B.Y.G. NATURAL RESOURCES INC.

MT. NANSEN GOLD PROJECT

TAILINGS IMPOUNDMENT FINAL DESIGN REPORT

AUGUST 1995

PM 5314.05.02

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August 10, 1995

BYG Natural Resources Inc.
Suite 208, 2190 St. John's Street
Port Moody, B.C.
V3H 2V7

Mr. Jim Smith

MT. NANSEN GOLD PROJECT
TAILINGS IMPOUNDMENT
FINAL DESIGN REPORT

Dear Sir:

Attached is our final geotechnical report for the Mt. Nansen Tailings Impoundment.

If you have any questions, please do not hesitate in calling the undersigned.

Yours very truly,

KLOHN-CRIPPEN CONSULTANTS LTD.

for Bill G. Chin, P.Eng.
Project Manager

BGC:clr
Attachment
cc: Kevin MacDonnell, RERC

B.Y.G. NATURAL RESOURCES INC.

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1. INTRODUCTION

B.Y.G. Natural Resources Inc. (BYG) intends to develop an open pit gold mine on the Mt. Nansen property located approximately 60 km west of Carmacks, Yukon (see Drawing A-5314-001). Development of the gold mine will require construction of stream diversion facilities and an embankment dam for tailings impoundment on Dome Creek. Several earlier investigations were carried out at the Mt. Nansen property by Klohn-Crippen, in order to evaluate potential dam sites for tailings impoundment and select a preferred site. Results of these earlier investigations by Klohn-Crippen are summarized in the following reports:

- Letter report related to Mt. Nansen Project, Tailings Disposal and Leach Pad Sites, dated November 1985.
- Mt. Nansen Gold Project, Tailings Dam Preliminary Design Report, dated December 1988.
- Mt. Nansen Gold Project, Tailings Facility, Preliminary Design Report, dated May 1990.
- Mt. Nansen Gold Project, Nansen Creek, Road Upgrading, dated September 1994.
- Mt. Nansen Gold Project, Tailings Dam Storage Study, dated September 1994.
- Mt. Nansen Gold Project, Tailings Dam Cost Estimate, dated October 1994.
- Mt. Nansen Gold Project, Tailings Impoundment Feasibility Design Update, dated April 1995.

Based on the results of the earlier investigations and evaluation of several alternatives, Site #4 was recommended by Klohn-Crippen as the preferred site due to the overall economy of a smaller dam combined with greater storage when compared to other site options. BYG has subsequently decided to proceed with final design and construction of a tailings impoundment facility at Site #4.

The scope of this final design investigation and report included the following:

- Summarize work carried out to date and provide details of site selection.
- Carry out test hole drilling at Site #4 to investigate in detail the foundation areas for the tailings dam, seepage collection dam, diversion ditch, emergency spillway, and closure spillway.
- Install thermistor strings to monitor and record the ground temperatures at several locations at the tailings dam site.
- Carry out field and laboratory tests to measure index properties of overburden soils including bulk density, moisture content, grain size, compaction density and permeability.
- Carry out analyses for final design including thermal modelling, static and seismic stability, seepage and settlement of the tailings dam due to thaw settlement.
- Review hydrology and water balance for impoundment accounting for details of tailings disposal, runoff inflows and reclaim water.
- Determine final design requirements for the tailings dam, seepage recovery dam, diversion ditch and spillways.
- Provide Construction Quality Assurance (CQA) requirements for construction of the tailings impoundment structures.
- Identify performance monitoring requirements and future design considerations.

Authorization to proceed with this investigation and final design were received from Mr. Jim Smith of BYG during a meeting with Mr. Bill Chin on June 5, 1995.

2. PROJECT DESCRIPTION

The project site is located about 60 km west of Carmacks, Yukon and is accessed from Carmacks via a gravel road which is presently maintained only during summer months. The Mt. Nansen property was previously developed as an underground mine which operated for two brief periods during the 1960's and 1970's. The mine has since been inactive, however, the old underground workings, mill buildings, two small tailings

ponds, a small water reclaim pond and several bulldozer trenches are still present on the property. (See Drawing B-5314-002.)

The proposed project will refurbish and utilize the existing mill facilities for processing of the ore. An open pit mine is proposed for mining and removal of the oxide ore body which exists at relatively shallow depths at the mine site location. Cyanide will be used to assist in the gold recovery process and cyanide destruction methods will be employed to remove most of the cyanide from the tailings prior to delivery to the tailings pond. Tailings generated from the oxide ore body will total about 300 000 tonnes, or about 240 000 m^3 assuming a dry unit weight of 1.25 tonnes/m^3 for the settled tailings. The proposed tailings impoundment facilities will be designed to accommodate this volume of tailings from the oxide ore body.

BYG indicates that there is also potential that permitting for the mine will be extended in the future to include additional volumes of tailings from mining and processing of a sulphide ore body which exists below the oxide ore body. BYG indicate that although there is a good possibility of raising the dam in two to three years to accommodate these extra tailings volumes, the present design should only be targeted for containment of the initial 300 000 tonnes.

The project layout at Site #4 includes a tailings dam, seepage collection dam, diversion ditch, access road, emergency spillway and closure spillway. Since there is a possibility of raising the dam in the future, BYG have scheduled that construction of the closure spillway be delayed until such time as the mine operations are completed and the final tailings level and dam crest elevation are determined. A diversion ditch and a temporary operating spillway are, however, required during operation of the facilities to divert streamflows in Dome Creek and handle runoff surcharges.

We understand that approximately 600 000 tonnes of waste rock will be mined from the open pit to liberate the ore. This rock is not considered to be acid generating and can therefore serve as a potential source of construction material for the tailings dam. The

construction schedule, however, requires the tailings dam to be constructed during 1995 with mine excavation not occurring until 1996. Therefore, use of this material for initial dam construction is not feasible. The waste rock may, however, be used as dam construction material if raising of the dam is required at a later date. The local sand soils in the immediate vicinity of the dam are therefore expected to be used as borrow material for the initial dam construction.

3. TAILINGS DAM SITE SELECTION

Several potential dam sites, including Sites #1 to #4 inclusive have been investigated by Klohn-Crippen for tailings impoundment on the Mt. Nansen property. Three potential dam sites (Site #1, Site #2 and Site #3 - see Drawing B-5314-002) are all located upstream in areas with relatively steep creek bed slopes which offer low storage volumes in proportion to the size of the dams required. Because of the lack of permafrost in the foundation, Site #1 was previously chosen as the best of the initial three sites. Site #1, however, has a limited storage capacity with a practical maximum of 300 000 tonnes for tailings impoundment and future expansion at this site is therefore not feasible.

Although Site #4 does have permafrost foundation soils, it is considered superior to the other sites (Site #1, Site #2 and Site #3) and is therefore recommended as a preferred site for development of a tailings impoundment facility on the following basis:

- The topographic location at Site #4 includes a natural constriction at the dam centreline with a widened valley immediately upstream. This site therefore offers the smallest dam volume for the tailings volume stored. The three other sites examined are all on relatively steep slopes and offer low storage volumes in proportion to the size of the dams.

- Compared to the three other alternative sites, a relatively low dam is required at Site # 4, to impound the necessary tonnage of tailings. In addition to the improved costs, the lower dam height improves stability and reduces potential seepage.

- Site #4 has a good capacity to increase storage with modest future dam construction. This would reduce the number of locations for tailings storage if additional reserves are exploited in the future.

- Borrow sources for embankment fill materials are close to site.
- The site has excellent potential to locate a closure spillway in bedrock on the south abutment.
- The Site #4 location lies downstream of all existing and future mining impacts on the Dome Creek drainage system, thereby offering an excellent monitoring and control point.

4. FIELD INVESTIGATION AND LABORATORY PROGRAM

The recent field investigation program was carried out at Site #4 on Dome Creek to supplement information collected at this site during previous field programs in 1988 and 1994. The 1995 field program included drilling of 26 test holes sites numbered DH95-04 to DH95-29 inclusive. The location plan for all test holes including holes drilled in this area during 1988, 1994 and 1995 are presented on the attached Drawing B-5314-003. Stratigraphic cross-sections of the site area are also presented on Drawings B-5314-004 and B-5314-005.

At several test hole sites, coarse gravel layers were encountered which required multiple attempts to drill and penetrate through the gravel. In the case of test holes DH95-08, DH95-08A, DH95-08B, DH95-14, and DH95-14A separate drill hole logs are presented for each drill hole attempt. At other drill sites, where multiple holes were drilled, the holes were closely spaced and stratigraphic information is combined onto one test hole log.

For the purpose of completeness, all test hole logs from each of the investigations in the Site # 4 area are included in Appendix I. Earlier field work in this area in 1988 and 1994 included:

- Main tailings dam (three test holes numbered DH94-01 to DH94-03).
- North abutment (14 test pits numbered TP94-01 to TP94-14).
- Reservoir area (two test holes numbered DH88-01 and DH88-02).

The test hole drilling for the 1995 field program included the following:

- Main tailings dam (eight test holes numbered DH95-04 to DH95-09).
- Seepage collection dam - (one test hole numbered DH95-10).
- Diversion ditch/emergency spillway on north abutment (eight test holes numbered DH95-11 to DH95-13 and DH95-24 to DH95-29).
- South abutment closure spillway (four test holes numbered DH95-14, DH95-15, DH95-16 and DH95-25).
- Borrow areas (seven test holes numbered DH95-17 to DH95-23).

All test holes were drilled during the recent field program with a CME 75 drill mounted on a tracked Nodwell, supplied and operated by Midnight Sun Drilling Ltd. The drill was equipped with solid and hollow stem augers and was capable of N size rotary drilling and coring. The drill program was carried out primarily using a combination of solid stem augers and a CRREL (Cold Regions Research Engineering Laboratory) tube sampler. In several test holes the overburden was cored continuously with a CRREL barrel until gravel layers were encountered which impeded further progress. Two test holes, DH95-06 and DH95-07, were drilled using water circulation and a N size core barrel to penetrate and sample the coarse gravels and underlying bedrock. In other holes a solid stem rock bit was successful in penetrating through some gravel layers. In several holes, however, drill refusal was encountered in the deeper gravel layers and full penetration to bedrock level was not possible without significant additional effort and expenditure.

The overburden soils were generally frozen and sampling with a CRREL barrel produced a stable hole through the fine sands and silt layers. In holes where the wet rotary system was used, the drilling caused washing of fines and thawing of the surrounding soils which resulted in significant sloughing problems.

CRREL tube samples were logged visually in the field for soil type and ice classification and content. All ice classifications were in accordance with Technical Memorandum 79 "Guide to a Field Description of Permafrost for Engineering Purposes" prepared by the National Research Council of Canada. Immediately after extraction of the CRREL tube samples, sections of each sample were selected for measurement of frozen bulk density and other index testing. Frozen bulk densities were measured in the field after trimming of samples and measurement of dimensions and weight. Samples were then bagged and transported to Klohn-Crippen's laboratory in Calgary for additional lab testing including moisture contents, grain size, specific gravity, permeability and compaction testing. The laboratory test results are included either on the corresponding test hole logs in Appendix I or on the attached data sheets in Appendix II.

Several test holes were also selected for installation of thermistors to measure in situ ground temperatures. Each thermistor string consisted of 7 to 10 thermistors which were installed in the open test holes and native sands used as backfill. A protective steel casing was then placed at the ground surface for each installation to protect the cable outlets. Temperatures were then monitored on a regular basis after installation up to the time of drill rig demobilization. Subsequent readings were obtained by BYG staff while on site after completion of the field program. A summary table of the thermistor readings recorded to date is presented in Appendix II.

All test hole locations were then surveyed for horizontal grid coordinates and elevations by Lamerton and Associates, from Whitehorse. An additional network of grid points were also surveyed to provide more detailed topographic mapping of the project site at 1 m contour intervals.

5. SITE DESCRIPTION

The Mt. Nansen mine site is located within the physiographic region known as the Yukon Plateau. The area typically has rounded mountain tops with broad valleys and gentle topographic features with side slopes in the vicinity of the mine typically varying from 2H:1V to 8H:1V. The proposed location of the Site #4 tailings dam is located on Dome Creek, a tributary of Victoria Creek which eventually flows into the Nisling River system. The site is located approximately 1500 m downstream of the existing Mt. Nansen mill site and tailings ponds, as shown on the general arrangement plan on Drawing B-5314-002. A detailed site plan of Site #4 is shown on Drawing B-5314-003. At this location, Dome Creek flows from west to east with the axis of dam oriented approximately north-south at Easting 20550.

The ground elevation in the base of creek valley at Site #4 is approximately 1133 m. The creek channel is approximately 10 m wide and is overgrown with small bushes except for a small active channel approximately 1 m wide. On the dam centreline the south valley slope rises at a grade of approximately 5H:1V to elevation 1150 m where grades increase to 3H:1V. Vegetation on the south abutment consists of small bushes with a thick moss cover. The lower portion of the north valley slope consists of a sand terrace which rises along the dam centreline at a grade of 6H:1V to elevation 1148 m at which point the top of sand terrace extends laterally approximately 25 m on the dam centreline and then rises gently at grades of 6H:1V to 8H:1V becoming steeper at higher elevations. Immediately downstream of the dam centreline, the terrace side slopes on the north side of the valley are steeper than in the dam centreline area and increase in grade to approximately 2H:1V.

The edge of the north bank terrace adjacent to Dome Creek has a thin moss cover and is vegetated with spruce and aspen. The upper plateau of the terrace is relatively flat with a slight grade of 5% to 7% towards the east. Downstream of the dam, the terrace plateau becomes wider and is covered in thick moss and peat and is sparsely vegetated with small bushes and trees. Higher on the valley slope above the terrace, the moss cover is again thin and the slopes are vegetated with large spruce and aspen. Valley

cross-sections are shown both parallel and perpendicular to the dam centreline on the Drawing B-5314-004 and B-5314-005 respectively.

6. SUBSURFACE CONDITIONS

6.1 Surficial Geology

Surficial soils in the Dome Creek valley area consist mainly of colluvial, residual and granular glacial outwash soils overlying bedrock. The soil cover is thin on the steeper valley sides, increasing in the valley bottom to between 16 to 22 m deep. Upper slopes are covered in a thin veneer of colluvial soils.

Four glacial advances have been defined across the central Yukon Territory. These are from oldest to youngest, the Nansen, Klaza, Reid and McConnell advances. The site area was glaciated during the earlier glacial advances which thus accounts for the mature rounded topography. The area was however, not glaciated during the most recent (Pleistocene) ice age. The Mt. Nansen minesite is situated within the area associated with the Nansen drift. At least 2 000 years ago, volcanic ash fell on this area up to 30 cm in depth. Remnants of this ash are visible at many locations on the property. The ash occurs at surface or just below the organic soils, and typically has a depth of less than 10 cm. Some glacial till was noted during the feasibility study at depth in the main valley bottom. Due to the coarseness of gravels in this lower zone, recent drill holes were unable to confirm the presence of glacial till.

The soils generally vary from a sandy gravel to a fine sandy silt and the material is generally medium dense with some pockets of loose material.

6.2 Bedrock Geology

The bedrock at the site appears to consists of igneous rocks of the Mt. Nansen Group which have intruded into the Pelly Formation metamorphic rocks. The metamorphic rocks have been mapped as undifferentiated schists, gneisses, quartzites and marbles. The igneous rocks observed at the Site #4 location consisted of andesite and andesite

porphyry. On the upper valley slopes, the bedrock is highly shattered and broken at the ground surface as observed in the exploration trenches and test pits. The degree of shattering is however anticipated to decrease with depth. Bedrock is also exposed on the ridge tops where there is very little tree or vegetation cover.

6.3 Soil Conditions

The main stratigraphic units across the Dome Creek Valley consist primarily of fine to medium sands with varying silt content. Surficial organic materials overly the sand soils at the ground surface with coarse gravel and sand layers occurring at depth underlying the main sand strata (See Drawing B-5314-004). Bedrock was encountered in some holes underlying the deep gravel layers. The bedrock is variable in depth and elevation and appears to be U shaped across the valley, becoming shallow on the upper slopes. The overburden soils were thickest in the central valley area and under the north valley slope where the terrace sand deposit is present. The deepest elevation at which bedrock was known to occur is at elevation 1116.7 m in DH94-03 located approximately 16 m below the base of the creek valley. The thickest overburden deposits were encountered in DH95-04 on the left abutment sand terrace where sand and gravel soils were encountered to at least a depth of 22.5 m.

The surficial organic materials include moss, peat and organic silts and sand with thicknesses varying significantly across the site. On the north abutment a surficial moss layer varied from 30 mm to 50 mm thick. On the south valley slope, the moss was much thicker with zones of underlying peat extending to at least 1.6 m deep in some areas near the dam centreline. Sand terraces were identified as potential borrow areas on the south valley slope further upstream of the dam. In these areas the surficial moss was generally very thin generally not exceeding 50 mm. The surficial materials in the creek bottom consist of interlayered peat, fine sands and silt which extend to depths up to 3.0 m. The peat layers are generally ice rich with random ice inclusions and ice contents estimated up to 30%.

Underlying the surficial organic layers, the main sand units are primarily fine to medium grained sand with silt contents ranging from 10% to 40%. The sands are generally cleaner on the upper portion of the north abutment terrace and become more silty at depth.

Moisture contents varied in the different soil strata, but showed a consistent trend. Moisture content values are summarized on Figure A2-1 in Appendix II. In well drained areas on the sand terraces, moisture contents in the sand layers near the ground surface were as low as 5% to 10%. Deeper strata on the valley side slopes and in borrow areas, had higher moisture contents generally increasing to between 10% to 20%. Below the creek bottom area, sands were generally more silty with some silt layers. Moisture contents in these soil layers often exceeded 20%.

Although gravel layers were encountered intermittently throughout the upper sand strata, the frequency and coarseness of gravel appeared to increase significantly below a depth of approximately 9 m to 10 m in the area underlying the creek bottom. The elevation of coarse gravels appeared to rise slightly in the areas underlying both valley side slopes. Undisturbed samples were not obtained in the gravel layers and moisture contents, grain size and bulk density could not, therefore, be determined. It is expected, however, that the gravel layers are generally more thaw stable in terms of compressibility and strength compared to the overlying sand layers. Bedrock is also expected to be in close proximity underlying the deep gravel layers where drill refusal was achieved.

The underlying bedrock was confirmed in test holes DH95-06 and DH95-07. Samples of the bedrock core in these holes indicated the bedrock to be andesite and andesite porphyry at these respective locations.

6.4 Permafrost Conditions

The site lies within the discontinuous permafrost zone, close to the southern boundary of widespread areas of permafrost islands. The site investigations carried out to date indicate the entire project site is underlain by permafrost. Therefore, the sands, silts and gravels underlying the dam are frozen, except where seasonal thawing has occurred within the active zone. At the time of investigation, the depth of thaw in the active zone, varied from approximately 0.3 m on the south slope where a thick moss cover was present to in excess of several metres on the north slope where a very thin moss cover was present. The frozen sands were generally well bonded with non visible ice varying from no excess ice (Nbn) to excess ice (Nbe). Occasionally, frozen silty zones contained thin randomly oriented ice formations (V_r). In only a few cases where silt layers were present, the ice was stratified or distinctly oriented (V_s). Generally the excess ice content in the frozen sands was low (less than 5%).

Thermistors were installed in several test holes to record in situ temperatures. Recorded temperatures are presented in Appendix II on a summary table. Installation of the thermistors results in thermal disturbances from drilling and back filling. Dependant on the degree of thermal disturbance encountered during the installation of the thermistors, a period of stabilization was required for the backfill surrounding the thermistors to freeze back and recover the thermal regime of the surrounding native soils. After initial freezeback, the period of thermal stabilization should be relatively rapid. The latest set of readings were obtained on August 9, 1995. It is estimated that these readings are nearly stabilized and should be representative of site conditions. In summary, ground temperatures appear to be coldest in the permafrost soils underlying the creek valley, where surface peat layers are thick and temperatures varied to as low as -1.5°C. Ground temperatures on the north valley slope are typically warmer (-0.2°C to -0.5°C) where only a thin moss cover is present and the upper sand layers are relatively dry. It is expected that ground temperatures on the south valley slope would be colder than the north valley slope, because of the presence of thick moss and peat, and less exposure to the sun.

6.5 Soil Properties

Bulk densities were recorded throughout the various strata in several test holes as shown on the logs. Bulk density values were measured on CRREL tube samples and the results are summarized on Figure A2-2 in Appendix II. Generally the lowest bulk density values were recorded in the upper strata in the valley centre where ice contents were highest. For each sample the frozen bulk density was estimated based on the following relationship:

$$\gamma_f = \frac{G_s + S_f e}{1 + e}$$

Where
- γ_f = frozen bulk density (g/cm^3)
- G_s = specific gravity of soil particles = 2.67
- S_f = degree of ice saturation
- e = void ratio = $1.09 \frac{G_s \cdot w}{S_f}$
- w = measured water content

Figure A2-2 compares the measured bulk densities to the estimated bulk densities calculated using the measured water content from the sample and an assumed degree of ice saturation. This plot suggests a typical ice saturation ratio of 90 to 95% in the native soils. The degree of ice saturation is expected to vary dependant on the location. Figure A2-3 in Appendix II summarizes the bulk density profiles with depth for each of the various soil types identified at the site. These plots show both measured bulk density and estimated bulk density based on the measured water content and an assumed ice saturation of 90%.

To determine the thawed permeability of the foundation materials, falling head permeability tests were performed on reconstituted sand samples compacted close to the in situ density of the material. The permeability results vary between 1.9×10^{-5} cm/s to 8.7×10^{-4} cm/s and are summarized as follows:

HOLE	DEPTH (m)	% SAND	% FINES	PERMEABILITY k (cm/s)
DH95-04	7.6	83.1	16.9	1.9×10^{-5}
DH95-06	7.3	83.4	16.6	8.7×10^{-4}
DH-95-08B	3.1	83.1	16.9	5.5×10^{-5}

Oedometer consolidation testing was also performed on a variety of soil types from silt to sand as shown on Figure A2-4 in Appendix II. To obtain conservative results, related to the soil compressibility after thawing, all samples except for one were placed in the oedometer ring in a "loose" state (i.e. to a density less than the in situ value). For comparison, one sample was compacted to approximately the in situ density and is labelled "dense". For each test, the following comparisons are plotted:

- void ratio (e) versus applied stress;
- coefficient of volume compressibility (m_v) versus applied stress; and
- coefficient of consolidation (C_v) calculated for three typical values of permeability (k) versus applied stress.

Typically, for a permeability value of 1×10^{-5} cm/s the coefficient of consolidation is approximately 1×10^{-4} m^2/s.

7. TAILINGS DAM DESIGN

7.1 General

The Site #4 tailings impoundment dam is designed with a capability of storing 300 000 tonnes or 240 000 m^3 of tailings based on a settled tailings density of 1.25 tonnes/m^3. The reservoir storage-elevation curve for this site as shown on Drawing A-5314-006 indicates that the flat tailings level for this volume of tailings is elevation 1149.2 m. In order to provide sufficient additional storage for a minimum two month

millwater circulation volume of 30 000 m^3 throughout the initial three year mine life, the design pond level should be at elevation 1149.7 m. The design requires a temporary emergency spillway to pass flood flows until such time as the mine operations are complete and a closure spillway is constructed. The temporary spillway is located on the north abutment in order to utilize the same outlet channel as the diversion ditch. The closure spillway will eventually be located on the south abutment due to the presence of suitable rock at this location.

The emergency spillway invert should be set at the pond level of 1149.7 m in order to discharge excess inflows during operation. The dam crest is set at elevation 1151.5 m, 1.8 m above the invert level in order to safely pass the design 200 year flood flow and at least 50% of the Probable Maximum Flood (PMF). The dam is considered to be in the low to significant hazard potential category and therefore a capacity discharge of 50% PMF is considered an appropriate safety standard.

An additional allowance for settlement is required for the initial dam crest elevation to ensure adequate freeboard at the end of mine operation. The settlement allowance should be at least 0.6 m resulting in a final dam crest elevation of 1151.5 m. The settlement allowance provides sufficient freeboard only for any short term settlements which occur in the first three years of operation. It is understood that prior to the end of year three of operation, the decision to raise the dam or alternatively to install a permanent closure spillway will be made. If a permanent closure spillway is constructed, raising of the dam may also be required to accommodate further long term settlements which may occur. Any decisions regarding raising of the dam at that time will be based on the dam performance as observed during the initial three year monitoring period.

The dam cross-section as shown on Drawing B-5314-007 includes a 6 m wide crest, an upstream slope at 2.5H:1V with toe berm and a downstream slope at 3.5H:1V with no berm. The downstream berm has been eliminated from the feasibility design on the basis that the thermal analyses indicate the shallow foundation soils are thaw-stable and

the deeper soils below the active layer will not thaw in the long term. The downstream berm would only be required to control seepage and to enhance seismic stability for the event of deep foundation thawing. In the event, the downstream foundation area does eventually thaw, the need for the berm will be determined by further investigations to characterize the dynamic properties of the foundation soils. If necessary for stability purposes, the downstream berm can be constructed with waste mine rock or sand borrow.

The dam cross-section will include a Bentofix NW geosynthetic clay liner on the upstream slope to restrict seepage through the dam embankment. Details of the geosynthetic clay liner are shown on Drawing B-5314-008. A beach will be spiggotted against the upstream face of the dam during summer months to provide long term seepage control in the event that the geosynthetic clay liner deteriorates in the long term. To avoid ice lensing, all tailings will be placed subsequently during winter. Should seepage be a concern at a later date after a period of operation, a downstream berm could be constructed to include drains into the berm cross-section. The need for drains to control seepage at the downstream toe is best determined after observation of the dam performance and instrument monitoring. In order to assist in any future decisions regarding the dam performance, an instrumentation plan has also been incorporated with the dam design. The instrumentation system will include thermistors, pneumatic piezometers and settlement pins, as shown on Drawing B-5314-009.

Gravel protection will also be placed on the downstream slope to prevent runoff erosion of the fine sands in the embankment.

The following sections discuss the analyses carried out to arrive at the design cross-section for the dam.

7.2 Thermal Analyses

7.2.1 General

Thermal analyses were carried out to predict the short-term and long-term thermal changes in the tailings dam foundation during the operation and closure phases of the tailings impoundment. The principal objectives of the analyses were to predict the depth and rate of thawing of the foundation soils and to estimate the magnitude of the resulting settlements for determination of freeboard allowance and thaw-induced excess pore pressures for stability assessment as presented in subsequent sections.

The thermal parameters for soils at the Mt. Nansen site were estimated by comparison with published correlations for similar materials as shown on Figure A3-1 in Appendix III. Based on the available data, the thermal parameters summarized on Figure A3-2 were adopted. A check on the suitability of these parameters was made by analyzing the existing site conditions as discussed in the following sections.

7.2.2 Analysis of Existing Site Conditions

A one-dimensional thermal analysis of the existing site was carried out using the computer program THERM1 by Nixon Geotechnical Ltd. The soil column and assumed thermal properties of the soils are shown on Figure A3-3. The soil column was modelled with an initial temperature of -1.5°C based on thermistor readings observed to date and the model then subjected to cyclic thermal boundary changes at the ground surface. The assumed air temperatures were assumed to be equivalent to the mean monthly air temperatures for Carmacks less 3°C to account for an elevation variation of approximately 600 m.

Ground surface and snow surface temperatures were derived from the corresponding air temperature by multiplying by the thermal "n" factor. A winter freezing n-factor of 0.9 was assumed to determine snow surface temperatures based on ambient air temperatures. The average snow cover thickness was estimated based on Environmental Canada records for Carmacks. The summer n-factor was assumed to be 1.3 in peat covered areas and a value of 1.5 was used for areas without peat such as the

main dam and tailings area. The resulting ground temperature profile for the months of January, April, July, and October at test hole location DH95-10 was calculated by THERM1 as shown on Figure A3-3 for a time period of 25 years. The depth of the active layer and the temperature profile at depth did not change significantly after 25 years. The graph on Figure A3-3 shows good correlation between the estimated and measured ground temperatures as observed at the end of July. The thermal model was then analyzed for a typical soil column on the terrace slope in the vicinity of test holes DH95-04 and DH95-05 where ground temperatures were warmer at approximately -0.2 to -0.5°C. At these locations the sand soils with little to no organic cover showed the calculated and measured values both as having deep active zones with temperatures slightly below freezing in the permafrost zone.

In the event of complete thawing, the one dimensional thermal model also shows freezeback for each of the typical soil columns, however, the rate of freezeback is expected to be very slow and significant freezeback should not be expected in the sand fill or tailings areas for several decades after the end of operation.

7.2.3 Thaw-Induced Pore Pressures

Thaw-induced pore pressures in the foundation soils may influence the stability of the tailings dam slopes, if the rate of thaw is faster than the rate of pore pressure dissipation at the thaw front. A conservative assessment of the rate of thawing of the foundation soils beneath the upstream dam slope was made by conducting a one-dimensional analysis of the rate of thaw beneath the reservoir with water only present and no tailings. The soil column and soil properties considered are shown on Figure A3-4. The temperature of the pond water was varied monthly using the reported reservoir temperatures at the Kelsey Generating Station in Northern Manitoba. These temperatures, given on Figure A3-4, agree with our experience at other lakes in the NWT were seasonal temperatures have been measures at the bottom of the lakes.

The predicted rate of thaw for a period of 25 years is plotted on Figure A3-4 in terms of the square root of time. The slope of the plot is the thaw constant (α). The predicted value of α is 6.2×10^{-4} m/s$^{0.5}$ (0.62 mm/s$^{0.5}$) which falls in the middle of the typical range of α between 0.2 and 1.0 mm/s$^{0.5}$ (Nixon and McRoberts, 1973).

The amount of excess pore pressure generated on thaw is related to the rate of thaw, and the soil's ability to dissipate pore pressure represented by the coefficient of consolidation, as follows:

$$u = \frac{\gamma'.d}{1 + \frac{1}{2R^2}}$$

Where:
- u = excess pore pressure (kPa)
- γ' = submerged unit weight = $\gamma_t - \gamma_w$ (kN/m^3)
- d = depth (m)
- R = thaw consolidation ratio = $\alpha / 2\sqrt{c_v}$
- α = rate of thaw (m/s$^{0.5}$)
- C_v = coefficient of consolidation (m^2/s)

This relationship has been plotted on Figure A3-5. Using a lower bound C_v from Figure A2-4 in Appendix II of 1×10^{-6} m^2/s and $\alpha = 6.2 \times 10^{-4}$ m/s$^{0.5}$. The predicted excess pore pressure from the chart is 16% of the initial effective stress. Pore pressures of this amount were accounted for in the subsequent stability analyses.

7.2.4 Two-Dimensional Analysis of Long-Term Dam Conditions

In order to evaluate and demonstrate the long-term thermal performance of the tailings dam, a two-dimensional finite element analysis of the tailings impoundment was carried out using the computer program TEMP/W developed by Geo-Slope International. The two-dimensional mesh used in the analyses is shown on Figure A3-6. The design includes an upstream berm which reduces the rate of thaw and enhances stability at the upstream toe of dam. This area will be subjected initially to thawing due to ponding

of water and tailings disposal during the initial mine operations startup and the berm will therefore provide additional thermal protection.

The analysis conservatively considered the impact of the three year operating impoundment life by assuming a full pond water level with no tailings for the entire three year period. Closure conditions starting in Year 4 were then modelled by a tailings beach with the pond set back 50 m from the dam crest. The monthly varying ground surface temperatures were derived for each typical soil column (i.e. tailings sand, sand fill and native foundation soils with peat cover) using the one dimensional analysis and these values then input into the two dimensional model. The analyses were then extended for a total duration of 25 years. Figure A3-7 shows the representative sections which were analyzed and the depths of the thaw boundaries (0°C isotherm) after years 1, 2, 3, 5, 10, 15, 20 and 25 years.

The results of the analyses show:

- The zone of thawing in the foundation soils will extend only one-third of the width of the tailings dam from the upstream toe. The thawing is indicated to be confined to the upper 1 to 2 m of the foundation soils in the area underlying the upstream slope of the dam and up to 5 m under the pond. The subsequent thaw settlement analyses presented in the next section, assume a conservative depth of thaw of 4 m under the dam.

- In the event the tailings pond is operated for only three years, complete freeze back of the foundation soils beneath the dam is predicted after approximately 25 years. Extension of the mine life will however increase depths of thaw and the time for freeze back.

- Partial freezing of the downstream portion of the dam fill is predicted during the operating phase of the impoundment. The rate of freezing can be accelerated by removal of snow on the downstream slope of the dam.

- In the long-term, complete freezing of the dam is predicted with the final thaw boundary lying within the upstream deposited tailings.

To better assess the potential for thawing in the foundation soils, an additional analysis was made which took the operating conditions with full pond to a long-term operation life of 50 years. The results of this analysis, shown on Figure A3-8, showed that the thaw front (0°C isotherm) beneath the impoundment would extend down through the foundation soils into the underlying bedrock. The analyses however, estimate that the thaw front would not extend downstream of the dam centreline.

The above analyses do not consider the effects of convective heat transfer by seepage beneath the dam. The effects of such seepage will be minimized by the presence of a tailings beach and the geosynthetic clay liner in the dam which will cutoff seepage through the dam and the upper part of the foundation. Seepage under the dam will be restricted by the presently ice-saturated, frozen foundation soils.

The thermal analysis yields two important conclusions:

- Complete thaw of the foundation soils beneath the dam is not predicted during the operational phase of the impoundment thereby reducing potential thaw-settlements; and
- After mine closure, the regional permafrost will aggrade upwards into the dam in the long-term resulting in a strong and impermeable dam.

Irrespective of the above, the design takes into consideration long term measures which are required in the event of complete thaw of the foundation soils under the worst case condition. The thermal performance of the dam and underlying foundation and the influence of the tailings will be monitored throughout the operational life of the impoundment to determine which long term solutions are required.

7.3 Thaw-Settlement Analyses

Settlement of the dam will occur in areas where the foundation soils thaw and consolidate under the embankment loading. Thermal analyses predict that the foundation soils under the upstream slope will only partially thaw during mine

operations due to the warming influence of the tailings pond. These analyses predict that during the three year design life of the mining operation, thawing of the foundation soils will occur to a maximum depth of approximately 5 m under the pond area and less than 2 m below the upstream portion of the dam. The depth of thaw for the settlement calculations has therefore conservatively been assumed as 4 m.

In assessing the settlement due to thaw consolidation, the in situ frozen bulk densities were compared to empirical relationships which have been derived from published laboratory measurements and case history data of thaw settlement for various frozen soils ranging from frozen clays and silts to frozen sands. A series of correlations are shown on Figure A3-9 which show the relationship between the initial frozen bulk density and the normalized thaw consolidation ratio (i.e. ratio of settlement to initial height). For a given bulk density, higher plasticity soils generally speaking yield a higher thaw settlement than non-plastic silts and sands.

The median relationship between thaw settlement and frozen bulk density (γ_f) for all soils is given by the following equation:

$$\frac{\Delta H_T}{H} = 0.57\ (1.97 - \gamma_f)$$

The upper bound relationship between thaw-settlement and frozen bulk density for sands is given by:

$$\frac{\Delta H_T}{H} = 0.57\ (2.1 - \gamma_f)$$

The area considered to have the greatest potential for thaw settlement is located in the base of the creek valley. Three test holes including DH95-06, DH95-08 and DH95-09 were drilled in this area. An average of the frozen bulk densities in the upper 4 m of these three holes indicated an initial bulk density of approximately 1760 kg/m^3. Comparison of this initial bulk density to the design graphs for thaw consolidation on Figure A3-9 indicates an estimated settlement after three years of pond operation ranging from 0.5 m for the median case to 0.8 m for the upperbound case.

Bulk density values in the lower sand deposits below a depth of 4 m indicated an average bulk density of 1900 kg/m^3. Based on an assumed thickness of 16 m, the estimated additional settlement due to complete thawing of the foundation could vary from 0.7 m to 1.7 m for the median and upper bound cases respectively. In the event of complete thaw of the foundation soils, total settlements are estimated to vary from 1.2 m to 2.5 m for the median and upperbound cases.

The proposed dam cross-section allows for a potential 0.6 m settlement during the first three years based on the estimated thaw settlement in the upper 4 m. The dam performance over the first three years will be monitored for various behaviour aspects including the depth of thaw and dam crest settlement. Prior to completion of three years of operation, BYG are required to make a decision regarding raising of the dam for additional tailings storage or construction of the closure spillway for long term abandonment of the tailings impoundment. At that time the dam crest height should be reviewed and any additional allowance for longterm settlement made at that time. Should the dam performance and instrument monitoring suggest freezeback will occur after mine closure; then additional raising of the dam may not be required for settlement purposes.

7.4 Stability Analyses

7.4.1 General

Stability of the main dam embankment will initially be controlled by the presence of permafrost in the underlying foundation soils. The tailings dam overlying a frozen

foundation is expected to behave more than adequately and stability is not an issue of concern. The design must however consider the long term possibility of the foundation thawing. Stability analyses were therefore carried out to determine the cross-sectional geometry required to ensure stability of the dam under static and seismic conditions with an unfrozen foundation.

Limit equilibrium analyses were used throughout the stability evaluation for the main tailings dam. The computer program SLOPE/W by Geo-Slope International was used to analyze the various stability models using the circular Bishop method.

A stability model was developed for the central valley Section 'B', as shown on Figure A4-1, where the dam height is a maximum of about 18 m. A review of the foundation stratigraphy indicated that the dam foundation could be conservatively modelled as a homogeneous sand despite the presence of frequent gravel layers in the foundation. The dam geometry was based on the preliminary design cross-section with upstream slopes of 2.5H:1V and downstream slopes of 3.5H:1V. As previously discussed, construction of the downstream berm was omitted, but a 4 m thick upstream berm was included to protect the upstream toe of the dam from rapid thawing and possible instability due to warm pond water during mine startup. Dependant on the dam foundation performance, a downstream berm may eventually be required, however, construction of the berm can be delayed without serious ramifications until the actual performance of the dam can be monitored by the foundation instrumentation.

For design, the minimum allowable factor of safety against failure for static conditions was taken to be 1.5.

7.4.2 Soil Parameters

Standard proctor densities were measured for the proposed embankment fill as part of the borrow material evaluation. Maximum dry densities were measured at 1766 kg/m^3 and 1850 kg/m^3 for the typical sand material which will be used in the embankment. For an average value of 1808 kg/m^3 at 95% standard Proctor density and 13% moisture

content, the estimated average bulk density of the embankment fill is 1940 kg/m^3 or 19.0 kN/m^3. During the recent field investigation, bulk densities were also measured in the various soil strata underlying the main dam embankment. These values are recorded on Figure A2-2. For the foundation soils underlying the base of creek valley, the average bulk density is estimated to vary from an average of 1760 kg/m^3 in the upper soils, to be between 1900 kg/m^3 and 2000 kg/m^3 in the lower layers. An average unit weight of 19.0 kN/m^3 was adopted in the analyses. Based on our experience with similar tailings at other mine sites, the dry density of the tailings is estimated at 1250 kg/m^3. With an average water content of about 40%, the estimated bulk density of the tailings is about 1730 kg/m^3 or 17.0 kN/m^3. The frictional strengths of the fine sands and tailings are estimated based on the typical grain size when compared to published values and experience with similar materials. The sand soils are all considered cohesionless. The soil parameters used in the stability analyses are summarized as follows:

SOIL TYPE	BULK UNIT WEIGHT (γ) (kN/m^3)	FRICTIONAL STRENGTH (ϕ) (Degrees)	COHESION (kPa)
Compacted Embankment Fill	19	34°	0
Foundation Sand	19	30°	0
Tailings	17	30°	0

7.4.3 Static Analyses

To assess the effect of foundation pore pressures on the factor of safety, a number of parametric analyses were undertaken to relate the factor of safety to the pore pressure parameter r_u' which is defined as the ratio of excess pore pressure (u) to the effective stress ($\gamma'.d$) at a specific depth. From the equation in Section 7.2.3, the pore pressure parameter is calculated based on the pore pressure generated on thaw relative to the rate of thaw as follows:

$$r_u' = u/(\gamma'.d) = \frac{1}{1 + \frac{1}{2R^2}}$$

Where:
- u = excess pore pressure (kPa)
- γ' = submerged unit weight = $\gamma_t - \gamma_w$ (kN/m^3)
- d = depth (m)
- R = thaw consolidation ratio = $\alpha / 2\sqrt{c_v}$
- α = rate of thaw (m/s$^{0.5}$)
- C_v = coefficient of consolidation (m^2/s)

The results of the slope stability analyses for the downstream slope are summarized on Figure A4-1. The upstream slope is contained by the tailings beach and stability is therefore not a concern by the time the foundation thaws. As shown, for the downstream slope, the minimum factor of safety for the downstream slope occurs at a r_u' value of approximately 0.55. The predicted r_u' value based on the rate of thaw ($\alpha = 6.2 \times 10^{-4}$ m/s$^{0.5}$) and the coefficient of consolidation ($c_v = 1 \times 10^{-6}$ m^2/s) of the material, as discussed in Section 7.2.3, is approximately 0.16 which results in a factor of safety in excess of 2.

7.4.4 Seismic Analyses

The Mt. Nansen minesite lies within a seismically active area of the Canadian north in Seismic Zone 2, as defined by the National Building Code of Canada, 1990. The site lies within the Northern British Columbia (NBC) source zone between the McKenzie (MKZ) zone and the Denali Shakwak (DSK) zone.

A probabilistic assessment of the seismic risk at the site has been undertaken by the Pacific Geoscience Centre for the Mt. Nansen site (October 1988). Based on this assessment, a peak horizontal ground acceleration of approximately 10% g is expected with probability of exceedance no greater than 0.0021 per annum, or one in 475 years, while a peak horizontal acceleration of 12% g is expected with a return period of .001, or one in 1 000 years.

The dam foundation consists primarily of fine sands and hence, if sufficiently loose, can be potentially liquefiable. The governing parameters regarding the liquefaction of the sand are the thawed in situ density and the design earthquake in terms of magnitude (M) and acceleration (a_h). Current engineering practice to determine liquefaction susceptibility in foundation soils, requires the measurement of Standard Penetration Test (SPT) corrected blow counts ($(N_1)_{60}$) either by SPT or cone penetration methods. If an analysis of the blow count profiles with depth indicates that the foundation is potentially liquefiable then the residual strength for the material can be estimated and a corresponding factor of safety can be calculated. However, based on the current frozen nature of the foundation and the predictions from the thermal analysis related to future thawing, the following approach is recommended:

- Monitor the actual performance of the dam and foundation over the 3 years of operation.
- At time of mine closure review seismic stability including the design earthquake and SPT data from thawed zones (if any).
- Review liquefaction potential and, if required, include a downstream berm in the mine closure plan.

7.5 Seepage Analyses

7.5.1 General

The design of the main tailings dam is intended to minimize seepage of the pond water downstream of the dam into Dome Creek. This will ensure release of water from the tailings pond is controlled through treatment facilities and/or the emergency spillway and will also ensure that piping and loss of material does not occur at the downstream toe of dam due to uncontrolled seepage pressures.

The proposed dam embankment is expected to be constructed of fine to medium sand with a silt content typically varying from 10% to 40%. The foundation soils underlying the dam similarly consist of these type of sand materials. The fine grained sands are moderately pervious and a seepage barrier is therefore required. The presence of an ice

saturated frozen foundation will provide an initial barrier against seepage, however, the design must account for the long term potential of the foundation thawing with a corresponding increase in foundation permeability.

The primary barrier to impede seepage through the dam will consist of the tailings which will be deposited on the upstream slope throughout the period of mine operation. The tailings to be stored in the impoundment are expected to have a high content of clay size particles with a corresponding low permeability. The thickness of tailings will increase throughout the mine operation as the level of required protection also increases due to higher pond levels and a greater potential for thawing in the foundation. A secondary seepage barrier is provided by inclusion of a geosynthetic clay liner on the upstream slope. The clay liner will provide seepage protection during the initial pond startup when water will be ponded against the upstream slope prior to tailings deposition. Seepage protection is also provided by the geosynthetic clay liner in the event foundation thawing occurs which may result in differential settlement and cracking of the dam. Cracking is not however considered a major concern due to the self healing nature of the cohesionless sand fill and the thick covering of tailings on the upstream slope.

The initial dam cross-section to be constructed does not include a downstream berm. In the event that seepage does develop and seepage pressures at the downstream toe are reason for concern, a downstream berm can be constructed with drains which can control seepage without piping or loss of material at the toe.

The limited seepage expected through the embankment and underlying foundation will be collected upstream of the seepage recovery dam where it can be returned to the tailings pond by pumping or released downstream if acceptable water quality is achieved. This small embankment for the seepage recovery dam will also be provided with a geosynthetic liner which will be keyed into the underlying permafrost. Details of the main dam, seepage recovery dam and geosynthetic clay liner are shown on Drawings B-5314-007 and -008.

7.5.2 Seepage Analyses

Seepage analyses were carried out using the two dimensional finite element computer program SEEP/W by Geo-Slope International. The seepage model is shown on Figure A5-1 and the hydraulic parameters are listed below:

MATERIAL	HYDRAULIC CONDUCTIVITY (cm/s)	Kh/Kv
Bedrock	$1x10^{-7}$	1
Frozen Sand Foundation	$1x10^{-7}$	1
Thawed Sand Foundation	$1x10^{-3}$	1
Dam	$1x10^{-3}$	1
Tailings	$1x10^{-5}$	1

The design values of the hydraulic conductivity were based on laboratory testing and assumed values for similar type soils. For comparison, falling head permeability tests on recompacted samples of the foundation sand gave permeability values of $2x10^{-5}$ cm/s to $9x10^{-4}$ cm/s. All materials were assumed to be isotropic with the ratio of horizontal and vertical permeabilities equal to unity.

The seepage model consisted of a typical dam cross-section with dam crest set at elevation 1151.5 m, a pond elevation of 1149.7 m and a 50 m wide tailings beach. The downstream water elevation was set at 1136 m. The presence of a geosynthetic clay liner was not included in the analyses and therefore the estimated seepage quantities are expected to be conservatively higher than anticipated. The seepage analyses indicate that the phreatic surface will be low in the downstream portion of the dam, as shown on Figure A5-1, and quantities of seepage through the dam should also be low at approximately a maximum of 0.2 l/sec for the case of a frozen foundation and unfrozen dam over a 200 m wide seepage zone. At this rate of seepage, the seepage recovery pond should fill to the crest level after two months operation. Figure A5-1 also presents the variation of predicted seepage with depth of thaw under the dam. With about 16 m of thawed foundation, the maximum predicted seepage increases to about 2.4 l/s

assuming a 200 m wide seepage zone (14 days capacity in the seepage recovery pond). It is important to note that these seepage rates are dependant on the development of a tailings beach on the upstream face of the dam.

7.5.3 Geosynthetic Clay Liner (GCL)

The proposed GCL consists of Bentofix NW by Terrafix. The Bentofix NW is a sandwiched composite of two non woven geotextiles with an intermediate bentonite clay layer. The Bentofix is needle punched across its entire surface to bind the two geotextiles together. The needle punching laterally confines the bentonite to control swelling during hydration and also provides a high degree of internal shear strength. As a result, the Bentofix GCL's internal friction within the composite is relatively high at approximately 34° so that in the hydrated state, no potential plane of weakness exists within the composite.

7.6 Instrumentation

An instrumentation system is required to adequately monitor the tailings dam performance both during and after mine operation. The proposed instrumentation plan should include thermistors, pneumatic piezometers and settlement pins in the area of the main tailings dam and seepage collection dam. Drawing B-5314-009 presents the proposed instrumentation details.

A series of six thermistor strings were installed during the recent field program at various depths up to 15 m in the foundation areas of the main dam and seepage recovery dam. The thermistors were supplied by R.S. Technical Instruments of Port Coquitlam, British Columbia and were accurate to $\pm$0.2°C. The thermistor cables are presently protected with steel casings at the ground surface at each test hole location. During construction of the dam, each cable should be extended to the toe of dam by splicing on additional cable and burying the cable horizontally in the embankment fill. An additional thermistor string with six thermistors spaced at 14 m intervals should be placed horizontally within the embankment fill approximately 5 m above the foundation base, as shown on Drawing B-5314-009. All thermistor strings should be labelled and

extended to a suitable readout location near the downstream toe. Monitoring of the thermistors should be continued throughout construction as well as the subsequent mine operation period to measure temperature changes and possible thawing in the foundation soils. Monitoring of this data is extremely important as the inclusion of any future design measures is dependant on the presence or absence of permafrost in the foundation.

Pneumatic piezometers are also recommended at several locations as shown on Drawing B-5314-009. In total, fifteen pneumatic piezometers are proposed underlying and within the dam embankment. The pneumatic piezometers should consist of P-100 General Purpose piezometers as supplied by R.S. Technical Instruments. Eleven of these pneumatic piezometers are proposed along a central line down the centre of the creek valley. The pneumatic piezometers should be installed at depths ranging from 3 m to 10 m below foundation level and up to 2 m above foundation level. An additional two piezometers should be installed on each abutment with each set consisting of one piezometer 3 m below foundation level and the other piezometer 1 m above foundation level. Pneumatic piezometer tube lines should be buried in the embankment fill and extended laterally to the toe of dam. Monitoring of the pneumatic piezometers is only recommended in zones which are known to have thawed. Measurement of pneumatic piezometers in frozen zones is not required as these instruments will not reliably measure pore pressures until the surrounding soils thaw. Once thawing has occurred, the pneumatic piezometers will, however, allow measurement of the foundation pore pressures which are caused due to thaw-consolidation and will also allow measurement of any seepage pressures present in the embankment. Monitoring of the pneumatic piezometers therefore need only be initiated after pond filling has commenced and the temperature regime indicates thawing is occurring.

Settlement pins are also required along the crest to monitor settlements after completion of the embankment construction. The settlement pins should consist of 25 mm diameter iron bars at least 1.5 m long which are driven into the embankment fill along the downstream edge of the dam crest. The settlement pins should be positioned across the

crest as shown on Drawing B-5314-009. The frequency of survey measurements for the settlement pins will depend on the performance history of the dam and should be reviewed as settlement data is collected.

7.7 Borrow Assessment

Approximately 100 000 m^3 of Zone 1 sand fill is required for construction of the tailings dam embankment. The borrow areas which have been identified for construction use in the dam embankment include three sand ridges on the south valley slope upstream of the dam (Borrow Areas A, B and C, see Drawing B-53147-003) and the operating spillway excavation (Borrow Area D) on the north valley slope located downstream of the dam. It is estimated that these borrow areas should be sufficient to provide the necessary quantities for dam construction. The primary borrow material from each of these areas is a fine to medium grained silty sand. The sand is generally frozen below the depth of active zone and thawing of any frozen materials will be required prior to compaction.

The silt content for the sand borrow material typically varies from 10% to 40%. Two standard Proctor density tests were carried out in accordance with ASTM D698 which showed maximum dry densities varying from 1766 kg/m^3 to 1850 kg/m^3. The optimum moisture content to achieve the required maximum dry density varied from 13.3% to 12.8% respectively for each of these two tests. (See test results on Figure A2-5 in Appendix II.)

Borrow Area A contained a surficial layer of fine sand to a depth of 6.25 m which is expected to be suitable for embankment construction. The sand is at or below optimum moisture content in the upper 3 m and then increases above optimum moisture content up to 20% below the 3 m depth. The lower strata in this area, below 6.25 m depth, as observed in DH95-17, consist of silt with sandy zones. Moisture contents in this strata are generally much higher at 30% and use of this zone is most likely not feasible due to the additional drying and conditioning of the wet material which is anticipated prior to compaction.

Borrow Area B is located further upstream on another sand ridge. Similar to Area A, test holes DH95-18 to DH95-20 generally showed a trend towards increasing moisture content with depth. For the most part moisture contents were generally within the 15% to 20% range in the fine sands. Silt layers were observed at various depths which may not be useable in the main dam embankment. It is expected the thickness of useable material may vary from about 9 m on the outer edges of this ridge tapering to less than 2 m towards the south valley slope.

Borrow Area C indicated the presence of significant silt layers in test holes DH95-21 to DH95-23. It is anticipated that the use of these silt soils will not be practical due to high moisture contents which were evident after thawing samples in the field. An upper layer of suitable sand borrow was, however, observed to a depth of 2.4 m near the edge of the deposit.

In addition to the borrow areas upstream of the dam, it is anticipated that a significant quantity of borrow will be obtained from the operating spillway excavation on the north valley slope in the vicinity of test hole DH95-26. It is expected that this excavation will be widened on either side to include a portion of the sand ridge which parallels Dome Creek. Test hole DH95-27 was drilled east of the spillway excavation on this sand ridge. Both of these holes in this area indicate good potential for sand borrow to depths up to 9 m and possibly deeper. Similar to other areas, there is a trend towards increasing moisture content with depth. Again, moisture contents were observed to be less than 20%, except in zones near the ground surface where moisture contents are less than 10%.

Operation of the borrow areas will require that the sand borrow be excavated in a manner to allow thawing prior to placement and compaction. In some cases, it is anticipated that ripping will be required to accelerate the thawing process. Operation of several borrow areas simultaneously will also maximize the amount of thawed material suitable for placement. Excavation should also be carried out in a manner which will mix dry soils with wet soils. This may best be carried out by sloping

excavations in order to mix soils from different layers. The deeper sands are otherwise expected to be wet of optimum and drying will be required prior to compaction. The use of a dozer or grader is recommended to blade materials across the embankment fill or in situ in borrow areas to allow sufficient aeration and drying.

8. HYDROLOGY AND WATER MANAGEMENT

8.1 Meteorological Stations

The long term meteorological station located closest to the site is Carmacks which has available about 22 years of data. The station is located about 60 km to the east of the site at an elevation of 524 m, or about 600 m to 800 m below the minesite elevation. Other long term stations reviewed as part of this study are listed in Table 1 along with their location with respect to the site.

Table 1 - Meteorological Stations

Station Name	Station Number	Location	Record Interval	Years of Record
Carmacks	2100300	60 km east	1963-1991	29
Whitehorse	2101300	180 km southeast	1942-1990	49
Pelly Ranch	2100880	80 km north	1951-1990	40
Mayo Airport	2100700	185 km north-northeast	1925-1990	66
Haines Junction	2100630	145 km south	1945-1984	40
Burwash Airport	2100182	135 km southwest	1966-1991	26
Aishihik	2100100	80 km southeast	1943-1966	24
Braeburn	2100167	90 km southeast	1974-1991	18

8.2 Annual Precipitation

Precipitation at Mt. Nansen occurs primarily as snow from November to the end of April. On average approximately 40% of the annual precipitation falls as snow which corresponds to the typical snowpack of 1 m as observed at the site. Some rainfall occurs as early as April, but the majority of rainfall occurs from June to August.

An analysis of regional weather stations indicates that the average annual precipitation is consistent from about Burwash Landing, northeast to Mayo and as far south as Whitehorse and north to Dawson. Although most of these stations are located at elevations substantially lower that the minesite, increases in precipitation with elevation are not expected at this site given the local rolling topography and the overwhelming effect of the St. Elias range in removing moisture from air masses moving to the northeast. Precipitation does however, begin to significantly increase further northeast of Mayo.

For the reasons mentioned above, Carmacks monthly precipitation data was taken as representative of the site. Mean annual precipitation values on a monthly basis are summarized in Table 2 along with a 200-year return period wet year and a 10-year return period dry year.

8.3 Lake Evaporation

The closest station for which lake evaporation data is available is Pelly Ranch (formerly Fort Selkirk) which is located about 80 km north of the minesite at an elevation of 454 m. The lake evaporation data from this station was taken as representative of the site.

There are 17 to 28 years of evaporation data available at Pelly Ranch, depending on the month (May and September have missing data). The data is shown in Table 2. During the summer months of May through August, evaporation exceeds average precipitation

indicating a soil moisture deficit. In the wettest month (July) lake evaporation is about twice the precipitation.

Table 2 - Summary of Monthly Precipitation and Evaporation

MONTH	PRECIPITATION			EVAPORATION
	Average Year (mm/month)	10-Year Return Period Dry Year (mm/month)	200-Year Return Period Wet Year (mm/month)	Average Monthly (mm/month)
January	17.5	13.0	26.5	0.0
February	12.0	8.9	18.2	0.0
March	6.8	5.0	10.3	0.0
April	6.6	4.9	10.0	0.0
May	19.6	14.5	29.8	105.0
June	33.7	25.0	51.2	121.3
July	53.8	39.9	81.7	111.2
August	38.5	28.5	58.5	80.0
September	30.0	22.2	45.6	36.6
October	18.7	13.9	28.4	0.0
November	17.9	13.2	27.2	0.0
December	14.9	11.0	22.6	0.0
TOTAL	270	200	410	454

8.4 Short Duration Storms

Weather data has been collected at Carmacks station since 1964. For the years of 1964 to 1984 rainfall data is available in IDF format from Atmospheric Environmental Services which gives annual extreme rainfall for durations from 5 minutes to 24 hours. The IDF format is based on a moving window average over the duration of the rainfall in question. From 1984 to present this level of detailed rainfall information is not available and only once daily measurements are available to determine annual "daily" extreme rainfall. The daily data is available from 1964 to present and thus represents a significantly longer period of record. To account for differences in sampling techniques

between the IDF and daily data methods, the daily data is typically scaled up by a sampling factor of 1.13.

The longer term extreme daily data from Carmacks was compared to other stations in the region. The results showed that the Carmacks extreme daily data was low and thus a scaling factor of 1.4 was applied to represent site conditions. Since the longer term daily data is more reliable, the shorter duration IDF data was scaled to match the 24-hour IDF to the daily data. A frequency analysis was done using this data to determine 20 year and 200 year data for durations of 5 min to 24 hour data as shown in Table 3.

The 24-hour Probable Maximum Precipitation (PMP) was determined from the Carmacks daily data using the Hershfield method. This value was scaled by 1.4 to obtain the 24-hour PMP for the site. Individual Hershfield analyses were carried out for the IDF data for each duration and these were scaled up to match the IDF 24 hour PMP to long term daily 24 hour PMP. The PMP values are shown in Table 3.

For design of the diversion ditch and emergency spillway and to provide estimates of required dam freeboard over the spillway invert, a short duration storm for the 20 year and 200 year return period and the PMP event was required. The rainfall runoff model OTTHYMO was used to determine peak flow in the diversion ditch and the inflow hydrograph for pond routing. Based on the estimated time of concentration of the catchment, a storm of 6 hours was selected. Six hour storms were assembled for each event with an interval of 5 minutes using rainfall data as shown in Table 3 incorporating an alternating block method.

Table 3 - Short Duration Rainfall Data

DURATION	RAINFALL (mm)		
	20 year	200 year	PMP
5 min	8.8	12.9	22.1
10 min	12.0	17.8	41.2
15 min	14.3	21.2	48.1
30 min	16.8	24.1	57.8
1 hr	18.8	26.9	86.1
2 hr	21.7	30.0	101
6 hr	26.0	35.5	124
12 hr	31.9	44.0	146
24 hr	35.7	49.2	170

8.5 Diversion Channel and Emergency Spillway Design

8.5.1 General

For operating conditions the recommended level of design is a 20 year return period for the diversion channel and 200 year return period for the emergency spillway. By designing the diversion channel for only the 20 year event, the required channel size and erosion protection are reduced. BYG have indicated that in order to minimize storage requirements for excess water in the tailings pond, water treatment will be performed if water quality standards are not achieved. Therefore, any flows larger than the 20 year return period will be routed through the tailings pond which lowers downstream channel requirements. The general layout and section details of the diversion channel and spillways are shown on Drawings B-5314-003 and B-5314-010.

8.5.2 Diversion Channel

To divert the flow of Dome Creek around the tailings pond, a diversion channel could be constructed on the north abutment of the dam, as shown on Drawing B-5314-003.

Water from the diversion would enter the emergency spillway channel downstream of the dam centreline. If required during mine operation, it would be possible to construct an outlet from the channel into the tailings pond to allow water into the pond if a water deficit were to occur.

A catchment area of approximately 2.3 km^2 contributes flow to the diversion channel. The 20 year peak flow in the diversion channel was calculated to be 6.4 m^3/s. The channel depth is shown in Table 4 for 0.1% and 6% gradients. The channel was assumed to have a 3 m wide invert and 2H:1V sideslopes.

The material underlying the diversion channel is a silty sand which will require protection against erosion. The flat gradient section of the diversion upstream of the dam centreline will require a 300 mm thick layer of Zone 2 gravel consisting of 75 mm minus pitrun gravel, while the steeper section will require a heavier Zone 3 riprap up to 300 mm diameter with a 300 mm thick bedding layer of Zone 2 gravel. Recommended gradations for riprap and bedding materials are provided in Section 9.4 and are summarized on Table 5. The heavier riprap should be extended 10 m upstream of the grade change to prevent scour in the transition from tranquil to supercritical flow. As an alternative, an appropriate geotextile filter cloth (Terrafix 600R or equivalent) could be substituted for the bedding material underlying the riprap.

Due to the permeability of the underlying material, water is expected to seep out of the channel. The amount of seepage is estimated to be in the order of 4500 m^3/month during the summer when the ground is not frozen. An impermeable liner, which would reduce the seepage to almost zero, may be cost effective when considering water treatment costs. The liner could be installed at a later date if pond inflow is deemed too large based on first year operating data.

In the spring, when snow-melt begins and rainstorms may occur, excessive ice, snow and snow drifts must be cleared from the channels to allow for the safe diversion of surface runoff. Every spring and fall, the channel must be checked for vegetation build-

up and subsidence due to frost action. Either of these may reduce the effectiveness of the drainage channels and therefore must be monitored.

The present design shows a temporary diversion channel which bypasses the emergency spillway channel. It is anticipated that dam construction will be carried out coincidentally with the emergency spillway excavation which will provide a significant amount of borrow for the dam. A temporary diversion channel is therefore required during the period of construction. Riprap placement and activation of the emergency spillway channel may be delayed till the end of dam construction as the reservoir is initially empty and excess flood flows could be stored in the reservoir if necessary until riprap could be placed. The temporary diversion channel is also subject to erosion during major flows. Construction should therefore be scheduled so as to minimize the operation period for this channel.

8.5.3 Emergency Spillway

The purpose of the emergency spillway is to prevent overtopping of the dam crest during peak inflow. The design level of flood protection is equivalent to the 200 year inflow to which freeboard has been added. To determine peak outflow, the 200 year inflow was routed through the pond to account for storage effects. The reservoir volume elevation curve used in the assessment is shown on Drawing B-5314-006 and the stage discharge curve was determined using a backwater computer model assuming critical flow occurs at the spillway transition from a 0.1% gradient to a 2% gradient.

The calculated emergency spillway flow is 3.7 m^3/s assuming the diversion channel is breached during the event and a starting water level at the spillway invert is 1149.7 m. The flow and channel depths for the emergency spillway are shown in Table 4 for various gradients. Downstream of the intersection with the diversion channel the design flow is 6.4 m^3/s which is equivalent to the diversion channel spillway 20 year peak flow. The channel was assumed to have a 5 m wide invert and 2H:1V sideslopes.

Table 4 - Diversion ditch and Emergency Spillway Hydraulics

Channel Description	Return Period (yrs)	Flow (m^3/s)	Slope (%)	Water Velocity (m/s)	Flow Depth (m)	Channel Depth (m)
North Diversion (3m width)	20 20	6.4 6.4	0.1-0.2 6	0.9 3.2	1.4 0.5	1.4 0.5
Emergency Spillway (5 m width) u/s of intersection with diversion	200 200	3.7 3.7	0.1-0.2 3	0.9 2.3	0.8 0.5	1.1 0.8
Emergency Spillway (5 m width) d/s of intersection with diversion	200 200	6.4 6.4	6 10	2.7 3.0	0.5 0.4	0.8 0.7

Note: Emergency Spillway depth includes 0.3 m freeboard.

The material underlying the emergency spillway is also a silty sand which will require protection against erosion. The flat gradient section of 0% to 0.2% will require a 300 mm thick layer of Zone 2 gravel, while the steeper sections of 2% to 10% will require either Zone 3 or Zone 4 riprap with a bedding layer of Zone 2 gravel or a geotextile filter fabric as shown on Table 5 and Drawing B-5314-010. The heavier riprap should be extended 10 m upstream of the grade change, to prevent scour in the transition from tranquil to supercritical flow. An appropriate geotextile filter cloth (Terrafix 600R or equivalent) could be substituted for the bedding material.

Table 5 - Recommended Diversion Channel and Emergency Spillway Riprap and Filter Sizes

Channel Description	Return Period (yrs)	Slope (%)	Riprap Zone	Riprap				Filter Size
				d15 (mm)	d50 (mm)	d100 (mm)	Thickness (mm)	
North Diversion (3 m width)	20 20	0.1-0.2 6	Zone 2 Zone 3	* 130	* 200	* 300	300 450	no filter 300 mm Zone 2 Gravel or Geotextile**
Emergency Spillway (5 m width) u/s of intersection with diversion	200 200	0.1-1.02 2-3	Zone 2 Zone 3	* 130	* 200	* 300	300 450	no filter 300 mm Zone 2 Gravel or Geotextile**
Emergency Spillway (5 m width) d/s of intersection with diversion	200	6-10	Zone 4	200	300	500	750	300 mm Zone 2 Gravel or Geotextile**

* Denotes (75 mm minus)
** Geotextile fabric should consist of Terrafix 600R or equivalent

The routing of the 200 year inflow produced a maximum pond level of 1150.5 m. Adding a freeboard of 0.4 m to this value results in a dam crest elevation of 1150.9 m. The effective protection of this dam crest level with zero freeboard is 50% of the PMF which is reasonable given the size of the dam and the downstream and financial consequences of failure.

8.5.4 Closure Spillway

For mine closure, a permanent spillway should be constructed in rock on the south abutment. For longterm abandonment, the design flood discharge is assumed to be 100% of the Probable Maximum Flood (PMF). Assuming a spillway invert width of 5 m, channel sideslopes in rock of 0.5H:1V, an invert elevation of 1149.2 m (final tailings level) and PMF conditions, a routed maximum pond level of 1151.3 m was calculated. Including freeboard for waves and wind setup a dam crest of up to 1151.8 m may be required. This exceeds the current planned dam crest elevation of 1150.9 m by 0.9 m indicating that the dam would require raising at closure. Depending on the final level of the tailings it may be acceptable to reduce the invert of the spillway thereby reducing the requirement to raise the dam crest at closure. Alternatively a 10 m wide spillway could be constructed which results in a PMF pond level of 1150.8 m requiring a final dam crest of 1151.3 m, reducing the amount of the dam raise at closure to 0.4 m. The final design of the closure spillway should be determined when the final orientation of the tailings and the settled dam height is known. The analysis should include provisions for wave protection and overtopping.

8.6 Water Balance

A combined water and tailings balance was carried out to determine the final tailings level and the amount of excess water that would require treatment. Because the tailings impoundment clearly operates with an excess of water for the average year and given that the diversion channel could be breached if more water were required, a dry year analysis was not done.

The water balance assumes that there is no seepage from the diversion ditch except that expected during July, August and September. During these months precipitation falling uphill of the diversion channel will infiltrate and pass underneath the diversion channel through the thaw zone. For the rest of the year the ground is frozen and runoff will flow into the diversion ditch. Thus, the pond catchment area with diversion channel is 75.8 ha for July to September and 50.9 ha for the remaining months.

Spring runoff was assumed to occur in the month of May, with the amount of snowmelt runoff equal to 80% of the cumulative precipitation from October to May. The remaining 20% accounts for overwinter losses in the snowpack, including base melt. For the summer months the runoff was assumed to be 60% which accounts for the presence of an impermeable permafrost at shallow depth, minimal ponding on the slopes, and relatively permeable thawed soils.

Mill water circulation was assumed to be 30 000 m^3/month with 100% recycle from the tailings pond year round. Seepage from the tailings impoundment is assumed to be minimal. Domestic and sewage water, which would be discharged with the tailings, have not been accounted for. However, their volumes would be small compared to the other factors and would not have a significant effect on this level of water balance calculation.

8.6.1 Tailings Level

Assuming 3380 m^3/month of tailings reporting to the impoundment and an in situ void ratio of 1.0 a final average tailings elevation of 1149.2 m is estimated at the end of Year 3. A void ratio of 1.0 reflects the use of subaqueous deposition in winter to prevent the formation of ice lenses in the tailings. The average tailings elevation estimate is based on a resultant flat tailings level after deposition.

8.6.2 Average Year Water Balance

The average year water balance results indicate that, with the diversion in place, there will be 237 300 m^3 of excess water over the 3 year mine life. The water level reaches

1149.7 m based on storing a minimum two-month mill water circulation volume of 30 000 m^3/month. During the winter there is a net loss of pond water due to minimal inflow and losses to tailings voids. In an average year, winter losses are estimated to be 2000 m^3/month. The results for the average year monthly water balance are shown in Appendix VI.

8.6.3 200 Year Water Balance

If a 200 year wet year is added in year 2, with the remaining years being average, results indicate that, with the diversion in place, there will be 298 360 m^3 of excess water over the 3 year mine life. The maximum water level of 1149.7 m is unchanged since it is based on the tailings level plus 2 months volume of mill water circulation. The results for the 200 year monthly water balance are also shown in Appendix VI.

9. CONSTRUCTION QUALITY ASSURANCE REQUIREMENTS

9.1 Site Clearing/Foundation Preparation

Site clearing and foundation preparation is required in the areas of work including the borrow areas, dam footprint area, seepage recovery dam, diversion ditch and emergency spillway. Performance of this work should be carried out as follows:

1. Remove all trees, shrubs and bushes and stockpile separately in the designated disposal areas shown on the drawings or approved otherwise by the Engineer.

2. Excavate surficial organic materials in areas of work including moss, peat and organic silts to expose native sands. Surficial organic soils may be used for future reclamation purposes and should therefore be stockpiled separately from surface vegetation in designated areas shown on the drawings. Excavation of organic soils in the base of Dome Creek valley underlying the dam embankment should be a minimum of 1 m and may vary up to a maximum of 2 m.

3. Remove all frozen lumps, ice or otherwise unsuitable material from the foundation area. Seepage from excavation side slopes should be controlled by positive drainage or pumping.

4. Foundation excavation and preparation in the base of Dome Creek valley should only be carried out after diversion of the creek flows and at such time as fill material is ready for placement on the prepared frozen subgrade. Immediately after the subgrade is exposed, the fill material should be placed and compacted in lifts as specified up to at least the original grade.

5. Subcuts are required along the upstream toe of tailings dam and seepage recovery dam for placement of the geosynthetic clay liner. These excavations should only be completed at such time as the liner material and backfill material are ready for placement.

9.2 Embankment Construction

Compacted earthfill embankments are required for the main tailings dam and seepage recovery dam. Performance of this work should be carried out as follows:

1. Supply Zone 1 embankment fill consisting of native sand material with a maximum of 50% fines passing the 75 μm size. The maximum size should not exceed 150 mm except in layers adjacent to the geosynthetic clay liner where the maximum size should not exceed 50 mm.

2. Ensure all Zone 1 fill materials are thawed prior to compaction.

3. Aerate or add water where necessary or mix dry soils with wet soils to achieve moisture contents within $\pm$ 3% of optimum moisture content as determined by ASTM D698.

4. Condition moisture content in Zone 1 embankment fill by blading, rolling or otherwise working material with a dozer or grader.

5. Place Zone 1 embankment fill in near horizontal lifts not exceeding a compacted lift thickness of 250 mm.

6. Compact embankment fill material to a minimum of 95% standard Proctor maximum dry density as determined by ASTM D698.

7. Compact embankment fill materials with a vibratory smooth or tapered pad drum roller with a minimum operating weight of 8000 kg.

8. Overbuild the upstream slope of the main tailings dam and seepage recovery dam to allow trimming and final grading of the fill surface prior to placement of the geosynthetic clay liner. Trim slopes for placement of liner using a smooth bucket excavator.

9. Ensure stones or rocks in excess of 50 mm are not exposed on the upstream fill surface prior to placement of the geosynthetic clay liner.

9.3 Geosynthetic Clay Liner (GCL) Installation

A geosynthetic clay liner is required on the upstream slope of the main tailings dam and seepage recovery dam. Supply and installation of the GCL should be performed as follows:

1. The geosynthetic clay liner should consist of Bentofix NW as produced by Terrafix Geosynthetics Inc. and should be supplied in rolls 4.62 m wide by 30.5 m long (packaged weight approximately 600 kg). BYG will supply the Bentofix GCL for installation by the Contractor.

2. During all stages of shipping, handling and storage of the Bentofix NW GCL, exercise care to prevent puncturing or other damage to the protective covering and GCL material and to protect against wetting of the rolls. Provide adequate storage facilities for the GCL materials while on-site prior to installation.

3. Remove protective coverings only immediately prior to deployment of the materials.

4. Any GCL materials that are exposed to precipitation or are otherwise wetted, should be set aside for examination by the Engineer to establish the degree of damage. Prior to deployment, examine any rolls of Bentofix that become contaminated with foreign materials to ensure that the material has not been compromised. In some cases, the material may be salvaged, but significant wetting of the Bentofix may complicate or even impede deployment and the normal course of action should be that the material be discarded.

5. In areas along the upstream toe of dam where the Bentofix is to be deployed directly above the in situ soil materials, remove all roots, large (>50 mm diameter) rocks, frozen lumps, debris or other foreign materials at the surface of the subgrade.

6. Ensure the final subgrade surface is smooth. If the subgrade is frozen and irregular, place a levelling layer of fine sand and roll with a smooth drum roller. The Engineer should record the soil type for the subgrade surface and approve the condition of this prepared surface prior to the deployment of any Bentofix.

7. Install sections of the Bentofix from the highest point to the lowest.

8. On slopes, install Bentofix down, not across the slope.

9. Cut Bentofix using only approved cutters, and take care to ensure that materials underlying them are not damaged during cutting.

10. The bentofix should be kept as clean as possible at all times up to and including the time of placement of the next layer of material covering them. Cover joint areas with a temporary layer of Terrofix 600 R geotextile until such time as joints are ready for placement of overlying layers of Bentofix.

11. Place adjacent panels of Bentofix parallel and overlap a minimum of 150 mm along the side joints, and 300 mm at end joints.

12. Treat overlap joints by the addition of powdered bentonite comprised of the same bentonite as used in the Bentofix sandwich, both between the overlapped sheets and along the exposed edge of the joint.

13. At the perimeter of the installation, as well as at the top of slopes, anchor the Bentofix layer into a trench. This anchor trench should be located at least 600 mm beyond the crest of the slope, and should be a minimum of 450 mm deep. Place the Bentofix into this trench extending down the inside face and across the bottom of the trench. Secure the material by the controlled placement and compaction of backfill into the trench in such a manner as to not damage the composite. In all cases, provide appropriate anchorage to prevent the ingress of any surface runoff beneath the Bentofix, and to secure the GCL for stability and performance.

14. Mark all areas requiring repair due to damage during shipping, handling, or deployment, or manufacturing flaws in the materials. In cases where the material is pervasively damaged and repair is impractical, the material so affected should be marked accordingly, removed, and set aside or removed from the site so as to avoid reuse. All repairs made by the placement of a patch of the same material over the flaw or damage should extend at least 300 mm beyond the flaw or damage in every direction.

15. Within 48 hours, after placement of the Bentofix GCL, completely cover the GCL with a layer of Zone 1 sand and protect the GCL against damage. Ensure all procedures for placement of the GCL and cover layer are carried out in a manner which does not tear or damage the GCL.

9.4 Erosion Protection

Gravel armour is required to prevent erosion in the diversion channel upstream of the dam centerline and also on the crest and downstream slope of the main tailings dam and seepage recovery dam. Riprap is required for erosion protection on the steep gradient sections of the diversion channel and emergency spillway on the north abutment. Supply and installation of erosion protection materials should be carried out as follows:

1. Zone 2 gravel armour should consist of the following:

Size	Percent Passing by Mass
75 mm	100%
40 mm	55% - 90%
20 mm	40% - 65%
5 mm	20% - 40%
1.25 mm	7% - 25%
80 μm	0% - 5%

2. Zone 3 riprap should consist of the following:

Size	Percent Passing by Mass
300 mm	80% - 100%
200 mm	40% - 60%
100 mm	10% - 30%
50 mm	0% - 10%

3. Zone 4 riprap should consist of the following:

Size	Percent Passing by Mass
500 mm	80% - 100%
300 mm	40% - 60%
150 mm	10% - 30%
50 mm	0% - 10%

4. The ratio of maximum to minimum dimension for riprap particles should not exceed 3.0.

5. Gravel armour and riprap should consist of sound, hard particles, free of organic matter and which meets the following minimum requirements for soundness and durability:

Test	Method of Test	Minimum Requirements
Abrasion Resistance	Los Angeles Machine ASTM C535	Less than 40% loss of weight after 500 revolutions
Soundness	Magnesium Sulphate Solution, ASTM C88	Less than 10% loss of weight after 5 cycles
Specific Gravity	ASTM C127	2.60 minimum
Absorption	ASTM C127	2.0% maximum

6. Supply Terrafix 600R geotextile on smooth prepared subgrade underlying areas of riprap.

7. Overlap joints of Terrafix 600 R geotextile by minimum of 600 mm. Joints should be oriented in a manner such that the upper geotextile layer is placed upstream of the lower geotextile layer.

8. Place armour and riprap materials in continuous layers of uniform thickness.

9. Place primary riprap and bedding materials on slopes by backhoe or similar lifting equipment. End dumping of materials on slopes and pushing into place will not be permitted. Adequately interlock particles and dress slopes as required.

10. Place riprap and bedding materials in a manner such that smaller stones shall fill the voids between larger stones so that there is no unfilled space which could permit the escape of lower layers of placed materials. Compaction of materials is not required, however, there shall be no tendency of stones to move or slide after placement.

11. Construction traffic will not be permitted upon placed riprap for armour layers.

12. Do not place riprap until the riprap bedding or underlying geotextile has been accepted by the Engineer.

13. Do not break individual pieces of riprap after placement either by blasting or mechanical methods.

14. Place riprap to its full course thickness in one operation and in such a manner as to avoid disturbance or displacement of the underlying

bedding materials or geotextile material. Remove riprap to repair disturbed or displaced bedding materials or geotextile.

15. Obtain the desired distribution of the various sizes of particles throughout the mass by selective loading at the quarry or other stockpile source, by controlled dumping of successive loads during placing, or by other methods of placement which will produce the specified results.

16. Place riprap and armour layers with a thickness at least as great as that shown on the Drawings.

9.5 Instrumentation

Installation of new instruments and extension of cables for existing instruments is required within the tailings dam. Performance of this work should be carried out as follows:

1. BYG will supply the instruments for installation by the Contractor. Drilling is required for installation of pneumatic piezometer tips below foundation grade. Installation of pneumatic piezometers will be supervised by the Engineer. Cooperate with Engineer and provide access for drilling and installation of pneumatic piezometers in the foundation.

2. Splice existing thermistor cables with additional cable sufficient to terminate at the downstream toe of dam. Splicing should be carried out in accordance with manufacturer's recommendations under the supervision of the Engineer. Pneumatic piezometers will be supplied with sufficient tubing at the time of installation to allow extension to the downstream toe of dam.

3. Excavate shallow trenches approximately 1 m deep in the Zone 1 sand fill for installation of the pneumatic piezometer tubing and thermistor cables.

4. Place all pneumatic piezometer tubing and thermistor cables on the base of trench in a zigzag manner to allow sufficient length for any deformations due to settlement. Backfill overtop tubing and cables in specified lift thicknesses. Compact lifts with compaction equipment not exceeding 1000 kg unless otherwise approved by the Engineer.

5. Drive steel bar settlement pins at the downstream edge of the dam crest with a stick-up of approximately 50 mm.

10. PERFORMANCE MONITORING

In order to assess the long term requirements of the dam, it is imperative that performance of the embankment and foundation be monitored throughout the mine operation period. The field monitoring program should include the following:

1. Record temperatures for each of the thermistor installations to determine rate and extent of thaw.

2. Record pore pressures for each of the pneumatic piezometers in embankment and foundation zones which are unfrozen. This will assist in determining seepage through the dam and will allow measurement of actual thaw-induced pore pressures for stability assessment.

3. Record settlements of dam crest by regular surveys of settlement pins. Settlements will be correlated with the depth of thaw and pore pressure dissipation to provide a basis for future settlement estimates.

4. Record daily maximum and minimum temperatures at the Mt. Nansen site. Comparison of data at the site with similar data recorded at the Environment Canada Station at Carmacks will provide a basis for adjustment of temperature data used in long term prediction models.

5. Record precipitation data at the Mt. Nansen site to determine runoff inflows.

6. Record tailings pond levels as well as inflow and outflow volumes. Quantities required for water balance assessment should include reclaim, seepage, evaporation and spillway discharges. Pumping rates should be recorded for determination of spigot, seepage and reclaim volumes. Rainfall records and measurement of snow pack in late winter should be required to assess runoff inflows. Spillway discharges should also be measured during operation to determine volumes of water which are diverted past the tailings pond. Comparison of diversion flows to runoff quantities will also provide an estimate of groundwater seepage inflows through the active zone.

7. Monitor the tailings beach development by survey to determine volume requirements and assist in planning of spigotting operations.

8. Record quantities and measured profiles of settled tailings to determine tailings densities and assess storage volume requirements.

9. Sample and measure the tailings gradation for assessment of the settling rate and permeability.

10. Monitor winter operations and tailings placement methods. Subaqueous deposition has been assumed for winter operations in order to minimize reservoir storage requirements.

11. Monitor performance of diversion and spillway channels to determine maintenance requirements. Monitor and remove snow in the diversion channel to prevent blockage.

12. If thawing of foundation soils occurs under the dam embankment, then test hole drilling should be carried out for measurement of SPT blow counts or cone penetration resistance. This data will allow assessment of seismic stability.

11. FUTURE CONSIDERATIONS

The current design assumes a three year mine operation after which no further tailings will be deposited. Based on this operation plan, the thermal analyses indicate limited thawing under the upstream portion of the dam with eventual freezeback of the tailings after mine operations are ceased. Should the mine life be extended it is anticipated that thaw penetration will continue which must be accounted for in future assessments of the settlement, stability and seepage. Incorporation of a downstream berm has been considered as a future solution to several of the technical concerns. The need for a downstream berm should be determined based on the observations of the performance monitoring program.

Raising of the dam will require new diversion and emergency spillway facilities at a higher elevation. Excavations at higher elevations will be more difficult due to steeper slopes further up the valley slope. In addition, the existing diversion channel design does not include an impervious liner. If seepage losses are excessive, a liner may be required in the future.

Raising of the dam must also consider the method of future embankment construction. Raising of the dam on the existing centerline will require embankment construction of the upstream slope of dam overtop of the tailings beach which may have technical concerns. Shifting the dam crest centreline downstream will allow all construction to

occur above the existing compacted embankment, however quantities of new fill will be greater and the downstream toe of dam may encroach on the seepage recovery dam.

The winter tailings deposition method will also affect the tailings density and beach slope. Subaqueous deposition is assumed, however, if beach spigotting occurs during the winter significant ice may build up, thereby reducing available storage densities and potential reclaim water.

A closure spillway is eventually required on the south abutment where bedrock can be exposed at the channel invert for long term protection. The downstream outlet channel of the spillway may, however, be constructed on overburden soils which will require erosion protection. It is anticipated that the riprap protection will be much larger than the riprap installed at the temporary emergency spillway. Waste rock which is large in size and may be suitable as riprap should therefore be salvaged from the mine operation over the next three years. The alignment of the closure spillway will be dependant on the eventual dam crest elevation. The invert of this channel should be situated in bedrock at least as far as the downstream toe of dam before descending the slope in the outlet channel. In order to finalize the alignment of the closure spillway, it will be necessary to eventually obtain additional rock depth information in the area downstream of the dam centreline on this abutment.

Respectfully submitted,
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APPENDIX I

Test Hole Logs and Test Pit Logs

TEST HOLE LOG

VERTICAL SCALE 1:100

DATE DRILLED October 7-8, 1988

DRILL TYPE C.M.E. 750, solid stem auger

ELEVATION GROUND ~ 1135 m from topo drawings

CO-ORD. LOCATION not surveyed (refer to Dwg. B-3002)

SAMPLE DATA

HAMMER MASS 63.5 kg

DROP HEIGHT 0.762 m

DEPTH ELEV. (m)	O.D. I.D.	BLOWS 0.3m	NO.	SYMBOL	DESCRIPTION OF MATERIAL	PIEZOMETER DETAILS
					0.4 Organics, black moss	
2		49	Sa-1		1.3 Grey medium sand - trace of silt ~10% fines content - no visible ice	
4		37 for 25 mm			Light grey, fine to medium, sand - little silt ~5% fines content - some gravel below 3.0 m depth - visible ice lenses below 3.0 m depth (V_s, V_x)	
6		60			4.6 Brown silty sand - some gravel - ~15% fines content - visible ice inclusions and lenses (V_s, V_x)	
8		106				
10		82 for 250 mm			9.1 Light brown sand and gravel - some silt ~10% fines content - visible ice in the form of one ice inclusion 5 mm diameter and 0.5 mm horizontal lens. (V_s, V_x)	
12		20 for 25 mm	Sa-2		11.4 Black and light brown colour weathered rock - from silt to gravel size particles - ice inclusions 3 mm diameter - ice lenses 2mm thick (V_s, V_x)	
14		53 for 175 mm			13.2 Light brown colour rock fragments 13.7 Unweathered bedrock	
16						

Total Depth = 13.7 m

Note: Hole was backfilled with cuttings, then sealed at depth 0.5 to 0.8 m with a bentonite plug. No piezometer installation.

The symbols shown in the sample no. column represent undisturbed samples that were bagged and taken to the Richmond office.

COHESION kPa

10 30 50 70 90

● FIELD VANE △ LAB VANE ▦ UNCONF.

PLASTIC LIMIT X — WATER CONTENT O — LIQUID LIMIT X

10 30 50 70 90%

KLOHN LEONOFF
CONSULTING ENGINEERS

JOB No.	PB 3574 0301
PROJECT	Mt. Nansen Gold Mine
LOCATION	Yukon Territory
HOLE No.	DH-88-1
DATE	October 7,8/88 PLATE page 1 of 1

TEST HOLE LOG

VERTICAL SCALE 1:100

SAMPLE DATA

HAMMER MASS 63.5 kg

DROP HEIGHT 0.762 m

DATE DRILLED October 8 to 10, 1988

DRILL TYPE CME 750, solid stem auger

ELEVATION GROUND ~ 1130 m from topo drawings

CO-ORD. LOCATION not surveyed (refer Dwg. B-3002)

PIEZOMETER DETAILS

COHESION kPa

10 30 50 70 90

● FIELD VANE △ LAB VANE ■ UNCONF

PLASTIC LIMIT X — WATER CONTENT O — LIQUID LIMIT X

10 30 50 70 90%

DEPTH ELEV.	O.D. I.D.	BLOWS 0.3m	NO.	SYMBOL	DESCRIPTION OF MATERIAL
(m)	17.8 cm				
		39			Moss, grass, black organics
					0.6
2		30 for 25 mm			Grey medium sand - ~5% fines content - visible ice inclusions 4 mm dia. - visible ice lenses 0.5 mm thick (vertical) - temperature -4°C - no visible ice in sample at 3.1 m - one visible ice lense at depth 4.5 m (V_s)
			Sa-1		
		117			
4					
		128			
6					
					6.1
		37 for 100 mm			Light brown sand and gravel - ~10% fines content - angular gravel particles - visible ice coatings on some gravel particles - temperature -4°C (V_c)
8		39 for 150 mm			
					9.1
		32 for 25 mm			Grey fine to medium sand - visible ice in sample, two 1 cm thick ice lenses. Some sections were ice with grey sand - ~5% fines content (V_x, V_s)
10					
		64 for 150 mm			
					11.1
12			Sa-2		Light brown sand and gravel - subangular gravel particles - no visible ice - temperature -4°C - ~10 to 15% fines content
		30 for 25 mm			
					13.0
14		55 for 150 mm			
					Grey fine sand ~5% fines content - contains trace of organics (reed like) - no visible ice - temperature -4°C
		75 for 75 mm			15.2
16					
			Sa-3		Olive green silty sand, changing to silty sand and gravel at 16.8 m - no visible ice - temperature -2 to -3°C
		79 for 150 mm			
18			Sa-4		
		64 for 150 mm			18.3
					See page 2 for soil description
20		152	Sa-5		

KLOHN LEONOFF CONSULTING ENGINEERS

JOB No. PB 3574 0301

PROJECT Mt. Nansen Tailings Dam

LOCATION Yukon Territory

HOLE No. DH-88-2

DATE Oct. 8-10/88 PLATE 1 of 2

TEST HOLE LOG

VERTICAL SCALE 1:100

SAMPLE DATA

HAMMER MASS 63.5 kg

DROP HEIGHT 0.762 m

DEPTH ELEV.	O.D. I.D.	BLOWS 0.3m	NO.	SYMBOL
20.0				
		58	Sa-6	
22				
24				
26				
28			Sa-7	
		Total	Depth	

DATE DRILLED October 8 to 10, 1988

DRILL TYPE CME 750, solid stem auger

ELEVATION GROUND ~ 1130 m from topo drawings

CO-ORD. LOCATION not surveyed (refer Dwg. B-3002)

PIEZOMETER DETAILS

COHESION kPa

10 30 50 70 90

● FIELD VANE △ LAB VANE ■ UNCONF.

PLASTIC LIMIT X — WATER CONTENT O — LIQUID LIMIT X

10 30 50 70 90%

DESCRIPTION OF MATERIAL

Black silty sand and gravel
(weathered rock?)
- no visible ice
- temperature $-3^{\circ}C$
- depth 18.0 to 18.3 m

21.3

Olive green silt to silty sand
- visible ice, one 5 mm thick horizontal lens found in SPT sample
- temperature $-2^{\circ}C$
(V_s)

Brown silty clay
- visible ice in SPT samples and off the end of the augers was in the form of horizontal ice layers 3 mm thick, and ice inclusions
- sample DH-88-2-6 did not have visible ice
- temperature -4 to $-1^{\circ}C$
(V_s, V_x)

26.8

Light grey silt
- some fine gravel particles

29.0

Note: Hole was backfilled with cuttings, then a bentonite seal was installed at depth 0.6 m to 0.9 m.
No piezometer installation.

The symbols shown in the sample no. column represent undisturbed samples that were bagged and taken to the Richmond office.

KLOHN LEONOFF
CONSULTING ENGINEERS

JOB No.	PB 3574 0301
PROJECT	Mt. Nansen Tailings Dam
LOCATION	Yukon Territory
HOLE No.	DH-88-2
DATE	Oct. 8-10/88 PLATE 2 of 2

TEST HOLE LOG

STARTED: 16/07/94 FINISHED: 16/07/94
DRILLING METHOD: SOLID STEM AUGER
GROUND ELEV(m):
COORDINATES(m):

DEPTH(m)	SPT BLOWS PER 0.15m	OTHER TESTS	SAMPLE TYPE AND NUMBER	SYMBOL	DESCRIPTION OF MATERIALS	PIEZOMETER DETAILS
					Silty SAND (SM); silty fine to medium sand, top 0.25 m is moss.	
					0.8	
1					Silty SAND (SM); sand medium to coarse, trace to little silt, frozen hard, salt and pepper, ice crystals, no visible ice lenses.	
					1.2	
					Gravelly beginning at 1.2 m. Changed to Carrel Tube and solid stem.	
					1.8	
2					SAND (SW); fine to medium sand with layers of coarse sand and pebbles, frozen, no visible ice.	
					2.1	
					SAND (SW); medium sand, medium brown, trace silt, some coarse sand, little rounded pebbles.	
					2.6	
					SAND (SW); fine to medium sand, light brown (blond), little coarse sand.	
3					3.1 SAND (SW); clean fine to medium sand, trace silt, frozen, no visible ice, cross bedded, light brown.	
					SAND (SW); fine to medium clean sand, well rounded gravelly layer 5 to 7.5 cm thick at 3.7 m.	
4					4.1	
			CT 1		SAND (SW); fine to medium clean sand with trace coarse sand and silt, frozen, no visible ice, cross bedding visible in sand, well rounded.	
5						
6			CT 2		Sand becoming coarser at 6.1 m.	
7						
8					Gravelly layer at about 8.4 m.	
					8.5	
9			CT 3		SAND (SW); clean medium sand, well rounded, light brown, no visible ice, at 9.1 m gravel angular to sub-rounded, cross bedded, teperature reading = 0.0 degrees celsius, Photo 1 at 9.0 m.	
10					Continued	

Su - kPa: 20 60 100 140 180
VANE FIELD LAB: PEAK ◆ ■ ▲UC/2; REMOLD ◇ □ △P.PEN/2; ● SPT N
W_P% W% W_L%: × - - - - ○ - - - - ×
10 30 50 70 90

PROJECT NO.: PM 5314 03 02
PROJECT: BYG MT. NANSEN
LOCATION: SITE #4
LOGGED BY: BST CHECKED BY:
SHEET 1 OF 2 HOLE NO.: DH94-01

FORM: SI01 93/04/12

TEST HOLE LOG

STARTED: 16/07/94 FINISHED: 16/07/94
DRILLING METHOD: SOLID STEM AUGER
GROUND ELEV(m):
COORDINATES(m):

DEPTH(m)	SPT BLOWS PER 0.15m	OTHER TESTS	SAMPLE TYPE AND NUMBER	SYMBOL	DESCRIPTION OF MATERIALS	PIEZOMETER DETAILS
					SAND (SW); (continued)	
					Gravelly layer at 10.7 m.	
					Gravelly layer at 10.8 m.	
11					Gravelly layer at 11.3 m.	
					11.3	
					SAND (SW); medium grey fine sand, trace silt, no visible ice.	
					11.6	
					SAND (SW); medium grey fine to medium sand, trace to little silt, no undisturbed sample recovered in tube (fell out).	
12					12.2	
					SAND (SW); grey fine to medium sand with trace silt and little coarse sand and gravel, organics, no visible ice.	
13					13.1	
			CT 4		SAND (SW); very fine sand with little to some silt, frozen hard, no visible ice, some organic layers and organic smell.	
					13.7	
14					Sample taken at 13.4 m.	
					SAND (SW); medium grey fine to medium sand with trace to little silt, organics, organic smell, no visible ice.	
15						
16						
			CT 5			
17						
			CT 6			
18						
19					19.1	
					GRAVEL (GRAVEL)	
					Very rocky at 19.8 m.	
					Refusal and end of hole at 20.1 m	
20					20.0	

Su - kPa
20 60 100 140 180
VANE PEAK ◆ FIELD ■ LAB
REMOLD ◇ □
▲UC/2 △P.PEN/2
● SPT N
W_P% W% W_L%
× - - - - - ○ - - - - - ×
10 30 50 70 90

PROJECT NO.: PM 5314 03 02
PROJECT: BYG MT. NANSEN
LOCATION: SITE #4
LOGGED BY: BST CHECKED BY:
SHEET 2 OF 2 HOLE NO.: DH94-01

FORM: SI01 93/04/12

TEST HOLE LOG

STARTED: 17/07/94 **FINISHED:** 17/07/94

DRILLING METHOD: SOLID STEM AUGER

GROUND ELEV(m):

COORDINATES(m):

Su - kPa: 20 60 100 140 180

VANE PEAK ◆ FIELD ■ LAB
REMOLD ◇ □
▲UC/2 △P.PEN/2
● SPT N

W_P% W% W_L%
× - - - - ○ - - - - ×
10 30 50 70 90

DEPTH(m)	SPT BLOWS PER 0.15m	OTHER TESTS	SAMPLE TYPE AND NUMBER	SYMBOL	DESCRIPTION OF MATERIALS	PIEZOMETER DETAILS
					MOSS (ORGANICS); 0.3 m cover over frozen soil.	
					0.3 SAND (SW); organic rich fine to medium sand with some small pebbles.	
1			CT 1		0.9 SAND (SW); organic rich at top, grading to little organics by 1.2 m, fine to medium sand with trace to little silt, 5 ice lenses each 1 mm thick in silty or organic-rich layer at 1.2 m depth, otherwise sand shows no visible ice, sand is medium brown, well rounded.	
2					2.3 Ice cuttings at 1.8 to 2.1 m.	
			CT 2		2.4 SAND (SW); dark brown, fine to med., trace silt & organics, no vis. ice.	
3					SAND (SW); light brown fine to medium sand becoming coarser with depth, trace silt, some pebbles, no visible ice, 40% angular rock below 2.9 m. Sample taken at 2.4 m.	
					3.7 SAND (SW); fine to medium sand, trace silt, trace to little pebbles, no visible ice.	
4					4.3 Silty SAND (SM); organic, rich brown, silty to sandy, ice rich with many 0.5-1.0 mm ice lenses in organics. Sample taken at 4.4 m. High ice content in cuttings (4.6 to 5.3 m).	
5					5.3	
			CT 3		Silty SAND (SM); silty fine to medium sand with organics and roots, numerous ice crystals to 3 mm in size, ice rich layers of frozen peat.	
6					6.1 Sample taken at 5.8 m.	
					Silty SAND (SM); silty fine sand with organics, strong organic odour, numerous roots, some visible ice crystals.	
7			CT 4		6.7 Silty SAND (SM); highly organic silty sand, brown.	
					7.0 SAND (SW); light grey fine to medium sand, trace to little silt, bedding visible in sand, no visible ice, angular pebbles at 7.6 m, organics melt to very soft consistency.	
8					7.6 Silty SAND (SM); silty fine to medium sand, frozen, sand well rounded, trace to some silt.	
					8.2 Attempted Carrel sample but sample fell from tube - no recovery.	
9					9.2 Silty SAND (SM); (same as from 7.6 to 8.2 m)	
10					Refusal (on bedrock?) and end of hole at 10.0 m. 10.0	

PROJECT NO.: PM 5314 03 02	
PROJECT: BYG MT. NANSEN	
LOCATION: SITE #4	
LOGGED BY: BST	CHECKED BY:
SHEET 1 OF 1	HOLE NO.: DH94-02

FORM: SI01 93/04/12

TEST HOLE LOG

STARTED: 18/07/94 FINISHED: 18/07/94
DRILLING METHOD: SOLID STEM AUGER
GROUND ELEV(m):
COORDINATES(m):

DEPTH(m)	SPT BLOWS PER 0.15m	OTHER TESTS	SAMPLE TYPE AND NUMBER	SYMBOL	DESCRIPTION OF MATERIALS	PIEZOMETER DETAILS
					Frozen PEAT (PEAT); significant ice in cuttings.	
					0.8	
1			CT 1		0.9 Frozen PEAT (PEAT); with silt, sand and pebbles - ice rich.	
					SAND (SW); fine to medium grey sand with little silt, some organic rich layers to 10 mm thick, no visible ice, solidly frozen.	
					1.5 SAND (SW); medium light brown sand, very clean, very well rounded, some fine gravel, zero to trace silt.	
2					2.3	
			CT 2		SAND (SW); organic rich, fine to medium sand, trace to some pebbles, trace silt, ice rich but no discrete ice layers.	
					2.6 SAND (SW); fine to medium sand, light brown to grey cross bedded, very well rounded.	
3					3.0 SAND (SW); grey-brown fine to medium sand, trace silt, well rounded.	
					3.8	
4			CT 3		SAND (SW); fine to medium sand with trace silt, trace pebbles, sand well rounded, cross bedded, some layers slighty organic.	
					4.6 SAND (SW); fine to medium sand with pebble layers.	
5					5.3	
			CT 4		SAND (SW); fine to medium sand with trace to some silt, gravel layer at 5.8 m, sampler refused, no visible ice.	
					5.8 SAND (SW); fine to medium grey-brown sand, pebbly.	
6						
7						
8						
					8.5 Sandy SILT (SM); trace pebbles, low plastic.	
					8.8	
9					SAND AND GRAVEL (SG); trace silt.	
					9.5	
			CT 5		SAND (SW); fine to medium sand, some pebbles to pebbley, trace silt, no visible ice, trace gravel, dark grey-brown.	
10					Continued	

Su - kPa
20 60 100 140 180
VANE PEAK ◆ FIELD ■ LAB
REMOLD ◇ □
▲UC/2 △P.PEN/2
● SPT N
W_P% W% W_L%
× - - - - - ○ - - - - - ×
10 30 50 70 90

PROJECT NO.: PM 5314 03 02
PROJECT: BYG MT. NANSEN
LOCATION: SITE #4
LOGGED BY: BST CHECKED BY:
SHEET 1 OF 2 HOLE NO.: DH94-03

FORM: SI01 93/04/12

TEST HOLE LOG

STARTED: 18/07/94 FINISHED: 18/07/94
DRILLING METHOD: SOLID STEM AUGER
GROUND ELEV(m):
COORDINATES(m):

DEPTH(m)	SPT BLOWS PER 0.15m	OTHER TESTS	SAMPLE TYPE AND NUMBER	SYMBOL	DESCRIPTION OF MATERIALS	PIEZOMETER DETAILS
					SAND (SW); (continued)	
					10.4	
11					SAND AND Coarse GRAVEL (SG); very dense, dark grey-brown, trace silt, possibly glacial till.	
					11.4	
			CT 6		11.6	
12					11.4 to 11.6 m: Silty SAND AND GRAVEL (SG); some silt, gravel angular to sub-rounded (possibly glacial till), no visible ice, dense. Sample bagged at 11.6 m.	
13						
14					Silty SAND (SM): grey brown silty to sandy (possibly glacial till) with numerous rocky layers, rocks angular to sub-rounded, very hard drilling, dense, rocky.	
15						
16					Refusal at 16.2 m. Assumed bedrock.	
					16.2	
17					END OF TEST HOLE AT 16.2 m.	
18						
19						
20						

Su - kPa
20 60 100 140 180
VANE PEAK ◆ ■ ▲UC/2
REMOLD ◇ □ △P.PEN/2
FIELD LAB
● SPT N
W_P% W% W_L%
× - - - - ○ - - - - ×
10 30 50 70 90

○

PROJECT NO.: PM 5314 03 02
PROJECT: BYG MT. NANSEN
LOCATION: SITE #4
LOGGED BY: BST CHECKED BY:
SHEET 2 OF 2 HOLE NO.: DH94-03

FORM: SI01 93/04/12

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 26 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1149.23

CO-ORDINATES (m): N 19,040 E 20,555

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.
1.0	CRREL	31	CT1
	CRREL	39	CT2
2.0	CRREL	37	CT3
3.0	CRREL	36	CT4
	CRREL	46	CT5
4.0	CRREL	67	CT6

SYMBOL

THERMISTOR DETAILS

DESCRIPTION OF MATERIALS

SAND (SP-SM)
- fine to medium
- some silt to silty
- trace to some rounded gravel
- trace organics
- trace mica
- occasional grey sandy SILT lenses <10mm thick
- dry to moist
- light brown to reddish brown
- frozen below 3.73 m
- SAMPLE SP1 taken @ 0.61m
- SAMPLE SP2 taken @ 1.14m
- SAMPLE SP3 taken @ 1.98m
- SAMPLE SP4 taken @ 2.67m
- SAMPLE SP5 taken @ 3.73m

3.73

- becoming frozen, Nbn to Nbe, excess ice content <5%
- becoming fine to coarse sand with trace to some silt
- SAMPLE SP6 taken @ 4.57m

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

1646 1981

1731 2015

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 5 HOLE NO: DH95-04

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 26 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1149.23

CO-ORDINATES (m): N 19,040 E 20,555

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CRREL	39	CT7		SAND (SP-SM) - as above - SAMPLE SP7 taken @ 5.03m	
					- SAMPLE SP8 taken @ 5.79m	
6.0	CRREL	61	CT8		- 30mm thick grey sandy SILT layer	
7.0	CRREL	8	CT9			
					- SAMPLE SP9 taken @ 7.3m	
	CRREL	100	CT10		- SAMPLE SP10 taken @ 7.6m	
8.0	CRREL	0	CT11			
9.0	CRREL	75	CT12		- 75mm sandy GRAVEL layer - SAMPLE SP11 taken @ 9.1m	
	CRREL		CT13			
					9.98	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

10 30 50 70 90

1772 2057

1748 2052

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 5 HOLE NO: DH95-04

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 26 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1149.23

CO-ORDINATES (m): N 19,040 E 20,555

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					GRAVEL and COBBLES (GP) - no recovery	
					10.29	
	AUGER				**SAND (SP-SM)** - as above	
11.0					11.10	
	CRREL	0	CT14		**GRAVEL (GP)** - no recovery - auger refused in gravel	
					11.41 - moved over and redrilled as DH95-04A	
					SAND (SP-SM) - fine to medium - silty - trace of rounded gravel - trace organic odour - grey	
12.0						
13.0						
14.0					- gravelly layer @ 14.9m, 200mm thick	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × - - - WATER CONTENT % ○ - - - LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 3 of 5 HOLE NO: DH95-04

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 26 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1149.23

CO-ORDINATES (m): N 19,040 E 20,555

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					SAND (SP-SM)
					- as above
16.0					
17.0					- gravelly layer @ 17.2m, 50mm thick
					- gravelly layer @ 17.8m, 200mm thick
18.0					
					- gravelly layer @ 18.4m, 75mm thick
19.0					

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO:	PM 5314 0502
PROJECT:	Mt. Nansen Gold Project
LOCATION:	Carmacks, Yukon Territory
LOGGED BY:	JM CHECKED BY:
PLATE:	4 of 5 HOLE NO: DH95-04

11/07/95

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 26 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1149.23

CO-ORDINATES (m): N 19,040 E 20,555

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
21.0					21.18	
					GRAVEL and COBBLES (GP) - hard drilling	
22.0					22.55	
					End of Hole @ 22.55m - auger refusal in gravel and cobbles	

NOTES:

1. A 30m long prepared thermistor string was installed folded into the borehole. The 10 individual thermistors are located at the following depths from the surface:

#1 @ 1.0m
#2 @ 2.0m
#3 @ 3.0m
#4 @ 5.0m
#5 @ 7.5m
#6 @ 10.0m
#10 @ 10.5m
#7 @ 15.0m
#9 @ 15.5m
#8 @ 20.0m

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 5 of 5 HOLE NO: DH95-04

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 27 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1143.44

CO-ORDINATES (m): N 18,998 E 20,540

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					Thin moss cover - 30mm
	AUGER				**SAND (SP-SM)** - fine to medium - some silt to silty - trace to some rounded gravel - brown - occasional organics (fine roots) - occasional grey sandy silt lenses up to 35mm thick - frozen below 1.12m
	CRREL	42	CT1		
1.0					- SAMPLE SP2 taken @ 1.19m
					- CT2 thawed on top 150mm - ice class Nbn - grey sandy silt layer @ 1.27m - 50mm thick sandy gravel layer @ 1.47m
	CRREL	43	CT2		
2.0					
					- SAMPLE SP3 taken @ 2.21m - CT3 ice class Nbn
	CRREL	29	CT3		
3.0					
	CRREL	0	CT4		
					- SAMPLE SP4 taken @ 3.73m
4.0	CRREL	71	CT5		
					- SAMPLE SP5 taken @ 4.34m
	CRREL	92	CT6		

THERMISTOR DETAILS

kg/cu.m

DENSITY: 1000 1500 2000 2500

◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × | WATER CONTENT % ○ | LIQUID LIMIT % ×

10 30 50 70 90

1822 2042

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 4 HOLE NO: DH95-05

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **26 JUN 95 - 27 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1143.44**

CO-ORDINATES (m): **N 18,998 E 20,540**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
	CRREL	72	CT7		- SAMPLE SP6 taken @ 5.56m - 75mm thick gravel zone @ 5.8m	
6.0						
	CRREL	58	CT8		- SAMPLE SP7 taken @ 6.4m - gravelly layer @ 6.53m; Nbn ice class, little Vc ice around gravel particles - SAMPLE SP8 taken @ 6.86m	
7.0	CRREL	100	CT9		- SAMPLE SP9 taken @ 7.32m - CT10 has thin gravelly layer at 7.49m	
	CRREL		CT10		7.52 **GRAVEL (GP)** - fine to coarse, sandy - subangular to angular 7.92	
8.0					**SAND (SP-SM)** - fine to medium - silty - trace fine gravel - greenish grey - occasional thin gravel layers indicated by return from solid stem auger	
	AUGER					
9.0						
	CRREL	0	CT11		- no recovery from CRREL tubes below 9.32m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

1758 2027

1792 2094

1822 2076

KLOHN-CRIPPEN

Continued

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 4** HOLE NO: **DH95-05**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **26 JUN 95 - 27 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1143.44**

CO-ORDINATES (m): **N 18,998 E 20,540**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CRREL	0	CT12		**SAND (SP-SM)** - as above	
					10.44	
	CRREL	0	CT13		**SILT (ML-SM)** - trace fine sand - trace fine gravel - trace organics - dark greyish brown - SAMPLE G11 taken @ 10.8m from auger	
11.0						
12.0	AUGER		G12		- SAMPLE G12 taken @ 12.5m	
13.0	AUGER		G13		- SAMPLE G13 taken @ 13.7m	
14.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 4** HOLE NO: **DH95-05**

19/07/95

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 26 JUN 95 - 27 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1143.44

CO-ORDINATES (m): N 18,998 E 20,540

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SILT (ML-SM) - as above	
15.40						
15.60					**SAND (SP-SM)** - fine, silty, trace fine gravel, dark grey/black, moist - SAMPLE G14 taken @ 15.5m End of hole @ 15.6m - auger refusal	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

NOTES:

1. A 30 m long prepared thermistor string was installed folded into the borehole. The 10 individual thermistors are located at the following depths from surface:
   #10 @ 0.5m
   #1 @ 1.0m
   #2 @ 2.0m
   #3 @ 3.0m
   #4 @ 5.0m
   #9 @ 5.5m
   #5 @ 7.5m
   #6 @ 10.0m
   #8 @ 10.5m
   #7 @ 15.0m

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 4 of 4 HOLE NO: DH95-05

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 19 JUN 95 - 21 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1133.87

CO-ORDINATES (m): N 18,917 E 20,542

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Moss cover - 100mm	
	AUGER				**PEAT (Pt)** - trace fine sand, dark brown - fine fibrous to amorphous - ice class Vs to Vr, ice lenses typically 1mm thick, 3-5mm apart, also random ice formations within fibrous peat structure	
	CRREL	100	CT1		0.70 - frozen below 0.3m, ice content 30%	
1.0					**SAND (SP-SM)** - fine, some silt to silty, trace sand, light grey - ice class Nbn, Vc in coarser pockets - approx. 5% excess ice	
					1.22 - SAMPLE SP1 taken @.76m	
					1.31 **PEAT (Pt)** - as above	
	CRREL	100	CT2		**SAND (SP-SM)** - as above	
					1.50 - SAMPLE SP2 taken @ 1.37m	
					PEAT (Pt)	
					1.74 - as above - ice class Vr, ice formations around larger roots	
2.0					**SAND (SP-SM)** - as above	
					2.04 - SAMPLE SP3 taken @ 1.83m	
	CRREL	100	CT3		**PEAT (Pt)** - as above	
					2.44	
					SAND (SP-SM) - as above	
					2.60	
					2.71 **PEAT (Pt)** - as above	
					SAND (SM) - fine, silty, grey - interbedded with 5mm-50mm thick silt lenses at 10mm-20mm spacing - occasional roots and fibrous organic zones - ice class Nbn except for occasional organic zones with Vr ice around roots - ice formations noncontinuous, random, and <5mm thick	
3.0	CRREL	93	CT4			
	CRREL	58	CT5		- SAMPLE SP4 taken @ 2.90m - SAMPLE SP5 taken @ 3.66m	
4.0						
	CRREL	100	CT6		- SAMPLE SP6 taken @ 4.47m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT %

10 30 50 70 90

1316 1660

913 1330

1377 1791

1473 1829

1312 1707

Continued

KLOHN-CRIPPEN

14/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 4 HOLE NO: DH95-06

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **19 JUN 95 - 21 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1133.87**

CO-ORDINATES (m): **N 18,917 E 20,542**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
	CRREL	100	CT7		**SAND (SM)** - as above
					5.20
	CRREL	100	CT8		**SAND (SP-SM)** - fine to medium - some silt to silty - trace rounded gravel - light greyish brown - occasional grey silt layers <10mm thick - occasional gravelly zones <75mm thick - SAMPLE SP7 taken @ 5.52m
6.0					
	CRREL	100	CT9		- SAMPLE SP8 taken @ 6.13m
	CRREL	100	CT10		- SAMPLE SP9 taken @ 6.86m
7.0					
	CRREL	100	CT11		
	CRREL	100	CT12		- SAMPLE SP10 taken @ 7.62m
8.0					
	CRREL	33	CT13		- SAMPLE SP11 taken @ 8.00m
	CRREL	63	CT14		- SAMPLE SP12 taken @ 8.84m
9.0					
	CRREL	100	CT15		9.30
	CORE		CR#1		**SAND & GRAVEL (SM-GM)** - angular particles up to 30mm size - SAMPLE SP13 taken @ 9.30m - CR#1 recovery of 10 pieces of angular to subangular gravel of varying rock types, particles to 30mm

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

1439 1900

1417 1761

1817 2158

1677 1996

1607 1892

1822 2146

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 4** HOLE NO: **DH95-06**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **19 JUN 95 - 21 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1133.87**

CO-ORDINATES (m): **N 18,917 E 20,542**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					SAND & GRAVEL (SM-GM) - as above
	CORE		CR#2		- CR#2 recovery of 4 pieces of cobbles likely up to 100mm; fine to medium, light brown sand
	CORE		CR#3		- CR#3 recovery of 3 pieces of rock including two 50mm cores from cobbles; fine to medium, light brown sand
11.0					
	CORE		CR#4		- CR#4 recovery of 36 pieces of gravel predominantly of 13mm to 20mm size; fine to medium, brown sand
12.0					
	CORE		CR#5		- CR#5 recovery of 20 gravel particles from 5mm-35mm; subangular; several pieces cored from cobbles/boulders; large rock at 11.9m depth
13.0					13.10
	CORE		CR#6		**SAND (SP-SM)** - medium CR#6 recovery of medium sand, grey; 7 pieces of subangular to angular rock from 25mm to 40mm
14.0					14.33
	CORE		CR#7		**GRAVEL (GP)** - some cobbles - trace silt - CR#7 recovery of 24 pieces of subangular gravel from 5mm - 40mm; trace silt

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**3 of 4** HOLE NO: **DH95-06**

11/07/95

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 19 JUN 95 - 21 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1133.87

CO-ORDINATES (m): N 18,917 E 20,542

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CORE		CR8		**GRAVEL (GP)** - as above - CR#8 recovery of 36 pieces of subangular gravel from 12mm-25mm	
					15.85	
	CORE	33	CR#9		**ANDESITE**, fine grained (anphanitic), moderately altered - CR#9 recovery of 1 piece of highly weathered rock; some clay along side and in depressions	
16.0	CORE		CR#10		- CR#10 recovery of 10 pieces of subangular to angular rock, brown, weathered; clay in discontinuities	
	CORE	100	CR#11		- CR#11: fractured, highly weathered rock in silty clay matrix; one 5mm piece of core with weathered subvertical joint @ 80 degrees; no visible ice, but excess water on thaw (Nbe)	
17.0	CORE	83	CR#12		- CR#12: fractured (RQD=44%), slightly weathered bedrock with 55 degree joints at 60mm spacing	
	CORE	89	CR#13		- CR#13: fractured (RQD=33%), slightly weathered bedrock	
					17.68	

End of Hole @ 17.68m

NOTES:

1. A 15 m long prepared thermistor string was installed folded into the borehole. The 7 individual thermistors are located at the following depths from surface:
   #7 @ 0.5m
   #1 @ 1.0m
   #2 @ 2.0m
   #3 @ 3.0m
   #4 @ 5.0m
   #6 @ 5.5m
   #5 @ 7.5m

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

10 30 50 70 90

KLOHN-CRIPPEN

13/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 4 of 4 HOLE NO: DH95-06

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 21 JUN 95 - 23 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1144.18

CO-ORDINATES (m): N 18,862 E 20,535

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
	AUGER				Moss cover - 150mm
					PEAT (Pt)
					- fine fibrous, occasional roots to 25mm, dark brown
					- frozen below 0.3m
					- Vr: 0.5mm-1.0mm ice lenses at 2mm-3mm spacing
	CRREL	80	CT1		
					- frozen white ash layer @ 0.3m, 125mm thick
					- 3mm thick ice lense @ 0.36m
					- SAMPLE SP1 taken @ 0.66m
					0.66
1.0					**SAND (SM)**
					- fine to medium, silty, trace of gravel, light grey
					- interbedded with brown silt lenses <12mm thick
	CRREL	80	CT2		
					- Vx to Vr, ice content 10% to 15%
					1.37
					PEAT (Pt)
					- as above
					- occasional gravelly sand pockets
					- Vx to Vr, ice content 20% to 25%
					- SAMPLE SP2 taken @ 1.07m
					1.80
2.0	CRREL	92	CT3		**SILT (ML)**
					- trace to some sand and gravel
					- trace to some organics
					- brown
					- Vx to Vr, ice content 15%
					SAND (SP-SM)
					- fine to medium
					- some silt to silty
					- trace of rounded gravel
					- occasional gravelly pockets
	CRREL	97	CT4		- occasional grey silt lenses <10mm thick
					- light brown
					- Nbn, occasional Nbe zones (ice content <5%)
3.0					
					- some Vc around particles in coarse zones (ice content <10%)
					- SAMPLE SP3 taken @ 2.08m
					- SAMPLE SP4 taken @ 2.90m
	CRREL	100	CT5		- ice layer @ 3.4m, 14mm thick
					- ice layer @ 3.5m, 7mm thick
					- SAMPLE SP5 taken @ 3.50m
					- ice layer @ 3.8m, 12mm thick (diagonal and non-continuous)
					- SAMPLE SP6 taken @ 3.81m
4.0	CRREL	43	CT6		
	CRREL	52	CT7		

THERMISTOR DETAILS

kg/cu.m

DENSITY: 1000 1500 2000 2500 — ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % × : 10 30 50 70 90

1248 1621

1793 2105

1705 2029

1677 1997

1504 1760

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO:	PM 5314 0502
PROJECT:	Mt. Nansen Gold Project
LOCATION:	Carmacks, Yukon Territory
LOGGED BY:	JM CHECKED BY:
PLATE:	1 of 3 HOLE NO: DH95-07

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 21 JUN 95 - 23 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1144.18

CO-ORDINATES (m): N 18,862 E 20,535

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					5.03
	CRREL	70	CT8		**SILT and SAND (ML-SM)** - fine sand, interbedded - trace to some organics - dark grey - no excess ice - SAMPLE SP7 taken @ 5.33m
					6.00
6.0	CRREL	79	CT9		**SAND (SM)** 6.17 - fine to medium, silty, grey, Nbn
	CRREL	100	CT10		**ANDESITE PORPHORY** - strong argillic weathering - light brown - Vr, some joints filled with ice to 5mm thick - SAMPLE SP8 taken @ 6.86m
7.0					
	CORE	40	CR1		- CR1: RQD=0% - 45 degree joints at 30mm-40mm spacing
8.0					
	CORE	74	CR2		- CR2: RQD=0% - some 50 degree joints - becoming moderately weathered
9.0	CORE	50	CR3		- CR3: RQD=0%
	CORE	95	CR4		- CR4: RQD=42%

Continued

KLOHN-CRIPPEN

13/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 3 HOLE NO: DH95-07

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **21 JUN 95 - 23 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1144.18**

CO-ORDINATES (m): **N 18,862 E 20,535**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CORE	60	CR5		**ANDESITE PORPHORY** - as above - becoming slightly weathered - joints at 50-55 degrees, 20mm to 150mm spacing - CR5: RQD=16%	
11.0	CORE	100	CR6		- CR6: RQD=65%	
	CORE	74	CR7		- CR7: RQD=58%	
					11.77 End of Hole @ 11.77m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

13/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-07**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **22 JUN 95 - 23 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1130.81**

CO-ORDINATES (m): **N 18,936 E 20,591**

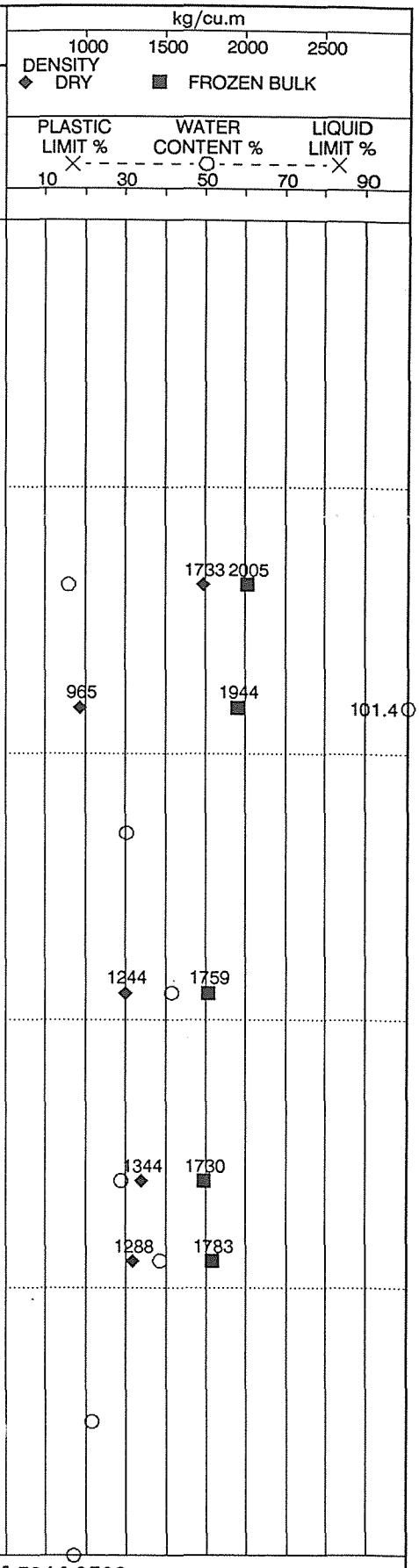
SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					Thin grass cover - 30mm
					SILT (ML-SM)
					- some fine sand to sandy
					- some organics and rootlets
					0.38 - dark grey
	CRREL		CT1		**PEAT (Pt)**
					- fine fibrous to amorphous
					- occasional roots to 15mm
					- reddish brown to dark brown
					- Vr ice around roots, also Vx
					- excess ice content 20%-30%
1.0					- 125mm thick SAND layer @ 0.7m, Nbn
	CRREL		CT2		1.07
					SAND (SP-SM)
					- fine to coarse
					- some silt to silty
					- trace rounded gravel
					- occasional rootlets
					- Nbn
					- grey
	CRREL		CT3		- 100mm thick gravelly layer @ 1.1m; Vr, excess ice <10%
					- SAMPLE SP1 taken @ 1.37m
					- 150mm thick sandy peat layer @ 1.7m; Vr, excess ice 15%
2.0					- SAMPLE SP2 taken @ 1.83m
	CRREL		CT4		- 75mm thick silt layers @ 2.03m and 2.1m; 0.5mm-1mm ice lenses at 1mm-3mm spacing, excess ice 20%
					- Vx and Vr in fine sand from 2.0m to 2.3m, excess ice 20%
					- SAMPLE SP3 taken @ 2.3m
	CRREL		CT5		- 125mm thick silt layer @ 2.4m; 0.5mm-2mm ice lenses at 4mm spacing
					- 50mm thick sandy ash layer @2.55m with Nbe ice (15%-20%)
3.0					- 125mm thick fine fibrous peat layer @ 2.6m; 0.5mm-2mm ice lenses at 4mm spacing
					- 25mm thick organic layer @ 2.8m; three 1mm thick ice lenses
	CRREL		CT6		- SAMPLE SP4 taken @ 2.9m
					- 150mm thick gravelly layer @ 3.0m; Vc around fine gravel particles
					- 150mm dia log @ 3.3m
					- SAMPLE SP5 taken @ 3.6m
					3.6-3.9m: interbedded dark brown silt and roots to 20mm
4.0					- SAMPLE SP6 taken @ 3.9m-4.5m
					3.9-4.5m: occasional dark brown to grey organic silt pockets; Nbn except for occasional Vc around gravel particles, excess ice <5%
	CRREL		CT7		- SAMPLE SP7 taken @ 4.5m
					- 150mm thick gravelly sand layer @ 4.9m

THERMISTOR DETAILS



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KLOHN-CRIPPEN

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**1 of 2** HOLE NO: **DH95-08**

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **22 JUN 95 - 23 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1130.81**

CO-ORDINATES (m): **N 18,936 E 20,591**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CRREL		CT8		- SAMPLE SP8 taken @ 5.0m	
5.28						
5.43					**GRAVEL (GP)** - some sand to sandy, some silt, angular	
					End of Hole @ 5.43m - refusal in gravel using CRREL and solid stem auger - moved rig over and redrilled as DH95-08A	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-08**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 24 JUN 95 - 24 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1131.20

CO-ORDINATES (m): N 18,936 E 20,583

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin grass cover - 30mm	
					SILT (ML) - trace to some sand - some organics - dark brown - frozen below 0.38m - ice fragments in cuttings	
					0.91	
1.0						
2.0					**SAND (SP-SM)** - fine to medium - silty - trace of rounded gravel - trace mica - occasional thin gravelly layers - light brown to grey	
3.0						
4.0						
					4.42	
					GRAVEL (GP)	
					4.57	
					End of Hole @ 4.57m - auger refusal in gravel - moved rig over and redrilled as DH95-08B	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 1 HOLE NO: DH95-08A

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 24 JUN 95 - 25 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1131.59

CO-ORDINATES (m): N 18,927 E 20,586

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					Thin grass cover - 30mm
	AUGER				**SAND (SM)** - fine, silty, trace to some organics, grey - sandy ash layer @ 0.45m, 75mm thick - frozen below 0.48m - Nbn
					0.61
					PEAT (Pt) - fine fibrous, dark brown, some roots to 5mm
	CRREL		CT1		0.81 - Vr, 0.5mm to 1.0mm thick ice lenses at 2mm spacing
1.0					**SAND (SP-SM)** - fine to coarse - some silt to silty - trace of rounded gravel - trace mica - occasional roots - occasional interbeds of grey silt <10mm thick
	CRREL		CT2		- grey - Nbn, occasional Vc around gravel particles
					1.91 - SAMPLE SP1 taken @ 1.12m - SAMPLE SP2 taken @ 1.37m
2.0					- decayed wood layer @ 1.88m, 25mm thick
					2.11 - organic layer @ 1.96m, 75mm thick (Vr, ice content 20%)
	CRREL		CT3		**Interbedded PEAT and GRAVEL (Pt-GP)** - fine fibrous peat, Vr around roots (ice content 20%); sandy gravel, Vr in voids, Vc around particles
					SILT (ML) - trace fine sand - trace mica
3.0					3.02 - grey with black banding - Nbn
	CRREL	37	CT4		- ice layer @ 2.23m, 6mm thick - SAMPLE SP3 taken @ 2.59m 2.74-2.84m: ice lenses 0.5mm to 1.0mm thick at 5mm spacing - coarse sand layer @ 2.87m, 25mm thick
					SAND (SP-SM) - fine to medium - some silt to silty - trace to some rounded gravel - occasional grey silt layers <20mm thick - grey
4.0	CRREL	0	CT5		- SAMPLE SP4 discarded
					- SAMPLE SP5 taken @4.70m
	CRREL		CT6		- SAMPLE SP6 taken @ 4.95m

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

10 30 50 70 90

1585 1843

1666 1986

Continued

KLOHN-CRIPPEN

27/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 3 HOLE NO: DH95-08B

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **24 JUN 95 - 25 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1131.59**

CO-ORDINATES (m): **N 18,927 E 20,586**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM)	
					- as above	
	CRREL	41	CT7			
6.0						
	CRREL		CT8		- SAMPLE SP7 taken @ 6.4m	
7.0						
8.0						
9.0						
					9.53	
					9.60 GRAVEL (GP)	
					End of Hole @ 9.60m	
					- auger refusal in gravel	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

1597 1943

Continued

KLOHN-CRIPPEN

27/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 3** HOLE NO: **DH95-08B**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **24 JUN 95 - 25 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1131.59**

CO-ORDINATES (m): **N 18,927 E 20,586**

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			

NOTES:

1. A prepared thermistor string was installed folded into the borehole. The 7 individual thermistors are located at the following depths from surface:

#7 @ 0.3m
#1 @ 0.8m
#2 @ 1.8m
#3 @ 2.8m
#4 @ 4.8m
#6 @ 5.3m
#5 @ 7.3m

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

27/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-08B**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **25 JUN 95 - 25 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1135.05**

CO-ORDINATES (m): **N 18,914 E 20,497**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	AUGER				Thin grass cover - 30mm	
					PEAT (Pt)	
					- fine fibrous, black to dark brown	
					- interbedded with discontinuous fine to medium sand layers	
					- frozen below 0.48m	
	CRREL	100	CT1		- Vr, ice content 30%	
					- SAMPLE SP1 taken @ 0.53m	
					- ice layer @ 0.76m, 3mm thick	
					1.01	
1.0					**SAND (SP-SM)**	
					- fine to medium	
					- some silt to silty	
					- trace rounded gravel	
	CRREL	71	CT2		- occasional roots to 10mm	
					- trace mica	
					- occasional grey silt lenses <15mm thick	
					- grey	
					- Nbn	
					- SAMPLE SP2 taken @ 1.40m	
					- becoming Nbe below 1.75m, ice content 5%-10%	
2.0					- PEAT layer @ 1.75m, 125mm thick	
	CRREL	94	CT3		- Vr with two 2mm thick ice lenses (ice content 25%)	
					- 1mm to 2mm thick ice lenses at 2mm spacing over 20mm @ 2.0m	
					- 0.5mm to 1.0mm thick ice lenses at 2mm spacing over 50mm @ 2.2m	
					- some Vc in coarse sand pockets	
					- SAMPLE SP3 taken @ 2.44m	
	CRREL	71	CT4		- sandy gravel layer @ 2.74m, 150mm thick	
3.0					2.90-3.51m: gravelly	
					- SAMPLE SP4 taken @ 2.90m	
					- SAMPLE SP5 taken @ 3.40m	
					3.51	
	CRREL	67	CT5		**SILT (ML-SM)**	
					- some organics, occasional sandy zones, dark brown	
					3.73	
					- Vr, 0.5mm ice lenses throughout @ 1mm to 2mm spacing (ice content 40%)	
4.0					**SAND (SP-SM)**	
					- fine to medium	
					- some silt to silty	
					- trace to some rounded gravel	
					- occasional roots	
					- trace mica	
					- dark brownish grey	
					- SAMPLE SP7 taken @ 4.11m	
	CRREL	86	CT6		4.62 - SAMPLE SP8 taken @ 4.62m	
					SILT (ML)	
					- trace to some sand, occasional sand interbeds	
					4.98	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

◆ 1181 ○ ■ 1608

◆ 1447 ■ 1854

◆ 1504 ■ 1840

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 3** HOLE NO: **DH95-09**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **25 JUN 95 - 25 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1135.05**

CO-ORDINATES (m): **N 18,914 E 20,497**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					- dark grey to brown - ice lense @ 4.72m, 3mm thick - 0.5mm to 1.0mm ice lenses @ 3mm spacing over 70mm - gravelly sand layer @ 4.98m, 50mm thick	
	CRREL	66	CT7		**SAND (SP-SM)** - fine to coarse - some silt to silty - trace to some rounded gravel - occasional organic interbeds <10mm thick - trace mica - occasional light grey silt lenses <10mm thick - greyish brown - SAMPLE SP9 taken @ 5.53m	
6.0						
	CRREL	61	CT8		- SAMPLE SP10 taken @ 6.50m - brown organic silt layer @ 6.55m, 50mm thick - sandy gravel layer @ 6.61m, 125mm thick - Vr in voids	
7.0					- grey silt layer @ 6.81m, 150mm thick - Vr, 1mm to 2mm ice lenses spaced at 12mm over 100mm - ice lense @ 7.06m, 3mm thick - SAMPLE SP11 taken @ 7.32m	
	CRREL	96	CT9			
					- gravelly layer @ 7.92m, 75mm thick	
8.0						
	CRREL	33	CT10			
9.0	CRREL	0	CT11			
					9.45 GRAVEL (GP) 9.60	
					End of Hole @ 9.60m - auger refusal in gravel	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

1541 1850

1939 2272

1616 1896

Continued

11/07/95

KLOHN-CRIPPEN

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**2 of 3** HOLE NO: **DH95-09**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **25 JUN 95 - 25 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1135.05**

CO-ORDINATES (m): **N 18,914 E 20,497**

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			

NOTES:

1. A prepared thermistor string was installed folded into the borehole. The 7 individual thermistors are located at the following depths from surface:

#7 @ 0.4m
#1 @ 0.9m
#2 @ 1.9m
#3 @ 2.9m
#4 @ 4.9m
#6 @ 5.4m
#5 @ 7.4m

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-09**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

DATE DRILLED: **27 JUN 95 - 28 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1128.43**

CO-ORDINATES (m): **N 18,936 E 20,676**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	AUGER				Moss cover - 100mm **SAND (SM)** - fine, silty, rounded, light brown with reddish zones - trace of some organics and rootlets - frozen below 0.38m	
					0.51 - Ice class Nbn, no visible ice	
	CRREL	100	CT1		**PEAT (Pt)** - fine, fibrous, dark brown - 150mm sandy ash layer at 0.71m - ice class Vr, zone of 1mm ice lenses at 2mm spacing	
1.0					0.99 - ice content 30% to 40% - SAMPLE SP1 taken @.51m	
	CRREL	100	CT2		**SAND (SP-SM)** - fine to medium, some silt to silty, rounded, grey - some organics with roots up to 25mm and leaves - occasional silty pockets and organic layers - ice class Nbe and Vr with ice coatings on roots and organics - occasional 0.5mm-1.0mm discontinuous lenses, ice content 15% - SAMPLE SP2 taken @ 1.09m - SAMPLE SP3 taken @ 1.73m	
2.0						
	CRREL	100	CT3		- SAMPLE SP4 taken @ 2.44m	
					- SAMPLE SP5 taken @ 2.72m	
3.0	CRREL	100	CT4			
	CRREL	94	CT5		3.81 **PEAT (Pt)** - pockets of coarse sand and gravel, fine to coarse sand, gravelly below 4.04m, ice class Vx to Vr, ice content 30%-40%	
4.0					4.04 **GRAVEL (GP)** - some sand, trace to some silt, rounded to subangular, particles up to 45mm - occasional cobbles, occasional fine roots - ice class Vc to Vr, 15% to 20% excess ice - SAMPLE SP6 taken @ 4.09m	
	AUGER					

159.54

586 1919

1244 1717

1596 1931

1614 1969

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 3** HOLE NO: **DH95-10**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m
DATE DRILLED: 27 JUN 95 - 28 JUN 95
DRILL TYPE: Track-mounted CME-75
ELEV. GROUND (m): 1128.43
CO-ORDINATES (m): N 18,936 E 20,676

SAMPLE DATA
HAMMER WEIGHT kg
DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					GRAVEL (GP) - as above - SAMPLE SP7 taken @ 5.31m	
	CRREL	68	CT6		5.54 **SAND (SP-SM)** - fine to coarse, some silt to silty, trace to some gravel, rounded, grey, occasional lenses of grey sandy silt <10mm thick - SAMPLE SP8 taken @ 5.69m - ice class Nbn to Nbe, excess ice <5% - SAMPLE SP9 taken @ 5.69m	
6.0	CRREL	22	CT7		6.55 **GRAVEL (GP-GM)** - some sand to sandy, some silt, subangular to rounded, occasional pockets of dark grey sandy silt, occasional cobbles, 80mm cored rock sample	
7.0	CRREL	33	CT8		6.99 - some Vr ice between particles of rock, excess ice <10% - SAMPLE SP10 taken @ 6.86m **SAND (SP-SM)** - fine to coarse, some silt to silty, trace to some gravel, rounded, occasional lenses of grey sandy silt up to 35mm thick - ice class Nbn to Nbe, excess ice content <5% - SAMPLE SP11 taken @ 7.67m	
8.0	CRREL	22	CT9			
	CRREL	0	CT10			
9.0	AUGER				9.02 **GRAVEL (GP)** - no return of cuttings to surface with solid stem auger, drilling response suggests gravel with some cobbles	

kg/cu.m
1000 1500 2000 2500
DENSITY ◆ DRY ■ FROZEN BULK
PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×
10 30 50 70 90

1787 2126

Continued

KLOHN-CRIPPEN

JOB NO:	PM 5314 0502
PROJECT:	Mt. Nansen Gold Project
LOCATION:	Carmacks, Yukon Territory
LOGGED BY:	JM CHECKED BY:
PLATE:	2 of 3 HOLE NO: DH95-10

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **27 JUN 95 - 28 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1128.43**

CO-ORDINATES (m): **N 18,936 E 20,676**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
					GRAVEL (GP) - as above	
					10.36 End of Hole @ 10.36m - refusal in gravel	

NOTES:

1. A 30m long prepared thermistor string was installed folded into the borehole. The 10 individual thermistors are located at the following depths from surface:
   - #8 @ -0.1m (above ground)
   - #1 @ 1.2m
   - #2 @ 2.2m
   - #3 @ 3.2m
   - #7 @ 4.7m
   - #9 @ 4.9m
   - #4 @ 5.2m
   - #5 @ 7.7m
   - #10 @ 9.6m
   - #9 @ 9.9m

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-10**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 17 JUN 95 - 17 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1150.12

CO-ORDINATES (m): N 19,083 E 20,553

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 60mm	
					SILT (ML) - trace fine sand - highly organic - dark brown - frozen below vegetation - excess ice apparent on thaw - ice lumps observed in cuttings from close to surface	
1.0						
					1.22	
					SAND and SILT (SM-ML) - fine - trace to some organics - reddish brown	
					1.80	
2.0						
					SAND (SP-SM) - fine to medium - silty with trace of fine rounded gravel - trace mica - greyish brown	
3.0						
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 4 HOLE NO: DH95-11

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 17 JUN 95 - 17 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1150.12

CO-ORDINATES (m): N 19,083 E 20,553

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0						
7.0						
8.0						
9.0						
					- 150mm thick gravelly layer	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 4 HOLE NO: DH95-11

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **17 JUN 95 - 17 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1150.12**

CO-ORDINATES (m): **N 19,083 E 20,553**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
11.0						
12.0						
13.0						
14.0						
					14.94	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**3 of 4** HOLE NO: **DH95-11**

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **17 JUN 95 - 17 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1150.12**

CO-ORDINATES (m): **N 19,083 E 20,553**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
					SILT (ML) - trace fine sand - grey	
16.0						
17.0						
18.0					- becoming coarser	
18.29					End of Hole @ 18.29m - limit of available auger sections NOTES: Probe hole augered to determine depth to bedrock	

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **4 of 4** HOLE NO: **DH95-11**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1156.88**

CO-ORDINATES (m): **N 19,144 E 20,552**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 60mm	
					SAND (SP-SM) - fine to medium - silty with trace of fine rounded gravel - trace mica - moist - light brown	
1.0						
2.0						
3.0						
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 3** HOLE NO: **DH95-12**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1156.88**

CO-ORDINATES (m): **N 19,144 E 20,552**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0						
7.0						
8.0					- 150mm to 300mm thick approx. gravelly layer	
9.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 3** HOLE NO: **DH95-12**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1156.88**

CO-ORDINATES (m): **N 19,144 E 20,552**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
11.0						
12.0					- becoming hard to drill below 12.0m	
12.34					End of Hole @ 12.34m - auger refusal NOTES: Probe hole augered to determine depth to bedrock	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-12**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1161.50**

CO-ORDINATES (m): **N 19,179 E 20,554**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 60mm	
					SILT (ML) - trace to some fine sand - trace to some organics - dark brown - frozen below vegetation - ice lumps observed in cuttings	
1.0						
					1.22 **SILT (ML-SM)** - some sand, trace to some gravel and organics 1.52 - dark grey	
					SAND (SP-SM) - fine to medium - some silt to silty - trace of rounded gravel to 25mm - light brown	
2.0						
3.0						
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 3** HOLE NO: **DH95-13**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1161.50**

CO-ORDINATES (m): **N 19,179 E 20,554**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0						
7.0					- 300mm thick approx. gravelly layer	
8.0						
9.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % O — LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**2 of 3** HOLE NO: **DH95-13**

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1161.50**

CO-ORDINATES (m): **N 19,179 E 20,554**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
					SAND (SP-SM) - as above	
10.97					End of Hole @ 10.97m - auger refusal NOTES: Probe hole augered to determine depth to bedrock.	

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-13**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 18 JUN 95 - 18 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1147.03

CO-ORDINATES (m): N 18,847 E 20,538

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Moss cover - 150mm	
					SILT (ML) - trace to some fine sand - trace to some organics - dark brown - frozen from surface - ice lumps in cuttings	
1.0						
2.0					- becoming light brown below 2.4m - becoming sandy below 2.6m - becoming gravelly below 2.7m	
					2.90 End of Hole @ 2.90m - auger refusal in bedrock NOTES: Probe hole augered to determine depth to bedrock.	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 1 HOLE NO: DH95-14

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **18 JUN 95 - 18 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m):

CO-ORDINATES (m):

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					Moss cover - 150mm
					SILT (ML) - trace fine sand - trace to some organics - dark brown - frozen from surface
1.0					
2.0					
					2.29 **SAND (SM)** - fine - silty with trace to some gravel
					2.60 **ANDESITE**
					2.74 End of Hole @ 2.74m - auger refusal in bedrock NOTES: Probe hole augered to determine depth to bedrock.

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

13/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 1** HOLE NO: **DH95-14A**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 23 JUN 95 - 23 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1150.44

CO-ORDINATES (m): N 18,833 E 20,548

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	AUGER				Moss cover - 150mm	
					SILT (ML)	
					- trace to some fine sand, trace to some gravel, dark brown	
					- some organics including roots	
					- 75mm silty gravel layer at 0.41m	
					- 125mm sandy ash layer at 0.53m	
	CRREL	100	CT1		- 25mm organic layer at 0.69m	
					- thawed to 0.46m depth	
					0.74 - ice class Vx to Vr with ice content of 30%-50%	
1.0					**SAND (SM)**	
					- fine, silty, trace to some rounded gravel, dark grey, occasional cobbles	
					- trace to some organics in 20mm interbeds between 0.74m-1.04m	
					1.42 - ice class Vs for two 3mm lenses at 0.79m and 1.01m	
	CRREL	61	CT2		- ice class Vr for several 1-2mm lenses from 1.04m to 1.24m	
					- excess ice estimated at 50%	
					GRAVEL (GM-GP)	
					- sandy, rounded, grey, occasional cobbles, occasional roots up to 15mm	
2.0					- ice class Vr in voids between large gravel particles, Vc around some fine gravel, Nbe in sand portion	
	CRREL	85	CT3		2.24 - excess ice 15%	
					Bottom of hole @ 2.24m	
					- auger refusal in gravel	
					NOTES:	
					Probe hole augered to determine depth to bedrock.	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT %

10 30 50 70 90

126.4

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 1 HOLE NO: DH95-15

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 28 JUN 95 - 28 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1138.36

CO-ORDINATES (m): N 18,877 E 20,628

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS
					Moss cover - 150mm
	AUGER				
					SAND (SP-SM) - fine to coarse - some silt to silty - trace rounded gravel - trace organics inc. fine roots - trace mica - occasional grey sandy silt layers <10mm thick - reddish brown to light brown - moist when thawed, thawed above 0.51m - Nbn with some Nbe zones - occasional Vc in coarse sand pockets - ice content <5%
	CRREL	53	CT1		
1.0					
	CRREL	36	CT2		
2.0					
	CRREL	70	CT3		
3.0					
	CRREL	61	CT4		- 75mm thick gravel layer @ 3.45m
	CRREL	0	CT5		
					3.96
4.0					
	AUGER				**GRAVEL (GP)** - to 30mm size - sandy - brown

THERMISTOR DETAILS

kg/cu.m

DENSITY: 1000 1500 2000 2500

◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × - - - - - ○ - - - - - × WATER CONTENT % LIQUID LIMIT %

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 2 HOLE NO: DH95-16

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **28 JUN 95 - 28 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1138.36**

CO-ORDINATES (m): **N 18,877 E 20,628**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × - - - WATER CONTENT % ○ - - - LIQUID LIMIT % ×

10 30 50 70 90

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
	CRREL	0	CT6		**GRAVEL (GP)** - as above	
					5.64	
6.0					**SILT (ML)** - some fine sand - trace of fine gravel - occasional gravelly layers - brown	
	AUGER					
7.0						
	CRREL	0	CT7		7.47	
	AUGER				**GRAVEL (GP)**	
					7.98	
					End of hole @ 7.98m - auger refusal in gravel	

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-16**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **29 JUN 95 - 29 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1149.10**

CO-ORDINATES (m): **N 18,883 E 20,417**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

SYMBOL

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT %

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	DESCRIPTION OF MATERIALS
				Thin moss cover - 20mm
	AUGER			
				- BULK SAMPLE BS1 taken @ 0.00m-1.22m
	CRREL	36	CT1	
1.0				**SAND (SP-SM)** - fine to coarse - some silt to silty - trace of rounded gravel - trace to some organics near surface - occasional grey sandy silt layers, typ. <50mm thick - brown - frozen below 1.2m - excess ice <5% - Nbn, some Nbe zones
	CRREL	42	CT2	- BULK SAMPLE BS2 taken @ 1.32m-2.23m
2.0				
				- BULK SAMPLE BS3 taken @ 2.23m-3.51m
	CRREL	26	CT3	
3.0				
				- SAMPLE SP4 taken @ 3.81m
	CRREL	38	CT4	
4.0				
				- SAMPLE SP5 taken @ 4.37m
	CRREL	28	CT5	

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**1 of 3** HOLE NO: **DH95-17**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **29 JUN 95 - 29 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1149.10**

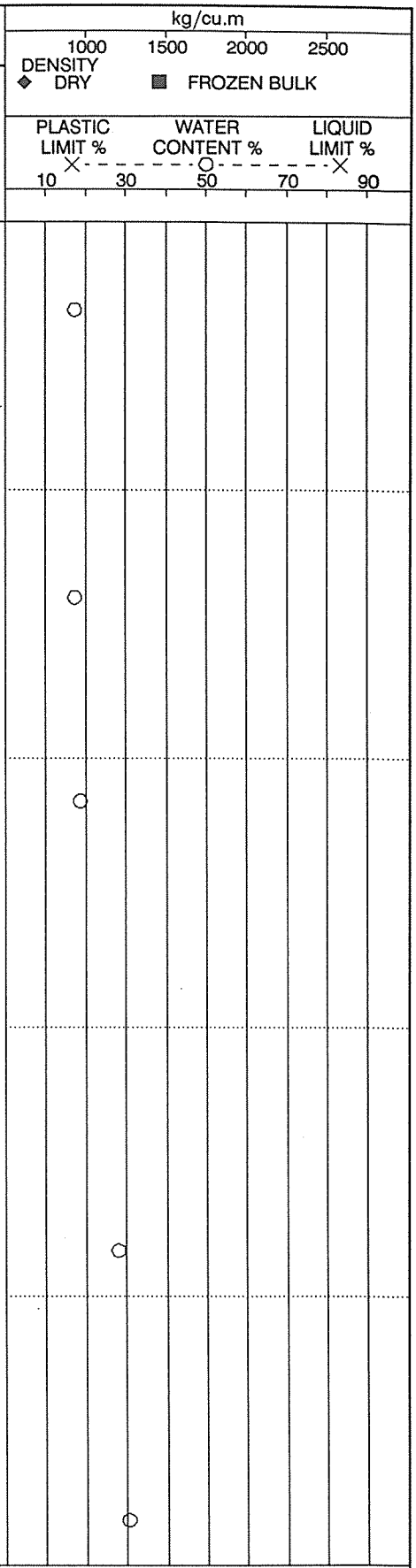
CO-ORDINATES (m): **N 18,883 E 20,417**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM)	
					- as above	
					- SAMPLE SP6 taken @ 5.33m	
					- some Vr to Vc around gravel particles @ 5.4m	
	CRREL	22	CT6		- excess ice 10%	
6.0						
					6.25	
					SILT (ML-SM)	
					- some fine sand to sandy	
					- trace mica	
	CRREL	47	CT7		- Nbn	
					- organic odour	
					- dark grey	
7.0					- interbedded with fine to medium SAND @ 6.25m-7.62m, layers <40mm thick	
					- some Nbe and Vc in sand interbeds (excess ice 5%-10%)	
					- SAMPLE SP7 taken @ 6.25m-6.55m	
					- SAMPLE SP8 taken @ 7.16m	
	CRREL	36	CT8			
8.0						
	CRREL	0	CT9			
					- SAMPLE SP9 taken @ 8.83m	
					- occasional thin brown organic layers <4mm thick	
9.0						
	CRREL	64	CT10			
					- SAMPLE SP10 taken @ 9.83m	



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KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 3** HOLE NO: **DH95-17**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **29 JUN 95 - 29 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1149.10**

CO-ORDINATES (m): **N 18,883 E 20,417**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SILT (ML-SM) - as above	
					10.36 End of Hole @ 10.36m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-17**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 29 JUN 95 - 29 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1156.82

CO-ORDINATES (m): N 18,933 E 20,257

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

SYMBOL

THERMISTOR DETAILS

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	DESCRIPTION OF MATERIALS
				Thin moss cover - 20mm
	AUGER			- SAMPLE SP1 taken @ 0.00m-0.61m
1.0	CRREL	44	CT1	**SAND (SP-SM)** - fine to medium - some silt to silty - trace to some organics at surface - occasional coarse sand layers - occasional grey silt lenses <20mm thick - reddish brown to brown - frozen below 1.8m - Nbn, occasional Nbe zones - SAMPLE SP2 taken @ 0.61m-1.52m
				- SAMPLE SP3 taken @ 1.68m
2.0	CRREL	31	CT2	
				- SAMPLE SP4 taken @ 2.59m
	CRREL	37	CT3	
3.0				
				- SAMPLE SP5 taken @ 3.2m
	CRREL	39	CT4	
4.0				
				- SAMPLE SP6 taken @ 4.11m
	CRREL	19	CT5	

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 3 HOLE NO: DH95-18

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 29 JUN 95 - 29 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1156.82

CO-ORDINATES (m): N 18,933 E 20,257

HAMMER WEIGHT kg

DROP HEIGHT m

kg/cu.m
1000 1500 2000 2500
DENSITY
◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × - - - ○ - - - × LIQUID LIMIT %
WATER CONTENT %
10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM)	
					- as above	
					- becoming more silty	
					- becoming greyish brown	
	CRREL	17	CT6		- SAMPLE SP7 taken @ 5.03m	
					5.50	
					SILT (ML-SM)	
					- trace to some fine sand	
					- trace mica	
6.0					- trace organics and organic odour	
					- interbedded with layers of fine to medium sand <30mm thick	
					- Nbn to Nbe	
	CRREL	39	CT7		- dark grey	
					- SAMPLE SP8 taken @ 5.94m	
					6.95	
7.0					- SAMPLE SP9 taken @ 7.01m	
	CRREL	44	CT8			
					SAND (SP-SM)	
					- fine to medium, rounded	
					- silty	
					- trace organics	
					- trace mica	
					- interbedded with occasional dark grey silt layers	
8.0					- Nbn	
					- grey	
	CRREL	25	CT9		- SAMPLE SP10 taken @ 7.77m	
					- SAMPLE SP11 taken @ 8.69m	
9.0						
	CRREL	33	CT10			
					- SAMPLE SP12 taken @ 9.6m	
					9.75	

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 3 HOLE NO: DH95-18

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **29 JUN 95 - 29 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1156.82**

CO-ORDINATES (m): **N 18,933 E 20,257**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
	CRREL	50	CT11		**SILT (ML)** - trace of fine sand - trace mica - occasional brown organic interbeds <5mm thick - organic odour - occasional grey sand interbeds 5mm-15mm thick - Nbn - grey - SAMPLE SP13 taken @ 10.52m	
11.0	CRREL	26	CT12			
12.0	CRREL	0	CT13			
					12.45 End of Hole @ 12.45m	

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **3 of 3** HOLE NO: **DH95-18**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 30 JUN 95 - 30 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1156.46

CO-ORDINATES (m): N 18,952 E 20,270

SAMPLE DATA				SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
HAMMER WEIGHT kg						
DROP HEIGHT m						
Depth (m)	Method	Rec %	Run No.			
					Thin moss cover - 20mm	
					- SAMPLE SP1 taken @ 0.15m-1.07m	
	CRREL	38	CT1			
1.0					**SAND (SP-SM)**	
					- fine to medium	
					- some silt to silty	
					- trace to some rounded gravel	
					- trace to some organics	
					- occasional grey silt layers <10mm thick	
					- reddish brown to brown	
					- frozen below 1.6m	
	CRREL	56	CT2		- Nbn, occasional Nbe zones	
					- excess ice <5%	
					- SAMPLE SP2 taken @ 1.68m	
2.0						
	CRREL	17	CT3			
3.0						
	CRREL	0	CT4			
4.0					- SAMPLE SP3 taken @ 4.11m	
	CRREL	50	CT5			
					- SAMPLE SP4 taken @ 4.88m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

10 30 50 70 90

1930 2219

Continued

KLOHN-CRIPPEN

JOB NO:	PM 5314 0502
PROJECT:	Mt. Nansen Gold Project
LOCATION:	Carmacks, Yukon Territory
LOGGED BY:	JM
CHECKED BY:	
PLATE:	1 of 2
HOLE NO:	DH95-19

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1156.46**

CO-ORDINATES (m): **N 18,952 E 20,270**

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	CRREL	28	CT6		**SAND (SP-SM)** - as above	
6.0	CRREL	0	CT7			
7.0	CRREL	0	CT8			
					7.62	
8.0	CRREL	0	CT9		**SILT (ML)** - trace to some fine sand - interbedded with fine to medium sand lenses <5mm thick - occasional thin brown organic layers - grey - SAMPLE SP5 taken @ 8.53m	
9.0	CRREL	33	CT10			
					9.41	
					End of Hole @ 9.41m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-19**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 30 JUN 95 - 30 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1158.59

CO-ORDINATES (m): N 18,903 E 20,234

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm	
					SAND (SP-SM) - fine to medium - some silt to silty - trace of rounded gravel - trace to some organics near surface - reddish brown to brown - frozen below 0.9m	
1.0						
					1.50	
2.0						
					SILT (ML) - some fine sand - trace mica - Nbe - grey	
3.0						
4.0						
					4.60	
					End of Hole @ 4.6m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 1 HOLE NO: DH95-20

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1164.92**

CO-ORDINATES (m): **N 19,000 E 20,094**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm - 50mm thick white sandy ash layer at surface below moss **SILT (ML)** - trace fine sand - occasional organic zones - brown	
1.0					1.07 **SAND (SP-SM)** - fine to coarse - some silt to silty - trace of rounded gravel - brown	
					1.52 **SILT (ML)** - trace to some sand - trace mica - excess water on thaw - grey	
2.0						
3.0						
4.0						

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 2** HOLE NO: **DH95-21**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1164.92**

CO-ORDINATES (m): **N 19,000 E 20,094**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SILT (ML) - as above	
6.0					6.10	
					End of Hole @ 6.1m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-21**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1161.55**

CO-ORDINATES (m): **N 19,009 E 20,141**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm	
					SAND (SM)	
					- fine, silty, trace to some gravel, trace organics, brown	
					0.30	
					SILT (ML)	
					- trace sand and gravel, organic odour, frozen with excess water on thaw, brown	
					0.76	
					SAND (SP-SM)	
					- fine to medium	
					- some silt to silty	
					- trace of rounded gravel	
					- brown	
					1.22 - thawed from 0.76m-1.07m	
					SILT (ML)	
					- trace to some sand	
					- trace gravel	
					- trace organics	
					- excess water on thaw	
					- grey	
					- ice content increasing	
					4.57	
					End of Hole @ 4.57m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT %

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 1** HOLE NO: **DH95-22**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1159.89**

CO-ORDINATES (m): **N 19,018 E 20,183**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm	
	BAG		SP1		**SAND (SP-SM)** - fine to medium - some silt to silty - some rounded gravel to gravelly - brown - gravelly layer 0.3m-0.6m, angular particles to 50mm	
1.0						
					- frozen below 1.8m	
2.0					- gravelly layer @ 2.1m, 150mm thick	
					2.44	
3.0					**SILT (ML)** - trace to some fine to medium sand - trace gravel - trace mica - excess water on thaw - grey	
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 2** HOLE NO: **DH95-23**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 30 JUN 95 - 30 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1159.89

CO-ORDINATES (m): N 19,018 E 20,183

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SILT (ML) - as above - sand content reduced to trace - becoming dark bluish grey - increasing ice content - interbedded with brown silt lenses @ 6.1m-7.6m	
6.0						
7.0						
8.0						
9.0						
					9.14 End of Hole @ 9.14m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 2 HOLE NO: DH95-23

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 30 JUN 95 - 30 JUN 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1157.52

CO-ORDINATES (m): N 19,133 E 20,482

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	AUGER				Thin moss cover - 30mm - 50mm thick greyish white ash layer underneath moss cover **SILT (ML-SM)** - trace to some sand - trace to some gravel - some organics and rootlets - frozen below 0.6m - Nbn	
0.81	CRREL	50	CT1		- SAMPLE SP1 taken @ 0.81m	
1.0					**SAND (SP-SM)** - fine to medium - silty to some silt - trace rounded gravel - trace mica - Nbn - brownish grey - occasional grey silt lenses <15mm thick - occasional gravelly zones <30mm thick	
	CRREL	36	CT2		- SAMPLE SP2 taken @ 1.37m	
2.0					- SAMPLE SP3 taken @ 2.29m	
	CRREL	39	CT3			
3.0					- SAMPLE SP4 taken @ 3.5m	
	CRREL	67	CT4			
4.0					- SAMPLE SP5 taken @ 4.11m	
	CRREL	42	CT5			

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

JOB NO:	PM 5314 0502
PROJECT:	Mt. Nansen Gold Project
LOCATION:	Carmacks, Yukon Territory
LOGGED BY:	JM
CHECKED BY:	
PLATE:	1 of 2
HOLE NO:	DH95-24

11/07/95

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

DATE DRILLED: **30 JUN 95 - 30 JUN 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1157.52**

CO-ORDINATES (m): **N 19,133 E 20,482**

kg/cu.m

DENSITY ◆ DRY ■ FROZEN BULK

1000 1500 2000 2500

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM)	
					- as above	
	CRREL	52	CT6		- SAMPLE SP6 taken @ 5.49m	
6.0						
	CRREL	78	CT7		- SAMPLE SP7 taken @ 6.61m	
7.0						
	CRREL	67	CT8		- gravelly layer @ 7.2m, 30mm thick	
8.0						
	CRREL	67	CT9		- SAMPLE SP8 taken @ 8.38m - gravelly layer @ 8.5m, 50mm thick	
					8.81 End of Hole @ 8.81m	

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-24**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

DATE DRILLED: **1 JUL 95 - 1 JUL 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1155.35**

CO-ORDINATES (m): **N 18,825 E 20,482**

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × - - - ○ - - - × LIQUID LIMIT %

10 30 50 70 90

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
	AUGER				Moss cover - 150mm	
					SILT (ML) - trace to some sand - trace to some gravel - some organics - brown to orangish brown - occasional gravelly zones below 0.6m - frozen below moss cover - Vr to Vs, 1mm-3mm ice lenses spaced at 4mm apart - excess ice 40%-60%	
	CRREL	83	CT1			
1.0						
					1.22 **PEAT (Pt)** - fine fibrous - occasional roots - dark brown	
	CRREL	100	CT2		1.60 - fine to coarse sand layer @ 1.47m, 70mm thick	
					1.75 **SAND (SP-SM)**, fine to medium, silty, greyish brown	
2.0	CRREL	100	CT3		**ANDESITE** - angular bedrock fragments in silty sand matrix	
					2.12 - SAMPLE SP1 taken @ 2.0m End of Hole @ 2.12m - auger refusal	

KLOHN-CRIPPEN

13/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **1 of 1** HOLE NO: **DH95-25**

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1144.45

CO-ORDINATES (m): N 18,989 E 20,653

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm	
	AUGER				**SAND (SP-SM)** - fine to medium - some silt to silty - trace to some rounded gravel - trace to some organics in upper 0.9m - brown to greyish brown - occasional gravel interbeds - occasional grey silt layers up to 40mm thick	
1.0	CRREL	39	CT1		- SAMPLE SP1 taken @ 0.86m	
					- SAMPLE SP2 taken @ 1.68m	
2.0	CRREL	33	CT2			
					- SAMPLE SP3 taken @ 2.74m - frozen below 2.75m - Nbn	
3.0	CRREL	42	CT3			
					- SAMPLE SP4 taken @ 3.35m	
	CRREL	11	CT4			
4.0					- SAMPLE SP5 taken @ 4.27m - grey silt layer @ 4.4m, 40mm thick	
	CRREL	28	CT5			

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 2 HOLE NO: DH95-26

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1144.45

CO-ORDINATES (m): N 18,989 E 20,653

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM)	
					- as above	
	CRREL	8	CT6			
6.0						
	CRREL	0	CT7			
7.0						
	CRREL	0	CT8			
8.0						
					- gravelly layer @ 8.08m, 75mm thick	
	CRREL	27	CT9			
					8.65	
					End of Hole @ 8.65m	
					- refusal in gravel	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % | WATER CONTENT % | LIQUID LIMIT %

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 2 HOLE NO: DH95-26

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1137.41

CO-ORDINATES (m): N 19,002 E 20,770

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Moss cover - 150mm	
					SILT (ML) - organic - ice rich - dark brown to black - thin white ash layer @ 0.6m	
					0.91	
1.0					**SAND (SP-SM)** - fine - silty - some rounded gravel to gravelly - trace to some organics in upper zone - light grey	
2.0						
3.0					- becoming fine to medium - some silt to silty - some rounded gravel to gravelly, to 30mm size - light brown - Nbn to Nbe - some Vc around coarser sand particles and fine gravel - excess ice <10%	
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 2 HOLE NO: DH95-27

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1137.41

CO-ORDINATES (m): N 19,002 E 20,770

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0						
7.0						
8.0						
9.0						
					9.14 End of Hole @ 9.14m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 2 HOLE NO: DH95-27

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1146.91

CO-ORDINATES (m): N 19,039 E 20,607

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 60mm	
					SILT (ML) - trace to some sand - trace to some gravel - some organics and roots - brown - frozen below 0.15m - excess water on thaw	
1.0					1.22	
					SAND (SP-SM) - fine to medium - some silt to silty - trace of rounded gravel - light brownish grey - Nbn, occasional Nbe	
2.0						
3.0						
4.0						

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 1 of 2 HOLE NO: DH95-28

TEST HOLE LOG

VERTICAL SCALE: 1cm = 0.25m

DATE DRILLED: 2 JUL 95 - 2 JUL 95

DRILL TYPE: Track-mounted CME-75

ELEV. GROUND (m): 1146.91

CO-ORDINATES (m): N 19,039 E 20,607

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0						
					- gravel layer @ 6.7m, 150mm thick - becoming fine, silty, light grey	
7.0						
8.0					- thin gravelly layers below 8.2m	
					8.53 GRAVEL 8.69	
					End of Hole @ 8.69m - auger refusal in gravel	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: PM 5314 0502

PROJECT: Mt. Nansen Gold Project

LOCATION: Carmacks, Yukon Territory

LOGGED BY: JM CHECKED BY:

PLATE: 2 of 2 HOLE NO: DH95-28

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **2 JUL 95 - 2 JUL 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1149.47**

CO-ORDINATES (m): **N 19,085 E 20,596**

SAMPLE DATA

HAMMER WEIGHT kg

DROP HEIGHT m

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					Thin moss cover - 20mm	
					SILT (ML-SM) - sandy - trace to some gravel - trace to some organics and roots near surface - brown	
1.0						
1.22					- frozen below 1.2m	
					SAND (SP-SM) - fine to medium - silty - trace of rounded gravel - light greyish brown - Nbe - excess ice 10%	
2.0						
3.0					- thin gravel layer @ 3.5m	
4.0					- gravelly layer @ 4.5m, 150mm thick	
					- occasional gravelly layers from 4.8m-5.8m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × — WATER CONTENT % ○ — LIQUID LIMIT % ×

10 30 50 70 90

Continued

KLOHN-CRIPPEN

11/07/95

JOB NO:	**PM 5314 0502**
PROJECT:	**Mt. Nansen Gold Project**
LOCATION:	**Carmacks, Yukon Territory**
LOGGED BY:	**JM** CHECKED BY:
PLATE:	**1 of 2** HOLE NO: **DH95-29**

TEST HOLE LOG

VERTICAL SCALE: **1cm = 0.25m**

DATE DRILLED: **2 JUL 95 - 2 JUL 95**

DRILL TYPE: **Track-mounted CME-75**

ELEV. GROUND (m): **1149.47**

CO-ORDINATES (m): **N 19,085 E 20,596**

SAMPLE DATA

HAMMER WEIGHT **kg**

DROP HEIGHT **m**

Depth (m)	Method	Rec %	Run No.	SYMBOL	DESCRIPTION OF MATERIALS	THERMISTOR DETAILS
					SAND (SP-SM) - as above	
6.0					6.10	
					End of Hole @ 6.1m	

kg/cu.m

1000 1500 2000 2500

DENSITY ◆ DRY ■ FROZEN BULK

PLASTIC LIMIT % × WATER CONTENT % ○ LIQUID LIMIT % ×

10 30 50 70 90

KLOHN-CRIPPEN

11/07/95

JOB NO: **PM 5314 0502**

PROJECT: **Mt. Nansen Gold Project**

LOCATION: **Carmacks, Yukon Territory**

LOGGED BY: **JM** CHECKED BY:

PLATE: **2 of 2** HOLE NO: **DH95-29**

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9401 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 1.0 m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
PEAT									0-15 cm Peat
			0.2						15cm - 1m fine to medium clean grey SAND, trace silt. 10cm thick ice lens at 80 cm. Water inflow at 40 cm.
SAND			0.4						
			0.6						
ICE			0.8						Refusal on solidly frozen ground at 1.0 m
SAND			1.0						
FROZEN SAND ↓									

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT. NANSEN MINE

HOLE No. 9401 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES — JOB No. PB5314 03 — PIT No. 9402 — SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE — WEATHER CLEAR — INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN — TEMP. 25 °C — STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ — DEPTH 1.5 M — FINISHED ____ .M. ____ 19__

DEPARTURE ____ — WIDTH ____ — ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING — LENGTH ____ — GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE — WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH (M)	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
BROWN PEAT			0.2						0-50 cm brown peat
			0.4						50cm - 1.0m medium grey fine to medium SAND, some organics, containing ice crystals
			0.6						
fine dark grey SAND			0.8						1.0m - 1.5m dark grey fine SAND, trace silt ice crystals
			1.0						
			1.2						1.5m - refusal on solidly frozen ground
			1.4						
solidly frozen ↓			1.6						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9402 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9403 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ___ .M. ___ 19__

LOCATION: LATITUDE ___ DEPTH 0.6 m FINISHED ___ .M. ___ 19__

DEPARTURE ___ WIDTH ___ ELEVATIONS: DATUM ___

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ___ GROUND SURFACE ___

METHOD OF EXCAVATION BACK HOE WATER LEVELS ___

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANIC SOIL									0-5cm organic soil
SAND trace silt			0.2						5cm - 60 cm fine to medium SAND, Trace silt, little pebbles. Pebbles angular
			0.4						
solidly frozen ↓			0.6						Refusal on solidly frozen soil at 60 cm no visible ice
			0.8						
			1.0						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9403 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9404 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 2.1 m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
Moss & Roots									0-10 cm moss & roots
			0.2						10 cm - 2.1 m
			0.4						uniform fine to med
			0.6						SAND little pebbles
			0.8						trace silt
SAND			1.0						no visible ice, cross-
			1.2						bedded, med brown
			1.4						
			1.6						
			1.9						
			2.0						
frozen hard ↓			2.2						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9404 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9405 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 2.0 m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR; CONSISTENCY; DENSITY; TEXTURE; STRUCTURE; SHAPE AND SURFACE CONDITION OF GRAINS; TESTING AND SAMPLING PROCEDURES AND EQUIPMENT; WATER AND GAIN; ODOUR; ETC.
ORGANIC SOIL									10 cm Organic Soil
med. brown SAND			0.2						10 cm - 20 cm med brown fine to medium SAND
light brown SAND			0.4						20 cm - 2.0 m light brown fine to medium clean SAND, little pebbles cross bedded, pebbles angular to sub-rounded no visible ice
			0.6						
			0.8						
			1.0						
			1.2						
			1.4						
			1.6						
			1.8						
			2.0						
frozen solidly ↓			2.2						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9405 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9406 SHEET No. 1 of 1
PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME
SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__
LOCATION: LATITUDE ____ DEPTH 2.5m FINISHED ____ .M. ____ 19__
DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____
CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____
METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK
** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
organic soil / med. brown SAND			0.2						0-5cm organic soil 5cm-20cm medium brown fine SAND, some roots, Volcanic ash mixed in top 5cm
light brown SAND			0.4						
			0.6						20cm-2.5m fine to medium clean SAND, cross bedded, medium loose no visible ice, light brown
			0.8						
			1.0						
			1.2						Refusal on solidly frozen ground at 2.5m
			1.4						
			1.6						
			1.8						
			2.0						
			2.2						
			2.4						
Solidly frozen									

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BBT
PROJECT MT. NANSEN
LOCATION MT NANSEN MINE
HOLE No. 9406 INSPECTOR BBT
APPROVED BBT DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9407 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 0.5m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
Moss & peat									0-20cm Moss & Peat
			0.2						
SAND									20cm-50cm Medium SAND clean, no visible ice salt & pepper texture
			0.4						
REFUSAL FROZEN SOLID			0.6						Refusal at 50cm in solidly frozen SAND, as above

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9407 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES — JOB No. PB5314/03 — PIT No. 9408 — SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE — WEATHER CLEAR — INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN — TEMP. 25 °C — STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ — DEPTH 0.5 m — FINISHED ____ .M. ____ 19__

DEPARTURE ____ — WIDTH ____ — ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING — LENGTH ____ — GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE — WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, FAIR, DISTURBED, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANIC SOIL & ROOTS			0.2						0-30 cm Organic soil and roots
SAND			0.4						30 cm - 50 cm fine to medium SAND, little silt (source of silt may be ash?) salt & pepper no visible ice
FROZEN SAND ↓			0.6						
			0.8						
			1.0						Refusal on solidly frozen sand, as above, at 50 cm

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9408 INSPECTOR BST

APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9409 SHEET No. 1 of 1
PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME
SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__
LOCATION: LATITUDE ____ DEPTH 1.0 M FINISHED ____ .M. ____ 19__
DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____
CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____
METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK
** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
organic soil & roots ASH			0.2						0-10cm organic soil & roots
SAND			0.4						10cm-12cm volcanic ash mixed with underlying sand & overlying organics
			0.6						
			0.8						12cm-1.0m medium brown fine to medium clean SAND trace silt, no visible ice
frozen SAND ↓			1.0						
			1.2						Refusal at 1.0m on solidly frozen SAND, as above

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST
PROJECT MT. NANSEN
LOCATION MT NANSEN MINE
HOLE No. 9409 INSPECTOR BST
APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9410 SHEET No. 1 of 1
PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME
SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ___ .M. ___ 19__
LOCATION: LATITUDE ___ DEPTH 0.5m FINISHED ___ .M. ___ 19__
DEPARTURE ___ WIDTH ___ ELEVATIONS: DATUM ___
CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ___ GROUND SURFACE ___
METHOD OF EXCAVATION BACK HOE WATER LEVELS ___

LOG LEGEND: SILT, SAND, CLAY, GRAVEL
* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST
** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK
** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH (m)	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
organic soil & roots									0-10 cm organic soil & roots
SAND			0.2						
			0.4						10 cm - 50 cm grey-brown fine to coarse SAND, trace silt, some pebbles sand rounded, pebbles angular to sub-rounded, larger fragments more angular. No visible ice
frozen SAND ↓			0.6						
			0.8						Refusal on frozen SAND as above at 50 cm

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST
PROJECT MT. NANSEN
LOCATION MT NANSEN MINE
HOLE No. 9410 INSPECTOR BST
APPROVED BST DATE 16 JULY 94

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9411 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 1.2 m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANIC SOIL, ROOTS									0-10cm organic soil & roots
~~SAND, ASH~~			0.2						
			0.4						10cm-12cm mixed sand and volcanic ash
SAND			0.6						12cm-1.2m medium brown SAND trace silt sand well rounded, no visible ice. loose
			0.8						
ROCKY AT BOTTOM			1.0						
frozen hard ↓			1.2						Refusal on frozen SAND, as above at 1.2 m
			1.4						Some angular rock fragg at base of pit - may be close to bedrock?

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BBT

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9411 INSPECTOR BBT

APPROVED BBT DATE 16 JULY 04

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9412 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ___ .M. ___ 19__

LOCATION: LATITUDE ___ DEPTH ___ FINISHED ___ .M. ___ 19__

DEPARTURE ___ WIDTH ___ ELEVATIONS: DATUM ___

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ___ GROUND SURFACE ___

METHOD OF EXCAVATION BACK HOE WATER LEVELS ___

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANICS									0-20cm organics
			0.2						
SAND									20cm - 30cm oxide stained salt & pepper SAND fine to medium
FROZEN ↓			0.4						Refusal on frozen SAND, as above at 30cm

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9412 INSPECTOR BST

APPROVED BST DATE 16 Jul 91

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9413 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ____ .M. ____ 19__

LOCATION: LATITUDE ____ DEPTH 1.2 m FINISHED ____ .M. ____ 19__

DEPARTURE ____ WIDTH ____ ELEVATIONS: DATUM ____

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ____ GROUND SURFACE ____

METHOD OF EXCAVATION BACK HOE WATER LEVELS ____

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK

** SHIPPING CONTAINER: O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG; S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANIC SOIL & ROOTS									0-15cm organic soil & roots
			0.2						15cm - 1.2m
									Clean, fine to medium
			0.4						SAND, med. brown,
SAND									no visible ice med
			0.6						dense, some angular
									pebbles - Angular
			0.8						broken rock at base
									of pit - close to
angular rock at base			1.0						bedrock?
△ ◇ △									
			1.2						Refusal on frozen SAND
frozen ↓									is above at 1.2 m
			1.4						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BST

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. 9413 INSPECTOR BST

APPROVED BST DATE 16 JULY 01

FIELD TEST PIT LOG

CLIENT B.Y.G NATURAL RESOURCES JOB No. PB5314 03 PIT No. 9414 SHEET No. 1 of 1

PROJECT MT. NANSEN GOLD MINE WEATHER CLEAR INSPECTOR B. TRENHOLME

SITE SITE #4, MT NANSEN TEMP. 25 °C STARTED ___ .M. ___ 19___

LOCATION: LATITUDE ___ DEPTH 1.5M FINISHED ___ .M. ___ 19___

DEPARTURE ___ WIDTH ___ ELEVATIONS: DATUM ___

CONTRACTOR I CAN DIG IT CONTRACTING LENGTH ___ GROUND SURFACE ___

METHOD OF EXCAVATION BACK HOE WATER LEVELS ___

LOG LEGEND: SILT, SAND, CLAY, GRAVEL

* SAMPLE CONDITION: GOOD, DISTURBED, FAIR, LOST

** SAMPLING METHOD: B - THIN WALL TUBE; C - PISTON SAMPLER; E - AUGER; G - SHOVEL; H - CARVED BLOCK; O - TUBE; P - WATER CONTENT TIN; Q - GLASS JAR; R - CLOTH BAG

** SHIPPING CONTAINER: S - PLIOFILM BAG; T - METAL CAN; U - WOODEN BOX

SKETCH	LOG	ELEVATION	DEPTH	SAMPLE *	SAMPLE ** TYPE	SAMPLE NO.	SAMPLE SIZE	SAMPLE RET'D.	DESCRIPTION AND FIELD NOTES: COLOUR, CONSISTENCY, DENSITY, TEXTURE, STRUCTURE, SHAPE AND SURFACE CONDITION OF GRAINS, TESTING AND SAMPLING PROCEDURES AND EQUIPMENT, WATER AND GAIN, ODOUR, ETC.
ORGANIC SOIL, ROOTS									0-10cm organic soil & roots
			0.2						10cm-1.5m
									colluvial soil, SAND,
			0.4						trace to little silt,
									some angular pebbles
			0.6						no visible ice
SANDY COLLUVIUM									
			0.8						Refusal on fractured
									rock at 1.5 m
			1.0						
			1.2						
			1.4						
X 1 fractured rock ↓			1.6						

KLOHN-CRIPPEN

JOB No. PB5314 03 LOGGED BY BBT

PROJECT MT. NANSEN

LOCATION MT NANSEN MINE

HOLE No. INSPECTOR BBT

APPROVED DATE 16 JULY 94

APPENDIX II

Thermistor Readings and Laboratory Test Data

PM 5314
MT. NANSEN MINE

THERMISTOR READINGS

Drill hole	Thermistor #	Depth (m)	Temperature Readings (°C) on												
			21-Jun-95	22-Jun-95	23-Jun-95	25-Jun-95	26-Jun-95	28-Jun-95	29-Jun-95	30-Jun-95	1-Jul-95	2-Jul-95	18-Jul-95	29-Jul-95	9-Aug-95
DH95-04	1	1.0										10.7	3.9	5.0	4.9
	2	2.0										7.2	-0.2	0.1	0.3
	3	3.0										4.2	-0.6	-0.5	-0.3
	4	5.0										0.8	-0.8	-0.7	-0.6
	5	7.5										1.0	-0.7	-0.7	-0.6
	6	10.0										0.0	-0.5	-0.5	-0.5
	10	10.5										0.0	-0.5	-0.5	-0.5
	7	15.0										0.0	-0.4	-0.4	-0.4
	9	15.5										-0.1	-0.4	-0.4	-0.4
	8	20.0										0.0	-0.4	-0.4	-0.4
DH95-05	10	0.5							3.6	3.9	4.3	4.6	6.7	5.6	6.0
	1	1.0							0.7	0.7	0.8	0.9	2.3	2.5	2.6
	2	2.0							0.1	0.1	0.1	0.1	0.1	0.1	0.1
	3	3.0							0.0	0.0	0.0	0.0	-0.1	-0.1	-0.1
	4	5.0							0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2
	9	5.5							0.0	0.0	0.0	0.3	-0.1	-0.2	-0.2
	5	7.5							-0.1	-0.1	-0.1	0.1	-0.2	-0.2	-0.3
	6	10.0							-0.1	0.0	0.0	0.0	-0.1	-0.2	-0.2
	8	10.5							0.0	0.0	0.0	0.0	-0.1	-0.2	-0.2
	7	15.0							-0.2	-0.2	-0.2	0.0	-0.2	-0.2	-0.3
DH95-06	7	0.5	4.1	7.4	0.3	0.1	0.2	0.3		0.5		0.5	1.6	1.3	2.2
	1	1.0	4.2	5.3	0.1	0.0	0.0	0.0		0.0		0.1	0.0	0.0	0.0
	2	2.0	3.4	2.9	0.0	-0.1	0.0	-0.1		0.0		0.0	-0.1	-0.3	-0.4
	3	3.0	3.7	0.0	0.0	-0.1	0.0	0.0		0.0		0.0	0.0	0.0	0.0
	4	5.0	2.5	-0.1	0.0	-0.1	-0.1	0.0		-0.1		0.0	-0.9	-1.0	-0.1
	6	5.5	2.6	0.0	0.0	0.0	0.0	0.0		0.0		0.1	-0.7	-1.0	-0.1
	5	7.5	3.6	0.3	0.0	-0.1	0.0	-0.1		0.0		0.0	-0.1	-0.2	-0.5
DH95-08B	7	0.3					4.9	4.5		7.1		7.2	7.8	6.0	6.4
	1	0.8					0.0	0.0		0.0		0.1	1.0	1.3	1.7
	2	1.8					0.0	0.0		0.0		0.0	0.0	0.0	0.0
	3	2.8					0.0	0.0		0.0		0.1	-0.1	-0.2	-0.2
	4	4.8					-0.1	-0.1		-0.1		-0.1	-0.4	-0.4	-0.5
	6	5.3					0.0	0.0		0.0		0.2	-0.1	-0.3	-0.5
	5	7.3					-	-		-		-	-	-	-
DH95-09	7	0.4					2.7		3.7	4.4	4.7	4.8	6.5	5.0	5.6
	1	0.9					-0.1		-0.1	0.0	0.0	0.1	0.7	1.0	1.4
	2	1.9					-0.1		-0.1	-0.1	-0.1	0.0	-0.2	-0.2	0.3
	3	2.9					0.0		0.0	0.0	0.0	0.0	-0.3	-0.4	-0.4
	4	4.9					-0.1		-0.1	-0.1	-0.1	-0.1	-0.5	-0.5	-0.5
	6	5.4					-0.2		-0.2	-0.2	-0.2	-0.1	-0.6	-0.6	-0.6
	5	7.4					-0.2		-0.2	-0.2	-0.2	-0.2	-0.7	-0.7	-0.7
DH95-10	8	-0.1						17.0		9.9		8.5	11.6	13.7	16.0
	1	1.3						2.5		-0.3		0.1	-0.7	-0.6	-0.6
	2	2.3						2.7		-0.9		-1.2	-1.1	-1.0	-0.9
	3	3.3						2.3		-0.9		-1.3	-1.3	-1.2	-1.2
	7	4.7						6.3		-0.3		-1.4	-1.5	-1.5	-1.4
	9	4.9						9.0		-0.1		-1.1	-1.5	-1.4	-1.4
	4	5.2						3.2		-1.1		-1.2	-1.4	-1.3	-1.2
	5	7.7						1.9		-1.3		-1.2	-1.4	-1.4	-1.3
	10	9.6						5.7		-0.1		-0.7	-1.2	-1.2	-1.2
	6	9.9						4.3		0.1		-0.6	-1.0	-1.0	-1.0

PM 5314
MT. NANSEN MINE

LAB DATA

Test Hole	Depth (m)	Water Content (%)	In Situ		Recompacted			Grain Size		Gs	Permeability (cm/s)	mv (m^2/kN)	Cv (m^2/s)	Comments
			Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Bulk Density (kg/m^3)	Water Content (%)	Dry Density (kg/m^3)	% Sand	% Fines					
DH95-04	0.61	12.27												
	1.14	5.47												
	1.98	6.27												
	2.67	4.43												
	3.73	20.36	1981	1646										
	4.57	16.41	2015	1731										
	5.03	16.1	2057	1772										
	5.79	14.25	2831	2478										
	7.3	14.4												
	7.6	17.4	2052	1748	2055	14.6	1793	83	17		1.90E-05			Single point Proctor
	9.1	16.8												
DH95-4A	0.76	8.06												
	1.8	2.95												
	3.2	16.04												
	6.2	18.66												
DH95-05	0.84	8.01												
	1.22	15.51												
	2.21	14.65												
	3.73	17.17												
	4.34	12.08	2042	1822				88	12					
	5.56	15.3	2027	1758										
	6.4	13.32												
	6.86	16.84	2094	1792										
	7.32	13.94	2076	1822										
	7.62	10.95												
	10.8	19.57												
	12.5	25.29						20	80			5.40E-05		
	13.7	24.94												
DH95-06	0.76	26.1	1660	1316				83	17					
	1.37	45.7	1330	913										Sand & Organics
	1.83	20.3												
	2.9	30.1	1791	1377				61	39					
	3.66	24.2	1829	1473				82	18			3.50E-05		
	4.42	30.1	1707	1312										
	5.49	32	1900	1439				69	31					
	6.1	24.3	1761	1417										
	6.71	18.5	2153	1817										
	7.32	19	1996	1677	1973	20.6	1636	83	17	2.67	8.70E-04			Single point Proctor
	7.62	17.7	1892	1607										
	8.08	17.8	2146	1822										
	9.3	10.5												
DH95-07	0.61	29.9	1621	1248										
	1.07	66.5												Sand & Organics
	2.07	17.4	2105	1793										
	2.9	19	2029	1705				87	13					
	3.5	19.1	1997	1677										
	3.8	17	1760	1504										
	5.3	31.5	1789	1360										Sand & Organics
	6.9	14.2												

PM 5314
MT. NANSEN MINE

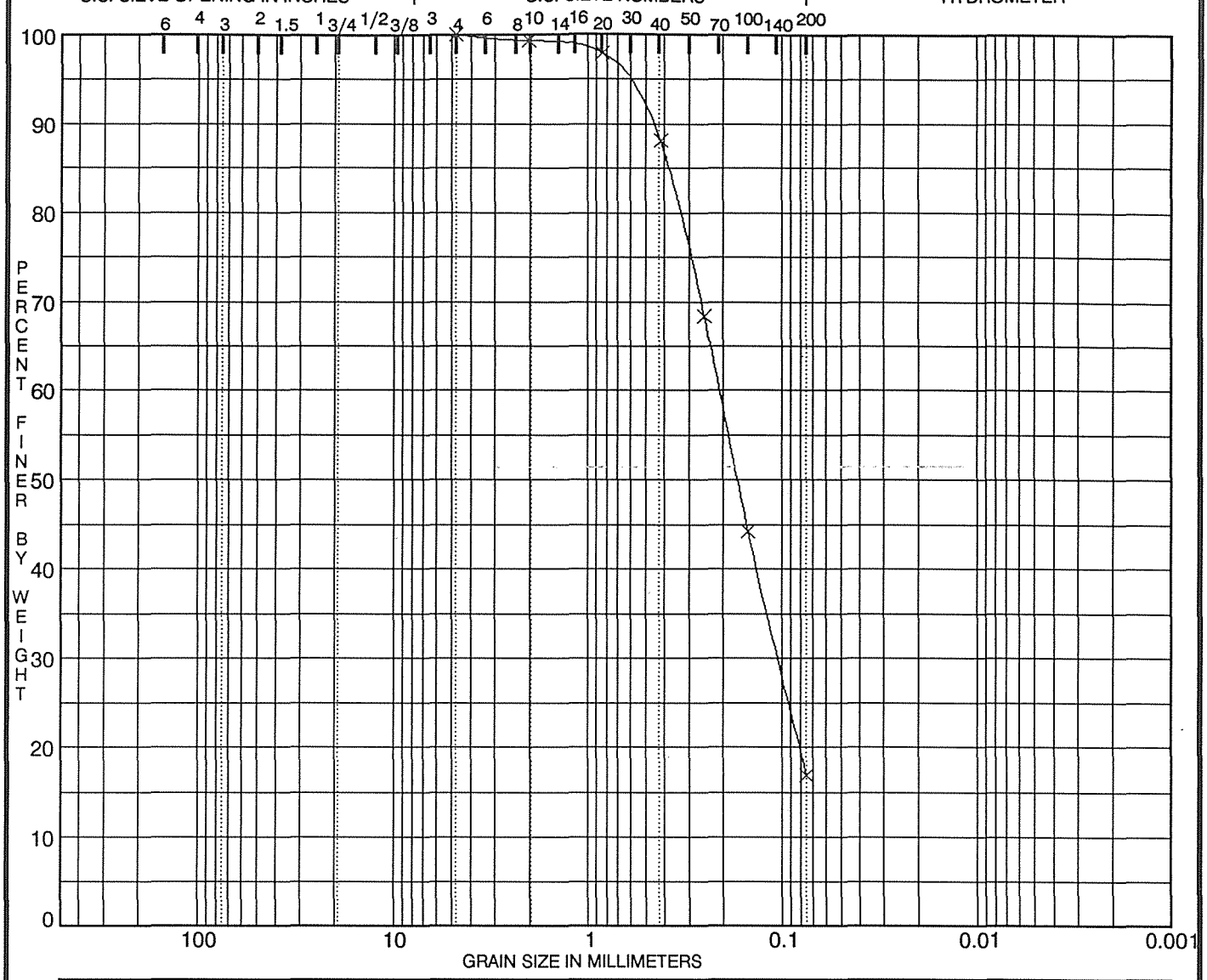
LAB DATA

Test Hole	Depth (m)	Water Content (%)	In Situ		Recompacted			Grain Size		Gs	Permeability (cm/s)	mv (m^2/kN)	Cv (m^2/s)	Comments
			Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Bulk Density (kg/m^3)	Water Content (%)	Dry Density (kg/m^3)	% Sand	% Fines					
DH95-08	1.37	15.7	2005	1733										
	1.83	101.4	1944	965										Peat
	2.3	30.1												Sand & Organics
	2.9	41.4	1759	1244										Sand & Organics
	3.6	28.7	1730	1344										Sand & Organics
	3.9	38.4	1783	1288										Sand & Organics
	4.5	21.4												
	5	16.8												
DH95-08B	1.1	25.4												
	1.37	21.3						75	25			2.30E-05		
	2.6	76												
	3.1	18.8			2015	18.4	1702	83	17	2.68	5.50E-05	1.00E-05	5.40E-03	Sand (Dense state)
												7.50E-05	7.50E-04	Sand (Loose state)
	4.6	16.3	1843	1585										
	4.9	19.2	1986	1666				90	10					
	6.4	21.7	1943	1597										
DH95-09	0.53	84.06												
	1.37	36.12	1608	1181										
	2.44	28.13	1854	1447										
	2.9	18.34												
	3.43	6.34												
	3.66	48.97												
	4.11	18.55												
	4.65	22.33	1840	1504										
	5.56	20.04	1850	1541				71	29					
	6.55	17.2	2272	1939										
	7.5	17.34	1896	1616										
DH95-10	0.53	159.54												
	1.09	21.35	1919	1581										
	1.68	37.73	1717	1247										
	2.44	20.91	1931	1597										
	2.74	22.27	1969	1610										
	4.09	25.2												
	5.28	9.59												
	5.69	13.68												
	6	19.46												
	6.86	9.69												
	7.65	19.25	2126	1783										
DH95-15	0.9	126.4												Peat
	2	17.9												Sand & Gravel
DH95-17	0.6	11.06												
	1.8	11.53												
	2.9	12.11			2001	13.3	1766	84	16					Standard Proctor
	3.81	20.19												
	4.37	18.19												
	5.33	17.22												
	6.4	17.19												
	7.16	18.5												
	8.83	27.94						10	90					
	9.83	30.36												

PM 5314
MT. NANSEN MINE

LAB DATA

Test Hole	Depth (m)	Water Content (%)	In Situ		Recompacted			Grain Size		Gs	Permeability (cm/s)	mv (m^2/kN)	Cv (m^2/s)	Comments
			Bulk Density (kg/m^3)	Dry Density (kg/m^3)	Bulk Density (kg/m^3)	Water Content (%)	Dry Density (kg/m^3)	% Sand	% Fines					
DH95-18	0.3	4.73												
	1.07	6.19			2087	12.8	1850	90	10					Standard Proctor
	1.68	17.8												
	2.59	15.51												
	3.2	15.63												
	4.11	19.33												
	5.03	16.27												
	5.94	19.85						65	35					
	7.01	15.87												
	7.77	16.19												
	8.69	16.25												
	9.6	17.91												
	10.52	19.24						74	26					
DH95-19	0.61	3.65												
	1.68	19.69												
	4.11	15.28	2219	1925										
	4.88	16.46												
	8.53	20.97												
DH95-23	0.6	3.79												
DH95-24	0.81	14.48												
	1.37	17.09												
	2.29	16.97												
	3.5	13.57												
	4.11	17.83												
	5.49	16.41												
	6.61	15.59												
	8.38	16.61												
DH95-25	1.98	14.65												
DH95-26	0.86	7.54												
	1.68	4.41												
	2.74	18.22												
	3.35	15.77												
	4.27	17.25												



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-04	7.3		14					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-04	7.3	4.76	0.21	0.104		0.0	83.1	16.9	

PROJECT Mt. Nansen Gold Project - Carmacks, Yukon Territory

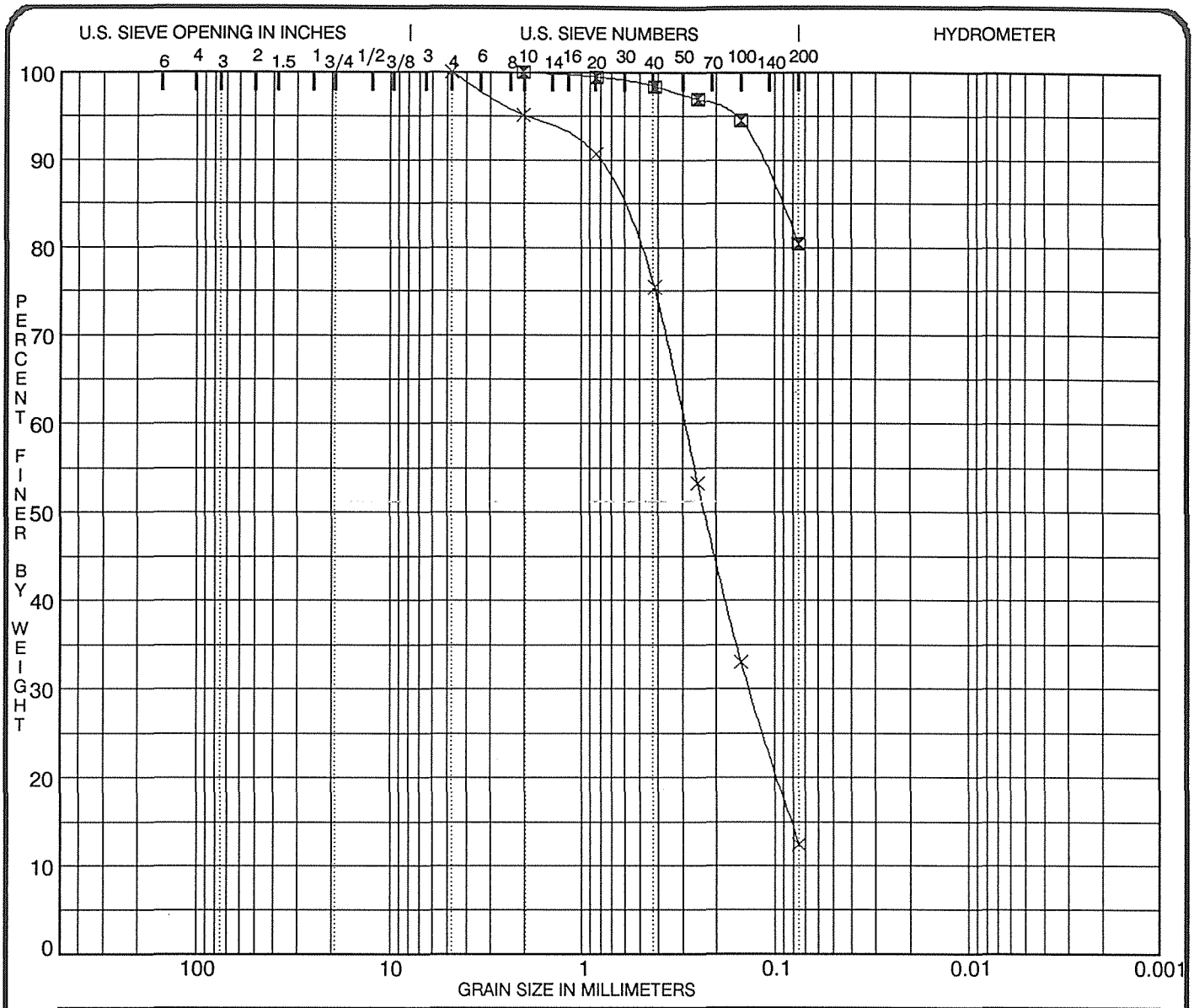
JOB NO. PM 5314 0502

DATE 10 July 1995

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-05	4.3		12				0.89	4.2
⊠	DH95-05	12.5		25					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-05	4.3	4.76	0.29	0.135		0.0	87.6	12.4	
⊠	DH95-05	12.5	2.00				0.0	19.6	80.4	

PROJECT Mt. Nansen Gold Project - Carmacks, Yukon Territory

JOB NO. PM 5314 0502

DATE 19 July 1995

GRADATION CURVES

KLOHN-CRIPPEN

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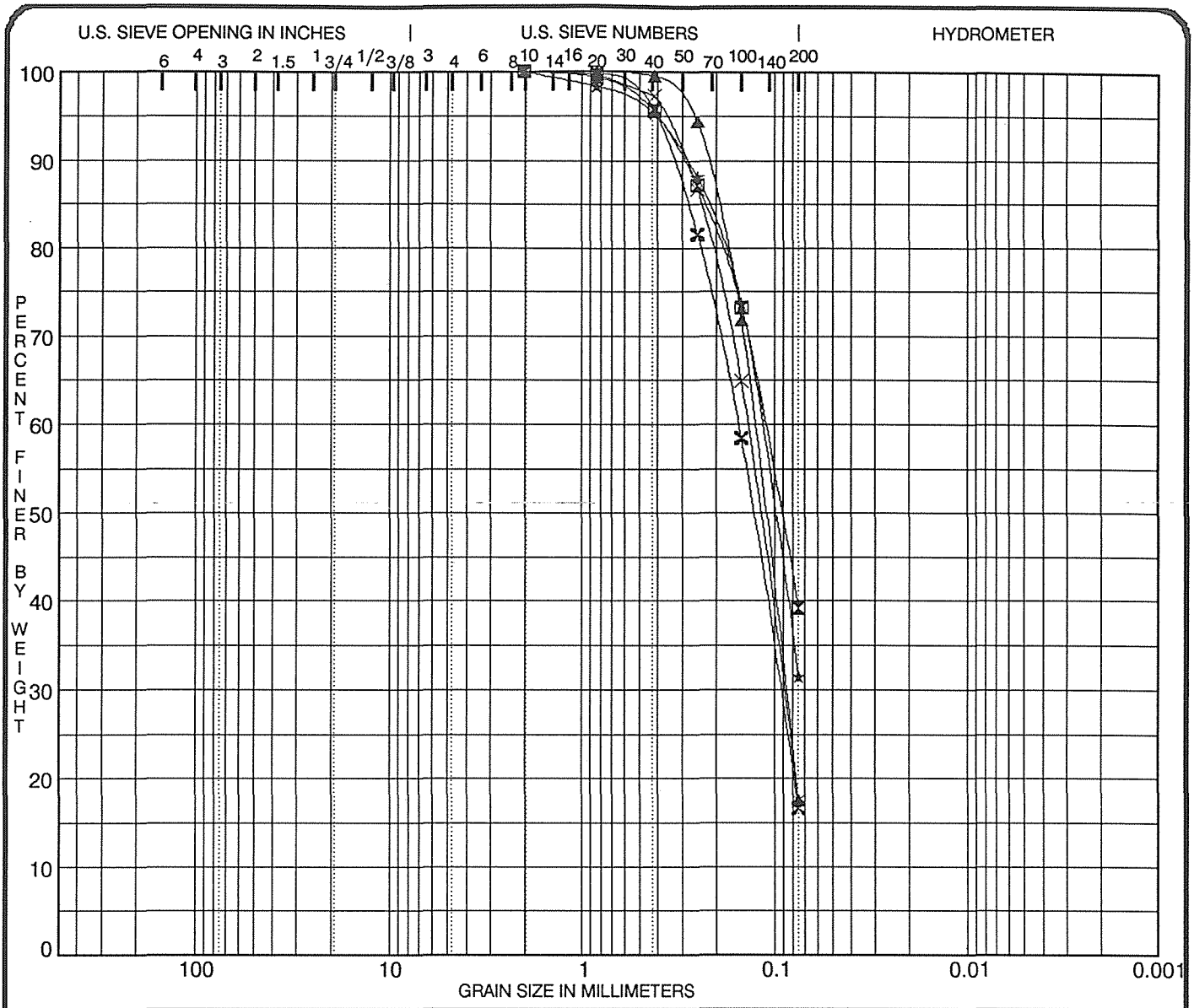


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-06	0.8		26					
⊠	DH95-06	2.9		30					
▲	DH95-06	3.7		24					
★	DH95-06	5.5		32					
⊠	DH95-06	7.3		19					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-06	0.8	2.00	0.14	0.090		0.0	82.5	17.5	
⊠	DH95-06	2.9	2.00	0.11			0.0	60.8	39.2	
▲	DH95-06	3.7	0.84	0.13	0.088		0.0	82.4	17.6	
★	DH95-06	5.5	2.00	0.12			0.0	68.5	31.5	
⊠	DH95-06	7.3	2.00	0.15	0.093		0.0	83.4	16.6	

PROJECT Mt. Nansen Gold Project - Carmacks, Yukon Territory

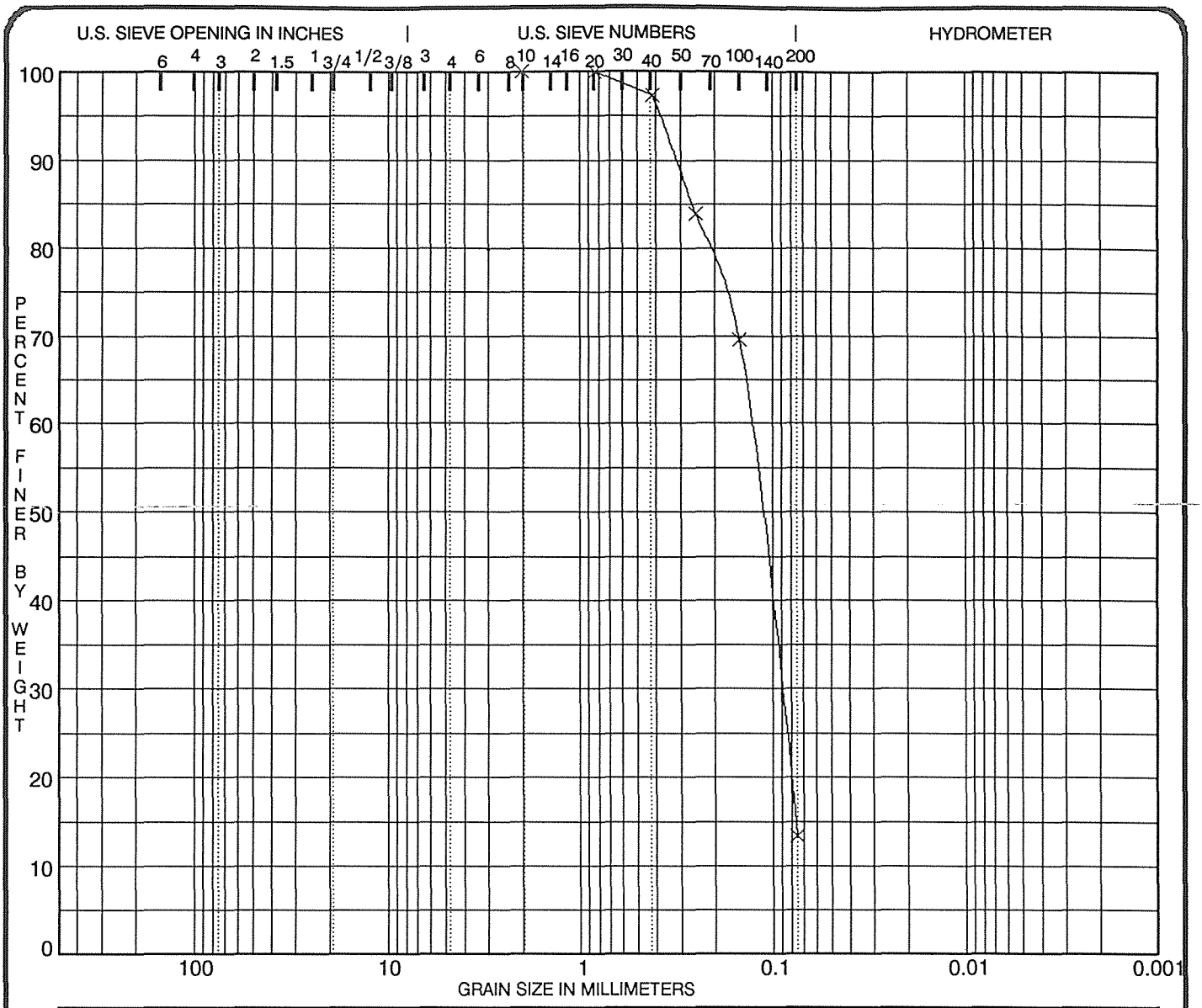
JOB NO. PM 5314 0502

DATE 19 July 1995

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-07	2.9							

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-07	2.9	2.00	0.13	0.092		0.0	86.6	13.4	

PROJECT Mt. Nansen Gold Project - Carmacks, Yukon Territory

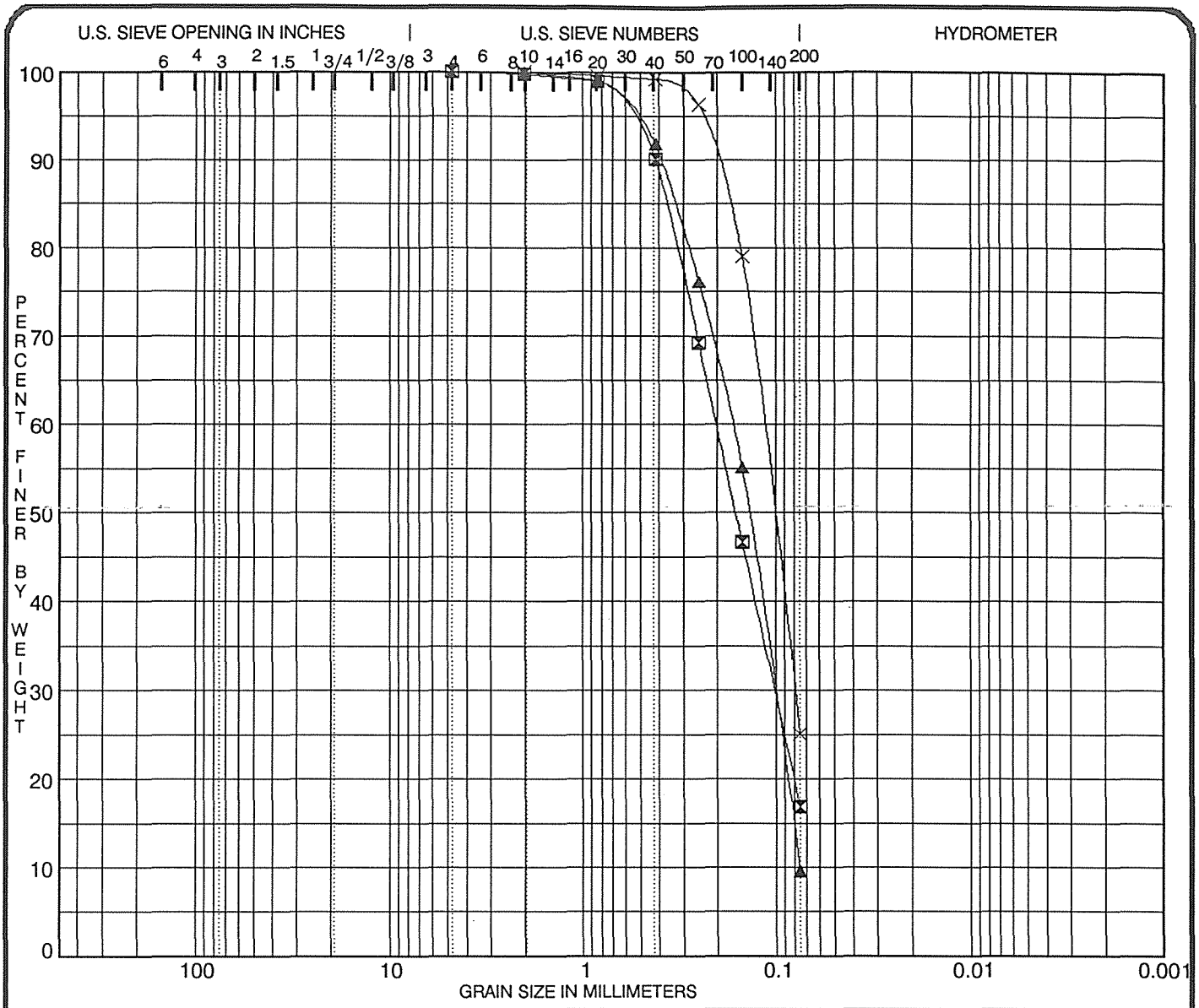
JOB NO. PM 5314 0502

DATE 30 June 1995

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-08B	1.4		21					
⊠	DH95-08B	3.1							
▲	DH95-08B	4.9						0.82	2.2

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-08B	1.4	2.00	0.12	0.080		0.0	74.9	25.1	
⊠	DH95-08B	3.1	4.76	0.20	0.102		0.0	83.1	16.9	
▲	DH95-08B	4.9	2.00	0.17	0.102	0.0755	0.0	90.4	9.6	

PROJECT **Mt. Nansen Gold Project - Carmacks, Yukon Territory**

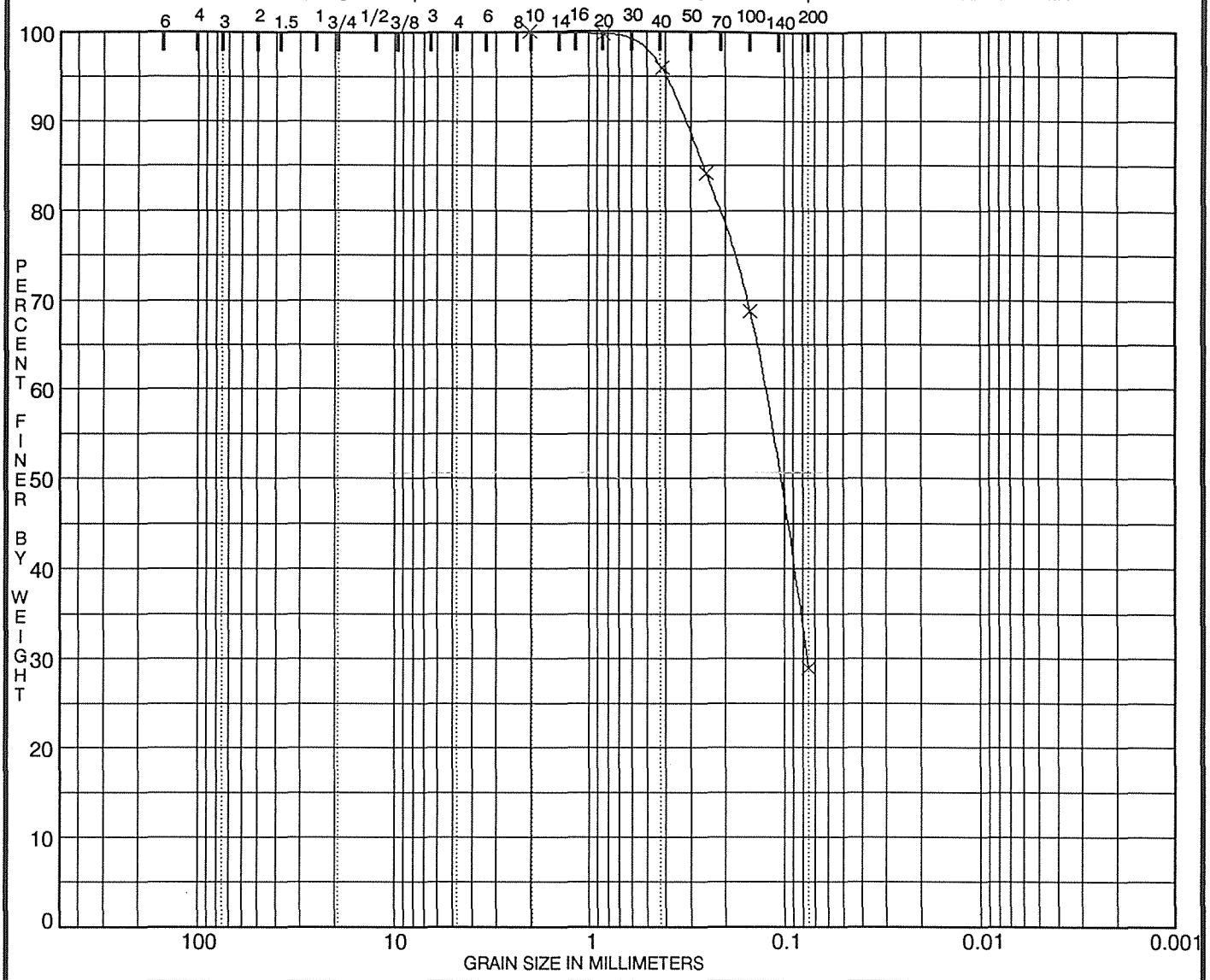
JOB NO. **PM 5314 0502**

DATE **19 July 1995**

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-09	5.6		20					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-09	5.6	2.00	0.13	0.076		0.0	71.1	28.9	

PROJECT **Mt. Nansen Gold Project - Carmacks, Yukon Territory**

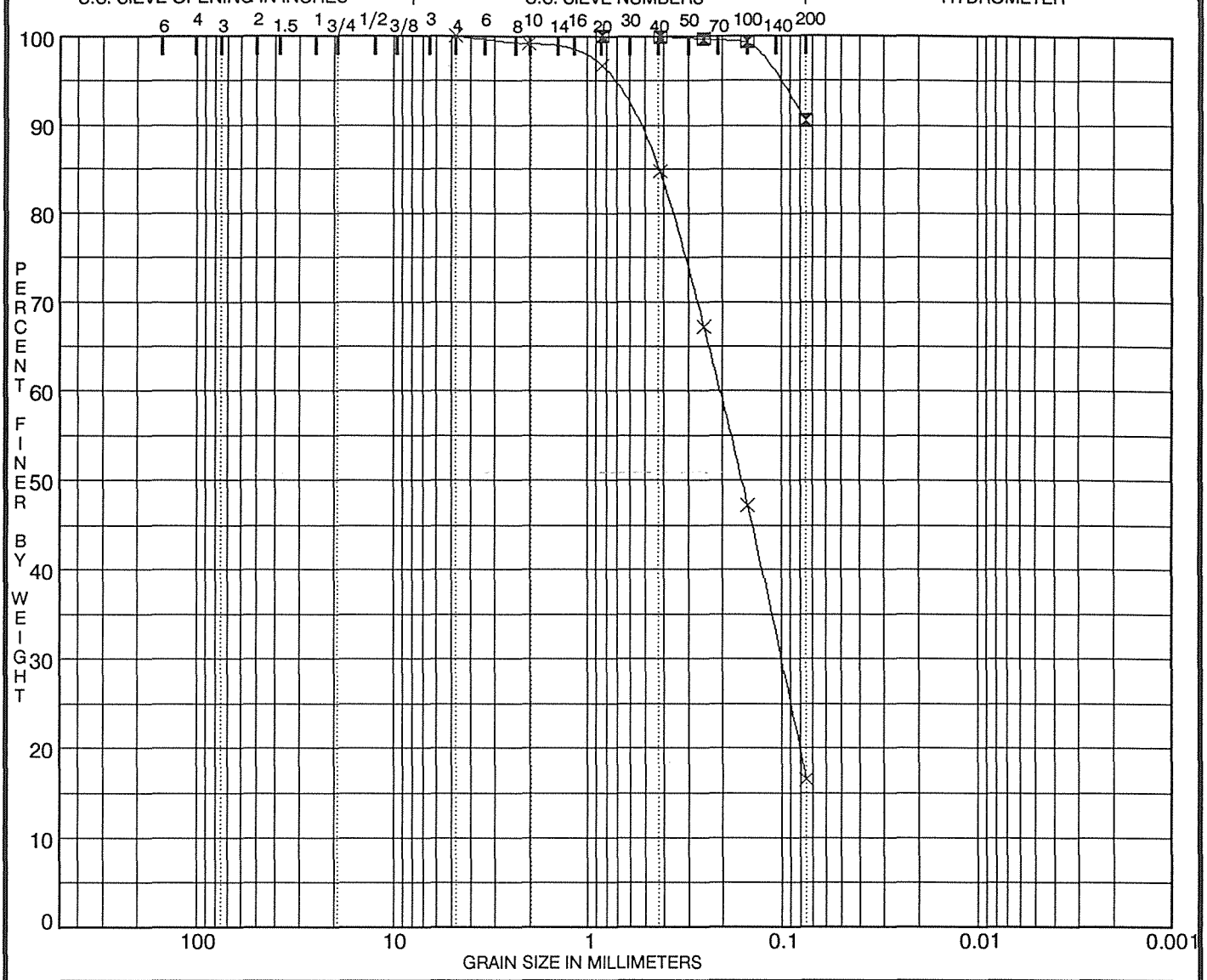
JOB NO. **PM 5314 0502**

DATE **10 July 1995**

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-17	2.9		12					
⊠	DH95-17	8.8		28					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-17	2.9	4.76	0.21	0.101		0.0	83.5	16.5	
⊠	DH95-17	8.8	0.84				0.0	9.5	90.5	

PROJECT **Mt. Nansen Gold Project - Carmacks, Yukon Territory**

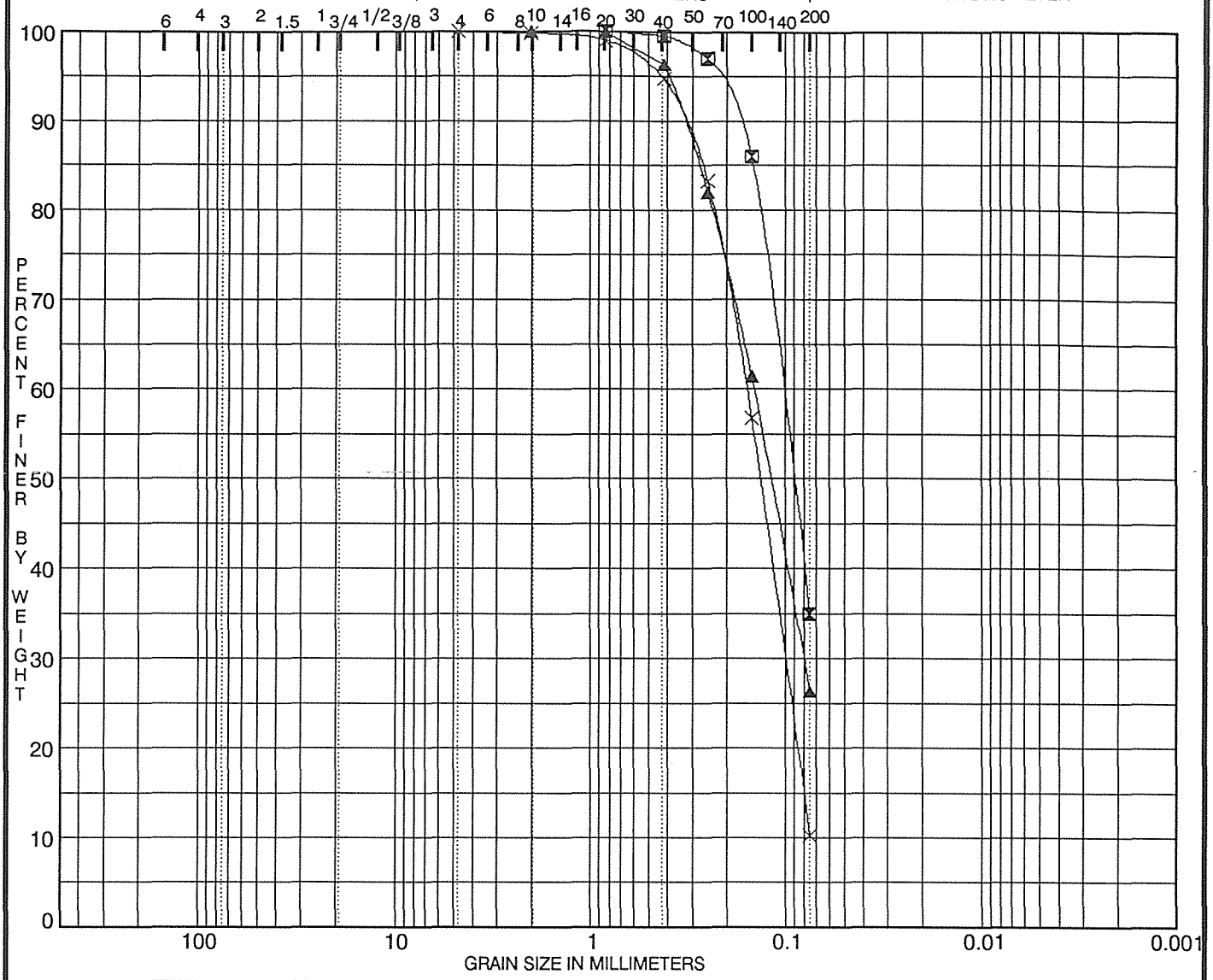
JOB NO. **PM 5314 0502**

DATE **12 July 1995**

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
×	DH95-18	1.1		6				0.91	2.3
⊠	DH95-18	5.9		20					
▲	DH95-18	10.5		19					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
×	DH95-18	1.1	4.76	0.16	0.100		0.0	89.8	10.2	
⊠	DH95-18	5.9	0.84	0.11			0.0	65.1	34.9	
▲	DH95-18	10.5	2.00	0.15	0.081		0.0	73.7	26.3	

PROJECT Mt. Nansen Gold Project - Carmacks, Yukon Territory

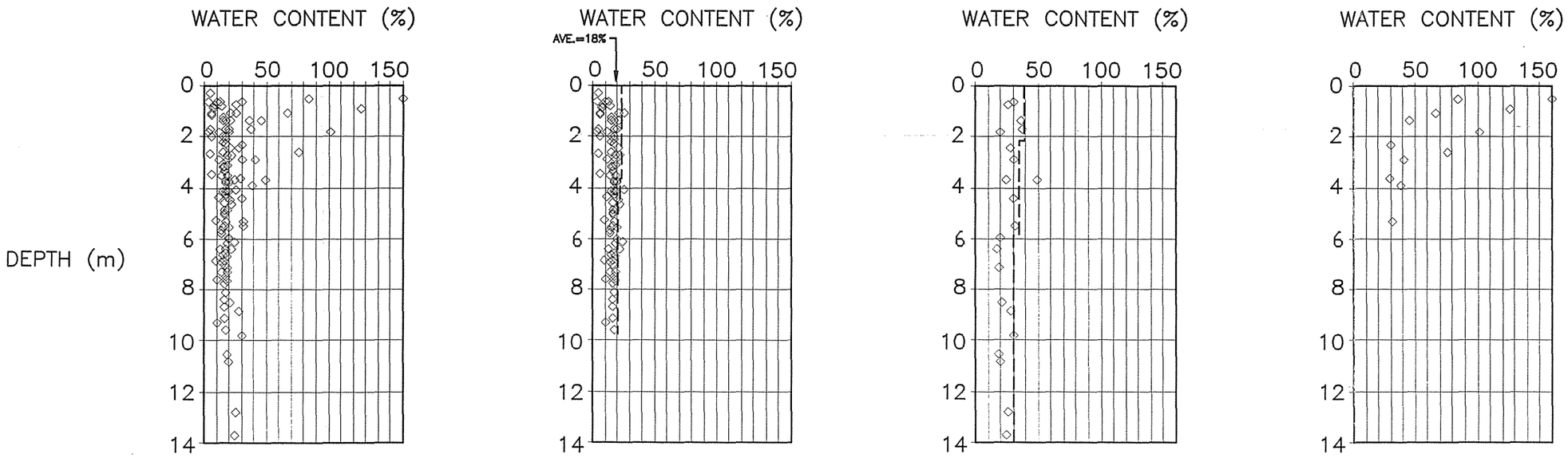
JOB NO. PM 5314 0502

DATE 12 July 1995

GRADATION CURVES

KLOHN-CRIPPEN

Calgary



ALL SOILS

SAND

SILTY SAND

(IDENTIFIED IN HOLES DH95–05, 06, 07, 09, 10, 17, 18, 19)

PEAT & SOILS WITH ORGANIC INCLUSIONS

(IDENTIFIED IN HOLES DH95–06, 07, 08, 09 10, 15)

NOTES:
1. SOIL TYPES DETERMINED FROM VISUAL DESCRIPTION SHOWN ON DRILL HOLE LOGS

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

KLOHN-CRIPPEN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

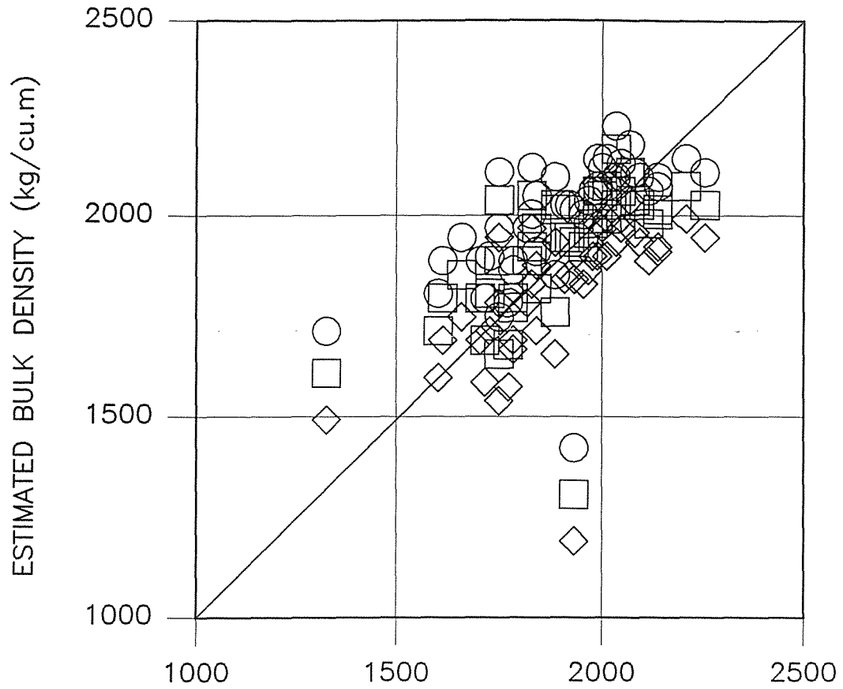
PROJECT: MT. NANSEN GOLD PROJECT

TITLE: WATER CONTENT PROFILES WITH DEPTH

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 95	PM 5314.05	FIGURE A2-1	

APPROVED

5314w009.DWG



◇ S=80%

□ S=90%

○ S=100%

TABLE OF MEASURED FROZEN BULK DENSITIES

Test Hole	Depth (m)	Water Content (%)	Bulk Density (kg/m^3)	Dry Density (kg/m^3)
DH95-04	3.73	20.36	1981	1646
	4.57	16.41	2015	1731
	5.03	16.1	2057	1772
	7.6	17.4	2052	1748
DH95-05	4.34	12.08	2042	1822
	5.56	15.3	2027	1758
	6.86	16.84	2094	1792
	7.32	13.94	2076	1822
DH95-06	0.76	26.1	1660	1316
	1.37	45.7	1330	913
	2.9	30.1	1791	1377
	3.66	24.2	1829	1473
	4.42	30.1	1707	1312
	5.49	32	1900	1439
	6.1	24.3	1761	1417
	6.71	18.5	2153	1817
	7.32	19	1996	1677
	7.62	17.7	1892	1607
	8.08	17.8	2146	1822
DH95-07	0.61	29.9	1621	1248
	2.07	17.4	2105	1793
	2.9	19	2029	1705
	3.5	19.1	1997	1677
	3.8	17	1760	1504
	5.3	31.5	1789	1360
DH95-08	1.37	15.7	2005	1733
	1.83	101.4	1944	965
	2.9	41.4	1759	1244
	3.6	28.7	1730	1344
	3.9	38.4	1783	1288
DH95-08B	4.6	16.3	1843	1585
	4.9	19.2	1986	1666
	6.4	21.7	1943	1597
DH95-09	1.37	36.12	1608	1181
	2.44	28.13	1854	1447
	4.65	22.33	1840	1504
	5.56	20.04	1850	1541
	6.55	17.2	2272	1939
	7.5	17.34	1896	1616
DH95-10	1.09	21.35	1919	1581
	1.68	37.73	1717	1247
	2.44	20.91	1931	1597
	2.74	22.27	1969	1610
	7.65	19.25	2126	1783
DH95-19	4.11	15.28	2219	1925

NOTES:

1. ESTIMATED FROZEN BULK DENSITY CALCULATED FROM:

$$\gamma_f = \frac{G_s + S.e.}{1+e}$$

γ_f = FROZEN BULK DENSITY (g/cm^3)
G_s = SPECIFIC GRAVITY OF SOIL PARTICLES = 2.67
S = DEGREE OF SATURATION
e = VOID RATIO = $\frac{1.09 G_s . W}{S}$
w = WATER CONTENT

2. MEASURED FROZEN BULK DENSITY DETERMINED IN THE FIELD FROM CRREL CORE SAMPLES (SEE TABLE).
3. BEST DATA FIT OBTAINED @ S=90%

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

KLOHN-CRIPPEN

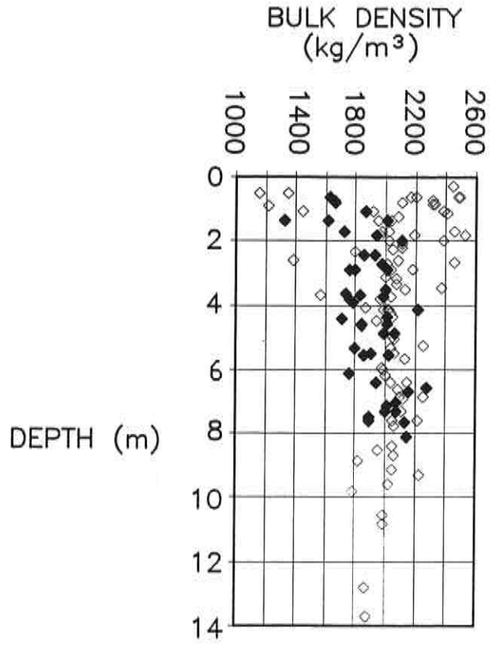
CLIENT: B.Y.G. NATURAL RESOUTCES INC.

PROJECT: MT. NANSEN GOLD PROJECT

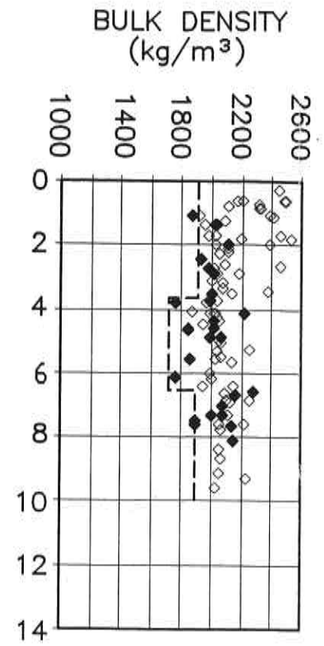
TITLE: CORRELATION BETWEEN ESTIMATED AND MEASURED FROZEN BULK DENSITIES

DATE OF ISSUE: JULY 1995
APPROVED:
PROJECT No.: PM 5314.05
DWG. No.: FIGURE A2-2
REV.:

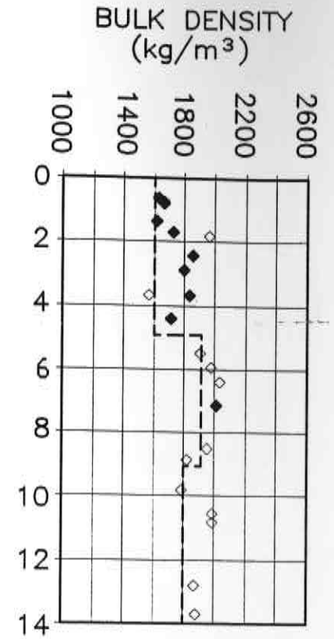
5314w013.DWG



ALL SOILS

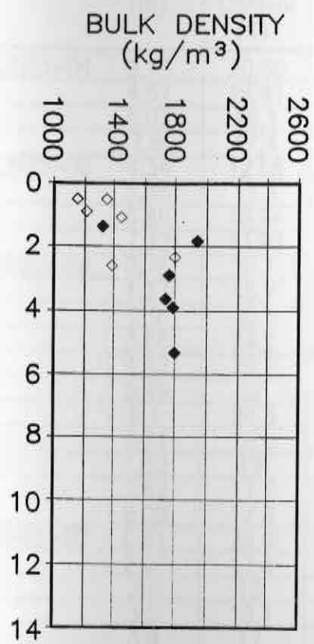


SAND



SILTY SAND

(IDENTIFIED IN HOLES DH95-05, 06, 07, 09, 10, 17, 18, 19)



PEAT & SOILS WITH ORGANIC INCLUSIONS

(IDENTIFIED IN HOLES DH95-06, 07, 08, 09 10, 15)

LEGEND

◆ MEASURED

◇ ESTIMATED

NOTES:

1. SOIL TYPES DETERMINED FROM VISUAL DESCRIPTION SHOWN ON DRILL HOLE LOGS
2. THE DATA SHOWN IS COMBINED FROM MEASURED FROZEN BULK DENSITIES AND ESTIMATED DENSITIES FROM MEASURED WATER CONTENTS WITH AN ASSUMED SATURATION OF 90%.

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

KLOHN-CRIPPEN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

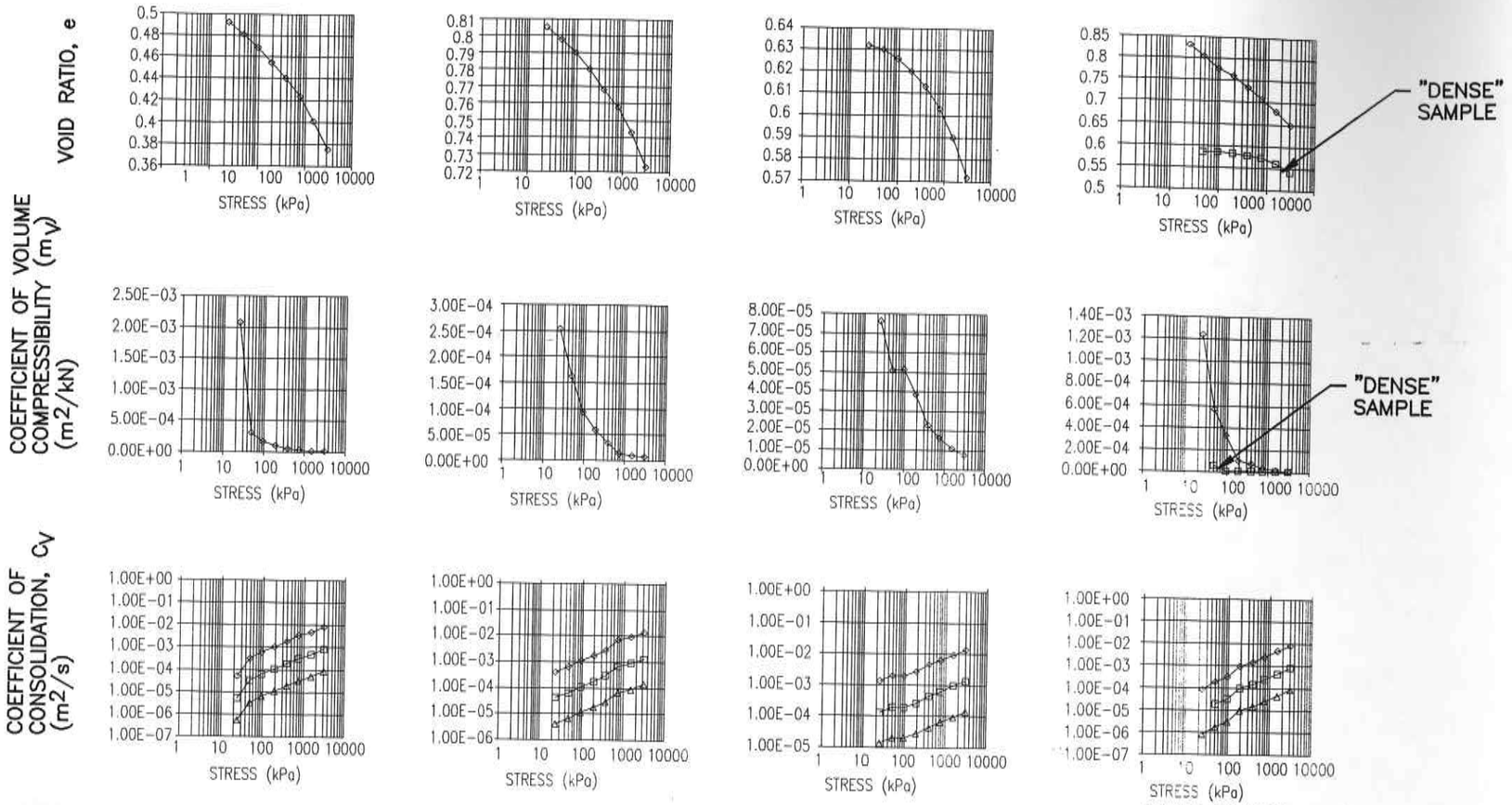
PROJECT: MT. NANSEN GOLD PROJECT

TITLE: FROZEN BULK DENSITY PROFILES WITH DEPTH

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 95	PM 5341.05	FIGURE A2-3	

APPROVED

5341w011.DWG



DH95-05(12.5m)

SAND = 20%
FINES = 80%

DH95-06(3.7m)

SAND = 82%
FINES = 18%

DH95-08B(1.4m)

SAND = 75%
FINES = 25%

DH95-08B(3.1m)

SAND = 83%
FINES = 17%

MEASURED k = 5.5×10^{-5} cm/s
(IN DENSE STATE)

NOTE:

1. ALL SAMPLES, EXCEPT AS NOTED ON DH95-08B(3.1m) WERE PLACED IN A LOOSE CONDITION IN THE OEDOMETER RING PRIOR TO SATURATION.

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

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KLOHN-CRIPPEN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

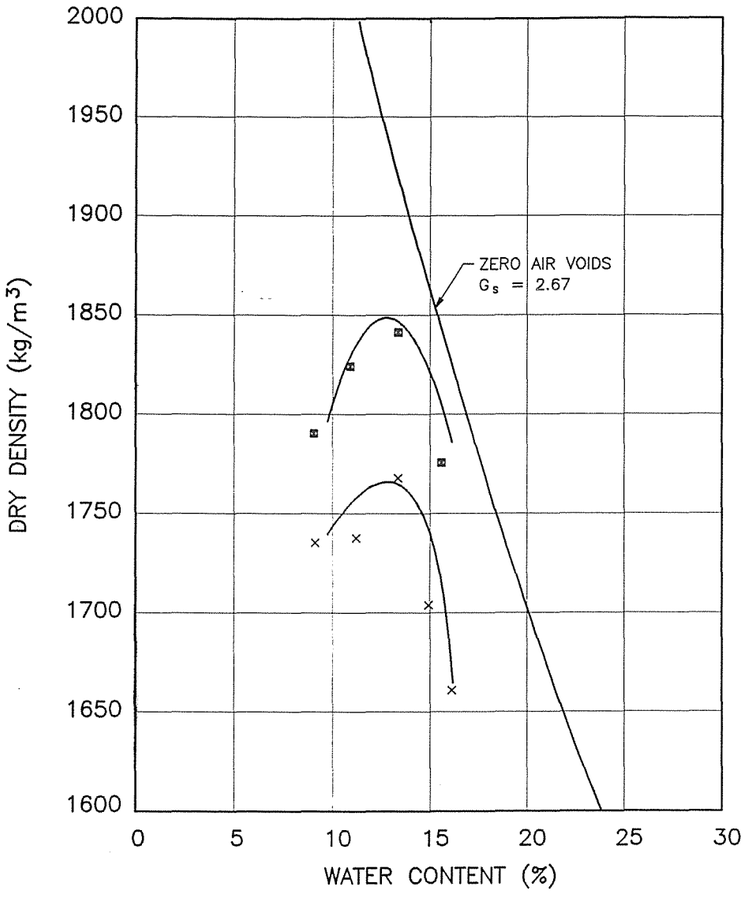
PROJECT: MT. NANSEN GOLD PROJECT

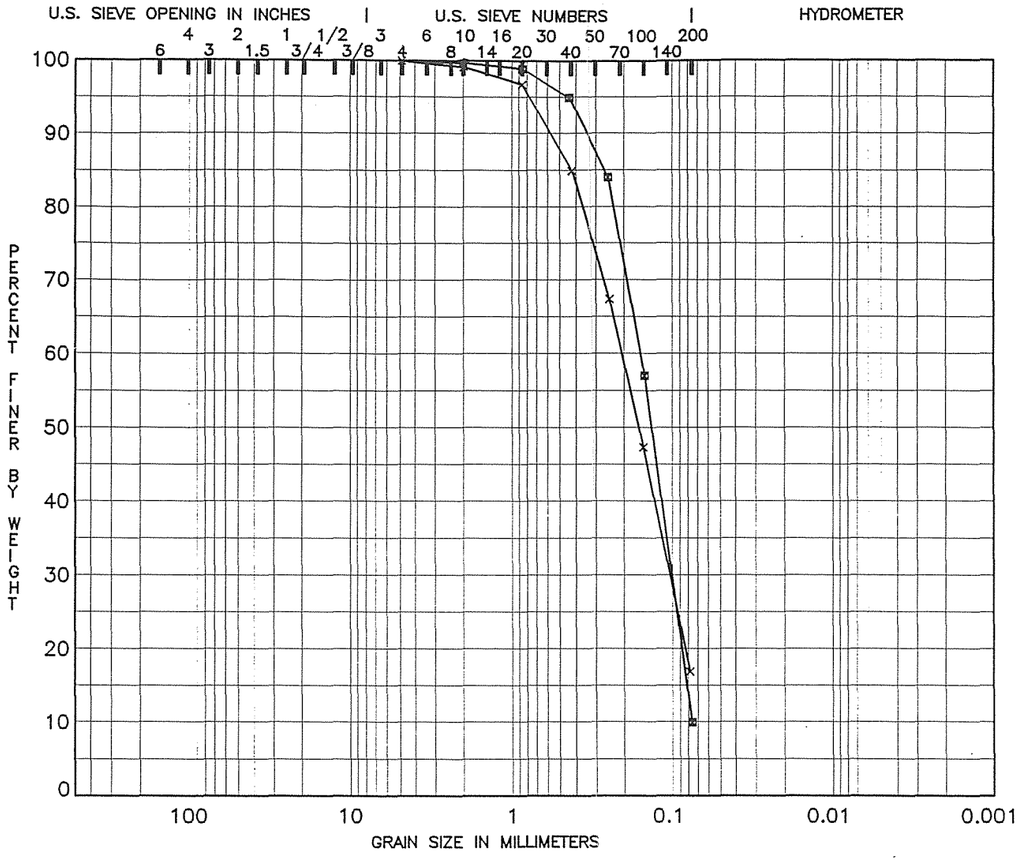
TITLE: OEDOMETER TEST RESULTS

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 1995	PM 5314.05	FIGURE A2-4	

APPROVED

5314w022.DWG





Hole Identification			Maximum Dry Density	Optimum Water Content
×	DH95–17	2.2–3.5m	1766 kg/m3	13.3 %
◙	DH95–18	0.6–1.5m	1850 kg/m3	12.8 %

Specimen Identtification			Classifiication	MC%	LL%	PL%	PI%	%Gravel	%Sand	%Silt	%Clay
×	DH95–17	2.2–3.5m	SAND (SP–SM)	12	–	–	–	0	84	16	
◙	DH95–18	0.6–1.5m	SAND (SP–SM)	6	–	–	–	0	90	10	

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KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: PROCTOR TEST RESULTS

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995

APPROVED:

PROJECT No.: PM 5314.05

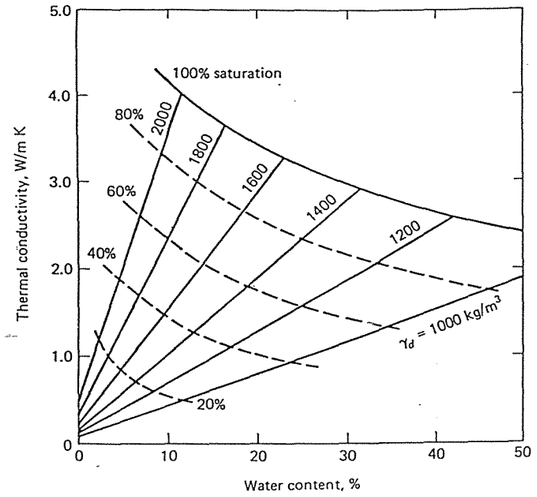
DWG. No.: FIGURE A2-5

REV.:

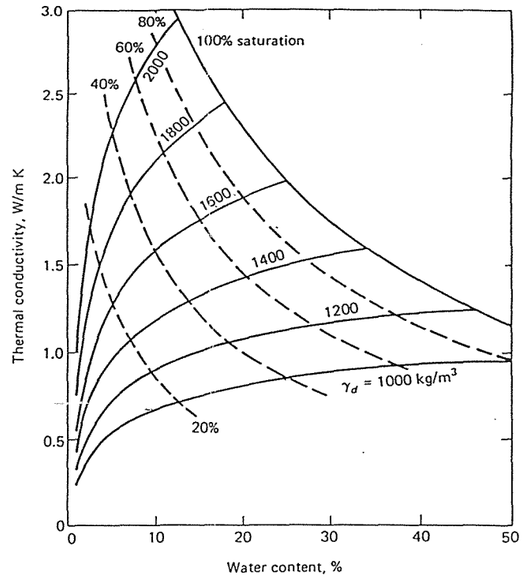
5314w008.dwg

APPENDIX III

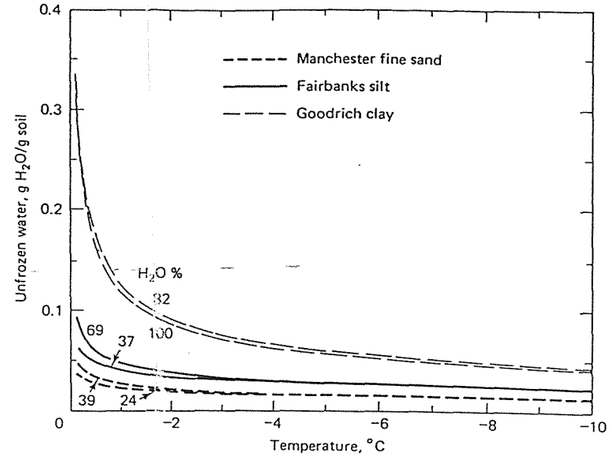
Thermal Analyses



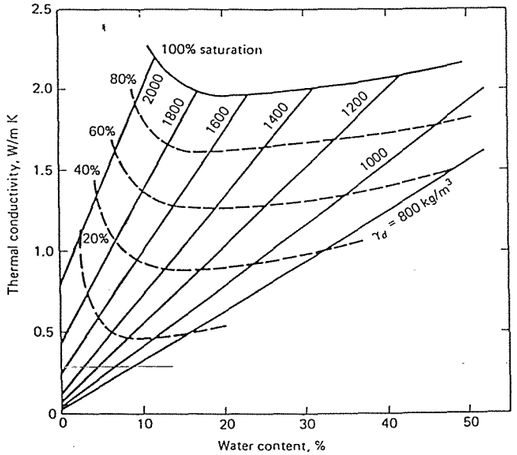
AVERAGE THERMAL CONDUCTIVITY FOR SANDY SOILS AS A FUNCTION OF WATER CONTENT AND DRY DENSITY, FROZEN



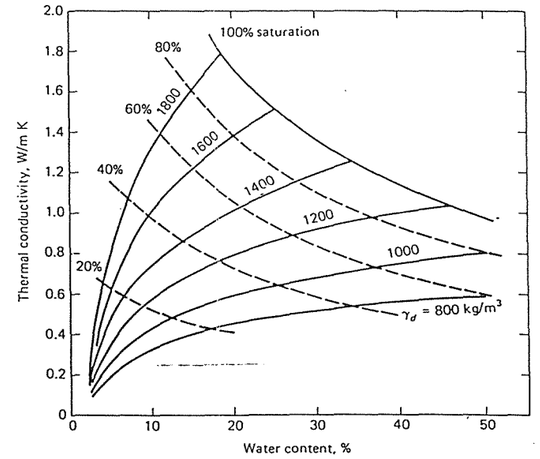
AVERAGE THERMAL CONDUCTIVITY FOR SANDY SOILS AS A FUNCTION OF WATER CONTENT AND DRY DENSITY, UNFROZEN



UNFROZEN WATER CONTENTS VS TEMPERATURE FOR THREE SOILS AT TWO DIFFERENT WATER CONTENTS



AVERAGE THERMAL CONDUCTIVITY FOR SILT AND CLAY SOILS AS A FUNCTION OF WATER CONTENT AND DRY DENSITY, FROZEN



AVERAGE THERMAL CONDUCTIVITY FOR SILT AND CLAY SOILS AS A FUNCTION OF WATER CONTENT AND DRY DENSITY, UNFROZEN

VOLUMETRIC HEAT CAPACITY (C)

$$C_{FROZEN} = \frac{\gamma d}{\gamma w}(0.18 + 0.5w) \times 4.18$$

$$C_{UNFROZEN} = \frac{\gamma d}{\gamma w}(0.18 + w) \times 4.18$$

NOTES:

1. 1 W/mk = 86.4 kJ/day.m.°C
   1 Cal/sec.cm.°C = 418.68 J/sec.m.°C
2. CHARTS FROM ANDERSLAND AND ANDERSON, 1978, "GEOTECHNICAL ENGINEERING FOR COLD REGIONS", McGRAW-HILL, 566p.

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: SOIL THERMAL PARAMETERS

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995

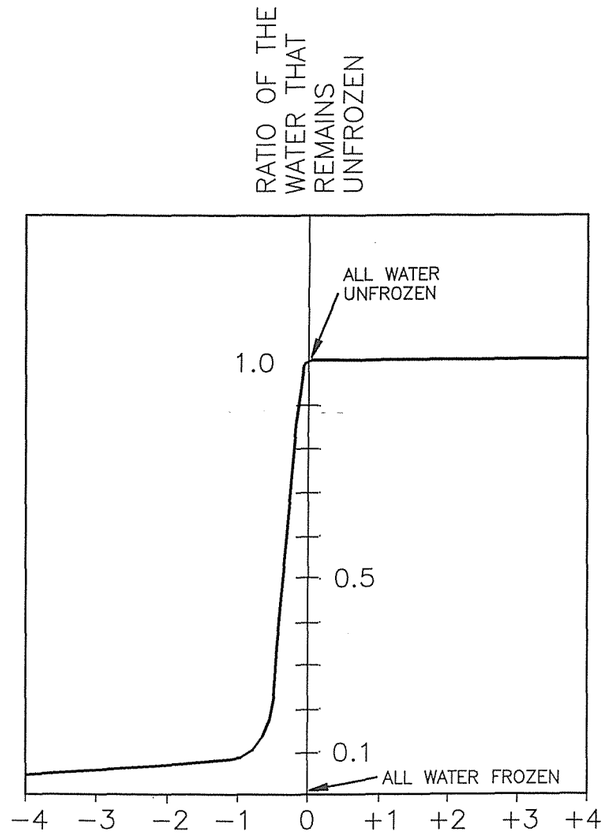
APPROVED:

PROJECT No.: PM 5314.05

DWG. No.: FIGURE A3-1

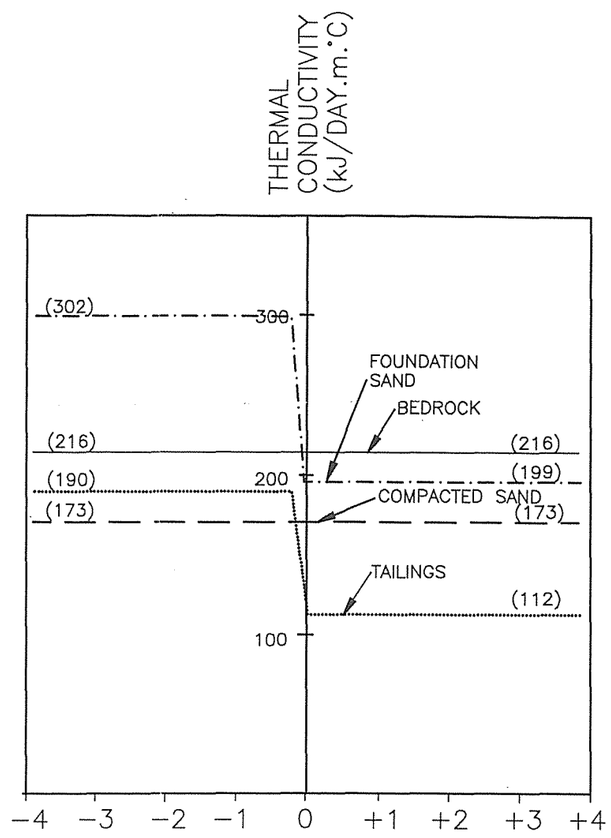
REV.:

5314w016.dwg



UNFROZEN WATER CONTENT

(ALL SOIL TYPES)



THERMAL CONDUCTIVITY

VOLUMETRIC HEAT CAPACITY

FOUNDATION SAND:
FROZEN = 1.9 MJ/m³°C
UNFROZEN = 2.5 MJ/m³°C

COMPACTED SAND:
FROZEN = 1.7 MJ/m³°C
UNFROZEN = 2.0 MJ/m³°C

TAILINGS:
FROZEN = 1.9 MJ/m³°C
UNFROZEN = 2.8 MJ/m³°C

BEDROCK:
FROZEN = 2.1 MJ/m³°C
UNFROZEN = 2.1 MJ/m³°C

PARAMETERS BASED ON:
1. AVE. FOUNDATION SAND WATER CONTENT = 18%
2. AVE. FOUNDATION SAND DRY DENSITY = 1600kg/m³
3. AVE. COMPACTED SAND WATER CONTENT = 8.5%
4. AVE. COMPACTED SAND DRY DENSITY = 1800kg/m³
5. AVE. TAILINGS WATER CONTENT = 35%
6. AVE. TAILINGS DRY DENSITY = 1250kg/m³
7. AVE. BEDROCK WATER CONTENT = 8.0%
8. AVE. BEDROCK DRY DENSITY = 2700kg/m³

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: SUMMARY OF SOIL THERMAL PARAMETERS

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995

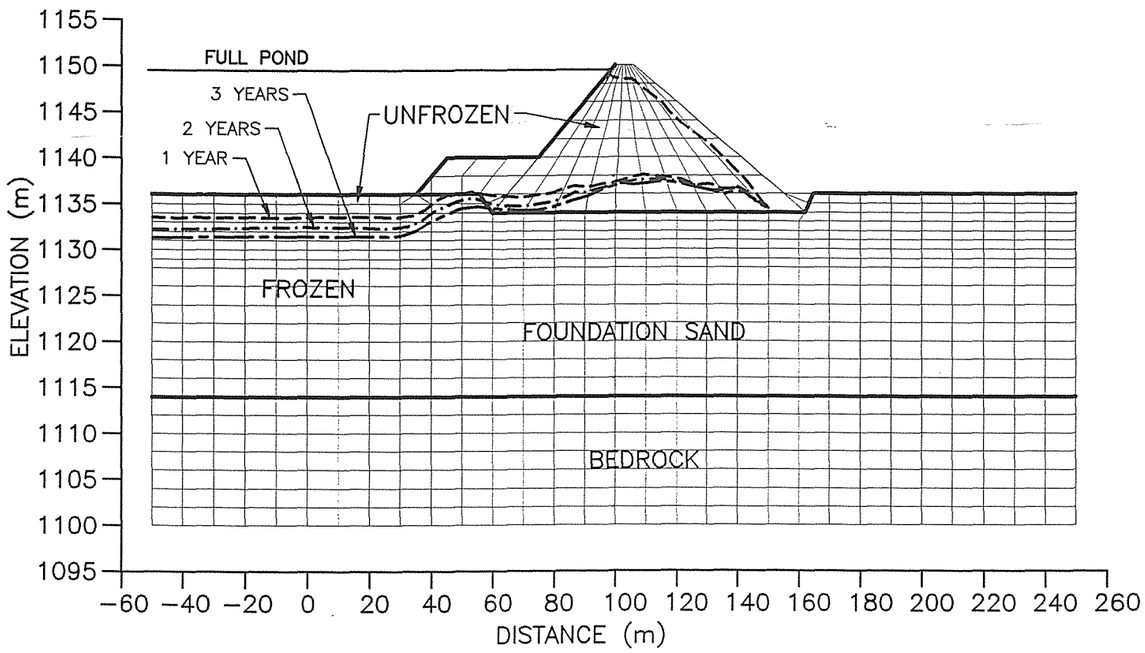
APPROVED:

PROJECT No.: PM 5314.05

DWG. No.: FIGURE A3-2

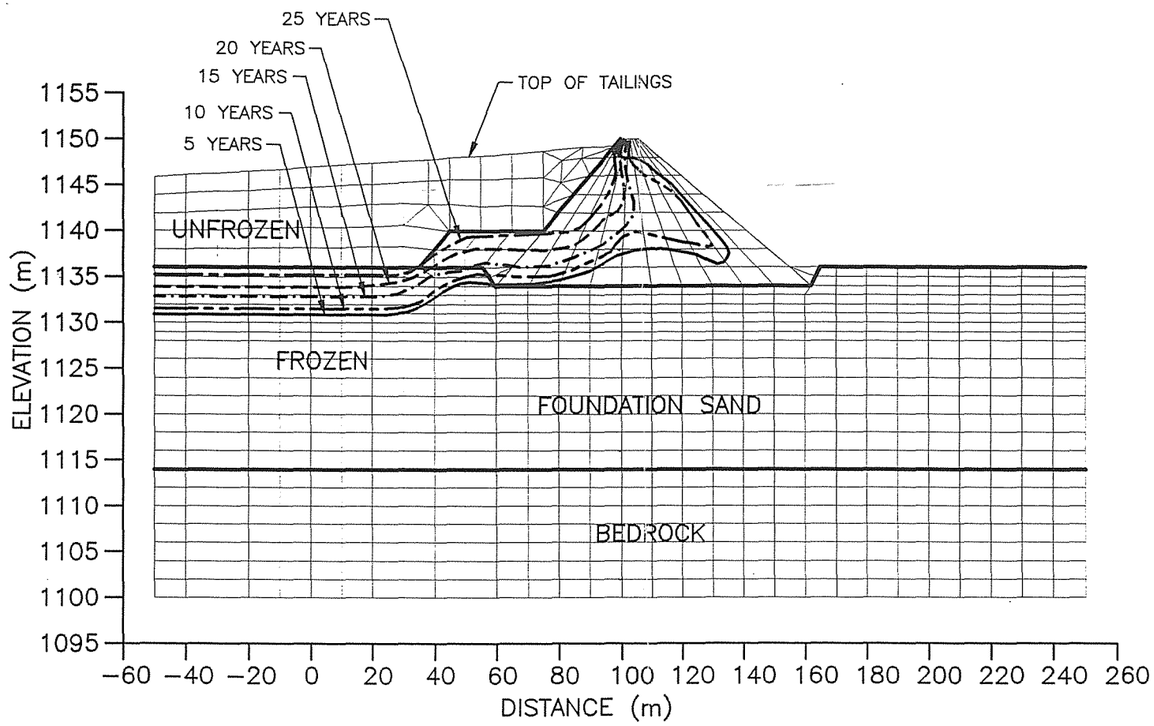
REV.:

5315w023.DWG



DEPTH OF THAW

OPERATION YEARS 1–3



DEPTH OF THAW

CLOSURE YEARS 5–25

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: TWO DIMENSIONAL THERMAL ANALYSES OPERATION & CLOSURE

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995

APPROVED:

PROJECT No.: PM 5314.05

DWG. No.: FIGURE A3-7

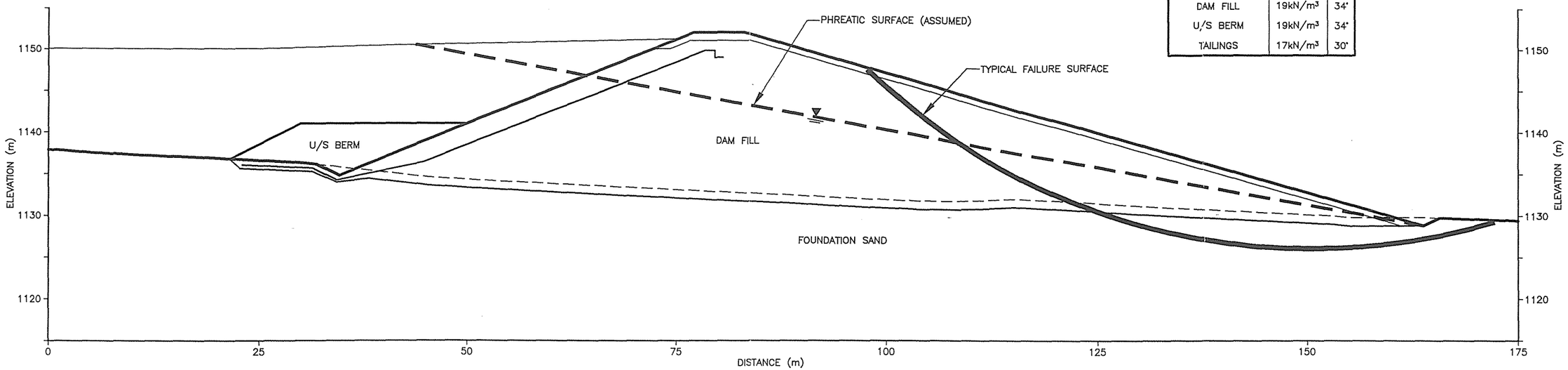
REV.:

5314w036.dwg

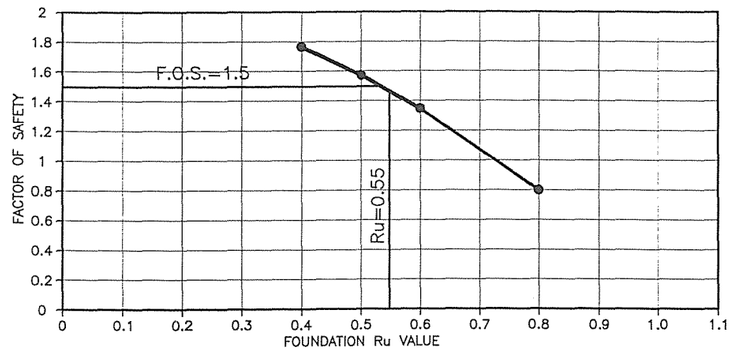
APPENDIX IV

Stability Analyses

MATERIAL PARAMETERS		
MATERIAL	ɣ	ø
FOUNDATION SAND	19kN/m³	30°
DAM FILL	19kN/m³	34°
U/S BERM	19kN/m³	34°
TAILINGS	17kN/m³	30°



STABILITY SECTION
SCALE A



FACTOR OF SAFETY VS FOUNDATION Ru

(1:550) 0 5 10m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL "B" SIZE DRAWINGS ONLY

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: STABILITY SECTION

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995

APPROVED

PROJECT No.: PM 5314.05

DWG. No.: FIGURE A4-1

REV.

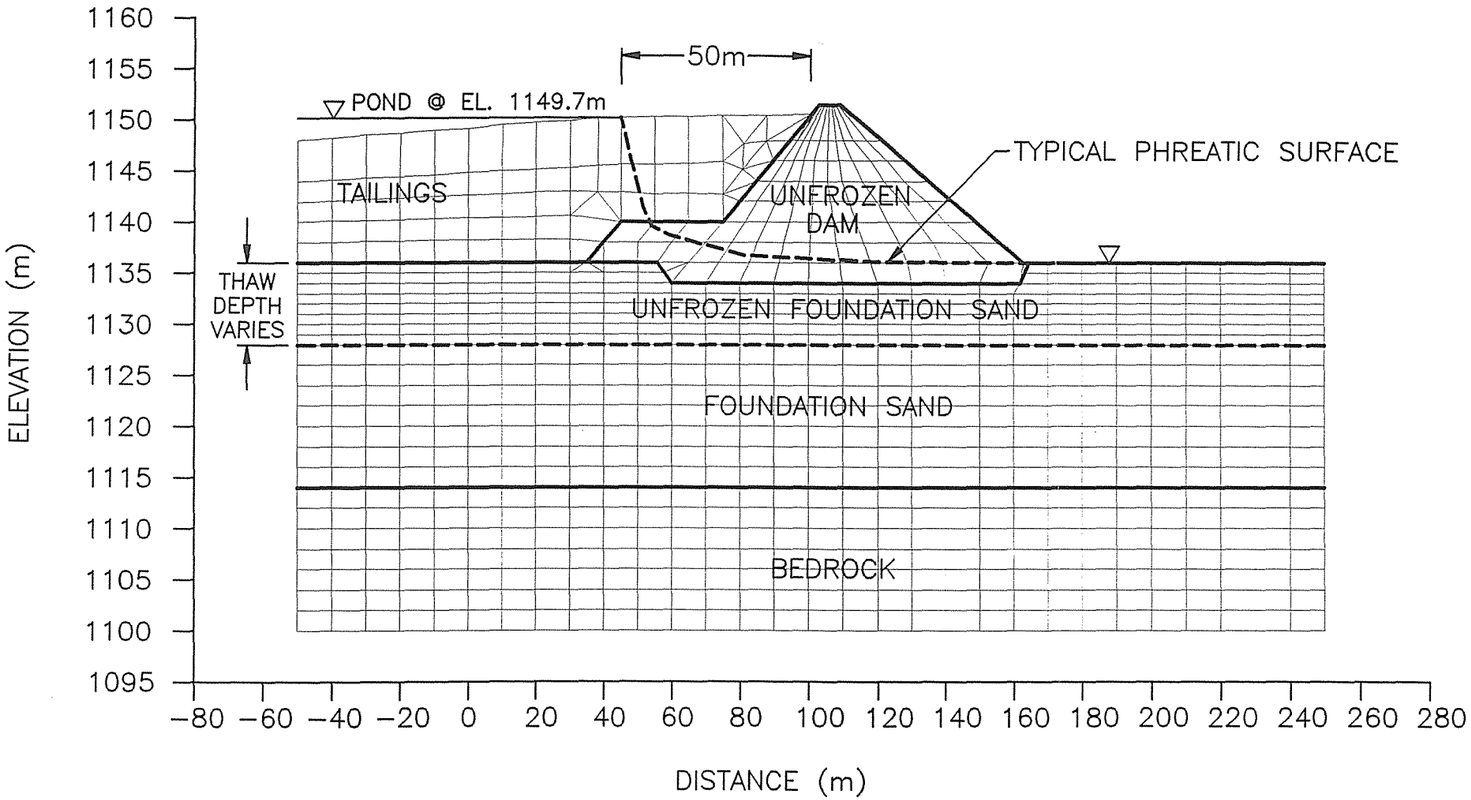
5314w026.dwg

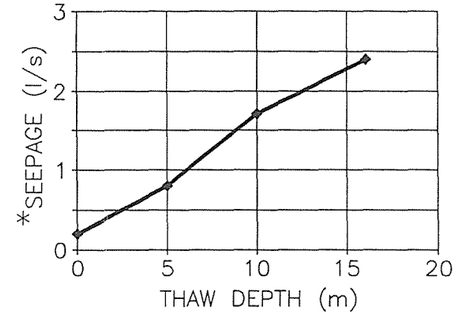
APPENDIX V

Seepage Analyses

HYDRAULIC PARAMETERS

MATERIAL	k (cm/s)
FROZEN SAND	$1x10^{-7}$
UNFROZEN SAND	$1x10^{-3}$
DAM	$1x10^{-3}$
TAILINGS	$1x10^{-5}$





* TOTAL SEEPAGE ASSUMING NO CLAY LINER AND A 200m WIDE SEEPAGE ZONE

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KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: TWO DIMENSIONAL SEEPAGE ANALYSES

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 1995	PM 5314.05	FIGURE A5-1	

APPROVED

5314w042.DWG

APPENDIX VI

Water Balance Analysis

Mt. Nansen Mass Balance

(200-Year Wet Year Precipitation - without Right Bank Diversion)

		Year 0								
Description	Units	Aug-95	Sep-95	Oct-95	Nov-95	Dec-95	Jan-96	Feb-96	Mar-96	Ann.Tot.
Annual Precip. = 270mm										
Monthly Distribution	%	14.3%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	25.4%
Monthly Precipitation	(mm)	38.6	30.0	0.0	0.0	0.0	0.0	0.0	0.0	68.6
Tailings Pond										
Beginning of the Month WL	(m)	1135.0	1141.3	1142.5	1142.5	1142.5	1142.5	1142.5	1142.5	
Inflow										
Pond Area	(ha)	0.0	0.8	1.3	1.3	1.3	1.3	1.3	1.3	
Inflow Volume	(m^3)	0	254	0	0	0	0	0	0	254
Catchment Area	(ha)	75.8	75.0	49.6	49.6	49.6	49.6	49.6	49.6	
Runoff Coeff.		0.6	0.6	0	0	0	0	0	0	
Inflow Vol.	(m^3)	17,569	13,485	0	0	0	0	0	0	31,054
Tailings Solids Inflow Volume	(m^3)	0	0	0	0	0	0	0	0	0
Slurry Water Inflow Volume	(m^3)	0	0	0	0	0	0	0	0	0
Total Inflows	(m^3)	17,569	13,739	0	0	0	0	0	0	31,308
Outflows										
Evaporation	(mm)	79.7	37.1							
Water Surface Area	(ha)	0.0	0.8	1.3	1.3	1.3	1.3	1.3	1.3	
Volume of Loss	(m^3)	0	314	0	0	0	0	0	0	314
Reclaim Rate	(m^3/h)	0	0	0	0	0	0	0	0	
Reclaim Volume	(m^3)	0	0	0	0	0	0	0	0	0
Release Rate	(m^3/h)	0	0	0	0	0	0	0	0	
Volume of Loss	(m^3)	0	0	0	0	0	0	0	0	0
Total Outflows	(m^3)	0	314	0	0	0	0	0	0	314
Net Inflows	(m^3)	17,569	13,425	0	0	0	0	0	0	30,994
Beginning of the Month Volume	(m^3)	0	17,569	30,994	30,994	30,994	30,994	30,994	30,994	
End of the Month Volume	(m^3)	17,569	30,994	30,994	30,994	30,994	30,994	30,994	30,994	
End of the Month WL	(m)	1141.3	1142.5	1142.5	1142.5	1142.5	1142.5	1142.5	1142.5	
Tailings Level										
Beginning of the Month Tailings Level	(m)	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	
Tailings Solids & Voids Inflows	(m^3)	0	0	0	0	0	0	0	0	
Beginning of the Month Volume	(m^3)	0	0	0	0	0	0	0	0	
End of the Month Volume	(m^3)	0	0	0	0	0	0	0	0	
End of the Month Tailings Elevation	(m)	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	1135.0	
Summary										
Total Reclaimed from Tailings Pond	(m^3)	0	0	0	0	0	0	0	0	0
Mill Water Required	(m^3)	0	0	0	0	0	0	0	0	0
Fresh Water Makeup	(m^3)	0	0	0	0	0	0	0	0	0
Cumul. Water Available	(m^3)	17,569	30,994	30,994	30,994	30,994	30,994	30,994	30,994	

Mt. Nansen Mass Balance

(200-Year Wet Year Precipitation - without Right Bank Diversion)

		Year 1												
Description	Units	Apr-96	May-96	Jun-96	Jul-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96	Jan-97	Feb-97	Mar-97	Ann.Tot.
Annual Precip. = 270mm														
Monthly Distribution	%	0.0%	42.3%	12.5%	19.9%	14.3%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Monthly Precipitation	(mm)	0.0	114.2	33.8	53.7	38.5	29.8	0.0	0.0	0.0	0.0	0.0	0.0	270.0
Tailings Pond														
Beginning of the Month WL	(m)	1142.5	1142.9	1143.4	1143.8	1144.1	1144.6	1145.3	1145.4	1145.6	1145.8	1145.9	1146.1	
Inflow														
Pond Area	(ha)	1.3	1.4	1.7	1.9	2.1	2.3	2.8	2.9	3.0	3.1	3.2	3.3	
Inflow Volume	(m^3)	0	1,635	569	1,008	799	696	0	0	0	0	0	0	4,707
Catchment Area	(ha)	49.6	49.4	49.2	74.0	73.8	73.5	48.1	48.0	47.9	47.8	47.7	47.6	
Runoff Coeff.		0	0.8	0.8	0.6	0.6	0.6	0	0	0	0	0	0	
Inflow Vol.	(m^3)	0	45,144	13,272	23,844	17,028	13,159	0	0	0	0	0	0	112,447
Tailings Solids Inflow Volume	(m^3)	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	40,556
Slurry Water Inflow Volume	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Total Inflows	(m^3)	17,067	63,846	30,908	41,920	34,894	30,922	17,067	17,067	17,067	17,067	17,067	17,067	321,959
Outflows														
Evaporation	(mm)		107.8	120.5	107.8	79.7	37.1							
Water Surface Area	(ha)	1.3	1.4	1.7	1.9	2.1	2.3	2.8	2.9	3.0	3.1	3.2	3.3	
Volume of Loss	(m^3)	0	1,543	2,031	2,023	1,655	865	0	0	0	0	0	0	8,117
Reclaim Rate	(m^3/h)	17	17	17	17	17	17	17	17	17	17	17	17	
Reclaim Volume	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Release Rate	(m^3/h)	0	57	14	28	15	0	0	0	0	0	0	0	
Volume of Loss	(m^3)	0	41,610	10,220	20,440	10,950	0	0	0	0	0	0	0	83,220
Total Outflows	(m^3)	12,319	55,472	24,570	34,781	24,924	13,184	12,319	12,319	12,319	12,319	12,319	12,319	239,162
Net Inflows	(m^3)	4,748	8,374	6,338	7,138	9,970	17,738	4,748	4,748	4,748	4,748	4,748	4,748	82,797
Beginning of the Month Volume	(m^3)	30,994	35,743	44,116	50,454	57,592	67,563	85,301	90,049	94,797	99,546	104,294	109,043	
End of the Month Volume	(m^3)	35,743	44,116	50,454	57,592	67,563	85,301	90,049	94,797	99,546	104,294	109,043	113,791	
End of the Month WL	(m)	1142.9	1143.4	1143.8	1144.1	1144.6	1145.3	1145.4	1145.6	1145.8	1145.9	1146.1	1146.2	
Tailings Level														
Beginning of the Month Tailings Level	(m)	1135.0	1139.5	1140.7	1141.6	1142.2	1142.7	1143.2	1143.6	1144.0	1144.3	1144.6	1144.9	
Tailings Solids & Voids Inflows	(m^3)	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	
Beginning of the Month Volume	(m^3)	0	6,759	13,519	20,278	27,037	33,796	40,556	47,315	54,074	60,833	67,593	74,352	
End of the Month Volume	(m^3)	6,759	13,519	20,278	27,037	33,796	40,556	47,315	54,074	60,833	67,593	74,352	81,111	
End of the Month Tailings Elevation	(m)	1139.5	1140.7	1141.6	1142.2	1142.7	1143.2	1143.6	1144.0	1144.3	1144.6	1144.9	1145.1	
Summary														
Total Reclaimed from Tailings Pond	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Mill Water Required	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Fresh Water Makeup	(m^3)	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	16,425
Cumul. Water Available	(m^3)	28,983	30,598	30,176	30,555	33,767	44,745	42,734	40,723	38,712	36,702	34,691	32,680	

Mt. Nansen Mass Balance

(200-Year Wet Year Precipitation - without Right Bank Diversion)

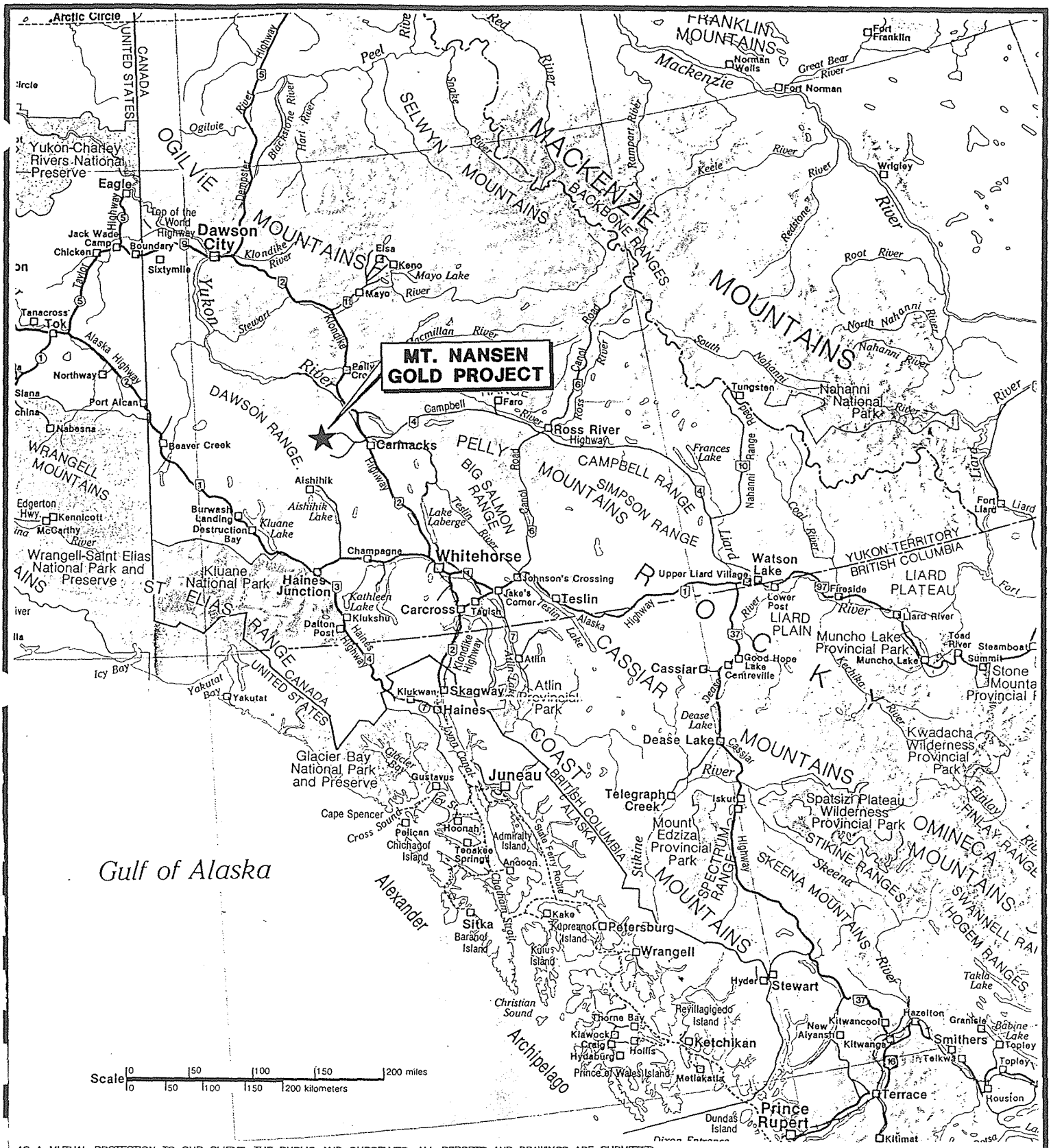
		Year 2												
Description	Units	Apr-97	May-97	Jun-97	Jul-97	Aug-97	Sep-97	Oct-97	Nov-97	Dec-97	Jan-98	Feb-98	Mar-98	Ann.Tot.
Annual Precip. = 270mm														
Monthly Distribution	%	0.0%	42.3%	12.5%	19.9%	14.3%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Monthly Precipitation	(mm)	0.0	173.4	51.3	81.6	58.4	45.3	0.0	0.0	0.0	0.0	0.0	0.0	410.0
Tailings Pond														
Beginning of the Month WL	(m)	1146.2	1146.3	1146.5	1146.7	1146.9	1147.1	1147.6	1147.7	1147.8	1147.9	1148.0	1148.1	
Inflow														
Pond Area	(ha)	3.4	3.5	3.6	3.7	3.8	4.0	4.3	4.4	4.5	4.5	4.6	4.7	
Inflow Volume	(m^3)	0	5,990	1,835	3,036	2,247	1,801	0	0	0	0	0	0	14,908
Catchment Area	(ha)	47.5	47.4	47.3	72.1	72.0	71.9	46.5	46.5	46.4	46.3	46.2	46.2	
Runoff Coeff.		0	0.8	0.8	0.6	0.6	0.6	0	0	0	0	0	0	
Inflow Vol.	(m^3)	0	65,746	19,377	35,305	25,238	19,535	0	0	0	0	0	0	165,200
Tailings Solids Inflow Volume	(m^3)	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	40,556
Slurry Water Inflow Volume	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Total Inflows	(m^3)	17,067	88,803	38,278	55,408	44,551	38,403	17,067	17,067	17,067	17,067	17,067	17,067	384,914
Outflows														
Evaporation	(mm)		107.8	120.5	107.8	79.7	37.1							
Water Surface Area	(ha)	3.4	3.5	3.6	3.7	3.8	4.0	4.3	4.4	4.5	4.5	4.6	4.7	
Volume of Loss	(m^3)	0	3,723	4,314	4,011	3,065	1,475	0	0	0	0	0	0	16,588
Reclaim Rate	(m^3/h)	17	17	17	17	17	17	17	17	17	17	17	17	
Reclaim Volume	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Release Rate	(m^3/h)	0	91	20	45	30	5	0	0	0	0	0	0	
Volume of Loss	(m^3)	0	66,430	14,600	32,850	21,900	3,650	0	0	0	0	0	0	139,430
Total Outflows	(m^3)	12,319	82,472	31,233	49,180	37,283	17,444	12,319	12,319	12,319	12,319	12,319	12,319	303,843
Net Inflows	(m^3)	4,748	6,331	7,046	6,228	7,268	20,959	4,748	4,748	4,748	4,748	4,748	4,748	81,071
Beginning of the Month Volume	(m^3)	113,791	118,539	124,870	131,916	138,144	145,412	166,372	171,120	175,868	180,617	185,365	190,113	
End of the Month Volume	(m^3)	118,539	124,870	131,916	138,144	145,412	166,372	171,120	175,868	180,617	185,365	190,113	194,862	
End of the Month WL	(m)	1146.3	1146.5	1146.7	1146.9	1147.1	1147.6	1147.7	1147.8	1147.9	1148.0	1148.1	1148.2	
Tailings Level														
Beginning of the Month Tailings Level	(m)	1145.1	1145.4	1145.6	1145.8	1146.1	1146.2	1146.4	1146.6	1146.8	1147.0	1147.2	1147.3	
Tailings Solids & Voids Inflows	(m^3)	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	
Beginning of the Month Volume	(m^3)	81,111	87,870	94,630	101,389	108,148	114,907	121,667	128,426	135,185	141,944	148,704	155,463	
End of the Month Volume	(m^3)	87,870	94,630	101,389	108,148	114,907	121,667	128,426	135,185	141,944	148,704	155,463	162,222	
End of the Month Tailings Elevation	(m)	1145.4	1145.6	1145.8	1146.1	1146.2	1146.4	1146.6	1146.8	1147.0	1147.2	1147.3	1147.5	
Summary														
Total Reclaimed from Tailings Pond	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Mill Water Required	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Fresh Water Makeup	(m^3)	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	16,425
Cumul. Water Available	(m^3)	30,669	30,240	30,527	29,996	30,505	44,705	42,694	40,683	38,672	36,661	34,650	32,640	

Mt. Nansen Mass Balance

(200-Year Wet Year Precipitation - without Right Bank Diversion)

		Year 3												
Description	Units	Apr-98	May-98	Jun-98	Jul-98	Aug-98	Sep-98	Oct-98	Nov-98	Dec-98	Jan-99	Feb-99	Mar-99	Ann.Tot.
Annual Precip. = 270mm														
Monthly Distribution	%	0.0%	42.3%	12.5%	19.9%	14.3%	11.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Monthly Precipitation	(mm)	0.0	114.2	33.8	53.7	38.5	29.8	0.0	0.0	0.0	0.0	0.0	0.0	270.0
Tailings Pond														
Beginning of the Month WL	(m)	1148.2	1148.3	1148.4	1148.6	1148.7	1148.9	1149.2	1149.3	1149.3	1149.4	1149.5	1149.6	
Inflow														
Pond Area	(ha)	4.8	4.8	4.9	5.0	5.1	5.3	5.5	5.6	5.7	5.7	5.8	5.9	
Inflow Volume	(m^3)	0	5,524	1,665	2,708	1,979	1,571	0	0	0	0	0	0	13,447
Catchment Area	(ha)	46.1	46.0	45.9	70.8	70.7	70.6	45.3	45.2	45.2	45.1	45.0	45.0	
Runoff Coeff.		0	0.8	0.8	0.6	0.6	0.6	0	0	0	0	0	0	
Inflow Vol.	(m^3)	0	42,033	12,395	22,824	16,320	12,633	0	0	0	0	0	0	106,206
Tailings Solids Inflow Volume	(m^3)	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	3,380	40,556
Slurry Water Inflow Volume	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Total Inflows	(m^3)	17,067	64,623	31,127	42,600	35,366	31,272	17,067	17,067	17,067	17,067	17,067	17,067	324,458
Outflows														
Evaporation	(mm)		107.8	120.5	107.8	79.7	37.1							
Water Surface Area	(ha)	4.8	4.8	4.9	5.0	5.1	5.3	5.5	5.6	5.7	5.7	5.8	5.9	
Volume of Loss	(m^3)	0	5,214	5,943	5,434	4,099	1,954	0	0	0	0	0	0	22,644
Reclaim Rate	(m^3/h)	17	17	17	17	17	17	17	17	17	17	17	17	
Reclaim Volume	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Release Rate	(m^3/h)	0	56	8	25	15	0	0	0	0	0	0	0	
Volume of Loss	(m^3)	0	40,880	5,840	18,250	10,950	0	0	0	0	0	0	0	75,920
Total Outflows	(m^3)	12,319	58,412	24,102	36,003	27,367	14,273	12,319	12,319	12,319	12,319	12,319	12,319	246,389
Net Inflows	(m^3)	4,748	6,211	7,025	6,597	7,999	16,999	4,748	4,748	4,748	4,748	4,748	4,748	78,069
Beginning of the Month Volume	(m^3)	194,862	199,610	205,821	212,846	219,443	227,442	244,441	249,189	253,937	258,686	263,434	268,183	
End of the Month Volume	(m^3)	199,610	205,821	212,846	219,443	227,442	244,441	249,189	253,937	258,686	263,434	268,183	272,931	
End of the Month WL	(m)	1148.3	1148.4	1148.6	1148.7	1148.9	1149.2	1149.3	1149.3	1149.4	1149.5	1149.6	1149.7	
Tailings Level														
Beginning of the Month Tailings Level	(m)	1147.5	1147.6	1147.8	1148.0	1148.1	1148.2	1148.4	1148.5	1148.6	1148.8	1148.9	1149.0	
Tailings Solids & Voids Inflows	(m^3)	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	6,759	
Beginning of the Month Volume	(m^3)	162,222	168,981	175,741	182,500	189,259	196,019	202,778	209,537	216,296	223,056	229,815	236,574	
End of the Month Volume	(m^3)	168,981	175,741	182,500	189,259	196,019	202,778	209,537	216,296	223,056	229,815	236,574	243,333	
End of the Month Tailings Elevation	(m)	1147.6	1147.8	1148.0	1148.1	1148.2	1148.4	1148.5	1148.6	1148.8	1148.9	1149.0	1149.2	
Summary														
Total Reclaimed from Tailings Pond	(m^3)	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	12,319	147,825
Mill Water Required	(m^3)	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	13,688	164,250
Fresh Water Makeup	(m^3)	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	1,369	16,425
Cumul. Water Available	(m^3)	30,629	30,080	30,346	30,183	31,423	41,663	39,652	37,641	35,630	33,619	31,609	29,598	

DRAWINGS



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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

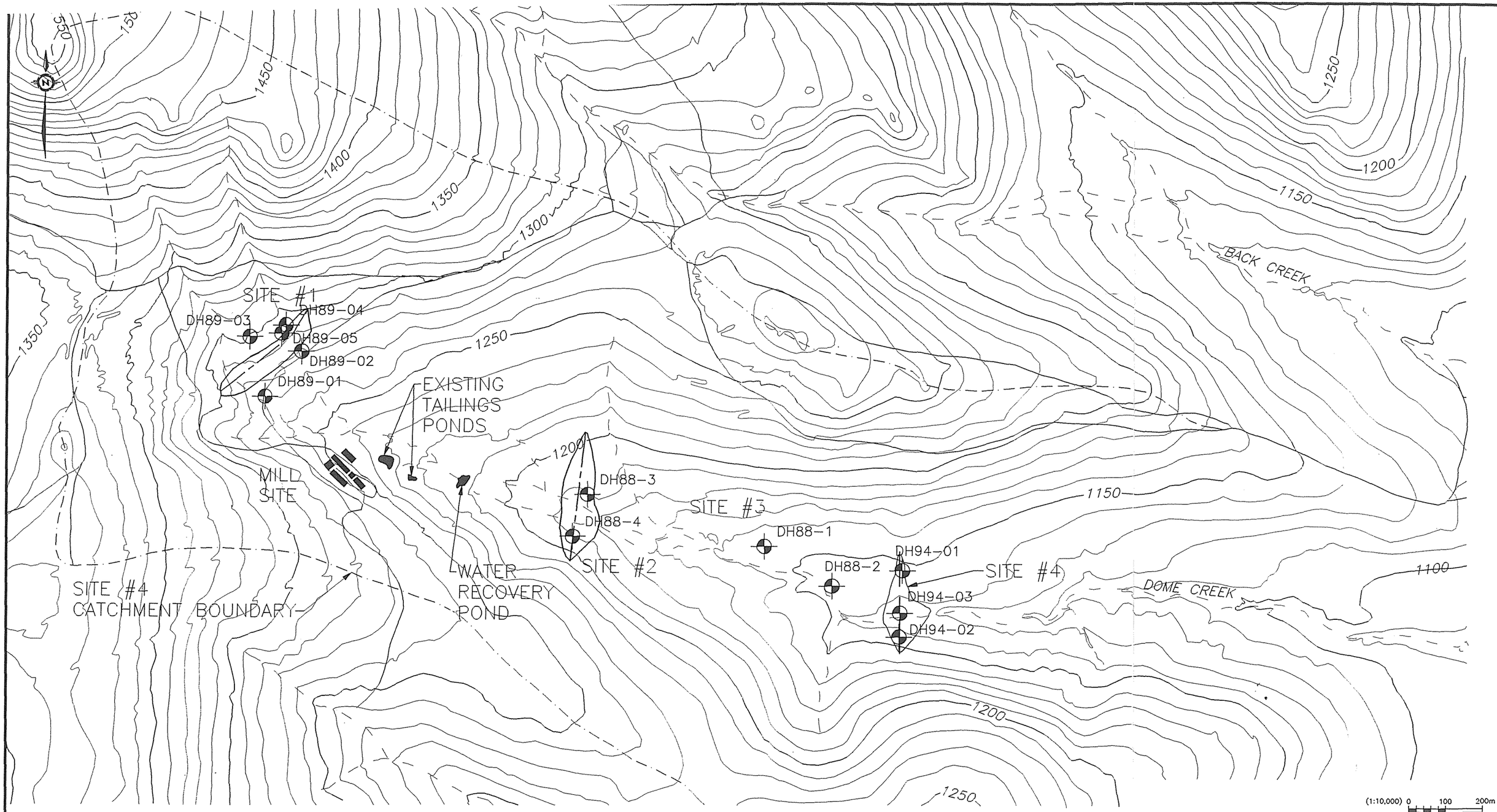
KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: PROJECT LOCATION PLAN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 1995	PM 5314.05	A-5314-001	
APPROVED			



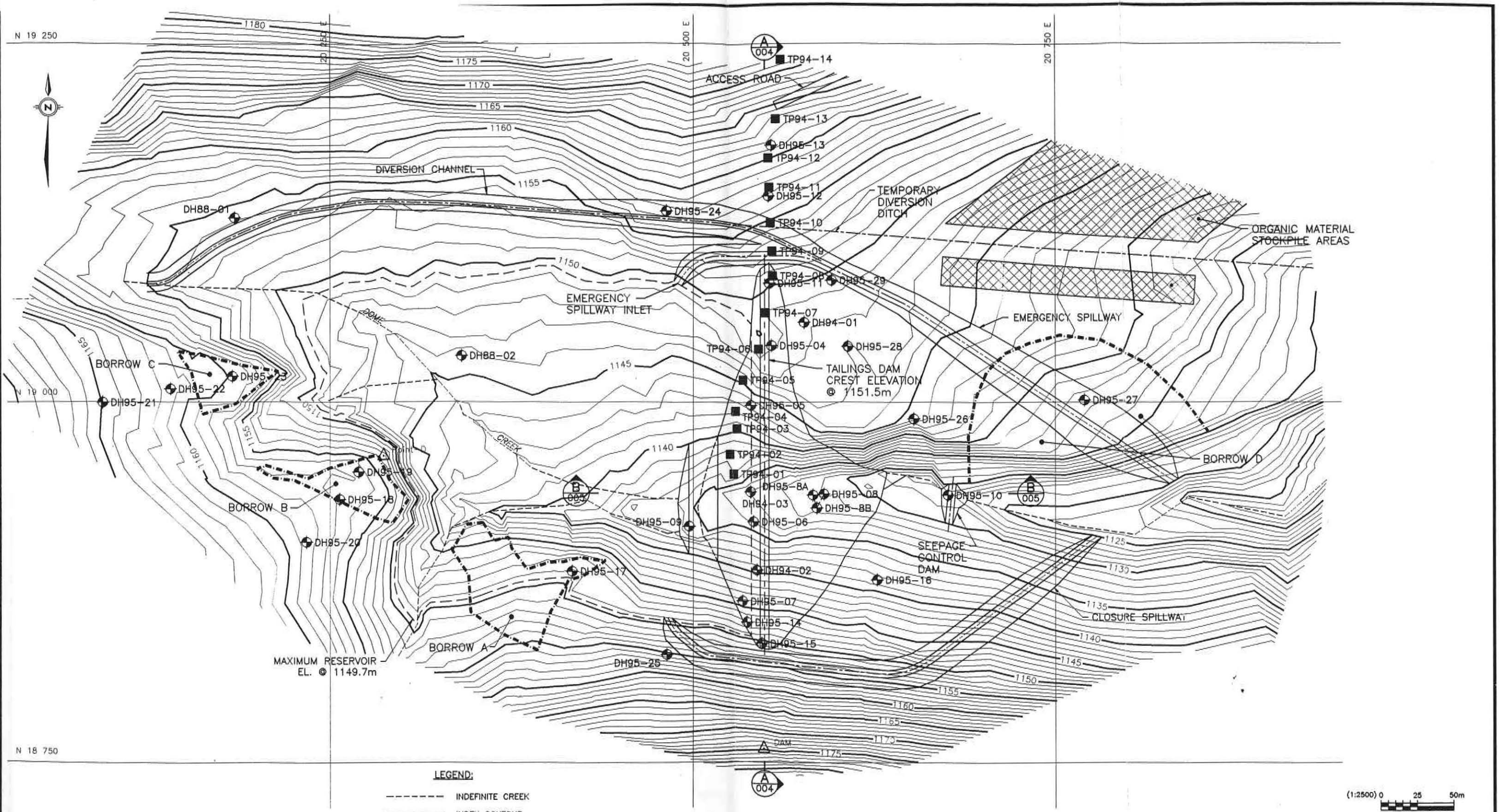
NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE: AS SHOWN	REV.	DATE	REVISION DETAILS
DESIGN	DRAWN C. P. B.	DATE JULY 1995	SCALES
KLOHN-CRIPPEN	PROJECT MT. NANSEN GOLD PROJECT		
	TITLE GENERAL ARRANGEMENT PLAN		
CLIENT: B.Y.G. NATURAL RESOURCES INC.	DATE OF ISSUE JULY 1995	PROJECT No. PM 5314.05	DWG. No. B-5314-002 REV.
	APPROVED		

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 AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA,STATEMENTS,CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

5314w030.dwg



LEGEND:

- INDEFINITE CREEK
- INDEX CONTOUR
- INTERM. CONTOUR
- BORROW AREA
- DH88-02 DRILL HOLE (1988 FIELD PROGRAM)
- DH94-03 DRILL HOLE (1994 FIELD PROGRAM)
- DH95-14 DRILL HOLE (1995 FIELD PROGRAM)
- TP94-02 TEST PIT (1994 FIELD PROGRAM)
- DAM CONTROL POINT

(1:2500) 0 25 50m

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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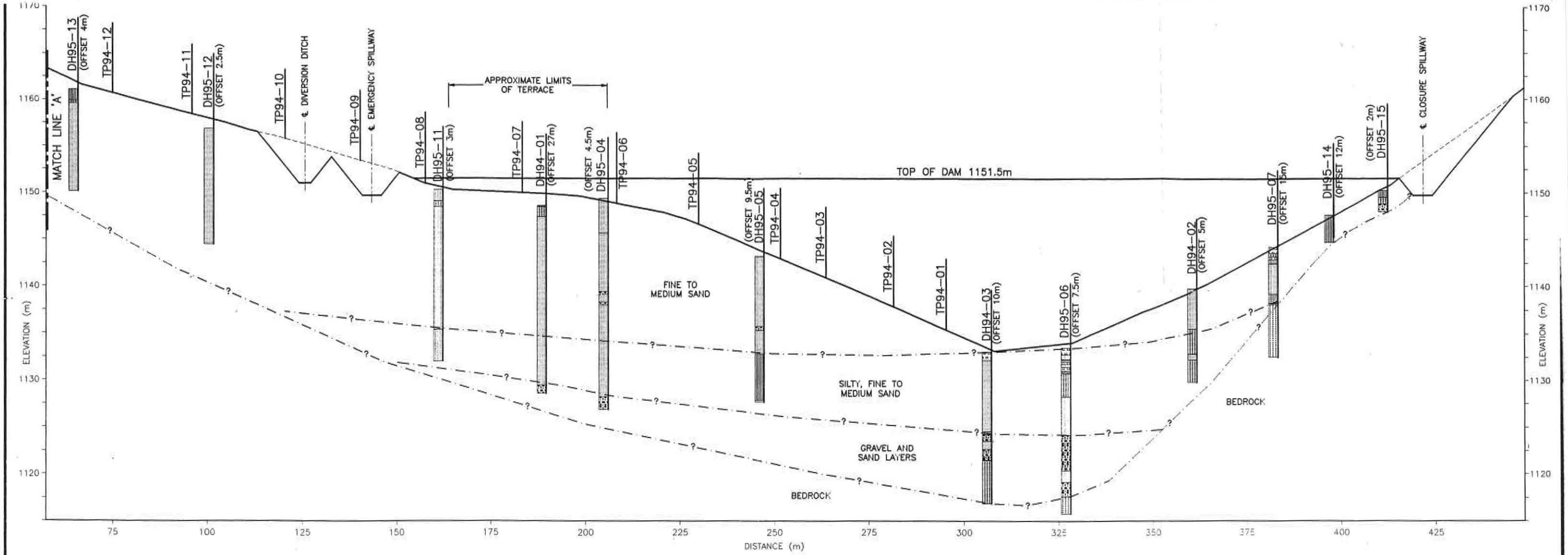
TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

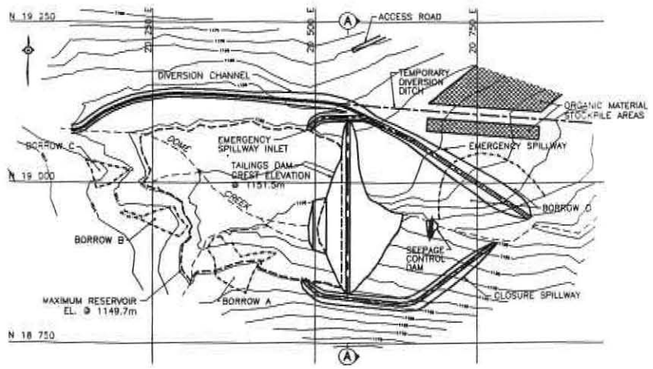
SCALE:	AS SHOWN
CLIENT:	B.Y.G. NATURAL RESOURCES INC.
REV. / DATE / REVISION DETAILS	
DESIGN / DRAWN / DATE / SCALES	C. P. B. / AUG 1995
PROJECT	MT. NANSEN GOLD PROJECT
TITLE	SITE LAYOUT PLAN AND TESTHOLE LOCATION PLAN
DATE OF ISSUE / APPROVED	AUG 1995
PROJECT No.	PM 5314.05
DWG. No. / REV.	B-5314-003

KLOHN-CRIPPEN

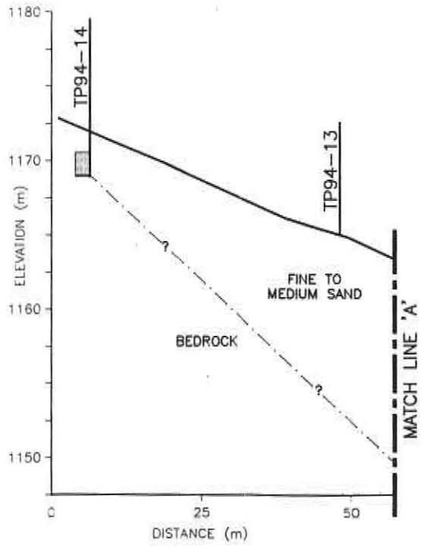
5314e033.dwg



SECTION (A) (003)
HOR. SCALE B
VERT. SCALE A



KEY PLAN



LEGEND

- SAND (SP-SM)
- SILTY SAND (SM)
- SILT (ML)
- BEDROCK
- GRAVEL (GP-GM)
- PEAT (Pt)

(1:1000) 0 10 20m (SCALE B)
(1:400) 0 4 8m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE: AS SHOWN

KLOHN-CRIPPEN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

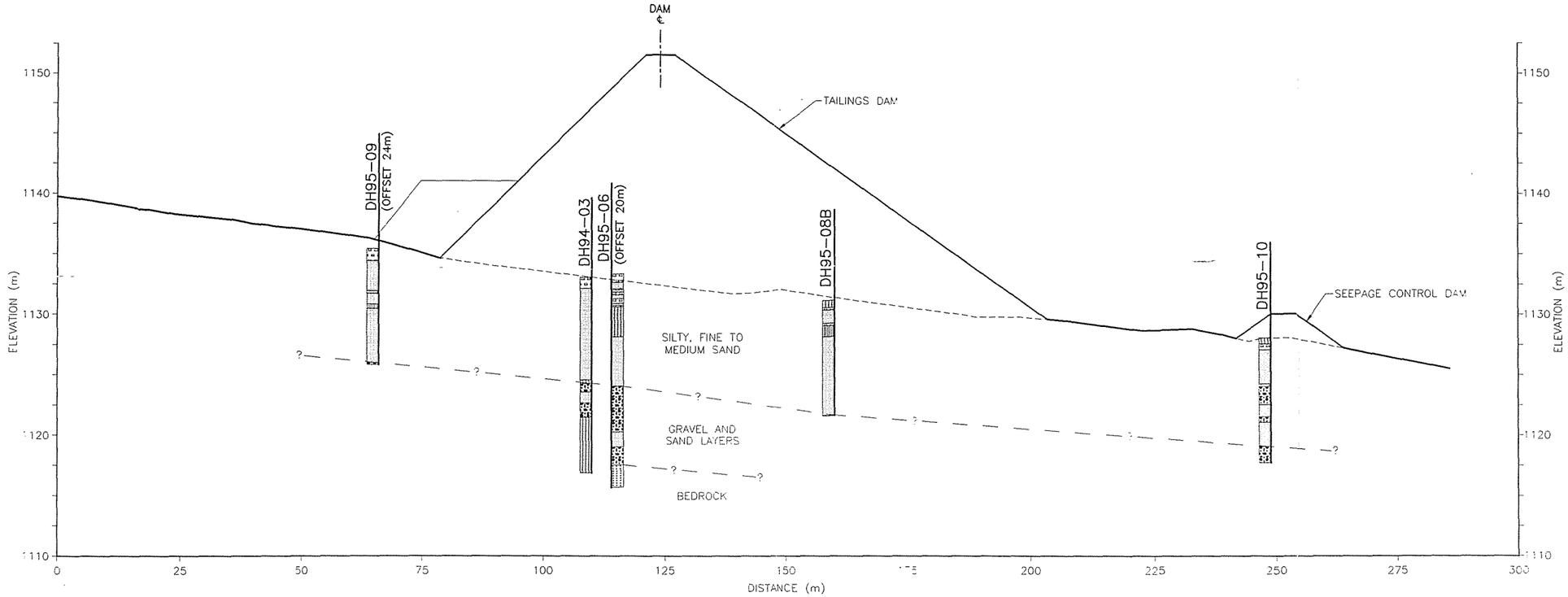
REV.	DATE	REVISION DETAILS
DESIGN D.W.R.	DRAWN L. G. H.	DATE JULY 1995	SCALES

PROJECT: MT. NANSEN GOLD PROJECT

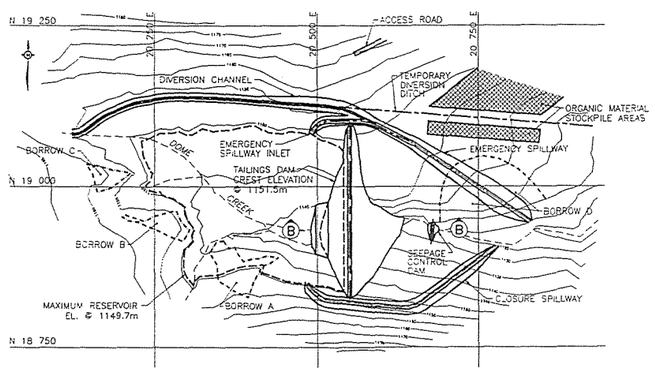
TITLE: CROSS SECTION ON DAM ℄

DATE OF ISSUE JULY 1995	PROJECT No. PM 5314.05	DWG. No. B-5314-004	REV.
APPROVED			

5314e038.dwg



SECTION B
HOR. SCALE B
VERT. SCALE A
003



KEY PLAN

LEGEND
- SAND (SP-SM)
- SILTY SAND (SM)
- SILT (ML)
- BEDROCK
- GRAVEL (GP-GM)
- PEAT (Pt)

(1:10000) 0 10 20m (SCALE B)
(1:400) 0 4 8m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE: AS SHOWN	REV. / DATE / REVISION DETAILS
DESIGN D.W.R.	DRAWN L. G. H.
DATE JULY 1995	SCALES
KLOHN-CRIPPEN	PROJECT: MT. NANSEN GOLD PROJECT
	TITLE: CROSS SECTION PERPENDICULAR TO DAM ℄
CLIENT: B.Y.C. NATURAL RESOURCES INC.	DATE OF ISSUE JULY 1995
APPROVED	PROJECT No. PM 5314.05
DWG. No. B-5314-005	REV.

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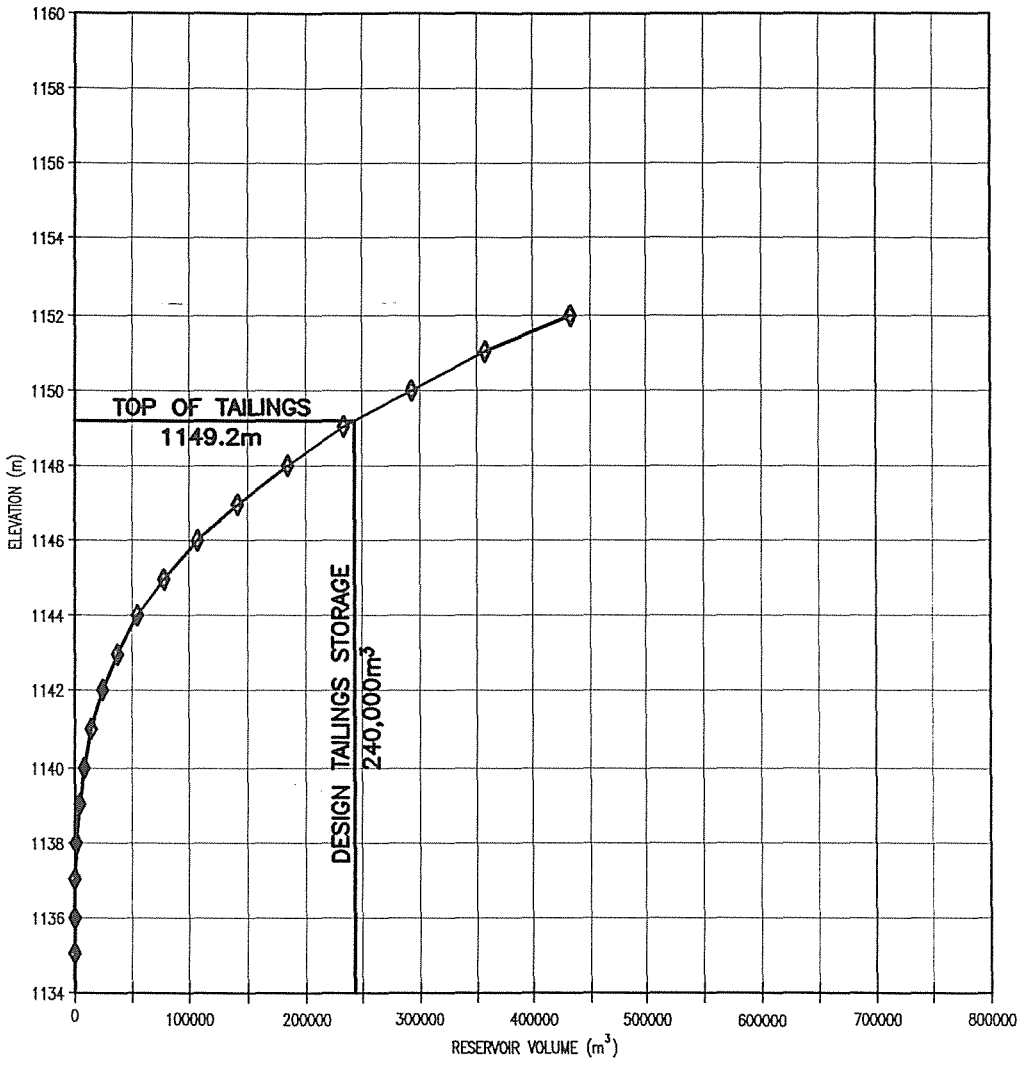

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KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

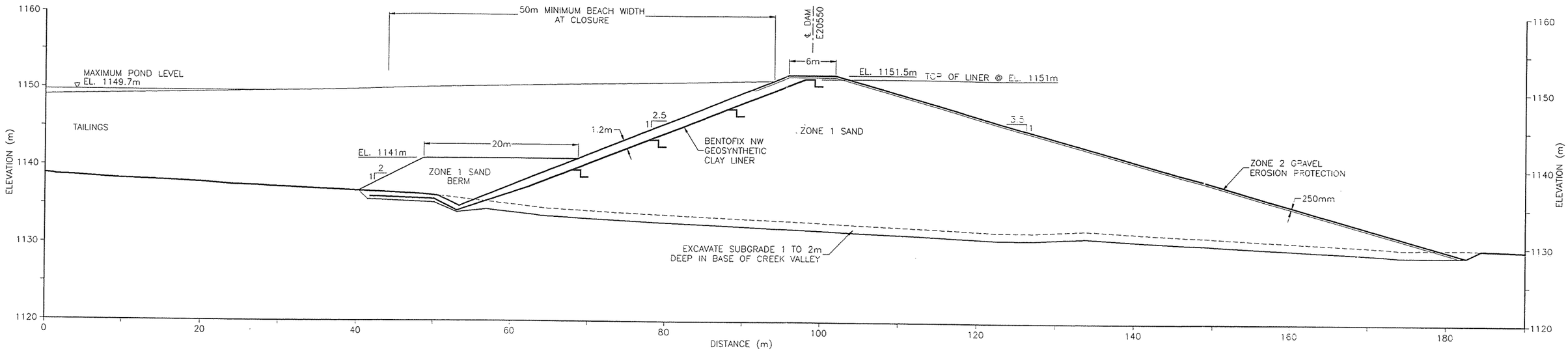
TITLE: RESERVOIR VOLUME VS ELEVATION

CLIENT: B.Y.G. NATURAL RESOURCES INC.

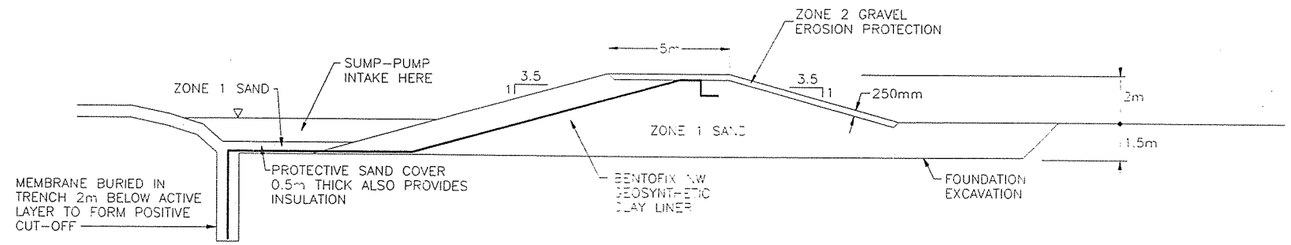
DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 1995	PM 5314.05	A-5314-006	

APPROVED

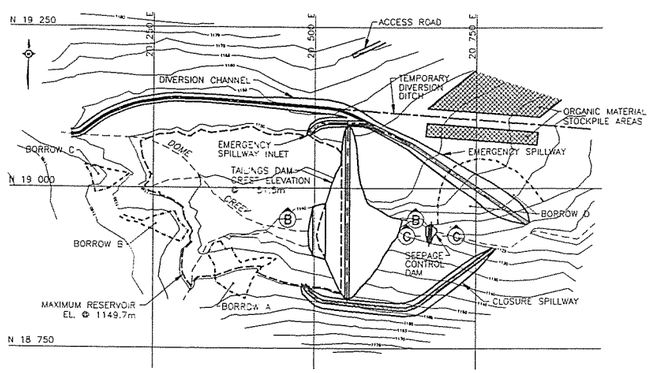
5314wr026.dwg



MAIN DAM
SECTION B
SCALE B



SEEPAGE RECOVERY DAM
SECTION C
SCALE A



KEY PLAN

NOTE:

1. SEE DRAWING B-5314-008 FOR DETAILS OF BENTOFIX NW GEOSYNTHETIC CLAY LINER INSTALLATION.

(1:500) 0 5 10m (SCALE B)
(1:250) 0 2.5 5m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE:

REV.	DATE	REVISION DETAILS

DESIGN | DRAWN: C. P. B. | DATE: JULY 1995 | SCALES

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: DAM CROSS-SECTIONS

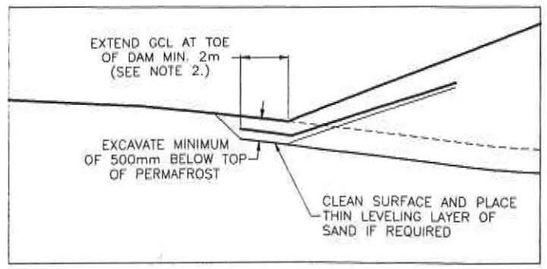
CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE: JULY 1995 | APPROVED

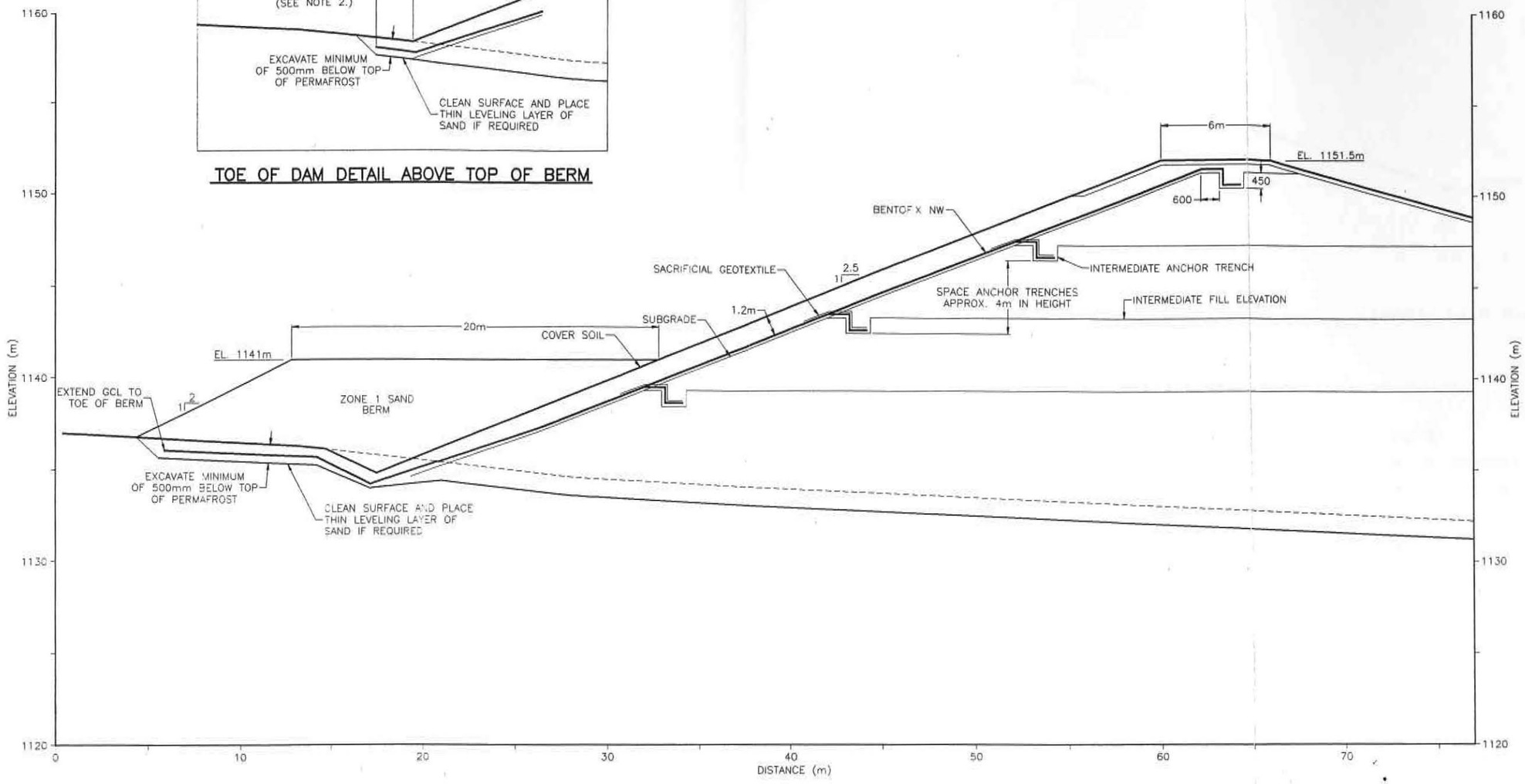
PROJECT No.: PM 5314.05

DWG. No.: B-5314-007 | REV.

5314-015.dwg



TOE OF DAM DETAIL ABOVE TOP OF BERM



NOTES:

1. INSTALL SACRIFICIAL GEOTEXTILE TO PROTECT JOINT AREA UNTIL UPPER SECTIONS OF GCL ARE PLACED. EXPOSE JOINT AREA BY HAND WHEN READY TO SEAL JOINTS.
2. IN AREA OF BERM EXTEND GCL TO TOE OF BERM. IN AREAS ABOVE TOP OF BERM EXTEND GCL AT TOE OF DAM AT LEAST 2m.

(1:250) 0 2.5 5m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE:

REV.	DATE	REVISION DETAILS

DESIGN T. K. M. | DRAWN C. P. B. | DATE JULY 1995 | SCALES

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: GEOSYNTHETIC CLAY LINER DETAILS

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE JULY 1995 | PROJECT No. PM 5314.05 | DWG. No. B-5314-008 | REV.

APPROVED

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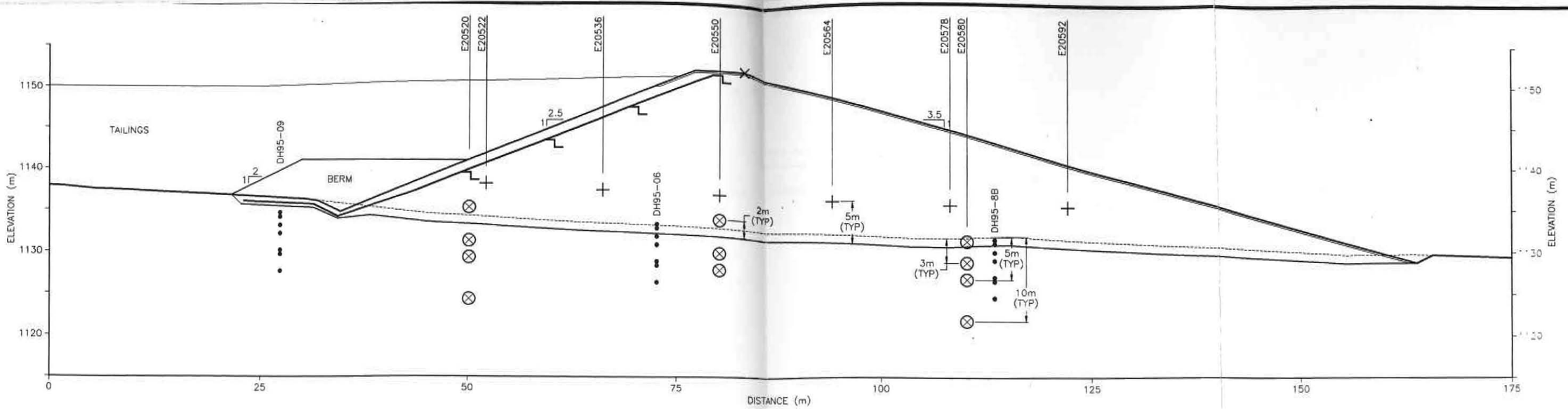
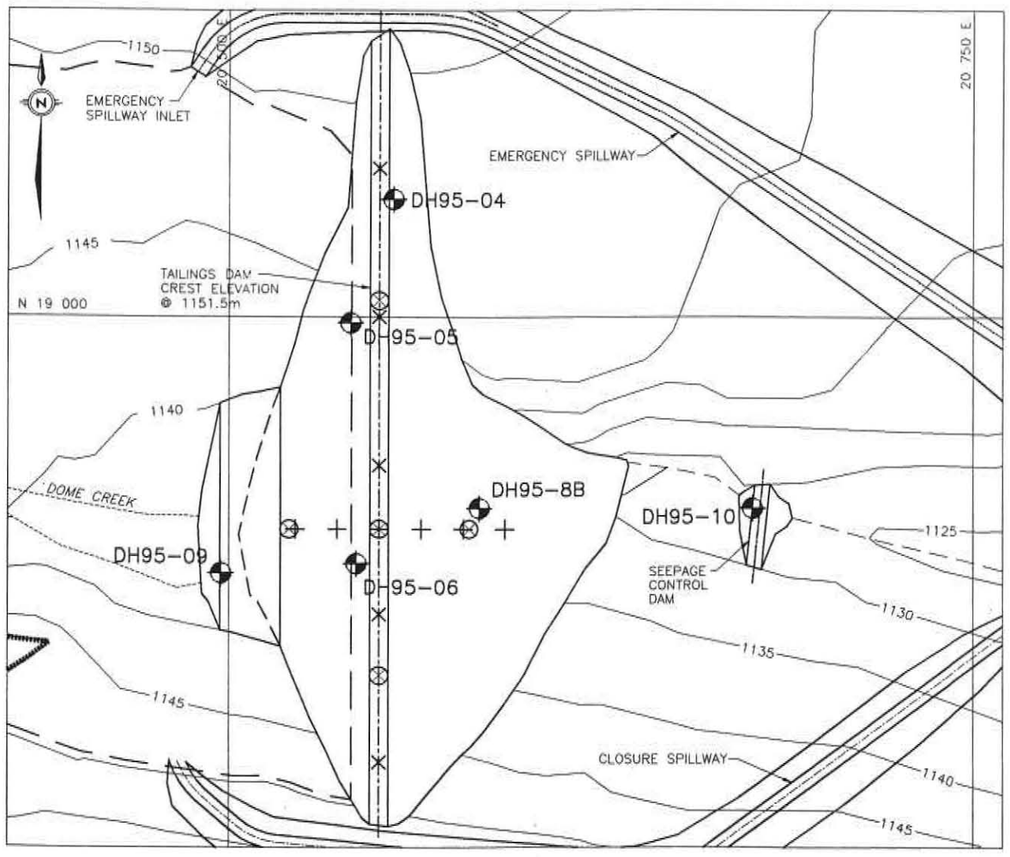


SECTION B
SCALE A



KEY PLAN
SCALE B

LEGEND

- NEW THERMISTORS
- EXISTING THERMISTORS
- PNEUMATIC PIEZOMETERS
- TEST HOLE LOCATIONS WITH EXISTING THERMISTOR STRINGS
- SETTLEMENT PINS

(1:2000) 0 20 40m (SCALE B)
(1:500) 0 5 10m (SCALE A)

NOTE: FRACTIONAL SCALES RELATE TO FULL 'B' SIZE DRAWINGS ONLY

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED

SCALE:

REV.	DATE	REVISION DETAILS
DESIGN	DRAWN C. P. B.	DATE JULY 1995

KLOHN-CRIPPEN

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: INSTRUMENTATION DETAILS

CLIENT: B.Y.G. NATURAL RESOURCES INC.

DATE OF ISSUE JULY 1995 | APPROVED | PROJECT No. PM 5314.05 | DWG. No. B-5314-009 | REV.

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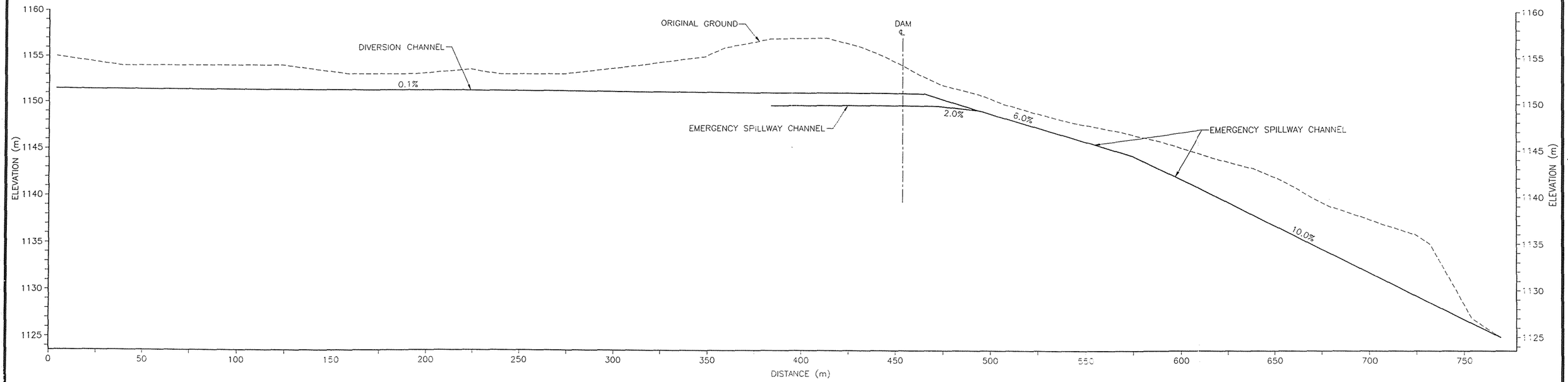


DIVERSION CHANNEL PROFILE

HOR. SCALE C
VERT. SCALE B

DIVERSION CHANNEL (INVERT GRADE 0.1% – 0.2%)

SCALE A

DIVERSION CHANNEL (INVERT GRADE 6%)

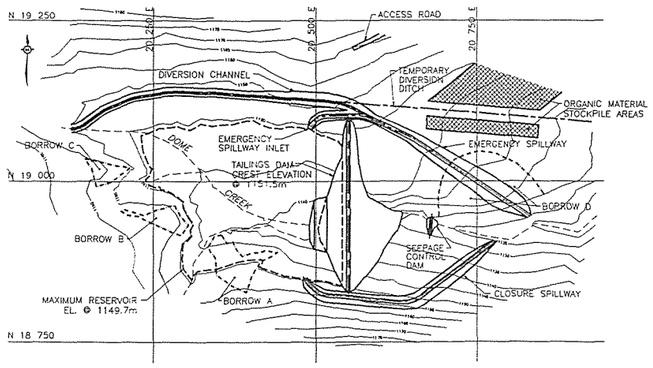
SCALE A

EMERGENCY SPILLWAY (INVERT GRADE 0.0% – 0.2%)

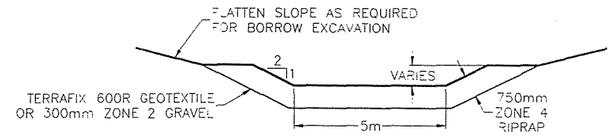
SCALE A

EMERGENCY SPILLWAY (INVERT GRADE 2% – 3%)

SCALE A



KEY PLAN



EMERGENCY SPILLWAY (INVERT GRADE 6% – 10%)

SCALE A

NOTE: DEPTH OF CHANNEL VARIES FROM 0.8m @ 6% GRADE TO 0.7m @ 10% GRADE.

(1:2000) 0 20 40m (SCALE C)
(1:400) 0 4 8m (SCALE B)
(1:200) 0 2 4m (SCALE A)

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TO BE READ WITH KLOHN CRIPPEN REPORT DATED _____

SCALE:

KLOHN-CRIPPEN

CLIENT: B.Y.G. NATURAL RESOURCES INC.

REV.	DATE	REVISION DETAILS
DESIGN	DRAWN C. P. B.	DATE JULY 1995
SCALES		

PROJECT: MT. NANSEN GOLD PROJECT

TITLE: DIVERSION AND SPILLWAY CHANNEL DETAILS

DATE OF ISSUE	PROJECT No.	DWG. No.	REV.
JULY 1995	PM 5314.05	B-5314-010	

APPROVED

5314dwg