TP95-58 TP-BGC09-HL1-1 TP95-59 TP-BGC10-35 TP-BGC09-HL6-14 BH-BGC10-11 TP-BGC10-34 TP-BGC10-33 BH-BGC10-12 TP-BGC09-HL1-2 MW10-DG TP95-45 TP96-232 BH-BGC10-23 TP96-230 TP96-231 BH-BGC10-17 TP-BGC10-36 TP-BGC09-DG1 DH-BGC09-DG1 MW09-DG1 TP95-43 TP-BGC10-38 TP-BGC09-DG3 TP95-44 MW09-DG3 DH-BGC09-DG3 BH-BGC10-13 TP-BGC10-39 TP-BGC10-37 MW09-DG2 DH-BGC09-DG2 TP-BGC10-40 TP-BGC10-17 BH-BGC10-16 MW09-STU2 DH95-152 TP95-49 TP-BGC10-43 TP-BGC10-45 TP-BGC09-HL4-3 TP95-47 MW09-STU4 DH-BGC09-STU-4 TP-BGC09-STU-3 DH-BGC09-STU-3 MW09-STU3 TP95-60 TP95-61 TP95-62 TP95-63 TP-BGC09-STU-4 TP95-48 TP-BGC09-HL4-7 TP-BGC09-HL4-11 TP-BGC09-A2 TP-BGC09-HL4-10 TP-BGC09-DG4 TP-BGC10-47 TP-BGC10-46 BH-BGC10-24 TP-BGC10-48 BH-BGC10-14 TP-BGC10-49 MW09-DG4 BH-BGC10-22 MW10-DG7 MW10-OBS2 MW10-OBS1 MW09-DG5

780 800 820 840 860 880 900 920

LEGEND

- 2009/2010 BGC BOREHOLE
- 2009/2010 BGC TEST PIT
- 1995 KNIGHT PIESOLD DRILL HOLE
- 1995 KNIGHT PIESOLD TEST PIT
- 1996 SITKA DRILL HOLE
- 1996 SITKA TEST PIT
- STANTEC MONITORING WELL
- EXISTING ROAD OR TRAIL
- PROPOSED INFRASTRUCTURE LAYOUT
- 25M CONTOUR
- 5M CONTOUR
- APPROXIMATE EXTENT OF PLACER TAILINGS IN VALLEY BOTTOM

0 50 100 150

METRES

NAD 1983 UTM Zone 8N

NOTES:
INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP, MAR.14, 2011.

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DRAFT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
VICTORIA GOLD CORPORATION

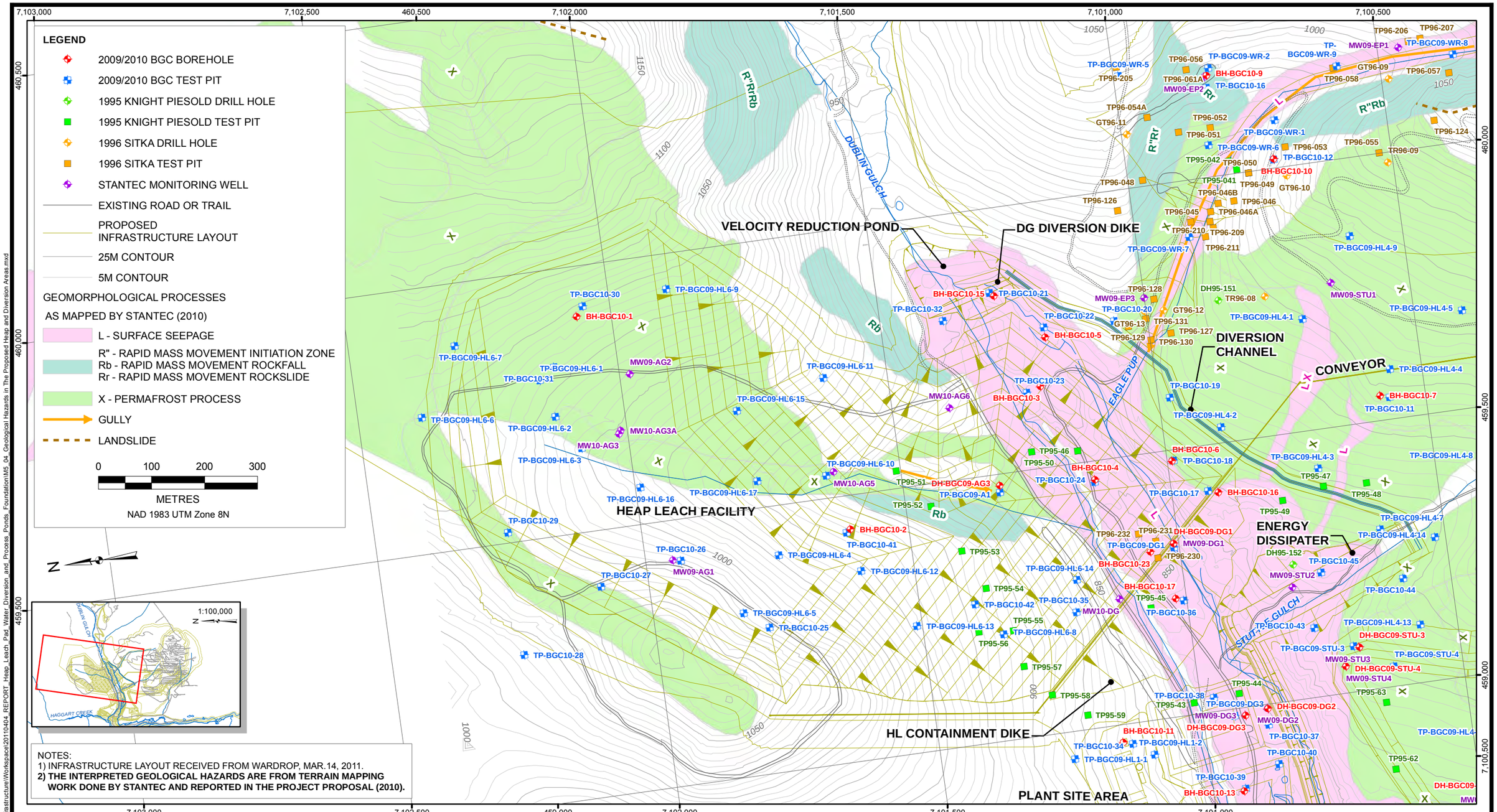
PROJECT:
EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT

TITLE:
PLAN VIEW - PROCESS MANAGEMENT PONDS

PROJECT No.:	DWG No.:	REV.:
0792-004	M5 - 03	A

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT" DATED APR 2011

X:\Projects\0792 Victoria Gold\0004_EG_FS_Infrastructure\Workspace\20110404_REPORT_Heap_Leach_Pad_Water_Diversion_and_Process_Ponds_Foundation\M5_03_Plan_View_Process_water_Ponds.mxd



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A	2011/04/21	ISSUED FOR CLIENT REVIEW	LL	DW	PQ

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DRAFT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
VICTORIA GOLD CORPORATION

PROJECT:
EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT

TITLE:
GEOLOGICAL HAZARDS IN THE PROPOSED HEAP AND DIVERSION AREAS (FROM STANTEC TERRAIN ANALYSIS)

PROJECT No.:	DWG No.:	REV.:
0792-004	M5 - 04	A

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT" DATED APR 2011

X:\Projects\0792 Victoria Gold\004_EG_FS_Infrastructure\Workspace\20110404_REPORT_Heap_Leach_Pad_Water_Diversion_and_Process_Ponds_Foundation\M5_04_Geological Hazards in The Proposed Heap and Diversion Areas.mxd

LEGEND

- EXISTING ROAD OR TRAIL
- PROPOSED INFRASTRUCTURE LAYOUT
- LINEAMENT [3]
- LINEAR FEATURE [4]
- NORMAL FAULT [4]
- FAULT / SCARP [3]

0 100 200 300

METRES

NAD 1983 UTM Zone 8N

VELOCITY REDUCTION POND

DUBLIN GULCH

DG DIVERSION DIKE

CONVEYER

DIVERSION CHANNEL

ENERGY DISSIPATER

SEE A

SEE B

SEE C

HEAP LEACH FACILITY

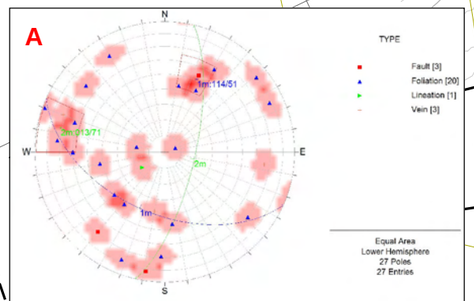
ANN GULCH

HL CONTAINMENT DIKE

PLANT SITE AREA

LAYDOWN AREA

A



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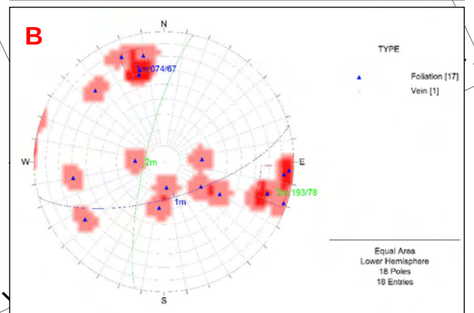

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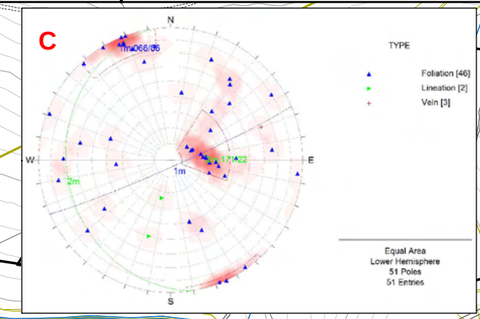

NOTES:
1) INFRASTRUCTURE LAYOUT RECEIVED FROM WARDROP, MAR.14, 2011.
2) POLES IN STEREONETS INFERRED FROM FIELD MAPPING OF EXPOSED OUTCROP CONDUCTED BY VICTORIA GOLD IN 2009 AND 2010.
3) LINEAMENT AND SCARP COMPILATION BY BGC (2009).
4) STRUCTURAL GEOLOGY FROM STEPHENS ET AL, 2004.

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PROFESSIONAL SEAL:

DRAFT

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: VICTORIA GOLD CORPORATION

PROJECT: EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT

TITLE: STRUCTURAL GEOLOGY MAP

PROJECT No.:	DWG No.:	REV.:
0792-004	M5 - 05	A

DWG TO BE READ WITH BGC REPORT TITLED "EAGLE GOLD – HEAP LEACH PAD, WATER DIVERSION AND PROCESS PONDS FOUNDATION REPORT" DATED APR 2011

X:\Projects\0792 Victoria Gold\004_EG_FS_Infrastructure\Workspace\20110404_REPORT_Heap_Leach_Pad_Water_Diversion_and_Process_Ponds_Foundation\M5_05_Structural_Geology_map.mxd

June 4, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of grain size distribution (pre and post) and consolidation and hydraulic conductivity testing on samples "BGC-GD-01 (50mm)" and "BGC-GD-01 (38mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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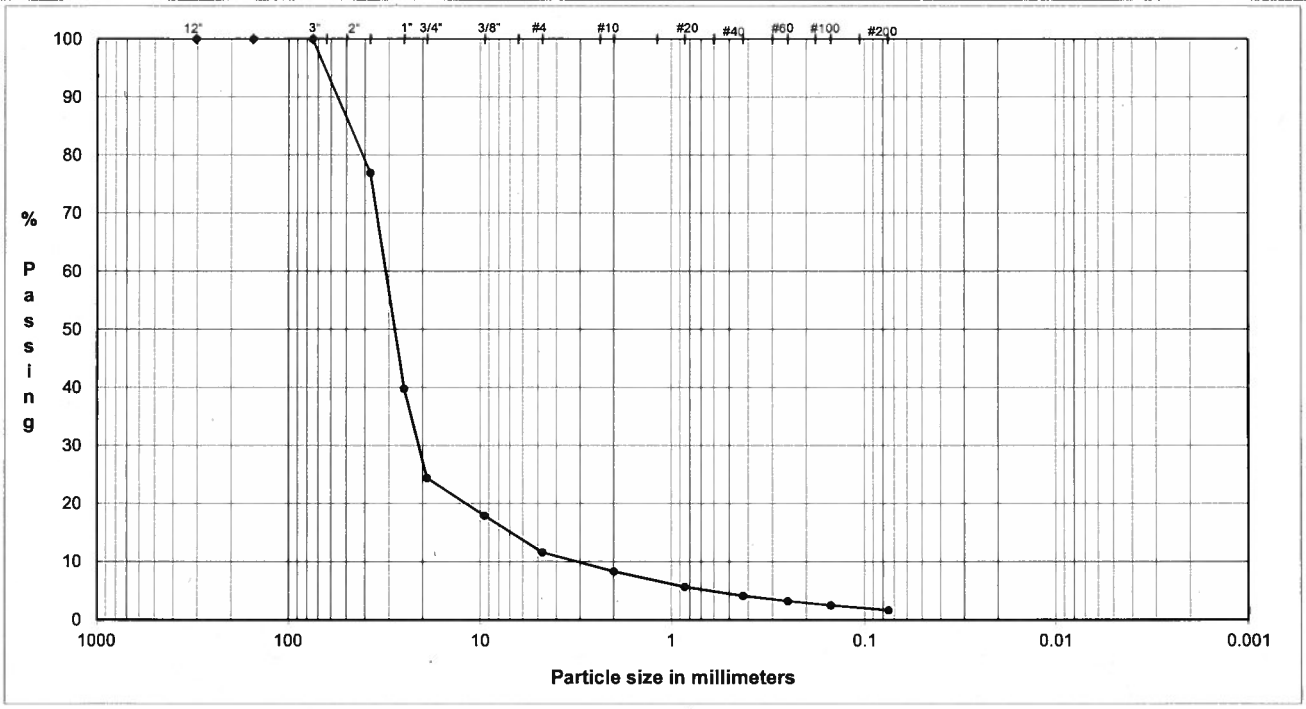
ATTACHMENTS

March-12 | 11-1415-0013.2000

PRE-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (50mm)** Depth (ft) --
TYPE: **Pail (Composite)**

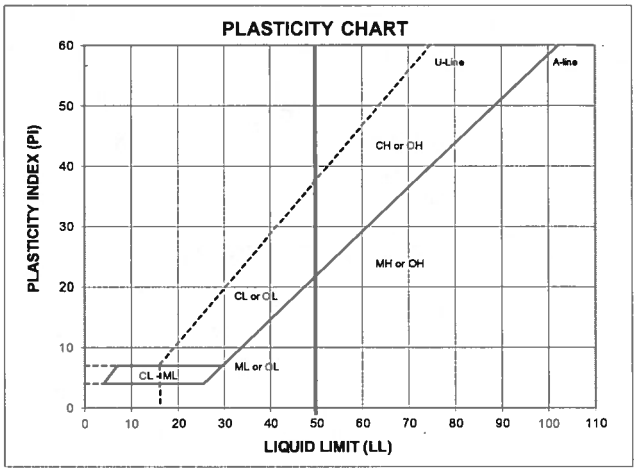


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**76.9**		
1.0"	25.0	**39.8**		
0.75"	19.0	**24.4**	Coarse Gravel	**75.60**
0.375"	9.5	**17.9**		
#4	4.8	**11.6**	Fine Gravel	**12.79**
#10	2.0	**8.3**	Coarse Sand	**3.31**
#20	0.9	**5.6**		
#40	0.4	**4.1**	Medium Sand	**4.18**
#60	0.3	**3.2**		
#100	0.2	**2.5**		
#200	0.1	**1.6**	Fine Sand	**2.49**
			Fines	**1.62**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

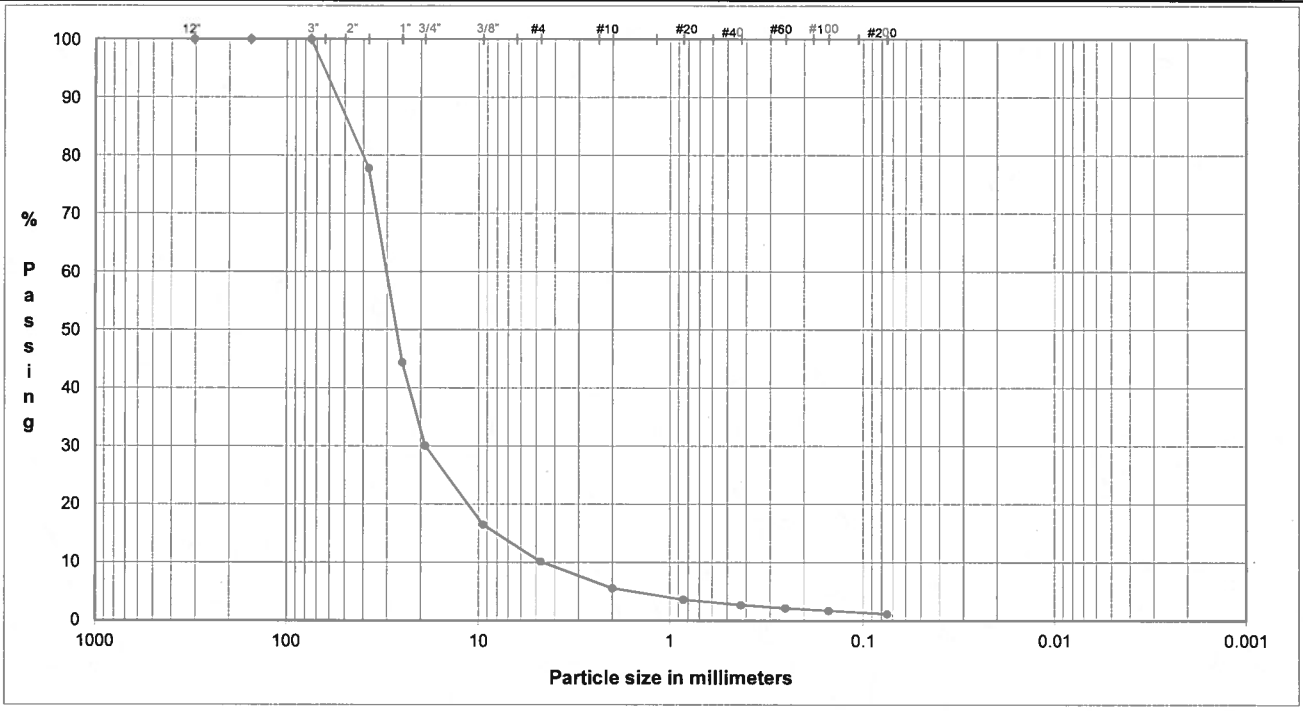
USCS: GP

TECH	JAM
DATE	3/7/12
REVIEW	PRH

March-12 11-1415-0013.2000

POST-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (50mm)** Depth (ft) --
TYPE: **Pail (Composite)**

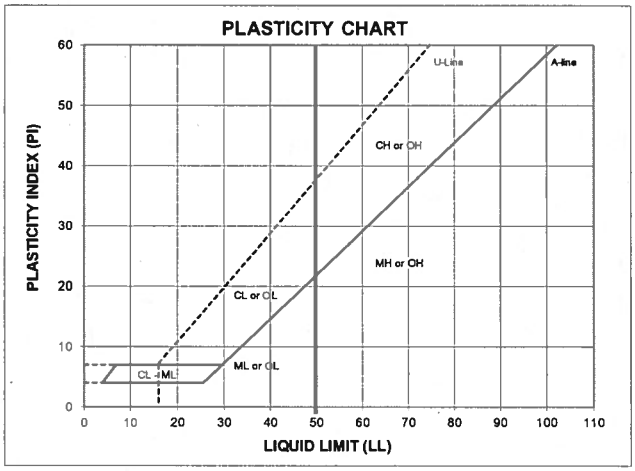


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	100.0		
6.0"	154.2	100.0		
3.0"	75.0	100.0	Cobbles	0.00
1.5"	37.5	77.8		
1.0"	25.0	44.4		
0.75"	19.0	30.1	Coarse Gravel	69.93
0.375"	9.5	16.5		
#4	4.8	10.1	Fine Gravel	19.95
#10	2.0	5.5	Coarse Sand	4.57
#20	0.9	3.6		
#40	0.4	2.7	Medium Sand	2.89
#60	0.3	2.1		
#100	0.2	1.7		
#200	0.1	1.1	Fine Sand	1.52
			Fines	1.14



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: GP

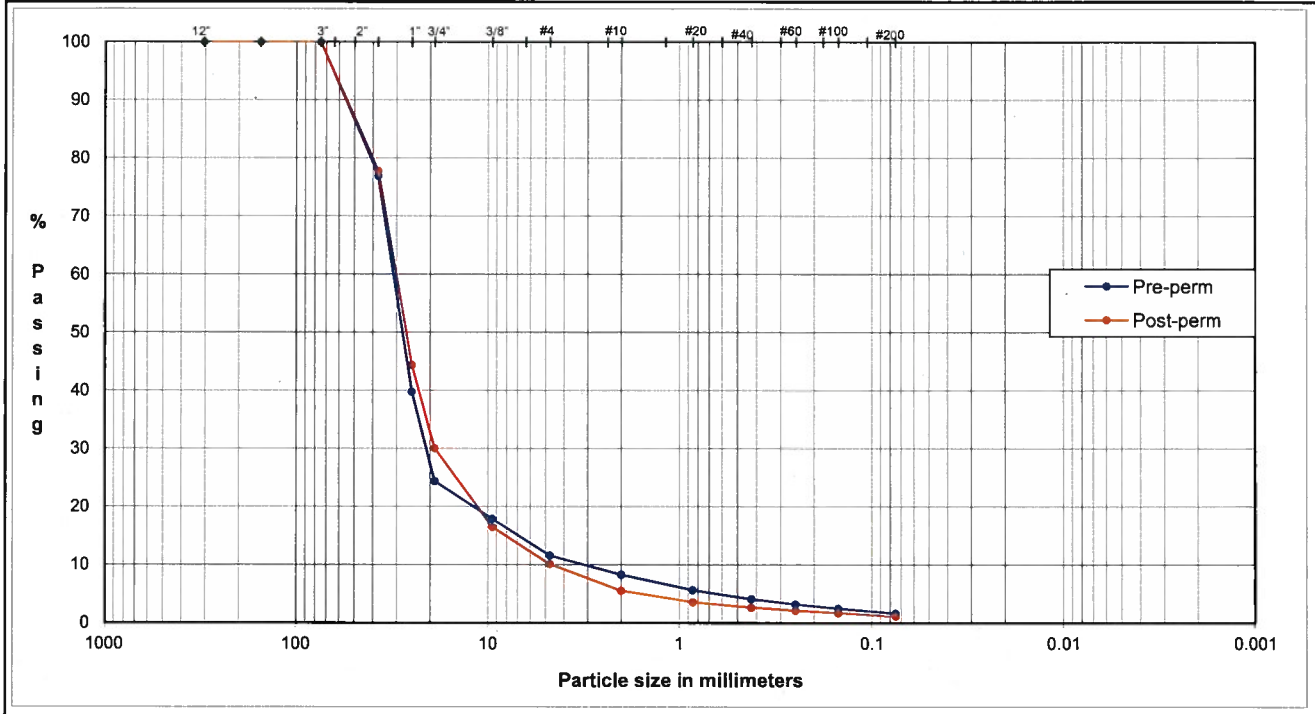
TECH JAM
DATE 3/12/2012
REVIEW PRH

March-12 | 11-1415-0013.2000

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (50mm)** Depth (ft) --
TYPE: **Pail (Composite)**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**76.9**		
1.0"	25.0	**39.8**		
0.75"	19.0	**24.4**	Coarse Gravel	**75.60**
0.375"	9.5	**17.9**		
#4	4.8	**11.6**	Fine Gravel	**12.79**
#10	2.0	**8.3**	Coarse Sand	**3.31**
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#40	0.4	**4.1**	Medium Sand	**4.18**
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#100	0.2	**2.5**		
#200	0.1	**1.6**	Fine Sand	**2.49**
			Fines	**1.62**

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
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3.0"	75.0	**100.0**	Cobbles	**0.00**
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1.0"	25.0	**44.4**		
0.75"	19.0	**30.1**	Coarse Gravel	**69.93**
0.375"	9.5	**16.5**		
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#40	0.4	**2.7**	Medium Sand	**2.89**
#60	0.3	**2.1**		
#100	0.2	**1.7**		
#200	0.1	**1.1**	Fine Sand	**1.52**
			Fines	**1.14**

ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: GP

TECH	JAM
DATE	3/7/12
REVIEW	PRH

TETRA TECH/AGGREGATE/YUKON
11-1415-0013.2000
TABLE 1
RIGID-WALL COMPRESSION
CONSTANT-HEAD PERMEABILITY
10-INCH DIAMETER CELL

Project Title:	Tetra Tech/Aggregate/Yukor	**Boring:**	--
Project Number:	11-1415-0013.2000	**Sample:**	BGC-GD-01 (50mm)
Dates Tested:	3/8/2012 **To:** 3/10/2012	**Depth (ft):**	--

Sample Setup

Initial Sample Height, in	11.067
Mold Diameter, in	10.00
Sample Area, in^2	78.54
Wet Sample Weight, g	21,384.3
Wet Sample Weight, lb	47.15
Dry Sample Weight, g	21,286.0
Dry Sample Weight, lb	46.94

Initial Sample:
Moisture Determinatior

Tare	FEE
Wet Weight and Tare, g	431.30
Dry Weight and Tare, g	429.87
Tare Weight, g	120.37
Moisture Content, %	0.5

Initial Sample Density and Void Rati

Specific Gravity[1]	2.70
Initial Sample Volume, ft^3	0.503
Initial Wet Density, lb/ft^3	93.7
Initial Dry Density, lb/ft^3	93.3
Initial Void Ratic	0.81

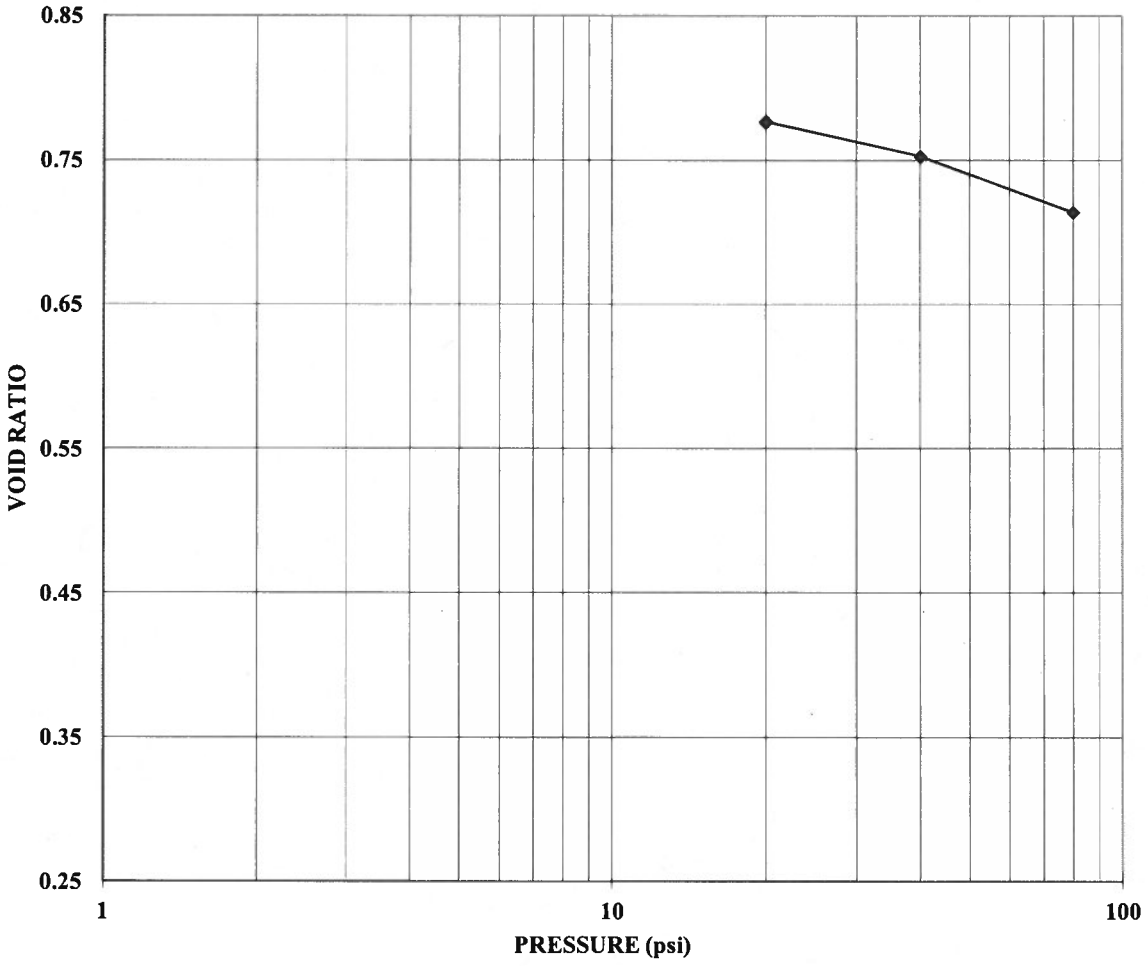
Final Sample Density and Void Rati

Final Sample Height, in	10.505
Final Sample Volume, ft^3	0.477
Final Dry Density, lb/ft^3	98.3
Final Void Ratio	0.71

Load (psi)	Height (in)	Dry Density (pcf)	Void Ratio	Flow Rate (ml/sec)	Gradient	Permeability (cm/sec)	Porosity
20	10.888	94.8	0.78	116.84	0.02	1.1E+01	0.44
40	10.741	96.1	0.75	101.04	0.02	9.7E+00	0.43
80	10.505	98.3	0.71	169.74	0.03	9.2E+00	0.42

NOTES: [1]Specific Gravity = Assumed Valu

ONE-DIMENSIONAL CONSOLIDATION



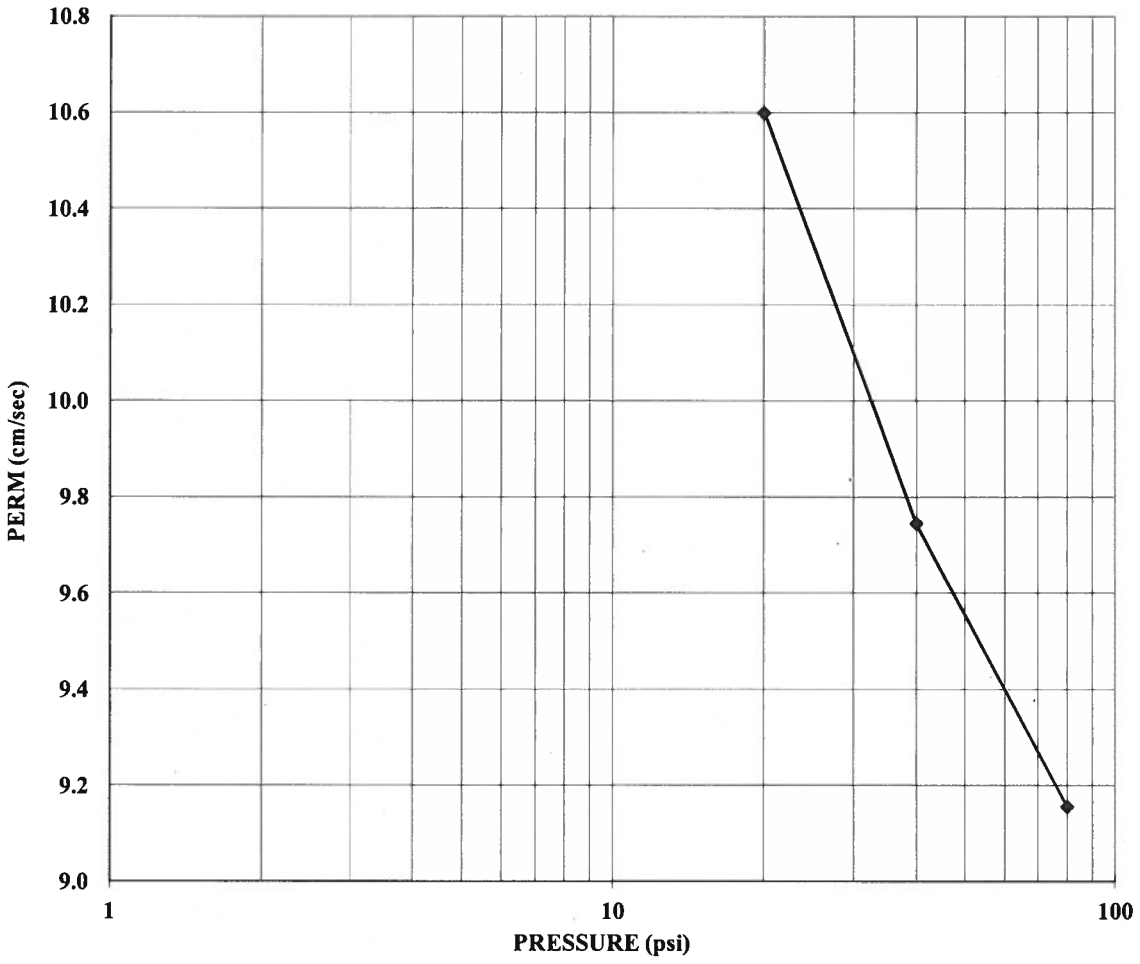
SAMPLE #:	**BGC-GD-01 (50mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	3/10/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



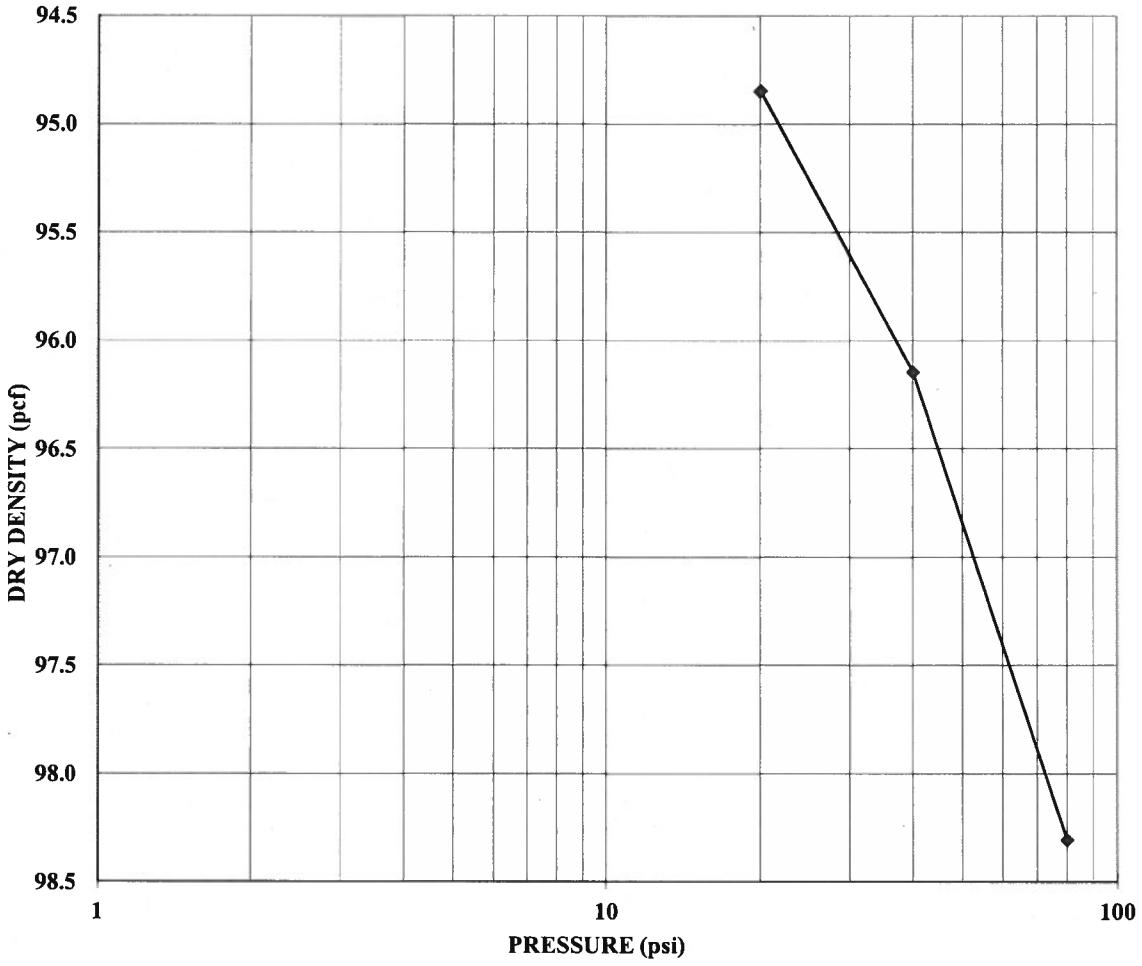
SAMPLE #:	**BGC-GD-01 (50mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	3/10/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



SAMPLE #:	**BGC-GD-01 (50mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	3/10/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

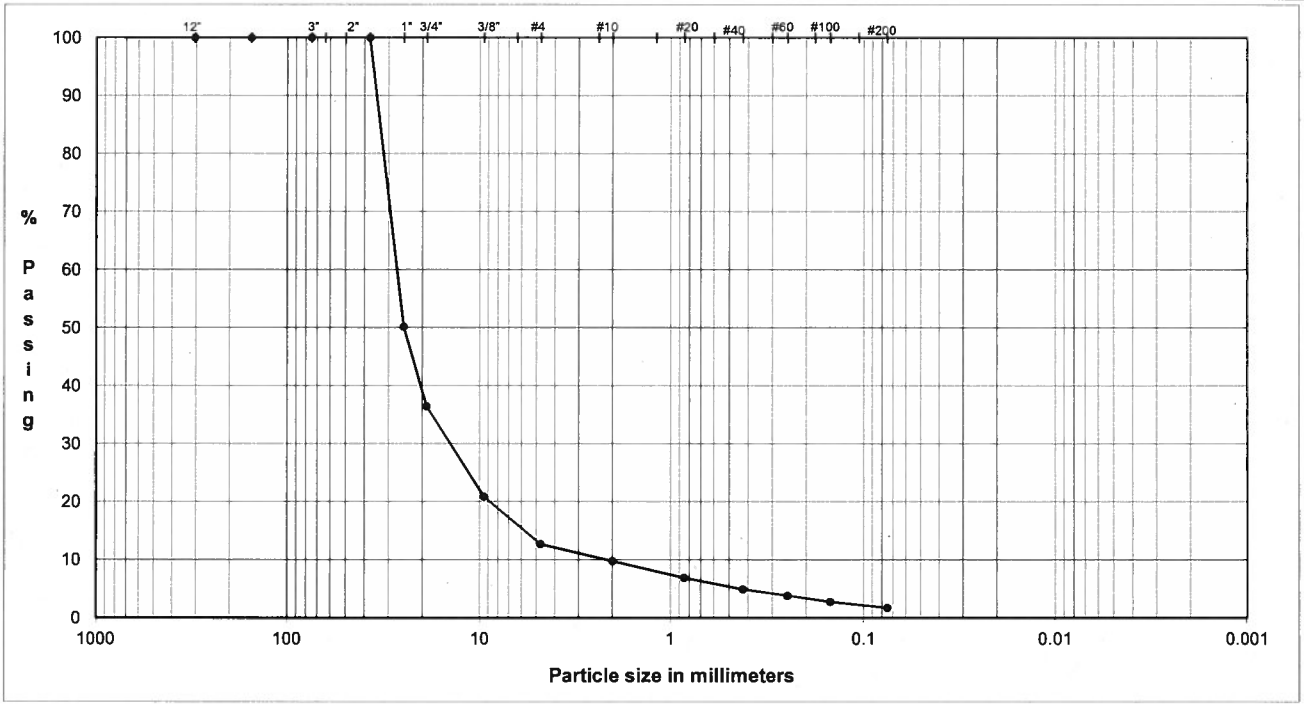
GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

May-12 | 11-1415-0013/2000

PRE-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (38mm)** Depth (ft) --
TYPE: **Pails**

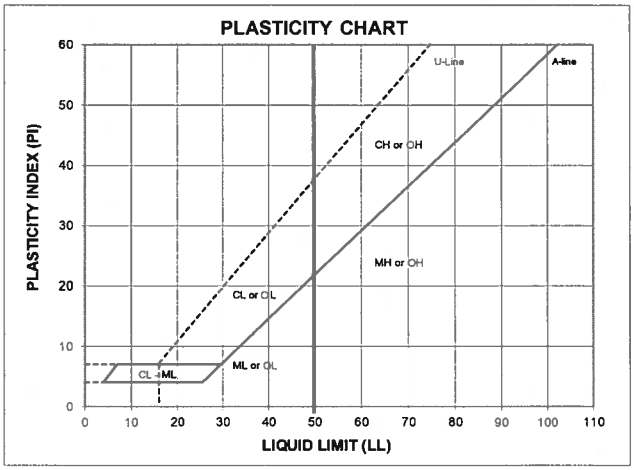


	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**50.1**		
0.75"	19.0	**36.4**	Coarse Gravel	**63.60**
0.375"	9.5	**20.9**		
#4	4.8	**12.7**	Fine Gravel	**23.72**
#10	2.0	**9.8**	Coarse Sand	**2.92**
#20	0.9	**6.9**		
#40	0.4	**4.9**	Medium Sand	**4.85**
#60	0.3	**3.8**		
#100	0.2	**2.8**		
#200	0.1	**1.7**	Fine Sand	**3.20**
			Fines	**1.71**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: GP

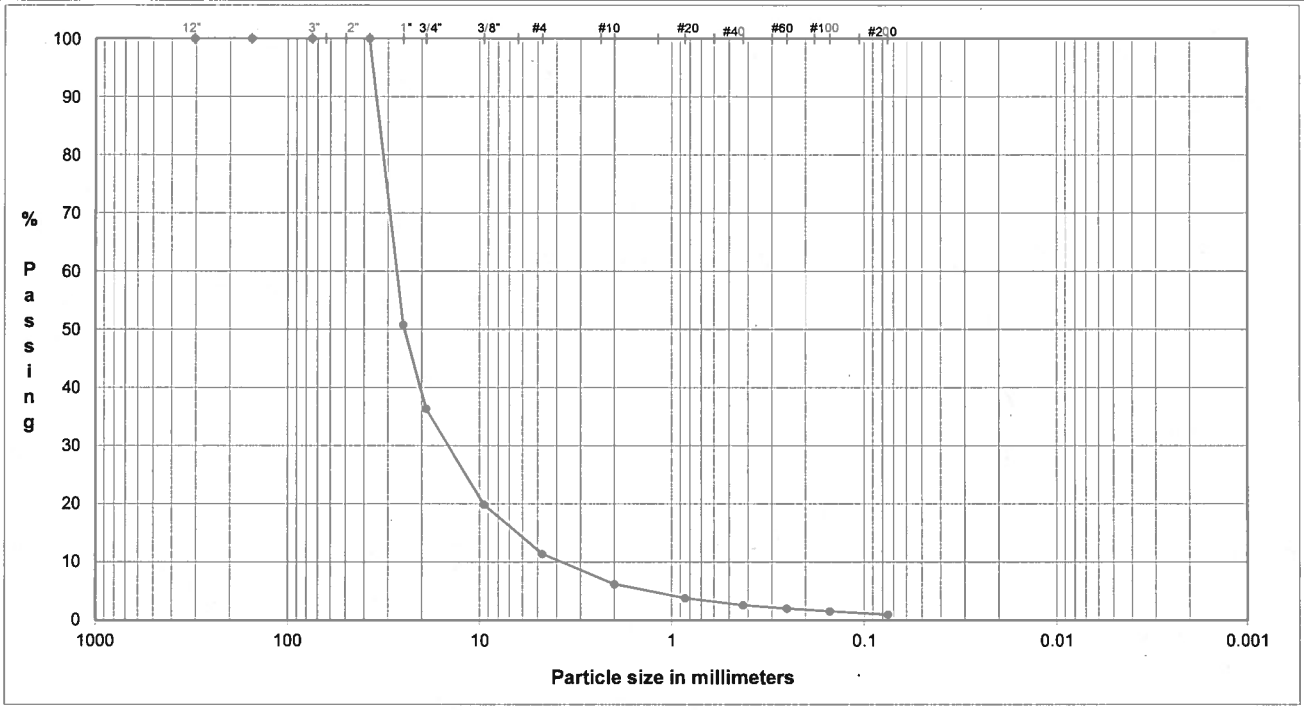
TECH JAM
DATE 5/18/12
REVIEW PRH

May-12 | 11-1415-0013/2000

POST-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (38mm)** Depth (ft) --
TYPE: **Pails**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
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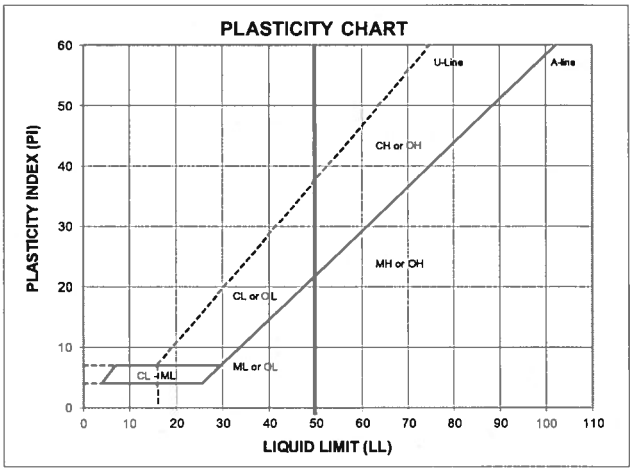
1.5"	37.5	**100.0**		
1.0"	25.0	**50.8**		
0.75"	19.0	**36.4**	Coarse Gravel	**63.64**
0.375"	9.5	**19.9**		
#4	4.8	**11.4**	Fine Gravel	**24.97**
#10	2.0	**6.2**	Coarse Sand	**5.19**
#20	0.9	**3.8**		
#40	0.4	**2.6**	Medium Sand	**3.60**
#60	0.3	**2.0**		
#100	0.2	**1.5**		
#200	0.1	**1.0**	Fine Sand	**1.61**
			Fines	**0.99**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: GP

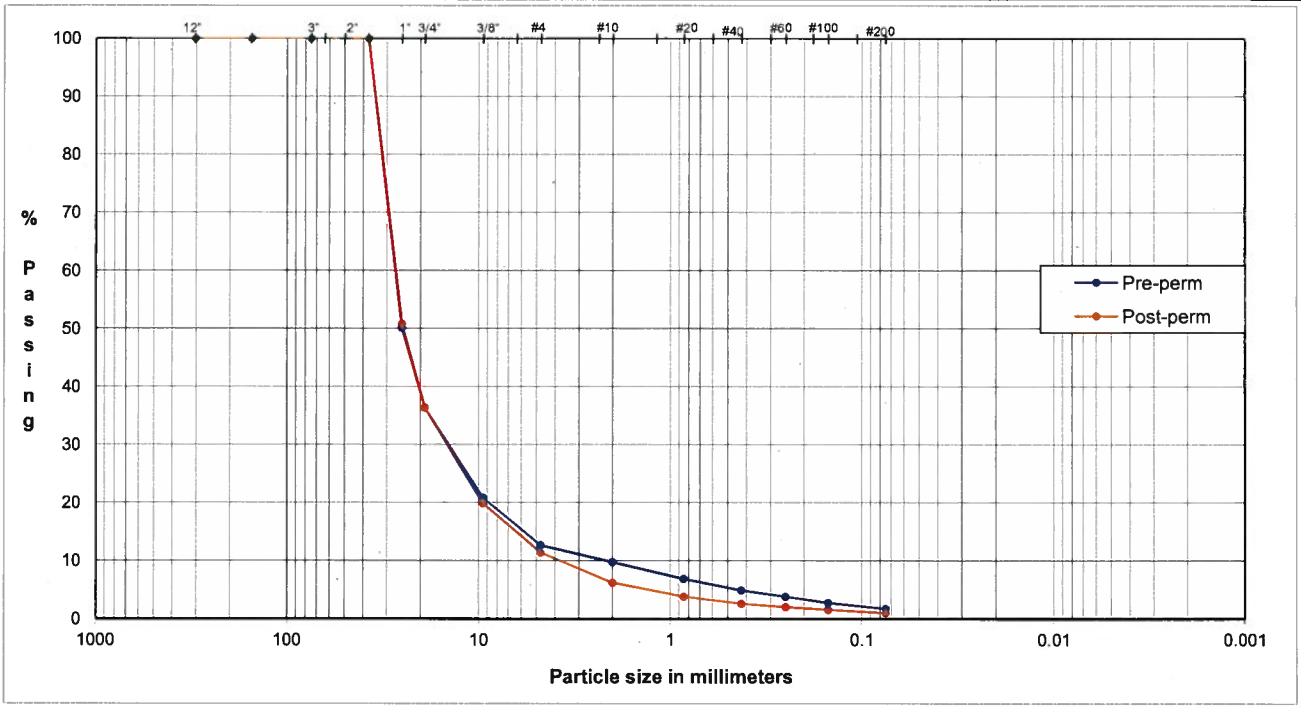
TECH JAM
DATE 5/22/2012
REVIEW PRH

May-12 11-1415-0013/2000

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (38mm)** Depth (ft) --
TYPE: **Pails**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

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POST-PERM

U.S. Standard Sieves Sizes and Numbers

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			Fines	**0.99**

ATTERBERG LIMITS

M,	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: GP

TECH	JAM
DATE	5/18/12
REVIEW	PRH

TETRA TECH/AGGREGATE/YUKON
11-1415-0013.2000
TABLE 1
RIGID-WALL COMPRESSION
CONSTANT-HEAD PERMEABILITY
10-INCH DIAMETER CELL

Project Title:	Tetra Tech/Aggregate/Yukor	**Boring:**	--
Project Number:	11-1415-0013/2000	**Sample:**	BGC-GD-01 (38mm)
Dates Tested:	5/18/2012 **To:** 5/21/2012	**Depth (ft):**	--

Sample Setup

Initial Sample Height, ir	12.045
Mold Diameter, in	10.00
Sample Area, in^2	78.54
Wet Sample Weight, g	22,542.6
Wet Sample Weight, lb	49.71
Dry Sample Weight, g	22,438.9
Dry Sample Weight, lb	49.48

Initial Sample:
Moisture Determination

Tare	ROB-1
Wet Weight and Tare, g	431.30
Dry Weight and Tare, g	429.87
Tare Weight, g	120.37
Moisture Content, %	0.5

Initial Sample Density and Void Ratio

Specific Gravity[1]	2.70
Initial Sample Volume, f^3	0.547
Initial Wet Density, lb/ft^3	90.8
Initial Dry Density, lb/ft^3	90.4
Initial Void Ratio	0.86

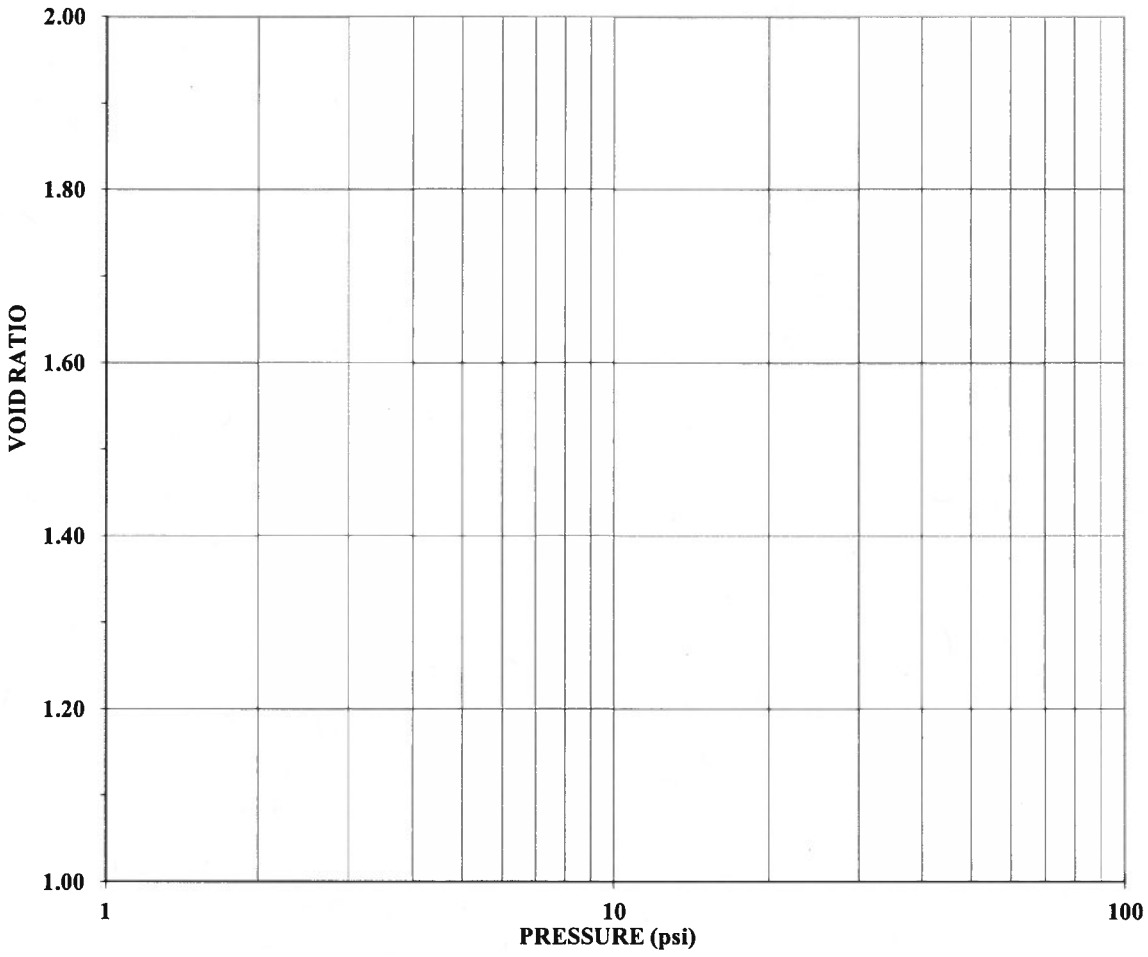
Final Sample Density and Void Ratio

Final Sample Height, ir	11.185
Final Sample Volume, f^3	0.508
Final Dry Density, lb/ft^3	97.3
Final Void Ratio	0.73

Load (psi)	Height (in)	Dry Density (pcf)	Void Ratio	Flow Rate (ml/sec)	Gradient	Permeability (cm/sec)	Porosity
20	11.663	93.3	0.81	202.53	0.02	1.8E+01	0.45
40	11.624	93.7	0.80	218.80	0.05	8.5E+00	0.44
80	11.185	97.3	0.73	123.92	0.07	3.4E+00	0.42

NOTES: [1]Specific Gravity = Assumed Valu

ONE-DIMENSIONAL CONSOLIDATION



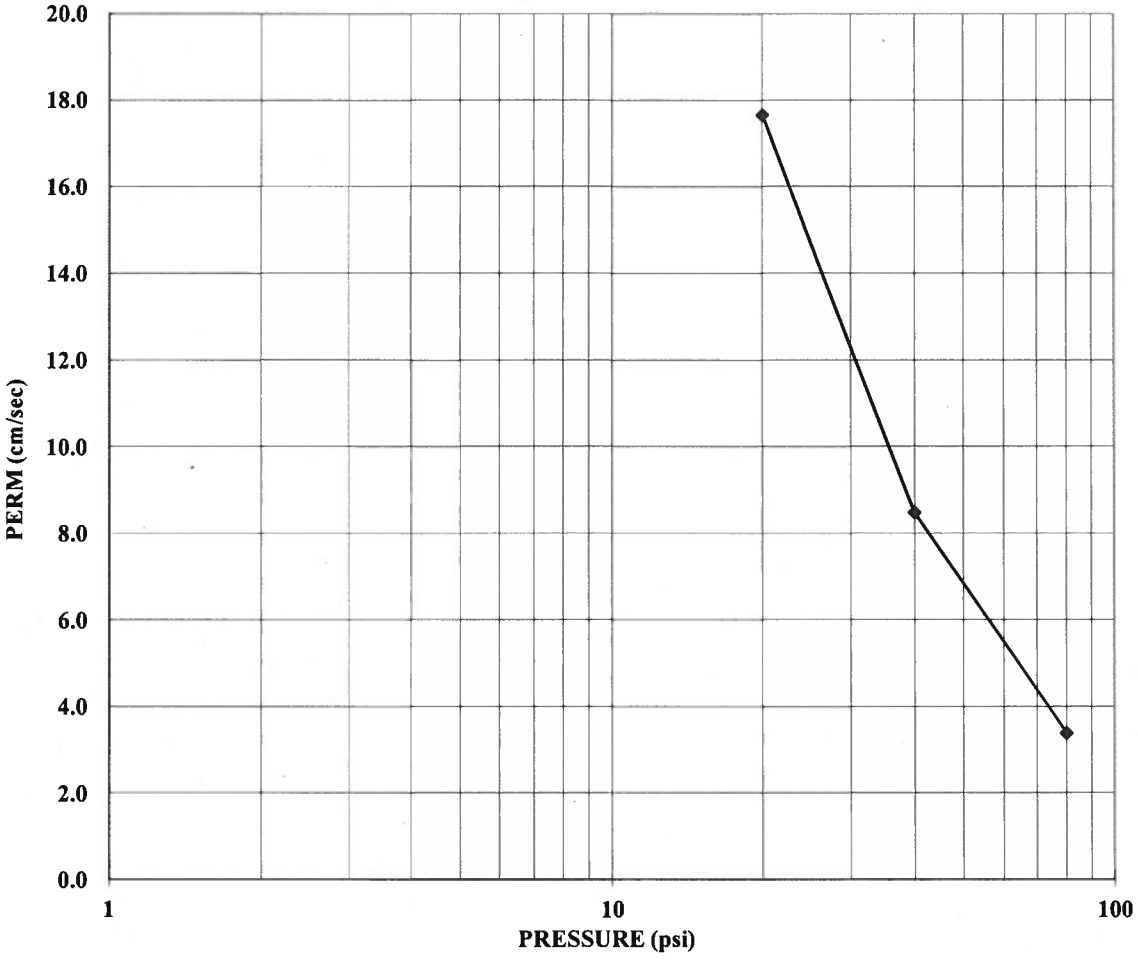
SAMPLE #:	**BGC-GD-01 (38mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	5/21/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013/2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



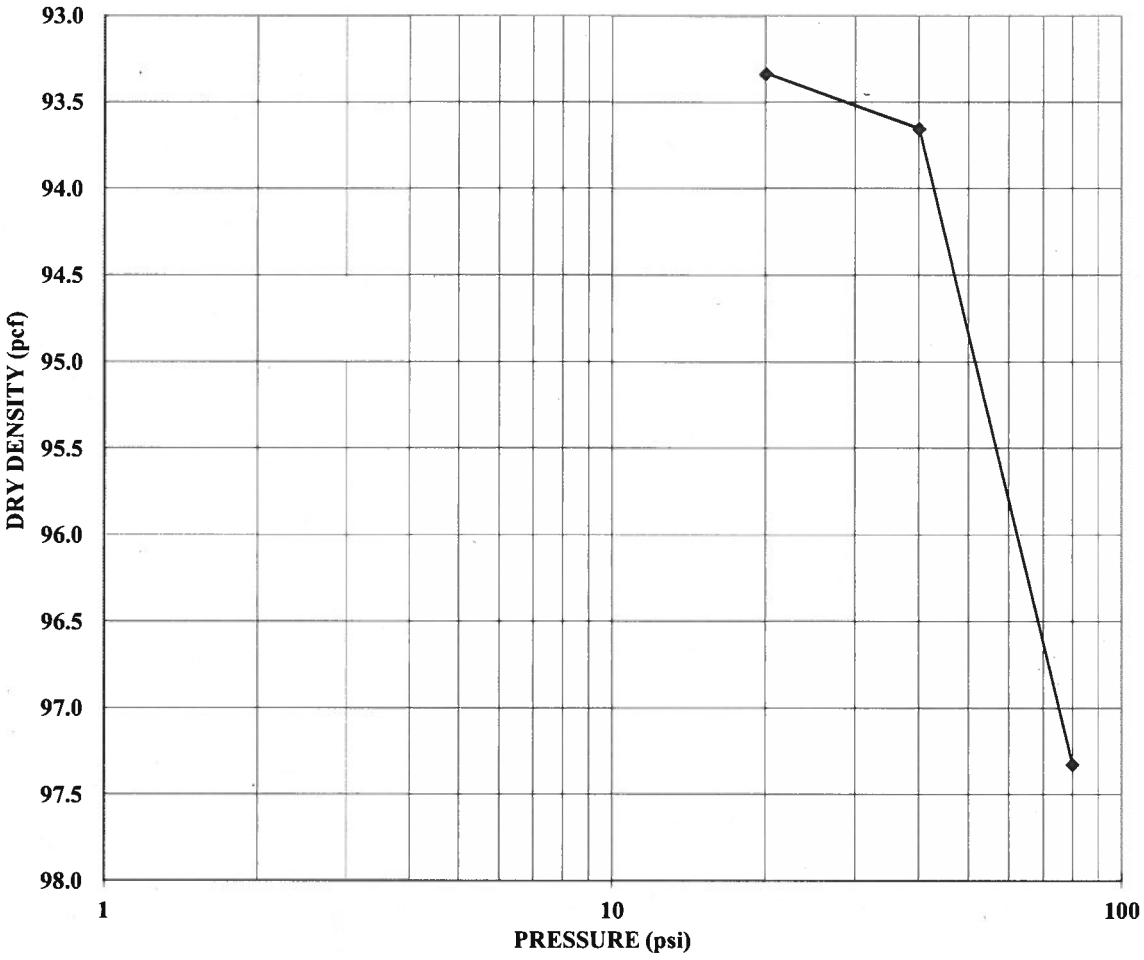
SAMPLE #:	**BGC-GD-01 (38mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	5/21/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013/2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



SAMPLE #:	**BGC-GD-01 (38mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate (GP)**

DATE	5/21/2012
TECH	JAM
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013/2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

Golder Associates

June 16, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on sample "BGC-GD-01 (50mm)". All pending laboratory tests results wi ll be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Section 2 Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (50mm)
DATE TESTED:	05/11/12		

Clay Liner		**Overliner**	
Initial Moisture Content		**Initial Moisture Content**	
Tare:	JW-18	Tare:	OG-1
Wet Weight & Tare, g:	583.7	Wet Weight & Tare, g:	670.82
Dry Weight & Tare, g:	524.38	Dry Weight & Tare, g:	669.24
Tare Weight, g:	128.53	Tare Weight, g:	129.35
Moisture, %:	**15.0**	Moisture, %:	**0.3**
Final Moisture Content		**Final Moisture Content**	
Tare:	Bowl 3	Tare:	J11
Wet Weight & Tare, g:	924.74	Wet Weight & Tare, g:	689.95
Dry Weight & Tare, g:	824.41	Dry Weight & Tare, g:	687.98
Tare Weight, g:	138.66	Tare Weight, g:	82.28
Moisture, %:	**14.6**	Moisture, %:	**0.3**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	4.000	3.337
2.	4.000	3.338
3.	4.000	3.339
4.	4.000	3.339
5.	4.000	3.337
6.	4.000	3.338
Average	4.000	3.338
Cell Height	--	16.250
Sample Height	4.000	8.851

Density	**Clay liner**		**Overliner**	
Wet Weight:	13,791.7	g	21441.10	g
Dry Weight:	11,994.3	g	21378.54	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	4.000	in	8.851	in
Final Height:	4.000	in	7.178	in
Initial Volume:	0.262	ft^3	0.58	ft^3
Final Volume:	0.262	ft^3	0.47	ft^3
Initial Wet Density:	116.2	pcf	81.7	pcf
Final Wet Density:	116.2	pcf	100.7	pcf
Initial Dry Density:	101.1	pcf	81.4	pcf
Final Dry Density:	101.1	pcf	100.4	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours.

Post-Test: No visual puncturing of geomembrane. No penetrations observed during the vaccuum test. Approximately 20 notable dimples on surface of geomembrane.

Liner Thickness (in)

1.	0.060	
2.	0.061	
3.	0.063	
4.	0.061	
5.	0.063	
6.	0.061	
Average	0.062	(in)
	61.50	(mls)

Remold Instructions

Minimun 12" thickness for -2" material. 95% compaction of optimum density. +/- 2% of optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 5/11/2012

Underliner (Bedding) Source: Section 2 Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 1726 corrected

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (50mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 81.4

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (60-mil)

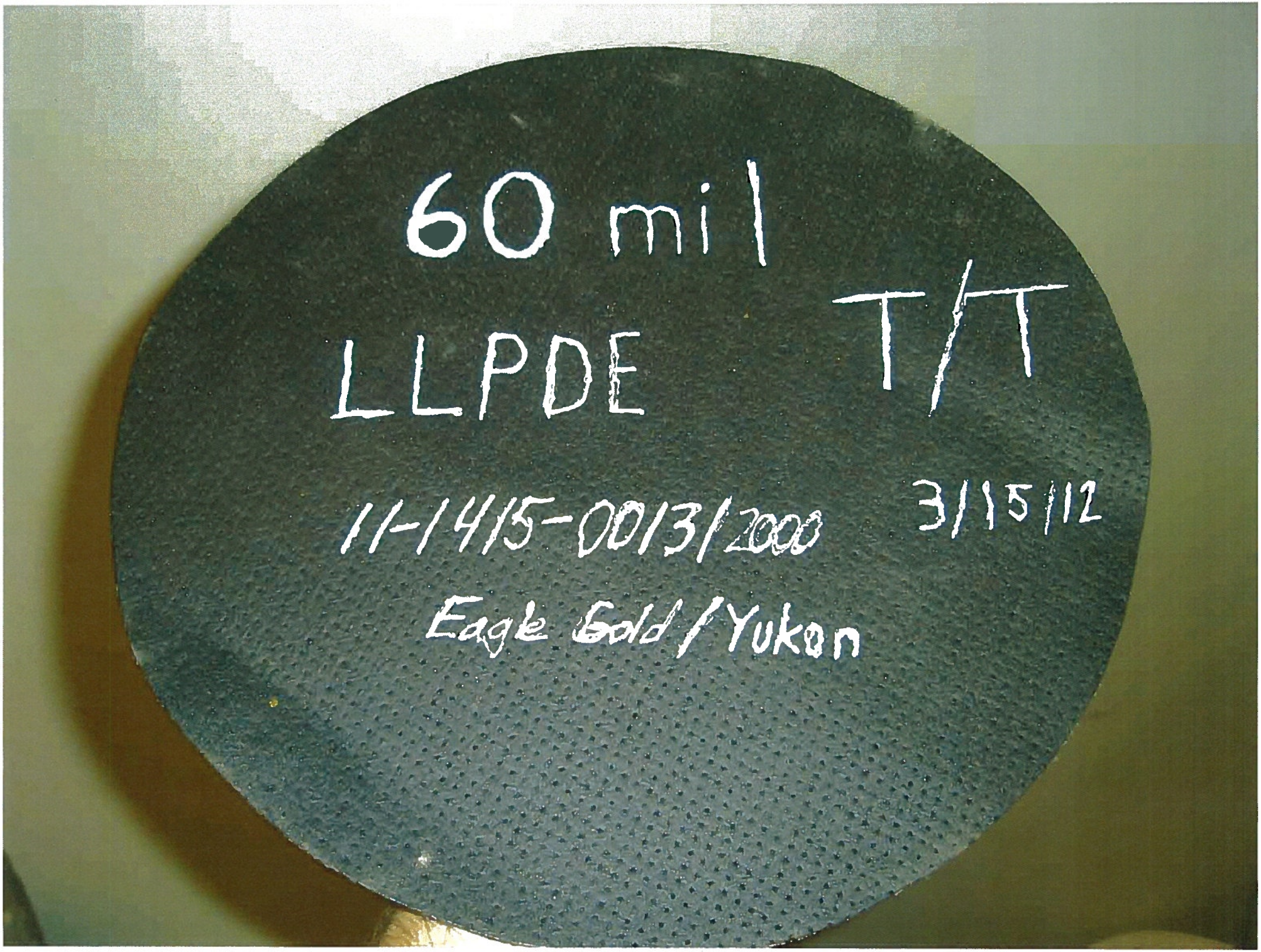
Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
LLDPE Microspike 60	61.50	48	93.9	15.2	640	1.673	Pass	Pass

General Test Notes: Test was conducted using a 12" diameter cell. The 60 mil microspike texture/texture HDPE liner was placed on top of 4.0 inches of underliner soil, then covered with approximately 8.8 inches of overliner material. Approximately 12 rocks were hand placed with points downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 20 hours. The load was maintained for 48 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the liner was inspected and tested for punctures both visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG

Liner observations: No visual puncturing of geomembrane. No penetrations observed during the vaccuum test. Approximately 20 notable dimples on surface of geomembrane.

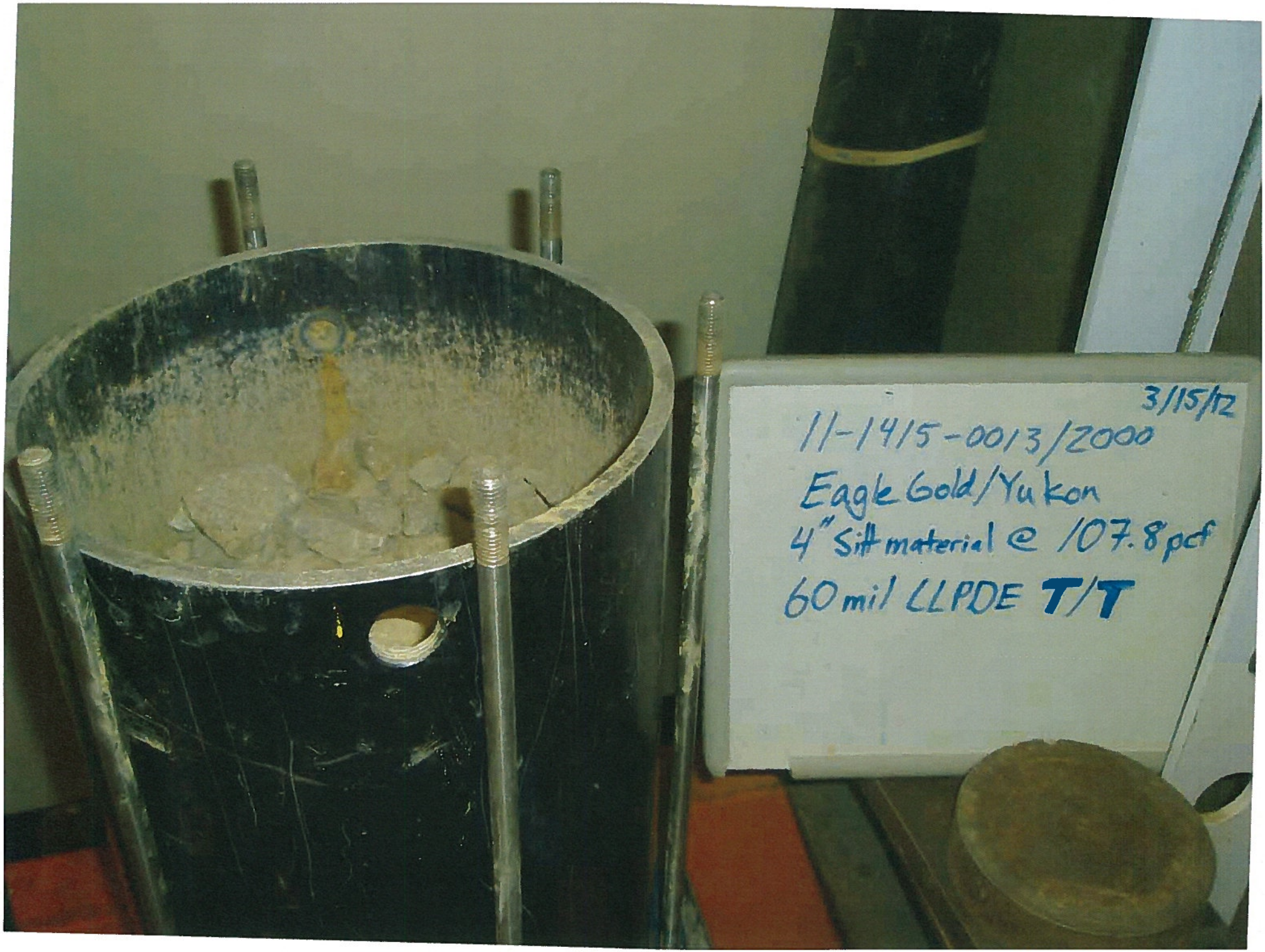
Underliner was remolded to 93.9% of maximum dry density at approximately optimum moisture. Overliner was loosely placed and slightly tamped.

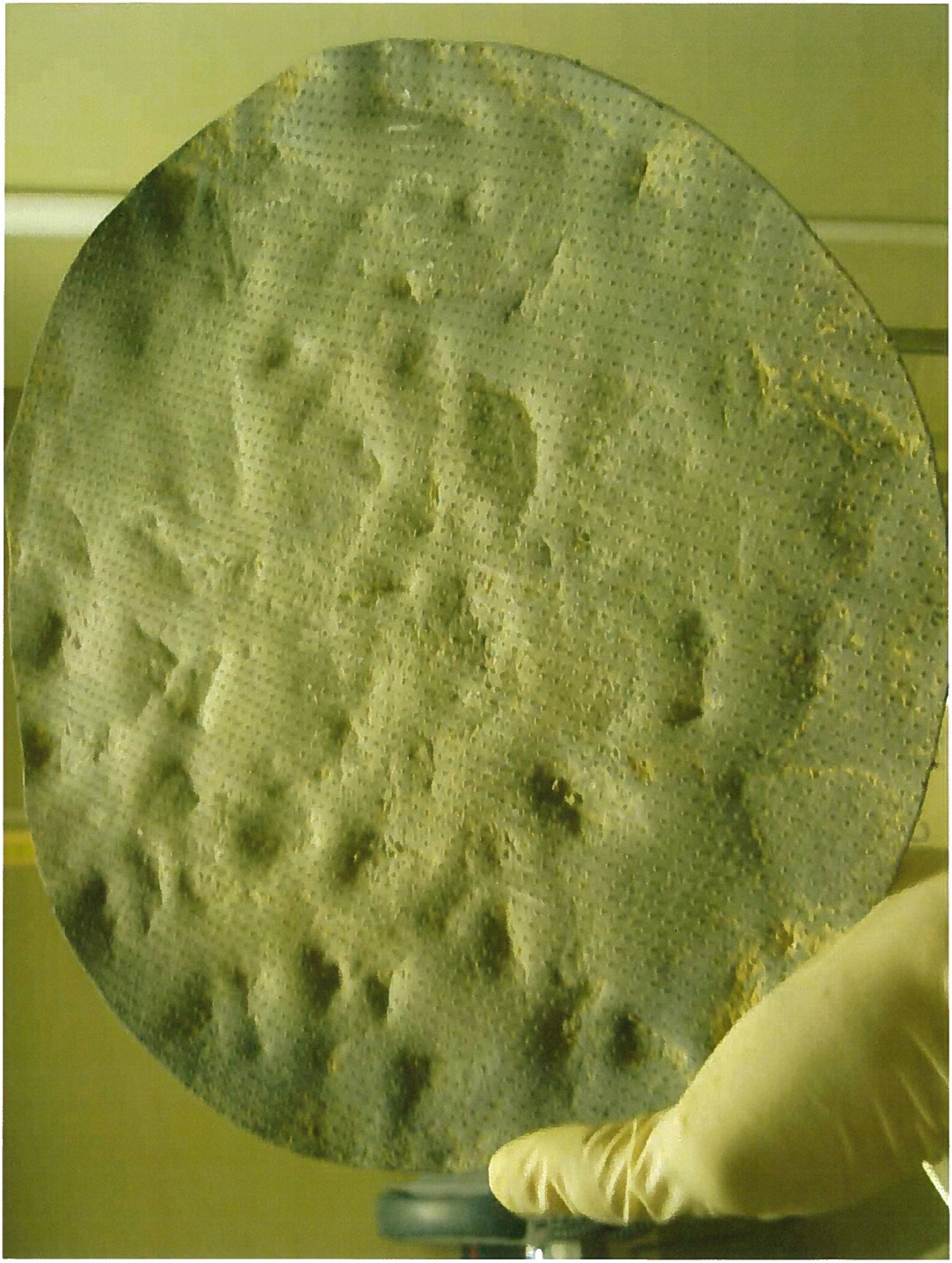
Date:	5/11/12
Tech:	JAM
Review:	MB


60 mil
LLPDE
T/T
11-1415-00131/2000
3/15/12
Eagle Gold / Yukon

60 mil
TYPE 7
MIL-S-901317600
GRADE 2 CLASS 2

60 mil
LLPDE
T/T
11-1415-00131/2000
3/15/12
Eagle Gold / Yukon


3/15/12
11-1415-0013/2000
Eagle Gold/Yukon
4" Silt material @ 107.8 pcf
60 mil LLPDE T/T



11-1413-0013/2000
Eagle Gold/Yukon
4" Silt material @ 107.8 pcf
60 mil LLDPE T/T
Complete Set-up
POST-TEST
3/18/12

June 22, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Agru Americas 80mil microspike liner sample and "BGC-GD-01 (38mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

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Lab Manager

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER: 11-1415-0013/2000
JOB NAME: Tetra Tech/Aggregate/Yukon
DATE TESTED: 06/16/12

UNDERLINER: Silt
OVERLINER: BGC-GD-01 (38mm)

Clay Liner

Initial Moisture Content

Tare:	KD-35
Wet Weight & Tare, g:	463.28
Dry Weight & Tare, g:	419.63
Tare Weight, g:	125.86
Moisture, %:	**14.9**

Final Moisture Content

Tare:	SCI
Wet Weight & Tare, g:	591.98
Dry Weight & Tare, g:	535.27
Tare Weight, g:	123.48
Moisture, %:	**13.8**

Overliner

Initial Moisture Content

Tare:	C3PO
Wet Weight & Tare, g:	692.31
Dry Weight & Tare, g:	690.83
Tare Weight, g:	128.65
Moisture, %:	**0.3**

Final Moisture Content

Tare:	TDM-2
Wet Weight & Tare, g:	748.00
Dry Weight & Tare, g:	746.03
Tare Weight, g:	128.28
Moisture, %:	**0.3**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	4.000	2.698
2.	4.000	2.691
3.	4.000	2.694
4.	4.000	2.697
5.	4.000	2.703
6.	4.000	2.698
Average	4.000	2.697
Cell Height	--	16.250
Sample Height	4.000	9.470

Density	**Clay liner**		**Overliner**	
Wet Weight:	14,125.50	g	24699.60	g
Dry Weight:	12,298.17	g	24634.75	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	4.000	in	9.470	in
Final Height:	4.000	in	7.001	in
Initial Volume:	0.262	ft^3	0.62	ft^3
Final Volume:	0.262	ft^3	0.46	ft^3
Initial Wet Density:	119.0	pcf	87.9	pcf
Final Wet Density:	119.0	pcf	118.9	pcf
Initial Dry Density:	103.6	pcf	87.7	pcf
Final Dry Density:	103.6	pcf	118.6	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours

Post-Test: No visual puncturing of geomembrane. No penetrations observed during the vacuum test.

Approximately 20 notable, rounded dimples on the surface of the membrane.

Liner Thickness (in)

1.	0.085	
2.	0.081	
3.	0.081	
4.	0.086	
5.	0.085	
6.	0.082	
Average	0.083	(in)
	83.33	(mls)

Remold Instructions

Compact subgrade to 95% & +/- 2% of the Standard Proctor density at optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 6/16/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.8

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (38mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 87.7

Geosynthetic Manufacturer/Supplier: Agru America (80 mil LLPDE T/T)

Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
LLDPE Microspike 80 mil	83.33	50	96.1	14.9	640	2.469	PASS	PASS

General Test Notes: Test was conducted using a 12" diameter cell. The 80 mil texture/texture LLDPE liner was placed on top of moistened GCL which was placed on top of 4.0 inches of underliner soil, then covered with approximately 9.5 inches of overliner material. Approximately 12 rocks were hand placed with points downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used t apply a load of 640 psi to the sample over a period of 14 hours. The load was maintained for 50 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the liner was inspected and tested for punctures both visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

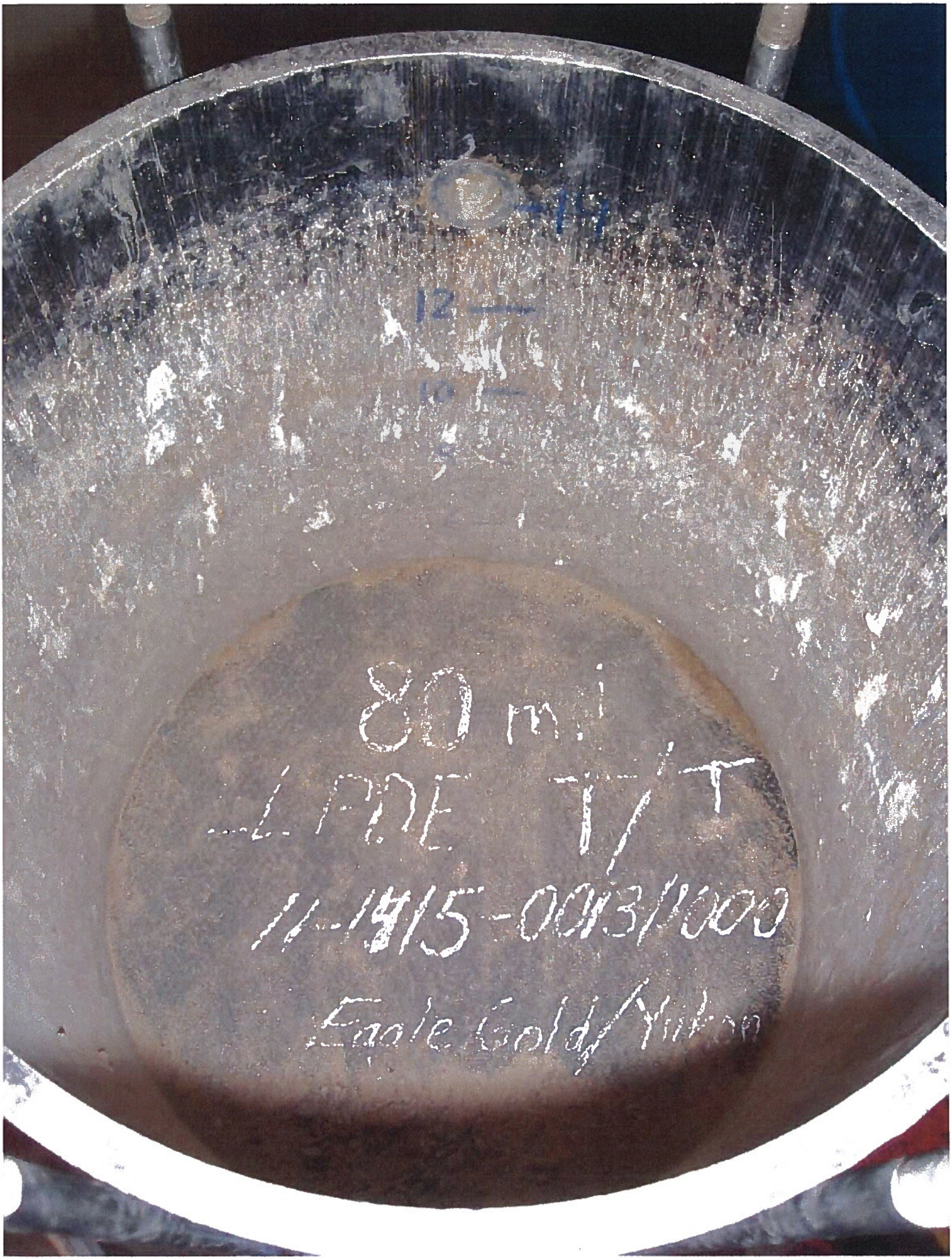
Liner observations: No punctures were present, but numerous rounded dimples.

Underliner was remolded to 96.1% of maximum dry density at approximately optimum moisture. Overliner was loosely placed and slightly tamped.

Date: 6/16/12

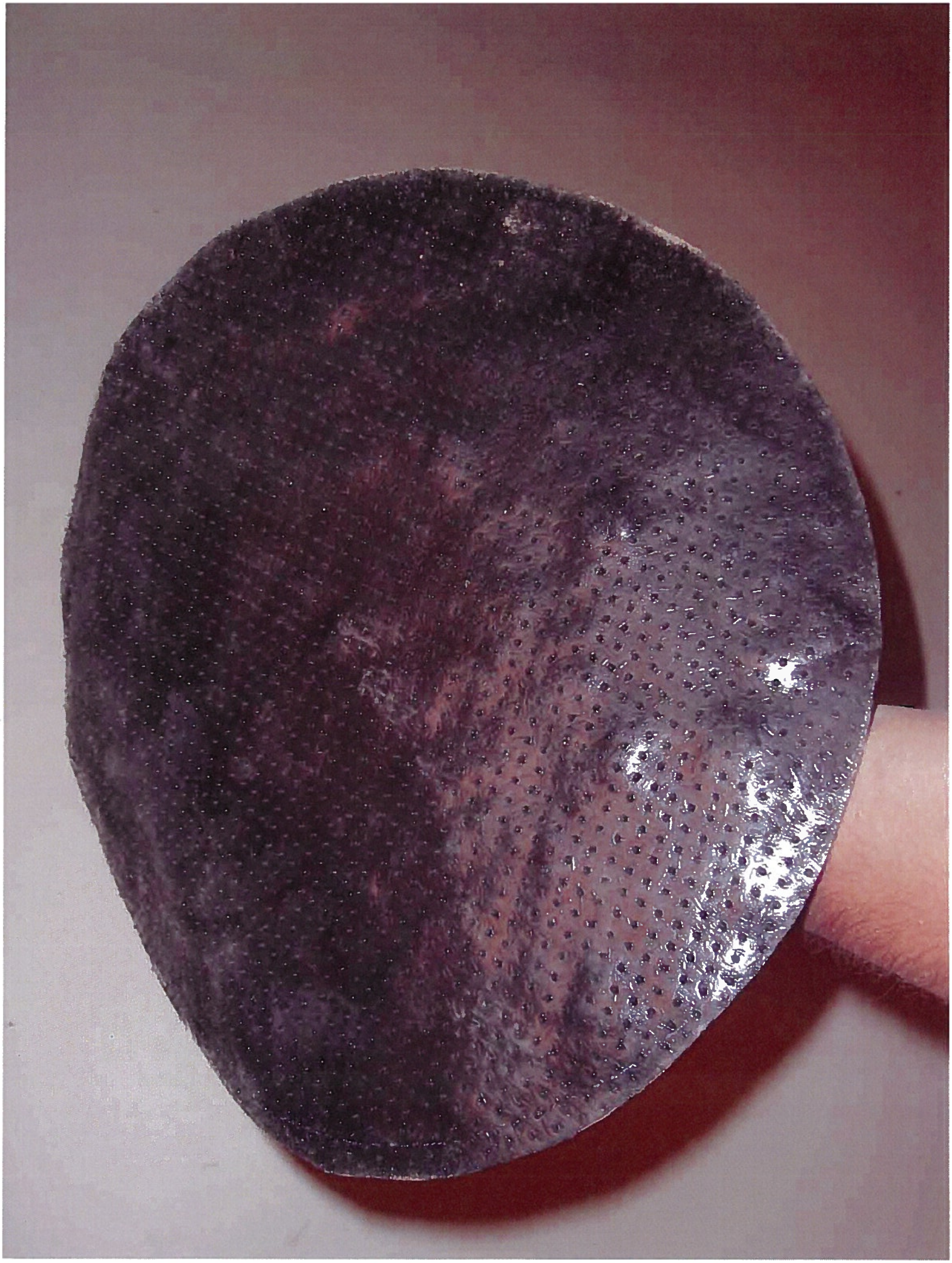
Tech: JAM

Review: MB


80 m.i
LINE W/T
11-1915-0013/0000
Eagle Gold Yukon

80 mi
LINE 17/T
N-1915-0003/1000
Eagle Gold Yukon
6/16/12

80 m.
LINE T/T
1915-0013/1000
Eagle Gold/Yukon
8/16/19



11-1415-0013/2000
6/21/12
Eagle Gold / Yukon
4" Silt @ 107.8 pcf
80 mil LLPDE T/T
TEST COMPLETE

Golder Associates

June 26, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Agru Americas 80mil microspike liner sample and "BGC-GD-01 (50mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Section 2 Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (50mm)
DATE TESTED:	06/21/12		

Clay Liner		**Overliner**	
Initial Moisture Content		**Initial Moisture Content**	
Tare:	SCI	Tare:	KD-35
Wet Weight & Tare, g:	591.98	Wet Weight & Tare, g:	712.90
Dry Weight & Tare, g:	535.27	Dry Weight & Tare, g:	710.81
Tare Weight, g:	123.48	Tare Weight, g:	125.83
Moisture, %:	**13.8**	Moisture, %:	**0.4**
Final Moisture Content		**Final Moisture Content**	
Tare:	EOTO	Tare:	FEE
Wet Weight & Tare, g:	615.14	Wet Weight & Tare, g:	947.87
Dry Weight & Tare, g:	555.36	Dry Weight & Tare, g:	944.49
Tare Weight, g:	122.15	Tare Weight, g:	120.41
Moisture, %:	**13.8**	Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	4.030	2.313
2.	4.038	2.073
3.	4.010	2.033
4.	4.120	2.163
5.	3.970	2.413
6.	4.010	2.503
Average	4.030	2.250
Cell Height	--	16.250
Sample Height	4.030	9.889

Density	**Clay liner**		**Overliner**	
Wet Weight:	14,125.50	g	26704.40	g
Dry Weight:	12,415.67	g	26609.33	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	4.030	in	9.889	in
Final Height:	4.022	in	8.326	in
Initial Volume:	0.264	ft^3	0.65	ft^3
Final Volume:	0.263	ft^3	0.54	ft^3
Initial Wet Density:	118.2	pcf	91.0	pcf
Final Wet Density:	118.4	pcf	108.1	pcf
Initial Dry Density:	103.9	pcf	90.7	pcf
Final Dry Density:	104.1	pcf	107.7	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours.

Post-Test: No visual puncture of geomembrane. No penetrations observed during the vacuum test.

Approximately 10 notable, rounded dimples on the surface of the membrane.

Liner Thickness (in)

1.	0.081	
2.	0.081	
3.	0.083	
4.	0.078	
5.	0.080	
6.	0.083	
Average	0.081	(in)
	81.00	(mls)

Remold Instructions

Compact subgrade to 95% & +/- 2% of the Standard Proctor density at optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 6/21/2012

Underliner (Bedding) Source: Section 2 Silt

Underliner Classification: -- Atterberg Limits: --

Maximum Dry Density (pcf): 107.8 Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (50mm)

Overliner Classification: GP Atterberg Limits: --

Dry Density (pcf): 90.7

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (80mil)

Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
LLDPE Microspike 80	81.00	70	96.4	13.8	640	2.373	PASS	PASS

General Test Notes: Test was conducted using a 12" diameter cell. The 80 mil texture/texture LLDPE microspike liner was placed on top of moistened GCL which was placed on top of 4.0 inches of underliner soil, then covered with approximately 9.75 inches of overliner material. Approximately 12 rocks were hand placed with points downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 89 hours. The load was maintained for 70 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the liner was inspected and tested for punctures both visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

Liner observations: No punctures were present but numerous dimples and scratches.

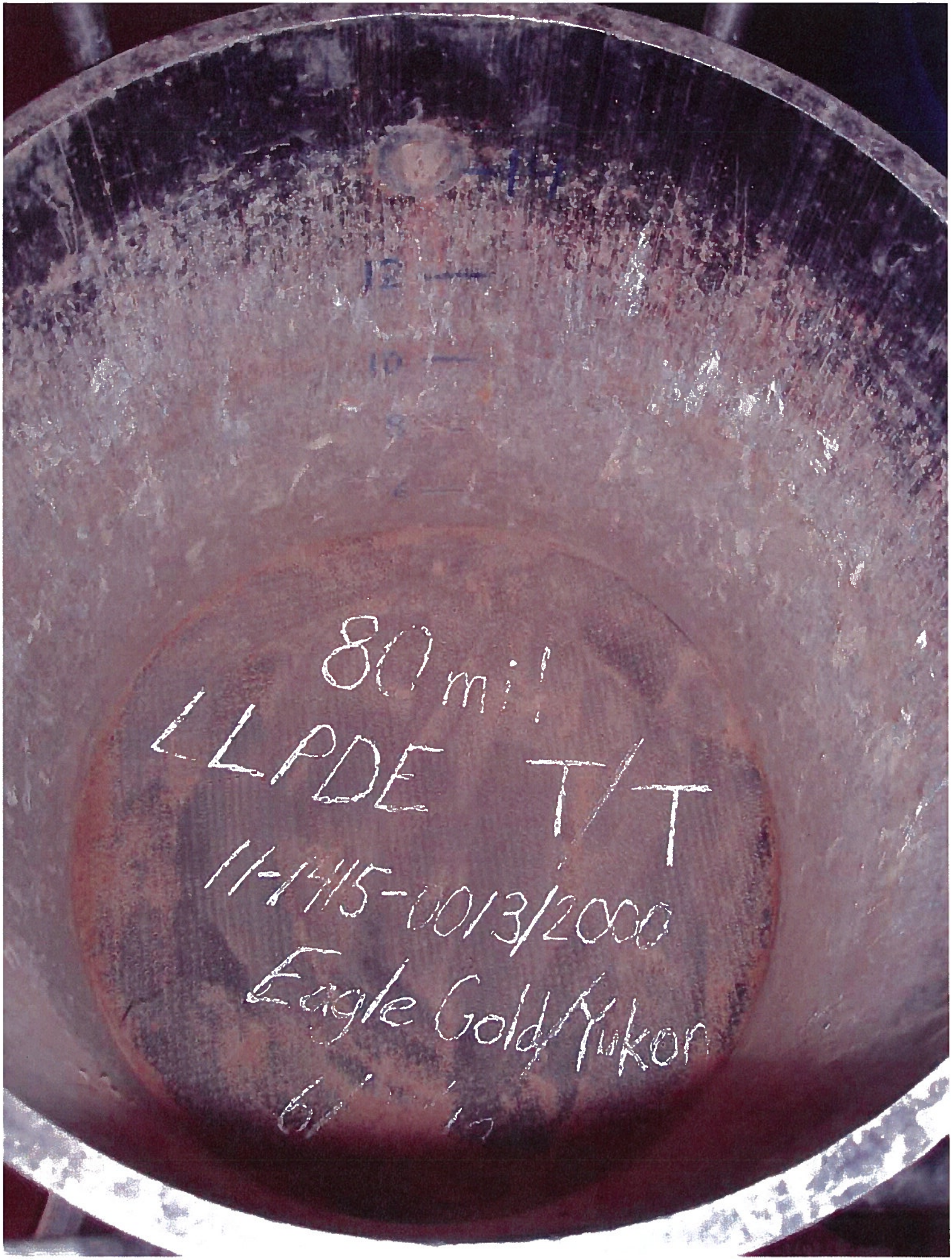
Underliner was remolded to 95% of maximum dry density at approximately optimum moisture. Overliner was loosely placed and slightly tamped.

Date: 6/21/12

Tech: JAM

Review: MB

80 mil
LLPDE T/T
11-1415-00013/2000
Eagle Gold/Yukon


80 mil
LLPDE T/T
11-1115-10/13/2000
Eagle Gold/Yukon

80 mil
CLODE T/T
11-14/15-0013/2000
Eagle Gold/Yukon
6-2-12

80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
6/21/12

11-1415-0013/2000
6/25/12
Eagle Gold / Yukon
4 @ 107.8pcf
60mil LLDPE T/T
TEST COMPLETE

Golder Associates

July 13, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Agru Americas 60mil microspike liner sample, GCL, and "BGC-GD-01 (38mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

60 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
6/25/12

60 mil
LLPDE T/T
11/15-0013/2000
Eagle Gold/Yukon
6/25/12

11-1415-0013/2000 6/25/12
Eagle Gold / Yukon
4 Silt @ 107.8pcf
0mil LLPDE T/T
mplete Setup

Golder Associates

July 30, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on a sample submitted from the Golder Office in Burnaby, British Columbia, Canada. The sample was tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of Liner System A liner load testing on sample "BGC-GD-01 (50mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER: 11-1415-0013/2000
JOB NAME: Tetra Tech/Aggregate/Yukon
DATE TESTED: 07/10/12

UNDERLINER: Silt
OVERLINER: BGC-GD-01 (50mm)

Clay Liner

Initial Moisture Content

Tare:	Z-42
Wet Weight & Tare, g:	382.80
Dry Weight & Tare, g:	361.18
Tare Weight, g:	208.02
Moisture, %:	**14.1**

Final Moisture Content

Tare:	PGC
Wet Weight & Tare, g:	532.00
Dry Weight & Tare, g:	487.73
Tare Weight, g:	127.19
Moisture, %:	**12.3**

Overliner

Initial Moisture Content

Tare:	EM-88
Wet Weight & Tare, g:	702.55
Dry Weight & Tare, g:	700.54
Tare Weight, g:	126.39
Moisture, %:	**0.4**

Final Moisture Content

Tare:	A-7X
Wet Weight & Tare, g:	833.18
Dry Weight & Tare, g:	830.49
Tare Weight, g:	125.19
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	3.945	1.817
2.	3.984	1.883
3.	3.866	1.827
4.	3.945	1.707
5.	4.063	1.657
6.	4.142	1.697
Average	3.991	1.765
Cell Height	--	16.250
Sample Height	3.991	10.013

Density

	Clay liner		Overliner	
Wet Weight:	13,882.2	g	25750.30	g
Dry Weight:	12,165.0	g	25660.47	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	3.991	in	10.013	in
Final Height:	3.932	in	7.453	in
Initial Volume:	0.261	ft^3	0.66	ft^3
Final Volume:	0.257	ft^3	0.49	ft^3
Initial Wet Density:	117.3	pcf	86.7	pcf
Final Wet Density:	119.0	pcf	116.5	pcf
Initial Dry Density:	102.8	pcf	86.4	pcf
Final Dry Density:	104.3	pcf	116.1	pcf

General Test Notes:

Consolidate @ 640 psi for a minimum of 48 hours

Post-Test: No visual or vacuum-tested punctures present in either "Top" or "Bottom" 80 mil microspike texture/texture LLDPE liner. "Top" liner had approximately 10 notable dimples while the "Bottom" liner had approximately 1 notable dimple.

TOP LINER Visual puncture inspection: PASS Vacuum Test: PASS

BOTTOM LINER Visual puncture inspection: PASS Vacuum Test: PASS

Liner Thickness (in)

	Top	Bottom	Geonet	
1.	0.083	0.08	0.335	
2.	0.081	0.083	0.33	
3.	0.079	0.08	0.328	
4.	0.080	0.081	0.305	
5.	0.079	0.080	0.324	
6.	0.081	0.081	0.297	
Average	0.081	0.081	0.320	(in)
	80.50	80.83	319.83	(mls)

Remold Instructions

Approximately 10" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density and +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 7/10/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.8

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (50mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 86.4

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (80-mil)

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (80-mil)

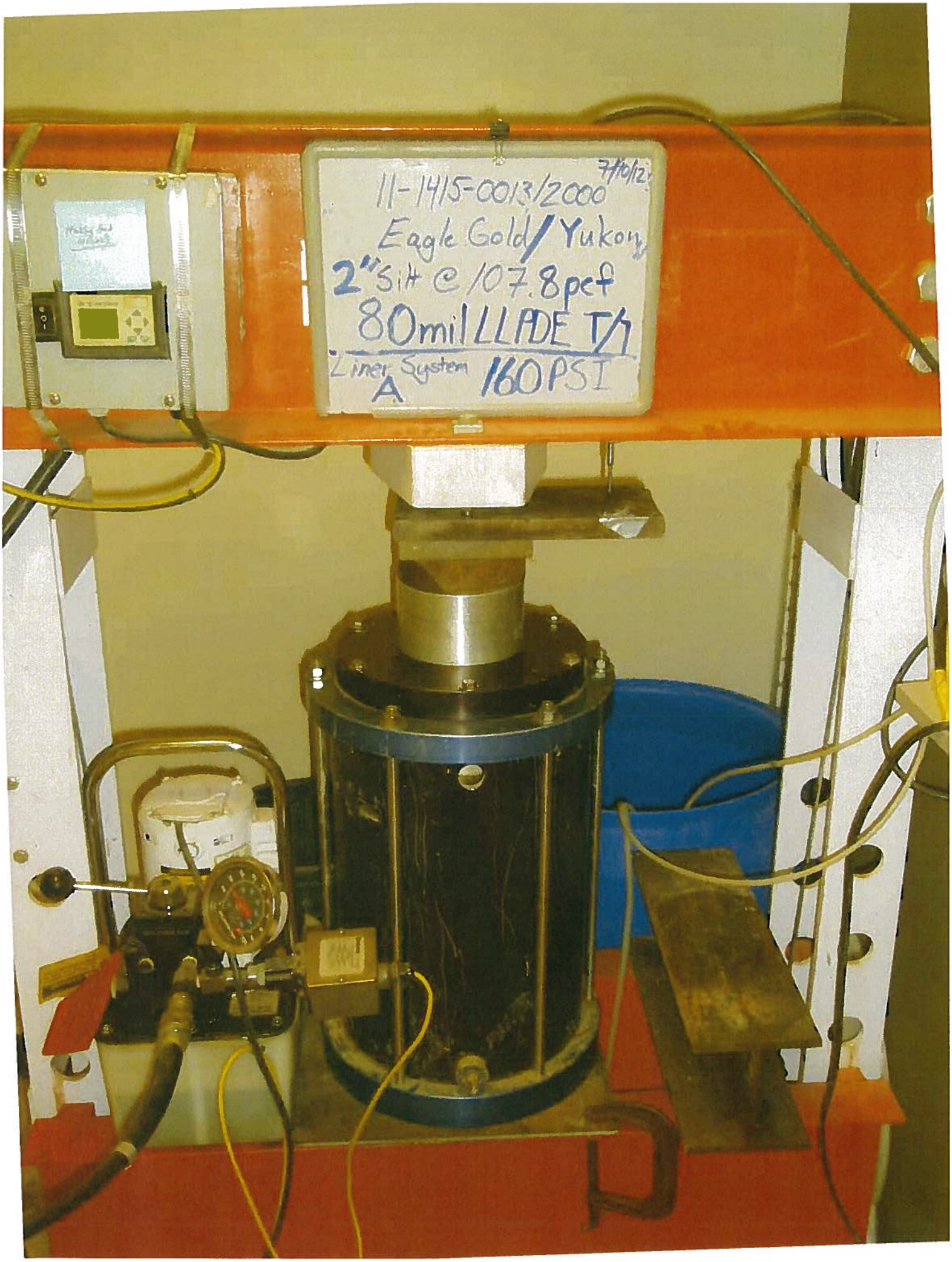
Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
(Top) LLDPE Microspike 80	80.50	52	95.3	14.1	640	2.56	PASS	PASS
Tendrain 770-2 Double-sided	319.83	52	95.3	14.1	640	2.56	PASS	--
(Bottom) LLDPE Microspike 80	80.83	52	95.3	14.1	640	2.56	PASS	PASS

General Test Notes: Test was conducted using a 12" diameter cell. GCL was placed on top of approximately 4 inches of the underliner material then overlaid by 80 mil microspike texture/texture LLDPE liner then followed by Geonet drain material. A second layer of 80 mil microspike texture/texture LLDPE liner was then placed on top of the Geonet and then overlain by approximately 10 inches of overliner material. Approximately 18 rocks were hand placed pointing downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 71 hours and maintained for 52 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, both liners were inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

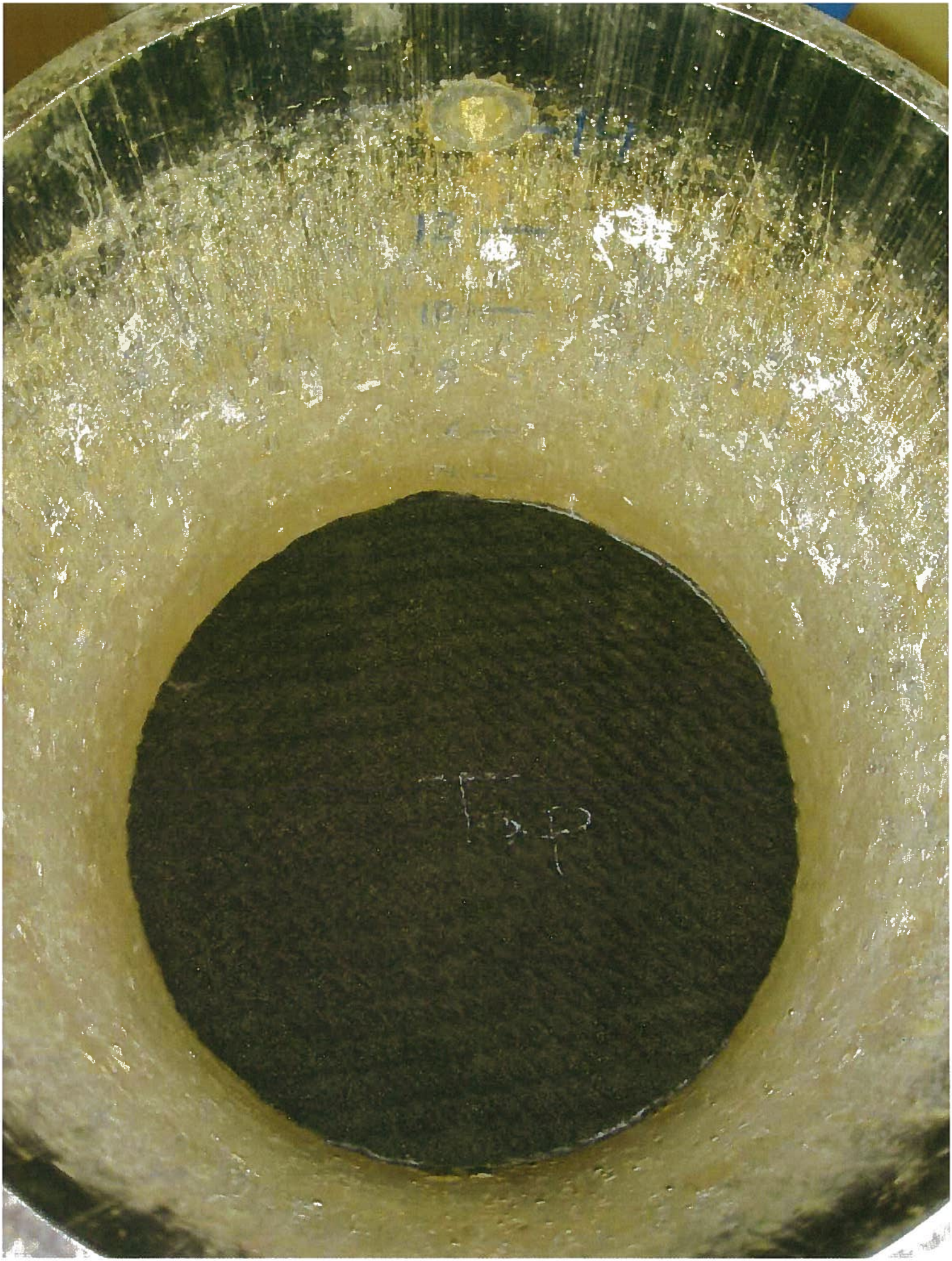
Liner observations: No visual puncturing of either geomembrane or Geonet. No leaks were observed during the vacuum test. Approximately 10 notable dimples were present on the surface of the "Top" LLDPE liner. The "Bottom" LLDPE liner had only 1 notable dimple. GCL and geonet have only indentations that mimic the dimples from overlying geosynthetic materials.

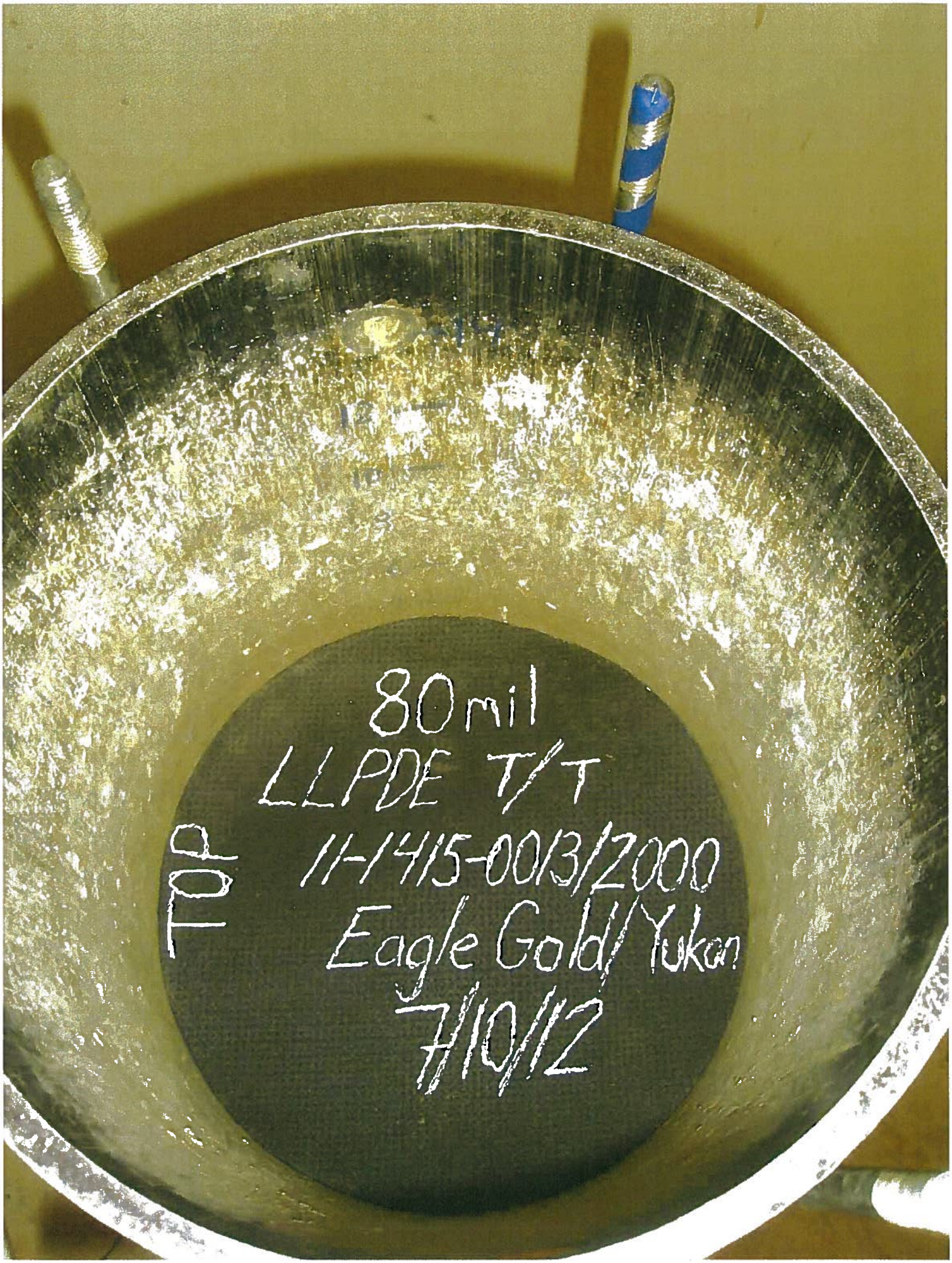
Underliner was remolded to 95.3% of standard Proctor maximum dry density and -1.1% of standard Proctor optimum moisture content. Overliner was loosely placed and slightly tampec

Date:	7/10/12
Tech:	JAM
Review:	MB

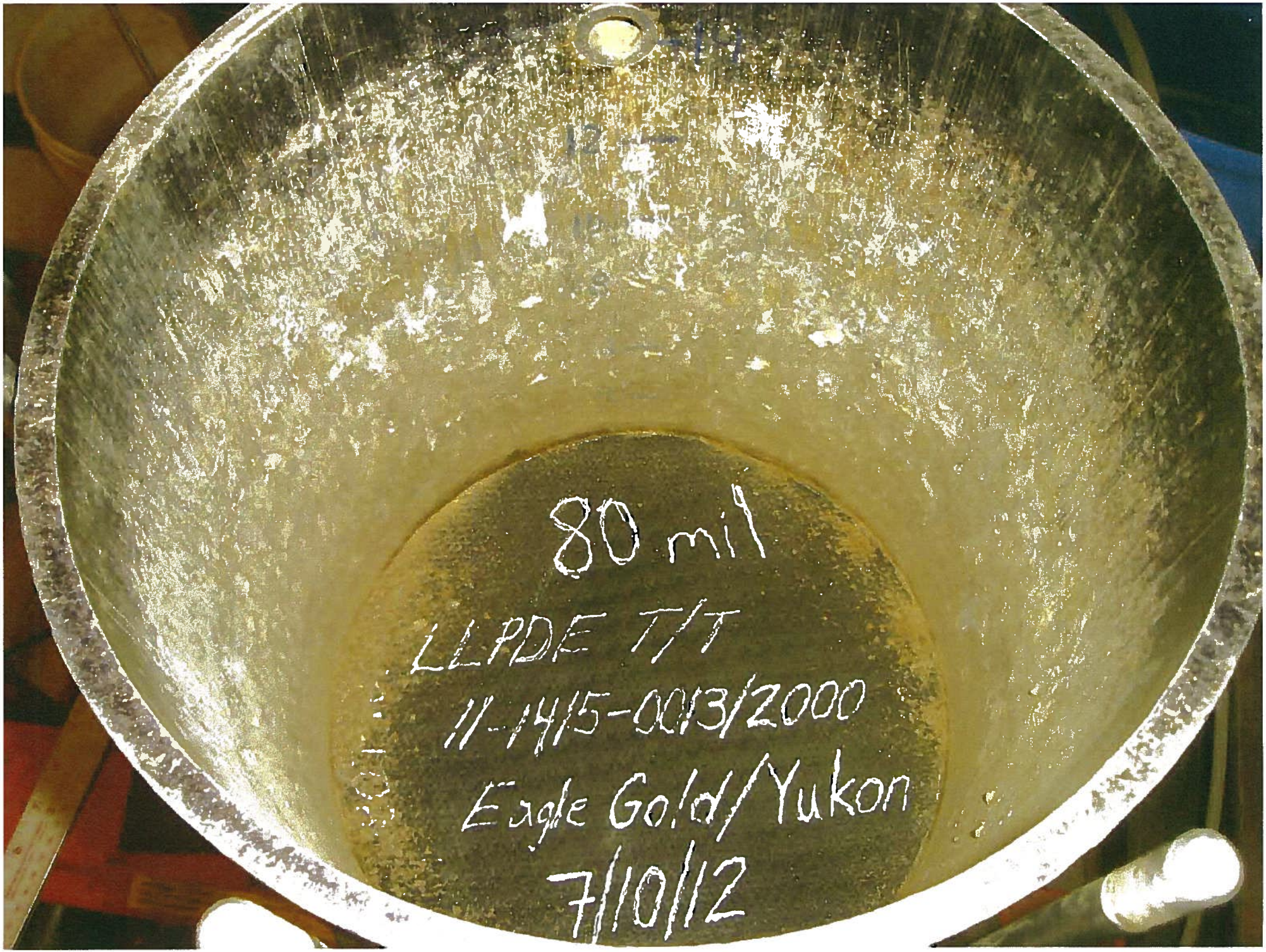

7/10/12
11-1415-0013/2000
Eagle Gold / Yukon
2" Silt @ 107.8 pcf
80 mil LLDPE T/1
Liner System A
160 PSI

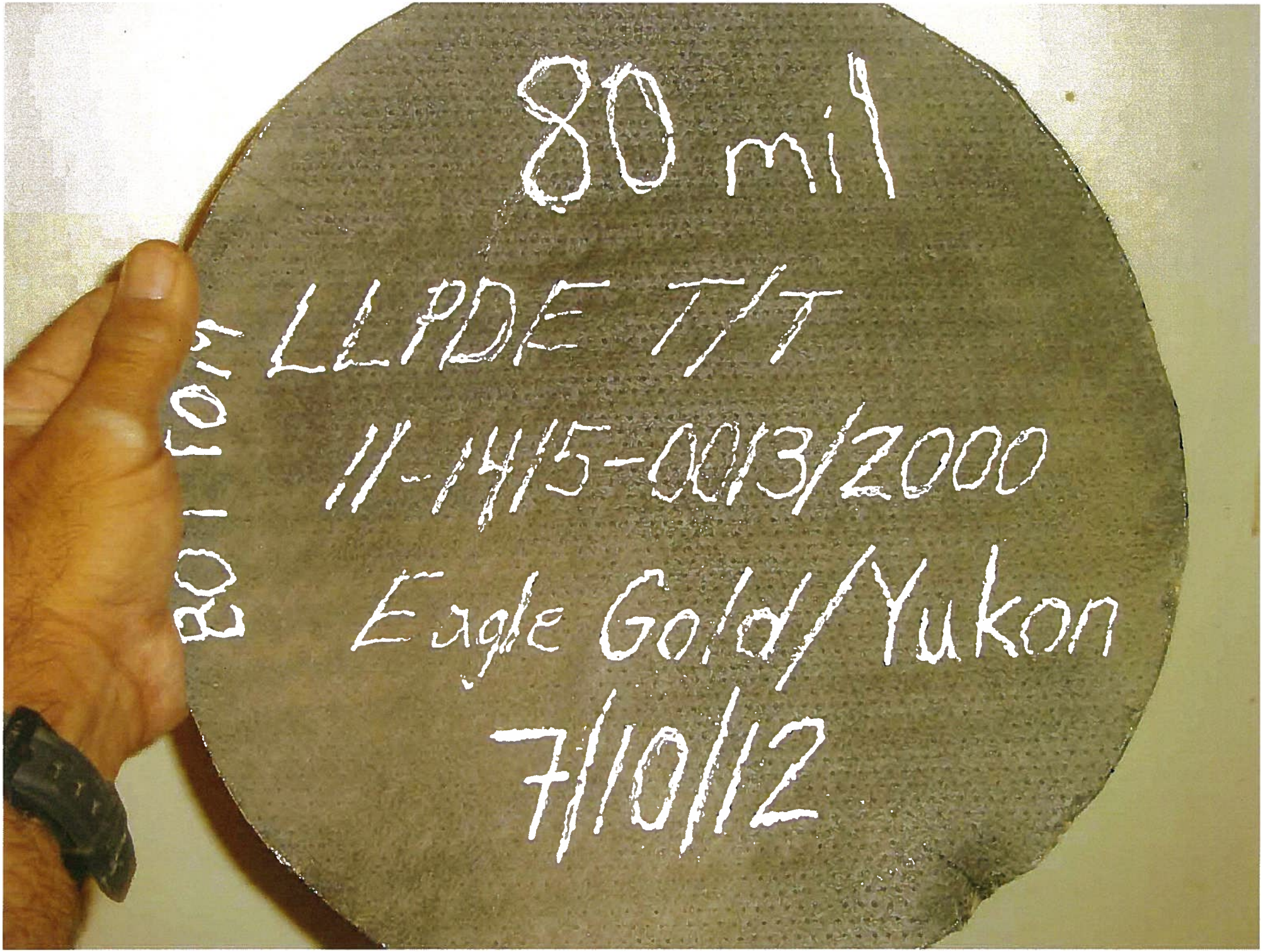
80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12
BOTTOM

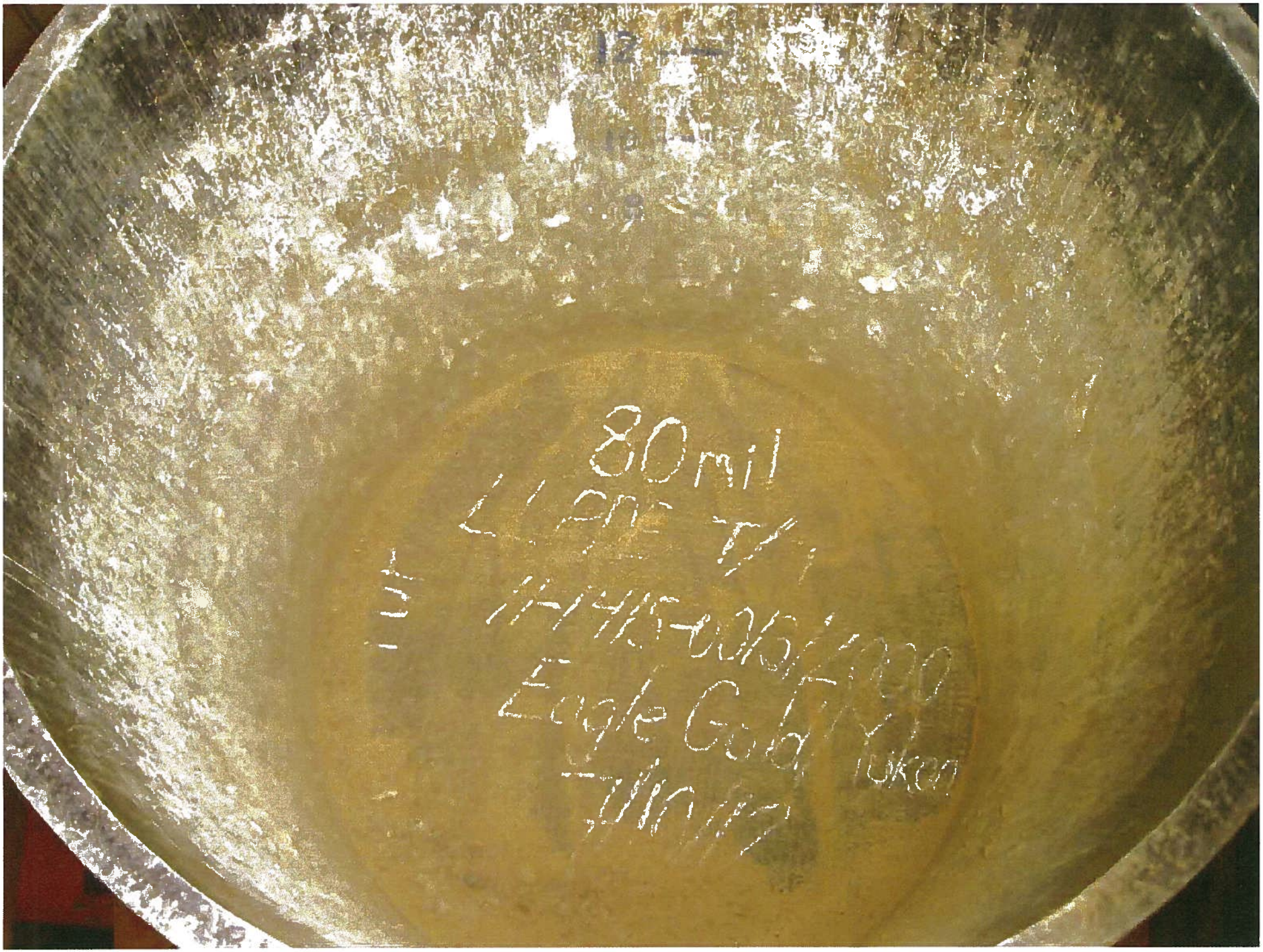


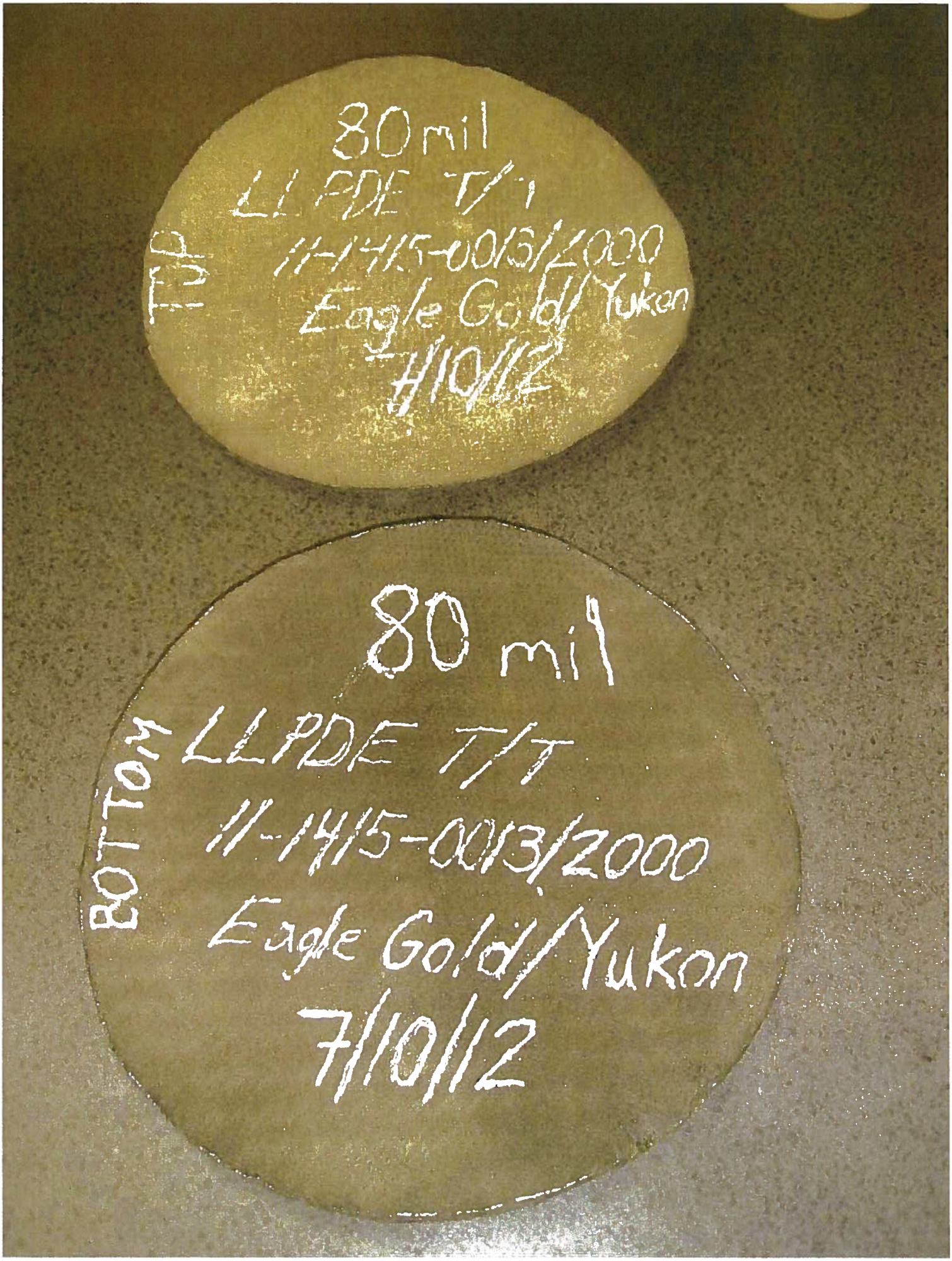

80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12
Top

12


80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12


80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12
80 mil


80mil
Eagle Gold Yukon


80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12
TOP
80 mil
LLPDE T/T
11-1415-0013/2000
Eagle Gold/Yukon
7/10/12
BOTTOM

July 31, 2012

Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on a sample submitted from the Golder Office in Burnaby, British Columbia, Canada. The sample was tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of Liner System C liner load testing on sample "BGC-GD-01 (50mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (50mm)
DATE TESTED:	07/17/12		

Clay Liner

Initial Moisture Content

Tare:	EOTO
Wet Weight & Tare, g:	450.29
Dry Weight & Tare, g:	409.72
Tare Weight, g:	122.16
Moisture, %:	**14.1**

Final Moisture Content

Tare:	AC
Wet Weight & Tare, g:	560.73
Dry Weight & Tare, g:	506.69
Tare Weight, g:	96.47
Moisture, %:	**13.2**

Overliner

Initial Moisture Content

Tare:	AC/DC
Wet Weight & Tare, g:	738.34
Dry Weight & Tare, g:	735.62
Tare Weight, g:	112.08
Moisture, %:	**0.4**

Final Moisture Content

Tare:	W-H
Wet Weight & Tare, g:	805.51
Dry Weight & Tare, g:	802.62
Tare Weight, g:	95.80
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Underliner	Overliner
1.	3.100	3.007
2.	3.140	2.981
3.	2.982	2.901
4.	2.982	2.866
5.	2.982	2.883
6.	3.140	2.971
Average	3.054	2.935
Cell Height	--	16.250
Sample Height	3.054	10.231

Density	**Underliner**		**Overliner**	
Wet Weight:	10,493.8	g	25028.20	g
Dry Weight:	9,196.3	g	24919.50	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	3.054	in	10.231	in
Final Height:	2.972	in	8.245	in
Initial Volume:	0.200	ft^3	0.67	ft^3
Final Volume:	0.195	ft^3	0.54	ft^3
Initial Wet Density:	115.8	pcf	82.5	pcf
Final Wet Density:	119.0	pcf	102.3	pcf
Initial Dry Density:	101.5	pcf	82.1	pcf
Final Dry Density:	104.3	pcf	101.9	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours. Approximately 3" of subgrade.

20 rocks positioned above PVC membrane prior to overliner addition.

PVC LINER: Visual puncture inspection: PASS Vacuum Test: FAIL

Two small perforations within membrane-noted with white circles in photos.

Liner Thickness (in)

1.	0.030	
2.	0.030	
3.	0.030	
4.	0.030	
5.	0.030	
6.	0.030	
Average	0.030	(in)
	30.00	(mls)

Remold Instructions

Approximately 12" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density. +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 7/17/2012

Underliner (Bedding) Source: Silt

Underliner Classification: -- Atterberg Limits: --

Maximum Dry Density (pcf): 107.8 Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (50mm)

Overliner Classification: GP Atterberg Limits: --

Dry Density (pcf): 82.1

Geosynthetic Manufacturer/Supplier: Nan Ya Plastics Corporation, America 0.75 mm PVC

Liner Type	Ave. Liner Thickness (mils)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
0.75mm PVC	30.0	65	94.1	14.1	640	1.986	PASS	FAIL

General Test Notes: Test was conducted using a 12" diameter cell. Smooth 0.75mm PVC was placed on top of approximately 3.0 inches of silt then overlain by approximatley 10.2 inches of overliner material. Approximately 20 rocks were hand placed pointing downward on the liner prior to placement of the remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 70 hours and maintained for 65 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the PVC liner was inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

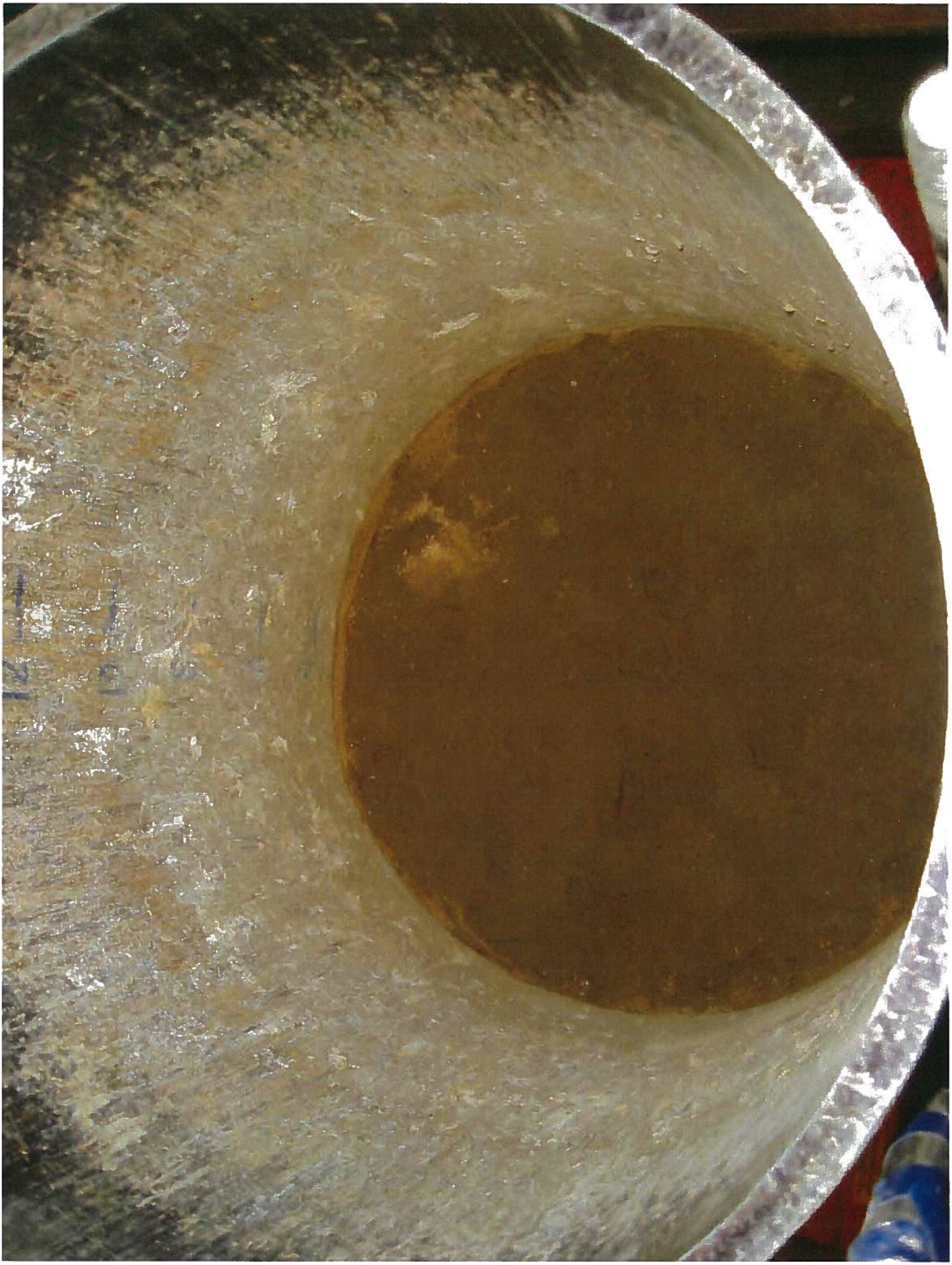
Liner observations: No visual puncturing of PVC liner. Two leaks were observed during the vacuum test. Approximately 40 notable dimples were present on the surface of the PVC liner.

Underliner was remolded to 94.1% of standard Proctor maximum dry density and -1.1% of standard Proctor optimum moisture content. Overliner was loosely placed and slightly tamped

Date:	7/17/12
Tech:	JAM
Review:	MB

11-1415-0013/2000
Eagle Gold / Yukon
3" Silt @ 107.8 pcf
0.75 mm PVC
Liner System TEST COMPLETE

0.75mm PVC
11-1415-0013/2000
Eagle Gold/Yukon
50mm Gravel



075mm PVC
11-1415-0013/2000
Eagle Gold / Yukon
50mm Gravel

0.75 mm PVC
Tarpaulin
Yellow
Grade
Fabric

0.75mm PVC
11-4/5-0013/2000
Gold/Yukon
50mm Gravel

August 22, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Liner System A sample "BGC-GD-01 (38mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (38mm)
DATE TESTED:	08/08/12		

Clay Liner

Initial Moisture Content

Tare:	K-5
Wet Weight & Tare, g:	136.14
Dry Weight & Tare, g:	123.05
Tare Weight, g:	21.82
Moisture, %:	**12.9**

Final Moisture Content

Tare:	N-8
Wet Weight & Tare, g:	224.47
Dry Weight & Tare, g:	200.59
Tare Weight, g:	26.77
Moisture, %:	**13.7**

Overliner

Initial Moisture Content

Tare:	JW-18
Wet Weight & Tare, g:	540.22
Dry Weight & Tare, g:	537.71
Tare Weight, g:	128.52
Moisture, %:	**0.6**

Final Moisture Content

Tare:	GURU
Wet Weight & Tare, g:	719.76
Dry Weight & Tare, g:	716.74
Tare Weight, g:	125.76
Moisture, %:	**0.5**

Initial Height Determination (Inches)

	Underliner	Overliner
1.	2.746	5.433
2.	2.707	5.433
3.	2.746	5.512
4.	2.707	5.512
5.	2.667	5.433
6.	2.825	5.590
Average	2.733	5.486
Cell Height	--	16.250
Sample Height	2.733	7.574

Density	**Underliner**		**Overliner**	
Wet Weight:	9,412.0	g	21355.00	g
Dry Weight:	8,334.3	g	21224.81	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	2.733	in	7.574	in
Final Height:	2.634	in	6.098	in
Initial Volume:	0.179	ft^3	0.50	ft^3
Final Volume:	0.172	ft^3	0.40	ft^3
Initial Wet Density:	116.1	pcf	95.0	pcf
Final Wet Density:	120.5	pcf	118.1	pcf
Initial Dry Density:	102.8	pcf	94.5	pcf
Final Dry Density:	106.7	pcf	117.3	pcf

General Test Notes:

Consolidate @ 640psi for 48hrs.

Post-Test: No visual or vacuum-tested punctures present in either "Top" or "Bottom" 60 mil microspike texture/texture LLDPE liner. "Top" liner had approximately 15 notable dimples, geocomposite had 7 dimples, while the "Bottom" liner had approximately 5 notable dimples.

17 rocks positioned with edges or points against top LLDPE liner.

TOP LINER Visual puncture inspection: PASS Vacuum Test: PASS

GCL and GEOCOMPOSITE No damage, only indentations.

BOTTOM LINER Visual puncture inspection: PASS Vacuum Test: PASS

Liner Thickness (in)

	Top	Bottom	Geonet	
1.	0.060	0.060	0.346	
2.	0.061	0.060	0.344	
3.	0.061	0.060	0.331	
4.	0.061	0.060	0.337	
5.	0.060	0.060	0.331	
6.	0.060	0.060	0.335	
Average	0.061	0.060	0.337	(in)
	60.50	60.08	337.33	(mils)

Remold Instructions

Approximately 7.5" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density and +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 8/8/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.8

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (38mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 94.5

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (60-mil)

Geocomposite Manufacturer/Supplier: SYNTEC

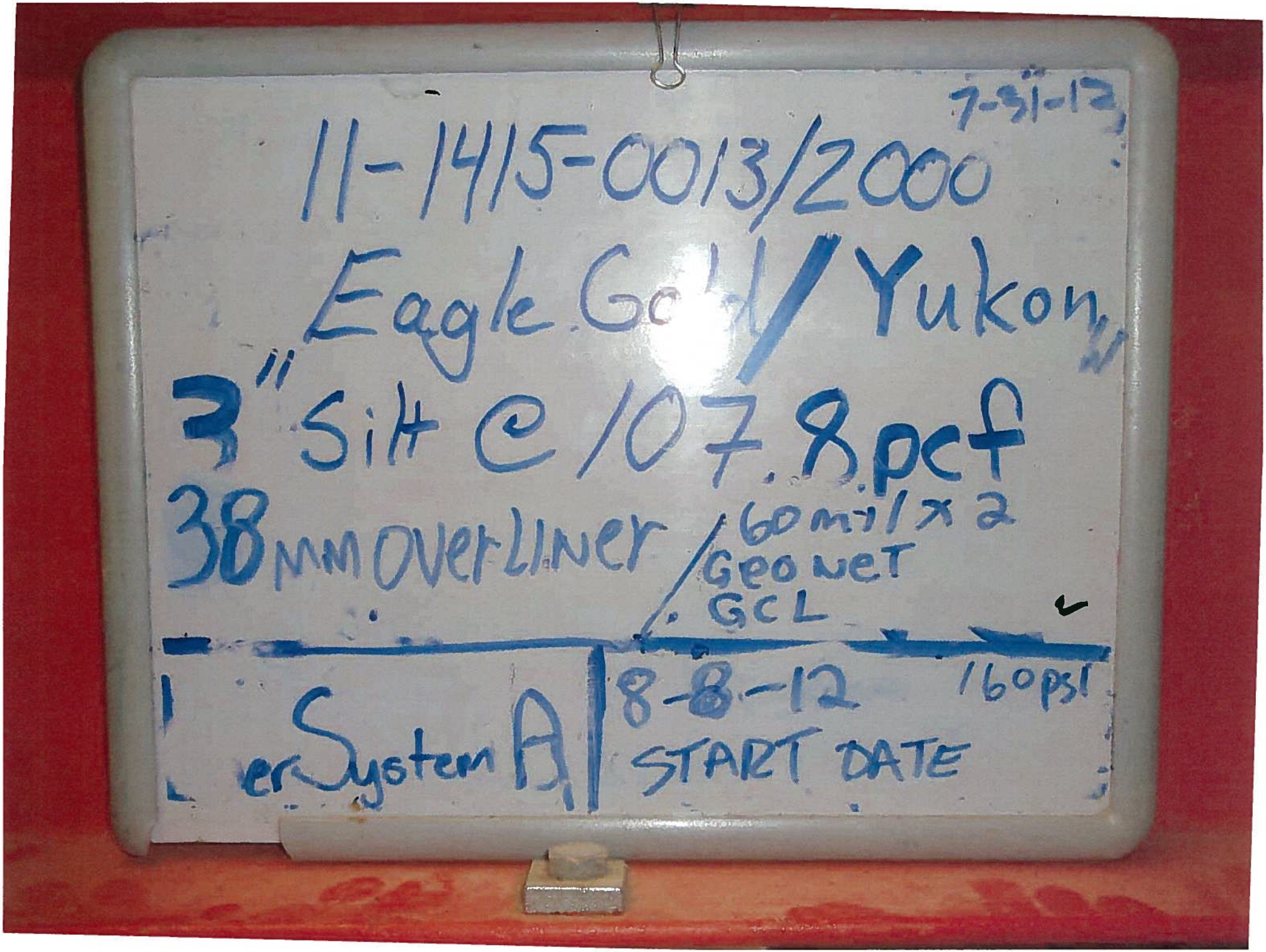
Liner Type	Ave. Liner Thickness (mils)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
(Top) LLDPE Microspike 60	60.5	48	95.4	12.9	640	1.575	PASS	PASS
Tendrain 770-2 Double-sided	337.3	48	95.4	12.9	640	1.575	PASS	--
(Bottom) LLDPE Microspike 60	60.1	48	95.4	12.9	640	1.575	PASS	PASS
GCL	0.3	48	95.4	12.9	640	1.575	PASS	--

General Test Notes: Test was conducted using a 12" diameter cell. GCL was placed on top of approximately 2.7 inches of underliner soil. 60 mil microspike texture/texture LLDPE liner was placed on top of the GCL, followed by GEONET drain material, a second layer of 60 mil microspike texture/texture LLDPE liner and approximately 7.5 inches of overliner material. Approximately 17 rocks were hand placed pointing downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 17 hours. The load was maintained for 48 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, both liners were inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG

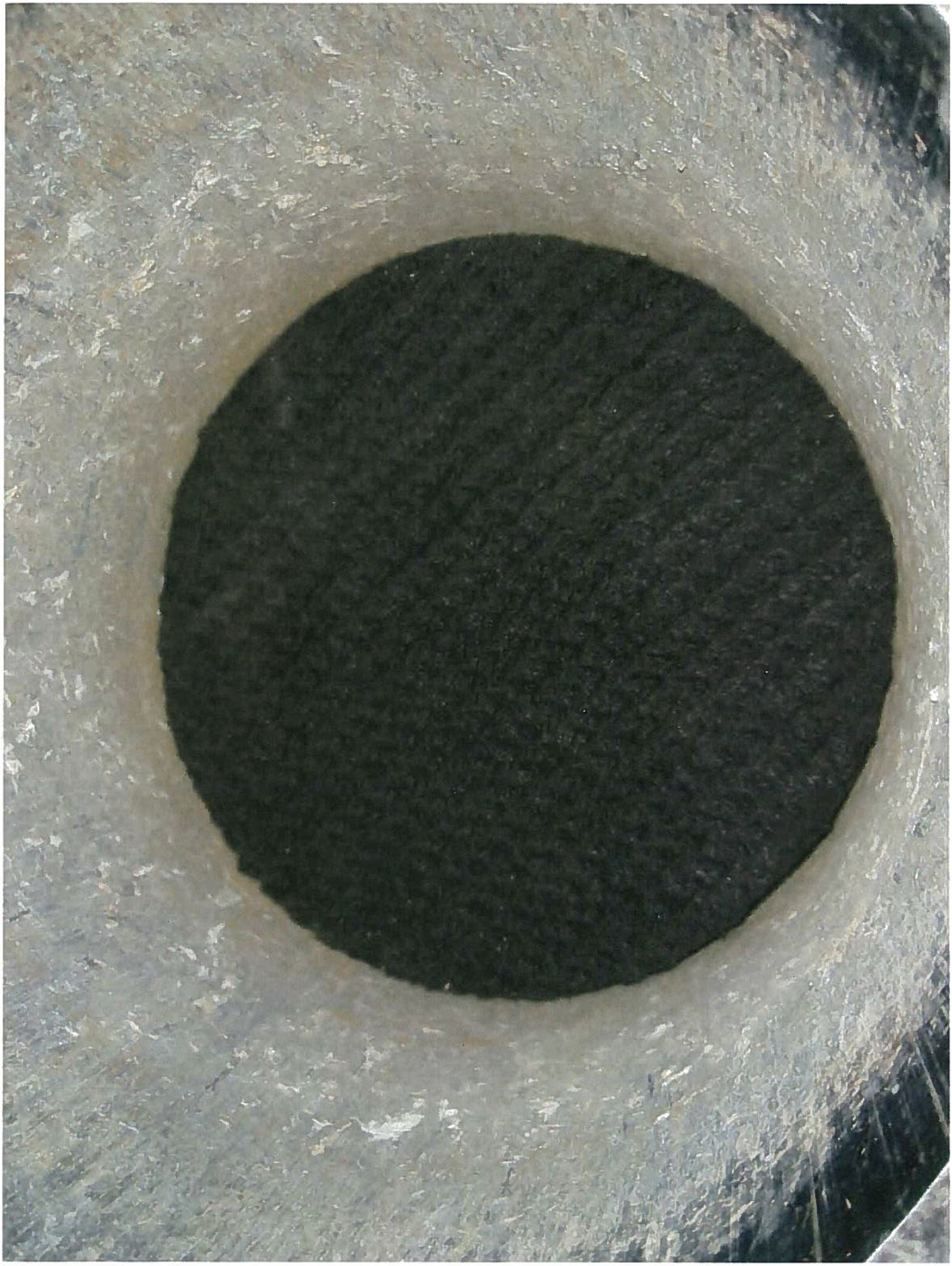
Liner observations: No visual puncturing of either geomembrane or Geonet. No leaks were observe during the vacuum test. Approximately 15 notable dimples were present on the surface of the "Top" LLDP liner. The "Bottom" LLDPE liner had only 5 notable dimples. GCL and geonet (7 dimples) have only indentations that mimic the dimples from overlying geosynthetic materials.

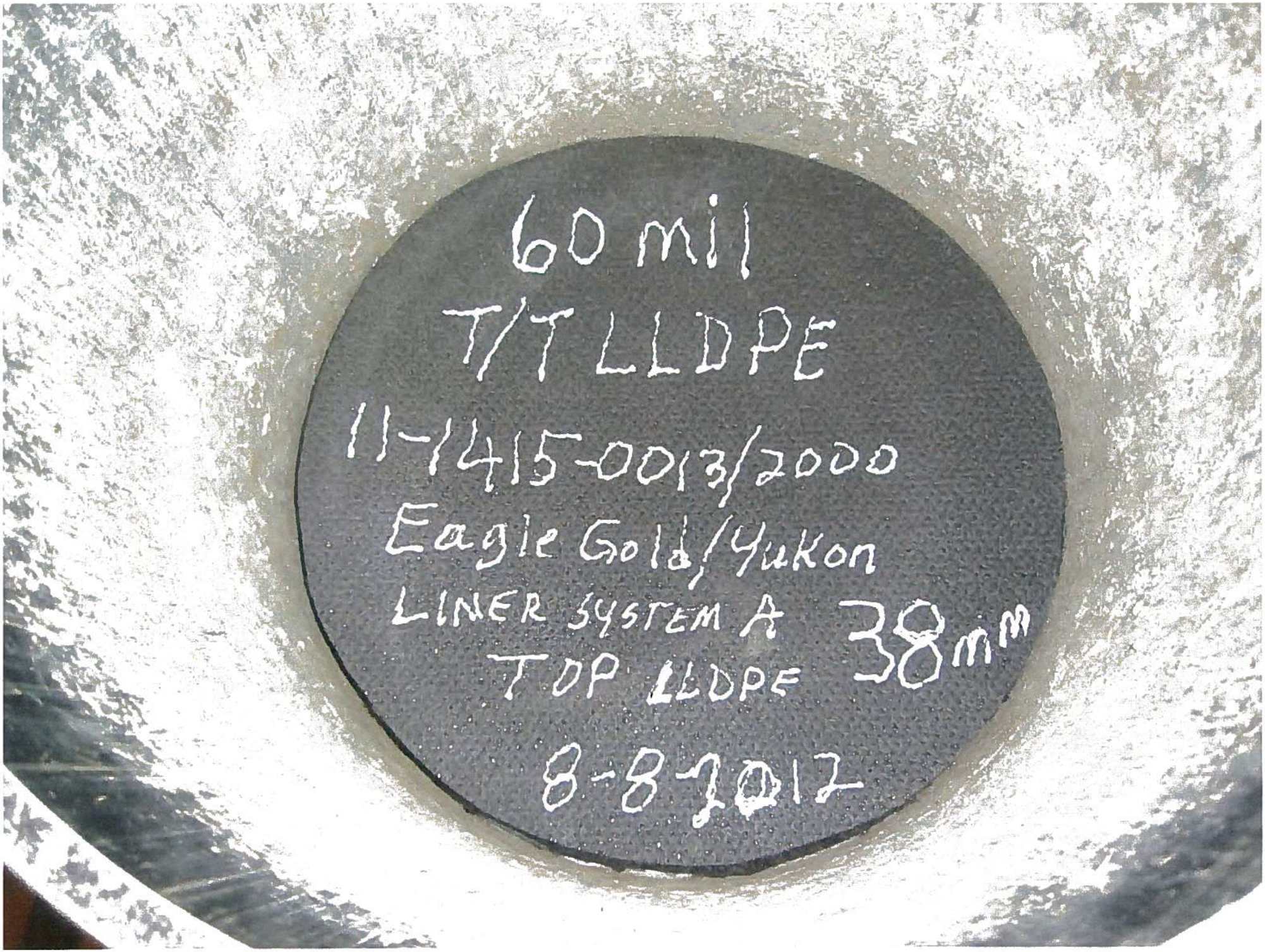
Underliner was remolded to 95.4% of standard Proctor maximum dry density at -2.3% of standard Proctor optimum moisture. Overliner was loosely placed and slightly tampe

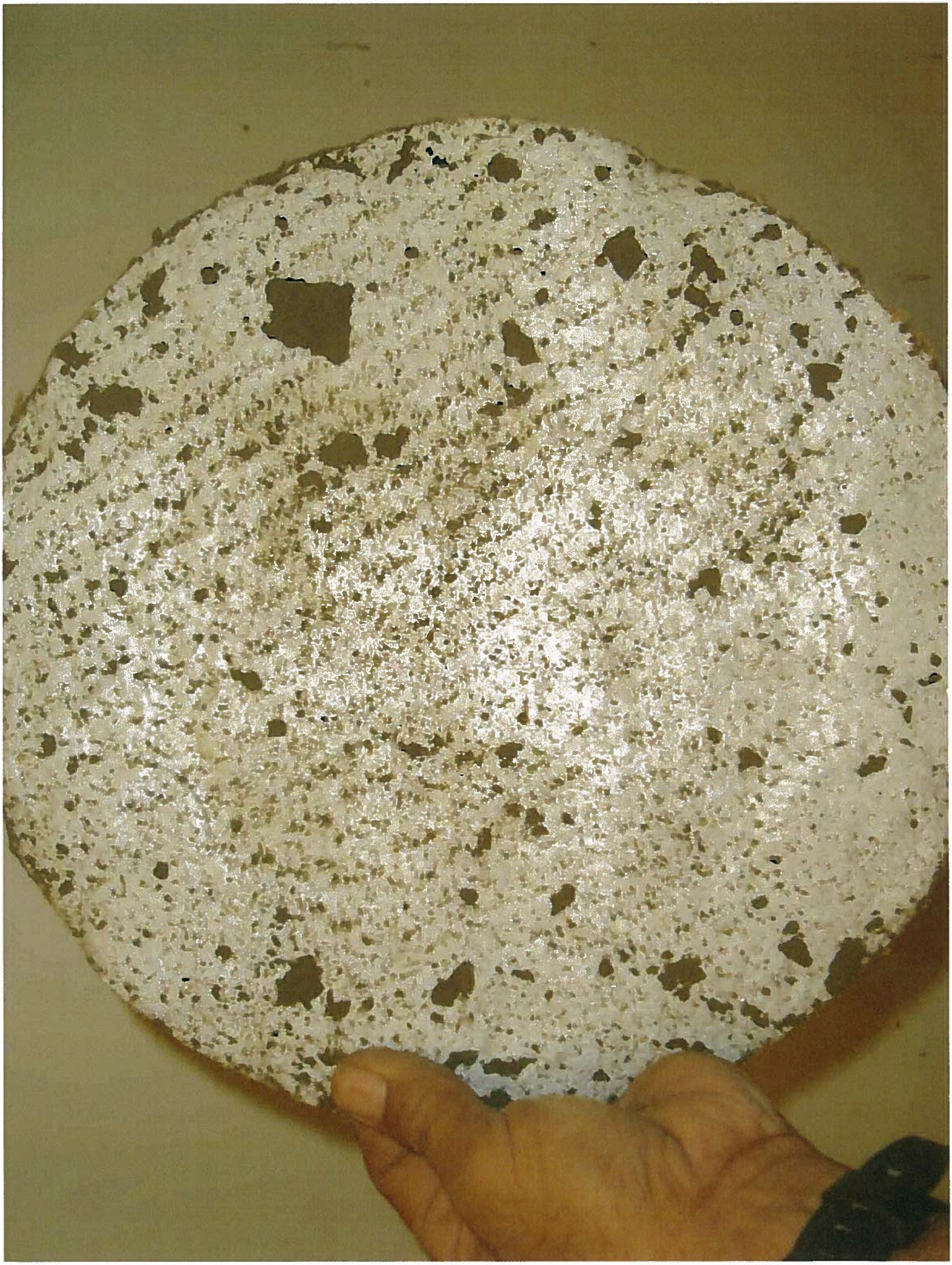
Date:	8/8/12
Tech:	JAM
Review:	MB


7-31-12
11-1415-0013/2000
Eagle Gc'l / Yukon
3" Silt @ 107.8 pcf
38 mm Over Liner
60 mil x 2
Geonet
GCL
8-8-12
160 psi
START DATE

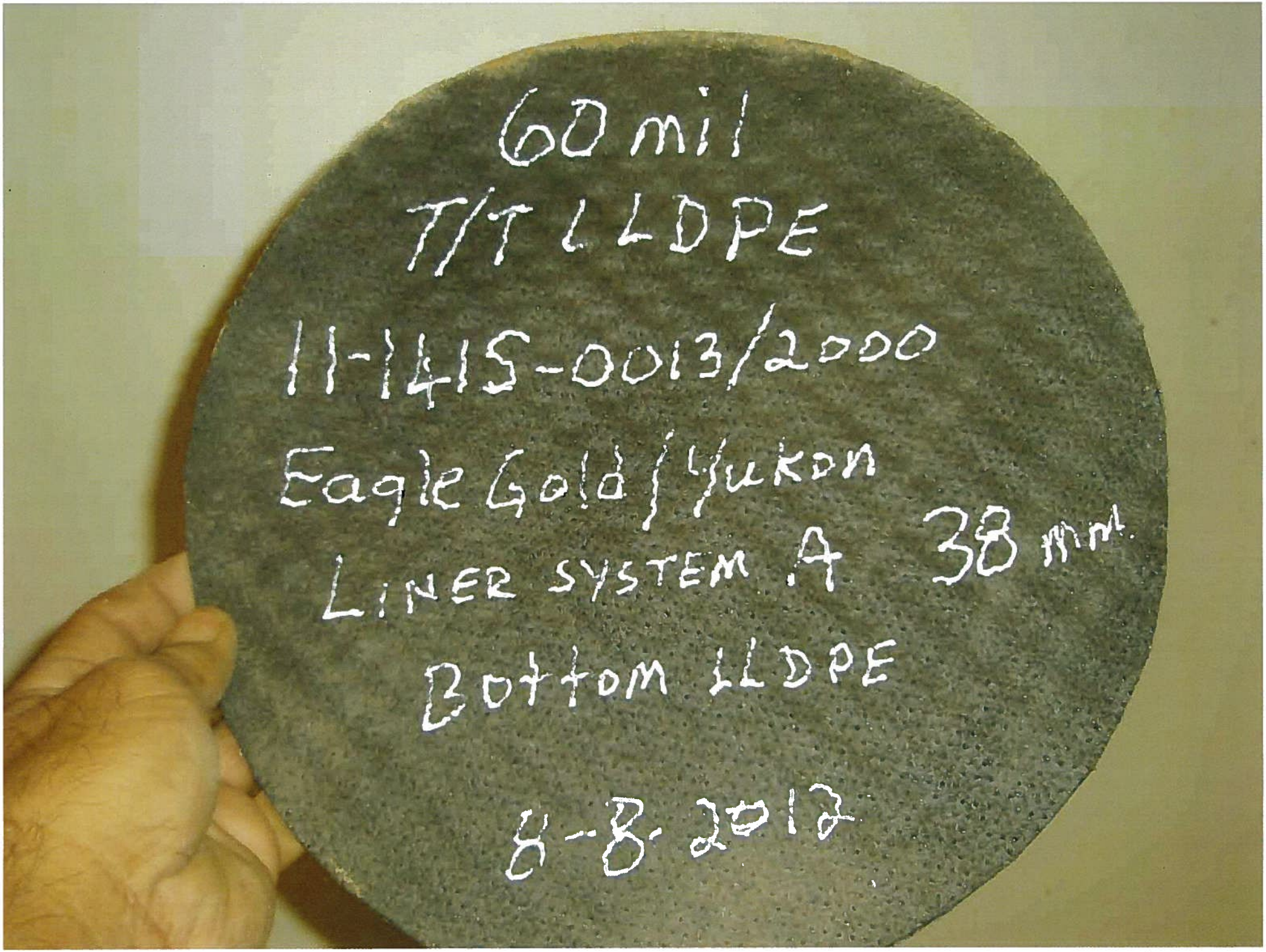
60 mil
T/T LLDPE
11-1415-0013/2000
Eagle Gold / Yukon
Liner System A 38 mm
Bottom LLDPE
8-8-2012

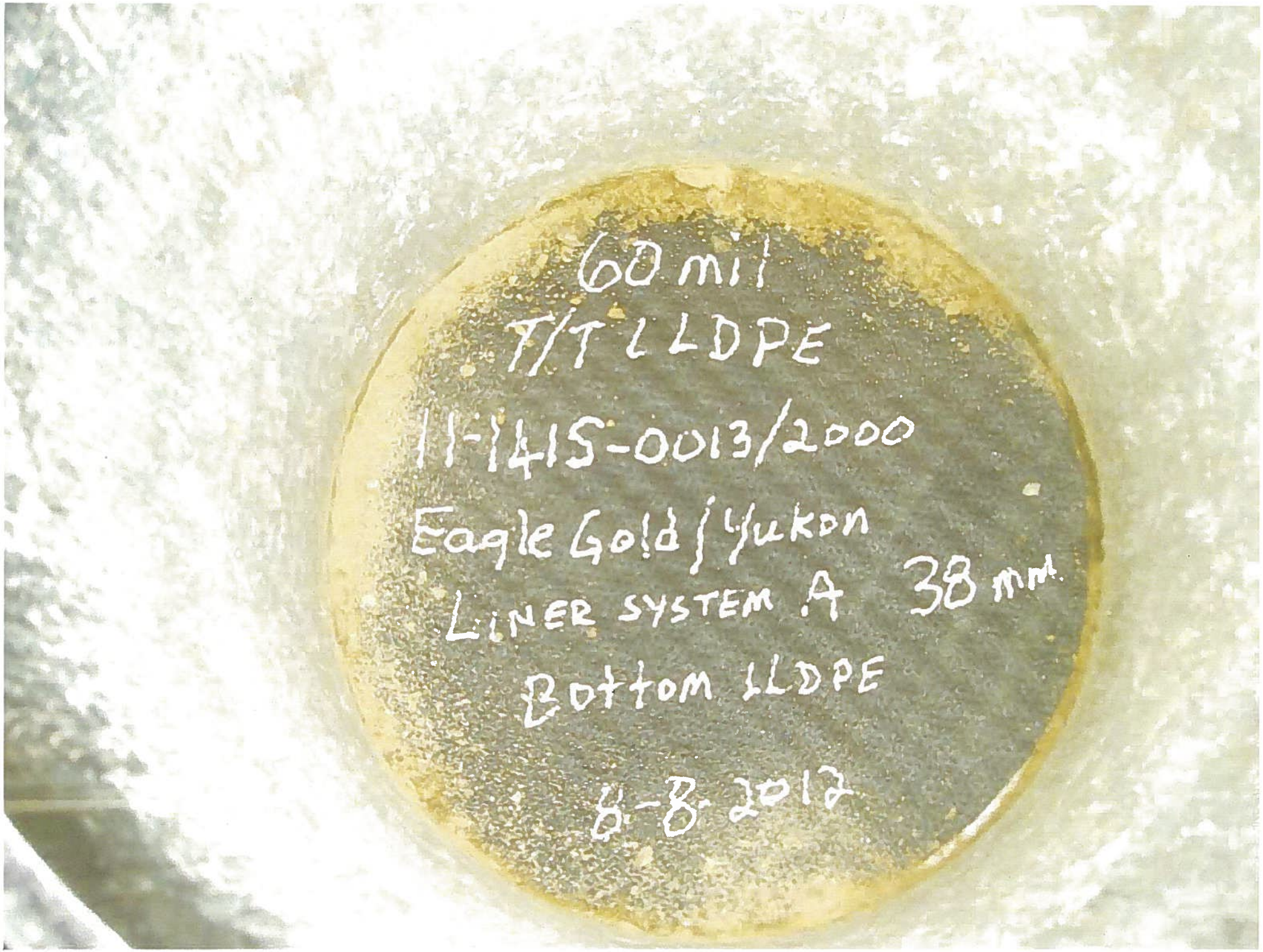


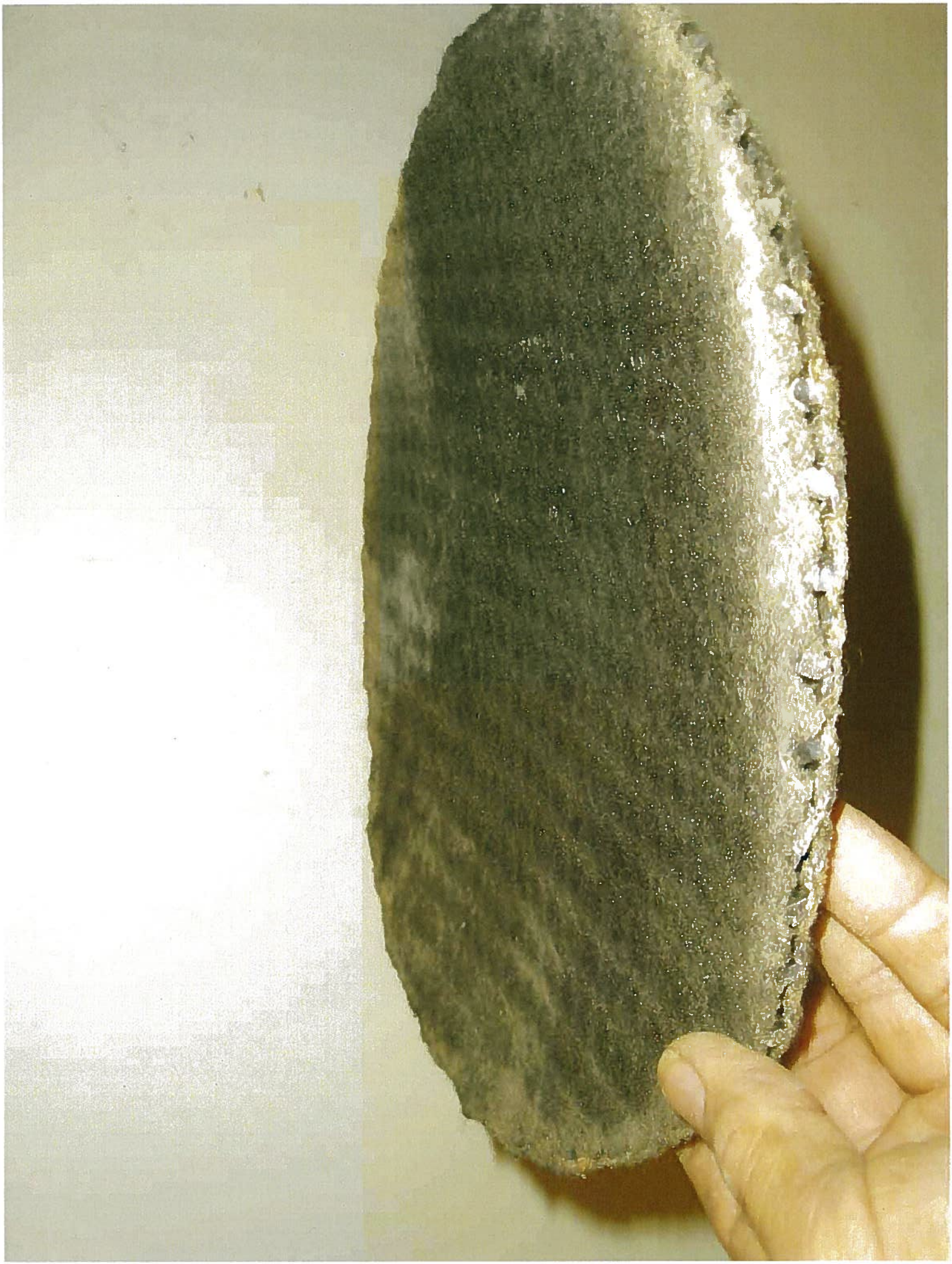

60 mil
T/T LLDPE
11-1415-0013/2000
Eagle Gold/Yukon
LINER SYSTEM A
TOP LLDPE
38mm
8-8-2017

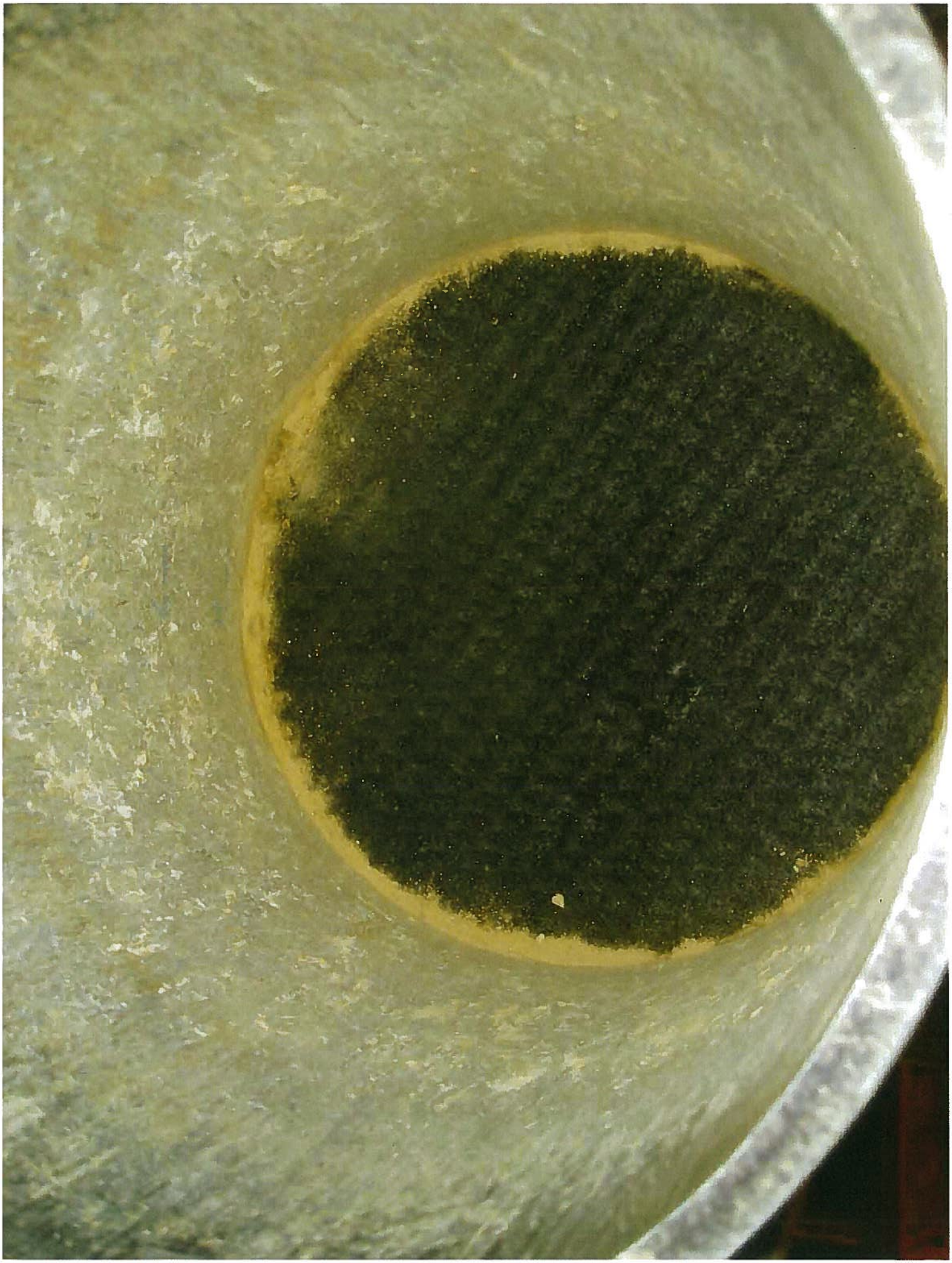


60 mil
HDPE
11-1415-0013/2000
Eagle Gold Yukon
Liner System A
Bottom Liner
4-8-2012
30 mil


60 mil
T/T LLDPE
11-1415-0013/2000
Eagle Gold / Yukon
Liner system A 38 mm.
Bottom LLDPE
8-8-2012


60 mil
T/T LLDPE
11-1415-0013/2000
Eagle Gold / Yukon
Liner system A 38 mm.
Bottom LLDPE
6-8-2012





August 22, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on "Liner System B sample "BCD-01 (25mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	25mm (60mil) Liner System B
DATE TESTED:	07/24/12		

Clay Liner

Initial Moisture Content

Tare:	PGC
Wet Weight & Tare, g:	572.01
Dry Weight & Tare, g:	510.09
Tare Weight, g:	127.18
Moisture, %:	**16.2**

Final Moisture Content

Tare:	R2D2
Wet Weight & Tare, g:	565.98
Dry Weight & Tare, g:	512.60
Tare Weight, g:	126.65
Moisture, %:	**13.8**

Overliner

Initial Moisture Content

Tare:	STS9
Wet Weight & Tare, g:	675.24
Dry Weight & Tare, g:	673.73
Tare Weight, g:	125.73
Moisture, %:	**0.3**

Final Moisture Content

Tare:	EOTO
Wet Weight & Tare, g:	802.03
Dry Weight & Tare, g:	799.47
Tare Weight, g:	122.15
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Underliner	Overliner
1.	3.06	2.011
2.	2.94	2.110
3.	2.90	2.311
4.	2.94	2.429
5.	3.14	2.339
6.	3.14	2.141
Average	3.022	2.224
Cell Height	--	16.250
Sample Height	3.022	10.679

Density	**Underliner**		**Overliner**	
Wet Weight:	10,461.3	g	26131.70	g
Dry Weight:	9,005.1	g	26059.89	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	3.022	in	10.679	in
Final Height:	2.870	in	8.892	in
Initial Volume:	0.198	ft^3	0.70	ft^3
Final Volume:	0.188	ft^3	0.58	ft^3
Initial Wet Density:	116.7	pcf	82.5	pcf
Final Wet Density:	122.9	pcf	99.1	pcf
Initial Dry Density:	100.5	pcf	82.3	pcf
Final Dry Density:	105.8	pcf	98.8	pcf

General Test Notes:

test completed. All membranes used saved. Vacuum test on membranes show some dimples but no holes.

Liner Thickness (in)

1.	0.061	
2.	0.061	
3.	0.059	
4.	0.060	
5.	0.060	
6.	0.061	
Average	0.060	(in)
	60.33	(mils)

Remold Instructions

Approximately 10" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density. +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 7/17/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.5

Optimum Moisture: 15.2

Overliner Material Source: 25mm (60mil) Liner System B

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 82.3

Geosynthetic Manufacturer/Supplier: Agru America (60 mil LLPDE T/T)

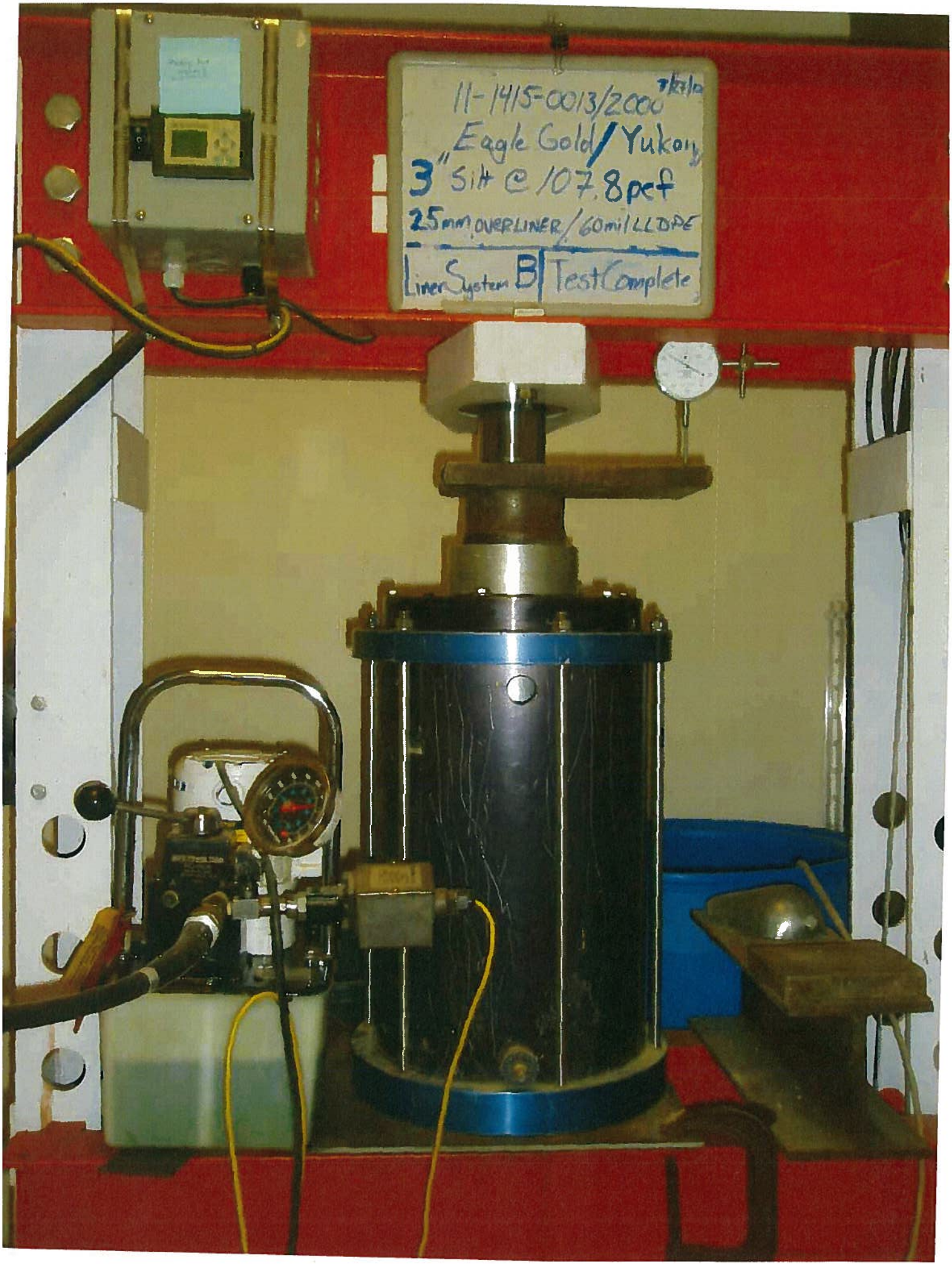
Liner Type	Ave. Liner Thickness (mils)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
LLDPE Microspike 80 mil	60.3	48	93.2	16.2	640	0.152	Pass	Pass
GCL	0.27	48	--	--	640	--	Pass	Pass

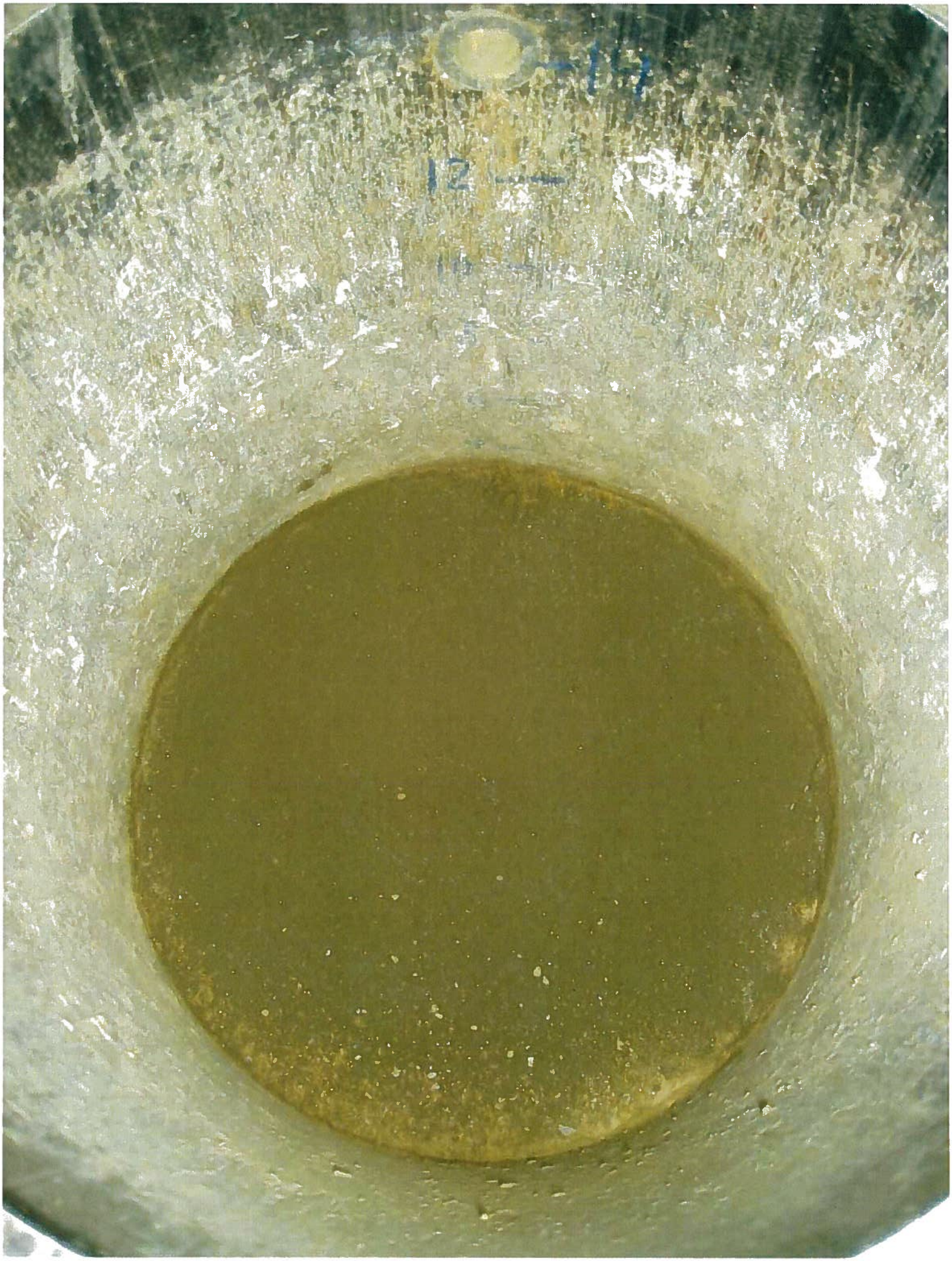
General Test Notes: Test was conducted using a 12" diameter cell. The 60 mil texture/texture LLDPE liner was placed on top of moistened GCL which was placed on top of approximately 3.0 inches of underliner soil, then covered with approximately 10.75 inches of overliner material. Approximately 12 rocks were hand placed with points downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 3 hours. The load was maintained for 48 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the liner was inspected and tested for punctures both visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

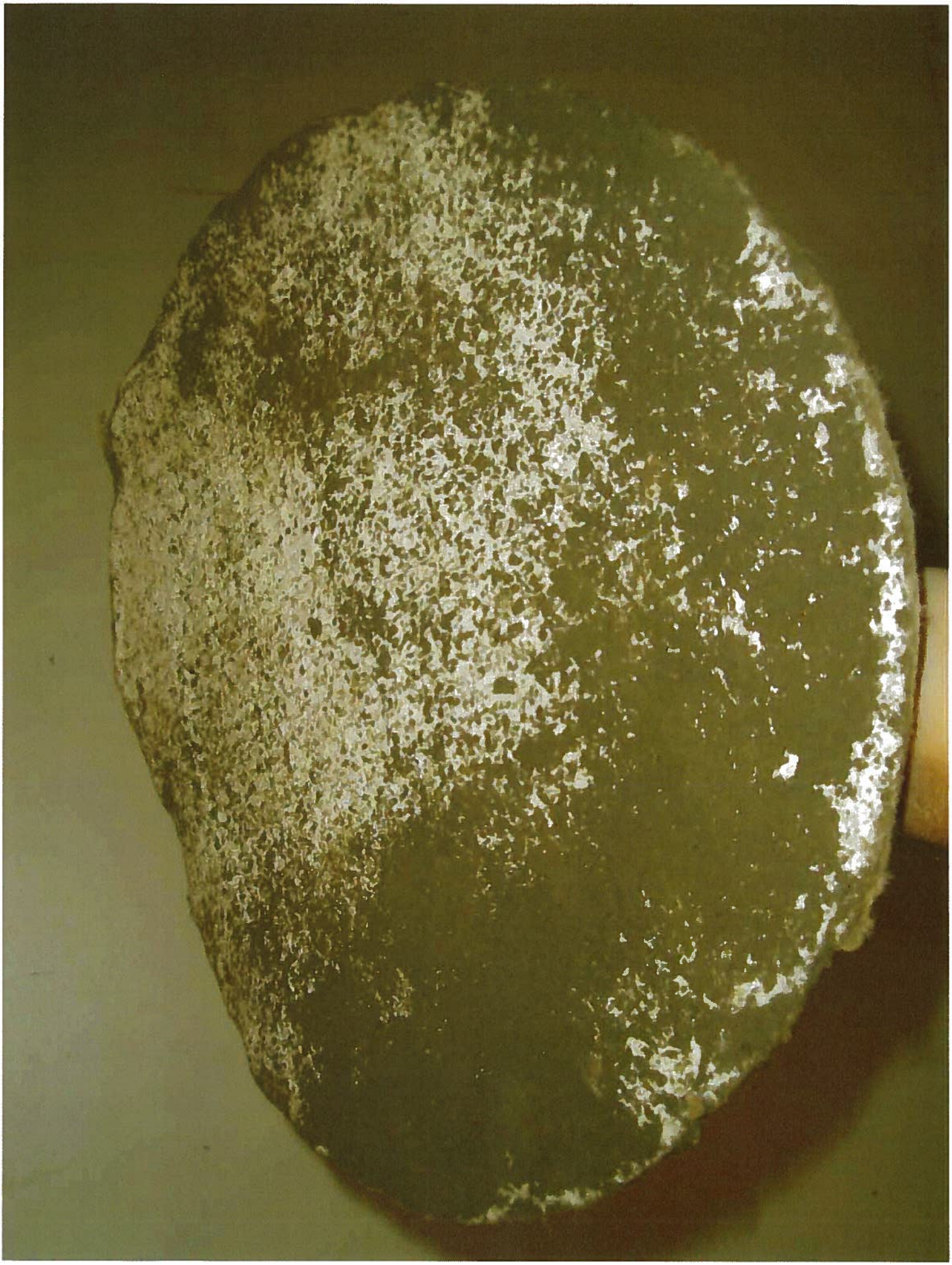
Liner observations: No punctures were present but numerous dimples (approximately 38) and scratches. There was no apparent damage to the underlying GCL, only depressions which mimicked th overlying geomembrane dimples.

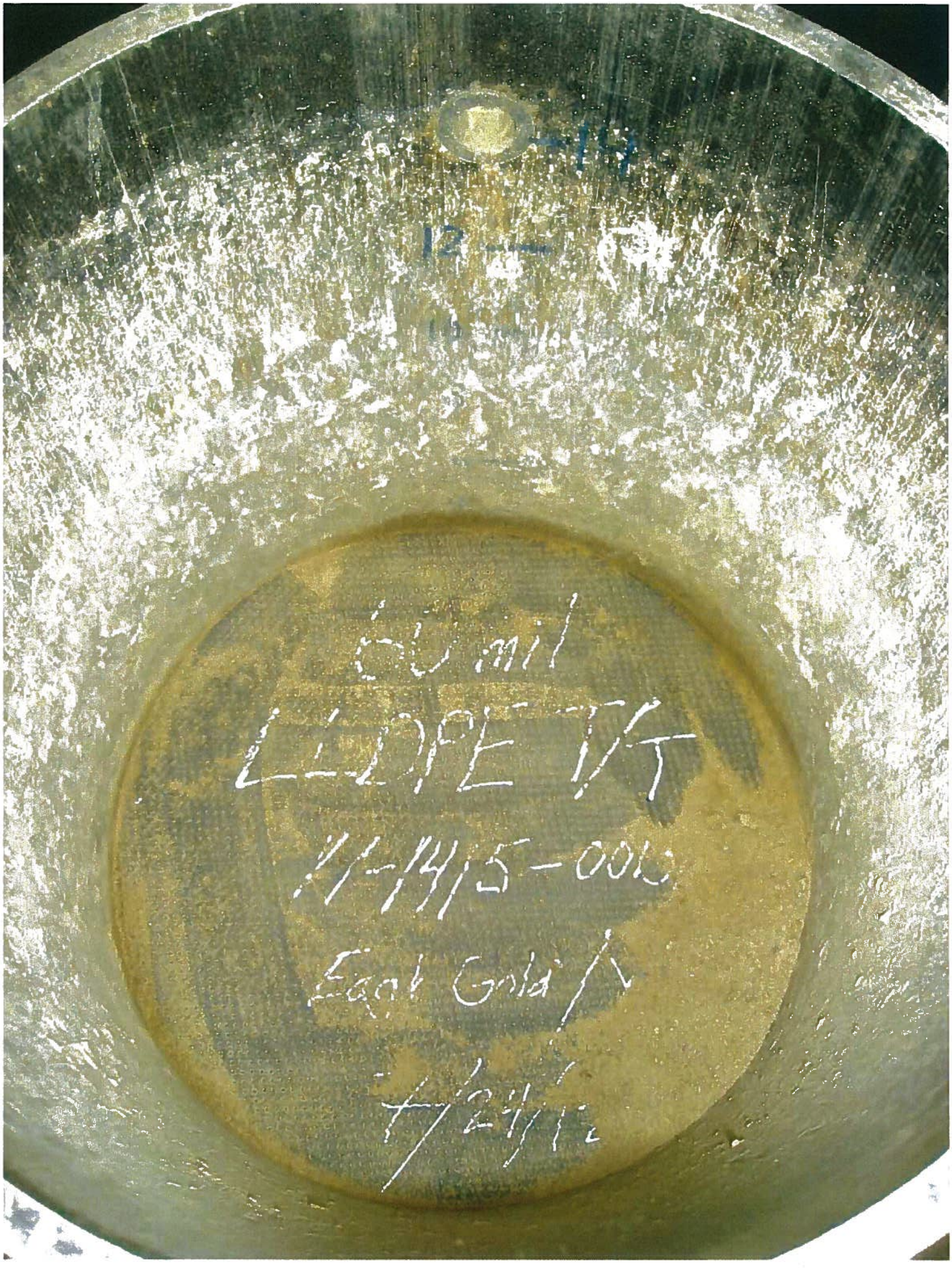
Underliner was remolded to 93.2% of standard Proctor maximum dry density at +1.0% of optimum moisture. Overliner was loosely placed and slightly tamped.

Date:	7/24/12
Tech:	JAM
Review:	MB


11-1415-0013/2000
Eagle Gold / Yukon
3" Slit @ 107.8pcf
25mm OVERLINER / 60mil LLDPE
Liner System B
Test Complete



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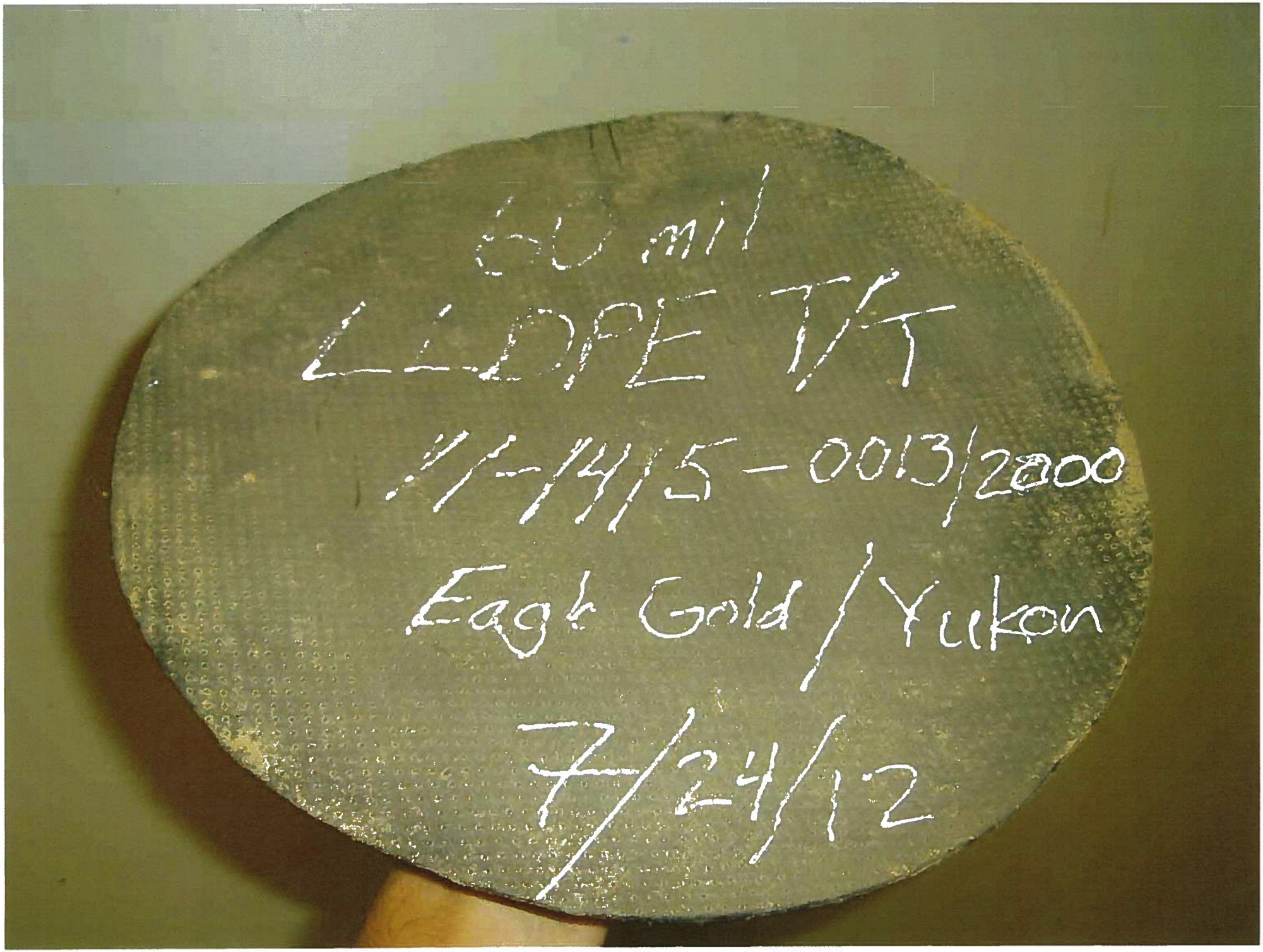
LDPE IV
YMS-001
East Gold A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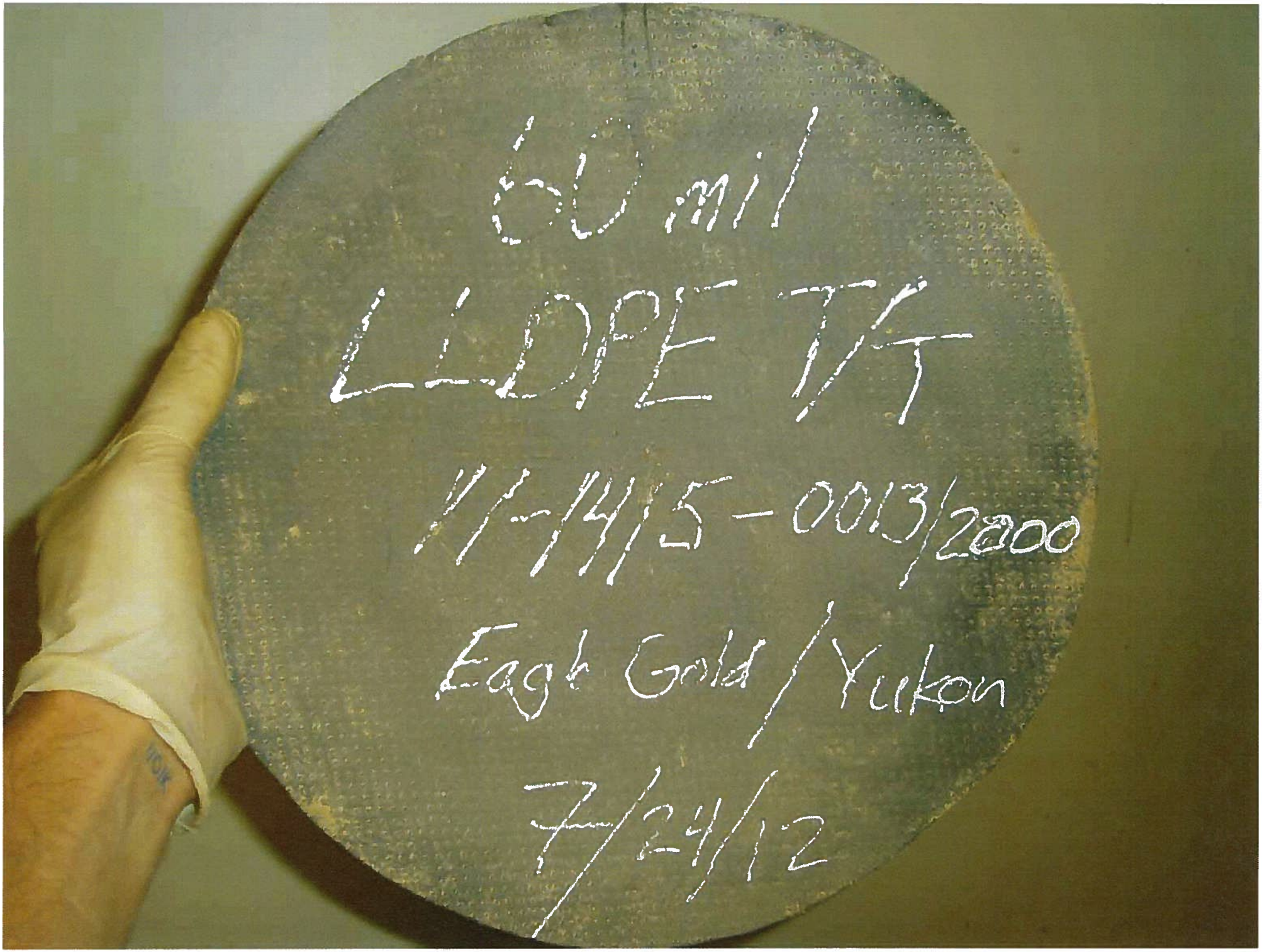
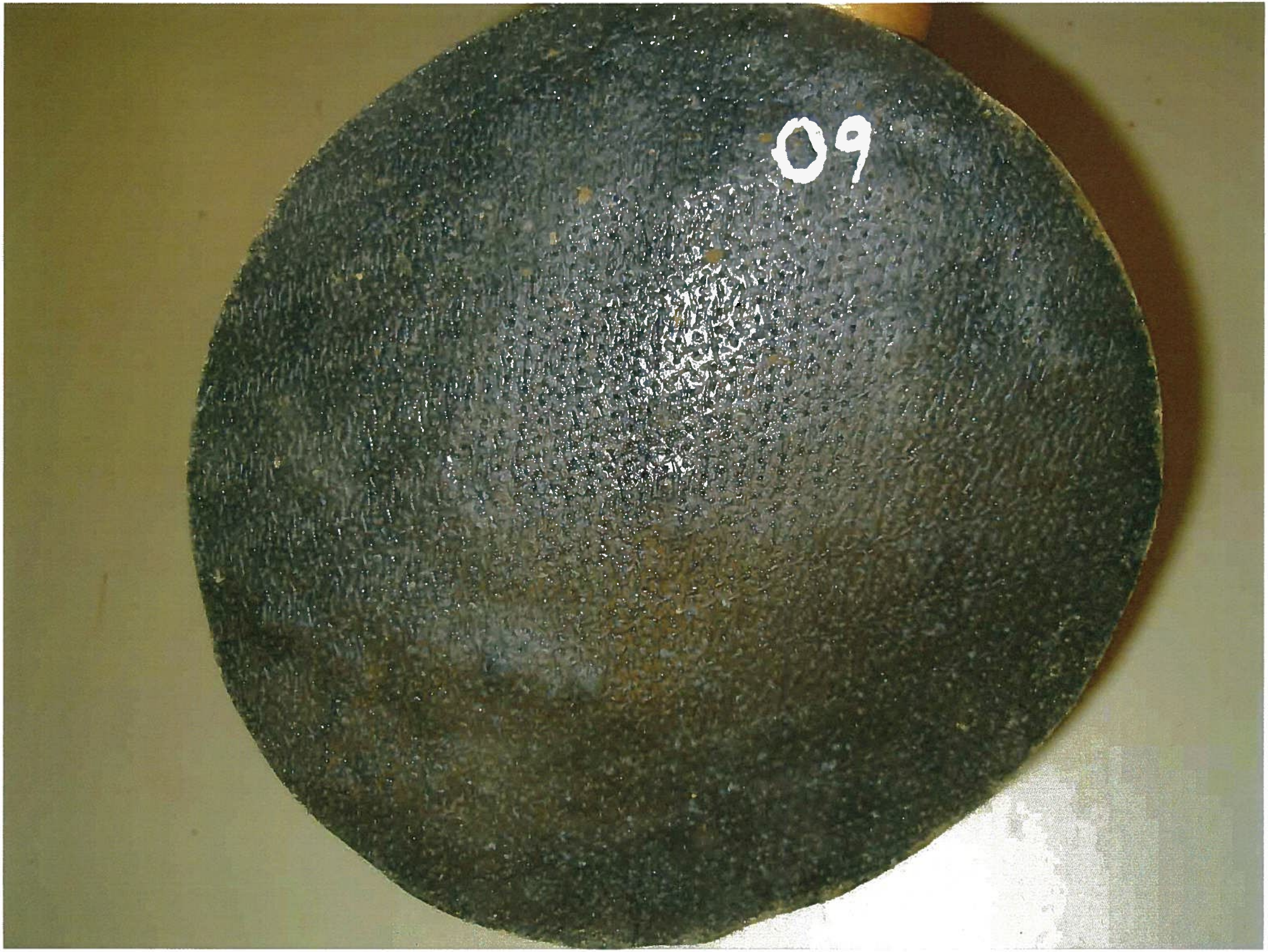
LLDPE TF
14/5-0013/2000
Eagle Gold / Yukon
7/24/12


60 mil
LLDPE/T
11-1415-0013/2000
Eagle Gold / Yukon
7/24/12


09

August 22, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing Liner System C sample "BGC-01 (38mm)", and consolidation/permeability testing on sample "BGC-01 (25mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (38mm)
DATE TESTED:	07/31/12		

Clay Liner

Initial Moisture Content

Tare:	S-7
Wet Weight & Tare, g:	154.67
Dry Weight & Tare, g:	138.17
Tare Weight, g:	27.58
Moisture, %:	**14.9**

Final Moisture Content

Tare:	T-4
Wet Weight & Tare, g:	159.44
Dry Weight & Tare, g:	144.95
Tare Weight, g:	27.25
Moisture, %:	**12.3**

Overliner

Initial Moisture Content

Tare:	M53
Wet Weight & Tare, g:	642.24
Dry Weight & Tare, g:	640.06
Tare Weight, g:	94.97
Moisture, %:	**0.4**

Final Moisture Content

Tare:	M53
Wet Weight & Tare, g:	689.89
Dry Weight & Tare, g:	687.04
Tare Weight, g:	94.89
Moisture, %:	**0.5**

Initial Height Determination (Inches)

	Underliner	Overliner
1.	3.088	3.750
2.	3.085	4.000
3.	3.079	3.750
4.	3.085	4.000
5.	3.092	3.750
6.	3.091	3.830
Average	3.087	3.847
Cell Height	--	16.250
Sample Height	3.087	9.240

Density	**Underliner**		**Overliner**	
Wet Weight:	10,512.0	g	24420.80	g
Dry Weight:	9,147.2	g	24323.52	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	3.087	in	9.240	in
Final Height:	2.969	in	8.134	in
Initial Volume:	0.202	ft^3	0.60	ft^3
Final Volume:	0.194	ft^3	0.53	ft^3
Initial Wet Density:	114.8	pcf	89.1	pcf
Final Wet Density:	119.3	pcf	101.2	pcf
Initial Dry Density:	99.9	pcf	88.7	pcf
Final Dry Density:	103.9	pcf	100.8	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours

20 rocks positioned above PVC membrane prior to overliner addition.

PVC membrane visual inspection showed 19 indentations where rocks were positioned prior to applying load. Vacuum test of PVC membrane showed zero punctures.

Liner Thickness (in)

1.	0.075	
2.	0.077	
3.	0.078	
4.	0.076	
5.	0.076	
6.	0.078	
Average	0.077	(in)
	76.67	(mils)

Remold Instructions

Approximately 9" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density and +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 7/31/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.8

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (38mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 88.7

Geosynthetic Manufacturer/Supplier: Nan Ya Plastics Corporation, America 0.75 mm PVC

Liner Type	Ave. Liner Thickness (mils)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
0.75mm PVC	76.7	48	92.7	14.9	640	1.226	Pass	Pass

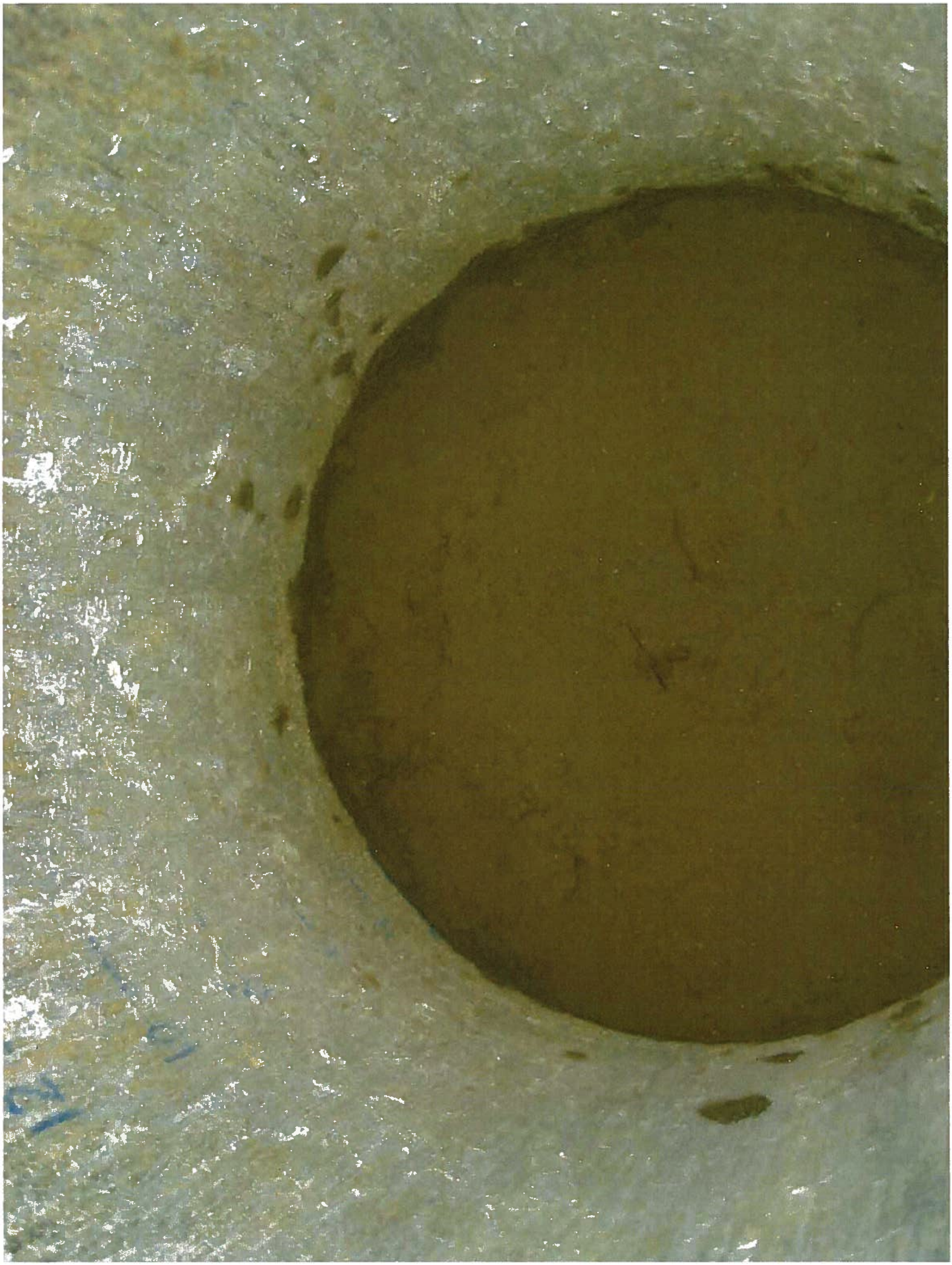
General Test Notes: Test was conducted using a 12" diameter cell. Smooth 0.75mm PVC was placed on top of approximately 3.0 inches of underliner then overlain by approximatley 9.25 inches of overliner materia Approximately 20 rocks were hand placed pointing downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 1.5 hours. The load was maintained for 48 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the PVC liner was inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG

Liner observations: No visual puncturing of PVC liner. No penetrations observed during the vacuum test. Approximately 19 notable dimples were present on the surface of the PVC liner.

Underliner was remolded to 92.7% of standard Proctor maximum dry density at -0.3% of standard Proctor optimum moisture. Overliner was loosely placed and slightly tamped

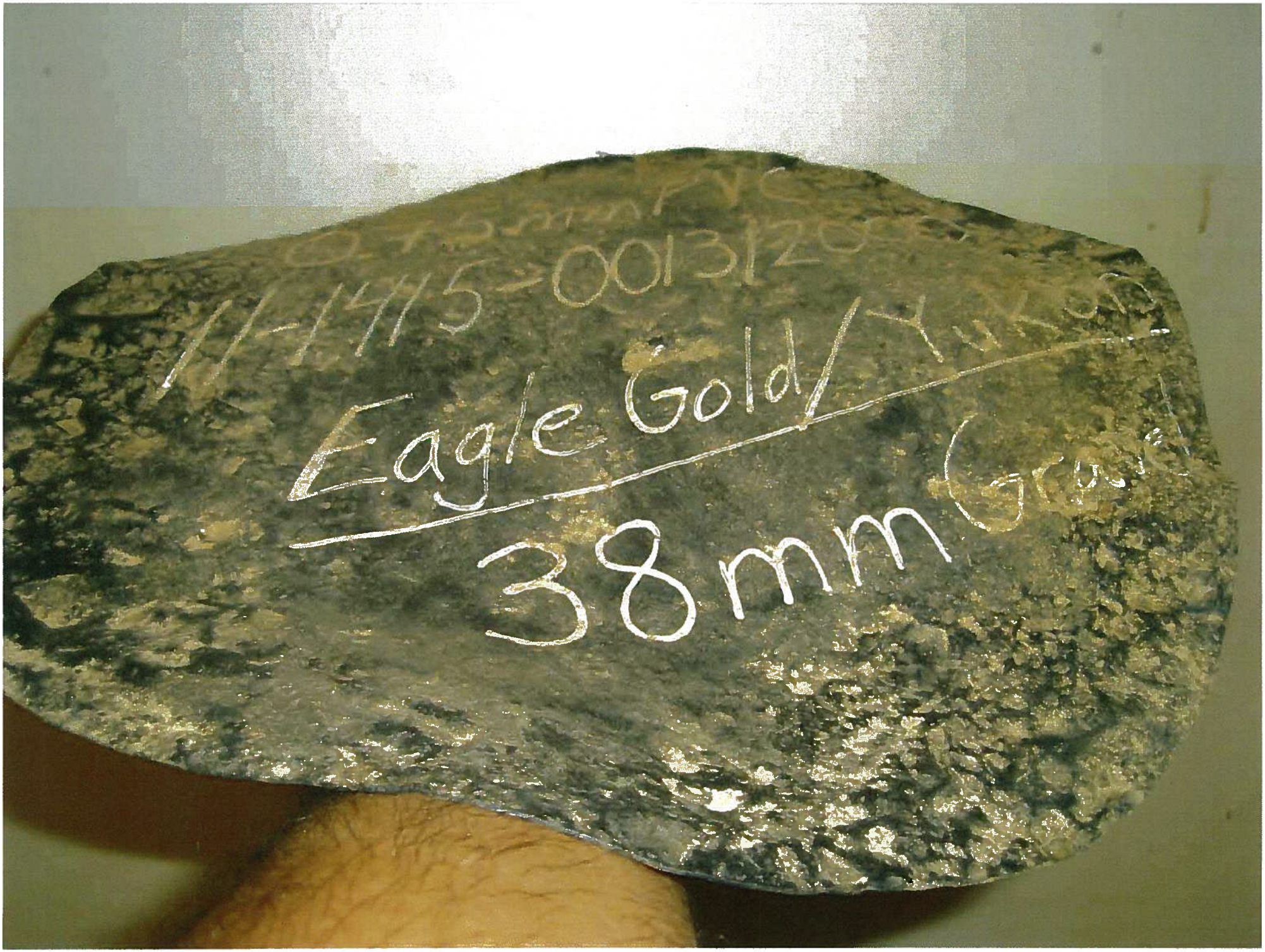
Date:	7/31/12
Tech:	ACE
Review:	MB

11-1415-0013/2000
Eagle Gold / Yukon
3" Sit @ 107.8 pcf
38mm Over Liner / 0.75mm PVC
Liner System C
START
7-31-12



0.75mm PVC
11-1415-0013/2000
Eagle Gold/Yukon
38mm Gravel

0.75mm PVC
11-1415-0013/2003
Eagle Gold/Yukon
38mm Gravel

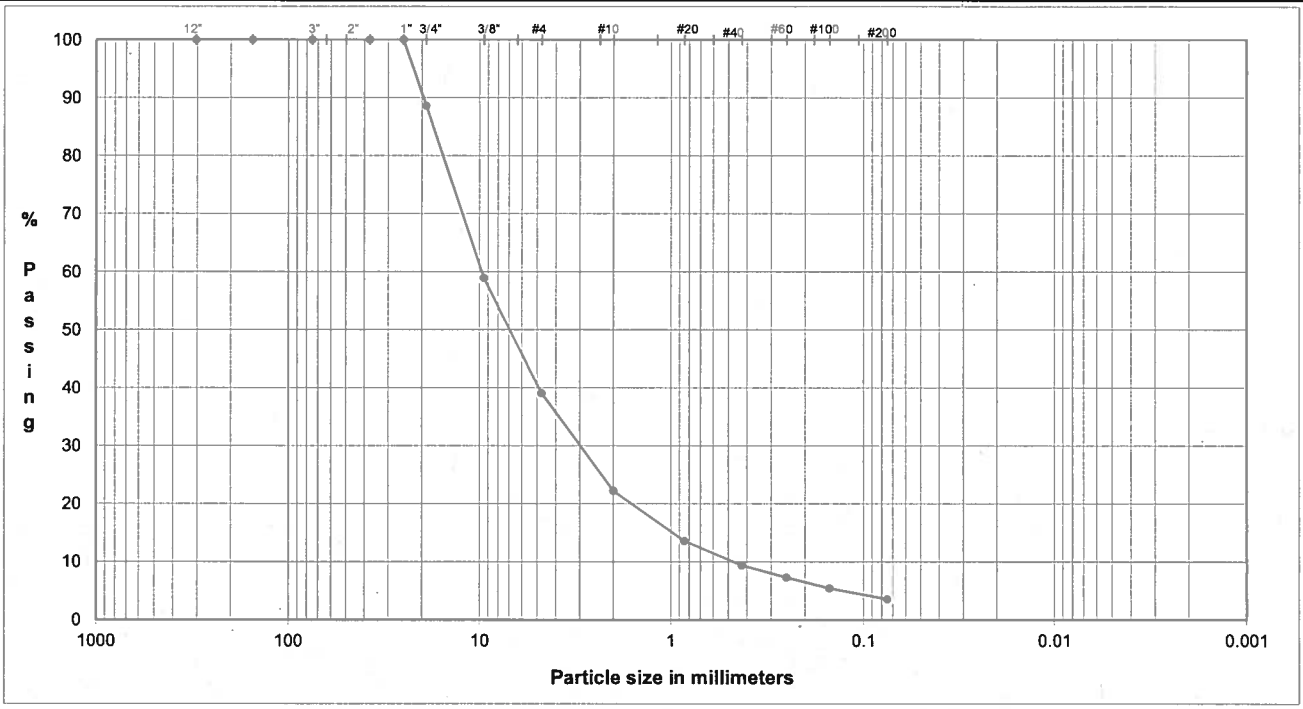

11-1415-001312
Eagle Gold/Yukon
38mm

August-12 | 11-1415-0013.2000

PRE-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (25mm)** Depth (ft) --
TYPE: **Pail**

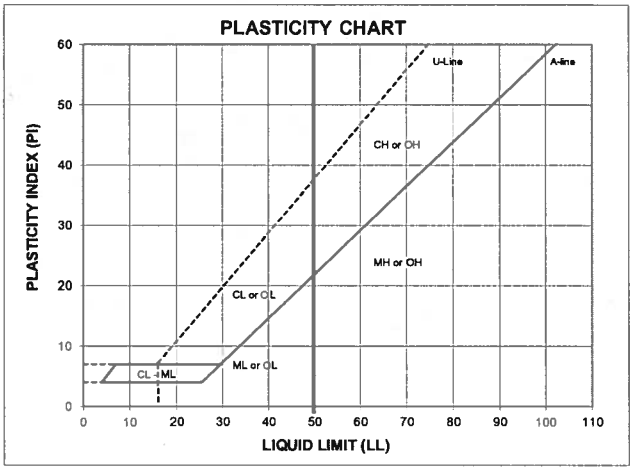


COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
6.0"	154.2	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.00**
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**88.6**	Coarse Gravel	**11.39**
0.375"	9.5	**58.9**		
#4	4.8	**39.1**	Fine Gravel	**49.54**
#10	2.0	**22.2**	Coarse Sand	**16.85**
#20	0.9	**13.6**		
#40	0.4	**9.4**	Medium Sand	**12.84**
#60	0.3	**7.3**		
#100	0.2	**5.4**		
#200	0.1	**3.6**	Fine Sand	**5.82**
			Fines	**3.57**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

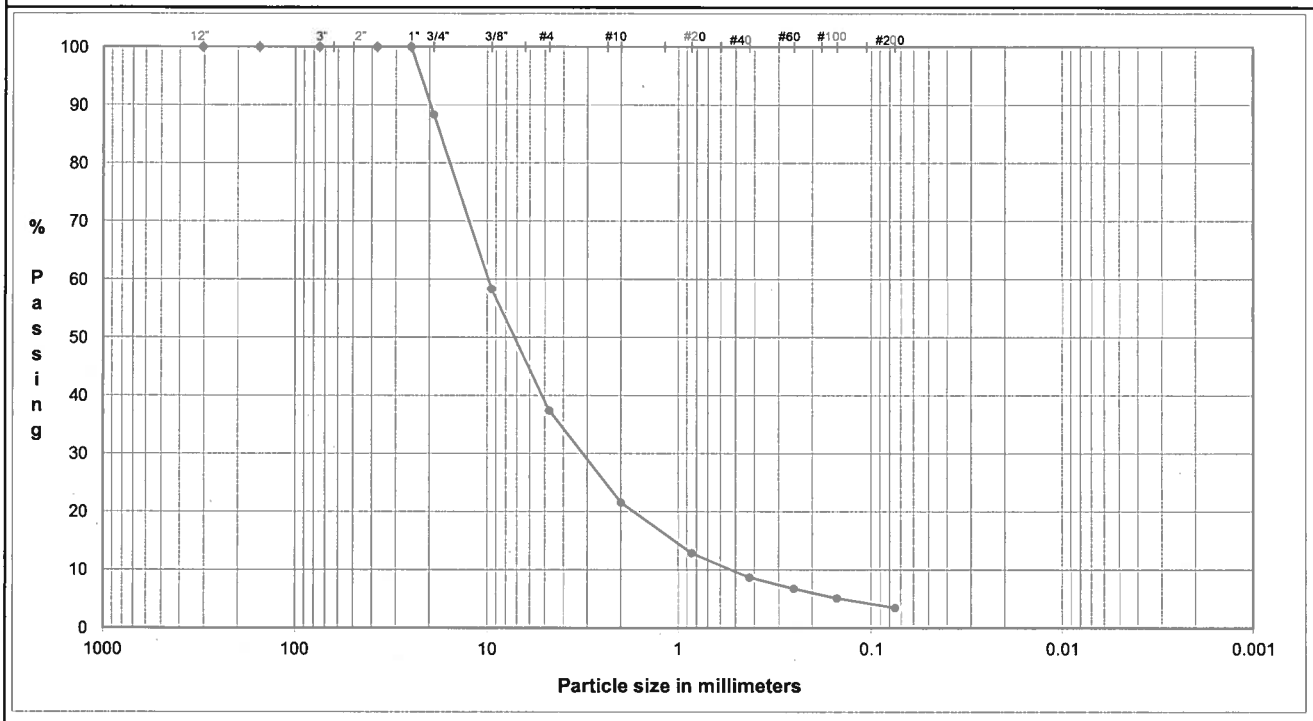
USCS: --

TECH	Ace/PH
DATE	8/6/12
REVIEW	PRH

August-12 | 11-1415-0013.2000

POST-PERM PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS
ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (25mm)** Depth (ft) --
TYPE: **Pail**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
12.0"	304.8	**100.0**		
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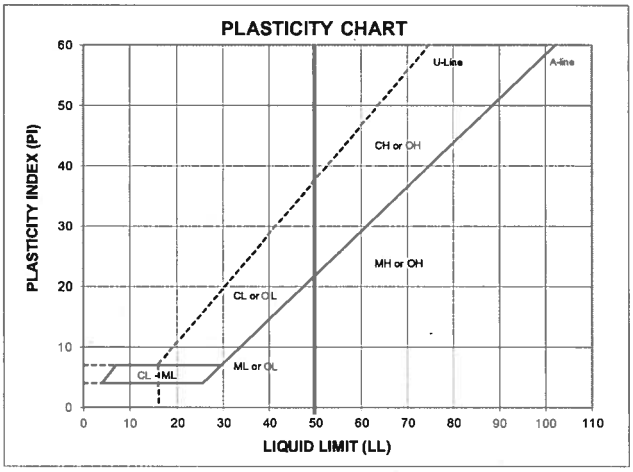
1.0"	25.0	**100.0**		
0.75"	19.0	**88.3**	Coarse Gravel	**11.67**
0.375"	9.5	**58.3**		
#4	4.8	**37.4**	Fine Gravel	**50.92**
#10	2.0	**21.6**	Coarse Sand	**15.85**
#20	0.9	**12.9**		
#40	0.4	**8.7**	Medium Sand	**12.88**
#60	0.3	**6.8**		
#100	0.2	**5.1**		
#200	0.1	**3.5**	Fine Sand	**5.22**
			Fines	**3.46**



ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: --

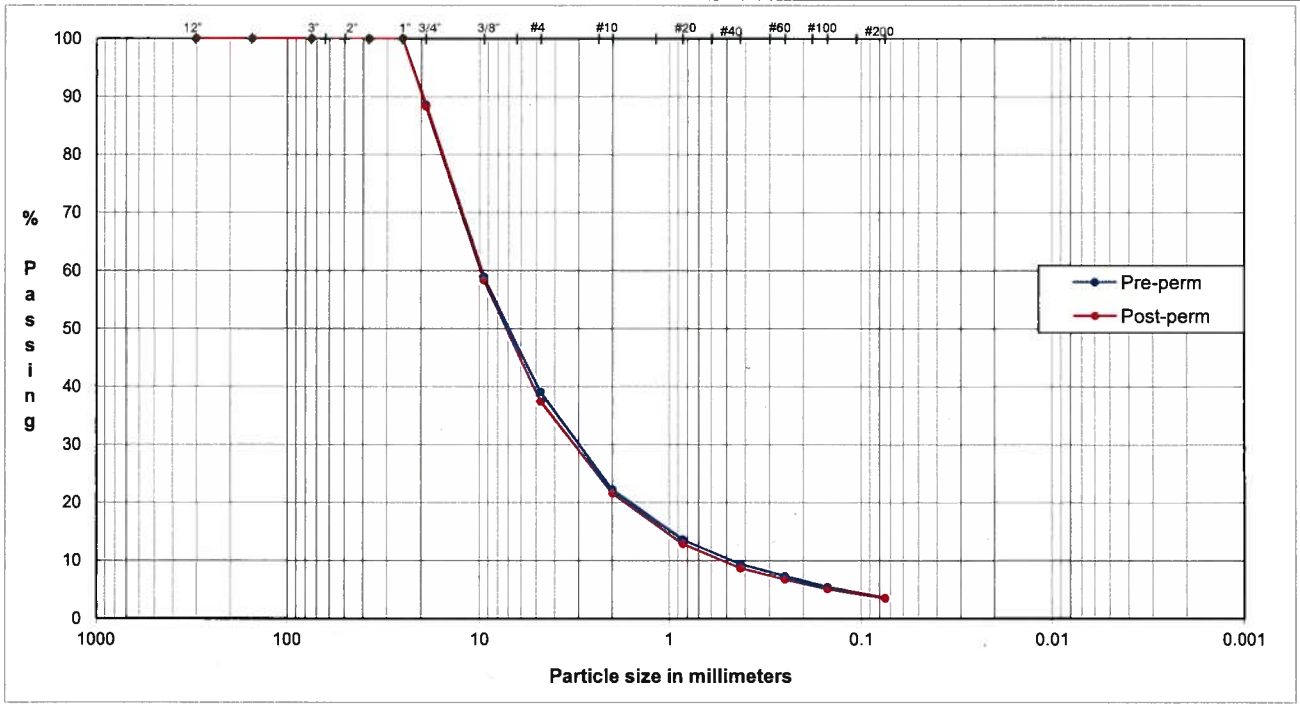
TECH	ACE/PRH
DATE	8/10/2012
REVIEW	PRH

August-12 11-1415-0013.2000

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **Tetra Tech/Aggregate/Yukon**
SAMPLE ID: **BGC-GD-01 (25mm)** Depth (ft) --
TYPE: **Pail**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

PRE-PERM

U.S. Standard Sieves Sizes and Numbers

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POST-PERM

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Particle Size Percentage
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			Fines	**3.46**

ATTERBERG LIMITS

M_c	LL	PL	PI	SG
--	--	--	--	--

DESCRIPTION: Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate

USCS: --

TECH	Ace/PH
DATE	8/6/12
REVIEW	PRH

TETRA TECH/AGGREGATE/YUKON
11-1415-0013.2000
TABLE 1
RIGID-WALL COMPRESSION
CONSTANT-HEAD PERMEABILITY
10-INCH DIAMETER CELL

Project Title:	Tetra Tech/Aggregate/Yukor	**Boring:**	--
Project Number:	11-1415-0013.2000	**Sample:**	BGC-GD-01 (25mm)
Dates Tested:	8/6/2012 **To:** 8/8/2012	**Depth (ft):**	--

Sample Setup

Initial Sample Height, in	9.932
Mold Diameter, in	10.00
Sample Area, in^2	78.54
Wet Sample Weight, g	21,873.6
Wet Sample Weight, lb	48.23
Dry Sample Weight, g	21,792.7
Dry Sample Weight, lb	48.05

Initial Sample:
Moisture Determinatior

Tare	M32
Wet Weight and Tare, g	651.17
Dry Weight and Tare, g	649.11
Tare Weight, g	93.98
Moisture Content, %	0.4

Initial Sample Density and Void Ratio

Specific Gravity[1]	2.70
Initial Sample Volume, ft^3	0.451
Initial Wet Density, lb/ft^3	106.8
Initial Dry Density, lb/ft^3	106.4
Initial Void Ratio	0.58

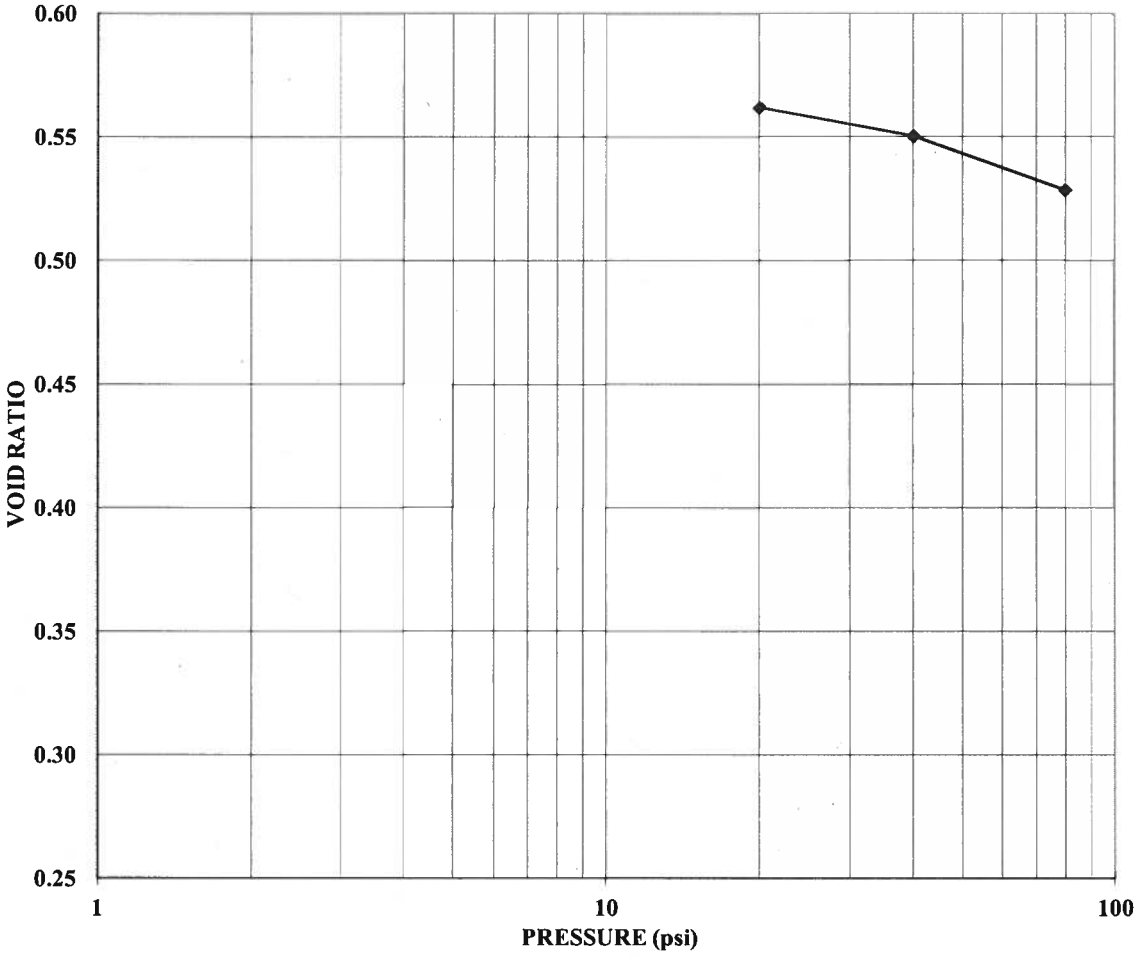
Final Sample Density and Void Ratio

Final Sample Height, in	9.590
Final Sample Volume, ft^3	0.436
Final Dry Density, lb/ft^3	110.2
Final Void Ratio	0.53

Load (psi)	Height (in)	Dry Density (pcf)	Void Ratio	Flow Rate (ml/sec)	Gradient	Permeability (cm/sec)	Porosity
20	9.800	107.9	0.56	95.18	0.08	2.4E+00	0.36
40	9.728	108.7	0.55	64.19	0.06	2.3E+00	0.35
80	9.590	110.2	0.53	54.04	0.05	2.2E+00	0.35

NOTES: [1]Specific Gravity = Assumed Value

ONE-DIMENSIONAL CONSOLIDATION



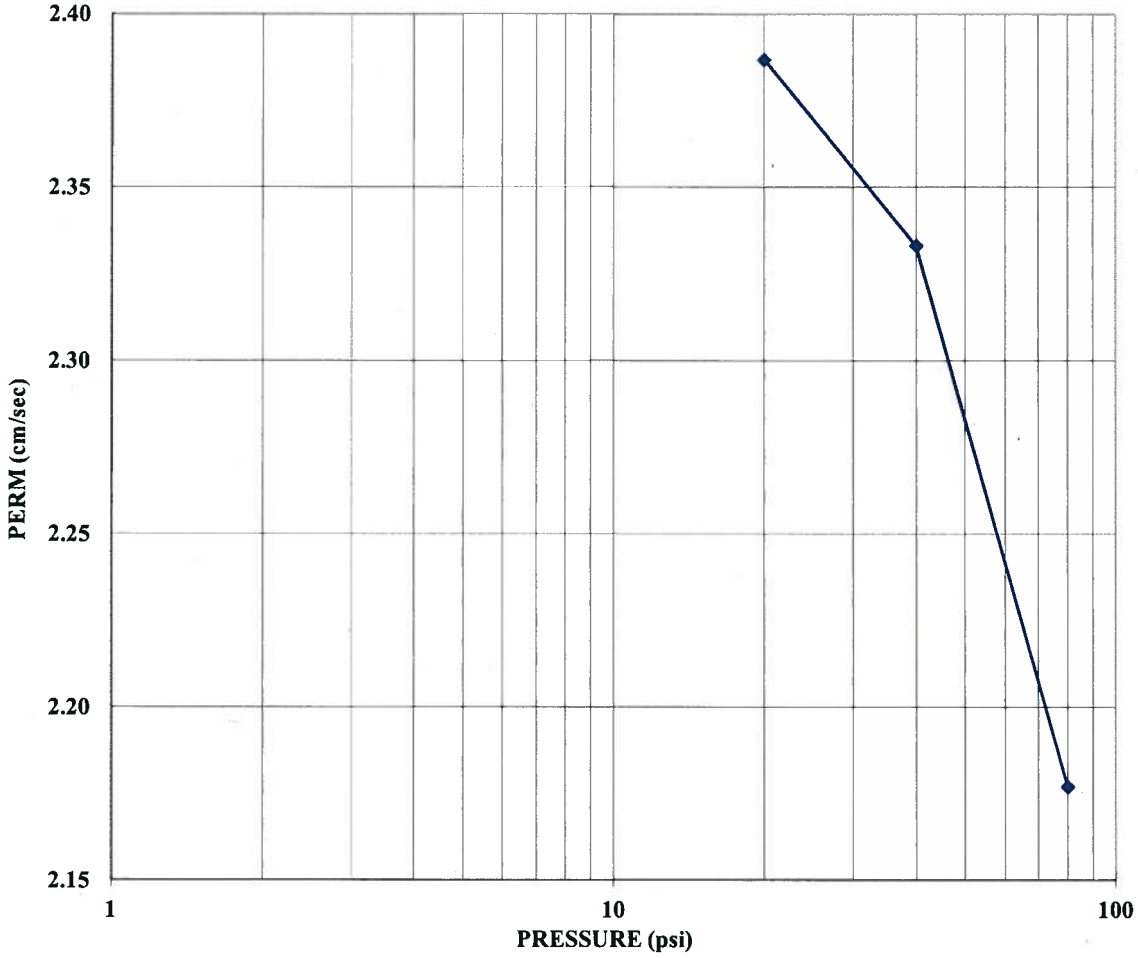
SAMPLE #:	**BGC-GD-01 (25mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate**

DATE	8/8/2012
TECH	Ace
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



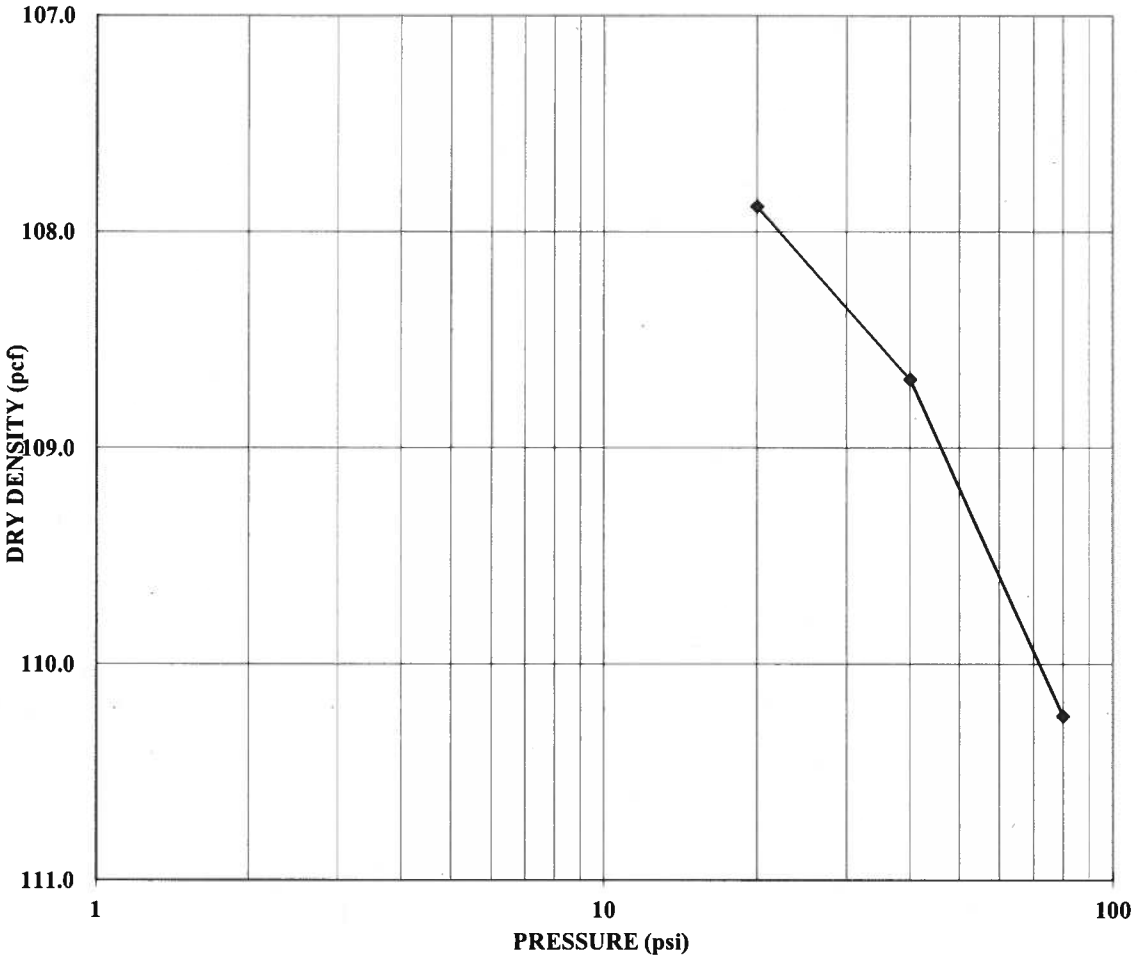
SAMPLE #:	**BGC-GD-01 (25mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate**

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

DATE	8/8/2012
TECH	Ace
REVIEW	PRH

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

ONE-DIMENSIONAL CONSOLIDATION



SAMPLE #:	**BGC-GD-01 (25mm)**
DESCRIPTION:	**Dry, light yellowish brown sandy GRAVEL, poorly graded, angular, brittle aggregate**

DATE	8/8/2012
TECH	Ace
REVIEW	PRH

Tetra Tech/Aggregate/Yukon
11-1415-0013.2000

GOLDER ASSOCIATES INC.
LAKEWOOD, COLORADO

Golder Associates

September 14, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Liner System A sample "BGC-GD-01 (25mm)" and Liner System B sample "BGC-GD-01 (25mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
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Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013\2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech Eagle Gold/Yukon	OVERLINER	BGC-GD-01 (25mm)
DATE TESTED:	8/23/12		

Clay Liner

Initial Moisture Content

Tare:	PAN
Wet Weight & Tare, g:	466.84
Dry Weight & Tare, g:	446.18
Tare Weight, g:	311.52
Moisture, %:	**15.3**

Final Moisture Content

Tare:	Q-4
Wet Weight & Tare, g:	214.84
Dry Weight & Tare, g:	192.07
Tare Weight, g:	27.45
Moisture, %:	**13.8**

Overliner

Initial Moisture Content

Tare:	X-14
Wet Weight & Tare, g:	288.51
Dry Weight & Tare, g:	287.40
Tare Weight, g:	31.70
Moisture, %:	**0.4**

Final Moisture Content

Tare:	M-7R
Wet Weight & Tare, g:	648.98
Dry Weight & Tare, g:	647.01
Tare Weight, g:	94.98
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	2.86	2.314
2.	2.86	2.434
3.	2.86	2.493
4.	2.75	2.449
5.	2.75	2.372
6.	2.79	2.294
Average	2.812	2.393
Cell Height	--	16.250
Sample Height[1]	2.812	10.274

Density	**Clay liner**		**Overliner**	
Wet Weight:	9,860.00	g	24949.10	g
Dry Weight:	8,548.47	g	24841.26	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	2.812	in	10.274	in
Final Height[2]:	2.590	in	8.556	in
Initial Volume:	0.184	ft^3	0.67	ft^3
Final Volume:	0.170	ft^3	0.56	ft^3
Initial Wet Density:	118.2	pcf	81.9	pcf
Final Wet Density:	128.3	pcf	98.3	pcf
Initial Dry Density:	102.5	pcf	81.5	pcf
Final Dry Density:	111.3	pcf	97.9	pcf

General Test Notes:

Consolidate @ 640psi for 48hrs.

Post-Test: No visual or vacuum-tested punctures present in either "Top" or "Bottom" 60 mil microspike texture/texture LLDPE liner. "Top" liner had approximately 24 notable dimples, geocomposite had 13 dimples, while the "Bottom" liner had approximately 9 notable dimples. GCL had 9 dimples.

TOP LINER Visual puncture inspection: PASS Vacuum Test: PASS

GCL and GEOCOMPOSITE No damage, only indentations.

BOTTOM LINER Visual puncture inspection: PASS Vacuum Test: PASS

Liner Thickness (in)

	Top	Bottom	Geonet	
1.	0.058	0.059	0.352	
2.	0.059	0.060	0.333	
3.	0.061	0.058	0.372	
4.	0.060	0.060	0.370	
5.	0.059	0.058	0.355	
6.	0.061	0.060	0.353	
Average	0.060	0.059	0.356	(in)
	59.67	59.17	355.83	(mils)

Remold Instructions

Approximately 9" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density and +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech Eagle Gold/Yukon

JOB NUMBER: 11-1415-0013\2000

DATE: 8/23/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.8

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (25mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 81.5

Geosynthetic Manufacturer/Supplier: Agru America LLDPE Microspike (60-mil)

Geocomposite Manufacturer/Supplier: SYNTEC

Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
(Top) LLDPE Microspike 60	59.67	72	95.1	15.3	640	1.718	PASS	PASS
Tendrain 770-2 Double-sided (Highload)	355.83	72	95.1	15.3	640	1.718	PASS	--
(Bottom) LLDPE Microspike 80	59.17	72	95.1	15.3	640	1.718	PASS	PASS
GCL	0.3	72	95.1	15.3	640	1.718	PASS	--

General Test Notes: Test was conducted using a 12" diameter cell. GCL was placed on top of approximately 2.8 inches of underliner soil. 60 mil microspike texture/texture LLDPE liner was placed on top of the GCL, followed by GEONET drain material, a second layer of 60 mil microspike texture/texture LLDPE liner and approximately 8.9 inches of overliner material. Approximately 26 rocks were hand placed pointing downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of approximately 21 hours. The load was maintained for 72 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, top liner was inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

Liner observations: No visual puncturing of either geomembrane or Geonet. No leaks were observed durin the vacuum test. Approximately 24 notable dimples were present on the surface of the "Top" LLDPE liner. The "Bottom" LLDPE liner had only 9 notable dimples. GCL and geonet (13 dimples) have only indentations that mimic the dimples from overlying geosynthetic materials.

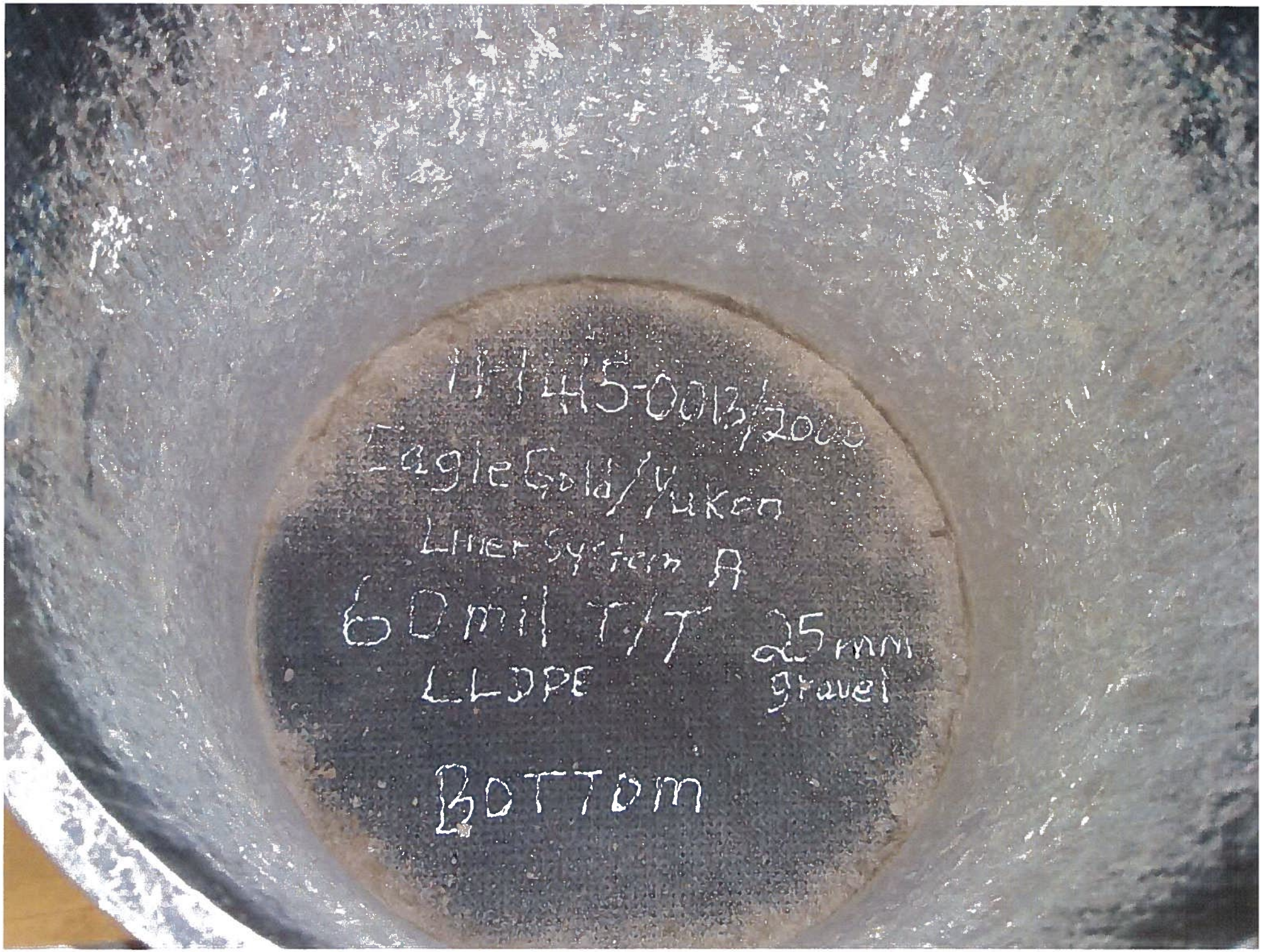
Underliner was remolded to 95.1% of standard Proctor maximum dry density at +0.1% of standard Proctor optimum moisture. Overliner was loosely placed and slightly tampe(

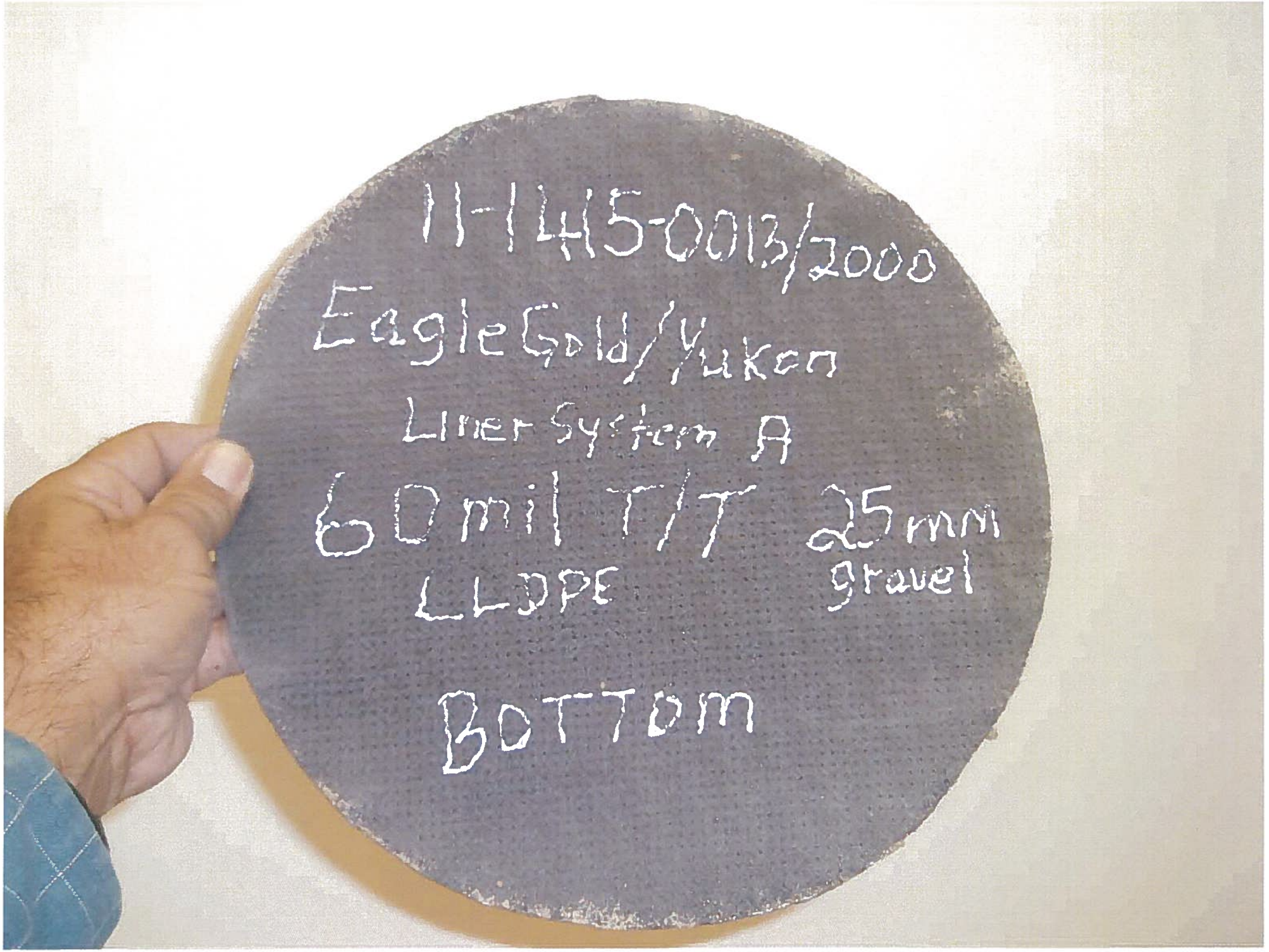
Date: 8/23/12

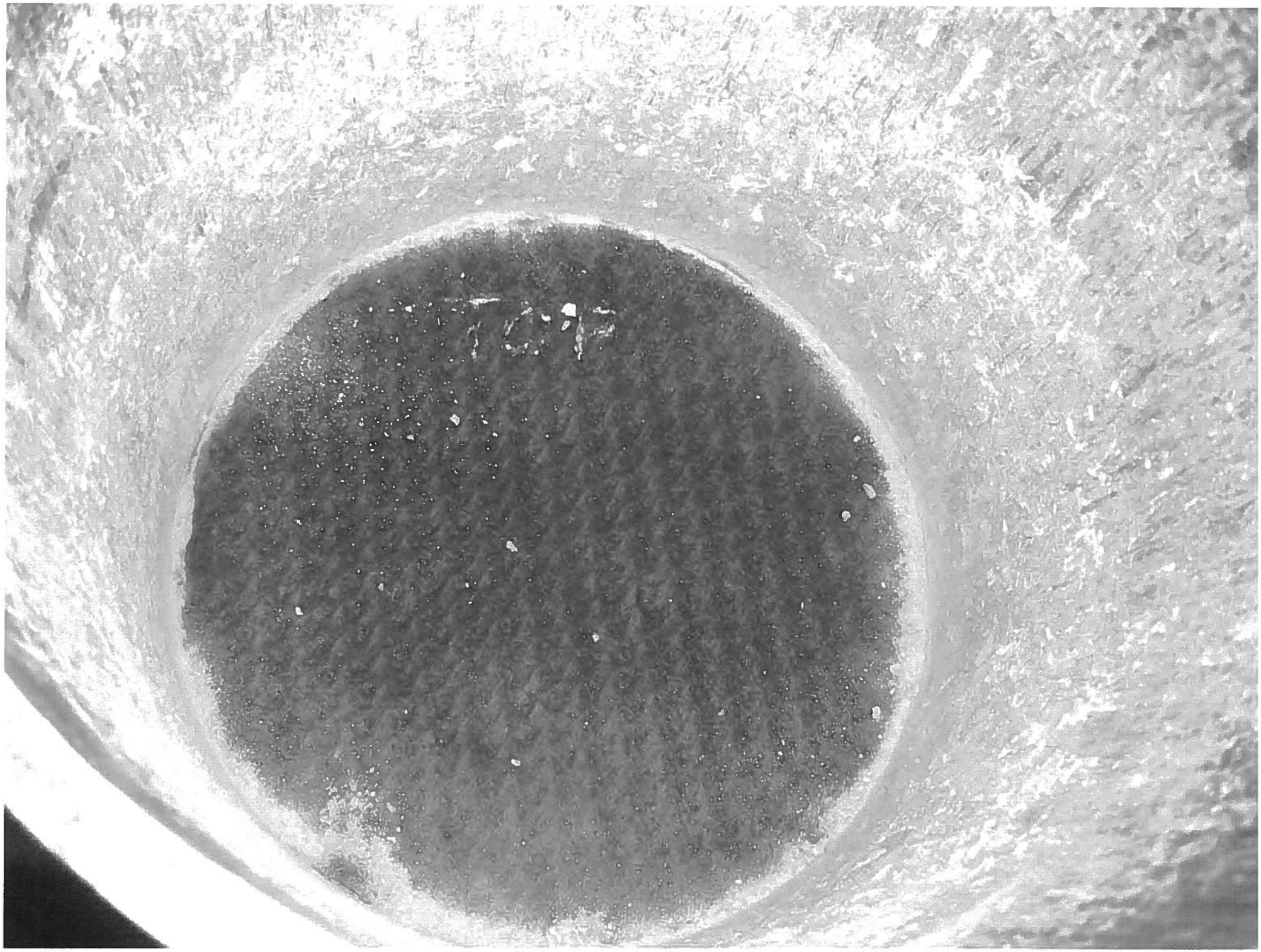
Tech: ACE

Review: MB

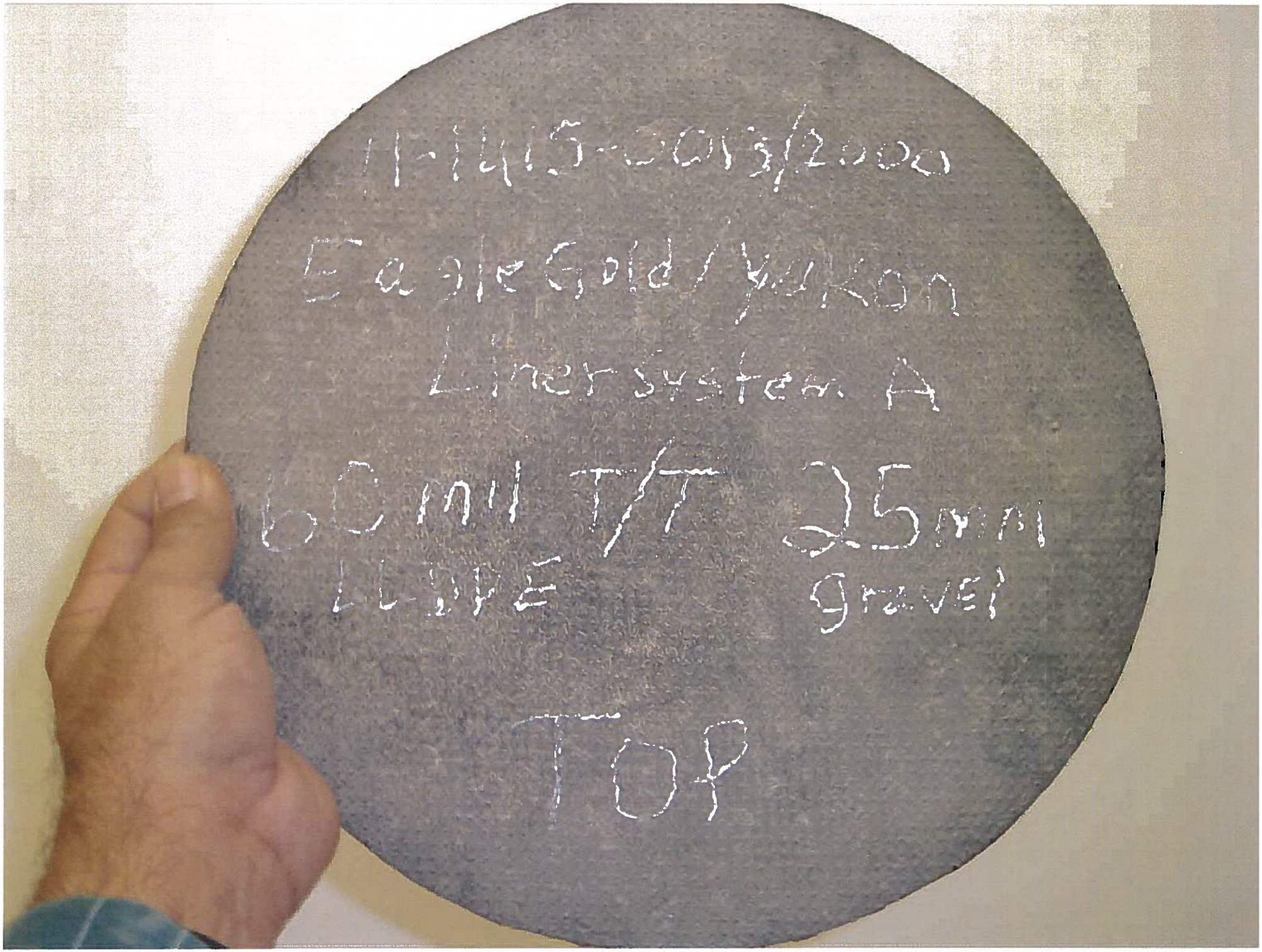
8-15-12
11-1415-0013/2000
Eagle Gold / Yukon
3" Slit @ 7.8 acfm
25mm Overliner
60 mil LLDPE TT
GEO NET
GCL
Liner System A
8-27-12/160-640 psi
TEST COMPLETED
Made in USA


HH45-0013/2000
Eagle Gold/Yukon
Liner System A
60 mil T/T
LLDPE
25 mm
gravel
Bottom


11-1145-0013/2000
EagleGold/Yukon
Liner System A
60mil T/T
LLDPE
25mm
gravel
Bottom


TOP

Hello Grandma!
Thanks for the
Cookies!
Love,
Andrew


11-HUS-001/2006
Eagle Gold/Yukon
Liner System A
60 mil T/T 25mm
LLDPE gravel
Top

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (25mm)
DATE TESTED:	08/27/12		

Clay Liner

Initial Moisture Content

Tare:	Q-6
Wet Weight & Tare, g:	205.46
Dry Weight & Tare, g:	182.07
Tare Weight, g:	27.97
Moisture, %:	**15.2**

Final Moisture Content

Tare:	F-3
Wet Weight & Tare, g:	190.70
Dry Weight & Tare, g:	171.60
Tare Weight, g:	29.10
Moisture, %:	**13.4**

Overliner

Initial Moisture Content

Tare:	M-7R
Wet Weight & Tare, g:	648.98
Dry Weight & Tare, g:	647.01
Tare Weight, g:	94.98
Moisture, %:	**0.4**

Final Moisture Content

Tare:	M-53
Wet Weight & Tare, g:	612.54
Dry Weight & Tare, g:	610.54
Tare Weight, g:	94.89
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Underliner	Overliner
1.	2.904	2.543
2.	3.061	2.573
3.	3.022	2.690
4.	2.943	2.560
5.	2.904	2.669
6.	2.904	2.743
Average	2.956	2.630
Cell Height	--	16.250
Sample Height	2.956	10.582

Density	**Underliner**		**Overliner**	
Wet Weight:	10,560.1	g	25518.90	g
Dry Weight:	9,168.5	g	25428.16	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	2.956	in	10.582	in
Final Height:	2.799	in	9.381	in
Initial Volume:	0.193	ft^3	0.69	ft^3
Final Volume:	0.183	ft^3	0.61	ft^3
Initial Wet Density:	120.4	pcf	81.3	pcf
Final Wet Density:	127.2	pcf	91.7	pcf
Initial Dry Density:	104.5	pcf	81.0	pcf
Final Dry Density:	110.4	pcf	91.4	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours.

Post-Test: No visual puncture of geomembrane. No penetrations observed during the vacuum test.

Approximately 44 notable, rounded dimples on the surface of the membrane.

Approximately 31 notable dimples on the surface of the GCL.

Liner Thickness (in)

1.	0.082	
2.	0.081	
3.	0.082	
4.	0.084	
5.	0.081	
6.	0.082	
Average	0.082	(in)
	82.00	(mils)

Remold Instructions

Approximately 10" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density. +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: Tetra Tech/Aggregate/Yukon

JOB NUMBER: 11-1415-0013/2000

DATE: 8/27/2012

Underliner (Bedding) Source: Silt

Underliner Classification: --

Atterberg Limits: --

Maximum Dry Density (pcf): 107.5

Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (25mm)

Overliner Classification: GP

Atterberg Limits: --

Dry Density (pcf): 81.0

Geosynthetic Manufacturer/Supplier: Argu America LLDPE Microspike (60-mil)

Liner Type	Ave. Liner Thickness (mls)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
LLDPE Microspike 80	82.0	48	97.2	15.2	640	1.359	PASS	PASS
GCL	284	48	97.2	15.2	640	1.359	--	--

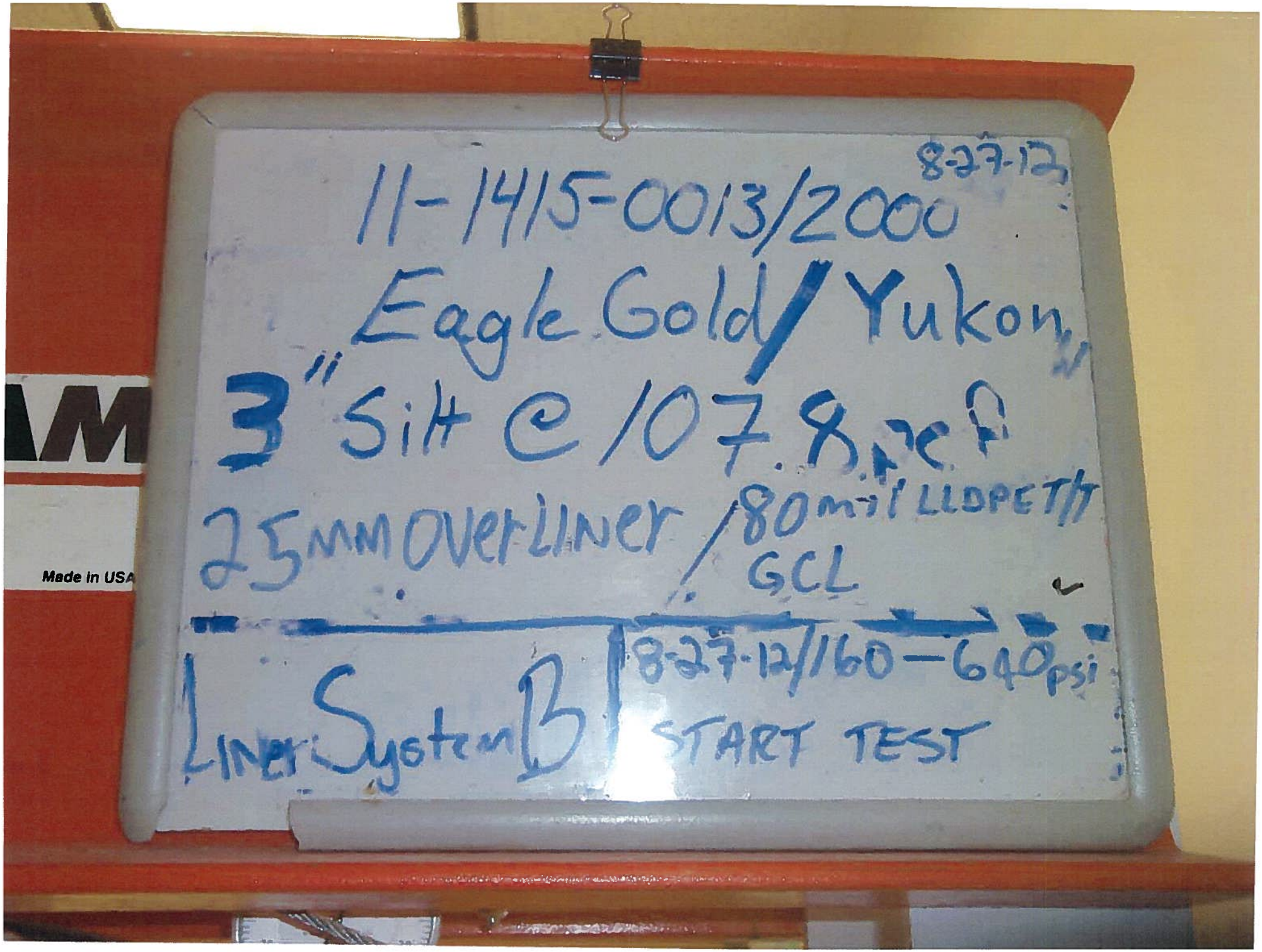
General Test Notes:

Test was conducted using a 12" diameter cell. The 80 mil texture/texture microspike liner was placed on top of moistened GCL which was placed on top of approximatly 3 inches of underliner soil, then covered with approximately 10.5 inches of overliner material. Approximately 15 rocks were hand placed with points downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 5 hours. The load was maintained for 48 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the liner was inspected and tested for punctures both visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

Liner observations: No punctures were present but numerous dimples (approximately 44) and scratches. There was no apparent damage to the underlying GCL, only depressions (33) which mimicked the overlying geomembrane dimples.

Underliner was remolded to 97.2% of standard Proctor maximum dry density at optimum moisture of standard Proctor. Overliner was loosely placed and slightly tamped.

Tech:	JAM
Review:	MB

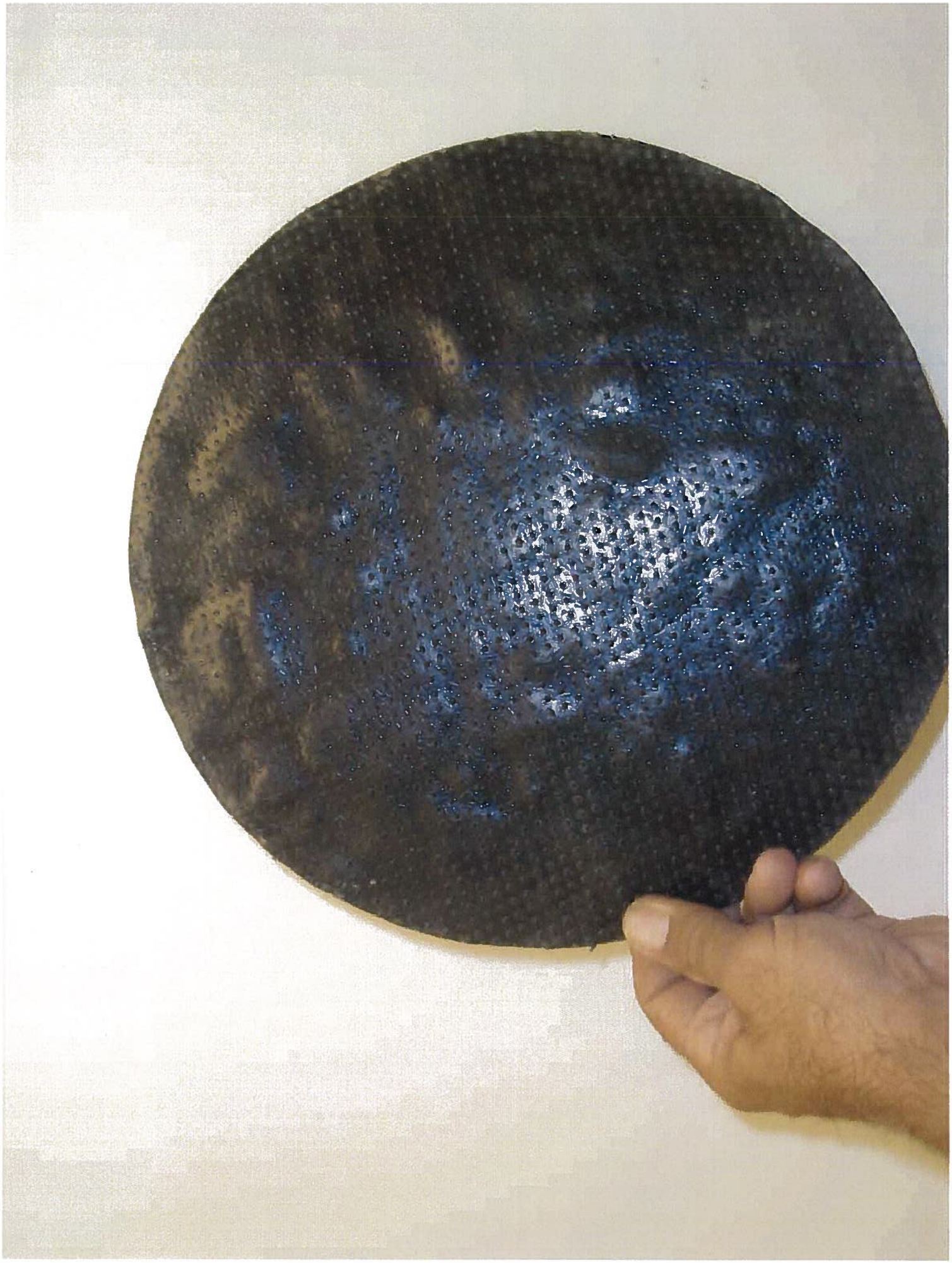

8-27-12
11-1415-0013/2000
Eagle Gold / Yukon
3" Sit @ 1078.2'
25mm Overliner / 80mil LLDPE/t
GCL
Liner System B
8-27-12/160—640psi
START TEST
Made in USA

11-145-0013-2000
TETRA TECH
EAGLE GOLD/YUKON
80 mil T/T LINER SYSTEM B
25 mm GRAVEL
7-31-12

2000
TETRA
AGLE GOLD/YUKON
LINER B
GRAVEL
7-31-

TETRA TECH
ENGLE GOLD
20 mil
Sawn Gravel
7-31-12

11-14C DRAIN
TETRA TECH
EAGLE GOLD, YUKON
80 mil TYP LINER
0.5 mm GRAVEL
7-31-12



September 14, 2012 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

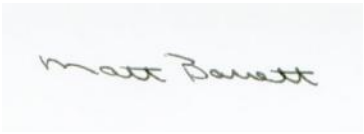
Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner load testing on Liner System C sample "BGC-GD-01 (25mm)". All pending laboratory tests results will be forwarded when completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.



Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

12 inch Liner Load Test

JOB NUMBER:	11-1415-0013/2000	UNDERLINER:	Silt
JOB NAME:	Tetra Tech/Aggregate/Yukon	OVERLINER	BGC-GD-01 (25mm)
DATE TESTED:	08/29/12		

Clay Liner

Initial Moisture Content

Tare:	Y-2
Wet Weight & Tare, g:	218.55
Dry Weight & Tare, g:	193.26
Tare Weight, g:	28.00
Moisture, %:	**15.3**

Final Moisture Content

Tare:	K-9
Wet Weight & Tare, g:	149.00
Dry Weight & Tare, g:	134.89
Tare Weight, g:	22.40
Moisture, %:	**12.5**

Overliner

Initial Moisture Content

Tare:	M-53
Wet Weight & Tare, g:	612.54
Dry Weight & Tare, g:	610.54
Tare Weight, g:	94.89
Moisture, %:	**0.4**

Final Moisture Content

Tare:	WU-10
Wet Weight & Tare, g:	591.50
Dry Weight & Tare, g:	589.88
Tare Weight, g:	128.41
Moisture, %:	**0.4**

Initial Height Determination (Inches)

	Clay Liner	Overliner
1.	2.983	3.519
2.	2.983	3.458
3.	2.904	3.513
4.	2.825	3.639
5.	2.983	3.506
6.	2.943	3.598
Average	2.937	3.539
Cell Height	--	16.250
Sample Height	2.937	9.744

Density	**Clay liner**		**Overliner**	
Wet Weight:	10,211.9	g	25970.00	g
Dry Weight:	8,856.8	g	25866.53	g
Diameter:	12.000	in	12.000	in
Area:	113.10	in^2	113.10	in^2
Initial Height:	2.937	in	9.744	in
Final Height:	2.825	in	8.469	in
Initial Volume:	0.192	ft^3	0.64	ft^3
Final Volume:	0.185	ft^3	0.55	ft^3
Initial Wet Density:	117.2	pcf	89.8	pcf
Final Wet Density:	121.9	pcf	103.4	pcf
Initial Dry Density:	101.7	pcf	89.5	pcf
Final Dry Density:	105.7	pcf	103.0	pcf

General Test Notes:

Consolidate @ 640 psi for 48 hours. Approximately 3" of subgrade.

15 rocks positioned above PVC membrane prior to overliner addition.

PVC LINER: Visual puncture inspection: PASS Vacuum Test: PASS

More than 50 notable dimples noted on the 0.75mm PVC membrane at the conclusion of the test

Liner Thickness (in)

1.	0.030	
2.	0.030	
3.	0.030	
4.	0.030	
5.	0.029	
6.	0.030	
Average	0.030	(in)
	30.00	(mils)

Remold Instructions

Approximately 11.5" thickness for overliner material. Compaction to 95% of standard Proctor maximum dry density. +/- 2% of standard Proctor optimum moisture.

GEOMEMBRANE LINER LOAD TEST SUMMARY

JOB NAME: **Tetra Tech/Aggregate/Yukon**

JOB NUMBER: **11-1415-0013/2000**

DATE: **8/29/2012**

Underliner (Bedding) Source: Silt

Underliner Classification: -- Atterberg Limits: --

Maximum Dry Density (pcf): 107.8 Optimum Moisture: 15.2

Overliner Material Source: BGC-GD-01 (25mm)

Overliner Classification: GP Atterberg Limits: --

Dry Density (pcf): 89.5

Geosynthetic Manufacturer/Supplier: Nan Ya Plastics Corporation, America 0.75 mm PVC

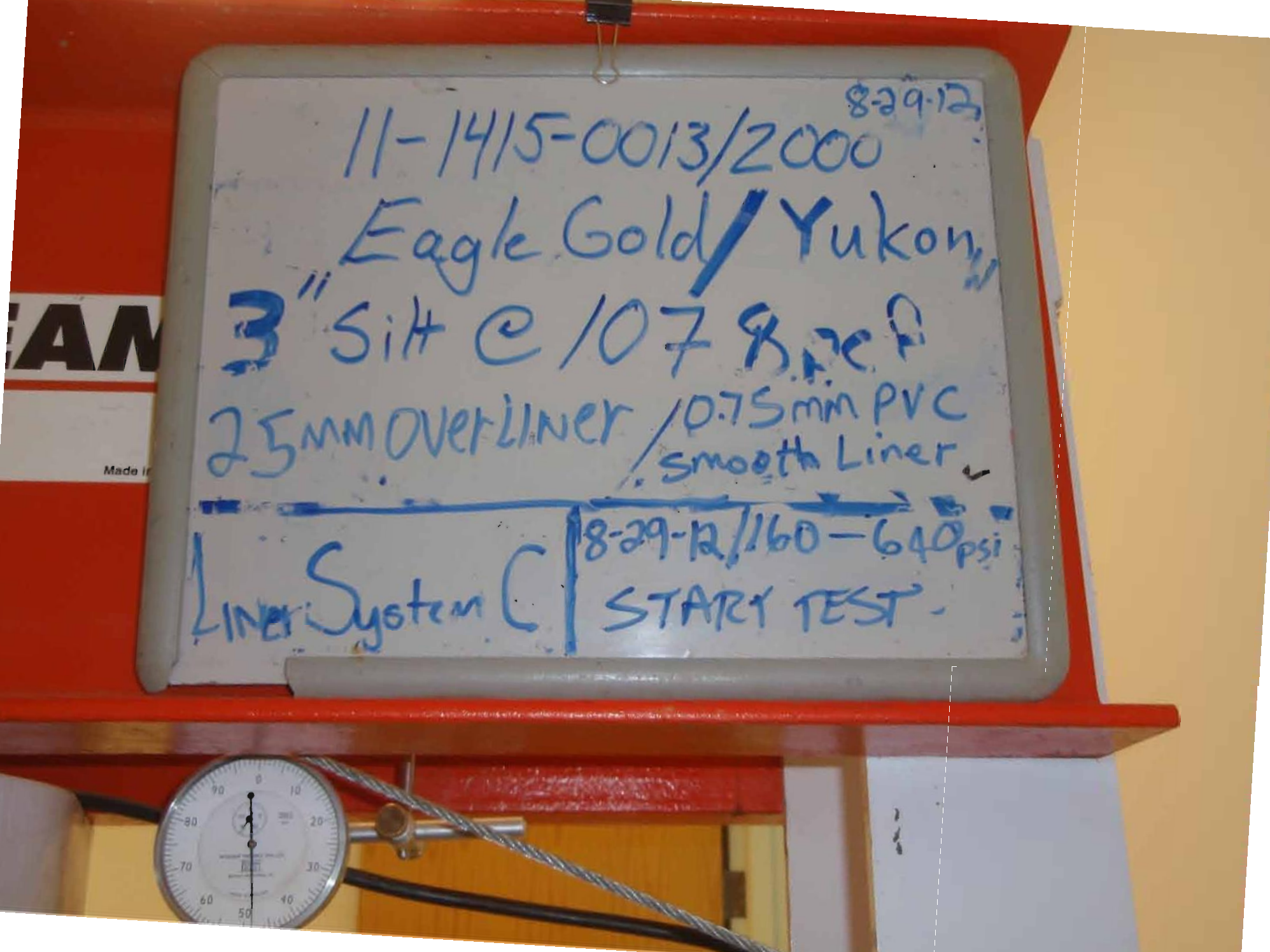
Liner Type	Ave. Liner Thickness (mils)	Duration of Test (hrs.)	Underliner Compaction %	Moisture %	Load Applied (psi)	Change in total sample height (in)	Test Results	
							Visual	Vacuum
0.75mm PVC	30.000	93	94.3	15.3	640	1.387	PASS	PASS

General Test Notes: Test was conducted using a 12" diameter cell. Smooth 0.75mm PVC was placed on top of approximately 3.0 inches of silt then overlain by approximatley 10.2 inches of overliner material. Approximately 15 rocks were hand placed pointing downward on the liner prior to placement of remaining overliner material. A hydraulic jack was used to apply a load of 640 psi to the sample over a period of 17 hours. The load was maintained for 93 hours. A dial gage was used to monitor deformation of the sample. At the conclusion of the test, the PVC liner was inspected and tested for punctures visually and by application of a vacuum. The vacuum pressure was approximately 465 mmHG.

Liner observations: No visual puncturing of PVC liner. No penetrations observed during the vacuum test. Over 50 notable dimples observed on the surface of the PVC liner.

Underliner was remolded to 94.3% of standard Proctor maximum dry density and +0.1% of standard Proctor optimum moisture content. Overliner was loosely placed and slightly tamped

Date:	8/29/12
Tech:	ACE
Review:	MB


8-29-12
11-1415-0013/2000
Eagle Gold / Yukon
3" Sit @ 107 B.C.S.
25mm Over Liner / 0.75mm PVC
Smooth Liner
Liner System C
8-29-12 / 160-640 psi
START TEST

0.75mm PVC
11-1415-0013/2000
Eagle Gold/Yukon
25mm Gravel

0.75mm PVC
1-1415-0013/2000
Eagle Gold/Yukon
2.5mm Gr

PVC
Ø 15mm
Galv
2.5mm

0.75mm PVC
11-1415-0013/2000
Eagle Gold/Yukon
25mm Gravel

January 8, 2013 Our Ref.: 11-1415-0013.2000

Mr. Troy Meyer, P.E., P.Eng
120 West Park Drive
Suite 204
Grand Junction, CO 81505

Attention: Mr. Troy Meyer

RE: LABORATORY TEST RESULTS FOR TETRA TECH, PROJECT – YUKON

Dear Mr. Meyer:

Golder Associates Inc. (Golder) has prepared this report to present the results of geotechnical laboratory testing conducted on samples submitted from the Golder Office in Burnaby, British Columbia, Canada. The samples were tested at Golder's Soils Laboratory in Lakewood, Colorado. This report presents the results of liner interface shear testing. All assigned laboratory tests have been completed. Hard copies of test results will be mailed to you under separate cover.

Thank you for the opportunity to provide these laboratory testing services and we look forward to assisting you on any future projects.

Should you have any questions or comments, please do not hesitate to call.

Sincerely,

GOLDER ASSOCIATES INC.

Matt Barrett
Lab Manager

MB/MB

Attachments

Golder Associates Inc.
9197 West 6th Ave, Building C Suite 100
Lakewood, CO 80215 USA
Tel: (303) 980-0540 Fax: (303) 985-2080 www.golder.com

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ATTACHMENTS

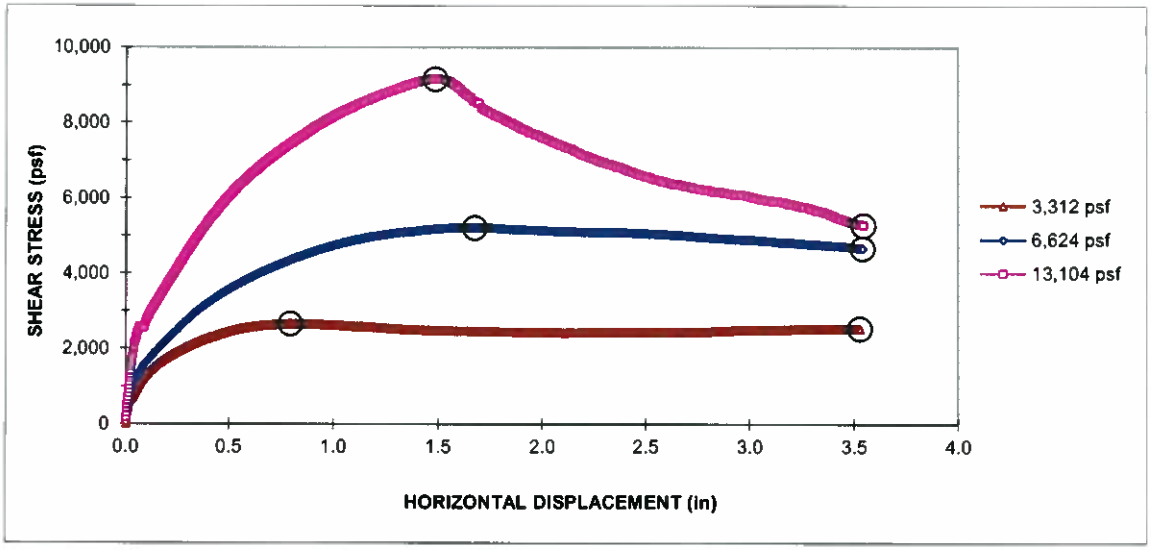
1/7/2013 11-1415-0013

DIRECT SHEAR TEST RESULTS

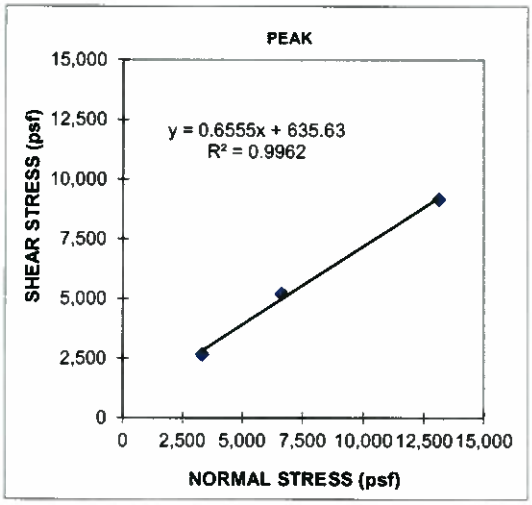
ASTM D5321

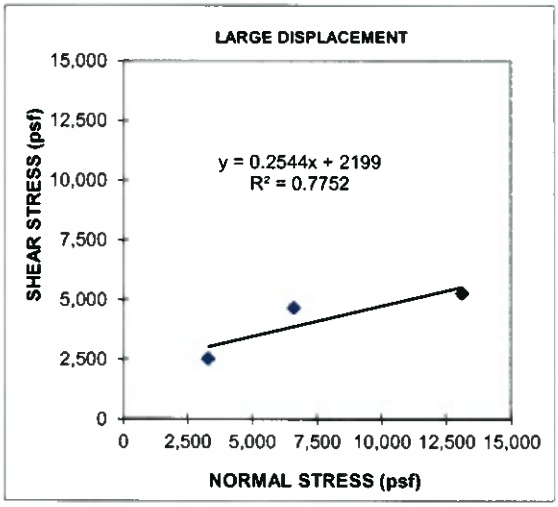
PROJECT NAME: Tetra Tech/Aggregate/Yukon
SAMPLE NUMBER: Silt

APPARATUS: 12"x12" shear box; air bladder used for all normal loads
INTERFACE TESTED: Top: Silt underliner (remolded to 102.4 pcf @ 15.2% moisture content)
Middle: Cetco DN GCL, unclamped
Bottom: ~1.5 inch gravel
TEST CONDITIONS: GCL hydrated 72 hours under 2.5 psi normal load; consolidated 24 hours at normal load
SHEAR RATE: 0.04 in/min



Normal Stress (psf)	Shear Stress		Peak		Large Displacement	
	Peak[1] (psf)	Lg. Displ. (psf)	Friction Angle	Adhesion[2] (psf)	Friction Angle	Adhesion[2] (psf)
3,312	2,656	2,529				
6,624	5,205	4,659	33.2	635.6	14.3	2199.0
13,104	9,148	5,271				





Observations After Test
3,312 psf: Shear appears to have occurred between the GCL/Silt interface.
6,624 psf: Shear appears to have occurred between the GCL/Silt interface.
13,104 psf: Shear appears to have occurred between the GCL/Silt interface followed by tearing of the top geotextile in tension.

Tech: PRH
Review: CCS

(1) Peak shear stresses for 3,312 psf, 6,624 psf, and 13,104 psf normal stresses were chosen at 0.796 in, 1.677 in, and 1.487 in horizontal displacements, respectively.
(2) Interface shear parameters are based on the "best-fit" line, per ASTM D5321. Interpretation of the data by a qualified professional for the specific application is required. Adhesion may result from the line fitting rather than physical adhesion.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

November 4, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

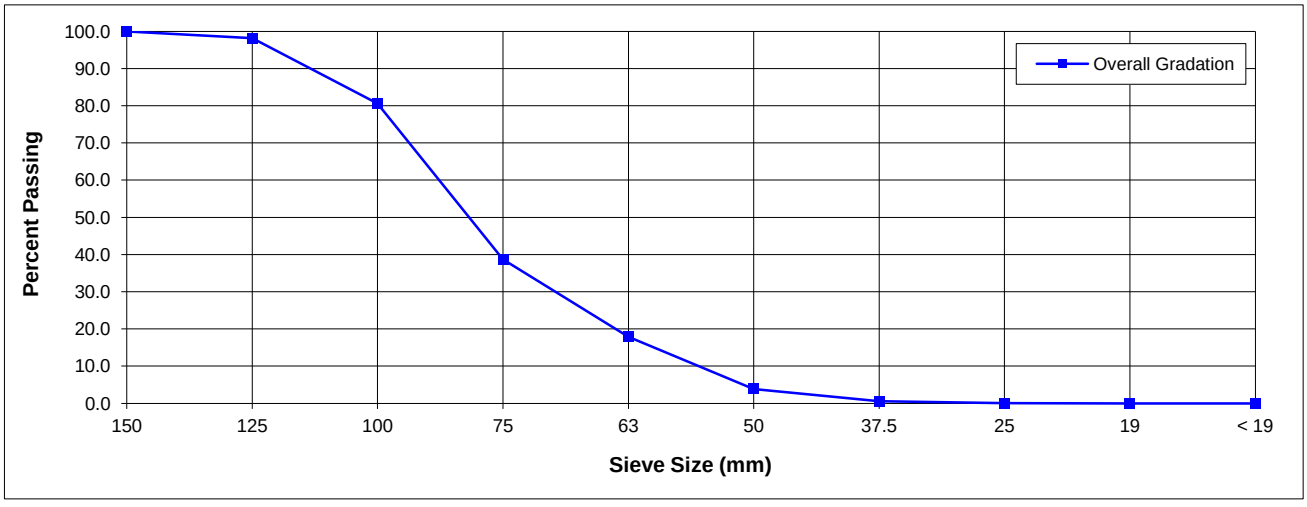
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF , As Received**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: November 4, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)		
			+ < 19	- < 19	
150	0.0	100.0	0.0		
125	1.8	98.2	1.8		
100	17.6	80.6	17.6		
75	41.9	38.7	41.9		
63	20.8	17.9	20.8		
50	14.0	3.9	14.0		
37.5	3.3	0.6	3.3		
25	0.5	0.0	0.5		
19	0.0	0.0	0.0		
< 19	0.0	0.0	0.0		
Total	100.0		100.0		



Remarks: Entire sample received sieved; total mass: 174928 g

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

November 7, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr. Troy Meyers, P.E.

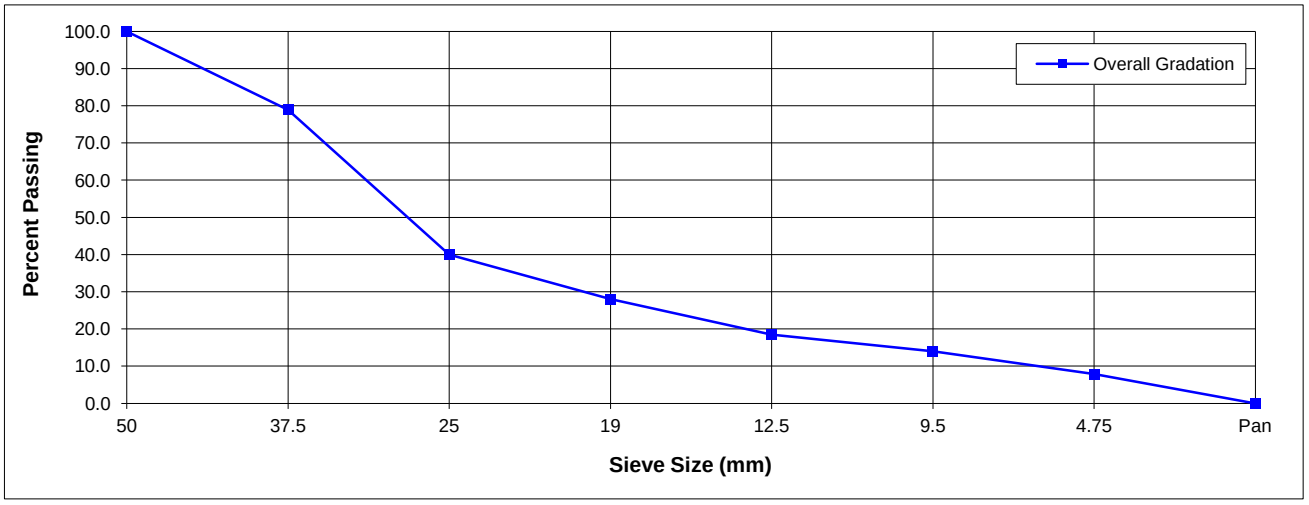
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 50mm Crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: November 7, 2011

SAMPLED BY: N/A
TESTED BY: IC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)		
			+ 4.75	- 4.75	
50	0.0	100.0	0.0		
37.5	21.1	78.9	22.9		
25	38.9	40.0	42.2		
19	12.0	28.0	13.0		
12.5	9.6	18.4	10.4		
9.5	4.5	14.0	4.8		
4.75	6.1	7.9	6.7		
Pan	7.9	0.0		100.0	
Total	100.0		100.0	100.0	



Remarks: Sample crushed to 50mm minus by jaw crusher.
Combined Sample (BGC-GD-1,2,3,4,5 and BGC-MS-1,2,3,4,5)

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

November 4, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

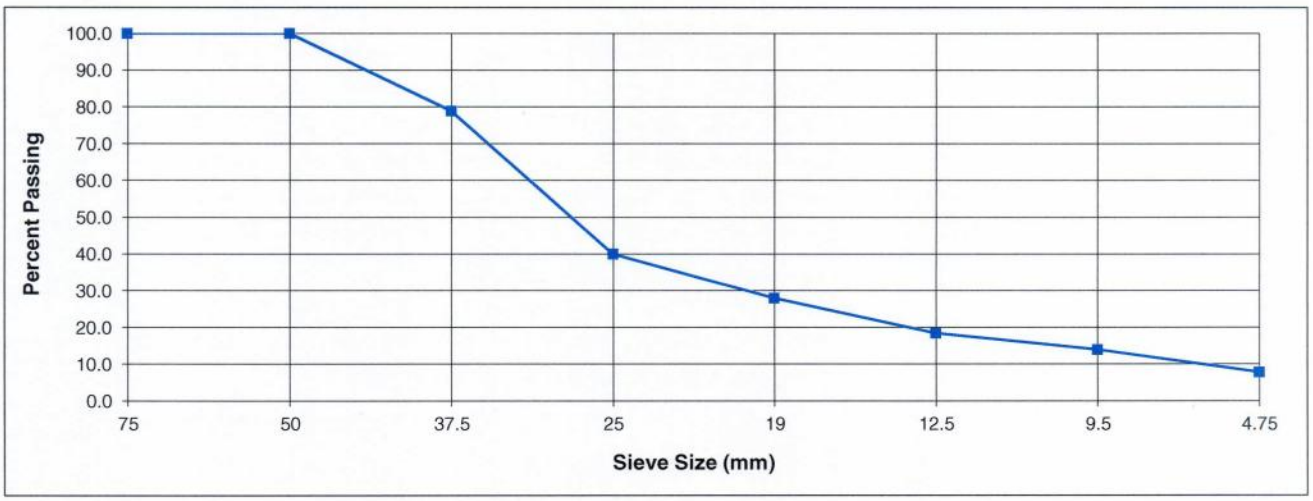
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 50mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: November 7, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)		
			+ 4.75	- 4.75	
75	0.0	100.0	0.0		
50	0.0	100.0	0.0		
37.5	21.1	78.9	22.9		
25	38.9	40.0	42.2		
19	12.0	28.0	13.0		
12.5	9.6	18.4	10.4		
9.5	4.5	14.0	4.8		
4.75	6.1	7.9	6.7		
PAN	7.9			100.0	
Total	100.0		100.0	100.0	



Remarks: Combined Sample(BGC-GD-1, 2,3,4,5 and BGC-MS-1, 2,3,4,5)
Sample crushed to 50mm minus by lab jaw crusher.

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: December 21, 2011

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1755	1764	1400
2	--	--	--
AVERAGE	**1755**	**1764**	**1400**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF COARSE AGGREGATE

ASTM C 127

December 12, 2011
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50mm minus crushed, Coarse Portions**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: November 30, 2011

Date received: November 3, 2011
Tested by: DC

Size Fractions	Relative Density (oven dry basis) g/cm^3	Relative Density (SSD basis) g/cm^3	Relative Density (Apparent) g/cm^3	Absorption (%)
50 x 37.5mm	2.661	2.683	2.722	0.84
37.5 x 25.0mm	2.643	2.665	2.702	0.82
25.0 x 12.5mm	2.634	2.659	2.701	0.94
12.5 x 4.75mm	2.603	2.638	2.697	1.33

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

December 12, 2011
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 50mm minus crushed, Passing 4.75mm Portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: November 30, 2011

Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.452	2.545	2.704	3.79
2	2.458	2.550	2.707	3.73
AVERAGE	**2.455**	**2.548**	**2.705**	**3.76**

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

January 12, 2012
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

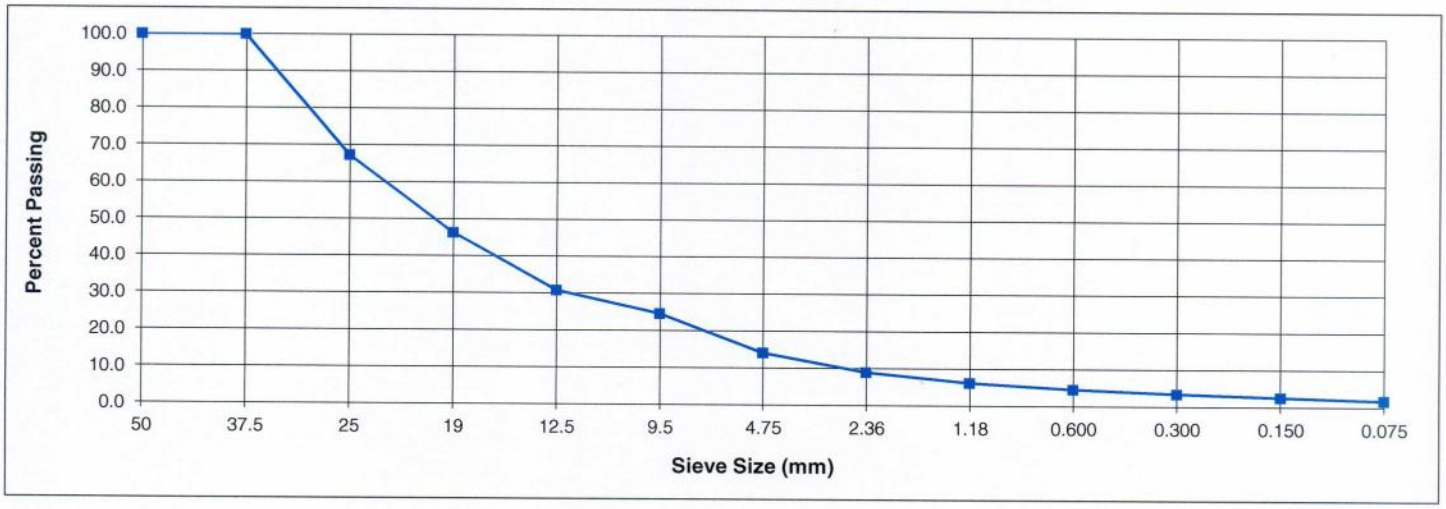
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 37.5mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: December 20, 2011

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
50	0.0	100.0	0.0			
37.5	0.0	100.0	0.0			
25	32.7	67.3	38.1			
19	21.0	46.3	24.4			
12.5	15.5	30.8	18.1			
9.5	6.2	24.6	7.2			
4.75	10.4	14.2	12.2			
2.36	5.2	9.0		36.5		
1.18	2.7	6.3		19.3		
0.600	1.6	4.6		11.4		
0.300	1.2	3.5		8.2		
0.150	0.8	2.7		5.8		
0.075	0.8	1.8		5.9		
PAN	1.8	0		12.9		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 5, 2012

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1854	1908	1553
2	1891	--	1532
AVERAGE	**1872**	**1908**	**1543**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5mm minus lab crushed, passing 4.75mm portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: December 21, 2011

Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.609	2.637	2.683	1.05
2	2.610	2.635	2.678	0.97
AVERAGE	**2.610**	**2.636**	**2.681**	**1.01**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE TO DEGRADATION OF SMALL-SIZE COARSE AGGREGATE BY ABRASION & IMPACT IN THE LOS ANGELES MACHINE

ASTM C 131

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 37.5mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 9, 2012

Date received: November 3, 2011
Tested by: DC

Grading	**A**
Number of revolutions	500
Loss after 500 revolutions (%)	**28.4**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

January 12, 2012
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

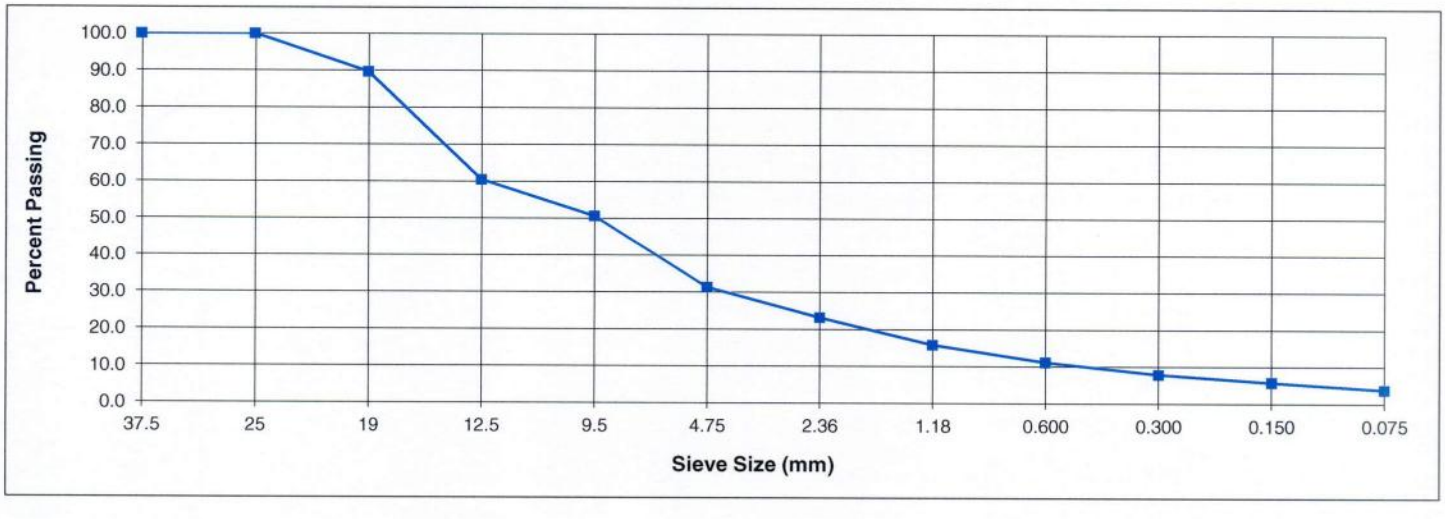
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 25mm minus lab crushed**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: November 3, 2011
DATE TESTED: January 9, 2012

SAMPLED BY: BGC
TESTED BY: DC

SIEVE ANALYSIS					MATERIAL SPECIFICATION :	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
37.5	0.0	100.0	0.0			
25	0.0	100.0	0.0			
19	10.3	89.7	15.1			
12.5	29.2	60.5	42.5			
9.5	9.8	50.7	14.3			
4.75	19.3	31.4	28.1			
2.36	8.2	23.2		26.0		
1.18	7.3	16.0		23.1		
0.600	4.7	11.3		15.0		
0.300	3.3	8.0		10.5		
0.150	2.1	5.8		6.8		
0.075	2.0	3.8		6.4		
PAN	3.8	0		12.2		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

MAXIMUM AND MINIMUM INDEX DENSITY USING A VIBRATORY TABLE

ASTM D 4253 & D 4254

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF, 25 mm minus lab crushed**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 11, 2012

Date received: November 3, 2011
Tested by: DC

Trial	Maximum Index Density (Dry method 2A) kg/m^3	Maximum Index Density (Wet method 2B) kg/m^3	Minimum Index Density (Method A) kg/m^3
1	1991	2108	1620
2	1984	--	1634
AVERAGE	**1988**	**2108**	**1627**

Note: Tests were carried out with the large mould.

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF COARSE AGGREGATE

ASTM C 127

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr. Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 25mm minus crushed, retain on 4.75mm portions**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 10, 2012
Date received: November 3, 2011
Tested by: DC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.638	2.661	2.699	0.87
2	2.634	2.658	2.700	0.93
AVERAGE	**2.636**	**2.660**	**2.700**	**0.90**

Reported by: I. Chung

Reviewed by: _____
L. Hu, MSc.E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RELATIVE DENSITY (SPECIFIC GRAVITY) AND ABSORPTION OF FINE AGGREGATE

ASTM C 128

January 12, 2012
Project number: 11-1415-0013/1000

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**ODF 25mm minus lab crushed, passing 4.75mm portion**
Source:	**Eagle Gold, Yukon**

Date sampled: Not provided
Date tested: January 10, 2012

Date received: November 3, 2011
Tested by: IC

Trial No.	Relative Density (dry basis)	Relative Density (SSD basis)	Apparent Relative Density	Absorption (%)
1	2.601	2.639	2.704	1.48
2	2.610	2.646	2.708	1.39
AVERAGE	**2.605**	**2.643**	**2.706**	**1.43**

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

PARTICLE SIZE ANALYSIS OF SOILS

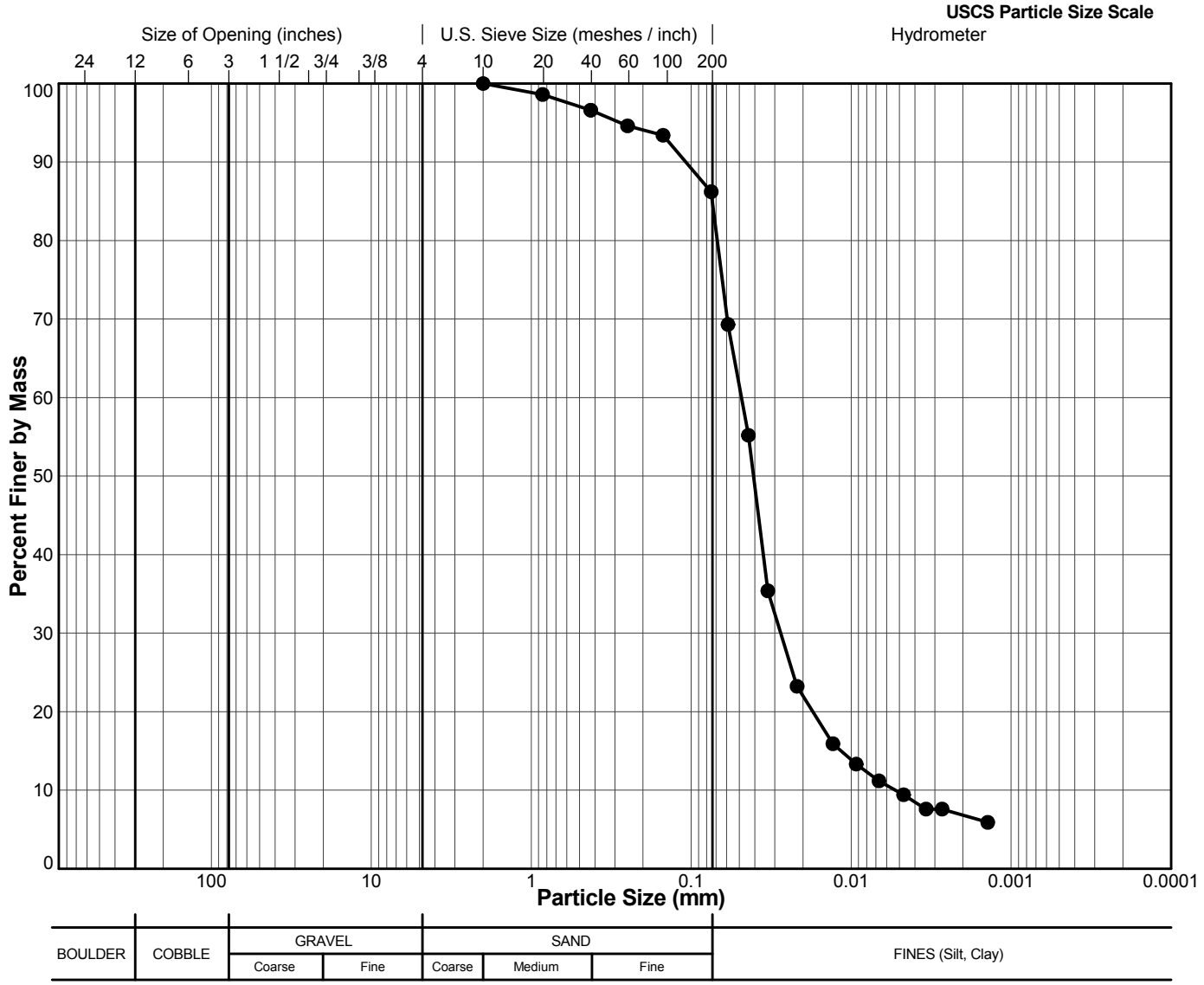
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 2 Silt**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 2	**Dispersion Method: Stirring**
Method: Split, Washed	**Dispersion Period (min): 1**

Hydrometer ID: BURNABY - 87024



SK	**12/5/2011**	**LP**	**12/21/2011**
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB ebarnes 09/13/12

Golder Associates Ltd.
500 - 4260 Still Creek Drive Burnaby, British Columbia V5C 6C6
Tel: (604) 296 4200 Fax: (604) 298 5253 www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

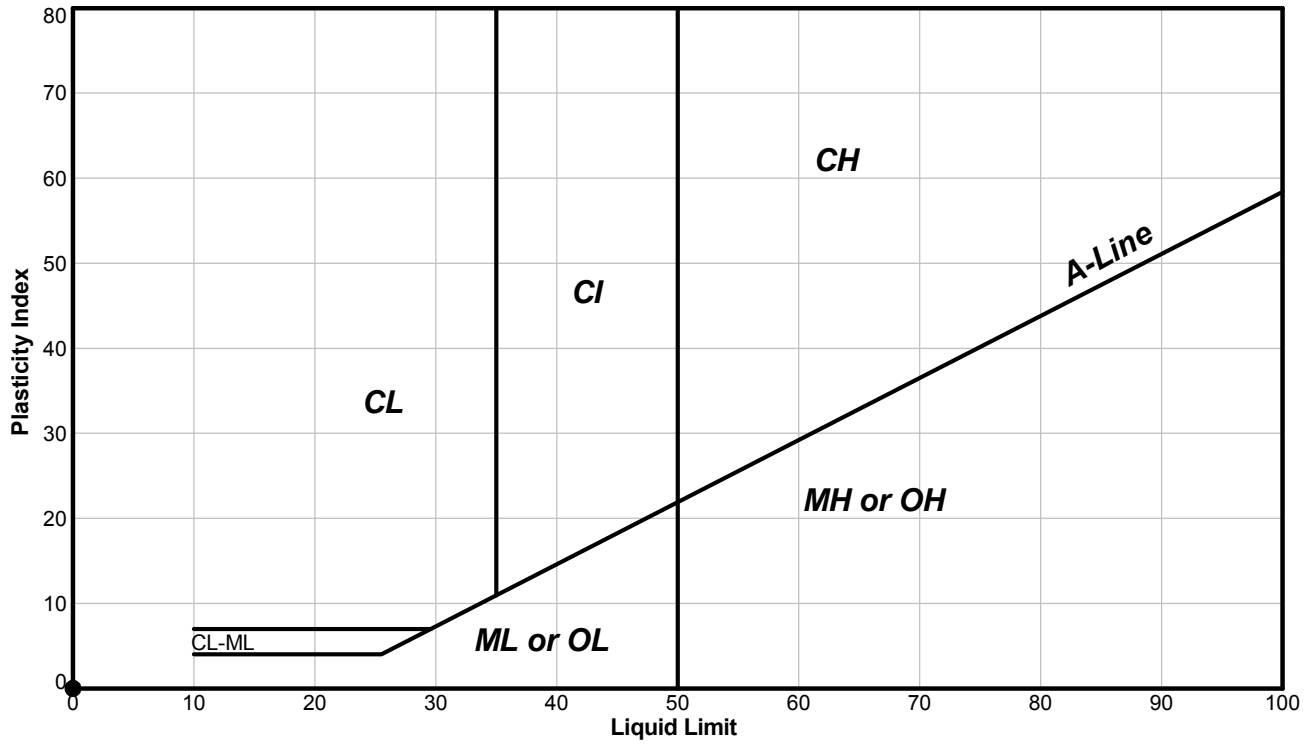
Client: Tetra Tech	**ID: Section 2 Silt**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 2 Silt	N/A	0.00	0.00	97	NP	NP	NP	21.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	12/5/2011	LP	12/21/2011
Tech	Date	Checked	Date

Golder Associates Ltd.
500 - 4260 Still Creek Drive Burnaby, British Columbia V5C 6C6
Tel: (604) 296 4200 Fax: (604) 298 5253 www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_ATTERBERG CASAGRANDE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB ebarnes 09/13/12

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 2 Silt**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		100		
Test Number		1		2
Flask Number		5		6
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		174.83		173.41
Mass of Flask + Dry Soil (g)	M_P	248.33		251.02
Mass of Dry Soil (g)		73.37		77.76
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	719.75		720.71
Test Temperature (g)	T_t	18.50		18.40
Mass of Flask + Water (g)	$M_{\rho w,t}$	673.08		671.53
Mass of Dish + Dry Soil (g)		252.00		424.26
Mass of Dish (g)		178.63		346.50
Mass of Oven Dry Soil (g)	M_S	73.37		77.76
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.75		2.72
Specific Gravity at Test Temperature	G_t	2.75		2.72
Specific Gravity at 20ºC	$G_{20°C}$	2.75		2.73
AVERAGE SPECIFIC GRAVITY		**2.74**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		0
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	
Apparent	C/(C-A)	
Absorbtion (%)	(B-C)/C	

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK/RS	December 5, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

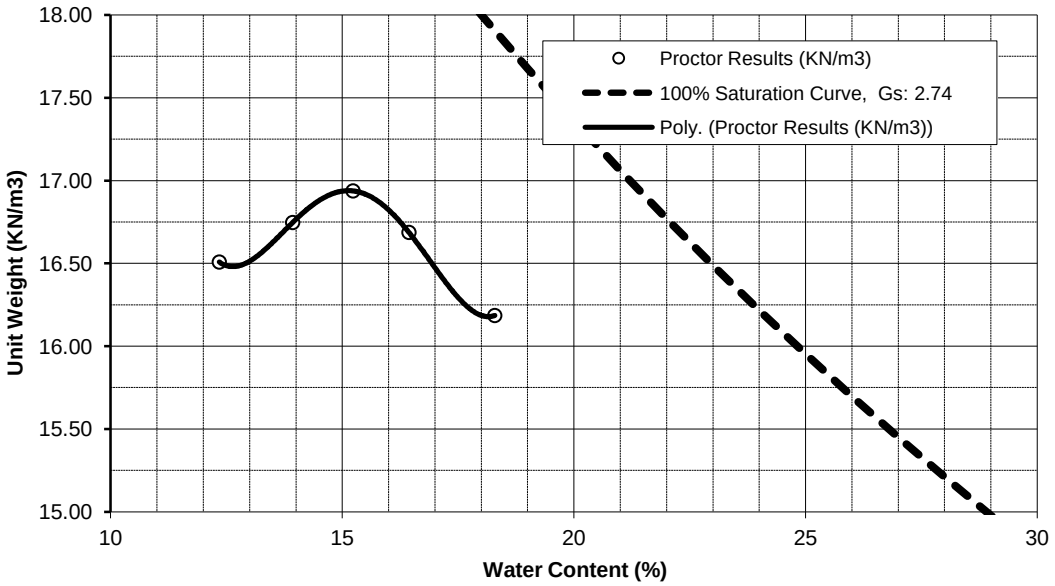
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 2 Silt
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	A	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.000945
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	16.51	16.75	16.94	16.19	16.7
Water Content (%):	12.3	13.9	15.2	18.3	16.4



Uncorrected Optimum w (%):	15.2	**Uncorrected Unit Weight (KN/m^3)**	16.93

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	25	**Sieve Size (mm):**	4.75
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	0.0	**Percent Test Fraction (%):**	100.0
Gsc (calculated):	2.74	**Gsf (calculated):**	2.74
Water Content of Oversized (%):	16.3	**Water Content of Test (%):**	15.2

Final Results

Corrected Optimum w (%):	15.2	**Corrected Unit Weight (KN/m^3)**	16.93
		Corrected Dry Density (Kg/m3)	1726

SK	December-09-11	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Measurements of Hydraulic Conductivity Using a Flexible Wall Permeameter

Reference: ASTM D5084-10 Method C

Client	Tetra Tech	**Sample No:**	SECTION 2 Silt	**Falling Head, rising tailwater elevation**	
Project	Aggregate Testing	**Sample ID:**	N/A		
Location	Eagle Gold, Yukon	**Depth:**	N/A		
Project #	11-1415-0013 Phase 1000	**Test Number**	Ktest-1	**Lab ID**	211

Remarks:

Sample Geometry

	Initial	Final	
Diameter =	10.16	10.16	cm
Length =	10.64	10.64	cm
Area =	81.14	81.14	cm^2
Volume =	863.1	863.1	cm^3

Test Parameters

Cell Pressure =	90.0	psi
Back Pressure =	80.0	psi
σ'_{3c} =	10.0	psi
δV_c =	-2.0	cc
B $_{value}$ =	1.00	
a_{in} =	1.00	cm^2
a_{out} =	1.00	cm^2

Phase Relationships

	Initial	Final
Wet Weight (g) =	1625.0	1758.9
Dry Weight (g) =	1410.6	1410.6
w (%) =	15.2	24.7
ρ_{dry} (kg/m^3) =	1634	1634
S (%) =	61.6	100.0
e =	0.68	0.68
G_s (test value) =	2.74	2.74

Read #	Date (mm/dd/yy)	Time (hh:mm)	Elapsed Time (min)	Burette Readings		Applied Pressure		Head Loss			Flow Volume		Viscosity Correction		k_{20} (cm/sec)
				Bottom (cc)	Top (cc)	p_{bot} (psi)	p_{top} (psi)	h (cm)	h_1 (cm)	h_2 (cm)	V_{in} (cc)	V_{out} (cc)	Temp (°C)	R_t	
0	1/23/2012	8:17	0.0	0.1	25.0	80.0	80.0	24.9	--	--	0.0	0.0	23.0	0.931	--
1			1.0	1.0	24.1	80.0	80.0	23.1	24.9	23.1	0.9	0.9	22.9	0.933	7.7E-05
2			2.0	1.8	23.4	80.0	80.0	21.6	24.9	21.6	1.7	1.6	23.0	0.931	7.2E-05
3			3.0	2.5	22.7	80.0	80.0	20.2	24.9	20.2	2.4	2.3	23.0	0.931	7.1E-05
4			4.0	3.2	21.9	80.0	80.0	18.7	24.9	18.7	3.1	3.1	23.0	0.931	7.3E-05
5			5.0	3.8	21.3	80.0	80.0	17.5	24.9	17.5	3.7	3.7	22.9	0.933	7.2E-05
6			10.0	6.4	18.7	80.0	80.0	12.3	24.9	12.3	6.3	6.3	22.9	0.933	7.2E-05
7			15.0	8.2	16.9	80.0	80.0	8.7	24.9	8.7	8.1	8.1	22.8	0.936	7.2E-05
8			20.0	9.4	15.7	80.0	80.0	6.3	24.9	6.3	9.3	9.3	22.8	0.936	7.0E-05
9			30.0	11.0	14.0	80.0	80.0	3.0	24.9	3.0	10.9	11.0	22.7	0.938	7.2E-05
10			40.0	11.6	13.4	80.0	80.0	1.8	24.9	1.8	11.5	11.6	22.7	0.938	6.7E-05
Trial-1											**Average k_{20} (cm/sec) last 4 readings =**				**7.0E-05**
1	1/22/2012	9:06	0.0	0.1	25.0	80.6	80.0	67.1	--	--	0.0	0.0	22.7	0.938	--
2			1.0	2.3	22.8	80.6	80.0	62.7	67.1	62.7	2.2	2.2	22.7	0.938	7.0E-05
3			2.0	4.5	20.7	80.6	80.0	58.4	67.1	58.4	4.4	4.3	22.7	0.938	7.1E-05
4			3.0	6.4	18.8	80.6	80.0	54.6	67.1	54.6	6.3	6.2	22.7	0.938	7.0E-05
5			4.0	8.3	16.8	80.6	80.0	50.7	67.1	50.7	8.2	8.2	22.7	0.938	7.2E-05
6			5.0	9.9	15.2	80.6	80.0	47.5	67.1	47.5	9.8	9.8	22.7	0.938	7.1E-05
7			7.5	13.7	11.4	80.6	80.0	39.9	67.1	39.9	13.6	13.6	22.7	0.938	7.1E-05
8			10.0	16.7	8.3	80.6	80.0	33.8	67.1	33.8	16.6	16.7	22.7	0.938	7.0E-05
9			12.5	19.4	5.7	80.6	80.0	28.5	67.1	28.5	19.3	19.3	22.7	0.938	7.0E-05
10			15.0	21.3	3.7	80.6	80.0	24.6	67.1	24.6	21.2	21.3	22.7	0.938	6.9E-05
11			17.5	23.1	2.0	80.6	80.0	21.1	67.1	21.1	23.0	23.0	22.7	0.938	6.8E-05
Trial-2											**Average k_{20} (cm/sec) last 4 readings =**				**6.9E-05**

Sample Description:

Conversion from pressure to water head:

Comments : Compacted to 95% of Standard Proctor Density at Optimum Water Content

1 psi = 70.305 cm of H_2O

Permeant Liquid : Tap water

TM	5-Jun-09	LP	June 1, 2012
Tested By	Date	Reviewed By	Date

Golder Associates Ltd. - Burnaby Laboratory
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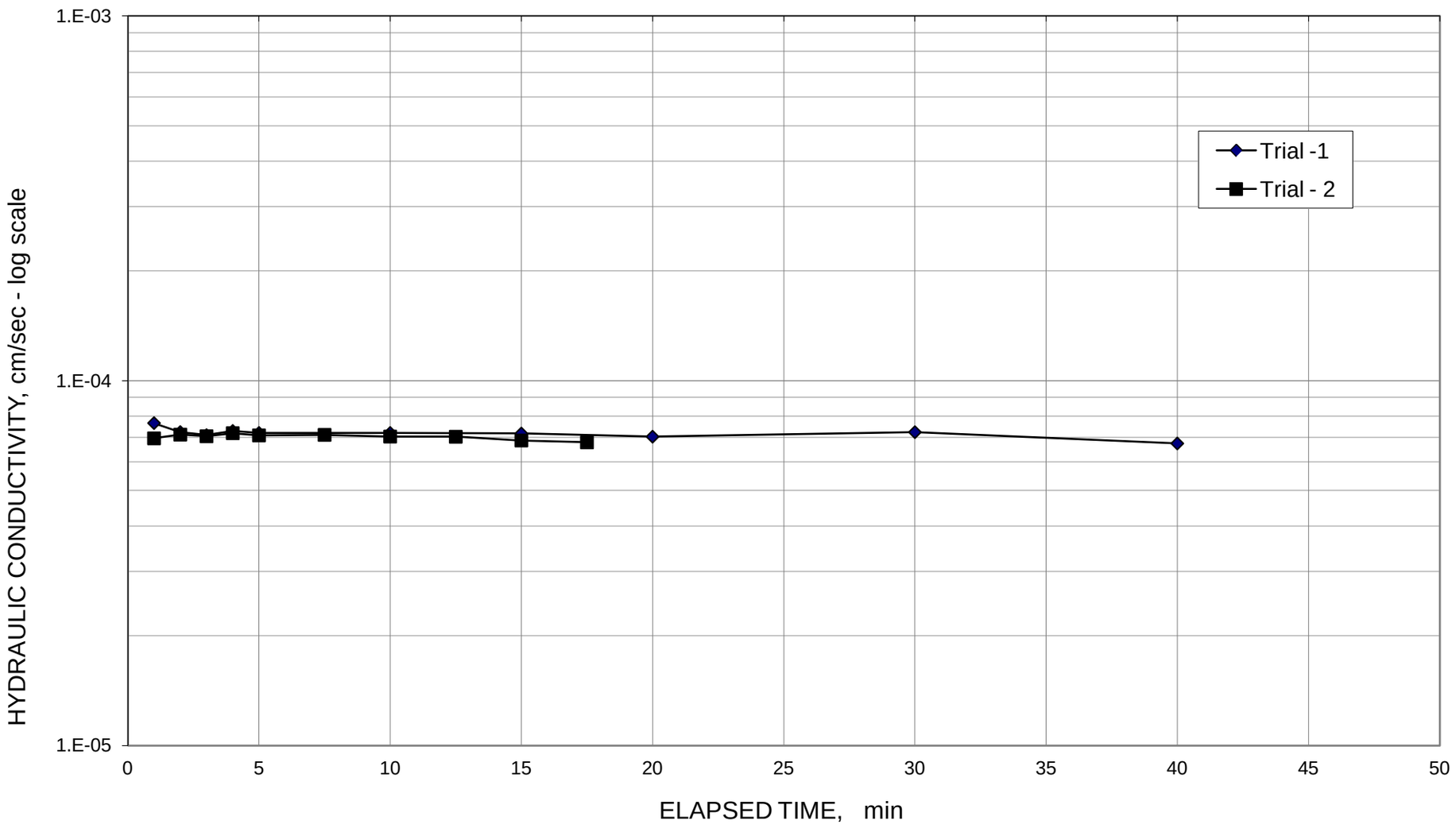
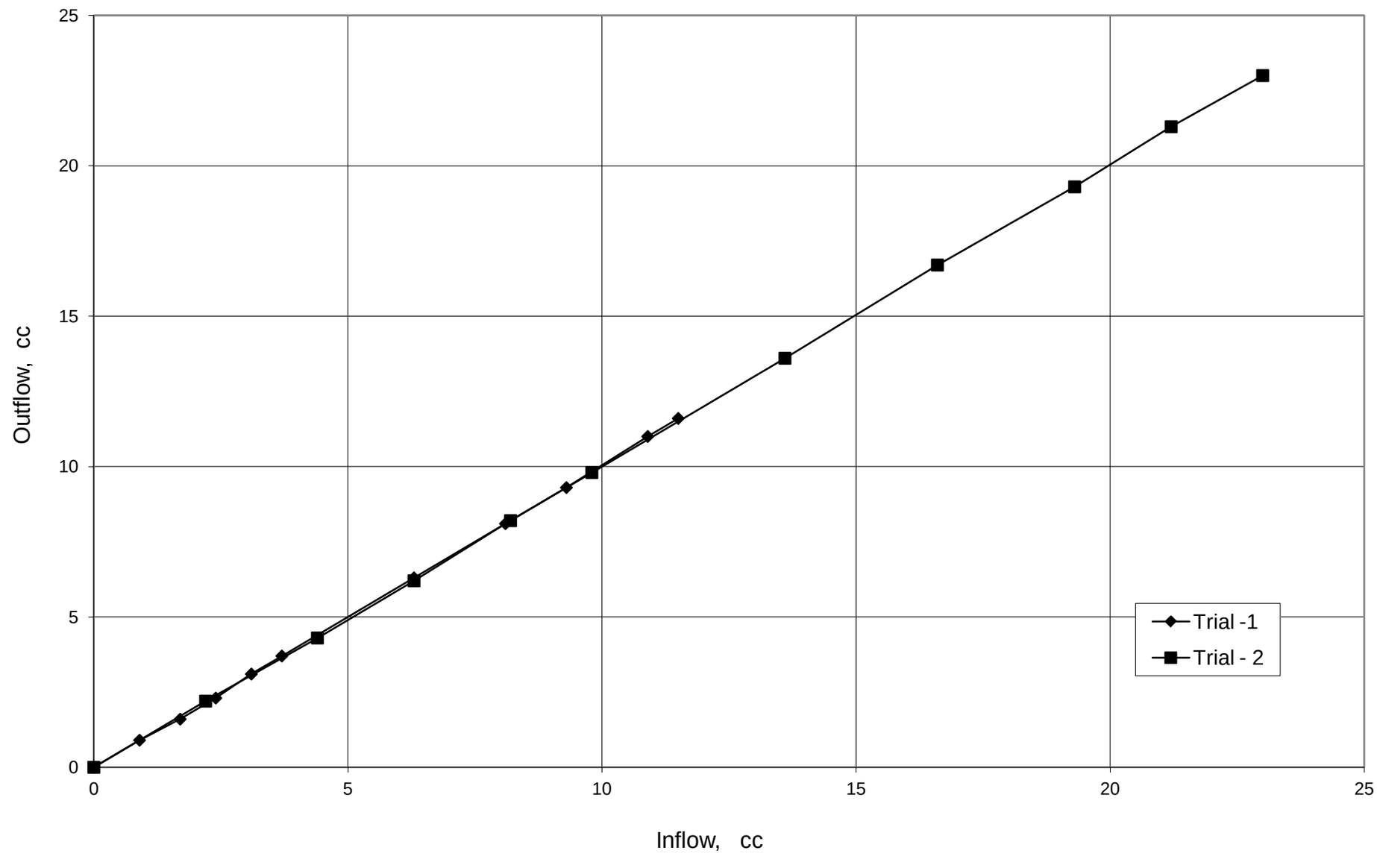
Measurements of Hydraulic Conductivity Using a Flexible Wall Permeameter

Reference: ASTM D5084-10 Method C

Client	Tetra Tech	**Sample No:**	SECTION 2 Silt	**Falling Head, rising tailwater elevation**	
Project	Aggregate Testing	**Sample ID:**	N/A		
Location	Eagle Gold, Yukon	**Depth:**	N/A		
Project #	11-1415-0013 Phase 1000	**Test Number**	Ktest-1	**Lab ID**	211





TM	5-Jun-09	LP	June 1, 2012
Tested By	Date	Reviewed By	Date

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Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

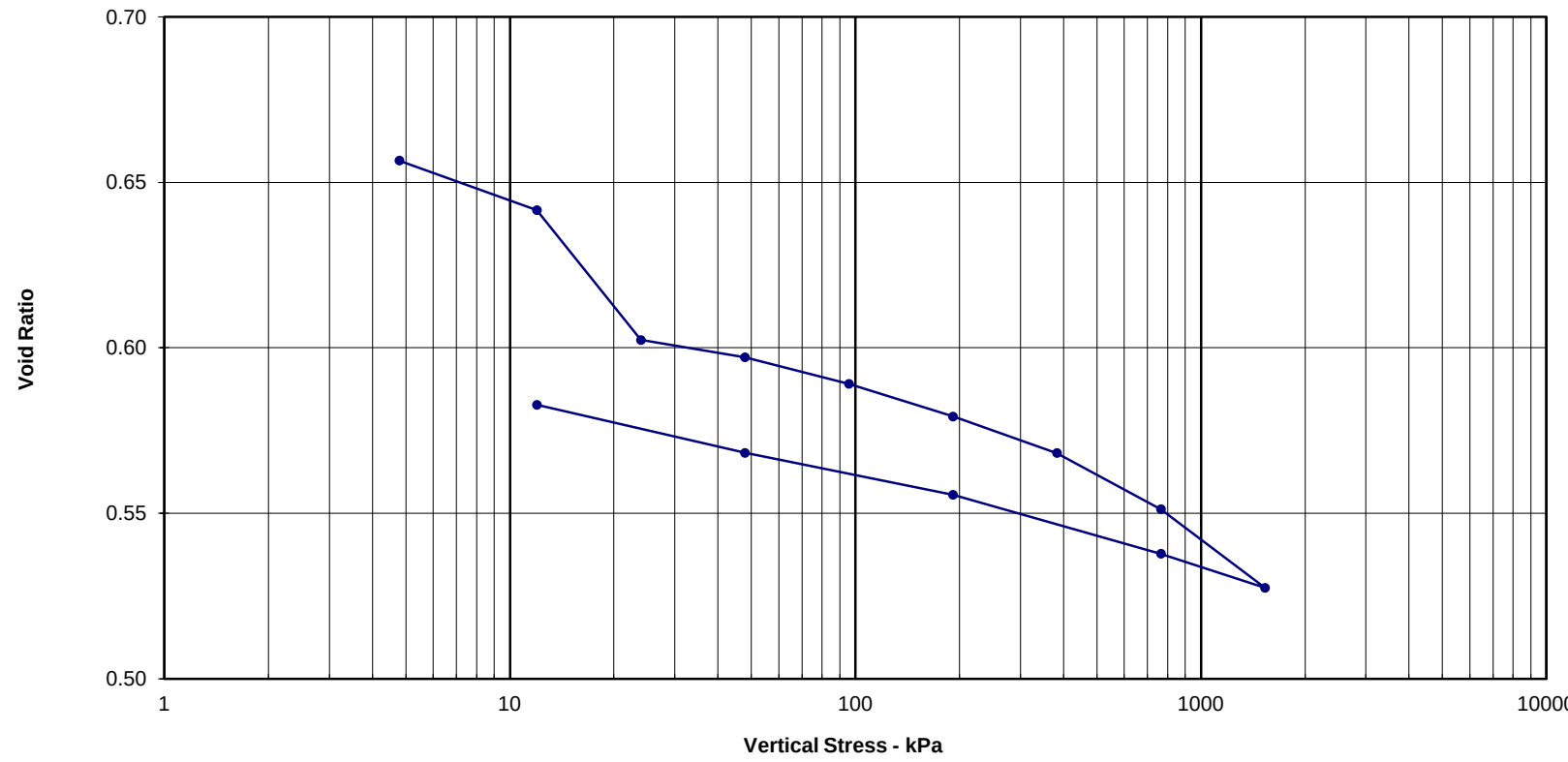
Burnaby, B.C. Canada V5C 6C8

One-Dimensional Consolidation Properties of Soils

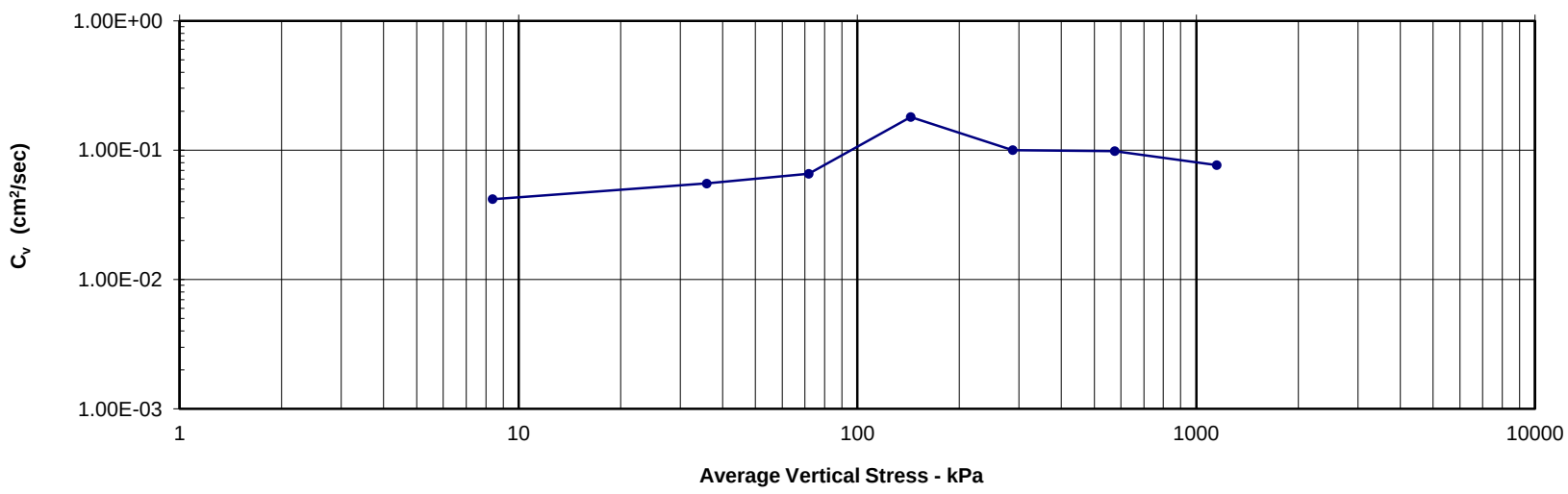
Reference(s)
ASTM D 2435/D 2435M-11

Project No. :	11-1415-0013 1000	**Client :**	Tetra Tech	**Sample No :**	Section 2 Silt
Sch No.	211	**Project :**	Aggregate Testing	**Sample ID :**	n/a
Lab Work:	TM	**Location:**	Eagle Gold, Yukon	**Depth (m) :**	n/a

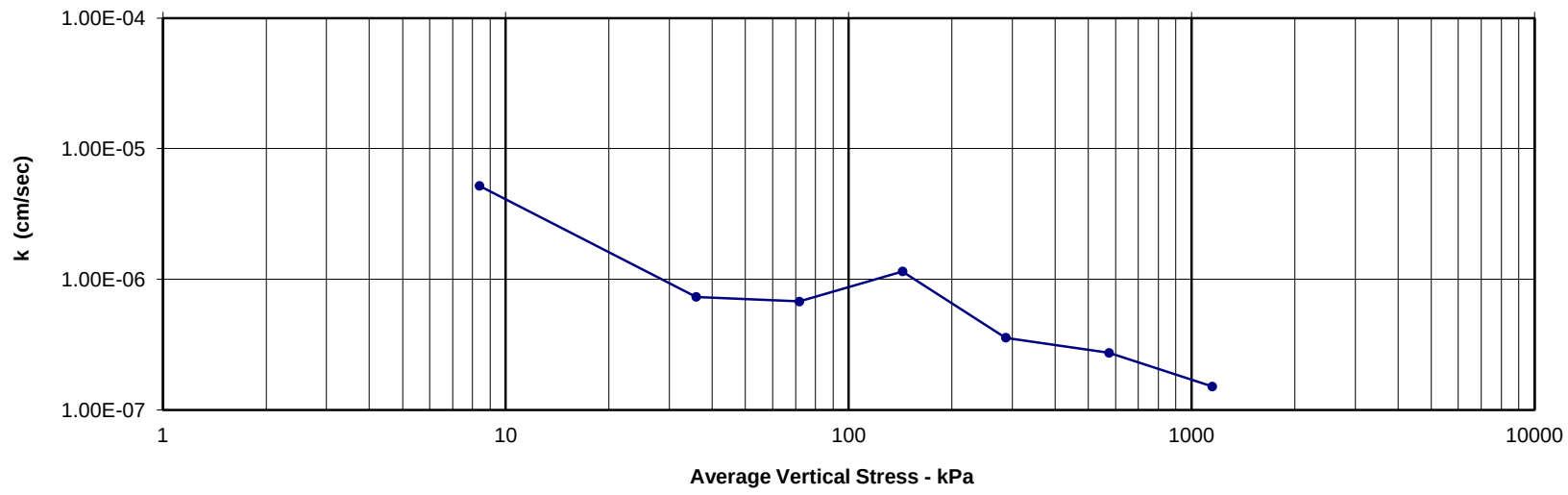
Vold Ratio vs Stress



Coefficient of Consolidation vs Stress



Coefficient of Permeability vs Stress



TM	January 20, 2012	ROB	Tuesday, May 22, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

One-Dimensional Consolidation Properties of Soils

Reference(s)
ASTM D 2435/D 2435M-11

Project No. :	11-1415-0013 1000	**Client :**	Tetra Tech	**Sample No :**	Section 2 Silt
Sch No.	211	**Project :**	Aggregate Testing	**Sample ID :**	n/a
Lab Work:	TM	**Location:**	Eagle Gold, Yukon	**Depth (m) :**	n/a

Equipment

Machine:	Sigma-1
Mach No.	Station 1
Ring No.	1 A
Drainage:	Double-sided

Specimen Geometry

	Initial	Final
Height (mm) =	22.43	21.41
Diameter (mm) =	63.30	63.30
Area (cm^2) =	31.47	31.47
Volume (cm^3) =	70.57	67.36

Phase Relationships

	Initial	Final
Wet Wt (g) =	133.64	141.35
Dry Wt (g) =	116.61	116.61
w (%) =	14.60	21.22
e =	0.66	0.58
ρ_{wet} (kg/m^3) =	1894	2098
ρ_{dry} (kg/m^3) =	1652	1731
S (%) =	61	100

Remarks

ASTM Method:	B - Constant Time Increment
Method for Cv :	Taylor
H_{avg} **:**	Half the specimen height
Time Increment:	120 minutes

Sample Properties

G_s =	2.74	Calculated
H_s (mm) =	13.52	

Load #	Stress (kPa)	ΔH (mm)	Corrected d_f (mm)	ε Σ ΔH / Ho (%)	H-H_s (mm)	e (H-H_s)/H_s	Stress $_{avg}$ (kPa)	e_{avg}	H_{avg} (mm)	t 90 (min)	Cv (cm^2/sec)	k (cm/sec)
1	5	0.02	22.40	0.10	8.88	0.66						
2	12	0.20	22.20	1.01	8.68	0.64	8	0.65	11.15	0.42	4.2E-02	5.2E-06
3	24	0.53	21.67	3.37	8.15	0.60	18	0.62				
4	48	0.07	21.60	3.69	8.08	0.60	36	0.60	10.82	0.30	5.5E-02	7.4E-07
5	96	0.11	21.49	4.17	7.97	0.59	72	0.59	10.77	0.25	6.6E-02	6.8E-07
6	192	0.13	21.36	4.77	7.83	0.58	144	0.58	10.71	0.09	1.8E-01	1.2E-06
7	383	0.15	21.21	5.43	7.69	0.57	287	0.57	10.64	0.16	1.0E-01	3.6E-07
8	766	0.23	20.98	6.46	7.46	0.55	575	0.56	10.55	0.16	9.8E-02	2.7E-07
9	1532	0.32	20.66	7.89	7.13	0.53	1149	0.54	10.41	0.20	7.7E-02	1.5E-07
10	766	-0.14	20.80	7.27	7.27	0.54						
11	192	-0.24	21.04	6.19	7.51	0.56						
12	48	-0.17	21.21	5.43	7.69	0.57						
13	12	-0.20	21.41	4.56	7.88	0.58						

Comments: Reconsituted to 95% Standard Proctor at optimum moisture content

Description: SILT, some fine sand

TM	January 20, 2012	ROB	Tuesday, May 22, 2012
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

December 16, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

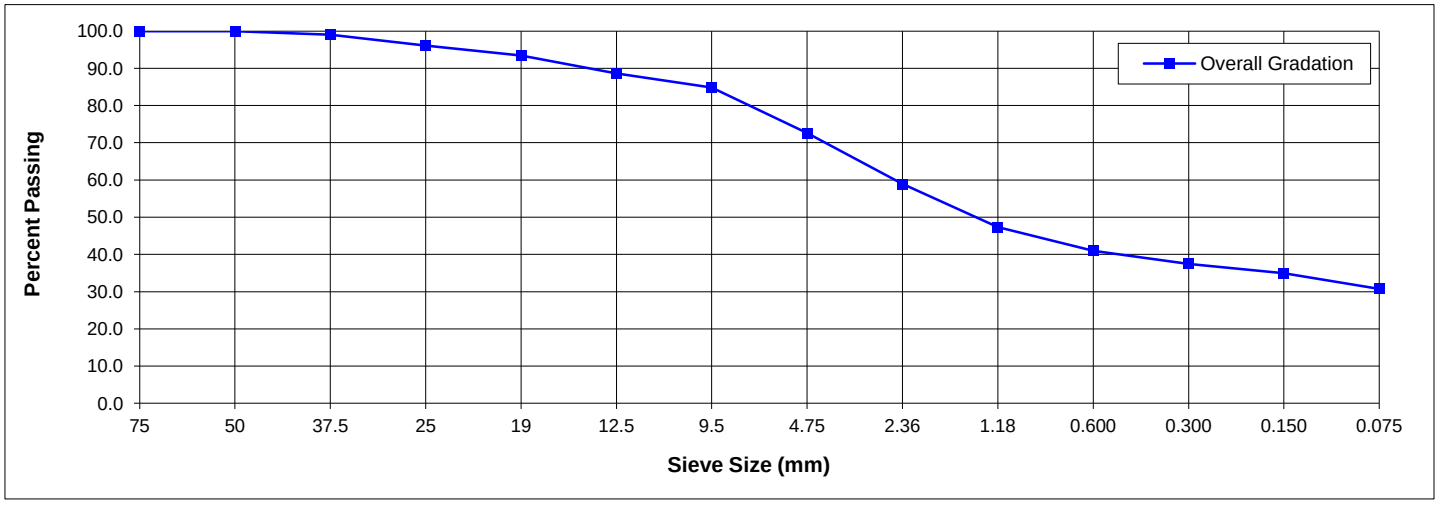
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 3 Colluvium**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: December 15, 2011
DATE TESTED: December 16, 2012

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
75	0.0	100.0	0.0			
50	0.0	100.0	0.0			
37.5	0.9	99.1	3.5			
25	2.9	96.1	10.7			
19	2.7	93.4	9.8			
12.5	4.8	88.6	17.5			
9.5	3.8	84.8	13.9			
4.75	12.2	72.6	44.7			
2.36	13.7	58.9		18.8		
1.18	11.6	47.3		15.9		
0.600	6.3	41.0		8.7		
0.300	3.5	37.5		4.8		
0.150	2.5	34.9		3.5		
0.075	4.2	30.7		5.8		
PAN	30.7	0		42.4		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS

ASTM D 6928

January 18, 2012
Project number: 11-1415-0013/1000

TETRA TECH
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
U.S.A.

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 3 Colluvium**
Source:	**Eagle Gold, Yukon**

Date sampled: Not Given
Date tested: January 16, 2012

Sampled by: Client
Tested by: VN

Grading	Section 8.2 – 19x16, 16x12.5, 12.5x9.5mm
Loss at conclusion of test (%)	**16.6**

Validation Test Data: Control Aggregate (Drain Bros. stone)	
Test date	January 10, 2012
Percent loss	12.7%
Valid range	11.4 – 14.8%

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

PARTICLE SIZE ANALYSIS OF SOILS

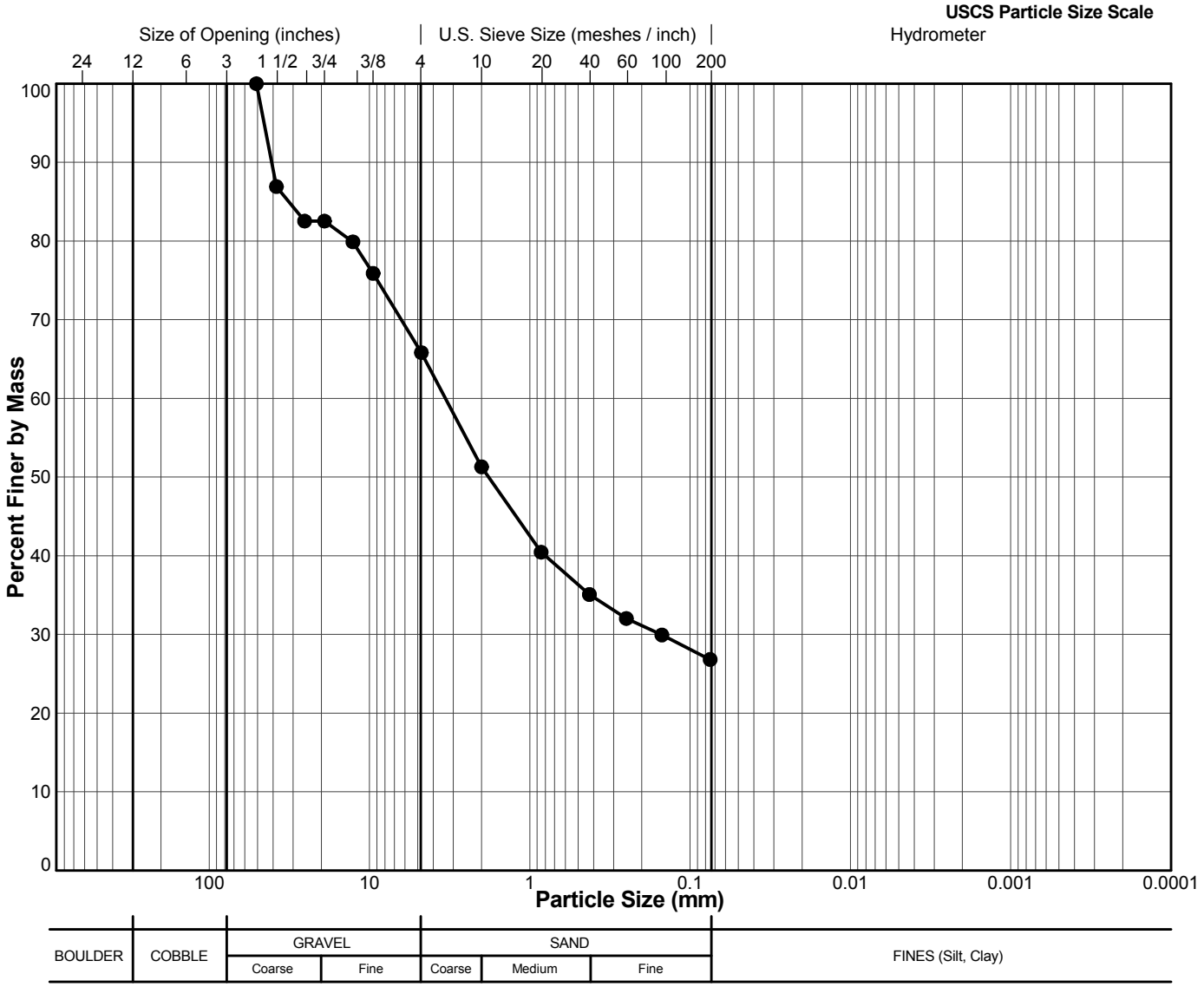
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 3 Colluvium**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 50.8	

Method: Split, Washed



SK	**12/8/2011**	**LP**	**12/21/2011**
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

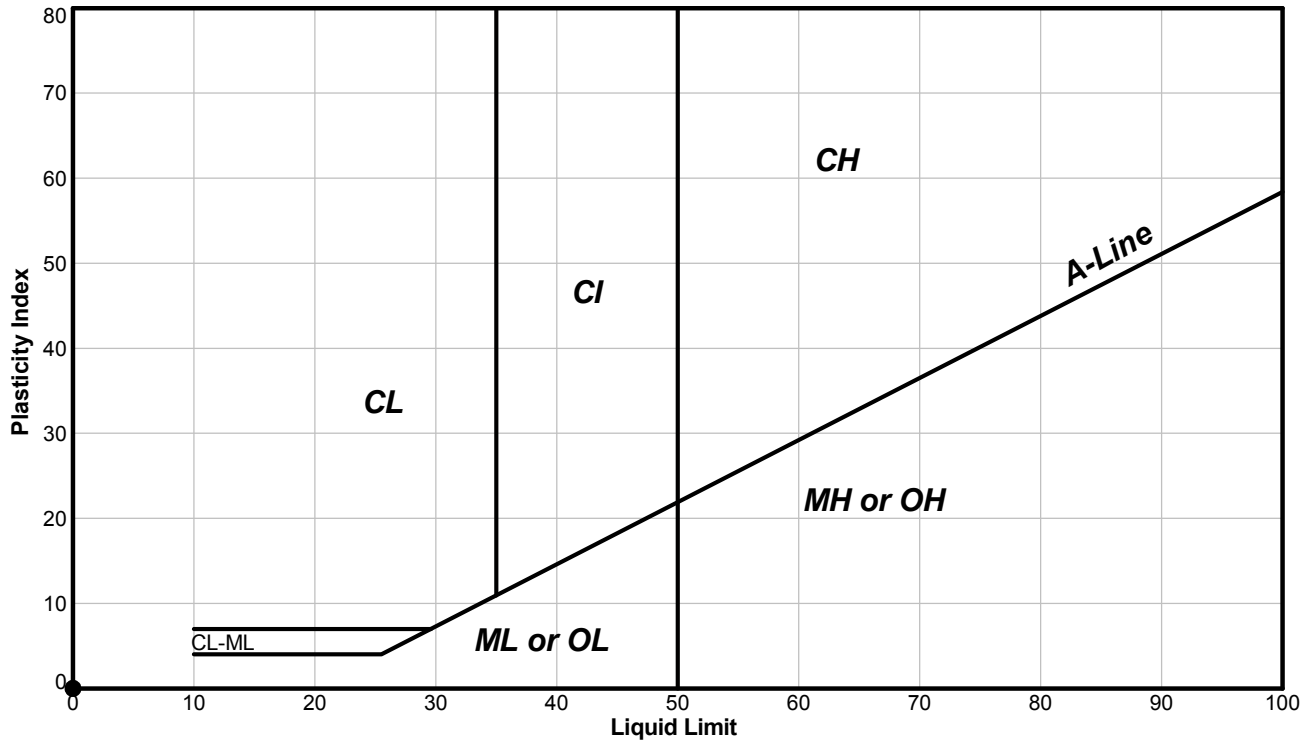
Client: Tetra Tech	**ID: Section 3 Colluvium**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 3 Colluvium	N/A	0.00	0.00	35	NP	NP	NP	6.8	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	12/5/2011	LP	12/21/2011
Tech	Date	Checked	Date

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Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 3 Colluvium**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		65.82		
Test Number		1		2
Flask Number		5		6
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		174.83		173.38
Mass of Flask + Dry Soil (g)	M_P	266.76		270.74
Mass of Dry Soil (g)		91.66		97.03
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	731.54		733.22
Test Temperature (g)	T_t	19.40		19.40
Mass of Flask + Water (g)	$M_{\rho w,t}$	673.04		671.44
Mass of Dish + Dry Soil (g)		202.22		207.55
Mass of Dish (g)		110.56		110.52
Mass of Oven Dry Soil (g)	M_S	91.66		97.03
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.76		2.75
Specific Gravity at Test Temperature	G_t	2.77		2.76
Specific Gravity at 20ºC	$G_{20°C}$	2.77		2.76
AVERAGE SPECIFIC GRAVITY		**2.76**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		31.39
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	2.54
Apparent	C/(C-A)	2.71
Absorbtion (%)	(B-C)/C	4.09

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	2.75

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK/RS	November 15, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

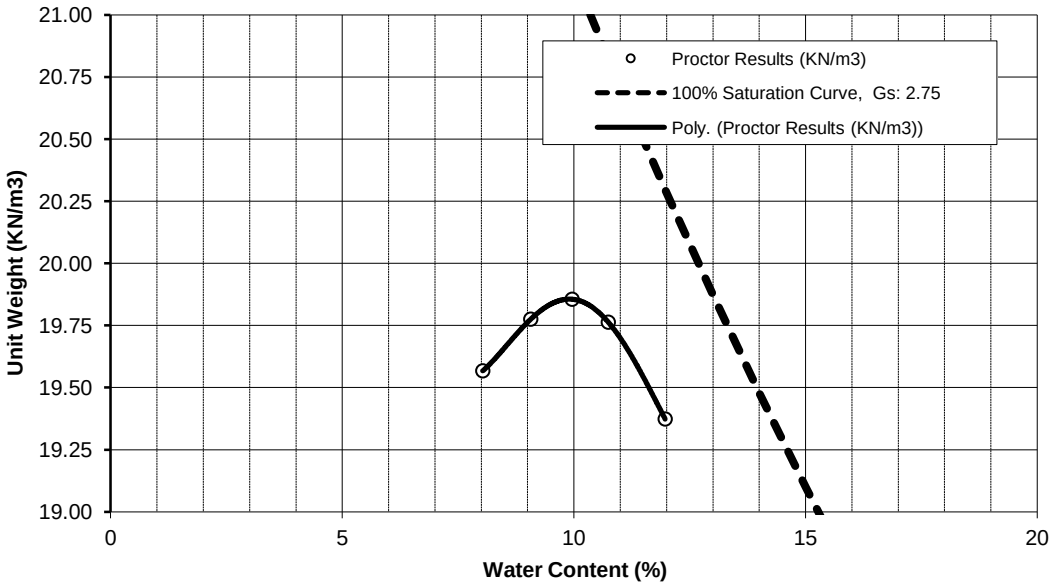
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	C	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.002122
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	19.57	19.78	19.86	19.76	19.4
Water Content (%):	8.0	9.1	10.0	10.7	12.0



Uncorrected Optimum w (%):	10.0	**Uncorrected Unit Weight (KN/m^3)**	19.86

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	25	**Sieve Size (mm):**	20.00
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	17.0	**Percent Test Fraction (%):**	83.0
Gsc (calculated):	2.75	**Gsf (calculated):**	2.75
Water Content of Oversized (%):	1.5	**Water Content of Test (%):**	10.0

Final Results

Corrected Optimum w (%):	8.6	**Corrected Unit Weight (KN/m^3)**	20.79
		Corrected Dry Density (Kg/m3)	2119

SK	December 21,2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference ASTM D 3080-11

Client:	Tetra Tech	**Sample No :**	SECTION 3 - COLLUVIUM
Project:	Aggregate Testing	**Sample ID :**	
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

Test Condition:	95% Std Proctor at opt. moisture	**Equipment Description:**		LDS
Visual Description:	SILTY SAND, some gravel, brown	**Normal LVDT:**	Serial No.:	HLS50/9686
	RECONSTITUTED	**Shear Load Cell:**	Serial No.:	2C202 10K
	Peak and residual	**Vertical LVDT:**	Serial No.:	HLS25M4407

Remarks: Area correction not applied to normal and shear stress calculation
Multi-stage test: peak + 3 residuals

Initial Sample Dimensions

Test No.	1		2	3		
Shear box geometry	Rectangular		Rectangular	Rectangular		
Length (mm)	250		250	250		
Width (mm)	150		150	150		
Depth (mm)	198		198	198		
Area (cm^2)	3.75E+02		3.75E+02	3.75E+02		
Volume (cm^3)	7.42E+03		7.42E+03	7.42E+03		

Weight Volume Relationships

Sample Type	PEAK		RESIDUAL	RESIDUAL		
Dry Mass (g)	14075	---	14063	14063		
Initial γ_{wet} (kN/m^3)	20.54	---	20.49	20.50		
Final γ_{wet} (kN/m^3)	20.76	---	20.74	20.75		
Initial γ_{dry} (kN/m^3)	18.60	---	18.54	18.55		
Final γ_{dry} (kN/m^3)	18.82	---	18.82	18.82		
Initial water content (%)	10.4	---	10.5	10.5		
Final water content (%)	10.3	---	10.2	10.3		
Specific Gravity (assumed)	2.75	---	2.75	2.75		
Initial Void Ratio, e	0.45	---	0.45	0.45		
Initial Saturation (%)	n/a	---	n/a	n/a		

Test Results

Rate of Deformation (mm/min)	0.83	0.83	0.83	0.83		
Normal Stress (kPa)	138	138	276	552		
Peak Shear Stress (kPa)		---	---	---		
Residual Shear Stress (kPa)	---					

Consolidation Results

Normal Stress (kPa)	138	---	276	552		
t_{90} (Taylor Method) (min)	---	---	---	---		
Calculated t_{50} (min)	---	---	---	---		
Change in height ΔH_c (mm)	---	---	---	---		

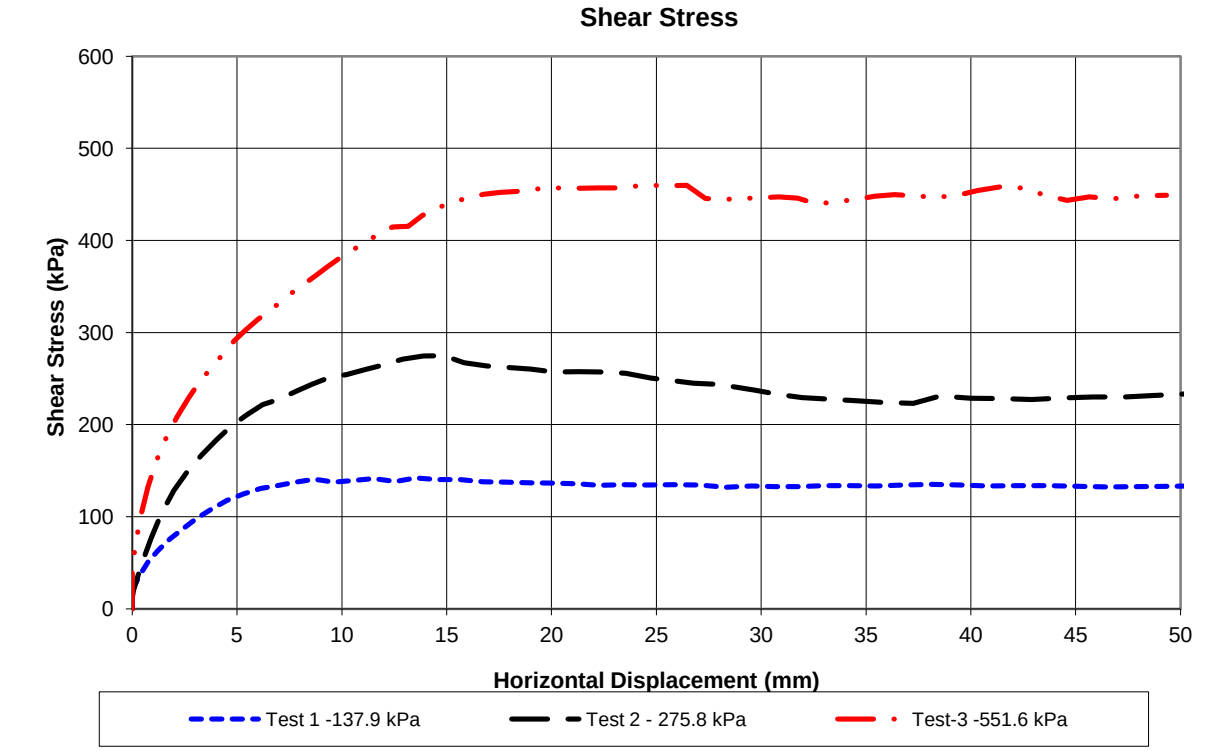
LP	February 22,2012	M. SANIN	May 31, 2012
TESTED BY	DATE	CHECKED BY	DATE

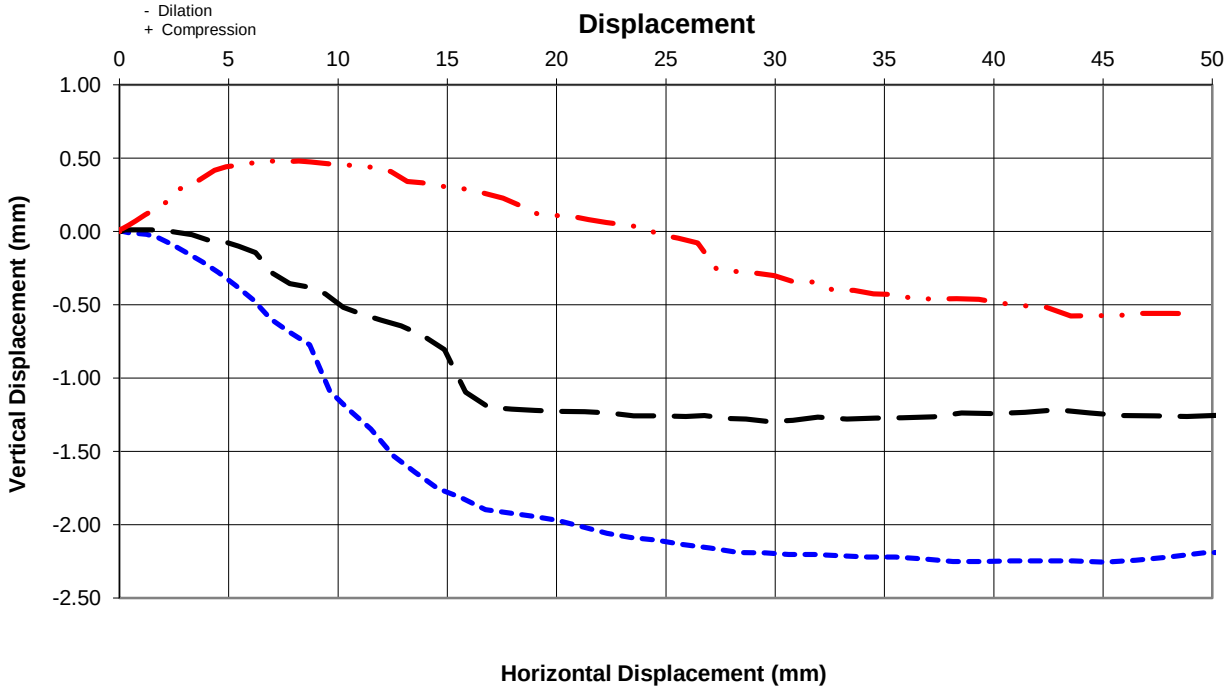
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D 3080-11

Client:	Tetra Tech	**Sample No :**	SECTION 3 - COLLUVIUM
Project:	Aggregate Testing	**Sample ID :**	-
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211





LP	February 22,2012	M. SANIN	May 31, 2012
TESTED BY	DATE	CHECKED BY	DATE

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4280 Still Creek Drive
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Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D 3080-11

Client:	Tetra Tech	**Sample No :**	SECTION 3 - COLLUVIUM
Project:	Aggregate Testing	**Sample ID :**	-
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

OPEN	
Normal Stress , kPa	

Horz Disp mm	Shear Stress kPa	Vert Disp mm

			21.15	135.73	-2.0136	22.40	256.97	-1.2388	16.75	450.14	0.2575
			22.30	134.01	-2.0599	23.53	255.65	-1.2569	17.55	452.15	0.2274
			23.39	134.68	-2.0875	24.75	250.56	-1.2571	18.33	453.22	0.1780
			24.55	134.48	-2.1060	25.91	247.39	-1.2629	19.11	455.22	0.1204
			25.78	134.71	-2.1364	26.76	245.09	-1.2551	19.86	457.20	0.1090
			27.03	134.33	-2.1607	27.74	244.06	-1.2743	20.65	456.72	0.1044
			28.34	132.05	-2.1906	28.67	241.03	-1.2804	21.45	456.83	0.0812
			29.56	133.33	-2.1917	29.73	237.34	-1.2979	22.26	456.84	0.0614
			30.61	132.65	-2.2031	30.80	232.62	-1.2894	23.06	457.09	0.0460
			31.79	132.78	-2.2044	31.95	229.19	-1.2666	23.88	458.63	0.0292
			33.00	133.54	-2.2118	33.29	227.56	-1.2803	24.73	459.80	-0.0223
			34.23	133.75	-2.2217	34.60	225.84	-1.2730	25.57	459.48	-0.0463
			35.49	133.38	-2.2217	35.82	224.04	-1.2712	26.45	459.75	-0.0785
			36.81	134.53	-2.2332	37.25	223.14	-1.2633	27.33	445.54	-0.2597
			38.14	135.13	-2.2517	38.53	230.86	-1.2388	28.21	444.55	-0.2720
			39.49	134.35	-2.2520	39.99	228.62	-1.2428	29.10	445.69	-0.2836
			40.81	133.45	-2.2480	41.43	228.19	-1.2329	29.96	446.10	-0.3002
			42.23	133.61	-2.2475	42.90	227.10	-1.2170	30.83	447.14	-0.3422
			43.63	133.62	-2.2476	44.40	229.06	-1.2385	31.74	445.73	-0.3438
			45.08	132.95	-2.2552	45.83	230.08	-1.2560	32.65	439.57	-0.3987
			46.50	132.33	-2.2421	47.34	229.87	-1.2574	33.60	442.23	-0.4024
			48.01	132.56	-2.2210	48.84	231.83	-1.2622	34.50	444.36	-0.4249
			49.59	133.09	-2.1921	50.41	233.32	-1.2542	35.42	447.87	-0.4304
			51.16	133.83	-2.1858	51.65	232.86	-1.2629	36.36	449.72	-0.4581
									37.33	448.15	-0.4600
									38.30	446.75	-0.4577
									39.31	448.76	-0.4617
									40.34	454.14	-0.4892
									41.37	458.05	-0.5055
									42.40	457.14	-0.5176
									43.52	449.44	-0.5773
									44.59	443.44	-0.5740
									45.64	447.33	-0.5742
									46.75	445.04	-0.5589
									48.06	448.24	-0.5585
									49.33	448.85	-0.5599
									50.58	456.22	-0.5794

LP	February 22,2012	M. SANIN	May 31, 2012
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Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D2850 - 03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-1 (20 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	SILTY SAND, some gravel, brown
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test scalpled on 3/8 inch screen

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.45
Diameter (cm):	10.15
Area (cm^2):	80.99
Volume (cm^3):	1656.7
Wet Weight (g):	3448.1
γ_{wet} (kN/m^3):	20.41
γ_{dry} (kN/m^3):	18.47
Water content, w (%):	10.5
Saturation (%):	63
Void ratio, e:	0.46
Gs (calculated)	2.75

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	Non-Plastic
Classification	SM

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	469
Strain, ε_f:	14.4
$\sigma_{1\ total}$ (kPa):	607
$\sigma_{3\ total}$ (kPa):	139

Equipment	
Machine:	Station 1 Load Frame 10 K
Load Cell:	400469
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Feed Rate (%/min):	1.00

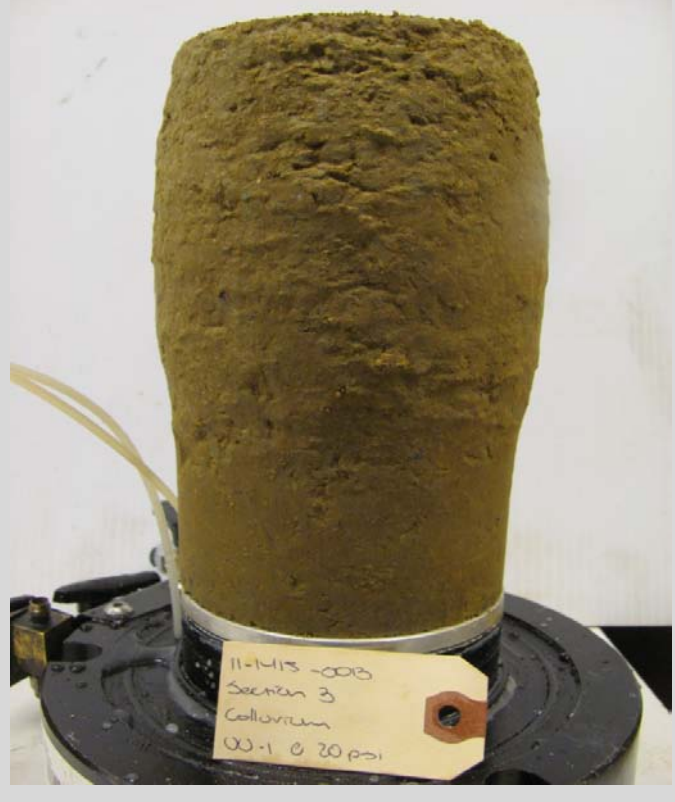


PHOTO AT END OF TEST

TM	February 17, 2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

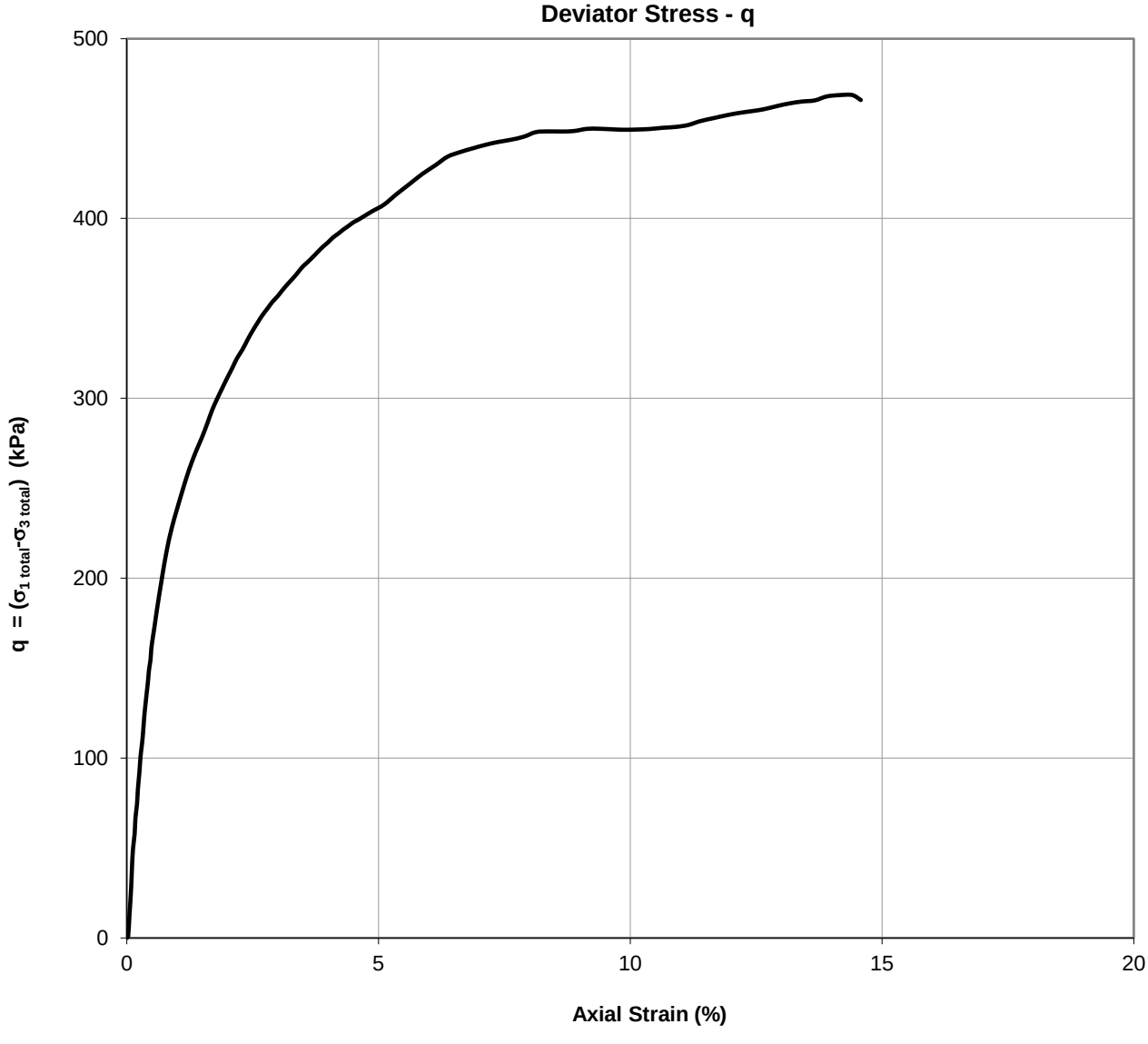
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 3 Colluvium\Triaxials\UU-1 @ 20psi\[Section-3 Colluvium UU-1 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference
ASTM D2850 - 03a (2007)

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-1 (20 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TM	February 17, 2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

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4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D2850 - 03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-2 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	SILTY SAND, some gravel, brown
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test scalpled on 3/8 inch screen

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.42
Diameter (cm):	10.15
Area (cm^2):	80.99
Volume (cm^3):	1653.6
Wet Weight (g):	3437.7
γ_{wet} (kN/m^3):	20.39
γ_{dry} (kN/m^3):	18.51
Water content, w (%):	10.1
Saturation (%):	61
Void ratio, e:	0.46
Gs (calculated)	2.75

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	Non-Plastic
Classification	SM

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	739
Strain, ε_f:	13.7
$\sigma_{1\ total}$ (kPa):	1015
$\sigma_{3\ total}$ (kPa):	277

Equipment	
Machine:	Station 1 Load Frame 10 K
Load Cell:	305670
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Feed Rate (%/min):	1.00

PHOTO AT END OF TEST

TESTED BY	DATE	CHECKED BY	DATE
TM	February 24, 2012	M. SANIN	April 16, 2012

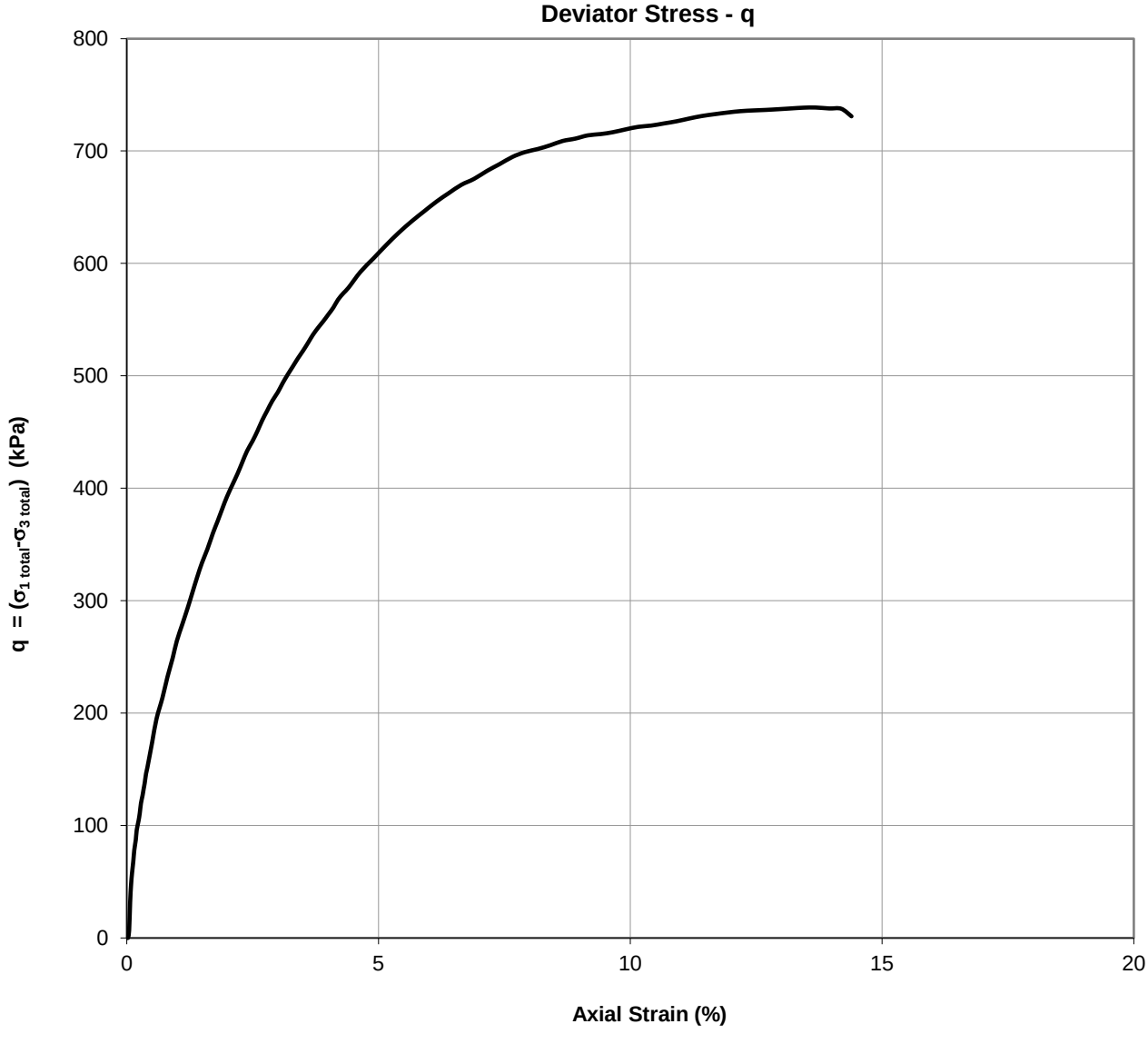
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 3 Colluvium\Triaxials\UU-2 @ 40psi\[Section-3 Colluvium-UU-2 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D2850 - 03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-2 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TESTED BY	DATE	CHECKED BY	DATE
TM	February 24, 2012	M. SANIN	April 16, 2012

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Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D2850 - 03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-3 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	SILTY SAND, some gravel, brown
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test scalpled on 3/8 inch screen

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.41
Diameter (cm):	10.13
Area (cm^2):	80.67
Volume (cm^3):	1646.4
Wet Weight (g):	3440.5
γ_{wet} (kN/m^3):	20.49
γ_{dry} (kN/m^3):	18.48
Water content, w (%):	10.9
Saturation (%):	65
Void ratio, e:	0.46
Gs (calculated)	2.75

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	Non-plastic
Classification	SM

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	1138
Strain, ε_f:	13.6
$\sigma_{1\ total}$ (kPa):	1691
$\sigma_{3\ total}$ (kPa):	552

Equipment	
Machine:	Station 2 Load Frame 5K
Load Cell:	305670
Axial DCDT:	LP-267
Cell Pressure:	PS-3118
Feed Rate (%/min):	1.00

PHOTO AT END OF TEST

TM	20/02/2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

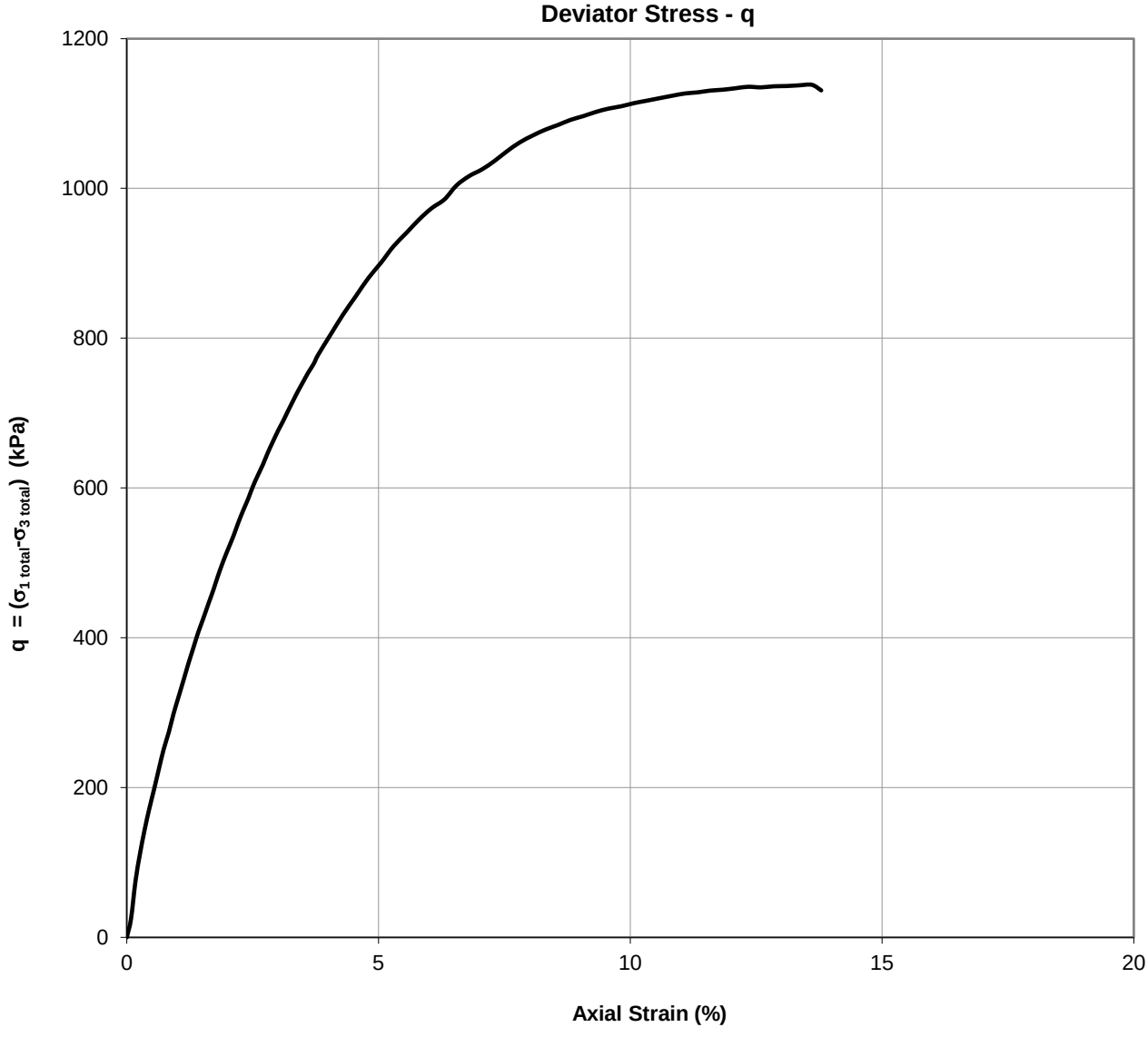
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 3 Colluvium\Triaxials\UU-3 @ 80psi\[Section-3 Colluvium UU-3 Report .xlsm]Report 2

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D2850 - 03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 3 Colluvium
Project:	Aggregate Testing	**Test ID:**	UU-3 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TESTED BY	DATE	CHECKED BY	DATE
TM	20/02/2012	M. SANIN	April 16, 2012

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Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Test	CIU1	CIU2	CIU3		
Sample	138 kPa	276 kPa	552 kPa		
Initial Dimensions					
H_o (cm)	20.38	20.37	20.40		
D_o (cm)	10.14	10.1	10.02		
Gs (calculated)	2.75	2.75	2.75		
w (%)	10.9	10.5	10.5		
$\gamma_{o\ dry}$ (kN/m^3)	18.55	18.61	19.11		
Sat. (%)	66	64	70		
e_o	0.45	0.45	0.41		
B_{Value}	1.00	1.00	0.98		
Consolidation Results					
σ_{CELL} (kPa)	1165	1309	1582		
OCR	n/a	n/a	n/a		
$\sigma_{3c'}$ (kPa)	135	273	546		
ΔV_c (cc)	-26.0	-56.0	-78.2		
t_{50} (min)	1.6	2.6	3.3		
After Consolidation Dimensions					
H_c (cm)	20.38	20.37	20.40		
D_c (cm)	10.06	9.97	9.89		
A_c (cm^2)	79.47	77.99	76.74		
V_c (cm^3)	1619	1589	1566		
$\gamma_{c\ dry}$ (kN/m^3)	18.85	19.27	19.63		
e_c	0.43	0.40	0.37		
w (%)	15.7	14.6	13.6		
Sat (%)	100	100	100		
Failure At Maximum Deviator Stress $\sigma_1'-\sigma_3'$:					
$\sigma_1'-\sigma_3'$ (kPa) :	202	353	651		
ε_f (%)	19.99	19.87	19.94		
u (kPa)	92	215	372		
σ_3' (kPa)	41	58	174		
σ_1' (kPa)	243	411	825		

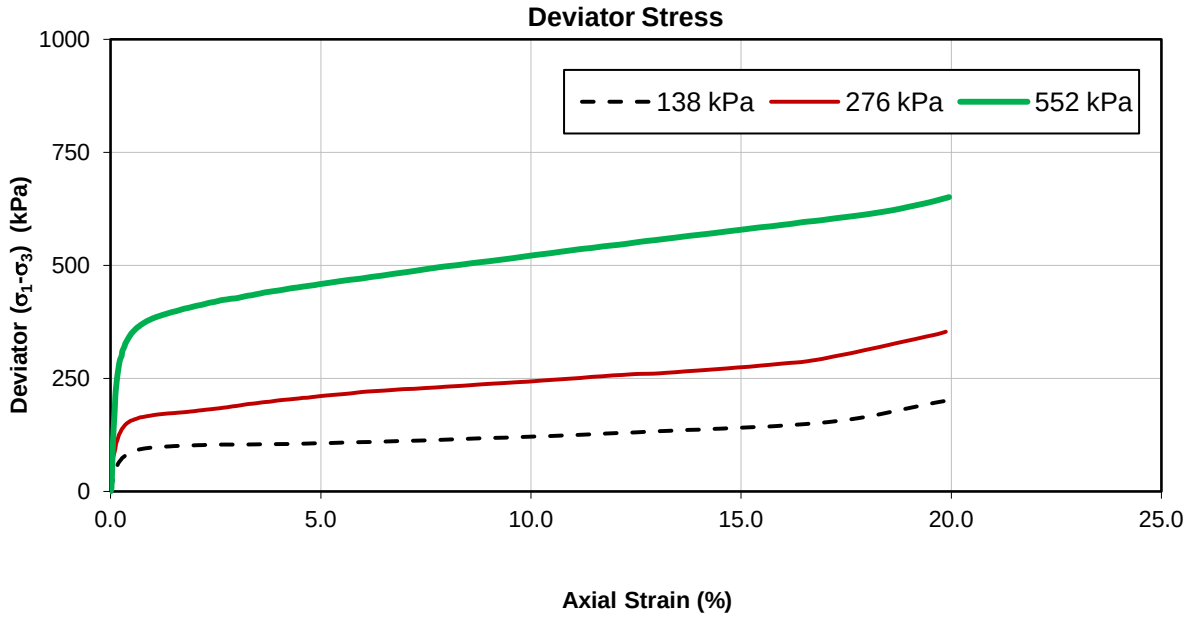
TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

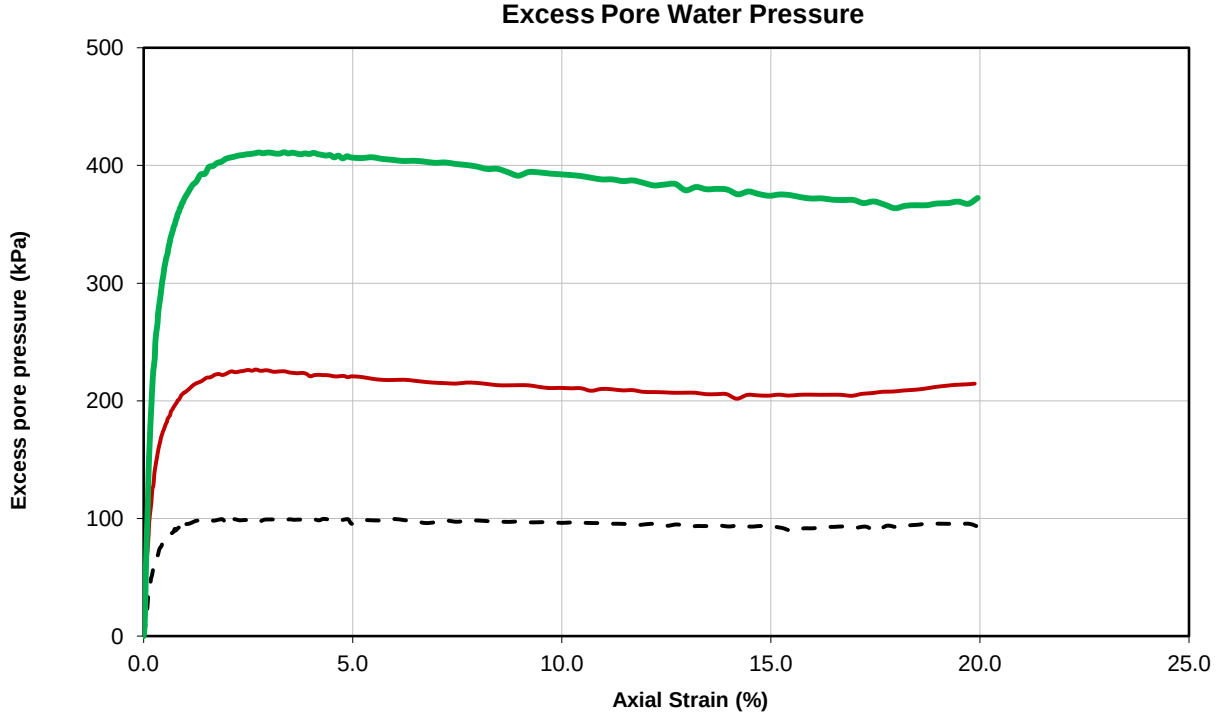
Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference
ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211





TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

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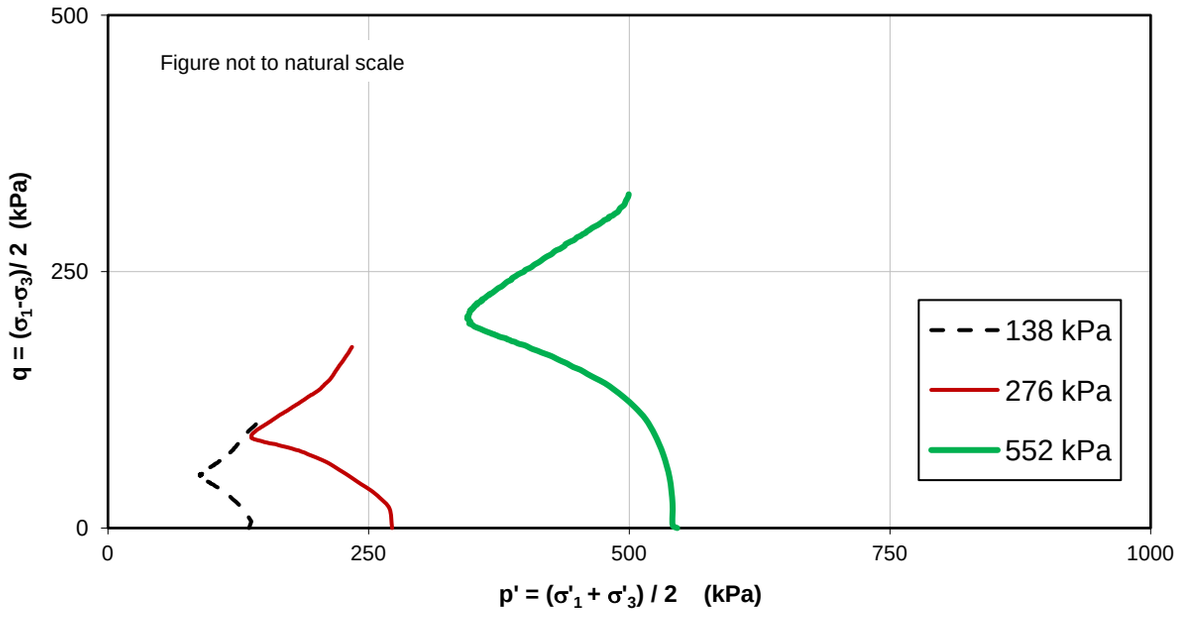
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

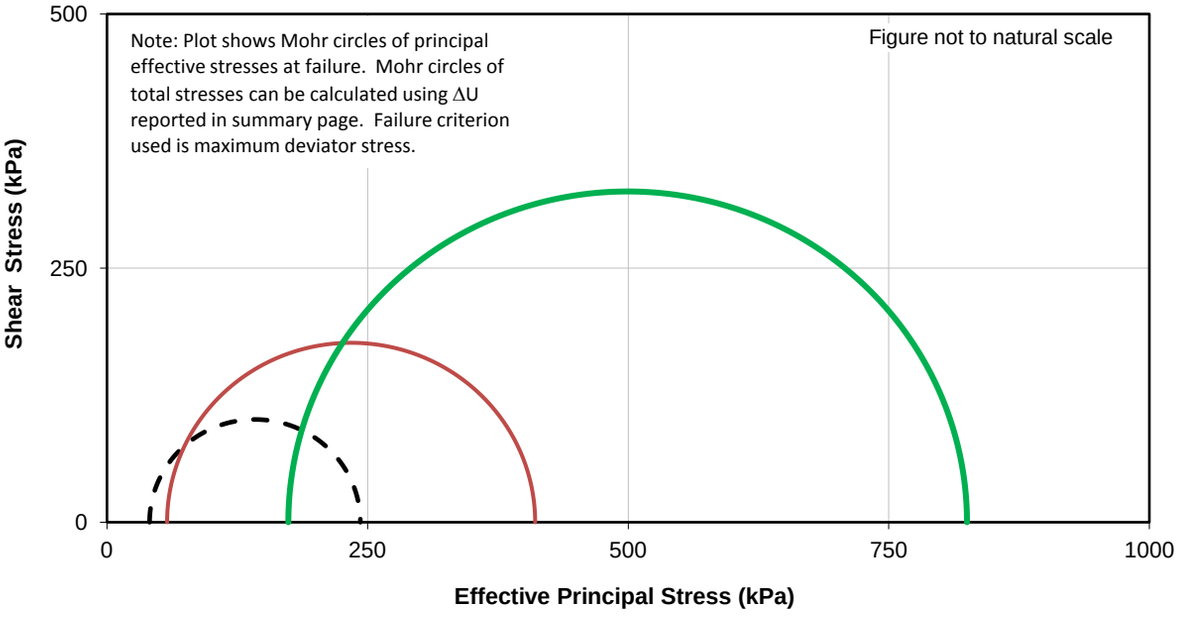
Reference: ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Stress Paths



Mohr Circles Deviator Stress



TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference
ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	SM
Saturation Method:	WET	**Material Type**	N/A
Visual Description	SILTY SAND, some gravel, brown		
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve		
	Reconstituted to 95% Standard Proctor at optimum moisture content		

Sample Data

	Before Consolidation	After Consolidation
Height (cm):	20.38	20.38
Diameter (cm):	10.14	10.06
Area (cm^2):	80.75	79.47
Volume (cm^3):	1646	1619
γ_{dry} (kN/m^3):	18.55	18.85
γ_{sat} (kN/m^3):	20.58	21.80
Water content, w (%):	10.9	15.7
Saturation (%):	66	100
Void ratio, e:	0.45	0.43
Gs (calculated):	2.75	2.75

Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	135
σ_{pwp} (kPa):	1030
B value:	1.00
Volume Change (cc):	-26.0
t_{50} (min):	1.60

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	202
Strain, ε_f:	19.99
u (kPa):	92
σ_1' (kPa):	243
σ_3' (kPa):	41

Equipment

Machine:	Truepath Load Frame - Stn.2
Chamber:	KW
Load Cell:	205857
Axial DCDT:	LP-267
Cell Pressure:	PS-3118
Back Pressure:	PS-2840
Pore Pressure:	PS-3278
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST

TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference: ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	SM
Saturation Method:	WET	**Material Type**	N/A

Visual Description	SILTY SAND, some gravel, brown
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve
	Reconstituted to 95% Standard Proctor at optimum moisture content

Sample Data

	Before Consolidation	After Consolidation
Height (cm):	20.37	20.37
Diameter (cm):	10.14	9.97
Area (cm^2):	80.74	77.99
Volume (cm^3):	1645	1589
γ_{dry} (kN/m^3):	18.61	19.27
γ_{sat} (kN/m^3):	20.57	22.07
Water content, w (%):	10.5	14.6
Saturation (%):	64	100
Void ratio, e:	0.45	0.40
Specific Gravity (calculated)	2.75	2.75

Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	273
σ_{pwp} (kPa):	1037
B value:	1.00
Volume Change (cc):	-56.0
t_{50} (min):	2.6

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	353
Strain, ε_f:	19.87
u (kPa):	215
σ_1' (kPa):	411
σ_3' (kPa):	58

Equipment

Machine:	Truepath Load Frame - Stn. 1
Chamber:	KW
Load Cell:	305670
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Back Pressure:	PS-3127
Pore Pressure:	PS-3125
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST

TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference
ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 3 Colluvium
Project:	Aggregate Testing	**Sample ID :**	CIU SUMMARY
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	SM
Saturation Method:	WET	**Material Type**	N/A
Visual Description	SILTY SAND, some gravel, brown		
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve		
	Reconstituted to 95% Standard Proctor at optimum moisture content		

Sample Data

	Before Consolidation	After Consolidation
Height (cm):	20.40	20.40
Diameter (cm):	10.02	9.89
Area (cm^2):	78.81	76.74
Volume (cm^3):	1608	1566
γ_{dry} (kN/m^3):	19.11	19.63
γ_{sat} (kN/m^3):	21.11	22.30
Water content, w (%):	10.5	13.6
Saturation (%):	70	100
Void ratio, e:	0.41	0.37
Specific Gravity (calculated)	2.75	2.75

Equipment

Machine:	Truepath Load Frame - Stn. 2
Chamber:	KW
Load Cell:	305670
Axial DCDT:	LP-267
Cell Pressure:	PS-3118
Back Pressure:	PS-2840
Pore Pressure:	PS-3278
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST

Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	546
σ_{pwp} (kPa):	1036
B value:	0.98
Volume Change (cc):	-78.2
t_{50} (min):	3.3

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	651
Strain, ε_f:	19.94
u (kPa):	372
σ_1' (kPa):	825
σ_3' (kPa):	174

TM	February 17, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE

ASTM C 136

Tetra Tech
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
United States

December 16, 2011
Project number: 11-1415-0013/1000

ATTENTION: Mr.Troy Meyer, P.E.

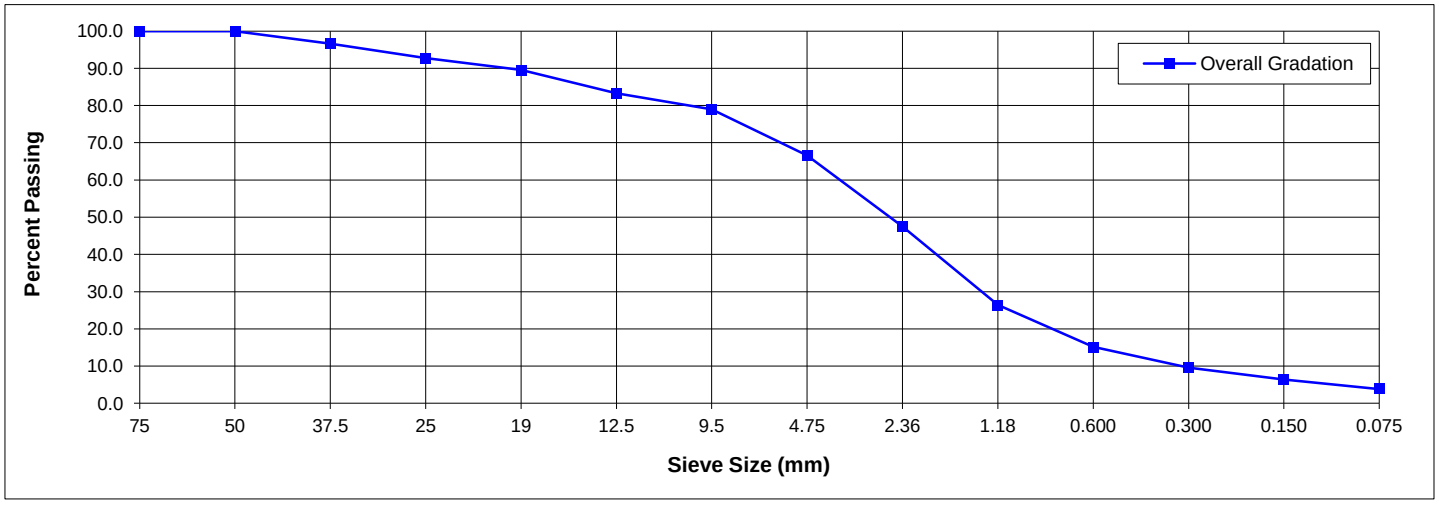
PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 4 Placer Tails**
Source	**Eagle Gold, Yukon**

DATE RECEIVED: December 15, 2011
DATE TESTED: December 16, 2012

SAMPLED BY: BGC
TESTED BY: IC

SIEVE ANALYSIS					**MATERIAL SPECIFICATION :**	
Sieve Size (mm)	% Retained	% Passing	Individual % Retained (Split values)			
			+ 4.75	- 4.75		
75	0.0	100.0	0.0			
50	0.0	100.0	0.0			
37.5	3.4	96.6	10.1			
25	3.9	92.7	11.7			
19	3.2	89.5	9.6			
12.5	6.2	83.3	18.6			
9.5	4.3	79.0	12.9			
4.75	12.4	66.6	37.2			
2.36	19.1	47.5		28.6		
1.18	21.1	26.4		31.7		
0.600	11.3	15.1		16.9		
0.300	5.6	9.6		8.3		
0.150	3.2	6.4		4.8		
0.075	2.5	3.9		3.8		
PAN	3.9	0		5.8		
Total	100.0		100.0	100.0		



Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other zones/depths. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO-DEVAL APPARATUS

ASTM D 6928

January 18, 2012
Project number: 11-1415-0013/1000

TETRA TECH
Ste 204, 120 West Park Dr.
Grand Junction, CO 81505
U.S.A.

ATTENTION: Mr.Troy Meyer, P.E.

PROJECT: TETRA TECH/ AGGREGATE/ YUKON

Sample:	**Section 4 Placer Tails**
Source:	**Eagle Gold, Yukon**

Date sampled: Not Given
Date tested: January 16, 2012

Sampled by: Client
Tested by: VN

Grading	Section 8.2
Loss at conclusion of test (%)	**32.1**

Validation Test Data: Control Aggregate (Drain Bros. stone)	
Test date	January 10, 2012
Percent loss	12.7%
Valid range	11.4 – 14.8%

Reported by: I. Chung

Reviewed by: _____
L. Hu, M. Sc. E.

Notice: The test data given herein pertain to the sample provided, and may not be applicable to material from other production zones/periods. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.

PARTICLE SIZE ANALYSIS OF SOILS

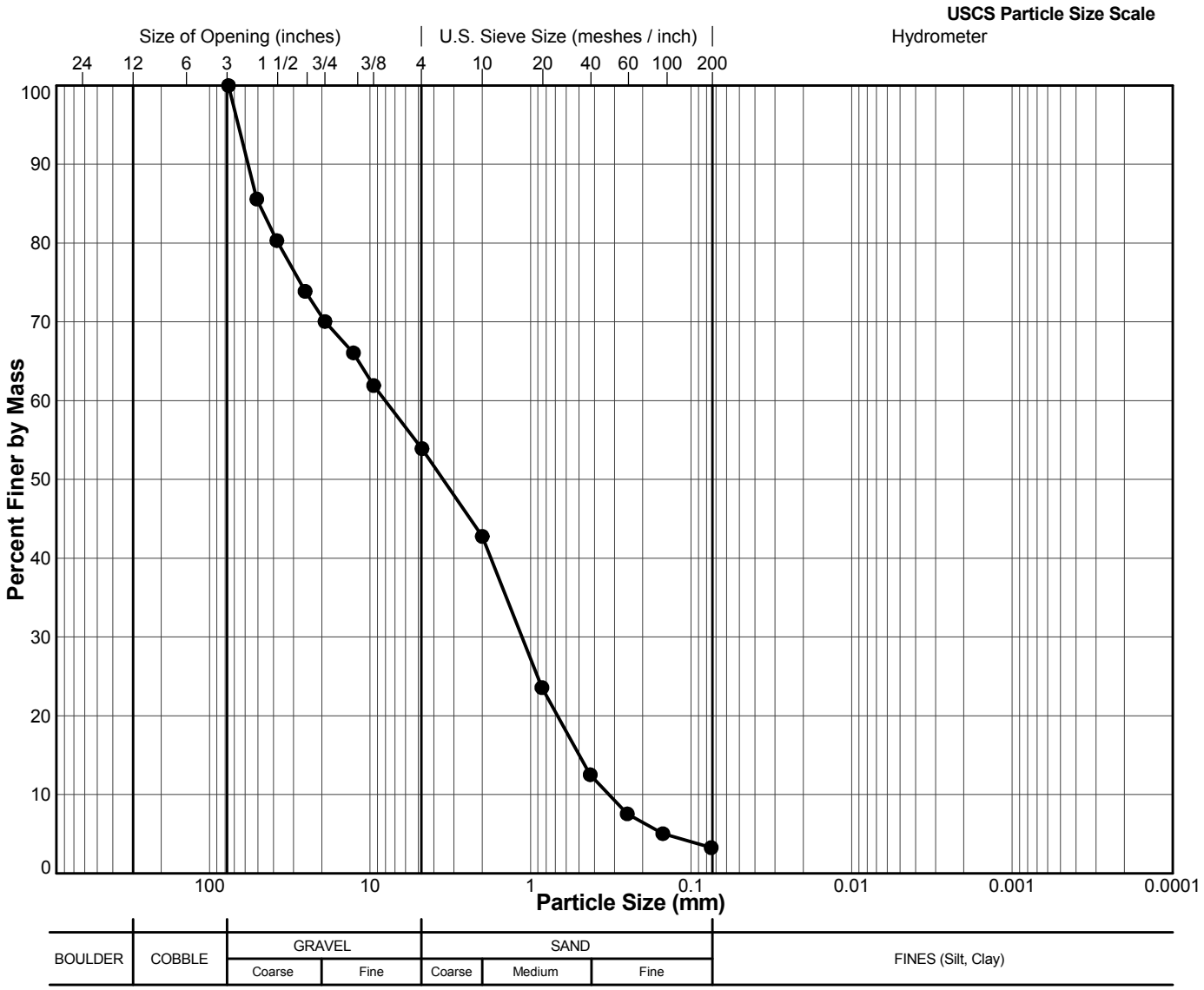
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 4 Placer Tails**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



		LP	**12/21/2011**
Tech	Date	Checked	Date

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LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Reference(s)
ASTM D 4318-10

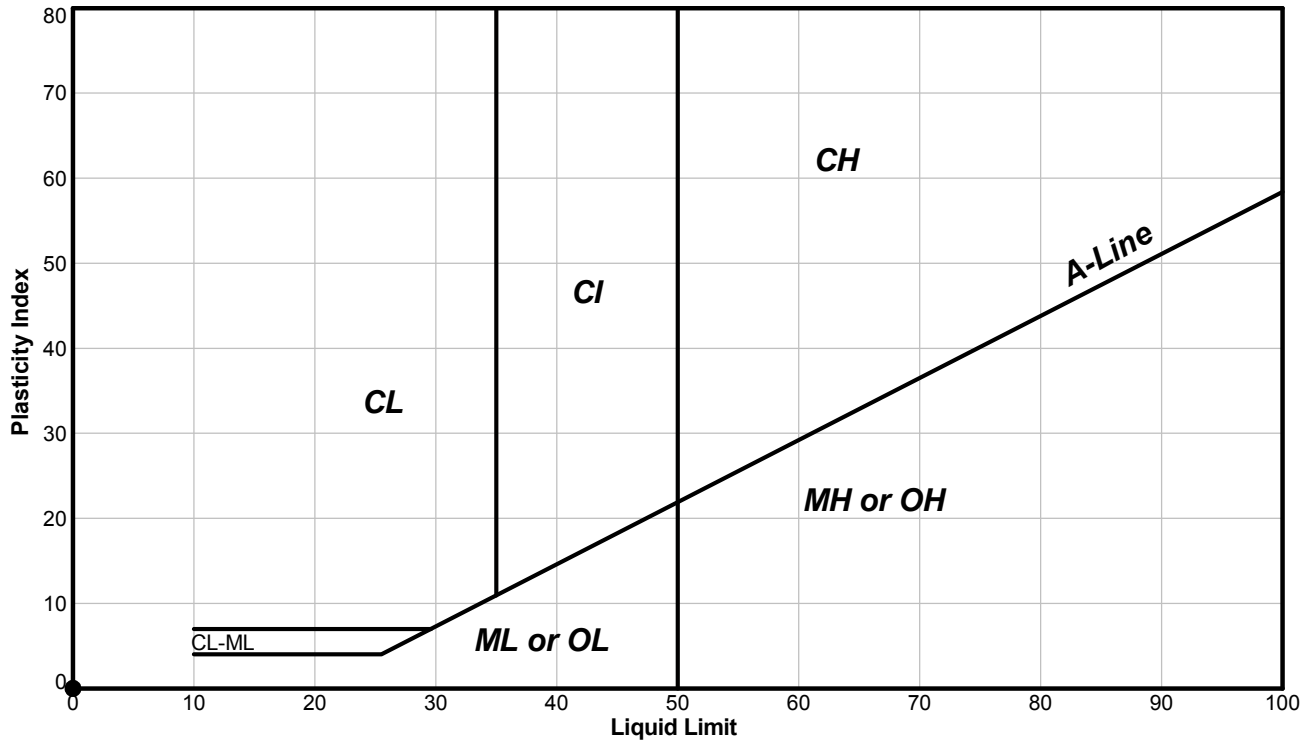
Client: Tetra Tech	**ID: Section 4 Placer Tails**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Classification and Definition: **Non-Plastic Soil (NP).**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Wet**

PLASTICITY CHART



Sym.	Sample Location	Sample Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	Section 4 Placer Tails	N/A	0.00	0.00	12	NP	NP	NP	2.1	NP

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

SK	12/5/2011	LP	12/21/2011
Tech	Date	Checked	Date

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File:N:\BUR-GRAPHICS\PROJECTS\2011\1415\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_ATTERBERG CASAGRANDE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB ebarnes 09/13/12

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

SPECIFIC GRAVITY OF SOIL SOLIDS

Reference
ASTM C 127-07
ASTM D 854-06 Method B

Project No.:	11-1415-0013/1000	**Borehole**	**Section 4 Placer Tails**
Client:	Tetra Tech	**Sample No.:**	N/A
Project:	Aggregate Testing	**Depth (m):**	N/A
Location:	Eagle Gold, Yukon	**Lab Sch No:**	211

Specific Gravity of Fine Fraction (ASTM D 854-06)

Percentage Passing #4 sieve		62.99		
Test Number		1		2
Flask Number		4		3
Air Removal Method		Vacuum		Vacuum
Mass of Flask (g)		172.71		173.97
Mass of Flask + Dry Soil (g)	M_P	286.80		285.41
Mass of Dry Soil (g)		113.77		111.24
Mass of Flask + Soil + Water (g)	$M_{\rho ws,t}$	742.87		742.45
Test Temperature (g)	T_t	19.00		18.90
Mass of Flask + Water (g)	$M_{\rho w,t}$	671.38		672.50
Mass of Dish + Dry Soil (g)		480.30		221.58
Mass of Dish (g)		366.53		110.34
Mass of Oven Dry Soil (g)	M_S	113.77		111.24
Temperature Coefficient	K	1.00		1.00
Density of Solids (g/cm3)	ρ_s	2.69		2.69
Specific Gravity at Test Temperature	G_t	2.70		2.70
Specific Gravity at 20ºC	$G_{20°C}$	2.70		2.70
AVERAGE SPECIFIC GRAVITY		**2.70**		

Specific Gravity of Coarse Fraction (ASTM C 127-07)

Percentage Retained on #4 sieve		31.39
Mass of Sample in Water (g)	A	
Mass of Sample @ SSD (g)	B	
Mass of Oven Dryed Sample (g)	C	
Bulk G (Oven Dry)	C/(B-A)	
Bulk G (SSD)	B/(B-A)	2.63
Apparent	C/(C-A)	2.70
Absorbtion (%)	(B-C)/C	1.65

Combined Specific Gravity

COMBINED SPECIFIC GRAVITY	$G_{avg\ @20°C}$	2.70

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data can be provided upon request.*

SK/RS	November 15, 2011	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory

4280 Still Creek Drive

Burnaby, B.C. Canada V5C 6C8

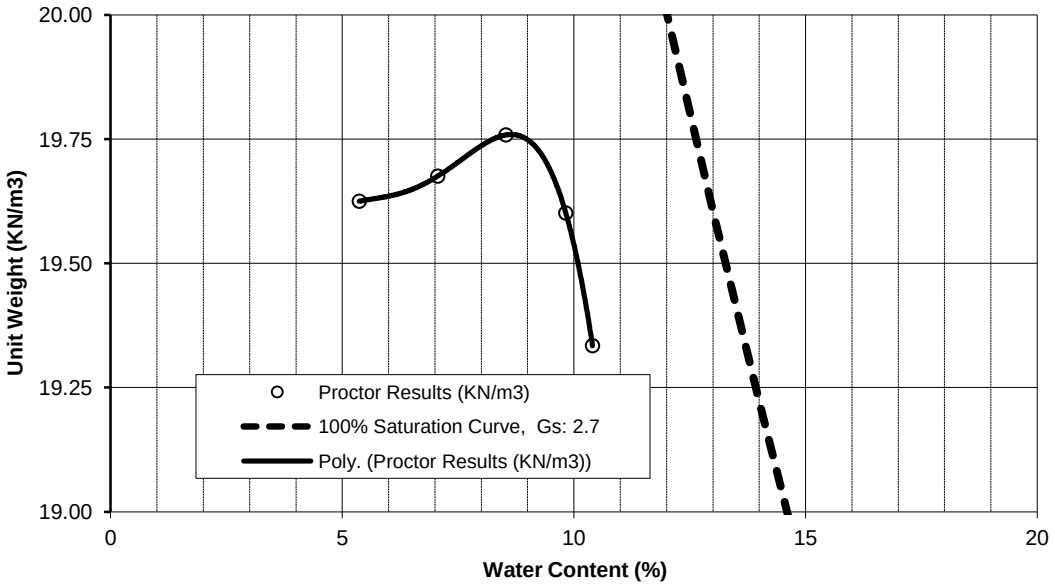
Compaction of Soil Using Standard Effort

Reference ASTM D 698-07

Client:	Tetra Tech	**Sample No.:**	Section 4 - Placer Tails
Project:	Aggregate Testing	**Sample Location:**	
Location:	Eagle Gold, Yukon	**Depth (m):**	
Project No.:	11-1415-0013/1000	**Lab ID No:**	211
Effort Type:	Standard	**Visual Description:**	-
Test Method:	C	**Type of Rammer:**	Mechanical
Preparation Method:	Moist	**Mould Volume (m^3):**	0.002122
Remarks:			

Compaction Results

Trial No.:	1	2	3	4	5
Unit Weight (KN/m^3)	19.63	19.68	19.76	19.60	19.3
Water Content (%):	5.4	7.1	8.5	9.8	10.4



Uncorrected Optimum w (%):	8.5	**Uncorrected Unit Weight (KN/m^3)**	19.80

ASTM D 4718-87 (2007) Correction for oversize particles

Max Percent Oversize (%):	20	**Sieve Size (mm):**	20.00
Oversized Fraction		***Test Fraction***	
Percent Oversized Fraction (%):	30.0	**Percent Test Fraction (%):**	70.0
Gsc (calculated):	2.70	**Gsf (calculated):**	2.70
Water Content of Oversized (%):	1.5	**Water Content of Test (%):**	8.5

Final Results

Corrected Optimum w (%):	6.4	**Corrected Unit Weight (KN/m^3)**	21.42
		Corrected Dry Density (Kg/m^3)	2183

SK, RS	December-15-11	LP	December 21,2011
TESTED BY	DATE	CHECKED BY	DATE

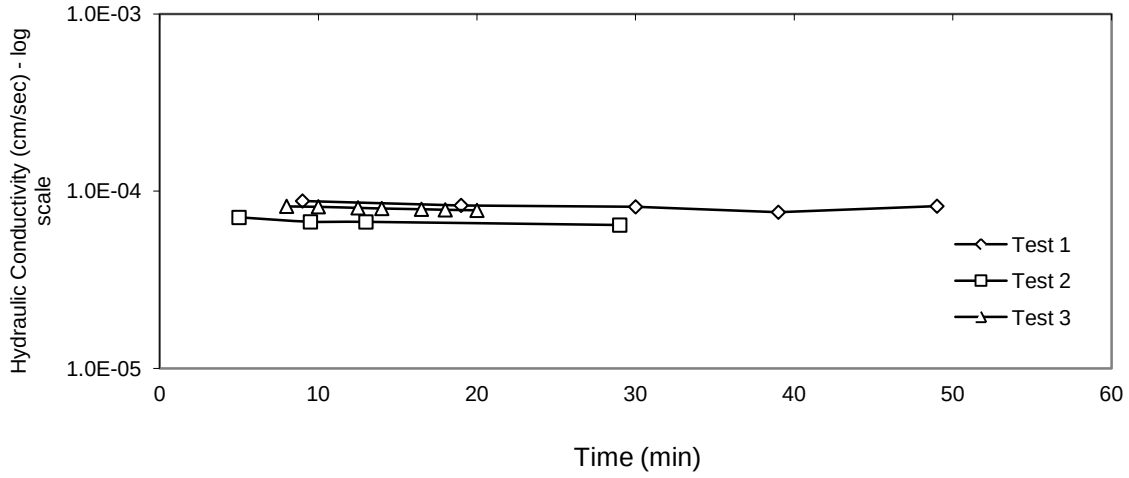
Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

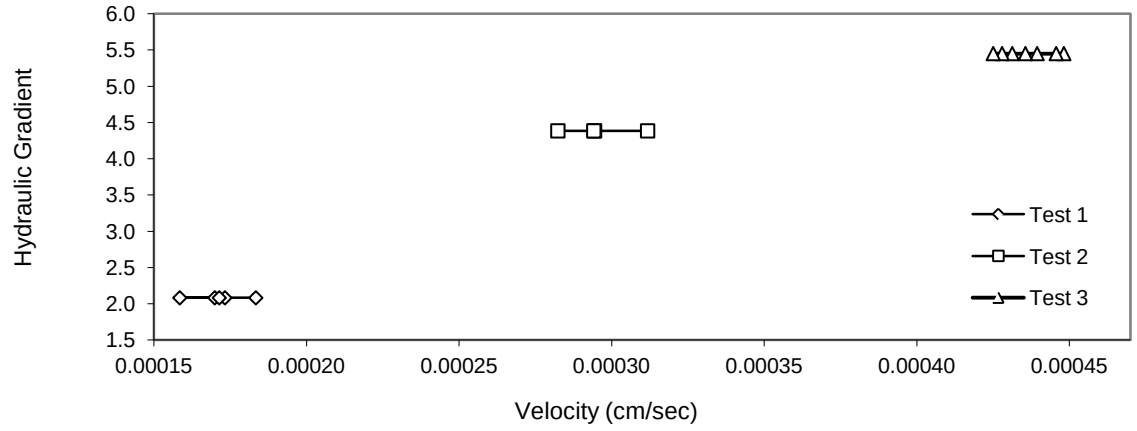
Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall, Compaction-Mold Permeameter

Reference: ASTM D 2434-68 (2006)

Project No:	**11-1415-0013/1000**	**Sample ID:**	**Section 4 Placer Tails**
Client:	**Tetra Tech**		
Project:	**Aggregate Testing**	**Test Parameters:**	95% of Std. Proctor at opt moisture content
Location	**Eagle Gold, Yukon**	**Lab ID No:**	211

Test Method:	A: Constant Head	**Permeameter :**	Single Ring Base Plate	**Permeant Liquid:**	De-aired Tap Water
Compaction:	Hand Compaction	**Initial Diameter, cm**	15.21	**Initial Water Content, %**	6.1
Target Compaction	95% Standard	**Initial Height, cm**	11.85	**Initial ρ_{dry}, kg/m^3:**	2074
Max ρ_{dry} (kg/m^3):	2074	**Initial Volume, cm^3**	2153.7	**Initial Void Ratio**	0.30
Gs (measured)	2.70	**Final Diameter, cm**	15.21	**Final Water Content, %**	8.9
		Final Height, cm	12.01	**Final ρ_{dry}, kg/m^3:**	2046
		Final Volume, cm^3	2182.2	**Final Void Ratio**	0.32





Test Comments: 3/4" Scalped. Coarse pore stone used with filter paper.

No. of Pore Volumes 1.71	Range of Hydraulic Gradient 2.08 to 5.45	**HYD. CONDUCTIVITY k_{20},cm/s** **7.7E-05**

EB	13-Jan-12	LP	June 7, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference ASTM D 3080-04

Client:	Tetra Tech	**Sample No :**	SECTION 4 - PLACER TAILS
Project:	Aggregate Testing	**Sample ID :**	
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

Test Condition:	95% Std Proctor at opt. moisture	**Equipment Description:**		LDS
Visual Description:	GRAVEL and SAND, trace silt	**Normal LVDT:**	Serial No.:	HLS50/9686
	RECONSTITUTED	**Shear Load Cell:**	Serial No.:	2C202 10K
	Peak and residual	**Vertical LVDT:**	Serial No.:	HLS25M4407

Remarks: Area correction not applied to normal and shear stress calculation
Multi-stage test: peak + 3 residuals

Initial Sample Dimensions

Test No.	1		2	3		
Shear box geometry	Rectangular		Rectangular	Rectangular		
Length (mm)	250		250	250		
Width (mm)	150		150	150		
Depth (mm)	198		199	198		
Area (cm^2)	3.75E+02		3.75E+02	3.75E+02		
Volume (cm^3)	7.42E+03		7.42E+03	7.42E+03		

Weight Volume Relationships

Sample Type	PEAK		RESIDUAL	RESIDUAL		
Dry Mass (g)	14261	---	14261	14274		
Initial γ_{wet} (kN/m^3)	20.18	---	20.12	20.11		
Final γ_{wet} (kN/m^3)	20.45	---	20.42	20.42		
Initial γ_{dry} (kN/m^3)	18.60	---	18.54	18.55		
Final γ_{dry} (kN/m^3)	18.82	---	18.82	18.82		
Initial water content (%)	8.5	---	8.5	8.4		
Final water content (%)	8.7	---	8.5	8.5		
Specific Gravity (test value)	2.70	---	2.70	2.70		
Initial Void Ratio, e	0.41	---	0.41	0.41		
Initial Saturation (%)	n/a	---	n/a	n/a		

Test Results

Rate of Deformation (mm/min)	0.83	0.83	0.83	0.83		
Normal Stress (kPa)	138	138	276	552		
Peak Shear Stress (kPa)		---	---	---		
Residual Shear Stress (kPa)	---					

Consolidation Results

Normal Stress (kPa)	138	---	276	552		
t_{90} (Taylor Method) (min)	---	---	---	---		
Calculated t_{50} (min)	---	---	---	---		
Change in height ΔH_c (mm)	---	---	---	---		

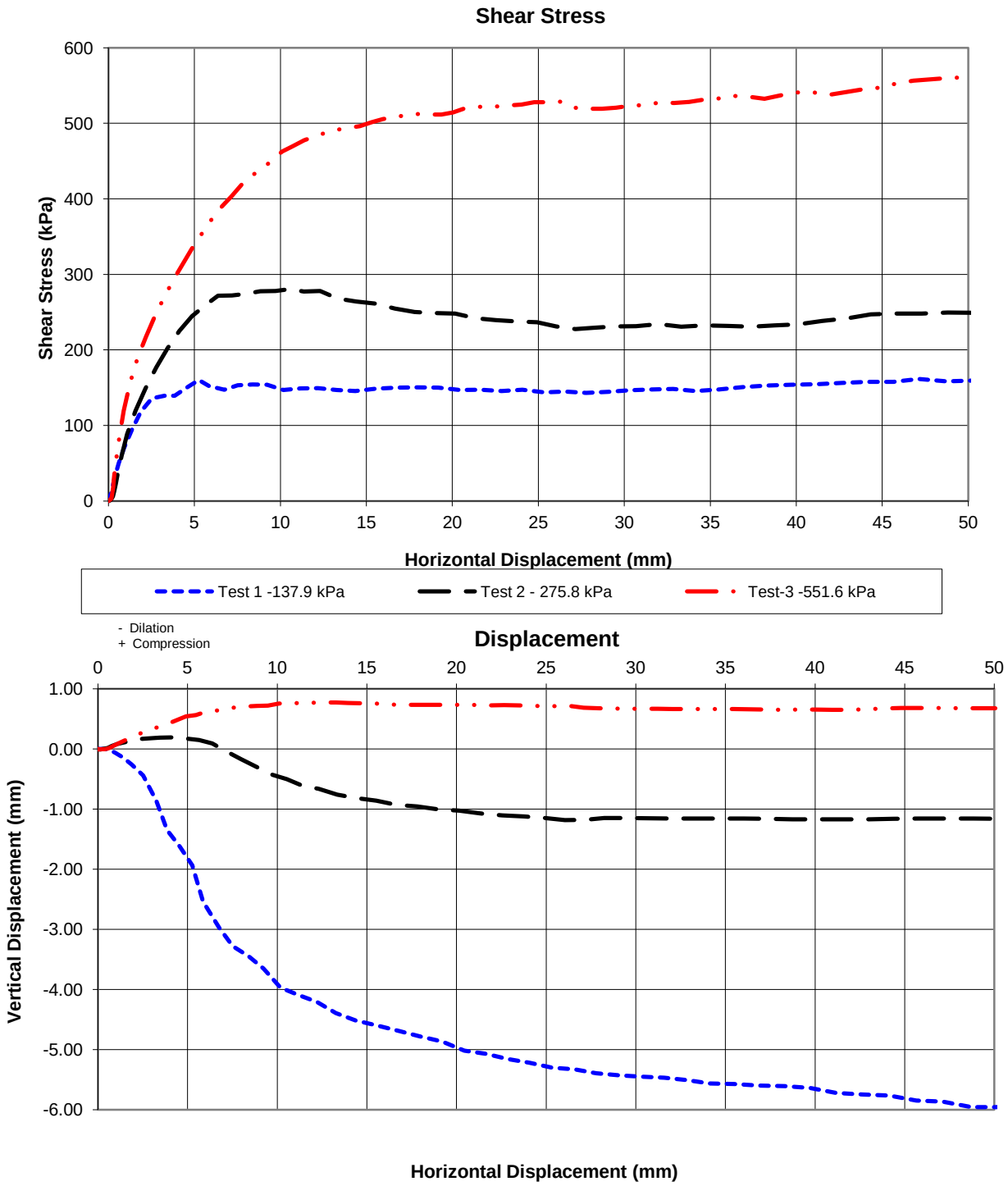
LP	February 22,2012	M. SANIN	May 31, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D 3080-11

Client:	Tetra Tech	**Sample No :**	SECTION 4 - PLACER TAILS
Project:	Aggregate Testing	**Sample ID :**	-
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211



LP	February 22,2012	M. SANIN	May 31, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Direct Shear Testing of Soils Under Consolidated Drained Conditions

Reference
ASTM D 3080-11

Client:	Tetra Tech	**Sample No :**	SECTION 4 - PLACER TAILS
Project:	Aggregate Testing	**Sample ID :**	-
Location:	Eagle Gold, Yukon	**Depth (m):**	-
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

OPEN	
Normal Stress , kPa	

Horz Disp mm	Shear Stress kPa	Vert Disp mm

			22.87	145.53	-5.1561	26.04	230.95	-1.1830	15.98	505.65	0.7508
			24.07	147.10	-5.2181	27.16	227.49	-1.1793	16.65	508.02	0.7373
			25.34	143.62	-5.3022	28.24	229.39	-1.1489	17.32	510.91	0.7348
			26.57	144.83	-5.3284	29.42	231.06	-1.1469	18.01	512.41	0.7342
			27.78	142.98	-5.3935	30.68	231.33	-1.1539	18.69	511.58	0.7344
			29.07	144.36	-5.4276	32.00	234.24	-1.1542	19.36	511.75	0.7352
			30.30	146.61	-5.4511	33.30	230.59	-1.1585	20.03	514.37	0.7345
			31.58	147.62	-5.4663	34.65	232.43	-1.1572	20.70	519.47	0.7344
			32.84	148.33	-5.5063	36.01	231.71	-1.1543	21.35	521.58	0.7318
			34.13	145.58	-5.5650	37.39	230.75	-1.1610	21.93	522.06	0.7286
			35.49	147.62	-5.5753	38.73	232.45	-1.1692	22.65	522.27	0.7319
			36.88	150.68	-5.5971	40.10	233.76	-1.1705	23.37	523.62	0.7274
			38.30	152.66	-5.6099	41.51	238.41	-1.1685	24.02	524.84	0.7203
			39.72	153.91	-5.6407	42.97	241.78	-1.1682	24.75	527.90	0.7146
			41.17	154.66	-5.7221	44.34	247.06	-1.1616	25.51	527.78	0.7149
			42.67	156.12	-5.7483	45.76	247.99	-1.1564	26.30	528.51	0.7174
			44.14	157.77	-5.7664	47.30	247.94	-1.1548	27.09	520.64	0.6881
			45.65	157.58	-5.8471	48.82	249.57	-1.1556	27.89	519.22	0.6791
			47.11	161.34	-5.8679	50.36	249.00	-1.1595	28.70	519.16	0.6744
			48.72	158.48	-5.9593				29.53	520.56	0.6697
			50.35	159.54	-5.9575				30.38	523.30	0.6676
									31.22	524.13	0.6679
									32.06	527.41	0.6632
									32.90	526.95	0.6657
									33.77	528.18	0.6653
									34.64	531.46	0.6666
									35.46	532.73	0.6639
									36.34	536.24	0.6620
									37.22	535.37	0.6565
									38.16	532.60	0.6539
									39.08	537.04	0.6575
									39.99	540.70	0.6569
									40.94	541.15	0.6539
									41.90	537.65	0.6533
									42.83	541.09	0.6610
									43.76	544.64	0.6758
									44.79	547.11	0.6809
									45.81	552.70	0.6816
									46.806	556.49	0.6814
									48.391	559.24	0.6792
									50.052	561.31	0.6766

LP	February 22,2012	M. SANIN	May 31, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D 2850-03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID:**	UU-1 (20 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	GRAVEL and SAND, trace silt
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test was scalped on the 3/8 inch sieve

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.28
Diameter (cm):	10.12
Area (cm^2):	80.39
Volume (cm^3):	1630.0
Wet Weight (g):	3369.2
γ_{wet} (kN/m^3):	20.27
γ_{dry} (kN/m^3):	18.47
Water content, w (%):	9.7
Saturation (%):	61
Void ratio, e:	0.43
Gs (calculated)	2.70

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	NP
Classification	GW/SW

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	538
Strain, ε_f:	4.76
$\sigma_{1\ total}$ (kPa):	678
$\sigma_{3\ total}$ (kPa):	140

Equipment	
Machine:	Station 1 Load Frame 10 K
Load Cell:	400469
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Feed Rate (%/min):	1.00

PHOTO AT END OF TEST

TESTED BY	DATE	CHECKED BY	DATE
TM	February 14, 2012	M. SANIN	April 16, 2012

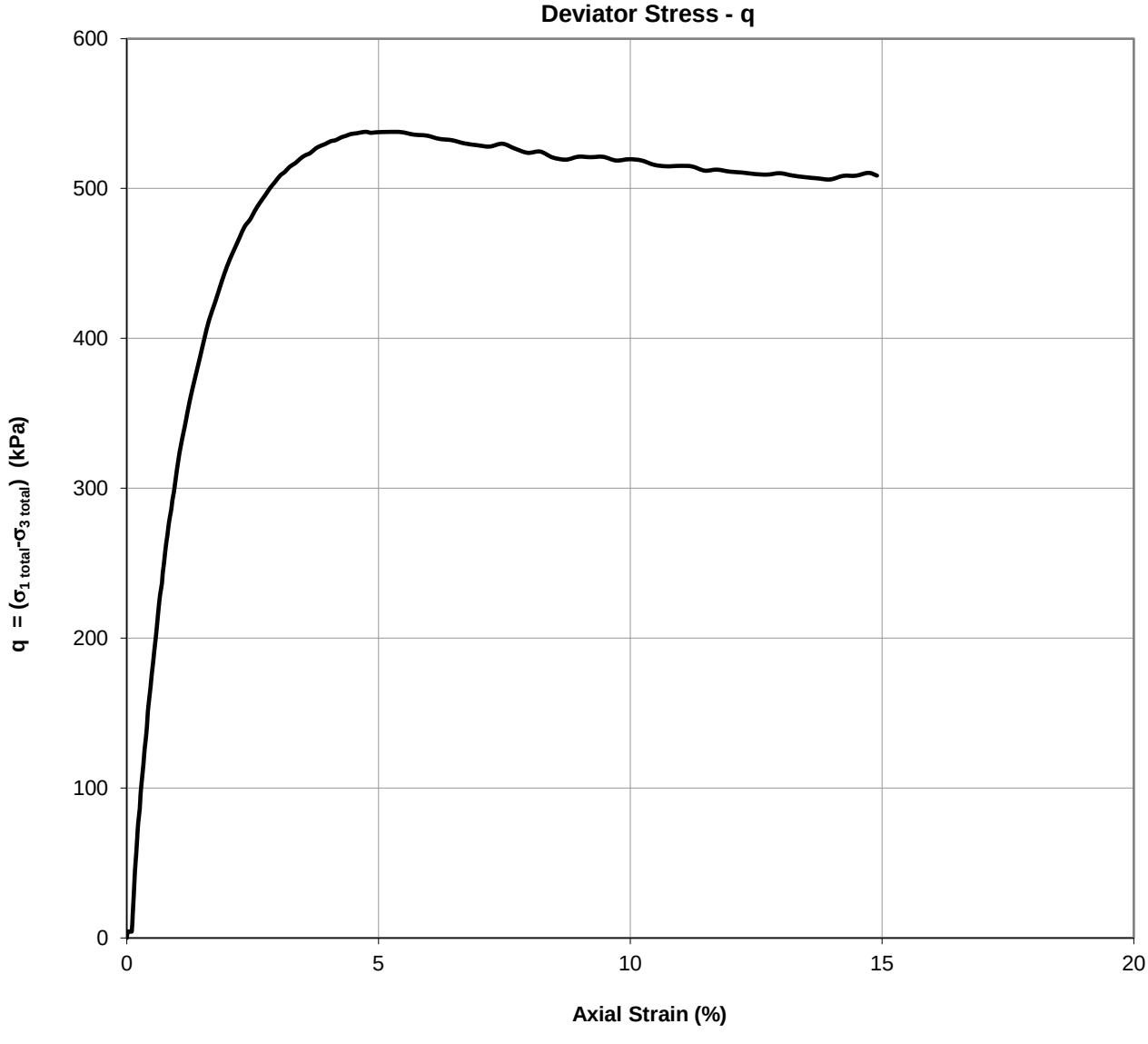
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-3 @ 80psi\[Section 4 Placer Tails UU-3 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference
ASTM D 2850-03a (2007)

Client:	Tetra Tech	**Borehole.:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Sample :**	UU-1 (20 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TM	February 14, 2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-3 @ 80psi\[Section 4 Placer Tails UU-3 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D 2850-03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID:**	UU-2 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	GRAVEL and SAND, trace silt
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test was scalped on the 3/8 inch sieve

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.28
Diameter (cm):	10.12
Area (cm^2):	80.39
Volume (cm^3):	1630.2
Wet Weight (g):	3369.3
γ_{wet} (kN/m^3):	20.27
γ_{dry} (kN/m^3):	18.38
Water content, w (%):	10.3
Saturation (%):	63
Void ratio, e:	0.44
Gs (calculated)	2.70

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	NP
Classification	GW/SW

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	883
Strain, ε_f:	7.72
$\sigma_{1\ total}$ (kPa):	1159
$\sigma_{3\ total}$ (kPa):	277

Equipment	
Machine:	Station 1 Load Frame 10 K
Load Cell:	305670
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Feed Rate (%/min):	1.00

PHOTO AT END OF TEST

TM	February 14, 2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

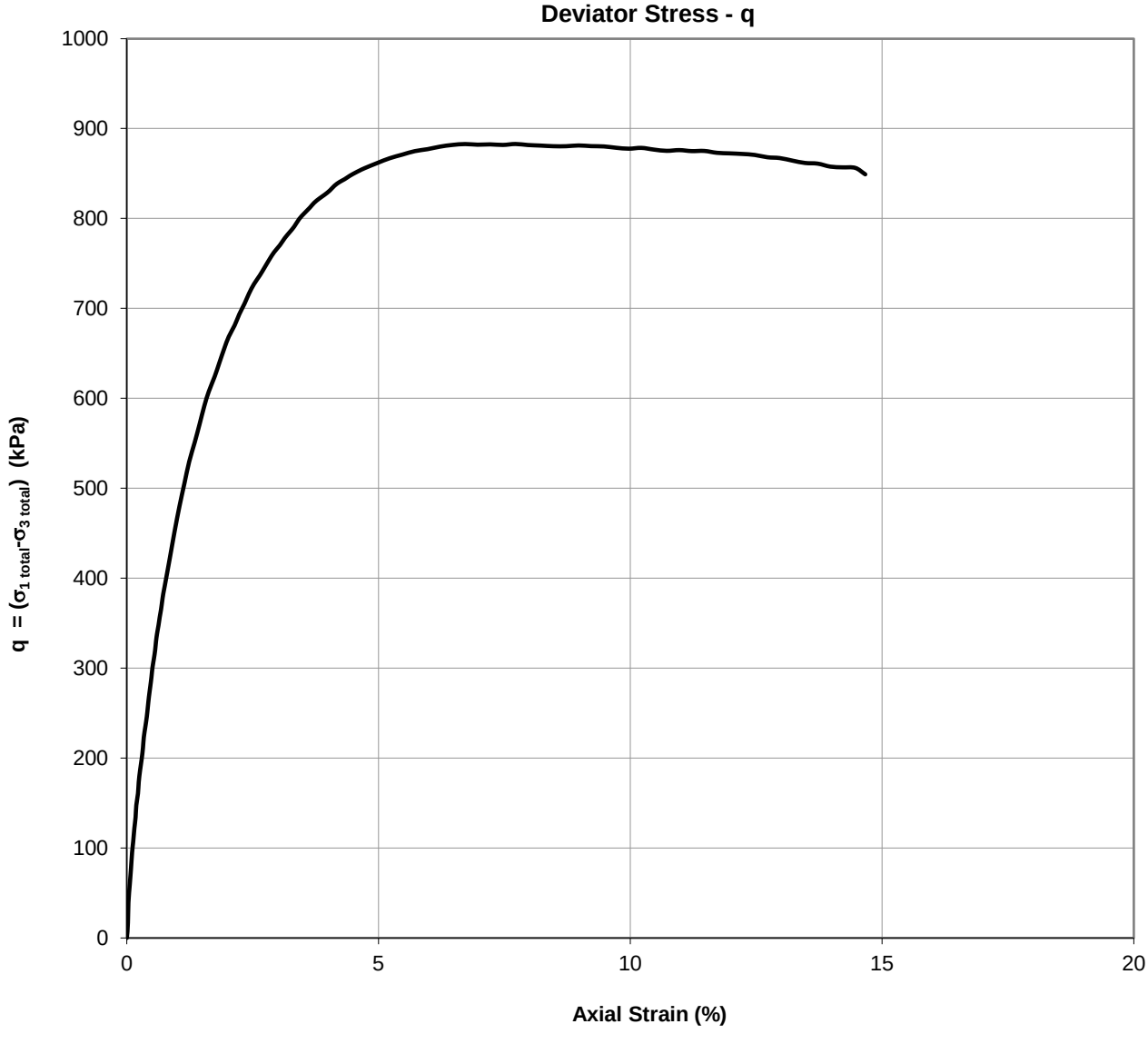
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-1 @ 20psi\[Section 4 Placer Tails UU-1 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D 2850-03a (2007)**

Client:	Tetra Tech	**Borehole.:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Sample :**	UU-2 (40 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TESTED BY	DATE	CHECKED BY	DATE
TM	February 14, 2012	M. SANIN	April 16, 2012

O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-1 @ 20psi\[Section 4 Placer Tails UU-1 Report .xlsm]Report 1

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D 2850-03a (2007)**

Client:	Tetra Tech	**Sample No:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID:**	UU-3 (80 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Visual Description:	GRAVEL and SAND, trace silt
Sample Type:	Reconsituted to 95% Standard Proctor at optimum moisture content
Other Remarks:	Material used for the UU test was scalped on the 3/8 inch sieve

Sample Data	
	Initial Sample Charateristics
Height (cm):	20.31
Diameter (cm):	10.10
Area (cm^2):	80.10
Volume (cm^3):	1627.3
Wet Weight (g):	3369.3
γ_{wet} (kN/m^3):	20.30
γ_{dry} (kN/m^3):	18.41
Water content, w (%):	10.3
Saturation (%):	63
Void ratio, e:	0.44
Gs (calculated)	2.70

Atterberg Limit Results	
Liquid Limits	N/A
Plastic Limits	N/A
Plastic Index	NP
Classification	GW/SW

Strength Results	
q_{MAX} ($\sigma_{1\ total}$ - $\sigma_{3\ total}$) at failure (kPa):	1600
Strain, ε_f:	9.06
$\sigma_{1\ total}$ (kPa):	2153
$\sigma_{3\ total}$ (kPa):	554

Equipment	
Machine:	Station 1 Load Frame 10 K
Load Cell:	305670
Axial DCDT:	LP-174
Cell Pressure:	PS-3119
Feed Rate (%/min):	1.00

PHOTO AT END OF TEST

TESTED BY	DATE	CHECKED BY	DATE
TM	February 14, 2012	M. SANIN	April 16, 2012

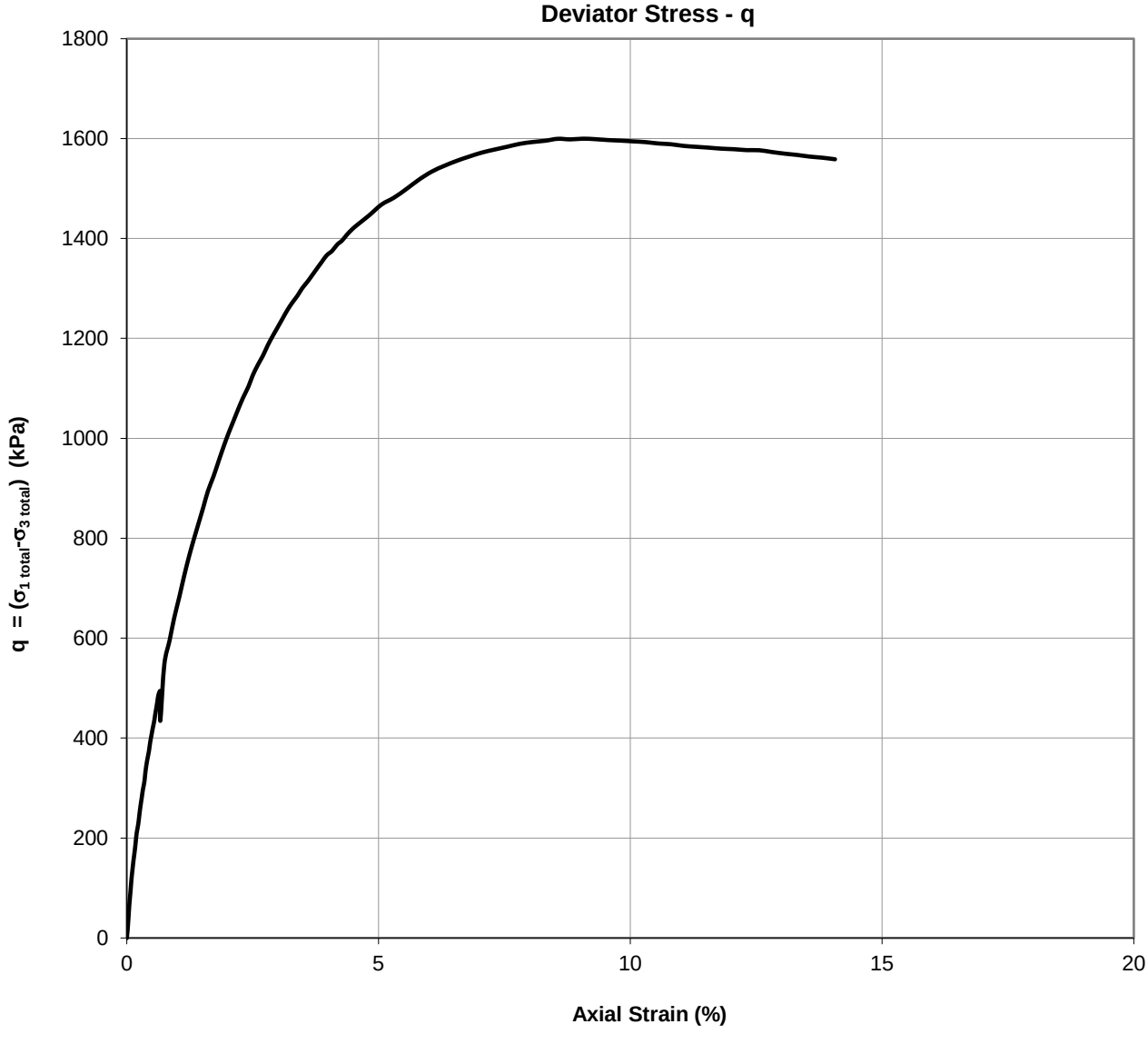
O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-2 @ 40psi\[Section 4 Placer Tails UU-2 Report .xlsm]Report 2

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

Reference: **ASTM D 2850-03a (2007)**

Client:	Tetra Tech	**Borehole.:**	Section 4 Placer Tails
Project:	Aggregate Testing	**Sample :**	UU-3 (80 PSI)
Location:	Eagle Gold, Yukon	**Depth (m):**	n/a
Project No.:	11-1415-0013/1000	**Lab ID No:**	211



Remarks:

TM	February 14, 2012	M. SANIN	April 16, 2012
TESTED BY	DATE	CHECKED BY	DATE

O:\Active_2011\1415\11-1415-0013 Tetra Tech\Phase 1000- Aggregate Testing\Section 4 Placer Tails\Triaxials\UU-2 @ 40psi\[Section 4 Placer Tails UU-2 Report .xlsm]Report 2

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU Summary
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013/1000	**Lab ID No:**	211

Test	CIU1	CIU2	CIU3		
Sample	138 kPa	276 kPa	552 kPa		
Initial Dimensions					
H_o (cm)	19.90	20.23	20.28		
D_o (cm)	9.98	10.09	9.94		
Gs (assumed)	2.75	2.75	2.75		
w (%)	9.3	9.3	10.1		
$\gamma_{o\ dry}$ (kN/m^3)	19.28	18.59	19.08		
Sat. (%)	64	57	67		
e_o	0.40	0.45	0.41		
B_{Value}	0.95	0.99	0.99		
Consolidation Results					
σ_{CELL} (kPa)	1101	1241	1102		
OCR	n/a	n/a	n/a		
$\sigma_{3c'}$ (kPa)	141	274	554		
ΔV_c (cc)	-17.8	-31.3	-39.0		
t_{50} (min)	0.8	1.7	1.6		
After Consolidation Dimensions					
H_c (cm)	19.90	20.12	20.28		
D_c (cm)	9.93	10.02	9.82		
A_c (cm^2)	77.38	78.85	75.72		
V_c (cm^3)	1540.0	1586.7	1535.4		
$\gamma_{c\ dry}$ (kN/m^3)	19.51	18.96	19.56		
e_c	0.38	0.42	0.38		
w (%)	13.9	15.4	13.8		
Sat (%)	100	100	100		
Failure At Maximum Deviator Stress $\sigma_1'-\sigma_3'$:					
$\sigma_1'-\sigma_3'$ (kPa) :	887	749	999		
ε_f (%)	19.39	20.11	12.39		
u (kPa)	-120	99	263		
σ_3' (kPa)	260	174	290		
σ_1' (kPa)	1147	923	1289		

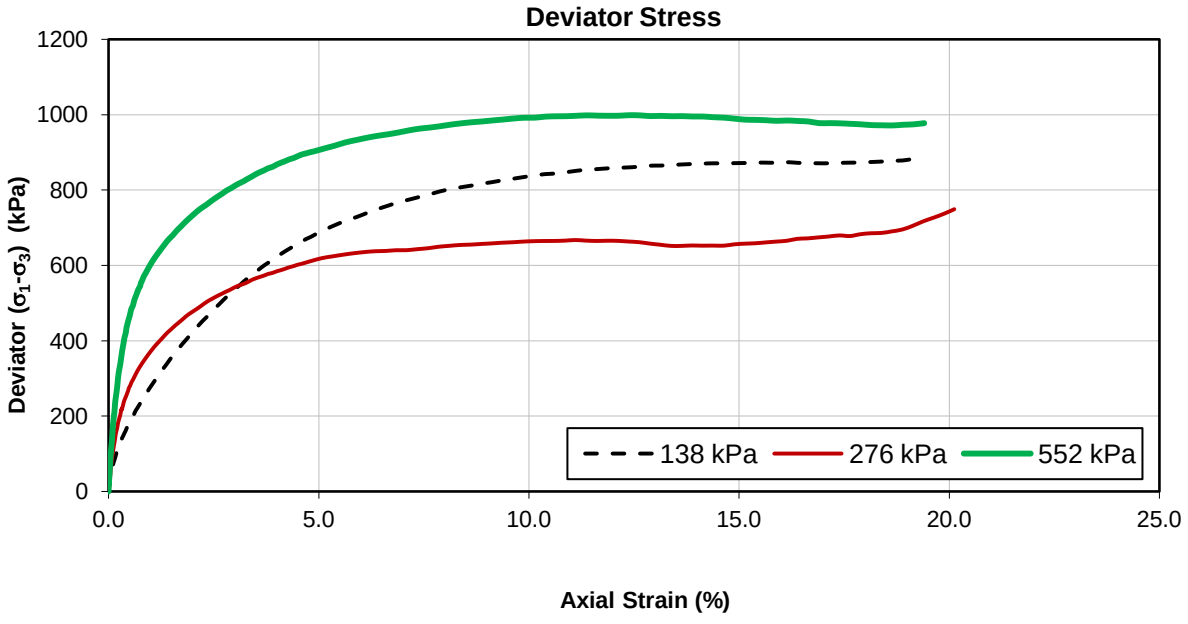
TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

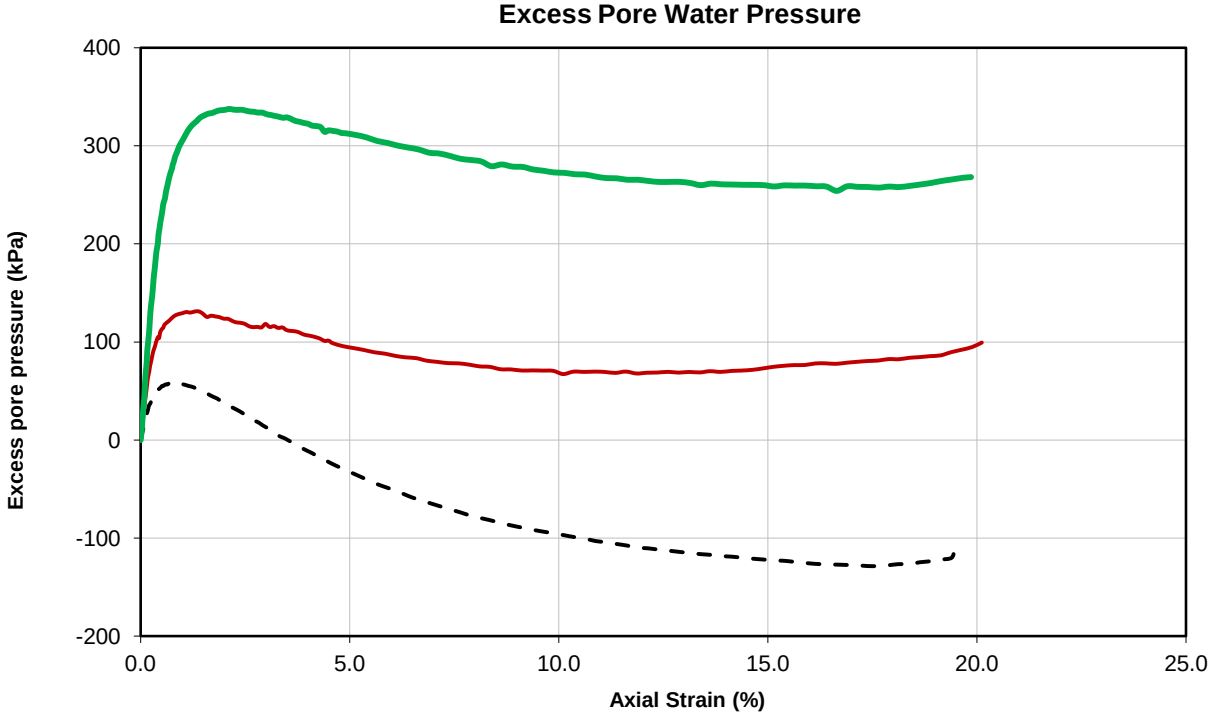
Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference
ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU Summary
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211





TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

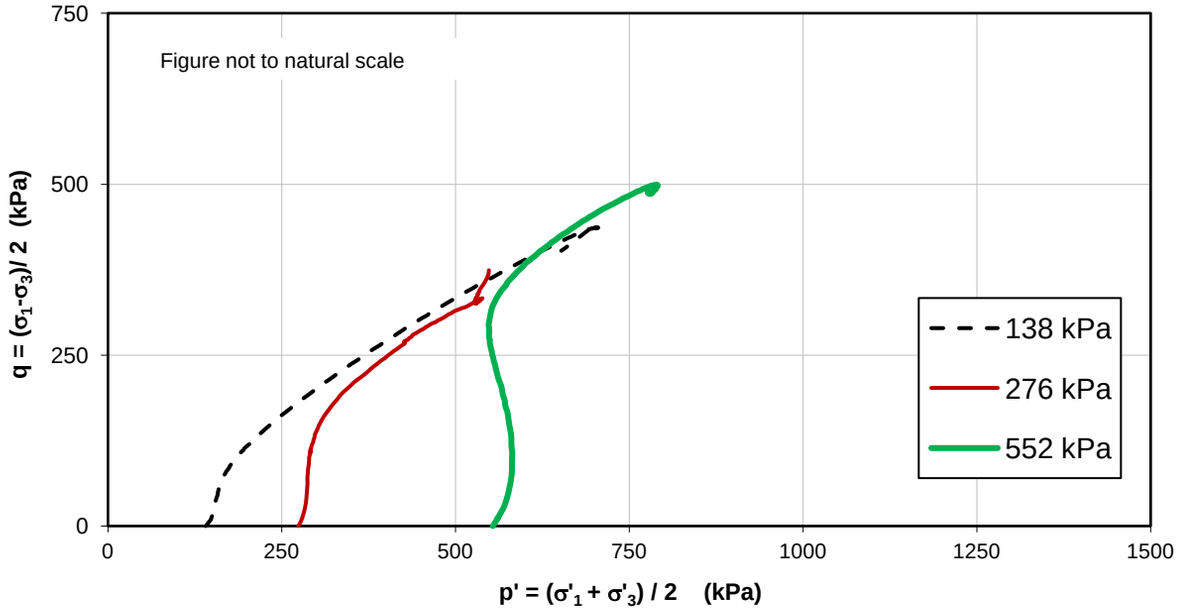
Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

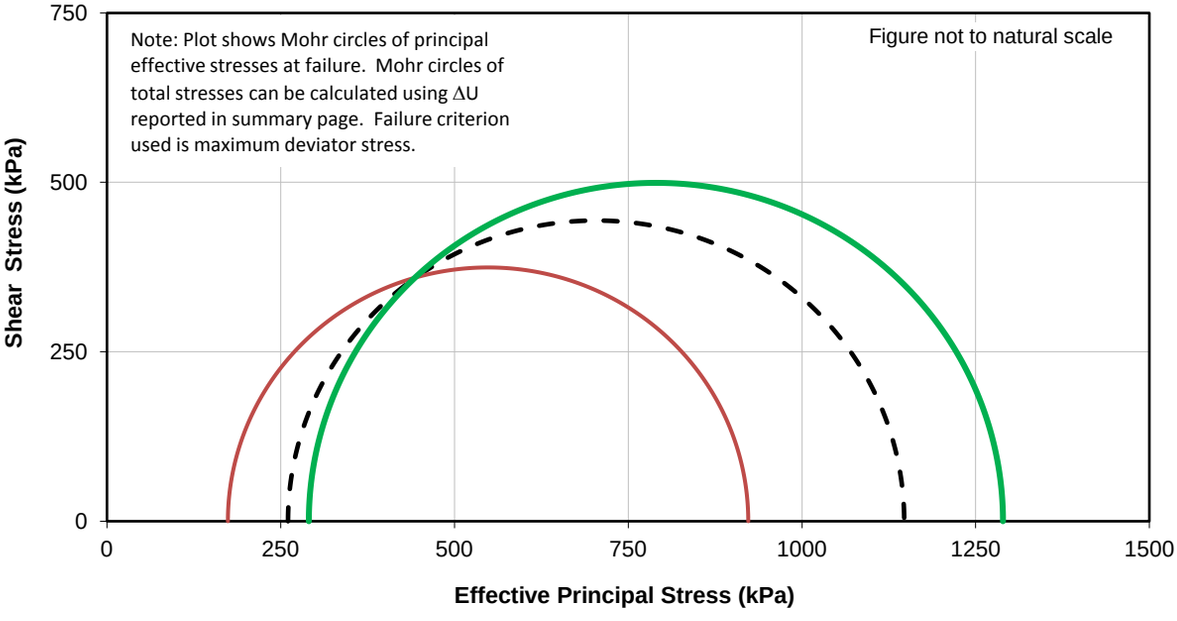
Reference
ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU Summary
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Stress Paths



Mohr Circles Deviator Stress



TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU-1
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	GW/SW
Saturation Method:	WET	**Material Type**	N/A

Visual Description	GRAVEL and SAND, trace silt
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve
	Reconstituted to 95% Standard Proctor at optimum moisture content

Sample Data

	Before Consolidation	After Consolidation
Height (cm):	19.90	19.90
Diameter (cm):	9.98	9.93
Area (cm^2):	78.27	77.38
Volume (cm^3):	1558	1540
γ_{dry} (kN/m^3):	19.28	19.51
γ_{sat} (kN/m^3):	21.07	22.22
Water content, w (%):	9.3	13.9
Saturation (%):	64	100
Void ratio, e:	0.40	0.38
Gs (assumed):	2.75	2.75

Equipment

Machine:	Truepath Load Frame - Stn.2
Chamber:	KW
Load Cell:	205857
Axial DCDT:	LP-267
Cell Pressure:	PS-3118
Back Pressure:	PS-2840
Pore Pressure:	PS-3278
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST

Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	141
σ_{pwp} (kPa):	961
B value:	0.95
Volume Change (cc):	-17.8
t_{50} (min):	0.83

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	887
Strain, ε_f:	19.39
u (kPa):	-120
σ_1' (kPa):	1147
σ_3' (kPa):	260

TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU-2
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 / 1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	GW/SW
Saturation Method:	WET	**Material Type**	N/A

Visual Description	GRAVEL and SAND, trace silt
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve
	Reconstituted to 95% Standard Proctor at optimum moisture content

Sample Data

	Before Consolidation	After Consolidation
Height (cm):	20.23	20.12
Diameter (cm):	10.09	10.02
Area (cm^2):	79.99	78.85
Volume (cm^3):	1618	1587
γ_{dry} (kN/m^3):	18.59	18.96
γ_{sat} (kN/m^3):	20.33	21.88
Water content, w (%):	9.3	15.4
Saturation (%):	57	100
Void ratio, e:	0.45	0.42
Specific Gravity (calculated)	2.75	2.75

Equipment

Machine:	Truepath Load Frame - Stn. 4
Chamber:	KW
Load Cell:	305670
Axial DCDT:	LP-764
Cell Pressure:	PS-5112
Back Pressure:	PS-5115
Pore Pressure:	PS-3373
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST

Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	274
σ_{pwp} (kPa):	967
B value:	0.99
Volume Change (cc):	-31.3
t_{50} (min):	1.7

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	749
Strain, ε_f:	20.11
u (kPa):	99
σ_1' (kPa):	923
σ_3' (kPa):	174

TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd -Burnaby Laboratory
4280 Still Creek Drive
Burnaby,B.C. Canada V5C 6C8

Consolidated Undrained Triaxial Compression Test for Soils

Reference ASTM D4767-11

Client:	Tetra Tech	**Sample No :**	Section 4 Placer Tails
Project:	Aggregate Testing	**Test ID :**	CIU-3
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Project No.:	11-1415-0013 /1000	**Lab ID No:**	211

Type :	Reconstututed	**Soil Classification:**	GW/SW
Saturation Method:	WET	**Material Type**	N/A
Visual Description	GRAVEL and SAND, trace silt		
Other Remarks:	Material used for the triaxial test was scalped on the 3/8 inch sieve		
	Reconstituted to 95% Standard Proctor at optimum moisture content		

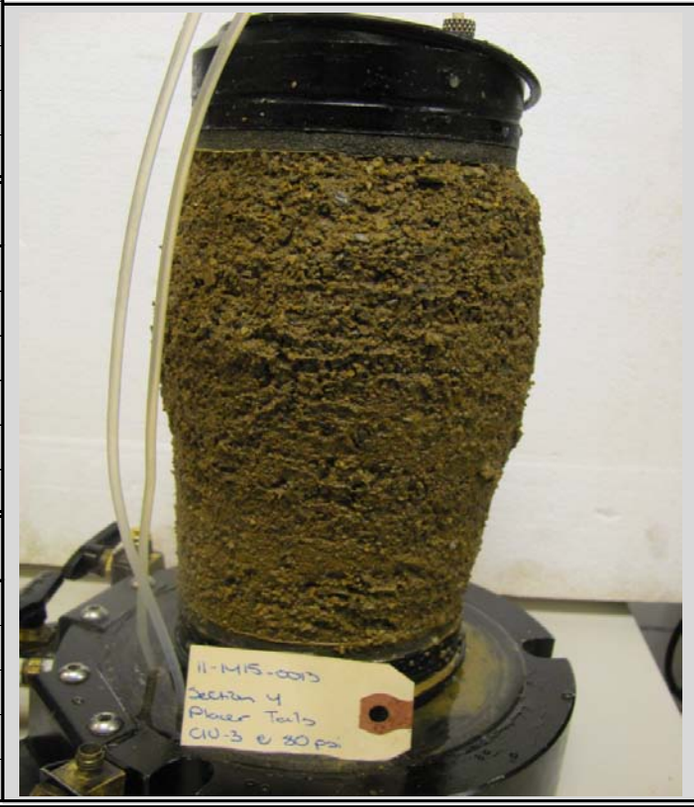
Sample Data

	Before Consolidation	After Consolidation
Height (cm):	20.28	20.28
Diameter (cm):	9.94	9.82
Area (cm^2):	77.65	75.72
Volume (cm^3):	1574	1535
γ_{dry} (kN/m^3):	19.08	19.56
γ_{sat} (kN/m^3):	21.00	22.26
Water content, w (%):	10.1	13.8
Saturation (%):	67	100
Void ratio, e:	0.41	0.38
Specific Gravity (calculated)	2.75	2.75

Equipment

Machine:	Truepath Load Frame - Stn. 2
Chamber:	KW
Load Cell:	305670
Axial DCDT:	LP-267
Cell Pressure:	PS-3118
Back Pressure:	PS-2840
Pore Pressure:	PS-3278
Feed Rate (%/hr):	2.00

PHOTO AT END OF TEST



Consolidation Results

$\sigma'_{eff} = \sigma_{cell} - \sigma_{pwp}$ (kPa):	554
σ_{pwp} (kPa):	549
B value:	0.99
Volume Change (cc):	-39.0
t_{50} (min):	1.6

Strength Results

$\sigma_1' - \sigma_3'_{MAX}$:	999
Strain, ε_f:	12.39
u (kPa):	263
σ_1' (kPa):	1289
σ_3' (kPa):	290

TM	February 9, 2012	M. SANIN	April 15, 2012
TESTED BY	DATE	CHECKED BY	DATE

PARTICLE SIZE ANALYSIS OF SOILS

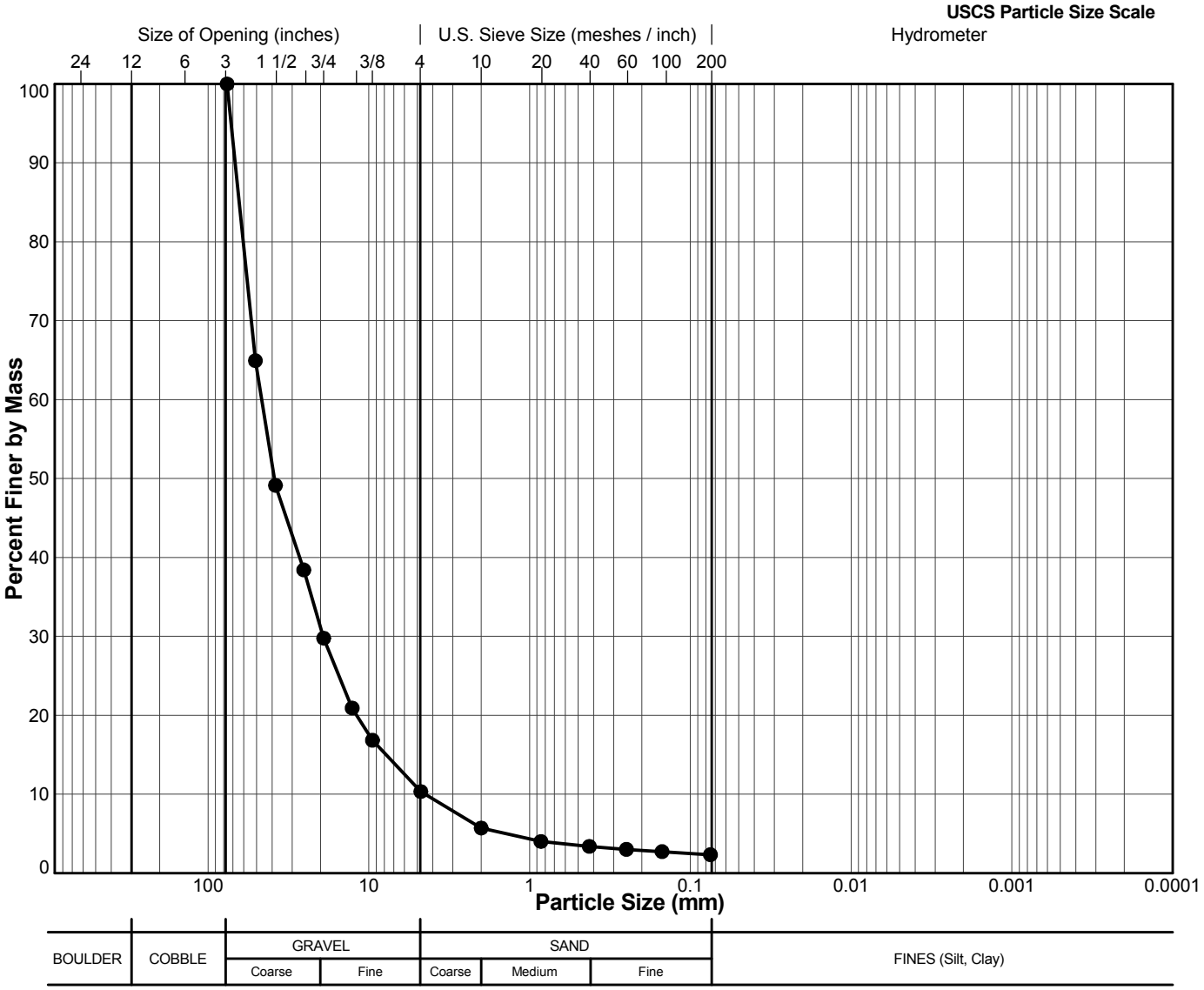
Reference(s)
ASTM D 422-63 (2007)

Client: Tetra Tech	**ID: Section 5 Weathered Rock**
Project: Aggregate Testing	**Sample No.: N/A**
Location: Eagle Gold, Yukon	**Depth Interval (m):** N/A
Project No.: 11-1415-0013 **Phase:** 1000	**Lab Schedule No.:** 211

Other Remarks: **N/A**

Specific Gravity (assumed):	**Shape:**
Max. Particle Size Passing (mm): 76.2	

Method: Split, Washed



SK	**12/15/2011**	**LP**	**12/21/2011**
Tech	Date	Checked	Date

File:N:\BUR-GRAPHICS\PROJECTS\2011\1416\11-1415-0013\11-1415-0013 PHASE 1000\11-1415-0013 PHASE 1000.GPJ Output Form: _LAB_PARTICLE SIZE (SINGLE) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB ebarnes 09/13/12

Golder Associates Ltd.
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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

Golder Associates Ltd. - Burnaby Laboratory
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C8

POINT LOAD STRENGTH INDEX TEST

Reference
ASTM D5731 - 08

Project No	11-1415-0013/1000	Sch. #	211
Client	Tetra Tech	Machine ID	BUR010024
Project	Aggregate Testing		
Location	Eagle Gold, Yukon		

Lump Test

Test #	Borehole No.	Sa#	Depth m	D mm	W mm	Guage Reading kN	Load P MN	$D_e^2 = D^2$ mm^2	$I_s = P/D_e^2$ MPa	$F = (D_e/50)^{0.45}$	$I_{s(50)}$ MPa	Type	Direction	Remarks
1	**Section 5**	**1**	**Combined**	30.00	52.40	2.053	0.00205	900.0	2.28	0.795	**1.81**	**L**	p	
2	**Section 5**	**2**	**Combined**	38.32	71.01	21.987	0.02199	1468.4	14.97	0.887	**13.28**	**L**	p	Sample was very strong - hard to cut into block shape
3	**Section 5**	**3**	**Combined**	31.19	51.98	4.253	0.00425	972.8	4.37	0.809	**3.54**	**L**	p	
4	**Section 5**	**4**	**Combined**	30.99	58.98	5.113	0.00511	960.4	5.32	0.806	**4.29**	**L**	p	
5	**Section 5**	**5**	**Combined**	39.69	59.61	5.130	0.00513	1575.3	3.26	0.901	**2.94**	**L**	p	
6	**Section 5**	**6**	**Combined**	32.81	48.90	2.289	0.00229	1076.5	2.13	0.827	**1.76**	**L**	p	
7	**Section 5**	**7**	**Combined**	32.62	69.34	1.428	0.00143	1064.1	1.34	0.825	**1.11**	**L**	p	
8	**Section 5**	**8**	**Combined**	48.39	61.74	1.48	0.00148	2341.4	0.63	0.985	**0.62**	**L**	\\	
9	**Section 5**	**9**	**Combined**	33.27	56.93	2.63	0.00263	1106.9	2.38	0.833	**1.98**	**L**	p	
10	**Section 5**	**10**	**Combined**	32.11	62.75	3.83	0.00383	1031.1	3.71	0.819	**3.04**	**L**	p	
11	**Section 5**	**11**	**Combined**	27.85	81.18	4.97	0.00497	775.6	6.41	0.768	**4.92**	**L**	\\	

$I_{s(50)}$ = Size Corrected Point Load Strength
$I_{s(50)} = FI_s$

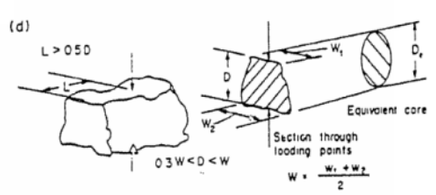
I_s = Uncorrected Point Load Strength
$I_s = P/D_e^2$

F = Size Correction Factor
$F = (D_e/50)^{0.45}$

D_e = equivalent core diameter (mm)
$D_e^2 = D^2$ (mm^2)

Direction
\\ = parallel
p = perpendicular to planes of weakness

Lump Test



G. Patton	1/5/2012	LP	January 17,2012
Tested By	Date	Checked By	Date

Golder Associates Ltd. - Burnaby Lab
4280 Still Creek Drive
Burnaby, B.C. Canada V5C 6C6

Slake Durability of Shales and Similar Weak Rocks

Reference
ASTM D4644-08

Project No.:	11-1415-0013/1000	**Borehole:**	**Weathered Rock**
Project:	Aggregate Testing	**Sample Number:**	N/A
Location:	Eagle Gold, Yukon	**Depth (m):**	N/A
Client:	Tetra Tech	**Lab ID No:**	211

Test Results

I_{d1} = Slake Durability index after 1st Cycle	97.6	%
I_{d2} = Slake Durability index after 2nd Cycle	95.6	%
I_{d3} = Slake Durability index after 3rd Cycle	94.1	%

Initial Sample Description	Final Description of Fragments in Drum
10 irregular lumps of weathered rock	I_{d1} Type II - Retained pieces consists of large and small pieces
	I_{d2} Type II - Retained pieces consists of large and small pieces
	I_{d3} Type II - Retained pieces consists of large and small pieces

Temperature ° C		Calibration	
Max	**22.2**	Machine ID	BUR010002
Min	**18.1**	Drum ID	A
Average	**20.1**	Thermometer ID	FB61328

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE

AFTER

G. Patton	December 19, 2011	LP	December 23,2011
TESTED BY	DATE	CHECKED BY	DATE

APPENDIX C – SITE SEISMIC HAZARD ANALYSIS

TETRA TECH

350 Indiana Street, Suite 500
Golden, CO 80401
Tel (303) 217-5700 **Fax** (303) 217-5705
www.tetratech.com

Technical Memorandum

To:	File	**From:**	Diana Cook, Dave Hallman
Company:	Victoria Gold Corp.	**Date:**	November 8, 2012
Re:	Dublin Gulch – Seismic Peak Ground Accelerations for Design	**Project #:**	114-201068x
CC:	Troy Meyer		

EXECUTIVE SUMMARY

This document provides a summary of the seismic hazard analysis performed for Victoria Gold Corporation's Dublin Gulch property. This seismic hazard analysis includes results from both deterministic and probabilistic methods. Deterministic analyses were performed using five equally weighted attenuation relationships to evaluate seismic hazard for the Dublin Gulch Property resulting from a maximum credible earthquake (MCE). An MCE, by definition, has no specific recurrence interval and is the largest reasonably conceivable earthquake that appears possible along a recognized fault or within a geographically defined tectonic province, under the presently known or presumed tectonic framework. Theoretically, no earthquake should occur which exceeds that of the MCE. A deterministic analysis therefore allows for a conservative approach to the determination of risks associated with identified seismic hazards. Data published by Natural Resources Canada (NRCAN) were used in the probabilistic analysis to estimate the probability of exceedance of peak ground accelerations (PGA) at the site for several return periods.

Tetra Tech recommends a design PGA of 0.35g for facilities requiring low-probability or MCE ground motions. This level of ground motion was estimated for an MCE of moment magnitude 6.0 for the background source area assuming this event occurs directly beneath the site at a depth of 6 km. For facilities requiring a PGA based on a return period of 2,475 years or less, the National Building Code of Canada (NBCC) values from Table 3 may be used. At present there is an insufficient level of understanding of the seismicity of the region to derive reliable estimates of ground motion levels for lower probability, longer return period events.

1.0 Introduction

This document provides a summary of a seismic hazard analysis for the Eagle Gold Project at Dublin Gulch, located approximately 85 km by road north of Mayo, and 20km northwest of Elsa in the Yukon Territory of Canada. For the purposes of this seismic hazard study, the site is assumed to be centered at 64.0^0 N Latitude and 135.9^0 W Longitude. Access to the site is by way of Silver Trail

Highway from Mayo, and South McQuesten River Road, which connects to the highway approximately 39 km northeast of Mayo. The purpose of this document is to provide ground motions that may be used in design procedures for facilities on the mine site. This updated seismic hazard analysis includes results from both deterministic and probabilistic analyses.

2.0 Tectonic Setting and Seismicity

Regionally, the site is contained within the northern Canadian Cordillera, which encompasses an area stretching between approximately Latitudes 55 to 70 N, and Longitudes 110 to 150 W (Figure 1). More specifically, the site is located in the Selwyn Basin and lies within the Tombstone Thrust and Robert Service Thrust fault zones (Figure 2), where more than 100 km of structural overlap was accommodated during the Cretaceous (Mair et al., 2006). Much of the mineralization present in the Selwyn Basin is due to collision-related deformation of the Yukon Tanana terrane onto the ancient continental margin before 100 million years ago (Ma), followed by the intrusion of granitic magma around 93 Ma. This new assembly experienced lateral displacement along the Tintina fault (located south of the site) during the Late Cretaceous (post-85 Ma). During recent geologic history, however, the Dublin Gulch area has generally been categorized as an area of low seismicity (Colpron, 2011), compared to other areas in Yukon Territory. These more seismically active areas include, but are not limited to, the Wernecke and Mackenzie Mountains to the east-northeast, the Ogilvie Mountains to the west-northwest, the Richardson Mountains to the north, and the Denali Fault zone to the southwest.

According to Natural Resources Canada (NRCAN), the northern Rocky Mountains region, which runs along the border of the Yukon and Northwestern Territory before extending westward, is one of the most seismically active areas in Canada. Earthquakes along the mountain front north and east of the Ogilvie, Wernecke, and Mackenzie Mountains, on the opposite side of these ranges from the Dublin Gulch site, are related to the northeastward push by the Yakutat microplate against the St. Elias Mountains in the south. Earthquakes are not nearly as common along the southern boundary of these ranges, closer to the site.

The largest earthquake recorded in the northern Rocky Mountains area was the magnitude 6.9 Nahanni earthquake that occurred on December 23, 1985 in the Mackenzie Mountains of the Northwest Territories, at a distance of approximately 622 km east of the site, according to available records. Other 6-plus magnitude earthquakes have occurred in the Richardson Mountains of the Yukon Territory and include: M=6.2 in May, 1940; M=6.5 in June, 1940, and M=6.6 in March, 1955.

3.0 Seismic Hazard Analysis

Seismic hazard analyses are typically conducted using one of two readily available methods: (1) deterministic analysis or (2) probabilistic analysis. Evaluating potential ground motions from an assumed earthquake, such as the maximum credible earthquake (MCE), along a known fault or seismogenic source zone, is a deterministic method. By definition, the MCE is the largest reasonably conceivable earthquake that can occur in conjunction with a seismic source given the current known tectonics of the region and has no specific return period or probability of occurrence. Evaluating ground motions from an MCE therefore requires a deterministic approach.

Probabilistic analyses are commonly used where the earthquakes occur in conjunction with known structures with known activity rates and in areas of diffuse historic seismicity where large regions of similar historic seismicity can be assigned characteristic ground motions based on the rate of historic earthquakes. This type of analysis results in probabilities of occurrence or non-exceedance versus time or return period. Both approaches were used in this study.

3.1 Deterministic Analysis

There are four key elements to performing deterministic seismic hazard analyses (DSHA) for use in project design, namely: (1) determination of seismogenic structures or seismogenic source zones; (2) definition of the associated characteristic earthquake magnitudes; (3) the distances between the project site and the seismogenic sources, and; (4) selection of an appropriate attenuation function(s) to represent the decay of earthquake ground motions with distance and estimate the ground motions at the project site. The following sections outline these key elements and discuss the assumptions and methodologies employed in determining each of these elements for the current study.

3.1.1 Earthquake Database

The deterministic seismic hazard analysis conducted for this study included a review of earthquake records from the Canadian National Earthquake Database (NEDB). A search of the NEDB was performed for a 150 km radius around a central Latitude and Longitude of 64.0^0 N and 135.9^0 W for Dublin Gulch (Figure 2). The search was initially restricted to earthquakes with moment magnitudes of 4 or greater, as magnitudes below this will have little impact on engineering works. Due to the historic, and even current, paucity of seismograph stations in the region, the database only includes earthquakes that have occurred since 1985.

The results of the earthquake search included local magnitude (M_L), short-wave body magnitude (m_b), and moment magnitude (M_w). These magnitude measurement scales are essentially equal for moment magnitudes of 6 or less (Idriss, 1985). They were therefore not converted to reflect the same magnitude scale. The search yielded 20 shallow earthquakes (18 km depth or less) that occurred within a 150 km radius, 17 between magnitudes 4 and 4.9, and three between magnitude 5 and 5.1. The two largest earthquakes in the 150 km record were located east and northeast of the site, at distances of 89 km and 148 km, respectively. These earthquakes were both magnitude 5.1, and occurred on November 25, 1997 and September 24, 2005 in the region of the Mackenzie Mountains.

3.1.2 Seismogenic Source Zones

Assessment of seismic hazards for the Eagle Gold site requires consideration of potential earthquake source zones, either identifiable seismogenic faults or larger areas with common seismogenic characteristics. Once source zones have been identified, maximum earthquakes can be assigned for each source zone. In the following sections, potential fault sources and source zones are identified. Considering that ground motions resulting from earthquakes with source-to-site distances greater than about 150 km are relatively small, the study area for the hazard assessment was restricted to those sources lying within 150 km of the project site.

Typically deterministic studies are restricted to assessing faults or source zones (large areas with common seismogenic characteristics) that have shown to or are suspected of having displaced Quaternary-age (less than approximately 1.8 million years) deposits, and are therefore generally considered "active." A site-specific search was conducted to identify all known faults near Dublin Gulch, using Geographic Information System (GIS) shapefiles provided through the Yukon Geological Survey. The search resulted in 3,145 individual fault listings within 150 km of the site. The majority of these faults do not appear to have been studied in detail, and few details are available concerning type, orientation, total length, or age. However, many of the individual fault segments are part of larger fault systems, which have been studied. Assuming that major faults capable of producing a significant earthquake would have been studied to some degree, the catalog of faults (Table 1) was restricted to named faults in the area, most of which can be tracked in a literature search. The faults listed in Table 1 are also included labeled in Figure 2. Table 1 includes the length of the longest individual fault segments and the closest distance to the site for each fault segment. However, there are no known faults in the Yukon Geologic Survey data base that exhibit Quaternary displacement within the study area. Maurice Colpron of the Yukon Geological Survey has also indicated that the Dublin Gulch area is not known to contain Quaternary-age faults (Personal Communication, 2011).

Table 1: Named Faults Near Dublin Gulch

FAULT ID	FAULT TYPE	FAULT NAME	LENGTH (km)	NEAREST DISTANCE TO SITE (km)
10666	Fault, defined, thrust, upright	CALLISON LAKE NORMAL FAULT	8.2	72.1
7568	Fault, defined, thrust, upright	CALLISON LAKE THRUST FAULT	26.4	62.6
7997	Fault, assumed, thrust, upright	DAWSON THRUST	216.5	44.2
7997	Fault, assumed, thrust, upright	DAWSON THRUST	126.5	114.3
8287	Fault, defined, normal/reverse	FOREST FAULT	15.0	109.5
13066	Fault, assumed, movement undefined	JOSEPHINE CREEK FAULT	10.1	53.7
11592	Fault, assumed, movement undefined	KATHLEEN LAKES FAULT	27.4	73.7
7792	Fault, defined, thrust, upright	LOWER LAKE CREEK THRUST	40.1	66.7
11707	Fault, assumed, thrust, upright	MOOSE LAKE THRUST	80.9	89.3
7542	Fault, defined, thrust, upright	NORTH FORK THRUST FAULT	68.3	123.2
11171	Fault, defined, thrust, upright	ROBERT SERVICE THRUST	398.2	15.2
13559	Fault, assumed, movement undefined	SIDESLIP LAKE FAULT	43.8	95.4
13665	Fault, approximate, normal/reverse	SPRAGUE CREEK FAULT	11.0	34.7
17536	Fault, assumed, movement undefined	TINTINA FAULT	820.2	82.5
13679	Fault, approximate, thrust, upright	TOMBSTONE STRAIN ZONE UPPER BOUNDARY	79.1	6.8
7604	Fault, assumed, thrust, upright	TOMBSTONE THRUST	113.8	16.1
7604	Fault, assumed, thrust, upright	TOMBSTONE THRUST	131.4	64.3
8273	Fault, defined, thrust, upright	UPPER LAKE CREEK THRUST	25	67.3
10298	Fault, assumed, thrust, upright	WERNICKE FAULT	36.8	129.4

The youngest known fault in the vicinity of the site which is large enough to generate a significant earthquake and strong ground motions appears to be the Tintina Fault, which is a major strike-slip fault that stretches from British Columbia to Alaska. This fault is estimated to have last moved during the Eocene epoch (approximately 54-36 Ma). However, Leonard, et. al. (2008) characterize the region as an area with low-level seismicity (up to M~5) and suggest that this fault no longer accommodates significant seismic deformation.

Other large historic faults in the area include the Dawson, Tombstone, and Roberts Service thrust faults, which are Cretaceous in age (approximately 141-65 Ma). Leonard et. al. (2008) suggest that seismicity in the region of these faults indicates reactivation of these structures to accommodate right-lateral transpression. Reactivation of these structures does not appear to have been substantiated through other sources, such as NRCAN. Reactivation of these structures in response to a right-lateral component of motion would also seem to require a shift in the seismotectonics of the region or the motion would be accommodated along the nearby right-lateral Tintina fault.

The remaining faults listed in Table 1 appear to be related to NE-SW collisional-deformation during the Cretaceous period. It must be emphasized that these structures were active during a very different seismogenic framework than exists in the area today, and they are therefore not included in the DSHA. While earthquakes have occurred in the area near Dublin Gulch in the recent past, they do not appear to be associated with specific geologic structures exhibiting offset or displacement at the ground surface.

A review of potential earthquake source zones in the project area, based on recent earthquake history and the existing seismogenic framework, confirms seismic activity related to movement associated with the nearby mountain ranges. Areas that show a concentration of earthquake activity (Figures 2 and 3) include the Wernecke and Ogilvie Mountains, as noted previously in Section 2.0. Similar source zones have been identified by others (e.g., Adams and Halchuk, 2003; Leonard et. al., 2008), though the interpretation of areal extents tends to differ. For purposes of the DSHA, the distance to these two source zones was assumed to approximately coincide with the base of the mountains at their nearest point to the site. This coincides with the edge of the Dawson Fault (Figure 3) for the Wernecke Mountains, and, for the Ogilvie Mountains, to a location northwest of the site which was chosen based on fault boundaries and the historic earthquake record.

A typical method for assigning a MCE to site-specific area sources is to add 0.5 to 1.0 magnitude to the maximum magnitude in the earthquake history (Coppersmith, 1991; McGuire, 1993), which would result in a MCE value of approximately magnitude 6.0. However, due to the short span of the earthquake history, and considering the earthquake magnitudes on a regional scale (Section 2.0), a magnitude of 7.0 was assigned to these two source zones. This is also consistent with the range of values used by NRCAN in the development of Canada seismic hazard maps (Adams and Halchuk, 2003) and the largest of the 1985 Nahanni NWT earthquakes (M=6.9).

A background source zone was also considered in the DSHA to account for the diffuse low magnitude events recorded within the Selwyn Basin. The MCE for this background source zone was assumed to be equal to approximately 1.0 magnitude larger than the maximum magnitude event in the historic earthquake data for the basin (Coppersmith, 1991; McGuire, 1993), which equates to a magnitude 6.0 for the MCE. In addition, the PGA for the background source zone was calculated assuming the corresponding earthquake occurs directly above the site, at a depth of 6 km.

The source zones and associated MCE's adopted in this DSHA are summarized below:

- Wernecke Mountains Source Zone, M = 7.0, Epicentral Distance (D) = 50 km
- Ogilvie Mountains Source Zone, M = 7.0, D = 30 km
- Background Source Zone, M = 6.0, D = 6 km

3.1.3 Attenuation Relations

Seismic hazard analyses require an attenuation relationship to represent the decay of earthquake ground motions with distance, or a combination of weighted attenuation relationships, in order to produce estimated ground motions for use in project design. Most recently published applicable attenuation relationships are based on a database of worldwide strong motion recordings provided by the Pacific Earthquake Engineering Research (PEER) Center for their Next Generation Attenuation (NGA) project. In general, these world-wide strong ground motion prediction equations (GMPE) are considered applicable to western North America and other tectonically active regions that experience shallow crustal faulting (Campbell and Bozorgnia, 2007). As noted by Adams and Halchuk (2003), "eastern and western Canada must be treated slightly differently because of the different properties of the crust." GMPE for western strong ground motions were therefore used by Adams and Halchuk (2003) for the 2005 NRCAN seismic hazard mapping project, and Adams (2011) states that the new generation of NBCC maps will "certainly include GMPEs derived by the NGA project for western North American crustal earthquakes." In addition, since alternate GMPE will provide a range in predicted ground motions, and include various levels of uncertainty in and of themselves, choosing just one will create bias in the predicted ground motions. An equally weighted average of the GMPE encompassed by the NGA project was therefore used to estimate anticipated ground motions at the Dublin Gulch Property, given its location within the North American Cordillera.

The NGA project supported five teams in the development of new empirical ground motion models for the estimation of peak ground accelerations and 5%-damped pseudo-acceleration response spectra. Each team was given access to the same database and a set of criteria dictating the limiting parameters of the final product, but otherwise the researchers were allowed to make their own interpretations. The five NGA model development teams included Abrahamson and Silva (2008); Boore and Atkinson (2008); Campbell and Bozorgnia (2008); Chiou and Youngs (2008); and Idriss (2008). In general, the NGA models provide median and aleatory uncertainty values for peak ground acceleration (PGA), peak ground velocity (PGV), peak ground displacement (PGD), and response spectral acceleration (PSA) and displacement (SD) for oscillator periods ranging from 0.01 to 10.0 seconds. The models are valid for earthquake magnitudes ranging from 4.0 to 8.0, and distances ranging from 0 to 200 km. A Microsoft Excel spreadsheet published by Dr. Linda Al Atik in September, 2009, includes the five NGA attenuation models and allows for the calculation of averages weighted at the user's discretion. The spreadsheet is available through the PEER website (http://peer.berkeley.edu/ngawest/index.html) and, according to Dr. Atik, has been compared with success to other calculation files (Al Atik, Linda, 2010).

3.1.4 Attenuation Model Input

The NGA spreadsheet requires earthquake magnitude and specific fault parameters be input, namely geometry-related values such as: site-to-source distances, fault rupture depth, fault rupture

width, and dip of rupture plane; depths to 1.0 km/s and 2.5 km/s shear wave velocity horizons; average shear wave velocity in the upper 30 m of the foundation materials (V_{s30}); sense of fault movement (i.e., normal, reverse, strike-slip, or unspecified); and, whether the site lies on the hanging wall (hanging wall factor) or foot wall, in the case of normal or reverse faults. This last factor is meant to account for the fact that ground motions on the hanging wall are typically higher than those observed on the footwall of a fault.

According to Cassidy et al. (2005), large earthquakes that have occurred in the Mackenzie Mountains are generally shallow thrust faults that often do not have a surface expression. This is assumed to be the case for earthquakes in the Dublin Gulch region in general, based on the tectonic framework of the area and the northeasterly movement of the Yukatat microplate, though Ristau et. al. (2007) note that strike-slip mechanisms are also important in this area. All source zones were modeled assuming movement on a thrust fault dipping to the south/southwest. This is a conservative assumption, as this puts the Dublin Gulch Property on the hanging wall for the area source zones, which results in higher ground motions. In addition, a shallow dip of 30 degrees and a depth of 6 km were assumed, based on the earthquake history and the gentle to moderate dip described for historic shallow thrust faults in the area (Mair et al., 2006). Within the likely range of possible orientation and depth, these assumptions also place the sources closer to the site and result in higher ground motions.

Empirical relationships presented by Wells and Coppersmith (1994), which relate segment lengths to magnitude, and magnitude to rupture area, were used to back-calculate segment lengths, and then, based on the segment lengths, estimate rupture widths. Depths to 1.0 km/s and 2.5 km/s shear wave velocity horizons are not known, but as this is the expected case for most sites, default values of 24.5 to 35.8 m and 65 m, respectively (based on typical crustal properties) are provided by the NGA models, which were then used for the Dublin Gulch Property. The average shear wave velocity in the upper 30 m of the foundation (V_{s30}) was assumed to be 750 m/s, a typical value for the National Building Code of Canada (NBCC) “firm ground” soil class C, which includes dense soils and soft rock.

3.1.5 Notes on Deterministic Model Conservatism

Conservative assumptions for this portion of the study mainly relate to magnitude and source orientation, and the method of analysis itself (deterministic using the MCE). MCE events are the largest possible earthquake that could reasonably be associated with a seismogenic structure under the presently known or presumed tectonic framework, with no consideration given to the probability that such an event will occur. The MCE is also conservatively assumed to occur at the closest point of the source zone to the project site. Theoretically, no earthquake should occur which exceeds that of the MCE.

The value used for shear wave velocity in the upper 30 m of the foundation was based on a regional average used in the NBCC. Considering the shallow depth to bedrock at the site, the actual value may well be higher, which would lead to a lower anticipated PGA. However, raising it to 1100 m/s (i.e., rock), only reduces the PGA by 0.01g to 0.03g from the PGA values reported (Table 2).

3.1.6 Deterministic Peak Ground Accelerations

A primary result of deterministic seismic hazard analysis is an estimate of peak ground acceleration (PGA) that can be expected at the site given the various geological and seismological parameters of the region. Table 2 presents a comparison of PGA estimates for the two sources expected to contribute the greatest potential ground motions within the 150 km radius of the Eagle Gold property. All PGA estimates presented in Table 2 reflect an average value derived from applying equal weights to the 2008 NGA models discussed previously.

Table 2: Deterministic Peak Ground Acceleration Estimates for Dublin Gulch

Seismic Source	Distance from Site (km)	MCE	PGA (g)
Wernecke Mountains Source Zone	50	7.0	0.15
Ogilvie Mountains Source Zone	30	7.0	0.31
Background Source Zone	6	6.0	0.35

3.2 Probabilistic Analysis

A consequence of deterministic analyses is that there is no consideration of probability or risk associated with the identified hazards. Ground motions associated with MCE are discrete values, whereas ground motions derived from probabilistic analyses, by definition, have likelihoods of occurrence associated with them. For instance, interpolation of the NRCAN 2005 National Building Code of Canada Seismic Hazard data indicates a ground motion of 0.14g at Dublin Gulch (Table 3) has a 10 percent chance of exceedance in 50 years. This equates to a risk of an earthquake occurring that exceeds 0.14g approximately every 475 years. A probabilistic analysis is included in order to assist Victoria Gold Corp. with quantification of the risks associated with seismic hazards at the Eagle Gold property.

The probabilistic analysis was conducted using the NRCAN 2005 National Building Code Seismic Hazard website (http://earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/index-eng.php) to determine the peak horizontal ground acceleration (PGA) for various return periods. The website is a tool developed by NRCAN to calculate probabilistic response spectra with different hazard levels for spectral periods up to 2.0 seconds at any location (the equivalent spectral response period for peak ground acceleration is 0.0 seconds). The on-line calculator uses an average shear wave velocity in the upper 30 meters (V_{s30}) that corresponds to NBCC 2005 soil class C (360-750 m/s). The peak ground accelerations for 10%, 5%, and 2% probabilities of exceedance in 50 years were calculated using the on-line calculator, and are shown in Table 3.

Table 3: Probabilistic Ground Motions for Dublin Gulch
NRCAN 2005 National Building Code of Canada Seismic Hazard Interpolation

Probability of Exceedance in 50 years (%)	Approximate Equivalent Return Period (yrs)	PGA (g)
10%	475	0.14
5%	975	0.18
2%	2475	0.25

4.0 Discussion

The design PGA should be chosen based on regulatory requirements and the level of tenable risk to the project. The Yukon Water Board Licensing Guidelines reference use of the MCE, but also defer to the 2007 Canadian Dam Association (CDA) guidelines for water management structures. Table 6-1 of the CDA guidelines provides a list of suggested earthquake design levels based on annual exceedance probabilities. Two points related to this table should be noted prior to its application in regards to the ground motions provided in this document.

First, though some of the CDA hazard classifications recommend the use of low-probability ground motions, (e.g., 1 in 5,000, or 1 in 10,000-yr event ground motions), PGA corresponding to events with lower probabilities, or return periods longer than the 1 in 2,475 event, are not available through NRCAN, as these low-probability values are beyond the intended purpose of the NBCC models (Personal Communication with Stephen Halchuck, 2011). While NRCAN provides some guidance for extrapolating low-probability ground motions (http://www.earthquakescanada.nrcan.gc.ca/hazard-alea/interpolat/lowprobability-eng.php) they emphasize that low-probability values extrapolated from their models can be given little credence, as the extrapolation is not constrained by the current tectonic environment, and should only be used as a screening tool to determine if a site-specific seismic hazard assessment is warranted. The site specific hazard study has shown that there is a very short earthquake history for the area. In particular, there have been very few earthquakes large enough to formulate a meaningful site-specific earthquake recurrence forecast model, which would be required to perform a site-specific probabilistic analysis that would significantly improve upon values established by NRCAN. We therefore recommend that a deterministic PGA be used for low-probability ground motions suggested by the CDA, as the 2007 CDA guidelines also specifically note that deterministic methods have “generally been very successful” and “remain essential methods of dam safety management”.

Second, the CDA guidelines recommend the use of mean (rather than median) ground motions. However, all of the values reported in this document are median values. In general, the 2007 CDA guidelines state that the ground motion values for each hazard classification should conform to societal norms of acceptable risk. Use of median values rather than mean values is considered justifiable for the purposes of the SHA for several reasons. Published GMPE typically provide median spectral accelerations rather than mean spectral accelerations; calculation of mean values generally requires coefficients which are not included in the published models. In addition, median values were chosen for the NBCC because “it is a robust parameter and can be expected to remain stable

as the range of scientific opinion changes" (Adams et. al., 2000). This was supported by the Canadian National Committee on Earthquake Engineering (CANCEE), as the mean is affected by uncertainty; uncertainty that was considered too incomplete to adopt into the code (Adams and Atkinson, 2003). In addition, Adams and Atkinson (2003) note:

"As a certain conservative bias has been included in the hazard model, particularly through the definition of upper and lower bound values, it is anticipated that the estimated median values presented here may actually lie between the true median and the true mean hazard values. Thus, as improved knowledge about epistemic uncertainty is incorporated into the analysis, a future change to using mean values may not be a large one."

5.0 Conclusions and Recommendations

This memorandum provides a summary of a seismic hazard analysis performed for Victoria Gold Corporation's Eagle Gold project, located near Dublin Gulch in the Yukon Territory, Canada. Peak ground accelerations were developed for both deterministic analyses and probabilistic analyses. A Microsoft Excel spreadsheet that applies a weighted average to five attenuation relationships developed through the PEER NGA project was used for the deterministic analyses, while data published by NRCAN was used to determine probabilistic site ground motions and their corresponding probabilities of occurrence. These results are summarized in Tables 2 and 3.

Tetra Tech recommends a design PGA of 0.35g for facilities requiring low-probability or MCE ground motions, as determined using an MCE of moment magnitude 6.0. For facilities requiring a PGA based on a return period of 2,475 years or less, the NBCC values from Table 3 should be used.

It is worth noting here that, if the Roberts Service Thrust or Tombstone Thrust faults become reactivated, the MCE PGA is likely to be larger than has been estimated in this SHA, based on the distances and fault lengths listed in Table 1. In the event that additional studies pertaining to these faults become available, and/or additional earthquake events occur, that provide new information, Tetra Tech recommends that the ground motions contained in this study be re-evaluated.

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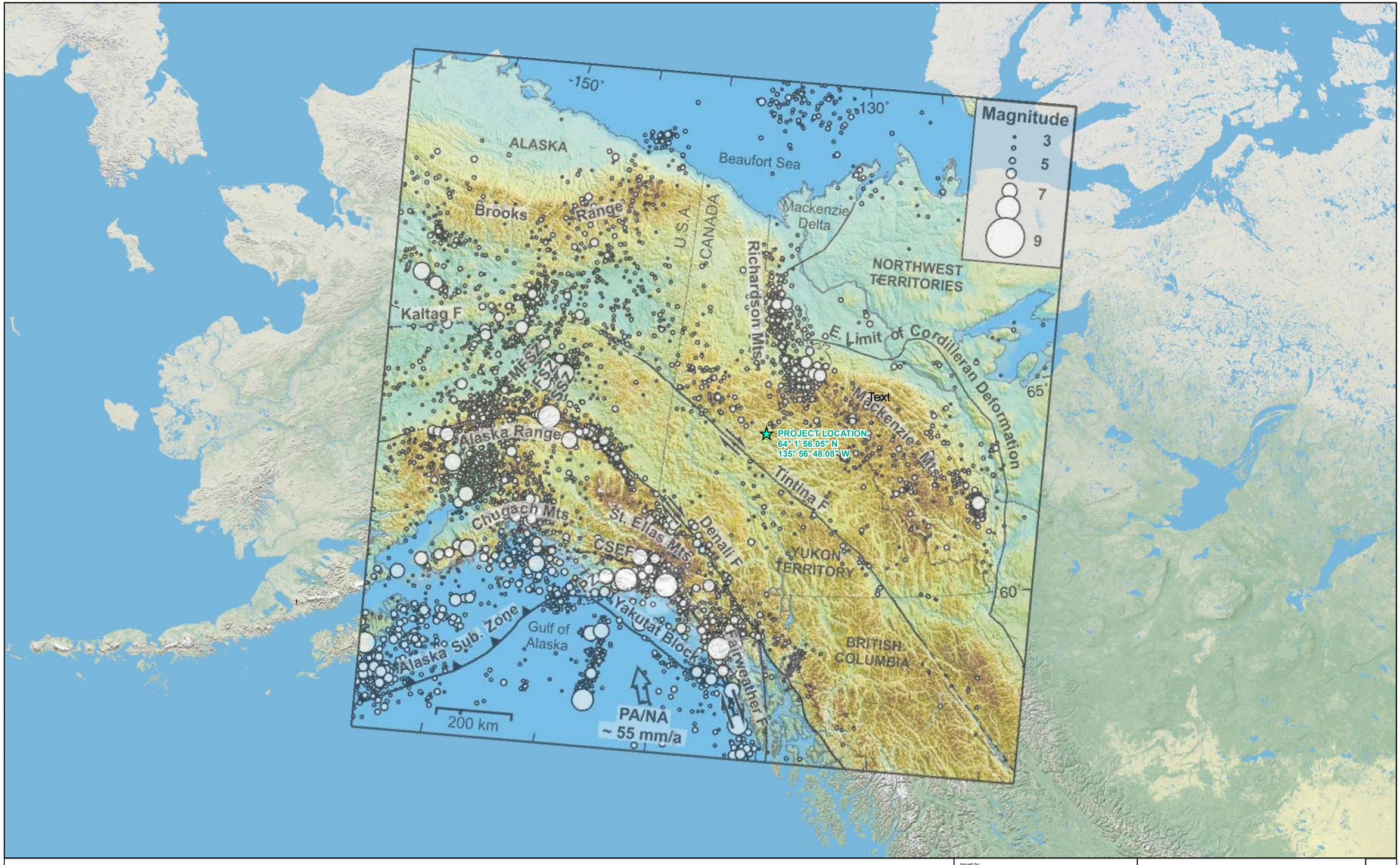

Tectonic setting of the northern Canadian Cordillera. Pacific plate motion relative to North America plate; CSEF: Chugach–St. Elias fault system; PZ: Pamplona zone; MFSZ, FSZ, and SSZ: Minto Flats, Fairbanks, and Salcha seismic zones, respectively. Insert is modified from Leonard et. al., 2008.

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TECTONIC SETTING OF THE DUBLIN GULCH PROJECT AREA

A

Project: EAGLE GOLD | Project no.: 114-201068x

Location: YUKON TERRITORY | Date: 11/2012

FIGURE 1

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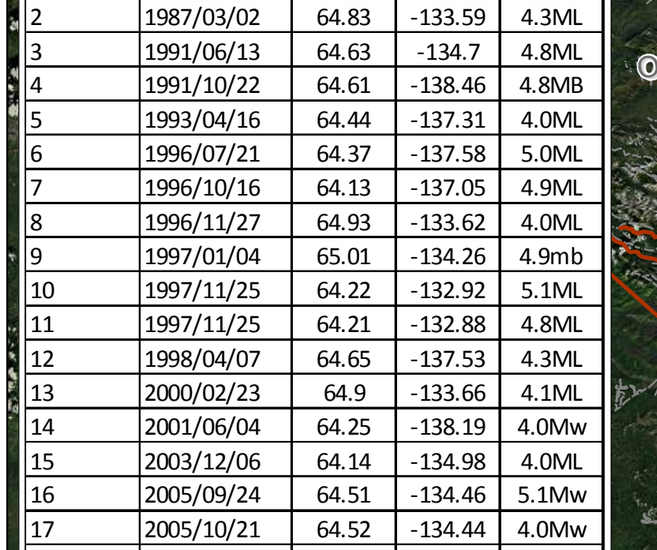
Dublin Gulch Earthquake Catalog				
Point ID	Date	Lat	Long	Mag
1	1985/08/09	64.32	-135.01	4.0ML
2	1987/03/02	64.83	-133.59	4.3ML
3	1991/06/13	64.63	-134.7	4.8ML
4	1991/10/22	64.61	-138.46	4.8MB
5	1993/04/16	64.44	-137.31	4.0ML
6	1996/07/21	64.37	-137.58	5.0ML
7	1996/10/16	64.13	-137.05	4.9ML
8	1996/11/27	64.93	-133.62	4.0ML
9	1997/01/04	65.01	-134.26	4.9mb
10	1997/11/25	64.22	-132.92	5.1ML
11	1997/11/25	64.21	-132.88	4.8ML
12	1998/04/07	64.65	-137.53	4.3ML
13	2000/02/23	64.9	-133.66	4.1ML
14	2001/06/04	64.25	-138.19	4.0Mw
15	2003/12/06	64.14	-134.98	4.0ML
16	2005/09/24	64.51	-134.46	5.1Mw
17	2005/10/21	64.52	-134.44	4.0Mw
18	2007/06/23	64.68	-134.86	4.3Mw
19	2010/08/07	65.01	-133.89	4.5Mw
20	2010/12/12	65.23	-134.93	4.0Mw



OGILVIE MOUNTAINS
MACKENZIE MOUNTAINS
WERNECKE MOUNTAINS
SELWYN BASIN
FOREST FAULT
WERNICKE FAULT
DAWSON THRUST FAULT
NORTH FORK THRUST FAULT
CALLISON LAKE THRUST FAULT
LOWER LAKE CREEK THRUST
UPPER LAKE CREEK THRUST
TOMBSTONE THRUST
ROBERT SERVICE THRUST FAULT
KATHLEEN LAKES FAULT
Tintina Fault
64° 1' 56.05" N
135° 56' 48.08" W
TOMBSTONE STRAIN ZONE UPPER BOUNDARY
SPRAGUE CREEK FAULT
Tombstone Thrust?
Moose Lake Thrust
Sideslip Lake Fault

EARTHQUAKE MAGNITUDE
4.0 - 4.9
5.0 - 5.9
Named Faults
Other Faults
Dublin Gulch Area of Interest (AOI)
AOI 150km Buffer

Source: (1) Yukon Geological Survey – http://www.geology.gov.yk.ca/databases_gis.html
(2) Earthquakes Canada Online Bulletin – http://earthquakescanada.nrcan.gc.ca/stnsdata/

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DUBLIN GULCH – FAULTS & EARTHQUAKE DATA

Project: EAGLE GOLD
Project no.: 114-201068x
Location: YUKON TERRITORY
Date: 11/2012

FIGURE 2

T:\GIS\TEMPORARY\Dublin_Gulch\mxds\DublinGulch_Seismic_Fig2.mxd November, 2012: sharon.reynolds

OGILVIE MOUNTAINS

MACKENZIE MOUNTAINS

WERNECKE MOUNTAINS

SELWYN BASIN

DAWSON THRUST FAULT

NORTH FORK THRUST FAULT

CALLISON LAKE THRUST FAULT

LOWER LAKE CREEK THRUST

TOMBSTONE THRUST

UPPER LAKE CREEK THRUST

ROBERT SERVICE THRUST FAULT

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TOMBSTONE THRUST

ROBERT SERVICE THRUST FAULT

Tintina Fault

FOREST FAULT

WERNICKE FAULT

KATHLEEN LAKES FAULT

64° 1' 56.05" N
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TOMBSTONE STRAIN ZONE UPPER BOUNDARY

ROBERT SERVICE THRUST FAULT

SPRAGUE CREEK FAULT

ROBERT SERVICE THRUST FAULT

Tombstone Thrust?

Tintina Fault

Moose Lake Thrust

Sideslip Lake Fault

ALASKA

YUKON TERRITORY

EARTHQUAKE MAGNITUDE[2]

- 5.0–5.9
- 4.0–4.9
- 3.0–3.9
- 2.0–2.9
- 1.0–1.9

Dublin Gulch
Area of Interest (AOI)

Area Source Zones

Ogilve Mountains Source

Wernecke Mountains Source

Named Faults

Other Faults

AOI 150km Buffer

Source: (1) Yukon Geological Survey – http://www.geology.gov.yk.ca/databases_gis.html
(2) Earthquakes Canada Online Bulletin – http://earthquakescanada.nrcan.gc.ca/stnsdata/

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DUBLIN GULCH AREA SOURCES AND EARTHQUAKE DATA

A

Project: EAGLE GOLD

Project no.: 114-201068x

Location: YUKON TERRITORY

Date: 11/2012

FIGURE 3

APPENDIX D – SPILLWAY DESIGN, DAM BREACH ANALYSES AND INUNDATION MAPING REPORT

Spillway Design, Dam Breach Analyses, and Inundation Mapping Report

Eagle Gold Heap Leach Facility

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Tetra Tech Project No. 114-201087

February 15, 2013

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Appendix E HEC-RAS Results
Appendix F Dam Breach Inundation Map

1.0 INTRODUCTION

StrataGold Corp. retained Tetra Tech to develop the final design of the Dublin Gulch diversion channel (DGDC) and the Heap Leach Facility (HLF) for the Eagle Gold project. As part of the final design, Tetra Tech analyzed the hazard classification of the embankment dam and determined the design flood for designing the auxiliary spillway on the HLF for the Eagle Gold project. As part of the final design, Tetra Tech analyzed the hazard classification of the embankment dam and determined the design flood required to design the auxiliary spillway on the HLF.

1.1 Site Location

The Eagle Gold project site is located about 20 miles northwest of Keno Hill in Yukon Territory, Canada. It is located in the vicinity of Dublin Gulch, Eagle Creek, and Haggart Creek. The project vicinity map is shown in Figure 1. The project area is located within the drainage basins of Dublin Gulch, Eagle Creek, and Haggart Creek above the Lynx Creek confluence. The drainage basins have steep terrain with a mean gradient of 18 percent and well-vegetated slopes. Dublin Gulch, Eagle Creek, and Haggart Creek are perennial streams (Knight Piesold, 2012). Several of the tributaries of these creeks/gulches are intermittent streams, which are streams that become dry at sections along the water course where flow is subsurface, or ephemeral streams, which are streams that have little to no groundwater storage and flow is in response to snowmelt or heavy rains.

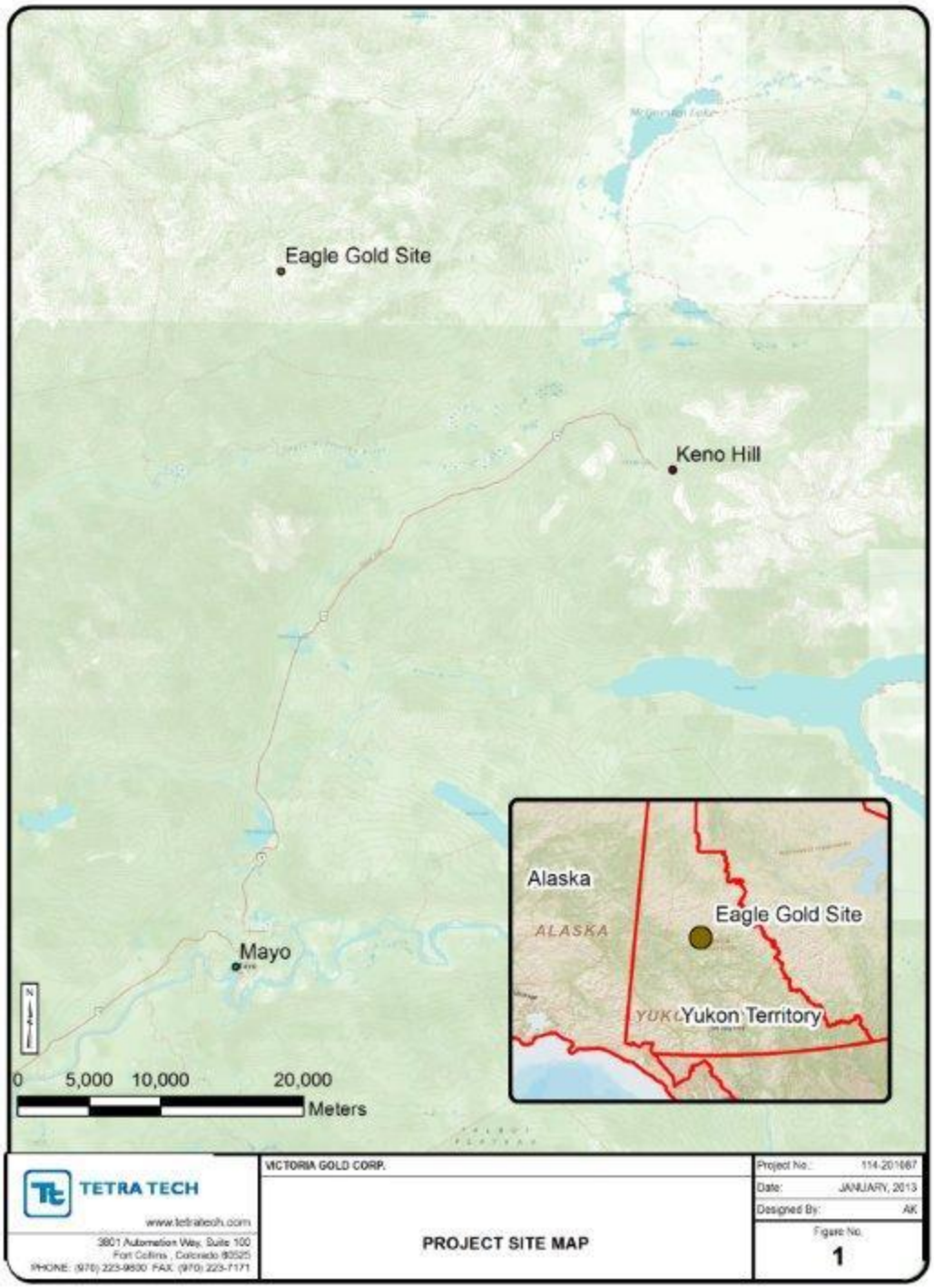

Figure 1. Project Site Map

2.0 DESIGN CRITERIA

Canadian Dam Association (CDA) provides recommendations for dam classifications in Canada based on risk, and the dam classifications are shown in Table 1, below.

Table 1. Dam Classification (CDA, 2007)

Dam class	Population at risk [note 1]	Incremental losses		
		Loss of life [note 2]	Environmental and cultural values	Infrastructure and economics
Low	None	0	Minimal short-term loss No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss of marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of *important* fish or wildlife habitat Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very high	Permanent	100 or fewer	Significant loss or deterioration of *critical* fish or wildlife habitat Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	Major loss of *critical* fish or wildlife habitat Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances)

Note 1. Definitions for population at risk:

None—There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

Temporary—People are only temporarily in the dam-breach inundation zone (e.g., seasonal cottage use, passing through on transportation routes, participating in recreational activities).

Permanent—The population at risk is ordinarily located in the dam-breach inundation zone (e.g., as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

Note 2. Implications for loss of life:

Unspecified—The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example, might not be higher if the temporary population is not likely to be present during the flood season.

The recommended design floods for sizing the spillways for dams of various classifications are shown in Table 2. Flood inundation analysis is performed to estimate the loss in the event of a dam breach, and the hazard classification is determined based on the loss.

Table 2. Spillway Design Criteria for Dams Based on Hazard Classification (CDA, 2007)

Dam class [note 1]	AEP	
	IDF [note 2]	EDGM [note 3]
Low	1/100	1/500
Significant	Between 1/100 and 1/1000 [note 4]	1/1000
High	1/3 between 1/1000 and PMF [note 5]	1/2500 [note 6]
Very high	2/3 between 1/1000 and PMF [note 5]	1/5000 [note 6]
Extreme	PMF [note 5]	1/10,000

Acronyms: AEP, annual exceedance probability; EDGM, earthquake design ground motion; IDF, inflow design flood; PMF, probable maximum flood.

Note 1. As defined in Table 2-1, Dam Classification.

Note 2. Extrapolation of flood statistics beyond 1/1000 year flood (10^{-3} AEP) is discouraged.

Note 3. AEP levels for EDGM are to be used for mean rather than median estimates of the hazard.

Note 4. Selected on the basis of incremental flood analysis, exposure, and consequences of failure.

Note 5. PMF has no associated AEP. The flood defined as "1/3 between 1/1000 year and PMF" or "2/3 between 1/1000 year and PMF" has no defined AEP.

Note 6. The EDGM value must be justified to demonstrate conformance to societal norms of acceptable risk. Justification can be provided with the help of failure modes analysis focused on the particular modes that can contribute to failure initiated by a seismic event. If the justification cannot be provided, the EDGM should be 1/10,000.

3.0 PREVIOUS STUDIES

Hallem Knight Piesold performed previous hydrologic analyses in 1996 for the feasibility study of the proposed HLF. In 2012, Knight Piesold revised the hydrologic analysis for the feasibility design of the HLF. These hydrologic studies are listed below.

- Hallem Knight Piesold. 1996. Report of Feasibility of the Heap Leach Pad and Associated Structures, Dublin Gulch Project. First Dynasty Mines.

- Tetra Tech. 2012. HLF Feasibility Design, Eagle Gold Project. Tetra Tech.

4.0 TOPOGRAPHIC DATA

A LiDAR survey and aerial photography were performed in the project area. The horizontal projection of the survey was in Universal Transverse Mercator (UTM) Zone 8N projection. Topographic information from the LiDAR survey area complemented with 10-meter digital elevation model (DEM) from the National Elevation Database available at http://www.geobase.ca/geobase/en/data/cded/index.html was used to develop a topographic map for the floodplain mapping.

Information regarding elevation of the embankment crest, elevation of the spillway, and elevation-storage data for the heap confining embankment were obtained from the heap leap design team in January 2013.

Information regarding elevation of the embankment crest, elevation of the spillway, and dimensions of the spillway were obtained from the heap leap design team in January 2013. The elevation-storage data for the in-heap pond upstream of the heap confining embankment were obtained from the design drawings prepared by Tetra Tech in December 2013.

5.0 HYDROLOGIC MODELING

5.1 Assumptions and Limitations

Hydrologic modeling was performed using Hydrologic Engineering Center — Hydrologic Modeling System (HEC-HMS) (U.S. Army Corp of Engineers [USACE], 2010). HEC-HMS simulates runoff from rainfall events only and does not include runoff from snowmelt. The project site is located near the Arctic Circle in the Yukon Territory. The winters are long and precipitations during winter are mostly snow. In many regions in Canada, in modest sized streams, the maximum flows occur at times other than the maximum annual rainfall (Environment Canada, 1985). Snowmelt in conjunction with heavy rain on frozen ground produces maximum runoff.

However, historic records show that most of the rainfall is limited to June through August. Most of the snowmelt occurs in April and May. In June through August, when the large rainfall events occur, most of snow is melted. A baseflow of 0.2 cubic meters per second (m^3/s) from every sub-basin is assumed to account for the groundwater.

5.2 Precipitation

Tetra Tech obtained rainfall depths from a technical memorandum prepared by Knight Piesold in December 2012 (Knight Piesold, 2012), which is provided in Appendix A. The memorandum summarizes the precipitation depths for various return intervals. The precipitation depths were determined using the "Rainfall Frequency Atlas for Canada" (Environment Canada, 1985). For the design of the spillway on the heap confining embankment, rainfall depths were calculated for 1,000-year and Probable Maximum Precipitation (PMP) events.

The rainfall depths were obtained from the Rainfall Frequency Atlas for Canada (Environment Canada, 1985), and were multiplied by a factor of 1.5 to account for the orographic pattern of precipitation. The factored rainfall depths are shown in **Error! Reference source not found.**Table 3.

Table 3. Rainfall Depths for 1,000-Year and PMP (in millimeters [mm])

Duration	1,000-year	PMP
5 min	12.9	39.2
10 min	15.3	44.2
15 min	19.4	58.9
30 min	19.8	55.4
1 hour	28.3	81.0
2 hour	29.9	82.6
6 hour	44.6	123.6
12 hour	78.1	206.4
24 hour	93.7	255.6

The PMP rainfall depth was calculated using Hershield's equation (1977) and was calculated to be 255.6 mm for a 24-hour storm event. Two studies, "Analysis of Probable Maximum

Precipitation for Faro Mine Site, Yukon Territory" and "Probable Maximum Precipitation for Wareham Dam, Mayo, Yukon Territory," which were performed to determine PMP events at separate project locations in Yukon Territory, were reviewed to verify that the PMP rainfall depths calculated for the Eagle Gold project site is appropriate. After reviewing these two studies, we determined that the PMP estimate of 255.6 mm is conservative compared to the other studies in the region.

Rainfall distribution in the project area was not available. For HEC-HMS modeling, the frequency storm method was used for rainfall distribution. Data to generate the frequency storm were obtained from the "Rainfall Frequency Atlas for Canada" (Environment Canada, 1985).

5.3 Watershed Delineation

LiDAR survey for the project site was provided by M3 Engineering and Technology. The areal coverage of the LiDAR was not sufficient to delineate the watershed for Dublin Gulch and other subsidiary gulches. Topographical data available from Esri was used to supplement the LiDAR data, and the watersheds were delineated using the Ersi supplemented topography. The watershed delineation map is shown as Figure 2.

The watershed for HLF was the one representing the HLF to be constructed at the end of phase 3. The watershed of the HLF is 1.15 square kilometers (sq.km).

The time of concentration was calculated using Figure 1 in the Manual of Operational Hydrology in British Columbia, which is provided in Appendix B. This graphical method, used for calculating time of concentration, takes into consideration the area and the terrain of the watershed. The watershed areas and the time of concentration for various sub-basins are shown in Table 4.

The Soil Conservation Service (SCS) unit hydrograph method was used to transform rainfall to runoff. Considering the limited availability of data, complexity due to snow cover at site, and the scope of the study, a site-specific hydrograph was not developed, and instead, a SCS unit hydrograph method was used. The lag time was calculated as 0.6 times the time of concentration.

Table 4. Sub-basin Area and Other Hydrologic Characteristics

Sub-Basin Name	Area (km^2)	Time of Concentration (minutes)
Area 1	0.17	32
Dublin Gulch	3.27	120
Eagle Pup	1.39	79
Heap Leach Facility	1.15	75
North Dublin Gulch	0.65	57
Olive Gulch	2.80	108
Stewart Gulch	1.67	87
Suttle Gulch	0.88	62

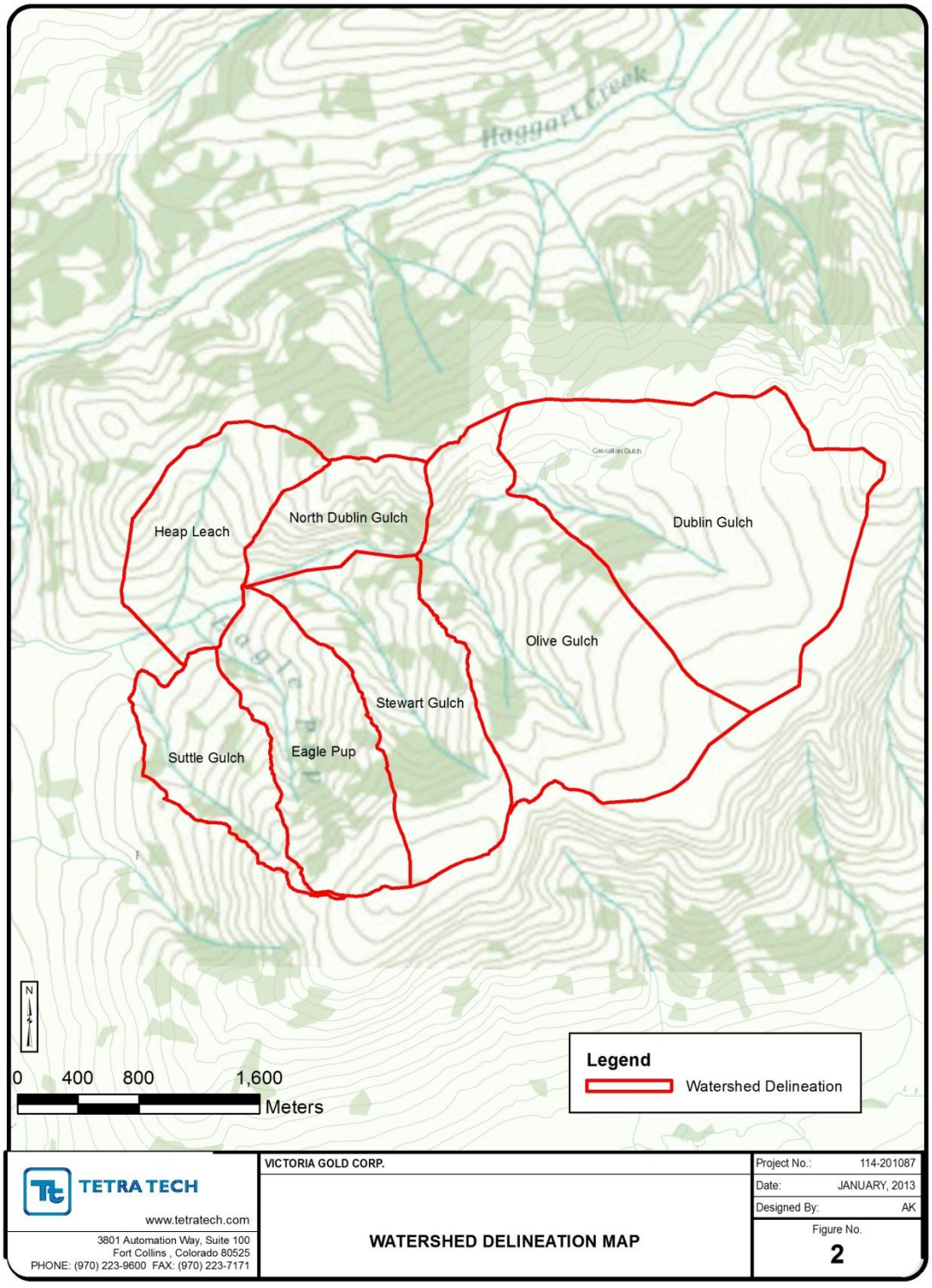

Figure 2. Watershed Delineation Map

5.4 Infiltration

The watershed is covered by permafrost in the winter, and infiltration during winter is less than during the summer. As the permafrost melts in the summer, infiltration increases. In addition, more rainfall gets intercepted in the foliage during summer compared to winter.

The soils map for the project area was obtained from Agriculture and Agri-Food Canada's mapping framework (Agriculture, 2013). The map shows that the soils in the project area are Turbic Cryosolic order soils, which are classified as "imperfectly drained". Soils classification define imperfectly drained soils as soils in which water is removed from the soil sufficiently slowly in relation to supply, which keeps the soil wet for a significant part of the growing season. If precipitation is the major supply, excess water moves slowly downward. These soils have permafrost within one meter of the surface. The layer above the permafrost undergoes seasonal thawing and freezing, becoming a saturated semifluid material in the spring. This description of soil type is equivalent to soil type D per the Natural Resources Conservation Service [NRCS] soil classification.

Field photographs, which were taken during the summer, indicated that the watershed is well vegetated. Technical Memorandum Number 55 (TR-55) was used to determine the curve number. A curve number of 77 for Antecedent Moisture Condition (AMC) II, which represents average moisture conditions, was selected for all drainage basins. This curve number represents the undisturbed watershed conditions. Based on TR-55, a curve number of 77 is representative of woods that have good soil cover. Woods with good soil cover are defined as woods that are protected from grazing, and litter and brush adequately cover the soil. A relevant excerpt from TR-55 is included in Appendix C.

5.5 Heap Confining Embankment

The heap confining embankment is a proposed earthen embankment. The proposed design plans show that the upstream and the downstream slopes of the embankment are 2.5H:1V each. The width of the embankment crest is 11 meters, and the elevation of the existing natural ground at the embankment is 840 meters. The crest of the proposed embankment is 885 meters. Therefore, the height of the embankment is approximately 45 meters.

The elevation-storage relationship for the heap confining embankment was obtained from the design final design drawings, and is presented below in Table 5. In the HLF, the amount of the void space that is available to capture surface water was assumed to be 13.71 percent of the gross volume of the HLF.

When the mine is in full operation, the HLF will be filled with crushed ore. Water will be captured upstream of the heap confining embankment in the initial years after construction of the embankment until the ore is mined from the pit. Crushed ore will gradually be deposited in the HLF. As mining progresses, the crushed ore will completely fill the space upstream of the embankment. Cyanide leaching solution will be applied to the ore, and water from snowmelt and rainfall will be stored in the pore spaces of the crushed ore. This water and solution area is referred to as the in-heap pond.

Table 5. Elevation Storage Data for Heap Leach Facility

Elevation (m)	Gage Height (m)	Area (m^2)	Storage Capacity (m^3)	Capacity in Voids (m^3)	Comment
840			0	0	
841	1	1,345	672	92	
842	2	3,012	2,851	391	
843	3	4,971	6,842	938	
844	4	7,214	12,934	1,773	
845	5	9,728	21,405	2,935	
846	6	12,425	32,481	4,453	
847	7	15,537	46,462	6,370	
848	8	19,063	63,761	8,742	
849	9	23,002	84,793	11,625	
850	10	27,354	109,971	15,077	
851	11	30,303	138,800	19,030	
852	12	33,873	170,889	23,429	
853	13	38,064	206,857	28,360	
854	14	42,875	247,327	33,909	
855	15	48,305	292,917	40,159	
856	16	51,278	342,709	46,985	
857	17	54,424	395,560	54,231	
858	18	57,745	451,644	61,920	
859	19	61,239	511,137	70,077	
860	20	64,908	574,211	78,724	
861	21	68,132	640,731	87,844	
862	22	71,533	710,563	97,418	
863	23	75,111	783,885	107,471	
864	24	78,866	860,874	118,026	
865	25	82,799	941,706	129,108	
866	26	86,337	1,026,274	140,702	
867	27	90,046	1,114,466	152,793	
868	28	93,928	1,206,452	165,405	
869	29	97,983	1,302,408	178,560	
870	30	102,210	1,402,504	192,283	
871	31	106,547	1,506,883	206,594	
872	32	111,030	1,615,672	221,509	
873	33	115,659	1,729,016	237,048	
874	34	120,436	1,847,064	253,232	
875	35	125,366	1,969,965	270,082	
876	36	130,139	2,097,717	287,597	
877	37	135,046	2,230,310	305,776	
878	38	140,086	2,367,876	324,636	
879	39	140,086	2,507,962	343,842	
880	40	150,575	2,653,293	363,766	
881	41	155,712	2,806,436	384,762	
882	42	160,931	2,964,758	406,468	
883	43	166,224	3,128,335	428,895	Spillway elevation
884	44	170,560	3,296,728	451,981	
885	45	175,886	3,469,951	475,730	Top of dam

6.0 DAM BREACH ANALYSIS

Failures of earthen dams usually result in a portion of the dam being washed out, leaving the remaining embankment intact. Data from historical failures show that fully formed breaches in earthen dams tend to have an average breach width that varies between 1/2 and 8 times the height of the dam[1] (Fread and Lewis, 1998). Earthen dams usually do not fail instantaneously, since the breach formation requires a finite time interval. The time of actual failure, also known as the breach formation time, varies according to the height of the dam, type of materials used in construction, compaction, and the magnitude and duration of overtopping flows. Failure times can be as short as few minutes and are often less than one hour (Fread and Lewis, 1998).

6.1 Failure Modes

A sunny-day or fair-weather failure is a failure that occurs in the absence of a flood event, when a reservoir is at normal pool level. Typical sunny-day failure modes include cracking due to settlement or seismic activity, or internal seepage erosion that creates an earthen "pipe" through the embankment. Flow through the initial opening increases the size of opening both horizontally and vertically until the section of the embankment over the top of it collapses, yielding a fully-formed breach. The outflow hydrographs from sunny-day breaches are usually not as large as outflow hydrographs from storm-related overtopping failures, but sunny-day breaches can occur with little or no warning and thus have a higher potential for loss of life. The magnitude of the outflow hydrograph is based on the storage in the reservoir, the height of the water-surface elevation, the initial piping elevation, and the time of formation of the breach.

6.2 Breach Parameters

Guidelines for simulating breach failures for HLFs are very limited. The two main tasks in the analysis of a dam breach are the prediction of the reservoir outflow hydrograph and the routing of that hydrograph through the downstream area (Wahl, 1998). Predicting the outflow hydrograph can be further subdivided into predicting the breach characteristics (e.g., shape, depth, width, initial time, rate of breach formation) and routing the reservoir storage and inflow hydrograph through the breach.

Prediction of reasonably accurate breach parameters is necessary in order to make reliable estimates of the breach outflow and resulting downstream inundation. The importance of breach parameters varies with reservoir size. For small reservoirs, there is significant change in reservoir level during the formation of the breach and peak outflow, which typically occurs before the breach has fully developed. In this situation, the rate at which the breach opens is the key parameter. The changes in the water-surface elevation upstream of the dam are significant during the breach formation period, and the peak discharge may be sensitive to the breach geometry and the formation time.

[1] When evaluating the breach time parameter, it is important to distinguish between breach initiation time and breach formation time. Breach initiation time, which may take many hours, is the period when the downstream face of the dam is eroding, but the crest is still intact. Breach formation occurs once the erosion on the downstream face reaches the upstream slope of the dam, and actually starts cutting down the crest elevation (Fread and Lewis, 1998). The "failure time" referenced in the empirical equations used for this study refers to the breach formation time.

6.3 Elevation-Storage of the In-Heap Pond for Dam Breach Analysis

At full operations, the HLF will store crushed ore. Water and leach solution will be stored in the pore spaces of the crushed ore. Cyanide solution will be applied to the HLF during operation. Knight Piesold's Feasibility Water Management Plan (2012) Knight Piesold's Feasibility Water Management Plan (2012) indicates that during operation of the HLF, the pore space of the ore will be capable of storing 13.7 percent of the overall volume of the heap for solution or water. The porosity of the dried crushed rock is much about 36.5 percent; however, the saturation during leaching condition is 62.45 percent. Therefore, the ore in the HLF can store about 13.7 percent by volume of total capacity in their pore spaces. The total capacity of the HLF at the spillway crest is 3,128,335 m^3 of crushed ore.

For the purpose of dam breach analysis, a synthetic dam is assumed such that the synthetic dam has a storage capacity of 13.7 percent of the capacity of the HLF. Assuming that the height of the synthetic dam and the heap confining embankment are same, the area of the impoundment behind the synthetic dam is assumed to 13.7 percent of the area of the impoundment behind the heap confining embankment. The elevation-storage data for the synthetic dam is derived and shown in Table 6.

The estimate of dam breach analysis using a synthetic dam is very conservative. In the event of the dam breach, the velocity of water coming out from the spaces in between the crushed ore is much slower compared to the velocity at which water comes out from dam breach of a water reservoir. The peak discharge from a heap leach dam break will also be much lower than the peak discharge from the dam break of a water storage dam an equivalent amount of water.

Table 6. Elevation Storage Data for Synthetic Dam Storage Data for Synthetic Dam

Elevation (m)	Synthetic Area (m^2)	Storage Capacity (m^3)	Comment
840	0	0	
841	184	92	
842	413	391	
843	681	938	
844	989	1,773	
845	1,334	2,935	
846	1,703	4,453	
847	2,130	6,370	
848	2,613	8,742	
849	3,154	11,625	
850	3,750	15,077	
851	4,155	19,030	
852	4,644	23,429	
853	5,219	28,360	
854	5,878	33,909	
855	6,623	40,159	
856	7,030	46,985	
857	7,462	54,231	
858	7,917	61,920	
859	8,396	70,077	
860	8,899	78,724	
861	9,341	87,844	
862	9,807	97,418	
863	10,298	107,471	

Elevation (m)	Synthetic Area (m^2)	Storage Capacity (m^3)	Comment
864	10,813	118,026	
865	11,352	129,108	
866	11,837	140,702	
867	12,345	152,793	
868	12,877	165,405	
869	13,433	178,560	
870	14,013	192,283	
871	14,608	206,594	
872	15,222	221,509	
873	15,857	237,048	
874	16,512	253,232	
875	17,188	270,082	
876	17,842	287,597	
877	18,515	305,776	
878	19,206	324,636	
879	19,206	343,842	
880	20,644	363,766	
881	21,348	384,762	
882	22,064	406,468	
883	22,789	428,895	Spillway
884	23,384	451,981	
885	24,114	475,730	Top of dam

6.4 Dam Breach Parameter Estimation

The sunny-day breach parameters for the HLF were based on a piping failure scenario in the embankment, and the initial water surface elevation is assumed to be the operational spillway at an elevation of 883 meters. Given the alluvium in the dam and the foundation, it is assumed that the piping breach would erode to an elevation of 837 meters, creating a 3-meter deep erosion below the natural grade.

The overtopping breach is based on the probable maximum flood (PMF) event. Although the auxiliary spillway is sized to convey the PMF, for the purpose of dam breach simulation an overtopping is considered regardless. An overtopping failure erodes a breach through the embankment from the top down. It is assumed that the overtopping breach will initiate when the water in the spillway is 0.5 meter deep. It is assumed that the overtopping breach will progress to the toe of the embankment and create a 3-meter deep erosion gully at the toe.

For this study, the breach parameters were estimated using statistically derived predictors for the average breach width and the time of failure based on documented case studies of dam failures. Summaries of the empirical relations can be found in Wahl's paper (1998) and in the FLDWAV User Manual (Fread and Lewis, 1998). A few of the generally accepted relations are summarized below.

6.4.1 Froehlich Relations

Froehlich (1987) developed relations for breach width, side slope, and time of failure based on 43 case studies of dam failures. In a follow up paper (Froehlich, 1995b), his work was expanded

to include a total of 63 dam failures. The empirical equations for breach width and time of failure (i.e., breach formation time), as presented in the FLDWAV User Manual, are listed below.

$$b_{avg} = 9.5\ k_o(V_r\ h_d)^{0.25}$$

$$t_f = 0.59\ (V_r^{\ 0.47} / h_d^{0.9})$$

In these equations, b_{avg} is average breach width (feet), t_f is the breach time (hours), k_o is a coefficient that is equal to 0.7 for piping breach and 1.0 for overtopping breach, V_r is the reservoir volume (acre-feet), and h_d is the height (feet) of water above the breach bottom. The breach parameters calculated using Froehlich's equations are shown in Table 7.

Table 7. Heap Confining Embankment Breach Parameters (Froehlich, 1987) Heap Confining Embankment Breach Parameters (Froehlich, 1987)

Parameter	Units	Overtopping Failure	Sunny Day Event (Piping Failure)	Note
k_o		1	0.7	
V_r	acre-feet	386	348	Storage volume
h_d	meters	48	46	Top of dam el= 885 meters, spillway crest el = 883 meters, breach invert = 837 meters
b_{avg}	meters	31	45	$b_{avg} = 9.5\ k_o\ (V_r\ h_d)^{0.25}$
t_f	hours	0.10	0.10	$t_f = 0.59\ (V_r\ 0.47 / h_d^{0.9})$

6.4.2 Von Thun And Gillette Relations

Von Thun and Gillette (1990) used the data from Froehlich (1987) and MacDonald and Langridge-Monopolis (1984) to develop guidance for estimating breach side-slopes, average breach width, and time to failure (Wahl, 1998).to develop guidance for estimating breach side-slopes, average breach width, and time to failure (Wahl, 1998). The predictive equation for average breach width (b_{avg}) is:

$$b_{avg} = 2.5\ h_w + C_b$$

where h_w is the height (meters) of water above the breach invert, and C_b is a function of reservoir storage as follows:

Reservoir Size (m^3)	$= C_b$ (m)
$<1.23 \times 10^6$	= 6.1
1.23×10^6 to 6.17×10^6	= 18.3
16.17×10^6 to 1.23×10^7	= 42.7
$>1.23 \times 10^7$	= 54.9

Von Thun and Gillette also developed upper- and lower-bound prediction equations for time of breach formation based on plots of time of breach formation versus depth of water above the breach invert. The lower bound is for erosion resistant material and the upper bound is for easily erodible material. T_f is in hours and h_w is in meters.

$$t_f = 0.020\ h_w + 0.25 \quad \text{[erosion resistant]}$$

$$t_f = 0.015\ h_w \quad \text{[easily erodible]}$$

Von Thun and Gillette developed two additional equations based on observed average lateral erosion rates (the ratio of final breach width to breach formation time) versus depth of water above the breach invert. The upper bound erosion rate was based on tests with erodible fuse plug embankments. Again, in the following equations, t_f is in hours and both b_{avg} and h_w are in meters.

$$t_f = b_{avg}/ (4h_w) \quad \text{[erosion resistant]}$$

$$t_f = b_{avg}/ (4h_w+61.0) \quad \text{[easily erodible]}$$

The breach parameters computed are shown in Table 8.

Table 8. Dam Breach Parameters (Von Thun and Gilette, 1990)

Parameter	Unit	Sunny Day Event (Piping Failure)	Overtopping Failure	Note
h_w	meters	46	48	
C_b	meters	6.1	6.1	
b_{avg}	meters	121.1	126.1	$b_{avg} = 2.5h_w + C_b$
Breach formation as a function of h_w				
High t_f	hour	1.17	1.21	$t_f = 0.020h_w + 0.25$ (erosion resistant)
Low t_f	hour	0.69	0.72	$t_f = 0.015h_w$ (easily erodible)
Breach formation as a function of h_w and b_{avg}				
High t_f	hour	0.66	0.66	$t_f = b_{avg}/(4h_w)$ (erosion resistant)
Low t_f	hour	0.49	0.50	$t_f = b_{avg}/(4h_w+61.0)$ (easily erodible)

These parameters do not distinguish between a piping breach and an overtopping breach. The differing results are a function of the initial headwater, h_w, and the storage volume for each event in this analysis.

6.4.3 Macdonald and Langridge-Monopolis Relations

MacDonald and Langridge-Monopolis (1984) developed predictive equations for the volume (V_{er}) of earth removed during a breach and the time (t_f) of breach formation using 42 case studies of dam failures. The equations, as presented in Wahl (1998), are shown below.

$$V_{er} = 0.0261(V_{out} h_w)^{0.769}$$

$$t_f = 0.0179 (V_{er}{}^{0.364})$$

V_{er} is in cubic meters , V_{out} is the volume of water through the breach in cubic meters, h_w is the depth water behind dam in meters, and t_f is the breach time in hours. The parameters computed are listed in Table 9. MacDonald and Langridge-Monopolis parameters also do not distinguish between piping and overtopping breaches. The differing results are a function of the initial headwater, h_w, and the storage volume.

Table 9. Breach Parameters (MacDonald and Langridge-Monopolis, 1984)

Parameter	Unit	Sunny Day Event (Piping Failure)	Overtopping Failure	Note
V_{out}	m^3	343,842	384,762	
h_w	m	46.00	48.00	
V_{er}	m^3	8,970	10,105	$V_{er} = 0.0261(V_{out} h_w)^{0.769}$
t_f	hour	0.49	0.51	$t_f = 0.0179 (V_{er})^{0.364}$

6.5 Comparison of Breach Parameters

The average breach-width parameters from the empirical relations are summarized in Table 10. For the overtopping failure, the average breach width predicted by Froehlich is about 44 meters and the breach width predicted by Von Thun and Gillette is about 130 meters. For the Piping failure event, the average breach width predicted by Froehlich is about 31 meters and the breach width predicted by Von Thun and Gillette is 128 meters.

Table 10. Comparison of Average Breach Width

Method	Average Breach Width (meters, rounded)	
	Sunny Day Event (Piping Failure)	Overtopping Failure
Froehlich	31	44
Von Thun and Gillette	128	130

The time-of-failure parameters from the empirical relationships are summarized in Table 11.

Table 11. Comparison of Time of Failure

Method		Time of Failure (hours, rounded)	
		Sunny Day Event (Piping Failure)	Overtopping Failure
1	Froehlich	0.1	0.1
2	Von Thun and Gillette (breach formation time as a function of height)	1.2-0.7	1.2-0.7
3	Von Thun and Gillette (breach formation time as a function of height and average width)	0.7-0.5	0.7-0.5
4	MacDonald and Langridge-Monopolis	0.5	0.5

The failure times for the various methods vary from 0.1 hours to 1.2 hours for a sunny-day event and from 0.1 hours to 1.2 hours for an overtopping event. The lower numbers correspond to the Froehlich relation, based on storage volume and the breach height. The higher numbers correspond to the Von Thun and Gillette equation for erosion-resistant embankment material, based on breach height. The empirical relations predicted breach parameters with a wide deviation.

6.6 Breach Peak-Discharge Estimation

The data for historical dam failures has also been used to develop empirical relations for the peak discharge of a breach outflow hydrograph. These are used to evaluate the breach outflows from the heap confining embankment, and are discussed below. As in the case of the breach parameters, these relations do not actually distinguish between a piping breach and an overtopping breach. The different results for the events in this analysis are a function of the initial inputs for headwater and storage volume.

6.6.1 Froehlich Relation

Froehlich (1995a) developed the following equation (as reported in Wahl, 1998) for estimating peak discharge based on reservoir volume and breach height, using 22 case studies of dam failures.

$$Q_p = 0.607 \, (V_r^{0.295} \, h_d^{1.24})$$

Q_p is the expected peak discharge (cm/s), V_r is the reservoir volume (cubic meters), and h_d is the height (meters) of water over breach bottom. The breach peak discharge computed from this equation, given an initial water-surface elevation at the crest of the spillway, is summarized in Table 12.

Table 12. Heap Confining Embankment Dam Breach - Peak Discharges, Froehlich

Parameter	Unit	Sunny-Day Event (Piping Failure)	Overtopping Failure	Note
V_r	m^3	428,895	475,730	Storage volume,
H_d	m	46	48	Top of dam = 885 m, spillway crest = 883 m, breach invert = 837 m.
Q_p	m^3/s	3210	3490	$Q_p = 0.607 * V_r^{0.295} * h_d^{1.24}$

6.6.2 Hagen and Fread Relations

The Hagen (1982) and Fread (1981) relations, as presented in the *FLDWAV User Manual*, are shown below respectively.

$$Q_p^* = 370 (V_r h_d)^{0.5}$$

$$Q_p = 3.1 * b_{avg} (C/(t_f + C/ (h_d)^{0.5}))^3$$

where Q_p^* and Q_p are the expected peak discharge (cfs) through the breach; V_r is the reservoir volume (acre-feet); h_d is the height (feet) of water over breach bottom; and $C = 23.4 A_s/b_{avg}$, in which A_s is the surface area (acres) of the reservoir at h_d. The values for b_{avg} and t_f are computed using the Froehlich method

Hagen's equation was developed using historical data from 14 dam failures. It provides a maximum envelope of all 14 of the observed discharges, and typically overestimates peak discharges by a factor of 130 percent (Fread and Lewis, 1998). Fread's equation is used in the *NWS Simplified Dam Break Model, SMPDBK* (Fread, 1998). The breach peak discharges computed from the two equations, for the piping and overtopping conditions, are shown in Table 13.

Table 13. Heap Confining Embankment Dam-Breach Parameters, Hagen and Fread

Parameter		Sunny Day Event (Piping Failure)	Overtopping Failure	Note
V_r	(acre-feet)	348	386	Storage volume
h_d	(feet)	150.9	157.5	Top of dam = 885 meters, spillway crest = 883 meters, breach invert = 837 meters
b_{avg}	(feet)	101	149	Average Breach Width (Use Froehlich)
t_f	(hours)	0.10	0.10	Breach time (Use Froehlich)
A_s	(acres)	5.6	6.0	Surface Area (acres) at h_d
C		1.2	0.9	$C = 23.4^{*}A_s/b_{avg}$
Q_p^{*}	(cfs)	84,760	91,188	$Q_p^{*} = 370\ (V_r h_d)^{0.5}$
Q_p	(cfs)	65,185	68,644	$Q_p = 3.1{*}b_{avg}(C/(t_f + C/(h_d)^{0.5}))^3$
Q_p^{*}	(m^3/s)	2400	2582	Converted to SI units
Q_p	(m^3/s)	1846	1944	Converted to SI unit

6.7 Comparison of Breach Parameters

The peak discharge in the event of a dam breach calculated using empirical relations are summarized in Table 14. The overtopping failure generates a greater discharge than piping failure. The range of the peak discharge from piping failure is between 3210 m^3/s and 1846 m^3/s, and for the overtopping breach is between 1944 m^3/s and 3490 m^3/s. The Froehlich's relation provides the largest estimates for peak discharge.

Table 14. Comparison of Peak Discharges from Dam Breach (m^3/s)

Peak Discharge	Piping	Overtopping
FLDWAV	2,400	2,582
FLDWAV	1,846	1,944
Froehlich	3,210	3,490

6.8 Dam Breach Modeling

A breach hydrographs for piping failure and overtopping failures were developed using the dam breach function in the HEC-HMS program. The program uses hydraulic equations to generate breach hydrographs, and the breach hydrograph is based on the breach formation parameters. The breach parameters predicted using the empirical equations discussed above were used as guidelines. A combination of breach parameters were used such that the peak discharge from

HEC-HMS program was in the range of the peak discharges calculated from the empirical equations.

The adopted breach parameters were adopted for use in HEC-HMS model are summarized in Table 15. It is to be noted that the bottom width of the breach is input into the HEC-HMS program, whereas the empirical equations predict the average width of the breach section.

Simulation results show that the peak discharge from the overtopping breach is 2507 m^3/s and that from the piping failure is 2396 m^3/s. The peak discharges are in line with the peak discharges derived using the empirical equations. For inundation analysis, the breach hydrograph from overtopping failure will be used.

Table 15. Adopted breach parameters

Breach Parameters	Piping Failure	Overtopping failure
Bottom Width (m)	30	50
Side slope (XH:1V)	1.5	1.5
Breach formation time (hr)	0.25	0.10
Breach Trigger Elevation		883.5
Breach Trigger Time	12:00	
Piping Elevation (m)	837	
Piping coefficient	0.65	
Peak Discharge (m^3/s)	2396	2507

6.9 Flood Routing

Routing the breach hydrograph and subsequent inundation mapping is required to determine the dam hazard classification and to prepare the emergency action plan. Routing the hydrograph is useful in estimating the flood attenuation as the flood wave travels downstream. The channel provides storage capacity, which reduces the peak discharge as the flood wave travels downstream. Flood routing and hydraulic analyses are useful in estimating the flood wave arrival time, and estimating the depth and velocity of water in the stream. The inundation mapping is prepared using Arc-GIS software in conjunction with the HEC-RAS hydraulic model.

Hydrologic routing is performed by using the continuity equation and establishing a storage-discharge relation for each routing reach. The river reach downstream of the dam is divided into 11 sub-reaches and storage-discharge relation for each routing reach is established. A HEC-RAS hydraulic model was prepared to generate a storage-discharge relation for each routing reach. The rating curve for hydraulic routing is provided in Table 16.

Hydrologic routing was performed by using HEC-HMS. The Modified Puls method was used to estimate the attenuation of flow downstream of the dam. Hydrologic routing model provided attenuated flow hydrographs at locations of interest in the downstream channel. The peak discharge at the dam breach section is 2507 m^3/s. At the junction of with the Lynx Creek, the peak discharge is attenuated to 302 m^3/s. The results from hydrologic analyses are presented on Appendix D.

The event ponds downstream of the embankment are conservatively assumed to be completely filled with debris in the event of a dam breach. Therefore, the event ponds are not considered for flow attenuation.

Table 16. Rating Curve for Routing Reaches

Reach ID	0	1	2	3	4	5	6	7	8	9	10
HEC-RAS station at upstream of the reach	6378	5914	5373	4873	4372	3875	3373	2873	2371	1874	1374
Discharge (m^3/s)	**Storage (1000 m^3)**										
1	1	1	1	1	1	1	2	2	1	1	1
50	22	18	11	16	14	14	23	22	20	15	17
100	38	31	20	27	24	23	37	35	33	24	27
500	152	102	112	100	83	100	119	105	109	75	83
1,000	265	166	187	173	158	196	204	171	190	126	135
1,500	352	219	236	268	229	284	273	227	268	171	181
2,000	427	267	284	362	303	373	329	277	344	212	223
2,500	508	313	333	462	374	439	387	324	420	252	260
3,000	580	358	384	551	442	508	441	369	496	290	295
3,500	659	400	431	634	511	572	484	416	569	328	331
4,000	726	444	473	695	580	641	529	459	641	362	365

6.10 Hydraulic Analysis

Fifty-six cross-sections were obtained at approximately every 100 meters downstream of the event ponds. These cross-sections were numbered such that the intersection of the Haggart Creek with Lynx Creek is referenced as Station 0+00 meters. Topographic information from LIDAR survey was used to obtain cross-section in the upstream reaches whereas coarse topography from a DEM was used to obtain cross-sections in the downstream reaches that are not covered by LiDAR survey.

Cross-section locations were chosen to represent geomorphic characteristics of the valley. Longitudinal profile of the Dublin Gulch shows that channel slope is about 3.3 percent in the upstream reaches whereas the channel slope is about 1.4 percent in the downstream reaches.

Cross sections were subdivided into a main-channel reach, a left overbank, and a right over bank. The flow paths in the main channel and the overbanks differ because of bends in the valley and localized geomorphic features. Manning's n values of 0.06 were used for the main channel, left overbank and right overbank throughout the model to represent brushy vegetation that along the channel. Field photographs were used as reference to estimate the Manning's n values. Breach flows were encoded into the model at the boundaries of the hydrologic routing reaches to account for attenuation of flow.

Both subcritical and supercritical flow regimes were evaluated in the flood wave model. The downstream boundary condition was established assuming normal depth with an existing bed stream slope of 0.02. The upstream boundary condition was set at critical depth. The results from the HEC-RAS model are included in Appendix E.

6.11 Inundation Mapping

The HEC-RAS model was used to create inundation maps of Dublin Gulch and Haggart Creek. The inundation map is provided as Appendix F.

Hydraulic analysis and inundation mapping showed that the Lower Dublin North Pond is inundated by the PMF flood. The channel section is wider immediately downstream of the embankment and is narrower and more defined after the confluence with the Haggart Creek; consequently, the floodplain in wider immediate downstream of the embankment and narrower downstream of the confluence.

In addition to the Lower Dublin North Pond, the road crossing that provides access to the water treatment plant, and the process building also inundated. Only a small area of the Camp/Recreational Area is inundated.

7.0 CONCLUSION

The heap confining embankment can be classified as a high hazard dam. Results from the dam breach analysis and inundation mapping show that loss of human life or damage to public and commercial facilities are unlikely in the event of a dam breach. However, the dam breach may cause significant damage to fish and wildlife habitat downstream of the embankment considering the potential for release of cyanide solution from upstream of the heap confining embankment.

While determining the discharge through the spillway, it was assumed that the mine is operating in Phase 3; therefore, a larger watershed contributing to the HLF at the end of phase 3 was considered for analyses. Results from hydrologic analysis show that the peak discharge from the HLF in the event of a PMP event is 20.2 m^3/s, and that in the event of a 1000-year event is 5.2 m^3/s. The CDA suggests that the spillway of a high hazard dam should be capable of conveying an inflow design floods (IDF), which is one-third between a 1000-year event and a PMF event. The IDF discharge is calculated 10.5 m^3/s. The spillway at the heap leach facility is designed as a rectangular channel that is 4.5 meters wide and two meters deep.

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APPENDIX A
HYDROLOGIC MEMO FROM KNIGHT PIESOLD 2012

MEMORANDUM

To:	Doug Grimes	Date:	December 12, 2012
		File No.:	VA101-290/6-A.01
From:	Erin Rainey	Cont. No.:	VA12-02096
Re:	Eagle Gold Project –Design Basis Peak Flows for the Dublin Gulch Diversion Channel Design		

1. INTRODUCTION

The objective of this memo is to summarize the design peak flow estimates for the Dublin Gulch Diversion Channel (DGDC) and to outline the peak flow estimation methodology that can also be used for other hydraulic structures.

Design peak flow values for the DGDC were estimated for the contributing catchment areas of the Dublin Gulch, Eagle Pup and Suttle Gulch basins. Based on the current DGDC alignment provided in the Eagle Gold Feasibility Study (Wardrop, 2012), the contributing areas are as follows:

- Dublin Gulch = 8.7 km^2
- Eagle Pup Gulch = 1.1 km^2, and
- Suttle Gulch = 0.45 km^2.

2. DESIGN CRITERIA AND METHODOLOGY

The design peak flows for the DGDC were determined for 100 year and 500 year return periods. Two approaches were used to develop the resulting peak flow values: a regional frequency analyses for the larger drainage area of Dublin Gulch and the rational method for the smaller drainage areas of Eagle Pup Gulch and Suttle Gulch.

2.1 Regional Frequency Analyses

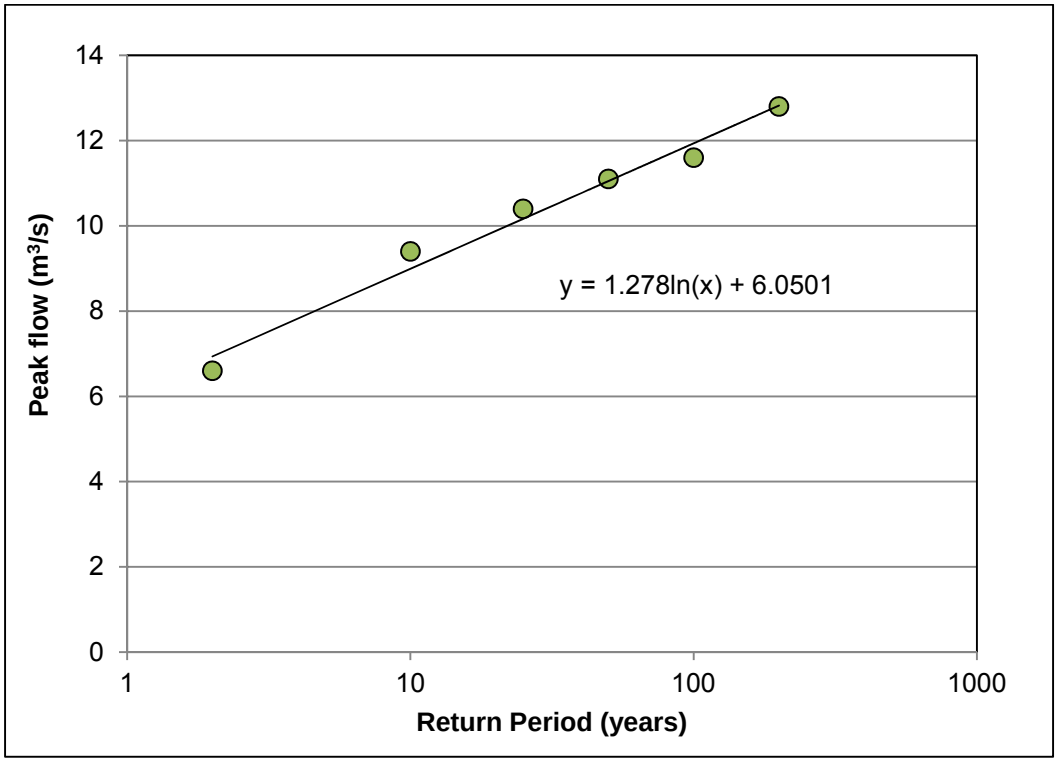
Peak flow frequency analyses were completed for data from the Water Survey of Canada (WSC) stations on the McQuesten River (station ID 09DD004) and Clear Creek (station ID 29DD002). The flood frequency values were generated using Environment Canada's Consolidated Frequency Analysis (CFA88) software and presented in the Hallam Knight Piésold (HKP) report for the project (formerly known as the Dublin Gulch Project) entitled "Dublin Gulch Project – Initial Environmental Evaluation" (HKP, 1996). The resulting best estimates for return period peak instantaneous flow values for the Dublin Gulch basin (12.7 km^2) in the HKP report (1996) are summarized in Table 1.

Table 1 Peak Flows for Dublin Gulch (12.7 km^2)

Return Period (years)	Peak Instantaneous Flow (m^3/s)
2	6.6
10	9.4
25	10.4
50	11.1
100	11.6
200	12.8

The corresponding 500 return period peak flow was estimated based on fitting a logarithmic trendline to the peak flow versus return period data and then extrapolating to the 500 year return period using the trendline, as shown on Figure 1.

Figure 1 Peak Instantaneous Flow versus Return Period for Dublin Gulch (12.7 km^2)



The 1:500 year peak flow for the Dublin Gulch basin (12.7 km^2) was calculated as follows:

$$Q_{500} = 1.278 * \ln(500) + 6.0501 = 14.0 \text{ m}^3/\text{s}$$

In order to estimate peak instantaneous flow values for the current Dublin Gulch contributing catchment area of 8.7 km^2, the peak flows in Table 1 were scaled by drainage area using a scaling exponent of 0.8 (HKP, 1996). For example, the 1:100 year peak flow (Q_{100}) for the Dublin Gulch basin area of 8.7 km^2 is:

$$Q_{100} = 11.6\ m^3/s * (8.7\ km^2/12.7\ km^2)^{0.8} = 8.6\ m^3/s$$

Table 2 provides a summary of the return period flow estimates for this area.

Table 2 Peak Flows for Dublin Gulch (8.7 km^2)

Return Period (years)	Peak Instantaneous Flow (m^3/s)
2	4.9
10	6.9
25	7.7
50	8.2
100	8.6
200	9.5
500	10.3

2.2 Rational Method

The rational method was used for estimating peak flows for drainage areas of approximately 1 km^2 or less. The rational method (MOE, 1991) is an empirical relationship that relates peak runoff to rainfall using the following equation:

$$\mathbf{Q_p = 0.28*C*I*A}$$

Where:

- Q_p = peak flow [m^3/s]
- C = runoff coefficient
- I = rainfall intensity over for the time of concentration (T_c [hrs]) [mm/hr]
- A = drainage area [km^2]

The runoff coefficient, based on a steep forested basin with possible snowmelt and return periods of greater than 25 years, was estimated to be 1.1, as outlined in the Manual of Operational Hydrology for BC (MOE, 1991).

Time of Concentration

The time of concentration was estimated based on drainage area, from the following relationships presented in the Manual of Operational Hydrology for BC (MOE, 1991):

For basins with an average slope > 10%: $\mathbf{T_c = 1.2*A^{0.5}}$

For basins with an average slope < 10% but > 1%: $\mathbf{T_c = 2.4*A^{0.5}}$

For basins with an average slope < 1%: $\mathbf{T_c = 3.8*A^{0.5}}$

Where:

T_c = time of concentration [hrs]

A = drainage area [km^2]

The time of concentration values for Eagle Pup Gulch and Suttle Gulch, based on their drainage areas and the above equation for slopes <10% but >1%, were determined to be approximately 2.5 hrs and 1.6 hrs, respectively.

Rainfall Intensity

The return period rainfall amounts and corresponding rainfall intensities for various return periods were determined based on the intensity-duration-frequency (IDF) values for the project location, as presented in the 1996 HKP Report, which were based on information in the "Rainfall Frequency Atlas for Canada (RFAC)" (Environment Canada, 1985). Table 3 summarizes the rainfall amounts for the 24 hour duration for various return periods.

Table 3 24 hour Return Period Rainfalls Amounts

Return Period (years)	24 hour Rainfall (mm)
2	31.0
5	41.8
10	49.1
15	42.1
20	56.0
25	58.1
50	64.9
100	71.6
200	78.3
PMP	255.6

Rainfall intensity equations were derived for various return periods, as summarized in Table 4, with rainfall intensity (I) in mm/hr and time of concentration (Tc) in hours.

Table 4 Rainfall Intensity Equations

Return Period (years)	Rainfall Intensity Equation (mm/hr)
2	$I_2 = 7.8721T_c^{-0.569}$
5	$I_5 = 11.438T_c^{-0.606}$
10	$I_{10} = 13.782\ T_c^{-0.619}$
15	$I_{15} = 14.778T_c^{-0.647}$
20	$I_{20} = 16.017T_c^{-0.628}$
25	$I_{25} = 16.725T_c^{-0.631}$
50	$I_{50} = 18.902T_c^{-0.637}$
100	$I_{100} = 21.065T_c^{-0.642}$
200	$I_{200} = 23.214T_c^{-0.646}$

Peak Flow Calculation Example

Using the rational method, the 100 year peak flow (Q_{100}) for the Eagle Pup basin (1.1 km^2) was calculated as follows:

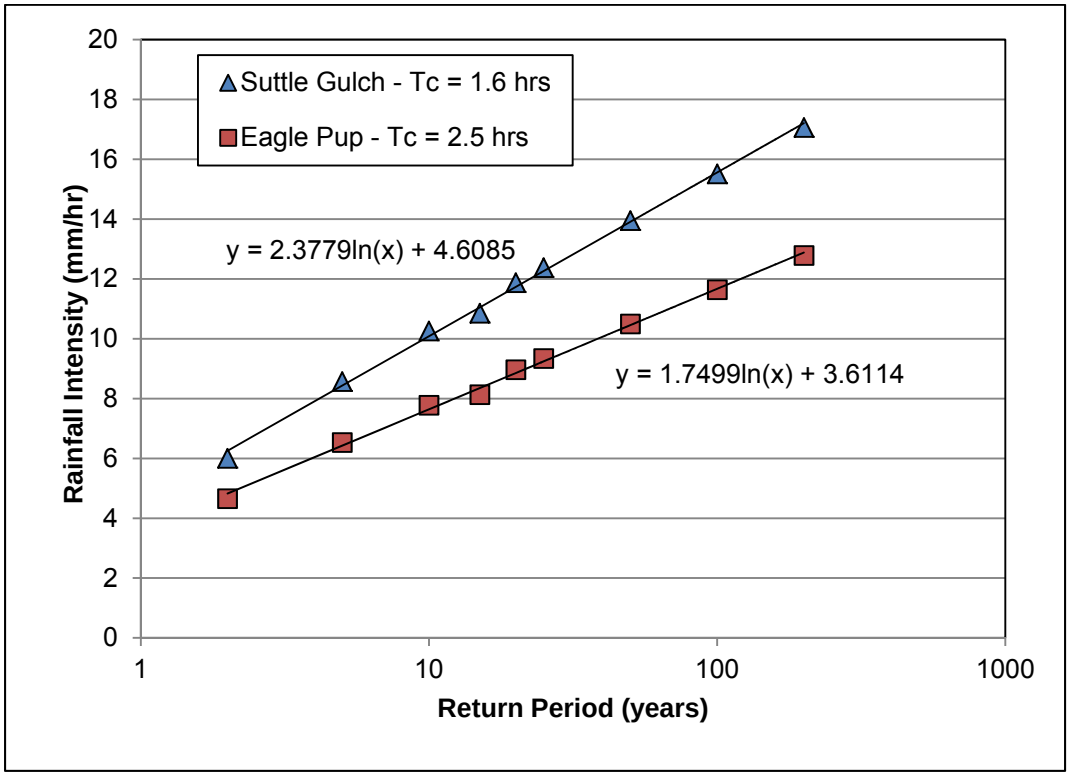
$Tc = 2.5\ hrs \rightarrow \quad I_{100} = 21.065T_c^{-0.642} = 21.065*(2.5)^{-0.642} = 11.7\ mm/hr$

$Q_{100} = 0.28 * 1.1 * 11.7\ mm/hr * 1.1\ km^2 \quad = 4.0\ m^3/s$

The 500 year return period rainfall intensity values, which are not specified in the Rainfall Frequency Atlas for Canada, were estimated using the rainfall intensity equations in Table 4 and the time of concentration values estimated for Eagle Pup and Suttle Gulch contributing areas.

Therefore, using the time of concentration values of 2.5 hrs and 1.6 hrs for the Eagle Pup and Suttle Gulch contributing areas, respectively, the resulting rainfall intensity values were plotted versus return period, as shown on Figure 2. A logarithmic trendline was fit to each dataset and extrapolated to the 500 year return period values using the trendline equations.

Figure 2 Rainfall Intensity versus Return Period for Select Time of Concentration Values



The resulting rainfall intensity and peak instantaneous flow for the 500 year return period (I_{500}) for Eagle Pup are estimated as follows:

I_{500} = 1.7499 * ln(500) + 3.6114= 14.49 mm/hr

Q_{500} = 0.28 * 1.1 * 14.49 mm/hr * 1.1 km^2 = 4.9 m^3/s

3. DESIGN PEAK FLOW VALUES

The design peak flow values for the DGDC, based on the above described criteria and methodology are summarized in Table 5.

Table 5 Dublin Gulch Diversion Channel Design Flows

Contributing basin	Contributing basin area (km^2)	1:100 year design flow (m^3/s)	1:500 year design flow (m^3/s)
Dublin Gulch	8.7	8.6	10.3
Eagle Pup	1.1	4.0	4.9
Suttle Gulch	0.45	2.2	2.7

4. REFERENCES

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Signed: _____
Erin Rainey, P.Eng – Project Engineer

Reviewed: _____
Jaime Cathcart, Ph.D., P.Eng – Specialist Hydrotechnical Engineer

Approved: _____
Ken Brouwer, P.Eng. –Managing Director

Copy To: Mr. Steve Wilbur, VIT (swilbur@vitgoldcorp.com)
Mr. Todd Goodsell, VIT (tgoodsell@vitgoldcorp.com)
Amit Karki, Tetra Tech (Amit.Karki@tetratech.com)

/er

APPENDIX B
GRAPH FOR TIME OF CONCENTRATION CALCULATION USING BRITISH COLUMBIA METHOD

7.5.3 Time of Concentration

Time of concentration (T_c) is the time required for surface runoff from the most remote part of the drainage basin to reach the point of consideration on the stream. For uniform rainfall intensity, this would be the time of equilibrium when all parts of the basin are contributing to streamflow and additional rainfall will not cause a greater peak flow but will just prolong the runoff period. For a given basin T_c is usually considered constant.

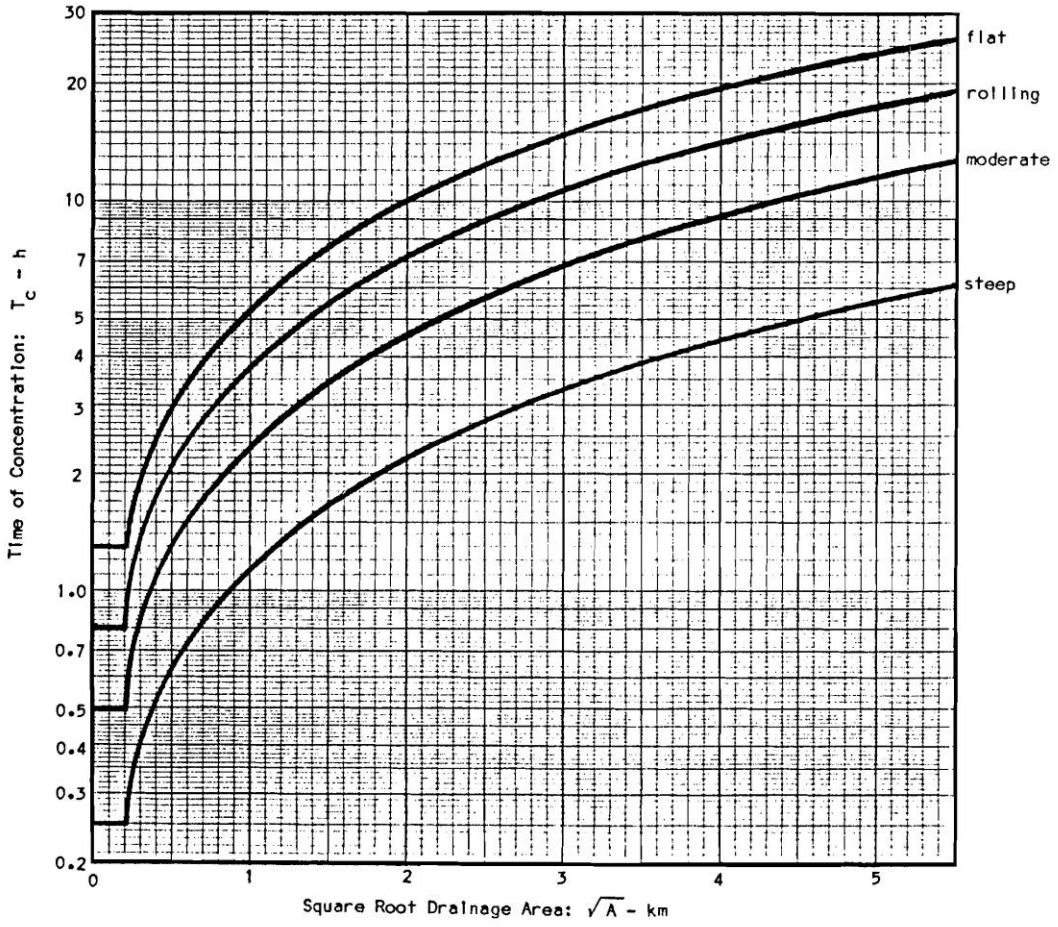


Figure 1. Time of Concentration (T_c)

Figure 1 provides estimates of T_c for forested, agricultural and rural basins. The top two curves (flat and rolling) can be used for agricultural and rural basins. A value for a given basin would lie somewhere between the two curves depending on basin slope. For forested watersheds the curves labelled rolling, moderate and steep should be used. For accurate determination of T_c the average basin slope should be determined.

The average basin slope is the elevation difference between the most remote point of the basin and the downstream point divided by the total stream length. In the graph rolling is a slope ≤ 0.01, moderate is a slope of 0.025 and steep is a slope ≥ 0.10.

The above procedure of estimating T_c is defined for a basin with a single main channel. If the basin in question has two or more dominant channels, each sub-basin should be considered separately.

Impermeable basins and urban basins (with large paved areas and roofs) would not be determined from the above curves. The time of concentration for such basins can be determined by use of empirical formulae such as those by Kirpich and Hathaway.

The Kirpich formula can be used to estimate T_c for small impermeable catchments, e.g., city storm drainages. The formula is expressed as:

$$T_c = \frac{L^{0.77}}{15\, S^{0.385}}$$

The Hathaway formula can be applied to small urban or agricultural catchments and to the small interior basins with a light forest. The formula is expressed as:

$$T_c = \frac{(nL)^{0.467}}{1.65\, S^{0.234}}$$

In both formulae:

- T_c is time of concentration in hours
- L is the total stream length from the most remote part of the basin as extended from the stream source to the divide in kilometres
- S is the average slope of the total stream length
- n is the roughness coefficient.

The roughness coefficient can be determined from Table 4.

APPENDIX C
CURVE NUMBER CALCULATION

Table 2-2c Runoff curve numbers for other agricultural lands [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2/]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3/]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4/]	48	65	73
Woods—grass combination (orchard or tree farm). [5/]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6/]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4/]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

APPENDIX D
HEC-HMS RESULTS

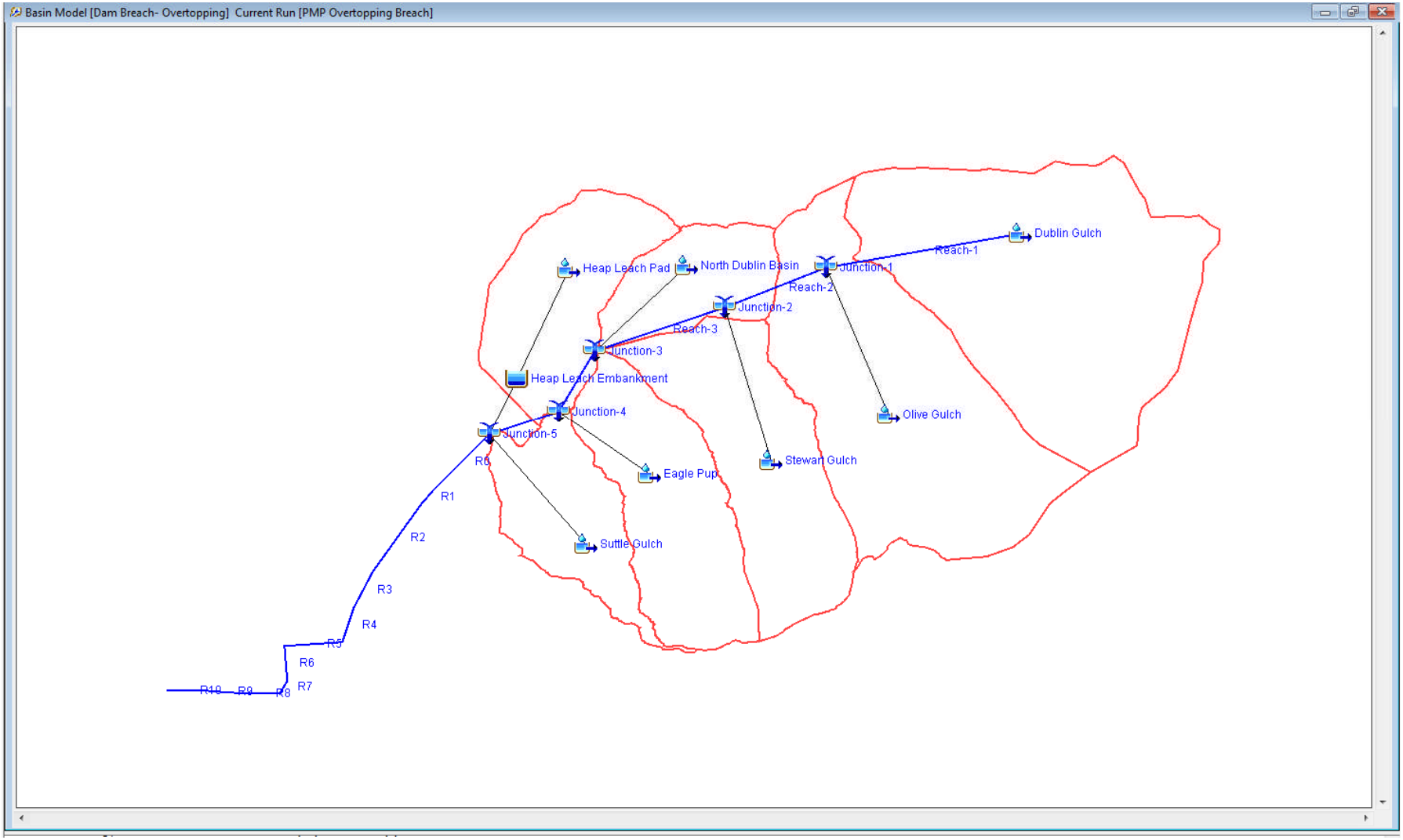


Figure: Watershed Map with HEC-HMS elements.

Table: HEC-HMS Results for Dam Breach

Global Summary Results for Run "PMP Overtopping Breach"

Project: Eagle GOLD Project Simulation Run: PMP Overtopping Breach

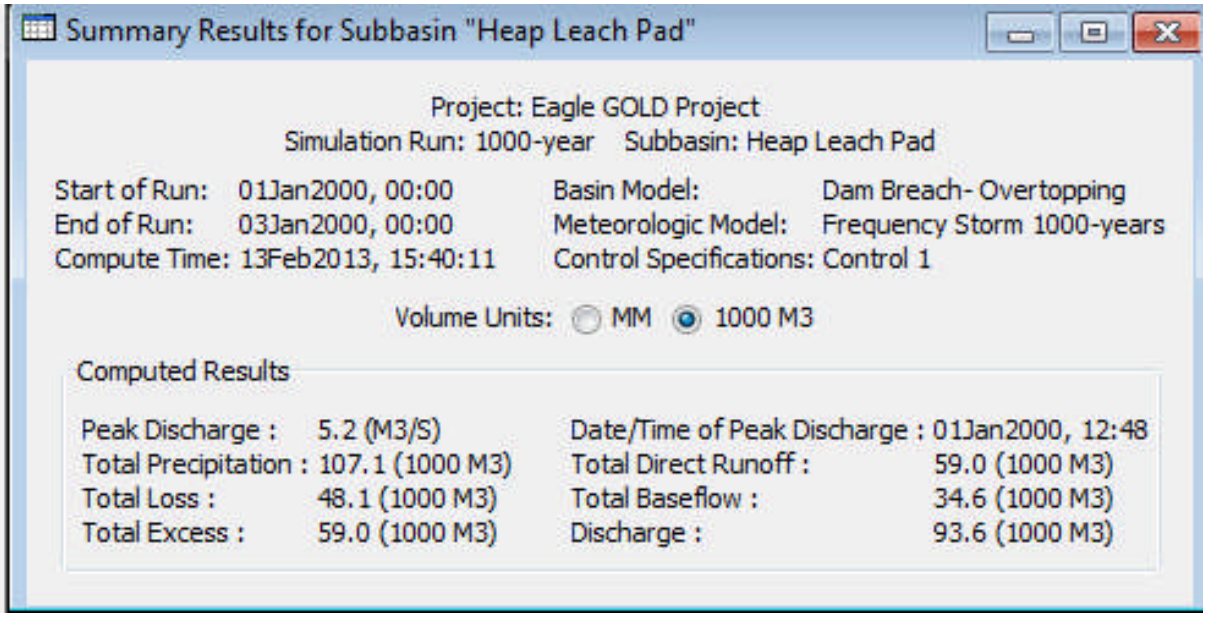
Start of Run: 01Jan2000, 00:00
End of Run: 03Jan2000, 00:00
Compute Time: 13Feb2013, 18:27:17

Basin Model: Dam Breach- Overtopping
Meteorologic Model: Frequency Storm PMP
Control Specifications: Control 1

Show Elements: All Elements Volume Units: MM 1000 M3 Sorting: Hydrologic

Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
Dublin Gulch	3.27	39.0	01Jan2000, 13:13	674.2
Reach-1	3.27	39.0	01Jan2000, 13:14	674.2
Olive Gulch	2.80	36.4	01Jan2000, 13:06	582.3
Junction-1	6.07	75.1	01Jan2000, 13:10	1256.5
Reach-2	6.07	75.1	01Jan2000, 13:11	1256.5
Stewart Gulch	1.67	26.0	01Jan2000, 12:54	361.2
Junction-2	7.74	98.3	01Jan2000, 13:06	1617.7
Reach-3	7.74	98.3	01Jan2000, 13:06	1617.7
North Dublin Basin	0.65	14.2	01Jan2000, 12:36	161.7
Junction-3	8.39	105.0	01Jan2000, 13:02	1779.4
Reach-4	8.39	105.0	01Jan2000, 13:03	1779.4
Eagle Pup	1.39	23.3	01Jan2000, 12:49	306.5
Junction-4	9.78	126.2	01Jan2000, 12:59	2085.8
Reach-5	9.78	126.2	01Jan2000, 13:00	2085.8
Heap Leach Pad	1.15	20.2	01Jan2000, 12:47	259.5
Heap Leach Embank...	1.15	2506.5	01Jan2000, 08:38	691.1
Suttle Gulch	0.88	18.0	01Jan2000, 12:39	206.7
Junction-5	11.81	2530.5	01Jan2000, 08:38	2983.6
R0	11.81	1116.3	01Jan2000, 08:40	2983.5
R1	11.81	773.9	01Jan2000, 08:42	2983.5
R2	11.81	558.0	01Jan2000, 08:45	2983.4
R3	11.81	468.6	01Jan2000, 08:48	2983.4
R4	11.81	434.7	01Jan2000, 08:51	2983.3
R5	11.81	407.7	01Jan2000, 08:54	2983.2
R6	11.81	367.7	01Jan2000, 08:57	2983.2
R7	11.81	344.6	01Jan2000, 09:01	2983.1
R8	11.81	322.2	01Jan2000, 09:04	2983.0
R9	11.81	312.8	01Jan2000, 09:06	2982.9
R10	11.81	302.7	01Jan2000, 09:09	2982.9

Table: HEC-HMS Results for 100-year Discharge from Heap Leach



APPENDIX E
HEC-RAS RESULTS

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Dam Breach Mapping
Project File : DamBreachMapping.prj
Run Date and Time: 2/13/2013 5:25:24 PM

Project in SI units

FLOW DATA

Flow Title: Attenuated Flows
Flow File : x:\201087 - Eagle Gold Div Chnl Dsgn - Dam Brk Anlys\Reference Docs\Hydrologic Analysis\HEC-RAS FP Mapping\DamBreachMapping.f04

Flow Data (m3/s)

River	Reach	RS	PF 1
Haggart Creek	Reach 1	6858	2530.3
Haggart Creek	Reach 1	5912	1115.8
Haggart Creek	Reach 1	5373	773.4
Haggart Creek	Reach 1	4873	557.4
Haggart Creek	Reach 1	4372	468.1
Haggart Creek	Reach 1	3875	434.2
Haggart Creek	Reach 1	3373	407.2
Haggart Creek	Reach 1	2873	367.2
Haggart Creek	Reach 1	2371	344
Haggart Creek	Reach 1	1874	321.6
Haggart Creek	Reach 1	1374	312.1

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Haggart Creek	Reach 1	PF 1	Critical	Normal S = 0.02

SUMMARY OF MANNING'S N VALUES

River:Haggart Creek

Reach	River Sta.	n1	n2	n3
Reach 1	6858	.06	.06	.06
Reach 1	6766	.06	.06	.06
Reach 1	6671	.06	.06	.06
Reach 1	6573	.06	.06	.06
Reach 1	6463	.06	.06	.06
Reach 1	6378	.06	.06	.06
Reach 1	6273	.06	.06	.06
Reach 1	6155	.06	.06	.06
Reach 1	6079	.06	.06	.06
Reach 1	5912	.06	.06	.06
Reach 1	5713	.06	.06	.06
Reach 1	5636	.06	.06	.06
Reach 1	5558	.06	.06	.06
Reach 1	5473	.06	.06	.06
Reach 1	5373	.06	.06	.06
Reach 1	5272	.06	.06	.06
Reach 1	5173	.06	.06	.06
Reach 1	5073	.06	.06	.06
Reach 1	4980	.06	.06	.06
Reach 1	4873	.06	.06	.06
Reach 1	4770	.06	.06	.06
Reach 1	4685	.06	.06	.06
Reach 1	4573	.06	.06	.06
Reach 1	4470	.06	.06	.06
Reach 1	4372	.06	.06	.06
Reach 1	4273	.06	.06	.06
Reach 1	4173	.06	.06	.06
Reach 1	4073	.06	.06	.06
Reach 1	3983	.06	.06	.06
Reach 1	3875	.06	.06	.06
Reach 1	3763	.06	.06	.06
Reach 1	3673	.06	.06	.06
Reach 1	3563	.06	.06	.06
Reach 1	3473	.06	.06	.06
Reach 1	3373	.06	.06	.06
Reach 1	3272	.06	.06	.06
Reach 1	3173	.06	.06	.06

Reach 1	3073	.06	.06	.06
Reach 1	2973	.06	.06	.06
Reach 1	2873	.06	.06	.06
Reach 1	2773	.06	.06	.06
Reach 1	2675	.06	.06	.06
Reach 1	2549	.06	.06	.06
Reach 1	2473	.06	.06	.06
Reach 1	2371	.06	.06	.06
Reach 1	2273	.06	.06	.06
Reach 1	2173	.06	.06	.06
Reach 1	2073	.06	.06	.06
Reach 1	1973	.06	.06	.06
Reach 1	1874	.06	.06	.06
Reach 1	1775	.06	.06	.06
Reach 1	1673	.06	.06	.06
Reach 1	1576	.06	.06	.06
Reach 1	1474	.06	.06	.06
Reach 1	1374	.06	.06	.06
Reach 1	1270	.06	.06	.06
Reach 1	1174	.06	.06	.06
Reach 1	1073	.06	.06	.06
Reach 1	971	.06	.06	.06
Reach 1	908	.06	.06	.06

SUMMARY OF REACH LENGTHS

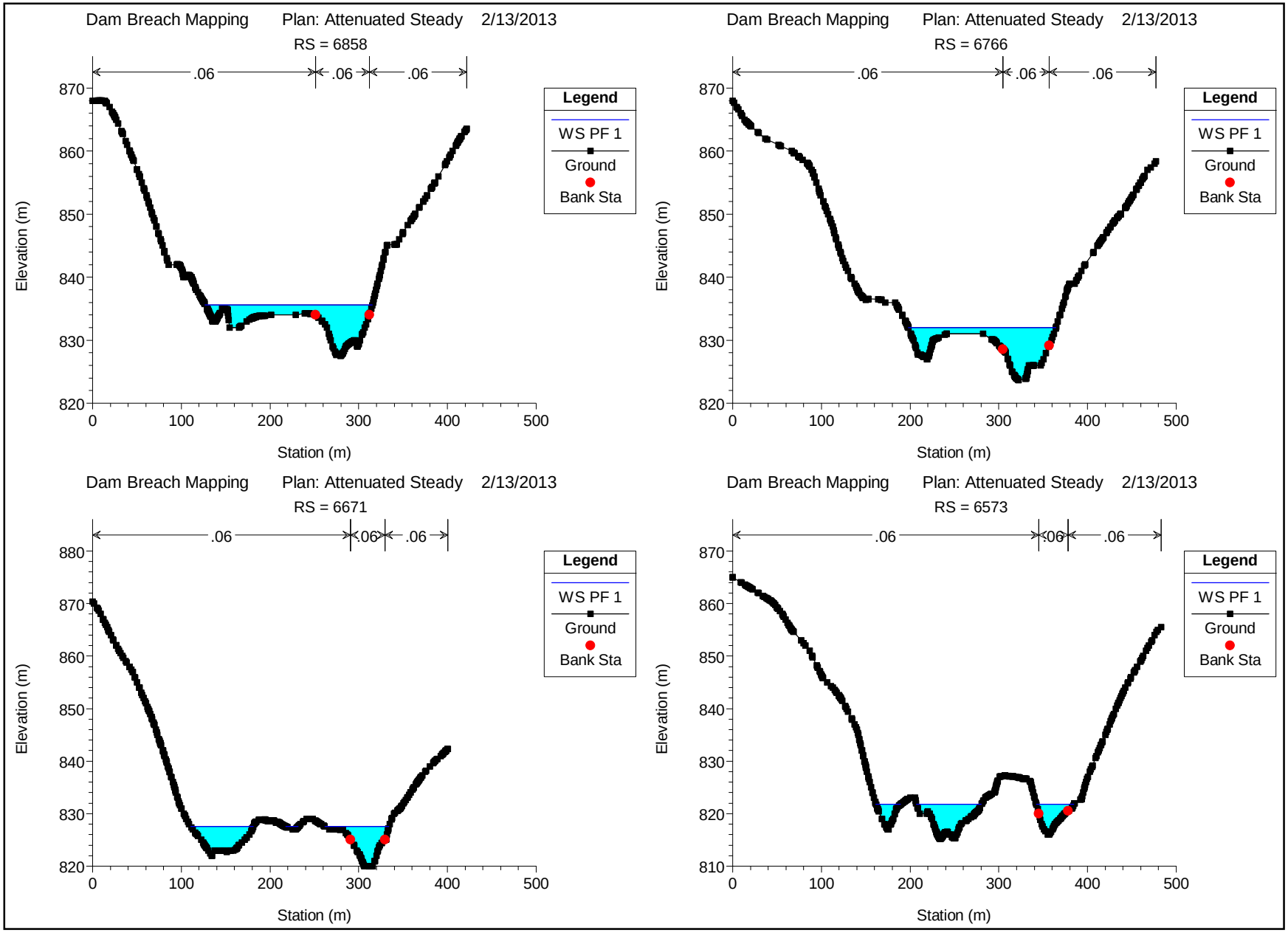
River: Haggart Creek

Reach	River Sta.	Left	Channel	Right
Reach 1	6858	93.02	91.41	89.8
Reach 1	6766	95.88	95.05	94.23
Reach 1	6671	97.91	98.39	98.86
Reach 1	6573	116.02	110.24	104.46
Reach 1	6463	87.37	85.05	82.72
Reach 1	6378	103.9	105.11	106.32
Reach 1	6273	116.8	118.5	120.19
Reach 1	6155	77.87	76.32	74.77
Reach 1	6079	158.7	166.56	174.41
Reach 1	5912	183.73	198.88	214.03
Reach 1	5713	73.18	77.19	81.21
Reach 1	5636	72.97	77.5	82.04
Reach 1	5558	86.66	85.77	84.88
Reach 1	5473	102.8	100	97.2
Reach 1	5373	99.8	100.26	100.73
Reach 1	5272	96.86	99.6	102.34
Reach 1	5173	100.21	100.26	100.31
Reach 1	5073	96.7	92.37	88.03

Reach 1	4980	106.56	107.46	108.35
Reach 1	4873	103.81	102.87	101.92
Reach 1	4770	85.51	84.63	83.75
Reach 1	4685	112.71	112.02	111.34
Reach 1	4573	99.63	102.8	105.97
Reach 1	4470	97.72	98.54	99.35
Reach 1	4372	100.21	99.19	98.18
Reach 1	4273	102.71	100	97.29
Reach 1	4173	100	100	100
Reach 1	4073	89.67	89.43	89.19
Reach 1	3983	107.06	107.85	108.64
Reach 1	3875	110.81	112.39	113.98
Reach 1	3763	89.79	89.99	90.21
Reach 1	3673	111.97	109.73	107.46
Reach 1	3563	90.58	90.36	90.14
Reach 1	3473	99.52	100.41	101.3
Reach 1	3373	100.67	100.68	100.7
Reach 1	3272	98.8	98.83	98.85
Reach 1	3173	97.87	99.89	101.9
Reach 1	3073	100.49	100.45	100.41
Reach 1	2973	99.12	100	100.88
Reach 1	2873	100	100	100
Reach 1	2773	96.98	97.99	98.99
Reach 1	2675	126.84	125.44	124.03
Reach 1	2549	76.58	76.58	76.58
Reach 1	2473	106.2	101.81	97.43
Reach 1	2371	99.87	98.19	96.5
Reach 1	2273	98.48	100	101.52
Reach 1	2173	100	100	100
Reach 1	2073	99.68	99.69	99.7
Reach 1	1973	100.43	98.55	96.66
Reach 1	1874	99.29	99.39	99.49
Reach 1	1775	102.31	102.24	102.16
Reach 1	1673	99.19	97	94.81
Reach 1	1576	102.8	102.25	101.7
Reach 1	1474	101.15	100.03	98.91
Reach 1	1374	102.64	103.37	104.11
Reach 1	1270	94.23	96.61	98.99
Reach 1	1174	100.24	100.32	100.4
Reach 1	1073	101.83	101.88	101.93
Reach 1	971	63.06	63.33	63.6
Reach 1	908	920.51	907.99	895.48

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
Reach 1	6858	PF 1	2530.30	827.53	835.61	835.61	836.97	0.014251	5.80	551.50	188.36	0.81
Reach 1	6766	PF 1	2530.30	823.64	831.98	831.98	833.50	0.012217	6.04	534.48	166.28	0.78
Reach 1	6671	PF 1	2530.30	820.00	827.52	827.52	829.12	0.017015	6.45	475.97	156.47	0.89
Reach 1	6573	PF 1	2530.30	816.00	821.74	821.74	823.38	0.024586	5.97	448.42	142.74	1.00
Reach 1	6463	PF 1	2530.30	812.00	814.08	814.08	815.49	0.023771	2.46	487.25	175.96	0.80
Reach 1	6378	PF 1	2530.30	807.00	810.84	810.84	812.40	0.018251	3.96	468.27	126.41	0.81
Reach 1	6273	PF 1	2530.30	801.00	807.98	807.98	809.75	0.026167	6.44	433.58	156.87	1.04
Reach 1	6155	PF 1	2530.30	793.00	799.16	799.16	799.90	0.017699	4.77	749.46	457.68	0.85
Reach 1	6079	PF 1	2530.30	786.84	792.88	792.88	793.76	0.020412	4.93	655.39	343.17	0.90
Reach 1	5912	PF 1	1115.80	774.00	779.15	778.06	779.87	0.010568	3.77	296.06	87.78	0.66
Reach 1	5713	PF 1	1115.80	772.00	777.81		778.30	0.005733	3.29	382.23	122.00	0.50
Reach 1	5636	PF 1	1115.80	772.00	777.43	776.07	777.88	0.004995	3.36	401.89	128.05	0.48
Reach 1	5558	PF 1	1115.80	771.00	775.97	775.97	777.19	0.014787	5.35	259.61	108.96	0.81
Reach 1	5473	PF 1	1115.80	770.00	774.61	774.61	775.73	0.018829	4.88	255.00	112.91	0.88
Reach 1	5373	PF 1	773.40	769.00	773.62		774.10	0.008332	3.47	274.88	123.37	0.59
Reach 1	5272	PF 1	773.40	767.42	772.18	772.18	772.96	0.015318	4.85	227.96	125.47	0.80
Reach 1	5173	PF 1	773.40	765.00	771.41		771.60	0.002149	2.25	447.97	160.60	0.31
Reach 1	5073	PF 1	773.40	763.00	770.31	770.31	771.14	0.009200	4.58	246.73	148.20	0.63
Reach 1	4980	PF 1	773.40	762.00	768.54	768.54	769.51	0.012410	5.18	212.78	96.94	0.71
Reach 1	4873	PF 1	557.40	761.00	765.53	765.53	766.87	0.026043	5.13	109.45	41.94	0.99
Reach 1	4770	PF 1	557.40	759.00	764.32	764.32	764.85	0.011256	3.95	219.49	169.03	0.65
Reach 1	4685	PF 1	557.40	757.00	762.66		762.97	0.003115	2.53	236.13	104.20	0.38
Reach 1	4573	PF 1	557.40	756.00	761.52		762.33	0.010702	4.00	141.12	74.88	0.67
Reach 1	4470	PF 1	557.40	755.00	760.07	759.64	760.96	0.016959	4.18	133.74	84.12	0.79
Reach 1	4372	PF 1	468.10	754.00	757.83	757.83	758.96	0.024923	4.77	101.25	121.08	0.96
Reach 1	4273	PF 1	468.10	752.00	756.22		756.81	0.009331	3.75	148.10	60.45	0.63
Reach 1	4173	PF 1	468.10	751.00	755.07		755.82	0.010287	3.91	128.23	48.14	0.66
Reach 1	4073	PF 1	468.10	750.00	754.22		754.79	0.009168	3.37	142.83	51.77	0.61
Reach 1	3983	PF 1	468.10	749.00	753.63	752.54	754.05	0.006683	2.89	165.25	57.04	0.52
Reach 1	3875	PF 1	434.20	748.00	752.80		753.33	0.006606	3.24	137.34	61.73	0.53
Reach 1	3763	PF 1	434.20	747.00	750.61	750.61	751.98	0.022993	5.24	86.06	66.64	0.96
Reach 1	3673	PF 1	434.20	745.27	748.80		749.43	0.011161	3.58	127.21	100.70	0.67
Reach 1	3563	PF 1	434.20	744.00	748.17		748.52	0.005437	2.68	166.96	69.68	0.47
Reach 1	3473	PF 1	434.20	743.00	747.58		748.02	0.005645	2.94	150.74	59.36	0.49
Reach 1	3373	PF 1	407.20	742.00	745.53	745.53	746.93	0.022942	5.30	80.28	106.10	0.95
Reach 1	3272	PF 1	407.20	740.00	743.99		744.27	0.004964	2.58	186.38	82.92	0.45
Reach 1	3173	PF 1	407.20	738.00	742.04	742.04	743.21	0.028628	4.79	85.10	37.54	1.01
Reach 1	3073	PF 1	407.20	737.00	738.37	738.37	738.99	0.033750	3.47	117.20	96.22	1.00
Reach 1	2973	PF 1	407.20	735.05	738.34		738.40	0.001232	1.15	368.61	145.68	0.22
Reach 1	2873	PF 1	367.20	735.05	738.12		738.24	0.002203	1.63	244.94	98.98	0.30
Reach 1	2773	PF 1	367.20	735.00	737.72	736.67	737.93	0.004460	2.06	186.48	83.79	0.41
Reach 1	2675	PF 1	367.20	734.00	737.11		737.40	0.006501	2.55	172.65	111.83	0.50
Reach 1	2549	PF 1	367.20	733.12	735.25	735.25	735.93	0.024695	3.78	105.43	75.96	0.91
Reach 1	2473	PF 1	367.20	731.93	733.95		734.19	0.010190	2.13	172.10	120.34	0.57
Reach 1	2371	PF 1	344.00	730.61	733.02		733.27	0.007962	2.26	161.68	106.83	0.53
Reach 1	2273	PF 1	344.00	729.43	732.56		732.71	0.003866	1.69	209.90	120.86	0.37
Reach 1	2173	PF 1	344.00	729.30	731.56		732.00	0.014675	3.21	127.15	96.28	0.72
Reach 1	2073	PF 1	344.00	728.30	730.91		731.11	0.005244	2.17	182.68	104.39	0.45
Reach 1	1973	PF 1	344.00	727.30	729.99		730.39	0.009858	3.05	132.04	78.34	0.61
Reach 1	1874	PF 1	321.60	726.30	729.41		729.67	0.005002	2.34	153.77	76.19	0.45
Reach 1	1775	PF 1	321.60	725.30	728.56		728.99	0.009125	3.02	116.35	59.10	0.59
Reach 1	1673	PF 1	321.60	724.30	727.76		728.16	0.007113	2.96	122.18	54.41	0.54
Reach 1	1576	PF 1	321.60	723.30	726.46	726.24	727.15	0.015698	3.93	93.84	50.42	0.78
Reach 1	1474	PF 1	321.60	721.71	724.58	724.46	725.35	0.019618	4.03	87.16	49.50	0.85
Reach 1	1374	PF 1	312.10	720.30	722.95		723.47	0.016663	3.29	102.45	69.07	0.76
Reach 1	1270	PF 1	312.10	719.30	721.81		722.14	0.009495	2.68	129.58	80.43	0.59
Reach 1	1174	PF 1	312.10	718.30	720.60	720.36	720.98	0.015371	3.35	119.85	89.88	0.74
Reach 1	1073	PF 1	312.10	717.30	719.18		719.50	0.013762	2.77	131.22	110.23	0.68
Reach 1	971	PF 1	312.10	716.30	718.19		718.42	0.008139	2.18	154.06	110.47	0.53
Reach 1	908	PF 1	312.10	715.30	717.16	717.11	717.63	0.020023	3.23	112.18	103.70	0.81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2/13/2013
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Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
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.06
.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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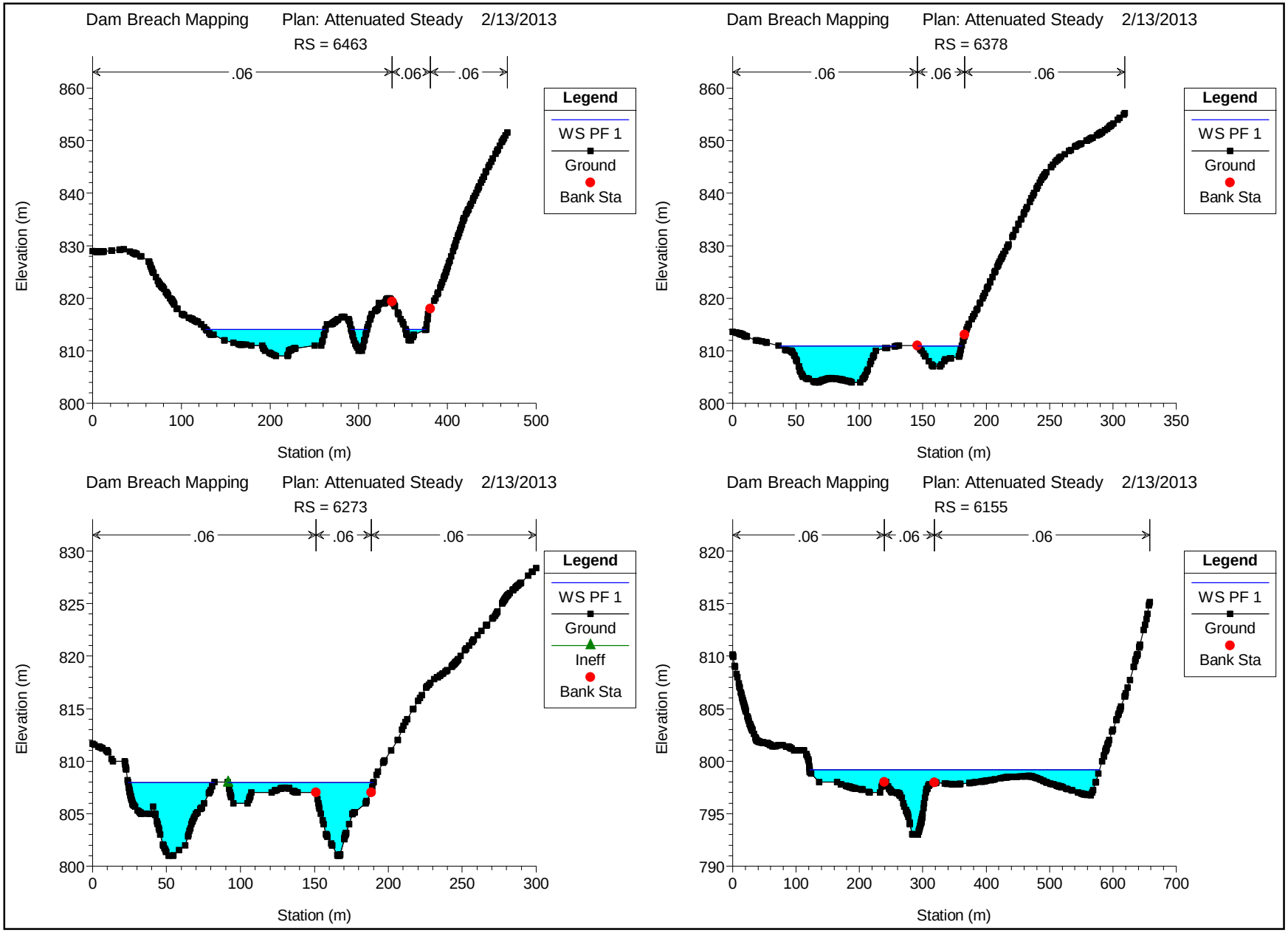
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)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Station (m)
Legend
WS PF 1
Ground
Bank Sta
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Plan: Attenuated Steady
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Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Bank Sta
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 6273
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Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
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Plan: Attenuated Steady
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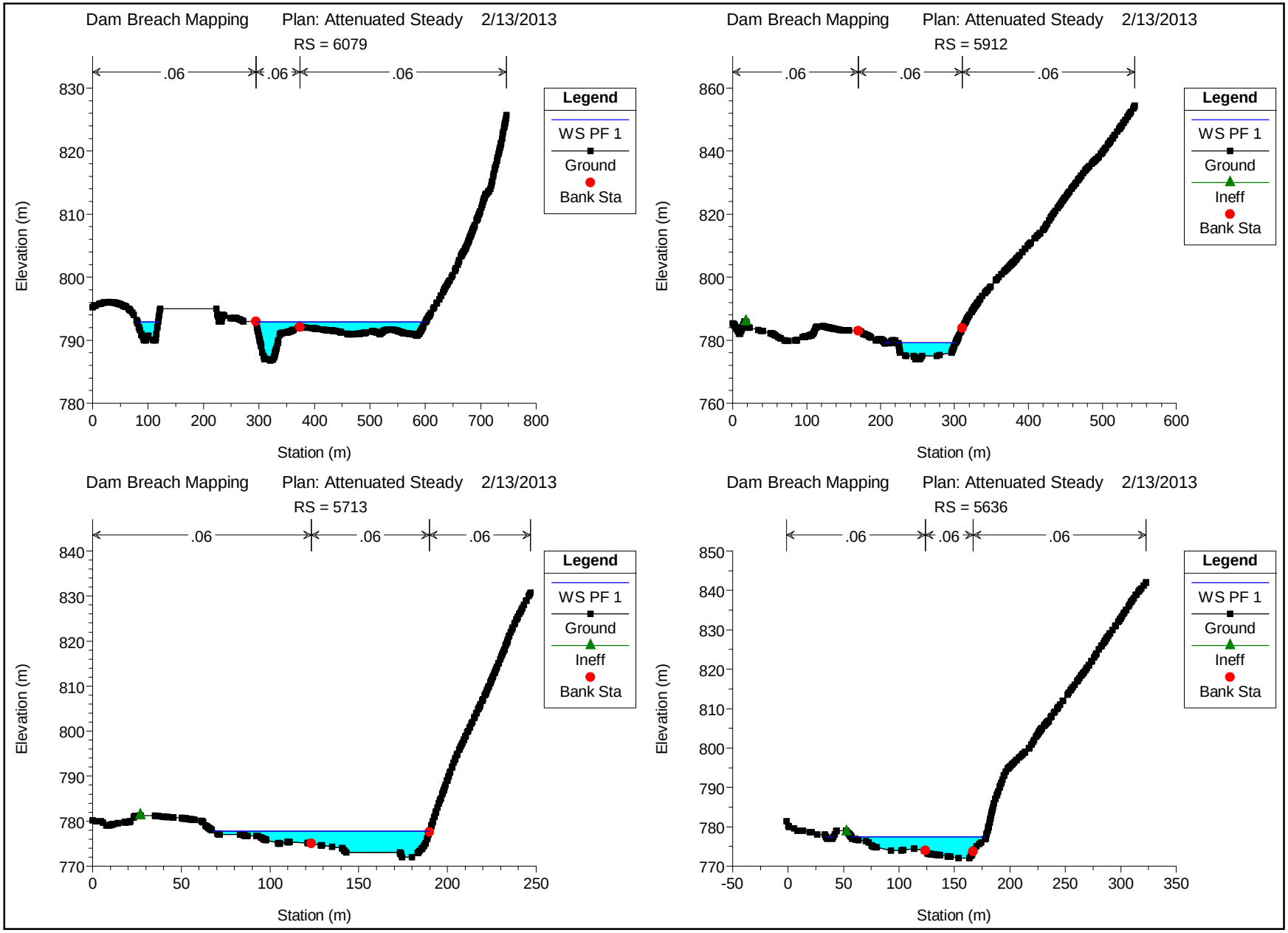
Station (m)
Legend
WS PF 1
Ground
Bank Sta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Legend
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Ground
Bank Sta
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Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 5912
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Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 5713
.06
.06
.06
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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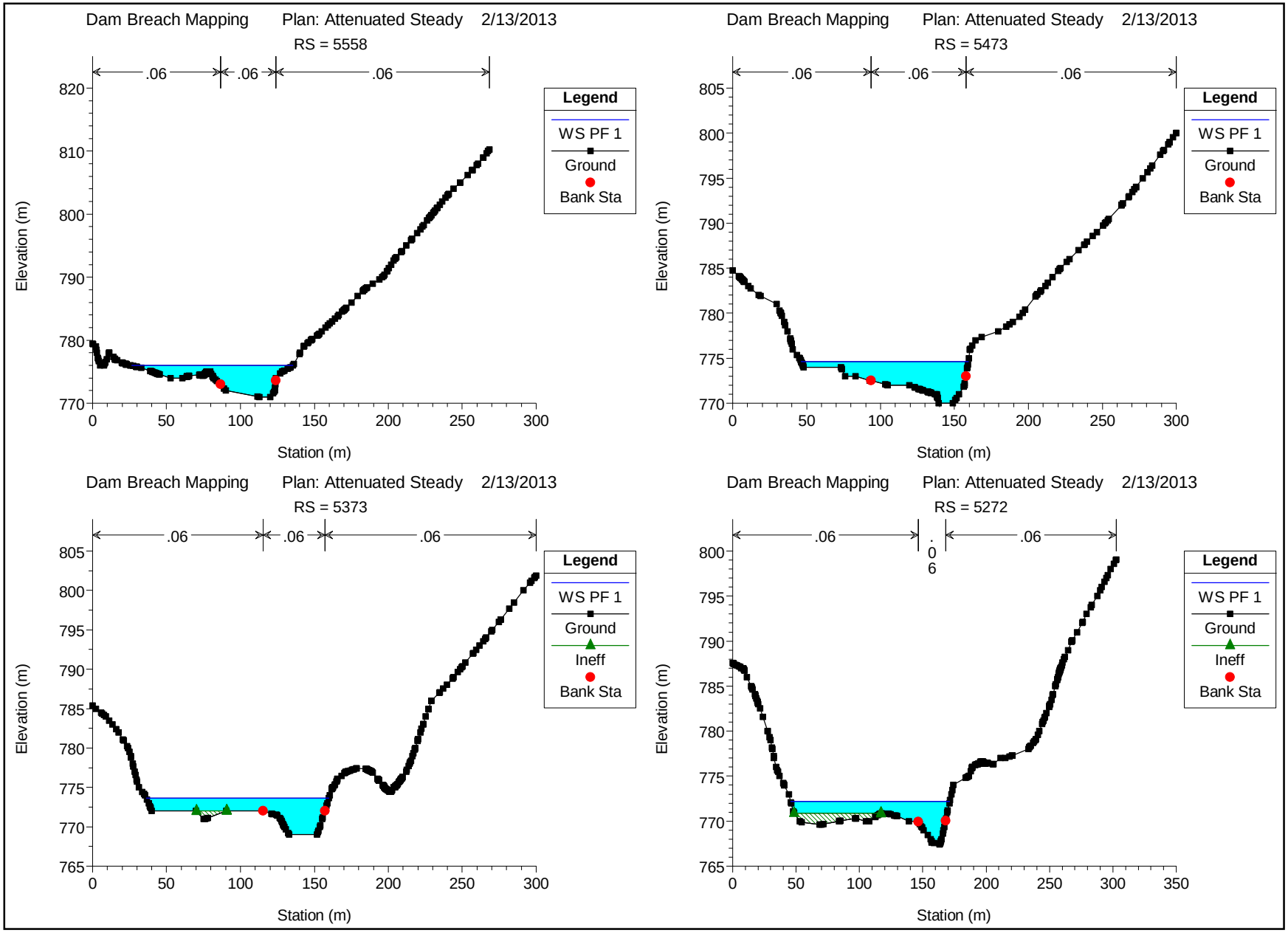
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)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Legend
WS PF 1
Ground
Bank Sta
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Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 5473
.06
.06
.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 5373
.06
.06
.06
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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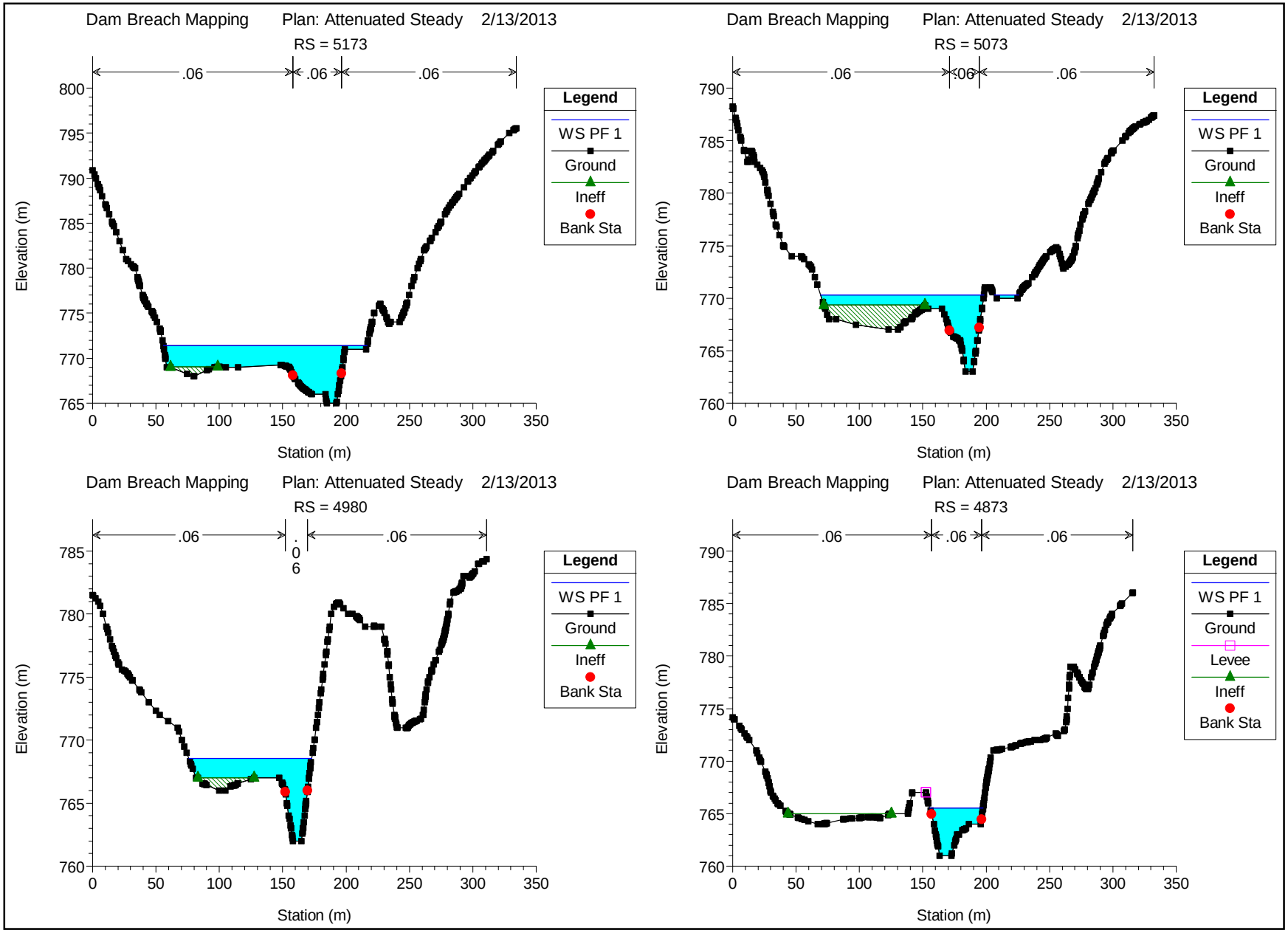
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)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2/13/2013
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Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 5073
.06
.06
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 4980
.06
.06
.06
Elevation (m)
Station (m)
Legend
WS PF 1
Ground
Ineff
Bank Sta
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
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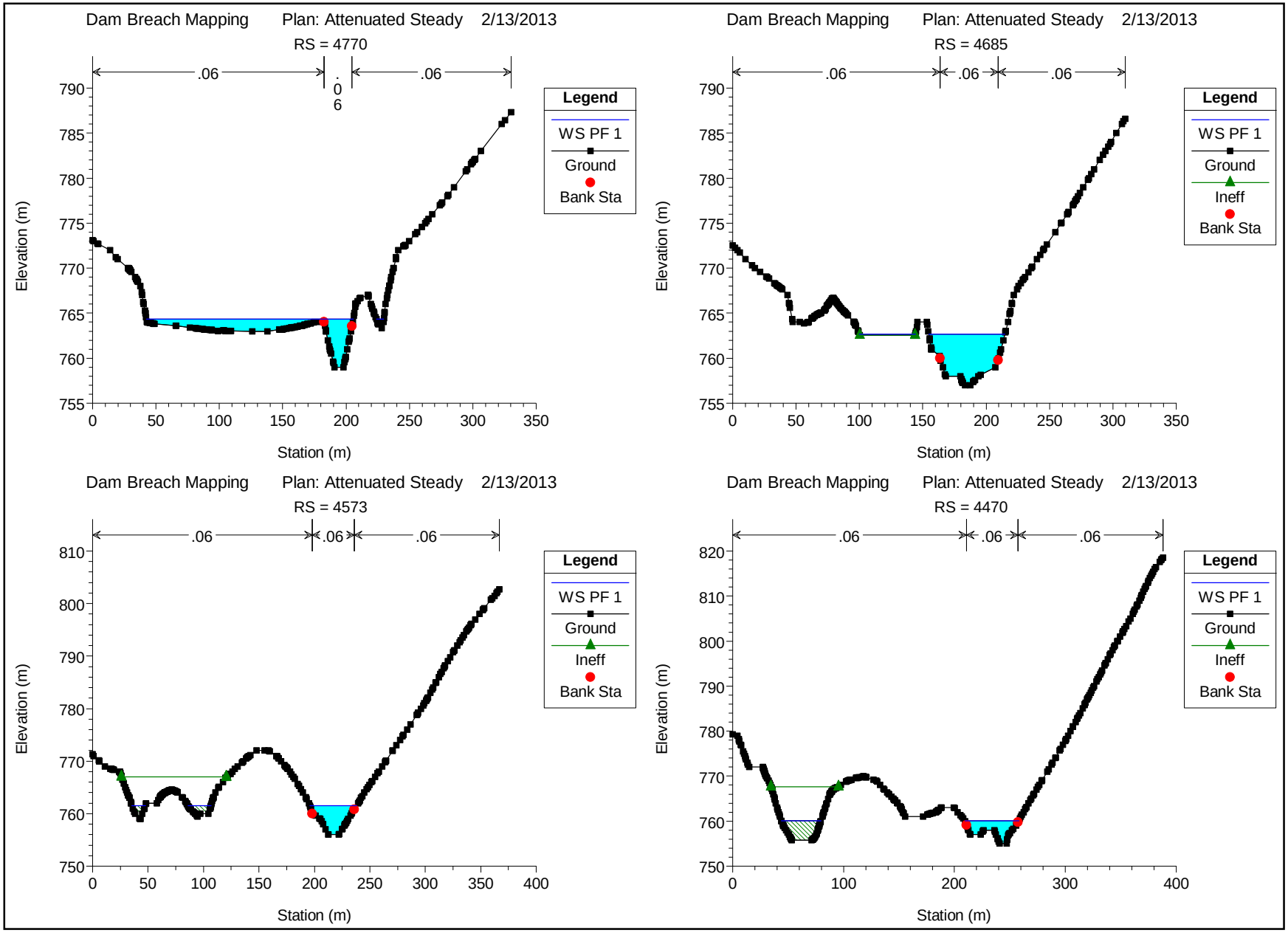
Station (m)
Legend
WS PF 1
Ground
Levee
Ineff
Bank Sta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Plan: Attenuated Steady
2/13/2013
RS = 4770
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.06
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Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 4685
.06
.06
.06
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 4573
.06
.06
.06
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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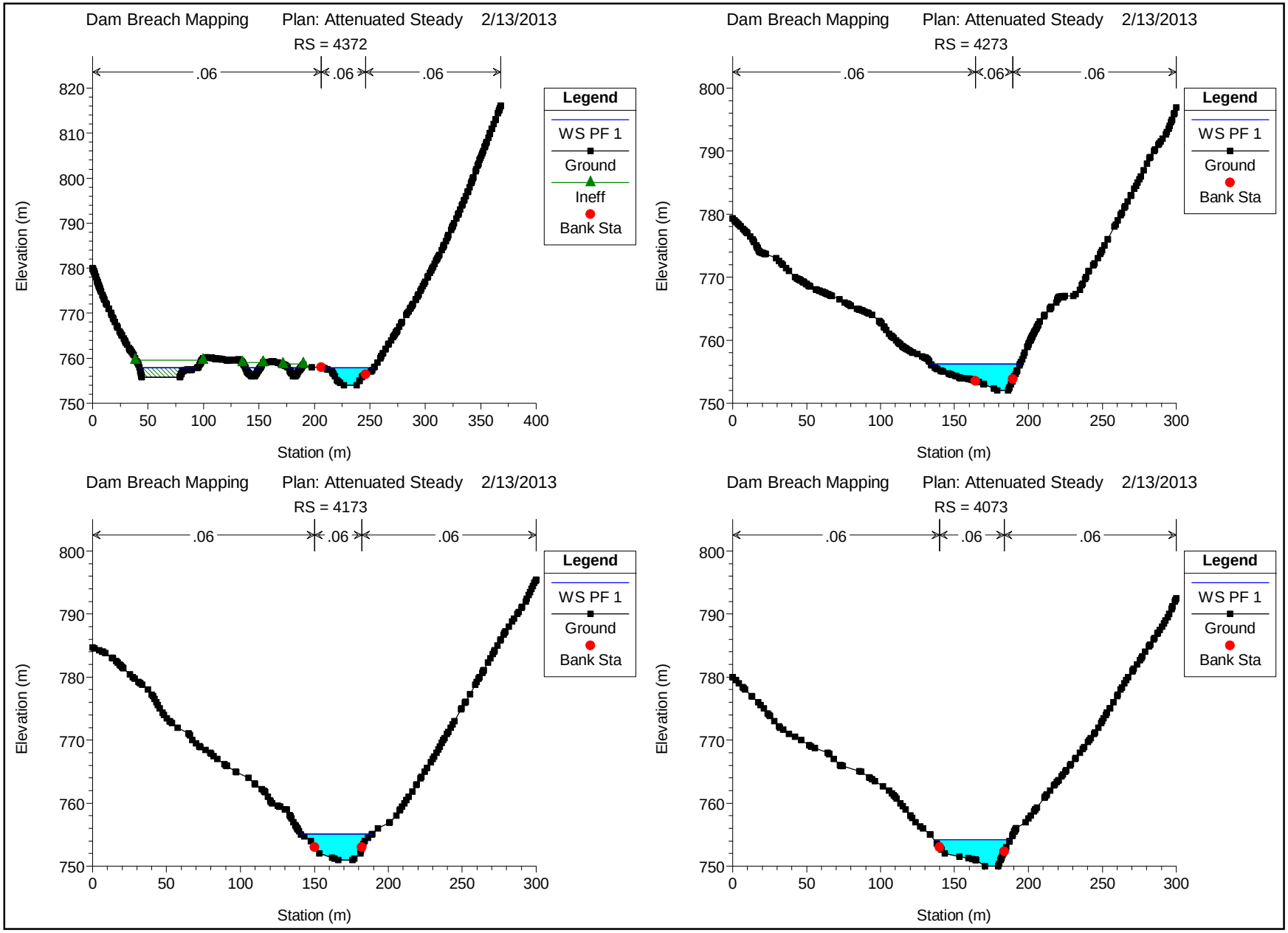
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)


Dam Breach Mapping
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Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 4273
.06
.06
.06
Legend
WS PF 1
Ground
Bank Sta
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Station (m)
Dam Breach Mapping
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2/13/2013
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.06
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Ground
Bank Sta
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Station (m)
Dam Breach Mapping
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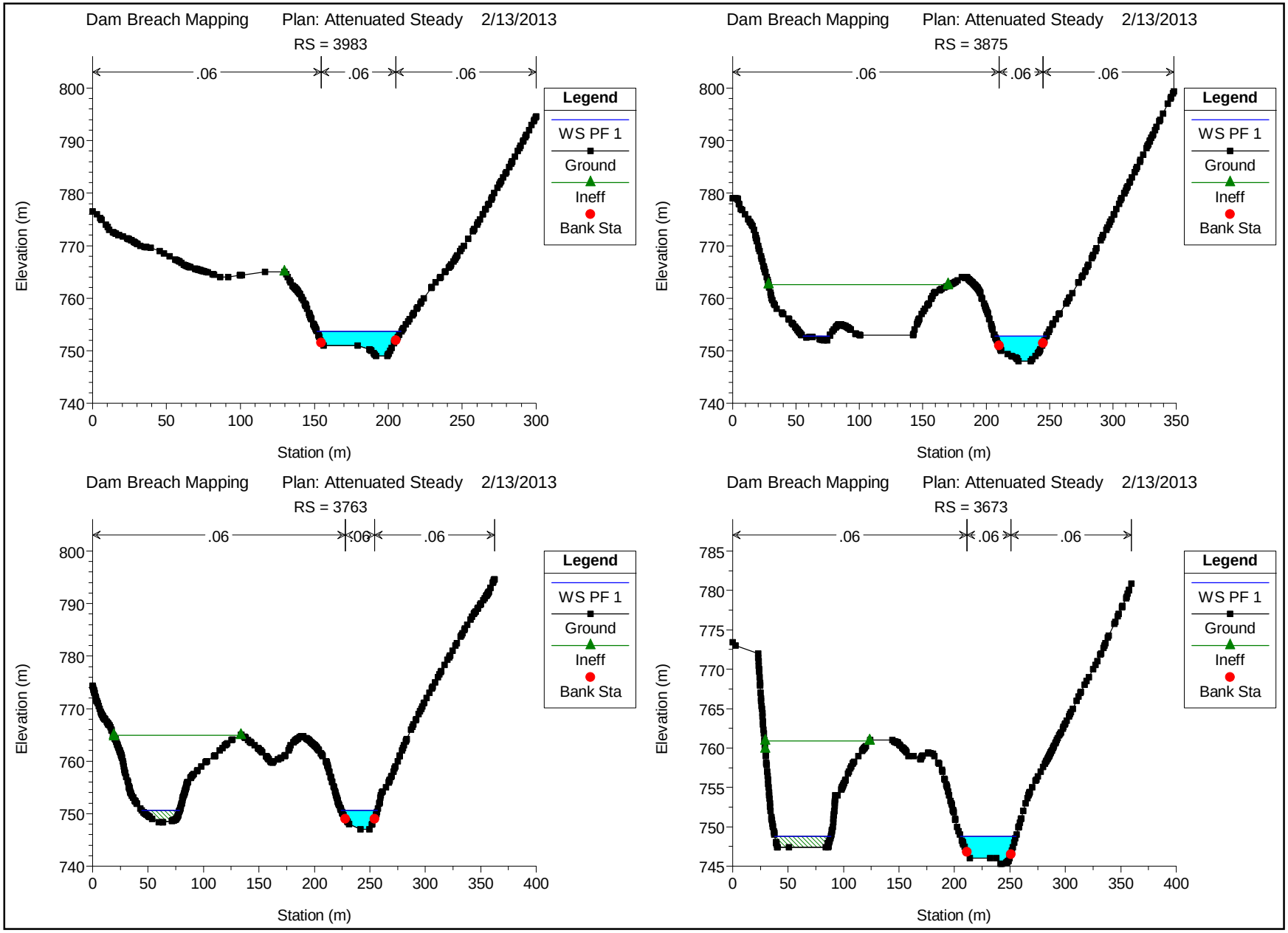
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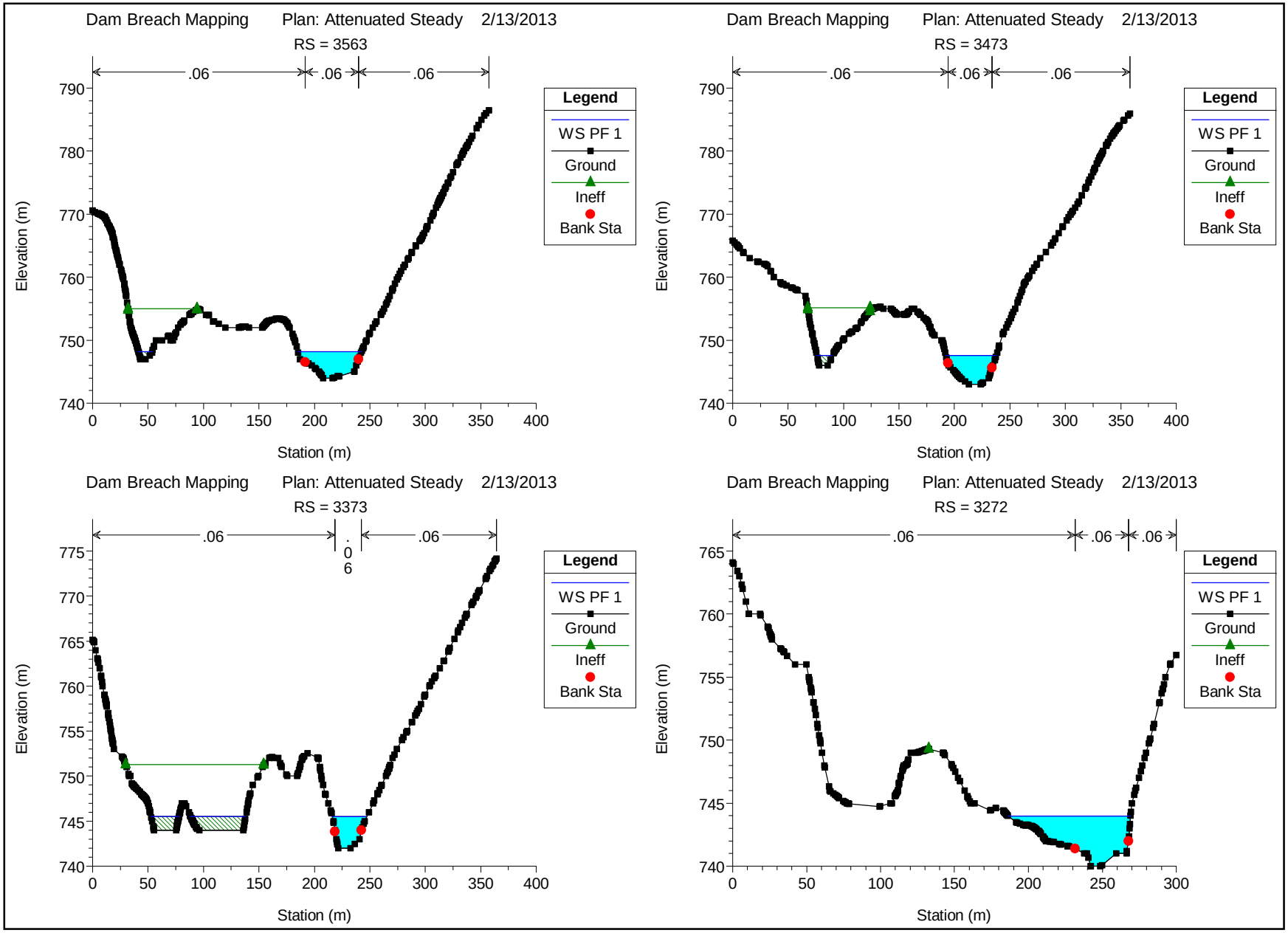
Station (m)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Ineff
Bank Sta
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Station (m)
Dam Breach Mapping
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.06
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Ineff
Bank Sta
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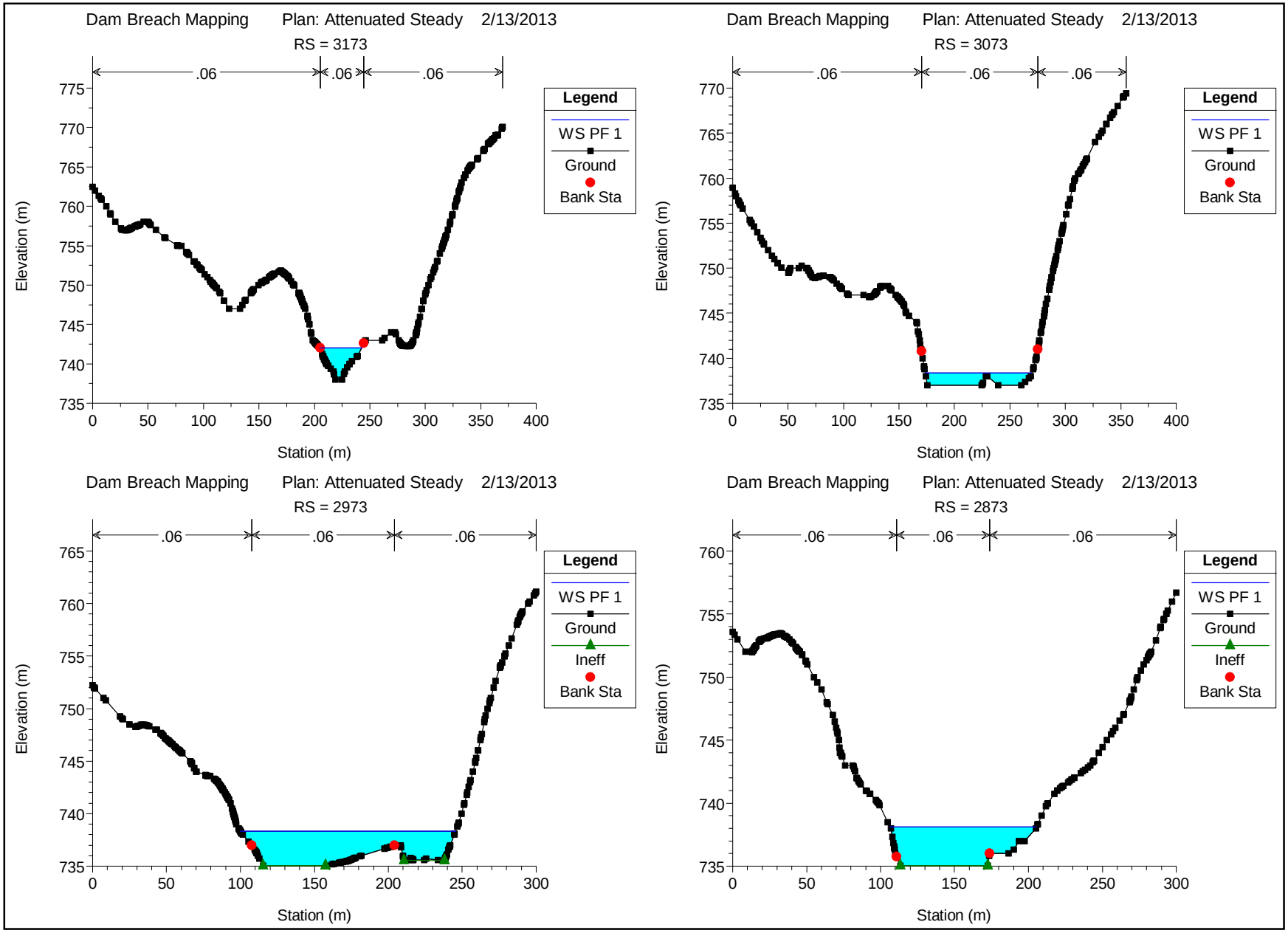
Station (m)


Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 3173
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Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 2973
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Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
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Ineff
Bank Sta
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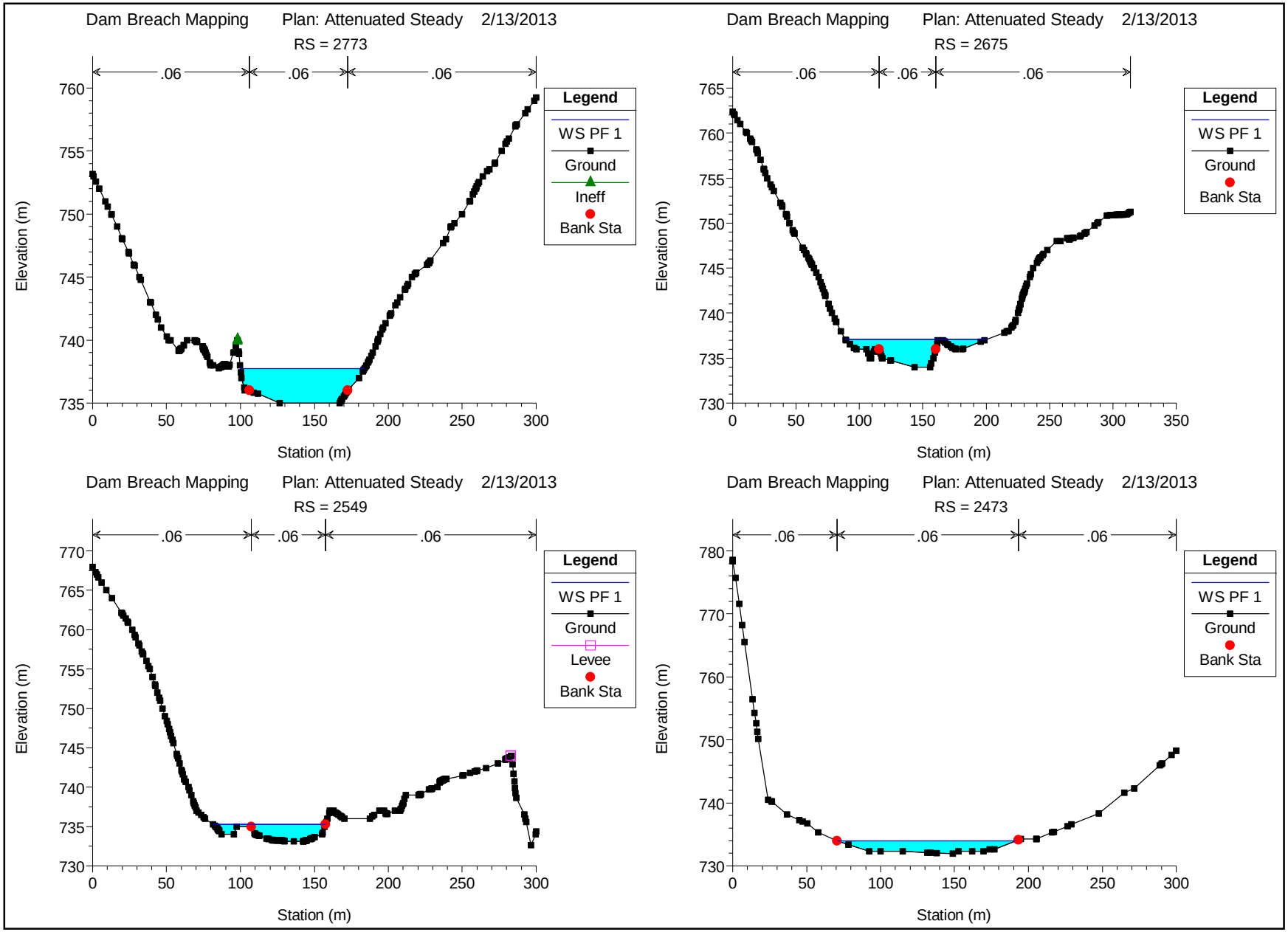
Station (m)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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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Bank Sta
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Station (m)
Dam Breach Mapping
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Levee
Bank Sta
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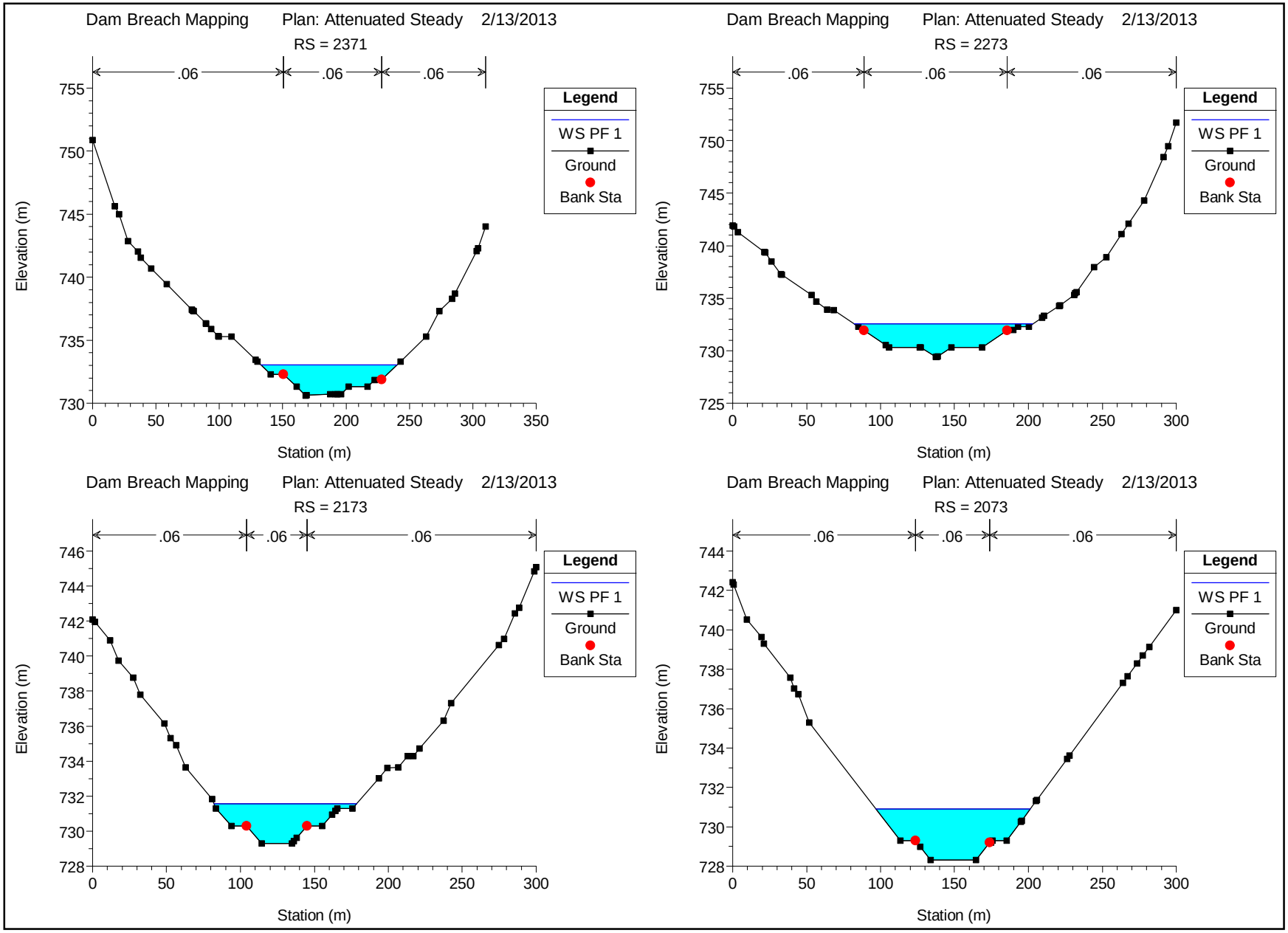
Bank Sta
Elevation (m)
Station (m)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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
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Station (m)
Dam Breach Mapping
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2/13/2013
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.06
Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
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.06
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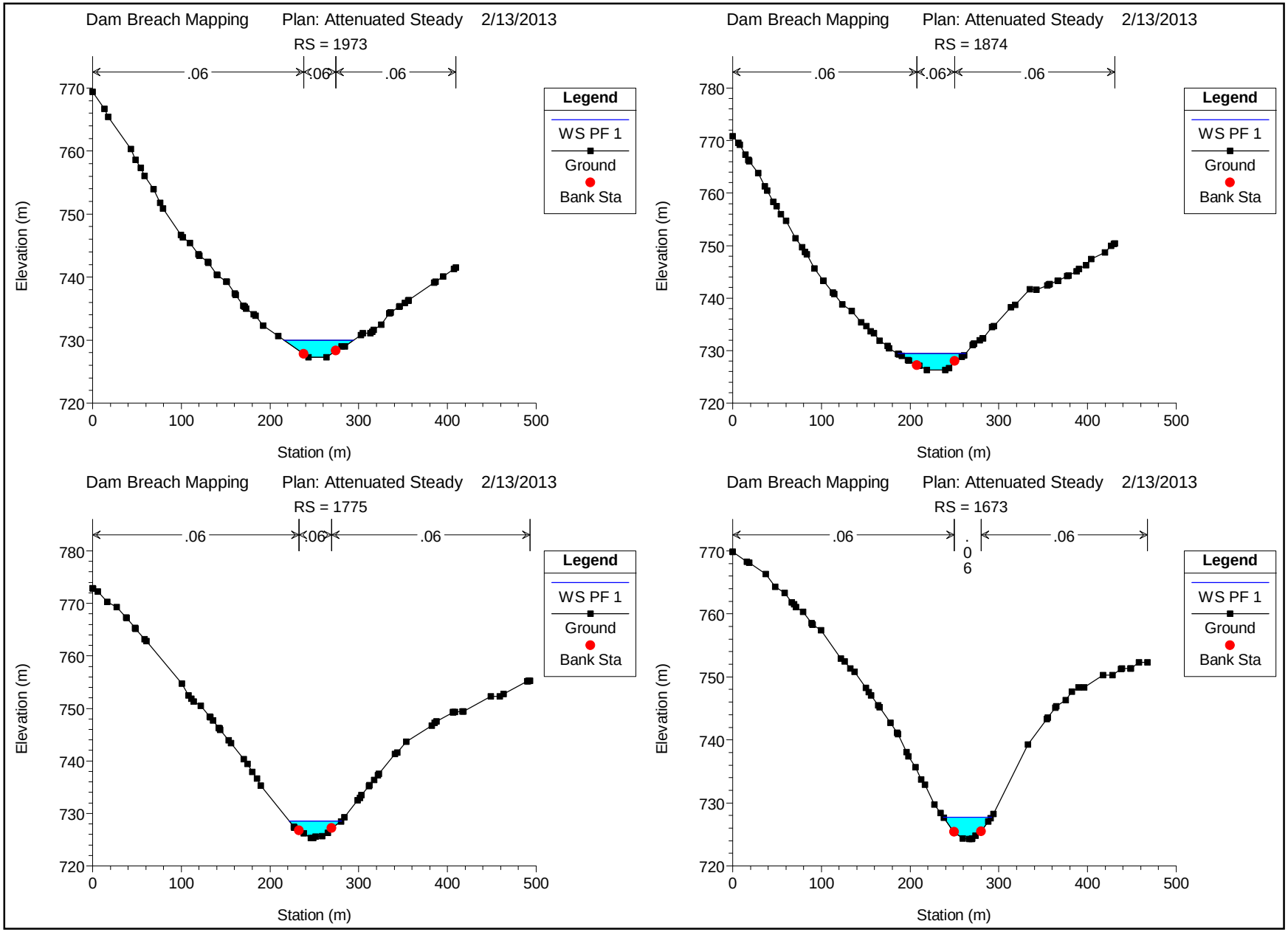
Ground
Bank Sta
Elevation (m)
Station (m)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Bank Sta
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Dam Breach Mapping
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2/13/2013
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Bank Sta
Elevation (m)
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RS = 1775
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Legend
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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
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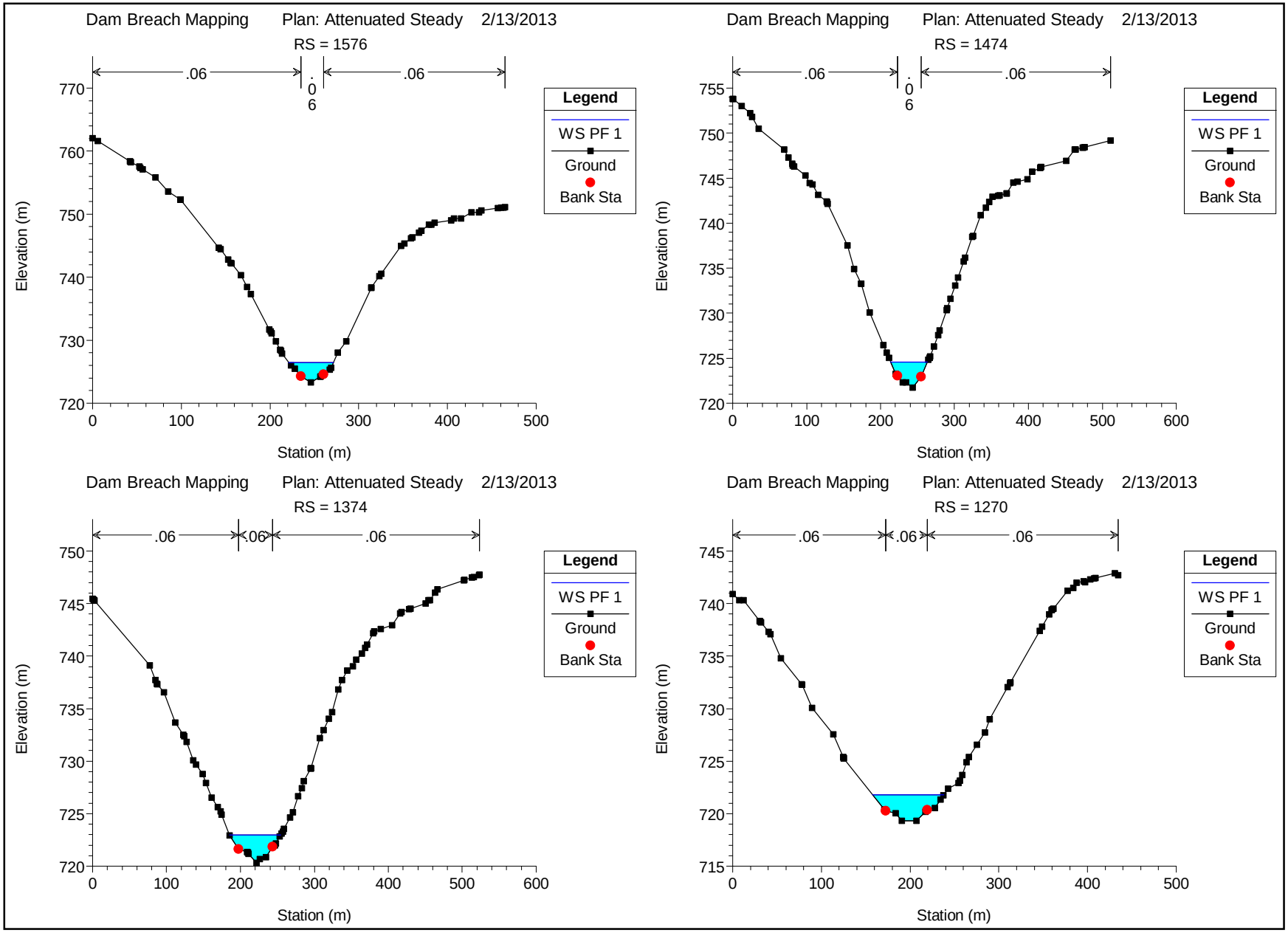
Bank Sta
Elevation (m)
Station (m)


Dam Breach Mapping
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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 1474
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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
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2/13/2013
RS = 1374
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WS PF 1
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Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
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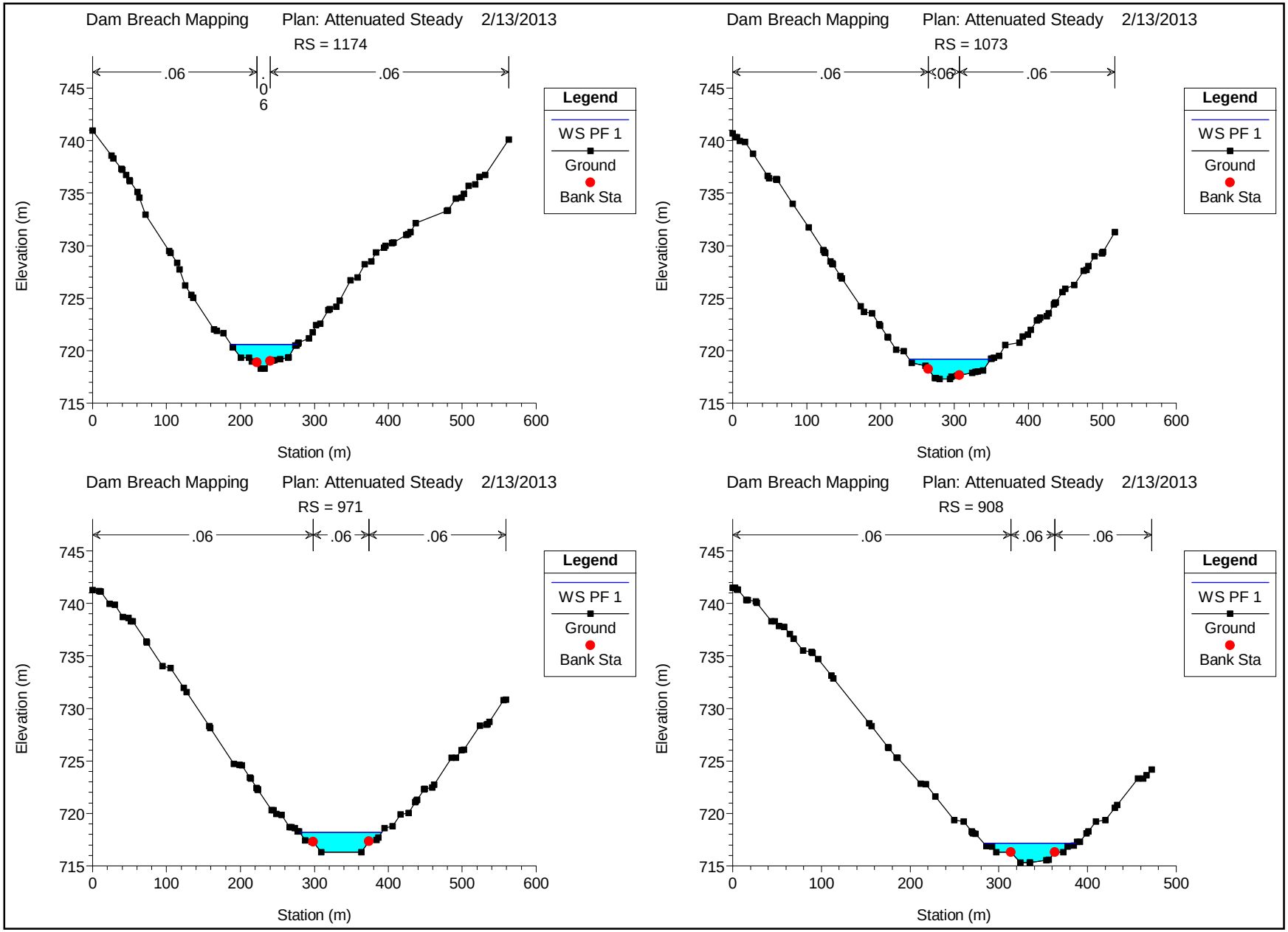
Bank Sta
Elevation (m)
Station (m)


Dam Breach Mapping
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2/13/2013
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Legend
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Bank Sta
Elevation (m)
Station (m)
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740
735
730
725
720
715
0
100
200
300
400
500
600
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 1073
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Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 971
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Legend
WS PF 1
Ground
Bank Sta
Elevation (m)
Station (m)
Dam Breach Mapping
Plan: Attenuated Steady
2/13/2013
RS = 908
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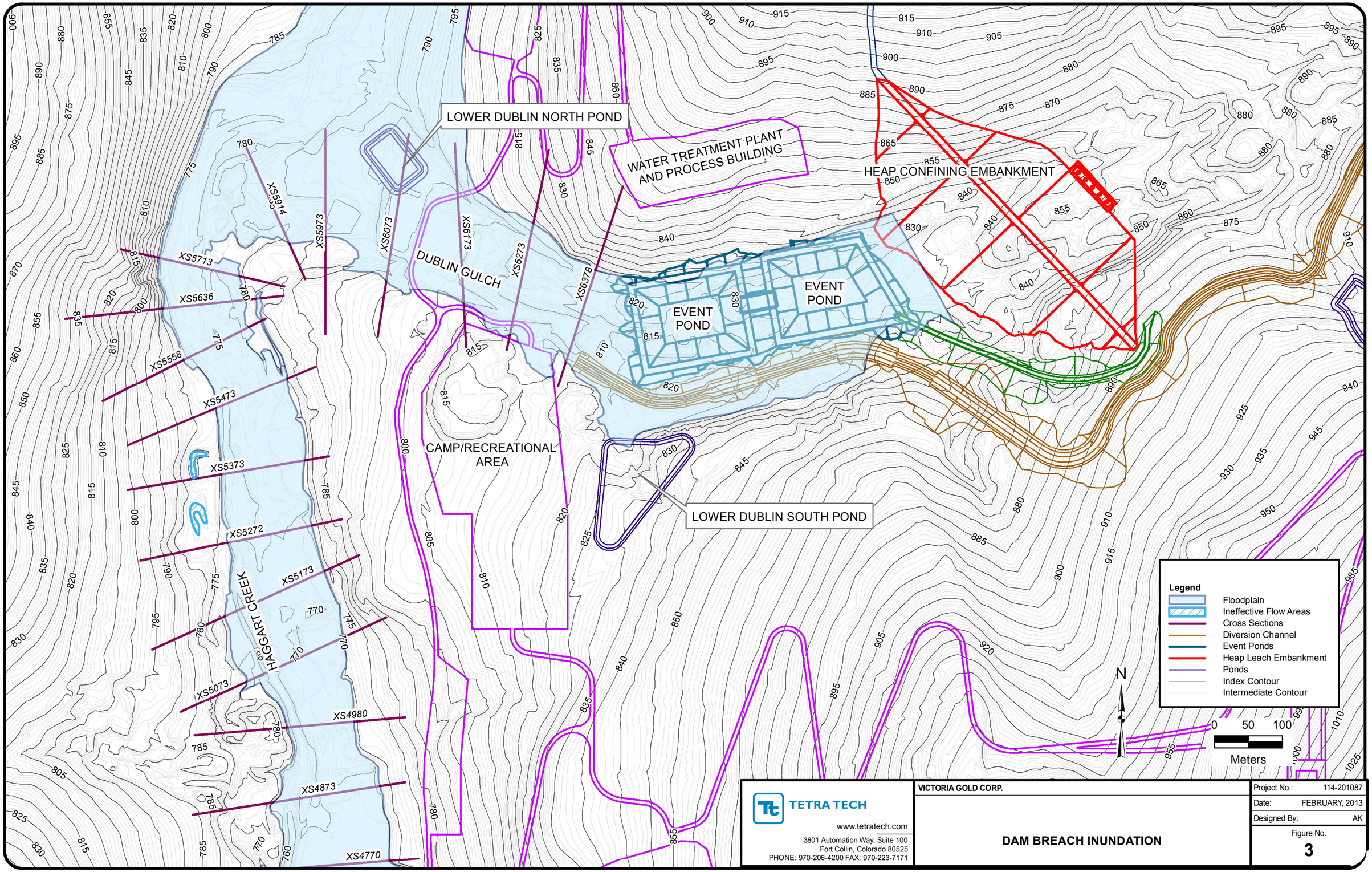
Ground
Bank Sta
Elevation (m)
Station (m)

APPENDIX F
DAM BREACH INUNDATION MAP



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VICTORIA GOLD CORP.

DAM BREACH INUNDATION

Project No.:	114-201087
Date:	FEBRUARY, 2013
Designed By:	AK
Figure No.	3

APPENDIX E – DAM FILTER DESIGN CALCULATIONS

TETRA TECH

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Technical Memorandum

To:	File	**From:**	Troy Meyer, P.E., P Eng
Company:	Tetra Tech	**Date:**	21 March 2013
Re:	Eagle Gold HLF – Embankment Filter Design	**Project #:**	114-201087
CC:			

Introduction

This memo presents the detailed design for the filter zone that is located between the subliner material and the embankment structural fill.

The Eagle Gold Heap Leach Facility (HLF) has been designed as a fully lined pad with internal solution pond. The feasibility-level design of the HLF embankment consists of the following elements, from the top down:

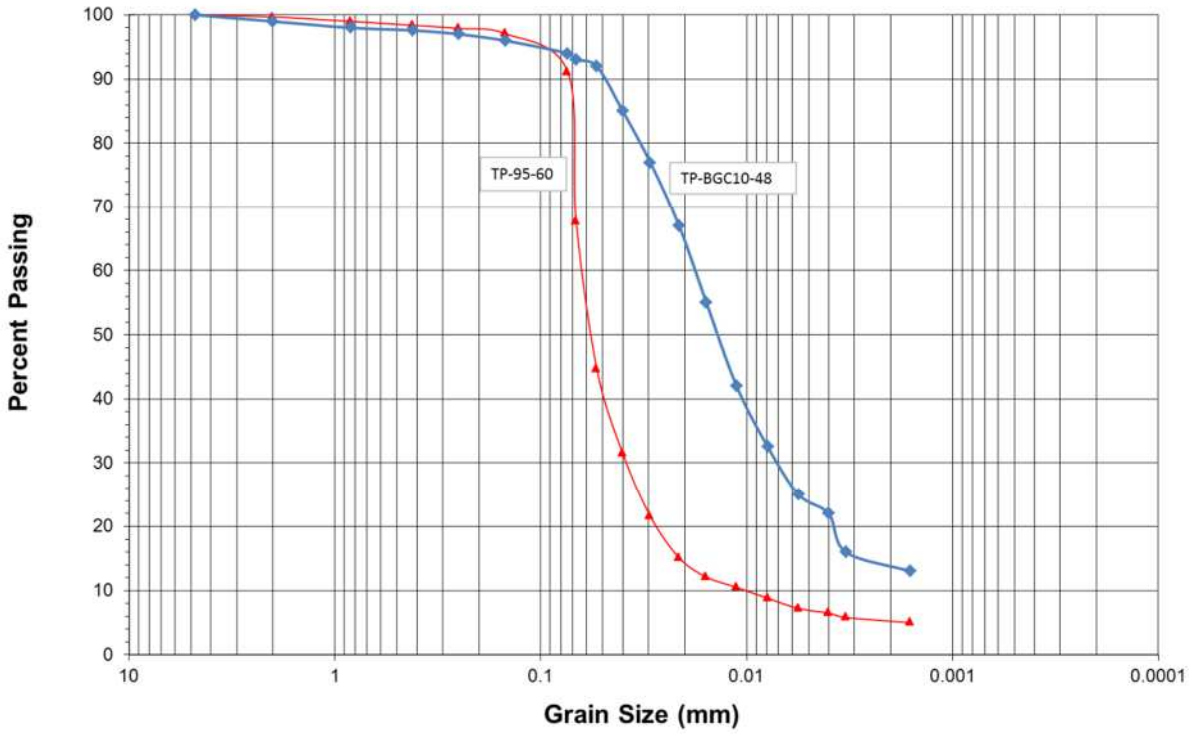
1. A zone of crushed and agglomerated ore,
2. Over Drain Fill (ODF) consisting of a 1000 mm thickness of permeable granular material (minus 38 mm crushed durable gravel) and perforated pipes.
3. A linear low density polyethylene (LLDPE) upper geomembrane liner.
4. A high load drainage net
5. A linear low density polyethylene (LLDPE) upper geomembrane liner.
6. A low permeability GCL overlying the prepared foundation subgrade. The liner bedding material must be filter compatible with the filter zone, preventing migration of the solids (piping) in the unlikely event of hydraulic head transferring through an opening in the liner system.
7. Filter zone(s).
8. Embankment structural fill.

Filter Design

The filter design and resulting filter zone material specification is based on U.S. Dept. of Agriculture National Resource Conservation Service (NRCS 1994) filter selection criteria and the grain size distribution of the site materials from laboratory test work conducted by BGC (2010) and Golder Associates (1995). The following steps were performed:

Step 1 – Plot grain size curve of base soil (see Figure 1). These gradations represent the range of expected materials from the identified borrow sources.

Figure 1 - Base Soil Gradation Curves



Step 2 – Proceed to Step 4 if the base soil contains no gravel (+4.76 mm)

Step 3 – (this step is skipped since tailings contains no gravel)

Step 4 – Determine base soil category based on fines content (percent finer than 0.074 mm).

Base soil contains 91 – 94% fines.

Soil category 1 – Fine Silt and Clays

Step 5 – Determine maximum D_{15} of the filter for filtration requirements.

Base soil category 1: $D_{15,max} \leq 9 \times D_{85}$ but not less than 0.2mm

$D_{15,max} \leq 0.495$ mm

Step 6 and 7 – Determine minimum D_{15} of the filter for permeability requirements.

Step 6 does not apply. The minimum D_{15} is not a requirement for the HLF embankment since the seepage from a potential leak through the double liner system is expected to be is very small compared to the capacity of the drain Also, since $D_{15,max}/D_{15,min} < 5$, adjustment of filter band width (Step 7) does not apply. Based on the gradational data, the following was chosen:

$D_{15,min} \geq 0.1$ mm

Step 8 – Coefficient of Uniformity (C_u) to prevent gap grading.

Coefficient of uniformity (C_u) of less than 6 will be specified for the drain material to ensure gap-graded materials and not used. For the purposes of providing a specification, the following was chosen:

$D_{60,min} \geq 0.5$ mm

Step 9 – Determine minimum D_5 & maximum D_{100} of the Filter Material from NRCS Table 26-5.

The D_5 value is not a factor since the tailings permeability is 10^{-7} cm/s and overdrain permeability is 10^{-3} cm/s. The D_{100} was chosen from the table as follows:

$D_{50,min} = .075$ mm

$D_{100,max} \leq 3$ inches (75 mm)

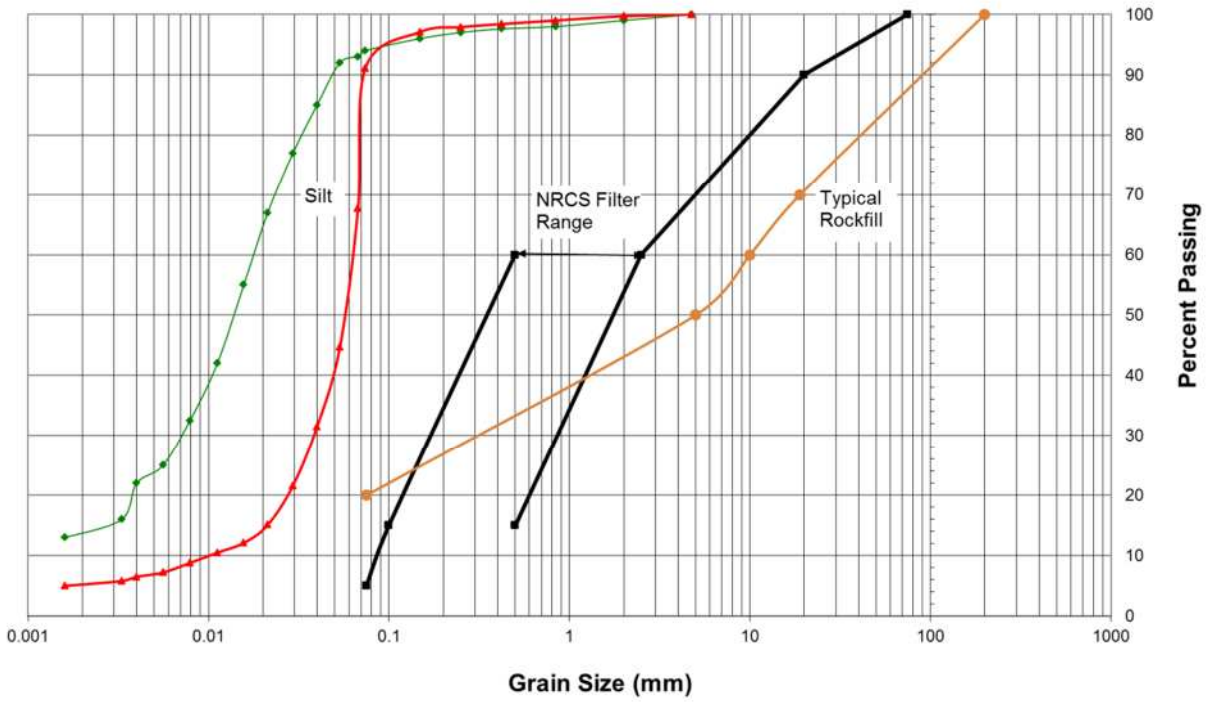
Step 10 – Determine maximum D_{90} for the Filter Material based on $D_{10,min}$ and NRCS Table 26-6

$\Rightarrow$ from Table 26-6 $D_{90,max} = 20$ mm

Step 11 – Connect the points to form the design for the filter band. Extrapolate to complete the curves.

Figure 2 presents the filter design based on NRCS criteria with gradation curves for representative liner bedding material.

Figure 2 - Filter Design Results



Based on the filter design, the suggested gradational specifications for the filter are shown in Table 1.

Table 1 – Specification for Filter Material

US Sieve Size	**% Passing by Weight**
3 inch (75 mm)	100
No. 4	70-100
No. 40	15-60
No. 200	0-5

Note: Coefficient of uniformity (C_u) shall be less than 6.

APPENDIX F – SOLUTION DRAIN PIPE DESIGN

TETRA TECH

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Technical Memorandum

To:	File	**From:**	Morris Riback, P.E.
Company:	StrataGold Corp.	**Date:**	March 28, 2013
Re:	Eagle Gold Project – Heap Leach Facility Phase 1 Solution Conveyance Pipe Design	**Doc #:**	20/13-201087-5.3
CC:	Troy Meyer, P.E., P.Eng (Tetra Tech)		

Introduction

The designed heap leach pad will contain a piping network that will be distributed throughout the limits of the facility and will accommodate the volumes from a 100-year, 24-hour storm in addition to 150% of the flow generated from the applied leaching solution. The drain pipes are located within the free-draining Overliner Drain Fill (ODF) material placed above the pad liner and will collect and convey the stormwater and Pregnant Leach Solution (PLS) to the designated pond.

Basis of Design

The following parameters were used in the Heap Leach Pad drain pipe sizing calculations. These parameters were based on the design criteria and on standard engineering practice.

- The 100-year, 24-hour storm event precipitation is 86.7 mm.
- The (design) average leaching solution application flow rate is 2,770 m^3/hr.
- Total flow capacity to be accounted for in the pads' drainage pipe system was comprised of the 100-year, 24-hour storm event plus 150% of the design leaching application flow rate (4,155 m^3/hr). Primary pipe spacing is based on the unit leaching rate (10 l/hr/m^2)
- Manning's "n" of 0.014 was selected for the perforated ADS N12 pipes to account for the roughness of the manufactured perforations and for wear over time.
- Flow conditions assumed pipes were 85% full for maximum conveyance under gravity.
- Drainage sections were divided and grouped in terms of similar average slopes over the length of the entire section area.
- The ODF permeability is equivalent to 2 x 10^{-2} cm/sec or greater under a 91 m maximum ore heap load.
- The drain system design conservatively assumed no moisture absorption or retention losses in the ore material.

Methodology

The calculations assumed that the ODF has been placed over the entire pad footprint and that the 86.7 mm of precipitation is evenly distributed throughout the 24-hours of the storms duration; therefore resulting in no peak flow occurrences. Pipe capacities are calculated using Manning's equation shown below (Chow, 1959).

$$\mathbf{Q = (1/n) \times A \times (R)^{2/3} \times (S)^{1/2}}$$ where:

Q = discharge (cms)

n = Manning's roughness coefficient

A = cross sectional area of the pipe (m^2)

$\mathbf{(R)^{2/3}}$ = hydraulic radius at 85% capacity (m)

$\mathbf{(S)^{1/2}}$ = pipe slope (m/m)

Note: Pipe design slopes were obtained from the design contours within the Heap Leach Pad limits.

In order to maximize the efficiency of the ore's drainage and to minimize the potential for leakage through the pads' liner system, the hydraulic head above the liner was designed to be less than a maximum height of 1.5 m. Drain pipe spacing was determined by the equation below for estimating the peak hydraulic head on the pads' liner system between drain pipes (McWhorter and Sunada, 1977).

$$\mathbf{H = (L/2) \times (W / K)^{0.5}}$$ where:

H = maximum desired hydraulic head on the liner of 1.5 m

L = drain pipe spacing (to be determined)

W = unit application rate of (10 l/hr/m^2)

K = hydraulic conductivity (permeability) of pad drain material (2 x 10^{-2} cm/sec)

The ODF shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm). The material shall be free of organic matter and soft, friable particles in quantities objectionable to the Engineer. The minimum in place hydraulic conductivity of the ODF will be $2x10^{-2}$ m/s. The design criteria specified an ODF permeability and maximum ore heap load to ensure both reasonable spacing of the drain pipes and fully drained heap conditions.

The Heap Leach Pads' drain pipes will consist of 100-mm, 250-mm and 450-mm diameter corrugated dual-wall, perforated ADS N-12 pipes. A series of 100-mm primary collector pipes will be spaced at 25 m on center and arranged in a "herringbone" pattern to convey flows for collection in 450-mm header pipes. Where slope lengths dictate, secondary 250mm collector pipes will be required to convey flows from the 100-mm pipes to the 450-mm header pipes.

Results

For design purposes the Heap Leach Pad was divided into East and West regions based on the design ground contours as shown in Figure 1. Pipes were individually sized by region to account for the different slopes from each contributing area. Future phases of the project were included in the contributing areas to provide pipe capacity for the facility at build-out. Calculations are presented in Attachment 1.

Primary Pipe Spacing

Calculating the hydraulic head using the assumed values indicates that a minimum secondary pipe spacing of 25 m on center will limit hydraulic head on the liner to less than 1.5 m.

Collector Pipe Size and Quantities

Contributing areas from subsequent project phases were accounted for in determination of header pipe requirements, while the area of Phase 1 was used for determination of collector system requirements.. Contributing areas are shown in Table 1.1.

Table 1.1 – Contributing Areas

Heap Leach Region	Total Region Area (m^2)	Phase 1 Area (m^2)
West	987,000	308,000
East	294,000	203,000

The total combined (100-year, 24-hour storm plus 150% of the applied leaching solution) flows for each of these section areas are summarized in the table below.

Table 1.2 – Summary of Total Combined Flows and Pipe Quantities

Heap Leach Region	Primary Section Total Flow (m^3/s)	Collector Section Total Flow (m^3/s)	Quantity 450-mm Collector	Quantity 250-mm Collector
West	1.463	2.145	3	9
East	1.050	1.449	2	4

Note: For reference, see Attachment 1.

Collector Pipe Size at Proposed Benches

Pipe sizing was evaluated for the reduction in capacity where collector pipes will cross proposed pad benches to be constructed with a 2% cross-slope. Pipe sizes will need to be increased at these locations as shown in Table 1.3

Table 1.3 – Pipe Sizing at Benches

Heap Leach Region	Required Size at Benches
250mm Collector	375mm
450mm Collector	600mm

References

Chow, V.T. *Open-Channel Hydraulics*, McGraw Hill, New York, 1959.

McWhorter, David B. & Sunada, Daniel K. *Ground-water Hydrology and Hydraulics*. Water Resources Publication, 1977.

TETRA TECH

FIGURES

N

SCALE

25m 0 75m

CONTOUR INTERVAL 5m

PHASE 3 WEST
327,000

PHASE 2 WEST
352,000

PHASE 3 EAST
67,000

PHASE 2 EAST
24,000

PHASE 1 WEST
308,000

PHASE 1 EAST
203,000

E:458500
N:7102000

E:460500
N:7102000

E:460500
N:7101000

HAGGART CREEK

DUBLIN GULCH

DUBLIN GULCH

EAGLE PUP GULCH

PRELIMINARY
NOT FOR CONSTRUCTION

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS						REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

		DATE
SCALE:	NONE	
DESIGNED BY		
DRAWN BY		
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

StrataGold Corporation

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120 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 986-3568 (970) 241-3120 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY SOLUTION COLLECTION CONTRIBUTING AREAS

PROJECT NO.	TT 114-201087
DWG NO.	FIG 01
REV NO.	
DATE	3-25-13

File: X:\Clients\Victoria Gold Corp\Eagle Gold Detail HLF 114-201087\9.0 CAD\Civil 3D 2011 - Eagle Gold HLF\Drawings\Other Submittals\Solution Drain Pipe Figure.dwg LAST UPDATE: 3/25/2013 12:09 PM BY: DUSTIN.GEHRETT

HEAP LEACH PHASE 2

ANN GULCH

HEAP LEACH PAD PERIMETER BERM

PHASE 1 TEMPORARY DIVERSION CHANNEL

100mm PRIMARY PLS DRAIN PIPES (TYP.)

250mm SECONDARY PLS DRAIN PIPE (TYP.)

250mm SECONDARY PLS DRAIN PIPE (TYP.)

HEAP LEACH PAD PHASE 1

(3) 450mm HEADER PLS DRAIN PIPES

250mm SECONDARY PLS DRAIN PIPE (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

250mm SECONDARY PLS DRAIN PIPE (TYP.)

HLF UNDERDRAIN PIPES (SEE DRAWING ##)

HEAP LEACH PAD PHASE 1

IN-HEAP POND MAX. WATER SURFACE ELEVATION

HEAP CONFINING EMBANKMENT

IN-HEAP POND CLOSURE PIPES (SEE DRAWING 23)

250mm SECONDARY PLS DRAIN PIPE (TYP.)

2
25|20

IN-HEAP POND

100mm PRIMARY PLS DRAIN PIPES (TYP.)

IN-HEAP POND PLS PUMP CASING (TYP. 5 LOCATIONS)

PLS SUMP

HEAP LEACH PAD PERIMETER BERM

IN-HEAP POND LDRS PUMP CASING (TYP. 2 LOCATIONS)

(2) 450mm HEADER PLS DRAIN PIPES

250mm SECONDARY PLS DRAIN PIPE (TYP.)

100mm PRIMARY PLS DRAIN PIPES (TYP.)

HEAP LEACH PAD PHASE 1

100mm PRIMARY PLS DRAIN PIPES (TYP.)

25.0m (TYP.)

250mm SECONDARY PLS DRAIN PIPE (TYP.)

(2) 250mm SECONDARY PLS DRAIN PIPES (TYP.)

DUBLIN GULCH

IN-HEAP POND SPILLWAY

DUBLIN GULCH DIVERSION CHANNEL

DUBLIN GULCH DIVERSION CHANNEL

AGGLOMERATOR PAD

N

SCALE

15m 0 45m

CONTOUR INTERVAL 1m

NOTES:

1. XXX

LEGEND

HEADER PLS DRAIN PIPE
CORRUGATED, PERFORATED 450mm ADS N-12 PE

SECONDARY PLS DRAIN PIPE
CORRUGATED, PERFORATED 250mm ADS N-12 PE

PRIMARY PLS DRAIN PIPE
CORRUGATED, PERFORATED 100mm ADS N-12 PE

PRELIMINARY
NOT FOR CONSTRUCTION

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES	
DWG. NO.	TITLE	DWG. NO.	TITLE

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

REVISIONS					
NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

SCALE:	NONE	
DESIGNED BY		
DRAWN BY		
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

DATE

StrataGold Corporation

TETRA TECH
120 West Park Drive, Suite 204
Grand Junction, Colorado 81505
(970) 986-3568 (970) 241-3120 fax

EAGLE GOLD PROJECT

HEAP LEACH FACILITY PLS RECOVERY PIPING PLAN VIEW

PROJECT NO. TT 114-201087

DWG NO. FIGURE 2

REV NO.

DATE 3-11-13

File: X:\Clients\Victoria Gold Corp\Eagle Gold Data\ 114-201087\10 CADD\Cat 3D 2011 - Eagle Gold mdl\Drawings\Other Submittals\Solution Recovery Plan View.dwg LAST UPDATE: 3/29/2013 1:15 PM BY: DUSTIN.DEWETT

TETRA TECH

ATTACHMENT 1

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Sizing (Capacity) Calculations	Date:	March 26, 2013

PIPE TYPE: ADS N-12

Manning's n: 0.014 Percent Flow:

Pipe Slope (ft/ft): **0.100**

Nominal Pipe Diameter (in)	*Inside Pipe Diameter (mm)	85% Flow (m^3/s)	Flow Velocity (m/s)
4.0	100	0.0156	2.197
6.0	150	0.0461	2.878
8.0	200	0.0992	3.487
10.0	250	0.1799	4.046
12.0	300	0.2926	4.569
15.0	375	0.5305	5.302
18.0	450	0.8627	5.987
24.0	600	1.8579	7.253
30.0	750	3.3685	8.417
39.0	1000	7.2546	10.196
59.0	1500	21.3889	13.360
71.0	1800	34.7807	15.087

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

PIPE TYPE: ADS N-12

Manning's n: 0.014 Percent Flow:

Pipe Slope (ft/ft): **0.113**

Nominal Pipe Diameter (in)	*Inside Pipe Diameter (mm)	85% Flow (m^3/s)	Flow Velocity (m/s)
4.0	100	0.0166	2.335
6.0	150	0.0490	3.060
8.0	200	0.1055	3.707
10.0	250	0.1913	4.301
12.0	300	0.3110	4.857
15.0	375	0.5639	5.636
18.0	450	0.9170	6.365
24.0	600	1.9749	7.710
30.0	750	3.5808	8.947
39.0	1000	7.7117	10.838
59.0	1500	22.7367	14.202
71.0	1800	36.9724	16.038

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

PIPE TYPE: ADS N-12

Manning's n: 0.014 Percent Flow:

Pipe Slope (ft/ft): **0.091**

Nominal Pipe Diameter (in)	*Inside Pipe Diameter (mm)	85% Flow (m^3/s)	Flow Velocity (m/s)
4.0	100	0.0149	2.095
6.0	150	0.0440	2.746
8.0	200	0.0947	3.326
10.0	250	0.1716	3.860
12.0	300	0.2791	4.359
15.0	375	0.5061	5.058
18.0	450	0.8229	5.712
24.0	600	1.7723	6.919
30.0	750	3.2134	8.029
39.0	1000	6.9204	9.726
59.0	1500	20.4037	12.745
71.0	1800	33.1787	14.392

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

PIPE TYPE: ADS N-12

Manning's n: 0.014 Percent Flow:

Pipe Slope (ft/ft): **0.020**

Nominal Pipe Diameter (in)	*Inside Pipe Diameter (mm)	85% Flow (m^3/s)	Flow Velocity (m/s)
4.0	100	0.0070	0.983
6.0	150	0.0206	1.287
8.0	200	0.0444	1.559
10.0	250	0.0805	1.810
12.0	300	0.1309	2.043
15.0	375	0.2373	2.371
18.0	450	0.3858	2.678
24.0	600	0.8309	3.244
30.0	750	1.5065	3.764
39.0	1000	3.2443	4.560
59.0	1500	9.5654	5.975
71.0	1800	15.5544	6.747

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

*Specifications taken from ADS N-12 ST IB PIPE (per ASTM F2648)

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Primary Pipe Spacing Calculations	Date:	March 26, 2013

Primary Pipe Spacing		
Units:	Metric	
Application Rate:	0.24	m^3/day/m^2
Maximum Desired Head on the Liner:	1.5	m
Hydraulic Conductivity:	17.28	m/day
Pipe Spacing:	25.5	m
Average Hydraulic Head on Liner:	0.6	m

Application Rate Converter		
Application Rate:	0.0041	gpm/ft^2
	10.0000	l/hr/m^2
	0.0100	m^3/hr/m^2
	0.24	m^3/day/m^2
	0.79	ft^3/day/ft^2

Hydraulic Conductivity Converter		
Hydraulic Conductivity:	0.0200	cm/s
	56.69	ft/day
	17.28	m/day

$$H = \frac{L}{2} * \left(\frac{W}{K} \right)^{0.5}$$

where:

H = Maximum Hydraulic Head on Liner at the Midpoint between Pipes m

L = Drain Pipe Spacing m

W = Application Rate m^3/day/m^2

K = Hydraulic Conductivity m/day

Notes:

1) Permeability in the Overliner Drain Fill of 2 x 10^{-2} cm/s for a fully loaded scenario with a maximum design height of 96m

2) Leaching solution application flowrate of 0.0041 l/hr/m^2

3) Active application surface area of 277,000 m^2

Reference:

Ritzema, H.P. 1994. International Institute for Land Reclamation and Improvement (IILRI). *Drainage Principles and Applications* . Publication 16, Second Edition (Completely Revised). Wageningen, The Netherlands. Pages 265-267.

TETRA TECH

Phase 1

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Primary Pipe Maximum Length Calculations	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.0156	100
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)			
Avg. Solution Application Flow Rate:	10	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Unit Area: 25 m^2/m

Check Primary Pipe Capacity

Calculated Pipe Spacing:	25	m	(From Ritzema, H.P. 1994)
Controlling Design Pipe Slope:	0.10	m/m	
Maximum Length:	**121.00**	**m**	

Collector Pipes: ADS N-12 Perforated Pipe

120% PLS Solution + 100-Year Storm Flow: Area A

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)
A	45	0.0126	0.003	0.0156

TETRA TECH

Phase 1 Bench

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity at 2% Cross-Slope Benches	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.2373	375
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.8309	600
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	392,772	m^2	Area Per Collector:	56,110 m^2
Total Area:	1,071,772	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.020 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1West	4,155	1.154	0.394	1.548	**7**	**375**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.020 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1, 2 & 3 West	4,155	1.154	1.075	2.230	**3**	**600**

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 1, 2 and 3 West	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1799	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.8229	450
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area: 308,000 m^2 Area Per Collector: 34,222 m^2

Total Area: 987,000 m^2

Collector Pipes: ADS N-12 Perforated Pipe Slope: 0.100 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1West	4,155	1.154	0.309	1.463	**9**	**250**

Header Pipes: ADS N-12 Perforated Pipe Slope: 0.091 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1, 2 & 3 West	4,155	1.154	0.990	2.145	**3**	**450**

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 2 and 3 West	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1913	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.9170	450
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	352,000	m^2	Area Per Collector:	44,000 m^2
Total Area:	679,000	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 2 West	4,155	1.154	0.353	1.507	**8**	**250**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 2 and 3 West	4,155	1.154	0.681	1.836	**3**	**450**

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 3 West	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1913	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.5639	375
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	327,000	m^2	Area Per Collector:	40,875 m^2
Total Area:	327,000	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 3 West	4,155	1.154	0.328	1.482	**8**	**250**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 3 West	4,155	1.154	0.328	1.482	**3**	**375**

TETRA TECH

Phase 1 East

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 1, 2 and 3 East	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1799	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.8229	450
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	203,000	m^2	Area Per Collector:	33,833 m^2
Total Area:	294,000	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.100 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1 East	3,045	0.846	0.204	1.050	**6**	**250**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.091 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 1,2&3 East	4,155	1.154	0.295	1.449	**2**	**450**

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 2 and 3 East	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1913	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.5639	375
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	24,000	m^2	Area Per Collector:	24,000 m^2
Total Area:	91,000	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 2 East	360	0.100	0.024	0.124	**1**	**250**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 2 and 3 East	1,365	0.379	0.091	0.470	**1**	**375**

TETRA TECH

Client:	Victoria Gold	Job No.:	114-201087
Subject:	Heap Leach Facility	By:	MIR
Details:	Pipe Quantity Calculations, Phase 3 East	Date:	March 26, 2013

					85% Pipe Flow (m^3/s)	Pipe Diameter (mm)
Barren Solution Flow Rate (nominal):	2,770	m^3/hr	(From Design Criteria)	Collector Pipe Flow:	0.1913	250
Active Leach Surface Area:	277,000	m^2	(From Design Criteria)	Header Pipe Flow:	0.5639	375
Avg. Solution Application Flow Rate:	10.0	$l/hr/m^2$	(From Design Criteria)			
100-Year 24-Hour Precipitation:	86.7	mm	(From Design Criteria)			
Percent PLS Volume for Design Calcs:	150.0%					

Phase Area:	67,000	m^2	Area Per Collector:	33,500 m^2
Total Area:	67,000	m^2		

Collector Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 3 East	1,005	0.279	0.067	0.346	**2**	**250**

Header Pipes: ADS N-12 Perforated Pipe — Slope: 0.113 ft/ft

Area	PLS Flow m^3/hr	PLS Flow (m^3/s)	Storm Flow (m^3/s)	Total Flow (m^3/s)	Number of Pipes	Pipe Diameter (mm)
Phase 3 East	1,005	0.279	0.067	0.346	**1**	**375**

APPENDIX G – PIPE DEFLECTION CALCULATIONS

TETRA TECH

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Tel (970) 986-3566 Fax (970) 241-3120
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Technical Memorandum

To:	File	**From:**	Will Vilhauer
Company:	Tetra Tech Inc.	**Date:**	April 24, 2013
Re:	StrataGold Corporation Eagle Gold – Heap Leach Facility Overdrain Pipe Deflection Analysis	**Project #:**	114-201087
Cc:	Troy Meyer (Tetra Tech)		

1.0 Introduction

The overdrains at the Eagle Gold Heap Leach Facility are covered by maximum ore stack design heights that range from 20 m to 150 m. The overdrain pipes must sustain large compressive loads ranging from 360 kPa to 2700 kPa. The effects of the load on the pipe were analyzed using spreadsheet software which requires the user to input pipe, soil, and load properties. The selected pipework materials for the project is double-walled corrugated PE pipe (ADS N-12), Smoothwall HDPE solid DR 11, and carbon steel pipe. The piping serves as the overdrain system associated with the Heap Leach Facility (HLF).

2.0 Pipe Material

The pipes used in this analysis consist of the following:

- HDPE corrugated, double wall ADS N-12 AASHTO M-252 and M-294 Leachate Grade pipes with a nominal diameter of 0.100, 0.150, 0.200, 0.250, 0.300 and 0.450 meters. Pipe properties including average diameter, area, moment of inertia, and an approximation of the flexural modulus were provided by ADS and used as inputs in the model.
- HDPE smoothwall DR 11. HDPE DR 11 properties are based on the following information for a 8” (150 mm) pipe size (Ewing, 2011):
    - Outside Diameter of Pipe;
    - Wall Thickness of the Pipe; and
    - Flexural Modulus of 827 MPa (120,000 psi)

- Carbon steel pipe. A 250 mm Schedule 40 steel pipe and a 600 mm diameter steel pipe with a specified wall thickness of 15 mm. Steel pipe properties are based on the following information:
    - Outside Diameter of Pipe;
    - Wall Thickness of the Pipe; and
    - Flexural Modulus of 206,843 MPa (30,000,000 psi)

3.0 Backfill

The backfill will be loosely placed granular material derived from competent rock crushed to minus 38mm. It will undergo compaction under ore placement, but not during initial installation.

An effective backfill soil modulus of 11,000 kPa (1,595 psi) was selected for the overdrain gravel based on guidance by Smith (2005) for maximum calculated vertical overburden loads of 2,710 kPa (393 psi). The work done by Smith was based on laboratory pipe deflection tests with crushed minus 38mm competent rock. The vertical soil modulus was measured directly and a relationship of soil modulus and overburden pressure was developed. Effective backfill soil modulus values were interpolated from those determined by Smith for values which correspond to overburden pressure associated with fill heights of 20 m and 90 m. A unit weight of 18 kN/m3 (115 pcf) was used based on the crushed ore material properties used in the HLF stability analysis (Tetra Tech, 2013). A Poisson's ratio of 0.30 was

4.0 Methodology

HDPE N-12 corrugated pipe deflection was analyzed using the Burns and Richards Solution (1964), modified to incorporate soil modulus values from recent laboratory research by Smith, et.al. (2005) as discussed above.

Solid HDPE DR 11 and steel pipe deflection calculations were analyzed based on the methodology detailed in Chapter 5 of the United States Army Corps of Engineers Engineering Manual (EM) EM 1110-1-4008, (2002).

5.0 Results

The results obtained from the analyses included the displacement and deflection of the soil and the pipe under varying ore load corresponding with bury depth. The displacement of the pipe was measured for each proposed pipe size and a percent deflection was calculated based on the varied effective soil modulus used in the analysis. The worse-case for all overdrain pipe uses and materials types are presented in Table 1 below. Detailed results for HDPE N-12 pipe deflection using the Burns and Richard Solution are presented in Attachment A. Detailed results for smooth wall flexible pipe deflection using the United States Army Corps of Engineers EM 1110-1-4008 are presented in Attachment B.

Table 1: Pipe Displacements and Percent Deflection

Pipe Size (mm)	Pipe Description	Pipe Material	Maximum Bury Depth (m)	Maximum Vertical Load (kPa)	E's (kN/m^2)	Pipe Displacement (mm)	Percent Deflection (%)
100	Collection System Tertiary Drain	Perforated, Corrugated HDPE N-12	150	2,710	11,000	11.58	10.29
100	Underdrain	Perforated, Corrugated HDPE N-12	150	2,710	11,000	11.58	10.29
150	Closure Drain Pipe	Perforated Corrugated HDPE N-12	90	1,630	9,300	13.6	8.21
150	Closure Drain Pipe	Solid, Smooth HDPE DR 11	90	1,630	9,300	17.3	7.91
150	Closure Drain Pipe	Corrugated HDPE N-12	90	1,630	9,300	13.6	8.21
200	Underdrain	Corrugated HDPE N-12	150	2,710	11,000	22.1	10.30
250	Collection System Secondary Drain	Perforated, Corrugated HDPE N-12	150	2,710	11,000	28.5	10.60
250	LDRS Casing	Perforated Sch. 40 Steel	90	1,630	9,300	6.9	2.54
300	Underdrain	Corrugated HDPE N-12	150	2,710	11,000	35.1	10.45
300	Closure Drain	Corrugated HDPE N-12	20	364	5,000	14.5	4.33
450	Collection System Primary Drain	Perforated, Corrugated HDPE N-12	150	2,710	11,000	53.1	10.69
600	Pump Casing	Solid Steel, Wall thickness 15 mm min.	90	1,630	9,300	27.9	4.68

The calculations indicate a maximum pipe deflection of approximately 10.29 percent for N-12 HDPE. The pipe load testing by Thiel (2003) indicates ADS N-12 pipe can withstand up to 25 percent vertical deformation without buckling, which suggests a minimum factor of safety of over 2 against pipe failure for the Eagle Gold HLF overdrain pipes if installed with competent crushed gravel cover.

A maximum deflection of 4.68% was calculated for the steel pipe material. A maximum allowable deflection of 5% is common for steel pipe. Therefore the calculated deflection is acceptable.

6.0 REFERENCES

Advanced Drainage Systems (ADS). Burns and Richard Solution.xls. October 2003. Date of Access: 10 March 2005 www.ads-pipe.com/us/en/Product_Info/Techsup/brsolut.xls .

Advanced Drainage Systems (ADS)
Contact: Jim Goddard, Chief Engineer
Phone: 614-658-0248
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ATTACHMENT A

PIPE PARAMETERS - AASHTO M294, Type S	
effective radius (in), R =	2.22
outside diameter (in), D =	4.78
thickness (in), t =	0.34
unit area of wall (in^2/in), A =	0.070
unit moment of inertia (in^4/in), I =	0.0014
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	84
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,468
distance from inner wall to n.a. (in), c =	0.17
SOIL PARAMETERS - good granular soil	
mod of soil reaction at 5' of cover (psi), E'_5 =	1595
modulus of soil reaction (psi), E' =	6,869
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	9247.22
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286
SOIL/STRUCTURE PARAMETERS (full slippage)	
ring flexibility ratio, UF =(1+K)M*/K_{rc} =	3.81
bending flexibility ratio, VF = (1-K)M*/K_f =	62.6
STRESS FUNCTION COEFFICIENTS	
constant term, a_0* =	0.445
cos(2*theta), a_2** =	0.978
sin(2*theta), b_2** =	0.967
LOAD PARAMETERS	
unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	492.0
surcharge pressure (psi), P =	392.9

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	148.4	-0.029	0.000	351	15	-5016	-1844	1844	-6860	-3172
10	148.8	-0.021	0.022	351	14	-5011	-1755	1755	-6767	-3256
20	150.1	0.001	0.042	350	12	-4998	-1501	1501	-6499	-3497
30	152.0	0.035	0.056	348	9	-4977	-1111	1111	-6088	-3866
40	154.4	0.077	0.064	347	5	-4952	-633	633	-5584	-4319
50	157.0	0.122	0.064	345	1	-4925	-124	124	-5048	-4801
60	159.4	0.164	0.056	343	-3	-4899	355	-355	-4544	-5254
70	161.3	0.198	0.042	341	-6	-4879	745	-745	-4134	-5623
80	162.6	0.221	0.022	341	-8	-4865	999	-999	-3866	-5864
90	163.1	0.228	0.000	340	-9	-4860	1088	-1088	-3773	-5948
100	162.6	0.221	-0.022	341	-8	-4865	999	-999	-3866	-5864
110	161.3	0.198	-0.042	341	-6	-4879	745	-745	-4134	-5623
120	159.4	0.164	-0.056	343	-3	-4899	355	-355	-4544	-5254
130	157.0	0.122	-0.064	345	1	-4925	-124	124	-5048	-4801
140	154.4	0.077	-0.064	347	5	-4952	-633	633	-5584	-4319
150	152.0	0.035	-0.056	348	9	-4977	-1111	1111	-6088	-3866
160	150.1	0.001	-0.042	350	12	-4998	-1501	1501	-6499	-3497
170	148.8	-0.021	-0.022	351	14	-5011	-1755	1755	-6767	-3256
180	148.4	-0.029	0.000	351	15	-5016	-1844	1844	-6860	-3172

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-5016	-0.045598	-0.0177
10	-5011	-0.0456	-0.0177
20	-4998	-0.045432	-0.0176
30	-4977	-0.045245	-0.0175
40	-4952	-0.045014	-0.0174
50	-4925	-0.044769	-0.0173
60	-4899	-0.044538	-0.0173
70	-4879	-0.044351	-0.0172
80	-4865	-0.044228	-0.0171
90	-4860	-0.044185	-0.0171
100	-4865	-0.044228	-0.0171
110	-4879	-0.044351	-0.0172
120	-4899	-0.044538	-0.0173
130	-4925	-0.044769	-0.0173
140	-4952	-0.045014	-0.0174
150	-4977	-0.045245	-0.0175
160	-4998	-0.045432	-0.0176
170	-5011	-0.0456	-0.0177
180	-5016	-0.045598	-0.0177
	SUM (I/2 circle) =		-0.3308

COMMENTS

1. *This is 4" diameter ADS N-12*
2. *Flexural and compressive modulus are taken as 110,000 psi.*
3. *Typical E'_5 values (in psi) for various soils are listed in the table below:*

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	10.29
Horizontal deflection (%) =	-2.62
Critical Buckling Pressure (psi), P_{cr}=	291.6
Radial Soil Pressure at Crown (psi), P_{act}=	163.1
Arc length of each sector (in) =	0.3875
CIRCUMFERENCE SHORTENS=	-0.66 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S

effective radius (in), R =	3.25
outside diameter (in), D =	6.92
thickness (in), t =	0.46
unit area of wall (in^2/in), A =	0.107
unit moment of inertia (in^4/in), I =	0.0036
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	69
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,622
distance from inner wall to n.a. (in), c =	0.25

SOIL PARAMETERS - good granular soil

mod of soil reaction at 5' of cover (psi), E'$_5$ =	1349
modulus of soil reaction (psi), E' =	4,795
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	6454.67
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286

SOIL/STRUCTURE PARAMETERS (full slippage)

ring flexibility ratio, UF =(1+K)M*/K_{rc} =	2.55
bending flexibility ratio, VF = (1-K)M*/K_f =	53.3

STRESS FUNCTION COEFFICIENTS

constant term, a_0* =	0.306
cos(2*theta), a_2** =	0.974
sin(2*theta), b_2** =	0.962

LOAD PARAMETERS

unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	296.0
surcharge pressure (psi), P =	236.4

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	111.9	-0.057	0.000	386	22	-3610	-1537	1291	-5147	-2318
10	112.3	-0.047	0.028	386	21	-3606	-1461	1227	-5067	-2379
20	113.2	-0.019	0.052	385	18	-3597	-1242	1043	-4839	-2554
30	114.5	0.024	0.071	383	13	-3583	-905	761	-4489	-2823
40	116.2	0.077	0.080	382	7	-3566	-493	414	-4059	-3152
50	118.0	0.133	0.080	380	1	-3548	-54	46	-3602	-3503
60	119.7	0.186	0.071	378	-5	-3531	358	-301	-3173	-3832
70	121.1	0.229	0.052	376	-10	-3517	694	-583	-2823	-4100
80	122.0	0.257	0.028	375	-13	-3508	914	-768	-2594	-4276
90	122.3	0.267	0.000	375	-14	-3505	990	-832	-2515	-4336
100	122.0	0.257	-0.028	375	-13	-3508	914	-768	-2594	-4276
110	121.1	0.229	-0.052	376	-10	-3517	694	-583	-2823	-4100
120	119.7	0.186	-0.071	378	-5	-3531	358	-301	-3173	-3832
130	118.0	0.133	-0.080	380	1	-3548	-54	46	-3602	-3503
140	116.2	0.077	-0.080	382	7	-3566	-493	414	-4059	-3152
150	114.5	0.024	-0.071	383	13	-3583	-905	761	-4489	-2823
160	113.2	-0.019	-0.052	385	18	-3597	-1242	1043	-4839	-2554
170	112.3	-0.047	-0.028	386	21	-3606	-1461	1227	-5067	-2379
180	111.9	-0.057	0.000	386	22	-3610	-1537	1291	-5147	-2318

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-3610	-0.032814	-0.0186
10	-3606	-0.0328	-0.0186
20	-3597	-0.032702	-0.0185
30	-3583	-0.032576	-0.0185
40	-3566	-0.032421	-0.0184
50	-3548	-0.032255	-0.0183
60	-3531	-0.0321	-0.0182
70	-3517	-0.031974	-0.0181
80	-3508	-0.031891	-0.0181
90	-3505	-0.031862	-0.0181
100	-3508	-0.031891	-0.0181
110	-3517	-0.031974	-0.0181
120	-3531	-0.0321	-0.0182
130	-3548	-0.032255	-0.0183
140	-3566	-0.032421	-0.0184
150	-3583	-0.032576	-0.0185
160	-3597	-0.032702	-0.0185
170	-3606	-0.0328	-0.0186
180	-3610	-0.032814	-0.0186
	SUM (I/2 circle) =		-0.3488

COMMENTS

1. *This is 6" diameter ADS N-12*
2. *Flexural and compressive modulus are taken as 110,000 psi.*
3. *Typical E'$_5$ values (in psi) for various soils are listed in the table below:*

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	8.21
Horizontal deflection (%) =	-3.49
Critical Buckling Pressure (psi), P_{cr}=	220.5
Radial Soil Pressure at Crown (psi), P_{act}=	122.3
Arc length of each sector (in) =	0.5672
CIRCUMFERENCE SHORTENS=	-0.70 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S	
effective radius (in), R =	4.22
outside diameter (in), D =	9.11
thickness (in), t =	0.605
unit area of wall (in^2/in), A =	0.135
unit moment of inertia (in^4/in), I =	0.0070
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	61
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,519
distance from inner wall to n.a. (in), c =	0.27
SOIL PARAMETERS - good granular soil	
mod of soil reaction at 5' of cover (psi), E'_5 =	1595
modulus of soil reaction (psi), E' =	6,869
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	9247.22
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286
SOIL/STRUCTURE PARAMETERS (full slippage)	
ring flexibility ratio, UF =(1+K)M*/K_{rc} =	3.75
bending flexibility ratio, VF = (1-K)M*/K_f =	86.0
STRESS FUNCTION COEFFICIENTS	
constant term, a_0* =	0.440
cos(2*theta), a_2** =	0.984
sin(2*theta), b_2** =	0.976
LOAD PARAMETERS	
unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	492.0
surcharge pressure (psi), P =	392.9

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	151.7	-0.058	0.000	670	40	-4966	-1547	1920	-6513	-3046
10	152.0	-0.043	0.043	670	38	-4962	-1473	1827	-6435	-3135
20	152.9	0.000	0.080	669	33	-4953	-1259	1562	-6211	-3391
30	154.4	0.065	0.108	667	24	-4938	-931	1155	-5868	-3783
40	156.1	0.146	0.122	664	14	-4919	-528	655	-5448	-4264
50	158.0	0.231	0.122	661	3	-4900	-100	124	-5000	-4776
60	159.8	0.312	0.108	659	-8	-4882	302	-375	-4579	-5257
70	161.2	0.377	0.080	657	-16	-4867	630	-782	-4236	-5649
80	162.1	0.420	0.043	656	-22	-4857	845	-1048	-4012	-5905
90	162.5	0.435	0.000	655	-24	-4854	919	-1140	-3935	-5994
100	162.1	0.420	-0.043	656	-22	-4857	845	-1048	-4012	-5905
110	161.2	0.377	-0.080	657	-16	-4867	630	-782	-4236	-5649
120	159.8	0.312	-0.108	659	-8	-4882	302	-375	-4579	-5257
130	158.0	0.231	-0.122	661	3	-4900	-100	124	-5000	-4776
140	156.1	0.146	-0.122	664	14	-4919	-528	655	-5448	-4264
150	154.4	0.065	-0.108	667	24	-4938	-931	1155	-5868	-3783
160	152.9	0.000	-0.080	669	33	-4953	-1259	1562	-6211	-3391
170	152.0	-0.043	-0.043	670	38	-4962	-1473	1827	-6435	-3135
180	151.7	-0.058	0.000	670	40	-4966	-1547	1920	-6513	-3046

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-4966	-0.045144	-0.0332
10	-4962	-0.0451	-0.0332
20	-4953	-0.045025	-0.0332
30	-4938	-0.044889	-0.0331
40	-4919	-0.044723	-0.0329
50	-4900	-0.044545	-0.0328
60	-4882	-0.044379	-0.0327
70	-4867	-0.044243	-0.0326
80	-4857	-0.044155	-0.0325
90	-4854	-0.044124	-0.0325
100	-4857	-0.044155	-0.0325
110	-4867	-0.044243	-0.0326
120	-4882	-0.044379	-0.0327
130	-4900	-0.044545	-0.0328
140	-4919	-0.044723	-0.0329
150	-4938	-0.044889	-0.0331
160	-4953	-0.045025	-0.0332
170	-4962	-0.0451	-0.0332
180	-4966	-0.045144	-0.0332
	SUM (I/2 circle) =		-0.6250

COMMENTS

1. This is 8" diameter ADS N-12

2. Flexural and compressive modulus are taken as 110,000 psi.

3. Typical E'_5 values (in psi) for various soils are listed in the table below:

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	10.30
Horizontal deflection (%) =	-2.75
Critical Buckling Pressure (psi), P_{cr}=	248.7
Radial Soil Pressure at Crown (psi), P_{act}=	162.5
Arc length of each sector (in) =	0.7365
CIRCUMFERENCE SHORTENS=	-1.25 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S

effective radius (in), R =	5.29
outside diameter (in), D =	11.36
thickness (in), t =	0.73
unit area of wall (in^2/in), A =	0.145
unit moment of inertia (in^4/in), I =	0.0110
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	49
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,015
distance from inner wall to n.a. (in), c =	0.34

SOIL PARAMETERS - good granular soil

mod of soil reaction at 5' of cover (psi), E'$_5$ =	1595
modulus of soil reaction (psi), E' =	6,869
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	9247.22
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286

SOIL/STRUCTURE PARAMETERS (full slippage)

ring flexibility ratio, UF =(1+K)M*/K_{rc} =	4.38
bending flexibility ratio, VF = (1-K)M*/K_f =	107.7

STRESS FUNCTION COEFFICIENTS

constant term, a_0* =	0.491
cos(2*theta), a_2** =	0.987
sin(2*theta), b_2** =	0.981

LOAD PARAMETERS

unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	492.0
surcharge pressure (psi), P =	392.9

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	138.4	-0.060	0.000	763	51	-5260	-1578	1810	-6838	-3450
10	138.7	-0.041	0.053	762	49	-5257	-1503	1724	-6760	-3533
20	139.4	0.013	0.100	761	42	-5248	-1287	1476	-6535	-3772
30	140.6	0.095	0.135	759	31	-5234	-956	1097	-6190	-4137
40	142.0	0.197	0.154	756	18	-5217	-551	632	-5768	-4585
50	143.5	0.304	0.154	754	4	-5199	-119	136	-5318	-5062
60	144.9	0.405	0.135	751	-9	-5182	287	-329	-4895	-5511
70	146.1	0.488	0.100	749	-20	-5168	618	-708	-4550	-5876
80	146.8	0.542	0.053	748	-27	-5159	834	-956	-4325	-6115
90	147.1	0.561	0.000	748	-29	-5155	909	-1042	-4247	-6197
100	146.8	0.542	-0.053	748	-27	-5159	834	-956	-4325	-6115
110	146.1	0.488	-0.100	749	-20	-5168	618	-708	-4550	-5876
120	144.9	0.405	-0.135	751	-9	-5182	287	-329	-4895	-5511
130	143.5	0.304	-0.154	754	4	-5199	-119	136	-5318	-5062
140	142.0	0.197	-0.154	756	18	-5217	-551	632	-5768	-4585
150	140.6	0.095	-0.135	759	31	-5234	-956	1097	-6190	-4137
160	139.4	0.013	-0.100	761	42	-5248	-1287	1476	-6535	-3772
170	138.7	-0.041	-0.053	762	49	-5257	-1503	1724	-6760	-3533
180	138.4	-0.060	0.000	763	51	-5260	-1578	1810	-6838	-3450

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-5260	-0.04782	-0.0442
10	-5257	-0.0478	-0.0441
20	-5248	-0.047709	-0.0440
30	-5234	-0.047582	-0.0439
40	-5217	-0.047426	-0.0438
50	-5199	-0.047261	-0.0436
60	-5182	-0.047105	-0.0435
70	-5168	-0.046978	-0.0434
80	-5159	-0.046896	-0.0433
90	-5155	-0.046867	-0.0433
100	-5159	-0.046896	-0.0433
110	-5168	-0.046978	-0.0434
120	-5182	-0.047105	-0.0435
130	-5199	-0.047261	-0.0436
140	-5217	-0.047426	-0.0438
150	-5234	-0.047582	-0.0439
160	-5248	-0.047709	-0.0440
170	-5257	-0.0478	-0.0441
180	-5260	-0.04782	-0.0442
	SUM (I/2 circle) =		-0.8310

COMMENTS

1. *This is 10" diameter ADS N-12*
2. *Flexural and compressive modulus are taken as 110,000 psi.*
3. *Typical E'$_5$ values (in psi) for various soils are listed in the table below:*

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	10.60
Horizontal deflection (%) =	-2.25
Critical Buckling Pressure (psi), P_{cr}=	222.2
Radial Soil Pressure at Crown (psi), P_{act}=	147.1
Arc length of each sector (in) =	0.9233
CIRCUMFERENCE SHORTENS=	-1.66 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S	
effective radius (in), R =	6.605
outside diameter (in), D =	14.45
thickness (in), t =	1.15
unit area of wall (in^2/in), A =	0.188
unit moment of inertia (in^4/in), I =	0.041
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	94
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,131
distance from inner wall to n.a. (in), c =	0.53
SOIL PARAMETERS - good granular soil	
mod of soil reaction at 5' of cover (psi), E'$_5$ =	1595
modulus of soil reaction (psi), E' =	6,869
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	9247.22
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286
SOIL/STRUCTURE PARAMETERS (full slippage)	
ring flexibility ratio, UF =(1+K)M*/K_{rc} =	4.22
bending flexibility ratio, VF = (1-K)M*/K_f =	56.3
STRESS FUNCTION COEFFICIENTS	
constant term, a_0* =	0.479
cos(2*theta), a_2** =	0.976
sin(2*theta), b_2** =	0.964
LOAD PARAMETERS	
unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	492.0
surcharge pressure (psi), P =	392.9

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	138.0	-0.074	0.000	984	150	-5232	-1944	2274	-7175	-2958
10	138.5	-0.051	0.066	982	143	-5226	-1851	2166	-7077	-3060
20	139.9	0.016	0.125	979	123	-5209	-1585	1855	-6795	-3355
30	142.1	0.117	0.168	975	91	-5184	-1178	1378	-6362	-3806
40	144.8	0.242	0.191	969	52	-5153	-678	793	-5831	-4359
50	147.6	0.375	0.191	962	11	-5120	-146	171	-5266	-4949
60	150.3	0.499	0.168	957	-27	-5088	354	-414	-4735	-5502
70	152.4	0.601	0.125	952	-59	-5063	761	-890	-4302	-5953
80	153.8	0.667	0.066	949	-79	-5046	1027	-1202	-4019	-6248
90	154.3	0.690	0.000	948	-87	-5041	1120	-1310	-3921	-6350
100	153.8	0.667	-0.066	949	-79	-5046	1027	-1202	-4019	-6248
110	152.4	0.601	-0.125	952	-59	-5063	761	-890	-4302	-5953
120	150.3	0.499	-0.168	957	-27	-5088	354	-414	-4735	-5502
130	147.6	0.375	-0.191	962	11	-5120	-146	171	-5266	-4949
140	144.8	0.242	-0.191	969	52	-5153	-678	793	-5831	-4359
150	142.1	0.117	-0.168	975	91	-5184	-1178	1378	-6362	-3806
160	139.9	0.016	-0.125	979	123	-5209	-1585	1855	-6795	-3355
170	138.5	-0.051	-0.066	982	143	-5226	-1851	2166	-7077	-3060
180	138.0	-0.074	0.000	984	150	-5232	-1944	2274	-7175	-2958

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-5232	-0.047559	-0.0548
10	-5226	-0.0475	-0.0548
20	-5209	-0.047356	-0.0546
30	-5184	-0.047126	-0.0543
40	-5153	-0.046843	-0.0540
50	-5120	-0.046541	-0.0537
60	-5088	-0.046258	-0.0533
70	-5063	-0.046027	-0.0531
80	-5046	-0.045877	-0.0529
90	-5041	-0.045824	-0.0528
100	-5046	-0.045877	-0.0529
110	-5063	-0.046027	-0.0531
120	-5088	-0.046258	-0.0533
130	-5120	-0.046541	-0.0537
140	-5153	-0.046843	-0.0540
150	-5184	-0.047126	-0.0543
160	-5209	-0.047356	-0.0546
170	-5226	-0.0475	-0.0548
180	-5232	-0.047559	-0.0548
	SUM (I/2 circle) =		-1.0237

COMMENTS

1. This is 12" diameter ADS N-12

2. Flexural and compressive modulus are taken as 110,000 psi.

3. Typical E'$_5$ values (in psi) for various soils are listed in the table below:

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	10.45
Horizontal deflection (%) =	-2.23
Critical Buckling Pressure (psi), P_{cr}=	307.4
Radial Soil Pressure at Crown (psi), P_{act}=	154.3
Arc length of each sector (in) =	1.1528

CIRCUMFERENCE SHORTENS= -2.05 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S	
effective radius (in), R =	6.605
outside diameter (in), D =	14.45
thickness (in), t =	1.15
unit area of wall (in^2/in), A =	0.188
unit moment of inertia (in^4/in), I =	0.041
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	94
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	3,131
distance from inner wall to n.a. (in), c =	0.53
SOIL PARAMETERS - good granular soil	
mod of soil reaction at 5' of cover (psi), E'$_5$ =	725
modulus of soil reaction (psi), E' =	1,567
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	2109.93
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286
SOIL/STRUCTURE PARAMETERS (full slippage)	
ring flexibility ratio, UF =(1+K)M*/K_{rc} =	0.96
bending flexibility ratio, VF = (1-K)M*/K_f =	12.8
STRESS FUNCTION COEFFICIENTS	
constant term, a_0* =	-0.011
cos(2*theta), a_2** =	0.903
sin(2*theta), b_2** =	0.855
LOAD PARAMETERS	
unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	66.0
surcharge pressure (psi), P =	52.7

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	33.7	-0.125	0.000	261	72	-1388	-931	1089	-2319	-299
10	33.9	-0.113	0.036	260	68	-1385	-881	1031	-2266	-354
20	34.7	-0.077	0.067	259	57	-1376	-738	863	-2114	-513
30	35.9	-0.022	0.090	256	40	-1363	-519	607	-1882	-755
40	37.3	0.045	0.103	253	19	-1346	-250	293	-1596	-1053
50	38.8	0.116	0.103	250	-3	-1328	36	-42	-1292	-1370
60	40.2	0.183	0.090	247	-24	-1311	304	-356	-1007	-1667
70	41.4	0.238	0.067	244	-41	-1298	524	-612	-774	-1910
80	42.2	0.273	0.036	242	-52	-1289	667	-780	-622	-2068
90	42.4	0.286	0.000	242	-55	-1286	716	-838	-569	-2123
100	42.2	0.273	-0.036	242	-52	-1289	667	-780	-622	-2068
110	41.4	0.238	-0.067	244	-41	-1298	524	-612	-774	-1910
120	40.2	0.183	-0.090	247	-24	-1311	304	-356	-1007	-1667
130	38.8	0.116	-0.103	250	-3	-1328	36	-42	-1292	-1370
140	37.3	0.045	-0.103	253	19	-1346	-250	293	-1596	-1053
150	35.9	-0.022	-0.090	256	40	-1363	-519	607	-1882	-755
160	34.7	-0.077	-0.067	259	57	-1376	-738	863	-2114	-513
170	33.9	-0.113	-0.036	260	68	-1385	-881	1031	-2266	-354
180	33.7	-0.125	0.000	261	72	-1388	-931	1089	-2319	-299

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-1388	-0.012621	-0.0145
10	-1385	-0.0126	-0.0145
20	-1376	-0.012511	-0.0144
30	-1363	-0.012387	-0.0143
40	-1346	-0.012235	-0.0141
50	-1328	-0.012073	-0.0139
60	-1311	-0.011921	-0.0137
70	-1298	-0.011797	-0.0136
80	-1289	-0.011716	-0.0135
90	-1286	-0.011688	-0.0135
100	-1289	-0.011716	-0.0135
110	-1298	-0.011797	-0.0136
120	-1311	-0.011921	-0.0137
130	-1328	-0.012073	-0.0139
140	-1346	-0.012235	-0.0141
150	-1363	-0.012387	-0.0143
160	-1376	-0.012511	-0.0144
170	-1385	-0.0126	-0.0145
180	-1388	-0.012621	-0.0145
	SUM (I/2 circle) =		-0.2668

COMMENTS

1. This is 12" diameter ADS N-12

2. Flexural and compressive modulus are taken as 110,000 psi.

3. Typical E'$_5$ values (in psi) for various soils are listed in the table below:

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

MISC CALCS

Vertical deflection (%) =	4.33
Horizontal deflection (%) =	-3.79
Critical Buckling Pressure (psi), P_{cr}=	146.9
Radial Soil Pressure at Crown (psi), P_{act}=	42.4
Arc length of each sector (in) =	1.1528

CIRCUMFERENCE SHORTENS= -0.53 inches

Calculations by: WEV

PIPE PARAMETERS - AASHTO M294, Type S

effective radius (in), R =	9.785
outside diameter (in), D =	21.2
thickness (in), t =	1.565
unit area of wall (in^2/in), A =	0.25
unit moment of inertia (in^4/in), I =	0.089
flexural modulus (psi), E_f =	110,000
ring compression modulus (psi), E_{rc} =	110,000
flexural stiffness (psi), $K_f = 6E_fI/R^3$ =	63
ring compression stiffness (psi), $K_{rc} = E_{rc}A/R$ =	2,810
distance from inner wall to n.a. (in), c =	0.75

SOIL PARAMETERS - good granular soil

mod of soil reaction at 5' of cover (psi), E'_5 =	1595
modulus of soil reaction (psi), E' =	6,869
Poisson's ratio, u =	0.30
constr mod (psi), M*=E*(1-u)/((1+u)(1-2u))=	9247
lateral stress ratio = K = u/(1-u) =	0.429
sym lateral stress ratio = B = (1/2)(1+K) =	0.714
antisym lat stress ratio = C = (1/2)(1-K) =	0.286

SOIL/STRUCTURE PARAMETERS (full slippage)

ring flexibility ratio, UF =(1+K)M*/K_{rc} =	4.70
bending flexibility ratio, VF = (1-K)M*/K_f =	84.3

STRESS FUNCTION COEFFICIENTS

constant term, a_0* =	0.514
cos(2*theta), a_2** =	0.984
sin(2*theta), b_2** =	0.976

LOAD PARAMETERS

unit weight of soil (lb/ft^3) =	115
height of fill above crown (ft) =	492.0
surcharge pressure (psi), P =	392.9

RESPONSE OF PIPE WALL

deg c.c.w. from horiz	radial soil press P_r(psi)	radial defl w(in)	tang defl v(in)	circum wall thrust N(#/in)	wall bend mom(M) (#-lb/in)	ring comp stress (psi)	inner bend stress (psi)	outer bend stress (psi)	total stress inner (psi)	total stress outer (psi)
0	130.9	-0.096	0.000	1353	224	-5411	-1886	2049	-7297	-3362
10	131.3	-0.062	0.099	1352	213	-5407	-1797	1953	-7204	-3454
20	132.2	0.037	0.186	1349	183	-5394	-1540	1674	-6935	-3720
30	133.7	0.189	0.250	1344	136	-5375	-1148	1247	-6523	-4128
40	135.5	0.376	0.284	1338	79	-5352	-666	723	-6018	-4629
50	137.4	0.574	0.284	1332	18	-5327	-153	166	-5480	-5161
60	139.2	0.761	0.250	1326	-39	-5304	329	-358	-4975	-5661
70	140.6	0.913	0.186	1321	-86	-5285	722	-784	-4563	-6069
80	141.6	1.012	0.099	1318	-116	-5272	978	-1063	-4294	-6335
90	141.9	1.046	0.000	1317	-127	-5268	1067	-1160	-4201	-6428
100	141.6	1.012	-0.099	1318	-116	-5272	978	-1063	-4294	-6335
110	140.6	0.913	-0.186	1321	-86	-5285	722	-784	-4563	-6069
120	139.2	0.761	-0.250	1326	-39	-5304	329	-358	-4975	-5661
130	137.4	0.574	-0.284	1332	18	-5327	-153	166	-5480	-5161
140	135.5	0.376	-0.284	1338	79	-5352	-666	723	-6018	-4629
150	133.7	0.189	-0.250	1344	136	-5375	-1148	1247	-6523	-4128
160	132.2	0.037	-0.186	1349	183	-5394	-1540	1674	-6935	-3720
170	131.3	-0.062	-0.099	1352	213	-5407	-1797	1953	-7204	-3454
180	130.9	-0.096	0.000	1353	224	-5411	-1886	2049	-7297	-3362

COMMENTS

1. *This is 18" diameter ADS N-12*
2. *Flexural and compressive modulus are taken as 110,000 psi.*
3. *Typical E'_5 values (in psi) for various soils are listed in the table below:*

Type of soil	Standard AASHTO Relative Compaction 85%	90%	95%
Fine-grained soils with less than 25% sand (CL, ML, DL-ML)	500	700	1000
Coarse-grained soils with fines (SM, SC)	600	1000	1200
Coarse-grained soils with little or no fines (SP, SW, GP, GW)	700	1000	1600

CALCULATION OF RING SHORTENING

deg c.c.w. from horiz	ring comp stress (psi)	ring comp strain (in/in)	ring shortening (in)
0	-5411	-0.04919207	-0.0840
10	-5407	-0.0492	-0.0839
20	-5394	-0.04903972	-0.0838
30	-5375	-0.04886648	-0.0835
40	-5352	-0.04865397	-0.0831
50	-5327	-0.04842781	-0.0827
60	-5304	-0.0482153	-0.0823
70	-5285	-0.04804206	-0.0820
80	-5272	-0.04792898	-0.0819
90	-5268	-0.04788971	-0.0818
100	-5272	-0.04792898	-0.0819
110	-5285	-0.04804206	-0.0820
120	-5304	-0.0482153	-0.0823
130	-5327	-0.04842781	-0.0827
140	-5352	-0.04865397	-0.0831
150	-5375	-0.04886648	-0.0835
160	-5394	-0.04903972	-0.0838
170	-5407	-0.0492	-0.0839
180	-5411	-0.04919207	-0.0840
		SUM (I/2 circle) =	-1.5762

MISC CALCS

Vertical deflection (%) =	10.69
Horizontal deflection (%) =	-1.97
Critical Buckling Pressure (psi), P_{cr}=	251.2
Radial Soil Pressure at Crown (psi), P_{act}=	141.9
Arc length of each sector (in) =	1.7078

CIRCUMFERENCE SHORTENS= -3.15 inches

Calculations by: WEV

ATTACHMENT B

Pipe Deflection Calculations

Client:	Strata Gold Corp.
Project:	Heap Leach Final Design
Project #:	114-201087
Calculated By:	WEV
Checked By:	
Date:	March 29, 2013

8" (150 mm) Smooth Wall HDPE DR 11 Pipe

The calculation methods utilized herein are detailed in Chapter 5 of the United States Army Corps of Engineers Engineering Manual (EM) EM 1110-1-4008, Engineering and Design - Liquid Process Piping. Dated May 5, 1999, Change 1 Dated September 16, 2002.

Results

Total Deflection (inches)	**0.68**
% Deflection	**7.91%**

Equations

$$\%\ Deflection = \frac{100 \bullet \Delta Y}{D_0}$$

$$\Delta Y = \frac{K_x \bullet d_e \bullet \Gamma}{(0.149 \bullet PS + 0.061 \bullet E')}$$

$$\Gamma = \frac{H \bullet D_O \bullet \gamma}{144}$$

$$PS = \frac{E \bullet I_a}{0.149 \bullet R^3}$$

$$R = \frac{D_O - t}{2}$$

$$I_a = \frac{t^3}{12}$$

Input Variables

H = Height of Cover (feet)	295
D_o = Outer Pipe Diameter (inches)	8.625
t = Wall Thickness of Pipe	0.784
γ = Density of Soil (lbs/ft^3)	115.0
E = Pipe Modulus of Elasticity (psi)	120,000
E' = Soil Modulus (psi)	1,349
K_x = Bedding Factor	0.100
d_e = Deflection Lag Factor	1.25

Output Variables

ΔY = Deflection (inches)	0.68
PS = Pipe Stiffness (psi)	536.71
Γ = Weight per Length of Overburden (lb/in)	2,032.0
E'' = Soil Moduls adjusted for depth (psi)	4,788.95
I_a = Area Moment of Inertia per unit Length (in^4/in)	0.040
R = Mean Radii of Pipe (inches)	3.921

Pipe Deflection Calculations

Client:	Strata Gold Corp.
Project:	Heap Leach Final Design
Project #:	114-201087
Calculated By:	WEV
Checked By:	
Date:	March 29, 2013

10" (250 mm) Steel Sch. 40 Pipe

The calculation methods utilized herein are detailed in Chapter 5 of the United States Army Corps of Engineers Engineering Manual (EM) EM 1110-1-4008, Engineering and Design - Liquid Process Piping. Dated May 5, 1999, Change 1 Dated September 16, 2002.

Results

Total Deflection (inches)	**0.27**
% Deflection	**2.54%**

Equations

$$\%\ Deflection = \frac{100 \bullet \Delta Y}{D_0}$$

$$\Delta Y = \frac{K_x \bullet d_e \bullet \Gamma}{(0.149 \bullet PS + 0.061 \bullet E')}$$

$$\Gamma = \frac{H \bullet D_O \bullet \gamma}{144}$$

$$PS = \frac{E \bullet I_a}{0.149 \bullet R^3}$$

$$R = \frac{D_O - t}{2}$$

$$I_a = \frac{t^3}{12}$$

Input Variables

H = Height of Cover (feet)	295
D_o = Outer Pipe Diameter (inches)	10.750
t = Wall Thickness of Pipe	0.365
γ = Density of Soil (lbs/ft^3)	115.0
E = Pipe Modulus of Elasticity (psi)	30,000,000
E' = Soil Modulus (psi)	1,349
K_x = Bedding Factor	0.100
d_e = Deflection Lag Factor	1.25

Output Variables

ΔY = Deflection (inches)	0.27
PS = Pipe Stiffness (psi)	5,827.78
Γ = Weight per Length of Overburden (lb/in)	2,532.6
E'' = Soil Moduls adjusted for depth (psi)	4,788.95
I_a = Area Moment of Inertia per unit Length (in^4/in)	0.004
R = Mean Radii of Pipe (inches)	5.193

Pipe Deflection Calculations

Client:	Strata Gold Corp.
Project:	Heap Leach Final Design
Project #:	114-201087
Calculated By:	WEV
Checked By:	
Date:	April 24, 2013

24" (600 mm) Solid Wall Steel Pipe

The calculation methods utilized herein are detailed in Chapter 5 of the United States Army Corps of Engineers Engineering Manual (EM) EM 1110-1-4008, Engineering and Design - Liquid Process Piping. Dated May 5, 1999, Change 1 Dated September 16, 2002.

Results

Total Deflection (inches)	**1.12**
% Deflection	**4.68%**

Equations

$$\%\ Deflection = \frac{100 \bullet \Delta Y}{D_0}$$

$$\Delta Y = \frac{K_x \bullet d_e \bullet \Gamma}{(0.149 \bullet PS + 0.061 \bullet E')}$$

$$\Gamma = \frac{H \bullet D_O \bullet \gamma}{144}$$

$$PS = \frac{E \bullet I_a}{0.149 \bullet R^3}$$

$$R = \frac{D_O - t}{2}$$

$$I_a = \frac{t^3}{12}$$

Input Variables

H = Height of Cover (feet)	295
D_o = Outer Pipe Diameter (inches)	24
t = Wall Thickness of Pipe	0.600
γ = Density of Soil (lbs/ft^3)	115.0
E = Pipe Modulus of Elasticity (psi)	30,000,000
E' = Soil Modulus (psi)	1,349
K_x = Bedding Factor	0.100
d_e = Deflection Lag Factor	1.25

Output Variables

ΔY = Deflection (inches)	1.12
PS = Pipe Stiffness (psi)	2,262.82
Γ = Weight per Length of Overburden (lb/in)	5,654.2
E'' = Soil Moduls adjusted for depth (psi)	4,788.95
I_a = Area Moment of Inertia per unit Length (in^4/in)	0.018
R = Mean Radii of Pipe (inches)	11.700

APPENDIX H – IN-HEAP POND, SPILLWAY AND EVENT PONDS SIZING

TETRA TECH

Technical Memorandum

To:	Andrew Kaczmarek	From:	Dan Evans, PE Amit Karki, PE
Company:	StrataGold Corporation	Date:	April 3, 2013
Address:	1055 Dunsmuir Street Vancouver, BC	Project No.:	114-201087-2.10
Re:	In-Heap Pond, Spillway, and Events Pond Sizing		
CC:	Troy Meyer (Tt); Todd Goodsell, Hans Rygersberg, and Steve Wilbur (StrataGold)		

1.0 INTRODUCTION

This technical memorandum explains the methodology and assumptions used in sizing the In-Heap Pond and Events Pond associated with the Eagle Gold Heap Leach Facility (HLF). The In-Heap Pond is the storage volume created within the pore space of the ore, directly upstream of the Confining Embankment (Embankment). The In-Heap Pond will store solution within the pore space of the ore to facilitate maximum recovery of solution and allow for leaching operations during the winters' freezing temperatures. The Events Pond is located down gradient of the HLF, and will store solution and/or runoff in excess of the capacity of the In-Heap Pond. The capacity of the In-Heap Pond is a function of the height of the Embankment and the porosity of the ore. Incoming flows in excess of the In-Heap Pond capacity will spill over the Embankment into the Events Pond via the spillway. Accordingly, this memorandum will determine the necessary height of the Embankment, volume of the In-Heap Pond, design dimensions of the spillway, and volume of the Events Pond.

2.0 HYDROLOGY

The U.S. Army Corps of Engineers Hydrologic Engineering Center's Hydrologic Modeling System (USACE HEC-HMS), version 3.5 (USACE, 2010a) was used to determine the peak flows and runoff volumes for the In-Heap Pond, HLF Spillway, and Events Pond. The methodology for the hydrologic analysis and results of the hydrologic modeling are presented in Appendix A.

2.1 Precipitation

Tetra Tech obtained rainfall depths from a memorandum prepared by Knight Piesold in December 2012 (KP, 2012), which is provided in Appendix B. This memorandum summarized the precipitation depths for various return intervals. The precipitation depths were determined using the Rainfall Frequency Atlas for Canada (Environment Canada, 1985). The design events used to evaluate the In-Heap Pond and Events Pond are the 100-year, 1,000-year, and Probable Maximum Precipitation (PMP) 24-hour rainfall events.

The rainfall depths obtained from the Rainfall Frequency Atlas for Canada were multiplied by a factor of 1.5 to account for the orographic pattern of precipitation (Environment Canada, 1985). The factored rainfall depths are shown in **Error! Reference source not found.** below.

Tetra Tech
3801 Automation Way, Suite 100, Fort Collins, CO 80525
Tel 970.223.9600 Fax 970.223.7171 www. tetratech.com

Rainfall distribution in the project area was not available. For HEC-HMS modeling, the frequency storm method was used for rainfall distribution. Data to generate the frequency storm were obtained from the Rainfall Frequency Atlas for Canada (Environment Canada, 1985).

Table 1. Rainfall Depths for Various Durations for the 100-Year and PMP Storm Events (in millimeters)

Duration	100-year	1,000-year	PMP
5 min	9.3	12.9	39.2
10 min	11.3	15.3	44.2
15 min	14.0	19.4	58.9
30 min	15.0	19.8	55.4
1 hour	21.1	28.3	81.0
2 hour	22.7	29.9	82.6
6 hour	33.8	44.6	123.6
12 hour	60.6	78.1	206.4
24 hour	71.6	93.7	255.6

The PMP rainfall depth was calculated using Hershield's equation (1977) and was calculated to be 255.6 millimeters (mm) for a 24-hour storm event. Two studies, "Analysis of Probable Maximum Precipitation for Faro Mine Site, Yukon Territory" and "Probable Maximum Precipitation for Wareham Dam, Mayo, Yukon Territory," which were performed to determine PMP events at separate project locations in Yukon Territory, were reviewed to verify that the PMP rainfall depths calculated for the Eagle Gold project site is appropriate. After reviewing these two studies, we determined that the PMP estimate of 255.6 mm is conservative compared to the other studies in the region.

2.2 Watershed Delineation

LiDAR survey for the project site was provided by M3 Engineering and Technology. The watershed delineation map is shown as Figure . The watershed of the HLF is 1.45 square kilometers (km^2).

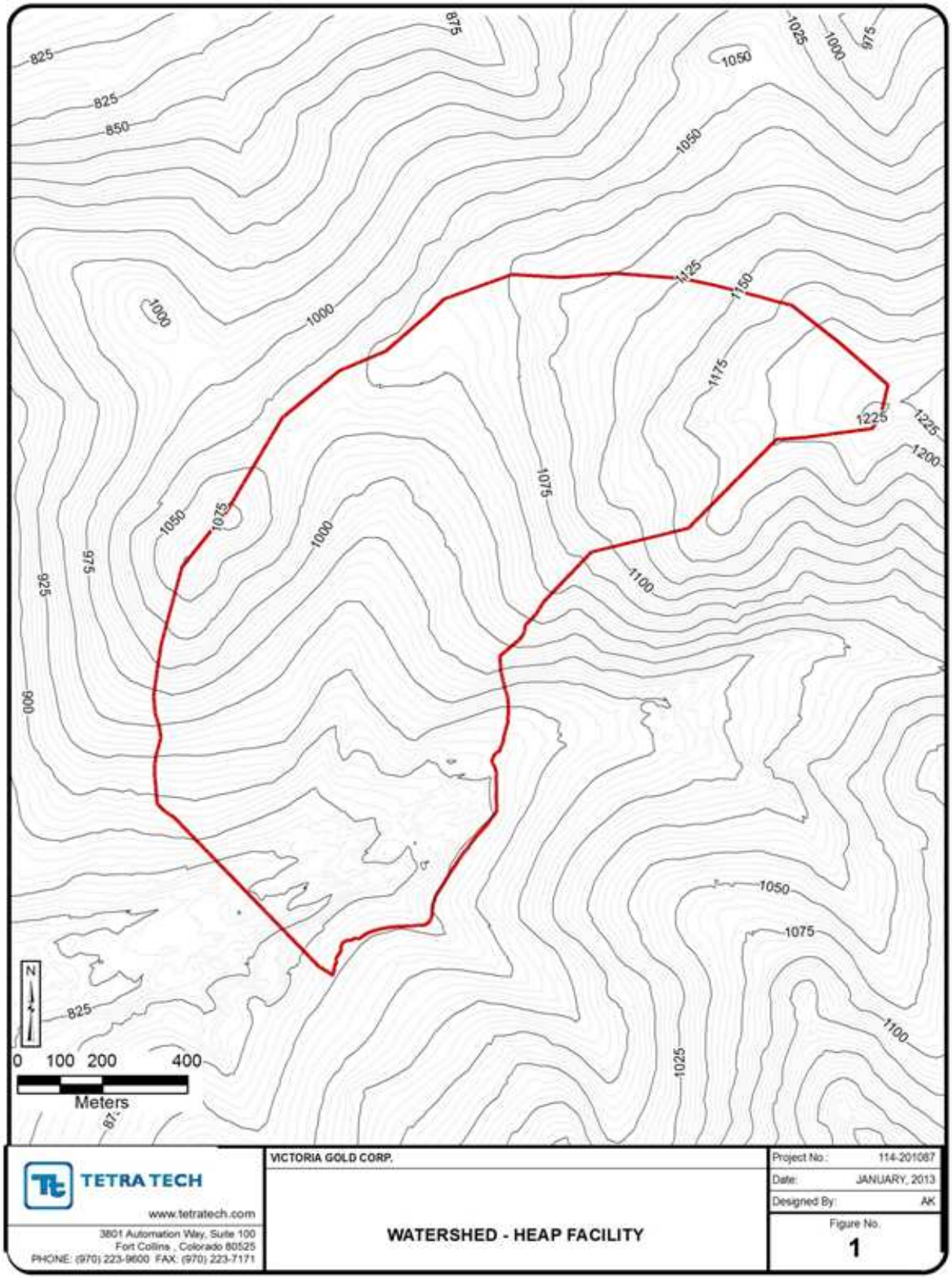

Figure 1. Watershed Delineation Map

2.2.1 Curve Number Method

The Soil Conservation Service (SCS) curve number method (NRCS, 1986) is a widely accepted method for estimating runoff from storm events. Rainfall initial losses depend primarily on soil characteristics and on land use (surface cover). The curve number (CN) method uses a combination of soil conditions and land use to assign curve numbers. Curve numbers represent the runoff potential of a soil type (i.e., the higher the CN, the higher the runoff potential).

The watershed is covered by permafrost in the winter, and infiltration during winter is less than during the summer. As the permafrost melts in the summer, infiltration increases. The NRCS provides curve numbers for various hydrologic soil-cover complexes in National Engineering Handbook (USACE, 2007). However, there are no CNs for HLFs, so a conservative number of 77 was selected for the HLF, which is equivalent to a gravel road.

2.2.2 Time of Concentration

The time of concentration for each sub-basin was calculated using Figure 1 in the Manual of Operational Hydrology in British Columbia (MOE, 1991). This graphical method, used for calculating time of concentration, takes into consideration the area and the terrain of the basin. The SCS unit hydrograph method was used to transform rainfall to runoff. The lag time was calculated as 0.6 times the time of concentration.

3.0 IN-HEAP POND VOLUME REQUIREMENTS

The In-Heap Pond volume requirements were determined assuming a combination of events were to occur simultaneously. This approach was taken to ensure adequate storage volume under the worst of conditions. Thus, the In-Heap Pond will provide containment storage for the following summation of events:

- Operational Volume – The operational volume is the amount of solution required in the pond to supply the gold recovery plant for 12 hours at a nominal rate of 2,770 cubic meters per hour (m^3/hr). This equates to a volume of 33,240 m^3 in the In-Heap Pond, which is a head of approximately 9 meters (m).

- Runoff Volume from 100-year, 24-hour rainfall event – The contributing area for the 100-year, 24-hour rainfall event is assumed to come from all three phases of the HLF. The contributing area for all three phases of the HLF combined is 1.45 km^2. The depth of the 100-year, 24-hour rainfall event is 72 mm, which is derived from the Rainfall Frequency Atlas for Canada (Environment Canada, 1985). Thus, the runoff volume reporting to the In-Heap Pond is 104,400 m^3 based on the SCS curve number method using a curve number of 77.

- Snowmelt Runoff Volume – The snowmelt runoff volume is the volume of water that is melted during a 24-hour rain-on-snow event followed by 48 hours of melting. The amount of snow that melts during the 100-year, 24-hour rainfall event was calculated using an empirical equation in the Manual of Operational Hydrology for British Columbia (MOE, 1991). The equation is shown below and results in a snowmelt of 26.4 mm. The amount of snow that melts during the two days following 100-year, 24-hour event was calculated using the degree-day method (USACE, 2007), and the result is 15.1 mm/day. This comes to a total of 56.6 mm over three days, which is approximately one-third of the estimated

maximum average snowpack depth of 164 mm (Wardrop, 2012). Thus, the snowmelt volume reporting to the In-Heap Pond is 82,026 m^3.

Rain-on-Snow Melt Equation (MOE, 1991):

$$M_t = T_a(1.33 + 0.86V + 0.0126P_r) + 2.33$$

Where:

M_t = snowmelt in (mm/day)

W_m = mean wind speed during event (m/second)

T_m = mean temperature during event (^{0}C), and

P_{24} = the 1:100 year 24-hour rainfall volume (mm).

Snowmelt Equation (Degree-Day Method, USACE, 2007)

$$M = C_m(T_a - T_b)$$

Where:

M = snowmelt (mm/day)

C_m = the degree-day coefficient (mm/degree-day °C)

T_a = mean daily air temperature (°C)

T_b = base temperature (°C)

- Heap Draindown Volume — In the event of a power loss (pumps stop operating), pump malfunction, or pump maintenance, the pond must be able to accommodate the draindown from the Heap. For conservatism, the largest possible draindown rate over a 72-hour period was used. The largest possible draindown volume is the nominal application rate of 2,770 m^3/hr multiplied by 72 hours, which equates to 199,440 m^3. It is assumed that the mine will be able to restore/repair or supply backup pumps within the 72 hours to prevent larger draindown volumes from accumulating.

- Freeboard — 0.5 m of freeboard below the ultimate Embankment crest is required. The 0.5 m of freeboard is added above the corresponding stage-storage volume that provides the required total volume.

The In-Heap Pond volume requirements are summarized in Table 2 below. The In-Heap Pond must provide 419,106 m^3 of solution storage capacity, excluding freeboard.

Table 2. In-Heap Pond Volume Requirements Summary

Volume Requirement	Volume (m^3)
Operational Volume	33,240

Runoff from a 100-year 24-hour Rainfall Event	104,400
Snowmelt Runoff Volume	82,026
Heap Draindown Volume	199,440
Total	**419,106**

4.0 CONFINING EMBANKMENT HEIGHT

In order to determine the height of the Confining Embankment, a stage-storage curve based on the proposed Embankment and HLF grading was created. The actual net capacity (storage volume within the ore pore space) of the In-Heap Pond was determined by multiplying the gross storage volume by the ore storage solution factor of 0.1661 (0.1661 m^3 of solution/m^3 of ore). This factor was determined by assuming initial ore moisture content of 5.0 percent, an ore bulk density of 1.87 tons/m^3, an ore specific gravity of 2.7, and an ore leaching moisture content of 16.8 percent (KCA, 2012). Detailed calculations for derivation of the solution storage factor can be found in Attachment A.

The total required In-Heap Pond volume (419,106 m^3) was compared to the net stage-storage curve to obtain a corresponding elevation that will provide the necessary storage volume. Based on the net stage-storage curve for the In-Heap Pond, an elevation of 885 m will provide the required volume. To account for uncertainty in the estimate, an elevation of 886 m was selected to provide an additional factor of safety to account for possible decreases in storage capacity. Decreases in storage capacity may also occur as a result of consolidation due to the loads from stacking as well as migration of fine particles into the pore space of the In-Heap Pond (i.e., agglomeration effects).

The final Embankment crest elevation will be at 888 m (2 m above the spillway elevation). The overflow spillway invert will be at elevation 886 m. The ultimate storage capacity of the In-Heap Pond up to the final Embankment crest elevation (888 m) is estimated at 503,161 m^3. The In-Heap net stage-storage curve is presented in Figure 1 below (stage-storage calculations can be found in Attachment A). At its maximum, (downstream side) the Embankment will have a height of approximately 60m.

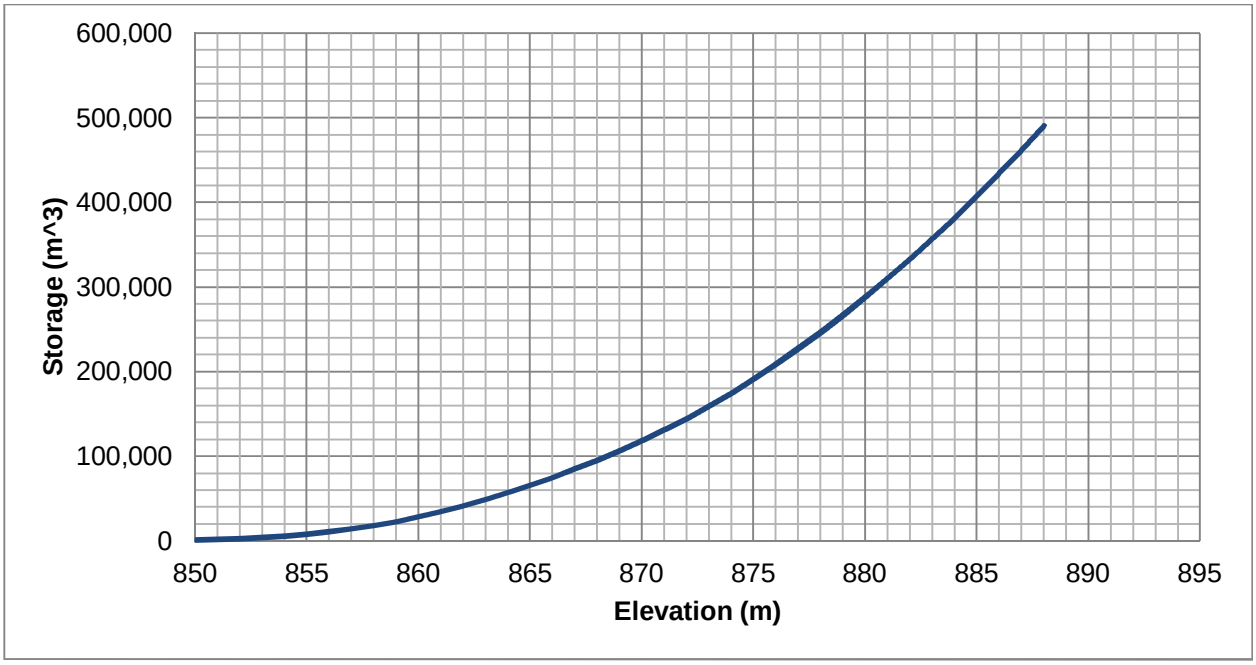

Figure 2. In-Heap Pond Stage-Storage Volume

5.0 IN-HEAP POND SPILLWAY

The In-Heap Pond spillway was designed in accordance with the Canadian Dam Association (CDA) guidelines for a "High" consequence dam. According to the CDA (2007) guidelines a dam classification of "High" suggests a design flood of 1/3 between the 1,000-year event and the Probable Maximum Flood (PMF). Flow from the Spillway will then be routed through to the Events Pond.

A worst-case scenario was developed for calculating the largest peak flow to be experienced by the spillway. The scenario assumed that Phase 1 of the pad is constructed, Phases 2 and 3 are being cleared and grubbed for construction, and the pad is loaded with ore to elevation 886 m (roughly at the spillway invert and below the Embankment crest). The scenario also assumed that the ore is loaded to this elevation, and is completely saturated when the design storm events occur. The HLF temporary diversion channels (sized for the 100-year, 24-hour event) were assumed to have overtopped resulting in the entire upstream watershed contributing to the peak flow. Details of the hydrology calculations performed for sizing the spillway are provided in the following sections.

5.1 Results from Hydrologic Analysis

The runoff volume from the PMF was calculated to be 280,000 m^3 for the watershed upstream of the Confining Embankment using the SCS CN method described in Section 2 above and the HEC-HMS hydrologic rainfall-runoff model.

The peak flow for the PMF is 24 m^3/s and 6 m^3/s for the 1000-year event from the hydrologic modeling. The summary of hydrology modeling can be found in Attachment B.

5.2 In-Heap Pond Spillway Sizing

The design flow for the spillway based on CDA regulations is 1/3 between the 1000-year and the PMF, which is 12 m^3/s. To accommodate an access road, the spillway will need to be concrete box culverts, the dimensions these culverts were determined using HY-8 (FHWA, 2008) and then verified with hydraulic analysis using Hydrologic Engineering Centers River Analysis System (HEC-RAS) (USACE, 2010b). The dimensions of the box culverts needed to convey the design flow without overtopping are two 2.5 m wide by 1.5 m high.

The USACE HEC-RAS model, version 4.1 (USACE, 2010b) was used to analyze the entire length of the spillway to confirm dimensions and evaluate the hydraulic jump from the design flow before it enters the Events Pond. The spillway will have an invert of 886 m at the upstream end. This configuration allows a 0.5 m of freeboard from the maximum anticipated water surface elevation to the crest of the Embankment. Based on results of the HEC-RAS model, the spillway downstream of the box culverts will be rectangular with a width of 4.5 m and a depth of 2.0 m. Results of the hydraulic analysis are provided in Attachment B.

6.0 EVENTS POND

The Events Pond serves as overflow containment providing additional storage in case the In-Heap Pond capacity is exceeded. The Events Pond is sized to provide containment storage for ¾ of the PMF Event. The PMF event rainfall depth was estimated to be 256 mm (KP, 2012) which is assumed to contribute entirely over the maximum contributing area (Phases 1, 2, and 3) of 1.45 km^3. The SCS CN method was also used to calculate the peak flow and runoff volume form the HLF that overflows the spillway and reports to the Events Pond. The rainfall volume from the PMF reporting to the Events Pond is 280,000 m^3, and the peak flow is 24 m^3/s.

The capacity of the Events Pond is 203,967 m^3 with freeboard, and is 254,848 m^3 without any freeboard. The peak discharge from the PMF through the Events Pond after hydrologic routing is expected to be 3 m^3/s. The spillway on the Events Pond will have a bottom width of 3 m and a depth of 1.5 m. The elevation of the spillway is set at 818.5m. The stage-storage for the Events Pond is provided in Attachment A.

7.0 SUMMARY

The In-Heap Pond will provide a storage capacity of 419,106 m^3 at elevation 885m with a freeboard of 1m to the spillway elevation of 886m. The crest elevation of the Confining Embankment is 888m, which corresponds to an ultimate storage capacity of 503,161 m^3. The spillway is sized to accommodate a design flow of 12 cms with a 0.5 m of freeboard. The Events Pond has a storage capacity of 203,967 m^3 with 1.5m of freeboard. The ultimate storage capacity of the Events Pond is 254,848 m^3 (without any freeboard).

The solution storage capacity of the In-Heap Pond excludes the runoff volume generated from the PMP event. If the PMP were to occur simultaneously with the events described above, flows would be routed to the Events Pond through the spillway. If the PMP event were to occur under normal conditions (not simultaneously with the events described above), the runoff volume from the PMP can be easily stored in the In-Heap Pond. Furthermore, if the In-Heap Pond is full, the PMF event will be safely conveyed through the Events Pond with a controlled release through the overflow spillway.

8.0 REFERENCES

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ATTACHMENT A
IN-HEAP POND AND EVENTS POND STAGE-STORAGE CALCULATIONS

In-Heap Pond Ore Solution Storage Calculations

Equations:

$\gamma_{dry} = \frac{\gamma_{bulk}}{1+w}$ $\quad V = V_a + V_w + V_s = 1$ assuming 1 m^3 of ore

$W_w = wW_s$ $\quad V_v = V_a + V_w$

$V_w = \frac{W_w}{\gamma_w}$ $\quad n = \frac{V_v}{V}$

$V_s = \frac{W_s}{G_s \gamma_w}$ $\quad Se = wG_s$

$V_a = 1 - V_s - V_w$

Initial Conditions (Ore as Delivered, Top of Ore Pile)

Specific Gravity G_s =	2.7	
Density of Water (γ_w) =	1000	kg/m^3
Water Content as Delivered (w) =	5.00%	
Ore Density (γ_{bulk}) =	1,481	kg/m^3
Ore Density (γ_{dry}) =	1,410	kg/m^3
Weight of Water (W_w) =	70.50	kg/m^3
Volume of Water (V_w) =	0.0705	m^3
Volume of Solids (V_s) =	0.5222	m^3
Volume of Air (V_a) =	0.4073	m^3/m^3 of ore
porosity (n) =	0.4778	
void ratio (e) =	0.9149	
Saturation (S) =	14.76%	

Loaded Conditions (Bottom of In-Heap Pond)

Specific Gravity G_s =	2.7	
Density of Water (γ_w) =	1000	kg/m^3
Water Content as Delivered (w) =	5.00%	
Ore Density (γ_{bulk}) =	1,869	kg/m^3
Ore Density (γ_{dry}) =	1,780	kg/m^3
Weight of Water (W_w) =	89.00	kg/m^3
Volume of Water (V_w) =	0.0890	m^3
Volume of Solids (V_s) =	0.6593	m^3
Volume of Air (V_a) =	0.2517	m^3/m^3 of ore
porosity (n) =	0.3407	
void ratio (e) =	0.5169	
Saturation (S) =	26.12%	

Leaching Conditions/Ore Solution Storage Capacity

Water content (w) =	13.30%	
Weight of Water (W_w) =	187.53	kg/m^3
Volume of Water (V_w) =	0.1875	m^3
Volume of Solids (V_s) =	0.5222	m^3
Volume of Air (V_a) =	**0.2902**	m^3/m^3 of ore
void ratio (e) =	0.9149	check - OK
Saturation (S) =	39.25%	

Leaching Conditions/Ore Solution Storage Capacity

Water content (w) =	16.79%	
Weight of Water (W_w) =	298.86	kg/m^3
Volume of Water (V_w) =	0.2989	m^3
Volume of Solids (V_s) =	0.6593	m^3
Volume of Air (V_a) =	**0.0419**	m^3/m^3 of ore
void ratio (e) =	0.5169	check - OK
Saturation (S) =	87.71%	

Volume of Air (V_a) = **0.1661** m^3/m^3 of ore ⇦ Average Estimated Ore Solution Storage Capacity within In-Heap Pond under Loaded Conditions and under Leach

Ore properties derived from KCA (2012) in *Report on Metallurgical Test Work* , October, 2012

In-Heap Pond Stage-Storage

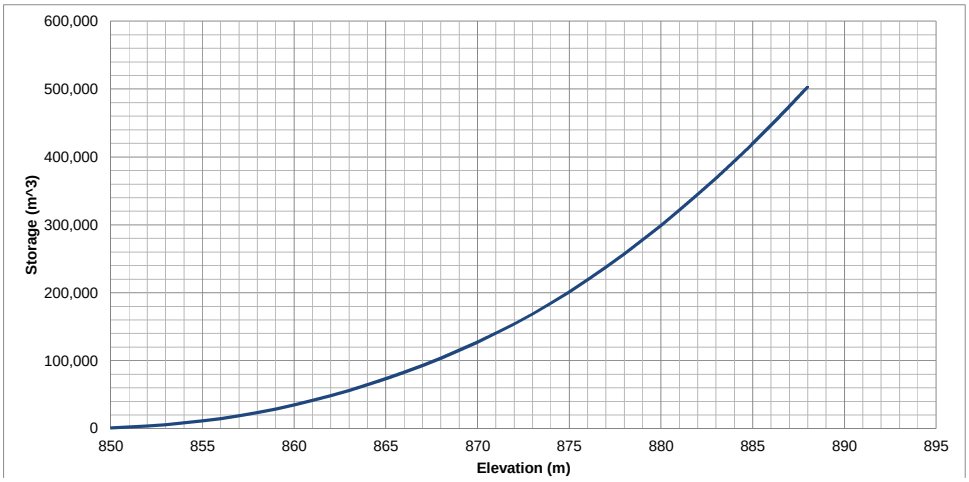
Elevation-Area Function

Revised 3/29/13 DAG
Embankment crest rasied to 888

Average Estimated Ore Solution Storage Capacity within
In-Heap Pond under Loaded Conditions solution storage per m^3 of ore 0.1661 m^3/m^3 of ore

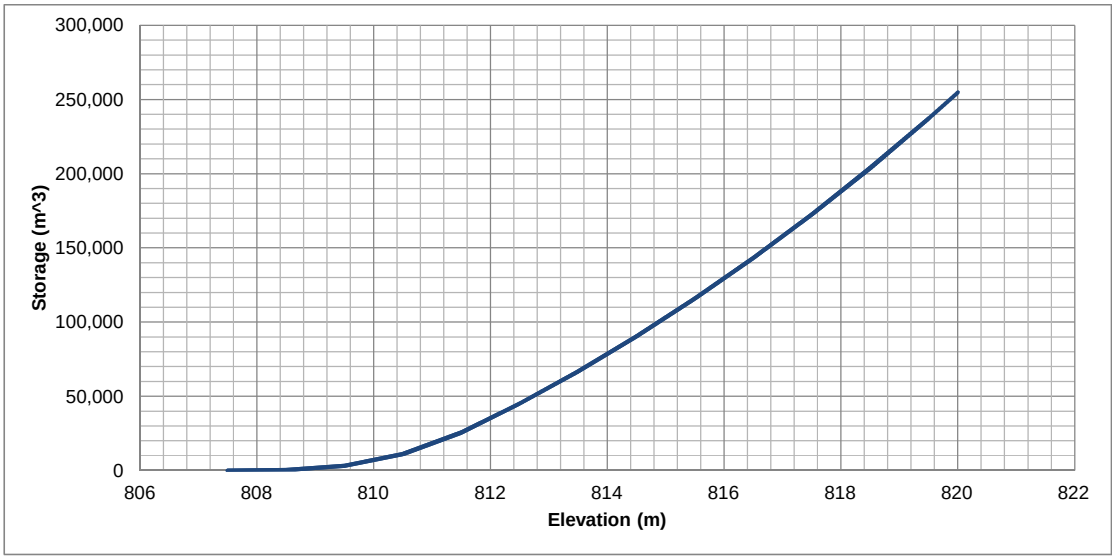
ELEV	AREA (m^2)	INCREMENTAL VOL (m^3)	GROSS TOTAL VOL (m^3)	NET TOTAL VOL (in Voids)
840		0	0	0.0
841	0	0.0	0.0	0.0
842	0	0.0	0.0	0.0
843	0	0.0	0.0	0.0
844	0	0.0	0.0	0.0
845	0	0.0	0.0	0.0
846	0	0.0	0.0	0.0
847	682	341.0	341.0	56.6
848	1,019	850.5	1191.5	197.9
849	1,457	1238.0	2429.5	403.4
850	6,062	3759.5	6189.0	1027.8
851	8,471	7266.5	13455.5	2234.5
852	11,024	9747.5	23203.0	3853.2
853	13,713	12368.5	35571.5	5907.1
854	16,529	15121.0	50692.5	8418.1
855	19,465	17997.0	68689.5	11406.8
856	22,452	20958.5	89648.0	14887.2
857	25,843	24147.5	113795.5	18897.2
858	29,638	27740.5	141536.0	23503.8
859	33,843	31740.5	173276.5	28774.8
860	38,462	36152.5	209429.0	34778.3
861	41,595	40028.5	249457.5	41425.6
862	44,842	43218.5	292676.0	48602.5
863	48,204	46523.0	339199.0	56328.3
864	51,679	49941.5	389140.5	64621.7
865	55,265	53472.0	442612.5	73501.4
866	58,991	57128.0	499740.5	82988.2
867	62,826	60908.5	560649.0	93102.8
868	66,773	64799.5	625448.5	103863.6
869	70,838	68805.5	694254.0	115289.6
870	75,020	72929.0	767183.0	127400.4
871	80,321	77670.5	844853.5	140298.6
872	85,933	83127.0	927980.5	154102.9
873	91,857	88895.0	1016875.5	168865.0
874	98,103	94980.0	1111855.5	184637.6
875	104,673	101388.0	1213243.5	201474.4
876	109,783	107228.0	1320471.5	219281.0
877	115,078	112430.5	1432902.0	237951.5
878	120,560	117819.0	1550721.0	257516.8
879	126,229	123394.5	1674115.5	278008.0
880	132,087	129158.0	1803273.5	299456.3
881	137,101	134594.0	1937867.5	321807.4
882	142,230	139665.5	2077533.0	345000.6
883	147,477	144853.5	2222386.5	369055.3
884	152,841	150159.0	2372545.5	393991.1
884.97				419106.0
885	158,327	155584.0	2528129.5	419827.8
886	164,283	161305.0	2689434.5	446614.6
887	170,039	167161.0	2856595.5	474373.8
888	176,667	173353.0	3029948.5	503161.2

Min. WSE for In-Heap Pond -	884.97	**419106.0**	**m^3 of storage req for the In Heap Pond**



Events Pond Stage-Storage

ELEV	AREA (m^2)	INCREMENTAL VOL (m^3)	TOTAL VOL (m^3)	
807.5	324.00	0	0	
808.5	529.00	427	427	
809.5	4,835.00	2,682	3,109	
810.5	11,146.00	7,991	11,099	
811.5	17,993.00	14,570	25,669	
812.5	20,855.00	19,424	45,093	
813.5	22,662.00	21,759	66,851	
814.5	24,513.00	23,588	90,439	
815.5	26,408.00	25,461	115,899	
816.5	28,349.00	27,379	143,278	
817.5	30,333.00	29,341	172,619	
818.5	32,363.00	31,348	203,967	Spillway
819.5	34,436.00	33,400	237,366	
820	35,490.00	17,482	254,848	Crest of Pond



ATTACHMENT B
SPILLWAY SIZING
HEC-HMS AND HEC-RAS RESULTS

The PMF discharge at the heap leach facility= 24.1 m^3/s
The 1000-year discharge at the heap leach facility = 6.0 m^3/s
The spillway is designed to convey a peak discharge one-third between the PMF – and the 1000-year discharge = $6.0 + \frac{(24.1-6.0)}{3}$ = 12.03 m^3/s

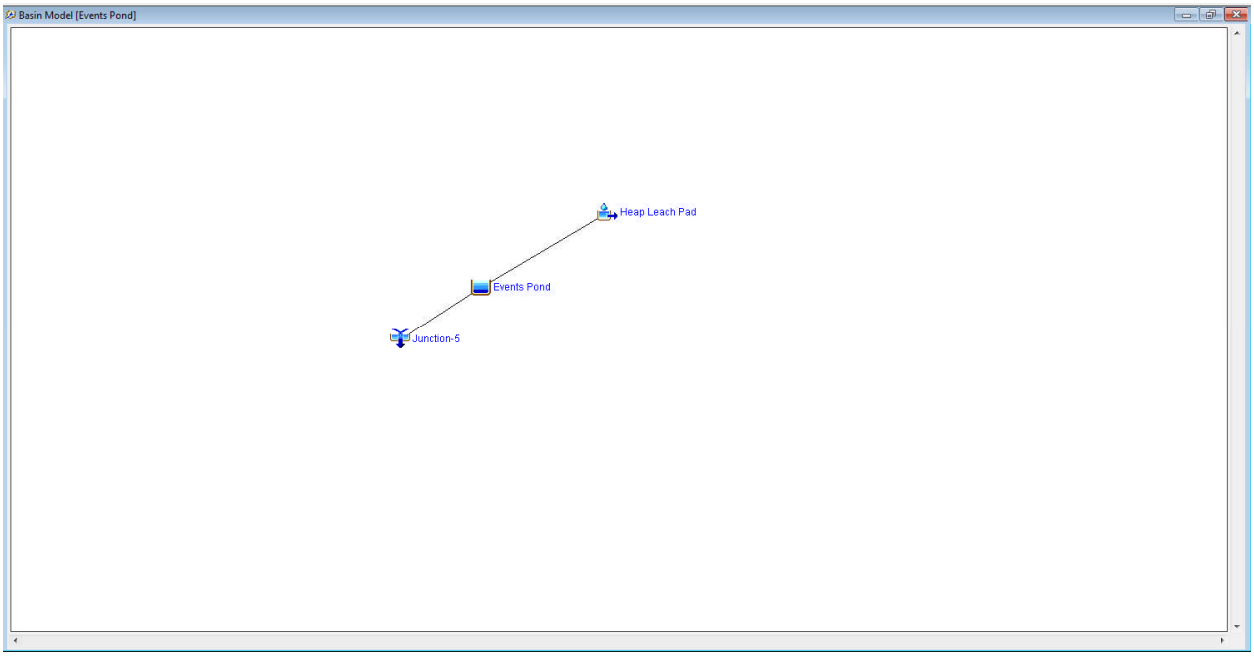
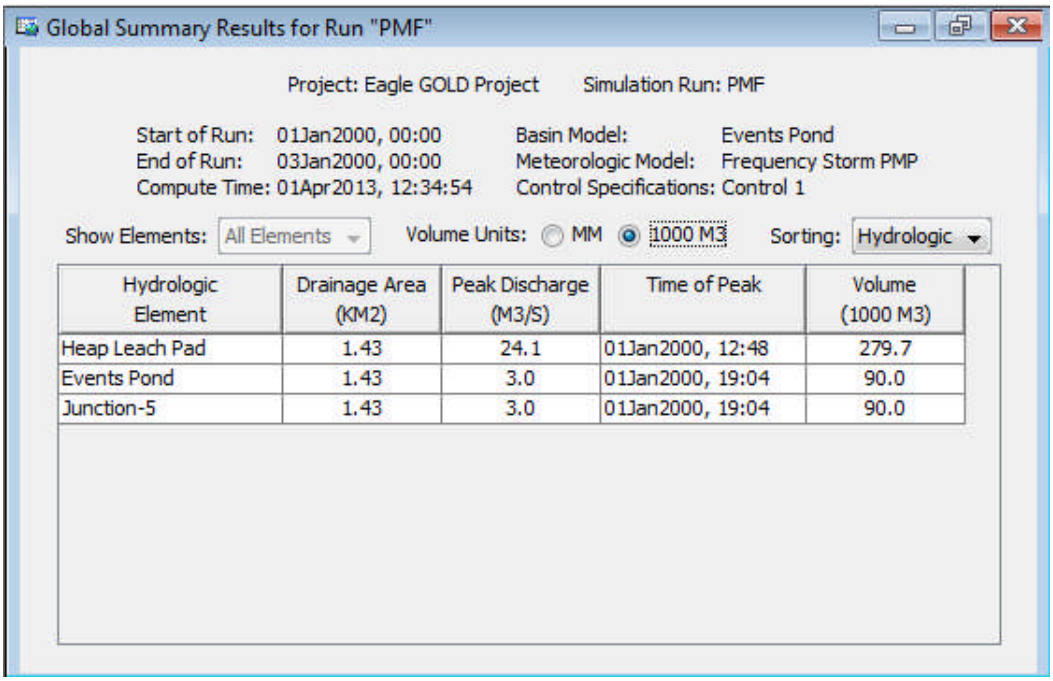


Figure 1. Model Layout



Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
Heap Leach Pad	1.43	24.1	01Jan2000, 12:48	279.7
Events Pond	1.43	3.0	01Jan2000, 19:04	90.0
Junction-5	1.43	3.0	01Jan2000, 19:04	90.0

Figure 2: Summary of peak discharges during a PMF event

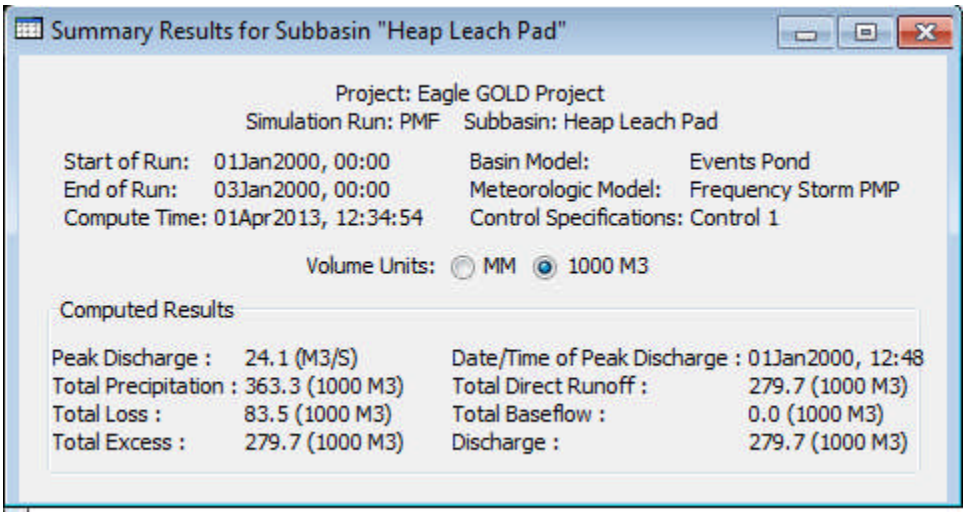


Figure 3. Summary Results Runoff from Heap Leach during PMF

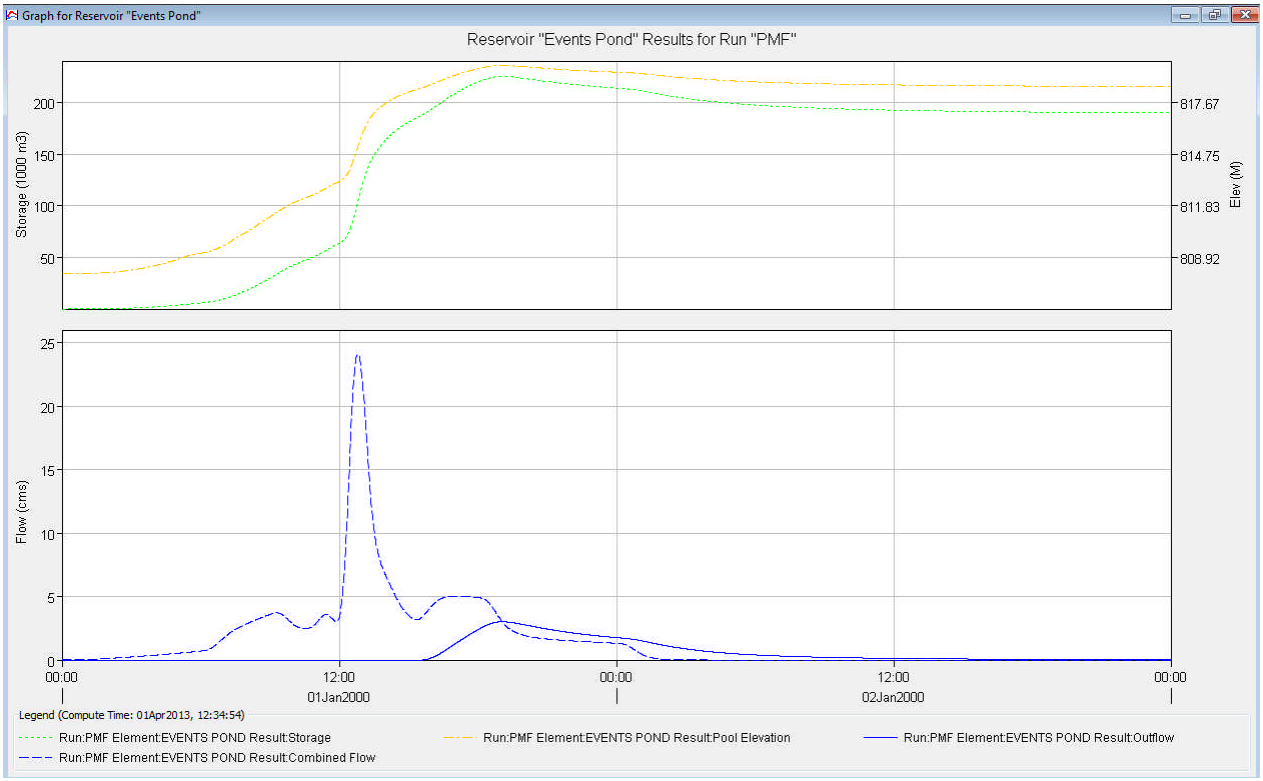
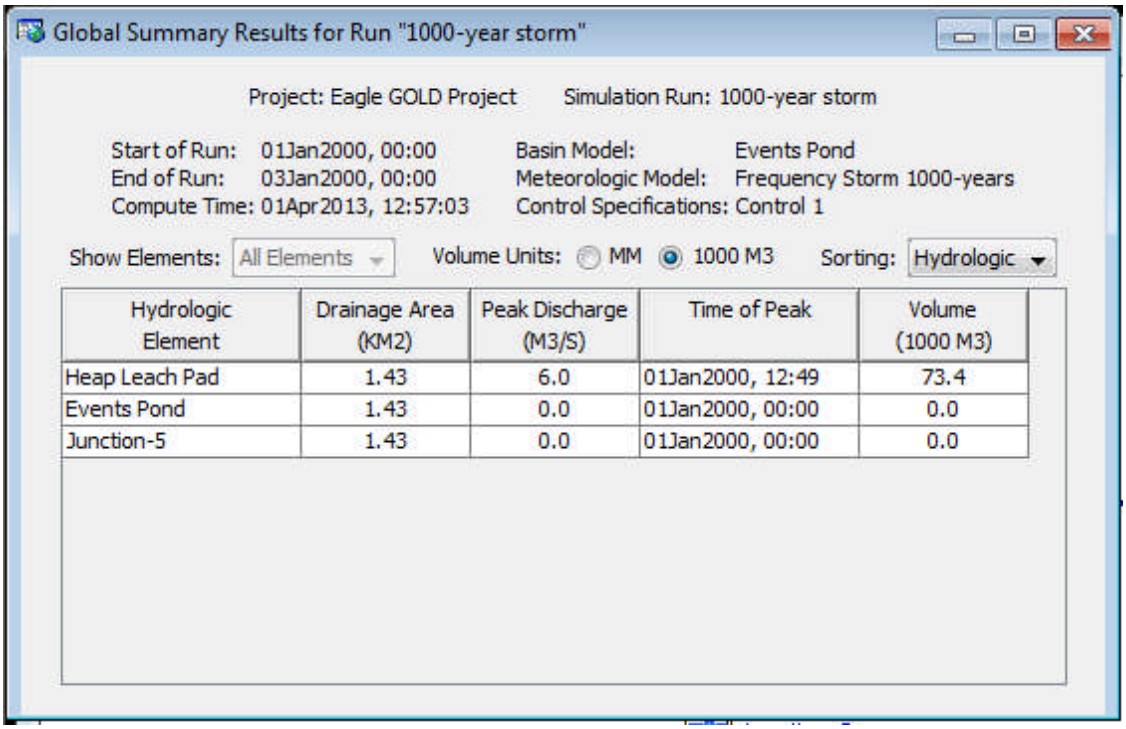


Figure 4. Flood Attenuation at Events Pond during a PMF event



Hydrologic Element	Drainage Area (KM2)	Peak Discharge (M3/S)	Time of Peak	Volume (1000 M3)
Heap Leach Pad	1.43	6.0	01Jan2000, 12:49	73.4
Events Pond	1.43	0.0	01Jan2000, 00:00	0.0
Junction-5	1.43	0.0	01Jan2000, 00:00	0.0

Figure5 : Summary of peak discharges during a 1000-year event

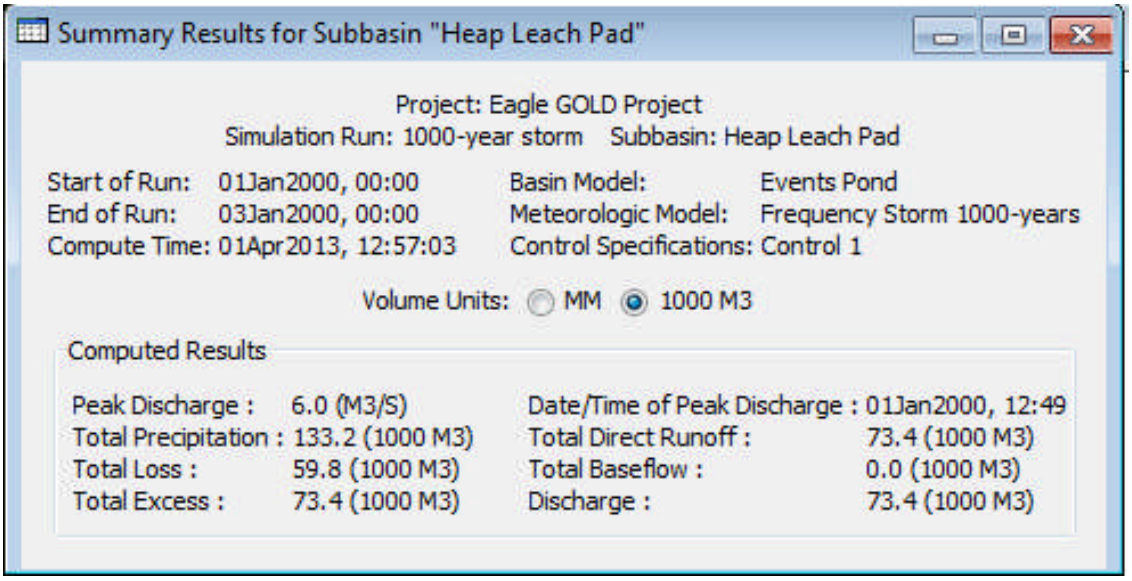


Figure 6. Summary Results Runoff from Heap Leach during a 1000-year event

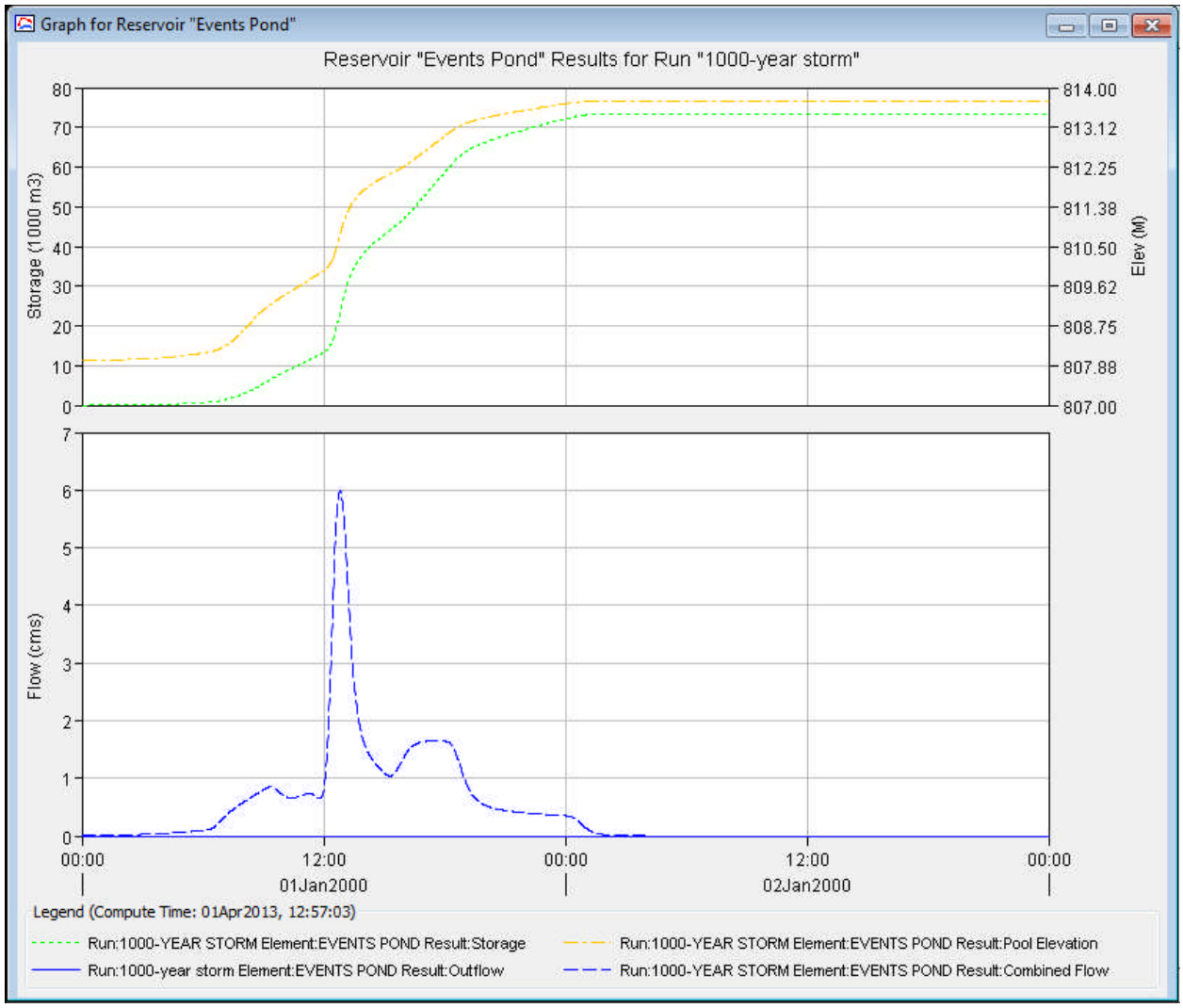


Figure 7. Flood Attenuation at Events Pond during a 1000-year event

APPENDIX I – LINER LEAKAGE ANALYSIS AND SUMP SIZING

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Technical Memorandum

To:	File	**From:**	Kyle Avery, EIT
Company:	Victoria Gold Corp	**Date:**	March 29, 2013
Re:	Eagle Gold Project – Heap Leach Facility Detailed Design – Liner Leakage Analysis	**Doc #:**	
CC:	Troy Meyer, P.E., P.Eng (Tetra Tech)		

1.0 Introduction

This Technical Memorandum demonstrates that a geosynthetic clay liner (GCL) provides a superior level of engineering control when compared to a soil liner that is 300 mm thick, compacted to achieve a maximum permeability of $1x10^{-6}$ cm/s. Additionally, this technical memorandum provides estimates of the amount of fluid that may leak through the three (3) lined Heap Leach Facilities (HLF) proposed for the Eagle Gold Project (Project) including:

- The Heap Leach Pad;
- The In-Heap Pond; and
- The Event Pond

2.0 Liner Leakage Equations

The calculations used in this memorandum are based on either Giroud's Equation, Bernoulli's Equation for free flow through an opening, and/or Darcy's Law.

2.1 Giroud's Equation

The leakage through a circular defect in a geomembrane liner system that includes a low permeability component GCL was estimated using Giroud's Equation (Giroud, 1997):

$$Q = 0.976 C_{qo} \left[1 + 0.1 \left(\frac{h}{ts} \right)^{0.95} \right] d^{0.2} h^{0.9} k_s^{0.74}$$

Where:

Q = Rate of liquid migration or potential leakage rate (PLR) (m^3/s/defect);

C_{qo} = Contact quality factor that represents the contact interface between the low permeability component and the geomembrane liner (dimensionless);

- Poor contact: 1.15; and
- Good contact: 0.21;

h = Height of liquid on top of geomembrane (m);

Giroud's Equation assumes that the hydraulic head on the liner to be less than or equal to three (3) meters. The empirical investigations published by Giroud and Bonaparte (1989) showed that permeation, leakage through a geomembrane liner without holes, may not be negligible in scenarios with more than three (3) meters of hydraulic head. Giroud's Equation does not take permeation into account.

t_s = Thickness of the low permeability component (m);

d = Diameter of circular defect (m); and

Giroud's Equation assumes a circular defect in the geomembrane liner having a diameter between 0.0005 m and 0.025 m.

k_s = Hydraulic conductivity of the low permeability component (m/s).

Once the PLR (m^3/s/defect) is determined, it is multiplied by the Lined Surface Area (LSA) of the pond and multiplied by the assumed defect rate to calculate the total potential leakage (TPL).

2.2 Bernoulli's Equation for Free Flow through an Opening

The PLR through a geomembrane liner that is not placed directly on a low permeability component can be calculated using Bernoulli's Equation for free flow through an opening.

$$Q = C_B a \sqrt{2gh_w}$$

Where:

Q = PLR through a geomembrane hole (m^3/s/defect);

C_B = Dimensionless coefficient related to the shape of the edges of the hole (for sharp edges $C_B = 0.6$);

a = Hole area (m^2);

g = Acceleration due to gravity (m/s^2); and

h_w = Liquid depth on top of the geomembrane (m).

Once the PLR (m^3/s/defect) is determined, it is multiplied by the LSA of the pond and by the assumed defect rate to calculate the TPL.

2.3 Defect Rate

Giroud's Equation and Bernoulli's Equation for free flow through an opening each require an assumed defect rate to determine the potential leakage through a liner.

A single, two (2) millimeter (mm) diameter [area (a) = 3.14 mm^2] hole per 4,047 m^2 represents defects in a geomembrane liner that still may exist after intensive quality assurance resulting from fabrication or installation factors.

Failure of the geomembrane due to poor design, or accidental punctures, may be represented by a single 11.3 mm diameter (a = 100 mm^2) hole per 4047 m^2 of liner (Giroud and Bonaparte, 1989).

2.4 Darcy's Law

The amount of permeation through a geomembrane liner without hole or a low permeability component can be calculated using Darcy's Law:

$$Q = \frac{k * A * h}{t}$$

Where:

Q = Rate of liquid migration (m^3/s);

k = Hydraulic conductivity (m/s);

t = Thickness (m);

A = Surface area of the liner; and

h = Height of liquid above the liner (m).

3.0 Demonstration of Superior Engineering Control with GCL

This demonstration considers two (2) ponds that are lined with either low permeability soil (LPS) or a GCL. The total potential leakage (TPL) through an LPS layer or a GCL was calculated using Darcy's Law:

$$Q = \frac{k * A * h}{t}$$

Where:

Q = Rate of liquid migration (m^3/s);

k = Hydraulic conductivity of the low permeability component (m/s);

k_{LPS} = $1x10^{-8}$ (m/s);

k_{GCL} = $5x10^{-11}$ (m/s) (Cetco, 2009);

t = Thickness of the low permeability component (m);

t_{LPS} = 0.300 (m);

t_{GCL} = 0.006 (m) (Cetco, 2009);

A = Area of the pond = 1,000 (m^2); and

h = Height of liquid above the liner = five (5) meters.

The total potential leakage for each pond would be:

$$Q_{LPS} = \frac{k_{LPS} * A * h}{t_{LPS}} = \frac{1x10^{-8} * 1{,}000 * 5}{0.3} = \frac{1.667x10^{-4} m^3}{s} x \frac{1{,}000 L}{m^3} x \frac{86{,}400 s}{day} = 14{,}400\left(\frac{L}{day}\right)$$

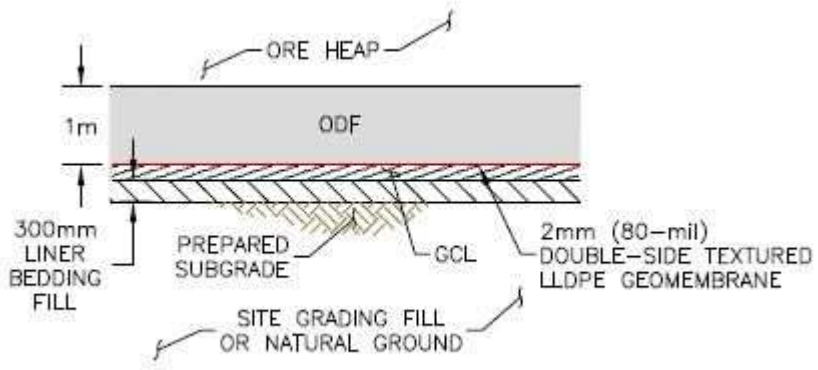
$$Q_{GCL} = \frac{k_{GCL} * A * h}{t_{GCL}} = \frac{5x10^{-11} * 1{,}000 * 5}{0.006} = \frac{4.167x10^{-5} m^3}{s} x \frac{1{,}000 L}{m^3} x \frac{86{,}400 s}{day} = 3{,}600\left(\frac{L}{day}\right)$$

As shown above, GCL provides a superior level of engineering control when compared to a low permeability soil layer that is 300 mm thick with a maximum permeability of $1.0x10^{-6}$ cm/s.

4.0 Heap Leach Pad

The following section evaluates the TPL of the liner system proposed for Phases 1 through 3 of the Heap Leach Pad with the configuration shown in Illustration 1. This liner system consists of a GCL overlain by a 1.5 mm double side textured linear low density polyethylene (LLDPE) geomembrane covered by a minimum of one (1) meter of overliner drain fill (ODF).

Illustration 1 Heap Leach Pad Liner Detail



As demonstrated in Section 2.0, GCL provides a superior level of engineering control; therefore, GCL was selected for the low permeability component. GCL provides superior puncture protection to the overlying geomembrane liner.

The TPL through the liner system for Phases 1 through 3 was estimated using Giroud's Equation (Giroud, 1997). To provide conservative leakage estimates, these calculations assume a maximum hydraulic head on the liner of 1.5 meters and a defect rate of one (1) large (d=11.3mm) hole in every 4,047 m^2 of liner to account for potential punctures. Table 1 presents the calculations used to determine the PLR through the Phase 1 through 3 Heap Leach Pads liner system.

Table 1 PLR through Heap Leach Pad Liner

C_{qo} =	0.21	(dimensionless)
h =	1.500	(m)
d =	0.0113	(m)
t_s =	0.006	(m)
k_s =	5.0E-11	(m/sec)
Q =	5.73E-08	PLR (m^3/s/defect)

The calculations yielded a PLR of Q = 5.73E-8 m^3/s/defect. This can be converted to liters per day (Lpd) per defect as follows:

$$\frac{5.73E-8m^3/s}{defect} x \frac{1000Liters}{m^3} x \frac{60s}{\min} x \frac{60\min}{hr} x \frac{24hr}{day} = \frac{4.95Lpd}{defect}$$

To establish the TPL, the PLR was multiplied by the LSA for each Phase and by the defect rate.

Phase 1:

$$TPL = \frac{4.95gpd}{defect} x \frac{1defect}{4046.86m^2} \times 462{,}000m^2 = 565.45Lpd$$

Phase 2:

$$TPL = \frac{4.95gpd}{defect} x \frac{1defect}{4046.86m^2} \times 462{,}000m^2 = 565.45Lpd$$

Phase 3:

$$TPL = \frac{4.95gpd}{defect} x \frac{1defect}{4046.86m^2} \times 413{,}000m^2 = 505.48Lpd$$

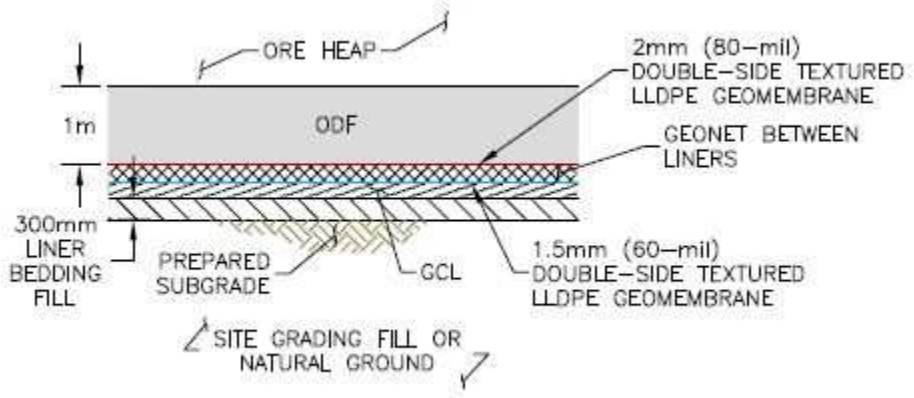
Phases 1, 2 and 3 of the Heap Leach Pad may discharge 565 Lpd, 565 Lpd, and 505 Lpd respectively.

5.0 In-Heap Pond Calculations

The following evaluates PLR through the top liner of the proposed In-Heap Pond to determine appropriate leakage alert levels to indicate a malfunction of the liner system. The double lined system beneath the In-Heap Pond is shown in Illustration 2 and consists of the following components from bottom to top:

- Prepared subgrade;
- GCL;
- 1.5 mm double side textured LLDPE geomembrane (bottom liner);
- Geonet;
- 2.0 mm single side textured LLDPE geomembrane (top liner); and
- One (1) meter ODF.

Illustration 2 In-Heap Pond Liner Detail



The In-Heap Pond has a maximum depth of 39 meters and the surface areas used for the analysis range from 682 m^2 to 176,667m^2. The surface areas and leachate depths were obtained from the In-Heap Pond Stage-Storage Elevation-Area Function calculations for the Eagle Gold Heap Leach Facility Project.

5.1 Alert Levels

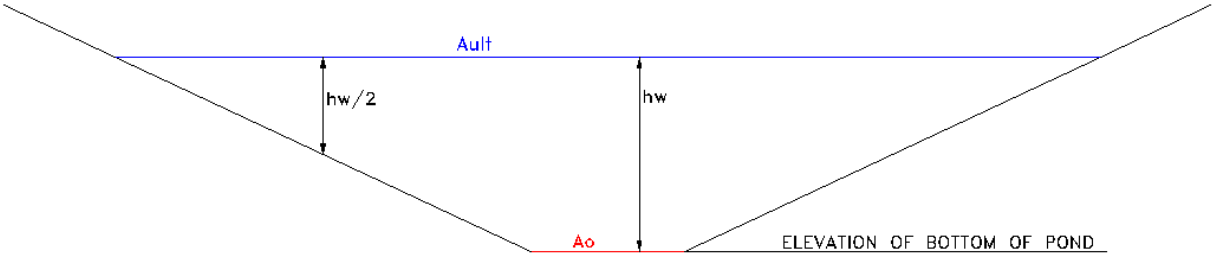
Alert Level 1 (AL1) provides a benchmark for liner performance in a double-lined pond under typical operating conditions using a defect rate one (1) small hole that is two (2) millimeter diameter per 4,047 m^2. AL1, as measured by the amount of fluid pumped by the pond's Leak Detection and Removal System (LDRS), is a low-level trigger that may indicate the presence of a small hole or defect in the top geomembrane.

Alert Level 2 (AL2) provides a high-level trigger that indicates serious malfunction of the liner system a single 11.3 mm diameter hole per 4,047 m^2. This criterion is used for AL2 with a factor of safety of 1.5 applied to the leakage rates.

Typically, the AL1 and AL2 are calculated using the total depth and total LSA of a double-lined pond. This approach provides accurate results for shallow ponds with a relatively flat bottom. Additionally, because the In-Heap Pond is much deeper than ten (10) meters, permeation through the liner is not insignificant. Therefore, the permeation was calculated at each interval using Darcy's Law and the average head on the liner. This value was included in AL1 and AL2.

The significant depth of the In-Heap Pond necessitates calculation of the PLR in steps using the differential LSA's and corresponding depths as the pond fills with leachate as shown in Illustration 3.

Illustration 3 Example of Liner Areas and Head Levels in the In-Heap Pond



Therefore, the alert levels were calculated using a modified Bernoulli's Equation for free flow through an opening as follows:

$$TPL = C_b a A\sqrt{2gh_w} + \frac{k * A_{Ult} * h_w}{2 * t} = C_b a\sqrt{2g}\left(A_o\sqrt{h_w} + (A_{Ult} - A_0)\sqrt{\frac{h_w}{2}}\right) + \frac{k * A_{Ult} * h_w}{2 * t}$$

Where:

A_0 = Surface area at bottom of pond; and

A_{ult} = Surface area at the maximum filled elevation;

Table 2 presents the results of the calculation at five (5) meter increments within the pond:

Table 2 AL1 and AL2 for the In-Heap Pond

Elevation	Depth (Meters)	Area (m^2)	Difference (m^2)	AL1 (Lpd)	AL2 (Lpd)	Pump Capacity (Lpd)
847	0	682	--	--	--	--
848	1	1,019	337	169	3,484	5,227
853	6	13,713	2,689	3,583	72,507	108,761
858	11	29,638	3,795	10,954	217,330	325,994
863	16	48,204	3,362	22,404	438,137	657,205
868	21	66,773	3,947	36,534	705,307	1,057,961
873	26	91,857	5,924	54,727	1,046,577	1,569,866
878	31	120,560	5,482	78,433	1,488,377	2,232,566
883	36	147,477	5,247	105,634	1,987,932	2,981,897
886	39	164,283	5,956	123,484	2,312,546	3,468,819

Attachment 1 provides the results of the calculation at one (1) meter increments

The system will be designed with the pumping capacity to accommodate the calculated leakage rate of 3,468,819 Lpd or 2,409 Lpm. However, the AL2 was lowered to provide a factor of safety of 1.5 as follows:

2,409 Lpm ÷ 1.5 = 1,606 Lpm

5.1.1 Summary

The Alert Levels for the In-Heap Pond, as measured by the amount of fluid pumped out of a LDRS were calculated to be:

- AL1 = 123,484 Lpd or 86 Lpm;
- AL2 = 2,312,546 Lpd or 1,606 Lpm; and
- Pumping Capacity = 3,468,819 Lpd or 2,409 Lpm.

If it is determined during normal operations that the amount of fluid pumped out of the LDRS exceeds AL1, the owner and/or operator should take action to determine the cause. This action may include physical inspection, mechanical leak detection, electric leak location, or other methods to determine what is causing the AL1 exceedance in order to maintain the liner integrity such that the AL2 is not exceeded.

If it is determined during normal operations that the amount of fluid pumped out of the LDRS exceeds AL2. The owner or operator should implement a contingency plan for the facility.

5.2 Leak Detection and Recovery System Sump Sizing

A Leak Detection and Recovery System (LDRS) sump was designed to contain 1 hr of AL2 flow, as determined above. The volume of the sump is calculated as the shape of a frustum of a pyramid with dimensioning as shown below. It is located at the lowest point in the facility, adjacent to the upstream toe of the proposed In-Heap Pond embankment, between the primary and secondary liners. The sump is filled with a Select Drain Fill which is assumed to have a porosity of 30%.

Illustration 4 LDRS Sump Geometry

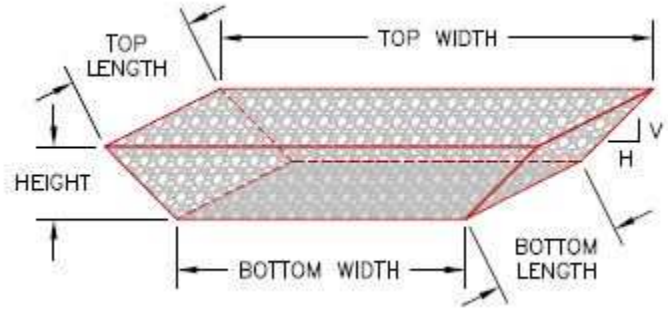


Table 3 LDRS Sump Dimensions

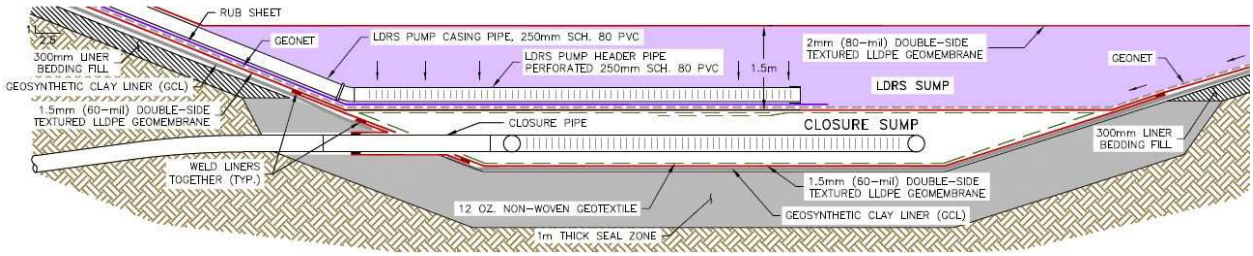
Dimension	Value	Unit
Bottom Width	13.8	m
Bottom Length	22	m
Height	1.5	m
Sideslope (H) (3 sides)	3	
Sideslope (H) (1 side)	2.5	
Sideslope (V)	1	
Top Width	22	m
Top Length	31	m

5.3 Leakage through the Secondary Liner of the In-Heap Pond

The following evaluates the TPL through the bottom liner of the proposed In-Heap Pond.

The In-Heap Pond LDRS sump is located in the bottom liner system with the configuration shown in Illustration 5. The liner system beneath the sump consists of a GCL overlain by a 1.5 mm double side textured LLDPE geomembrane.

Illustration 5 In-Heap Pond Sump Detail



The TPL through the bottom liner of the sump was estimated using Giroud's Equation (Giroud, 1997) assuming that the sump contains one (1) small hole and the fluid on the bottom liner is contained within the sump.

Table 3 presents the calculations used to determine the PLR through the bottom liner of the sump.

Table 4 PLR through the Bottom of the In-Heap Pond Sump using a GCL

C_{qo} =	0.21	(dimensionless)
h =	1.50	(m)
d =	0.002	(m)
t_s =	0.006	(m)
k_s =	5.0E-11	(m/sec)
Q =	4.05E-08	PLR (m^3/s/defect)

The calculations yielded a PLR of Q = 4.05E-8 m^3/s/defect. This can be converted to liters per day (Lpd) per defect as follows:

$$\frac{4.05E-8m^3/s}{defect} x \frac{1000Liters}{m^3} x \frac{60s}{\min} x \frac{60\min}{hr} x \frac{24hr}{day} = \frac{3.50Lpd}{defect} x1defect = 3.50Lpd$$

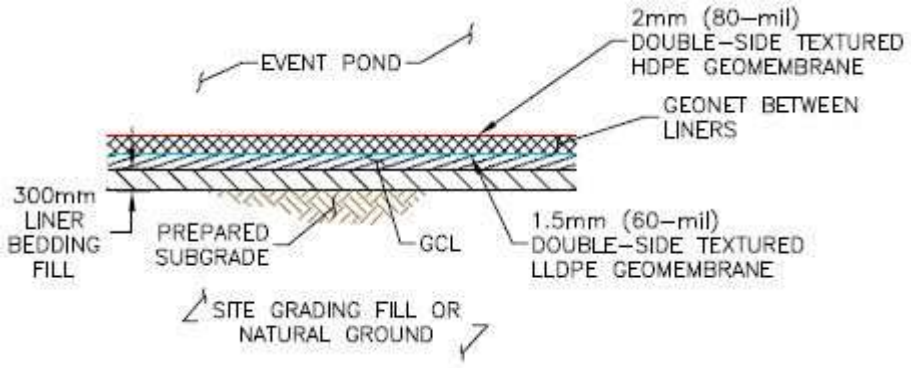
The calculations indicate that the In-Heap Pond sump could potentially discharge 3.5 Lpd.

6.0 Event Pond

The following evaluates the PLR through the top liner of the proposed Event Pond to determine appropriate leakage alert levels to indicate a malfunction of the liner system. The double lined system beneath the Event Pond is shown in Illustration 6 and consists of the following components from bottom to top:

- Prepared subgrade;
- GCL;
- 2 mm double side textured LLDPE geomembrane (bottom liner);
- Geonet;
- 2.0 mm single side textured HDPE geomembrane (top liner); and

Illustration 6 Event Pond Liner Detail



The Event Pond has a maximum depth of 11 meters and the surface areas used for this analysis range from 324 m^2 to 35,490 m^2. The surface areas and leachate depths were obtained from the Event Pond Stage-Storage Elevation-Area Function calculations for the Eagle Gold Heap Leach Facility Project.

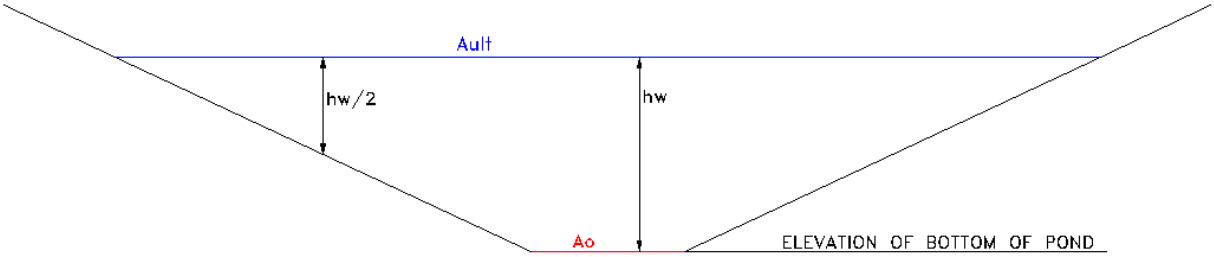
6.1 Alert Levels

Alert Level 1 (AL1) provides a benchmark for liner performance in a double-lined pond under typical operating conditions using a defect rate one (1) small hole that is two (2) millimeter diameter per 4,047 m^2. AL1, as measured by the amount of fluid pumped by the pond's Leak Detection and Removal System (LDRS), is a low-level trigger that may indicate the presence of a small hole or defect in the top geomembrane.

Alert Level 2 (AL2) provides a high-level trigger that indicates serious malfunction of the liner system a single 11.3 mm diameter hole per 4,047 m^2. This criterion is used for AL2 with a factor of safety of 1.5 applied to the leakage rates.

The design methodology used for the In-Heap Pond PLR calculations was also used for the Event Pond. The PLR was calculated in steps using the differential LSA's and corresponding depths as the pond fills with liquid as shown in Illustration 6. Additionally, because the Event Pond is deeper than ten (10) meters, permeation through the liner is not insignificant. Therefore, the permeation was calculated at each interval using Darcy's Law and the average head on the liner. This value was included in AL1 and AL2.

Illustration 7 Example of Liner Areas and Head Levels in the Event Pond



The alert levels were calculated using a modified Bernoulli's Equation for free flow through an opening as follows:

$$TPL = C_b a A\sqrt{2gh_w} + \frac{k * A_{Ult} * h_w}{2 * t} = C_b a\sqrt{2g}\left(A_o\sqrt{h_w} + (A_{Ult} - A_0)\sqrt{\frac{h_w}{2}}\right) + \frac{k * A_{Ult} * h_w}{2 * t}$$

Where:

A_0 = Surface area at bottom of pond; and

A_{ult} = Surface area at the filled elevation;

Table 4 presents the results of the calculation at two (2) meter increments within the pond:

Table 5 AL1 and AL2 for the Event Pond

Elevation	Depth (Meters)	Area (m^2)	Difference (m^2)	AL1 (Lpd)	AL2 (Lpd)	Pump Capacity (Lpd)
807.5	0	324	--	--	--	--
809.5	2	4,835	4,306	674	14,035	21,053
811.5	4	17,993	6,847	3,338	69,075	103,613
813.5	6	22,662	1,807	6,412	131,113	196,670
815.5	8	26,408	1,895	9,449	191,386	287,079
817.5	10	30,333	1,984	12,539	252,127	378,190
818.5	11	32,363	2,030	14,140	283,513	425,269

Attachment 1 provides the results of the calculation at one (1) meter increments

The system will be designed with the pumping capacity to accommodate the calculated leakage rate of 425,269 Lpd or 295 Lpm. However, the AL2 was lowered to provide a factor of safety of 1.5 as follows:

295 Lpm ÷ 1.5 = 197 Lpm

6.1.1 Summary

The Alert Levels for the Event Pond, as measured by the amount of fluid pumped out of a LDRS were calculated to be:

- AL1 = 14,140 Lpd or 10 Lpm;
- AL2 = 283,513 Lpd or 197 Lpm; and
- Pumping Capacity = 425,269 Lpd or 295 Lpm.

If it is determined during normal operations that the amount of fluid pumped out of the LDRS exceeds AL1, the owner and/or operator should take action to determine the cause. This action may include physical inspection, mechanical leak detection, electric leak location, or other methods to determine what is causing the AL1 exceedance in order to maintain the liner integrity such that the AL2 is not exceeded.

If it is determined during normal operations that the amount of fluid pumped out of the LDRS exceeds AL2. The owner or operator should implement a contingency plan for the facility.

6.2 Leak Detection and Recovery System Sump Sizing

A Leak Detection and Recovery System (LDRS) sump was designed to contain 1 hr of AL2 flow, as determined above. The volume of the sump is calculated as the shape of a frustum of a pyramid with dimensioning as shown below. It is located at the lowest point in the facility, in the northwest corner of the Event Pond, between the primary and secondary liners. The sump is filled with a Select Drain Fill which is assumed to have a porosity of 30%.

Illustration 8 LDRS Sump Geometry

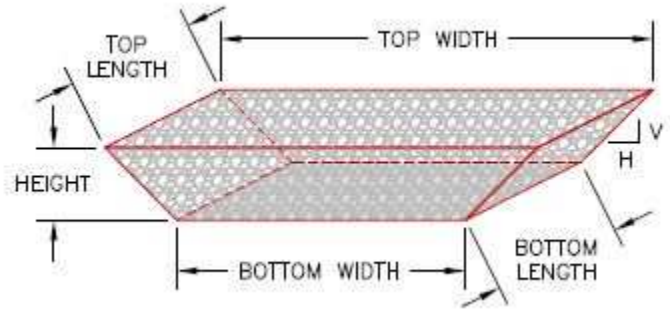


Table 6 LDRS Sump Dimensions

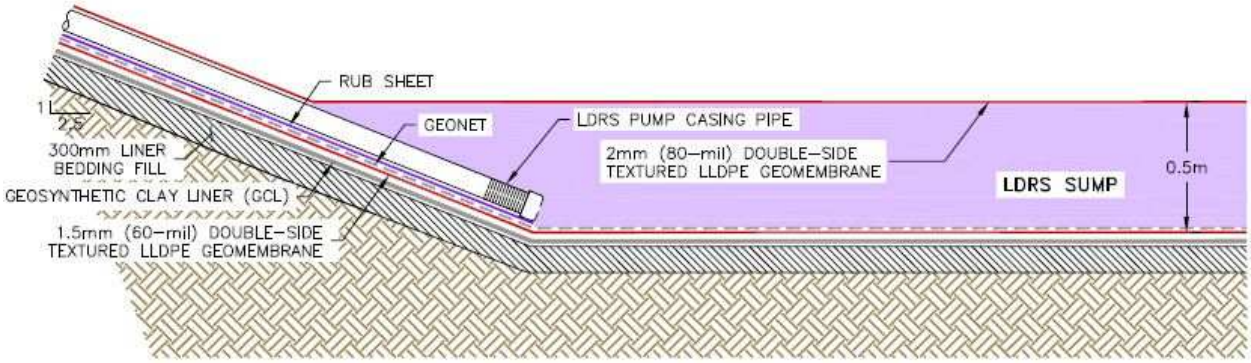
Dimension	Value	Unit
Bottom Width	10	m
Bottom Length	10	m
Height	0.5	m
Sideslope (H)	2.5	m
Sideslope (V)	1	m
Top Width	12.5	m
Top Length	12.5	m

6.3 Leakage through the Secondary Liner of the Event Pond

The following evaluates the TPL through the bottom liner of the proposed Event Pond.

The Event Pond sump is located in the bottom liner system with the configuration shown in Illustration 7. The liner system beneath the sump consists of a GCL overlain by a 1.5 mm double side textured LLDPE geomembrane.

Illustration 9 Event Pond Sump Detail



The TPL through the bottom liner of the sump was estimated using Giroud's Equation (Giroud, 1997) assuming that the sump contains one (1) small hole and the fluid on the bottom liner is contained within the sump.

Table 5 presents the calculations used to determine the PLR through the bottom liner of the sump.

Table 7 PLR through the Bottom of the Event Pond Sump using a GCL

C_{qo} =	0.21	(dimensionless)
h =	0.5	(m)
d =	0.002	(m)
t_s =	0.006	(m)
k_s =	5.0E-11	(m/sec)
Q =	5.80E-09	PLR (m^3/s/defect)

The calculations yielded a PLR of Q = 5.80E-09 m^3/s/defect. This can be converted to liters per day (Lpd) per defect as follows:

$$\frac{5.80E-9m^3/s}{defect} x \frac{1000Liters}{m^3} x \frac{60s}{\min} x \frac{60\min}{hr} x \frac{24hr}{day} = \frac{0.50Lpd}{defect} x1defect = 0.50Lpd$$

The calculations indicate that the Event Pond sump could potentially discharge 0.50 Lpd.

7.0 Summary

This Technical Memorandum estimates the total potential leakage (TPL) through various components of the proposed liner systems of the Heap Leach Facility for the Eagle Gold Project.

- Phase 1 Heap Leach Pad: TPL = 565 Lpd;
- Phase 2 Heap Leach Pad: TPL = 565 Lpd;
- Phase 3 Heap Leach Pad: TPL = 505 Lpd;
- In-Heap Pond: TPL = 3.5 Lpd;
- Event Pond : TPL = 0.5 Lpd;
- Entire Heap Leach Facility TPL = 1,639 Lpd.

Additionally, this Technical Memorandum provides Alert Levels to indicate potential malfunction of the In-Heap Pond primary liners,

- AL1 ranges from 169 Lpd to 123,484 Lpd depending on the depth; and
- AL2 ranges from 3,484 Lpd to 2,312,546 Lpd depending on the depth.

and the Event Pond primary liners,

- AL1 ranges from 85 Lpd to 14,140 Lpd depending on the depth; and
- AL2 ranges from 1,775 Lpd to 283,513 Lpd depending on the depth.

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ATTACHMENT A

IN-HEAP POND
AND EVENT POND
AL1 & AL2
ONE (1) METER INCREMENTS

TETRA TECH

Table A1 AL1 and AL2 for the In-Heap Pond

Elevation	Depth (Meters)	Area (m^2)	Difference (m^2)	AL1 (Lpd)	AL2 (Lpd)	Pump Capacity (Lpd)
847	0	682	--	--	--	--
848	1	1,019	337	169	3,484	5,227
849	2	1,457	438	298	6,102	9,153
850	3	6,062	4,605	985	20,266	30,400
851	4	8,471	2,409	1,641	33,614	50,421
852	5	11,024	2,553	2,547	51,837	77,755
853	6	13,713	2,689	3,583	72,507	108,761
854	7	16,529	2,816	4,757	95,805	143,708
855	8	19,465	2,936	6,072	121,754	182,631
856	9	22,452	2,987	7,519	150,174	225,260
857	10	25,843	3,391	9,141	181,935	272,903
858	11	29,638	3,795	10,954	217,330	325,994
859	12	33,843	4,205	12,982	256,857	385,285
860	13	38,462	4,619	15,247	300,907	451,360
861	14	41,595	3,133	17,521	344,724	517,086
862	15	44,842	3,247	19,923	390,779	586,169
863	16	48,204	3,362	22,404	438,137	657,205
864	17	51,679	3,475	24,987	487,263	730,895
865	18	55,265	3,586	27,683	538,386	807,579
866	19	58,991	3,726	30,504	591,725	887,588
867	20	62,826	3,835	33,453	647,332	970,998
868	21	66,773	3,947	36,534	705,307	1,057,961
869	22	70,838	4,065	39,753	765,723	1,148,585
870	23	75,020	4,182	43,112	828,640	1,242,960
871	24	80,321	5,301	46,743	896,799	1,345,198
872	25	85,933	5,612	50,603	969,202	1,453,802
873	26	91,857	5,924	54,727	1,046,577	1,569,866
874	27	98,103	6,246	59,120	1,128,940	1,693,409
875	28	104,673	6,570	63,787	1,216,395	1,824,593
876	29	109,783	5,110	68,508	1,304,307	1,956,461
877	30	115,078	5,295	73,404	1,395,243	2,092,865
878	31	120,560	5,482	78,433	1,488,377	2,232,566
879	32	126,229	5,669	83,624	1,584,288	2,376,432
880	33	132,087	5,858	88,992	1,683,293	2,524,939
881	34	137,101	5,014	94,415	1,782,842	2,674,264
882	35	142,230	5,129	99,970	1,884,526	2,826,789
883	36	147,477	5,247	105,634	1,987,932	2,981,897
884	37	152,841	5,364	111,426	2,093,441	3,140,161
885	38	158,327	5,486	117,359	2,201,283	3,301,925
886	39	164,283	5,956	123,484	2,312,546	3,468,819

Table A2 AL1 and AL2 for the Event Pond

Elevation	Depth (Meters)	Area (m^2)	Difference (m^2)	AL1 (Lpd)	AL2 (Lpd)	Pump Capacity (Lpd)
807.5	0	324	--	--	--	--
808.5	1	529	205	85	1,775	2,663
809.5	2	4,835	4,306	674	14,035	21,053
810.5	3	11,146	6,311	1,752	36,414	54,621
811.5	4	17,993	6,847	3,338	69,075	103,613
812.5	5	20,855	2,862	4,858	99,925	149,888
813.5	6	22,662	1,807	6,412	131,113	196,670
814.5	7	24,513	1,851	7,938	161,496	242,244
815.5	8	26,408	1,895	9,449	191,386	287,079
816.5	9	28,349	1,941	10,977	221,485	332,228
817.5	10	30,333	1,984	12,539	252,127	378,190
818.5	11	32,363	2,030	14,140	283,513	425,269

APPENDIX J – HLF STABILITY ANALYSES

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Technical Memorandum

To:	File	**From:**	Tony Monasterio
Company:	StrataGold Corp.	**Date:**	17 April, 2014
Re:	Eagle Gold Heap Leach Facility - Slope Stability	**Project #:**	114-201087
CC:	Troy Meyer		

1.0 Introduction

This memorandum presents the results of slope stability analyses performed for StrataGold Corp's Eagle Gold Heap Leach Facility (HLF). The Eagle Gold Project is located approximately 85km by road northeast of the village of Mayo in the Yukon, Canada. At its downstream end, the proposed crushed ore heap will consist of a 60m-high embankment that will be constructed below the confluence of Ann Gulch and Dublin Gulch. From this confluence, the proposed heap leach facility will extend approximately 1200 meters up Ann Gulch, and will ultimately contain up to 92 million tonnes of ore. A total of four cross sections were analyzed for the Phase 1 HLF to assess stability of the facility under static and pseudo-static conditions; the results of these analyses are attached.

2.0 Design Criteria

Based on a dam break analysis and inundation study (Tetra Tech 2013a), the HLF dam has been classified as "High" according to Canadian Dam Association (CDA, 2007) dam classification guidelines. CDA design recommendations for "High" hazard dams include consideration of the Earthquake Design Ground Motion (EDGM) for 1/2500 return frequency and factors of safety as summarized in Table 2.1.

Recommendations provided by Hynes-Griffin and Franklin, 1984, were adopted for development of the seismic coefficient for the pseudo-static analyses.

Table 2.1: Slope Stability Design Criteria

Condition	Factor of Safety Requirement
Static	1.5 (impounding) 1.3 (non-impounding)
Operational Pseudo-static	1.0
Post-operational Pseudo-static	1.0

2.1 Seismicity

The Design Basis Earthquake (DBE) for operational conditions of the HLF was chosen as 0.25g, which has a recurrence interval of 2475 years or a 2 percent probability of exceedance in 50 years, and meets the CDA requirements for a "High" hazard dam. The DBE was considered in the pseudo-static stability analyses of the leach pad for the following reasons:

- Compliance with CDA recommendations for "High" hazard dam designed for 1/2500 yr EDGM.
- The leach facility is designed to operate with low phreatic conditions within the heap ore pile. The mostly drained, generally granular heap ore has a negligible risk of liquefaction.
- The facility has a relatively short operating life of about 10 years after which it will be rinsed and closed in a manner resulting in a stable landform with little to no water impounding behind the dam.

For post-closure conditions of the HLF, the Maximum Design Earthquake (MDE) was considered. Tetra Tech recommends a design PGA of 0.35g for facilities requiring low-probability or MDE ground motions, as determined using an MDE of moment magnitude 6.0 (Tetra Tech 2012).

Pseudo-static analyses were performed to evaluate the stability of the facility under seismic (earthquake) loading. A pseudo-static stability analysis incorporates the effects of seismic loads by subjecting the two-dimensional sliding mass to a horizontal acceleration equal to a seismic coefficient based on the peak ground acceleration (PGA) expected during an earthquake.

According to the site-specific seismic hazard analysis previously performed for this site (Tetra Tech, 2012), a design PGA of 0.35g should be used for facilities requiring low-probability (e.g., 1 in 5,000, or 1 in 10,000-yr events) or maximum design earthquake (MDE) ground motions, and a PGA of 0.25g should be used for facilities requiring a PGA of 2,475 years (equivalent to a 2 percent probability of exceedance in 50 years). The lower PGA (0.25g) was used for ground motions associated with a design basis earthquake (DBE), and the higher PGA (0.35g) was used for ground motions associated with an MDE event. The DBE PGA was used in the operational pseudo-static analysis, while the MDE PGA was used in the post-closure pseudo-static analysis. According to recommendations provided by the United States Army Corps of Engineers (USACE) miscellaneous paper GL-84-13 (Hynes-Griffin and Franklin, 1984), a seismic coefficient equal to one-half the PGA is typically used for a pseudo-static analysis (i.e., 0.125g for an DBE design, and 0.175g for an MDE design at this site), and the shear strength properties of the granular materials should be reduced by 20%. As it is expected the liner will be punctured during closure of the HLF, this reduction was not applied to the post-closure analyses when the in-heap solution pond will be drained.

2.2 Phreatic Conditions

2.2.1 Leach Ore Pile

The granular ore heap will be wetted by controlled leaching, but will have a gravity drain system above the pad liner draining to an internal sump. Therefore, the heap will remain in an unsaturated state except within a portion of the in-heap solution pond, where the embankment provides physical confinement. For design purposes, a maximum head of 1.0 m on the pad liner was used in areas

outside the in-heap solution pond and the water level in the in-heap pond was assumed to be at the spillway invert. Piezometers will be installed in the heap above the in-heap pond level to monitor and confirm the low phreatic conditions during operations.

2.2.2 Embankment and Collection Ponds

The HLF embankment upstream face will be lined with a double geomembrane, designed to limit seepage. However a phreatic surface was conservatively modeled in the HLF embankment to simulate a large rupture in the liner system on the upper portion of the dam. This condition is considered unlikely and representative of a "worst-case" scenario.

2.2.3 Foundation

A phreatic surface was included in the foundation materials beneath the event ponds based on a conservative assumption that groundwater could be present several meters below the liner system. A liner underdrain has been incorporated into the design to drain the foundation materials and prevent upward hydraulic pressure on the liner. Although shallow groundwater conditions exist at the site (particularly in the placer deposits along the Dublin Gulch valley floor), the combination of the liner underdrain, interception collection trenches to be installed along the upstream edge of the Phase 1 HLF pad, and reduction of infiltration due to placement of the liner system is expected to result in a lower groundwater level during operations and into post-operations.

2.2.4 Modeled Conditions

Two different groundwater conditions were assumed: operational and long-term post-closure. The operational condition was considered for both static and pseudo-static analyses. This condition was modeled by an upper phreatic surface within the crushed ore, the liner interface and the structural fill in the embankment, and a lower phreatic surface which impacted the in-situ materials (colluvium, placer tailings and alluvium, and weathered bedrock).

The upper failure surface was intended to simulate a large rupture of the liner system at the embankment upstream face thereby allowing the phreatic surface to continue through the liner into the embankment structural fill, where it passed into the lower drain. The post-closure groundwater condition was used in the post-closure static and pseudo-static analyses. This case assumed the liner had been perforated during closure of the HLF and no longer retained the perched upper phreatic surface.

2.3 Liquefaction

2.3.1 Foundation

The confining embankment foundation preparation includes partial excavation stripping and removal of the poorly consolidated placer tailings in the Dublin Gulch valley. The loose placer tailings may be susceptible to liquefaction during intense earthquake events, and will be treated with dynamic compaction to strengthen the dam foundation and to provide a firm foundation for the liner system in the in-heap pond area.

The confining embankment foundation preparation includes densification through Deep Dynamic Compaction (DDC). The DDC method will achieve deep ground densification using the dynamic effects of high energy impacts resulting from the drop of large weights, mitigating against potential

liquefaction. Liquefaction analyses are presented in a separated technical memorandum (Tetra Tech 2013b).

2.3.2 Ore Heap

The upper leach facility (above the in-heap pond) is designed to operate with solution collection and low phreatic conditions within the heap. The mostly drained, generally granular heap has a negligible risk of experiencing the increases in pore pressure which cause liquefaction during dynamic (earthquake) loading. The ore within the in-heap pond is considered saturated, and therefore may be susceptible to liquefaction. For the pseudo-static analyses, this material is assumed to have a reduced strength (as recommended by Army Corps of Engineers, 1984) to simulate potentially liquefied ore within the in-heap pond during the design earthquake event.

3.0 Methods of Analysis

Slope stability analyses were conducted on four two-dimensional sections to assess the slope stability of the proposed design for the heap leach facility. The locations of these sections are illustrated in Figure 3.1. The locations of the sections were chosen based upon areas of interest and sections representative of the proposed design including the maximum section through the confining embankment.

Stability analyses were conducted using the Slope/W component of GeoStudio 2007 (v. 7.20) by GeoSlope International, Ltd. Slope/W was used to conduct limit equilibrium analyses using the Morgenstern-Price method, which satisfies both moment and force equilibrium. The Slope/W program incorporates a search routine to locate the failure surfaces with the lowest factor of safety within user-defined search limits. Trial failure surfaces were defined with "entry and exit" parameters. This option defines a range of possible slip surface entry and exit locations within which the most critical (lowest factor of safety) may be found.

Due to the model geometry and various material transitions, a perfectly circular failure surface did not appear to accurately represent the most likely potential failure surface. To optimize the shape of the slip surface, the most critical failure surfaces were subjected to an optimization tool in Slope/W. This tool analyzes each point along the slip surface, randomly adjusting an individual point's position until the lowest factor of safety is reached. Frequently, the result is a failure surface which appears to be more realistic and produces a lower factor of safety. This optimization tool was used in the majority of the analyses. Shallow failures (<10m deep) in the ore pile above the liner system were disregarded, and "global" stability factors of safety are reported.

Three different stability conditions were analyzed for each cross section: static, operational pseudo-static, and post-closure pseudo-static. The static analyses were used to evaluate the slope stability of the facility under normal operating conditions.

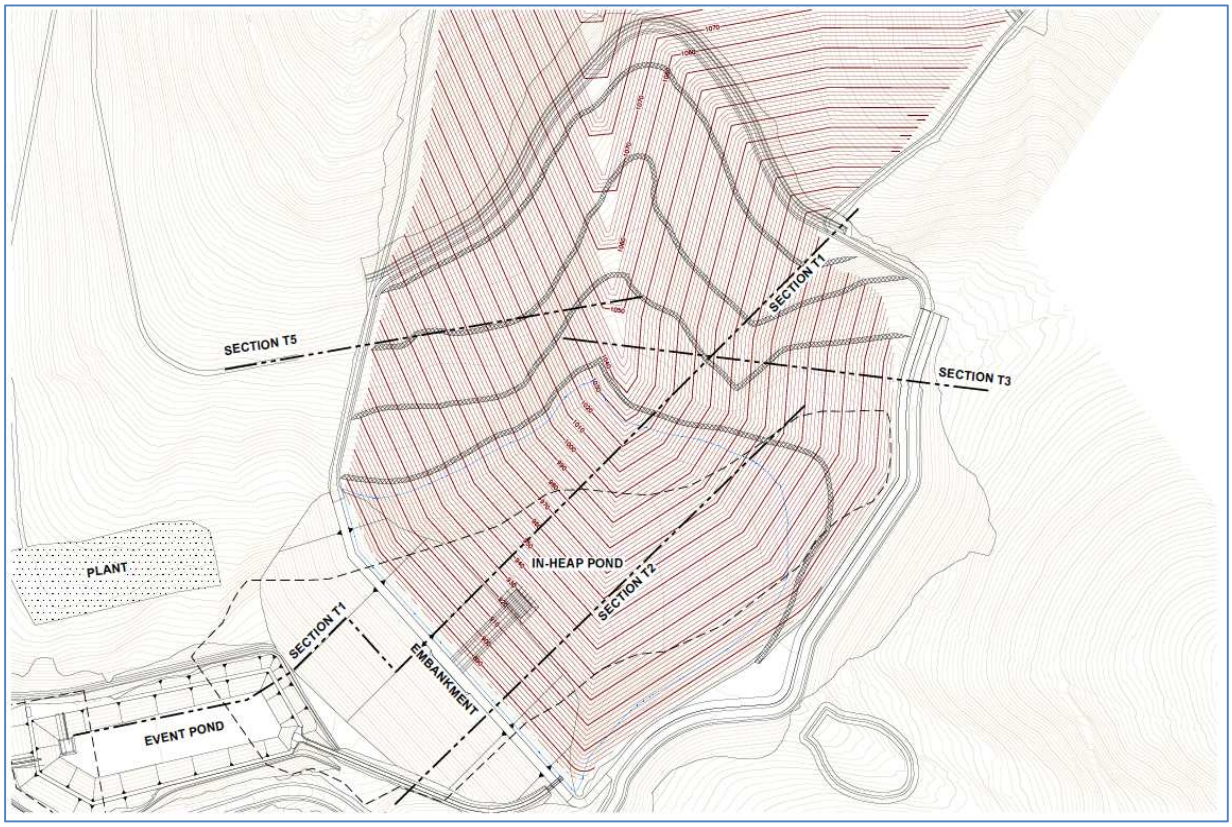

Figure 3.1: Heap Leach Facility Cross-sections Analyzed for Slope Stability

Section T1, as shown in Figure 3.1 was modified to incorporate a worst-case slope scenario. This included the addition of the event pond geometry at the toe of the embankment and the crest widening at the top of the embankment.

4.0 Material Properties

The strength of the rock fill was based upon examples of weak rock fill as provided by Leps (1970) and Barton (2008). These sources provide a non-linear relationship between shear strength and normal stress for various types of rock fill; the points defining this function are included in Table 4.1.

Table 4.1: Shear Strength Envelope for Rockfill as Used in Slope Stability Analyses

Normal Stress (kPa)	Friction Angle (°)	Shear Stress (kPa)
7	49.8	8
14	47.9	15
35	45.2	35
69	43.3	65
138	41.2	121
345	38.6	275
690	36.6	513
1379	34.5	949
3447	32.1	2162

The unit weight of the crushed ore was estimated from loaded column percolation laboratory tests (KCA 2010).

SPT data collected in placer tailings and alluvium during the 2011 geotechnical investigation were related to friction angles using several empirically derived equations produced by Liao & Whitman (1986), Skempton (1986), Wolff (1989), and Hatanaka & Uchida (1996). The most conservative of these results were used as the strength parameters of the placer tailings.

Material properties for the colluvium were based upon triaxial test results produced by Golder, 2012 (presented as Attachment A).

The ranges of Unconfined Compressive Strength (UCS) and Geological Strength Index (GSI) provided in a report by BGC Engineering, Inc. (BGC, 2011) were used to evaluate the effective apparent cohesion (c') and the effective angle of internal friction (φ') of the weathered bedrock. The UCS and GSI values were used as input parameters in the Rocscience, Inc. software RocLab (2011), v. 1.032, which uses the Hoek-Brown failure criteria to calculate strength properties for rock masses. Table 4.2 displays the RocLab input parameters and output c' and φ'.

Two of RocLab's input parameters were estimated based upon typical expected conditions; the intact rock parameter (mi) and the disturbance factor (D). The intact rock parameter (mi) used is the average of the values listed in RocLab's lookup table for metasandstone, which is assumed to be representative of the metasediments in the foundation of the heap leach facility. A disturbance factor of 0.0 was used because the material is assumed to be undisturbed.

Table 4.2: RocLab Input Parameters and Output

Rock Type	Input Parameters				Output	
	UCS (MPa)	GSI	mi	D	c' (MPa)	φ' (°)
Weathered Bedrock (Type 2)	20	20	19	0.0	0.531	26.8
Weathered Bedrock (Type 3)	2.5	20	19	0.0	0.090	26.8

The material properties of the interface between the various components of the liner system, referred to as 'liner interface', were based upon liner interface test results produced by Golder (2013), presented as Attachment A of this memorandum. The test results indicate a peak friction angle of 33.2 degrees and a large displacement (post-peak residual) friction angle of 14.3 degrees. The residual results were conservatively used in all analyses to reflect possible long-term creep or movement during earthquake events. The residual interface test results indicate two shear strengths which apply different lengths of displacement (with a linear best-fit line of 14.3 degrees). Instead of applying the best fit line, the residual strength envelope was modeled in SLOPE/W using 'bilinear' model, which considers two friction angle values and a normal stress at which the transition occurs. This model type uses five input parameters (Liner Interface inputs in parentheses); unit weight (12 kN/m^3), φ_1 (33.2°), φ_2 (14.3°), cohesion (30.4 kPa), and normal stress (186.6 kPa). The listed cohesion value that of the strength described by φ_1 when normal stress is zero.

As per Hynes-Griffin & Franklin (1984), the pseudo-static analyses performed require that materials which experience small increases in pore pressure during cyclic loading, such as clayey material, dry or partially saturated cohesionless soils or very dense saturated cohesionless materials, be analyzed

using 80% of their undrained shear strength. Materials on site which fall under these criteria have been assigned a reduced effective friction angle, as seen in Table 4.3.

Table 4.3 illustrates all material properties used in the slope stability analyses.

Table 4.3: Material Properties Used in Slope Stability Analyses

Material Description	Strength Model	Unit Weight (kN/m³)	c' (kPa)	φ' (°)
Structural Rock Fill	Shear/Normal Function*	20	*1	*1
Grading Rock Fill	Shear/Normal Function*	20	*1	*1
Crushed Ore	Mohr-Coulomb	18	0	38
Crushed Ore 80%	Mohr-Coulomb	18	0	30.4
Placer Tailings & Alluvium (Post DDC)	Mohr-Coulomb	20	0	41
Placer Tailings & Alluvium 80% (Post DDC)	Mohr-Coulomb	20	0	32.8
Colluvium	Mohr-Coulomb	22	0	40
Colluvium 80%	Mohr-Coulomb	22	0	32
Weathered Bedrock (Type 3)	Mohr-Coulomb	22	90	26.8
Weathered Bedrock (Type 2)	Mohr-Coulomb	22	531	26.8
Liner Interface	Mohr-Coulomb	12	*2	*2

*1 Shear/Normal Function definition shown as Table 4.1, *2 Bilinear Function

5.0 Slope Stability Results

The results of the slope stability analyses are shown in Table 5.1. The printed results produced by Slope/W are included as Attachment B.

In some cases, the most critical slip surface, that with the lowest factor of safety, did not pass through the embankment and foundation materials, rather the failure surface passed only through the crushed ore and the liner interface. This type of failure, labeled 'critical' in Table 5.1, is important to include, but is not a complete 'global' failure, which is also displayed.

Table 5.1: Stability Results for Proposed Heap Leach Facility

Stability Analysis Type	Section			
	T1	T2	T3	T5
Static – Global	1.92	2.07	1.98	2.11
Static – Critical	2.00	2.09	-	-
Operational Pseudo-static – Global	1.29	1.38	1.43	1.52
Operational Pseudo-static – Local	1.35	1.40	-	-
Post-Closure Pseudo-static – Global	1.22	1.32	1.28	1.37
Post-Closure Pseudo-static – Local	1.28	1.44	-	-

6.0 References

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APPENDIX K – LIQUEFACTION ANALYSIS

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Technical Memorandum

To:	File	**From:**	Will Vilhauer
Company:	Tetra Tech Inc.	**Date:**	March 22, 2013
Re:	StrataGold Corporation Eagle Gold – Heap Leach Facility Embankment Liquefaction Analysis	**Project #:**	114-201087
Cc:	Troy Meyer (Tetra Tech) Dave Hallman (Tetra Tech)		

1.0 INTRODUCTION

StrataGold Corporation has commissioned Tetra Tech to perform a detailed design for the Heap Leach Facility (HLF) for the Eagle Gold Project (Project) in the central Yukon Territory, Canada. This memorandum has been prepared to present the liquefaction analysis calculations associated with the design of the Confining Embankment (embankment) for the HLF.

A detailed description of the HLF site is provided in various reports prepared by BGC Engineering Inc. (BGC). The reports of primary relevance to the HLF include *2011 Geotechnical Investigation for Mine Infrastructure, Factual Data Report* issued by BGC and dated 20 January 2012 and *Eagle Gold – Heap Leach Pad, Water Diversion and Process Management Ponds DRAFT Foundation Report* issued by BGC and dated 21 April 2011.

Geophysical Field survey data used in the analysis was provided by Frontier Geosciences Inc. (included as Attachment A).

2.0 LIQUEFACTION ANALYSIS AND DESIGN CRITERIA

2.1 Purpose of Analysis

The purpose of the analysis presented in this memorandum was to determine a minimum placer tailings excavation depth or insitu foundation improvement requirements in order to establish an acceptable Factor of Safety (FS) against the potential for liquefaction due to the presence of existing placer tailings below the proposed embankment, or the effects should liquefaction of the placer tailings occur. Undrained residual shear strength ratio estimates were also performed in order to obtain post-liquefaction strength. The calculations and analysis performed in this memorandum are based on the recommended method as outlined in the "*Liquefaction Resistance to Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance to Soils*", by Youd and Idriss, for the Journal of Geotechnical and Geoenvironmental Engineering, April 2001. Undrained residual

shear strength ratio calculations were performed based on the “Estimation of residual shear strength ratios of liquefied soil deposits from shear wave velocity” (Özener 2012).

2.2 Liquefaction

The foundation of the embankment may be susceptible to liquefaction during intense vibrations generated from earthquake events due to the poorly consolidated saturated placer tailings which currently lie within the Dublin Gulch valley. In order to strengthen the foundation of the embankment and prevent instability as a result of liquefaction, the existing placer tailings must be removed or compacted to an acceptable depth and/or level of compaction in order to achieve a minimum FS against liquefaction. The liquefaction analysis performed in this memorandum conservatively assumed a no overburden condition on the existing placer tailings. A scenario with the embankment constructed would increase the overburden pressure on the placer tailings, thus increasing resistance to liquefaction. A factor of safety of 1.5 against liquefaction was adopted for design. This is consistent with and on the conservative side of the typical range of 1.3 to 1.5 (Lindeburg, 2008).

2.3 Geophysical Field Survey Data

Multichannel analysis of surface waves (MASW) seismic refraction surveys and downhole seismic field investigations were performed by Frontier Geosciences Inc. at the Project in August and September of 2011 in order to supplement existing geological data on conditions at the proposed HLF. The geophysical procedures, field results and recommendations of the investigation are summarized in the “Report on Seismic Refraction and Downhole Seismic Investigation” prepared by Frontier Geosciences Inc., dated September, 2011 for BGC. Downhole shear wave velocity field data obtained from boreholes BH-BGC11-32, BH-BGC11-33, BH-BGC11-34 and supplemental MASW survey locations along seismic line SL-33 were used in this analysis due to their location within the drainage gulch, proximity to (or within) the embankment footprint and the presence of placer tailings. Boreholes with shear wave velocity field data that were located outside the proposed embankment footprint and where placer tailings were not encountered were excluded from this analysis. It should be noted that although borehole BH-BGC11-39 is located within placer tailings and lies within the Dublin Gulch, it was determined:

1. This borehole is not representative of material conditions within the embankment (See Figure 1 in Attachment B) and;

2. Is located a distance downstream of the embankment which corresponds with placer tailings deposition depths that are non-representative of those typically encountered near or within the embankment footprint.

Supplemental MASW survey locations along seismic line SL-33 were also used to support the analysis. Figure 1 within Attachment A presents the 2011 borehole locations, seismic lines (SL), and MASW survey locations relative to the proposed confining embankment and material groups as identified by BGC. Material Groups identified in Figure 1 are not necessarily defined as placer tailings, however for the purpose of this analysis all material groups were considered

as potentially liquefiable. Depth to bedrock was determined based on 2011 field borehole log data for the respective borehole.

2.4 Placer Tailings and Bedrock

The existing overburden soils within a portion of the proposed HLF in the Dublin Gulch valley bottom have been reworked by historical placer mining activities. Placer tailings (fill) within the Dublin Gulch valley are observed from the ground surface to bedrock, with thicknesses ranging between 1.5 m and 8.7 m, and an average thickness of approximately 4.9 m. It should be noted that isolated "pockets" or zones with fill thicknesses greater than these depths may be present, as interpreted by the seismic refraction and downhole seismic surveys performed within the valley by Frontier Geosciences Inc. The material encountered is generally a well graded, loose to dense, silty sand and gravel, ranging to sand and gravel with some silt and occasional cobbles and boulders. Loose and moist zones have been encountered within the placer tailings. There is little to no vegetative cover on the placer tailings.

For the liquefaction analysis, a unit weight of 20 kN/m^3 was used for placer tailings. This value is consistent with that used for the Eagle Gold HLF - Slope Stability Technical Memorandum (Tetra Tech, 2013). A percent fines value of 5 percent was conservatively used in order to model a worse-case scenario and is consistent with the less than 10 percent fines identified for placer tailings within Table 5.2 of the HLF Feasibility Design (Tetra tech, 2012a).

The bedrock encountered in the mine site area is generally classified as metamorphosed sedimentary rock, with a variably deep weathering profile. The overall weathered bedrock surface was developed based on 2009, 2010 and 2011 field borehole log data relevant to boreholes drilled within the heap leach pad and embankment area. In areas where boreholes were not drilled, depth to weathered bedrock (or bedrock) was estimated at representative points along the seismic lines (SL) based on the bedrock depths interpreted by Frontier Geosciences Inc. from the seismic refraction surveys. For the purpose of this analysis, weathered bedrock was considered non-liquefiable.

2.5 Seismic Hazard

A seismic hazards analysis (SHA) was performed by Tetra Tech for the site, which provided recommendations for Peak Ground Acceleration (PGA) values for various return periods.

For post-closure conditions, the MCE was considered. A design PGA of 0.35g was previously recommended for facilities requiring low-probability or MCE ground motions, as determined using an MCE of moment magnitude 6.0 (Tetra Tech 2012b). Therefore, for the purpose of this liquefaction analysis, a PGA of 0.35g was used with a moment magnitude (Mw) of 6.0.

2.6 Groundwater

The placer tailings in the Dublin Gulch valley bottom are generally saturated. Groundwater levels are typically about 2.5 m below ground surface in the Dublin Gulch valley bottom, but can be expected to be closer to ground surface near streams and deeper below piles of tailings. It is anticipated that these levels will vary seasonally. For the purpose of this analysis the

groundwater elevation was conservatively assumed to be equal to the ground surface for all downhole and MASW seismic surveys, in order to assume a saturated condition. Although shallow groundwater conditions exist at the site (particularly in the placer deposits along the Dublin Gulch valley floor), the combination of the liner underdrain, interception collection trenches to be installed along the upstream edge of the Phase 1 HLF pad, and reduction of infiltration due to placement of the liner system is expected to result in a lower groundwater level during operations and into post-operations.

3.0 THEORY AND METHODOLOGY

3.1 Shear Wave Velocity for Evaluating Potential for Liquefaction

The evaluation of liquefaction resistance was performed based on shear wave velocity data. Shear wave velocity data (V_s) obtained from seismic field survey measurements provides an accepted means for evaluating soil resistance to liquefaction as indicated by Youd and Idriss: "*The use of V_s as a field index of liquefaction resistance is soundly based because both V_s and CRR are similarly, but not proportionally, influenced by void ratio, effective confining stresses, stress history, and geologic age*" (Youd, T. L., Idriss, I. M., April, 2001).

Shear wave velocity values obtained from Frontier Geosciences Inc. field data were corrected in order to account for overburden stress at varying depths. The following procedure was used to determine the overburden stress-corrected (sometimes referred to as "normalized" by others) shear wave velocities at one (1) meter depth intervals based on the following equation (Sykora 1987; Kayen et al 1992; Robertson et al. 1992):

$$V_{s1} = V_s * \left(\frac{P_a}{\sigma'_{vo}} \right)^{0.25}$$

Where:

V_{s1} = Overburden Stress-Corrected Shear Wave Velocity (m/s);

V_s = Field Measurement of Shear Wave Velocity (m/s);

σ'_{vo} = Initial Effective Vertical Overburden Stress (kPa), discussed later in Section 3.2;

P_a = Atmospheric Pressure approximated to be 100 kPa (1 TSF), in the same units as σ'_{vo};

V_S data for boreholes BH-BGC11- 32, BH-BGC11- 33 and BH-BGC11- 34 were obtained from the Downhole Seismic Survey for each borehole at depth intervals of one (1) meter. It should be noted that the V_S data for these boreholes is limited to interpolations for certain ranges of depth that represent significant changes in shear wave velocity as identified by Frontier Geosciences Inc. In addition to the downhole surveys, supplementary MASW profiles for the locations (SL-33 at STA 165, STA 360 and STA 380) within the vicinity of the aforementioned boreholes were also analyzed at one (1) meter depth intervals. Because raw data files were not available,

conservative best estimates for the V_s values were interpreted from the profiles and may not be exact.

The Cyclic Stress Ratio (CSR) and Cyclic Resistance Ratio (CRR) were estimated in order to evaluate the liquefaction resistance of the placer tailings.

3.2 Cyclic Stress Ratio

The following equation estimates the cyclic stress ratio (CSR) induced by the earthquake ground motion based on Seed and Idriss (1971):

$$CSR = 0.65 * \left(\frac{\sigma_{vo}}{\sigma_{vo}^{'}} \right) * \left(\frac{a_{\max}}{g} \right) * (r_d)$$

Where:

CSR = Cyclic Stress Ratio;

σ_{vo} = Total Vertical Overburden Stress (kPa);

$\sigma_{vo}^{'}$ = Effective Vertical Overburden Stress (kPa);

$a_{\max}$ = Peak Horizontal Acceleration generated by the earthquake (m/s^2);

g = Acceleration of Gravity (m/s^2);

r_d = Stress Reduction Coefficient;

The total vertical overburden stress is given by the following equation:

$$\sigma_{vo} = \gamma * h$$

Where:

γ = Soil Unit Weight (kN/m^3);

h = Soil depth (m);

The effective overburden stress is given by the following equation:

$$\sigma_{vo}^{'} = \sigma_{vo} - \mu$$

Where:

μ = Neutral Stress (pore water pressure) (kPa)

The Neutral Stress is given by the following equation:

$$\mu = \rho_w * g * (z_w + h)$$

Where:

ρ_w = Density of Water (kg/m^3);

z_w = Depth to the water table (m);

The groundwater elevation was assumed to be at ground surface in order to estimate a saturated soil condition (z_w = 0 for all calculations).

The stress reduction coefficient can be calculated based on a variety of methods, however for the purpose of this analysis, the stress reduction coefficient was set equal to one (1) for all depths. The stress reduction coefficient (r_d) is meant to account for flexibility in the soil column and reduced ground acceleration occurring at depth relative to the acceleration occurring at the ground surface. Because the PGA for the site is estimated for bedrock, the PGA for the soil column begins from the bedrock depth and rises toward the ground surface as opposed to starting from the ground surface, then down to a given depth. Because of this it was more conservative to set the stress reduction factor equal to unity for all depths. A constant applied stress reduction factor coupled with the assumption of fully saturated conditions resulted in a constant CSR for all depths.

3.3 Cyclic Resistance Ratio

The Cyclic Resistance Ratio ($CRR_{7.5}$) was calculated based on the relationship between overburden stress-corrected shear wave velocity as proposed by Andrus and Stokoe (1997):

$$CRR_{7.5} = a*\left(\frac{V_{s1}}{100}\right)^2 + b*\left(\frac{1}{V_{s1}^* - V_{s1}} - \frac{1}{V_{s1}^*}\right)$$

Where:

$CRR_{7.5}$ = Cyclic Resistance Ratio, with reference to an earthquake magnitude of 7.5;

V_{s1} = Overburden Stress-Corrected Shear Wave Velocity (m/s);

V_{s1}^* = Limiting upper value of V_{s1} for liquefaction occurrence (m/s);

a, b = curve fitting parameters;

The values of the curve fitting parameter coefficients *a* and *b* for this analysis were 0.022 and 2.8 respectively, consistent with the final values used by Youd, T. L., Idriss, I. M., (2001). Placer tailings have been identified as having less than 5 percent fines (subsequent to the less than 10 percent fines as indicated in Table 2.1), therefore a value of V^*_{s1} = 215 m/s was used for the limiting upper value of V_{s1} for liquefaction resistance for estimating the CRR. This is consistent with the varying linear relationship identified by Youd, T. L., Idriss, I. M., (2001) for soils with fines content of 5 percent or less for the CRR estimate. Calculated CRR values were limited to a range of $0 < CRR_{7.5} \leq 0.7$.

3.4 Magnitude Scaling Factor and Factor of Safety

Because the CRR curve applies only to magnitude 7.5 earthquakes, a Magnitude Scaling Factor (MSF) must be applied in order to adjust the CRR calculations to a site specific earthquake

moment magnitude. The MSF applied for this analysis is based on the method proposed by Andrus and Stokoe (1997) and is given by the following equation:

$$MSF = \left(\frac{7.5}{M_w} \right)^{2.56}$$

Where:

M_w = Moment Magnitude;

An MSF of 1.77 was calculated based on a moment magnitude of 6.0 for the site. The MSF was then applied to the ratio of the CRR and CSR in order to obtain the Factor of Safety (FS) against liquefaction as indicated by the following equation:

$$FS = \left(\frac{CRR_{7.5}}{CSR} \right) * \left(MSF \right)$$

The FS was calculated for all depths up to weathered bedrock or bedrock. For the purpose of this analysis, weathered bedrock was considered non-liquefiable.

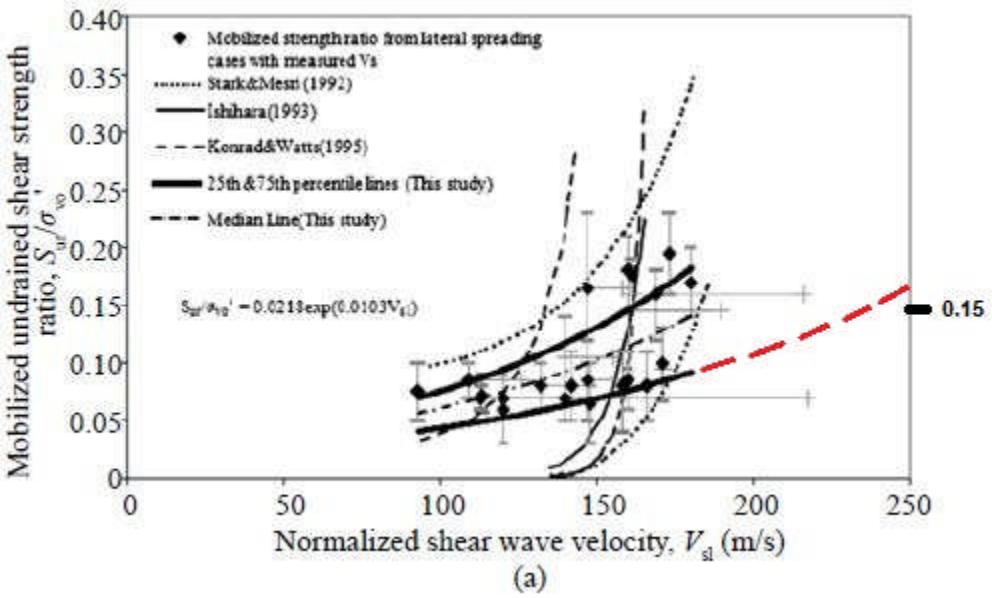
3.5 Undrained Residual Post-liquefaction Shear Strength Ratio

Undrained post-liquefaction residual shear strength ratio calculations were performed in order to identify a value to be used in a separate stability analysis of the embankment. In order to determine the undrained residual shear strength ratio for depths at which liquefaction is likely to occur, the following equation has been defined based on the estimate of Özener (2012):

$$\frac{S_{ur}}{\sigma'_{vo}} = 0.0218 * \exp\left(0.0103 * V_{s1}\right)$$

The above equation is proposed for V_{s1} values equal to or less than 250 m/s above which soil liquefaction is not considered to be likely (Özener, 2012). Although a V_{s1} value of 215 m/s has been identified as the limiting upper value for liquefaction resistance of soils with less than 5 percent fines content (Youd, T. L., Idriss, I. M., 2001) for estimating the CRR value, a V_{s1} value of 250 m/s was used to determine the undrained residual shear strength ratio in order to be consistent with the recommendations proposed by the respective authors. An undrained residual shear strength ratio value of 0.15 was ultimately selected based on an extrapolation (dashed in red) of the 25th percentile relationship of Özener (2012) to the stress-corrected (normalized) shear wave velocity of 250 m/s as shown in Figure 3.1. The 25th percentile line was extrapolated as opposed to the median relationship in order to be conservative due to the large amount of uncertainty in the correlation.

Figure 3.1: Relationship between residual undrained shear strength back-analyzed from liquefaction induced lateral spreads and normalized shear wave velocity (Özener, 2012)



(a)

4.0 LIQUEFACTION ANALYSIS RESULTS

The results of the liquefaction analysis are presented in tabular form by depth within Attachment C. In general, the results of the analyses indicate discrete zones of liquefaction down to a limited depth of several meters from the ground surface within the placer tailings. The exception to this is the results of the liquefaction analysis for Borehole BH-BGC-32, which is located downstream of the embankment at the proposed event pond. The results for this borehole indicate that liquefaction to the full 19 m depth of the placer tailings at this location is possible under the earthquake loading considered.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The results of the analysis suggest that liquefaction could potentially occur (FS less than 1.5) within depths ranging from 0 to 12 m below the existing ground surface, where placer tailings are present within the proposed embankment area. This is evident after reviewing the results for Boreholes BH-BGC11-33, BH-BGC11-34 and supplemental MASW Profiles SL-33 (Stations 1+65, 3+60 and 3+80) which are located immediately near or within the embankment, at depths where a FS less than 1.5 has been calculated.

Placer tailings layers at depths down to weathered bedrock may be prone to liquefaction as indicated by borehole BH-BGC11-32 for this “Material Group”. Although borehole BH-BGC11-32 is outside of the proposed embankment footprint, for conservatism it should be assumed that layers or “pockets” with shear wave velocities similar to those found within the downhole survey

of borehole BH-BGC11-32 may be present down to depths corresponding to the weathered bedrock surface within the embankment footprint.

Based on the above conclusions it is recommended that the placer tailings within the proposed embankment footprint be excavated and/or be subject to insitu foundation improvements to a minimum depth corresponding to weathered bedrock in order to reduce the potential for liquefaction. A combination of excavation and insitu foundation improvements may be required in order to perform this in the field and verify the placer tailings have been removed and/or compacted to a depth corresponding with top of weathered bedrock due to the variable topography of the weathered bedrock surface. Potential "pockets" or zones within the placer tailings with shear wave velocities at depth similar to BH-BGC11-33 should be identified in the field and excavated to a minimum depth at which the material exhibits an overburden stress-corrected (normalized) shear wave velocity of V_{s1} greater than 430 m/s, or to bedrock. This corrected shear wave velocity corresponds to a FS of 1.5 based on the calculations presented in this memorandum.

As an alternative to excavation, dynamic compaction can be used to improve the insitu liquefaction resistance of saturated soil deposits on embankment and dam construction projects. Deep Dynamic Compaction (DDC) provides soil material densification at depth in order to increase the liquefaction resistance. This method may offer a cost savings for embankment construction relative to complete excavation of the potentially liquefiable placer tailings.

In addition to the minimum corrected shear wave velocity requirement mentioned above, DDC specification compliance will also consist of performing Becker Penetration Tests (BPT) for the purpose of Quality Control to verify that adequate compaction of the placer tailings within the embankment has been achieved. Minimum BPT N_b blowcounts were correlated from Standard Penetration Test (SPT) N_{60} blowcounts that were estimated for the site based on geotechnical and seismic parameters. SPT N_{60} blowcounts were estimated based on a minimum FS of 1.5 for 1 m depth intervals. The results are presented in Attachment D. The analysis methodology is based on the procedure outlined by Idriss and Boulanger, 2010, for SPT-Based Liquefaction Triggering Procedures.

Equivalent Becker N_b blowcounts were then correlated from the estimated SPT N_{60} blowcounts based on the procedures outlined by Sy and Campanella, 1994, and Sy et al, 1995. The results are presented within Attachment E and are summarized in Table 1 below.

Table 1: Minimum Required BPT N_b and equivalent SPT N_{60} Blowcounts

Depth (m)	BPT N_b value (equivalent to SPT (N_{60})	Minimum equivalent SPT N_{60} values
1	11	15
2	12	15
3	15	17
4	18	20
5	24	23
6	27	25
7	30	27
8	30	29
9	32	29
10	33	31
11	35	33
12	36	34

It should be noted that the minimum BPT N_b values presented in Table 1 are estimates for the minimum required BPT N_b blowcounts based on assumptions of Becker drill performance, casing friction, soil parameters and other correction factors. It is recommended equivalency calculations be performed in the field to demonstrate the field obtained BPT blowcounts meet the minimum corresponding SPT N_{60} values. Additional geophysical seismic refraction field testing is recommended to provide Quality Assurance to the BPT tests and to adjust the minimum required BPT N_b values as needed while satisfying minimum compaction requirements.

6.0 REFERENCES

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ATTACHMENT A

BGC ENGINEERING INC.

REPORT ON

SEISMIC REFRACTION AND

DOWNHOLE SEISMIC INVESTIGATION

PROPOSED MINE SITE FACILITIES

EAGLE GOLD PROJECT

YUKON

by

Alex Smith, M.Sc.

Russell Hillman, P.Eng.

September, 2011 **PROJECT FGI-1216**

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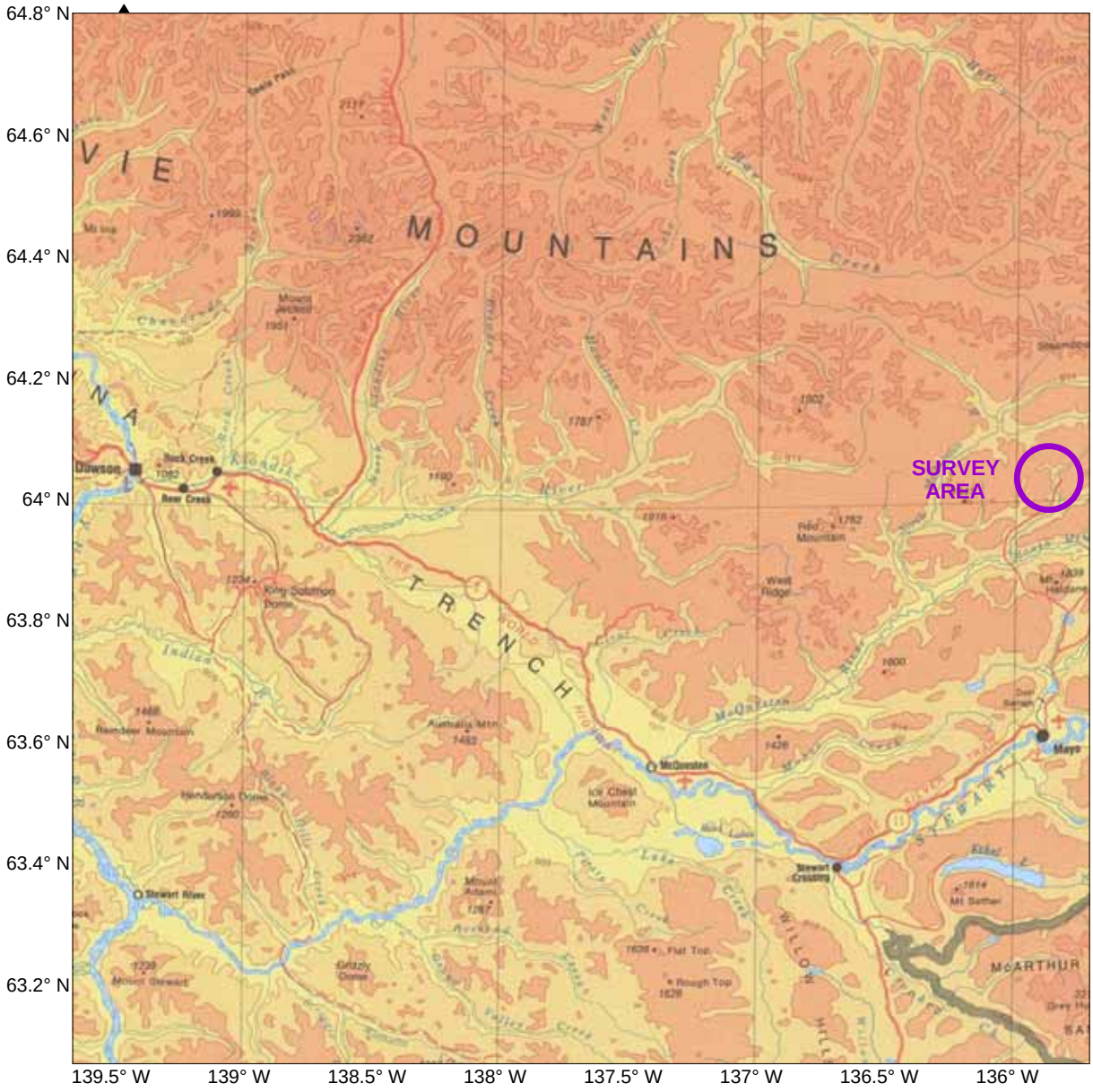
1. INTRODUCTION

During the period August 24 to September 8, 2011, Frontier Geosciences Inc. carried out a seismic refraction and downhole compressional and shear wave investigation for BGC Engineering Inc. at Victoria Gold Corporation's Eagle Gold Project in the Tintina Gold Belt, central Yukon. The site is located approximately 50 kilometres north of the town of Mayo, at the intersection of Dublin Gulch and Haggart Creek. A Survey Location Plan of the area is shown at a scale of 1:1,250,000 in Figure 1.

The purpose of the seismic refraction and downhole surveys was to determine geological conditions at the proposed Heap Leach Embankment, Events Ponds and Plant Site Area. In addition, shear and compressional downhole surveys were conducted in three boreholes in the vicinity of the proposed Crusher site. A Site Plan of the survey area is presented at 1:10,000 scale in Figure 2 in the Appendix.

In all, 10 separate seismic traverses and 11 downhole compressional and shear wave surveys were completed at the proposed mine site. A total of approximately 5335 metres of detailed seismic refraction surveying was carried out in the investigation on 51 separate seismic spreads.



0 12.5 25 37.5 50

KILOMETRES

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
SURVEY LOCATION PLAN		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT. 2011	SCALE 1:1,250,000	FIG. 1

2. THE SEISMIC REFRACTION SURVEY METHOD

2.1 Equipment

The seismic refraction investigation was carried out using a Geometrics, Geode, 24 channel, signal enhancement seismograph and Mark Products Ltd., 48 Hz geophones. Geophone intervals along the multi-cored seismic cables were maintained at 5 metres in order to produce high resolution data on subsurface layering as well as to ensure adequate coverage of the basal layer. The zero delay or instantaneous blasting caps in the small explosive charges used for energy input, were detonated electrically with a Geometrics, HVB-1, high voltage, capacitor type blaster.

2.2 Survey Procedure

For each spread, the seismic cable was stretched out in a straight line and the geophones implanted. Six separate 'shots' were then initiated: one at either end of the geophone array, two at intermediate locations along the seismic cable, and one off each end of the line to ensure adequate coverage of the basal layer. The shots were detonated individually and arrival times for each geophone were recorded digitally in the seismograph. Data recorded during field surveying operations was generally of good to excellent quality.

Throughout the survey, notes were recorded regarding seismic line positions in relation to topographic and geological features, and survey stations in the area. Relative elevations on the seismic lines were recorded by chain and inclinometer with absolute elevations taken from a digital elevation model provided by BGC Engineering Inc.

2.3 Interpretive Method

The final interpretation of the seismic data was arrived at using the method of differences technique. This method utilises the time taken to travel to a geophone from shotpoints located to either side of the geophone. Using the total time, a small vertical time is computed which represents the time taken to travel from the refractor up to the ground surface. This time is then multiplied by the velocity of each overburden layer to obtain the thickness of each layer at that point.

3. THE DOWNHOLE SEISMIC SURVEY

3.1 Equipment

The downhole seismic survey was carried out with the Geometrics, Geode, 24 channel, signal enhancement seismograph which was also used for digital storage of the data. The receiver package employed was a Sercel GS14-L3 triaxial, downhole geophone package. The two horizontal geophones in the package are optimal for recording the down-going, horizontally polarised, shear wave generated at the ground surface. The package was held against the casing wall by a spring steel carrier which was acoustically decoupled from the suspending cable and the weight that draws the carrier down the drillhole.

The shear wave source was a large wooden beam approximately 2 metres in length which was secured against the ground for good shear wave transmission. Force was applied to both ends of the beam with a sledge hammer to provide both positive and negative wave directions. The compressional wave source was produced by applying the sledge hammer to a steel impact plate on the ground surface. In both the shear wave and the compressional wave surveys, an electric circuit was switched-closed with the impact of the sledgehammer, to trigger the record and provide accurate zero times.

3.2 Survey Procedure

Field procedure consisted of lowering the geophone package to the measuring point in the hole and ensuring firm coupling of the geophones to the drillhole wall. The holes were tested every 0.5 metres. The secured wood beam was then struck horizontally from one end with the sledge hammer to produce a shock wave rich in shear wave energy. The horizontal geophones in the downhole triaxial package are sensitive to horizontally polarised shear wave arrivals. After recording of the first impact, the source beam was struck horizontally from the opposite end. The shear wave recorded downhole from the second impact produced an opposite polarity to the initial impact. By recording impacts from each end at every depth location, the oppositely polarised shear waves were plotted to optimise the arrival times of the horizontal shear waves.

A compressional wave was also produced by striking the steel impact plate with the hammer. This produced a well defined compressional wave from the point of impact that penetrated the depth of the holes. This compressional wave was recorded by the vertical geophone in the triaxial package

3.3 Post-Processing Data Reduction

Initial analysis of the shear wave downhole data was conducted on site directly after data acquisition. Observations were made to ensure data quality and validity. Following data acquisition, the overlapping opposite direction blows for each depth station were plotted on a single baseline. This enabled recognition of the phase of the arrival from one depth station to the next.

Initial monitoring and analysis of the compressional wave downhole data was also conducted on site to confirm data quality and validity.

The picking of the first arrival times involved identification of the shear wave break on the basis of polarity, increase in amplitude and abrupt change in frequency. An evaluation of the location of the first break was made on the location of the departure from the baseline of oppositely polarised data. This was also facilitated by comparison with data recorded both above and below the data point and by knowledge that arrival times must increase with depth. The same procedure was followed for the picking of the first arrivals of the compressional wave with the exception of polarity change.

4. GEOPHYSICAL RESULTS

4.1 General

The majority of the 10 seismic profiles were conducted along the placer deposits in Dublin Gulch and across the Gulch at the proposed location of the Heap Leach Embankment. The results of the seismic interpretations for these lines are presented at 1:500 scale in Figures 3 through 20 of the Appendix. Compressional and shear wave velocity profiles for the surveyed boreholes within the proposed Plant site, Event Ponds, Heap Leach Facility and Crusher site are shown in Figures 21 through 31 in the Appendix.

4.2 Discussion

4.2.1 Heap Leach Embankment and Placer Tailings

A primary focus of the survey was to determine depths to bedrock and geological conditions within the previously deposited placer tailings and the proposed location of the Heap Leach Embankment.

Seismic lines SL-12, SL-2 and SL-33 were surveyed from west to east along the placer tailings deposits within Dublin Gulch. The seismic refraction data indicate the area is underlain by three or four velocity layers. In many areas, the deeper intermediate velocity layer is associated with a layer of highly weathered bedrock.

The surficial layer with compressional (P) wave velocities ranging from 305 m/s to 650 m/s, averages approximately 3.5 metres in thickness across the three traverses. This layer correlates to shallow shothole and drillhole intersections of cobbles, gravel, sand, silt and clay.

The surficial layer is underlain by one or two intermediate layers exhibiting significant variations in compressional wave velocities. Line SL-12 contains two intermediate layers with the shallower intermediate layer displaying (P-wave) velocities of 675 m/s to 1000 m/s. This narrow range in velocities is consistent with more compact silt, sand and silty sand. This shallow intermediate layer is underlain by a second intermediate layer with velocities varying from 1400 m/s to 1750 m/s. With an average thickness of 19.5 metres, the velocities suggest this layer is composed of very compact, saturated placer tailings. There exists however, the possibility that the base of this layer may be highly weathered bedrock.

The majority of line SL-2 is interpreted to be underlain by three velocity layers with the onset of a fourth layer at approximate station 420E. This intermediate layer with velocities from 700 m/s to 1700 m/s, correlates with drill log intersections of silt, sand, gravel, cobbles and boulders. Higher velocities are likely associated with localized zones of coarser or denser material. The deeper intermediate layer from 420E to the east end of the line, has a compressional wave velocity of approximately 1900 m/s. Borehole intersections of bedrock at a depth of 11.6 metres in DH-BGC09-DG-3, indicate this layer is highly weathered bedrock. Intersections of granodiorite boulders intermixed with gravel and cobbles immediately above the bedrock may account for the two metre discrepancy between the interpreted bedrock surface and the borehole intersection.

There is good agreement between the interpreted bedrock surface and the intersection of bedrock in borehole BH-BGC11-32. Downhole shear wave velocities for BH-BGC11-32 indicate the surficial materials have a shear wave velocity of 120 m/s. Velocities vary from 265 m/s to 480 m/s throughout the thick sequence of cobbles and boulders and increase to a value of 670 m/s at the onset of the highly weathered bedrock. Compressional wave velocities determined from the downhole survey are elevated when compared with values from seismic refraction analysis. This discrepancy may be associated with the downhole pressure wave preferentially travelling through the grout column.

Seismic line SL-33 was located between borehole DH-BGC09-DG-3 and a point north and east of borehole BH-BGC11-52. This traverse is underlain by four layers to station 560ENE, where the interpreted weathered bedrock layer pinches out against the basal, competent bedrock. The shallow intermediate layer exhibits compressional wave velocities ranging from 500 m/s to 1600 m/s. With an average thickness of 6.9 metres, the velocities generally increase to the east along the traverse. This correlates well with an increase in coarse materials observed in geotechnical investigations in the site area. The deeper intermediate layer is likely associated with the onset of weathered bedrock as observed in boreholes DH-BGC09-DG-3 and BH-BGC11-33. In the approximate station interval 300ENE to 440ENE, this layer may be associated with lower compressional wave sands and gravels. Black dashed lines on the sections indicate possible transitions from weathered bedrock to tailings material within this velocity layer. Basal layer velocities from 3075 m/s to 4240 m/s, denote the competent metasedimentary bedrock surface.

Shear wave velocity surveying of BH-BGC11-33 yielded values from 205 m/s to 510 m/s in the initial 8.5 metres of the borehole. There is a noticeable increase to 800 m/s at the onset of the weathered bedrock. Similarly, borehole BH-BGC11-34 exhibits shear wave velocities of

205 m/s to 510 m/s in the initial 15 metres of the hole. Below 15 metres, the shear wave velocity increases to 800 m/s. This velocity increase correlates reasonably well with the onset of weathered bedrock at a depth of 16.3 metres.

Seismic line SL-8 was situated between borehole BH-BGC11-34 to a point roughly 125 metres northeast of BH-BGC11-28. This traverse, with the exception of a segment from 290NE to 390NE, is believed to be underlain by four velocity layers. The surficial layer averages only 2.2 metres in thickness and exhibits compressional wave velocities of 305 m/s to 375 m/s. Consistent with loose soils, sands and gravels, this layer is underlain by a more compact layer of sands and gravels with velocities of 550 m/s to 1375 m/s. Borehole BH-BGC11-28 located approximately 11 metres off the line, indicates this layer may in places, be comprised of highly weathered bedrock. This shallower intermediate layer is underlain by a weathered bedrock layer with velocities ranging from 1350 m/s to 2450 m/s. The interpreted thicknesses of the weathered bedrock layer vary from 2 m to 28.7 metres, and average 14.6 metres. The basal layer with velocities from 3100 m/s to 4350 m/s is the interpreted competent bedrock surface.

Borehole BH-BGC11-28 has a calculated shear wave velocity of 210 m/s for the surficial 3.5 metres of moderately weathered bedrock. The velocity increases significantly to 880 m/s in the depth interval, 3.5 m to 17 metres. Velocities vary from 650 m/s to 1130 m/s below 17 metres depth, consistent with slightly to moderately weathered bedrock.

Seismic lines SL-1 and SL-3 cut across the placer tailings deposits in the western part of the survey area. Seismic line SL-1 has surficial layer velocities of 300 m/s to 445 m/s, which coincide with borehole intersections of silts and sands. This surficial layer is underlain by a thicker section of sands, gravels, cobbles and boulders exhibiting compressional wave velocities of 500 m/s to 1000 m/s. A deeper intermediate layer with velocities of 1500 to 1600 m/s coincides with the borehole intersection of sands, silts and gravels. This layer and the corresponding higher velocities is in good agreement with saturated conditions and the expected water table. The basal layer is interpreted to be competent bedrock, although there are two zones with abnormally low compressional wave velocities. From 45NNE to 110NNE and from 215NNE to 255NNE, compressional wave velocities varying from 2050 m/s to 2300 m/s were computed for the basal refractor These velocities likely reflect either highly weathered bedrock or significant shear zones in the bedrock.

Borehole BH-BGC11-39 located approximately 2 metres off line SL-1 shows good agreement with the interpreted seismic section. Saturated overburden velocities are observed

at approximately 10 metres depth. Shear wave velocities obtained from the borehole survey are approximatley 130 m/s in the surficial 3 metres of loose silts and sands. Velocities increase significantly to 325 m/s, at the onset of a layer of gravel, cobbles and boulders.

Seismic line SL-3 is interpreted to consist of three distinct layers, with compressional wave velocities for the surficial layer varying from 375 m/s to 420 m/s. Surficial layer thicknesses range from 0.1 metres to 8.1 metres, with the thinnest section located near the middle of the traverse. The surficial layer is underlain by a thick intermediate layer with P-wave velocities of 950 m/s to 1500 m/s. Higher velocities indicate the presence of coarser materials and possibly, increased water content. Basal velocities vary from 2125 m/s to 3630 m/s and are interpreted to be metasedimentary bedrock with varying degrees of weathering. The 2125 m/s velocity zone at the north end of the line may be indicative of either highly weathered bedrock or a shear zone in the bedrock

Parallel seismic lines SL-10 and SL-5 were oriented southeast to northwest, with line SL-5 located on the proposed heap embankment and line SL-10 running along the edge of the embankment up to the proposed Plant Site. Both lines are interpreted to be underlain by 3 or 4 velocity layers. Typically, the surficial layer is associated with loose sands and gravels with compressional wave velocities varying from 290 m/s to 550 m/s.

A thin layer of surficial material overlying weathered bedrock with compressional wave velocities of 2700 m/s to 2900 m/s, is present on the southern end of both traverses. The weathered bedrock in turn overlies more competent bedrock. The weathered bedrock layer is no longer discernible at approximately 100NW on lines SL-5 and SL-10, as indicated by the dashed black lines on the sections.

From station 110NW on line SL-10 and station 145NW on line SL-5, the interpreted sections consist of four layers. The shallow intermediate layer exhibits velocities ranging from 600 m/s to 1900 m/s. This layer is correlated in boreholes with gravel, and gravel with sand. This layer is underlain by a thicker intermediate layer with velocities of 1050 m/s to 2100 m/s. This intermediate layer is consistent with denser sands, gravels, cobbles and boulders as observed in BH-BGC11-34 on line SL-5, and highly weathered bedrock intersected in borehole BH-BGC11-33 on line SL-10. The deeper intermediate layer pinches out at the elevation low associated with the creek at 460NW on line SL-10B and 400NW on line SL-5B. Northwest of the creek, line SL-5 consists of 3 layers, with the intermediate layer varying in velocity from 750 m/s to 1900 m/s. Seismic line SL-10 has a thick intermediate layer with velocities ranging from 715 m/s to 1250 m/s from 460NW to the end of the

traverse. From station 635NW, this layer is underlain by a deeper intermediate layer with a velocity of 2050 m/s. This deeper layer is likely consistent with highly weathered bedrock.

Basal layer velocities on both lines vary from 1635 m/s to 4800 m/s, with low velocity zones observed at 495NW to 525NW and 665NW to 700NW on line SL-5, and 110NW to 120NW on line SL-10. The higher velocities are interpreted as competent metasedimentary bedrock. The three low velocity zones with values of 1635 m/s to 1900 m/s are believed to be indicative of highly weathered rock or shear zones.

Located approximately 5 metres off SL-5, borehole BH-BGC11-59 exhibits good agreement between the interpreted basal layer and the intersection of weathered bedrock. Shear wave velocities also show a noticeable increase from 290 m/s to 570 m/s at the onset of the bedrock. Inconsistent with some boreholes, the compressional wave velocities for BH-BGC11-59 compare reasonably well with the refraction results, with velocities of 2045 m/s in the frozen overburden and 3085 m/s in the slightly to moderately weathered bedrock.

The final section SL-7, is located at the eastern end of the survey area. Line SL-7 was oriented south to north and consists of 3 distinct velocity layers. The surficial layer varies in thickness from 0.3 to 4.5 metres, with an average thickness of 2.2 metres. Velocities ranging from 300 m/s to 380 m/s are consistent with loose, surficial, sands and gravels. The surficial layer is underlain by a thick layer of more compact sands, gravels and cobbles. Compressional wave velocities for this layer range from 650 m/s to 1150 m/s.

The interpreted basal layer is in good agreement with moderately weathered metasedimentary bedrock observed in borehole BH-BGC11-52. Depths to bedrock vary from 6.1 to 24.4 metres, with an average depth of 13.2 metres. Calculated basal layer velocities range from 2445 m/s to 4670 m/s. The lower velocity zone of 2445 m/s at the southern end of the line likely indicates highly to moderately weathered bedrock.

Downhole shear and compressional wave testing in borehole BH-BGC11-52 shows similar results to other boreholes, with low shear wave velocity of 115 m/s to 210 m/s in the shallow overburden materials. An increase in shear wave velocities at 4.5 metres depth to 475 m/s, coincides well with an increase in compressional wave velocities apparent on seismic line SL-7 at approximately 4 metres depth. Shear wave velocities increase again to 665 m/s at the onset of the metasedimentary rock..

4.2.2 Crusher Site Boreholes

Boreholes BH-BGC11-36, BH-BGC11-40B and BH-BGC11-62 are all located within the proposed crusher site. The boreholes all contain a thin section of overburden material overlying relatively shallow bedrock. Bedrock ranges from slightly to moderately weathered. Shear wave velocities typically exceed 800 m/s at or near, the surface of the bedrock. Shear wave testing in borehole BH-BGC11-36 resulted in one of the thickest, continuous shear wave zones in bedrock. The 1290 m/s zone is approximately 30 m thick and is underlain at a depth of about 40 m, by a 1745 m/s velocity zone that extends to the bottom of the hole.

4.2.3 Supplementary MASW Profiles.

The Multichannel analysis of surface wave (MASW) method was applied to surface seismic data within the vicinity of boreholes BH-BGC11-32, BH-BGC11-33, BH-BGC11-34 and BH-BGC11-52. The MASW profiles are presented at a vertical scale of 1:250 in Figures 32 to 37 of the Appendix. Each profile indicates the seismic line number and the distance along the traverse. Also shown at the lower left hand corner of the plots is the closest geotechnical borehole. The MASW results show general agreement with the downhole shear wave velocities calculated from borehole seismic logging.

5. LIMITATIONS

The depths to subsurface boundaries derived from seismic refraction surveys are generally accepted as accurate to within ten percent of the true depths to the boundaries. In some cases, unusual geological conditions may produce false or misleading data points with the result that computed depths to subsurface boundaries may be less accurate. In seismic refraction surveying difficulties with a 'hidden layer' or a velocity inversion may produce erroneous depths. The first condition is caused by the inability to detect the existence of a layer because of insufficient velocity contrasts or layer thicknesses. A velocity inversion exists when an underlying layer has a lower velocity than the layer directly above it. The interpreted depths shown on drawings are to the closest interface location, which may not be vertically below the measurement point if the refractor dip direction departs significantly from the survey line location.

In downhole seismic surveys, individual values taken at discrete depth points may precede or lag the anticipated arrival due to 'zero time', timing errors in the circuitry. These errors are generally quite small and average velocities taken over a broader zone are good representations of in situ shear wave and compressional wave velocities in a layer.

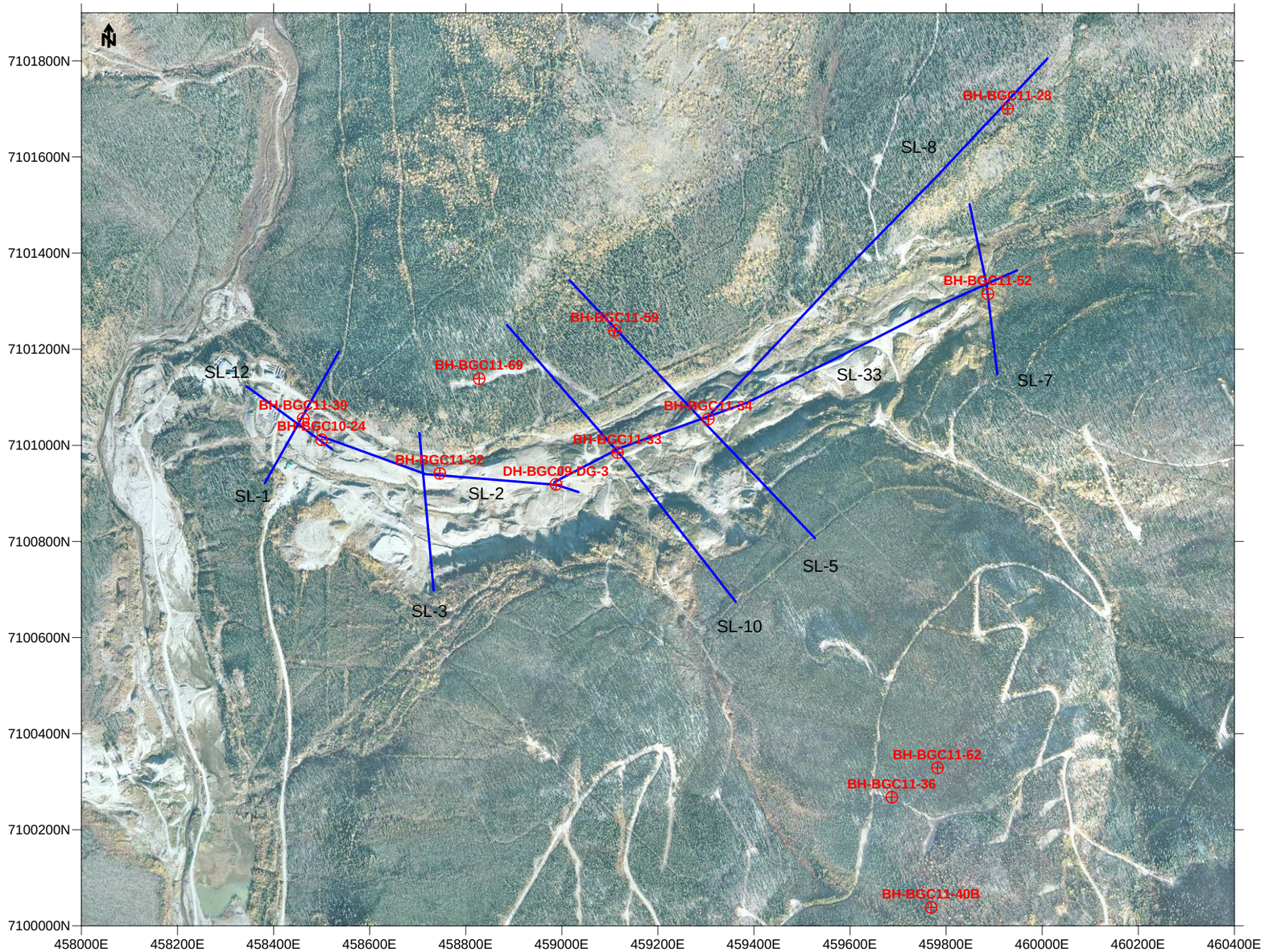
In this survey, some difficulty was encountered in downhole logging due to seismic energy travelling in the grout surrounding the plastic casing. This difficulty was generally overcome by careful picking of later seismic arrivals subsequent to the arrival of the grout wave.

The results are interpretive in nature and are considered to be a reasonably accurate representation of existing subsurface conditions within the limitations of the seismic refraction and downhole seismic methods.

For: Frontier Geosciences Inc.

Alex Smith, M.Sc.

Russell Hillman, P.Eng.



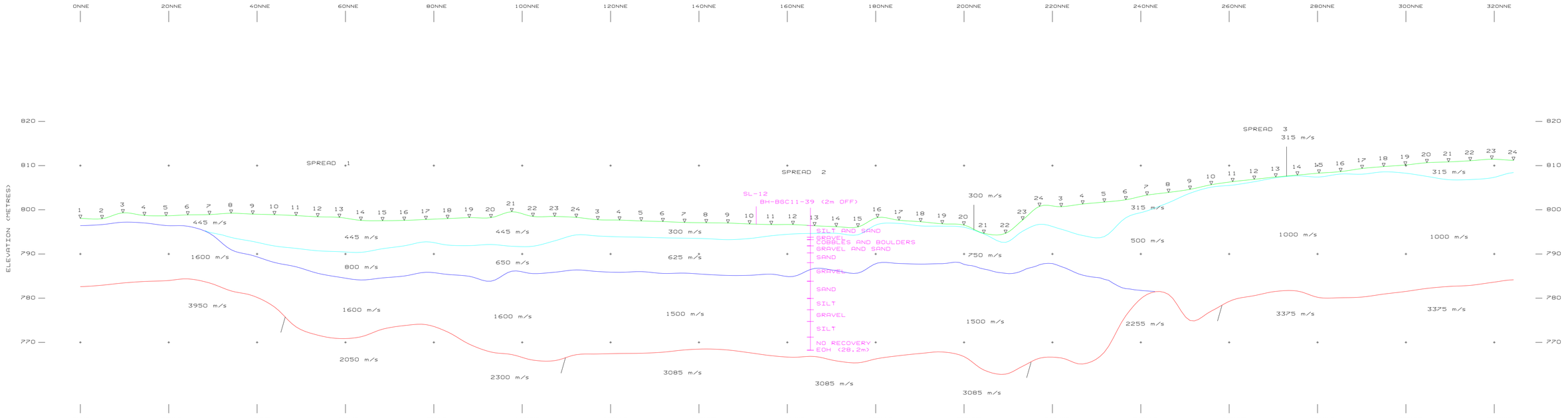
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

GEOPHYSICAL SURVEY

SITE PLAN

FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:10,000	FIG. 2



SEISMIC LINE SL-1

INSTRUMENT: GEOMETRICS GEODE

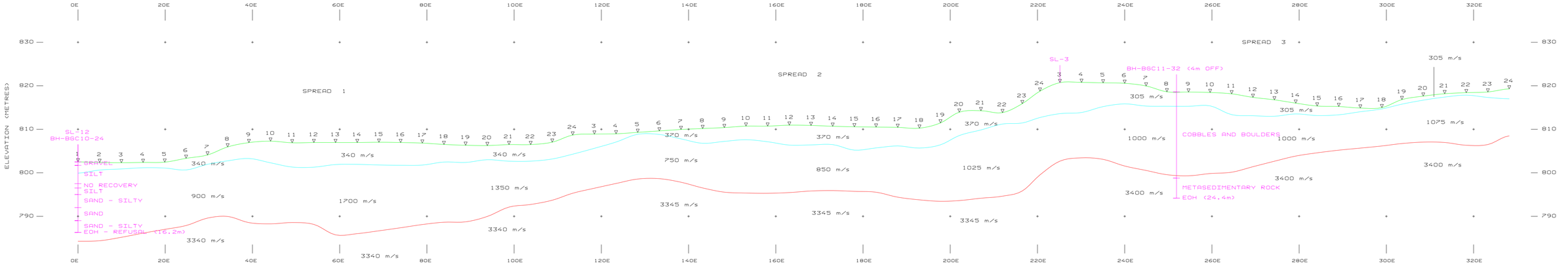
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-1

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 3



SEISMIC LINE SL-2A

INSTRUMENT: GEOMETRICS GEODE

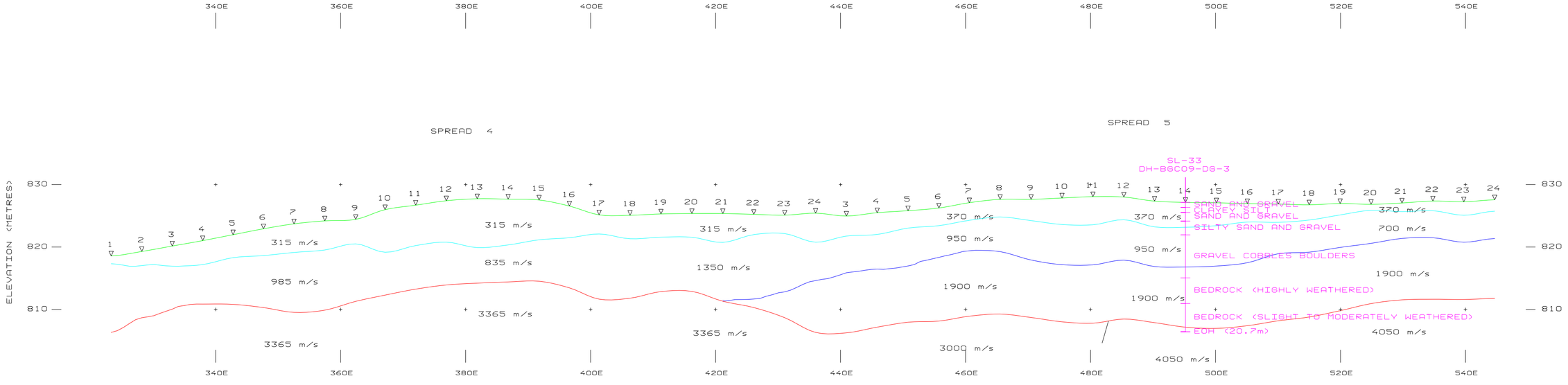
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-2A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 4



SEISMIC LINE SL-2B

INSTRUMENT: GEOMETRICS GEODE

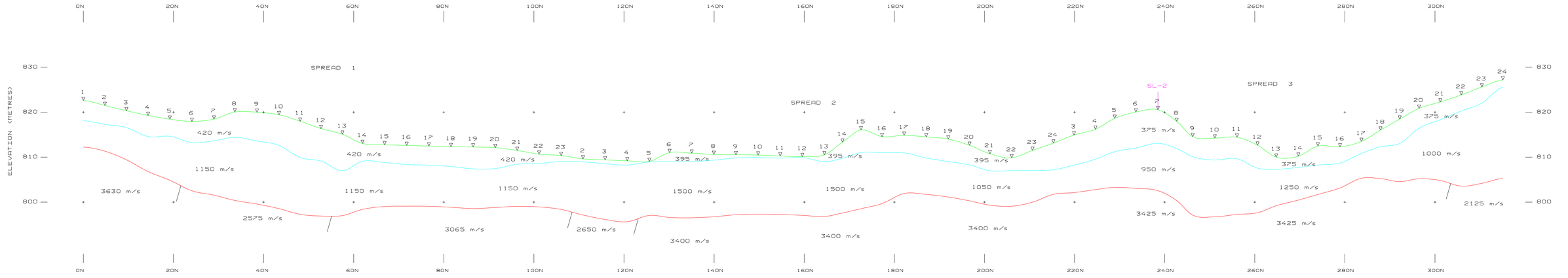
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-2B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 5



SEISMIC LINE SL-3

INSTRUMENT: GEOMETRICS GEODE

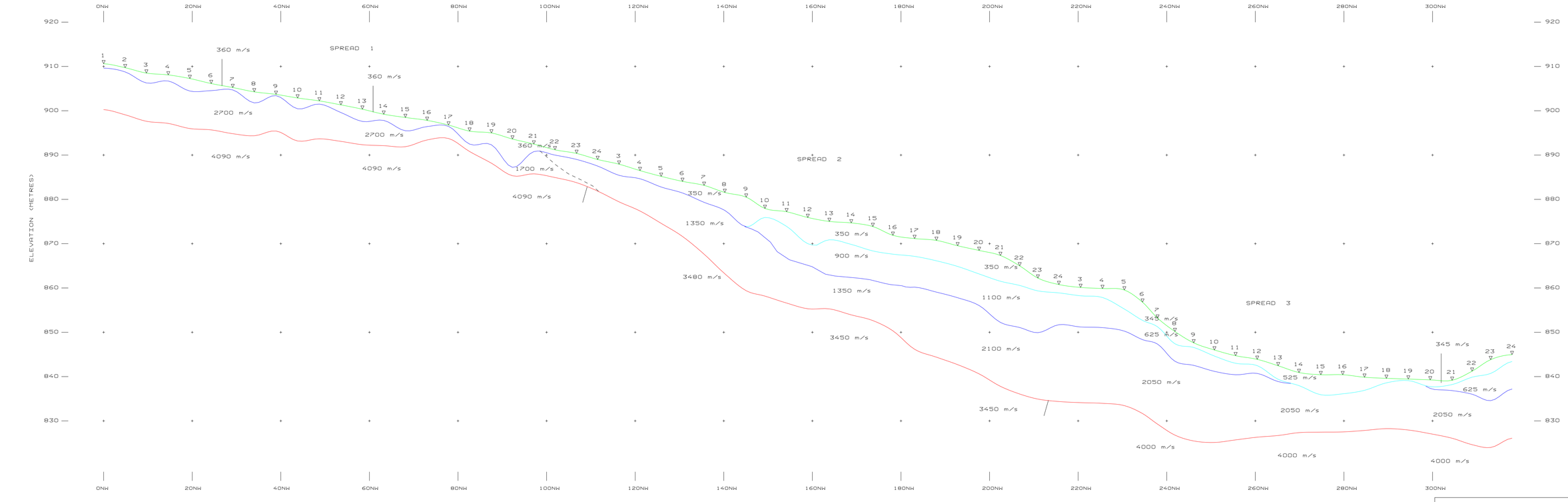
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-3

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 6



SEISMIC LINE SL-5A

INSTRUMENT: GEOMETRICS GEODE

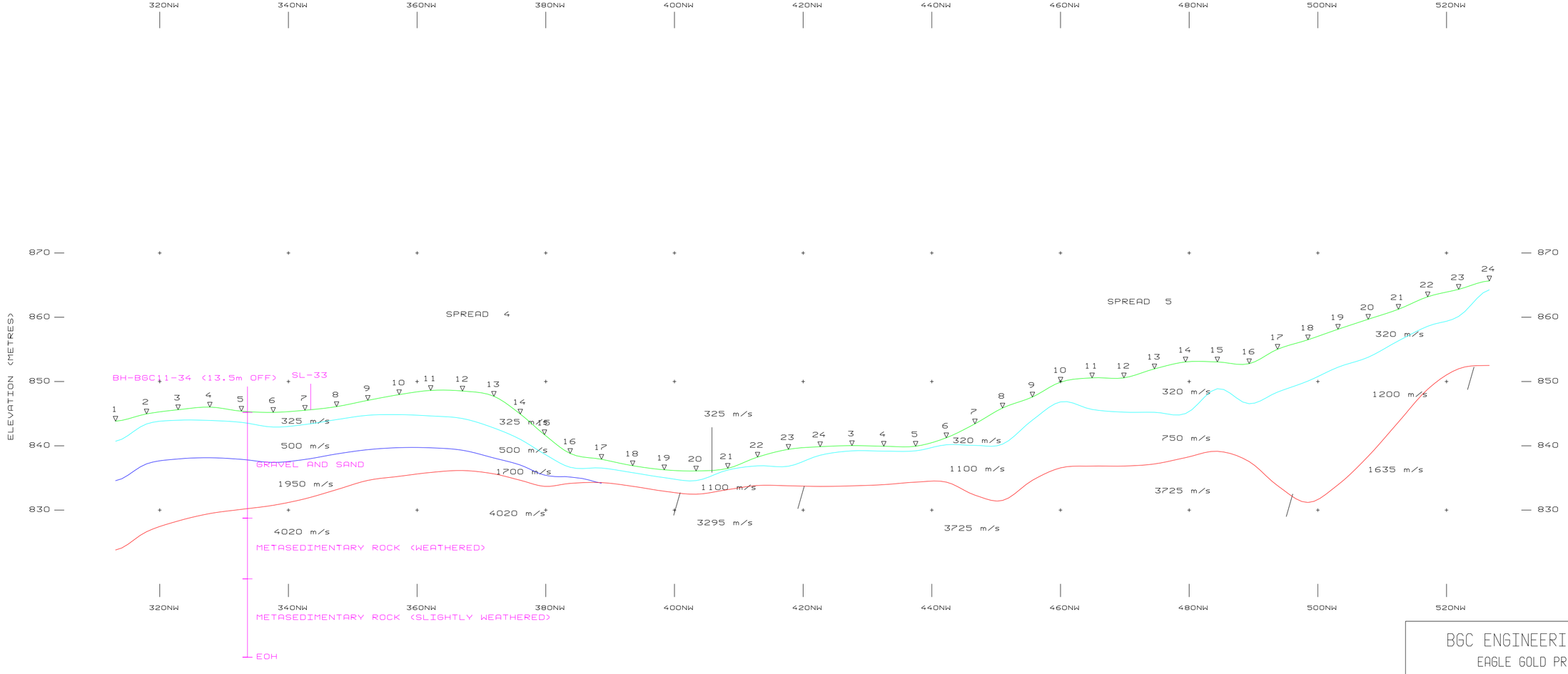
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 7



SEISMIC LINE SL-5B

INSTRUMENT: GEOMETRICS GEODE

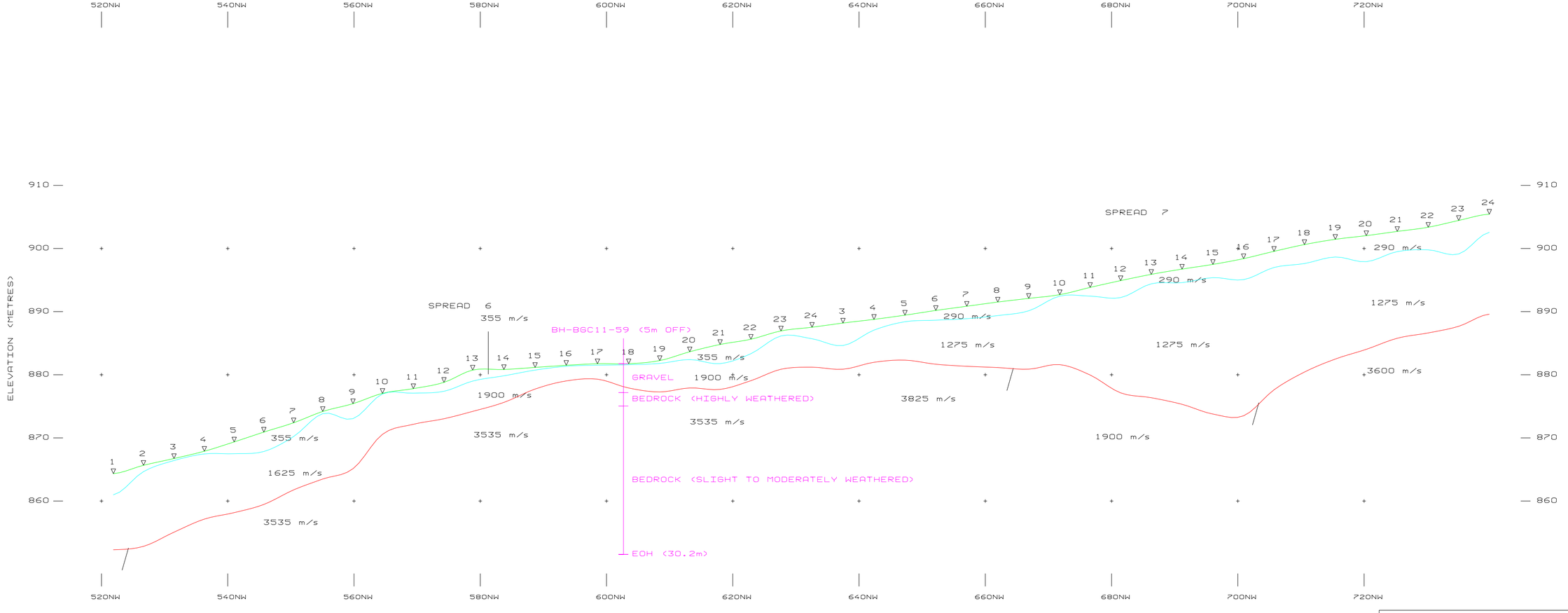
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 8



SEISMIC LINE SL-5C

INSTRUMENT: GEOMETRICS GEODE

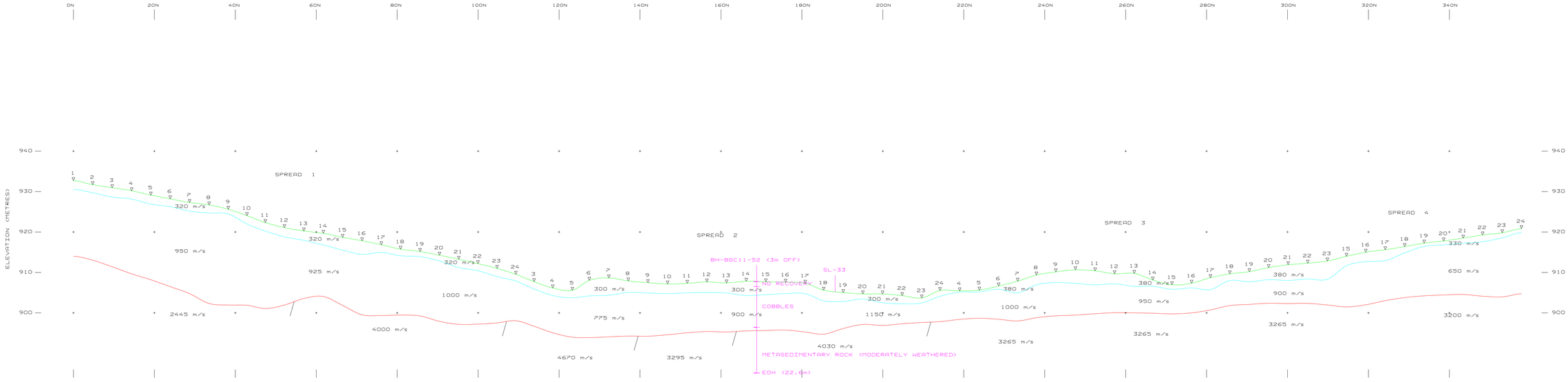
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-5C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 9



SEISMIC LINE SL-7

INSTRUMENT: GEOMETRICS GEODE

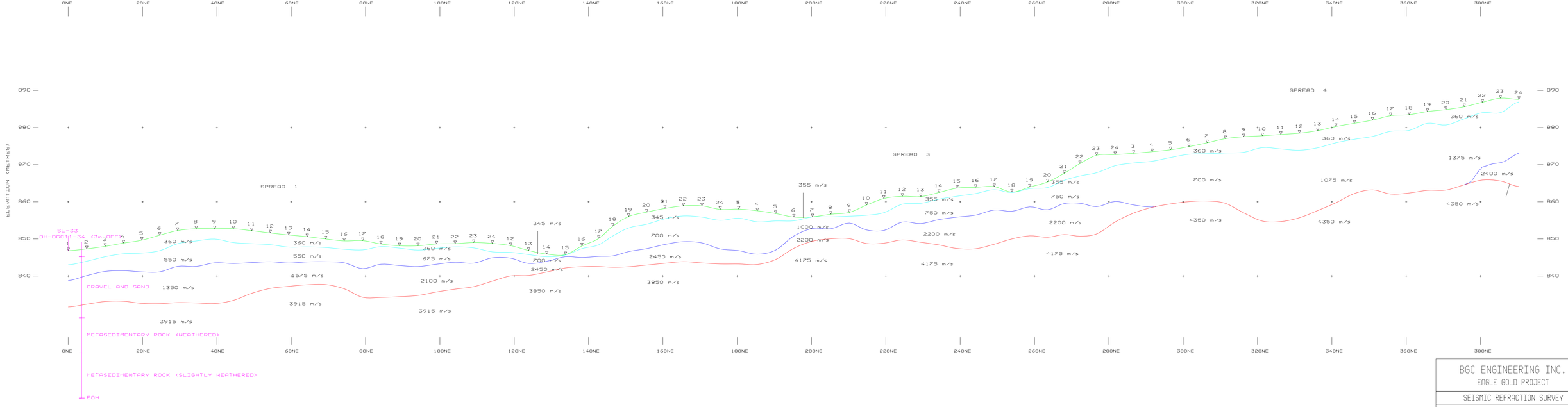
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-7

FRONTIER GEOSCIENCES INC.

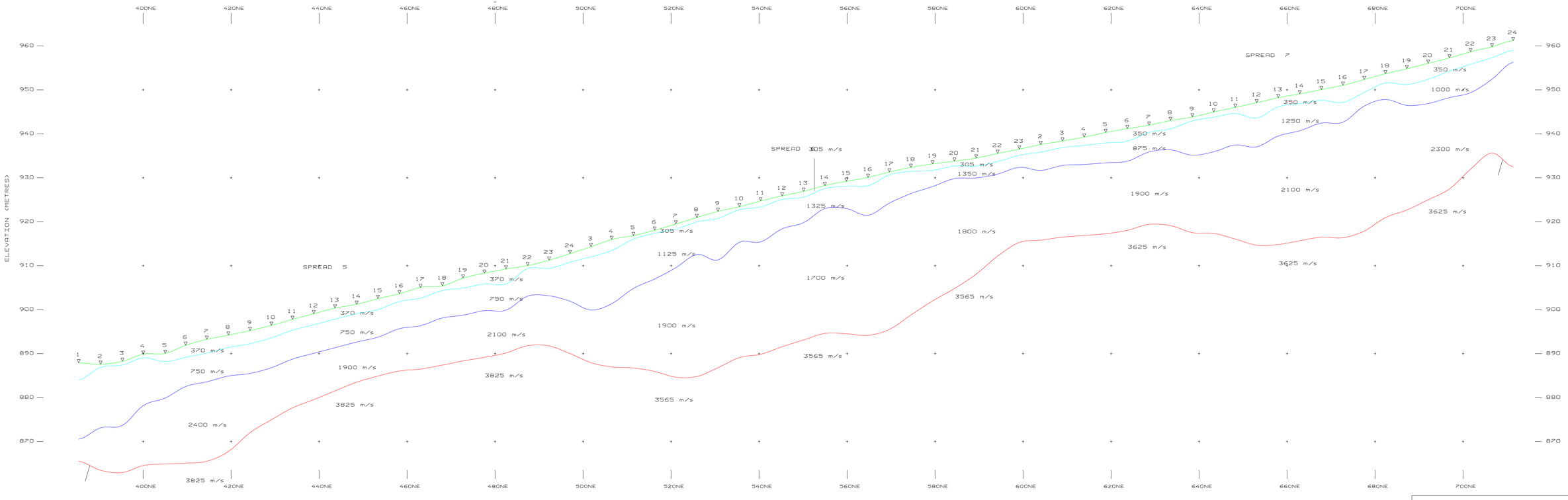
DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 10



SEISMIC LINE SL-8A

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.
EAGLE GOLD PROJECT
SEISMIC REFRACTION SURVEY
INTERPRETED DEPTH SECTION SL-8A
FRONTIER GEOSCIENCES INC.
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 11



SEISMIC LINE SL-8B

INSTRUMENT: GEOMETRICS GEODE

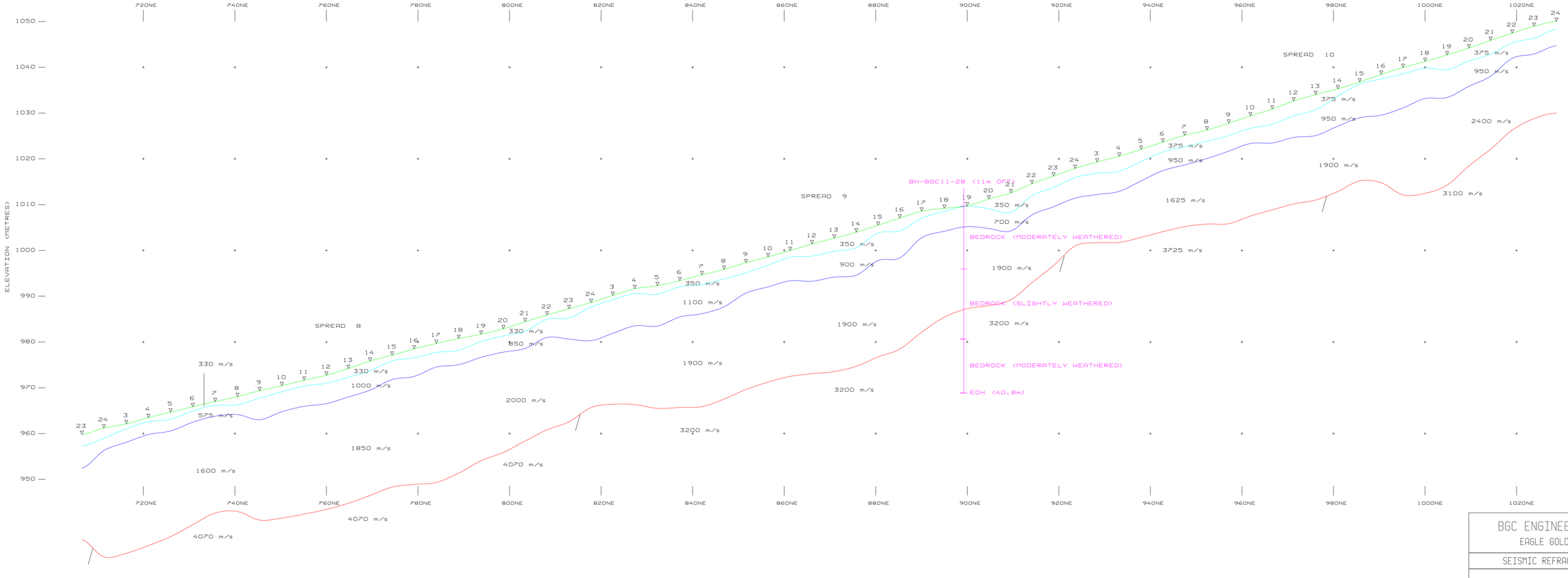
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-8B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 12



SEISMIC LINE SL-8C

INSTRUMENT: GEOMETRICS GEODE

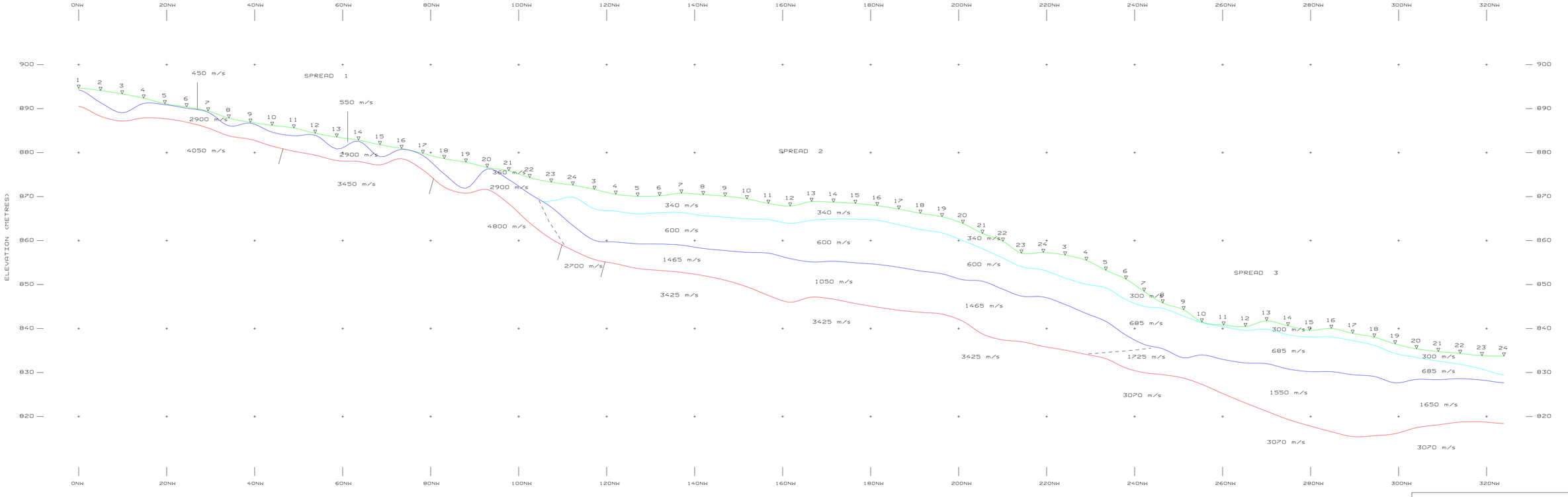
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-8C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 13



SEISMIC LINE SL-10A

INSTRUMENT: GEOMETRICS GEODE

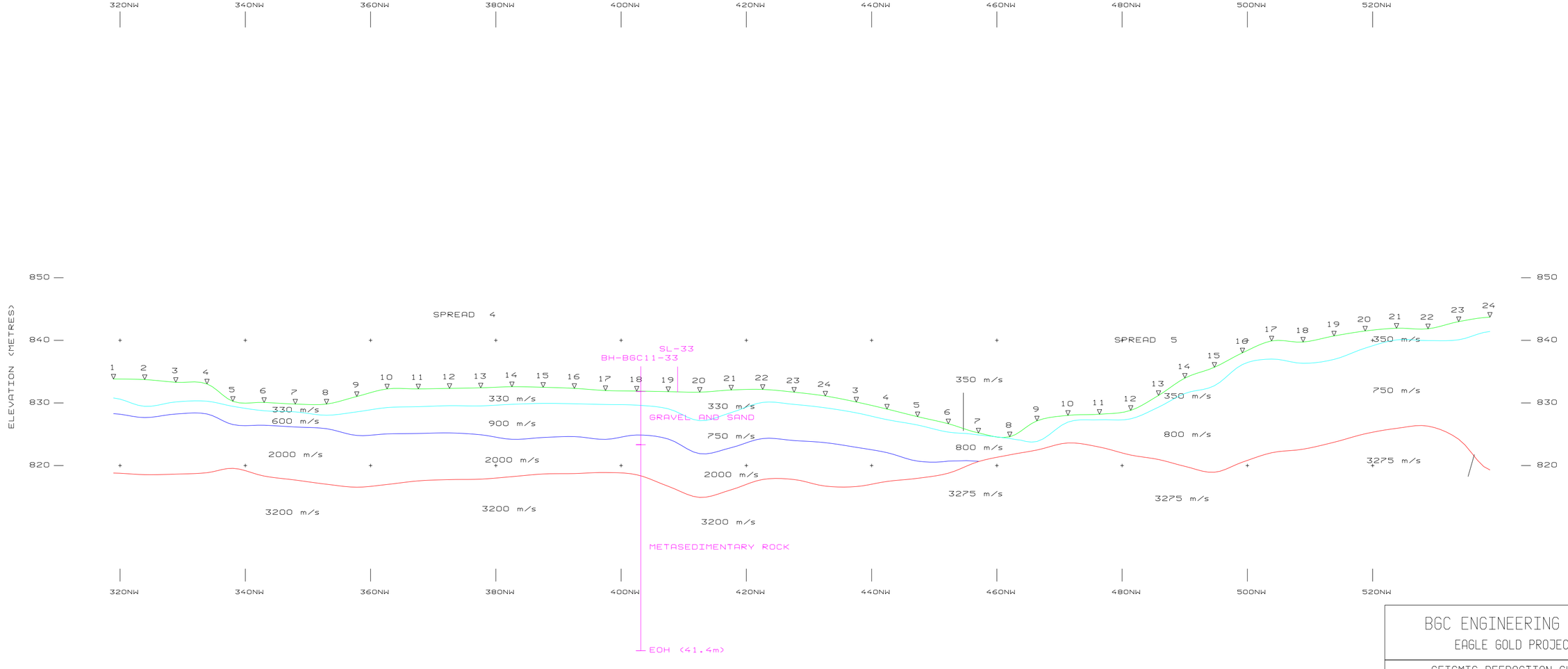
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 14



SEISMIC LINE SL-10B

INSTRUMENT: GEOMETRICS GEODE

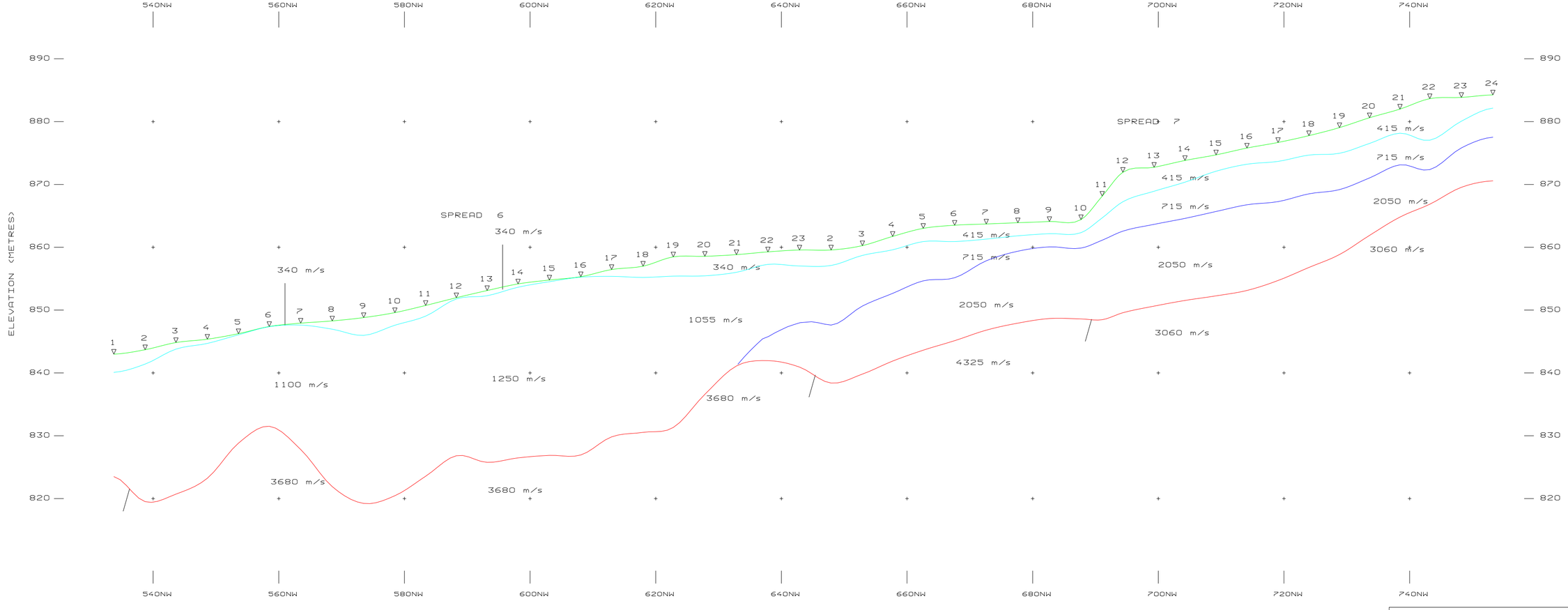
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10B

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 15



SEISMIC LINE SL-10C

INSTRUMENT: GEOMETRICS GEODE

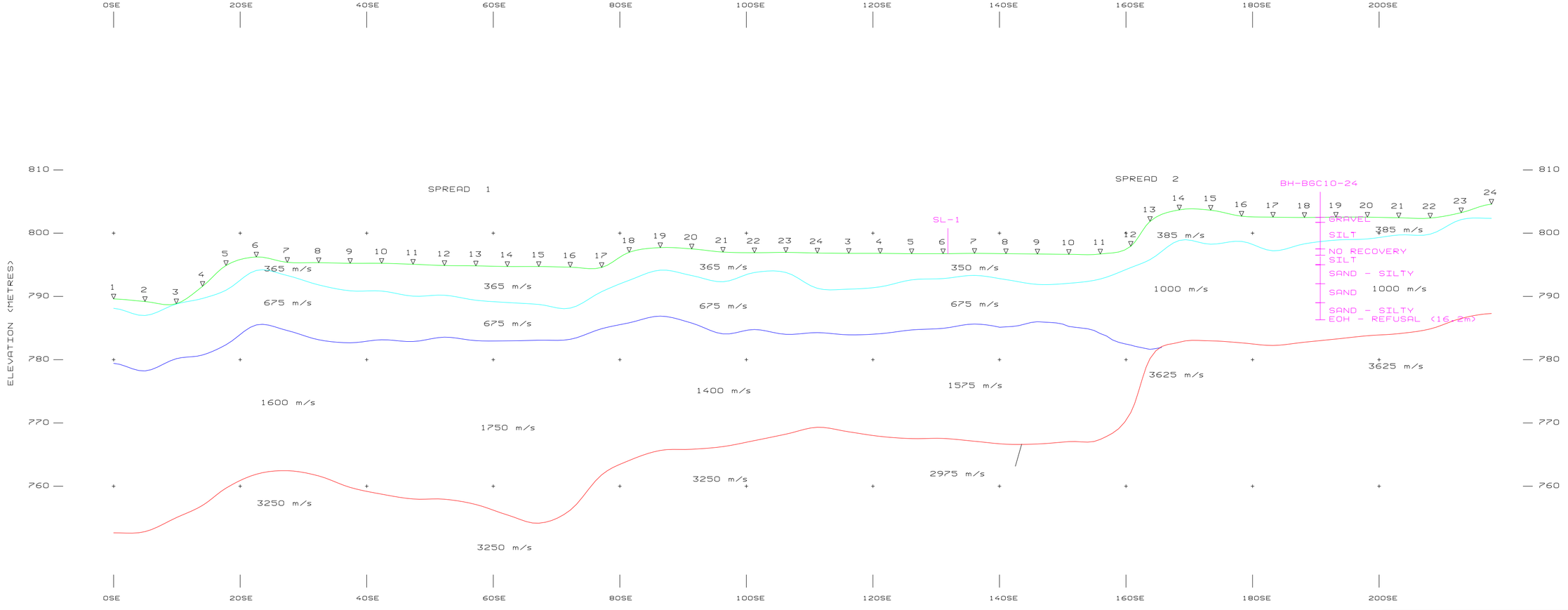
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-10C

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 16



SEISMIC LINE SL-12

INSTRUMENT: GEOMETRICS GEODE

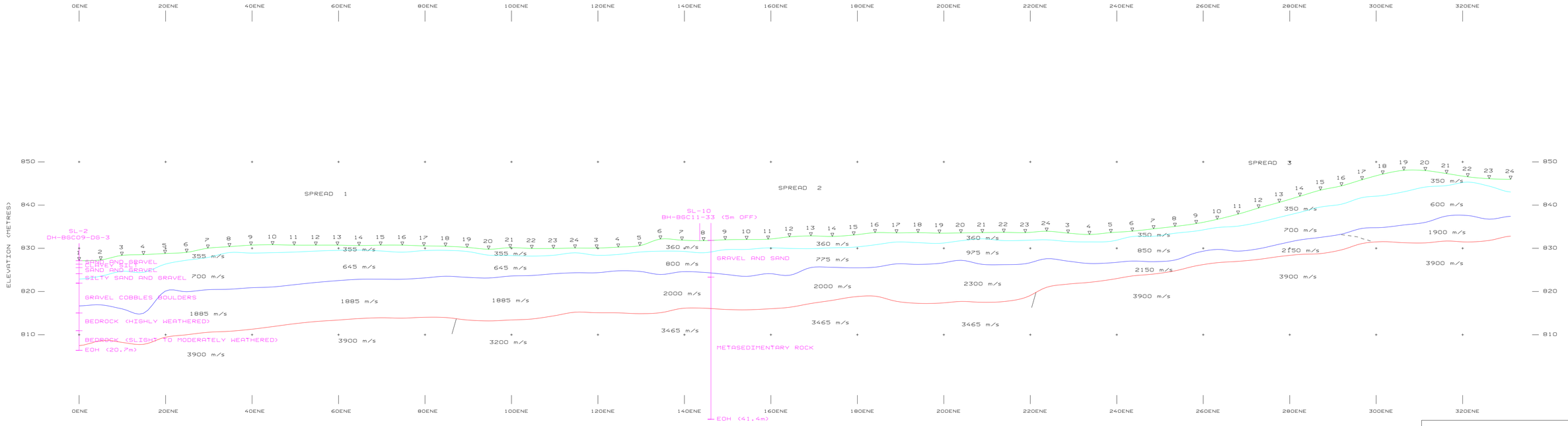
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-12

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011	SCALE 1:500	FIG. 17



SEISMIC LINE SL-33A

INSTRUMENT: GEOMETRICS GEODE

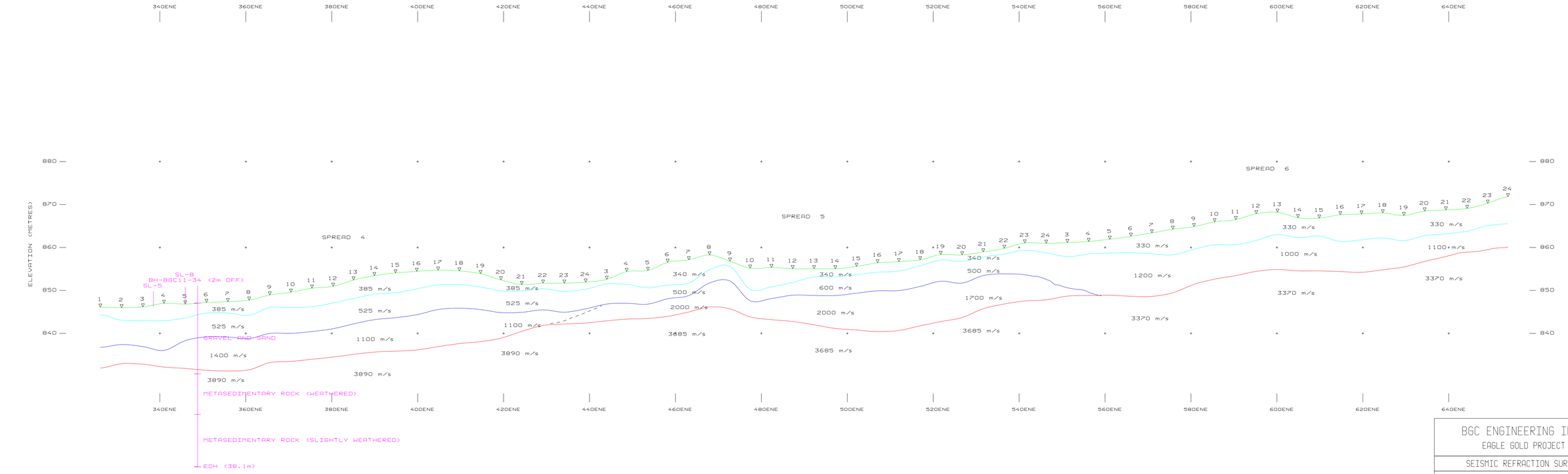
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-33A

FRONTIER GEOSCIENCES INC.

DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 18



SEISMIC LINE SL-33B

INSTRUMENT: GEOMETRICS GEODE

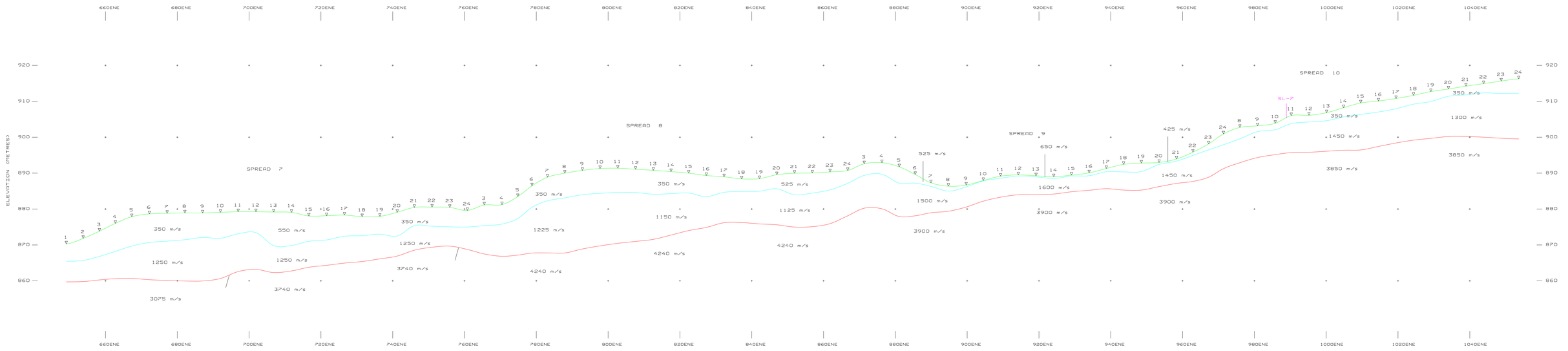
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

SEISMIC REFRACTION SURVEY

INTERPRETED DEPTH SECTION SL-33B

FRONTIER GEOSCIENCES INC.

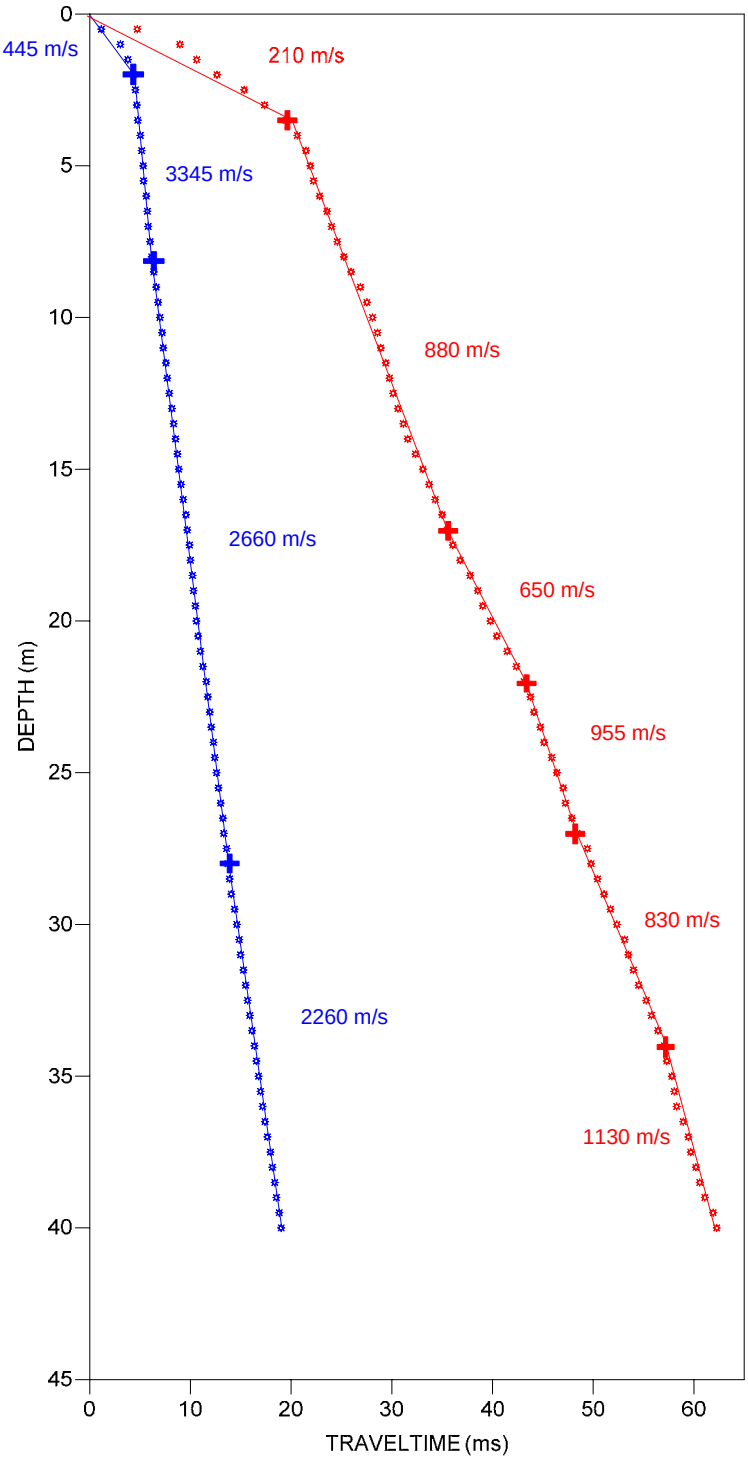
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 19

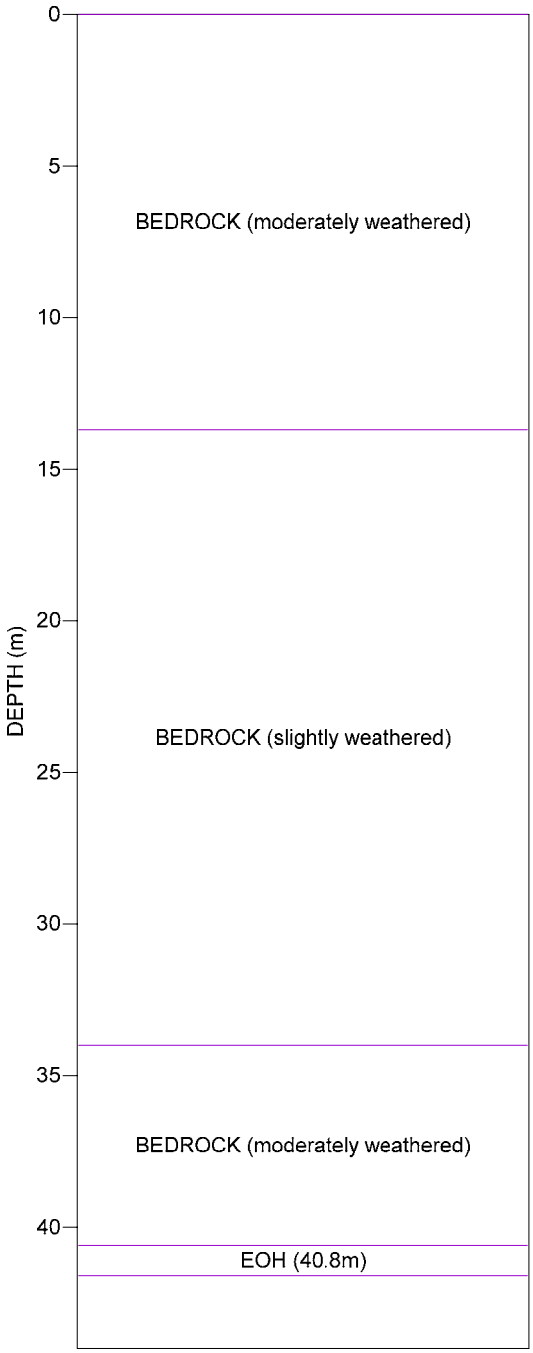


SEISMIC LINE SL-33C

INSTRUMENT: GEOMETRICS GEODE

BGC ENGINEERING INC.
EAGLE GOLD PROJECT
SEISMIC REFRACTION SURVEY
INTERPRETED DEPTH SECTION SL-33C
FRONTIER GEOSCIENCES INC.
DATE: SEPTEMBER 2011 | SCALE 1:500 | FIG. 20





LEGEND

DATA POINTS

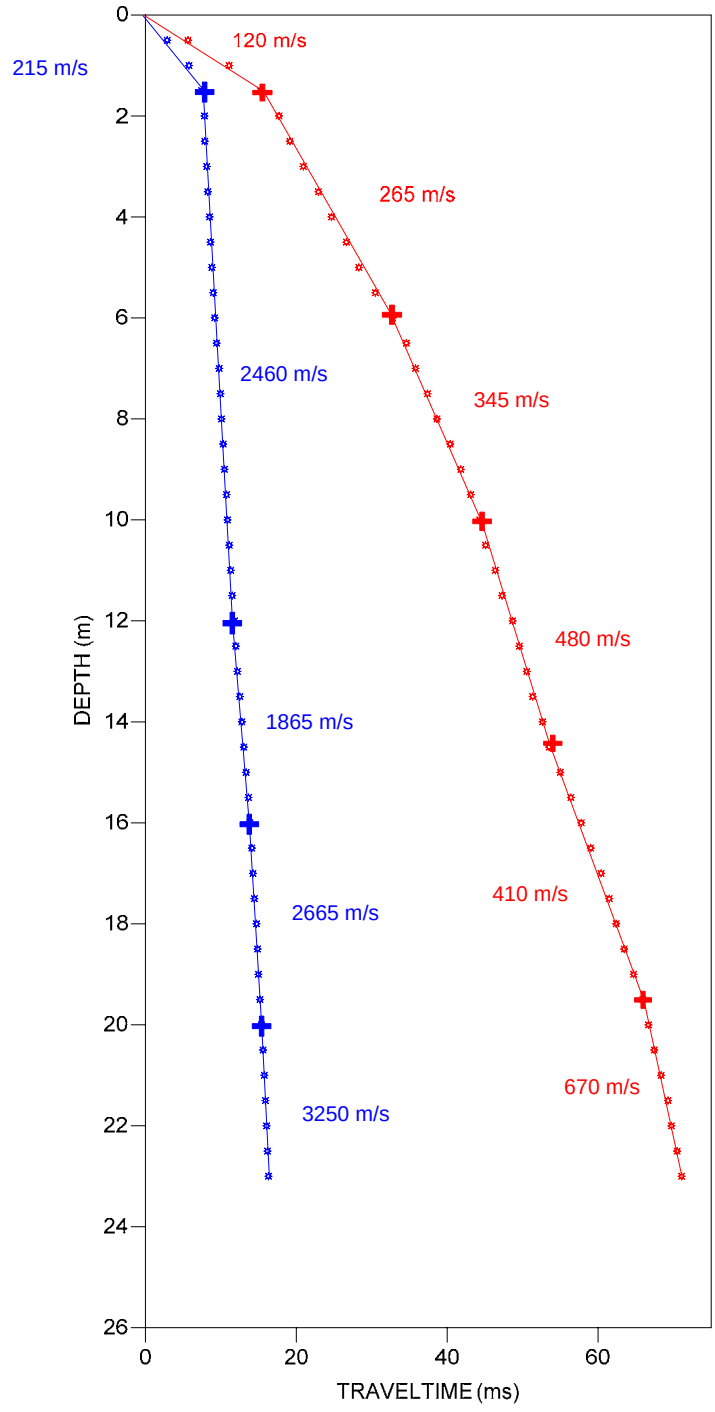
VELOCITY CHANGE

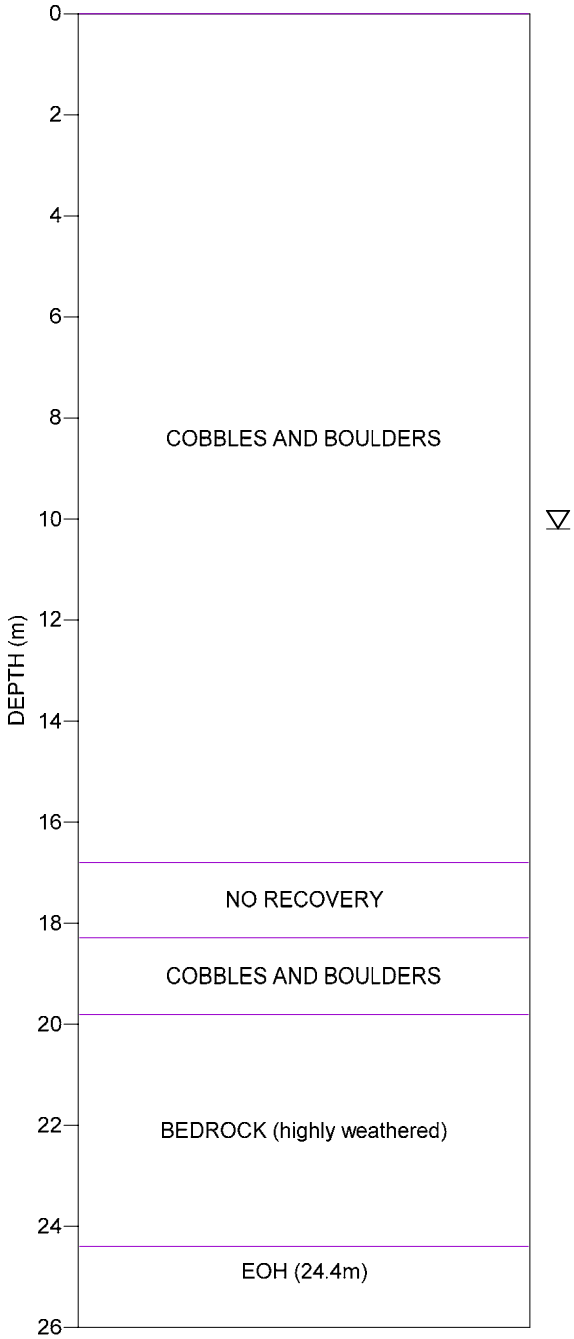
P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC. EAGLE GOLD PROJECT
DOWNHOLE SEISMIC SURVEY
BOREHOLE BH11-28 P AND S WAVE VELOCITIES
FRONTIER GEOSCIENCES INC.
DATE: SEPT. 2011 | VSCALE 1:250 | FIG. 21





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

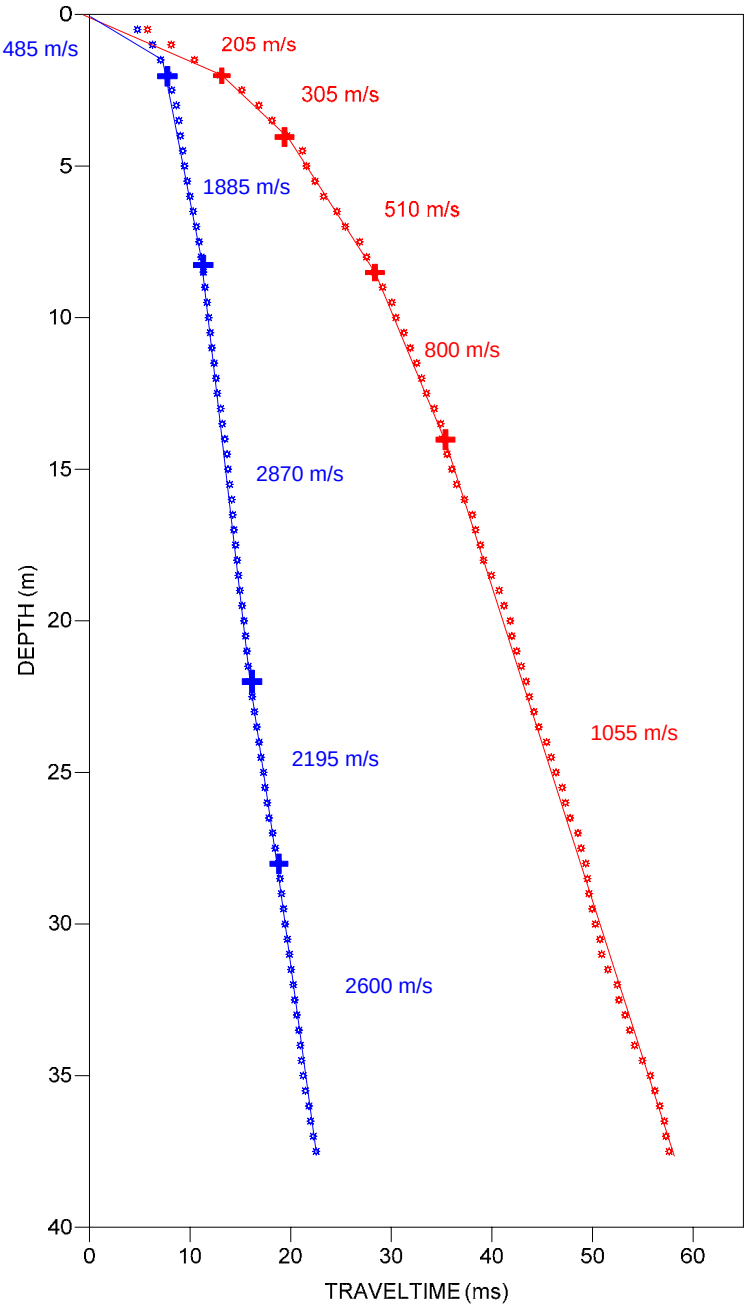
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

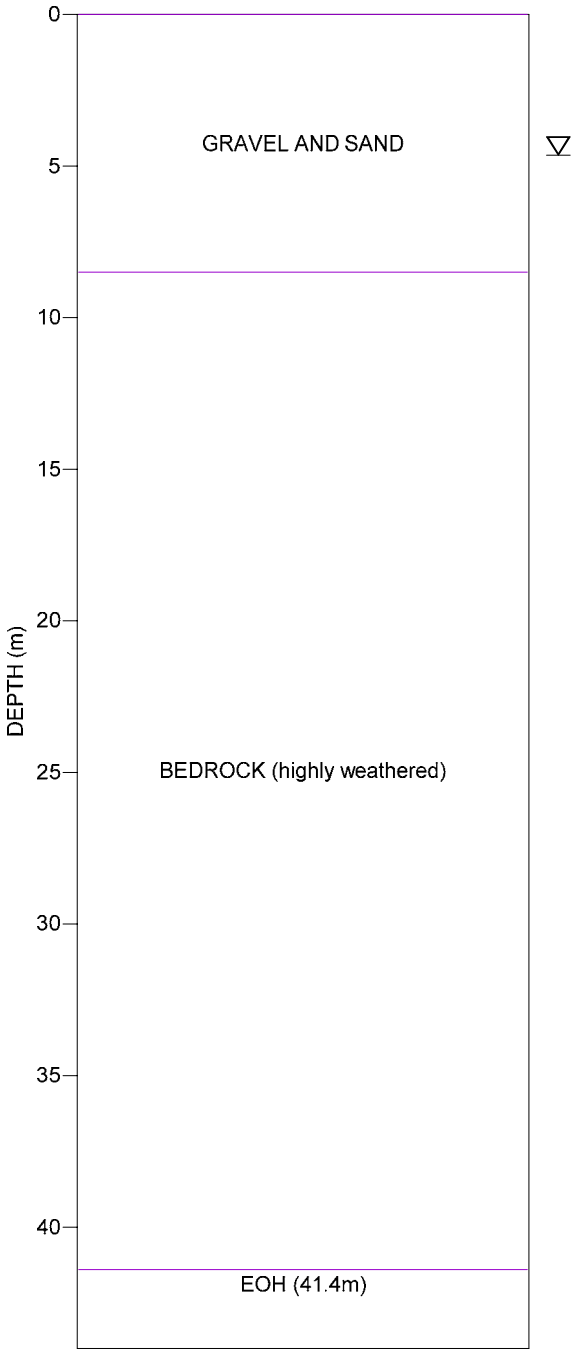
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-32
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 22





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

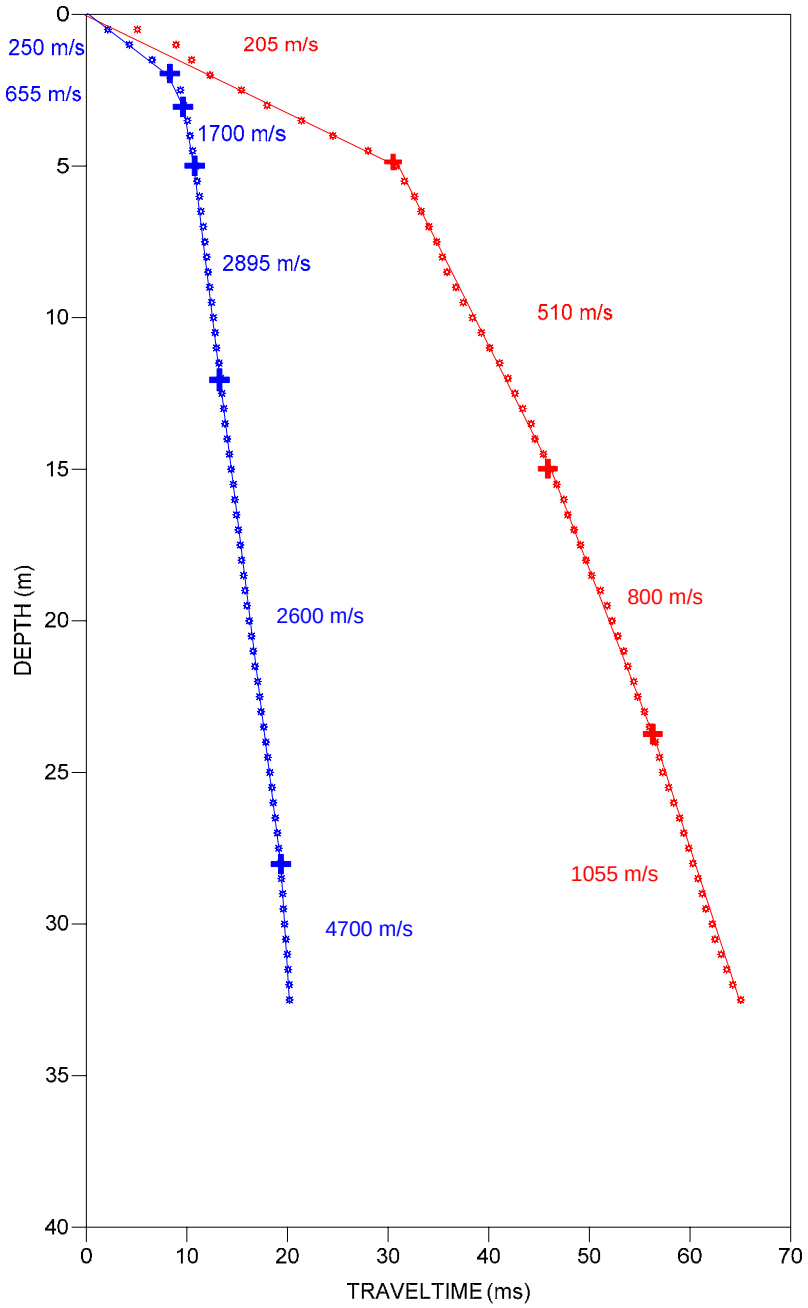
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

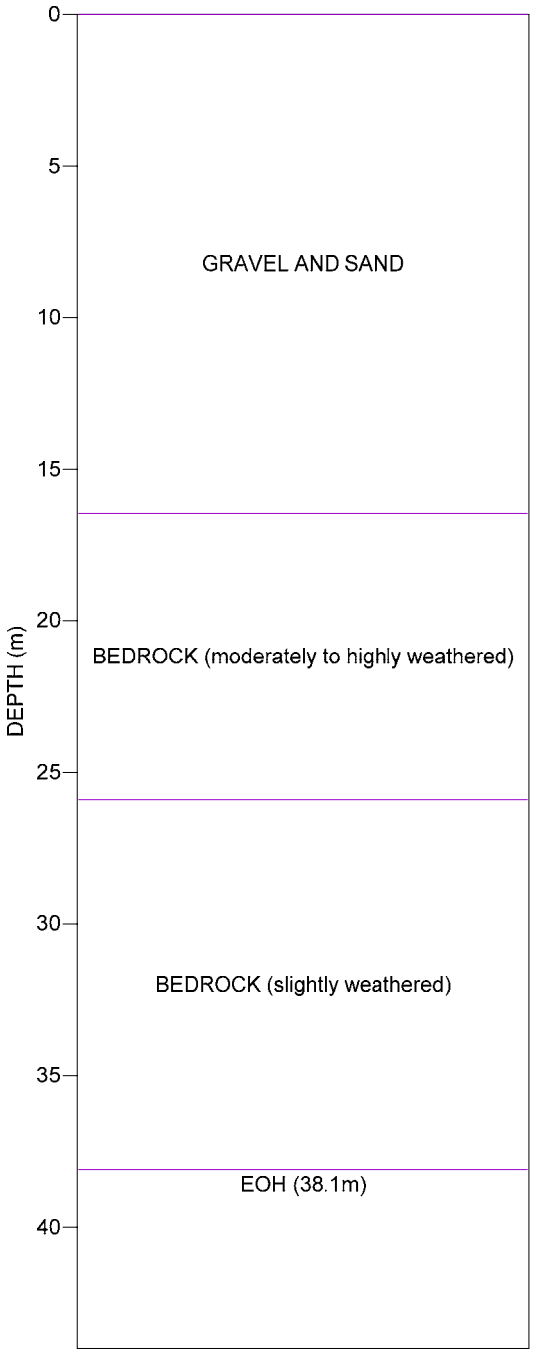
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-33
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 23





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

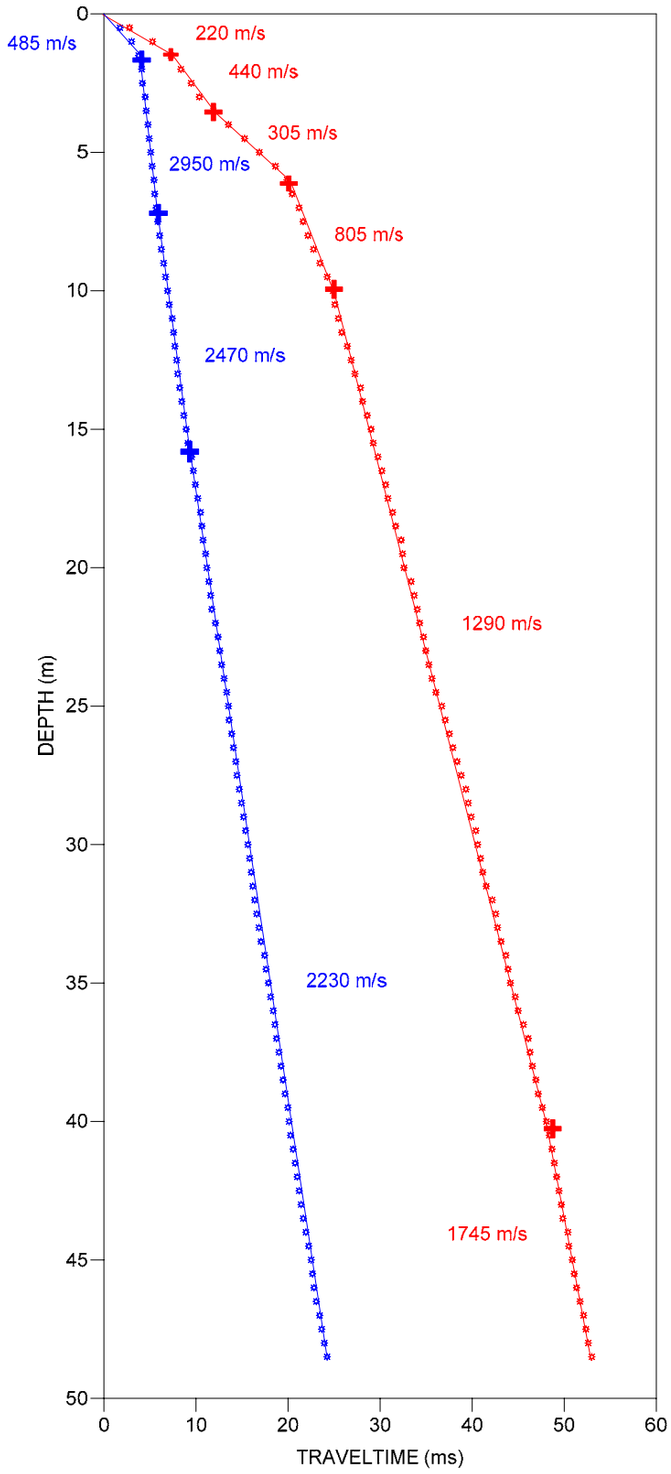
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

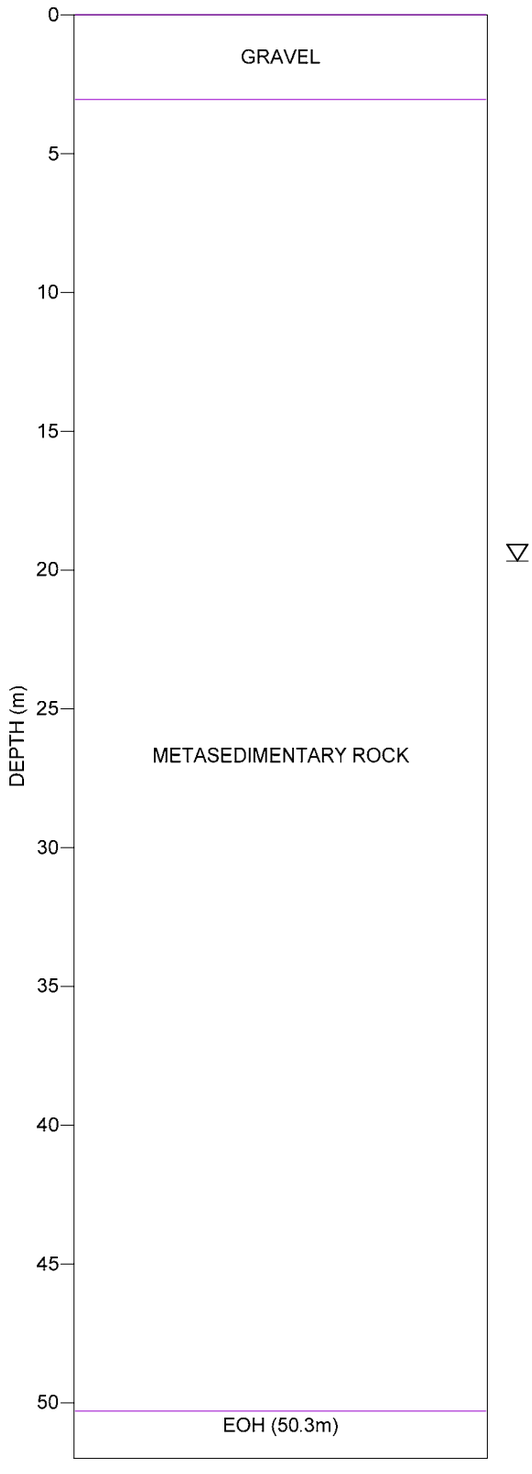
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-34
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 24





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

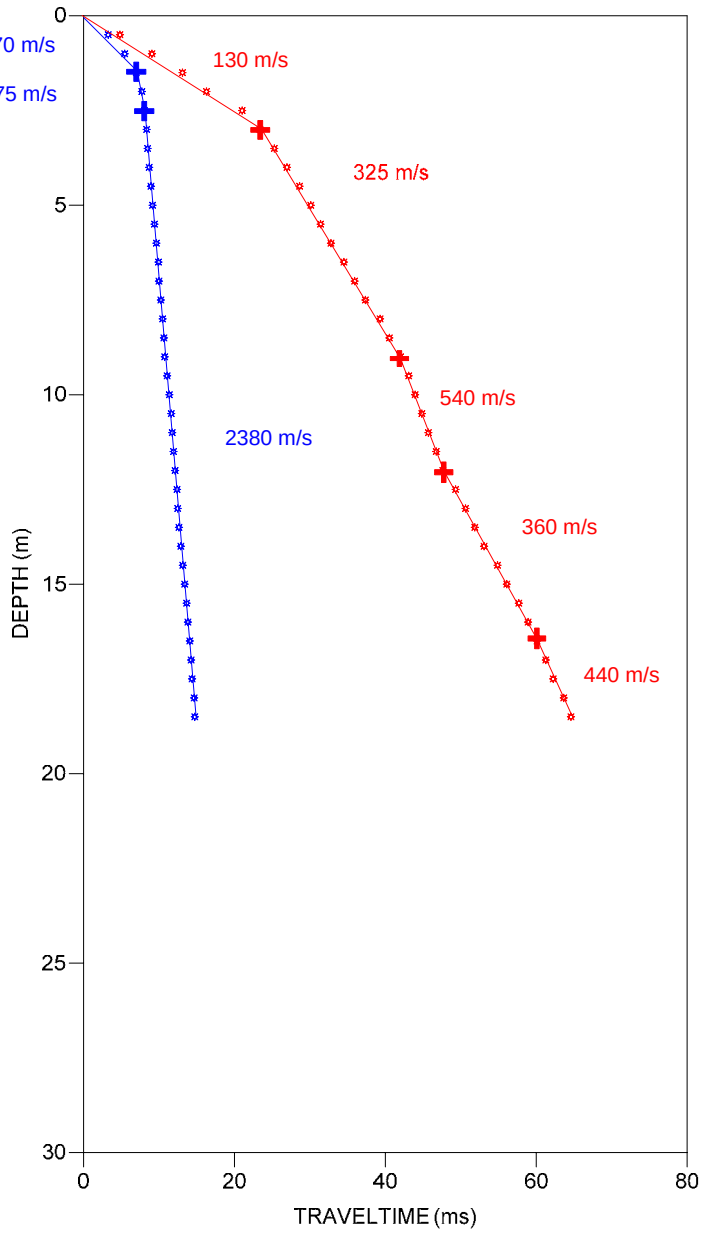
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

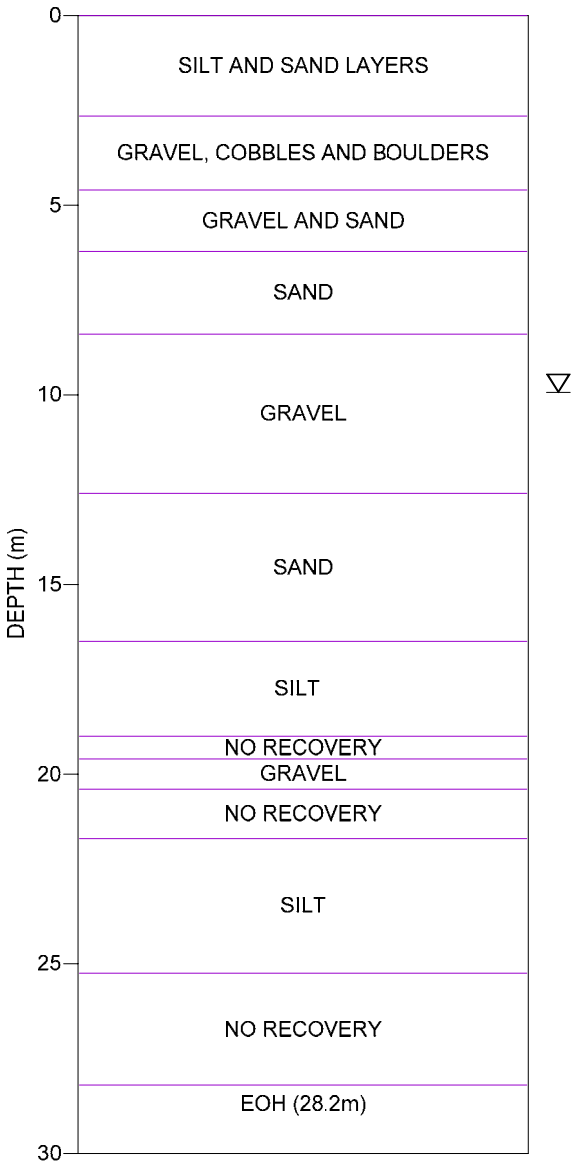
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-36
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 25





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

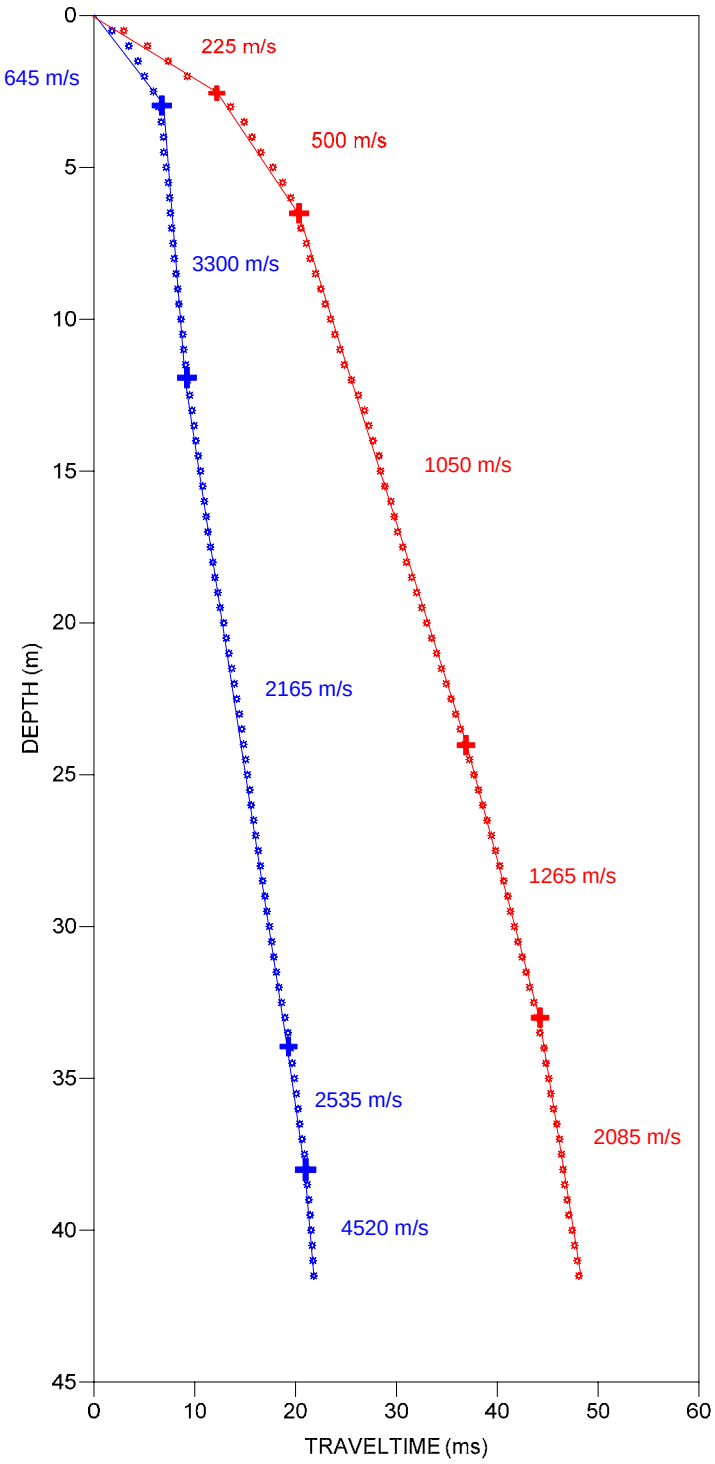
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

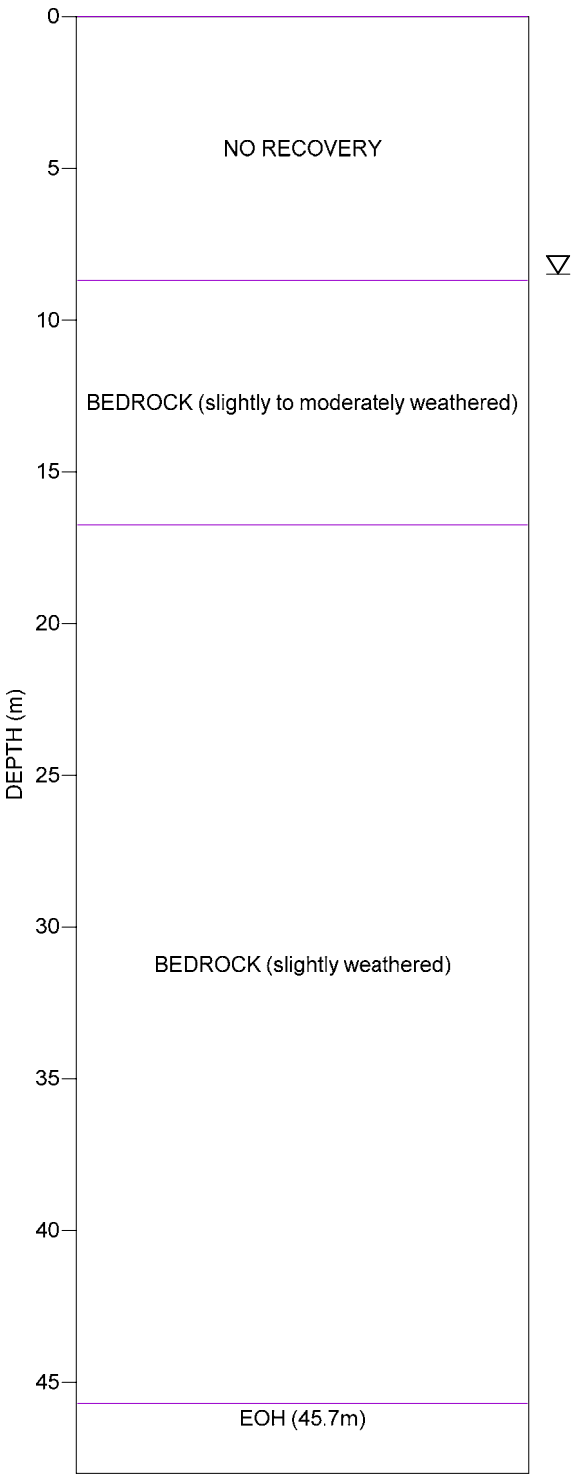
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-39
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:200	FIG. 26





LEGEND

- DATA POINTS
- VELOCITY CHANGE
- P WAVE
- S WAVE
- LAYER BOUNDARIES

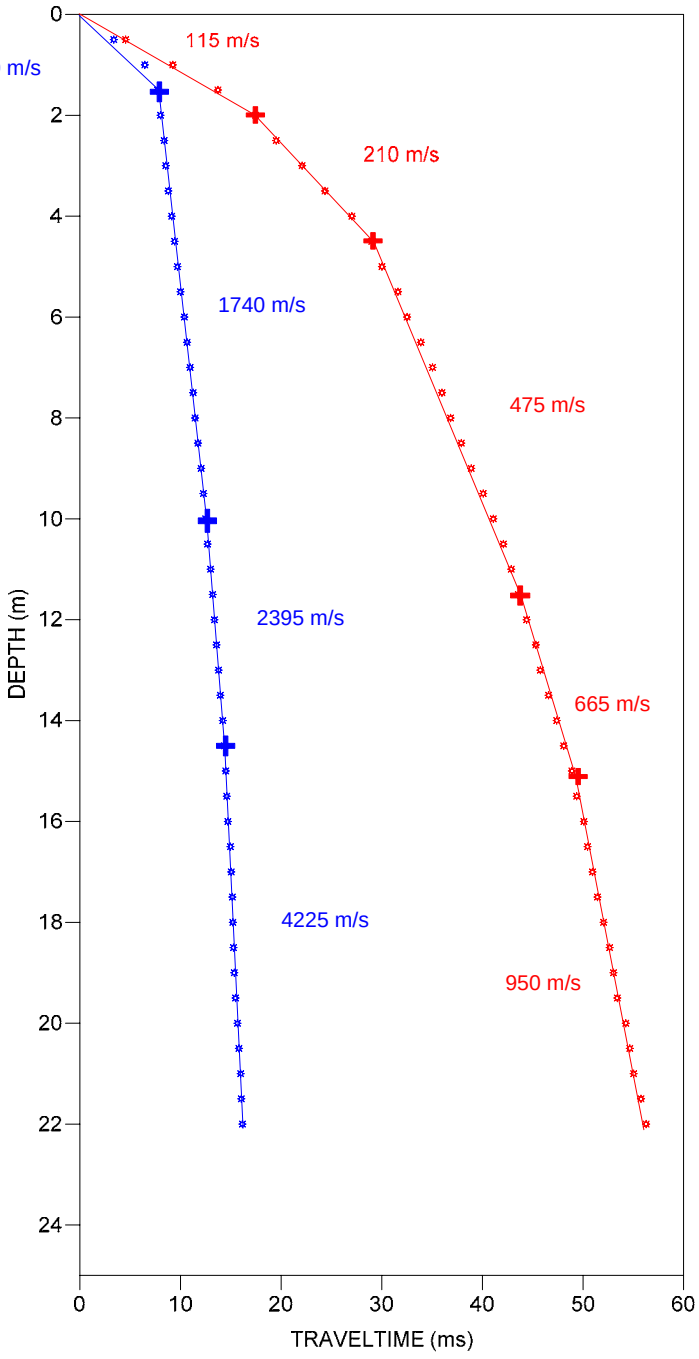
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

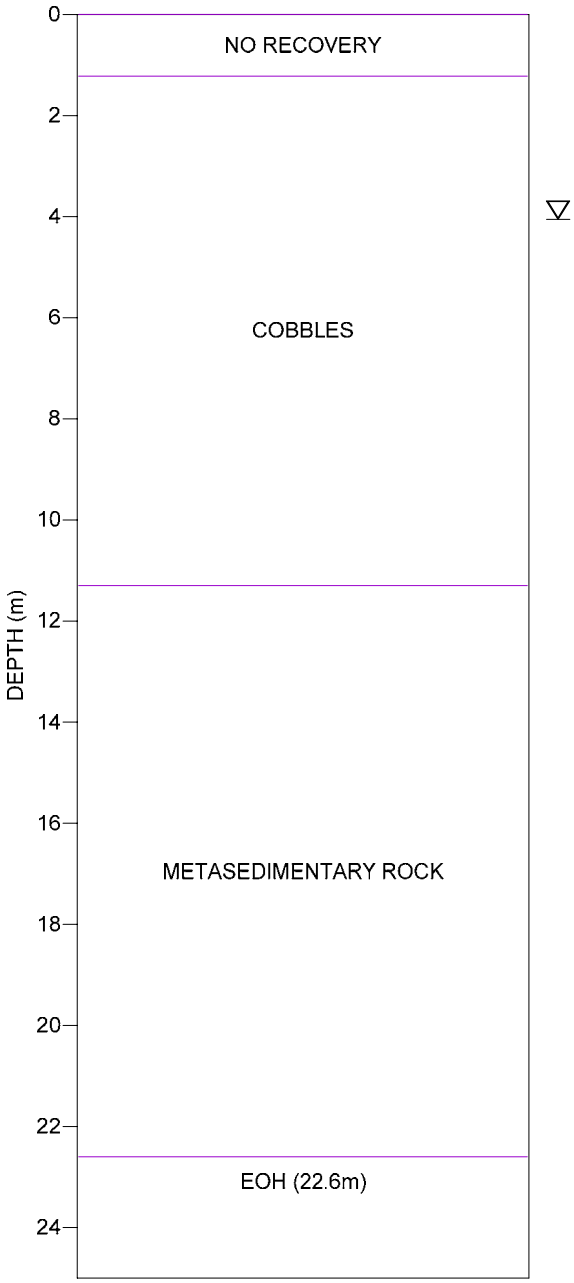
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-40B
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:250	FIG. 27





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

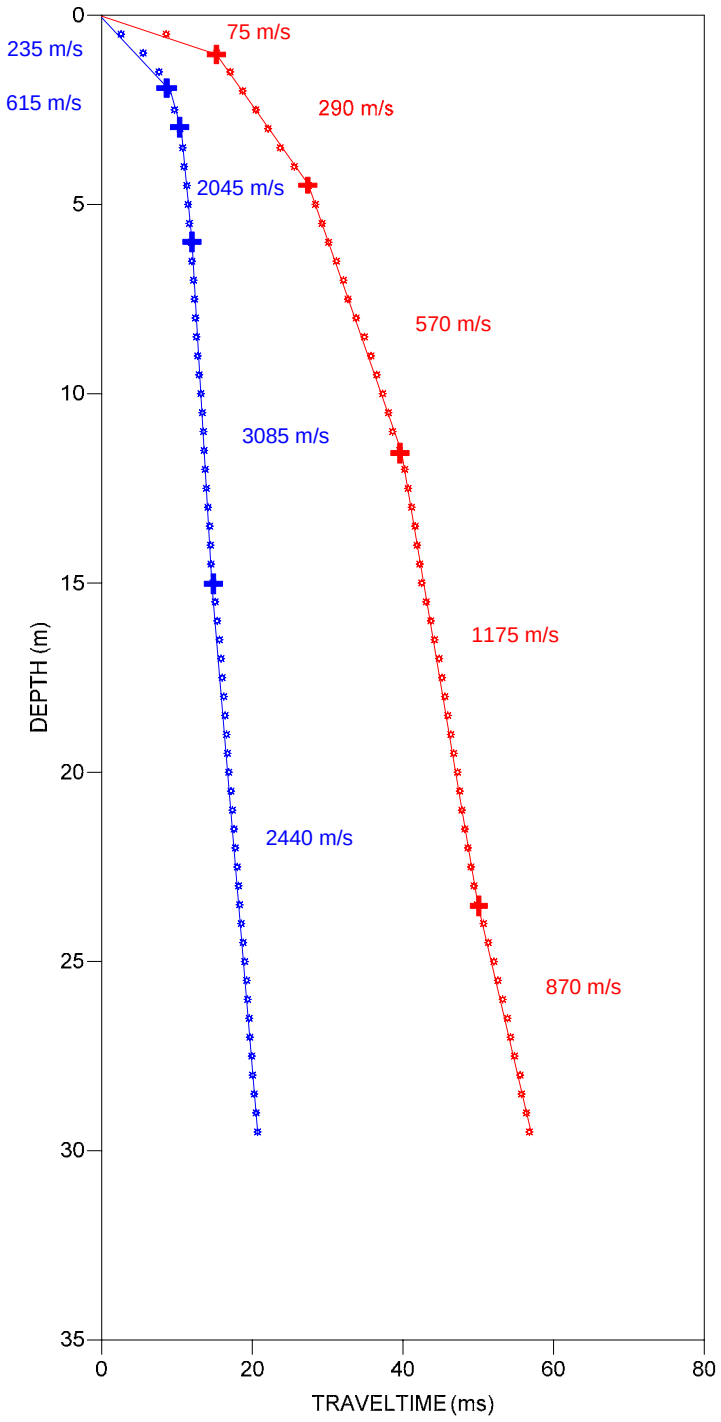
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

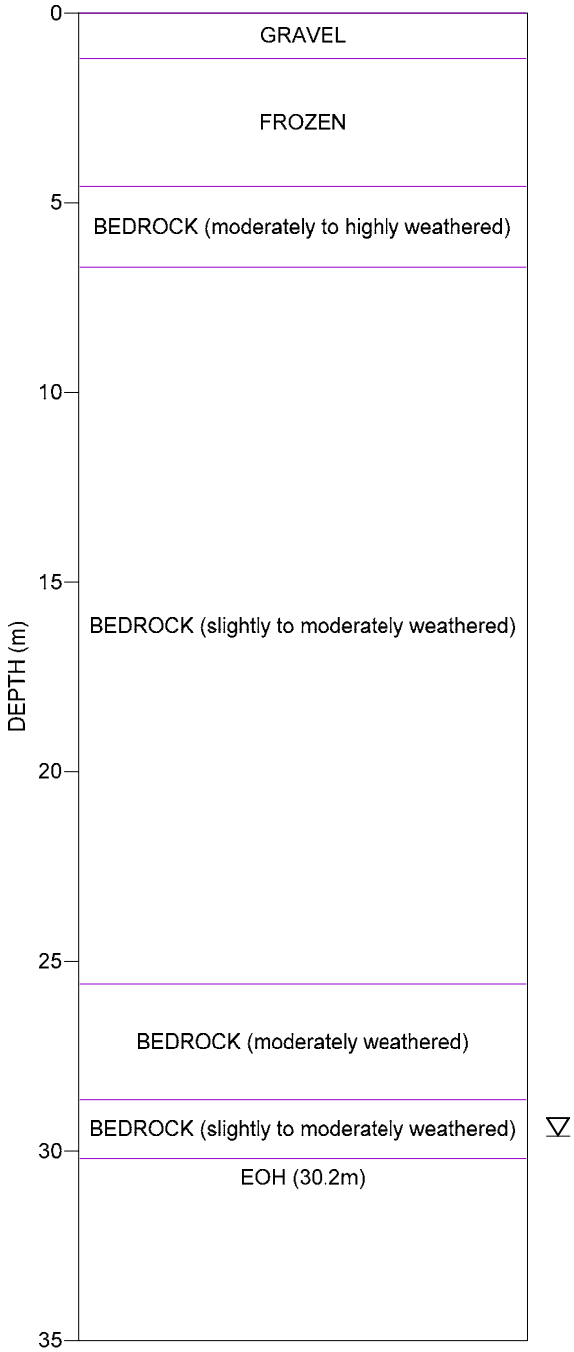
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-52
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 28





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

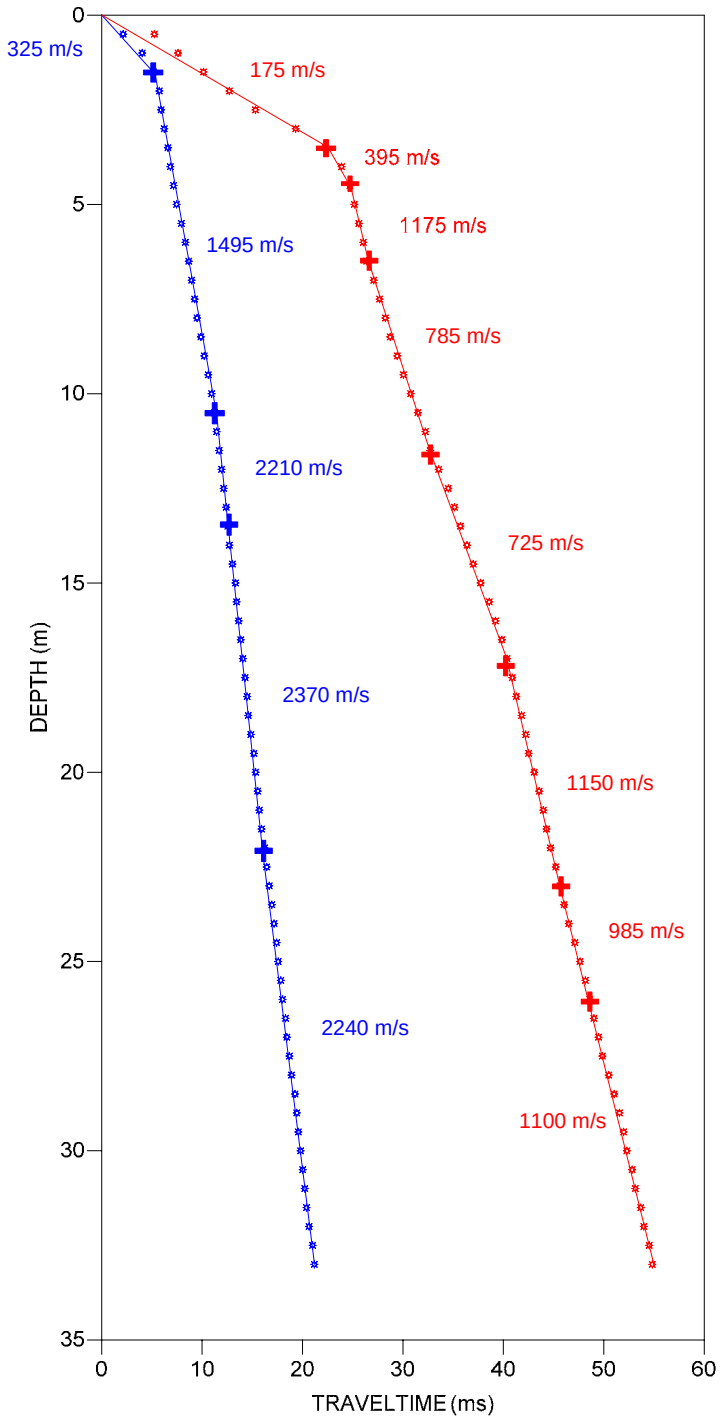
BGC ENGINEERING INC.
EAGLE GOLD PROJECT

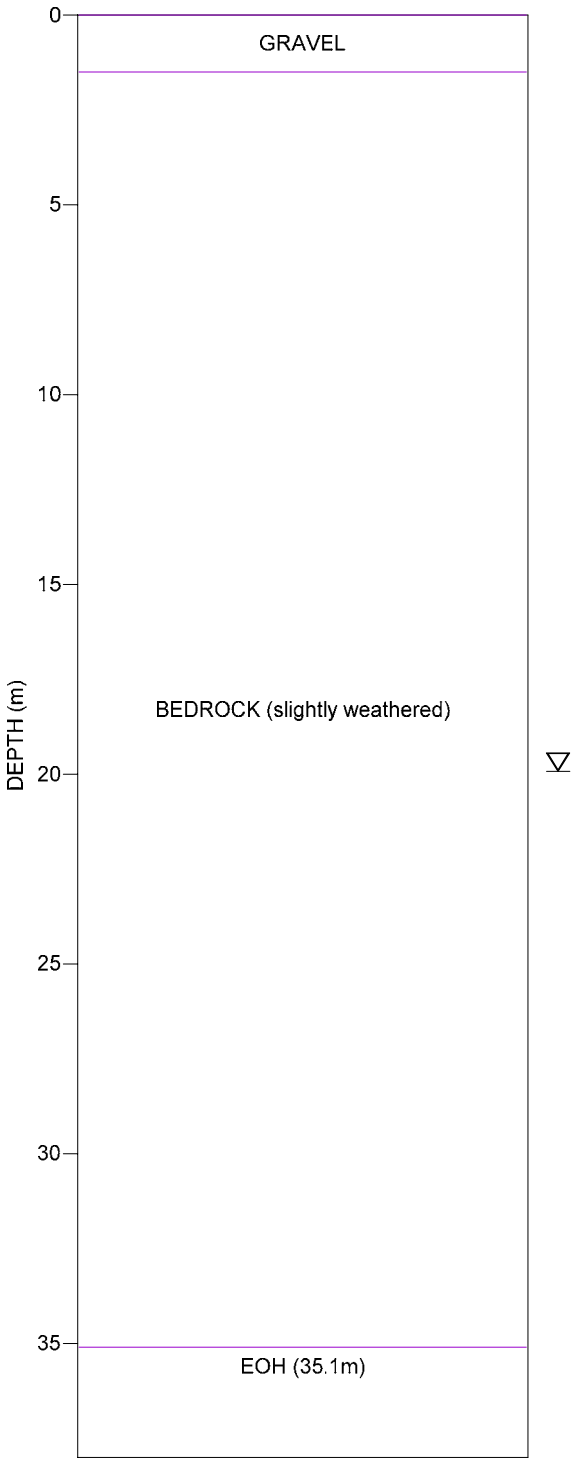
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-59
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:200	FIG. 29





LEGEND

DATA POINTS

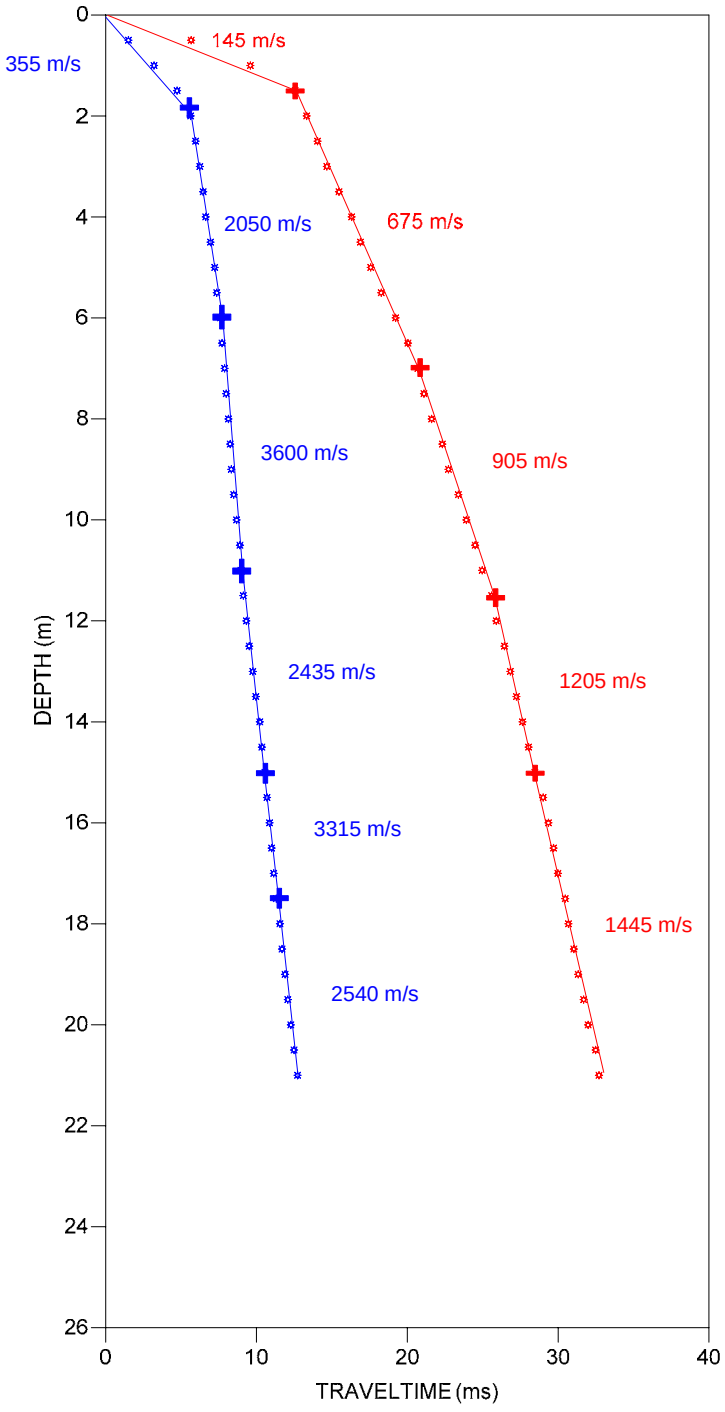
VELOCITY CHANGE

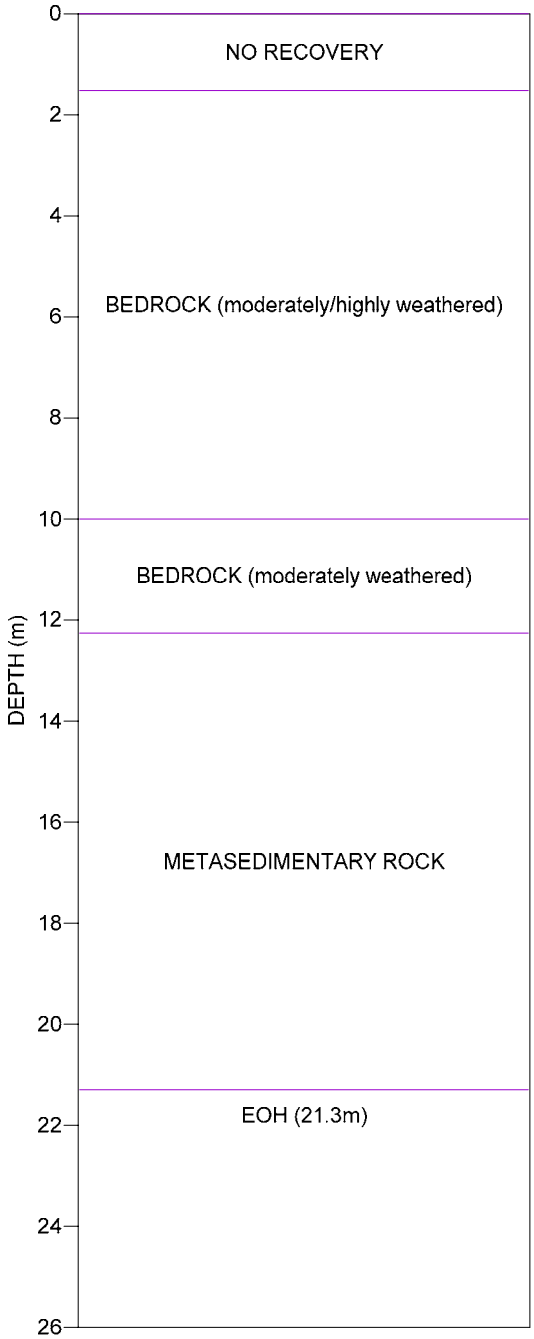
P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC. EAGLE GOLD PROJECT
DOWNHOLE SEISMIC SURVEY
BOREHOLE BH11-62 P AND S WAVE VELOCITIES
FRONTIER GEOSCIENCES INC.
DATE: SEPT. 2011 | VSCALE 1:200 | FIG. 30





LEGEND

DATA POINTS

VELOCITY CHANGE

P WAVE

S WAVE

LAYER BOUNDARIES

BGC ENGINEERING INC.
EAGLE GOLD PROJECT

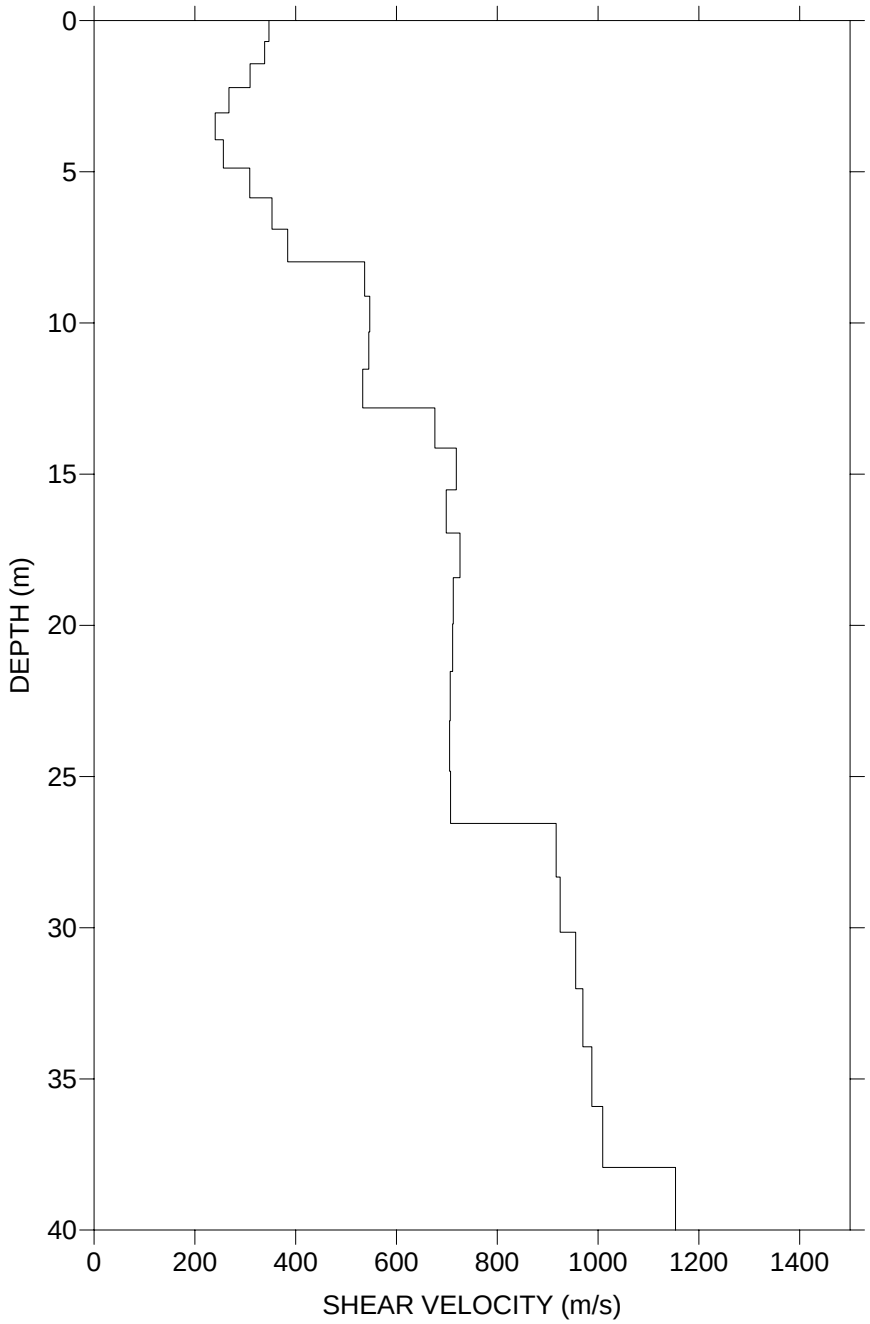
DOWNHOLE SEISMIC SURVEY

BOREHOLE BH11-69
P AND S WAVE VELOCITIES

FRONTIER GEOSCIENCES INC.

DATE: SEPT. 2011	VSCALE 1:150	FIG. 31

MASW PROFILE SL-2 STATION 300m

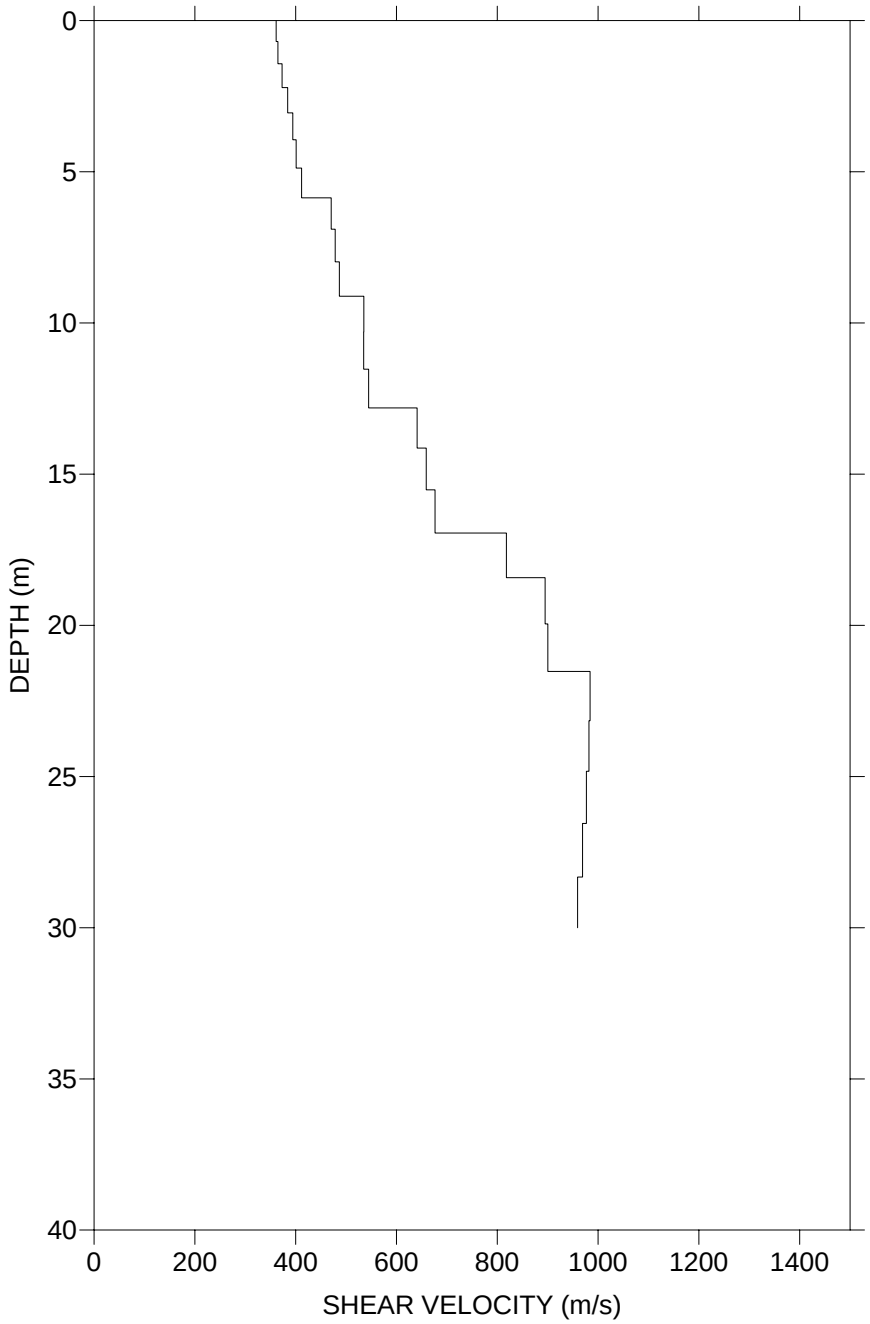


BH-BGC11-32

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-2 STATION 300M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 32

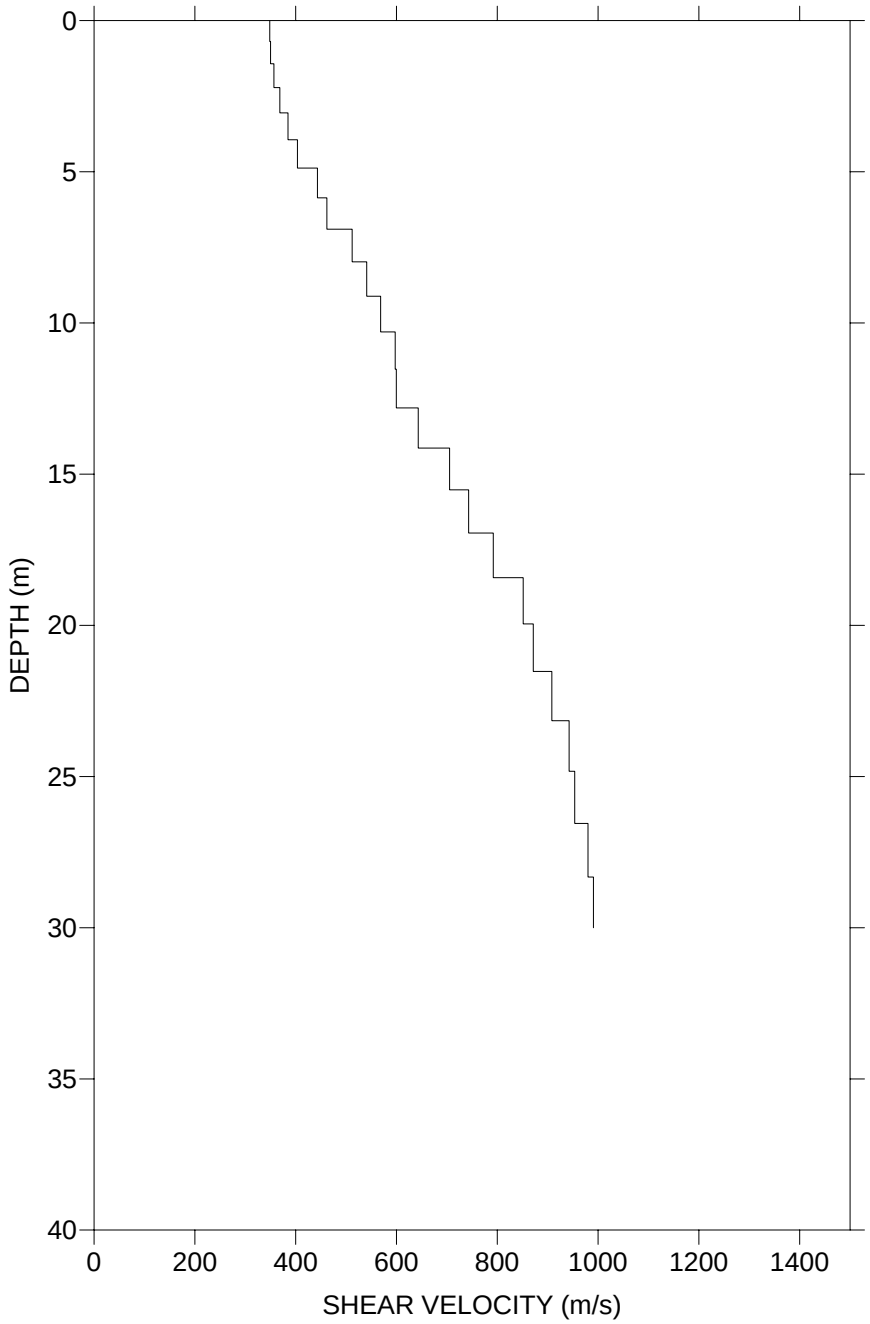
MASW PROFILE SL-7 STATION 155m



BH-BGC11-52

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
MASW PROFILE SL-7 STATION 155M		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT 2011	SCALE 1:250	FIG. 33

MASW PROFILE SL-7 STATION 185m

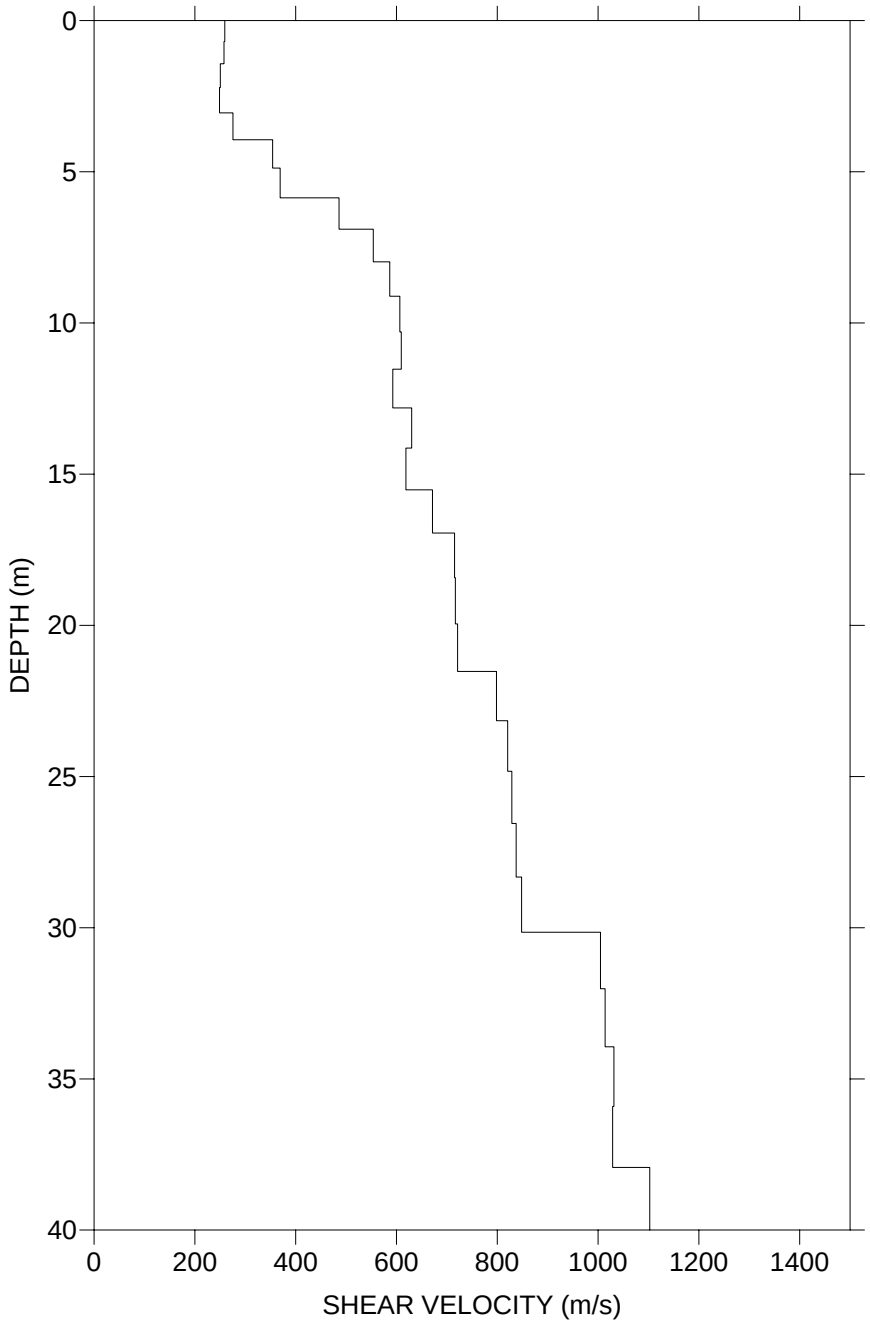


BH-BGC11-52

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-7 STATION 185M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 34

MASW PROFILE SL-33 STATION 165m

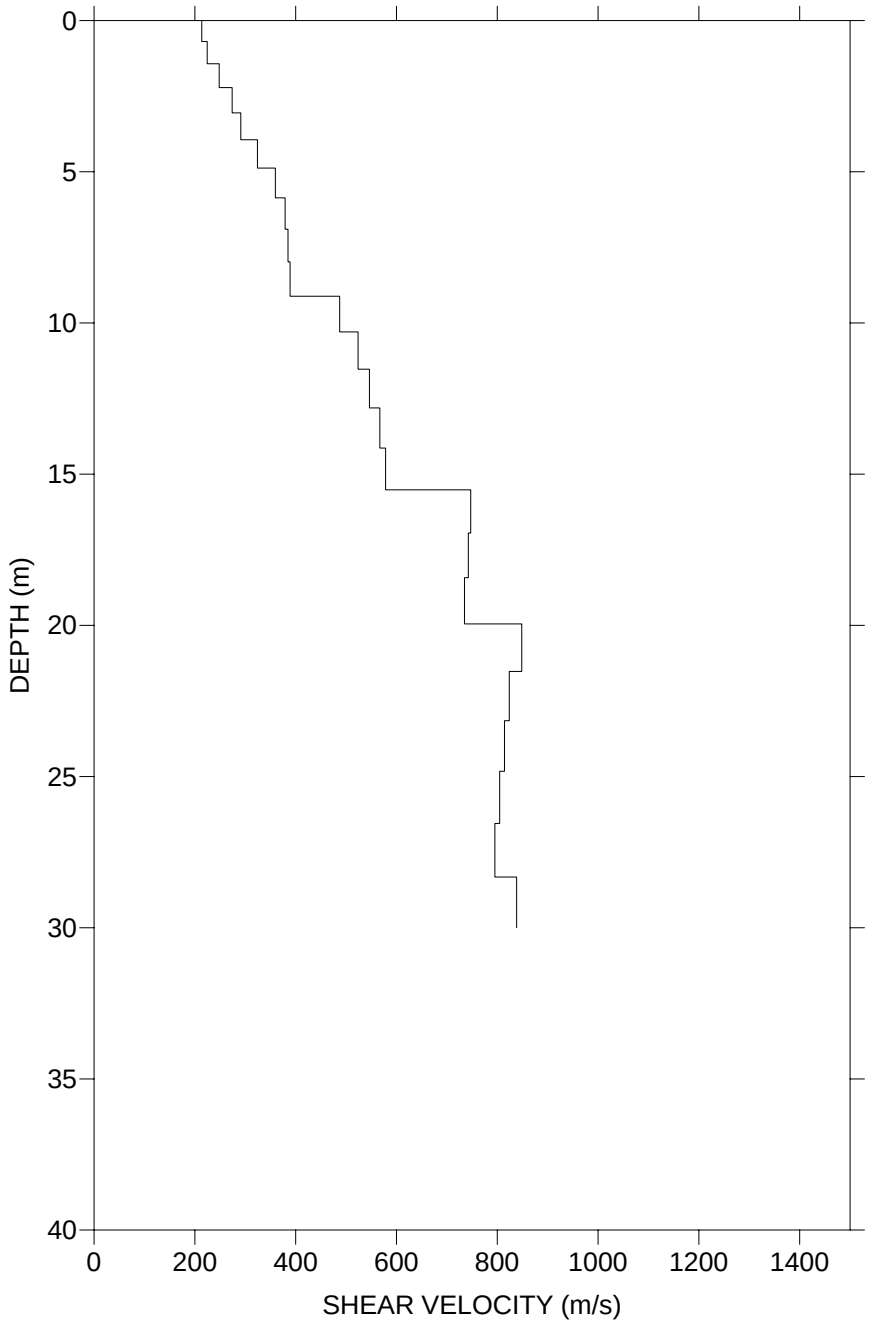


BH-BGC11-33

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-33 STATION 165M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 35

MASW PROFILE SL-33 STATION 360m

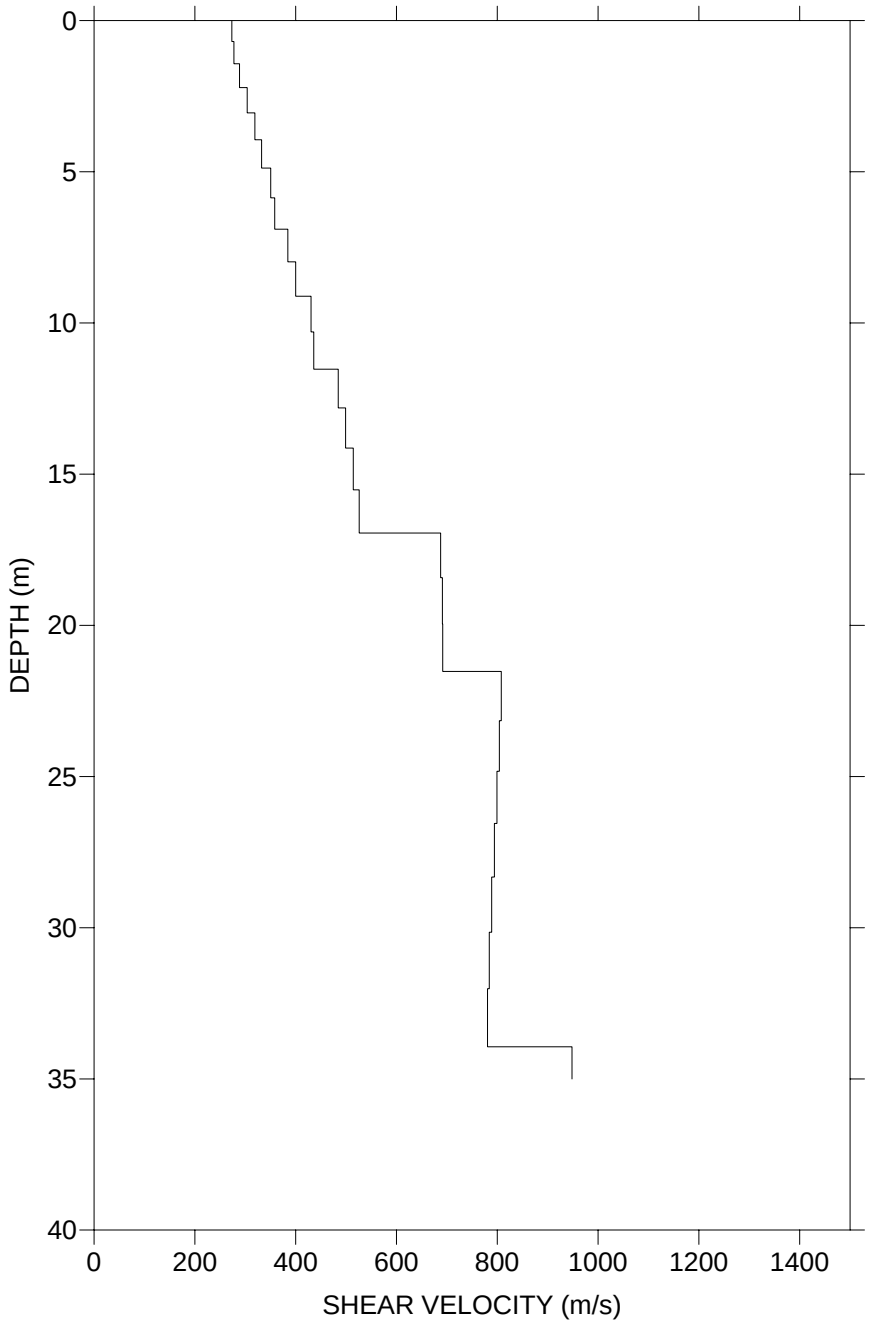


BH-BGC11-34

BGC ENGINEERING INC. EAGLE GOLD PROJECT
GEOPHYSICAL SURVEY
MASW PROFILE SL-33 STATION 360M
FRONTIER GEOSCIENCES INC.

DATE: SEPT 2011	SCALE 1:250	FIG. 36

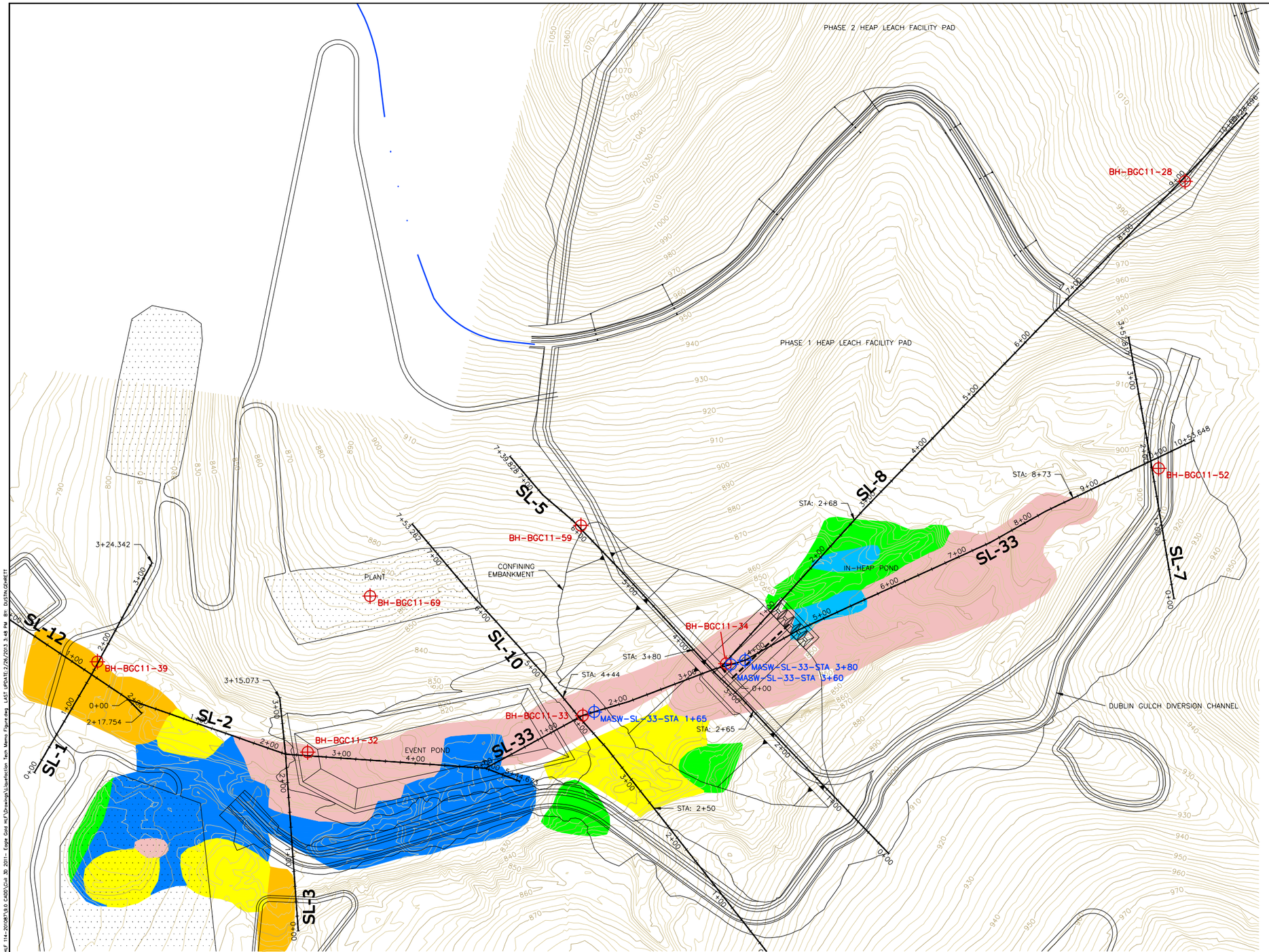
MASW PROFILE SL-33 STATION 380m



BH-BGC11-34

BGC ENGINEERING INC. EAGLE GOLD PROJECT		
GEOPHYSICAL SURVEY		
MASW PROFILE SL-33 STATION 380M		
FRONTIER GEOSCIENCES INC.		
DATE: SEPT 2011	SCALE 1:250	FIG. 37

ATTACHMENT B



N

SCALE

25m 0 75m

CONTOUR INTERVAL 5m

MATERIAL GROUPS

1. SAND (SW)
   GRAVELY, TRACE TO SOME SILT, TRACE COBBLES, WELL GRADED. LARGE CLASTS (COBBLES) ARE MAINLY EQUANT TO ELONGATED SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4). PARTICLES UP TO LARGE GRAVEL SIZE ARE A MIX OF WEAK TO STRONG (R2-R4) METASEDIMENTARY ROCK AND STRONG (R4) GRANODIORITE, MAINLY METASEDIMENTARY.
2. GRAVEL (GW)
   FINE TO COARSE, SANDY, TRACE TO SOME BOULDERS, TRACE COBBLES, TRACE SILT, WELL GRADED. LARGE CLASTS (COBBLES) ARE MAINLY EQUANT TO ELONGATED SUB-ROUNDED TO ROUNDED GRANODIORITE, MODERATELY STRONG TO STRONG (R3-R4).
3. GRAVEL (GP)
   COARSE AND COBBLES, SOME BOULDERS, TRACE SAND, GAP GRADED. CLASTS ARE MAINLY EQUANT SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
4. COBBLES AND BOULDERS
   SOME GRAVEL, TRACE SAND, GAP GRADED. CLASTS ARE MAINLY EQUANT SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
5. GRAVEL (GW)
   FINE TO COARSE, SANDY, COBBLEY, TRACE TO SOME BOULDERS, WELL GRADED. CLASTS ARE MAINLY SUB-ROUNDED TO ROUNDED GRANODIORITE, STRONG (R4).
6. SILT (ML)
   SOME SAND, MAINLY FINE, TRACE CLAY, NON TO SLIGHTLY PLASTIC, BROWNISH GREY, MOIST, HOMOGENOUS, RAPID TO MODERATELY RAPID DILATANCY.

LEGEND

- EXISTING GROUND CONTOURS
- BOREHOLES
- MASW SURVEY LOCATIONS
- SEISMIC LINES (SL)

NOTES

1. MATERIAL GROUPS OBTAINED FROM BGC ENGINEERING INC. REPORT TITLED "EAGLE GOLD PROJECT 2010 GEOTECHNICAL INVESTIGATION FOR MINE SITE INFRASTRUCTURE FACTUAL DATA REPORT" DATED NOVEMBER 2011 PREPARED FOR VICTORIA GOLD CORPORATION.
2. SEISMIC LINES (SL), BOREHOLES AND MASW LOCATIONS OBTAINED FROM "REPORT ON SEISMIC REFRACTION AND DOWNHOLE SEISMIC INVESTIGATION PROPOSED MINE SITE FACILITIES" EAGLE GOLD PROJECT, YUKON, DATED SEPTEMBER, 2011 PREPARED FOR BGC ENGINEERING INC.
3. BASE MAP INFORMATION OBTAINED FROM M3 ENGINEERING FROM 2011 LIDAR SURVEY.

PRELIMINARY
NOT FOR CONSTRUCTION

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES		REVISIONS						REVISIONS					
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT	NO.	DESCRIPTION	BY	APP'D	DATE	CLIENT

		DATE
SCALE:	NONE	
DESIGNED BY		
DRAWN BY		
CHECKED BY		
PROJECT MGR		
CLIENT APPR.		

StrataGold Corporation

TETRA TECH
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EAGLE GOLD PROJECT

HEAP LEACH FACILITY

EMBANKMENT LIQUEFACTION ANALYSIS

PROJECT NO. TT 114-201087
DWG NO.
FIGURE 1
REV NO.
DATE 2-26-13

File: X:\Clients\Victoria Gold Corp\Eagle Gold Detail HLF 114-201087\9.0 CADD\Civil 3D 2011 - Eagle Gold HLF\Drawings\Liquefaction Tech Memo Figure.dwg LAST UPDATE:2/26/2013 3:48 PM BY: DUSTIN.GEHRETT

ATTACHMENT C

LIQUEFACTION ANALYSIS RESULTS

BOREHOLE BH-BGC11-32

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	120	212	0.446	0.70	2.78	0.19
2	1	40	20.39	5	120	179	0.446	0.13	0.53	0.14
3	1	60	30.58	5	265	356	0.446	0.25	0.98	0.86
4	1	80	40.77	5	265	332	0.446	0.20	0.81	0.66
5	1	100	50.97	5	265	314	0.446	0.17	0.69	0.55
6	1	120	61.16	5	265	300	0.446	0.15	0.60	0.48
7	1	140	71.35	5	345	375	0.446	0.28	1.11	N/A
8	1	160	81.55	5	345	363	0.446	0.26	1.02	N/A
9	1	180	91.74	5	345	353	0.446	0.24	0.95	0.82
10	1	200	101.93	5	345	343	0.446	0.22	0.89	0.75
11	1	220	112.13	5	480	466	0.446	0.45	1.80	N/A
12	1	240	122.32	5	480	456	0.446	0.43	1.72	N/A
13	1	260	132.51	5	480	447	0.446	0.42	1.65	N/A
14	1	280	142.71	5	480	439	0.446	0.40	1.58	N/A
15	1	300	152.90	5	480	432	0.446	0.38	1.52	N/A
16	1	320	163.09	5	410	363	0.446	0.26	1.02	0.91
17	1	340	173.29	5	410	357	0.446	0.25	0.98	N/A
18	1	360	183.48	5	410	352	0.446	0.24	0.95	N/A
19	1	380	193.67	5	410	348	0.446	0.23	0.92	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. A depth below 19 m is weathered bedrock and was not analyzed
6. Calculated Cyclic Resistance Ratio limited to range of $0 < CRR7.5 \leq 0.7$
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

LIQUEFACTION ANALYSIS RESULTS

BOREHOLE BH-BGC11-33

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	205	363	0.446	0.26	1.02	N/A
2	1	40	20.39	5	205	305	0.446	0.16	0.64	0.50
3	1	60	30.58	5	305	410	0.446	0.34	1.36	N/A
4	1	80	40.77	5	305	382	0.446	0.29	1.15	N/A
5	1	100	50.97	5	510	604	0.446	0.70	2.78	N/A
6	1	120	61.16	5	510	577	0.446	0.70	2.78	N/A
7	1	140	71.35	5	510	555	0.446	0.66	2.60	N/A
8	1	160	81.55	5	510	537	0.446	0.61	2.43	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. Depth below 8 m is weathered bedrock and was not analyzed
6. Calculated Cyclic Resistance Ratio limited to range of $0 < CRR7.5 \leq 0.7$
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

LIQUEFACTION ANALYSIS RESULTS

BOREHOLE BH-BGC11-34

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	205	363	0.446	0.26	1.02	N/A
2	1	40	20.39	5	205	305	0.446	0.16	0.64	0.50
3	1	60	30.58	5	205	276	0.446	0.11	0.43	0.37
4	1	80	40.77	5	205	257	0.446	0.06	0.26	0.31
5	1	100	50.97	5	510	604	0.446	0.70	2.78	N/A
6	1	120	61.16	5	510	577	0.446	0.70	2.78	N/A
7	1	140	71.35	5	510	555	0.446	0.66	2.60	N/A
8	1	160	81.55	5	510	537	0.446	0.61	2.43	N/A
9	1	180	91.74	5	510	521	0.446	0.58	2.28	N/A
10	1	200	101.93	5	510	508	0.446	0.54	2.16	N/A
11	1	220	112.13	5	510	496	0.446	0.52	2.05	N/A
12	1	240	122.32	5	510	485	0.446	0.49	1.96	N/A
13	1	260	132.51	5	510	475	0.446	0.47	1.88	N/A
14	1	280	142.71	5	510	467	0.446	0.45	1.80	N/A
15	1	300	152.90	5	800	719	0.446	0.70	2.78	N/A
16	1	320	163.09	5	800	708	0.446	0.70	2.78	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. A depth below 16 m is weathered bedrock and was not analyzed
6. Calculated Cyclic Resistance Ratio values were limited to range of $0 < CRR7.5 \leq 0.7$.
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

LIQUEFACTION ANALYSIS RESULTS

MASW PROFILE SL-33 STATION 165m

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	260	460	0.446	0.44	1.75	N/A
2	1	40	20.39	5	260	387	0.446	0.30	1.19	N/A
3	1	60	30.58	5	250	336	0.446	0.21	0.84	N/A
4	1	80	40.77	5	280	350	0.446	0.24	0.94	N/A
5	1	100	50.97	5	370	438	0.446	0.40	1.57	N/A
6	1	120	61.16	5	370	418	0.446	0.36	1.42	N/A
7	1	140	71.35	5	475	517	0.446	0.57	2.24	N/A
8	1	160	81.55	5	550	579	0.446	0.70	2.78	N/A
9	1	180	91.74	5	600	613	0.446	0.70	2.78	N/A
10	1	200	101.93	5	610	607	0.446	0.70	2.78	N/A
11	1	220	112.13	5	610	593	0.446	0.70	2.78	N/A
12	1	240	122.32	5	590	561	0.446	0.67	2.66	N/A
13	1	260	132.51	5	620	578	0.446	0.70	2.78	N/A
14	1	280	142.71	5	620	567	0.446	0.69	2.72	N/A
15	1	300	152.90	5	600	540	0.446	0.62	2.45	N/A
16	1	320	163.09	5	650	575	0.446	0.70	2.78	N/A
17	1	340	173.29	5	700	610	0.446	0.70	2.78	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. Field shear wave velocity data for depths below 17 m: Vs > 700 m/s and is bedrock per refraction survey (non-liquefiable)
6. Calculated Cyclic Resistance Ratio limited to range of 0 < CRR7.5 ≤ 0.7
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

LIQUEFACTION ANALYSIS RESULTS

MASW PROFILE SL-33 STATION 360m

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	210	372	0.446	0.27	1.08	N/A
2	1	40	20.39	5	230	342	0.446	0.22	0.88	N/A
3	1	60	30.58	5	260	350	0.446	0.24	0.93	N/A
4	1	80	40.77	5	290	363	0.446	0.26	1.02	N/A
5	1	100	50.97	5	380	450	0.446	0.42	1.67	N/A
6	1	120	61.16	5	380	430	0.446	0.38	1.51	N/A
7	1	140	71.35	5	380	413	0.446	0.35	1.38	N/A
8	1	160	81.55	5	390	410	0.446	0.34	1.36	N/A
9	1	180	91.74	5	390	398	0.446	0.32	1.27	N/A
10	1	200	101.93	5	490	488	0.446	0.50	1.98	N/A
11	1	220	112.13	5	530	515	0.446	0.56	2.23	N/A
12	1	240	122.32	5	560	532	0.446	0.60	2.39	N/A
13	1	260	132.51	5	570	531	0.446	0.60	2.38	N/A
14	1	280	142.71	5	580	531	0.446	0.60	2.37	N/A
15	1	300	152.90	5	590	531	0.446	0.60	2.37	N/A
16	1	320	163.09	5	590	522	0.446	0.58	2.29	N/A
17	1	340	173.29	5	780	680	0.446	0.70	2.78	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. Field shear wave velocity data for depths below 17 m: Vs > 700 m/s and is bedrock per refraction survey (non-liquefiable)
6. Calculated Cyclic Resistance Ratio limited to range of 0 < CRR7.5 ≤ 0.7
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

LIQUEFACTION ANALYSIS RESULTS

MASW PROFILE SL-33 STATION 380m

EXISTING CONDITIONS (NO OVERBURDEN)

Depth (m)	Stress Reduction Coefficient	Overburden Stress (kPa)		Fines Content (%)	Shear Wave Velocity (m/s)	Corrected Shear Wave Velocity(m/s)	Cyclic Stress Ratio	Cyclic Resistance Ratio [4]	Factor of Safety	Undrained Residual Shear Strength Ratio
	Rd	Total	Effective		Vs	V_{s1}	CSR	CRR7.5	FS	S_{ur}/σ_{vo}'
1	1	20	10.19	5	270	478	0.446	0.48	1.90	N/A
2	1	40	20.39	5	290	432	0.446	0.38	1.52	N/A
3	1	60	30.58	5	300	403	0.446	0.33	1.31	N/A
4	1	80	40.77	5	320	400	0.446	0.32	1.29	N/A
5	1	100	50.97	5	350	414	0.446	0.35	1.39	N/A
6	1	120	61.16	5	350	396	0.446	0.32	1.25	N/A
7	1	140	71.35	5	390	424	0.446	0.37	1.47	N/A
8	1	160	81.55	5	390	410	0.446	0.34	1.36	N/A
9	1	180	91.74	5	390	398	0.446	0.32	1.27	N/A
10	1	200	101.93	5	420	418	0.446	0.36	1.42	N/A
11	1	220	112.13	5	430	418	0.446	0.36	1.42	N/A
12	1	240	122.32	5	480	456	0.446	0.43	1.72	N/A
13	1	260	132.51	5	500	466	0.446	0.45	1.80	N/A
14	1	280	142.71	5	500	457	0.446	0.44	1.73	N/A
15	1	300	152.90	5	510	459	0.446	0.44	1.74	N/A
16	1	320	163.09	5	530	469	0.446	0.46	1.82	N/A
17	1	340	173.29	5	700	610	0.446	0.70	2.78	N/A

Notes:
1. Values indicated with "N/A" indicate liquefaction is not likely at this depth (FS > 1 and Vs1 > 250 m/s) and output data is not provided for non-liquefiable layers
2. A saturated condition was assumed (groundwater at depth 0 m)
3. Indicates Placer Tailings
4. CRR7.5 = Cyclic Resistance Ratio with reference to an earthquake magnitude of 7.5
5. Field shear wave velocity data for depths below 17 m: Vs > 700 m/s and is bedrock per refraction survey (non-liquefiable)
6. Calculated Cyclic Resistance Ratio limited to range of 0 < CRR7.5 ≤ 0.7
7. Factor of Safety (FS) values shown in red indicate a FS < 1.5

ATTACHMENT D

TETRA TECH

SPT-BASED LIQUEFACTION TRIGGERING ANALYSIS
EAGLE GOLD - DEEP DYNAMIC COMPACTION
MINIMUM ESTIMATED SPT N_{60} BLOWS PER 1 M DEPTH BASED ON MINIMUM FS OF 1.5

Depth (m)	Unit Weight (kN/m^3)	Estimated SPT N value[6]	Hammer Energy Correction	Borehole Diameter Correction	Sampler Correction	Rod Length Correction	Estimated Corrected SPT N value	Estimated Corrected SPT N value - (overburden adjusted)	Estimated Corrected Clean-Sand SPT N value	Equivalent Clean Sand Adjustment	Overburden Correction Factor	Stress Reduction Coefficient	Overburden Stress (kPa)			Fines Content (%)	Overburden Correction Factor	Magnitude Scaling Factor	Cyclic Stress Ratio	Cyclic Resistance Ratio for M=7.5 & σ_{vc}=1 atm	Cyclic Resistance Ratio	Factor of Safety
z		N	Ce	C_B	C_S	C_R	N_{60}	$(N_1)_{60}$	$(N_1)_{60\text{-}cs}$	$\Delta(N_1)_{60}$	C_N	Rd	Total	Effective	Neutral	FC	K_σ	MSF	CSR	CRR7.5	$CRR_{M,\sigma'v}$	FS
1	20.0	20	1.00	1.00	1.00	0.75	**15.0**	25.50	25.50	0.00	1.70	1.00	20.0	20.0	0.0	5	1.10	1.48	0.228	0.302	0.493	2.17
2	20.0	20	1.00	1.00	1.00	0.75	**15.0**	22.18	22.18	0.00	1.48	1.00	40.0	40.0	0.0	5	1.10	1.48	0.228	0.236	0.384	1.69
3	20.0	22	1.00	1.00	1.00	0.75	**16.5**	20.69	20.69	0.00	1.25	1.00	60.0	60.0	0.0	5	1.07	1.48	0.228	0.215	0.341	1.50
4	20.0	24	1.00	1.00	1.00	0.85	**20.4**	23.68	23.69	0.00	1.16	1.00	80.0	70.2	9.8	5	1.06	1.48	0.259	0.262	0.410	1.58
5	20.0	27	1.00	1.00	1.00	0.85	**23.0**	25.14	25.14	0.00	1.10	1.00	100.0	80.4	19.6	5	1.04	1.48	0.283	0.293	0.451	1.59
6	20.0	26	1.00	1.00	1.00	0.95	**24.7**	25.78	25.78	0.00	1.04	1.00	120.0	90.6	29.4	5	1.02	1.48	0.301	0.310	0.467	1.55
7	20.0	28	1.00	1.00	1.00	0.95	**26.6**	26.62	26.63	0.00	1.00	1.00	140.0	100.8	39.2	5	1.00	1.48	0.316	0.334	0.496	1.57
8	20.0	30	1.00	1.00	1.00	0.95	**28.5**	27.50	27.50	0.00	0.96	1.00	160.0	111.0	49.0	5	0.98	1.48	0.328	0.364	0.530	1.62
9	20.0	31	1.00	1.00	1.00	0.95	**29.5**	27.48	27.48	0.00	0.93	1.00	180.0	121.2	58.8	5	0.97	1.48	0.338	0.363	0.521	1.54
10	20.0	31	1.00	1.00	1.00	1.00	**31.0**	28.08	28.08	0.00	0.91	1.00	200.0	131.4	68.6	5	0.95	1.48	0.346	0.387	0.545	1.57
11	20.0	33	1.00	1.00	1.00	1.00	**33.0**	29.13	29.13	0.00	0.88	1.00	220.0	141.5	78.5	5	0.93	1.48	0.354	0.436	0.603	1.71
12	20.0	34	1.00	1.00	1.00	1.00	**34.0**	29.26	29.27	0.00	0.86	1.00	240.0	151.7	88.3	5	0.92	1.48	0.360	0.443	0.603	1.68

Notes:

1. Weathered bedrock assumed for depths beyond 12 m
2. Indicates Placer Tailings to undergo Deep Dynamic Compaction
3. Analysis methodology based on Idriss, Boulanger (2010)
4. Stress Reduction Coefficient equal to unity for all depths
5. A minimum measured SPT N value of 20 blows required for all depths since it was identified from liquefaction case histories that for SPT N-values less than approx. 20, loose to medium dense gravelly soils are susceptible to liquefaction (Sy et al, 1995).
6. SPT hammer energy percentage, ER_m efficiency conservatively estimated at 60%
7. Estimated groundwater depth is a conservative value based on a typical groundwater depth of 3 m for Dublin Gulch. A lower groundwater elevation is expected at the time of construction and post-construction due to dewatering activity within the gulch and proposed site improvements.
8. All SPT corrected and non-corrected N values presented in this worksheet are estimates only and were not calculated from field obtained SPT data. This spreadsheet is meant to provide an estimate of corrected SPT N_{60} values at depth intervals of 1 m based on geotechnical and seismic design parameters for the site corresponding to a min. FS of 1.5. Estimated N_{60} values were then used to correlate equivalent BPT N_b values to provide an initial estimate for minimum required BPT N_b blowcounts for verifying post DDC densification.

Input Parameters

Peak Ground Acceleration (g):	0.35
Earthquake Magnitude (M):	6.0
Estimated Water Table Depth (m):	3

Project Information

Project Name:	Eagle Gold
Project Number:	114-201087
Minimum FS:	1.50

ATTACHMENT E

SPT-BPT CORRELATION FOR EVALAUTION OF LIQUEFACTION RESISTANCE EAGLE GOLD - DEEP DYNAMIC COMPACTION						
Depth (m)	Estimated SPT N value (blows)	Estimated Corrected SPT N value	Estimated Total Shaft Resistance (kN)	Estimated Normalized BPT blow count	Estimated Maximum Transferred Energy (%)	Estimated BPT blow count
z	N	N_{60}	Rs	N_{b30}	ENTHRU	N_b
1	20	15	5	7	20	**11**
2	20	15	15	8	20	**12**
3	22	17	20	10	20	**15**
4	24	20	20	12	20	**18**
5	27	23	45	16	20	**24**
6	26	25	50	18	20	**27**
7	28	27	55	20	20	**30**
8	30	29	55	20	20	**30**
9	31	29	60	21	20	**32**
10	31	31	60	22	20	**33**
11	33	33	65	23	20	**35**
12	34	34	65	24	20	**36**

Notes:

1. Weathered bedrock assumed for depths beyond 12 m.
2. Indicates Placer Tailings to undergo Deep Dynamic Compaction.
3. BPT-SPT Correlation methodology (Sy and Campanella, 1994).
4. ENTHRU value of 20% conservatively assumed for all depths.
5. Rs values are estimates interpreted from Figure 9 of Case Study 2 (Sy et. Al., 1995).
6. N_{b30} values are estimates interpreted from Figure 15 (Sy and Campanella, 1994).
7. BPT calculations based on performance of an AP1000 drill rig driving 170mm diameter casings with bounce chamber pressures averaging approximately 100kPa.
8. All SPT corrected and non-corrected N values presented in this worksheet are estimates only and were not calculated from field obtained SPT data. Estimated N_{60} values were used to correlate equivalent BPT N_b values in order to provide an initial estimate for minimum required BPT N_b blowcounts for verifying post DDC densification.
9. Calculated BPT N_{b30} values derived from field obtained N_b values should be modified to account for actual conditions encountered in the field and Becker drill considerations which would effect N_b blowcounts. Such conditions include but are not limited to the type of Becker drill, throttle level, hammer drop height, hammer weight, driver casing diameter, energy correction factors, casing/soil friction, bounce chamber pressures and soil type.

APPENDIX L – DYNAMIC DEFORMATION ANALYSIS

TETRA TECH

350 Indiana St., Suite 500
Golden, Colorado 80401
Tel (303) 217-5700 / 877.855.2655- **Fax** (303) 217-5705
www.tetratech.com

Technical Memorandum

To:		**From:**	Rebecca Walthall, Dave Hallman
Company:	StrataGold Corp.	**Date:**	01 April, 2013
Re:	Eagle Gold Heap Leach Facility-Deformation	**Project #:**	114-201087
CC:	Troy Meyer		

1.0 INTRODUCTION

This memorandum presents the results of simplified deformation analyses performed for StrataGold Corp's Eagle Gold Heap Leach Facility. The Eagle Gold Project is located approximately 85 km by road northeast of the village of Mayo in the Yukon, Canada. At its downstream end, the proposed crushed ore heap will consist of a 55 m-high embankment that will be constructed at the confluence of Ann Gulch and Dublin Gulch. From this confluence, the proposed heap leach facility will extend approximately 1200 meters up Ann Gulch, and will ultimately contain up to 130 million tonnes of ore. A total of four cross sections were analyzed to assess stability of the facility under static, pseudo-static and post-operational pseudo-static conditions; the results of these analyses are presented in the Eagle Gold Heap Leach Facility – Slope Stability Technical Memorandum dated March 08, 2013. The largest of these sections was used in the simplified deformation procedures described herein. Table 1 presents the pertinent dimensions of this section.

Table 1: Embankment Ultimate Configuration Characteristics

Crest elev. (m)	Max Centerline Height (m)	Crest Length (m)	Overall Embankment Slopes (H:V)
888	55	520	2.5H:1V

The stability analyses of the Dublin Gluch heap leach facility were performed using the Maximum Design Earthquake (MDE) for operational pseudo-static evaluation and the Maximum Credible Earthquake (MCE) for post-operational analysis. The MDE ground motion complies with the Canadian Dam Association (CDA) recommendations for analysis of a dam classified as

"high" hazard. The MDE has a recurrence interval of 2475 years. The post-operational conditions require a lower probability ground motion (e.g. 1 in 5,000 years or 1 in 10,000 years). For these closure conditions the MCE is implemented, which, by definition, has no specific recurrence interval and is the largest reasonably conceivable earthquake that appears possible along a recognized fault.

As the performance of embankments subjected to strong earthquake ground motions is an extremely complicated process for which all of the variables affecting the behavior are not yet fully understood or capable of being analyzed, a variety of methods were employed to provide an indication of the probable Dublin Gulch facility performance under the levels of earthquake loading considered. The level of agreement between the various methods considered provides an indication of the level of confidence in the results of any one approach. Methods implemented include historical precedence as well as empirical and analytical evaluations.

The stability of the Dublin Gulch facilities under earthquake loading was evaluated based on the historical performance of tailings and embankment dams during earthquakes, the historical performance of the proposed method of construction relative to common types of dam construction, and the magnitude and possible impact of the potential permanent slope deformations that could occur. Review of historical earthquake loading versus embankment and tailings dam performance statistics indicates that a potential for damage to the heap leach embankment exists for the level of dynamic loading adopted for design of the structure. Accordingly, the potential level of deformation and damage to the embankment was assessed.

Deformations under earthquake loading were estimated using a variety of semi-empirical and simplified analytical methods to evaluate an overall average or probable response. These methods included the procedures of Makdisi and Seed (1978), Franklin and Chang (1978), Ambraseys and Srbulov (1995) Ambraseys and Menu (1998), Travasarou, Bray, and Der Kiureghian (2004), and Bray and Travasarou (2007).

2.0 SEISMICITY

According to the site-specific hazard analysis previously performed for this site (Tetra Tech, 2012a) the Peak Ground Accelerations (PGA) used in stability analysis are 0.25g for the MDE and 0.35g for the MCE. The MDE is defined as previously described by a return period of 2475 years which corresponds to a 2 percent probability of exceedance in 50 years using a probabilistic analysis published by Natural Resources Canada (NRCAN). Deterministic methods are used to estimate the ground motions resulting from a maximum credible earthquake (MCE), which is defined as the largest conceivable earthquake within a geographically defined tectonic province under the presently known or presumed tectonic framework. Theoretically, no earthquake should occur which exceeds that of the MCE. A deterministic analysis therefore allows for a conservative approach to the determination of risks associated with identified seismic hazards.

A review of potential earthquake source zones in the project area, based on recent earthquake history and the existing seismogenic framework, confirms seismic activity related to movement associated with the nearby mountain ranges, the Wernecke and Ogilvie Mountains. The

distance from the project site was assumed to approximately coincide with the base of the mountains at their closest point and a magnitude of 7.0 is adopted as the MCE for these source zones based on historic earthquake activity. A background source zone was also considered to account for the diffuse low magnitude events recorded within the Selwyn Basin. The MCE for this source was determined assuming an event directly over the site and a magnitude of 6.0 based on historic activity. These MCEs are summarized in Table 2. PGAs for each MCE are determined using attenuation models described in the site-specific seismic hazard analysis (Tetra Tech, 2012a).

Table 2: Maximum Credible Earthquakes (MCEs) by source zone

Source Zone	Magnitude	Epicentral Distance from Site	PGA (g)
Wernecke Mountains	7.0	50 km	0.15
Ogilvie Mountains	7.0	30 km	0.31
Background Source	6.0	6 km	0.35

For the dynamic deformation analyses, magnitude 6.0 and 7.0 ground motions were evaluated based on the MCEs in Table 2. The M6 earthquake was characterized as 6km from the site and having a PGA of 0.35g. The M7 ground motion was defined using 30km from the site and a PGA of 0.31g.

3.0 HISTORICAL PERFORMANCE OF EMBANKMENT DAMS

3.1 Historical Tailings Dam Performance - Conlin (1987)

Conlin (1987) presents a summary of historical tailings dam performance during actual earthquakes. This summary includes a plot of earthquake magnitude and epicentral distance relative to reported damage at operating and non-operating tailings dams. Boundary relationships are included to provide an initial screen for possible tailings dam performance during an earthquake. These data indicate a potential for damage for a tailings dam during a M = 6.0 earthquake at a distance of less than 15 kilometers for operating conditions and 9 kilometers for non-operating conditions (Figures 1 and 2 respectively). These data suggest a potential for damage to the heap leach embankment as a result of the 6.0 magnitude earthquake. However, Conlin (1987) primarily considered the performance of dams constructed in an upstream fashion using tailings materials as the basis for the data presented in Figures 1 and 2. The rockfill embankment is expected to have a better performance. Nevertheless, it appears that some potential for damage to the embankment as a result of the MDE would exist.

Figure 1: Operating Tailings Impoundment Performance

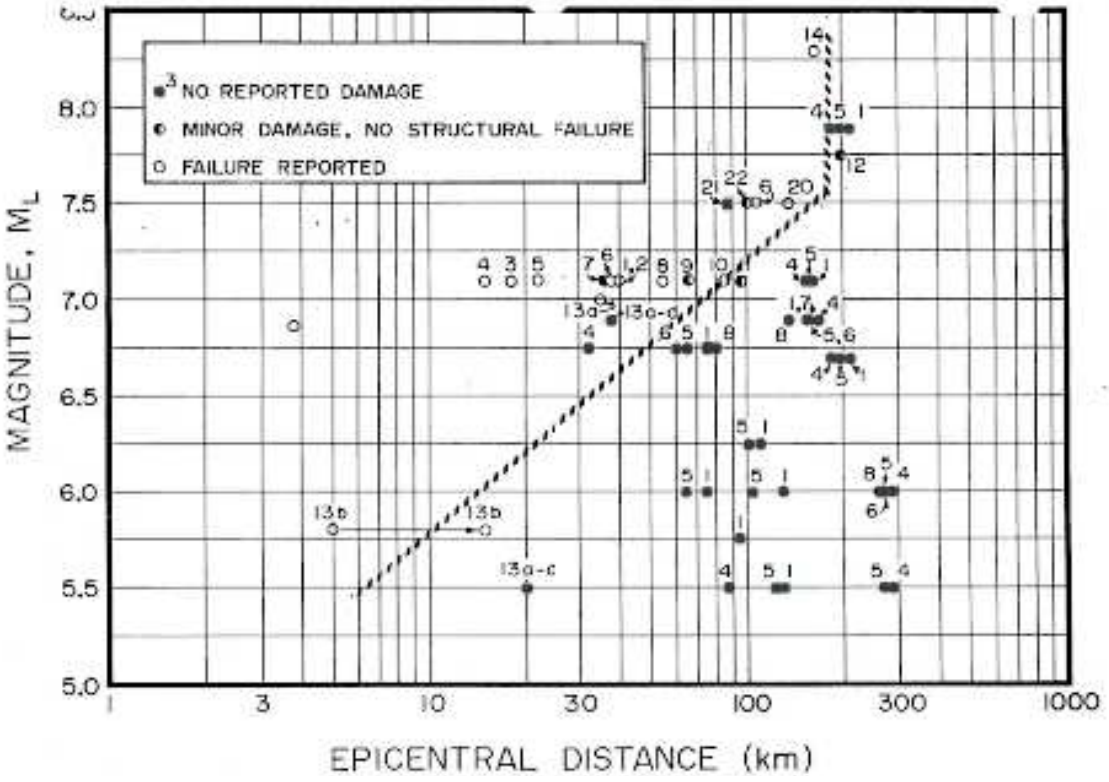
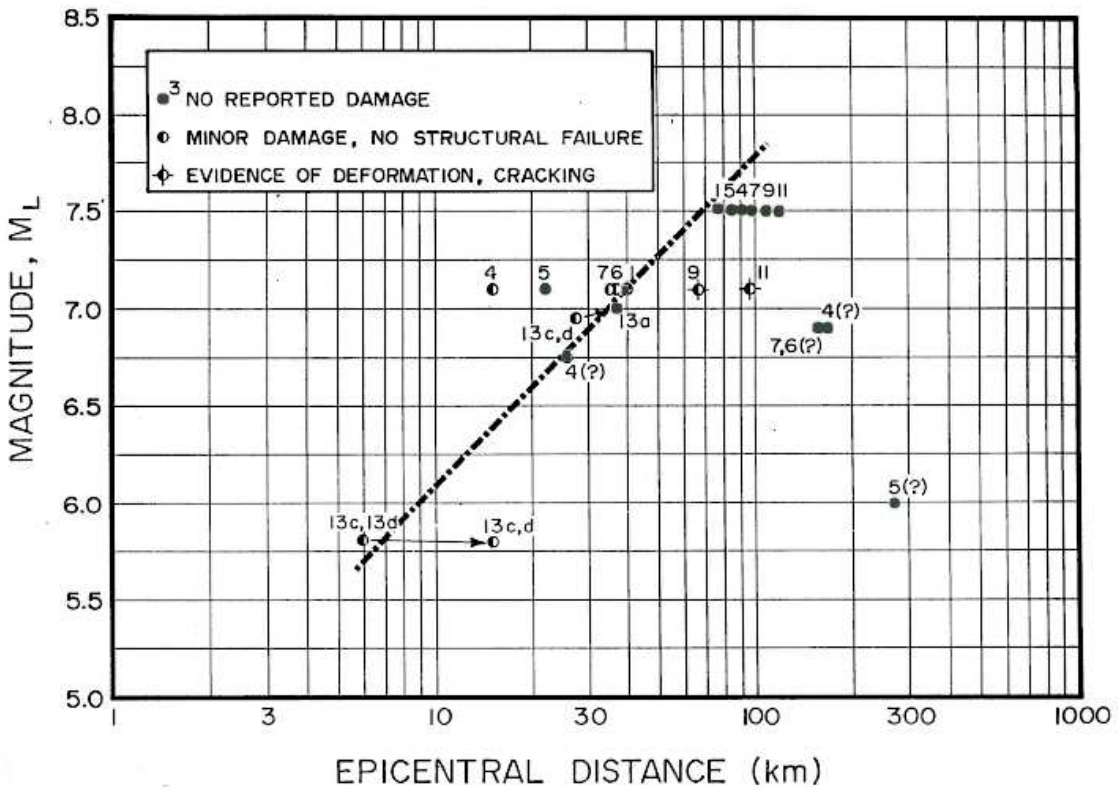


Figure 2: Non-operating Tailings Impoundments Performance



4.0 SIMPLIFIED ESTIMATES OF SEISMIC DEFORMATION

4.1 Makdisi and Seed (1978)

The simplified procedure developed by Makdisi and Seed (1978) is based on the sliding block concept originally proposed by Newmark (1965). By subjecting several real and hypothetical embankments to ground motions scaled to represent different earthquake magnitudes, Makdisi and Seed developed a series of curves for earthquakes of various magnitudes that relate the ratio of the yield acceleration (ky) to the maximum average acceleration of the sliding mass (ky/kmax) to a range of expected permanent embankment displacements. The yield acceleration is that horizontal acceleration of the slope, under the influence of a postulated earthquake, at which movement is imminent. It is by definition the horizontal pseudo-static acceleration that produces a computed factor of safety of one. The yield acceleration for a full height global failure of the Dublin Gulch facility was evaluated to be 0.16g using conventional limit equilibrium stability.

The MCE ground motions adopted represent free-field peak horizontal acceleration at the bedrock surface beneath the Dublin Gulch facility. The procedure of Makdisi and Seed incorporates the frequency characteristics of the design earthquake parameters and an acceleration response spectra to estimate the peak acceleration acting on a potential slide mass.

The acceleration response spectra shown in Figures 3 and 4 were developed using Campbell and Bozorgnia (2003) mean results equivalent to M=6.0 at 6 km and M=7.0 at 30km, respectively. They show the spectral acceleration versus period at 2, 5, 10 and 20 percent damping per Newmark and Hall (1983).

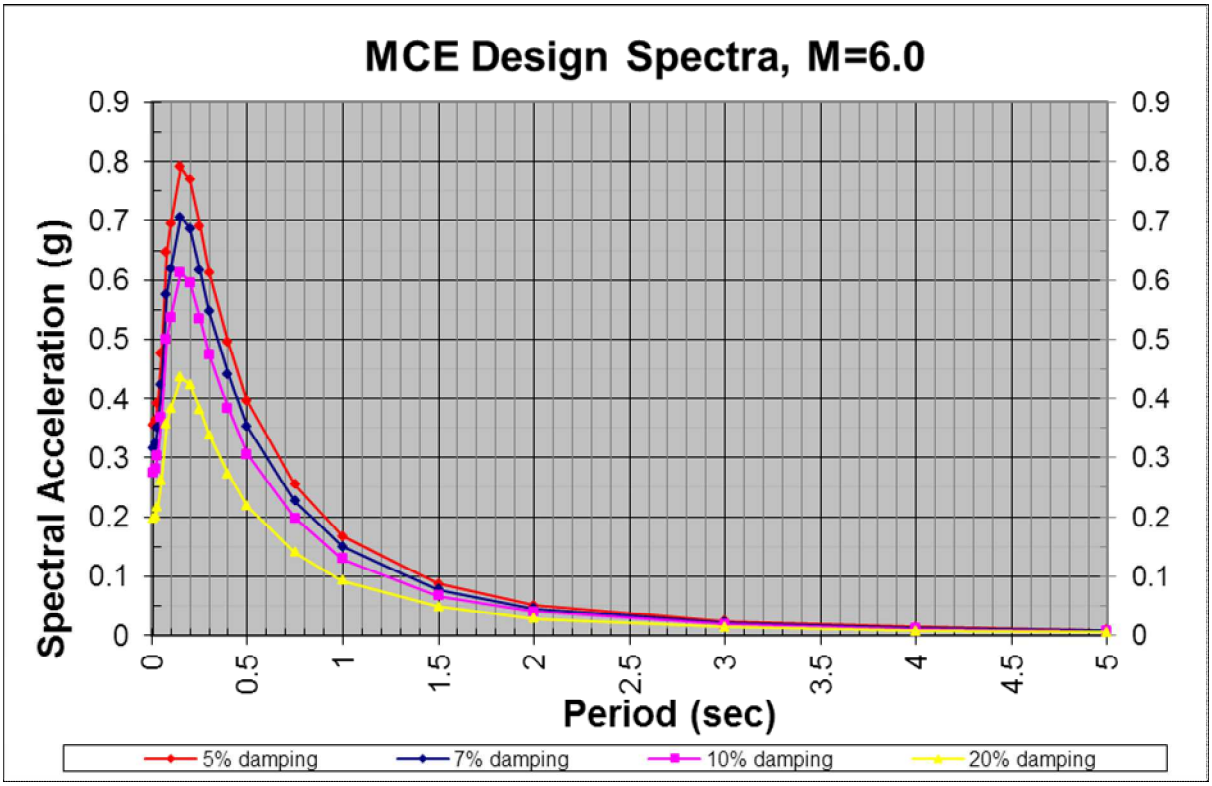


Figure 3: MCE Response Spectra for PGA = 0.35g

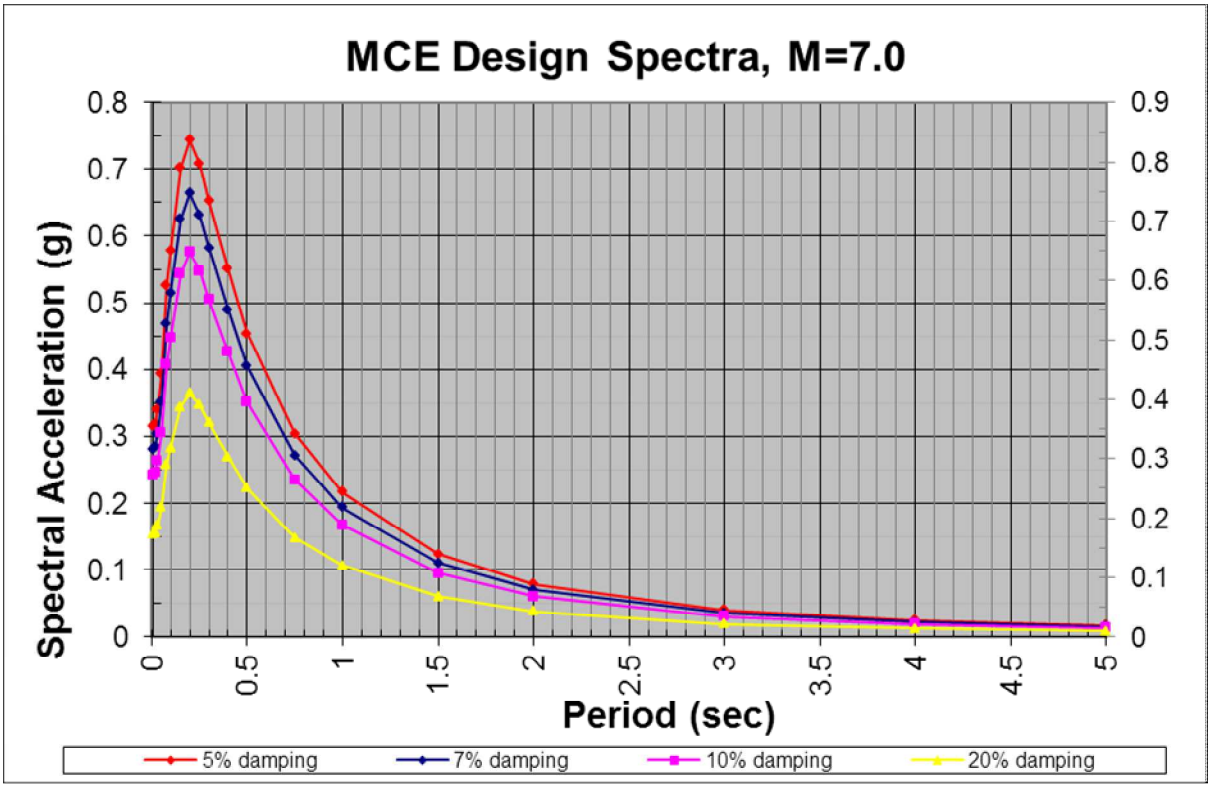


Figure 4: MCE Response Spectra for PGA = 0.31g

The Makdisi and Seed procedure also requires the small strain (i.e. a strain of 10^{-4} percent) shear modulus (Gmax), as well as the shear modulus verses shear strain degradation

relationship and damping ratio verses shear strain amplification relationship in order to estimate the dynamic response of the structure. The maximum shear modulus was based on the empirical relationship between the small-strain shear modulus and effective vertical stress proposed by Seed and Idriss (1970):

$$G = 1{,}000 \times K2 \times \sqrt{\sigma'v}$$

where:

$\sigma'v$ = effective vertical stress, psf

K2 = empirical coefficient

G = shear modulus, psf

In the use of this relationship an average K2 value of 35 was assumed in this analysis to represent a weak rockfill material that has broken down into fines. This value typically represents a loose sand material (Seed, et. al., 1986). The analyses incorporate the shear modulus degradation versus shear strain relationships presented by Makdisi and Seed, (1977) for loose sand (Figure 5).

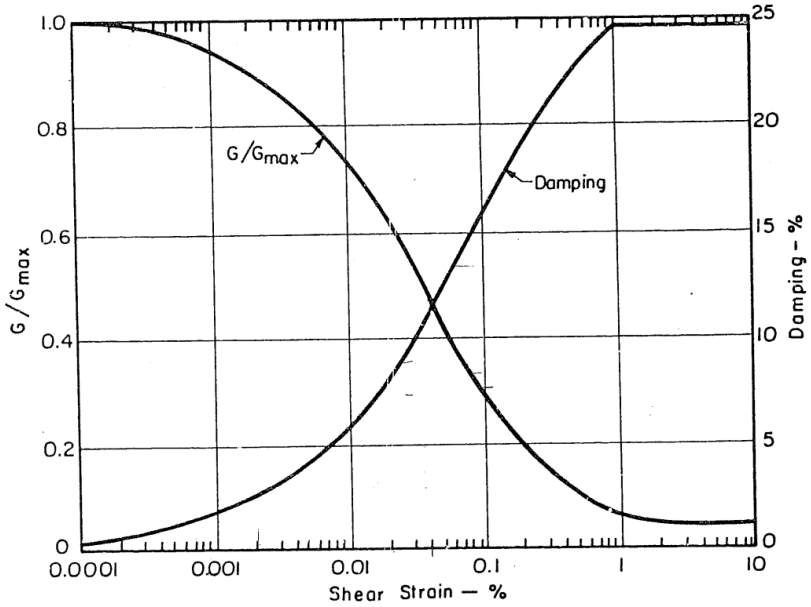


Figure 5: Modulus Degradation and Damping versus Cyclic Shear Strain (Makdisi and Seed 1977)

Using the simplified Makdisi and Seed procedure for computing embankment response, the peak acceleration at the crest (Umax) of the Dublin Gluch facility during the M=6.0 MCE (PGA = 0.35g) was estimated to be 0.72 g, and similarly, 0.75g for the M=7.0 MCE (PGA=0.31g). These results reflect acceleration amplification ratios of 2.02 (M=6.0) and 2.4 (M=7.0) due to the structural response.

For estimating dynamic deformation using the method of Makdisi and Seed, it is also necessary to establish the average horizontal seismic acceleration (kmax) acting on the critical sliding

mass. This value is also dependent on the shape and depth of the sliding mass. Based on data and results of analyses by others, Makdisi and Seed (1978) developed a relationship for estimating kmax as a function of Umax and the depth of the sliding mass within an embankment. The critical failure surface from the stability analysis of the embankment is the same as the full height of the embankment. For a potential failure surface which extends over the full height of the structure, Makdisi and Seed indicate that the mean relationship for kmax is 35 percent of the peak crest acceleration, Umax. The ratio of the yield acceleration to kmax is then used to estimate the dynamic deformation based on graphical relationships presented by Makdisi and Seed for different earthquake magnitudes.

The estimated potential seismic deformations for each ground motion are given in Section 4.7, Table 3. As indicated in this table, the maximum deformation estimated for M=6.0 using this method is 0.6 cm and the deformation estimated for M=7.0 is 1.3 cm.

4.2 Franklin and Chang (1977)

Franklin and Chang (1977) carried out 'Newmark-type' sliding block analyses by processing many additional strong-motion records and revised his upper bound limits for displacement. A total of 169 horizontal and 10 vertical records from 27 earthquakes and 10 synthetic accelerograms were used by Franklin and Chang with the sliding block analyses. All strong-motion records were scaled to a maximum acceleration of 0.5 g and maximum ground velocity of 30 in/sec by adjusting the acceleration and time scales. The resulting scaled values of displacement are therefore standardized and can be utilized for any value of acceleration and/or velocity through scaling factors. They provide a graph for estimating the upper bound displacement as a function of the yield acceleration to peak ground acceleration ratio (N/A) for earthquakes up to magnitude 8.

The critical global failure surface for the Dublin Gulch facility has a yield acceleration of 0.16 g. For peak ground accelerations of 0.31 g (M=7.0) and 0.35 g (M=6.0) the N/A ratios are therefore 0.52 and 0.46, respectively, and the standardized displacement is less than 10 inches and 15 inches, respectively, for all earthquake magnitudes considered. In order to convert the standardized displacement for PGA = 0.50 g to displacements for each MCE, the peak ground velocity for the MCEs were estimated from the PGA using the velocity to acceleration ratio presented by Newmark and Hall (1982). These authors indicate that the peak ground velocity is approximately 48 in/sec multiplied by the PGA expressed as a percent of gravity. For M=6.0 this results in a peak ground velocity of 8.0 in/sec. For M=7.0 the peak ground velocity is 8.9 in/sec. Using these values to normalize the standardized displacement to site-specific displacement, results in a deformation of less than 4 cm for both assumed ground motions. These results are summarized in Section 4.7, Table 3.

4.3 Ambraseys and Srbulov (1995)

The semi-empirical method of Ambraseys and Srbulov (1995) was developed using ground motion records from 76 shallow (depth < 25 km) earthquakes of surface wave magnitude 5.0 to 7.7. The mean magnitude and depth in this data set are 6.0 and 10 km, respectively, which is reasonably consistent with the design events for M=6.0 and M=7.0. Using these data

Ambraseys and Srbulov developed a numerical relationship to estimate deformation based on the ratio of the yield acceleration to PGA, earthquake magnitude and source-to-site distance.

The largest estimated mean deformations calculated from the semi-empirical method of Ambraseys and Srbulov (1995) are 3.5 cm for M=6.0 and 3.9 cm for M=7.0 Results for this method are summarized in Section 4.7, Table 3.

4.4 Ambraseys and Menu (1998)

The numerical procedure of Ambraseys and Menu (1998) was developed specifically for near-field ground motions from shallow earthquakes using 52 records from earthquakes in the magnitude range of 6.6 to 7.3 recorded at distances of 1 to 54 km. The use of this relationship will be somewhat conservative for the slightly lower M=6.0 design event for the MDE ground motion.

Ambraseys and Menu provide a numerical relationship to estimate deformation based on the ratio of the yield acceleration (0.16g) to PGA. The ratio for M=6.0 (PGA=0.35) loading is 0.45 resulting in a mean deformation of 4.0 cm. For M=7.0 (PGA=0.31) the ratio is 0.51 resulting in a mean deformation of 2.6 cm. Results using the empirical method of Ambraseys and Menu (1998) are summarized in Section 4.7, Table 3.

4.5 Travasarou, Bray, and Der Kiureghian (2004)

Travasarou, Bray, and Der Kiureghian (2004) present a numerical method for estimating probabilisitic deformations based on the yield acceleration, one-dimensional fundamental period (Ts) and the spectral acceleration at a degraded period equal to 1.5Ts. This method was developed from a much larger data base of earthquake records than preceding methods considered, as it includes many recordings from more recent earthquakes. The utilized data base consists of 688 records from 41 shallow crustal earthquakes in the magnitude range of 5.5 to 7.6 recorded at distances of less than 100 km.

For the Dublin Gulch facility the equivalent embankment crest length is 520 feet and the height is 55 feet. Using the relationship of Öner (1984), the fundamental period for this structure (T_s) would be approximately 0.266 sec. For the M=6.0 ground motion (distance 6 km) the degraded period ($1.5T_s$) yields a spectral acceleration of 0.495 g at 5% damping. The estimated mean deformation from this acceleration using the method of Travasarou, Bray, and Der Kiureghian (2004) is only 4.8 cm. For the M=7.0 ground motion (distance 30 km) the degraded period (1.5Ts) yields a spectral acceleration of 0.55 g at 5% damping. The estimated mean deformation from this acceleration is 8.6 cm. Results using the empirical method of Travasarou, Bray, and Der Kiureghian (2004) are summarized in Section 4.7, Table 3.

4.6 Bray and Travasarou (2007)

Bray and Travasarou (2007) present a semi-empirical analytical procedure for estimating probabilistic deformations based on the yield acceleration, earthquake magnitude, one-dimensional fundamental period (T_s) and the spectral acceleration at a degraded period equal to $1.5T_s$. The method is based on a nonlinear coupled stick-slip deformable sliding block model to provide a more realistic representation by accounting for the plastic deformation of the slide

mass, nonlinear dynamic response, and intermittent sliding. This method presents refinement of the earlier work of Travasarou, Bray, and Der Kiureghian (2004) and also computes the probability of having negligible (i.e. less than 0.4 inches) displacement for the loading conditions considered.

Bray and Travasarou (2007) include the same data base of 688 records from 41 shallow crustal earthquakes in the magnitude range of 5.5 to 7.6 recorded at distances less than 100 km on sites of UBC Class B, C or D as were used by Travasarou, Bray, and Der Kiureghian (2004). The method of Bray and Travasarou (2007) includes further validation through re-examination of 16 case histories of earth dam and solid-waste landfill performance during strong earthquake ground motions.

For the Dublin Gulch facility, the relationship of Bray and Travasarou (2007) indicates a 3 percent probability for displacements of less than 4.8 cm for a full height global failure due to a M=6.0 ground motion and, a probability of 1 percent due to a M=7.0 ground motion for a displacement of 8.0 cm.

For the M=6.0 ground motion (distance 6 km) the degraded period ($1.5T_s$) yields a spectral acceleration of 0.495 g at 5% damping. The estimated mean deformation from this spectral acceleration using the method of Bray and Travasarou (2007) is 43.8 cm. For the M=7.0 ground motion (distance 30 km) the degraded period (1.5Ts) yields a spectral acceleration of 0.45g at 5% damping. The estimated mean deformation from this spectral acceleration is only 8.0 cm. Results using the empirical method of Bray and Travasarou (2007) are summarized in Section 4.7, Table 3.

4.7 Summary of Simplified Deformation Analyses Results

Results of the empirical and simplified deformation analyses for the embankment at 6.0 and 7.0 magnitude earthquakes are summarized in Table 3. The considered deformation methods all yielded remarkably similar results. Each of the methodologies resulted in deformations which are on the order of centimeters in scale. This agreement when using a variety of methods significantly increases the level of confidence in the results.

The method of Travasarou et. al. (2007) yielded the largest displacements of the semi-empirical simplified analytical methods.

Table 2: Summary of Simplified Deformation Analyses Results for the Heap Leach Embankment.

Ground Motion	Crest Elev. (ft)	Crest Height (m)	Yield Accel. (ky, g)	Estimated Potential Seismic Deformation – cm					
				Makdisi and Seed (1978)	Franklin and Chang (1977)	Ambraseys and Srbulov (1995)	Ambraseys and Menu (1998)	Travasarou, et. al. (2004)	Bray and Travasarou (2007)
M=6.0	888	55	0.16	0.6	3.9	3.5	4.0	4.8	4.8
M=7.0	888	55	0.16	1.3	3.2	3.9	2.6	8.6	8.1

5.0 RESULTS AND CONCLUSIONS

The stability of the Dublin Gulch Heap Leach Embankment under earthquake loading was evaluated based on the historical performance of embankment and tailings dams during earthquakes, the historical performance of rockfill dams and the downstream method of construction relative to other types of dams, and the magnitude and possible impact of the potential permanent slope deformations that could occur. Review of historical earthquake loading versus tailings and embankment dam performance statistics indicates that a potential for damage to the heap leach embankment exists for the level of dynamic loading adopted for design of the structure. Accordingly, the probable level of deformation and potential for damage to the Dublin Gulch facility was assessed.

The performance of the Dublin Gulch embankment during earthquake loading was estimated using a variety of approaches including semi-empirical and simplified analytical procedures to evaluate an overall average or probable response and provide an indication of the potential 'order of magnitude' deformation under the levels of earthquake loading considered. These methods included the procedures of Makdisi and Seed (1978), Franklin and Chang (1978), Ambraseys and Srbulov (1995) Ambraseys and Menu (1998), Travasarou, Bray, and Der Kiureghian (2004), and Bray and Travasarou (2007).

Results of the simplified deformation analyses for the Dublin Gulch facility are summarized in Table 3 for the designed heap leach dimensions. The results of the simplified deformation analyses demonstrate that the heap leach facility is stable at the MCE seismic loading considered for a M=6.0 earthquake at a distance of 6km (PGA=0.35g) and for a M=7.0 earthquake at a distance of 30km (PGA=0.31g). The results summarized in Table 3 should be conservative considering:

- The embankment would tend to experience less amplification of the earthquake ground motion than a conventional water dam that is free to strain in both the downstream and upstream directions;
- Non-linear behavior associated with strong ground motions and permanent plastic deformation will absorb some of the earthquake energy and the amplification will be less.

This will result in a decoupling effect whereby large accelerations are not transmitted to higher levels in the structure.

As indicated in Table 3 the various deformation methods considered all yielded similar results with each of the methodologies resulting in deformations which are on the order of centimeters in scale. The close level of agreement among the wide variety of methods used significantly increases the level of confidence in the results. The calculated permanent displacements of the embankment are consistent with empirical data and there are no excessive deformations indicated that compromise the global stability. The maximum vertical deformation computed using any of the methods considered was 8.6 cm for the facility under MCE loading conditions using the empirical method of Travasarou (2007). The rockfill embankment and heap leach facility can safely withstand this level of deformation with no disruption to operations.

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APPENDIX M – SETTLEMENT ANALYSIS

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Technical Memorandum

To:	File	**From:**	Kanyembo Katapa & Will Vilhauer
Company:	Strata Gold Corporation	**Date:**	August 30, 2011
Re:	Heap Leach Facility Settlement Assessment	**Revised:**	March 22, 2013
CC:	Marvin Silva, Joel Carrasco, Troy Meyer		

1.0 Introduction

This Technical Memorandum provides a summary of Tetra Tech's one dimensional settlement assessment of the Heap Leach Facility (HLF) at the proposed Eagle Gold Mine Project (Project).

The assessment of the foundation conditions has been carried out as part of the preliminary design of the HLF. The construction of the HLF would apply loads to the foundation soils which would result in total and differential settlements. These settlements will impact the performance of the proposed liner system and collection pipe network at the base of the HLF pad. In addition, the settlements would impact the stability of the confining embankment and the performance of other facilities directly associated with the embankment such as the conveyor belt and the in-heap pond.

This assessment has been conducted using data collected from previous geotechnical site investigations and site information obtained by others. Tetra Tech did not conduct any additional geotechnical investigations prior to completing this settlement assessment.

2.0 Site Conditions

2.1 Current Site Conditions and Proposed Development

The planned development at the Eagle Gold mine calls for construction of a heap leach facility in the Ann Gulch area (see Figure 1). The primary structures of the HLF include the heap leach pad and the confining embankment. The heap leach pad covers an area of approximately 128 hectares. The impoundment area is sloping down at a slope of approximately 18%. A confining embankment at the down-slope toe of the leach pad will be constructed to provide lateral containment of the pregnant leach solution and form the in-heap pond.

The change in elevation from the toe of the confining embankment to the top of the heap pad is approximately 380 m, with a maximum thickness at any location of approximately 150 m. The maximum changes in pressure applied to the foundation soil and embankment are subsequently expected to be in the order of 2,700 kPa.

It is understood that current site conditions consist of a thin cover of organic soil and vegetation underlain by colluvium and variably weathered bedrock. Some areas of the site have been disturbed from previous mining activities. Alluvial sediments, glacial till or 'placer' tailings (fill)

are present in or near the valley bottom close to Dublin Gulch. Ground conditions throughout the project site are highly variable.

It is recommended that all surficial organic soil must be removed prior to construction. Therefore, the presence of the organic layer, although noted on borehole logs, is neglected in this settlement assessment.

2.2 Existing Subsurface Conditions

Subsurface conditions at the HLF site were inferred from geotechnical investigations previously carried out by others across the proposed location of the HLF (BGC 2009 and 2010). Borehole and test pit data from these investigations were provided to Tetra Tech. The previous geotechnical investigations consist of 15 boreholes and 31 test pits. Groundwater monitoring wells were installed in four of the 15 boreholes.

Based on the previous site investigation results, the subsurface soil stratigraphy across the HLF generally consists of the following:

- Organic Layer
- Placer Tailings (Fill)
- Colluvium
- Highly Weathered to Moderately Weathered Bedrock
- Slightly Weathered Bedrock

The previous site investigation reports characterized these subsurface layers as follows:

Organic cover consists of vegetative rootmat, moss, silt and sand, and organic matter. The thickness was typically in the order of 0.2 m and was not present in previously disturbed areas.

The fill materials were encountered in the south areas of the HLF site in the lower elevations. The fill consists of placer tailings material from previous mining activities. The bulk of the fill is loose to compact sand and gravel with variable amounts of silt, cobbles and boulders. The fill is also characterized with considerable variability in material gradation and compactness. Average SPT N-values for tests performed on placer tailings ranged from 4 to 32.

Colluvium material was generally encountered on sloping ground and near the ground surface below the organic cover and was not present in previously disturbed areas. The colluvium consists of loose to compact angular gravel with occasional cobbles in a silt and sand matrix, derived from transported weathered metasedimentary bedrock. The colluvium may also include variable amounts of organics, which are often observed in distinct layers within the colluvium.

A horizon of variably weathered rock was observed across the entire site. The bedrock encountered at the HLF site is generally classified as metamorphosed sedimentary rock, with a variably deep weathering profile. Bedrock at the mine site has been subdivided into three broad categories – Type 1, Type 2 and Type 3 based on the rockmass quality and inferred engineering behavior. A summary of the typical characteristics on the three rock types are summarized in the Table 1.

Table 1 Bedrock Characteristics

Parameter	Type 1	Type 2	Type 3
Unconfined Compressive Strength	>25 MPa	5 to 25 MPa	1 to 5 MPa
Geological Strength Index	>20	15 to 25	15 to 25
Weathering Grade	Slightly to Moderately Weathered	Moderately to Highly Weathered	Highly Weathered

Groundwater

Seven groundwater wells have been installed in the general area of the HLF. Data from these wells show an average groundwater depth of approximately 12 m in the upland and 2.5 m in the valley bottom.

Permafrost

Frozen ground was encountered in the upper part of the HLF footprint. Frozen ground was typically encountered within colluvial gravels, and gravels and sands with depths varying between 0.6 m to 2.8 m, and occasionally included excess ice. Frozen ground was not encountered in the valley bottom nor on the southern edge of the proposed heap leach pad, but localized pockets of frozen ground may be present in these areas. One thermistor string with multiple temperature-measuring beads was installed in the HLF area to the depth of 10 m. Temperature data measured in August, September and October of 2009 do not show freezing temperatures within the 10 m zone, indicating an absence of permafrost at this location. Permafrost has been confirmed using thermistor data in other locations of the mine site. The thermistor data show the permafrost to be warm, at close to 0° C.

Existing Laboratory Tests Data

Laboratory testing conducted on select samples included: moisture content tests, Atterberg limits, grain size analysis (sieves and hydrometers), specific gravity, and modified proctor. Not all samples tested were from the HLF area. However, in certain cases, the test results are considered to be representative of similar soils within the HLF area.

Moisture content test results were used in this evaluation to estimate the total moisture content of frozen soil.

The laboratory test data are contained in the respective references noted above.

3.0 Settlement

3.1 Thaw Consolidation

Frozen soil was encountered within the colluvium layer at the HLF site. The colluvium is classified as gravel in a silt and sand matrix. Gravels are generally not considered to be highly susceptible to frost heave and thaw consolidation settlement. The potential for thaw consolidation settlement due to the silt and sand matrix was investigated using the oedometer test data for silts and sand from several sites along the Mackenzie River presented by (Andersland & Ladanyi, 2004). Moisture content data from the tests pits and boreholes in which frozen soil was reported was analyzed to determine the representative moisture content of the frozen soil. An estimate of the thaw settlement was determined by comparing the representative moisture content to the plot of moisture content versus thaw settlement, presented by Andersland and Ladanyi (2004), shown in Illustration 1.0..

The average moisture content from boreholes and test pits from which frozen soil was reported was calculated to be 12.2 %. The thaw settlement corresponding to this moisture content is very low (Illustration 1.0). Thaw consolidation at the HLF was considered to be negligible. It is therefore, not expected that thaw consolidation will contribute significantly to the HLF total and differential settlements.

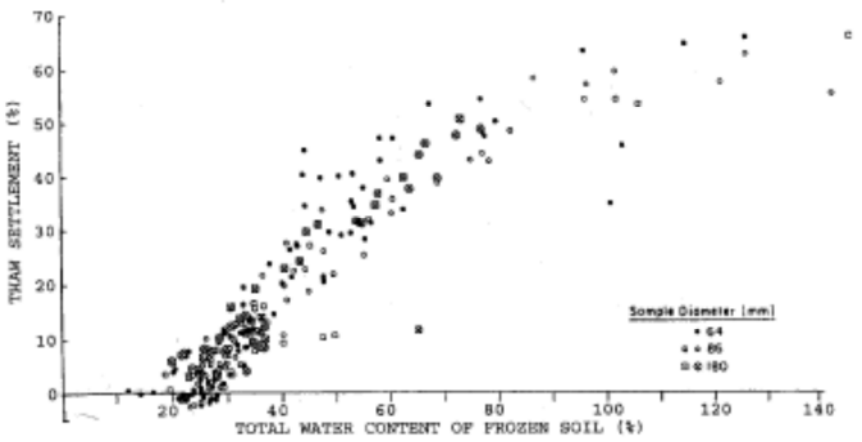

Illustration 1.0 Thaw settlement versus total water content for some Mackenzie Valley soils (From Andersland & Ladanyi 2004)

3.2 Elastic Settlement Prediction Method

Foundation elastic settlements were calculated using the Schmertmann strain influence method. Originally proposed by Schmertmann (1970) and modified by Schmertmann, Hartmann, and Brown (1978), this method was developed to estimate foundation settlements in cohesionless soils. This procedure provides settlement compatible with field measurements in many different areas. The analysis assumes that the distribution of vertical strain is compatible with a linear elastic half space subjected to a uniform pressure. To use this method, the subsurface is broken into sub layers. Each layer has a constant value of strain and soil modulus. The soil parameters used in the settlement calculation were selected based on the results of the geotechnical investigations referenced above. Settlement is calculated by summing the influence of all layers, as calculated by equation (1).

$$\Delta H = C_1 C_2 \Delta p \sum_{i=1}^{n} \left(\frac{I_{zi}}{E_{si}}\right) \Delta z_i \qquad (1)$$

where:

C_1 = embedment correction factor = $1 - 0.5(\sigma'_{od}/\Delta p) \geq 0.5$
C_2 = creep correction factor = $1 + 0.2 \log (10t)$
σ'_{od} = overburden pressure at foundation level or depth d, tsf
ΔP = net foundation pressure increase = $q - \sigma'_{od}$, tsf
t = lapsed time in years
I_{zi} = influence factor of soil layer i
E_{si} = elastic modulus of soil layer i, 0.2B, tsf
Δz_i = depth increment i, inches

Schmertmann developed the diagram shown in Illustration 2.0 to determine the appropriate strain influence factor, I_z, for each layer within the profile. Two distributions are shown: one for square or circular footings (L/B=1, axisymmetric), and a second for strip footings (L/B>10, plane strain). Both are triangular distributions, and the one for square or circular footings begins at a value of 0.1 at the base of the footing, while the one for strip footings begins at a value of 0.2 at the base of the footing.

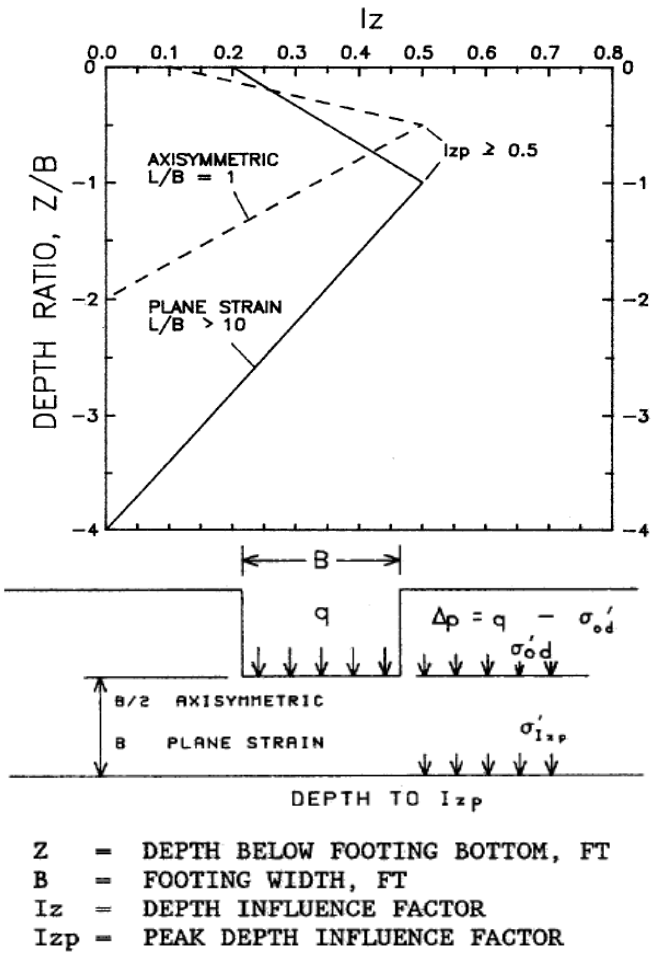

Illustration 2.0 Strain Influence Factors for Schmertmann's Approximation (From Engineer Manual No. 1110-1-1904, USACOE, 30 Sep 90, page 3-8)

The maximum strain factor, I_{zp}, occurs at a depth equal to B/2 for square footings and B for strip footings, and is calculated using equation (2)

$$I_{zp} = 0.5 + 0.1\sqrt{\frac{\Delta P}{\sigma'_{Izp}}} \qquad (2)$$

where:

σ'_{Izp} = initial effective stress at the depth of maximum strain influence

Axisymmetric: $\sigma'_{Izp} = 0.5B\gamma' + D\gamma'$
Plane strain: $\sigma'_{Izp} = B\gamma' + D\gamma'$

where:

γ' = effective unit weight, tcf
B = footing width, ft
D = excavated or embedded depth, ft

In this evaluation, the plane strain distribution was used. The strain factors I_z, any given depth within the soil (i.e. not peak strain factor) profile were computed using equations (3) and (4).

For z_f = 0 to B $\quad I_z = 0.2 + \left(\frac{z_f}{B}\right)\left(I_{zp} - 0.2\right)$ (3)

For z_f = B to 4B $\quad I_z = 0.333 I_{zp}\left(4 - \frac{z_f}{B}\right)$ (4)

where:

z_f = depth from bottom of leach pad to midpoint of layer

I_z = strain influence factor

Values of soil modulus, E_s, for the fill (placer tailings) and the colluvium were established using the following relationships (NAVFAC 1986):

Table 2 Soil Modulus/SPT-N Value Relationship

Soil Type	E_s/N
silts, sands silts, slightly cohesive silt-sand mixtures	4
clean, fine to med, sands & slightly silty sands	7
coarse sands & sands with little gravel	10
sandy gravels and gravel	12

where:

Es = Soil modulus in tons per square foot (tsf)

N = corrected blow count from standard penetration tests (SPT)

For this evaluation, based on the grain size analyses results and the descriptions of the subsurface profile at the HLF site, the fill was classified as coarse sand with little gravel and the colluvium was classified as sandy gravel. This classification of the fill and colluvium resulted in Es/N values of 10 and 12 respectively.

The results of SPTs performed in the fill material show that the blow counts range from 4 to 36. The lowest blow counts recorded were N = 3.5 at a depth of 8 m. Based on the lowest blow count, the N value for the fill was assumed to be 4. SPTs were not performed in the colluvium. Based on the soil classification and the characterization of the colluvium consistency, the N-value for the colluvium was assumed to be equal to 8.

Values of rock modulus were established using the following relationship (Marinos and Hoek, 2001):

$$E_m = \sqrt{\frac{\sigma_{ci}}{100}} \times 1000 \times 10^{\frac{(GSI-10)}{40}}$$

where:

E_m = modulus of deformation in mega pascals (MPa)

σ_{ci} = the uniaxial compressive strength of the intact rock pieces

GSI = Geological Strength Index

A stress increase approximately equal to the height of the leach material multiplied by the unit weight of the ore was applied to the heap leach foundation soils to model the ultimate loading due to the heap. The height of the leach material at each borehole location was obtained from the proposed site plans (Tetra Tech 2011). The borehole locations at which the settlement assessment was performed are shown on Figure 1. The unit weight of the ore is 18 kN/m^3 (BGC, 2011). The estimated settlement at each of the borehole locations within the HLF is presented in Table 3.

Table 3 Settlement Evaluation Results Summary

Area	Borehole ID	Consolidation Settlement (mm)
HLF Pad Area	BH-BGC10-AG3	716
	BH-BGC10-AG5	533
	BH-BGC10-1	82
	BH-BGC10-2	1,357
	BH-BGC10-3	809
	BH-BGC10-4	2,142
	BH-BGC10-5	42
	BH-BGC10-6	673
	DH-BGC09-AG3	123
	MW09-AG2[A]	1,898
HLF Embankment	BH-BGC10-16	67
	BH-BGC10-17	297
	BH-BGC10-23	572
	DH-BGC09-DG-1	766

[A]The boring log for this borehole was not available, only depth to rock was reported. Material above the rock was assumed to be colluvium based on logs from the surrounding boreholes.

It should be noted that the estimated settlements presented in Table 3 do not account for planned Deed Dynamic Compaction ground treatment of the placer materials in the HLF embankment and pad areas.

3.3 Criteria for Determining Acceptable Settlements

The maximum allowable strain on the liner system is controlled by the strain tolerance of the LLDPE and the GCL components. The allowable yield strain for the proposed 60 mil double-side textured LLDPE is 12 percent and the elongation at break is 250 percent. There is additional concern when a geomembrane is exposed to tension perpendicular to seams. In these cases, a general rule-of-thumb is that the allowable strain on the geomembrane is about half the value of the un-seamed sheet material (Giroud et al. 1995). For this reason, horizontal seams are not allowed on side slopes. Tensile stresses applied to a geomembrane parallel to the seams are generally not a large concern, provided that the seams are good quality, and were installed in accordance with the specifications. For these reasons, strains of up to 12 percent will be considered acceptable for the proposed LLDPE geomembrane.

For GCL materials, the yield strain is not typically included on standard specifications. For these materials, the yield strain is typically controlled by the geotextile layers on the top and bottom of the clay. Geotextiles generally have yield strains in excess of 50 percent. The bentonite component of GCLs also has a high strain tolerance, and can heal cracks (if they occur) over time. If the GCL were to experience such large strains, thinning of the bentonite layer (and a corresponding increase in permeability) would likely be the primary concern. A second concern would be the GCL panel overlap. To avoid separation of panels caused by strain on the liner system, project specifications include required overlaps twice as large as typical manufacturer recommended overlaps.

In summary, the least strain-tolerant component of the liner system is the LLDPE geomembrane. Accordingly, the maximum acceptable strain on the liner system is 12 percent, which is the allowable yield strain of the LLDPE component.

The settlement calculations show that the differential settlement on the foundation liner system caused by the ore material will be most critical between MW09-AG2 and BH-BGC10-1. Settlement at the two boreholes was calculated to be 1,898 mm and 82 mm respectively. The two boreholes are 150 m apart. This differential settlement will produce an increase in the liner system length of 0.011 m, which is equivalent to a strain of 0.007 percent. Therefore, according to the criteria set previously, the liner system will not be damaged by differential settlement induced by the weight of the ore material.

4.0 Permissible Slope based on Allowable Strain and Maximum Settlement

Ground settlement of up to 2.142 mm has been identified to occur in colluvial materials in the upper pad areas and at a minimum of 67 mm in the Dublin Gulch valley area. Under a worse-case scenario it could be assumed that the settlement in the Dublin Gulch valley area would be 0 mm, resulting in a maximum differential settlement of 2.142. Such a scenario should be considered assuming placer tailings located in the Dublin Gulch valley will undergo insitu densification improvements using Deep Dynamic Compaction (DDC). Under this assumed worse-case condition, in the transition interface area along the edge of the DDC treated material, a settlement differential might occur over a much shorter length then those previously identified in Section 3.3.

In order to evaluate the impact on the liner for this worse-case condition, the maximum permissible transition slope between improved (placer tailings) and unimproved (colluvium) materials was determined based on the maximum settlement differential and the allowable liner strain. From this a maximum permissible slope and corresponding Factor of Safety (FS) between settlements materials was determined. Illustration 3.0 (LaGatta, et al, 1997) shows differential settlement geometrically where Point 1 is represented as compacted (improved) placer tailings and Point 2 is the unimproved colluvium material.

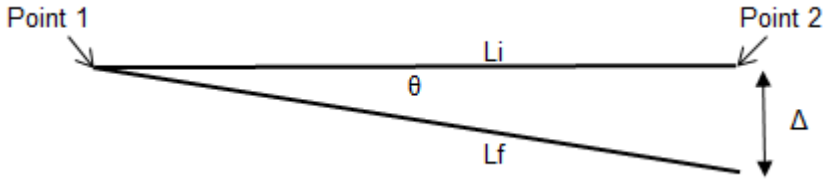

Illustration 3.0 Differential Settlement (Δ)

Strain can be determined by the following:

$$\varepsilon = (Lf - Li) / Li * (100)$$

where:

ε = Strain (%)

Lf = Final length (m)

Li = Length on which the distortion acts (m)

θ = Angular Rotation

Δ = Differential Settlement (m)

Slopes ranging from 0.1:1 (H:V) to 2:1 were analyzed based on a maximum differential settlement of 2.142 m for a placer tailings depth of 12 m. A depth beyond 12 m was not considered for this analysis since site conditions indicate weathered bedrock exists beyond this depth or site improvements (excavation) will occur in order meet this minimum required depth to bedrock to allow for effective DDC treatment. Factors of safety for these slopes based on a maximum allowable strain of 12% were calculated. The results are presented in Table 4.

Table 4 Settlement Evaluation Summary (Insitu Compacted Embankment)

Slope	Placer Tailings	Δ	Li	Lf	ε	ε (allowed)	FS
H:V	Depth(m)	(m)	(m)	(m)	(%)	(12%max)	
0.1	12	2.142	1.2	2.46	104.60	12	0.11
0.15	12	2.142	1.8	2.80	55.44	12	0.22
0.2	12	2.142	2.4	3.22	34.04	12	0.35
0.3	12	2.142	3.6	4.19	16.36	12	0.73
0.4	12	2.142	4.8	5.26	9.51	12	1.26
0.5	12	2.142	6	6.37	6.18	12	1.94
1	12	2.142	12	12.19	1.58	12	7.59
1.5	12	2.142	18	18.13	0.71	12	17.01
1.75	12	2.142	21	21.11	0.52	12	23.13
2	12	2.142	24	24.10	0.40	12	30.19

Applying a Factor of Safety of 1.5, the resultant maximum permissible slope between the improved placer tailings and the unimproved colluvium is 0.5:1. After reviewing the existing topography and proposed grading improvements between the embankment perimeter and embankment abutment areas, transition slopes were not found to exceed 1.5:1. Therefore insitu improvements such as DDC to the placer tailings within the embankment footprint will result in a maximum strain of 0.71% resulting in a calculated Factor of Safety of 17 against expected liner strain, exceeding yield strain.

5.0 Summary and Conclusions

Subsurface soil information from previous geotechnical investigations has been used in this settlement assessment in spite of limitations in terms of the amount of data. Subsurface layer moduli were conservatively inferred from the limited SPT-N value data and from empirical correlations.

Based on these conservative estimates of strength parameters, the settlement calculations show that significant settlement may be expected in areas with deep fill (placer tailings) and colluvium (however DDC treatment of placer materials would result in significantly smaller settlements upon loading). Settlement within the slightly weathered bedrock was considered negligible.

Ground settlements of up to 2,000 mm can be expected in areas with large thicknesses of untreated fill and/or colluvium. In areas of shallow bedrock and low imposed loads from the ore, settlements as low as 50 mm can be expected. Settlements at the embankment can be expected to range from 760 mm to 60 mm for untreated placer materials. However with

proposed DDC treatment of the placer tailings foundation materials, settlement is expected to be negligible, and is not expected to impact the performance of the embankment, the in-heap pond or the liner systems.

With the exception of DDC, the results of this settlement evaluation support the previous subgrade preparation recommendations by BGC, 2011:

1. Surficial organics should be removed from all foundation subgrades.
2. Frozen materials containing excess ice should be removed from all foundation and replaced with structural fill as required to build the grades up to design elevations.
3. Shallow colluvium should be removed to expose Type 3 (or better) rock in the dam abutment areas. Where colluvium is exposed as HLF subgrade, it should be proof-rolled to identify weak zones for removal and replacement with structural or rock fill.
4. All placer tailings should be removed from all foundation subgrades to expose Type 3 (or better) rock. Structural or rock fill can be used to build the grade up to design foundation elevations. Based on the calculations presented in Section 4.0, DDC treatment is considered an acceptable alternative to placer tailings removal.

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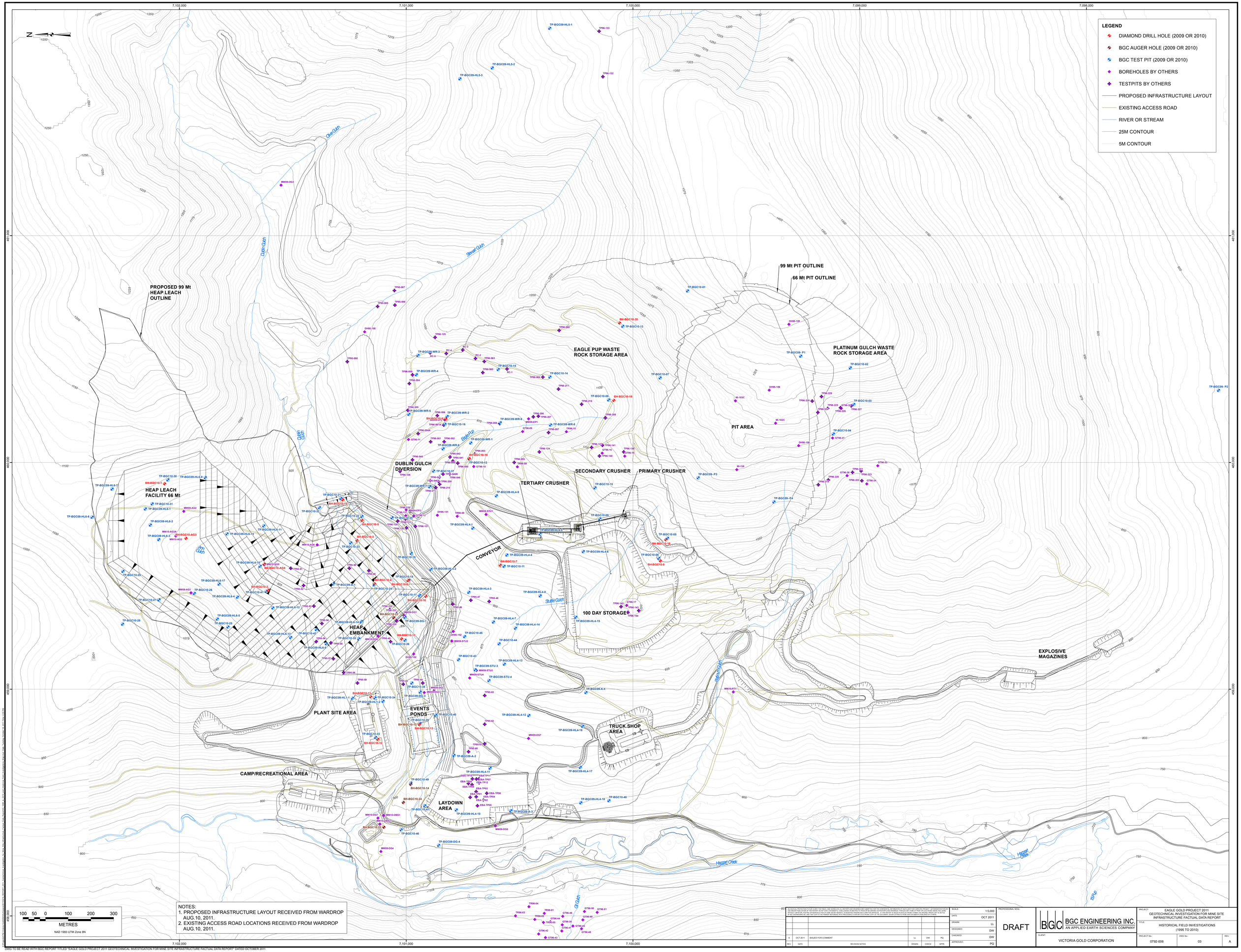
FIGURES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LEGEND
DIAMOND DRILL HOLE (2009 OR 2010)
BGC AUGER HOLE (2009 OR 2010)
BGC TEST PIT (2009 OR 2010)
BOREHOLES BY OTHERS
TESTPITS BY OTHERS
PROPOSED INFRASTRUCTURE LAYOUT
EXISTING ACCESS ROAD
RIVER OR STREAM
25M CONTOUR
5M CONTOUR
PROPOSED 99 Mt HEAP LEACH OUTLINE
99 Mt PIT OUTLINE
66 Mt PIT OUTLINE
EAGLE PUP WASTE ROCK STORAGE AREA
PLATINUM GULCH WASTE ROCK STORAGE AREA
PIT AREA
HEAP LEACH FACILITY 66 Mt
HEAP EMBANKMENT
DUBLIN GULCH DIVERSION
SECONDARY CRUSHER
PRIMARY CRUSHER
TERTIARY CRUSHER
CONVEYOR
100 DAY STORAGE
EXPLOSIVE MAGAZINES
PLANT SITE AREA
EVENTS PONDS
TRUCK SHOP AREA
CAMP/RECREATIONAL AREA
LAYDOWN AREA
Clear Gulch
Dublin Gulch
Eagle Pup
Sluice Gulch
Basin Pup
Hazel Creek
G Gulch
B Pup
TP96-133
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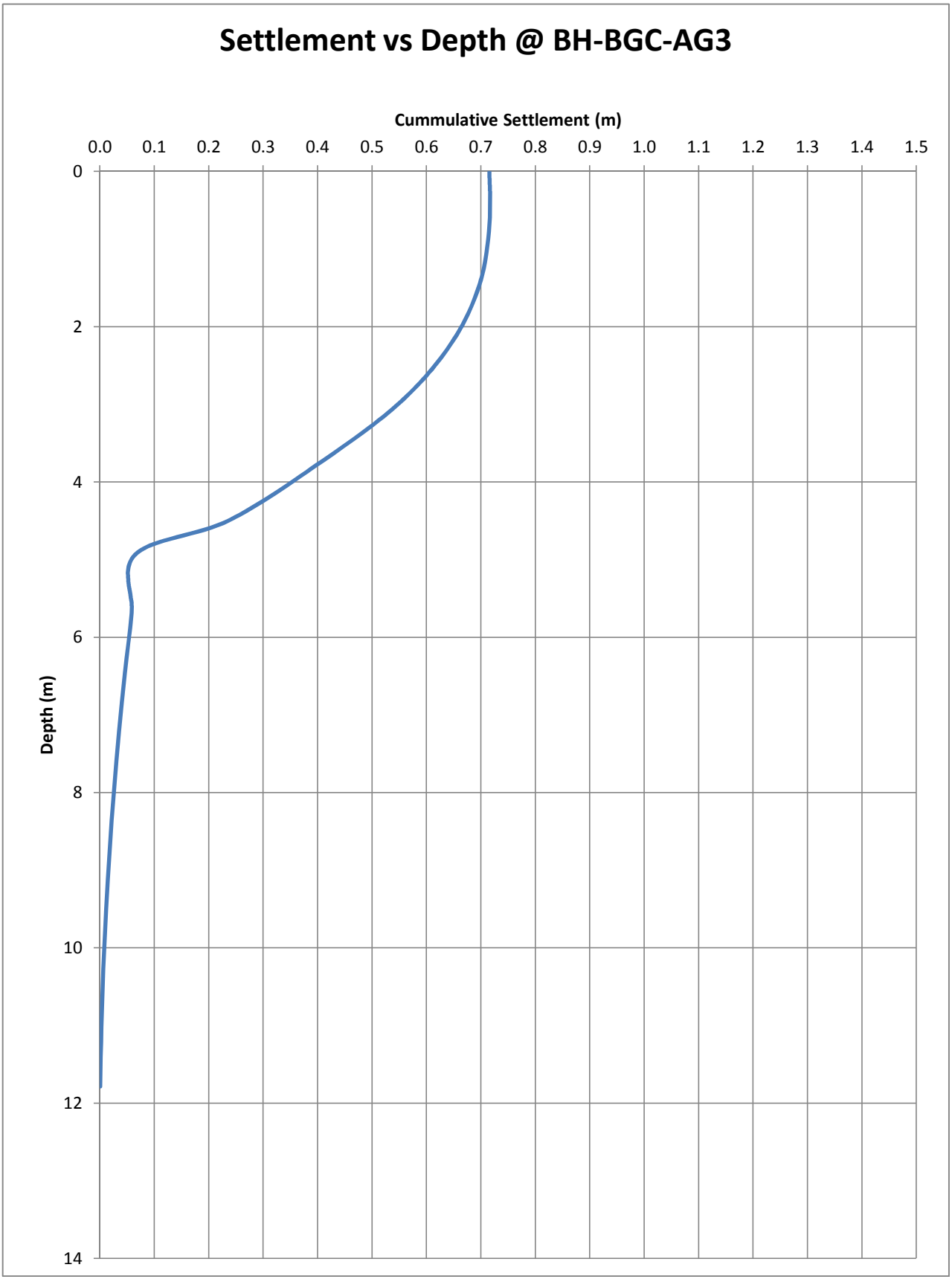
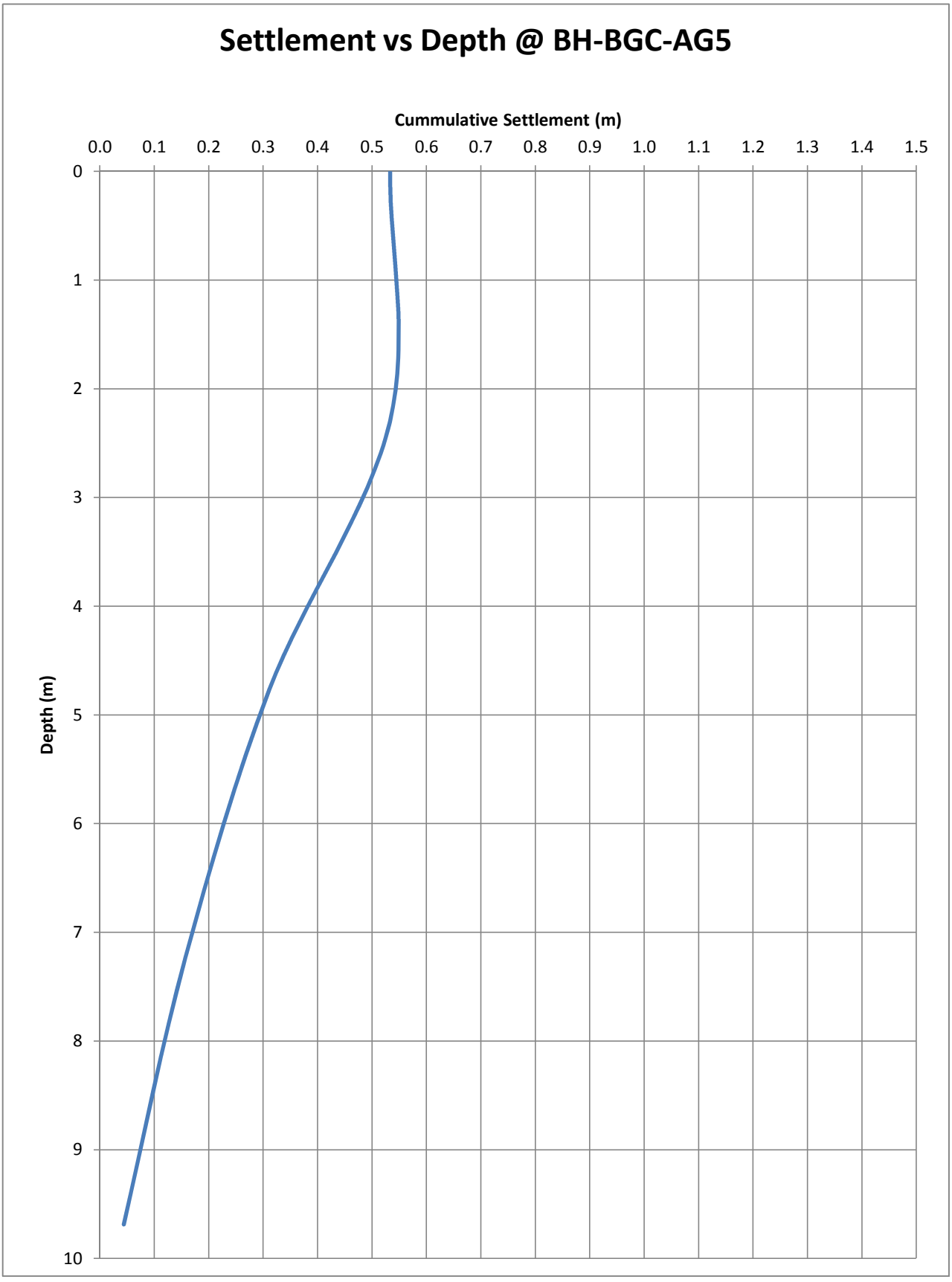
BH-BGC09-40

APPENDIX A
SETTLEMENT VERSUS DEPTH PLOTS


Settlement vs Depth @ BH-BGC-AG3
Cummulative Settlement (m)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
2
4
6
8
10
12
14


Settlement vs Depth @ BH-BGC-AG5
Cummulative Settlement (m)
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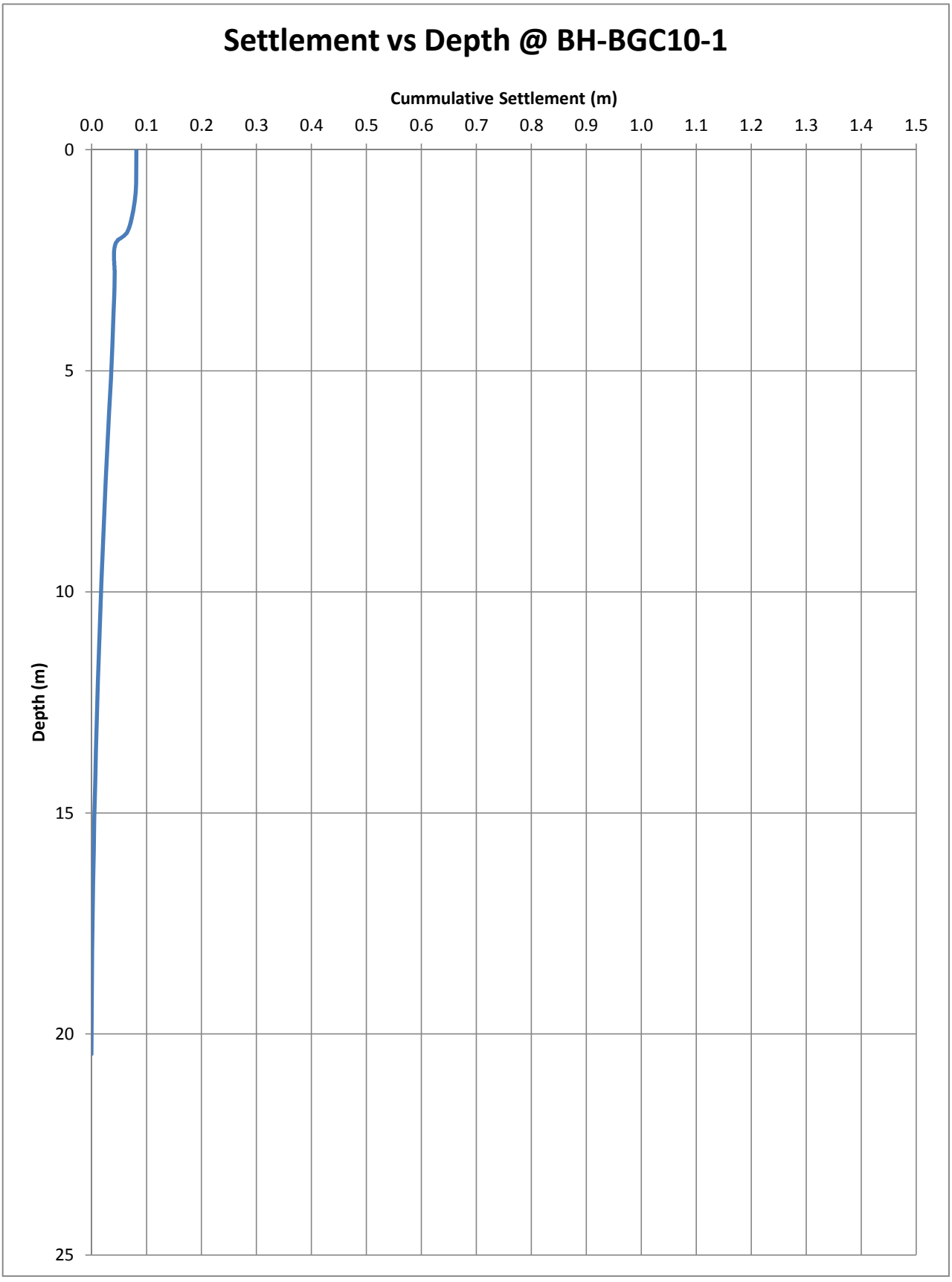
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8
9
10


Settlement vs Depth @ BH-BGC10-1
Cummulative Settlement (m)
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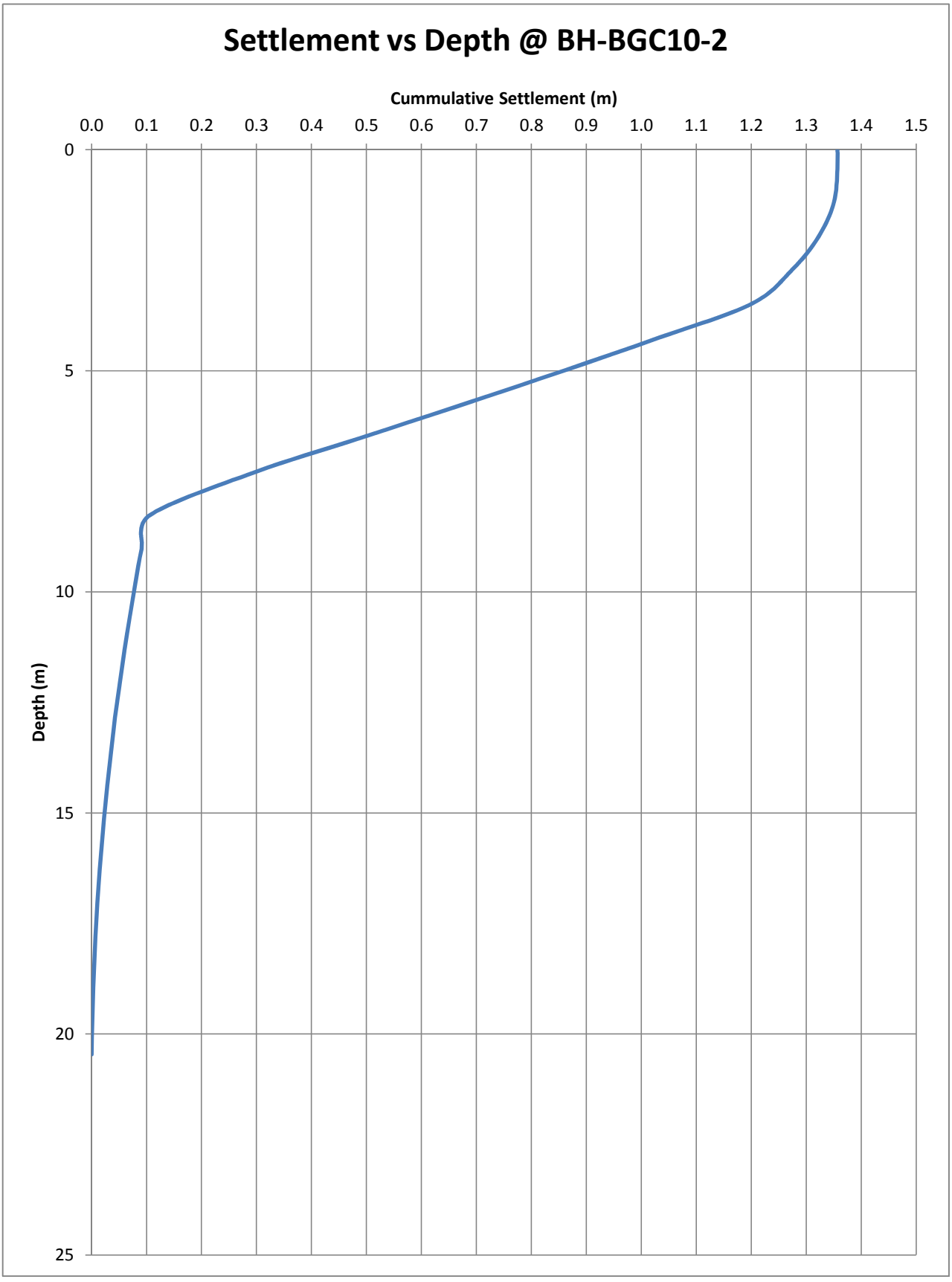
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
5
10
15
20
25


Settlement vs Depth @ BH-BGC10-2
Cummulative Settlement (m)
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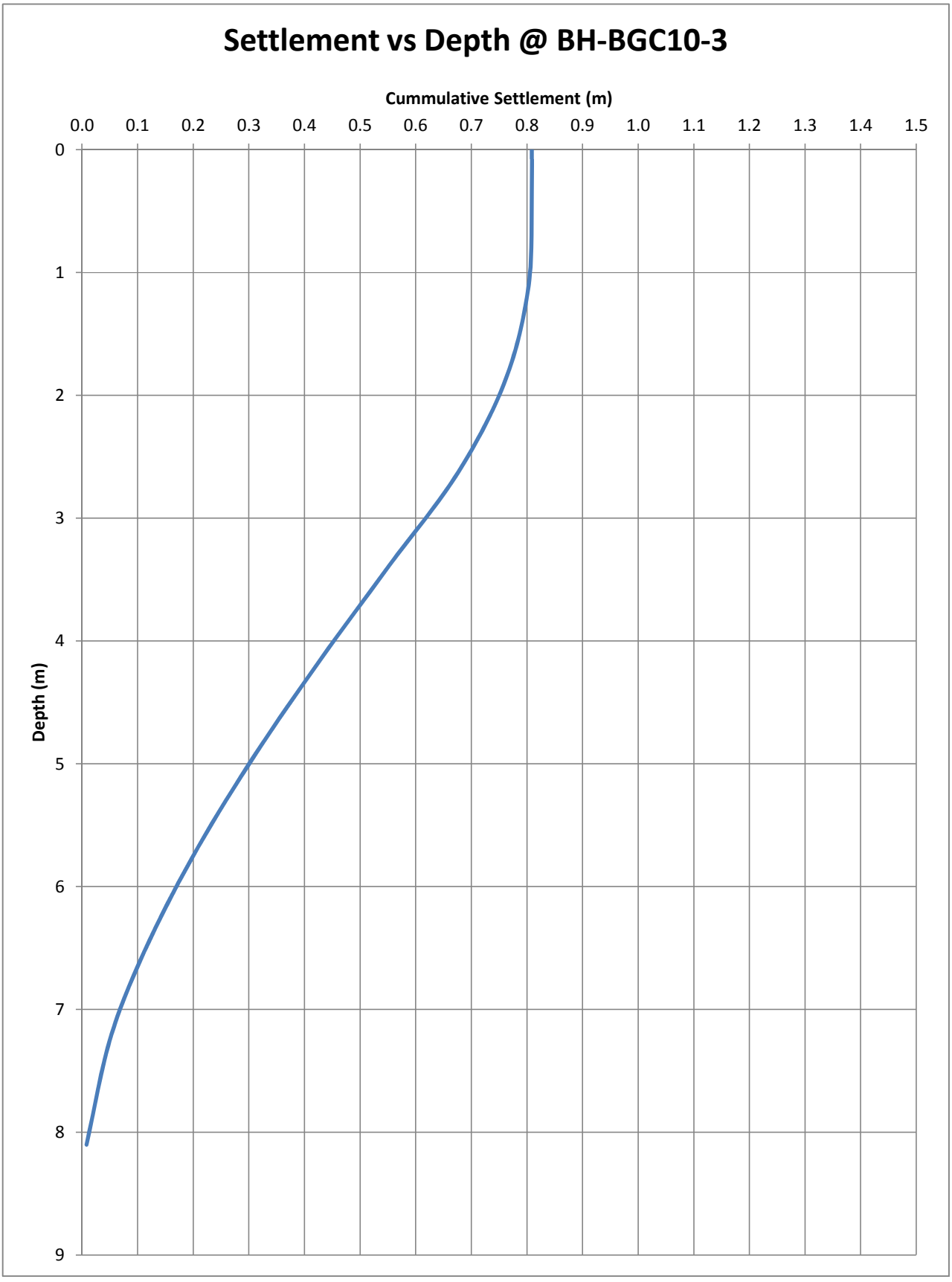
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
5
10
15
20
25


Settlement vs Depth @ BH-BGC10-3
Cummulative Settlement (m)
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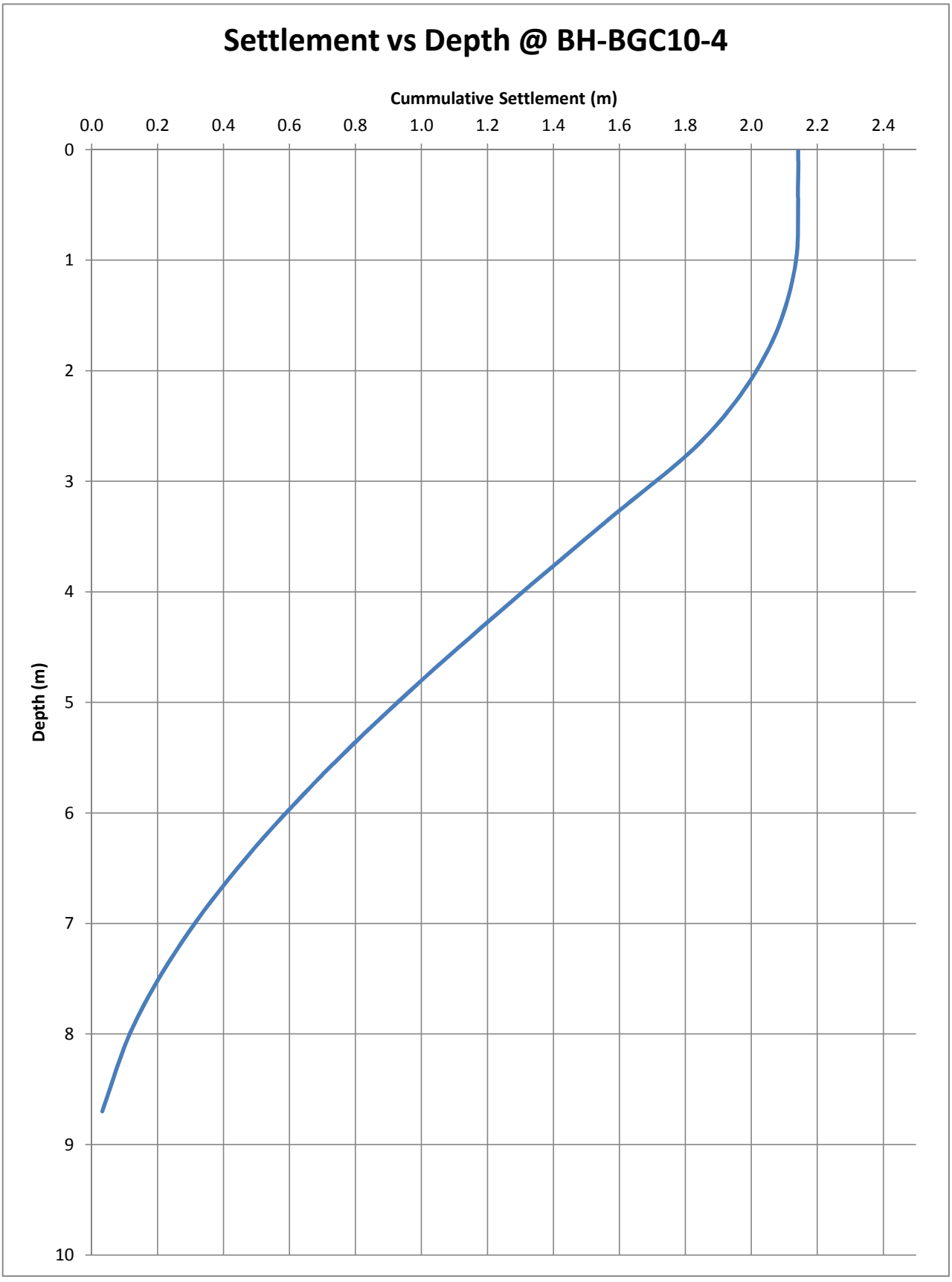
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8
9


Settlement vs Depth @ BH-BGC10-4
Cummulative Settlement (m)
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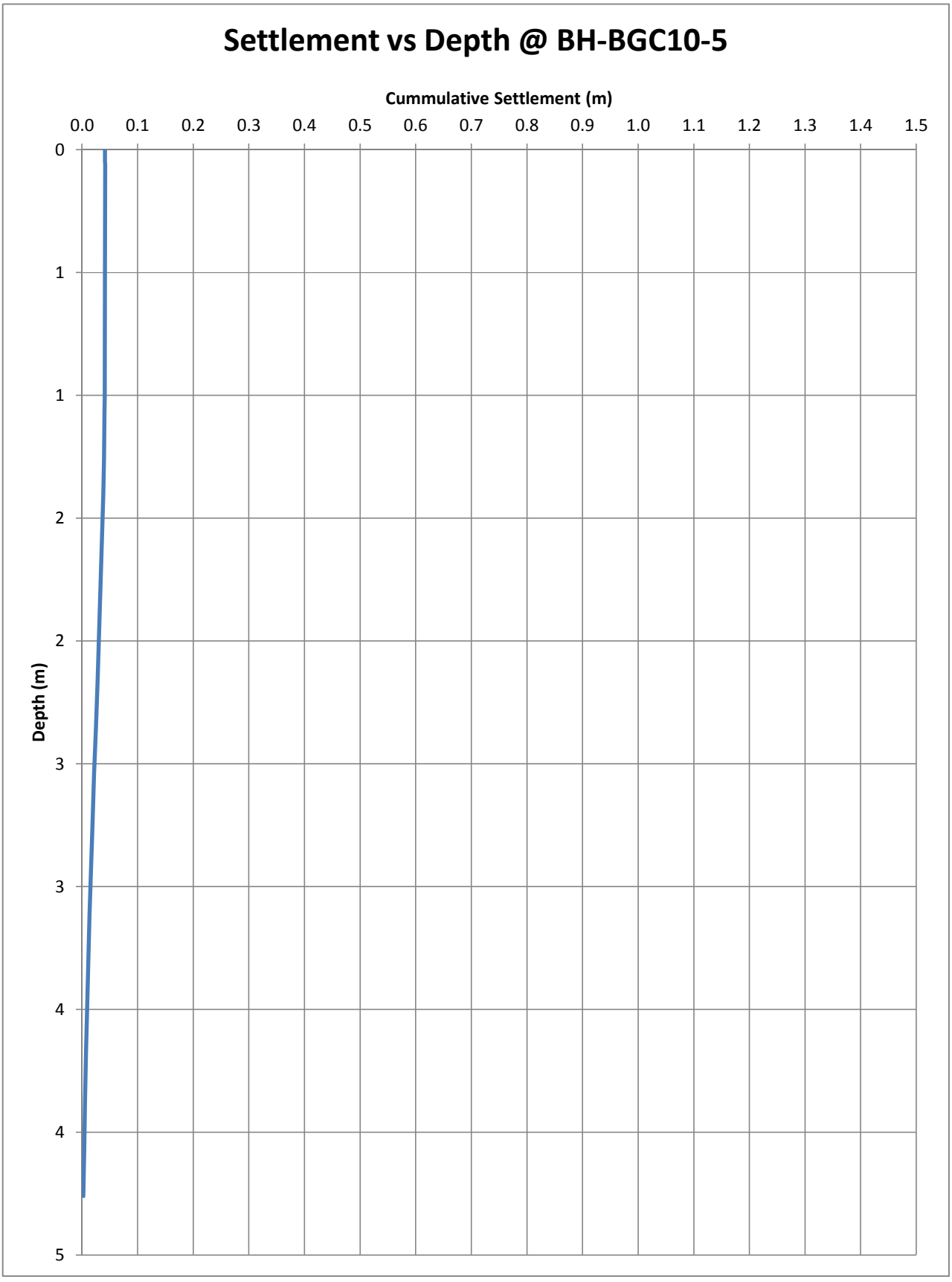
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
Depth (m)
0
1
2
3
4
5
6
7
8
9
10


Settlement vs Depth @ BH-BGC10-5
Cummulative Settlement (m)
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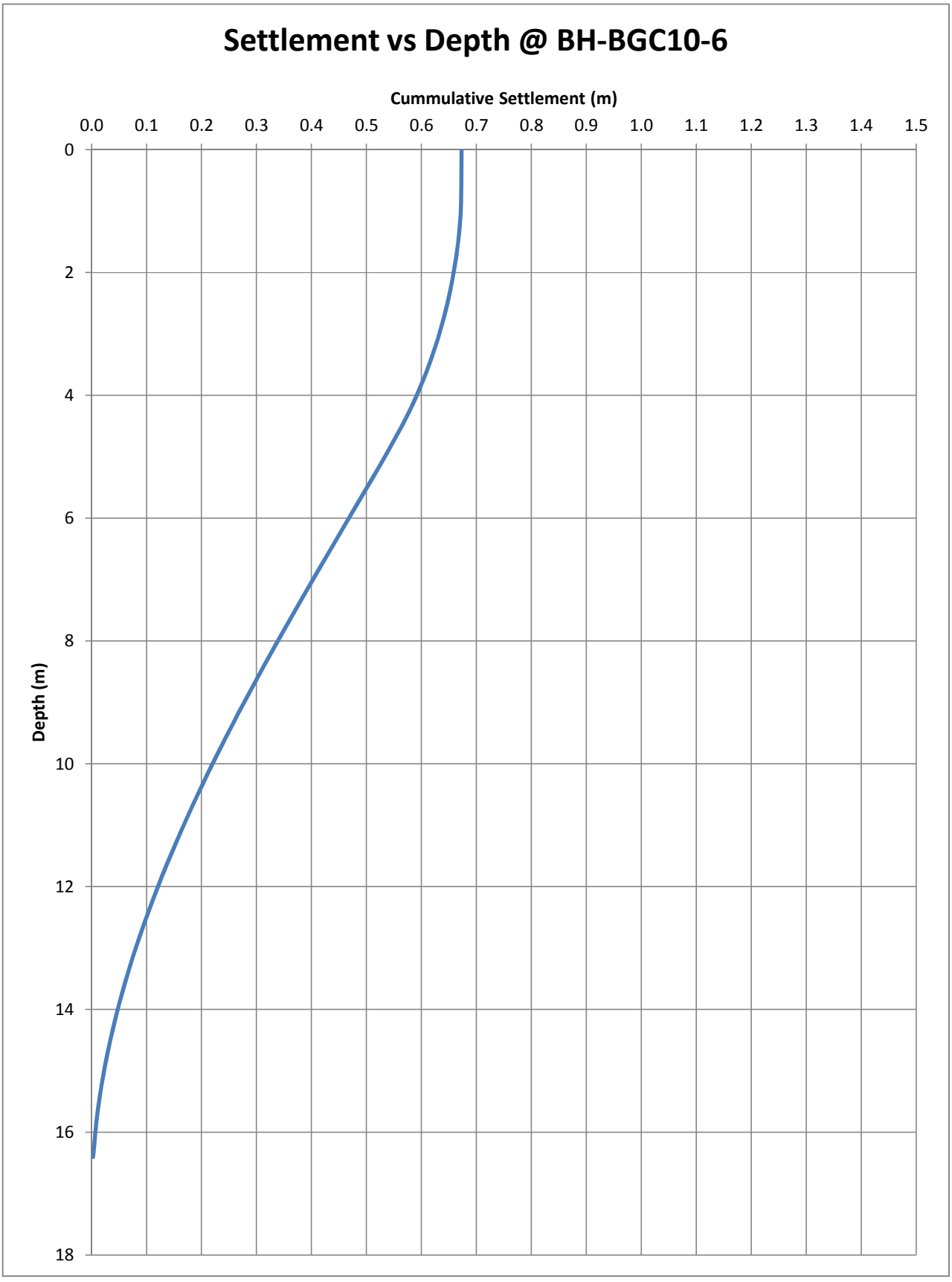
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
1
2
2
3
3
4
4
5


Settlement vs Depth @ BH-BGC10-6
Cummulative Settlement (m)
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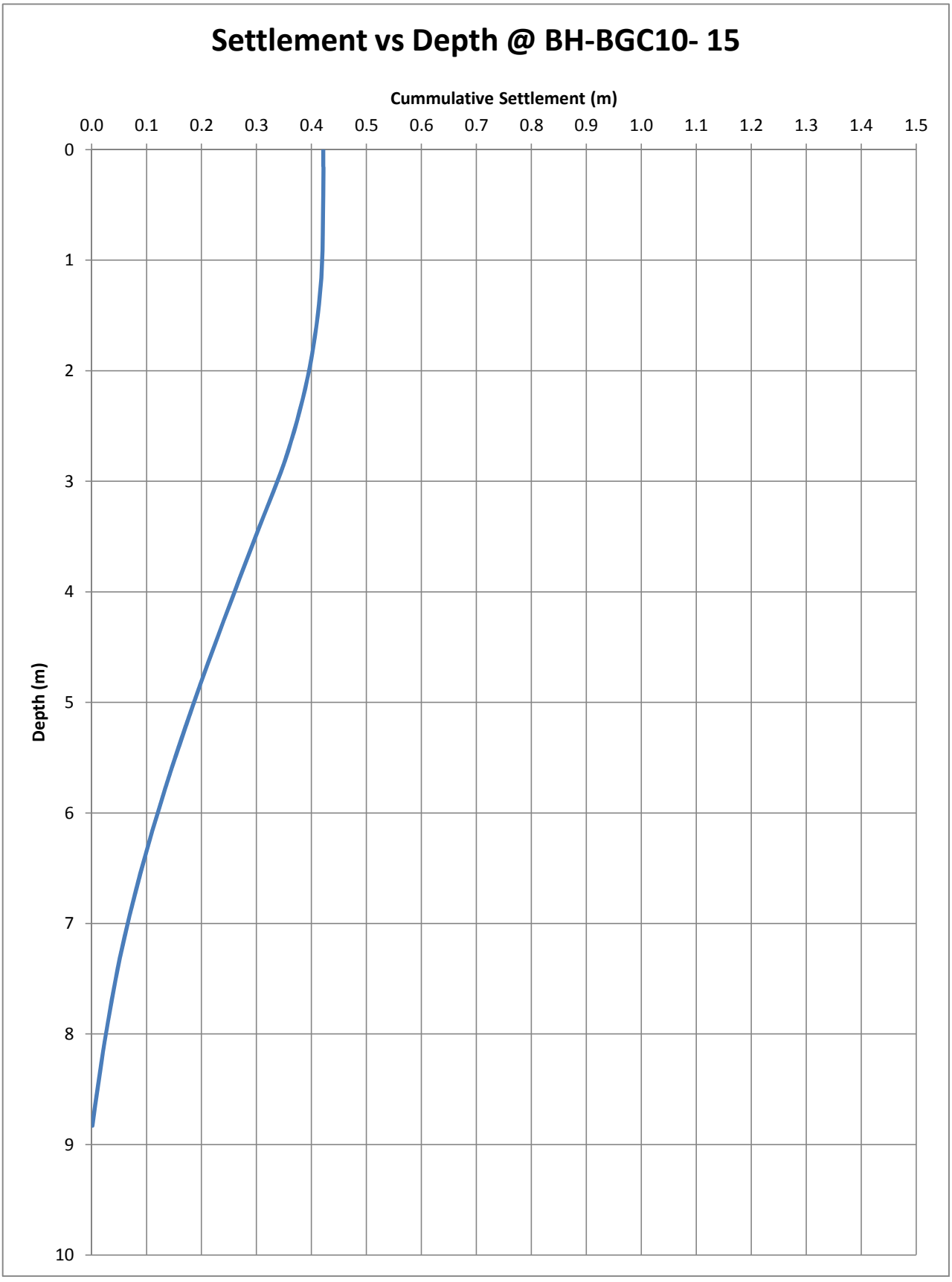
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
2
4
6
8
10
12
14
16
18


Settlement vs Depth @ BH-BGC10- 15
Cummulative Settlement (m)
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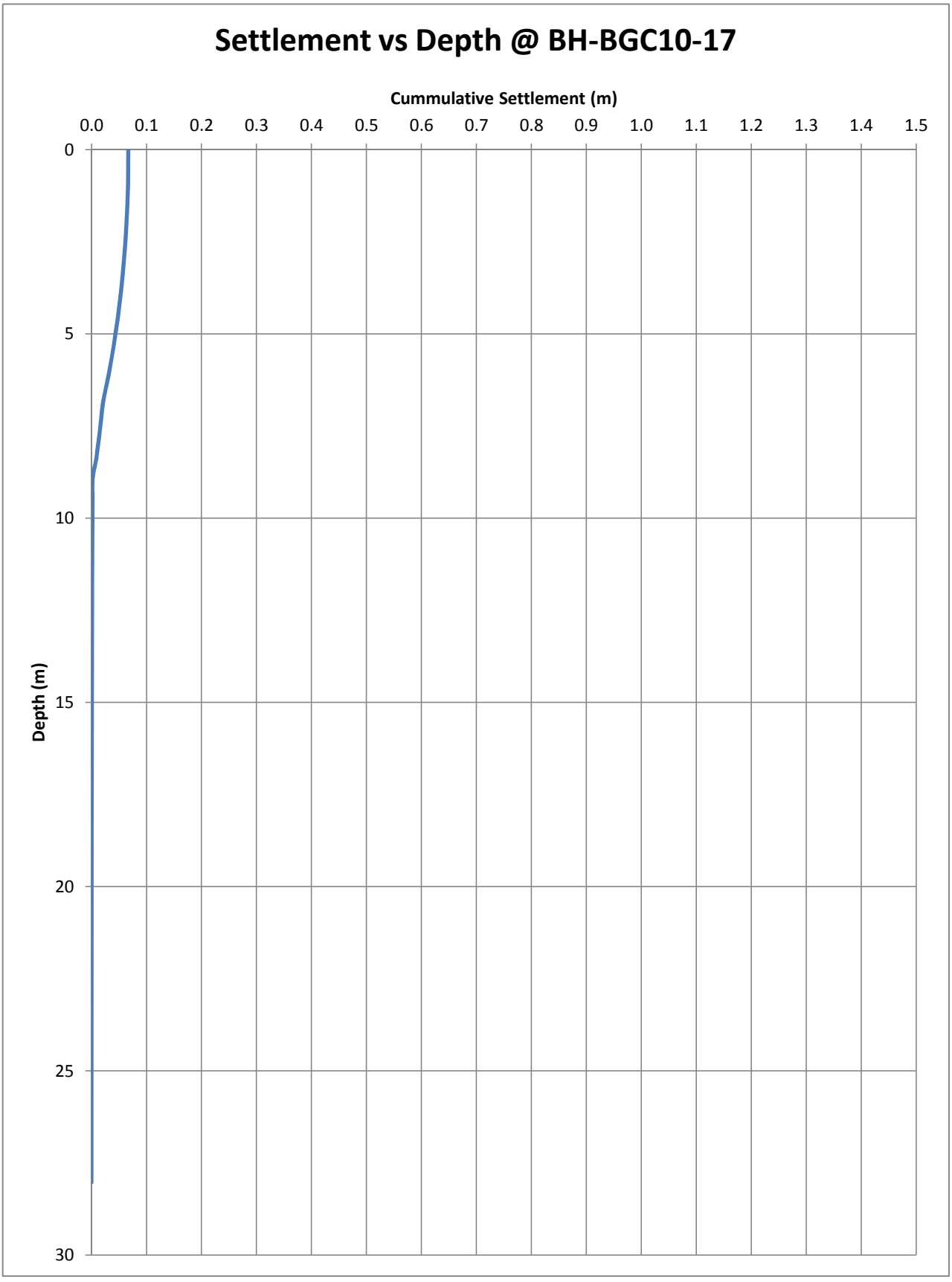
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8
9
10


Settlement vs Depth @ BH-BGC10-17
Cummulative Settlement (m)
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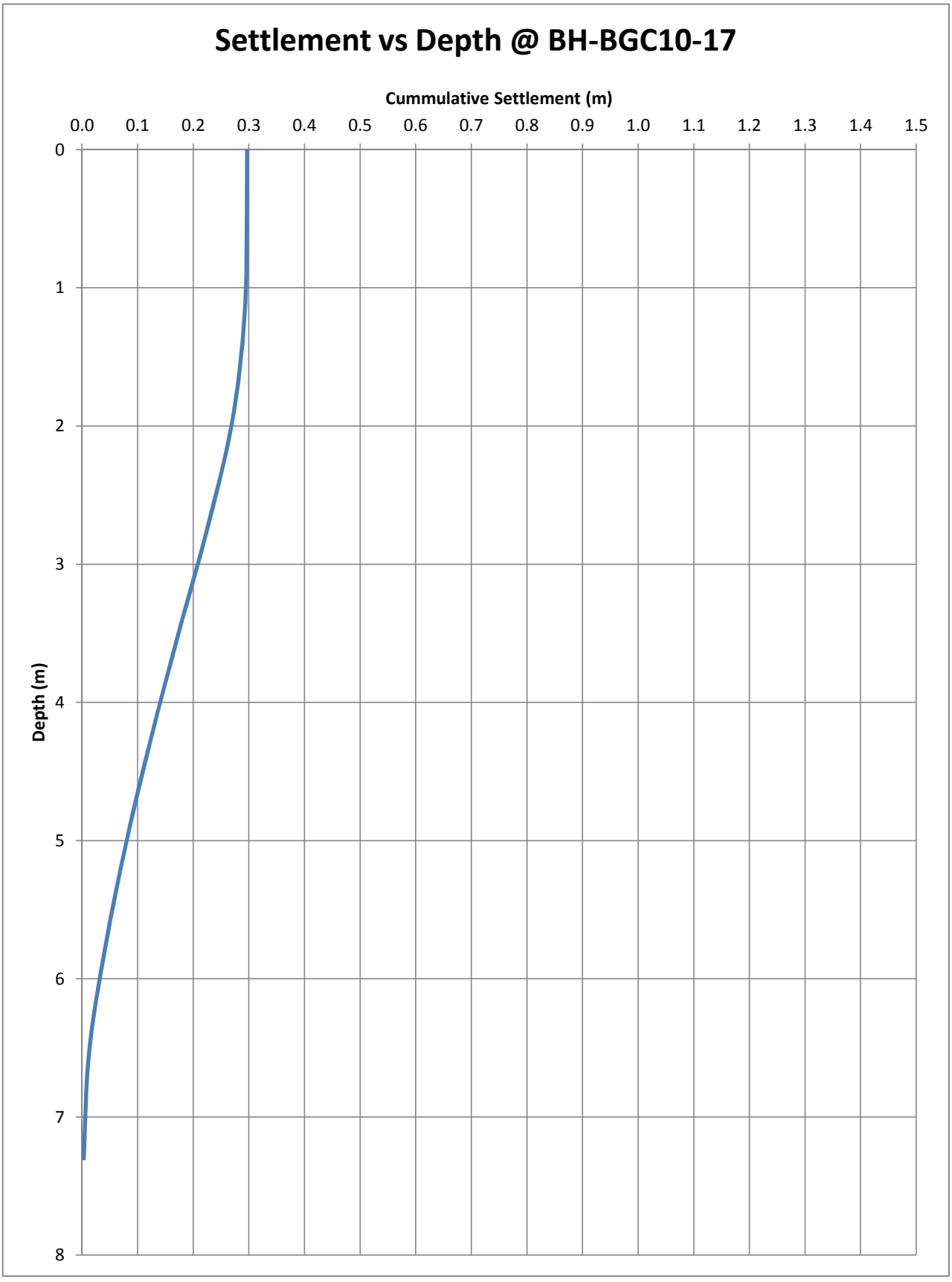
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
5
10
15
20
25
30


Settlement vs Depth @ BH-BGC10-17
Cummulative Settlement (m)
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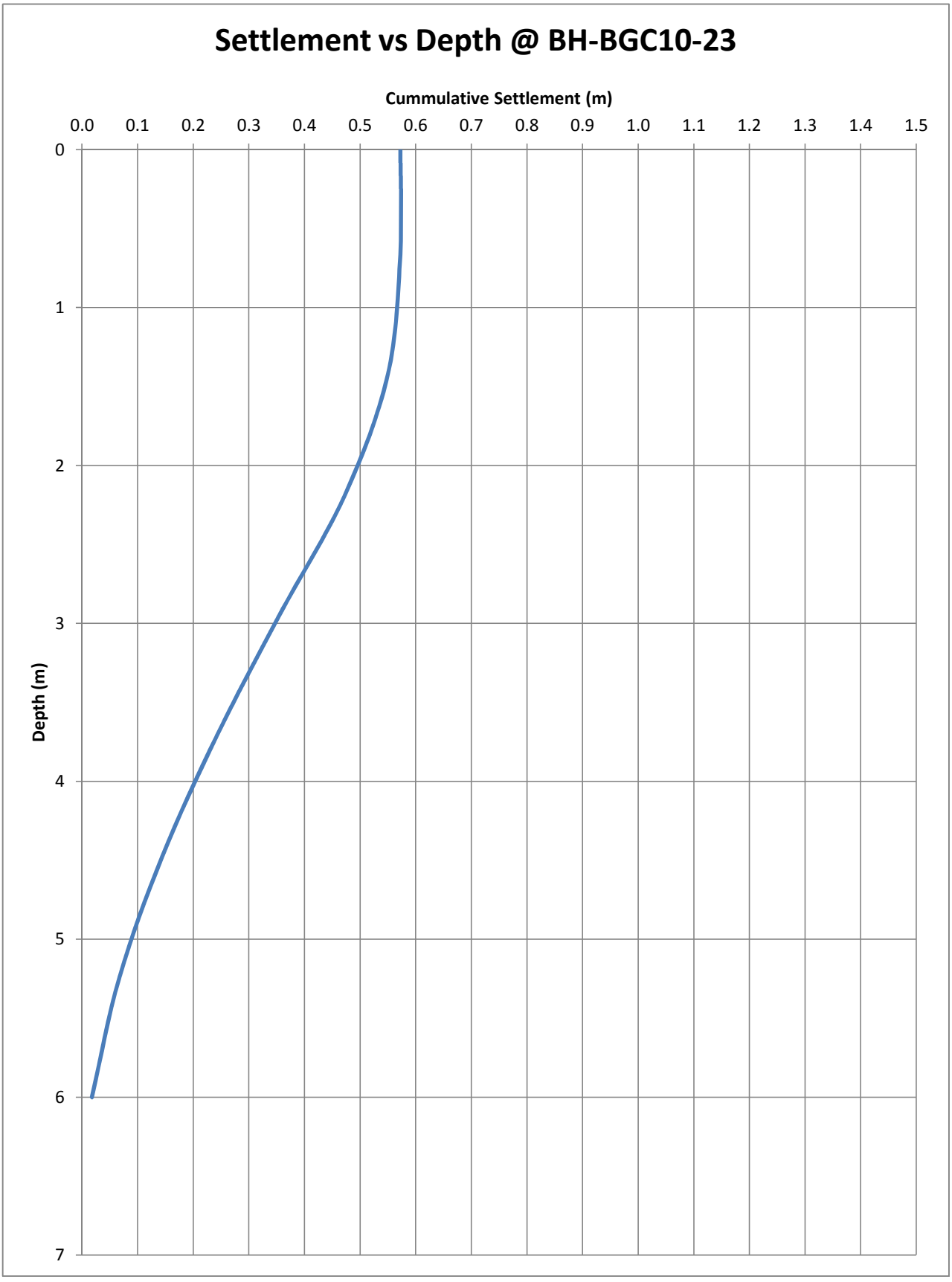
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8


Settlement vs Depth @ BH-BGC10-23
Cummulative Settlement (m)
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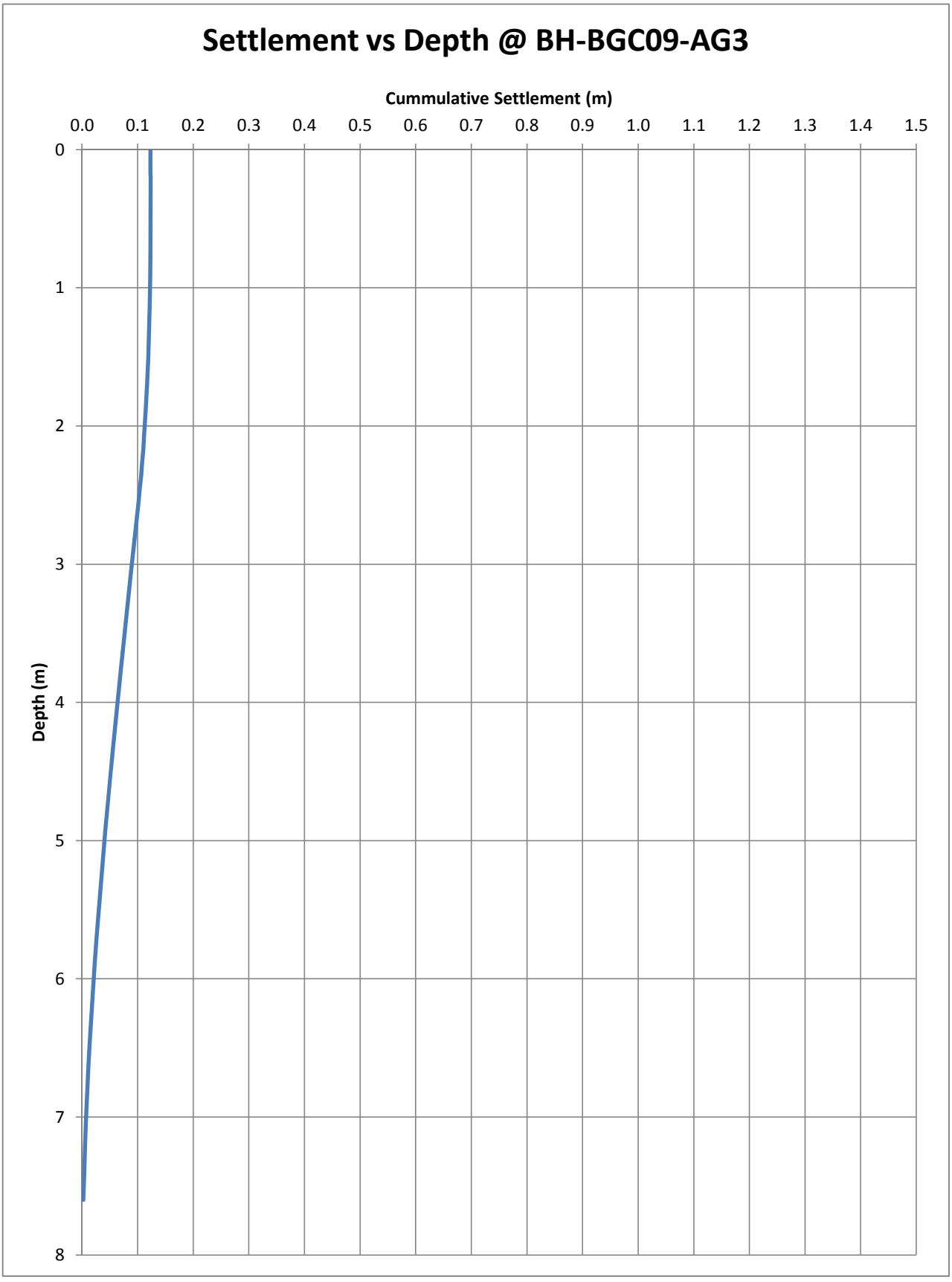
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7


Settlement vs Depth @ BH-BGC09-AG3
Cummulative Settlement (m)
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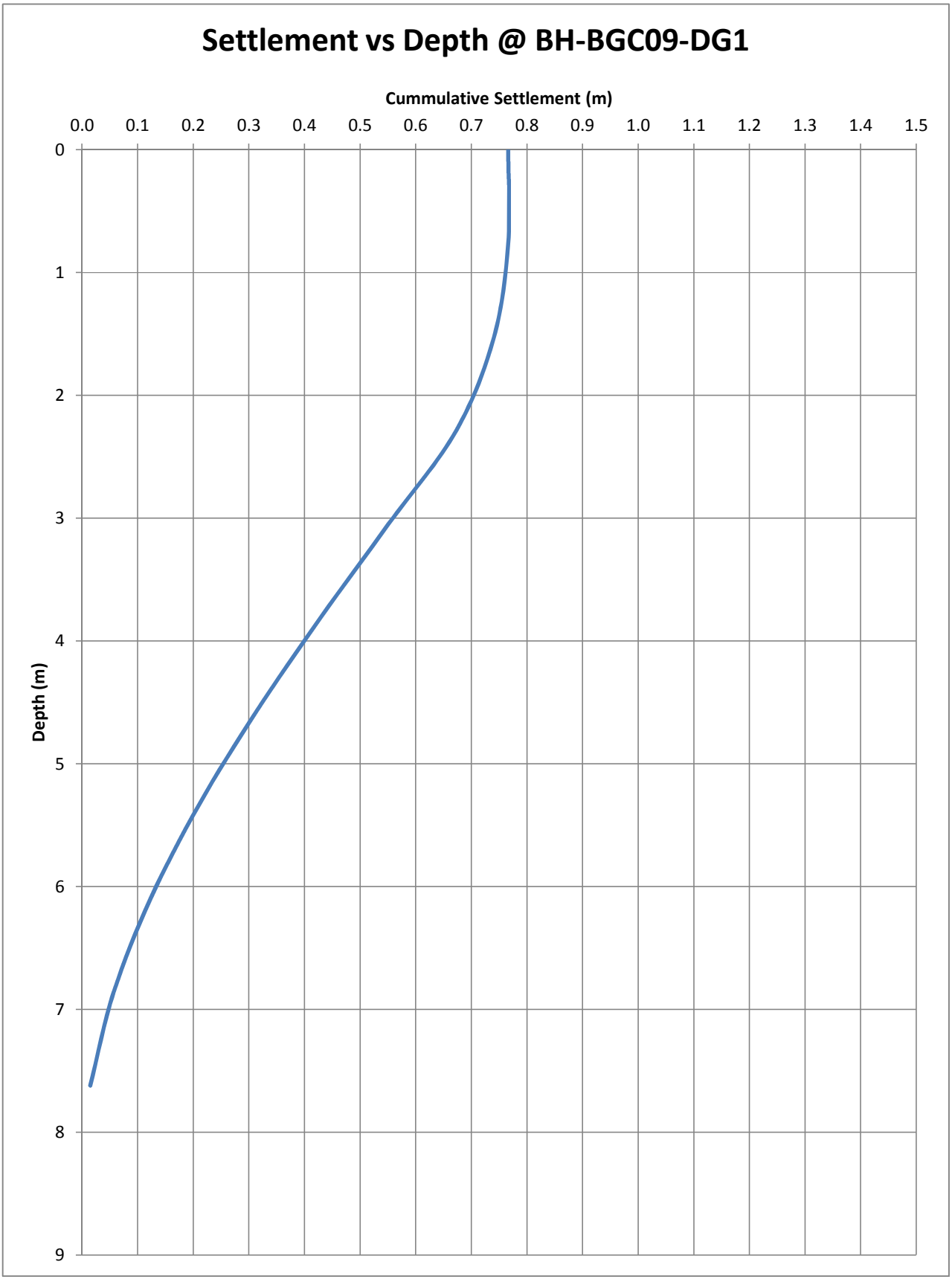
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8


Settlement vs Depth @ BH-BGC09-DG1
Cummulative Settlement (m)
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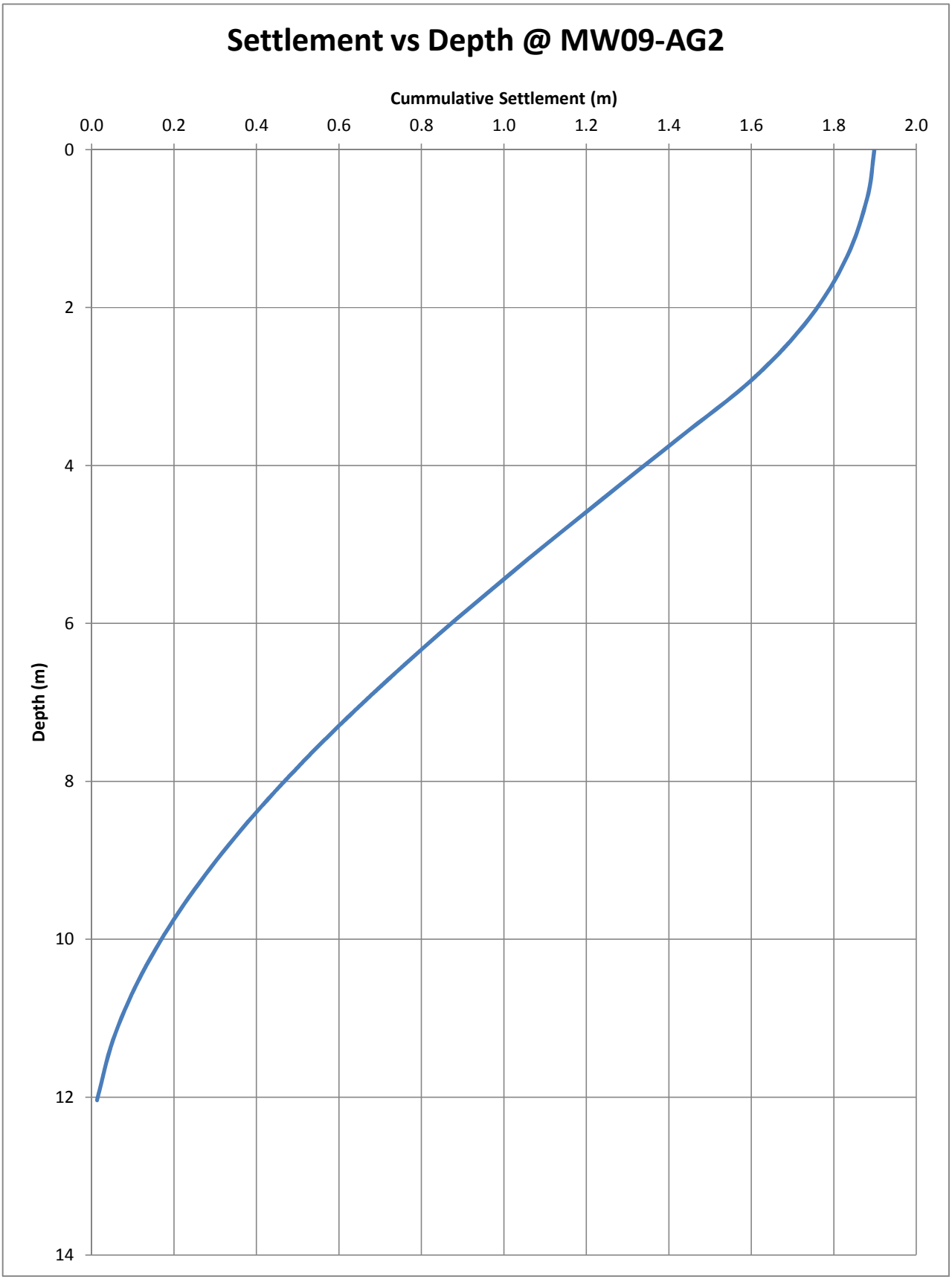
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
1.5
Depth (m)
0
1
2
3
4
5
6
7
8
9


Settlement vs Depth @ MW09-AG2
Cummulative Settlement (m)
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0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
Depth (m)
0
2
4
6
8
10
12
14

Borehole ID	Change in Stress	Material	Thickness, (m)		Classification
BH-BGC09-AG2					
BH-BGC09-AG3		Colluvium	1.6		SW/GW
		--	4.8		SP
			3.1		Quartzite
		Rock	3.02		Biotite Schist
BH-BGC10-1		--	1.8		--
		Moderately Weathered Rock	18.6		
BH-BGC10-2		--	7.3		--
		Very Weathered Rock	13.1		--
BH-BGC10-3		Fill	7.2		
		Colluvium	0.9		
		Moderately Weathered Rock	42.6		
BH-BGC10-4		Fill	8.7		
		Moderately Weathered Rock	22.3		
BH-BGC10-5		Fill	4.3		
		Moderately Weathered Rock	16.7		
BH-BGC10-6		Till	16.4		
		Moderately Weathered Rock	12.5		
BH-BGC10-16		--	8.8		
		Moderately Weathered Rock	12.2		
BH-BGC10-17		Fill	7.3		
		Moderately Weathered Rock	30		
BH-BGC10-23		Fill	6		
BH-BGC10-23		Placer Taillings	4.5		SW/GW
		Colluvium?	1.6		GP
		Weathered Bedrock	1.5		CL
		Metasedimentary	5.2		Rock

Area	Borehole ID	Consolidation Settlement (mm)
HLF Impoundment	BH-BGC10-AG3	716
	BH-BGC10-AG5	533
	BH-BGC10-1	82
	BH-BGC10-2	1,357
	BH-BGC10-3	809
	BH-BGC10-4	2,142
	BH-BGC10-5	42
	BH-BGC10-6	673
	DH-BGC09-AG3	123
	MW09-AG2	1,898
HLF Embankment	BH-BGC10-16	67
	BH-BGC10-17	297
	BH-BGC10-23	572
	DH-BGC09-DG-1	766

APPENDIX N – HLF WATER BALANCE

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Fort Collins, CO
Tel 970.206.4200 Fax 970.223.7171
www.tetratech.com

Technical Memorandum

To:	Steve Wilbur Andrew Kaczmarek	**From:**	Amit Karki, P.E.
Company:	Victoria Gold Corporation 1055 Dunsmuir Street Vancouver, BC	**Date:**	April 29, 2013
Re:	Eagle Gold Heap Leach Facility Water Balance – Revision 3	**Project #:**	114-201087
CC:	Troy Meyer, P.E. (Tetra Tech Inc.) Dan Evans (Tetra Tech Inc.)		

1.0 Introduction

This technical memorandum explains the methodologies and assumptions used to create a water balance model that has been developed for the Eagle Gold Heap Leach Facility. The intent of the water balance model is to determine the monthly freshwater make-up requirements for the Heap Leach Facility (HLF) as well as estimate the solution inventory within the HLF over the operational life of the facility. The draindown process and long term solution inventory after closure is not considered as part of this model.

The water balance model accounts for a three phase Heap Leach Pad and a 100-day stockpile, with an ore production rate of 29,500 tons per day for 350 days a year. For 250 days (March-November), ore will be processed through three stages of crushing and stacked on the heap leach pad. For the remaining 100 days (November-February), ore will be sent through the primary crusher only and stored on the 100-day stockpile. When the 250 day stacking period begins the following year, the ore from the stockpile will be sent through remaining crushers (secondary and tertiary) and stacked on the heap leach pad.

The water balance model accounts for all water that enters or leaves the HLF either through: environmental contributions/losses, natural ore water content, and solution application. Any excess water accumulated during high precipitation/runoff conditions will either be reintroduced (recycled) back into the HLF circuit or will be sent to the cyanide detoxification/minewater treatment plant (CD/MWTP) and discharged to the environment. Optimal use of the excess water released from the HLF will be determined by the overall site-wide water balance model which is being done by Knight Piesold (KP). The HLF water balance is setup on a monthly time increment. Summary graphs and tableson of monthly and yearly make-up quantities are summarized in the memorandum. Estimated solution inventory quantities over the operational life of the HLF are also summarized herein.

2.0 Water Balance Model Overview

The HLF water balance model is shown in Figure 1. Ore is assumed to be mined 350 days year at a constant rate of 29,500 tons per day. For 250 days beginning in March of the first year, 29,500 tons of raw ore each day goes through three (3) stages of crushing, and is then stacked

on the heap leach pad. Halfway through November, stacking of the ore in the heap leach pad will cease; the same rate of ore will go through primary crushing only and will be placed on a stockpile for 100 days till the beginning of March the following year. The stockpile stores partially crushed ore in the winter time (November-February), when snowpack on the heap leach pad interferes with stacking and the heap leaching. In March of the second and every subsequent years, 29,500 tons of ore mined each day will return to the three stages of crushing, followed by stacking in the heap leach pad. In addition, the ore stockpiled during the previous winter will also go through the last two stages of crushing and will be stacked during the same 250 days. It is assumed that the stockpiled ore will be moved to the heap at 11,800 tons per day (an even rate over the 250 stacking days.) Thus, a total of 41,300 tons of ore per day is added to the heap from March through part of November beginning in Year 2.

All water movement into, out of, or within the entire water balance system (characterized by the large green box) is represented by arrows in Figure 1. Red arrows signify ore movement and the associated water content that naturally occurs with it, which is considered an input (positive) to the water balance. Crushing is assumed to neither contribute nor take water from the ore; therefore, it is assumed that ore water content stays constant during the crushing process. Ore from the stockpile is assumed to have an additional water content due to environmental exposure; however, this additional amount is assumed to stay constant also. Blue arrows represent water/solution that is added or removed from the system during the leaching process. This includes leaching solution and fresh make-up water. Environmental contributions/losses are highlighted using purple arrows, and symbolize the amount of water that is added or removed from the stockpile and heap due to exposure to the environment.

The stockpile and the heap leach pad are the two areas of primary focus, because they are the areas mainly affected by the inflows and outflows of the water balance. Because stockpiling and stacking take place in different locations, at different rates and during different times of the year, the two areas are treated as two separate systems that contribute to the entire water balance.

Environmental contributions change seasonally, therefore a monthly time step was used in the water balance model to reflect the changes. For this water balance analysis, only average climatic conditions (precipitation, evaporation and sublimation) were simulated for each month.

As shown in Figure 1, leaching solution is assumed to be added to the crushed ore after being stacked on the heap. Because this water balance considers the entire HLF (i.e., and not just the active leaching area), the leaching requirement is defined as the amount of water required to meet the average stacking water content for leaching (explained in Section 4.0). The leaching application solution used during leaching is composed of two parts: recycle water and freshwater. Recycle water is the water/solution that is released from the ore to the In-Heap Pond and then pumped out and sent to the Adsorption, Desorption and Recovery ADR Plant. Fresh make-up water is the water that must be supplied by an outside source (i.e., groundwater or collected surface water) to meet the water demands of the HLF after recycling. The fresh make-up water requirements calculated from this water balance do not include requirements for the ADR Plant.

Water/solution that is released from the ore is assumed to be temporarily stored in the In-Heap Pond. The In-Heap Pond provides a maximum capacity of 419,106 m^3 (Tetra Tech, 2013a). For modeling purposes, minimum (33,240 m^3) and maximum (199,440 m^3) operating volumes of water/solution in the In-Heap Pond were also assumed to establish controls on whether to:

- recycle water/solution to supply make-up water,
- maintain a minimum operating volume of 33,240 m^3, or

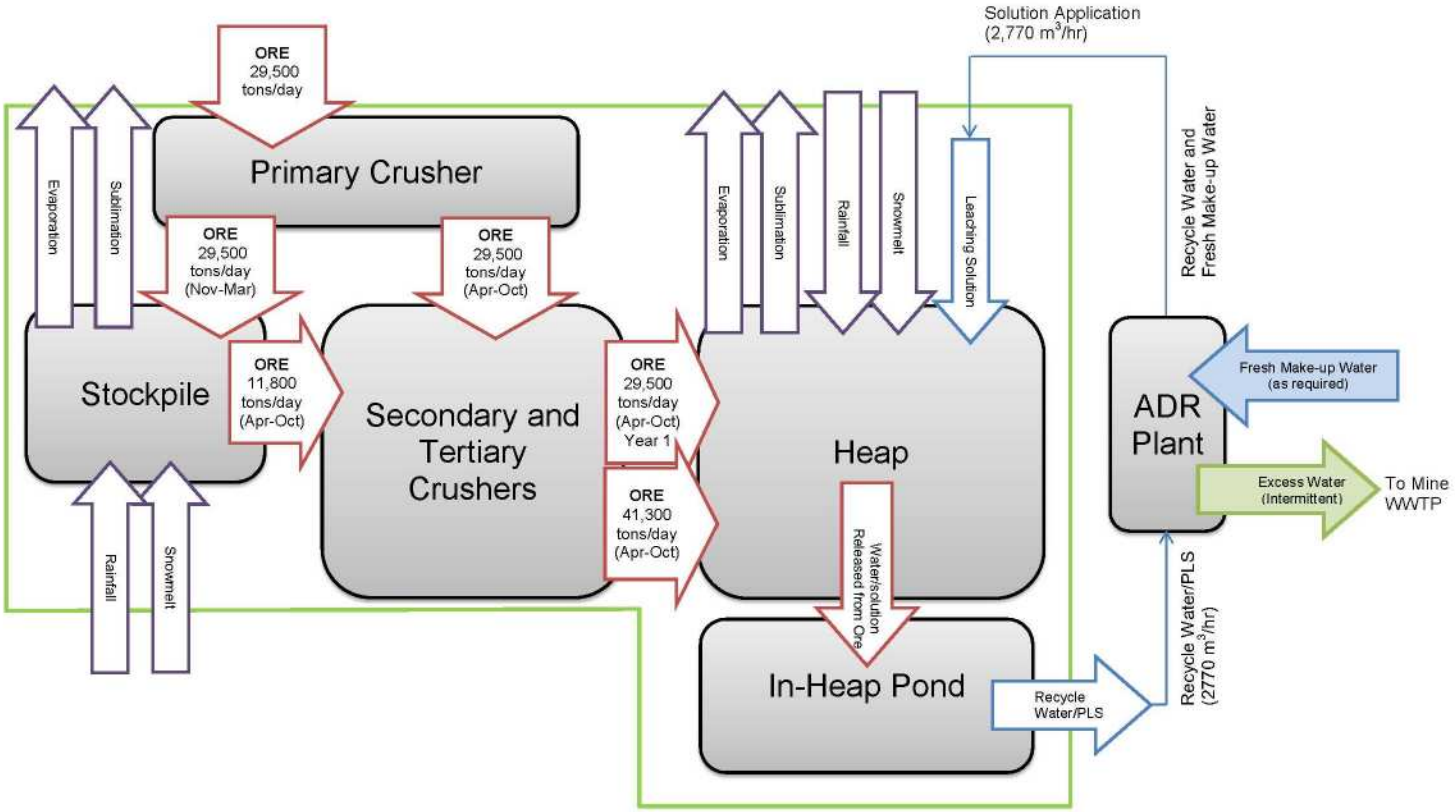
- determine whether there is excess water/solution that would need to be discharged to the CD/MWTP.

The minimum operating volume is based on having a sufficient volume in the In-Heap pond to prevent cavitation in the pump sumps while sustaining a minimum pumping period of 12 hours at the nominal pumping capacity of 2,770 m^3/hr (i.e., 12 hrs at 2,770 m^3/hr = 33,240 m^3). The maximum operating volume is defined as the difference between the maximum design capacity (419,906 m^3) and the total from two low probability events (maximum snowmelt and 72-hr draindown) occurring simultaneously (i.e., 419,906 m^3 – 82,026 m^3 – 199,440 m^3 = 137,640 m^3).[1] The derivation and volumes of the maximum snowmelt and 72-hour draindown are described in (Tetra Tech, 2013a).

The Event Pond was not modeled as part of the water balance system as it was designed only to store extreme event conditions such as the overflow from the probable maximum precipitation (PMP) event. The Event Pond will remain dry through the life of the HLF so that it can provide adequate storage in case the In-Heap Pond overtops. It will not be used to temporaroy store recycle water or any other water while the HLF is operating.

[1] This minimum condition differs from and supersedes the previously reported (Tetra Tech, 2012a) average or nominal operating volume of 132,960 m^3 which assumed 48 hours at 2,770 m^3/hr, and the minimum and maximum operating values of 133,000 m^3 and 200,000 m^3 cited in Knight Piesold (2012b)

Figure 1 Heap Leach Facility Water Balance Model Schematic



3.0 Water Balance Inflows and Outflows

Figure 1 includes a visual representation of the water balance inputs and outputs that will be considered for this model.

System inflows include:

- Ore Water – Water that naturally occurs in the mined ore.
- Rainfall – Rainfall that is collected within each contributing area (further defined in Section 4.3). The contributing areas are defined by the pad geometry of the HLF and estimated stockpile geometry.
- Snowmelt – Snow accumulates over the winter, but is not released into the system as water until it melts during the warmer months. Snowfall within the contributing areas is considered as an input (positive) into the water balance. Snowmelt is distributed each month as a percentage of total yearly snowmelt. The snowfall and snowmelt distribution percentages over the year can be found in Attachment A.
- Leaching Solution – The solution applied to the heap to raise the water content of the ore to the average operating water content. It is comprised of:
    - Recycle Water – Pregnant Leach Solution (PLS) from the heap minus gold that is reintroduced back into the leach cycle.
    - Fresh Make-up Water – Water required from an external source to make-up any water shortages.

System outflows are:

- Evaporation (on the pad) –Evaporation that occurs on the top surface area of the ore due to warmer temperatures. Evaporation varies with area and is assumed to occur over the entire area occupied by the ore on the pad and stockpile area.
- Evaporation (from leaching solution) – Percent of leaching solution that evaporates from drip emmitters upon application every month, and is shown in Appendix A.
- Sublimation – Water that vaporizes from the winter snowpack, reducing the water content of the snowpack that is available for snowmelt. This is estimated at 20% of the snowpack (Knight Piesold, 2013).
- Excess Water – Water that is released from HLF in excess of the operating storage capacity of the In-Heap Pond (after gold is extracted).

The total amount of recovered leachate solution is assumed to be available for recycling to the HLF for leaching and any surplus water not completely used in a given month is assumed to be available for use in the following month.

4.0 Water Balance Model Assumptions

This section of the technical memorandum discusses all the assumptions of the HLF water balance including: moisture contents of the ore, stacking and stockpiling rates, contributing areas of the heap and stockpile, climate data, and the solution application and leaching rate.

4.1 Moisture Contents of the Ore

The natural water content of the raw ore when removed from the pit, before processing is 5.0% by mass (Wardrop, 2011a). All ore processed and sent directly to the Heap Leach Pad (HLP) during the 250 stacking days contributes 5.0% water content (by mass) into the water balance. The ore bulk density is assumed to be 1,870 kg/m^3 (Tetra Tech, 2013b). All ore processed and sent to the Heap via the temporary stockpile is assumed to have an average ore water content of 6.65% by mass. All environmental water, rainfall and snow less evaporation, accumulated on the stockpile is assumed to contribute to the total water content of the ore stockpile. The sum of all contributing water for the entire year is divided evenly per cubic meter of ore, assuming an even distribution of the accumulated water throughout the stockpiled ore. See Attachment B for calculations.

It is assumed that makeup water will be added to the ore during irrigation (after being crushed and stacked on the HLP). Even though the water content for ideal leaching is 13.3% by mass (Wardrop, 2011) and occurs only under the active leaching area, for practical modeling purposes it is assumed that to reasonably account for solution inventory over time, the ore water content of the previously leached areas will decrease to about 8.6% water content by mass (Wardrop, 2011a). It is assumed that solution will be able to drain from a water content of 13.3% (by mass) to 8.6% (by mass) in approximately one months' time (average) regardless of ore lift heights, during operation of the HLF.

The "Water Content" worksheet in Attachment B shows the calculations for the water quantities listed above. In summary, the ore properties used in the water balance are (Wardrop, 2011a):

- Natural ore water content = 5.0% by mass
- Optimal ore water content = 13.3% by mass and
- Residual ore water content after leaching = 8.6% by mass.

Water content within the ore on the HLP is constantly changing during operations and is a complex process; as some portions of the ore are being actively leached while previously leached areas are draining down (with overall moisture contents ranging from 13.3% to 8.6% by mass). Estimating moisture content throughout the heap is complex and is a function of ore stack height, leach time, solution travel time, ore stack geometry, and placement of the irrigation drip system. At this level of design and for practical purposes, a simplified leaching, drainage and recycling process was incorporated into the water balance model to account for variation in water content throughout the HLP.

In order to account for the variation of water content and solution movement through the ore, approximate percentages of active areas (leaching) vs. inactive areas (draining) were estimated for each phase. These active vs. inactive areas were estimated from preliminary stacking plans (M3, 2013 to be received from M3) taking into account the percentage of area being leached in comparison to the overall area of the ore lifts, as well as accounting for the changes in geometry of the stacked ore as the height of the HLP increases. A namesake stacking plan was developed, to be updated later, for this simulation run. The percentages of active vs. inactive

areas were calculated for each stacking lift then a combined average was estimated for each phase of the HLP. The estimated percentages of active vs. inactive areas for each phase of the HLP are summarized Table 1 below.

Table 1. Heap Leach Pad Active vs. Inactive Leaching Area Percentages

Heap Phase	Active Area (Leaching) 13.3% by mass	Inactive Area (Draining) 8.6% by mass
Phase 1	78%	22%
Phase 2	74%	26%
Phase 3	54%	46%

Using the active and inactive areas estimates from Table 1, an average stacking water content for the ore was calculated. The average stacking water content is the assumed average water content that any volume of ore going onto the HLP would reach after being stacked. This average stacking water content collectively accounts for ore that is actively being leached, and for ore that has started draining. It is calculated using an area weighted average of active vs. inactive area multiplied by its respective assumed water content. For example, from Table 1, Phase 1 active vs. inactive area estimates are 78% and 22%, respectively. These values are then multiplied by the optimal water content (13.3% by mass) and residual moisture content (8.6% by mass) (i.e., 0.78 x 13.3% + 0.22 x 8.6% = 12.3% by mass as shown in Table 2). The resulting average stacking water content values associated with its respective phase are presented in Table 2 below.

Table 2. Ore Average Stacking Water Contents

Heap Phase	Average Stacking Water Content (volume)	
	% by mass	m^3/m^3 ore (by vol.)
Phase 1	12.3%	0.218
Phase 2	12.1%	0.215
Phase 3	11.1%	0.198

4.2 Stacking and Stockpiling Rates

Stacking and stockpiling rates are based on an ore production rate of 29,500 tons of ore per day for 350 days a year, and stockpiling takes place for 100 of those days. Figure 1 reflects the following stacking and stockpiling information and assumptions:

- 29,500 tons/day of ore is processed through three stages of crushing and stacking on the HLP for 250 days (March through part of November every year);

- 29,500 tons/day of ore is processed through the primary crusher and placed on the stockpile for 100 days (the last part of November through February every year beginning in November of the first year);
- 11,800 tons/day of partially crushed ore from the stockpile is sent through the secondary and tertiary crushers and is stacked on the HLP for 250 days (March through part of November after the first year);
- 41,300 tons/day of fully processed (crushed) ore is placed on the HLP for 250 stacking days (March through part of November after the first year).

For the purposes of this water balance, March 1, 2015 is assumed to be the beginning of the 250 day stacking season in the first year.

Preliminary stacking plans were incorporated into the HLF water balance to estimate active vs. inactive areas as described in section 4.1 to account for environmental effects, as well as leaching and drainage effects.

4.3 Heap Leach Pad and Stockpile Contributing Area

The HLP will be constructed and stacked in three phases. Preliminary stacking plans developed by Tetra Tech (2012b) were utilized to determine the amount of ore being placed on the HLP throughout the life of the HLF. The HLF water balance will be revised once the new stacking plans are received from M3. These preliminary stacking plans are essential to estimating the amount of environmental losses and contributions to the ore water content. The cumulative area occupied by ore at each elevation was used to calculate the amount of evaporation and sublimation. The preliminary stacking plans were also used to estimate the ratio of active vs. inactive areas of the ore that is being stacked as described in Section 4.1.

It is assumed that temporary diversion channels will be placed upstream of each lined pad phase area. These diversion channels delineate the contributing watershed areas. Since each area is lined, all precipitation (minus evaporative losses) that falls within that area is assumed to directly add to the water balance.

The stockpile area also contributes to the water balance, and its contribution is assumed to remain at a constant rate when stockpile ore is added to the crushing circuit during the life of the mine. All precipitation (minus evaporative losses) that falls within the stockpile area is assumed to be added to the water balance. It is also assumed that all runoff from higher elevations will be diverted around the stockpile area.

The contributing areas that collect precipitation for each phase of the HLP and stockpile are as follows:

- Phase 1: 477,898 square meters
- Phase 2: 993,330 square meters
- Phase 3: 1,384,816 square meters
- Stockpile: 185,485 square meters

The stockpile areas were estimated using an approximate footprint and contributing area, and are assumed to increase evenly during the 100 days of stockpiling. Similarly, the stockpile area is assumed to decrease incrementally during 250 stacking days. As the physical geometry and layout of the stockpile is further designed, the water balance may be adjusted accordingly.

4.4 Climate Data Input

Monthly climate data was provided by Knight Piesold (2013) for a site near the proposed HLF. This data includes monthly values for:

- Precipitation (rainfall and snowfall);
- Snowmelt; and
- Evaporation.

Evaporation data provided by Knight Piesold is based on pan evaporation values that have been corrected for evaporation from rock surfaces. This climate data input can be found in Attachment A. Evaporation calculations from the leaching solution drip emitters is included on the "Environmental Contribution Water" sheet in Attachment C.

4.5 Leaching Solution and Recovered Solution

Leaching solution is applied to the top area of the HLP at a rate of 2,770 m^3/hr, and consists of two sources: recycle water from the recovered solution and fresh make-up water from an external source (either groundwater or collected surface runoff). The amount of freshwater required is determined from this water balance. Recycle water is the recovered Pregnant Leach Solution (PLS) minus the gold that is available for reuse. It is assumed that the amount of leaching solution and recovered leachate solution are equal, therefore negligible in the overall water balance calculations. The leaching solution and recovered solution (PLS) are represented using two blue line arrows as shown in Figure 1.

5.0 Results

Calculated monthly freshwater make-up requirements, recycle water, In-Heap Pond volumes and excess water discharge to the CD/MWTP are displayed graphically in Figures 2 through 5, representing Phases 1, 2, and 3, respectively. The numeric data can be found in Attachment C in the "Monthly Makeup Water Requirements" table. The following sections discuss the results for each phase.

5.1 Phase 1 Results

Phase 1 (Figure 2) exhibits roughly the same pattern in freshwater demand in the first two (2) years. In the first year, the fresh make-up water demand appears smaller than the subsequent year because the maximum production rate is 29,500 tpd in the first year, as there is no stockpile inflow of ore onto the HLP. Less ore going to the pad required less water to wet the ore. The make-up water demands peak in March and August during the first year. The largest peak in year two occurs during March, corresponding with the month that stacking begins on the HLP. Make-up water decreases in April of both years, when precipitation begins to contribute larger amounts to the water balance. By May, most of the winter snowpack has melted, resulting in an increased amount of recycle water. From June through October, water demand rises again and remains high, as ore loading increases to 41,300 tpd. November experiences a decreased demand for freshwater as stacking occurs for half of the month. December through February does not exhibit any demand for water, because ore is not being loaded on to the HLP. Recycle water remains constant in the In-Heap Pond over the winter and is used for recycle beginning in February.

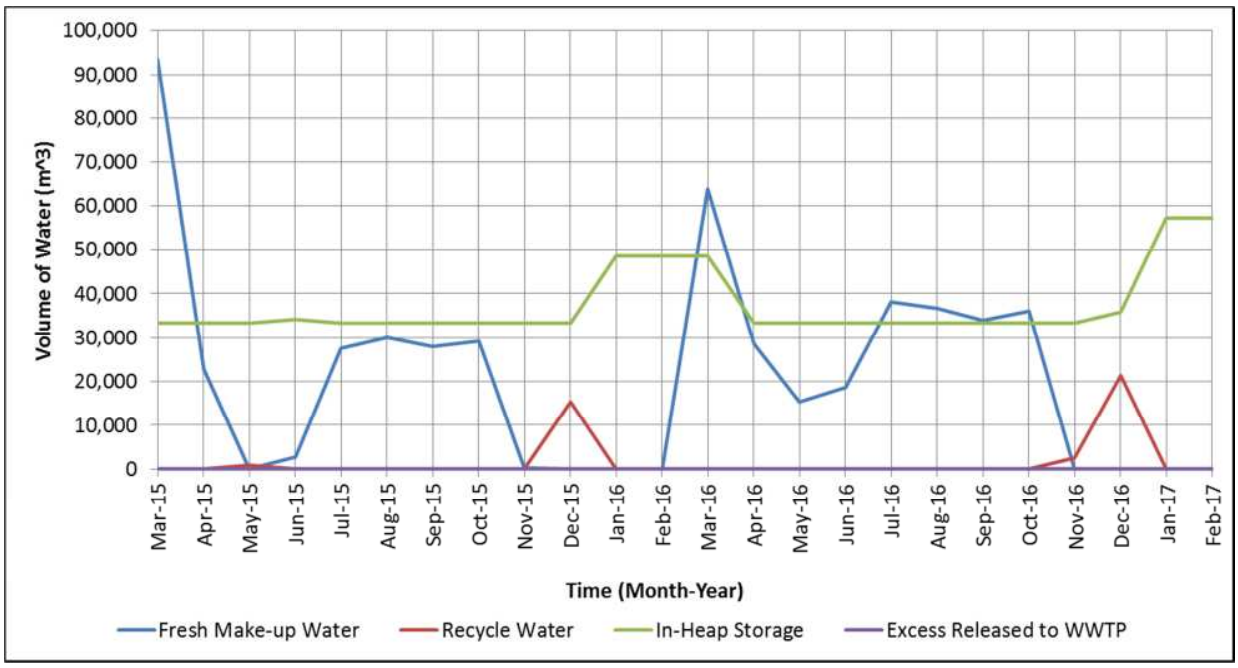
As shown in Figure 2, Year 1 monthly demand extremes are:

- Maximum freshwater make-up requirement of 93,579 m^3 occurring at startup (March 2015) – includes initial In-Heap Pond solution inventory/minimum operating volume of 33,240 m^3.
- Minimum freshwater make-up requirement of 174 m^3 in November 2015;
- Zero (0 m^3) freshwater make-up requirements in May 2015 and from December 2015 through February 2016;

Phase 1 (Year 2+) monthly water demand extremes are:

- Maximum freshwater make-up requirement of 63,708 m^3 occurring in March 2016;
- Zero (0 m^3) freshwater make-up requirements in and November 2016 through February 2017.

Figure 2 Phase 1 Summary



5.2 Phase 2 Results

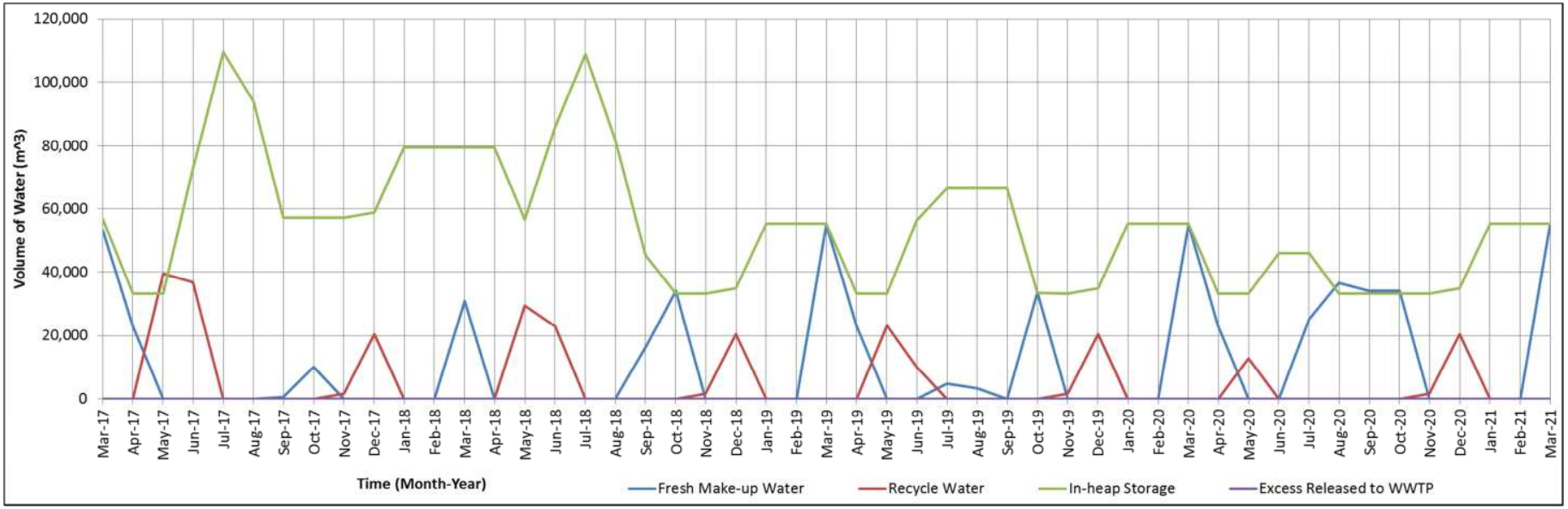
Freshwater demand exhibits the same pattern year to year throughout Phase 2 (Figure 3). Fresh make-up water requirements are minimal in Phase 2 with an initial peak usage in March 2017. In May 2017, the freshwater demand drops to zero, due to the notably larger Phase 2 area collecting more precipitation. Throughout Phase 2, the water available for recycle as a result of environment contributions is greater than the water demand, resulting in extra recycle water available for subsequent months.

As shown on Figure 3, Phase 2 monthly water demand extremes are:

- Maximum freshwater make-up requirement of 55,071 m^3 in March 2019,2020 and 2021;
- Zero (0 m^3) freshwater make-up requirements ar intermittently observed for several months as shown in Figure 3.

As shown on Figure 3, the amount of recycle water increases in March and April, as most of the snow melts in May and June. Snowmelt meets water demands in the month of May and June, and rainfall meet the water demand in the month of July and August. The average monthly rainfall in September and October are less compared to July and August; hence, the makeup water requirement increases in September and October. This recharges the In-Heap Pond storage for the subsequent months which allows recycling of most of the water. Excess water is not released to the CD/MWTP throughout Phase 2.

Figure 3 Phase 2 Summary

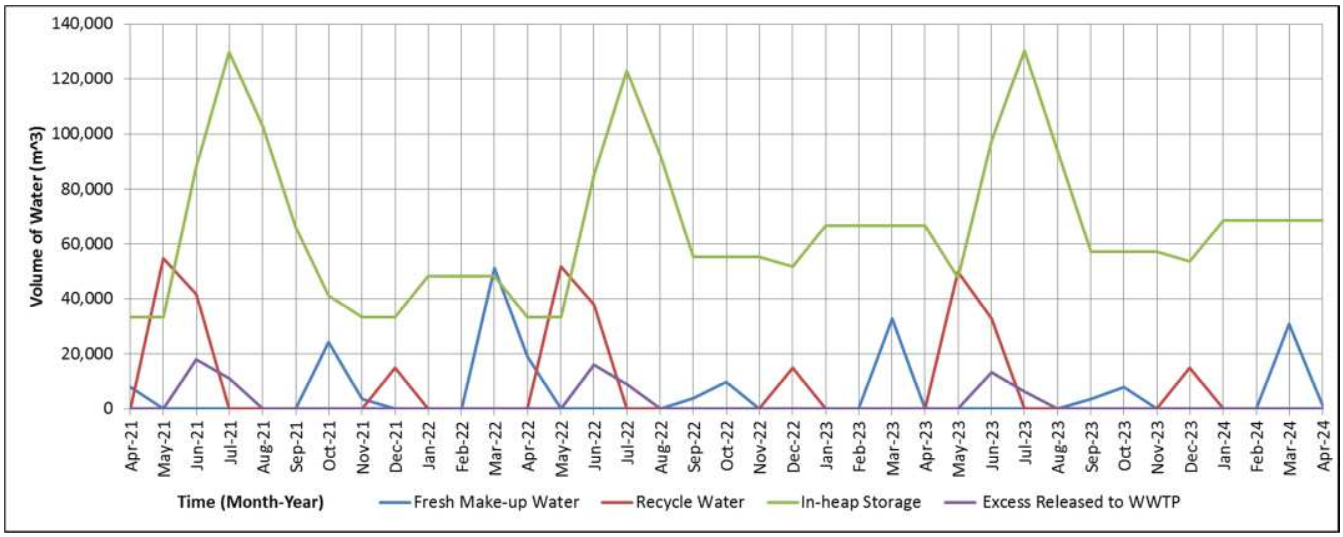


5.3 Phase 3 Results

Throughout Phase 3, the water available for recycle as a result of environment contributions is greater than the water demand, resulting in extra recycle water available for subsequent months. The freshwater makeup demand is seen in the months of March, April, September and October. Excess water is released from the HLP to the MWTP in the months on June and July.

As shown on Figure 4, the amount of recycle water increases from April through June. As the HLP increases in size, the volume of water lost through evaporation also increases; consequently, a lot the net contribution of environmental water in July and August decreases. The In-Heap Pond storage capacity increase over the subsequent months which allows recycling of most of the water. Excess water released from the HLF (to the CD/MWTP) is the greatest in Phase 3. Phase 3 has a maximum excess discharge of 18,138 m^3 occurring in June 2021.

Figure 4 Phase 3 Summary



5.4 Freshwater Make-up and Excess Water Summary

Overall, the HLF water balance model shows a decreasing need for freshwater make-up over its operational life. The first year (year 2015) requires the greatest amount of water, at approximately 210,513 m^3 for the year. The first year assumes a required initial startup volume of 33,240 m^3 and this volume of solution must remain in the heap at all times.

Rinsing estimates are also included and assume that the same application rate (2,770 m^3/hr) comprised of clean recycled water from the CDP plant is applied over the HLP. As calculated from the HLF water balance, at the end of operations there is an estimated 150,000 m^3 of solution/water in the In-Heap Pond. This volume of solution/water in addition to environmental contributions is adequate to be used for detoxification and rinsing. Thus, no additional fresh makeup water is required for rinsing. The HLF water balance during rinsing and draindown are considered in the Site Water Balance Model (Knight Piesold, 2012b).

The HLF water balance model shows an increasing release of excess water over the operational life. The first release occurs in year 4 (2018) and occurs in the subsequent years until year 9 (2023). The maximum excess water released is 75,847 m^3 in year 9 (2021).

Table 1 Total Freshwater Make-up and Excess Volumes

Mine Phase	Year	Freshwater Make-up (m^3)	Excess Water (Released to CD/MWTP) (m^3)
10 Months Operation	2015	234,039	0
12 Months Operation	2016	271,183	0
12 Months Operation	2017	86,845	0
12 Months Operation	2018	81,283	0
12 Months Operation	2019	119,990	0
12 Months Operation	2020	207,946	0
12 Months Operation	2021	91,022	29,338
12 Months Operation	2022	84,167	25,249
12 Months Operation	2023	44,471	19,800
4 Months Operation	2024	32,151	0
8 Months Additional Gold Recovery	2024	0	0
4 Months Additional Gold Recovery	2025	0	0
8 Months Rinsing	2025	0	0
12 Months Rinsing	2026	0	0
4 Months Rinsing	2027	0	0

5.5 Solution Inventory Summary

Estimates of the HLF solution inventory are shown on Figure 5. It shows a steady net increase in total solution retained in the ore over time. The total solution inventory in the HLF at the end of operations is estimated to be 7,236,701 m^3. At the same time, the total average water content is initially high (over 23% by mass or over 41% by volume) in the first year, rapidly decreases to 8.9% by mass (15.9% by volume) within the first year and then slowly decreases over time

(Figure 5). The total average water content within the HLF at the end of operations is estimated to be about 8.0% by mass (14.3% by volume). It is estimated that over time into post-closure the HLF will maintain a moisture content of from 5% to 7% by mass depending on long-term environmental conditions and the HLF drainage process.

Figure 5 Solution Inventory Summary

6.0 Conclusion

In general, assuming average climate conditions, the HLF water balance requires fresh make-up water up throughout the mine life. However, the make-up water demands vary over the life of mine. The HLF will release excess water to the CD/MWTP as it becomes a net positive system, and this is observed only in Phase 3. The In-Heap Pond capacity allows for solution/water to be stored and used for recycle, thus limiting the amount of freshwater required for operations. The most fresh make-up water is required during Phase1 and at the beginning of Phase 2. The fresh make-up water requirements decrease significantly in Phase 3.

The estimates generated by this water balance are limited to the assumptions presented. As more detailed stacking plans for the heap and stockpile are created the water balance model may be revised to more accurately predict fresh water make-up requirements and solution inventory.

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ATTACHMENT A
HEAP LEACH WATER BALANCE CALCULATIONS
MODEL INPUTS

Input Data

	Year Round	Mar - Oct from stockpile	April - Oct Total	
Ore Production Rate =	29,500	11,800	41,300	tons/day
	15,775	6,310	22,086	m^3/day

	Heap Leach Pad	Ore Stockpile	
Heap Contributing Area (phase 1)=	477,898	185,425	m^2
Heap Contributing Area (phase 2)=	993,330		m^2
Heap Contributing Area (phase 3)=	1,384,816		m^2
Ore Bulk Density=	1.87		t/m^3
Density of Water=	1,000		kg/m^3
Solution Application=	66,480		m^3/day
Sublimation Losses=	20.0%		
Natural Ore Water Content=	5.0%	by mass	
Optimal Leaching Water Content=	13.3%	by mass	
Residual Ore Water Content=	8.6000%	by mass	

m^3/day

	# Stockpiling days	# heap days
Jan	29.75	
Feb	26.75	
Mar		29.75
Apr		28.75
May		29.75
Jun		28.75
Jul		29.75
Aug		29.75
Sep		28.75
Oct		29.75
Nov	13.75	15.00
Dec	29.75	
	100	250

Average Monthly Climate Data

Month	Rainfall	Snowfall SWE	Snowmelt Distribution per month	Evaporation	Est. Emitter Evaporation
	(mm)	(mm)	(%)	(mm)	(%)
Jan	0.00	36.00	0%	0	0.000
Feb	0.00	29.00	0%	0	0.000
Mar	0.00	36.00	0%	0	0.000
Apr	0.00	31.00	5%	0	0.000
May	12.00	6.00	50%	69	0.010
Jun	53.00	0.00	35%	95	0.013
Jul	64.00	0.00	10%	101	0.012
Aug	45.00	0.20	0%	70	0.010
Sep	35.00	14.00	0%	32	0.006
Oct	4.00	48.00	0%	0	0.000
Nov	0.00	37.00	0%	0	0.000
Dec	0.00	40.00	0%	0	0.000
Total	213.00	277.20		367.00	

ATTACHMENT B
HEAP LEACH WATER BALANCE CALCULATIONS
STOCKPILE WATER AND
ORE WATER CONTENT

Water Content

Ore Water Content, as delivered (initial conditions)	w	5.00%
Residual Water Content (after draining)	w	8.60%
Optimal Leaching Content	w	13.30%

Densities			
Bulk, initial	γb	1870	kg/m3
Water	γw	1000	kg/m3
Dry	γd	1780.952381	kg/m3
Specific Gravity**	Gs	2.7	

Stockpile Inputs			
Ore added to stockpile	15,775	m3/day	
Total Ore	1,577,540	m3	806
Total Water in Stockpile	186,828	m3	1435447.619

INITIAL CONDITIONS, VOLUME OF WATER IN ORE			
Name	Variable	Amount	Units
Weights*			
Solid, per 1 m3 ore	Ws	1780.952381	kg
Water, per 1 m3 ore	Ww	89.04761905	kg
Volumes			
Water, per 1 m3 ore	Vw	0.089047619	m3
Solid, per 1 m3 ore***	Vs	0.66	m3
Air, per 1 m3 ore	Va	0.25	m3
Void (Water + Air), per 1 m3 ore	Vv	0.34	m3
Porosity	n	0.34	
Void Ratio	e	0.516042781	
Saturation	S	26.16%	

STOCKPILE WATER VOLUME			
Name	Variable	Amount	Units
Weights			
Solid, per 1 m3 ore	Ws	1780.952381	kg
Water, per 1 m3 ore	Ww	118.4296525	kg
Volumes			
Water, per 1 m3 ore	Vw	0.118429653	m3
Solid, per 1 m3 ore	Vs	0.6596	m3
Air, per 1 m3 ore	Va	0.22	m3
Void (Water + Air), per 1 m3 ore	Vv	0.34	m3
Porosity	n	0.34	
Void Ratio	e	0.516042781	
Saturation	S	34.79%	

RESIDUAL WATER VOLUME			
Name	Variable	Amount	Units
Weights			
Solid, per 1 m3 ore	Ws	1781.0	kg
Water, per 1 m3 ore	Ww	153.16	kg
Volumes			
Water, per 1 m3 ore	Vw	0.153	m3
Solid, per 1 m3 ore	Vs	0.66	m3
Air, per 1 m3 ore	Va	0.19	m3
Void (Water + Air), per 1 m3 ore	Vv	0.34	m3
Porosity	n	0.34	
Void Ratio	e	0.516043	
Saturation	S	45.00%	

WATER VOLUME FOR OPTIMAL LEACHING			
Name	Variable	Amount	Units
Weights			
Solid, per 1 m3 ore	Ws	1781.0	kg
Water, per 1 m3 ore	Ww	236.87	kg
Volumes			
Water, per 1 m3 ore	Vw	0.237	m3
Solid, per 1 m3 ore	Vs	0.66	m3
Air, per 1 m3 ore	Va	0.10	m3
Void (Water + Air), per 1 m3 ore	Vv	0.34	m3
Porosity	n	0.34	
Void Ratio	e	0.516043	
Saturation	S	69.59%	

*weight of air is negligible
**using assumed value for Gs (Budhu, 2007)
***Solid volume calculated using specific gravity

Stockpile Water Content	w	6.65%

Water Content Equations:
γd = γb / (1 + w)
Ww = w * Ws
Vw = Ws / γw
Vs = Ws / (Gs * γw)
Va = 1 - Vs - Vw
V = Va + Vw + Vs = 1
Vv = Va + Vw
n = Vv / V

Ore properties provided by Wardrop (Wardrop, 2011a).

Stockpile Precipitation and Sublimation Calculations

	Stockpile Pad		
Stockpile Contributing Area (all phases)=	185,425	m^2	assumes diversion channels in place upstream of Pad
Sublimation losses	20.0%		

	Climate Data									
Date	Rainfall	Snowfall SWE	Snowmelt Distribution per month	Top Area	Rain on Heap Area	Snowfall SWE on Heap Area	Sublimation from Snowpack	Snowfall SWE Minus Sublimation	Snowmelt	Stockpile Precipitation and Sublimaiton
	(mm)	(mm)	(%)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Jan	0.0	36.0	0.0%	108,242	0	6,675	1,335	5,340	0	0
Feb	0.0	29.0	0.0%	160,624	0	5,377	1,075	4,302	0	0
Mar	0.0	36.0	0.0%	174,392	0	6,675	1,335	5,340	0	0
Apr	0.0	31.0	5.0%	152,697	0	5,748	1,150	4,599	2,056	2,056
May	12.0	6.0	50.0%	131,003	2,225	1,113	223	890	20,560	22,785
Jun	53.0	0.0	35.0%	109,308	9,828	0	0	0	14,392	24,219
Jul	64.0	0.0	10.0%	87,613	11,867	0	0	0	4,112	15,979
Aug	45.0	0.2	0.0%	65,548	8,344	37	7	30	0	8,344
Sep	35.0	14.0	0.0%	43,853	6,490	2,596	519	2,077	0	6,490
Oct	4.0	48.0	0.0%	22,158	742	8,900	1,780	7,120	0	742
Nov	0.0	37.0	0.0%	18,311	0	6,861	1,372	5,489	0	0
Dec	0.0	40.0	0.0%	53,078	0	7,417	1,483	5,934	0	0
Totals		277.2				51,400		41,120		80,615

Stockpile Water

Input Data

	To Stockpile:	To Heap: Nov-	
Ore Production Rate =	29,500	11,800	tons/day
	15,775	6,310	m^3/day

Total Stockpile Area	185,425	m^2	assumes diversion channels in place upstream of Pad
As-Delivered Ore Water	0.0890	m^3/ m3 ore	from Water Content Sheet
Total Stockpiling Days	100		

Ore Destination	Date	# days per month	# Stockpiling days	# Heap days	Evaporation Data	Average Stockpile Area	Ore Water	Precipitation and Sublimation	Evaporation	Monthly Stockpile Water
					(mm)	(m^2)	(m^3)	(m^3)	(m^3)	(m^3)
Stockpile	Jan	31	29.75	0	0.0	108,242	41,792	0	0	41,792
Stockpile	Feb	28	26.75	0	0.0	160,624	37,577	0	0	37,577
Heap	Mar	31	0.00	30	0.0	174,392	0	0	0	-
Heap	Apr	30	0.00	29	0.0	152,697	0	2,056	0	2,056
Heap	May	31	0.00	30	69.0	131,003	0	22,785	9,039	13,746
Heap	Jun	30	0.00	29	95.0	109,308	0	24,219	10,384	13,835
Heap	Jul	31	0.00	30	101.0	87,613	0	15,979	8,849	7,130
Heap	Aug	31	0.00	30	70.0	65,548	0	8,344	4,588	3,756
Heap	Sep	30	0.00	29	32.0	43,853	0	6,490	1,403	5,087
Heap	Oct	31	0.00	30	0.0	22,158	0	742	0	742
Stockpile/Heap	Nov	30	13.75	15	0.0	18,311	19,315	0	0	19,315
Stockpile	Dec	31	29.75	0	0.0	53,078	41,792	0	0	41,792
Yearly Totals			100	250				80,615	34,264	186,828

Leaching (250 days) 36400

ATTACHMENT C
HEAP LEACH WATER BALANCE CALCULATIONS
HEAP LEACH PAD MAKE-UP WATER REQUIREMENTS

Environmental Contribution Water

Solution Application 66,480 m^3/day

Phase 1 Max Contributing Area = 477,898 m^2
Phase 2 Max Contributing Area = 993,330 m^2
Phase 3 Max Contributing Area = 1,384,816 m^2

Phase 1
Phase 2
Phase 3

Date	# days per month	Top Area	Approximate Elevation (from Stacking Plan)	Evaporation Data	Est. Emitter Evaporation	Precipitation less Sublimation	Evaporation from Precipitation	Solution Application Drip Emitter Evaporation	Monthly Environmental Contribution Water
		(m^2)	(m)	(mm)	(%)	(m^3)	(m^3)	(m^3)	(m^3)
Mar-15	31	173,558	860	0.0	0.0%	0	0	0	0
Apr-15	30	236,941	870	0.0	0.0%	5,299	0	0	5,299
May-15	31	302,528	880	69.0	1.0%	58,724	20,874	20,609	17,241
Jun-15	30	365,911	880	95.0	1.3%	62,421	34,762	25,927	1,732
Jul-15	31	431,498	880	101.0	1.2%	41,183	43,581	24,731	-27,129
Aug-15	31	497,085	890	70.0	1.0%	21,505	34,796	20,609	-33,899
Sep-15	30	560,468	890	32.0	0.6%	16,726	17,935	11,966	-13,175
Oct-15	31	626,055	890	0.0	0.0%	1,912	0	0	1,912
Nov-15	30	659,124	900	0.0	0.0%	0	0	0	0
Dec-15	31	659,124	900	0.0	0.0%	0	0	0	0
Jan-16	31	659,124	900	0.0	0.0%	0	0	0	0
Feb-16	29	659,124	900	0.0	0.0%	0	0	0	0
Mar-16	31	724,712	900	0.0	0.0%	0	0	0	0
Apr-16	30	788,094	900	0.0	0.0%	5,299	0	0	5,299
May-16	31	853,681	910	69.0	1.0%	58,724	58,904	20,609	-20,789
Jun-16	30	917,064	910	95.0	1.3%	62,421	87,121	25,927	-50,627
Jul-16	31	982,651	910	101.0	1.2%	41,183	99,248	24,731	-82,795
Aug-16	31	1,048,239	910	70.0	1.0%	21,505	73,377	20,609	-72,480
Sep-16	30	1,111,621	920	32.0	0.6%	16,726	35,572	11,966	-30,812
Oct-16	31	1,177,208	920	0.0	0.0%	1,912	0	0	1,912
Nov-16	30	1,210,278	920	0.0	0.0%	0	0	0	0
Dec-16	31	1,210,278	920	0.0	0.0%	0	0	0	0
Jan-17	31	1,210,278	920	0.0	0.0%	0	0	0	0
Feb-17	28	1,210,278	920	0.0	0.0%	0	0	0	0
Mar-17	31	1275865	920	0.0	0.0%	0	0	0	0
Apr-17	30	1339248	930	0.0	0.0%	11,014	0	0	11,014
May-17	31	1404835	930	69.0	1.0%	122,060	96,934	20,609	4,518
Jun-17	30	1468217	930	95.0	1.3%	129,745	139,481	25,927	-35,663
Jul-17	31	1533805	940	101.0	1.2%	85,601	154,914	24,731	-94,044
Aug-17	31	1599392	940	70.0	1.0%	44,700	111,957	20,609	-87,866
Sep-17	30	1662775	940	32.0	0.6%	34,767	53,209	11,966	-30,409
Oct-17	31	1728362	940	0.0	0.0%	3,973	0	0	3,973
Nov-17	30	1761431	950	0.0	0.0%	0	0	0	0
Dec-17	31	1761431	950	0.0	0.0%	0	0	0	0
Jan-18	31	1761431	950	0.0	0.0%	0	0	0	0
Feb-18	28	1761431	950	0.0	0.0%	0	0	0	0
Mar-18	31	1827018	950	0.0	0.0%	0	0	0	0
Apr-18	30	1890401	950	0.0	0.0%	11,014	0	0	11,014
May-18	31	1955988	950	69.0	1.0%	122,060	134,963	20,609	-33,512
Jun-18	30	2019371	960	95.0	1.3%	129,745	191,840	25,927	-88,023
Jul-18	31	2084958	960	101.0	1.2%	85,601	210,581	24,731	-149,710
Aug-18	31	2150545	960	70.0	1.0%	44,700	150,538	20,609	-126,447
Sep-18	30	2213928	960	32.0	0.6%	34,767	70,846	11,966	-48,046
Oct-18	31	2279515	970	0.0	0.0%	3,973	0	0	3,973
Nov-18	30	2312584	970	0.0	0.0%	0	0	0	0
Dec-18	31	2312584	970	0.0	0.0%	0	0	0	0
Jan-19	31	2312584	970	0.0	0.0%	0	0	0	0
Feb-19	28	2312584	970	0.0	0.0%	0	0	0	0
Mar-19	31	2378172	970	0.0	0.0%	0	0	0	0
Apr-19	30	2441554	970	0.0	0.0%	11,014	0	0	11,014
May-19	31	2507141	980	69.0	1.0%	122,060	172,993	20,609	-71,541
Jun-19	30	2570524	980	95.0	1.3%	129,745	244,200	25,927	-140,382
Jul-19	31	2636111	980	101.0	1.2%	85,601	266,247	24,731	-205,377
Aug-19	31	2701699	980	70.0	1.0%	44,700	189,119	20,609	-165,028
Sep-19	30	2765081	990	32.0	0.6%	34,767	88,483	11,966	-65,682
Oct-19	31	2830668	990	0.0	0.0%	3,973	0	0	3,973
Nov-19	30	2863738	990	0.0	0.0%	0	0	0	0
Dec-19	31	2863738	990	0.0	0.0%	0	0	0	0
Jan-20	31	2863738	990	0.0	0.0%	0	0	0	0
Feb-20	29	2863738	990	0.0	0.0%	0	0	0	0
Mar-20	31	2929325	990	0.0	0.0%	0	0	0	0
Apr-20	30	2992708	1000	0.0	0.0%	11,014	0	0	11,014
May-20	31	3058295	1000	69.0	1.0%	122,060	211,022	20,609	-109,571
Jun-20	30	3121677	1000	95.0	1.3%	129,745	296,559	25,927	-192,742
Jul-20	31	3187265	1000	101.0	1.2%	85,601	321,914	24,731	-261,043
Aug-20	31	3252852	1010	70.0	1.0%	44,700	227,700	20,609	-203,609
Sep-20	30	3316235	1010	32.0	0.6%	34,767	106,120	11,966	-83,319
Oct-20	31	3381822	1010	0.0	0.0%	3,973	0	0	3,973
Nov-20	30	3414891	1010	0.0	0.0%	0	0	0	0
Dec-20	31	3414891	1010	0.0	0.0%	0	0	0	0
Jan-21	31	3414891	1010	0.0	0.0%	0	0	0	0
Feb-21	28	3414891	1010	0.0	0.0%	0	0	0	0
Mar-21	31	3480478	1010	0.0	0.0%	0	0	0	0
Apr-21	30	3543861	1020	0.0	0.0%	15,355	0	0	15,355
May-21	31	3609448	1020	69.0	1.0%	170,166	249,052	20,609	-99,495
Jun-21	30	3672831	1020	95.0	1.3%	180,879	348,919	25,927	-193,967
Jul-21	31	3738418	1020	101.0	1.2%	119,338	377,580	24,731	-282,973
Aug-21	31	3804005	1030	70.0	1.0%	62,317	266,280	20,609	-224,572
Sep-21	30	3867388	1030	32.0	0.6%	48,469	123,756	11,966	-87,254
Oct-21	31	3932975	1030	0.0	0.0%	5,539	0	0	5,539
Nov-21	30	3966044	1030	0.0	0.0%	0	0	0	0
Dec-21	31	3966044	1030	0.0	0.0%	0	0	0	0
Jan-22	31	3966044	1030	0.0	0.0%	0	0	0	0
Feb-22	28	3966044	1030	0.0	0.0%	0	0	0	0
Mar-22	31	4031632	1030	0.0	0.0%	0	0	0	0
Apr-22	30	4095014	1040	0.0	0.0%	15,355	0	0	15,355
May-22	31	4160601	1040	69.0	1.0%	170,166	287,081	20,609	-137,524
Jun-22	30	4223984	1040	95.0	1.3%	180,879	401,278	25,927	-246,327
Jul-22	31	4289571	1040	101.0	1.2%	119,338	433,247	24,731	-338,639
Aug-22	31	4355159	1040	70.0	1.0%	62,317	304,861	20,609	-263,153
Sep-22	30	4418541	1050	32.0	0.6%	48,469	141,393	11,966	-104,891
Oct-22	31	4484128	1050	0.0	0.0%	5,539	0	0	5,539
Nov-22	30	4517198	1050	0.0	0.0%	0	0	0	0
Dec-22	31	4517198	1050	0.0	0.0%	0	0	0	0
Jan-23	31	4517198	1050	0.0	0.0%	0	0	0	0
Feb-23	28	4517198	1050	0.0	0.0%	0	0	0	0
Mar-23	31	4582785	1050	0.0	0.0%	0	0	0	0
Apr-23	30	4646168	1050	0.0	0.0%	15,355	0	0	15,355
May-23	31	4711755	1050	69.0	1.0%	170,166	325,111	20,609	-175,554
Jun-23	30	4775137	1060	95.0	1.3%	180,879	453,638	25,927	-298,686
Jul-23	31	4840725	1060	101.0	1.2%	119,338	488,913	24,731	-394,306
Aug-23	31	4906312	1060	70.0	1.0%	62,317	343,442	20,609	-301,734
Sep-23	30	4969695	1060	32.0	0.6%	48,469	159,030	11,966	-122,528
Oct-23	31	5035282	1060	0.0	0.0%	5,539	0	0	5,539
Nov-23	30	5068351	1070	0.0	0.0%	0	0	0	0
Dec-23	31	5068351	1070	0.0	0.0%	0	0	0	0
Jan-24	31	5068351	1070	0.0	0.0%	0	0	0	0
Feb-24	29	5068351	1070	0.0	0.0%	0	0	0	0
Mar-24	31	5133938	1070	0.0	0.0%	0	0	0	0
Apr-24	30	5197321	1070	0.0	0.0%	15,355	0	0	15,355

TETRA TECH

Attachment C to the Technical Memorandum titled
Eagle Gold Heap Leach Facility Water Balance

Monthly Summary and Makeup Water Requirements

	Nominal (Mar - Nov Yr 1)	Stockpile (Nov - Feb)	From Crusher 3 (Mar -Nov 15)	
Ore Production Rate (tonnes)=	29,500	11,800	41,300	tonnes/day
Ore Production Rate (m^3)=	15,775	6,310	22,086	m^3/day

Solution Application 66,480 m^3/day

22944.44444

Legend
Phase 1
Phase 2
Phase 3
() denotes negative balance (make-up water required)
Positive value denotes Excess Water
Red Indicates exceedance of In-Heap Capacity

Heap Phases - Active vs. Inactive Area Ratios

Heap Phase	Inactive (Draining) (%)	Active (leaching) (%)
Phase 1	0.23	0.78
Phase 2	0.26	0.74
Phase 3	0.46	0.54

	Water Content (volume) m^3/m^3 ore (vol.)	% mass
Natural Ore Water Content	0.0890476	5.0%
Optimal Leaching Content	0.236867	13.3%
Residual Moisture Content	0.1531619	8.6%
Stockpile Ore Water Content	0.1184297	6.65%

Average Operating Water Content (volume)		
	m^3/m^3 ore (vol.)	% mass
Phase 1	0.218	12.2%
Phase 2	0.215	12.1%
Phase 3	0.198	11.1%

In Heap Max Capacity = 199,440 m^3
In Heap Minimum Operating = 33,240 m^3 (In-Heap Min. Vol. - 12 hrs @ 2770m3/hr)
In Heap Operating range = 166,200 m^3

Water Density= 1000 kg/m3
Dry Density= 1781.0 kg/m3

					Ore Stacking			Water In Ore going to HLP									In-Heap Storage						
	Date	Year	# days per month	# Heap Days	Monthly Aproximate Amount of Ore Going on Pad		Cumulative Volume of Ore Going on Pad	Approximate Elevation (from Stacking Plan)	Water In Ore from Pit (ROM) (5%)	Water In Ore from Stockpile (7.5%)	Total Monthly Water Requirement in Ore going on Pad to Reach Avg. Operating Water	Water Deficit to Reach Avg. Operating Water Content	Vol. of Water Released from Ore at End of Period (Availabe for Recycle)	Environmental Contribution Water to Pad	Total Monthly Water Balance (includes Recycling)	Makeup Water Required Includes Recycle	Excess Availabe for Recycle	Cumulative Banked Volume above Min. Operating (166,200 m^3 range)	Total Cumulative Banked In-Heap Storage (199,440 m^3 max)	Total Freshwater Make-up Water Required (includes Recycle)	Excess Water Released from HLF (to WWTP)	Total Volume of Solution in heap (solution inventory)	Average Monthly Moisture Content	
					(m^3)	(tonnes)	(tonnes)	(m)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(% by vol.)	(% by mass)
0	Mar-15	1	31	29.75	487,569	877,625	0	860	41,792	0	102,130	(60,339)	30,249	0	(60,339)	60,339	0	0	33,240	93,579	0	135,370	41.8%	23.5%
1	Apr-15	1	30	28.75	471,181	848,125	487,569	870	40,387	0	98,698	(58,311)	29,232	5,299	(22,763)	22,763	0	0	33,240	22,763	0	203,819	41.8%	23.5%
2	May-15	1	31	29.75	487,569	877,625	958,750	870	41,792	0	102,130	(60,339)	30,249	32,070	963	0	963	0	33,240	0	0	277,681	29.0%	16.3%
3	Jun-15	1	30	28.75	471,181	848,125	1,446,319	880	40,387	0	98,698	(58,311)	29,232	24,417	(3,645)	3,645	0	963	34,203	2,682	0	345,166	23.9%	13.4%
4	Jul-15	1	31	29.75	487,569	877,625	1,917,500	880	41,792	0	102,130	(60,339)	30,249	3,613	(27,494)	27,494	0	0	33,240	27,494	0	418,065	21.8%	12.2%
5	Aug-15	1	31	29.75	487,569	877,625	2,405,069	880	41,792	0	102,130	(60,339)	30,249	0	(30,090)	30,090	0	0	33,240	30,090	0	489,946	20.4%	11.4%
6	Sep-15	1	30	28.75	471,181	848,125	2,892,639	890	40,387	0	98,698	(58,311)	29,232	0	(28,062)	28,062	0	0	33,240	28,062	0	558,395	19.3%	10.8%
7	Oct-15	1	31	29.75	487,569	877,625	3,363,819	890	41,792	0	102,130	(60,339)	30,249	1,912	(29,195)	29,195	0	0	33,240	29,195	0	631,294	18.8%	10.5%
8	Nov-15	1	15.00	245,833	442,500	3,851,389	6,932,500	890	21,071	0	51,494	(30,423)	15,252	0	(174)	174	0	0	33,240	174	0	652,539	16.9%	9.5%
9	Dec-15	1	31	0.00	0	0	4,097,222	890	0	0	0	0	0	0	15,252	0	15,252	0	33,240	0	0	652,539	15.9%	8.9%
10	Jan-16	2	31	0.00	0	0	4,097,222	890	0	0	0	0	0	0	0	0	0	15,252	48,492	0	0	652,539	15.9%	8.9%
11	Feb-16	2	29	0.00	0	0	4,097,222	890	0	0	0	0	0	0	0	0	0	15,252	48,492	0	0	652,539	15.9%	8.9%
12	Mar-16	2	31	29.75	682,597	1,228,675	4,097,222	900	41,792	22,231	142,983	(78,960)	42,348	0	(78,960)	78,960	0	15,252	48,492	63,708	0	780,270	19.0%	10.7%
13	Apr-16	2	30	28.75	659,653	1,187,375	4,779,819	900	40,387	21,484	138,177	(76,306)	40,925	5,299	(28,658)	28,658	0	0	33,240	28,658	0	876,098	18.3%	10.3%
14	May-16	2	31	29.75	682,597	1,228,675	5,439,472	910	41,792	22,231	142,983	(78,960)	42,348	22,672	(15,363)	15,363	0	0	33,240	15,363	0	978,156	18.0%	10.1%
15	Jun-16	2	30	28.75	659,653	1,187,375	6,122,069	910	40,387	21,484	138,177	(76,306)	40,925	15,232	(18,726)	18,726	0	0	33,240	18,726	0	1,073,984	17.5%	9.9%
16	Jul-16	2	31	29.75	682,597	1,228,675	6,781,722	920	41,792	22,231	142,983	(78,960)	42,348	0	(38,035)	38,035	0	0	33,240	38,035	0	1,176,042	17.3%	9.7%
17	Aug-16	2	31	29.75	682,597	1,228,675	7,464,319	920	41,792	22,231	142,983	(78,960)	42,348	0	(36,612)	36,612	0	0	33,240	36,612	0	1,276,677	17.1%	9.6%
18	Sep-16	2	30	28.75	659,653	1,187,375	8,146,917	930	40,387	21,484	138,177	(76,306)	40,925	0	(33,957)	33,957	0	0	33,240	33,957	0	1,372,505	16.8%	9.5%
19	Oct-16	2	31	29.75	682,597	1,228,675	8,806,569	930	41,792	22,231	142,983	(78,960)	42,348	1,912	(36,123)	36,123	0	0	33,240	36,123	0	1,474,563	16.7%	9.4%
20	Nov-16	2	30	15.00	344,167	619,500	9,489,167	930	21,071	11,209	72,092	(39,812)	21,352	0	2,537	0	2,537	0	33,240	0	0	1,506,843	15.9%	8.9%
21	Dec-16	2	31	0.00	0	0	9,833,333	930	0	0	0	0	0	0	21,352	0	21,352	2,537	35,777	0	0	1,506,843	15.3%	8.6%
22	Jan-17	3	31	0.00	0	0	9,833,333	930	0	0	0	0	0	0	0	0	0	23,889	57,129	0	0	1,506,843	15.3%	8.6%
23	Feb-17	3	28	0.00	0	0	9,833,333	930	0	0	0	0	0	0	0	0	0	23,889	57,129	0	0	1,506,843	15.3%	8.6%
24	Mar-17	3	31	29.75	682,597	1,228,675	9,833,333	940	41,792	22,231	141,333	(77,310)	40,698	0	(77,310)	77,310	0	23,889	57,129	53,421	0	1,624,287	16.5%	9.3%
25	Apr-17	3	30	28.75	659,653	1,187,375	10,515,930	950	40,387	21,484	136,582	(74,711)	39,330	11,014	(22,999)	22,999	0	0	33,240	22,999	0	1,720,171	16.4%	9.2%
26	May-17	3	31	29.75	682,597	1,228,675	11,175,583	950	41,792	22,231	141,333	(77,310)	40,698	77,516	39,537	0	39,537	0	33,240	0	0	1,861,710	16.7%	9.4%
27	Jun-17	3	30	28.75	659,653	1,187,375	11,858,180	950	40,387	21,484	136,582	(74,711)	39,330	70,883	36,851	0	36,851	39,537	72,777	0	0	1,994,444	16.8%	9.4%
28	Jul-17	3	31	29.75	682,597	1,228,675	12,517,833	960	41,792	22,231	141,333	(77,310)	40,698	22,279	(15,700)	15,700	0	76,388	109,628	0	0	2,080,746	16.6%	9.3%
29	Aug-17	3	31	29.75	682,597	1,228,675	13,200,431	960	41,792	22,231	141,333	(77,310)	40,698	0	(36,612)	36,612	0	60,687	93,927	0	0	2,144,769	16.2%	9.1%
30	Sep-17	3	30	28.75	659,653	1,187,375	13,883,028	970	40,387	21,484	136,582	(74,711)	39,330	9,442	(24,570)	24,570	0	24,076	57,316	495	0	2,216,577	16.0%	9.0%
31	Oct-17	3	31	29.75	682,597	1,228,675	14,542,681	970	41,792	22,231	141,333	(77,310)	40,698	3,973	(34,006)	34,006	0	24,076	57,316	9,931	0	2,294,504	15.8%	8.9%
32	Nov-17	3	30	15.00	344,167	619,500	15,225,278	970	21,071	11,209	71,260	(38,980)	20,520	0	1,719	0	1,719	24,076	57,316	0	0	2,326,784	15.3%	8.6%
33	Dec-17	3	31	0.00	0	0	15,569,444	970	0	0	0	0	0	0	20,520	0	20,520	25,794	59,034	0	0	2,326,784	14.9%	8.4%
34	Jan-18	4	31	0.00	0	0	15,569,444	970	0	0	0	0	0	0	0	0	0	46,314	79,554	0	0	2,326,784	14.9%	8.4%
35	Feb-18	4	28	0.00	0	0	15,569,444	970	0	0	0	0	0	0	0	0	0	46,314	79,554	0	0	2,326,784	14.9%	8.4%
36	Mar-18	4	31	29.75	682,597	1,228,675	15,569,444	980	41,792	22,231	141,333	(77,310)	40,698	0	(77,310)	77,310	0	46,314	79,554	30,995	0	2,421,803	15.6%	8.7%
37	Apr-18	4	30	28.75	659,653	1,187,375	16,252,042	980	40,387	21,484	136,582	(74,711)	39,330	11,014	(22,999)	22,999	0	46,314	79,554	0	0	2,494,687	15.3%	8.6%
38	May-18	4	31	29.75	682,597	1,228,675	16,911,694	990	41,792	22,231	141,333	(77,310)	40,698	67,390	29,411	0	29,411	23,316	56,556	0	0	2,626,100	15.5%	8.7%
39	Jun-18	4	30	28.75	659,653	1,187,375	17,594,292	990	40,387	21,484	136,582	(74,711)	39,330	56,922	22,909	0	22,909	52,726	85,966	0	0	2,744,893	15.6%	8.8%
40	Jul-18	4	31	29.75	682,597	1,228,675	18,253,944	990	41,792	22,231	141,333	(77,310)	40,698	11,013	(26,967)	26,967	0	75,635	108,875	0	0	2,819,928	15.4%	8.7%
41	Aug-18	4	31	29.75	682,597	1,228,675	18,936,542	1000	41,792	22,231	141,333	(77,310)	40,698	0	(36,612)	36,612	0	48,668	81,908	0	0	2,883,951	15.2%	8.6%
42	Sep-18	4	30	28.75	659,653	1,187,375	19,619,140	1000	40,387	21,484	136,582	(74,711)	39,330	5,675	(28,338)	28,338	0	12,057	45,297	16,281	0	2,967,778	15.1%	8.5%
43	Oct-18	4	31	29.75	682,597	1,228,675	20,278,791	1000	41,792	22,231	141,333	(77,310)	40,698	3,973	(34,006)	34,006	0	0	33,240	34,006	0	3,069,780	15.1%	8.5%
44	Nov-18	4	30	15.00	344,167	619,500	20,961,389	1010	21,071	11,209	71,260	(38,980)	20,520	0	1,719	0	1,719	0	33,240	0	0	3,102,061	14.8%	8.3%
45	Dec-18	4	31	0.00	0	0	21,305,556	1010	0	0	0	0	0	0	20,520	0	20,520	1,719	34,959	0	0	3,102,061	14.6%	8.2%
46	Jan-19	5	31	0.00	0	0	21,305,556	1010	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	3,102,061	14.6%	8.2%
47	Feb-19	5	28	0.00	0	0	21,305,556	1010	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	3,102,061	14.6%	8.2%
48	Mar-19	5	31	29.75	682,597	1,228,675	21,305,556	1010	41,792	22,231	141,333	(77,310)	40,698	0	(77,310)	77,310	0	22,239	55,479	55,071	0	3,221,155	15.1%	8.5%
49	Apr-19	5	30	28.75	659,653	1,187,375	21,988,151	1010	40,387	21,484	136,582	(74,711)	39,330	11,014	(22,999)	22,999	0	0	33,240	22,999	0	3,317,038	15.1%	8.5%
50	May-19	5	31	29.75	682,597	1,228,675	22,647,807	1010	41,792	22,231	141,333	(77,310)	40,698	61,194	23,215	0	23,215	0	33,240	0	0	3,442,256	15.2%	8.5%
51	Jun-19	5	30	28.75	659,653	1,187,375	23,330,402	1020	40,387	21,484	136,582	(74,711)	39,330	43,999	9,986	0	9,986	23,215	56,455	0	0	3,548,125	15.2%	8.5%
52	Jul-19	5	31	29.75	682,597	1,228,675	23,990,056	1020	41,792	22,231	141,333	(77,310)	40,698	0	(37,980)	37,980	0	33,201	66,441	4,779	0	3,616,927	15.1%	8.5%
53	Aug-19	5	31	29.75	682,597	1,228,675	24,672,651	1020	41,792	22,231	141,333	(77,310)	40,698	0	(36,612)	36,612	0	33,201	66,441	3,411	0	3,684,361	14.9%	8.4%
54	Sep-19	5	30	28.75	659,653	1,187,375	25,355,251	1030	40,387	21,484	136,582	(74,711)	39,330	1,088	(32,924)	32,924	0	33,201	66,441	0	0	3,747,320	14.8%	8.3%
55	Oct-19	5	31	29.75	682,597	1,228,675	26,014,902	1030	41,792	22,231	141,333	(77,310)	40,698	3,973	(34,006)	34,006	0	276	33,516	33,730	0	3,849,046	14.8%	8.3%
56	Nov-19	5	30	15.00	344,167	619,500	26,697,500	1030	21,071	11,209	71,260	(38,980)	20,520	0	1,719	0	1,719	0	33,240	0	0	3,881,327	14.5%	8.2%
57	Dec-19	5	31	0.00	0	0	27,041,667	1030	0	0	0	0	0	0	20,520	0	20,520	1,719	34,959	0	0	3,881,327	14.4%	8.1%
58	Jan-20	6	31	0.00	0	0	27,041,667	1030	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	3,881,327	14.4%	8.1%
59	Feb-20	6	29	0.00	0	0	27,041,667	1030	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	3,881,327	14.4%	8.1%
60	Mar-20	6	31	29.75	682,597	1,228,675	27,041,667	1030	41,792	22,231	141,333	(77,310)	40,698	0	(77,310)	77,310	0	22,239	55,479	55,071	0	4,000,420	14.8%	8.3%
61	Apr-20	6	30	28.75	659,653	1,187,375	27,724,262	1030	40,387	21,484	136,582	(74,711)	39,330	11,014	(22,999)	22,999	0	0	33,240	22,999	0	4,096,304	14.8%	8.3%
62	May-20	6	31	29.75	682,597	1,228,675	28,383,918	1040	41,792	22,231	141,333	(77,310)	40,698	50,735	12,756	0	12,756	0	33,240	0	0	4,211,062	14.8%	8.3%
63	Jun-20	6	30	28.75	659,653	1,187,375	29,066,513	1040	40,387	21,484	136,582	(74,711)	39,330	33,991	(22)	22	0	12,756	45,996	0	0	4,306,924	14.8%	8.3%
64	Jul-20	6	31	29.75	682,597	1,228,675	29,726,167	1040	41,792	22,231	141,333	(77,310)	40,698	0	(37,980)	37,980	0	12,734	45,974	25,246	0	4,396,192	14.8%	8.3%
65	Aug-20	6	31	29.75	682,597	1,228,675	30,408,762	1040	41,792	22,231	141,333	(77,310)	40,698	0	(36,612)	36,612	0	0	33,240	36,612	0	4,496,827	14.8%	8.3%
66	Sep-20	6	30	28.75	659,653	1,187,375	31,091,362	1050	40,387	21,484	136,582	(74,711)	39,330	0	(34,013)	34,013	0	0	33,240	34,013	0	4,592,710	14.8%	8.3%
67	Oct-20	6	31	29.75	682,597	1,228,675	31,751,013	1050	41,792	22,231	141,333	(77,310)	40,698	3,973	(34,006)	34,006	0	0	33,240	34,006	0	4,694,713	14.8%	8.3%
68	Nov-20	6	30	15.00	344,167	619,500	32,433,611	1050	21,071	11,209	71,260	(38,980)	20,520	0	1,719	0	1,719	0	33,240	0	0	4,726,993	14.6%	8.2%
69	Dec-20	6	31	0.00	0	0	32,777,778	1050	0	0	0	0	0	0	20,520	0	20,520	1,719	34,959	0	0	4,726,993	14.4%	8.1%
70	Jan-21	7	31	0.00	0	0	32,777,778	1050	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	4,726,993	14.4%	8.1%
71	Feb-21	7	28	0.00	0	0	32,777,778	1050	0	0	0	0	0	0	0	0	0	22,239	55,479	0	0	4,726,993	14.4%	8.1%
72	Mar-21	7	31	29.75	682,597	1,228,675	32,777,778	1050	41,792	22,231	141,333	(77,310)	40,698	0	(77,310)	77,310	0	22,239	55,479	55,071	0	4,846,087	14.8%	8.3%
73	Apr-21	7	30	28.75	659,653	1,187,375	33,460,373	1050	40,387	21,484	125,952	(64,081)	28,701	15,355	(8,028)	8,028	0	0	33,240	8,028	0	4,931,341	14.7%	8.3%
74	May-21	7	31	29.75	682,597	1,228,675	34,120,029	1060	41,792	22,231	130,333	(66,310)	29,699	92,298	54,689	0	54,689	0	33,240	0	0	5,087,662	14.9%	8.4%
75	Jun-21	7	30	28.75	659,653	1,187,375	34,802,624	1060	40,387	21,484	125,952	(64,081)	28,701	76,117	41,735	0	41,735	54,689	87,929	0	18,148	5,207,502	15.0%	8.4%
76	Jul-21	7	31	29.75	682,597	1,228,675	35,462,278	1060	41,792	22,231	130,333	(66,310)	29,699	10,794	(26,816)	26,816	0	96,423	129,663	0	11,190	5,271,129	14.9%	8.3%
77	Aug-21	7	31	29.75	682,597	1,228,675	36,144,873	1060	41,792	22,231	130,333	(66,310)	29,699	0	(36,612)	36,612	0	69,607	102,847	0	0	5,335,151	14.8%	8.3%
78	Sep-21	7	30	28.75	659,653	1,187,375	36,827,473	1070	40,387	21,484	125,952	(64,081)	28,701	9,270	(25,113)	25,113	0	32,996	66,236	0	0	5,406,292	14.7%	8.2%
79	Oct-21	7	31	29.75	682,597	1,228,675	37,487,124	1070	41,792	22,231	130,333	(66,310)	29,699	5,539	(32,071)	32,071	0	7,883	41,123	24,188	0	5,500,042	14.7%	8.2%
80	Nov-21	7	30	15.00	344,167	619,500	38,169,724	1070	21,071	11,209	65,714	(33,434)	14,974	0	(3,735)	3,735	0	0	33,240	3,735	0	5,536,057	14.5%	8.1%
81	Dec-21	7	31	0.00	0	0	38,513,889	1070	0	0	0	0	0	0	14,974	0	14,974	0	33,240	0	0	5,536,057	14.4%	8.1%
82	Jan-22	8	31	0.00	0	0	38,513,889	1070	0	0	0	0	0	0	0	0	0	14,974	48,214	0	0	5,536,057	14.4%	8.1%
83	Feb-22	8	28	0.00	0	0	38,513,889	1070	0	0	0	0	0	0	0	0	0	14,974	48,214	0	0	5,536,057	14.4%	8.1%
84	Mar-22	8	31	29.75	682,597	1,228,675	38,513,889	1070	41,792	22,231	130,333	(66,310)	29,699	0	(66,310)	66,310	0	14,974	48,214	51,336	0	5,651,416	14.7%	8.2%
85	Apr-22	8	30	28.75	659,653	1,187,375	39,196,484	1070	40,387	21,484	125,952	(64,081)	28,701	15,355	(19,028)	19,028	0	0	33,240	19,028	0	5,747,670	14.7%	8.2%

	Date	Year	# days per month	# Heap Days	Monthly Aproximate Amount of Ore Going on Pad		Cumulative Volume of Ore Going on Pad	Approximate Elevation (from Stacking Plan)	Water In Ore from Pit (ROM) (5%)	Water In Ore from Stockpile (7.5%)	Total Monthly Water Requirement in Ore going on Pad to Reach Avg. Operating Water	Water Deficit to Reach Avg. Operating Water Content	Vol. of Water Released from Ore at End of Period (Availabe for Recycle)	Environmental Contribution Water to Pad	Total Monthly Water Balance (includes Recycling)	Makeup Water Required Includes Recycle	Excess Available for Recycle	Cumulative Banked Volume above Min. Operating (166,200 m^3 range)	Total Cumulative Banked In-Heap Storage (199,440 m^3 max)	Total Freshwater Make-up Water Required (includes Recycle)	Excess Water Released from HLF (to WWTP)	Total Volume of Solution in heap (solution inventory)	Average Monthly Moisture Content	
					(m^3)	(tonnes)	(m^3)	(tonnes)	(m)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(% by vol.)	(% by mass)
86	May-22	8	31	29.75	682,597	1,228,675	39,856,138	71,741,048	1080	41,792	22,231	130,333	(66,310)	29,699	89,498	51,888	0	51,888	0	33,240	0	0	5,901,190	14.8%	8.3%
87	Jun-22	8	30	28.75	659,653	1,187,375	40,538,733	72,969,720	1080	40,387	21,484	125,952	(64,081)	28,701	72,261	37,878	0	37,878	51,888	85,128	0	16,171	6,019,151	14.8%	8.3%
88	Jul-22	8	31	29.75	682,597	1,228,675	41,198,387	74,157,096	1080	41,792	22,231	130,333	(66,310)	29,699	6,694	(30,916)	30,916	0	89,766	123,006	0	9,078	6,080,790	14.8%	8.3%
89	Aug-22	8	31	29.75	682,597	1,228,675	41,880,987	75,385,776	1090	41,792	22,231	130,333	(66,310)	29,699	0	(36,612)	36,612	0	58,850	92,090	0	0	6,144,813	14.7%	8.2%
90	Sep-22	8	30	28.75	659,653	1,187,375	42,563,582	76,614,448	1090	40,387	21,484	125,952	(64,081)	28,701	8,172	(26,211)	26,211	0	22,239	55,479	3,972	0	6,218,827	14.6%	8.2%
91	Oct-22	8	31	29.75	682,597	1,228,675	43,223,236	77,801,824	1090	41,792	22,231	130,333	(66,310)	29,699	5,539	(32,071)	32,071	0	22,239	55,479	9,832	0	6,298,221	14.6%	8.2%
92	Nov-22	8	30	15.00	344,167	619,500	43,905,836	79,030,504	1090	21,071	11,209	65,714	(33,434)	14,974	0	(3,735)	3,735	0	22,239	55,479	0	0	6,330,501	14.4%	8.1%
93	Dec-22	8	31	0.00	0	0	44,250,000	79,650,000	1090	0	0	0	0	0	0	14,974	0	14,974	18,504	51,744	0	0	6,330,501	14.3%	8.0%
94	Jan-23	9	31	0.00	0	0	44,250,000	79,650,000	1090	0	0	0	0	0	0	0	0	0	33,478	66,718	0	0	6,330,501	14.3%	8.0%
95	Feb-23	9	28	0.00	0	0	44,250,000	79,650,000	1090	0	0	0	0	0	0	0	0	0	33,478	66,718	0	0	6,330,501	14.3%	8.0%
96	Mar-23	9	31	29.75	682,597	1,228,675	44,250,000	79,650,000	1100	41,792	22,231	130,333	(66,310)	29,699	0	(66,310)	66,310	0	33,478	66,718	32,832	0	6,427,356	14.5%	8.2%
97	Apr-23	9	30	28.75	659,653	1,187,375	44,932,596	80,878,672	1100	40,387	21,484	125,952	(64,081)	28,701	15,355	(19,028)	19,028	0	33,478	66,718	0	0	6,504,582	14.5%	8.1%
98	May-23	9	31	29.75	682,597	1,228,675	45,592,249	82,066,048	1100	41,792	22,231	130,333	(66,310)	29,699	87,556	49,946	0	49,946	14,450	47,690	0	0	6,656,161	14.6%	8.2%
99	Jun-23	9	30	28.75	659,653	1,187,375	46,274,849	83,294,728	1120	40,387	21,484	125,952	(64,081)	28,701	67,123	32,740	0	32,740	64,397	97,637	0	13,537	6,771,617	14.6%	8.2%
100	Jul-23	9	31	29.75	682,597	1,228,675	46,934,498	84,482,096	1120	41,792	22,231	130,333	(66,310)	29,699	1,231	(36,379)	36,379	0	97,137	130,377	0	6,263	6,830,608	14.6%	8.2%
101	Aug-23	9	31	29.75	682,597	1,228,675	47,617,098	85,710,776	1120	41,792	22,231	130,333	(66,310)	29,699	0	(36,612)	36,612	0	60,758	93,998	0	0	6,894,631	14.5%	8.1%
102	Sep-23	9	30	28.75	659,653	1,187,375	48,299,693	86,939,448	1130	40,387	21,484	125,952	(64,081)	28,701	6,522	(27,861)	27,861	0	24,146	57,386	3,715	0	6,966,738	14.4%	8.1%
103	Oct-23	9	31	29.75	682,597	1,228,675	48,959,347	88,126,824	1130	41,792	22,231	130,333	(66,310)	29,699	5,539	(32,071)	32,071	0	24,146	57,386	7,924	0	7,044,224	14.4%	8.1%
104	Nov-23	9	30	15.00	344,167	619,500	49,641,947	89,355,504	1130	21,071	11,209	65,714	(33,434)	14,974	0	(3,735)	3,735	0	24,146	57,386	0	0	7,076,505	14.3%	8.0%
105	Dec-23	9	31	0.00	0	0	49,986,111	89,975,000	1130	0	0	0	0	0	0	14,974	0	14,974	20,411	53,651	0	0	7,076,505	14.2%	7.9%
106	Jan-24	10	31	0.00	0	0	49,986,111	89,975,000	1130	0	0	0	0	0	0	0	0	0	35,386	68,626	0	0	7,076,505	14.2%	7.9%
107	Feb-24	10	29	0.00	0	0	49,986,111	89,975,000	1130	0	0	0	0	0	0	0	0	0	35,386	68,626	0	0	7,076,505	14.2%	7.9%
108	Mar-24	10	31	29.75	682,597	1,228,675	49,986,111	89,975,000	1140	41,792	22,231	130,333	(66,310)	29,699	0	(66,310)	66,310	0	35,386	68,626	30,925	0	7,171,452	14.3%	8.1%
109	Apr-24	10	31	29.75	682,597	1,228,675	50,639,640	91,151,352	1150	41,792	22,231	130,333	(66,310)	29,699	0	(36,612)	36,612	0	35,386	68,626	1,226	0	7,236,701	14.3%	8.0%

Phase 2 Precipitation and Sublimation Calculations

	Heap Leach Pad			
Heap Contributing Area (phase 2)=	993,330	m^2	assumes diversion channels in place upstream of Pad	Phase 1
Sublimation losses	20.0%			Phase 2
				Phase 3

	Climate Data								
Date	Rainfall	Snowfall SWE	Snowmelt Distribution per month	Rain on Heap Area	Snowfall SWE on Heap Area	Sublimation	Snowfall SWE Minus Sublimation	Snowmelt	Precipitation and Sublimation, Phase 2
	(mm)	(mm)	(%)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Jan	0.0	36.0	0.0%	0	35,760	7,152	28,608	0	0
Feb	0.0	29.0	0.0%	0	28,807	5,761	23,045	0	0
Mar	0.0	36.0	0.0%	0	35,760	7,152	28,608	0	0
Apr	0.0	31.0	5.0%	0	30,793	6,159	24,635	11,014	11,014
May	12.0	6.0	50.0%	11,920	5,960	1,192	4,768	110,140	122,060
Jun	53.0	0.0	35.0%	52,646	0	0	0	77,098	129,745
Jul	64.0	0.0	10.0%	63,573	0	0	0	22,028	85,601
Aug	45.0	0.2	0.0%	44,700	199	40	159	0	44,700
Sep	35.0	14.0	0.0%	34,767	13,907	2,781	11,125	0	34,767
Oct	4.0	48.0	0.0%	3,973	47,680	9,536	38,144	0	3,973
Nov	0.0	37.0	0.0%	0	36,753	7,351	29,403	0	0
Dec	0.0	40.0	0.0%	0	39,733	7,947	31,787	0	0

Yearly Totals							220,281		431,860

Phase 3 Precipitation and Sublimation Calculations

	Heap Leach Pad			Phase 1
Heap Contributing Area (phase 3)=	1,384,816	m^2	assumes diversion channels in place upstream of Pad	Phase 2
Sublimation losses	20.0%			Phase 3

	Climate Data								
Date	Rainfall	Snowfall SWE	Snowmelt Distribution per month	Rain on Heap Area	Snowfall SWE on Heap Area	Sublimation	Snowfall SWE Minus Sublimation	Snowmelt	Precipitation and Sublimation, Phase 2
	(mm)	(mm)	(%)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Jan	0.0	36.0	0.0%	0	49,853	9,971	39,883	0	0
Feb	0.0	29.0	0.0%	0	40,160	8,032	32,128	0	0
Mar	0.0	36.0	0.0%	0	49,853	9,971	39,883	0	0
Apr	0.0	31.0	5.0%	0	42,929	8,586	34,343	15,355	15,355
May	12.0	6.0	50.00%	16,618	8,309	1,662	6,647	153,548	170,166
Jun	53.0	0.0	35.0%	73,395	0	0	0	107,484	180,879
Jul	64.0	0.0	10.0%	88,628	0	0	0	30,710	119,338
Aug	45.0	0.2	0.0%	62,317	277	55	222	0	62,317
Sep	35.0	14.0	0.0%	48,469	19,387	3,877	15,510	0	48,469
Oct	4.0	48.0	0.0%	5,539	66,471	13,294	53,177	0	5,539
Nov	0.0	37.0	0.0%	0	51,238	10,248	40,991	0	0
Dec	0.0	40.0	0.0%	0	55,393	11,079	44,314	0	0

Yearly Totals	307,097	602,063

Phase 1 Precipitation and Sublimation Calculations

	Heap Leach Pad			
Heap Contributing Area (phase 1)=	477,898	m^2	assumes diversion channels in place upstream of Pad	Phase 1
Sublimation losses	20.0%			Phase 2
				Phase 3

	Climate Data									
Date	Rainfall	Snowfall SWE	Snowmelt Distribution per month		Rain on Heap Area	Snowfall SWE on Heap Area	Sublimation	Snowfall SWE Minus Sublimation	Snowmelt	Precipitation less Sublimation, Phase 1
	(mm)	(mm)	(%)		(m^3)	(m^3)	(m^3)	(m^3)	(m^3)	(m^3)
Jan	0.0	36.0	0.0%		0	17,204	3,441	13,763	0	0
Feb	0.0	29.0	0.0%		0	13,859	2,772	11,087	0	0
Mar	0.0	36.0	0.0%		0	17,204	3,441	13,763	0	0
Apr	0.0	31.0	5.0%		0	14,815	2,963	11,852	5,299	5,299
May	12.0	6.0	50.0%		5,735	2,867	573	2,294	52,989	58,724
Jun	53.0	0.0	35.0%		25,329	0	0	0	37,093	62,421
Jul	64.0	0.0	10.0%		30,585	0	0	0	10,598	41,183
Aug	45.0	0.2	0.0%		21,505	96	19	76	0	21,505
Sep	35.0	14.0	0.0%		16,726	6,691	1,338	5,352	0	16,726
Oct	4.0	48.0	0.0%		1,912	22,939	4,588	18,351	0	1,912
Nov	0.0	37.0	0.0%		0	17,682	3,536	14,146	0	0
Dec	0.0	40.0	0.0%		0	19,116	3,823	15,293	0	0

Yearly Totals	105,979	207,771

APPENDIX O – ESTIMATE OF QUANTITIES

Victoria Gold Corporation
Eagle Gold Project
Phase 1 Heap Leach Facility Quantities Estimate

SUMMARY FORM

WBS No.	Description	Units	Quantity	Comments
1.0 – General Items				
1.1	Mobilization	LOT	1	
1.2	Construction Staking and Layout	LOT	1	
1.3	Construction Stormwater Control	LOT	1	
1.4	Demobilization	LOT	1	
3.0 – PONDS				
3.1 - Event Pond				
3.1.1	Clearing and Grubbing	ha	2	
3.1.2	Excavation	m^3	553,764	
3.1.3	Deep dynamic compaction treatment area	m^2	16,115	
3.1.4	Ponds Grading (fill)	m^3	126,768	compacted fill material with a maximum particle size of 50mm compacted to 95% of proctor density and +/- 2% optimum moisture
3.1.5	Ponds Groundwater Drainage Piping	m	1,339	200mm Perforated, Corrugated HDPE N-12
3.1.6	Underdrain Drainage Geotextile	m^2	4,553	8 oz non-woven geotextile
3.1.7	Underdrain Trench (cut)	m^3	670	
3.1.8	Prepared Subgrade	m^2	36,899	
3.1.9	Primary Geomembrane Placement [2mm HDPE]	m^2	38,094	80-mil Double-side textured HDPE Geomembrane
3.1.10	Geocomposite for Leak Detection System	m^2	38,094	Syntec Minedrain TD-7 (or approved equivalent) 300-mil geonet heat-laminated on both sides with 270 gr/sq m (8 oz/sq yd) nonwoven geotextile
3.1.11	Secondary Geomembrane Placement [1.5mm LLDPE]	m^2	38,094	60-mil Double-side textured LLDPE Geomembrane
3.2.12	Leak Detection & Recovery System (Leak Detection Pump System)	LOT	1	Low flow suction pump with leak detection probe (by others)
3.1.13	Leak Detection and recovery system pump casing	m	37	150mm SCH. 80 PVC Pipe
3.1.14	150mm End Cap	each	2	
3.1.15	Liner Rub Sheet under Leak Detection and recovery system pump casing	m^2	74	80 mil thickness HDPE strips, 2m wide minimum
3.1.16	Liner Rub Sheet for Rolling Pump System	m^2	259	80 mil thickness HDPE strips, 2m wide minimum
3.1.17	Geosynthetic Clay Liner	m^2	38,094	a sodium bentonite soil layer between two non-woven geotextiles, needle punched together
3.1.18	Perimeter Drainage Swale Cut	m^3	28,547	
3.1.19	Perimeter Drainage Swale Fill	m^3	8,448	
3.1.20	Select Drain Fill	m^3	770	In LDRS sump & Pipe bedding for Underdrain
3.1.21	Anchor Trench Backfill	m^3	483	0.75m x 0.75m
3.1.22	Bollards	each	2	102mm SCH. 40 steel pipe, concrete filled, painted OSHA yellow
3.1.23	UV Resistant sandbags	LOT	1	
3.1.24	Pump Casing Anchor Post	each	2	Each side of pump casing, 100mm Ø x 4m long concrete filled steel pipe, embedded 3m deep.
3.1.25	150mm Wear Course	m^3	627	150mm thick road base wear course
3.1.26	Flow meter	each	5	

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WBS No.	Description	Units	Quantity	Comments
4.0 – HEAP LEACH FACILITY				
4.1 Embankment Construction				
4.1.1	Clearing and Grubbing	ha	12	
4.1.2	Topsoil Stripping	m^3	24,800	200mm thickness
4.1.3	Excavate Permafrost	m^3	39,077	
4.1.4	Deep dynamic compaction treatment area	m^2	104,907	
4.1.5	Site Grading Cut	m^3	756,852	Includes Placer Tailings & native material removal
4.1.6	Site Grading Fill	m^3	28,695	Place and compact site grading fill or place placer tailings and treat with deep dynamic compaction per project technical specifications.
4.1.7	Compacted Rock Fill	m^3	2,308,253	
4.1.8	Filter Zone	m^3	44,448	0.15m thick hard and durable free-draining fine gravels with 12.5-mm maximum particle size and a maximum of 3 percent passing the No. 200 ASTM sieve size (0.075-mm).
4.1.9	Seal Zone	m^3	44,787	0.3-m minimum compacted thickness of low-permeability clay soil liner
4.1.9	Geosynthetic Clay Liner	m^2	41,252	a sodium bentonite soil layer between two non-woven geotextiles, needle punched together
4.1.11	In-heap Primary Geomembrane (2mm LLDPE)	m^2	41,252	80 mil thickness (double-sided textured) LLDPE
4.1.12	Geocomposite for Leak Detection System	m^2	41,252	Syntec Minedrain TD-7 (or approved equivalent) 300-mil geonet heat-laminated on both sides with 270 gr/sq m (8 oz/sq yd) nonwoven geotextile
4.1.13	In-heap Secondary Geomembrane (1.5mm LLDPE)	m^2	41,252	60 mil thickness (double-sided textured) LLDPE
4.1.14	Overliner Drain Fill (crushed drainage layer material)	m^3	40,814	1m thickness; crushed to minus 50mm and screened over 12mm with no more than 5% fines
4.1.15	150mm Wear Course	m^3	977	150mm thick road base wear course
4.1.16	Safety berm	m^3	1,146	
4.1.17	Anchor Trench Backfill	m^3	331	0.75m x 0.75m
4.1.18	Planned Survey Monument	each	11	
4.1.19	Embankment Piezometer	each	6	
4.1.20	Slope Inclinometer	each	2	
4.1.21	Flow meter	each	2	
4.1.22	Data logger	each	2	
4.2 In Heap Pond Spillway Construction				
4.2.1	Spillway Grading Cut	m^3	2,915	
4.2.2	Spillway Grading Fill	m^3	11,037	Compacted wear course
4.2.3	Spillway Concrete	m^3	801	
4.2.4	200mm Aggregate Base Course	m^3	388	Compacted select drain fill
4.2.5	Drive through concrete swale	m^3	102	300mm Thick Concrete
4.2.6	Batten strips to fasten liner to driveable swale	m	28	
4.2.7	Concrete Box Culvert	LOT	1	In heap pond spillway box culvert at embankment

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WBS No.	Description	Units	Quantity	Comments
4.2.8	Batten strips to fasten liner on to box culvert	m	28	
4.3 Event Pond Spillway Construction				
4.3.1	Spillway Grading Cut	m^3	89	
4.3.2	Spillway Grading Fill	m^3	427	
4.3.3	Spillway Concrete	m^3	83	
4.3.4	200mm Aggregate Base Course	m^3	36	Compacted select drain fill
4.3.4	Steel Grating	LOT	1	Brown & Campbell 15W4 6" x 5/16" (60ksi steel) or better
4.3.5	Batten strips to fasten liner on to concrete spillway	m	6	
4.3.6	Compacted wear course backfill (along pond embankment)	m^3	285	
4.4 Heap Leach Pad - Phase 1				
4.4.1	Clearing and Grubbing	ha	48	
4.4.2	Topsoil Stripping	m^3	95,600	200mm thickness
4.4.3	Excavate Permafrost	m^3	247,929	
4.4.4	Pad Grading (cut)	m^3	333,135	
4.4.5	Pad Grading (fill)	m^3	243,435	
4.4.6	Underdrain Trench (cut)	m^3	6,535	
4.4.7	Deep dynamic compaction treatment area	m^2	98,026	
4.4.8	HLF Underdrain Bedding fill	m^3	3,793	Select drain fill
4.4.9	Underdrain Drainage Geotextile	m^2	26,777	8 oz non-woven geotextile
4.4.10	300mm Underdrain Pipe	m	2,265	300mm Corrugated Solid Wall HDPE N-12
4.4.11	300mm Perforated Underdrain Pipe	m	147	300mm Corrugated Perforated Wall HDPE N-12
4.4.12	200mm Underdrain Pipe	m	1,279	200mm Corrugated Solid Wall HDPE N-12
4.4.13	200mm Perforated Underdrain Pipe	m	1,031	200mm Corrugated Perforated Wall HDPE N-12
4.4.14	100mm PerforatedUnderdrain Pipe	m	5,593	100mm Corrugated Perforated Wall HDPE N-12
4.4.15	Pipe Bedding fill (300mm HDPE line)	m^3	1,024	Crushed or non-crushed durable rock well graded between the #4 sieve size and below the #100 sieve
4.4.16	300mm 45-degree elbow fitting	each	2	West of monitoring vault
4.4.17	300mm x 300mm 45° lateral	each	2	West of monitoring vault
4.4.18	100mm x 200mm 45° lateral	each	22	Connection to Header Pipe
4.4.19	100mm x 300mm 45° lateral	each	2	Connection to Header Pipe
4.4.20	Prepared Subgrade	m^2	427,092	
4.4.21	Geosynthetic Clay Liner	m^2	431,221	a sodium bentonite soil layer between two non-woven geotextiles, needle punched together
4.4.22	In-heap Primary Geomembrane (2mm LLDPE)	m^2	431,221	80 mil thickness (double-sided textured) LLDPE

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WBS No.	Description	Units	Quantity	Comments
4.4.23	Geocomposite between liners	m^2	165,292	Syntec Minedrain TD-7 (or approved equivalent) 300-mil geonet heat-laminated on both sides with 270 gr/sq m (8 oz/sq yd) nonwoven geotextile
4.4.24	In-heap Secondary Geomembrane (1.5mm LLDPE)	m^2	165,292	60 mil thickness (double-sided textured) LLDPE
4.4.25	Overliner Drain Fill (crushed drainage layer material)	m^3	435,589	1m thickness; crushed to minus 50mm and screened over 12mm with no more than 5% fines
4.4.26	PLS Pump Casing	m	563	600mm Solid Steel, Wall thickness 20 mm min.
4.4.27	PLS Pump Casing Removable End Cap	each	5	
4.4.28	Liner Rub Sheet under PLS Pump Casing	m^2	3,472	80 mil thickness LLDPE
4.4.29	PLS Pump System	LOT	1	By others
4.4.30	PLS Collection Header Pipe	m	4,132	450mm Perforated, Corrugated HDPE N-12
4.4.31	PLS Collection Primary Pipe	m	3,310	250mm Perforated, Corrugated HDPE N-12
4.4.31	PLS Collection Secondary Pipe	m	17,638	100mm Perforated, Corrugated HDPE N-12
4.4.32	450mm End Cap	each	5	Uphill ends of Header Pipe
4.4.33	250mm End Cap	each	16	Both ends of 250mm Collection Pipes (except 2)
4.4.34	200mm End Cap	each	4	Uphill ends of 200mm Underdrain Pipes
4.4.35	100mm End Cap	each	452	Both ends of 100mm Collection Pipes (PLS) & Uphill end of Underdrain Pipes
4.4.36	750mm x 450mm Reducer	each	5	Fittings in PLS Sump
4.4.37	750mm 22.5-degree elbow fitting and pump seating ring	each	5	Vertical bend fittings in PLS Sump
4.4.38	450mm 90-degree elbow fitting	each	4	Fittings in PLS Sump
4.4.39	450mm Tee fitting	each	8	Fittings in PLS Sump
4.4.40	450mm Cross fitting	each	21	Fittings in PLS Sump
4.4.41	450mm x 250mm Reducer	each	2	Fittings in PLS Sump
4.4.42	450mm Wye	each	40	Wyes for header pipes at bench
4.4.43	250mm Wye	each	30	Wyes for primary pipes at bench
4.4.44	300mm Closure Drain Pipe	m	356	300mm Corrugated HDPE N-12
4.4.45	150mm Perforated Closure Drain Pipe	m	52	150mm Perforated Corrugated HDPE N-12
4.4.46	150mm Closure Drain Pipe	m	9	150mm Solid, Smooth HDPE DR 11
4.4.47	150mm Corrugated Closure Drain Pipe	m	1,027	150mm Corrugated HDPE N-12
4.4.48	150mm Tee fitting	each	3	Closure drain sump
4.4.49	150mm Cross fitting	each	1	Closure drain sump
4.4.50	150mm 90-degree elbow fitting	each	2	Closure drain sump
4.4.51	300mm x 300mm 45° lateral	each	2	Closure drain line to monitoring vault
4.4.52	150mm 45° Bend	each	1	Closure drain line to monitoring vault
4.4.53	300mm x 150mm Reducer	each	3	Closure drain line to monitoring vault
4.4.54	150mm Clean-out	each	3	Closure drain line to monitoring vault
4.4.55	LDRS Solid Pump Casing	m	231	250mm Sch. 40 Steel
4.4.56	LDRS Pump Casing Removable End Cap	each	2	

Victoria Gold Corporation
Eagle Gold Project
Phase 1 Heap Leach Facility Quantities Estimate

SUMMARY FORM

WBS No.	Description	Units	Quantity	Comments
4.4.56	Liner Rub Sheet under LDRS Pump Casing	m^2	464	80 mil thickness LLDPE strips, 2m wide minimum
4.4.57	LDRS Perforated Pump Casing	m	16	250mm Perforated Sch. 40 Steel
4.4.58	250mm 22.5-degree elbow fitting and pump seating ring	each	2	Vertical bend from LDRS sump
4.4.59	250mm End Cap	each	2	LDRS Sump
4.4.60	Anchor Trench Backfill	m^3	1,695	0.75m x 0.75m
4.4.61	150mm Wear Course	m^3	351	150mm thick road base wear course
4.4.62	Bollards	each	2	102mm ø SCH. 40 steel pipe, concrete filled, painted OSHA yellow
4.4.63	Pump Casing Anchor Post	each	10	Each side of pump casing, 100mm ø x 4m long concrete filled steel pipe, embedded 3m deep.
4.4.64	Sump Area Drain Fill	m^3	3,490	Select drain fill
4.4.65	12 oz. Non-woven Geotextile in sump area	m^2	2,837	Under overliner drain fill and surrounding closure sump
	4.5 Heap Leach Pad - Phase 1 Temporary Diversion Channels			
4.5.1	Clearing and Grubbing	ha	4.2	
4.5.2	Topsoil Stripping	m^3	8,427	200mm thickness
4.5.3	Excavate Permafrost	m^3	28,774	
4.5.4	Cut Diversion Channel	m^3	95,115	Cut weathered rock - "Type 3" rock as defined in reference [1]
4.5.5	Diversion Channel Grading (fill)	m^3	9,403	
4.5.6	Geotextile (Riprap)	m^2	10,812	
4.5.6	Riprap	m^3	4,181	300mm thick, D50 = 150mm
4.5.6	150mm Wear Course	m^3	658	150mm thick road base wear course
5.0 – MONITORING VAULT				
	4.6 Monitoring Vault			
4.6.1	Overflow Pipe	m	35.0	300mm DIA. Solid Wall HDPE N-12
4.6.2	300mm 45-degree elbow fitting	each	2	Overflow pipe west of vault
4.6.2	Piping (overflow, underdrain, and closure) inside monitoring vault	LOT	1.0	By others
4.6.3	Monitoring Vault	LOT	1.0	By others

APPENDIX P – CONSTRUCTION PLAN AND PROJECT TECHNICAL SPECIFICATIONS

Heap Leach Facility Construction Plan

Eagle Gold Project

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Tetra Tech Project No. 114-201087

April 23, 2014

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1.0 HEAP LEACH FACILITY CONSTRUCTION

1.1 Introduction

StrataGold Corporation (StrataGold) commissioned Tetra Tech to advance the existing Feasibility Study (FS) to final detailed design for the Eagle Gold Heap Leach Facility (Project). The project site is located in central Yukon Territory, Canada. The Phase 1 Heap Leach Facility (HLF) design including the lined pad, confining embankment, in-heap pond, events pond, temporary ditches, and conveyor corridors is presented in a document prepared by Tetra Tech titled "Heap Leach Facility Detailed Design, Eagle Gold Project" and dated April 23, 2014.

This report presents the Construction Plan (Plan) of the Phase 1 HLF including the lined pad, confining embankment, in-heap pond, event pond, temporary diversion, and conveyor corridors.

The design of mine facilities is being prepared by the Tucson, Arizona office of M3 Engineering (M3). Construction of the crushing facilities, cement and lime silos, agglomerator, process plant, mill facilities, and other pertinent structures including access and haul roads are not covered in this Plan.

1.2 Construction Staging

The HLF is a valley fill design that incorporates a rock filled embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam will also provide for the storage and management of cyanide process solutions within the heap, which eliminates the need for downstream pregnant and barren process solution ponds or tanks.

The ore heap will be stacked in nominal 10 m thick lifts. However, the first lifts at the pad's lowest point adjacent to the dam may need to be thicker to allow sufficient space for leaching. The Phase 1 pad will be constructed in pre-production to accommodate a maximum of three years of ore production or approximately 30 Mt of ore.

The construction Phase 2 pad will start at the beginning of Year 3 of operations, at the latest. The Stage 2 heap will consist of approximately 30 Mt of ore and will be stacked above the Stage 1 heap and the Phase 2 pad. The Stage 2 heap stacking will begin in Year 4 and conclude at the end of Year 7 of operation.

The Phase 3 pad will be constructed by end of Year 7. The Stage 3 heap stacking will start at the beginning of Year 8 of operation and conclude near the end of Year 10 after covering most of the Phase 3 pad. The Stage 3 heap amount will be approximately 30 Mt.

The heap ore capacity quantities are based on an estimated average stacked ore heap dry density of 1.7 tonnes/m^3 and an overall ore pile outslope angle of 2.5H:1V.

1.3 HLF Foundation

Foundation preparation includes removing or relocating any existing structures, removing vegetation and unsuitable materials, site grading, Deep Dynamic Compaction ground treatment of the placer tailings deposit, and installation of subsurface drainage pipelines.

Bedrock at the mine site has been subdivided by BGC into three broad categories – Type 1, Type 2 and Type 3 – on the basis of rockmass quality and inferred engineering behavior, with Type 1 being the highest quality, and Type 3 being the lowest quality with unconfined compressive strength of 1 to 5 MPa. Type 3 bedrock, the lowest quality rockmass considered to behave as rock (rather than as a soil), can be recognized in the field by a qualified geotechnical engineer/geologist on the basis of evident preserved fabric of the parent rock within the highly

weathered rockmass, and the requirement for moderate effort to excavate with heavy excavators. Types 1 and 2 bedrock are of generally better rockmass quality. The transition from Type 3 to Type 2 can be inferred where it becomes necessary to rip the rock. Type 1 bedrock will require the use of hydraulic hammers and/or drilling and blasting to excavate.

1.3.1 HLF Foundation Preparation

Several conditions could affect the performance of the HLF foundation; however, when properly identified the conditions can be mitigated. For occurrences of permafrost, overexcavation with rock fill replacement is specified. The grading plan for the HLF accounts for removal of known ice-rich materials within the footprint of the facility. However, during the course of construction, additional ice-rich material may be encountered and will be removed.

In the area of the HLF dam, the foundation abutment areas (outside the limits of the placer tailings in colluvial materials) will be excavated to bedrock (Type 3 rock or better) to remove any poorly consolidated or ice-rich material that could shift or settle upon loading the foundation with the embankment and crushed ore. The dam foundation within the limits of the placer tailings will be treated with Deep Dynamic Compaction (see Section 1.3.2).

Surface runoff and near surface groundwater must be controlled to avoid ponding and the saturation of low strength soils. Proof rolling the base of the HLF prior to liner placement will identify problem areas that should be reworked to produce a stable foundation.

1.3.2 Deep Dynamic Compaction

Deep Dynamic Compaction (DDC) ground treatment will be performed to densify the placer materials within the footprint of the dam and In-Heap pond of the HLF. The work will be extended below the dam to the upper portion of the Event Pond to ensure stability of the downstream toe of the dam and the adjacent excavation cut slope of the Event Pond. The performance criteria have been developed to provide a minimum factor of safety of 1.5 against liquefaction triggering of the placer material during the maximum credible earthquake.

The work will be carried out by a qualified DDC contractor to meet specified project performance criteria set forth by the Owner's Engineer. The key tasks involved in the DDC work include:

- Preparation of the treatment area to include site earthworks to lines and grades specified by the Owner's Engineer. The grading plan was developed to provide a suitable surface for DDC work, and a maximum depth of placer material of 12 m (depth of achievable DDC treatment).
- Dewatering to achieve a minimum of 1.5m freeboard (top of graded placer tailings to top of groundwater).
- Surface water controls to include ditching and sumps to prevent inundation of the work area and to help control groundwater levels.
- Densification of soil using DDC to achieve the following minimum criterion described in the project Technical Specifications.
- Site verification testing for confirmation that the project specification has been achieved.
- Preparation of an engineering report of the densification to be submitted to the Owner's Engineer for review and acceptance.

The general extent of the DDC treatment area is shown in the construction drawings. The Owner's Engineer may modify the treatment limits based on field observations.

The project Technical Specifications provide details and requirements for DDC work. A test section consisting of 40 meters by 40 meters shall be densified at the beginning of the densification work at a location determined by the Owner's Engineer.

The intent of the test section is that the Contractor shall demonstrate that the procedures used for the test section are satisfactory and can be continued throughout the remainder of the work. Acceptance of the densification method based on the results of the test section will be based on field Becker Penetration Testing (BPT). Additionally, geophysical seismic refraction field testing will be conducted by the Owner's Engineer for Quality Assurance (QA). The Technical Specifications include the BPT and seismic wave velocity criteria requirements.

The Owner's Engineer will periodically monitor progress and performance of the densification Work. The monitoring may include but is not limited to any or all of the following: observance of the Densification Contractor's procedures, recording of craters volumes, witness of BPT testing and additional QA geophysical testing.

Testing to determine specification compliance will consist of performing one BPT boreholes to a minimum depth of 12 m or refusal below the finished floor every 5,000m^2 of densified soil. Owner's Engineer will conduct, at a minimum, geophysical testing within the footprint of the proposed dam for QA purposes. Areas of the site that do not achieve the required penetration resistance or seismic shear wave velocity shall be remedied by the Contractor at the Contractor's cost.

1.3.3 HLF Foundation Drainage

An underdrain system will be constructed to remove any surface runoff and near surface groundwater from beneath the HLF. The HLF underdrain piping network will collect and route natural seepage flows beneath the liner system and confining embankment to a monitoring vault located near the Event Ponds.

The underdrains will be entrenched at approximately 75m spacing with vertical or 1H:1V side trench walls and constructed with geofabric wrapped around granular drain rock backfill materials and perforated PE piping to form a french drain. The backfilled and geofabric wrapped drain fill will be covered by soil backfill to limit geofabric exposure time to the wind and sunlight. The backfilled underdrain trench final surface will be rubber tire wheel-rolled without scarification to prevent construction equipment damage to the geofabric wrap in preparation for placement of the HLF composite liner and overdrain system. The drains will be installed with a minimum 1 percent longitudinal grade for gravity drainage and the perforated piping will be routed beneath the HLF dam to the monitoring vault.

Table 1.1 presents a summary of the material and construction requirements for foundation preparation and underdrains.

Table 1.1: Foundation Preparation and Underdrains

Component	Description
Structures	Remove any existing structures Plug any boreholes or piezometers in top 30 m depth with concrete grout or bentonite
Vegetation	Clear and grub vegetation
Organic Surface Soils	Strip organic soil cover to minimum 3 m beyond the HLF construction limits and place in temporary topsoil stockpiles for final reclamation. Locate stockpiles as shown on drawings or at the direction of the Owner.

Component	Description
Foundation Improvement	Perform Deep Dynamic Compaction of placer tailings to project Technical Specifications. Remove loose and unsuitable materials to Type 3 or better bedrock at the dam abutments. Remove ice-rich materials.
Underdrains	Construct underdrain system as shown on the drawings. Perform grading as necessary in drainage bottoms to allow equipment access and to accommodate the required underdrain size. Install underdrains with geotextile, ADS N12 (or equal) PE pipe and gravel materials as specified.
Site Grading	Remove loose or unsuitable materials within the dam and limits as directed by the Engineer. Engineer to inspect exposed rock in dam foundation to determine suitability. Stripped rock subgrade surfaces and rock outcrops in at-grade areas to be cleared of loose rock fragments greater than 150 mm in size and wetted in preparation for foundation preparation. Foundation preparation to consist of placing and compacting fill material in varying thicknesses to suit field conditions to support the liner system. Site Grading Soil Fill material shall consist of soil with 150-mm maximum particle size and less than 30 percent particles larger than 19 mm. Place fill in maximum 0.3-m loose lifts and compact each lift to a minimum 95 percent of the maximum dry density (ASTM D-698) within ±2 percent of the optimum moisture content. Site grading rockfill will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size shall be no more than two thirds the loose thickness of the fill lift. The rockfill shall generally have 300-mm maximum rock particle size and oversized rocks larger than 300 mm shall be removed to the exterior fill slopes. Rocks larger than 300 mm may be incorporated in thicker fill lifts provided the rocks do not protrude from the lift surfaces after compaction, and the required compaction of the lifts is proven achievable by a test fill.
Subgrade	After clearing, grubbing, stripping, and excavating, the exposed subgrade surface shall be inspected and evaluated by the Engineer for the presence of loose or soft areas or unsuitable material prior to fill placement or geomembrane installation. Subgrade evaluation methods will depend on the location and the materials that will be placed over the subgrade and on the prevailing field conditions. Evaluation methods may include proof-rolling with a loaded dump truck or similar pneumatic-tired equipment to ensure that the surface is firm and smooth. Probing with a metal rod may also be performed. Soil subgrade surface receiving site grading fill or geomembrane shall be scarified to a minimum depth of 150mm, moisture conditioned if necessary to within plus or minus two (±2) percent of the optimum moisture content as determined by the Standard Proctor test (ASTM D-698), and recompacted to a minimum of 95 percent of the maximum dry density (ASTM D-698). Soil subgrade surface receiving geosynthetics shall be prepared such that it is smooth and free of protruding rocks, vegetation, or any other materials, or objects deemed unsuitable by the Engineer. In areas where rocks larger than 38 mm are protruding, the rocks shall be removed and replaced with compacted fine-grained soil material. This may also be performed in other areas to produce a relatively smooth surface suitable for installation of the liner system.

1.4 HLF Confining Embankment

The embankment dam is designed as an earth fill/rock fill structure with a geomembrane lined upstream dam face and appropriate filter and transition zones to provide a suitable surface for geomembrane installation and to ensure containment integrity with filter compatible materials. The planned fill placement for the HLF structures includes the use of conventional earth moving equipment, water wagons, roller compactors for earth fills, and vibratory compactors for rock fills. Suitable fill materials will be produced from required excavations for the HLF structures, borrow areas and onsite mine pit excavations. Moisture conditioning will be performed as needed in the embankment fills for compaction.

The fill types include compacted rock fill material taken from selective excavations and pit overburden for placement in the central and downstream section of the HLF embankment. The pre-production overburden removal excavations are estimated to include sufficient quantities of materials suitable for embankment fill and site grading fills. More competent durable rock for production of required drain rock will be quarried and crushed from required site excavations and filter materials will be produced from screening of placer fill materials in the Dublin Gulch valley bottom that require excavation.

Rock fill material containing more than 30 percent of particles above 19 mm (3/4 inch) size may be considered for use as fill in areas for select applications where frost susceptibility and drainage are less important such as the HLF containment embankment.

The rock fill specifications will require selection of competent waste rock with strength rating of R2 or harder as determined by International Society of Rock Mechanics (ISRM) procedures. Dozers will spread the dumped rock piles in controlled lifts for compaction by the loaded trucks or by large vibratory steel drum compactor rollers. The lift thickness and compactive effort for rock fill placement will be determined by the Engineer in test fills at the embankment site during startup of embankment construction and as required during construction or when material differing from the initial test materials is encountered. Compaction control requirements for rock fill may be determined based on the results of a test fill. The test fill should be constructed and monitored in accordance with the U. S. Army Corps of Engineers' (USACE) guidelines for test fill construction (USACE EM 1110-2-2301). In the event a source of higher quality rock is located capable of producing hard, durable rock particles, as expected from some of the waste rock derived from the open pit, the rock fill can be constructed in 1 m lifts and compacted by heavy construction traffic.

The compacted earth and rock fill embankment section will use compacted rock fill materials in the compacted rock fill zone for dam slope stability. A low-permeability earth fill section will be placed in the upstream section for seepage control with a filter zone to provide transition from the upstream seal zone fill to the downstream rock fill section. The dam configuration and fill descriptions are provided in Table 6.2.

Table 6.2: Dam Configuration and Zoning

Component	Description
Dam Configuration	Constructed in a single stage with a top crest with of 11m for each stage and a final crest elevation of 888m and upstream and downstream slopes of 2.5H:1V.
Zoning	Upstream seal zone with 3m horizontal thickness as shown on the drawings. Filter / transition zone of 3m width.
Seal Zone Fill	Low-permeability fine-grained (silty) soil compacted in 0.15m lifts to a minimum 95 percent of the maximum dry density (ASTM D-698) within -2 to +1 percent of the optimum moisture content 75-mm maximum particle size with minimum 60 percent passing the No. 4 ASTM sieve size (4.75-mm) and minimum 35 percent passing the No. 200 ASTM sieve size (0.075-mm). Final outer upstream dam surface to be minus 19-mm material, compacted with a smooth drum roller to form a smooth, firm and unyielding surface in preparation for geomembrane placement. Plasticity Index (PI) at 15 or higher. Permeability at 1×10^{-7} m/sec or lower.
Filter Zone	Derived from screened alluvial, placer fill or site soil borrow sources. 75-mm maximum particle size with minimum 70 to100 percent passing the No. 4 ASTM sieve size (4.75-mm) and maximum 5 percent non-plastic fines passing the No. 200 ASTM sieve size (0.075-mm). Coefficient of uniformity (C_u) shall be less than 6.
Compacted Rock Fill	Rock fill with compaction effort based on large-scale test fill results. Fill materials to consist mainly of rock fill excavated from mine pre-stripping operations that will generate a relatively high strength, durable and relatively clean marbleized limestone. Rock fill shall be competent material with a strength rating of R2 (soft to medium hard rock) or harder as determine by ISRM procedures. Rock fill material will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size to be no more than two thirds the fill loose lift thickness Place rock fill in maximum loose lifts and compact each lift according to specifications derived from the results of a test fill.

1.5 Liner System

The liner system provides a boundary to contain ore and process fluids. A single composite liner system will be constructed within the HLF limits (double composite liner within the in-heap pond and on the upstream face of the dam embankment). In conjunction with the geomembrane, a geosynthetic clay liner (GCL) will be used in the entire HLF impoundment, and an additional low permeability soil zone at the dam upstream face.

The selected composite liner system consists of a primary geomembrane liner barrier in direct contact with a low permeability bentonite GCL barrier for containment. The liner system design includes 1m of overliner drain fill (ODF) above the liner to protect the liner during ore placement and limit hydraulic heads on the geomembrane liner surface during operations.

The lining system for the HLF In-Heap Pond is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The lining system for the HLF Phase 1 pad (up-gradient of the In-Heap Pond) is comprised of the following:

- A minimum 1m thick layer of overliner material with imbedded perforated drainage piping;
- A 2.0mm (80-mil) LLDPE liner;
- A geosynthetic clay liner (GCL) below the 2.0mm (80-mil) LLDPE liner; and
- Liner bedding beneath the GCL.

The Event Pond will be a double-lined facility with LDRS having the following components:

- An 2.0mm (80-mil) high-density, polyethylene (HDPE) liner (top liner);
- A geonet that is part of the LDRS and located between the top and bottom liners;
- A 1.5mm (60-mil) low-linear density polyethylene (LLDPE) liner (bottom liner);
- A geosynthetic clay liner (GCL) below the 1.5mm (60-mil) LLDPE bottom liner; and
- Liner bedding beneath the GCL.

1.6 Overliner Drain Fill

Overliner Drain Fill (ODF) material will be produced from crushing and/or screening operations from screening of sand and gravel aggregate from borrow sources. Crushed cobbles and boulders screened from the placer fill deposit in Dublin Gulch and/or crushed competent rock from site excavations are the primary anticipated source for ODF material. The ODF shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm). The material shall be free of organic matter and soft, friable particles in quantities objectionable to the Engineer. The minimum in place hydraulic conductivity of the ODF will be $2x10^{-4}$ m/s.

The ODF material shall be placed in such a manner as to reduce segregation and construct the zones in accordance with the details and to the lines and grades shown on the Drawings, or as specified by the Engineer. Methods shall be developed on site for placing the material in a manner that will protect the geomembranes and drain pipework from damage and keep compaction of the material to a minimum. Any drain fill material that has received too much compaction shall be scarified to a loose condition without damage to the underlying geomembrane and pipework.

The overliner drain fill above the geomembrane shall be placed in a single 1-m minimum lift thickness by suitable dozer and truck equipment, as approved by the Engineer. A thicker layer, a minimum of twice the pipe diameter, shall be placed above the larger diameter primary collection drain pipes as detailed on the Drawings. No moisture conditioning or compaction is required. Haul truck speeds, braking, and turning during drain cover fill placement shall be strictly controlled by the Contractor to prevent damage to the underlying geomembrane and pipework. The cover fill thickness shall also be increased in concentrated traffic areas or across collection pipes, as required, to prevent damage to the geomembrane and pipework. Haul traffic on the cover fill surface shall be spread out as much as practical to prevent over-compaction of the cover fill in localized areas.

Select drain fill to construct the process pond leak detection sump shall be placed in a single lift thickness with no moisture conditioning or compaction. The top surface of the select drain fill shall be hand leveled in preparation for geocomposite placement. Any loose particles spilled outside of the backfilled sump area shall be removed from the pond's bottom geomembrane surface to prevent geomembrane puncture.

Table 6.4: Overliner System

Component	Description
Drain Pipework	Perforated corrugated PE primary collection pipes to be ADS N-12 dual wall smooth interior Type SP, or approved equivalent. 450, 375, 250 and 100 mm diameter perforated corrugated polyethylene (PE) collection pipes.
Overliner Drain Fill	The ODF shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm) with minimum in place hydraulic conductivity of $2x10^{-4}$ m/s.

1.7 CQA Testing

Laboratory tests including moisture content (ASTM D-2216), Atterberg limits (ASTM D-4318), gradation (ASTM D-422), moisture/density relationship (ASTM D-1557), permeability (ASTM D-5084) and other tests, where applicable, will be conducted by the Engineer on samples of fill materials taken from cuts within the HLF limits and from borrow areas at frequencies sufficient to assess whether the materials are in compliance with these Technical Specifications. The Engineer will also conduct field density tests (ASTM D-2922/nuclear gauge method and/or ASTM D-1556/sand cone method), and will obtain samples of the compacted fill for related laboratory testing at such frequency as the Engineer considers necessary to assess whether the compacted fill is in full compliance with the Specifications. In-place field density testing on soil fills shall also be conducted in accordance with ASTM D-2167 and D-3017, as specified by the Engineer. Rock fill materials exceeding the standard range of soil testing methods shall be tested for acceptable compactive effort as specified in the Site Grading Fill Section of these Specifications, including in-place field density measured in accordance with ASTM D-5030/water replacement method.

1.8 Borrow Development

The planned borrow development for the HLF structures includes excavation of earth fill borrow materials from within the HLF and mine site. The rock borrow materials for embankment compacted rock fill will be competent rock that will generate a high strength, durable and relatively clean rock fill. Rock fill shall be competent material with a strength rating of R2 (soft to medium strong rock) or harder as determine by ISRM procedures. Filter and transition zone fill materials will be processed from required onsite excavations or screened/crushed alluvial and placer fill materials.

The required excavations within the footprint of the HLF include stripping of alluvial and placer fill soils in the valley bottoms and stripping of surficial soils on the abutments to a competent weathered rock or bedrock foundation. The required excavations for perimeter roads and benches around the HLF will generally be a cut and fill balance, as determined during construction. The suitable borrow materials from required stripping excavations are planned to be used directly in shallow compacted fills, or placed in temporary stockpiles for moisture conditioning or processing for filter materials.

1.9 Geotechnical Instrumentation

Construction and operational monitoring requirements for the HLF will include instrumentation for measuring phreatic levels and pore pressures within the foundation and embankment, movement of the embankment, and ground temperatures in the facility. Monitoring will be used

to verify the facility components are performing as expected and to provide early warning of problematic conditions. Observations on the performance of the initial stages may provide useful information for optimizing subsequent stages of development. The following instrumentation is recommended to be installed within, and beneath the HLF:

- *Vibrating Wire Piezometer:* Piezometers allow measurement of water levels and pore pressures. Instruments*:* should be placed at strategic locations within the foundation materials, foundation drains, embankment fill materials, overliner, and at critical locations within the collection piping and sumps. These instruments will provide important information regarding pore pressures and phreatic levels in the embankment and solution levels within the heap leach ore pile.
- *Slope Inclinometers:* Inclinometers allow accurate measurement of ground movement and deformation. Inclinometer casings should be placed within the embankments as either construction progresses, or installed at the end of construction.
- *Survey Monuments:* Conventional survey monuments can installed at strategic locations for periodic survey to detect ground movement. Monuments should be installed on the finished surface of the structures, and potentially on select areas of the stacked ore.
- *Flow Meters:* Flow meters are used to measure flow volume and velocity in pipes. Instruments should be installed at the outlets of the LDRS. The flow meters will provide a measure of leakage through the liner. Flow meters may also be installed at the outlets of the foundation drains in order to monitor the flow of water out of the foundations, which coupled with the temperature data may give some indication of settlement that is occurring beneath the base of the heap.

Technical Specifications and CQA Plan

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1.0 SCOPE AND REQUIREMENTS

1.1 Work Scope

The work scope of these Technical Specifications is to set out the requirements and procedures necessary to complete the construction of earthwork, geosynthetics, and pipework for the Eagle Gold heap leach pad (HLP). Any alternatives or exceptions to these Specifications shall be submitted in writing to the Owner and shall require approval in writing from the Owner prior to implementation of the Work.

The work scope generally includes the following: site preparation, fill placement, geosynthetics installation, and pipework installation. The process solution pumps and facilities, ore delivery and heap stacking equipment, and their associated structures are not part of these Technical Specifications. Specific features of the work scope include, but are not limited to the following:

- Mobilization/demobilization of all equipment and material required for the work;
- Installation of temporary and permanent diversions for surface water control;
- Clearing, grubbing and stripping in required areas;
- Excavation in required areas;
- Development of borrow areas within and outside the HLP limits;
- Construction of temporary and permanent access roads;
- Foundation preparation for site grading fill and liner placement;
- Fill placement and compaction;
- Installation of geosynthetic materials for liner, drainage and leak detection systems;
- Installation of leach pad gravity flow drain pipework (solution collection piping); and
- Placement of overliner drain fill; and
- Furnishing and installing all materials and constructing all items appurtenant and incidental to the above.

The construction plans and the quality of the constructed leach pad and collection ponds are important aspects of this project. All earthwork and geosynthetic construction Quality Assurance/Quality Control (QA/QC) test locations and results shall be summarized in an as-built report, a copy of which shall be kept in the Owner's files at the completion of each phase of the HLF.

1.2 General Technical Requirements

The general technical requirements specified herein shall apply to all activities and operations relating to carrying out the Work or as required by the Engineer or the Owner.

In the event of a contradiction in the Technical Specifications and Drawings, the Contractor shall refer all questions to the Engineer for final decision. Work that concerns the contradiction shall not be performed until the contradiction is remedied or explained by the Engineer. In all events, the decision of the Engineer is final.

1.3 Submittals

Any alternatives or exceptions to these Technical Specifications shall be submitted in writing with the Contractor's bid.

The Contractor shall provide the Owner and Engineer with the procedures and equipment to be used for surveying and construction, and the material specifications. This is required for review and approval prior to the Work being allowed to commence and the materials brought to the Site.

1.4 Definition of Terms

"Owner" is defined as an authorized representative of StrataGold Corp.

"Engineer" is defined as representative appointed and authorized by the Owner. The Engineer shall be a Registered Professional Engineer or a designated site representative under the supervision of a Registered Professional Engineer.

"Contractor" is defined as the party which has executed a contract agreement with the Owner for the specified Work.

"Technical Specifications" is defined as this document, prepared by Tetra Tech (Tt), and all supplemental addenda.

"Drawings" are defined as the Drawings, in conjunction with these Technical Specifications, entitled "Final Design Drawings, Heap Leach Pad Facility, Eagle Gold Project" prepared by Tt and dated April 2014.

"Work" is defined as the entire completed construction, or the various separately identifiable parts thereof, required to be furnished under the Contract Documents.

"Site" is defined as the project area where the Work is to be performed.

"Contract Documents" are defined as the Agreement, Addenda, Contractor's Bid (when attached as an Exhibit to the Agreement), Bonds, General Conditions, Special Conditions, Technical Specifications, Drawings, and all modifications issued after execution of the Agreement.

"Modifications" are defined as changes made to the Technical Specifications or the Drawings that are approved by the Owner and Engineer in writing after the Technical Specifications and Drawings have been finalized.

2.0 MOBILIZATION AND DEMOBILIZATION

2.1 Mobilization

The Contractor shall mobilize to the Site sufficient labor, materials, and equipment to allow commencement of the Work. The Contractor shall bring onto the Site, as and when necessary, any additional equipment, labor, and materials which may be required to complete the remainder of the Work in the time specified in the General Terms and Conditions.

2.2 Contractor's Workshops, Stores, and Offices

The Contractor shall erect, in the area designated by the Owner and Engineer, adequate workshops, offices, and other buildings and structures for the completion of the Work as designated in the Contract Documents. Such workshops, offices, etc. shall be maintained in a neat and tidy condition throughout the duration of the Work to the satisfaction of the Engineer and Owner.

2.3 Sanitation

The Contractor shall provide and maintain adequate sanitary facilities for the personnel at the Site, including the Contractor's offices and Engineer's offices, in compliance with local health regulations and to the satisfaction of the Engineer and Owner.

2.4 Construction Roads

All temporary construction roads, which the Contractor may require to complete the Work, shall be constructed at the Contractor's expense. The location of any temporary roads, or portions thereof, on the Site shall be subject to the Owner's and Engineer's approval prior to construction. Unless otherwise approved by the Owner, all temporary roads shall be reclaimed at the Contractor's expense upon completion of the Work.

2.5 Drainage

Adequate drainage facilities in the form of ditches, culverts, or other conduits shall be installed as necessary to protect the Work and to maintain temporary construction or access roads. These temporary drainage facilities shall be constructed to the satisfaction of the Engineer and Owner.

2.6 Demobilization

Upon completion of the Work, the Contractor shall remove all of the Contractor's equipment and materials from the Site. The Site shall be left in a clean and tidy state to the satisfaction of the Engineer and Owner. All waste and refuse shall be disposed of in a manner acceptable to the Owner.

3.0 CLEARING, GRUBBING, STRIPPING, AND STOCKPILING

The natural ground surface shall be cleared, grubbed and stripped of all organic and objectionable materials by the Earthwork Contractor to the limits shown on the Drawings or as required by the Owner. The limits of stripping shall generally be 3 m outside of the Work activity areas as shown on the Drawings. All usable topsoil, as determined by the Owner, shall be properly stockpiled in locations shown on the Drawings or designated by the Owner.

Clearing and grubbing shall mean the removal of vegetation and roots. Stripping shall mean the removal of topsoil, which shall be defined as soil of any gradation or degree of plasticity that contains significant quantities of visually identifiable vegetable matter, sod, roots, or humus as determined by the Engineer, or that can be used as growth medium. The depth of topsoil to be removed will be determined by the Engineer based on the character and thickness of material encountered. Clearing and grubbing may generally be conducted as a single operation together with stripping.

Prior to stripping, the topsoil may require moisture conditioning to the satisfaction of the Engineer in order to prevent the loss of fines and to maintain dust control. The Earthwork Contractor shall allow sufficient time after pre-wetting for the moisture to be evenly distributed throughout the topsoil layer prior to removal. The topsoil may need to be ripped prior to moisture conditioning to allow the moisture to be evenly distributed throughout the topsoil layer. The decision of when to rip the topsoil and how often for the purpose of moisture conditioning shall be determined by the Engineer. Additional moisture conditioning may be required on stockpiled materials as determined by the Engineer.

Stripping shall be carried out using whatever method deemed necessary providing it is consistent with producing an acceptable end result as determined by the Owner. Any stripping beyond the limits shown on the Drawings, or as required by the Owner, shall be subject to the approval of the Owner. Unapproved stripping will be subject to remediation at the sole expense of the Earthwork Contractor.

After stripping of the required area, the ground surface shall be treated as specified on the Drawings or in these Technical Specifications. This activity can involve trimming and shaping the surface, scarifying, moisture conditioning, and compacting fill material. Prior to any surface treatment on a stripped area, the Engineer shall be notified to inspect the stripped area and designate the method of treatment.

3.1 Excavation

Excavation shall consist of excavating to the lines and grades shown on the Drawings and hauling materials to designated fill, stockpile, or waste areas. Excavation methods, techniques, and procedures shall be developed by the Earthwork Contractor with due consideration of the nature of the materials to be excavated and shall include all precautions that are necessary to preserve, in an undisturbed condition, all areas outside the lines and grades shown on the Drawings or required by the Owner. The work shall be carried out by whatever method considered most suitable providing it is consistent with producing an acceptable end result as determined by the Engineer.

No excavation beyond the lines and grades shown on the Drawings, or as required by the Engineer, shall be done without the prior written approval of the Owner. If such additional excavation is done without the prior written approval of the Owner and, in the opinion of the Engineer, requires backfilling in order to satisfactorily complete the Work, such backfilling shall

be completed at the Contractor's expense. All such backfilling will be subject to approval by the Engineer.

Pockets of unsuitable materials within the limits of an excavation shall be removed and disposed of as directed by the Owner and Engineer. Unsuitable materials may include, but not be limited to, ash, boulder or gravel zones, soft saturated zones, highly organic zones, drilling mud pits, and other deleterious material.

Topsoil and waste stockpiles shall be leveled, trimmed, and shaped as required by the Owner to prevent the occurrence of ponding or concentrations of surface runoff and to provide a neat appearance. Finished slopes of the topsoil stockpiles shall be graded to 2.5H:1V (horizontal: vertical) for interim reclamation. All surface water runoff shall be directed to existing surface water management structures.

3.2 Subgrade Preparation

After clearing, grubbing, stripping, and excavating, the exposed subgrade surface shall be inspected and evaluated by the Engineer for the presence of loose or soft areas or unsuitable material prior to fill placement or geomembrane installation. Evaluation methods will depend on the location and the materials that will be placed over the subgrade and on the prevailing field conditions. Evaluation methods may include proof-rolling with a loaded dump truck or similar pneumatic-tired equipment to ensure that the surface is firm and smooth. Probing with a metal rod may also be performed. Soft or yielding areas delineated by the evaluation that cannot be stabilized by compacting shall be removed and replaced with site grading fill. Unsuitable materials shall also be removed and replaced with site grading fill as directed by the Engineer. The subgrade shall be prepared to the satisfaction of the Engineer.

If deemed necessary by the Engineer, evaluation of the subgrade soils may include excavating test pits to allow the Engineer to designate the method of surface treatment, as needed. The Earthwork Contractor shall, under the direction of the Engineer, excavate shallow test pits oriented as directed by the Engineer. The pits may cover the entire Work area and any other area designated by the Engineer and shall be spaced as directed by the Engineer. The pits may be excavated by whatever method the Contractor deems necessary provided it produces a clearly visible cut face in the soils. After the pits have been examined and logged by the Engineer, they are to be backfilled by backfilling the excavated material back into the pits and compacting in layers to the surface to the satisfaction of the Engineer.

Stripped rock subgrade surfaces and rock outcrops in at-grade areas shall be cleared of loose rock fragments greater than 50 mm in size and wetted in preparation for foundation preparation. Foundation preparation shall consist of placing and compacting granular soil fill material in varying thicknesses to suit field conditions to support the leach pad and collection ponds liner systems. The granular fill shall be placed and compacted as specified in the Site Grading Fill Placement Section of these Technical Specifications.

Soil subgrade surface receiving site grading fill or geomembrane shall be scarified to a minimum depth of 150mm, moisture conditioned if necessary to within plus or minus two (±2) percent of the optimum moisture content as determined by the Standard Proctor test (ASTM D-698), and recompacted to a minimum of 95 percent of the maximum dry density (ASTM D-698).

Soil subgrade surface receiving geosynthetics shall be prepared such that it is smooth and free of protruding rocks, vegetation, or any other materials, or objects deemed unsuitable by the Engineer. In areas where rocks larger than 38 mm are protruding, the rocks shall be removed

and replaced with compacted fine-grained soil material. This may also be performed in other areas to produce a relatively smooth surface suitable for installation of the liner system.

The Contractor shall modify (smooth) the existing contours such that the finished subgrade surface approximately conforms to the dimensions shown on the Drawings. While exact contours are not required, the Contractor shall maintain positive drainage and ensure that there are no abrupt changes in grade that would prohibit placement of, or create stress in, the overlying liner systems. No site-grading fill shall be placed, until the stripped and reworked areas have been inspected and approved by the Engineer.

3.3 Borrow Development

The majority of the site grading fill will consist of rockfill excavated from mine pre-stripping operations that will generate quality, clean re-crystallized limestone. The Contractor shall also excavate, haul, place and compact site grading cut materials from required excavations within the limits of the HLP including leach pad, collection ditch, conveyor corridors, collection ponds, and diversion channels, as shown on the Drawings. In addition, the Owner will designate borrow areas and limits outside the HLP for the Contractor to excavate, haul, place and compact site grading fill and clay soil liner fill, as needed. The Owner plans to stockpile crushed ore materials adjacent to the pad limits for the Contractor to haul and place as drain cover fill above the pad liner.

The Contractor may select and use any Owner/Engineer approved borrow area for this construction materials provided the materials meet the Specification requirements for the intended use. Representative tests shall be conducted by the Engineer on the borrow materials in the field or at an offsite laboratory to determine the materials' suitability for use as fill. It shall be the Contractor's responsibility to notify the Engineer of changes in borrow materials in advance of development to allow time for representative testing without unduly interrupting construction activities.

Should a borrow material prove to be unsuitable for fill, a new borrow source shall be designated by the Owner, or the Contractor's processing operations shall be adjusted to produce acceptable fill material meeting the Specifications.

The Contractor shall liaise with the Owner, as needed, to schedule and coordinate the production and/or stockpiling of acceptable borrow materials from the mine pit area and other sources onsite and offsite for the execution of the Contractor's work.

Acceptable borrow areas shall be cleared, grubbed, and stripped in stages, as approved by the Owner/Engineer, to minimize ground disturbance. Each stage of stripping shall be sufficient in areal extent for the Contractor to operate conventional earthwork equipment for conditioning and excavating materials acceptable for fill placement. Moisture conditioning in preparation for fill placement, if required, shall be done in the borrow areas as much as practical.

The final surfaces of all borrow areas developed by the Contractor shall be left in reasonably smooth, even conditions and graded to drain for long-term stability. Final surface grading shall be by dozer or grader blade operations, as approved by the Engineer. Final cut slopes shall be no steeper than 2H:1V unless approved by the Engineer. The Contractor shall replace stripped topsoil cover over the final borrow cuts, unless otherwise approved by the Owner.

3.4 General Fill Placement Procedures

All materials used for fill shall be loaded and hauled to the placement site, dumped, spread, and leveled to the specified layer thickness, moisture conditioned if required, and compacted to form a dense integral fill in accordance with these Technical Specifications and to the approval of the Owner and Engineer.

Under most conditions, the fill shall be constructed in near horizontal layers with each layer being completed over the full length and breadth of the zone before placement of subsequent layers. Each zone shall be constructed with materials meeting the specified requirements and shall be free from lenses, pockets, and layers of materials that are substantially different in gradation from the surrounding material in the same zone as determined by the Engineer. All fill placed shall be free from organic debris, frozen soil, ice, or other unsuitable materials. All oversized material shall be removed from the fill material either prior to it being placed or after it is dumped and spread but prior to compaction.

All particles that have dimensions that will interfere with compaction in the specified layer thickness, as determined by the Engineer, shall be removed from the zone in which they were placed either prior to or during compaction.

As approved by the Engineer, fill may be compacted by routing the hauling and spreading equipment approximately parallel to the long axis of fill. The hauling equipment shall be routed in such a manner that they do not follow the same paths but spread their traveled paths evenly over the surface of the fill.

Moisture conditioning is the operation required to increase or decrease the moisture content of material to within the specified limits. If moisture conditioning is necessary, it shall be carried out by whatever method the Earthwork Contractor deems suitable provided it produces the moisture content specified in these Technical Specifications or designated by the Engineer. The moisture shall be distributed uniformly throughout each layer of material being placed immediately prior to compaction. Measures shall be adopted as necessary to ensure that the designated moisture content is preserved after compaction and until the succeeding layer is placed.

Should the surface of the fill become rutted or uneven subsequent to compaction, it shall be regraded and recompacted before the next layer of fill is placed. To permit suitable bonding with the subsequent layer if necessary, the surface material shall be loosened by scarifying or disk harrowing, as approved by the Engineer, and if necessary, it shall be moisture conditioned before an additional layer is placed.

Compaction of each layer of fill shall proceed in a systematic, orderly, and continuous manner approved by the Engineer to ensure that each layer receives the compaction specified. The rolling pattern for compaction of all zone boundaries or construction joints shall be such that the full number of roller passes required in one of the adjacent zones, or on one side of the construction joint, extends completely across the boundary or joint.

Fill shall not be placed on frozen soil or when air temperatures drop below 0°C unless otherwise approved by the Engineer.

3.4.1 Compaction Equipment

Sufficient compaction equipment shall be provided as necessary for compaction of the various fill materials. Compaction equipment shall be maintained in good working condition at all times to ensure that the amount of compactive effort obtained is a maximum for the equipment. Before commencing Work with the proposed compaction equipment, the Owner and the

Engineer shall be provided with a list of each piece of equipment to be used together with the Manufacturer's specifications.

If alternative equipment than initially proposed is to be used, a submittal shall be made to the Engineer for approval of the equipment, and the submittal shall give complete details of such equipment and the methods proposed for its use. The Engineer's approval of the use of alternative equipment may be dependent upon completion of suitable test fills, to the satisfaction of the Engineer, to confirm that the alternative equipment will compact the fill materials to the specified density.

The use of mine haul trucks or scrapers as compaction equipment shall be acceptable provided that test fills confirm the fill materials can be adequately compacted with the proposed equipment.

The following compaction equipment and specifications may be considered.

3.4.2 Smooth Steel Drum Vibratory Roller

Smooth steel drum vibratory rollers shall be equipped with a suitable cleaning device to prevent the accumulation of material on the drum during rolling. Each roller shall have a total static weight of not less than 9,000 kg at the drum when the roller is standing on level ground. The drum shall be not less than 1.5 m in diameter and 2 m in width. The vibration frequency of the roller drum during operation shall be between 1,100 and 1,500 vibrations per minute, and the centrifugal force developed by the roller, at 1,250 vibrations per minute, shall not be less than 170 kN. The power of the motor driving the vibrator shall be sufficient to maintain the specified frequency and centrifugal force under the most adverse conditions, which may be encountered during the compaction of the fill.

3.4.3 Tamping Foot Roller

The tamping foot roller shall be a self-propelled, fully ballasted, standard tamping foot design developing 75 kN per linear m of width at rest on level ground, or equivalent, as approved by the Engineer.

3.4.3.1 Special Compactors

Special compactors and compaction measures shall be used to compact materials that, in the opinion of the Engineer, cannot be compacted properly by the specified roller because of location or accessibility. Such special compactors and measures may include hand-held vibratory compactors or other methods approved by the Engineer to compact fill in trenches, around structures, and in other confined areas that are not accessible to the larger vibratory roller or tamping foot roller. All compaction shall be to the specified density.

3.5 Site Grading Fill

Site grading fill will be placed within the HLP limits to achieve the desired final grades as shown on the Drawings.

3.5.1 Material Requirement

Material for compacted site grading fill may consist of any material which, when compacted, is suitable for use in the various parts of the Work. The site grading fill material will have a wide range of Unified Soil Classifications and may contain significant variations in gradation and compaction properties. Materials that contain or are contaminated by organic matter are not

suitable for use as site grading fill. Site grading fill will be placed in areas where the material is not required to be of uniform character and engineering properties. The site grading fill will be obtained from several sources including from required excavation or regrading activities within the HLP limits (leach pad, collection ditch, collection ponds, and diversion channels), and from borrow areas.

Site grading soil fill shall generally include inorganic soils with less than 30 percent particles larger than 19 mm and a maximum 150-mm particle size. Soft, weathered rock that breaks down during the excavation, hauling, and processing operations to form essentially a soil and compacts without excessive voids may be used for site grading soil fill, as approved by the Engineer. Materials (such as placer tailings) containing large size, sound rock or cobbles and gravels from required excavations may be used as site grading fill subject to the Engineer's approval and provided the rock is reasonably graded such that large void spaces do not result. The maximum particle size in the fill shall be no larger than two-thirds the fill compacted lift thickness, unless otherwise approved by the Engineer. Oversized materials shall be removed from the fill.

Site grading rockfill shall be used to fill the valleys below the confining embankment and diversion embankment to the lines and grades shown on the Drawings. The rockfill will have more than 30 percent particles larger than 19 mm, and the maximum rock particle size shall be no more than two thirds the loose thickness of the fill lift. The rockfill shall generally have 300-mm maximum rock particle size and oversized rocks larger than 300 mm shall be removed to the exterior fill slopes. Rocks larger than 300 mm may be incorporated in thicker fill lifts provided the rocks do not protrude from the lift surfaces after compaction, and the required compaction of the lifts is proven achievable by a test fill.

3.5.2 Placement

The surface upon which site grading fill is placed shall be prepared as specified in the Subgrade Preparation Section of these Technical Specifications.

The site grading soil fill material shall be placed and spread in the fill to form lifts which shall not exceed 0.3 m in loose thickness unless otherwise specified by the Engineer and proven to achieve the specified compaction in a test fill. The actual lift thickness may need to be less than 0.3 m in loose thickness to meet the compaction requirement. Cobbles and boulders that are large enough to interfere with the construction of the designated lift thickness shall be removed and disposed of in areas specified by the Owner.

After spreading, the site grading soil fill material shall be moisture conditioned, if necessary, by sprinkling and disk harrowing until a uniform distribution of moisture is obtained. Material that is too wet may be spread on the fill area and permitted to dry, assisted by disking and harrowing if necessary, until the moisture is reduced to an amount within the specified limits. The Contractor shall utilize all measures necessary to achieve a moisture content for site grading soil fill within plus or minus two (±2) percent of the optimum moisture content as determined by the Standard Proctor test (ASTM D-698), distributed uniformly throughout the lift of material being placed, immediately prior to compaction. The Contractor shall utilize whatever measures necessary to ensure that the designated moisture content is preserved after compaction until the succeeding lift is placed. The Engineer may specify deviation from the moisture content limits provided the required compaction is achieved. Each site grading soil fill lift shall be compacted to a minimum of 95 percent of the maximum dry density (ASTM D-698).

The site grading rockfill material shall also be spread in individual lifts and shall be conditioned, placed and compacted according to the specifications derived from the results of a test fill. The rockfill lifts shall generally not exceed 0.5 m in loose thickness unless otherwise specified by the

Engineer and proven to achieve the specified compaction in the test fill. The actual lift thickness may need to be less than 0.5 m in loose thickness to meet the compaction requirement. The test fill procedures are outlined in the following section.

3.5.3 Test Fills

Test fills shall be conducted according to US Army Corps of Engineers standards to establish the specifications for the proper placement and compaction of site grading rockfill having more than 30 percent particles larger than 19 mm. Test fills shall also be conducted if circumstances arise where they are deemed necessary by the Engineer such as in order to determine if greater or lesser lift thicknesses are appropriate for certain soils and to still meet the design intent for site grading fill. The type of compaction equipment, number of passes, and maximum particle size and loose lift thickness to be used in the Work will be approved by the Engineer in writing based on the acceptable test fill performance. The Contractor shall outline his proposed procedures for moisture conditioning and fill placement and submit them to the Engineer for review and approval.

The test fill shall be constructed within the limits of the Work to determine the compactive effort required to be applied to a particular material or increased lift thickness. The test fill shall be sufficiently wide to support the compaction equipment. The proposed compaction equipment to be used in actual site grading fill placement shall be routed over the test fill.

In the soil test fill, the number of compaction equipment passes shall be counted, and, at certain numbers of passes, in-place density tests shall be performed by the nuclear gauge method (ASTM D-2922) or sand cone method (ASTM D-1556). This process shall be repeated until a curve representing number of passes versus density is generated. This information will allow the Engineer to evaluate the optimum density of the soil and the corresponding number of passes. This will establish a guideline for the compaction procedure required during construction.

For rockfills, the data to be collected from the test fill shall include the following:

- Lift thickness of 0.3, 0.6, and 0.9 m (three test fills to establish optimum lift thickness);
- Amount of settlement after every two passes of compactor to a maximum of 25 passes;
- Gradation and moisture content of in-place material; and
- In-place fill density at completion of the test fill by nuclear gauge method (ASTM D-2922) or sand cone method (ASTM D-1556), as approved by the Engineer.

A curve showing change in rockfill lift settlement versus number of passes shall be produced from the data. The minimum number of passes to achieve acceptable compaction will be the number required to achieve 80 percent of the total settlement obtained after no fewer than ten complete passes of the compaction equipment. The lift thickness and minimum number of passes with compaction equipment shall be approved by the Engineer after review of test fill data.

Upon completion of each test fill, a test fill report shall be generated that must include all appropriate documentation pertinent to the test fill, including but not limited to, field and laboratory test results, graphics displaying the aforementioned curves, photographs, and a written narrative of the test fill and results.

3.6 Seal Zone Fill

The intent of the design is to construct a compacted thickness of low-permeability soil liner beneath the geomembranes on the upstream face of the HLF confining embankment and the adjacent sumps. Low-permeability fine-grained soil fill will also be used to construct seal zone fills as shown on the Drawings.

If the in-place material is not suitable for seal zone fill, then suitable material shall be imported from required excavations within the HLF limits and/or from borrow sources. Imported seal zone fill material shall be placed in maximum 0.15 m thick lifts (after compaction) and be moisture conditioned if necessary and compacted according to the requirements stated herein. Prior to placing each lift, and if necessary, the surface of the first lift shall be scarified to a depth of 50 mm or otherwise roughened to ensure complete bonding between the lifts, as directed by the Engineer.

Moisture conditioning of seal zone fill material to adjust the measured moisture content shall occur when the material is in a loose condition such as after scarifying or during placement of imported materials and never after compaction. The seal zone fill material shall be scarified, mixed, and moisture conditioned, if necessary, by sprinkling and disk harrowing until a uniform distribution of moisture is obtained. Material that is too wet may be spread on the fill area and permitted to dry, assisted by disking and harrowing if necessary, until the moisture content is reduced to within the specified limits.

The Contractor shall adopt removal of oversized or protruding particles at the top of seal zone fills as specified in Subgrade Preparation section of these specifications.

3.6.1 Material Requirement

In-place or imported low-permeability fine-grained soil liner material meeting the requirements stated herein shall be acceptable. If suitable in-place soil liner material cannot be found as specified by the Engineer, additional material, which meets the material requirements, shall be imported from excavations within the HLF limits or designated borrow areas. Suitability of soils in this category is dependent on the properties of gradation to provide a suitable foundation for the geomembranes.

The Engineer will have the authority to approve variations to the compaction and moisture content requirements. The Engineer will determine the suitability of the material for use as seal zone fill material. The seal zone fill material shall conform to the following gradation.

ASTM Sieve Size	Percent Passing
75 mm	100
No. 4	60-100
No. 200	35-100

Seal zone fill material shall be free of organic matter in quantities that would adversely affect the performance of the HLF, as specified by the Engineer.

3.6.2 Placement

Where suitable material exists in-place, the top 0.15 m of the material shall be removed and windrowed to allow access to the lower half of the seal zone fill layer. The lower 0.15 m of the soil liner shall be scarified by disking or other approved means, moisture conditioned if necessary, and compacted to minimum of 95 percent of the maximum dry density at a moisture

content between -2 and +1 percent of the optimum, as determined by the Standard Proctor test (ASTM D-698). Once the compaction of the lower layer has been confirmed, the upper 0.15 m of material shall be spread across the surface; moisture conditioned if necessary, and compacted according to the requirements stated above.

3.7 Granular Fill

3.7.1 Drain Fill

Drain fill shall be used to construct the leach pad liner cover fill and the process pond leak detection sump, as shown on the Drawings. The drain fill material shall be produced from crushing and/or screening operations of ore and/or mine waste, and/or from screening of sand and gravel aggregate from borrow sources. The material shall be free of organic matter and soft, friable particles in quantities objectionable to the Engineer.

3.7.1.1 Material Requirement

The Overliner Drain Fill (ODF) for the leach pad liner cover fill shall consist of free-draining granular material with 38-mm maximum particle size and a maximum of 5 percent fines passing the No. 200 ASTM sieve size (0.075-mm). The ODF shall have an operational permeability of $2x10^{-4}$ m/sec or higher.

Select drain fill shall be used in constructing the process pond leak detection sump an for PLS pipe cover as shown on the Drawings. The select drain fill shall consist of hard and durable free-draining fine gravels with 12.5-mm maximum particle size and a maximum of 3 percent passing the No. 200 ASTM sieve size (0.075-mm).

3.7.1.2 Placement

The drain fill material shall be placed in such a manner as to reduce segregation and construct the zones in accordance with the details and to the lines and grades shown on the Drawings, or as specified by the Engineer. Methods shall be developed on site for placing the material in a manner that will protect the drain pipework from damage and keep compaction of the material to a minimum. Any drain fill material that has received too much compaction shall be scarified to a loose condition without damage to the underlying geomembrane and pipework.

The ODF above the geomembrane shall be placed in a single 1-m minimum lift thickness by suitable dozer and truck equipment, as approved by the Engineer. A thicker layer, a minimum of twice the pipe diameter, shall be placed above the larger diameter primary collection drain pipes as detailed on the Drawings. No moisture conditioning or compaction is required. Haul truck speeds, braking, and turning during drain cover fill placement shall be strictly controlled by the Contractor to prevent damage to the underlying geomembrane and pipework. The cover fill thickness shall also be increased in concentrated traffic areas or across collection pipes, as required, to prevent damage to the geomembrane and pipework. Haul traffic on the cover fill surface shall be spread out as much as practical to prevent over-compaction of the cover fill in localized areas.

Select drain fill to construct the process pond leak detection sump shall be placed in a single lift thickness with no moisture conditioning or compaction. The top surface of the select drain fill shall be hand leveled in preparation for getextile placement. Any loose particles spilled outside of the backfilled sump area shall be removed from the pond's bottom geomembrane surface to prevent geomembrane puncture.

3.7.2 Filter Zone

Filter zone material shall be used as a filter material between the Seal Zone FIll and the compacted rock fill in the HLF Confining embankment. The ODF material shall be produced from crushing and/or screening operations of ore and/or mine waste, and/or from screening of sand and gravel aggregate from borrow sources. The material shall be free of organic matter and soft, friable particles in quantities objectionable to the Engineer.

3.7.2.1 Material Requirement

The fine filter zone material shall conform to the following gradation.

ASTM Sieve Size	Percent Passing
75 mm	100
4.76 mm	70-100
0.42 mm	15-60
No. 200	0-5

Fine filter zone material shall have a coefficient of uniformity (Cu) shall be less than 6 when tested in accordance with ASTM D 422 or ASTM C 136.

Fine filter zone material shall be used in constructing the in-heap storage pond leak detection sump. The select drain fill shall consist of hard and durable free-draining fine gravels with 12.5-mm maximum particle size and a maximum of 3 percent passing the No. 200 ASTM sieve size (0.075-mm).

The drain fill shall have an operational permeability of $1x10^{-4}$ m/sec or greater when tested in accordance with the constant-head method described in ASTM D 2434 using a hydraulic gradient of 1.

3.7.2.2 Placement

The filter fill shall be placed and compacted to a compacted thickness of no less than 0.15 m to the lines and grades shown on the Drawings, or as required by the Owner. The layer shall be graded to form a relatively smooth surface, free of rock pockets or protrusions of rock fragments. The filter fill shall be compacted by a minimum of three passes with a smooth drum roller to achieve a minimum 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698).

3.7.3 Compacted Rock Fill

The intent of the compacted rock fill is to form the confining and diversion embankments for the heap leach facility.

3.7.3.1 Material Requirement

Compacted rock fill shall consist of rock excavated from mine pre-stripping operations that generate relatively high strength, durable and relatively clean marbleized limestone resistant to weathering and to water action, and free of potentially acid-generating rock, shale, soil, organic, deleterious, or other objectionable material. Rounded rock, in general, is not desirable. The

quality of the material must be approved by the Engineer prior to removal from the processed stockpile.

The maximum particle size for the compacted rock fill shall be no greater than 2/3 the fill loose lift thickness as determined in test fills and all rock fill material shall contain more than 30 percent particles larger than 19mm.

Rock fill shall be competent material with a minimum strength rating determined by ISRM methods of R2, soft to medium strong rock.

3.7.3.2 Placement

The Contractor shall place the rock fill in maximum loose lifts and compact in accordance with specifications derived from results of test fills.

3.7.4 Anchor Trench Backfill

3.7.4.1 Material Requirement

Geomembrane anchor trenches shall be backfilled with inorganic material meeting the site grading fill material requirement.

3.7.4.2 Placement

The anchor trenches shall be excavated to the lines and grades shown on the Drawings. Particles greater than 138mmin size and any other protrusions shall be removed from the trench bottom and sides to protect the geomembrane from puncture. The backfill material shall be placed in nominal150 mm thick lifts and compacted to a minimum of 85 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). Moisture conditioning will not be critical, as determined by the Engineer. Compaction shall be accomplished by the use of hand-operated compactors. Care shall be exercised to avoid damage to the geomembrane. The final backfill surface shall be rolled by a rubber-tired front-end loader with loaded bucket, or equivalent equipment approved by the Engineer. The final backfill surface shall be graded to drain.

3.7.5 Road Wearing Course

The road wearing course material shall be selected and placed as specified by the Owner. The following should be considered as guidelines.

3.7.5.1 Material Requirement

Generally, the road wearing course material shall be produced from crushing and/or screening operations of mine waste or borrow sources and shall consist of well-graded sandy gravel. The wearing course material shall conform to the following gradation.

ASTM Sieve Size	Percent Passing
50 mm	100
38 mm	95-100
19 mm	65-95
No. 4	35-55

No. 16	15-45
No. 200	4-15

3.7.5.2 Placement

The wearing course shall be placed and compacted to a compacted thickness of no less than 0.15 m to the lines and grades shown on the Drawings, or as required by the Owner. The layer shall be graded to form a relatively smooth surface, free of rock pockets or protrusions of rock fragments. The wearing course shall be compacted by a minimum of three passes with a smooth drum roller to achieve a minimum 95 percent of the maximum dry density as determined by the Standard Proctor test (ASTM D-698). The wearing course shall contain enough moisture to produce a homogeneous, smooth, and compacted layer. To achieve this, the Contractor may be required to moisture condition the material in the processing operation before placement, or after spreading but before compaction.

3.7.6 Pipe Bedding Fill

3.7.6.1 Material Requirement

All pipe bedding and cover shall be “squeegee” on other select material meeting specifications as follows:

Pipe bedding material shall be crushed or non-crushed durable rock well graded between the #4 sieve size and below the #100 sieve size with less than 5% passing the #200 sieve.

ASTM Sieve Size	Percent Passing
10 mm	100
No. 4	40-90
No. 16	10-30
No. 200	0-5

Pipe bedding is to be poured into place and hand tamped around installed pipe using shovel handle or a similar tool. To prevent lateral displacement, squeegee shall be deposited uniformly and simultaneously on each side of the pipe.

3.7.7 Riprap

Riprap may be required to line portions of the diversion channels and may be required at diversion pipe discharge points for protection against erosion.

3.7.7.1 Material Requirement

The preferred riprap shall be hard, angular, durable, and reasonably well-graded rock resistant to weathering and to water action, and free of potentially acid-generating rock, shale, soil, organic, deleterious, or other objectionable material. Rounded rock, in general, is not desirable. The more competent and durable rock encountered on site during required excavations and mine overburden stripping shall be selected for use as riprap. The quality of the material must be approved by the Engineer prior to removal from the processed stockpile.

The maximum particle size for the different size riprap shall be equal to the layer thickness, and all riprap material shall, in general, contain no fines passing the No. 200 ASTM sieve size

(0.075-mm), as determined by visual observation by the Engineer or by ASTM D-422. The D_{50} designation for riprap material refers to the average rock size. Processing may be required to produce the specified material. Los Angeles abrasion tests may be specified by the Engineer on proposed riprap material if the quality of the riprap material is questionable. The minimum abrasion number for riprap material shall be 40 percent.

In general, the riprap shall conform to the following gradation requirements; however, minor deviation from these requirements may be acceptable for specific cases, subject to the Engineer's approval.

Rock Size	D50 = 75 mm (% passing)	D50 = 100 mm (% passing)	D50 = 150 mm (% passing)	D50 = 225 mm (% passing)	D50 = 300 mm (% passing)
600 mm					100
450 mm				100	
300 mm			100		35-55
225 mm				35-55	
200 mm		100			
150 mm	100		35-55		5-20
100 mm		35-55		5-20	
75 mm	35-55		5-20		
50 mm		5-20			
38 mm	5-20				

3.7.7.2 Placement

The Contractor shall haul from the stockpile, spread, and level the riprap to the lines and grades specified on the Drawings, or as specified by the Engineer or Owner at the time of construction. Riprap shall be placed in a manner that minimizes segregation and produces a reasonably well-graded mass of rocks with a minimal practical percentage of voids, as approved by the Engineer. The material shall be placed and distributed such that there are no large accumulations of either larger or smaller sizes of rock. Hand placing or rearranging of individual stones by mechanical equipment may be required to achieve this result.

3.8 QA/QC Testing

3.8.1 General

The Engineer and his quality assurance team will be responsible for testing construction materials to assess whether materials and methods comply with these Technical Specifications. All testing performed by the Engineer will be performed in accordance with procedures outlined in the Specifications. The results of the tests carried out by the Engineer will be final and conclusive in determining compliance with the Specifications. The QA/QC test results shall be

used to document and verify the quality of work and the extent to which the earthwork and related installations have been completed as set forth in the Drawings, Specifications, and permits for the construction and operation of the facilities.

To the extent possible, QA/QC testing shall be conducted so as not to interfere with normal construction operations. However, if required for any reason, the Contractor shall stop work in the area being tested, until the QA/QC testing is complete or approval to proceed has been given by the Engineer or his appointed representative. Each lift of fill will require approval by the Engineer prior to placement of the next lift. Sufficient time shall be allowed by the Contractor for the Engineer to carry out the required test work and interpretation of the test results in order to decide upon the acceptability of each lift. Cooperation shall be given by the Contractor to the Owner and the Engineer for taking samples and making tests, and such assistance shall be rendered as is necessary to enable sampling and testing to be carried out expeditiously.

The QA/QC guidelines do not relieve the Contractor of any of his responsibilities to conduct his own daily quality control testing or to complete in a timely manner the Work agreed to under the Contract Documents in accordance with the Specifications.

3.8.2 Tests

Laboratory tests including moisture content (ASTM D-2216), Atterberg limits (ASTM D-4318), gradation (ASTM D-422), moisture/density relationship (ASTM D-1557), permeability (ASTM D-5084) and other tests, where applicable, will be conducted by the Engineer on samples of fill materials taken from cuts within the HLP limits and from borrow areas at frequencies sufficient to assess whether the materials are in compliance with these Technical Specifications. The Engineer will also conduct field density tests (ASTM D-2922/nuclear gauge method and/or ASTM D-1556/sand cone method), and will obtain samples of the compacted fill for related laboratory testing at such frequency as the Engineer considers necessary to assess whether the compacted fill is in full compliance with the Specifications. In-place field density testing on soil fills may also be conducted in accordance with ASTM D-2167 and D-3017, as specified by the Engineer. Rockfill materials exceeding the standard range of soil testing methods shall be tested for acceptable compactive effort as specified in the Site Grading Fill Section of these Specifications.

3.8.3 QA/QC Plan

If the above tests indicate the Work does not meet the specified requirements, the following remedial action shall be performed.

Compaction below specified minimum: apply additional effort, or scarify, moisture condition, recompact, and retest.

- Moisture content outside of specified limits during compaction:
- Moisture content below specified minimum: scarify the depth of the lift, moisture condition, mix to achieve uniform moisture content, compact, and retest.
- Moisture content above specified maximum: scarify the depth of the lift, allow to air dry, mix to achieve uniform moisture content, compact, and retest; or remove the wet material. Mixing of dry material to lower the moisture content shall not be allowed without the prior approval of the Engineer and on a case by case basis.

Moisture content outside of specified limits after compaction and approval but prior to covering: determine depth of material outside of specified limits and correct as specified above.

Material not in accordance with the Specification requirements: remove material in its entirety, as directed by the Engineer.

3.8.4 Testing Frequency

The testing frequencies in the following tables are the minimum number of record QC tests to be completed on the various fill materials during the Work. The Engineer may specify additional tests to be carried out, if in the opinion of the Engineer, such additional tests are required due to variability in the soil materials or soil properties that may affect the Work. Control tests shall be performed on the material, as necessary, to determine the suitability of borrow areas. The number of control tests shall satisfy the minimum record test frequency for the volume anticipated to be removed. This may entail performing enough testing to develop "families" of borrow area soils, classified by both gradation and moisture/density relationship. The control test results shall be submitted to the Engineer for approval prior to removing material from borrow areas for fill placement. The results must demonstrate that the borrow materials conform to the Specifications. The control tests conducted for borrow areas are considered essential to understanding how borrow area materials will be placed in the Work. Upon review of the control test data, the Engineer may specify that additional tests be performed prior to approval of a borrow area.

Site Grading Fill	
Laboratory/Field Test	**Test Frequency**
Moisture Content	Minimum 1 per 5,000 m3
Atterberg Limits	Minimum 1 per soil type or 1 per 5,000 m3, whichever is more frequent
Gradation	Minimum 1 per soil type or 1 per 5,000 m3, whichever is more frequent
Moisture/Density Relationship	Minimum 1 per soil type or 1 per 5,000 m3, whichever is more frequent
In-Place Density and Moisture	Minimum 1 per 1,500 m3 placed

Seal Zone Fill	
Laboratory/Field Test	**Test Frequency**
Moisture Content	Minimum 1 per 3,000 m^3
Atterberg Limits	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent
Gradation	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent

Moisture/Density Relationship	Minimum 1 per soil type or 1 per 3,000 m^3, whichever is more frequent
In-Place Density and Moisture	Minimum 1 per lift per 1,500 m^2
Laboratory Permeability	Minimum 1 per lift per 75,000 m^2

Filter Zone	
Laboratory/Field Test	**Test Frequency**
Moisture Content	Minimum 1 per 5,000 m^3
Gradation	Minimum 1 per 5,000 m^3
Moisture/Density Relationship	Minimum 1 per 5,000 m^3
In-Place Density and Moisture	Minimum 1 per lift per 1,500 m^2

Overliner Drain Fill	
Laboratory/Field Test	**Test Frequency**
Moisture Content	Minimum 1 per 5,000 m^3
Gradation	Minimum 1 per 5,000 m^3
Moisture/Density Relationship	Minimum 1 per 5,000 m^3
In-Place Density and Moisture	Minimum 1 per lift per 1,500 m^2

Anchor Trench Backfill	
Laboratory/Field Test	**Test Frequency**
Moisture Content	Minimum 1 per 5,000 m^3
Atterberg Limits	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
Gradation	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent

Moisture/Density Relationship	Minimum 1 per soil type or 1 per 5,000 m^3, whichever is more frequent
In-Place Density and Moisture	Minimum 1 per 150 linear m of trench length

Gradation testing of the rock fill shall not be required. The Engineer will visually inspect the rock fill in conjunction with measurement of the size of select stones to determine its compliance with the gradation requirements.

Tests may be conducted more frequently at the direction of the Engineer. More frequent testing shall be performed, where indicated by the following guidelines:

- Areas where special compaction equipment or methods are used;
- Areas where the height of fill rises quickly versus the quantity of fill placed, specifically in areas of slope reduction fill;
- Areas where compaction control is particularly important such as around appurtenant structures;
- Areas where doubtful construction procedures are being used;
- Areas where the required compaction may not have been achieved based upon visual observations; and
- Areas where unacceptable material may have been placed.

4.0 GEOSYNTHETICS

4.1 Geomembrane

4.1.1 General

The intent of the design is to provide linear low density polyethylene (LLDPE) geomembrane for the leach pad. The geomembrane shall be manufactured in the largest widths and lengths possible to minimize the number of field seams. The Geomembrane Installer shall install geomembrane materials and miscellaneous materials incident thereto in accordance with the Manufacturer's recommendations. Alignments, lengths and areas are shown on the Drawings. Exact locations and lengths may vary to suit field conditions, as approved by the Engineer.

Direct vehicular contact with the geomembrane shall not be allowed to prevent geomembrane damage. Ultra-violet (UV) sensitive geomembrane shall be protected from exposure to sunlight until placement. After placement, the geomembrane shall be covered within three months of placement, unless otherwise approved by the Owner and warranted by the Manufacturer.

The Installer shall notify the Engineer for written acceptance of the completed geomembrane installation prior to covering the leach pad's geomembrane with drain fill and prior to covering the in-heap storage pond's bottom geomembrane with geocomposite.

The geomembrane materials, installation and testing shall be in accordance with the following sections, and shall generally conform to the Geosynthetic Research Institute (GRI) standards GM-13, GM-17 and GM-19, or Engineer approved equivalent.

4.1.2 Manufacturer's Experience

The Manufacturer of the geomembrane shall have previously demonstrated the ability to produce the specified geomembrane by having successfully manufactured a minimum of 500 acres of similar geomembrane for hydraulic lining installations. A list of similar containment projects completed in which the manufactured material has been successfully used shall be submitted and is subject to approval by the Engineer.

4.1.3 Submittal of Engineering Data

The Installer is responsible for supplying engineering data and results of QC testing of the geomembrane materials. The Manufacturer shall allow sufficient time in his production schedule to perform the specified QC testing for the project. The results of all required testing shall be supplied at least seven days prior to shipment of the materials to the site. The Installer shall furnish the following engineering data prior to construction:

1. Shop drawings with panel layouts and appropriate details along with a time schedule for the installation of the geomembrane;
2. An instruction manual which includes the proper storage, handling, deployment, and seaming of the geomembrane. This manual shall be in compliance with these Specifications and any conditions of warranty;
3. QC certificates on the resin used to manufacture the geomembrane. The data submitted on the resin shall include production dates and the results of conformance tests. The submittals for the resin shall also include a statement that no reclaimed polymer was used. The edges of geomembrane that are trimmed during the manufacturing process are not considered reclaimed polymer. All resin shall be of the same type and quality;

4. QC certificates on each geomembrane roll. Each certificate shall be customized for the project and shall include but not be limited to: the roll and resin batch numbers, production date of the roll, a listing of the QC tests, test method numbers, values specified for the project, and the QC test results. All tests shall be performed prior to submittal of the QC certificates to the Engineer. Test results for each property specified shall be provided on the QC certificate.
5. Certification that the geomembrane and extrudate rod or beads are made from the same resin type and have the same properties.

4.1.4 Delivery, Storage and Handling of the Geomembrane

The Installer shall be responsible for transporting, unloading, and storing the geomembrane. At the discretion of the Owner, conformance testing and a plant audit may be performed by the Engineer and/or Owner prior to shipment. In the event that conformance testing is to be performed, the Manufacturer shall not arrange for transport of the geomembrane until such testing is complete. The Installer or Manufacturer shall provide the Engineer and Owner a schedule for manufacturing the materials for the project at least 14 days prior to manufacturing so that testing and travel arrangements can be properly arranged. This schedule shall remain firm throughout the duration of the project. Any proposed changes to the production schedule shall be approved by the Owner. The Engineer shall notify the Manufacturer at least seven days prior to performing the testing or plant audit of his intentions to perform these tasks.

The geomembrane shall be shipped such that it is not damaged in transport and shall be offloaded in the presence of the Owner. Any damage to the geomembrane during the offloading process will be documented by the Owner. All damaged rolls shall be separated from undamaged material. The final disposition of the damaged rolls shall be determined by the Owner with input from the Engineer. The Installer shall be responsible for replacing any geomembrane determined to be unacceptable at no additional cost to the Owner.

Once the geomembrane rolls have been offloaded, they shall be stacked on a prepared surface no more than three rolls high. The surface shall be prepared such that the geomembrane is not subjected to rocks or sharp objects, water, oil, or other deleterious conditions. The geomembrane rolls shall not be placed on pallets.

The Installer shall use appropriate equipment to transport the geomembrane from the storage area and deploy it. This equipment may include a spreader and roll bars and shall not damage the geomembrane or subgrade. Any damage shall be repaired by the Installer to the satisfaction of the Engineer.

4.1.5 Material Requirement

The geomembrane shall be composed of new, first quality material designed and manufactured specifically for the purpose of liquid containment. The geomembrane shall be produced in rolls and shall be free of holes, blisters, undispersed raw material, cuts, folds, or any sign of foreign matter. Each roll of geomembrane shall be identified with a label that provides the thickness, length, width, roll number, and plant location.

The total combined percentage of all additives including carbon black, antioxidants, and processing aids shall be less than 3.5 percent by weight of the geomembrane. Of the 3.5 percent, no more than 1 percent shall be additives other than carbon black. All additives shall be evenly dispersed throughout the geomembrane.

The material shall be warranted against Manufacturer's defects as well as degradation due to UV light for exposed geomembrane for a minimum of 20 years from the date of installation or as

mutually agreed upon in writing prior to award of the contract between the Owner and the Manufacturer. This warranty shall cover the cost of material, shipping and handling, labor, and equipment to replace the defective or failed material.

The materials provided for the leach pad, even pond, and any other process component liners shall conform to the following standards:

Tested Property	Test Method	Frequency	Minimum Average Value			
			1.50 mm HDPE Textured	2.0 mm HDPE Textured	1.50 mm LLDPE Textured	2.0 mm LLDPE Textured
Thickness, (minimum average), mm Lowest individual reading	ASTM D 5994	every roll	1.50 1.35	2.00 1.80	1.50 1.35	2.00 1.80
Density, g/cm^3 , (min.)	ASTM D 1505	90,000 kg	0.940	0.940	0.939	0.939
Tensile Properties (each direction) Strength at Break, N/mm Strength at Yield, N/mm Elongation at Break, % Elongation at Yield, %	ASTM D 6693, Type IV Dumbbell, 50 mm/min G.L. 50 mm G.L. 33 mm	9,000 kg	 16 22 100 12	 21 29 100 12	 16 250	 21 250
Tear Resistance, N	ASTM D 1004	20,000 kg	187	249	150	250
Puncture Resistance, N	ASTM D 4833	20,000 kg	400	534	300	500
Carbon Black Content, % (Range)	ASTM D 1603*/4218	9,000 kg	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	20,000 kg	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mm	ASTM D 7466	second roll	0.45	0.45	0.45	0.45
Notch Constant Tensile Load(2), hr	ASTM D 5397, Appendix	90,000 kg	300	300		
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	90,000 kg	>100	>100	>100	>100

NOTES:

- (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
- (2)NCTL for HD Textured may be conducted on representative smooth geomembrane samples.

The above properties shall be evaluated by the Manufacturer at a minimum frequency of one test every 0.5 hectares of geomembrane. In the event that the Manufacturer performs any given test at a frequency greater than specified herein, the results of such testing shall be reported to the Engineer and Owner. The testing shall be performed and the results submitted to the Owner and Engineer prior to arranging shipment of the materials to the project site.

4.1.6 Conformance Testing

Prior to or upon delivery to the site, samples of the geomembrane shall be removed by the Owner or Engineer and sent to a laboratory selected by the Owner for testing to ensure conformance to the requirements of these Technical Specifications. Conformance sampling may be performed at the Manufacturer's plant or in the field at the site. Unless testing is performed prior to shipment, the Installer shall deliver the geomembrane to the site an adequate period of time prior to installation to allow for sufficient time for sampling and testing, as specified by the Owner or Engineer.

Samples shall be taken at the rate of one sample per batch or one sample per 6 acres, whichever is less. Samples shall be taken from across the entire width of the geomembrane roll and shall be at least 1m long unless otherwise approved by the Engineer. The samples shall not include the first 1m of the roll. The Engineer may increase the frequency of sampling in the event that test results do not comply with these Specifications. Any material that is not certified in accordance with the Specifications shall be rejected and replaced with new material.

4.1.7 Installation

Installation of the geomembrane shall be performed by the geomembrane Manufacturer or an Installer trained and certified by the Manufacturer. The purpose of these Specifications is to achieve a lined system as free of defects as current installation and inspection techniques will allow.

Surfaces to receive geomembrane shall be prepared as specified in the Subgrade Preparation Section of these Technical Specifications. The surfaces shall be smooth and free of all rocks, stones, sticks, roots, sharp objects, or debris of any kind. The surface shall provide a firm, unyielding foundation for the geomembrane with no sudden, sharp or abrupt changes in grade. No standing water or excessive moisture shall be allowed. The Installer shall certify in writing that the surface on which the geomembrane is to be installed is acceptable before commencing work.

Once the subgrade is acceptable, it shall be maintained until the geomembrane has been installed and accepted. Any rough areas or damage caused by the installation shall be repaired by the Installer. The leading edge of the anchor trench shall be rounded to avoid a sharp bend in the geomembrane.

4.1.7.1 Placement

To the maximum extent possible, the geomembrane panels shall be oriented such that they are perpendicular to the natural contours (parallel to the maximum slope). Unless otherwise approved in writing by the Engineer, no horizontal seams will be allowed on slopes steeper than 3H:1V. All seams shall be oriented such that they are shingled in a down-slope direction. If cross seams are required on a steep slope, the end of each panel shall be cut at a diagonal of 45 degrees and seamed to prevent installation of a horizontal seam. The geomembrane shall be placed according to the panel layout drawing submitted by the Installer and approved by the Engineer.

Each geomembrane panel shall be labeled with a unique identification number or code which is agreed to by all parties. The geomembrane shall be placed using methods and equipment that do not damage it or the subgrade. Installation personnel working on the geomembrane shall not smoke, wear shoes that could damage the geomembrane, or engage in potentially damaging activities.

The Installer shall use appropriate means to protect the geomembrane from uplift from the wind. Edges of panels shall have continuous ballast to lessen the chance of wind flow under the panels. The material used to hold down the geomembrane shall not cause damage to it. No vehicles shall be allowed to drive over exposed geomembrane.

As the geomembrane material is deployed, it shall be visually inspected and any defects marked for repair. If a significant amount of defects are identified as determined by the Engineer, the material shall be removed and replaced at no expense to the Owner. No geomembrane deployment shall be allowed during periods of wet or extremely windy weather or in the presence of ponded water.

The Installer shall provide sufficient slack in the geomembrane to allow for contraction due to cold temperatures. Prior to the start of construction, the Installer shall submit calculations and a resultant table showing the amount of extra material required per 30m of geomembrane in place, for a given temperature.

4.1.7.2 Seaming

Prior to installation, the Installer shall submit the resumes of seaming personnel who will be used on the project. At least one seaming supervisor shall be present who has the experience of a minimum of 0.5 hectares of geomembrane installation using the seaming device proposed for use at the project site.

The Installer shall weld the geomembrane, where possible, using the double-wedge fusion welding method. No seaming shall begin until each welding technician and apparatus used in the field has passed a test weld. Scrap pieces of geomembrane material at least 1m long and 0.3m wide shall be seamed together under the same conditions as those in the area to be lined. A minimum of four 25mm wide coupons shall be cut from the test weld and quantitatively tested for shear and peel with a field tensiometer in accordance with ASTM D-6392. A test weld passes when the break is ductile and a film tearing bond (FTB); and the following minimum values are met:

HDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	121	98	78
80	162	130	104

LLDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	90	75	72
80	120	100	96

A test weld is considered passing when all coupons pass the above requirements. If repeated test welds fail, the welding technician or apparatus may not be used until the reason for the failing values is identified. Once the test welds have passed and are approved by the Engineer, seaming of the geomembrane may begin.

The geomembrane panels shall overlap a minimum of 75mm for extrusion welding and 100mm for fusion welding. Any fishmouths or wrinkles at seam overlaps shall be cut out and removed. If the overlap after cutting is less than 75mm, the area shall be patched. As seaming progresses, the Installer shall log the temperature measured at 150mm above the geomembrane, the operating temperature, pressure, and speed of the wedge welder, and the extrudate temperatures in the barrel and at the nozzle of the extrusion welder.

If a hot wedge welding device is used by the Installer, it shall be self-propelled and equipped with gauges that monitor the temperature and speed of the apparatus. The wedge welder shall not be placed directly on the geomembrane when not in use. The Installer shall make sure that there is no dirt or moisture build-up between the geomembrane sheets.

When using an extrusion welder, the Installer shall tack bond the geomembrane sheets together in a manner that does not damage the geomembrane. The Installer shall thoroughly clean and dry the seam area immediately before tack bonding (lystering) and wedge welding. Prior to welding and after any work stoppages of more than three minutes, the welding apparatus shall be purged of heat-degraded extrudate. The top edges of the geomembrane shall be beveled prior to welding and the oxidation on the geomembrane surface shall be removed by a disc grinder no more than a half hour before welding. On seams that are more than five minutes old, the end of the seam shall be ground prior to continuing the weld. All grind marks shall not extend more than 6 mm beyond the weld head. The grinder shall be held parallel to the geomembrane edge and any area where grinding removes more than 4 mils shall be patched.

No seaming shall be conducted if the temperature measured at 15cm above the geomembrane is lower than 5°C or above 38°C, without written acceptance by the Engineer. When the temperature is below 10°C, the Installer shall preheat the weld zone by a hot air device.

4.1.7.3 Seaming Equipment

The approved processes for field seaming are extrusion welding and fusion (hot wedge) welding. The preferred method of seaming is the double-fusion welding. Proposed alternative processes shall be documented and submitted to the Owner or Engineer for approval.

The extrusion welding apparatus shall be equipped with gauges giving the temperature of the apparatus at the nozzle. The fusion-welding apparatus shall be an automated vehicular-mounted device which produces a double seam with an enclosed space. The fusion welding apparatus shall be equipped with gauges giving the applicable temperatures. The Engineer shall verify that:

1. Equipment used for seaming is not likely to damage the geomembrane;

2. The extrusion welder is purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel; and
3. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane.

The Installer shall carry on-site spare welders and the necessary spare parts for their repair, such that construction delays do not occur.

4.1.8 Field Quality Control

The Installer shall designate a technician that is responsible for supervising and/or conducting the Installer's field quality control program. Testing of the geomembrane seams shall consist of both destructive and non-destructive testing. All seams shall be 100 percent inspected using non-destructive test methods. Non-destructive and destructive testing procedures are outlined below.

In addition to the field seam testing specified herein, the Installer shall water test the top geomembrane installed in the in-heap storage pond with ponded fresh water to a level of 1 m below the pond crest. No leaks shall be detected by the pond's leak detection system over a 48-hour period prior to acceptance by the Owner. If leaks occur in the installed geomembrane, the Installer shall find and repair the leaks and retest as before. The Owner shall provide the source of water for testing.

4.1.8.1 Non-Destructive Testing

Vacuum boxes shall be used to non-destructively test extrusion or single wedge fusion welds over their entire length. Prior to using the vacuum box, the weld to be tested shall be wetted with a soapy solution. The vacuum box shall then be placed over the weld and a vacuum of 35 to 56 kN/m2 (5 to 8 psi)shall be drawn. The entire length of the box shall be observed through the viewing window for the creation of bubbles for a period of at least 15 seconds and shall be tested with a minimum of 75 mm of overlap with the previous section. Any areas that bubbles appear on, shall be identified, repaired, and retested.

In areas that cannot be tested with a vacuum box, the seam should be cap-stripped if possible. If the seam can be tested prior to installation, then the Installer shall do so. Seaming and testing in these areas shall be observed by the Engineer.

If the double hot wedge welding system is used, air pressure testing may be conducted instead of vacuum testing. Each continuous length of seam shall be pressurized to 210 kN/m2 (30 psi) and monitored for a period of 5 minutes. In order to pass, the seam shall stabilize and not lose more than 14 kN/m^2 (2 psi) of pressure. The test method shall include a method to verify that the entire length of the air channel is pressurized. If the wedge weld cannot be air tested because of a blockage in the air channel, the welded seam shall be considered a failure. Any failed seams shall be repaired and retested. The repair may include running an extrusion weld along the wedge weld.

4.1.8.2 Destructive Testing

The location of all destructive tests shall be determined by the Engineer. A minimum of one sample per 500 mof seam shall be obtained. The frequency of testing may be increased by the Engineer to suit the field conditions. The Installer shall repair any suspicious looking welds before release of a seam for destructive sampling. Destructive samples shall be cut as the installation progresses and not at the completion of the project. All destructive samples shall be marked with consecutive numbers along with the seam number. A log shall be kept with the

date, time, location, seaming technician, apparatus, temperature, and pass or fail criteria. All destructive sample holes shall be repaired immediately. The destructive samples shall be a minimum of 0.3m wide by 1m long with the seam centered lengthwise.

The destructive samples shall be cut into three total samples, two which are 0.3 m by 0.3 m (one each for the Installer and Owner) and one which is 0.3 m by 1.0 m (for the Engineer). Prior to removing a destructive sample, two 25 mm coupons shall be cut off of each end of the designated destructive sample location and tested in the field using a field tensiometer. These coupons shall pass the specified requirements for shear and peel. If a coupon sample fails, the Installer shall go a minimum of 3 m in each direction and obtain additional samples for retesting. These samples shall also be given to the Engineer for testing using a field tensiometer. This procedure shall continue until the coupons on each side of a destructive sample location pass the shear and peel criteria.

Once the sample coupons pass the seam strength requirements, a destructive sample shall be obtained and divided as specified above. No destructive sample need be obtained between failing coupon tests. The destructive samples shall be tested in the field by the Engineer or the testing may be conducted offsite with the consent of the Owner.

For each destructive test, a minimum of five samples in shear and five samples in peel shall be tested according to ASTM D-6392. In order to have passing results, a minimum of four out of five samples shall meet the specified test values. In order for one failed test out of five to be acceptable, the failure shall be ductile, a film tearing bond, and shall be within 80 percent of the required specifications.

The seam must exhibit film tear bond (FTB). Welds should have < 25% incursion into the weld. The following minimum values must be met:

HDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	121	98	78
80	162	130	104

LLDPE Seam Strength Properties

Material (mil)	Shear Strength (PPI)	Fusion Peel (PPI)	Extrusion Peel (PPI)
60	90	75	72
80	120	100	96

The Engineer will notify the Installer and Owner of any failing results. Should a destructive sample fail, the Installer shall move 3 m in either direction from the failure and take additional destructive samples. This procedure shall continue until passing results are obtained. The Installer shall repair or cap-strip seams that have failing destructive tests. The Installer shall not cover any seams which have not been tested unless he agrees in writing to uncover any failing seams and make the required repairs.

4.1.9 Repairs

The Installer may repair holes smaller than 6 mm by using an extrusion weld. The surface oxidation surrounding the hole shall be removed a minimum of 125 mm around the hole and then immediately welded. After the hole has been welded, it shall be vacuum tested for leaks. The result of the test, the name of the tester, and the date shall be recorded on the geomembrane near the repair.

All destructive sample holes, tears, large holes, or areas with blisters or undispersed raw materials shall be patched. Patches shall be round or oval in shape, extend at least 150 mm beyond the defect, and made of the same material as the geomembrane. The edge of the patch shall be beveled and welded to the geomembrane according the procedures outlined for extrusion welding. All patches shall be vacuum tested and the results recorded on the geomembrane.

For areas that have very large defects, the material shall be removed and replaced. All folds or large wrinkles shall also be removed. The Engineer shall determine the areas that require removal. Seams that fail destructive testing or cannot be vacuum tested shall be cap-stripped. Bridging or trampolining of the geomembrane shall also be repaired prior to covering. At no time shall the Installer discard excess geomembrane, packaging materials, or other items beneath the geomembrane.

4.1.10 Quality Assurance and Acceptance

Quality Assurance testing will be performed by the Engineer in accordance with these Specifications. The Installer shall be responsible for notifying the Engineer when areas of Work are completed and ready for QA testing. Additionally, the Installer shall allow time for the testing to be performed. Every reasonable effort will be made to expedite the necessary testing; nevertheless, delays occasioned by testing will not be considered grounds for extension of time to complete the contract Work.

The Installer shall be responsible for maintaining the geomembrane until final acceptance by the Engineer. The Engineer will recommend final acceptance when all seams have passed destructive testing, the Installer has supplied all documentation, and all field and laboratory testing is complete and satisfactory. As part of the final acceptance, the Installer shall furnish reproducible as-built drawings showing the location of the geomembrane panels, seams, repairs, patches and destructive samples. The drawings shall be prepared on 24 by 32-inch size sheets to a scale approved by the Engineer. They shall be submitted in final form to the Owner within two weeks after completion of each phase of construction.

4.2 Geocomposite

A geocomposite will be installed between the geomembranes of the in-heap storage pond to serve as a leak detection layer connected to the pond's leak detection sump. The geocomposite will consist of a Syntec Minedrain TD-7 (or approved equivalent) 300-mil geonet heat-laminated on both sides with 270 gr/sq m (8 oz/sq yd) nonwoven geotextile.

4.2.1 Material Requirement

The geonet shall be a high flow capacity polyethylene grid comprised of a tri-planar structure consisting of middle ribs that provide direct channelized flow, with diagonally placed top and bottom ribs. The geonet shall conform to the following standards:

Geonet Property	ASTM Test Method	Value
Transmissivity, m2/sec	D-4716	1 × 10-3
Thickness, mm (mil)	D-5199	7.6 (300)
Density, g/cm3	D-792	0.94-0.96
Tensile Strength, N/mm (lb/in)	D-7179	17.6 (100)
Carbon Black Content, %	D-4218	2-3

The material requirement for the nonwoven geotextile component of the geocomposite is covered in the following section.

The Contractor shall provide a written material guarantee covering the geocomposite material for a minimum warranty period of one year. The material warranty shall cover the cost of any material required to replace failed material. A minimum one-year installation warranty shall also be provided and shall cover the cost of labor and equipment to replace the failed material.

4.3 Nonwoven Geotextile

A 270 gr/sq m (8 oz/sq yd) nonwoven geotextile will be used in manufacturing the in-heap storage pond geocomposite. A 405 gr/sq m (12 oz/sq yd) nonwoven geotextile will be used as specified on the Drawings.

4.3.1 Material Requirement

The nonwoven geotextile shall be of new, first-quality (needle-punched) material having polymer of 100 percent polyethylene, 100 percent polypropylene, or polyester/polypropylene blend designed and manufactured specifically for the purpose of separation, tensile reinforcement, planar flow, and filtration. The geotextile material shall be produced such that it is free of holes, undispersed raw materials, broken needles, or any sign of contamination by foreign matter. The geotextile shall be uniform in color, thickness, size, and texture, and all rolls shall be properly tagged and identified by the Manufacturer.

The non-woven geotextile shall conform to the following minimum average roll values (MARV) unless otherwise specified.

Nonwoven Geotextile Property	ASTM Test Method	Value[1]	
		270 gr/sq m (8 oz/sq yd)	405 gr/sq m (12 oz/sq yd)
Grab Tensile Strength, N (lb)	D-4632	930 (210)	1,420 (320)
Grab Elongation, %	D-4632	50	50
Puncture Strength, N (lb)	D-4833	600 (135)	930 (210)
Mullen Burst, kPa (psi)	D-3786	2,895 (420)	4,270 (620)

Trapezoidal Tear Strength, N (lb)	D-4533	420 (95)	555 (125)
Apparent Opening Size, US Sieve No. (mm)	D-4751	80 (0.180)	100 (0.150)
Permeability, cm/sec	D-4491	0.38	0.29
Water Flow Rate, lpm/m2 (gpm/ft^2)	D-4491	4,480 (110)	2,440 (60)
UV Resistance (retained after 500 hours), %	D-4355	70	70

Notes:

[1] All values are MARV except apparent opening size; it is the maximum average value per roll, and the UV resistance is the minimum value.

4.3.2 Installation

The nonwoven geotextile fabric sheets shall be placed as shown on the Drawings or as directed by the Engineer. All joints shall have a 0.15-m minimum overlap and shall be heat fused or sewn. The integrity of each seam is important. As a means of regulating the fusion machines, frequent samples of seams will be tested for grab strength. Minimum grab strength of 80 percent of the fabric strength, as defined above, will be required. Any machine that produces failing samples shall be repaired or removed from the Work.

On slopes steeper than 10H:1V, all seams shall be oriented parallel to the slope direction. Seams constructed perpendicular or transverse to the direction of the slope will not be accepted, unless approved by the Engineer.

Seams shall be sewn using a Type 401 stitch. One or two rows of stitching may be used. Each row of stitching shall consist of four to seven stitches per 25 mm. The minimum seam allowance (minimum distance from the geotextile edge to the stitch line nearest that edge) shall be 38 mm if a Type SSa (prayer or flat) seam is used. The minimum seam allowance for all other seam types shall be 25 mm. The Engineer shall have final approval of all seams. The Installer shall ensure that no soil materials are present within seams or overlaps.

All seams will be inspected for continuity, and the Installer shall repair any gaps or seams that are flawed. Costs for repairing the geotextile shall be borne by the Installer.

Sandbags shall be provided as ballast to hold the various layers of geotextile in place prior to the next operation. If permanently left in place to ensure that wind damage does not occur during the expected exposure life, sufficient ultraviolet-resistant sandbags shall be used.

4.4 Geosynthetic Clay Liner

A geosynthetic clay liner (GCL) will be used in the leach pad liner system instead of the low-permeability clay soil liner for the HLP and ponds, as shown on the Drawings.

4.5 Material Requirement

The GCL shall be reinforced consisting of a layer of sodium bentonite between two nonwoven geotextiles, which are needle-punched together (similar to Cetco Bentomat DN, or equivalent). The geotextile shall conform to the standards in the previous section of these Specifications. The GCL material shall be warranted against Manufacturer's defects for a period mutually

agreed upon in writing prior to award of the contract between the Owner and the Manufacturer. This warranty shall cover the cost of material, shipping and handling, labor, and equipment to replace the defective or failed material.

The GCL material shall conform to the following standards and shall be free of tears, holes, or other defects that may affect its serviceability.

GCL Property	ASTM Test Method	Required Value
Bentonite Swell Index	D-5890	24 mL/2g min.
Bentonite Fluid Loss	D-5891	18 mL max.
Bentonite Mass/Area[1]	D-5993	3.6 kg/m^2 (0.75 lb/ft^2) min.
GCL Grab Strength[2]	D-4632 D-6768	660 N (150 lbs) MARV 88 N/cm (50 lbs/in) MARV
GCL Peel Strength[2]	D-4632 D-6496	65 N (15 lbs) min. 6.1 N/cm (3.5 lbs/in) min.
GCL Hydraulic Conductivity	D-5887	5 x 10^{-10} m/sec min.
GCL Hydrated Internal Shear Strength[3]	D-5321 D-6243	24 kPa (500 psf) typ.

Notes:

1 At 0 percent moisture content.

2 Testing is performed in the machine direction using 100-mm grips. Results are reported as minimum average roll values (MARV) unless otherwise indicated.

3 Peak values measured at 10 kPa (200 psf) normal stress for a specimen hydrated for 48 hours.

The GCL material shall be sampled and tested in accordance with the Manufacturer's approved QC Manual.

4.5.1 Installation

In general, the GCL material shall be installed in accordance with the procedures provided in the Manufacturer's QC Manual and approved by the Engineer. In particular, the following procedures shall be followed.

The GCL rolls shall be protected from damage during shipping and exposure to the elements until time of deployment. Rolls damaged during shipping, storing and deploying, or from climate exposure, in ways that affect the quality of the GCL as an effective seepage barrier, shall be rejected as determined by the Engineer, and replaced with acceptable rolls.

The subgrade shall be prepared in accordance with the Subgrade Preparation Section of these Technical Specifications prior to GCL installation. The GCL shall be installed in advance of the geomembrane installation, provided the GCL panels can be covered with seamed geomembrane within each day of deployment. Only those GCL panels that can be covered in the same day shall be unpackaged and installed. If exposed GCL cannot be permanently

covered before the end of the work day, it shall be temporarily covered with plastic or other waterproof material to prevent hydration.

The GCL panels shall be placed with seams oriented parallel to the line of maximum slope and shall be free of tension or stress upon completion of the installation. Panels shall be positioned with the seam overlap not less than 250mm (12 in) for longitudinal seams and 500mm (24 in) for end-of-panel seams. Dirt or other foreign matter shall be removed from the overlap area immediately prior to seaming. Granular sodium bentonite of the same type as the bentonite used in the GCL shall be placed along the entire seam overlap at minimum widths of 75mm (3 in) and 250mm (12 in) from the edge of the underlying panel for longitudinal and end-of-panel seams, respectively. The minimum application rate of the granular sodium bentonite shall be 0.27 lb/ft. End-of-panel overlapped seams shall be constructed such that they are shingled in the direction of the grade to prevent runoff from entering the overlap zone.

Holes or tears in the GCL shall be repaired by placing a patch of GCL extending a minimum of 250mm (12 in) beyond the edges of the hole or tear on all sides. Granular sodium bentonite or bentonite mastic shall be applied in the overlap area. Patches shall be secured with construction adhesive or other approved methods.

GCL shall not be covered prior to inspection and approval by the Engineer.

4.6 Corrugated PE Pipe

This section refers to all corrugated polyethylene (PE) pipework to be used in the project including solution collection and drainage pipes and diversion culvert pipes. Pipe and fittings shall be made of virgin polyethylene compounds, which shall have a minimum cell classification of 324420C for 3 in through 10 in diameters or 335420C for 1 ft through 5 ft diameters as defined in ATSM D-3350. Pipe and fittings shall be manufactured and comply with AASHTO Standard Specifications M-252, M-294 and MP-7. All sizes shall conform to the AASHTO classification “Type S” for dual wall smooth interior solid pipe, “Type SP” for dual wall smooth interior perforated pipe, and “type CP” for single wall perforated pipe, or “Type D” for diameters greater than 3.5 ft. Sealed couplers shall conform to ASTM D-3212.

Dual wall pipe shall have minimum pipe stiffness at 5 percent deflection when tested in accordance with ASTM D-2412 as follows:

Internal Diameter mm (in)	Pipe Stiffness kPa (psi)
100 – 300 (4 – 12)	345 (50)
375 (15)	289 (42)
450 (18)	276 (40)
600 (24)	234 (34)
750 (30)	193 (28)
900 (36)	152 (22)
1,050 (42)	138 (20)
1,200 (48)	124 (18)
1,500 (60)	96 (14)

Where perforations are specified, they shall conform to the requirements as follows:

- ASTM F-667 for 3 in diameter pipe
- AASHTO M-252 “Class 2” for 4 in to 10 in diameter pipe
- AASHTO M-294 “Class 2” for 1 ft to 4 ft diameter pipe
- AASHTO MP-7 “Class 2” for 5 ft diameter pipe

Slots shall be cut circumferentially unless specified otherwise.

Couplings shall be corrugated to match the pipe corrugations and shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints. Couplings, unless watertight connections are specified, shall be split collar and shall engage at least two full corrugations on each pipe section.

4.7 Steel Pipe

Steel pipe and pipe diameters shall be as specified on the Drawings. Fittings shall conform to the appropriate ANSI and ASTM standards.

4.8 Installation

The Contractor shall furnish and install the pipework and miscellaneous materials incident thereto, in accordance with the Manufacturer's instructions and recommendations. The pipework shall be installed to the lines and grades and generally in the manner shown on the Drawings. Where specific lines and grades are not indicated on the Drawings, the lines and grades will be specified by the Engineer in the field to suit the existing ground conditions. The pipe shall be installed using equipment and methods described in these Specifications and in accordance with the pipe Manufacturer’s recommendations for handling and placement of the pipe and fittings.

The pipework shall be installed in accordance with good piping practices, whether such practices are specifically detailed on the Drawings or not. The general layout as shown on the Drawings shall be maintained. Where interference is encountered during installation or relocation of pipework is deemed necessary, the Engineer shall be consulted and shall approve the revised plan before any changes are made.

All pipework shall be erected to preserve accurate alignment. Care shall be taken during the installation of pipeline runs where drainage is required to ensure that the pipeline has a continuous slope to the point of drainage.

Construction equipment shall not cross over installed pipework unless covered with specified material or protective cover fill approved by the Engineer. If pipework is damaged by the Contractor's method of installation and construction, and are deemed not suitable for use in permanent construction, as determined by the Engineer, the damaged pipework shall be replaced by the Contractor at no expense to the Owner.

Prior to installation, each segment of pipe and all fittings shall be inspected for defects and/or damage. Care shall be exercised to prevent foreign matter from entering the pipe while it is being installed. Open ends of the pipe shall be covered by temporary end caps or other approved means when installation is not in progress to prevent foreign matter from entering the pipe.

Pipe bends to form curves either in the horizontal or vertical plane shall not exceed that recommended by the Manufacturer or approved by the Engineer. The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanship like manner without damage to the pipe and so as to leave a smooth end at right angles to the axis of the pipe.

Couplers used to join two sections of corrugated pipe together or to join a pipe section with a fitting (e.g. wye, tee, etc.) shall be of the snap variety for diameters of 250 mm or less and of the split variety for diameters greater than 300 mm. Zip ties used to secure split couplers must be manufactured of the same material as that for the couplers themselves. All unions between pipe sections or specific fittings shall be completed such that the seam in the split coupler (for diameters that require split couplers) shall be rotated to the pipe springline such that the potential ingress of solids is eliminated.

During actual solution collection pipework installation, methods shall be developed to ensure the corrugated pipe is not damaged during installation or backfilling. Sequencing of corrugated pipe placement on the leach pad shall be done such that vehicle traffic is minimized over the completed areas.

The diversion culvert PE pipes shall be installed in accordance with the Manufacturer's instructions and recommendations. The culvert pipes shall be handled with fabric, non-metallic slings and shall not be dragged along the ground. Pipe connections shall be banded with 300 mm minimum width metal straps provided by the Manufacturer. Joint bands shall be positioned and drawn tight before the next section of pipe is positioned. Deflections or "kinks" at joints shall be acceptable, provided they are not greater than the maximum deflection recommended by the pipe Manufacturer.

5.0 DEEP DYNAMIC COMPACTION

5.1 Subcontractors

Work of this section shall be performed by a specialized/qualified sub-contractor retained by the General contractor who can prove to have the credentials and experience to perform the work as required herein.

5.2 Description of Work

The Work specified in this Section includes furnishing of all labour, tools, plant and equipment and related services to perform all Deep Dynamic Compaction (DDC) work and verification of the placer tailing in the area of the proposed future Heap Leach Facility (HLF).

The principal items of work by the DDC Contractor are:

- Mobilization and demobilization of all equipment required to perform the work and any subsequent testing required for confirmation that the project specification has been achieved.
- Densification of soil using DDC to achieve the following minimum criterion described in Table 5.1.
- Site Verification Testing.
- Preparation of an engineering report of the densification to be submitted to the Owner's Engineer for review and acceptance.

5.3 Extent of Densification

The extent of the Work is shown on the Project Construction Drawings.

A detailed description of the HLF site is provided in various reports prepared by BGC Engineering Inc. (BGC). The reports of primary relevance to the HLF include the *2011 Geotechnical Investigation for Mine Infrastructure, Factual Data Report* issued by BGC and dated 20 January 2012 and the *Eagle Gold – Heap Leach Pad, Water Diversion and Process Management Ponds DRAFT Foundation Report* issued by BGC and dated 21 April 2011.

5.4 Examination and Pre-Construction Meetings

- Each Tenderer, before submitting his tender, shall carefully examine the tender documents to establish the extent of work and must visit and examine the site and fully inform himself/herself of all existing conditions, limitations and difficulties that may arise.
- Include in his/her tender the cost of all labour, equipment and services required to complete the work.
- Carefully examine existing conditions prior to submitting bid. No extras will be authorized for work which could have been determined by an examination of site conditions.

- A site pre-construction meeting to discuss the work shall be held prior to starting work. The meeting shall include the Owner, Owner's Representative, Owner's Geotechnical Engineer, the General Contractor and the Soil Densification Contractor.

5.5 Experience

- The Specialty Contractor shall be regularly engaged in Dynamic Compaction work and shall be qualified to perform this project. Pre-qualification shall contain a minimum of the following and shall be submitted prior to bid opening. The Specialty Contractor shall document that they have performed a minimum of the following work in Canada:
- Within the past 10 years, provided all supervision, labor, material and equipment to successfully densify by Dynamic Compaction, 15 separate Deep Dynamic Compaction projects involving over 10,000 m^2. These projects included utilizing energy inputs of between 10 and 40 tons dropped from heights of over 20 meters (60 feet) to improve soil for liquefaction and/or bearing capacity using free fall, and single and/or double lines. Five of the documented, successfully completed projects shall be mining related projects representative of the type of soil to be densified (variable man-made deposits), depth to be densified, energy input required and the type of modified cranes to be used at the HLF site.
- The Densification work shall be conducted under the overall supervision of a Canadian professional engineer with at least 10 years of experience in Deep Dynamic Compaction and retained by the densification contractor, referenced through this Section as being the Contractor's Engineer.
- The densification work shall be conducted under the supervision in the field by a superintendent who has at least worked in that capacity on five (5) previous major projects using Dynamic Compaction on Canadian projects. A list of these projects complete with a detailed resume shall be submitted by the contractor as part of the Tender submission. The superintendent shall be knowledgeable with the densification method, including: familiarity with the design procedures, limitations of the method, interpretation of test results, field verification of performance, etc.
- Work shall not proceed with alternative personnel unless the alternative personnel have similar experience and are approved by the Owner's Representative.
- The Contractor's Engineer in charge of the densification work shall be available for on-site consultation and meetings within 3 days' notice. The foreman for the densification work shall be on-site at all times during the work.
- Following the completion of the densification work, a report shall be submitted confirming that the design criteria were achieved. The report shall be prepared and stamped by the Contractor's Engineer.

5.6 Site Layout

The contractor shall responsible for all site layout of the Dynamic Compaction except for twelve (12) survey reference points that will be supplied by the Owner. Owner will also be responsible for staking out the treatment area limits.

5.7 Submittals

- The contractor shall provide a statement describing the equipment(s) to be used and the procedures to be followed to achieve the required criteria including a Quality Control procedure document. Such statement shall not relieve the Contractor of any responsibilities under this Contract to meet project specifications.
- The contractor shall submit proposed work plan to densify the soil for Owner's Engineer's approval. The submission should include the following information, as a minimum:
    - Pattern used/Grid of densification points
    - Weight of hammers to be used, impact, drop height, etc.
    - Survey of the ground surface prior to and after compaction
    - Measurement of craters volumes and heaving if required
    - Quality control plan with type of testing method, frequency, laboratory analyses, etc.
    - Schedule of the work
- Submit the completed report to the Owner's Engineer for review and comments prior to commencement of any densification work.
- A Daily Log shall be submitted to the Owner's Engineer by the Contractor showing the pattern selected for densification, the ground settlement achieved at each location.
- The Contractor shall maintain a set of up-to-date Drawings throughout the Contract to show the work as constructed. The as-constructed drawing shall be delivered to the Owner's Engineer on completion of the work.
- Approval of the facilities and procedures shall not relieve the Densification Contractor of the responsibility to meet the terms and conditions of the contract.

5.8 Payment

- The contractor shall provide a lump sum price of densification including all labour, equipment, testing. etc. to complete the work described in this section.
- If tests indicate that the specified criteria are not achieved, additional testing to define the extent of the area requiring remediation and post-remediation testing shall be required by the Owner Representative. The additional testing shall be carried out at the Densification contractor's cost.

5.9 Execution

- Deep Dynamic Compaction (DDC) shall improve the areas to be treated as specified. DDC shall be carried out at the location of the proposed new Heap Leach Facility area as per the limit shown on Drawings. DDC shall be carried out from the elevation shown on the grading plan in the Drawings.

- The Contractor shall keep the site clean and tidy at all times and store and locate equipment and materials required for the performance of the Work as required by the Owner's Engineer.
- Construct and maintain barriers, guard rails, covers, lighting as required for the work and to comply with the applicable safety regulations.
- A test section consisting of 40 metres by 40 metres shall be densified at the beginning of the densification work at a location determined by the Owner's Engineer.
- A test section will be located within the production densification area (as agreed to by all involved parties) and will be considered as production work if completed to meet the required BPT blow counts given in this specification. Testing will to be carried out by the contractor and witnessed by the Owner's Engineer.
- The intent of the test section is that the Densification Contractor shall demonstrate that the procedures used for the test section are satisfactory and can be continued throughout the remainder of the work. If procedures are to be changed during test section evaluation or during production work, the Owner's Representative shall be informed of the changes and the reasons for these changes.
- Acceptance of the densification method based on the results of the test section does not relieve the responsibility of the Densification Contractor to meet the specified BPT criteria.
- Where the test section indicates that the performance criteria is not achieved, the Densification Contractor shall conduct additional test sections at his own expense with revised procedures until the performance criteria are achieved to the satisfaction of the Owner's Representative.
- The Owner's Engineer will periodically monitor progress and performance of the densification Work. The monitoring may include but is not limited to any or all of the following: observance of the Densification Contractor's procedures, recording of craters volumes, witness of BPT testing. Monitoring by the Owner's Engineer does not relieve the Densification Contractor of any responsibility for proper execution of the work.
- Testing to determine specification compliance will consist of performing one BPT borehole to a minimum depth of 12 m or refusal below the finished floor every 5,000m^2 of densified soil. Owner's Engineer or Contractor may conduct sieve analyses of soil samples to determine the fines content (percent of dry weight of soil passing the 75µm US Standard #200 sieve) if there is any dispute between the Owner's Engineer and the Densification Contractor on fines content.
- Depending on observations made during densification, the Owner's Engineer reserves the right to request testing prior to completion of the densification of the whole site. Owner's Engineer may elect to request 50 percent of the above specified testing be performed at the completion of one third or half of the site area to be densified.
- Notify Owner's Engineer of day of testing (48 hours before testing) so that he may witness the drilling process. As part of the verification, shear wave velocity measurement may be completed by the Owner in the densified area following the completion of the densification.
- Location of the verification boreholes will be determined commonly by the Owner's Engineer and the Dynamic Compaction Contractor.

- Ninety (90) percent of the obtained BPT test values shall meet or exceed the minimum required values shown in Table 1 shall be obtained at each borehole location.
- Areas of the site that do not achieve the required penetration resistance shall be remedied by the Contractor at the Contractor's cost.
- Table 5.1 below present the minimum required **BPT N_b blowcount** values at 1 meter depth intervals to be achieved following densification, which correlate with minimum equivalent SPT N_{60} blowcounts. The Contractor's Engineer will provide equivalency calculations which demonstrate the N_b values are equivalent to or greater than the minimum SPT N_{60} values by accounting for conditions encountered in the field and correction based on the type and performance of the Becker drill. These corrections include but are not limited to:
    - Type of Becker drill used
    - Throttle level
    - Hammer drop height
    - Hammer weight
    - Driver casing diameter
    - Hammer efficiency
    - Casing friction
    - Bounce chamber pressure correction

Table 5.1: Required minimum BPT N_b and equivalent SPT N_{60} Blowcounts

Depth (m)	BPT N_b value (equivalent to SPT (N_{60})	Minimum equivalent SPT N_{60} values
1	11	15
2	12	15
3	15	17
4	18	20
5	24	23
6	27	25
7	30	27
8	30	29
9	32	29
10	33	31
11	35	33
12	36	34

5.10 Quality Assurance

The Owner's Engineer will conduct geophysical seismic refraction field testing for Quality Assurance (QA). The following QA testing shall be performed (at a minimum):

- Geophysical testing during the test section work to verify DDC performance and calibrate to BPT data; and
- Geophysical testing within the footprint of the proposed dam during DDC work and/or following completion of the DDC.
- Additional geophysical surveys may be conducted, at the discretion of the Engineer, to verify performance of the completed DDC work. Areas of the site that do not achieve the required seismic corrected shear wave velocity shall be remedied by the Contractor at the Contractor's cost. The required minimum corrected shear wave velocity (V_{s1}) is 430 m/s to a depth of at least 12m.

The Owner's engineer performing the geophysical surveys will provide calculations to obtain corrected shear wave velocities (V_{s1}) based on field measured shear wave velocities (V_s) at 1 meter depth intervals. The corrected shear wave velocities for each depth interval (up to 12 m) will then be compared to the minimum required corrected value, verifying adequate compaction has been achieved.

5.11 Schedule and Site Cleanup

The densification work (expect for mob/demob) shall start by July 1st, 2015 and be completed by September 30th, 2015.

Following completion of the site improvement work, and acceptance of the work by the Owner's Representative, remove all densification equipment.

APPENDIX Q – FAILURE MODES AND EFFECTS ANALYSIS

DOWL HKM

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Technical Memorandum

To:	Mark Ayranto	**From:**	Troy Meyer, P.Eng.
Company:	Victoria Gold Corp	**Date:**	21 April 2014
Re:	Eagle Gold Heap Leach Facility – Failure Modes and Effects Analysis	**Project #:**	7122.74010.01
CC:	Hugh Coyle		

1.0 INTRODUCTION

Victoria Gold Corporation (VIT) has proposed to construct, operate, close and reclaim a gold mine in central Yukon. The Eagle Gold Project (Project) is located 85 km from Mayo, Yukon. The Project will involve open pit mining at a production rate of approximately 10 million tonnes per year (Mt/y) ore, an average strip ratio (amount of waste: amount of ore) of 1.45:1.0 and gold extraction using a three stage crushing process, heap leaching, and a carbon adsorption, desorption, and recovery system over a 10 year mine life.

Victoria Gold intends to process gold-bearing ore on the planned leach pad using standard cyanide heap leach technology. The Phase 1 Heap Leach Facility (HLF) design including the lined pad, confining embankment, in-heap pond, events pond, temporary ditches, and conveyor corridors is presented in a document prepared by Tetra Tech titled “Heap Leach Facility Detailed Design, Eagle Gold Project” and dated April 2014. An Operation, Maintenance and Surveillance (OMS) Manual and a Construction Plan have been prepared to support the construction and operation of the HLF.

To effectively and proactively manage the HLF, there is a need to have a broad understanding of all of the associated uncertainties, risks, and consequences. It is important that focusing on one risk component, such as slope failure, doesn't lead to other components being overlooked. The Failure Mode and Effects Analysis (FMEA) methodology allows a balanced evaluation of the risks associated with various components of a system. Haimes (2004) describes an FMEA as a reliability-based method that is “widely used for reliability analysis of systems, subsystems, and individual component of systems”. It constitutes an enabling mechanism with which to identify the multiple paths of system failures. Indeed, a requisite for an effective risk assessment process is to identify all conceivable failure modes of a system.”

VIT and DOWL HKM prepared a FMEA of the Eagle Gold HLF. A team of cross-disciplinary experts from Tetra Tech, DOWL HKM and VIT provided input. This team represented a range of disciplines and experiences related to various aspects of the HLF design and operations.

1.1 Facility Description

The HLF is a valley fill design that incorporates a rock filled embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam will also provide for the storage

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and management of cyanide process solutions within the heap, which eliminates the need for downstream pregnant and barren process solution ponds or tanks.

The design incorporates a double-sided textured 80 mil linear low-density, polyethylene (LLDPE) liner. A geosynthetic clay liner (GCL) will be used in lieu of a 300 mm thick layer of compacted low-permeability material. GCL will be placed underneath the geomembrane and will provide equal or greater protection than 300 mm material having a saturated hydraulic conductivity of no greater than 10-6 cm/sec.

The Heap Leach Pad is designed to contain a network of pipes that will be distributed throughout the limits of the facility and will collect and convey pregnant leach solution (PLS) in addition to stormwater.

In summary, the proposed Heap Leach Pad will consist of two liner systems:

- In-heap Pond Liner System.
- Up-gradient Heap Leach Pad Liner System.

A one meter (1 m) thick layer of overliner material will be placed over the LLDPE geomembrane in a single lift. The Overliner Drain Fill (ODF) will be placed in bulk onto the liner using suitable haulage equipment or conveyors and spread by dozers in a uniform layer.

Solution collection pipes will be placed within the Overliner Drain Fill to convey PLS and storm flows to the In-heap Pond which is confined by the embankment.

The HLF embankment also provides stability to the ore pile, and creates an In-Heap Pond leaching configuration that provides storage of pregnant solution within the pore spaces of the ore. The embankment location, geometry, and height and the ore porosity determine the solution storage capacity of the HLF.

A downstream Events Pond serves as overflow containment providing additional storage in case the In-Heap Pond capacity is exceeded. The Events Pond is sized to provide containment storage for ¾ of the Probable Maximum Flood (PMF) Event.

1.2 Objectives

The FMEA was conducted as part of an approach to define a risk management plan for the HLF. The needs for this risk management plan are two-fold:

- Risk to the operation of the HLF represents a significant risk to VIT, in that it affects the operation's ability to leach ore and collect the pregnant leach solution. It is imperative that there is a clear understanding of the "key risks" for the HLF, so that risk mitigation efforts can be properly focused.
- VIT will be obtaining various permits to construct and operate the HLF. Risk management planning is expected and required as part of obtaining permits and complying with regulatory standards.

VIT prefers pro-active management to reactive management, and would therefore prefer to have a risk management plan that places the appropriate emphasis on all sources of risk. The objective of the FMEA was therefore to evaluate all of the types of risk associated with the HLF, both as a basis for prioritizing risk mitigation measures, and as support for further risk management discussions with regulators, as needed.

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2.0 FMEA METHODOLOGY AND APPROACH

2.1 FMEA Boundaries

It is essential that an FMEA be directed at a well-defined system. The spatial, functional and temporal boundaries of the FMEA were discussed with participants and the following guidelines were adopted:

The FMEA would be bounded spatially to incorporate the HLF itself and the other directly connected site components:

- Confining Embankment and Spillway;
- In-Heap Pond;
- Events Pond;
- Leachate Detection and Recovery System (LDRS);
- Overliner Drain Fill;
- Solution Collection System;
- Ore Heap; and
- Dublin Gulch Diversion Channel.

The FMEA would include site components and functions that directly affect (or could affect) the operation of the HLF:

- Ore preparation;
- Ore delivery and placement;
- Ore leaching;
- Water diversion and pumping systems;
- Electrical systems;
- Management system; and
- Work force.

The temporal scope of the FMEA was not limited, but three phases were defined:

- Construction - the period during initial construction of the key HLF components;
- Operations – the period during which ore is actively placed and leached;
- Closure – the period in which the ore is no longer placed and treated but solution may continue to be collected and processed.

2.2 Participants and Preparation

The FMEA was completed over a period from April 2013 to June 2013 and the participants were:

- Troy Meyer, P.Eng (HLF Designer);

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- Dave Hallman, PE (Tetra Tech Seismic Expert);
- Andrew Kaczmarek (former Victoria Gold COO);
- Allan Breitenbach (Third Party Reviewer);
- Todd Goodsell (former Victoria Gold Environmental Manager);

In preparation for the FMEA process, a general template for the FMEA was compiled and distributed. Participants prepared the following:

- A list of various components that constitute the HLF facility, and processes/procedures associated with the operation of the facility;
- A list of documents related to the HLF facility design, construction, operation, (etc) of the facility; and
- An initial list of “failure modes”.

2.3 Approach

Troy Meyer, P.Eng prepared a FMEA template with the list of components, and initial list of failure modes and provided the participants with a review of the background and methodology.

The first step was to decide on the criteria to be used for likelihood, consequence severity and risk. Previous criteria were used from similar FMEA exercises and provided a basis that was familiar to most participants. The FMEA approaches presented in Haimes (2004) and Robertson and Shaw (2002) were used as general guidelines.

A key of the FMEA template is provided as Figure 1. It was agreed to adopt the definitions of occurrence frequency ratings in Figure 2. The consequence-severity definitions were also adopted as shown in Figure 3, with the following categories:

- Biological Impacts and Land Use
- Regulatory Impacts and Closure
- Public Concern and Image
- Health and Safety

An additional rating, shown in Figure 4, was introduced to capture the confidence in the detection of possible event.

Participants were then asked to address specific failure modes and their effects, and to provide estimates of the likelihood of failure, criticality of consequences and confidence of the evaluation.

A Risk Priority Number (RPN) was then calculated as follows:

RPN = SEV x OFR x DET

Where:

SEV = Severity Rating (1 to 10, where 1 is ‘negligible’ and 10 is ‘extreme’)

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OFR = Occurrence Frequency Rating (1 to 10, where 1 is 'not likely' and 10 is 'expected')

DET = Detection Rating (1 to 10, where 1 is 'high confidence' and 10 is 'low confidence')

The resulting RPN product can range between 1 and 1000, with higher risk priority assigned to larger values. As the HLF risks were assessed, it became clear that some of the consequence types would be the dominant risks, while others were likely in a "Low Risk" category. This was primarily due to low severity ratings or low likelihood ratings.

3.0 FMEA RESULTS

The outcome of the discussions and evaluations is summarized in the FMEA Risk Register, presented in Figure 5. A total of 19 failure modes over the 9 major HLF components were listed and discussed.

The four highest Risk Priority Number (RPN) scores were:

- Liner System Failure - 216 (RPN) = 9 (SEV) x 3 (OFR) x 8 (DET)
- LDRS Failure - 147 (RPN) = 7 (SEV) x 3 (OFR) x 7 (DET)
- Ore Heap (localized shallow) Failure - 120 (RPN) = 4 (SEV) x 6 (OFR) x 5 (DET)
- Dublin Gulch Diversion Failure - 96 (RPN) = 8 (SEV) x 4 (OFR) x 3 (DET)

The consequences severity of potential events 1 and 2 above were considered high for obvious reasons. A liner system failure would potentially result in contamination of the groundwater and LDRS failure would result in the inability to detect liner leakage.

Event 3 has a fairly high RPN due to the likelihood of a shallow (bench) slope failure. This type of event is considered 'moderately likely' since the inter-bench slopes of the heap will be stacked at angle of repose. However the consequences of such a shallow localized ore slope failure are considered to be low as any damage to the liner on the perimeter of the heap could be mitigated or repaired.

It should be noted that although a massive failure of the confining embankment is considered to have a high consequence due to potential downstream impacts to environment, the RPN is fairly low (10) due to the very low likelihood of a dam failure coupled with the very high confidence in the ability to detect precursors to such an event via dedicated monitoring systems installed in and around the dam.

4.0 REFERENCES

Haimes, Y.Y. (2004) Risk Modeling, Assessment, and Management, 2nd Edition, John Wiley and Sons, 837 pp.

Roberston and Shaw (2002) Mine Closure, E-Book, http://ebookbrowse.com/e-book-02-mine-closure-pdf-d410706050

DOWL HKM

FIGURES

FIGURE 1 - DESIGN FMEA KEY

Item and Function	Potential Failure Mode	Potential Effects of Failure	SEV	Potential Cause(s) of Failure	OFR	Detection Method & Quality Controls	DET	RPN	Recommended Actions
List Part Name, Number and Function	List the possible modes of failure	List the consequences of failure on part function and on the next higher assembly		List those such as: inadequate design, improper materials, etc.		List these measures available to detect failures before they reach the customer			List them for each of the failure modes identified as being significant by the RPN

SEV = Severity rating (1 to 10)
OFR = Occurrence Frequency Rating (1 to 10)
DET = Detection Rating (1 to 10)
RPN = SEV*OFR*DET = Risk Priority Number (1 to 1000)

FIGURE 2 - OCCURANCE FREQUENCY RATING

Eagle Gold Heap Leach Facility

Occurance Frequency Rating (OFR)	Likelihood Class	Description
1-2	Not Likely	Extremely unlikely to occur during the lifetime of facility
3-4	Low	Not expected to occur during the lifetime of facility
5-6	Moderate	Expected to occur once during the lifetime of facility
7-8	High	Expected to occur several times during the lifetime of facility
9-10	Expected	Expected to occur more than once a year

FIGURE 3 - SEVERITY RATING

Eagle Gold Heap Leach Facility

Consequences Severity	Severity Rating	Biological Impacts and Land Use	Regulatory Impacts and Censure	Public Concern and Image	Health and Safety
Extreme	9-10	Catastrophic impact on habitat (irreversible and large)	Unable to meet regulatory obligations; shut down or severe restriction of operations	Local, international and NGO outcry and demonstrations, results in large stock devaluation; severe restrictions of 'license to practice'; large compensatory payments etc.	Fatality or multiple fatalities expected
High	7-8	Significant, irreversible impact on habitat (large but reversible)	Regularly (more than once per year) or severely fail regulatory obligations or expectations - large increasing fines and loss of regulatory trust	Local, international or NGO activism resulting in political and financial impacts on company's 'license to do business' and in major procedure or practice changes	Severe injury or disability likely; or some potential for fatality
Moderate	5-6	Significant, reversible impact on habitat	Occasionally (less than one per year) or moderately fail regulatory obligations or expectations - fined or censured	Occasional local, international and NGO attention requiring minor procedure changes and additional public relations and communications	Lost time or injury likely; or some potential for serious injuries; or small risk of fatality
Low	3-4	Minor impact on habitat	Seldom or marginally exceed regulatory obligations or expectations. Some loss of regulatory tolerance, increasing reporting.	Infrequent local, international and NGO attention addressed by normal public relations and communications	First aid required; or small risk of serious injury
Negligible	1-2	No measurable impact	Do not exceed regulatory obligations or expectations	No local, international, or NGO attention	No concern

FIGURE 4 - DETTECTION RATING

Eagle Gold Heap Leach Facility

Class	Detection Rating (DET)	Description
Low	Range from 1 to 10 Lowest = 10 Highest = 1	Do not have confidence in ability to detect during during operations.
Medium		Have some confidence in ability to detect during operations.
High		Have high level of confidence in ability to detect during operations.

FIGURE 5 - FMEA RISK REGISTER

EAGLE GOLD HEAP LEACH FACILITY										
Component	***Function***	***Potential Failure Mode***	***Potential Effects of Failure***	***SEV***	***Potential Cause(s) of Failure***	***OFR***	***Detection Method and Quality Controls***	***DET***	***RPN***	***Recommended Actions***
Confining Embankment	Confines ore and solution within the heap leach facility	Foundation or slope failure	Major damage to multiple pad components Damage to liner system and loss of product - solution leakage Damage to collection piping system Uncontrolled release of ore and solution	10	Poor quality control during foundation preparation and embankment fill placement Extraordinary seismic event exceeding projected maximum event Progressive piping (fines erosion) through embankment Overtopping of dam crest during runoff event due to spillway plugging	1	Dam instrumentation: - Piezometers - Inclinometers - Survey monuments Regular inspection by Engineer	1	**10**	High level of CQA Follow procedures identified in OMS Manual Maintain an operational heap water balance Comply with operational criteria for solution volumes and maintain in-heap pond storm volume capacity Buttress embankment
In-Heap Pond	Provides operational and contingency storage of solutions Frost protection for solution in the In-Heap Pond	Solution flow-through	Uncontrolled release of solution to Haggart Creek	10	Extraordinary combination of upset events occurring simultaneously resulting in loss of contingency storage in In-Heap Pond	3	In-Heap Pond and flow instrumentation: - level meter in pond - flow meters within solution recovery system Visual inspections	3	**90**	Maintain an operational heap water balance to account for water volumes in each component of the HLF, and that they are within the criteria established Calculate late winter snow accumulation on the heap pad to predict snowmelt runoff Prioritize the sources for HLF solution make up, use any excess water volumes derived during upset conditions first Recycle to inactive i.e. drained or partially drained sections of leached ore on the leach pad (i.e., put into short-term storage on the pad) Transfer to the events ponds for short-term/temporary storage and for prompt recycling to the HLF process circuit Excavation of temporary down gradient solution management ponds
Events Pond	Provides operational and contingency storage of solutions	Solution flow-through	Uncontrolled release of solution to Haggart Creek	10	Extraordinary combination of upset events occurring simultaneously resulting in loss of contingency storage and/or loss of event storage in Event Pond	2	Regularly monitor water levels Visual inspections	3	**60**	Maintain an operational heap water balance to monitor events pond capacity Prioritize the sources for HLF solution make up, use any excess water volumes derived during upset conditions first Recycle to inactive i.e. drained or partially drained sections of leached ore on the leach pad (i.e., put into short-term storage on the pad) Surplus solution that cannot be utilized in the process circuit will be delivered to the CD/MWTP for treatment and discharge.
		Foundation or slope failure	Uncontrolled release of solution to Haggart Creek Damage to liner system and loss of product - solution leakage	10	Poor quality control during foundation preparation and fill placement Overtopping of events pond crest during runoff event due to spillway plugging	2	Regularly monitor water levels Visual inspections	3	**60**	High level of CQA Follow procedures identified in OMS Manual Excavation of temporary down gradient solution management ponds
Liner System	Groundwater Protection Containment and recovery of metal values	Leaks Holes Tears Material Flaw	Contamination of Groundwater Product Loss	9	Poor fabrication quality control Poor installation quality control Damage during construction Damage during operations (large ore pile failure) Damage during operations (ground movement) High phreatic level in ore pile Differential settlement casued by improper compaction during construction	3	QA/QC during manufacturing Construction quality assurance (CQA) testing In-Heap Pond LDRS system Visual inspection Down-gradient monitoring wells Instrumentation including piezometers	8	**216**	High level of CQA Isolate leak if possible Restrict leaching operations in affected area Perform forensic study Unload ore and repair liner Install interlift liners if necessary Temprorarily cease solution application in affected area, drill and case borehole and pump bentonite or similar material to affected area
Leachate Detection/ Recovery System (LDRS)	Leak Detection and Recovery	Clogs Crushes Material Flaw	Loss of Detection Product Loss	7	Poor installation quality control Wrong materials specified / installed Damage during construction	3	In-Heap Pond LDRS system Visual inspection Down-gradient monitoring wells	7	**147**	High level of CQA Replace or repair damage Isolate affected area, if possible Do nothing

EAGLE GOLD HEAP LEACH FACILITY										
Component	***Function***	***Potential Failure Mode***	***Potential Effects of Failure***	***SEV***	***Potential Cause(s) of Failure***	***OFR***	***Detection Method and Quality Controls***	***DET***	***RPN***	***Recommended Actions***
Overliner Drain Fill	Protects Liner Provides preferential path for solution thereby reducing hydraulic head on liner	Clogs Material degradation	Damage to Liner Elevated hydraulic head in ore pile	3	Poor installation quality control Wrong materials specified / installed	3	CQA testing and field inspections	3	**27**	High level of CQA Replace and repair, where practical Install inter-lift liner
Solution Collection and Delivery System	Collects process solution and conveys to process plant	Clogs Crushes Damage to pipes	Elevated hydraulic head in ore pile Loss of ability to control water balance Loss of revenue	6	Poor installation quality control Wrong materials specified / installed Damage during construction	3	CQA testing and field inspections	3	**54**	High level of CQA Unload ore and repair or replace Install interlift liner and new collection piping system Do nothing
Ore Heap	Process system for extracting metals Metal inventory till full recovery realized	Shallow Slope Failure	Damage to other components / functions Damage to liner system and loss of product - solution leakage Damage to collection piping system Disruption of stacking and leaching operations	4	Improper ore placement methods Fluid build-up over liner (elevated hydraulic head)	6	Visual inspections and surveys	5	**120**	Restrict leaching operations in affected area Unload ore pile, inspect and repair liner, reload Do nothing
		Deep Slope Failure	Major damage to multiple pad components Damage to liner ssytem and loss of product - solution leakage Damage to collection piping system Disruption of stacking and leaching operations	10	Extraordinary seismic event exceeding projected maximum event Elevated solution levels within heap due to impaired drainage Improper ore placement methods	2	Visual inspections and surveys	1	**20**	Restrict leaching operations in affected area Unload Ore pile, inspect and repair liner, reload Buttress ore pile
Dublin Gulch Diversion	Conveys flows from Dublin Gulch around the HLF	Failure of armouring Plugging Slope failure Overtopping	Flooding of HLF In-Heap Pond Erosion of HLF confining embankment	8	Extraordinary runoff event exceeding projected design event Inadequate maintenance of channel Improper installation of armouring	4	Visual inspections and surveys	3	**96**	High level of CQA Follow procedures and contingency plan identified in OSM Manual Channel maintenance to maintain design capacity Repair embankment erosion Repair channel armouring

APPENDIX B

Water Balance Modeling for the Eagle Gold Mine Heap Leach Pad Facility

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Water Balance Modeling for the Eagle Gold Mine Heap Leach Pad Facility

Prepared for:

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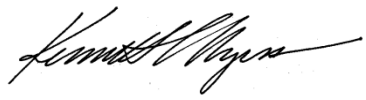
Project No. 137302
January 29, 2014

Water Balance Modeling for the Eagle Gold Mine Heap Leach Pad Facility

The following documents have been prepared by The MINES Group, Inc. under the professional supervision of the engineer whose signature appears hereon.

The findings are presented within the limits described by the client, and prepared in accordance with generally accepted professional engineering principles and practices. No other warranties either express or implied are made.



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Kenneth L. Myers, P.E.
Principal

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1 EXECUTIVE SUMMARY

An operational water balance model has been developed for the heap leach pad facility at the Eagle Gold Project (Project) site in the Yukon Territory, Canada, with the primary objectives of evaluating heap leach pad performance in terms of predicting 1) makeup water demands and 2) the potential for filling the pond system and spilling to the environment. Two (2) different types of water balance models were used: a deterministic model (using a chain of single valued input parameters to produce a series of single valued results) and a stochastic model (probability based). In the stochastic model the single valued input parameters are replaced with probability distributions derived from the computed statistics of the observations (in this case the monthly mean and variance or its square root, the standard deviation). A Monte Carlo procedure is then used to propagate the uncertainty through the model by sampling all of the input parameter distributions and compiling output distributions for specific results of interest.

Two (2) sources of precipitation information are available. These include site-specific observations from the Project site having a record length of 3 (Camp) to 5 (Potato Hill) years, and observations from the Mayo, Dawson, Keno Hill, Elsa, and Klondike regional stations having record lengths of 88 years, 32 years, 9 years, 42 years, and 42 years, respectively. Although the mean values for monthly precipitation at the Project site are likely to be reasonably close and stable after 5 years, the measure of variance will be substantially better at the regional stations due to the longer record lengths. Therefore, for purposes of deterministic modeling, a synthetic record was developed from the Mayo data set to represent the expected precipitation history at the Project site. The Mayo data set was selected primarily due to the very long record length (88 years or more than 17 times the length of the Potato Hill record and almost 30 times the length of the Camp record). The longer record permits a much better estimate of the population variance which can then be transferred to the site record as a function of the site specific mean using the "coefficient of variation" (the ratio of the standard deviation to the mean). It is also much more likely to disclose the existence, frequency, and duration of wet and dry cycles within the record. Given that the statistical testing showed an acceptable level of correlation between the site specific stations and the Mayo data set, the Mayo data can be factored such that the synthetic record's mean will match the site specific mean. This allows the synthetic record derived from the Mayo data to account for differences in precipitation patterns, orographic effects, and so on.

Results from the deterministic modeling include mean values that are averaged over each phase of operations. Simple volumes reported as m^3 are the totals over one (1) month duration. Construction/Operations Phases for the heap leach facility (HLF) are as follows:

- Phase 1 – Startup through heap elevation 1000 m – April 2015 – February 2018
- Phase 2 – Northward expansion of the HLF footprint and continued stacking to heap elevation 1090 m – February 2018 – May 2023
- Phase 3 – Northward expansion of the HLF footprint and continued stacking to final heap elevation 1150 m – May 2023 – May 2024
- Phase 4 – Termination of mining and ore production, but continued irrigation of the ore stack for gold production – May 2024 – May 2025
- Phase 5 – Termination of gold production and beginning of closure and rinsing, and reclamation – May 2025 – May 2028[1]

[1] This is an abbreviated portion of the closure period intended to show the transition from operations into closure. The extended closure period is more appropriately viewed through the draindown model.

Results show that normal operating volumes in the ponds increase over time as the lined footprint of the HLF increases and the system recruits more and more meteoric water. Pond levels peak in Phase 4 as irrigation for gold production continues, but no additional ore is being delivered and therefore the wetting of new ore no longer soaks up any water. However, pond levels during normal operations do not approach the level that would begin to spill into the event pond. Clean water runoff from reclaimed areas with soil cover does not begin until Phase 4 and increases as the % of the HLF covered increases. Makeup water demand is highest during startup and Phase 1 and decreases over time as water accumulates in the system.

Rather than an historic weather record intended to depict normal operating conditions (the deterministic model), the stochastic model is intended to look at extreme or upset conditions and to quantify the risk of experiencing those upset conditions. As discussed earlier, the stochastic model produces results that are actually probability distributions. These distributions show not just a single value, but the entire range of possible values for each parameter of interest. With regard to the HLF at the Project site, the primary concern is with the makeup water requirement each month, and the frequency with which treatment and discharge of process water might be required. Stochastic models use a Monte Carlo sampling procedure to sample input distributions and generate output distributions. In a classic Monte Carlo procedure a random number generator is used to sample distributions and about 3000 iterations (samples) are required to get good definition in the tails or extreme limits of the distribution.

Makeup water demand during Phase 1, which includes startup and the charging of the system with water, is very erratic. Starting in Phase 2 and continuing during Phase 3, the makeup water demand pattern becomes considerably more consistent. The peak or maximum makeup water demand in Phases 2 and 3 occurs consistently in August or September of each year. By Phase 4 when irrigation for gold recovery continues, but mining and ore delivery have ceased, the peak makeup water demand shifts away from August and September to the driest time of the year which is March and April.

Both the mean and the 95^{th} percentile makeup water demand peaks in Phase 1 and declines going forward through Phases 2 through 5 due to the increase in liner footprint and the accumulation of water in the system. Makeup water demand typically spikes in March and April (due to the resumption of ore stacking after the winter) declines to near zero during and immediately after the snowmelt (May and June), then gradually increases over the summer (July through September), and decreases again from October through December. Phase 1 makeup water demands are erratic and high reaching mean values in the 80,000 m^3 to 90,000 m^3 range and 95^{th} percentile values as high as 105,000 m^3. Phase 2 and 3 values drop into a more consistent range with means of 15,000 m^3 to 30,000 m^3 and 95^{th} percentile values of 30,000 m^3 to 60,000 m^3.

The risk of spilling from the in-heap pond is very small (less than 1%), and from the event pond (to treatment) even smaller (0.2% or less) beginning midway through Phase 2. However, beginning in Phase 3 the liner footprint is large enough and the volume of water accumulated great enough to see the likelihood of spilling into the event pond increase to 10% to 16% and the peak flood risk months of May, June, and July show the risk of requiring treatment prior to discharging to the environment increase to the 7% to 10% range. This risk during the peak flood risk months continues to increase over time peaking in Phase 4 with about a 13% to 19% probability of spilling to the event pond and a 10% to 15% probability of requiring treatment prior to discharge to the environment.

It is tempting to view the spill probabilities from the stochastic modeling in the same way as the design criteria (which is typically to store the 1% probability 24 hr storm (100 year event) plus

the draindown from a power outage of some duration (typically 8 to 24 hours)). However these probabilities cannot be compared. Because storm pond design criteria are based on a single 24 hr event, it is assumed that there is not sufficient time to respond to or mitigate the event. The only available option is to detain the entire event in a pond. Conversely, the spill probabilities from the stochastic model represent some random combination of multiple events over an extended period of time (weeks or months). The quantified estimate of risk (exceedance probabilities) must be interpreted in the context of both options and consequences. Operators will typically see the circumstances leading to an increased probability of spilling to the environment ahead of time, and as result have time to respond in some way. Options to reduce the risk once identified could include making additional storage room in the system by pumping water into a contact water pond, sending water to treatment and discharge over a period of time, or installing additional pumping capacity to increase the area under leach putting more water into circulation. Any or all of these actions could be deployed to prevent a spill as necessary. In the case of the Project, the highest flood risk is commonly associated with the spring snowmelt. The snow-water equivalent of the snowpack can be measured and monitored over the period from October through April so that the subsequent snowmelt event in May can be predicted with a high degree of certainty and prepared for well ahead of time.

Once all gold production has ceased and the proposed rinsing of the HLF is finished, the post closure heap will be allowed to dewater and drain. The draindown process is an unsaturated flow process that is controlled by the soil water retention characteristics of the ore. The rate of flow during draindown is a function of the unsaturated hydraulic conductivity which is in turn a function of the moisture content of the ore. As the ore drains the moisture content decreases and the effective unsaturated hydraulic conductivity declines as well leading to an exponentially declining flow rate curve. It is not practical nor advantageous to simply turn off the pumps and allow the heap to just drain as a very large volume of water would report quickly to the ponds, filling and overtopping them. Therefore, the model assumes that pumping of process solution will continue at a declining rate until such time as the potential draindown volume remaining would not fill the ponds but would be captured in the pond system and still provide sufficient capacity to capture and store the 1% probability (100 yr) 24 hr storm. At that point the pumps would be turned off and the heap permitted to continue to drain until it reaches meta-stable equilibrium with the variable amounts of meteoric water that continue to enter the pad year after year.

In the environment at the Project site, it is not expected to be possible to fully dewater the HLF and pond system without diverting some water to treatment. The rate at which the water is diverted to treatment will control the time required for the leach column to reach the moisture content of the unirrigated ore and also the time required to reach equilibrium with the meteoric precipitation regime. Although less of an impact, the placement of a cover material on the surface of the HLF will also impact the rate of drainage and time to equilibrium by creating clean surface runoff that can be diverted off of the HLF and released directly into the environment.

2 Introduction and Project Description

The Eagle Gold Project (Project) is located in the Yukon Territory of northwestern Canada at an elevation of approximately 1,000 m asl, in mountainous topography. The climate in this region is characterized by warm, wet summers and cold, snowy winters. Annual precipitation is approximately 450 mm, occurring mainly in the summer and fall months, from May to November. Runoff is characterized by a substantial snowmelt period that typically peaks in the month of May. The project involves the construction and operation of a heap leaching facility (HLF) for the extraction of disseminated gold from a low-grade ore. The heap leaching process involves the management of a large volume of weak cyanide solution, and considerations of water balance are of considerable importance to the successful operation of the facility.

3 Heap Leach Pad Operational Water Balance

Heap leaching involves the dissolving of precious metals contained in a low-grade ore using the application and circulation of a weak cyanide solution through the ore. An operational water balance model has been developed for the proposed HLF at the Project site. The model provides output to evaluate meteoric (weather) impacts on the facility design and to predict the fresh water demand during operations and subsequent post mining fresh water circulation.

3.1 Water Balance Concept

The water balance model for a heap leach pad operation is essentially a water budget that tracks all of the water entering and leaving the lined containment system. Sources of water entering the system include pore water delivered with the ore, precipitation falling as rain or snow, and any fresh water (makeup water) added to the system from outside the lined limits of the pad. System losses are a bit more complicated and include three basic categories of loss.

- Evaporative losses
- Losses to surface tension
- Extraction losses

In general, evaporative losses include the solution application system (2% to 3% volume loss for sprinklers or about a 1% loss for drip emitters), “lake” or “pond” evaporation from the free water surface in any of the process ponds (pregnant, intermediate, or barren) or event ponds, and potential evaporation from any wetted soil surfaces (primarily the portion of the ore heap under active leach, but potentially any portion of the ore after rainfall events). It should be noted that measured evaporation at weather stations is typically “pan” evaporation or the loss from a Class A pan device. The pan is very shallow relative to a typical pond environment and has exposed sides that are capable of transferring more heat to the water than the earthen banks of a pond. Therefore the evaporation from a typical lake or pond is less than that measured in a typical pan device and is reduced by a factor on the order of 0.70 to 0.75. In order to calculate the volume evaporated from pond surfaces, the surface area of each pond must be known at a particular point in time. Therefore, all sources of new water added to the system must be routed within the system and the net increase that must go into storage allocated to the various ponds. In order to avoid “circular references” and a mathematically in-determinant condition, a consistent point in time must be selected for reconciliation. In the case of our water balance model, this is the end of each month.

Therefore, evaporative losses from ponds are determined by computing the volume stored in each pond at the end of the prior month, calculating the depth and area of each pond, and using that calculated surface area to calculate the volume of lake evaporation from each pond. Then applying the calculated change in volume along with all other losses and additions, a new volume is computed for the end of the current month. This allows a new depth and area to be calculated and the process repeats itself. In the case of the model for the Project it involves only one pond (the event pond) since the process ponds are actually tanks and in-heap pond is at the lined base of the ore stack (i.e., covered by ore). None of these are exposed to the atmosphere.

Evaporative losses on soil surfaces must be handled differently, as there is no well-defined free water surface. The evaporative loss will be limited by one of two factors:

1. the maximum "potential" evaporation, or the greatest depth (volume per unit area) that could be evaporated under the weather conditions for that month given an unlimited supply of water, or
2. the maximum amount of water available.

In the case of an operating heap leach pad, the area under active leach is assumed to be continuously wetted by sprinklers or emitters with a limitless supply of water. Therefore, the full potential depth of evapotranspiration is applied to that area. Outside of the area under active leach, the ore surface is assumed to be dry, except for that fraction of the month's rainfall events that coated the soil particles or infiltrated into the soil and did not run off. This volume of water is assumed to be available during that month for evapotranspiration. Any portion of the infiltrated water volume that is not lost to evapotranspiration during the same month it falls is assumed to be beyond the reach of evapotranspiration in the following month and is routed into the solution collection system along with the other applied solution. Therefore, during months where evaporation/evapotranspiration greatly exceeds rainfall, rain events add nothing to the water volume stored in the system. However, during months where rainfall greatly exceeds evaporation/ evapotranspiration, a significant volume of water may be added to storage.

Environments like the Project site where snowfall is a substantial part of the precipitation regime create a special case. During much of the year, a snowpack will exist on the surface of the HLF which will significantly hinder evaporative loss, but create a new opportunity for "sublimation" loss (which is a phase change where water goes directly from the solid phase to the gas phase without passing through a liquid state).

Losses to surface tension involve changes in the water content of the ore during operations. The ore is not delivered to the heap leach pad in a truly dry condition, but rather contains some relatively small amount of moisture in the pore spaces that is held in place by surface tension. This delivered water content is typically less than the "specific retention" of the ore. The specific retention is a threshold moisture content that marks the position on the soil water characteristic curve where the soil begins refusing to release its water to gravity (i.e., below that moisture content it simply will not readily drain). Therefore for ore to release the applied solution carrying the dissolved precious metals to the solution collection system, it is necessary to raise the moisture content of the soil to a level above the specific retention. For example, if the delivered moisture content of the ore is at 8% moisture by weight and the specific retention of the ore is 10% by weight, then the difference of 2% is "soaked up" by the ore upon first wetting and is considered for all practical purposes to be a volume of water that is locked up in storage in the ore and held indefinitely against gravity. However, even at the specific retention moisture content, the ore will not pass the applied solution on to the solution collection system. Unsaturated hydraulic conductivity of the ore is a function of the moisture content. The moisture content of the ore must be increased to a level that allows the water to be passed through the ore at the same rate that it is

being applied so that the system is in equilibrium or in balance. If for example this operating moisture content were 14% by weight, then an additional 4% (14% minus the specific retention of 10%) would be required to bring the ore under active leach into equilibrium. Once an area is no longer actively being leached (i.e., no new solution is being applied), then the ore would drain back down to its specific retention moisture content and release the 4% difference back into the solution collection system. The water balance model tracks these changes in moisture content in the ore and accounts for the addition and subtraction of water volume in the system.

Once all additions and losses to the volume of water stored in the system have been estimated and accounted for at the end of the month, the model evaluates whether or not there is sufficient water available in storage to maintain the solution application rate for the next month

Heap leach pads are designed as fully lined containment systems that in theory release nothing back into the environment. Solutions that are not stored within the ore itself as described in the earlier paragraphs, are routed through the system and stored in various lined ponds. However, should extreme events exceed the storage capacity of the system, then the excess must be extracted from the system. The water balance model computes any excess volume detected in the system and routes that volume into a phantom pond that is labeled “treatment and discharge”. This allows the model to estimate both the frequency and size of events that could exceed the design capacity of the pond storage and require extraction of water and a reduction in storage through the treatment and discharge of solutions.

Figure 1 shows a schematic of the heap leach pad with respect to water balance. Using the ore heap as a control volume, the following equation may be written:

$$SC = SA + Pi - Es - Ed - (Wo - Wi) + Wd$$

Where:

SA = Water available for solution application
SC = Solution Collection
P = Precipitation
Pi = The infiltration component of precipitation
Es = Evapotranspiration from soil
Ed = Evaporative losses from sprinklers/emitters (the distribution system)
(Wo – Wi) = Water captured in the ore from the difference in initial and operating water contents
Wd = Water returned from the ore (operating moisture minus specific retention)

Then using the lined ponds as a control volume, the water balance equation can be written as follows:

$$0 = SC + Pr - Ep - D - SA + \Delta S + M$$

Where:

Pr = The runoff component of precipitation
Ep = Evaporation from ponds
D = Discharge out of the system
M = Makeup water
ΔS = The change in storage in the system

Rearranging the terms to isolate the two (2) unknowns (makeup water and change in storage) yields:

$$M + \Delta S = SA - SC + D + Ep - Pr$$

The water balance model uses this equation to track the water available in storage and then calculate the outside makeup water required for each monthly period. The term [SA – SC] defines the net changes in water content in the ore stack area while the term [D + Ep – Pr] defines the net changes in water stored in the ponds.

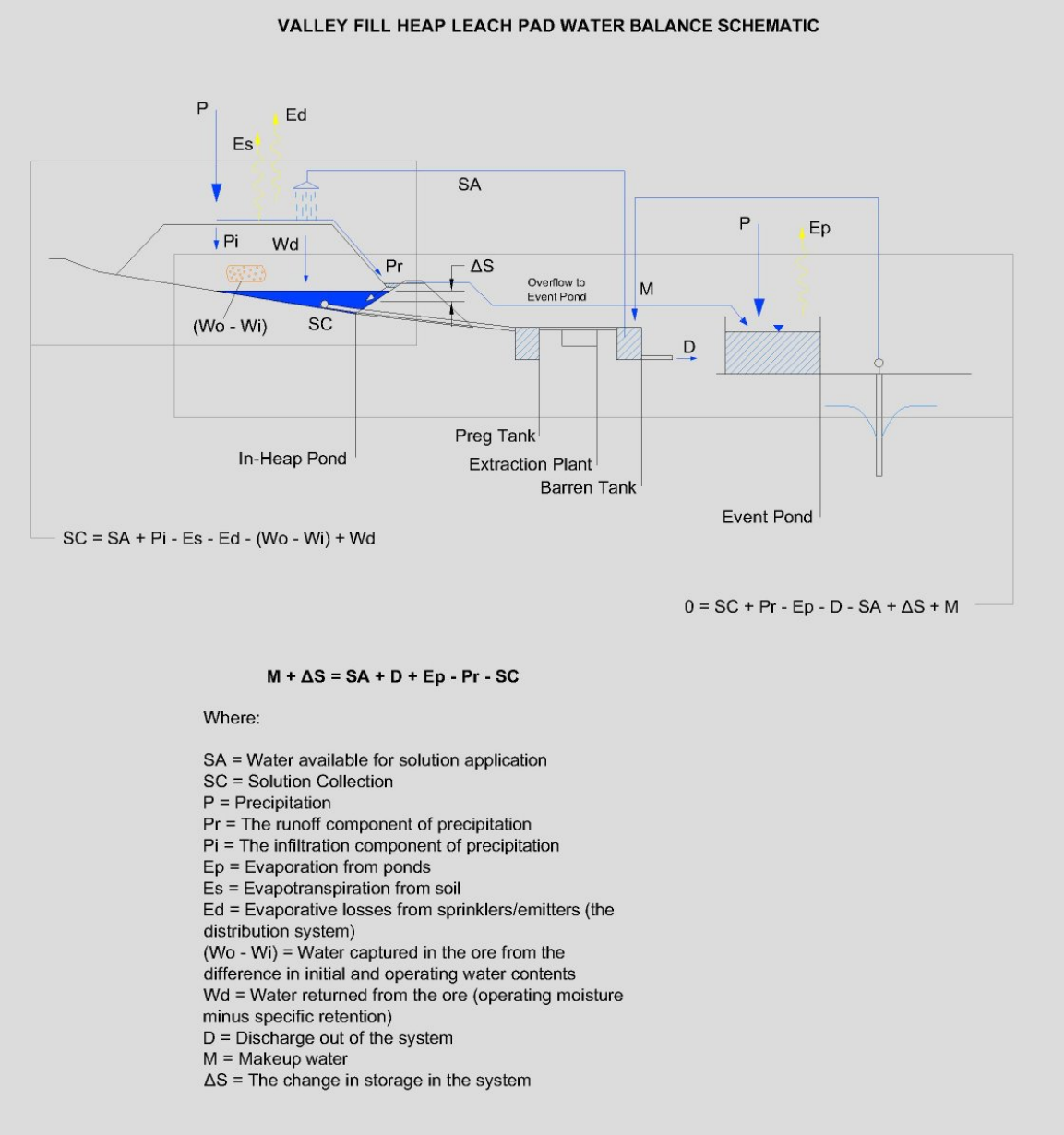
Another way to look at the water balance is to expand the SC parameter and rearrange the equation to get the following:

$$M + \Delta S = Es + Ed + Ep - (Pi + Pr) + (Wo - Wi) + Wd + D$$

[Es + Ed + Ep] represents all the evaporative losses in the system;
[Pi + Pr] represents all the gains in the system due to precipitation;
[(Wo – Wi) + Wd] represents the net impact of changes in pore water content in the ore;
and D is simply the volume of water physically removed from the system for treatment.

As long as water is available in storage in the system, it will be allocated for use in processing the ore in future months. ΔS increases and decreases in response to precipitation and the demand for processing water and M is zero. However, once the storage in the ponds falls to operational minimums, the model assumes that the ponds are not capable of supplying the demand and any shortfall in supply is made up as “outside makeup water” (M) or freshwater from outside the lined system, introduced into the lined system to meet the processing water demand.

Figure 1 – Heap Leach Pad Water Balance Schematic



3.2 Stochastic vs. Deterministic Models

There are two (2) different classifications of water balance model that can be used to evaluate heap leach pad performance and makeup water requirements. A deterministic model uses a chain of single valued input parameters to produce a series of single valued results. The weather data (which is the primary input) is often derived from some portion of an existing historic record or may consist of a synthetic record generated using the statistical summaries of the historic record. The potential range of variability can only be evaluated in a general sense over the full time history of the model.

In a stochastic model, the single valued input parameters are replaced with probability distributions derived from the computed statistics of the observations (in this case the monthly mean and variance or its square root, the standard deviation). Precipitation distributions are assumed to be Gamma distributed (i.e., there can be no negative values permitted in the sampling since a negative precipitation has no meaning). Shape and scale parameters for the Gamma distributions are computed as a function of the mean and standard deviation. A Monte Carlo procedure is then used to propagate the uncertainty through the model by sampling all of the input parameter distributions and compiling output distributions for all the results of interest. In this way results are also probability distributions that permit exceedance probabilities to be associated with each event or outcome. For example, the probability of exceeding a particular makeup water flow rate during the month of October during Phase 3 of the heap leach pad operation can be quantified from the results of the stochastic model. Probability distributions in hydrology are often highly skewed distributions, such that the mean or average result may not be the most frequently observed result (i.e., the mean and mode of the distribution do not coincide). Stochastic model results can be very useful in setting system design criteria and quantifying risk.

3.3 Weather Data

The primary inputs required for the HLF water balance model are the monthly precipitation totals, the monthly number of days of rain, the mean monthly temperature, the monthly total for lake evaporation, and the monthly total for potential evapotranspiration from soil surfaces.

3.3.1 PRECIPITATION

Two (2) sources of precipitation and temperature information are available. These include site-specific observations from the Project site having a record length of 3 (Camp) to 5 (Potato Hill) years, and observations from the Mayo, Dawson, Keno Hill, Elsa, and Klondike regional stations having a record lengths of 88 years, 32 years, 9 years, 42 years, and 42 years respectively (see Figure 2 through Figure 5). Although the mean values for monthly precipitation and temperature at the Project site are likely to be reasonably close and stable after 5 years, the measure of variance will be substantially better at the regional stations due to the longer record lengths. Therefore, for purposes of deterministic modeling, a synthetic precipitation record was developed from the Mayo data set (see Figure 6) to represent the expected precipitation history at the Project site (see Figure 7). The purpose of developing a synthetic weather record for the projected life of the HLF was to permit the development of a deterministic model that would produce a reasonable estimate of the range of values for makeup water demand, pond storage, and so on during normal operations and to verify the reasonableness of the model prior to stochastic analysis.

Correlation of the two site specific rainfall time series with the Mayo station record over the same time period was checked using the non-parametric Kolmogorov-Smirnov procedure. Plots of the normalized cumulative time series are shown on Figure 8. The K-S statistic between the Camp station and the Mayo station was 0.086 and the K-S statistic between the Potato Hill station and the Mayo station was 0.077. For $n = 29$ (the number of common records) and $\alpha = 0.05$ the critical test statistic value is 0.2215. Neither of the observed K-S statistics exceed the critical value, therefore there is no reason to reject the hypothesis that they were all drawn from the same distribution. In other words, a factored value of the Mayo data set should provide an acceptable surrogate for the Project site precipitation data. The Mayo data set was selected primarily due to the very long record length (88 years or more than 17 times the length of the Potato Hill record

and almost 30 times the length of the Camp record). The longer record permits a much better estimate of the population variance which can then be transferred to the site record as a function of the site specific mean using the "coefficient of variation" (the ratio of the standard deviation to the mean). It is also much more likely to disclose the existence, frequency, and duration of wet and dry cycles within the record. Given that the statistical testing showed an acceptable level of correlation between the site specific stations and the Mayo data set, the Mayo data can be factored such that the synthetic record's mean will match the site specific mean. This allows the synthetic record derived from the Mayo data to account for differences in precipitation patterns, orographic effects, and so on.

Based on a comparison of observed mean values for precipitation at the Project and the observed mean precipitation values for Mayo an adjustment factor of 1.49 (mean annual site precipitation depth divided by the mean annual Mayo precipitation depth) was selected to generate a synthetic precipitation history for the Project site using the Mayo precipitation record for the period from 1925 through 2012. As shown in Figure 6, the Mayo record includes some extended, multi-year dry periods and wet periods. A three (3) year dry period and a three (3) year wet period taken from these intervals in the Mayo record and included within the 13 year synthetic mine life record (see Figure 7). Inclusion of these wet and dry periods in the deterministic record assure that the potential impact of historically observed variations in precipitation will be resolved by the model and included in the normal operating range. The order in which they are included is of relatively little consequence. However, in order to preserve conservatism, the dry sequence was placed early in the record (when the lined surface area was smaller and the annual amount of water recruited lower) and the wet sequence later in the record (when the lined surface area was greater amplifying the impact of more precipitation).

For use in stochastic modeling, descriptive statistics were developed for the observations at both Potato Hills and Mayo. The observed variance for the Mayo data was converted to a coefficient of variance (the standard deviation divided by the mean) for each month. The design data set used a synthetic mean monthly precipitation for the Project (149% of the observed mean monthly precipitation at Mayo) and the variance (coefficient of variation) from the Mayo record. The number of days of rain per month was processed in a similar fashion. The final design statistical data set is shown in Table 1. A plot of the mean monthly precipitation is shown in Figure 9**Error! Reference source not found.**. The number of days of precipitation is shown in Table 2. A plot of the number of days of precipitation per month is also shown in Figure 9.

Since the Project site receives much of its precipitation in the form of snow, the model accounts for the accumulation and storage of snow water equivalent (SWE) in a snowpack and the release of the SWE as snowmelt based on fluctuations in mean monthly temperature at the site. Therefore, a synthetic temperature record was also developed. Based on comparisons of mean annual temperature at the Mayo (-3.3°C), Camp (-3.2°C), and Potato Hill (-3.9°C) stations, the synthetic record was created using the Mayo data and subtracting 0.3°C. The synthetic mean monthly temperature is shown in Table 3 and Figure 10.

Figure 2 – Comparisons of Mean Monthly Rainfall from Site and Regional Stations

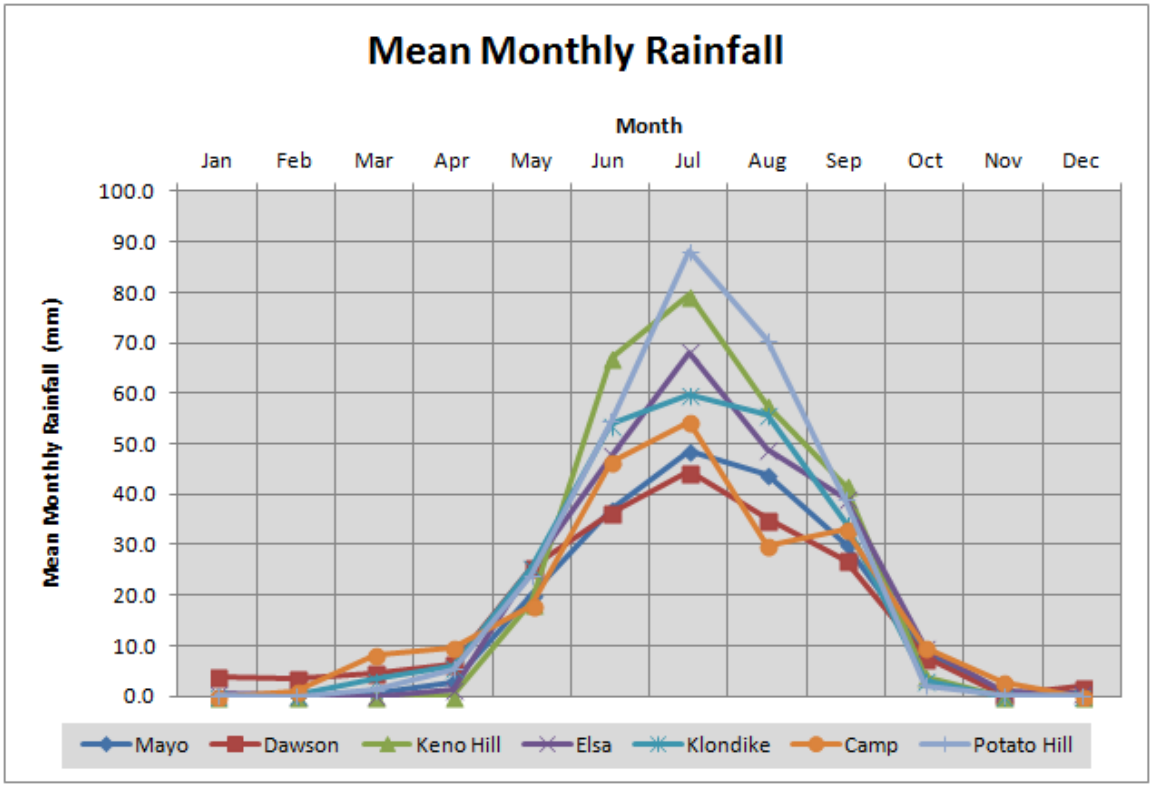


Figure 3 – Comparisons of Mean Monthly Precipitation from Regional Stations

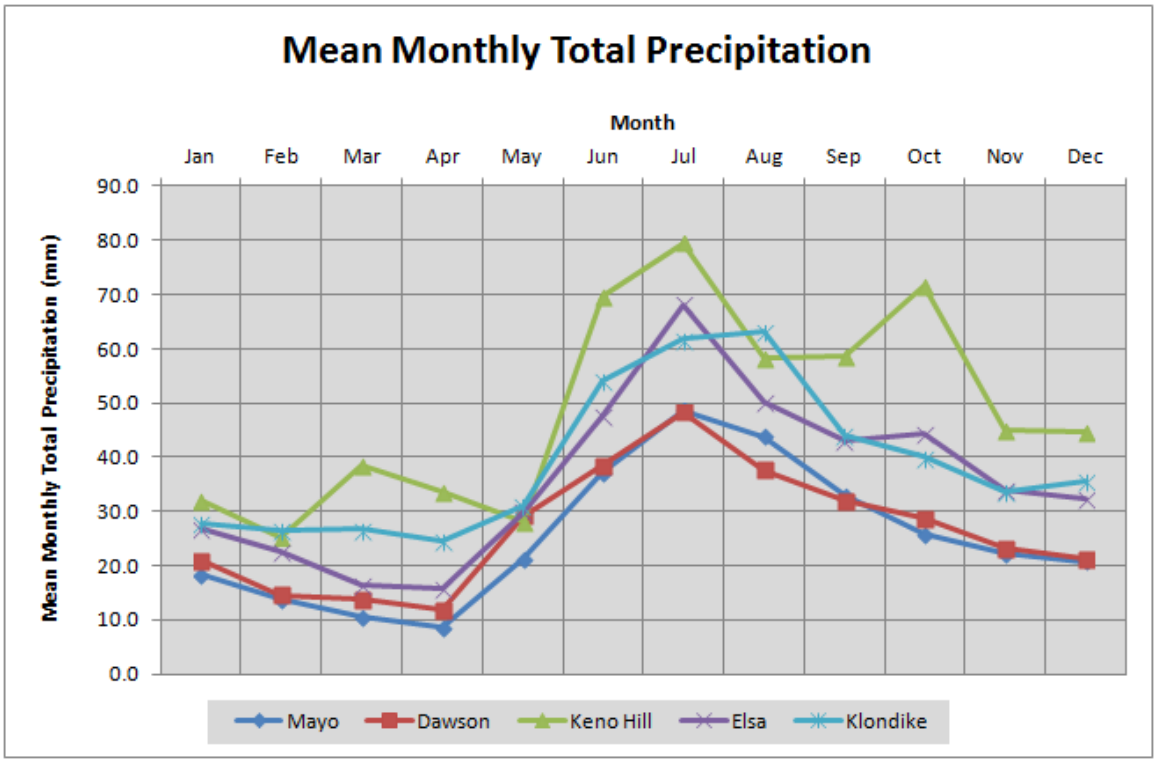


Figure 4 - Comparisons of Mean Monthly Snowfall from Regional Stations

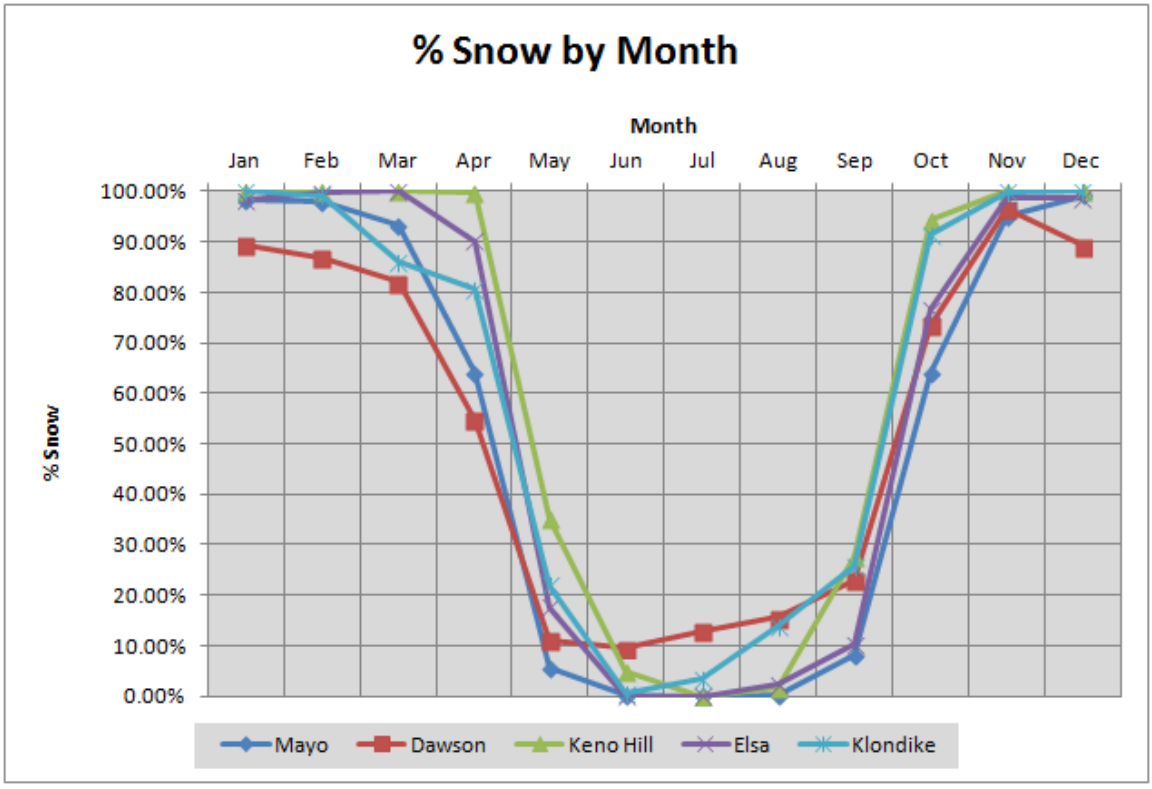


Figure 5 - Comparisons of Mean Monthly Temperature from Site and Regional Stations

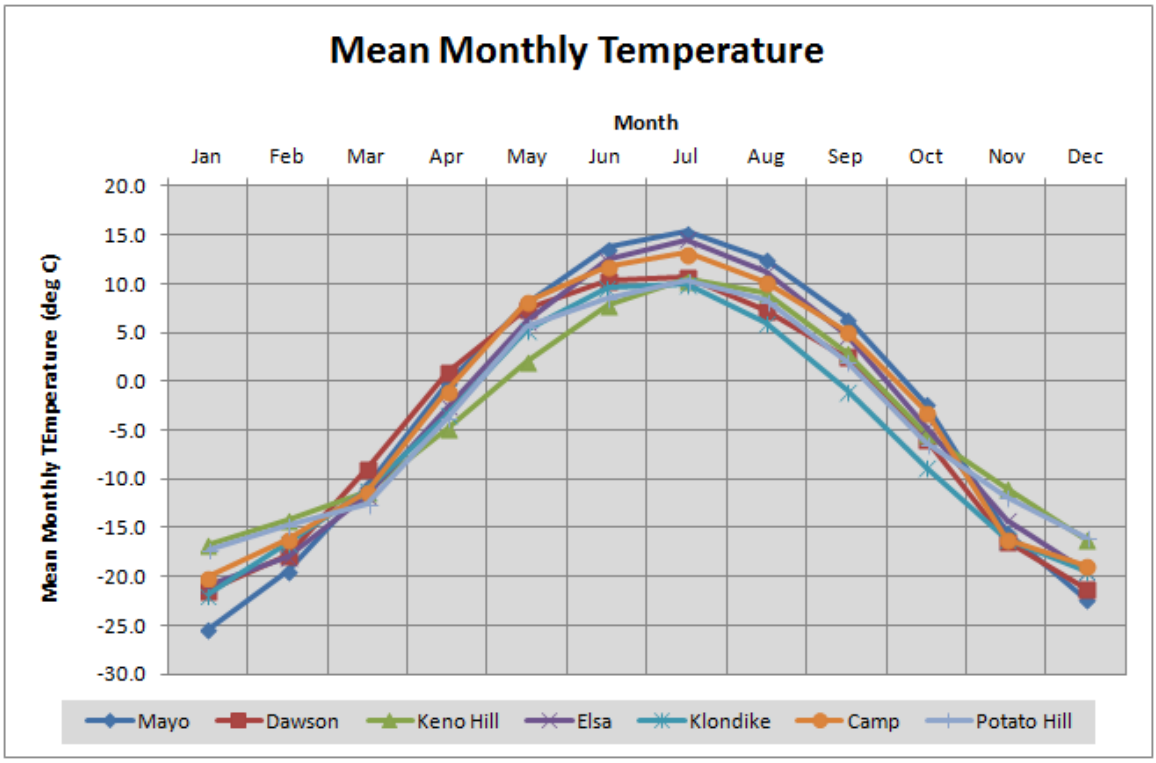


Figure 6 – Historic Precipitation Record from Mayo Station

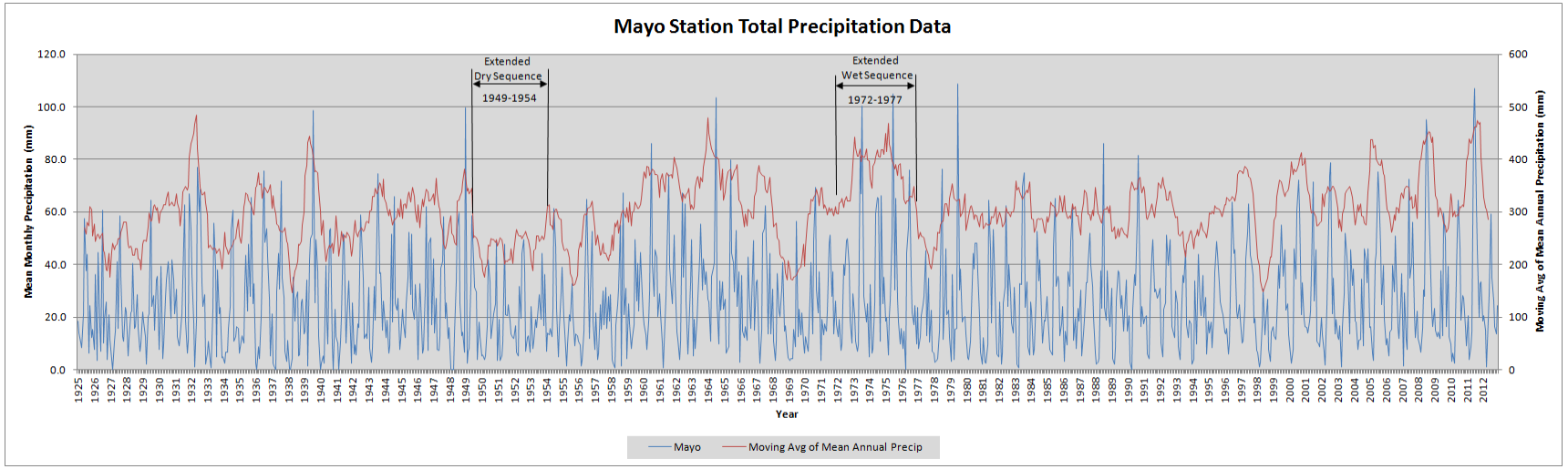


Figure 7 - – Synthetic Precipitation History for the Eagle Gold Project Site over Projected Mine Life

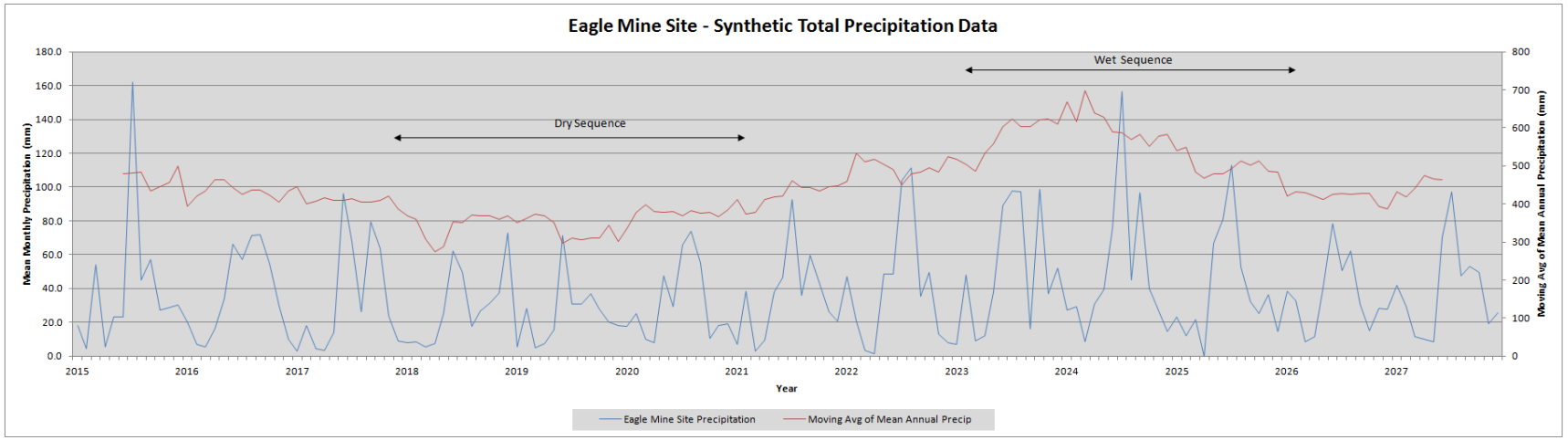


Figure 8 – Correspondence Between Camp and Potato Hill Site Stations and Mayo Regional Station

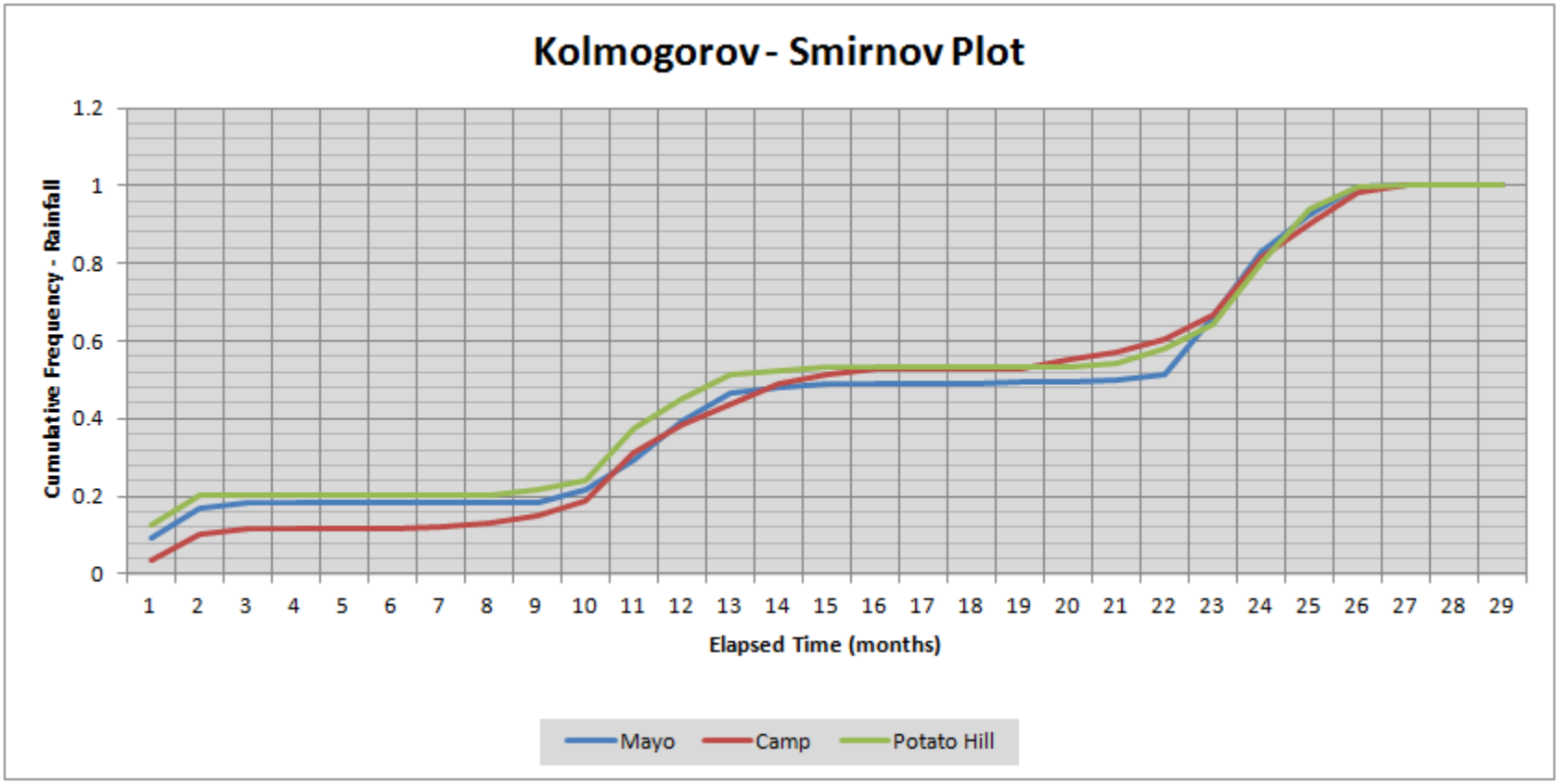


Table 1 – Summary of Site Synthetic Mean Monthly Precipitation

Month	Mean Precipitation (mm)	Standard Deviation (mm)	Coefficient of Variation (%)
Jan	20.30	14.68	72.3%
Feb	23.19	13.05	56.3%
Mar	11.51	13.69	119.0%
Apr	9.50	7.79	82.0%
May	33.72	16.22	48.1%
Jun	64.49	22.01	34.1%
Jul	88.05	40.00	45.4%
Aug	55.12	27.56	50.0%
Sep	50.06	23.21	46.4%
Oct	41.27	23.33	56.5%
Nov	26.51	7.65	28.9%
Dec	24.83	18.59	74.9%

Table 2 – Site Synthetic Mean Number of Days of Rain

Month	Mean Number of Days of Rain	Standard Deviation	Coefficient of Variation (%)
Jan	9.31	4.39	47.1%
Feb	8.69	2.81	32.3%
Mar	6.15	3.83	62.2%
Apr	5.15	3.56	69.0%
May	9.38	4.23	45.1%
Jun	12.08	3.86	32.0%
Jul	15.69	4.80	30.6%
Aug	12.23	3.42	28.0%
Sep	11.62	3.88	33.4%
Oct	12.85	5.68	44.2%
Nov	9.69	3.01	31.1%
Dec	10.54	5.67	53.8%

Table 3 - Site Synthetic Mean Monthly Temperature

Month	Mean Monthly Temperature	Standard Deviation
Jan	-27.45	9.74
Feb	-22.29	6.94
Mar	-10.62	3.86
Apr	0.08	2.10
May	7.83	1.47
Jun	13.09	1.37
Jul	15.24	0.78
Aug	12.21	1.01
Sep	6.52	1.54
Oct	-2.95	3.19
Nov	-14.48	7.84
Dec	-23.98	7.87

Figure 9 – Mean Monthly Precipitation Data Extracted from the Synthetic Record

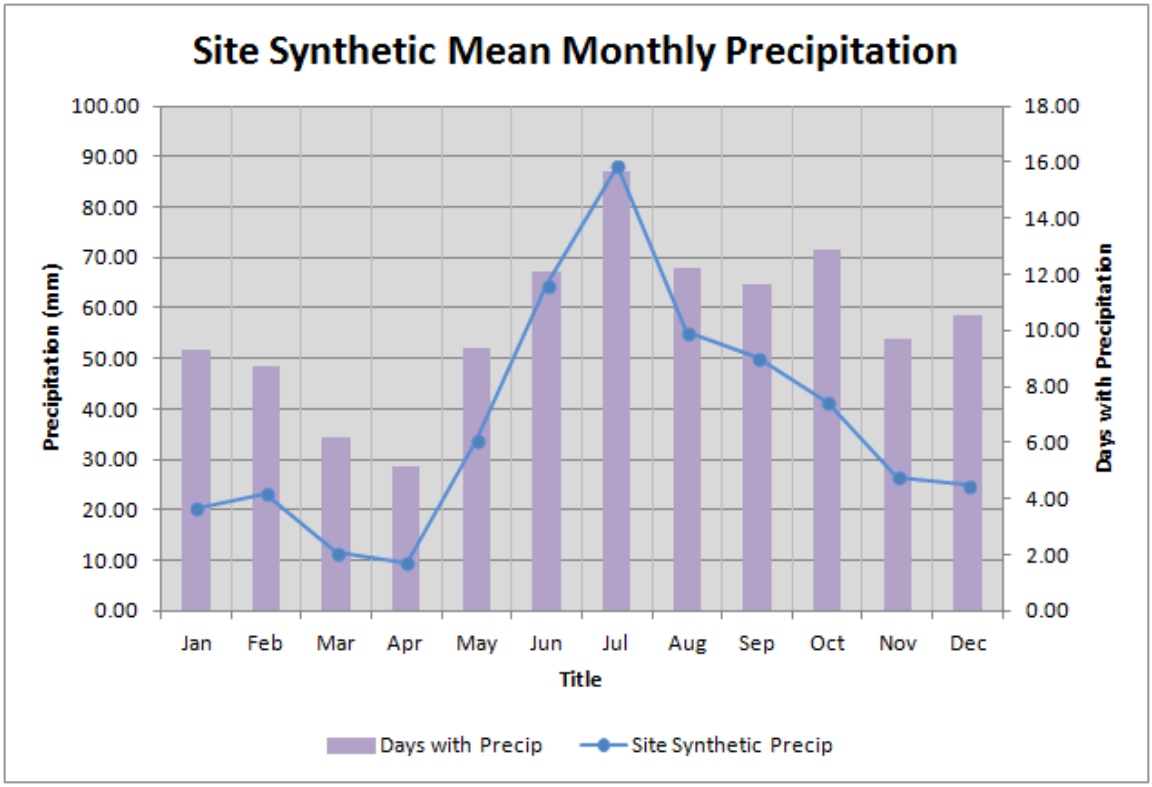
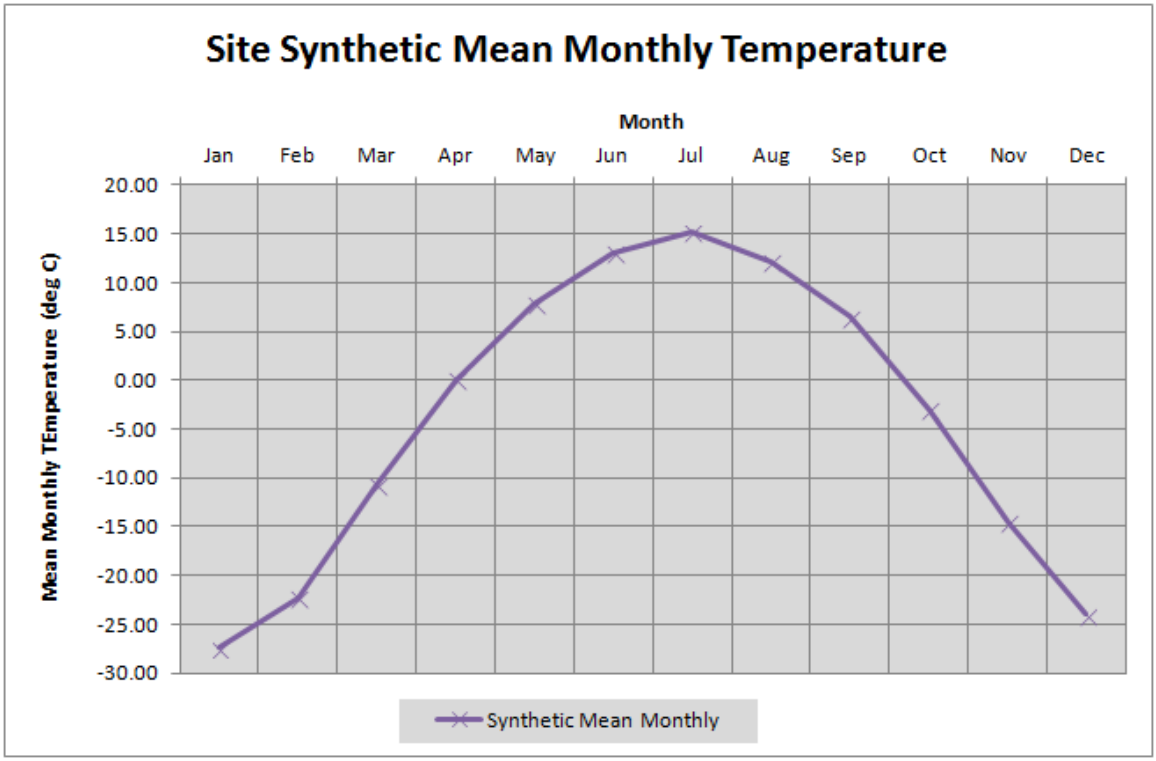


Figure 10 - Monthly Temperature Data Extracted from the Synthetic Record



3.3.2 EVAPORATION

Observations of evaporation are not available for the Project site or any of the regional stations. In order to provide consistency with assumptions made by others for the Project Site, for months where the mean monthly temperature is less than or equal to 0°C, it was assumed that losses will consist of sublimation only at a rate of 20% of the precipitation for that month. For months where the mean monthly temperature exceeds 0°C, the Thornwaite Equation was used to estimate the mean monthly evaporation loss. The estimated values for sublimation/potential evapotranspiration (ET) are shown in Table 4. .

Table 4 – Monthly Sublimation/Evaporation Data Extracted from the Synthetic Record

Month	Sublimation/Evapotranspiration (mm)	Standard Deviation
Jan	4.06	2.94
Feb	4.64	2.61
Mar	2.30	2.74
Apr	8.54	10.54
May	52.12	7.50
Jun	77.79	6.32
Jul	87.57	3.50
Aug	73.71	4.70
Sep	45.14	8.40
Oct	9.96	5.97
Nov	5.30	1.53
Dec	4.97	3.72

3.4 Input Parameter Assumptions

In addition to the weather data discussed in the earlier sections, there are a number of other key input parameters required for operation of the water balance model. These key parameters are summarized as follows:

- Initial moisture content of the ore = 5.84% by weight (5.0% from the Pit blended with 7.93% from a stockpile) [2]
- Specific retention of the ore = 8.6% by weight [2]
- Active leaching moisture content (operating moisture content) = 13.3% by weight [2]
- Solution application rate = 10 liters/hr/m^2 [2]
- Ore density (unit weight) = 1.8 tonnes/m^3 [2]
- Lift height = 10 m^3 [3]
- Number of lifts = 29 [3]
- Sprinkler/emitter evaporative losses = 0.5% [4]
- Distribution of daily rainfall (% of the rain days in a month with precipitation < X) [5]
    - 10 mm – cumulative probability less than = 89.2%
    - 25 mm – cumulative probability less than = 99.2%
    - 50 mm – cumulative probability less than = 99.9%
- SCS Curve Number (for the partitioning of runoff and infiltration) [4]
    - Ore – CN = 70
    - Liner – CN = 99
    - Reclaimed surface – CN = 88
- Ore production rate = approx. 29,500 tonnes per day year 1, then approx. 41,300 tonnes per day (adjusted slightly to produce a total stacked ore volume of 91,823,175 tonnes over the life of mine) [2]
- Total pumping rate [2]

[2] From project design reports and technical memoranda by Wardrop, Knight Piesold, and Tetra Tech
[3] From draft design drawings and stacking plan
[4] Engineering judgment and experience on past projects
[5] Based on analysis of the synthetic precipitation record

    - Startup through Phase 1: Varies
    - Phase 2 on = 2,770,000 liters per hr
- Maximum pond storage volumes [2]
    - Pregnant pond = Tank (volume not significant)
    - Barren pond = Tank (volume not significant)
    - In-Heap Pond = 447,945 m^3 (at elevation of spillage to the event pond, that is, with no freeboard left)
    - Event Pond = 254,071 m^3 (at elevation of spillway, that is, with no freeboard left)

3.5 Model Results

The deterministic model uses the synthetic precipitation record, number of days of precipitation, and the synthetic evaporation time history for the same time period to track system storage and makeup water demand on a monthly basis, to compute a single value for all variables and results for each month in the record. Similarly the stochastic model substitutes probability distributions for the discrete monthly rainfall and evaporation values and samples the distributions based on the observed statistical parameters (monthly mean and standard deviation). Then the model compiles new probability distributions for the results of interest. Results of both models are summarized below.

3.5.1 DETERMINISTIC RESULTS

Results of the deterministic modeling are summarized in the tables and figures that follow. In general, outside makeup water demand falls to zero during and immediately after the spring snowmelt period (primarily May) and peaks during the drier months of August and September. The cyclical nature of the makeup water demand is clearly seen in the figures as a series of spikes showing water stored in the in-heap pond during the snowmelt and post snowmelt months and virtually nothing in storage (minimum pumping head only) in the late summer and fall months. The makeup water demand is just the opposite, showing spikes in demand when the in-heap pond storage is near empty, and falling to zero when there is excess water stored in the in-heap pond. The peak storage volume contained in the in-heap pond varies with the total annual precipitation in any given year.

The water balance model covers the period of leach pad operation that includes startup and Phase 1 through Phase 5 (see below) which includes one (1) year of post mining leaching and three (3) years of rinsing. It is assumed to start in April of 2015 and ore placement is assumed to continue through April of 2024. Operations effectively end with the termination of gold production in May of 2025.[6] Upon completion of active leaching operations, solution management will be required until such time as the closure cover is established and clean runoff is diverted off the facility. Once the solution draindown rate falls to a level that can be safely and passively contained in the post-closure in-heap pond, active solution management can cease (i.e., no pumping). The water

[6] It should be noted that the HLF water balance model is designed to evaluate the period of heap leach operation, and not the period of reclamation and closure, despite its ability to depict areas of concurrent reclamation during operations. Reclaimed areas within the model impact the partitioning of runoff and infiltration on the ore heap and the routing of precipitation into the pond system. It does not model the performance of a cover system.

balance model does not model these post-closure conditions, and therefore results are presented only through the end of operations in 2025 and an arbitrary rinsing period through 2027. A separate closure/draindown model was prepared and is described in Section 4.

Table 5 summarizes results from the deterministic modeling. Mean values reported in the table are averaged over each phase of operations. Simple volumes reported as m^3 are the totals over one (1) month duration. Construction/Operations Phases for the HLF are as follows:

- Phase 1 – Startup through heap elevation 1000 m – April 2015 – February 2018
- Phase 2 – Northward expansion of the HLF footprint and continued stacking to heap elevation 1090 m – February 2018 – May 2023
- Phase 3 – Northeastward expansion of the HLF footprint and continued stacking to final heap elevation 1150 m – May 2023 – May 2024
- Phase 4 – Termination of mining and ore production, but continued irrigation of the ore stack for gold production – May 2024 – May 2025
- Phase 5 – Termination of gold production and beginning of closure and rinsing, and reclamation – May 2025 – May 2028

Results show that normal operating volumes in the in-heap pond increases over time as the lined footprint of the HLF increases and the system recruits more and more meteoric water. The in-heap pond levels peak during Phase 4 as irrigation for gold production continues, but no additional ore is being delivered and therefore the wetting of new ore no longer soaks up any water. However, the in-heap pond levels during normal operations do not approach the level that would begin to spill into the event pond.

Clean water discharge from reclaimed areas with soil cover does not begin until Phase 4 and increases as the % of the HLF covered increases.

Makeup water demand is highest during startup and Phase 1 and decreases over time as water accumulates in the system.

Charts are generally self-explanatory, but are briefly summarized here. Figure 11 shows the relative magnitude of the circulated solution volume and the infiltration from rainfall. Figure 12 is a summary of the monthly precipitation over the operating period and Figures 13 and 14 provide the total of rainfall and snowmelt and a summary of the SWE in the snowpack. Figure 15 summarizes runoff volumes from various sources and shows the relative magnitude of monthly storm water runoff from the various surfaces over time. Figures 16 and 17 show the monthly volume of water and the associated depth of water in storm ponds. The summary of significant losses in the system is provided in Figure 18, which shows the relative magnitude of the various means by which water is removed from circulation over time. Figures 19, 20, 21 and 22 depict the outside makeup water requirement in four (4) different ways, as a flow rate (liters per second), a monthly usage rate, a daily usage (m^3 per day), and a water demand (liters per tonne of ore). All figures show the most frequently occurring event (about 42% of the time) to be zero since, after the initial startup, the makeup water requirement drops to zero consistently each winter. The remainder of the time the makeup water requirement varies from about 5000 m^3 per month to as much as about 110,000 m^3 per month, but is most frequently on the order of 45,000 to 50,000 m^3 per month.

Table 5 – Results Summary from Deterministic Model

Parameter	Phase	Max	Mean	Min
Water in Stored in Ponds (m3)	**1**	34,299	26,298	0
	2	126,357	42,635	26,160
	3	171,966	98,530	55,313
	4	319,768	230,049	148,272
	5	279,015	76,905	26,160
Runoff from Reclaimed Areas (m3/month)	**1**	0	0	0
	2	0	0	0
	3	0	0	0
	4	10,267	1,461	0
	5	24,640	2,717	0
Outside Makeup Water (m3/month)	**1**	97,584	28,920	0
	2	45,824	10,404	0
	3	0	0	0
	4	0	0	0
	5	9,206	288	0
Outside Makeup Water (liters/s)	**1**	37.13	11.00	0
	2	17.43	3.96	0
	3	0.00	0.00	0
	4	0.00	0.00	0
	5	3.50	0.11	0
Outside Makeup Water (m3/tonne of ore)	**1**	0.0810	0.0268	0
	2	0.0380	0.0091	0
	3	0.0000	0.0000	0
	4	0.0000	0.0000	0
	5	0.0000	0.0000	0
% of Time Makeup Water Demand is Zero	**1**		29.4%	
	2		52.4%	
	3		100.0%	
	4		100.0%	

Figure 11 – Sources of Water

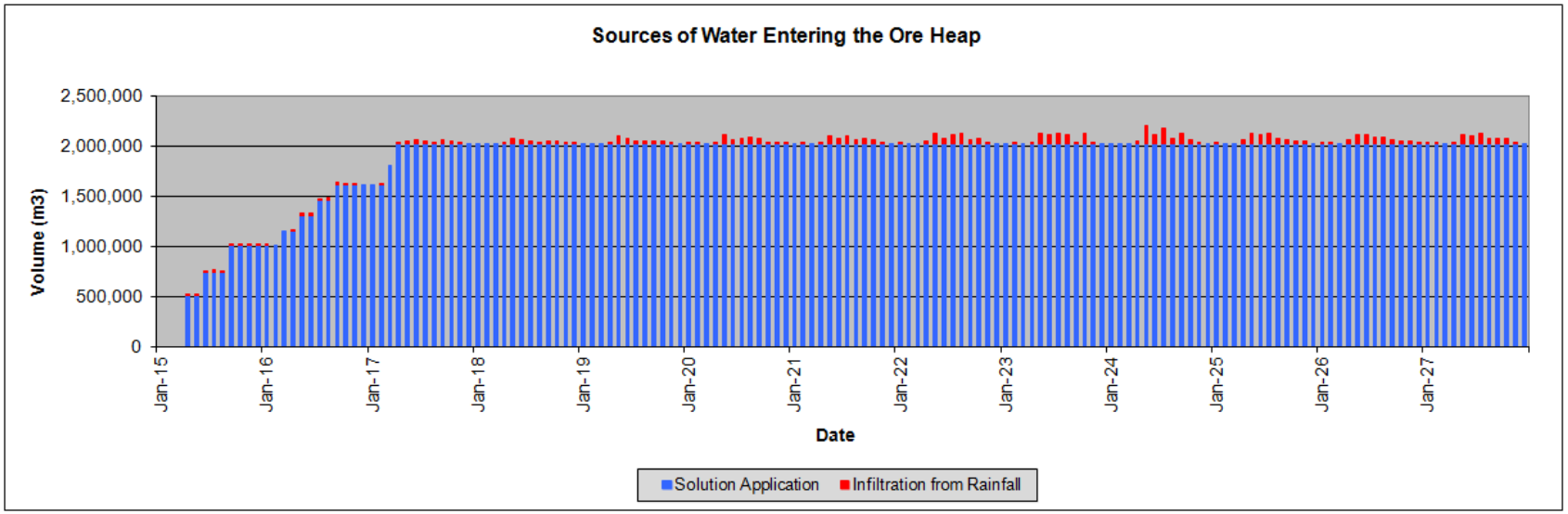


Figure 12 – Monthly Precipitation

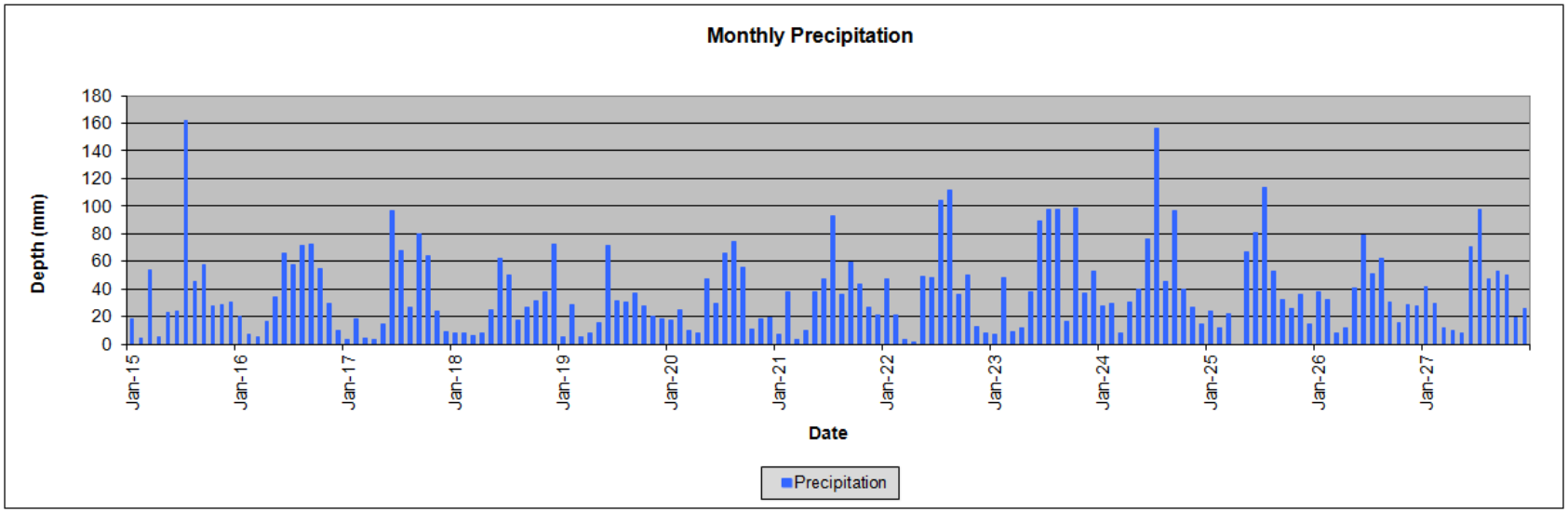


Figure 13 – Rainfall Plus SWE from Snowmelt

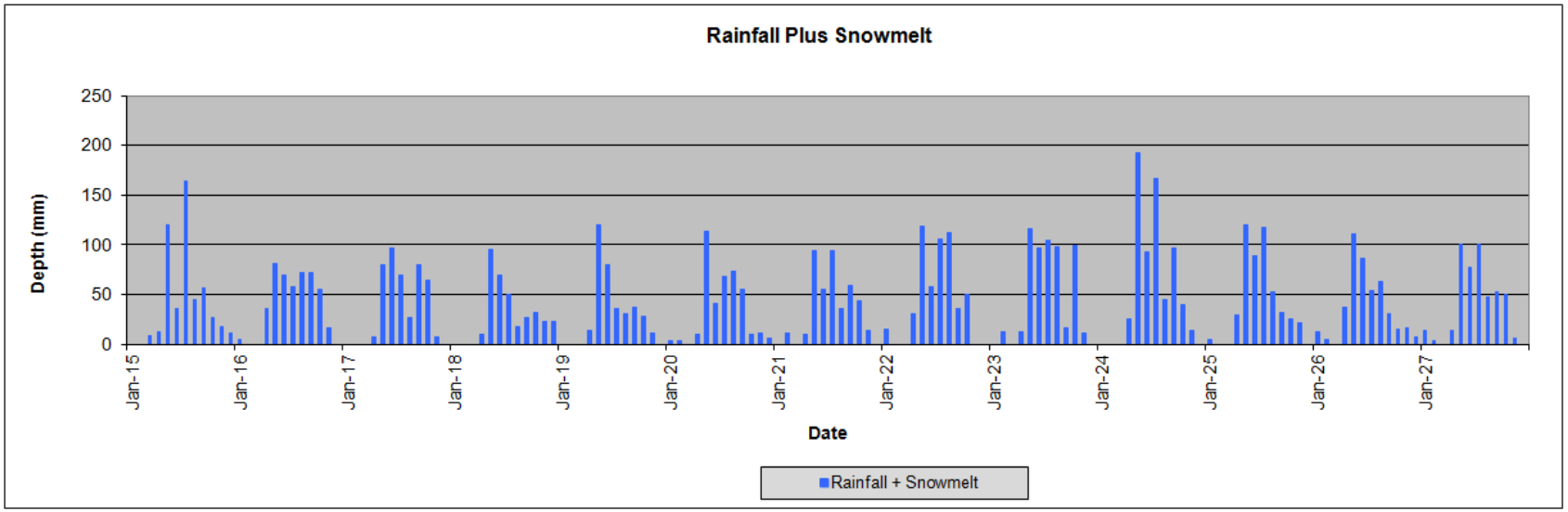


Figure 14 – Snow Water Equivalent (SWE) Stored in the Snowpack

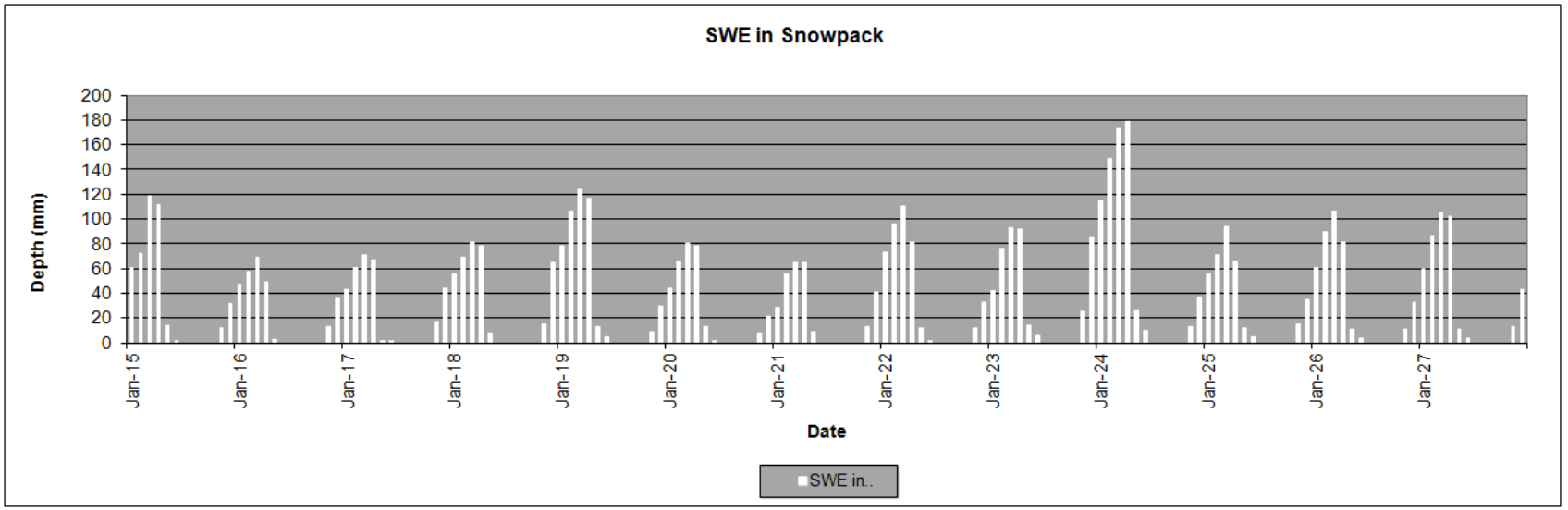


Figure 15 – Runoff from Various Surfaces

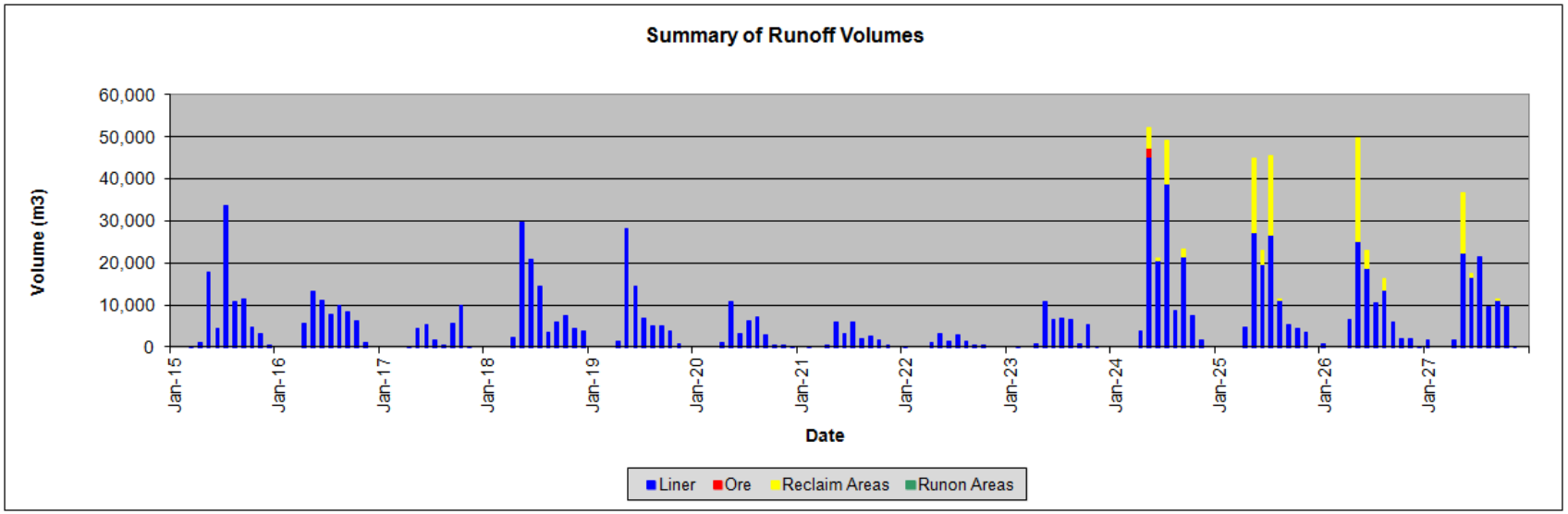


Figure 16 – Water Volume Stored in the HLF Pond System

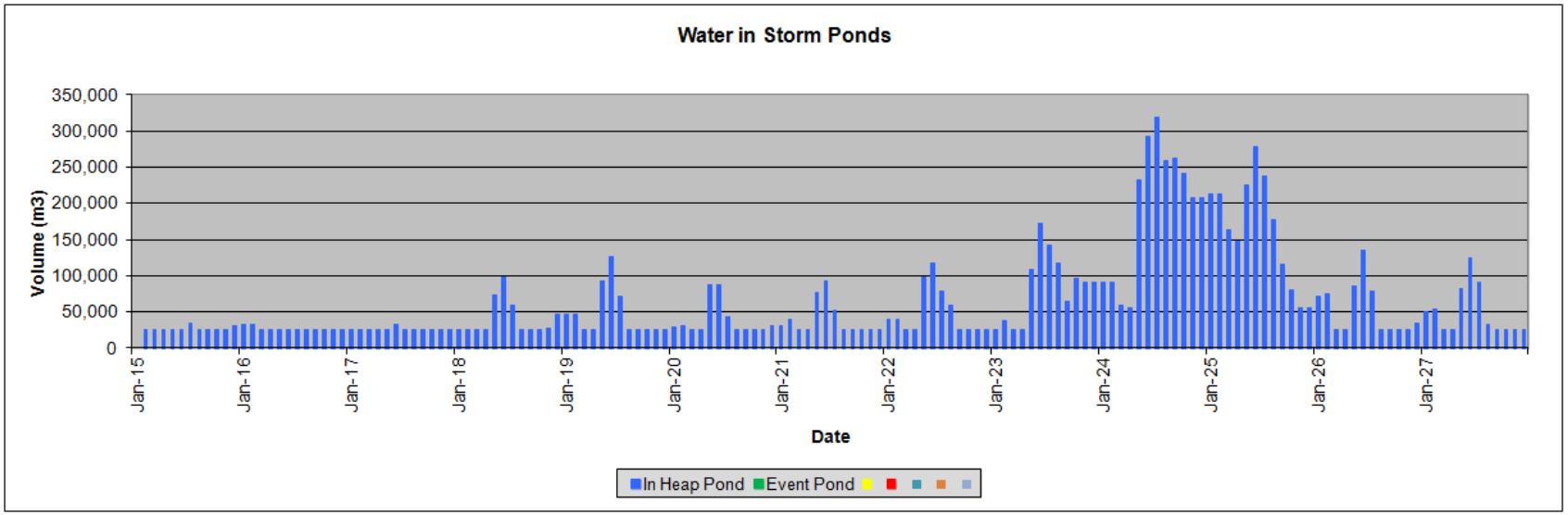


Figure 17 – Depth of Water in the Various Ponds

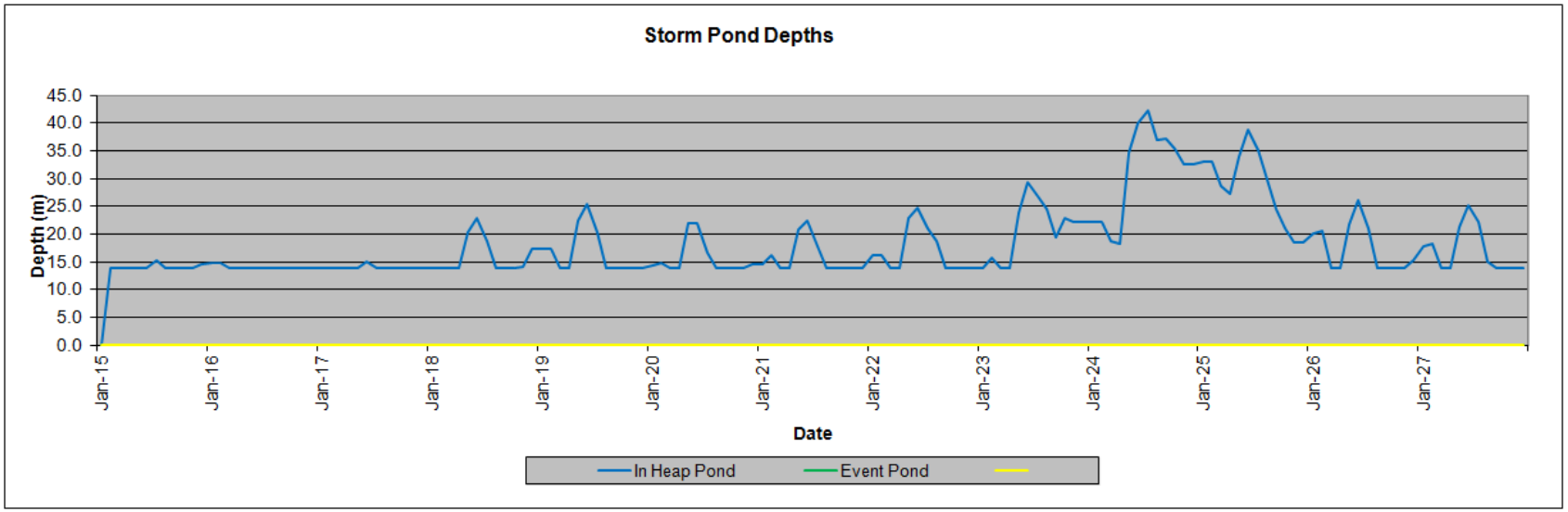


Figure 18 – Summary of Significant Water Losses in the HLF

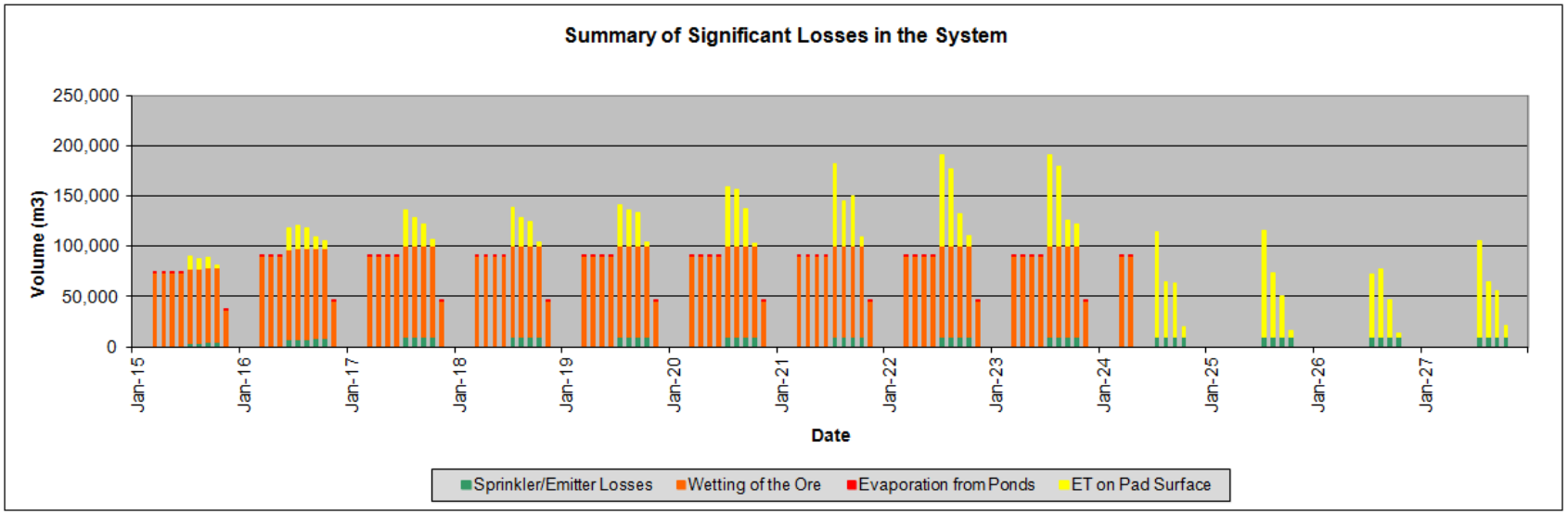


Figure 19 – Average Monthly Makeup Water Demand Flow Rate in Liters/Second

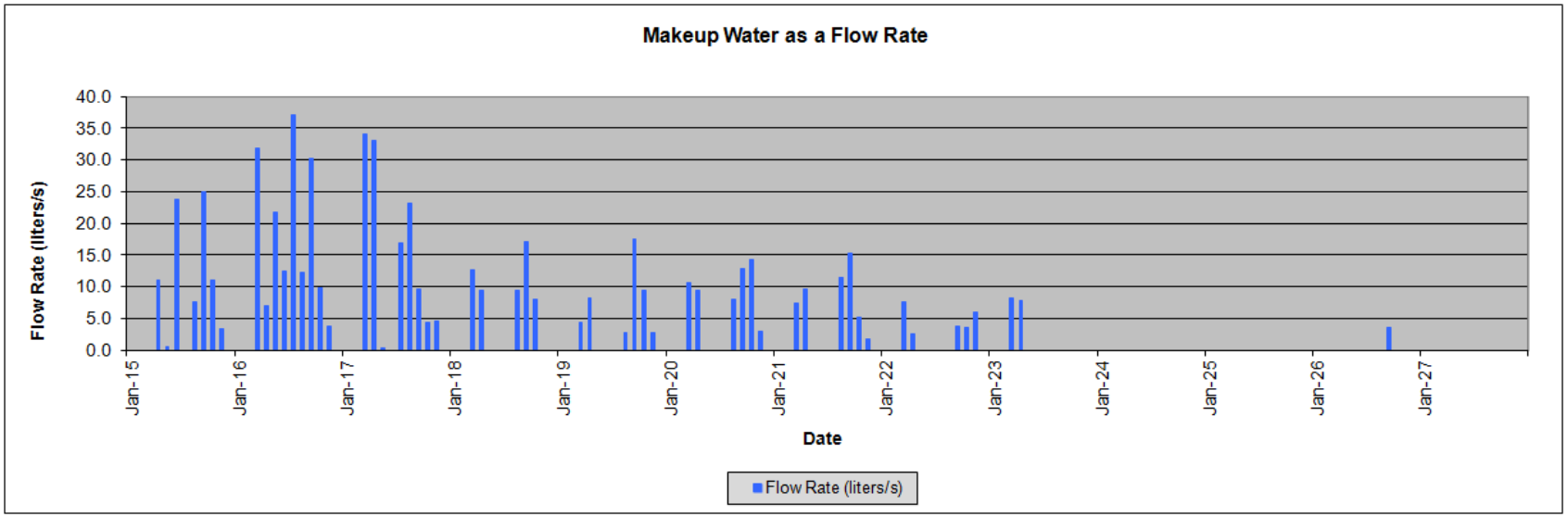


Figure 20 – Average Monthly Makeup Water Demand in Cubic Meters per Day

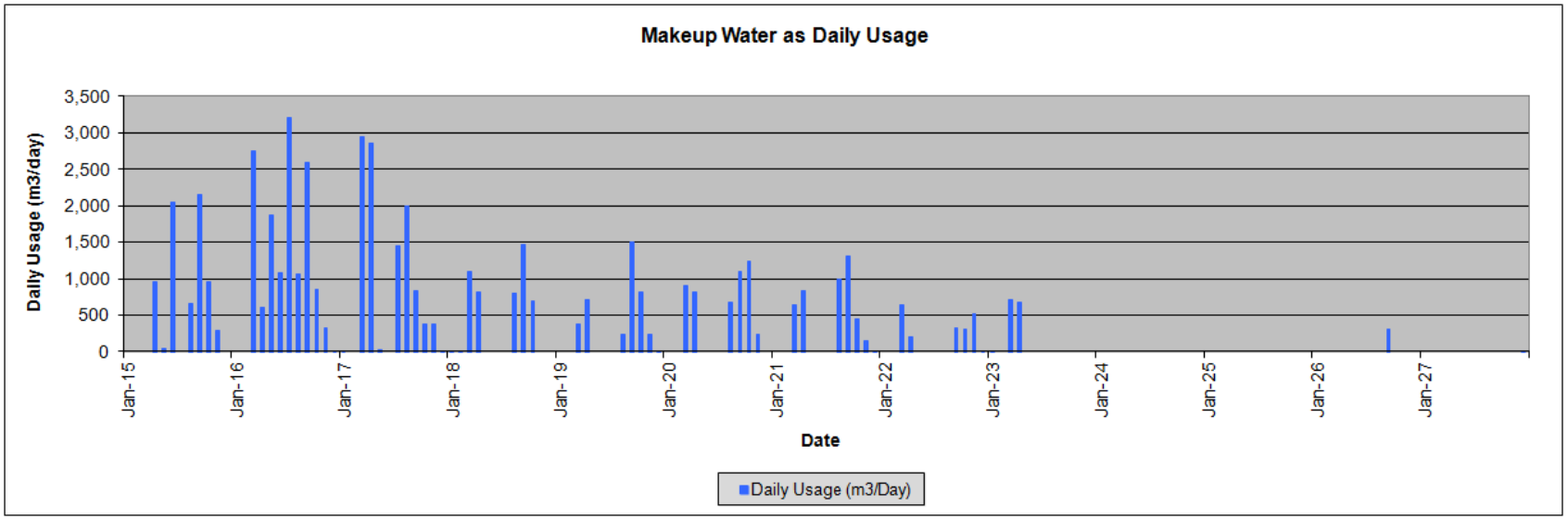


Figure 21 – Monthly Makeup Water Demand

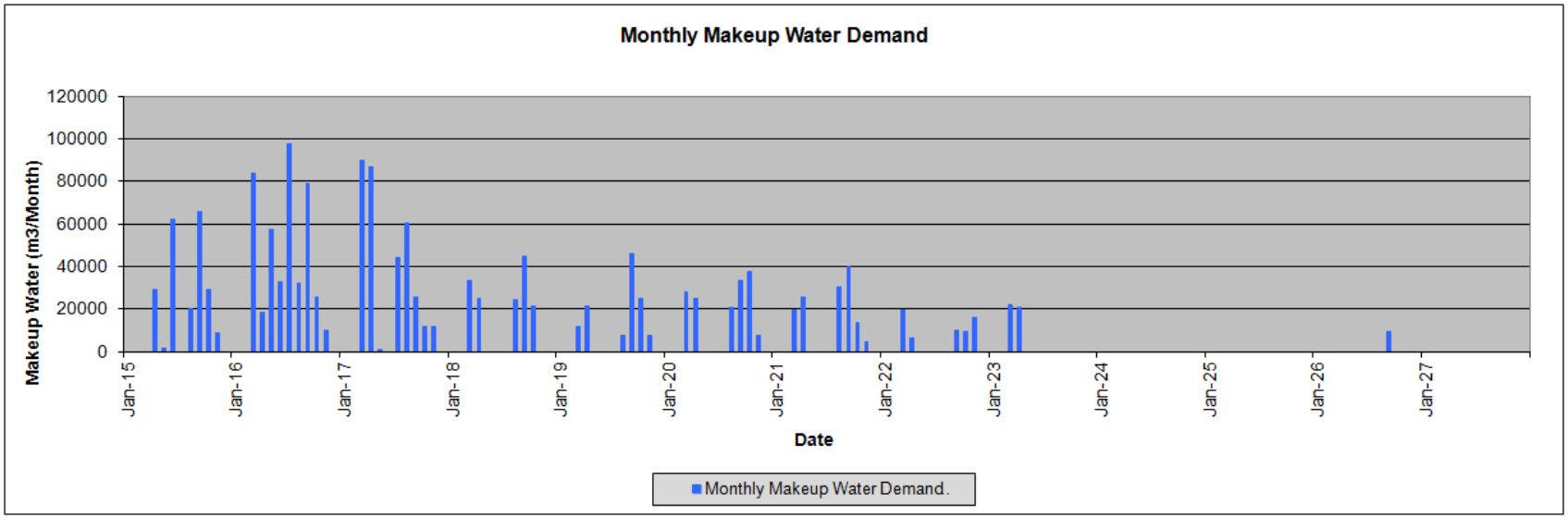
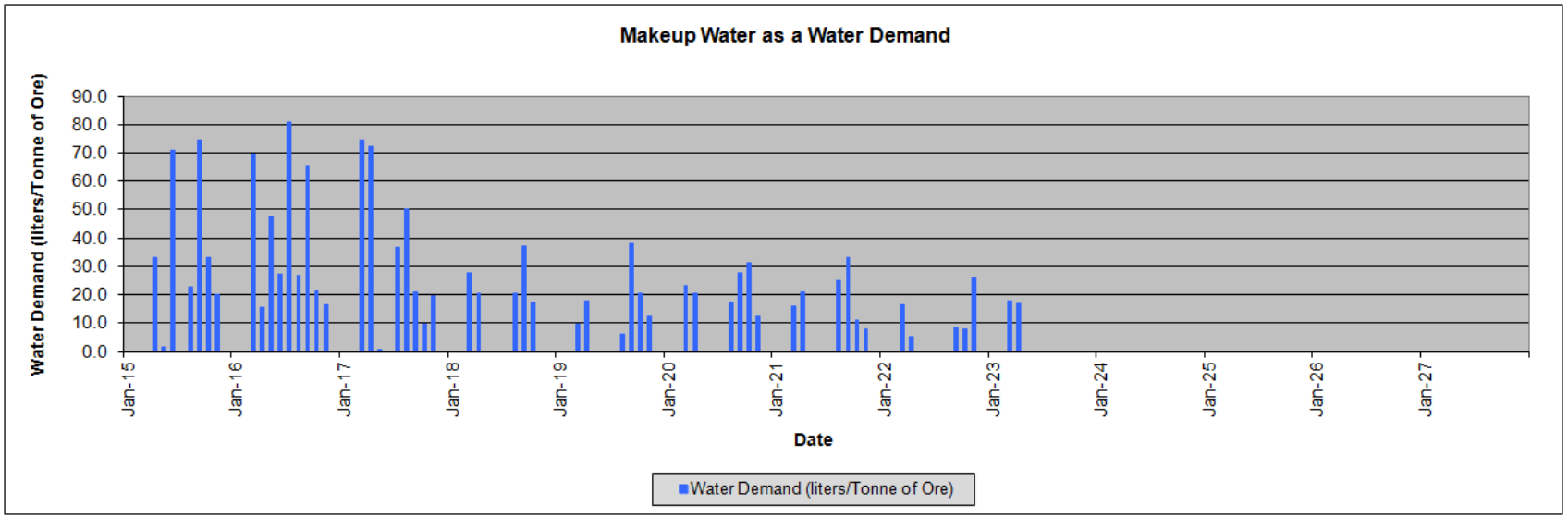


Figure 22 – Makeup Water Demand as Liters per Tonne of Ore



3.5.2 STOCHASTIC RESULTS

Rather than an historic weather record intended to depict normal operating conditions (the deterministic model), the stochastic model is intended to look at extreme or upset conditions and to quantify the risk of experiencing those upset conditions. As discussed earlier, the stochastic model produces results that are actually probability distributions. These distributions show not just a single value, but the entire range of possible values for each parameter of interest. With regard to the HLF for the Project, the primary concern is the makeup water requirement for each month, and the frequency with which treatment and discharge of process water might be required. Just as in the deterministic case, makeup water requirements can be characterized in different ways (as a monthly volume, a flow rate, a water demand per tonne, or a daily usage). For purposes of the discussion of stochastic model results, the makeup water requirement is discussed in terms of monthly usage (m^3 per month).

Stochastic models use a Monte Carlo sampling procedure to sample input distributions and generate output distributions. In a classic Monte Carlo procedure a random number generator is used to sample distributions and about 3000 iterations (samples) are required to get good definition in the tails or extreme limits of the distribution.

Stochastic modeling generates an enormous volume of calculated results (dozens of parameters times 1000 iterations per month times 156 months of operating history or about 8 million calculated values). Therefore, in reporting and interpreting results, it is important to simplify and focus on representative windows of time over the operating history. Since the primary concern is the behavior during each individual month during the year, a full calendar year of results was extracted from various portions of the modeled operating history to represent each major phase of leach pad construction/operation. Table 6 shows the selected windows in time.

Table 6 – Representative Time Windows for Presentation of Stochastic Model Results

Phase	Representative Year
Phase 1	2016
Phase 2	2018
Phase 3	2023
Phase 4	2024
Phase 5	2026

Figure 23 shows a “box and whiskers” plot of result summaries for each month of the time period listed in Table 6. The box and whiskers plot provides a sort of snapshot of the individual probability distributions. Each box (the red band) represents the middle 50% of the distribution (25^{th} percentile to the 75^{th} percentile) while the whiskers (the thin line) bracket 90% of the distribution (the 5^{th} percentile to the 95^{th} percentile). The dashed white line in the red box is the mean.

Several things become evident from an examination of the plot. Makeup water demand during Phase 1, which includes startup and the charging of the system with water, is very erratic. Starting in Phase 2 and continuing during Phase 3, the makeup water demand pattern becomes considerably more consistent. The peak or maximum makeup water demand in Phases 2 and 3 occurs consistently in August or September of each year. By Phase 4 when irrigation for gold

recovery continues, but mining and ore delivery have ceased, the peak makeup water demand shifts away from August and September to the driest time of the year which is March and April. Figure 24 through Figure 28 provide a more detailed look at a representative calendar year for each HLF Phase.

Figure 23 – Box & Whiskers Plot for Stochastic Makeup Water Requirement Results

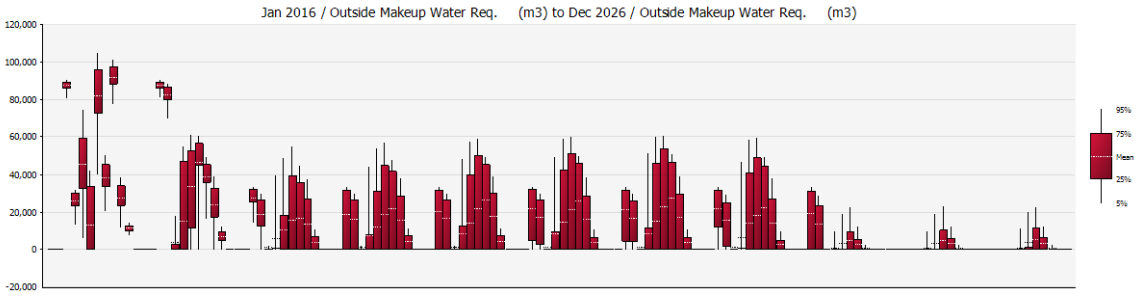


Figure 24 - Box & Whiskers Plot for Phase 1 Makeup Water

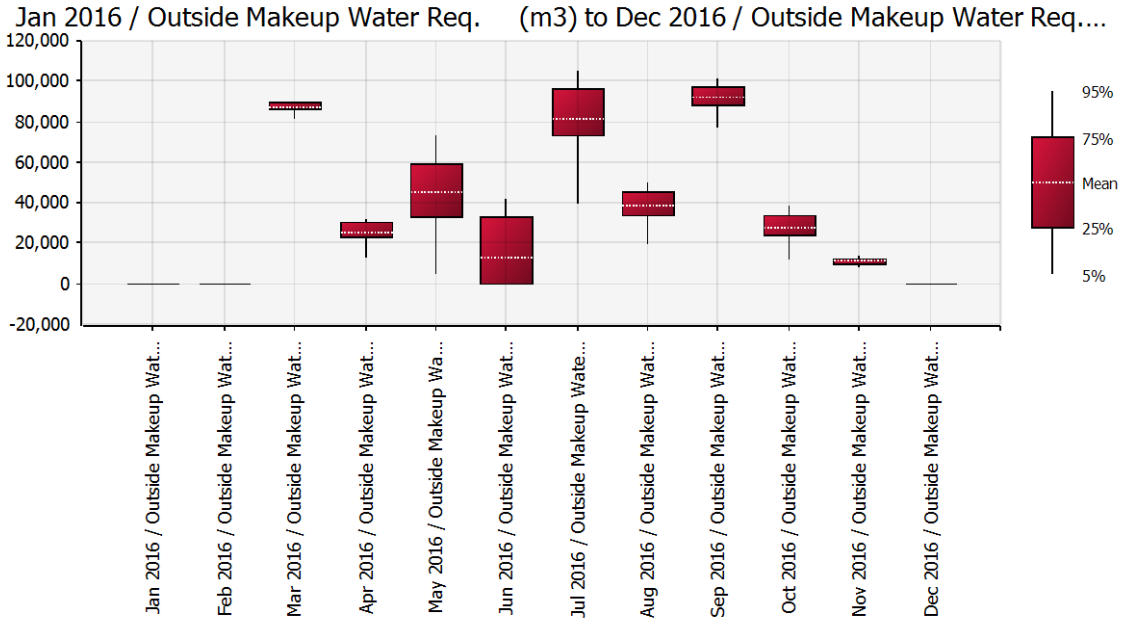


Figure 25 - Box & Whiskers Plot for Phase 2 Makeup Water

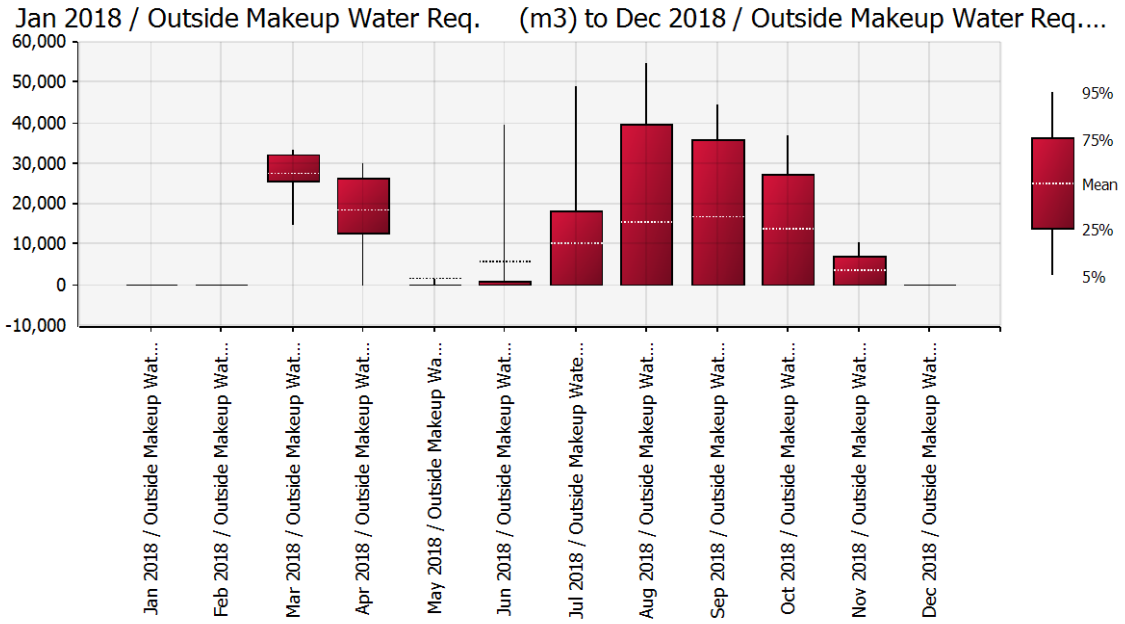


Figure 26 - Box & Whiskers Plot for Phase 3 Makeup Water

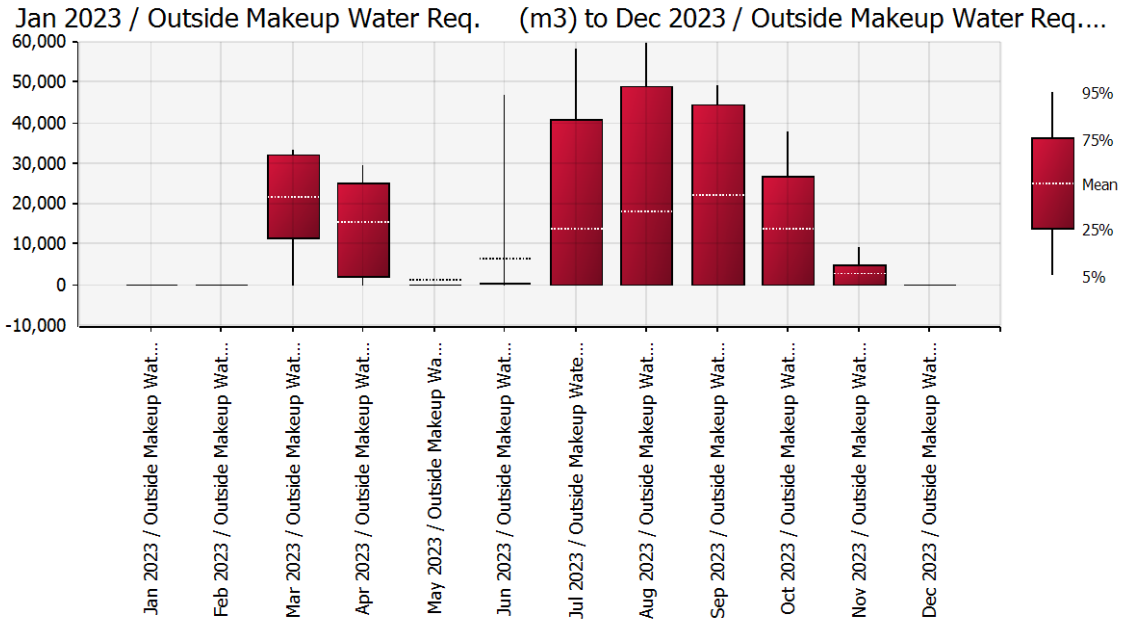


Figure 27 - Box & Whiskers Plot for Phase 4 Makeup Water

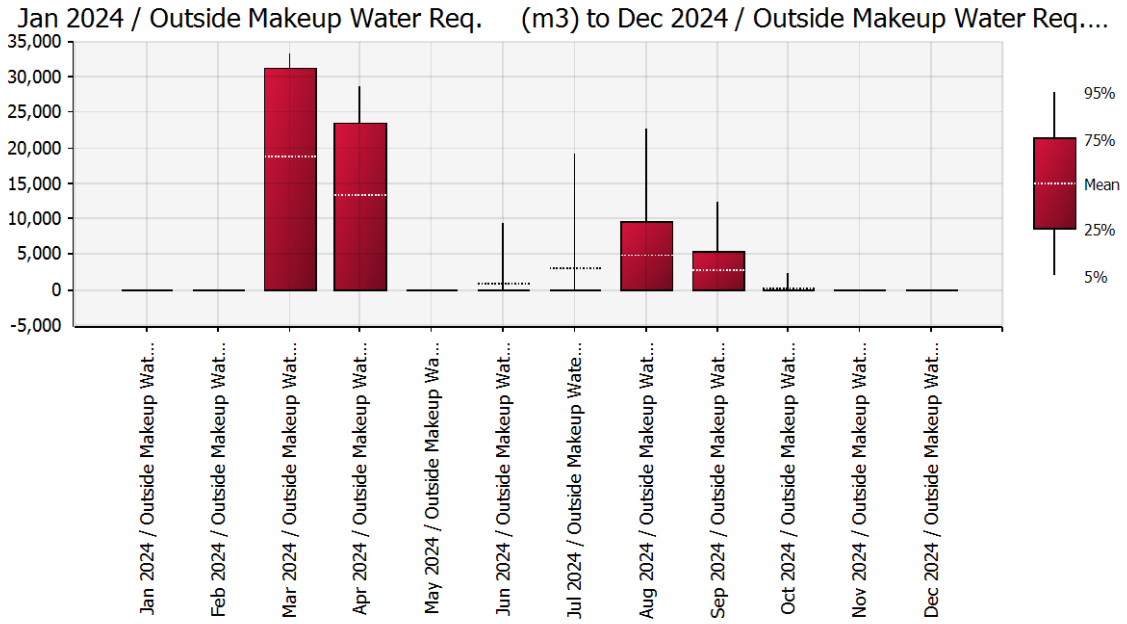
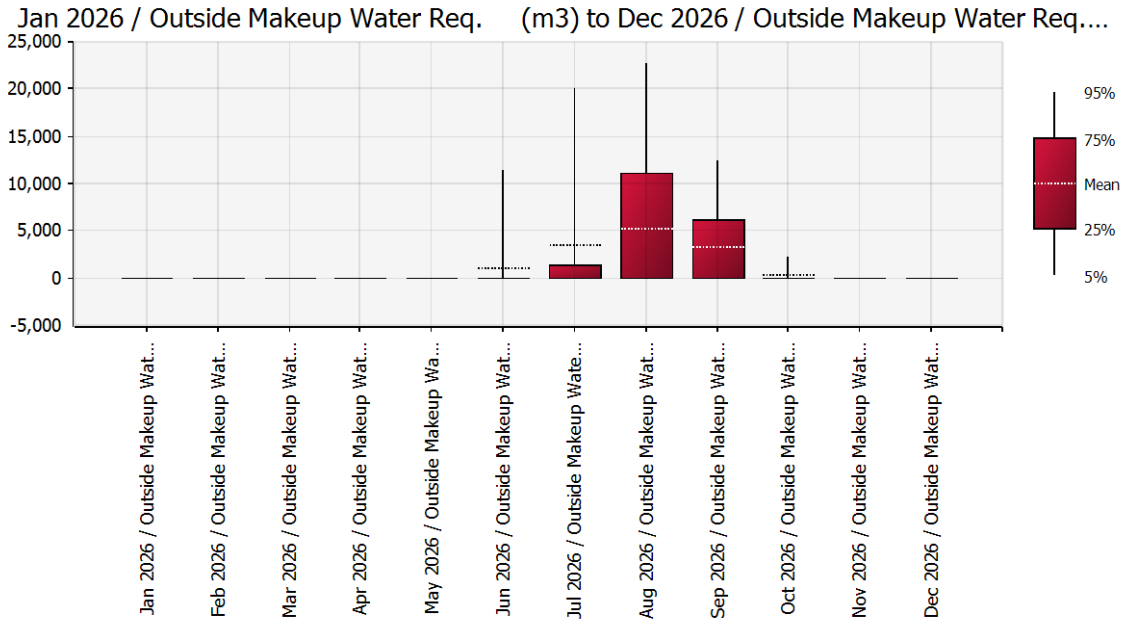


Figure 28 - Box & Whiskers Plot for Phase 5 Makeup Water



The next 12 charts (Figure 29 through Figure 40) show the monthly probability distributions for makeup water demand in m^3 per month for a typical calendar year (in this case for the Phase 2 pad in year 2018). Although it is apparent from the earlier discussion that the makeup water usage

behavior varies over time, an examination of one calendar year of monthly distributions will be sufficient to illustrate the typical character of each individual month.

The distributions for January and February are very similar with the vast majority of events showing zero demand (about 76% of the time in January and about 88% of the time in February) and the frequency of non-zero demand events low enough and the demand small enough (less than two (2) m^3) for the events to be considered "outliers" (rare occurrences beyond the expected tail of the distribution).

Figure 29 – Probability Distribution for Phase 2 in January

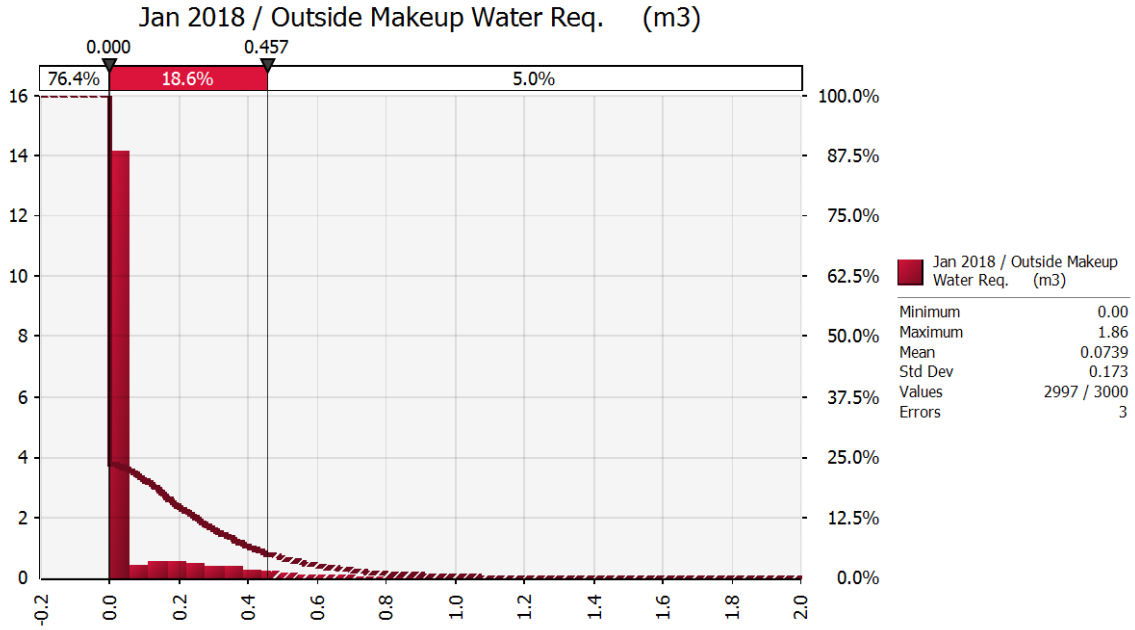
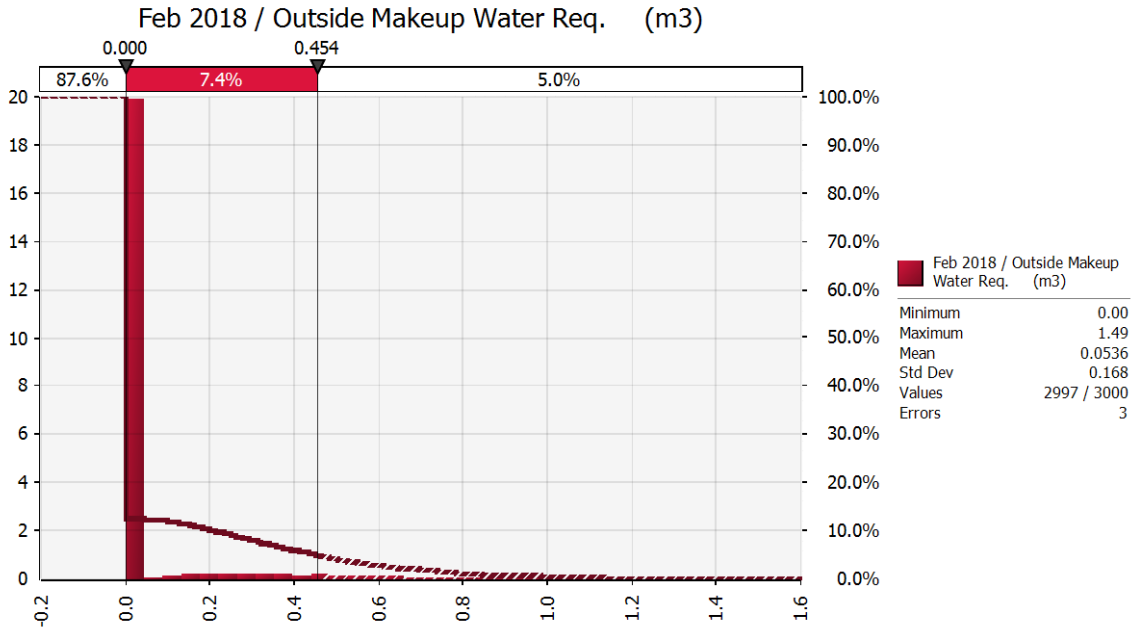


Figure 30 - Probability Distribution for Phase 2 in February



Makeup Water Demand changes significantly in March and April with %zero levels dropping to 2% to 9% and the mean increasing from essentially 0 to 19,000 to 28,000 m^3. The mode or most frequently observed non-zero value increases to a value of about 29,000 m^3 (April) to 33,000 m^3 (March).

Figure 31 - Probability Distribution for Phase 2 in March

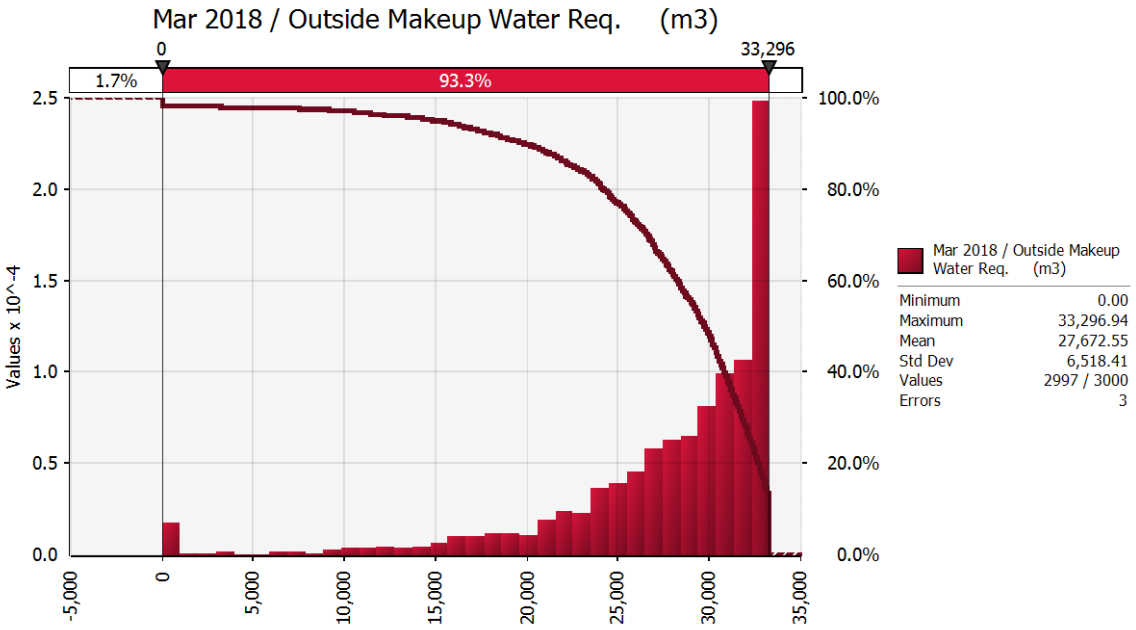
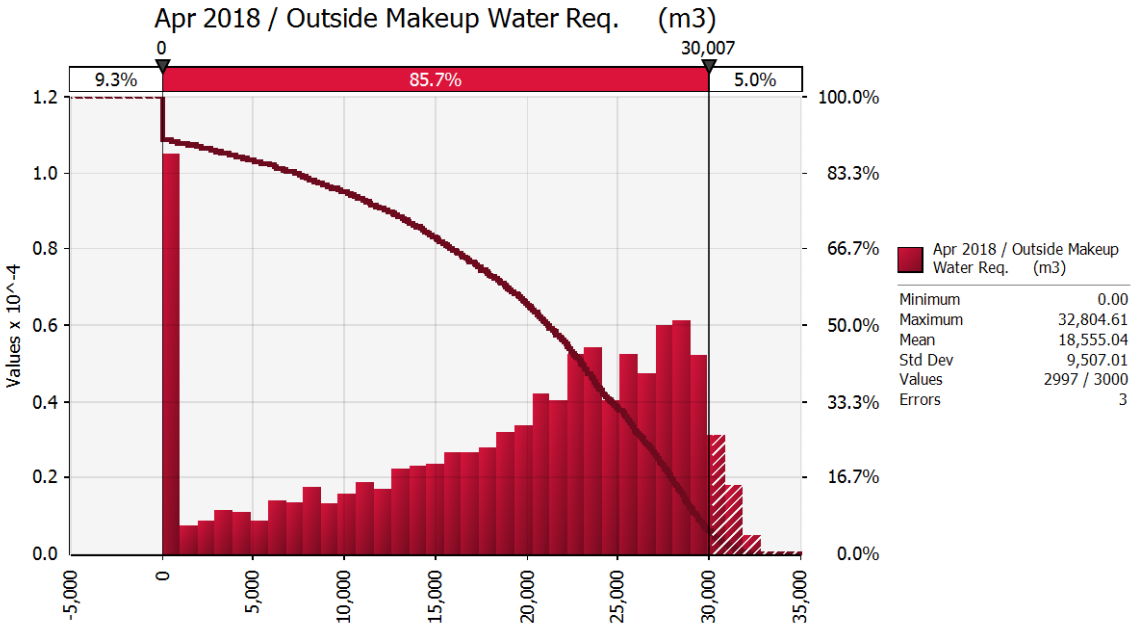
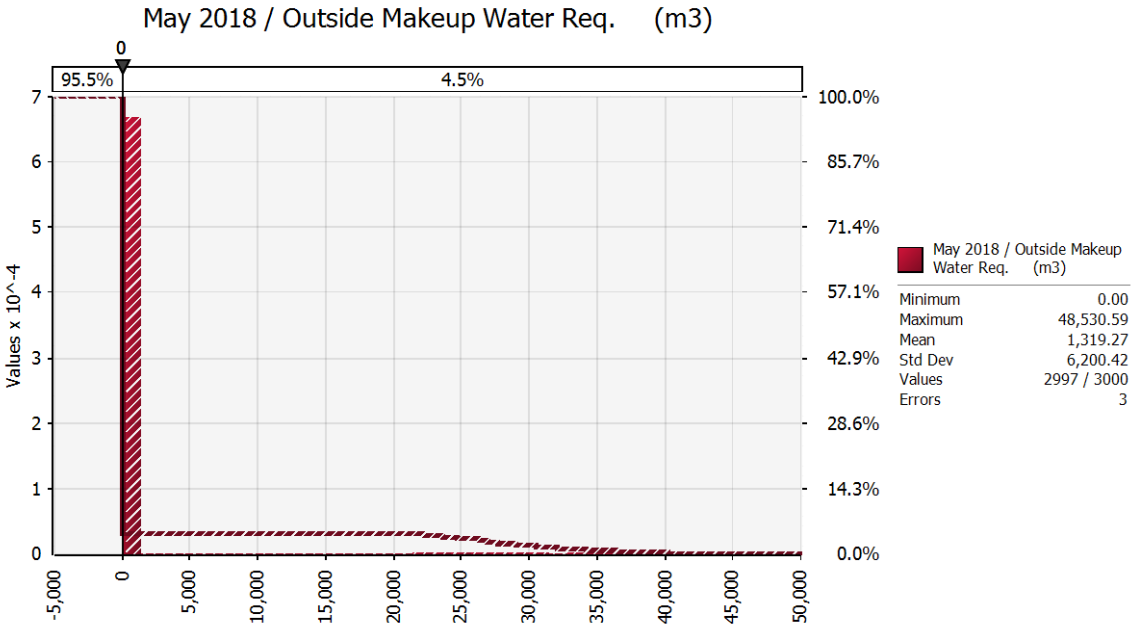


Figure 32 - Probability Distribution for Phase 2 in April



The month of May, which is dominated by snowmelt, shows a zero makeup water demand over 95% of the time, but still has a 4.5% probability of experiencing a makeup water demand on the order of 20,000 m^3 to 48,000 m^3.

Figure 33 - Probability Distribution for Phase 2 in May



By June the summertime makeup water demand pattern is well established, and the in-heap pond is typically carrying a substantial volume of water from the May snowmelt. Therefore, the most

frequently observed makeup water demand value remains zero with the %zero time varying from a high of 75% in June to as little as 42% in October and November

Figure 34 - Probability Distribution for Phase 2 in June

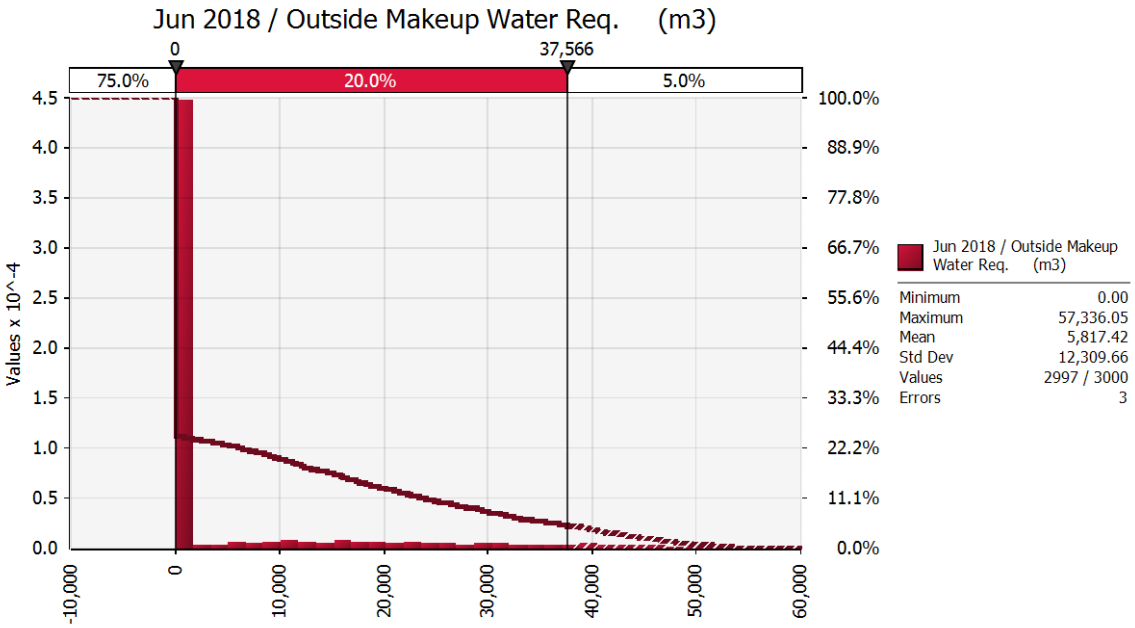


Figure 35 - Probability Distribution for Phase 2 in July

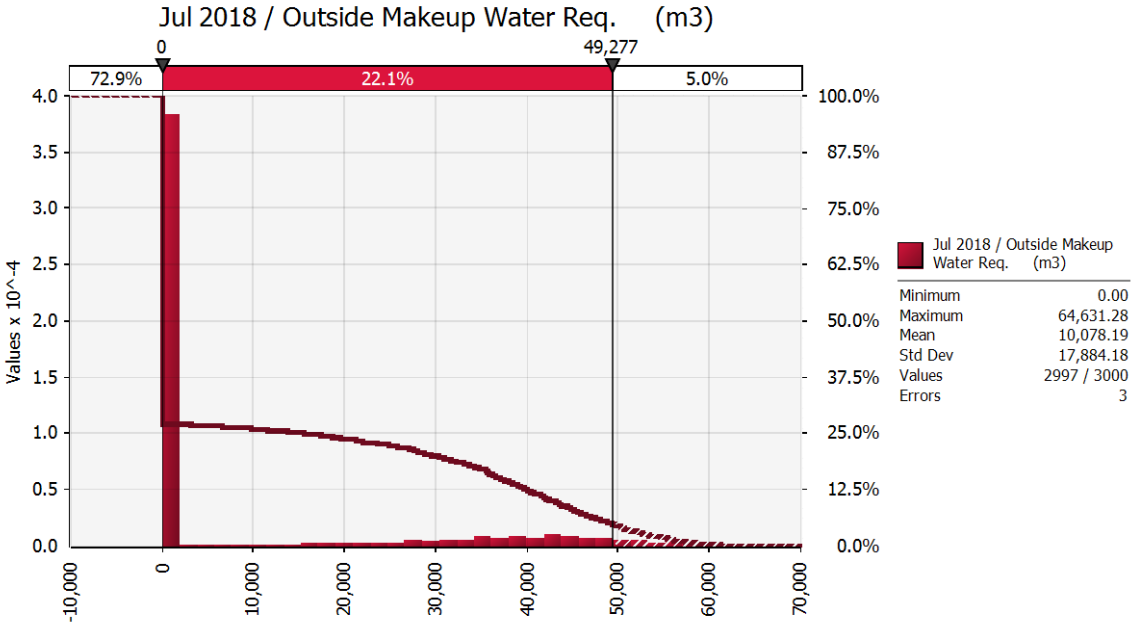


Figure 36 - Probability Distribution for Phase 2 in August

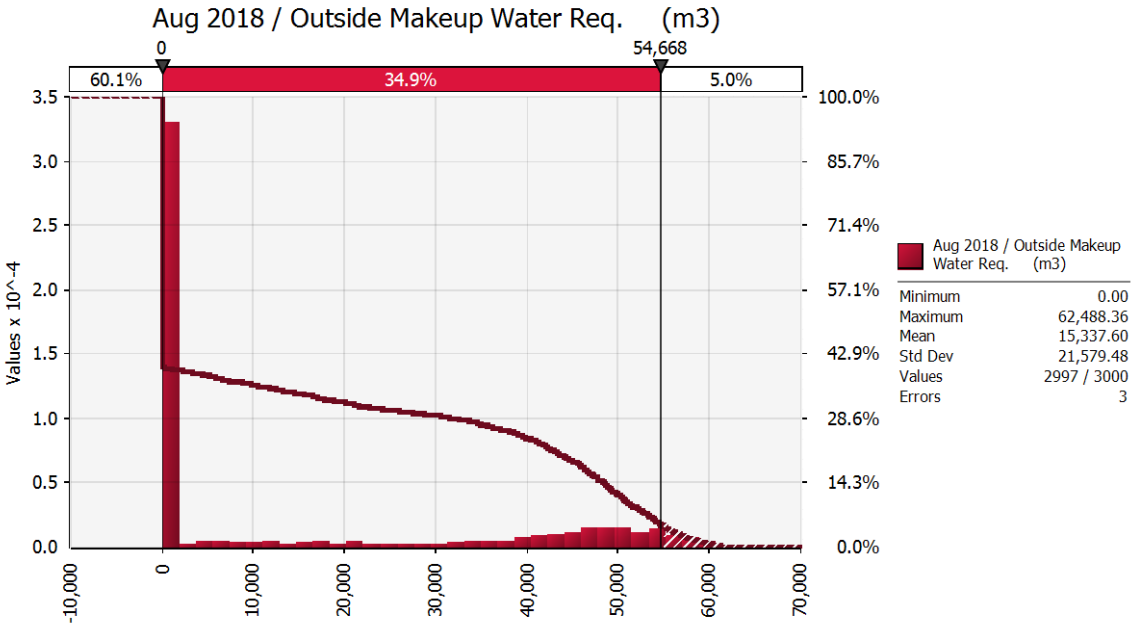


Figure 37 - Probability Distribution for Phase 2 in September

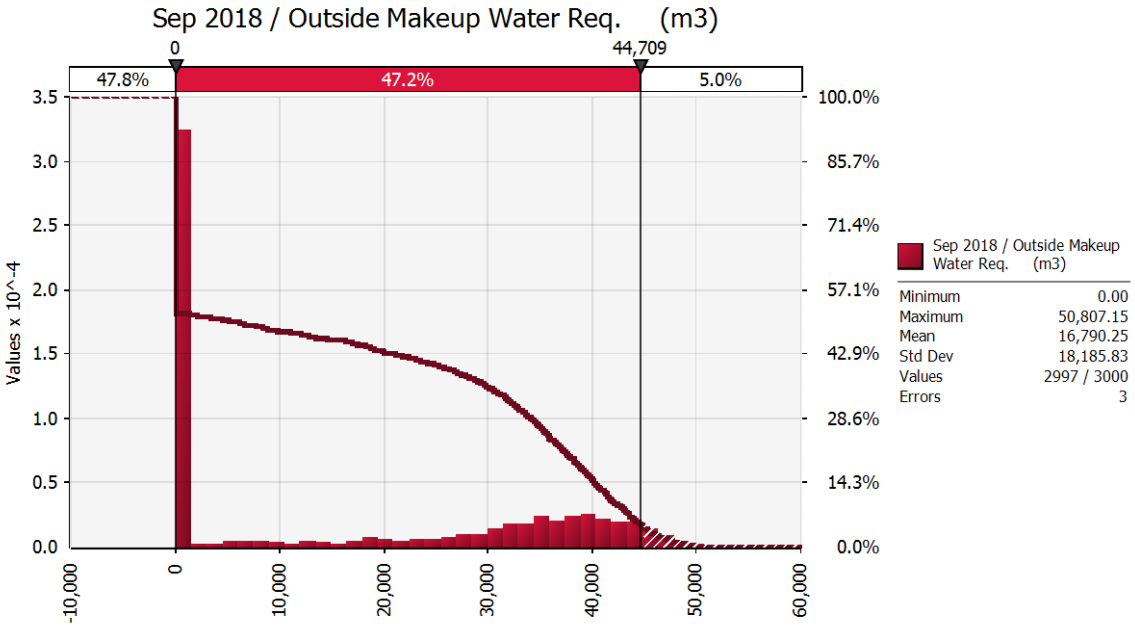


Figure 38 - Probability Distribution for Phase 2 in October

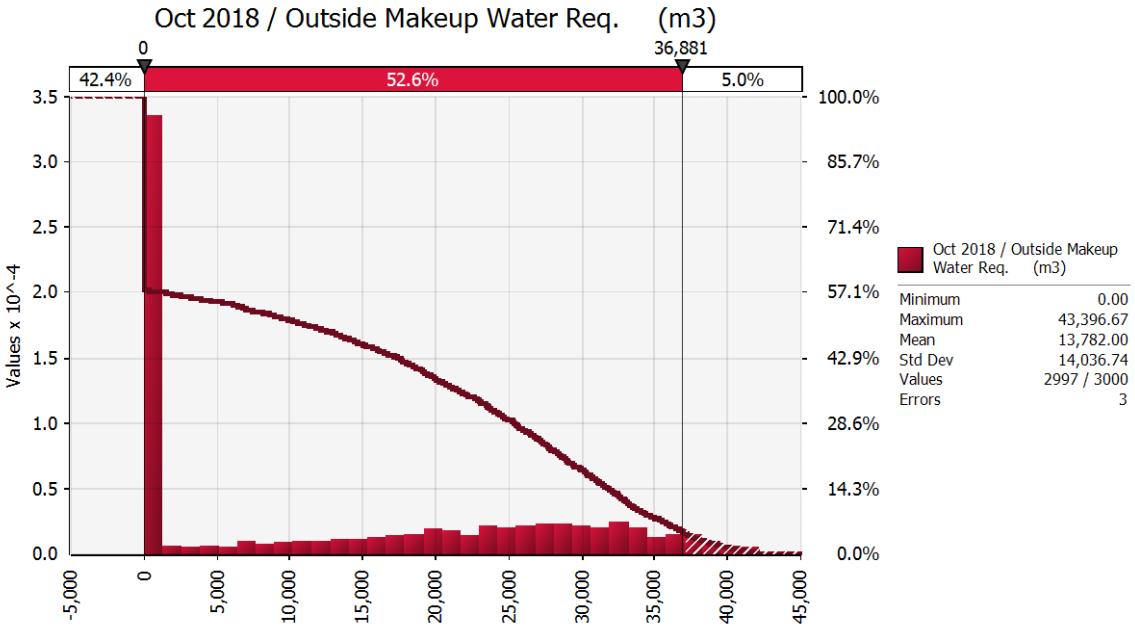
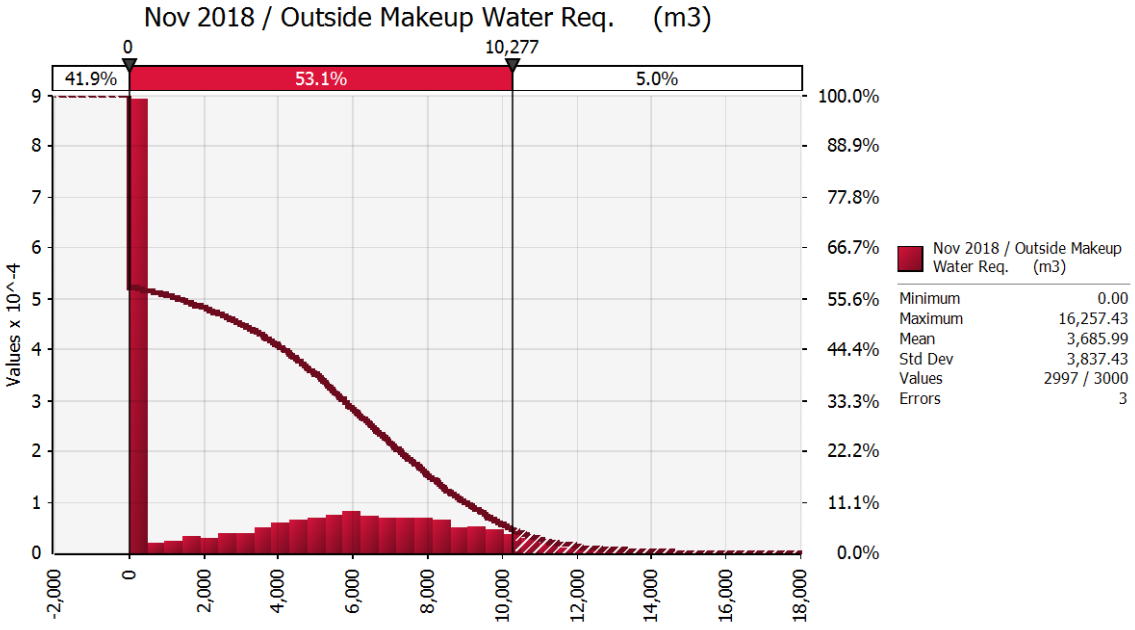


Figure 39 - Probability Distribution for Phase 2 in November



The December pattern is the same as January and February, essentially zero all of the time since the non-zero events are less than two (2) m^3 and trivial in nature.

Figure 40 - Probability Distribution for Phase 2 in December

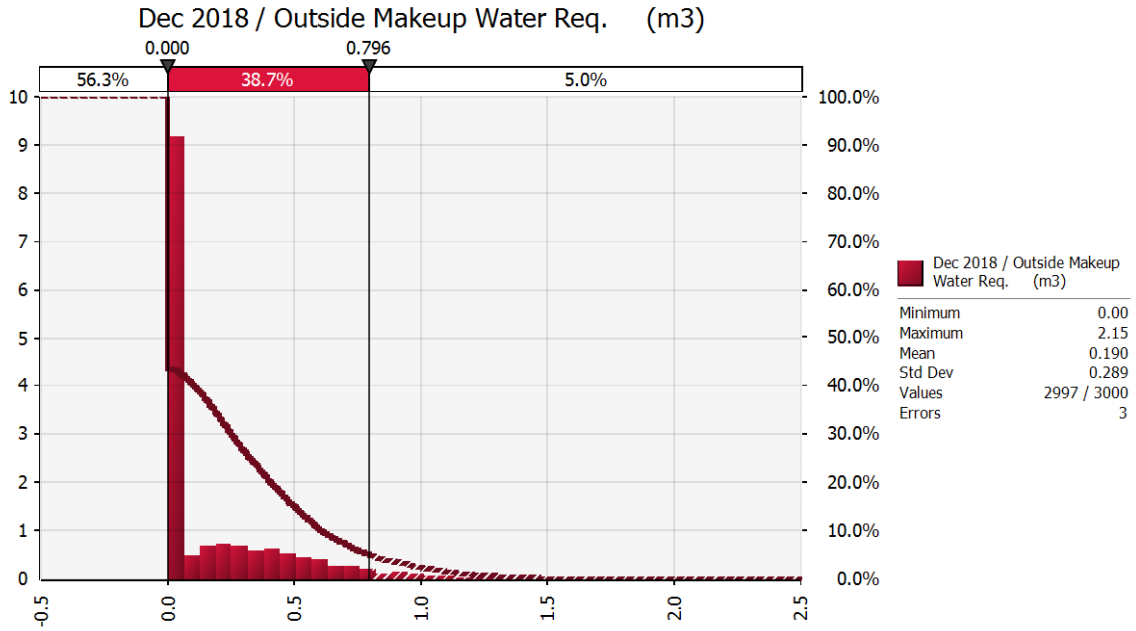


Figure 41 shows a box and whiskers plot for pond storage over the Phase 1 through Phase 5 time period. The plot shows there is very little risk of filling the in-heap pond (447,945 m^3) and the combined capacity of both the in-heap and event ponds (702,016 m^3) during Phase 1and the first two (2) years of Phase 2. There is a 5% probability of spilling from the in-heap pond into the event pond by the year 2020, and a 5% probability of filling the event pond and requiring treatment prior to discharge to the environment by the year 2021 (the significance of this is discussed later in this section of the report). Again, for Phase 1, the in-heap pond level values are erratic. However, beginning in Phase 2 in-heap pond level patterns become more consistent. The mean and even 75th percentile values typically stay below about 200,000 m^3. Figure 42 through Figure 46 provide a more detailed look at a representative calendar year for each HLF Phase.

Figure 41 – Box and Whiskers Plot for Pond Storage

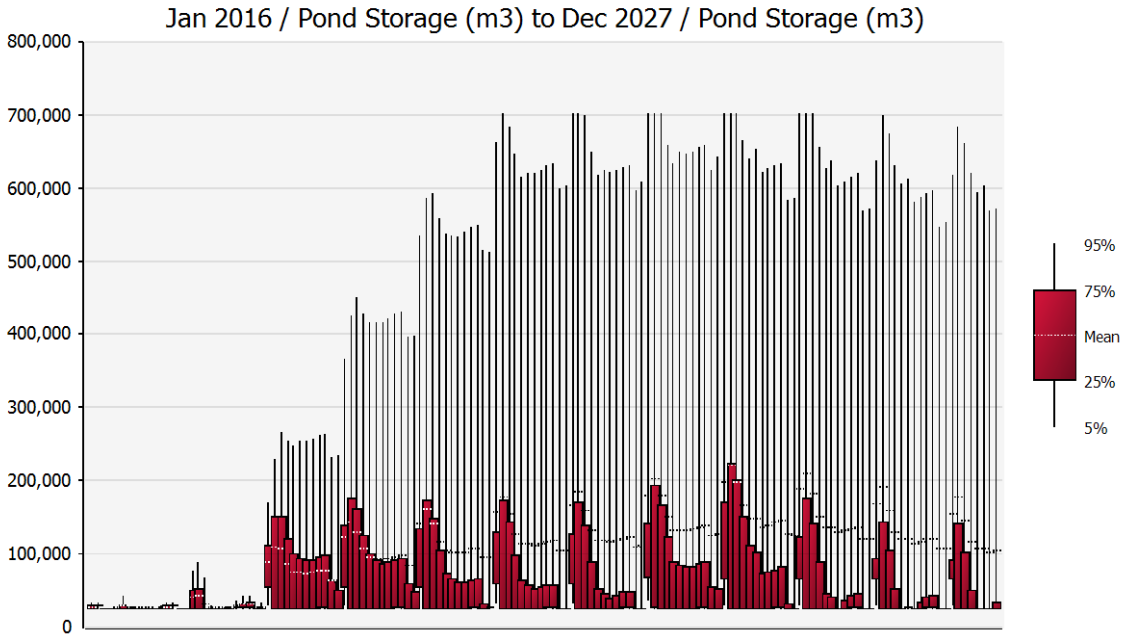


Figure 42 - Box and Whiskers Plot for Phase 1 Pond Storage

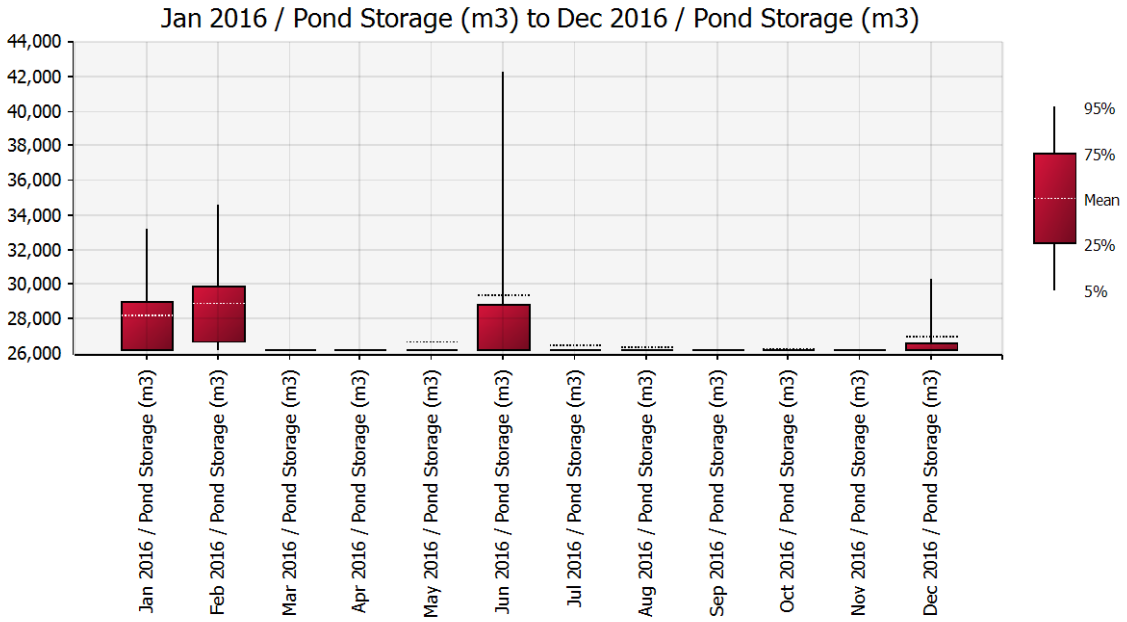


Figure 43 - Box and Whiskers Plot for Phase 2 Pond Storage

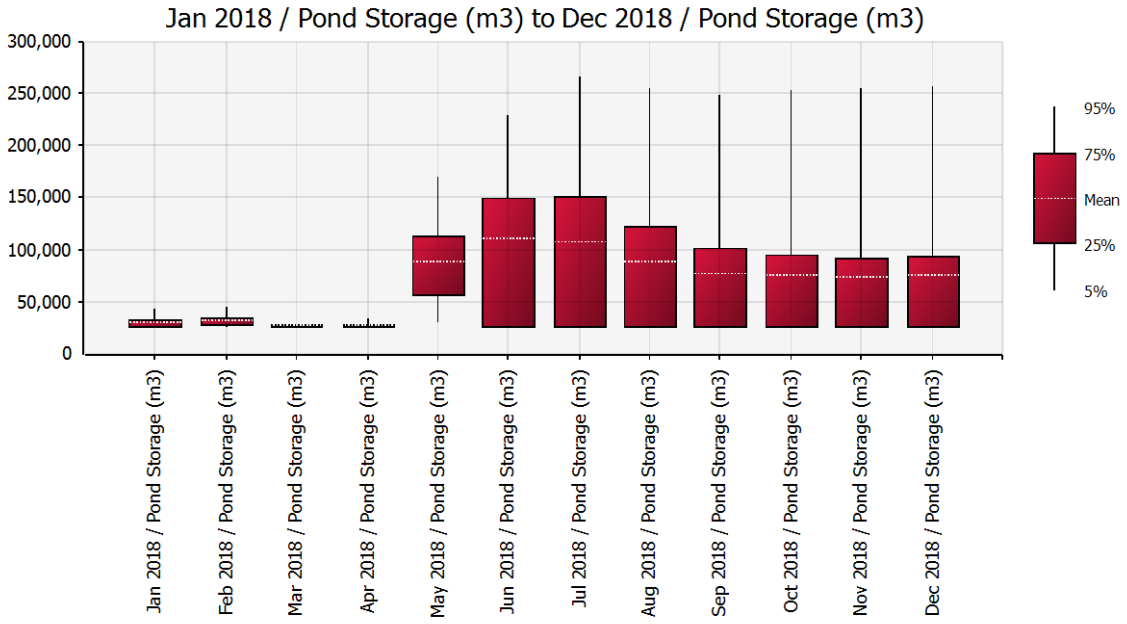


Figure 44 - Box and Whiskers Plot for Phase 3 Pond Storage

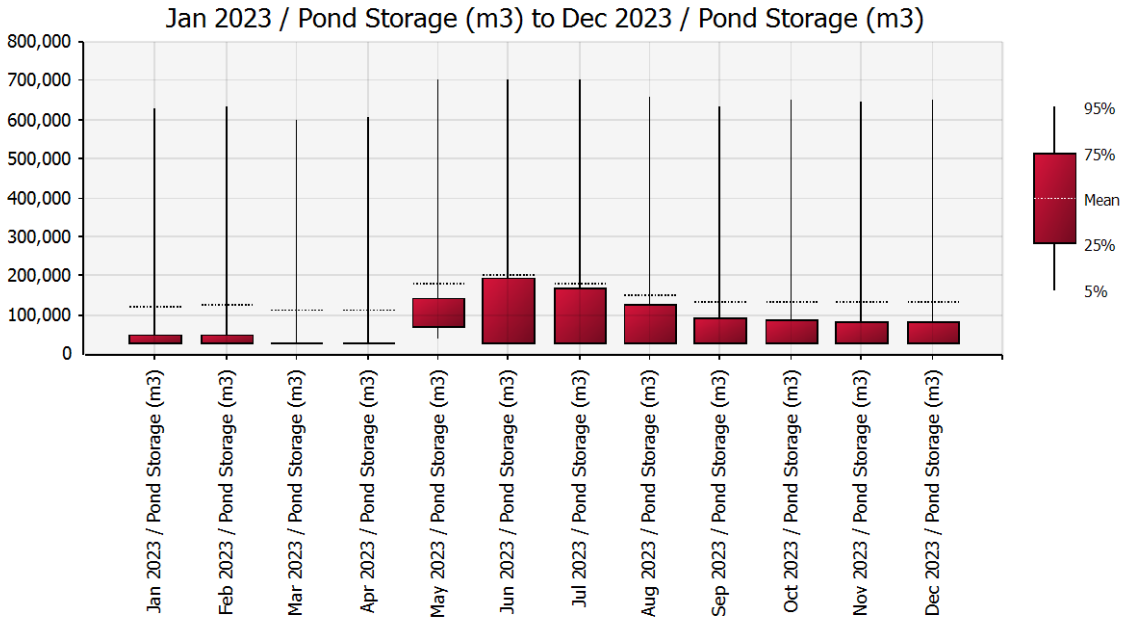


Figure 45 - Box and Whiskers Plot for Phase 4 Pond Storage

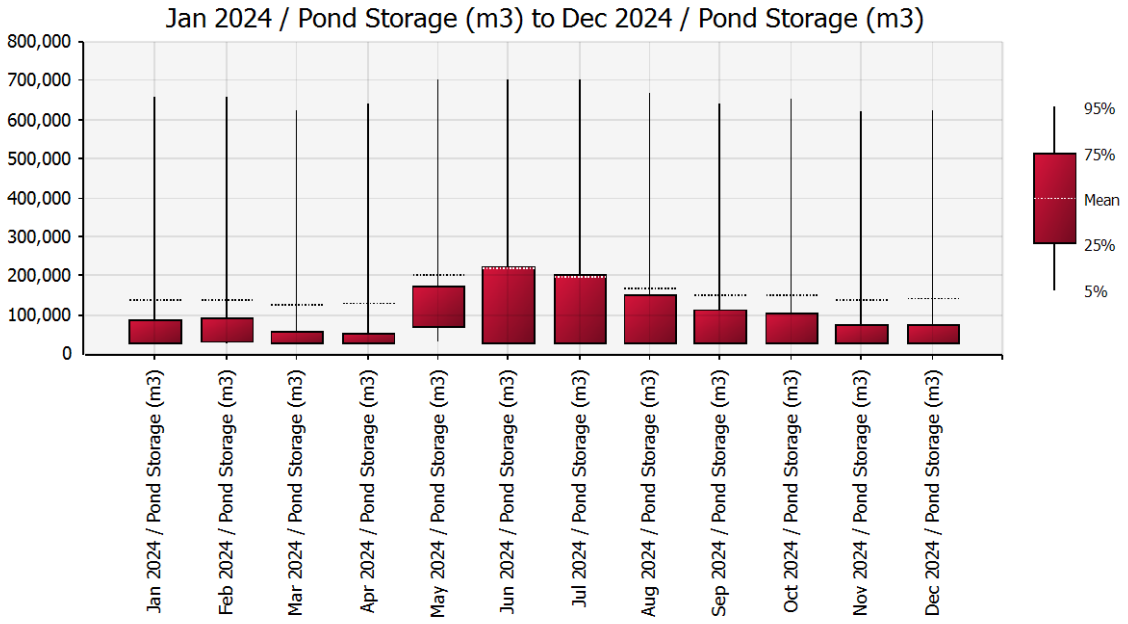
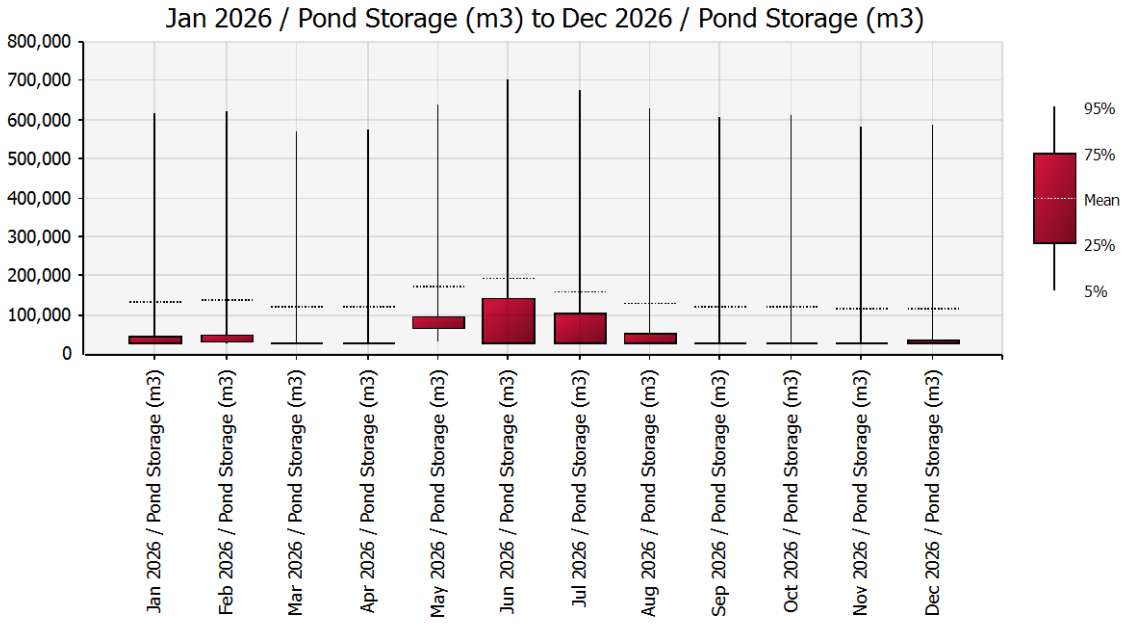


Figure 46 - Box and Whiskers Plot for Phase 5 Pond Storage



The next 12 charts (Figure 47 through Figure 58) show the monthly probability distributions for makeup water demand in m^3 per month for a typical calendar year (in this case for the Phase 2 pad in year 2018). Although it is apparent from the earlier discussion that the makeup water usage

behavior varies over time, an examination of one calendar year of monthly distributions will be sufficient to illustrate the typical character of each individual month.

The distributions for January through April are very similar with the vast majority of events showing the assumed minimum pond operating volume of 26,500 m^3. Maximum values (zero % exceedance probability) are on the order of 250,000 m^3 to 295,000 m^3. This is far less than the volume required to spill into the Event Pond (447,945 m^3) much less the volume required to spill to the environment (702,016 m^3), while still providing the capacity (385,866 m^3) to contain the concurrent occurrence of the three design events.

Figure 47 – Pond Filling Probability distribution for Phase 2 in January

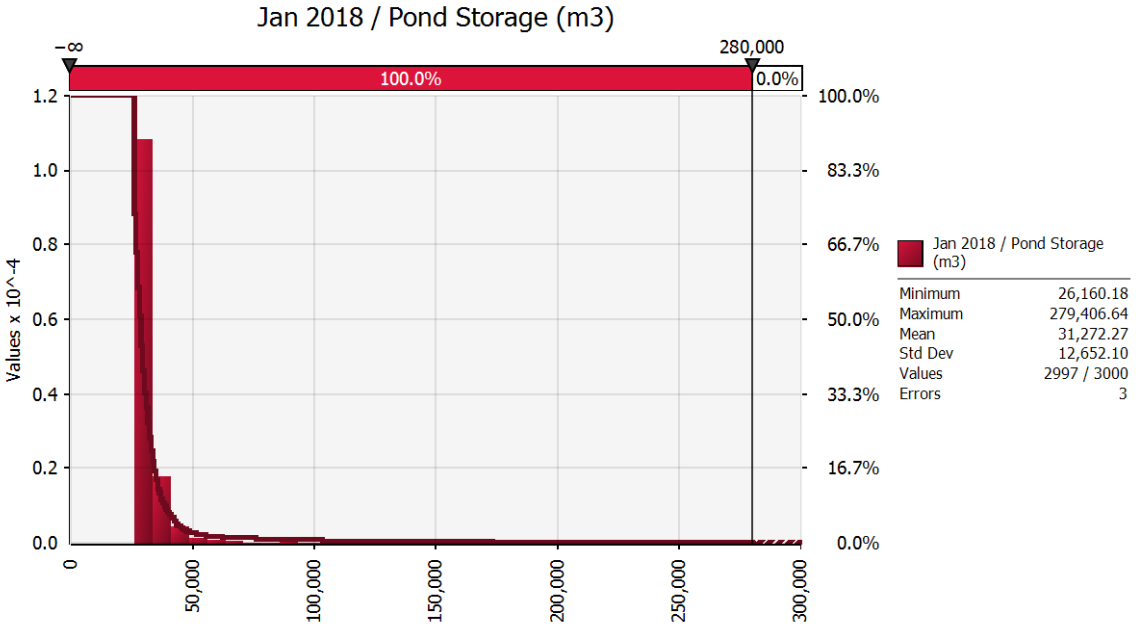


Figure 48 - Pond Filling Probability distribution for Phase 2 in February

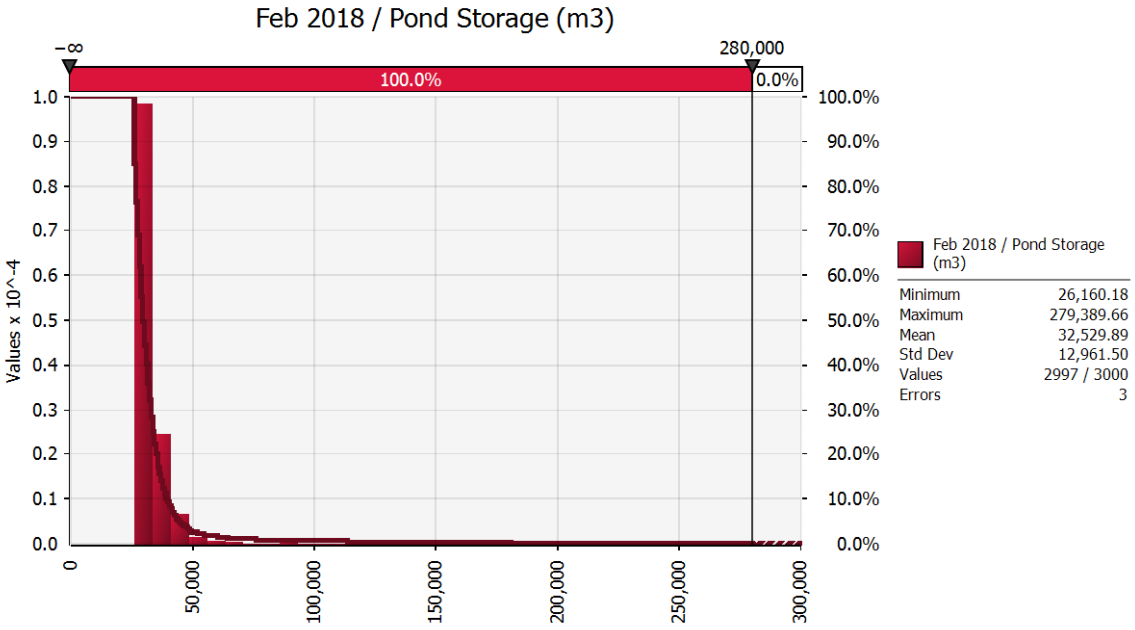


Figure 49 - Pond Filling Probability distribution for Phase 2 in March

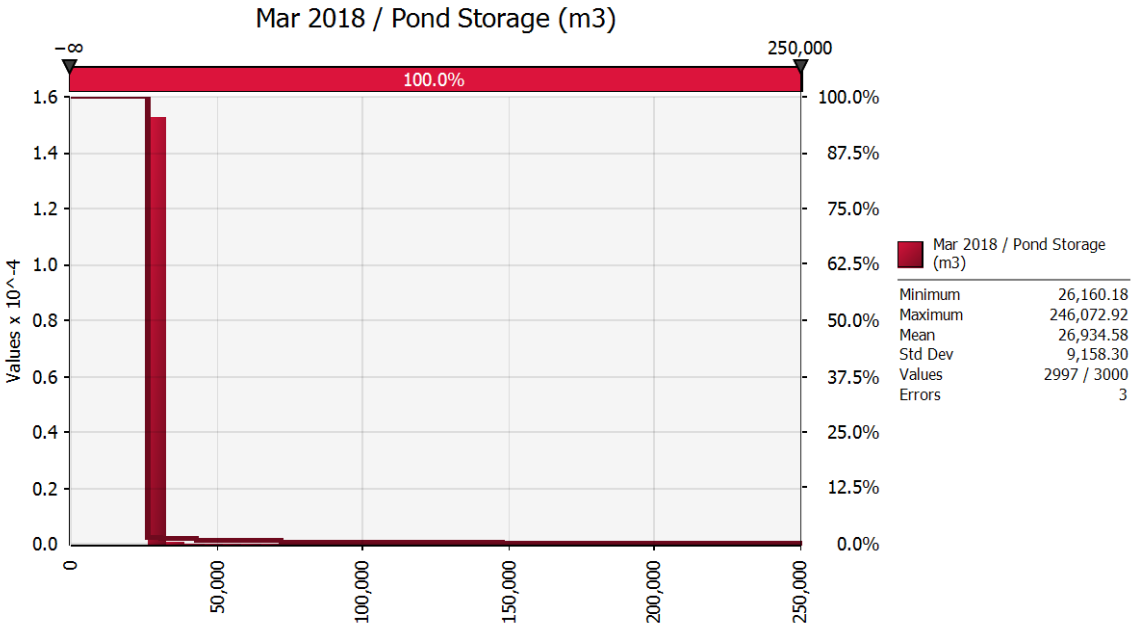
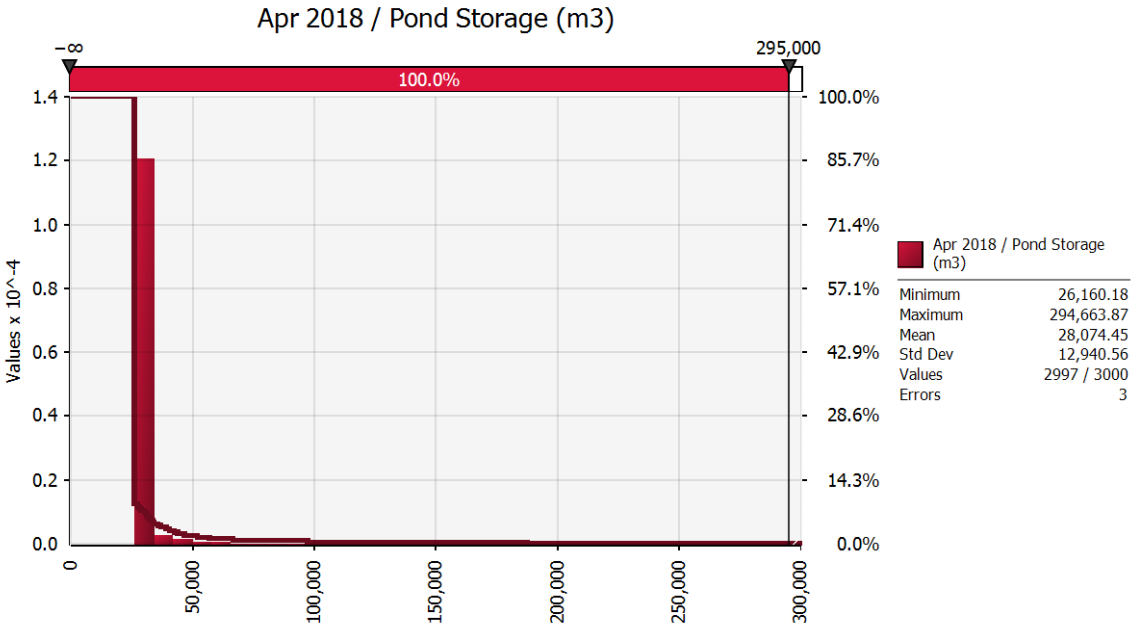
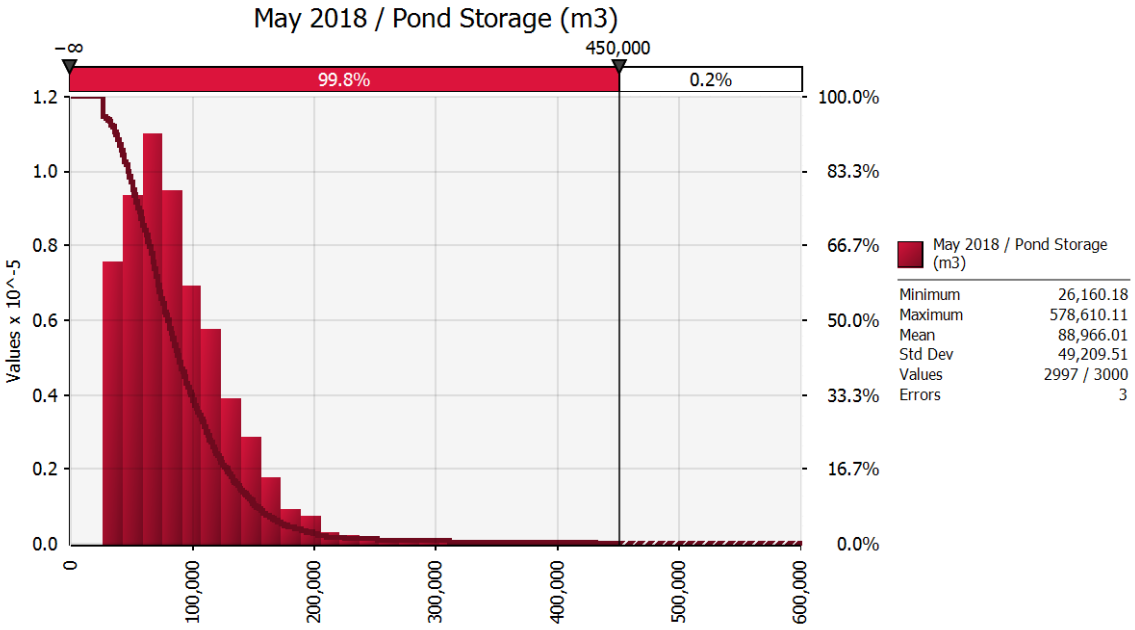


Figure 50 - Pond Filling Probability distribution for Phase 2 in April



The month of May, which is the snowmelt month, is the first to show a measurable probability of spilling from the In-heap Pond to the Event Pond (probability of 0.2%). The maximum value (zero % exceedance probability) is less than the required 702,016 required to spill to the environment.

Figure 51 - Pond Filling Probability distribution for Phase 2 in May



The remaining months of June through December are all very similar. All have a small probability of spilling to the Event Pond (0.2% to 0.9%) and an even smaller probability of

spilling to the environment. During later phases (Phase 3 through Phases 5) the risk of overtopping and spilling will increase primarily due to increases in the liner footprint, but also due to the termination of the stacking of fresh, dry ore.

Figure 52 - Pond Filling Probability distribution for Phase 2 in June

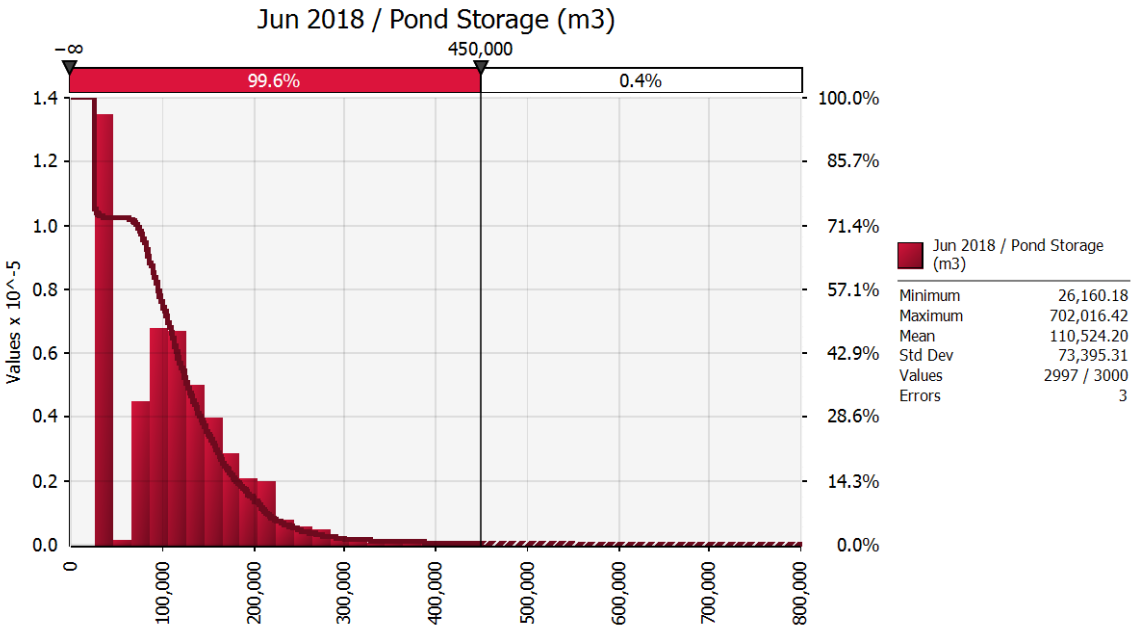


Figure 53 - Pond Filling Probability distribution for Phase 2 in July

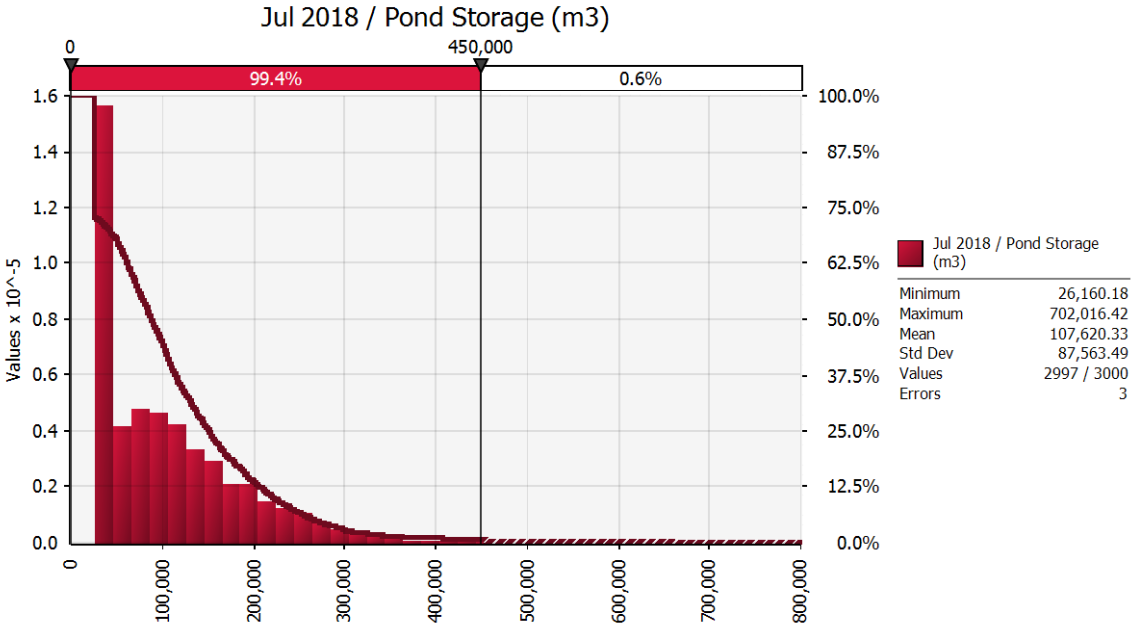


Figure 54 - Pond Filling Probability distribution for Phase 2 in August

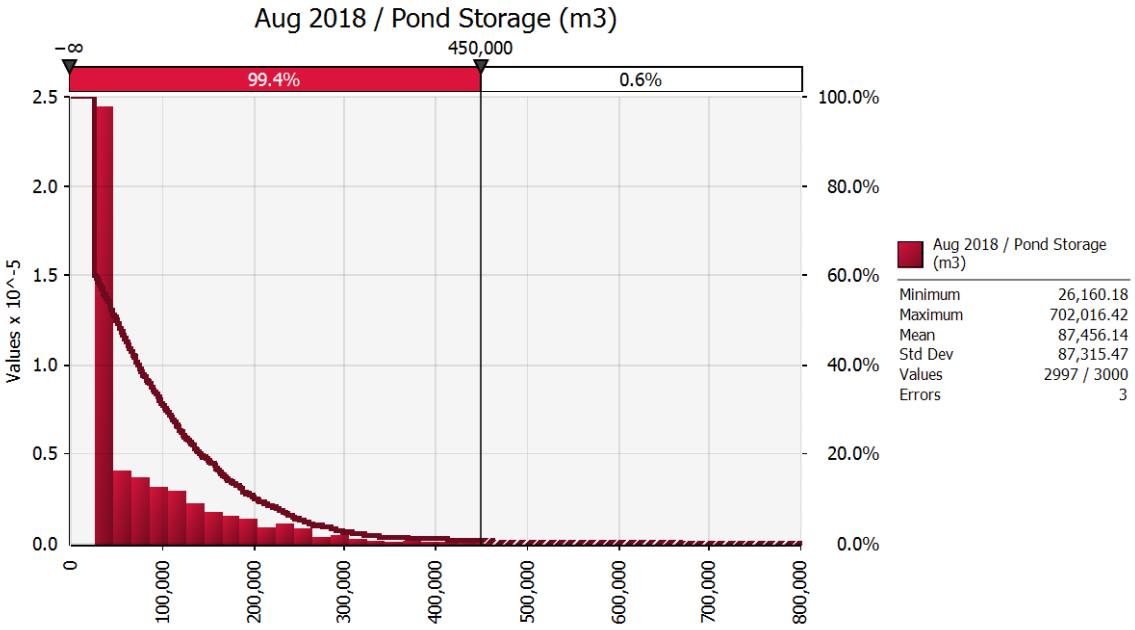


Figure 55 - Pond Filling Probability distribution for Phase 2 in September

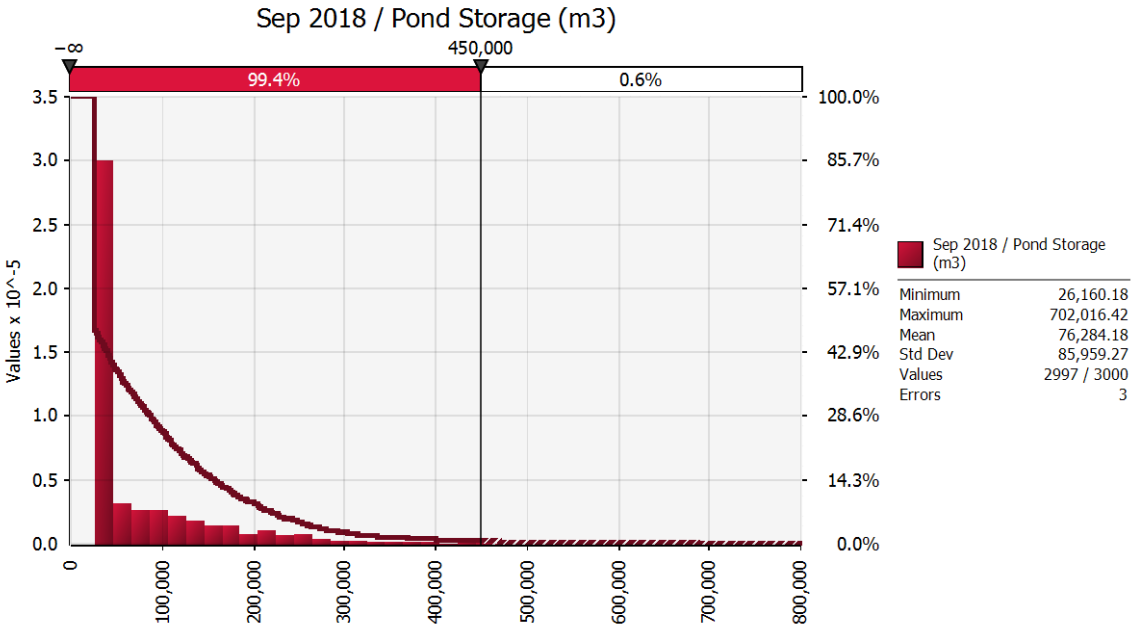


Figure 56 - Pond Filling Probability distribution for Phase 2 in October

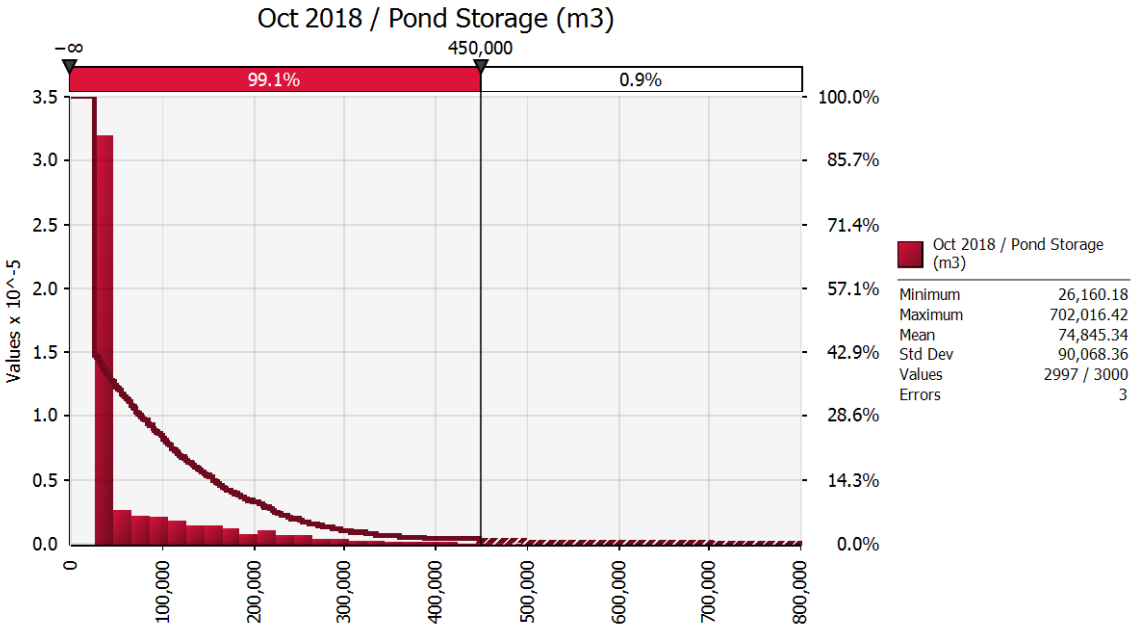


Figure 57 - Pond Filling Probability distribution for Phase 2 in November

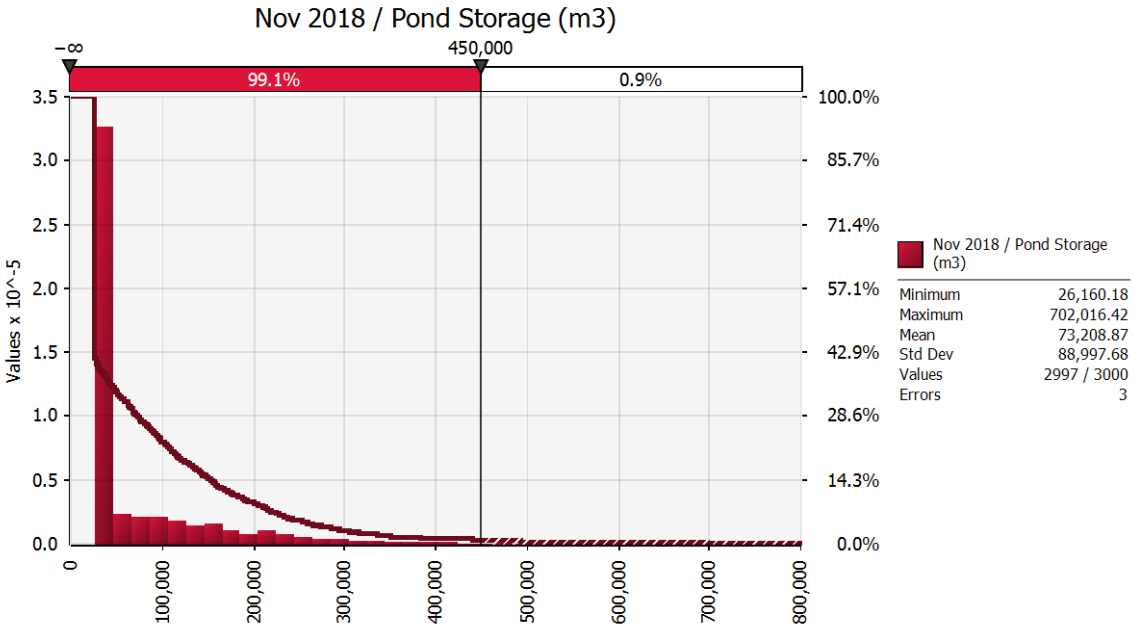


Figure 58 - Pond Filling Probability distribution for Phase 2 in December

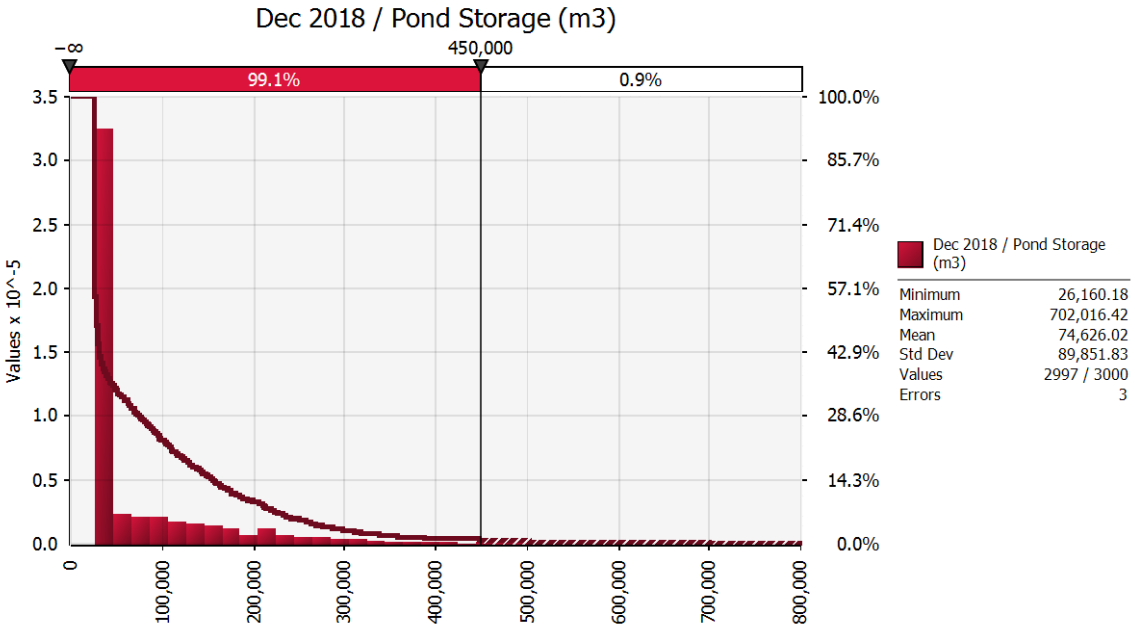


Table 7 will summarize the results of the stochastic modeling by month over all five (5) Phases. The table addresses the two operational extremes, makeup water demand (the risk of not having enough water) and the risk of spilling from ponds (the risk of having too much water). For makeup water demand it reports three (3) parameters:

1. %Zero – the percentage of time there is no makeup water demand
2. The Mean – the simple numerical average of all values (including the zeros)
3. The 95th Percentile – the volume of makeup water demand that would cover needs 95% of the time (the equivalent of 95% reliability), or alternatively the volume of makeup water demand that would be exceeded only 5% of the time.

To characterize the risk of spilling from ponds, it reports the exceedance probability associated with two (2) events:

1. Event A – The In-heap Pond reaches capacity and spills into the Event Pond (a significant event, but with no environmental consequences).
2. Event B – The Event Pond reaches capacity and spills into the environment

The reported probability is a "hands off" annualized probability specific to each month of the year and assumes no management action is taken. Comments on interpretation of this risk and comparisons with design criteria will be discussed later in this section.

Table 7 – Summary of Stand Alone HLF Stochastic Water Balance Modeling Results

Phase	Month	Makeup Water Demand			Storm Ponds	
		%Zero	Mean	95th Percentile	Event A	Event B
1	**Jan**	76.0%	0.08	0.48	0%	0%
	Feb	87.3%	1.60	0.46	0%	0%
	Mar	0.0%	87,215	89,937	0%	0%
	Apr	0.6%	25,593	31,692	0%	0%
	May	3.3%	45,284	71,817	0%	0%
	Jun	32.5%	12,779	41,991	0%	0%

Phase	Month	Makeup Water Demand			Storm Ponds	
		%Zero	Mean	95th Percentile	Event A	Event B
	Jul	0.9%	81,765	104,989	0%	0%
	Aug	0.7%	38,244	50,167	0%	0%
	Sep	0.1%	91,645	101,308	0%	0%
	Oct	0.9%	27,761	38,308	0%	0%
	Nov	0.2%	11,074	14,108	0%	0%
	Dec	29.9%	0.46	1.45	0%	0%
2	Jan	76.4%	0.07	0.46	0%	0%
	Feb	87.6%	0.05	0.45	0%	0%
	Mar	1.7%	27,673	33,296	0%	0%
	Apr	9.3%	18,555	30,007	0%	0%
	May	95.5%	1319	0	0.2%	0%
	Jun	75.0%	5817	37,566	0.4%	0%
	Jul	72.9%	10,078	49,277	0.6%	0.1%
	Aug	60.1%	15,338	54,668	0.6%	0.1%
	Sep	47.8%	16,790	44,709	0.6%	0.1%
	Oct	42.4%	13,782	36,881	0.9%	0.2%
	Nov	41.9%	3686	10,277	0.9%	0.1%
	Dec	56.3%	0.19	0.80	0.9%	0.2%
3	Jan	79.8%	0.05	0.36	11.1%	0.8%
	Feb	89.7%	1.02	0.35	11.1%	0.8%
	Mar	23.5%	21,696	33,296	10.5%	0.0%
	Apr	24.5%	15,715	29,384	10.6%	0.6%
	May	95.5%	1271	0	14.0%	8.5%
	Jun	75.0%	6576	43,308	15.8%	9.7%
	Jul	73.0%	13,916	58,735	15.2%	6.8%
	Aug	57.9%	17,762	59,213	14.1%	0.8%
	Sep	41.9%	22,101	49,498	13.3%	0.4%
	Oct	39.7%	14,063	37,625	13.3%	1.2%
	Nov	45.9%	2701	9059	13.4%	0.6%
	Dec	58.7%	0.18	0.79	13.5%	0.8%
4	Jan	82.2%	0.04	0.30	13.5%	1.3%
	Feb	91.1%	0.03	0.29	13.6%	1.3%
	Mar	30.6%	19,031	33,296	12.8%	0.0%
	Apr	31.4%	13,450	28,602	12.8%	1.2%
	May	99.7%	15	0	17.1%	11.5%
	Jun	92.8%	815	8045	18.6%	14.5%
	Jul	77.7%	2989	19,409	18.4%	9.7%
	Aug	70.2%	4783	22,567	18.1%	1.1%
	Sep	62.0%	2829	12,629	17.6%	0.7%
	Oct	92.8%	274	2058	17.5%	1.6%
	Nov	100.0%	0	0	17.2%	0.0%
	Dec	46.8%	0.26	0.97	17.2%	0.1%
5	Jan	78.0%	0.06	0.40	16.8%	0.3%

Phase	Month	Makeup Water Demand			Storm Ponds	
		%Zero	Mean	95th Percentile	Event A	Event B
	Feb	88.4%	0.05	0.41	16.9%	0.4%
	Mar	88.4%	0.02	0.09	15.8%	0.0%
	Apr	100.0%	0	0	15.4%	0.2%
	May	99.2%	27	0	16.9%	1.6%
	Jun	91.8%	926	9411	17.3%	5.0%
	Jul	74.8%	3490	20,017	16.9%	2.2%
	Aug	66.8%	5151	22,588	15.9%	0.2%
	Sep	53.6%	3221	12,678	14.3%	0.2%
	Oct	92.6%	279	2206	14.2%	0.8%
	Nov	100.0%	0	0	12.7%	0.0%
	Dec	41.6%	0.32	1.09	12.9%	0.1%

Both the mean and the 95th percentile makeup water demand peaks in Phase 1 and declines going forward through Phases 2 through 5 due to the increase in liner footprint and the accumulation of water in the system. Makeup water demand typically spikes in March and April (due to the resumption of ore stacking after the winter) declines to near zero during and immediately after the snowmelt (May and June), then gradually increases over the summer (July through September), and decreases again from October through December. Phase 1 makeup water demands are erratic and high reaching mean values in the 80,000 m^3 to 90,000 m^3 range and 95th percentile values as high as 105,000 m^3. Phase 2 and 3 values drop into a more consistent range with means of 15,000 m^3 to 30,000 m^3 and 95th percentile values of 30,000 m^3 to 60,000 m^3.

The risk of spilling from ponds is very small through Phase 2 (less than 1%). However, beginning in Phase 3 the liner footprint is large enough and the volume of water accumulated great enough to see a likelihood of spilling into the event pond increase to 10% to 16% and the peak flood risk months of May, June, and July show the risk of spilling into the environment increasing to the 7% to 10% range. This risk continues to increase over time peaking in Phase 4 with about a 13% to 19% probability of spilling to the Event Pond and a 10% to 15% probability of spilling to the environment during the peak months.

It is tempting to view the spill probabilities from the stochastic modeling in the same way as the design criteria (which is typically to store the 1% probability 24 hr storm (100 year event) plus the draindown from a power outage of some duration (typically 8 to 24 hours)). However these probabilities cannot be compared. The storm pond design criteria is a single 24 hr event. There is no time to do anything to respond to the event. The only available option is to catch it in a pond. The spill probabilities from the stochastic model represent some random combination of multiple events over an extended period of time (weeks or months). The quantified estimate of risk (exceedance probabilities) must be interpreted in the context of both options and consequences. Operators will typically see the circumstances leading to an increased probability of spilling to the environment ahead of time, in time to respond in some way. Options to reduce the risk once identified could include making additional storage room in the system by pumping water into a contact water pond, sending water to treatment and discharge over a period of time, or installing additional pumping capacity to increase the area under leach putting more water into circulation. Any or all of these actions could be deployed to prevent a spill as necessary. In the case of the Eagle Gold Project, the highest flood risk is commonly associated with the spring snowmelt. The SWE of the snowpack can be measured and monitored over the period from October through

April so that the subsequent snowmelt event in May can be predicted with a high degree of certainty and prepared for well ahead of time.

Finally, it is important to note that the stochastic model results for the HLF provided in this report represents a standalone model, independent of any other facilities at the mine site. This model is being incorporated into a site-wide stochastic water balance model (GoldSim Model) that will consider the capacities and impacts of other storage facilities, treatment facilities, and so on, optimize their design, and may well reduce exceedance probabilities further.

4 Post Closure Draindown Model

This section will briefly describe the development of a spreadsheet based draindown model for incorporation into the site-wide GoldSim water balance model. Once all gold production has ceased and the proposed cyanide neutralization and rinsing of the HLF is finished, the post closure heap will be allowed to dewater and drain. The draindown process is an unsaturated flow process that is controlled by the soil water retention characteristics of the ore. The rate of flow during draindown is a function of the unsaturated hydraulic conductivity which is in turn a function of the moisture content of the ore (see Figure 59). As the ore drains the moisture content decreases and the effective unsaturated hydraulic conductivity declines as well leading to an exponentially declining flow rate curve. There are two (2) distinctly different areas of the HLF that will behave differently during the draindown period. The first area is the column of ore below the area under leach which will have an elevated moisture content relative to the adjacent unirrigated ore. The elevated moisture allows the leach column to drain at a faster rate than the unirrigated ore. At some point in time the moisture content of the leach column will essentially equal the moisture content of the unirrigated ore and there will be no measureable difference in the draindown rate anywhere across the heap.

It is not practical nor advantageous to simply turn off the pumps and allow the heap to just drain as a very large volume of water would report quickly to the ponds filling and overtopping them. Therefore, the model assumes that pumping of process solution will continue at a declining rate until such time as the water content in the active leach column approaches the water content in the unirrigated ore or the potential draindown volume[7] remaining would not fill the ponds but would be captured in the pond system and still provide sufficient capacity to capture and store the design events (i.e., 1% probability (100 yr) 24 hr storm, snowmelt event and a short-term drain-down). At that point the pumps would be turned off while allowing the heap to continue to drain until it reaches a meta-stable equilibrium with the level of meteoric water that continues to enter the pad year after year.

In the environment at the Project site, it is not expected to be possible to fully dewater the HLF and pond system without diverting some water to treatment. The rate at which the water is diverted to treatment will control the time required for the leach column to reach the moisture content of the unirrigated ore and also the time required to reach equilibrium with the meteoric precipitation regime. Although less of an impact, the placement of a cover material on the surface of the HLF will also impact the rate of drainage and time to equilibrium by creating clean surface runoff that can be diverted off of the HLF and released directly into the environment.

Figure 60 through Figure 62 show draindown model results (flow rate, water content change, and water stored on ponds) for a scenario that assumes about 10 l/s of water flow to a treatment plant

[7] The volume of water in the active leach column that is above the water content of the unirrigated ore.

both before and after the leach column water content equals the water content of the unirrigated ore.

Figure 59 – Assumed Unsaturated Hydraulic Conductivity Curve vs. Volumetric Water Content (Van Genuchten Relationship) for the Ore

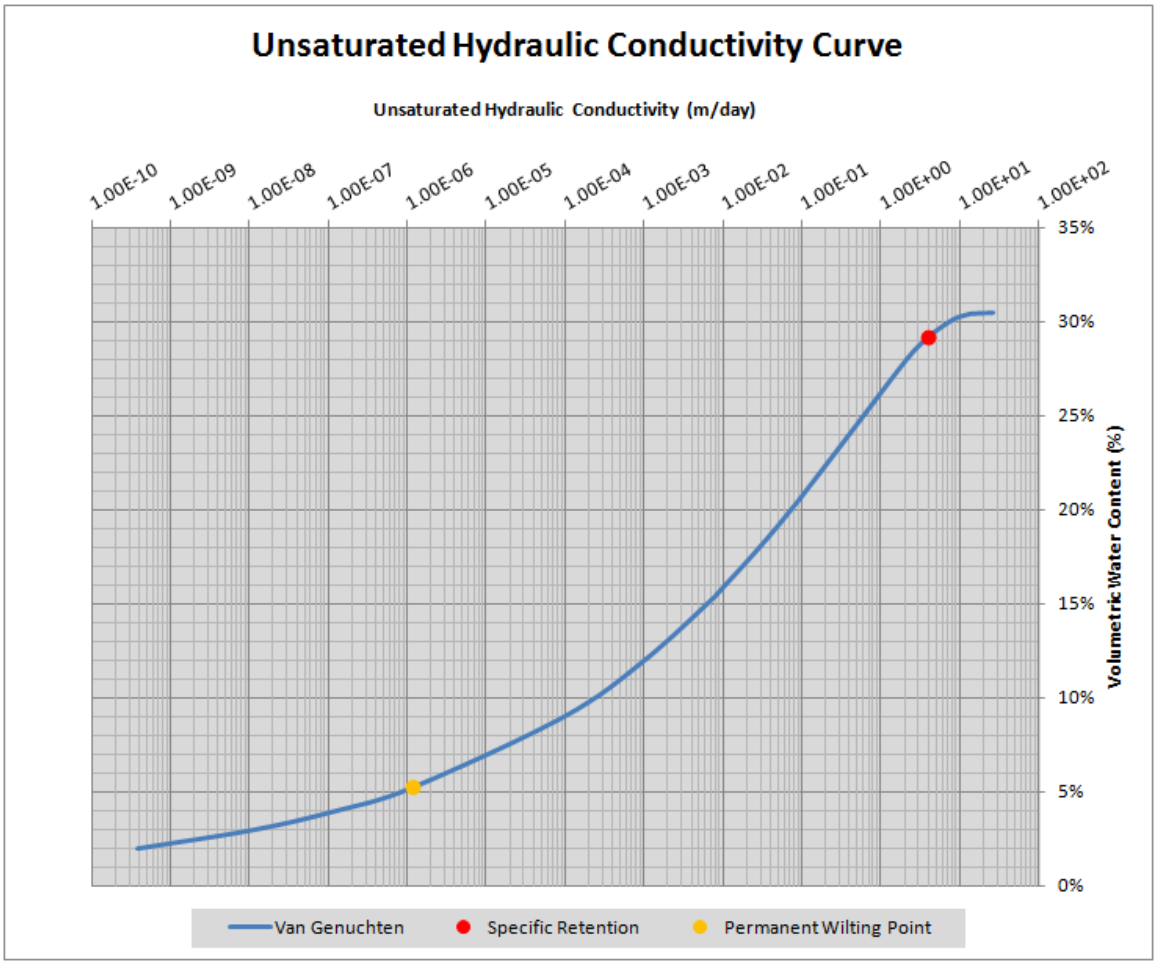


Figure 60 – Draindown Flow rate Over Time

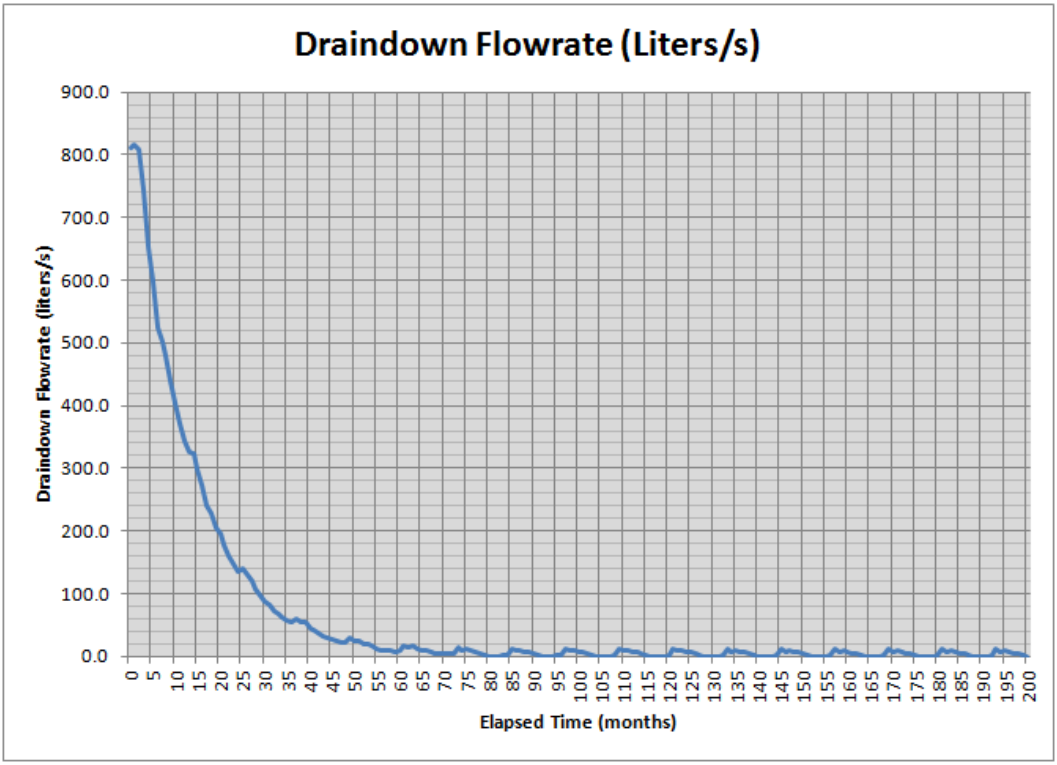


Figure 61 -
Changes in Volumetric Water Content Over Time

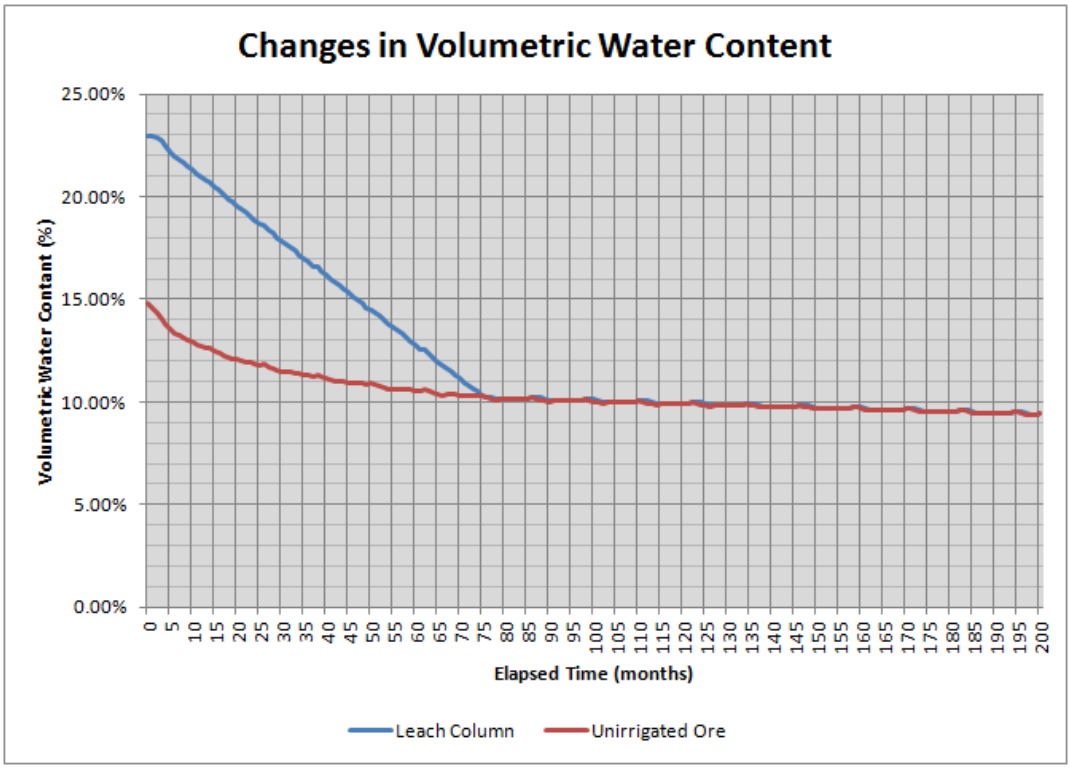
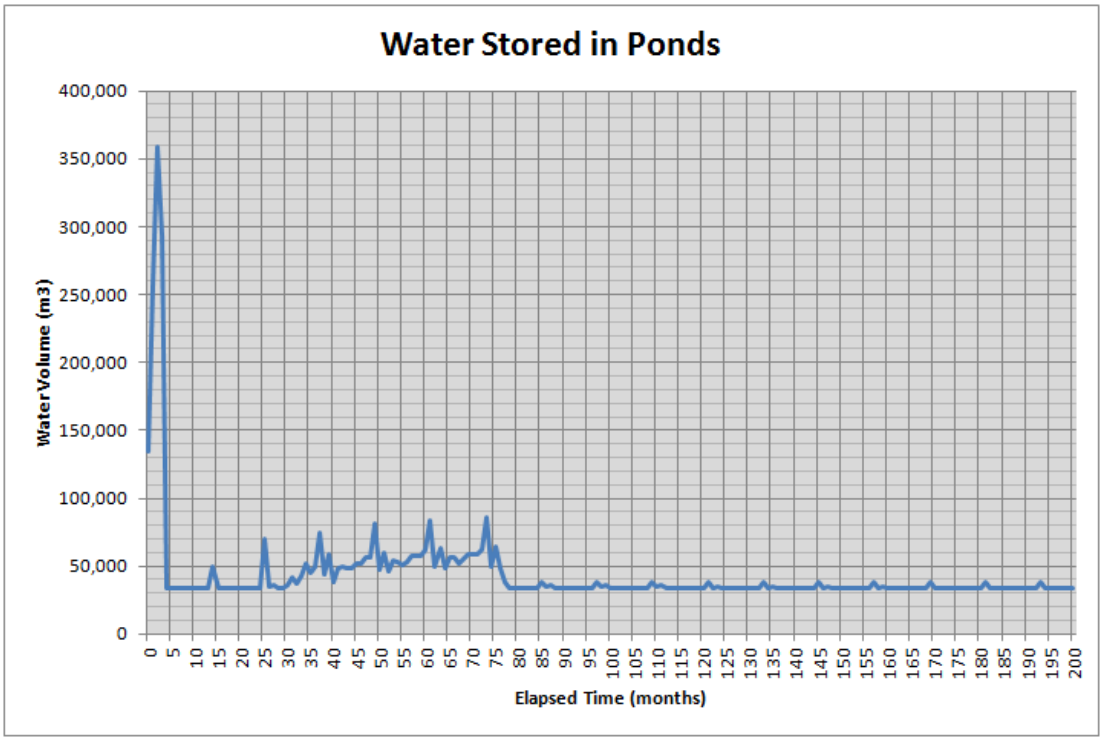


Figure 62 – Estimate of Water Volume Stored in Ponds Over Time



It should be noted that the above results only consider behavior for "average" annual precipitation conditions. The version incorporated into the site-wide GoldSim model will permit variable precipitation consistent with all other facilities on site.

APPENDIX C

Operation, Maintenance and Surveillance Manual - Eagle Gold Project

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OPERATION, MAINTENANCE AND SURVEILLANCE MANUAL

Eagle Gold Project

Heap Leach Facility

Tetra Tech Project No. 114-201045X

April 23, 2014

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1.0 INTRODUCTION

This Operation, Maintenance and Surveillance (OMS) Manual for the Eagle Gold Project Heap Leach Facility (HLF) was prepared by StrataGold Corporation (SGC) as a requirement of the Quartz Mining License (QML) for the Project. This Manual will be updated to account for any facility design or operational changes that may occur during the licensing process.

The HLF is a valley fill design that incorporates a rock filled embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam will also provide for the storage and management of cyanide process solutions within the heap, which eliminates the need for downstream pregnant and barren process solution ponds or tanks. Since the HLF design incorporates a dam, this Manual was prepared in accordance with the procedures outlined in the Mining Association of Canada's (MAC) current guidance document *Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities* (MAC, 2011). Information from the following supporting documents was also used to support the preparation of this Manual.

- *Dam Safety Guidelines*. Canadian Dam Association, Toronto, Ontario, Canada, 2007.
- Victoria Gold Corporation – Eagle Gold Project Feasibility Study. Prepared by Wardrop, a Tetra Tech Company, Vancouver, British Columbia, Canada. April 18, 2012.
- Victoria Gold Corporation - Heap Leach Facility Detailed Design, Eagle Gold Project. Prepared by Tetra Tech, Grand Junction, Colorado, USA. April 23, 2014.

This Manual provides a framework for actions and a basis for measuring performance and demonstrating due diligence for the HLF operations. As discussed in the 2011 MAC guidance document, key items and activities covered in this Manual include the following:

- Roles and responsibilities of personnel assigned to OMS activities for the HLF;
- Description of the HLF including site conditions, key components, regulatory requirements, and design criteria;
- Facility operations including ore stacking, leaching, in-heap solution management, solution processing, environmental protection, and documentation and reporting;
- Facility maintenance including routine and event-driven maintenance, and documentation and reporting;
- Facility surveillance including routine, event-driven and annual comprehensive inspections and documentation and reporting.

This Manual covers HLF operations from construction through operations, reclamation and closure. It presents procedures that will be implemented by appropriate mine personnel for the operation, maintenance, and surveillance of the HLF to ensure that it is functioning as designed; meets regulatory and corporate environmental policy obligations; and assists in minimizing the potential for environmental degradation to occur. A separate Emergency Respons Plan document has been prepared by SGC for the Eagle Gold project.

2.0 MANAGING CHANGE

The HLF OMS Manual will be reviewed and updated as required by the Process Plant Manager, with support from the Environmental Superintendent, and the Health and Safety Superintendent. When updated, the Manual will be reviewed by the Mine General Manager and the Vice President responsible for Environment, Health and Safety; and submitted to Government of Yukon Department of Energy, Mines and Resources and local authorities. Manual revisions may incorporate changes in facility design or performance, capacity, operational requirements, closure requirements, site management, roles and responsibilities, or regulations or reporting procedures.

Previous versions of the Manual will serve as a record of construction and operations of the HLF, and will be accessible to all persons operating the facility, the Design Engineer and regulatory authorities. Table 2.1-1 summarizes the Manual revisions to date. The list of Manual holders for the HLF is provided in Table 2.1-2. SGC will maintain a record of the location of each copy of the Manual and will ensure that all copies are updated when required.

Table 2.1-1: OMS Manual Revisions Summary

Revision Number	Details	Issue Date
Version 2012-01	Initial OMS for HLF. Presents the proposed facility design; operation, maintenance and surveillance activities; from construction through reclamation and closure.	April 2014

Table 2.1-2: List of Manual Holders and Contact Information

Manual Copy No.	Name	Organization and Title	Email address	Telephone Number
	(To be completed prior to start of HLF operations)			

3.0 ROLES AND RESPONSIBILITIES

This section identifies the individuals having responsibility for the operation, maintenance and surveillance of the HLF. Responsible parties for employee training and managing HLF change procedures are also identified.

3.1 Assignment of Responsibilities

The main individuals associated with the HLF OMS are the Process Plant Manager and Environmental Superintendent. Other supporting personnel include the Mine General Manager, Health and Safety Superintendent, Process Plant General Foreman, and employees trained in the operating of the HLF. Certain SGC corporate personnel will also support the onsite operations. As necessary, additional support will be provided by outside engineering firms as appropriate. External reporting will occur to First Nations, the Government of Yukon Department of Energy, Mines and Resources, and local authorities as appropriate. Figure 3.1-1 presents an organization chart that shows reporting links within the organization and communication links to external organizations.

Personnel responsible for OMS activities and emergency preparedness and response are listed in Table 3.1-1. Contact information for these key individuals is provided in Table 2.1-2 of this Manual.

Table 3.1-1: HLF OMS Personnel and Responsibilities

Title	Name	Operations	Maintenance	Surveillance	Emergency Preparedness	Training	Change Management
General Manager		x	x	x	x	x	x
Process Plant Manager		x	x	x	x	x	x
Process Plant General Foreman		x	x	x	x	x	x
Process Plant Metallurgical Dept.		x		x			
Process Plant Maintenance Foreman		x	x	x	x		
Process Plant Shift Foreman		x	x	x	x		
Environmental Superintendent				x	x	x	x
Health and Safety Superintendent		x	x		x	x	x

The Mine General Manager is responsible for all operations at the Eagle Gold Project, including any decisions regarding the procedures to be carried out during an emergency. The Process Plant Manager is responsible for the day-to-day operations, plus maintenance and monitoring requirements. The Process Plant Manager, or a designate such as the Process Plant General Foreman, is also responsible for ensuring that daily and monthly reports for maintenance, inspection and monitoring of the tailings facility are prepared. The Environmental Superintendent is responsible

for monitoring and managing the various territorial and federal environmental permits, licenses and regulations. In the event that these individuals are not available, the responsibility is then delegated to a designate.

In addition, all site personnel and visitors on project business are requested to be vigilant of visual indications of faulty performance of all aspects of the facility.

3.2 Training

The Process Plant Department will provide routine training workshops for all personnel with OMS responsibilities for the HLF. The workshops will focus on the operation, maintenance, surveillance, emergency response, and regulatory reporting requirements for the HLF. Engineering consultants who are familiar with the HLF design and operations will assist with the training program as needed.

4.0 PROJECT OVERVIEW

This section provides an overview of the Eagle Gold Project including ownership, location, site context, proposed HLF components, basis of the HLF design and design criteria, and regulatory requirements.

4.1 Ownership

SGC is the owner of the Project. The Project is located within SGC's 100% owned Dublin Gulch Property which comprises a total area of 34,576 ha, including a contiguous block of 1,912 quartz claims, 10 quartz leases, and 1 federal Crown grant. This Project focuses on the Eagle Zone portion of the Dublin Gulch Property. Figure 4.1-1 illustrates the general Project location, while Figure 4.1-2 illustrates the Project site, including all facilities and components.

4.2 Site Overview

The Project is an open pit gold mine and heap leach operation. As illustrated by Figure 4.2-1, it is located in the central Yukon Territory, approximately 400 km north of the capital Whitehorse, and 85 km by road north-northeast of the Village of Mayo, the closest community with significant commercial services. The Project site is located within the Mayo Mining District. The center of the property is coincident with the confluence of Haggart Creek and Dublin Gulch, at approximately 64°02'N latitude, and 135°50'W longitude Universal Transverse Mercator (UTM) Coordinates 7100950N/453750E, Zone 8, North American Datum (NAD) 83 Datum. The Property is located within portions of NTS sheets 105M/13, 105M/14, 106D/3, 106D/4, 115P/16 and 116A/1.

The Project has year-round road access, and is located approximately 45 km north-northeast of the Village of Mayo, Yukon. As illustrated by Figure 4.2-1, the Project site can be accessed from Mayo by following Highway 2 for 35 km, then heading along the South McQuesten Road for 21 km. The last 25 km are public but user-maintained, which are generally in good repair and allow passage for cars, trucks, and heavy haul highway truck and trailer units. A network of four-wheel drive roads provides access to most parts of the Property.

This Project focuses on the Eagle Zone portion of the Dublin Gulch Property, which contains vein-hosted gold mineralization. The deposit contains a Probable Mineral reserve of 91.6 Mt, with a diluted grade of 0.781 g/t Au. The Project is based on a conventional open pit mine; ore will be mined and processed at a rate of 29,500 t/d for a 10-year life of mine (LOM). Ore will be crushed using three stages of conventional crushing, and then heap leached to produce saleable gold doré.

Under the current mine plan, the Project will require a construction and commissioning period of 24 months, commencing in March 2015. Full operations will begin in March 2017 and last through April 2026. Concurrent reclamation of specific facilities no longer required for operations will be completed during normal mine operations. Under the current mine plan, final reclamation and closure of the Project site will be initiated after all economic precious metal values have been recovered from the HLF. Final reclamation and closure is scheduled to commence in May 2027 and will last through April 2038 while the heap is drained. Post closure monitoring of the Project site, including the HLF is scheduled for 3 to 5 years depending on facility, closure objectives and when close criteria are met.

The Project will require the development of various facilities including the following:

- The HLF that will cover 138 ha and contain up to 92 MT at the end of the LOM.
- The Adsorption/Desorption Recovery (ADR) plant and refinery that will be used for the processing of pregnant heap leach solutions and gold recovery.
- The Dublin Gulch Diversion Channel, which is a major structure designed to relocate the Dublin Gulch waterway around the HLF.
- Water supply systems to treat and distribute fresh water, process water, fire water, and potable water.
- Access and site roads including the upgrading of the existing 23 km Haggart Creek access road.
- Water management infrastructure including an Events Pond, diversion ditches (during construction) for both contact and non-contact water, interceptor ditches, several sediment control and seepage collection ponds and pumps.
- Water treatment infrastructure including a mine water treatment plant (MWTP), a cyanide destruction facility, and potable and sewage treatment infrastructure.
- Waste management systems including sewage disposal and domestic waste disposal.
- Ancillary facilities including the warehouse/truck shop/mine dry/first aid; cold storage/laydown; administration building; on-site fuel storage; on-site explosive storage; detonator magazine storage; assay laboratory; temporary and permanent camp accommodations with recreation area, commissary and laundry facilities.
- Power supply and distribution including a 45 km long, 69 kV power supply line from the Yukon Energy Corporation power grid where a tap in point is available, approximately 25 km southeast of the Property; a power distribution from the mine site substation to all the facilities; process control and instrumentation: and the communication systems.

A complete site layout drawing is provided by Figure 4.1-2.

4.3 HLF Overview

The HLF will be progressively developed in three phases: one phase during initial construction (pre-mining), and two phases during mining operations. The HLF will occupy an area of 40 ha and contain about 29 MT at the end of Year 3 in 2019; 91 ha and contain about 75 MT at the end of Year 7 in 2023; and 138 ha and contain up to 92 MT at the end of the LOM/Year 10 in 2026 .

The HLF is a valley fill design that incorporates a rock / earth fill embankment (dam) that will provide stability to the base of the heap and the stacked ore. The dam also creates an in-heap pond leaching configuration that provides storage of pregnant solution within the ore pore spaces of the ore which eliminates the need for downstream process solution ponds. The major design components for the HLF includes the following: the dam; a composite liner system; the in-heap solution pond; solution recovery wells; associated piping network for solution collection and

distribution; a leak detection and recovery system (LDRS); and a down-stream Events Pond to contain excess solution that results from extreme precipitation or emergency events.

The HLF pad will consist of two liner systems (Figure 4.3-1), the up-gradient liner system and the in-heap pond liner system. The single composite liner system in the upper portion of the pad (above the in-heap solution storage area) will be comprised of a double-side textured 80 mil linear low-density, polyethylene (LLDPE) liner over a geosynthetic clay liner (GCL) system. The double composite liner system in the lower portion of the pad (forming the in-heap solution storage area) will be comprised of two discrete layers of LLDPE liner, separated by a layer of geonet material to form the LDRS, over a GCL system.

The in-heap solution storage area will act as an in-heap leach pond (essentially a saturated zone within the lower extent of the HLF ore pile) for the primary storage of PLS. The in-heap pond at the spillway invert elevation of 886 m asl will be able to contain up to 447,945 m^3 of solution. Typical operational volume will be less than 33,240 m^3 (minimum would be that volume sufficient to keep the sump full and prevent pump caviation), which is less than 8% of the total capacity. Storage of pregnant leach solution (PLS) in the in-heap leach pond is a cold-weather mitigation and has the added benefit that PLS will not be exposed during normal operations.

Process (barren) solution containing cyanide will be applied to the ore via a drip irrigation system (buried during winter). The resultant PLS will be captured in the solution collection system and flow to the in-heap solution pond. The PLS will be recovered via well system using pumps and standpipes. The PLS will be transferred to the adsorption/desorption recovery (ADR) plant for gold recovery.

The heap leach pad is designed to contain a network of pipes that will be distributed throughout the limits of the facility at the base of the ore pile. This pipe network will collect and convey PLS and any infiltrated stormwater to the in-heap pond area where it will be pumped to the process plant via the solution collection wells. The pipe network was designed to accommodate stormwater volume from a 100-year, 24-hour storm event in addition to 150 percent of the design capacity of the anticipated PLS solution flow (150 percent PLS flow + 100 year, 24 hour storm event).

The downstream Events Pond (Figure 4.3-2) will serve as an overflow containment area that provides additional solution storage in case the in-heap pond capacity is exceeded. The Events Pond is sized to provide containment storage for ¾ of the Probable Maximum Flood (PMF) Event assuming the in-heap pond solution storage is at maximum capacity. As designed, the Events Pond has an operational storage capacity of approximately 203,967 m^3 with 1 m of freeboard. The ultimate storage capacity of the Events Pond without freeboard is 254,848 m^3.

4.4 Site Conditions

The Project site is located in the central Yukon in the Traditional Territory of the NND, approximately 350 km north of the Yukon capital of Whitehorse, and 45 km (85 km by existing access roads) north-northeast of the Village of Mayo. Regionally, the Project is situated within the Yukon Plateau North Ecoregion, in the Boreal Cordillera Ecozone which encompasses the Stewart, MacProcess Plantan and Pelly plateaus and southern part of the Selwyn Mountains.

The Project area topography is characterized by rolling hills and plateaus ranging in elevation from approximately 765 masl near the confluence of Dublin Gulch and Haggart Creek, to 1,525 masl at

Potato Hills which forms the eastern boundary of the Dublin Gulch watershed.. The majority of the Project site lies within the Dublin Gulch watershed. The Dublin Gulch stream is a tributary to Haggart Creek which flows to the South McQuesten River within the Stewart River sub-basin of the Yukon River Watershed.

The ground surface within the Project area is covered by residual soil and felsenmeer. Outcrops are rare, generally less than two percent of the surface area, and are limited to ridge tops and creek walls. Lower elevations are vegetated with black spruce, willow, alder and moss, and higher elevations by sub-alpine vegetation. Patchy permafrost occurs on north-facing slopes.

The Project area has a northern continental climate which is characterized by moderate annual precipitation and a large temperature range. Summers are short and can be hot, while winters are long and cold with moderate snowfall. Rainstorm events can occur frequently during the summer and may contribute between 30 to 40% of the annual precipitation. Higher elevations are snow-free by mid-June. Frost action may occur at any time during the summer or fall. The mean annual temperature for the area is approximately -3°C, with an annual range of 63.5°C. January is the coldest month while July the warmest. Annual precipitation ranges from 375 to 600 mm, about half of which falls as snow (Stantec 2012).

5.0 REGULATORY REQUIREMENTS

Regulations and permitting requirements for the design of Heap Leach Facilities in the Yukon Territory are not expressly stated; but rather, they have historically relied on regulations from other regions and on precedence established from other successful projects. Previous studies (Scott Wilson, 2010) selected the Brewery Creek Gold Mine (1996-2002) located approximately 55 km east of Dawson City, Canada as the example facility to follow for permitting guidelines. This was understood to be the only HLF permitted in the Yukon, the design of which (Sitka Corporation 1996) was based on the State of Nevada (Unites States of America) guidelines and associated permitting limitations. This regulatory approach has been adopted for the design of the Eagle Gold HLF along with best engineering practice. The HLF design standards adopted for the project include:

- The applicable regulatory requirements of Yukon and Canada;
- The Yukon Water Board Licensing Guidelines (2009);
- Guidelines from the Canadian Dam Association (2007); and
- Permitting requirements of the State of Nevada.

The State of Nevada standards are not regulatory requirements in the Yukon, but are considered as standards for best engineering practice.

6.0 BASIS OF HLF DESIGN AND DESIGN CRITERIA

6.1 Design Requirements

There are currently no published international standards for the design and construction of the HLF. Nevada State Guidelines provide minimum standards for heap leach facilities and have been adopted for the Project. North American standards for the design of embankment dams were used where applicable, specifically the Canadian Dam Association guidelines. Table 6.1-1 summarizes the main technical and permitting requirements for the State of Nevada for the key elements of the HLF design.

Table 6.1-1: Summary of HLF Design and Permitting Requirements

Heap Leach Feature	Description
Leach Pad	System must have containment capability equal to or greater than that of a composite liner consisting of a synthetic liner over one foot of compacted soil at a permeability of 1×10^{-6} cm/s or 1×10^{-5} cm/s if a leak detection system is used beneath portions of the liner with the greatest potential for leakage Synthetic liners must be rated as having resistance to fluid passage equal to a permeability of less than or equal to 1×10^{-11} cm/s.
Solution Ponds	System must have a primary synthetic liner and a secondary liner that meet the above-described liner specifications. The synthetic liners must be separated by a fluid transmission layer which is capable of transmitting leaked fluids at a rate that will ensure that excessive head will not develop on the secondary liner.
Solution Management and Containment	Process components must be demonstrated to have the capacity to "withstand" the runoff from a 100-year, 24-hour precipitation event. In addition, facility fluid management systems must demonstrate the capability of remaining "fully functional and fully contain all process fluids including all accumulation resulting from a 25-year, 24 hour precipitation event. The foregoing standards are minimal and additional containment capacity may be required if surface water bodies or human populations are in close proximity to the facility, or if groundwater is shallow.
Foundations	Consider static / dynamic loads and differential movement or shifting.
Construction QA/QC	Regulations require that each applicant develop and carry out a quality assurance and quality control program for liner construction. A summary of the QA/QC program must be submitted with as-built drawings after construction has been completed.
Neutralization of Spent Ore	Spent ore, whether it is to be left on pads or removed from a pad, must be rinsed until it can be demonstrated either the remaining solid material, when representatively sampled does not contain levels of contaminants that are likely to become mobile and degrade the waters of the state under the conditionsthat will exist at the site, or, the spent ore is stabilized in such a manner as to inhibit meteoric waters from migrating through the material and transporting contaminants that have the potential to degrade the waters of the state (for the Project, "Territory" is substituted for "state")

6.2 Design Basis

The Yukon Water Board Licensing Guidelines for Type A Quartz Mining Undertakings provide specific guidance for selected mine site earthworks facilities, as follows:

> "*General: Type A quartz mining undertakings may vary significantly in their magnitude and in the potential environmental effects associated with them. The guidelines contained in this document assume the development of a mine with significant potential environmental impacts such as those resulting from acid rock drainage or the failure of a large tailings impoundment. Projects such as this are considered to fall into the Very High Consequence of Failure category described in the Canadian Dam Safety Guidelines (January 1999). In situations where this category is not appropriate for some reason, the Board is prepared to consider well developed and documented justification for the use of alternative consequences of failure criteria developed in accordance with the Canadian Dam Safety Guidelines*."

Further, specific design guidance is included as follows:

- The design, construction, operation, maintenance and surveillance of dams and associated water management structures should be carried out in a manner which is consistent with the recommendations contained in the Canadian Dam Safety Guidelines (January 1999) for the Very High Consequence Category, unless compelling reasons consistent with the Canadian Dam Safety Guidelines for a lower consequence category are provided.
- Long-term dams and associated water management structures should be designed to withstand the Maximum Credible Earthquake (MCE) and pass the Probable Maximum Flood (PMF). Shorter term structures may be built to lesser standards but a compelling rationale for the selected criteria must be provided.
- Heaps should be designed to have a minimum factor of safety under static loading of 1.3 for short term cases (i.e. within the mine life) and 1.5 for long term cases (i.e. abandonment) as described in the Investigation and Design of Mine Dumps (British Columbia Mine Dump Committee, 1991). The factor of safety for dams should be as recommended in the Canadian Dam Safety Guidelines (January 1999).
- Designs for dams and associated water management structures, rock dumps, and heaps should recognize the probable presence of permafrost and should include appropriate measures to manage permafrost and maximize the stability of the structures consistent with recommendations contained in the Canadian Dam Safety Guidelines (January 1999).

Although the 1999 CDA are referenced by the Yukon Water Board, the latest version of the CDA guidelines (2007) was used for the Project. Although the embankment will operate as a dam for only a short-term (<25 years), the confining embankment has been conservatively classified as a high hazard dam. Results from the dam breach analysis and inundation mapping show that loss of human life or damage to public and commercial facilities are unlikely in the event of a dam breach. However, the dam breach may cause significant damage to fish and wildlife habitat downstream of the embankment considering the potential for release of cyanide solution from upstream of the heap confining embankment.

6.3 Engineering Design Criteria

The parameters and criteria presented in Table 6.3-1 below form the basis of design for the HLF. Geotechnical design criteria were developed by Tetra Tech while considering the analyses and discussions in Appendix C (Site Seismic Hazard Analysis), Appendix J (HLF Stability Analyses), Appendix K (Liquefaction Analysis), and Appendix M (Settlement Analysis) of the above referenced HLF design report. Ore parameters were taken from a report issued by Kappes Cassiday & Associates titled Eagle Gold Project Report of Metallurgical Test Work and dated October 2012.

Table 6.3-1: Engineering Design Criteria

Heap Leach Facility	Criteria
Mine Life	10 years
Life of Mine Ore Quantity to be Stacked on the Heap Leach Pad	92 MT
Crushing Rate, stages	Fine ore crushing rate approximately 41,300 tpd based on 10.3 million tonnes per year over a 250 day crushing and stacking season Three-stage crushing
Final Ore Crush Size	6.35 mm (P80)
Leach pad type	Permanent, multiple lift
Initial stacking capacity	Minimum of 2 years for Phase 1 pad
Stacking schedule	250 days per year
Stacking Rate	41,300 tpd
Agglomeration	Belt Type or Agglomorator Drum, first 2 years of operation or as needed.
Stacking method	Conveyor-stacker
Stacked dry density of ore	Initial - 1.70 t/m^3
Stack / lift height	Nominal 10 m lifts
Overall slope angle of stacked ore	2.5:1 (H:V), 22 degrees
Ore solution storage	0.137 m^3 of solution per m^3 of ore
Ore moisture contents	Initial 5.0%, leaching 13.3%,
Leach schedule	365 days per year
Solution application method	Drip emitters (buried during cold weather operations)
Solution application rate	10 l/hr/m^2
Leach cycle time	150 days
Solution application flow	2,770 m^3/hour
Geotechnical Stability	**Criteria**
Design Basis Earthquake (DBE)	0.14g (1 in 475 year return period) 0.25g (1 in 2475 year return period)
Maximum Design	0.35g (Maximum Credible Earthquake)

Heap Leach Facility	Criteria
Earthquake (MDE)	Moment Magnitude 6.0
Minimum embankment Factor of Safety	Static Loading - 1.5 (impounding),1.3 (non-impounding), Seismic Loading - 1.0 (pseudo-static)
Permafrost	Ice-rich materials encountered in the pad or pond foundations, if thaw unstable, will be removed.
Containment Dam	**Criteria**
General	To provide stable confinement of the ore and in-heap storage of solution.
Standards	Designed to 2007 Canadian Dam Association (CDA) Standards.
In-heap solution storage	To attenuate variation in flows into the heap to allow a constant flow to the process plant and minimize treatment and release. 1. Minimum operational storage volume (to ensure the pumps stay primed to supply the process plant) equivalent to 12 hours of supply at the 2770 m3/hr application rate. 2. Contain the runoff volume from a 100-year, 24-hour storm event rainfall event. 3. Contain the snowmelt volume from the 100-year 24-hour rain-on-snow event then 48 hours of melting following this event. 4. Maximum storage volume to allow for three day's (72-hours) of draindown (see Note 1).
Overflow spillway	Sized to pass 1/3 between the 1000-year event and the PMF assuming heap storage is at capacity at the start of the event.
Groundwater	**Criteria**
General	A drainage system is required beneath the liner system to control groundwater pressures. The system is to collect groundwater in a controlled manner before discharge downslope of the containment embankment.
Pad Liner System	**Criteria**
Overliner	Crushed clean rock to provide a free draining layer under the placed ore and to protect the lining system from damage by ore placement while not impacting the conveyance of solution to the recovery wells.
Geosynthetic liner	Suitable liner material to provide required puncture resistance, elastic strain range and resistance to solution attack along with good cold weather performance. Objective maximum permeability 1×10^{-5} cm/s or 1×10^{-6} cm/s in the absence of a leachate detection and removal system.
Geosynthetic Clay Liner (GCL)	Geosynthetic clay liner below the geosynthetic liner to provide a composite liner to minimize leakage. Objective maximum permeability 1×10^{-5} cm/s or 1×10^{-6} cm/s.
Leak detection and recovery system (LDRS)	A system to collect leakage through the composite liner and convey it to monitoring points. The system to comprise geonet or similar synthetic drainage product to collect and convey any leaked solution to a sump and pumping system.
LDRS monitoring	Monitoring of the flow into the LDRS to ensure that allowable rates (as determined by design performance and regulatory authorities) are not exceeded.

Heap Leach Facility	Criteria
Solution Recovery Wells	**Criteria**
General	Solution is to be recovered from the heap through inclined well casings equipped with submersible pumps installed in the in-heap solution storage area along the upstream dam slope. Adequate access for installing and recovering pumps from well casings will be provided on the dam crest.
Events Pond	**Criteria**
General	The purpose of the events pond (constructed downstream of the embankment) is to temporarily store process make-up water or excess inflows that cannot be stored in the in-heap pond. Any precipitation on or flow into the events pond will be evacuated, and used as make-up water, as fresh ore is added to the HLF. Otherwise, the events pond will be kept dry.
Overflow spillway	Sized for PMF assuming in-heap pond storage is at capacity (with 2 m of freeboard) at the start of the event. Spillways to be provided in the events pond to safely pass the peak PMF flow.
Storage Capacity	Sized to contain ¾ of the runoff volume from the PMF event.
Liner system	Lining to comprise a double composite geosynthetic liner system with LDRS

Note 1: Typical industry standard for heap leach draindown storage capacity is 24 to 48 hrs. A more conservative draindown duration of 72 hrs was chosen for Eagle Gold to allow for contingency related to pump replacement in the PLS inclined riser system.

7.0 HEAP LEACH FACILITY OPERATIONS

The HLF will be progressively developed in three phases: one phase during construction, and two phases during operations. At the end of Year 3 in 2018, the HLF will occupy an area of 40 ha and contain about 29 MT; at the end of Year 7 in 2022, the HLF will cover 91 ha and contain about 75 MT; at the end of the LOM in 2025 (Year 10), the HLF will cover 138 ha and contain up to 92 MT.

7.1 Agglomeration and Pad Loading

The HLF conveyor system will be operated during a 250 day per year period (i.e., approximately March – November) using a planned 1,219 mm wide conveyor stacking system. As the crushed ore (final product material) is conveyed from the tertiary crushing area, lime and Portland cement may be added to the material on the conveyor at a controlled rate by screw conveyor or rotary valve, together with barren solution to facilitate agglomeration (moisture control) of the heap leach feed material. As the crushed ore leach feed material passes from one conveyor to another en route to the HLF, the particles will be mixed with the these reagents for agglomeration. The 100 d primary crushed ore stockpile will be fed to the secondary and tertiary crushing-conveyor stacking system once stacking operations resume during the 250 d period. The planned heap stacking system will include:

- A series of overland conveyors
- Up to 20 grasshopper-type portable transfer conveyors, each approximately 38 m in length
- A 43 m long horizontal mobile bridge conveyor mounted on a dozer crawler carriage
- A 37 m long radial stacking conveyor, capable of powered luffing, slewing and stacking to a height of 10 m and fitted with a 6.1 m stinger.

The HLF feed conveyors will be installed adjacent to the heap leach pad, and then extended as needed around the western circumference pad, from the crusher area. The grasshopper conveyors will transport the ore from the overland conveyors to the bridge conveyor. The ore will be placed in 10 m lifts using the radial stacker. The leach lifts will be constructed from east to west, retreating up the slope of the pad. As the stacker retreats, the grasshopper conveyors will be removed from the transfer train and relocated in an adjacent area so that the heap will be constructed from the toe upwards in a series of 60 m wide by 500 m long lifts.

The in-heap pond area will be the first area filled with ore. The maximum depth of the first ore lift in this area will be approximately 26 m. As stacking operations advance, ore will be stacked on top of the heap leach pad in 10 m lifts. Ramps will be established to allow conveyor access to the top of the heap for construction of additional lifts.

For areas of the heap that will be under leach in the winter months, the ore will be placed initially in 10 m lifts. To insulate the drip emitter system, the leach lines will be “ripped in” to the ore and covered to prevent freezing. To insulate larger piping, an additional insulation cover and crushed ore may be placed in stockpiles on the heap and spread by low ground pressure dozers to facilitate rapid placement and spreading of the ore.

7.2 Ore Stacking Plan

The heap leach stacking plan was designed in coordination with the mining plan to efficiently schedule ore stacking and leaching over the 10-year LOM. The stacking plan is based on a loading rate of 41,300 t/d for 250 loading days. The stacking plan is based on:

- Pad surface area
- Conveyor utilization integrated with the crushing plant
- Conveyor repositioning (mobile sections are moved every 1 to 2 d)
- Coordination of mobile equipment for moving the portable conveyors
- Coordination of piping to follow the ore placement as quickly as practical.

Table 7.2-1 summarizes the pad stacking plan. Figures, 7.2-1, 7.2-2 and 7.2-3 illustrate the leach pad development plan through the LOM.

Table 7.2-1: Pad Stacking Plan

Pad ID	Pad Stacking (d)	Cumulative Pad Stacking (d)	Pad Stacking Remaining (d)	Percent Area Sacked Year End (%)	Pad Area Stacked (m^2)	Pad Area Remaining (m^2)	Leach Pad Stacked	Stack (a)	Year Pad Leach Cycle Starts (a)	Year Pad Leach Cycle Ends (a)
860	23.33	23.33	37.67	-	53,597	-	860	1	1	2
870	50.85	74.18	(13.18)	59	51,311	36,306	870	1	1	2
880	47.16	121.34	204.40	-	163,435	-	870, 880	2	2	2
890	62.09	183.43	142.31	-	163,164	-	890	2	2	2
900	68.48	251.91	73.83	-	161,291	-	900	2	2	2
910	67.99	319.90	5.84	-	160,047	-	910	2	2	3
920	67.36	387.27	(61.52)	7	11,088	146,231	920	2	2	3
930	58.82	446.08	144.03	-	286,990	-	920, 930	3	2	3
940	57.23	503.31	86.81	-	146,193	-	940	3	3	3
950	58.40	561.71	28.41	-	155,955	-	950	3	3	3
960	60.61	622.32	(32.20)	39	63,644	98,000	960	3	3	4
970	64.63	686.95	162.71	-	261,992	-	960, 970	4	3	4
980	68.19	755.14	94.52	-	179,184	-	980	4	3	4
990	73.53	828.67	20.99	-	179,184	-	990	4	4	4
1000	79.28	907.95	(58.29)	22	47,284	164,516	1000	4	4	4
1010	87.87	995.82	112.88	-	400,588	-	1000, 1010	5	4	5
1020	96.77	1,092.59	16.11	-	258,226	-	1020	5	4	5
1030	104.73	1,197.32	(88.62)	13	37,449	245,422	1030	5	4	5
1040	116.85	1,314.17	53.27	-	560,621	-	1030, 1040	6	5	5
1050	126.83	1,441.00	(73.56)	36	122,433	213,069	1050	7	5	6

Pad ID	Pad Stacking (d)	Cumulative Pad Stacking (d)	Pad Stacking Remaining (d)	Percent Area Sacked Year End (%)	Pad Area Stacked (m_2)	Pad Area Remaining (m_2)	Leach Pad Stacked	Stack (a)	Year Pad Leach Cycle Starts (a)	Year Pad Leach Cycle Ends (a)
1060	131.05	1,572.05	54.91	-	550,498	-	1050, 1060	7	5	6
1070	128.74	1,700.79	(73.83)	37	118,845	201,523	1070	8	5	6
1080	119.52	1,820.31	66.76	-	492,876	-	1070, 1080	8	6	6
1090	107.11	1,927.42	(40.35)	53	138,297	120,322	1090	8	6	7
1100	97.36	2,024.78	122.29	-	345,630	-	1090, 1100	9	6	7
1110	85.07	2,109.85	37.22	-	291,352	-	1110	9	7	7
1120	71.78	2,181.63	(34.56)	42	67,771	92,116	1120	9	7	8
1130	58.89	2,240.51	75.74	-	125,841	-	1120, 1130	10	7	8
1140	46.87	2,287.39	28.87	-	102,182	-	1140	10	8	8
1150	36.55	2,323.94	(7.68)	63	44,969	26,412	1150	10	8	9

7.3 Leaching and Solution Delivery

Barren cyanide solution will be applied to the ore stacked on the HLF to extract the gold. After passing through the stacked ore, the gold-bearing PLS will be stored within the in-heap pond where it will be recovered by the PLS pumps and pumped to the ADR facility for processing.

The in-heap pond, designed to be a saturated zone within the lower extent of the HLF ore pile, will contain up to 447,945 m^3 of solution storage capacity. Typically operational volume will be less than 33,240 m^3 (minimum would be that volume sufficient to keep the sump full and prevent pump caviation), which is less than 8% of the total capacity.. Up to four vertical turbine pumps will be used to advance the PLS to the ADR plant at 2,770 m^3/h.

A series of barren solution pumps located at the ADR facility will pump solution to the heap leach pad and the tertiary crusher discharge conveyor. Pressure piping will be dual contained at all times. A series of pipe headers will distribute the solution to secondary and tertiary headers, and ultimately to 81 x 81 cm drip emitters placed under the surface of the ore. Fresh sodium cyanide solution will be added as needed to the barren solution tank at the ADR plant. The primary supply line will track along the west side of the HLF and has been located a safe distance from the service roads and conveyors.

7.4 Heap Leaching Cycle

Table 7.4-1 illustrates the heap leaching cycle from initiation through the LOM.

Table 7.4-1: Heap Leaching Plan assuming a start date of October 1, 2016.

Pad ID	Ore Stack Start Date	Ore Stack End Date	Leaching Start Date	Leaching End Date	No. Days Impaired	No. Days Unimpaired	Ore (t)	Impairment (%)
860	10/1/16	10/24/16	10/25/16	3/24/17	0	150	447,438	-
870	10/25/16	12/2/16	12/3/16	5/2/17	0	150	661,591	0.00
870	3/12/17	3/25/17	3/26/17	8/23/17	102	48	468,115	-
880	3/26/17	5/12/17	5/13/17	10/10/17	87	63	1,717,970	-
890	5/13/17	7/14/17	7/15/17	12/12/17	81	69	2,322,349	-
900	7/15/17	9/21/17	9/22/17	2/19/18	81	69	2,595,640	-
910	9/22/17	11/29/17	11/30/17	4/28/18	0	150	2,570,704	-
920	11/30/17	12/6/17	12/7/17	5/5/18	0	150	178,949	2.24
920	3/15/18	5/16/18	5/17/18	10/14/18	32	118	2,359,982	-
930	5/17/18	7/15/18	7/16/18	12/13/18	92	58	2,384,627	-
940	7/16/18	9/11/18	9/12/18	2/9/19	81	69	2,295,616	-
950	9/12/18	11/9/18	11/10/18	4/9/19	0	150	2,417,181	-
960	11/20/18	12/19/18	12/20/18	5/19/19	0	150	1,000,377	1.54
960	3/29/19	4/30/19	5/1/19	9/28/19	84	66	1,540,410	-
970	5/1/19	7/4/19	7/5/19	12/2/19	81	69	2,605,082	-
980	7/5/19	9/12/19	9/13/19	2/10/20	75	75	2,745,402	-
990	9/13/19	11/25/19	11/26/19	4/25/20	0	150	2,984,381	-
1000	11/26/19	12/17/19	12/18/19	5/17/20	0	150	724,513	1.61

Pad ID	Ore Stack Start Date	Ore Stack End Date	Leaching Start Date	Leaching End Date	No. Days Impaired	No. Days Unimpaired	Ore (t)	Impairment (%)
1000	3/27/20	5/24/20	5/25/20	10/22/20	61	89	2,520,795	-
1010	5/25/20	8/21/20	8/22/20	1/19/21	52	98	3,582,973	-
1020	8/22/20	11/27/20	11/28/20	4/27/21	0	150	3,954,381	-
1030	11/28/20	12/14/20	12/15/20	5/14/21	0	150	573,078	0.51
1030	3/24/21	6/21/21	6/22/21	11/19/21	0	150	3,755,695	-
1040	6/22/21	10/17/21	10/18/21	3/16/22	0	150	4,784,560	-
1050	10/18/21	12/10/21	12/11/21	5/9/22	0	150	1,899,660	0.00
1050	3/19/22	5/31/22	6/1/22	10/29/22	18	132	3,305,954	-
1060	6/1/22	10/11/22	10/12/22	3/11/23	0	150	5,383,453	-
1070	10/12/22	12/5/22	12/6/22	5/5/23	0	150	1,952,148	0.01
1070	3/15/23	5/28/23	5/29/23	10/26/23	29	121	3,310,230	-
1080	5/29/23	9/26/23	9/27/23	2/24/24	0	150	4,893,766	-
1090	9/27/23	12/3/23	11/30/23	4/29/24	0	150	2,352,782	0.01
1090	3/13/23	4/22/24	4/23/24	9/20/24	52	98	2,046,985	-
1100	4/23/23	7/29/24	7/30/24	12/27/24	0	150	3,871,413	-
1110	7/30/23	10/23/24	10/24/24	3/23/25	0	150	3,347,680	-
1120	10/24/23	12/1/24	11/28/24	4/27/25	0	150	1,197,129	0.09
1120	3/11/25	4/14/25	4/15/25	9/12/25	90	60	1,627,177	-
1130	4/15/25	6/13/25	6/14/25	11/11/25	102	48	2,285,818	-
1140	6/14/25	7/31/25	8/1/25	12/29/25	0	150	1,824,179	-
1150	8/1/25	8/30/25	8/31/25	1/28/26	0	150	1,388,504	2.01

Under the proposed leaching plan, 22 of 39 lifts will be leached for the design leaching cycle (150 d). The remaining 17 leach lifts will experience a reduced leach cycle time, as additional lifts are progressively stacked on top before the full leaching cycle is complete. These 17 leach lifts will have leaching cycle times ranging from 48 to 132 d and consequently have some impairment in gold recovery. The shortened leaching cycle for these lifts will result in some leachable gold remaining in the ore. An estimated 80% of the impaired leachable gold will simply take longer to leach out of the heap. The remaining 20% is assumed to not be recovered until the heap leach is rinsed. During rinsing operations it is estimated 75% of the remaining impaired gold will be recovered. A total of 21,664 oz Au is delayed until the rinsing stage and 3,742 oz Au is assumed to be entirely impaired and not recovered through the leaching operations (Table 7.4-2).

Table 7.4-2: LOM Heap Leach Metal Balance

Leaching Phase	Recovered/ Balance (oz)
Design Leach (150 d)	1,676,234
Primary Leaching	1,650,828
Rinsing	21,664
Impairment	(3,742)

7.5 Cold Weather Considerations

The following parameters have been incorporated into the HLF design to provide for year round heap leaching activities:

- selected an in-valley heap configuration to create a heat sink
- selected a south facing valley
- use of an in-heap solution pond for PLS storage
- sizing of the fine ore crushing operation to allow increased production rate during warm months
- ore stacking on the heap leach pad during the warm season (250 d)
- storing ore on the 100 d ore storage pad during the winter season
- sizing of the starter heap leach pad to accommodate more than one year of ore production to allow advanced stacking for at least the first winter season

The process pumping and solution delivery system includes pumps, pipelines, valves, and associated controls to move solution between the ADR plant and the HLF. The system includes the following provisions for year-round operation:

- buried emitters (ripped in by dozer) and covered to 3 m depth
- heat traced and insulated barren solution tank
- heat traced and insulated (or buried) pipelines as needed
- backup power supply to pumps via emergency generators
- provision for pipeline drain down upon shutdown
- provision for a D9 track dozer equipped with a ripper assembly to rip frozen ore prior to resuming leaching in the spring
- heating of barren solution during the winter season (100 d)
- in-heap temperature monitoring
- burying drip emitter lines with 3 m of ore
- heat-tracing and insulating the barren tank
- heat-tracing and insulating (or burying) pipelines
- generators for backup power supply to pumps and emergency process equipment.

7.6 Leachate Solution Collection System

The heap leach pad will consist of two liner systems (see Figure 4.3-1), the up-gradient liner system and the lower, in-heap pond liner system. The lower section of the heap leach pad acts as an in-heap pond for the primary storage of PLS. Located above this liner system is a 1 m layer of drainage rock (all passing 38 mm) which has been designed to transmit the PLS to a collection system. This overliner drainage blanket serves to efficiently transmit the PLS and protect the primary liner from damage by rocks and/or equipment which might come in contact with the liner.

The HLF drain pipes will consist of 100-mm, 250-mm and 450-mm diameter corrugated dual-wall, perforated ADS N-12 pipes. A series of 100-mm primary collector pipes will be spaced at 25 m on center and arranged in a “herringbone” pattern to convey flows for collection in 450-mm header pipes. Where slope lengths dictate, secondary 250-mm collector pipes will be required to convey flows from the 100-mm pipes to the 450-mm header pipes.Within the in-heap pond there are three vertical turbine pumps operating and one spare. The inclined arrangement will consist of five thick-walled, steel pipes, each approximately 0.90 m in diameter to allow for raising and lowering of a submersible pump. Pregnant pumps are 300 x 250 mm, and 186 kW each. Each well has an outer casing connected to the 450 mm collection lines, mechanical pump, and related electrical and control components. These wells and pumps serve to convey the pregnant solution to the process plant.

Because of the efficient capture and conveyance of fluids, the primary liner has very limited hydrostatic head exerted as a result of the process fluid. The design criteria call for a hydraulic head limited to the extent practicable to prevent pump cavitation. Figure 7.6-1 provides an overview of the system.

7.7 Leak Detection and Recovery System

A leak detection and recovery system (LDRS) will be installed between the upper and lower geomembrane liners, in the area of the heap pond, where the hydrostatic head is greatest (Figure 7.7-1). This LDRS is designed to detect, contain and pump back any leakage resulting from a possible liner failure before any contamination can reach the groundwater. If a leak occurs, the drain system will collect the PLS via drainpipes, connected to a collection monitoring sump, located in the HLF. The sump will be installed with monitoring instruments to provide early alerts to the presence of flow. Collected solution will then be pumped back to the ADR plant or the HLF.

7.8 Events Pond

A lined events pond located downstream of the HLF (Figure 4.3-2) will be constructed to temporarily store excess process solution that may occur during upset conditions, freshet, and excess precipitation events. The solution contained in this pond will be recycled back into the heap leach circuit when normal operation resumes. The pond has been sized to contain peak intensity storm events as well as repetitive wet years and/or periods. The pond will be constructed to include leak detection and recovery within the liner system.

If all the leach solution cannot be recycled back to the HLF due to water balance constraints, the remaining leach solution will be stored within the events pond. In the unlikely event storage volume within the events pond approaches capacity, then the solution will be treated through the cyanide destruction plant and the MWTP prior to discharge into Haggart Creek.

8.0 HEAP LEACH FACILITY MAINTENANCE

The purpose of the HLF Maintenance Program is to ensure the individual facility components, and the entire facility as a whole, are operating as designed. Proper HLF maintenance will provide a safe working environment for employees; maximize precious metals recovery to the extent possible; and minimize the potential for events that would contribute to environmental degradation.

Maintenance of the HLF is the responsibility of the Process Plant Manager. The Process Plant Department will have personnel with the required qualifications to understand operating and maintenance manuals, assess whether HLF design or performance standards are being achieved, complete routine or predictive maintenance tasks, and to adequately respond to event-driven maintenance requirements.

Figure 8.1-1 presents a general Maintenance Flowchart for the HLF. This flowchart presents a maintenance review process that will be applied to individual components to ensure the facility is operating as designed.

8.1 Routine Maintenance

HLF components requiring routine maintenance include:

- Leach pad embankment;
- Stacked ore pile;
- PLS recovery pumps;
- Accessible portions of the solution delivery and collection system including pipelines, drip emitters, pumps, tanks and other support facilities;
- Conveyors, radial stacker and agglomeration facilities;
- Instrumentation as appropriate; and
- Event Pond.

Regular maintenance procedures for the HLF components include the following:

- Regularly check interceptor ditches and solution channels for accumulation of debris or sediment, and remove as appropriate.
- Visually inspect the embankment for signs of erosion, leaks or slope movement. Repair erosion gullies, local slumps or slides in the embankment face. Report all signs of erosion, leakage or slope movement to a qualified geotechnical engineer as appropriate.
- Visually inspect the heap pile for signs of sliding, tension cracks, erosion or other signs of instability. Repair as appropriate. Report all signs of heap instability to a qualified geotechnical engineer as appropriate.
- Conduct routine inspections and maintenance of all pumps per manufacturer guidelines.
- Conduct routine inspections and maintenance of all instrumentation per manufacturer guidelines.
- Conduct routine inspections and maintenance of the conveyor systems, radial stacker and agglomeration equipment per manufacturer guidelines.

- Visually inspect the visible portions of the HLF and Events Pond liners and make repairs to damaged sections as appropriate.
- Conduct routine inspections of the Events Pond. Remove any accumulated debris as appropriate. Make repairs to pond liners as appropriate. Remove any accumulated solutions, including stormwater runoff, within the specified timeframes to maintain required pond storage capacities.
- Conduct routine inspections of accessible portions of the solution delivery and collection system including pipelines, drip emitters, pumps, and tanks. Perform regular non-destructive testing appropriate for components of the system including periodic measurement of pipeline thickness to identify areas of wear and to schedule pipeline replacement if necessary. Replace pipe work, bends and fitting components as required. Remove accumulated debris from valves, reducers and off takes. Carry out maintenance as recommended by fitting and valve suppliers, and regularly inspect major wear components.

8.2 Event Driven Maintenance

Potential event-driven maintenance items arising from pipeline leaks or breaks, earthquakes and floods are listed below.

8.2.1 Solution Collection and Delivery System Pipeline Leaks or Breaks

- Inspect entire pipeline;
- Repair or replace affected components;
- Perform opportune and scheduled maintenance;
- Repair any collateral damage caused by a leak or break;
- Collect any released or spilled solutions and return them to the HLF fluid management system; and
- Reclaim any disturbed areas.

8.2.2 Earthquake Occurrence

- Inspect embankment for sign of distress due to deformation;
- Inspect embankment for signs of liquefaction (e.g. local sand boils, etc.);

8.2.3 Flood Event

- Monitor in-heap pond and Events Pond fluid levels.
- Measure freeboard in both solution ponds for compliance with design requirements.
- Inspect embankment and diversion ditches for signs of excessive erosion and repair if required; and
- Inspect solution collection and delivery system for operational adequacy.

8.3 Maintenance Schedule and Spare Parts

All electrical and mechanical components will be inspected and maintained as per manufacturer's recommendation. A spare parts inventory will be maintained as recommended by equipment manufacturers and as required by the Owner.

8.4 Documentation

Maintenance records of each component will be kept by the Process Plant Manager and will include:

- Up-to-date logs of in-service equipment and facilities ;
- Maintenance schedules;
- Maintenance history ;
- Inspection logs;
- Repair reports including cost;
- Frequency, cause of problems and planned mitigation;
- Component reliability records;
- Quality control records;
- Photographs, videos of repair issues;
- Inventory of spares, materials, tools and equipment; and
- Critical spares list.

8.5 Reporting

A Maintenance Report will be prepared monthly, or as required,by the Process Plant Manager or designate and will include:

- Completed work;
- Updated maintenance log and schedule;
- Progress on partially completed work that has been halted for some reason;
- Items not requiring maintenance and why;
- New items or conditions requiring maintenance;
- Problems and possible solutions for items requiring greater than expected maintenance; and
- Cause of any neglected or late maintenance.

9.0 HEAP LEACH FACILITY SURVEILLANCE

Regular surveillance is essential to ensure ongoing safety of the HLF and to identify areas requiring maintenance before problems and safety concerns develop. Behavior and performance of the facility are assessed visually and through monitoring of instrumentation.

A flow chart of the Surveillance process is shown in Figure 9.1-1. The flowchart describes a surveillance review procedure, including an inspection program, to help ensure safe and continued operation of the HLF.

The purpose of an inspection program is to identify problems and/or unsafe conditions that are visually evident. Visual inspections are an integral part of proper maintenance and performance of monitoring programs for the HLF. Failure to correct identified maintenance and repair items, or potential adverse behavior, could result in unsafe conditions or lead to a failure of operating systems or cause an adverse environmental effect. Table 9.1-1 summarizes the routine surveillance requirements for the HLF.

Table 9.1-1: Surveillance Requirements for the HLF

Surveillance	Frequency
Routine Inspection	
Embankment	Weekly by staff (Annually by Engineer)
Pad Liner	Weekly
Stacked leach ore for stability	Weekly
Solution collection and recovery system	Weekly
Leak Detection and Collection System Monitoring Ports	Daily
Heap leach pad standpipe piezometers	Weekly
Monitoring Vault	Weekly
Embankment geotechnical instrumentation	Weekly
Events Pond liners	Weekly
Conveyors, radial stacker, agglomeration facilities	Weekly
Geochemical sampling of leach ore	Quarterly
Geochemical sampling of pregnant and barren process solution	Quarterly
HLF and Dam Inspection by Engineer	Annually
Event Driven Inspection	Following Unusual Event
Comprehensive Review	Every 7 years and prior to decommissioning
Instrumentation	Monthly and per Manufacturer Guidelines
General Visual Inspection of HLF Components and the Events Pond	Daily during the completion of standard work procedures

If any unusual occurrences are observed during the completion of the routine surveillance activities, they will be immediately reported to the Process Plant Manager and the Process Plant General Foreman for assessment and development of an appropriate course of action. If deemed necessary, appropriate procedures will be implemented as outlined in the Eagle Gold Project Emergency Response Plan.

9.1 Routine Inspections

Routine and/or regular visual inspections of the HLF components listed in Table 9.1-1 will be completed weekly. Ideally the inspections should be performed and recorded by the same person(s) to ensure that relevant incremental changes are observed between each inspection. The visual inspections will be done for all components of the HLF, including the visible portions of the leach pad liner; leach pad embankment; stacked ore pile; accessible portions of the solution delivery and collection system including pipelines, drip emitters, pumps, tanks and other support facilities; conveyors, radial stacker and agglomeration facilities; the two event ponds, and instrumentation as appropriate.

Representative samples of the leach ore and the pregnant and barren solution will be sampled on a quarterly basis and analyzed for constituents as stipulated..

The leach pad leak detection and solution collection system monitoring ports will be monitored daily for the presence of solution. If solutions are present, they will be sampled and analyzed for the presence ofconstituents as stipulated. Contained solutions in any of the monitoring ports will be evacuated and measured for volume. All information will be recorded for comparison with follow-up measurements. The presence of process solution in any of the ports is expected but excess volume is a potential indication of a leak in the heap leach pad liner. The findings will be reported to the appropriate government agencies and an appropriate course of action will be developed in coordination with SGC.

Emphasis will be placed on visual inspections of the HLF embankment. The following are items that will be looked for during these inspections: evidence of settlement or subsidence on the embankment crest or slope; evidence of cracks or erosion on the embankment slope; bulging on the downstream slope which could indicate leakage; and evidence of animal burrows or unusual vegetation patterns on the dam.

All observations will be formally documented..

9.2 Annual Inspections

Annual inspections are intended to be part of a more thorough review of the condition of the facility, and are carried out by a qualified engineer, experienced with the design and maintenance of the HLF. The annual inspections will be conducted by July 1st and will include the following main items:

- Visual inspection of the HLF and dam by the engineer, including taking appropriate photographs of the observed conditions;
- Review of routine inspection records prepared by operating personnel in the past year;
- Review whether or not recommendations from previous year's inspection(s) have been addressed, and any incidents or actions arising from those previous recommendations;
- Review of instrumentation and monitoring data;
- Review of the previous year's operations including reports of any incidents (and remedial measures) that may have occurred;
- An evaluation and interpretation of the structural performance of the embankment and related components, and identify any potential safety deficiencies or recommended items that need to be addressed in the coming year;
- Review construction records, QA/QC data and as-built information on dam construction and beaching; and
- Evaluation of the OMS Manual to assess the need for updating.

The results of the inspection and review will be documented in a report that will be submitted as per regulatory requirements.

9.3 Event-Driven Inspections

Special inspections will be carried out if any of the following events occur:

- Unusual events such as an earthquake or large precipitation event;
- Unusual operating events such as rupture of a pipeline or a power loss that lasts longer than 8 hours;
- Slide of the stacked leach ore;
- Unusual observations such as cracks, excessive settlements, sinkholes, large slope or foundation deformations in the embankment; or
- Instrument readings that deviate from historical trends, or are within site specific designated “alert” action levels.

Special inspections after unusual events are necessary to evaluate whether there has been any damage requiring correction, any safety measures or special operating procedures that need to be implemented, or if there is a need to initiate emergency procedures as outlined in the Eagle Gold Project Emergency Reponse Plan.

9.4 Comprehensive Dam Safety Review

The Canadian Dam Association, Dam Safety Guidelines (CDA, 2007) recommend a comprehensive dam safety review be carried out every 7 years during operations, prior to decommissioning and following closure. The comprehensive review provides independent verification of:

- Safety and environmental performance of the HLF facility, including the embankment;
- Adequacy of the surveillance program;
- Adequacy of delivery of OMS requirements;
- Design basis with respect to current standards and possible failure modes; and
- Compliance with new engineering standards (including analysis to confirm if necessary).

9.5 Documentation

Documentation of surveillance activities will be maintained by the Process Plant Manager and Environmental Superintendent and will include recording of:

- Routine visual observations (departures from normal conditions);
- Instrumentation monitoring and testing;
- Analyses and evaluations; and
- Reviews.

Documentation will include, as a minimum, the following:

- Routine inspection log;

- Surveillance network monitoring report
- Quarterly instrumentation reports;
- Annual engineering inspection reports;
- Biannual review of data and annual environmental monitoring and surveillance report
- Comprehensive dam safety report every 7 years.

Documentation will include a hard copy (paper) and electronic filing system for inspection reports, photographic and video records, incident reports, instrumentation readings, instrumentation plots, annual inspections and third-party reviews, so that they can be quickly retrieved for review and in case of an emergency.

9.6 Reporting

The Process Plant Manager will review collected data records from facility monitoring and assess the need for maintenance activities or response. The reporting procedures for various levels of surveillance are summarized below.

Performance meets design expectations

Data will continue to be plotted as recorded and documented in the monthly and annual reports.

Conditions may require adjustment to design, operation, maintenance or surveillance

The results of the routine maintenance and surveillance programs may results in a caution warning that requires action. The Process Plant Manager will formally notify the Design Engineer and request assessment of the data and to advise any remedial actions or potential modification to HLF components to bring the facility back into design expectations. The frequency of monitoring should be increased to confirm the measurements and to assess if the rate of change is increasing, stabilizing, or decreasing.

Potential Emergency Response Alert

Certain unexpected or unplanned events may trigger an emergency response alert. Examples of these events include earthquakes or large precipitation events that exceed the design storm event. The Process Plant Manager will immediately inform the following personnel, who will determine what immediate action should be taken and whether the Emergency Response Plan should be implemented:

- Site Management including the Mine General Manager, Environmental Superintendent, Health and Safety Superintendent;
- Design Engineer; and
- YTG Departments (Energy, Mines and Resources, Water Resources, Environment, etc.) and Environment Canada.

Environmental Monitoring and Reporting

The Environmental Superintendent is responsible for overseeing sample and data collection and analysis, and reporting as per Water Use License requirements to the Yukon Water Board. Data acquired from all environmental programs will be compiled bi-annually, and reported annually in the QML Annual Report (due March 31st of the subsequent year). The Annual Report for the Type A Water Use License is due February 28th of the subsequent year.

10.0 REFERENCES

Information from the following publications and documents was utilized to support the preparation of the OMS Manual.

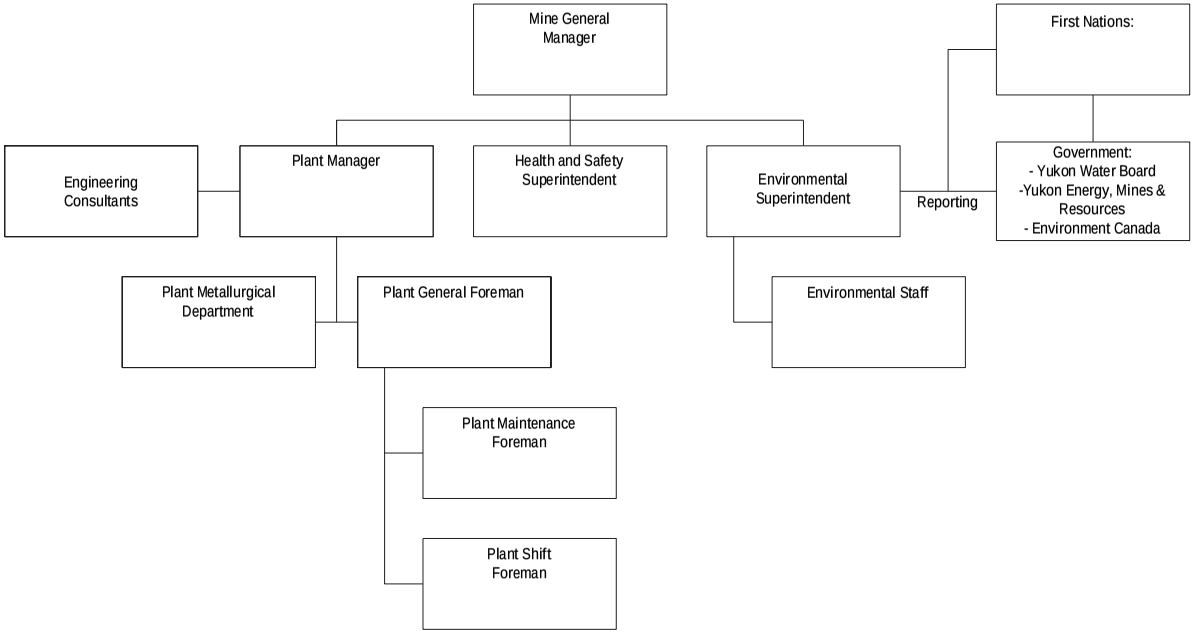
BCG, 2011. *Eagle Gold – Geotechnical Design Basis for Mine Site Infrastructure in the Project Proposal* dated. Prepared by BGC Engineering, Vancouver, British Columbia, Canada. April 2011.

CDA, 2007. *Dam Safety Guidelines*. Canadian Dam Association, Toronto, Ontario, Canada, 2007.

MAC, 2011. Developing an Operation, Maintenance and Surveillance Manual for Tailings and Water Management Facilities. ISBN 0-921108-25-7. The Mining Association of Canada, Ottawa, Ontario, Canada, 2011.

Stantec, 2012. Environmental Baseline Report: Climate, Eagle Gold Project, prepared March 2012.

FIGURES



NOTES

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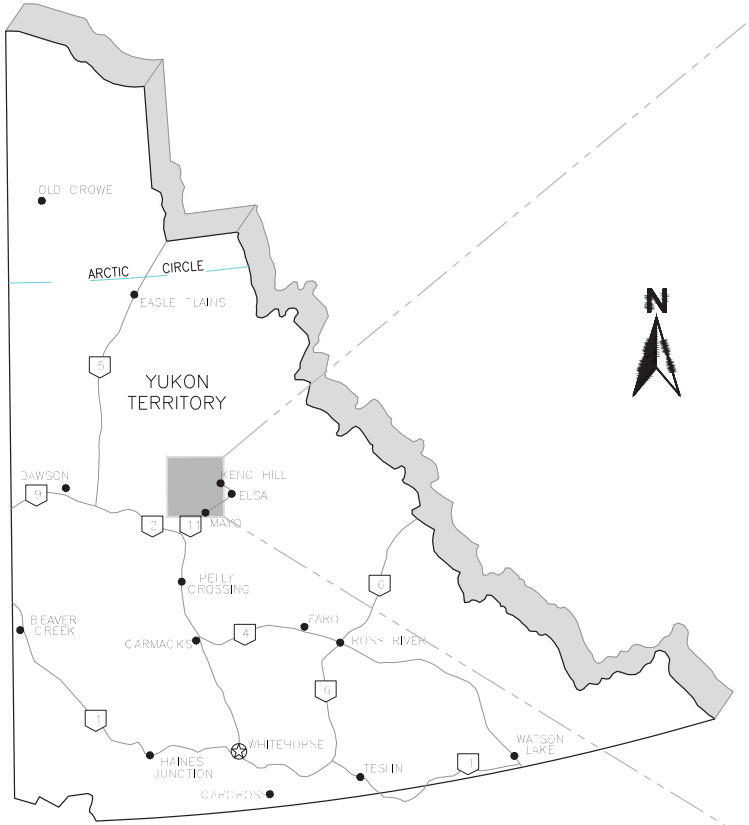
EAGLE GOLD PROJECT
YUKON TERRITORY

OMS RESPONSIBILITY ORGANIZATIONAL CHART

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	3.3-1

OFFICE	DATE
	DECEMBER 2013



REGIONAL LOCATION MAP
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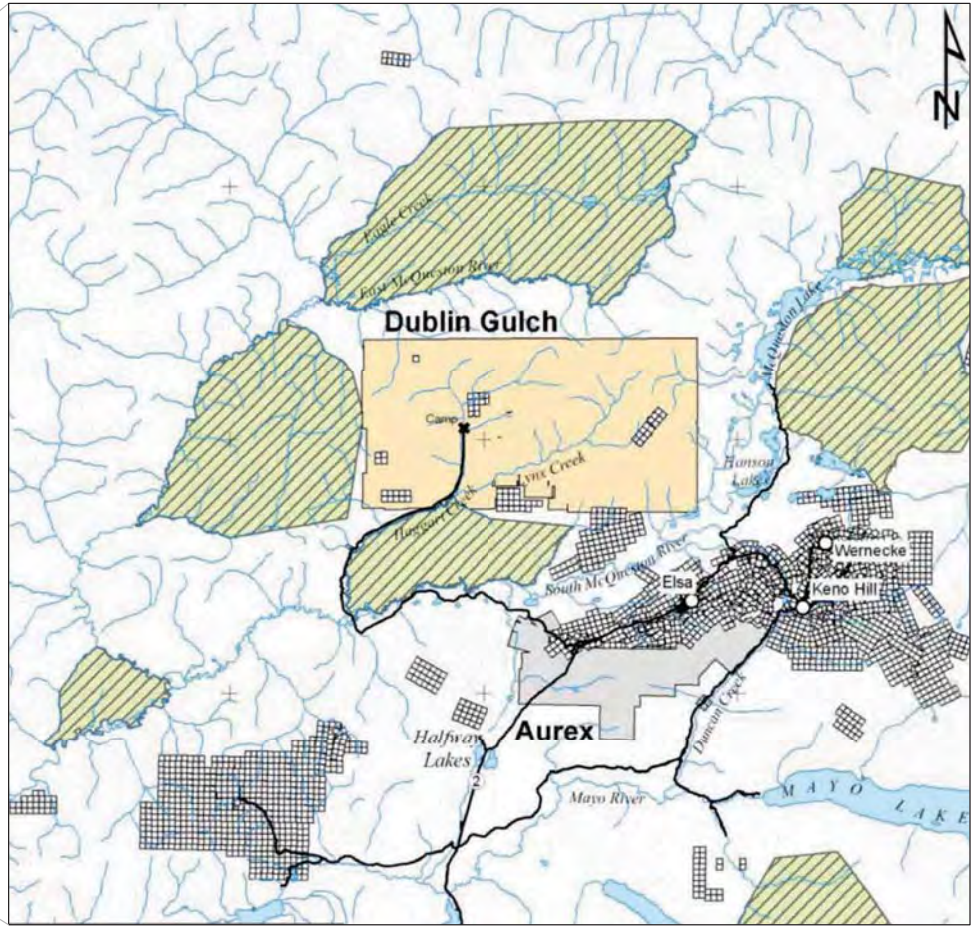

PROJECT LOCATION MAP
N.T.S.

7068000

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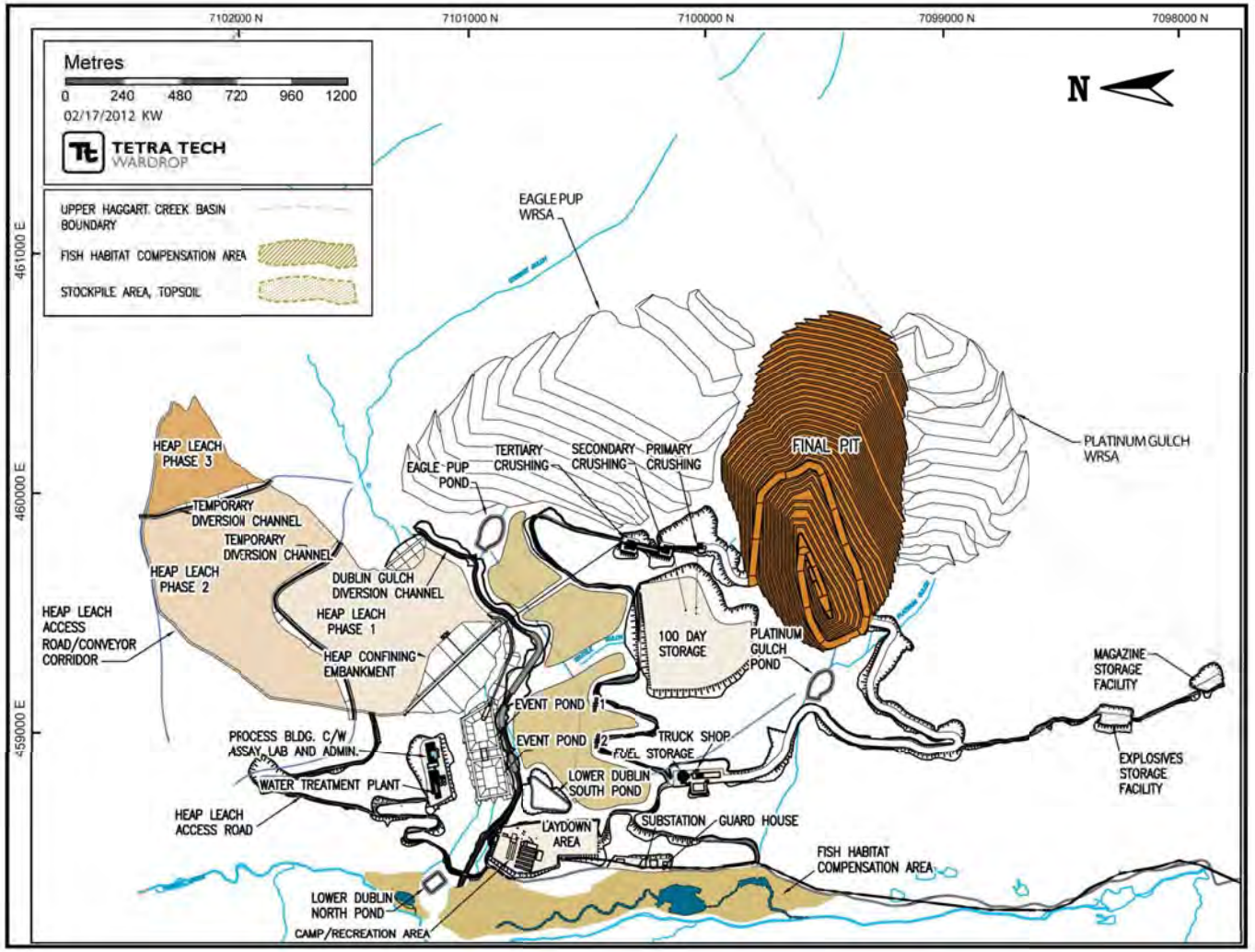
YUKON TERRITORY

PROJECT LOCATION

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	4.1-1

OFFICE

DATE
DECEMBER 2013



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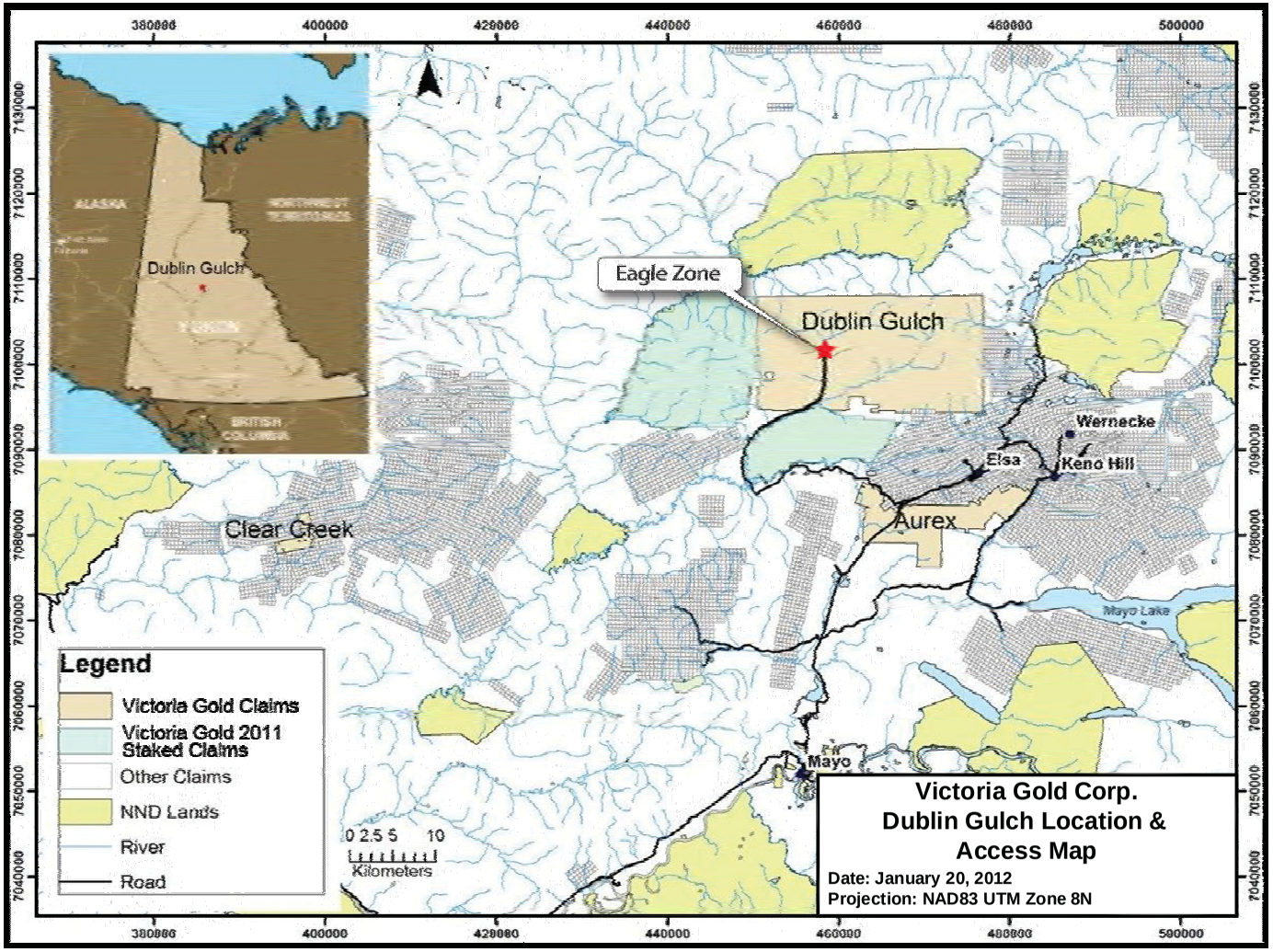
EAGLE GOLD PROJECT
YUKON TERRITORY

SITE LAYOUT

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	4.1-2
OFFICE	DATE	DECEMBER 2013		



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EAGLE GOLD PROJECT
YUKON TERRITORY

SITE LOCATION & ACCESS

PROJECT NO.	DWN	CKD	REV	FIGURE
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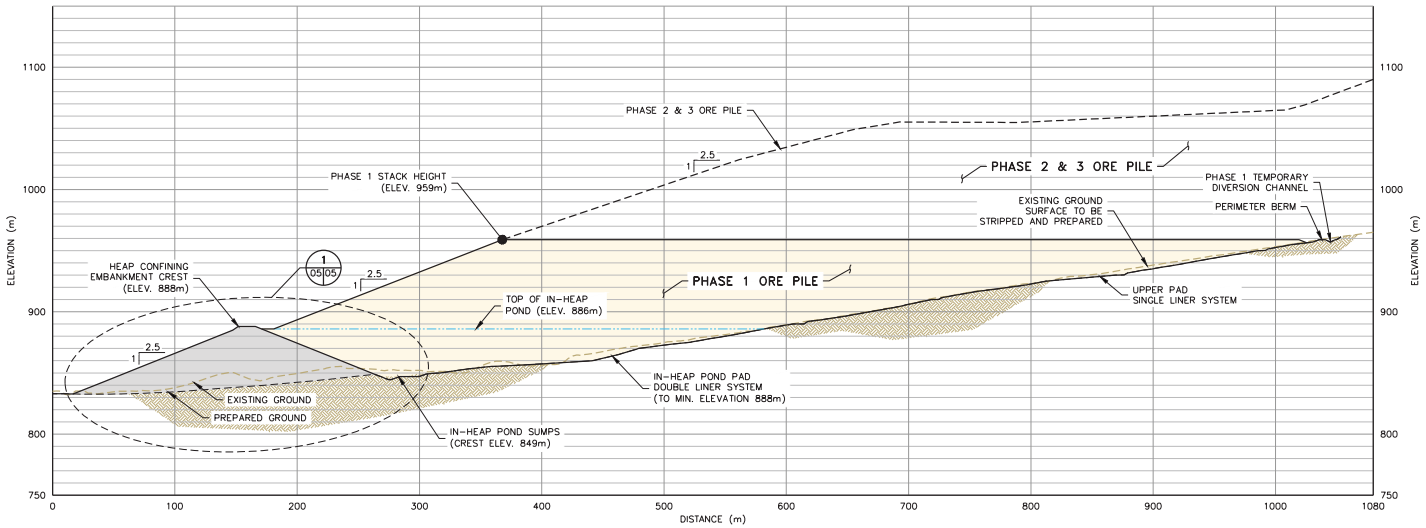
OFFICE

DATE
DECEMBER 2013



HEAP LEACH PAD CROSS SECTION
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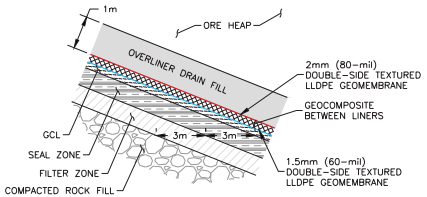

2 / 05|05 **EMBANKMENT LINER DETAIL**
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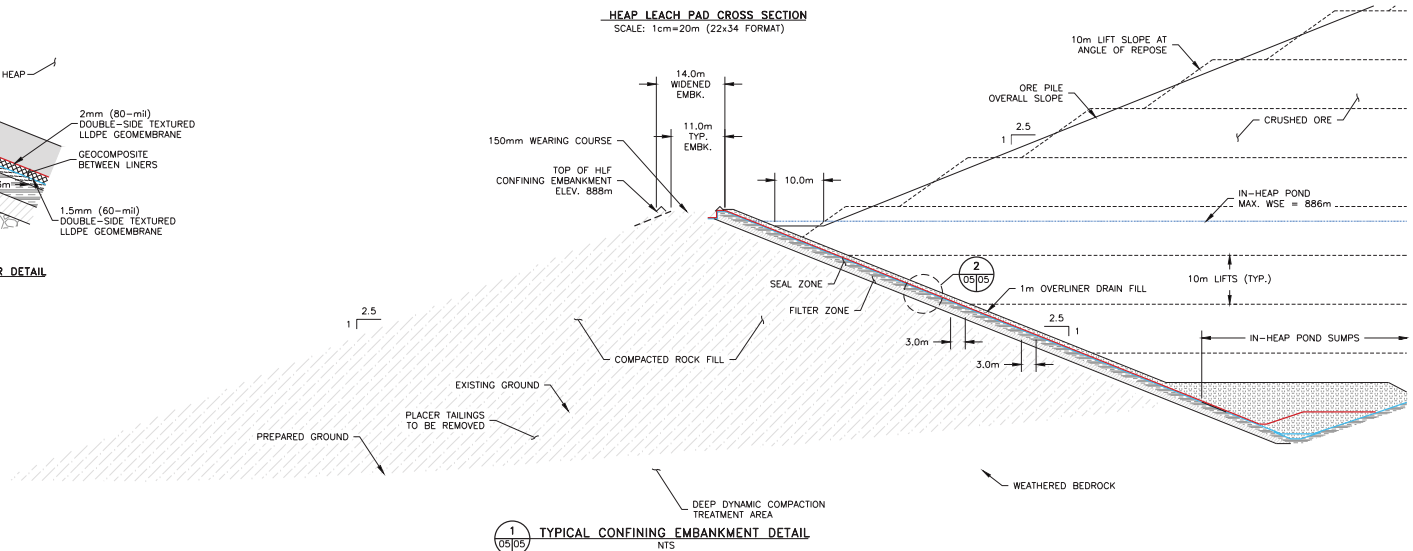

1 / 05|05 **TYPICAL CONFINING EMBANKMENT DETAIL**
NTS

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EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH FACILITY
CROSS SECTION AND LINER SYSTEM

PROJECT NO.	DWN	CKD	REV	FIGURE
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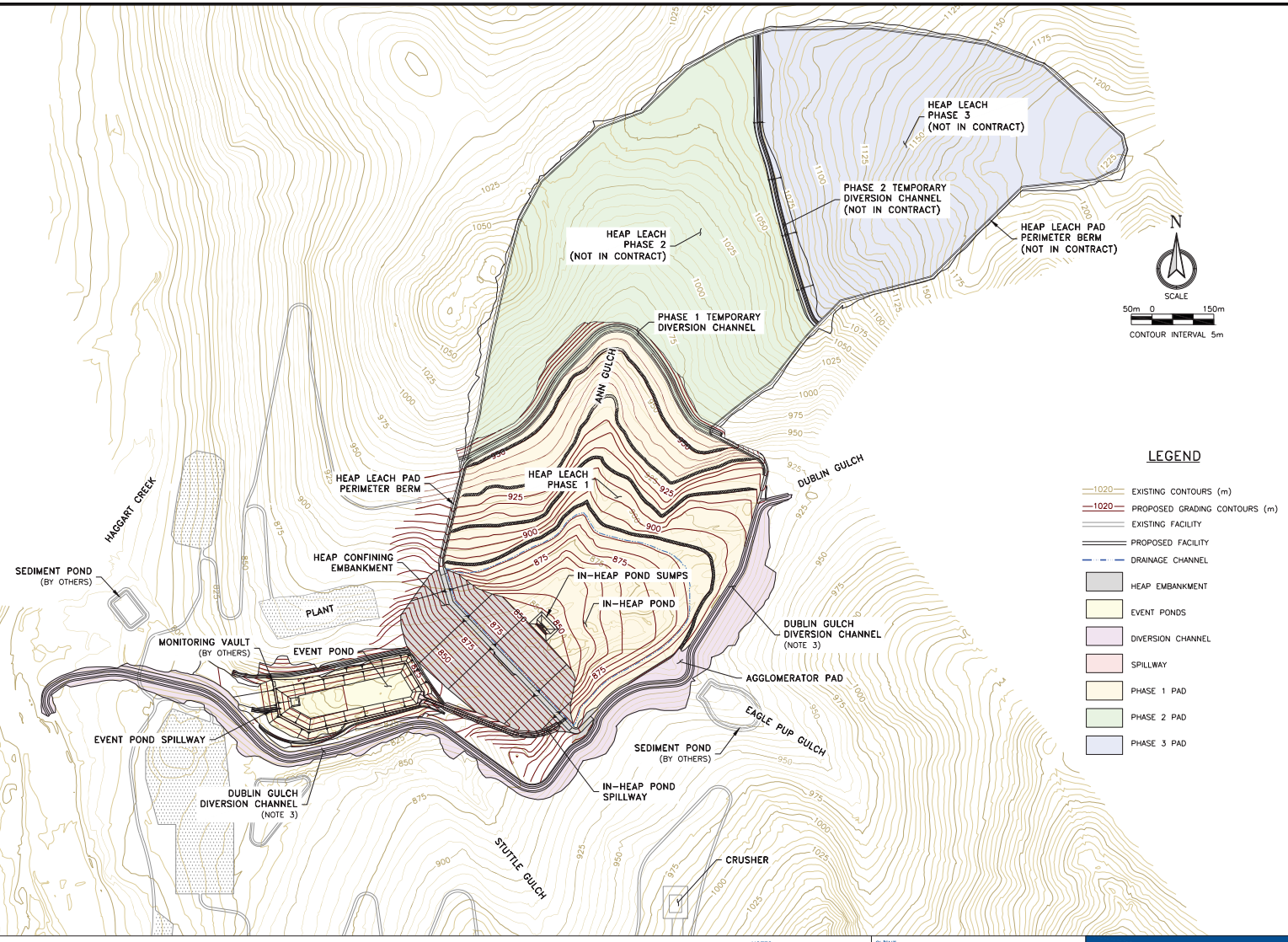
OFFICE

DATE
DECEMBER 2013



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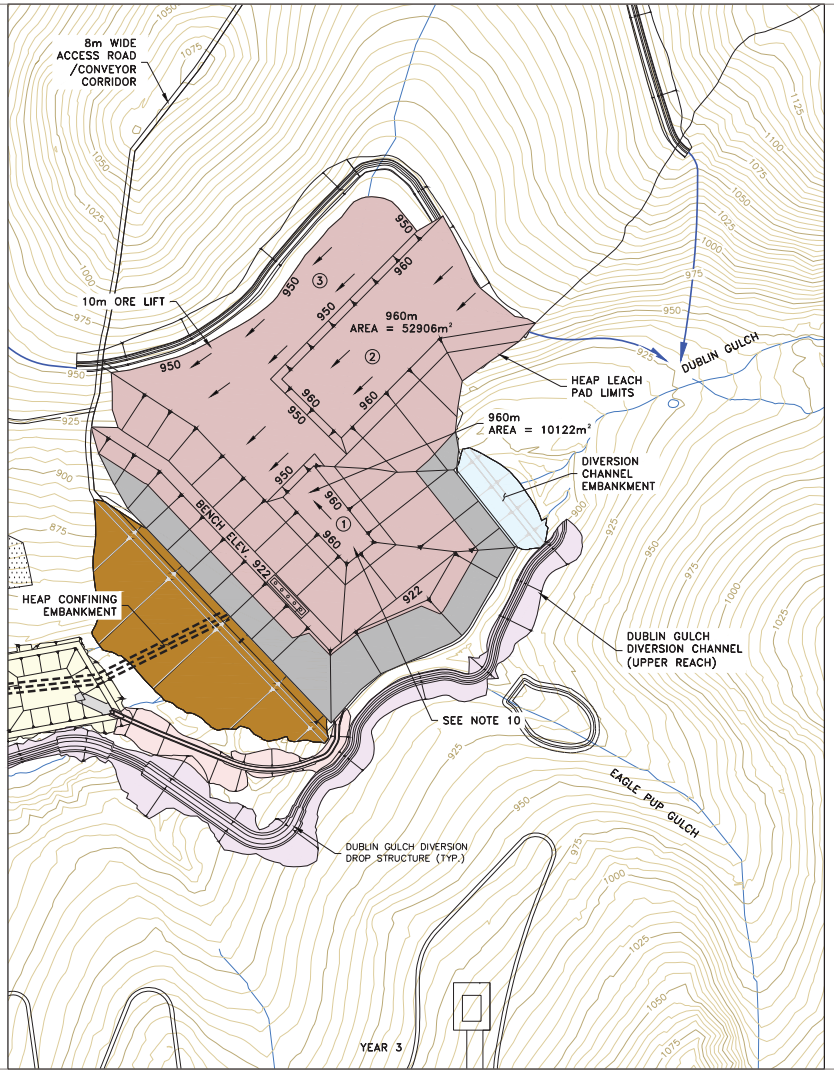
EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH FACILITIES
GENERAL ARRANGEMENT

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	4.3-2
OFFICE	DATE			
	DECEMBER 2013			



N

SCALE
40m 0 120m
CONTOUR INTERVAL 5m

NOTES:

1. BEGIN START-UP LIFT AT TOE OF HEAP, STACKING UPHILL.
2. ORE PRODUCTION RATE BASED ON 29,500 TPD 350 DAYS PER YEAR
3. ORE TOTAL STACKED TONNAGE = 32MT
4. AVERAGE IN-PLACE BULK DENSITY ASSUMED TO BE 1.8 TONNES/m³.
5. STACKING RATE BASED ON 250 DAYS PER YEAR AT 41,300 TPD.
6. OVERALL SLOPE ANGLE STACKED ORE IS 2.5:1 H:V
7. LIFT HEIGHT = 10m OVERALL STACKING WIDTH 164m
8. TOTAL LEACH PAD AREA EQUALS 40ha
9. THE COLLECTION WELL RISER TO BE EXTENDED TO 922 MASL.
10. BENCH NARROWER THAN STANDARD.

LEGEND:

STACKING DIRECTION .....
CURRENT PHASE .....
EXISTING PHASE .....
STACKING SEQUENCE ..... ②

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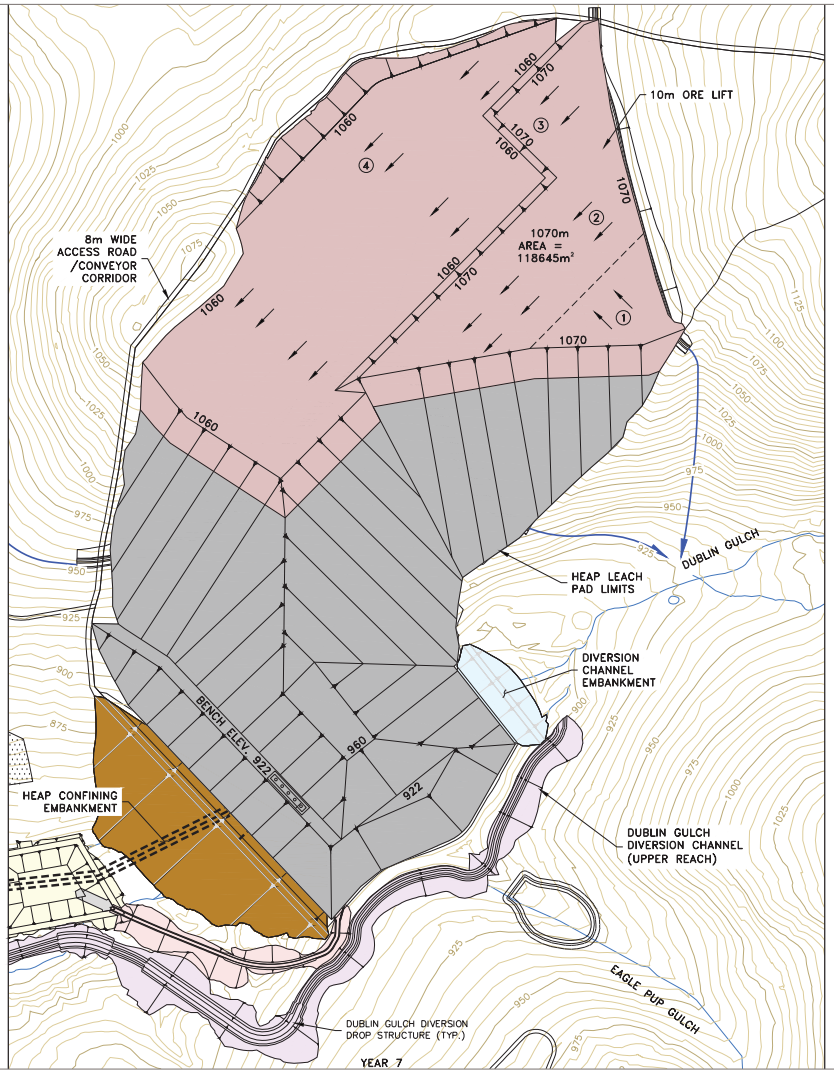
EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH PAD
AT END END OF PHASE 1

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	7.2-1
OFFICE	DATE			
	DECEMBER 2013			



N

SCALE
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CONTOUR INTERVAL 5m

NOTES:

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2. ORE PRODUCTION RATE BASED ON 29,500 TPD 350 DAYS PER YEAR
3. ORE TOTAL STACKED TONNAGE = 75MT
4. AVERAGE IN-PLACE BULK DENSITY ASSUMED TO BE 1.8 TONNES/m^3.
5. STACKING RATE BASED ON 250 DAYS PER YEAR AT 41,300 TPD.
6. OVERALL SLOPE ANGLE STACKED ORE IS 2.5:1 H:V
7. LIFT HEIGHT = 10m OVERALL STACKING WIDTH 164m
8. TOTAL LEACH PAD AREA EQUALS 91ha
9. THE COLLECTION WELL RISER TO BE EXTENDED TO 922 MASL.
10. ACCESS TO LIFT 1070 AND ABOVE VIA INTERNAL RAMPS.

LEGEND:

STACKING DIRECTION .....
CURRENT PHASE .....
EXISTING PHASE .....
STACKING SEQUENCE ..... ②

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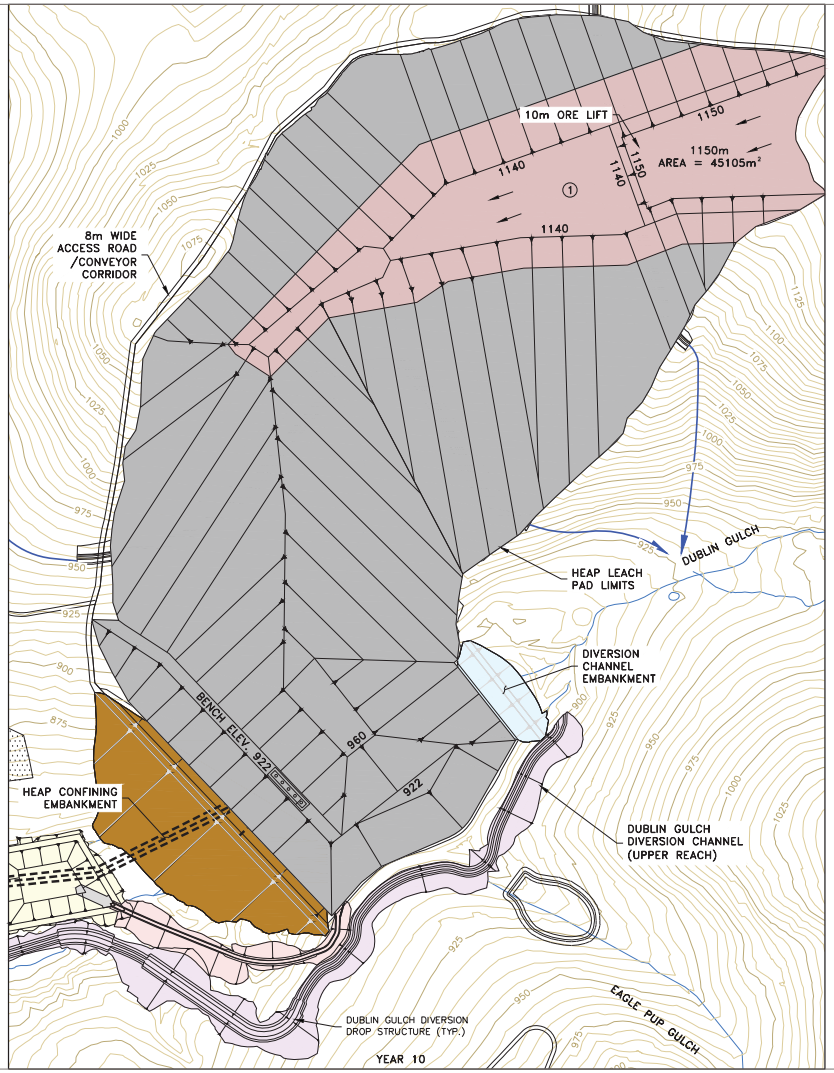
EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH PAD
AT END OF PHASE 2

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	7.2-2
OFFICE	DATE			
	DECEMBER 2013			



N

SCALE

40m 0 120m

CONTOUR INTERVAL 5m

NOTES:

1. BEGIN START-UP LIFT AT TOE OF HEAP, STACKING UPHILL.
2. ORE PRODUCTION RATE BASED ON 29,500 TPD 350 DAYS PER YEAR
3. ORE TOTAL STACKED TONNAGE = 91.6MT
4. AVERAGE IN-PLACE BULK DENSITY ASSUMED TO BE 1.8 TONNES/m^3.
5. STACKING RATE BASED ON 250 DAYS PER YEAR AT 41,300 TPD.
6. OVERALL SLOPE ANGLE STACKED ORE IS 2.5:1 H:V
7. LIFT HEIGHT = 10m OVERALL STACKING WIDTH 164m
8. TOTAL LEACH PAD AREA EQUALS 105ha
9. THE COLLECTION WELL RISER TO BE EXTENDED TO 922 MASL.
10. ACCESS TO LIFT 1070 AND ABOVE VIA INTERNAL RAMPS.

LEGEND:

STACKING DIRECTION .....

CURRENT PHASE .....

EXISTING PHASE .....

STACKING SEQUENCE ..... ②

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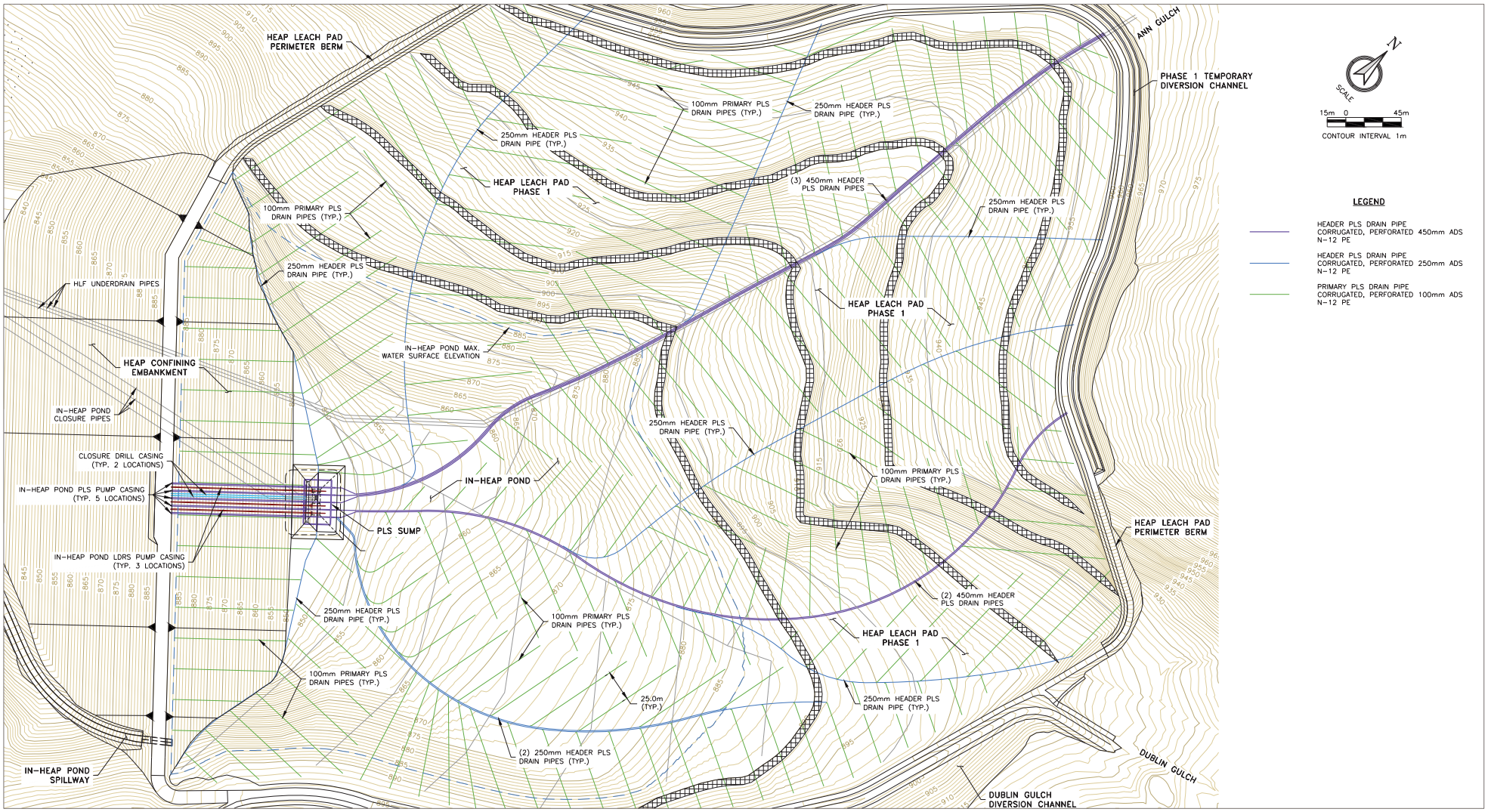
EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH PAD
AT END OF PHASE 3 (LOM)

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	7.2-3
OFFICE	DATE			
	DECEMBER 2013			



NOTES

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EAGLE GOLD PROJECT
YUKON TERRITORY

LEACHATE SOLUTION COLLECTION SYSTEM

PROJECT NO.	DWN	CKD	REV	FIGURE
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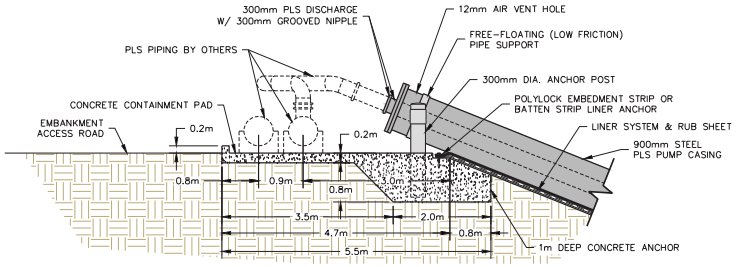
OFFICE

DATE
DECEMBER 2013



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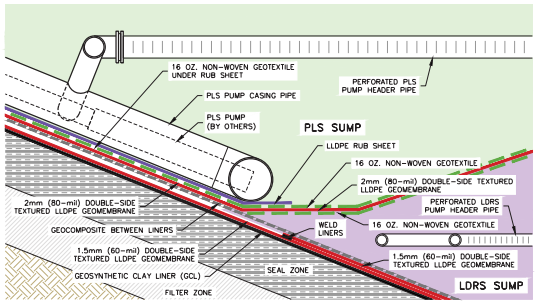

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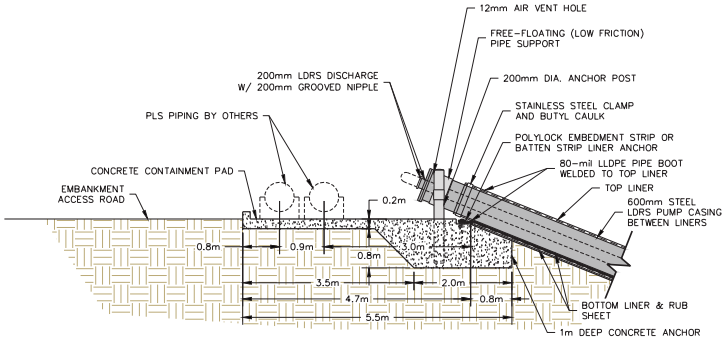

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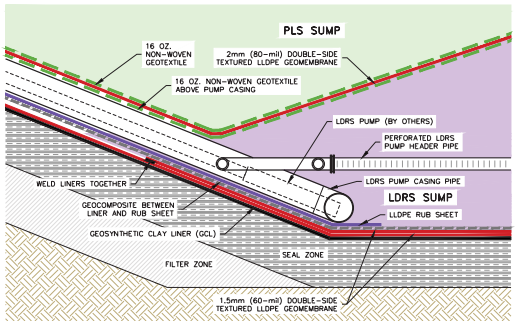

82 (21|23) LDRS SUMP LINER DETAIL
SCALE: NTS

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EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH FACILITY
PLS SUMP AND LDRS DETAIL

PROJECT NO.	DWN	CKD	REV	FIGURE
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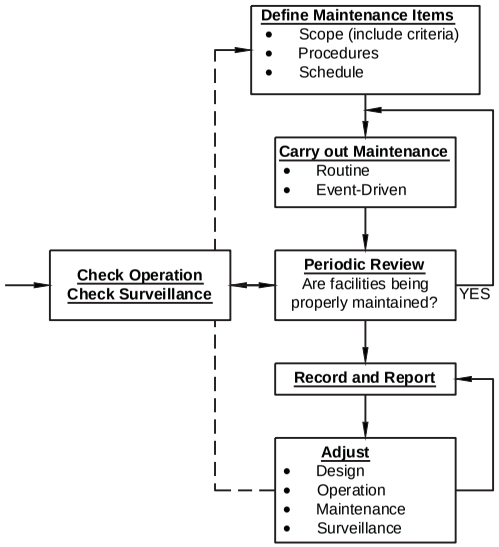
OFFICE	DATE			
	DECEMBER 2013			



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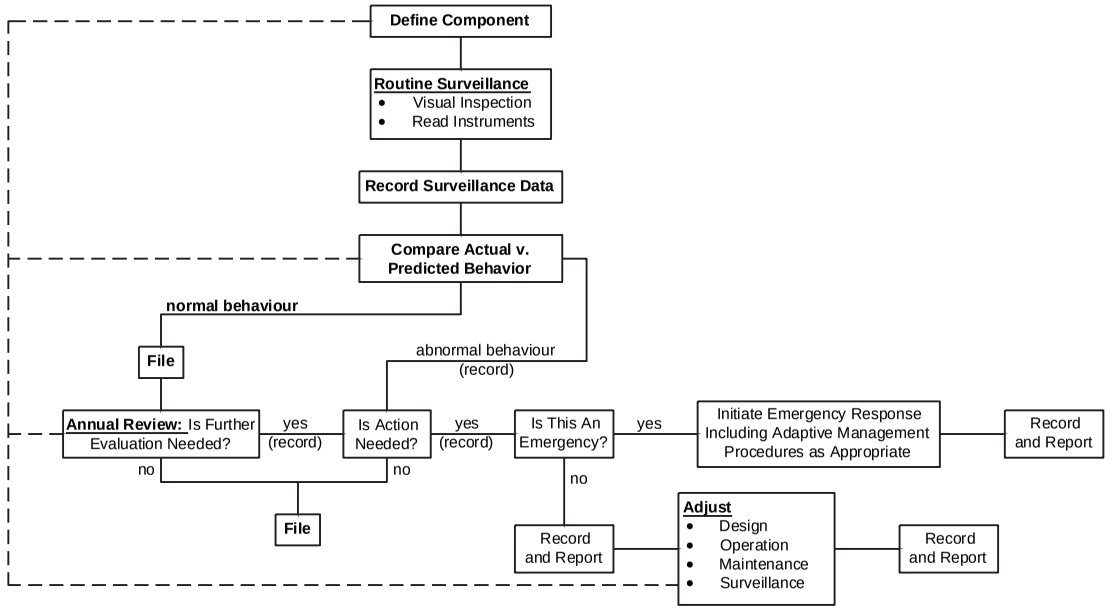
EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH FACILITY
MAINTENANCE FLOWCHART

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	8.8-1
OFFICE	DATE			
	DECEMBER 2013			



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EAGLE GOLD PROJECT
YUKON TERRITORY

HEAP LEACH FACILITY
SURVEILLANCE FLOWCHART

PROJECT NO.	DWN	CKD	REV	FIGURE
320905X	MRH	TLM/WJR	0	9.9-1

OFFICE	DATE
	DECEMBER 2013

APPENDIX D

Heap Leach and Process Facilities Emergency Response Plan

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EAGLE GOLD PROJECT

HEAP LEACH AND PROCESS FACILITIES EMERGENCY RESPONSE PLAN

Version 2014-01

JUNE 2014

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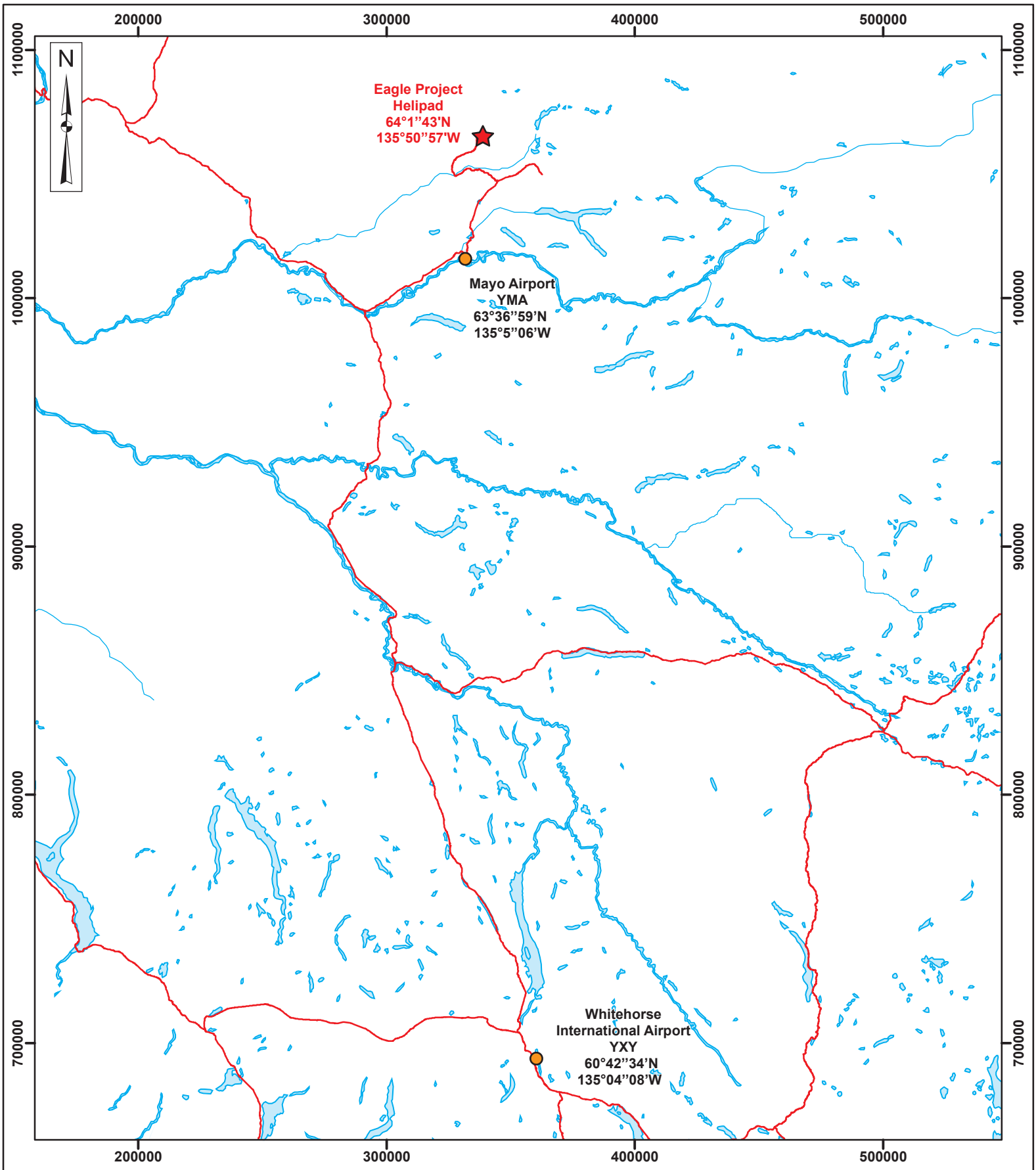
1 INTRODUCTION

StrataGold Corporation (SGC), a directly held wholly owned subsidiary of Victoria Gold Corporation has proposed to construct, operate, close and reclaim a gold mine in central Yukon. The Eagle Gold Project ('the' Project) is located 85 km from Mayo, Yukon using existing highway and access roads as shown on Figure 1-1.

The Project will involve open pit mining at a production rate of approximately 10 million tonnes per year (Mt/y) ore, an average strip ratio (amount of waste: amount of ore) of 1.45:1.0 and gold extraction using a three stage crushing process, heap leaching, and a carbon adsorption, desorption, and recovery system over a 10 year mine life.



Legend:

- Eagle Gold Project
- Town / Village
- Major Roadway
- Watercourse
- Waterbody

StrataGold Corporation

0 12.5 25 50

Kilometres

Scale = As Shown

EAGLE GOLD PROJECT
YUKON TERRITORY

Project Location

Projection:	Drawn By:	Date:	Figure:
Yukon Albers	SS	2014/05/23	1-1

2 HEAP LEACH AND PROCESS FACILITIES EMERGENCY RESPONSE PLAN PURPOSE

The purpose of this Heap Leach Facility Emergency Response Plan (the Plan) is to ensure that an adequate level of emergency preparedness and response is available in the event of an emergency scenario involving the Heap Leach Facility (HLF) or associated structures. The Plan is supplemental to the Eagle Gold Project Emergency Response Plan.

This plan was developed based on the following guidelines:

- Dam Safety Guidelines (2007);
- International Cyanide Management (2012);
- Type A and B Quartz Mining Undertakings - Information Package for Applicants (2012);
- Plan Requirement Guidance for Quartz Mining Projects (2013).

3 HEAP LEACH AND PROCESS FACILITIES OVERVIEW

The Heap Leach Facility (HLF) is a valley fill design which incorporates a rock-filled embankment that will provide stability to the base of the heap and the stacked ore. The embankment also creates an In-Heap Pond leaching configuration that provides storage of pregnant solution within the pore spaces of the ore.

The major design components for the HLF includes the following: the rock-filled embankment (dam) and the In-Heap Pond; a composite liner system; solution recovery wells; associated piping network for solution collection and distribution; a leak detection and recovery system (LDRS); and a downstream Events Pond to contain excess solution that results from extreme precipitation or emergency events.

3.1 HEAP LEACH EMBANKMENT AND IN-HEAP SOLUTION POND

The embankment is designed as an earthfill/rockfill structure with a geo-membrane lined upstream dam face and appropriate filter and transition zones to ensure containment integrity. The final embankment crest will be at 888 masl and includes a 10 m crest width for road and pipeline access, and 2.5H:1V upstream and downstream slopes.

The In-Heap Pond will store process solution within the pore space of the ore, directly up gradient of the confining embankment. The In-heap Pond volume requirements (Table 3-1) were determined assuming a combination of events were to occur simultaneously. In the unlikely event the design capacity is exceeded, or if the 24-hour 100 year storm event were to occur simultaneously with the snowmelt and heap draindown, the spillway in the In-Heap Pond will enable a controlled discharge of water to the Events Pond.

Table 3-1: In-Heap Pond Volume Requirements Summary

Volume Requirement	Volume (m^3)
Assumed Normal Operational Volume	33,240
Runoff from a 100-year 24-hour Rainfall Event	104,400
Snowmelt Runoff Volume	82,026
Heap Draindown Volume	199,440
Total Volume Requirement	**419,106**

The required In-Heap Pond volume (419,106 m^3) was used to obtain a corresponding elevation that would provide the necessary storage volume. Elevation 886 masl will provide a volume of 447,945 m^3; this elevation was selected because it will provide an additional factor of safety and one meter of freeboard to account for possible decreases in storage capacity.

The final embankment crest elevation will be at 888 masl (2 m above the required elevation). The In-Heap Pond Spillway invert will be at elevation 886 masl. Thus, the ultimate storage capacity of the In-Heap Pond up to the final embankment crest elevation (888 masl) is estimated at 504,560 m^3.

3.2 EVENTS POND

The Events Pond is a double lined facility with a leak detection and recovery system (LDRS) which serves as overflow containment in case the In-Heap Pond capacity is exceeded. The capacity of the Events Pond is 203,967 m^3 with freeboard, and is 254,848 m^3 without freeboard.

3.3 LINER SYSTEM

The liner for the HLF and the Events Pond will consist of a composite geomembrane and underlying low-permeability bedding material. The primary purpose of the composite liner system is to prevent the loss of process leach solution (PLS) for both environmental and economic reasons.

3.4 OVERLINER DRAIN FILL

The overliner drain fill (ODF) is a 1 m thick layer of crushed material placed over the entire In-Heap Pond and heap leach pad area including the upstream face of the confining embankment. The ODF minimizes the hydraulic head on the liner system to reduce the risk of PLS leakage and protects the liner system from damage during ore placement.

3.5 SOLUTION COLLECTION SYSTEM

Solution will be collected in the high permeability ODF at the base of the heap leach pad, with perforated collection pipes placed within the ODF to increase solution removal rates. The collection pipe network will direct the solution to the sump at the toe of the embankment for pumping through inclined riser pipes to the process plant.

The base of the sump will be constructed approximately 2 m below the elevation of the surrounding liner and the liner system and LDRS will extend under the sump. Solution will be pumped from the sump through three of five available inclined risers to the process plant. The inclined arrangement will consist of five thick-walled, steel pipes to allow for raising and lowering of a submersible pump. Three pumps will have the capacity to meet the solution application throughflow. The remaining two riser pipes will be installed as a back-up, to maintain access to the sump in the event that any riser pipes become blocked.

3.6 LEAK DETECTION AND RECOVERY SYSTEM

A LDRS will be constructed within the In-Heap Pond and the Events Pond and will consist of a monitoring sump equipped with an automatic, fluid-level activated pump located between the top and bottom liners. The pump will be sized to sufficiently remove fluids to minimize head on the bottom liner and will also be connected to a flow meter to provide the volumes recovered over specific time intervals.

3.7 UNDERDRAIN SYSTEM

The HLF underdrain system provides for the collection and drainage of subsurface water beneath the lined facility to limit upward pressure on the facility liner. The underdrain will be constructed with

geofabric wrapped around granular drain rock backfill materials and 100 mm perforated pipes placed at regular intervals (approximately 75 m spacing). The drains will convey unaffected subsurface water to collector pipes that will discharge to an outlet monitoring vault. The vault is equipped with a pump system to return flows to the HLF for use as make up water or allow flows to outfall to receiving waters if discharge criteria are met.

3.8 SOLUTION CONVEYANCE AND PUMPING SYSTEMS

Barren solution containing cyanide will be applied to the ore stacked on the HLF to extract the gold. After passing through the ore, this solution will be collected by the solution collection system.

A series of barren solution pumps located at the Adsorption Desorption Recovery (ADR) facility will pump solution to the Heap Leach Pad. A series of pipe headers will distribute the solution to secondary and tertiary headers, and ultimately drip emitters placed under the surface of the ore.

The process pumping system includes pumps, pipelines, valves, and associated controls to move solution between the ADR plant and the HLF.

3.9 METAL RECOVERY AND PROCESSING FACILITY

Gold will be recovered from the PLS by activated carbon adsorption and pressurized cyanide/caustic desorption, followed by electrowinning onto stainless steel cathodes, and then subsequent on-site smelting to gold doré. This process is referred to as the adsorption, desorption and recovery process. The gold-barren leach solution that remains after passing the PLS through the carbon columns will be replenished with reagents for cyanide and pH control and re-circulated back to the HLF as barren solution.

Sodium cyanide briquettes will be added to the system via 1 t super sacks. The sodium cyanide will be mixed and then transferred to the cyanide mix storage tank. This concentrated cyanide solution will be metered into the barren solution tank, to the carbon columns, and to the strip solution tank, as required. Sodium hydroxide, or caustic solution, will be used in the system for acid neutralization and for preparing the fresh barren solution.

4 ORGANIZATION AND RESPONSIBILITY

4.1 EMERGENCY RESPONSE

Clearly defined roles and responsibilities are vital for effective and timely response to an emergency situation. The key roles for emergency response related to the Project are described below and depicted in Figure 4-1.

Discoverer

The Discoverer is any individual witnessing an emergency on the Project site and is responsible for initiating a Code 1 emergency response. The Discoverer will call out on their current radio channel "Code 1, Code 1, Code 1" and clearly state the nature and location of the emergency. The Discoverer will then change their radio to Channel 1 (Emergency Channel) and repeat "Code 1, Code 1, Code 1" and the nature and location of the emergency. The Discoverer will remain on Channel 1 and await response from the Emergency Responder.

Emergency Responder

The Emergency Responder will respond to the Discoverer on Channel 1 to request confirmation of the nature and location of the emergency. Once the emergency details have been confirmed, the Emergency Responder will provide instructions to the Discoverer on the appropriate immediate response the Discoverer should undertake.

The Emergency Responder will then contact Security who will be responsible for initiating a page for the Emergency Response Team (ERT).

Security

Security is responsible for paging the ERT at the request of the Emergency Responder. If no reply to the initial Code 1 call from the Discoverer is heard from the Emergency Responder, Security will assume the role of Emergency Responder to ensure a timely response.

Emergency Response Team

The ERT will mobilize to the scene and the first, or most senior ERT member, will conduct an initial assessment and assume command of the scene. The ERT team member who assumes control of the scene will not relinquish control of the scene until the arrival of the Emergency Response Coordinator (ERC).

Emergency Response Coordinator

The ERC will mobilize to the scene and, after being briefed on any developments, will assume control of the scene and direct the response of all personnel at the scene. After the ERC has provided direction for the response effort, which may include radioing for additional assistance from First Aid Attendants, he/she will appoint an appropriate ERT member to act as Team Captain and to

assume control of the scene. The ERC will then report to the Incident Control Center (ICC) to brief the Incident Commander (IC).

First Aid Attendants

Any First Aid Attendants on the Project site that are not part of the ERT will immediately cease all activity upon hearing the Code 1 and ensure they are in a location where they can clearly hear any radio broadcasts for further assistance. If further assistance is required, they will mobilize to the scene or any other location as directed by the ERC.

If a First Aid Attendant is in the immediate area of the emergency they are to report to the scene and assist with the efforts of the Discoverer or identify themselves to the ERT as a First Aid Attendant and await further instructions.

Incident Commander

The Incident Commander will immediately report to the ICC when a Code 1 response has been initiated. The IC will be responsible for communicating the nature and extent of any emergency to SGC senior management.

Prior to the arrival of related Governmental Agencies, only the IC has the authority to order the evacuation of personnel from the Project site or the authority to give the “All Clear” order, indicating that it is safe to re-enter an area or building following an evacuation.

SGC Senior Management

SGC Senior Management will be responsible for communication with relevant Yukon Government agencies based on information provided by the IC.

All Other Site Personnel

All site personnel that are not directly involved in emergency response efforts will cease work, unless the cessation of their work could result in an emergency situation, and will observe radio silence until an “All Clear” has been given.

Incident Command Center

Each incident in which a Code 1 response has been raised will require the activation of the Incident Control Center. The ICC will be able to receive and send critical communications (telephone, VHF radio and fax) and will be operated continuously throughout the incident. The ICC is located in the Administrative Office Boardroom on site and chaired by the Incident Commander. A secondary location will be established in the SGC Vancouver office.

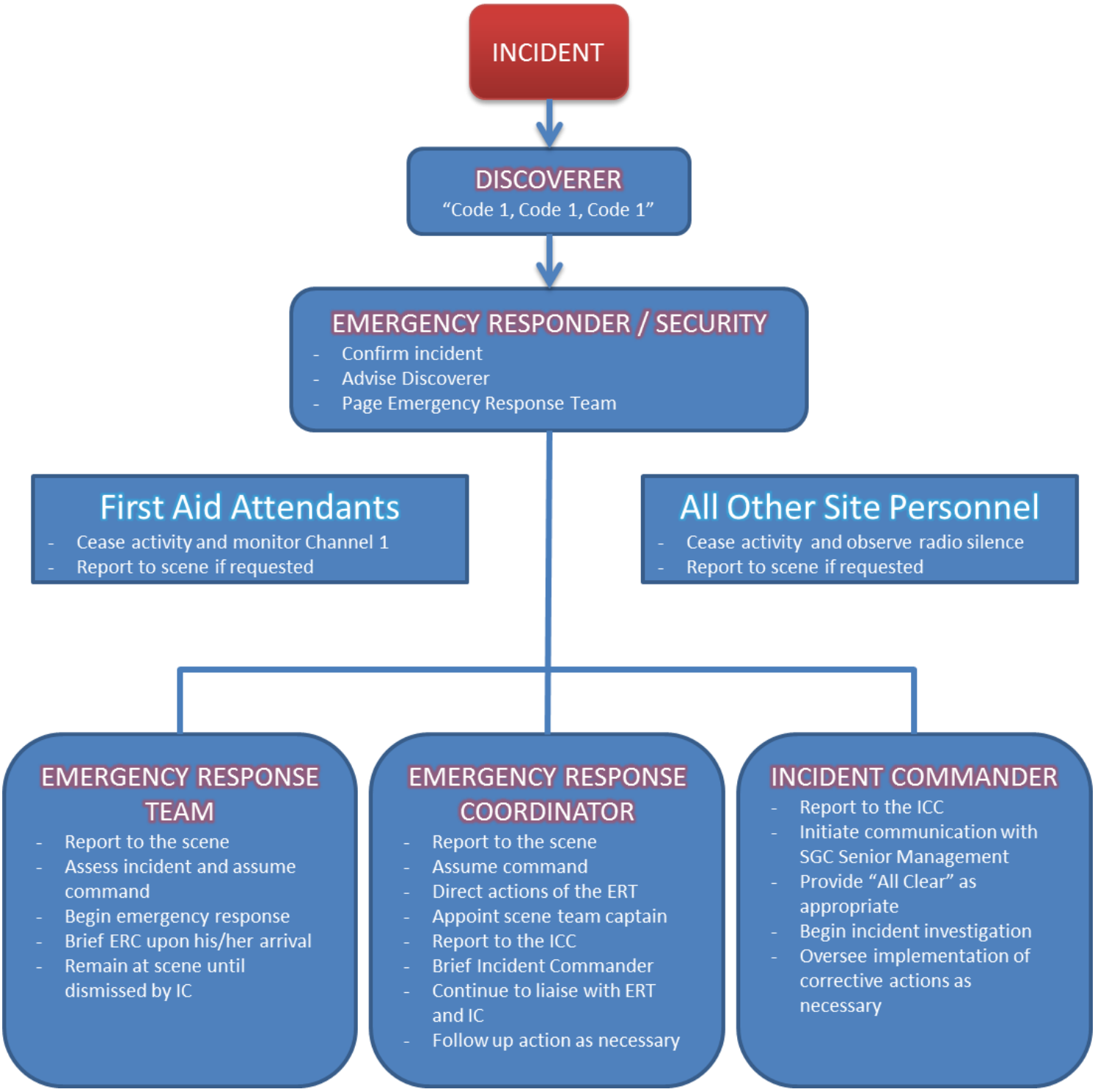


Figure 4-1: Emergency Response Organizational Chart

4.2 DELEGATION OF RESPONSIBILITIES

The Project is intended to be a continuous operation with work activities being undertaken 24 hours a day for 365 days a year. Continuous operations require a planned and documented delegation of responsibilities to ensure the integrity of emergency response. The Mine Manager is ultimately responsible for ensuring that all key positions related to emergency response are staffed by competent personnel. The delegates for each of the emergency response positions will be posted in conspicuous locations around the Project site including, but no limited to, the administration building, the dining room, arctic corridors leading to the bunk rooms, the ICC, and at the SGC Vancouver office.

The currently approved delegates for emergency response are provided in Table 4-1.

Table 4-1: Emergency Response Designates

Emergency Response Position	Project Phase	Primary Personnel	Designate	Minimum Skills/Qualifications
Emergency Responder	Pre-Construction	First Aid Attendant	First Aid Attendant	Occupational First Aid Level 3 WHMIS
	Construction and Operations	ICC & First Aid dedicated First Aid Attendant	ICC & First Aid dedicated First Aid Attendant cross shift	Occupational First Aid Level 3 WHMIS
	Closure	First Aid Attendant	First Aid Attendant	Occupational First Aid Level 3 WHMIS
Security	Pre-Construction	Camp Coordinator	Site Operations	N/A
	Construction and Operations	Security Team Leader	Security Officer	N/A
	Closure	Camp Coordinator	Site Operations	N/A
Emergency Response Team	Pre-Construction	Various	Various	Occupational First Aid Level 1 WHMIS
	Construction and Operations	Various	Various	Occupational First Aid Level 1 Surface Mine Rescue WHMIS Industrial Fire Brigade Spill Response Hazardous Materials Handling
	Closure	Various	Various	Occupational First Aid Level 1 WHMIS Spill Response Hazardous Materials Handling
Emergency Response Coordinator	Pre-Construction	Various	Various	Occupational First Aid Level 3 WHMIS Industrial Fire Brigade

Emergency Response Position	Project Phase	Primary Personnel	Designate	Minimum Skills/Qualifications
	Construction and Operations	Health, Safety and Compliance Manager	Safety Coordinator	Occupational First Aid Level 3 Surface Mine Rescue WHMIS Industrial Fire Brigade Spill Response Hazardous Materials Handling
	Closure	Various	Various	Occupational First Aid Level 3 WHMIS Industrial Fire Brigade
Incident Commander	Pre-Construction	Site Manager	Camp Coordinator	WHMIS
	Construction and Operations	Mine Manager	Health, Safety and Compliance Manager	Surface Mine Rescue WHMIS Industrial Fire Brigade Spill Response Hazardous Materials Handling
	Closure	Site Manager	Camp Coordinator	WHMIS Spill Response Hazardous Materials Handling

5 EMERGENCY DETECTION AND CLASSIFICATION

5.1 EMERGENCY DETECTION

As described in operational and environmental management plans developed for the Project, a range of monitoring and inspections will be conducted to ensure that Project features operate as intended. Unusual conditions or emergency events may be detected by the planned monitoring and inspection but may also be detected by:

- Observation by SGC personnel or contractors during the ordinary course of operations
- Observation by government personal (local, territorial, federal), visitors, or the public
- Evaluation of instrumentation data
- Earthquakes felt or reported in the vicinity of the Project
- Advanced warning of conditions that may cause an unusual event or emergency (e.g. severe weather warnings, forest fires, etc.)

Unusual conditions or emergency events are situations that are different from the normal or expected conditions of the heap leach and process facilities. These unusual conditions may indicate problems needing further monitoring, inspection, or corrective measures or may indicate an emergency condition requiring emergency response. Table 5-1 provides a description of the emergency levels which may be detected on the Project.

Table 5-1: Emergency Levels

Emergency Level		Description
1	Non-failure	Abnormal situation which has not threatened the operation, or structural integrity, of a system.
2	Potential failure developing	Abnormal situation which may eventually lead to a system failure but there is no immediate threat
3	Imminent or actual failure	Extremely urgent situation where a system failure is occurring or its failure is imminent

5.2 EMERGENCY CLASSIFICATION

The design, construction, and operation of the heap leach and process facilities are all intended to mitigate the possibility of an emergency event developing; however, the potential for an emergency event does exist. Table 5-2 provides some of the unusual conditions and emergency events that have been planned for and also provides the anticipated emergency level. This information is provided as a general guide only and the professional opinion of qualified personnel should always be strongly considered.

Table 5-2: Emergency Level Determination

Project Facility or Event	Unusual Condition	Emergency Level
HLF Spillway	Process solution is spilling to Events Pond	1
	Process solution is spilling to Events Pond which is at 80% of total capacity	2
	Process solution is spilling to Events Pond which is at full capacity	3
Embankment	New cracks in the embankment less than 0.5cm wide without seepage	1
	New cracks in the embankment greater than 0.5cm wide without seepage	2
	Cracks in the embankment with seepage	3
	Visual movement/slippage of the embankment slope	2
	Sudden or rapidly proceeding slides of the embankment slopes	3
	Process solution is overtopping embankment crest	3
Events Pond	Events Pond is full to 80% of total capacity	2
	Fluid level has encroached freeboard and rising flow over the Events Pond spillway is imminent or occurring	3
	New cracks in the pond slopes less than 0.5cm wide without seepage	1
	New cracks in the pond slopes greater than 0.5cm wide without seepage	2
	Cracks in the pond slopes with seepage	3
	Visual movement/slippage of the pond slopes	2
	Sudden or rapidly proceeding slides of the pond slopes	3
Ore heap	Visual movement/slippage of the ore heap (shallow slope failure)	2
	Sudden or rapidly proceeding slides of the ore heap (deep slope failure)	3
Liner and LDRS	In Heap Pond Alert Level 1 (84 L/minute)	1
	In Heap Pond Alert Level 2 (1,582 L/minute)	2
	Events Pond Alert Level 1 (11 L/minute)	1
	Events Pond Alert Level 2 (217 L/minute)	2
Dublin Gulch Diversion Channel	Water level in the DGDC is above ordinary high water mark	1
	Water level at downstream end of DGDC is at full channel capacity	2
	Water level at upstream end of DGDC is at full channel capacity	3
Earthquake	Measurable earthquake felt or reported on or within 100 km of the Project	1
	Earthquake resulting in visible damage to the HLF or appurtenances	2
	Earthquake resulting in uncontrolled release of PLS from the HLF	3
Security Threat	Verified threat that, if carried out, could result in damage to the HLF or appurtenances	2
	Detonated bomb or act of sabotage/vandalism that has resulted in damaged to the HLF or appurtenances	3

5.3 COMMUNICATION WITH STAKEHOLDERS

SGC's response and communication procedures for heap leach and process facility scenarios are based on a three-tiered system linked to the emergency levels. Broadly, the three tiers for response and communication are shown in Table 5-1.

The tiered communication and emergency level system has been developed so that SGC Senior Management and site personnel are able to notify appropriate communities, government agencies, and other stakeholders of an emergency. Proper communication of an event involving heap leach and process facilities is intended to reduce the likelihood of a panicked response which may exacerbate the emergency.

5.3.1 Tier 1 Communication Protocol

If a scenario is deemed to be a "Non-Failure" situation then the primary communication responsibility is to report the situation to an immediate supervisor and/or the Manager of Health, Safety and Compliance. The goal of the communication is to ensure that all relevant personnel are aware of the situation so corrective measures can be taken as necessary. Any site personnel made aware of a Tier 1 emergency level event are to limit communication to internal SGC personnel and any decision to communicate the situation to government agencies, the media, or local communities is at the discretion of SGC Senior Management.

5.3.2 Tier 2 Communication Protocol

If a scenario is deemed a "Potential failure developing" situation, the communication level is expanded outside of SGC. The responsibility for this communication is the Mine Manager and/or the Manager of Health, Safety and Compliance once they have been made away of the situation. The goal of the communication is to ensure that the relevant government agencies are aware of the situation and are advised that SGC is taking appropriate action to correct the situation and assistance is likely not immediately required.

The organizations to be contacted will vary based on the type of emergency developing, however the Yukon Workers' Compensation Health and Safety Board should be notified (867-667-5450) and at the discretion of the Mine Manager and/or the Manager of Health, Safety and Compliance the following agencies may also be notified:

- Yukon Emergency Medical Service (EMS) 867-667-3333
- Mayo RCMP 867-996-5555
- Mayo Fire and Ambulance 867-996-2222
- Yukon Spill Report Centre 867-667-7244
- Yukon Water Board 867-456-3980
- Transport Canada CANUTEC 24-hour service 613-996-6666
- Yukon Government - Energy, Mines and Resources CS&I Mayo 867-996-2568
- Yukon Government - Energy, Mines and Resources CS&I Whitehorse 867-456-3209

5.3.3 Tier 3 Communication Protocol

If an “Imminent or actual failure” situation is developing at the Project site, the communication is expanded outside of SGC and includes local stakeholders. This extremely urgent situation may require assistance and has the potential to affect communities.

SGC Senior Management will have responsibility for communicating a Tier 3 emergency; however, if the Mine Manager cannot immediately contact them, the Mine Manager is to assume communication responsibility until SGC Senior Management can assume control.

The organizations to be contacted will vary based on the type of emergency developing, however the Yukon Workers’ Compensation Health and Safety Board must be notified (867-667-5450) and following agencies may also be notified so that they can provide assistance with the response or with the notification of affected communities:

- Yukon Emergency Medical Service (EMS) 867-667-3333
- Mayo RCMP 867-996-5555
- Mayo Fire and Ambulance 867-996-2222
- 24 HOURS Yukon Spill Report Centre 867-667-7244
- Yukon Water Board 867-456-3980
- Transport Canada CANUTEC 24-hour service 613-996-6666
- Yukon Government - Energy, Mines and Resources CS&I Mayo 867-996-2568
- Yukon Government - Energy, Mines and Resources CS&I Whitehorse 867-456-3209

6 EMERGENCY SCENARIO CAUSES, PREVENTATIVE MEASURES AND RESPONSE

To effectively and proactively manage the HLF, there is a need to have a broad understanding of all of the associated uncertainties, risks and consequences. It is important that focusing on one risk component, such as a slope failure, doesn't lead to other components being overlooked. The Failure Modes and Effects Analysis (FMEA) methodology allows a balanced evaluation of the risks associated with various components of a system. A FMEA for the HLF was undertaken to support detailed design and to inform development and operational planning for the Project.

The HLF FMEA identified a range of failure modes over the 9 major HLF components which, during construction and operations, are mitigated by standard engineering and design practices. However, planning for emergency response in the unlikely event that these failure modes are experienced is a key proactive management tool.

In addition to the failure modes identified by the FMEA, additional consideration must be given to activities associated with the operation of the HLF which would not have implications for the structural and functional integrity of the HLF but could result in an emergency. The additional risks which need to be considered to ensure the safe operation of the HLF primarily involve the safe handling and use of cyanide.

The following emergency scenarios have been considered for the heap leach and process facilities:

1. HLF foundation or slope failure
2. Overtopping of HLF
3. Ore heap slope failure
4. Events Pond foundation or slope failure
5. Overtopping of Events Pond
6. Failure of liner system
7. Failure of leak detection and recovery system
8. Failure of overliner drain fill
9. Failure of solution collection and delivery system
10. Dublin Gulch Diversion Channel failure
11. Catastrophic release of hydrogen cyanide from ADR plant or during transportation

6.1 HEAP LEACH FACILITY FOUNDATION OR SLOPE FAILURE

Incident	HLF Foundation or Slope Failure
Potential Causes	• Progressive piping (fines erosion) through embankment • Overtopping of dam crest during runoff event due to spillway plugging • Extreme rain or snowfall event in excess of design parameters • Extraordinary seismic event exceeding projected maximum event • Poor quality control during foundation preparation and embankment fill placement
Preventative Measures	• Maintain operational controls for solution management • Preventative maintenance • Event driven maintenance • High level of construction quality assurance
Detection Method	• Routine facility inspection • Event driven inspection • HLF instrumentation (piezometers, inclinometers, survey monuments)

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Administer first aid as required
	• Evacuate down gradient work areas
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes to safe levels by any or all of the following methods:
	  • Pumping to events pond
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pumping to water management ponds (e.g. Lower Dublin South Pond) if appropriate
	  • Activating spare vertical turbine pump
	• Excavation of additional down gradient emergency management ponds in the Dublin Gulch valley
	• Buttress embankment with fill excavated from the Dublin Gulch valley
	• Inspect and clear the HLF spillway as necessary
	• Restore freeboard by placing sandbags if necessary
	• Contain any spill of PLS to the greatest extent possible

Emergency Level	Tier 3
Potential Effects	• Major damage to multiple HLF components • Uncontrolled release of ore and PLS
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Cease pad loading and new solution application until repair and geotechnical inspection complete • Environmental remediation if PLS is released

6.2 OVERTOPPING OF HEAP LEACH FACILITY

Incident	Overtopping of Heap Leach Facility
Potential Causes	• Overtopping of dam crest during runoff event due to spillway plugging • Extreme rain or snowfall event in excess of design parameters • Power or mechanical failure
Preventative Measures	• Maintain operational controls for solution management • Preventative maintenance • Event driven maintenance • Removal of late winter snowpack from HLF to reduce melt volume if necessary • Installation of temporary diversion ditches to intercept surface runoff from HLF if extreme precipitation event is forecast • Installation of temporary rain coats to reduce infiltration if extreme precipitation event is forecast • Emergency backup generator • Backup vertical turbine pump
Detection Method	• Routine facility inspection • Event driven inspection • In-heap pond instrumentation (level meters, flow meters in recovery system)

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Administer first aid as required
	• Evacuate down gradient work areas
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes to HLF Operating Volume (33,240 m^3) by any or all of the following methods:
	  • Pumping to events pond
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pumping to water management ponds (e.g. Lower Dublin South Pond) if appropriate
	  • Activating spare vertical turbine pump
	• Excavation of additional down gradient emergency management ponds
	• Inspect and clear the HLF spillway as necessary
	• Provide erosion-resistant protection to the downstream slope by placing plastic sheets or other material over any eroding areas
	• Restore freeboard by placing sandbags if necessary
	• Contain any spill of PLS to the greatest extent possible

Emergency Level	Tier 3
Potential Effects	• Uncontrolled release of PLS • Damage to HLF embankment
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Cease pad loading until repair complete

Incident	Overtopping of Heap Leach Facility
	• Environmental remediation if PLS is released

6.3 ORE HEAP SLOPE FAILURE

Incident	Ore Heap Slope Failure
Potential Causes	• Improper ore placement methods • Fluid build-up over liner system creating elevated hydraulic head • Elevated PLS levels within the HLF due to impaired drainage • Extraordinary seismic event exceeding projected maximum event
Preventative Measures	• Maintain operational controls for solution management • Preventative maintenance • Event driven maintenance • Follow HLF stacking plan or alter stacking plan if slope failure experienced
Detection Method	• Routine facility inspection • Event driven inspection • HLF instrumentation (piezometers, inclinometers, survey monuments)

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Administer first aid as required
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes to HLF Operating Volume (33,240 m^3) by any or all of the following methods:
	  • Pumping to events pond
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pumping to water management ponds (e.g. Lower Dublin South Pond) if appropriate
	• Restrict PLS application in affected area
	• Unload affected ore pile area and inspect and repair any damaged HLF liner and solution collection components
	• Install interlift liner if unloading of ore pile impractical
	• Buttress ore pile
	• Contain any spill of PLS to the greatest extent possible

Emergency Level	Deep Slope Failure - Tier 3 Shallow Slope Failure - Tier 2
Potential Effects	• Damage to other HLF components • Disruption of stacking and leaching operations • Potential loss of PLS if liner system is damaged
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Environmental remediation if PLS is released • Cease pad loading until repair complete

6.4 EVENTS POND FOUNDATION OR SLOPE FAILURE

Incident	Events Pond Foundation or Slope Failure
Potential Causes	• Progressive piping (fines erosion) through embankment • Overtopping of events pond crest during runoff event due to spillway plugging • Extreme rain or snowfall event in excess of design parameters • Poor quality control during foundation preparation and embankment fill placement • Extraordinary seismic event exceeding projected maximum event
Preventative Measures	• Preventative maintenance • Event driven maintenance • High level of construction quality assurance
Detection Method	• Routine facility inspection • Event driven inspection

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Administer first aid as required
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes in events pond by any or all of the following methods:
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pump PLS to MWTP for treatment and release
	• Excavation of additional down gradient emergency management ponds in the Dublin Gulch valley
	• Restore freeboard by placing sandbags if necessary
	• Buttress embankment with fill excavated from the Dublin Gulch valley
	• Inspect and repair any damaged liner and solution collection components
	• Contain any spill of PLS to the greatest extent possible

Emergency Level	Tier 3
Potential Effects	• Damage to other events pond components • Disruption of stacking and leaching operations • Potential loss of PLS if liner system is damaged
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Environmental remediation if PLS is released

6.5 OVERTOPPING OF EVENTS POND

Incident	Overtopping of Events Pond
Potential Causes	• Overtopping of events pond crest during runoff event due to spillway plugging • Extreme rain or snowfall event in excess of design parameters • Extraordinary seismic event exceeding projected maximum event
Preventative Measures	• Maintain operational controls for solution management • Preventative maintenance • Event driven maintenance
Detection Method	• Routine facility inspection • Event driven inspection

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Administer first aid as required
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes in events pond by any or all of the following methods:
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pump PLS to MWTP for treatment and release
	• Excavation of additional down gradient emergency management ponds in the Dublin Gulch valley
	• Restore freeboard by placing sandbags if necessary
	• Buttress embankment with fill excavated from the Dublin Gulch valley
	• Inspect and repair any damaged liner and solution collection components
	• Contain any spill of PLS to the greatest extent possible

Emergency Level	Tier 3
Potential Effects	• Damage to other events pond components • Disruption of stacking and leaching operations • Potential loss of PLS if liner system is damaged
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Environmental remediation if PLS is released

6.6 FAILURE OF LINER SYSTEM

Incident	Failure of Liner System
Potential Causes	• Material flaw • Damage during construction (puncturing, differential settlement) • Damage during operations (ground movement, ore pile failure) • High phreatic level in ore pile
Preventative Measures	• Preventative maintenance • Event driven maintenance • High level of construction quality assurance
Detection Method	• Routine facility inspection • Event driven inspection • In-heap pond or events pond LDRS • Down gradient monitoring wells
Site Response	• Isolate leak if possible • Restrict leaching operations in affected area for liner failure in HLF • Unload ore and repair any damaged liner for failure in HLF • Install interlift liner where practical • Temporarily cease solution application in affected area, drill and case borehole and pump bentonite or similar material to affected area for failure in HLF • Remove or repair liner system in Events Pond • Contain any spill of PLS to the greatest extent possible
Emergency Level	In heap pond Alert Level 1 (84 L/minute) - Tier 1 In heap pond Alert Level 2 (1,582 L/minute) - Tier 2 Events Pond Alert Level 1 (11 L/minute) - Tier 1 Events Pond Alert Level 2 (217 L/minute) - Tier 2
Potential Effects	• Contamination of groundwater • Product loss
Follow Up	• Incident/accident investigation • Increased monitoring frequency until effectiveness of response assured • Environmental remediation if PLS is released

6.7 FAILURE OF LEAK DETECTION AND RECOVERY SYSTEM

Incident	Failure of Leak Detection and Recovery System
Potential Causes	• Material Flaw • Damage during construction (puncturing, differential settlement) • Damage during operations (ground movement, ore pile failure)
Preventative Measures	• Preventative maintenance • Event driven maintenance • High level of construction quality assurance
Detection Method	• Routine facility inspection • Event driven inspection • In-heap pond or events pond LDRS • Down gradient monitoring wells
Site Response	• Restrict leaching operations in affected area for liner failure in HLF • Unload ore and repair any damaged LDRS for failure in HLF • Install interlift liner where practical • Temporarily cease solution application in affected area, monitor wells to determine if there has been a liner failure, drill and case borehole and pump bentonite or similar material to affected area if monitoring indicates solution leakage • Remove or repair LDRS in Events Pond • Contain any spill of PLS to the greatest extent possible
Emergency Level	Tier 2
Potential Effects	• Contamination of groundwater • Product loss
Follow Up	• Incident/accident investigation • Increased monitoring frequency until effectiveness of response assured • Environmental remediation if PLS is released

6.8 FAILURE OF OVERLINER DRAIN FILL

Incident	Failure of Overliner Drain Fill
Potential Causes	• Material Flaw • Damage during construction (differential settlement) • Damage during operations (ground movement, ore pile failure)
Preventative Measures	• Event driven maintenance • High level of construction quality assurance
Detection Method	• Routine inspection during construction and pad loading • Event inspection during construction and pad loading
Site Response	• Replace and repair where practical
Emergency Level	Tier 1
Potential Effects	• Damage to liner system • Elevated hydraulic head in ore pile
Follow Up	• Incident/accident investigation • Increased monitoring frequency until effectiveness of response assured

6.9 FAILURE OF SOLUTION COLLECTION AND DELIVERY SYSTEM

Incident	Failure of Solution Collection and Delivery System
Potential Causes	• Material Flaw • Damage during construction (puncturing, differential settlement) • Damage during operations (ground movement, ore pile failure)
Preventative Measures	• Preventative maintenance • Event driven maintenance • High level of construction quality assurance
Detection Methods	• Routine inspection during construction and pad loading • Event inspection during construction and pad loading
Site Response	• Unload ore and repair or replace where practical • Install interlift liner and collection piping system where practical
Emergency Level	Tier 2
Potential Effects	• Elevated hydraulic head in ore pile • Loss of ability to control water balance • Loss of revenue
Follow Up	• Incident/accident investigation • Increased monitoring frequency until effectiveness of response assured

6.10 FAILURE OF DUBLIN GULCH DIVERSION CHANNEL

Incident	Failure of Dublin Gulch Diversion Channel
Potential Causes	• Plugging • Extreme rain or snowfall event in excess of design parameters • Extraordinary seismic event exceeding projected maximum event • Poor quality control during foundation preparation and embankment fill placement
Preventative Measures	• Preventative maintenance • Event driven maintenance • Installation of temporary diversion ditches to intercept surface runoff from headwaters of Dublin Gulch if extreme precipitation event is forecast
Detection Method	• Routine facility inspection • Event driven inspection

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Evacuate down gradient work areas
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Immediate lowering of PLS volumes to HLF Operating Volume (33,240 m^3) by any or all of the following methods to reduce risk if HLF threatened:
	  • Pumping to events pond
	  • Increasing area under leach (i.e. returning PLS into circulation)
	  • Pumping to water management ponds (e.g. Lower Dublin South Pond) if appropriate
	  • Activating spare vertical turbine pump
	• Provide erosion-resistant protection to the by placing plastic sheets or other material over any eroding areas
	• Restore freeboard by placing sandbags if necessary

Emergency Level	Tier 3
Potential Effects	• Flooding of HLF In-Heap Pond • Erosion of HLF confining embankment
Follow Up	• Incident/accident investigation • Inspection by geotechnical engineer • Increased monitoring frequency until effectiveness of response assured

6.11 RELEASE OF HCN GAS WITHIN THE ADR PLANT

Incident	Release of HCN Gas within the ADR Plant
Potential Causes	• Accidental release of dry sodium cyanide which is then exposed to acids, acid salts, water, moisture or carbon dioxide • Rupture or failure of tanks, pipelines, fittings or valves containing sodium cyanide solution • Temporary loss of process pH control systems
Preventative Measures	• Preventative maintenance • Event driven maintenance • Hazard identification and response training for relevant ADR Plant Personnel • Installation and regular testing of fixed HCN detectors and portable HCN monitors • High level of construction quality assurance
Detection Method	• Routine facility inspection • Event driven inspection • Activation of fixed HCN detectors or portable HCN monitors

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Evacuate area
	  • Small spills in reactive conditions - 60 m in all directions, 200 m downwind
	  • Large spills in reactive conditions - 390 m in all directions, 1.3 km downwind
	• Administer first aid as required
	• ERT or other trained and equipped personnel stop release, contain spill, and neutralize if possible
	• Immediate notification of SGC Senior Management so communication protocol can be enacted
	• Construct emergency catchment areas if secondary containment breached

Emergency Level	Tier 1 - 3
Potential Effects	• Fatality
Follow Up	• Incident/accident investigation • Pump spilled solutions back in the cyanidation process • Environmental remediation if PLS is released

6.12 RELEASE OF HCN GAS DURING TRANSPORTATION

Incident	Release of HCN Gas during Transportation
Potential Causes	• Vehicle accident resulting in the release of dry sodium cyanide which is then exposed to acids, acid salts, water, moisture or carbon dioxide
Preventative Measures	• Strictly enforced speed limits for cyanide transport vehicles • Pilot vehicles for cyanide transport vehicles on access road during inclement weather • Appropriate spill response equipment mandatory for all cyanide transport vehicles • Use of International Cyanide Management Code certified transporters • Establish cooperative arrangements with emergency responders in communities along the transportation route • Periodic emergency response drills
Detection Method	• Observation of event

Site Response	• Initiate “Code 1” as per “Initial Response - Code 1 Procedure”
	• Evacuate area
	  • Small spills in reactive conditions - 60 m in all directions, 200 m downwind
	  • Large spills in reactive conditions - 390 m in all directions, 1.3 km downwind
	• Administer first aid as required
	• ERT or other trained and equipped personnel stop release, contain spill, and neutralize if possible
	• Immediate notification of SGC Senior Management so communication protocol can be enacted

Emergency Level	Tier 3
Potential Effects	• Fatality
Follow Up	• Incident/accident investigation • Environmental remediation

7 HYDROGEN CYANIDE INFORMATION

Hydrogen cyanide gas is an extremely toxic, flammable compound which can be produced by the decomposition of sodium cyanide when exposed to acids, acid salts, water, moisture and carbon dioxide. HCN gas is colorless with a faint odor of bitter almonds and can be smelled in the concentration range of 1 - 5 parts per million (ppm). Exposure to HCN gas concentrations greater than 50 ppm for 30 minutes can result in cyanide poisoning and any exposed individual must obtain immediate medical treatment.

In a release situation, the immediate release area and a downwind isolation zone must be established. Vapor generation will be very rapid and vapors can travel a considerable distance. All ignition sources must be removed as vapors are easily ignitable at ambient temperature conditions.

7.1.1 First Aid for Inhalation of Hydrogen Cyanide Gas

The application of prompt and effective first aid is crucial to maximize the chances of survival following cyanide poisoning. In all cases of exposures to cyanides, emergency transport to the nearest medical facility should be arranged.

The following first aid steps may prove useful.

Step 1 - Remove the patient from cyanide exposure.

The first priority is to try and remove the patient, if possible, from further exposures to cyanides and into a source of fresh air. Rescuers must be properly trained in emergency procedures and wear appropriate PPE.

Even if the patient recovers quickly after being removed from exposure to cyanide, administer 100 percent oxygen and arrange transfer to a medical facility.

Step 2 - Support airway, breathing and circulation

Speed is critical in treating a patient with cyanide poisoning.

- Check the patient's airway. Remove blockages or restrictions as necessary.
- Check the patient's breathing.

If the patient is breathing, place in the recovery position and administer 100 percent oxygen. If the patient is unconscious, insert an oral airway if available and if trained in its use. If the patient is not breathing, begin resuscitation using a resuscitation bag or mask connected to an oxygen source or 100 percent oxygen via a non-rebreathing facemask.

Mouth-to-mouth resuscitation should be avoided due to the risk of contamination of the rescuer.

Check for a pulse. If no pulse is present, start external cardiac massage (also known as hands-only CPR)

Step 3 - Decontamination

Contaminated clothing should be carefully removed and placed in a sealed bag for decontamination or disposal. The patient should then be washed down with copious fresh water; however, decontamination should not delay first aide.

Step 4 - Transfer of patient to medical care

If not already arranged, immediately organize urgent ambulance treatment to the nearest medical facility. During transfer, the patient should be accompanied by someone trained in CPR and a cyanide antidote kit should also be taken.

7.1.2 Signs and Symptoms of Hydrogen Cyanide Gas Exposure

Effects occur extremely rapidly following exposure to hydrogen cyanide. After inhalation exposure, symptoms begin within seconds to minutes; death may occur within minutes. The time of onset of effects depends on the concentration and duration of exposure.

Early symptoms of cyanide poisoning include light headedness, giddiness, rapid breathing, nausea, vomiting (emesis), feeling of neck constriction and suffocation, confusion, restlessness, and anxiety. Accumulation of fluid in the lungs (pulmonary edema) may complicate severe intoxications. Rapid breathing is soon followed by respiratory depression/respiratory arrest (cessation of breathing).

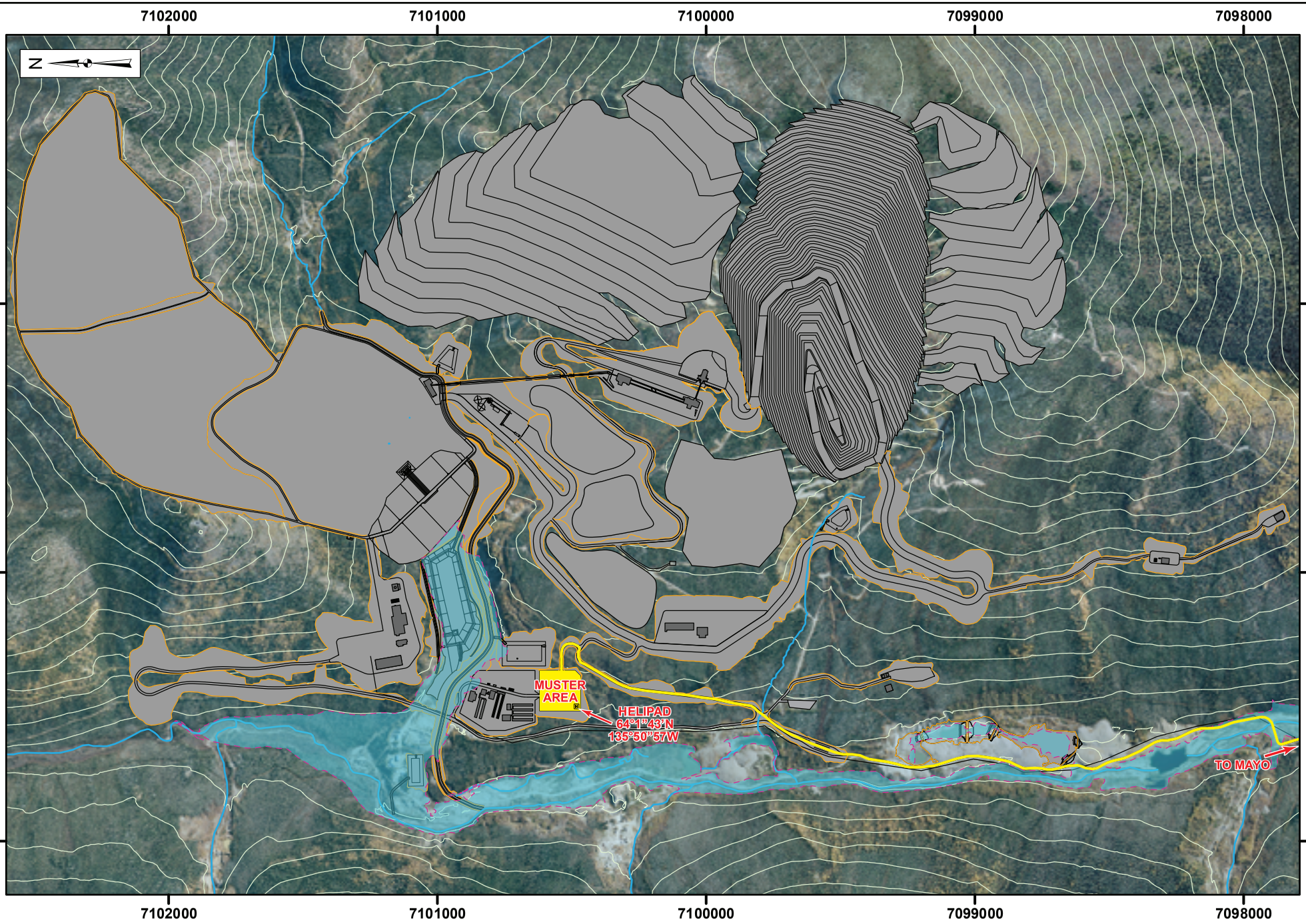
Severe cyanide poisonings progress to stupor, coma, muscle spasms (in which head, neck, and spine are arched backwards), convulsions (seizures), fixed and dilated pupils, and death. The CNS is the most sensitive target organ of cyanide poisoning. Cardiovascular effects require higher cyanide doses than those necessary for CNS effects. In serious poisonings, the skin is cold, clammy, and diaphoretic. Blue discoloration of the skin may be a late finding. Severe signs of oxygen deprivation in the absence of blue discoloration of the skin suggest cyanide poisoning.

8 EVACUATION

The emergency scenarios considered for the heap leach and process facilities will under most circumstances require only temporary evacuation from an affected work area. Only in an extreme circumstance should a full site evacuation be undertaken. A full evacuation can only be authorized by the Mine Manager. The muster location and evacuation route for the Project is provided in Figure 8-1.

Based on the anticipated emergency scenarios for the heap leach and process facilities only a major failure of the embankment due to an extraordinary seismic event during periods of extreme cold weather present a situation in which a full evacuation should be considered.

As part of the FMEA and design of the Project an inundation map was developed which predicts the locations which would be flooded by PLS during a catastrophic failure of the embankment. Figure 8-1 illustrates the anticipated inundation areas for a catastrophic failure of the HLF embankment.



Legend:

- General Arrangement Infrastructure
- Contour (25m)
- Watercourse
- Evacuation Route
- Inundation Mapping Area
- Building

*2010 Orthophotos

Strata Gold Corporation

0 125 250 500
Metres
Scale = As Shown

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 UTM Zone 8N	SS	
Date:	Figure:	Inundation Map and Evacuation Route
2014/06/12	8-1	