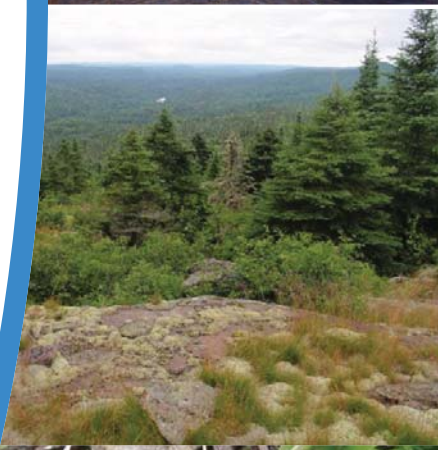
ENVIRONMENTAL ASSESSMENT FOR THE MARATHON PGM-Cu PROJECT AT MARATHON, ONTARIO

STILLWATER CANADA INC. MARATHON PGM-Cu PROJECT

SUPPORTING INFORMATION DOCUMENT No. 2 - SOIL CONDITIONS AT THE MARATHON PGM-Cu PROJECT SITE



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Ref. 11-1851
June 2012

BASELINE SOIL CONDITIONS AT THE MARATHON PGM-Cu PROJECT SITE

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EXECUTIVE SUMMARY

Stillwater Canada Inc. (SCI) proposes to develop a platinum group metals (PGMs), copper (Cu) and possibly iron (Fe) open-pit mine and milling operation near Marathon, Ontario (the Project). EcoMetrix Incorporated was retained to characterize baseline soil conditions at the Project site.

The objectives of this investigation were:

1. to provide a general understanding of terrain, surficial soils and overburden characteristics within the Project footprint;
2. to characterize baseline surficial soil chemistry at air quality sampling locations that may be used in the future to monitor fugitive air emissions from the site;
3. to characterize overburden volume in areas where overburden will be removed; and,
4. to describe the acid generation and metal leaching potential of overburden materials that will be excavated and subsequently stored to accommodate the construction of Project-related infrastructure on site.

The topography of the proposed mine site is varied, with ground surface elevations in the area range from about 200 m to over 400 m above sea level (asl). A central ridge comprising an area of relatively high elevation transects the Project site along the north-south axis. Overall there is a gradual decrease in elevation on the Project site from north to south, and to a lesser extent from east to west. According to the Geologic Survey of Canada the Project area lies within a region of low seismicity.

On a regional scale the overburden is derived from till veneer and to a lesser extent fine- and coarse-grained glaciolucustrine material. Podzols are the dominant soil type. On the Project site the top soils and overburden are typically relatively thin layers and there are extensive areas of bedrock outcrops. The Pic River flood plain is comprised of thick deposits of sand and sandy silts and clays.

Geochemical characterization of the Project site soils included solid characterization, solid phase elemental analysis and soluble constituent analyses. The solid characterization testing was conducted using the modified Sobek method to determine the neutralization potential, sulphur speciation, and carbonate content in order to evaluate the potential for acid generation. Solid phase elemental analysis was conducted using a strong acid digestion (Aqua-Regia) followed by multi-element analysis in order to provide an inventory of constituents within the soils. Finally, an inventory of soluble constituents was determined using shake flask leaching procedures.

The results of the metals analyses on the top soil and overburden samples taken across the project site and at air quality stations indicated that metals contents of most constituents are generally low compared to the screening criteria of the Ontario Ministry of Environment (OMOE) full depth background site condition standards. A limited number of sites were found to exhibit

elevated levels of metal constituents in top soils, likely attributable to isolated pockets of mineralization associated with the ore body. With the exception of these isolated areas of elevated metals, the overburden material is suitable for use as reclamation material.

A preliminary estimate of the volume of overburden material that would be made available as the result excavation of the site to facilitate, using an average site-wide overburden thickness and approximated surface area, was determined. It is estimated that about 3,710,000 m^3 of overburden would be available for project infrastructure (e.g., roads, dams) and reclamation purposes. Of this total volume 39% would be obtainable from the Process Solids Management Facility (PSMF), 35% from the primary open pit, 19% from the satellite pits, and the remaining 8% from the mill site.

The results of soil characterization completed as part of this assessment supports the existence of non-acid generating conditions, as sulfide levels in soils were low (across both the overburden and the top soils sampled). Sulphate content in soils accounted for the majority of the total sulphur content, which is likely explained by the presence of the mineral barite. Carbonate levels in the sampled overburden soils were relatively low in the project site soils, and thus the overburden material has little neutralization potential.

Shake flask testing indicated that the leachate from overburden would generally not exceed provincial water quality objectives. Overburden excavated from the area in the main pit has the potential to release copper to the extent that monitoring and or management may be needed.

TABLE OF CONTENTS

LIST OF APPENDICES:

LIST OF TABLES

Table No:

LIST OF FIGURES

ACRONYMS AND ABBREVATIONS

AP	Airport
ARD	Acid Rock Drainage
asl	Above Sea Level
BHP	BHP Engineering Pty Ltd.
CARs	Canadian Aviation Regulations
CEA Agency	Canadian Environmental Assessment Agency
Cu	Copper
CYSP	Marathon Municipal Airport
EA	Environmental Assessment
EIS	Environmental Impact Statement
EMRD	Extraction Metallurgy Research Division
Euralba	Euralba Mining Ltd.
Fe	Iron
FO	Field Office
Geostat	Geostat Systems International
HL	Hare Lake
HO	Harmonization Order
Hwy	Highway
JRP	Joint Review Panel
MG	May's Gifts
MPGM	Marathon PGM Corp.
MPI	Marathon Pulp Inc.
m	Metre
MRSA	Mine Rock Storage Area
N	Nitrogen
NoC	Notice of Commencement
O. Reg.	Ontario Regulation
OB	Overburden
OEA Act	Ontario Environmental Assessment Act
OMOE	Ontario Ministry of the Environment
PGE	Platinum Group Element
PGM	Platinum Group Metal
PR	Pic River
PSMF	Process Solids Management Facility
PWQO	Provincial Water Quality Objectives
QA/QC	Quality Assurance/Quality Control

SCI	Stillwater Canada Inc.
SFL	Sustainable Forest License
SWC	Stillwater Mining Company
TGCL	True Grit Consulting Limited
ToR	Terms of Reference
VA	Voluntary Agreement

1.0 INTRODUCTION

Stillwater Canada Inc. (SCI) proposes to develop a platinum group metals (PGMs), copper (Cu) and possibly iron (Fe) open-pit mine and milling operation near Marathon, Ontario. A Notice of Commencement (NoC) of an environmental assessment (EA) in relation to the proposed Marathon PGM-Cu Project (the "Project") was filed by the Canadian Environmental Assessment Agency (CEA Agency) under Section 5 of the Canadian Environmental Assessment Act on April 29, 2010 (updated July 19, 2010).

The EA was referred to an independent Review Panel by the Federal Minister of the Environment on October 7, 2010. On March 23, 2011 SCI entered into a Voluntary Agreement (VA) with the Province of Ontario to have the Project subject to the Ontario Environmental Assessment Act (OEA Act). This agreement was the instrument that permitted the provincial government to issue a Harmonization Order (HO) under Section 18(2) of the Canada-Ontario Agreement on Environmental Assessment Cooperation to establish a Joint Review Panel for the Project between the Minister of the Environment, Canada and the Minister of the Environment, Ontario.

The HO was issued on March 25, 2011. The Terms of Reference (ToR) for the Project Environmental Impact Statement (EIS) and the agreement establishing the Joint Review Panel (JRP) were issued on August 8, 2011.

The following provides an overview of the proposed development including its location, surrounding land uses, the exploration history of the site and the primary conceptual features of the mining and milling facilities. The information provided below, in the Environmental Impact Statement Report and supporting technical studies is based on the conceptual mine design for the Project. The conceptual design provides planning level information for the environmental assessment process. Final detailed design will commence following EA approval in concordance with the concepts presented herein.

1.1 Project Location

1.1 Project Location

The Project is located approximately 10 km north of the Town of Marathon, Ontario (Figure 1.1-1). The town, with a population of 3,353 (2011 Census), is situated adjacent to the Trans-Canada Highway 17 (Hwy 17) on the northeast shore of Lake Superior, about 300 km east and 400 km northwest (by highway) of Thunder Bay and Sault Ste. Marie, respectively.

The centre of the Project footprint sits at approximately 48° 47' N latitude and 86° 19' W longitude. The Project site is in an area characterized by relatively dense vegetation, comprised largely of a birch and, to a lesser extent, spruce-dominated mixed wood forest. The terrain is moderate to steep, with frequent bedrock outcrops and prominent east to west oriented valleys.

The climate of this area is typical of northern areas within the Canadian Shield, with long winters and short, warm summers.

Figure 1.1-1: Location of the Proposed Marathon PGM-Cu Project Site near Marathon, Ontario

1.2 Surrounding Land Uses

The Project site lies partially within the municipal boundaries of the Town of Marathon, as well as partially within the unorganized townships of Pic, O'Neil and McCoy. The primary zoning designation within the Project Site is 'rural'.

In the immediate vicinity of the Project there are several authorized aggregate sites, including SCI's licensed aggregate site located to the northeast of Hwy 17 along the existing site access road (Camp 19 Road).

The Marathon Municipal Airport (CYSP), which operates as a Registered Airport (Aerodrome class) under the Canadian Aviation Regulations (CARs; Subsection 302), is adjacent to, and south of the Project site. The airport occupies a land area of approximately 219 hectares and is accessed from Hwy 17.

Several First Nations and Métis peoples claim the Project site as falling within their traditional land use boundaries. Based on Aboriginal accounts, prior to the construction of the forestry road, the land and water uses associated with (or close to) the site would have typically been limited to the Pic River corridor, the Bamoos Lake-Hare Lake-Lake Superior corridor and the Lake Superior shoreline and near-shore area, rather than the interior of the Project site. Traditional land and water uses (or rights conferred by Treaty) that can be ascribed to the site could include:

- Hunting;
- Trapping;
- Fishing; and,
- Plant harvesting for food, cultural and medicinal uses.

Primary industries supporting the Town of Marathon, as well as the region, have historically been forestry, pulp and paper, mining and tourism. The Project site is located within the Big Pic Forest Management Area. The Big Pic Forest includes Crown land east and north of Lake Superior and is generally north, south and west of the community of Manitouwadge and includes the communities of Marathon, Caramat and Hillsport.

Until July 2010 the forest was managed under the authority of a Sustainable Forest License (SFL), which was held by Marathon Pulp Inc. This SFL was revoked, with the forest reverting to the Crown as a Crown Forest. Until recently, Marathon Pulp Inc. (MPI) operated a kraft pulp mill in Marathon on the shore of Peninsula Harbour. The mill announced its indefinite shut down (effective at the end of February 2009) on February 11, 2009, and as a result there has been a significant downturn in the local economy. A second mill operated in Terrace Bay was temporarily closed in December 2011.

The Hemlo Mining Camp is located 30 km to the southeast. There are currently two mines in production at the Camp (David Bell Mine, Williams Mine), which are estimated to be in operations until 2025.

1.3 Exploration History of the Site

Exploration for copper and nickel deposits on the Project site started in the 1920s and continued until the 1940s with the discovery of titaniferous magnetite and disseminated chalcopyrite occurrences. During the past four decades, the site has undergone several phases of exploration and economic evaluation, including geophysical surveys, prospecting, trenching, diamond drill programs, geological studies, resource estimates, metallurgical studies, mining studies, and economic analyses. These studies have successively enhanced the knowledge base of the deposit.

In 1963, Anaconda acquired the Marathon property and carried out systematic exploration work including diamond drilling of 36,531 m in 173 drill holes. This culminated in the discovery of a large copper-PGM deposit. Anaconda discontinued further work on the project in the early 1980s due to low metal prices at the time.

In 1985, Fleck purchased a 100% interest in the Marathon PGM-Cu Project with the objective of improving the project economics by focusing on the platinum group element (PGE) values of the deposit. The Fleck drilling totaled 3,615 m in 37 diamond drill holes. In 1986, H.A. Symons carried out a feasibility study for Fleck based on a 9,000 tonnes per day conventional flotation plant with marketing of copper concentrate and Kilborn Limited carried out a prefeasibility review for Fleck that included preliminary results from the Lakefield pilot plant tests (Kilborn Limited, 1987). The feasibility study indicated a low internal rate of return which was confirmed by Teck Corporation who concluded the project was uneconomic due to low metal prices at the time. On June 10, 1998, Fleck changed its name to PolyMet Mining Corp.

In 2000, Geomaque acquired certain rights to the Marathon PGM-Cu Project through an option agreement with Polymet. Geomaque and its consultants carried out a study of the economic potential of the Marathon PGM-Cu Project. The study included a review of the geology and drill hole database, interpretation of the mineralized zones, statistics and geostatistics, computerized block model, resource estimation, open pit design and optimization, metallurgy, process design, environmental aspects, capital and operating cost.

Marathon PGM Corp. acquired the Marathon PGM-Cu deposit from Polymet in December 2003. Marathon PGM Corp. funded programs of advanced exploration and diamond drilling on a continuous basis between June 2004 and 2009. Approximately 320 holes and 65,000 m were drilled from 2007 to 2009 to define and expand the resource and for condemnation holes outside of the pit area. A feasibility study was published in 2008 and updated in January 2010.

Stillwater Mining Company (SWC) and Marathon PGM entered into an agreement on September 7, 2010 pursuant to which SWC would acquire all of the outstanding shares of Marathon PGM. The acquisition agreement received ministerial approval under the Investment Canada Act on November 24, 2010 and the agreement closed on November 30, 2010. On December 31, 2010 Stillwater Mining Company formed a Canadian corporation, Stillwater Canada Inc. In March 2012, MC MINING LTD (MC) purchased 25% interest in Stillwater Canada Inc. who is the proponent of the Marathon PGM-Cu Project.

1.4 Project Overview

The Project is based on the development of an open pit mining and milling operation. Existing conditions on and around the site and the conceptual general layout of the components of the mine site, the transmission line corridor and access road are provided in Figures 1.4-1 and 1.4-2, respectively. One primary pit and a satellite pit complex to the south (currently envisaged to be comprised of four satellite pits) are proposed to be mined. Ore will be processed (crushed, ground, concentrated) at an on-site processing facility. Final concentrates containing copper and platinum group metals will be transported off-site via road and/or rail to a smelter and refinery for subsequent metal extraction and separation. The total mineral reserve (proven and probable) is estimated to be approximately 91.5 million tonnes. It is possible that an iron concentrate may also be produced, depending upon the results of further metallurgical testing and market conditions at that time.

During the operations phase of the Project, ore will be fed to the mill at an average rate of approximately 22,000 tonnes per day. The operating life of the mine is estimated to be approximately 11.5 years. The construction workforce will average approximately 400 people and will be required for between 18 and 24 months. During operations the work force will comprise an estimated 365 workers. The mine workforce will reside in local and surrounding communities, as well as in an Accommodations Complex that will be constructed in the Town of Marathon.

Approximately 288 million tonnes of mine rock[1] will be excavated. It is estimated that between eighty five to ninety percent of this material is non-acid generating (NAG) and will be permanently stored in a purposefully built Mine Rock Storage Area (MRSA) located east of the primary pit. The NAG or so-called Type 1 mine rock will also be used in the construction of access roads, dams and other site infrastructure as needed. Drainage from the MRSA will be collected, stored, treated and discharged as necessary to the Pic River. During mine operations, about 20 million tonnes of mine rock could have the potential to generate acid if left exposed for extended periods of time. This mine rock is referred to as Type 2 mine rock or potentially acid generating (PAG). The Type 2 mine rock will be managed on surface during mine operations in

[1] Mine rock is rock that has been excavated from active mining areas but does not have sufficient ore grades to process for mineral extraction.

temporary stock piles with drainage directed into the open pits. This material will be relocated to the bottom of the primary and satellite pits and covered with water to prevent potential acid generation and covered with Type 1 materials.

Process solids[2] will be managed in the Process Solids Management Facility (PSMF), as well as in the satellite pit complex. The PSMF will be designed to hold approximately 61 million m^3 of material, and its creation will require the construction of dams. Two streams of process solids will be generated. An estimated 85 to 90% of the total amount of process solids produced will be non-acid generating, or so-called Type 1 process solids. The remaining ten to fifteen percent of the process solids could be potentially acid generating and is referred to as Type 2 process solids. The Type 2 process solids will be stored below the water table in the PSMF or below water in the pits to mitigate potential acid generation and covered with Type 1 materials. Water collected within the PSMF, as well as water collected around the mine site other than from the MRSA will be managed in the PSMF for eventual reclamation in the milling process. Excess water not needed in the mill will be discharged, following treatment as is necessary, to Hare Lake.

Access to the Project site is currently provided by the Camp 19 Road, opposite Peninsula Road at Hwy 17. The existing road runs east towards the Pic River before turning north along the river to the Project site (approximately 8 km). The existing road will be upgraded and utilized from its junction with Hwy 17 for approximately 2.0 km. At this point a new road running north will be constructed to the future plant site. The primary rationale for developing the new road is to move traffic away from the Pic River. The new section of road will link two sections of forest access roads located on the site.

Power to the Project site will be provided via a new 115 kV transmission line that will be constructed from a junction point on the Terrace Bay-Manitouwadge transmission line (M2W Line) located to the northwest of the primary pit. The new transmission line will run approximately 4.1 km to a substation at the mill site. The width of the transmission corridor will be approximately 30 m.

Disturbed areas of the Project footprint will be reclaimed in a progressive manner during all Project phases. Natural drainage patterns will be restored as much as possible. The ultimate goal of mine decommissioning will be to reclaim land within the Project footprint to permit future use by resident biota and as determined through consultation with the public, Aboriginal peoples and government. A certified Closure Plan for the Project will be prepared as required by Ontario Regulation (O.Reg.) 240/00 as amended by O.Reg.194/06 “Mine Development and Closure under Part VII of the Mining Act” and “Mine Rehabilitation Code of Ontario”.

[2] Process solids are solids generated during the ore milling process following extraction of the ore (minerals) from the host material.

Maps showing the existing features and topography of the site, as well as the proposed conceptual development of the site are provided in Figure 1.4-1 and 1.4-2 below.

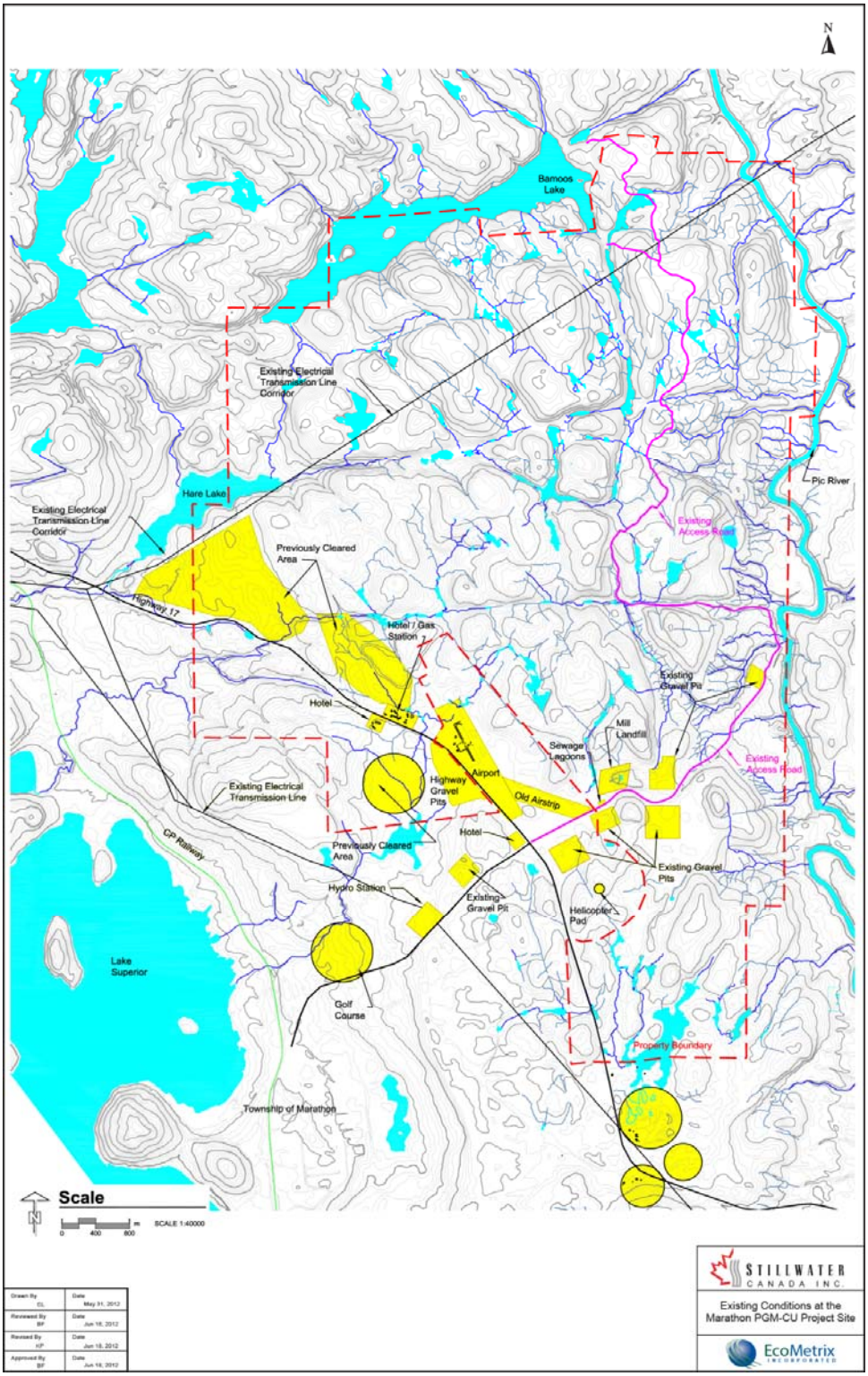

Figure 1.4-1: Existing Conditions at the Marathon PGM-Cu Project Site

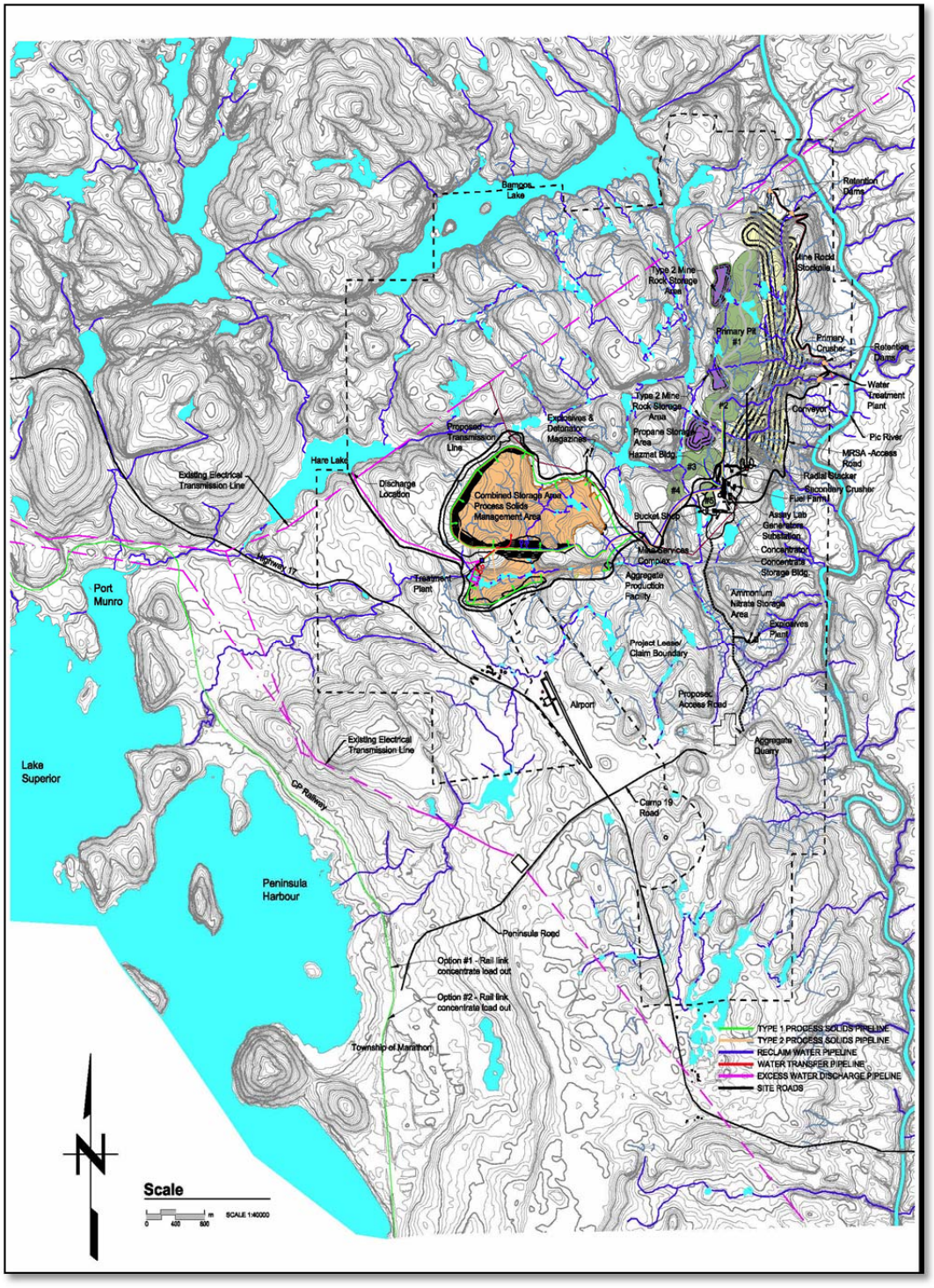

Figure 1.4-2: Marathon PGM-Cu Project General Site Layout

1.5 Scope of Work

The primary objectives of the characterization of baseline soil conditions at the Marathon PGM-Cu Project site were:

1. to provide a general understanding of terrain, surficial soils and overburden characteristics within the project footprint. To this end the report draws on information gathered from a number of sources including: borehole and test pit records from geotechnical investigations by Golder Associates (Golder, 2008) and AMEC (AMEC, 2010); drilling logs from exploration activities at the site and borrow pit investigations (pers. comm., Dave Good, SCI, 2010, 2011); borehole logs from groundwater well installation records from True Grit Consulting Ltd, (pers. comm., Cliff Long, TGCL, 2010, 2011); and borehole logs from geotechnical investigation from Knight Piésold (pers. comm., Craig Hall, Knight Piésold, 2011); and test pit and soil chemistry data collected by EcoMetrix Incorporated in 2009 and 2011.
2. to characterize baseline surficial soil chemistry at air quality sampling locations that may be used in the future to monitor fugitive air emissions from the site.
3. to characterize overburden volume in areas where overburden will be removed.
4. to describe the acid generation and metal leaching potential of overburden materials that will be excavated and subsequently stored to accommodate the construction of Project-related infrastructure on site. To this end, this report draws on information collected during geotechnical investigations on site in 2011, specifically in areas where overburden stripping was likely to occur (e.g., open pits, mill site, PSMF dam locations).

1.6 Report Format

Following the introductory section the remainder of the report is organized as follows:

- Section 2 provides a description sample collection and analysis procedures;
- Section 3 provides the results and discussion of the survey;
- Section 4 outlines the primary conclusions of the study; and
- Section 5 provides references that were consulted in the preparation of this report.

Appendix material provided includes a compilation of soil characterization tables, a summary of the shake flask test set-up, EcoMetrix test pit logs and certificate of analyses and official laboratory reports, and a summary of borehole and test pit records from Golder, AMEC, Knight Piésold and EcoMetrix.

2.0 SAMPLE COLLECTION AND ANALYSIS

2.1 Sample Collection

In the 2009, EcoMetrix collected soils from seven locations across the Project site (herein referred to as “Soil 1”, “Soil 2”, etc …). Samples comprised the top 5 cm of the soil horizon and were composites of five augured boreholes at each of the seven sampling sites.

In 2011, EcoMetrix collected top soil and overburden material at locations across the proposed Project site including, the MRSA, the primary open pit, the satellite pits and the mill site. Samples were collected by digging 0.5 m x 0.5 m test pits with a handheld shovel. Samples were separated according to any visible horizon separation. Samples were labeled according to their associated Project site location. Test pit logs were recorded for each site and the overburden materials were described in accordance to The Canadian System of Soil Classification (Agriculture and Agri-food Canada, 1998).

Soil samples were also collected in 2001 by Knight Piésold and True Grit Consulting Limited (TGCL). Knight Piésold collected samples at a number of geotechnical borehole locations around the perimeter of the proposed PSMF. These samples, which were collected from a hollow stem auger, comprised aliquots of soil from the top of the overburden layer and from the overburden-bedrock interface. TGCL collected surficial samples at sites from which baseline air quality data were also collected. These samples comprised about 1 kg aliquots of material collected from the top 5 cm of the soil horizon with a small shovel. Loose surface material and plants were removed prior to sample collection.

Refer to Figure 2.1-1 for all soil sampling locations.

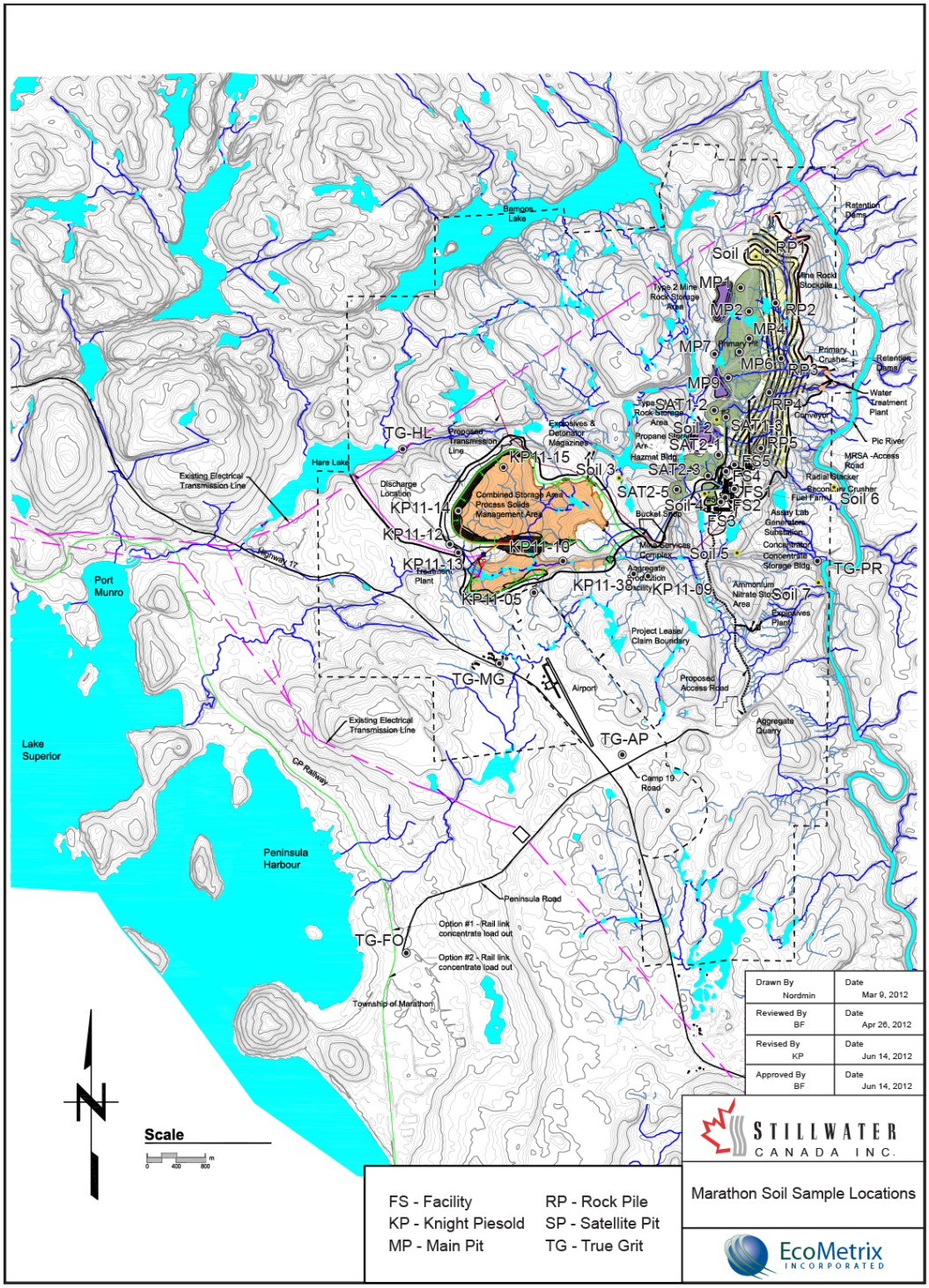

Figure 2.1-1: Marathon PGM-Cu Soil Sample Locations

2.2 Sample Analysis

The 2009 composited soil samples were sent for to ALS Laboratory Group in Thunder Bay, Ontario for metal analyses.

The 2011 overburden samples were prepared for analysis as follows: the top soil layer was separated and the remaining sample horizons were composited and referred to as the overburden sample. Select sub-samples of solids were submitted to SGS in Lakefield, ON for solids characterization and metals analyses.

Top soil sub-samples of selected sample sites were subjected to short-term leach (Shake Flask) tests using distilled water. The shake flask test configuration is presented in Appendix B. The leach tests used a 3:1 water:solids ratio (approximately 300 mL of water to 100 g of material). The samples were constantly agitated for approximately 24 hours prior to extraction of leachate samples. After agitation, leachate samples were filtered (0.45 µm) and acidified (HNO_3) prior to submission for analysis to ALS Environmental in Mississauga, ON. The liquid fractions from the leach tests were analysed for metals and other parameters, such as pH and acidity, to evaluate the key indicators of acid rock drainage (ARD). The leach test methods followed the guidelines in Price (1997) as required by the Ontario Mining Act.

2.3 Quality Assurance/Quality Control

A critical requirement of any sampling program is the maintenance of sample integrity from the time of collection to the arrival of the samples at the location where further sample processing is required (i.e. analytical laboratory). To ensure the integrity of the samples upon collection, the field technicians cleaned sampling equipment prior to excavating each test pit, and used clean gloves and sample bags to collect and store the samples. Each sample was given a unique identification label and test pit logs were recorded for each site to characterize the nature of the samples collected. Samples were stored at appropriate temperatures prior to processing in the laboratory and shipment for analysis. Chain-of-custody forms were completed to document the shipment and handling of all samples.

Analysis of blank, duplicate and reference material standards were performed during laboratory analysis by SGS and ALS Environmental to ensure quality assurance/quality control (QA/QC). Laboratory Certificates of Analysis provide details of the laboratories QA/QC checks and confirm that all data has acceptable accuracy and precision (see Appendix D).

3.0 RESULTS AND DISCUSSION

3.1 General Site Geography

The Project site is characterized by moderate to steep hilly terrain and is marked by a relatively high frequency of streams, ponds and small lakes. Vegetation in the area is dense and consists of northern hardwood and conifer trees, as well as muskeg areas (bogs), which is common to boreal forest regions.

The general elevation around the proposed mine site (or mine infrastructure) is slightly higher than the overall regional topography. Ground surface elevations in the area range from about 200 m to over 400 m above asl. A central ridge comprising an area of relatively high elevation transects the Project site along the north-south axis, which generally runs to the west of the proposed primary pit. This ridge is the primary watershed divide and water to the east of the divide drains to the Pic River, whereas water to the west of the divide drains to Lake Superior. Differences in relief between this area and the Pic River flood plain to the east are the most severe seen on the site, with differences in elevation of 150 m or more seen over a distance of 1.5 to 2 km. Overall there is a gradual decrease in elevation on the Project site from north to south, and to a lesser extent from east to west.

On a regional scale the overburden is derived from till veneer and to a lesser extent fine- and coarse-grained glaciolucustrine material (Fulton, 1995). In the vicinity of the Town of Marathon, and on the Project site in particular, it appears as though coarse-grained glaciolucustrine material is the most prominent host material.

In terms of soil, on a regional level podzols are the dominant soil type (Baldwin *et al.*, 2000). Podzols extend in a wide band from north and east of Lake Superior to the Ontario-Quebec border and from the claybelt to the southern limit of the Canadian Shield. This soil type typically develops under forest stands on coarse-textured, stony, glacial tills and outwash and on glaciofluvial sand overlying acidic parent material. In Ontario, podzols are of the humo-ferric variety, which are commonly associated with exposed bedrock (Baldwin *et al.*, 2000).

Sands and sandy silts and clays are the dominant feature within the Pic River flood plain. Deposits of tens of metres thickness can be found along the banks of the river in the vicinity of the Project site.

The Geologic Survey of Canada identifies the Project area as being within a region of relatively low seismicity (Figure 3.1-1) (NRCAN, 2011).

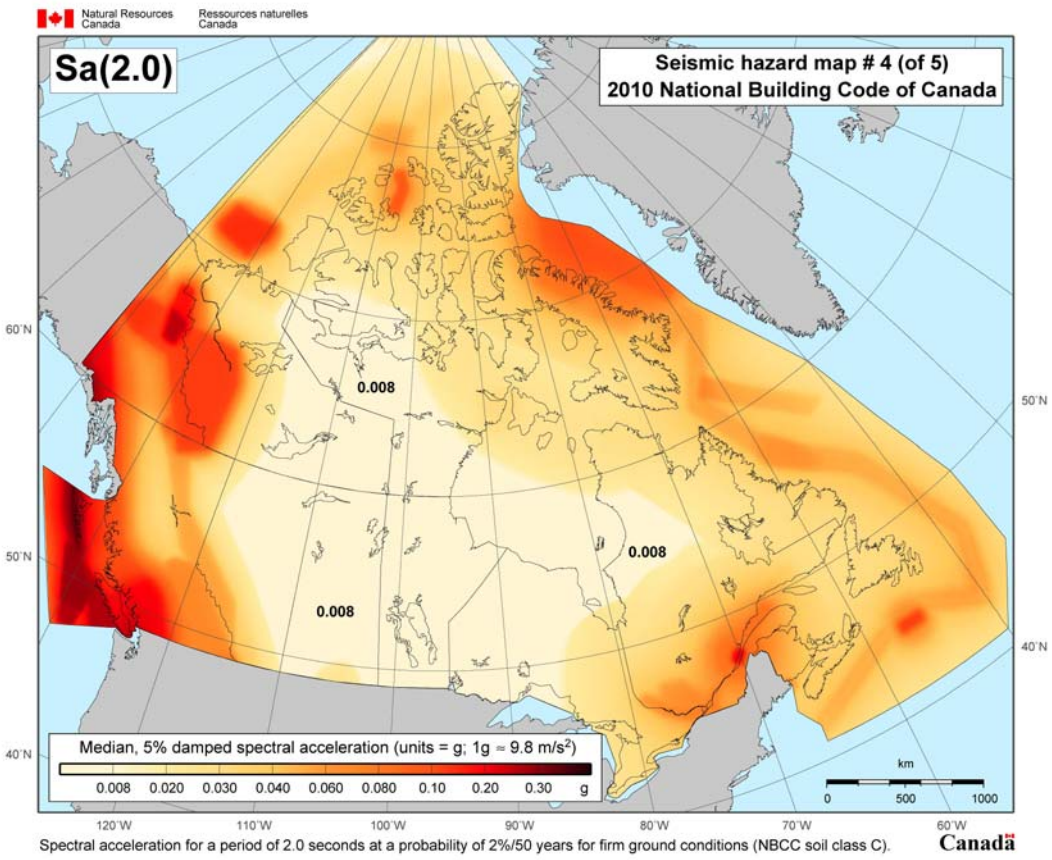

Figure 3.1-1: Seismic Hazard Map of Canada (NRCAN, 2011)

3.2 Overburden and Soils Physical Characterization

In the 2009 and 2011 sampling programs, top soils and overburden were sampled from locations across the Project site including the proposed sites for the main and satellite pits, the MRSA and the mill facilities site. Geotechnical investigations were conducted at the PSMF by Knight Piésold (pers. comm., Craig Hall, Knight Piésold, 2011). Soils were also sampled by TGCL at five locations that also served as air quality monitoring locations to establish baseline conditions of key constituents. These locations are referred to herein as: Hare Lake (HL), Pic River (PR), May's Gifts (MG), Airport (AP), and Field Office (FO).

The soil and OB characterization presented below is based on the information generated from the investigations referred to above, as well as geotechnical investigations completed by Golder Associates between March 2007 and April 2008 (Golder, 2008), AMEC in 2010 (AMEC, 2010) and MPGM between 2001 and 2009 (pers. comm., Cliff Long, TGCL, 2010, 2011; pers. comm., Dave Good, MPGM, 2010). A summary of the test pit and borehole records is provided in Appendix E.

Mine Rock Storage Area

The overburden thickness was variable and ranged from approximately 0.5 to 4.2 m. The overburden top soils were dark brown to black and rich in organic matter with an average thickness of 7.6 cm. The horizons below the top soil were typically a mix of fine to coarse sand and silt with gravel and boulder fractions. The subsequent layers were rich in silt and clay with some traces of sand. At some sites clay laminations about 1 cm thick were found in the overburden soils.

With the exception of RP-1, ground water seepage was not evident as the majority of the pits remained dry after completion. Seepage was observed at 0.68 m at site RP-1.

Primary Open Pit

The overburden cover was generally thin in the primary open pit area with cover as shallow as 6.0 cm. There are many areas of exposed bedrock outcrop in this area. The average overburden thickness indicated by drill hole investigations was 2.59 m, and in a few cases overburden cover was over 6.0 m in depth.

Overburden top soils in the main pit are dark brown to black and rich in organic matter including root material with an average thickness of 7.98 cm. The overburden material was typically composed of sand and silt and in some instances gravel. Below the surface horizon, overburden soils were classified as clayey silts and sandy silts and the occurrence of coarse grained sand, gravel and cobbles increased with depth. Ground water seepage was not evident as test pit sites remained dry after completion.

Satellite Pits

Overburden thickness is variable at the satellite pit sites and ranges from approximately 0.25 m to 4.0 m. Outcrops of exposed bedrock are found in these areas. The satellite pit sample site top soils provided the thinnest cover compared to the other sample sites with an average thickness of 6.86 cm. Top soils were dark brown to black and rich in organic matter and contains rootlets. Underlying soil horizons were light grey to brown in colour and were composed of a mixture of sand, silt and clay and gravel sized fractions. The majority of the test pits sampled in the satellite pit sites remained dry after completion. Seepage was noted at site TP07-14 and was associated with a peat rich layer.

Mill Site

The overburden thickness at the mill site typically ranged from 0.03 m to 0.61 m. On average top soil layers were thickest at the mill site, with an average thickness of 9.91 cm, and were rich in organic material, such as roots and leaf litter. Underlying soil horizons were composed of variable mixtures of silt, sand and clay (clayey-silt and silty-sand horizons were typical).

Seepage was evident in the organic rich top soil layers at sites BH08-3, BH08-9, BH08-11 and TP08-13.

Process Solids Management Facility

The overburden thickness at the PSMF site was generally shallow, with a typical overburden cover of 0.3 m. The overburden cover was thicker at the southernmost end of the PSMF site, where overburden thickness was greater than 11 m. The shallow overburden soils sampled at the process management facility location were reddish-brown to light brown to grey in colour and were predominately sandy with some traces of silt, clay and gravels. Groundwater seepage was encountered at KP11-09 and KP11-38 at a depth of 1.5 and 1.6 m.

Pic River Flood Plain

The Pic River area was comprised of thick (as much as > 20 m in some places) deposits of sand, silt, and clay with a moist, black topsoil cover ranging from 20 to 30 cm thick. Test pits in the Pic River area both indicated overburden thickness greater than 4.55 m (auger depth terminated at 4.55 m), consistent with visual inspection of the area's overburden cover. Historically this material is derived from river bedload that has been deposited in the floodplain during times of high water.

The overburden stratigraphy generally consisted of clayey silt with trace sand to sand with trace silt for about 1.25 to 2 m below the topsoil cover. Below this depth the material gradually transitioned into a more clay rich silt with trace interlayered sands. Test pits in the Pic River flood plain had variable instances of ground water seepage. Grain size distribution was dominantly medium to fine sands with smaller proportions of silt, clay, coarse sands, and gravel.

Proposed Access Road

The overburden thickness at test pit sites along the corridor for the proposed access road were as shallow as 0.1 m and reached a depth greater than 4 m. Bedrock was not encountered at most test pits sites sampled. Overburden cover was over 13 m at one borehole site. Top soil was 0.21 m thick on average and contained moist, black organic silt or peat material containing rootlets. The overburden soils were generally made up of horizons that had a variable composition and distribution of sand, silt, and clay. The soil horizons beneath the topsoil layer tended to follow a trend of increased silt to sand ratios from south to north along the proposed access road, with increasing clay content with depth along the same trajectory. The occurrence of gravels tended to be in the more sandy horizons, and the gravels became less abundant traveling north along the proposed access road. The soils along the proposed access road, just south of the intersection with the existing access road, tended to have higher silt and clay contents then the soil horizons to the south. With the exception of a single test pit (TP08-2), groundwater seepage was indicated at depths ranging from 1.5 m to 2.6 m; however, groundwater was only indicated in small percentage of the sites, whereas the rest remained dry after the completed excavation.

Air Quality Monitoring Stations

Soil sampled at Hare Lake (HL) was dark brown to black was rich in organic matter. The soils at other sites were predominately sandy soils. The Airport site had sandy soils with traces of gravel.

3.3 Overburden and Top Soils Metal Content

The results for selected soil constituents are presented in Tables 3.3-1 and 3.3-2. Refer to Appendix Table A3 for metal analyses results for all constituents. Constituent concentrations were screened against average crustal abundance concentrations according to Faure (1998) and the Ontario Ministry of the Environment (OMOE, 2011) full depth background site condition standards, which are based on typical background concentrations found in non-contaminated Ontario soils.

Mine Rock Storage Area

Overburden samples collected from the MRSA were elevated with respect to average crustal abundance concentrations for antimony, arsenic, cadmium, lead, molybdenum and selenium. With the exception of antimony, most samples did not exceed or only slightly exceeded the OMOE background standards. Antimony levels in the top soil at four of the six sampling sites were found to be elevated above the standards and were highest at site RP-1 (150 mg/kg). With the exception of site RP-1, which exhibited elevated antimony concentrations in the top soil, metal contents in the top soil and overburden material in the MRSA met the screening conditions according to the OMOE background site conditions, or were only marginally elevated above criteria levels. This implies that overburden material in the MRSA, if excavated, could be considered for use as reclamation material.

Primary Open Pit

Most samples exceeded average crustal abundance concentrations for the selected constituents, but only cobalt, mercury, molybdenum and selenium were found to exceed the OMOE background standards. Top soil and overburden material at five of the seven sites were elevated with respect to the standards for cobalt (20 mg/kg). Cobalt concentrations ranged from 26 mg/kg to 520 mg/kg and the highest concentrations of cobalt were found in the top soil at site MP-6. Mercury, molybdenum and selenium levels only marginally exceeded the standards at a few sites.

Although top soil at site MP-6 was highly elevated in cobalt, top soil and overburden material in the main pit generally met the OMOE site condition standards or was only slightly elevated above screening criteria for the majority of the metals tested, therefore this material could be considered for use as reclamation material.

Satellite Pits

Top soil and overburden material generally exceeded average crustal abundance concentrations for the selected constituents, but only a few samples exceeded the background standards for cadmium, cobalt, copper, molybdenum and zinc. In most cases the constituents were only marginally elevated with respect to the OMOE background levels, with the exception of soils from site “Soil 2”. Site “Soil 2” is found in the Satellite 1 pit area and cadmium, cobalt and copper concentrations were 9.94, 78 and 406 mg/kg, respectively. Molybdenum and zinc concentrations were 13.6 and 15,400 mg/kg at this site. Copper concentrations were also elevated at site “SAT 1-3” (150 mg/kg) with respect to the OMOE standards.

The occurrence of highly elevated metals found at site “Soil 2” and in the top soil of “SAT 1-3” appear to be isolated instances (and may represent data anomalies), as overburden material from both satellite pits were general only marginally elevated above background site standards.

Mill Site

Overburden soils were found to be elevated in antimony, arsenic, cadmium, lead, molybdenum, and selenium with respect to average crustal abundance concentrations. Molybdenum and selenium concentrations were found to slightly exceed the OMOE background standards.

Overburden material from the mill site would make suitable reclamation material as the selenium and molybdenum concentrations were only marginally elevated above screening criteria.

Process Solids Management Facility

All constituent concentrations were either below or only marginally above crustal abundance concentrations. Only molybdenum and selenium concentrations were found to exceed OMOE background site standards and were only marginally elevated at a few sites. Overburden material from the PSMF site would be suitable for use as reclamation material.

Pic River Flood Plain

Arsenic, cadmium, lead, selenium, silver and thallium exceeded average crustal abundance levels at both sampling locations in the Pic River flood plain. No constituent exceeded the full depth background site condition standards provided by the OMOE.

Air Quality Monitoring Stations

Soil samples collected from the off-site air quality monitoring stations were elevated in arsenic, cadmium, lead, molybdenum and zinc content with respect to average crustal abundance concentrations. Only molybdenum was found to exceed the OMOE standards at the “AP” and “HL” sites. Characterizing the metal content in soils at the air quality monitoring sites was

appropriate for establishing baseline soil conditions of off-site locations for use in possible future fugitive air emission studies. This data can be used during later phases of mine life to monitor fugitive dust emissions.

Other Sites

Sampling sites “Soil 3” and “Soil 5” are not associated with any specific mine-related facility and represent general overburden conditions within the Project area (see Figure 2.1-1). “Soil 3” is located near the north eastern end of the PSMF and “Soil 5” is located east of the southeast corner of the PSMF and east of the proposed access road. At both sites, constituent concentrations were generally below average crustal abundance concentrations and no constituents were found to exceed OMOE standards.

Table 3.3-1: Metal constituent summary for Project site locations

Table 3.3-1: Metal Constituent Summary for Project Site Locations

PARAMETER Units		Antimony (Sb) mg/kg	Arsenic (As) mg/kg	Cadmium (Cd) mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Selenium (Se) mg/kg	Sulphur (S) mg/kg	Zinc (Zn) mg/kg
Average Crustal Abundance[1]		0.2	1	0.1	29	75	8	4	1	0.05	-	80
OMOE Soil Quality Guidelines[2]		1.3	18	1.2	20	92	120	0.27	2	1.5	-	290
Mine Rock Storage Area												
RP-1	TS	150	13	0.53	2.3	11	66	0.3	2.7	6.2	1400	34
	OB	< 0.8	< 0.5	0.08	7.1	19	5.5	< 0.1	0.9	0.8	180	43
RP-2	TS	7.5	5.5	0.42	1.1	7.4	41	0.2	1.2	1.7	560	44
	OB	< 0.8	2.4	0.13	2.6	17	8.7	0.2	1.7	1.8	810	23
RP-3	TS	12	3.2	0.58	3.4	10	51	0.2	1.6	1.2	870	53
	OB	< 0.8	2.2	0.09	15	28	12	< 0.1	0.4	< 0.7	130	56
RP-4	TS	1.1	3.6	0.48	9.6	15	36	0.1	0.6	0.7	710	120
	OB	< 0.8	1.9	0.18	8.7	17	7.4	< 0.1	0.2	< 0.7	1600	43
RP-5	TS	1.8	3.1	1.1	2.7	13	85	0.2	1.5	1.1	890	50
	OB	< 0.8	2.3	0.17	12	19	10	< 0.1	0.3	< 0.7	800	55
Soil 1		< 1.0	3	< 0.5	4.9	10.5	12.7	0.052	< 1.0	1.1	229	66.1
Primary Open Pit												
MP-1	TS	1	3.7	0.47	43	16	50	0.1	1.7	< 0.7	750	120
	OB	< 0.8	< 0.5	0.16	67	30	5.9	< 0.1	1.8	< 0.7	210	130
MP-2	TS	1	1.3	0.88	4.3	36	43	0.2	0.9	1.3	1300	36
	OB	< 0.8	0.7	0.1	4.4	31	14	< 0.1	2.7	< 0.7	120	16
MP-3	TS	< 0.8	1.9	0.63	2.6	10	51	0.3	0.9	1.3	1300	38
	OB	< 0.8	0.7	0.1	28	18	6.9	< 0.1	0.9	< 0.7	210	33
MP-4	TS	< 0.8	0.5	0.87	36	76	15	< 0.1	0.6	< 0.7	650	130
	OB	< 0.8	1.1	0.14	3.1	32	7.5	< 0.1	3.4	1	400	19
MP-6	TS	< 0.8	10	0.97	520	49	46	0.1	3.7	2.3	1600	67
	OB	< 0.8	< 0.5	0.12	120	63	3.8	< 0.1	1.4	0.8	270	55
MP-7	TS	< 0.8	2	0.44	26	36	36	0.1	3.3	< 0.7	690	180
	OB	< 0.8	0.8	0.16	50	77	8.7	< 0.1	4	< 0.7	720	210
MP-9	TS	< 0.8	2.7	0.5	4.5	12	40	0.2	1.3	0.9	870	41
	OB	< 0.8	0.9	0.05	7.3	13	5.9	< 0.1	0.5	< 0.7	72	24
Satellite Pits												
SAT 1-2	TS	< 0.8	1	0.78	1	8.6	53	0.2	1.0	1.2	1100	46
	OB	< 0.8	1	0.15	8.7	15	10	< 0.1	0.6	< 0.7	120	36
SAT 1-3	TS	< 0.8	3.5	2.2	10	150	39	0.1	1.0	1.2	960	130
	OB	< 0.8	2	0.12	12	31	10	< 0.1	0.2	< 0.7	360	55
SAT 2-1	TS	< 0.8	< 0.5	0.21	28	20	2.7	< 0.1	0.6	< 0.7	670	50
	OB	0.8	0.5	0.21	28	20	2.7	0.1	0.6	0.7	210	50
SAT 2-3	TS	< 0.8	3.6	0.9	43	40	43	0.2	1.9	1.3	1100	47
	OB	< 0.8	< 0.5	0.09	17	24	4.1	< 0.1	8.6	< 0.7	120	26
SAT 2-5	TS	0.9	4.9	0.64	19	14	72	< 0.1	2.3	< 0.7	530	120
	OB	< 0.8	< 0.5	0.14	27	27	2.1	< 0.1	1.4	< 0.7	210	69
Soil 2		< 1.0	6.2	9.94	78.2	406	36.3	0.075	13.6	1.6	5350	15400
Mill Site												
FS-1	TS	1	3.2	0.74	3.3	20	24	0.2	1.7	2	1300	24
	OB	< 0.8	1.4	0.12	4.3	10	9.4	< 0.1	4.3	< 0.7	200	20
FS-2	TS	1.1	1.8	0.49	0.93	8.6	49	0.2	1.1	1.6	1300	30
	OB	< 0.8	3.7	0.14	3.5	26	6.5	< 0.1	3.2	0.9	640	16
FS-3	TS	< 0.8	2.3	0.16	6.8	11	40	< 0.1	1.5	< 0.7	530	27
	OB	< 0.8	< 0.5	0.14	21	43	3.5	< 0.1	2.6	< 0.7	380	38
FS-4	TS	1.2	2.8	0.29	0.9	5.6	36	0.2	2.1	1.1	510	24
	OB	< 0.8	0.8	0.14	2.2	7.1	6.7	0.1	2	1.4	340	11
FS-5	TS	< 0.8	2.3	1.1	4.1	18	62	0.2	1.5	1.3	980	50
	OB	< 0.8	< 0.5	0.07	1.9	8.4	6.3	< 0.1	3.9	< 0.7	100	9.4
Soil 4		< 1.0	2.6	< 0.5	4.7	9.1	5.3	0.063	< 1.0	1.1	300	52.3
Process Solids Management Facility												
KP11-05 (0-0.3)		< 0.8	0.8	0.08	3.3	6	3.3	0.2	0.5	1	NA	12
KP11-05 (8.8-9.4)		< 0.8	< 0.5	0.04	3	8.5	2	< 0.1	0.2	0.8	NA	8.8
KP11-09 (0-0.3)		< 0.8	1.2	0.17	6.6	12	3.6	< 0.1	0.7	1	NA	26
KP11-10 (0-0.3)		< 0.8	2.8	0.18	1.7	8.5	13	0.2	2.4	1.1	NA	20
KP11-12 (0-0.3)		< 0.8	2.5	0.07	3.4	6.6	6.3	< 0.1	1.4	0.8	NA	19
KP11-13 (0-0.3)		< 0.8	2.2	0.2	1.3	4.3	7.6	< 0.1	1.9	1.7	NA	15
KP11-14 (0-0.3)		< 0.8	1.4	0.11	3.5	6.9	5.4	< 0.1	1.2	1.8	NA	21
KP11-15 (0-0.3)		< 0.8	1.7	0.08	2.4	6	5.9	< 0.1	11	0.8	NA	19
KP11-38 (0-0.3)		< 0.8	0.7	0.14	9.7	25	3	< 0.1	0.7	< 0.7	NA	47
Pic River Flood Plain												
Soil 6		< 1.0	2.1	< 0.5	4.9	11	6.5	< 0.05	< 1.0	< 1.0	326	44.4
Soil 7		< 1.0	1.55	< 0.5	11.1	24.9	9.15	< 0.05	< 1.0	< 1.0	261	57.0
Other Sites												
Soil 3		< 1.0	4.9	< 0.5	4.8	7.8	5.0	< 0.05	< 1.0	< 1.0	303	270
Soil 5		< 1.0	1.3	< 0.5	4.9	10.9	5.9	< 0.05	< 1.0	< 1.0	303	39.8

Notes:
1. From Faure, Gunter. 1998. Principles and Applications of Geochemistry. Prentice Hall. New Jersey. Table A. 10 pg.513
2. OMOE, 2011. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act
3. TS refers to Top soil, OB refers to Overburden
4. Bolded cells indicate exceedance for average crustal abundances; highlighted cells indicate exceedances for the OMOE Soil Quality Guidelines

Table 3.3-2: Metal constituent summary for air quality stations

Table 3.3-2: Metal Constituent Summary for Air Quality Stations

PARAMETER Units	Antimony (Sb) mg/kg	Arsenic (As) mg/kg	Cadmium (Cd) mg/kg	Cobalt (Co) mg/kg	Copper (Cu) mg/kg	Lead (Pb) mg/kg	Manganese (Mn) mg/kg	Mercury (Hg) mg/kg	Molybdenum (Mo) mg/kg	Selenium (Se) mg/kg	Sulphur (S) mg/kg	Uranium (U) mg/kg	Zinc (Zn) mg/kg
Average Crustal Abundance[1]	0.2	1	0.1	29	75	8	1400	4	1	0.05	NA	0.91	80
OMOE Soil Quality Guidelines[2]	1.3	18	1.2	20	92	120	-	0.27	2	1.5	NA	2.5	290
AP	**< 0.8**	**1.1**	0.09	8.1	12	4.2	350	< 0.1	2.8	**< 0.7**	180	0.46	35
FO	**< 0.8**	**1.2**	0.07	6.7	10	3.7	270	< 0.1	0.6	**< 0.7**	250	0.46	24
PR	**< 0.8**	0.8	0.06	4.5	9.6	3.7	290	< 0.1	**1.5**	**< 0.7**	1400	0.51	21
MG	**< 0.8**	0.8	0.07	5.7	6.3	2.6	220	< 0.1	0.5	**< 0.7**	130	0.37	22
HL	**< 0.8**	**2.6**	**0.81**	5.7	11	**22**	300	< 0.1	3.9	**0.9**	1600	**0.95**	**90**

Notes:
1. From Faure, Gunter. 1998. Principles and Applications of Geochemistry. Prentice Hall. New Jersey. Table A. 10 pg.513
2. OMOE, 2011. Soil, Groundwater and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act
3. Bolded cells indicate exceedance for average crustal abundances; highlighted cells indicate exceedances for the OMOE Soil Quality Guidelines

3.4 Overburden Excavation Volume Estimate

A preliminary estimate of the quantity of overburden material that could be available for use in Project-related infrastructure (e.g., roads, dams, fill), or during the reclamation phase of the Project, was made at each of the following four development zones: the primary open pit, satellite pits, the mill site and the PSMF. This estimation of available overburden volume should not be used to quantify available construction inventories and a more accurate estimate would need to be developed during detailed design and engineering.

For the purposes of overburden estimate the surface areas of the primary open pit, satellite pits, and the mill site were estimated from the site layout map (see Figure 1.4-2). The estimated surface areas are shown in Table 3.4-1 for each of the mine components. Overburden thickness in each of the areas was extrapolated from the results of a compilation of site-wide overburden thickness information (see Figure 3.4-1). Additionally, an estimate of overburden excavation volume at the PSMF site was provided by Knight Piésold (1,428,100 m^3) (pers. comm., Craig Hall, Knight Piésold, 2011).

Table 3.4-2 presents the estimated volume of overburden to be excavated at each zone if each zone were fully excavated across its entire depth. Acknowledging the aforementioned assumptions it is estimated that approximately 3,710,000 m^3 of overburden would be available to be used in the development of Project infrastructure and for reclamation purposes. Of this volume, 39% would be obtainable from the PSMF, 35% from the primary open pit, 19% from the satellite pits, and the remaining 8% from the mill site.

Table 3.4-1: Surface Area for overburden excavation zones

Zone	Approximate Surface Area (m^2)
Main Pit	800,000
Satellite Pits	420,000
Facilities Site	170,000

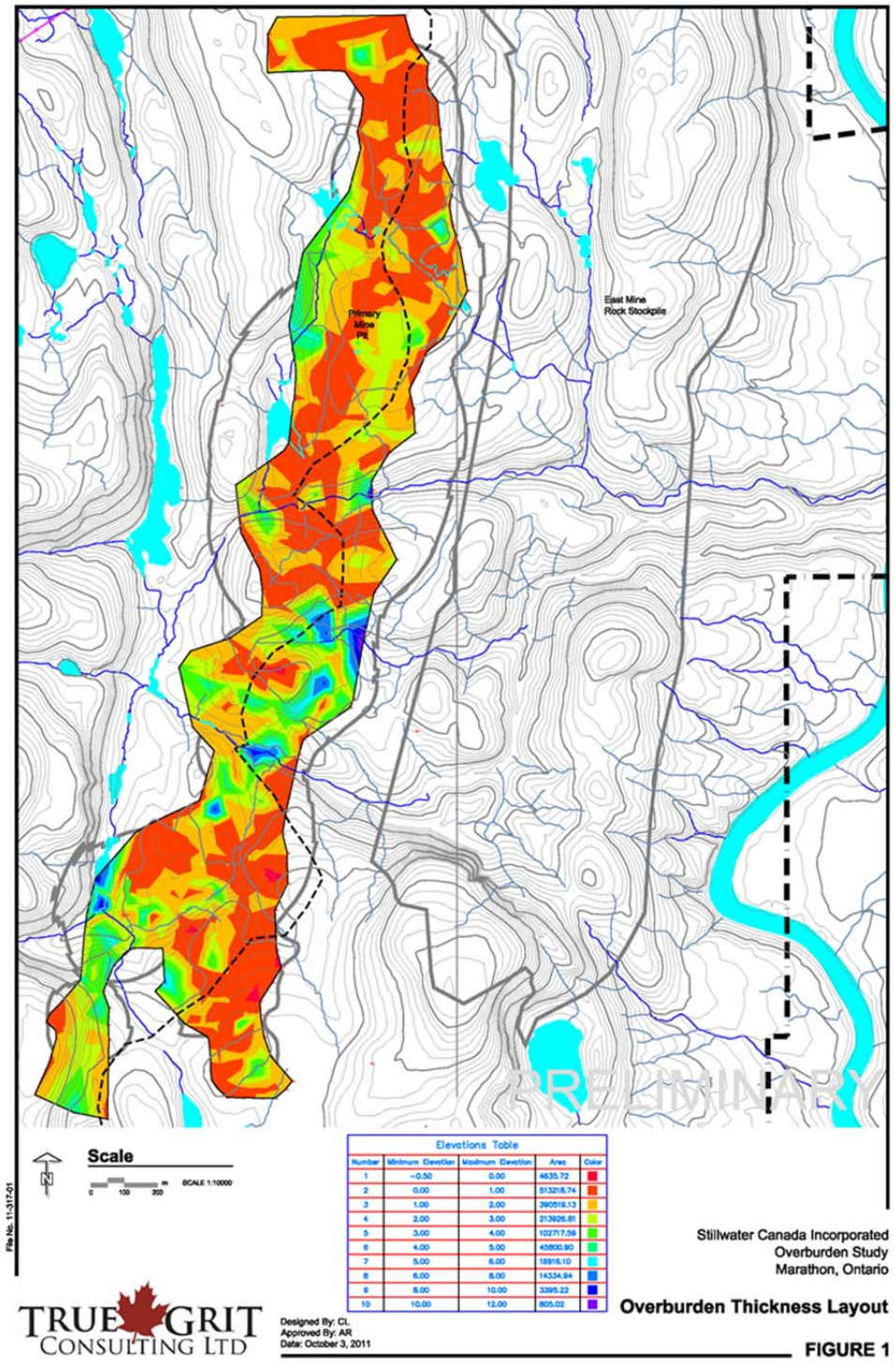

Figure 3.4-1: Marathon PGM-Cu overburden thickness layout

3.5 Solids Characterization

A summary of the results of the solids characterization of the 2011 samples are presented in Tables 3.5-1 to 3.5-4. Refer to Appendix A1 and A2 for full results. Soils and overburden materials sampled on the Project site and at the air quality stations were characterized for pH, carbonate, total organic carbon, sulphide and sulphate content.

Mine Rock Storage Area

The pH of MRSA top soils and overburden materials were variable and ranged from 4.22 to 5.22 in the top soils and from 3.83 to 4.67 in the overburden material. These values are typical of podzolic soils in northern Ontario.

The total organic carbon content in the top soil was relatively high as concentrations ranged from 10.3% to 37.0%. Top soils sampled at the MRSA were visibly rich in organic matter, as the soils were a rich dark brown to black and contained root material. Carbonate levels were comparatively low, and total organic carbon was found to account for the majority of the total carbon content in the soils (refer to Figure 3.5-1).

Overburden material was comparatively rich in organic carbon and low in carbonate. Total organic carbon contents in the overburden ranged from 13.4% to 34.1%, with the highest levels occurring at sites “RP-2” and “RP-3” (30.1% and 34.1%). It is characteristic for accumulation of organic material in the horizon below the top organic layer of podzolic soils, which could explain the high contents of the organic carbon in the overburden sample. Generally soils rich in organic matter are naturally more productive and would suitable as reclamation material.

Total sulphur content in the top soils ranged from 0.01% to 0.069%, and ranged from 0.056% to 0.169% in overburden material. Sulphide contents were either at detection limits or marginally above detection limits in both the top soils and overburden materials. With this in mind, sulphide oxidation and resulting acid generating conditions would not be expected of these materials. Sulphate accounts for the majority of the sulphur content in the soils (refer to Figure 3.5-2). The source of the sulphate content in the soils could be attributed to the presence of sulphate rich minerals, most likely barite.

Primary Open Pit

Top soil pH values were variable and ranged from 3.95 to 5.08; overburden pH values ranged from 5.60 to 6.09.

Total organic carbon was greater in the top soil compared to the overburden material. Top soil total organic carbon contents ranged from 14.2% to 33.4% and the total organic carbon content in the overburden material ranged from 0.995% to 7.50%. Carbonate content was considered to be low (< 0.02%) in the top soils and overburden materials. Soils rich in organic material would be useful as reclamation material.

The total sulphur content in the top soils ranged from the detection limit (0.01%) to 0.101%, and ranged from 0.116% to 0.173% in the overburden material. Sulphate was found to account for the majority of the total sulphur content in the soils and overburden material (refer to Figure 3.5-2). The potential for acid generation from sulphide oxidation is very low in these materials. The sulphate content in the soil would most likely be accounted for by the presence of the sulphate rich mineral barite.

Satellite Pits

Top soil pH values ranged from 5.31 to 6.08, and overburden material pH values ranged from 3.83 to 5.98.

Total organic carbon was variable in the top soil samples and ranged from 8.0% to 19.3%. The total organic carbon content of the overburden material was higher than levels found in the top soil with concentrations ranging from 2.83% to 33.2%. Carbonate content in the top soil and overburden was considered to be low, as total organic carbon content accounted for the majority of the total carbon content (refer to Figure 3.5-1).

Average total sulphur contents in the top soil and overburden material samples were 0.042% and 0.151%, respectively. Sulphate levels were found to account for the majority of the total sulphur (refer to Figure 3.5-2). There are insufficient levels of sulphide in the soils to cause concern of acid generation due to the oxidation of sulphide minerals.

Mill Site

Mill site top soils were slightly acidic as pH values ranged from 3.80 to 5.56. Overburden material pH values were variable and ranged from 5.39 to 8.06. The more alkaline pH values observed in the overburden at some of the sites can be attributed to the carbonate content in the overburden materials. Carbonate contents at sites “FS-2”, “FS-3” and “FS-4” were 16.1%, 6.48% and 2.19%, respectively.

Total organic carbon in the mill site top soils was high and ranged from 13.7% to 25.3%. The carbonate content of the top soils was low (<0.2%). Total organic carbon contents were comparatively low in the overburden material as concentrations ranged from 0.581% to 1.99%. As indicated above, carbonate concentrations were relatively high in overburden at three of the five mill area sites. These high carbonate contents may be explained by erratic mineral deposits from glacial outwash, as the soils were developed on glacial tills.

Total sulphur contents in the top soils were low and generally below detection limits (<0.01%). Average sulphur content in the overburden material was 0.11%, with sulphate accounting for much of the total sulphur content. Soils and overburden at the mill site have little potential for acid generation due to these low total sulphur and sulphide contents.

Process Solids Management Facility

The pH of the overburden material sampled at the PSMF site was variable with values ranging from 4.61 to 6.42. Material sampled at a depth of 8.8 - 9.4 m ("KP11-05") were more alkaline with a pH of 8.28, which corresponded to higher carbonate levels in the sample.

Total organic carbon contents in the overburden soils sampled were variable and ranged from 0.01% to 7.64%. Carbonate concentrations were low with the exception of the overburden material sampled at a depth of 8.8 - 9.4 m at "KP11-05".

Total sulphur and sulphide contents were found to be below detection limits (<0.01%) for the majority of the sites, and therefore there is little potential for acid generation from the material sampled at the PSMF site.

Air Quality Monitoring Stations

The soils sampled at the air quality monitoring stations were slightly acidic in nature with an average pH of 5.63.

Total organic carbon ranged from 1.98% to 3.38% and carbonate content ranged from 0.05% to 0.09%.

Sulphur content was low in the air quality station soils. Average total sulphur, sulphate and sulphide contents were 0.14%, 0.13% and <0.01%, respectively.

Table 3.5-1: Solids Characterization for EcoMetrix Top soil Samples

PARAMETER	Paste pH	Total C	CO3	TOC	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur
Units	-	%	%	%	%	%	%
RP-1	4.65	37.4	0.045	37.0	0.069	0.059	< 0.01
RP-2	4.30	19.9	0.138	19.0	0.060	0.030	0.03
RP-3	4.55	10.6	< 0.01	10.3	0.010	0.000	0.01
RP-4	5.22	11.5	0.170	11.0	0.053	0.043	< 0.01
RP-5	4.22	22.7	0.152	20.7	< 0.01	0.000	< 0.01
MP-3	4.15	34.6	0.144	33.4	< 0.01	0.000	< 0.01
MP-6	5.08	15.7	0.155	14.2	0.071	0.061	< 0.01
MP-9	3.95	25.8	0.169	25.1	0.101	0.091	< 0.01
SAT 1-3	6.08	12.5	0.330	11.8	0.043	0.033	< 0.01
SAT 2-3	5.31	20.3	0.150	19.3	0.050	0.040	< 0.01
SAT 2-5	5.54	8.42	0.140	8.00	0.032	0.022	< 0.01
FS-1	5.56	27.4	0.107	25.3	< 0.01	0.000	< 0.01
FS-2	3.80	40.0	0.122	37.8	< 0.01	0.000	< 0.01
FS-4	4.22	14.6	0.129	13.7	0.030	0.020	< 0.01
Minimum	3.80	8.42	0.01	8.00	0.01	0.00	0.01
Maxium	6.08	40.00	0.33	37.80	0.10	0.09	0.03
Average	4.76	21.53	0.14	20.47	0.04	0.03	0.01

Table 3.5-2: Solids Characterization for EcoMetrix Overburden Samples

PARAMETER	Paste pH	Total C	CO3	TOC	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur
Units	-	%	%	%	%	%	%
RP-1	4.21	13.9	0.122	13.4	0.108	0.098	< 0.01
RP-2	4.26	31.8	0.055	30.1	0.056	0.046	< 0.01
RP-3	3.83	35.8	0.148	34.1	0.160	0.150	< 0.01
RP-4	4.21	18.0	0.128	16.7	0.169	0.159	< 0.01
RP-5	4.67	18.5	0.134	17.2	0.150	0.140	< 0.01
MP-1	5.64	2.71	0.033	2.45	0.107	0.097	< 0.01
MP-2	5.93	1.24	0.029	1.13	0.083	0.073	< 0.01
MP-3	6.09	1.11	0.024	0.995	0.086	0.076	< 0.01
MP-4	5.60	3.00	0.053	2.88	0.116	0.106	< 0.01
MP-6	5.96	4.15	0.049	3.91	0.170	0.160	< 0.01
MP-7	5.84	5.66	0.060	5.52	0.149	0.139	< 0.01
MP-9	5.60	7.45	0.090	7.50	0.171	0.161	< 0.01
SAT 1-2	5.18	10.9	0.110	10.6	0.139	0.129	< 0.01
SAT 1-3	4.25	35.4	0.159	33.2	0.173	0.163	< 0.01
SAT 2-1	3.83	17.5	0.139	16.2	0.146	0.136	< 0.01
SAT 2-3	5.98	3.11	0.047	2.83	0.116	0.106	< 0.01
SAT 2-5	5.28	5.68	0.047	5.24	0.182	0.172	< 0.01
FS-1	5.91	1.03	0.041	0.951	0.117	0.107	< 0.01
FS-2	8.06	4.05	16.1	0.581	0.100	0.090	< 0.01
FS-3	7.96	3.02	6.48	1.37	0.105	0.095	< 0.01
FS-4	8.00	0.907	2.19	0.327	0.100	0.090	< 0.01
FS-5	5.39	2.18	0.047	1.99	0.110	0.100	< 0.01
Minimum	3.83	0.91	0.02	0.33	0.06	0.05	0.01
Maxium	8.06	35.80	16.10	34.10	0.18	0.17	0.01
Average	5.53	10.32	1.19	9.51	0.13	0.12	0.01

Table 3.5-3: Solids Characterization for Knight Piésold Overburden Samples

PARAMETER	Paste pH	Total C	CO3	TOC	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur
Units	-	%	%	%	%	%	%
KP11-05(0-0.3)	5.54	2.14	0.018	1.88	< 0.01	< 0.01	< 0.01
KP11-05(8.8-9.4)	8.28	3.42	14.8	< 0.01	< 0.01	< 0.01	< 0.01
KP11-09(0-0.3)	5.70	7.31	0.273	2.05	< 0.01	< 0.01	< 0.01
KP11-10(0-0.3)	4.61	1.94	0.048	7.64	< 0.01	< 0.01	< 0.01
KP11-12(0-0.3)	5.13	2.16	0.022	2.31	< 0.01	< 0.01	< 0.01
KP11-13(0-0.3)	5.11	4.57	0.056	4.47	< 0.01	< 0.01	< 0.01
KP11-14(0-0.3)	5.91	2.27	0.014	2.10	< 0.01	< 0.01	< 0.01
KP11-15(0-0.3)	5.48	2.96	0.013	3.11	0.015	< 0.01	0.02
KP11-38(0-0.3)	6.42	1.19	0.028	1.02	< 0.01	< 0.01	< 0.01
Minimum	4.61	1.19	0.01	0.01	0.01	0.01	0.01
Maxium	8.28	7.31	14.80	7.64	0.02	0.01	0.02
Average	5.80	3.11	1.70	2.73	0.01	0.01	0.01

Table 3.5-4: Solids Characterization for True Grit Air Quality Station Soils

PARAMETER	Paste pH	Total C	CO3	TOC	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur
Units	-	%	%	%	%	%	%
AP	5.73	2.19	0.049	1.98	0.112	0.102	< 0.01
FO	5.71	3.45	0.049	3.06	0.150	0.140	< 0.01
PR	5.47	2.63	0.066	2.27	0.135	0.125	< 0.01
MG	5.63	3.53	0.056	2.92	0.115	0.105	< 0.01
HL	5.62	5.76	0.088	3.38	0.167	0.157	< 0.01
Minimum	5.47	2.19	0.05	1.98	0.11	0.10	0.01
Maxium	5.73	5.76	0.09	3.38	0.17	0.16	0.01
Average	5.63	3.51	0.06	2.72	0.14	0.13	0.01

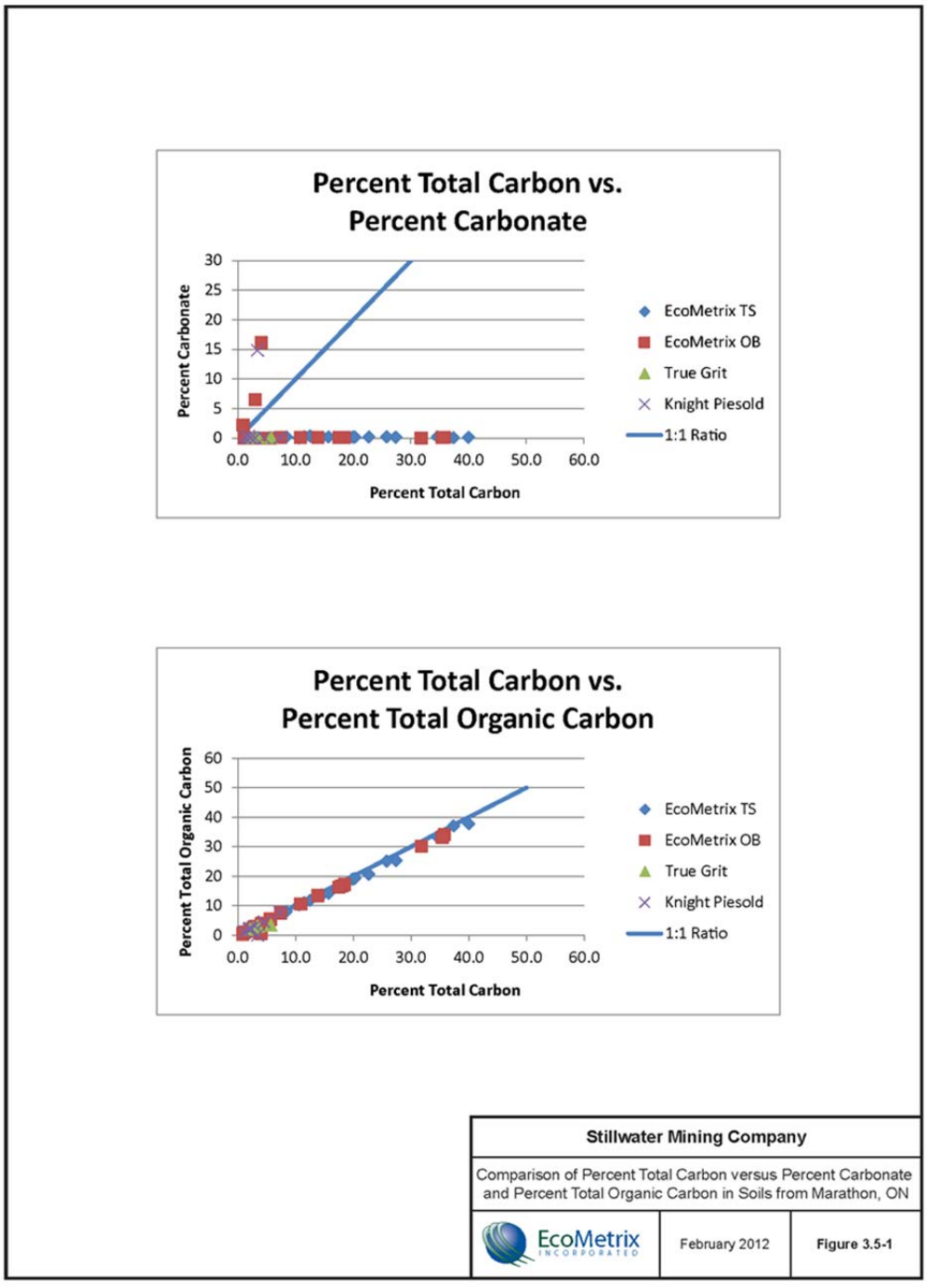

Figure 3.5-1: Comparison of Percent Total Carbon versus Percent Carbonate and Percent Total Organic Carbon in Soils from Marathon, ON

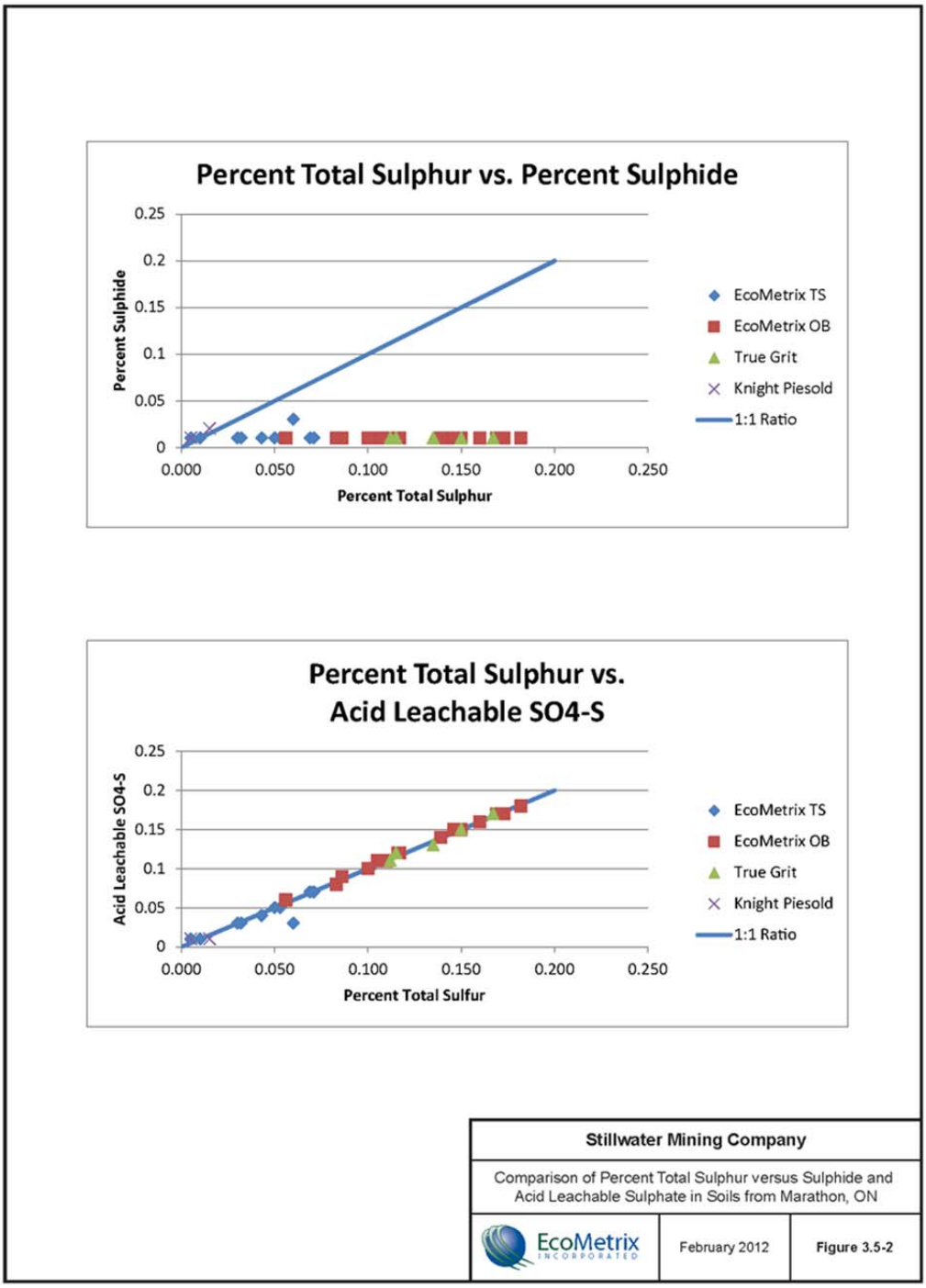

Figure 3.5-2: Comparison of Percent Total Sulphur versus Sulphide and Acid Leachable Sulphate in Soils from Marathon, ON

3.6 Leach Testing Results

Short term leach tests (shake flasks) were performed in order to assess the metal leaching potential of the overburden materials. The results from shake flask tests comparing the soluble concentrations of selected constituents in a selection of samples collected by Knight Piésold and EcoMetrix in 2011 are presented in Table 3.6.1 and 3.6.2, with detailed analytical information provided in Appendix Table A4. For reference purposes only, the soluble concentrations were compared the Ontario Ministry of Environment Provincial Water Quality Objective (PWQO) guidelines (OMOE, 1994). The constituents selected for comparison were: antimony, arsenic, cadmium, cobalt, copper, lead, manganese, mercury, molybdenum, selenium, uranium and zinc.

Mine Rock Storage Area

The overburden samples were marginally elevated above OMOE guidelines for cadmium and cobalt. As such, it is not expected for overburden obtained from the rock pile to present a metals leaching risk.

Primary Open Pit

At sampling locations “MP-1” and “MP-7” it was found that soluble copper exceeded the screening criteria. As such, it may be worthwhile to consider further investigations during detailed design and engineering to determine whether a monitoring and or management plan for this constituent at these locations is warranted. Dissolved zinc and cobalt concentrations only marginally exceeded the guidelines.

Satellite Pits

At sampling location “SAT 2-1” soluble cobalt concentrations were marginally elevated above OMOE guidelines. No additional constituents exceeded the screening level at sampling locations “SAT 2-1” and “SAT 1-3” (near Satellite Pit 2). As such, it is not expected for overburden obtained from the satellite pits to present a metals leaching risk.

Mill Site

At sampling location “FS-5” soluble cobalt concentrations were marginally elevated above OMOE guidelines. No additional constituents exceeded the established screening level at sampling locations “FS-2” and “FS-5”. It is not expected for overburden excavated from the satellite pits to present a metals leaching risk.

Process Solids Management Facility

Overburden samples were marginally elevated above OMOE guidelines for dissolved copper, cobalt and zinc concentrations. It is not expected for overburden excavated from the PSMF site to present a metals leaching risk.

Table 3.6-1: Summary of Soluble Concentrations of Selected Constituents in Soil for EcoMetrix Samples

Parameter	Antimony (Sb)	Arsenic (As)	Cadmium (Cd)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Selenium (Se)	Uranium (U)	Zinc (Zn)
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
PWQO	0.02	0.005	0.0001 - 0.0005	0.0009	0.001 - 0.005	0.001 - 0.005	N/A	0.0002	0.04	0.1	0.005	0.02
Sample												
RP-2 OB	< 0.0001	0.00014	0.000608	0.00375	0.00094	0.000059	0.179	< 0.000	< 0.0001	< 0.0001	< 0.00001	0.0180
RP-4 OB	< 0.0001	0.00036	0.000017	< 0.0001	0.00290	0.000051	0.00160	< 0.000	0.000828	0.00014	0.000387	< 0.003
MP-1 OB	< 0.0001	0.00042	0.000158	0.00462	0.0152	0.00133	0.0336	0.000066	< 0.0001	0.00054	0.000093	0.0174
MP-4 OB	< 0.0001	0.00023	0.000374	0.00195	0.00194	0.000470	0.0377	< 0.000	< 0.0001	< 0.0001	< 0.00001	0.0399
MP-7 OB	0.00020	0.00198	0.000275	0.00317	0.0250	0.00285	0.0396	0.000080	0.000104	0.00086	0.000193	0.0535
MP-9 OB	< 0.0001	0.00032	0.000026	0.00069	0.00455	0.000904	0.00800	< 0.000	< 0.0001	0.00016	0.000049	0.0037
SAT 1-3 OB	< 0.0001	0.00022	0.000011	0.00017	0.00294	0.000361	0.00777	< 0.000	0.000339	0.00012	0.000459	0.0036
SAT 2-1 OB	< 0.0001	0.00056	0.000102	0.00163	0.00412	0.000819	0.125	< 0.000	0.000057	0.00080	0.000021	0.0097
FS-2 OB	< 0.0001	0.00038	0.000208	0.00086	0.00323	0.000483	0.0251	< 0.000	< 0.0001	0.00018	0.000045	0.0076
FS-5 OB	< 0.0001	0.00026	0.000170	0.00165	0.00177	0.000143	0.0194	< 0.000	< 0.0001	< 0.0001	0.000012	0.0156

Note: Highlighted values indicate an exceedance of the screening criteria (PQWO)

Table 3.6-2: Summary of Soluble Concentrations of Selected Constituents in Soil for Knight Piésold Samples

Parameter	Antimony (Sb)	Arsenic (As)	Cadmium (Cd)	Cobalt (Co)	Copper (Cu)	Lead (Pb)	Manganese (Mn)	Mercury (Hg)	Molybdenum (Mo)	Selenium (Se)	Uranium (U)	Zinc (Zn)
Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
PWQO	0.02	0.005	0.0001 - 0.0005	0.0009	0.001 - 0.005	0.001 - 0.005	N/A	0.0002	0.04	0.1	0.005	0.02
Sample												
KP11-14 OB	< 0.0001	0.00063	0.000209	0.00041	0.00081	0.000221	0.0366	< 0.000	< 0.0001	0.00027	0.000019	0.0082
KP11-38 (0.3-0.6) OB	< 0.0001	0.00040	0.000063	0.00132	0.00582	0.000594	0.0270	0.000031	< 0.0001	0.00020	0.000117	0.0082
KP11-12 OB	0.00011	0.00116	0.000333	0.00050	0.00694	0.00245	0.0407	0.000127	0.000118	0.00047	0.000439	0.0363

Note: Highlighted values indicate an exceedance of the screening criteria (PQWO)

4.0 CONCLUSIONS

Overall, metal contents of the project site top soil and overburden materials and air quality site stations met or were only slightly elevated above screening criteria according to Faure (1998) and OMOE (2011) background site condition standards for uncontaminated soils. This indicates that project site overburden material would be suitable for use as reclamation material. Elevated levels of antimony found in the top soil at rock pile site “RP-1”, elevated levels of copper in top soils at site “MP-6”, and elevated metal concentrations at site “Soil 2” seem to be isolated situations.

The overall results of the investigation suggest that there is little to no risk of acid generation from excavated overburden at the Marathon PGM-Cu Project site. Sulphur speciation conducted as part of the solids characterization indicated that sulphur is present largely as sulphate-sulphur within the overburden and is likely attributable to the presence of barite. Top soil and overburden material were found to have high levels of organic carbon and all sites generally exhibited low levels of carbonates. Soils in the Project site therefore have little acid neutralization potential.

Although surface water characterization and solids characterization completed as part of this assessment supports the existence of non-acid generating conditions, additional measures for the monitoring of copper concentrations may be needed for the leachate resulting from the overburden excavated from the main pit.

Consideration of monitoring the run-off from the excavated main pit overburden material may be warranted, as soluble loads were measured at levels in excess of the PWQO for copper.

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APPENDIX A

SOIL CHARACTERIZATION TABLES

Table A1
Summary of Acid Base Accounting Results for EcoMetrix, Knight Piesold and True Grit Samples

Parameter	EcoMetrix TS			EcoMetrix OB			True Grit			Knight Piésold			Overall		
	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max	Min	Average	Max
Paste pH	3.80	4.76	6.08	3.83	5.53	8.06	5.47	5.63	5.73	4.61	5.88	8.28	3.80	5.40	8.28
Fizz Rate	1.00	1.00	1.00	1.00	1.27	4.00	1.00	1.00	1.00	1.00	1.38	4.00	1.00	1.17	4.00
Sample weight (g)	1.96	1.99	2.05	1.96	2.00	2.05	1.97	2.00	2.04	1.99	2.02	2.04	1.96	2.00	2.05
HCl added (mL)	20.00	21.74	29.70	20.00	36.50	172.50	20.00	28.38	38.60	20.00	38.13	149.50	20.00	31.30	172.50
HCl (Normality)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH (Normality)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to pH 8.3 (mL)	18.29	27.20	34.66	13.96	29.93	60.11	20.72	27.13	38.82	19.13	25.17	38.81	13.96	27.85	60.11
Final pH	1.18	1.39	1.59	1.00	1.59	1.97	1.40	1.59	1.73	1.24	1.54	1.73	1.00	1.53	1.97
NP (tCaCO3/1000t)	-37.40	-13.66	4.30	-34.20	16.62	295.00	-7.60	3.12	14.00	-12.40	51.71	271.00	-37.40	11.62	295.00
AP (tCaCO3/1000t)	0.31	0.36	1.00	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.34	0.57	0.31	0.33	1.00
Net NP (tCaCO3/1000t)	-37.70	-14.02	4.00	-34.50	16.27	295.00	-7.90	2.82	13.70	-12.70	51.36	271.00	-37.70	11.27	295.00
NP/AP ((tCaCO3/1000t)	-121.00	-41.79	13.90	-110.00	53.52	952.00	-24.50	10.06	45.20	-40.00	137.96	875.00	-121.00	33.68	952.00
S (%)	0.01	0.04	0.10	0.06	0.13	0.18	0.11	0.14	0.17	0.01	0.01	0.02	0.01	0.08	0.18
Acid Leachable SO4-S (%)	0.01	0.04	0.10	0.06	0.13	0.18	0.11	0.14	0.17	0.01	0.01	0.01	0.01	0.08	0.18
Sulphide (%)	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03
C (%)	8.42	21.53	40.00	0.91	10.32	35.80	2.19	3.51	5.76	1.19	2.92	7.31	0.81	10.95	40.00
CO3 (%)	0.01	0.14	0.33	0.02	1.19	16.10	0.05	0.06	0.09	0.01	1.90	14.80	0.01	0.83	16.10
TOC (%)	8.00	20.47	37.80	0.33	9.51	34.10	1.98	2.72	3.38	0.01	2.51	7.64	0.01	10.17	37.80

Table A2
Acid Base Accounting Laboratory Results for EcoMetrix, Knight Piesold and True Grit Samples

Sample ID		RP-1 TS	RP-2 TS	RP-3 TS	RP-4 TS	RP-5 TS	FS-2 TS	FS-4 TS	FS-1 TS	SAT 2-5 TS	SAT 2-3 TS	SAT 1-3 TS	MP-3 TS	MP-6 TS	MP-9 TS
Analysis	**Units**														
Paste pH	units	4.65	4.30	4.55	5.22	4.22	3.80	4.22	5.56	5.54	5.31	6.08	4.15	5.08	3.95
Fizz Rate	---	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sample weight	g	1.98	1.97	1.99	1.97	2.00	1.96	2.00	1.98	1.96	1.99	1.96	2.05	2.03	2.00
HCl added	mL	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	26.70	28.00	20.00	29.70	20.00
HCl	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to	pH=8.3 mL	32.52	24.92	24.14	21.39	27.36	34.66	27.24	18.29	18.96	30.93	27.51	30.77	34.52	27.57
Final pH	units	1.45	1.22	1.28	1.53	1.24	1.18	1.58	1.33	1.33	1.57	1.59	1.23	1.59	1.32
NP	t CaCO3/1000 t	-31.6	-12.5	-10.4	-3.5	-18.4	-37.4	-18.1	4.3	2.7	-10.6	1.3	-26.3	-11.9	-18.9
AP	t CaCO3/1000 t	0.31	1.00	0.36	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Net NP	t CaCO3/1000 t	-31.9	-13.5	-10.8	-3.8	-18.7	-37.7	-18.4	4.0	2.4	-10.9	1.0	-26.6	-12.2	-19.2
NP/AP	ratio	-102	-12.5	-28.9	-11.3	-59.4	-121	-58.4	13.9	8.7	-34.2	4.2	-84.8	-38.4	-61.0
S	%	0.069	0.060	0.010	0.053	< 0.01	< 0.01	0.030	< 0.01	0.032	0.050	0.043	< 0.01	0.071	0.101
Acid Leachable SO4-S	%	0.07	0.03	< 0.01	0.05	< 0.01	< 0.01	0.03	< 0.01	0.03	0.05	0.04	< 0.01	0.07	0.10
Sulphide	%	< 0.01	0.03	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
C	%	37.4	19.9	10.6	11.5	22.7	40.0	14.6	27.4	8.42	20.3	12.5	34.6	15.7	25.8
CO3	%	0.045	0.138	< 0.01	0.170	0.152	0.122	0.129	0.107	0.140	0.150	0.330	0.144	0.155	0.169
TOC	%	37.0	19.0	10.3	11.0	20.7	37.8	13.7	25.3	8.00	19.3	11.8	33.4	14.2	25.1
Weight	g	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A2
Acid Base Accounting Laboratory Results for EcoMetrix, Knight Piesold and True Grit Samples

Sample ID		RP-1 OB	RP-2 OB	RP-3 OB	RP-4 OB	RP-5 OB	SAT1-3 OB	SAT1-2 OB	SAT2-1 OB	SAT2-3 OB	SAT2-5 OB	FS-1 OB	FS-2 OB	FS-3 OB	FS-4 OB	FS-5 OB	MP-1 OB	MP-2 OB	MP-3 OB	MP-4 OB	MP-6 OB	MP-7 OB	MP-9 OB
Analysis	**Units**																						
Paste pH	units	4.21	4.26	3.83	4.21	4.67	4.25	5.18	3.83	5.98	5.28	5.91	8.06	7.96	8.00	5.39	5.64	5.93	6.09	5.60	5.96	5.84	5.60
Fizz Rate	---	1	1	1	1	1	1	1	1	1	1	1	4	3	2	1	1	1	1	1	1	1	1
Sample weight	g	2.00	1.96	1.96	1.99	2.01	2.05	1.99	2.02	2.05	2.03	1.99	2.00	1.96	1.97	2.02	1.97	2.05	2.00	1.99	2.00	1.99	2.04
HCl added	mL	20.00	20.00	20.00	20.00	20.00	20.00	26.30	20.00	26.10	43.30	20.00	172.50	77.90	33.50	20.00	28.70	20.00	26.20	20.00	39.90	60.50	48.10
HCl	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to	pH=8.3 mL	23.92	32.53	26.39	23.74	19.92	34.02	20.12	20.18	26.97	47.80	19.46	54.43	29.75	13.96	20.65	27.14	18.24	21.69	20.36	42.03	60.11	55.08
Final pH	units	1.22	1.43	1.00	1.69	1.75	1.42	1.59	1.53	1.87	1.73	1.77	1.63	1.71	1.97	1.61	1.58	1.32	1.57	1.46	1.63	1.59	1.89
NP	t CaCO3/1000 t	-9.8	-32.0	-16.3	-9.4	0.20	-34.2	16	-0.5	-2.1	-11.1	1.4	295	123	50	-1.6	4.0	4.3	11	-0.9	-5.3	1.0	-17.1
AP	t CaCO3/1000 t	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Net NP	t CaCO3/1000 t	-10.1	-32.3	-16.6	-9.7	-0.1	-34.5	15.2	-0.8	-2.4	-11.4	1.1	295	122	49.3	-1.9	3.7	4.0	11.0	-1.2	-5.6	0.7	-17.4
NP/AP	ratio	-31.6	-103	-52.6	-30.3	0.6	-110	50.0	-1.6	-6.8	-35.8	4.5	952	396	160	-5.2	12.9	13.9	36.5	-2.9	-17.1	3.2	-55.2
S	%	0.108	0.056	0.160	0.169	0.150	0.173	0.139	0.146	0.116	0.182	0.117	0.100	0.105	0.100	0.110	0.107	0.083	0.086	0.116	0.170	0.149	0.171
Acid Leachable SO4-S	%	0.11	0.06	0.16	0.17	0.15	0.17	0.14	0.15	0.12	0.18	0.12	0.10	0.11	0.10	0.11	0.11	0.08	0.09	0.12	0.17	0.15	0.17
Sulphide	%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
C	%	13.9	31.8	35.8	18.0	18.5	35.4	10.9	17.5	3.11	5.68	1.03	4.05	3.02	0.907	2.18	2.71	1.24	1.11	3.00	4.15	5.66	7.45
CO3	%	0.122	0.055	0.148	0.128	0.134	0.159	0.110	0.139	0.047	0.047	0.041	16.1	6.48	2.19	0.047	0.033	0.029	0.024	0.053	0.049	0.060	0.090
TOC	%	13.4	30.1	34.1	16.7	17.2	33.2	10.6	16.2	2.83	5.24	0.951	0.581	1.37	0.327	1.99	2.45	1.13	0.995	2.88	3.91	5.52	7.50
Weight	g	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table A2
Acid Base Accounting Laboratory Results for EcoMetrix, Knight Piesold and True Grit Samples

Sample ID		AP	FO	PR	MG	HL	KP11-13	KP11-05 (0-0.3)	KP11-05 (8.8-9.4)	KP11-10	KP11-09 (0-0.3)	KP11-12	KP11-14	KP11-38 (0.3-0.6)	KP11-15	DUP-1 (RP-3 TS)	DUP-2 (SAT 2-3 OB)	DUP-3 (MP-9 OB)
Analysis	**Units**																	
Paste pH	units	5.73	5.71	5.47	5.63	5.62	5.11	5.54	8.28	4.61	5.70	5.13	5.91	6.42	5.48	6.42	5.06	6.20
Fizz Rate	---	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1	1	1
Sample weight	g	2.04	1.98	1.97	2.03	1.98	2.02	2.02	2.04	2.00	2.02	1.99	2.03	1.99	2.04	1.99	2.01	2.03
HCl added	mL	20.00	27.50	20.00	38.60	35.80	20.00	20.00	149.50	20.00	20.00	20.00	35.50	20.00	20.00	37.50	26.90	20.00
HCl	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH	Normality	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to	pH=8.3 mL	20.72	22.37	20.80	32.92	38.82	23.48	20.37	38.81	24.97	19.21	20.93	37.08	19.13	20.89	35.59	21.35	19.23
Final pH	units	1.61	1.73	1.40	1.58	1.61	1.59	1.46	1.66	1.46	1.63	1.24	1.59	1.73	1.52	1.62	1.70	1.78
NP	t CaCO3/1000 t	-1.8	13	-2.0	14	-7.6	-8.6	-0.9	271	-12.4	2.0	-2.3	-3.9	2.2	158	4.8	14	1.9
AP	t CaCO3/1000 t	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.57	0.31	0.31	0.31
Net NP	t CaCO3/1000 t	-2.1	12.7	-2.3	13.7	-7.9	-8.9	-1.2	271	-12.7	1.7	-2.6	-4.2	1.9	157	4.5	13.5	1.6
NP/AP	ratio	-5.8	41.9	-6.5	45.2	-24.5	-27.7	-2.9	875	-40.0	6.5	-7.4	-12.6	7.1	278	15.5	44.5	6.1
S	%	0.112	0.150	0.135	0.115	0.167	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.015	0.142	0.109	0.089
Acid Leachable SO4-S	%	0.11	0.15	0.13	0.12	0.17	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.01	0.14	0.11	0.09
Sulphide	%	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01
C	%	2.19	3.45	2.63	3.53	5.76	4.57	2.14	3.42	7.31	1.94	2.16	2.27	1.19	2.96	2.54	2.87	0.810
CO3	%	0.049	0.049	0.066	0.056	0.088	0.056	0.018	14.8	0.048	0.273	0.022	0.014	0.028	0.013	0.068	0.099	0.045
TOC	%	1.98	3.06	2.27	2.92	3.38	4.47	1.88	< 0.01	7.64	2.05	2.31	2.10	1.02	3.11	1.95	2.37	0.609
Weight	g	--	--	--	--	--	33.7	35.1	56.8	27.7	39.9	41.9	57.7	58.3	41.7	--	--	--

Table A3
Metals Summary for all Constituents

Parameter	Units	Average Crustal Abundance	RP-1 TS	RP-2 TS	RP-3 TS	RP-4 TS	RP-5 TS	FS-2 TS	FS-4 TS	FS-1 TS	SAT 2-5 TS	SAT 2-3 TS	SAT 1-3 TS	MP-3 TS	MP-6 TS	MP-9 TS	FS-3 TS	FS-5 TS	SAT 1-2 TS	SAT 2-1 TS	MP-1 TS	MP-2 TS	MP-4 TS	MP-7 TS
Moisture Content	%	No Value	68.7	40.0	38.6	47.0	47.6	59.8	43.8	74.8	24.2	44.2	44.3	41.2	43.3	22.1	28.4	57.7	40.3	24.6	26.7	47.8	35.3	25.9
Aluminum (Al)	ppm	84000	6300	3100	4500	12000	4500	2000	8800	11000	4700	11000	16000	2000	18000	4200	5100	6900	1700	7900	2800	4900	8600	3100
Antimony (Sb)	ppm	0.2	**150**	**7.5**	**12**	**1.1**	**1.8**	**1.1**	**1.2**	**1**	**0.9**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**1**	**1**	**1**	**< 0.8**	**< 0.8**
Arsenic (As)	ppm	1	**13**	**5.5**	**3.2**	**3.6**	**3.1**	**1.8**	**2.8**	**3.2**	**4.9**	**3.6**	**3.5**	**1.9**	**10**	**2.7**	**2.3**	**2.3**	1	**2.2**	**3.7**	**1.3**	0.5	**2**
Barium (Ba)	ppm	250	85	53	91	89	95	73	44	50	**430**	110	170	92	170	79	67	97	78	81	87	87	80	**260**
Beryllium (Be)	ppm	1.5	0.27	0.09	0.18	0.4	0.21	0.09	0.15	0.26	0.15	0.39	0.62	0.09	1.4	0.14	0.11	0.55	0.08	0.16	0.12	0.17	0.07	0.11
Bismuth (Bi)	ppm	0.06	**0.39**	**0.31**	**0.36**	**0.29**	**0.45**	**0.28**	**0.3**	**0.23**	**0.38**	**0.27**	**0.33**	**0.29**	**0.35**	**0.29**	**0.3**	**0.35**	**0.26**	**0.57**	**0.38**	**0.29**	**0.12**	**0.29**
Cadmium (Cd)	ppm	0.1	**0.53**	**0.42**	**0.58**	**0.48**	**1.1**	**0.49**	**0.29**	**0.74**	**0.64**	**0.9**	**2.2**	**0.63**	**0.97**	**0.5**	**0.16**	**1.1**	**0.78**	**0.52**	**0.47**	**0.88**	**0.87**	**0.44**
Calcium (Ca)	ppm	53000	2600	2000	3300	6000	3300	2700	590	1100	4400	3700	9600	3400	2700	3100	2400	1800	1900	3500	2000	3700	5500	8200
Chromium (Cr)	ppm	185	26	140	79	69	41	48	73	86	53	58	47	92	30	180	89	57	50	88	150	87	**360**	26
Cobalt (Co)	ppm	29	2.3	1.1	3.4	9.6	2.7	0.93	0.9	3.3	19	**43**	10	2.6	**520**	4.5	6.8	4.1	1	11	**43**	4.3	**36**	26
Copper (Cu)	ppm	75	11	7.4	10	15	13	8.6	5.6	20	14	40	**150**	10	49	12	11	18	8.6	13	16	36	**76**	36
Iron (Fe)	ppm	71000	3400	10000	9500	20000	8400	5300	15000	15000	55000	22000	23000	5100	**120000**	11000	35000	5500	4400	26000	**95000**	6400	66000	**110000**
Lead (Pb)	ppm	8	**66**	**41**	**51**	**36**	**85**	**49**	**36**	**24**	**72**	**43**	**39**	**51**	**46**	**40**	**40**	**62**	**53**	**53**	**50**	**43**	**15**	**36**
Lithium (Li)	ppm	13	< 2.0	< 2.0	3	**18**	3	< 2.0	< 2.0	2	2	5	**15**	< 2.0	4	3	< 2.0	< 2.0	< 2.0	< 2.0	3	< 2.0	**16**	3
Magnesium (Mg)	ppm	32000	380	430	1300	5700	1100	480	390	700	4400	2700	6600	680	3000	1000	1300	540	420	7600	24000	720	25000	7100
Manganese (Mn)	ppm	1400	110	330	220	610	110	77	60	47	**4100**	**4100**	**2000**	140	**26000**	210	240	60	110	440	**1800**	70	980	**1700**
Mercury	ppm	0.1 to 4	**0.3**	**0.2**	**0.2**	0.1	**0.2**	**0.2**	**0.2**	**0.2**	< 0.1	**0.2**	0.1	**0.3**	0.1	**0.2**	< 0.1	**0.2**	**0.2**	0.1	0.1	**0.2**	< 0.1	0.1
Molybdenum (Mo)	ppm	1	**2.7**	**1.2**	**1.6**	0.6	**1.5**	**1.1**	**2.1**	**1.7**	**2.3**	**1.9**	1	0.9	**3.7**	**1.3**	**1.5**	**1.5**	1	1	**1.7**	0.9	0.6	**3.3**
Nickel (Ni)	ppm	105	11	6.4	9.7	21	10	5.7	4.3	9.6	51	18	52	9.3	29	11	15	15	5.4	25	100	16	53	3.8
Phosphorus (P)	ppm	No Value	810	510	610	650	760	580	460	1200	2200	1100	1100	610	1800	550	340	870	670	820	670	640	650	4300
Potassium (K)	ppm	9000	740	600	1300	2400	1400	830	650	770	2200	710	2500	780	640	1100	570	690	1000	910	560	880	950	540
Selenium (Se)	ppm	0.05	**6.2**	**1.7**	**1.2**	**0.7**	**1.1**	**1.6**	**1.1**	**2**	**< 0.7**	**1.3**	**1.2**	**1.3**	**2.3**	**0.9**	**< 0.7**	**1.3**	**1.2**	**1.1**	**< 0.7**	**1.3**	**< 0.7**	**< 0.7**
Silver (Ag)	ppm	0.08	**0.37**	0.06	**0.42**	0.08	**0.26**	**0.12**	**0.09**	**0.3**	**0.13**	**0.31**	**0.47**	**0.17**	**0.25**	**0.2**	**0.23**	**0.22**	**0.13**	**0.16**	**0.11**	**0.31**	**0.09**	**0.34**
Sodium (Na)	ppm	23000																						
Suphur (S)	ppm	No Value	1400	560	870	710	890	1300	510	1300	530	1100	960	1300	1600	870	530	980	1100	670	750	1300	650	690
Strontium (Sr)	ppm	260	23	10	24	15	15	23	5.7	10	34	36	50	23	26	18	27	18	15	43	19	32	45	43
Thallium (Tl)	ppm	0.36	0.07	0.08	0.1	0.15	0.12	0.07	0.06	0.08	0.24	0.16	0.17	0.1	**0.4**	0.08	0.06	0.1	0.08	0.08	0.1	0.1	0.03	0.03
Tin (Sn)	ppm	2.5	1.8	1.4	1.7	1	1.9	1.3	1	0.8	1.8	0.9	1.2	1.2	0.8	1.3	1.2	1.4	1.2	1.1	1.6	1	< 0.5	1.1
Titanium (Ti)	ppm	5300	75	270	420	660	350	89	420	290	1600	360	550	180	390	460	770	150	120	280	2000	180	1000	**14000**
Uranium (U)	ppm	0.91	0.27	0.19	0.3	0.34	0.35	0.18	0.41	**1**	0.42	0.58	**1.7**	0.19	**1.4**	0.24	0.18	0.5	0.19	0.66	0.21	0.26	0.15	0.33
Vanadium (V)	ppm	230	9	26	27	36	22	14	36	18	33	25	34	25	140	29	230	12	14	38	**250**	16	180	**360**
Yttrium (Y)	ppm	20	4.3	0.77	1.6	2.8	1.4	0.92	1.2	3.6	4.5	2.8	9	0.74	6.6	0.97	0.77	4.6	0.68	2.3	0.82	1.9	1.4	13
Zinc (Zn)	ppm	80	34	44	53	**120**	50	30	24	24	**120**	47	**130**	38	67	41	27	50	46	48	**120**	36	**130**	**180**

Notes:
Bolded values indicate concentrations greater than the average crustal abundance.
Bolded and highlighted cells indicate concentrations greater than 10x the average crustal abundance.

Table A3
Metals Summary for all Constituents

Parameter	Units	Average Crustal Abundance	RP-1 OB	RP-2 OB	RP-3 OB	RP-4 OB	RP-5 OB	SAT 1-3 OB	SAT 1-2 OB	SAT 2-1 OB	SAT 2-3 OB	SAT 2-5 OB	FS-1 OB	FS-2 OB	FS-3 OB	FS-4 OB	FS-5 OB	MP-1 OB	MP-2 OB	MP-3 OB	MP-4 OB	MP-6 OB	MP-7 OB	MP-9 OB
Moisture Content	%	No Value	41.0	28.4	21.4	21.0	23.5	20.4	20.6	9.6	14.5	11.7	30.6	32.2	19.2	41.5	24.3	11.1	14.4	19.9	19.8	13.7	9.8	10.7
Aluminum (Al)	ppm	84000	17000	30000	25000	14000	19000	18000	16000	16000	9400	11000	8400	20000	28000	23000	8700	7000	9100	11000	17000	28000	5900	15000
Antimony (Sb)	ppm	0.2	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**
Arsenic (As)	ppm	1	< 0.5	**2.4**	**2.2**	**1.9**	**2.3**	**2**	1	< 0.5	< 0.5	< 0.5	**1.4**	**3.7**	< 0.5	0.8	< 0.5	< 0.5	0.7	0.7	**1.1**	< 0.5	0.8	0.9
Barium (Ba)	ppm	250	33	44	130	80	100	110	51	40	34	200	50	29	63	29	45	34	75	37	38	99	110	64
Beryllium (Be)	ppm	1.5	0.38	0.48	0.9	0.61	0.81	0.75	0.37	0.17	0.18	0.24	0.19	0.26	0.28	0.29	0.16	0.18	0.17	0.13	0.38	0.83	0.12	0.39
Bismuth (Bi)	ppm	0.06	**< 0.09**	**0.13**	**0.2**	**0.14**	**0.22**	**0.17**	**0.14**	**< 0.09**	**< 0.09**	**< 0.09**	**0.16**	**0.2**	**< 0.09**	**0.12**	**0.13**	**0.36**	**0.23**	**0.15**	**0.11**	**< 0.09**	**0.2**	**0.11**
Cadmium (Cd)	ppm	0.1	0.08	**0.13**	0.09	**0.18**	**0.17**	**0.12**	**0.15**	**0.21**	0.09	**0.14**	**0.12**	**0.14**	**0.14**	**0.14**	0.07	**0.16**	0.1	0.1	**0.14**	**0.12**	**0.16**	0.05
Calcium (Ca)	ppm	53000	2400	370	3400	**96000**	45000	19000	1200	4900	1900	7800	1100	1300	6600	800	750	1500	1500	2900	1000	5800	43000	1900
Chromium (Cr)	ppm	185	140	49	68	41	50	54	68	29	43	61	**220**	**210**	140	180	**200**	**460**	**210**	**200**	**190**	72	64	160
Cobalt (Co)	ppm	29	7.1	2.6	15	8.7	12	12	8.7	28	17	27	4.3	3.5	21	2.2	1.9	**67**	4.4	28	3.1	**120**	**50**	7.3
Copper (Cu)	ppm	75	19	17	28	17	19	31	15	20	24	27	10	26	43	7.1	8.4	30	31	18	32	63	**77**	13
Iron (Fe)	ppm	71000	18000	26000	34000	22000	29000	29000	26000	45000	21000	67000	15000	46000	61000	23000	9500	**190000**	16000	49000	18000	**130000**	**210000**	21000
Lead (Pb)	ppm	8	5.5	**8.7**	**12**	7.4	**10**	**10**	**10**	2.7	4.1	2.1	**9.4**	6.5	3.5	6.7	6.3	5.9	**14**	6.9	7.5	3.8	**8.7**	5.9
Lithium (Li)	ppm	13	13	8	**34**	**24**	**30**	**29**	13	6	10	11	8	9	6	3	5	6	4	5	7	**17**	8	**18**
Magnesium (Mg)	ppm	32000	4000	1500	9200	24000	15000	11000	5000	16000	4500	12000	2400	3400	9800	1400	1100	**42000**	1600	24000	1700	14000	20000	5600
Manganese (Mn)	ppm	1400	190	65	500	470	670	640	280	1100	1200	1100	150	200	550	75	58	**2400**	77	410	96	**5300**	**3900**	220
Mercury	ppm	0.1 to 4	< 0.1	**0.2**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum (Mo)	ppm	1	0.9	**1.7**	0.4	0.2	0.3	0.2	0.6	0.6	**8.6**	**1.4**	**4.3**	**3.2**	**2.6**	**2**	**3.9**	**1.8**	**2.7**	0.9	**3.4**	**1.4**	**4**	0.5
Nickel (Ni)	ppm	105	19	7.4	36	24	27	31	22	44	18	37	11	7.8	35	6	6.9	**160**	16	**200**	13	64	5.1	25
Phosphorus (P)	ppm	No Value	590	460	350	500	710	530	290	1500	440	3700	230	320	1200	330	98	610	86	270	330	1100	18000	320
Potassium (K)	ppm	9000	1000	410	2900	2900	2900	2900	940	470	470	1400	1200	470	550	580	910	390	830	620	730	510	580	1400
Selenium (Se)	ppm	0.05	**0.8**	**1.8**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**0.9**	**< 0.7**	**1.4**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**1**	**0.8**	**< 0.7**	**< 0.7**
Silver (Ag)	ppm	0.08	0.05	0.06	0.08	**0.1**	0.08	0.08	0.04	0.05	0.07	0.06	0.06	0.06	**0.36**	0.03	0.06	**0.11**	**0.1**	0.06	0.06	0.02	**0.15**	0.05
Sodium (Na)	ppm	23000																						
Suphur (S)	ppm	No Value	180	810	130	1600	800	360	120	210	120	210	200	640	380	340	100	210	120	210	400	270	720	72
Strontium (Sr)	ppm	260	11	4.4	23	63	37	27	9	34	13	34	13	16	68	7	9	16	14	19	10	60	91	12
Thallium (Tl)	ppm	0.36	0.05	0.06	0.21	0.17	0.21	0.19	0.07	0.02	0.05	0.03	0.08	0.04	0.03	0.04	0.06	0.03	0.08	0.03	0.05	0.09	0.03	0.08
Tin (Sn)	ppm	2.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	0.5	0.7	0.6	< 0.5	< 0.5	< 0.5	0.7	< 0.5
Titanium (Ti)	ppm	5300	570	590	1200	830	880	980	900	370	650	1900	690	600	690	520	500	**5500**	1000	940	600	2500	**17000**	890
Uranium (U)	ppm	0.91	0.48	0.59	0.64	0.67	0.73	0.67	0.33	0.3	0.37	0.61	0.58	0.49	0.24	0.69	0.36	0.25	0.29	0.23	0.78	0.58	0.83	0.44
Vanadium (V)	ppm	230	25	53	55	33	40	44	71	50	93	98	39	44	180	39	21	**550**	61	110	36	**740**	**570**	39
Yttrium (Y)	ppm	20	4	3.6	9.4	11	9.8	9.4	2.6	5.2	2.4	11	2.1	4	3.5	2.7	1.7	1.1	1.5	1.4	4.7	7.1	**61**	3.8
Zinc (Zn)	ppm	80	43	23	56	43	55	55	36	50	26	69	20	16	38	11	9.4	**130**	16	33	19	55	**210**	24

Notes:
Bolded values indicate concentrations greater than the a
Bolded and highlighted cells indicate concentrations gre

Table A3
Metals Summary for all Constituents

Parameter	Units	Average Crustal Abundance	AP	FO	PR	MG	HL	KP11-15	KP11-13	KP11-05(0-0.3)	KP11-05(8.8-9.4)	KP11-10	KP11-09(0-0.3)	KP11-12	KP11-14	KP11-38(0-0.3)	DUP-1 (RP-3 TS)	DUP-2 (SAT 2-3 OB)	DUP-3 (MP-9 OB)
Moisture Content	%	No Value	3.8	0.9	13.2	4.9	56.7	24.4	29.6	21.1	15.1	28.4	18.3	16.9	9.2	19.3	28.9	15.2	10.1
Aluminum (Al)	ppm	84000	11000	9500	6000	8600	15000	12000	11000	7400	2700	8400	10000	7100	17000	12000	7400	10000	14000
Antimony (Sb)	ppm	0.2	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**	**< 0.8**
Arsenic (As)	ppm	1	**1.1**	**1.2**	0.8	0.8	**2.6**	**1.7**	**2.2**	0.8	< 0.5	**2.8**	**1.2**	**2.5**	**1.4**	0.7	**2.8**	< 0.5	**2.1**
Barium (Ba)	ppm	250	40	74	43	25	94	31	29	19	18	35	39	23	25	41	94	43	59
Beryllium (Be)	ppm	1.5	0.3	0.32	0.27	0.25	0.87	0.39	0.23	0.17	0.17	0.17	0.3	0.22	0.34	0.32	0.23	0.19	0.39
Bismuth (Bi)	ppm	0.06	**0.1**	**< 0.09**	**< 0.09**	**< 0.09**	**0.11**	**< 0.09**	**0.09**	**< 0.09**	**< 0.09**	**0.16**	**< 0.09**	**0.11**	**< 0.09**	**< 0.09**	**0.34**	**< 0.09**	**< 0.09**
Cadmium (Cd)	ppm	0.1	0.09	0.07	0.06	0.07	**0.81**	0.08	**0.2**	0.08	0.04	**0.18**	**0.17**	0.07	**0.11**	**0.14**	**0.5**	0.07	0.05
Calcium (Ca)	ppm	53000	7100	10000	**81000**	2100	3500	990	480	1300	**68000**	590	2100	350	930	2700	3200	2500	2100
Chromium (Cr)	ppm	185	180	160	130	**190**	180	40	39	86	35	54	93	50	64	100	180	**190**	150
Cobalt (Co)	ppm	29	8.1	6.7	4.5	5.7	5.7	2.4	1.3	3.3	3	1.7	6.6	3.4	3.5	9.7	4.6	12	7.3
Copper (Cu)	ppm	75	12	10	9.6	6.3	11	6	4.3	6	8.5	8.5	12	6.6	6.9	25	11	21	13
Iron (Fe)	ppm	71000	21000	20000	12000	17000	25000	38000	39000	12000	7900	35000	17000	38000	37000	23000	17000	21000	21000
Lead (Pb)	ppm	8	4.2	3.7	3.7	2.6	**22**	5.9	7.6	3.3	2	**13**	3.6	6.3	5.4	3	**47**	4.5	5
Lithium (Li)	ppm	13	13	12	10	9	12	7	4	6	5	3	11	6	7	11	5	11	**16**
Magnesium (Mg)	ppm	32000	5600	5700	25000	3500	2900	1200	680	1800	20000	790	3400	1200	2000	5300	1800	4700	5300
Manganese (Mn)	ppm	1400	350	270	290	220	300	220	210	150	270	190	210	540	350	410	230	820	170
Mercury	ppm	0.1 to 4	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**0.2**	< 0.1	**0.2**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Molybdenum (Mo)	ppm	1	**2.8**	0.6	**1.5**	0.5	**3.9**	**11**	**1.9**	0.5	0.2	**2.4**	0.7	**1.4**	**1.2**	0.7	**1.2**	**2.8**	0.5
Nickel (Ni)	ppm	105	22	20	13	16	12	5.8	3.1	9.4	9.1	4	26	6.1	8.9	29	12	19	27
Phosphorus (P)	ppm	No Value	460	370	470	390	930	310	180	390	390	300	530	120	190	580	420	420	340
Potassium (K)	ppm	9000	1300	1100	1600	980	1400	670	590	470	620	500	780	740	590	670	1800	1100	1600
Selenium (Se)	ppm	0.05	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**	**0.9**	**0.8**	**1.7**	**1**	**0.8**	**1.1**	**1**	**0.8**	**1.8**	**< 0.7**	**< 0.7**	**< 0.7**	**< 0.7**
Silver (Ag)	ppm	0.08	0.04	0.03	0.04	0.02	0.04										**0.21**	0.03	0.06
Sodium (Na)	ppm	23000						270	260	290	270	210	320	190	310	390			
Suphur (S)	ppm	No Value	180	250	1400	130	1600										1000	170	110
Strontium (Sr)	ppm	260	19	21	50	13	16	4.2	3.8	7.8	47	3.8	14	3.3	7.3	16	23	18	10
Thallium (Tl)	ppm	0.36	0.07	0.04	0.08	0.04	0.11	0.05	0.04	0.04	0.03	0.05	0.05	0.05	0.05	0.05	0.12	0.07	0.07
Tin (Sn)	ppm	2.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	1.1	0.9	< 0.5	< 0.5	0.8	< 0.5	0.6	< 0.5	< 0.5	1.3	< 0.5	< 0.5
Titanium (Ti)	ppm	5300	760	710	460	540	510	470	710	590	380	790	540	570	750	820	560	650	740
Uranium (U)	ppm	0.91	0.46	0.46	0.51	0.37	**0.95**	0.77	0.63	0.34	0.67	0.68	0.46	0.57	0.62	0.52	0.38	0.48	0.39
Vanadium (V)	ppm	230	30	31	16	23	20	22	23	22	14	40	32	27	20	51	36	30	34
Yttrium (Y)	ppm	20	4.3	5.3	6.3	3.5	12	4.7	2.5	3.1	5.9	2	3.7	2.8	4.1	5.4	1.9	3	3.1
Zinc (Zn)	ppm	80	35	24	21	22	**90**	19	15	12	8.8	20	26	19	21	47	46	23	24

Notes:
Bolded values indicate concentrations greater than the a
Bolded and highlighted cells indicate concentrations gre

Table A4
Summary of Soluble Concentrations for all Samples

Sample ID	FS-2 OB	RP-4 OB	SAT1-3 OB	RP-2 OB	MP-9 OB	FS-5 OB	SAT2-1 OB	MP-7 OB	MP-4 OB	MP-1 OB
Anions and Nutrients										
Acidity (as CaCO3)	6.3	2.9	2.8	9.1	6.7	6.9	5.3	-	10.5	21.1
Dissolved Metals (mg/L)										
Aluminum (Al)-Dissolved	1.92	0.0831	0.474	0.353	1.74	0.550	1.55	2.82	0.259	2.19
Antimony (Sb)-Dissolved	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00020	< 0.0001	< 0.0001
Arsenic (As)-Dissolved	0.00038	0.00036	0.00022	0.00014	0.00032	0.00026	0.00056	0.00198	0.00023	0.00042
Barium (Ba)-Dissolved	0.0187	0.00825	0.00942	0.0438	0.0250	0.0230	0.0101	0.141	0.0279	0.0122
Beryllium (Be)-Dissolved	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Bismuth (Bi)-Dissolved	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Boron (B)-Dissolved	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.012	< 0.010	< 0.010
Cadmium (Cd)-Dissolved	0.000208	0.000017	0.000011	0.000608	0.000026	0.000170	0.000102	0.000275	0.000374	0.000158
Calcium (Ca)-Dissolved	1.18	39.2	29.9	1.49	0.820	1.51	0.673	2.21	2.44	0.917
Chromium (Cr)-Dissolved	0.00140	0.00029	0.00086	0.00038	0.00236	0.00108	0.00050	0.00135	0.00112	0.00119
Cobalt (Co)-Dissolved	0.00086	< 0.0001	0.00017	0.00375	0.00069	0.00165	0.00163	0.00317	0.00195	0.00462
Copper (Cu)-Dissolved	0.00323	0.00290	0.00294	0.00094	0.00455	0.00177	0.00412	0.0250	0.00194	0.0152
Iron (Fe)-Dissolved	0.745	0.059	0.303	< 0.010	0.782	0.104	0.694	8.13	0.036	2.70
Lead (Pb)-Dissolved	0.000483	0.000051	0.000361	0.000059	0.000904	0.000143	0.000819	0.00285	0.000470	0.00133
Lithium (Li)-Dissolved	0.00126	< 0.0005	0.00058	0.00113	0.00077	0.00079	0.00062	0.00109	0.00066	0.00066
Magnesium (Mg)-Dissolved	0.425	5.29	6.35	0.823	0.445	0.539	0.475	0.651	0.727	1.57
Manganese (Mn)-Dissolved	0.0251	0.00160	0.00777	0.179	0.00800	0.0194	0.125	0.0396	0.0377	0.0336
Mercury (Hg)-Dissolved	< 0.000	< 0.000	< 0.000	< 0.000	< 0.000	< 0.000	< 0.000	0.000080	< 0.000	0.000066
Molybdenum (Mo)-Dissolved	< 0.0001	0.000828	0.000339	< 0.0001	< 0.0001	< 0.0001	0.000057	0.000104	< 0.0001	< 0.0001
Nickel (Ni)-Dissolved	0.00299	0.00072	0.00134	0.00272	0.00211	0.00308	0.00197	0.00238	0.00426	0.0124
Phosphorus (P)-Dissolved	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	< 0.300	2.41	< 0.300	< 0.300
Potassium (K)-Dissolved	1.68	0.925	0.611	0.842	1.99	0.389	1.76	2.68	2.06	1.24
Selenium (Se)-Dissolved	0.00018	0.00014	0.00012	< 0.0001	0.00016	< 0.0001	0.00080	0.00086	< 0.0001	0.00054
Silicon (Si)-Dissolved	5.33	1.91	2.63	4.88	4.72	2.64	4.40	6.31	4.91	5.36
Silver (Ag)-Dissolved	< 0.000	< 0.000	0.000019	< 0.000	0.000196	< 0.000	0.000012	0.000038	0.000093	0.000019
Sodium (Na)-Dissolved	1.16	1.26	1.73	1.04	1.65	1.13	1.64	2.02	1.54	2.93
Strontium (Sr)-Dissolved	0.00774	0.0366	0.0441	0.00945	0.00631	0.0102	0.00799	0.0209	0.0235	0.00702
Sulfur (S)-Dissolved	5.05	0.65	< 0.500	4.09	0.77	< 0.500	1.46	1.84	4.57	1.60
Thallium (Tl)-Dissolved	0.000148	< 0.000	0.000012	0.000039	0.000018	0.000031	0.000029	0.000045	0.000041	0.000039
Tin (Sn)-Dissolved	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Titanium (Ti)-Dissolved	0.012	< 0.010	0.014	< 0.010	0.024	< 0.010	0.010	0.149	< 0.010	0.027
Uranium (U)-Dissolved	0.000045	0.000387	0.000459	< 0.000	0.000049	0.000012	0.000021	0.000193	< 0.000	0.000093
Vanadium (V)-Dissolved	0.0011	< 0.001	0.0013	< 0.001	0.0017	< 0.001	0.0011	0.0052	< 0.001	0.0024
Zinc (Zn)-Dissolved	0.0076	< 0.003	0.0036	0.0180	0.0037	0.0156	0.0097	0.0535	0.0399	0.0174

Table A4
Summary of Soluble Concentrations for all Samples

Sample ID	KP11-14 OB	KP11-38(0.3-0.6) OB	KP11-12 OB	RP-2 TS	RP-4 TS	SAT 1-3 TS	FS-2 TS	MP-9 TS	DUP-1 (RP4 OB)
Anions and Nutrients									
Acidity (as CaCO3)	8.0	7.6	16.9	56.1	14.6	5.3	77.5	71.2	5.6
Dissolved Metals (mg/L)									
Aluminum (Al)-Dissolved	0.219	4.01	5.98	2.28	1.13	0.201	1.24	2.76	0.218
Antimony (Sb)-Dissolved	< 0.0001	< 0.0001	0.00011	0.00028	0.00013	< 0.000	0.00018	0.00023	< 0.0001
Arsenic (As)-Dissolved	0.00063	0.00040	0.00116	0.00371	0.00309	0.00032	0.00390	0.00565	0.00041
Barium (Ba)-Dissolved	0.0145	0.0142	0.0204	0.0298	0.0285	0.0307	0.0237	0.0416	0.00912
Beryllium (Be)-Dissolved	< 0.0001	0.00013	0.00020	< 0.000	< 0.000	< 0.000	< 0.000	< 0.000	< 0.0001
Bismuth (Bi)-Dissolved	< 0.0005	< 0.0005	< 0.0005	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.0005
Boron (B)-Dissolved	< 0.010	< 0.010	< 0.010	0.040	0.029	0.025	0.030	0.029	< 0.010
Cadmium (Cd)-Dissolved	0.000209	0.000063	0.000333	0.000437	0.000139	0.000037	0.000252	0.000356	0.000021
Calcium (Ca)-Dissolved	0.766	1.36	1.18	4.28	9.58	29.8	2.94	4.72	38.3
Chromium (Cr)-Dissolved	0.00033	0.00247	0.00342	0.00819	0.00269	0.00046	0.00633	0.0127	0.00060
Cobalt (Co)-Dissolved	0.00041	0.00132	0.00050	0.00035	0.00043	0.00010	0.00051	0.00102	0.00013
Copper (Cu)-Dissolved	0.00081	0.00592	0.00694	0.0107	0.00659	0.00475	0.0186	0.0143	0.00324
Iron (Fe)-Dissolved	0.045	1.45	6.95	1.95	0.803	0.156	0.627	2.37	0.193
Lead (Pb)-Dissolved	0.000221	0.000594	0.00245	0.0142	0.00245	0.000322	0.0141	0.0233	0.000249
Lithium (Li)-Dissolved	0.00096	< 0.0005	0.00213	0.00161	0.00238	< 0.001	0.00109	0.00468	0.00055
Magnesium (Mg)-Dissolved	0.316	0.247	0.396	0.760	2.02	16.5	0.765	0.994	5.24
Manganese (Mn)-Dissolved	0.0366	0.0270	0.0407	0.436	0.0395	0.00912	0.0894	0.0943	0.00546
Mercury (Hg)-Dissolved	< 0.000	0.000031	0.000127	0.000050	0.000024	< 0.000	0.000032	0.000032	< 0.000
Molybdenum (Mo)-Dissolved	< 0.0001	< 0.0001	0.000118	0.000250	0.000136	0.000122	0.000391	0.000475	0.000787
Nickel (Ni)-Dissolved	0.00093	0.0100	0.0108	0.00402	0.00272	0.00248	0.00427	0.00564	0.00091
Phosphorus (P)-Dissolved	< 0.300	< 0.300	< 0.300	< 0.300	1.19	< 0.300	5.66	4.28	< 0.300
Potassium (K)-Dissolved	1.46	0.195	1.04	6.69	10.9	3.01	16.5	14.3	1.14
Selenium (Se)-Dissolved	0.00027	0.00020	0.00047	0.00162	0.00039	0.00017	0.00098	0.00185	0.00011
Silicon (Si)-Dissolved	4.84	3.22	4.79	7.18	5.50	6.54	12.2	9.28	2.14
Silver (Ag)-Dissolved	< 0.000	0.000025	0.000010	0.000126	0.000072	< 0.000	0.000094	0.000048	0.000014
Sodium (Na)-Dissolved	0.529	0.963	2.40	2.77	1.58	1.72	2.62	3.07	1.15
Strontium (Sr)-Dissolved	0.00385	0.00782	0.00511	0.0153	0.0175	0.145	0.0175	0.0239	0.0355
Sulfur (S)-Dissolved	2.27	0.69	1.78	3.54	3.67	2.07	7.33	7.59	0.52
Thallium (Tl)-Dissolved	0.000097	< 0.000	0.000053	0.000099	0.000042	< 0.000	0.000277	0.000217	< 0.000
Tin (Sn)-Dissolved	< 0.0001	< 0.0001	< 0.0001	0.00028	< 0.000	< 0.000	0.00018	0.00025	< 0.0001
Titanium (Ti)-Dissolved	< 0.010	0.027	0.060	0.099	0.036	< 0.010	0.012	0.177	0.010
Uranium (U)-Dissolved	0.000019	0.000117	0.000439	0.000087	0.000038	0.000015	0.000072	0.000093	0.000391
Vanadium (V)-Dissolved	< 0.001	0.0025	0.0043	0.0108	0.0033	< 0.001	0.0112	0.0239	0.0012
Zinc (Zn)-Dissolved	0.0082	0.0082	0.0363	0.0667	0.0345	0.0051	0.0347	0.0423	< 0.003

APPENDIX B

SHAKE FLASK TESTING SET-UP

Table B1
Soils Shake Flask Set-up

Sample ID	Bottle Mass	Sample Mass	Water Mass	Water Volume	Total Mass	pH	Electrical Conductivity
Units	g	g	g	mL	g	--	µS/cm
FS-2 OB	38.76	99.95	300.02	300.56	438.70	5.67	66.2
RP-4 OB	38.38	102.87	308.82	309.37	450.03	7.87	230.9
SAT1-3 OB	38.62	100.08	300.68	301.22	439.67	7.88	225.7
RP-2 OB	38.61	100.58	300.39	300.93	439.58	4.57	38.9
MP-9 OB	38.59	100.23	301.85	302.39	440.64	5.13	26.82
FS-5 OB	38.79	99.09	297.82	298.35	435.67	4.80	31.5
SAT2-1 OB	38.50	100.60	301.38	301.92	440.49	5.60	34.2
MP-7 OB	38.44	91.19	273.74	274.23	403.31	4.28	60.3
MP-4 OB	38.70	100.31	304.61	305.16	443.58	4.78	50
MP-1 OB	38.31	100.92	303.29	303.83	442.45	4.23	57.9
KP11-14 OB	39.38	103.78	312.88	313.44	456.06	5.08	32.1
KP11-38(0.3-0.6) OB	38.39	107.08	320.74	321.32	466.19	5.75	18.49
KP11-12 OB	38.60	106.46	319.47	320.04	464.44	4.62	31.5
RP-2 TS	38.59	75.35	226.30	226.71	340.24	4.46	122.8
RP-4 TS	38.26	117.38	352.40	353.03	508.04	5.52	190.8
SAT 1-3 TS	38.76	101.21	303.23	303.77	443.20	6.92	343
FS-2 TS	38.53	85.45	256.35	256.81	380.33	3.85	255.1
MP-9 TS	38.36	77.25	231.91	232.33	347.52	4.25	194.5
DUP1 - RP4 OB	38.68	103.31	309.49	310.05	451.47	7.22	238.6

APPENDIX C

ECOMETRIX TEST PIT LOGS

Table C1: Physical Description of Test Pits (Source: EcoMetrix, 2011)						
Test Pit ID	**OB (m)**	**From (m)**	**To (m)**	**g.w. (m)**	**Dominant Sediment**	**Description**
RP-1	0.76	0	0.10	Dry	TOP SOIL	Topsoil, organic, black, roots
-		0.10	0.41	-	SILT-SAND	Dark brown, silty sand, boulders located throughout
-		0.41	0.61	Seepage (0.68m)	SAND-GRAVEL	Wet medium sand with trace gravel and silt, brown
-		0.61	0.76	-	CLAY-SILT	Clayey silt with trace sand, comp saturated, dark grey
RP-2	0.46	0	0.08	Dry	TOP SOIL	Dark brown topsoil, full of roots, some random pockets of light grey clayey silt
-		0.08	0.33	-	SAND-SILT-GRAVEL	Orange-brown med to fine sand, trace silt, gravel to boulders present
-		0.33	0.46	-	SILT-SAND	Dark grey to brown silty sand, lighter sandy silt near bedrock
RP-3	1.02	0.00	0.08	Dry	TOP SOIL	Topsoil, black organic with roots, needle debris, contains pockets of light gray clayey silt
-		0.08	0.28	-	SAND	Brown fine to coarse sand with trace gravel to cobble with boulders, roots
-		0.28	0.43	-	SILT	Light brown silt with trace sand
-		0.43	1.02	-	SILT-CLAY	Gradient from brown to gray clayey silt to silty clay
RP-4	0.99	0	0.08	Dry	TOP SOIL	Topsoil, black organic, full of roots
-		0.08	0.20	-	SILT-SAND	Brown to light brown silty sand, trace clay
-		0.20	0.76	-	SILT-CLAY	Gray silty clay with trace sand
-		0.76	0.99	-	CLAY	Light gray clay with some dark gray clay bands
RP-5	1.02	0	0.05	Dry	TOP SOIL	Topsoil, dark brown to black organic with roots
-		0.05	0.18	-	SAND	Brown fine to coarse sand, trace gravel, rootlets
-		0.18	0.28	-	SILT-SAND	Light gray to brown silty sand, trace roots
-		0.28	0.69	-	SILT-CLAY	**B**rown silty clay with sporadic organic debris (sticks, twigs), sporadic moderately rounded gravel
-		0.69	1.02	-	CLAY-SILT	Varved clayey silt with light gray to gray laminations
MP-1	0.15	0	0.04	Dry	TOP SOIL	Topsoil, mostly roots and litter, dark brown to black, low OM
-		0.04	0.15	-	SAND	Brown coarse to fine sand, full of rootlets
MP-2	0.15	0.00	0.09	Dry	TOP SOIL	Topsoil, brown to dark brown, organic rich, full of roots, lots of needles
-		0.09	0.15	-	CLAY-SILT	Grey to light brown clayey silt with some trace sand
MP-3	0.19	0	0.04	Dry	TOP SOIL	Topsoil, dark brown, full of rootlets, organic with some dark grey sand
-		0.04	0.08	-	CLAY-SILT	Light grey clayey silt
-		0.08	0.19	-	SILT-SAND	Transitions from dark orange-brown to light brown, fine silty sand with some trace gravel
MP-4	0.56	0	0.08	Dry	TOP SOIL	Topsoil, brown to dark brown organic, full of rootlets
-		0.08	0.30	-	SILT-SAND	Light brown to gray silty samd with pockets of discontinuous light gray clayey silt, rootlets, occasional pockets of dark orange
-		0.30	0.56	-	SAND-SILT	Fine sandy silt, light brown, trace clay, no roots
-		0.56	0.00	-	SILT-SAND	Bedrock, at interface: 1/2 to 1 inch thick layer of light brown to white sandy silt with trace coarse
MP-6	0.51	0	0.15	Dry	TOP SOIL	Topsoil, black to dark brown, organic, trace brown sand, roots
-		0.15	0.46	-	SAND	Dark brown gravelly sand with some cobbles
-		0.46	0.51	-	SAND-GRAVEL	Light brown to red-orange gravelly sand, appears to be weathered bedrock, contains very
MP-7	0.06	0	0.06	Dry	TOP SOIL	Topsoil, brown/black organic, filled with roots
-		0.06	0.10	-	SAND-GRAVEL	Brown sand with gravel
MP-9	0.71	0.00	0.10	Dry	TOP SOIL	Topsoil, black to dark brown organic, full of roots
-		0.10	0.41	-	SILT-SAND	Brown silty sand with trace gravel, rootlets, pockets of light gray clayey silt, contains cobbles
-		0.41	0.71	-	SAND-GRAVEL	Light brown/gray coarse sand with gravel, trace silt
FS-1	0.36	0	0.08	Dry	LITTER	Moss
-		0.08	0.18	-	TOP SOIL	Topsoil, full of roots, dark
-		0.18	0.36	-	SILT-SAND	Dark grey silty sand with some trace clay. Trace gravel throughout
FS-2	0.48	0	0.06	Dry	TOP SOIL	Organic, leaves, twigs, 0-6 cm
-		0.06	0.10	-	CLAY-SILT	Grey clayey silt lense
-		0.10	0.15	-	CLAY-SAND	Dark brown/red medium clay-sand
-		0.15	0.41	-	SAND	Light orange/brown to whitish-yellow coarse-fine sand
-		0.41	0.48	-	CLAY-SILT-COBBLES	Whitish yellow with large cobbles. Clayey/silt with some fine sands

Test Pit ID	OB (m)	From (m)	To (m)	g.w. (m)	Dominant Sediment	Description
FS-3	0.20	0	0.08	Dry	TOP SOIL	Topsoil, organic, roots, (H horizon)
-		0.08	0.20	-	SAND	Orange-brown, med-grain sand with some fines, roots.
FS-4	0.46	0.00	0.10	Dry	TOP SOIL	Topsoil, dark grey to black, full of roots
-		0.10	0.23	-	CLAY-SILT	Grey clayey silt with trace sand
-		0.23	0.46	-	SILT-SAND	Dark brown/red silty sand
FS-5	0.41	0	0.05	Dry	TOP SOIL	Topsoil, black, organic, full of roots
-		0.05	0.41	-	CLAY-SILT	Light grey to grey clayey silt with some fine to coarse sands
SAT1-2	0.71	0	0.08	Dry	TOP SOIL	Topsoil, dark brown organic, full of roots
-		0.08	0.11	-	SAND-SILT	Light gray sandy silt, consistent throughout layer
-		0.11	0.53	-	SAND-GRAVEL	Brown gravelly sand with gravel to boulder size throughout, gravel to cobble moderately
-		0.53	0.71	-	SAND-GRAVEL	Light brown, densely packed gravelly sand to sandy gravel
SAT1-3	0.97	0	0.08	Dry	TOP SOIL	Topsoil, black organic with small rootlets
-		0.08	0.25	-	CLAY-SILT	Light gray clayey silt, some trace sand
-		0.25	0.97	Seepage (0.25)	SILT-CLAY	Gray silty clay, moist, contains striations/laminations from 0.5 m, varves ranging from light gray
SAT2-1	0.25	0	0.09	Dry	TOP SOIL	Topsoil, black organic, full of roots
-		0.09	0.25	-	SAND-GRAVEL	Brown to dark brown fine to coarse sand with gravel, rootlets
SAT-2-3	0.69	0	0.05	Dry	TOP SOIL	Topsoil, brown/black, full of roots
-		0.05	0.38	-	SAND-GRAVEL	Fine to coarse sand with gravel, brown, some rootlets from 5 to 20 cm
-		0.38	0.69	-	CLAY-SILT	Light gray clayey silt
SAT2-5	0.61	0	0.05	Dry	TOP SOIL	Topsoil, black organic with roots
-		0.05	0.25	-	SAND	Brown medium to coarse sand with trace silt, full of roots
-		0.25	0.38	-	SILT-SAND	Light brown silty sand with trace clay
-		0.38	0.61	-	SAND	Medium to coarse sand with trace gravel

EcoMetrix INCORPORATED

Test Pit ID: FS-1

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: sunny, humid @ 11:55 am
ground surface covered in moss 10 cm thick
black organic soils

Depth (inches) From	To	Soil Description
0	3	Moss
3	7	Topsoil, full of roots, dark
7	14	dark grey silty sand with some trace clay. Trace gravel throughout
14	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: FS-2

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: Humid, overcast @ 10:40 AM

Depth (inches) From	To	Soil Description
0	2.5	organic, leaves, twigs, 0-2.5 inches
2.5	4	grey clayey silt lense
4	6	dark brown/red med. Clay/sand
6	16	light orange/brown to whitish-yellow coarse-fine sand
16	19	whitish yellow with large cobbles. Clayey/silt with some fine sands
19	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

General overburden observations: reddish brown sand texture with some cobbles at 4 inches transitioning to light brown/yellow at 6 inches.

EcoMetrix INCORPORATED

Test Pit ID: FS-3

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: Humid, overcast @ 10 AM

Depth (cm) From	To	Soil Description
0	8	topsoil, organic, roots, (H horizon)
8	20	orange-brown, med-grain sand with some fines, roots.
20	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: FS-4

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: slightly cloudy, hot @5:40 PM
located in treed area
surface covered in moss, roots, litter

Depth (inches) From	To	Soil Description
0	4	topsoil, dark grey to black, full of roots
4	9	grey clayey silt with trace sand
9	18	dark brown/red silty sand
18	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: FS-5

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: Sunny, hot, humid @ 4:45
located on ledge of bedrock face
surface covered in litter, ferns, small plants

Depth (inches) From	To	Soil Description
0	2	topsoil, black, organic, full of roots
2	16	light grey to grey clayey silt with some fine-coarse sands
16	--	Auger refusal. Possible bedrock

Notes:

Possible area of interest for clay

EcoMetrix INCORPORATED

Test Pit ID: MP-1

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks: Surface covered in ferns, litter
Weather: sunny, clear, cool @ 9:20 am
tried multiple locations within 20 m radius,
very shallow soils.

Depth (inches) From	To	Soil Description
0	1.5	topsoil, mostly roots and litter, dark brown to black, low OM
1.5	6	brown coarse to fine sand, full of rootlets
6	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

overburden thickness varies from 1 to 6 inches

EcoMetrix INCORPORATED

Test Pit ID: MP-2

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: sunny with clouds @ 12:25 pm
dense forest
ground covered in needles, litter

Depth (inches) From	To	Soil Description
0	3.5	topsoil, brown to dark brown, organic rich, full of roots, lots of needles
3.5	6	grey to light brown clayey silt with some trace sand
6	--	Auger refusal. Possible bedrock

Notes:

EcoMetrix INCORPORATED

Test Pit ID: MP-3

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks: conifers not present
Weather: sunny, clear, breezy @ 4:35 pm
located in slightly treed area with blueberries
ground covered in bushes, small plants, leaf litter, deciduous trees

Depth (inches) From	To	Soil Description
0	1.5	topsoil, dark brown, full of rootlets, organic with some dark grey sand
1.5	3	light grey clayey silt
3	7.5	transitions from dark orange-brown to light brown, fine silty sand with some trace gravel
7.5	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: MP-4

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, breezy @ 5:30 pm

Remarks: located in a wooded area near exposed bedrock; ground covered in moss, small conifers, plants, leaf litter

Depth (inches) From	To	Soil Description
0	3	topsoil, brown to dark brown organic, full of rootlets
3	12	light brown to gray silty samd with pockets of discontinuous light gray clayey silt, rootlets, occasional pockets of dark orange
12	22	fine sandy silt, light brown, trace clay, no roots
22	--	bedrock, at interface: 1/2 to 1 inch thick layer of light brown to white sandy silt with trace coarse sand. Auger refusal, possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: MP-6

Date: August 6 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, warm @ 4:47 pm

Remarks: located in stand of alder trees and old pines near 2 Duck and new road cut for current drilling, ground covered in young conifers, pine needles and litter

Depth (inches) From	To	Soil Description
0	6	topsoil, black to dark brown, organic, trace brown sand, roots
6	18	dark brown gravelly sand with some cobbles
18	20	light brown to red-orange gravelly sand, appears to be weathered bedrock, contains very friable black mineral, appears to be weathered blue-green syenite
20	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: MP-7

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, hot @ 1:33 pm

Remarks: located in old tree stand near recent drill hole and possible moose blind, ground surface covered in moss, pine needles, litter

Depth (inches) From	To	Soil Description
0	2.5	topsoil, brown/black organic, filled with roots
2.5	4.5	brown sand with gravel
4.5	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: MP-9

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, breezy @ 6:33 pm
Remarks: located in slightly wooded area off access road; ground covered in pine cones, moss, small plants, litter

Depth (inches) From	To	Soil Description
0	4	topsoil, black to dark brown organic, full of roots
4	16	brown silty sand with trace gravel, rootlets, pockets of light gray clayey silt, contains cobbles
16	28	light brown/gray coarse sand with gravel, trace silt
28	--	Auger refusal. Bedrock, at interface: 1 inch fine material, fine silty sand.
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: RP-1

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: sunny, warm @ 10:25 am
located in low-lying area at bottom of rock face
ground covered in leaf litter, moss, plants

Depth (inches) From	To	Soil Description
0	4	topsoil, organic, black, roots
4	16	dark brown, silty sand, boulders located throughout
16	24	wet medium sand with trace gravel and silt, brown
24	30	clayey silt with trace sand, comp saturated, dark grey, water filled to 27 inches
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: RP-2

Date: August 4 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks:
Weather: sunny, warm, breezy @ 2:57 pm
located on top of ledge in lightly forested area
ground covered in shrubs, light moss, litter

Depth (inches) From	To	Soil Description
0	3	dark brown topsoil, full of roots, some random pockets of light grey clayey silt (looks like soot)
3	13	orange-brown med to fine sand, trace silt, gravel to boulders present
13	18	dark grey to brown silty sand, lighter sandy silt near bedrock
18	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: RP-3

Date: August 6 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: rainy, warm @ 9:53 am

Remarks: located in mixed tree stand east of southern tip of S19, ground covered in small conifers, needles, saplings, litter, trace ferns

Depth (inches) From	To	Soil Description
0	3	topsoil, black organic with roots, needle debris, contains pockets of light gray clayey silt
3	11	brown fine to coarse sand with trace gravel to cobble with boulders, roots
11	17	light brown silt with trace sand
17	40	gradient from brown to gray clayey silt to silty clay
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: RP-4

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear @ 10:35 am

Remarks: located in dense alder trees on side of hill, ground covered in grasses, ferns, saplings, litter

Depth (inches) From	To	Soil Description
0	3	topsoil, black organic, full of roots
3	8	brown to light brown silty sand, trace clay
8	30	gray silty clay with trace sand
30	39	light gray clay with some dark gray clay bands
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: RP-5

Date: August 6 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: wet, cloudy, warm @ 1:26 pm
Remarks: general area is abundant in clay, located in clay rich area surrounded by alder trees east of bedrock cliffs, ground covered in ferns, saplings, pine needles, litter, some moss covered logs

Depth (inches) From	To	Soil Description
0	2	topsoil, dark brown to black organic with roots
2	7	brown fine to coarse sand, trace gravel, rootlets
7	11	light gray to brown silty sand, trace roots
11	27	brown silty clay with sporadic organic debris (sticks, twigs), sporadic moderately rounded gravel to boulder
27	40	varved clayey silt with light gray to gray laminations, thicknesses ranged between 1/2 inch to 1.5 inch
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: SAT 1-2

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, hot @ 2:30 pm

Remarks: located in tree stand near swampy area and access road, ground covered in small conifers, litter, slight moss

Depth (inches) From	To	Soil Description
0	3	topsoil, dark brown organic, full of roots
3	4.5	light gray sandy silt, consistent throughout layer
4.5	21	brown gravelly sand with gravel to boulder size throughout, gravel to cobble moderately rounded, boulder slightly rounded
21	28	light brown, densely packed gravelly sand to sandy gravel
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: SAT 1-3

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, hot @ 4:03 pm

Remarks: located in old creek bed under alder trees, ground covered in ferns, shrubs, litter, slight moss

Depth (inches) From	To	Soil Description
0	3	topsoil, black organic with small rootlets
3	10	light gray clayey silt, some trace sand
10	38	gray silty clay, moist, contains striations/laminations from 20 inches, varves ranging from light gray to gray
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: SAT 2-1

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, warm @ 6:09 pm

Remarks: located in plant filled area near former cut line, ground covered in plants, litter, trace amounts of moss

Depth (inches) From	To	Soil Description
0	3.5	topsoil, black organic, full of roots
3.5	10	brown to dark brown fine to coarse sand with gravel, rootlets
10	--	Auger refusal. Possible bedrock.
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: SAT 2-3

Date: August 5 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Weather: sunny, clear, warm @ 6:55 pm

Remarks: located off access road in sloping area near exposed bedrock, ground covered in ferns, litter

Depth (inches) From	To	Soil Description
0	2	topsoil, brown/black, full of roots
2	15	fine to coarse sand with gravel, brown, some rootlets from 2-9 inches
15	27	light gray clayey silt
27	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

EcoMetrix INCORPORATED

Test Pit ID: SAT-2-5

Date: August 3 2011

Project: 11-1851 Stillwater

Location: Marathon, Ontario

Coordinates:

Sampled By: M. Bower, V. Van Schaik

Remarks: surface covered in ferns, tree litter
Weather: Sunny, hot, humid @3:08 pm
located on side of cliff on Malachite trail
heavily wooded area

Depth (inches) From	To	Soil Description
0	2	topsoil, black organic with roots
2	10	brown med-coarse sand with trace silt, full of roots
10	15	light brown silty sand with trace clay
15	24	med-coarse sand with trace gravel
24	--	Auger refusal. Possible bedrock
	End	End of test pit

Notes:

Occasional moderate rounded cobble pieces in with gravel

APPENDIX D

COMPILATION OF DATA FROM LABORATORY TESTING

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Friday, October 28, 2011

Ecometrix
Attn : Michael Bower

6800 Campobello Road
Mississauga, Ontario
L5N 2L8, Canada

Phone: 905-794-2325
Fax:905-794-2338

Date Rec. : 27 September 2011
LR Report: **CA10555-SEP11**
Reference: 11-1851

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Sample Date & Time	% Moisture (wet wt) %	Hg µg/g	Ag µg/g	Al µg/g	As µg/g	Ba µg/g	Be µg/g	Bi µg/g	Ca µg/g	Cd µg/g
3: Analysis Approval Date		04-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11
4: Analysis Approval Time		18:08	18:01	12:17	12:19	12:17	12:17	12:17	12:17	12:19	12:17
5: RP-1 TS	20-Sep-11	68.7	0.3	0.37	6300	13	85	0.27	0.39	2600	0.53
6: RP-2 TS	20-Sep-11	40.0	0.2	0.06	3100	5.5	53	0.09	0.31	2000	0.42
7: RP-3 TS	20-Sep-11	38.6	0.2	0.42	4500	3.2	91	0.18	0.36	3300	0.58
8: RP-4 TS	20-Sep-11	47.0	0.1	0.08	12000	3.6	89	0.40	0.29	6000	0.48
9: RP-5 TS	20-Sep-11	47.6	0.2	0.26	4500	3.1	95	0.21	0.45	3300	1.1
10: FS-2 TS	20-Sep-11	59.8	0.2	0.12	2000	1.8	73	0.09	0.28	2700	0.49
11: FS-4 TS	20-Sep-11	43.8	0.2	0.09	8800	2.8	44	0.15	0.30	590	0.29
12: FS-1 TS	20-Sep-11	74.8	0.2	0.30	11000	3.2	50	0.26	0.23	1100	0.74
13: SAT 2-5 TS	20-Sep-11	24.2	< 0.1	0.13	4700	4.9	430	0.15	0.38	4400	0.64
14: SAT 2-3 TS	20-Sep-11	44.2	0.2	0.31	11000	3.6	110	0.39	0.27	3700	0.90
15: SAT 1-3 TS	20-Sep-11	44.3	0.1	0.47	16000	3.5	170	0.62	0.33	9600	2.2
16: MP-3	20-Sep-11	41.2	0.3	0.17	2000	1.9	92	0.09	0.29	3400	0.63
17: MP-6	20-Sep-11	43.3	0.1	0.25	18000	10	170	1.4	0.35	2700	0.97
18: MP-9	20-Sep-11	22.1	0.2	0.20	4200	2.7	79	0.14	0.29	3100	0.50
19: FS-3 TS	20-Sep-11	28.4	< 0.1	0.23	5100	2.3	67	0.11	0.30	2400	0.16
20: FS-5 TS	20-Sep-11	57.7	0.2	0.22	6900	2.3	97	0.55	0.35	1800	1.1
21: SAT 1-2 TS	20-Sep-11	40.3	0.2	0.13	1700	1.0	78	0.08	0.26	1900	0.78
22: SAT 2-1 TS	20-Sep-11	24.6	0.1	0.16	7900	2.2	81	0.16	0.57	3500	0.52

OnLine LIMS

SGS Canada Inc.
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Lakefield - Ontario - KOL 2HO
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LR Report : **CA10555-SEP11**

Sample ID	Sample Date & Time	% Moisture (wet wt) %	Hg µg/g	Ag µg/g	Al µg/g	As µg/g	Ba µg/g	Be µg/g	Bi µg/g	Ca µg/g	Cd µg/g
23: MP-1 TS	20-Sep-11	26.7	0.1	0.11	2800	3.7	87	0.12	0.38	2000	0.47
24: MP-2 TS	20-Sep-11	47.8	0.2	0.31	4900	1.3	87	0.17	0.29	3700	0.88
25: MP-4 TS	20-Sep-11	35.3	< 0.1	0.09	8600	0.5	80	0.07	0.12	5500	0.87
26: MP-7 TS	20-Sep-11	25.9	0.1	0.34	3100	2.0	260	0.11	0.29	8200	0.44
27: RP-1 OB Lab	Date: n/a	41.0	< 0.1	0.05	17000	< 0.5	33	0.38	< 0.09	2400	0.08
28: RP-2 OB Lab	Date: n/a	28.4	0.2	0.06	30000	2.4	44	0.48	0.13	370	0.13
29: RP-3 OB Lab	Date: n/a	21.4	< 0.1	0.08	25000	2.2	130	0.90	0.20	3400	0.09
30: RP-4 OB Lab	Date: n/a	21.0	< 0.1	0.10	14000	1.9	80	0.61	0.14	96000	0.18
31: RP-5 OB Lab	Date: n/a	23.5	< 0.1	0.08	19000	2.3	100	0.81	0.22	45000	0.17
32: SAT 1-3 OB Lab	Date: n/a	20.4	< 0.1	0.08	18000	2.0	110	0.75	0.17	19000	0.12
33: SAT 1-2 OB Lab	Date: n/a	20.6	< 0.1	0.04	16000	1.0	51	0.37	0.14	1200	0.15
34: SAT 2-1 OB Lab	Date: n/a	9.6	< 0.1	0.05	16000	< 0.5	40	0.17	< 0.09	4900	0.21
35: SAT 2-3 OB Lab	20-Sep-11	14.5	< 0.1	0.07	9400	< 0.5	34	0.18	< 0.09	1900	0.09
36: SAT 2-5 OB Lab	20-Sep-11	11.7	< 0.1	0.06	11000	< 0.5	200	0.24	< 0.09	7800	0.14
37: FS-1 OB Lab	Date: n/a	30.6	< 0.1	0.06	8400	1.4	50	0.19	0.16	1100	0.12
38: FS-2 OB Lab	Date: n/a	32.2	< 0.1	0.06	20000	3.7	29	0.26	0.20	1300	0.14
39: FS-3 OB Lab	Date: n/a	19.2	< 0.1	0.36	28000	< 0.5	63	0.28	< 0.09	6600	0.14
40: FS-4 OB Lab	Date: n/a	41.5	0.1	0.03	23000	0.8	29	0.29	0.12	800	0.14
41: FS-5 OB Lab	Date: n/a	24.3	< 0.1	0.06	8700	< 0.5	45	0.16	0.13	750	0.07
42: MP-1 OB Lab	Date: n/a	11.1	< 0.1	0.11	7000	< 0.5	34	0.18	0.36	1500	0.16
43: MP-2 OB Lab	Date: n/a	14.4	< 0.1	0.10	9100	0.7	75	0.17	0.23	1500	0.10
44: MP-3 OB Lab	Date: n/a	19.9	< 0.1	0.06	11000	0.7	37	0.13	0.15	2900	0.10
45: MP-4 OB Lab	20-Sep-11	19.8	< 0.1	0.06	17000	1.1	38	0.38	0.11	1000	0.14
46: MP-6 OB Lab	20-Sep-11	13.7	< 0.1	0.02	28000	< 0.5	99	0.83	< 0.09	5800	0.12
47: MP-7 OB Lab	20-Sep-11	9.8	< 0.1	0.15	5900	0.8	110	0.12	0.20	43000	0.16
48: MP-9 OB Lab	20-Sep-11	10.7	< 0.1	0.05	15000	0.9	64	0.39	0.11	1900	0.05
49: AP	20-Sep-11	3.8	< 0.1	0.04	11000	1.1	40	0.30	0.10	7100	0.09
50: FO	20-Sep-11	0.9	< 0.1	0.03	9500	1.2	74	0.32	< 0.09	10000	0.07
51: PR	20-Sep-11	13.2	< 0.1	0.04	6000	0.8	43	0.27	< 0.09	81000	0.06
52: MG	20-Sep-11	4.9	< 0.1	0.02	8600	0.8	25	0.25	< 0.09	2100	0.07
53: HL	20-Sep-11	56.7	< 0.1	0.04	15000	2.6	94	0.87	0.11	3500	0.81
54: DUP-1	20-Sep-11	28.9	< 0.1	0.21	7400	2.8	94	0.23	0.34	3200	0.50
55: DUP-2	20-Sep-11	15.2	< 0.1	0.03	10000	< 0.5	43	0.19	< 0.09	2500	0.07
56: DUP-3	20-Sep-11	10.1	< 0.1	0.06	14000	2.1	59	0.39	< 0.09	2100	0.05

OnLine LIMS

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

LR Report : **CA10555-SEP11**

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
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Friday, October 28, 2011

Ecometrix
Attn : Michael Bower

6800 Campobello Road
Mississauga, Ontario
L5N 2L8, Canada

Phone: 905-794-2325
Fax:905-794-2338

Date Rec. : 27 September 2011
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Reference: 11-1851

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CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Co µg/g	Cr µg/g	Cu µg/g	Fe µg/g	K µg/g	Li µg/g	Mg µg/g	Mn µg/g	Mo µg/g	Ni µg/g	P µg/g
3: Analysis Approval Date	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11
4: Analysis Approval Time	12:17	12:17	12:17	12:19	12:19	12:17	12:19	12:17	12:18	12:18	12:19
5: RP-1 TS	2.3	26	11	3400	740	< 2	380	110	2.7	11	810
6: RP-2 TS	1.1	140	7.4	10000	600	< 2	430	330	1.2	6.4	510
7: RP-3 TS	3.4	79	10	9500	1300	3	1300	220	1.6	9.7	610
8: RP-4 TS	9.6	69	15	20000	2400	18	5700	610	0.6	21	650
9: RP-5 TS	2.7	41	13	8400	1400	3	1100	110	1.5	10	760
10: FS-2 TS	0.93	48	8.6	5300	830	< 2	480	77	1.1	5.7	580
11: FS-4 TS	0.90	73	5.6	15000	650	< 2	390	60	2.1	4.3	460
12: FS-1 TS	3.3	86	20	15000	770	2	700	47	1.7	9.6	1200
13: SAT 2-5 TS	19	53	14	55000	2200	2	4400	4100	2.3	51	2200
14: SAT 2-3 TS	43	58	40	22000	710	5	2700	4100	1.9	18	1100
15: SAT 1-3 TS	10	47	150	23000	2500	15	6600	2000	1.0	52	1100
16: MP-3	2.6	92	10.0	5100	780	< 2	680	140	0.9	9.3	610
17: MP-6	520	30	49	120000	640	4	3000	26000	3.7	29	1800
18: MP-9	4.5	180	12	11000	1100	3	1000	210	1.3	11	550
19: FS-3 TS	6.8	89	11	35000	570	< 2	1300	240	1.5	15	340
20: FS-5 TS	4.1	57	18	5500	690	< 2	540	60	1.5	15	870
21: SAT 1-2 TS	1.0	50	8.6	4400	1000	< 2	420	110	1.0	5.4	670
22: SAT 2-1 TS	11	88	13	26000	910	< 2	7600	440	1.0	25	820

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Lakefield - Ontario - KOL 2HO
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LR Report : **CA10555-SEP11**

Sample ID	Co µg/g	Cr µg/g	Cu µg/g	Fe µg/g	K µg/g	Li µg/g	Mg µg/g	Mn µg/g	Mo µg/g	Ni µg/g	P µg/g
23: MP-1 TS	43	150	16	95000	560	3	24000	1800	1.7	100	670
24: MP-2 TS	4.3	87	36	6400	880	< 2	720	70	0.9	16	640
25: MP-4 TS	36	360	76	66000	950	16	25000	980	0.6	53	650
26: MP-7 TS	26	26	36	110000	540	3	7100	1700	3.3	3.8	4300
27: RP-1 OB Lab	7.1	140	19	18000	1000	13	4000	190	0.9	19	590
28: RP-2 OB Lab	2.6	49	17	26000	410	8	1500	65	1.7	7.4	460
29: RP-3 OB Lab	15	68	28	34000	2900	34	9200	500	0.4	36	350
30: RP-4 OB Lab	8.7	41	17	22000	2900	24	24000	470	0.2	24	500
31: RP-5 OB Lab	12	50	19	29000	2900	30	15000	670	0.3	27	710
32: SAT 1-3 OB Lab	12	54	31	29000	2900	29	11000	640	0.2	31	530
33: SAT 1-2 OB Lab	8.7	68	15	26000	940	13	5000	280	0.6	22	290
34: SAT 2-1 OB Lab	28	29	20	45000	470	6	16000	1100	0.6	44	1500
35: SAT 2-3 OB Lab	17	43	24	21000	470	10	4500	1200	8.6	18	440
36: SAT 2-5 OB Lab	27	61	27	67000	1400	11	12000	1100	1.4	37	3700
37: FS-1 OB Lab	4.3	220	10	15000	1200	8	2400	150	4.3	11	230
38: FS-2 OB Lab	3.5	210	26	46000	470	9	3400	200	3.2	7.8	320
39: FS-3 OB Lab	21	140	43	61000	550	6	9800	550	2.6	35	1200
40: FS-4 OB Lab	2.2	180	7.1	23000	580	3	1400	75	2.0	6.0	330
41: FS-5 OB Lab	1.9	200	8.4	9500	910	5	1100	58	3.9	6.9	98
42: MP-1 OB Lab	67	460	30	190000	390	6	42000	2400	1.8	160	610
43: MP-2 OB Lab	4.4	210	31	16000	830	4	1600	77	2.7	16	86
44: MP-3 OB Lab	28	200	18	49000	620	5	24000	410	0.9	200	270
45: MP-4 OB Lab	3.1	190	32	18000	730	7	1700	96	3.4	13	330
46: MP-6 OB Lab	120	72	63	130000	510	17	14000	5300	1.4	64	1100
47: MP-7 OB Lab	50	64	77	210000	580	8	20000	3900	4.0	5.1	18000
48: MP-9 OB Lab	7.3	160	13	21000	1400	18	5600	220	0.5	25	320
49: AP	8.1	180	12	21000	1300	13	5600	350	2.8	22	460
50: FO	6.7	160	10.0	20000	1100	12	5700	270	0.6	20	370
51: PR	4.5	130	9.6	12000	1600	10	25000	290	1.5	13	470
52: MG	5.7	190	6.3	17000	980	9	3500	220	0.5	16	390
53: HL	5.7	180	11	25000	1400	12	2900	300	3.9	12	930
54: DUP-1	4.6	180	11	17000	1800	5	1800	230	1.2	12	420
55: DUP-2	12	190	21	21000	1100	11	4700	820	2.8	19	420
56: DUP-3	7.3	150	13	21000	1600	16	5300	170	0.5	27	340

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OnLine LIMS

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CERTIFICATE OF ANALYSIS
Final Report

Sample ID	S µg/g	Pb µg/g	Sb µg/g	Se µg/g	Sn µg/g	Sr µg/g	Ti µg/g	Tl µg/g	U µg/g	V µg/g	Y µg/g	Zn µg/g
3: Analysis Approval Date	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11	27-Oct-11
4: Analysis Approval Time	12:19	12:18	12:18	12:18	12:18	12:18	12:18	12:18	12:18	12:18	12:18	12:18
5: RP-1 TS	1400	66	150	6.2	1.8	23	75	0.07	0.27	9	4.3	34
6: RP-2 TS	560	41	7.5	1.7	1.4	10	270	0.08	0.19	26	0.77	44
7: RP-3 TS	870	51	12	1.2	1.7	24	420	0.10	0.30	27	1.6	53
8: RP-4 TS	710	36	1.1	0.7	1.0	15	660	0.15	0.34	36	2.8	120
9: RP-5 TS	890	85	1.8	1.1	1.9	15	350	0.12	0.35	22	1.4	50
10: FS-2 TS	1300	49	1.1	1.6	1.3	23	89	0.07	0.18	14	0.92	30
11: FS-4 TS	510	36	1.2	1.1	1.0	5.7	420	0.06	0.41	36	1.2	24
12: FS-1 TS	1300	24	1.0	2.0	0.8	10	290	0.08	1.0	18	3.6	24
13: SAT 2-5 TS	530	72	0.9	< 0.7	1.8	34	1600	0.24	0.42	33	4.5	120
14: SAT 2-3 TS	1100	43	< 0.8	1.3	0.9	36	360	0.16	0.58	25	2.8	47
15: SAT 1-3 TS	960	39	< 0.8	1.2	1.2	50	550	0.17	1.7	34	9.0	130
16: MP-3	1300	51	< 0.8	1.3	1.2	23	180	0.10	0.19	25	0.74	38
17: MP-6	1600	46	< 0.8	2.3	0.8	26	390	0.40	1.4	140	6.6	67
18: MP-9	870	40	< 0.8	0.9	1.3	18	460	0.08	0.24	29	0.97	41
19: FS-3 TS	530	40	< 0.8	< 0.7	1.2	27	770	0.06	0.18	230	0.77	27
20: FS-5 TS	980	62	< 0.8	1.3	1.4	18	150	0.10	0.50	12	4.6	50
21: SAT 1-2 TS	1100	53	< 0.8	1.2	1.2	15	120	0.08	0.19	14	0.68	46
22: SAT 2-1 TS	670	53	1.0	1.1	1.1	43	280	0.08	0.66	38	2.3	48

OnLine LIMS

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Sample ID	S µg/g	Pb µg/g	Sb µg/g	Se µg/g	Sn µg/g	Sr µg/g	Ti µg/g	Tl µg/g	U µg/g	V µg/g	Y µg/g	Zn µg/g
23: MP-1 TS	750	50	1.0	< 0.7	1.6	19	2000	0.10	0.21	250	0.82	120
24: MP-2 TS	1300	43	1.0	1.3	1.0	32	180	0.10	0.26	16	1.9	36
25: MP-4 TS	650	15	< 0.8	< 0.7	< 0.5	45	1000	0.03	0.15	180	1.4	130
26: MP-7 TS	690	36	< 0.8	< 0.7	1.1	43	14000	0.03	0.33	360	13	180
27: RP-1 OB Lab	180	5.5	< 0.8	0.8	< 0.5	11	570	0.05	0.48	25	4.0	43
28: RP-2 OB Lab	810	8.7	< 0.8	1.8	< 0.5	4.4	590	0.06	0.59	53	3.6	23
29: RP-3 OB Lab	130	12	< 0.8	< 0.7	0.6	23	1200	0.21	0.64	55	9.4	56
30: RP-4 OB Lab	1600	7.4	< 0.8	< 0.7	< 0.5	63	830	0.17	0.67	33	11	43
31: RP-5 OB Lab	800	10	< 0.8	< 0.7	< 0.5	37	880	0.21	0.73	40	9.8	55
32: SAT 1-3 OB Lab	360	10	< 0.8	< 0.7	< 0.5	27	980	0.19	0.67	44	9.4	55
33: SAT 1-2 OB Lab	120	10	< 0.8	< 0.7	< 0.5	9.0	900	0.07	0.33	71	2.6	36
34: SAT 2-1 OB Lab	210	2.7	< 0.8	< 0.7	< 0.5	34	370	0.02	0.30	50	5.2	50
35: SAT 2-3 OB Lab	120	4.1	< 0.8	< 0.7	< 0.5	13	650	0.05	0.37	93	2.4	26
36: SAT 2-5 OB Lab	210	2.1	< 0.8	< 0.7	< 0.5	34	1900	0.03	0.61	98	11	69
37: FS-1 OB Lab	200	9.4	< 0.8	< 0.7	0.6	13	690	0.08	0.58	39	2.1	20
38: FS-2 OB Lab	640	6.5	< 0.8	0.9	< 0.5	16	600	0.04	0.49	44	4.0	16
39: FS-3 OB Lab	380	3.5	< 0.8	< 0.7	< 0.5	68	690	0.03	0.24	180	3.5	38
40: FS-4 OB Lab	340	6.7	< 0.8	1.4	< 0.5	7.0	520	0.04	0.69	39	2.7	11
41: FS-5 OB Lab	100	6.3	< 0.8	< 0.7	0.5	9.0	500	0.06	0.36	21	1.7	9.4
42: MP-1 OB Lab	210	5.9	< 0.8	< 0.7	0.7	16	5500	0.03	0.25	550	1.1	130
43: MP-2 OB Lab	120	14	< 0.8	< 0.7	0.6	14	1000	0.08	0.29	61	1.5	16
44: MP-3 OB Lab	210	6.9	< 0.8	< 0.7	< 0.5	19	940	0.03	0.23	110	1.4	33
45: MP-4 OB Lab	400	7.5	< 0.8	1.0	< 0.5	10	600	0.05	0.78	36	4.7	19
46: MP-6 OB Lab	270	3.8	< 0.8	0.8	< 0.5	60	2500	0.09	0.58	740	7.1	55
47: MP-7 OB Lab	720	8.7	< 0.8	< 0.7	0.7	91	17000	0.03	0.83	570	61	210
48: MP-9 OB Lab	72	5.9	< 0.8	< 0.7	< 0.5	12	890	0.08	0.44	39	3.8	24
49: AP	180	4.2	< 0.8	< 0.7	< 0.5	19	760	0.07	0.46	30	4.3	35
50: FO	250	3.7	< 0.8	< 0.7	< 0.5	21	710	0.04	0.46	31	5.3	24
51: PR	1400	3.7	< 0.8	< 0.7	< 0.5	50	460	0.08	0.51	16	6.3	21
52: MG	130	2.6	< 0.8	< 0.7	< 0.5	13	540	0.04	0.37	23	3.5	22
53: HL	1600	22	< 0.8	0.9	< 0.5	16	510	0.11	0.95	20	12	90
54: DUP-1	1000	47	< 0.8	< 0.7	1.3	23	560	0.12	0.38	36	1.9	46
55: DUP-2	170	4.5	< 0.8	< 0.7	< 0.5	18	650	0.07	0.48	30	3.0	23
56: DUP-3	110	5.0	< 0.8	< 0.7	< 0.5	10	740	0.07	0.39	34	3.1	24

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LR Report : **CA10555-SEP11**

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December-09-11

Ecometrix
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Phone: 905-794-2325
Fax:905-794-2338

Date Rec. : 02 December 2011
LR Report: **CA10130-DEC11**
Reference: Marathon 11-1851

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % Recovery
% Moisture (wet wt) [%]	05-Dec-11	13:15	---	---	---
Mercury [Õg/g]	08-Dec-11	11:46	< 0.1	95%	100%
Aluminum [Õg/g]	08-Dec-11	11:33	< 1	96%	101%
Arsenic [Õg/g]	09-Dec-11	10:04	< 0.5	101%	100%
Barium [Õg/g]	09-Dec-11	10:04	< 0.01	104%	120%
Beryllium [Õg/g]	09-Dec-11	10:04	< 0.02	98%	100%
Bismuth [Õg/g]	09-Dec-11	10:04	< 0.09	97%	102%
Calcium [Õg/g]	08-Dec-11	11:33	< 1	98%	109%
Cadmium [Õg/g]	09-Dec-11	10:04	< 0.02	107%	106%
Cobalt [Õg/g]	09-Dec-11	10:04	< 0.01	104%	102%
Chromium [Õg/g]	09-Dec-11	10:04	< 0.5	100%	95%
Copper [Õg/g]	09-Dec-11	10:04	< 0.1	100%	100%
Iron [Õg/g]	08-Dec-11	11:33	< 1	98%	100%
Potassium [Õg/g]	08-Dec-11	11:33	< 1	94%	117%
Lithium [Õg/g]	09-Dec-11	10:04	< 2	102%	100%
Magnesium [Õg/g]	08-Dec-11	11:33	< 1	100%	102%
Manganese [Õg/g]	09-Dec-11	10:04	< 0.1	102%	101%
Molybdenum [Õg/g]	09-Dec-11	10:04	< 0.1	101%	98%
Sodium [Õg/g]	08-Dec-11	11:33	< 1	98%	101%

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LR Report : **CA10130-DEC11**

Analysis	3: Analysis Approval Date	4: Analysis Approval Time	5: QC - Blank	6: QC - STD % Recovery	7: QC - DUP % Recovery
Nickel [Õg/g]	09-Dec-11	10:04	< 0.1	101%	100%
Phosphorus [Õg/g]	08-Dec-11	11:33	< 2	97%	103%
Lead [Õg/g]	09-Dec-11	10:04	< 0.05	97%	105%
Antimony [Õg/g]	09-Dec-11	10:04	< 0.8	104%	108%
Selenium [Õg/g]	09-Dec-11	10:04	< 0.7	106%	100%
Tin [Õg/g]	09-Dec-11	10:04	< 0.5	99%	106%
Strontium [Õg/g]	09-Dec-11	10:04	< 0.02	104%	100%
Titanium [Õg/g]	09-Dec-11	10:04	< 0.1	105%	105%
Thallium [Õg/g]	09-Dec-11	10:04	< 0.02	97%	98%
Uranium [Õg/g]	09-Dec-11	10:04	< 0.002	103%	100%
Vanadium [Õg/g]	09-Dec-11	10:04	< 1	100%	100%
Yttrium [Õg/g]	09-Dec-11	10:04	< 0.004	103%	100%
Zinc [Õg/g]	08-Dec-11	11:34	< 0.1	98%	100%

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Project Specialist
Environmental Services, Analytical

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December-09-11

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Date Rec. : 02 December 2011
LR Report: **CA10130-DEC11**
Reference: Marathon 11-1851

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	9: KP11-15	10: KP11-13	11: KP11-05(0-0.3)	12: KP11-05(8.8-9.4)	13: KP11-10	14: KP11-09(0-0.3)	15: KP11-12	16: KP11-14	17: KP11-38(0-0.3)
% Moisture (wet wt) [%]	24.4	29.6	21.1	15.1	28.4	18.3	16.9	9.2	19.3
Mercury [Õg/g]	< 0.1	< 0.1	0.2	< 0.1	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Aluminum [Õg/g]	12000	11000	7400	2700	8400	10000	7100	17000	12000
Arsenic [Õg/g]	1.7	2.2	0.8	< 0.5	2.8	1.2	2.5	1.4	0.7
Barium [Õg/g]	31	29	19	18	35	39	23	25	41
Beryllium [Õg/g]	0.39	0.23	0.17	0.17	0.17	0.30	0.22	0.34	0.32
Bismuth [Õg/g]	< 0.09	0.09	< 0.09	< 0.09	0.16	< 0.09	0.11	< 0.09	< 0.09
Calcium [Õg/g]	990	480	1300	68000	590	2100	350	930	2700
Cadmium [Õg/g]	0.08	0.20	0.08	0.04	0.18	0.17	0.07	0.11	0.14
Cobalt [Õg/g]	2.4	1.3	3.3	3.0	1.7	6.6	3.4	3.5	9.7
Chromium [Õg/g]	40	39	86	35	54	93	50	64	100
Copper [Õg/g]	6.0	4.3	6.0	8.5	8.5	12	6.6	6.9	25
Iron [Õg/g]	38000	39000	12000	7900	35000	17000	38000	37000	23000
Potassium [Õg/g]	670	590	470	620	500	780	740	590	670
Lithium [Õg/g]	7	4	6	5	3	11	6	7	11
Magnesium [Õg/g]	1200	680	1800	20000	790	3400	1200	2000	5300
Manganese [Õg/g]	220	210	150	270	190	210	540	350	410
Molybdenum [Õg/g]	11	1.9	0.5	0.2	2.4	0.7	1.4	1.2	0.7
Sodium [Õg/g]	270	260	290	270	210	320	190	310	390

OnLine LIMS

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LR Report : **CA10130-DEC11**

Analysis	9: KP11-15	10: KP11-13	11: KP11-05(0-0.3)	12: KP11-05(8.8-9.4)	13: KP11-10	14: KP11-09(0-0.3)	15: KP11-12	16: KP11-14	17: KP11-38(0-0.3)
Nickel [Õg/g]	5.8	3.1	9.4	9.1	4.0	26	6.1	8.9	29
Phosphorus [Õg/g]	310	180	390	390	300	530	120	190	580
Lead [Õg/g]	5.9	7.6	3.3	2.0	13	3.6	6.3	5.4	3.0
Antimony [Õg/g]	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Selenium [Õg/g]	0.8	1.7	1.0	0.8	1.1	1.0	0.8	1.8	< 0.7
Tin [Õg/g]	1.1	0.9	< 0.5	< 0.5	0.8	< 0.5	0.6	< 0.5	< 0.5
Strontium [Õg/g]	4.2	3.8	7.8	47	3.8	14	3.3	7.3	16
Titanium [Õg/g]	470	710	590	380	790	540	570	750	820
Thallium [Õg/g]	0.05	0.04	0.04	0.03	0.05	0.05	0.05	0.05	0.05
Uranium [Õg/g]	0.77	0.63	0.34	0.67	0.68	0.46	0.57	0.62	0.52
Vanadium [Õg/g]	22	23	22	14	40	32	27	20	51
Yttrium [Õg/g]	4.7	2.5	3.1	5.9	2.0	3.7	2.8	4.1	5.4
Zinc [Õg/g]	19	15	12	8.8	20	26	19	21	47

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Modified ABA (Price 1997)

Friday, November 18, 2011

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Fax:905-794-2338

Date Rec. : 27 September 2011
LR Report: **CA10556-SEP11**
Reference: 11-1851

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CERTIFICATE OF ANALYSIS
Final Report

Sample ID	Sample Date & Time	Paste pH units	Fizz Rate ---	Sample weight g	HCl added mL	HCl Normality	NaOH Normality	NaOH to pH=8.3 mL	Final pH units
3: Analysis Approval Date		01-Nov-11	01-Nov-11	01-Nov-11	01-Nov-11	01-Nov-11	01-Nov-11	01-Nov-11	01-Nov-11
4: Analysis Approval Time		14:43	14:43	14:43	14:43	14:43	14:43	14:43	14:43
5: RP-1 TS	20-Sep-11	4.65	1	1.98	20.00	0.10	0.10	32.52	1.45
6: RP-2 TS	20-Sep-11	4.30	1	1.97	20.00	0.10	0.10	24.92	1.22
7: RP-3 TS	20-Sep-11	4.55	1	1.99	20.00	0.10	0.10	24.14	1.28
8: RP-4 TS	20-Sep-11	5.22	1	1.97	20.00	0.10	0.10	21.39	1.53
9: RP-5 TS	20-Sep-11	4.22	1	2.00	20.00	0.10	0.10	27.36	1.24
10: FS-2 TS	20-Sep-11	3.80	1	1.96	20.00	0.10	0.10	34.66	1.18
11: FS-4 TS	20-Sep-11	4.22	1	2.00	20.00	0.10	0.10	27.24	1.58
12: FS-1 TS	20-Sep-11	5.56	1	1.98	20.00	0.10	0.10	18.29	1.33
13: SAT 2-5 TS	20-Sep-11	5.54	1	1.96	20.00	0.10	0.10	18.96	1.33
14: SAT 2-3 TS	20-Sep-11	5.31	1	1.99	26.70	0.10	0.10	30.93	1.57
15: SAT 1-3 TS	20-Sep-11	6.08	1	1.96	28.00	0.10	0.10	27.51	1.59
16: MP-3	20-Sep-11	4.15	1	2.05	20.00	0.10	0.10	30.77	1.23
17: MP-6	20-Sep-11	5.08	1	2.03	29.70	0.10	0.10	34.52	1.59
18: MP-9	20-Sep-11	3.95	1	2.00	20.00	0.10	0.10	27.57	1.32
19: RP-1 OB Lab	Date: n/a	4.21	1	2.00	20.00	0.10	0.10	23.92	1.22
20: RP-2 OB Lab	Date: n/a	4.26	1	1.96	20.00	0.10	0.10	32.53	1.43
21: RP-3 OB Lab	Date: n/a	3.83	1	1.96	20.00	0.10	0.10	26.39	1.00

OnLine LIMS

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LR Report : **CA10556-SEP11**

Sample ID	Sample Date & Time	Paste pH units	Fizz Rate ---	Sample weight g	HCl added mL	HCl Normality	NaOH Normality	NaOH to pH=8.3 mL	Final pH units
22: RP-4 OB Lab	Date: n/a	4.21	1	1.99	20.00	0.10	0.10	23.74	1.69
23: RP-5 OB Lab	Date: n/a	4.67	1	2.01	20.00	0.10	0.10	19.92	1.75
24: SAT 1-3 OB Lab	Date: n/a	4.25	1	2.05	20.00	0.10	0.10	34.02	1.42
25: SAT 1-2 OB Lab	Date: n/a	5.18	1	1.99	26.30	0.10	0.10	20.12	1.59
26: SAT 2-1 OB Lab	Date: n/a	3.83	1	2.02	20.00	0.10	0.10	20.18	1.53
27: SAT 2-3 OB Lab	20-Sep-11	5.98	1	2.05	26.10	0.10	0.10	26.97	1.87
28: SAT 2-5 OB Lab	20-Sep-11	5.28	1	2.03	43.30	0.10	0.10	47.80	1.73
29: FS-1 OB Lab	20-Sep-11	5.91	1	1.99	20.00	0.10	0.10	19.46	1.77
30: FS-2 OB Lab	20-Sep-11	8.06	4	2.00	172.50	0.10	0.10	54.43	1.63
31: FS-3 OB Lab	20-Sep-11	7.96	3	1.96	77.90	0.10	0.10	29.75	1.71
32: FS-4 OB Lab	20-Sep-11	8.00	2	1.97	33.50	0.10	0.10	13.96	1.97
33: FS-5 OB Lab	20-Sep-11	5.39	1	2.02	20.00	0.10	0.10	20.65	1.61
34: MP-1 OB Lab	20-Sep-11	5.64	1	1.97	28.70	0.10	0.10	27.14	1.58
35: MP-2 OB Lab	20-Sep-11	5.93	1	2.05	20.00	0.10	0.10	18.24	1.32
36: MP-3 OB Lab	20-Sep-11	6.09	1	2.00	26.20	0.10	0.10	21.69	1.57
37: MP-4 OB Lab	20-Sep-11	5.60	1	1.99	20.00	0.10	0.10	20.36	1.46
38: MP-6 OB Lab	20-Sep-11	5.96	1	2.00	39.90	0.10	0.10	42.03	1.63
39: MP-7 OB Lab	20-Sep-11	5.84	1	1.99	60.50	0.10	0.10	60.11	1.59
40: MP-9 OB Lab	20-Sep-11	5.60	1	2.04	48.10	0.10	0.10	55.08	1.89
41: AP	20-Sep-11	5.73	1	2.04	20.00	0.10	0.10	20.72	1.61
42: FO	20-Sep-11	5.71	1	1.98	27.50	0.10	0.10	22.37	1.73
43: PR	20-Sep-11	5.47	1	1.97	20.00	0.10	0.10	20.80	1.40
44: MG	20-Sep-11	5.63	1	2.03	38.60	0.10	0.10	32.92	1.58
45: HL	20-Sep-11	5.62	1	1.98	35.80	0.10	0.10	38.82	1.61
46: DUP-1	20-Sep-11	6.42	1	1.99	37.50	0.10	0.10	35.59	1.62
47: DUP-2	20-Sep-11	5.06	1	2.01	26.90	0.10	0.10	21.35	1.70
48: DUP-3	20-Sep-11	6.20	1	2.03	20.00	0.10	0.10	19.23	1.78

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LR Report : **CA10556-SEP11**

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Friday, November 18, 2011

Date Rec. : 27 September 2011
LR Report: **CA10556-SEP11**
Reference: 11-1851

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Sample ID	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	Sulphur (total) %	Acid Leachable SO4-S %	Sulphide %	Carbon (total) %	Carbonate %	Total Organic Carbon %
3: Analysis Approval Date	01-Nov-11	13-Nov-11	13-Nov-11	13-Nov-11	13-Nov-11	13-Nov-11	04-Nov-11	17-Nov-11	04-Nov-11	17-Nov-11
4: Analysis Approval Time	14:43	18:24	18:24	18:24	18:22	18:23	11:00	17:39	08:24	17:39
5: RP-1 TS	-31.6	0.31	-31.9	-102	0.069	0.07	< 0.01	37.4	0.045	37.0
6: RP-2 TS	-12.5	1.00	-13.5	-12.5	0.060	0.03	0.03	19.9	0.138	19.0
7: RP-3 TS	-10.4	0.36	-10.8	-28.9	0.010	< 0.01	0.01	10.6	< 0.005	10.3
8: RP-4 TS	-3.5	0.31	-3.8	-11.3	0.053	0.05	< 0.01	11.5	0.170	11.0
9: RP-5 TS	-18.4	0.31	-18.7	-59.4	< 0.005	< 0.01	< 0.01	22.7	0.152	20.7
10: FS-2 TS	-37.4	0.31	-37.7	-121	< 0.005	< 0.01	< 0.01	40.0	0.122	37.8
11: FS-4 TS	-18.1	0.31	-18.4	-58.4	0.030	0.03	< 0.01	14.6	0.129	13.7
12: FS-1 TS	4.3	0.31	4.0	13.9	< 0.005	< 0.01	< 0.01	27.4	0.107	25.3
13: SAT 2-5 TS	2.7	0.31	2.4	8.7	0.032	0.03	< 0.01	8.42	0.140	8.00
14: SAT 2-3 TS	-10.6	0.31	-10.9	-34.2	0.050	0.05	< 0.01	20.3	0.150	19.3
15: SAT 1-3 TS	1.3	0.31	1.0	4.2	0.043	0.04	< 0.01	12.5	0.330	11.8
16: MP-3	-26.3	0.31	-26.6	-84.8	< 0.005	< 0.01	< 0.01	34.6	0.144	33.4
17: MP-6	-11.9	0.31	-12.2	-38.4	0.071	0.07	< 0.01	15.7	0.155	14.2
18: MP-9	-18.9	0.31	-19.2	-61.0	0.101	0.10	< 0.01	25.8	0.169	25.1
19: RP-1 OB Lab	-9.8	0.31	-10.1	-31.6	0.108	0.11	< 0.01	13.9	0.122	13.4
20: RP-2 OB Lab	-32.0	0.31	-32.3	-103	0.056	0.06	< 0.01	31.8	0.055	30.1
21: RP-3 OB Lab	-16.3	0.31	-16.6	-52.6	0.160	0.16	< 0.01	35.8	0.148	34.1

OnLine LIMS

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
Phone: 705-652-2000 FAX: 705-652-6365

Modified ABA (Price 1997)

LR Report : **CA10556-SEP11**

Sample ID	NP t CaCO3/1000 t	AP t CaCO3/1000 t	Net NP t CaCO3/1000 t	NP/AP ratio	Sulphur (total) %	Acid Leachable SO4-S %	Sulphide %	Carbon (total) %	Carbonate %	Total Organic Carbon %
22: RP-4 OB Lab	-9.4	0.31	-9.7	-30.3	0.169	0.17	< 0.01	18.0	0.128	16.7
23: RP-5 OB Lab	0.20	0.31	-0.1	0.6	0.150	0.15	< 0.01	18.5	0.134	17.2
24: SAT 1-3 OB Lab	-34.2	0.31	-34.5	-110	0.173	0.17	< 0.01	35.4	0.159	33.2
25: SAT 1-2 OB Lab	16	0.31	15.2	50.0	0.139	0.14	< 0.01	10.9	0.110	10.6
26: SAT 2-1 OB Lab	-0.5	0.31	-0.8	-1.6	0.146	0.15	< 0.01	17.5	0.139	16.2
27: SAT 2-3 OB Lab	-2.1	0.31	-2.4	-6.8	0.116	0.12	< 0.01	3.11	0.047	2.83
28: SAT 2-5 OB Lab	-11.1	0.31	-11.4	-35.8	0.182	0.18	< 0.01	5.68	0.047	5.24
29: FS-1 OB Lab	1.4	0.31	1.1	4.5	0.117	0.12	< 0.01	1.03	0.041	0.951
30: FS-2 OB Lab	295	0.31	295	952	0.100	0.10	< 0.01	4.05	16.1	0.581
31: FS-3 OB Lab	123	0.31	122	396	0.105	0.11	< 0.01	3.02	6.48	1.37
32: FS-4 OB Lab	50	0.31	49.3	160	0.100	0.10	< 0.01	0.907	2.19	0.327
33: FS-5 OB Lab	-1.6	0.31	-1.9	-5.2	0.110	0.11	< 0.01	2.18	0.047	1.99
34: MP-1 OB Lab	4.0	0.31	3.7	12.9	0.107	0.11	< 0.01	2.71	0.033	2.45
35: MP-2 OB Lab	4.3	0.31	4.0	13.9	0.083	0.08	< 0.01	1.24	0.029	1.13
36: MP-3 OB Lab	11	0.31	11.0	36.5	0.086	0.09	< 0.01	1.11	0.024	0.995
37: MP-4 OB Lab	-0.9	0.31	-1.2	-2.9	0.116	0.12	< 0.01	3.00	0.053	2.88
38: MP-6 OB Lab	-5.3	0.31	-5.6	-17.1	0.170	0.17	< 0.01	4.15	0.049	3.91
39: MP-7 OB Lab	1.0	0.31	0.7	3.2	0.149	0.15	< 0.01	5.66	0.060	5.52
40: MP-9 OB Lab	-17.1	0.31	-17.4	-55.2	0.171	0.17	< 0.01	7.45	0.090	7.50
41: AP	-1.8	0.31	-2.1	-5.8	0.112	0.11	< 0.01	2.19	0.049	1.98
42: FO	13	0.31	12.7	41.9	0.150	0.15	< 0.01	3.45	0.049	3.06
43: PR	-2.0	0.31	-2.3	-6.5	0.135	0.13	< 0.01	2.63	0.066	2.27
44: MG	14	0.31	13.7	45.2	0.115	0.12	< 0.01	3.53	0.056	2.92
45: HL	-7.6	0.31	-7.9	-24.5	0.167	0.17	< 0.01	5.76	0.088	3.38
46: DUP-1	4.8	0.31	4.5	15.5	0.142	0.14	< 0.01	2.54	0.068	1.95
47: DUP-2	14	0.31	13.5	44.5	0.109	0.11	< 0.01	2.87	0.099	2.37
48: DUP-3	1.9	0.31	1.6	6.1	0.089	0.09	< 0.01	0.810	0.045	0.609

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*NP (Neutralization Potential)

$$= \frac{50 \times (N \text{ of HCL} \times \text{Total HCL added} - N \text{ NaOH} \times \text{NaOH added})}{\text{Weight of Sample}}$$

*AP (Acid Potential) = % Sulphide Sulphur x 31.25
*Net NP (Net Neutralization Potential) = NP-AP
NP/AP Ratio = NP/AP
*Results expressed as tonnes CaCO3 equivalent/1000 tonnes of material
Samples with a % Sulphide value of <0.01 will be calculated using a 0.01 value.

Sulphur analysis performed following BC ARD Guidelines (Price 1997)

Brian Graham B.Sc.
Project Specialist
Environmental Services, Analytical

OnLine LIMS

SGS Canada Inc.
P.O. Box 4300 - 185 Concession St.
Lakefield - Ontario - KOL 2HO
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Modified ABA (Price 1997)

December-09-11

Ecometrix
Attn : Michael Bower

6800 Campobello Road
Mississauga, Ontario
L5N 2L8, Canada

Phone: 905-794-2325
Fax:905-794-2338

Date Rec. : 02 December 2011
LR Report: **CA10129-DEC11**
Reference: Marathon 11-1851

Copy: #1

CERTIFICATE OF ANALYSIS
Final Report

Analysis	1: Analysis Start Date	2: Analysis Start Time	3: Analysis Approval Date	4: Analysis Approval Time	5: KP11-15	6: KP11-13	7: KP11-05(0-0.3)	8: KP11-05(8.8-9.4)	9: KP11-10	10: KP11-09(0-0.3)	11: KP11-12	12: KP11-14	13: KP11-38(0-0.3)
Paste pH [units]	06-Dec-11	09:10	09-Dec-11	12:17	5.48	5.11	5.54	8.28	4.61	5.70	5.13	5.91	6.42
Fizz Rate [---]	06-Dec-11	09:10	09-Dec-11	12:17	1	1	1	4	1	1	1	1	1
Sample weight [g]	06-Dec-11	09:10	09-Dec-11	12:17	2.04	2.02	2.02	2.04	2.00	2.02	1.99	2.03	1.99
HCl added [mL]	06-Dec-11	09:10	09-Dec-11	12:17	20.00	20.00	20.00	149.50	20.00	20.00	20.00	35.50	20.00
HCl [Normality]	06-Dec-11	09:10	09-Dec-11	12:17	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH [Normality]	06-Dec-11	09:10	09-Dec-11	12:17	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
NaOH to pH=8.3 [mL]	06-Dec-11	09:10	09-Dec-11	12:17	20.89	23.48	20.37	38.81	24.97	19.21	20.93	37.08	19.13
Final pH [units]	06-Dec-11	09:10	09-Dec-11	12:17	1.52	1.59	1.46	1.66	1.46	1.63	1.24	1.59	1.73
NP [t CaCO3/1000 t]	28-Nov-11	09:15	09-Dec-11	12:17	158	-8.6	-0.9	271	-12.4	2.0	-2.3	-3.9	2.2
AP [t CaCO3/1000 t]	09-Dec-11	14:01	09-Dec-11	14:32	0.57	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Net NP [t CaCO3/1000 t]	09-Dec-11	14:01	09-Dec-11	14:32	157	-8.9	-1.2	271	-12.7	1.7	-2.6	-4.2	1.9
NP/AP [ratio]	09-Dec-11	14:01	09-Dec-11	14:32	278	-27.7	-2.9	875	-40.0	6.5	-7.4	-12.6	7.1
Sulphur (total) [%]	08-Dec-11	13:34	08-Dec-11	14:30	0.015	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Acid Leachable SO4-S [%]	08-Dec-11	14:34	09-Dec-11	13:58	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphide [%]	09-Dec-11	13:54	09-Dec-11	13:58	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon (total) [%]	08-Dec-11	13:34	08-Dec-11	14:30	2.96	4.57	2.14	3.42	7.31	1.94	2.16	2.27	1.19
Carbonate [%]	07-Dec-11	11:44	07-Dec-11	14:21	0.013	0.056	0.018	14.8	0.048	0.273	0.022	0.014	0.028
Total Organic Carbon [%]	07-Dec-11	10:57	08-Dec-11	14:30	3.11	4.47	1.88	< 0.005	7.64	2.05	2.31	2.10	1.02
Weight [g]	---	---	---	---	41.7	33.7	35.1	56.8	27.7	39.9	41.9	57.7	58.3

OnLine LIMS

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Modified ABA (Price 1997)

LR Report : **CA10129-DEC11**

Chris Sullivan, B.Sc., C.Chem
Project Specialist
Environmental Services, Analytical

OnLine LIMS

ECOMETRIX INC
ATTN: Mike Bower
6800 Campobello Road
Mississauga ON L5N 2L8

Date Received: 06-DEC-11
Report Date: 13-DEC-11 13:59 (MT)
Version: FINAL

Client Phone: 905-794-2325

Certificate of Analysis

Lab Work Order #: L1092416

Project P.O. #: NOT SUBMITTED
Job Reference: 11-1851
C of C Numbers: 116307
Legal Site Desc:

Emerson Perez
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1092416-1 WATER 30-NOV-11 FS-2	L1092416-2 WATER 30-NOV-11 RP-4	L1092416-3 WATER 30-NOV-11 SAT1-3	L1092416-4 WATER 30-NOV-11 RP-2	L1092416-5 WATER 30-NOV-11 MP-9
WATER						
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	6.3	2.9	2.8	9.1	6.7
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	1.92	0.0831	0.474	0.353	1.74
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00038	0.00036	0.00022	0.00014	0.00032
	Barium (Ba)-Dissolved (mg/L)	0.0187	0.00825	0.00942	0.0438	0.0250
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000208	0.000017	0.000011	0.000608	0.000026
	Calcium (Ca)-Dissolved (mg/L)	1.18	39.2	29.9	1.49	0.820
	Chromium (Cr)-Dissolved (mg/L)	0.00140	0.00029	0.00086	0.00038	0.00236
	Cobalt (Co)-Dissolved (mg/L)	0.00086	<0.00010	0.00017	0.00375	0.00069
	Copper (Cu)-Dissolved (mg/L)	0.00323	0.00290	0.00294	0.00094	0.00455
	Iron (Fe)-Dissolved (mg/L)	0.745	0.059	0.303	<0.010	0.782
	Lead (Pb)-Dissolved (mg/L)	0.000483	0.000051	0.000361	0.000059	0.000904
	Lithium (Li)-Dissolved (mg/L)	0.00126	<0.00050	0.00058	0.00113	0.00077
	Magnesium (Mg)-Dissolved (mg/L)	0.425	5.29	6.35	0.823	0.445
	Manganese (Mn)-Dissolved (mg/L)	0.0251	0.00160	0.00777	0.179	0.00800
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000040 DLIS
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000828	0.000339	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00299	0.00072	0.00134	0.00272	0.00211
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.68	0.925	0.611	0.842	1.99
	Selenium (Se)-Dissolved (mg/L)	0.00018	0.00014	0.00012	<0.00010	0.00016
	Silicon (Si)-Dissolved (mg/L)	5.33	1.91	2.63	4.88	4.72
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	0.000019	<0.000010	0.000196
	Sodium (Na)-Dissolved (mg/L)	1.16	1.26	1.73	1.04	1.65
	Strontium (Sr)-Dissolved (mg/L)	0.00774	0.0366	0.0441	0.00945	0.00631
	Sulfur (S)-Dissolved (mg/L)	5.05	0.65	<0.50	4.09	0.77
	Thallium (Tl)-Dissolved (mg/L)	0.000148	<0.000010	0.000012	0.000039	0.000018
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.012	<0.010	0.014	<0.010	0.024
	Uranium (U)-Dissolved (mg/L)	0.000045	0.000387	0.000459	<0.000010	0.000049
	Vanadium (V)-Dissolved (mg/L)	0.0011	<0.0010	0.0013	<0.0010	0.0017
	Zinc (Zn)-Dissolved (mg/L)	0.0076	<0.0030	0.0036	0.0180	0.0037

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1092416-6 WATER 30-NOV-11 FS-5	L1092416-7 WATER 30-NOV-11 SAT2-1	L1092416-8 WATER 30-NOV-11 MP-7	L1092416-9 WATER 30-NOV-11 MP-4	L1092416-10 WATER 30-NOV-11 MP-1
WATER						
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	6.9	5.3		10.5	21.1
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.550	1.55	2.82	0.259	2.19
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00020	<0.00010	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00026	0.00056	0.00198	0.00023	0.00042
	Barium (Ba)-Dissolved (mg/L)	0.0230	0.0101	0.141	0.0279	0.0122
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.010	<0.010	0.012	<0.010	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.000170	0.000102	0.000275	0.000374	0.000158
	Calcium (Ca)-Dissolved (mg/L)	1.51	0.673	2.21	2.44	0.917
	Chromium (Cr)-Dissolved (mg/L)	0.00108	0.00050	0.00135	0.00112	0.00119
	Cobalt (Co)-Dissolved (mg/L)	0.00165	0.00163	0.00317	0.00195	0.00462
	Copper (Cu)-Dissolved (mg/L)	0.00177	0.00412	0.0250	0.00194	0.0152
	Iron (Fe)-Dissolved (mg/L)	0.104	0.694	8.13	0.036	2.70
	Lead (Pb)-Dissolved (mg/L)	0.000143	0.000819	0.00285	0.000470	0.00133
	Lithium (Li)-Dissolved (mg/L)	0.00079	0.00062	0.00109	0.00066	0.00066
	Magnesium (Mg)-Dissolved (mg/L)	0.539	0.475	0.651	0.727	1.57
	Manganese (Mn)-Dissolved (mg/L)	0.0194	0.125	0.0396	0.0377	0.0336
	Mercury (Hg)-Dissolved (mg/L)	<0.000020	<0.000040 DLIS	0.000080 DLIS	<0.000020	0.000066 DLIS
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000057	0.000104	<0.000050	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00308	0.00197	0.00238	0.00426	0.0124
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	2.41	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.389	1.76	2.68	2.06	1.24
	Selenium (Se)-Dissolved (mg/L)	<0.00010	0.00080	0.00086	<0.00010	0.00054
	Silicon (Si)-Dissolved (mg/L)	2.64	4.40	6.31	4.91	5.36
	Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000012	0.000038	0.000093	0.000019
	Sodium (Na)-Dissolved (mg/L)	1.13	1.64	2.02	1.54	2.93
	Strontium (Sr)-Dissolved (mg/L)	0.0102	0.00799	0.0209	0.0235	0.00702
	Sulfur (S)-Dissolved (mg/L)	<0.50	1.46	1.84	4.57	1.60
	Thallium (Tl)-Dissolved (mg/L)	0.000031	0.000029	0.000045	0.000041	0.000039
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.010	0.149	<0.010	0.027
	Uranium (U)-Dissolved (mg/L)	0.000012	0.000021	0.000193	<0.000010	0.000093
	Vanadium (V)-Dissolved (mg/L)	<0.0010	0.0011	0.0052	<0.0010	0.0024
	Zinc (Zn)-Dissolved (mg/L)	0.0156	0.0097	0.0535	0.0399	0.0174

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1092416-11	L1092416-12	L1092416-13	L1092416-14	
Description	WATER	WATER	WATER	WATER	
Sampled Date	30-NOV-11	30-NOV-11	30-NOV-11	30-NOV-11	
Sampled Time					
Client ID	KP11-14	KP11-38(0.3-0.6)	KP11-12	DUP1	
Grouping / **Analyte**					
WATER					
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	8.0	7.6	16.9	5.6	
Dissolved Metals					
Aluminum (Al)-Dissolved (mg/L)	0.219	4.01	5.98	0.218	
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	0.00011	<0.00010	
Arsenic (As)-Dissolved (mg/L)	0.00063	0.00040	0.00116	0.00041	
Barium (Ba)-Dissolved (mg/L)	0.0145	0.0142	0.0204	0.00912	
Beryllium (Be)-Dissolved (mg/L)	<0.00010	0.00013	0.00020	<0.00010	
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
Cadmium (Cd)-Dissolved (mg/L)	0.000209	0.000063	0.000333	0.000021	
Calcium (Ca)-Dissolved (mg/L)	0.766	1.36	1.18	38.3	
Chromium (Cr)-Dissolved (mg/L)	0.00033	0.00247	0.00342	0.00060	
Cobalt (Co)-Dissolved (mg/L)	0.00041	0.00132	0.00050	0.00013	
Copper (Cu)-Dissolved (mg/L)	0.00081	0.00592	0.00694	0.00324	
Iron (Fe)-Dissolved (mg/L)	0.045	1.45	6.95	0.193	
Lead (Pb)-Dissolved (mg/L)	0.000221	0.000594	0.00245	0.000249	
Lithium (Li)-Dissolved (mg/L)	0.00096	<0.00050	0.00213	0.00055	
Magnesium (Mg)-Dissolved (mg/L)	0.316	0.247	0.396	5.24	
Manganese (Mn)-Dissolved (mg/L)	0.0366	0.0270	0.0407	0.00546	
Mercury (Hg)-Dissolved (mg/L)	<0.000020	0.000031	0.000127	<0.000020	
Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	<0.000050	0.000118	0.000787	
Nickel (Ni)-Dissolved (mg/L)	0.00093	0.0100	0.0108	0.00091	
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
Potassium (K)-Dissolved (mg/L)	1.46	0.195	1.04	1.14	
Selenium (Se)-Dissolved (mg/L)	0.00027	0.00020	0.00047	0.00011	
Silicon (Si)-Dissolved (mg/L)	4.84	3.22	4.79	2.14	
Silver (Ag)-Dissolved (mg/L)	<0.000010	0.000025	0.000010	0.000014	
Sodium (Na)-Dissolved (mg/L)	0.529	0.963	2.40	1.15	
Strontium (Sr)-Dissolved (mg/L)	0.00385	0.00782	0.00511	0.0355	
Sulfur (S)-Dissolved (mg/L)	2.27	0.69	1.78	0.52	
Thallium (Tl)-Dissolved (mg/L)	0.000097	<0.000010	0.000053	<0.000010	
Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Titanium (Ti)-Dissolved (mg/L)	<0.010	0.027	0.060	0.010	
Uranium (U)-Dissolved (mg/L)	0.000019	0.000117	0.000439	0.000391	
Vanadium (V)-Dissolved (mg/L)	<0.0010	0.0025	0.0043	0.0012	
Zinc (Zn)-Dissolved (mg/L)	0.0082	0.0082	0.0363	<0.0030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Method Blank	Chromium (Cr)-Dissolved	MB-LOR	L1092416-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Iron (Fe)-Dissolved	MB-LOR	L1092416-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Manganese (Mn)-Dissolved	MB-LOR	L1092416-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Molybdenum (Mo)-Dissolved	MB-LOR	L1092416-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9
Method Blank	Nickel (Ni)-Dissolved	MB-LOR	L1092416-1, -10, -11, -12, -13, -14, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLIS	Detection Limit Adjusted: Insufficient Sample
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
HG-DIS-LOW-FF-WT	Water	Mercury (Hg) -Total, Low level	SW846 7470A
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

116307

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1092416 Report Date: 13-DEC-11

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-TB	**Water**							
Batch R2299955								
WG1402890-3 DUP		**L1092234-5**						
Acidity (as CaCO3)		3.4	3.6		mg/L	5.7	20	09-DEC-11
WG1402890-2 LCS								
Acidity (as CaCO3)			103.2		%		85-115	09-DEC-11
WG1402890-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	09-DEC-11
HG-DIS-LOW-FF-WT	**Water**							
Batch R2298130								
WG1400527-5 DUP		**WG1400527-3**						
Mercury (Hg)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	25	07-DEC-11
WG1400527-2 LCS								
Mercury (Hg)-Dissolved			96.0		%		70-130	07-DEC-11
WG1400527-1 MB								
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	07-DEC-11
WG1400527-6 MS		**WG1400527-4**						
Mercury (Hg)-Dissolved			89.9		%		70-130	07-DEC-11
MET-D-CCMS-VA	**Water**							
Batch R2300379								
WG1401836-5 DUP		**L1093108-3**						
Aluminum (Al)-Dissolved		0.0038	0.0037		mg/L	2.5	20	10-DEC-11
Antimony (Sb)-Dissolved		0.00056	0.00055		mg/L	1.2	20	10-DEC-11
Arsenic (As)-Dissolved		0.00095	0.00096		mg/L	1.1	20	10-DEC-11
Barium (Ba)-Dissolved		0.124	0.127		mg/L	2.2	20	10-DEC-11
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	10-DEC-11
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-DEC-11
Boron (B)-Dissolved		0.114	0.115		mg/L	0.54	20	10-DEC-11
Cadmium (Cd)-Dissolved		0.000034	0.000034		mg/L	1.4	20	10-DEC-11
Calcium (Ca)-Dissolved		139	141		mg/L	1.2	20	10-DEC-11
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	10-DEC-11
Cobalt (Co)-Dissolved		0.00435	0.00437		mg/L	0.44	20	10-DEC-11
Copper (Cu)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	10-DEC-11
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	10-DEC-11
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	10-DEC-11
Lithium (Li)-Dissolved		0.0307	0.0310		mg/L	0.84	20	10-DEC-11
Magnesium (Mg)-Dissolved		36.0	36.3		mg/L	0.92	20	10-DEC-11

Quality Control Report

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2300379								
WG1401836-5 DUP		**L1093108-3**						
Manganese (Mn)-Dissolved		0.814	0.820		mg/L	0.76	20	10-DEC-11
Molybdenum (Mo)-Dissolved		0.0112	0.0114		mg/L	1.8	20	10-DEC-11
Nickel (Ni)-Dissolved		0.0112	0.0114		mg/L	1.1	20	10-DEC-11
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	10-DEC-11
Potassium (K)-Dissolved		3.85	3.89		mg/L	1.0	20	10-DEC-11
Selenium (Se)-Dissolved		0.00018	0.00018		mg/L	3.5	20	10-DEC-11
Silicon (Si)-Dissolved		4.06	4.00		mg/L	1.5	20	10-DEC-11
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	10-DEC-11
Sodium (Na)-Dissolved		30.3	30.6		mg/L	1.0	20	10-DEC-11
Strontium (Sr)-Dissolved		0.316	0.318		mg/L	0.62	20	10-DEC-11
Thallium (Tl)-Dissolved		0.000054	0.000054		mg/L	0.11	20	10-DEC-11
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	10-DEC-11
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	10-DEC-11
Uranium (U)-Dissolved		0.00882	0.00878		mg/L	0.51	20	10-DEC-11
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	10-DEC-11
Zinc (Zn)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	10-DEC-11
Batch R2300454								
WG1401836-1 MB								
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	09-DEC-11
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	09-DEC-11
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Bismuth (Bi)-Dissolved			<0.00050		mg/L		0.0005	09-DEC-11
Boron (B)-Dissolved			<0.010		mg/L		0.01	09-DEC-11
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	09-DEC-11
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	09-DEC-11
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	09-DEC-11
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	09-DEC-11
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	09-DEC-11
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	09-DEC-11
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	09-DEC-11

Quality Control Report

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2300454								
WG1401836-1 MB								
Potassium (K)-Dissolved			<0.050		mg/L		0.05	09-DEC-11
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	09-DEC-11
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	09-DEC-11
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	09-DEC-11
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	09-DEC-11
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	09-DEC-11
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	09-DEC-11
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	09-DEC-11
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	09-DEC-11
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	09-DEC-11
Batch R2300457								
WG1401836-7 DUP		**L1093387-3**						
Aluminum (Al)-Dissolved		0.0033	0.0031		mg/L	6.2	20	12-DEC-11
Antimony (Sb)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-DEC-11
Arsenic (As)-Dissolved		0.00010	0.00010		mg/L	0.17	20	12-DEC-11
Barium (Ba)-Dissolved		0.0518	0.0517		mg/L	0.19	20	12-DEC-11
Beryllium (Be)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-DEC-11
Bismuth (Bi)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	12-DEC-11
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	12-DEC-11
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-DEC-11
Calcium (Ca)-Dissolved		40.3	40.3		mg/L	0.082	20	12-DEC-11
Chromium (Cr)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-DEC-11
Cobalt (Co)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-DEC-11
Copper (Cu)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	12-DEC-11
Iron (Fe)-Dissolved		0.030	0.031		mg/L	1.2	20	12-DEC-11
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	12-DEC-11
Lithium (Li)-Dissolved		0.00426	0.00437		mg/L	2.6	20	12-DEC-11
Magnesium (Mg)-Dissolved		10.7	10.8		mg/L	0.58	20	12-DEC-11
Manganese (Mn)-Dissolved		0.00684	0.00691		mg/L	1.1	20	12-DEC-11
Molybdenum (Mo)-Dissolved		0.000712	0.000692		mg/L	2.9	20	12-DEC-11
Nickel (Ni)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	12-DEC-11

Quality Control Report

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2300457								
WG1401836-7 DUP		**L1093387-3**						
Phosphorus (P)-Dissolved		<0.30	<0.30	RPD-NA	mg/L	N/A	20	12-DEC-11
Potassium (K)-Dissolved		0.368	0.373		mg/L	1.3	20	12-DEC-11
Selenium (Se)-Dissolved		0.00025	0.00024		mg/L	4.6	20	12-DEC-11
Silicon (Si)-Dissolved		1.42	1.42		mg/L	0.20	20	12-DEC-11
Silver (Ag)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-DEC-11
Sodium (Na)-Dissolved		1.45	1.45		mg/L	0.23	20	12-DEC-11
Strontium (Sr)-Dissolved		0.120	0.121		mg/L	0.45	20	12-DEC-11
Thallium (Tl)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-DEC-11
Tin (Sn)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-DEC-11
Titanium (Ti)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	12-DEC-11
Uranium (U)-Dissolved		0.000237	0.000241		mg/L	1.7	20	12-DEC-11
Vanadium (V)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-DEC-11
Zinc (Zn)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	12-DEC-11
Batch R2300814								
WG1401836-1 MB								
Chromium (Cr)-Dissolved			0.00081	MB-LOR	mg/L		0.0001	12-DEC-11
Iron (Fe)-Dissolved			0.078	MB-LOR	mg/L		0.01	12-DEC-11
Manganese (Mn)-Dissolved			0.00111	MB-LOR	mg/L		0.00005	12-DEC-11
Molybdenum (Mo)-Dissolved			0.000250	MB-LOR	mg/L		0.00005	12-DEC-11
Nickel (Ni)-Dissolved			0.00069	MB-LOR	mg/L		0.0005	12-DEC-11
S-DIS-ICP-VA	**Water**							
Batch R2300469								
WG1401836-3 DUP		**L1093634-9**						
Sulfur (S)-Dissolved		27.4	27.4		mg/L	0.0	20	09-DEC-11

Quality Control Report

Workorder: L1092416 Report Date: 13-DEC-11

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

116307

C of C # 00000

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested		
5 day (regular)	X	2 day TAT (50%)	
3-4 day (25%)		Next day TAT (100%)	
		Same day TAT (200%)	

COMPANY NAME: ECOMETRIX
OFFICE: MISSISSAUGA
PROJECT MANAGER: MICHAEL BOWER
PROJECT #: 11-1851
PHONE: 905-794-2325 x232
FAX: 905-794-2338
ACCOUNT #:
QUOTATION #: Q32202
PO #:

CRITERIA — Criteria on report YES___ NO___
Reg 153/04 ☐ Reg 511/09 ☐
Table 1 2 3 4 5 6 7 8 9
TCLP _____ MISA _____ PWQO _____
ODWS _____ OTHER _____

REPORT FORMAT/DISTRIBUTION
EMAIL X FAX _____ BOTH _____
SELECT: PDF _____ DIGITAL _____ BOTH X
EMAIL 1 mbower@ecometrix.ca
EMAIL 2 _____

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <----- (F, P, F/P)

SUBMISSION #: L1092416
ENTERED BY: WA
DATE/TIME ENTERED: 6-DEC-11 15:17
BIN #:

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24hr) (hh:mm)	TYPE: COMP	TYPE: GRAB	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P: DISSOLVED METALS (INCL. S) BY ICP-MS	F: ACIDITY	F/P: HEXAVALENT CHROMIUM							COMMENTS	LAB ID
30-11-11				X			FS-2	3	X	X	X								-1
							RP-4	3											-2
							SAT1-3	3											-3
							RP-2	3											-4
							MP-9	3											-5
							FS-5	3											-6
							SAT 2-1	3											-7
							MP-7	2											-8
							MP-4	3		X									-9
							MP-1	3											-10
							KP11-14	3											-11
							KP11-38 (0.3-0.6)	3											-12
							KP11-12	3											-13
							DUP-1	3											-14

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FORWATER SAMPLES (CHECK Yes OR No)

Are any samples taken from a regulated DW System? Yes ☐ No X
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No X

SAMPLE CONDITION

FROZEN	☐	MEAN TEMP
COLD	☐	
COOLING INITIATED	☐	1.5°C
AMBIENT	☐	
OBSERVATIONS Yes ☐ No ☐ If yes add SIF		INIT ~~DLL~~

SAMPLED BY: D. SKRUCH
RELINQUISHED BY:

DATE & TIME	RECEIVED BY:	DATE & TIME
30-11-11		
DATE & TIME	RECEIVED AT LAB BY: WA	DATE & TIME 6-DEC-11 13:30

Notes

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

ECOMETRIX INC
ATTN: Mike Bower
6800 Campobello Road
Mississauga ON L5N 2L8

Date Received: 09-DEC-11
Report Date: 15-DEC-11 13:58 (MT)
Version: FINAL

Client Phone: 905-794-2325

Certificate of Analysis

Lab Work Order #: L1094636

Project P.O. #: NOT SUBMITTED
Job Reference: 11-1851
C of C Numbers: 104392
Legal Site Desc:

Emerson Perez
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1094636-1 WATER 09-DEC-11 RP-2 TS	L1094636-2 WATER 09-DEC-11 RP-4 TS	L1094636-3 WATER 09-DEC-11 SAT 1-3 TS	L1094636-4 WATER 09-DEC-11 FS-2 TS	L1094636-5 WATER 09-DEC-11 MP-9 TS
WATER						
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	56.1	14.6	5.3	77.5	71.2
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	2.28	1.13	0.201	1.24	2.76
	Antimony (Sb)-Dissolved (mg/L)	0.00028	0.00013	<0.00010	0.00018	0.00023
	Arsenic (As)-Dissolved (mg/L)	0.00371	0.00309	0.00032	0.00390	0.00565
	Barium (Ba)-Dissolved (mg/L)	0.0298	0.0285	0.0307	0.0237	0.0416
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.040	0.029	0.025	0.030	0.029
	Cadmium (Cd)-Dissolved (mg/L)	0.000437	0.000139	0.000037	0.000252	0.000356
	Calcium (Ca)-Dissolved (mg/L)	4.28	9.58	29.8	2.94	4.72
	Chromium (Cr)-Dissolved (mg/L)	0.00819	0.00269	0.00046	0.00633	0.0127
	Cobalt (Co)-Dissolved (mg/L)	0.00035	0.00043	0.00010	0.00051	0.00102
	Copper (Cu)-Dissolved (mg/L)	0.0107	0.00659	0.00475	0.0186	0.0143
	Iron (Fe)-Dissolved (mg/L)	1.95	0.803	0.156	0.627	2.37
	Lead (Pb)-Dissolved (mg/L)	0.0142	0.00245	0.000322	0.0141	0.0233
	Lithium (Li)-Dissolved (mg/L)	0.00161	0.00238	<0.00050	0.00109	0.00468
	Magnesium (Mg)-Dissolved (mg/L)	0.760	2.02	16.5	0.765	0.994
	Manganese (Mn)-Dissolved (mg/L)	0.436	0.0395	0.00912	0.0894	0.0943
	Mercury (Hg)-Dissolved (mg/L)	0.000050	0.000024	<0.000020	0.000032	0.000032
	Molybdenum (Mo)-Dissolved (mg/L)	0.000250	0.000136	0.000122	0.000391	0.000475
	Nickel (Ni)-Dissolved (mg/L)	0.00402	0.00272	0.00248	0.00427	0.00564
	Phosphorus (P)-Dissolved (mg/L)	<0.30	1.19	<0.30	5.66	4.28
	Potassium (K)-Dissolved (mg/L)	6.69	10.9	3.01	16.5	14.3
	Selenium (Se)-Dissolved (mg/L)	0.00162	0.00039	0.00017	0.00098	0.00185
	Silicon (Si)-Dissolved (mg/L)	7.18	5.50	6.54	12.2	9.28
	Silver (Ag)-Dissolved (mg/L)	0.000126	0.000072	<0.000010	0.000094	0.000048
	Sodium (Na)-Dissolved (mg/L)	2.77	1.58	1.72	2.62	3.07
	Strontium (Sr)-Dissolved (mg/L)	0.0153	0.0175	0.145	0.0175	0.0239
	Sulfur (S)-Dissolved (mg/L)	3.54	3.67	2.07	7.33	7.59
	Thallium (Tl)-Dissolved (mg/L)	0.000099	0.000042	<0.000010	0.000277	0.000217
	Tin (Sn)-Dissolved (mg/L)	0.00028	<0.00010	<0.00010	0.00018	0.00025
	Titanium (Ti)-Dissolved (mg/L)	0.099	0.036	<0.010	0.012	0.177
	Uranium (U)-Dissolved (mg/L)	0.000087	0.000038	0.000015	0.000072	0.000093
	Vanadium (V)-Dissolved (mg/L)	0.0108	0.0033	<0.0010	0.0112	0.0239
	Zinc (Zn)-Dissolved (mg/L)	0.0667	0.0345	0.0051	0.0347	0.0423

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACIDITY-TB	Water	Acidity (as CaCO3)	APHA 2310 B-POTENTIOMETRIC TITRATION
HG-DIS-LOW-FF-WT	Water	Mercury (Hg) -Total, Low level	SW846 7470A
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030 B&E / EPA SW-846 6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using hotblock, or filtration (APHA 3030B&E). Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

S-DIS-ICP-VA	Water	Dissolved Sulfur in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulphur results for all samples. Sulphide or other volatile forms of sulphur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulphur represents all non-volatile forms of sulphur present in a particular sample.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA
TB	ALS ENVIRONMENTAL - THUNDER BAY, ONTARIO, CANADA
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

104392

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1094636 Report Date: 15-DEC-11

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ACIDITY-TB	**Water**							
Batch R2300798								
WG1403802-3 DUP		**L1092773-1**						
Acidity (as CaCO3)		5.0	5.4		mg/L	7.7	20	13-DEC-11
WG1403802-2 LCS								
Acidity (as CaCO3)			104.4		%		85-115	13-DEC-11
WG1403802-1 MB								
Acidity (as CaCO3)			<2.0		mg/L		2	13-DEC-11
HG-DIS-LOW-FF-WT	**Water**							
Batch R2301482								
WG1404270-4 DUP		**WG1404270-3**						
Mercury (Hg)-Dissolved		<0.000020	<0.000020	RPD-NA	mg/L	N/A	25	14-DEC-11
WG1404270-2 LCS								
Mercury (Hg)-Dissolved			99.5		%		70-130	14-DEC-11
WG1404270-1 MB								
Mercury (Hg)-Dissolved			<0.000020		mg/L		0.00002	14-DEC-11
WG1404270-6 MS		**WG1404270-5**						
Mercury (Hg)-Dissolved			101.0		%		70-130	14-DEC-11
MET-D-CCMS-VA	**Water**							
Batch R2301489								
WG1403998-1 MB								
Aluminum (Al)-Dissolved			<0.0030		mg/L		0.003	13-DEC-11
Antimony (Sb)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Barium (Ba)-Dissolved			<0.000050		mg/L		0.00005	13-DEC-11
Beryllium (Be)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Bismuth (Bi)-Dissolved			<0.00050		mg/L		0.0005	13-DEC-11
Boron (B)-Dissolved			<0.010		mg/L		0.01	13-DEC-11
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	13-DEC-11
Calcium (Ca)-Dissolved			<0.020		mg/L		0.02	13-DEC-11
Chromium (Cr)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Copper (Cu)-Dissolved			<0.00050		mg/L		0.0005	13-DEC-11
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	13-DEC-11
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	13-DEC-11
Lithium (Li)-Dissolved			<0.00050		mg/L		0.0005	13-DEC-11
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	13-DEC-11
Manganese (Mn)-Dissolved			<0.000050		mg/L		0.00005	13-DEC-11

Quality Control Report

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-VA	**Water**							
Batch R2301489								
WG1403998-1 MB								
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	13-DEC-11
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	13-DEC-11
Phosphorus (P)-Dissolved			<0.30		mg/L		0.3	13-DEC-11
Potassium (K)-Dissolved			<0.050		mg/L		0.05	13-DEC-11
Selenium (Se)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Silicon (Si)-Dissolved			<0.050		mg/L		0.05	13-DEC-11
Silver (Ag)-Dissolved			<0.000010		mg/L		0.00001	13-DEC-11
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	13-DEC-11
Strontium (Sr)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Thallium (Tl)-Dissolved			<0.000010		mg/L		0.00001	13-DEC-11
Tin (Sn)-Dissolved			<0.00010		mg/L		0.0001	13-DEC-11
Titanium (Ti)-Dissolved			<0.010		mg/L		0.01	13-DEC-11
Uranium (U)-Dissolved			<0.000010		mg/L		0.00001	13-DEC-11
Vanadium (V)-Dissolved			<0.0010		mg/L		0.001	13-DEC-11
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	13-DEC-11
S-DIS-ICP-VA	**Water**							
Batch R2301376								
WG1403998-1 MB								
Sulfur (S)-Dissolved			<0.50		mg/L		0.5	13-DEC-11

Quality Control Report

Workorder: L1094636 Report Date: 15-DEC-11

Client: ECOMETRIX INC
6800 Campobello Road
Mississauga ON L5N 2L8
Contact: Mike Bower

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

104392

C of C # 00000

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

ALS Environmental

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required

Service requested		2 day TAT (50%)	X
5 day (regular)		Next day TAT (100%)	
3-4 day (25%)		Same day TAT (200%)	

COMPANY NAME: EcoMetrix
OFFICE: Mississauga
PROJECT MANAGER: Michael Bower
PROJECT #: 11-1851
PHONE: 905 794 2325 x232 FAX: 905 794 2338
ACCOUNT #:
QUOTATION #: Q32202 PO #:

CRITERIA — Criteria on report YES___ NO___
Reg 153/04 ☐ Reg 511/09 ☐
Table 1 2 3 4 5 6 7 8 9
TCLP ____ MISA ____ PWQO ____
ODWS ____ OTHER ____

REPORT FORMAT/DISTRIBUTION
EMAIL X FAX ____ BOTH ____
SELECT: PDF ____ DIGITAL ____ BOTH X
EMAIL 1 mbower@ecometrix.ca
EMAIL 2 ____

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <---- (F, P, F/P)

SUBMISSION #: L1094636
ENTERED BY: WA
DATE/TIME ENTERED: 12-DEC-11 14:07
BIN #:

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24hr) (hh:mm)	TYPE: COMP	TYPE: GRAB	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	F/P: Dissolved metals (including 3) by ICP-MS	F: Acidity	F/P: Mercury	COMMENTS	LAB ID
09/12/2011				X			RP-2 TS	3	X	X	X		-1
				X			RP-4 TS	3					-2
				X			SAT 1-3 TS	3					-3
				X			FS-2 TS	3					-4
				X			MP-9 TS	3					-5

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FORWATER SAMPLES (CHECK Yes OR No)

Are any samples taken from a regulated DW System? Yes ☐ No ☒
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ☐ No ☒

SAMPLE CONDITION

FROZEN	☐	MEAN TEMP
COLD	☒	5.1°C
COOLING INITIATED	☐	
AMBIENT	☐	
OBSERVATIONS Yes ☐ No ☒ If yes add SIF		INIT

SAMPLED BY: S. McKee
RELINQUISHED BY:
DATE & TIME: 09/12/2011
DATE & TIME: 09/12/11 16:40
RECEIVED BY:
RECEIVED AT LAB BY:
DATE & TIME
DATE & TIME: 09-DEC-11 16:40

Notes

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

ECOMETRIX INC
ATTN: Mike Bower
6800 CAMPOBELLO ROAD
MISSISSAUGA ON L5N 2L8

Date Received: 11-NOV-11
Report Date: 18-NOV-11 14:50 (MT)
Version: FINAL

Client Phone: 905-794-2325

Certificate of Analysis

Lab Work Order #: L1083937

Project P.O. #: NOT SUBMITTED
Job Reference: 11-1851
C of C Numbers:
Legal Site Desc:

Emerson Perez
Account Manager

ANALYTICAL REPORT

Physical Tests (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-1 / 25-OCT-11 / - / **FS-2 TS**	L1083937-2 / 25-OCT-11 / - / **FS-3 TS**	L1083937-3 / 25-OCT-11 / - / **SAT 1-2 TS**	L1083937-4 / 25-OCT-11 / - / **MP-4 TS**	L1083937-5 / 25-OCT-11 / - / **MP-9 TS**	L1083937-6 / 25-OCT-11 / - / **RP-2 TS**
% Moisture	%	63.3	33.2	42.7	41.7	33.5	38.1

Physical Tests (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-7 / 25-OCT-11 / - / **RP-5 TS**	L1083937-8 / 25-OCT-11 / - / **MG-TS**	L1083937-9 / 25-OCT-11 / - / **FS-5 TS**	L1083937-10 / 25-OCT-11 / - / **MP-6 TS**	L1083937-11 / 25-OCT-11 / - / **RP-3 TS**	L1083937-12 / 25-OCT-11 / - / **FOTS**
% Moisture	%	43.3	5.52	64.3	44.7	41.3	1.28

Physical Tests (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-13 / 25-OCT-11 / - / **RP-4 TS**	L1083937-14 / 25-OCT-11 / - / **SAT 1-3 TS**	L1083937-15 / 25-OCT-11 / - / **FS-1 TS**	L1083937-16 / 25-OCT-11 / - / **SAT 2-3 TS**	L1083937-17 / 25-OCT-11 / - / **SAT 2-1 TS**	L1083937-18 / 25-OCT-11 / - / **MP-1 TS**
% Moisture	%	42.6	45.7	68.5	44.7	24.9	27.4

Physical Tests (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-19 / 25-OCT-11 / - / **RP-1 TS**	L1083937-20 / 25-OCT-11 / - / **PR-TS**	L1083937-21 / 25-OCT-11 / - / **HL-TS**	L1083937-22 / 25-OCT-11 / - / **AP-TS**	L1083937-23 / 25-OCT-11 / - / **MP-3 TS**	L1083937-24 / 25-OCT-11 / - / **FS-4 TS**
% Moisture	%	68.1	13.4	57.5	4.07	43.7	46.8

Physical Tests (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID			
		L1083937-25 / 25-OCT-11 / - / **MP-2 TS**	L1083937-26 / 25-OCT-11 / - / **MP-7 TS**	L1083937-27 / 25-OCT-11 / - / **SAT 2-5 TS**	L1083937-28 / 25-OCT-11 / - / **DUP-1**
% Moisture	%	46.8	24.6	30.0	57.4

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-1 / 25-OCT-11 / - / **FS-2 TS**	L1083937-2 / 25-OCT-11 / - / **FS-3 TS**	L1083937-3 / 25-OCT-11 / - / **SAT 1-2 TS**	L1083937-4 / 25-OCT-11 / - / **MP-4 TS**	L1083937-5 / 25-OCT-11 / - / **MP-9 TS**	L1083937-6 / 25-OCT-11 / - / **RP-2 TS**
Total Nitrogen by LECO	%	1.61	0.619	1.34	1.22	0.950	0.575
Phosphorus, Total	mg/kg	812	472	740	982	553	586

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-7 / 25-OCT-11 / - / **RP-5 TS**	L1083937-8 / 25-OCT-11 / - / **MG-TS**	L1083937-9 / 25-OCT-11 / - / **FS-5 TS**	L1083937-10 / 25-OCT-11 / - / **MP-6 TS**	L1083937-11 / 25-OCT-11 / - / **RP-3 TS**	L1083937-12 / 25-OCT-11 / - / **FOTS**
Total Nitrogen by LECO	%	1.25	0.023	1.69	1.42	0.776	<0.020
Phosphorus, Total	mg/kg	907	327	795	1660	481	222

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-13 / 25-OCT-11 / - / **RP-4 TS**	L1083937-14 / 25-OCT-11 / - / **SAT 1-3 TS**	L1083937-15 / 25-OCT-11 / - / **FS-1 TS**	L1083937-16 / 25-OCT-11 / - / **SAT 2-3 TS**	L1083937-17 / 25-OCT-11 / - / **SAT 2-1 TS**	L1083937-18 / 25-OCT-11 / - / **MP-1 TS**
Total Nitrogen by LECO	%	0.788	0.938	1.47	1.34	0.818	0.960
Phosphorus, Total	mg/kg	494	1250	1770	1420	72	802

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID	L1083937-19 25-OCT-11 - RP-1 TS	L1083937-20 25-OCT-11 - PR-TS	L1083937-21 25-OCT-11 - HL-TS	L1083937-22 25-OCT-11 - AP-TS	L1083937-23 25-OCT-11 - MP-3 TS	L1083937-24 25-OCT-11 - FS-4 TS
Total Nitrogen by LECO	%		1.75	0.053	0.516	<0.020	1.86	0.667
Phosphorus, Total	mg/kg		1030	366	963	384	584	682

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Anions and Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID			
		L1083937-25 / 25-OCT-11 / - / **MP-2 TS**	L1083937-26 / 25-OCT-11 / - / **MP-7 TS**	L1083937-27 / 25-OCT-11 / - / **SAT 2-5 TS**	L1083937-28 / 25-OCT-11 / - / **DUP-1**
Total Nitrogen by LECO	%	1.49	0.438	0.329	0.559
Phosphorus, Total	mg/kg	746	897	959	840

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

ANALYTICAL REPORT

Plant Available Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-1 / 25-OCT-11 / - / **FS-2 TS**	L1083937-2 / 25-OCT-11 / - / **FS-3 TS**	L1083937-3 / 25-OCT-11 / - / **SAT 1-2 TS**	L1083937-4 / 25-OCT-11 / - / **MP-4 TS**	L1083937-5 / 25-OCT-11 / - / **MP-9 TS**	L1083937-6 / 25-OCT-11 / - / **RP-2 TS**
Cation Exchange Capacity	meq/100g	90.9 NSSM	35.5 NSSM	69.3 NSSM	79.2 NSSM	55.3 NSSM	41.0 NSSM

Plant Available Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-7 / 25-OCT-11 / - / **RP-5 TS**	L1083937-8 / 25-OCT-11 / - / **MG-TS**	L1083937-9 / 25-OCT-11 / - / **FS-5 TS**	L1083937-10 / 25-OCT-11 / - / **MP-6 TS**	L1083937-11 / 25-OCT-11 / - / **RP-3 TS**	L1083937-12 / 25-OCT-11 / - / **FOTS**
Cation Exchange Capacity	meq/100g	58.0 NSSM	3.05	85.4 NSSM	71.3 NSSM	42.2 NSSM	1.67

Plant Available Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-13 / 25-OCT-11 / - / **RP-4 TS**	L1083937-14 / 25-OCT-11 / - / **SAT 1-3 TS**	L1083937-15 / 25-OCT-11 / - / **FS-1 TS**	L1083937-16 / 25-OCT-11 / - / **SAT 2-3 TS**	L1083937-17 / 25-OCT-11 / - / **SAT 2-1 TS**	L1083937-18 / 25-OCT-11 / - / **MP-1 TS**
Cation Exchange Capacity	meq/100g	57.4 NSSM	56.0 NSSM	67.7 NSSM	61.8 NSSM	44.3 NSSM	38.5 NSSM

Plant Available Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID					
		L1083937-19 / 25-OCT-11 / - / **RP-1 TS**	L1083937-20 / 25-OCT-11 / - / **PR-TS**	L1083937-21 / 25-OCT-11 / - / **HL-TS**	L1083937-22 / 25-OCT-11 / - / **AP-TS**	L1083937-23 / 25-OCT-11 / - / **MP-3 TS**	L1083937-24 / 25-OCT-11 / - / **FS-4 TS**
Cation Exchange Capacity	meq/100g	96.4 NSSM	4.53 NSSM	36.9 NSSM	3.66	87.7 NSSM	39.4 NSSM

Plant Available Nutrients (SOIL)

Analyte	Unit	ALS ID / Sampled Date / Sampled Time / Sample ID			
		L1083937-25 / 25-OCT-11 / - / **MP-2 TS**	L1083937-26 / 25-OCT-11 / - / **MP-7 TS**	L1083937-27 / 25-OCT-11 / - / **SAT 2-5 TS**	L1083937-28 / 25-OCT-11 / - / **DUP-1**
Cation Exchange Capacity	meq/100g	80.9 NSSM	30.1 NSSM	16.0 NSSM	33.5 NSSM

* Please refer to the Reference Information section for an explanation of any qualifiers noted.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
NSSM	Non-standard sample matrix. Modified methods were used for sample processing and analysis.

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference**
CEC-SK	Soil	Cation Exchange Capacity (NH4OAC Extn)	CSSS(1978) 3.321/Comm Soil Sci 17(7)

Cation Exchange Capacity
This method involves saturation of the soil cation exchange sites with ammonium. Excess ammonium is removed from the soil with alcohol. Ammonium on the cation exchange site is then removed by leaching with NaCl and determined by autoanalyzer. This value is used to estimate CEC.

Reference: M.R. Carter (ed.). Soil Sampling and Methods of Analysis. Canadian Society of Soil Science. Lewis Publishers Ann Arbor, MI, method 19.4

MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
N-TOT-LECO-SK	Soil	Total Nitrogen by combustion method	SSSA (1996) p. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 C in the presence of oxygen.
Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen.
This mixture of N2, CO2, and H2O is then passed through an absorber column containing magnesium perchlorate to remove water. N2 and CO2 gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference: Bremner, J.M. 1996. Nitrogen - Total (Dumas Methods). P. 1088 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

P-TOTAL-WT	Soil	Phosphorous, Total	APHA 4500-P B E

A homogenized soil sample is digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

**ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
SK	ALS ENVIRONMENTAL - SASKATOON, SASKATCHEWAN, CANADA

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Mineral Division - ALS Chemex

Sample Submittal Form _____

Company EcoMetrix Incorporated
Submitted _____ Telephone (905)794-2325
Project 11-1851 Date October 25, 2011
Order _____ Quote Q31404
Courier _____ Waybill _____

Internal Use Only

Date WAI 4-NOV-11 15:13
Client _____
Workorder L1083937

Sample Type: Rock ___ Sediment___ Drill Core ___ Soil_X_ Percussion___ Ore___ Other _____ (Rush = 2 x List Price)

Samples		Quantity	Elements or Method	Rush	Range (x)	
Start No.	Finish No.			(√)	Trace	Ore
MP-2 TS	-25	1	All samples receive: CEC-SK, MOISTURE-WT, N-TOT-LECO-SK, P-TOTAL-WT, PREP-DRY/GRIND-SK			
MP-7 TS	-26	1				
SAT 2-5 TS	-27	1				
Dup-1	-28	1				
	Total:	4				

Special Instructions: _____

Results to: Michael Bower X Certificate
Address: 6800 Campobello Rd. __ Webtrieve
Mississauga, ON L5N 4L8
Email: mbower@ecometrix.ca __ Email
Fax: _____ __ Fax

Copy to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Invoice to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Pulp and Reject

Pulps	Rejects
__ Return after analysis	__ Return after analysis
__ Return after 90 days	X Return after 45 days
X Discard after 90 days	Discard after 45 days
__ Paid storage after 90 days	__ Paid storage after 45 days

Return Address:
_____
_____
_____
Attention: _____
Refer to Pulp and Reject Policy in Service Schedule

Authorized by:

Name: Sean McKee
(Please Print)
Signature: _____

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Mineral Division - ALS Chemex

Sample Submittal Form

Company EcoMetrix Incorporated
Submitted _____ Telephone (905)794-2325
Project 11-1851 Date October 25, 2011
Order _____ Quote Q31404
Courier _____ Waybill _____

Internal Use Only

Date WA | 11-NOV-11 15:13
Client _____
Workorder L1083937

Sample Type: Rock ___ Sediment___ Drill Core ___ Soil_x__ Percussion___ Ore___ Other _____ (Rush = 2 x List Price)

Samples		Quantity	Elements or Method	Rush	Range (x)	
Start No.	Finish No.			(√)	Trace	Ore
SAT 2-1 TS ✓	-17	1	All samples receive: CEC-SK, MOISTURE-WT, N-TOT-LECO-SK, P-TOTAL-WT, PREP-DRY/GRIND-SK			
MP-1 TS ✓	-18	1				
RP-1 TS ✓	-19	1				
PR-TS	-20	1				
HL-TS	-21	1				
AP-TS	-22	1				
X MP-3 TS	Priority CEC / N LECO	1 -23				
FS-4 TS ✓	-24	1				
	Total:					

Special Instructions: _____

Results to: Michael Bower _____ X Certificate
Address: 6800 Campobello Rd. __ Webtrieve
Mississauga, ON L5N 4L8
Email: mbower@ecometrix.ca _X_ Email
Fax: _____ __ Fax

Copy to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Invoice to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Pulp and Reject

Pulps	Rejects
__ Return after analysis	__ Return after analysis
__ Return after 90 days	X Return after 45 days
X Discard after 90 days	Discard after 45 days
__ Paid storage after 90 days	__ Paid storage after 45 days

Return Address:
_____
_____
_____
Attention: _____
Refer to Pulp and Reject Policy in Service Schedule

Authorized by:

Name: Sean McKee
(Please Print)
Signature: _____

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Courier _____ Waybill _____

Internal Use Only

Date WA / 11-Nov-11 15:13
Client _____
Workorder L1083937

Sample Type: Rock ___ Sediment___ Drill Core ___ Soil_x_ Percussion___ Ore___ Other _____ (Rush = 2 x List Price)

Samples		Quantity	Elements or Method	Rush	Range (x)	
Start No.	Finish No.			(√)	Trace	Ore
FS-5 TS ✓	-9	1	All samples receive: CEC-SK, MOISTURE-WT, N-TOT-LECO-SK, P-TOTAL-WT, PREP-DRY/GRIND-SK			
MP-6 TS ✓	-10	1				
RP-3 TS ✓	-11	1				
FO-TS	-12	1				
RP-4 TS ✓	-13	1				
SAT 1-3 TS ✓	-14	1				
FS-1 TS ✓	-15	1				
SAT 2-3 TS ✓	-16	1				
	Total:	8				

Special Instructions: _____

Results to: Michael Bower _____ X Certificate
Address: 6800 Campobello Rd. __ Webtrieve
Mississauga, ON L5N 4L8
Email: mbower@ecometrix.ca __ Email
Fax: _____ __ Fax

Copy to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Invoice to: _____ __ Certificate
Address: _____ __ Webtrieve
_____
Email: _____ __ Email
Fax: _____ __ Fax

Pulp and Reject

Pulps	Rejects
__ Return after analysis	__ Return after analysis
__ Return after 90 days	X Return after 45 days
X Discard after 90 days	~~__~~ Discard after 45 days
__ Paid storage after 90 days	__ Paid storage after 45 days

Return Address:
_____
_____
_____
Attention: _____

Refer to Pulp and Reject Policy in Service Schedule

Authorized by:

Name: Sean McKee
(Please Print)
Signature: _____

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Mineral Division - ALS Chemex

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Submitted _____ Telephone (905)794-2325
Project 11-1851 Date October 25, 2011
Order _____ Quote Q31404
Courier _____ Waybill _____

Internal Use Only
WA
Date 11-NOV-11 15:13
Client _____
Workorder L1083937

Sample Type: Rock ___ Sediment___ Drill Core ___ Soil_x__ Percussion___ Ore___ Other _____ (Rush = 2 x List Price)

Samples		Quantity	Elements or Method	Rush	Range (x)	
Start No.	Finish No.			(√)	Trace	Ore
FS-2 TS	-1	1	All samples receive: CEC-SK, MOISTURE-WT, N-TOT-LECO-SK, P-TOTAL-WT, PREP-DRY/GRIND-SK			
FS-3 TS	-2	1				
SAT 1-2 TS	-3	1				
MP-4 TS	-4	1				
MP-9 TS	-5	1				
RP-2 TS	-6	1				
RP-5 TS	-7	1				
MG-TS	-8	1				
	Total:	8				

Special Instructions: _____

Results to: Micahel Bower — X Certificate
Address: 6800 Campobello Rd. — __ Webtrieve
Mississauga, ON L5N 4L8
Email: mbower@ecometrix.ca — _x Email
Fax: _____ — __ Fax

Copy to: _____ — __ Certificate
Address: _____ — __ Webtrieve
Email: _____ — __ Email
Fax: _____ — __ Fax

Invoice to: _____ — __ Certificate
Address: _____ — __ Webtrieve
Email: _____ — __ Email
Fax: _____ — __ Fax

Pulp and Reject

Pulps	Rejects
__ Return after analysis	__ Return after analysis
__ Return after 90 days	X Return after 45 days
X Discard after 90 days	~~__~~ Discard after 45 days
__ Paid storage after 90 days	__ Paid storage after 45 days

Return Address:
_____
_____
_____
Attention: _____
Refer to Pulp and Reject Policy in Service Schedule

Authorized by:
Name: Sean McKee
(Please Print)
Signature: _____

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APPENDIX E

TEST PIT AND BOREHOLE RECORDS

TABLE E1 - Physical Description of Boreholes (Source: Golder, 2008)

Hole ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
BH07-2	0.58	0	0.15	1.1	TOPSOIL	black, silty TOPSOIL
-		0.15	0.58	-	SILT	moist, brown, SILT, trace clay and sand
BH07-3	2.9	0	0.27	1.9	TOPSOIL	black, silty TOPSOIL
-		0.27	1.37	-	SILTY CLAY	moist, stiff, brown, SILTY CLAY, some sand
-		1.37	2.9	-	SANDY SILT - SILT	moist-wet, compact-dense, brown-grey, SANDY SILT to SILT, some sand, trace clay and gravel, sand interlayers
BH07-4	13.25	0	0.15	2.2	TOPSOIL	black, silty TOPSOIL
-		0.15	1.83	-	SILTY CLAY	soft-firm, brown, SILTY CLAY, some sand, silty-sand interlayers
-		1.83	2.9	-	SANDY SILT - SILT	very loose, brown, SANDY SILT to SILT, trace clay, trace topsoil
-		2.9	6.71	-	SILTY SAND - SAND	wet, very loose-compact, brown, SILTY SAND to SAND, some silt, trace clay
-		6.71	11.6	-	SANDY SILT - SILT	wet, very loose-compact, grey, SANDY SILT to SILT
-		11.6	13.25	-	SILTY CLAY	moist-wet, very stiff, grey, SILTY CLAY, sand layers
BH08-1	6.57	0	0.3	0 (seepage)	TOPSOIL	wet, black, TOPSOIL, contains peat
-		0.3	5.48	-	SILT	loose-compact, wet, grey, SILT, trace-some clay, trace sand
-		5.48	5.82	-	SAND	loose, wet, brown, SAND, some gravel
-		5.82	6.09	-	COBBLE/BOULDER	dark grey, gabbro COBBLE/BOULDER
-		6.09	6.57	-	SAND - GRAVEL	very dense, wet, brown, SAND and GRAVEL, contains cobbles and/or boulders
BH08-2	2.95	0	2.6	0	PEAT	very soft, wet, black to dark brown, PEAT, contains wood fragments
-		2.6	2.95	-	O-SILT	very loose, wet, grey, organic SILT, trace to some clay and sand
BH08-3	4.88	0	0.09	0 (seepage)	TOPSOIL	moist, brown/black TOPSOIL, contains peat and roots
-		0.09	0.73	-	COBBLE/BOULDER	red and black syenite COBBLE/BOULDER
-		0.73	1.04	-	O-SILT	loose, moist, black, organic silt, some sand and gravel
-		1.04	1.49	-	COBBLE/BOULDER	dark grey, gabbro COBBLE/BOULDER
-		1.49	1.74	-	PEAT	very soft, dark brown, PEAT, contains silt and wood fragments
-		1.74	2.13	-	COBBLE/BOULDER	dark grey, gabbro COBBLE/BOULDER
-		2.13	2.74	-	SAND - GRAVEL	compact, wet, brown, SAND and GRAVEL
-		2.74	3.02	-	COBBLE/BOULDER	dark grey, gabbro COBBLE/BOULDER
-		3.02	3.72	-	SAND - GRAVEL	compact, wet, grey, SAND and GRAVEL
-		3.72	4.88	-	SAND	loose to compact, wet, grey, SAND, some gravel
BH08-4	1.62	0	0.3	0.8	PEAT/VEG	misture of PEAT and VEGETATION, including mos and roots
-		0.3	1.62	-	PEAT	very soft, wet, dark brown, PEAT
BH08-5	1.55	0	0.24	3.3 (seepage)	TOPSOIL	moist, black, silty TOPSOIL
-		0.24	1.55	-	SILTY SAND	compact, moist, brown to grey, SILTY SAND, contains sandy silt and silty clay interlayers
BH08-6	0.03	0	0.03	0 (dry)	VEGETATION	VEGETATION including moss
BH08-7	0.64	0	0.15	0(dry)	TOPSOIL	moist, black, silty TOPSOIL
-		0.15	0.64	-	SILTY SAND	moist, brown, Silty SAND, some gravel; contains cobbles, and/or boulders, trace topsoil/rootlets

Hole ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
BH08-8	0.64	0	0.27	0.5 (seepage)	TOPSOIL	moist, black, silty TOPSOIL
-		0.27	0.64	-	SILT - SAND	wet, brown, SILT and SAND, some gravel, trace clay; contains cobbles and/or boulders
BH08-9	0.61	0	0.21	0.8 (seepage)	TOPSOIL	moist, black, silty TOPSOIL
-		0.21	0.61	-	SILTY SAND	wet, darkk brown, Silty SAND, some gravel, trace clay, topsoil, and organic matter
BH08-10	0.03	0	0.03	0 (dry)	TOPSOIL	moist, black, silty TOPSOIL
BH08-11	0.15	0	0.15	0.6 (seepage)	TOPSOIL	moist, black, silty TOPSOIL

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-2

SHEET 1 OF 2

LOCATION: N 5403117.0 ;E 550185.0

BORING DATE: April 3, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		350.00							
	Rotary Stem Augers	Black, silty TOPSOIL		0.00							
	Rotary Stem Augers	Moist, brown, SILT, trace clay and sand		0.15	1	A.S					Hole Plug
	Rotary Stem Augers	Auger Refusal		349.42 0.58							
1	108mm I.D. Hollow	Black and white to greenish/grey GABBRO BEDROCK									
	108mm I.D. Hollow	Syenite band at 4.2 m depth. Coarse grained from 3.8 m to 4.4 m depth									Bentonite
2	108mm I.D. Hollow	Cored from 0.6 m to 4.6 m									
	108mm I.D. Hollow	For Bedrock Coring details refer to Record of Drillhole BH07-2									
3	Rotary NQ Coring										Screen
4	Rotary NQ Coring			345.37							
		End of Borehole		4.63							
5		Notes:									
		1. Water level measured in piezometer at 1.1 m depth approximately 0.5 hours after installation.									
6		2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: BH07-2

SHEET 2 OF 2

LOCATION: N 5403117.0 ;E 550185.0

DRILLING DATE: April 3, 2007

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75 Track Mounted

DRILLING CONTRACTOR: Marathon

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		349.42																	
1	Rotary NQ Coring	Black and White to greenish/grey slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		0.58	1									,SH,IR,Ro ,JN,PL,Ro							
														,JN,PL,Ro							10.0 MPa Axial Point Load Index = 10.9 MPa
2					2									,JN,PL,Ro ,JN,PL,Ro-SM							Bentonite
														,JN,PL,SM ,JN,PL,Ro							
3														,JN,PL,Ro							Screen
					3									,BR,IR,Ro ,Oxidized,, ,JN,PL,Ro							
4		Syenite band at 4.2 m depth. Coarse grained from 3.8 m to 4.4 m depth.		345.37										,JN,IR,Ro-SM ,JN,IR,Ro							
		END OF DRILLHOLE		4.63																	
5																					
6																					
7																					
8																					
9																					
10																					

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-3

SHEET 1 OF 2

LOCATION: N 5402391.0 ;E 550383.0

BORING DATE: March 22, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl, 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		305.00							
	Rotary (108mm I.D. Hollow Stem Augers)	Black, silty TOPSOIL		0.00 / 304.73							
		Moist, stiff, brown, SILTY CLAY, some sand		0.27 / 303.63	1	50 DO	10				Bentonite
1		Moist to wet, compact to dense, brown to grey, Sandy SILT to SILT, some sand, trace clay and gravel, contains sand interlayers		1.37	2	50 DO	20				
2											Sand
					3	50 DO	38			SH	
				302.10	4	50 DO	50/ .03				Screen Bentonite
3	Rotary (NQ Coring)	Auger Refusal Black and white and/or pink SYENITE and GABBRO BEDROCK Cored from 2.9 m to 9.4 m For Bedrock Coring details refer to Record of Drillhole BH07-3									
4											
5											
6											Bentonite
7											
8											
9				295.64							
		End of Borehole Notes: 1. Water level measured in piezometer		9.36							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-3

SHEET 2 OF 2

LOCATION: N 5402391.0 ;E 550383.0

BORING DATE: March 22, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10		at 1.9 m depth approximately 2 hours after installation. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: BH07-3

SHEET 2 OF 2

LOCATION: N 5402391.0 ;E 550383.0

DRILLING DATE: March 22, 2007

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75 Track Mounted

DRILLING CONTRACTOR: Marathon

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -'Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		302.10																		
3	Rotary NQ Coring	Black, White and pink, slightly weathered to fresh medium to coarse grained SYENITE BEDROCK		2.90	1										,JN,PL,SM ,JN,PL,SM							Bentonite
4					2										,JN,PL,Ro ,JN,IR,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM ,Oxidized,,							10.8 MPa Axial Point Load Index = 10.6 MPa
5					3										,JN,PL-IR,SM ,JN,PL,SM ,JN,PL,Ro ,BR,, ,JN,PL,Ro-SM ,JN,PL,Ro ,JN,PL,Ro							
6				298.69											,FR,IR,Ro ,FR,IR,Ro							Bentonite
		Black and White to greenish/grey slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		6.31											,JN,PL,Ro ,BR,, ,JN,PL,Ro ,FR,PL,Ro							
7					4										,JN,PL,Ro-SM ,JN,PL,Ro							
8					5										,FR,IR,Ro ,JN,PL,SM ,FR,IR,Ro							
9															,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,FR,PL,Ro ,FR,PL,Ro							
				295.64																		
		END OF DRILLHOLE		9.36											,JN,PL,Ro							
10																						
11																						
12																						

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-4

SHEET 1 OF 3

LOCATION: N 5401838.0 ;E 549966.0

BORING DATE: March 23, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		271.00							
		Black, silty TOPSOIL		0.00							
		Soft to firm, brown, SILTY CLAY, some sand, contains silty sand interlayers.		0.15							
1	Rotary 108mm I.D. Hollow Stem Augers				1	50 DO	5				
					2A	50 DO	3				
				269.17							
		Very loose, brown, sandy SILT to SILT, trace to some clay, trace topsoil		1.83	2B						
2					3	50 DO	3			SH	
				268.10							
		Wet, very loose to compact, brown, Silty SAND to SAND,some silt, trace clay		2.90	4	50 DO	8				
3											
4					5	50 DO	4				
					6	50 DO	7			SH	
5											
					7	50 DO	1				
6											
					8	50 DO	16				
				264.29							
		Wet, very loose to compact, grey, Sandy SILT to SILT		6.71							
7					9	50 DO	9				
					10	50 DO	5				
8											
9											
					11	50 DO	12			SH	
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-4

SHEET 2 OF 3

LOCATION: N 5401838.0 ;E 549966.0

BORING DATE: March 23, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Rotary, 108mm I.D. Hollow Stem Augers	Wet, very loose to compact, grey, Sandy SILT to SILT									
					12	50 DO	2				
11				259.42							
		Moist to wet, very stiff, grey, SILTY CLAY, contains sand layers									
12											
					13	50 DO	19				
13				257.75							
		Bedrock Fragments		13.25	14	50 DO	50/.08				
	Rotary, NQ Coring	Auger Refusal		13.41							
14		Black and white GABBRO BEDROCK									
		Cored from 13.4 m to 19.5 m									
		For Bedrock Coring details refer to Record of Drillhole BH07-4									
15											
16											
17											
18											
19				251.44							
		End of Borehole		19.56							
		Notes:									
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: BH07-4

SHEET 3 OF 3

LOCATION: N 5401838.0 ;E 549966.0

BORING DATE: March 23, 2007

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
20		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		1. Water level in Shallow piezometer at 2.2 m depth and in Deep piezometer at 2.3 m depth approximately 0.5 hr after installation.End of Borehole. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: BH07-4

SHEET 3 OF 3

LOCATION: N 5401838.0 ;E 549966.0

DRILLING DATE: March 23, 2007

DATUM: Geodetic

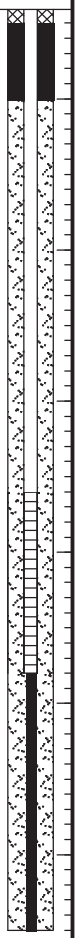
INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75 Track Mounted

DRILLING CONTRACTOR: Marathon

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		257.59																		
14	Rotary NQ Coring	Black and White to greenish/grey slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		13.41	1										,FR,IR,Ro ,JN,PL,SM ,FR,PL,Ro ,JN,PL,SM ,JN,PL,SM					6.6 MPa Axial Point Load Index = 9.1 MPa		
15					2										,FO,PL,SM ,FR,PL,Ro ,JN,PL,SM ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro							
16															,JN,PL,Ro							
17					3										,JN,PL,Ro ,JN,PL,SM ,FR,PL,Ro ,JN,IR,Ro							
18															,FR,PL-IR,Ro-SM ,JN,PL,Ro-SM ,JN,PL,Ro							
19					4										,JN,PL,Ro ,JN,PL-IR,Ro							
				251.44											,JN,PL,Ro							
20		END OF DRILLHOLE		19.56																		
21																						
22																						
23																						



MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-1

SHEET 1 OF 5

LOCATION: N 5402648.0 ;E 547515.0

BORING DATE: March 23, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W WI) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		299.93							
0	Rotary Power Auger 108 mm I.D. Hollow Stem Augers	Wet, black, TOPSOIL. Contains peat		0.00 / 299.63							
		Loose to compact, wet, grey, SILT, trace to some clay, trace sand		0.30	1	50 DO	13				
1					2	50 DO	8				
2					3	50 DO	9			MH	
3					4	50 DO	10				
					5	50 DO	9			NP	
4					6	50 DO	9				
5					7A	50 DO	8				
		Loose, wet, brown, SAND, some gravel		294.45 / 5.48	7B						
		Dark grey, Gabbro COBBLE/BOULDER		294.11 / 5.82							
6		Very dense, wet, brown, SAND and GRAVEL. Contains cobbles and/or boulders		293.84 / 6.09	8	50 DO					
	Rotary NQ Rock Core	AUGER REFUSAL Black and pink SYENITE BEDROCK Cored from 6.6 m to 22.3 m. For Bedrock Coring details refer to Record of Drillhole BH08-1.		293.36 / 6.57							Hole Plug Sand Screen
7											
8											
9											
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-1

SHEET 2 OF 5

LOCATION: N 5402648.0 ;E 547515.0

BORING DATE: March 23, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
10	Rotary NQ Rock Core	AUGER REFUSAL Black and pink SYENITE BEDROCK Cored from 6.6 m to 22.3 m. For Bedrock Coring details refer to Record of Drillhole BH08-1.									
11											Screen
12											
13											
14											
15											Hole Plug
16											
17											
18											
19											
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-1

SHEET 3 OF 5

LOCATION: N 5402648.0 ;E 547515.0

BORING DATE: March 23, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Rotary NQ Rock Core	AUGER REFUSAL Black and pink SYENITE BEDROCK Cored from 6.6 m to 22.3 m. For Bedrock Coring details refer to Record of Drillhole BH08-1.		277.49							
21											Hole Plug
22											
		End of Borehole		22.44							
23		Notes: 1. Water seepage noted at ground surface during drilling on March 23, 2008.									
24		2. Frozen water level in shallow monitoring well at ground surface (Elevation 299.9 m) on April 8, 2008. 3. Frozen water level in deep monitoring well at 1.2 m above ground surface (Elevation 301.1 m) on April 8, 2008.									
25		4. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-1

SHEET 4 OF 5

LOCATION: N 5402648.0 ;E 547515.0

DRILLING DATE: March 23, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -'Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		293.33																		
		Black, pink, slightly weathered to fresh, medium to coarse grained, SYENITE BEDROCK Contains dark grey/black bands		6.60	1										,JN,PL,Ro ,FR,IR,Ro ,BR,,							
7															,FR,ST,Ro							
															,JN,PL,Ro							
															,FR,PL-IR,Ro							
															,JN,PL,SM							
					2										,JN,PL,SM ,JN,PL-IR,Ro							
8															,JN,PL,Ro							Hole Plug
															,JN,PL,Ro							
9																						Sand
					3										,FR,PL,Ro							10.0 MPa
															,JN,PL,Ro							8.3 MPa
															,FR,PL,Ro							
10															,FR,PL-ST,Ro							
															,JN,PL,Ro							
					4																	Screen
11															,JN,PL,Ro-SM							
															,JN,PL,Ro							
															,BR,,							
															,JN,PL,Ro							15.3 MPa
12					5																	UC = 86.6 MPa
																						Axial Point Load Index = 8.5 MPa
															,JN,PL,Ro							
															,JN,PL,Ro							
13															,FR,IR,Ro							
					6										,JN,PL,Ro							
14															,JN,PL,Ro							Axial Point Load Index = 9.1 MPa
															,JN,PL,Ro							
15																						Hole Plug
					7										,FR,IR,Ro							
															,JN,PL,Ro							
16																						
					8										,JN,PL,Ro							
	Rotary NQ Rock Core	*CONTINUED NEXT PAGE*																				

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-1

SHEET 5 OF 5

LOCATION: N 5402648.0 ;E 547515.0

DRILLING DATE: March 23, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	COLOUR % RETURN FLUSH	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																			
17	Rotary / NQ Rock Core	Black, pink, slightly weathered to fresh, medium to coarse grained, SYENITE BEDROCK												,JN,PL,Ro							
		Contains dark grey/black bands			8									,FR,IR,Ro							
														,FR,IR,Ro							
														,JN,PL,Ro							
18														,JN,PL-ST,Ro							
					9									,FR,IR,Ro ,JN,PL,Ro ,FR,IR,Ro							
19														,JN,PL,SM							
														,JN,PL,Ro							
20					10									,FR,PL,Ro ,FR,IR,Ro							
														,JN,PL,Ro							
														,JN,PL,SM							
21		Becoming balck and white												,JN,PL,SM-Ro							Hole Plug
					11																
22				277.49										,JN,PL,Ro							
		END OF DRILLHOLE		22.44																	
23																					
24																					
25																					
26																					

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-2

SHEET 1 OF 2

LOCATION: N 5403223.0 ;E 550275.0

BORING DATE: March 15, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		349.00							
0	Rotary Power Auger 108 mm I.D. Hollow Stem Augers	Very soft, wet, black to dark brown, PEAT. Contains wood fragments		0.00							
1					1	50 DO	WH				
2					2	50 DO	WH				
				346.40	3	50 DO	WH				
		Very loose, wet, grey, Organic SILT, trace to some clay and sand		2.60							
3	Rotary NQ Rock Core	AUGER REFUSAL White and dark grey SYENITE BEDROCK Cored from 2.9 m to 9.1 m. For Bedrock Coring details refer to Record of Drillhole BH08-2.		346.05 2.95							
4											
5											
6											
7											
8											
9				339.86							
		End of Borehole Notes: 1. Water level at ground surface during drilling on March 15, 2008.		9.14							
10		*CONTINUED NEXT PAGE*									

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-2

SHEET 2 OF 2

LOCATION: N 5403223.0 ;E 550275.0

BORING DATE: March 15, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	SOIL PROFILE: STRATA PLOT	SOIL PROFILE: ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
		2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-2

SHEET 2 OF 2

LOCATION: N 5403223.0 ;E 550275.0

DRILLING DATE: March 15, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		346.05																		
3	Rotary NQ Rock Core	White and dark grey/black, slightly weathered to fresh fine to medium grained SYENITE BEDROCK		2.95											,FR,IR,Ro							
															,JN,PL,Ro							
					1										,JN,PL,Ro							
4															,FR,PL,Ro							
															,JN,PL,Ro							
															,JN,PL,Ro							
															,JN,PL-IR,Ro							
															,JN,PL,Ro-SM							
															,JN,PL,SM							
															,BR,,							
5															,BR,,							
															,JN,PL,Ro							
															,JN,PL,SM							
					2										,JN,PL,Ro							
															,FR,PL-IR,Ro							
															,JN,PL,Ro							
6															,FR,IR,Ro							
															,BR,,							
															,JN,PL,Ro							
															,JN,PL,SM							
															,FR,PL,Ro							
															,JN,PL,Ro							
					3										,JN,PL-ST,Ro							
7															,FR,PL-IR,Ro							
															,BR,,							
															,JN,PL,SM							
															,JN,PL,SM							
8															,BR,,							
															,JN,PL,SM							
															,JN,PL,Ro							
					4										,BR,,							
															,JN,PL,Ro-SM							
															,JN,PL,Ro							
9				339.86																		
		END OF DRILLHOLE		9.14																		
10																						
11																						
12																						

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-3

SHEET 1 OF 5

LOCATION: N 5403639.0 ;E 549230.0

BORING DATE: March 18, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m
		GROUND SURFACE		350.00			
0	Rotary Power Auger; NQ Rock Core/108 mm I.D. Hollow Stem Augers	Moist, brown/black TOPSOIL. Contains peat and roots		0.00			
		Red and black Syenite COBBLE/BOULDER		0.09 349.27	1	NQ	-
1		Loose, moist, black, Organic SILT, some sand and gravel		0.73 348.96	2	50 DO	5
		Dark grey, Gabbro COBBLE/BOULDER		1.04 348.51	3	NQ	-
		Very soft, dark brown, PEAT. Contains silt layers and wood fragments		1.49 348.26	4	50 DO	2
2		Dark grey, Gabbro COBBLE/BOULDER		1.74 347.87	5	NQ	-
		Compact, wet, brown, SAND and GRAVEL		2.13 347.26	6	50 DO	23
		Dark grey, Gabbro COBBLE/BOULDER		2.74 346.98	7	NQ	-
3		Compact, wet, grey, SAND and GRAVEL		3.02 346.28	8	50 DO	12
		Loose to compact, wet, grey, SAND, some gravel		3.72 345.12	9 10	50 DO	5 17
4							
5	Water Flush; NQ Rock Core	AUGER REFUSAL Black, white and pink SYENITE BEDROCK Cored from 4.9 m to 20.5 m. For Bedrock Coring details refer to Record of Drillhole BH08-3.		4.88			
6							
7							
8							
9							
10		*CONTINUED NEXT PAGE*					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: 20 40 60 80 (nat V. + Q - ● / rem V. ⊕ U - ○)

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40

ADDITIONAL LAB. TESTING: 64.5; M

PIEZOMETER OR STANDPIPE INSTALLATION: Hole Plug; Sand; Screen

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-3

SHEET 2 OF 5

LOCATION: N 5403639.0 ;E 549230.0

BORING DATE: March 18, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10	Water Flush NQ Rock Core	*--- CONTINUED FROM PREVIOUS PAGE ---* AUGER REFUSAL Black, white and pink SYENITE BEDROCK Cored from 4.9 m to 20.5 m. For Bedrock Coring details refer to Record of Drillhole BH08-3.									Screen
11											
12											Hole Plug
13											
14											
15											
16											Sand
17											
18											
19											
20		*CONTINUED NEXT PAGE*									

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-3

SHEET 3 OF 5

LOCATION: N 5403639.0 ;E 549230.0

BORING DATE: March 18, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		--- CONTINUED FROM PREVIOUS PAGE ---									
20	Water Flush			329.46							Sand
		End of Borehole		20.54							
21		Notes:									
		1. Water seepage noted at ground surface during drilling on March 18, 2008.									
22		2. Frozen water level in shallow monitoring well at 0.5 m above ground surface (Elevation 350.5 m) on April 8, 2008.									
		3. Frozen water level in deep monitoring well at 1.2 m above ground surface (Elevation 351.2 m) on April 8, 2008.									
23		4. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
24											
25											
26											
27											
28											
29											
30											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-3

SHEET 4 OF 5

LOCATION: N 5403639.0 ;E 549230.0

DRILLING DATE: March 18, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		345.12																		
5	Rotary NQ Rock Core	Black, pink and white, slightly weathered to fresh, medium to coarse grained, SYENITE BEDROCK		4.88	1										,BR,,							
															,JN,PL,Ro							
															,JN,PL-IR,Ro							
															,FR,IR,Ro							
6															,JN,PL,Ro							
					2										,JN,PL,Ro-SM							
															,BR,,							
															,JN,PL,SM							
7																						
					3										,FR,PL,Ro							
8																						Hole Plug
															,FR,PL,Ro							
															,JN-FR,PL,Ro							
9					4										,JN,PL,Ro-SM							Sand
															,JN,PL,Ro							
															,FR,ST,Ro-SM							
10															,FR,PL-IR,Ro							
																						Screen
															,JN,PL,SM							
															,FR,PL,Ro							
															,FR,PL,Ro							
11					5										,BR,,							
															,JN,PL,Ro							
															,BR,,							
															,FR,IR,Ro							
															,JN,PL,Ro							Hole Plug
12																						
					6										,JN,PL-IR,Ro							
															,JN,PL,Ro							
13																						Sand
					7										,BR,,							
14															,JN,PL,Ro							
					8																	
		CONTINUED NEXT PAGE																				

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-3

SHEET 5 OF 5

LOCATION: N 5403639.0 ;E 549230.0

DRILLING DATE: March 18, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																			
15	Rotary / NQ Rock Core	Black, pink and white, slightly weathered to fresh, medium to coarse grained, SYENITE BEDROCK												,FR,PL-IR,Ro							
					8									,FR,PL-IR,Ro							
														,JN,PL,Ro							
16														,FR,PL,Ro							
					9									,JN,PL,Ro							
17														,JN,PL,Ro							
														,BR,,							
														,BR,,							
														,FR,IR,VR							Sand
18					10									,FR,IR,Ro							
														,JN,PL,Ro-SM							
19																					
					11																
20														,JN,PL,Ro							
				329.46																	
		END OF DRILLHOLE		20.54																	
21																					
22																					
23																					
24																					

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-4

SHEET 1 OF 4

LOCATION: N 5402881.0 ;E 548959.0

BORING DATE: March 21, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m
0		GROUND SURFACE		351.00			
	Rotary Power Auger, 108 mm I.D. Hollow Stem Augers	Mixture of PEAT and VEGETATION, including moss and roots		0.00			
		Very soft, wet, dark brown, PEAT		350.70			
1				0.30	1	50 DO	WH
					2	50 DO	1
	Rotary, NQ Rock Core	AUGER REFUSAL		349.38			
2		Black and white GABBRO BEDROCK		1.62			
		Cored from 1.6 m to 15.1 m.					
		For Bedrock Coring details refer to Record of Drillhole BH08-4.					
3							
4							
5							
6							
7							
8							
9							
10		*CONTINUED NEXT PAGE*					

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ●; rem V. ⊕ U - ○; 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp W Wl; 10 20 30 40

838.3

362.6

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

Hole Plug

Sand

Screen

Hole Plug

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-4

SHEET 2 OF 4

LOCATION: N 5402881.0 ;E 548959.0

BORING DATE: March 21, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
10		*--- CONTINUED FROM PREVIOUS PAGE ---*									
10	Rotary / NQ Rock Core	AUGER REFUSAL Black and white GABBRO BEDROCK Cored from 1.6 m to 15.1 m. For Bedrock Coring details refer to Record of Drillhole BH08-4.									Sand Hole Plug Sand
15				335.91 15.09							
		End of Borehole Notes: 1. Water level in open borehole noted at 0.8 m depth during drilling on March 22, 2008. 2. Water level in monitoring well noted at 1.4 m depth below ground surface (Elevation 349.6 m) on April 7, 2008. 3. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
20											

DEPTH SCALE

1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-4

SHEET 3 OF 4

LOCATION: N 5402881.0 ;E 548959.0

DRILLING DATE: March 21, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -'Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		349.38																		
2	Rotary NQ Rock Core	Black and white to greenish/grey, slightly weathered to fresh, medium to coarse grained, GABBRO BEDROCK		1.62	1										,BR,, ,FR,IR,Ro ,FR,IR,Ro ,BR,, ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro							
3					2										,JN,PL,SM-Ro ,JN,PL,Ro ,FR,IR,Ro							Hole Plug
4															,JN,PL,Ro ,FR,PL-IR,Ro ,PR,PL,Ro ,FR,IR,Ro ,FR-JN,PL,Ro ,FR-JN,PL,Ro							
5					3										,FR,IR,Ro ,JN,PL,Ro ,JN,PL,Ro-SM ,JN,PL,Ro ,BR,, ,JN,PL,Ro ,JN,PL,SM							Sand
6															,JN,PL,SM ,JN,PL,Ro ,JN,PL,Ro							
7					4										,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro-SM							Screen
8					5										,JN,PL,Ro ,FR,PL,Ro ,BR,, ,JN,PL,Ro ,FR,IR,Ro ,JN,PL,Ro ,JN,PL,Ro							
9															,JN,PL,Ro ,JN,IR,Ro ,JN,PL,Ro-SM							
10					6										,JN,PL,Ro/Sm ,JN,PL,SM ,JN,PL,SM ,JN,PL,SM							Hole Plug
11					7										,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM							Sand Hole Plug
		CONTINUED NEXT PAGE																				

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-4

SHEET 4 OF 4

LOCATION: N 5402881.0 ;E 548959.0

DRILLING DATE: March 21, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		--- CONTINUED FROM PREVIOUS PAGE ---																				
12	Rotary NQ Rock Core	Black and white to greenish/grey, slightly weathered to fresh, medium to coarse grained, GABBRO BEDROCK			7										,JN,PL,Ro							Hole Plug
															,JN,PL,SM-Ro							
															,JN,PL,Ro							
13					8										,JN,PL,SM							
															,JN,IR,SM							
															,JN,PL,Ro							
															,JN,PL,Ro-SM							Sand
14															,JN,PL,SM							
					9										,JN,PL,Ro							
															,JN,PL,SM							
15				335.91																		
		END OF DRILLHOLE		15.09																		
16																						
17																						
18																						
19																						
20																						
21																						

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-5

SHEET 1 OF 2

LOCATION: N 5404237.0 ;E 550633.0

BORING DATE: March 26, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80); SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}); WATER CONTENT PERCENT (Wp, W, Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		280.00							
0	Rotary Power Auger 108 mm I.D. Hollow Stem Augers	Moist, black, Silty TOPSOIL		0.00 / 279.76							
		Compact, moist, brown to grey, Silty SAND. Contains sandy silt and silty clay interlayers		0.24							
1					1	50 DO	18		W	MH	
				278.45							
	Rotary NQ Rock Core	AUGER REFUSAL Grey/black and white GABBRO BEDROCK Cored from 1.6 m to 7.2 m. For Bedrock Coring details refer to Record of Drillhole BH08-5.		1.55							
2											
3											
4											
5											
6											
7				272.84							
		End of Borehole		7.16							
8		Notes: 1. Water seepage noted at 3.3 m depth during drilling. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
9											
10											

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-5

SHEET 2 OF 2

LOCATION: N 5404237.0 ;E 550633.0

DRILLING DATE: March 26, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -'Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		278.45																	
2	Rotary NQ Rock Core	Grey/black and white, slightly weathered to fresh, fine to medium grained, GABBRO BEDROCK		1.55	1									,JN,PL,SM ,JN,PL,SM ,JN,PL,SM-Ro ,JN,PL,SM							19.3 MPa Axial Point Load Index = 7.9 MPa
3					2									,FR,IR,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM ,JN,PL-ST,Ro ,JN,PL-ST,Ro ,JN,PL,Ro							
4														,BR,, ,JN,PL,SM							
5		Contains quartz and feldspathic band/veins at 4.7 m and 5.5 m depth			3									,JN,PL,SM ,JN,PL,Ro							
6														,FR,IR,Ro							
7				272.84	4									,FR,IR,Ro ,JN,PL,SM ,JN,PL,Ro ,FR,IR,Ro ,JN,PL,SM ,JN,PL,Ro ,JN,PL,Ro-SM ,BR,, ,FR,IR,Ro							
		END OF DRILLHOLE		7.16																	
8																					
9																					
10																					
11																					

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-6

SHEET 1 OF 2

LOCATION: N 5403552.0 ;E 550296.0

BORING DATE: March 17, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		357.00							
0	Rotary / NQ Rock Core	VEGETATION including moss		0.03							
		AUGER REFUSAL Black/grey and white GABBRO BEDROCK Cored from 0.03 m to 6.3 m. For Bedrock Coring details refer to Record of Drillhole BH08-6.									
6				350.75							
6		End of Borehole Notes: 1. Borehole dry during drilling. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.		6.25							

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-6

SHEET 2 OF 2

LOCATION: N 5403552.0 ;E 550296.0

DRILLING DATE: March 17, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		356.97																		
1	Rotary / NQ Rock Core	Black and white to greenish/grey slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		0.03	1										,FR,PL/IR,Ro ,JN,PL,Ro ,JN,PL,Ro ,FR,IR,Ro ,FR,IR,Ro ,JN,PL,Ro ,FR,IR,Ro ,JN/VN,PL,SM/Ro ,JN,PL,VR							
2					2										,JN,PL,Ro ,FR,IR,Ro ,JN,PL,Ro ,VN/JN,PL,SM ,JN,PL,Ro ,JN,PL/IR,Ro ,JN,PL/IR,Ro ,JN/VN,PL,SM-Ro							
3					3										,FR,IR,Ro ,FR,IR,Ro ,FR,PL,Ro ,JN,PL/ST,Ro-SM ,JN/VN,PL,Ro-SM ,JN/VN,PL,Ro-SM ,FR,PL,Ro ,FR,PL,Ro ,JN,PL,SM-Ro ,FR,PL,Ro							
4					4										,FR,PL/IR,Ro ,FR,IR,Ro ,FR,PL,Ro ,JN,PL,SM-Ro ,BR,, ,FR,IR,Ro ,FR/JN,PL/ST,SM/Ro							
5																						
6				350.78											,FR,PL,Ro							
		END OF DRILLHOLE		6.25																		
7																						
8																						
9																						
10																						

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-7

SHEET 1 OF 2

LOCATION: N 5403398.0 ;E 550385.0

BORING DATE: March 16, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		354.00							
0	Rotary Power Auger / Hollow Stem Augers	Moist, black, Silty TOPSOIL		0.00							
		Moist, brown, Silty SAND, some gravel. Contains cobbles and/or boulders, trace topsoil/rootlets		0.15							
				353.36							
	Rotary / 108 mm I.D. Hollow Stem Augers	AUGER REFUSAL		0.64							
1		Black and white and/or pink GABBRO and SYENITE BEDROCK Cored from 0.6 m to 7.2 m. For Bedrock Coring details refer to Record of Drillhole BH08-7.									
2											
3											
4	Rotary / NQ Rock Core										
5											
6											
7				346.81							
		End of Borehole		7.19							
8		Notes: 1. Borehole dry during drilling. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-7

SHEET 2 OF 2

LOCATION: N 5403398.0 ;E 550385.0

DRILLING DATE: March 16, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		353.36																		
1	Rotary NQ Rock Core	Black and white to greenish/grey, slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		0.64	1										,BR,, ,FR,ST,Ro ,JN,PL,SM ,FR,IR,Ro ,JN,PL,SM ,JN,PL,Ro ,JN,PL,SM ,JN,PL,Ro ,FR,IR,Ro ,JN,PL,Ro							
2					2										,FR,IR,Ro ,JN,PL,Ro ,JN,PL,Ro ,FR,PL,Ro ,FR,PL,SM ,JN,PL,SM ,FR,IR,Ro ,JN,ST,Ro ,FR,IR,VR ,JN,PL,SM ,JN,PL,SM							
3															,JN,PL,Ro ,JN,PL,Ro ,JN,IR,Ro ,JN,PL,Ro ,JN,ST,Ro							
				350.19											,FR,PL,Ro							
4		Black/grey and white, slightly weathered to fresh, fine to medium grained SYENITE BEDROCK		3.81	3										,FR,ST,Ro ,JN,PL,SM-Ro ,JN,PL,Ro ,JN,PL,Ro							
				349.30											,JN,PL-ST,Ro							
5		Black and white to greenish/grey, slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		4.70											,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,BR,, ,FR,PL,Ro ,JN,PL,Ro ,FR,IR,Ro ,FR,IR,Ro							
6		Syenite banding at 5.9 m depth			4										,JN,PL,Ro-SM ,JN,PL,Ro-SM							
7					5										,JN,PL,Ro ,FR,IR,Ro ,JN,PL,SM							
				346.81											,JN,PL-ST,SM-RO							
		END OF DRILLHOLE		7.19																		
8																						
9																						
10																						

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-8

SHEET 1 OF 2

LOCATION: N 5403228.0 ;E 550465.0

BORING DATE: March 12, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		373.00							
0	Rotary Power Auger / Hollow Stem Augers 108 mm I.D.	Moist, black, Silty TOPSOIL		0.00 / 372.73							
		Wet, brown, SILT and SAND, some gravel, trace clay. Contains cobbles and/or boulders		0.27 / 372.36							
		AUGER REFUSAL		0.64							
1		Dark grey/Black GABBRO BEDROCK									
		Cored from 0.6 m to 7.3 m.									
		For Bedrock Coring details refer to Record of Drillhole BH08-8.									
2											
3											
4	Rotary NQ Rock Core										
5											
6											
7				365.68							
		End of Borehole		7.32							
8		Notes:									
		1. Water seepage noted at 0.5 m depth during drilling.									
		2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
9											
10											

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-8

SHEET 2 OF 2

LOCATION: N 5403228.0 ;E 550465.0

DRILLING DATE: March 12, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		372.36																		
1	Rotary / NQ Rock Core	Dark grey, slightly weathered to fresh, fine to medium grained, GABBRO BEDROCK		0.64	1										,JN,PL,Ro ,FR,ST,Ro ,JN,PL,Ro ,,, ,JN-FR,PL,Ro ,FR,IR,Ro ,JN,PL,Ro-SM ,JN,PL,Ro ,JN,PL,SM							
2		Contains quartz and feldspar veins/bands													,FR,PL,Ro ,BR,,							
3					2										,JN,PL,SM ,JN,PL,SM ,JN,PL,SM ,FR,PL,Ro ,FR,PL,Ro ,JN,PL,Ro ,FR,IR,Ro							
4					3										,JN,PL,SM ,JN,PL,Ro ,FR,IR-ST,Ro ,JN,PL,Ro ,JN,PL,Ro							
5															,FR,PL,Ro							
6					4										,FR,PL-IR,Ro ,JN,ST,Ro ,JN,PL-W,SM ,JN,PL,SM ,JN,PL,SM ,JN,PL,SM							
7					5																	
		END OF DRILLHOLE		365.68 7.32																		
8																						
9																						
10																						

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-9

SHEET 1 OF 2

LOCATION: N 5403257.0 ;E 550470.0

BORING DATE: March 14, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		381.00									
0	Rotary Power Auger / Hollow Stem Augers	Moist, black, Silty TOPSOIL		0.00 / 380.79									
		Wet, dark brown, Silty SAND, some gravel, trace clay, topsoil, and organic matter		0.21 / 380.39	1	AS							
1	Rotary / 108 mm I.D.	AUGER REFUSAL Black and white to greenish/grey GABBRO BEDROCK Cored from 0.6 m to 6.7 m. For Bedrock Coring details refer to Record of Drillhole BH08-9.		0.61									
2													
3													
4	Rotary / NQ Rock Core												
5													
6				374.26									
		End of Borehole		6.74									
7		Notes: 1. Water seepage noted in open borehole at 0.8 m depth on March 15, 2008. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.											
8													
9													
10													

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-9

SHEET 2 OF 2

LOCATION: N 5403257.0 ;E 550470.0

DRILLING DATE: March 14, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		380.39																		
1	Rotary NQ Rock Core	Black and white to greenish/grey slightly weathered to fresh, fine to medium grained GABBRO BEDROCK		0.61	1										,BR,, ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,Ro ,FR,ST,Ro ,JN,PL,SM-Ro ,JN,PL,Ro ,JN,PL/W,Ro ,JN,PL,Ro						
2					2										,,IR,Ro ,BR,, ,,IR,Ro ,FR,PL,Ro ,FR,PL,Ro ,FR,ST,Ro ,JN,PL,SM ,FR,IR-PL,Ro ,JN,PL,Ro ,BR,, ,JN,PL,SM ,JN,PL,Ro ,JN,PL/ST,Ro						
3					3										,JN,PL,Ro ,FR,IR,Ro ,FR,IR,Ro ,FR,IR/UE,Ro ,JN,PL,Ro ,JN,PL,Ro						
4					4										,JN,PL,Ro ,JN,PL,SM-Ro ,JN,PL,Ro ,FR,ST,Ro ,FR,IR,Ro ,JN,PL,Ro						
5																						
6																						
7		END OF DRILLHOLE		374.26 6.74											,FR,IR/PL,Ro							
8																						
9																						
10																						

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: MR
CHECKED: SLP

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-10

SHEET 1 OF 2

LOCATION: N 5403148.0 ;E 550530.0

BORING DATE: March 14, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		383.00							
0	Rotary NQ Rock Core	Moist, black, Silty TOPSOIL		0.03							
		AUGER REFUSAL Dark grey GABBRO BEDROCK Cored from 0.03 m to 7.4 m. For Bedrock Coring details refer to Record of Drillhole BH08-10.									
1											
2											
3											
4											
5											
6											
7				375.59							
		End of Borehole		7.41							
8		Notes: 1. Borehole dry prior to start of rock coring. 2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.									
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-10

SHEET 2 OF 2

LOCATION: N 5403148.0 ;E 550530.0

DRILLING DATE: March 14, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DIP w.r.t. CORE AXIS	TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		382.97																		
1	Rotary NQ Rock Core	Dark grey, slightly weathered to fresh, fine to coarse grained, GABBRO BEDROCK		0.03	1										,JN,PL,Ro ,BR,, ,JN,PL,SM ,FR,IR,Ro							
2					2										,JN,PL,Ro ,JN,PL,SM ,JN-FR,PL,SM ,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM ,FR,IR,Ro							9.7 MPa Axial Point Load Index = 10.7 MPa
3					3										,JN,PL,Ro ,FR,PL,Ro-SM ,JN,PL,Ro ,JN,PL,SM ,JN,PL,Ro ,BR,, ,JN,PL,SM ,FR,PL,Ro							16 MPa UC = 86.0 MPa
4					4										,JN,PL,Ro ,JN,PL,SM-Ro ,JN,PL,Ro ,JN,PL,Ro-SM ,FR,IR,Ro ,FR,IR,Ro							
5					5										,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM ,JN,PL,Ro							
6				375.59																		
7		END OF DRILLHOLE		7.41																		
8																						
9																						
10																						

NOTES
WATER LEVELS
INSTRUMENTATION

DEPTH SCALE
1 : 50

LOGGED: MR

CHECKED: SLP

Golder Associates

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF BOREHOLE: 08-11

SHEET 1 OF 2

LOCATION: N 5403177.0 ;E 550458.0

BORING DATE: March 14, 2008

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m
0		GROUND SURFACE		383.00			
		Moist, black, Silty TOPSOIL		0.00			
		AUGER REFUSAL		0.15			
		Black/grey GABBRO BEDROCK					
		Cored from 0.2 m to 6.4 m.					
		For Bedrock Coring details refer to Record of Drillhole BH08-11.					
1	Rotary						
2	NQ Rock Core						
3							
4							
5							
6				376.63			
		End of Borehole		6.37			
7		Notes:					
		1. Water seepage noted at 0.6 m depth during drilling.					
		2. Borehole elevations was obtained with a hand/field global positioning system (GPS) and should therefore be considered an estimate only.					
8							
9							
10							

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20 40 60 80

SHEAR STRENGTH Cu, kPa: nat V. + Q - ● rem V. ⊕ U - ○ (20 40 60 80)

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp ⊢ W ⊣ Wl (10 20 30 40)

ADDITIONAL LAB. TESTING

PIEZOMETER OR STANDPIPE INSTALLATION

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: MR

CHECKED: SLP

MIS-BHS 001 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

PROJECT: 07-1118-0012

RECORD OF DRILLHOLE: 08-11

SHEET 2 OF 2

LOCATION: N 5403177.0 ;E 550458.0

DRILLING DATE: March 14, 2008

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 75

DRILLING CONTRACTOR: Marathon Drilling

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
PL - Planar; CU - Curved; UN - Undulating; ST - Stepped; IR - Irregular
PO- Polished; K - Slickensided; SM- Smooth; Ro - Rough; MB- Mechanical Break
BR - Broken Rock
NOTE: For additional abbreviations refer to list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	PENETRATION RATE min/(m)	FLUSH	COLOUR % RETURN	RECOVERY TOTAL CORE %	RECOVERY SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.3 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jr	Ja	Jn	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -'Q' AVG.	NOTES WATER LEVELS INSTRUMENTATION
		Continued from Borehole log		382.85																		
1	Rotary NQ Rock Core	Dark grey, slightly weathered to fresh, fine to medium grained, GABBRO BEDROCK		0.15	1										,FR,PL,Ro ,FR,IR,Ro ,JN,PL,Ro ,FR,ST,Ro ,BR,, ,JN,PL,Ro							
2					2										,JN,PL,Ro ,JN,PL,Ro ,JN,PL,SM ,FR-JN,IR,Ro ,FR,IR,Ro ,JN,PL,Ro							
3					3										,JN,PL-IR,Ro ,JN,PL,Ro ,JN,PL,SM ,JN,PL,Ro							
4					4										,JN,PL,Ro ,JN,PL-ST,Ro ,JN,PL,Ro ,FR,IR,Ro							
5																						
6				376.63																		
		END OF DRILLHOLE		6.37																		
7																						
8																						
9																						
10																						

DEPTH SCALE
1 : 50

LOGGED: MR
CHECKED: SLP

Golder Associates

MIS-RCK 004 0711180012.GPJ GAL-MISS.GDT 5/16/08 JFC

TABLE E2 - Physical Description of Test Pits (Source: Golder 2008)

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
TP07-2	Not Indicated (NI)	0	0.15	4.4 (seepage)	TOPSOIL	moist, black TOPSOIL, contains rootlets
-		0.15	1.2	-	SILTY CLAY	moist, brown SILTY CLAY, trace sand
-		1.2	2	-	SILTY CLAY	moist, light brown SILTY CLAY, trace sand
-		2	4.5	-	SILT	moist to wet, light brown to grey SILT, trace clay; contains sand and silty clay interlayers
TP07-3	1.25	0	0.32	0.32 (seepage)	TOPSOIL	moist, black TOPSOIL
-		0.32	0.73	-	SAND	wet, dark brown SAND, trace silt, topsoil and rootlets
-		0.73	1.25	-	SILTY SAND - SANDY SILT	moist, light brown Silty SAND to Sandy SILT
TP07-4	0.55	0	0.12	0 (dry)	TOPSOIL	moist, black TOPSOIL, contains rootlets
-		0.12	0.35	-	SANDY TOPSOIL	moist, brown Sandy TOPSOIL, trace silt and gravel and rootlets
-		0.35	0.55	-	BOULDERS	BOULDERS
TP07-5	2.75	0	0.5	0.1 (seepage)	PEAT and TOPSOIL	wet, black PEAT and TOPSOIL, contains logs
-		0.5	1.8	-	PEAT	wet, dark brown PEAT, contains wood fragments
-		1.8	2.75	-	SANDY SILT	wet, grey Sandy SILT, trace clay, gravel and organics
TP07-6	0.43	0	0.025	0 (dry)	VEGETATION	Vegetation
-		0.025	0.12	-	TOPSOIL	moist, black TOPSOIL, contains rootlets
-		0.12	0.43	-	SILT	wet, brown SILT, some sand, trace gravel
TP07-7	1.42	0	0.05	0.05 (seepage)	VEGETATION	Vegetation
-		0.05	0.48	-	PEAT and TOPSOIL	wet, black PEAT and TOPSOIL, contains logs and wood fragments
-		0.48	1.42	-	PEAT	wet, dark brown PEAT, contains layers of fibrous peat and wood fragments
TP07-8	NI	0	0.32	2.5 (seepage)	TOPSOIL	moist, black TOPSOIL, contains rootlets
-		0.32	2.4	-	SILTY CLAY	moist, brown SILTY CLAY, trace sand
-		2.4	4.55	-	SILTY CLAY - CLAYEY SILT	wet, light brown SILTY CLAY to CLAYEY SILT, trace sand
TP07-10	0.55	0	0.18	0 (dry)	TOPSOIL	moist, dark brown TOPSOIL, contains rootlets
-		0.18	0.55	-	SILT	moist to wet, light brown SILT, trace sand, clay and gravel
TP07-11	4.4	0	1.4	0.05 (seepage)	PEAT - TOPSOIL	wet, black PEAT and TOPSOIL, contains logs
-		1.4	4.4	-	PEAT	wet, dark brown fibrous PEAT, contains wood fragments
TP07-12	1.1	0	0.15	0 (dry)	TOPSOIL	moist, black TOPSOIL, contains rootlets and boulders
-		0.15	1.1	-	BOULDERS	BOULDERS
TP07-13	1.6	0	0.35	0 (dry)	TOPSOIL	moist, black TOPSOIL, contains cobbles and boulders
-		0.35	1.4	-	SILTY CLAY	moist, brown SILTY CLAY, trace sand
-		1.4	1.6	-	BOULDERS	BOULDERS
TP07-14	NI	0	0.6	0 (seepage @ surface)	PEAT	wet, black, Fibrous PEAT, contains logs
-		0.6	1.75	-	PEAT - SILTY CLAY	moist to wet, brown to grey Fibrous PEAT to Organic SILTY CLAY, contains rootlets
-		1.75	2.1	-	SILTY CLAY	moist to wet, grey, Organic SILTY CLAY, contains interlayers of silty sand and shells
-		2.1	4.4	-	SILTY CLAY	moist to wet, grey SILTY CLAY, contains varved interlayers of silt and sand
TP07-15	1.45	0	0.14	0 (dry)	TOPSOIL	moist, black TOPSOIL, contains rootlets
-		0.14	1.2	-	SILTY SAND	moist, brown, Silty SAND, trace gravel
-		1.2	1.45	-	BOULDERS	BOULDERS
TP07-16	NI	0	0.21	0 (dry)	TOPSOIL	moist, black, TOPSOIL
-		0.21	1.75	-	SAND	moist, light brown, SAND, trace silt
-		1.75	4.55	-	CLAYEY SILT - SILT	moist, light brown, CLAYEY SILT to SILT, trace clay and sand, contains sand interlayers
TP07-17	0	0	0	0 (dry)	BEDROCK	BEDROCK Outcrop
TP07-18	0	0	0	0 (dry)	BEDROCK	BEDROCK Outcrop

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
TP07-19	0	0	0	0 (dry)	BEDROCK	BEDROCK Outcrop
TP08-1	4.15	0	1.25	0.3 (seepage) & 3 (seepage)	PEAT	wet, dark brown non-fibrous PEAT, contains wood fragments
-		1.25	2.45	-	PEAT	wet, dark brown fibrous PEAT, trace sand
-		2.45	3	-	SILT	wet, grey Organic SILT, trace sand and clay
-		3	4.15	-	SAND	wet, grey SAND, trace to some silt
TP08-2	NI	0	0.08	0.08 (seepage)	ICE	ICE
-		0.08	0.15	-	WATER	WATER
-		0.15	0.85	-	PEAT	wet, black, non-fibrous, PEAT, contains roots and logs
-		0.85	4.2	-	SILT	moist to wet, grey SILT, trace to some clay, contains silty clay and silty sand interlayers-seams
TP08-3	NI	0	0.34	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.34	0.45	-	SILTY SAND	moist, reddish brown Silty SAND, trace topsoil and rootlets
-		0.45	1.5	-	SILT	moist to wet, light brown SILT, trace to some clay, contains silty clay interlayers-seams
-		1.5	4.05	-	SILTY CLAY	moist, reddish brown SILTY CLAY, trace sand, contains sandy silt interlayers-seams
TP08-4	NI	0	0.2	2.6 (seepage)	TOPSOIL	moist, black Silty TOPSOIL
-		0.2	1.15	-	SANDY SILT - SILT&SAND	moist, light Sandy SILT to SILT and SAND, trace rootlets
-		1.15	2.05	-	SAND	moist, light brown SAND, trace silt
-		2.05	3.95	-	SAND	wet, grey, SAND
TP08-5	NI	0	0.18	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL
-		0.18	4.2	-	SILT	moist to wet, brown, SILT, trace to some clay, trace sand, contains silty clay interlayers above 2.2m depth, becoming grey below 2.2m depth
TP08-6	0.1	0	0.03	0 (dry)	VEGETATION	moss, Vegetation
-		0.03	0.1	-	TOPSOIL	moist, black Silty TOPSOIL
TP08-7	0.4	0	0.19	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains roots
-		0.19	0.4	-	SILT - SAND	moist, brown SILT and SAND, trace clay and gravel and organic matter including rootlets, contains cobbles
TP08-8	0.63	0	0.18	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets and cobbles and boulders
-		0.18	0.63	-	SILTY SAND	moist, light brown Silty SAND, some gravel, trace organic matter, contains
TP08-9	0.24	0	0.1	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.1	0.24	-	PEAT	wet, dark brown PEAT, trace gravel
TP08-10	0.65	0	0.25	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.25	0.65	-	SILT	moist, reddish brown SILT, some sand, trace topsoil and rootlets, contains organic matter
TP08-11	0.57	0	0.22	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets and cobbles and/or boulders
-		0.22	0.57	-	SILT - SAND	moist, brown Gravelly SILT and SAND, trace clay, contains cobbles and organic matter including rootlets
TP08-12	0.45	0	0.25	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.25	0.45	-	SILT - SAND	moist, brown SILT and SAND, some gravel, contains cobbles and/or boulders and organic matter including rootlets
TP08-13	0.88	0	0.25	0.6 (seepage)	PEAT - TOPSOIL	moist, black PEAT and TOPSOIL, contains cobbles and/or boulders
-		0.25	0.58	-	PEAT	wet, black, non-fibrous PEAT, trace gravel
-		0.58	0.88	-	SILT	moist, brown and grey SILT, trace to some sand and clay
TP08-14	0.54	0	0.32	0 (dry)	TOPSOIL	moist, black TOPSOIL, contains cobbles and /or boulders
-		0.32	0.54	-	SILT	moist, light brown, SILT, some sand, trace clay and gravel, contains pocketséinterlayers of clay
TP08-15	0.15	0	0.15	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains cobbles and/or boulders

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
TP08-16	0.68	0	0.17	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains cobbles
-		0.17	0.68	-	SILT	moist, brown SILT, trace to some sand, trace clay, contains organic matter, including rootlets
TP08-17	NI	0	0.12	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.12	0.25	-	SILTY SAND	moist, reddish brown Silty SAND, contains organic matter, including roots
-		0.25	4.12	-	SILTY CLAY	moist, brown SILTY CLAY, trace to some sand, contains silt interlayers/seams
TP08-19	0.58	0	0.15	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL
-		0.15	0.58	-	SILTY SAND	moist, brown Silty SAND, some gravel, contains cobbles and boulders
TP08-20	NI	0	0.22	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL
-		0.22	2.24	-	SILT	moist to wet, brown SILT, some sand and clay, contains silty clay and sand seams/interlayers
-		2.24	4.2	-	SILTY SAND	wet, brown Silty SAND, contains silt and sand interlayers/seams
TP08-21	NI	0	0.26	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains roots
-		0.26	0.45	-	SAND - GRAVEL	moist, dark brown SAND and GRAVEL, trace to some topsoil and roots
-		0.45	0.8	-	SAND	moist, reddish brown SAND, some gravel, trace silt
-		0.8	1.85	-	SAND	moist, light brown to grey SAND, trace to some silt
-		1.85	4.18	-	SILTY SAND - SILT and SAND	wet, grey Silty SAND to SILT and SAND, contains silt seams/interlayers
TP08-22	NI	0	0.15	0 (dry)	TOPSOIL	moist, black Sandy TOPSOIL
-		0.15	0.48	-	SILT - SAND	moist, brown SILT and SAND, contains rootlets
-		0.48	4.25	-	SAND	moist grey SAND, trace silt
TP08-23	NI	0	0.32	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains rootlets
-		0.32	4.15	-	SILTY CLAY	moist, brown SILTY CLAY, trace to some sand, trace gravel, contains silt seams/interlayers, becoming wet an containing sand seams/interlayers below 1.2 m depth
TP08-24	1.05	0	0.38	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains cobbles and/or boulders
-		0.38	0.85	-	SANDY SILT	moist, reddish brown Sandy SILT, trace to some gravel, trace clay, contains cobbles and/or boulders
-		0.85	1.05	-	BOULDERS	BOULDERS
TP08-25	0.1	0	0.36	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains roots, cobbles, and/or boulders
TP08-26	NI	0	0.12	1.5 (seepage)	TOPSOIL	moist, black Silty TOPSOIL
-		0.12	0.65	-	SAND	moist, brown SAND, some silt, trace topsoil and rootlets
-		0.65	0.78	-	SAND - GRAVEL	moist, brown SAND and GRAVEL
-		0.78	4.15	-	SAND	wet, grey layered SAND, trace to some silt
TP08-27	NI	0	0.18	0 (dry)	TOPSOIL	moist, black Clayey TOPSOIL, contains roots
-		0.18	0.4	-	SILTY CLAY	moist, dark brown SILTY CLAY, some sand, trace to some topsoil and rootlets
-		0.4	4.45	-	SILT	moist, light brown, SILT, trace sand and clay, contains silty sand and silty clay seams/interlayers
TP08-28	0.26	0	0.15	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL, contains roots
-		0.08	0.26	-	SANDY SILT	moist, dark brown Sandy SILT, trace to some topsoil, contains cobbles and/or boulders
TP08-29	NI	0	0.2	0 (dry)	TOPSOIL	moist, black Silty TOPSOIL
-		0.2	0.28	-	SILTY SAND	moist, reddish brown Silty SAND, trace to some topsoil and rootlets
-		0.28	1.15	-	CLAYEY SILT	moist, brown, CLAYEY SILT, trace to some sand, trace rootlets, contains silt seams/interlayers
-		1.15	2.55	-	SILTY CLAY	moist, brown layered SILTY CLAY, some sand, contains sand seams

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
-		2.55	4.2	-	SILTY CLAY	moist, brown, layered, SILTY CLAY, some sand, contains silt and sand seam/interlayers

TEST PIT LOG TP07-2

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-2 **Test Pit Location:** 0550497 / 5404106

Date: March 30, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 274 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black TOPSOIL, contains rootlets	
0.15	1.20	Moist, brown SILTY CLAY, trace sand	Sa. 10 (0.95 m) W: 32% LL: 27%, PL: 17%, PI: 10%
1.2	2.0	Moist, light brown SILTY CLAY, trace sand	Sa. 11 (1.8 m) W=26% MH: See Figure 3
2.0	4.5	Moist to wet, light brown to grey SILT, trace clay. Contains sand and silty clay interlayers	Sa. 12 (3.0 m) W: 25%
		Becoming wet at 4.0 m and grey at 4.3 m depth	Sa. 13 (4.5 m) W: 27%
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 4.4 m depth in open test pit upon completion of excavating.

2. Sloughing of test pit walls noted between 4.0 m and 4.5 m depth upon completion of excavating.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-3

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-3 **Test Pit Location:** 0550354 / 5403718

Date: March 30, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 329 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.32	Moist, black TOPSOIL	
0.32	0.73	Wet, dark brown SAND, trace silt, topsoil and rootlets	Sa. 8 (0.5 m) W: 28%
0.73	1.25	Moist, light brown Silty SAND to Sandy SILT	Sa. 9 (1.0 m) W: 28% SH: MH: See Figure 8
1.25	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 0.32 m depth in open test pit upon completion of excavating.

2. Caving of test pit walls noted between 0.32 m and 1.25 m depth upon completion of excavating.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-4

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-4 **Test Pit Location:** 0550062 / 5403042

Date: March 27, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 349 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.12	Moist, black TOPSOIL, contains rootlets	
0.12	0.35	Moist, brown Sandy TOPSOIL, trace silt and gravel and rootlets	Sa. 3 (0.25 m) W: 52%
0.35	0.55	BOULDERS	
0.55	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-5

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-5 **Test Pit Location:** 0550212 / 5402990

Date: March 28, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 342 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.50	Wet, black PEAT and TOPSOIL, contains logs	
0.50	1.80	Wet, dark brown PEAT, contains wood fragments	Sa. 4 (1.2 m) W: 281%
1.80	2.75	Wet, grey Sandy SILT, trace clay, gravel and organics	Sa. 5 (2.0 m) W: 20% MH: See Figure 6
2.75	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 0.10 m depth in open test pit upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-6

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-6 **Test Pit Location:** 0550213 / 5402739

Date: March 26, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 334 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.025	Vegetation	
0.025	0.12	Moist, black TOPSOIL, contains rootlets	
0.12	0.43	Wet, brown SILT, some sand, trace gravel	Sa. 2 (0.3 m) W: 48%
0.43	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-7

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-7 **Test Pit Location:** 0550011 / 5402745

Date: March 26, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 348 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.05	Vegetation	
0.05	0.48	Wet, black PEAT and TOPSOIL, contains logs and wood fragments	
0.48	1.42	Wet, dark brown PEAT, contains layers of fibrous peat and wood fragments	Sa. 1 (1.0 m) W: 395%
1.42	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 0.05 m depth in open test pit upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-8

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-8 **Test Pit Location:** 0551368 / 5403019

Date: April 4, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 215 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.32	Moist, black TOPSOIL, contains rootlets	
0.32	2.40	Moist, brown SILTY CLAY, trace sand	Sa. 23 (1.5 m) W=27%
2.40	4.55	Wet, light brown SILTY CLAY to CLAYEY SILT, trace sand	Sa. 24 (3.5 m) W: 24%
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 2.5 m depth in open test pit upon completion of excavating.

2. Caving of test pit walls noted between 2.5 m and 4.55 m depth upon completion of excavating.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-10

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-10 **Test Pit Location:** 0550066 / 5402928

Date: March 28, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 352 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.18	Moist, dark brown TOPSOIL, contains rootlets	
0.18	0.55	Moist to wet, light brown SILT, trace sand, clay and gravel	Sa. 7 (0.4 m) W: 53% SH: MH: See Figure 5
0.55	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-11

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-11 **Test Pit Location:** 0550189 / 5403029

Date: March 28, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 346 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	1.40	Wet, black PEAT and TOPSOIL, contains logs	
1.40	4.40	Wet, dark brown Fibrous PEAT, contains wood fragments	Sa. 6 (2.5 m) W: 757%
4.40	-	Excavator Refusal - Probable BEDROCK or BOULDERS	
		END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 0.05 m depth in open test pit upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-12

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-12 **Test Pit Location:** 0550113 / 5402759

Date: March 26, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 346 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black TOPSOIL, contains rootlets and boulders	
0.15	1.10	BOULDERS	
1.10	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test Pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-13

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-13 **Test Pit Location:** 0549977 / 5404135

Date: March 31, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 290 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.35	Moist, black TOPSOIL, contains cobbles and boulders	
0.35	1.40	Moist, brown SILTY CLAY, trace sand	Sa. 14 (1.0 m) W: 37%
1.40	1.60	BOULDERS	
1.60	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Test Pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-14

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-14 **Test Pit Location:** 0549936 / 5404041

Date: March 31, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 290 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.60	Wet, black, Fibrous PEAT, contains logs	
0.60	1.75	Moist to wet, brown to grey Fibrous PEAT to Organic SILTY CLAY, contains rootlets	Sa. 15 (1.5 m) W: 901%
1,75	2.10	Moist to wet, grey, Organic SILTY CLAY, contains interlayers of silty sand and shells	Sa. 16 (1.9 m) W: 148%
2.10	4.40	Moist to wet, grey SILTY CLAY, contains varved interlayers of silt and sand	Sa. 17 (3.0 m) W : 28% LL: 34%, PL: 21%, PI: 13%
		END OF TEST PIT	Sa. 18 (4.3 m) W : 29%

Notes:

1. Groundwater seepage noted at ground surface upon completion of excavating.

2. Caving of test pit walls noted during excavating.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-15

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-15 **Test Pit Location:** 0549775 / 5403924

Date: April 2, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 307 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.14	Moist, black TOPSOIL, contains rootlets	
0.14	1.20	Moist, brown, Silty SAND, trace gravel	Sa. 19 (0.8 m) W: 20%
1.20	1.45	BOULDERS	
1.45	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-16

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-16 **Test Pit Location:** 0551502 / 5402365

Date: April 3, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 191 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.21	Moist, black, TOPSOIL	
0.21	1.75	Moist, light brown, SAND, trace silt	Sa. 20 (1.2 m) W: 7%
1.75	4.55	Moist, light brown, CLAYEY SILT to SILT, trace clay and sand Contains sand interlayers	Sa. 21 (3.5 m) W: 23% LL: 20%, PL: 16%, PI: 4% Sa. 22 (4.45 m) W: 22%
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-17

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-17 **Test Pit Location:** 0549918 / 5404019

Date: April 3, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 292 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.0	BEDROCK Outcrop	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-18

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-18 **Test Pit Location:** 0549915 / 5404037

Date: April 3, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 291 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.0	BEDROCK Outcrop	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP07-19

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP07-19 **Test Pit Location:** 0549899 / 5404068

Date: April 3, 2007 **Logged by:** M. Rhody

Test Pit Elevation: 293 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.0	BEDROCK Outcrop	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-1

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-1 **Test Pit Location:** 0550195 / 5403000 Proposed Access Road

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 349 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	1.25	Wet, dark brown non fibrous PEAT. Contains wood fragments	Sa. 1 (0.85 m) W: 468%
1.25	2.45	Wet, dark brown fibrous PEAT, trace sand	Sa. 2 (2.0 m) W: 552%
2.45	3.0	Wet, grey Organic SILT, trace sand and clay	Sa. 3 (2.8 m) W: 77%
3.0	4.15	Wet, grey SAND, trace to some silt	Sa. 4 (3.8 m) W: 18% MH: See Figure 9
4.15	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Significant groundwater seepage noted at 0.3 m and 3.0 m depths in open test pit upon completion of excavating.

2. Sloughing/caving noted during excavating along entire depth of test pit walls.

3. No visible bedrock outcrops in the area of the test pit.

4. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-2

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-2 **Test Pit Location:** 0549846 / 5402425 Proposed Access Road

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 280 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.08	ICE	
0.08	0.15	WATER	
0.15	0.85	Wet, black, non fibrous, PEAT Contains roots and logs	Sa. 1 (0.5 m)
0.85	4.2	Moist to wet, grey SILT, trace to some clay. Contains silty clay and silty sand interlayers/seams	Sa. 2 (1.8 m) Sa. 3 (2.8 m) Sa. 4 (3.8 m)
		END OF TEST PIT	

Notes:

1. Significant groundwater seepage noted at 0.08 m depth in open test pit upon completion of excavating.

2. Caving of test pit walls noted between 0.15 m and 1.0 m depth upon completion of excavating.

3. Test pit excavated at the north edge of Beaver pond/creek; north of the existing roadway.

4. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-3

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-3 **Test Pit Location:** 0549859 / 5402397 Proposed Access Road

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 282 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.34	Moist, black Silty TOPSOIL Contains rootlets	
0.34	0.45	Moist, reddish brown Silty SAND, trace topsoil and rootlets	
0.45	1.50	Moist to west, light brown SILT, trace to some clay. Contains silty clay interlayers/seams	Sa. 1 (1.0 m) W: 30%
1.50	4.05	Moist, reddish brown SILTY CLAY, trace sand, Contains sandy silt interlayers/seams END OF TEST PIT	Sa. 2 (2.2 m) Sa. 3 (3.4 m) W: 39% LL: 43%, PL: 17%, PI: 26%

Notes:

1. Open test pit dry upon completion of excavating.

2. Test pit (TP08-3) excavated about 30 m south of TP07-2.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-4

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-4 **Test Pit Location:** 0550275 / 5401373 Proposed Access Road

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 250 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.20	Moist, black Silty TOPSOIL	
0.20	1.15	Moist, light Sandy SILT to SILTand SAND, trace rootlets	Sa. 1 (0.6 m)
1.15	2.05	Moist, light brown SAND, trace silt	Sa. 2 (1.3 m) Sa. 3 (1.9 m)
2.05	3.95	Wet, grey, SAND	Sa. 4 (3.5 m)
		END OF TEST PIT	

Notes:

1. Significant groundwater seepage noted at 2.6 m depth in open test pit upon completion of excavating.

2. Caving of test pit walls noted from 2.0 m depth to the base of the test pit upon completion of excavating.

3. Test pit (TP08-4) excavated to about 1.4 m below creek base level.

4. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-5

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-5 **Test Pit Location:** 0550297 / 5401466 Proposed Access Road

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 276 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.18	Moist, black Silty TOPSOIL	
0.18	4.2	Moist to wet, brown, SILT, trace to some clay, trace sand	Sa. 1 (0.5 m) W: 31%
		Contains silty clay interlayers above 2.2 m depth	Sa. 2 (1.8 m)
		Becoming grey below 2.2 m depth	Sa. 3 (3.3 m) W: 23% Non-Plastic
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test pit excavated on mound/hill, north of TP07-4.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-6

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-6 **Test Pit Location:** 0550094 / 5402683 Proposed Access Road

Date: April 3, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 348 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.03	Moss / Vegetation	
0.03	0.10	Moist, black Silty TOPSOIL	
0.1	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-7

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-7 **Test Pit Location:** 0550439 / 5403227 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 367 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.19	Moist, black Silty TOPSOIL, contains roots	
0.19	0.40	Moist, brown SILT and SAND, trace clay and gravel and organic matter including rootlets. Contains cobbles	Sa. 1 (0.35 m) W: 38% MH: See Figure 7
0.4	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1 Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-8

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-8 **Test Pit Location:** 0550452 / 5403209 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 375 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.18	Moist, black Silty TOPSOIL Contains rootlets and cobbles and/or boulders	
0.18	0.63	Moist, light brown Silty SAND, some gravel, trace organic matter. Contains cobbles and/or boulders	Sa. 1 (0.45 m)
0.63	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-9

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-9 **Test Pit Location:** 0550487 / 5403208 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 371 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.1	Moist, black Silty TOPSOIL Contains rootlets	
0.1	0.24	Wet, dark brown PEAT, trace gravel	Sa. 1 (0.2 m)
0.24	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1 Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-10

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-10 **Test Pit Location:** 0550478 / 5403162 Proposed Plant Site

Date: March 12, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 369 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.25	Moist, black Silty TOPSOIL. Contains rootlets	
0.25	0.65	Moist, reddish brown SILT, some sand, trace topsoil and rootlets. Contains organic matter	Sa. 1 (0.5 m)
0.65	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Open test Pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-11

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-11 **Test Pit Location:** 0550510 / 5403180 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 382 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.22	Moist, black Silty TOPSOIL Contains rootlets and cobbles and/or boulders	
0.22	0.57	Moist, brown Gravelly SILT and SAND, trace clay. Contains cobbles and organic matter including rootlets	Sa. 1 (0.4 m) W: 24% MH: See Figure 7
0.57	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Test Pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-12

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-12 **Test Pit Location:** 0550535 / 5403197 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 387 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.25	Moist, black Silty TOPSOIL, contains rootlets	
0.25	0.45	Moist, brown SILT and SAND, some gravel. Contains cobbles and/or boulders and organic matter including rootlets	Sa. 1 (0.35 m)
0.45	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Test Pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-13

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-13 **Test Pit Location:** 0550513 / 5403230 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 378 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.25	Moist, black PEAT and TOPSOIL Contains cobbles and/or boulders	
0.25	0.58	Wet, black, non-fibrous PEAT, trace gravel	Sa. 1 (0.4 m) W: 102%
0.58	0.88	Moist, brown and grey SILT, trace to some sand and clay	Sa. 2 (0.75 m) W: 20% LL: 24%, PL: 20%, PI: 4%
0.88	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Groundwater seepage noted at 0.6 m depth in open test pit upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-14

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-14 **Test Pit Location:** 0550494 / 5403264 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 374 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.32	Moist, black TOPSOIL. Contains cobbles and/or boulders	
0.32	0.54	Moist, light brown, SILT, some sand, trace clay and gravel. Contains pockets/interlayers of clay	Sa. 1 (0.45 m)
0.54	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-15

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-15 **Test Pit Location:** 0550555 / 5403165 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 371 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black Silty TOPSOIL. Contains cobbles and/or boulders	Sa. 1 (0.1 m)
0.15	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-16

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-16 **Test Pit Location:** 0550309 / 5401636 Proposed Access ROad

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 279 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.17	Moist, black Silty TOPSOIL. Contains cobbles	
0.17	0.68	Moist, brown SILT, trace to some sand, trace clay. Contains organic matter, including rootlets	Sa. 1 (0.1 m)
0.68	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted northwest and southeast of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-17

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-17 **Test Pit Location:** 0550151 / 5401799 Proposed Access Road

Date: April 4, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 277 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.12	Moist, black Silty TOPSOIL. Contains rootlets	
0.12	0.25	Moist, reddish brown Silty SAND. Contains organic matter, including roots	
0.25	4.12	Moist, brown SILTY CLAY, trace to some sand. Contains silt interlayers/seams END OF TEST PIT	Sa. 1 (1.0 m) Sa. 2 (2.5 m) W: 32% MH: See Figure 3 Sa. 3 (3.8 m)

Notes:

1. Open test pit dry upon completion of excavating.

2. A bedrock outcrop was noted about 40 m east of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-19

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-19 **Test Pit Location:** 0549967 / 5402112 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 277 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black Silty TOPSOIL	
0.15	0.58	Moist, brown Silty SAND, some gravel. Contains cobbles and boulders	Sa. 1 (0.35 m)
0.58	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted to the north, south and east of this test pit, with a valley located to the west.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-20

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-20 **Test Pit Location:** 0549895 / 5402318 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 287 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.22	Moist, black Silty TOPSOIL.	
0.22	2.24	Moist to wet, brown SILT, some sand and clay. Contains silty clay and sand seams/interlayers.	Sa. 1 (0.5 m) Sa. 2 (2.0 m)
2.24	4.20	Wet, brown Silty SAND. Contains silt and sand interlayers/seams. END OF TEST PIT	Sa. 3 (3.7 m)

Notes:

1. Open test pit dry upon completion of excavating.

3. Bedrock outcrops noted about 30 m east of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-21

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-21 **Test Pit Location:** 0550503 / 5400297 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 289 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.26	Moist, black Silty TOPSOIL. Contains roots	
0.26	0.45	Moist, dark brown SAND and GRAVEL, trace to some topsoil and roots.	
0.45	0.80	Moist, reddish brown SAND, some gravel, trace silt	Sa. 1 (0.65 m) W: 5%
0.80	1.85	Moist, light brown to grey SAND, trace to some silt	Sa. 2 (1.0 m) W: 13% MH: See Figure 9
1.85	4.18	Wet, grey Silty SAND to SILT and SAND. Contains silt seams/interlayers.	Sa. 3 (3.2 m) W: 25%
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating

2. Caving of test pit walls noted upon completion of excavating.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-22

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-22 **Test Pit Location:** 0550486 / 5400399 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 286 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black Sandy TOPSOIL.	
0.15	0.48	Moist, brown SILT and SAND. Contains rootlets.	Sa. 1 (0.35 m) Sa. 2 (1.0 m)
0.48	4.25	Moist grey SAND, trace silt	Sa. 3 (3.0 m)
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating

2. Caving of test pit walls noted from 1.0 m depth to base of test pit upon completion of excavating.

3. No visible bedrock outcrops in the area of the test pit.

4. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-23

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-23 **Test Pit Location:** 0550512 / 5400595 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 282 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.32	Moist, black Silty TOPSOIL. Contains rootlets	
0.32	4.15	Moist, brown SILTY CLAY, trace to some sand, trace gravel. Contains silt seams/interlayers. Also becoming wet and containing sand seams/interlayers below 1.2 m depth END OF TEST PIT	Sa. 1 (0.7 m) Sa. 2 (2.5 m) Sa. 3 (3.7 m)

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-24

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-24 **Test Pit Location:** 0550588 / 5400745 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 274 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.38	Moist, black Silty TOPSOIL. Contains cobbles and/or boulders	
0.38	0.85	Moist, reddish brown Sandy SILT, trace to some gravel, trace clay. Contains cobbles and/or boulders	Sa. 1 (0.5 m)
0.85	1.05	BOULDERS	
1.05	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-25

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-25 **Test Pit Location:** 0550573 / 5402846 Proposed Access Road

Date: April 5, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 259 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.36	Moist, black Silty TOPSOIL. Contains roots, cobbles and/or boulders	
0.1	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating

2. Attempted to dig 5 m away from test pit location to confirm the above conditions.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-26

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-26 **Test Pit Location:** 0550268 / 5401374 Proposed Access Road

Date: April 7, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 260 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.12	Moist, black Silty TOPSOIL	
0.12	0.65	Moist, brown SAND, some silt, trace topsoil and rootlets	Sa. 1 (0.5 m)
0.65	0.78	Moist, brown SAND and GRAVEL,	
0.78	4.15	Wet, grey layered SAND, trace to some silt.	Sa. 2 (2.0 m) Sa. 3 (3.0 m)
		END OF TEST PIT	

Notes:

1. Significant groundwater seepage noted at 1.5 m depth in open test pit upon completion of excavating.

2. Sloughing/caving noted during excavating along entire depth of test pit walls.

3. Test Pit located on the south side of creek.

4. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-27

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-27 **Test Pit Location:** 0550393 / 5401261 Proposed Access Road

Date: April 7, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 271 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.18	Moist, black Clayey TOPSOIL. Contains roots	
0.18	0.40	Moist, dark brown SILTY CLAY, some sand, trace to some topsoil and rootlets. Contains silty seams/interlayers.	Sa. 1 (0.3 m) W: 28%
0.40	4.45	Moist, light brown, SILT, trace sand and clay. Contains silty sand and silty clay seams/interlayers END OF TEST PIT	Sa. 2 (1.5 m) W: 20% Sa. 3 (3.3 m) W: 20% MH: See Figure 5

Notes:

1. Open test pit dry upon completion of excavating.

2. No visible bedrock outcrops in the area of the test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-28

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-28 **Test Pit Location:** 0550405 / 5401062 Proposed Access Road

Date: April 7, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 275 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black Silty TOPSOIL. Contains roots	
0.08	0.26	Moist, dark brown Sandy SILT, trace to some topsoil. Contains cobbles and/or boulders	
0.26	-	Excavator Refusal - Probable BEDROCK END OF TEST PIT	

Notes:

1. Open test pit dry upon completion of excavating

2. Attempted to dig at two other nearby spots to confirm the above conditions.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.
.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-29

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-29 **Test Pit Location:** 0550547 / 5400920 Proposed Access Road

Date: April 7, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 276 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.20	Moist, black Silty TOPSOIL.	
0.20	0.28	Moist, reddish brown Silty SAND, trace to some topsoil and rootlets.	
0.28	1.15	Moist, brown, CLAYEY SILT, trace to some sand, trace rootlets. Contains silt seams/interlayers	Sa. 1 (1.0 m) W: 29%
1.15	2.55	Moist, brown layered SILTY CLAY, some sand. Contains sand seams	Sa. 2 (2.2 m)
2.55	4.20	Moist, brown, layered, SILTY CLAY, some sand. Contains silt and sand seams/interlayers END OF TEST PIT	Sa. 3 (3.5 m) W: 51% LL: 51%, PL: 20%, PI: 31% MH: See Figure ?

Notes:

1. Open test pit dry upon completion of excavating.

2. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis

TEST PIT LOG TP08-15

Job Number: 07-1118-0012 **Project Location:** Marathon PGM

Test Pit Number: TP08-15 **Test Pit Location:** 0550555 / 5403165 Proposed Plant Site

Date: April 2, 2008 **Logged by:** M. Rhody

Test Pit Elevation: 371 m

Depth (m) To	Depth (m) From	Soil Description	Remarks
0.0	0.15	Moist, black Silty TOPSOIL. Contains cobbles and/or boulders	Sa. 1 (0.1 m)
0.15	-	Excavator Refusal - Probable BEDROCK	
		END OF TEST PIT	

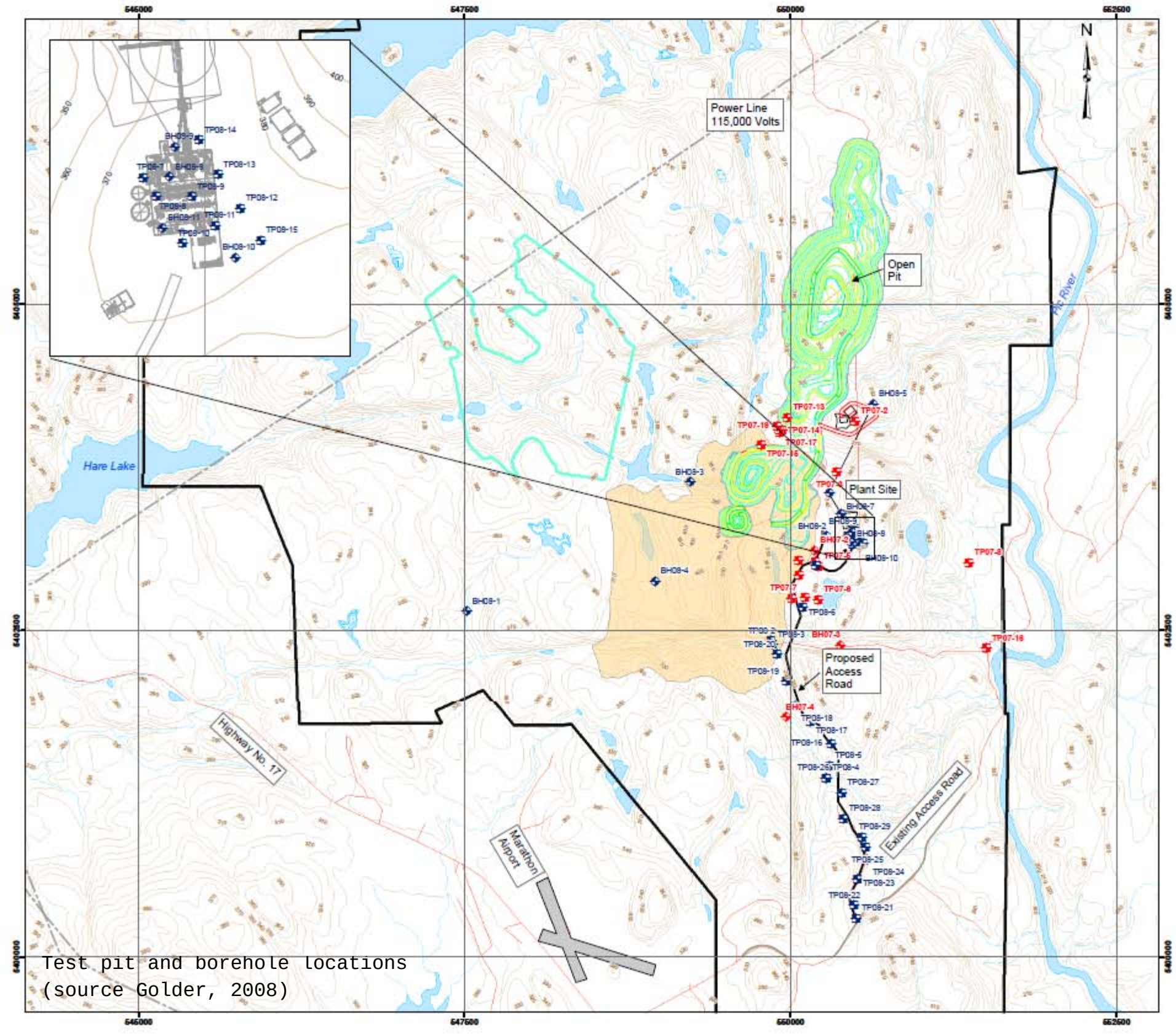
Notes:

1. Open test pit dry upon completion of excavating.

2. Bedrock outcrops noted in the general vicinity of this test pit.

3. Test Pit Elevation was obtained with a handheld global positioning system (GPS) and should therefore be considered an estimate only.

* W = Water Content percent
* LL = Liquid Limit, PL = Plastic Limit, PI = Plasticity Index (Atterberg Limits Testing)
* MH = Combined sieve and hydrometer analysis



Test pit and borehole locations
(source Golder, 2008)

TABLE E3 - Thickness of Cores from Drillholes (Source: Marathon PGM)

Sample ID	Thickness (m)
M-09-470	0.84
M-09-471	2.07
M-09-472	3.05
M-09-473	6.75
M-09-474	1.43
M-09-475	2.6
M-09-476	2.2
M-09-477	1.25
M-09-478	1.6
M-09-479	1.6
M-09-480	2.62
M-09-481	1.9
M-09-482	3
M-09-483	2.8
M-09-484	0.9
M-09-485	0.4
M-09-486	0.3
M-09-487	4.7
M-09-488	6.06
M-09-489	1.5
M-09-490	2
G1	4.35
G2	2.20
G3	5.60
G4	3.72
G5	1.35
G6	3.00
G7	4.61
G8	3.00
G9	1.00
G10	1.00
G11	1.00
G12	3.60
G13	3.00
G14	1.00
G15	3.00

Table E4: Physical Description of Boreholes (Source: Knight Piésold, 2011)						
Test Pit ID	**OB (m)**	**From (m)**	**To (m)**	**g.w. (m)**	**Dominant Sediment**	**Description**
KP11-05	10.1	0	3	Dry	SAND	SAND, some silt, trace clay, light brown, very loose, moist to wet
-		3	6.7	-	SAND-SILT	SAND AND SILT, trace clay, non-plastic, grey soft, moist to wet
-		6.7	8.4	-	SANDY SILT	SANDY SILT, trace clay, low plasticity, grey, wet
-		8.4	10.1	-	SILT	SILT, some trace sand, trace clay, low plasticity, grey, soft, wet
KP11-09	NI	0	0.5	Dry	BOULDER-COBBLES	BOULDER AND COBBLES, some sand, gravel and organics, trace fines, loose, damp, brown
-		0.5	8.5	Seepage (1.6)	GRAVEL-COBBLES	GRAVEL AND COBBLES, some silt and sand, loose, saturated, grey (colluvium and alluvium)
-		8.5	9.4	-	SAND-GRAVEL	SAND AND GRAVEL, loose to dense, saturated, grey, (colluvium and alluvium)
-		9.4	11	-	GRAVEL-COBBLES	GRAVEL AND COBBLES and sand, loose, saturated, grey, (colluvium and alluvium)
KP11-10	0.3	0	0.3	Dry	SAND	SAND, reddish brown, dark brown organic material
KP11-12	0.2	0	0.2	Dry	SAND	SAND, light brown
KP11-13	0.2	0	0.2	Dry	SAND	SAND, reddish brown, dark brown organic material, roots
KP11-14	0.3	0	0.3	Dry	SAND-GRAVEL	SAND AND GRAVEL, brownish-orange
KP11-15	0.3	0	0.3	Dry	SILT	SILT, some clay, trace sand, low plasticity, light brown, soft
KP11-38	3.7	0	1.45	Dry	SILTY-SAND	SILTY-SAND, trace gravel, trace caly, non plastic, grey to brown
-		1.45	2.1	Seepage (1.5)	SAND	SAND, some gravel, trace silt, trace clay, grey to brown, very dense, moist to wet
-		2.1	3.7	-	RUBBLE	RUBBLE

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: PSMF

Coordinates: 5,402,045 N , 548,226 E

Drillhole No.: KP11-04 **Page:** 1 of 2

Drill Type: CME75 Date Started: 23-Oct-11

Total Depth: 15.90 m Date Completed: 25-Oct-11

Elevation: 328.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS: RECOVERY / RQD / RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	PL MC LL (%) 20 40 60 80		
0.0	328.0		**OVERBURDEN** (0 to 0.3) OVERBURDEN (washed sample).													
1.0	327.0		(0.3 to 15.9) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		92			80	4	74.6	60			
2.0	326.0				2		100			80	4	100	74			
3.0	325.0				3		100			80	0	100	86			
4.0	324.0				4		100			80	0	100	86		3.7	
5.0	323.0															
6.0	322.0				5		80			80	4	80	60		6.7	
7.0	321.0				6		98.7			80	4	98.6	63			
8.0	320.0														7.9	
9.0	319.0				7		100			80	3	100	67			

SYMBOLS:

BULK · SPLITSPOON · THERMISTOR · BENTONITE · SLOUGH · GROUT

CORE · SHELBY TUBE · WELL · SAND · CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.1

I:\10\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-04 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Location: PSMF
Coordinates: 5,402,045 N , 548,226 E

Drill Type: CME75
Total Depth: 15.90 m
Elevation: 328.00 m
Inclination: -90

Date Started: 23-Oct-11
Date Completed: 25-Oct-11
Logged by: CWM
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK / SOIL	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	FIELD TESTS	RQD (%)	BLOW COUNTS (PER 0.15m)	RMR	SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS / SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
11.0	317.0				8		100			80	2		100		67				
12.0	316.0				9		100			80	1		100		72				
13.0	315.0				10		100			80	2		100		67				
14.0	314.0																		
15.0	313.0				11		100			80	0		100		92				
16.0	312.0		End of Drillhole: 15.9 m															15.9	
17.0	311.0																		
18.0	310.0																		
19.0	309.0																		

KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.1

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-05 **Page:** 1 of 3

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 30-Oct-11

Location: PSMF
Total Depth: 24.60 m
Date Completed: 31-Oct-11

Coordinates: 5,402,181 N , 547,644 E
Elevation: 321.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	FIELD TESTS	RQD (%)	BLOW COUNTS (PER 0.15m)	RMR	SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
1.0	320.0		**SAND** (0 to 3) SAND, some silt, trace clay, light brown, very loose, moist to wet.		SPT1		92							2/1/1/3		2			
					SPT2		92							0/0/0/0		0			
2.0	319.0				SPT3		48							0/1/3/4		4			
3.0	318.0		**SAND AND SILT** (3 to 6.7) SAND AND SILT, trace clay, non plastic, grey, soft, moist to wet.		SPT4		75							2/4/2/3		6			
4.0	317.0				SPT5		82							2/2/2/4		4			
					SPT6		77							2/4/3/1		7			
5.0	316.0				SPT7		80							2/3/3/5		6			
6.0	315.0				SPT8		77							0/1/3/4		4			
7.0	314.0		**SANDY SILT** (6.7 to 8.4) Sandy SILT, trace clay, low plasticity, grey, wet.		SPT9		82							7/5/7/8		12			
8.0	313.0		**SILT** (8.4 to 10.1) SILT, some sand, trace clay, low plasticity, grey, soft, wet.																
9.0	312.0				SPT10		100							4/1/2/3		3			

KEY ROCK MASS CHARACTERISTICS: PL MC LL (%) 20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.2

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-05 **Page:** 2 of 3

Contractor: DrillTec Environmental Inc.
Location: PSMF
Coordinates: 5,402,181 N , 547,644 E

Drill Type: CME75
Total Depth: 24.60 m
Elevation: 321.00 m
Inclination: -90

Date Started: 30-Oct-11
Date Completed: 31-Oct-11
Logged by: CWM
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
			(10.1 to 24.6) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		100			80	1	100	67		
11.0	310.0				2		100			80	3	100	67		
12.0	309.0				3		100			80	5	96	65		
13.0	308.0				4		100			80	2	98	65		
14.0	307.0				5		100			80	4	86	64		
15.0	306.0				6		100			80	2	100	67		
16.0	305.0				7		100			80	7	86	58		
17.0	304.0														
18.0	303.0														
19.0	302.0														

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK | SPLITSPOON | THERMISTOR | BENTONITE | SLOUGH | GROUT
CORE | SHELBY TUBE | WELL | SAND | CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.2

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-05 **Page:** 3 of 3

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 30-Oct-11

Location: PSMF
Total Depth: 24.60 m
Date Completed: 31-Oct-11

Coordinates: 5,402,181 N , 547,644 E
Elevation: 321.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR / SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE		PL MC LL (%) 20 40 60 80		
21.0	300.0				8		100			80	9	44	49			
22.0	299.0				9		100			80	2	100	67			
23.0	298.0				10		100			80	3	96	67			
24.0	297.0		End of Drillhole: 24.6 m													
25.0	296.0															
26.0	295.0															
27.0	294.0															
28.0	293.0															
29.0	292.0															

SYMBOLS:

BULK · SPLITSPOON · THERMISTOR · BENTONITE · SLOUGH · GROUT
CORE · SHELBY TUBE · WELL · SAND · CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

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Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.2

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-06 **Page:** 1 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 29-Oct-11

Location: PSMF
Total Depth: 15.80 m
Date Completed: 30-Oct-11

Coordinates: 5,401,958 N , 547,293 E
Elevation: 315.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	SPT 'N' VALUE	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
											FIELD TESTS	BLOW COUNTS (PER 0.15m)				
1.0	314.0		(0 to 15.8) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		95.7			80	7	85.9	60		1.2	
2.0	313.0				2		100			80	3	100	69			
3.0	312.0															
4.0	311.0				3		100			80	0	100	92		4.3	
5.0	310.0															
6.0	309.0				4		100			80	0	100	92		5.6	
7.0	308.0				5		100			80	3	94.6	65			
8.0	307.0															
9.0	306.0				6		100			80	1	100	74			

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.3

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-06 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 29-Oct-11

Location: PSMF
Total Depth: 15.80 m
Date Completed: 30-Oct-11

Coordinates: 5,401,958 N , 547,293 E
Elevation: 315.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	
11.0	304.0				7		100			80	4	96	67	
12.0	303.0				8		100			80	2	100	67	
13.0	302.0				9		100			80	0	100	92	
14.0	301.0													
15.0	300.0				10		100			80	1	100	86	
15.8			End of Drillhole: 15.8 m											
16.0	299.0													
17.0	298.0													
18.0	297.0													
19.0	296.0													

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

INSTRUMENTATION / WELL DEPTHS (m)

SYMBOLS:

BULK | SPLITSPOON | THERMISTOR | BENTONITE | SLOUGH | GROUT
CORE | SHELBY TUBE | WELL | SAND | CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.3

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-09 **Page:** 1 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 11-Oct-11

Location: Process Water Pond
Total Depth: 12.00 m
Date Completed: 12-Oct-11

Coordinates: 5,402,391 N , 549,191 E
Elevation: 272.00 m
Logged by: CNH

Inclination: -90
Reviewed by: CWM

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	FIELD TESTS	RQD (%) / BLOW COUNTS (PER 0.15m)	RMR / SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
			BOULDER AND COBBLES (0 to 0.5) Boulders and Cobbles, some sand, gravel and organics, trace fines, loose, damp, brown.														
1.0	271.0		**GRAVEL AND COBBLES** (0.5 to 8.5) Gravel and Cobbles, some silt and sand, loose, saturated, grey (Colluvium and Alluvium). - Poor recovery, silt and fine sand washing from drillhole during coring and casing advancement.		1		25										
2.0	270.0																
3.0	269.0																
4.0	268.0																
5.0	267.0				SPT1		33						10/9/6/10	15			
6.0	266.0																
7.0	265.0																
8.0	264.0																
9.0	263.0		**SAND AND GRAVEL** (8.5 to 9.4) Sand and Gravel, loose to dense, saturated, grey (Colluvium and Alluvium). - Poor recovery, sand and silt washing from drillhole during coring and casing advancement.		SPT2		25						18/18/26/22	44			
					2		50										

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.4

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-09 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 11-Oct-11

Location: Process Water Pond
Total Depth: 12.00 m
Date Completed: 12-Oct-11

Coordinates: 5,402,391 N , 549,191 E
Elevation: 272.00 m
Logged by: CNH

Inclination: -90
Reviewed by: CWM

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR / SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
											FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	PL MC LL (%) 20 40 60 80		
			GRAVEL AND COBBLES (9.4 to 11) Gravel and Cobbles and Sand, loose, saturated, grey (Colluvium and Alluvium).		3		35									
			- Poor recovery, sand washing from hole.													
11.0	261.0		- Drill rods stuck in casing due to sanding in of casing at bottom depth.													
12.0	260.0		End of Drillhole: 12 m													
13.0	259.0															
14.0	258.0															
15.0	257.0															
16.0	256.0															
17.0	255.0															
18.0	254.0															
19.0	253.0															

SYMBOLS:

BULK · SPLITSPOON · THERMISTOR · BENTONITE · SLOUGH · GROUT
CORE · SHELBY TUBE · WELL · SAND · CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.4

I:\10\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: PSMF

Coordinates: 5,402,595 N , 548,035 E

Drillhole No.: KP11-10 **Page:** 1 of 2

Drill Type: CME75 Date Started: 21-Oct-11

Total Depth: 15.70 m Date Completed: 22-Oct-11

Elevation: 360.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS / SPT TEST 'N' VALUES	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE			
1.0	359.0		(0 to 15.7) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		100			80	4	99.3	63		0.9	
2.0	358.0				2		100			80	0	100	92			
3.0	357.0				3		100			80	4	92.6	67			
4.0	356.0				4		100			80	4	100	63			
5.0	355.0				5		100			80	4	94.6	67			
6.0	354.0				6		100			80	4	100	65		7 7.3	
7.0	353.0				7		100			80	4	100	67			
8.0	352.0															
9.0	351.0															

KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%) 20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT, CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.5

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-10 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 21-Oct-11

Location: PSMF
Total Depth: 15.70 m
Date Completed: 22-Oct-11

Coordinates: 5,402,595 N , 548,035 E
Elevation: 360.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
											FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE		
11.0	349.0				8		100			80	4	100	65		
12.0	348.0				9		100			80	4	96	63		
13.0	347.0				10		100			80	1	100	74		
14.0	346.0				11		100			80	3	94.6	65		
15.0	345.0		End of Drillhole: 15.7 m											15.7	
16.0	344.0														
17.0	343.0														
18.0	342.0														
19.0	341.0														

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK | SPLITSPOON | THERMISTOR | BENTONITE | SLOUGH | GROUT
CORE | SHELBY TUBE | WELL | SAND | CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.5

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-12 **Page:** 1 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 19-Oct-11

Location: PSMF
Total Depth: 14.30 m
Date Completed: 20-Oct-11

Coordinates: 5,402,746 N , 546,617 E
Elevation: 320.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	FIELD TESTS / BLOW COUNTS (PER 0.15m) / SPT 'N' VALUE	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
			OVERBURDEN (0 to 0.2) OVERBURDEN (washed sample).												0.4	
1.0	319.0		(0.2 to 14.3) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		100			80	8	92.6	68			
2.0	318.0				2		100			80	0	100	86			
3.0	317.0				3		100			80	2	100	71			
4.0	316.0				4		100			80	6	98.6	71			
5.0	315.0				5		100			80	9	78	61			
6.0	314.0														6.49	
7.0	313.0				6		100			80	1	100	74			
8.0	312.0														7.6	
9.0	311.0				7		100			80	2	100	73			

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK SPLITSPOON THERMISTOR BENTONITE SLOUGH GROUT
CORE SHELBY TUBE WELL SAND CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.6

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-12 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Location: PSMF
Coordinates: 5,402,746 N , 546,617 E

Drill Type: CME75
Total Depth: 14.30 m
Elevation: 320.00 m
Inclination: -90

Date Started: 19-Oct-11
Date Completed: 20-Oct-11
Logged by: CWM
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	FIELD TESTS	RQD (%)	BLOW COUNTS (PER 0.15m)	RMR	SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS: RECOVERY / RQD / RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
11.0	309.0				8		100			80	1		100		74				
12.0	308.0				9		100			80	2		100		67				
13.0	307.0				10		100			80	1		100		74				
14.0	306.0		End of Drillhole: 14.3 m															14.3	
15.0	305.0																		
16.0	304.0																		
17.0	303.0																		
18.0	302.0																		
19.0	301.0																		

PL MC LL (%) 20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT, CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.6

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: PSMF

Coordinates: 5,402,848 N , 546,483 E

Drillhole No.: KP11-13 **Page:** 1 of 2

Drill Type: CME75 Date Started: 18-Oct-11

Total Depth: 14.80 m Date Completed: 19-Oct-11

Elevation: 331.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	SPT 'N' VALUE
			OVERBURDEN (0 to 0.2) OVERBURDEN (washed sample).											
1.0	330.0		(0.2 to 14.8) Rock Type: Augite Syenite Colour: Black, green Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		100			80	11	83.3	62	
2.0	329.0				2		100			80	1	88.6	64	
3.0	328.0				3		100			80	6	92.6	65	
4.0	327.0				4		99			80	2	100	67	
5.0	326.0				5		97			80	2	100	65	
6.0	325.0				6		100			80	1	100	68	
7.0	324.0				7		100			80	0	100	86	
8.0	323.0													
9.0	322.0													

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

INSTRUMENTATION / WELL DEPTHS (m)
0
0.6
6.9
9.1

INSTRUMENTATION / WELL DETAILS

SYMBOLS:

BULK SPLITSPOON THERMISTOR BENTONITE SLOUGH GROUT

CORE SHELBY TUBE WELL SAND CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.7

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-13 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 18-Oct-11

Location: PSMF
Total Depth: 14.80 m
Date Completed: 19-Oct-11

Coordinates: 5,402,848 N , 546,483 E
Elevation: 331.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	FIELD TESTS	RQD (%)	BLOW COUNTS (PER 0.15m)	RMR	SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
11.0	320.0				8		100			80	2		100		65				
12.0	319.0				9		100			80	5		89.3		64				
13.0	318.0																		
14.0	317.0				10		100			80	0		100		86				
15.0	316.0		End of Drillhole: 14.8 m																
16.0	315.0																		
17.0	314.0																		
18.0	313.0																		
19.0	312.0																		

KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR
SPT TEST 'N' VALUES - ×
PL MC LL (%) 20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.7

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-14 **Page:** 1 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 17-Oct-11

Location: PSMF
Total Depth: 12.80 m
Date Completed: 17-Oct-11

Coordinates: 5,403,275 N , 546,605 E
Elevation: 328.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE		
1.0	327.0		(0 to 12.8) Rock Type: Augite Syenite Colour: Grey/black Fabric and Textures: Medium to coarse grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		100			80	0	100	92		
2.0	326.0				2		100			80	0	100	92		
3.0	325.0				3		100			80	2	96	67	2.61	
4.0	324.0				4		98.6			80	2	98.6	65		
5.0	323.0				5		98.6			80	4	98.6	63		
6.0	322.0				6		100			80	2	99.3	63	7.18	
7.0	321.0				7		99.3			80	3	95.3	63		
8.0	320.0													9.1	
9.0	319.0														

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK | SPLITSPOON | THERMISTOR | BENTONITE | SLOUGH | GROUT
CORE | SHELBY TUBE | WELL | SAND | CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.8

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-14 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 17-Oct-11

Location: PSMF
Total Depth: 12.80 m
Date Completed: 17-Oct-11

Coordinates: 5,403,275 N , 546,605 E
Elevation: 328.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS / SPT TEST 'N' VALUES	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE				
11.0	317.0				8		100			80	0	100	92			
12.0	316.0				9		100			80	0	100	92			
			End of Drillhole: 12.8 m												12.8	
13.0	315.0															
14.0	314.0															
15.0	313.0															
16.0	312.0															
17.0	311.0															
18.0	310.0															
19.0	309.0															

KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR
SPT TEST 'N' VALUES - ×
PL MC LL (%) 20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.8

I:\1101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: PSMF

Coordinates: 5,403,870 N , 547,245 E

Drillhole No.: KP11-15 **Page:** 1 of 2

Drill Type: CME75 Date Started: 14-Oct-11

Total Depth: 15.50 m Date Completed: 17-Oct-11

Elevation: 348.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
0.0	348.0		**SILT** (0 to 0.3) SILT, some clay, trace sand, low plasticity, light brown, soft.															
			(0.3 to 15.5) Rock Type: Augite Syenite Colour: Grey, black, green Fabric and Textures: Medium grained Weathering: Fresh Discont. Type: Joints Other: Dominant minerals observed in field are olivine and horneblende		1		97.3			80	5	94.5	67					
1.0	347.0																	
2.0	346.0				2		99.3			80	2	95.3	67					
3.0	345.0																	
4.0	344.0				3		100			80	2	96	67					
5.0	343.0				4		100			80	1	100	65					
6.0	342.0																	
7.0	341.0				5		100			87.5	1	100	57					
8.0	340.0				6		100			80	1	100	66					
9.0	339.0																	

KEY ROCK MASS CHARACTERISTICS
RECOVERY
RQD
RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)
20 40 60 80

SYMBOLS:

BULK SPLITSPOON THERMISTOR BENTONITE SLOUGH GROUT

CORE SHELBY TUBE WELL SAND CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.9

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-15 **Page:** 2 of 2

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 14-Oct-11

Location: PSMF
Total Depth: 15.50 m
Date Completed: 17-Oct-11

Coordinates: 5,403,870 N , 547,245 E
Elevation: 348.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK / SOIL	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR; SPT TEST 'N' VALUES - ×	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	PL MC LL (%) 20 40 60 80		
11.0	337.0				7		95.3			80	1	100	65			
12.0	336.0				8		100			80	2	98.6	67			
13.0	335.0				9		100			80	0	100	92			
14.0	334.0				10		100			80	0	100	92			
15.0	333.0		End of Drillhole: 15.5 m													
16.0	332.0															
17.0	331.0															
18.0	330.0															
19.0	329.0															

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.9

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINT\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: Process Water Pond

Coordinates: 5,402,415 N , 548,968 E

Drillhole No.: KP11-38 **Page:** 1 of 3

Drill Type: CME75 Date Started: 26-Oct-11

Total Depth: 20.40 m Date Completed: 26-Oct-11

Elevation: 293.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	FIELD TESTS	BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE	KEY ROCK MASS CHARACTERISTICS / SPT TEST 'N' VALUES	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
0.0	293.0		**SILTY SAND** (0 to 1.45) Silty SAND, trace gravel, trace clay, non plastic, grey to brown, dense, moist.														RECOVERY RQD RMR SPT TEST 'N' VALUES - × PL MC LL (%) 20 40 60 80		
1.0	292.0				SPT1		75								13/14/15/12	29	×		
			SAND (1.45 to 2.1) SAND, some gravel, trace silt, trace clay, grey to brown, very dense, moist to wet.		SPT2		48								10/30/R	R			
2.0	291.0		**RUBBLE** (2.1 to 3.7) RUBBLE (washed sample).																
3.0	290.0				SPT3		0												
4.0	289.0		(3.7 to 8.3) Rock Type: Aphanitic Intrusive Dyke Colour: Dark reddish grey Weathering: Fresh Discont. Type: Joints, calcite veins		1		100			50	25	64	57						
5.0	288.0																		
6.0	287.0				2		100			50	2	97	64						
7.0	286.0				3		100			50	4	94	62						
8.0	285.0																		
9.0	284.0		(8.3 to 11.3) Rock Type: Aphanitic Intrusive Dyke Colour: Dark reddish grey Weathering: Fresh Discont. Type: Faults, calcite veins		4		100			50	10	80	54						

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT, CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.10

I:\101\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Contractor: DrillTec Environmental Inc.

Location: Process Water Pond

Coordinates: 5,402,415 N , 548,968 E

Drillhole No.: KP11-38 **Page:** 2 of 3

Drill Type: CME75 Date Started: 26-Oct-11

Total Depth: 20.40 m Date Completed: 26-Oct-11

Elevation: 293.00 m Logged by: CWM

Inclination: -90 Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SOIL / ROCK	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS	NoD	RQD (%)	RMR	KEY ROCK MASS CHARACTERISTICS / SPT TEST 'N' VALUES	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
										FIELD TESTS		BLOW COUNTS (PER 0.15m)	SPT 'N' VALUE			
11.0	282.0				5		100			50	14	60	62			
12.0	281.0		(11.3 to 14.6) Rock Type: Augite Syenite Colour: orangey red/black, hematite staining Fabric and Textures: Medium grained Weathering: Fresh Discont. Type: Fault, brecciation Other: Horneblende crystals		6		100			50	27	54	55			
13.0	280.0				7		100			50	11	87	66			
14.0	279.0															
15.0	278.0		(14.6 to 20.4) Rock Type: Aphanitic Dyke Colour: Dark reddish grey Weathering: Fresh Discont. Type: Joints Other: Remnants of augite syenite in dyke		8		100			50	9	85	64			
16.0	277.0				9		100			50	17	72	60			
17.0	276.0															
18.0	275.0				10		96			50	7	87	64			
19.0	274.0				11		100			80	3	100	69			

KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR

SPT TEST 'N' VALUES - ×

PL MC LL (%)

20 40 60 80

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT, CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.10

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Project: Marathon PGM-Cu Project

Drillhole No.: KP11-38 **Page:** 3 of 3

Contractor: DrillTec Environmental Inc.
Drill Type: CME75
Date Started: 26-Oct-11

Location: Process Water Pond
Total Depth: 20.40 m
Date Completed: 26-Oct-11

Coordinates: 5,402,415 N , 548,968 E
Elevation: 293.00 m
Logged by: CWM

Inclination: -90
Reviewed by: RDW

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	ROCK / SOIL	SAMPLE / RUN No.	SAMPLED CORE	RECOVERY (%)	RECOVERED SAMPLE TYPE	PERMEABILITY TESTING (cm/s)	UCS / FIELD TESTS	NoD / BLOW COUNTS (PER 0.15m)	RQD (%) / SPT 'N' VALUE	RMR	KEY ROCK MASS CHARACTERISTICS: RECOVERY, RQD, RMR; SPT TEST 'N' VALUES - ×; PL MC LL (%) 20 40 60 80	INSTRUMENTATION / WELL DEPTHS (m)	INSTRUMENTATION / WELL DETAILS
			End of Drillhole: 20.4 m													
21.0	272.0															
22.0	271.0															
23.0	270.0															
24.0	269.0															
25.0	268.0															
26.0	267.0															
27.0	266.0															
28.0	265.0															
29.0	264.0															

SYMBOLS:

BULK, SPLITSPOON, THERMISTOR, BENTONITE, SLOUGH, GROUT
CORE, SHELBY TUBE, WELL, SAND, CONCRETE

Stillwater Canada Inc.
Marathon PGM-Cu Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
NB101-446/2	3	0

FIGURE A1.10

I:\1\01\00446\02\A\DATA\2011 SUMMER DRILLING PROGRAM\DRILLHOLE LOGS\MARATHON.GPJ
I:\0\GINTL\LIBRARY\KP LIB.GLB, DRILLHOLE LOG - MARATHON PROJECT, KP DATA TEMPLATE.GDT, 16-Nov-11

Table E5: Physical Description Test Pits (Source: AMEC, 2010)						
Test Pit ID	**OB (m)**	**From (m)**	**To (m)**	**g.w. level (m)**	**Dominant Sediment**	**Description**
ATP-10-01	2.1	0	0.3	Dry	SILT- SAND- GRAVEL	Dark brown silt, sand and gravel
-		0.3	2.1	-	SILT	Gray silt till
ATP-10-02	1.8	0	0.3	Dry	TOP SOIL	Dark brown, oxidized
-		0.3	1.8	-	SILT	Gray silt till
ATP-10-03	2.7	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	CLAY	Brown clay
-		1.5	2.7	-	SILT	Light brown very fine sand silt
ATP-10-04	3.6	0	3.6	Dry	CLAY	Brown clay - varved
ATP-10-05	3 sloping to 1.8	0	0.1	Dry	TOP SOIL	Black topsoil on sloping rock surface
-		0.1	1.6/2.8	-	CLAY	Brown clay
-		1.6/2.8	1.8/3.0	-	SILT	Gray silt till
ATP-10-06	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	3.9	-	CLAY	Brown clay - varved
ATP-10-07	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	2.1	-	CLAY	Light brown dessicated clay
-		2.1	3.9	-	CLAY	Soft gray clay
ATP-10-08	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	3.3	-	CLAY	Brown clay
-		3.3	3.9	-	CLAY	Gray clay
ATP-10-09	3.6	0	2.4	Dry	CLAY	Brown clay
-		2.4	3.6	-	SILT	Silt
ATP-10-10	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	2.4	-	CLAY	Brown clay
-		2.4	3	-	SAND-SILT	Light brown very fine sand/silt
ATP-10-11	3.6	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	2.4	-	SILT-CLAY	Brown clay
-		2.4	3.6	Seepage (3.0)	CLAY-SILT	Gray clay with stratified sand and silt
ATP-10-12	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.8	-	CLAY	Brown clay (dry)
-		1.8	3	-	SILT-CLAY	Clayey silt
ATP-10-13	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	0.6	-	CLAY-SILT	Silty clay - varved
-		0.6	3.9	-	SILT-CLAY	Light brown clay - varved with silt
ATP-10-14	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	3	-	CLAY-SILT	Stratified brown clay
-		3	3.9	-	SILT	Clayey silt
ATP-10-15	2.4	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	0.3	-	SAND	Oxidized

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
-		0.3	2.4	-	SAND	Gray sand becoming coarse with depth
ATP-10-16	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	3	-	CLAY	Clay rich
ATP-10-17	2.4	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	2.4	-	SILT	Clayey till
ATP-10-18	1.5	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	CLAY	Clay
ATP-10-19	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.8	-	CLAY	Stratified brown clay-varved
-		1.8	3.9	Seepage (3.9)	CLAY	Gray clay (moist)
ATP-10-20	3.9	0	0.2	Dry	TOP SOIL	Organic rich
-		0.2	3.9	Seepage (3.9)	CLAY	Brown clay-varved
ATP-10-21	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	2.4	-	CLAY	Stratified brown clay (dry)
-		2.4	3.9	Seepage (3.6)	CLAY	Stratified gray clay (moist)
ATP-10-22	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	CLAY-SILT	Brown silty clay
-		1.5	3.9	-	CLAY-SILT	Clayey silt, stratified with bands of silt
ATP-10-23	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	CLAY	Brown clay
-		1.5	3	-	CLAY-SILT	Gray clayey silt
ATP-10-24	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	CLAY-SILT	Brown stratified silty clay
-		1.5	3	-	CLAY-SILT	Gray stratified silty clay
ATP-10-25	4.2	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	SILT	Brown stratified silty clay
-		1.5	4.2	-	SILT	Gray stratified slighty silty clay
ATP-10-26	1.2	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.2	-	SILT-CLAY	Brown stratified clay (dry)
ATP-10-27	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	3.9	-	SILT	Light brown slightly clayey stratified silt
ATP-10-28	0.5	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	0.5	-	CLAY	Clay
ATP-10-29	1.2	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.2	-	SILT	Light brown silt with a touch of stratified clay
ATP-10-30	1.5	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	-	SILT	Silt
ATP-10-31	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.2	-	SILT	Silt

Test Pit ID	OB (m)	From (m)	To (m)	g.w. level (m)	Dominant Sediment	Description
-		1.2	3.9	Seepage (3.3)	CLAY-SILT	Light brown silty clay
ATP-10-32	3.9	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.2	-	CLAY-SILT	Light brown clayey silt
-		1.2	2.7	Seepage (1.2)	SILT-CLAY	Silty clay (moist)
-		2.7	3.9	-	CLAY	Gray clay
ATP-10-33	3	0	0.1	Dry	TOP SOIL	Organic rich
-		0.1	1.5	Seepage (0.9)	SILT-CLAY	Light brown silty clay (moist)
-		1.5	3	-	SILT-CLAY	Gray silty clay

AMEC Earth and Environmental
Project: Marathon PGM-Cu
No.: TX 10112403

Date: May 18, 2010

Test Pits done by Kurt McKay

Test Pit

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-01		0.3	Dark brown silt, sand and gravel	Photos 1281-1284
			Gray Silt till	Photos 1285-1287: possible clay silt till on slope of hill
				NAD 27 GPS #16: 5401189 N 550434 E
				Sample 1 @ 1.2 m (Wet)
				Sample 2 @ 2.1 m (Dry)
	2.1			Till PGM-1

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-02		0.3	Dark brown/ oxidized (includes topsoil)	Photo 1293
		1.5	Gray silt till	Sample @ 1.5 m
	1.8		Bedrock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-03		0.1	Organic	Photos 1294, 1298, 1300
		1.4 (Sloping)	Brown clay	Sample 1 @ 0.3-1.5 m
	2.7	1.2	Light brown very fine sand silt	Sample 2 @ 2.1-2.7 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-04		3.6	Brown clay - varved	Photos 1301-1310
				Sample 1 @ 1.2 m
	3.6			Sample 2 @ 3.6 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-05		0.1	Black topsoil	On slope 3.0 m to 1.8 m on rock
		2.7 sloping to 1.5	Brown clay	
				Photos 1312-1316
		0.2	Dark gray silt till	
				Sample 1 @ 1.2 m
	3.0 sloping to 1.8		Bedrock	Sample 2 @ 3.0 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-06		0.1	Organic	Photos 1317-1320
		3.8	Brown clay - varved	Sample 1 @ 1.2 m
	3.9			Sample 2 @ 3.9 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-07		0.1	Organic	Photos 1323-1328
		2.0	Light brown desiccated clay	Sample 1 @ 1.2 m
	3.9	1.8	Soft gray clay	Sample 2 @ 3.9 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-08		0.1	Organic	Photos 1329-1337
		3.2	Brown clay	Sample 1 @ 2.1 m
	3.9	0.6	Gray clay	Sample 2 @ 3.9 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-09		2.4	Brown clay	Photos 1338-1343
		1.2	Silt	Sample 1 @ 1.2 m
	3.6			Sample 2 @ 3.6 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-10		0.1	Organic	Photos 1344-1347
		2.6	Brown clay	Sample 1 @ 2.4 m
	3.0	0.3	Light brown very fine sand/ silt	Sample 2 @ 3.0 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-11		0.1	Organic	Photos 1348-1359
		2.3	Brown clay	Sample 1 @ 2.1 m
		1.2	Gray clay with stratified sand & silt (Wet)	Sample 2 @ 3.6 m
	3.6			Water infiltration @ 3.0 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-12		0.1	Organic	Photos 1372-1373
		1.7	Brown clay (Dry)	Sample 1 @ 1.2 m
	3.0	1.2	Clayey silt	Sample 2 @ 3.0 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-13		0.1	Organic	Photo 1374
		0.5	Silty clay - varved	Sample 1 @ 1.2 m varved
		3.4	Light brown clay - varved and silt	Sample 2 @ 3.9 m varved
	3.9			silt clay layers

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-14		0.1	Organic	
		2.9	Stratified brown clay	Sample 1 @ 0.9 m
	3.9	0.9	Clayey silt	Sample 2 @ 3.9 m

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-15		0.1	Organic	Sample @ 2.4 m
		0.2	Oxidized	
	2.4	2.1	Gray sand becoming coarse with depth	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-16		0.1	Organic	Sample @ 1.2 m
		2.9	Clay	Area estimate: 10 m x 30 m x 3 m
	3.0		Rock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-17		0.1	Organic	Sample @ 1.5 m
		2.3	Clayey till	Area estimate: 20 m x 20 m x 2 m
	2.4		Bedrock (Rock slopes up & down)	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-18		0.1	Organic	Sample @ 1.5 m
		1.4	Clay	
	1.5		Bedrock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-19		0.1	Organic	Sample @ 3.9 m
		1.7	Stratified brown clay - varved	
	3.9	2.1	Gray clay (Moist)	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-20		0.2	Organic	Sample 1 @ 1.5 m
		3.7	Brown clay - varved	Sample 2 @ 3.9 m (Moist) (slight water accumulation after 10 minutes)
	3.9			

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-21		0.1	Organic	Sample 1 @ 1.5 m
		2.3	Stratified brown clay (Dry)	Sample 2 @ 3.6 m
	3.9	1.5	Stratified gray clay (Moist)	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-22		0.1	Organic	Sample @ 3.9 m
		1.4	Brown silty clay	
	3.9	2.4	Clayey silt, stratified wide bands of silt	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-23		0.1	Organic	Sample @ 3.0 m
		1.4	Brown clay	Hill Slope
	3.0	1.5	Gray clayey silt - stratified	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-24		0.1	Organic	Sample @ 3.0 m
		1.4	Brown stratified silty clay	
	3.0	1.5	Gray stratified silty clay	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-25		0.1	Organic	Sample @ 3.9 m
		1.4	Brown stratified silty clay	
		2.7	Gray stratified slightly silty clay	
	4.2		Bedrock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-26		0.1	Organic	Sample @ 0.9 m
		1.1	Brown stratified clay (Dry)	
	1.2		Bedrock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-27		0.1	Organic	Sample @ 3.9 m
	3.9	3.8	Light brown slightly clayey stratified silt	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-28		0.1	Organic	
		0.4	Clay	
	0.5		Bedrock	

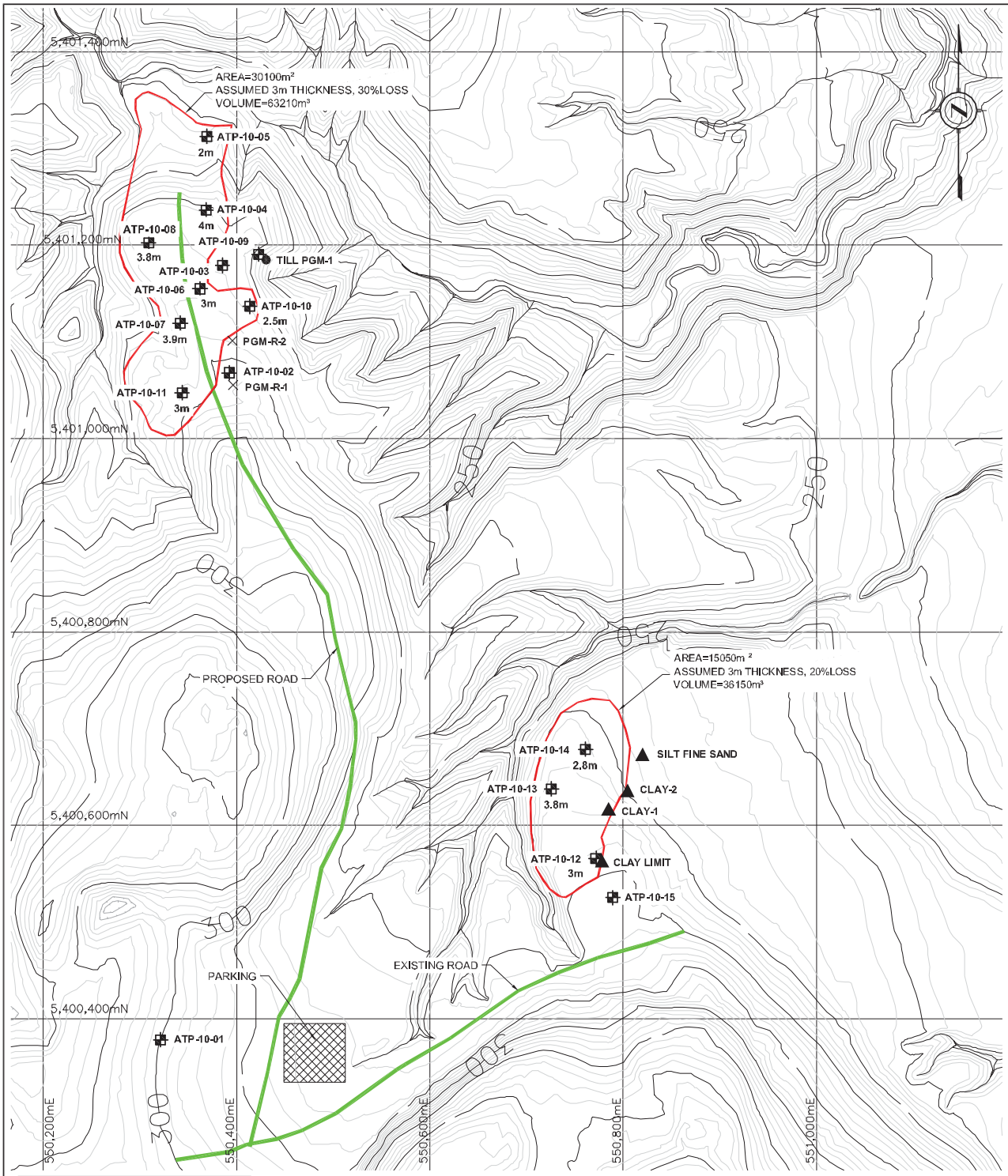
	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-29		0.1	Organic	
	1.2	1.1	Light brown silt with touch of stratified clay	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP-10-30		0.1	Organic	
		1.4	Silt	
	1.5		Bedrock	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-31		0.1	Organic	Sample @ 3.9 m
		1.1	Silt	Water infiltration @ 3.3 m
	3.9	2.7	Light brown silty clay (Moist)	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-32		0.1	Organic	Sample @ 3.9 m
		1.1	Light brown clayey silt	
		1.5	Silty clay (Moist)	
	3.9	1.2	Gray clay	

	Total Depth (m)	Thickness (m)	Description	Notes
ATP 10-33		0.1	Organic	On Slope
		1.4	Light brown silty clay (becoming moist @ 0.9 m)	Sample @ 3.0 m
	3.0	1.5	Gray silty clay	



TEST PIT IDENTIFICATION AND LOCATION		
TEST PIT ID	EASTING	NORTHING
APT10-01	550 321	5 400 378
TILL PGM-1	550 431	5 401 185
PGM-R-1	550 396	5 401 055
ATP-10-02	550 392	5 401 068
ATP-10-03	550 385	5 401 179
ATP-10-04	550 369	5 401 236
ATP-10-05	550 369	5 401 312
ATP-10-06	550 362	5 401 155
ATP-10-07	550 342	5 401 119
PGM-R2	550 396	5 401 101
ATP-10-08	550 309	5 401 203
ATP-10-09	550 423	5 401 191
ATP-10-10	550 414	5 401 137
ATP-10-11	550 344	5 401 047
CLAY1	550 785	5 400 610
SILT FINE SAND	550 820	5 400 666
CLAY-2	550 804	5 400 629
ATP-10-12	550 772	5 400 566
ATP-10-13	550 726	5 400 637
ATP-10-14	550 761	5 400 679
ATP-10-15	550 789	5 400 525
CLAY LIMIT	550 778	5 400 556

LEGEND:

LIMIT OF ESTIMATED BORROW AREA

NOTES:

1. ALL PROPOSED TEST PITS COORDINATES ARE APPROXIMATE AND LOCATION MAY CHANGE ACCORDING TO SITE RESULTS
2. BASE MAP PROVIDED BY MARATHON PGM CORPORATION
3. DATUM: NAD 27 PROJECTION : UTM ZONE 16N.
4. ELEMENTS SHOWN ON THIS DRAWING DO NOT NECESSARILY REFLECT MINE DEVELOPMENT.
5. ALL DIMENSIONS IN METERS.

SCALE: 1:4000

0 100 200 300 400 500m

P:\Project\TX1010\TX10112403 Marathon PGM-Cu Site Inspection\Dessins\4_rev1.dwg

NOT FOR CONSTRUCTION

amec

CLIENT :

Marathon PGM CORPORATION

PROJECT :

MARATHON PGM-Cu
GEOTECHNICAL STUDY
TEST PITS LOCATION
SOUTH SIDE-PLAN VIEW

MARATHON, ONTARIO

DATE :	SCALE :
10-10-15	1:4000

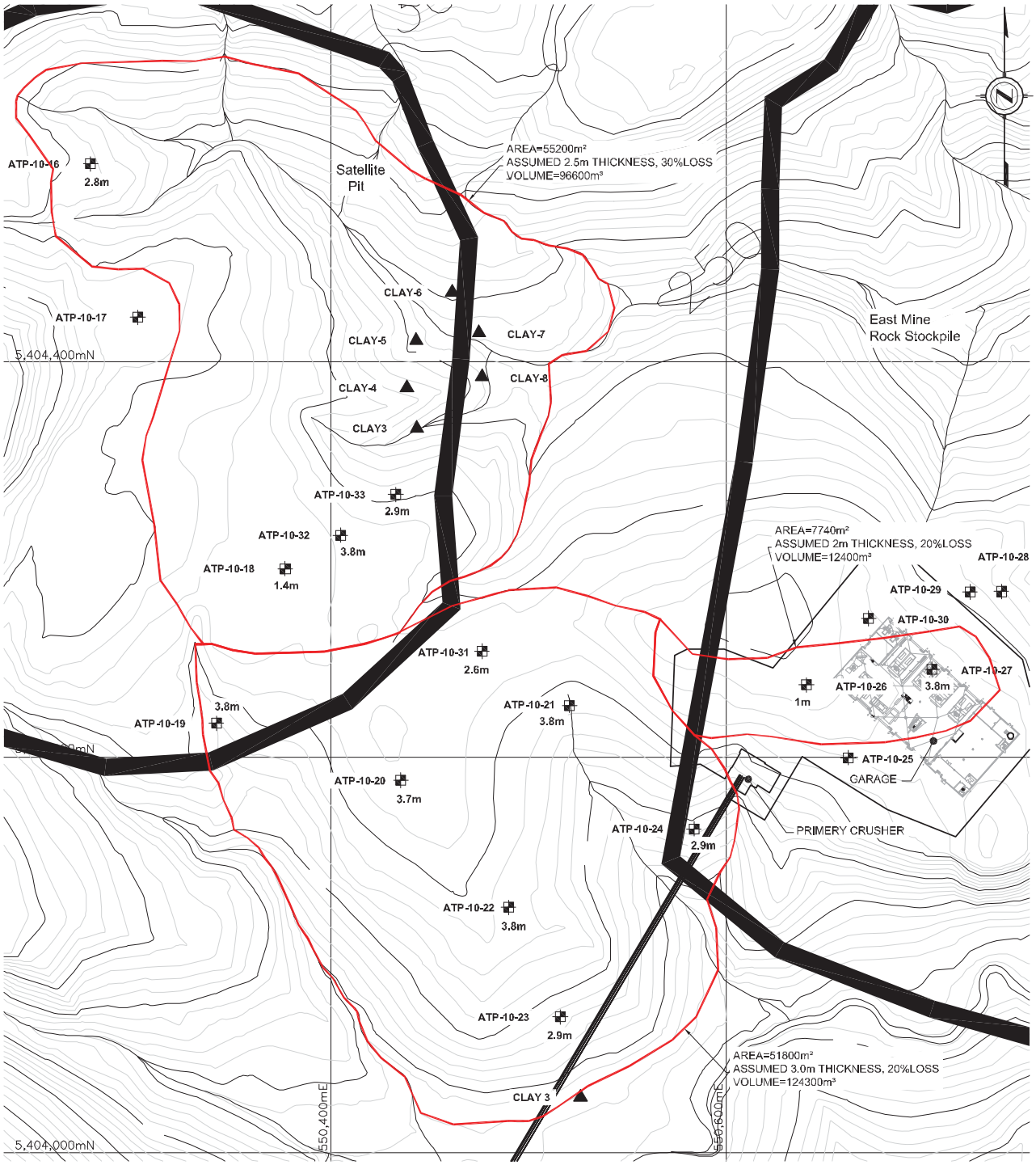
DRAWN BY : S. OLYAIE, Tech.

PROJECTED BY : P. ROBERGE, Eng.

APPROVED BY : P. ROBERGE, Eng.

PROJECT No. :	DRAWING No. :	REV. :
TX10 1124 03, 1000	4	A

Sanaz.Olyaie



TEST PIT IDENTIFICATION AND LOCATION		
TEST PIT ID	EASTING	NORTHING
ATP-10-16	550 278	5 404 500
ATP-10-17	550 302	5 404 423
ATP-10-18	550 377	5 404 295
ATP-10-19	550 342	5 404 217
ATP-10-20	550 435	5 404 189
ATP-10-21	550 521	5 404 226
ATP-10-22	550 490	5 404 124
CLAY 3	550 526	5 404 028
ATP-10-23	550 516	5 404 069
ATP-10-24	550 584	5 404 164
ATP-10-25	550 662	5 404 200
ATP-10-26	550 641	5 404 237
ATP-10-27	550 704	5 404 245
ATP-10-28	550 739	5 404 284
ATP-10-29	550 723	5 404 284
ATP-10-30	550 672	5 404 270
ATP-10-31	550 476	5 404 254
ATP-10-32	550 405	5 404 312
CLAY3	550 443	5 404 366
CLAY-4	550 438	5 404 387
CLAY-5	550 443	5 404 411
CLAY-6	550 461	5 404 435
CLAY-7	550 475	5 404 415
CLAY-8	550 476	5 404 393
ATP-10-33	550 433	5 404 333

LEGEND:

LIMIT OF ESTIMATED BORROW AREA

NOTES:

1. ALL PROPOSED TEST PITS COORDINATES ARE APPROXIMATE AND LOCATION MAY CHANGE ACCORDING TO SITE RESULTS
2. BASE MAP PROVIDED BY MARATHON PGM CORPORATION
3. DATUM: NAD 27 PROJECTION : UTM ZONE 16N.
4. ELEMENTS SHOWN ON THIS DRAWING DO NOT NECESSARILY REFLECT MINE DEVELOPMENT.
5. ALL DIMENSIONS IN METERS.

SCALE 1:2 000

0 40 80 120 160 200m

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amec

CLIENT :

Marathon PGM CORPORATION

PROJECT :

MARATHON PGM-Cu
GEOTECHNICAL STUDY
TEST PITS LOCATION
NORTH SIDE – PLAN VIEW

MARATHON, ONTARIO

DATE :	SCALE :
10-10-15	1:2000
DRAWN BY : C. LAPLANTE, Tech.	
PROJECTED BY : P. ROBERGE, Eng.	
APPROVED BY : P. ROBERGE, Eng.	

PROJECT No. :	DRAWING No. :	REV. :
TX10 1124 03, 1000	5	A