Deloitte & Touche

Geochemical Studies of Faro and Vangorda/Grum Waste Rock Progress Report on Phase 1 and 2

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GEOCHEMICAL STUDIES OF FARO AND VANGORDA/GRUM WASTE ROCK
PROGRESS REPORT ON PHASE 1 AND 2

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EXECUTIVE SUMMARY

The Anvil Range Mining Complex, located in Faro, Yukon, ceased operations in January 1998 when Anvil Range Mining Corporation filed for creditor protection under the Companies' Creditor Arrangement Act. Deloitte & Touche Inc. was appointed Interim Receiver of Anvil Range Mining Corporation ("Interim Receiver") on April 21, 1998. The Interim Receiver has overseen the management of the property under the terms of two water licenses since that time. SRK Consulting is evaluating various aspects of the site as part of closure planning for the complex. This report describes progress on the investigation of the geochemical stability of waste rock.

Mining in both areas of the complex (Faro Site and Vangorda Plateau) was dominantly by open pit. Both areas involved significant pre-stripping of overburden and rock, and waste rock stripping as mining proceeded. At both sites, several hundred million tonnes of waste rock were produced and placed in nearly 40 dumps, fill areas and stockpiles.

Waste rock in both areas comprises rock types with geochemical characteristics that range from already acid generating to potentially acid generating and acid consuming. Monitoring data indicates generally that seepage is non-acidic, with some exceptions, but often contains elevated concentrations of zinc and cadmium. The long-term trend in seepage chemistry is an important consideration for remedial planning. The objectives of this project are therefore to evaluate the current sources of contaminant loadings from the site and evaluate how these sources might change in the long term.

This report reviews the existing information (Phase 1) and the programs implemented in 2002 to collect additional information and samples for testing (Phase 2). The testing program (Phase 3) is currently underway.

A bibliography of more than 250 reports was compiled based on existing document lists at SRK Consulting, Deloitte & Touche Inc., Access Consulting Group (ACG) in Whitehorse, the Yukon Water Board and Indian and Northern Affairs Canada. These reports were ranked according to title and four individuals at SRK and ACG reviewed the 140 top-ranked documents. Review comments were compiled using a standard template. The documents were reviewed to evaluate the adequacy of the existing geochemical database, operational procedures for managing waste rock, the inventory of rock in the waste rock dump and the loading of acidity from various sources. The main conclusions of the review were:

(1) the extensive water quality database is not easily accessed due to the version of software used to manage the data;
(2) the rock geochemical database is useful but more testing will be needed to link the data to field conditions;
(3) no documents describing operational procedures are in the public domain; and
(4) a detailed inventory of rock types for the Faro waste rock dumps has been completed, but the degree to which different rock types were mixed is not well known.

Field work completed in 2002 included two seepage surveys (June and September), surface waste rock mapping of several waste rock dumps in both mining areas, excavation of 100 test pits and trenches (including five along the Vangorda Plateau Haul Road), drilling and instrumentation of seven holes in waste rock and collection of bulk water samples from the pit lakes.

The seepage surveys showed that a wide range of water chemistry exists in the Faro area with water chemistry broadly correlated to surface waste rock type. Seepage chemistry at the Grum and Vangorda waste rock dumps showed that zinc and sulphate concentrations are probably increasing.

Surface mapping identified sulphide-rich waste rock placed outside areas designated for this type of rock. Field leach tests showed that any rock mixture can be acidic. Sulphide pockets in the Faro waste rock may be present at scales up to 10 of metres. During mapping, three warm air vents were found in the Faro site waste rock.

Test pits and trenches documented the degree of local mixing of waste rock and evaluated current weathering conditions in near-surface materials. Only a few test pits in the Faro area encountered pockets of sulphide rock that were not apparent on surface. In the Grum area, sulphide rock was found in several test pits outside the designated sulphide area and in the uppermost lift of the waste rock dump and few samples had low pH. At Vangorda Pit, test pits indicated that several materials had low pH. A few test pits along the Vangorda Plateau Haul Road identified sulphide rock mixed in with the non-acid generating rock fill. This indicated that rock used for road construction may be a source of acidity and metal leaching.

Sulphide waste rock was confirmed at the location of sulphide rock cells in the Intermediate Dump (Faro) and Grum Dump by drilling. In addition, sulphide waste rock was also encountered in the Intermediate Dump outside the area designed for this type of waste rock.

The laboratory testing program was designed based on the information gaps identified by the review and the needs for eventual revision of the site wide water quality predictions, and assessment of remedial measures. Static testing has been completed and kinetic testing is continuing.

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GEOCHEMICAL STUDIES OF FARO AND VANGORDA/GRUM WASTE ROCK PROGRESS REPORT ON PHASE 1 AND 2

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GEOCHEMICAL STUDIES OF FARO AND VANGORDA/GRUM WASTE ROCK PROGRESS REPORT ON PHASE 1 AND 2

1. INTRODUCTION

1.1 Background

The Anvil Range Mining Complex, located in Faro, Yukon, ceased operations in January 1998 when Anvil Range Mining Corporation filed for creditor protection under the Companies' Creditor Arrangement Act. Deloitte & Touche Inc. was appointed Interim Receiver of Anvil Range Mining Corporation ("Interim Receiver") on April 21, 1998. The Interim Receiver has overseen the management of the property.

The mining complex is composed of two main mining areas: the Faro Site and the Vangorda Plateau site. Mining in both areas was dominantly by open pit. At the Faro Site, three adjacent pits or zones were mined, whereas at the Vangorda Plateau site two separate ore bodies (Grum and Vangorda) were mined in the 1990s. Both areas involved significant pre-stripping of overburden and rock, and ongoing waste rock stripping as mining proceeded. At the Faro site, an estimated 258 million tonnes were placed in 31 waste rock dumps, fill areas and stockpiles. The Vangorda Plateau Pits were smaller and produced several tens of millions of tonnes of waste rock.

Waste rock in both areas is composed of rock types with a wide range of geochemical characteristics. These include rock types that are already locally generating acid rock drainage (ARD), rock types that have the potential to generate ARD at some time in the future, rock types that are releasing high concentrations of zinc under non-acidic conditions, rock types that are naturally acid neutralizing, and rock types that have low reactivity. Drainage monitoring at the sites indicates generally that water is non-acidic with some exceptions but often contains elevated concentrations of zinc and cadmium. The long term trend in drainage chemistry is an important consideration for remedial planning. Should drainage chemistry worsen, primarily by depression of pH, the type of remediation measures are likely to be significantly different from those currently in place or being considered. The objectives of this project are therefore to evaluate the

current sources of contaminant loadings from the site and evaluate how these sources might change in the long term.

1.2 Terms of Reference

The terms of reference for this project were detailed in a letter dated August 8, 2002 from SRK Consulting (SRK) to Deloitte & Touche, Inc (Appendix A.1) and was based on requirements for Tasks 3.2 and 4.2 presented in the report on the Closure Alternatives Workshop (Deloitte & Touche, April 2002). The project includes the following general items:

- Phase 1 – Review of Existing Information and Identification of Data Gaps.
- Phase 2 – Initial Data Collection and Instrumentation of Waste Rock Dumps.
- Phase 3 – Laboratory Testing.

This report summarize progress on Phase 1 and 2.

1.3 Project Design

The project was designed based on the facilities present at each site and the geochemical and geotechnical data needs anticipated to evaluate typical generic remedial measures. Three sets of tables were produced for Faro, Grum and Vangorda (Appendix A.2). These tables contain the following headings:

- Facilities (eg. pit, waste rock).
- The issues for each facility.
- A list of possible remedial options for each facility.
- The information needs for each remedial option.
- The studies that could be implemented to collect the necessary information.

For example, at Faro, closure of the acid generating low grade ore and oxide fines could involve several measures including disposal in the flooded Faro Pit. In order to assess these measures, it would be necessary to determine the stored acidity in the material, the requirement of lime addition during backfilling to limit impacts to the pit water, the actual capacity of the pit to accept the waste, and the possible reaction of the pit water with the waste. The studies required would include collection of surface and sub-surface samples and laboratory testing.

To ensure that recent information from closure-related investigations was taken into account, an initial review of all existing information was planned. It was therefore intended when the project was initiated that Phase 1 would be completed entirely prior to Phase 2. However, due to the need to complete fieldwork in September prior to the onset of winter conditions at the site, Phase 2 was designed and started before Phase 1 was completed.

1.4 Acknowledgements

This project is being coordinated by SRK Consulting with involvement from the following organizations:

- Access Consulting Group (Whitehorse) – Compilation and review of documents for Phase 1.
- Midnight Sun Drilling (Whitehorse) – Waste rock dump boreholes.
- Gartner Lee Limited (Burnaby, British Columbia) – Assistance with seepage sampling
- Mine site personnel – Site logistics, assistance with many aspects of fieldwork.
- Tom Moon (Ross River) – Excavator operator.

2. METHODS

2.1 Phase 1 – Review of Existing Information

2.1.1 Objective

The objective of Phase 1 was to review all the information currently available to ensure that full use is made of the existing data, and that any data gaps are identified and addressed in subsequent phases. Particular aspects to be addressed included:

- The adequacy of the existing geochemical database. This includes the degree to which sampling sufficiently represented the geological and geochemical variability, and the appropriateness of sampling and testing methods.
- The operational procedures used to segregate different rock types and possible sources of classification error.
- The inventory of rock types in each waste rock dumps and to what degree the rock types were mixed by operational handling (Faro and Vangorda).
- The loading of acidity and metals from various sources.

2.1.2 Methods

The review proceeded in three steps.

The first step was to develop a complete bibliography of reports from existing information in libraries at Deloitte & Touche and SRK, and listings of reports available at the offices of the various regulatory agencies (Water Board, Indian and Northern Affairs Canada (DIAND), Environment Canada (EC), Yukon Territorial Government (YTG)). The reports were compiled into a single list along with the location of the document.

The second state involved prioritizing of the large list of documents (more than 250, Appendix B.1) for review based on the specific needs of the project. Priorities were assigned on a scale of 1 to 4 based on the title of the report. Priority levels 1 and 2 identified documents that were specifically concerned with waste rock at the site, or indicated an assessment of geochemical conditions at the site in general. Priority level 3 included documents that were generally regional in nature though possibly including

geochemical aspects, or were exclusively concerned with physical aspects of the Rose Creek tailings management area. Level 4 included documents that were definitely concerned with downstream biological aspects or socio-economic issues. Any documents that could not be prioritized based on the title were included in Levels 1 and 2 to ensure that the table of contents would be reviewed. The documents were then sorted using the priority levels, and assignments for review sent to three SRK reviewers (Stephen Day, Kelly Sexsmith, John Chapman) and Access Consulting Group (ACG) reviewer Dan Cornett. ACG were mostly assigned documents located in regulatory agency offices in Whitehorse to limit copying and shipping information to Vancouver.

In the third step, the reviews were completed. An average of 0.5 hours were assigned to each document assuming that many documents would require very limited review. To allow the four sets of reviews to be comparable common headings were developed and review results entered in a spreadsheet. The following headings were included:

- Objective of Report or Reason for the Report
- Critical Findings
- Validity of Findings
- Sampling and Results
    - Type of Samples (rock, water, soil etc)
        - Number of Samples
        - Location of Samples (By Waste Rock Dump or monitoring location)
        - Geological Distribution
        - Analyses Completed

Any new analytical results for rock geochemistry were copied and compiled. Water results were not copied due to the large number of documents and the expectation that most of the results are already in the site water quality database (see Section 3.2.1 for further discussion).

2.2 Phase 2 – Initial Data Collection

2.2.1 Seep Surveys

The seepage surveys involved walking along the toes of all the waste rock dumps and collecting any flowing seeps emerging from these areas. Details on the sampling methods are provided in Appendix C. The samples were analyzed for a comprehensive suite of parameters.

2.2.2 Surface Waste Rock Mapping

Prior to starting the mapping program, Stephen Day (SRK) developing mapping methods and codes based on two days of initial mapping at Faro, Grum and Vangorda (Appendix D.1). Subsequently, Stephen Day, Uwe Schmidt and Kelly Sexsmith prepared the maps. All maps prepared for this project should be regarded as "reconnaissance" detail meaning that they should not be used for detailed planning of remediation measures (Appendix D.2, D.3 and D.4).

Waste dumps were mapped at a scale of 1:5,000. Areas of similar lithology were first defined at a distance, using colour and textural differences. Dumps were then mapped by traversing along their toes or crests, depending on slope stability and access. Most areas consisted of a mixture of rock types. These mixtures were estimated and their relative abundance noted. Rock types were mapped using mine rock units established by Anvil Range (see Appendix D.1)[1]. Specimens of the common rock types and mine rock units were collected for reference as mapping progressed. Samples of waste dump fines were collected at irregular intervals, depending on availability, to estimate contact (or rinse) pH and conductivity. Approximately 100 to 200 grams of –2 mm material was screened in the field. In the evenings, sufficient fines were added to 40 mL of distilled water to make a volume of approximately 70 mL. Measurements of pH and conductivity were carried out after samples were agitated and sediment settled out. Measurements are tabulated in Appendix D.5.

All sampling locations and selected major contacts were surveyed in the field by GPS. Survey accuracy was usually better than ±10 m.

[1] It should be noted that Anvil Range established different non-interchangeable rock type nomenclature for the Faro and Vangorda Plateau areas. These conventions have been used for this project.

Three traverses were carried out to locate hot spots on the Faro waste dumps (Appendix D.6). This occurred during the drilling phase and after snow covered the area. Hot spots could be identified by the lack of snow. The sites were photographed and surveyed by GPS.

2.2.3 Test Pits and Trenches

Test pits and trenches were excavated in waste rock dumps at Faro, Grum and Vangorda, between September 17 and 29, 2002 (Appendix E.1). Forty-one pits and nine trenches were completed at Faro, 23 pits and six trenches were completed at Grum, and 15 pits and one trench were excavated at Vangorda. An additional five pits were dug along the 12 km of the Vangorda Plateau haul road for a project total of 16 trenches and 84 test pits.

At Faro and along the Vangorda Plateau haul road, a Cat 320 excavator, owned and operated by Tim Moon of Ross River, Yukon was used. This equipment was capable of digging to depth of approximately 7 metres. A sampling assistant was also provided by the mine.

A Link-Belt 460LX hydraulic excavator, operated by minesite personnel was used at the Vangorda Plateau. This equipment was also capable of digging to a depth of approximately 7 metres, but this depth was not attained in any pits because of poor pit wall stability. Typical pit depths ranged from 3 to 5 metres. All trenches were dug to a 1 metre depth and varied in length from 30 to 35 metres.

A typical test pit was excavated at incremental depth intervals of about 50 cm. Variations in colour or lithology in the upper metre were examined in place. At greater depths, representative samples of distinct layers were set aside by the equipment operator for later examination and sampling. Test pits were terminated primarily when pit walls failed or less compacted material at depth, undercut the pit walls. Less commonly, excavations ended by encountering large boulders, or material sloughed in at the same rate as removal and at one site by the inflow of ground water.

Pit depth, lithological and colour boundaries were measured and sketched. Trenches were laid out perpendicular to the dump crests and excavated to a depth of approximately 1 metre. Layers were measured, mapped and sampled in place. Representative samples, weighing approximately 2 kg, were collected by screening out the +1 cm fraction. An approximately 200-g sub-sample was collected by further

screening of the –1 cm fraction to –2 mm. This finer sub-sample was tested in the field with 10% HCl to estimate calcium carbonate content, and retained for later pH and conductivity contact tests (see Section 2.2.2, and Appendix E.6). The abundance of rock fragments of the various lithologies in the waste piles were determined and noted. Reference samples of common rock types were also collected.

Locations of all test pits were surveyed using a GPS. Survey accuracy was usually better than ±10 m.

2.2.4 Waste Rock Drilling

2.2.4.1 Location Selection

Ten drill sites were initially chosen in areas of interest within the waste piles (Table 2.1). These location selections were prioritized because it was expected that not all holes could be drilled within the available time frame.

The locations were also selected based on access considerations for the truck-mounted rig. Access roads to each site required some grading or leveling, but in general the vehicle was able to negotiate the sites without difficulty.

2.2.4.2 Equipment

Waste rock drilling was carried out using a truck mounted T685H Schramm drill using an ODEX style casing advance system to install 152mm (6") steel casing. The drillhole was produced using a downhole hammer and compressed air to clear cuttings from the hole. All steel casing was retrieved from the drillhole during monitoring equipment installation.

TABLE 2.1

Borehole Locations

General Area	Depth (m)	Designation	Rationale
Faro NW	10	10M-1	Old waste rock
Faro Intermediate	60	60M-1*	Sulphide cell
Faro Intermediate	60	30M-1*	Comparison with 60M-1 and edge effects
Faro Main	60	60M-2	Suspected waste sulphide rock cell
Grum	10	10M-2*	Sulphide cell
Grum	30	30M-3*	Sulphide cell
Grum	10	10M-3*	Non-sulphide cell for comparison with 10M-2 and 30M-3
Vangorda	10	10M-4*	General characterization
Vangorda	30	30M-4*	General characterization

Note - * indicates hole drilled. See also Figures 4.1, 4.2 and 4.3.

2.2.4.3 Lithological Logging

The drilling method returned mostly fines with lesser amounts of chips up to 3 cm making lithological identification difficult. For the purpose of logging, chips were separated from fines with a 1 cm mesh and rinsed with water to remove the fines. Rock type, color, and chip morphology was then logged. Color and moisture content (dry vs. moist) of fines were also noted for the unwashed chips. Reaction with dilute HCl was recorded.

2.2.4.4 Sample Collection and Shipment

Sampling interval was determined based on the anticipated full depth of the borehole. For the 10-m holes, 1.5 to 2 kg samples were collected at 1 m intervals; and for the 30 and 60 m holes samples were collected at 2 m intervals. In addition, 2 to 3 kg composite samples were collected. The composite sampling interval for the 10 m holes was 5 m (0-5 m, 5-10 m); and for the 30 m and 60 m holes was 6 m (0-6 m, 6-12 m, etc.).

Samples were collected from the cyclone. A 1-cm mesh screen and a 20 L plastic pail were used to capture the coarse and fine fractions, respectively. A subsample of the +1 cm coarse fraction was reserved for logging purposes as described above. Fines were homogenized by mixing several times between two pails. A sample was collected from the homogenized fines and placed in a 30 cm x 45 cm plastic sample bag, to which a portion of the coarse fraction was added.

Following collection, samples were stored in a warehouse at the Faro mine site prior to being trucked to Canadian Environmental and Metallurgical in Vancouver for chemical analysis.

2.2.4.4 Monitoring Instruments

Monitoring instruments for installation in the boreholes were manufactured, or supplied, by RST Instruments of Coquitlam, British Columbia and consisted of the following:

- 51 mm (2") ID, schedule 40 PVC casing, equipped with 3 m long #10 slot screens in installations where water was anticipated in the drillhole. Screen sections are indicated on the drill logs (see Appendix F);

- Plastic "gas collection" tubing (5 mm ID) taped to the outside of the PVC;
- multi-point thermistor strings either attached to the outside of the PVC (borehole 10M-2) or hung vertically inside the PVC. Drillhole logs indicate the thermistors as "inside" or "outside" depending on installation (Appendix F).

Instrumentation was installed by taping the gas collection tubes and thermistors strings to the outside of the PVC casing as it was lowered into the casing. Duct tape was used in the 7 to 10 m screened zone in well 10M-2. All subsequent installations used electrician's tape.

Because tubing may be pinched during installation, many of the gas sampling tubes were installed in duplicate. Duplicate tubing could not be installed in every monitoring zone due to limited tubing supplies.

Deep installations (30 m and 60 m) utilized a lifting apparatus on the drill hoist to prevent possibly dropping the PVC during installation due to excessive weight. This prevented potential damage and was considered the safest method of installing the materials.

Once all of the PVC casing had been installed, the drill casing was pulled back in stages, typically 0.25 to 0.4 m, and sand, bentonite chips, or backfill poured down the annulus to act as backfill. Graded silica sand was used in all monitoring zones (ie; wherever a screened section or gas tube was located), and bentonite was placed above and below this to restrict vertical movement of water or gas along the backfill. Drill logs indicate the placement of backfill in each drillhole. Some sections of the drillholes required significant volumes of backfill in order to fill the void space. This indicated that void spaces within the waste rock exist in these areas and have therefore, been noted on the drill logs to assist with interpretation of gas sampling results.

The gas sampling tubing was truncated at surface at a custom built aluminum wellhead fitted with "swagelock" fittings to terminate each tube. Tube connections for gas probe attachment were equipped with 3/8" (12.3 mm) diameter NPT fittings. Each termination fitting was marked on the aluminum plate with the corresponding depth of

the tubing (datum used was ground surface). Markings were both inscribed in the aluminum and marked with indelible ink.

Wellheads were protected by plywood boxes, approximately 1.3 m high by 0.8 m by 0.8 m. The boxes had two 2' by 4's fixed to the bottom of the box; and these protrude beyond the edge of the box a length of 0.3 m. When accessing the wellhead, the plywood box is tipped over with the 2' by 4's acting as cantilevers; this allows clearance of accumulated snow by the box and facilitate replacement of box following data collection. Additionally, the 2' by 4's were anchored by four sand bags, one at each corner, to stabilize the structure. A 3.3 m pole was fixed to each box. Orange flagging tape attached to the top of this pole will allow the wellhead to be located in the event of drifting snow, as well as increase the visibility of the installation and minimize the likelihood of accidental vehicular damage.

2.2.5 Collection of Bulk Water Samples

Bulk water samples were recovered from pit lakes with a 20-L plastic bucket, which was sealed with a watertight plastic lid. The sampling locations had a minimum of 30 cm of water to prevent contamination from the sediments at the bottom. The bucket and the lid were rinsed thoroughly at least five times using the pit water before recovering the water sample. Each of the bulk water samples contained about 15 to 18 litres of pit water. The bucket of water was then sealed and identified in preparation for shipment to the laboratory. Samples were not specifically refrigerated after collection but were stored in a cool room prior to leaving the site. The samples were shipped by Loomis to Canadian Environmental and Metallurgical, Vancouver, B.C. Refrigeration was not available for shipping the bulk water samples, although they would have remained relatively cool for most of the transit.

3. PHASE 1 REVIEW RESULTS - PRELIMINARY

3.1 Document Inventory

The bibliography includes 254 documents (Appendix B.1). Of these, 67% (169) were assigned either a Priority Level of 1 or 2. About 140 documents (55%) were reviewed. This included some documents which were catalogued but could not be located.

An important aspect of the document inventory is that it contains only those documents submitted to regulatory agencies, prepared by the agencies or prepared to describe research results. None of the documents reviewed were documents prepared internally by the mine operators.

3.2 Current Findings

Findings to date are described below in the context of relevant specific issues described in Section 2.1.1. Detailed review results are provided in Appendix B.2.

3.2.1 Adequacy of the Existing Geochemical Database

The current geochemical database consists primarily of water and rock analysis. No other types of data relevant to geochemical investigations of the waste rock dumps were located. These could include pore gas measurements and temperature profiles.

The water database includes waste rock seeps and surface water (upgradient and downgradient of sources). Limited groundwater analyses directly relevant to the waste rock dumps are available. The extent and usefulness of the water chemistry database could not be readily evaluated. Numerous water analysis reports were identified but were not compiled because SRK understands that a water database exists in EQWin. However, the reviewers were not able to check if the individual results have been entered in the database because it is an obsolete version that cannot be read by current EQWin releases. Updating the water compilation is recommended as a high priority as it may allow the long term behaviour of the various sources to be evaluated.

Rock geochemical data has been collected at various times:

- 1988. Faro Mine Abandonment Plan. This document includes acid-base accounting results for 20 samples of rock for use in construction purposes. The rock types were calc-silicate breccia and biotite-muscovite-andalusite schist.
- 1989. Documents in support of the Initial Environmental Evaluation (IEE) and Water License Application for the Vangorda Platau Development. Sixty-nine bedrock core samples were submitted for analysis of acid-base accounting parameters. Twelve samples were tested for short term leachability. Two composite samples representing phyllites and sulphides were tested in humidity cells. Petrographic reports were also produced.
- 1992. Summary Report on Schedule D to Water License #IN89-001. This report is the first documented major effort to compile information on the geochemical characteristics of waste rock at the Faro site. It includes acid-base accounting data collected in 1975, 1987, 1989 and 1990. Results for acid-base accounting on 53 rock samples, and 12 humidity cells (conducted on six samples) are provided.
- 1996. Integrated Comprehensive Abandonment Plan (ICAP). This report provides results for 160 samples of waste rock from Faro and Vangorda Plateau tested for acid-base accounting parameters, metal concentrations and leachability. The samples were collected from surface and test pits. Fourteen composite samples were tested in leach columns for 23 weeks.
- 2000. Interim Report on the Feasibility of Reclaiming Vangorda Pit as a Clean Water System. This report contains results for 14 samples of waste rock and pit wall talus from the Vangorda Pit. Samples were tested for metals, acid-base accounting parameters, leachable metals and mineralogical characteristics.

The existing rock geochemical database indicates that considerable useful information has been collected. Some data are only available as hardcopies. SRK entered the data into spreadsheets so that the variability of the characteristics of the various rock types could be assessed.

The limitations identified to date in the database that can be addressed by the current project include, but are not limited to:

- **Determination of sulphur forms**. The speciation of sulphur has generally not determined but is a significant consideration for rocks containing a variety of different sulphide and sulphates.
- **Form of neutralization potential.** The mineralogy of potentially acid neutralizing rock components is complex (including clay minerals and iron carbonates). Considerable mineralogical work has been reported in several documents, but the characterization of these forms by conventional neutralization potential determinations has not been evaluated.
- **Characterization of local spatial variability.** To date, investigations of the distribution of reactive components at the particle size or local (up to several metres) scale have not been completed.
- **Characterization of reactivity and trends in reactivity under field conditions.** Currently, there is limited understanding of how reaction rates estimated under laboratory conditions relate to field conditions. These include important factors such as the rates of oxidation (effect of temperatures), effects of oxygen limitation in waste rock, behaviour of encapsulated rock and rate of depletion of acid neutralizing minerals.

3.2.2 Operational Procedures

The documents reviewed did not indicate the operational procedures for management of waste rock and particularly the segregation of sulphide rock at Faro and Grum. It is likely that such documents exist at least for the latter part of mining when segregation of reactive rock types was implemented. However, these documents do not appear to have entered the public domain. SRK contacted former mine personnel to determine operational procedures but has not yet received any relevant documents.

3.2.3 Inventory of Rock Types

The Integrated Closure and Abandonment Plan (ICAP) prepared in 1996 by Curragh included a detailed effort to evaluate the composition of the waste rock at the Faro Site using historical mining records. The composition of 31 dump components, fill areas and stockpiles was estimated. The ICAP then used acid-base accounting

determinations and metal analyses to estimate the "acid generation potential" of each pile. The proportion estimates concluded that the sulphide rock content of the dumps varied from 0 to 100% (average 13%), but only four dumps (accounting for less than 10% of the 258 million tonnes of waste rock) were expected to contain no sulphide rock. A similar inventory is not available for the Vangorda Plateau mines.

A limitation of these estimates is that the mining records do not indicate where within each dump the rock was placed, and therefore the degree to which mixing of the various rock types occurred during mining. This is an important consideration because it determines the degree to which acid generated internally can be attenuated along flow paths prior to emerging as ARD. Surface waste rock mapping at the Faro Site completed in 1991 by Curragh (Rock Types in the Faro Minsite Waste Dumps; Fieldwork completed September 9-14, 1991; Report #WH9201) showed that sulphide rock types were repeatedly dumped at the same location either inadvertently as a result of dump truck scheduling or deliberately to create the segregated sulphide waste rock dumps. This general observation suggests the mining approach resulted in significant large pockets of sulphide rock rather than well mixed waste rock dumps.

3.2.4 Source Acidity and Metals Loadings

The ICAP included a detailed attempt to assign metal and acidity loadings to different sources although these are limited by the difficulty of extrapolating laboratory results to the field (Section 3.2.1, above) and the estimates of waste rock dump compositions (3.2.3). The loading model was not calibrated. Further review of this approach is planned as part of subsequent work.

3.3 Current Conclusions

Conclusions based on the review to date include:

1. The water monitoring database is possibly incomplete and is not easily used. The existing EQWin database needs to be converted to a current version and historical records should be input if missing.

2. The rock testing database includes static testing results for about 300 samples and several kinetic tests. The main limitation of the database relates to how the test results relate to the relatively complex sulphur and carbonate mineralogy, and how predictions and weathering rates can be related to site conditions.

3. No documents describing operational waste rock management practices were identified.

4. A fundamental limitation of the inventory of rock types in the various waste rock dumps is that the degree of mixing of wastes is not understood. Surface mapping completed by Curragh in 1991 indicates significant pockets of sulphide rock were probably created.

4. PHASE 2 - TASKS COMPLETED AND INITIAL RESULTS

4.1 Seep Surveys

4.1.1 Results

The results of the seepage surveys and location maps are presented and discussed in detail in Appendix C.

4.1.2 Findings

Seeps associated with the Faro Waste Rock Dumps showed a wide range of pH and zinc concentrations. The highest zinc concentrations (greater than 200 mg/L, and as high as 9.2 g/L) were associated with the ore stockpiles and mill area. High zinc concentrations were also associated with the sulphide cells on the Main Dump (up to 600 mg/L). A large number of seeps associated with the waste rock were acidic or partially buffered, and had zinc concentrations in the range of 20 to 100 mg/L. A moderate number of seeps at Faro had alkaline pH's, and zinc concentrations of less than 5 mg/L. These were associated with dumps that contained relatively little sulphide waste rock. Cadmium, cobalt, copper, iron, manganese and nickel concentrations in some of the seeps are at concentrations that significantly exceed receiving water quality criteria.

Seeps associated with the Grum Waste Rock Dumps had consistently neutral to alkaline pH's. Seeps draining to the southeast had zinc concentrations ranging from 2 to 4 mg/L and elevated sulphate concentrations. Seeps draining to the northwest had zinc concentrations ranging from undetectable to 0.028 mg/L, and generally lower sulphate concentrations. The seeps to the southeast were located below the sulphide cell, or below sulphidic waste identified in the SRK September 2002 surface mapping programs. A brief review of routine monitoring data from Grum suggests that zinc

and sulphate concentrations along the Southeast side of the dump have increased in the past few years. No other trace metals of concern have been detected in the Grum seepage to date.

Seeps associated with the Vangorda Waste Rock Dumps were acidic to partially buffered, and contained high to very high zinc concentrations (from 28 to 6,990 mg/L). Sulphate and zinc concentrations have increased since the routine seepage monitoring programs were initiated in 1994. Other trace metals significantly exceeding receiving water quality criteria in the Vangorda seepage include cadmium, cobalt, copper, iron, manganese and nickel. Cobalt and nickel are notably higher compared to acidic seeps at Faro.

4.2 Surface Waste Rock Mapping

4.2.1 Results

Surface mapping was completed in the following areas:

- Faro Site (see Appendix D.2)
  - Main and Intermediate Dump – lifts accessible from the Vangorda Plateau Haul Road, lifts accessible from the dump haul roads, and some accessible uppermost lifts.
  - Zone II East Dump
  - Northeast Dump
  - Lower and Middle Northwest Dump
  - Part of Upper Northwest Dump
- Grum (see Appendix D.3)
  - Main Dump
- Vangorda (see Appendix D.4)
  - One lift face above Little Creek Pond

Mapping in the Grum area was limited by the lack of suitable topographic base maps to provide landmarks. Maps were prepared generally using GPS survey waypoints and tracklines along toes and crests of individual lifts.

Three hot spots were located at Faro Intermediate Dump (Appendix D.6).

4.2.2 Findings

The maps of the Main and Intermediate Dumps indicated the dominant exposed rock type is schist of the type porphyroblastic biotite muscovite andalusite schist (Unit 1D). Significant deposits of sulphide rock (Unit 2) were found in the location of the sulphide waste rock cell along the boundary between the dumps, in the lower lift along the east edge, and at least six other locations unrelated to known sulphide rock disposal. A large area of free-dumped calc-silicate schist (Unit 3D0) was located on the middle lift surface in the northern part of the Main Dump.

Porphyroblastic biotite muscovite andalusite schist (Unit 1D) was also an important component of the Zone II and Northeast Dump but it was also intimately mixed with calc-silcate schist. Sulphide rock was less exposed in this area. This was consistent with the lower proportion of sulphide rock reported in the ICAP.

The exposed rock in the lower Northwest Dump was mixed Unit 1D, Unit 10 and Unit 5 (overburden). The middle and upper Northwest Dump had significant exposures of sulphide rock mixed with Units 1D and 10. These findings were not consistent with ICAP proportions which indicated 7 to 10% sulphide rock throughout the Northwest Dump.

The main finding for mapping of the Grum Waste Dump was that the various phyllites are dominant but mixed sulphide rock occasionally occurs up to a few percent. Mapping along the upper lift in the general location of the sulphide cell indicated local exposures of high concentrations of sulphide rock (10% to 100%) (Appendix D.4). This suggests either that the sulphide cell was not completely incapsulated or that segregation of rock types was not effective.

Limited mapping in the Vangorda Dump confirmed the widespread presence of blocky siliceous massive to semi-massive sulphide waste rock. Carbonates in this rock were iron stained.

Results of 75 contact tests on field samples are provided in Appendix D.5 and summarized in Table 4.1. The latter showed results grouped by primary rock type. Most samples consisted of a mixture of rock types including a second major rock type and a minor rock type. Contact pH and electrical conductivity were highly variable for all rock types (except 5D at Grum) including low pH and high conductivity and vice versa. In some cases, low pH results are expected (eg. the sulphide units at both Faro

and Vangorda Plateau). In other cases, the observed presence of minor amounts of sulphide rock also could explain the lower pHs. However, in about ten samples, the low pH and elevated conductivity are not explainable. Although this may occasionally be attributed to mapping error, it is also likely that the low buffering capacity of some rock types and sulphides in the fines results in acidic conditions. These results suggest that net acidic conditions are more widespread than indicated by the bulk characteristics of the observable rock types.

TABLE 4.1
Summary of Field Contact Test Results for Surface Samples

Area(s)	Waste Rock Dumps	Primary Rock Type	Statistic	pH s.u.	EC mS/cm
Faro	*Main, Intermediate, NW*	*1D (Schist)*	Minimum	8.2	0.1
			Median	7.3	0.9
			Maximum	2.6	5.2
			Number	18	18
Faro	*Main, Intermediate, NW*	*2 (Sulphide Rock Types)*	Minimum	5.4	1.0
			Median	2.8	2.6
			Maximum	2.3	5.0
			Number	7	7
Faro	*Main, Intermediate, NW, NE*	*3DO (Calc-Silicate Schist)*	Minimum	8.2	0.0
			Median	7.4	0.3
			Maximum	3.6	3.6
			Number	5	5
Faro	*NE*	*5 (Glacial Till)*	Minimum	7.5	0.2
			Median	6.5	5.4
			Maximum	3.5	5.6
			Number	3	3
Faro	*Main, NW, NE*	*10F (Quartz Feldspar Porphyry)*	Minimum	8.5	0.1
			Median	7.5	0.2
			Maximum	3.1	0.5
			Number	5	5
Grum, Vangorda		*3G0 (Non-Calcareous Phyllite)*	Minimum	7.8	0.4
			Median	7.2	2.0
			Maximum	2.2	5.8
			Number	5	5
Grum, Vangorda		*4 (Sulphide Rock Types)*	Minimum	7.0	0.2
			Median	5.3	2.0
			Maximum	2.2	7.7
			Number	7	7
Grum, Vangorda		*5A0 (Carbonaceous Phyllite)*	Minimum	8.6	0.1
			Median	7.2	0.9
			Maximum	4.3	3.6
			Number	8	8
Grum, Vangorda		*5B0 (Calcareous Phyllite)*	Minimum	8.5	0.1
			Median	7.6	1.0
			Maximum	3.5	3.0
			Number	10	10
Grum		*5D (Chlorite Phyllite)*	Minimum	8.7	0.1
			Median	8.4	0.3
			Maximum	8.0	1.1
			Number	6	6
Vangorda		*Till*	Result	3.2	2.5
			Number	1	1

4.3 Test Pits and Trenches

4.3.1 Results

Faro

Forty-one test pits and nine trenches were excavated in the Faro waste dumps (Appendic E.1). From these, a total of 84 samples was recovered. Descriptions and photographs of the Faro test pits are provided in Appendix E.2. Complete descriptions of the samples, including results of the field contact tests are provided in Appendix E.6.

Table 4.2 summarizes samples collected by area. In general, waste rock at Faro was strongly weathered and oxidized compared to waste rock at Grum and Vangorda. The only material with any physical resistance to weathering was the calc-silicates.

TABLE 4.2
Summary of Faro Test Pits and Trenches by Area

Area	Test Pits	Trenches	Samples	Samples Collected
Faro Valley North (FVN)	5	-	8	oxidized schists and phyllites with sulphides (5), sulphides (1), intrusives (1), till (1).
North East Dumps (NEU and NEL)	6	2	11	calc-silicates (4), intrusives (3), till (2), phyllite (1), and schist (1)
Zone II East (ZIIE)	1	2	5	schist (3), calc-silicate (1), and intrusives (1)
Intermediate Dump (ID)	3	2	9	sulphides (4), schist (2), intrusives (2), and calc-silicates (1).
Ore Stockpiles (GSPA, GSPC, OXSP, MGSP, CHSP).	6	-	11	strongly oxidized sulphides (11)
Main Dump East (MDE).	7	2	15	schist (9), calc-silicates (4), intrusives (2).
Northwest Upper (NWU)	4	-	8	intrusives (4), sulphides (3), siliceous phyllite with pyrite (1). Sulphides were in stockpiles.
Northwest Middle (NWM)	5	-	9	schist (6), calc-silicates (2), calc-silicate/schist (1)
Upper Parking Lot (UPL)	4	-	5	calc-silicates (4), till (1)
Outer Haul Road East (OHRE)	1	-	2	calc-silicates (1), calc-silicate/schist (1)

Schists and phyllites (Unit 1) were the most common types of rock encountered in the Faro waste dumps, comprising 34% of the samples. Approximately half of these samples had acidic paste pH's (ranging from 1.8 to 5.9, while the remainder were in the neutral to alkaline pH range (pH 6.0 to 8.4). Rinse conductivities were highest in the acidic samples (up to 6,430 µS/cm). These materials were typically strongly weathered and often oxidized, with colours ranging from grey to orange.

Calc-silicates (Unit 3D0) comprised 23% of the samples. These samples were typically blocky and fresh in appearance. All pure samples of calc-silicates had neutral to alkaline rinse pH's (pH 6.8 to 8.4), and low to moderate rinse conductivities (213 to 1,118 µS/cm). Calc-silicates mixed with schist or sulphides (3 of the samples) tended to have higher rinse conductivities, and in one case, a rinse pH of 5.2.

Intrusive rocks (diorite, Unit 10E; and quartz feldspar porphyry, Unit 10F) comprised 15% of the samples. These were typically weathered to a coarse sand-like material, and were often pink to brown-coloured. Three of these samples were strongly acidic (pH less than 4), with high rinse conductivities (greater than 3,000 µS/cm), and the remainder were near neutral with typical rinse conductivities of <1000 µS/cm.

Sulphide rock (Unit 2) comprised 23% of the samples, with the majority originating from ore stockpiles or sulphide waste piles (eg. on the upper Northwest dump). Sulphides were also encountered in the Faro Valley Dump, and the Intermediate Dump. This material was typically strongly oxidized and weathered with a high proportion of fines and efflorescent salts were observed in several of the samples. Rinse pH's for these samples were typically acidic, with fourteen of the samples below pH 3, and the remainder ranging from 3.5 to 6.5. Rinse conductivites were very high, reaching over 14,000 µS/cm in some of the more acidic samples.

Till comprised 5% of the samples. The till exhibited a wide range of characteristics, and had rinse pH's ranging from 2.0 to 6.9. The low pHs suggested that the till contained sulphide rock.

Grum

Twenty-three test pits and six trenches were excavated in the Grum waste dumps (Appendix E.1). From these, a total of 47 samples was recovered. Descriptions and photographs of the Grum test pits are provided in Appendix E.3. Complete descriptions of the samples, including results of the field contact tests are provided in Appendix E.6.

Ten of the test pits (GTP01 through 10) were located on the three lower benches of the Main dump, southeast of the sulphide cell. Samples from these pits included grey calcareous phyllites, greenish grey chloritic phyllites (also calcareous), and grey non-calcareous phyllites. One test pit contained approximately 10% sulphides and pyritic non-calcareous phyllites. Most of the material was fresh in appearance, with relatively little iron staining, and was relatively fine-grained, with typically greater than 50% occurring as fines (<1 cm). With the exception of the pyritic sample, these samples had neutral to slightly alkaline rinse pH's (7.3 to 8.4), and low to moderate rinse conductivities (369 to 1,540 μS/cm), indicating minor oxidation had occurred under pH buffered conditions.

One test pit (GTP11) was located east of the core shacks on the approach to the sulphide dumps. This sample consisted of calcareous chloritic phyllite, with similar characteristics to the phyllites in the Main dump.

The area of the sulphide cell was completely covered by free dumps, and was inaccessible to the back hoe.

Eight of the test pits and four trenches (GTP 14 through 23) were located in the upper two lifts of the waste dump (with access from the core shack area). Samples from these pits and trenches were similar to samples from the Main dump, including chloritic phyllite, calcareous phyllite and non-calcareous phyllite. Four of the samples also contained significant amounts of sulphide rock (>5%). Samples were generally fresh in appearance, with minor and localized iron staining present in only a few of the test pits, and significant oxidation in only one pit (GTP21). Rinse pH's were typically in the neutral to slightly alkaline range (6.2 to 8.3). However, one sample had an acidic rinse pH of 4.9. Rinse conductivities were generally low to moderate, ranging from 345 to 1,897 μS/cm, indicating minor oxidation had occured under pH buffered conditions.

Two test pits and two trenches were located in the "Southwest dump" (located in the Northwest portion of the dump). The majority of these samples were calcareous phyllites, with neutral rinse pH's and low to moderate rinse conductivities (307 to 998 µS/cm). However one sample (GTP27A) was mixed with a till like material, and had significantly higher rinse conductivity (3,787 µS/cm). This latter material was observed during the surface mapping in free dumped piles along the access road in this area, and was typically encrusted with a white precipitate.

Two test pits were excavated in the ore transfer pad. Samples from this area consisted of a mixture of sulphide minerals, including substantial amounts of sphalerite. Paste pH's were in the range of 5.5 to 5.7, and rinse conductivities ranged from 1,300 to 4,000 µS/cm, indicating the presence of soluble oxidation products.

Vangorda

A total of fifteen test pits and one trench was excavated in the Vangorda waste dump (Appendix E.1). From these, a total of 27 samples was recovered. Descriptions and photographs of the Vangorda test pits are provided in Appendix E.4. Complete descriptions of the samples, including results of the field contact tests are provided in Appendix E.6.

Eleven of the test pits and the one trench were excavated in waste rock. Samples recovered from these pits included phyllite (Unit 3G0), oxidized phyllite, graphitic phyllite (Unit 5A0), pyritic phyllite, and oxidized sulphide rock (Unit 4). The waste rock was generally fine grained, typically with greater than 50% of the material finer than 1 cm. Rinse pH's ranged from 3.1 to 6.9, with the lowest values in the oxidized phyllite, and highest in the graphitic phyllite. Paste pH's in the pyritic phyllite and sulphide samples ranged from 5.7 to 6.4. Rinse conductivities were consistently elevated, ranging from 1182 µS/cm to 5900 µS/cm, with the highest values occurring in samples with the lowest pH's. The majority of the samples did not react or reacted only slightly to a 10% solution of hydrochloric acid, indicating that they did not contain appreciable amounts of reactive carbonate minerals. Sulphides were noted in several of the samples.

Two of the test pits were in the baritic fines pile (VTP 11 and 12). These pits showed a distinct oxidation front, with orange staining to a depth of 25 cm, and dark grey

material below that depth. Samples collected below the visible oxidation front had rinse pH's of 3.8 and 4.1, and rinse conductivities of 4,610 and 6,390 μS/cm.

Two of the test pits were excavated in the till stockpile (VTP 14 and 15). Both pits consisted of a grey clay cobble till, overlying oxidized waste rock mixed with till. The grey till had rinse pH's of 7.8 (both samples), and rinse conductivities of 402 and 1,642 μS/cm. The oxidized material had rinse pH's of 2.9, 3.4 and 5.1, and rinse conductivities of 2,610, 4,750, and 4,670 μS/cm.

Haul Road

Five test pits were excavated along the haul road between Vangorda Plateau and Faro. Samples recovered from these pits included calc-silicates, biotite schist, chloritic schist, quartz porphyry, till, and phyllite mixed with sulphides. Significant amounts of sulphide were observed in one of the pits, and minor amounts of sulphides were observed in two others. Most of the samples had rinse pH's in the neutral to slightly alkaline range. However, the sample with significant amounts of sulphide had a rinse pH of 5.9. Rinse conductivities ranged from 200 to 3,200 μS/cm.

4.3.2 Findings

Faro

Test pits in the Faro dumps typically encountered schists, calc-silicates, or intrusive rocks. Pockets of pure sulphides occurred in only a few of the test pits in waste dump areas. Most of the sulphides were found in sulphide stockpiles (e.g. on the Northwest dump), or ore stockpiles. Till was identified in four of the test pits.

Several of the schist samples and most of the sulphide samples were strongly oxidized, with acidic rinse pH's and elevated rinse conductivities. A small proportion of the intrusives also had acidic rinse pH's. The calc-silicates were typically fresh in appearance, and had neutral to alkaline rinse pH's.

Grum

Test pits in the Grum dumps typically encountered calcareous or non-calcareous phyllites, with relatively few sulphides. There was relatively little iron staining evident, and rinse conductivities were typically below 1000 μS/cm indicating

relatively little oxidation has occurred since deposition. Sulphides were present in five of the test pits located outside of the designated sulphide cell. Four of these were on the uppermost lift of the dump.

Test pits in the ore transfer pile encountered a mixture of sulphides, including some ore minerals. Some oxidation of the sulphides was evident, with acidic rinse pH's and elevated rinse conductivities in the samples collected.

Vangorda

The test pits at Vangorda indicate that the majority of the waste rock is comprised of non-calcareous phyllites, pyritic phyllites and sulphides. Oxidation was evident in most of the test pits. Rinse tests indicate that soluble oxidation products are present in all of the samples, and that several samples were acidic, with pH's of less than 6.

Test pits in the baritic fines pile indicated a distinct oxidation front, with iron staining to a depth of 25 cm. Samples from below that depth had acidic paste pH's and high rinse conductivity values, indicating oxidation products were present. The lack of iron staining in the deeper samples could be indicative of a change in redox conditions resulting in a shift from ferric iron in the near surface samples to ferrous iron at depth.

Test pits in the till stockpile indicated oxidized and mineralized rock and till was present below a relatively clean grey cobble till. This oxidized material may reflect mineralized rock and till removed during pre-stripping of the pit.

Haul Road

Sulphide minerals were present in three of the five test pits, and comprised a significant portion of the material in one of these pits. This is contrary to expectations that the haul road was deliberately constructed using non-acid generating rock, and suggests that further investigation work may be necessary along the haul road. The types of rock encountered along the haul road were primarily from the Faro pit.

4.4 Waste Rock Drilling

4.4.1 Results

Seven boreholes were completed as summarized in Table 2.1 and shown in Figures 4.1 to 4.3. Borehole logs and construction details are provided in Appendix F.

The number and depth of sampling ports installed in each borehole are summarized below ("dup" indicates duplicate tubing was installed):

- 10 m drillholes
  - 10M-2: 0.7 m, 1.4 m (dup), 2.8 m (dup), 5.6 m (dup), 10 m.
  - 10M-3: 0.7 m (dup), 1.4 m (dup), 2.8 m (dup), 5.6 m (dup), 10 m (dup).
  - 10M-4: 0.7 m, 1.4 m, 2.8 m, 5.6 m, 10 m.

- 30 m drillholes
  - 30M-1: 0.7 m (dup), 1.4 m (dup), 2.8 m (dup), 5.6 m (dup), 10 m (dup), 20 m (dup), 30 m.
  - 30M-3: 0.7 m (dup), 1.4 m (dup), 2.8 m (dup), 5.6 m (dup), 10 m (dup), 20 m (dup), 30 m (dup).
  - 30M-4: 0.7 m (dup), 1.4 m (dup), 2.8 m, 5.6 m (dup), 10 m (dup), 20 m, 30 m.

- 60 m drillhole
  - 60M-1: 0.7 m (dup), 1.4 m (dup), 2.8 m (dup), 5.6 m (dup), 10 m (dup), 20 m (dup), 30 m, 40 m, 60 m.

4.4.2 Findings

4.4.2.1 Faro Site

60M-1 was drilled in the area of segregated sulphide rock disposal. Siliceous sulphide rock (up to an estimated 20%) was encountered almost immediately to a depth of 26 metres. The sulphide rock was mixed with calc-silicate schist (3D0) and grey schist (1D). Below 26 m, sulphide rock was not noted and generally calc-silicate schist was the most abundant rock type.

30M-1 was drilled near the edge of Intermediate Dump in an area of extensive surface exposures of Unit 1D. Above 24 m, the dominant rock type was calc-silicate gneiss. At 24.5 m, hard ground (possibly a traffic surface) was encountered and below this variable amounts (5% to 50%) of sulphide rock were encountered.

4.4.2.2 Grum Site

10M-2 and 10M-3 were both drilled outside the expected area of sulphide rock disposal. Non-calcareous phyllites was encountered throughout both bore holes.

30M-3 was drilled where sulphide deposition occurred. From surface to 11 metres depth, the rock consisted of mostly weakly to non-calcareous phyllite. At a depth of 11 metres, massive sulphide rock was logged mixed with grey phyllite and pyrite phyllite. From this depth to 30 m, patchy occurrences of pyritic phyllite and oxidized pyrite mixed with non-pyritic phyllite were logged.

4.4.2.3 Vangorda Site

10M-4 intersected mostly sulphide waste rock containing both pyrite and pyrrhotite.

In contrast, 30M-4 intersected pyritic quartzite at surface, then phyllites to a depth of 20 m. From 20 m to 30 m, the waste rock was granitic with 10-20% sulphide waste rock.

4.5 Bulk Water Samples

Bulk water samples were collected from the Vangorda, Grum and Faro pits for chemical analysis. The water samples from the Faro and Grum Pits were collected from the shore of the pit in about 0.3 to 0.5 m of water. The sample at the Faro Pit was recovered at the bottom of the access ramp at the southeast end of the pit water. The Grum Pit sample was collected at the bottom of the access ramp along the southwest end of the pit water. The water sample at the Vangorda Pit was recovered from the end of the floating platform that is used for a pumping system. It is located at the southeast end of the pit. This water sample was obtained within the surficial 0.5 m of the pit water.

The three bulk water samples were all collected on October 11, 2002. The water samples were transported to Whitehorse before being shipped by air to Canadian Environmental and Metallurgical laboratory in Vancouver.

5. SUMMARY AND INITIAL CONCLUSIONS

A summary of activities and initial conclusions reached are provided for each aspect of the project below.

5.1 Phase 1 – Review

Based on a review of approximately 140 documents, the following initial conclusions have been reached:

1. The water monitoring database is possible incomplete and is not easily used. The existing EQWin database needs to be converted to a current version and historical records should be input if missing.

2. The rock testing database includes static testing results for about 300 samples and several kinetic tests. The main limitation of the database relates to how the test results relate to the relatively complex sulphur and carbonate mineralogy, and how predictions and weathering rates can be related to site conditions.

3. No documents describing operational waste rock management practices were identified.

4. A limitation of the very detailed inventory of rock types in the various waste rock dumps is that the degree of mixing of wastes is not understood. Surface mapping completed by Curragh in 1991 indicates significant pockets of sulphide rock were probably created.

5.2 Phase 2 – Site Investigations

Seeps Surveys

- Seep surveys were completed in June and September 2000.
- A wide range of seepage chemistry (acidic to alkaline and orders-of-magnitude differences in zinc concentrations) were found at the Faro Site.

- Alkllaine pHs and low zinc concentrations originate from waste dumps containing low sulphide rock proportions.

- Seepage from the Grum waste rock dump is non-acidic and has relatively low zinc concentrations compared to Faro
  - Review of historical monitoring data indicates that zinc concentrations are increasing.

- Seepage from the Vangorda waste rock dump is strongly acidic to near neutral but associated with high zinc concentrations.
  - Sulphate and zinc concentrations have increased since monitoring began in 1994.

Surface Mapping

- Reconnaisance style 1:5000 maps of surface waste rock exposures were prepared for most of the Faro Site, the Grum Site and a small part of the Vangorda Site.

- Mapping at the Faro and Grum site indicated that sulphide rock occurs mixed with other rock types outside areas of defined sulphide deposition and that sulphide pockets exist at scales of tens of metres.

- Seventy-five contact tests showed that acidic conditions can exist in any mixture of rock types, and that the lithological cause of the acidity is not always apparent.

- Three hotspots were mapped at the Intermediate Dump after the first snowfall in October.

Test Pits

- Test pits in the Faro dumps typically encountered schists, calc-silicates, or intrusive rocks.
  - Pockets of pure sulphides occurred in only a few of the test pits in waste dump areas.

- Test pits in the Grum dumps typically encountered calcareous or non-calcareous phyllites, with relatively few sulphides.

- Sulphides were present in five of the test pits located outside of the designated sulphide cell. Four of these were on the uppermost lift of the dump.

- Test pits in the Vangorda dumps indicated that the majority of the waste rock is comprised of non-calcareous phyllites, pyritic phyllites and sulphides.
  - Rinse tests indicate that soluble oxidation products are present in all of the samples, and that several samples were acidic, with pH's of less than 6.

- Five test pits in the Vangorda Plateau Haul Road indicated sulphide rock at three locations, and significant sulphide rock at one location.
  - These findings suggest that segregation of "clean rock" for road construction was partially ineffective.

- Over 160 samples were collected from test pits.

Drilling

- Seven boreholes were completed (Faro – 2; Grum – 3; Vangorda – 2) to investigate deep waste rock dump composition, and install instruments to monitor internal temperatures and pore gas composition.

- The presence of sulphide waste rock was confirmed at the location of segregated sulphide rock cells in the Intermediate Dump and Grum Dump.

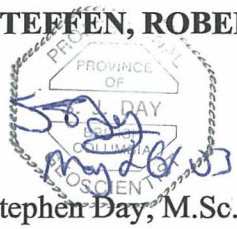
- Sulphide rock was also logged in the Intermediate Dump outside the area of sulphide rock disposal.

6. FURTHER WORK

Static and kinetic testing were implemented based on the information gaps identified by the review and the needs for eventual revision of the site wide water quality predictions and assessment of remedial measures. Static testing was completed, and kinetic testing is ongoing.

This report, **1CD003.11 - Geochemical Studies of Faro and Vangorda/Grum Waste Rock - Progress Report on Phase 1 and 2** has been prepared by:

STEFFEN, ROBERTSON AND KIRSTEN (CANADA) INC.



Stephen Day, M.Sc., P.Geo.
Principal Geochemist

pp Daryl Hockley
Principal, Review

FIGURES

6914500 N
356500 E
6914500 N
357500 E
6914500 N
358500 E

60M-1

30M-1

6913000 N
356500 E
6913000 N
357500 E
6913000 N
358500 E

Legend

● 60M-1 Borehole Location

100 0 200 400 600 Feet

100 0 100 200 300 Metres

NAD 27 DATUM
Contour Interval = 10 ft.

File Ref: FaroPit-Metric.dwg

SRK Consulting
Engineers and Scientists

DELOITTE & TOUCHE INC.

FARO MINE SITE

LOCATION OF BOREHOLES
FARO SITE

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Nov, 2002		4.1

592,000 E

ORE TRANSFER PAD

ORE HAUL SHOP

ALEX ROAD

SHOP

6,905,000 N

591,000 E

BLASTER'S SHACK

NEW DITCH ROAD

250 mm DIA. BURIED PIPELINE FROM LITTLE CREEK TO WATER TREATMENT PLANT

LITTLE CREEK DAM

EMERGENCY SPILLWAY

10M-2

30M-3

10M-3

ROAD

LEGEND

10M-2 Borehole Location

0 100 200 300 400 500 600 700 800 900 1000m

Scale 1:10,000

NAD 27 DATUM

File Ref: Sample_plan-NAD27.dwg

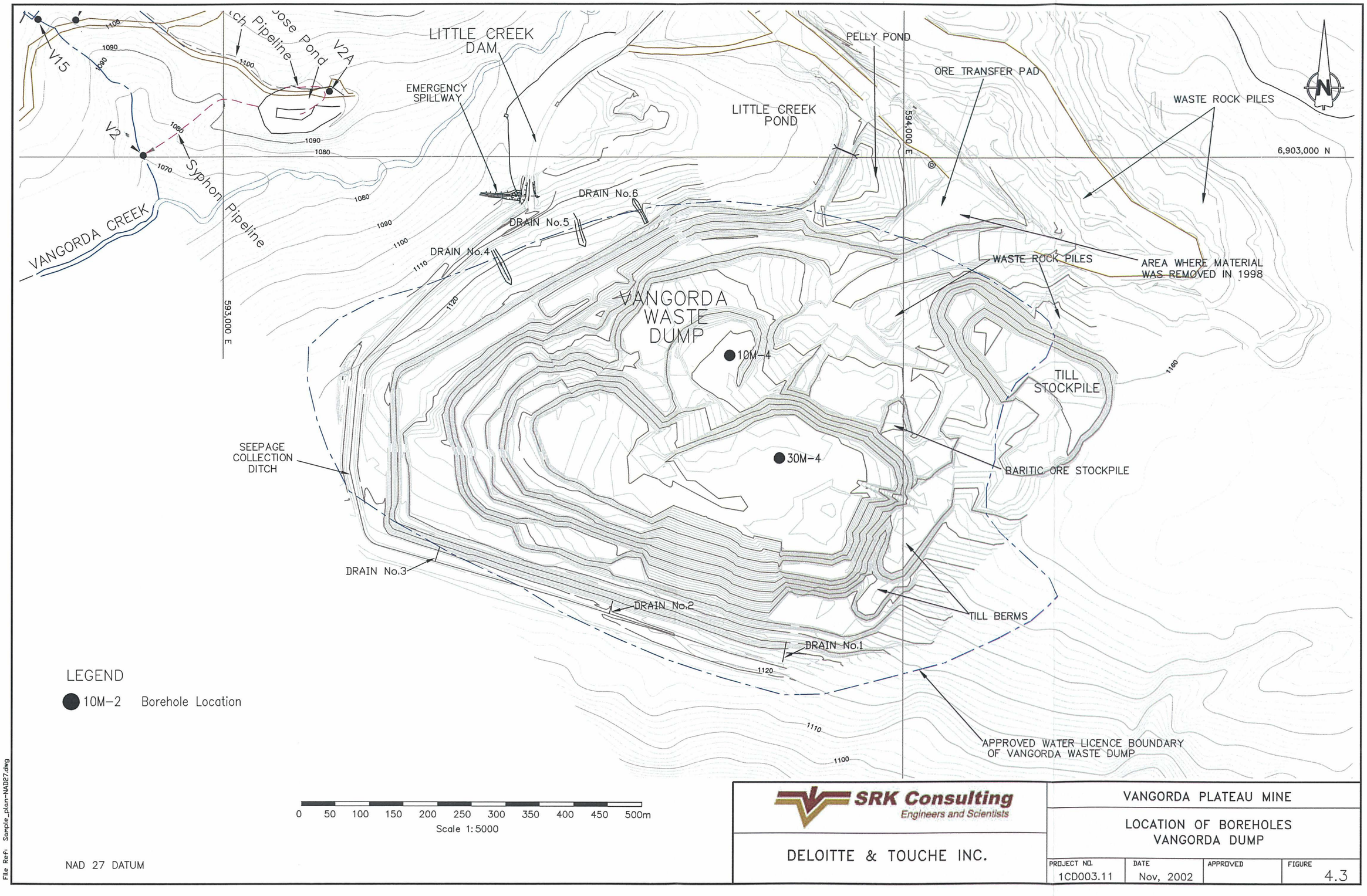
SRK Consulting
Engineers and Scientists

DELOITTE & TOUCHE INC.

VANGORDA PLATEAU MINE

LOCATION OF BOREHOLES
GRUM WASTE DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Nov, 2002		4.2



File Ref: Sample_plan-NAD27.dwg

SRK Consulting
Engineers and Scientists

DELOITTE & TOUCHE INC.

VANGORDA PLATEAU MINE

LOCATION OF BOREHOLES
VANGORDA DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Nov, 2002		4.3

APPENDIX A
Terms of Reference

APPENDIX A.1
Scope of Work Letter

SRK Consulting
Engineers and Scientists

Steffen Robertson and Kirsten (Canada.) Inc.
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August 8, 2002
Project Number: 1CD003.13

Deloitte & Touche Inc.
Suite 1400, BCE Place
181 Bay Street
Toronto, ON M5J 2V1

Attention: Valerie Chort
National Leader, Environment, Health & Safety Practice

Dear Ms. Chort:

Re: Tasks 3.2 & 4.2 – Geochemical Studies of Faro and Vangorda/Grum Waste Rock

SRK Consulting Inc. is pleased to submit this proposal to lead Tasks 3.2 and 4.2 of the work plan presented in the report on the Closure Alternatives Workshop, (Deloitte & Touche, April 2002). The task descriptions provided in the workshop report are:

> Task 3.2, Characterize Faro Waste Rock ARD Status & Potential - "Compile all previous studies of Faro acid rock drainage (ARD) and complete gap analysis. Subject to priorities arising from Task 3.1, carry out the following investigations to define current conditions and future ARD potential. Complete drillholes to sample waste rock and install temperature and gas monitoring devices. Sample rock from drillholes and test to confirm ARD potential mapped in the 1996 ICAP. Complete additional test pits to investigate changes since 1996 ICAP, characterize unmapped areas or dumps, and obtain samples for laboratory testing. Review all available seepage water quality data and carry out additional seep surveys. Carry out laboratory tests to determine acid-base accounts, stored soluble contaminant loads, and contaminant leaching rates. Include grain size analyses, permeability, compaction and other testing for geotechnical classification of selected samples. Prepare report summarizing geochemical tests. Prepare data report summarizing geotechnical testing."

> Task 4.2, Characterize Vangorda/Grum Waste Rock ARD Status & Potential – "Compile previous ARD studies and complete gap analysis. Subject to priorities arising from Task 4.1, carry out the following investigations to define current conditions and future acid generation potential. Complete drillholes to sample waste rock and install temperature and gas monitoring devices. Sample rock from drillholes and test to confirm ARD potential mapped in the 1996 ICAP and 1999 SRK pit lake study. Complete additional test pits to investigate changes, characterize unmapped areas (including the ore transfer area), and obtain samples for laboratory testing. Review all available seepage water quality data and carry out additional seep surveys. Carry out laboratory tests to determine acid-base accounts, stored soluble contaminant loads, and contaminant leaching rates. Include grain size analyses, permeability, compaction and other testing for geotechnical classification of selected samples. Include agricultural testing of Grum overburden. Prepare report summarizing geochemical tests. Prepare data report summarizing geotechnical testing.

The work plan has been developed based on information needs defined for conceptual management plans for the various areas. These are being refined by Tasks 3.1 and 4.1 (Scoping Studies), however, for the purpose of the Work Plan, the conventional remedial options considered were (i) "do nothing"; (ii) re-locate; (iii) cover; and (iv) collect and treat. The main objective of the geochemical studies will be to predict source water chemistry effects for each of the remedial approaches. The information obtained will provide input into other tasks including 3.5 and 4.5 (Water Quality Predictions), 3.7 and 4.7 (Waste Rock Cover Tests), and 3.9 and 4.9 in combination with results from tasks 3.4 and 4.4 (Water Balances).

The remainder of this letter presents our proposed work plan followed by a proposed schedule and cost estimate. To avoid repetition, subtasks that are parallel among the three tasks are combined in the description.

The sub-tasks are grouped into three phases.

Proposed Work Plan

Phase 1 - Review of Existing Information

Subtasks 3.2.1, 4.2.1 - Review of Existing Information

The objective of these sub-tasks is to review all the information currently available, most of which is contained in the documents supporting the Integrated Closure and Abandonment Plan (ICAP). Other sources of information are: site files, documents produced by various consultants and governments.

This review will need to be critical to ensure that full use is made of all the existing data, and that any data gaps are identified and addressed in subsequent phases. Particular aspects include:

- The adequacy of the existing geochemical database. This includes the degree to which sampling sufficiently represented the geological and geochemical variability, and the appropriateness of sampling and testing methods.
- The operational procedures used to segregate different rock types and possible sources of classification error.
- The inventory of rock types in each waste rock dumps and to what degree the rock types were mixed by operational handling (Faro and Vangorda).
- The loading of acidity and metals from various sources.

We recommend that key regulatory agencies also be contacted in the course of Phase 1, and asked to identify their concerns with previous ARD studies at the site. The engineer leading this task will be travelling to Whitehorse to review DIAND files, and could try to arrange meetings with DIAND, DFO, Environment Canada or other groups with an interest in this work. That step will initiate a consultative approach to the project.

Phase 1 will also include collection of local contractor bids for support of the subsequent field investigations, and development of a detailed plan for Phase 2.

Phase 2 – Initial Data Collection and Instrumentation of Waste Rock Dumps

Phase 2 will be initiated in September 2002. The objective will be to complete drilling and installation of monitoring instruments prior to freeze-up. However, depending on the results of Phase 1, it may prove more cost-effective to further subdivide Phase 2 (into 2a and 2b) and complete only the most critical items in September, with further field work deferred until next year, after the laboratory studies are completed.

Sub Tasks 3.2.2 and 4.2.2 - Seep Surveys

An initial detailed seep survey was completed in June 2002 immediately following spring freshet. A second seep survey would be completed in the early fall to characterize water chemistry under base flow conditions and maximum thawing of the active zone. Permanent flow monitoring stations may be installed to provide input to an update of the site load balance.

Sub Tasks 3.2.3 and 4.2.3 - Surface Waste Rock Mapping

Surface waste rock mapping and field geochemical characterization (pH, leachable metals and acidity) will provide an initial indication of the accuracy of the waste rock inventory reported in the ICAP and the weathering status of the various waste rock types (i.e. which rock types have begun to generate acid or are sources of leachable metals).

This work will be carried by two geochemists. They will start by defining the rock types of interest and examining each type until they can recognize them visually and/or with simple field tests. They will then walk along the crest and toes of waste rock piles and record the rock types on a map. For large flat areas, they will walk transects. The result will be a map showing what type of rock is on the surface of each area.

The process of mapping will also give the geochemists an oportuntity to examine how each rock type has behaved under exposure to air and precipitation - *i.e.* which rock has become acidic, which has remained neutral, which has broken down and which has remained competent. That information is helpful in interpreting how the rock that is more deeply buried (and less exposed to air and precip) will affect future water quality.

Sub Tasks 3.2.4 and 4.2.4 - Shallow Test Pits

Locations for test pits will be selected strategically to answer specific questions rather than to attempt to obtain statistically representative data. Information needs addressed by test pits include:

- *Collection of subsurface samples to investigate weathering status.* Samples will be collected for laboratory testing of acid generation potential
- *Estimate of the stored acidity and metal load in waste rock.* This information will be needed to determine how much lime might need to be added to waste rock when backfilled into flooded pits, and to estimate the potential for of contaminants from any re-sloping of the dumps.
- *Further evaluation of the accuracy of the waste rock inventory reported in the ICAP.*
- *Investigation of the degree of mixing of different rock types.* This information is needed to see if there are large pods of reactive rock, or whether the reactive rock has been thoroughly mixed with acid consuming rock. This is a factor in the potential for long term degradation of water quality and opportunities for segregation of waste rock during re-handling.

Test pits will be excavated by a small rub-tired equipment, under supervision of an SRK geologist. If it is possible and convenient for the site staff, site equipment will be used. Otherwise a local contractor will be arranged.

Sub Tasks 3.2.5 and 4.2.5 - Deep Large Scale Trenches

Shallow test pits are limited by their depth and the scale of the opening. A few large scale trenches will be considered to evaluate degree of mixing. The larger test pits will probably require site equipment or a contractor with a track-mounted backhoe, again under supervision of an SRK geologist.

Sub Tasks 3.2.6 and 4.2.6 - Waste Rock Drilling

Waste rock drilling will be used to extend the subsurface investigation to greater depths but will be limited by the cost and nature of drilling and small size of the opening. Specific information gathered by drilling will include:

- *Evidence of chemical layering effects such as decrease in degree of oxidation at depth.*
- *Variation of geochemical characteristics within the waste rock.*
- *Evidence of perched water and ice formation*

Drillholes will also allow installation of piezometers, oxygen monitors and thermistor strings. These will indicate, for example, whether oxidation is occurring deep within the waste rock and the possible effects of propagation of permafrost into the waste rock. The instrumentation will be designed to collect the additional information needed for the dump water balances.

Drilling will be completed by a contractor probably using air rotary or a hammer drill, under supervision of SRK.

Sub Tasks 3.2.7 and 4.2.7 - Collection of Bulk Water Samples

As part of the investigation of backfilling of waste rock into pits, bulk water samples will be collected for experiments to characterize the reaction of pit water with waste rock

Sub Tasks 3.2.8 and 4.2.8 - Reporting

A progress report will be prepared to describe the complete results of Phase 1 and available results from Phase 2.

PHASE 3 – Laboratory Testing

Sub Tasks 3.2.9 and 4.2.9 - Testing

Laboratory testing will continue through the late fall of 2002 and winter of 2002-2003. Planned testing includes:

- Analysis of water samples

- Tests of acid generation potential.
- Tests of stored acid and metal load in waste rock.
- Determination of alkali requirements for stored acid and metal load in waste rock.
- Investigation of field testing methods to be used when re-handling waste rock.
- Reaction of backfill with pit water.
- Kinetic tests.

Laboratory tests will be designed by SRK and bids to carry out the tests will be requested from at least two Vancouver-area laboratories that specialize in ARD studies.

Cost Estimate

A cost estimate for the project is shown in Table 1.

Only the cost estimate for Phase 1 (Subtask .1) is firm. The estimates for the field and laboratory programs (Phases 2 and 3, Subtasks .2 through .9) are provided only to demonstrate that it will be possible to meet the project objectives in the budgeted amount. All contractor and laboratory costs have been included. More detailed estimates will be prepared during Phase 1, once the particulars of the field program are defined and subcontractor quotes are available.

The estimate does not include GST.

Project Personnel

The project will be coordinated by Daryl Hockley. Other participants in the tasks will include:

- Stephen Day, P.Geo., a Senior Geochemist with SRK who has over 13 years of experience in mine waste geochemistry and 17 years of experience in geochemistry.
- John Chapman, P.Eng, a Senior Chemical Engineer with SRK who has over 15 years of experience in mine waste geochemistry
- Kelly Sexsmith, P.Geo. a Senior Environmental Geochemist with SRK who has six years of experience in mine waste geochemistry.

Field work will be completed with the assistance of staff or contract geologists coordinated by the above SRK personnel. The cost estimate also allows for the above geoscientists and

engineers to be assisted by technical or support staff, for example for copying documents and preparing drawings.

Proposed Schedule

Phase 1 will be initiated in mid-August 2002. Phase 2 activities are primarily slated for September. The Phase 1 and 2 report (Subtask 3.2.8/4.2.8) will be completed by mid-October. Phase 3 analytical work will competed mostly in October but longer term testing will proceed through to December 2002. Longer term testing and long term monitoring of the instrumentation are not included in this proposal. (They are covered by separate tasks in the plan developed at the Closure Alternatives Workshop.)

Thank you for the opportunity to present this proposal.

Sincerely,
STEFFEN ROBERTSON AND KIRSTEN (CANADA) INC.



Daryl Hockley, P.Eng.
Principal

Table 1
Cost Estimates for Tasks 3.2 and 4.2,
Geochemical Studies of Faro and Vangorda/Grum Waste Rock

Task	Task Description	Professional Fees								Disbursements									
		DH	SD	JTC	KSS	Geo1	Geo2	Support	Subtotal	Air Travel	Auto Rental	Rooms & Meals	Eqpt.	Analysis	Office	Drilling	Excavator	Subtotal	Totals
.1	Review of Existing Information	8	16	120	24				$24,560						$0			$0	$24,560
.2	Seep Surveys	2			100	100			$18,350	$3,600	$1,000	$1,800	$800	$20,000	$0			$27,200	$45,550
.3	Surface Waste Rock Mapping	2			50	100	100		$19,100		$1,000				$0			$1,000	$20,100
.4	Shallow Test Pits	2	100				50		$18,600	$3,600	$1,000	$2,250	$1,300		$0		$6,500	$14,650	$33,250
.5	Deep Large Scale Trenches	2		50					$7,850			$750			$0		$15,000	$15,750	$23,600
.6	Waste Rock Drilling	2				100			$6,850		$1,000	$1,500	$1,000		$0	$130,000		$133,500	$140,350
.7	Collection of Bulk Water Samples	2			20				$2,650			$300			$0			$300	$2,950
.8	Reporting	16			80	80	80	100	$28,400						$0			$0	$28,400
.9	Testing	2			32				$4,030					$42,000	$0			$42,000	$46,030
	Total hours	38	116	170	306	380	230	100											
	Hourly rate	$175	$150	$150	$115	$65	$65	$60											
	Item totals	$6,650	$17,400	$25,500	$35,190	$24,700	$14,950	$6,000	$130,390	$7,200	$4,000	$6,600	$3,100	$62,000	$0	$130,000	$21,500	$234,400	
	Project total (not including GST)																		**$364,790**

Notes:
DH - Daryl Hockley (Principal Review)
SJD - Stephen Day (Principal Geochemist)
KSS - Kelly Sexsmith (Senior Environmental Geochemist)
Geo1 - Staff Geocehmist
Geo2 - Staff or Contract Geologist
Support - Word Pro, Drafting
Office charge is percentage of professional fees -3%
Handling charge is a percentage of Sub fees 0%

APPENDIX A.2
Project Design

SCOPE FOR FARO GEOCHEMICAL STUDIES

7/31/2002 16:19

FACILITY	ISSUE	REMEDIAL OPTION	INFO NEEDS	STUDIES
Underground	Flooded	Do nothing	Evaluate SRB for water treatment	Groundwater Monitoring
Pits	PAG walls, particularly highwall	Collect and treat	Loading study to detemine significance	Loading study
			Water quality of pit	Review previous predictions New predictions if warranted
		Cover	Feasibility	Source of cover materials Geotechnics
Waste Rock	AG LGO and Oxide Fines	Backfill to Pit	Stored acidity/lime rqt	Trenching/Drilling/Lab tests
			Field tests for lime rqt	Lab tests on samples from drilling etc.
			Pit capacity	Hydrology study
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
		Covers	Oxidation Rates	O2, T monitoring in situ Review existing kinetic tests New kinetic tests
			Infiltration rates	Hydrogeology study
		Consolidate at one location	Site selection	Engineering
			Engineering design	Engineering
		Processing	Metallurgy	Review existing studies Metallurgy Marketability
		Water Treatment	Water quality prediction	Above studies
			Treatment process	Lab tests on water samples
	PAG and marginal PAG Waste Rock	All	Will acid generation occur?	Review existing data and methods (ICAP) Drilling/Trenching to follow-up Large scale trenching New kinetic tests
			Is acid generation occurring already? When will acid generation occur?	Seepage monitring Groundwater monitoring
			Chemistry of drainage	
			Contribution of different sources to prioritize	Loading study
			Fate of pore water	Groundwater Monitoring
		Backfill to Pit	Stored acidity/lime rqt	Trenching/Drilling/Lab tests
			Segregation opportunities	Review of rock handling practices Large scale trenching/mapping to determine in situ character
			Field tests for segregation, lime rqt	Lab tests on samples from drilling etc.
			Pit capacity	Hydrology study
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
		Covers	Oxidation Rates	O2, T monitoring in situ Review existing kinetic tests New kinetic tests
			Infilttration rates	Hydrogeology study
		Water Treatment	Water quality prediction	Above studies
			Treatment requirement	

SCOPE FOR GRUM GEOCHEMICAL STUDIES

7/31/2002 16:19

FACILITY	ISSUE	REMEDIAL OPTION	INFO NEEDS	STUDIES
Pit	Mostly till in walls Pit water quality good so far?	Do nothing	Confirm water quality	Review existing data Review geology and geochem characteristics of wall Water balance
Waste rock	Most waste rock is calcareous phyllite	All	Confirm characteristics of rock	Review existing data and methods (ICAP) Drilling/Trenching to follow-up
			Water quality	Seep survey Groundwater monitoring
		Do nothing	Confirm waste rock is adequately mixed to prevent further water degradation	Review of rock handling and segregation practices Large scale trenching and surface mapping to determine in situ character
		Backfill to Pit	Stored acidity/lime rqt	Trenching/Drilling/Lab tests
			Segregation opportunities	Review of rock handling practices Large scale trenching/mapping to determine in situ character
			Field tests for segregation, lime rqt	Lab tests on samples from drilling etc.
			Pit (Grum/Vangorda) capacity	Hydrology study
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
		Covers	Oxidation Rates	O2, T monitoring in situ Review existing kinetic tests New kinetic tests
			Infilttration rates	Hydrogeology study
		Water Treatment	Water quality prediction	Above studies
			Treatment requirment	Lab tests
	Sulphide cell	All	Confirm characteristics of rock	Review existing data and methods (ICAP) Drilling/Trenching to follow-up
		Do nothing	Determine whether cell is oxidizing or releasing water	Review construction methods Drilling and instrumentation to evaluate existing conditions Review existing kinetic tests New kinetic tests
		Backfill to Pit	Stored acidity/lime rqt	Drilling/Lab tests
			Field tests for segregation, lime rqt	Lab tests on samples from drilling etc.
			Pit (Grum/Vangorda) capacity	Hydrology study
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
		Blend with phyllite	Overall ABA balance	Existing data and methods (ICAP) Drilling/Trenching to follow-up
		Covers	Oxidation Rates	O2, T monitoring in situ Review existing kinetic tests New kinetic tests
			Infiltration rates	Hydrogeology study
		Water Treatment	Water quality prediction	Above studies
			Treatment requirment	Lab tests

SCOPE FOR VANGORDA GEOCHEMICAL STUDIES

7/31/2002 16:19

FACILITY	ISSUE	REMEDIAL OPTION	INFO NEEDS	STUDIES
Pit	pH Neutral, Elevated Zn (current)	Water Treatment	Water quality prediction	Ongoing data review Alkalinity balance
	Decreasing pH, other metals (predicted)	Water Treatment	Alkalinity Depletion Rates	Review existing kinetic tests New kinetic tests
			Water quality prediction	Ongoing data review Alkalinity balance
		Cover walls	Feasibility	Source of cover materials Geotechnics
		Backfill with calcareous waste rock	Water quality prediction	From above
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
Waste Rock	All rock is PAG, phyllite is non-calcareous. Oxide fines are acidic. Seepage less significant than expected	All	Confirm characteristics of rock	Review existing data and methods (ICAP) Drilling/Trenching to follow-up
			Water quality	Seep survey Groundwater monitoring
		Do nothing (if insignificant water releases from dump)	Confirm no water release	Hydrogeology study
		Backfill to Pit	Stored acidity/lime rqt	Trenching/Drilling/Lab tests
			Segregation opportunities	Review of rock handling practices Large scale trenching/mapping to determine in situ character
			Field tests for segregation, lime rqt	Lab tests on samples from drilling etc.
			Pit (Grum/Vangorda) capacity	Hydrology study
			Reaction of backfill with pit water	Lab tests on samples from drilling etc.
		Covers	Oxidation Rates	O2, T monitoring in situ Review existing kinetic tests New kinetic tests
			Infilttration rates	Hydrogeology study
		Water Treatment	Water quality prediction	Above studies
			Treatment requirment	Lab studies

APPENDIX B
Review of Existing Information

APPENDIX B.1
Bibliography

APPENDIX B.1
PHASE 1 DOCUMENT REVIEW
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APPENDIX B.1
PHASE 1 DOCUMENT REVIEW
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APPENDIX B.2
Compilation of Review Notes

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
								Rock/Soil	Number of Samples	Location of Samples (By Dump)	Geological Distribution	Analyses Completed	Seep/SW/GW	SRK Equivalent Location	Analyses Completed	Analytical Results Copied
000					Text	Text	Text	R/S	000	Text	Text	Text	S/SW/G	Text	Text	Yes
193	DC	Geochemistry of Bedrock and Soils in the vicinity of the Anvil Mine, Yukon Territory: M.Sc.Thesis	1968	P. Morton	Master thesis to determine if a geochemical marker horizon exists for bedrock and soils and if there is a geochemical halo around the Faro ore body	Detailed bedrock, overburden and soil sampling at Faro deposit. Primary dispersion halo, related to Pb, Zn in bedrock with soils having distinctive thresholds for Cu, Pb, Zn. Bedrock and soil analyses provided. Diamond drill and overburden drill logs provided.	Sample locations provided. Diamond drill and overburden drill logs provided. Analytical results provided. Bedrock emission and atomic absorption Analyses provide on bedrock samples. Soil traverse maps.	Rock/Soil	244 rock chip samples - 8 diamond drill holes;168 soils samples; 19 soil - overburden sites corresponding to drill holes; 154 soils - glacial till, plus 10 rock chip samples; Creek channel samples - 6 bedrock and 9 soil and till samples.	Faro ore body and surrounding creeks	Covers all rock types	AAS & Emission spec metals	N/A	N/A	N/A	N/A
191	DC	Kerr-Aex Grum Joint Venture, Preliminary Engineering and Enviornmental Investigation , 1975 Program	1973		Results from 1975 Kerr-AEX Grum Joint Venture, including evaluation of waste management, water supply, tailings disposal, power supply and biophysical & socio-economic studies (Surface WQ monitoring).	Background pre mine baseline water quality data (1975) - 14 station sampled on three occasions during 1975. Stations on the Pelly River, Vangorda Cr, Blind River and Rose Creek. Drinking water well sample and Grum mine water samples including treatment pond.	Station descriptions provided and WQ results. Independent laboratory analyses.	N/A	N/A	N/A	N/A	N/A	SW/GW	V1;V2;V4;V5; V6;V8.	pH; Condo; DO; Turb; Color; Cu;Fe; Pb;Zn;Mn; Ni; Cd; As; Hg; SO4,SS; Hardness; T-AlK	Results for SW
192	DC	Kerr-Aex Grum Joint Venture, Environmental Baseline Investigation, Results of 1977 Program	1973		Results from 1977 Kerr-AEX Grum Joint Venture, including water treatment at Grum adit, water quality, fish tissue, benthos, stream flow, and climate.	Background pre mine baseline water quality data (1977) - 14 station sampled on one occasions during August 1977. Stations on the Pelly River, Vangorda Cr, Blind River and Rose Creek. DIAND also collected surface WQ samples from selected stations in 1976 and 1977.	Station descriptions provided and WQ results. Independent laboratory analyses.	N/A	N/A	N/A	N/A	N/A	SW	V1;V2;V4;V5; V6;V8.	pH; Condo; DO; Turb; Color; Cu;Fe; Pb;Zn;Mn; Ni; Cd; As; Hg; SO4,SS; Hardness; T-AlK; Na; K; Co.	Results for SW
217	KSS	Environmental Quality of Rose Creek as Affested	1975	Cyprus Anvil Mining Corporation	NEED from AGC - this report title is not complete, but Dan thinks he knows what it should be											
227	DC	Appendix 5 (I) (Volume II) - Annual Report	1978	Curragh Resources	Annual Geotechnical Inspection of Down Valley, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence (1990).	Provides instrumentation monitoring data for piezometers, thermistors, inclinometers at the Cross Valley Dam, The Intermediate Dam, The Diversion Canal, Freshwater Dam, Other Miscellaneous locations, and data from movement hubs. Seepage data.	Seepage data sets X5, X13.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
228	DC	Appendix 5 (iii) - Annual Report Waste Rock Dumps faro Mine	1979	Curragh Resources	Annual Geotechnical Inspection of waste dumps as required by the water licence (1990).	No data sets. Except for qualitative and quantitative results of geophysical inspections of Waste rock Dumps berms (quantitative for slope and angle of repose).	No data sets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
221	DC	Water Quality Assessment - Tailings Disposal in the Faro Pit 43 pp.	1979	SRK	Assessment of the WQ in the Faro pit and affects to downstream receiving waters resulting from in pit tailings disposal.	In pit disposal preferred option, tailing environmentally secure, reduce in pit sulphide oxidation. Hydrogeology of water quality predictions and loading completed. No new data sets. Use of previously collected WQ data.	No new data collected.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
222	DC	Anvil Range Mining Complex -1996 Piezometer Installation Program	1985	Robertson GeoConsultants Inc	Report describes the drilling, installation and testing of new piezometers installed in Rose Creek tailings, d/s Faro rock Dump and Grum main rock dump. Purpose to monitor groundwater quality down gradient of waste rock dumps and tailings.	Ten boreholes drilled, 17 monitoring wells installed. 11 wells installed in Rose Creek tailings (replacing 9 older or destroyed wells - X21A/B/C = MW96-5A/B/C; X24A/B/C/D = MW96-4A/B/C/D; X25 A/B = MW96-3A/B). Four new well installed down gradient Faro Rock dumps (MW 96-6, 96-7 & 96-8 A/B). Two wells installed below Grum main dump (MW96-9A/B). Groundwater data included as well as piezometers readings. Geochemistry assay from tailings borehole 96-5 - with depth integrated assay results.	Sample location map for new monitoring wells, including borehole logs. Water quality results from independent laboratory. Geochemistry assay results for tailings.	Tailings	6 sample from various depths - one borehole	Rose Creek tailings - borehole 96-5.	Sample of tailings with depth	AAS & ICP metals, Total S, Sulphide S, Sulfate	GW	?	GW= pH; Cond., NH3-N; dissolved ICP metals, SO4,SS, T-Alk, acidity, Cl.	yes
103	SJD	Open Pit Excavation Faro Valley	1986	Piteau Gadsby Macleod Limited	Evaluation of water seepage from overburden in Faro Valley	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
223	DC	Application to Amend Licence # Y2L3 - 2098- Faro (A, B, C, D, E, F, G, H, I)	1987	Cyprus Anvil Mining Corp	As Built documents Appendix contains "Abandonment Plans" with lots of data description but no tabular data just interpretation.	No Data Sets		N/A	N/a	N/A	N/A	N/A	N/A	N/A	N/A	No
81	DC	Water License Y2L3 - 2226 - 1983 Annual Report - Volume I	1987	Cyprus Anvil Mining	Faro Mine Water Licence (Y2L3-2226). Annual Report (1983). Report on water use, Water Quality, Biological, Geotechnical Inspection.	Surface and ground water well data for mine discharges, receiving water and ground waterwells. Zone II pit samples.	Stn maps. Onsite data analysis. Data appendices provided.	N/A	N/A	N/A	N/A	N/A	SW/G	?	pH, SS, Pb, Zn, Cg, Na, CN^-, Mn.	Yes
79	DC	Water License Y2L3 - 2226 - 1984 Annual Report - Volume I	1987		Faro Mine Water Licence (Y2L3-2226). Annual Report (1984). Report on water use, Water Quality, Biological, Geotechnical Inspection.	Surface and ground water well data for mine discharges, receiving water and ground waterwells. Zone II pit samples. Mill did not operate. Tailings boreholes K10, K11 & K12, WQ results	Stn maps. Onsite data analysis. Data appendices provided.	N/A	N/A	N/A	N/A	N/A	SW/G	?	pH, SS, Pb, Zn, Cg, Na, CN^-, Mn, Turb, SO_4, Cond, T-Alk, CN^-, NH_3, Na, Ca, Mg, Fe.	Yes
78	DC	Water License Y1N85 - 07LE - 1985 Annual Report	1988	Cyprus Anvil Mining	Water Licence Y-IN85-07LE Annual Report 1985. Provides monitoring results for water use, pit pumping, tailings water balance, Surface WQ, Ground WQ, Bio assay, Biological, physical stability, stream flow, stream sedimentation, maintenance , groundwater contingency plan.	Mill did not operate in 1985. Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter. Waters released from CVD non Toxic, occasional exceedances of zinc. . Groundwater results reported from old tailings pond piezometers..	Surface and Groundwater WQ data provided. Station descriptions provided. Independent laboratory analyses.	N/A	N/A	N/A	N/A	N/A	SW/GW	?	SW = pH, Zn, Fe, Mn, Na, SO4, flow. GW= pH, Zn, Mn, Na, SO4, elevation.	Results for SW & G
33	KSS	Report No. 2 to Curragh Resources Corp re Proposed Rock Drain North Fork	1988	Curragh Resources Inc.	Letter providing information on proposed haul road to Vangorda	Calc silicates were recommended for use in the rock drain. Report also has design drawings	Likely that calc-silicates were used for the rock drain	na	na	na	na	na	na	na	na	na
68	KSS	Assessment of Groundwater Conditions in Faro Pit, East Wall	1988	Piteau Associates	Assess groundwater conditions in the Faro Pit (physical hydrogeology)	Piezometers installed and tested Hydraulic conductivity of bedrock on east wall is very low (<1x10-8 m/s). Most water in storage	Minimal relevance to current studies, but may be useful for pit lake hydrogeology.	na	na	ba	na	na	na	na	na	na
75	DC	1986 Annual Report Curragh Y - IN85 - 05AL	1988	Curragh Resources	Faro Mine Water Licence (IN85-05AL). Annual Report (1986). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ monitoring data for 1986.	No lab indicated	N/A	N/a	N/A	N/A	N/A	SW, GW			No
235	DC	Long Range Development Plan, Overview Faro Area	1988	Curragh Resources	Outlines the long-range development plans for Vangorda Plateau.	Lists a series of reports prepared previously by Montreal Engineering which contained biophysical baseline data. No data sets	No data sets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
85	JTC	Mathematical Modelling of Water and Oxygen Transport in Layered Soil Covers	1988	Royal Institute of Technology - Sweden	THESIS REPORT Mathematical Modelling of Water and Oxygen Transport in Layer Soil Covers	Fundamental concepts in oxygen diffusion and water transport for cover modelling	SoilCover and SEEP/W usewd by SRK for cover designs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
205	DC	Initial Environmental Evaluation, Vangorda Plateau Development Stage 1 1987 Program	1989	Curragh Resources	Vangorda Plateau IEE to support water licence application. Provides project description and environmental conditions.	Provides catchment area details and flows/flood levels for the Grum NE Diversion Ditch, Vangorda Run-off Ditch, and the Vangorda SE diversion Channel. Provides after Quality Data of several watercourse and groundwater monitors including Vangorda V1,2, 3, 9, 4, 6a, 6, 5, 7, 8; Grum adit water, Red Spring, and a flowing drill hole in the Vangorda open pit; additional sites at Rose Creek (v14), Blind Creek at Bridge (V13). Report also contains sediment loadings at the Pelly River @ Pelly X-ing and flows on the Pelly below Vangorda Creek confluence. Report Contains appendix with a geotechnical, hydrological, and hydrogeological review of the proposed Vangorda and Grum Pits. Includes review of available water quality data, soils analysis, falling head tests, and a description of rock mechanics core logging procedure. Consistently high background pH levels. Extractable metals generally near detection levels, higher levels correspond to higher ss levels. Drinking water wells at the Grum camp showed copper cyanide and mercury levels in excess of water use licence limits.	Has maps and station descriptions. States samples sent to outside lab but doesn't list names or dates. Sediment data from water Survey of Canada.	N/A	N/A	N/A	N/A	N/A	SW	?	pH, TSS, Temp., Ammonia, Copper, Lead, Zinc, Magnesium, sodium, Sulphate, Suspended Sediments (from Water Survey of Canada 1987)	yes

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REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
108	JTC	Development of the Zone 2 Waste Dump	1989	Curragh Resources Inc	Presents plans for the use of the Faro Zone II pit as a waste rock dump facility	Engineering plans for backfilling 8 million tonnes - schedule of construction, dewatering diversions, and internal rock drain. Drain constructed with calc.silicate rock. Estimated porewater storage capacity = 106 000 m3; details of decant / pump sump system. SCHEDULE of waste rock placement by type in table- 98.5 % biotite schist and 1.5 % calc.silicate. Comparison of flow expected from 'west waste dump' watershed to observed flow suggest water surfaces beneath the dumps and leaches zinc etc. - source is likely losses from the Faro Creek diversion; Some of the acid generating waste rock will remain above the water table.	historical seep data showing local water quality in and around the Zone 2 pit area; some waste rock properties; configuration of dumps and diversions need to be considered for water balance purposes. Geological map for Zone 2 Pit	rock	12+11+1	?? - likely from mining or drill core - to be placed in the Zone 2 dump	Biotite Schist + Calc-silicate+massive sulphide	S, AP, paste pH, NP	Seep/SW (26 samples +2)	n/a	metals, pH, SO4	
206	DC	YIN85 - 05AL - Annual Report 1987	1989	Curragh Resources	Water Licence Y-IN85-05AL Annual Report 1987 which provides results of licence monitoring (Surface WQ, Ground WQ, Biological, Physical, Water Use, Pit Pumping, Tailings Water Balance, Maintenance, Waste Rock Disposition, Assessment of elimination of 1000 igpm in Rose Creek Diversion and water conservation)	Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter . Mine discharges at X5 & X13 generally meet water licence effluent standards. Exceedances at X5 for NH4, Pb, Cu, & T CN. Emergency treatment established for CN. No Zn exceedances at X5. X13 seepage met all effluent limits, except CN . Assessment provided for each surface WQ parameter. Dam seepage rates remain constant. Ground WQ d/s CVD good, similar to 1986 data. No toxic bioassay at X5 or X13.	Surface and Groundwater WQ data provided. Independent laboratory analyses. Supporting results provided in Appendices.	N/A	N/A	N/A	N/A	N/A	Seep/SW/ GW	?	SW= pH; CN;NH4;Cu;Pb;Zn;Mn ,Na,SO4,SS. GW=pH; Cu; Pb; Zn;Mn; Na;SO4.	Results for SW & G
57	SJD	1988 Abandonment Submission - Summary Report	1989	Curragh Resources Inc., SRK	Non-techniucal language summary of abandonment plan	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
109	SJD	Faro Mine Abandonment Plan	1989	R.Mclenehan, J.Bowers	Describes abandonment plan	Identifies segregation of PAG waste in rock dump. **Also refers to planned ABA on waste rock.** One sulphide dump is described. Located SW of the highest level of Main Dump and between the Main and Intermediate Dumps. Fig 15 shows location. Sulphide waste is also stored in the Zone I/III Pit (for flooding). Main Dump contains a segregated calc-silicate waste dump area on the NE corner 3DBx and 1DO samples all had high positive NNP	N/A	N/A	20	Rock drain and causeway (10 each)	3DBx (10), 1D0 (10)	Total S, Paste pH, NP	S	Wall locations A30, A31, A25, A26, A28, A14, A15, A16, A18, A19, A21 (Sept 87) 1, 2, 3, 5, 7, 8, 9 (June 1984)	Pb, Zn, Fe, Cu, Mn Mg, Ca, Na, SO4, pH, T, EC, Flow	Yes
86	JTC	Mathematical Modelling of Water and Oxygen Transport in Layered Soil Covers	1989	Royal Institute of Technology - Sweden	Paper based on Marie Collin Modelling thesis	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
67	KSS	Report to Curragh Resources Inc Re: Performance of Rock Drain North Fork,	1990	Golder Associates	Report on performance of the Rose Creek Rock Drain	Information on rock type and particle size plus hydraulic performance is presented. Rocks used were Calc silicates.	Minimal relevance to current studies	na	na	na	na	na	na	na	na	na

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Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
76	DC	Faro Mine - 1988 Annual Report to the Yukon Territory Water Board	1990	SRK	Water Licence Y-IN85-05AL Annual Report 1988 which provides results of licence monitoring (Surface WQ, Ground WQ, Biological, Physical, Water Use, Pit Pumping, Tailings Water Balance, Maintenance, Waste Rock Disposition, Licence Studies and Impact Assessment)	Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter. Mine discharge at X5 & X13 generally meet water licence effluent standards for NH4, Zn, Pb, Cu, T CN, WAD CN, SS and pH with occasional exceedances. December 7, 1988 CN spill required ongoing H2O2 treatment. Waste Rock characterization studies initiated Feb 1989. Further 5 seepage surveys conducted (Apr, May, June, Oct)	Surface and Groundwater WQ data provided. Station descriptions provided. Independent laboratory analyses. Supporting results provided in Appendix 1A to Appendix 11 (Doc# 74). No seepage or waste rock testing results provided in report.	N/A	N/A	N/A	N/A	N/A	S/SW/G	?	T-AlK; pH; CN; CN WAD; NH4;Cu;Pb;Zn;Mn, Fe, Na, SO4,SS	Results for SW & G
114	SJD	Other Facilities Abandonment Plan	1990	E. Soprovich	Abandonment of bldgs etc	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
56	SJD	Vangorda Plateau Development - Initial Environmental Evaluation - Volume I - Stage II Report	1990	SRK	Section 2.4.5 provide overview of AG potential of rock at Vangorda and Grum for IEE	Grum rock largely acid consuming. Vangorda rock largely PAG. Notes the significance of possible Fe-carbonates Notes that significant small scale heterogeneity with respect to sulfide and carbonate content Slaking tests indicate that carbonaceous phyllite breaks down rapidly Freeze thaw tests showed that carb phyllites and altered phyllites were prone to decomposition	Environmental impacts to water quality were evaluated using direct concentrations from lab tests, groundwater monitoring and drainage from the Grum Adit. Details of calculation not provided	R	24 (12 duplicates)	Vangorda and Grum. DDH samples prior to mining	Non-calcareous phyllites	24 hr extraction test 25 g of -1/4"sample with 500 mL of DI (20:1). Leachates analyzed for pH, acidity, SO4, Cu, Z, Fe, Mn (dissolved)				Yes
70	SJD	Vangorda Plateau Development - Initial Environmental	1990	SRK	Appendices to Vangorda IEE	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41
195	SJD	Faro Pits and Rock Waste Dumps - 1987 & 1988 Seep Surveys	1990	SRK	Static testing report Faro site - Appendix H	Unit 1: Schist - mostly not acidic. Median AP is 23. NP low at 6. Majority NP/AP<1 Unit 2: Sulphide. Almost all acidic and no NP. NP reported as "0" not <0. NP/AP<0.05. Unit 3: Calc schist. All but one pH>7. Median S 0.45%. NP/AP>2 mostly. Median 5.2 Unit 4: Intrusives. Wide range in S. Median in s 0.6%. NP/AP<2 mostly. Unit 5: Phyllite. Wide range in S but calcareous. NP/AP>10 except when S high.	Stats provided on ABAs. ICAP Vol 2 Figure 4-5 shows sample locations Tables in report are sorted by rock type. Location can probably be identified from tables. TIC not determined H2O2 tests not intepreted	Channel samples from near surface of individual piles (composites), Samples from discrete layers of zones. Vertical composites	160	Main and intermediate (44) Low Grade Stockpile (12) NE Dumps (16) Zone 2 (10) Faro Valley (22) NW (6) Main Pit (8) Vangorda and Grum (26)	Faro Unit 1: Non-Calc Schist (42) Unit 2: Sulphide (59) Unit 3: Calc Schist (31) Unit 4: Intrusives (22) (No overburden samples) Unit 5: Grum and Vangorda Phyllite	Total S, S-SO4, paste pH, NP, ICP Scan, XRD, Petrographics (BC ARD Technical Guide Methods) Field rinse pH and EC Particle Size Short term extraction tests (2 mL/g, 24 hours, water and H2O2 extractions (pH, SO4, acidity, metals				
224	DC	TADP Annual Report (Technical) Report # 60613	1990	SRK	Tailings Test Facility chemical and physical testing	Pore Water Quality -Grain Size -ABA -Attenuation Capacity -Bacteria Testing - Metals Analysis	Independent lab results, station descriptions	Tailings	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
195	KSS	#N/A	1990	#N/A	Seepage surveys of the Faro Pit and Waste Dumps	Data, maps and field notes from several small seeps from 12 years ago.	Data useful for long-term trends etc. Used in seepage report	na	na	na	na	na	S	Faro - several stations	Basic in-house suite	No - Data should be integrated with Eqwin database, but for now is useless without the accompaning maps

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Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
190	DC	Vangorda Plateau Development - Water License Application	1990	Curragh Resources	Vangorda Plateau Development - Water Licence Application, to permit open pit mining operations at both Vangorda Pit & Grum Pit, collectively termed the Vangorda Plateau	Curragh internal report, which presents test results data (ABA work done by independent lab) that supports assumptions that both Vangorda & Grum rock will generate acid drainage (total of approximately 194 MT waste rock to be produced). A conceptual mine closure plan is presented, consisting primarily of allowing both pits to flood, with application of till covers on acid-generating waste rock dumps. A separate water treatment facility is proposed to treat collected seepage from pits & dumps (in perpetuity).	review of subsequent reports (including *"Vangorda Plateau Development, Initial Environmental Evaluation, Addendum*) indicates that review of this document by RERC resulted in request for additional ABA test work. In body of this report, only the mean of all results of ABA testwork is presented - complete data is located in the Appendix (no copy of the appendix at ACG). Conclusions appear valid based on representative sampling, esp. if include addendum results. **Water Quality** results appear limited for assumptions drawn (small number of samples/sites). Regulatory agencies subsequently rejected perpetual treatment scenario.	Rock & limited Soil (geotechnical, not geochemical)	**Rock sampling**: total # of samples not disclosed in main report - will be in Appendix A, not at this office, but, rock samples appear to be representative of all major rock types at the pits, **Soil Sampling**: three boreholes at Grum Pit location	all rock samples taken from drill core from each major rx type from each Vangorda & Grum deposits	ribbon banded graphitic quartzite, pyritic quartzite, pyritic massive sulphide, altered phyllite, carbonaceous phyllite, non calcareous phyllite, calcareous phyllite, for both the Grum and Vangorda deposits	**Rock** sampling: slake tests, freeze-thaw tests, extraction tests, Acid Base Accounting (maximum acidity & neutralization potential) **Soil** sampling: visual material description (logging), geotechnical testing for density, plasticity	GW		**WQ**: metals, NH3,SO4,SS, pH, Alkalinity **Hyd.**: flows at Vangorda Ck., Ross R., Pelly R., Rose Ck.	
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda	No findings, data only	N/A	R	17	Vangorda		Slaking test, wet dry cycle testing (151 days)				
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda			R	10	Grum		Slaking test, wet dry cycle testing (151 days)				
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda	ABA: No interpretation. 25 samples had NNP<0.Almost all S>0.5%. Carb phyllite has av S of 1.5% and NNP<0. Calc phyllite has av S of 0.2% and NP 130 kg/t. Massive sulfide had 5<pH<6.	No TIC or S-SO4	R	69	Vangorda and Grum. DDH samples prior to mining	All major rock types	pH, total S, NP				
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda	HCT: Sulphide composite has pH 4.3 at end. Elevated Zn, Pb and Cd in leachate Innoculated had pH<3, v high SO4. Al, As, Co, Cu, Fe, Mn, Ni, Zn>1 mg/L Phyllite composite had pH variable but less than 5 at end of test. SO4 at 500 to 200 mg/L decreasing. Elevated Zn in leachate Phhyllite innouclated had pH<4, higher SO4. Leached Fe, Mn, Zn	No ABA tests, sample weights provided (see V.1?)		3	Unknown	Sulphide composite Sulphide compsoite (II) innoculated Phyllite composite Phyllite composite (II) innoculated	HCT (32 weeks)				
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda	Carbonates mostly ferroan dolomite, dolomite or ankerite		R	11	Vangorda area drill holes	Phyllites and low grade ore	petrographics	SW	V01 (22), V02 (20), V03 (27), V04 (15), V05 (25), V06 (15), V06A (12), V06B (5), V07 (5), V08 (27), V10 (14), V11 (13), V14 (15), DDH-322 (12), Grum Adit (23), Artesian Pz (6), Red Spring (natural reduced spring from sulphides (17) various surface waters	pH, alk, TSS, SO4, NH3, Zn, Cu, Pb, Mn, Fe. Not clear T or D	

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Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
41	SJD	Water License Application, Vangorda Plateau, Volume 2 of 2	1990	SRK	Appendices to water licence application for Vangorda								SW	1975 to 1980 various background data by agneices	pH, Zn, SO4, Cu, TSS, Alk	
41	SJD	Water License Application, Vangorda	1990	SRK	Appendices to water licence application for Vangorda											
69	SJD	Vangorda Plateau Development - Water License Application -	1990	SRK	Figures for Vangorda WL app	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
71	SJD	Vangorda Plateau Development - Water License Application -	1990	SRK	Appendices to Vangorda WL app	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41	Same data as in doc 41
10	KSS	Vangorda Plateau Development, Review of Alternative Abandonment Plans and Water Quality Prediction Methods	1991	SRK	Evaluate water quality associated with different closure alternatives	Water quality estimates for different dump designs and closure alternatives. Water and load balance for site. Chapter 7 presents data supporting the concentration assumptions. This is probably in the IEE, but includes some humidity cell data and average seep data from Faro. The seepage data is from the 1988/89 seep survey report (also reviewed by KSS)	Predicted zinc concentrations of 29 mg/L from sulphides (Grum and Vangorda) and 14 mg/L from phyllites (Vangorda only). These are much lower than seepage concentrations currently observed at Vangorda. Pit concentrations from 5 mg/L to 1 mg/L Zn also much lower than currently measured.	na	na	na	na	na	na	na	na	na
226	DC	EARP Screening Report Grum/Vangorda Project (Northern	1991	Curragh Resources	Environmental screening of Vangorda Plateau Development under EARPGO (IN90-002)	Project description and listing of environmental issues and mitigation for project including ARP, fisheries, wildlife and stability. No data sets.	No data sets. Relies on previously submitted reports.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14	JTC	Vangorda Plateau Development, Vangorda Waste Dump, Geotechnical	1991	SRK	Geotechnical investigtaion of Vangorda waste dump foundation soils for seepage collection ditches and pond designs	17+2+4+2 test pits of soil and subsoil conditions	test pit logs may be of significance for closure design; permeability of soils (2x10^-6 cm/s)	soil	17+2+4+2 test pits of soil and subsoil conditions	Vangroda dump foundations		moisture, grainsize, density and lab permeability				
35	SJD	Report to Curragh Resources Inc. re	1991	Golder Associates	Inspection of SE and SW perimeter dumps ti assess stability	Not expected to fail, dumps are stable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
80	JTC	Modelling of Water and Oxygen Transport in Layered Soil Covers - Codes for Deposits of	1991	Kemakta Consultants Co.	Model description for Oxygen Transport Modelling in soil covers (Marie Collin Model)	generic fortran model that was (?) used for the tailings test plot cover designs	SoilCover and SEEP/W usewd by SRK for cover designs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
113	DC	Faro Mine 1990 Annual Report to the Yukon Territory Water Board	1991	Curragh Resources Inc	Water Licence IN89-001 Annual Report 1990 - Faro Mine Site which provides results of licence monitoring (Water Quantity & Wastewater flow, Surface and Ground WQ, Biological, Bioassay, Fisheries, Physical, and Spill Reporting).	Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter. Effluent limits for X5 exceeded for NH4 - 54%; Zn - 13.5%; Pb 5.2%; T CN 27% and SS - 2%. Effluent limits for X13 exceeded for NH4 - 56%; T CN 39.	Surface and Groundwater WQ data provided. Site descriptions provided. Independent laboratory analyses. Supporting results provided in Appendices. Incomplete results for some station parameters.	N/A	N/A	N/A	N/A	N/A	SW/GW	?	SW= pH; T CN;WAD CN; NH3;Cu;Pb;Zn;Fe; MN; Na,SO4,SS, T-Alk. GW = pH; Cu; Zn; Na; SO4, T-Alk.	Results for SW & G
99	JTC	Geotechnical Review of East Wall of Faro Pit	1991	Piteau Associates	Review of geotechnical conditions of Faro Pit East Wall; Assessment of faults and structures on east wall with respect to geotechnical failure	Verification of geological interpretation for the east pit wall	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
229	DC	IN89-001 - Schedule D progress Report # WH9105	1992	Curragh Resources	Progress report on Closure Plan Studies under licence IN89-002. Includes Seep Survey, waste rock characterization, GW, Pit WQ.	Seep survey, 1989, 1990, 1991 as per SRK #60612. Static ABA of Faro waste rock. Geological survey of old dumps, (no data). Trenching of old waste dumps. Humidity cell of weathered sulphide dump. Groundwater wells installed below Zone II and eastern dumps. Zone II pit water quality.	Site maps provided and data appendix. Exact location of rock dump samples not provided.	R	39	Samples of rock type by Faro dump volume	Samples from 60% of total waste rock dump volume.	ABA;S. For humidity cells=pH, SO4,Acidity,T-Alk,Cu, Zn, Pb, Mn, Fe.	SW/G	Seep Survey as per SRK report #69612	Condo, pH, Cu, Pb, Zn, Fe, Na, SO4, NH3	yes

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
119	DC	Faro Decommissioning Overview of the Environmental Plans	1992	Curragh Resources Inc	Summary report prepared by Curragh - all encompassing "umbrella" summary in non technical language - of decommissioning plans for Faro operation. Prepared in anticipation of Jan. 1992 YTWB public hearing for all stakeholders	Report addresses closure plans for pits, ponds, dams, waste rock dumps; tailings transfer from Rose Creek facility using hydromonitoring and slurry pumping to mill for reprocessing, marketable bulk concentration production, environmental management, biological treatment of waste dump drainage, water quality predictions and scheduling. Tailings to be removed above elevation 1044.3m in Rose Creek, reprocessed in the mill and tailings deposited back in Faro pit beneath a water cover. Water cover over remaining tailings in Rose Creek valley. No data sets	Report relies on previously submitted technical documents (Appendix A - Doc # 115; Appendix=x B, Doc #118; & references Doc #109, #114, & #89.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
115	DC	Faro Decommissioning Overview of the Environmental Plans Appendices A to D	1992	Kilborn Inc	Faro Decommissioning, Overview of the Environmental Plans, Appendices A to D (Appendices to Report #WH9108), Dec. 1991	Appendix A: Faro Mine Tailings Relocation Project, Preliminary Design & Cost Estimates; App. B Sulphate Reduction as a water treatment alternative; App. C Reprocessing Tailings; App. D Geotechnical Considerations for Faro Pit Decommissioning	N/A	N/A	N	N/A	N/A	N/A	N/A		N/A	N/A
230	DC	Faro Decommissioning, Overview of the Environmental Plans -	1992	Curragh Resources	Same document as #119	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
96	JTC	Geotechnical Review of Faro and Vangorda Pits	1992	Piteau Associates	Review of geotechnical concerns at the Faro and Vangorda Pits	Descriptions of faults and structures and how they relate to the stability of the pit walls	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
4	JTC	Vangorda Creek Diversion Realignment,	1992	Healey, Peter	As built report for the construction of the Vangorda Creek Diversion re-alignment	Reports diversion design changes;	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
197	DC	Inspection Report 1992	1993	Curragh Resources	DIAND Northern Affairs Program Physical Inspection of engineered structures at the Faro and Vangorda mine sites.	No soil, rock, surface water , groundwater or seep sampling conducted. Visual inspection of structures with recommendations for corrective action.	Physical inspection only, no sample data collected	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
26	KSS	Summary Report on Schedule D to Water License #IN89-001	1993	Healey, Peter	Report on studies to determine the impacts of mining operations on Rose Creek. The studies included 16 areas of data collection, including: 1. Seepage Surveys 2. Waste Dump Stability 3. Waste Rock Characterization 4. Groundwater studies 5. Diversion channel studies 6. Assessment of phyllite as a dump cover 7. WQ in Faro Pit 8. Hydrology studies 9. Water Balance 10. Rose Creek WQ 11. Fisheries 12. Toxicity studies	Source of data on topics listed. Seepage data used to generate mass loading diagrams ABA data is useful Humidity cell data useful, but tests could have been run for longer. Groundwater data - only really high concentrations are in the spill area below the ZII pit. Phyllite not suitable for covers. Other activities were really interpretive. Surface mapping activities were also summarized in report. The result of the mapping was that sulphides occur widely in the dumps, except the NE dump.	This report contains some very useful data and interpretation from 10 years ago. Probably Steve should also review testing data generated. Humidity cell interpretation needs revisiting	R	53 (ABA) 6 (humidity cells) 6 (innoculated cells)	Faro - not specified	All Types	ABA Humidity Cells (Data is most of report. Refer directly to report for the data) (Pages have been flagged)	S GW	Faro - several stations	Basic in-house suite	No - Need to check Eqwin database to see if these have been integrated. ABA data copied Humidity cell data not copied refer to report
198	DC	IN89-001 1991 Annual Report , 1991 Annual Report - Appendix 5, Volume I	1993	Curragh Resources	Faro Mine Water Licence Annual Report (1991) QZ295-003. Report on water use, water quality, Biological, closure WQ survey, Geotechnical.	Surface and Ground Water Sampling from mine discharge, receiving waters and ground wells. Additional ground wells monitored conducted. WQ assessment provided by parameter and station.	Stn map & description. Independent data analysis and complete data appendices.	N/A	N/A	N/A	N/A	N/A	SW/G	?	pH, Cond, SS, NH3, Cu, Pb, Zn, CN, WADCN, SO4, T-Alk	Yes
232	DC	Water Treatment Sludge Characterization and Disposal Plan	1993	Curragh Resources	Vangorda Treatment Plan Sludge characterization Report and per water use licence.	Characterizes the sludge from the Vangorda water treatment plant, calculates its volume, provides disposal options, and a disposal plan and provides recommendations	Independent lab results. Location known.	Sludge	1	WTP sludge pond	N/A	Modified SWEP, % solids, percolation rates, Metals analysis	seep		zinc concentration and rate of seepage	yes
11	JTC	Expansion of the Vangorda Mine Rock Containment Facility , Vangorda Plateau Development	1993	Healey, Peter; Skermer, Nigel A.	Review of Vangorda Dump expansion design	Provides estimates of waste by material category (Sulphide, Phyllite, Till); physical stability analysis; recommends instrumentation of dump (for physical stability)	waste rock volume estimates??; dump design does not match existing conditions	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
199	DC	IN89-001 - Faro Mine Site Annual Report 1992 #WH 9304	1993	Curragh Resources	Water Licence IN89-001 Annual Report 1992 - Faro Mine Site which provides results of licence monitoring (Water Quantity & Wastewater flow, Surface and Ground WQ, Biological, Bioassay, Physical, and Spill Reporting).	Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter. Effluent limits for X5 exceeded for NH4 - 93%; Zn - 17%; Cu - 31%; T CN 36% and SS - 5%. Effluent limits for X13 exceeded for NH4 - 58%; T CN 11% and SS - 11%. Bioassay tests from X13 - passed all. Bioassay X5 failed 19 of 21 samples. Mill in operation except for two period (Aug 15 - Sept 5 & Dec 19 - 31). Lime treatment at X4 to control effluent discharge. Benthos samplings indicates that production in Rose Creek significantly effected by effluent discharges. Downstream waters in Rose and Anvil Creek exceeded CCME Guidelines for Zn, Pb, Cu and CN. Little change in d/s ground WQ, except NH4 and Zn increase in X16 and a Zn spike in X16 and X18 in July 1992.	Surface and Groundwater WQ data provided. Site descriptions provided. Independent laboratory analyses. Supporting results provided in Appendices.	N/A	N/A	N/A	N/A	N/A	Seep/SW/GW	?	SW= pH; T CN;WAD CN; NH4;Cu;Pb;Zn;Na,SO4,SS, T-Alk. GW = pH; Cu; Pb; Zn;Mn;Fe, NH4, Na;SO4, T-Alk.	Results for SW & G
139	JTC	Due Diligence Report on the principal Mining Assets of Curragh Inc. for Koloshuk Farrugia	1993	Watts, Griffis and McOuat Ltd	Financial and resource due dilligence evaluation as a prelude to a private equities placement transaction	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
200	DC	IN89-002 Grum/Vangorda - Construction Report for Vangorda Mine Rock Containment Facility	1993	Curragh Resources	Construction report for Vangorda/Grum rock containment facility as required by water use licence IN89-002.	No geochemical data of physical properties of material used for construction. Presents results of the final design and geotechnical investigation for the construction of the starter dyke and drains for the Vangorda Mine Rock Containment Facility. Appendix Contains geotechnical data in Appendix including test pit data for the dykes, seepage collection ditches, collection pond, proposed road x-ing of the gully, Vangorda Pit (test pit logs, grain size analysis, % moisture).	Geotechnical data sets only.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
201	DC	IN89-002 Grum/Vangorda - 1992 Annual Report, WH9302	1993	Curragh Resources	Vangorda Plateau Water Licence (IN89-002). Annual Report (1992) Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Water Quality Data for water diversions, treatment plant, other surface waters	Station descriptions and maps provided. Outside Laboratory make it reasonably solid	N/A	N/A	N/A	N/A	N/A	SW		pH; Condo;NH3;Cu;Pb;Zn;Fe; As; SO4,SS; Hardness; T-AlK	
201	DC	IN89-002 Grum/Vangorda - 1992 Annual Report, WH9302	1993	Curragh Resources	Water Licence IN89-002 Annual Report 1992 - Vangorda Plateau which provides results of licence monitoring (Water Quantity & Diversions, WTP Quantity, Surface WQ, Biological, Physical, Spill Reporting and Technical Advisory Committee activities).	Surface WQ data sets - monitoring for mine discharge, WTP & receiving waters (u/s and d/s). WQ assessment provided for each surface WQ parameter. WTP started March 1991. WTP design at 2000 usgpm. WTP average flow rate 0.014 m3/s for 220 days. Total volume = 434,246 m3. Effluent limits for WTP exceeded for NH4 - 98%; Zn - 8% and SS - 2%.Bioassay tests from WTP discharge non toxic for first three quarters 1992, failed last quarter due to NH4 and pH.	Surface WQ and bioassay data provided. Site descriptions provided. Independent laboratory analyses. Lakefield completes WTP evaluation. Supporting results provided in Appendices.	N/A	N/A	N/A	N/A	N/A	SW	?	pH; Condo;NH4;Cu;Pb;Zn;Fe; As; SO4,SS; Hardness; T-AlK	Results for SW
82	JTC	Summary of the Year's Operation s 1982	1993	Cyprus Anvil Mining	Cyprus Anvil summary of Year's operations for 1982	Completed construction of the Intermediate and Cross Valley dams; Zn at X4 increased to 1 mg/L; historic water quality monitoring results at X16A,B; X17A,B; X18A,B; X20, X21A,B,C; X24A,B; X25, X23, X22; X13; X12; X11 - X5, X4, X1; X2; X3. Bioassays	Early surface water quality monitoring data -	n/a	n/a	n/a	n/a	n/a	SW: X16A,B; X17A,B; X18A,B; X20, X21A,B,C; X24A,B; X25, X23, X22; X13; X12; X11 - X5, X4, X1; X2; X3	?	TYP. : pH, SS, Temp, Q, Pb, Zn, Cu, Na, CN, NH3, Mn	Should already be in database? ?

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
106	JTC	Critical Evaluation of Acid Mine Drainage Modelling , 1986-1991 for Curragh, Down Valley Tailings, Faro, Yukon	1994	Ronald Nicholson , Jeno Scharer	A critical evaluation of the test plot program and ARD modelling of the Faro Tailings Storage Facility; cfritical evaluation of tailings loadings presented in SRK Report 60635; Issues reviewed included : i) quality of test plot data ii) metal mobility in the subsurface (geochemical controls) iii) interpretation of test cover facility results iv) modelling v) Uncertainties	Quality of data is good except for oxygen monitoring in some plots at depth; conservative to apply NO solubility contsraints on Zinc, PbSO4 okay, copper controlled by secondary sulphide in the tailings; recommendations for test plot facility included draining the plots, improving gas sampling, and improving water sampling and interpretation; Findings with respect to modelling (Marie Collin) were: i) oxygen transport calculations are reasonable for the coarse tailings but less so for fine tailings; ii) oxidation rates may be under estimated based on range of data iii) zinc "yield" factor for tailings amy be in the order of 0.04 mg Zn / mg SO4 generated (which is about 10X higher than that used in the modelling) and acidification will likely change the yield factor;	makes some reasonable comments with respect to the calculation procedures in particular the rate of oxygen diffusion into the tailings with respect to size gradation and degree of saturation; however comments are likely redundant as current modelling procedures will differ from those present ("state of the art" has changed)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
12	JTC	Annual Inspection Report of Waste and Water Management Facilities, Vangorda Plateau	1994	Healey, Peter	Inspection of waste and water management facilities at Vangorda/Grum to evaluate performance and stability of facilities	Requirements for soil works to upgrade existing ditches, embankments and containment areas to address slope stability and erosion issues; Grum dump physical stability failures due to foundation soil failures	inspection	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
54	JTC	Proposal for Vangorda Waste Rock Containment Facility -	1994	Pelly Construction Ltd	Proposal for Vangorda Waste Dump Design	-	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
202	DC	Inspection Report 1993 - Northern Affairs, Geo Engineering 6052-4	1994	Curragh Resources	DIAND Water Resources Inspection of Engineered Structures - Freshwater Dam, (DVD) Rose Creek Diversion, Faro Pit & Dumps	Physical visual engineering inspection results. No data sets.	No data sets.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
204	DC	IN89-001 (Faro, Annual Inspection Report 1993 - Golder 932-2421	1994	Curragh Resources	Annual Geotechnical Inspection of Down Valley, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence.	Physical inspection data based on visual inspection and review of physical monitoring instruments. Piezometric elevations reported. Seepage data from CVD reported. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical inspections only. Supporting results provided in Appendices (see doc #233).	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2	JTC	Vangorda Rehabilitation, GSC Project 760831, Vangorda Plateau, Faro Mine	1994	Healey, Peter	Design specifications for the seepage collection and resloping of the Vangorda waste rock dumps	soil conditions - friable shallow bedrock (phyllite); moisture content of till from 7 to 13.6 %; estimates of 200 year peak flows (p8); proposed a decrease in the cover thickness from 3 m to 2 m; proposed 3 areas for test covers	only a small portion of one area of the proposed covers was completed; funds were sepnt on completing the divertion ditch (see doc 7 for details)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
203	KSS	IN89=002 Grum /Vangorda - KPM 6/SRK 1993 Annual	1995	Curragh Resources	NEED from AGC											
203	DC	IN89=002 Grum /Vangorda - KPM 6/SRK 1993 Annual Report, Ground Water & Surface Water	1995	Curragh Resources	Water Licence IN89-002 Annual Report 1993 - Vangorda Plateau which provides results of licence monitoring (Water Quantity & Diversions, WTP Quantity, Surface WQ, Biological, Physical, Spill Reporting and Technical Advisory Committee activities).	Surface WQ data sets - monitoring for mine discharge, WTP & receiving waters (u/s and d/s). WQ assessment provided for each surface WQ parameter. WTP operated for 116 days in 1993. KPMG took over site, therefore some missing data gaps for licence monitoring. No data interpretation	Surface WQ and bioassay data provided. Site descriptions provided. Independent laboratory analyses. No WTP evaluation completed. Supporting results provided in Appendices.	N/A	N/A	N/A	N/A	N/A	SW	?	pH; Condo;NH3;Cu;Pb;Zn ;Fe; As; SO4,SS; Hardness; T-AlK	Results for SW
7	JTC	Vangorda Rehabilitation, PWGSC Project 760831, Vangorda Plateau Development	1995	Healey, Peter	As built" report for Document 2; provides field changes to propsoed designs	Cover materials Mod. and STd Proctor compaction desnsities of 2230 and 2115 kg/m3; cover area constructed in 4 lifts of 0.5 m each; compacted with sheepsfoot to 98 % STd Proctor Density; area approx 8,000 m2; piezometer installation details	=as built	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
123	DC	Construction Report Vangorda Rehabilitation Vangorda Plateau, Faro Mine Yukon	1995	SRK	Construction Report, Vangorda Rehabilitation PWGSC Project 760831, Vangorda Plateau, Faro Mine, Yukon Territory; SRK Report P225101 ; Nov. 1994	geotechnical engineering report describing construction of the Vangorda seepage collection ditch construction, and waste dump recontouring, included installation of some monitoring wells;	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
239	DC	Report A114101 Groundwater Investigation, North Fork of Rose Creek, Faro Mine	1995	Anvil Range Mining	Investigation & Monitoring Program to evaluate potential sources of contamination to North Fork Rose Creek. Water Licence requirements.	Installed monitoring wells (2) between Main & Zone II Pits. 3 wells installed down gradient Zone Ii pit. # wells along toe of northeast rock pile. 4 wells along side North Fork Rose Creek. WQ collected for each well along with sediment samples for lead test for North fork Rose Creek wells. Hydrogeological assessment conducted. Confirmed seepage flow path from Zone II pit & North Fork Rose Creek.	Maps provided WQ results appended. Independent lab analysis, borehole data.	S	13 from 4 boreholes	BH94-05 BH94-06 BH94-07 BH94-08	Native and alluvial outwash soils.	30 element ICP; S; SO4	SW/G	BH94-05 BH94-06 BH94-07 BH94-08 PLUS Faro pit, Zone II pit	pH, Cond, hardness, T-Alk, SO4, Diss and total ICP metals.	No, (SRK report)
5	JTC	Seepage Collection and Diversion Systems, Grum Mine,	1996	Healey, Peter	Draft report - conceptual design for seepage collection at Grum	Estimates flood peaks; catchment areas and flows	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
8	DC	1995 Annual Inspection Report of Waste and Water Management Facilities	1996	Healey, Peter	SRK Physical Engineering Inspection of Vangorda Mine Waste & Water Management Facility. As per water use licence.	No data sets. Engineering inspection report only. Information in report focused on inspection details and recommendations for future action.	No data sets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9	KSS	1995 Annual Inspection Report of Waste and Water	1996	Healey, Peter	Inspect Geotechnical Performance and Stability of Structures (1995)	60	Not relevant to current planning	na	na	na	na	na	na	na	na	na
140	DC	Proposed Modification to the Grum waste	1996	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		
233	DC	IN89-001, 1995 Annual Geotechnical Performance Evaluation & Instrumentation Data Report - Vol. I & II	1996	Curragh Resources	Annual Geotechnical Inspection of Down Valley, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence. Data Appendices for Doc # 204.	Physical instruments monitoring data. Includes piezometric elevations, and thermistor data for dams and canal. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical monitoring data from installed instruments. Appendices for doc # 204.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
124	DC	Design Modifications for the Grum Open pit and Waste Rock Dumps, Faro Yukon	1996	Anvil Range	Submission of revised design for Grum pit and waste rock dumps. Licence requirement for report. Design to accommodate mine plan and waste deposition and construction of Grum dump sulphide cell.	Three new dumps proposed - main dump with phyllite and sulphide waste containment cell, SW dump with phyllite and till dump. Revised sulphide containment cell volume = 13,564,079 cu. M. Report provides revised Grum pit waste rock quantities. Geological section maps and geotechnical foundation data. No rock samples. Soil sample for geotechnical.	No rock or water samples. No map fro geotech boreholes	Soil	8	toe of Grum waste dump.	N/A	soil logs, particle size, moisture, plastic limit.	N/A	N/A	N/A	N/A
133	DC	Faro Mine Conceptual Abandonment Plan	1996	Robertson Geoconsultans	Anvil Range Mining Complex Conceptual Closure Plan (check title on master list - *Faro Mine Conceptual Abandonment Plan* - is this the same report?)	This is a conceptual study only, designed to facilitate discussions with the project team to develop preferred options for closure of Faro, Vangorda, and Grum	presents only concepts & commitments (description of what test work will be conducted to support the closure plan) , no data	N/A	N/A	N/A	N/A	N/A	N/A		N/A	N/A
120	JTC	Review of Post - Closure Water Treatment Options at Anvil Range Mine	1996	Simons Environmental	Evaluation of treatment alternatives at Vangorda/Grum and Faro	Identified lowest caital cost options based on presented water quality	Revised estimates used in the Options Study; does not consider conditions if the water quality deteriorates and become acidic						Seep/SW/ GW	n/a		estimated feed water quality
208	DC	IN89-001, Anvil Range, 1995 Annual Report	1996	Anvil Range Mining	Faro Mine Water Licence (IN89-001). Annual Report (1995). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ monitoring data for 1995.	Good, Maps & Station descriptions provided. Independent laboratory analyses.	N/A	N/a	N/A	N/A	N/A	SW		Pb, En, As, SO_4, NH_3, TSS plus pH hardness and flow	WQ, yes
209	DC	IN89-002, Anvil Range, 1995 Annual Report for Vangorda Plateau	1996	Anvil Range Mining	Vangorda Plateau Water Licence (IN89-002). Annual Report (1995). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ monitoring data for 1995.	Good, Maps & Station descriptions provided. Independent laboratory analyses.	Sediments	4	V1, V27, V5, V8	N/A	Cu, Pb, Zn	SW		Pb, En, As, SO_4, NH_3, TSS plus pH hardness and flow	WQ, yes
214	DC	IN89-002 Anvil Range Mining Corporation Faro Operations: Vangorda Plateau Minesite Seepage Monitoring Program and Groundwater Monitoring Program for the Grum and	1996	Anvil Range Mining	Vangorda Plateau Mine Seepage & Groundwater Monitoring program (licence IN89-002) This document outlined the details of a monitoring program that would be initiated the following year (1997). Seepage and groundwater monitoring programs for the Vangorda and Grum phyllite and sulphide waste rock dumps are described.	Seep and Groundwater Monitoring program defined. No data sets.	No data sets	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
25	DC	1996 Annual Inspection Report of Waste and Water Management Facilities	1996	Healey, Peter	SRK Physical Engineering Inspection of Vangorda Mine Waste & Water Management Facility. As per water use licence.	Physical visual engineering inspection and review of structure instrumentation. Piezometers water levels & temp reported. No chemistry data.	No data sets.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
51	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan -	1996	Robertson Geoconsultans	Background Info	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
52	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan - Volume 2 of 3 - Site Characterization	1996	Robertson Geoconsultans	Objectives of geochem work: 1. Identify existing WQ concerns in terms of sources and contaminants 2. Evaluate future changes in terms of acidity and metals 3. Obtain data for WT requirements	NW Dumps - Lower and Middle not PAG, no acidic seepage. Sulphides in upper Dump FV Dumps - PAG/AG Main/Intermediate - Sulphide cells in upper lifts but encapsulation failures NE Dumps - Z2 Dumps - Not predicted to be AG Near Pit - LGO - Most reactive Haul Road and Rock Drain - Constructed from calc silicate	Determination of proportions of different rock types is not clear.									
52	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan - Volume 2 of 3 - Site Characterization	1996	Robertson Geoconsultans	Objectives of geochem work: 1. Identify existing WQ concerns in terms of sources and contaminants 2. Evaluate future changes in terms of acidity and metals 3. Obtain data for WT requirements	Vangorda Pit rock types are all PAG but sulphides more so. Purpose of MS segregation was to allow future processing of the sulfides. Tonnages of rock types on p.5-19 Oxides fines are 225 kt	Not clear in the report where the segregated sulfides were placed.									
53	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan -	1996	Robertson Geoconsultans	Closure plan and cost estimates	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
236	DC	IN89-001 Tailings Reprocessing Feasibility Study	1996	Anvil Range Mining	Report describes an operating plan for the physical movement of tailings from the down valley system to concentrator for reprocessing. Discusses hydromonitoring and metallurgical testing, including the collection of additional tailings samples.	Additional test pit samples (10 test pits with 10 samples per pit) collected for metallurgical analyses. Test pit logs and paste pH data collected. Laser Ionization Mass Spectrometry used to semi quantify surface chemistry of 15 composite tailings samples. Sulphides not altered,Sphalerite, pyrite, pyrrhotite occur as liberated particles.	Sample location map for tailings test pits, including sample logs and paste pH results.	Tailings	10 tests with 10 samples per pit = 100	Down valley tailings area	N/A	pH, metallurgical testwork	N/A	N/A	N/A	No
125	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan	1997	Robertson Geoconsultans	ICAP Appendices Includes all hydrogeological work	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
126	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan	1997	Robertson Geoconsultans	ICAP Appendices Includes all water quality data	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
127	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan Volume 6 Appendices F to I	1997	Robertson Geoconsultans	Appendix I - Provides kinetic test results but no interp	Col 1 - Acidic intitially, then recovered. Ca, Mg SO4 water. Zn salt leaching Col 2 (Hi S). Extremely acidic (pH<2). Hi SO4 increasing Col 4 - (MS) - pH<4/ . Ho SO4 increasing. Col 5 - Non acidic, Ca-SO4-HCO3 Col 6 (Semi-MS) - Non-acidic Ca-SO4-HCO3 Col 7 (Semi-MS) - pH<3 Col 8 (Schist, 2%S), pH>8, Ca-HCO3-SO4 Col 9 (Semi-MS) - pH<3 Col 10 (MS) - pH<5 (NP available?) Col 12 (Calc Schist 0.5% S) - pH>8, Mg-Ca-HCO3-SO4 Col 13 (MS) - pH>7 Ca-SO4-HCO3 (no NP) Col 14 (MS) - pH<5 Zn-SO4 (NP remaining) Leaching of soluble salts rather than oxidation is believed to control water chemistry, and water chemistry is stable (ICAP 6.2.2)	Does not appear to consider NP depletion effects in mixed waste rock dumps.		12	Distribution uncertain, IDs should indicate location	Unit 1 - (1?) Unit 1 and 2 mix (1) Unit 2 (6) Unit 3 (1) Unit 4 - not tested Unit 2 and 4 mix (1) Unit 2 and 5 mix (2)	Column tests (~20 kg) Analysis for pH, Eh, EC, Alk, Acidity, SO4 (metals) 23 weeks				No See Appendix I
128	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan	1997	Robertson Geoconsultans	Appendices to ICAP on water and load balance calcs, MINTEQ runs and water treatment options	Load balance is basically a dilution model	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
129	SJD	Anvil Range Mining Complex - Integrated Comprehensive Abandonment Plan	1997	Robertson Geoconsultans	ICAP Appendices Appendix K has groundwater quality tables	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
210	DC	IN89-001 1996 Annual Report for Faro	1997	Anvil Range Mining	Faro Mine Water Licence (IN89-001) Annual Report (1996). Report on water use, Water Quality, Biological, Geotechnical, Closure.	Surface and ground water WQ data for mine discharges receiving systems and seeps. Stream sediment collected as part of D/S receiving biological program.	Stn descriptions and maps. Independent laboratory analysis, data appended	Stream Sediments	7 stn's, soil samples/site	R1, R2, R3, R4, R5, R6, R7	N/A	ICP Metals (23 element)	S/SW/G	?	SW=pH, cond CN-T, NH_3-N, SO_4, TSS, Total metals, Ag, As, Ba, Cd, Cu, Hg, Mo, Ni, Pb, Sb, Zn. S=CN-T cond, NH3, pH, SO4, TSS, Total ICP metals.	Yes
237	DC	IN89-001 1996 Drilling & Piezometer	1997	Anvil Range Mining	Same document as #220	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
143	DC	1997 Faro Annual Environmental Report Water Licence QZ95-003 (previously IN89-	1997	January-00	Faro Mine Water Licence (IN89-001). Annual Report (1997). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ monitoring data for 1997.	Good, Maps & Station descriptions provided. Independent laboratory analyses.	N/A	N/a	N/A	N/A	N/A	SW		Pb, En, As, SO_4, NH_3, TSS plus pH hardness and flow	No
240	DC	1996 Annual Environmental Report for IN89-002 - Vangorda Plateau	1997	Anvil Range Mining	Vangorda Plateau Water Licence (IN89-002). Annual Report (1996). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ monitoring data for 1996.	Good, Maps & Station descriptions provided. Independent laboratory analyses.	Sediments	4	V1, V27, V5, V8	N/A	Cu, Pb, Zn	SW		Pb, Eh, As, SO_4, NH_3, TSS	WQ, yes
130	KSS	Stage 1 - Development and Preliminary Results of Anvil Range	1997	Robertson Geoconsultans	Develop a Water and Load Balance for the site	Can be used to evaluate alternative closure measures	Useful evaluation tool									
15	DC	1997 Annual Inspection Report of Waste and Water Management Facilities	1997	Healey, Peter	Annual Engineering Inspection Vangorda Plateau Waste & Water Management Facilities Required by Water Use Licence IN89-002	Engineering Inspections of physical structures, static water levels of piezometers, no soil, rock or WQ data.	No data collected.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
180	DC	Faro Water Licence QZ95-003	1998	January-00	Water Use Licence for Faro Operation issued pursuant to the Yukon Waters Act. Authorizes water use, waste deposit and monitoring requirements	Licence terms and conditions specifying reporting, monitoring (physical, surface & Ground WQ, biological, seep WQ and rock testing), construction, operations, discharge limits, closure, studies. Details provided of monitoring stations locations and descriptions, frequency and parameters.	No data or samples.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
181	DC	Vangorda Water Licence IN89-002	1998	January-00	Water Use Licence for Vangorda Operation issued pursuant to the Yukon Waters Act. Authorizes water use, waste deposit and monitoring requirements	Licence terms and conditions specifying reporting, monitoring (physical, WTP, surface & Ground WQ, biological, sediments, & seep WQ), construction, operations, discharge limits, closure, studies. Details provided of monitoring stations locations and descriptions, frequency and parameters.	No data or samples.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
145	DC	1997 Annual Environmental Report for Water License IN89-002-Vangorda Plateau	1998	Anvil Range Mining	Vangorda Plateau Water Licence (IN89-002). Annual Report (1997). Report on water use, water quality, WTP and Engineering Inspection.	Surface & groundwater WQ data for mine discharges, receiving water and ground water wells. Stream sediment data provided.	Maps & stn descriptions provided. Independent lab analysis and data appendices.	Stream Sediments	4 Stn - 3 replicate	V1, V5, V8, V27	N/A	TCP metal			pH, SO4, TSS, T hardness, T-AlK, Acidity, Condo, NH3, Total & dissolved ICP Metals.	Yes
211	DC	1997 Annual Enviornmental Report (Vangorda Plateau) IN89-007	1998	January-00	Vangorda Plateau Water Licence (IN89-002). Annual Report (1997). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Summarizes WQ and Stream sediment monitoring data for 1997.	Good, Maps & Station descriptions provided. Independent laboratory analyses.	Sediments	4	V1, V27, V5, V8	N/A	Cu, Pb, Zn	SW		Pb, Eh, As, SO_4, NH_3, TSS, plus pH Hardness and flow.	WQ, yes
147	DC	1997 Annual Geotechnical Performance Evaluation and Instrumentation Draft Report - Faro Mine, Yukon - Volume 2	1998	Golder Associates	Annual Geotechnical Inspection (1997) of Down Valley Dam, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence. Volume II - Data Appendices - for Doc # 146.	Physical instruments monitoring data. Includes piezometric elevations, and thermistor data for dams and canal. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical monitoring data from installed instruments. See doc # 147 - Volume I companion doc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
146	DC	1997 Annual Geotechnical Performance Evaluation and Instrumentation Draft Report - Faro Mine,	1998	Golder Associates	Annual Geotechnical Inspection (1997) of Down Valley Dam, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence. Volume I. Volume II Data Appendices - see Doc # 147.	Physical instruments monitoring data. Includes piezometric elevations, and thermistor data for dams and canal. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical monitoring data from installed instruments. See doc # 147 for data.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
238	DC	Faro Main Pit Discharge	1998	January-00	Same document as #148	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

c Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
148	DC	Faro Main Pit Discharge Contingency Plan (Water Licence QZ95-003)	1998	Anvil Range Mining	Water Licence requirement for a Faro Pit Discharge Contingency Plan. Plan describes systems for water conveyance, treatment and discharge and triggers for plan implementation and contingency.	Operations Plan. No sample or monitoring data. Good description of pit inputs and main pit filling curve.	No samples or data	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	KSS	Vangorda Reclamation, Vangorda Plateau	1998	Healey, Peter	Document relocation of material from the ore transfer pad to the existing sulphide cell at the Vangorda waste rock pile.	Record of moving 13000 m3 of sulphidic rock to the northwest side of the pile and therefore disturbed material there.	Not relevant to current planning	na	na	na	na	na	na	na	na	na
	KSS	1998 Annual Inspection Report of Waste and Water Management Facilities Vangorda Mine	1998	Healey, Peter	Inspect Geotechnical Performance and Stability of Structures (1995)	Minor maintanance issues identified. Some information on construction related activities. 1998 work included relocation of 12,000 m3 of sulphide rock to the Vangorda Dump. Water level data for piezometers	Not relevant to current planning	na	na	na	na	na	na	na	na	na
21	JTC	Little Creek Pond Emergency Spillway,	1998	Healey, Peter	???											
149	DC	1998 Annual Geotechnical Performance Evaluation and Instrumentation Data Report - Faro Mine,	1999	Golder Associates	Annual Geotechnical Inspection (1998) of Down Valley Dam, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence. Volume I. Volume II Data Appendices - see Doc # 150.	Physical instruments monitoring data. Includes piezometric elevations, and thermistor data for dams and canal. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical monitoring data from installed instruments. See doc # 150 for data.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
150	DC	1998 Annual Geotechnical Performance Evaluation and Instrumentation Data Report - Faro Mine, Yukon - Volume 2	1999	Golder Associates	Annual Geotechnical Inspection (1998) of Down Valley Dam, Freshwater Dam, North Fork Causeway and waste dumps as required by the water licence. Volume II - Data Appendices - for Doc # 149.	Physical instruments monitoring data. Includes piezometric elevations, and thermistor data for dams and canal. No soil, rock or surface, groundwater or seepage WQ.	No samples collected. Seepage flow data provided for X11, X12, X13 weirs. Physical monitoring data from installed instruments. See doc # 149 - Volume I companion doc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
16	JTC	Proposal for: Progressive Rehabilitation,	1999	Healey, Peter	Proposal for progressive rehabilitation of Vangorda	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
17	JTC	Proposal for: Progressive Rehabilitation,	1999	Healey, Peter	Proposal for progressive rehabilitation of Vangorda - REVISED	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
151	DC	1998 Faro Annual Environmental Report Water LicenceQZ95-003 (previously IN89-001)	1999	January-00	Faro Mine Annual Environmental Report (1998), Water Licence QZ95-003 (previously IN89-001)	Presentation of monitoring data as required by Water Licence QZ95-003, including SW/GW samples	independent lab results, complete site water quality network as required by water licence: high validity/utility	N/A	N/A	N/A	N/A	N/A	GW, SW		surface water: pH, flow, SO4-T, S04-D, TSS, NH3-N, hard.,CN-T, CN-WAD, Alk_T, CL-T; Groundwater: pH, SWL, S04,NH3-N, Acid-T, Alk-T,; bioassay;	Yes
152	DC	1998 Annual Environmental Report for Water Licence IN89-002 - Vangorda Plateau	1999	D&T	Vangorda Plateau Water Licence (IN89-002). Annual Report (1998). Report on water use, water quality, WTP and Engineering Inspection.	Surface & groundwater WQ data for mine discharges, receiving water and ground water wells.	Maps & stn descriptions provided. Independent lab analysis and data appendices.	N/A	N/A	N/A	N/A	N/A	SW/G	?	pH, SO4, TSS, T hardness, T-AlK, Acidity, Condo, NH3, Total & dissolved ICP Metals.	Yes
153	DC	1998 Faro Annual Environemtnal Report Water Licence QZ95-003 (previously IN89-001)	1999	Deliotte & Touche	Faro Mine Water Licence Annual Report (1998) QZ295-003. Report on water use, water quality, Biological, closure WQ survey, Geotechnical.	Surface and Ground Water Sampling from mine discharge, receiving waters and ground wells. Additional ground wells monitored, seep survey conducted. WQ assessment provided by parameter and station.	Stn map & description. Independent data analysis and complete data appendices.	N/A	N/A	N/A	N/A	N/A	S/SW/G	A3O, FCO, FDU, FCD, FaroCR, GHSCR, 10SEEP, NE, NE2N NF1, NF2, NWINT, SP506, W8, W10	pH, SO4, NH3, T-Alk, ICP metals (T & Diss) SS	Yes
142	DC	1998 Annual Environmental Report for Water Licence IN89-002 - Vangorda Plateau	1999	Deliotte & Touche	Vangorda Plateau Water Licence (IN89-002). Annual Report (1998). Report on Water Use, Water Quality, Benthos, WTP, Engineering Inspection.	Lower Vangorda Creek is influenced by mine on Vangorda Plateau for TSS, Zn, Pb, NH_3. Also, W.Q. at V5 can have an effect on SO_4 and TSS concentration in lower Vangorda Creek. Summarizes WQ monitoring data for 1998	Good, Maps & Station descriptions provided. Independent laboratory analyses.	Sediments	4	V1, V27, V5, V8	N/A	Cu, Pb, Zn	SW		Pb, En, As, SO_4, NH_3, TSS plus pH hardness and flow	WQ, yes

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
153	KSS	Faro Mine - Down Valley Tailings Contaminant Transport Assessment and Evaluation of the Existing Monitoring Network for Groundwater	1999	Environment Canada, Environmental Protection, Yukon Branch	Review effectiveness of groundwater monitoring network below tailings area	Elevated sulphate concs in groundwater, attributed to sulphate from the tailings porewater. Zinc concentrations are relatively low due to chemical attenuation within the tailings and in the underlying sediments. Some attenuation data from earlier SRK reports is presented.	Relevent to tailings studies. Preceeds additional work by Peri Mehling and Gartner Lee Ltd.	na	na	na	na	na	na	na	na	na
61	SJD	Work Plan for Progressive Rehabilitation -	1999	SRK	Proposal for re-hab at Vangorda	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20	JTC	1999 Annual Inspection Report of Waste and Water Management Facilities	1999	Healey, Peter	Annual inspection of waste and water management facilities at Vangorda/Grum to evaluate performance and stability of facilities	Static water levels in piezometers in Vangorda waste dump area	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
157	DC	1999 Faro Annual Environmental Report - Water Licence QZ95-003	2000	January-00	Water Licence QZ95-003Annual Report 1999 which provides results of licence monitoring (Surface WQ, Ground WQ, Seep WQ Physical, Maintenance, Licence Studies and Other activities)	Surface WQ data sets - monitoring for mine discharges & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. Seep Survey data sets. Groundwater seep survey data sets. WQ assessment provided for surface WQ and Groundwater parameter.	Surface and Groundwater WQ data provided. Station descriptions provided. Independent laboratory analyses. Supporting results provided in Appendices.	N/A	N/A	N/A	N/A	N/A	S/SW/G	?	SW= pH; T CN;WAD CN; NH3-N; total & dissolved ICP metals, SO4,SS, T-Alk, hardness, acidity. GW = pH; Dissolved ICP metals, NH3-N, SO4. Seeps = pH, SO4, TSS, NH3-N, Total and Dissolved ICP metals.	Results for SW/GW/Seeps
158	KSS	1999 Vangorda Plateau Annual Environmental Report - Water Licence IN89-002	2000	January-00	Annual reporting of monitoring and inspections (1999)	Water quality data and discussion of water quality results by station, includes good descriptions of stations in text of report	Data useful for long-term trends etc.						S/SW	All Vangorda Stations	Comprehensive	No - These are in the EQWin database
160	KSS	Rose Creek Mass Balance for Sulphate and Total Zinc at Locations X2 and X14	2000	Anvil Range	Update Mass Balance at X2 (Rose Creek below rock drain and X14 (Rose Creek below tailings)	Base Balance gave good closure except for sulphate below the tailings area which suggested a missing source of sulphate was present. The mass balance used site seepage data from the waste dumps and some groundwater data to estimate loading from the waste dumps	Reasonable, but difficult to follow structure. Important for any load balance work	na	na	na	na	na	na	na	na	Supporting data is all in the Eqwin database
159	KSS	Faro Mine Pit Pond - Compilation of Water Chemistry Profiles: 1994 to March 2000	2000	Anvil Range Mining	Compilation of chemical and physical profiling data for Faro Pit	Oxygen depleted at depth. Temperature is 4C at depth, seasonally variable on surface. pH lower at depth. Cond higher at depth in the spring. Redox lower at depth. Some differences in metal content with depth	Potentially useful for pit lake modelling/predictions	na	na	na	na	na	na	na	na	No - Data should be available from Eric Denholm electronically
161	JTC	Investigation of Treatment Methods for	2000	Canadian Environmental	??? Not on Shelf											
170	JTC	Vangorda Rock Dump Investigation Final	2001	Gartner Lee	??? Not on Shelf											
42	JTC	2000 Annual Inspection Report of Waste and Water Management Facilities	2001	Healey, Peter	PMHhas this - not yet seen											
24	JTC	2001 Annual Inspection Report of Waste and Water Management Facilities	2001	Healey, Peter	Annual inspection of the Vangorda waste rock and water management facilitioes	recommends earthworks related towater management	water levels in Piezometers below waste dump - need to assess relative to dump water balance	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
166	KSS	2000 Vangorda Plateau Annual Environmental Report - Water Licence IN89-002	2002	Gartner Lee	Annual reporting of monitoring data and inspections (2000)	Water quality data and discussion of water quality results by station, includes good descriptions of stations in text of report, and location maps	Data useful for long-term trends etc.	na	na	na	na	na	na	na	na	No - These are in the EQWin database

APPENDIX B.2
PHASE 1 - REVIEW
REVIEW NOTES

Doc Num	Reviewer	Title	Date	Authors	Objective of Report or Reason for the Report	Critical Findings	Validity of Findings	Sampling and Results								
165	DC	2000 Faro Annual Environmental Report Water - Licence QZ95-003	2002	Gartner Lee	Faro Mine Water Licence Annual Report (2000) QZ295-003. Report on water use, water quality, Biological, closure WQ survey, Geotechnical.	Surface and Ground Water Sampling from mine discharge, receiving waters and ground wells. Additional ground wells monitored, seep survey conducted. WQ assessment provided by parameter and station.	Stn map & description. Independent data analysis and complete data appendices.	N/A	N/A	N/A	N/A	N/A	S/SW/G	A3O, FCO, FDU, FCD, FaroCR, GHSCR, 10SEEP, NE, NE2N NF1, NF2, NWINT, SP506, W8, W10	pH, SO4, NH3, T-Alk, ICP metals (T & Diss) SS	Yes
241	DC	Vangorda Plateau, Annual Environmental Report, 2000	2002	Gartner Lee Ltd	Vangorda Plateau Water Licence (IN89-002). Annual Report (2000) Report on Water Use, Water Quality, stream sediments, Benthos, WTP, Engineering Inspection.	Surface groundwater data for mine discharges, receiving waters and groundwater wells. Stream sediment data for Vangorda Creek.	WQ/Maps provided independent laboratory analysis. Data appendices. Some SW parameters not always tested.	N/A	N/A	N/A	N/A	N/A	SW/G	?	pH, SO_4, TSS, hardness, T-AlK, Condo, NH_3, Total & dissolved ICP Metals.	Yes
215	DC	IN89-002 Annual Environmetal Report 2001 Vangorda Plateau	2002	January-00	Vangorda Plateau Water Licence (IN89-002). Annual Report (2001) Report on Water Use, Water Quality, Stream sediments, Benthos, WTP, Engineering Inspection.	Surface groundwater data for mine discharges, receiving waters and groundwater wells. Stream sediment data for Vangorda Creek.	WQ/Maps provided independent laboratory analysis. Data appendices. Some SW parameters not always tested.	Stream Sediments	4 sites (triplicates)	V1, V27, V5, V8	N/A	ICP Metals	SW/G	?	pH, SO4, TSS, hardness, T-AlK, Condo, NH3, Total & dissolved ICP Metals.	Yes
216	DC	QZ95-003-@001 Faro Annual Environmental Report & 2001 Annual Geotechnical Evaluation and Instrument Review - Vol. 1 & 2	2002	January-00	Faro Mine Water Licence Annual Report (2001) QZ295-003. Report on water use, water quality, Biological, closure WQ survey, Geotechnical.	Surface and Ground Water Sampling from mine discharge, receiving waters and ground wells. Additional ground wells monitored, seep survey conducted. WQ assessment provided by parameter and station.	Stn map & description. Independent data analysis and complete data appendices.	N/A	N/A	N/A	N/A	N/A	S/SW/G	A3O, FCO, FDU, FCD, FaroCR, GHSCR, 10SEEP, NE, NE2N NF1, NF2, NWINT, SP506, W8, W10	pH, SO4, NH3, T-Alk, ICP metals (T & Diss) SS	Yes
40	KSS	Water Licence Application, Vangorda Plateau, Volume 1 of 2	No date	SRK	Water Licence Application	Soil conditions beneath dump described (p.2-32), including some mention of permafrost features Block model estimates of rock types in Grum and Vangorda Dumps Majority of Vangorda rock is net acid generating Sulphides at Grum net acid generating		R	23 - Vangorda 46 - Grum	Results are in Vol II, Tables A4 and A.5	3 - 10 samples in each rock type	ABA - no speciation or carbonate analyses. Metal data in summary but not detailed tables - probably from block model	S	na - Stream stations upstream and downstream of development - all baseline	Basic suite - in house	all except baseline water quality
40	KSS	Water Licence Application, Vangorda Plateau, Volume 1 of 2	No date	SRK	Water Licence Application	Leach extraction tests have concentratiosn in the 1 - 30 mg/L range for Zn.		R	24	Area not indicated	In tables	Leach Extraction Tests on weathered core samples				
40	KSS	Water Licence Application, Vangorda Plateau, Volume 1 of 2	No date	SRK	Water Licence Application	Tests develop acidic conditions over 50 week test period		R	2 (2)	Area not indicated	sulphide and phyllite composites - Data in Appendix A	Humidity cell tests - with acidified innoculated replicate				
40	KSS	Water Licence Application, Vangorda	No date	SRK	Water Licence Application	Samples contain ferroan dolomites		R	11	Area not indicated	Phyllites and sulphides	Mineralogy - Petrology descriptions				
74	DC	Appendix 1A to Appendix 11	No date	SRK	Water Licence Y-IN85-05AL Annual Report - 1988 Appendices (see Doc #76). Results from Surface WQ, Ground WQ, CN Spill Report, Bioassay Data, Biological Monitoring Report, North Fork Fisheries Report, Golder Waste Rock stability Assessment, Golder North Fork Rose Creek Performance Report, Emergency Procedures down Valley Dam and Fresh Water Dam, Review of Fresh Water Demand and Review of Flood Estimation methodologies.	See Doc # 76. Surface WQ data sets - monitoring for mine discharge & receiving waters (u/s and d/s). Ground WQ monitoring data sets - tailings, dams, d/s CVD. WQ assessment provided for each surface WQ parameter.	Data reports support Doc #76.	N/A	N/A	N/A	N/A	N/A	SW/GW	?	T-AlK; pH; CN; CN WAD; NH4;Cu;Pb;Zn;Mn, Fe, Na, SO4,SS	Results for SW & G
77	KSS	Water License Y-IN85-05AL - 1987 Annual Report	No date	SRK	Annual Report on data related to water licence	Some surface and groundwater analyses, but no maps showing station locations etc.	Data should be added to existing databases						W	X7, X22 and X23 at Faro area	Basic in-house suite	Yes (all stations reflecting waste rock seepage)

APPENDIX C
Summary of Seep Sampling Results

SRK Consulting
Engineers and Scientists

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MEMORANDUM

DATE: November 14, 2002

TO: File

FROM: Kelly Sexsmith

RE: 2002 Seepage Surveys

1. INTRODUCTION

As part of the 2002 site characterization activities for Tasks 3.2 and 4.2 of the overall ICAP work plan, seep surveys were completed in June and September at the Faro, Vangorda and Grum waste rock dumps. The purpose of the surveys was to determine the water quality associated with discrete areas of seepage pathways from each of the major waste rock dumps. The seep surveys included several small seepage stations that are not sampled in the routine seepage monitoring programs completed by site personnel.

This memo documents the methods and results of the 2002 seepage surveys, and an initial interpretation of the data.

2. METHODS

The June seepage survey involved walking along the toes of all of the waste rock dumps and stockpiles, where the rock rests on original ground, and collecting water samples from any flowing seeps that emerged from these areas. Additional seeps were located by slowly driving along accessible roads and ramps in the Faro Pit complex that were below waste rock dumps or ore stockpiles. Most of the seeps were flowing, or had been recently flowing based on observations of moisture along flow paths, or because ponds were filled to their spill points. Sample locations and other possible seepage sites identified during the June survey were revisited during the September survey. Some additional seeps were located due to heavy rainfall during the survey.

Samples were collected for analyses of routine parameters (pH, conductivity, acidity, alkalinity, chloride and sulphate), and dissolved metals (dissolved metals by ICP-OES). The samples were filtered and preserved in the field according to standard methods for collection of environmental samples. Field pH, conductivity, redox, temperature measurements were taken at each station

using a WTW meter. Flow estimates were made using the bucket and stopwatch method, or by estimating the velocity and cross sectional area of the seep.

The sampling locations were marked for later reference with flagging tape and surveyed using a hand-held GPS. The locations are shown in Figures 1 through 3. Photographs were taken to document the general appearance of the station, and any precipitates along the flow paths.

Duplicates, field blanks and travel blanks were collected as a check on the quality of the field methods and laboratory results.

3. RESULTS

The results of the 2002 seepage surveys are provided in Attachment 1. Select parameters (pH, conductivity, flow, sulphate and zinc concentrations are presented in Figures 1 through 3.

4. DISCUSSION

4.1 Faro Waste Rock Dumps

4.1.1 Water Types

Seepage from the Faro Waste Rock Dumps can be divided into three distinct types on the basis of pH and zinc concentrations (Table 1):

- Type 1 seeps had pH's of greater than 6.5 (typically greater than 7), and zinc concentrations of less than 5 mg/L. Other trace metals (eg. aluminum, iron, manganese) were low or below detection limits.

- Type 2 seeps had pH's typically between 6 and 7, and variable zinc concentrations ranging from 4 to 595 mg/L. Cadmium, cobalt, iron, manganese, and nickel were also elevated in several of the samples.

- Type 3 seeps typically had pH's of less than 6, and zinc concentrations typically greater than 40 mg/L and as high as 9210 mg/L (exceptions include the June FD20 sample, with 7.93 mg/L Zn, and the September FD21B sample, with 17 mg/L Zn.). Aluminum, cadmium, cobalt, copper, manganese, and nickel concentrations were high in several of these samples.

TABLE 1
Characteristics of Faro Water Types

	Type 1					Type 2					Type 3				
Sample ID	Average	Median	Min	Max	N	Average	Median	Min	Max	N	Average	Median	Min	Max	N
pH	7.32	7.24	6.61	8.14	13	6.55	6.56	5.76	7.00	21	3.93	3.33	2.32	5.96	17
Acidity pH 8.3	11	11	4	24	13	293	61	15	2160	21	4321	283	27	39900	17
Alkalinity Total	121	125	37	215	13	183	163	13	394	21	17	8	<1	92	17
Chloride	1.0	0.8	<0.5	2.4	13	5.2	2.0	0.5	18	21	20	0.6	<0.5	240	17
Sulphate	572	355	10	2470	13	2343	2220	298	4600	21	5447	1980	193	43300	17
Calcium	107	98	13	263	13	353	322	49	628	21	215	240	10	504	17
Magnesium	87	53	2	378	13	315	215	51	686	21	233	166	9	1000	17
Potassium	6	3	<2	24	13	9.3	10	3	17	21	15	3	<80	14	17
Sodium	31	5	<2	122	13	24	17	3	69	21	18	4	<80	50	17
Aluminum	<0.2	<0.2	<0.2	<0.2	13	0.3	<0.2	<0.6	0.3	21	75	9.1	<1	857	17
Cadmium	<0.01	<0.01	<0.01	<0.01	13	0.08	0.02	<0.02	0.62	21	1.9	0.17	<0.01	14	17
Cobalt	0.01	<0.01	<0.01	0.01	13	0.18	0.06	<0.01	0.53	21	1.2	0.28	0.03	9.8	17
Copper	<0.01	<0.01	<0.01	<0.01	13	0.05	<0.01	<0.03	0.30	21	45	0.99	0.03	559	17
Iron	<0.03	<0.03	<0.03	<0.03	13	14	0.38	<0.09	90	21	793	40	<0.03	9170	17
Lead	<0.05	<0.05	<0.05	<0.05	12	0.09	<0.05	<0.2	0.23	21	0.55	<0.05	<2	1.6	17
Manganese	0.04	<0.005	<0.005	0.28	13	19	3.8	0.08	54	21	76	7.4	0.60	811	17
Nickel	0.06	<0.05	<0.05	0.09	13	0.34	0.16	<0.05	0.90	21	1.2	0.37	0.05	6.0	17
Zinc	1.5	1.1	0.01	5.0	13	123	30	1.3	595	21	1134	97	7.9	9210	17

Note: Units in mg/L except for alkalinity in mg $CaCO_3$ eq/L

TABLE 2
Seepage Stations Classified by Water Type

Type 1 (pH >7, Zn <5 mg/L)		Type 2 (pH 6 – 7, Zn concentrations ranging from 4 to 595 mg/L)		Type 3 (pH <6, Zn typically >40mg/L)	
ID	Location	ID	Location	ID	Location
SRK-FD02	Upper Parking Lot Dump	SRK-FD1	Ore and Low Grade Ore Stockpiles	SRK-FD04	Oxide Fines Stockpile
SRK-FD05	Toe of Northeast Dump	SRK-FD8	East Main Dump	SRK-FD13	Intermediate Dump
SRK-FD06	Toe of Northeast Dump	SRK-FD9	Ore and Low Grade Ore Stockpiles, West Main Dump	SRK-FD20	Faro Creek Diversion
SRK-FD07	Toe of Northeast Dump	SRK-FD10	Ore and Low Grade Ore Stockpiles, West Main Dump	SRK-FD21	Northeast Dumps towards Pit
SRK-FD14	Ranch Zone Dump	SRK-FD12	Ore and Low Grade Ore Stockpiles, West Main Dump	SRK-FD22 (September only)	Northeast Dumps towards Pit
SRK-FD16	Upper Northwest Dump	SRK-FD19	Lower Northwest Dump	SRK-FD23 (September only)	Northeast Dumps towards Pit
SRK-FD17	Upper Northwest Dump	SRK-FD22 (June only)	Northeast Dumps towards Pit	SRK-FD24 (September only)	Northeast Dumps towards Pit
SRK-FD18	Upper Northwest Dump	SRK-FD23 (June only)	Northeast Dumps towards Pit	SRK-FD27 (September only)	Northeast Dumps towards Pit
		SRK-FD24 (June only)	Northeast Dumps towards Pit	SRK-FD33	Mill
		SRK-FD26	Northeast Dumps towards Pit	SRK-FD34	Mill
		SRK-FD27 (June only)	Northeast Dumps towards Pit	SRK-FD36	West Main Dump
		SRK-FD30	West Main Dump	SRK-FD37	Medium Grade Stockpile
		SRK-FD31	Ore and Low Grade Ore Stockpiles, West Main Dump	SRK-FD40	Faro Valley Dump
		SRK-FD32	Mill		
		SRK-FD35	Mill		
		SRK-FD38	Ore and Low Grade Ore Stockpiles		

Table 2 lists the seepage stations by each of the above types. The results boxes in Figure 1 also indicate these groupings by colour.

The Type 1 seeps included samples from below the Upper Parking Lot dump (FD02), along the toe of the Northeast Dump (FD05, 06, and 07), the Ranch Zone Dump (FD14), and the Upper Northwest Dump (FD16, 17, and 18). According to the inventory of rock types presented in the 1996 ICAP report, these dumps contained relatively low proportions of sulphide waste rock, and higher proportions of calc-silicates or intrusives compared to other parts of the Faro Dump. The seepage chemistry reflects some buffering by reactive carbonate minerals, which help to maintain neutral pH conditions.

The Type 2 seeps included samples from several different areas, including ore and low grade ore stockpiles (FD01, 10, 12, 31 and 38), the West Main Dump (FD10, 12, 30 and 31), the Lower Northwest Dump (FD19), seeps entering the pit below the Northeast Dumps (FD21, 22, 23, 24, 26 and 27; spring survey only), and seeps in the mill area (FD32 and 35). A common element of all these areas is the presence of sulphides or oxidized schist. Although the pH is in the pH 6 to 7 range, it is clear that this drainage is strongly influenced by oxidation of sulphide minerals. It is not clear why the pH of these samples is still close to neutral. However, many of these seeps contain high levels of calcium and magnesium, suggesting that there are still some carbonates present in the source materials. Samples from below the Low Grade Stockpile C (FD38, Zn = 595 mg/L), and from the mill area (FD32, Zn = 581 mg/L) contained the highest zinc concentrations. Samples from along the original Faro Creek channel (FD10, 12 and 31) had zinc concentrations in the range of 220 mg/L, and were likely influenced in part by ore stockpiles upstream of this location. Type 2 samples outside of the influence of the ore stockpiles and mill area had zinc concentrations typically below 30 mg/L.

The Type 3 seeps included samples from the Oxide Fines Stockpile (FD04), the Medium Grade Stockpile (FD37), the mill area (FD33 and 34), the West Main Dump (FD36), the Intermediate Dump (FD13), the Faro Creek Diversion Dyke (FD20), the Faro Valley Dump (FD40), and seeps entering the pit below the Northeast Dumps (FD21, 22, 23, 24, and 27; fall survey only). Portions of the waste rock in all of the above areas contained sulphides or oxidized schist. The seepage quality indicates very little if any neutralizing minerals are available to control the pH and metal concentrations in these seeps. Samples from the Oxide Fines Stockpile (FD04, Zn = 1230 to 9210 mg/L), the Medium Grade Stockpile (FD37, Zn = 6130 mg/L), and the mill area (FD33, Zn = 1110 mg/L) had the highest zinc concentrations. However, zinc concentrations in the remaining acidic seeps ranged from 8 to 751 mg/L (median of 54 mg/L) indicating that seeps with high zinc concentratiosn also occur in association with the sulphide waste rock cells and other sulphidic waste rock.

4.1.2 Initial Review of Historical Data

Some of the larger seeps from the waste rock dumps have been included in the routine monitoring programs for the site over the past 10 to 15 years. This data is presented in the Baseline Studies Report prepared by Gartner Lee Limited (GLL, 2002). Results from the three most relevant seepage stations are briefly discussed below. Unfortunately, the data is in an older database system, and is not in a format that can be presented graphically at this time.

Station X23

This station is located east of the mill, in the original Faro Creek channel, below the East Main Dump, the Oxide Fines Stockpile, and the Medium Grade Stockpile. It includes drainage from three distinct seeps sampled during the 2002 seepage surveys (SRK-FD10, 12, and 31). This station has been monitored for select parameters on an irregular basis since 1986, and for a full suite of parameters since 1999. Sulphate was the only parameter that has been consistently included since 1986. Sulphate concentrations have increased throughout the monitoring period, reaching approximately 2000 mg/L in 1991, 3000 mg/L in 1999, and then peaking in late summer 2000 at >10,000 mg/L. Sulphate concentrations have since decreased to approximately 4500 mg/L. The increase in sulphate concentrations corresponds to a shift in the major ion chemistry from calcium exceeding magnesium to magnesium exceeding calcium, and an increase in iron concentrations. Zinc concentrations from 1989/90 were approximately 20 mg/L. In 1999 (the next period of monitoring), zinc concentrations were typically in the range of 20 to 100 mg/L, with concentrations of approximately 200 occurring during spring 1999 and spring 2000. In the fall of 2000, concentrations increased dramatically reaching a peak of 1120 mg/L by October 2000. Concentrations then decreased somewhat in 2001, and are currently in the range of 220 mg/L. pH was not been consistently measured until 1996. The pH was typically close to 7 from 1996 to 1998 (inclusive), and has been in the range of 6.3 to 6.7 since early 1999.

Further information is needed to determine the history and configuration of the waste rock dumps and ore stockpiles over the monitoring period. However, the data indicates a generally increasing trend in zinc and sulphate concentrations.

Stations A30

Station A30 (SRK-FD40) is located along the north wall of the pit, below the Faro Valley Dump. The current location is accessed by hiking down from the Faro Valley Dump. In earlier years, the station was a sump, which may have received drainage from other seepage along the pit walls. Data is available for 1987 to 1989, and 1997 to 2001. Sulphate and zinc concentrations in

the late 1980's were near 200 and 5 mg/L respectively, with near neutral pH's. In the more recent data, sulphate and zinc concentrations were in the range of 500 and 50 mg/L respectively, with acidic pH's. The changes are indicative of the strongly oxidized condition of the Faro Valley Dumps, which are some of the older dumps on site.

Station W5

Stations W5, NE1 and NE2 are located along the toe of the Northeast Dump. W5 was monitored in the late 80's, and was probably close to the toe of the dump. NE1 and NE2 are monitored in the regular seepage program, and are collected approximately 100 metres downstream of the toe. These stations are equivalent to SRK-FD05 and 06. The late 80's data from W5 indicated this seepage had a slightly alkaline pH, sulphate concentrations in the range of 300 to 800 mg/L, and zinc concentrations of 0.6 to 1.6 mg/L. The data from NE1 and NE2 indicate similar pH's, sulphate concentrations in the range of 70 to 900 mg/L, and zinc concentrations ranging from <0.01 to 2.5 mg/L. Lower zinc concentrations at this location may be due to attenuation of zinc along the seepage flow path. The 2002 seepage data has similar pH's and sulphate concentrations, and slightly higher zinc concentrations (1.1 to 2.8 mg/L).

4.2 Grum Waste Rock Dumps

4.2.1 Water Types

All of Grum seeps had neutral to slightly alkaline pH's, and would be classified as Type I seeps under the system described for Faro. However, further division is possible on the basis of sulphate and zinc concentrations.

- Type 1a seeps generally had very low sulphate (26 to 386 mg/L) and low zinc concentrations (<0.005 to 0.028 mg/L). These seeps reflect drainage from calcareous phyllites and till in the northwest draining portion of the dump. Surface mapping in this drainage indicated some sulphides were present in this area, but they were typically in small isolated pockets, and were surrounded by extensive areas of calcareous phyllites.

- Type 1b seeps had zinc concentrations in the range of 2 to 4 mg/L, and sulphate concentrations greater than 500 mg/L. Most of these seeps were towards the southeast, and were below the sulphide cell. However, SRK-GD11, which was upgradient of the sulphide cell, also fell into this group. Waste rock mapping completed in September indicated that signfiicant amounts of sulphide were present above this location, and that sulphidic waste rock was not limited to the sulphide cell.

Table 3 provides a summary of key characteristics for each of the above seepage types.

TABLE 3
Characteristics of the Grum Water Types

Parameter	Type 1a					Type 1b				
	Average	Median	Min	Max	N	Average	Median	Min	Max	N
pH	7.50	7.60	6.87	7.85	7	7.20	7.19	6.67	8	10
Acidity pH 8.3	13	6	<1	40	7	29	27	13	69	10
Alkalinity Total	310	336	186	405	7	484	496	278	700	10
Chloride	1.4	1.8	<0.5	2.3	7	1.8	1.9	0.90	2.5	10
Sulphate	222	194	26	413	7	1042	1090	593	1350	10
Calcium	129	142	45	205	7	324	349	201	361	10
Magnesium	50	55	24	71	7	205	208	108	347	10
Potassium	2.4	<2	<2	4.0	7	7.3	7.5	4.0	10	10
Sodium	2.4	2.0	<2	3.0	7	10.5	10.5	4.0	16	10
Aluminum	<0.2	<0.2	<0.2	<0.2	7	<0.2	<0.2	<0.2	<0.2	10
Cadmium	<0.01	<0.01	<0.01	<0.01	7	<0.01	<0.01	<0.01	<0.01	10
Cobalt	<0.01	<0.01	<0.01	<0.01	7	0.01	<0.01	<0.01	0.03	10
Copper	<0.01	<0.01	<0.01	<0.01	7	0.01	<0.01	<0.01	0.01	10
Iron	<0.03	<0.03	<0.03	<0.03	7	<0.03	<0.03	<0.03	<0.03	10
Lead	<0.05	<0.05	<0.05	<0.05	7	<0.05	<0.05	<0.05	<0.05	10
Manganese	0.28	<0.005	<0.005	1.9	7	0.13	0.1175	0.008	0.26	10
Nickel	<0.05	<0.05	<0.05	<0.05	7	0.39	0.38	0.22	0.59	10
Zinc	0.01	<0.005	<0.005	0.03	7	3.1	2.7	2.1	5.1	10

Note: Units in mg/L except for alkalinity in mg $CaCO_3$ eq/L

4.2.2 Routine Monitoring

The routine monitoring stations at Grum are shown in Figure 2. Station V2 has been monitored on a regular basis since 1988, at V2A since 1997, and at V15 since 1995. The routine stations are located along the road access, and are between 200 and 800 metres below the toe of the dumps. All three stations had lower concentrations than measured at the toes of the dumps, indicating there is some dilution and/or attenuation of zinc along the flow paths.

Total and dissolved zinc concentrations at V2 have remained generally very low (<0.5 mg/L) throughout the monitoring period. However, in the past two years, a greater proportion of the samples has had higher concentrations than in earlier years, and sulphate concentrations have risen from typically <200 mg/L to between 200 and 800 mg/L.

Station V15, which is above Station V2, and closer to the Waste Roc Dump has shown similar results, with sulphate concentration increased from typically <100 mg/Lin 1995, 1997, and early 1998, to 200 to 300 in 1998 and 1999, and to as high as 1067 mg/L in 2002.

Total and dissolved zinc concentrations at V2A were very low (<0.1 mg/L) from 1997 through to 1999. In 2001 and 2002, concentrations were in the range of 0.12 to 3.4 mg/L. This change also corresponds to an increase in sulphate concentrations.

A direct comparison of these stations with the seepage data is not possible at this time because the spring 2002 data is not in an accessible format.

4.3 Vangorda Waste Rock Dumps

4.3.1 Water Types

All of the seeps associated with the Vangorda Waste Rock Dump had very high zinc concentrations (28 to 6990 mg/L). Four of the seeps had pH's between 6 and 7, four were acidic, with pH's of less than 6, and one was pH neutral during the spring survey, but acidic during the fall survey.

- The seeps with pH's between 6 and 7 can be classified as Type 2 seeps following the system described for the Faro seeps (Section 4.1.1). At Vangorda, these seeps tended to have higher zinc concentrations (27.9 to 1650 mg/L) than at Faro, reflecting the high proportion of sulphidic waste rock in the Vangorda Dumps. These seeps also had elevated concentrations of cadmium, cobalt, iron, manganese, and nickel. Cobalt and nickel concentrations were substantially higher than in Type 2 seeps at Faro.

- The acidic seeps can be classified as Type 3 following the system described for Faro. As for the Type 2 seeps, these tended to have higher zinc concentrations than at Faro, ranging from 474 to 6990 mg/L. Aluminum, cadmium, cobalt, iron, manganese and nickel concentrations were also generally very high.

Table 4 provides a summary of key characteristics for each of the above seepage types.

TABLE 4
Characteristics of the Vangorda Water Types

Parameter	Type 2					Type 3				
	Average	Median	Min	Max	N	Average	Median	Min	Max	N
pH	6.36	6.22	6.03	7.08	6	4.02	3.77	2.55	5.93	8
Acidity pH 8.3	727	445	53	2550	6	6453.8	3665	764	16500	8
Alkalinity Total	138	142	30	289	6	20	5	<1	119	8
Chloride	0.92	0.9	<0.5	1.3	6	1.9	0.6	<0.5	11	8
Sulphate	4574	3205	766	13700	6	14403	9115	2470	33100	8
Calcium	362	412	207	442	6	432	457	196	528	8
Magnesium	612	461	54	1880	6	1487	618	105	3490	8
Potassium	11	9.5	<20	13	6	33	<30	<80	11	8
Sodium	11	7.5	<20	13	6	32	<30	<80	5	8
Aluminum	<0.56	<0.3	<2	<0.2	6	53	13.5	<4	339	8
Cadmium	0.19	0.095	0.06	0.7	6	3.9	2.6	0.56	8.5	8
Cobalt	2.9	1.8	0.1	10.3	6	9.2	4.2	0.75	22	8
Copper	0.045	<0.015	<0.2	0.01	6	25	0.22	<0.4	180	8
Iron	78	50	<0.03	243	6	794	524	15	3040	8
Lead	0.15	<0.075	<0.5	0.1	6	1.2	<0.45	<2	2.5	8
Manganese	222	86	4.8	1000	6	891	179	18	2600	8
Nickel	3.4	3.5	0.18	7.2	6	8.0	5.4	1.1	17	8
Zinc	433	219	28	1650	6	2992	2140	471	6990	8

4.3.1 Routine Monitoring

Three of the drains (Drain 3, 5 and 6) at Vangorda have been monitored as part of the routine monitoring programs. Metal data is available for 1994 to 1997, and data for routine parameters have been collected regularly since 1994. The locations of these drains are shown in Figure 3.

Station V30 (Drain 3, SRK-FD03) has had zinc concentrations in the range of 200 to 500 mg/L since 1994. pH's have been close to 6 throughout that period, and sulphate concentrations have increased from 2500 in 1994 to 4000 mg/L in the more recent data.

Station V32 (Drain 5, SRK-FD04) had pH's in the range of 4 to 5, sulphate concentrations of 3000 to 7000 mg/L, and zinc concentrations of 700 to 1700 mg/L in the 1994 to 1997 data. From 1997 to present, the pH has continued to decrease, and sulphate and zinc concentrations have increased, reaching current pH's of 3.3, sulphate concentration of 30,000 mg/L, and zinc concentrations of almost 7000 mg/L. Sulphate and zinc concentrations appear to be increasing further rather than showing signs of reaching a peak.

Station V33 (Drain 6, SRK-FD05) has consistently had pH's in the 6 to 7 range, but has showed an increasing trend in sulphate concentrations since 1994 from 3000 to 10000 in the 1994 to 1999 data to greater than 13000 mg/L in data from late 1999 to present. Zinc concentrations have also increased from 400 to 800 mg/L in the 1994 to 1997 data to 1650 to 2850 mg/L in the more recent data.

5. CONCLUSIONS

Seeps associated with the Faro Waste Rock Dumps showed a wide range of pH and zinc concentrations. The highest zinc concentrations (>200 mg/L, as high as 9210 mg/L) were associated with the ore stockpiles and mill area. High zinc concentrations were also associated with the sulphide cells on the Main Dumps (up to 600 mg/L). A large number of seeps associated with the waste rock were acidic or partially buffered, and had zinc concentrations in the range of 20 to 100 mg/L. A moderate number of seeps at Faro had alkaline pH's, and zinc concentrations of less than 5 mg/L. These were associated with dumps that contained relatively little sulphide waste rock. Cadmium, cobalt, copper, iron, manganese and nickel concentrations in some of the seeps are at concentrations that significantly exceed receiving water quality criteria.

Seeps associated with the Grum Waste Rock Dumps had consistently neutral to alkaline pH's. Seeps draining to the Southeast had zinc concentrations ranging from 2 to 4 mg/L and elevated sulphate concentrations. Seeps draining to the Northwest had zinc concentrations ranging from undetectable to 0.028 mg/L, and generally lower sulphate concentrations. The seeps to the Southeast were located below the sulphide cell, or below sulphidic waste identified in the SRK September 2002 surface mapping programs. A brief review of routine monitoring data from Grum suggests that zinc and sulphate concentrations along the Southeast side of the dump have increased in the past few years. No other trace metals of concern have been detected in the Grum seepage to date.

Seeps associated with the Vangorda Waste Rock Dumps were acidic to partially buffered, and contained high to very high zinc concentrations (from 28 to 6990 mg/L). Sulphate and zinc concentrations have increased since the routine seepage monitoring programs were initiated in 1994. Other trace metals significantly exceeding receiving water quality criteria in the Vangorda seepage include cadmium, cobalt, copper, iron, manganese and nickel. Cobalt and nickel are notably higher compared to acidic seeps at Faro.

6. RECOMMENDATIONS

Several of the seepage stations identified in the 2002 seepage monitoring programs are not included in the routine seepage monitoring programs, or are monitored at locations that are some distance from the toes of the waste rock piles. These may provide valuable information on the evolution of seepage quality both prior to and during closure activities. Stations worth including in future seepage surveys are listed as follows:

Faro

Routine Stations

- X23
- A30
- SP5/6

New Stations

- SRK-FD01
- SRK-FD02
- SRK-FD19
- SRK-FD18
- SRK-FD13
- SRK-FD14
- SRK-FD24
- SRK-FD21
- SRK-FD23
- SRK-FD24
- SRK-FD05

Grum:

Routine Stations

- V2
- V2A
- V15

New Stations

- SRK-GD01
- SRK-GD04
- SRK-GD06
- SRK-GD11
- SRK-GD07
- SRK-GD12

- SRK-GD13

Vangorda:

Routine Stations

- A30 (Drain 3, SRK-FD03)
- A32 (Drain 5, SRK-FD04)
- A33 (Drain 6, SRK-FD05)

New Stations

- SRK-VD06
- SRK-VD9

Differences in water quality between the spring and fall surveys indicate that most of these stations should be monitored during both seasons.

The routine monitoring data that has been collected over the past 15 years is important for long-term projections of water quality at this site. The current database is maintained in an outdated version of EQWin. This should be upgraded to the most recent version so that is compatible for other users. A few problems with date formats and inconsistent station names have been noted, and should be corrected so that trends in the data can be analyzed.

FIGURES

FARO PIT
Yukon Territory
Topographic Map

100 0 200 400 600 feet
100 0 100 200 300 Metres

Date of photography: October 1990
Scale of photography: 1:20000
Survey Control provided by Curragh Resources Ltd.
Compiled by: The ORTHOSHOP, Calgary, Nov. 1990.
W 2MM

CONTOUR INTERVAL 10 ft

LEGEND

SAMPLE ID	
DATE	
pH	
Conductivity	(uS/cm)
Flow	(L/min)
Sulphate	(mg/L)
Zinc	(mg/L)

TYPE 1
TYPE 2
TYPE 3

SRKFD20	
JUNE	SEPT
3.18	2.78
655	1875
0.5	60
193	1170
7.930	59.80

SRKFD16
JUNE
6.61
84
300
10
0.010

SRKFD17	
JUNE	SEPT
7.15	7.35
103	130
25.5	1.5
10	1
0.081	0.088

SRKFD40
SEPT
3.23
938
>1000
445
46.700

SRKFD18	
JUNE	SEPT
6.98	7.33
177	173
?	1.5
28	19
0.102	0.101

SRKFD19	
JUNE	SEPT
6.98	6.87
5030	5110
30	30
3380	3810
43.90	51.30

SRKFD23	
JUNE	SEPT
6.39	4.27
729	1403
Trace Flow	5
346	801
8.890	43.40

SRKFD22	
JUNE	SEPT
6.59	5.45
2270	1766
Trace Flow	slight
1390	1130
7.190	41.0

SRKFD1	
JUNE	SEPT
6.69	6.59
3670	1900
6	0.5
2220	1070
34.60	13.60

SRKFD2
JUNE
7.88
1558
20
704
0.166

SRKFD24	
JUNE)	SEPT
6.95	5.12
1323	902
300	1000
710	406
26.800	13.30

SRKFD21	
JUNE	SEPT
4.57	5.21
4470	2860
15	slight
3540	1980
65.900	17.0

SRKFD33
SEPT
6.96
4540
30
3620
1110.0

SRKFD4	
JUNE	SEPT
2.32	2.54
2500	7350
No Flow	ponded
43300	7490
9210.0	1230.0

SRKFD36
SEPT
7.75
3540
10
2810
151.0

SRKFD38
SEPT
7.00
3970
2.9
4380
595.0

SRK-FD14	
JUNE	SEPT
8.14	7.78
2740	3400
<1	3
2260	2470
1.720	4.950

SRKFD26	
JUNE	SEPT
6.76	6.56
875	1117
>1000	>1000
298	391
1.280	2.020

SRKFD34
SEPT
5.95
1242
60
700
428.0

SRKFD37
SEPT
2.44
12740
300
16500
6130.0

SRKFD31
SEPT
6.87
5750
300
4350
223.0

SRK-FD5	
JUNE	SEPT
7.23	6.97
1252	882
10	60
440	266
2.150	1.080

SRKFD27	
JUNE)	SEPT
6.98	3.33
1552	2590
Trace Flow	slight
1050	1650
29.400	180.0

SRK-FD6	
JUNE	SEPT
7.21	7.24
1118	1045
10	240
382	355
2.790	2.040

SRKFD35
SEPT
6.22
1654
30
968
13.700

SRKFD32
SEPT
6.38
3580
60
2790
581.0

SRK-FD12	
JUNE	SEPT
6.42	6.24
5760	5740
2.4	120
4480	4220
231.0	219.0

SRK-FD13	
JUNE	SEPT
3.23	4.52
5670	2990
<1	slight
4780	2090
751.0	98.50

SRK-FD10	
JUNE	SEPT
6.17	6.25
5720	7760
80	300
4380	4600
215.0	223.0

SRK-FD9
JUNE
6.98
2560
No Flow
1710
26.40

SRK-FD7
JUNE
7.31
1050
No Flow
484
3.890

SRKFD30
SEPT
6.40
3740
ponded
2670
30.40

SRK-FD8
JUNE
5.76
2560
No Flow
995
3.880

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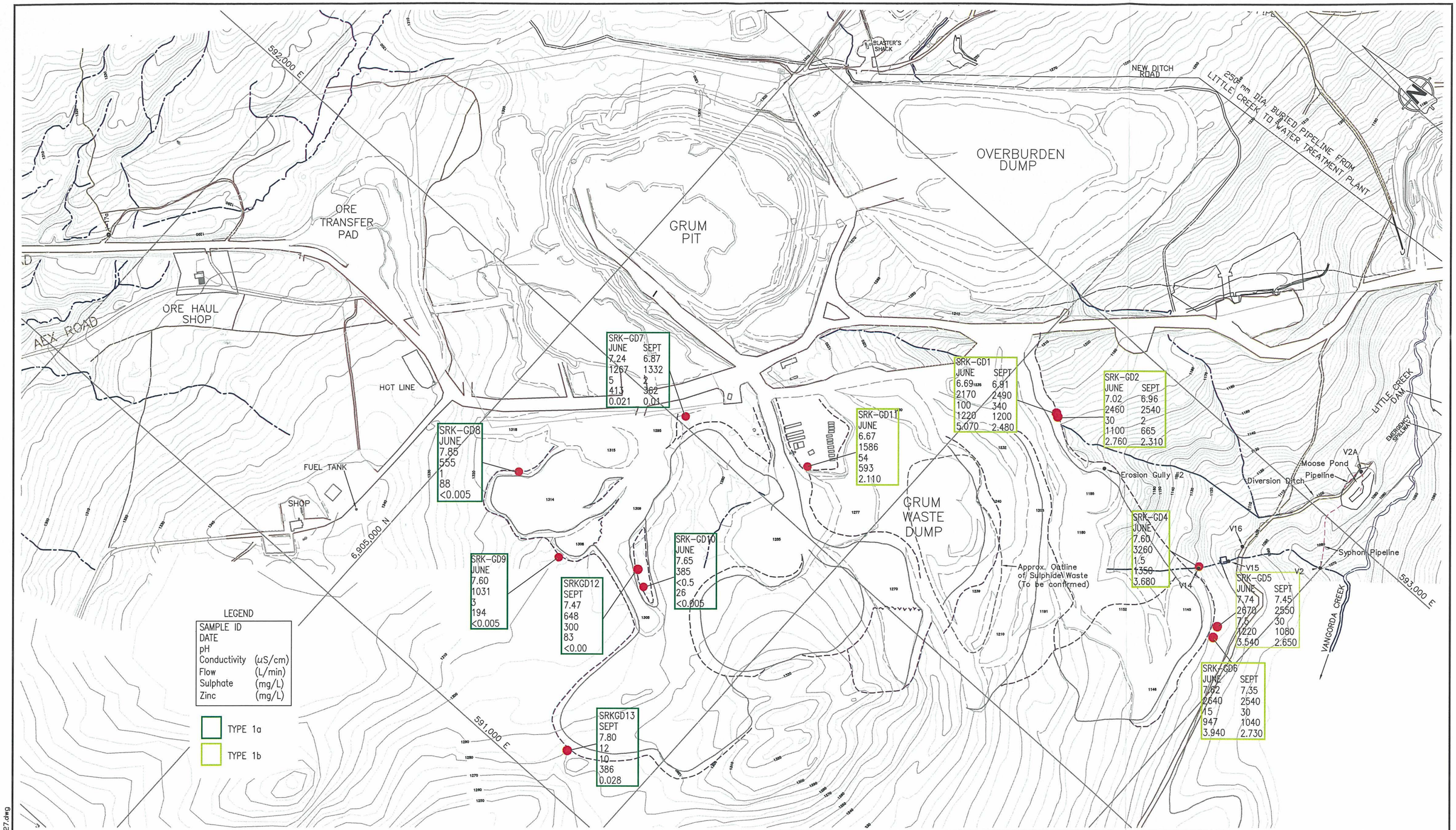
DELOITTE & TOUCHE INC.

FARO MINE SITE

SEEP SURVEY LOCATIONS
FARO DUMPS

PROJECT NO.	DATE	APPROVED	FIG.
1CD003.11	Oct, 2002		1

File Ref: Sample Plan-Nad27.dwg



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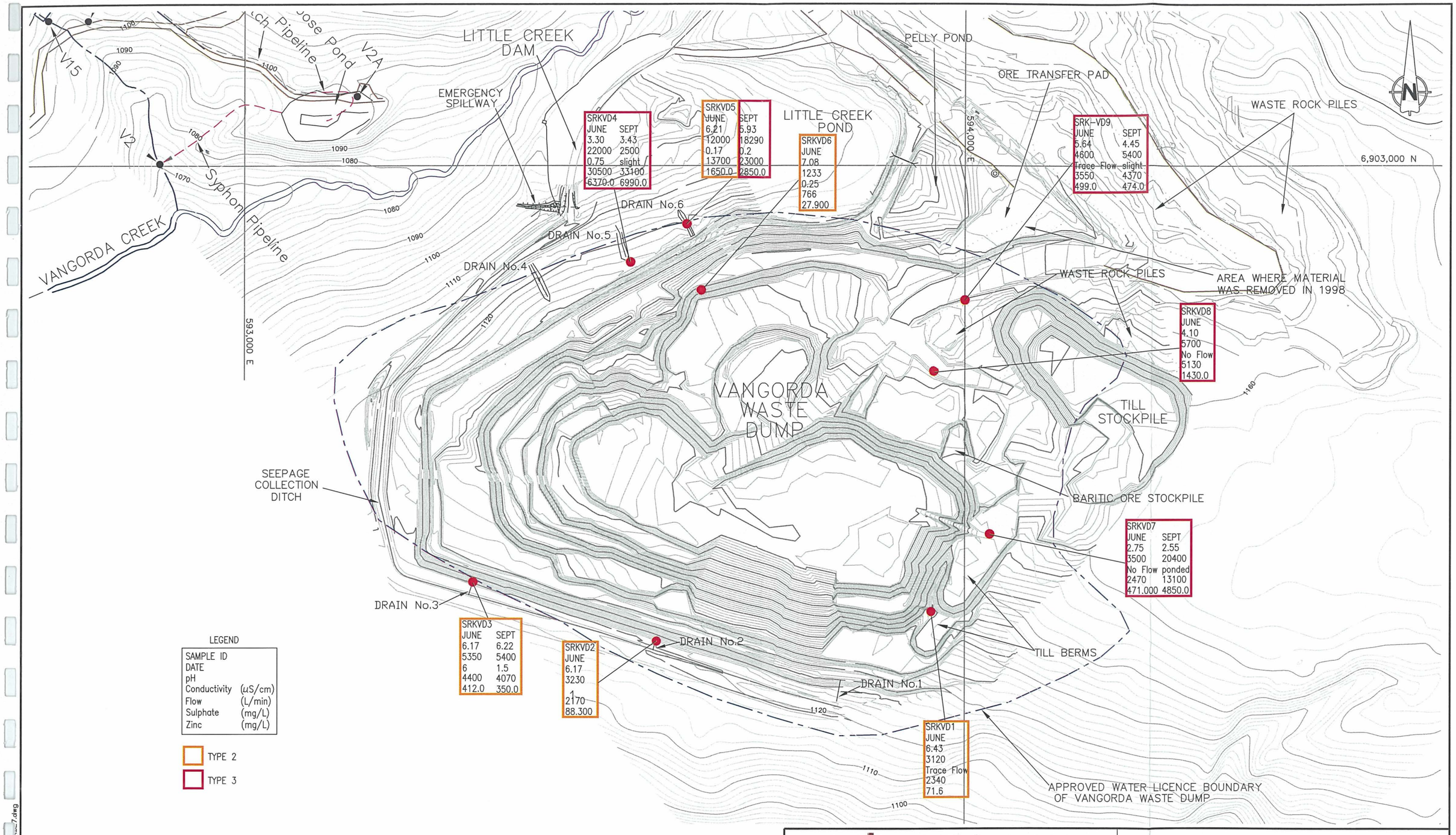
DELOITTE & TOUCHE INC.

VANGORDA PLATEAU MINE

SEEP SURVEY LOCATIONS
GRUM WASTE DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Oct, 2002		2

File Ref: Sample_plan-NAD27.dwg



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Engineers and Scientists

DELOITTE & TOUCHE INC.

VANGORDA PLATEAU MINE

SEEP SURVEY LOCATIONS
VANGORDA DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Sept, 2002		3

File Ref: ...sample_plan_nad27.dwg

ATTACHMENT A

Seep Survey Results

		FARO DUMP									
Sample ID		**SRK-FD01**	**SRK-FD01**	**SRK-FD02**	**SRK-FD02 Duplicate**	**SRK-FD04**	**SRK-FD04**	**SRK-FD05**	**SRK-FD05**	**SRK-FD06**	**SRK-FD06B**
Date		10-Jun-02	11-Sep-02	10-Jun-02	10-Jun-02	10-Jun-02	11-Sep-02	12-Jun-02	10-Sep-02	12-Jun-02	10-Sep-02
Time		15:45	9:40	16:15	16:30	17:20	11:00	10:30	13:20	11:00	13:50
Field Parameters											
pH		6.69	6.59	7.88	7.88	2.32	2.54	7.23	6.97	7.21	7.24
Conductivity	mS/cm	3670	1900	1558	1558	23500	7350	1252	882	1118	1045
Redox	mV	139	212	248	248	460	460	317	225	217	324
Temp	^{0}C	13.2	4.2	1.6	1.6	17.3	6.2	1.2	1.9	1.5	2.2
Flow	L/min	6	0.5	20	20	No Flow	ponded	10	60	10	240
Laboratory Parameters											
pH		7.55	7.41	8.2	8.21	2.33	2.7	7.87	7.65	7.97	7.85
Conductivity	mS/cm	3560	-2	1520	1530	22600	6370	1240	875	1110	1020
Dissolved Anions											
Acidity pH 8.3	mg/L	72	22	4	3	39900	5780	16	18	12	14
Alkalinity Total as CaCO3	mg/L	365	97	165	166	-1	-1	215	172	209	191
Chloride	mg/L	4.5	4.3	1.2	1.2	240	78	2.4	1.3	2.4	1.1
Sulphate	mg/L	2220	1070	704	831	43300	7490	440	266	382	355
Dissolved Metals*											
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	857	137	-0.2	-0.2	-0.2	-0.2
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-8	-1	-0.2	-0.2	-0.2	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	87	9	-0.2	-0.2	-0.2	-0.2
Barium	mg/L	0.02	0.02	0.03	0.03	-0.4	-0.05	0.03	0.02	0.02	0.01
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.2	-0.03	-0.005	-0.005	-0.005	-0.005
Bismuth	mg/L	-2	-0.2	-0.2	-0.2	-10	-1	-0.2	-0.2	-0.2	-0.2
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-4	-0.5	-0.1	-0.1	-0.1	-0.1
Cadmium	mg/L	0.02	0.02	-0.01	-0.01	14.4	1.68	-0.01	-0.01	-0.01	-0.01
Calcium	mg/L	543	272	248	232	504	160	151	104	112	95.7
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	1.1	0.22	-0.01	-0.01	-0.01	-0.01
Cobalt	mg/L	0.02	0.02	-0.01	-0.01	9.8	1.38	-0.01	-0.01	-0.01	-0.01
Copper	mg/L	-0.01	-0.01	-0.01	-0.01	559	55.4	-0.01	-0.01	-0.01	-0.01
Iron	mg/L	0.36	0.38	-0.03	-0.03	9170	1420	-0.03	-0.03	-0.03	-0.03
Lead	mg/L	0.23	0.07	-0.05	-0.05	-2	-0.3	-0.05	-0.05	-0.05	-0.05
Lithium	mg/L	0.03	0.02	-0.01	0.01	0.8	0.2	0.03	0.02	0.03	0.02
Magnesium	mg/L	244	87.4	40.5	38.1	1000	190	90	53.4	85.3	86.9
Manganese	mg/L	3.41	2.06	0.028	0.026	811	125	0.057	-0.005	0.036	-0.005
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-2	-0.2	-0.03	-0.03	-0.03	-0.03
Nickel	mg/L	0.08	0.05	-0.05	-0.05	6	0.8	0.06	-0.05	-0.05	-0.05
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-20	-2	-0.3	-0.3	-0.3	-0.3
Potassium	mg/L	11	6	5	5	-80	-10	5	3	4	3
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-8	-1	-0.2	-0.2	-0.2	-0.2
Silicon	mg/L	5.91	2.94	4.5	4.28	82	16.4	5.74	5.29	5.3	5.37
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.6	-0.05	-0.01	-0.01	-0.01	-0.01
Sodium	mg/L	30	17	96	91	-80	-10	8	5	7	5
Strontium	mg/L	2.86	1.11	1.4	1.31	0.5	0.22	0.64	0.439	0.466	0.42
Thallium	mg/L	-0.2	-0.2	-0.2	-0.2	-20	-1	-0.2	-0.2	-0.2	-0.2
Tin	mg/L	-0.03	-0.03	-0.03	-0.03	-2	-0.2	-0.03	-0.03	-0.03	-0.03
Titanium	mg/L	-0.04	-0.01	-0.01	-0.01	-0.4	-0.05	-0.01	-0.01	-0.01	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-2	-0.2	-0.03	-0.03	-0.03	-0.03
Zinc	mg/L	34.6	13.6	0.166	0.153	9210	1230	2.15	1.08	2.79	2.04
Notes: * Travel blank results are for *total* metals											
anions (meq)		54	24	18	21	909	158	14	9	12	11
cations (meq)		51	23	20	19	1017	159	16	10	14	13
%diff		2.4%	3.7%	-5.9%	4.1%	-5.6%	-0.2%	-8.2%	-6.1%	-5.2%	-6.2%
Type		2	2	1	1	3	3	1	1	1	1

		FARO DUMP									
Sample ID		**SRK-FD07**	**SRK-FD08**	**SRK-FD09**	**SRK-FD10**	**SRK-FD10**	**SRK-FD10 duplicate**	**SRK-FD12**	**SRK-FD12**	**SRK-FD13**	**SRK-FD13**
Date		12-Jun-02	12-Jun-02	12-Jun-02	12-Jun-02	10-Sep-02	12-Jun-02	12-Jun-02	10-Sep-02	12-Jun-02	12-Sep-02
Time		11:30	12:30	16:00	16:30	16:00	17:00	17:30	16:30	18:10	14:30
Field Parameters											
pH		7.31	5.76	6.98	6.17	6.25		6.42	6.24	3.23	4.52
Conductivity	mS/cm	1050	2560	2560	5720	7780		5760	5740	5670	2990
Redox	mV	260	188	235	87	145		81	173	382	400
Temp	^{0}C	2.4	8.9	5.9	4.9	5.3		5.5	5.2	15.5	8.1
Flow	L/min	No Flow	No Flow	No Flow	80	300		2.4	120	-1	slight
Laboratory Parameters											
pH		7.89	7.32	7.12	6.36	6.58	6.9	6.98	6.91	3.36	4.72
Conductivity	mS/cm	1020	1540	2450	5440	5440	5580	5560	5400	5460	2960
Dissolved Anions											
Acidity pH 8.3	mg/L	13	24	61	434	578	432	420	519	1720	200
Alkalinity Total as CaCO3	mg/L	125	22	54	350	319	350	338	320	-1	12
Chloride	mg/L	0.8	0.8	1.8	17.5	17.5	17.6	15	14.4	0.7	-0.5
Sulphate	mg/L	484	995	1710	4380	4600	4340	4480	4220	4780	2090
Dissolved Metals*											
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	-0.4	-0.2	-0.2	-0.4	21.7	0.3
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.4	-0.2	-0.2	-0.4	-0.6	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.4	-0.2	-0.2	-0.4	-0.6	-0.2
Barium	mg/L	-0.01	0.02	0.02	0.02	-0.02	0.02	0.02	-0.02	-0.03	-0.01
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.01	-0.005	-0.005	-0.01	0.02	-0.005
Bismuth	mg/L	-0.2	-0.2	-0.2	-0.3	-0.4	-0.3	-0.3	-0.4	-0.9	-0.6
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.1	-0.2	-0.3	-0.1
Cadmium	mg/L	-0.01	-0.01	0.01	0.05	0.02	0.05	0.16	0.08	0.85	0.1
Calcium	mg/L	97.8	166	216	538	552	531	542	563	299	268
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02	-0.03	-0.01
Cobalt	mg/L	0.01	-0.01	0.03	0.47	0.45	0.47	0.47	0.43	1.53	0.28
Copper	mg/L	-0.01	-0.01	0.01	-0.01	-0.02	-0.02	0.3	0.11	4.54	0.12
Iron	mg/L	-0.03	0.07	0.05	37	57.8	36.7	23.4	35.7	284	0.45
Lead	mg/L	-0.05	-0.05	0.1	-0.05	-0.1	-0.05	-0.05	-0.1	1.6	0.31
Lithium	mg/L	0.13	-0.01	0.08	0.18	0.13	0.18	0.15	0.12	0.29	0.18
Magnesium	mg/L	69.8	114	284	686	630	677	682	627	502	319
Manganese	mg/L	0.278	0.188	0.844	54	53.9	53.3	50.4	49.1	64.3	12.6
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.06	-0.03	-0.03	-0.06	-0.09	-0.03
Nickel	mg/L	-0.05	0.06	0.16	0.66	0.6	0.65	0.72	0.7	3.2	0.76
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-0.6	-0.3	-0.3	-0.6	-0.9	-0.3
Potassium	mg/L	8	3	13	17	15	18	16	13	12	13
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.4	-0.2	-0.2	-0.4	-0.6	-0.2
Silicon	mg/L	1.15	6.27	3.07	7.59	7.3	7.46	7.46	7.3	7.8	1.76
Silver	mg/L	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02	-0.03	-0.01
Sodium	mg/L	25	5	7	69	60	68	57	50	12	36
Strontium	mg/L	1.06	0.473	0.758	3.86	3.67	3.8	3.55	3.48	0.69	1.01
Thallium	mg/L	-0.2	-0.2	-0.2	-0.4	-0.4	-0.4	-0.3	-0.4	-0.6	-0.2
Tin	mg/L	-0.03	-0.03	-0.03	0.03	-0.06	-0.03	0.03	-0.06	-0.09	-0.03
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.02	-0.03	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.06	-0.03	-0.03	-0.06	-0.09	-0.03
Zinc	mg/L	3.89	3.88	26.4	215	223	211	231	219	751	96.5
Notes: * Travel blank results are for											
anions (meq)		13	21	37	99	103	98	101	95	100	44
cations (meq)		12	19	37	101	97	100	99	96	102	47
%diff		0.8%	6.4%	-0.3%	-0.9%	2.7%	-1.2%	0.5%	-0.5%	-1.4%	-3.0%
Type		1	2	2	2	2	2	2	2	3	3

		FARO DUMP									
Sample ID		**SRK-FD14**	**SRK-FD14**	**SRK-FD16**	**SRK-FD17**	**SRK-FD17**	**SRK-FD18**	**SRK-FD18**	**SRK-FD19**	**SRK-FD19**	**SRK-FD19 Duplicate**
Date		12-Jun-02	12-Sep-02	13-Jun-02	13-Jun-02	12-Sep-02	13-Jun-02	12-Sep-02	13-Jun-02	11-Sep-02	11-Sep-02
Time		18:30	14:55	9:00	9:25	16:15	9:45	16:05	11:00	11:30	11:40
Field Parameters											
pH		8.14	7.78	6.61	7.16	7.35	6.98	7.33	6.98	6.87	
Conductivity	mS/cm	2740	3400	84	103	130	177	173	5030	5110	
Redox	mV	241	275	298	321	316	307	334	259	283	
Temp	^{0}C	15.3	9.4	2.1	1.6	3.5	1.6	3.2	0	0.2	
Flow	L/min	-1	3	300	25.5	1.5		1.5	30	30	
Laboratory Parameters											
pH		7.7	8.23	7.79	8	7.68	8.01	7.72	7.52	7.21	7.27
Conductivity	mS/cm	2860	3360	82	101	130	173	170	4710	4900	5000
Dissolved Anions											
Acidity pH 8.3	mg/L	24	8	9	7	4	11	4	91	115	119
Alkalinity Total as CaCO3	mg/L	112	137	37	42	54	55	65	394	386	362
Chloride	mg/L	1.3	-0.5	-0.5	0.6	-0.5	0.5	-0.5	2	1.6	1.5
Sulphate	mg/L	2260	2470	10	10	11	28	19	3380	3810	3720
Dissolved Metals*											
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Barium	mg/L	0.01	-0.01	0.02	0.03	0.04	0.06	0.06	0.04	0.04	0.04
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.01	-0.01
Bismuth	mg/L	-0.2	-0.8	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
Cadmium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Calcium	mg/L	223	263	12.9	15.3	19.1	26.4	26.3	595	628	604
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Cobalt	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.06	0.06	0.06
Copper	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.12	-0.02
Iron	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	0.06	2.94	0.09
Lead	mg/L	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.1	-0.1
Lithium	mg/L	0.23	0.2	-0.01	-0.01	-0.01	-0.01	-0.01	0.03	0.03	0.03
Magnesium	mg/L	314	378	1.9	2.6	3.1	4.6	4.3	584	574	555
Manganese	mg/L	0.041	0.014	-0.005	-0.005	-0.005	-0.005	-0.005	16.5	19.3	18.4
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Nickel	mg/L	0.07	0.09	-0.05	-0.05	-0.05	-0.05	-0.05	0.35	0.3	0.3
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.6	-0.6
Potassium	mg/L	24	21	-2	-2	2	-2	-2	11	10	10
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Silicon	mg/L	0.8	0.87	5.9	5.5	6.22	5.35	6.21	6.44	6.3	6.1
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Sodium	mg/L	122	119	-2	-2	-2	-2	2	22	20	19
Strontium	mg/L	3.32	3.75	0.045	0.046	0.076	0.095	0.099	3.28	3.29	3.18
Thallium	mg/L	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4
Tin	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Zinc	mg/L	1.72	4.95	0.01	0.081	0.088	0.102	0.101	43.9	51.3	46.8
Notes: * Travel blank results are for											
anions (meq)		49	54	1	1	1	2	2	78	87	85
cations (meq)		44	52	1	1	1	2	2	84	85	83
%diff		5.2%	2.2%	-0.5%	-4.1%	-2.4%	-5.2%	-4.0%	-3.3%	1.3%	1.2%
Type		1	1	1	1	1	1	1	2	2	2

		FARO DUMP									
Sample ID		**SRK-FD20**	**SRK-FD20**	**SRK-FD21**	**SRK-FD21B**	**SRK-FD22**	**SRK-FD22B**	**SRK-FD23**	**SRK-FD23B**	**SRK-FD24**	**SRK-FD24 Duplicate**
Date		13-Jun-02	13-Sep-02	13-Jun-02	13-Sep-02	13-Jun-02	12-Sep-02	13-Jun-02	13-Sep-02	13-Jun-02	13-Jun-02
Time		14:00	9:10	15:10	9:30	15:30	17:20	15:50	9:50	16:25	16:35
Field Parameters											
pH		3.18	2.78	4.57	5.21	6.59	5.45	6.39	4.27	6.95	
Conductivity	mS/cm	555	1875	4370	2860	2270	1766	729	1403	1323	
Redox	mV	492	586	418	371	271	288	113	235	71	
Temp	^{0}C	8.2	0.9	7.1	1.6	13.4	12	19.4	36.9	8.4	
Flow	L/min	0.5	60	1.5	slight	Trace Flow	slight	Trace Flow	5	300	
Laboratory Parameters											
pH		3.18	2.82	4.51	5.37	7.72	6.7	7.42	4.46	7.32	7.43
Conductivity	mS/cm	572	1820	4130	2820	2150	1740	708	1450	1310	1280
Dissolved Anions											
Acidity pH 8.3	mg/L	135	8750	283	35	25	70	27	227	46	44
Alkalinity Total as CaCO3	mg/L	-1	12	8	8	179	15	31	92	88	88
Chloride	mg/L	0.6	-0.5	0.8	-0.5	0.7	-0.5	2.1	0.7	2	1.9
Sulphate	mg/L	193	1170	3540	1980	1390	1130	346	801	710	793
Dissolved Metals*											
Aluminum	mg/L	9.1	46.8	27.3	1.5	-0.2	1.4	-0.2	0.6	-0.2	-0.2
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Barium	mg/L	0.03	0.04	-0.01	-0.01	-0.01	0.01	-0.01	-0.01	-0.01	-0.01
Beryllium	mg/L	-0.005	0.006	0.009	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Bismuth	mg/L	-0.2	-0.2	-0.2	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Cadmium	mg/L	-0.01	0.08	0.17	0.05	0.01	0.07	0.08	0.22	0.03	0.03
Calcium	mg/L	10.2	35.2	410	322	346	239	49.1	73.5	138	135
Chromium	mg/L	0.01	0.07	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Cobalt	mg/L	0.05	0.25	0.28	0.03	0.02	0.04	0.13	0.38	0.06	0.06
Copper	mg/L	0.99	8.06	2.59	0.3	-0.01	0.45	-0.01	0.2	0.03	0.03
Iron	mg/L	16.9	173	0.06	-0.03	-0.03	0.07	2.14	50	2.47	2.39
Lead	mg/L	-0.05	-0.05	0.09	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Lithium	mg/L	0.01	0.08	0.11	0.03	0.07	0.07	0.04	0.06	0.04	0.04
Magnesium	mg/L	9.1	35.8	504	256	158	88.2	53.6	104	90.4	88
Manganese	mg/L	0.603	2.31	6.79	1.26	1.24	2.37	2.84	7.44	2.46	2.41
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nickel	mg/L	0.06	0.24	0.53	0.18	0.07	0.06	0.13	0.37	0.11	0.11
Phosphorus	mg/L	-0.3	0.7	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Potassium	mg/L	-2	-2	14	10	9	9	3	3	4	4
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Silicon	mg/L	10.8	16.7	8.54	3.15	2.51	3.37	3.65	5.21	5.1	4.95
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Sodium	mg/L	2	4	14	8	4	5	3	3	4	4
Strontium	mg/L	0.046	0.145	1.73	1.02	1.23	0.816	0.183	0.23	0.449	0.438
Thallium	mg/L	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Tin	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Zinc	mg/L	7.93	59.8	65	17	7.19	41	8.89	43.4	26.8	26.3
Notes: * Travel blank results are for											
anions (meq)		4.1	25	74	41	33	24	8	19	17	18
cations (meq)		3.6	22	71	40	32	22	8	17	16	17
%diff		5.7%	6.8%	2.3%	2.1%	1.3%	5.0%	0.3%	3.5%	1.6%	4.6%
Type		3	3	3	3	2	3	2	3	2	2

		FARO DUMP								
Sample ID		**SRK-FD24**	**SRK-FD24 Duplicate**	**SRK-FD26**	**SRK-FD26**	**SRK-FD26 Duplicate**	**SRK-FD27**	**SRK-FD27**	**SRK-FD30**	**SRK-FD31**
Date		13-Sep-02	13-Sep-02	13-Jun-02	12-Sep-02	12-Sep-02	13-Jun-02	12-Sep-02	10-Sep-02	10-Sep-02
Time		10:10	10:20	16:45	15:20	15:30	17:15	15:10	15:05	16:45
Field Parameters										
pH		5.12		6.76	6.56		6.98	3.33	6.4	6.37
Conductivity	mS/cm	902		875	1117		1552	2590	3740	5750
Redox	mV	196		212	345		237	392	360	181
Temp	^{0}C	3.2		2.7	2.6		18.8	11.6	6.6	6.2
Flow	L/min	1000		Good Flow	>1000		Trace Flow	slight	ponded	300
Laboratory Parameters										
pH		7.32	7.84	7.68	7.51	7.33	7.46	3.86	6.91	6.46
Conductivity	mS/cm	884	883	797	1030	1020	1510	2350	3590	5420
Dissolved Anions										
Acidity pH 8.3	mg/L	27	26	17	15	27	48	350	60	585
Alkalinity Total as CaCO3	mg/L	90	93	163	198	199	43	-1	36	333
Chloride	mg/L	1	0.6	1.8	1.2	1.3	0.5	-0.5	0.9	15
Sulphate	mg/L	406	400	298	391	383	1050	1650	2670	4350
Dissolved Metals*										
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	9.2	-0.4	-0.4
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Barium	mg/L	0.01	0.01	0.02	0.03	0.03	-0.01	-0.01	-0.02	-0.02
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	0.005	-0.01	-0.01
Bismuth	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2
Cadmium	mg/L	0.02	0.02	-0.01	-0.01	-0.01	0.04	0.25	-0.02	0.08
Calcium	mg/L	77.7	80.2	82.2	116	113	140	240	261	576
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Cobalt	mg/L	0.04	0.03	-0.01	-0.01	-0.01	0.03	0.2	0.09	0.44
Copper	mg/L	0.03	0.02	-0.01	-0.01	-0.01	-0.01	3.3	-0.02	0.12
Iron	mg/L	2.51	2.61	-0.03	-0.03	-0.03	-0.03	40.4	-0.06	36.7
Lead	mg/L	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	0.81	-0.1	-0.1
Lithium	mg/L	0.03	0.03	0.02	0.03	0.02	0.09	0.11	0.22	0.12
Magnesium	mg/L	52.2	54.1	51.4	76.3	74	123	166	472	640
Manganese	mg/L	1.21	1.26	0.081	0.151	0.144	1.46	9.38	7.52	50.3
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Nickel	mg/L	0.05	0.06	-0.05	-0.05	-0.05	0.11	0.35	0.6	0.7
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.6	-0.6
Potassium	mg/L	4	2	3	4	3	8	8	12	13
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Silicon	mg/L	4.22	4.37	4.9	5.79	5.63	1.69	6.66	2.6	7.5
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Sodium	mg/L	3	3	4	6	6	3	4	14	51
Strontium	mg/L	0.252	0.26	0.32	0.461	0.448	0.617	0.731	1.56	3.56
Thallium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4
Tin	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.06	-0.06
Zinc	mg/L	13.3	13.8	1.28	2.02	1.96	29.4	180	30.4	223
Notes: * Travel blank results are for										
anions (meq)		10	10	10	12	12	23	34	56	98
cations (meq)		9	11	9	13	14	19	36	56	98
%diff		5.2%	-1.5%	3.4%	-3.0%	-5.9%	9.0%	-2.1%	0.1%	0.0%
Type		3	3	2	2	2	2	3	2	2

		FARO DUMP								
Sample ID		**SRK-FD31 Duplicate**	**SRK-FD32**	**SRK-FD33**	**SRK-FD34**	**SRK-FD35**	**SRK-FD36**	**SRK-FD37**	**SRK-FD38**	**SRK-FD40 (A30)**
Date		10-Sep-02	10-Sep-02	11-Sep-02	11-Sep-02	11-Sep-02	11-Sep-02	11-Sep-02	12-Sep-02	13-Sep-02
Time		17:00	17:00	8:20	8:35	9:00	10:20	10:40	16:55	8:45
Field Parameters										
pH			6.38	5.96	5.95	6.22	2.75	2.44	7	3.23
Conductivity	mS/cm		3580	4540	1242	1654	3540	12740	3970	938
Redox	mV		81	85	152	266	521	438	313	540
Temp	^{0}C		9.6	6.2	4.6	7	5.5	10.1	8.6	4.9
Flow	L/min		60	30	60	30	10	300	2.5	>1000
Laboratory Parameters										
pH		6.52	4.86	5.36	6.63	6.54	2.78	2.66	6.83	3.52
Conductivity	mS/cm	5410	3410	4250	1190	1600	3410	12700	3830	877
Dissolved Anions										
Acidity pH 8.3	mg/L	567	2160	1590	227	37	1530	12500	792	135
Alkalinity Total as CaCO3	mg/L	330	13	31	8	33	-1	-1	83	-1
Chloride	mg/L	14.6	2.6	2.9	0.5	1.7	19.4	-0.5	0.7	-0.5
Sulphate	mg/L	4300	2790	3620	700	962	2810	16500	3380	445
Dissolved Metals*										
Aluminum	mg/L	-0.4	-0.6	-1	-0.2	0.3	38.9	117	-0.6	4
Antimony	mg/L	-0.4	-0.6	-1	-0.2	-0.2	-0.2	-6	-0.6	-0.2
Arsenic	mg/L	-0.4	-0.6	-1	-0.2	-0.2	-0.2	28	-0.6	-0.2
Barium	mg/L	0.02	-0.03	-0.05	0.03	0.01	-0.01	-0.3	-0.03	0.02
Beryllium	mg/L	-0.01	-0.02	-0.03	-0.005	-0.005	0.011	-0.2	-0.02	-0.005
Bismuth	mg/L	-0.4	-0.6	-1	-0.2	-0.2	-0.2	-6	-0.6	-0.2
Boron	mg/L	-0.2	-0.3	-0.5	-0.1	-0.1	-0.1	-3	-0.3	-0.1
Cadmium	mg/L	0.08	0.46	0.88	0.12	-0.01	0.23	12.6	0.62	0.07
Calcium	mg/L	567	322	355	107	272	250	268	504	33.6
Chromium	mg/L	-0.02	-0.03	-0.05	-0.01	-0.01	0.12	-0.3	-0.03	-0.01
Cobalt	mg/L	0.45	0.5	0.9	0.08	0.03	0.52	4.8	0.53	0.13
Copper	mg/L	0.12	-0.03	0.34	0.14	0.07	4.2	133	0.06	0.58
Iron	mg/L	36.2	89.9	236	33.9	1.42	274	1780	-0.09	2.51
Lead	mg/L	-0.1	-0.2	-0.3	0.36	-0.05	1.17	-2	-0.2	0.1
Lithium	mg/L	0.13	0.07	0.12	0.02	0.03	0.14	-0.3	0.13	0.02
Magnesium	mg/L	629	168	221	38.8	51.1	120	310	215	52.5
Manganese	mg/L	49.3	36.5	63.4	5.67	3.84	13.6	166	44.4	3.79
Molybdenum	mg/L	-0.06	-0.09	-0.2	-0.03	-0.03	-0.03	-0.9	-0.09	-0.03
Nickel	mg/L	0.7	0.6	0.8	0.08	-0.05	1.05	5	0.9	0.12
Phosphorus	mg/L	-0.6	-0.9	-2	-0.3	-0.3	-0.3	-9	-0.9	-0.3
Potassium	mg/L	13	8	-10	3	7	5	-60	10	-2
Selenium	mg/L	-0.4	-0.6	-1	-0.2	-0.2	-0.2	-6	-0.6	-0.2
Silicon	mg/L	7.4	4.2	6.5	2.06	11.9	23.3	29	6.3	8.02
Silver	mg/L	-0.02	-0.03	-0.05	-0.01	-0.01	-0.01	-0.3	-0.03	-0.01
Sodium	mg/L	50	42	50	14	34	6	-60	11	3
Strontium	mg/L	3.47	1.25	1.54	0.347	0.715	0.7	0.5	1.78	0.154
Thallium	mg/L	0.5	-0.6	-1	-0.2	-0.2	-0.3	-6	-0.6	-0.2
Tin	mg/L	-0.06	-0.09	-0.2	-0.03	-0.03	-0.03	-0.9	-0.09	-0.03
Titanium	mg/L	-0.02	-0.03	-0.05	-0.01	-0.01	-0.01	-0.3	-0.03	-0.01
Vanadium	mg/L	-0.06	-0.09	-0.2	-0.03	-0.03	-0.03	-0.9	-0.09	-0.03
Zinc	mg/L	220	581	1110	128	13.7	151	6130	595	46.7
Notes: * Travel blank results are for										
anions (meq)		97	58	76	15	21	59	344	72	9
cations (meq)		97	57	88	15	20	47	347	65	9
%diff		-0.2%	1.5%	-7.5%	-2.0%	0.9%	10.9%	-0.4%	5.6%	4.1%
Type		2	2	3	3	2	3	3	2	3

		GRUM DUMP							
Sample ID		**SRK-GD01**	**SRK-GD01**	**SRK-GD02**	**SRK-GD02**	**SRK-GD02 duplicate**	**SRK-GD04**	**SRK-GD05**	**SRK-GD05**
Date		11-Jun-02	11-Sep-02	11-Jun-02	11-Sep-02	11-Jun-02	11-Jun-02	11-Jun-02	11-Sep-02
Time		10:10	14:50	10:40	14:35	11:10	11:30	12:00	14:00
Field Parameters									
pH		6.69	6.91	7.02	6.96		7.6	7.74	7.45
Conductivity	mS/cm	2170	2490	2460	2540		3260	2670	2550
Redox	mV	272	272	235	298		248	273	292
Temp	^{0}C	1.8	2.5	3.2	4		2.5	3.1	3.7
Flow	L/min	100	340	30	2		1.5	7.5	30
Laboratory Parameters									
pH		7.66	7.27	8.02	7.56	7.85	8.06	8.14	7.88
Conductivity	mS/cm	2080	2460	2430	1580	2400	3220	2570	2470
Dissolved Anions									
Acidity pH 8.3	mg/L	38	69	19	27	30	18	13	28
Alkalinity Total as CaCO3	mg/L	337	497	494	278	494	477	527	600
Chloride	mg/L	1.7	1.5	1.8	0.9	1.9	1.9	2.2	1.9
Sulphate	mg/L	1220	1200	1100	665	1130	1350	1220	1080
Dissolved Metals*									
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Barium	mg/L	0.03	0.06	0.04	0.04	0.04	0.02	0.03	0.02
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Bismuth	mg/L	-0.2	-0.4	-0.2	-0.4	-0.2	-0.2	-0.2	-0.3
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Cadmium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Calcium	mg/L	283	351	302	335	296	352	358	349
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Cobalt	mg/L	-0.01	-0.01	-0.01	-0.01	0.01	0.03	-0.01	-0.01
Copper	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Iron	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Lead	mg/L	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Lithium	mg/L	0.02	0.02	0.02	0.01	0.02	0.04	0.04	0.03
Magnesium	mg/L	141	216	206	213	200	347	211	199
Manganese	mg/L	0.059	0.062	0.121	0.114	0.159	0.207	0.189	0.008
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nickel	mg/L	0.26	0.29	0.34	0.32	0.32	0.42	0.59	0.51
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Potassium	mg/L	5	8	8	7	7	10	8	7
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Silicon	mg/L	3.98	4.09	3.74	3.89	3.66	3.65	5.66	6.06
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01
Sodium	mg/L	7	9	10	9	9	16	14	11
Strontium	mg/L	0.914	1.31	1.2	1.26	1.17	1.59	1.52	1.41
Thallium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Tin	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Zinc	mg/L	5.07	2.48	2.76	2.31	2.77	3.68	3.54	2.65
Notes: * Travel blank results are for									
anions (meq)		32	35	33	19	33	38	36	35
cations (meq)		27	37	34	36	34	49	37	36
%diff		8.7%	-2.8%	-1.4%	-29.8%	-0.6%	-12.9%	-1.6%	-1.4%
Type		1b	1b	1b	1b	1b	1b	1b	1b

		GRUM DUMP									
Sample ID		**SRK-GD06**	**SRK-GD06**	**SRK-GD07**	**SRK-GD07B**	**SRK-GD08**	**SRK-GD09**	**SRK-GD10**	**SRK-GD11**	**SRK-GD12**	**SRK-GD13**
Date		11-Jun-02	11-Sep-02	11-Jun-02	11-Sep-02	11-Jun-02	11-Jun-02	11-Jun-02	11-Jun-02	11-Sep-02	12-Sep-02
Time		13:00	13:50	14:00	17:00	14:30	15:05	15:30	16:30	16:05	13:15
Field Parameters											
pH		7.62	7.35	7.24	6.87	7.85	7.6	7.65	6.67	7.47	7.8
Conductivity	mS/cm	2640	2540	1267	1332	555	1031	385	1586	648	12
Redox	mV	269	314	254	2.45	235	238	256	232	335	201
Temp	^{0}C	3.5	3.1	3.1	3.7	0.8	4.6	5.6	2.5	2.8	4.6
Flow	L/min	15	30	5	2	1	3	-0.5	54	300	10
Laboratory Parameters											
pH		8.1	8.00	8.18	7.51	8.31	8.22	8.3	7.69	7.87	7.73
Conductivity	mS/cm	2540	2480	1210	1250	542	999	384	1570	6300	1190
Dissolved Anions											
Acidity pH 8.3	mg/L	17	26	6	40	-1	3	-1	31	13	29
Alkalinity Total as CaCO3	mg/L	557	700	336	405	209	379	186	371	268	388
Chloride	mg/L	2.5	1.8	2	1.8	2.3	2.1	1.3	2.1	-0.5	0.9
Sulphate	mg/L	947	1040	413	362	88	194	26	593	83	386
Dissolved Metals*											
Aluminum	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Antimony	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Barium	mg/L	0.03	0.03	0.07	0.11	0.08	0.11	0.05	0.05	0.1	0.11
Beryllium	mg/L	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Bismuth	mg/L	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Boron	mg/L	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Cadmium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Calcium	mg/L	361	348	178	205	75.3	142	45.4	201	86.3	168
Chromium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Cobalt	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Copper	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	-0.01	-0.01
Iron	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Lead	mg/L	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Lithium	mg/L	0.04	0.02	-0.01	-0.01	-0.01	-0.01	-0.01	0.02	-0.01	-0.01
Magnesium	mg/L	209	196	69.6	63.6	26.8	54.5	24.2	108	40.4	71.4
Manganese	mg/L	0.23	0.008	-0.005	1.92	-0.005	-0.005	-0.005	0.26	0.028	0.007
Molybdenum	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nickel	mg/L	0.52	0.42	-0.05	-0.05	-0.05	-0.05	-0.05	0.22	-0.05	-0.05
Phosphorus	mg/L	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Potassium	mg/L	9	7	4	2	-2	-2	-2	4	-2	3
Selenium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Silicon	mg/L	5.87	6.07	3.79	4.61	3.64	3.23	3.32	3.39	4.02	5.69
Silver	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Sodium	mg/L	14	11	3	3	-2	-2	-2	4	2	3
Strontium	mg/L	1.56	1.39	0.604	0.719	0.365	0.492	0.205	0.815	0.329	0.823
Thallium	mg/L	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Tin	mg/L	0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Titanium	mg/L	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Zinc	mg/L	3.94	2.73	0.021	0.01	-0.005	-0.005	-0.005	2.11	-0.005	0.028
Notes: * Travel blank results are for											
anions (meq)		31	36	15	16	6	12	4	20	7	16
cations (meq)		37	35	15	16	6	12	5	20	8	15
%diff		-9.2%	0.7%	0.6%	-1.1%	-1.4%	-1.4%	-2.7%	0.0%	-5.9%	3.2%
Type		1b	1b	1a	1a	1a	1a	1a	1b	1a	1a

		VANGORDA DUMP								
Sample ID		**SRK-VD01**	**SRK-VD02 Drain 2**	**SRK-VD03 Drain 3**	**SRK-VD03-Drain 3**	**SRK-VD04-Drain 5**	**SRK-VD04-Drain 5**	**SRK-VD05-Drain 6**	**SRK-VD05-Drain 6**	**SRK-VD06**
Date		10-Jun-02	10-Jun-02	10-Jun-02	12-Sep-02	10-Jun-02	12-Sep-02	10-Jun-02	12-Sep-02	10-Jun-02
Time		10:30	11:00	11:30	9:20	12:00	9:50	12:45	10:00	13:30
Field Parameters										
pH		6.43	6.17	6.03	6.22	3.3	3.43	6.21	5.93	7.08
Conductivity	mS/cm	3120	3230	5350	5400	22000	2500	12000	18290	1233
Redox	mV	136	112	97	65	334	344	15	62	106
Temp	^{0}C	10	8.8	7.3	4.4	9.9	5.8	13.5	4.6	10
Flow	L/min	Trace Flow	1	6	1.5	0.75	slight	0.17	0.2	0.25
Laboratory Parameters										
pH		7.23	7.07	6.84	6.39	3.57	3.52	6.17	5.4	7.39
Conductivity	mS/cm	3080	3180	5220	5140	21400	22300	11700	1730	1200
Dissolved Anions										
Acidity pH 8.3	mg/L	115	171	719	755	12300	12500	2550	5490	53
Alkalinity Total as CaCO3	mg/L	38	289	187	124	-1	7	160	119	30
Chloride	mg/L	-0.5	1.2	1.3	0.8	-0.5	-0.5	1	0.7	0.7
Sulphate	mg/L	2340	2170	4400	4070	30500	33100	13700	23000	766
Dissolved Metals*										
Aluminum	mg/L	-0.2	-0.2	-0.4	-0.4	20	22	-2	-4	-0.2
Antimony	mg/L	-0.2	-0.2	-0.4	-0.4	-8	-6	-2	-4	-0.2
Arsenic	mg/L	-0.2	-0.2	-0.4	-0.4	-8	-6	-2	-4	-0.2
Barium	mg/L	-0.01	0.02	0.02	-0.02	-0.4	-0.3	-0.1	-0.2	0.02
Beryllium	mg/L	-0.005	-0.005	-0.01	-0.01	-0.2	-0.2	-0.05	-0.1	-0.005
Bismuth	mg/L	-0.2	-0.3	-0.6	-0.4	-20	-6	-4	-4	-0.2
Boron	mg/L	-0.1	-0.1	-0.2	-0.2	-4	-3	-1	-2	-0.1
Cadmium	mg/L	0.12	0.08	0.11	0.06	6.8	8.1	0.7	1.1	0.08
Calcium	mg/L	261	393	435	431	467	456	442	440	207
Chromium	mg/L	-0.01	-0.01	-0.02	-0.02	-0.4	-0.3	-0.1	-0.2	-0.01
Cobalt	mg/L	0.23	0.81	2.99	2.86	22.3	22.3	10.3	15.6	0.1
Copper	mg/L	-0.01	-0.01	-0.02	-0.02	-0.4	-0.3	-0.2	-0.2	0.01
Iron	mg/L	0.25	5.48	93.7	127	1160	1030	243	807	-0.03
Lead	mg/L	0.1	-0.05	-0.1	-0.1	-2	-2	-0.5	-1	-0.05
Lithium	mg/L	0.07	0.05	0.1	0.07	-0.4	0.4	0.2	0.3	0.02
Magnesium	mg/L	370	257	551	558	3180	3490	1880	3170	54.2
Manganese	mg/L	16.4	36	139	135	2350	2600	1000	1600	4.8
Molybdenum	mg/L	-0.03	-0.03	-0.06	-0.06	-2	-0.9	-0.3	-0.6	-0.03
Nickel	mg/L	0.78	2	5.3	5	17	17	7.2	12	0.18
Phosphorus	mg/L	-0.3	-0.3	-0.6	-0.6	-20	-9	-3	-6	-0.3
Potassium	mg/L	8	11	13	12	-80	-60	-20	-40	2
Selenium	mg/L	-0.2	-0.2	-0.4	-0.4	-8	-6	-2	-4	-0.2
Silicon	mg/L	1.73	5.25	7.5	7.8	21	20	9.5	11	0.87
Silver	mg/L	-0.01	-0.01	-0.02	-0.02	-0.4	-0.3	-0.1	-0.2	-0.01
Sodium	mg/L	5	10	13	13	-80	-60	-20	-40	-2
Strontium	mg/L	1.69	1.48	1.87	1.77	1	1.1	2.15	3	0.517
Thallium	mg/L	-0.3	-0.3	-0.4	-0.4	-8	-6	-2	-4	-0.2
Tin	mg/L	-0.03	0.04	-0.06	-0.06	-2	-0.9	-0.4	-0.6	-0.03
Titanium	mg/L	-0.01	-0.01	-0.02	-0.02	-0.4	-0.3	-0.1	-0.2	-0.01
Vanadium	mg/L	-0.03	-0.03	-0.06	-0.06	-2	-0.9	-0.3	-0.6	-0.03
Zinc	mg/L	71.6	88.3	412	350	6370	6990	1650	2850	27.9
Notes: * Travel blank results are for										
anions (meq)		50	51	95	87	635	690	289	482	17
cations (meq)		48	47	93	93	650	696	287	490	16
%diff		1.1%	4.1%	1.1%	-3.4%	-1.1%	-0.5%	0.3%	-0.8%	1.0%
Type		2	2	2	2	3	3	2	3	2

		VANGORDA DUMP				
Sample ID		**SRK-VD07**	**SRK-VD07**	**SRK-VD08**	**SRK-VD09**	**SRK-VD09B**
Date		10-Jun-02	12-Sep-02	10-Jun-02	11-Jun-02	12-Sep-02
Time		14:30	11:00	15:15	8:30	10:30
Field Parameters						
pH		2.75	2.55	4.1	5.64	4.45
Conductivity	mS/cm	3500	20400	5700	4600	5400
Redox	mV	498	431	377	145	341
Temp	°C	15.5	7.1	16.5	6.3	5.4
Flow	L/min	No Flow	ponded	No Flow	Trace Flow	slight
Laboratory Parameters						
pH		2.79	2.55	3.85	6.36	4.18
Conductivity	mS/cm	3420	14600	5620	4610	5190
Dissolved Anions						
Acidity pH 8.3	mg/L	1400	16500	1840	764	836
Alkalinity Total as CaCO3	mg/L	-1	-1	3	11	14
Chloride	mg/L	0.7	11	0.5	0.8	-0.5
Sulphate	mg/L	2470	13100	5130	3550	4370
Dissolved Metals*						
Aluminum	mg/L	27.9	339	7	-0.4	0.4
Antimony	mg/L	-0.4	-4	-2	-0.4	-0.4
Arsenic	mg/L	-0.5	19	-2	-0.4	-0.4
Barium	mg/L	-0.02	-0.2	-0.1	-0.02	-0.02
Beryllium	mg/L	-0.01	-0.1	-0.05	-0.01	-0.01
Bismuth	mg/L	-0.4	-4	-2	-0.6	-0.4
Boron	mg/L	-0.2	-2	-1	-0.2	-0.2
Cadmium	mg/L	1.19	8.5	4.1	0.83	0.56
Calcium	mg/L	196	457	528	444	467
Chromium	mg/L	0.03	0.3	-0.1	-0.04	-0.02
Cobalt	mg/L	0.75	6	2.1	1.72	2.45
Copper	mg/L	11.2	180	9.2	0.37	0.07
Iron	mg/L	240	3040	14.8	35.3	25.5
Lead	mg/L	0.6	-1	2.5	0.1	0.7
Lithium	mg/L	0.08	0.5	0.1	0.12	0.19
Magnesium	mg/L	105	721	346	371	514
Manganese	mg/L	17.6	232	122	79.7	126
Molybdenum	mg/L	-0.06	-0.6	-0.3	-0.06	-0.06
Nickel	mg/L	1.1	7	3.3	2.8	3.7
Phosphorus	mg/L	-0.6	-6	-3	-2	-0.6
Potassium	mg/L	-4	-40	-20	11	10
Selenium	mg/L	-0.4	-4	-2	-0.4	-0.4
Silicon	mg/L	12.4	74	11.2	4.3	5.9
Silver	mg/L	-0.02	-0.2	-0.1	-0.02	-0.02
Sodium	mg/L	-4	-40	-20	-4	5
Strontium	mg/L	0.45	0.7	0.9	1.78	1.9
Thallium	mg/L	-0.4	-4	-2	-0.4	-0.4
Tin	mg/L	-0.06	-0.6	-0.3	-0.06	-0.06
Titanium	mg/L	-0.02	-0.2	-0.1	-0.02	-0.02
Vanadium	mg/L	-0.06	-0.6	-0.3	-0.06	-0.06
Zinc	mg/L	471	4850	1430	499	474
Notes: * Travel blank results are for						
anions (meq)		51	273	107	74	91
cations (meq)		50	446	108	75	89
%diff		1.2%	-24.0%	-0.3%	-0.5%	1.3%
Type		3	3	3	3	3

		Blanks									
Sample ID		**SRK-Field Blank**	**SRK-Field Blank**	**Travel Blank***	**Travel Blank A**	**Travel Blank B**	**Travel Blank C**	**Method Bl**	**Method Bl**	**Blank**	**Blank**
Date		13-Jun-02	13-Jun-02	June	September	September	September	12-Sep-02	13-Sep-02	12-Sep-02	12-Sep-02
Time		8:30	19:00					17:45	10:30	10:45	13:10
Field Parameters											
pH		-	-	-							
Conductivity	mS/cm	-	-	-							
Redox	mV	-	-	-							
Temp	^{0}C	-	-	-							
Flow	L/min	-	-	-							
Laboratory Parameters											
pH		8.2	8.31	-	6.7	6.09	-	7.88	7.74	6.14	7.75
Conductivity	mS/cm	-2	-2	-	-2	877	-	-2	1810	2	-2
Dissolved Anions											
Acidity pH 8.3	mg/L	-1	-1	-	-1	-1	-	2	-1	-1	11
Alkalinity Total as CaCO3	mg/L	-1	-1	-	-1	-1	-	1	95	1	1
Chloride	mg/L	-0.5	-0.5	-	-0.5	-0.5	-	-0.5	-0.5	-0.5	-0.5
Sulphate	mg/L	-1	2	-	-1	-1	-	-1	-1	-1	-1
Dissolved Metals*				***Total Metals***							
Aluminum	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Antimony	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Arsenic	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Barium	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Beryllium	mg/L	-0.005	-0.005	*-0.005*	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Bismuth	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Boron	mg/L	-0.1	-0.1	*-0.1*	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Cadmium	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Calcium	mg/L	-0.05	-0.05	*-0.05*	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Chromium	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Cobalt	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Copper	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Iron	mg/L	-0.03	-0.03	*-0.03*	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Lead	mg/L	-0.05	-0.05	*-0.05*	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Lithium	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Magnesium	mg/L	-0.1	-0.1	*-0.1*	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1
Manganese	mg/L	-0.005	-0.005	*-0.005*	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Molybdenum	mg/L	-0.03	-0.03	*-0.03*	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Nickel	mg/L	-0.05	-0.05	*-0.05*	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Phosphorus	mg/L	-0.3	-0.3	*-0.3*	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Potassium	mg/L	-2	-2	*-2*	-2	-2	-2	-2	-2	-2	-2
Selenium	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Silicon	mg/L	-0.05	-0.05	*-0.05*	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Silver	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Sodium	mg/L	-2	-2	*-2*	-2	-2	-2	-2	-2	-2	-2
Strontium	mg/L	-0.005	-0.005	*-0.005*	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Thallium	mg/L	-0.2	-0.2	*-0.2*	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
Tin	mg/L	-0.03	-0.03	*-0.03*	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Titanium	mg/L	-0.01	-0.01	*-0.01*	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Vanadium	mg/L	-0.03	-0.03	*-0.03*	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
Zinc	mg/L	-0.005	-0.005	*-0.005*	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
Notes: * Travel blank results are for											
anions (meq)					0	0		0	2	0	0
cations (meq)					0	0		0	0	0	0
%diff					-46.6%	-46.6%		-46.6%	85.5%	-46.6%	-46.6%
Type											

APPENDIX D
Surface Waste Rock Mapping

APPENDIX D.1
Mapping Codes

Geochemical Studies Logging Guide

Faro Area Rock Types

1D Non-carbonaceous fine-grained schist containing muscovite, biotite and andalusite. Typically contains finely disseminated pyrite or pyrrhotite along foliations. May contain quartz veins with coarse grained pyrite and/or chalcopyrite. Occassionally contains calcite in fractures and along foliations. Often loose but sometimes cemented by white salts. May be blocky or fine-grained.

A variety of 1D is maroon-stained and typically contains more visible pyrite and calcite. Sometimes appears to be a transitional form between 1D and 1D4.

1C6 Same as above but with biotite and andalusite porphyroblasts along foliation

1D2 Carbonaceous fine-grained schist. Typically friable with abundant fines.

1D4 Quartz muscovite schist. In palest form, is extremely friable and decomposed. Fine-grained pyrite may be visible. Oxidized fines are pale yellow to orange brown. Quartz veins typically contain pyrite. Rinse pH is strongly acidic (pH<3). See comment about maroon stained variety of 1D.

2 Sulphide rock types. These include massive to semi-massive siliceous pyrite occurring as blocks (brown stained), massive crumbly pyrite occurring as blocks and fines (no stain), and massive sphalerite. Barite is common.

3D0 Amphibolite and calc-silicate schist. Distinctive centimetre-scale light and dark banding. Calcite is common both as a matrix component and as a fracture filling. Rare sulphides. Typically blocky.

6 Milky quartz. Informal name.

10E Hornblende biotite quartz diorite. Dark porphyritic rock type. Typically blocky and stable but also rapidly decomposing and fines forming.

10F Quartz feldspar porphyry. Distinctive white rock and 1 mm biotite and hornblende phenocrysts. Typically blocky and stable but also rapidly decomposing and fines forming.

5 or T Overburden. Till.

Grum and Vangorda Area

Units		Symbols Used on Field Maps
Vangorda Formation		
5C	Poorly foliated greenstone	
5D	Chlorite phyllite, calcareous	5D0, 5D4
5B0	Calcareous phyllite, silver to dark grey	5B
5A0	Carbonaceous phyllite, weakly calcareous	5A
Mount Mye Formation		
3G0	Non-calcareous phyllite	3G
4EC	Undifferentiated massive and disseminated sulphides	
4E	Massive pyritic sulphides (60 to 100% pyrite)	
4C	Pyritic quartzite (<30% pyrite)	
4L0	Bleached phyllite, commonly pyritic	4L

Modifiers

ca	Calcareous
py	Pyritic
ox	Oxidized
st	Visible salts (describe type in notes)
gn	Galena
sl	Sphalerite
bl	Blocky (describe in notes)
sk	Slaking (describe in notes)
ms	Massive sulphide

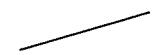
Clast sizes

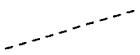
m>cm:	Coarse
cm/m:	Mixed metre and centimetre scale
mm>cm>>m	Fine Frained

Mapping Conventions

3D0ox/10Fsk	About equal quantities.
10% 3D0ox/90% 10Fsk	Proportions indicated

Symbols


Distinct contact

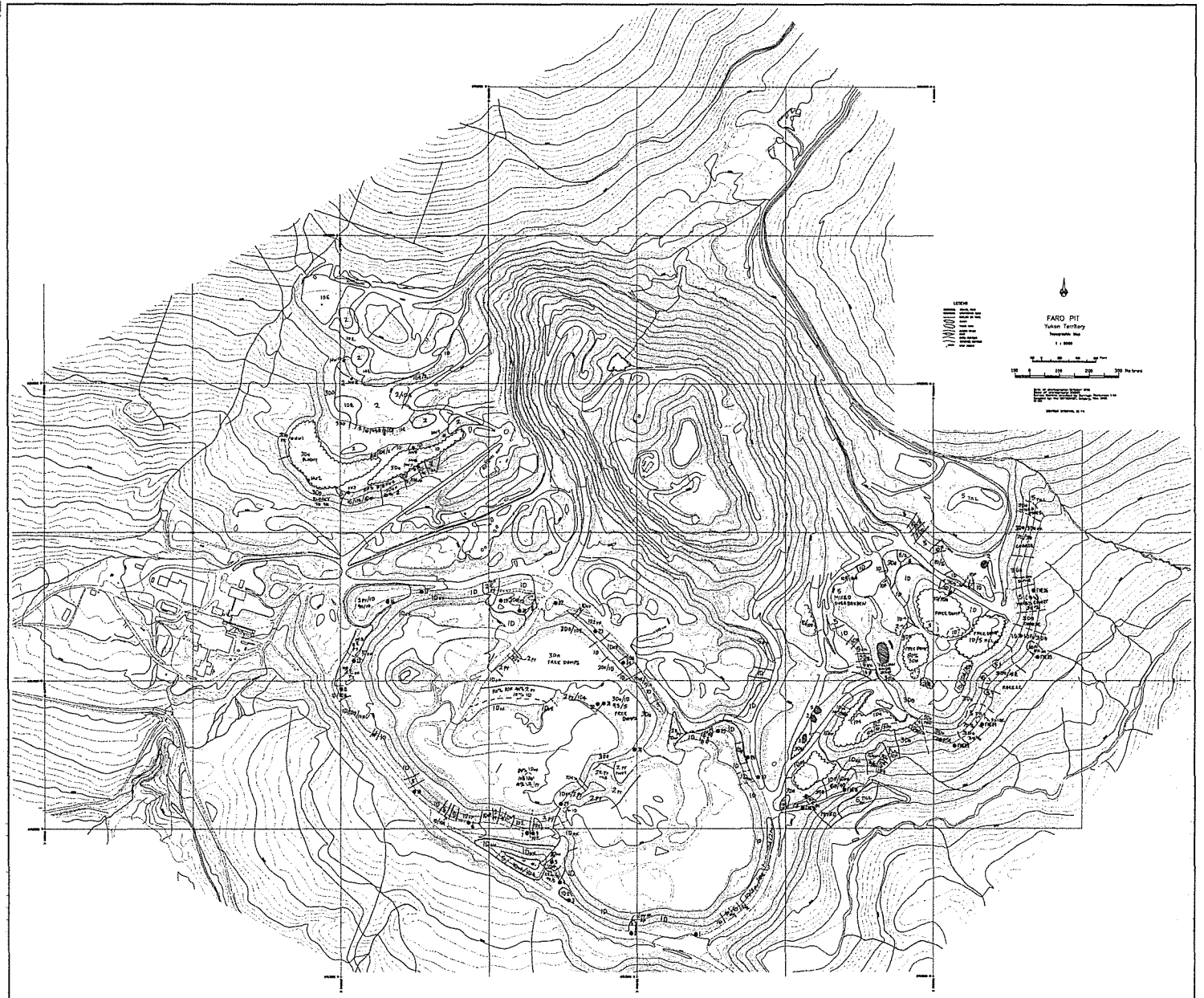

Indistinct contact


FD – Free dumped area

* Small cluster of sulphide boulders

• GUS-01 Fine screened sample location for contact test

APPENDIX D.2
Faro Site Field Reconnaissance Map (In Pocket)



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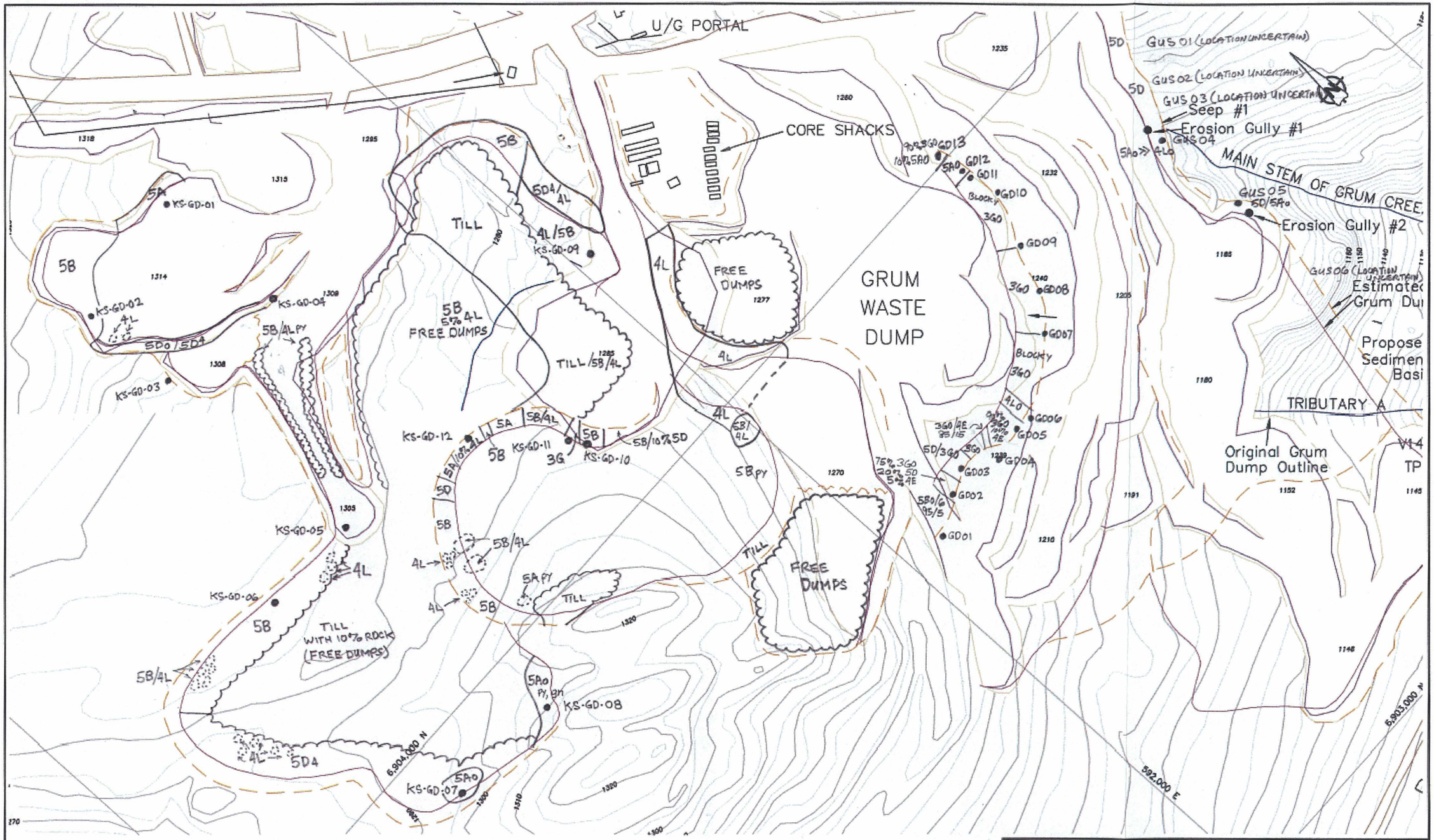
DELOITTE & TOUCHE INC.

FARO MINE SITE

SITE PLAN

PROJECT NO.	DATE	APPROVED	FIG.
1CD003.11	Nov. 2002		1

APPENDIX D.3
Grum Site Field Reconnaissance Maps (In Pocket)


U/G PORTAL
CORE SHACKS
GRUM WASTE DUMP
FREE DUMPS
TILL
TILL WITH 10% ROCK (FREE DUMPS)
GUS01 (LOCATION UNCERTAIN)
GUS02 (LOCATION UNCERTAIN)
GUS03 (LOCATION UNCERTAIN)
Seep #1
Erosion Gully #1
GUS04
MAIN STEM OF GRUM CREEK
GUS05
Erosion Gully #2
GUS06 (LOCATION UNCERTAIN)
Estimated Grum Dump
Proposed Sediment Basin
TRIBUTARY A
Original Grum Dump Outline
KS-GD-01
KS-GD-02
KS-GD-03
KS-GD-04
KS-GD-05
KS-GD-06
KS-GD-07
KS-GD-08
KS-GD-09
KS-GD-10
KS-GD-11
KS-GD-12
GD01
GD02
GD03
GD04
GD05
GD06
GD07
GD08
GD09
GD10
GD11
GD12
GD13
6,904,000 N
6,903,000 N
592,000 E
0 50 100 150 200 250 300 350 400 450 500m
Scale 1:5000
Note: The outline of the Grum Dump shown above is incomplete and will be updated as more survey data becomes available.
Contour Interval = 2m
SRK Consulting
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DELOITTE & TOUCHE
VANGORDA PLATEAU MINE
GRUM WASTE DUMP
PROJECT NO. 1CD003.08
DATE Nov, 2002
APPROVED
FIG. 1

APPENDIX D.4
Vangorda Site Field Reconnaissance Maps (In Pocket)

)UND
LVERT
EXIT
CHUTE
TRENCH
CUT
RESERVE
POOL
PELLY POND
WASTE ROCK PILE
TILL
STOCKPILE
LITTLE CREEK
POND
FLOW
DIRECTION
WASTE ROCK PILES
VANGORDA
WASTE
DUMP
MIXED
FREE DUMPS
BARITIC ORE STOCKPILE
TILL BERMS
DRAIN No.6
DRAIN No.5
DRAIN No.4
DRAIN No.1
DRAIN No.2
DRAIN No.3
REGRADED
SLOPE
(1994)
TILL COVER (1994)
MIXED
FREE
DUMPS
SAMPLING TRANSECT - TILL
V2A
Moose Pond
Pipeline
ersion Ditch
VANGORDA CREEK
Syphon Pipeline
V2
sing
ment
ORDA CREEK
593,000 E
6,902,000 N
594,000 E
SEEPAGE
COLLECTION
DITCH
APPROVED WATER LICENCE BOUNDARY
OF VANGORDA WASTE DUMP
* LOCATION UNCERTAIN
0 50 100 150 200 250 300 350 400 450 500m
Scale 1:5000
Contour Interval = 2m

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Engineers and Scientists

DELOITTE & TOUCHE

VANGORDA PLATEAU MINE

VANGORDA WASTE DUMP

PROJECT NO.	DATE	APPROVED	FIG.
1CD003.08	July, 2002		1

APPENDIX D.5
Results of Field Contact Tests

APPENDIX D.5
Results of Contact Tests - Surface Waste Rock Mapping - September 2002

Sampler	Waste Dump	Sample ID	Colour	Rock Code			pH	EC
				Primary	Secondary	Minor	s.u.	mS/cm
SD	Intermediate	MD-1	dark grey/brown	1D		6	7.4	1
SD	Intermediate	MD-2	dark brown/orange	2pycpo			2.6	4.5
SD	Intermediate	MD-26	light yellow	1D			2.6	4.2
SD	Intermediate	MD-29	yellow brown	1Dox		2py	2.9	2
SD	Intermediate	MD-3	grey yellow	1D2ca			6.9	0.3
SD	Intermediate	MD-30	dark grey brown	3D0ca			7.4	0.3
SD	Intermediate	MD-32	yellow brown	2py	1D4		2.5	2.9
SD	Intermediate	MD-4	not recorded	1D4			7.5	0.3
SD	Intermediate	MD-5	brown yellow	2pycpo	1D	6	2.8	1.5
SD	Main	MD-10	medium grey	1D			7.4	1.6
SD	Main	MD-11	medium grey	1D	1D2	6	6.9	2.4
SD	Main	MD-13	olive grey	4py			3	1
SD	Main	MD-16	dark brown	2mspy			5.4	1.1
SD	Main	MD-17	yellow	2mspy			3.5	2.6
SD	Main	MD-19	medium grey	1Dca			7.4	0.3
SD	Main	MD-21	grey green	3DD	1D		5.6	<0.01
SD	Main	MD-24	yellow brown	1D4			3.1	0.7
SD	Main	MD-25	medium grey	1Dca			7.4	0.2
SD	Main	MD-25	medium grey	1Dca			7.6	0.6
SD	Main	MD-6	light grey	1D	1D4	2pyms	6.7	2.1
SD	Main	MD-7	dark grey	1D2			7.1	2.2
SD	Main	MD-9	white	10F			7.5	0.3
KS	NW	NW-2	medium grey	3D0			8.2	0.1
KS	NW	NW-3	dark grey	1D4			8.0	3.0
KS	NW	NW-4	yellow	1D4ox			2.7	5.2
KS	NW	NW-5	light tan grey	1D			7.9	0.6
KS	NW	NW-6	light tan grey	3D0			8.2	0.5
KS	NW	NW-7	yellow	2	1D4		2.3	5.0
KS	NW	NW-8	yellowish brown	1D			8.2	0.4
KS	NW	NW-9	pinkish tan	10F			8.5	0.2
KS	NW	NW-10	light brown	10F			8.4	0.1
KS	NW	NW-11	yellow brown	1D4	2		5.2	0.1
US	NE	FNE-1	beige	10F			6.9	0.2
US	NE	FNE-2	pale grey	5			7.5	5.6
US	NE	FNE-3	pale green grey	3D0			3.6	3.6
US	NE	FNE-4	pale green grey	5	3D0		3.5	5.4
US	NE	FNE-5	pale yellow brown	10Fox			3.1	0.5
US	NE	FNE-6	pale grey	5			6.5	0.2
KS	Grum	KS-GD-1	brownish grey	5B			7.7	0.8
KS	Grum	KS-GD-2	greyish brown	5B			8.2	0.1
KS	Grum	KS-GD-3	brownish grey	5B	4L		6.4	1.4
KS	Grum	KS-GD-4	medium grey	5D4			8.7	0.1
KS	Grum	KS-GD-5	brownish grey	4L			4.7	2.5
KS	Grum	KS-GD-6	medium grey	5B			8.2	0.3
KS	Grum	KS-GD-7	black	5AO			8.0	0.5
KS	Grum	KS-GD-8	dark grey	5AO			7.8	1.3
KS	Grum	KS-GD-9	dark grey	5B			7.4	1.6

APPENDIX D.5
Results of Contact Tests - Surface Waste Rock Mapping - September 2002

Sampler	Waste Dump	Sample ID	Colour	Rock Code			pH	EC
				Primary	Secondary	Minor	s.u.	mS/cm
KS	Grum	KS-GD-10	medium grey	5B	5D		8.5	0.2
KS	Grum	KS-GD-11	light grey	3G0	5B		7.8	1.3
KS	Grum	KS-GD-12	dark grey	5A	3GO	4L	8.6	0.1
US	Grum	GUS-1	grey-green	5D			8.4	0.2
US	Grum	GUS-2	grey-green	5D			8.2	0.4
US	Grum	GUS-3	medium grey	5A0		5D	8.6	0.3
US	Grum	GUS-4	grey	5D			8.4	0.4
US	Grum	GUS-5	grey	5D	5A0		8.0	1.1
US	Grum	GUS-6	grey	5D0			8.7	0.1
SD	Grum	GD-1	light grey	5B0	6	4C	7.0	1.1
SD	Grum	GD-2	light brown grey	3G0	5D	4E	7.5	2.0
SD	Grum	GD-5	light brown grey	3G0	4E		7.2	3.3
SD	Grum	GD-7	dark grey	4L0py	4C		7.0	1.6
SD	Grum	GD-8	light yellow brown	4L0py			5.3	2.5
SD	Grum	GD-11	light grey	5B0			8.4	0.3
SD	Grum	GD-12	black	5A0pyca			6.5	3.6
US	Vangorda	VUS-1	reddish brown	5BO		4E	3.5	3.0
US	Vangorda	VUS-2	black	5A0			6.0	3.0
US	Vangorda	VUS-3	greenish grey	4c			2.2	7.7
US	Vangorda	VUS-4	dark brown grey	5B0		4e	5.6	2.4
US	Vangorda	VUS-5	orange brown	Tox			3.2	2.5
US	Vangorda	VUS-6	reddish brown	4L	4C	4e	4.2	2.0
US	Vangorda	VUS-7	black	5A0			6.2	0.6
SD	Vangorda	VD-2	medium grey brown	3G0		4C	6.0	0.4
SD	Vangorda	VD-3	dark brown	4Cca			6.6	0.2
SD	Vangorda	VD-6	light green grey	3G0		4C	2.2	5.8
SD	Vangorda	VD-11	light brown grey	4L0py(ca)			6.2	1.0
SD	Vangorda	VD-13	medium grey	5A0			4.3	1.1

SD - Stephen Day
US - Uwe Schmidt
KS - Kelly Sexsmith

APPENDIX D.6
Map of Hot Spots and Photographs

6914500 N
584500 E
584750 E
585000 E
6913000 N

FHS1
FHS2
FHS3

Legend

FHS1 Hot Spot Location

100 0 200 400 600 feet

100 0 100 200 300 Metres

NAD 27 DATUM
Contour Interval = 10 ft.

File Ref: FaroPit-Metric.dwg

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FARO MINE SITE

MAP OF HOT SPOTS
FARO SITE

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Nov, 2002		D.6



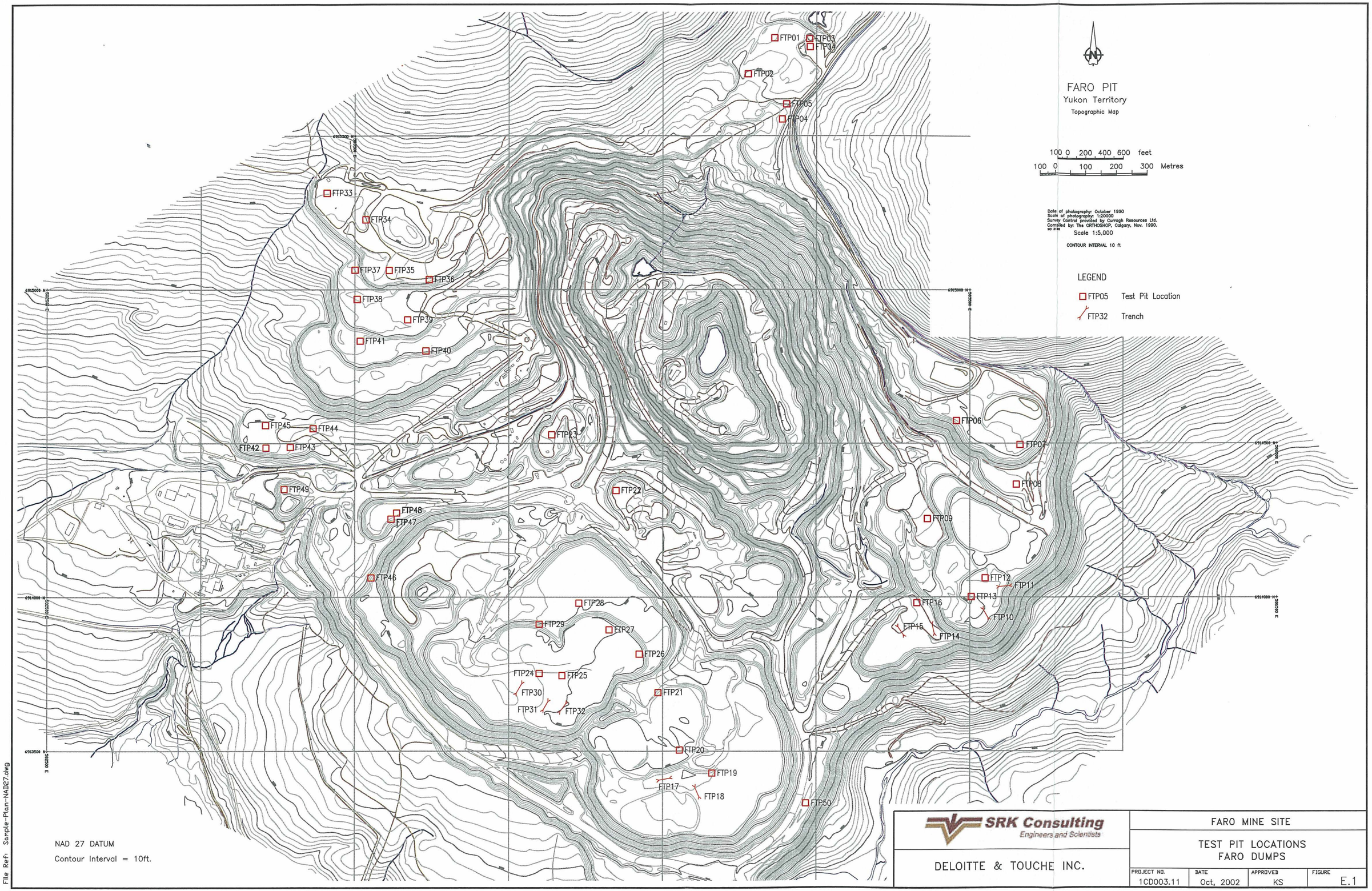
Faro Hot Spot 1 (FHS-1) – Snow patch is about 0.5 m across



Faro Hot Spot 1 (FHS-1) – Close-up

APPENDIX E
Test Pits and Trenches

APPENDIX E.1
Locations of Test Pits and Trenches


FTP01
FTP03
FTP02
FTP05
FTP04
FTP33
FTP34
FTP37
FTP35
FTP36
FTP38
FTP39
FTP41
FTP40
FTP45
FTP44
FTP42
FTP43
FTP23
FTP06
FTP07
FTP49
FTP22
FTP08
FTP48
FTP47
FTP09
FTP46
FTP12
FTP11
FTP13
FTP16
FTP10
FTP15
FTP14
FTP28
FTP29
FTP27
FTP26
FTP24
FTP25
FTP30
FTP21
FTP31
FTP32
FTP20
FTP19
FTP17
FTP18
FTP50
6915000 N
6913500 N
6914000 N
3 050000 E
3 052500 E
3 055000 E
3 057500 E
3 060000 E
3 062500 E
3 065000 E
3 067500 E
3 070000 E
3 072500 E
3 075000 E
3 077500 E
3 080000 E
3

592,000 E

GTP28
ORE TRANSFER PAD

GTP29

ORE HAUL SHOP

AEX ROAD

HOT LINE

FUEL TANK

SHOP

6,905,000 N

GTP24

GTP25

GTP26

GTP27

GTP23

GRUM PIT

BLASTER'S SHACK

NEW DITCH ROAD

250 mm DIA. BURIED PIPELINE FROM LITTLE CREEK TO WATER TREATMENT PLANT

OVERBURDEN DUMP

GRUM WASTE DUMP

GTP11

GTP01

GTP04

GTP02

Erosion Gully #2

GTP05

GTP10

GTP06

GTP22

GTP12

GTP13

GTP14

GTP19

GTP20

GTP21

GTP15

GTP18

GTP16

GTP17

GTP09

GTP07

GTP08

Approx. Outline of Sulphide Waste (To be confirmed)

GTP03

V14

V16

V15

V2

V2A

Moose Pond Pipeline

Diversion Ditch

Syphon Pipeline

LITTLE CREEK DAM

EMERGENCY SPILLWAY

VANGORDA CREEK

593,000 E

591,000 E

LEGEND

GTP12 Test Pit Location

VTP04 Trench

0 100 200 300 400 500 600 700 800 900 1000m

Scale 1:10,000

NAD 27 DATUM

File Ref: Sample_plan-NAD27.dwg

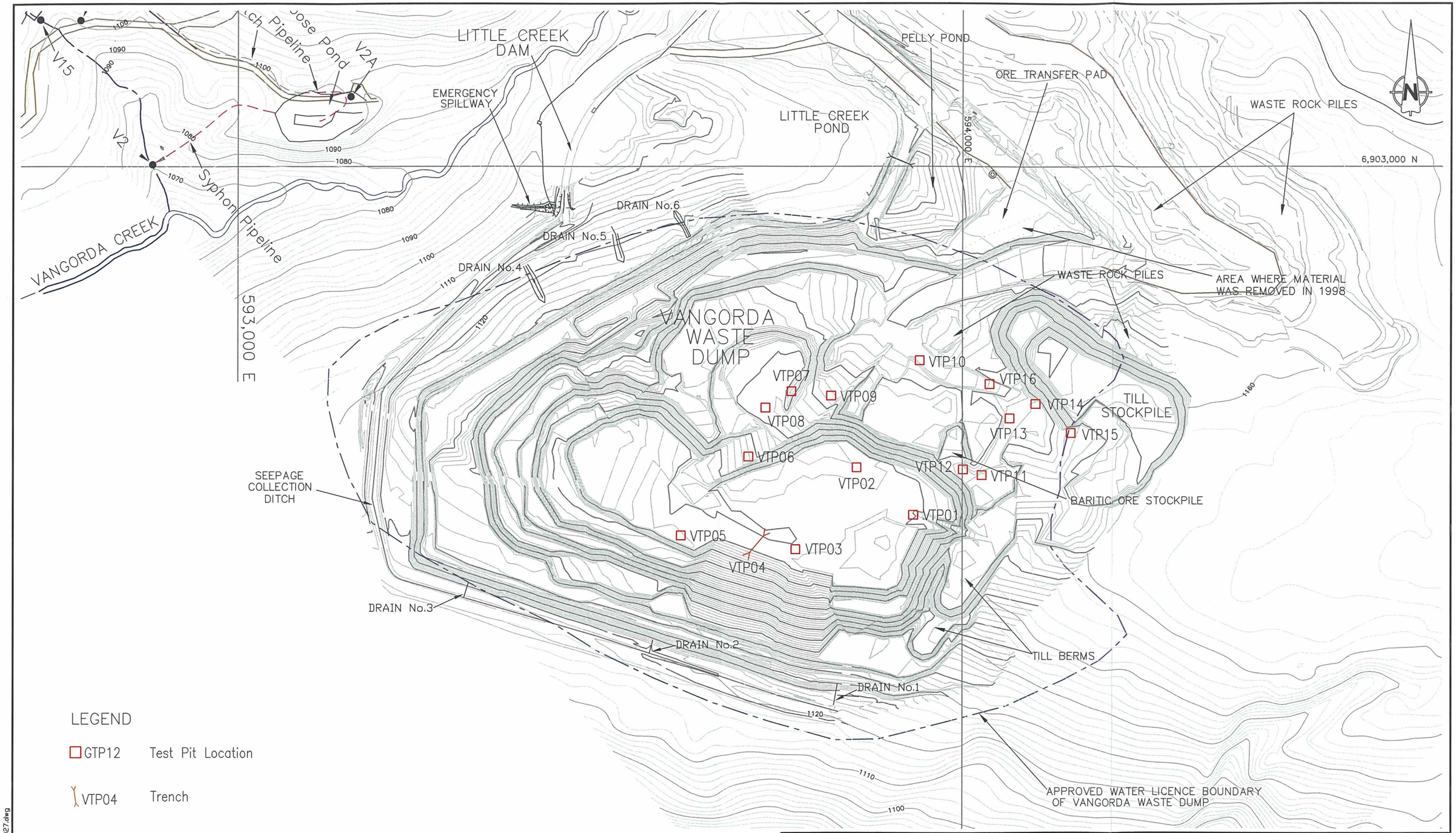
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VANGORDA PLATEAU MINE

TEST PIT LOCATIONS
GRUM WASTE DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Oct, 2002		E.2



LEGEND

GTP12 Test Pit Location

VTP04 Trench

0 50 100 150 200 250 300 350 400 450 500m

Scale 1:5000

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VANGORDA PLATEAU MINE

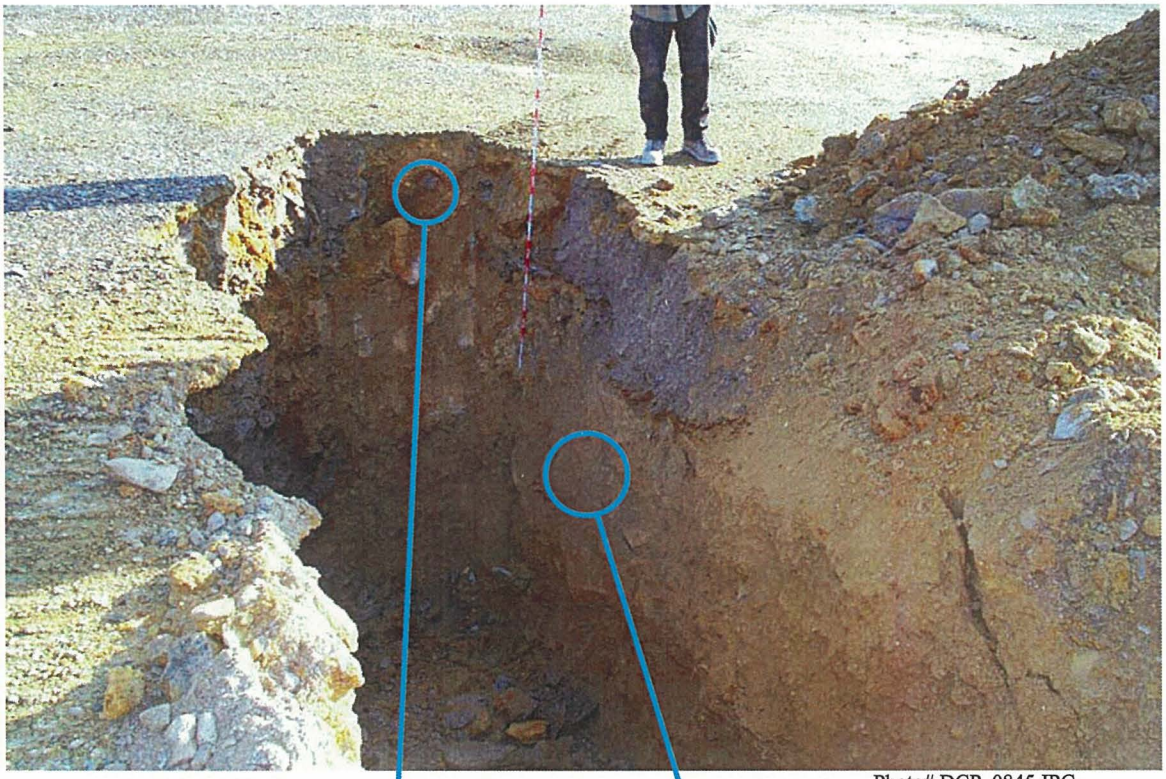
TEST PIT LOCATIONS
VANGORDA DUMP

PROJECT NO.	DATE	APPROVED	FIGURE
1CD003.11	Oct, 2002		E.3

File Ref: Sample_plan-NAD27.dwg

APPENDIX E.2
Test Pit Descriptions and Photos – Faro Site

FTP01 (Faro valley north)



Photo# DCP_0845.JPG

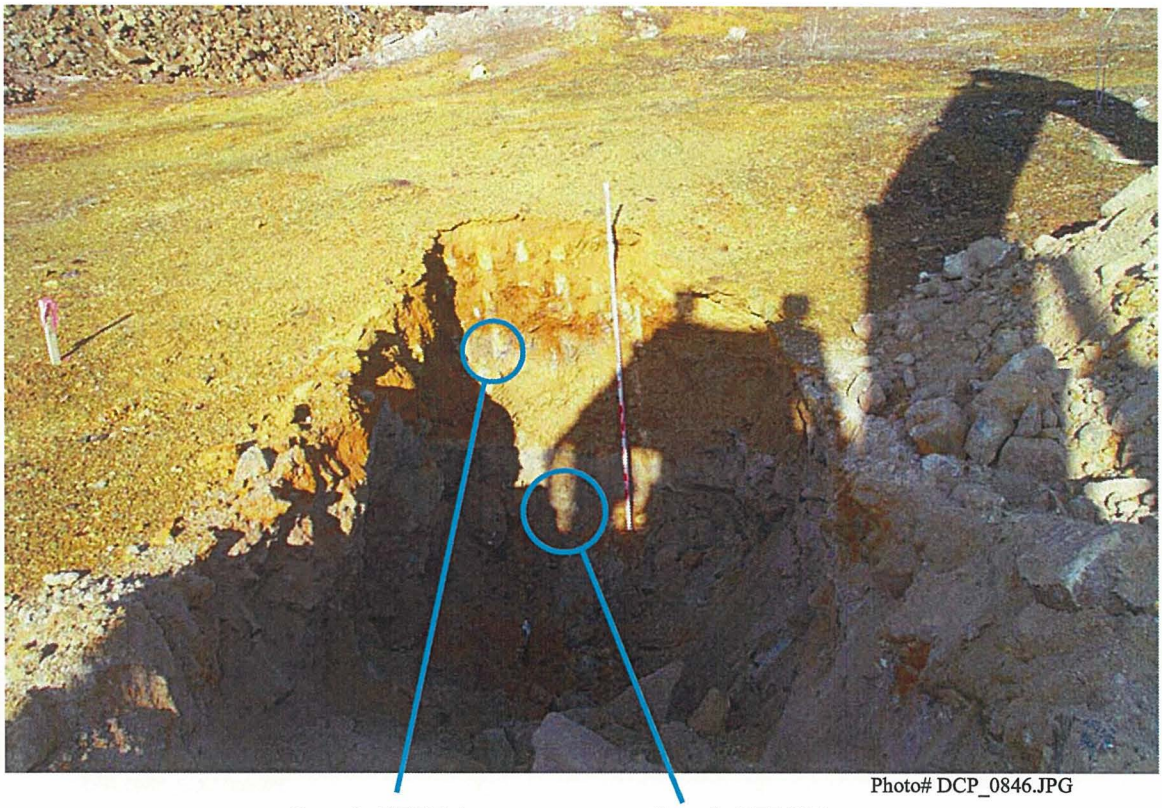
Sample FTP01A Sample FTP01B

Description:
Fine pale orange brown oxidized waste, with pale brown patches, containing pale grey to grayish green quartz muscovite phyllites with trace pyrite overlies pale grey waste. The basal horizon consists of grey green muscovite schist, pale orange brown to beige schist, altered granitic boulders and ferricrete clasts in a pale orange non-calcareous matrix. Upper contact is a dark red brown oxidation front 2-3 cm in thickness.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP01A	70801	50
FTP01B	70802	150

FTP02 (Faro valley north)



Photo# DCP_0846.JPG

Description:
Pale orange brown oxidized fine waste with quartz muscovite phyllite, containing a wedge of red brown material (sample FTP02A) overlies a pale beige feldspathic sand derived from weathered granitic material containing altered fragments of biotite quartz granodiorite; fines are strongly calcareous.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP02A	70803	50
FTP02B	70804	150

FTP03 (Faro valley north)



Photo# DCP_0847.JPG

Description:
3.5 m thickness of uniform medium greenish grey weakly oxidized non-calcareous quartz muscovite phyllite in a matrix of pale orange brown non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP03A	70805	200

FTP04 (Faro valley south)



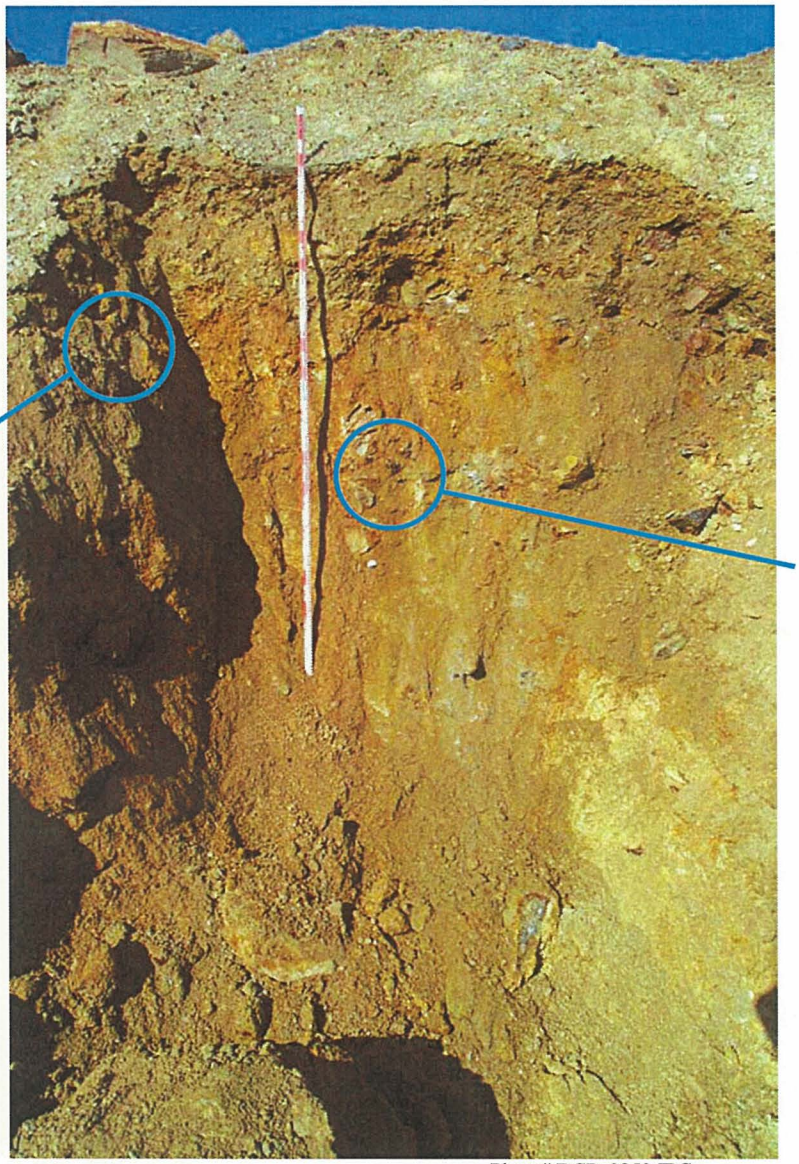
Photo# DCP_0848.JPG

Description:
3.5 m thickness of mixed sulphides in a medium orange non-calcareous matrix. Contains massive pyrrhotite and pyrite, banded pyritic quartz sericite schist, pyrite/sphalerite/galena in a granular quartz matrix, and biotite quartz granodiorite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP04A	70806	200-300

FTP05 (Faro valley south)



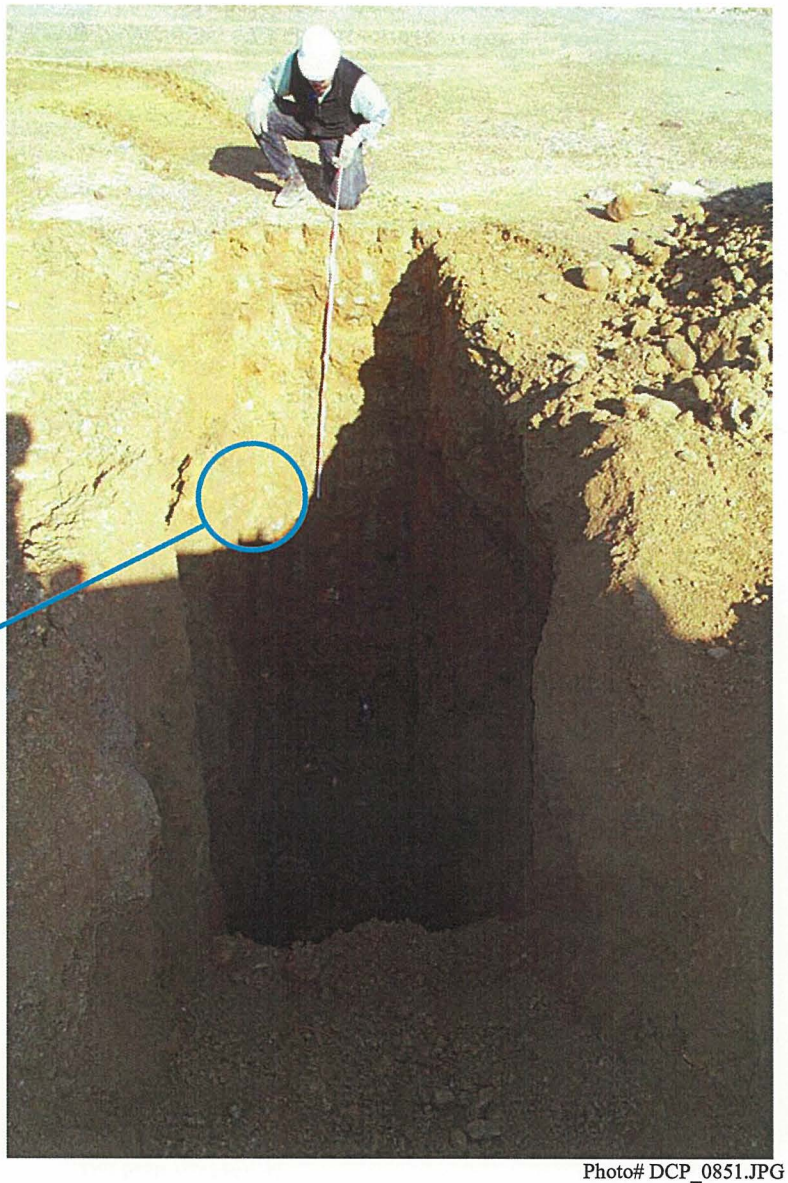
Photo# DCP_0850.JPG

Description:
Pale orange brown mixed till and fragments of quartz muscovite schist in a matrix of non-calcareous fines overlies red brown oxidized overburden containing fresh and oxidized granitic fragments, minor quartz muscovite schist, and occasional sulphide clasts to 20 cm.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP05A	70807	0-50
FTP05B	70808	50-80

FTP06 (North East upper)



Photo# DCP_0851.JPG

Description:
Uniform 3.5 m thickness of medium reddish brown sandy pebbly till containing rounded weathered granitic cobbles, white quartz porphyry and minor quartz muscovite phyllite in a matrix of non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP06A	70809	100-150

FTP07 (North East upper)



Photo# DCP_0852.JPG

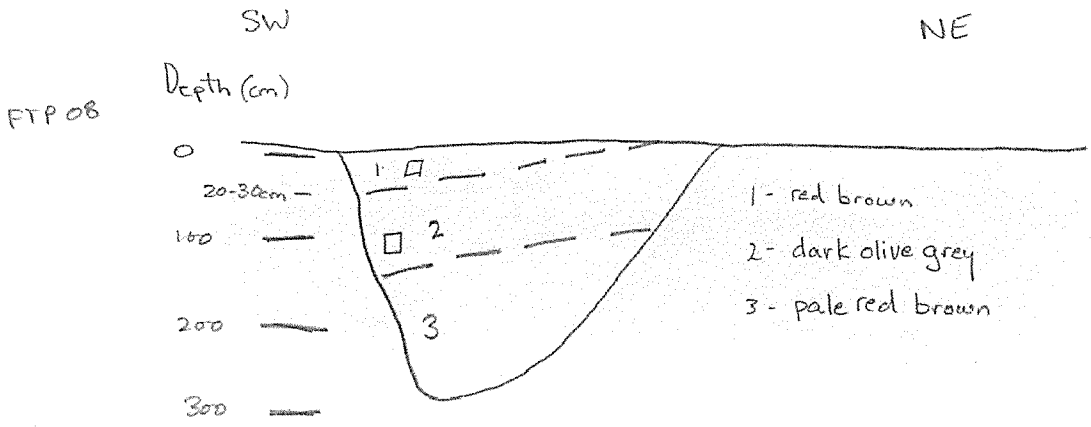
Sample FTP07A

Description:
2 m of pale brown till mixed with smoky quartz porphyry; matrix is weakly calcareous.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP07A	70810	100-200

FTP08 (North East upper)



No photo available

Description:
Red brown surface material with non-calcareous fines, containing quartz muscovite phyllite and pyritic sericite schist, with dark red brown oxidized zone at base overlies a dark olive grey horizon containing pale grey brown quartz muscovite phyllite and 10% pyrite fragments. Basal horizon consists of pale red brown material containing smoky quartz porphyry and quartz phyllite in a matrix of non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP08A	70811	20-30
FTP08B	70812	100-150

FTP09 (North East lower)



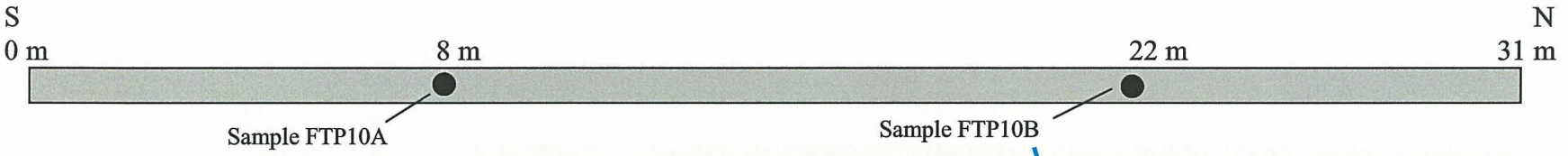
Photo# DCP_0853.JPG

Description:
3.7 m of pale grey to beige clay rich talcose overburden containing 20% subrounded cobbles to 15 cm and 10% platy schist; matrix is non-calcareous.

Samples collected:

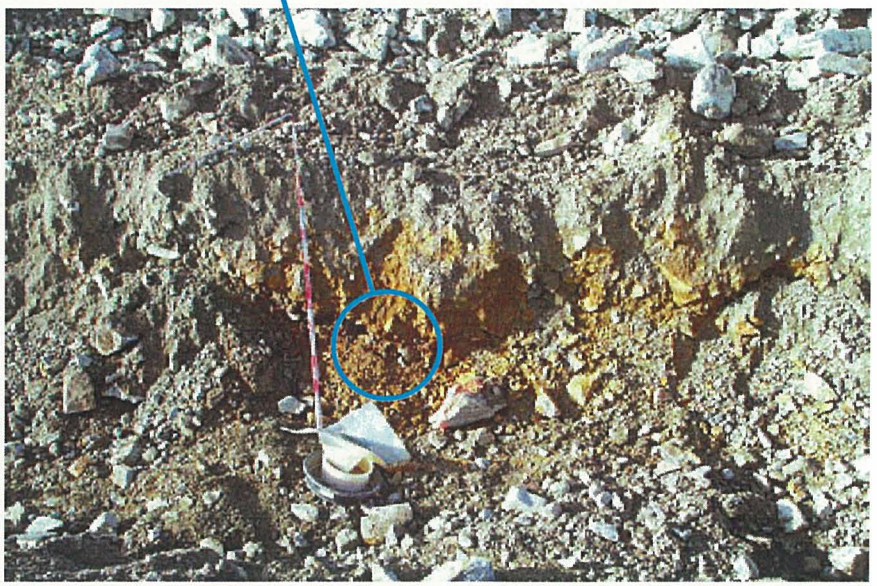
Sample ID	Lab ID	Depth (cm)
FTP09A	70813	300-370

FTP10 **(North East lower)**





Photo# DCP_0854.JPG



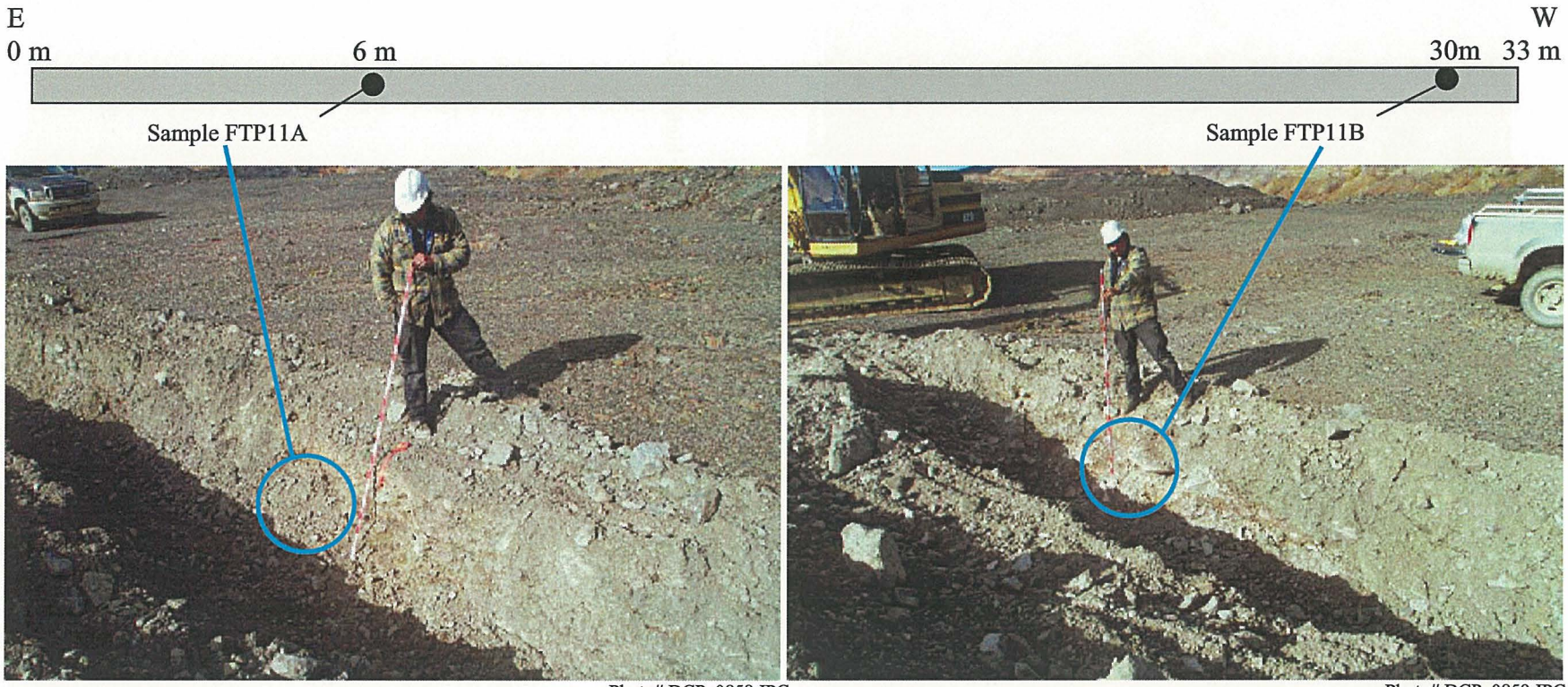
Photo# DCP_0855.JPG

Description:
1 m deep 1.5 m wide trench- azimuth 330. Trench is excavated in pale grey banded and brecciated calc-silicate, mixed with pale greenish grey biotite quartz porphyry. From 15 to 23 m, pockets of orange brown weathering pyritic calc-silicate with minor iron stained biotite porphyry occur; sample FTP10B is taken from one such pocket.

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP10A	70814	8
FTP10B	70815	22

FTP11 **(North East lower)**

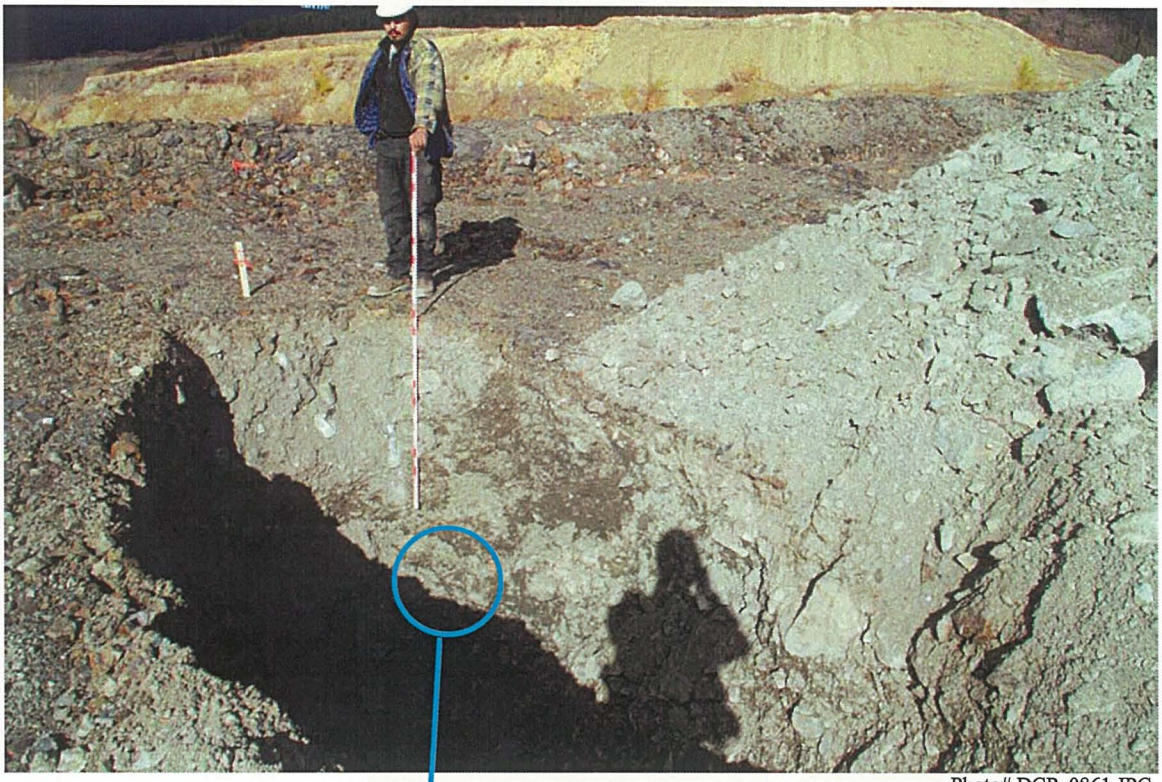


Description:
1 m deep 1.5 m wide trench- azimuth 265. East end of trench is excavated in pale greenish grey calcareous calc-silicate with a matrix of pale greenish grey sandy calcareous fines. From 10 m to 28 m, material is darker in color- medium greenish grey. West end of trench from 28 m is excavated in pale silvery talcose schist and medium grey muscovite biotite phyllite with minor schist in a pale beige to pale brown sandy highly calcareous talcose matrix.

Samples collected:

Sample ID	Lab ID	Distance from E (m)
FTP11A	70816	6
FTP11B	70817	30

FTP12 (North East lower)



Photo# DCP_0861.JPG

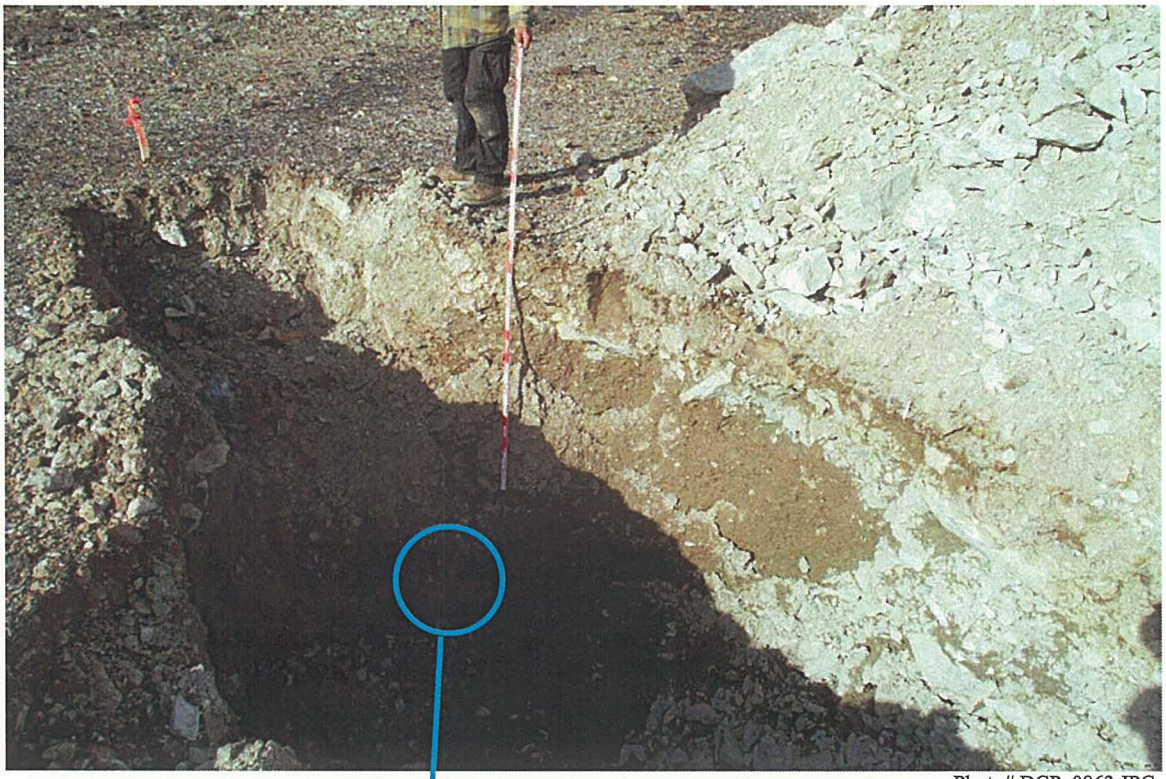
Sample FTP12A

Description:
Medium greenish grey calcareous calc-silicate fragements with pale greenish sandy clay highly calcareous fines to base of pit.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP12A	70818	200

FTP13 (North East lower)



Photo# DCP_0863.JPG

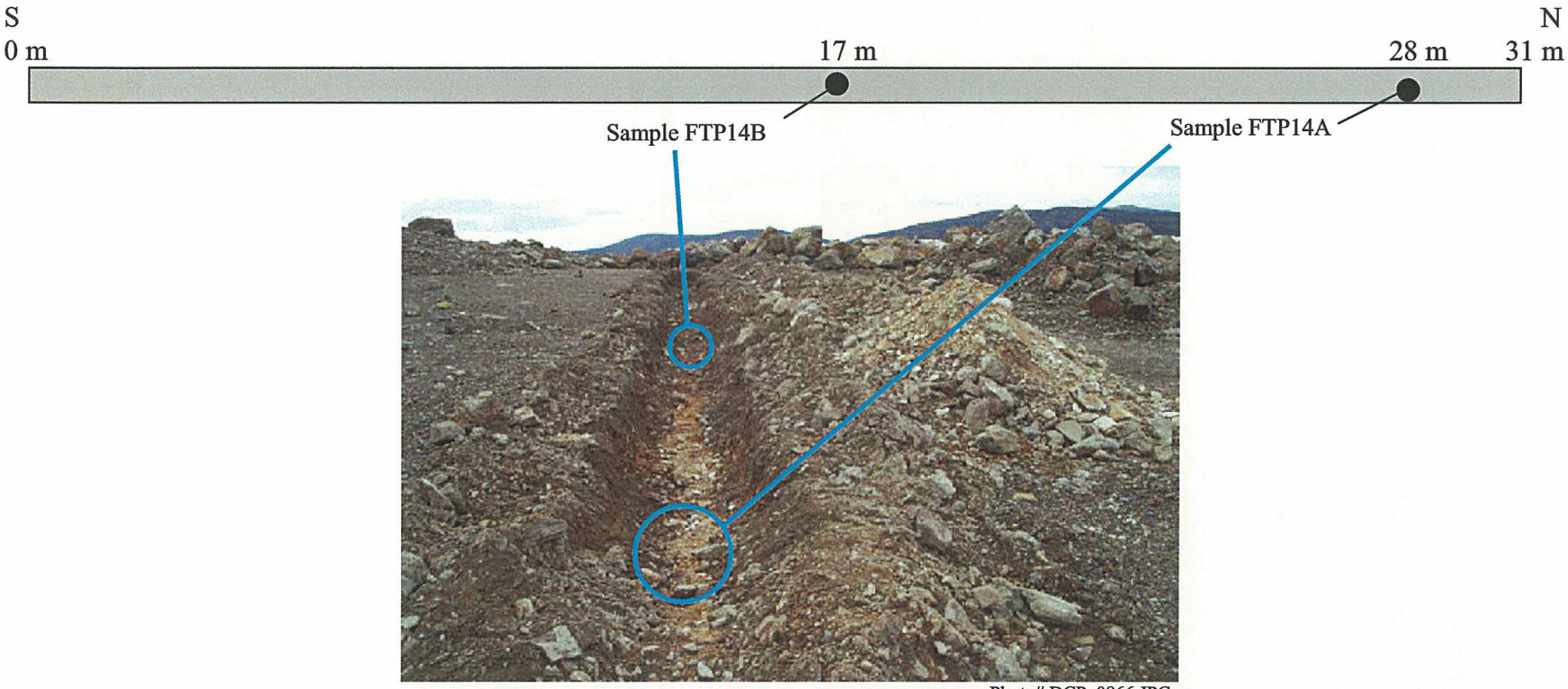
Sample FTP13A

Description:
Pale greenish grey calc-silicate fragments with pale olive brown highly calcareous fines to base of pit; minor porphyry fragments throughout.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP13A	70819	200

FTP14 (Zone II East)



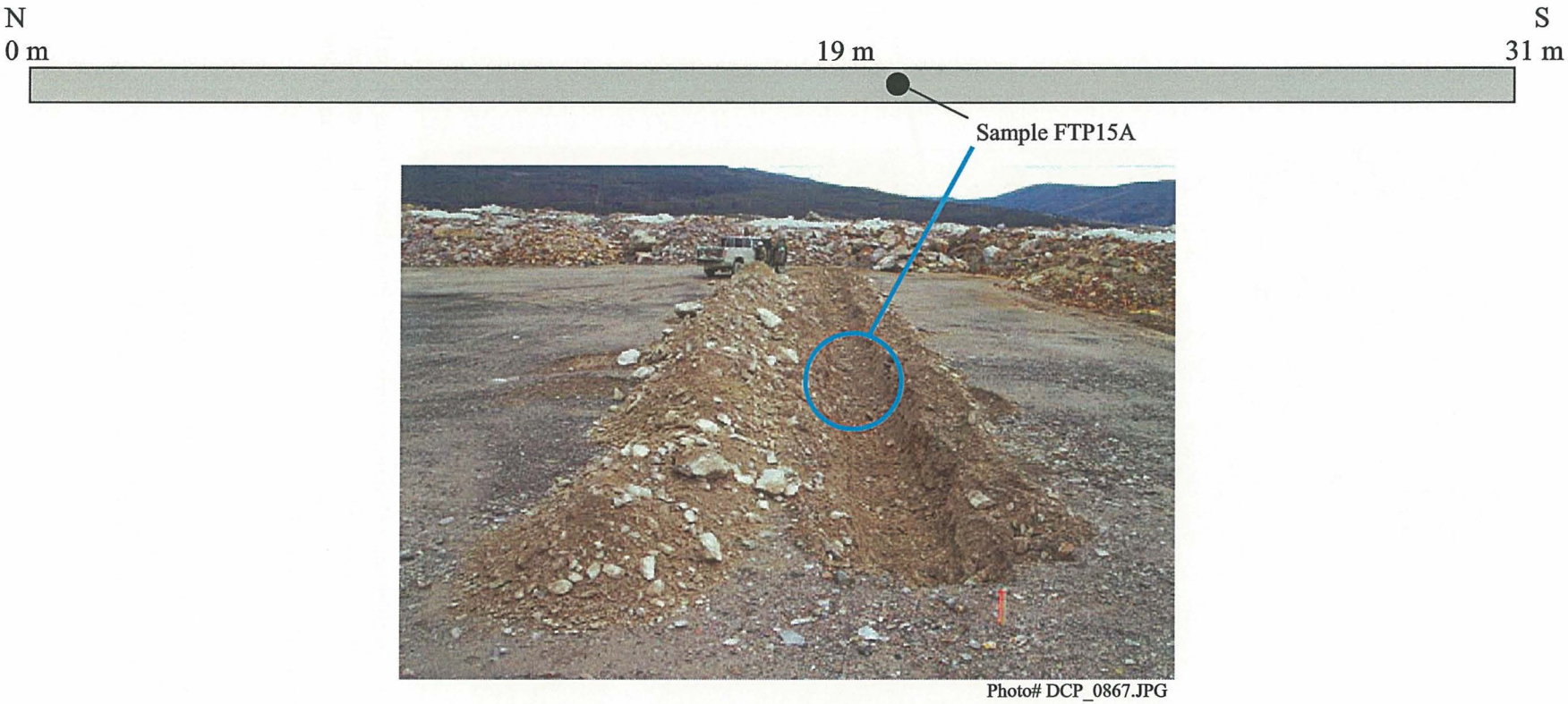
Photo# DCP_0866.JPG

Description:
Trench- azimuth 347. South end of trench is excavated in med grey to medium olive grey calc-silicate with medium greenish grey highly calcareous fines. At 20 m fines transition to grey brown in color. From 28 to 30 m, calc silicate waste overlies a pale grey mix of quartz porphyry, altered sericite schist and greenish grey biotite muscovite quartz schist with pale beige non-calcareous fines

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP14A	70820	17
FTP14B	70821	28

FTP15 (Zone II East)



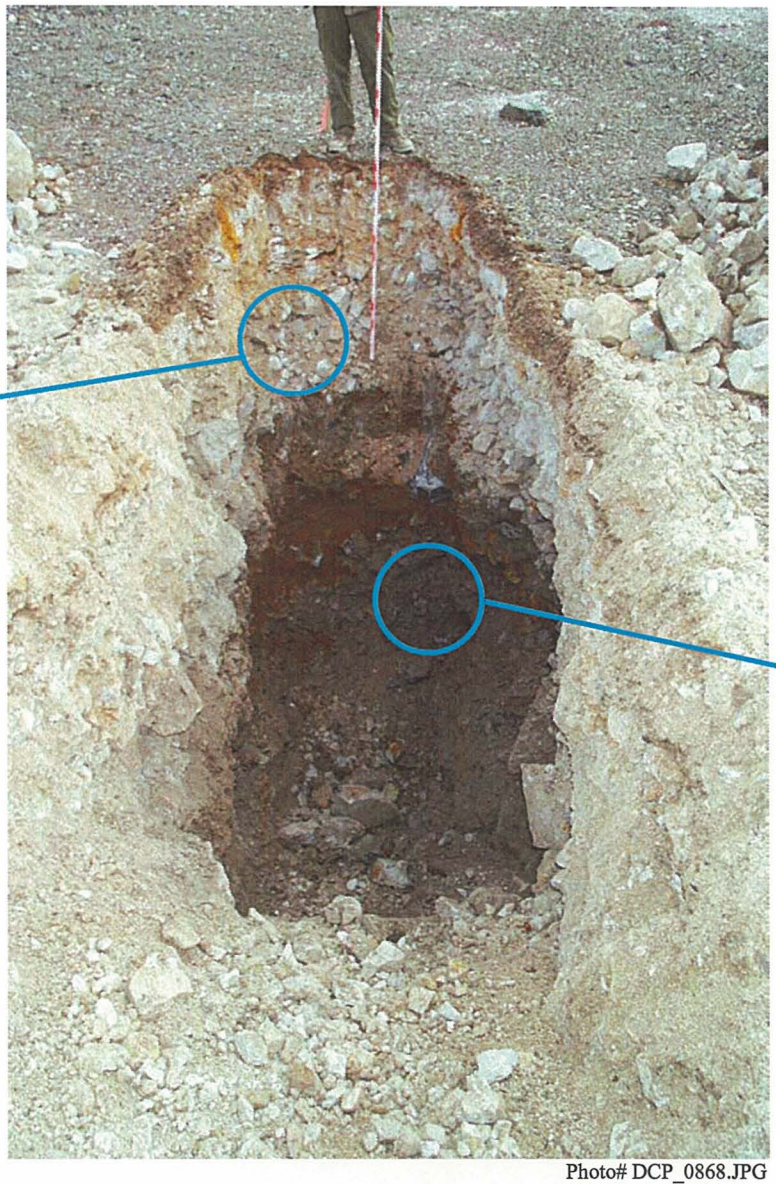
Photo# DCP_0867.JPG

Description:
Trench- azimuth 146. Entire trench is excavated in pale grey-brown to beige biotite muscovite quartz schist with non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Distance from N (m)
FTP15A	70822	19

FTP16 (Zone II East)



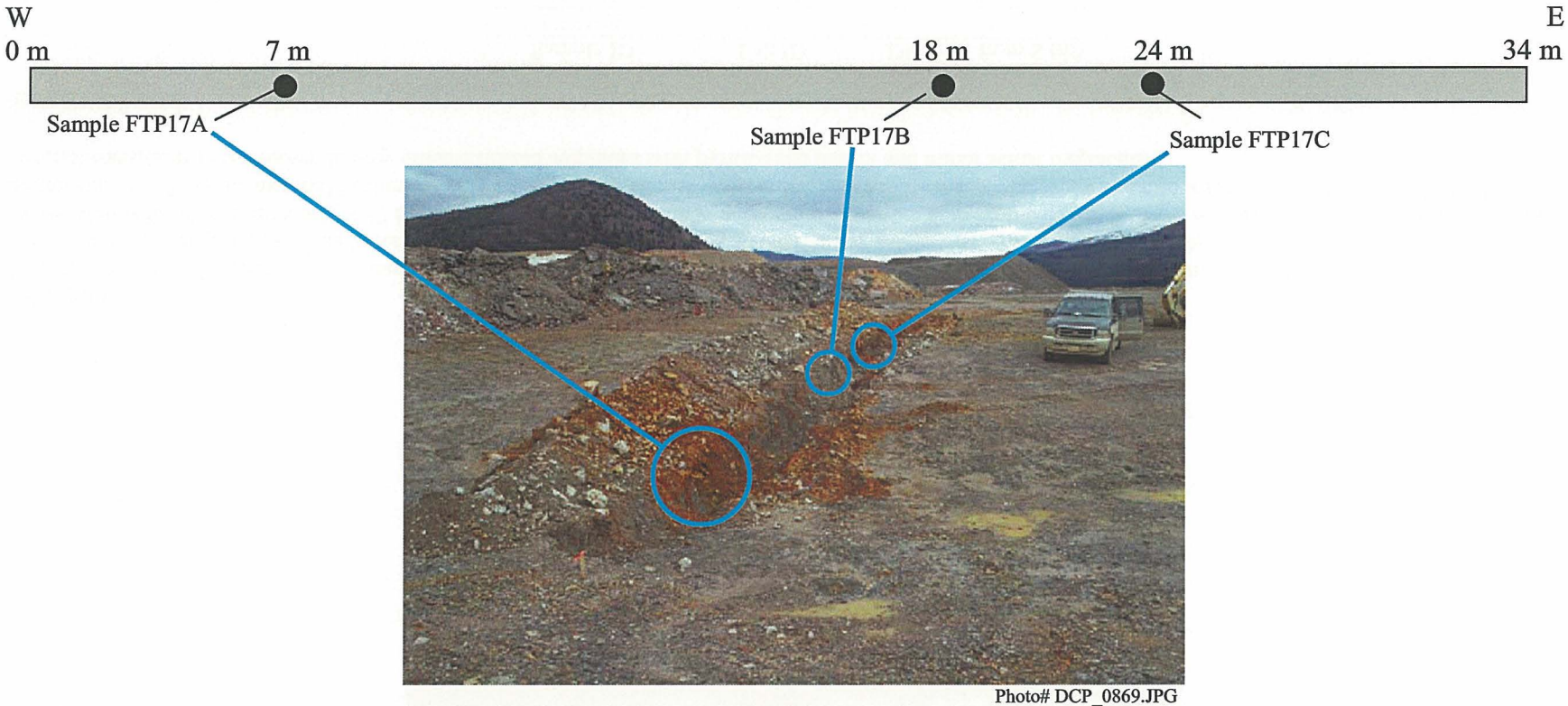
Photo# DCP_0868.JPG

Description:
Smoky quartz porphyry with beige granular non-calcareous matrix overlying a discontinuous 50 cm layer of olive brown till, which in turn overlies a discontinuous clay rich oxide zone. The lowest exposed horizon consists of greenish grey andalusite biotite muscovite schist with rare calc-silicate and schist fragments in a medium grey brown non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP16A	70823	100-120
FTP16B	70824	200-300

FTP17 (Intermediate Dump)



Photo# DCP_0869.JPG

Description:
Trench- azimuth 080. West end of trench is excavated in pale to medium greenish grey biotite muscovite schist, minor calc-silicate, biotite quartz porphyry and massive pyrite, in a matrix of talcose non-calcareous fines; this material has occasional oxidized zones (sample FTP17A) which are more frequent to the west. At 24 m material grades to an oxidized zone of biotite quartz feldspar porphyry with minor calc-silicate, biotite muscovite schist and pyrite fragments; the oxidized zones decrease in frequency to the east, disappearing completely at ~30 m.

Samples collected:

Sample ID	Lab ID	Distance from W (m)
FTP17A	70825	7
FTP17B	70826	18
FTP17C	70827	24

FTP18 (Intermediate Dump)



Photo# DCP_0870.JPG

Description:

Trench- azimuth 337. South end of trench is excavated in medium greenish grey calc-silicate, schist and biotite quartz feldspar porphyry. At 10 m there is a sharp transition to dark grey to green sulphides, with a high percentage of pyrite, sphalerite and galena. At ~13 m material transitions to medium brown mixed overburden with schist fragments; at 17 m the material changes to pale grey brown overburden with biotite quartz feldspar porphyry and schist and minor oxidized fragments. At ~20 m the material becomes a pale greenish grey talcose overburden with biotite muscovite schist and minor ferricrete nodules. At 29 m the material transitions to red brown to grey green oxidized sulphides with pyritic sand matrix and minor schist fragments.

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP18A	70853	11
FTP18B	70854	29

FTP19 (Intermediate Dump)



Photo# DCP_0871.JPG

Sample FTP19B

Description:
A discontinuous orange brown oxide layer caps a horizon of greenish grey weakly calcareous biotite quartz feldspar porphyry with lesser medium grey green schist and calc-silicate with weakly calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP19A	70855	200-230

FTP20 (Intermediate Dump)



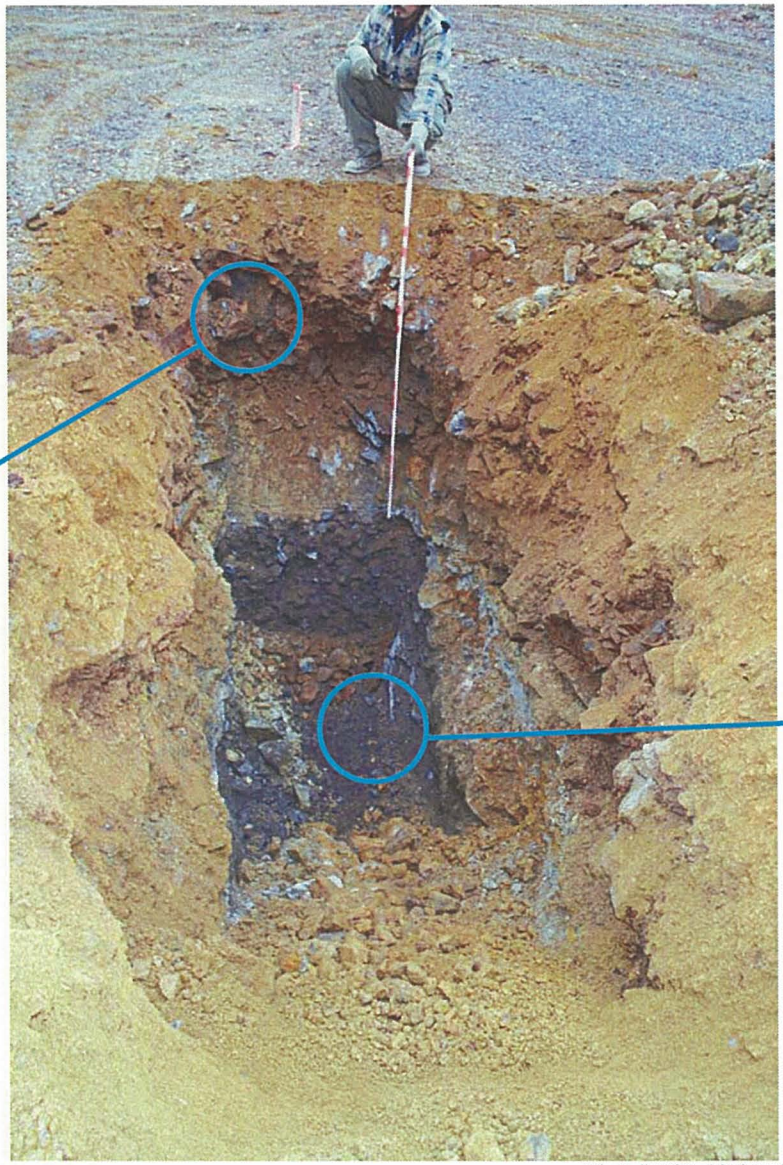
Photo# DCP_0872.JPG

Description:
Medium grey green calc silicate with minor 1D schist. From 300 cm on, material is darker in color. Matrix is clay rich and highly calcareous.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP20A	70856	400-450

FTP21 (Intermediate Dump)



Photo# DCP_0873.JPG

Description:
1.8 m of massive and disseminated pyrite with minor sphalerite and galena, yellow brown at surface, grading through red brown to grey green at depth; fines are non-calcareous. Underlain by dark grey pyritic sand and massive and siliceous pyrite fragments.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP21A	70857	75-100
FTP21B	70858	200-260

FTP22 (Low Grade Stockpile C)



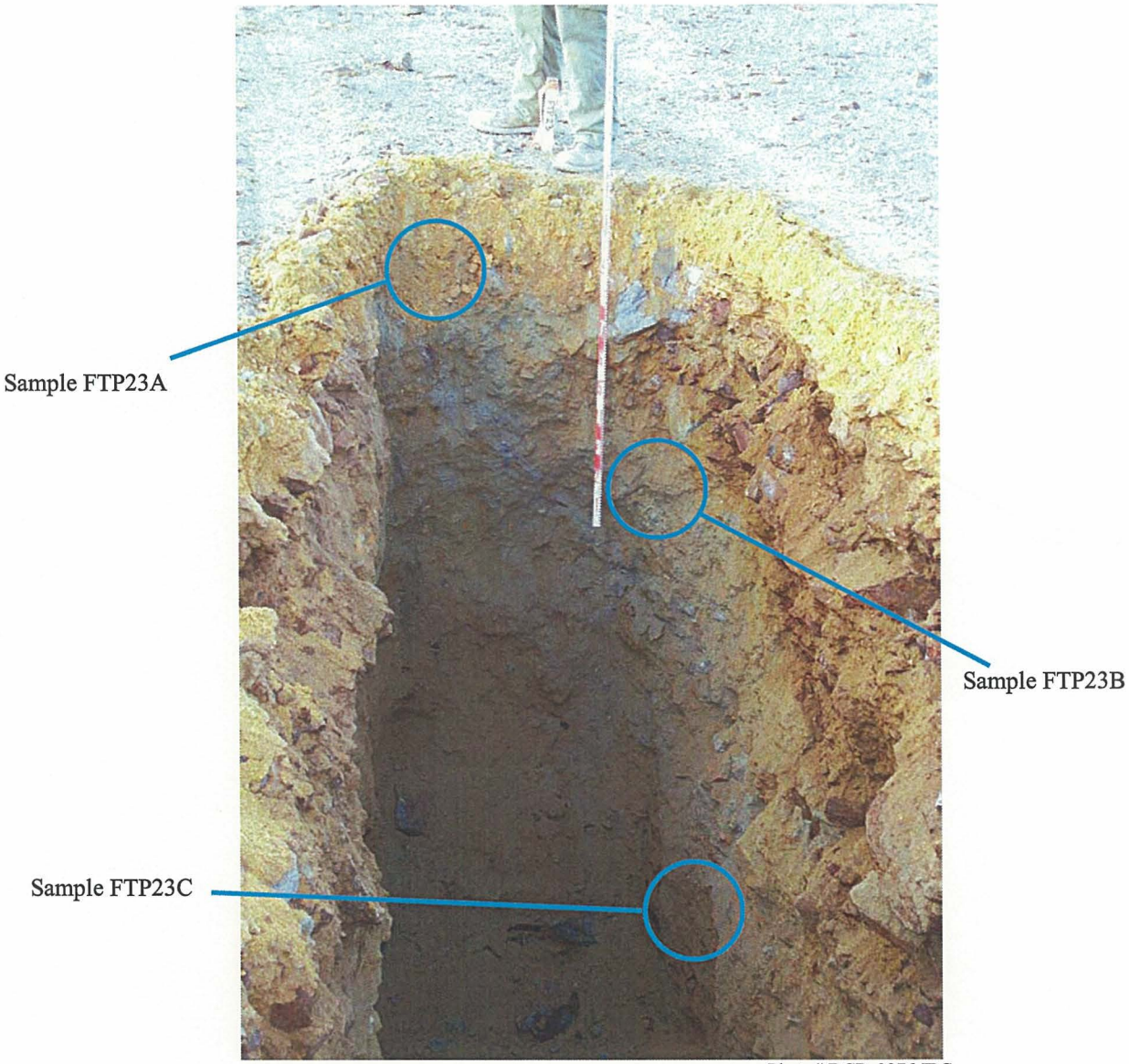
Photo# DCP_0874.JPG

Description:
Discontinuous surface layer of pale red brown oxidized disseminated, massive and banded siliceous pyrite fragments (sample FTP20A) overlies a discontinuous layer of med grey pyritic sand. This overlies a continuous layer of red brown oxidized waste consisting of mixed dark grey pyritic phyllite and pyrite fragments. The basal horizon consists of a non-calcareous orange brown matrix containing dark grey pyritic siliceous phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP22A	70859	30
FTP22B	70860	200

FTP23 (Low Grade Stockpile A)



Photo# DCP_0876.JPG

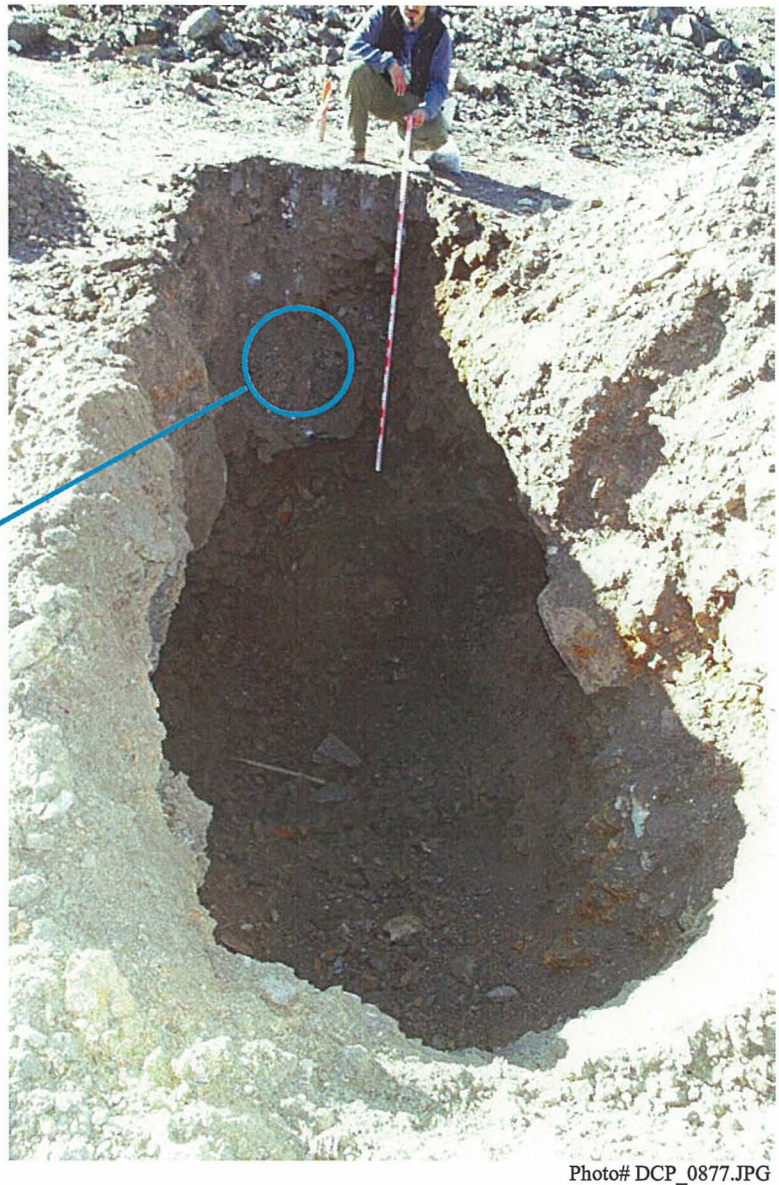
Description:

80 cm of dark red brown sulphide waste (50% massive pyrite fragments) with non-calcareous fines overlies 130 cm of pale grey brown sulphide waste: mainly pyritic massive sulphides with less than 10% sphalerite and galena and occasional pyrrhotite in a matrix of non-calcareous fines. Lowest exposed material is pale orange brown pyritic sand with rare schist and siliceous fragments; fines are non-calcareous.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP23A	70861	50-100
FTP23B	70862	150-200
FTP23C	70863	300-320

FTP24 (Main Dump East)



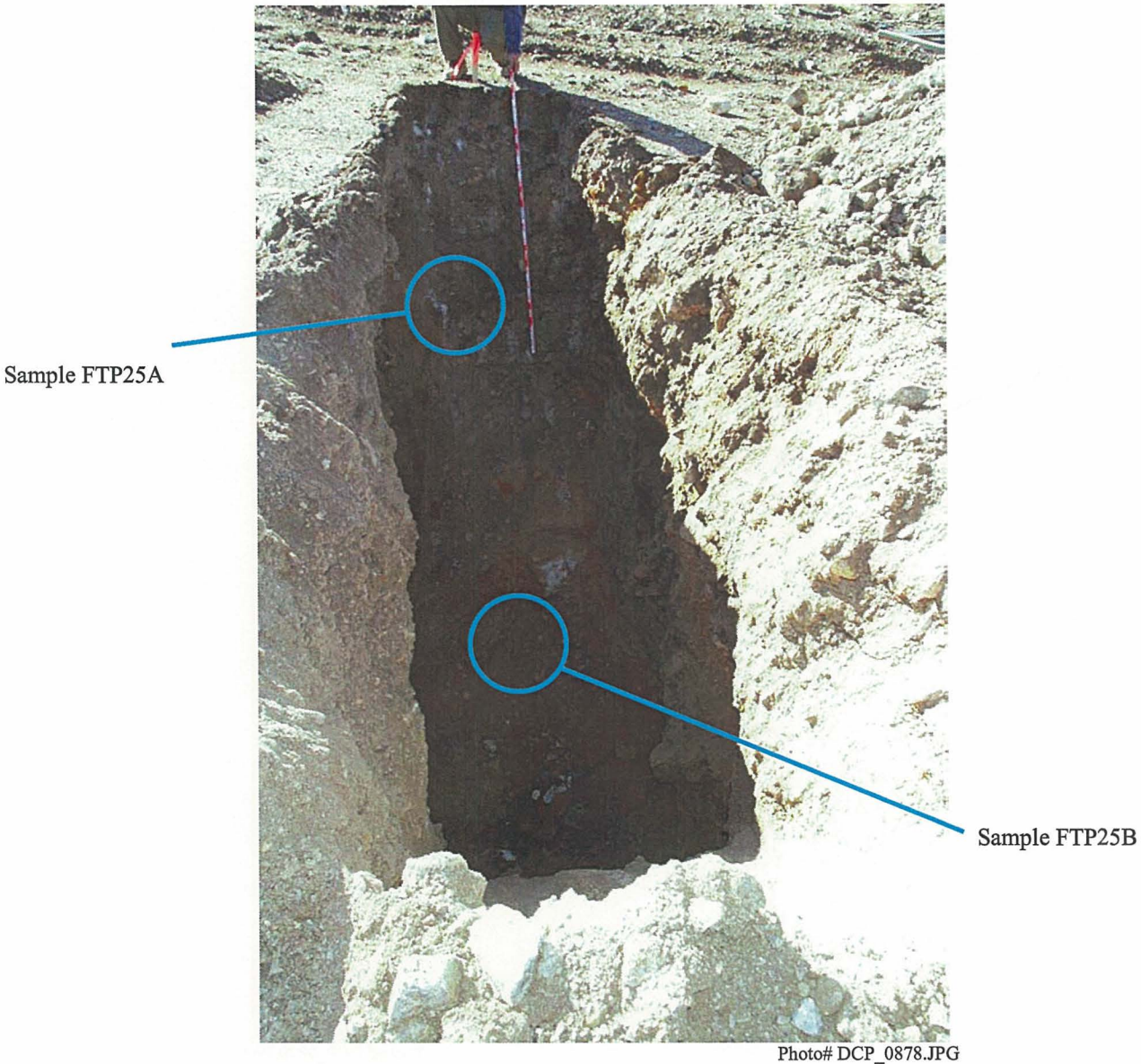
Photo# DCP_0877.JPG

Description:
Pale olive grey mix of biotite muscovite schist and calc-silicate in a pale grey brown non-calcareous matrix of sandy talcose fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP24A	70864	100-200

FTP25 (Main Dump East)



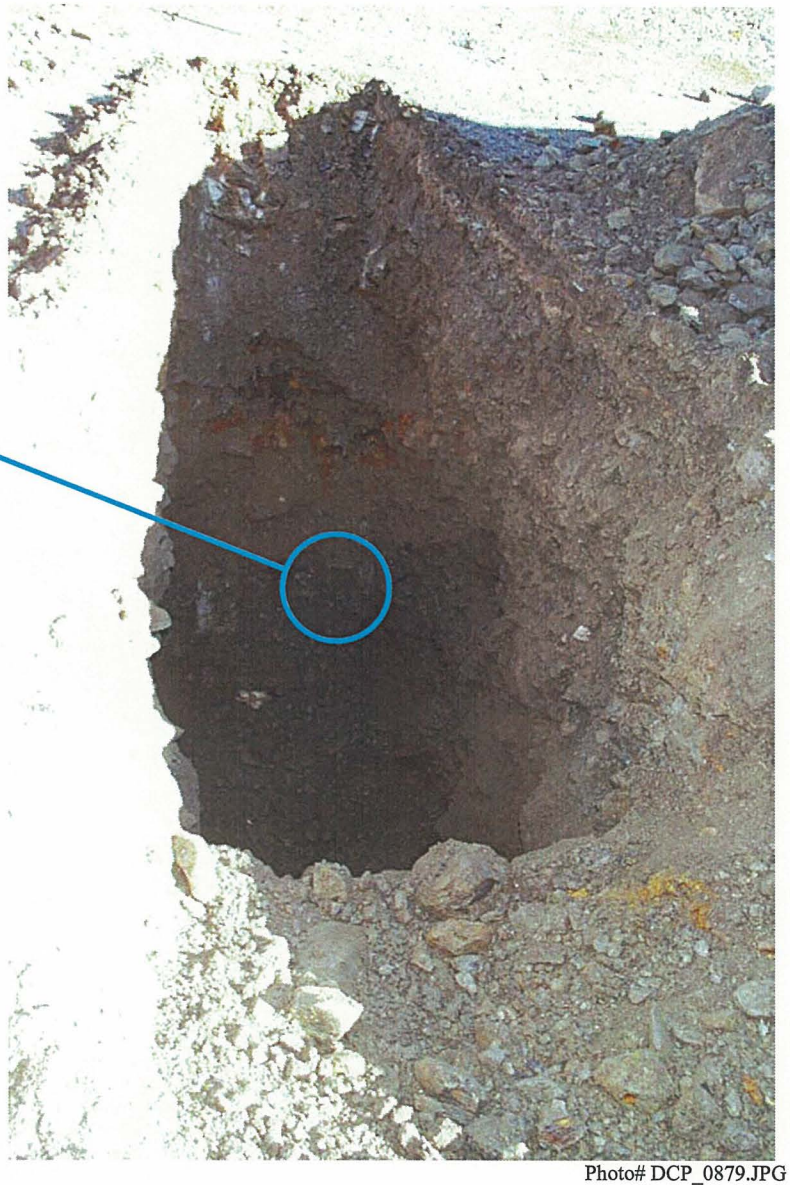
Photo# DCP_0878.JPG

Description:
Pale greenish grey highly calcareous granular fines containing calc-silicate fragments and rare schist and biotite quartz feldspar porphyry overlies a pale grey to beige mixed horizon with highly calcareous granular fines containing talcose quartz sericite schist, biotite muscovite schist, pyritic banded quartz schist +/- sphalerite and galena and hornblende biotite quartz porphyry.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP25A	70865	150
FTP25B	70866	300-400

FTP26 (Main Dump East)



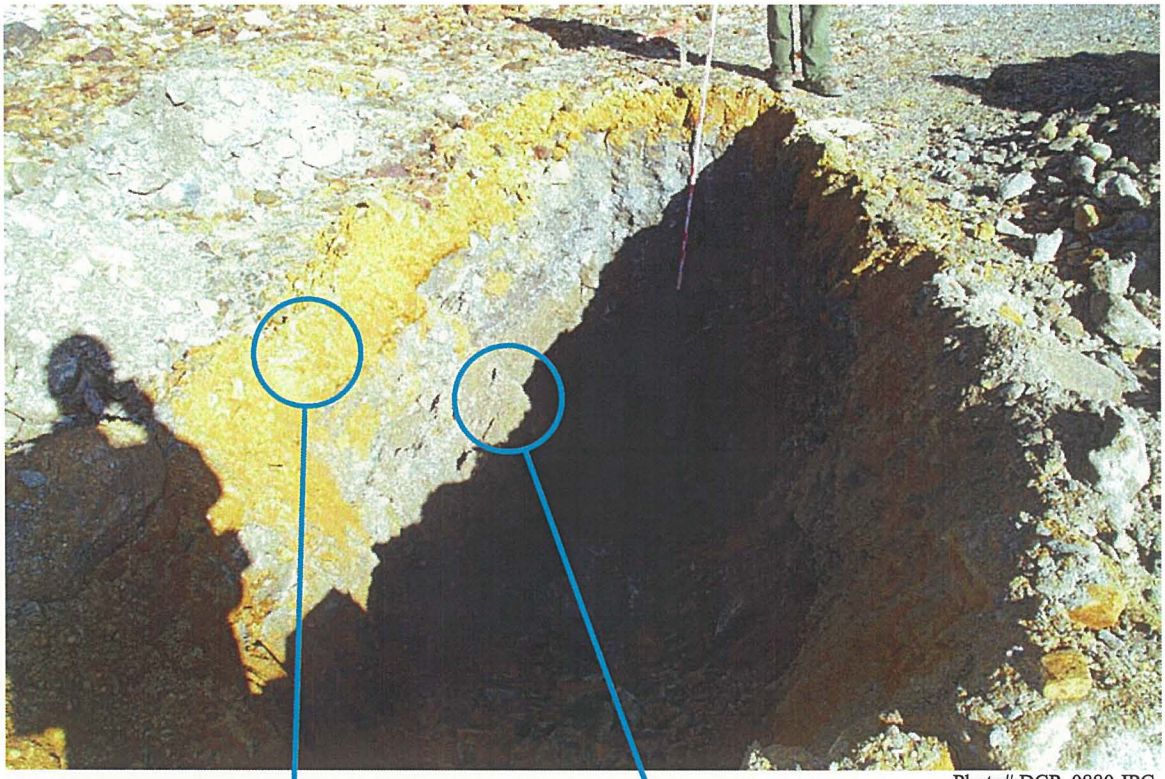
Photo# DCP_0879.JPG

Description:
Pale greenish biotite muscovite andalusite schist, biotite muscovite quartz schist and quartz fragments in a pale greenish grey granular calcareous matrix. A narrow wedge of oxidized biotite muscovite schist occurs at 1 m.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP26A	70867	200-300

FTP27 (Main Dump East)



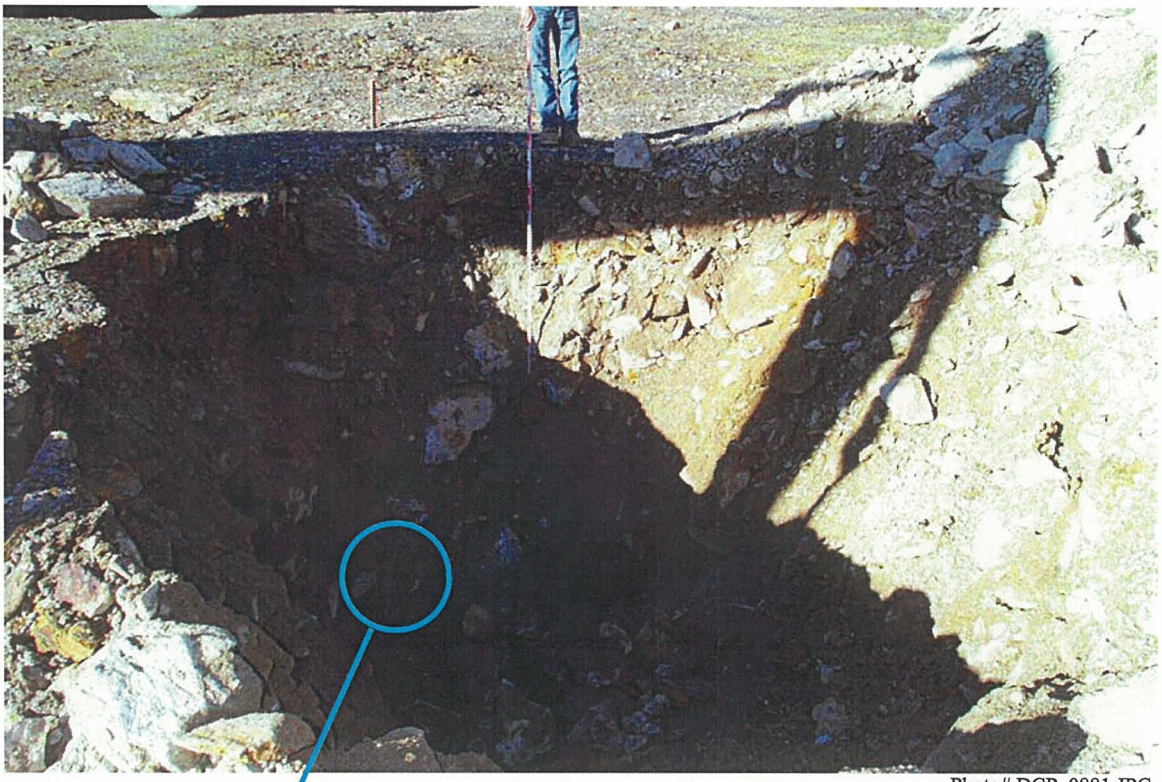
Photo# DCP_0880.JPG

Description:
20 cm of red brown oxidized non-calcareous sandy fines containing calc-silicate fragments with lesser quartz porphyry and fine grained massive pyrite fragments overlies 40 cm of medium grey sandy fines containing biotite muscovite quartz schist and minor dark grey siliceous pyritic phyllite. Basal horizon is pale olive brown to beige calcareous fines containing medium greenish grey biotite muscovite chlorite schist, pyritic quartz phyllite and minor massive pyrite fragments.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP27A	70868	0-20
FTP27B	70869	100-200

FTP28 (Main Dump East)



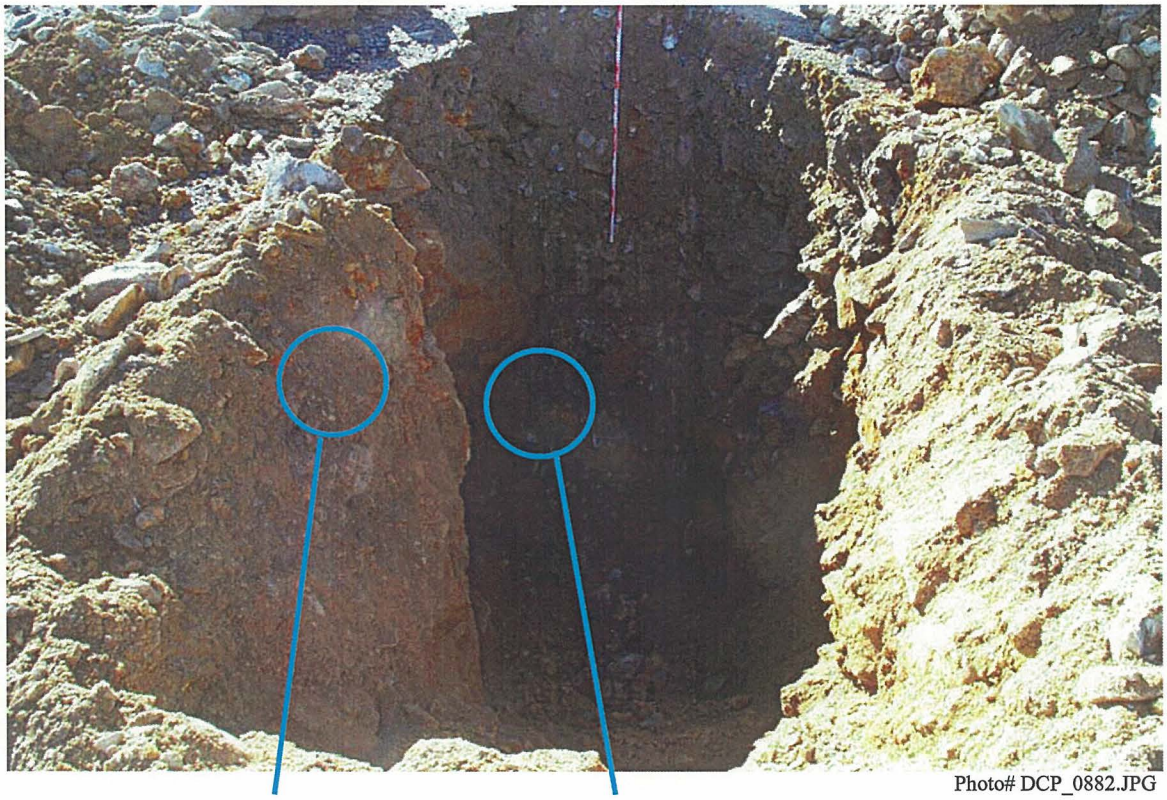
Photo# DCP_0881.JPG

Description:
Pale greenish grey sandy matrix containing quartz sericite schist (75%), quartz porphyry (20%) and massive and disseminated fine grained pyrite and pyritic quartzite (5%).

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP28A	70870	200-300

FTP29 (Main Dump East)



Photo# DCP_0882.JPG

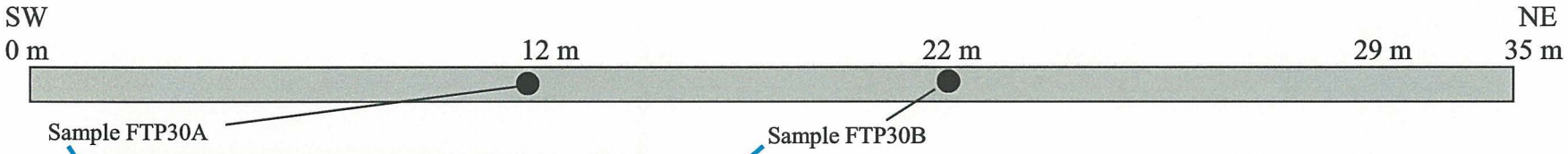
Sample FTP29A Sample FTP29B

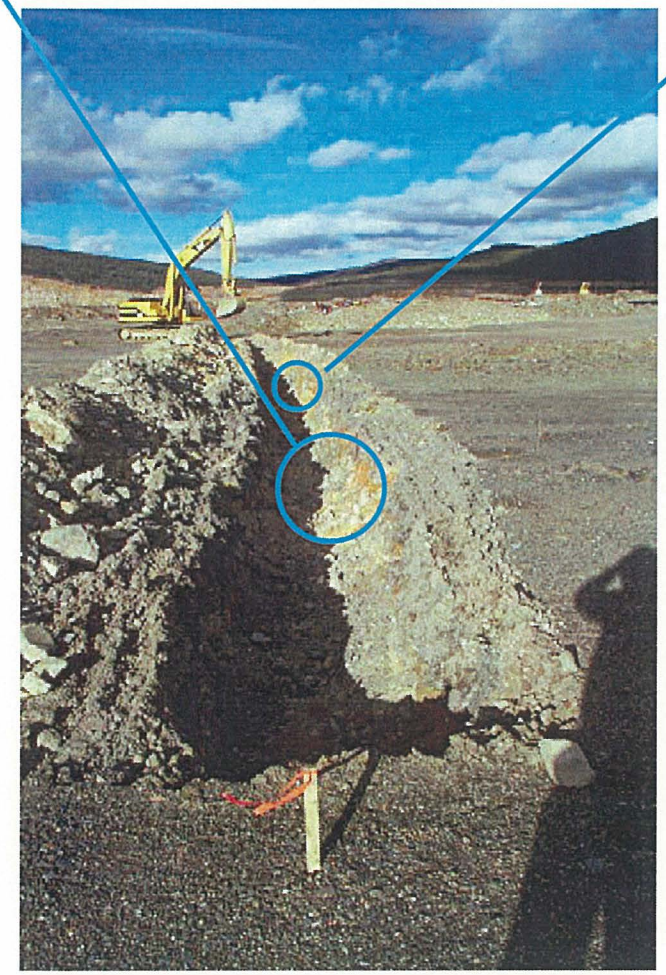
Description:
Pale grey brown non-calcareous granular micaceous fines containing medium grey crenulated talcose schist and minor quartz sericite schist overlying a medium orange brown horizon containing medium grey muscovite talc schist and quartz sericite schist with minor pyrite in an oxidized granular non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP29A	70871	50-100
FTP29B	70872	300-350

FTP30 (Main Dump East)





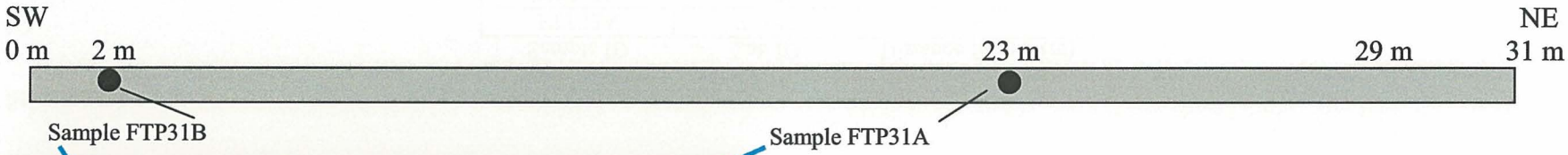
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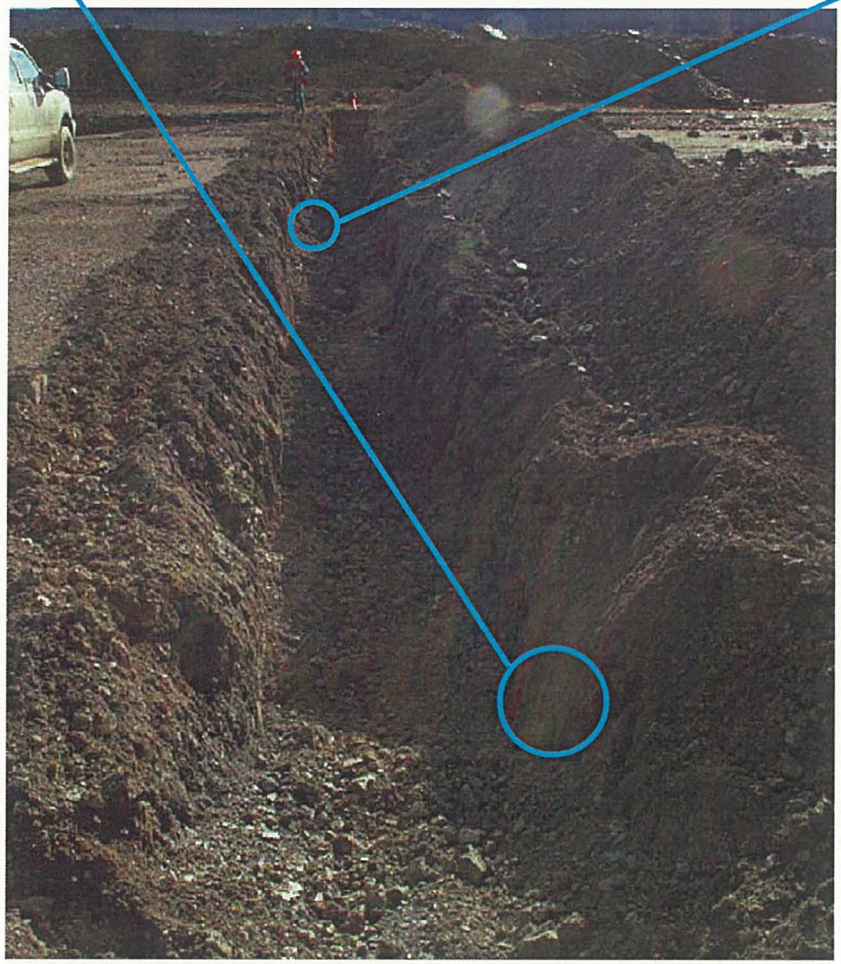
Description:
Trench- azimuth 030. Southwest end of trench is excavated in pale orange brown material consisting of quartz sericite schist, medium grey talcose schist, massive sphalerite + pyrite, and biotite muscovite quartz schist in a granular non-calcareous matrix (herein referred to as Unit 1). At 7 m, material transitions to a pale greenish grey material consisting of hornblende biotite quartz porphyry, dark grey phyllite and graphitic phyllite and biotite muscovite quartz schist in a matrix of pale grey granular fines (herein referred to as Unit 2). Material transitions to Unit 1 at ~17 m, to Unit 2 at ~25 m, and to Unit 1 again at ~27 m.

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP30A	70873	12
FTP30B	70874	22

FTP31 (Main Dump East)





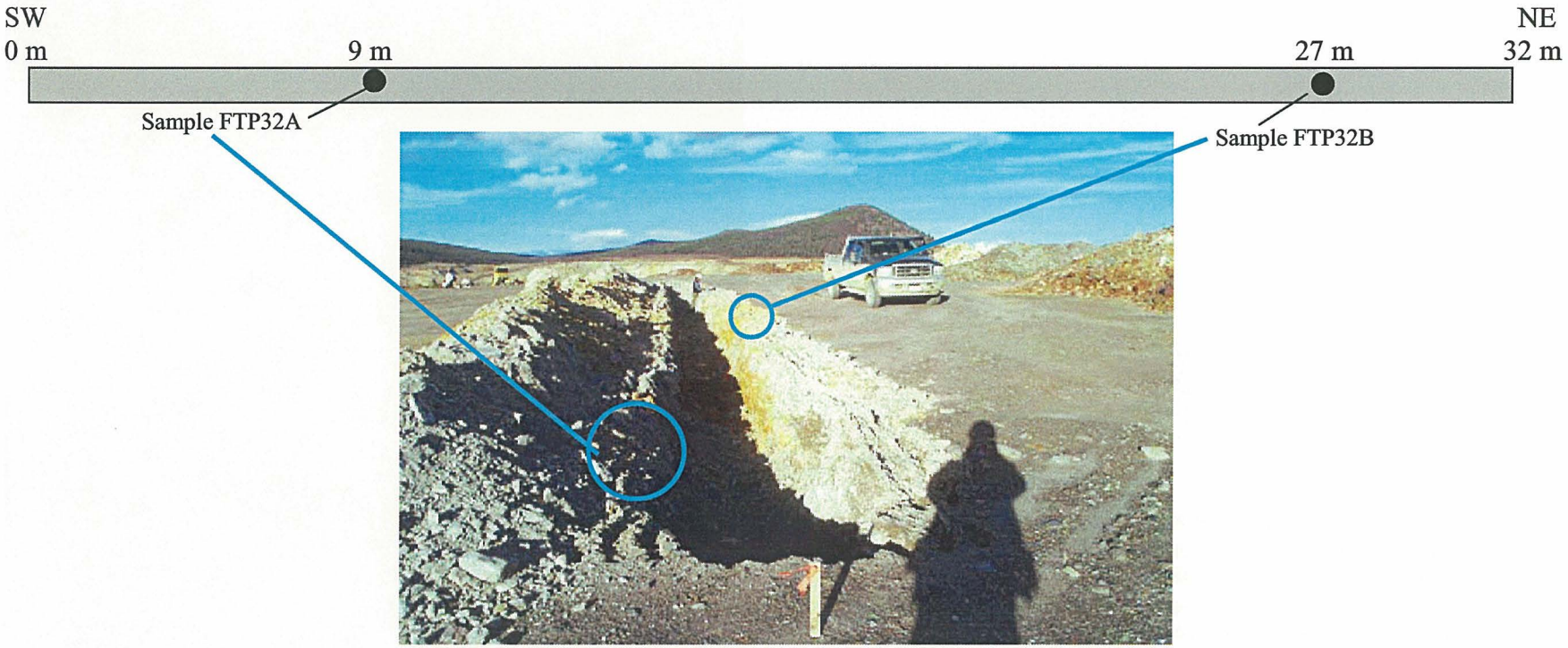
Photo# DCP_0884.JPG

Description:
Trench- azimuth 030. Southwest end of trench is excavated in pale orange brown 100% oxidized quartz porphyry with pale brown granular calcareous fines . At 3 m this material transitions to a pale brown to beige mix of oxidized quartz porphyry, hornblende biotite porphyry and minor calc-silicate. At ~7 m, the material changes to a pale greenish grey unit of calc-silicate, green grey hornblende biotite quartz porphyry and dark grey crenulated phyllite in a matrix of pale greenish grey highly calcareous fines.

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP31A	70875	2
FTP31B	70876	23

FTP32 (Main Dump East)



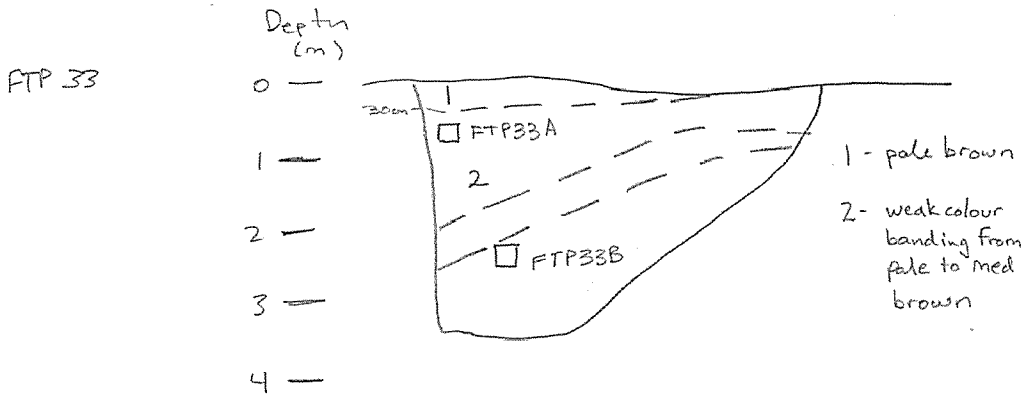
Photo# DCP_0885.JPG

Description:
Trench- azimuth 036. Southwest end of trench is excavated in pale orange brown pyritic quartz sericite schist. At 2m, material changes to pale grey biotite muscovite quartz schist and minor banded quartz + pyrite + sphalerite + galena; at 7 m, material change to an oxidized 1D schist with abundant ferricrete. At 13 m the material changes to a pale brown to beige oxidized talcose pyritic schist. At 25 m the material transitions to a medium grey biotite muscovite schist with minor dark green feldspar porphyry with granular weakly calcareous fines.

Samples collected:

Sample ID	Lab ID	Distance from S (m)
FTP32A	70877	9
FTP32B	70878	27

FTP33 (North West upper)



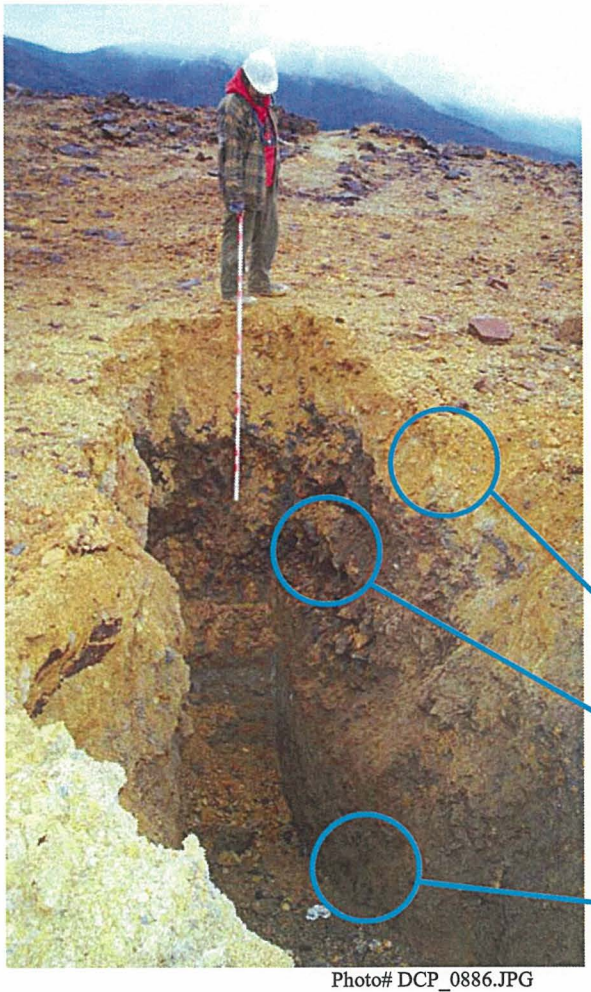
No photo available

Description:
Pale brown horizon with discontinuous patchy orange brown oxide and white salts overlying pale to medium brown sandy non-calcareous fines containing fragments of hornblende biotite granodiorite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP33A	70879	50-100
FTP33B	70880	200-300

FTP34 (North West upper- stockpile)



Photo# DCP_0886.JPG

Description:
60 cm of pale orange to yellow brown non-calcareous clay fines containing minor siliceous phyllite and sulphide fragments overlying 130 cm of grey brown non-calcareous matrix containing sphalerite and galena with pyrite as well as massive pyrrhotite and massive sphalerite. The basal unit consists of weathered hornblende biotite quartz granodiorite in a matrix of brown non-calcareous granular fines.

Samples collected:

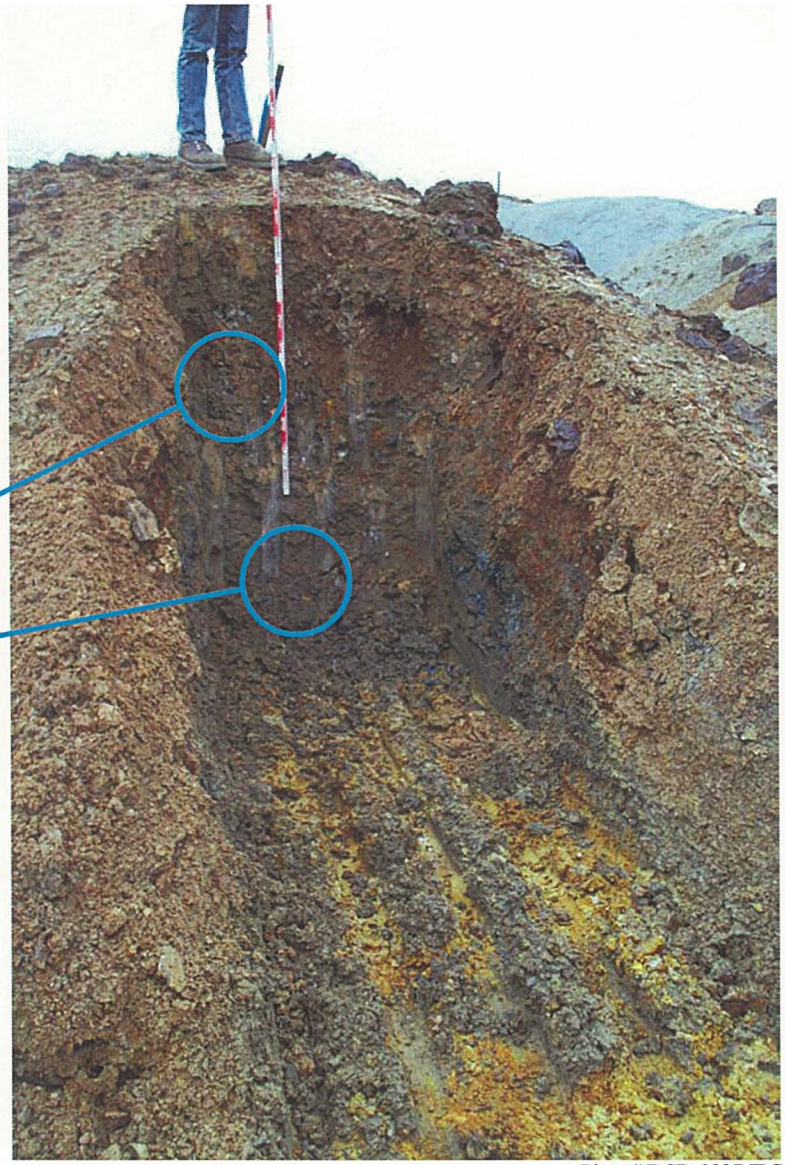
Sample ID	Lab ID	Depth (cm)
FTP34A	70881	30-60
FTP34B	70882	150
FTP34C	70883	250

Sample FTP34A

Sample FTP34B

Sample FTP34C

FTP35 (North West upper- stockpile)



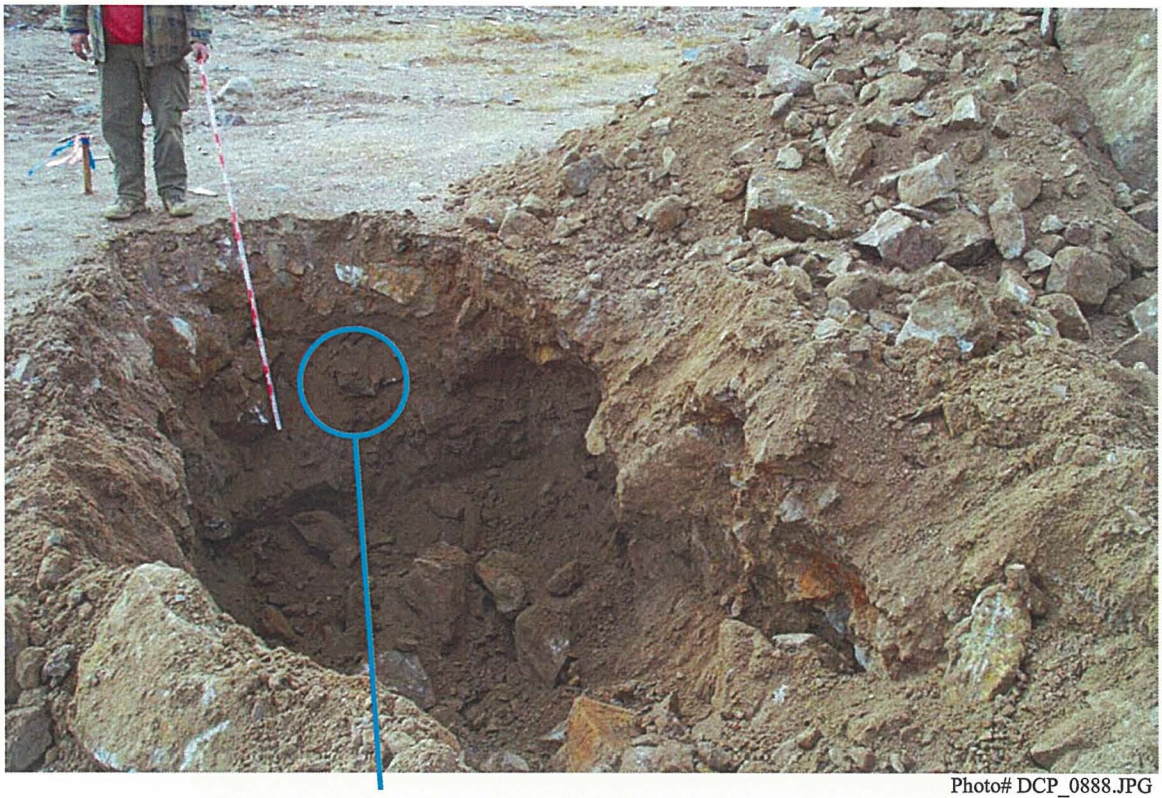
Photo# DCP_0887.JPG

Description:
Pale brown clay rich waste containing 20-30% fine grained massive pyrite fragments, pyritic sand, and blocky siliceous disseminated pyrite with sphalerite and galena overlying a medium to red brown horizon of banded siliceous pyrite with sphalerite and galena, and disintegrating fine grained massive pyrite fragments in a matrix of pale yellow brown non-calcareous fines with pale green salt crystals in void spaces. Basal horizon is med grey sulphide waste containing pyrite sand and angular sulphide fragments along with pale green salts in voids.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP35A	70884	30-50
FTP35B	70885	80-170

FTP36 (North West upper- stockpile)



Photo# DCP_0888.JPG

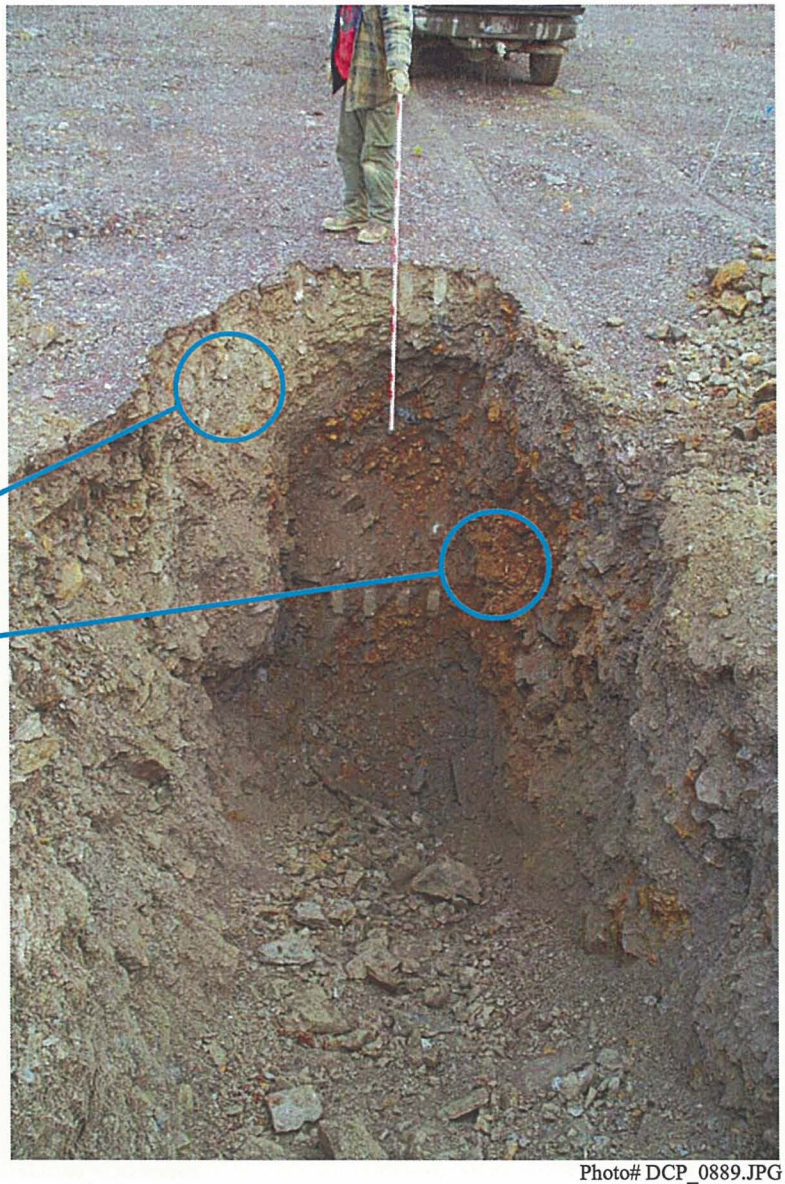
Sample FTP36A

Description:
Pale greenish grey biotite hornblende quartz granodiorite in a pale brown non-calcareous sandy quartzofeldspathic matrix; at 90 cm, matrix changes to pale brown.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP36A	70886	50-90

FTP37 (North West middle)



Photo# DCP_0889.JPG

Description:
Muscovite biotite quartz schist in a pale greenish grey weakly calcareous granular matrix overlying med grey biotite muscovite quartz schist, pyritic quartz sericite schist and talcose schist in a pale orange brown sandy matrix. Matrix transitions to pale gray at base of pit.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP37A	70887	50-100
FTP37B	70888	200

FTP38 (North West middle)



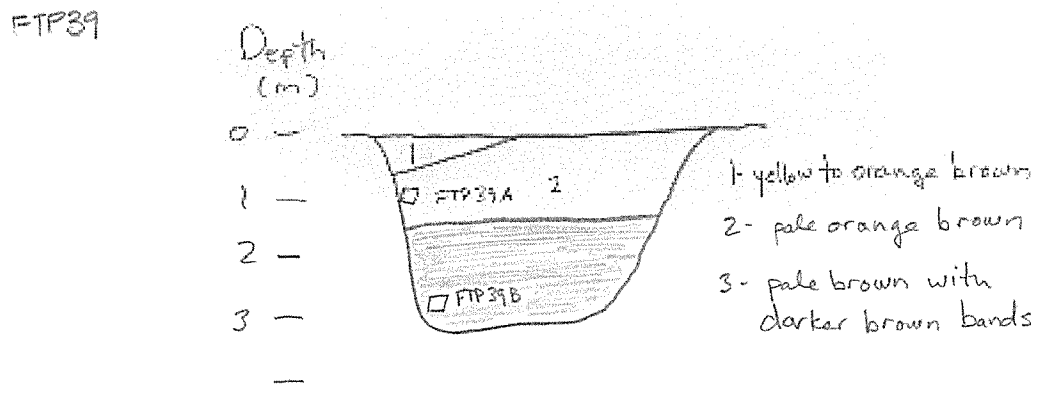
Photo# DCP_0890.JPG

Description:
Calc silicate with minor oxidized pyritic chloritic schist and amphibole schist in a matrix of pale olive brown calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP38A	70889	150

FTP39 (North West middle)



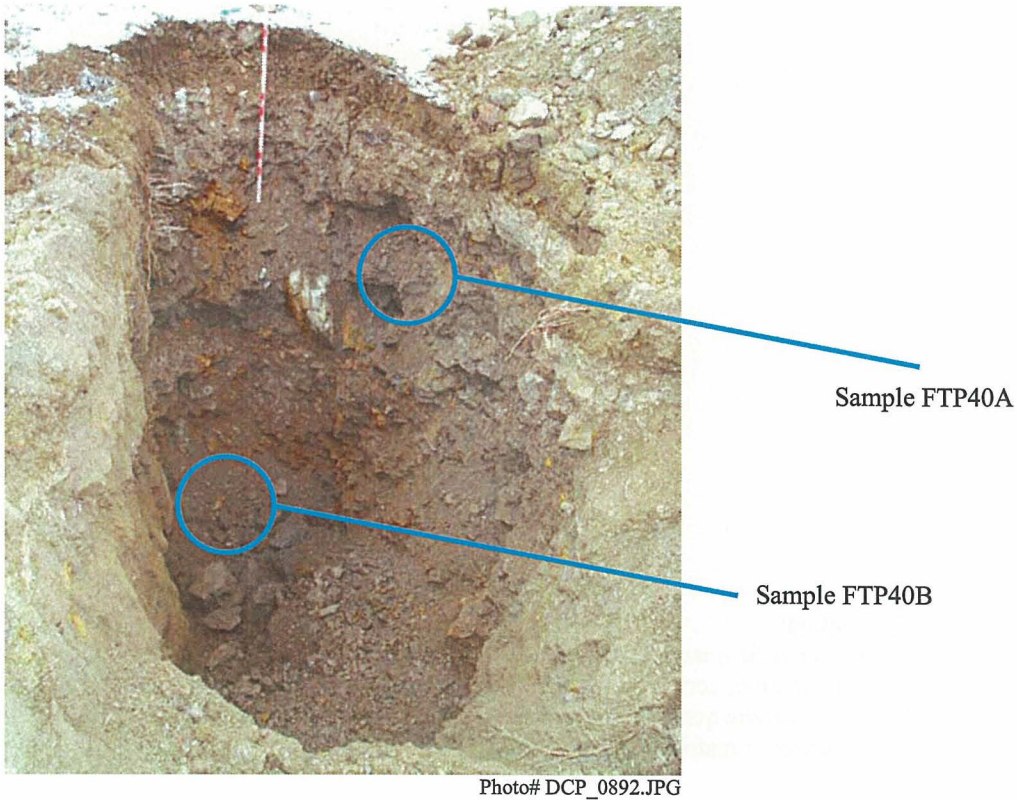
No photo available

Description:
Oxidized pyritic quartz schist traffic surface overlies pale orange brown oxidized biotite muscovite quartz schist with minor sericite schist in a pale brown non–calcareous matrix. The basal horizon consists of biotite muscovite quartz schist with minor sericite schist, talcose schist and chloritic schist in a pale brown non–calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP39A	70890	100
FTP39B	70891	200-300

FTP40 (North West middle)



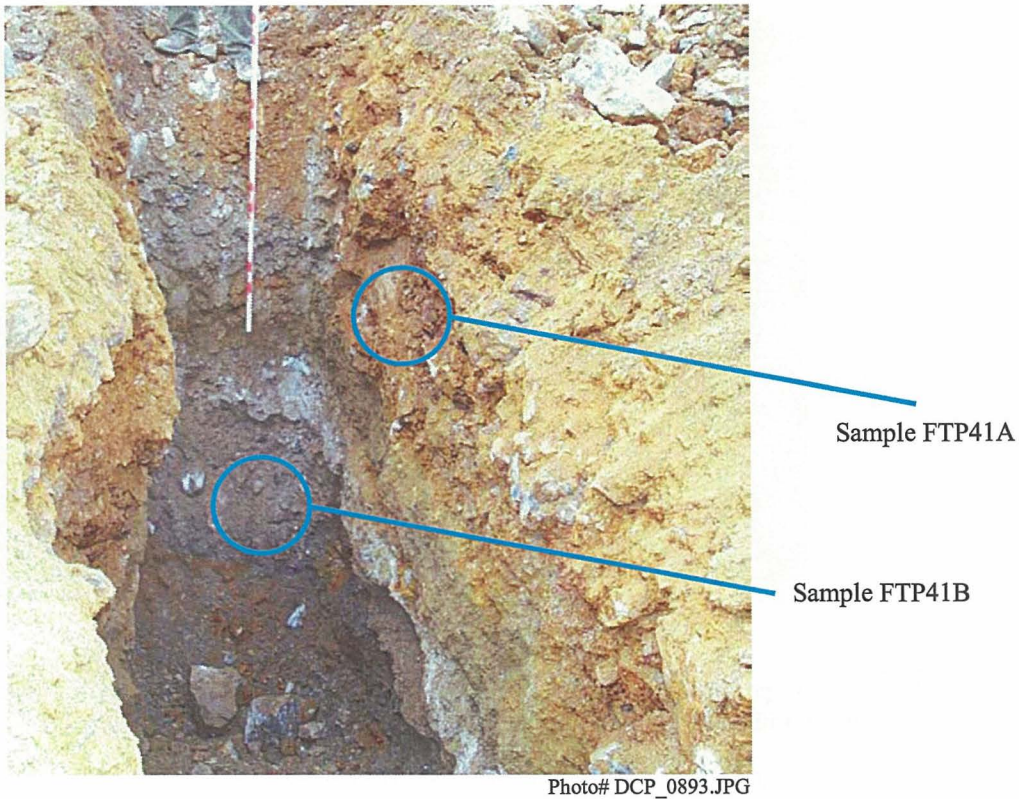
Photo# DCP_0892.JPG

Description:
35 cm traffic surface capping pale grey-brown to beige calc silicate fragments with a sandy clay matrix overlying an orange brown mixed horizon of calc-silicate schist, biotite muscovite schist and dark grey phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP40A	70892	100
FTP40B	70893	300

FTP41 (North West middle)



Photo# DCP_0893.JPG

Description:
Oxidized zone of quartz sericite schist with ferricrete overlying a medium brown oxidized overburden (till?) overlying a pale grey to beige horizon of mixed biotite muscovite schist, quartz sericite schist, biotite granodiorite and quartz.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP41A	70894	50-100
FTP41B	70895	250-300

FTP42

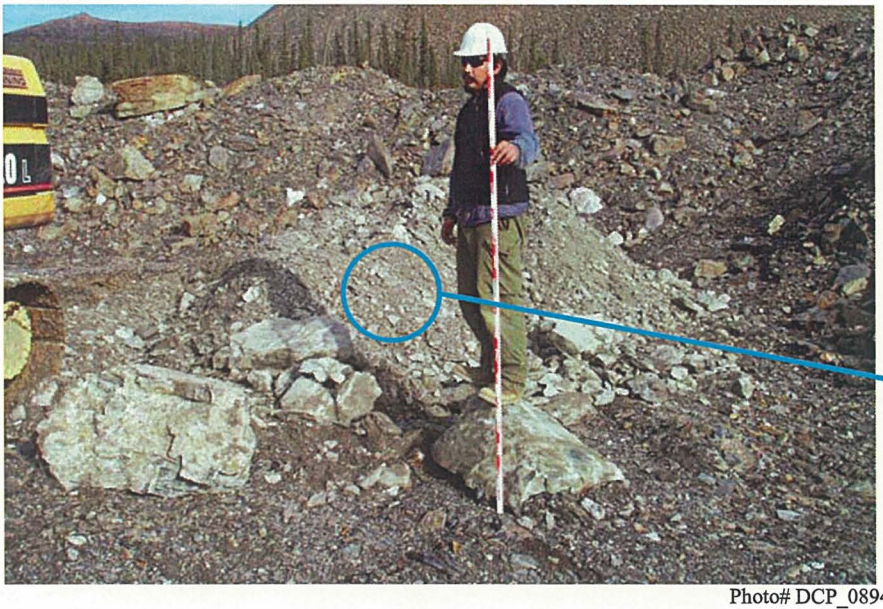
No photo taken.

Description:
Pale greenish grey calc silicate overlying mixed pale greenish grey and beige calc-silicate with pale brown calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP42A	70896	200

FTP43 (Upper parking lot)



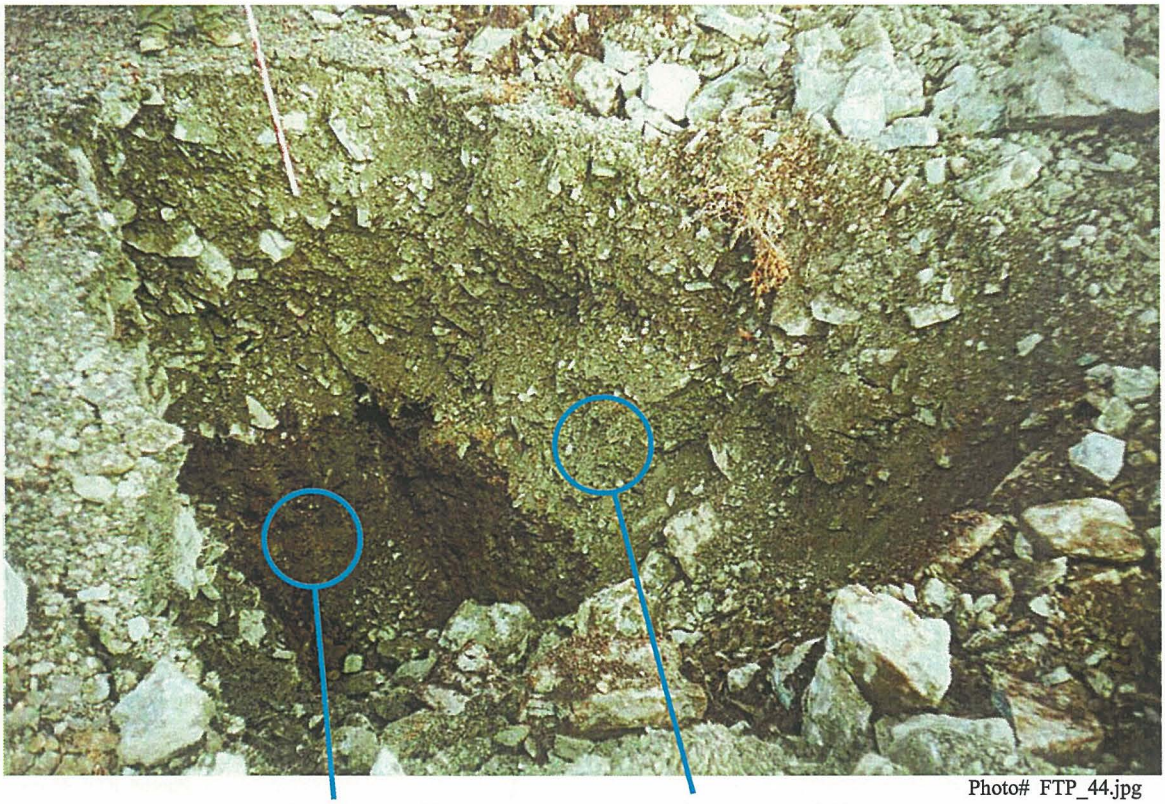
Photo# DCP_0894.JPG

Description:
Pale to medium greenish grey calc-silicate fragments with lesser biotite muscovite quartz schist and minor pale green chloritic schist. Fines are pale greenish grey and highly calcareous.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP43A	70897	200

FTP44 (Upper parking lot)



Photo# FTP_44.jpg

Sample FTP44B

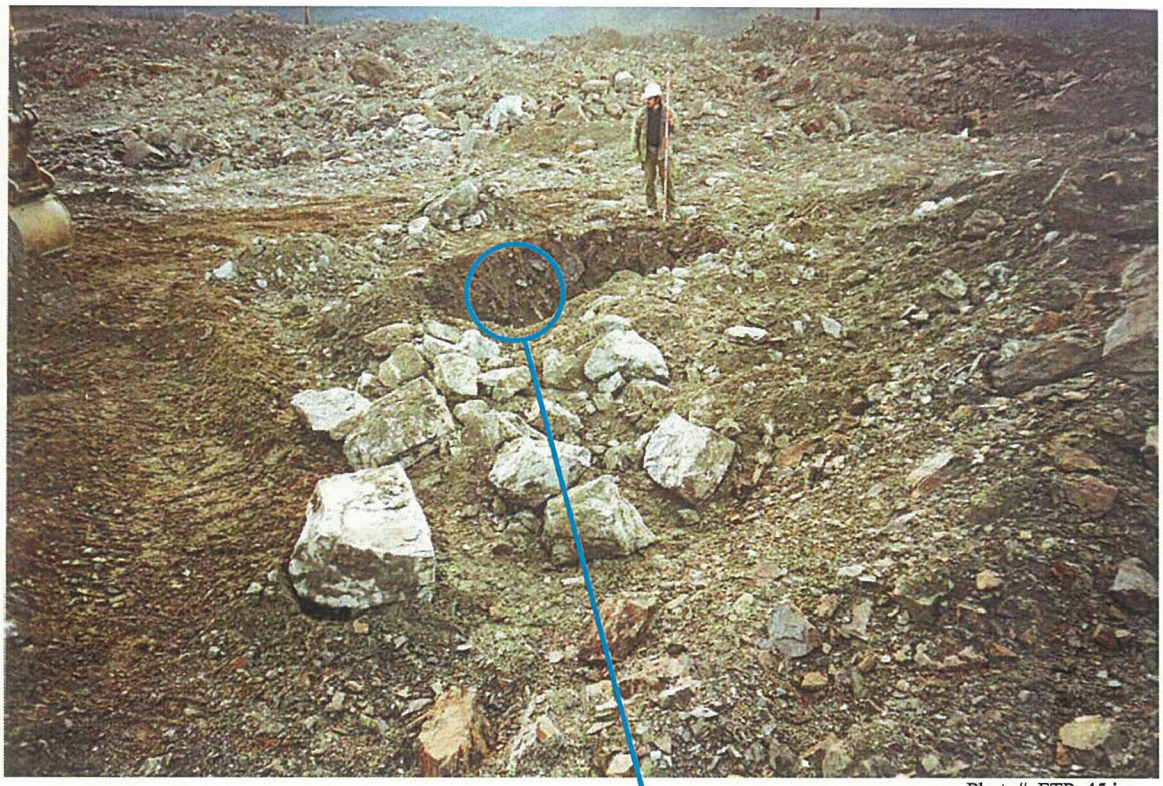
Sample FTP44A

Description:
120 cm of pale greenish grey calc-silicate with pale greenish grey highly calcareous fines overlies medium brown non-calcareous overburden with minor organics

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP44A	70898	100-150
FTP44B	70899	200-280

FTP45 (Upper parking lot)



Photo# FTP_45.jpg

Sample FTP45A

Description:
270 cm of pale greenish grey calc-silicate waste with areas of weak brown color; fines are highly calcareous. Contains minor biotite quartz feldspar porphyry.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP45A	70900	250

FTP46 (oxidized stockpile)



Photo# FTP_46.jpg

Sample FTP46B

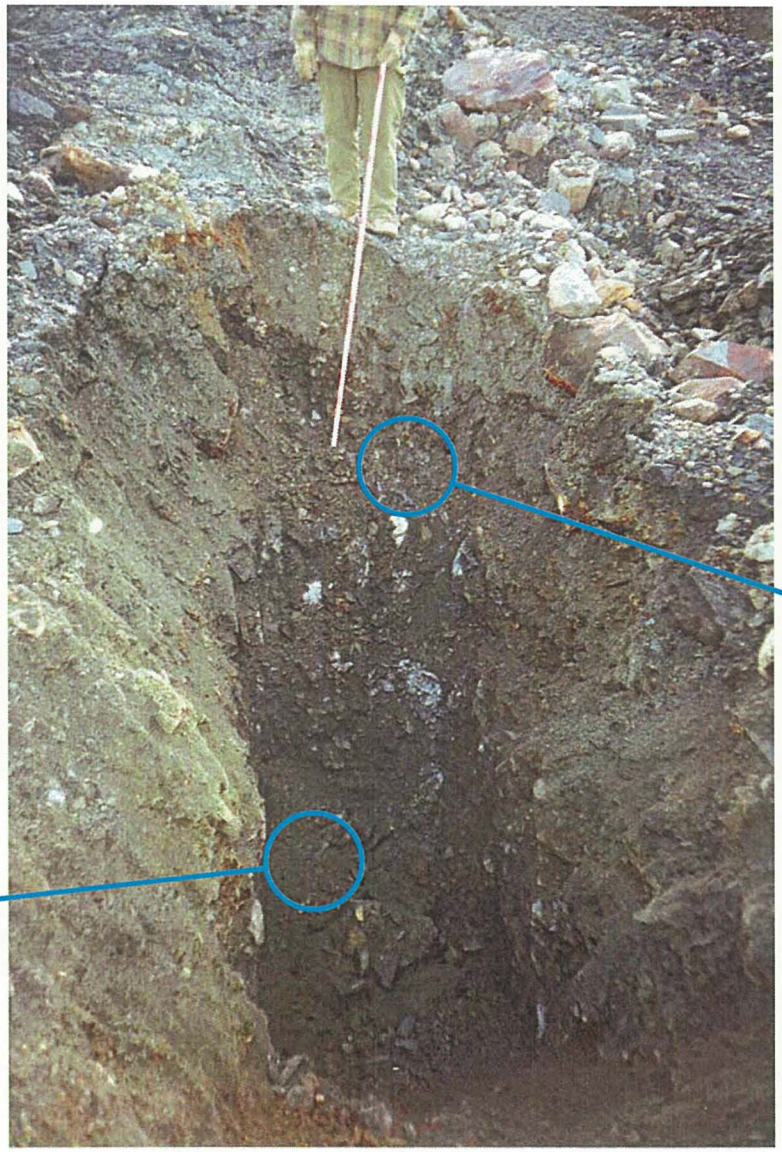
Sample FTP46A

Description:
120 cm of yellow to orange brown fine grained non-calcareous material containing oxidized pyrite and pyrrhotite with sphalerite and galena; overlies dark brown to red brown massive pyrrhotite and massive pyrite with sphalerite and galena, disseminated pyrite and banded sphalerite-galena-pyrite, all in a pale greenish grey clay matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP46A	70901	50-100
FTP46B	70902	200-250

FTP47 (medium grade stockpile)



Photo# FTP_47.jpg

Description:
150 cm of grey green fine matrix containing red brown oxidized fragments, black graphitic quartz phyllite with pyrite, sphalerite and galena, massive fine grained pyrite, banded sphalerite and galena, and banded siliceous pyritic phyllite. Overlies dark grey green horizon with fewer oxidized fragments.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP47A	70903	100
FTP47B	70904	200-260

FTP48 (medium grade stockpile)



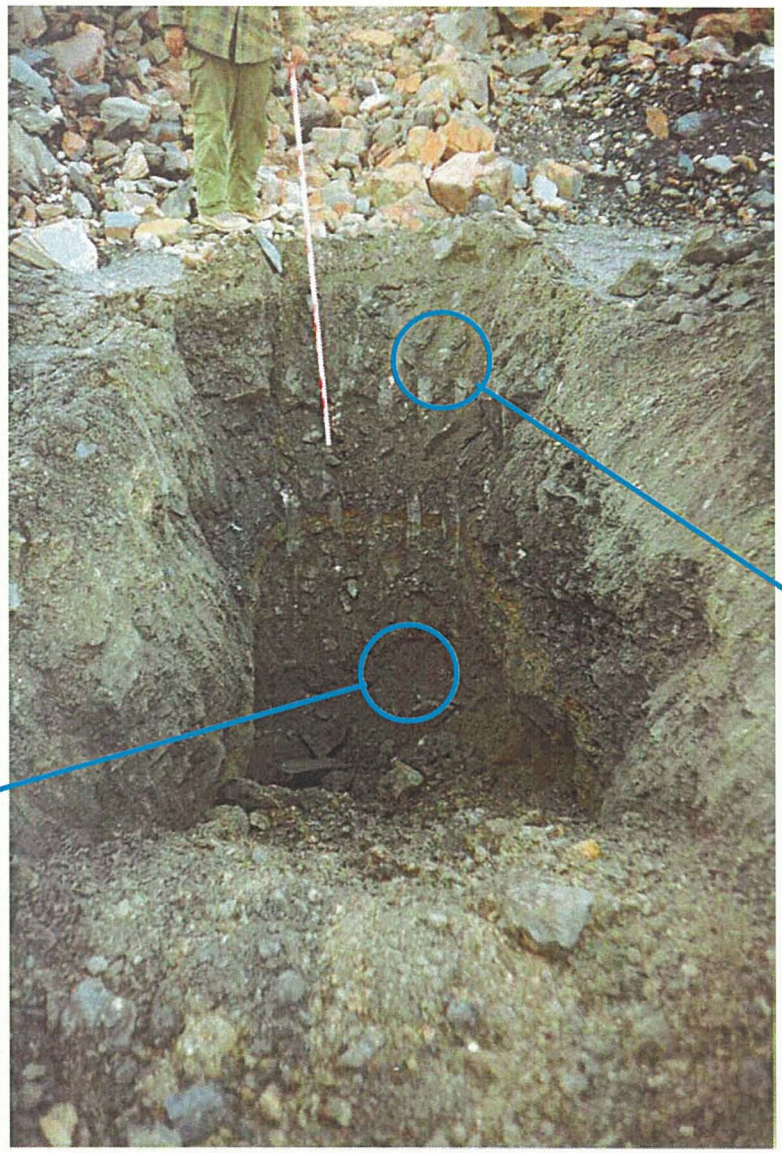
Photo# FTP_48.jpg

Description:
Medium olive grey-green sulphide waste with sulphide fragments having dark red brown oxide coatings. Sulphides are 60% dark grey to black banded siliceous phyllite with disseminated pyrite, sphalerite and galena in siliceous bands, fine grained massive pyrite and fine grained pyrite with banded sphalerite and galena.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP48A	70905	150

FTP49 (crusher stockpile)



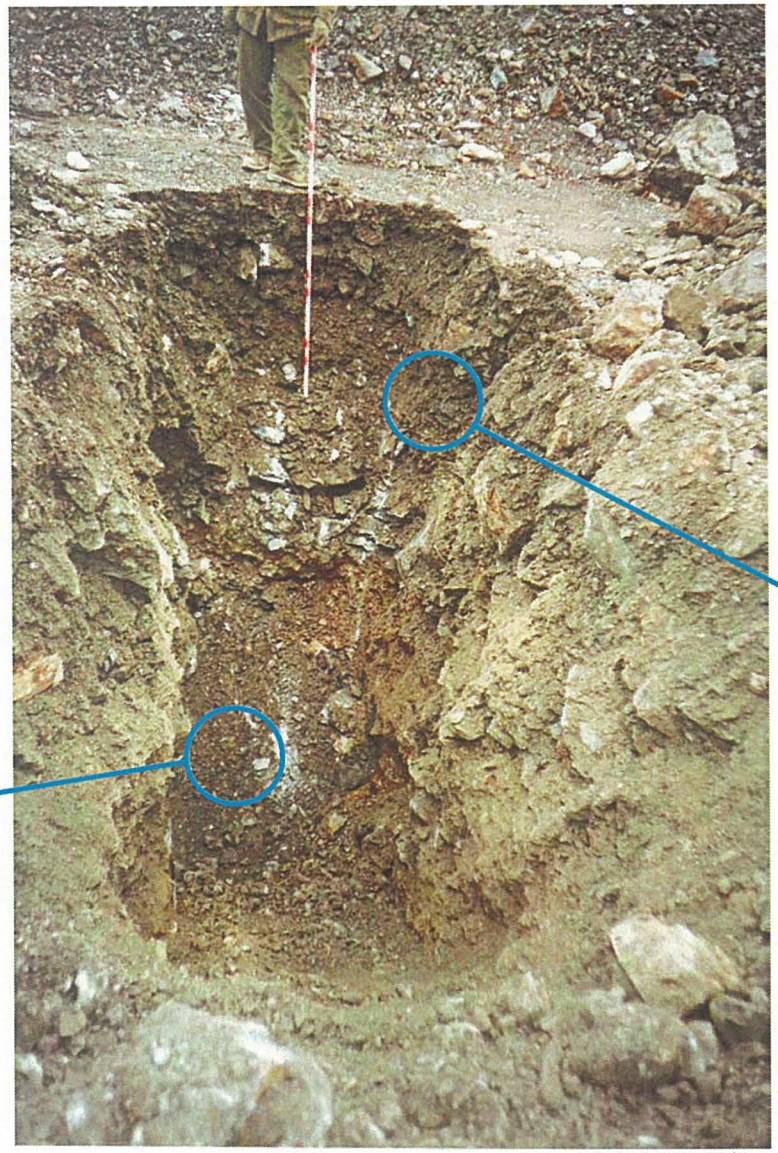
Photo# FTP_49.jpg

Description:
Excavation at Faro crusher dump. 120 cm of dark grey ore- mainly graphitic banded siliceous ore types with pyrite sphalerite and galena in a matrix of dark grey non-calcareous fines. Overlies dark olive grey green massive pyrite, sphalerite and galena with lesser graphitic banded ore in dark olive grey green non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP49A	no ID in notes	50-75
FTP49B	no ID in notes	200-250

FTP50 (Outer Haul Road East)



Photo# FTP_50.jpg

Description:
180 cm of medium greenish grey calc-silicate schist in a matrix of pale grey weakly calcareous granular fines. Overlies a pale greenish grey horizon with orange brown bands containing equal parts calc-silicate schist and biotite muscovite quartz schist in a matrix of pale grey weakly calcareous granular fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
FTP50A	70919	100
FTP50B	70920	200-250

APPENDIX E.3
Test Pit Descriptions and Photos – Grum Site

GTP01 (Lower lift)



Photo# DCP_0803.JPG

Description:
Traffic surface of 20 cm sandy gravel capping pale greenish gray 5D phyllite and lesser med grey non-calcareous phyllite with calcareous fines. Underlain by a discontinuous wedge of mixed chloritic and dark grey calcareous phyllite which overlies a uniform horizon of pale greenish grey chloritic phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP01A	70977	20-130

GTP02 (Lower lift)



Photo# DCP_0804.JPG

Description:
Traffic surface of 10 cm sandy gravel capping pale medium grey phyllite over a mixed discontinuous horizon of grey phyllite and black graphitic phyllite. Underlain by med grey calcareous phyllite and non-calcareous phyllite with minor chloritic calcareous phyllite. Underlain by dark olive green till which overlies pale greenish grey mix of calcareous chloritic phyllite and non-calcareous phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP02A	70978	10-70
GTP02B	70979	300-400

GTP03 (Lower lift)



Photo# DCP_0805.JPG

Sample GTP03A

Description:
Pale greenish grey phyllite with clay matrix containing a 10 cm discontinuous black graphitic phyllite horizon at 130 cm. Underlain by a spotty dark olive green till.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP03A	70980	0-130

GTP04 (2nd lift)



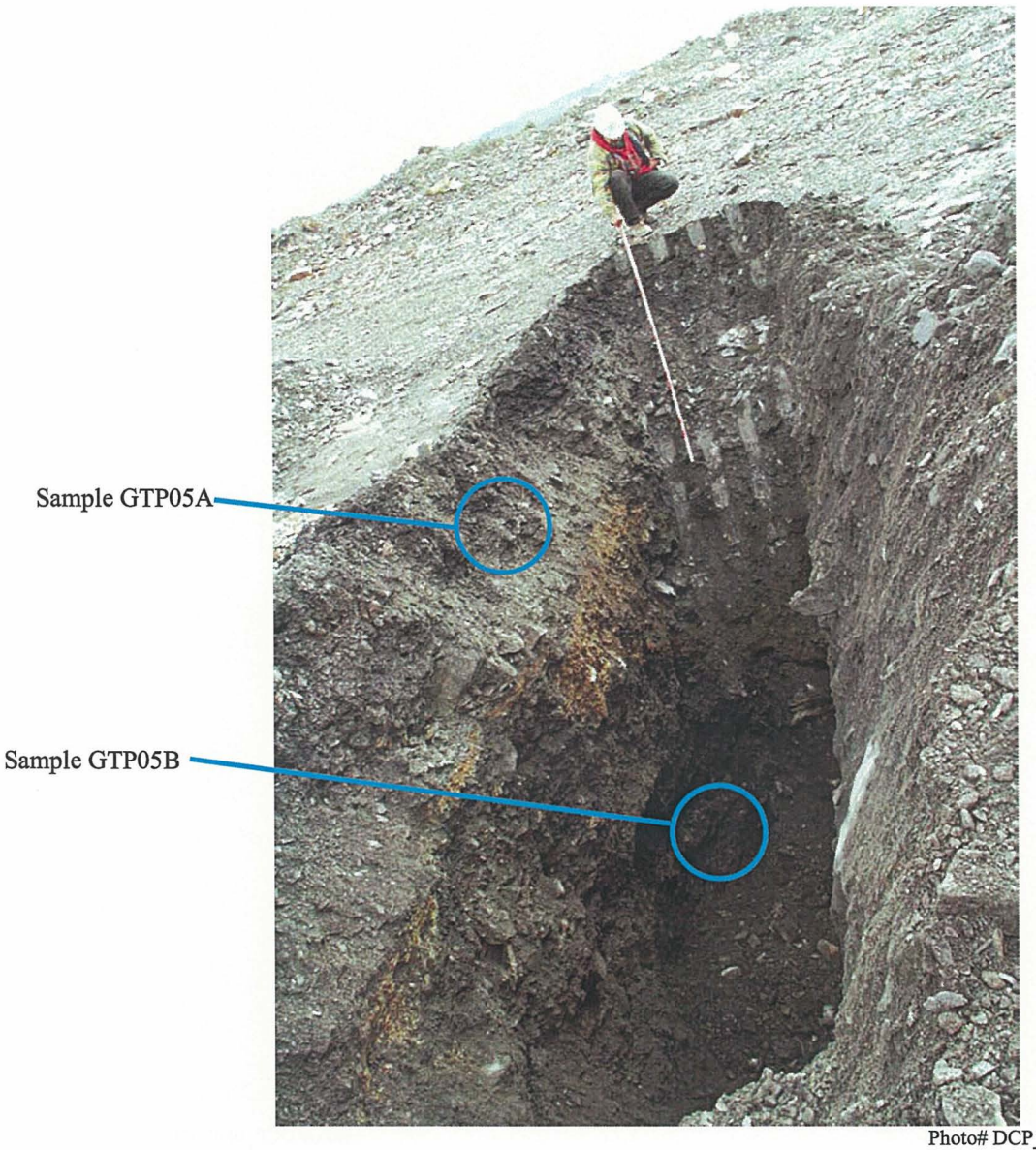
Photo# DCP_0806.JPG

Sample GTP04A

Description:
Pale greenish grey non-calcareous talcose phyllite in a calcareous clay matrix with lesser calcareous chloritic phyllite and rare quartz.
Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP04A	70981	0-130

GTP05 (2nd lift)



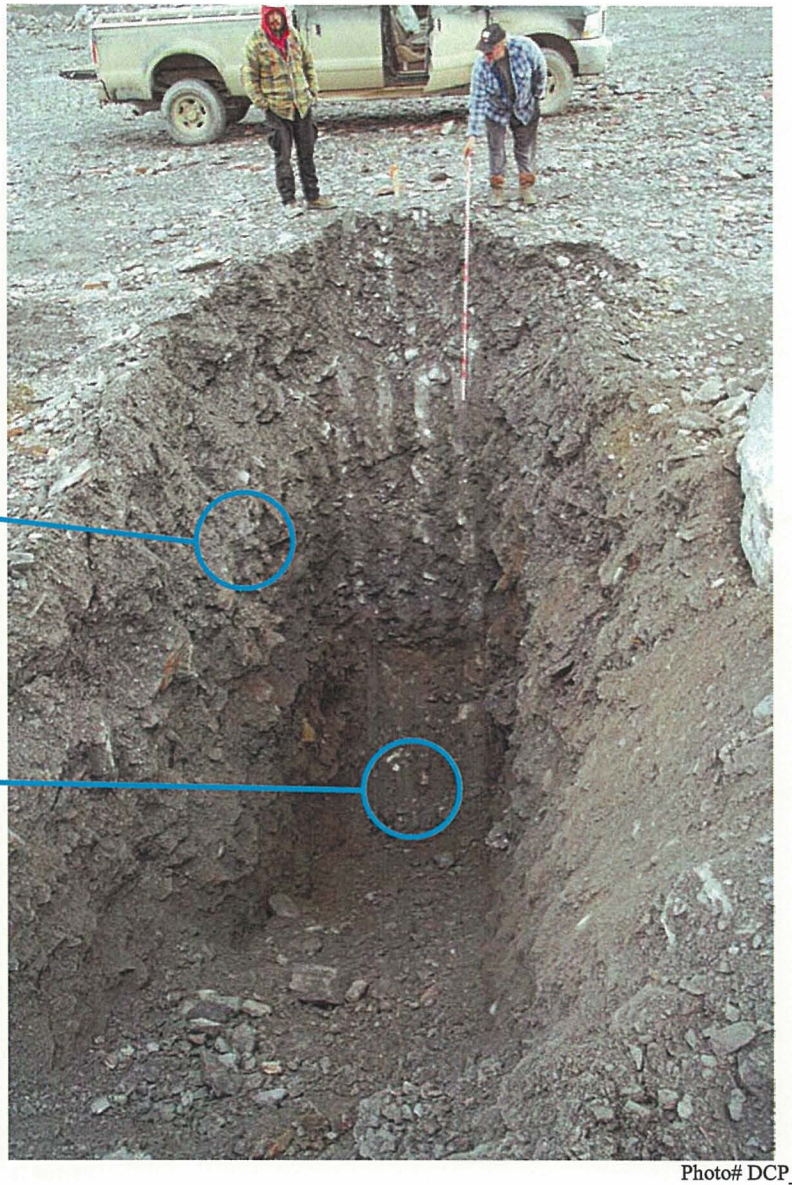
Photo# DCP_0807.JPG

Description:
Traffic surface of sandy mixed material capping 20 cm of black graphitic phyllite over pale grey green chloritic phyllite and dark grey calcareous and non-calcareous phyllite with weakly calcareous fines. Underlain by mixed bands of med grey brown and dark grey waste, chloritic phyllite, 10-15% massive fine grained pyrite and banded pyritic phyllite. Basal horizon is pale brown and grey mixed waste including 10% sulphides, banded pyritic dark grey phyllite, massive fine grained pyrite, chloritic phyllite and dark grey phyllite with weakly calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP05A	70982	30-200
GTP05B	70983	400-450

GTP06 (2nd lift)



Photo# DCP_0808.JPG

Description:
Pale greenish grey calcareous chloritic phyllite with lesser grey calcareous phyllite in a calcareous matrix overlying medium grey talcose phyllite in a pale olive brown highly calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP06A	70984	100
GTP06B	70985	300

GTP07 (2nd lift)



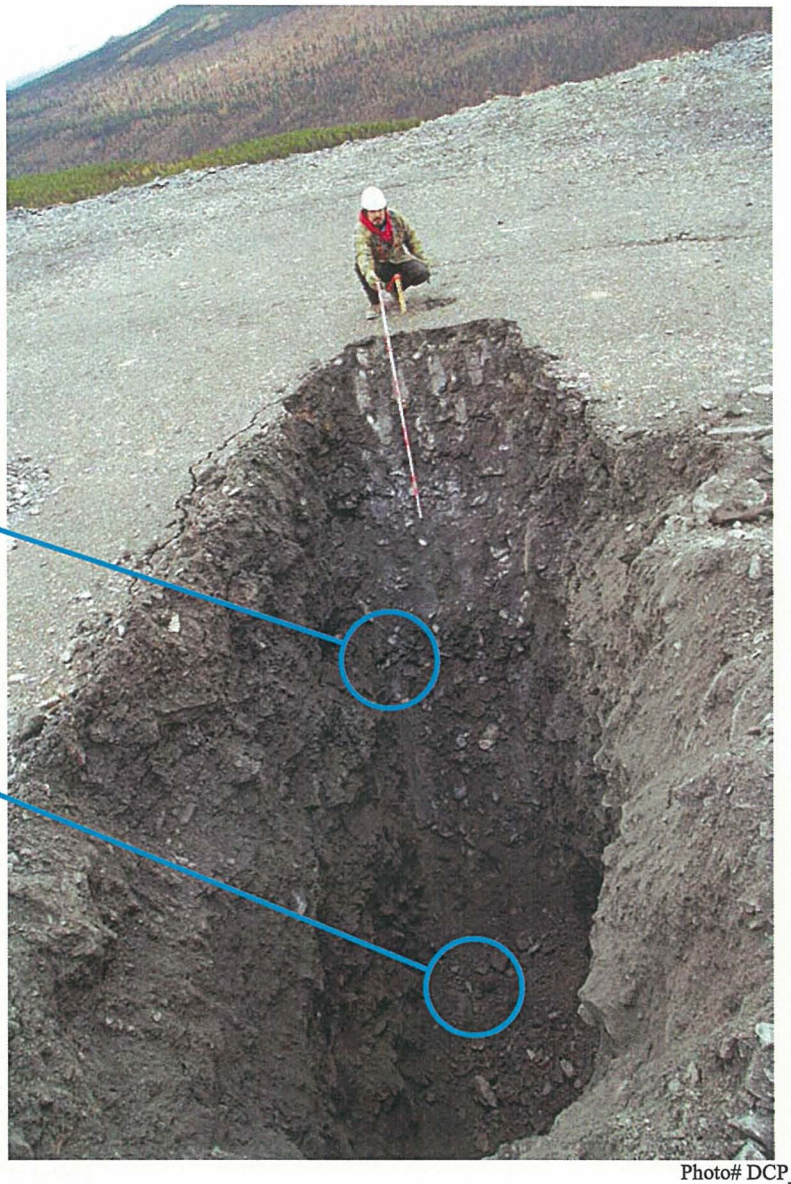
Photo# DCP_0809.JPG

Description:
Discontinuous pale beige surface layer caps med grey to greenish grey talcose calcareous phyllite with lesser graphitic phyllite and chloritic schist in a calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP07A	70986	200

GTP08 (2nd lift)



Photo# DCP_0810.JPG

Description:
Greenish grey platy chloritic calcareous phyllite with strongly calcareous fines overlies a mixed horizon of pale olive chloritic phyllite, calcareous grey phyllite and pale talcose schist with weakly calcareous fines. Underlain by interbanded pale green chloritic phyllite and beige altered chloritic phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP08A	70987	200
GTP08B	70988	400

GTP09 (3rd lift)



Photo# DCP_0811.JPG

Sample GTP09A

Description:
Pale greenish grey phyllite and med grey calcareous phyllite overlying medium to dark grey waste with 10-20 cm interbands of greenish grey waste in a non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP09A	70989	500

GTP10 (3rd lift)



Photo# DCP_0812.JPG

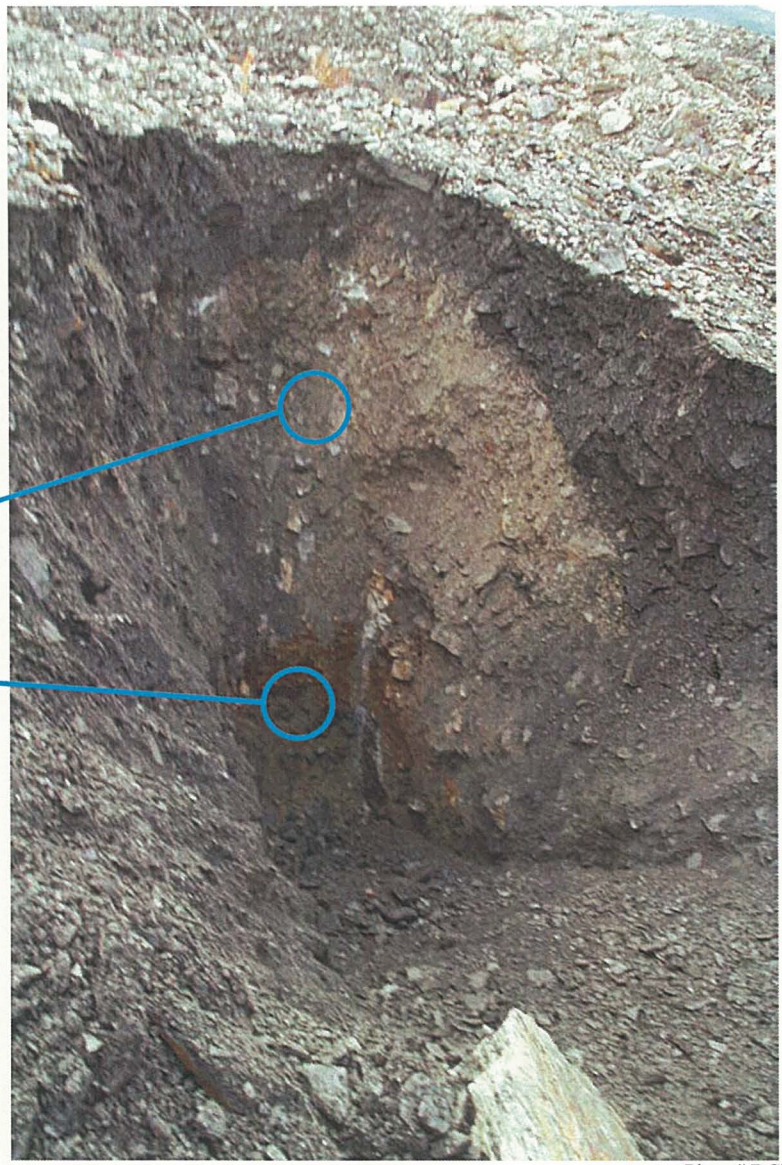
Sample GTP10A

Description:
Dark grey graphitic phyllite overlying greenish grey chloritic phyllite. Interlayered medium grey and pale greenish grey phyllites to depth; calcareous chloritic phyllite most abundant, with lesser med grey calcareous phyllite and graphitic phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP10A	70990	300

GTP11 (near core shacks)



Photo# DCP_0814.JPG

Description:
Black graphitic phyllite overlies pale greenish grey talcose calcareous phyllite with non-calcareous fines. Basal horizon consists of med grey non-calcareous phyllite and minor medium grey pyritic quartzite in a matrix of pale orange brown non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP11A	70991	150
GTP11B	70992	370

GTP12 (upper lift)



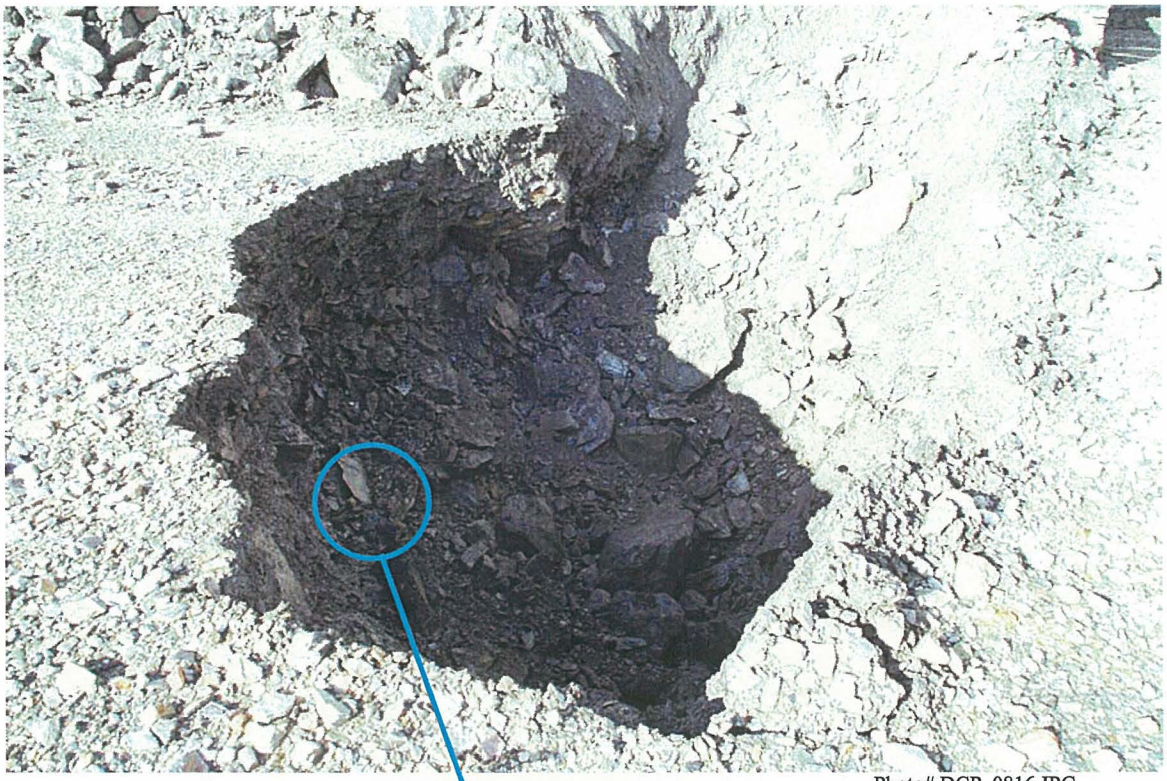
Photo# DCP_0815.JPG

Description:
Pale greenish grey chlorite and grey phyllite traffic surface capping a mixed horizon of calcareous chloritic phyllite with lesser graphitic phyllite. Basal horizon consists of chloritic phyllite and talcose grey phyllite in a medium grey non-calcareous matrix. Up to 20% massive sulfides.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP12A	70993	300-370

GTP13 (upper lift)

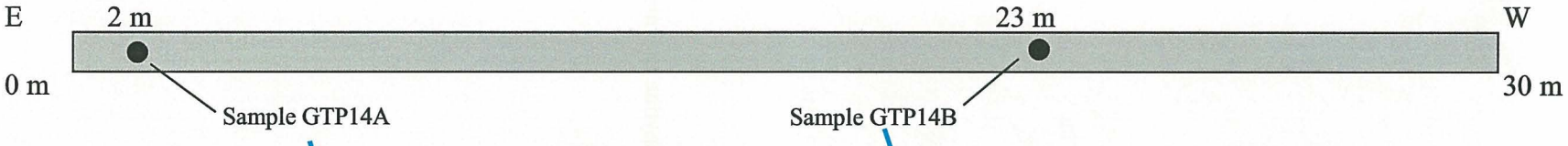


Description:
Coarse medium olive green calcareous chloritic phyllite with pale beige altered chloritic phyllite and minor grey calcareous phyllite in a matrix of pale greenish grey weakly calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP13A	70994	200

GTP14 (upper lift)



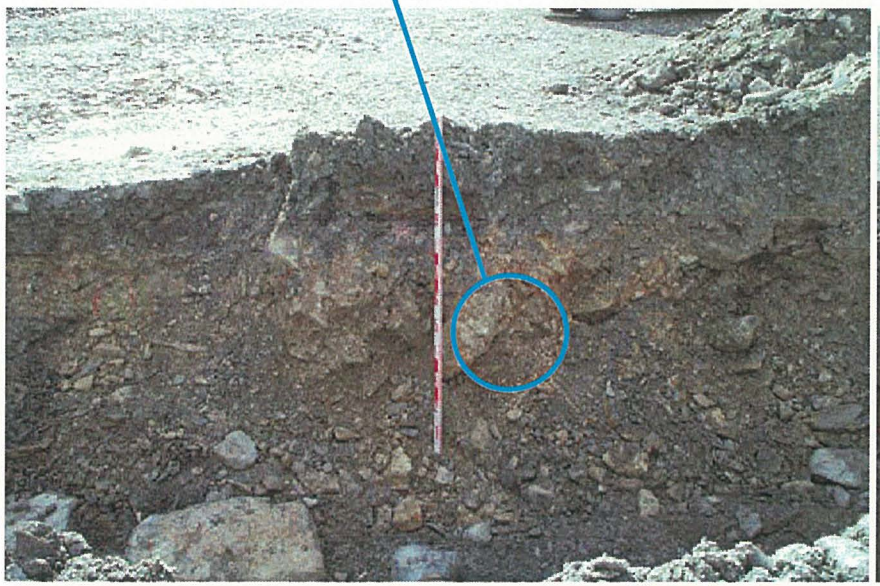


Photo # DCP_0819.JPG

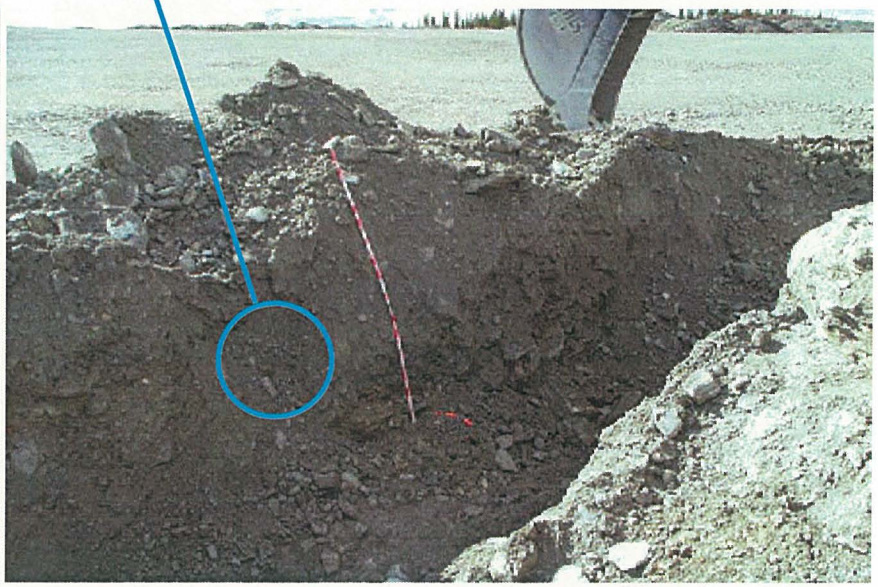


Photo # DCP_0817.JPG

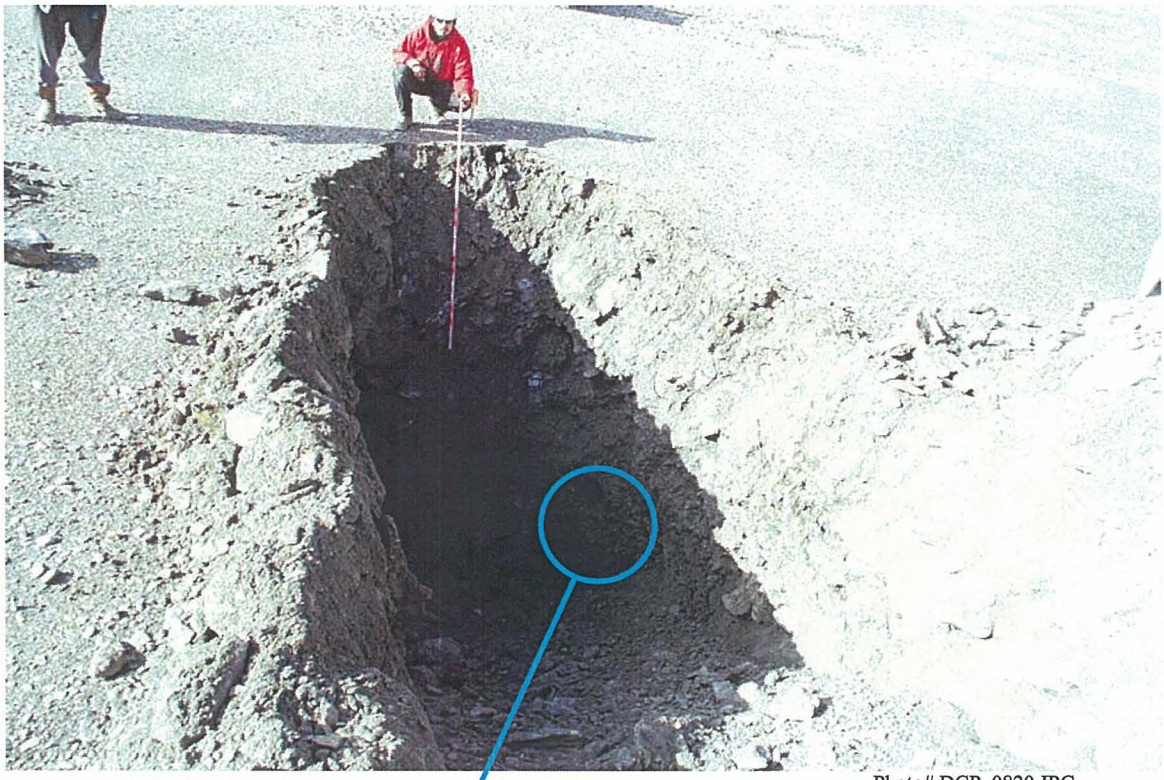
Description:

Trench- azimuth 286. Continuous pale greenish grey traffic layer overlies pale brown to beige altered chloritic schist with pale olive green weakly calcareous fines containing discrete zones of dark grey phyllite at east end of trench. West end of trench consists of med grey mix of altered and fresh chloritic schist with talcose, non-calcareous fines

Samples collected:

Sample ID	Lab ID	Length from E (m)
GTP14A	70995	2
GTP14B	70996	23

GTP15 (upper lift)



Photo# DCP_0820.JPG

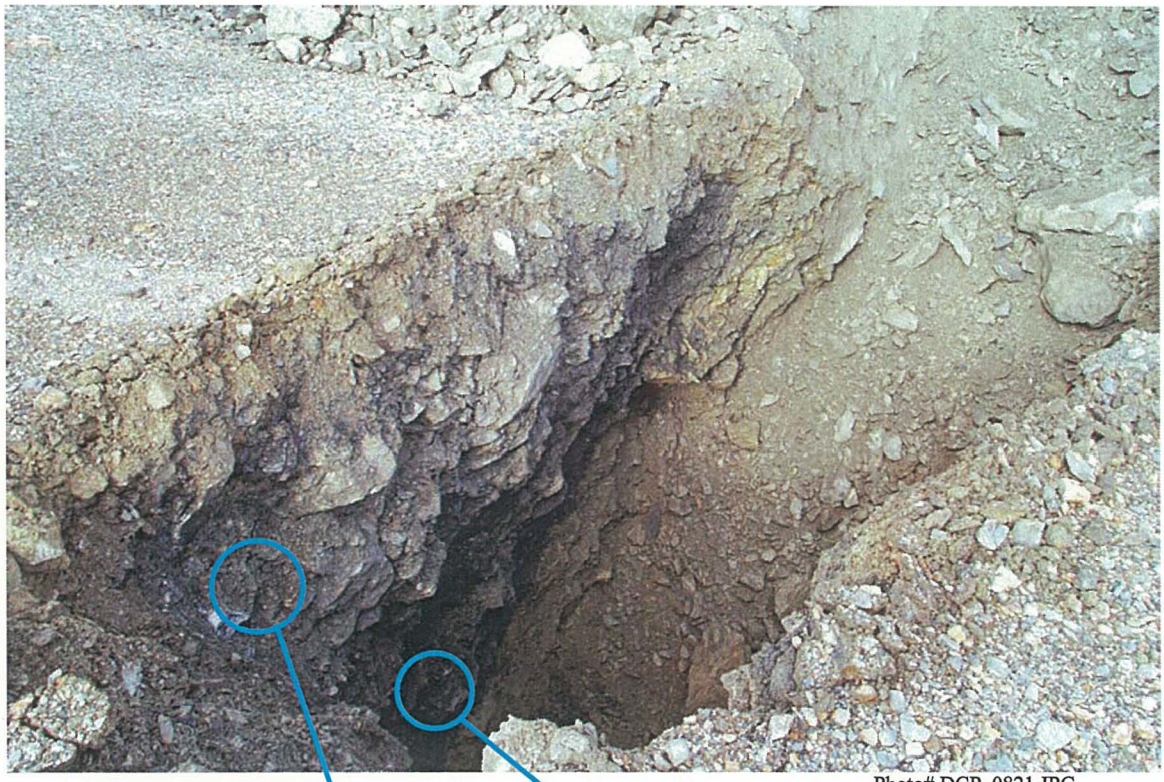
Sample GTP15A

Description:
Medium greenish grey chloritic phyllite in a matrix of pale greenish grey moderately calcareous fines. Very weak color banding.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP15A	70997	300

GTP16 (upper lift)



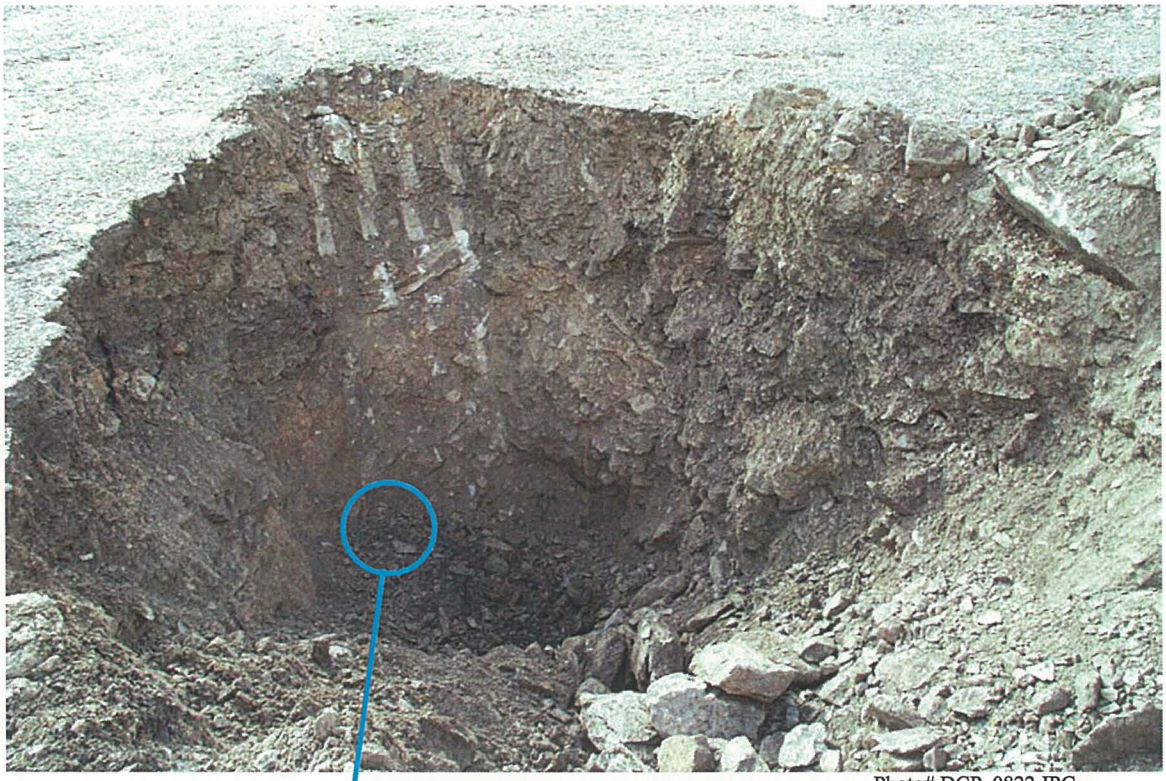
Photo# DCP_0821.JPG

Description:
2 m of pale grey calcareous phyllite with lesser olive grey chloritic schist containing two distinct moderately dipping layers of dark grey graphitic phyllite overlies a pale greenish grey to beige mix of grey non-calcareous phyllite and calcareous chloritic phyllite in a pale olive grey non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP16A	70998	100
GTP16B	70999	350

GTP17 (upper lift)



Photo# DCP_0822.JPG

Sample GTP17A

Description:
Pale greenish grey chloritic phyllite with minor grey non-calcareous phyllite and pyritic phyllite in a matrix of pale greenish grey non-calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP17A	71000	300

GTP18 (upper lift)

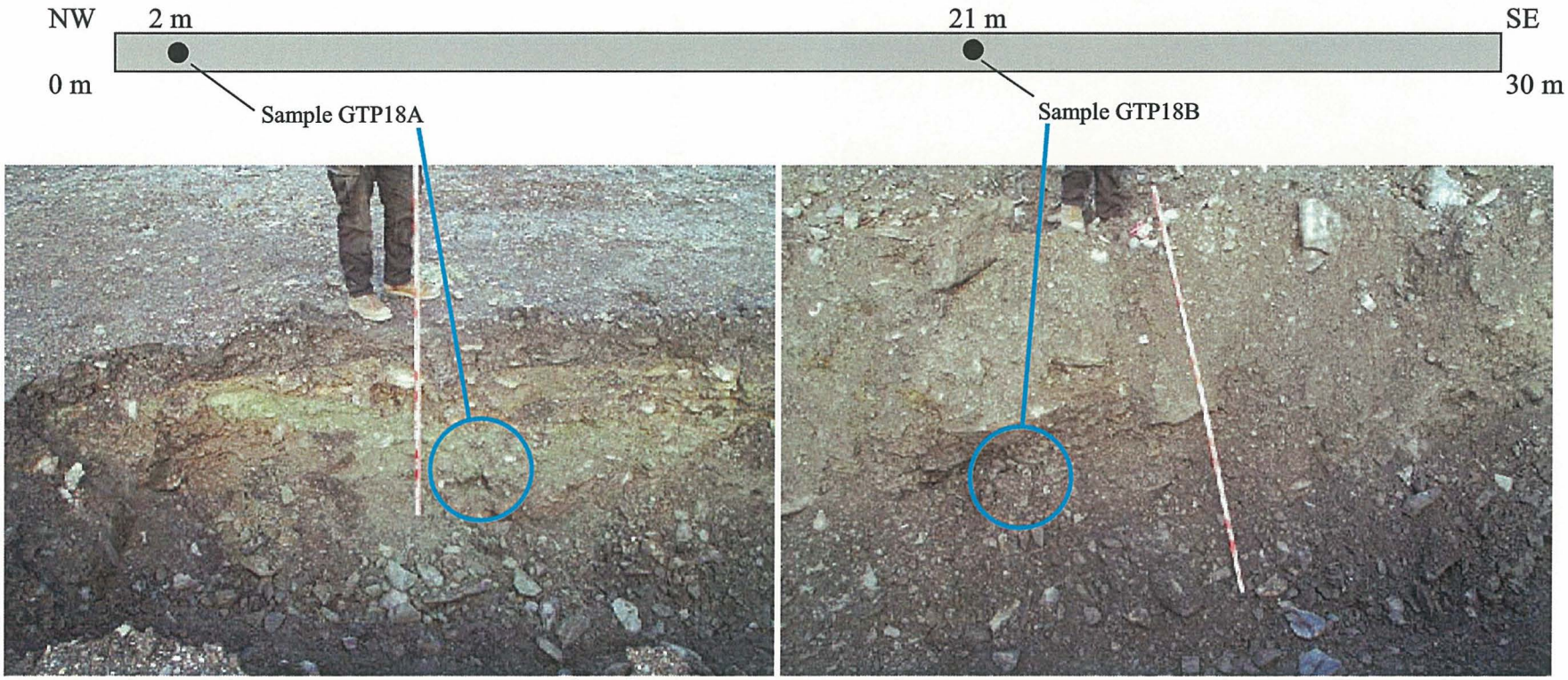


Photo # DCP_0823.JPG

Photo # DCP_0824.JPG

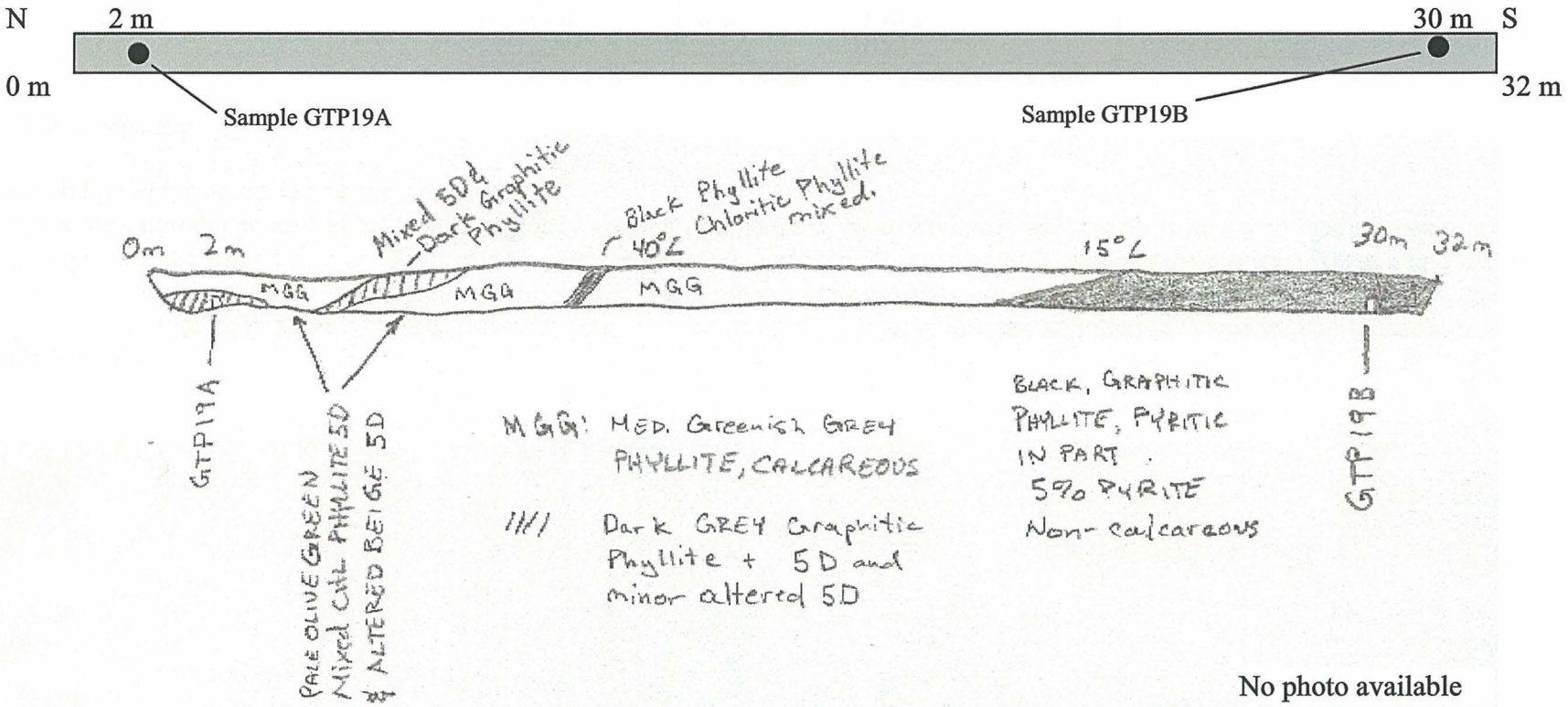
Description:

Trench- azimuth 134. NW end of trench reveals a pale green non-calcareous clay rich matrix containing med to dark grey non-calcareous phyllite with occasional mariposite and trace pyrite. At 13 m along trench composition changes to dark grey crenulated phyllite and black graphitic phyllite with pockets of dark olive green till.

Samples collected:

Sample ID	Lab ID	Length from NW (m)
GTP18A	70781	2
GTP18B	70782	21

GTP19 (upper lift)



No photo available

Description:

Trench- azimuth 190. N end of trench contains medium greenish grey calcareous phyllite with patches of dark green till intermixed; discrete lenses of black graphitic phyllite occur within the greenish grey material over the first 12 m. Uniform greenish grey material is present between 12 and 21 m, where greenish grey material gives way to black graphitic non-calcareous phyllite containing up to 5% pyrite.

Samples collected:

Sample ID	Lab ID	Length from N (m)
GTP19A	70783	2
GTP19B	70784	30

GTP20 (upper lift)

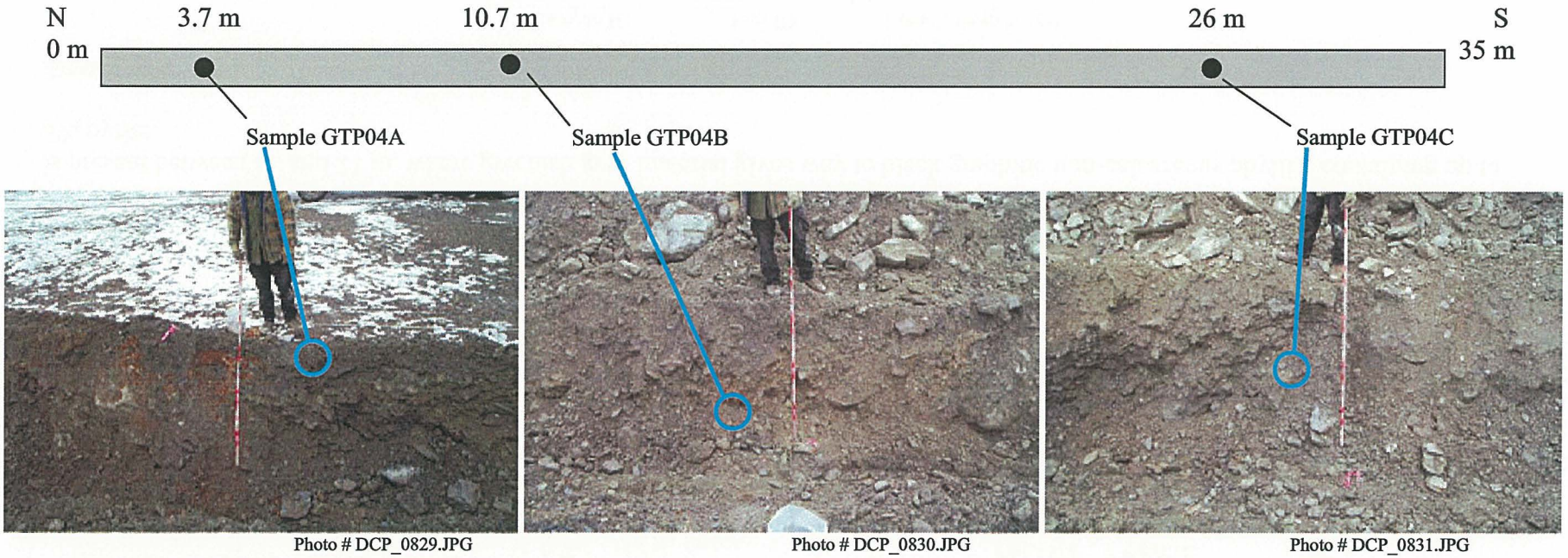


Photo # DCP_0829.JPG

Photo # DCP_0830.JPG

Photo # DCP_0831.JPG

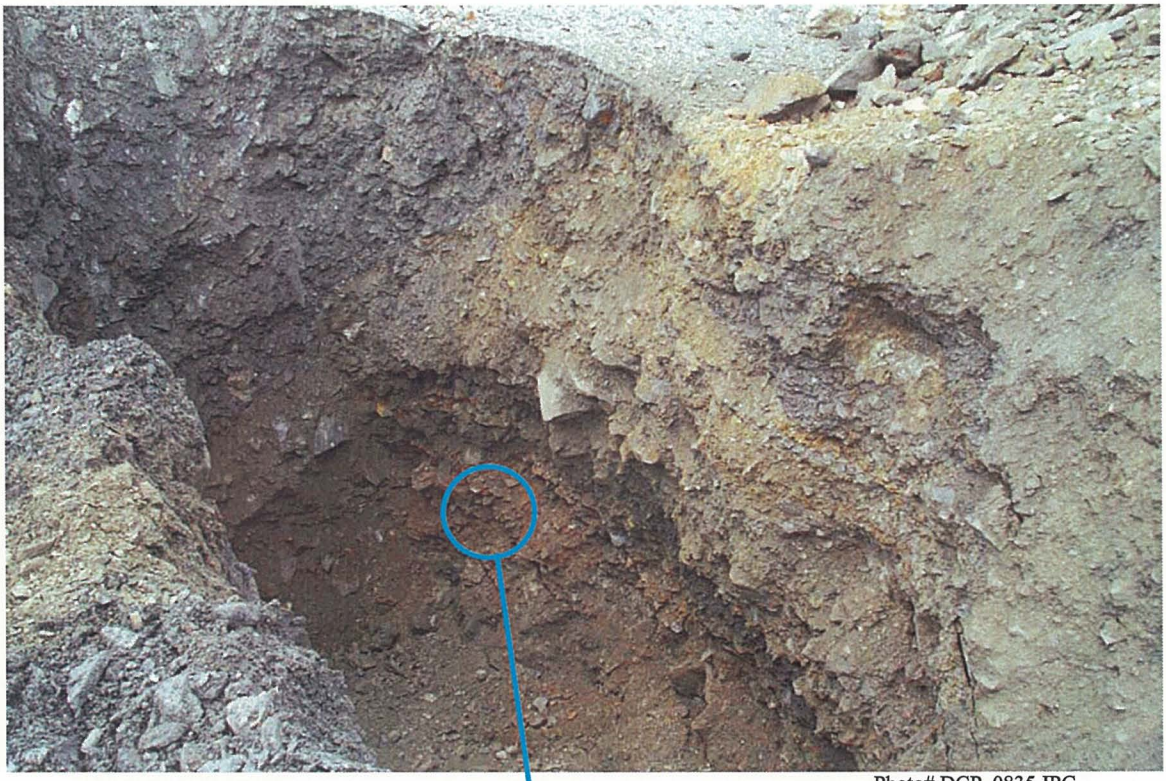
Description:

Trench- azimuth 187. From N end of trench, pale olive green to beige chloritic phyllite and med grey talcose non-calcareous phyllite is encountered to 20 m. A minor lens of pale orange brown altered chloritic schist with minor mariposite and medium grey schist is found at surface from 3 to 6 m. From 20 to 35 m, the material is a medium greenish grey mix of grey chloritic phyllite and medium silver grey non-calcareous phyllite with minor pyrite; a 15 cm layer of black graphitic phyllite outlines the former surface of a single dump pile at the south end of the trench.

Samples collected:

Sample ID	Lab ID	Length from N (m)
GTP20A	70785	3.7
GTP20B	70786	10.7
GTP20C	70787	26

GTP21 (upper lift)



Photo# DCP_0835.JPG

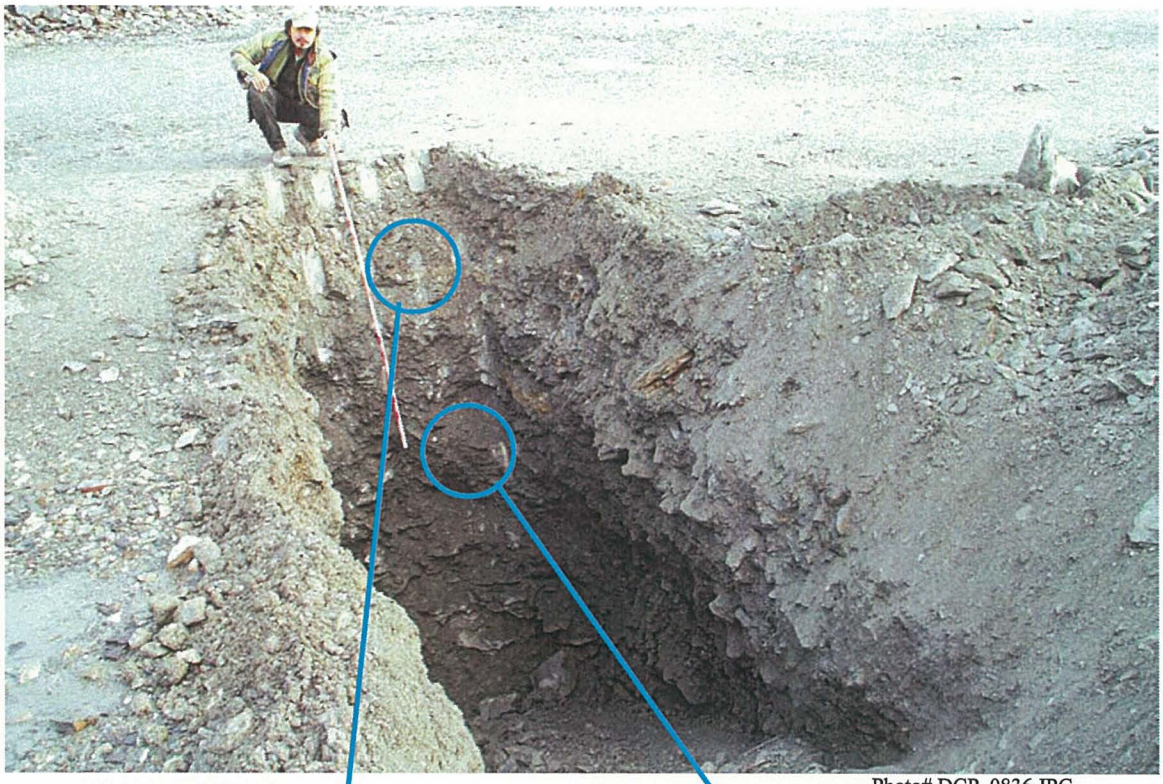
Sample GTP21A

Description:
Dark grey graphitic phyllite mixed with med grey pyritic phyllite and banded quartz sericite pyrite schist overlies a pale orange brown layer containing pyritic medium grey phyllite, pyritic banded quartzite, massive pyrite + sphalerite and chloritic phyllite. Within the pale orange brown oxidized layer there is a continuous thin layer of black graphitic phyllite. The pale greenish grey basal horizon consists of medium grey banded pyritic phyllite containing 10-30% pyrite, altered chloritic phyllite and sphalerite and galena ore fragments.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP21A	70788	2.5

GTP22 (upper lift)



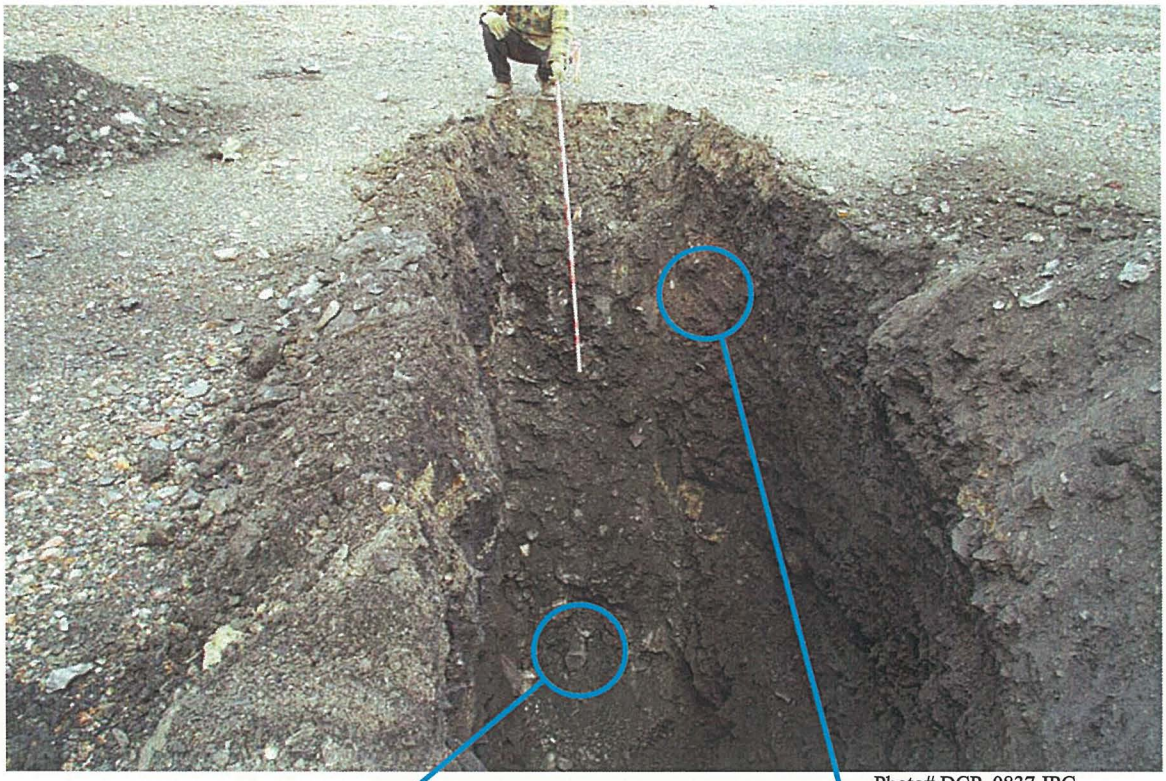
Photo# DCP_0836.JPG

Description:
The upper horizon consists of medium green grey and pale brown altered and fresh chloritic phyllite with lesser medium to dark grey non-calcareous phyllite in a matrix of pale greenish grey non-calcareous fines. Underlain by medium greenish grey to pale brown altered chloritic phyllite with minor mariposite and lesser medium grey calcareous phyllite with trace pyrite. The basal horizon is composed of pale greenish grey chloritic phyllite, altered calcareous chloritic phyllite and non-calcareous phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP22A	70789	100-170
GTP22B	70790	200-300

GTP23 (upper lift)



Photo# DCP_0837.JPG

Sample GTP23B

Sample GTP23A

Description:
Dark grey non-calcareous pyritic graphitic phyllite containing minor altered lenses of chloritic phyllite overlies a dark greenish grey horizon consisting of medium to dark grey phyllite, partially pyritic, with minor altered chloritic phyllite in a weakly calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP23A	70791	100-200
GTP23B	70792	300-400

GTP24 (southwest dump)

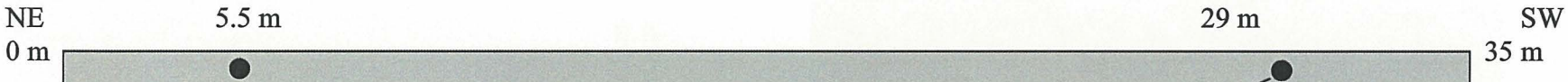




Photo # DCP_0838.JPG



Photo # DCP_0839.JPG

Description:

Trench- azimuth 226. NE end of trench: calcareous chloritic phyllite , minor med grey phyllite and trace pyrite in an oxidized strongly calcareous overburden matrix, occasionally containing wood and organics. Sharp angular contact at 25 m; exposed material changes to silver grey oxidized calcareous phyllite.

Samples collected:

Sample ID	Lab ID	Length from NE (m)
GTP24A	70793	5.5
GTP24B	70794	29

GTP25 (southwest dump)





Photo # DCP_0840.JPG

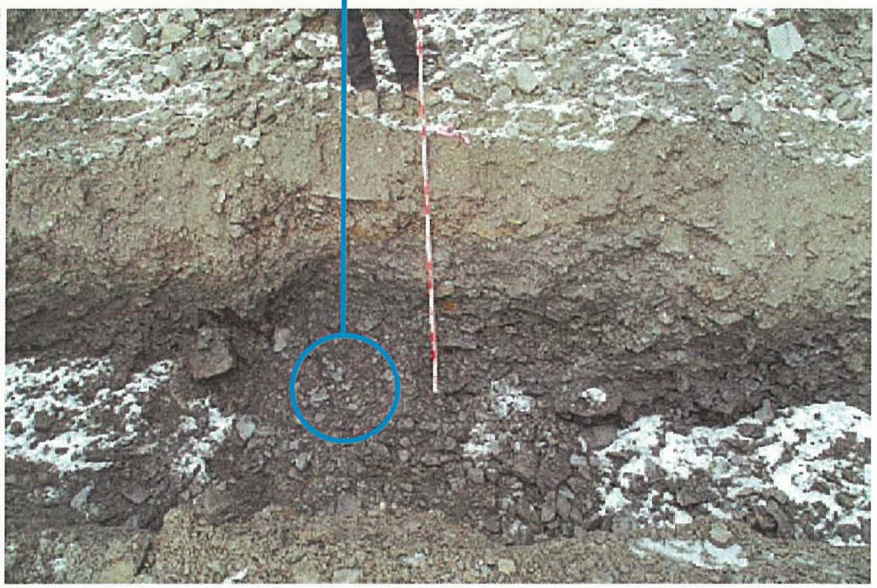


Photo # DCP_0842.JPG

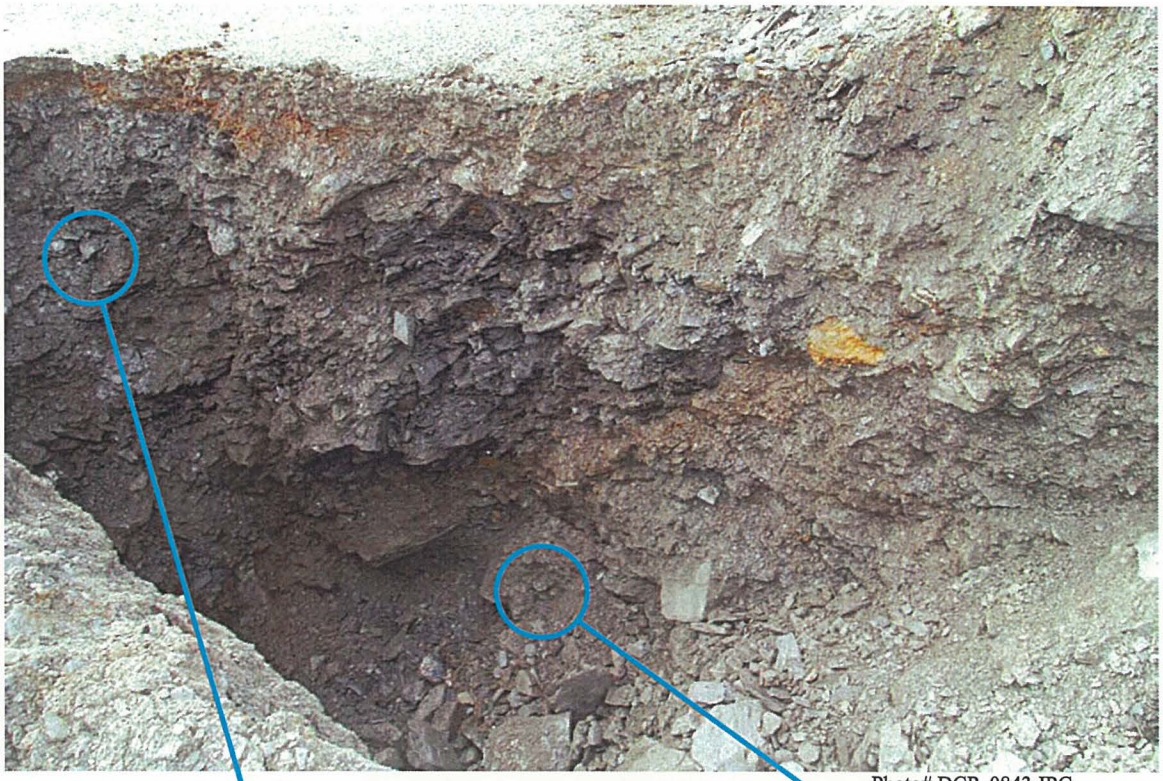
Description:

Trench- azimuth 134. NW end of trench: greenish gray horizon with isolated pockets and bands of oxidized material containing med grey calcareous phyllite; fines are calcareous. Transitions to pale greenish grey calcareous chloritic phyllite with lesser pale grey phyllite.

Samples collected:

Sample ID	Lab ID	Length from NW (m)
GTP25A	70795	2.5
GTP25B	70796	22

GTP26 (southwest dump)



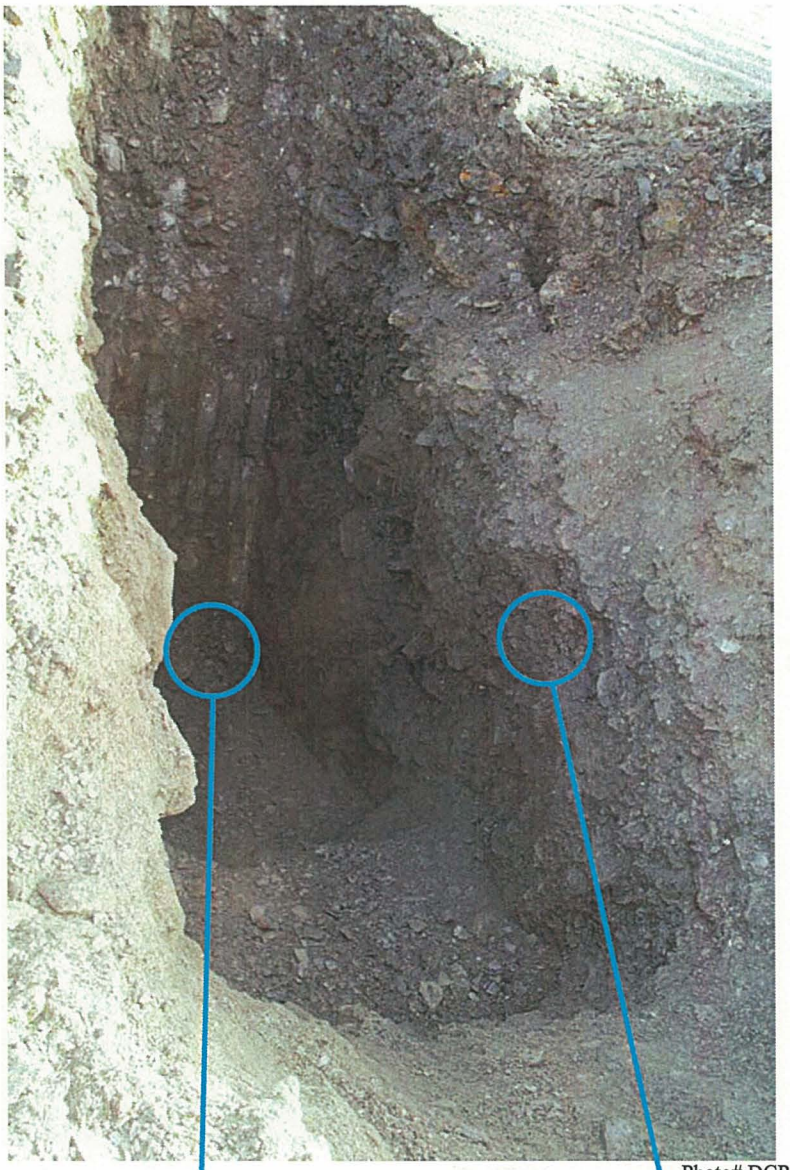
Photo# DCP_0843.JPG

Description:
Discontinuous red brown oxide layer caps pale to medium greenish grey calcareous fines containing medium grey calcareous phyllite and trace pyrite. A thin olive brown dipping layer separates overlying material from the basal horizon consisting of pale greenish brown oxidized phyllite with pale olive brown calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP26A	70797	100-150
GTP26B	70798	300

GTP27 (southwest dump)



Photo# DCP_0844.JPG

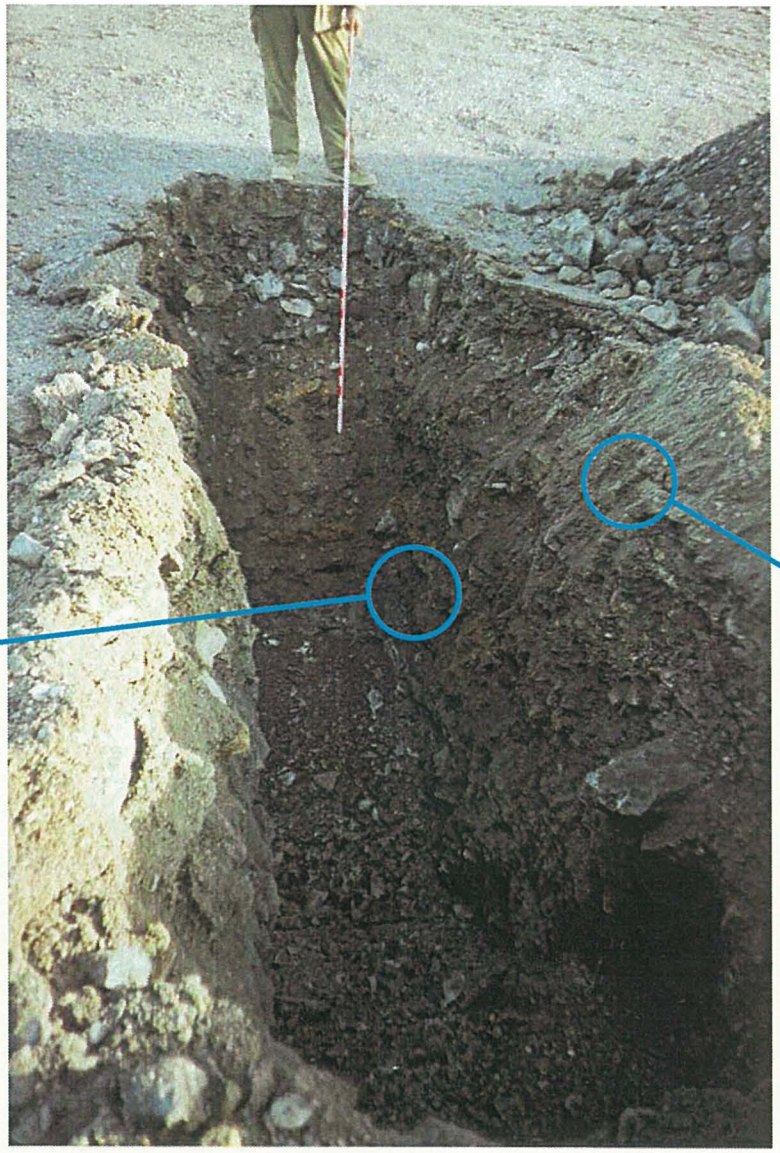
Sample GTP27B

Sample GTP27A

Description:
Weakly stratified pale olive to pale greenish grey chloritic schist mixed with medium grey phyllite. Bottom meter is upper material mixed with medium olive brown till; fines are strongly calcareous.
Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP27A	70799	200-300
GTP27B	70792	300-400

GTP28 (ore transfer pad)



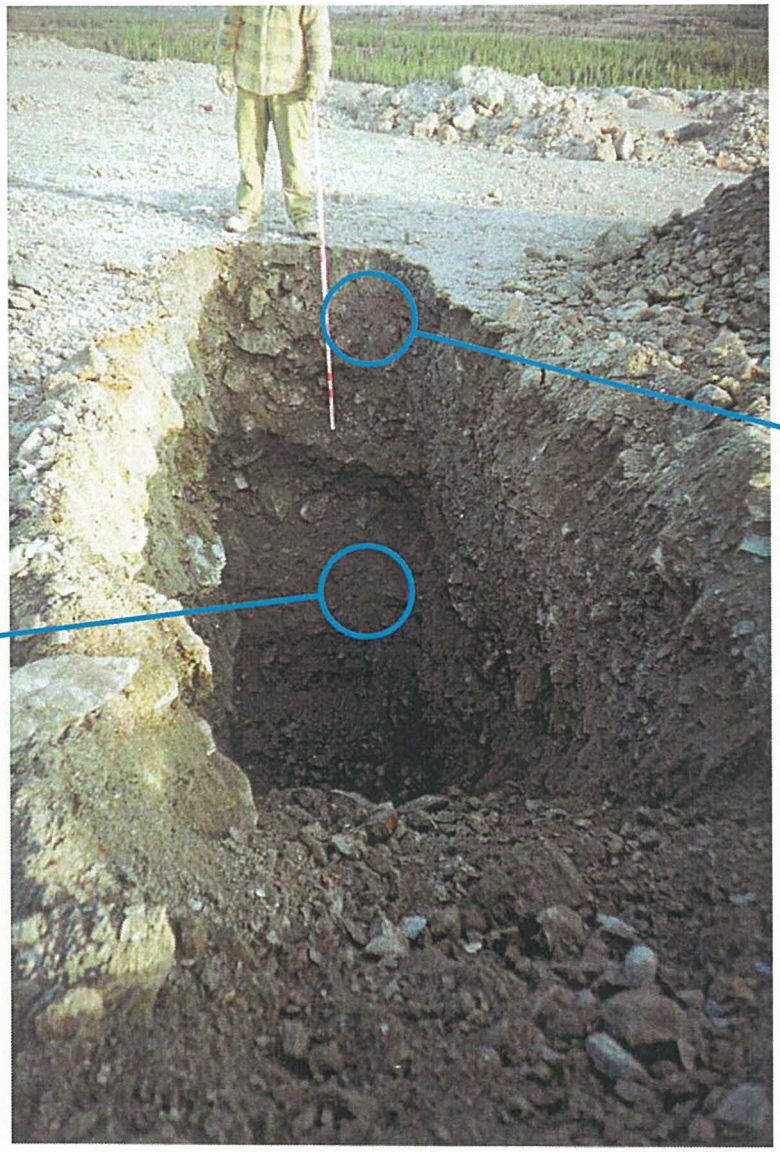
Photo# GTP_28.jpeg

Description:
Excavation at Grum ore stockpile area. 120 cm of pale grey and medium grey interbanded ribbon-banded graphitic quartzite, pyritic quartzite and massive pyrite in a matrix of pale grey fines, overlying 70 cm of grey brown with pale orange material containing ribbon-banded graphitic quartzite with sphalerite and galena, pyritic quartzite with sphalerite and galena and massive pyrite with sphalerite and galena. The basal exposed horizon consists of a pale grey chloritic phyllite with quartz in a matrix of medium grey fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP28A	70908	70-100
GTP28B	70909	120-190

GTP29 (ore transfer pad)



Photo# GTP_29.jpeg

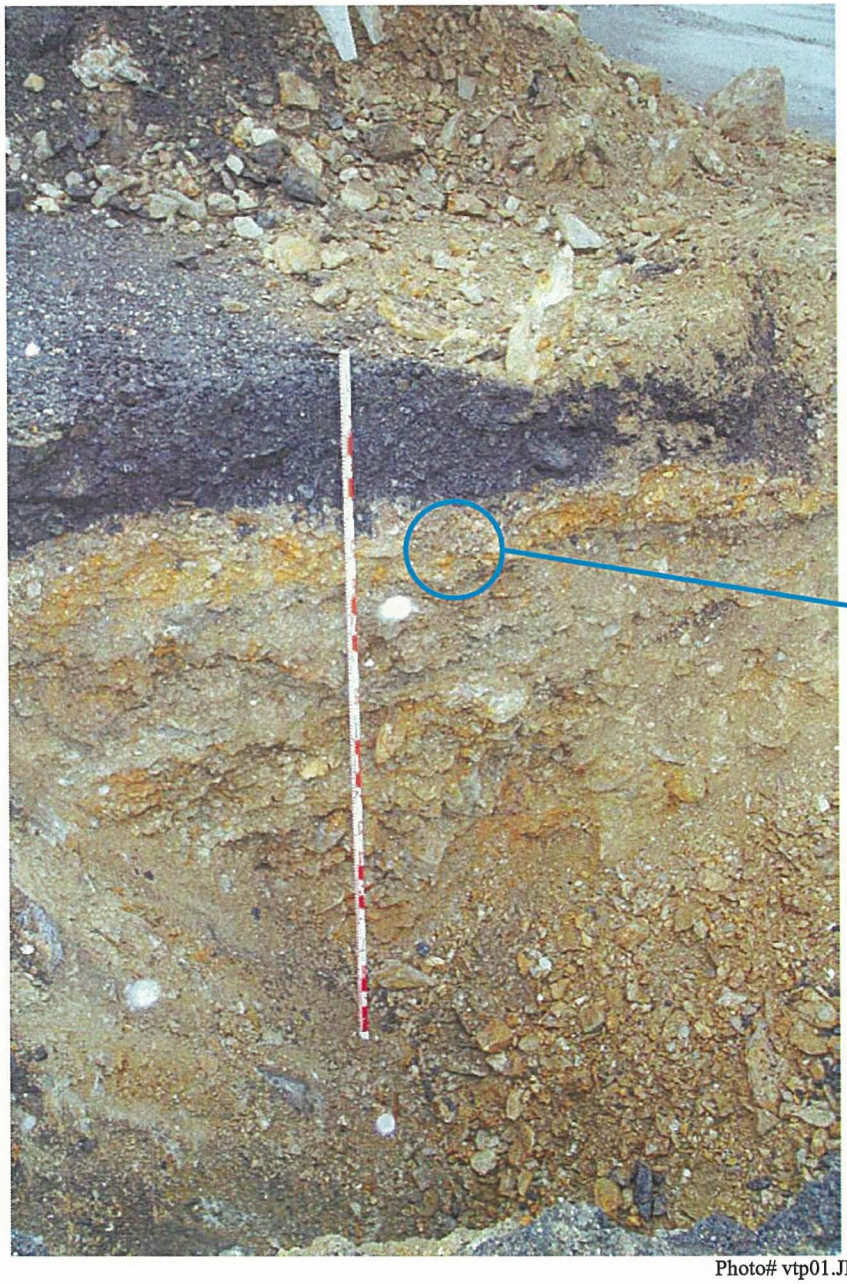
Description:
Excavation on Grum sulphide dump ramp. 100 cm of mixed pale grey crenulated non-calcareous phyllite and massive pyrite with sphalerite in a med grey non-calcareous granular matrix. Overlies a medium to greenish grey horizon containing massive pyrite with sphalerite and galena, pyritic quartzite, and medium grey to pale grey crenulated non-calcareous phyllite in a dark grey non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
GTP28A	70910	50-100
GTP28B	70911	250-300

APPENDIX E.4
Test Pit Descriptions and Photos – Vangorda Site

VTP01



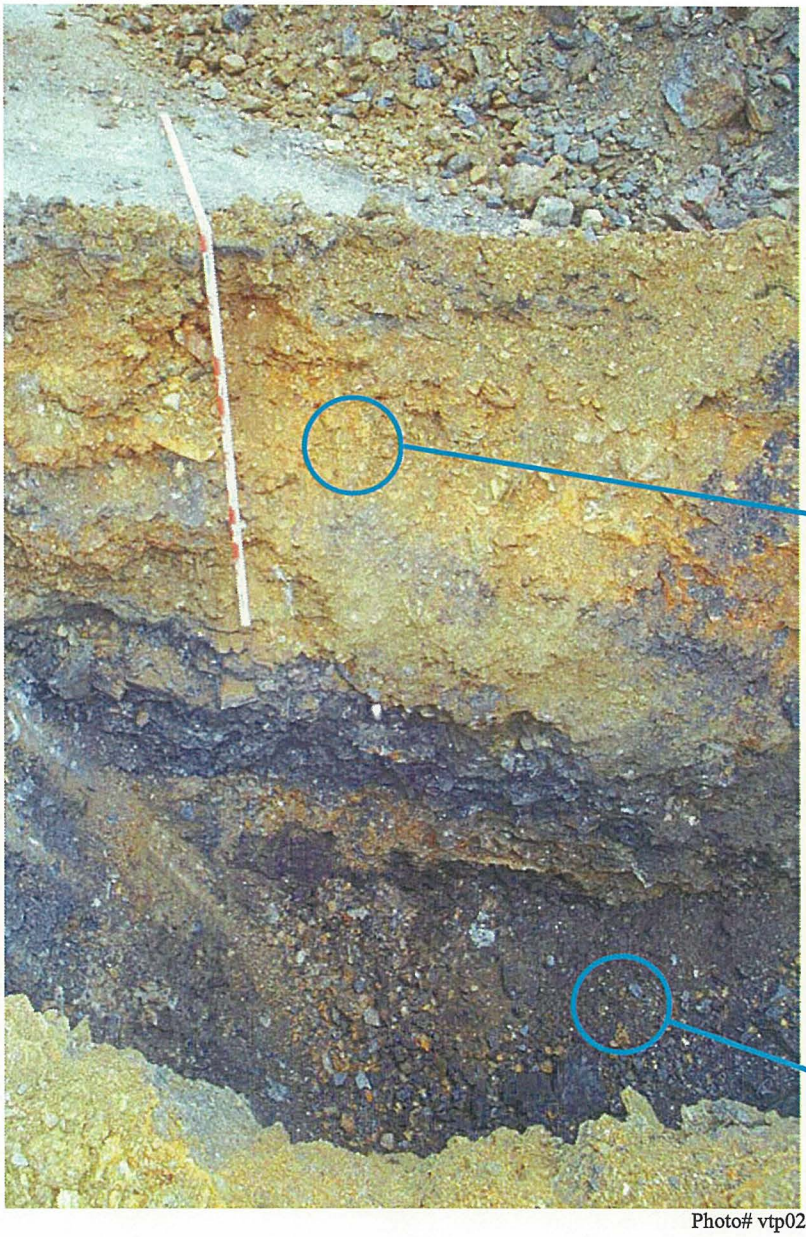
Photo# vtp01.JPG

Description:
35 cm of black graphitic phyllite fines with 5% sulphides, overlying 20 cm of orange brown weathered muscovite phyllite overlying beige to brownish grey phyllite, overlying patchy orange brown and beige mixed phyllite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP01A	70951	100

VTP02



Photo# vtp02.JPG

Description:
Orange red brown strongly oxidized grey sericitic non-calcareous phyllite, overlying dark grey to black graphitic phyllite, overlying oxidized grey sericitic non-calcareous phyllite, overlying black graphitic phyllite. Bottom 90 cm is black graphitic phyllite mixed with oxidized orange-brown sericitic schist.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP02A	70952	20
VTP02B	70953	250

VTP03



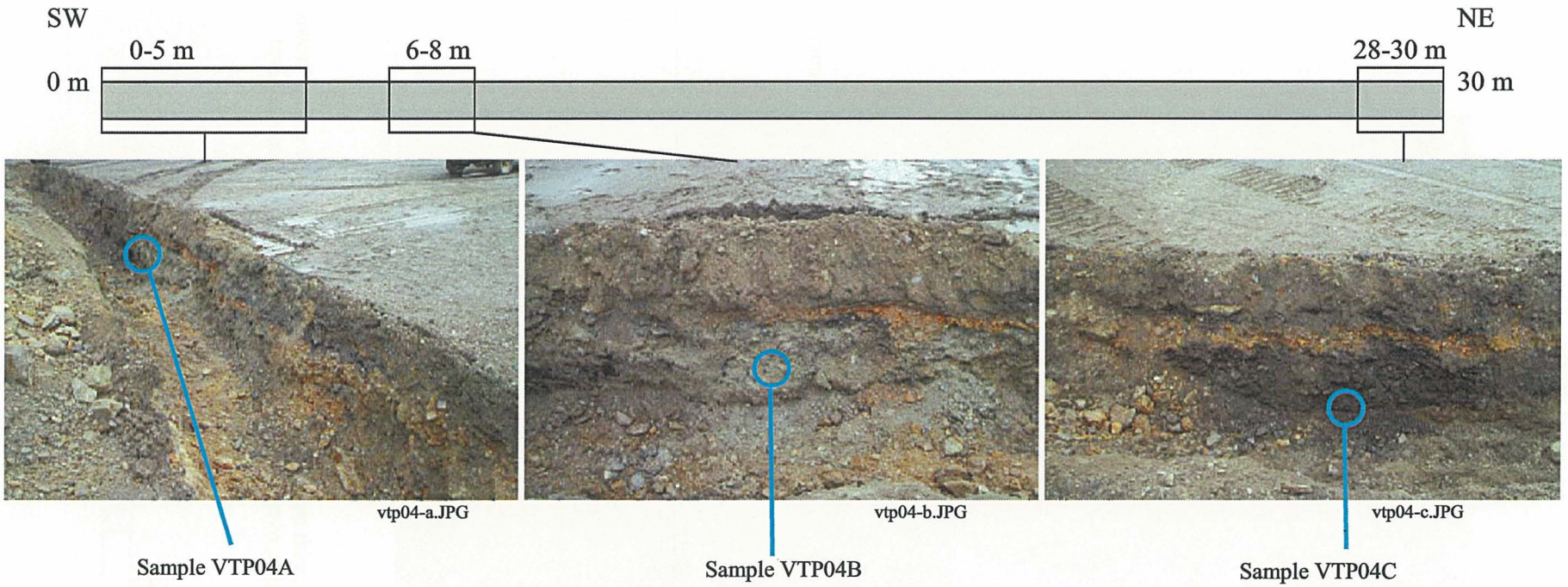
Photo# vtp03JPG

Description:
Traffic surface of black graphitic phyllite, with quartz and minor sulphides, capping pale orange brown weathering non calcareous pale grey phyllite, overlying similar slightly darker brown less weathered material.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP03	70954	250

VTP04



Description:

Trench- azimuth 040. Continuous traffic layer of dark grey to black phyllite overlies discrete, discontinuous segregations of different materials. Below the traffic layer: SW end of trench (sample location VTP04A) has greenish beige to dark grey non-calcareous phyllite; sample location VTP04B (middle photo) has mixed green phyllite and black non-calcareous phyllite; NE end of trench has black weakly calcareous graphitic phyllite containing a few sulphide fragments.

Samples collected:

Sample ID	Lab ID	Length from SW (m)
VTP04A	70955	0-5
VTP04B	70956	6-8
VTP04C	70957	28-30

VTP05



Photo# vtp05.JPG

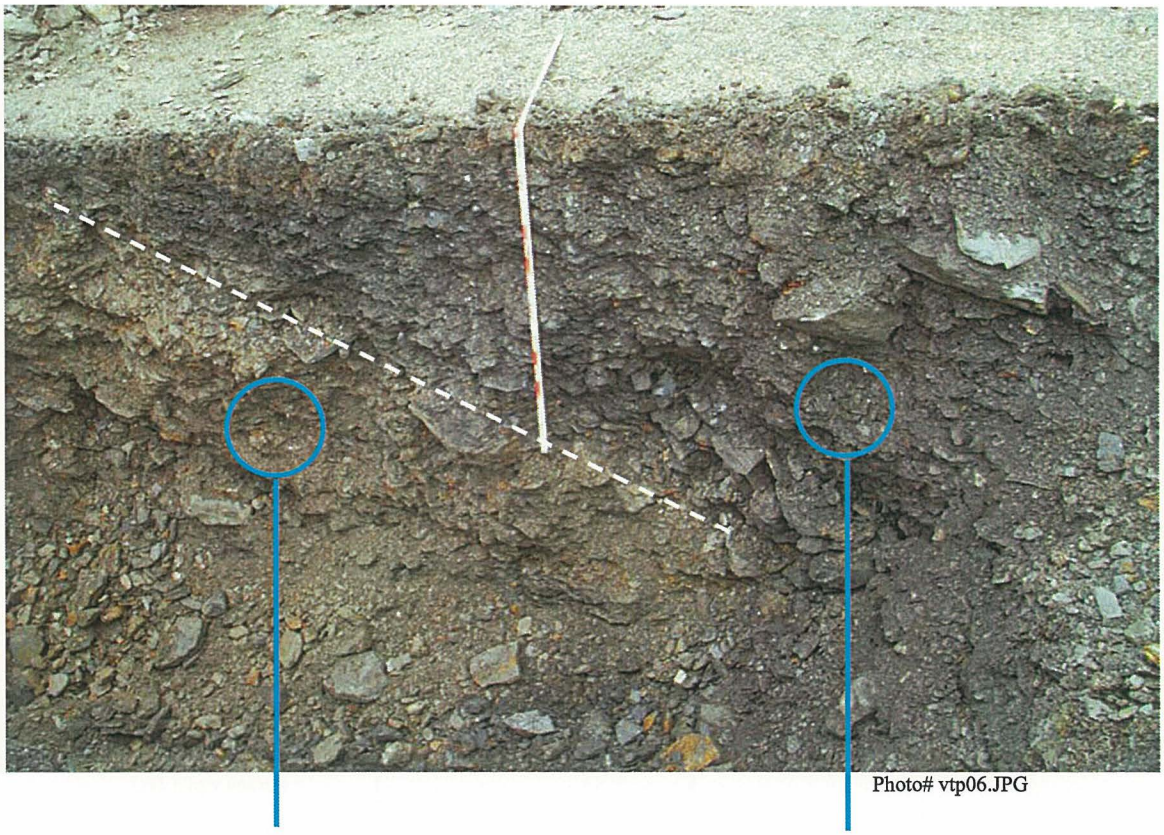
Sample VTP05A Sample VTP05B

Description:
20 cm med to dark brown oxide horizon with grey-green patches and cobble-sized regions of ferricrete, overlying 80 cm of fine grained pale grey-green clay-rich matrix, which in turn overlies black graphitic weakly calcareous pyritic phyllite with minor pale olive green non-calcareous phyllite, rare massive pyrite and pyrrhotite and quartz banded pyrite fragments. The lowest exposed horizon is a medium olive grey clay.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP05A	70958	0-20
VTP05B	70959	140

VTP06

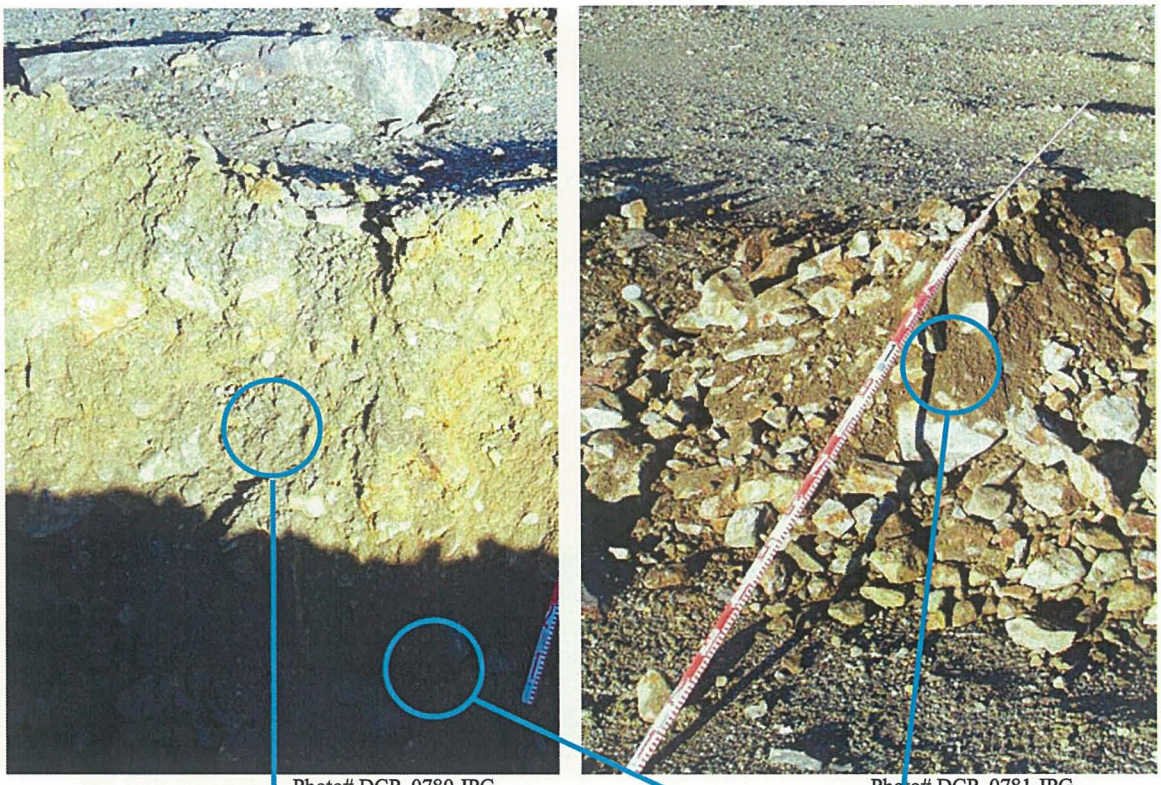


Description:
Black pyritic phyllite and pyritic quartzite overlying mixed tan/ grey horizon containing black pyritic phyllite, pyritic quartzite, grey phyllite and sericite schist. Contact between horizons runs from lower right to upper left in above photo. Both horizons have 5-10% orange brown clasts scattered throughout.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP06A	70960	100
VTP06B	70961	100

VTP07

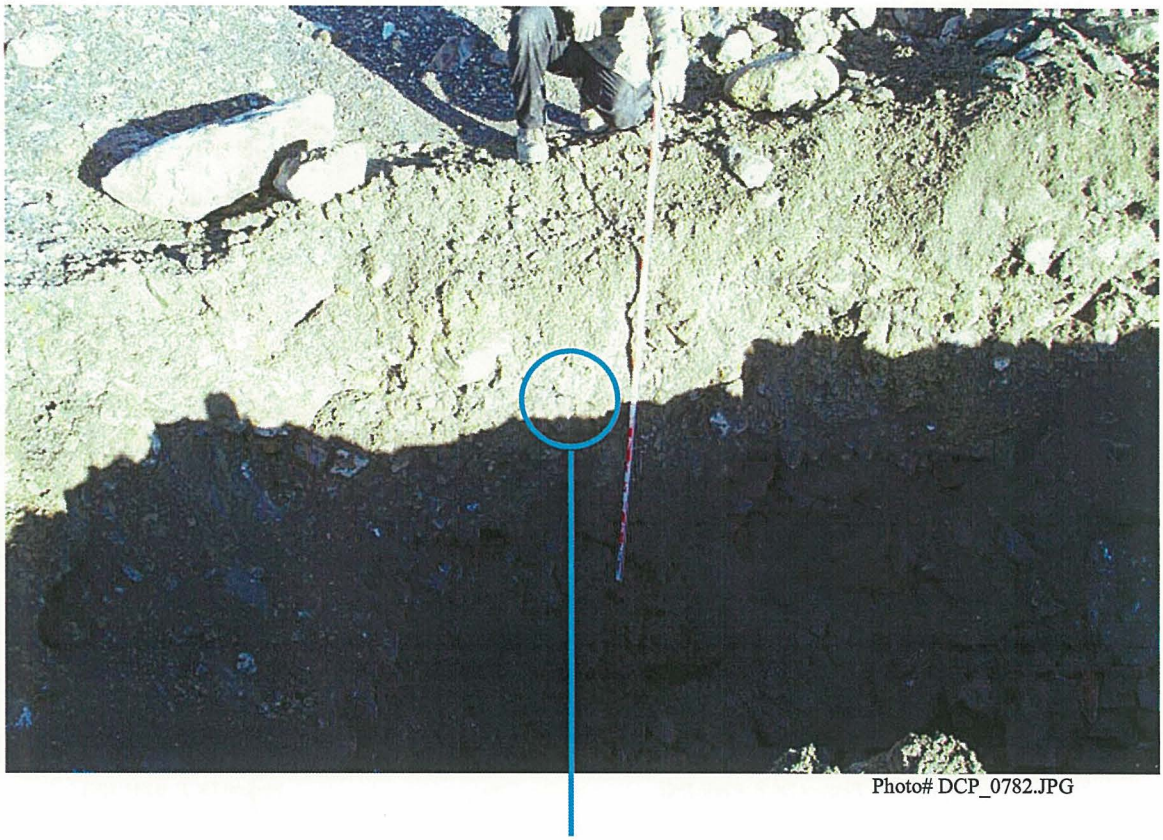


Description:
Medium olive brown sulphides with patches of red brown; no horizon- oxide development is patchy. Fines are non-calcareous. Underlain by dark olive brown sulphides and quartzose sulphides with patches of red brown throughout; photo at right shows excavated lower horizon material.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP07A	70962	100
VTP07B	70963	250

VTP08



Photo# DCP_0782.JPG

Sample VTP08A

Description:
Massive and disseminated pyrite clasts with minor grey phyllite, medium grey green non-calcareous fines; underlain by similar material of darker olive color.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP08A	70964	100

VTP09



Photo# DCP_0783.JPG

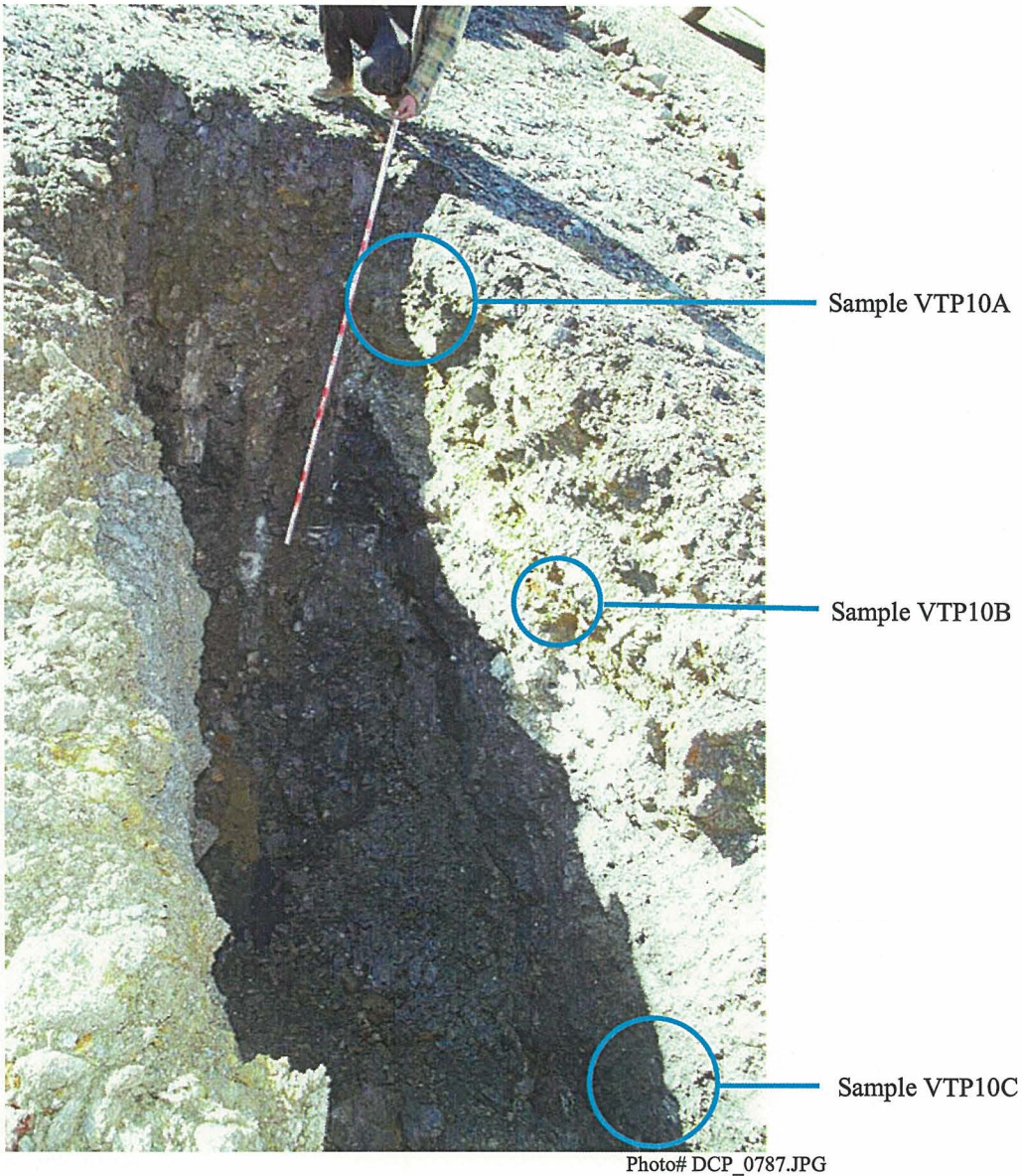
Sample VTP09A

Description:
Traffic surface of 10 cm dark phyllite capping pale olive grey till mixed with medium grey talcose quartz phyllite fragments, minor patches of pale orange brown weathering till. No oxide stratification.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP09A	70965	150

VTP10



Photo# DCP_0787.JPG

Description:
Traffic surface of dark grey phyllite containing 15% sulphide cobbles caps olive brown clay rich till. Underlain by a steel grey clay rich horizon with silvery phyllite and banded sulphide fragments, overlying pale olive brown clay with 20% fine grained massive pyrite pebbles. Below that is silvery grey clay with talcose phyllite fragments containing massive pyrite and banded pyritic quartzite cobbles, underlain by silver grey talcose phyllite with lesser black graphitic phyllite containing fine grained massive pyrite with lesser sphalerite.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP10A	70966	20-40
VTP10B	70967	40-60
VTP10C	70968	200

VTP11 (Baritic Fines)



Photo# DCP_0790.JPG

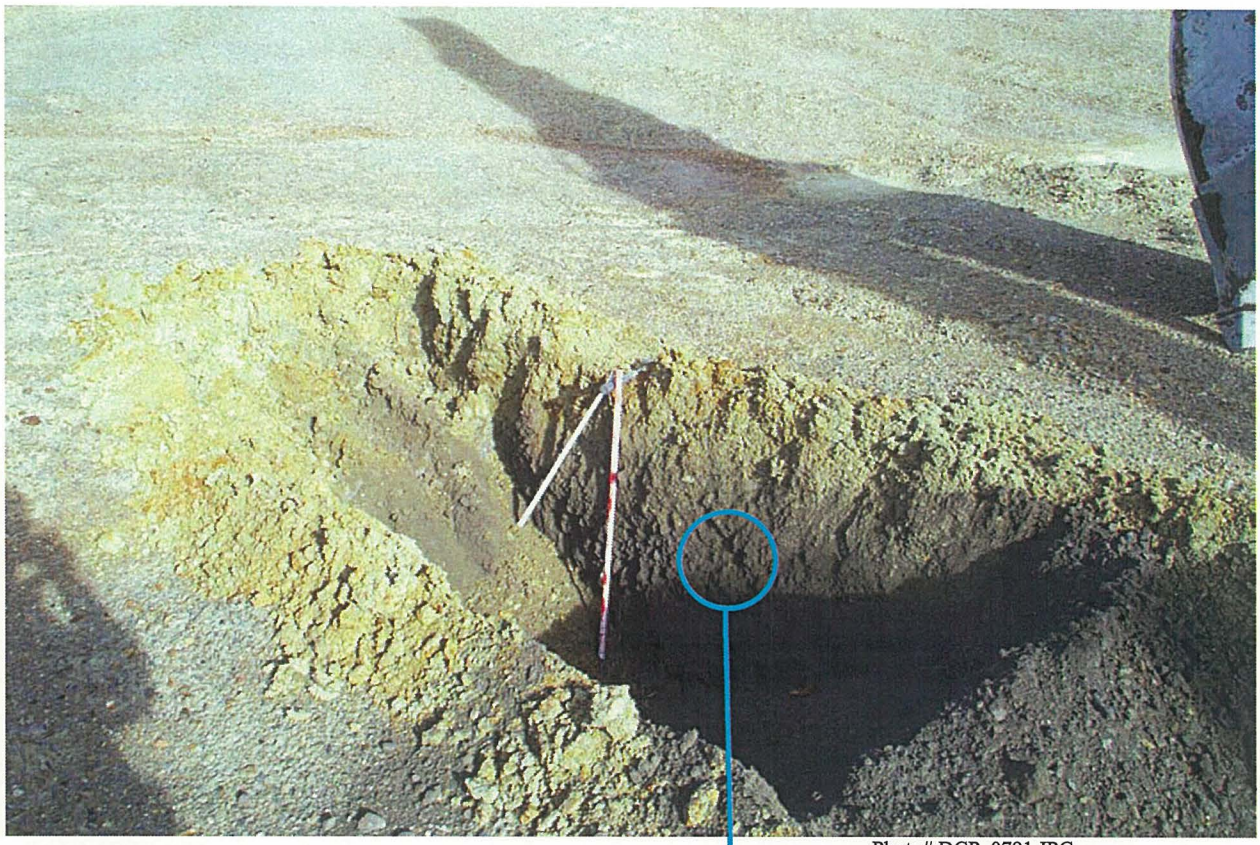
Sample VPT11A

Description:
Baritic ore stockpile; 25 cm of red brown oxidized sulfides with cm scale salts overlies dark olive green sulphide fines and disseminated sulphide clasts to 4 cm.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP11A	70969	100

VTP12 (Baritic Fines)



Photo# DCP_0791.JPG

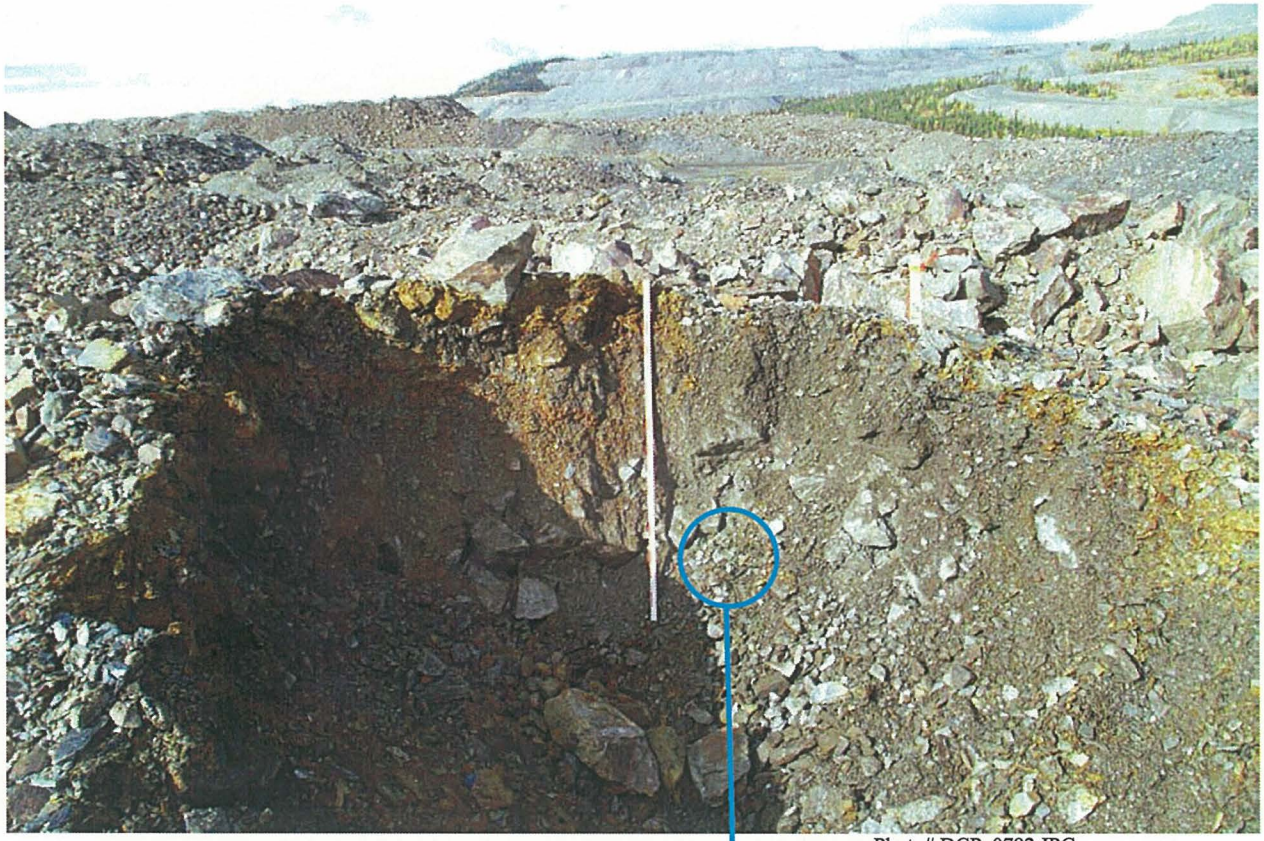
Sample VPT12A

Description:
Baritic ore stockpile;25 cm of yellowish to reddish brown oxidized massive pyrite with minor black phyllite fragments and clay textured fines overlying dark grey to dark olive green sulphide fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP12A	70970	100

VTP13



Photo# DCP_0792.JPG

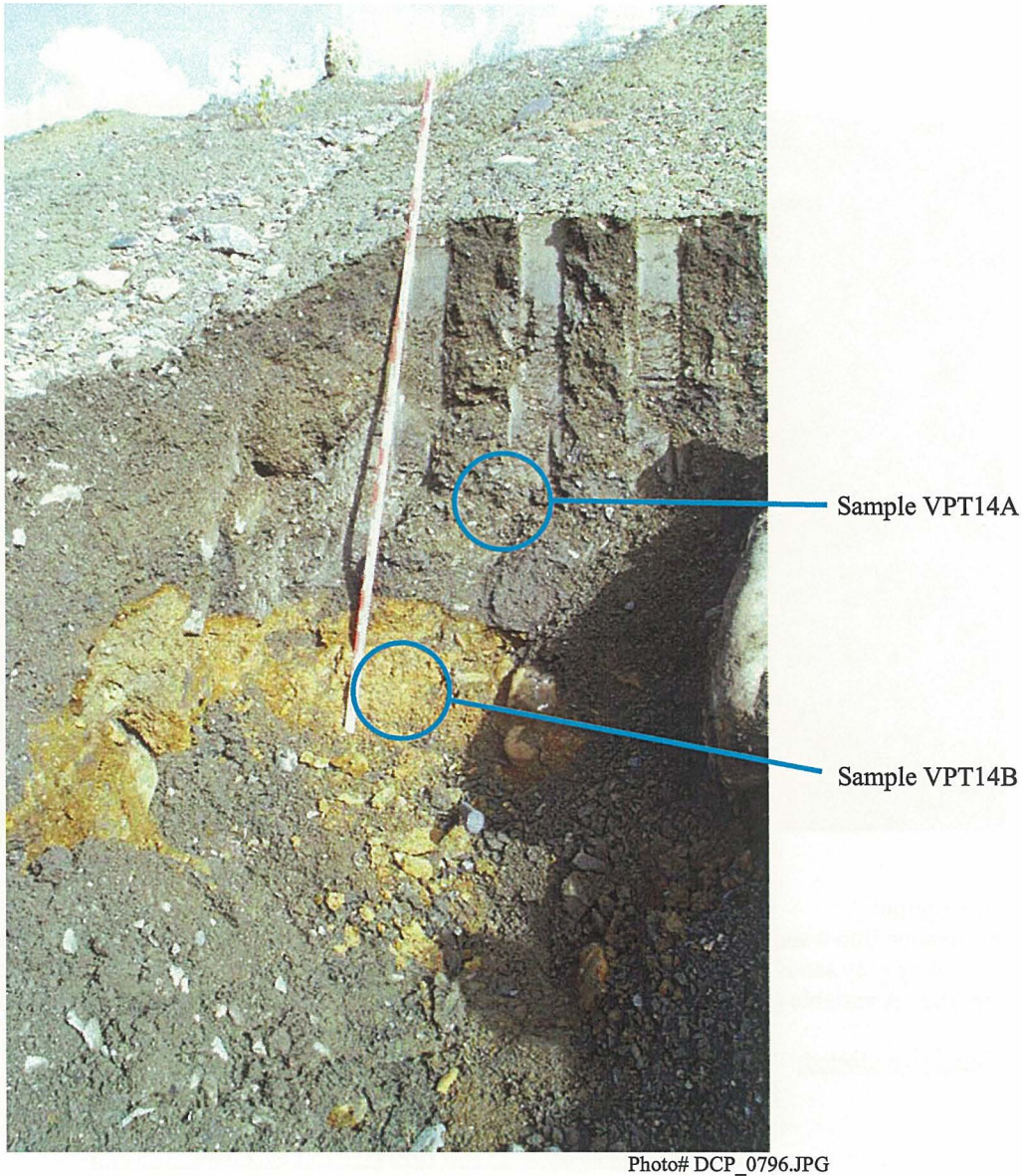
Sample VPT13A

Description:
Excavation into a single free dump revealed 70% banded fine grained and massive pyrite with some sphalerite in a dark olive gray sandy matrix, 30% mixed dark grey phyllite, banded pyritic quartzite and dark grey chloritic phyllite. A variable oxidized zone was evident beneath the dump surface from 0 to 20 cm in thickness.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP13A	70971	100

VTP14 (Till Stockpile)



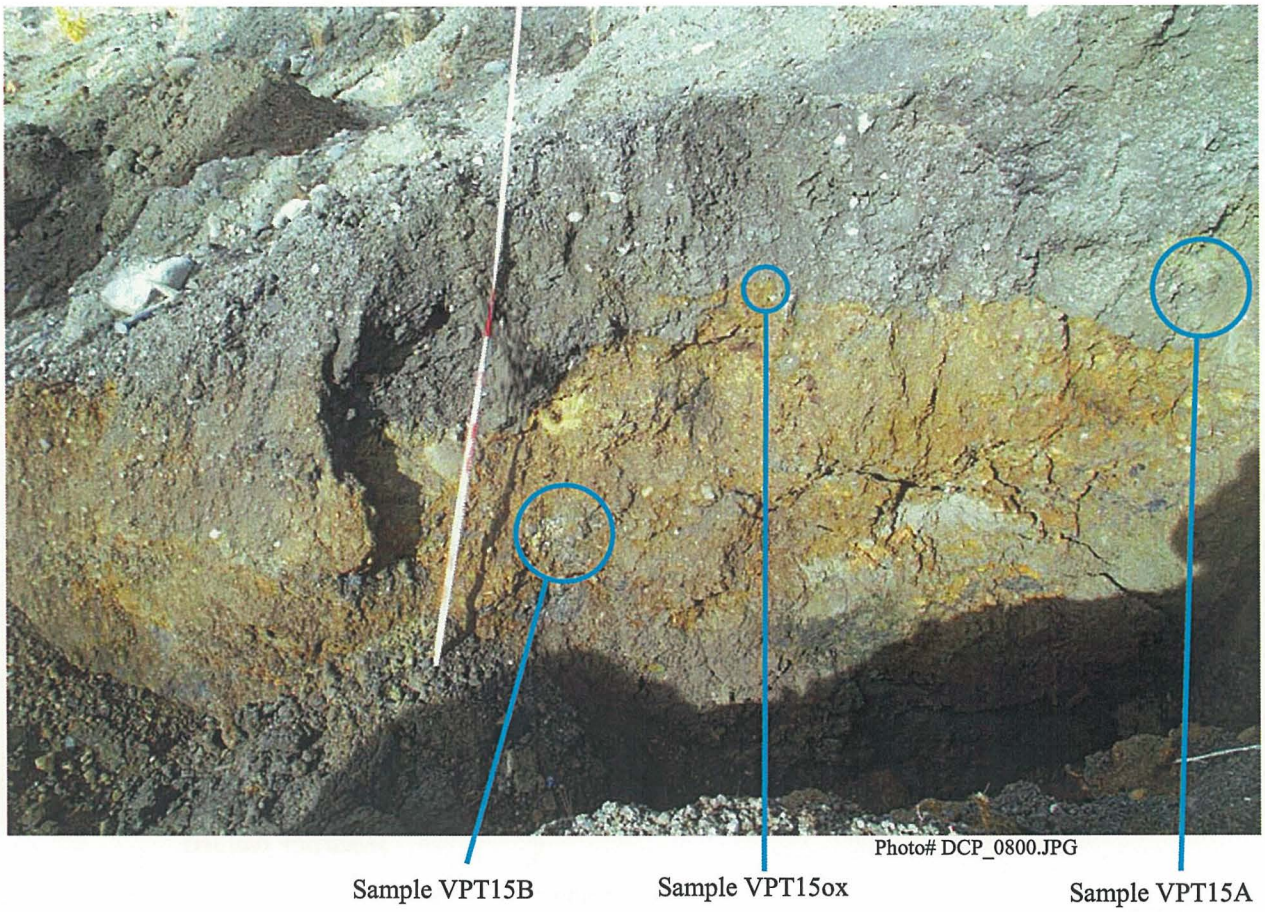
Photo# DCP_0796.JPG

Description:
Excavation into edge of till stockpile revealed an upper layer of medium grey green till with strongly calcareous fines up to 1 m thick underlain by a pale orange brown oxidized till with weakly calcareous fines that continues beyond 2 m depth. The contact between the upper and lower till is marked by a darker orange brown oxidation front.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP14A	70972	50
VTP14B	70973	100

VTP15 (Till Stockpile)

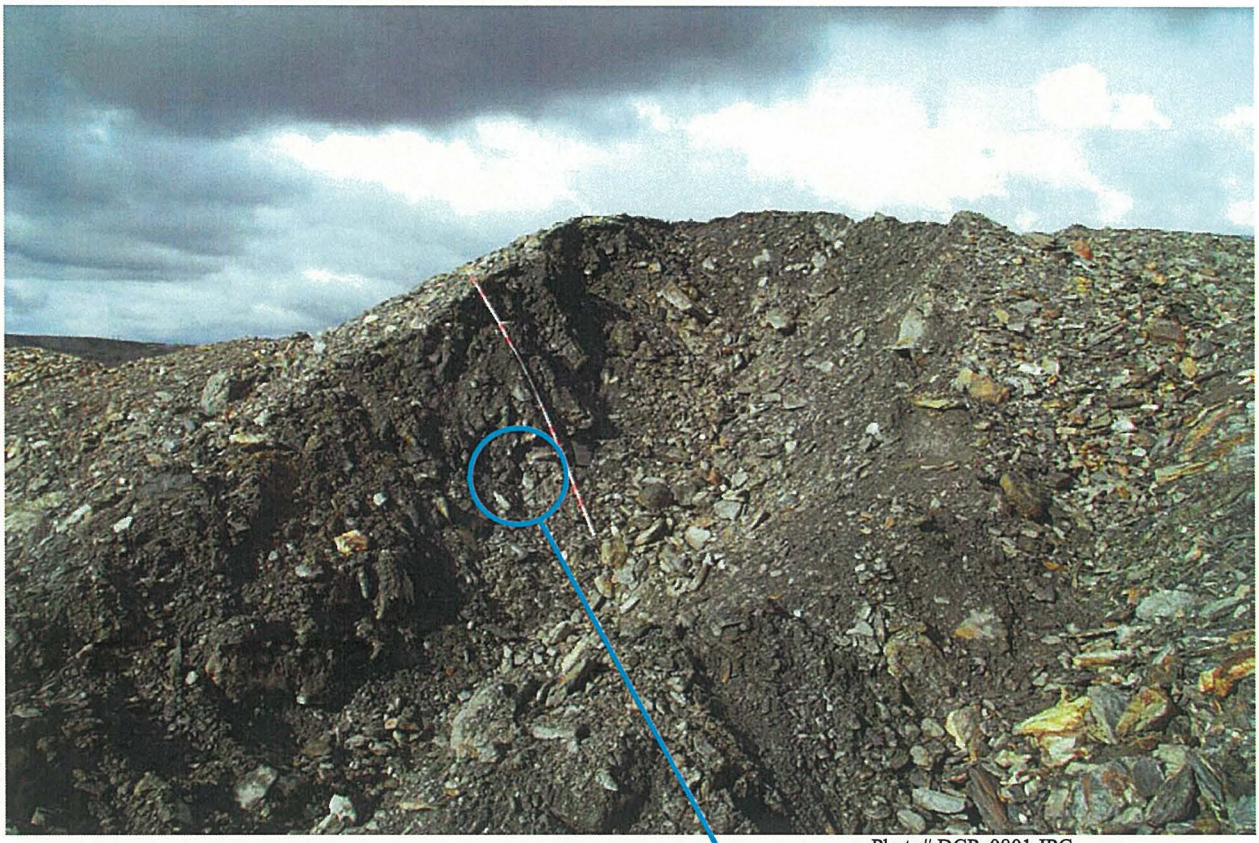


Description:
Excavation into edge of till stockpile revealed an upper layer of dark grey green till overlying both a pale olive green till with strongly calcareous fines and a medium orange brown non-calcareous oxide coated siliceous pyritic phyllite. Upper contact of oxidized material marked by a 1 cm darker orange brown oxidation front containing salt residues.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP15A	70974	50
VTP15B	70975	100
VTP15ox		20

VTP16



Photo# DCP_0801.JPG

Sample VPT16A

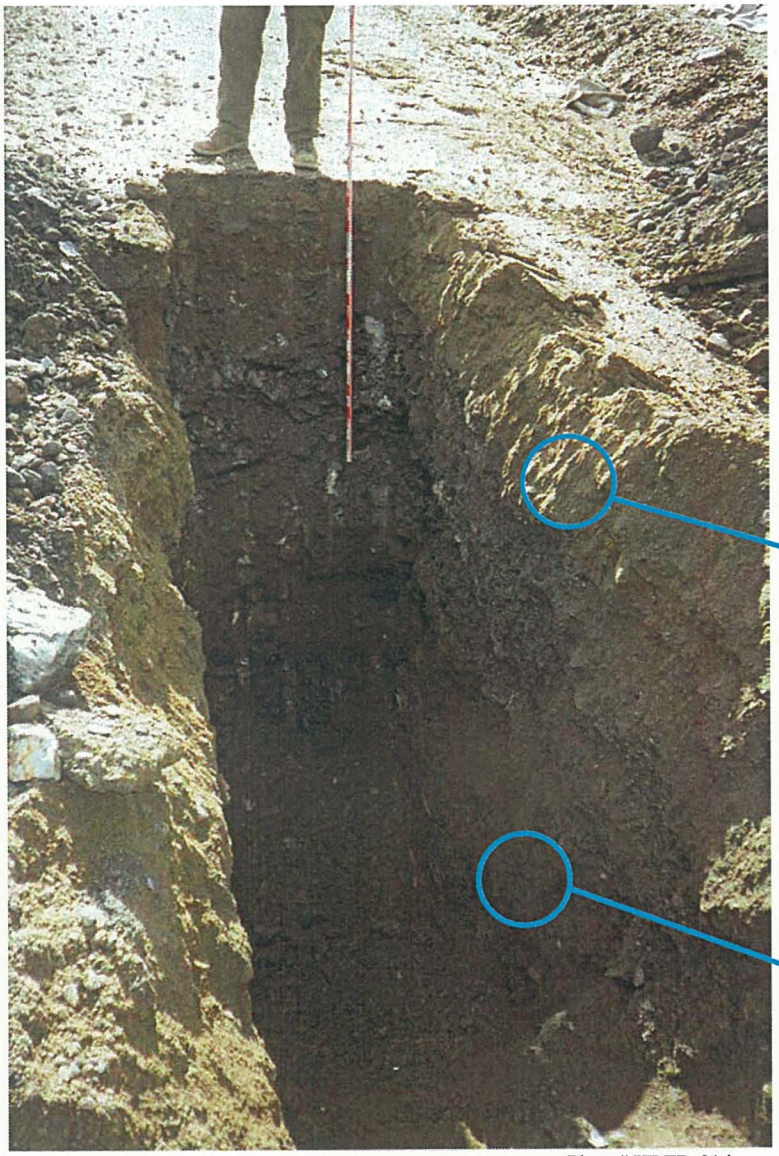
Description:
Excavation into a single free dump revealed 75% silvery and dark grey non-calcareous phyllite and sericitic schist, 10% massive banded pyrite with some sphalerite, pyritic quartz phyllite, chloritic phyllite, graphitic and talcose phyllites, rare spotty red brown oxide patches below the weathering surface in a dark gray to black non-calcareous matrix.

Samples collected:

Sample ID	Lab ID	Depth (cm)
VTP16A	70976	100

APPENDIX E.5
Test Pit Descriptions and Photos – Haul Road

HRTP01



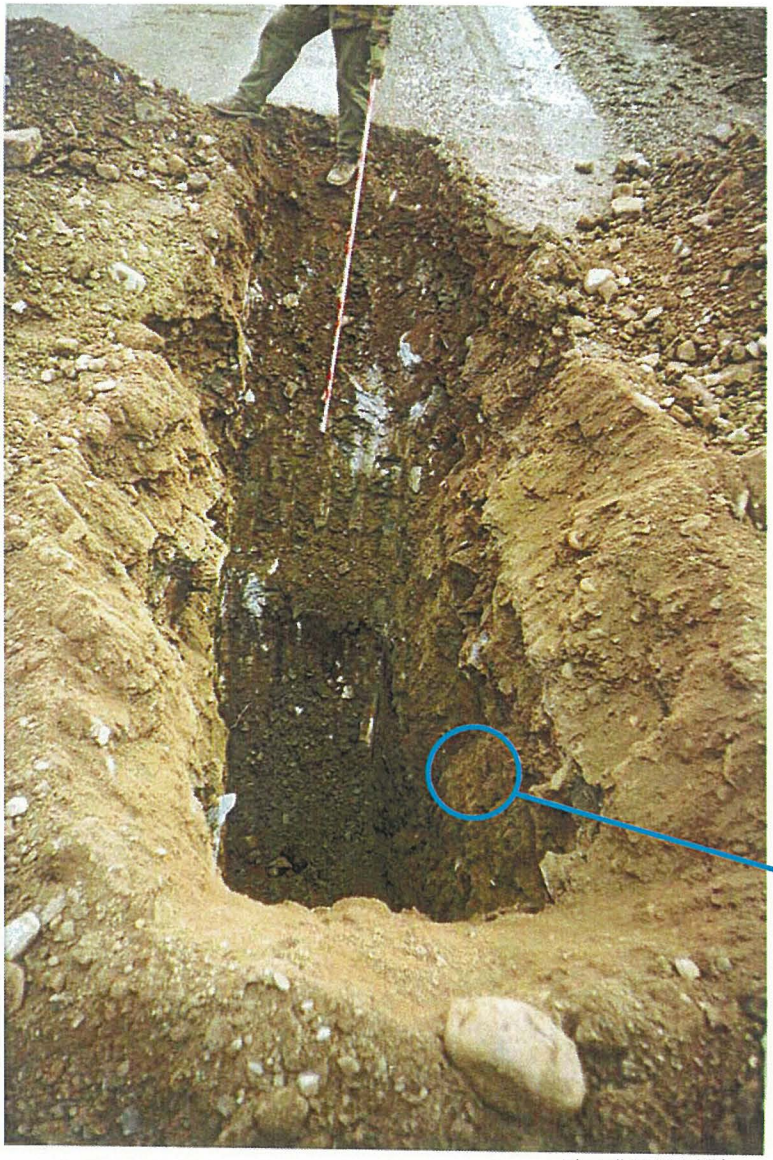
Photo# HRTP_01.jpeg

Description:
Pale brown gravel road surface overlies a medium grey horizon containing dark grey crenulated phyllite, massive pyrite with sphalerite and galena, and pyritic quartzite with sphalerite. 40 cm of pale reddish brown gravel constitute the third layer, which overlies a dark grey phyllite and sulphide waste horizon. The bottom 40 cm of the pit are in pale reddish brown gravel.

Samples collected:

Sample ID	Lab ID	Depth (cm)
HRTP01A	70912	30-100
HRTP01B	70913	180-220

HRTP02



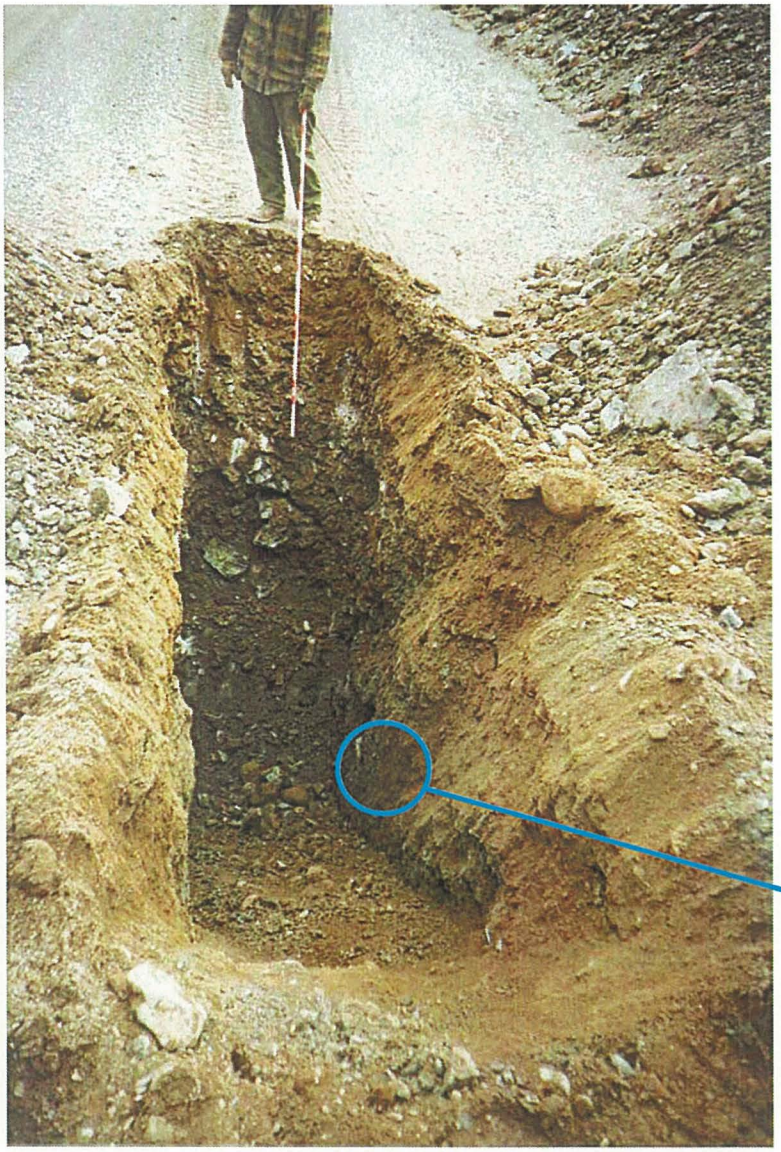
Photo# HRTP_02.jpeg

Description:
100 cm of pale to medium brown gravel and calc-silicate riprap overlies pale olive brown till and calc-silicate schist, which locally contains minor organics.

Samples collected:

Sample ID	Lab ID	Depth (cm)
HRTP02A	70914	150

HRTP03



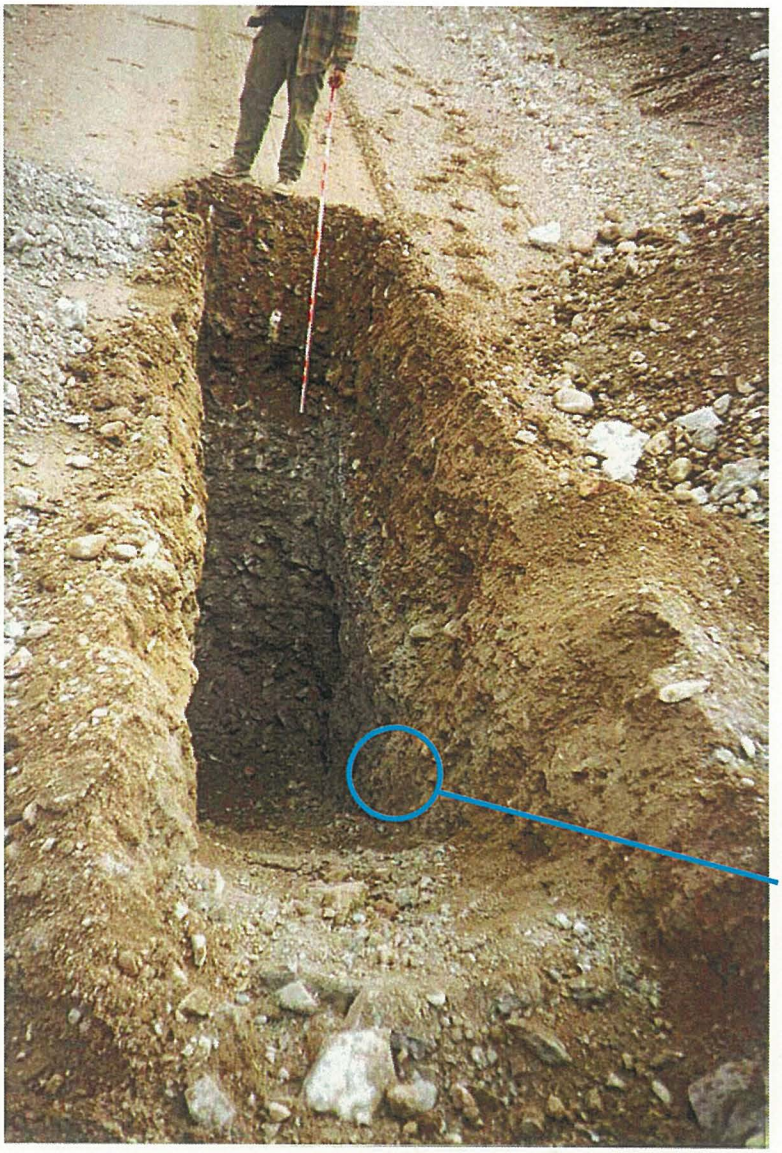
Photo# HRTP_03.jpeg

Description:
Pale brown sandy gravel road surface overlies pale green calc silicate waste with granular calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
HRTP03A	70915	200

HRTP04



Photo# HRTP_04.jpeg

Description:
Brown overburden and gravel cobbles make up road surface. Underlain by pale greenish grey mixed waste including chloritic schist, dark grey phyllite, calc-silicate schist, biotite muscovite schist, rare fine grained massive pyrite, pyritic quartzite with sphalerite and galena, and quartzite with chalcopyrite, all in a matrix of pale greenish grey non calcareous fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
HRTP04A	70916	200-300

HRTP05



Photo# HRTP_05.jpeg

Description:
50 cm brown gravel and sand traffic surface overlies a light greenish grey sandy clay with calc-silicate schist fragments and rare dark grey phyllite and rare pyrite in calc-silicate schist; matrix consists of medium greenish grey calcareous clay. Contains a wedge of pale orange brown oxidized quartz porphyry with weakly calcareous granular fines.

Samples collected:

Sample ID	Lab ID	Depth (cm)
HRTP05A	70917	150
HRTP05B	70918	220

Test Pit Sample Log

		Location					Sample Info					Grain size				Field Measurements			
Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (µs	Fizz	Colour
FTP01	23-Sep	FVN	584864	6915818	1305.8		FTP01A	70801	50 cm	Oxidized Qtz musc phyllite	Orange, oxidized fragments of pale grey to grey-green qtz musc phyllite, some frags have 5% diss py in qtz layers, frags subangular blocky	40	60	non-calc fines	845	4.5	2070	none	orangish brown
							FTP01B	70802	150 cm	Oxidized schist	Pale orange brown to beige subangular blocky frags of weathered schist	50	50	non-calc fines		3.3	2480	none	light orange
FTP02	23-Sep	FVN	584778	6915701	1296.9		FTP02A	70803	50 cm	Oxidized phyllite	Pale orange brown oxidized phyllite with qtz musc phyll; small wedge of strongly oxidized material, red-brown	15	85	orange brown non-calc fines	846	3.5	372	none	orangish brown
							FTP02B	70804	150 cm	Weathered granite	Pale beige sandy waste with blocky altered granitic frags; granite has broken down to feldspathic sand, subang frags of biot-qtz granodiorite to 20 cm	30	70	sandy fines, strongly calc		7.4	579	moderate t	light brown
FTP03	23-Sep	FVN	584977	6915815	1296		FTP03A	70805	200 cm	Oxidiized Qtz musc phyllite	Med greenish grey weakly oxidized qtz musc phyll, non-calc, platy and blocky frags 2-9 cm	50	50	pale orange brown fines, non-calc	847	5.2	315	none	brownish orange
FTP04	23-Sep	FVS	584979	6915789	1290.4		FTP04A	70806	200-300 cm	Oxidized Sulphides	Med orange weathering oxidized material, fines are non-calc, 10-20% mixed sulphide frags in the 10-15 cm range, massive po (2H), mass py, banded pyritic qtz sericite schist, py sph, gn in granular qtz matrix; biot qtz granodiorite (10E)	25	75	med-orange brown non-calc fines	848	2.0	6430	none	medium orange
FTP05	23-Sep	FVS	584903	6915603	1290.4		FTP05A	70807	0-50 cm	Brown till	Pale orange brown mixed till and waste frags of qtz musc schist	20	80	non-calc fines	849, 850	2.0	4800	none	brownish orange
							FTP05B	70808	50-80 cm	Oxidized waste	Red-brown oxidized overburden waste, biot granite frags in oxidized gritty matrix, minor qtz musc schist; 2 boulders of py sph (20 cm) in gritty matrix					2.4	4920	none	light orange
FTP06	23-Sep	NEU	585656	6914490	1281.1		FTP06A	70809	100-150 cm	Sandy pebbly till	Med reddish brown sandy pebbly till, rare subang platy frags 2-4 cm, minor white qtz porphyry and qtz musc phyll	30	70	non-calc fines	851	4.7	280	none	light orange
FTP07	23-Sep	NEU	585663	6914496	1286.8		FTP07A	70810	100-200 cm	Qtz porphyry	Ang granitic material 'smoky qtz porphyry' (10F)	60	40	pale brown weakly calc fines	852	7.4	418	moderate	medium brown
FTP08	23-Sep	NEU	585651	6914367	1259.4		FTP08A	70811	20-30 cm	Qtz musc phyllite	subangular blocky qtz musc phyll, pyritic sericite schist	50	50	non-calc fines		2.9	3990	none	orangish brown
							FTP08B	70812	100-150 cm	Qtz porphyry	Smoky qtz porphyry' (10F), qtz phyll	40	60	dark grey non-calc fines		3.5	4750	none	greenish brown
FTP09	24-Sep	NEL	585362	6914255	1227.7		FTP09A	70813	300-370 cm	Till	Clay rich talcose overburden, 20% cobbles, 10% platy schist; test pit did not penetrate sulphide cell	40	60	non-calc fines	853	6.6	266	weak	light brown
FTP10	24-Sep	NEL	585560	6913933	1256.3		FTP10A	70818	100 cm deep 8 m along trench	Calc-silicate	Pale grey banded and brecciated calc-silicate, mixed with lesser pale greenish grey biot qtz porphyry ,60% (10E)?/40% (3DO)	40	60	pale olive brown fines, highly calc	854	8.2	213	strong	medium brown
							FTP10B	70815	100 cm deep 22 m along trench	Biot porphyry	Iron stained biotite porphyry, with lesser orange brown weathering pyritic calc-silicate	40	60	med orange brown fines, non-calc	855	6.5	2210	weak	orangish brown
FTP11	24-Sep	NEL	585629	6914037	1260.4		FTP11A	70816	100 cm deep 6 m along trench	Calc-silicate	Med greenish grey calc silicate (3D), calcareous, minor (1D) biot-musc schist			pale greenish grey sandy fines, highly calc	858	8.4	353	strong	brownish grey
							FTP11B	70817	100 cm deep 30 m along trench	Brown schist	Med olive brown schist, with biot musc phyll (1D) and pale silvery talcose musc-biot schist, calcareous platy frags	40	60	pale brown sand sized talcose fines, very calcareous	859	8.4	182	moderate t	light brown
FTP12	24-Sep	NEL	585550	6914062	1259.2		FTP12A	70818	200 cm	Calc-silicate	2-4 cm blocky calcareous calc-silicate frags	30	70	pale greenish grey fines, highly calc	861	8.2	207	strong	brownish grey
FTP13	24-Sep	NEL	585505	6914001	1253.2		FTP13A	70819	200cm	Calc-silicate	2-4 cm blocky calcareous calc-silicate frags, minor porphyry frags	40	60	pale olive brown fines, stronly calc	863	8.2	391	strong	light brown
FTP14	24-Sep	ZIIE	585385	6913882	1246		FTP14A	70820	100 cm deep 28 m along trench	Sericite schist	Pale grey to beige altered sericite schist, frags 2-4 cm	50	50	Pale beige non-calc fines	866	7.8	1228	none	light brown
							FTP14B	70821	100 cm deep17 m along trench	Calc-silicate	Med olive grey highly calcareous calc-silicate, 2-3 cm frags	40	60			8.4	256	strong	light brownish grey
FTP15	25-Sep	ZIIE	585267	6913903	1218.1		FTP15A	70822	100 cm	Musc schist	Pale grey-brown to beige musc-biot-qtz schist (1D), > 10 cm fraction 40%	50	50			7.8	481	weak	light brown
FTP16	25-Sep	ZIIE	585328	6913981	1217.6		FTP16A	70823	100-120 cm	Qtz porphyry	Smoky qtz porphyry (10F), white with beige granular matrix, 2-3 cm blocky	50	50	pale brown non-calc fines	868	7.6	296	weak to m	light brown
							FTP16B	70824	200-300 cm	Andalusite schist	Greenish grey andalusite biot musc schist (1D), rare calc-sil frags	50	50	Med grey brown non-calc fines + schist frags		6.0	2050	none	light brown
FTP17	25-Sep	ID	584489	6913407	1218.8		FTP17A	70825	30 cm deep 7 m along trench	Biot musc schist	Greenish grey biot musc schist (1D)	50	50	Red brown granular non-calc fines	869	4.0	4570	none	brownish orange
							FTP17B	70851	50 cm deep 18 m along trench	Musc biot schist	Greenish grey biot musc schist (1D)	40	60	Pale greenish grey non-calc fines		7.4	956	weak	brownish grey
							FTP17C	70852	50 cm deep 24 m along trench	Biot QFP	Biotite QFP (10E), minor calc-silicate, minor biot schist, minor py and gn	40	60	Bright orange brown non-calc fines		2.7	3400	none	medium orange
FTP18	25-Sep	ID	584620	6913353	1219.5		FTP18A	70853	100 cm deep 29 m along trench	Sulfides	Blocky, subrounded py frags, lesser QFP (10E)	40	60	orange brown granular non-calc fines	870	6.5	1977	weak	brownish grey
							FTP18B	70854	100 cm deep10 m along trench	sulfides	Med grey blocky pyritic sph/gn frags, 2-4 cm, minor schist frags			Med grey granular fines, non-calc		3.5	7240	none	brownish orange
FTP19	25-Sep	ID	584662	6913429	1221.2	6	FTP19A	70855	200-230 cm	Biot QFP	Greenish-grey biot QFP (10E)70%, weakly calc med grey-green schist/calc-silicate (3D0) 30%	50	50	pale greenish grey weakly calc fines	871	8.0	650	strong	brownish grey
FTP20	25-Sep	ID	584555	6913503	1223.6	6	FTP20A	70856	400-450 cm	Calc-silicate	Grey green calc-silicate (3D0), 2-7 cm frags	60	40	clay rich matrix, balling up on sieve, highly calc	872	7.3	482	moderate	greenish grey
FTP21	25-Sep	ID	584485	6913690	1217.1	6	FTP21A	70857	75-100 cm	Sulfides	Mass and diss py (2E), minor gn, sph, frags 2-6 cm	60	40	red brown granular fines, non-calc	873	2.4	7550	none	brownish orange
							FTP21B	70858	200-260 cm	sulfides	Rounded massive py frags, 1-4 cm	50	50	dark grey pyritic sands		4.3	5200	none	medium brown

Test Pit Sample Log

		Location					Sample Info					Grain size				Field Measurements			
Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (us	Fizz	Colour
FTP22	25-Sep	GSPC	584348	6914347	1199.8	6	FTP22A	70859	30 cm	Sulfides	Oxidized sulfides, pale reddish brown, diss to mass banded, siliceous py frags	50	50	pale brown fines non-calcareous	874	2.0	5720	none	brownish orange
							FTP22B	70860	200 cm	Pyritic sand	Med grey pyritic sand and pyritic phyllite frags	60	40	red-brown non-calc fines		2.4	9750	none	brownish orange
FTP23	26-Sep	GSPA	584139	6914528	1234.7		FTP23A	70861	50-100 cm	Sulfides	2-4 cm frags of mass py	50	50	red brown non-calc fines	876	2.2	6870	none	brownish orange
							FTP23B	70862	150-200 cm	Sulfides	Pale grey brown sulfide waste to greenish brown py sand w/ 20% rounded mass py frags of 2-4 cm	30	70	brown non-calc fines		2.1	7260	none	brownish orange
							FTP23C	70863	300-320 cm	Sulfides	Pale orange brown sulfide; pyrite sand with 30% rounded frags, rare schists and silica-rich frags to 20 cm	30	70	pale brown non-calc fines		2.5	6760	none	orangish brown
FTP24	26-Sep	MDE	584099	6913752	1308.2		FTP24A	70864	100-200 cm	Calc-silicate	50% calc-silicate (3D0), 50% (1D) biot-musc qtz schist, 3-5 cm blocky frags	50	50	pale grey brown sandy, talcose fines, highly calc	877	8.0	558	strong	brownish grey
FTP25	26-Sep	MDE	584173	6913745	1303.7		FTP25A	70865	150 cm	Calc-silicate	Angular blocky calc -silicate frags, 1-3 cm, rare schist and biot QFP (10E)	50	50	pale greenish grey highly calc granular fines	878	7.6	1118	strong	light grey
							FTP25B	70866	300-400 cm	Qtz sericite schist	20% talcose qtz sericite schist, 15% (1D) biot musc schist, 10% hbl-biot QFP (10E), 5% py in banded qtz schist, sph,gn			pale brown talcose sandy fines, highly calc		7.8	1492	moderate t	brownish grey
FTP26	26-Sep	MDE	584424	6913815	1254.4		FTP26A	70867	200-300 cm	Biot musc schist	Pale greenish grey (1D) biot musc andalusite schist, biot musc qtz schist, 10% quartz frags; frags angular + blocky, 2-6 cm	50	50	pale green ganular calc fines	879	7.1	2650	moderate	greenish grey
FTP27	26-Sep	MDE	584326	6913894	1250.6	7	FTP27A	70868	0-20 cm	Calc-silicate + sulphides	70% calc silicate (3D0), 10% qtz porphyry (10F); py-qtz, fine grained mass py frags	40	60	red-brown non-calc sandy fines	880	5.2	2430	weak	brownish orange
							FTP27B	70869	100-200 cm	1D schist	Pale olive brown to med greenish grey biot musc chl schist, pyritic qtz phyllite, 10% mass py frags; frags 2-5 cm angular + blocky			pale brown to beige calc fines		7.4	1774	moderate	light brown
FTP28	26-Sep	MDE	584228	6913981	1242.6	6	FTP28A	70870	200-300 cm	Qtz sericite schist	75% qtz sericite schist (1D4), 20 % QFP (10F), 5% mass and diss fine grained py, pyritic qtzite	50	50	pale greenish grey sandy matrix	881	7.6	666	weak	orange brown
FTP29	26-Sep	MDE	584099	6913912	1244.5	6	FTP29A	70871	50-100 cm	Talcose schist	90% med grey crenulated talcose schist, 10% qtz sericite schist (1D4); subangular frags 2-7 cm, minor py	50	50	pale brown non-calc fines	882	6.2	1511	weak to no	medium brown
							FTP29B	70872	300-350 cm	Talcose schist	Med grey musc talcose schist 70%, qtz sericite schist (1D4)30% pyritic in part, rounded frags 1-5 cm	50	50	pale orange brown non-calc fines		4.9	5940	none	orangish brown
FTP30	26-Sep	MDE	584025	6913689	1321.2		FTP30A	70873	50 cm deep, 12 m along trench	Qtz porphyry	Hbl biot qtz porphyry (10E) , dark grey phyll and graphitic phyll, (1D) biot musc qtz schist	40	60	pale grey granular fines	883	7.6	763	weak	greenish grey
							FTP30B	70874	50 cm deep, 22 m along trench	Qtz sericite schist	Qtz sericite schist, med grey talcose schist, mass sulphide sph, py, 1D biot musc qtz schist	50	50	pale orange brown granular fines non-calc		6.9	579	weak	light orange
FTP31	26-Sep	MDE	584112	6913634	1239.3	5	FTP31A	70875	100 cm deep 23 m along trench	Calc-silicate	60% calc-silicate (3D0), 30% hbl biot qtz porphyry (10E), 10% dark grey crenulated phyll	50	50	pale greenish grey highly calc fines	884	8.4	306	strong	light grey
							FTP31B	70876	100 cm deep 2 m along trench	Ox QFP	100% oxidized QFP (10F), pale orange brown	40	60	pale brown granular calc fines		8.2	223	moderate	light brown
FTP32	26-Sep	MDE	584167	6913629	1240.2	6	FTP32A	70877	100 cm deep, 9 m along trench	Ox 1D schist	Pale orange brown pyritic qtz sercite schist; 80% oxidized (1D) schist, 20 % ferricrete	40	60	pale orange brown granular fines	885	2.3	7360	none	dark orange
							FTP32B	70878	100 cm deep, 27 m along trench	Biot musc schist	Med grey 90% biot musc schist (1D), 10% dark green feldspar porphyry (10E)	40	60	pale greenish grey granular fines weakly calc		6.5	932	weak to m	light brown
FTP33	27-Sep	NWU	583409	6915315	1301	8	FTP33A	20879	50-100 cm	Hbl biot granodiorite	Subangular hbl biot granodiorite frags, 1-3 cm; some frags are breaking down to sand	30	70	pale brown non-calc granular fines		7.1	511	weak to m	orangish brown
							FTP33B	20880	200-300 cm	Hbl biot granodiorite	Subangular hbl biot granodiorite frags, 1-3 cm; some frags are breaking down to sand	30	70	pale brown non-calc granular fines		6.7	583	none	orangish brown
FTP34	27-Sep	NWU	583535	6915228	1308.2	6	FTP34A	70881	30-60 cm	Siliceous phyllite	Pale orange to yellow brown oxide zone, siliceous phyllite w/ sulfides	30	70	pale yellow brown to beige non calc clay fines (fines ball up during screening), weathered sulfides (py) and qtz	886	1.8	6020	none	brownish orange
							FTP34B	70882	150 cm	Mass sulfides	Dark brown coarse angular material, massive po, mass sph w/ gn, dark very fine grained heavy sooty angular frags 2-7 cm			grey brown non-calc fines, form clay balls		2.2	5480	none	medium brown
							FTP34C	70883	250 cm	Hbl biot granodiorite	Weathered hbl biot qtz granodiorite (10E), rounded	30	70	Brown granular non-calc fines, form clay balls		3.5	4030	none	orangish brown
FTP35	27-Sep	NWU	583611	6915063	1304.9	6	FTP35A	70884	30-50 cm	Sulfides	Banded siliceous pyritic rocks with sph, gn - disintegrating; massive py + po frags, sulphates in voids	40	60	Pale yellow brown fines, clay balls - non calc	887	1.6	14780	none	dark orange
							FTP35B	70885	80-170 cm	Sulfides	Med grey sulfides; porphyry (10E); pale green salt precipitate	30	70	Pale grey fines "pyrite sand" and non-calc clay balls		1.6	14080	none	orangish brown
							FTP35C		80-170 cm	Pale green crystals	Pale green transparent elongate crystals 2mm								
FTP36	27-Sep	NWU	583741	6915033	1297.4	6	FTP36A	70886	50-90 cm	Biot hbl granodiorite	Angular blocks of biot hbl qtz granodiorite (10E), pale greenish grey	40	60	Pale brown granular non-calc fines	888	7.2	946	moderate	light brown

Test Pit Sample Log

		Location					Sample Info					Grain size				Field Measurements			
Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (µs	Fizz	Colour
FTP37		NWM	583500	6915064	1261.8	8	FTP37A	70887	50-100 cm	Musc biot schist	Musc biot qtz schist (1D), 2-5 cm blocky angular frags	40	60	Pale greenish grey weakly calc sandy fines	889	7.2	444	weak to m	light brown
							FTP37B	70888	200 cm	Musc biot schist	Med grey biot musc qtz schist, pyritic qtz sericite schist, talcose schist, oxidized on surface, mixed platy and blocky frags	50	50	pale orange brown sandy matrix		6.6	2530	weak	light brown
FTP38	27-Sep	NWM	583507	6914969	1259.9	8	FTP38A	70889	150 cm	Calc-silicate	90% calc-silicate (3D0), 10% oxidized pyritic chl schist, amphibole schist	50	50	pale brown calc fines	890	7.5	618	strong	light brown
FTP39	27-Sep	NWM	583671	6914902	1254.9	8	FTP39A	70890	100 cm	Biot musc schist	Oxidized biotite musc qtz schist, minor qtz sericite schist	50	50	pale brown non-calc fines	891	2.4	1805	none	light orange
							FTP39B	70891	200-300 cm	Biot musc schist	Oxidized biotite musc qtz schist, minor qtz sericite schist; minor talcose and chl schist	50	50	pale brown non-calc fines		5.8	999	none	orangish brown
FTP40	28-Sep	NWM	583730	6914801	1244.3	8	FTP40A	70892	100 cm	Calc-silicate	Pale grey-brown to beige calc silicate, frags 2-3 cm subang	50	50	pale brown granular fines, weakly calc	892	6.9	700	weak	pale gry-brown
							FTP40B	70893	300 cm	Calc-silicate, schist	40% calc-silicate (3D0), 40% biot musc schist (1D), 20% dark grey phyllite	50	50	pale brown non-calc fines		6.8	2500	moderate	pale gry-brown
FTP41	28-Sep	NWM	583517	6914833	1245.7	7	FTP41A	70894	50-100 cm	Qtz sericite schist	Oxidized qtz sericite schist (1D4), ferricrete	50	50	oragne brown fines	893	3.1	2500	none	pale orange brown
							FTP41B	70895	250-300 cm	Qtz sericite schist	Pale greenish grey horizon, qtz sericite schist + pyritic banded qtzite, frags subang and blocky, 2-4 cm	50	50	pale brown fines		4.5	4200	none	pale orange brown
FTP42	28-Sep	UPL	583211	6914486	1193.8	7	FTP42A	70896	200 cm	Calc-silicate	88% pale greenish grey calc-silicate (3D0), 9% schist, 3% qtz; frags angular, platy + blocky, 2-6 cm			pale grey-brown calc fines	no photo	6.9	500	strong	pale grey
FTP43	28-Sep	UPL	583290	6914488	1187.6	7	FTP43A	70897	200 cm	Calc-silicate	Calc-silicate (3D0), minor biot musc schist; ang platy + blocky frags, 2-8 cm	50	50	pale greenish grey granular fines, highly calc	894	6.9	600	strong	pale grey
FTP44	28-Sep	UPL	583364	6914549	1185.7	6	FTP44A	70898	100-150 cm	Calc-silicate	Pale greenish grey blocky calc-silicate (3D0), 60% > 10 cm	65	35	pale greenish grey granular fines, highly calc		7.4	300	strong	pale grey
							FTP44B	70899	200-280 cm	Till	Med brown overburden + 10% organics	20	80	med brown non-calc fines		6.9	100	none	med grey brown
FTP45	28-Sep	UPL	583210	6914559	1185.9	9	FTP45A	70900	250 cm	Calc-silicate	Pale greenish grey blocky calc-silicate (3D0)91%, Biot QFP (10E)9%	50	50	pale greenish grey highly calc fines	6	7.4	300	strong	pale green grey
FTP46	28-Sep	OXSP	583553	6914063	1168.1	8	FTP46A	70901	50-100 cm	Sulfides	Oxidized rounded to sub ang py + po, with sph and gn (2E, 2H)	30	70	pale orange-brown fines, mainly clay balls , non-calc	7	2.0	11200	none	pale yellow brown
							FTP46B	70902	200-250 cm	Sulfides	Blocky dark brown to red-brown sulfide frags; mass blocky py + po, also sph, gn, diss py, banded sph gn py	40	60	pale greenish grey clay matrix		1.9	7000	none	pale yellow brown
FTP47	28-Sep	MGSP	583618	6914254	1176.8	7	FTP47A	70903	100 cm	Sulfides	Dark red-brown oxidized frags, black graphitic qtz phyll with py + sph + gn (2A), mass sulfide, fine grained py, banded sph +gn (2E)	50	50	Med grey fines	8	2.3	8500	none	med grey
							FTP47B	70904	200-260 cm	Sulfides	Dark grey green horizon, fewer oxidized frags	50	50	Med grey fines		2.7	9400	none	med grey
FTP48	28-Sep	MGSP	583636	6914274	1175.6	7	FTP48A	70905	150 cm	Sulfides	Sub ang frags of sulfides w/ dark brown oxide coatings 60%; dark grey to black banded siliceous phyllite with diss sulfides, py, sph, gn (2A) , also fine grained mass py and fine grained py with banded sph + gn (2E)	50	50	Pale greenish grey fines	9	2.2	9200	none	light greenish grey
FTP49	28-Sep	CHSP	583270	6914351	1167.9	7	FTP49A	70906	50-75 cm	Sulfides	Dark grey horizon, mainly (2A)- graphitic ribbon banded quartzite, py + sph + gn; minor (2B) quartzite	50	50	Dark grey non-calc fines	10	5.5	2400	none	dark grey
							FTP49B	70907	200-250 cm	Sulfides	Mass py + sph + gn (2E), minor graphitic banded (2A)	60	40	Dark olive green granular non-calc fines		4.8	4800	weak	med greenish grey
FTP50	29-Sep	OHRE	584967	6913331	1175.1	5	FTP50A	70919	100 cm	Calc-silicate	Med greenish grey calc-silicate (3D0)	50	50	pale grey granular fines, weakly calc		8.0	400	weak	pale green grey
							FTP50B	70920	250 cm	Calc-sil + biot schist	50% calc-silicate schist (3D0), 50% biot-musc qtz schist	50	50	pale grey granular fines, weakly calc		7.4	1900	weak to m	pale green grey

Test Pit Sample Log

		Location					Sample Info					Grain size				Field Measurements			
Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (µs	Fizz	Colour
GTP01	19-Sep	Grum	592749	6903947	1224.4	6	GTP01A	70977	20-130 cm	Grey phyllite	Med grey non-calc phyllite > (5D) chloritic phyllite, platy frags, 40 % 3-15 cm	40	60	calc fines	803	8.2	475	moderate	light grey
GPT02	19-Sep	Grum	592674	6903637	1199.4	5	GTP02A	70978	10 to 70 cm	Grey phyllite	Pale silver grey coated med grey non-calc greasy phyllite, 1-7 cm platy frags	40	60	weakly calc fines	804	7.6	413	moderate	medium grey
	19-Sep						GPT02B	70979	300-400 cm	Green grey phyllite	Pale greenish grey mix of (5D) calc chl phyllite/ med grey non-calc phyllite (50/50); higher % (5D) in coarser fractions, platy frags 2-5 cm	40	60	weakly calc fines		7.9	865	weak	medium grey
GPT03	19-Sep	Grum	592578	6903320	1172.9	5	GPT03A	70980	130 cm	Grey phyllite	Med grey calc phyllite, pale greenish grey fines, platy frags 2-5 cm, weakly calc, clay balls for fines	50	50	weakly calc fines	805	7.8	471	strong	light brown
GPT04	19-Sep	Grum	592597	6903807	1228.7	6	GPT04A	70981	200-300 cm	Talcose phyllite	Med grey talcose (greasy) non-calc phyllite (70%) + chloritic calc phyllite (30%), rare qtz, higher % chloritic phyllite in larger frags	60	40		806	8.0	745	weak to mo	medium grey
GTP05	19-Sep	Grum	592507	6903651	1216.7	7	GTP05A	70982	30-200 cm	Chloritic phyllite	Pale grey-green chloritic phyll + dark grey calc and non-calc phyllite	60	40	weakly calc fines	807	7.6	1017	weak to mo	medium grey
	19-Sep						GTP05B	70983	400-450 cm	Mixed phyllites and sulphides	10% sulfide frags, banded pyritic dark grey phyll, massive f.g. py, chloritic phyll + dark grey phyll, 3-14 cm platy and blocky frags			weakly calc fines		6.9	2450	weak	medium grey
GTP06	19-Sep	Grum	592424	6903580	1215.9	7	GPT06A	70984	100 cm	Grey phyllite	Pale grey to greenish grey calc phyll (50/50 5D/5BO), larger frags (5D)>(5BO); 60% of frags 10 to 30 cm, frags platy	60	40	fines mod calc	808	8.4	369	moderate	medium grey
	19-Sep						GPT06B	70985	300-500 cm	Talcose phyllite	Pale olive brown to med grey talcose phyllite (5BO); frags platy	40	60	fines highly calc		8.0	636	moderate t	greyish brown
GTP07	19-Sep	Grum	592275	6903470	1216.4	7	GPT07A	70986	200 cm	Talcose phyllite	Pale grey talcose calcareous phyllite, 3-5 cm platy frags	50	50	calc fines	809	8.0	825	moderate	medium grey
GTP08	19-Sep	Grum	592202	6903398	1218.1	6	GPT08A	70987	200 cm	Chloritic phyllite	Greenish grey platy chloritic calcareous phyllite (5D)	40	60	fines strongly calc	810	8.2	907	strong	medium grey
	19-Sep						GPT08B	70988	400 cm	Mixed waste	Interbanded pale brown and pale greenish grey (5D + altered 5D)	50	50			7.7	1540	weak to mo	medium grey
GTP09	20-Sep	Grum	592134	6903625	1248.9	8	GTP09A	70989	500 cm	Grey phyllite	Med grey non-calc phyllite, minor qtz (3GO), larger frags mix of (5BO/3GO)	60	40	pale grey non-calc fines	811	8.1	1190	weak	medium grey
GPT10	20-Sep	Grum	592369	6903686	1252	7	GTP10A	70990	300 cm	Grey phyllite	Med grey and green-grey mixed non-calc phyllite (3GO/5D 70/30), 20% frags 15-25 cm	50	50	pale greenish grey non-calc fines	812	7.3	1390	weak	light grey
GPT11	20-Sep	Grum	592402	6904157	1283	8	GTP11A	70991	150 cm	Green-grey phyllite	Pale greenish grey talcose calcareous chloritic phyllite (5D)	50	50	non-calc fines	813, 814	7.8	744	weak to mo	light grey
	20-Sep						GTP11B	70992	370 cm	Grey phyllite	Med grey non-calc phyllite (3GO), minor pyritic med grey phyll	60	40	non-calc fines		6.4	1825	weak	brownish grey
GTP12	20-Sep	Grum	591878	6904118	1313	6	GTP12A	70993	300-370 cm	Phyllite + sulphides	Chloritic phyllite, grey phyllite, waste pile 10-20% mass sulfides	40	60	talcose non-calc fines, med grey	815	7.1	1103	weak	medium grey
GTP13	20-Sep	Grum	591956	6904048	1311.4	6	GTP13A	70994	200 cm	Chloritic phyllite	Coarse med olive green calc chloritic phyllite, paler beige altered frags near bottom, >1 cm fraction chloritic phyllite/ grey calc phyllite	50	50	pale greenish grey talcose fines, weakly calc	816	8.3	412	weak to mo	light grey
GTP14	20-Sep	Grum	591998	6903952	1319	6	GTP14A	70995	20-100 cm deep, 2 m along trench	Chloritic phyllite	Pale brown to beige platy talcose calcareous chloritic phyllite and grey phyllite	50	50	plae olive green fines, weakly calc	818, 819	8.3	345	weak	light brown
	20-Sep					6	GTP14B	70996	60 cm deep, 23 m along trench	Chloritic schist (ox)	Pale orange brown, red-brown to beige platy altered (5D) chloritic schist, minor grey phyllite	40	60	talcose non-calc fines	817	7.2	477	weak	brownish grey
GTP15	20-Sep	Grum	591921	6903884	1317.6	6	GTP15A	70997	300 cm	Chloritic schist	Platy greenish gray chloritic schist, 2-10 cm frags (5D)	50	50	pale greenish grey frags, mod calc	820	8.2	680	weak to mo	light grey
GTP16	20-Sep	Grum	591783	6903965	1322.6	6	GTP16A	70998	100 cm	Chloritic schist	Olive grey chloritic schist (5D) and altered (5D) minor dark grey phyllite	60	40	Pale olive grey highly calcareous	821	8.1	772	moderate	light grey
	20-Sep						GTP16B	70999	350 cm	Chloritic phyllite	2-7 cm grey non-calc phyllite and chloritic phyllite, >10 cm calc chloritic phyllite	60	40	pale olive grey non-calc fines		7.6	1023	weak	light grey
GTP17	20-Sep	Grum	591618	6904029	1326	6	GTP17A	7100	300 cm	Chloritic phyllite	Chloritic and grey phyllite, minor pyritic phyllite, coarse fraction 60% 5 to 30 cm; larger frags are chloritic phyllite, smaller frags are mix of chl phyll and med grey non-calc crenulated phyllite	50	50	pale grenish grey non-calc fines	822	7.4	1005	weak	light grey
GTP18	20-Sep	Grum	591619	6904147	1325.8	7	GTP18A	70781	100 cm deep 2m along trench	Chloritic phyllite	2-6 cm altered (5D), 'fault gouge', spotty mariposite, trace py	50	50	fines weakly calc	825	8.1	645	moderate	light grey
	20-Sep					7	GTP18B	70782	100 cm deep 21 m along trench	Grey phyllite	Platy med grey non-calc phyllite, larger frags contain py	50	50	non-calc fines	824	7.8	542	weak	medium grey
GTP19	20-Sep	Grum	591730	6904207	1325.8	7	GTP19A	70783	70 cm deep 2 m along trench	Grey phyllite	Med grey non-calc phyll with trace py, mixed chl phyll (5D) and altered beige (5D)	50	50	med-grey fines, weakly calcareous		7.4	660	weak	dark grey
	20-Sep					7	GTP19B	70784	70 cm deep 30 m along trench	Graphitic phyllite	2-6 cm platy black graphitic phyllite, 5% py	40	60	black graphitic non-calc fines		8.1	495	weak	dark grey

Test Pit Sample Log

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Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (µs	Fizz	Colour
GTP 20	20-Sep					7	GPT20A	70785	20 cm deep 4 m along trench	Chloritic schist	Pale orange brown altered chloritic schist (5D), 2-8 cm subangular blocky frags, minor mariposite	50	50	Fines non-calc	826-829	6.2	566	weak	light brown
	21-Sep	Grum	591788	6904079	1322.9	7	GTP20B	70786	70 cm deep 11 m along trench	Chloritic phyllite	Pale olive green platy chloritic phyllite altered chl phyll and talcose med grey phyll, minor S2 qtz, frags 2-5cm	40	60	non-calc fines	830	7.8	540	weak to m	greenish grey
	21-Sep						GTP20C	70787	100 cm deep 26 m along trench	Chloritic phyllite	Pale greenish grey chloritic phyllite and med grey talcose phyllite	40	60	non-calc fines	831	7.4	612	weak to m	medium grey
GTP21	21-Sep						GTP21A	70788	250 cm	Oxidized phyllite and sulphides	Pale orange to pale olive brown mixed oxidized material, 2 to 5 cm angular to subangular fragments consisting of py in banded dark grey phyllite, diss to massive py, med grey phyllite	50	50		832-835	4.9	1897	weak	medium grey
GTP22	21-Sep	Grum	592003	6903840	1304.6	7	GTP22A	70789	100-170 cm	Grey phyllite	Pale greenish grey to dark grey noncalc phyllite, frags 2-8 cm platy and blocky,	50	50	non-calc fines	836	7.6	655	weak to m	greenish grey
	21-Sep	Grum	592047	6904005	1307.3	7	GTP22B	70790	200-300 cm	Grey phyllite	Med grey phyllite, non- to weakly-calc, minor altered (5D) chl phyll	40	60	pale greenish grey fines, weakly calc		6.6	786	moderate	medium grey
GTP23	21-Sep					6	GTP23A	70791	100-200 cm	Graphitic phyllite	Dark grey graphitic pyritic phyllite, narrow lenses of altered chl phyll	40	60	non-calc fines	837	7.0	871	weak	medium grey
	21-Sep	Grum	592024	6904312	1308.5		GTP23B	70792	300-400 cm	Pyritic phyllite	Dark grey banded pyritic phyllite, non-calc, minor altered chl phyll	50	50	weakly calc		7.4	848	moderate	dark grey
GTP24	21-Sep					6	GTP24A	70793	70 cm	Chloritic phyllite	Greenish grey calcareous chloritic phyllite, frags platy, 3-9 cm	30	70	pale orange brown fines, strongly calc	838	7.8	379	strong	yellowish brown
	21-Sep	Grum	591692	6904732	1323.6	6	GTP24B	70794	70 cm	Grey phyllite	Silver grey oxidized calcareous phyllite	50	50	pale grey brown fines,strongly calc	839	7.4	998	strong	medium brown
GTP25	21-Sep	Grum	591536	6904800	1325.3	6	GTP25A	70795	70 cm	Grey phyllite	Med grey calc phyllite with oxide coatings on fracture (combined oxidized and slightly oxidized material in sample); frags platy, 2-7 cm	40	60	pale to orange brown calc fines	840 841	7.9	403	strong	medium brown
	21-Sep						GTP25B	70796	70 cm	Chloritic phyllite	Pale greenish grey calc chloritic phyllite, smaller platy frags include pale grey phyllite	40	60	pale greenish grey	842	7.8	307	strong	medium grey
GTP26	21-Sep	Grum	591558	6904608	1321.7	6	GTP26A	70797	10-150 cm	Grey phyllite	Med grey platy and blocky calcareous phyllite, trace pyrite, frags 3-9 cm	50	50	pale greenish grey calc fines	843	6.7	460	strong	medium grey
	21-Sep						GTP26B	70798	300 cm	Brown phyllite	Pale oxidized greenish brown phyllite, frags 3-9 cm, minor grey phyllite	60	40	pale olive brown fines, strongly calc		7.4	324	moderate t	brownish grey
GTP27	21-Sep	Grum	591821	6904564	1309.7	6	GTP27A	70799	200-300 cm	Grey phyllite	Med grey phyllite frags, mixed with medium olive brown till	50	50	med olive brown fines, strongly calcareous	844	7.7	3787	moderate	brownish grey
GTP28	29-Sep	Grum - OT	591867	6905679	1313.3		GTP28A	70908	70-100 cm	Sulfides	Pale to med grey interbanded (2A) 'ribbon banded graph qtzite', (2CD) 'pyritic qtzite', (2E) 'massive py'	60	40	pale grey fines		5.5	3100	none	med grey
							GTP28B	70909	120-190 cm	Sulfides	Grey-brown w/ pale orange-brown (2A) 'ribbon banded graph qtzite', (2CD) 'pyritic qtzite', (2E) 'massive py'	60	40	med grey fines		5.5	4000	none	dark grey
GTP29	29-Sep	Grum - OT	591803	6905443	1320.7		GTP29A	70910	50-100 cm	Sulfides	30% (2E) py w/ sph, 20% pale grey crenulated non-calc phyll, 50% fines	50	50	med grey non-calc fines		5.7	1300	none	med grey
							GTP29B	70911	250-300 cm	Sulfides	50% (2E) mass py w/ sph + gn,40% med to pale grey crenulated non-calc phyll, 10% (2CD) py qtzite	50	50	dark grey non-calc fines		5.7	2900	none	dark grey

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VTP01	17-Sep	Vangorda	593933	6902518	1188.8	11	VTP01A	70951	250cm	Oxidized phyllite	strongly oxidized orange brown, clots of oxidized clay rich material	40	60		92	4.4	4400	v. weakly	brown
VTP02	17-Sep	Vangorda	593854	6902583	1180.4	7	VTP02A	70952	40cm	Oxidized phyllite	orange red brown strongly oxidized sericitic non-calc phyllite	30	70		91	3.1	4300	none	rusty brown
							VTP02B	70953	250cm	Graphitic phyllite	black graphitic weakly calc phyllite, 10% sercite schist	50	50			6.7	3200	weakly	black
VTP03	17-Sep	Vangorda	593771	6902471	1178.9	7	VTP03A	70954	150cm	Oxidized phyllite	Pale grey non-calc siliceous phyllite	50	50		89	5.4	2300	none	rusty brown
VTP04	17-Sep	Vangorda	593707	6902466	1174.6	5	VTP04A	70955	0-5m along trench, 100cm deep	dark grey phyllite	Dark grey non-calc phyllite, occasionally greasy	40	60		87	5.0	3700		brownish grey
							VTP04B	70956	6-8m along trench	Greenish phyllite	>1cm fraction 90% platy black non-calc phyllite up to 4 cm (KS note - the greenish colour was a surface coating - probably ppt.)	30	70		86	3.6	5900	none	med grey
							VTP04C	70957	28-30m along trench	Graphitic phyllite	Black weakly calc phyllite, resistant sulfide clasts observed nearby				85	6.9	3200	weakly	black
VTP05	17-Sep	Vangorda	593611	6902489	1176	7	VTP05A	70958	0-20cm	Oxidized phyllite	Med to dark red-brown oxide horizon with grey green patches, 'oxide front'?, massive pyrite frags, diss py in grey qtz phyllite, ferricrete in cobble size patches (30% in sample), pyrite 30%	50	50		82	3.2	3800		brownish grey
							VTP05B	70959	100-170cm	Pyritic phyllite	Black, graphitic, weakly calcareous pyritic phyllite, pale olive green non-calc phyllite, rare massive po, massive py frags	25	75			5.9	2900	weakly	brownish grey
VTP06	17-Sep	Vangorda	593705	6902598	1165.5	6	VTP06A	70960	100cm	Pyritic phyllite	Black pyritic phyllite, greasy crenulated, pyritic qtzite, 60% larger frags 15-40 cm	60	40		81	6.4	2000		dark grey
							VTP06B	70961	100cm	Graphitic phyllite	Tan / grey, non-calc black graphitic phyllite/pyritic quartzite/grey phyllite/sericite schist, 50% > 5cm, up to 30-40 cm	60	40			6.8	1700	none	dark grey
VTP 07	18-Sep	Vangorda	593764	6902687	1159	6	VTP07A	70962	100cm	Sulfides	Med olive brown w/ patches of red-brown, f g diss py, f g massive py	40	60	Fines non-calc	780	5.7	2690	weak	yellowish brown
	18-Sep						VTP07B	70963	250cm	Sulfides	Coarse grey f g diss py w/ patches of red-brown, 30% of surface mainly sulfides and qtz sulfides	50	50		781	6.4	2690	moderate	medium brown
VTP08	18-Sep	Vangorda	593728	6902665	1161.6	6	VTP08A	70964	100cm	Sulfides	Med grey-green fines, coarse boulders to 1 m no stratification, rare patches of orange brown oxide, massive sulphide boulders	50	50	non-calc med grey-green fines	782	6.4	2350	moderate	medium brown
VTP09	18-Sep	Vangorda	593819	6902682	1158.5	6	VTP09A	70965	150cm	Phyllite + till	20% rounded cobbles, 20% med grey talcose qtz phyllite frags, I cobble of diss py			non-calc fines	783	4.4	1552	weak	yellowish brown
VTP10	18-Sep	Vangorda	593941	6902730	1151.5	6	VTP10A	70966	20-40cm	grey phyllite	Silver to steel grey clay rich horizon w/ silvery phyllite and banded sulfide frags, talcose phyllite > 50%, 10% sulfides	60	40	non-calc fines	787	7.1	2170	weak	brownish grey
	18-Sep						VTP10B	70967	40-60cm	Sulphides in clay rich horizon	Pale olive-brown clay rich horizon, ~20% mass fine grained py pebbles to 7 cm	40	60	wet clay forms balls on screening		6.1	2110	weak	greyish brown
	18-Sep						VTP10C	70968	140-200cm	Talcose phyllite	Grey-green talcose phyllite with trace pyrite, water at 200 cm	40	60			6.1	1934	weak	medium grey
VTP11	18-Sep	Vangorda	594027	6902572	1159.7	6	VTP11A	70969	100cm	Sulfide fines	Dark olive green massive sulfide fines, red-brown oxide to 25 cm	15	85		788, 789,790	3.8	4610	none	greenish grey
VTP12	18-Sep	Vangorda	594002	6902580	1163.1	6	VTP12A	70970	100cm	Sulfide fines	Dark grey to dark olive green sulfide fines, coarse fraction to 5 cm	40	60	non-calc fines	791	4.1	6390	none	greenish grey
VTP13	18-Sep	Vangorda	594066	6902651	1160.4		VTP13A	70971	100cm	Talcose phyllite	Platy dark grey talcose phyllite, 30 % f g diss py	65	35	dark olive grey sandy gritty matrix, non-calc fines	792, 793	5.6	2300	weak	greyish brown
VTP14	18-Sep	Vangorda	594101	6902671	1162.1	7	VTP14A	70972	0-100cm	Grey green till	Upper till layer, 10% > 1cm includes balls of clay, med-grey green, pebbly till with cobbles up to 1 m	10	90	strongly calcareous	794, 795, 796, 797, 795, 798	7.8	402	strong	medium grey
	18-Sep						VTP14B	70973	100cm	Orange brown oxide horizon	Lower till, pale orange brown, 1-3 cm exotic pebbles w/ oxidized clay coatings	30	70	weakly calc		2.9	2610	none	brownish yellow
VTP15	18-Sep	Vangorda	594151	6902630	1167.6	5	VTP15A	70974	70cm	Olive green till	Pale olive green till, >1 cm fraction includes clay balls	10	90	clay fines strongly calcareous	799, 800	7.8	1642	strong	medium brown
	18-Sep						VTP15B	70975	100cm	Oxidized till	Oxidized till with mixed angular frags, oxide coated siliceous pyritic phyllite, non-calc	40	60	non-calc		5.1	4670	none	greyish brown
	18-Sep						VTP15ox		20cm	Oxide front in till	Lower till, oxidation front separating greenish grey till from oxidized till					3.4	4750	none	greenish grey
VTP16	18-Sep	Vangorda	594037	6902698	1158.5	5	VTP16A	70976	100cm	Black phyllite	Platy black non calc phyllite	50	50	non-calc fines	801, 802	6.6	1182	weak	medium grey

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Pit	Date	Area	Easting	Northing	Elevation	Acc (m)	Sample	Tag No	Notes	Rock Type	Sample Description	% > 1 cm	% < 1 cm	Fines description	Photo	pH	Cond (µs	Fizz	Colour
HRTP01	29-Sep	Haul Road	590797	6906632	1259.4	6	HRTP01A	70912	30-100 cm	grey phyllite + sulfides	30% dark grey crenulated phyllite, 10% (2E) mass py, sph, gn, 10% (2CD) py qtzite sph, 50% fines	50	50	med grey non-calc granular fines		5.9	2300	weak	med grey
							HRTP01B	70913	180-220 cm	grey phyllite + sulfides	Dark grey phyllite, 15% (2E), 5% (2CD)	50	50	dark grey granular fines		6.4	1000	weak	dark grey
HRTP02	29-Sep	Haul Road	589226	6908138	1225.1	6	HRTP02A	70914	150 cm	Till + calc-silicate	Pale olive brown till w/ rounded cobbles + angular calc-silicate schist			Pale olive rey-brown granular non-calc fines		6.9	200	strong	med green grey
HRTP03	29-Sep	Haul Road	587779	6909742	1231.8	5	HRTP03A	70915	200 cm	Calc-silicate	Pale green calc-silicate schist, 2-4 cm blocky	40	60	Pale greenish granular calc fines		8.7	500	strong	med green grey
HRTP04	29-Sep	Haul Road	586553	6911176	1190	6	HRTP04A	70916	200-300 cm	Chl schist	Mixed waste, chl schist, dark grey phyllite, calc-silicate schist, biot-musc qtz schist, rare fg mass py, pyritic quartzite with sph gn, qtzite w/ cpy	40	60	Pale greenish-grey non-calc fines		6.7	3200	weak	pale green grey
HRTP05	29-Sep	Haul Road	585291	6912509	1135.2	6	HRTP05A	70917	150 cm	Ox qtz porphyry	Pale orange brown oxidized qtz porphyry (10F)	40	60	Pale orange brown granular fines weakly calc		7.6	500	moderate	pale olive brown
							HRTP05B	70918	220 cm	Calc-silicate schist	Calc-silicate schist frags (3D0), rare dark grey phyllite, rare py in calc-silicate schist	40	60	Med greenish grey clay balls, calc		9.5	600	strong	pale green grey

APPENDIX F
Waste Rock Drilling Logs

PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: aro Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6913518 **EASTING:** 584420
LOGGED BY: Uwe Schmidt

HOLE NO: 60M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
1	65% pale grey brown weathering biotite muscovite schist (1D), 15% quartz porphyry (10), 10% quartz, 10% dark grey biotite schist/ calc silicate, blocky >> platy, beige fines non-calcareous		60M1-2 0-2 m		0.7m Gas Ports (2) Thermistor Bead (inside)
2	75% med grey biotite muscovite schist (1D), 10% porphyry (10), 10% pyrite (2E), 5% med grey quartz biotite pyritic quartzite, blocky >> platy, pale brown fines non-calcareous				1.4m Gas Ports (2) Thermistor Bead (inside)
3			60M1-4 2-4 m		2.8m Gas Ports (2) Thermistor Bead (inside)
4	65% biotite muscovite schist (1D), 15% calc-silicate schist (3D0), 10% pyritic quartzite, 10% quartz, blocky > platy, pale grey brown fines non-calcareous		60M1-0/6 0-6 m		
5			60M1-6 4-6 m		
6	60% biotite muscovite schist (1D), 15% calc-silicate (3D0), 15% quartz sericite schis (1D4)t, 10% pyritic quartzite (2A), blocky				5.6m Gas Ports (2) Thermistor Bead (inside)
7			60M1-8 6-8 m		
8	60% calc-silicate (3D0), 15% pyritic quartzite (2CD), 15% biotite muscovite schsit (1D), 10% grey feldspar porphyry (10E), blocky, pale grey brown fines				
9	As above, with void space indicated by lack of sample return and air exiting casing on backfill.		60M1-10 8-10 m		
10			60M1-6/12 6-12 m		10m Gas Ports (2) Thermistor Bead (inside)

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: aro Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6913518 **EASTING:** 584420
LOGGED BY: Uwe Schmidt

HOLE NO: 60M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
11	55% calc-silicate (3D0), 30% biotite muscovite schist (1D), 15% silver to pale green muscovite schist, 5% quartz, blocky, pale brown fines Void space indicated by air exiting casing on backfill.		60M1-12 10-12 m		
12					
13	40% calc-silicate (3D0), 30% pale silver grey muscovite schis (1D)t, 5% pyritic quartzite (2CD), 10% pyrite (2E), 15% dark grey pyritic phyllite, blocky > plate, 10% of fragments have bright red oxide coating, pale green fines		60M1-14 12-14 m		
14	50% Biotite muscovite quartzite (1D), 20% silver grey schist, 10% pyrite (2E), 10% dark grey phyllite, 5% pyritic quartzite (2CD), 5% quartz, rare po (2), red brown oxide coatings prevalent, blocky, pale red brown fines				
15	Void space indicated by air exiting casing on backfill.		60M1-16 14-16 m		
16	80% calc-silicate (3D0), 10% 2 CD pyritic quartzite, 10% biotite muscovite schist (1D), rare po (2), blocky, no 1 cm sulphides observed, pale grey warm fines		60M1-12/18 12-18 m		
17	Void space indicated by air exiting casing on backfill. Poor sampel return 16.5 to 17 m.		60M1-18 16-18 m		
18	100% calc-silicate (3D0), blocky, pale grey fines				
19			60M1-20 18-20 m		
20					20m Gas Ports (2) Thermistor Bead (inside)

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: aro Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6913518 **EASTING:** 584420
LOGGED BY: Uwe Schmidt

HOLE NO: 60M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
21	93% calc-silicate (3D0), 1% 2E pyrite, 5% quartz, 1% 1D4 muscovite schist, blocky, pale grey brown warm fines Void space indicated by air exiting casing on backfill.		60M1-22 20-22 m		
22	ed brown oxides at 22 m		60M1-18/24 18-24 m		
23	30% calc-silicate (3D0), 24% 1D schist, 15% quartz, 10% quartz sericite schist (1D4), 10% pyrite (2E),10% 2CD pyritic quartzite, 1% galena quartz, blocky, pale grey brown warm fines		60M1-24 22-24 m		
24	Sulphides from 24 to 25 m Poor recovery				
25	60% calc-silicate (3D0), 20% biotite muscovite schist (1D), 10% sericite schist (1D4), 10% pyrite (2E), blocky, beige slightly warm fines		60M1-26 24-26 m		
26	70% biotite muscovite schist (1D), 15% calc-silicate (3D0). 15% quartz porphyry (10), blocky, beige slightly warm fines				
27	Void space indicated by air exiting casing on backfill.		60M1-28 26-28 m		
28	60% biotite muscovite schist (1D), 20% calc-silicate, 10% quartz, 10% quartz porphyry, blocky, pale brown fines		60M1-24/30 24-30 m		
29			60M1-30 28-30 m		
30					30 m Gas Port Thermistor Bead (inside)

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SURFACE (COLLAR) ELEVATION:
NORTHING: 6913518 **EASTING:** 584420
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HOLE NO: 60M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
31	65% biotite muscovite schist-oxidized (1D), 20% calc-silicate (3D0), 10% quartz, 5% quartz sericite schist (1D4), blocky, pale brown fines Void space indicated by air exiting casing on backfill.		60M1-32 30-32 m		
32					
33	75% biotite muscovite schist (1D), 20% calc-silicate (3D0), 5% quartz, blocky > platy, beige fines		60M1-34 32-34 m		
34	50% calc-silicate (3D0), 45% biotite muscovite schist-oxidized (1D), 5% quartz, blocky > platy, pale brown slightly warm fines Void space indicated by air exiting casing on backfill.		60M1-30/36 30-36 m		
35			60M1-36 34-36 m		
36	75% biotite muscovite schist (1D), 20% calc-silicate (3D0), 3% quartz, 2% oxidized fragments, blocky > platy, pale brown slightly warm fines Void space indicated by air exiting casing on backfill.				
37			60M1-38 36-38 m		
38	97% calc-silicate (3D0), 3% quartz, blocky > platy, pale gret-brown slightly warm fines Void space indicated by air exiting casing on backfill.				
39			60M1-40 38-40 m		
40			60M1-36/42 36-42 m		40 m Gas Port Thermistor Bead (inside)

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NORTHING: 6913518 **EASTING:** 584420
LOGGED BY: Uwe Schmidt

HOLE NO: 60M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	100% calc-silicate (3D0), lots of 1 cm chips, blocky > platy, pale grey slightly warm fines				
41	Void space indicated by air exiting casing on backfill.		60M1-42 40-42 m		
42	99% calc-silicate (3D0), 1% quartz, blocky > platy, pale grey brown fines				
43			60M1-44 42-44 m		
44	99% calc-silicate (3D0), 1% quartz, blocky, beige fines				
45			60M1-46 44-46 m		
46	100% calc-silicate (3D0), blocky, beige fines		60M1-42/48 42-48 m		
47			60M1-48 46-48 m		
48	99% calc-silicate (3D0), 1% pale grey muscovite quartz schist, blocky >> platy, pale green grey fines, damp clay at 49 m.				
49			60M1-50 48-50 m		
50					

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DATE AND TIME STARTED: Oct 7, 2002
DATE AND TIME FINISHED: Oct 8, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	99% calc-silicate (3D0), 1% quartz, blocky, pale grey slightly warm fines				
51	Void space indicated by air exiting casing on backfill.				
52	100% calc-silicate (3D0), blocky >> platy, pale grey slightly warm fines		60M1-48/54 48-54 m		
53					
54	90% calc-silicate (3D0), 10% biotite muscovite andalusite schist (1D), blocky > platy, pale grey brown fines				
55					
56	90% calc-silicate (3D0), 10% biotite muscovite andalusite schist, blocky platy, pale green grey fines				
57					
58	85% calc-silicate (3D0), 10% biotite muscovite andalusite schist, 5% quartz, blocky > platy, pale grey fines		60M1-54/60 54-60 m		
59					
60					60 m Gas Port Thermistor Bead (inside)

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: aro Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6913288 **EASTING:** 584712
LOGGED BY: Uwe Schmidt

HOLE NO: 30M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
1	60% calc-silicate (3D0), 35% biotite muscovite schist (1D), 2%quartz sericite schist (1D4), 1% quartz, 2% other, blocky > platy, medium grey brown moist fines (from surface)		30M1-2 0-2 m		0.7m Gas Ports (2) Thermistor Bead (inside)
2					1.4m Gas Ports (2) Thermistor Bead (inside)
3	70% calc-silicate (3D0), 30% biotite muscovite schist (1D), 1% quartz, platy > blocky, pale grey fines		30M1-4 2-4 m		2.8m Gas Ports (2) Thermistor Bead (inside)
4					
5			30M1-0/5 0-5 m 30M1-6 4-6 m		

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SURFACE (COLLAR) ELEVATION:
NORTHING: 6913288 **EASTING:** 584712
LOGGED BY: Uwe Schmidt

HOLE NO: 30M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
6	50% 3DO calc-silicate, 35% 1D biotite muscovite schist, 10% 1D4 quartz sericite schist				5.6m Gas Ports (2) Thermistor Bead (inside)
7			30M1-8 6-8 m		
8	60% biotite muscovite schist (1D), 25% calc-silicate (3D0), 5% quartz sericite schist (1D4), 10% quartz, blocky > platy, pale grey fines				
9			30M1-10 8-10 m		
			30M1-5/10 5-10 m		10m Gas Ports (2) Thermistor Bead (inside)
10					

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DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
11	85% calc-silicate (3D0), 15% biotite muscovite schist (1D), blocky > platy, pale grey brown fines		30M1-12 10-12 m		
12	70% calc-silicate (3D0), 25% biotite muscovite schist (1D), 5% quartz, blocky > platy, pale grey brown fines				
13			30M1-14 12-14 m		
14					
15			30M1-10/15 10-15 m 30M1-16 14-16 m		



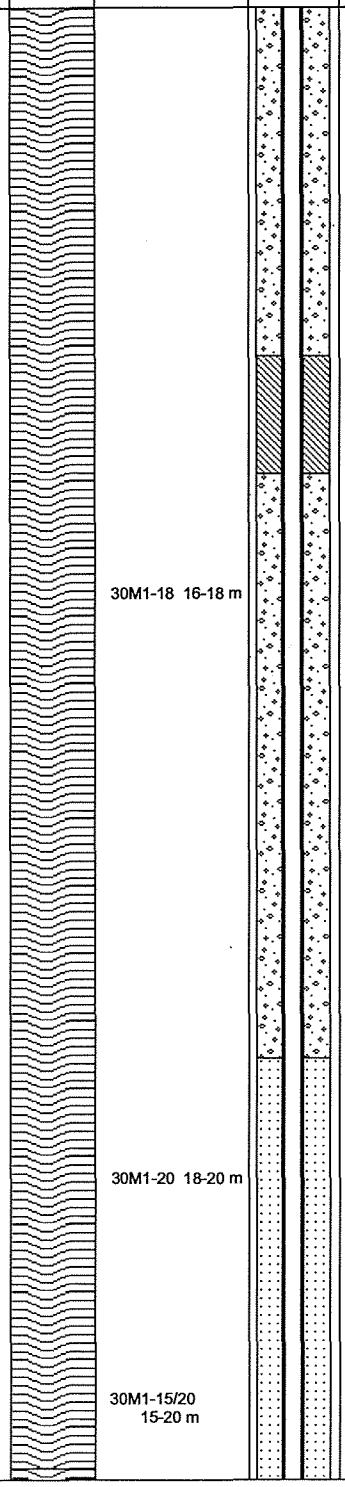
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DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	84% calc-silicate (3D0), 15% biotite muscovite schist (1D), 1% quartz, blocky > platy, pale grey brown fines				
16	brown horizon at 16 m				
	84% calc-silicate (3D0), 10% biotite muscovite schist (1D), 1% quartz, 5% pyritic quartzite (2CD), rare pyrite (2E), blocky platy, pale grey brown fines				
17			30M1-18 16-18 m		
18					
	90% calc-silicate (3D0), 5% biotite muscovite schist (1D), 5% quartz, blocky, pale grey brown fines				
19			30M1-20 18-20 m		
			30M1-15/20 15-20 m		20m Gas Ports (2) Thermistor Bead (inside)
20					



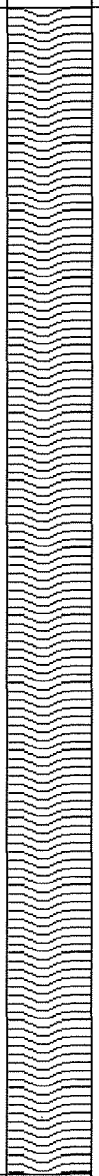
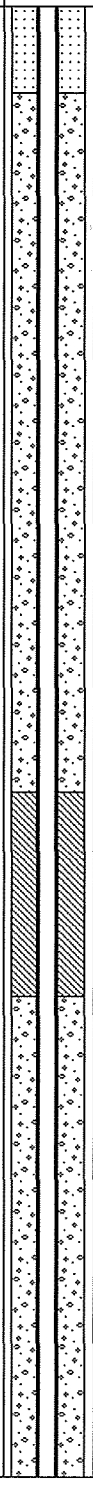
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HOLE NO: 30M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
21	94% calc-silicate (3D0), 5% biotite muscovite schist (1D), 1% quartz porphyry (10), blocky platy, pale grey brown fines		30M1-22 20-22 m		
22	80% calc-silicate (40% pyritic) (3D0), 20% quartz porphyry (10), blocky > platy, pale grey brown fines				
23			30M1-24 22-24 m		
24	ard ground at 24.5 m 50% pyrite (2E), 40% 1D ( ) grey schist, 5% pyritic quartzite (2CD), 5% calc-silicate (3D0), rare sphalerite and galena, medium grey brown fines		30M1-20/25 20-25 m 30M1-26 24-26 m		
25					

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HOLE NO: 30M1
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 10, 2002
DATE AND TIME FINISHED: Oct 10, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
26	Brown horizon at 26.5 m 80% biotite muscovite schist (1D), 15% quartz, 5% pyrite (2CD/2E) 20% is red-oxide stained, pale grey brown fines				
27			30M1-28 26-28 m		
28	72% biotite muscovite schist (1D), 10% quartz porphyry (10E), 10% sericite schist (1D4), 5% pyrite (2E), 3% pyritic quartzite (2CD), medium brown fines Sulphides from 28-29 m				
29	Pale grey fines at 30 m		30M1-30 28-30 m		
			30M1-25/30 25-30 m		30 m Gas Port Thermistor Bead (inside)
30					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903981 **EASTING:** 592332
LOGGED BY: Uwe Schmidt

HOLE NO: 10M2
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 4, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	Non-calcareous grey phyllite, platy > blocky, fines non-calcareous		0-1 m 10M2-1		0.7 m Gas Port Thermistor Bead (inside outside PVC)
1			1-2 m 10M2-2		1.4 m Gas Port (2) Thermistor Bead (inside outside PVC)
2			2-3 m 10M2-3		2.8 m Gas Port (2) Thermistor Bead (inside outside PVC)
3			3-4 m 10M2-4		
4			4-5 m 10M2-5		
			0-5 m 10M2-0/5		
5					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903981 **EASTING:** 592332
LOGGED BY: Uwe Schmidt

HOLE NO: 10M2
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 4, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Plezometer	Installations
	Non-calcareous medium grey phyllite, pale greenish grey phyllite, blocky > platy, fines calcareous		5-6 m 10M2-6		5.6 m Gas Port (2) Thermistor Bead (inside outside PVC)
6			6-7 m 10M2-7		
7			7-8 m 10M2-8		
8			8-9 m 10M2-9		
9			9-10 m 10M2-10		
10			5-10 m 10M2-6/10		10 m Gas Port Thermistor Bead (inside outside PVC)

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903797 **EASTING:** 592309
LOGGED BY: Uwe Schmidt

HOLE NO: 30M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
1	Platy fragments, pale grey fines- calcareous, 70 % medium grey non-calcareous phyllite, 20% green phyllite, 10% qtz		30M3-2 0-2 m		0.7m Gas Ports (2) Thermistor Bead (inside)
2					1.4m Gas Ports (2) Thermistor Bead (inside)
3			30M3-4 2-4 m		2.8m Gas Ports (2) Thermistor Bead (inside)
4	ragments: Platy > blocky, calcareous medium grey fines, 60% med grey phyllite, 30% green phyllite, 10% silver grey phyllite		30M3-0/6 0-6 m		
5			30M3-6 4-6 m		

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903797 **EASTING:** 592309
LOGGED BY: Uwe Schmidt

HOLE NO: 30M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
6	ragments: blocky platy, pale green grey fines- weakly calcareous, 50% pale greenish grey non-calcareous phyllite, 40% medium grey phyllite, 10% qtz				5.6m Gas Ports (2) Thermistor Bead (inside)
7	ragments with calcareous talcose coating, platy blocky, pale green-grey fines- weakly calcareous, 70% medium grey phyllite, 30% green phyllite		30M3-8 6-8 m		
8					
9	100% darkgrey non-calcareous pyritic graphitic phyllite, platy blocky, dark grey to black graphitic fines- weakly calcareous, fragments coated in graphite		30M3-10 8-10 m 30M3-6/12 6-12 m		10m Gas Ports (2) Thermistor Bead (inside)
10					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903797 **EASTING:** 592309
LOGGED BY: Uwe Schmidt

HOLE NO: 30M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Plezometer	Installations
11	Platy blocky, dark gre to black fines- non-calcareous, fragments coated in graphite, 70% dark grey non-calcareous pyritic graphitic phyllite, 25% green phyllite, 5% massive sulphide (po)		30M2-12 10-12 m		
12	Blocky >> platy, pale grey non-calcareous fines, 60% dark grey non-calcareous phyllite, 30% pale green chloritic phyllite, 10% quartz				
13			30M3-14 12-14 m		
14	Blocky fragments, medium grey brown non-calcareous granular fines, 70% dark grey non-calcareous pyritic phyllite, 20% oxidized massive pyrite, 10% quartz sericite schist				
15			30M3-16 14-16 m		

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903797 **EASTING:** 592309
LOGGED BY: Uwe Schmidt

HOLE NO: 30M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
16	ragments: blocky platy, pale grey brown non-calcareous silty fines, 50% dark grey phyllite, 30% pale grey non-calcareous phyllite, 20% oxidized grey phyllite		30M3-12/18 12-18 m		
17			30M3-18 16-18 m		
18					
19	Platy > blocky, pale green-grey fines- strongly calc, 60% med to silver grey phyllite, 40% pale green phyllite (non-calcareous)		30M3-20 18-20 m		
20					20m Gas Ports (2) Thermistor Bead (inside)

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LOGGED BY: Uwe Schmidt

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HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	ragments: blocky > platy, medium grey moist calcareous fines, coated medium grey pyritic non-calcareous phyllite				
21			30M3-22 20-22 m		
			30M3-18/24 18-24 m		
22					
23	ragments: blocky >platy, 40% dark grey pyritic phyllite, 30% pale grey phyllite, 25% green phyllite, 5% quartz, medium grey brown non-calcareous fines		30M3-24 22-24 m		
24					
			30M3-26 24-26 m		
25					

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DATE AND TIME STARTED: Oct 4, 2002
DATE AND TIME FINISHED: Oct 5, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Plezometer	Installations
26	ragments: blocky > platy, 50% green phyllite with mariposite, 30% med grey pyritic phyllite, 5% quartz, trace massive pyrite and beige altered phyllite, pale grey non-calcareous fines				
27	ragments: blocky > platy, 30% med grey pyritic phyllite, 30% green phyllite, 10% quartz, 10% silver-grey phyllite, 10% oxidized pyrite, 10% grey brown phyllite, pale grey non-calcareous fines		30M3-28 26-28 m 30M3-24-30 24-30 m		
28					
29	Blocky > platy fragments, 50% dark grey phyllite, 15% silver-grey phyllite, 10% quartz, 10% oxidized pyrite, 15% pale green phyllite		30M3-30 28-30 m		
30					30m Gas Ports (2) Thermistor Bead (inside)

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903307 **EASTING:** 592593
LOGGED BY: Uwe Schmidt

HOLE NO: 10M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 6, 2002
DATE AND TIME FINISHED: Oct 6, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	90% med to silver grey phyllite, 10% quartz chips, dark grey fines, non-calcareous		10M3-1 0-1 m		0.7 m Gas Port (2) Thermistor Bead (inside PVC)
1	60% med grey phyllite, 35% dark grey to black phyllite, 5% quartz, dark grey fines non-calcareous		10M3-2 1-2 m		1.4 m Gas Port (2) Thermistor Bead (inside PVC)
2	60% med silver-grey phyllite, 35% black phyllite, 5% altered chloritic phyllite, dark grey fines non-calcareous, fragments: platy > blocky		10M3-3 2-3 m		2.8 m Gas Port (2) Thermistor Bead (inside PVC)
3	Overburden: 40% dark grey-brown clay balls, 10% rounded pebbles, exotic gneiss fragments, minor phyllite, blocky > platy, dark grey brown fines strongly calc		10M3-4 3-4 m		
4	70% med silver grey phyllite, 10 % dark grey phyllite, 15% oxidized green grey phyllite, 5% quartz, platy > blocky, pale grey fines strongly calcareous		10M3-5 4-5 m 10M3-0/5 m 0-5		
5					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Grum Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6903307 **EASTING:** 592593
LOGGED BY: Uwe Schmidt

HOLE NO: 10M3
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 6, 2002
DATE AND TIME FINISHED: Oct 6, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	65% med silver grey phyllite, 30% pale green phyllite, 5% quartz, rare pyrite, platy > blocky, pale grey calcareous fines		10M3-6 5-6 m		5.6 m Gas Port (2) Thermistor Bead (inside PVC)
6	75% med silver grey phyllite, 20% pale green phyllite, 5% quartz, rare pyrite, pale grey calcareous fines, platy blocky		10M3-7 6-7 m		
7	65% medium silver grey phyllite, 25% pale green oxidized phyllite, 10% quartz, platy blocky, pale grey calcareous fines		10M3-8 7-8 m		
8	65% medium grey to silver grey phyllite, 20% pale green oxidized phyllite, 10% black phyllite, 5% quartz, platy blocky, pale grey non-calcareous fines		10M3-9 8-9 m		
9	75% medium grey to silver grey phyllite, 15% pale green phyllite, 10% quartz, platy >> blocky, pale grey calcareous fines		10M3-10 9-10 m		
			10M3-6/10 5-10 m		10 m Gas Port (2) Thermistor Bead (inside PVC)
10					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Vangorda Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6902706 **EASTING:** 593745
LOGGED BY: Uwe Schmidt

HOLE NO: 10M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 1, 2002
DATE AND TIME FINISHED: Oct 1, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Plezometer	Installations
	35% massive fine grained pyrite (4E), 26% pyritic quartzite (4C), 17% undifferntiated magnetic sulfides (4EC), dark grey to olive green fines, weakly calcareous, 65%>1 cm, fragments blocky > platy		10M4-1 0-1 m		0.7 m Gas Port and Thermistor Bead (inside PVC)
1	64% massive pyritic sulfides (4E), 36% undifferentiated magnetic sulfides (4EC), dark grey to olive green fines, weakly calcareous, poor chip recovery, 11% > 1 cm, fragments blocky		10M4-2 1-2 m		1.4 m Gas Port and Thermistor Bead (inside PVC)
2	Dark olive brown sulfide fines, noncalcareous, no chips recovered		10M4-3 2-3 m		2.8 m Gas Port and Thermistor Bead (inside PVC)
3	No fines or chips recovered 1 m to 5.2 m: Large voids requiring addition of large volumes of backfill. Sloughing of backfill into voids- may have some bearing on gas sampling.		No sample		
4	Dark olive brown sulfide fines, noncalcareous, no chips recovered, no fizz		10M4-0/5 0-4 m		
5					

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Vangorda Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6902706 **EASTING:** 593745
LOGGED BY: Uwe Schmidt

HOLE NO: 10M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 1, 2002
DATE AND TIME FINISHED: Oct 1, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Sample	Installations
	36% undifferentiated magnetic sulfides (4EC), 16% massive fine grained pyrite (4E), 16% pyritic quartzite (4C), 16% chloritic phyllite (5D), 16% carbonaceous phyllite (5A0), dark olive brown fines, weakly calcareous, no chips recovered	10M4-6 5-6 m	5.6 m Gas Port and Thermistor Bead (inside PVC)
6	42% undifferentiated magnetic sulfides (4EC), 33% pyritic quartzite (4C), 9% carbonaceous phyllite (5A0), 7% noncalcareous phyllite (3G0), 4% bleached phyllite (4L0), 5% quartz, medium olive brown fines, noncalcareous, 25% > 1 cm, fragments blocky > platy	10M4-7 6-7 m	
7	42% pyritic quartzite (4C), 34% undifferentiated magnetic sulfides (4EC), 10% massive fine grained pyrite (4E),9% noncalcareous phyllite (3G0), 4% bleached phyllite (4L0), 1% quartz, medium olive brown fines, noncalcareous, 81% > 1 cm, fragments blocky > platy	10M4-8 7-8 m	
8	46% pyritic quartzite (4C), 16% noncalcareous phyllite (3G0), 16% carbonaceous phyllite (5A0), 13% massive fine grained pyrite (4E), 7% undifferentiated magnetic sulfides (4EC), 2% quartz, dark olive brown fines, noncalcareous, 45% > 1 cm, fragments blocky > platy	10M4-9 8-9 m	
9	No fines or chips recovered	10M4-6/10 5-9 m	
10			10 m Gas Port and Thermistor Bead (inside PVC)

PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Vangorda Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6902555 **EASTING:** 593818
LOGGED BY: Uwe Schmidt

HOLE NO: 30M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
1	38% pyritic quartzite (4C), 20% noncalcareous phylite (3G0), 18% chloritic phyllite (5D), 11% pyritic massive sulfides (4E), 7% quartz, 6% undifferentiated magnetic sulfides, pale grey noncalcareous fines, fragments platy blocky, 71% > 1 cm		30M4-2 0-2 m		0.7m Gas Ports (2) Thermistor Bead (inside)
2	67% noncalcareous phylite (3G0), 17% chloritic phyllite (5D), 16% quartz, pale grey noncalcareous fines, fragments platy > blocky				1.4m Gas Ports (2) Thermistor Bead (inside)
3			30M4-4 2-4 m 30M4-0/6 0-6 m		2.8 m Gas Port and Thermistor Bead
4	62% noncalcareous phylite (3G0), 28% chloritic phyllite (5D), 10% quartz, pale yellow brown noncalcareous fines, fragments platy > blocky				
5			30M4-6 4-6 m		

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PROJECT: Faro ARD Assessment
PROJECT NO: 1CD003.11
LOCATION: Vangorda Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6902555 **EASTING:** 593818
LOGGED BY: Uwe Schmidt

HOLE NO: 30M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
6	37% noncalcareous phylite (3G0), 33% chloritic phyllite (5D), 10% pyritic massive sulphides (4E), 10% undifferentiated magnetic sulphides, 10% quartz, pale yellow brown noncalcareous fines, fragments platy > blocky				5.6m Gas Ports (2) Thermistor Bead (inside)
7			30M4-8 6-8 m		
8	92% noncalcareous phylite (3G0), 5% chloritic phyllite (5D), 3% quartz, pale green grey noncalcareous fines, fragments platy > blocky		30M4-6/12 6-12 m		
9			30M4-10 8-10 m		
10					10m Gas Ports (2) Thermistor Bead (inside)

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LOCATION: Vangorda Dumps
SURFACE (COLLAR) ELEVATION:
NORTHING: 6902555 **EASTING:** 593818
LOGGED BY: Uwe Schmidt

HOLE NO: 30M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
11	100% noncalcareous phylite (3G0), pale grey noncalcareous fines, fragments platy		30M4-12 10-12 m		
12	73% silver to dark grey calcareous phyllite (5B0), 18% carbonaceous phyllite (5A0), 8% quartz, 1% pyritic quartzite (4C), charcoal grey moderately calcareous fines, fragments platy blocky				
13			30M4-14 12-14 m		
14	56% grey calcareous phyllite (5B0), 22% carbonaceous phyllite (5A0), 21% chloritic phyllite (5D), 1% quartz, pale green grey noncalcareous fines, fragments platy > blocky				
15			30M4-16 14-16 m		

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HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Plezometer	Installations
16	74% noncalcareous phyllite (3G0), 26% quartz, pale grey noncalcareous fines, fragments platy > blocky		30M4-12/18 12-18 m		
17			30M4-18 16-18 m		
18	62% noncalcareous phyllite (3G0), 35% granitic (10E), 3% quartz, pale grey noncalcareous fines, fragments platy blocky				
19			30M4-20 18-20 m		
20					20m Gas Port Thermistor Bead (inside)

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HOLE NO: 30M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
	49% granitic (10E), 24% chloritic phyllite (5D), 18% undifferentiated magnetic sulfides (4EC), 9% pyritic massive sulfides (4E), medium grey noncalcareous fines, fragments platy blocky		30M4-22 20-22 m		
21			30M4-18/24 18-24 m		
22	43% granitic (10E), 26% chloritic phyllite (5D),13% pyritic quartzite (4C), 8% carbonaceous phyllite (5A0), 7% undifferentiated magnetic sulfides (4EC), 3% quartz, 2% pyritic massive sulfides (4E), pale green grey noncalcareous fines, fragments platy blocky				
23			30M4-24 22-24 m		
24	35% granitic (10E), 29% chloritic phyllite (5D), 12% pyritic massive sulfides (4E), 8% carbonaceous phyllite (5A0), 8% undifferentiated magnetic sulfides (4EC), 8% quartz, pale green brown noncalcareous fines, fragments platy blocky				
25			30M4-26 24-26 m		

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HOLE NO: 30M4
HOLE DIAMETER: 6"
DATE AND TIME STARTED: Oct 2, 2002
DATE AND TIME FINISHED: Oct 2, 2002
DRILL CONTRACTOR: Midnight Sun
DRILLING METHOD: Odex, conventional air circulation

Depth (m)	Material Description	Lithology	Sample	Piezometer	Installations
26	49% carbonaceous phyllite (5A0), 21% non-calcareous phyllite (3G0), 12% undifferentiated magnetic sulphides (4EC), 9% chloritic phyllite (5D), 6% pyritic quartzite (4C), 3% quartz, medium grey noncalcareous fines, fragments platy > blocky contains 3 fragments of oxidized sulphides		30M4-28 26-28 m		
27			30M4-24/30 24-30 m		
28	56% granitic (10E), 22% undifferentiated magnetic sulphides, 13% noncalcareous phyllite (3G0), 9% carbonaceous phyllite (5A0), pale grey noncalcareous fines, fragments platy blocky				
29	28.5 to 30 m depth: poor sample recovery, indicating void space ad acent to drill column.		30M4-30 28-30 m		30m Gas Port Thermistor Bead (inside)
30					

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