

Appendix 7-B

2012 Geotechnical Site Investigation Factual Report

HARPER CREEK PROJECT

**Application for an Environmental Assessment Certificate /
Environmental Impact Statement**

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**



**2012 GEOTECHNICAL SITE INVESTIGATION
FACTUAL REPORT**

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VA101-458/7-1
Rev 0
July 25, 2013

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ISO 9001 FS 64925
ISO 14001 EMS 550121
OHSAS 18001 - OHS 550122

YELLOWHEAD MINING INC. HARPER CREEK PROJECT

2012 GEOTECHNICAL SITE INVESTIGATION FACTUAL REPORT VA101-458/7-1

Rev	Description	Date	Approved
0	Issued in Final	July 25, 2013	

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EXECUTIVE SUMMARY

Knight Piésold Ltd. (KPL) was commissioned by Yellowhead Mining Inc. (YMI), in the spring of 2012, to complete a geotechnical site investigation program at the Harper Creek Project. The Harper Creek Project is a proposed copper-gold-silver mine located approximately 12 km southwest of Vavenby, B.C, south of the North Thompson River at an elevation of approximately 1800 m. The proposed open pit mine will extract approximately 700 Mt of ore, processed at 70,000 tonnes per day over the 28 year mine life. A tailings management facility (TMF), south of the open pit, will store all 704 million tonnes of tailings and 206 million tonnes of Potentially Acid Generating (PAG) waste rock produced during the mine life utilizing a 180 m high embankment.

The 2012 Geotechnical Site Investigation (SI) program commenced on July 17 and was completed on October 15, 2012. The primary objective of the site investigation program was to evaluate the overburden, geotechnical and hydrogeological conditions at the open pit, TMF and the overburden, waste rock and low grade stockpiles. The following activities were completed over the course of the site investigation:

- Eight geotechnical drillholes utilizing ODEX and diamond drilling methods completed at the TMF, rock quarry, and the overburden, waste rock and low grade stockpile areas.
- Twenty-eight overburden holes completed using ODEX drilling methods. Ten holes were completed within the open pit area and eighteen were completed within the TMF area.
- Installation of 10 long term monitoring wells across the project area.
- Installation of standpipe piezometers in seven out of eight geotechnical drillholes.

In situ hydrogeological testing, using Lugeon (Single Packer) and Falling Head Response testing methods, was completed in all geotechnical drillholes. Response Tests were also completed after piezometer installation and monitoring well development. Soil and rock core samples were collected for soil index and rock strength laboratory testing.

Data from the 2012 Site Investigation program was incorporated into the existing database created during the 2011 Site Investigation program. Details of the 2011 SI program can be found in the 2011 Geotechnical Site Investigation Factual Report (KPL Ref. No.VA101-458/3-1, Rev 0, Feb. 2012).

Summaries of the geotechnical and hydrogeological characteristics for each area are as follows:

- **Open Pit:** Open pit conditions were primarily characterized using data from 2011 SI program as no monitoring wells or geotechnical drillholes were completed at the open pit area during the 2012 SI program. The open pit encompasses a 2 x 2 km area. The overburden at the open pit is generally scarce within the southeast half of the pit, which is covered by a thin veneer of topsoil over bedrock. The northwest region of the open pit is overlain by silty sands and gravels, till and weathered bedrock. The overburden ranges in thickness from <1 to 10 m below ground surface. The bedrock at surface is typically strongly weathered up to depths of 6 m, thus rippable for excavation purposes. Bedrock within the open pit area is mainly comprised of phyllite and schist layers with foliation planes dominantly dipping towards the north at 30° to 35°. Numerous minor thrust faults exist throughout the open pit with orientations similar to the foliation planes within the rock mass. A regional fault, the Harper Creek Fault, bisects the pit area, running sub-vertically at a south western/north eastern trend. The rock quality at the open pit area is generally regarded as 'GOOD' quality rock; with a typical Rock

Mass Rating (RMR, Bieniawski 1989) of 66. The average rock strength based on Uniaxial or Unconfined Compressive Strength (UCS) testing ranges from 60 to 175 MPa, with an average value of 100 MPa based on laboratory rock test results. Previous hydrogeological testing has confirmed that the hydraulic conductivity of the rock typically ranges from 1×10^{-7} to 5×10^{-4} cm/sec. Groundwater levels vary from artesian conditions to 12 m below ground surface.

- **TMF:** The TMF is covered by a thin veneer of organics and topsoil underlain by stiff to dense, moist, sands and gravels with some silt and clay ranging from <1 to 16 m thick. The west side of the TMF is dominated by lacustrine deposits and tends to be sandier than eastern till deposits, which are mainly silty sand and gravel with weathered bedrock. The overburden at the central section has similar characteristics to the east side but contains thicker topsoil layer due to the low and flat geography of the valley basin. Orthogneiss is the dominant bedrock at the TMF with some granodiorite intrusions. Quartz monzonite is the primary lithology on the downstream of the embankment. Overall, the rock quality is 'GOOD' with an average RMR of 68. The rock strength ranges from 114 to 206 MPa with an average of 150 MPa. The permeability at the TMF is generally low with hydraulic conductivity values typically ranging from 1×10^{-7} to 1×10^{-5} cm/sec. The groundwater is shallow at the TMF with water levels generally less than 2 m below ground surface.
- **Overburden Stockpiles:** The overburden at the Overburden Stockpile site ranges in thickness from 2 to 6 m and mainly consists of silty sand and gravel materials. The bedrock is primarily quartz eye schists with phyllite layers. The average UCS, RMR and RQD of the bedrock are 49 MPa, 51 and 58 %. The hydraulic conductivity ranges from 9×10^{-5} to 1×10^{-4} cm/sec. Static water levels are usually less than 1 m below ground surface.
- **Topsoil Stockpiles:** There are four proposed topsoil stockpile sites: North, East, South and West Topsoil Stockpiles. Based on available data, the material characteristics of each site are outlined below:
 - North Topsoil Stockpile
 - § Overburden is approximately 9 m thick and is comprised of sand with gravel
 - § Bedrock is alternating phyllite and schists with an average RMR value of 51
 - East Topsoil Stockpile
 - § Overburden is approximately 6 m thick and is comprised of silty sand and gravel
 - § Bedrock is orthogneiss and minor quartz eye schists with an average RMR value of 59
 - South Topsoil Stockpile
 - § Overburden is approximately 5 m thick and is comprised of sand and gravel
 - § Bedrock is quartz monzonite with an average RMR value of 77
 - West Topsoil Stockpile
 - § Overburden is approximately 3 m thick and is comprised of silt and gravel
 - § Bedrock is orthogneiss with an average RMR value of 63
- **Non-PAG and PAG Low Grade Stockpiles:** The Low Grade Stockpile sites for both Non-PAG and PAG materials are located just northwest of the proposed TMF area. The overburden ranges from 1 to 4 m in thickness and it mainly consists of silty sand with gravel. Results from 2011 indicate that the bedrock is mainly orthogneiss with small layers of quartz eye schists. The average RMR and UCS are 59 and 115 MPa, respectively. Cumulative hydrogeological data from 2011 and 2012 shows that observed static water levels ranges from artesian conditions to 6.3 m below ground surface. The overall hydraulic conductivity at the Low Grade Stockpile areas ranges from 7×10^{-5} to 1×10^{-5} cm/sec.

- **Non-PAG Waste Rock Stockpile:** The overburden at the Non-PAG Waste Rock Stockpile ranges in thickness from 6 to 25 m. It is mainly comprised of silt, sand and gravel, trace clay. The bedrock comprises alternating layers of schists, quartz eye schists and phyllites. The average RMR and rock strength of the bedrock is 49 and 52 MPa, respectively. The static water level ranges from 4.4 to 6 m below ground surface and the hydraulic conductivity ranges from 7×10^{-6} to 1×10^{-5} cm/sec.
- **PAG Waste Rock Stockpile:** 2011 drillhole data indicates that the PAG Waste Rock Stockpile is covered by till material with depths varying from 5 to 7 m. The bedrock is primarily orthogneiss and has an average RMR and UCS of 65 and 113 MPa, respectively. The hydraulic conductivity ranges from 1×10^{-6} to 3×10^{-4} cm/sec with water levels ranging from 2.8 to 3.6 m below ground surface. No drillholes were completed at the PAG Waste Rock Stockpile during the 2012 SI program.
- **Crusher Site:** Overburden at the Crusher Site varies in depth from 5 to 10 m and consists of silty sand and gravel. The bedrock is mainly interbedded phyllites and schists with an average RMR and UCS values of 47 and 52 MPa, respectively. The 2011 drillhole HC11-GT08, drilled slightly northwest of the crusher, intercepted a fault zone approximately 2 m thick. The overall hydraulic conductivity ranges from 3×10^{-7} to 1×10^{-5} cm/sec with static water levels varying from 5 to 12 m below ground surface.
- **Plant Site:** 2011 data shows that the overburden at the Plant Site varies in thickness from 1 to 3 m and is comprised of gravelly, silty sand with some cobbles and boulders. The bedrock is found to be alternating layers of phyllites and quartz eye schists but orthogneiss is also present in the south sections. The average RMR and UCS values are 54 and 100 MPa, respectively. Groundwater level varies in depth from 2 to 5 m below surface. The overall hydraulic conductivity ranges from 5×10^{-7} to 1×10^{-4} cm/sec. No drillholes were completed at the Plant Site during the 2012 SI program.
- **Rock Quarry:** The overburden at the proposed Rock Quarry location is approximately 6.6 m thick and is comprised of gravels and cobbles with silt, sand and clay. The bedrock is quartz monzonite with an average RMR and UCS of 57 and 97 MPa, respectively. Static water level is measured at 0.7 m below ground surface with hydraulic conductivity values ranging from 8×10^{-6} to 3×10^{-6} cm/sec.

The 2012 SI program was developed utilizing the updated 2012 Harper Creek mine facility layouts. It is important to note that the mine layouts developed during this study are subject to change for future phases of engineering design.

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Appendix E1 Open Pit Drillholes

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ABBREVIATIONS

CME	CME Consultants
FHT	Falling Head Test
GSI	Geological Strength Index
Harper Creek Project	the project
IPI	Inflatable Packer International
KPL	Knight Piésold Ltd.
MAP	mean annual precipitation
masl	metres above sea level
NBCC	National Building Code of Canada
Non-PAG	Non-Potentially Acid Generating
PAG	Potentially Acid Generating
PET	potential evapotranspiration
PGA	Peak Ground Acceleration
PLT	Point Load Test
PSA	Particle Size Analysis
PVC	Polyvinyl Chloride (pipe)
RHT	Rising Head Test
RMR	Rock Mass Rating
RQD	Rock Quality Designation
SI	Site Investigation
SPT	Standard Penetration Test
SWiPS	Standard Wireline Inflatable Packer System
TMF	Tailings Management Facility
UCS	Uniaxial or Unconfined Compressive Strength
Westech	Westech Drilling Corporation
YMI	Yellowhead Mining Incorporated

1 – INTRODUCTION

1.1 PROJECT DESCRIPTION

The Harper Creek Project is a proposed copper-gold-silver mine located approximately 12 km southwest of Vavenby, B.C, south of the North Thompson River at an elevation of approximately 1800 m. The proposed open pit mine will extract approximately 700 Mt of ore, processed at 70,000 tonnes per day over the 28 year mine life. A tailings management facility (TMF) has been identified to the south of the open pit. The TMF will store all tailings and Potentially Acid Generating (PAG) waste rock produced during the mine life utilizing a 180 m high embankment. Ore will be taken directly from the open pit until year 22, after which backfilling of the pit with water from the TMF will begin as part of the mine closure plan. Ore processed from year 22 to the end of the mine life at year 28 will be obtained from the low grade ore stockpiles that will be progressively developed during pit excavation.

Knight Piésold Ltd. (KPL) was commissioned by Yellowhead Mining Inc. (YMI), in the spring of 2012, to complete a geotechnical site investigation program at the Harper Creek Project area. The site investigation included overburden drilling at the open pit and TMF embankment areas and geotechnical and hydrogeological drilling primarily at the TMF, and the overburden, waste rock and low grade stockpile areas.

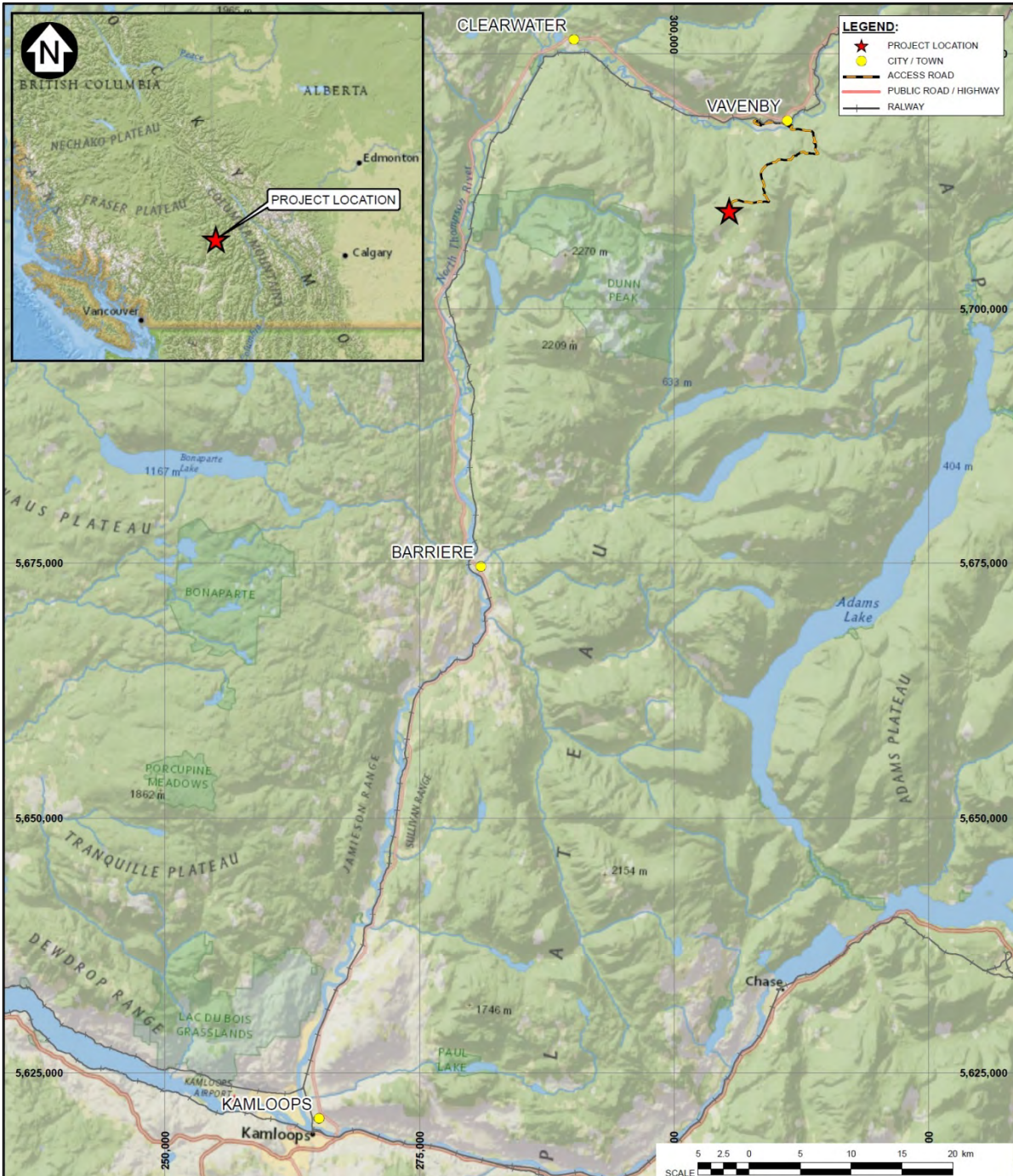
1.2 PROJECT HISTORY

Noranada and Quebec Cartier Mines investigated this property between 1966 and 1973. A pre-feasibility study, commissioned by Aurun Mines, was completed by Phillips Barratt Kaiser Engineering Ltd. in 1986. Scott Wilson Roscoe Postle Associates completed an NI 43-101 Technical Report on November 1, 2007, which was updated in August of 2010. Wardrop Engineering produced a preliminary economic assessment in 2011, which incorporated preliminary test pitting and core logging by other consultants. A preliminary TMF location alternatives assessment was conducted as part of the preliminary economic assessment.

KPL completed a geotechnical site investigation (SI) factual report in February 2012 (Ref. No.VA101-458/3-1, Rev 0) which detailed the results of the 2011 SI drilling program. In addition, an open pit geotechnical design report was completed in April 2012 (Ref. No.VA101-458/3-1) which presented feasibility level open pit slope designs based also on the 2011 SI drilling program and an updated pit shell model provided by Wardrop in January 2012.

1.3 PROJECT LOCATION

The Harper Creek Project area is located 12 km southwest of Vavenby, B.C., south of the North Thompson River, approximately 150 km north by highway of Kamloops in south-central British Columbia, Canada, as shown on Figure 1.1. The mine site is located at latitude 51° 33' N and longitude 119° 42' W and at about 1800 metres above sea level (masl). The project can be accessed from Vavenby or Barrière via existing highways, forestry roads and mine access roads.



NOTES:

1. BASE MAP: ESRI ARCGIS ONLINE TOPOGRAPHIC MAP
2. COORDINATE GRID IS IN METRES.
COORDINATE SYSTEM: NAD 1983 UTM ZONE 11N.

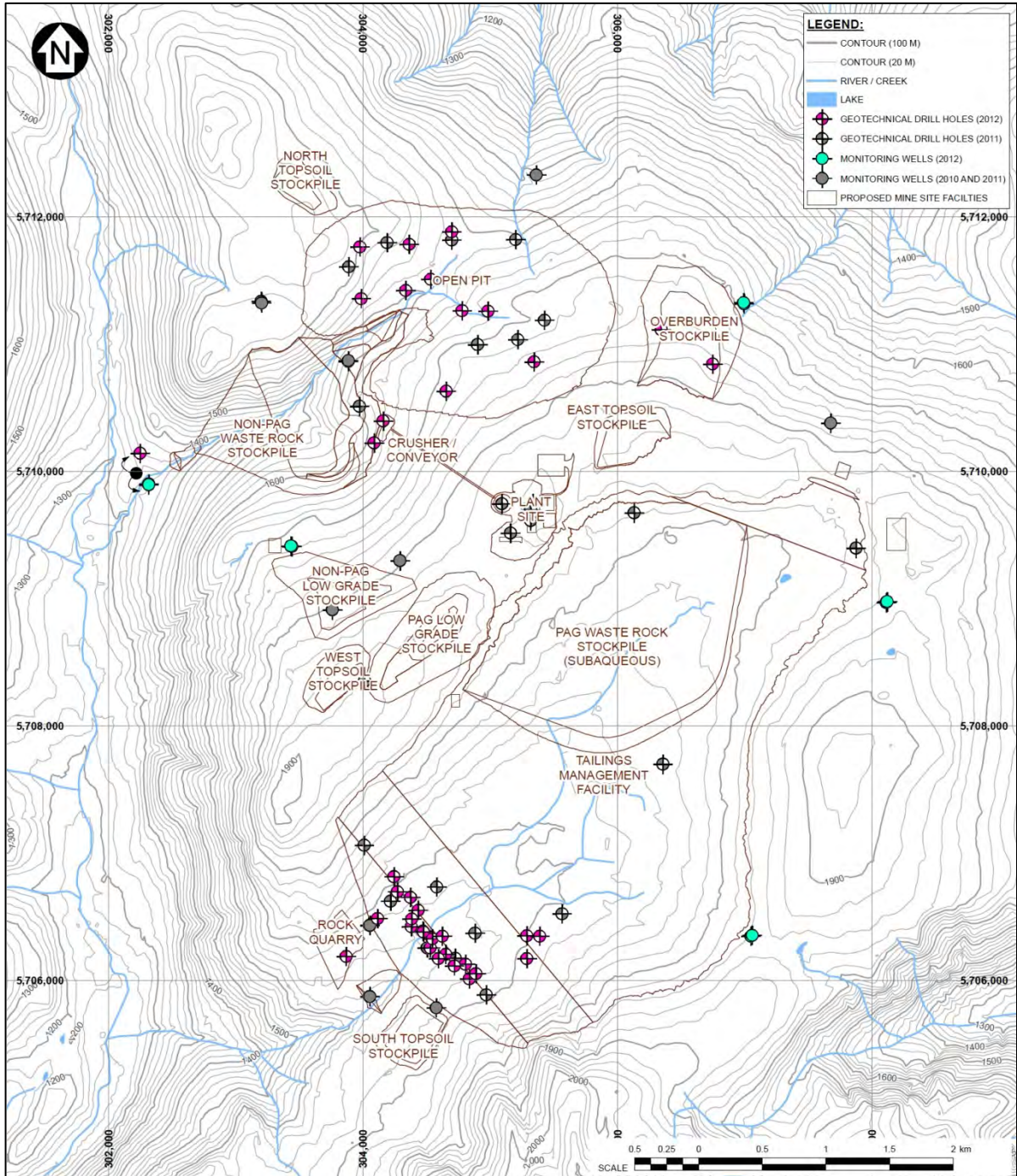
Figure 1.1 Project Location Map

1.4 GENERAL SITE ARRANGEMENT

The 2012 general site arrangement of the Harper Creek Project has been updated with primary changes and modifications to several proposed facilities and infrastructures. Figure 1.2 illustrates the general layout of the most updated site arrangement at the Harper Creek Project.

An overburden stockpile site, originally proposed to the west of the open pit has been moved to the east side of the pit. A Non-PAG Waste Rock Stockpile site has been proposed just southwest of the open pit and west of the proposed crusher site. The PAG Waste Rock Stockpile previously located west of the TMF has been moved into the TMF impoundment for co-disposal and submergence with the tailings. The low grade materials will be stored west of the TMF at the proposed Non-PAG and PAG Low Grade Stockpile locations.

Additionally, four proposed topsoil stockpile sites have been identified across the project area. The North Topsoil Stockpile site has been proposed to the northwest of the open pit, while the South Topsoil Stockpile to be located to the south of the TMF. The East Topsoil Stockpile and West Topsoil Stockpile sites have been proposed to the north and to the west of the TMF, respectively.



NOTES:

1. Base map: ESRI ARCGIS Online.
2. Coordinate grid is in metres.
 Coordinate system: NAD 1983 UTM Zone 11N.

Figure 1.2 Overall General Site Arrangement

1.5 SCOPE OF REPORT

The primary objective of the 2012 Geotechnical Site Investigation (SI) program was to collect geotechnical and hydrogeological data within the open pit, TMF, and stockpile areas to supplement the 2011 SI database. This report presents and summarizes the results of the 2012 SI program. Additionally, geotechnical and hydrogeological data analysis and characterization of the 2011 SI data were performed to refine the geotechnical site conditions of the Harper Creek Project.

The scope of work for the 2012 SI program included:

- Characterization of geotechnical and hydrogeological foundation conditions at the TMF, rock quarry, and at the stockpile areas.
- Characterization of overburden conditions at the proposed open pit area.
- Installation of long term groundwater monitoring wells for environmental baseline studies, and
- Installation of long term groundwater standpipe piezometers for hydrogeological testing.

The above site activities were performed by or under the direct supervision of KPL staff. Detailed lithological logging and precision surveying of drill holes was performed by CME Consultants staff.

2 – SITE CHARACTERISTICS

2.1 GEOLOGY

2.1.1 Regional Geomorphology

The open pit and TMF areas are hosted in gently sloping upland ridges flanked by steepened valley slopes. These valleys include the Harper Creek Valley to the west and the Barrière River to the East, with the moderately sloped Thompson River Valley to the north. The elevations of the area range from approximately 1100 m at the floor of the Harper Creek Valley to 1900 m at the ridges surrounding the TMF area. The average elevation of the open pit area and plant site is 1800 m. The area has been glaciated and mountain tops are typically rounded. The property is covered in coniferous forest, and has undergone extensive logging in the past.

The TMF itself is situated within a broad, shallow valley, which drains southward down a steep bedrock canyon into Harper Creek. The side slopes of the TMF basin are approximately 30° to 45°. The centre of the TMF valley features hummocky terrain with swampy, poorly drained areas.

Overburden thickness within the TMF area ranges from 1 to 12 m, and typically is greater than 4 m thick. The overburden typically consists of four separate soil types:

- Glacial tills are discontinuous over the bedrock and are comprised of silty sand with some gravel, cobbles and rare boulders.
- Thin layers of colluvium, typically boulder gravel with some silt and sand, are found along the base of some steeper slopes.
- Fluvial and glaciofluvial sand and gravel are present in isolated pockets and adjacent to some riverside terraces.
- Thin layers of organics are present within the poorly drained areas of the property, and consist of wet fibric to mesic plant material in various stages of decomposition.

2.1.2 Regional Geology

The regional geology consists of deformed and metamorphosed Lower Cambrian and Upper Devonian to Mississippian sedimentary and volcanic rocks with sills and dikes consisting of foliated granite to diorite. These rock units comprise what is known as the Eagle Bay Assemblage. This assemblage is intruded by Middle to Upper Jurassic and Cretaceous granitic plutons. Eocene-age Kamloops Group volcanic rocks overlay the Eagle Bay Assemblage rocks.

The regional structure consists typically of east-west striking, low to moderately dipping stratigraphy. Thrust faults disrupt the stratigraphic sequence by positioning Cambrian rocks overtop of younger Paleozoic strata. A series of steeply southeast-dipping normal faults are present, hosting Tertiary dikes. Figure 2.1 shows the regional bedrock geology.

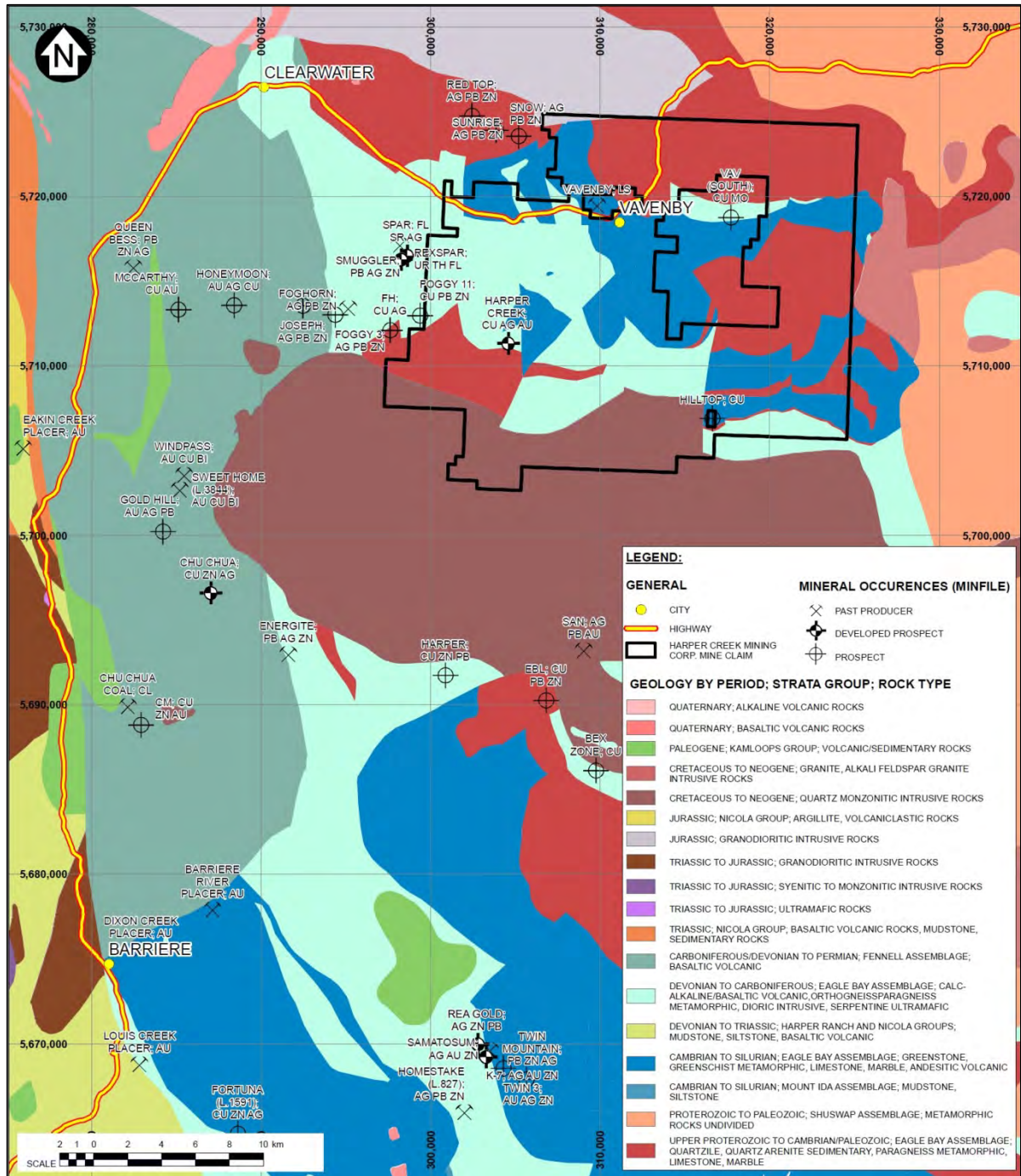


Figure 2.1 Regional Bedrock Geology of the Harper Creek Project

2.1.3 Deposit Geology

The Harper Creek deposit is an extensive volcanogenic sulphide system, with a mineralized zone spanning 2000 m along strike, 2000 m down dip and lies within a 1000 m thickness of volcano-sedimentary stratigraphy. The deposit is hosted in the Eagle Bay Assemblage, specifically within the

Lower Paleozoic and Greenstone Belts. The deposit is interpreted to be a polymetallic volcanogenic sulphide deposit comprised of lenses of disseminated, banded and fracture-filling iron and copper sulphides. The mineralization consists of chalcopyrite with accessory pyrite, magnetite and pyrrhotite. There are significant amounts of Au and Ag present within the mineralized zone. The mineralization is tabular and strikes east-west, dipping at 15° to 25°, with sulphide lenses up to tens of metres thick. This tabular mineralization comprises the central and west zones of the pit. There is a broad lower-grade zone of Cu with Au/Ag that is linked to multi-phased stringer or feeder zones within the eastern zone of the pit area.

2.1.4 Seismicity

The Harper Creek area is not a highly active area in terms of seismicity. Typical earthquake events within a 200 km radius have been observed to be magnitude 2 to 3 since 1985. The highest magnitude earthquake in the area occurred in 2002 approximately 180 km from the property, near Merritt, B.C.; it was recorded as a magnitude 4.5 event.

Site-specific ground motion parameters have been determined for the Harper Creek project site based on information provided by the probabilistic seismic hazard database of Natural Resources Canada (http://earthquakescanada.nrcan.gc.ca/hazard/index_e.php). The results are summarized in Table 2.1 in terms of earthquake return period, probability of exceedance (for a 50 year design life) and the corresponding spectral accelerations and peak ground acceleration.

For structural design of plant site buildings using the National Building Code of Canada (NBCC, 2005) the parameters used to represent seismic hazard at the site are the 5%-damped horizontal spectral acceleration values for periods (T) of 0.2, 0.5, 1.0 and 2.0 seconds and the horizontal Peak Ground Acceleration (PGA) value, that have a 2% probability of being exceeded in 50 years (return period of 2475 years).

The following design spectral acceleration values, Sa(T), have been determined for the project site:

- Sa(0.2) = 0.27g
- Sa(0.5) = 0.16g
- Sa(1.0) = 0.08g, and
- Sa(2.0) = 0.05g.

The corresponding PGA is 0.14g for the 1 in 2475 year earthquake.

The acceleration values correspond to a reference ground condition of Site Class C (defined by NBCC as very dense soils or soft rock). Appropriate factors need to be applied to the acceleration values to account for seismic site response, based on consideration of site specific conditions defined by the Site Class (as defined by NBCC, 2005).

An earthquake Magnitude of 7.0 is recommended for seismic design analyses for the geotechnical foundation design, based on a review of the regional tectonics and historical seismicity.

Table 2.1 Summary of Probabilistic Seismic Hazard Parameters

Return Period	Probability of Exceedance	Spectral Acceleration				Peak Ground Acceleration
		g				
Years	%	Sa(0.2)	Sa(0.5)	Sa(1.0)	Sa(2.0)	g
100	39%	0.05	0.03	0.02	0.01	0.03
475	10%	0.13	0.08	0.04	0.02	0.07
1,000	5%	0.18	0.11	0.05	0.03	0.10
2,475	2%	0.27	0.16	0.08	0.05	0.14

NOTES:

1. Probability of exceedance calculated for a design life of 50 years. $q=1-(-L/T)$
Where: q = probability of exceedance, L = design life in years, and T = returned period of years.
2. Spectral and peak ground accelerations obtained from the seismic hazard database of Natural Resources Canada.
3. Spectral and peak ground accelerations are for "very dense/soft rock" (site class C), as defined by the National Building Code of Canada (2010).
4. Spectral accelerations are 5%-damped horizontal acceleration values.
5. Spectral and peak ground accelerations are median (50th percentile) values.
6. Seismic memo 'Harper Creek Project – Seismic Design Parameters for Structural Design', prepared July 6, 2011 (KPL REF. NO. VA11-01058).

2.2 CLIMATE, HYDROMETEOROLOGY AND HYDROGEOLOGY

Detailed information on the hydrometeorological conditions at the Harper Creek site is available in the Engineering Hydrometeorology Report (KPL Ref. No. VA101-458/4-2, November 15, 2011). The following summary of climate, hydrometeorology and hydrogeological conditions is from this report.

The mean monthly temperature values were estimated based on a long-term synthetic record developed for the project site. The available site data were correlated to the concurrent monthly temperature data at the Criss Creek MSC station using a simple linear regression analysis. The resulting synthetic temperature record has a mean annual temperature of 0.6°C, with minimum and maximum mean monthly temperatures of -9.4°C and 10.7°C occurring in December and July, respectively.

The mean annual wind speed is approximately 1.6 m/s, with the wind predominantly blowing from the east-southeast year-round, although east-northeast winds are common during the summer periods. The mean annual relative humidity is approximately 75%.

Neither site nor regional lake evaporation datasets are available, and therefore lake evaporation for the site was estimated according to common empirical equations for potential evapotranspiration (PET). PET values are generally representative of lake evaporation. The empirical Thornthwaite equation was used with the measured site temperature record and the long-term synthetic temperature record to estimate a mean annual lake evaporation value (potential evapotranspiration) of 428 mm.

The mean annual precipitation (MAP) for the site is estimated to be 1050 mm at an elevation of 1680 m, with 49% falling as rain and 51% falling as snow.

Mean annual runoff in the region ranges from 7 l/s/km² to 29 l/s/km², with the majority of runoff occurring during the May and June snowmelt freshet.

3 – SITE INVESTIGATION PROGRAM

3.1 GENERAL

The 2012 Geotechnical Site Investigation program started on July 17 and was completed on October 15, 2012. The primary objective of the site investigation program was to evaluate the overburden, geotechnical and hydrogeological conditions at the open pit, TMF, and the overburden, waste rock, and low grade stockpile areas. The data collected will be used to support a feasibility level engineering design. Long-term groundwater monitoring wells were installed in order to support environmental baseline studies and continual groundwater monitoring throughout the construction of the mine.

The 2012 Geotechnical SI program included the following activities:

- 443 metres drilled in 8 geotechnical drillholes using both ODEX and diamond drilling methods. In-situ packer testing was conducted during drilling to evaluate the hydraulic conductivity of the rock mass. The geotechnical holes were completed to assess the soil and rock foundation conditions of various mine site facilities, primarily at the TMF and stockpile areas. Geotechnical logging of drill core was carried out in all diamond drillholes to characterize the rock mass.
- 364 metres drilled in 5 pairs of deep and shallow monitoring wells (10 wells total) using ODEX drilling methods. Soil logging was performed in these holes by KPL field personnel.
- 258 metres drilled in 28 overburden drillholes using ODEX drilling methods. 10 holes were completed in the open pit area to collect overburden samples for geochemical testing and to overburden characterization. 18 holes were completed in the TMF embankment foundation area to define the extents of geotechnical units identified during the 2011 SI program.
- Long term monitoring wells were installed at 7 of the 8 geotechnical drillholes. Monitoring wells were developed to remove fines from screened zones and allow indicative groundwater quality samples to be obtained.
- Response testing conducted in the monitoring wells to determine the hydraulic conductivity of the well completion zones. Testing was completed by KPL field personnel after the completion of the drilling program.
- Drill core samples were collected for rock mass strength testing. This includes field point load testing and laboratory UCS testing. Laboratory testing of the rock samples was conducted by PB Hughes and Associates Rock Mechanics Consultants.
- Samples of soil materials, recovered from both the overburden and geotechnical drillholes, were taken for laboratory soil testing. Soil samples were sent to the KPL Denver soils lab for Particle Size Analysis (PSA) testing.

All drill collars were surveyed at the completion of drilling by CME staff using a differential GPS, except for the geotechnical drillhole, GT12-08 and the monitoring wells, MW12-05D and MW12-05S. All survey information uses the UTM-NAD 83 coordinate system.

Westech Drilling Corp. (Westech) completed all drilling using a Mobile B-54 truck mounted drill rig capable of ODEX drilling in overburden and HQ3 sized diamond drilling in bedrock. All drillholes were drilled under the supervision of KPL field personnel. Detailed geotechnical logging of soil and drill core was conducted in all drillholes in order to evaluate and characterize the ground conditions.

The Mobile B-54 truck mounted drill rig was equipped with a drop-hammer to perform Standard Penetration Tests (SPTs). SPT results and sample descriptions were recorded by KPL field personnel. SPTs were not conducted in shallow to negligible overburden depths.

3.2 OVERBURDEN DRILLING

Overburden drilling was completed to characterize overburden conditions at the open pit and TMF areas. The holes were drilled using the ODEX drilling method with SPT's conducted every 1.5 m. Soils were logged according to the specified guidelines found in the Canadian Foundation Engineering Manual and according to the Visual-Manual Procedure for Standard Practice for Description and Identification of Soils (ASTM D2488-06). The drillhole logs for the open and TMF overburden holes are presented in Appendix A1 and A2, respectively. In addition, SPT photographs from the open pit and TMF holes are included in Appendix E3-1 and E3-2, respectively.

3.2.1 Open Pit

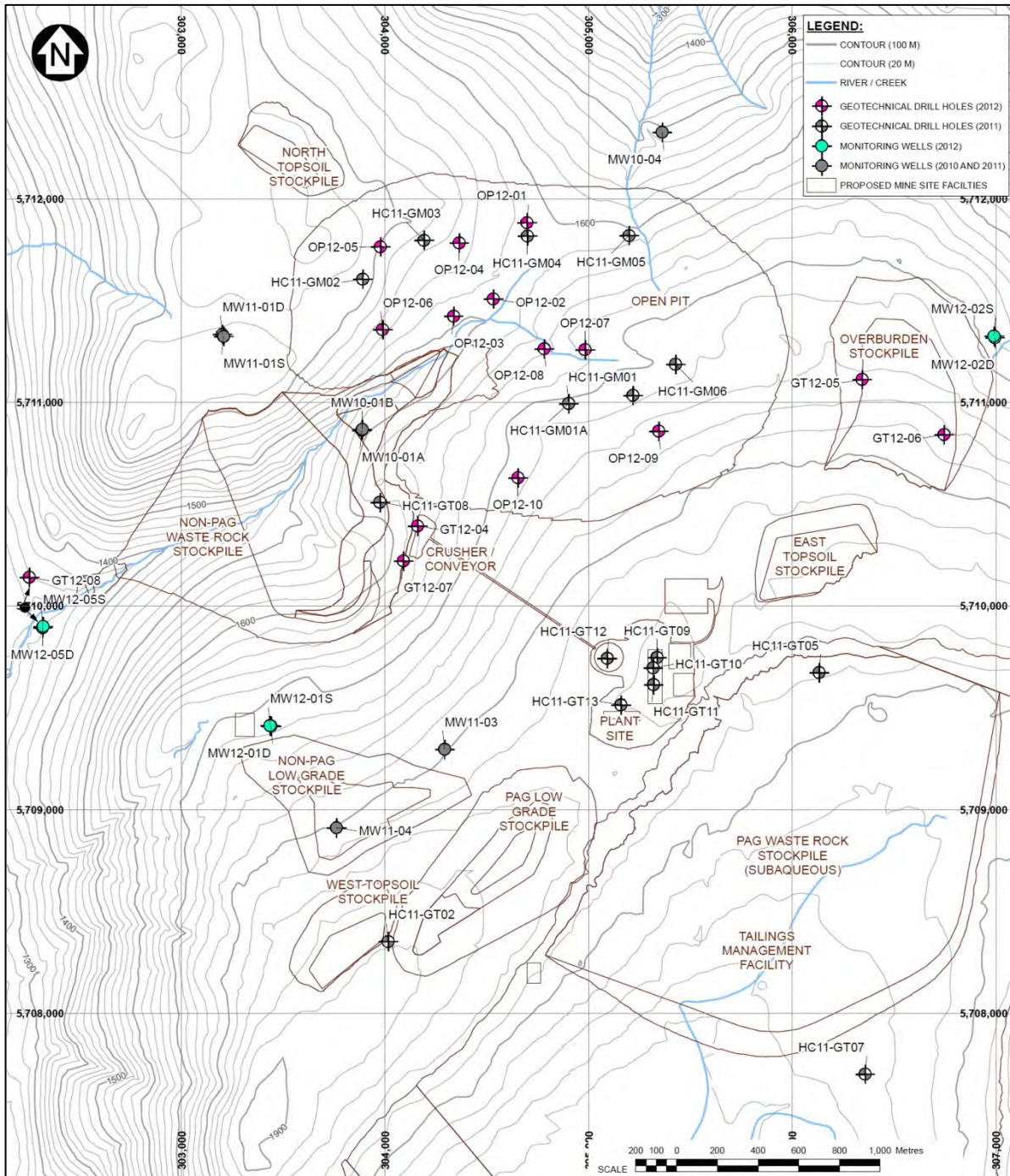
Ten open pit holes were drilled to collect overburden samples for geochemical testing and to characterize the overburden conditions and determine the weathered bedrock depths at different locations of the open pit area. Table 3.1 provides a summary of the open pit holes and their locations shown in Figure 3.1.

Table 3.1 Summary of Open Pit Drillholes

Drillhole	Coordinates ¹			Total Depth	Depth to Rock
	Northing	Easting	Elevation		
	(m)	(m)	(m)		
OP12-01	5,711,886	304,697	1,594	11.6	9.1
OP12-02	5,711,511	304,523	1,593	10.4	5.5
OP12-03	5,711,425	304,337	1,593	10.4	4.9
OP12-04	5,711,787	304,364	1,629	7.2	3.4
OP12-05	5,711,766	303,976	1,679	5.5	1.4
OP12-06	5,711,361	303,988	1,629	5.6	3.7
OP12-07	5,711,262	304,983	1,663	11.7	6.6
OP12-08	5,711,266	304,781	1,639	5.8	0
OP12-09	5,710,860	305,344	1,732	4.3	0.6
OP12-10	5,710,632	304,653	1,696	4.3	2.4

NOTES:

1. Coordinates are based on final collar survey data using the UTM NAD 83 coordinate system.
2. All holes are vertical and drilled using a 4.75" ODEX Casing.



NOTES:

1. Base map: ESRI ARCGIS Online.
2. Coordinate grid is in metres.
3. Coordinate system: NAD 1983 UTM Zone 11N.

Figure 3.1 Locations of Open Pit Area Drillholes

3.2.2 Tailings Management Facility

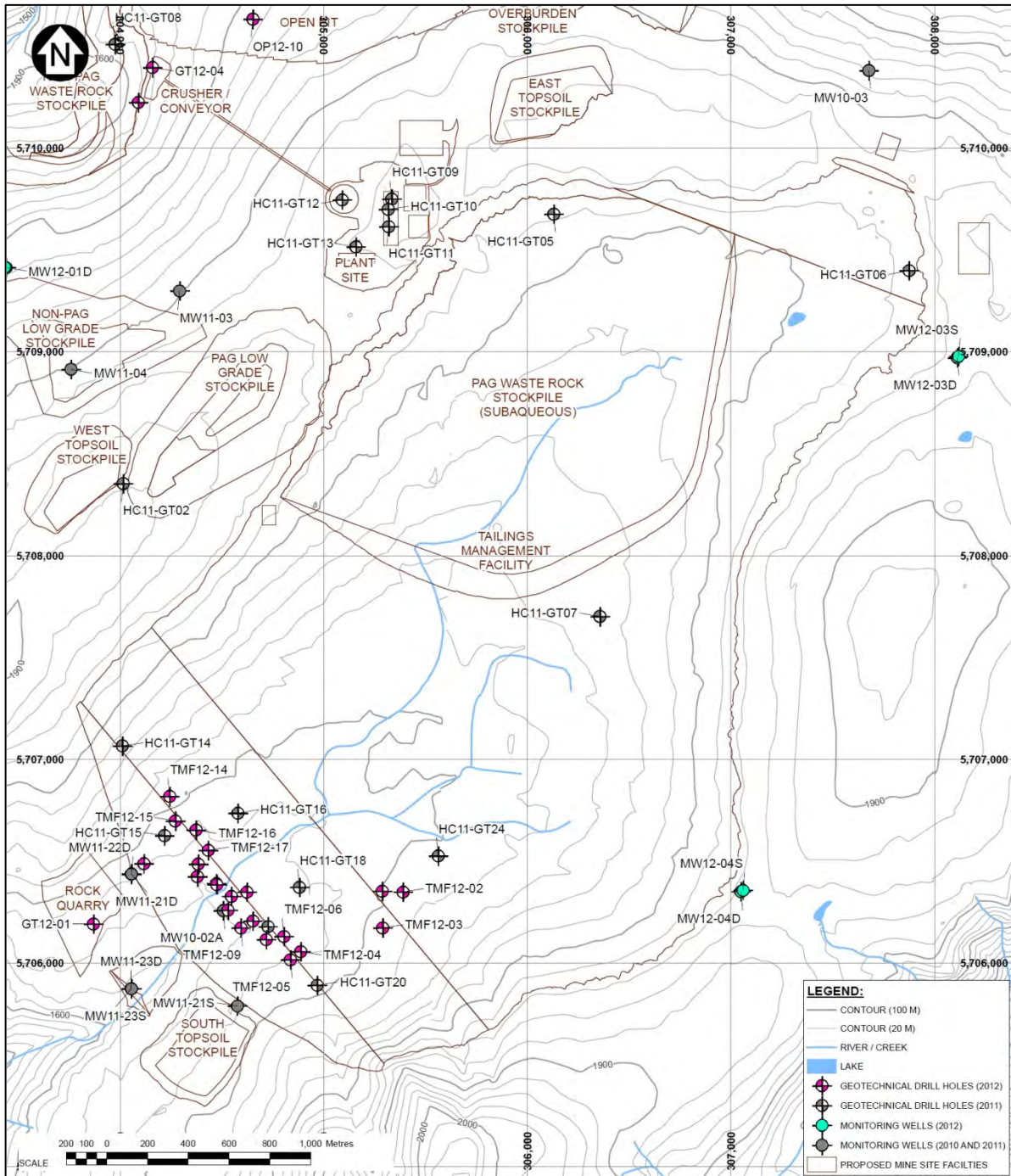
Eighteen holes were drilled in the TMF Embankment area to characterize the overburden and define the thickness and extent of the till blanket covering the area as identified during the 2011 SI program. Table 3.2 provides a summary of the TMF holes and their locations are shown in Figure 3.2 with a detailed view of the TMF embankment shown in Figure 3.3.

Table 3.2 Summary of TMF Drillholes

Drillhole	Drillhole Location	Coordinates ¹			Total Depth	Depth to Rock
		Northing	Easting	Elevation		
		(m)	(m)	(m)	(m)	(m)
TMF12-01	TMF Upstream Area	5,706,353	305,287	1,687	14.9	11.9
TMF12-02	TMF Upstream Area	5,706,349	305,389	1,694	10.1	5.2
TMF12-03	TMF Upstream Area	5,706,172	305,289	1,694	8.5	4.3
TMF12-04	TMF Embankment East	5,706,056	304,888	1,664	10.4	3.1
TMF12-05	TMF Embankment East	5,706,016	304,837	1,667	8.7	3.1
TMF12-06	TMF Embankment East	5,706,131	304,806	1,660	10.1	7.3
TMF12-07	TMF Embankment East	5,706,115	304,719	1,655	10.1	7.3
TMF12-08	TMF Embankment Central	5,706,206	304,652	1,648	9.1	6.1
TMF12-09	TMF Embankment Central	5,706,173	304,593	1,641	7.6	1.8
TMF12-10	TMF Embankment Central	5,706,259	304,529	1,646	13.4	10.4
TMF12-11	TMF Embankment Central	5,706,328	304,547	1,645	13.7	10.7
TMF12-12	TMF Embankment Central	5,706,384	304,475	1,645	11.6	8.5
TMF12-13	TMF Embankment West	5,706,488	304,117	1,666	8.8	5.2
TMF12-14	TMF Embankment West	5,706,818	304,245	1,692	8.8	5.3
TMF12-15	TMF Embankment West	5,706,698	304,272	1,673	8.8	3.1
TMF12-16	TMF Embankment West	5,706,654	304,373	1,665	8.8	4.3
TMF12-17	TMF Embankment West	5,706,553	304,433	1,656	8.7	4.4
TMF12-18	TMF Embankment West	5,706,485	304,384	1,652	8.8	4.3

NOTES:

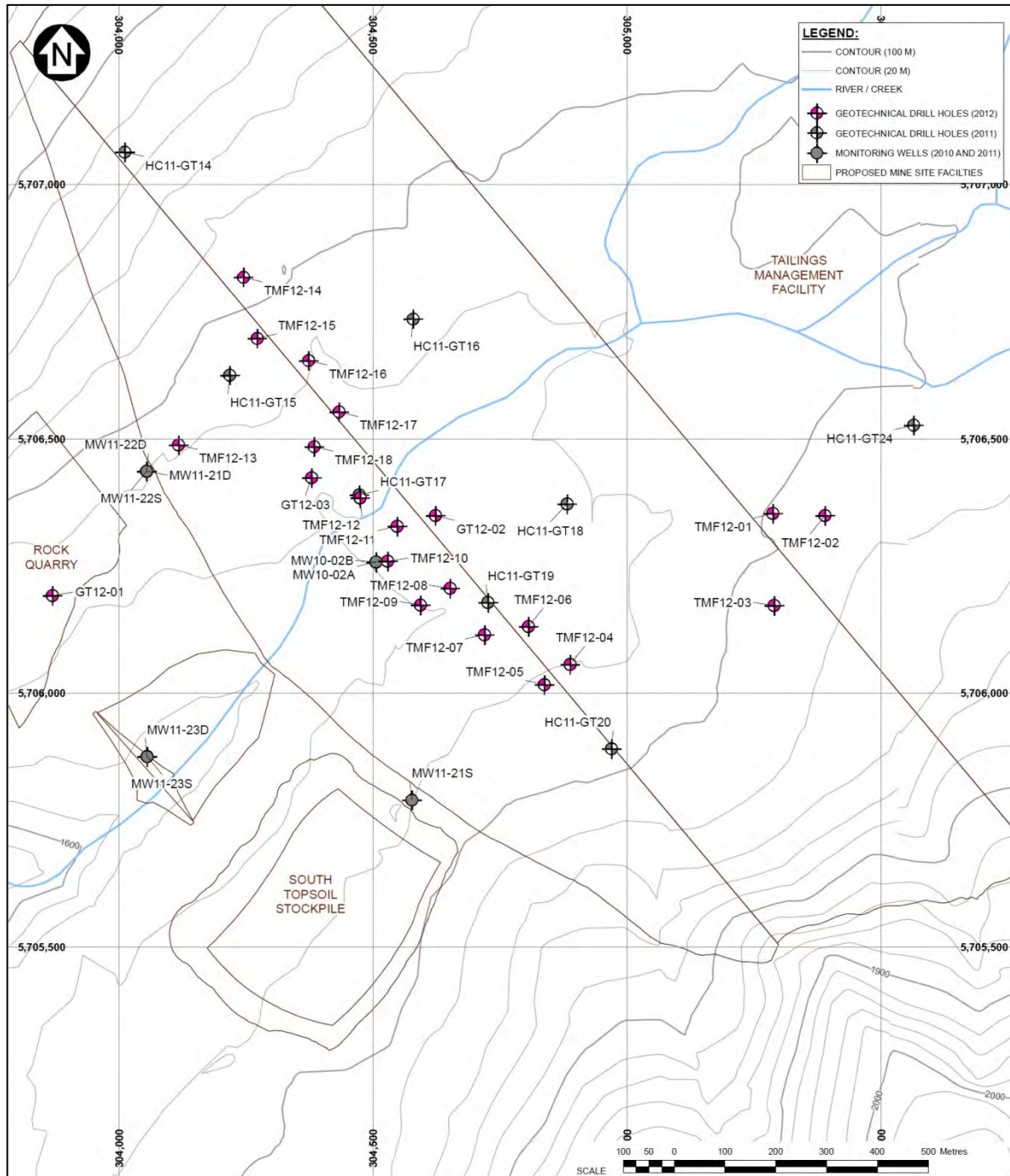
- Coordinates are based on final collar survey data using the UTM NAD 83 coordinate system.
- All holes are vertical and drilled using a 4.75" ODEX Casing.



NOTES:

1. Base map: ESRI ARCGIS Online.
2. Coordinate grid is in metres.
Coordinate system: NAD 1983 UTM Zone 11N.

Figure 3.2 Locations of TMF Area Drillholes



NOTES:

1. Base map: ESRI ARCGIS Online.
2. Coordinate grid is in metres.
3. Coordinate system: NAD 1983 UTM Zone 11N.

Figure 3.3 Detailed View of TMF Embankment Drillholes

3.3 GEOTECHNICAL DRILLING

A total of 443 metres of geotechnical diamond drilling was completed in 8 geotechnical drillholes during the 2012 SI program. The depth of the holes varied from 30 to 100 m. Geotechnical and hydrogeological data was collected for various mine facilities, primarily at the TMF and stockpile areas. Table 3.3 provides a summary of the geotechnical drillholes and their locations can be seen in Figures 3.2 and 3.3 in the previous sections.

SPTs were conducted at holes GT12-01, GT12-04, GT12-05, GT12-06, GT12-07 and GT12-08 at 1.5 m intervals. Holes GT12-02 and GT12-03 were inclined. Piezometers were installed in all geotechnical holes except GT12-08, as it was grouted to surface on its completion. A pair of monitoring wells (MW12-05D and MW12-05S) was installed at the GT12-08 pad instead of a piezometer. The installation involved the use of one-inch PVC standpipe piezometers installed at specified depths within bedrock contacts, fractured/fault zones, or highly permeable zones. The installations were conducted by Westech under the direction and supervision of KPL field personnel.

Table 3.3 Summary of Geotechnical Drillholes

Drillhole	Drillhole Location	Coordinates ^{1,2}			Azimuth	Dip	Total Depth	Depth to Rock
		Northing	Easting	Elevation				
		(m)	(m)	(m)				
GT12-01	Rock Quarry	5,706,192	303,869	1,654	000	90	30.2	6.6
GT12-02	TMF Embankment	5,706,349	304,623	1,648	000	60	101.2	9.3
GT12-03	TMF Embankment	5,706,424	304,379	1,646	180	60	101.2	5.2
GT12-04	Crusher Site	5,710,396	304,159	1,621	000	90	38.3	5.9
GT12-05	Overburden Stockpile	5,711,114	306,344	1,726	000	90	38.4	4.6
GT12-06	Overburden Stockpile	5,710,844	306,746	1,752	000	90	35.1	1.8
GT12-07	Non-PAG Waste Rock Stockpile	5,710,224	304,090	1,602	000	90	42.1	10.1
GT12-08	Southwest of Non-PAG Waste Rock Stockpile	5,709,998	302,226	1,363	000	90	56.2	24.4

NOTES:

1. UTM NAD 83 coordinate system.
2. Coordinates were surveyed at the end of drilling except GT12-08, which was located using a handheld GPS.
3. All holes drilled using a combination of ODEX and HQ3 diamond drilling methods.

3.3.1 Overburden Drilling and Logging

Overburden drilling in the geotechnical drillholes was completed by Westech using ODEX drilling methods. SPTs were completed at selected overburden depth intervals in six drillholes. SPTs were not conducted in shallow to negligible overburden depths where bedrock was encountered close to ground surface. SPTs were completed every 1.5 m (5 feet) and then terminated when bedrock was

encountered. A 140-lb automatic hammer with a 30 inch drop setup, equipped with a 24 inch split spoon sampler was utilized for each test. Blow counts were recorded over three 15 cm (6 in) intervals for a total of 45 cm (18 in) of sampling length. In some SPT samples, an additional 15 cm was driven to collect a larger sample. Selected samples were collected for laboratory testing.

Soils were logged according to guidelines specified in the Canadian Foundation Engineering Manual and according to the Visual-Manual Procedure for Standard Practice for Description and Identification of Soils (ASTM D2488-06).

3.3.2 Bedrock Drilling and Logging

The drilling method switched from ODEX to diamond drilling once bedrock was encountered. Coring bedrock involved the use of a diamond drill bit with a wireline standard barrel set-up and a 1.5 m core barrel. This coring method allowed for continuous core sampling as the drillhole was advanced. All drillholes were drilled with HQ3 size equipment using a triple tube core barrel set up.

All geotechnical drillholes were advanced using water as the main drilling fluid. Additives such as polymers and/or drill mud were not required during drilling.

Detailed geotechnical logging of the drill core was carried out in all of the geotechnical drillholes in order to characterize the rock mass quality using Bieniawski's Rock Mass Rating (Bieniawski, 1989) classification system. On a run-by-run basis, the following information was collected:

- Core run interval
- Core recovery
- Rock Quality Designation (RQD)
- Lithological Description
- Field estimated Unconfined Compressive Strength (UCS) of rock
- Number of discontinuities
- Discontinuity Types, and
- Joint Conditions of Discontinuities (i.e. roughness, infilling, weathering/alteration, aperture, etc.)

Point Load Tests (PLTs) were also performed in the field using a hydraulic point-load test apparatus with a digital read-out, provided by Hoskins Scientific.

3.3.3 Rock Mass Rating Classification System

The Rock Mass Rating (RMR) Classification System (Bieniawski 1989) has been used to classify the bedrock conditions. RMR is frequently employed in geotechnical engineering to describe the general rock mass conditions and identify the zones of weakness where further site investigation may be required. The RMR system is based on determining values for the following five key rock mass parameters:

- Intact Rock Hardness and/or UCS – The rock hardness and intact rock strength were estimated in the field and then later verified with laboratory testing.
- RQD – The RQD was determined on a run-by-run basis by summing the lengths of all intact core pieces greater than 10 cm long and presenting this as a percentage of the drill run length.
- Joint Spacing – An estimate of the joint spacing was determined by counting the number of naturally occurring joints encountered per length of drill run.

- Joint Condition – The joint condition is based on an evaluation of joint persistence, roughness, infilling, aperture and weathering. The persistence has been conservatively assumed to have a rating of 0, consistent with high persistence, as the delineation of the actual persistence of a discontinuity is impossible with drill core. The roughness, infilling, aperture and weathering were determined by direct examination of the core.
- Groundwater Condition – A constant groundwater rating of 15, which corresponds to dry conditions, was used for RMR calculation. This allows the RMR values to be consistent with geological strength index (GSI) value (Hoek et al, 1995) that can be used to estimate rock mass strengths.

The RMR rating and the rock mass quality classification system is presented in Table 3.4. The table shows the number ratings that are applied to each of the five parameters. The sum of these ratings defines the rock mass quality as an RMR value. This value can range from <20 to 100 and the rock mass is classified as follows:

- VERY GOOD rock: RMR 81 to 100
- GOOD rock: RMR 61 to 80
- FAIR rock: RMR 41 to 60
- POOR rock: RMR 21 to 40, and
- VERY POOR rock: RMR <20.

The geotechnical drillhole logs and detailed logging spreadsheets are presented in Appendices B1 and B2, respectively. Field estimated run-by-run based Recovery, RQD, UCS and RMR values vs. drill depth plots are illustrated in Appendix B3. Drill core photographs are included in Appendix E3-3.

Table 3.4 Rock Mass Rating (RMR, 1989) Classification System

Intact Rock Strength	PLST	10	8	6.5	5.5	5	4.5	3	2	1	<1
	UCS, MPa	250	200	160	140	125	110	75	50	25	<25
	Field Est.	chipped by hammer			many blows by hammer to break			single blow		pocket knife	
	RATING	15	14	13	12	11	10	8	6	4	<3
RQD	RQD %	100	90	80	70	60	50	40	30	20	0
	RATING	20	18	16	14	12	10	9	5	4	3
Joint Spacing	Js, cm	>200	160	130	90	60	40	20	15	10	<6
	RATING	20	18	16	14	12	10	9	8	7	5
Joint Condition	Persistence	< 1 m		1 - 3m		3 - 10m		10 - 20 m		>20m	
	RATING	6		4		2		1		0	
	Aperture	None		< 0.1 mm		0.1 - 1.0		1 - 5		5 - 10	
	RATING	6		5		4		1		0	
	Roughness	V Rough		Rough		SL Rough		Smooth		Slicks	
	RATING	6		5		3		1		0	
	Infilling	None		Hard Infilling			Soft Infilling				
	RATING	6		< 5 mm		> 5 mm		< 5mm		> 5 mm	
Groundwater	Inflow	None		< 10		10 - 25		25 -125		> 125	
	l/min/10m	Dry		Damp		Wet		Dripping		Flowing	
	RATING	15		10		7		4		0	
Adjustment for Joint Orientation		DIP OF ADVERSE JOINT SET									
		0 - 20			20 - 45			45 - 90			
Strike Perpendicular to Tunnel Axis drive with Dip		Unfavourable			Favourable			Very Favourable			
		-10			-2			0			
Strike Perpendicular to Tunnel Axis drive against Dip		Unfavourable			Unfavourable			Fair			
		-10			-10			-5			
Strike Parallel to Tunnel		Unfavourable			Fair			Very Unfavourable			
		-10			-5			-12			
RMR RATING		80 - 100		60 - 80		40 - 60		20 - 40		0 - 20	
DESCRIPTION		VERY GOOD		GOOD		FAIR		POOR		VERY POOR	
ROCK CLASS		1		2		3		4		5	

3.3.4 Field Point Load Testing

PLTs were performed in the field on selected core samples using a portable hydraulic PLT machine with calibrated gauges, provided by Hoskins Scientific. The field PLT provides an early determination of intact rock strength that can be later verified with laboratory strength testing.

A total of 96 PLTs were completed by KPL field personnel on geotechnical drillholes GT12-03, GT12-04, GT12-05, GT12-06 and GT12-07. A summary of the 2012 PLT results, as separated by lithology, is shown in Table 3.5.

Table 3.5 Summary of 2012 Field PLT Results

Rock Type	Number of Samples Tested	Estimated UCS from PLT Results (MPa)				
		Mean	Median	St. Dev.	Max.	Min.
Phyllite	11	28	14	28	85	0
Schist	27	24	20	19	68	0
Orthogneiss	56	111	116	65	245	3

NOTES:

1. Data is based on all 2012 field PLT results from holes GT12-03 to GT12-07.
2. Data could not be categorized into failure types because it was not specified from field documentation.

3.3.5 Hydrogeological Testing

Hydrogeological testing was conducted to assess the hydraulic conductivity of the rock mass at various intervals. Two testing methods were adopted: Lugeon (Single Packer) Permeability testing and Falling Head Response tests.

In-situ lugeon conductivity testing utilized a single bladder packer assembly in order to evaluate the permeability of the rock mass at various intervals. The tests were conducted using the Inflatable Packer International (IPI) Standard Wireline inflatable Packer System (SWiPS) with the IVA inflation method. Tests were only performed in competent bedrock in order to establish a seal above the test formation and to reduce risk of bladder damage.

Prior to testing, the drillholes are flushed with clean water to remove drill cuttings which could clog the fractures of the rock and affect the test results. Drill rods are then pulled out to expose the interval to be tested, and then the packer equipment is lowered by wireline inside the drill rods to the drill bit. Water is pumped through the packer assembly to inflate the bladder against the rock formation to seal off the test zone. Once a successful seal is established, water is pumped (under a controlled test pressure) into the isolated test interval to achieve a constant differential head. This step is repeated for three ascending and two descending water stages, in which the flow rate of water is recorded. The flow rates from these tests are used to calculate the hydraulic conductivity of the formation over that particular test interval.

A total of 24 Lugeon tests were conducted in all geotechnical drillholes. The individual packer hydraulic conductivity test sheets are presented in Appendix C1 and are summarized in Table 3.6 below. Plots of hydraulic conductivity vs. elevation separated by rock type are shown on Figures 3.5 and 3.6. Figure 3.5 shows the 2012 Lugeon test results. Figure 3.6 shows the cumulative results of the 2011 and 2012 Lugeon testing.

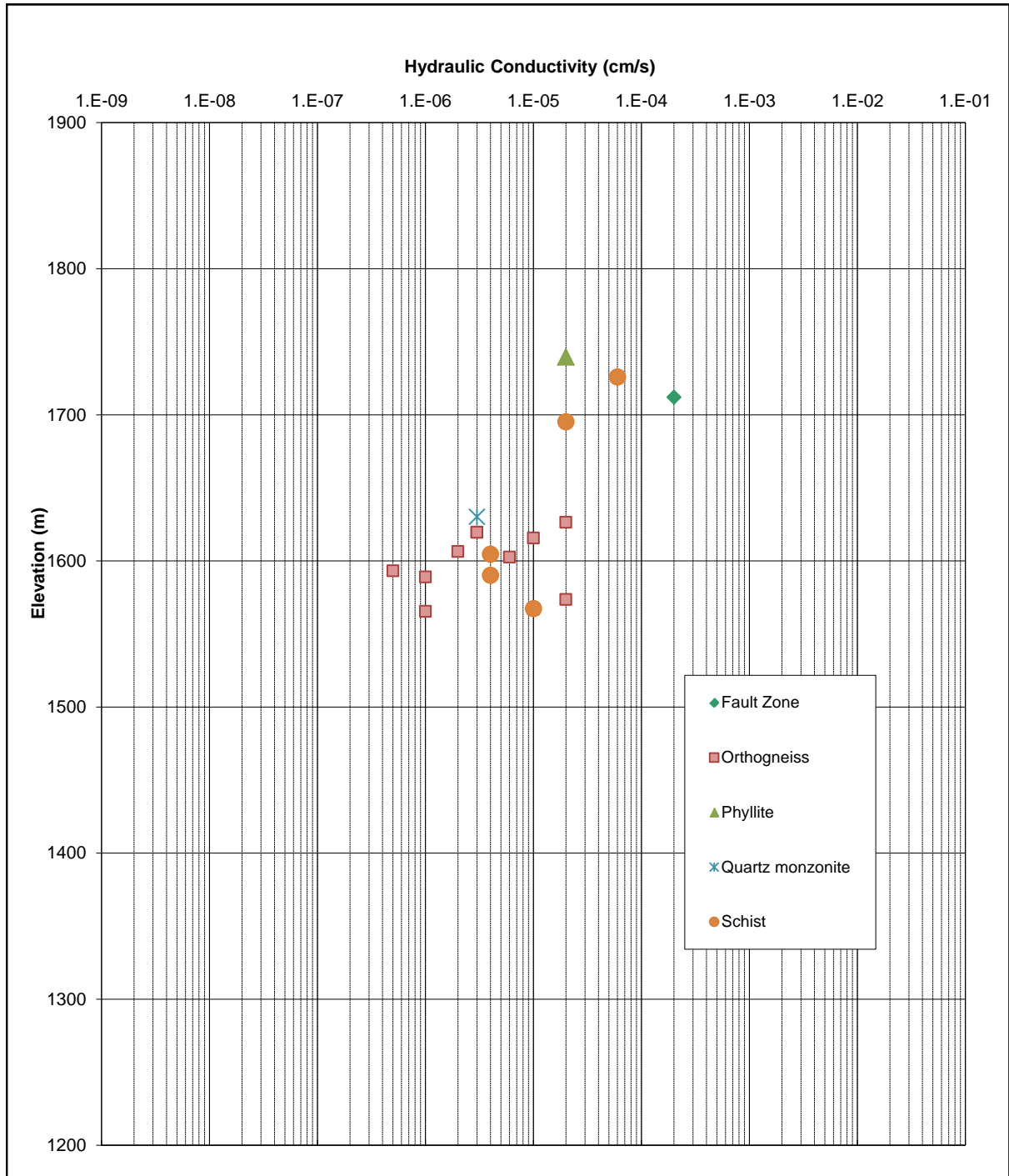
Response testing conducted in standpipe piezometer completion zones have comparable hydraulic conductivity results to the Lugeon testing results from the same depth intervals. The 2011 test results indicate that the rock mass across the project area typically has a low permeability with hydraulic conductivities estimated to be in the order of 1×10^{-7} to 1×10^{-5} cm/sec, with a small number of tests exhibiting hydraulic conductivities in the order of 1×10^{-4} cm/sec.

Table 3.6 Summary of Hydrogeological Testing in Geotechnical Drill Holes

Drillhole	Test Number	Packer Test (Lugeon) ¹		
		Packer Zone		Hydraulic Conductivity
		From (m)	To (m)	(cm/s)
GT12-01	1 ^{2A}	18.0	25.6	n/a ³
	2 ^{2A,C}	18.0	30.2	3 x 10 ⁻⁶
GT12-02	1 ^{2A,C}	17.1	32.8	2 x 10 ⁻⁵
	2 ^{2A,B,C}	29.7	45.0	1 x 10 ⁻⁵
	3 ^{2A,B,C}	43.0	61.7	6 x 10 ⁻⁶
	4 ^{2A,C}	59.2	77.0	1 x 10 ⁻⁶
	5 ^{2A,B,C}	78.1	93.8	2 x 10 ⁻⁵
	6	85.7	101.2	1 x 10 ⁻⁵
GT12-03	1 ^{2B}	7.9	23.5	NO TAKE
	2 ^{2B}	23.2	38.7	3 x 10 ⁻⁶
	3 ^{2B,C}	38.4	54.0	2 x 10 ⁻⁶
	4 ^{2B,C}	53.7	69.2	5 x 10 ⁻⁷
	5 ^{2B,C}	68.9	84.5	NO TAKE
	6 ^{2B,C}	85.7	101.2	1 x 10 ⁻⁶
GT12-04	1 ^{2B,C}	8.8	22.9	4 x 10 ⁻⁶
	2 ^{2B,C}	22.6	38.1	4 x 10 ⁻⁶
GT12-05	1 ^{2B}	6.1	21.7	2 x 10 ⁻⁴
	2 ^{2B,C}	22.9	38.4	2 x 10 ⁻⁵
GT12-06	1 ^{2B,C}	4.3	19.8	2 x 10 ⁻⁵
	2 ^{2B,C}	18.0	33.5	6 x 10 ⁻⁵
GT12-07	1 ^{2B,C}	11.3	26.8	NO TAKE ⁴
	2 ^{2B,C}	26.5	42.1	1 x 10 ⁻⁵
GT12-08	1	31.7	44.0	2 x 10 ⁻⁷
	2	54.0	56.2	3 x 10 ⁻⁶

NOTES:

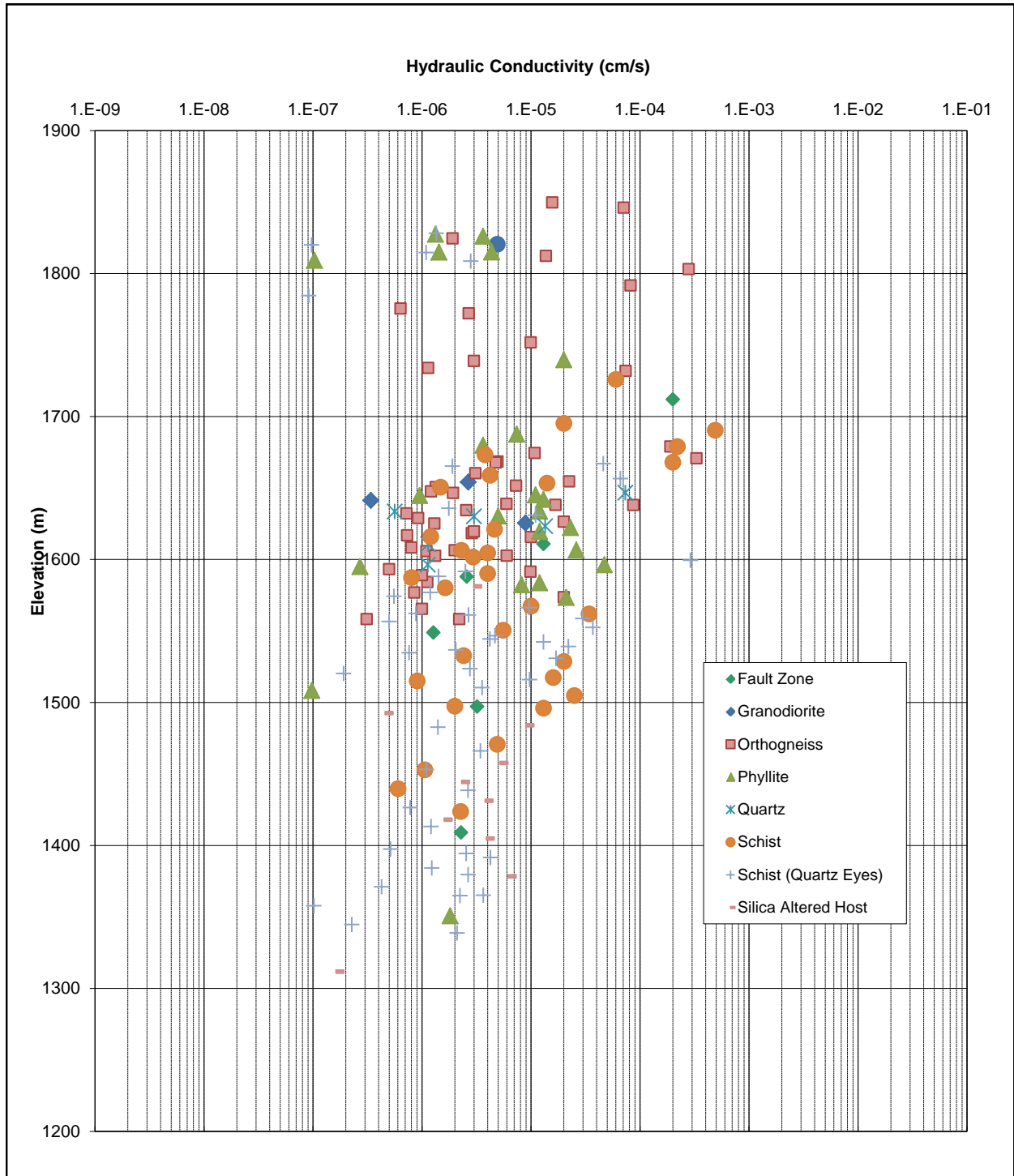
- Head loss test was not completed for the Packer system used for all lugeon tests. Head loss plot from the SWiPS Manual (Version 2.0, June 2012) is applied for the analysis.
- A) Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 – 10 minutes at each pressure step. Test results have been analyzed to accommodate this change.
B) The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of the test interval. The hydraulic conductivity value does not appear to be affected by the high pressures.
C) No water level measured prior to the test. It is assumed that water is at ground surface for the analysis or if it is available, the water level is based on previous tests conducted on a different interval in the same drillhole.
- Test result for GT12-01 lugeon test 1 is considered unreliable due to problems encountered during testing. An extended test interval was used in GT12-01 lugeon test 2.
- There was no take for GT12-07 lugeon test 1, but a response test conducted that includes the same interval yielded a hydraulic conductivity value of 7 x 10⁻⁶ cm/s.



NOTES:

1. Data is based from in situ Lugeon Tests conducted in the 2012 SI program.
2. Data from Lugeon Tests conducted in GT12-08 is not included because its detailed lithology log is unavailable.
3. Lugeon Test GT12-01 Test 1 is not shown because test results deemed unreliable.
4. Lugeon Tests that yielded no take results (GT12-03 Test 1, GT12-03 Test 5 and GT12-07 Test 1) are not shown.

Figure 3.4 Hydraulic Conductivity vs. Elevation Plot of 2012 Lugeon Tests



NOTES:

1. Data is based from in situ Lugeon Tests conducted in both 2011 and 2012 SI programs.

Figure 3.5 Hydraulic Conductivity vs. Elevation plot of 2011 and 2012 Lugeon Tests

3.3.6 Standpipe Piezometer Installation

All geotechnical holes were selected for standpipe piezometer installation except for GT12-08, which was grouted all the way to ground surface. Piezometers were installed at specified depths in areas of interest such as bedrock contacts, fractured/fault zones, or highly permeable zones as identified by geotechnical logging and Lugeon testing results. The purpose of the installation is to be able to measure the groundwater level and conduct falling/rising head response tests in the isolated completion zone.

Installation of the piezometers was completed by Westech Drilling Corp. under the supervision and direction of KPL field personnel. The piezometers were constructed with 1-inch diameter, decontaminated, flush-threaded, Schedule 40 polyvinyl chloride (PVC) riser pipes. The screened completion zones are 1-inch Schedule 40, Slot 20 PVC threaded installed across the zone of interest, and 1-inch Schedule 40 PVC threaded blank pipe was installed to the surface. A Van Ruth plug was pumped down the hole which acts as a wedge below the desired completion zone, if it is not desirable to set the completion zone at the bottom of the hole. The annular space around the completion zone was backfilled with silica 10/20 filter sand. The completion zone was sealed at either end with hydrated bentonite chips or pellets. A cement/grout mix was used to backfill the drillhole to surface above the top bentonite seal. Monuments were installed to protect and prevent tampering to the PVC pipe, which extends above the ground surface. The piezometer completion details are illustrated in Appendix C2.

3.3.7 Falling/Rising Head Response Testing in Standpipe Piezometers

Falling head tests (FHTs) were conducted after the piezometer installation. FHTs were performed by changing the water level, or piezometric head, in the piezometer by inserting a measured slug of water and measuring the water level at regular intervals until the static groundwater level re-stabilizes. The Hvorslev method utilizes the change in head over time to calculate the hydraulic conductivity of the isolated interval.

Typically, the tests are performed by filling the piezometer with water and measuring the falling water level at regular intervals. However, in cases where the water level is near surface or artesian, a rising head test (RHT) is performed by removing water from the piezometer and similarly measuring the rising water level at regular intervals. Both testing methods yield valid results.

The piezometer testing sheets are presented in Appendix C3 and a summary of results is shown in Table 3.7.

Table 3.7 Summary of Piezometer Installation and Hydrogeological Testing

Drillhole	Piezometer Information ^{1,2}				
	Completion Zone		Stick Up Height	Static Water Level ³	Hydraulic Conductivity (Falling Head)
	From (m)	To (m)	(m)	(m)	(cm/sec)
GT12-01	22.6	28.7	0.87	0.7	8×10^{-6}
GT12-02	18.9	25	0.91	0	$<1 \times 10^{-6}$ ^{4,5}
GT12-03	14.6	18.9	0.98	1.1	$<1 \times 10^{-6}$ ⁴
GT12-04	29	37.2	0.96	6.0	3×10^{-6}
GT12-05	9.4	14.9	0.97	1.2	1×10^{-4}
GT12-06	15.2	20.7	0.94	0.7	2×10^{-4}
GT12-07	10.4	15.9	0.91	4.4	7×10^{-6}

NOTES:

- All tests were performed in 1" piezometer diameter.
- No piezometer was installed in GT12-08. Hole was grouted to surface. Monitoring wells MW12-05D and MW12-05S were installed at this location.
- Water levels are based on measurements below ground surface
- Response testing in GT12-02 and GT12-03 indicates a low hydraulic conductivity value. The hydraulic conductivity is reported $<1 \times 10^{-6}$ cm/s to indicate that the value is likely less than testing can reliably measure.
- The hydraulic conductivity value for GT12-02 response test is lower than GT12-02 lugeon test 1 which includes the same depth interval. The lower conductivity value may be attributed to borehole damage during drilling, and/or the presence of a higher permeability zone from 25 to 32.8 m.

3.4 MONITORING WELL DRILLING AND INSTALLATION

Five pairs of groundwater monitoring wells were installed during the 2012 SI program. A total of 364 m in 10 monitoring wells, ranging from 18 to 52 m in depth, were completed using ODEX drilling methods. All monitoring wells were drilled and installed by Westech Drilling Corp. (Westech) with the supervision of KPL field personnel.

The wells were installed at various mine facilities, primarily surrounding non-PAG stockpiles and the TMF, in order to monitor baseline groundwater quality conditions. A pair of deep and shallow wells was installed for each location. Deep wells were installed in bedrock, while shallow wells were typically installed at or immediately below the overburden/rock interface. Table 3.8 provides a summary of the monitoring wells and their locations can be seen in Figures 3.2 and 3.3 in previous sections.

Table 3.8 Summary of Monitoring Wells

Drillhole	Drillhole Location	Coordinates ^{1, 2}			Total Depth	Depth to Rock
		Northing	Easting	Elevation		
		(m)	(m)	(m)		
MW12-01D	Northwest of Non-PAG Low Grade Stockpile	5,709,413	303,440	1,702	44.0	2.9
MW12-01S	Northwest of Non-PAG Low Grade Stockpile	5,709,415	303,434	1,702	30.9	3.6
MW12-02D	East of Overburden Stockpile	5,711,320	306,995	1,669	51.2	6.1
MW12-02S	East of Overburden Stockpile	5,711,328	306,992	1,670	27.4	5.2
MW12-03D	Northeast of TMF	5,708,972	308,111	1,829	50.3	2.9
MW12-03S	Northeast of TMF	5,708,977	308,119	1,829	18.3	2.4
MW12-04D	East of TMF	5,706,350	307,049	1,830	49.4	5.0
MW12-04S	East of TMF	5,706,357	307,059	1,830	29.0	4.0
MW12-05D	Southwest of Non-PAG Waste Rock Stockpile	5,709,989	302,230	1,350	44.2	25.0
MW12-05S	Southwest of Non-PAG Waste Rock Stockpile	5,709,995	302,232	1,341	18.5	15.8

NOTES:

1. UTM NAD 83 coordinate system.
2. All coordinates were surveyed at the end of drilling except MW12-05D and MW12-05S, which were located using a handheld GPS.
3. All holes are vertical and drilled using 5" ODEX Casing.

The wells were installed using 2-inch diameter, decontaminated, flush-threaded Schedule 40 PVC pipes. The installation process is the same method used for standpipe piezometer installations, as described in the previous section.

Each well was developed and response tests were conducted in the screened completion zones a minimum of 48 hours after the installation. Monitoring well completion details are included in Appendix C4.

3.4.1 Well Development

The monitoring wells were developed before sampling in order to remove fines from the completion zone, enhance the flow of formation water through the well, and provide water samples with minimal amount of suspended solids. The well development was conducted after the cement/grout seal had hardened and a minimum of 48 hours had passed after installation.

Well development was completed using a Waterra© Hydrolift II groundwater pump, 5/8" high-density polyethylene tubing, a surge block, and a D-25 Waterra foot valve. The surge block and foot valve was used to pump water through the screened interval and out of the well. Several passes were made along the screen length to ensure thorough development, to create a well-graded filter pack around the screens, and to increase the well yield for reliable sample collection.

3.4.2 Response Testing

Several days after the development of each monitoring well, response testing was conducted in order to estimate the hydraulic conductivity in the completion zone of the monitoring well. The test involved the displacement of the static water level in the well, and then recording the response of the water level over time until the water level rises or falls to static conditions. The Cooper et al. method was used for the response testing analysis. Details of the analysis are provided in Appendix C5 and a summary of the installation and the result of the response testing is shown in Table 3.9 below.

Table 3.9 Summary of Monitoring Well Installation and Hydrogeological Testing

Drillhole	Piezometer Information ¹				
	Completion Zone		Stick Up Height	Static Water Level ²	Hydraulic Conductivity (Falling Head) ^{3,4}
	From (m)	To (m)	(m)	(m)	(cm/sec)
MW12-01D	39	43.3	0.89	1.9	-
MW12-01S	26.8	30.6	0.96	6.3	1 x 10 ⁻⁵
MW12-02D	45.7	51.1	0.91	0.8	-
MW12-02S	17.7	23.2	0.89	0.3	9 x 10 ⁻⁵
MW12-03D	44.8	50.1	0.98	0.05	-
MW12-03S	12.8	17.4	0.93	1.5	3 x 10 ⁻⁵
MW12-04D	42.4	49.4	0.97	33.1	-
MW12-04S	23.2	29	0.84	11.2	<1 x 10 ⁻⁶
MW12-05D	36.2	44.2	1.32	9.3	-
MW12-05S	13.3	18.5	1.32	9.3	-

NOTES:

1. All tests were performed in 2" piezometer diameter.
2. Water levels are based on measurements below ground surface.
3. Response tests were not completed at MW12-01 D, MW12-02D, MW12-03D and MW12-04D because water level in the wells had not recovered sufficiently from well development.
4. Response test were not completed at MW12-05D and MW12-05S as these wells were installed later in the season after well development and testing of the previous wells.
5. Response testing in MW12-04S indicates a low hydraulic conductivity value. The hydraulic conductivity is reported <1 x 10⁻⁶ cm/s to indicate that the value is likely less than testing can reliably measure.

3.5 LABORATORY TESTING

Selected samples from the drillholes were collected for laboratory strength testing and material characterization. Detailed summaries of the results from all soil and rock laboratory testing are provided in Appendix D.

3.5.1 Soil Testing

Disturbed SPT soil samples, from both TMF and geotechnical drillholes, were selected for laboratory testing in order to characterize the types of materials found at the drillhole locations. The laboratory testing was conducted at the KPL soils laboratory in Denver, Colorado. Particle Size Analysis (PSA), moisture content and Atterberg limits testing were completed.

PSAs were conducted in accordance with ASTM D-422 procedures using both conventional screen and hydrometer methods, in order to assess the particle distribution and grading characteristics of the material deposits on site. A hydrometer analysis was used to determine the silt and clay fraction particle sizes for material with a fine fraction exceeding 15% of the total sample.

Soil testing results and PSA summaries for the various mine site facilities are presented in Appendices D1 and D2, respectively. Table 3.10 summarizes the number of tests and test types performed.

Table 3.10 Soil Laboratory Testing Summary

Test Type	Number of Tests
Particle Size Distribution	77
Moisture Content	76
Atterberg Limits	53

3.5.2 Rock Testing

Six rock core samples were collected during the 2012 SI program. UCS and elastic modulus testing was completed by Paul Hughes from P.B. Hughes & Associates Rock Mechanics Consultants (Vancouver, BC). Representative samples of the rock types on site without pre-existing planes of weakness were collected when possible.

Test results are presented in Appendix D3. The drillhole ID presented in the lab testing report uses the prefix "GM" in place of the prefix "GT" to identify the 2012 geotechnical drillholes the samples were collected from. The 2012 rock testing results are summarized in Table 3.11.

Table 3.11 Summary of 2012 Rock Strength Laboratory Testing

Hole ID	Sample ID	Depth From	Depth To	UCS	Young's Modulus	Poisson's Ratio	Lithology
		(m)	(m)	(MPa)	(GPa)		
GT12-01	G1	12	12.65	97	78.2	0.234	Intrusives
GT12-02	G2	13.91	14.13	206	72.5	0.242	Orthogneiss
GT12-03	G3	38.71	39.07	136	62.2	0.155	Orthogneiss
GT12-04	G4	19.33	19.58	52	40.8	0.137	Schist (w/ Quartz Eyes)
GT12-05	G5	19.28	19.53	63	15.1	0.124	Schist (w/ Quartz Eyes)
GT12-06	G6	16.28	16.51	49	44.1	0.066	Phyllite

NOTES:

1. Elastic Modulus and Poisson's Ratio were determined during "UCS w/ strain analysis" tests for all samples.
2. Depths shown are vertical depths, except for GT12-02 and GT12-03 which are inclined depths.

4 – GEOTECHNICAL CONDITIONS

4.1 GENERAL

The geotechnical conditions of the overburden and bedrock for the open pit, tailings management facility and the overburden, waste rock and low grade stockpiles areas have been assessed using the geological and geotechnical information during the 2011 and 2012 SI programs. The following sections summarize the site conditions, based on the 2011 and 2012 SI data.

4.1.1 Overburden

A total of 24 geotechnical drillholes, 7 geomechanical drillholes, 10 monitoring wells, 55 test pits, and 17 road cuts were logged during the 2011 SI program. The 2012 SI overburden program included 8 geotechnical holes, 10 open pit holes, 18 TMF holes, and 10 monitoring wells were completed throughout the open pit, TMF and the overburden, waste rock and low grade ore stockpile areas. Overburden from all holes was logged and classified through visual inspection and laboratory soil testing to characterize its properties.

Findings from all locations across the project area indicate that overall, the overburden is mainly comprised of silty sand and gravel with trace to some cobbles and boulders and trace clay. The overburden is typically stiff to dense, moist, with angular to sub-angular particles. Overburden typically ranges in thickness from 0 to 10 m in the open pit area, <1 to 16 m in the TMF area, 6 to 9 m in the crusher and plant sites and <1 to 25 m at the stockpile areas. Localized variation in overburden composition will be discussed in the following sub-sections.

A topsoil veneer covers the Harper Creek project area, comprised of moist, spongy, fibrous, and dark to blackish brown silt and sand with organics. Drillhole logs and previous test pitting works indicate that the topsoil layer varies in thickness from 0.1 to 0.5 m.

4.1.2 Bedrock

Deformed and metamorphosed Lower Cambrian and Upper Devonian to Mississippian sedimentary and volcanic rocks and foliated granite to diorite sills and dikes of the Eagle Bay Assemblage underlay the Harper Creek Property. Middle to Upper Jurassic and Cretaceous granitic plutons intrude these rocks. Eocene-age Kamloops Group volcanic rocks overlay the Eagle Bay Assemblage.

Bedrock within and surrounding the open pit and TMF areas consists of intrusives, orthogneiss, fault zones, phyllites, schists, quartz eye schists and silica altered host rocks. A cumulative summary of the rock mass properties grouped by lithology is presented in Table 4.1. Additionally, cumulative summaries of the rock strength properties as grouped by failure types and by testing methods are shown in Table 4.2. Many samples of phyllite and schist selected for UCS testing failed along the foliation planes within the rock, providing significantly lower UCS values. The rock strength values for failure through intact rock and failure through foliation are presented separately. Point Load Test samples do not differentiate between intact vs. foliation failure, and as such PLT results are presented in their own category as well.

Table 4.1 Summary of Rock Mass Quality

Lithology ¹	RQD (%)				RMR ⁸⁹				
	No. of Runs	Mean	Median	St. Dev.	No. of Discontinuities	Mean	Median	St. Dev.	Description
Intrusives	151	72	79	25	831	69	68	11	GOOD
Orthogneiss	580	74	85	27	3182	67	67	10	GOOD
Fault Zone	42	60	69	36	144	57	57	11	FAIR
Phyllite	394	64	75	33	2117	65	64	10	GOOD
Schist	436	77	88	26	898	63	63	10	GOOD
Schist (w/Quartz Eyes)	859	75	85	27	2236	63	63	9	GOOD
Silica Altered Zone	110	74	85	28	258	66	67	8	GOOD

NOTES:

1. Data is grouped in lithological categories provided by CME, except data from GT12-08 which is based on KPL field interpretations.
2. Data is from 2012 geotechnical holes (GT12-01 to GT12-08), 2011 geotechnical holes (HC11-GT01 to HC11-GT24) and 2011 geomechanical holes (HC11-GM01 to HC11-GM07).

Table 4.2 Summary of Rock Mass Strength Properties

Lithology	Mean Rock Strength (MPa) ¹			Mean Young's Modulus (GPa) ³	Mean Poisson's Ratio ³	Direct Shear	
	UCS		PLT ²			Mean Peak Friction	Mean Residual Friction
	Foliation Break	Intact					
Intrusives	-	120 (2)	-	78	0.234	-	-
Orthogneiss	-	138 (10)	119 (49)	67	0.199	-	-
Fault Zone	-	-	-	-	-	-	-
Phyllite	39 (5)	80 (2)	22 (27)	44	0.150	36	29
Schist	26 (2)	91 (3)	23 (38)	44	0.290	42	37
Schist (w/Quartz Eyes)	53 (11)	93 (4)	25 (83)	48	0.196	37	32
Silica Altered Zone	37 (1)	-	29 (12)	52	0.273	37	32

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Values used for Young's Modulus and Poisson's Ratio are based on the unweighted combination of all failure types.
4. Data is based on 2012 geotechnical holes (GT12-01 to GT12-08), 2011 geotechnical holes (HC11-GT01 to HC11-GT24) and 2011 geomechanical holes (HC11-GM01 to HC11-GM07).

4.2 OPEN PIT AREA

10 holes (OP12-01 to OP12-10), ranging from 5 to 10 metres depth, were drilled within the open pit area during the 2012 SI program. These shallow holes were drilled in order to collect overburden geochemical samples and to characterize the overburden in the open pit. Overburden logging was not conducted during the 2011 SI program. However, overburden depths were logged based on the depth of casing for all 2011 geomechanical holes.

4.2.1 Overburden

Overburden in the open pit area ranges in thickness from <1 to 10 m, This is consistent with the data gathered from the 2011 SI program, which consisted of 7 geomechanical open pit holes (HC11-GM01A to HC11-GM07).

Overall, the overburden is generally scarce within the southeast areas of the pit, which is covered by a thin veneer of topsoil over the bedrock. The northwest region of the open pit is overlain by silty sands and gravels, till and weathered bedrock. The overburden is covered by a layer of organic topsoil. Bedrock near surface or at the overburden and bedrock interface is typically rippable to a depth of 6 m due to weathering of the rock mass. The overburden till that covers the open pit area is suitable for use as construction material, provided that geochemical characterization testing confirms its suitability.

4.2.2 Bedrock

Bedrock within the open pit area is mainly comprised of phyllites and schists. The bedrock is light grey to grey green in colour, with occasional quartz inclusions and traces of pyrite and other sulphides. It is also strongly foliated, with foliation planes dipping towards the north at shallow angles. Numerous minor thrust faults exist throughout the open pit, dipping towards the north at approximately 25° to 35°, similar to the orientation of the foliation within the rock mass. The Harper Creek Fault bisects the proposed pit location, running sub-vertically along a northeast-southwest trend.

Overall, the bedrock within the open pit has an average RQD of 78% and an average RMR value of 66, which indicates 'GOOD' quality rock. A summary of the open pit rock mass properties grouped by relevant area specific lithology is shown in Table 4.3. Data is derived from the 2011 geomechanical drilling as no bedrock coring was completed during the 2012 SI program. The open pit bedrock lithology and rock mass properties are described in the open pit geotechnical design report (KPL Ref. No.VA101-458/3-1, April 2012).

The intact rock mass within the pit is typically "Average" to "Hard", with UCS ranging from 60 to 175 MPa and average UCS of 100 MPa based on seven laboratory tests. The foliation planes within the rock mass are planes of weakness along which several samples failed preferentially, and at a much lower UCS than failures that occurred through intact rock.

Table 4.3 Summary of Rock Mass Properties at the Open Pit

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹		
			UCS		PLT ²
			Foliation Break	Intact	
Fault Zone	57	55	-	-	-
Phyllite	75	64	38 (4)	110 (1)	19 (14)
Schists	78	65	26 (2)	91 (3)	25 (39)
Schists (w/Quartz Eyes)	80	67	52 (10)	106 (3)	27 (65)
Silica Altered Zone	79	68	37 (1)		32 (11)
Veins	83	70	-		-
All	78	66	45 (17)	100 (7)	26 (129)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2011 geomechanical holes (HC11-GM01 to HC11-GM07).

4.2.3 Groundwater

Hydrogeological testing from the 2011 SI program indicates that the hydraulic conductivity within the open pit area typically varies from 1×10^{-7} to 5×10^{-4} cm/sec. In addition, the groundwater levels vary throughout the open pit, from artesian conditions observed within the south and east regions to 12 m deep in the northwest. There seem to be no significant correlation between the hydraulic conductivity and lithology; however conductivity generally decreases with depth, as shown Figure 3.5.

4.3 TAILINGS MANAGEMENT FACILITY

The TMF is located within a broad shallow basin southeast of the open pit area. The basin narrows slightly at its mouth and serves as an optimal location for the TMF embankment.

A total of 18 overburden holes (TMF12-01 to TMF12-18) and 2 geotechnical holes (GT12-02 and GT12-03) were drilled within the TMF during the 2012 SI program.

The overburden holes, ranging from 8 to 15 m in depth, were completed to characterize the overburden and delineate the extent of a till blanket within the TMF basin as identified in 2011. 15 of the holes were drilled at the footprint of the TMF embankment and the other 3 were drilled at the upstream section of the TMF.

Geotechnical holes GT12-02 and GT12-03 were drilled at an inclination of 60 degrees. GT12-02 was drilled to the north and was completed on the upstream side of the TMF embankment while GT12-03 was drilled towards the south on the downstream side. The purpose of the inclined holes was to confirm the presence of a potential fault zone observed in 2011.

4.3.1 Overburden

The overburden till blanket in the TMF area was characterized through overburden drilling, geotechnical drilling, test pitting and soil laboratory testing of selected samples during the 2012 SI

program. Supplemental data from 2011 was also used to refine the geotechnical characteristics of the overburden.

Overall, the overburden ranges in thickness from <1 to 16 m throughout the TMF area. This is consistent with the findings of the 2011 seismic refraction survey program, which indicated the bedrock has a maximum depth of 11 m across the embankment. Details of the seismic refraction survey are available in the 2011 SI factual report (Ref. No.VA101-458/3-1, Rev 0).

The overburden is comprised mainly of stiff to dense, moist, sands and gravels with some silt and clay. The gravel is typically angular to sub-angular and poorly graded. Moisture contents for the till range from 1% to 55%, with an average of 9%. Test pitting has exposed till layers varying in thickness from 0.5 to 4.4 m throughout the TMF area. A thin veneer of topsoil, consisting of moist, spongy, fibrous, dark brown silt and sand with organic overlies the overburden. The topsoil layer typically ranges in thickness from 0.1 to 0.5 m.

The eastern side of the TMF has silty sands, and gravels (till) and weathered bedrock. The central section of the embankment area has similar overburden characteristics to the eastern section as described as sandy till, however it contains a thicker topsoil layer due to the low, flat geography of the valley basin. The overburden near the west abutment of the TMF is sandier than the eastern till deposits and is described as fine, glacial lake sand deposits.

The overburden characteristics at different sections of the embankment are summarized as follows:

- **East Embankment:** 4 overburden holes (TMF12-04 to TMF12-07) were completed on the east side of the TMF embankment area during the 2012 SI program. The overburden can be characterized as a dense till material comprised of dense silty sand and gravels with clay. The overburden varies in thickness from 3 to 8 m.
- **Central Embankment:** 4 overburden holes (TMF12-08 to TMF12-12) and 2 geotechnical holes (GT12-02 and GT12-03) were completed in the central area of the TMF. The overburden varies in thickness from 1 to 11 m and is comprised of dense silty sand and gravel with clay (till).
- **West Embankment:** 6 overburden holes (TMF12-13 to TMF12-18) were completed on the west side of the TMF embankment. Overburden typically ranges in thickness from 3 to 6 m and is comprised of silty and clayey sand with angular to sub-angular gravel (till).

3 overburden holes (TMF12-01 to TMF12-03) were completed upstream of the TMF embankment area in 2012. Drillhole logs show that the overburden varies in thickness between 4 to 12 m. Overall, the overburden is similar in characteristics to the rest of the TMF area, typically till comprised of dense, silty sands and gravels with sub-angular to sub-rounded particles.

1 geotechnical hole (GT12-01) was drilled during 2012 within the proposed rock quarry footprint, located within a 300 x 300 m area downstream of the TMF embankment. Overburden at the downstream section is characterized as sand and gravel, firm to dense, moist and sub-rounded to sub-angular with depths ranging from 1 to 7 m.

The laboratory particle size analyses (PSAs) results for samples collected within the TMF are presented in Appendix D2. TMF drillhole logs and geotechnical drillhole logs are presented in Appendix A2 and B1, respectively.

4.3.2 Bedrock

The dominant bedrock type in the TMF area is orthogneiss, which is present from GT12-02 and GT12-03. Intrusive rocks such as granodiorite and quartz monzonite were also intercepted from drillhole GT12-01 and previous 2011 holes.

Drillholes HC11-GT17, HC11-GT18 and HC11-GT20 exhibited zones of fractured rock indicating a potential fault zone. GT12-02 and GT12-03 were drilled in order to confirm the presence of the fault and delineate its structure if present. However, based on the available logging data, a fault was not intersected by either drillhole. The geotechnical drillhole logs are presented in Appendices B1 and B2.

The bedrock in the TMF area is described as 'GOOD' quality rock. The bedrock has an average RMR value of 68 and an average RQD of 78%. Typically, the RMR values show little to no variation with depth, as shown in Appendix B3. Table 4.4 provides a summary of the TMF rock mass properties grouped by relevant area specific lithology. The UCS of the bedrock at the TMF ranges from 114 to 206 MPa, with an average strength of 150 MPa.

Table 4.4 Summary of Rock Mass Properties at the TMF

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹		
			UCS		PLT ²
			Foliation Break	Intact	
Orthogneiss	78	68	-	156 (6)	112 (58)
Intrusives	79	61	-	142 (1)	-
Fault	62	63	-	-	-
Schists	56	58	-	-	-
Schists (w/Quartz Eyes)	58	58	-	-	-
Dykes	38	56	-	-	-
All	78	68	-	154 (7)	-

NOTES:

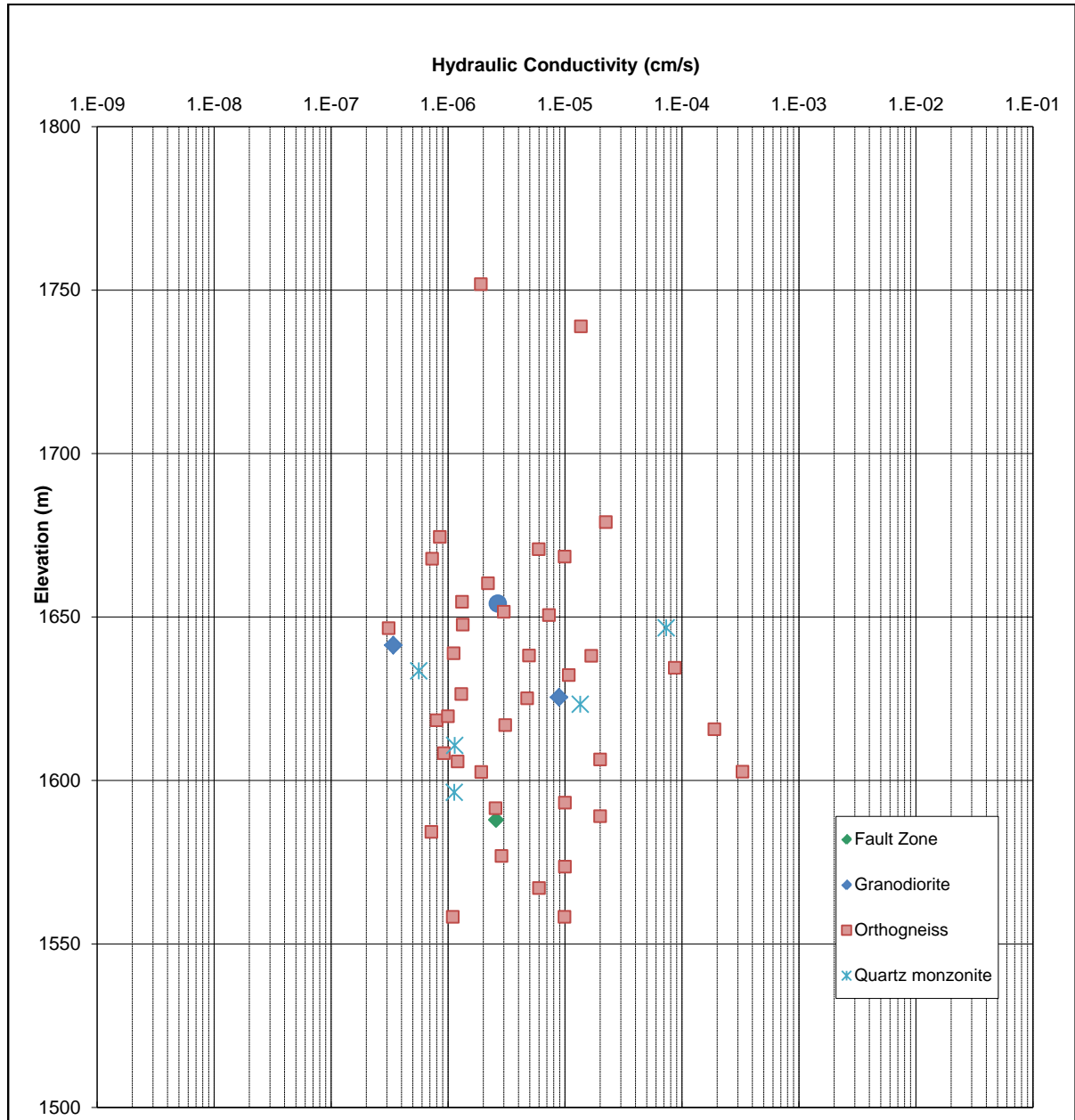
1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2011 geotechnical holes (HC11-GT05 to HC11-GT07, HC11-GT14 to HC11-GT24) and 2012 geotechnical holes (GT12-02 to GT12-03).

4.3.3 Groundwater

The permeability of the foundation is a critical factor that must be considered in the TMF embankment design. In-situ Lugeon testing was conducted in the two geotechnical holes, GT12-02 and GT12-03.

Hydraulic conductivity testing data from the 2011 and 2012 SI programs was compiled to determine the overall permeability of the TMF embankment foundation. The rock mass permeability was found to be relatively low, with hydraulic conductivities typically varying between 1×10^{-7} to 1×10^{-5} cm/sec. The data does not indicate significant correlation between lithology, elevation and hydraulic

conductivity. GT12-01, which was completed downstream of the TMF, also exhibited low hydraulic conductivity values ranging from 3×10^{-6} to 8×10^{-6} cm/sec. Figure 4.1 shows a plot of the 2011 and 2012 Lugeon test results from drillholes completed at the TMF area.



NOTES:

1. Data is based from in situ Lugeon Tests conducted in the 2011 and 2012 SI programs from TMF drillholes.

Figure 4.1 Hydraulic Conductivity vs. Elevation plot of TMF Lugeon Tests

One-inch piezometers were installed in the geotechnical holes once drilling was complete. Groundwater was observed to be generally very close to ground surface from these holes. The

static water level of GT12-03 is 1.1 m below ground surface, while the static water level for GT12-02 is at ground surface. These measurements are consistent with 2011 values, which showed static water levels generally less than 2 m below ground surface at the TMF area as observed in piezometers and monitoring wells.

4.4 OVERBURDEN, WASTE ROCK AND LOW-GRADE STOCKPILES

The Overburden Stockpile, which is located to the east of the open pit, will be used to store overburden materials during surface excavation work. Topsoil materials will be stored in four topsoil stockpile sites (North, East, South and West Topsoil Stockpiles). Low grade ore materials will be temporarily stored at the appropriate non-PAG or PAG Low Grade Stockpile areas that are located northwest of the TMF.

Waste rock from the mine will be either used as construction material for the TMF embankment or placed in waste rock stockpiles areas. The non-PAG (non-potentially acid generating) waste rock will be placed in the non-PAG Waste Rock Stockpile located to the southwest of the open pit. The PAG Waste Rock Stockpile is located southeast of the Plant Site area, and is confined within the final TMF impoundment area. PAG waste rock will be placed in this facility to be submerged as the impoundment fills over the course of the mine life.

4.4.1 Overburden Stockpile

Drillholes GT12-05 and GT12-06 were drilled at the Overburden Stockpile area. Overburden ranges in thickness from 2 to 6 m at this location and it mainly consists of silty sand with gravel materials. The bedrock is primarily comprised of quartz eye schist with layers of phyllite. The average RMR and RQD for the Overburden Stockpile area are 51 and 58%, respectively. A phyllite sample was collected for UCS testing, and it exhibited an intact strength of 49 MPa. A quartz eye schist sample was also collected for UCS testing, and failed through foliation with a rock mass strength of 63 MPa.

Additionally, 15 field PLTs were completed during drilling, with results indicating a lower rock mass strength of 24 MPa in phyllite, and 9 MPa in schist. These lower rock mass strengths are consistent with samples that broke along the pre-existing foliation planes present in the phyllites and schists. Table 4.5 provides a summary of the rock mass properties in the Overburden Stockpile site, grouped by area specific lithology.

Two one-inch piezometers were installed at the proposed Overburden Stockpile area in drillholes GT12-05 and GT12-06. Static water levels were measured at 1.2 m and 0.7 m below ground surface for GT12-05 and GT12-06, respectively.

Two monitoring wells, a deep and shallow well, labelled MW12-02D and MW12-02S respectively, were installed just to the northeast of the Overburden Stockpile. Static water levels below ground surface are 0.8 m for MW12-02D and 0.3 m for MW12-02S.

The hydraulic conductivity, as indicated by the cumulative hydrogeological testing results from all holes ranges from 9×10^{-5} to 1×10^{-4} cm/sec.

Table 4.5 Summary of Rock Mass Properties at the Overburden Stockpile

Lithology	Mean RQD (%)	Mean RMR	Rock Strength (MPa) ¹		
			Mean UCS		Mean PLT ²
			Foliation Break	Intact	
Fault	75	53	-	-	-
Phyllite	53	51	-	49 (1)	25 (10)
Schists (w/Quartz Eyes)	60	51	63 (1)	-	9 (5)
Veins	38	48	-	-	-
All	58	51	63 (1)	49 (1)	20 (15)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2012 geotechnical holes (GT12-05 and GT12-06).

4.4.2 Topsoil Stockpiles

There are four stockpile sites that have been proposed across the site for storage during excavation work.

The North Topsoil Stockpile is located northwest of the open pit. Drillhole HC11-GT01 was completed in 2011 just to the south of this site. Data from HC11-GT01 indicates that the overburden thickness is approximately 9 m. Bedrock is mainly comprised of alternating layers of phyllite and schists. The RMR of the bedrock has an average value of 51, which is considered as 'FAIR' quality rock.

The East Topsoil Stockpile is located north of the proposed TMF site. Drillhole HC11-GT05 and test pit TP-51 were completed at the site during the 2011 SI program. The overburden was observed to be approximately 6 m thick and is composed of silty sand and gravel. The bedrock is comprised of orthogneiss with minor quartz eye schist layering. The RMR of the bedrock has an average value of 59, which is considered as 'FAIR' quality rock.

The West Topsoil Stockpile is located west of the proposed PAG Low Grade Stockpile and TMF site. Drillhole HC11-GT02 was completed at the site during the 2011 SI program. The overburden at the site is approximately 3 m thick and mainly silt and gravel. The bedrock is mainly orthogneiss which has an average RMR value of 63 and is considered as 'FAIR' to 'GOOD' quality rock.

The South Topsoil Stockpile is located south of the TMF site. Several test pits and one drillhole (HC11-GT21) were completed at the proposed site in 2011. The overburden is approximately 5 m thick and characterized as sand and gravel, firm to dense, moist and sub-rounded to sub-angular. The bedrock at the site is considered as 'GOOD' quality rock and is mainly quartz monzonite with an average RMR value of 77.

4.4.3 Non-PAG and PAG Low Grade Stockpiles

The Low Grade Stockpiles for both Non-PAG and PAG materials are located just northwest of the TMF. Two monitoring wells, a deep and shallow well labelled MW12-01D and MW12-01S, were

installed during the 2012 SI program. No geotechnical or overburden holes were completed in the area in 2012.

The overburden at the site has been found to consist of silty sand with gravel, with thicknesses ranging from 1 to 4 m. From previously drilled geotechnical holes (HC11-GT02, HC11-GT03, and HC11-GT-04), the bedrock has been identified as orthogneiss rock, with a small layer of quartz eye schist present in HC11-GT03. The average RMR and RQD for the Low Grade Stockpile areas are 59 and 38%, respectively. The average UCS of the bedrock, based on three orthogneiss UCS samples, is 115 MPa. Table 4.6 provides a summary of the rock mass properties at the Low Grade Stockpile sites, grouped by area specific lithology.

Table 4.6 Summary of Rock Mass Properties at the Low Grade Stockpiles

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹	
			UCS	
			Foliation Break	Intact
Orthogneiss	46	62	-	115 (3)
Schists (w/Quartz Eyes)	3	48	-	-
All	38	59	-	115 (3)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. No PLTs were completed at this area.
3. Data is based on 2011 geotechnical holes (HC11-GT02 to HC11-GT04).

Artesian conditions have been observed in the monitoring wells MW11-03 and MW11-04, while MW12-01D and MW12-01S exhibit static water levels at 1.88 m and 6.28 m below ground surface, respectively. Overall, the hydraulic conductivity at the Low Grade Stockpile areas ranges from 7×10^{-5} to 1×10^{-5} cm/sec.

4.4.4 Non-PAG Waste Rock Stockpile

Drillholes GT12-04, GT12-07 and GT12-08 were drilled within and in the surrounding areas of the Non-PAG Waste Rock Stockpile located southwest of the proposed open pit. Overburden variably ranges in thickness from 6 to 25 m and is mainly comprised of silt, sand and gravel, trace clay.

The bedrock typically is comprised of alternating schist, quartz eye schist and phyllite layers. The average RMR and RQD for the area are 49 and 37%, respectively. A single sample of quartz eye schist was collected for laboratory testing and provided a UCS value of 52 MPa. A phyllite sample and quartz eye schist sample were selected for field PLTs and exhibited rock strength values of 57 MPa and 33 MPa, respectively. Table 4.7 provides a summary of the rock mass properties in the Non-PAG Waste Rock Stockpile, grouped by area specific lithology.

Table 4.7 Summary of Rock Mass Properties at the Non-PAG Waste Rock Stockpile

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹		
			UCS		PLT ²
			Foliation Break	Intact	
Intrusives	46	55	-	-	-
Fault	62	56	-	-	-
Phyllite	24	48	-	-	57 (1)
Schists	30	44	-	-	-
Schists (w/Quartz Eyes)	45	47	-	52 (1)	33 (14)
Silica Altered Zone	17	50	-	-	-
Veins	62	61	-	-	-
All	37	49	-	52 (1)	35 (15)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2011 geotechnical holes (HC11-GT01 and HC11-GT08) and 2012 geotechnical holes (GT12-04, GT12-07, and GT12-08).

Two one-inch piezometers were installed at the Non-PAG Waste Rock Stockpile area in drillholes GT12-04 and GT12-07. GT12-08 was grouted all the way to ground surface, but a deep and shallow monitoring well were drilled near its location, labelled MW12-05D and MW12-05S, respectively. The static water level ranges from 4.4 to 6 m below ground surface.

The hydraulic conductivity determined from Lugeon testing in the geotechnical drill holes ranges from 7×10^{-6} to 1×10^{-5} cm/sec. No hydrogeological testing was conducted in the monitoring wells as they were installed later in the season, after the initial round of well development and testing.

4.4.5 PAG Waste Rock Stockpile

There were no holes drilled within the PAG Waste Rock Stockpile area during the 2012 SI program. Previously, two 2011 holes (HC11-GT05 and HC11GT-07) along with one test pit (TP51) were completed within and in the surrounding area of the proposed facility. The PAG Waste Rock Stockpile will be confined within the final TMF embankment with the purpose of subaqueous waste rock disposal.

The 2011 SI data indicates that the overburden is comprised of till material with depths ranging from 5 to 7 m. The bedrock which is primarily orthogneiss has average RMR and RQD of 65 and 71%, respectively. A single laboratory orthogneiss UCS sample provided a rock mass strength of 113 MPa. Table 4.8 provides a summary of the rock mass properties in the PAG Waste Rock Stockpile as grouped by relevant area specific lithology.

The hydraulic conductivity ranges from 1×10^{-6} to 3×10^{-4} cm/sec. The static water level measured from the standpipe piezometers installed in HC11-GT05 and HC11-GT07 is 3.6 m and 2.8 m below ground surface, respectively.

Table 4.8 Summary of Rock Mass Properties at the PAG Waste Rock Stockpile

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹	
			UCS	
			Foliation Break	Intact
Orthogneiss	73	66	-	114 (1)
Schists (w/Quartz Eyes)	56	58	-	-
All	71	65	-	114 (1)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. No PLTs were completed at this area.
3. Data is based on 2011 geotechnical holes (HC11-GT05 and HC11-GT07).

4.5 CRUSHER SITE

The crusher site is located east of the Non-PAG Waste Rock Stockpile area, southwest of the proposed open pit. Drillholes GT12-04 and GT12-07 were completed at the proposed crusher site during the 2012 SI program.

Overall, the overburden at the crusher site is primarily comprised of silty sand and gravel which ranges in thickness from 5 to 10 m. The bedrock at the crusher site is mainly interlayered phyllites and schists, which is present in both GT12-04 and GT12-07.

The average RMR and RQD for the crusher site are 47 and 36%, respectively. The UCS, based from one laboratory test on quartz eye schist, is 52 MPa. PLT results indicate a rock mass strength of 27 MPa in the quartz eye schists and 57 MPa in the phyllites. Table 4.9 provides a summary of the rock mass properties at the crusher site, grouped by area specific lithology.

Table 4.9 Summary of Rock Mass Properties at the Crusher Site

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹		
			UCS		PLT ²
			Foliation Break	Intact	
Phyllite	27	43	-	-	57 (1)
Schists	30	44	-	-	-
Schists (w/Quartz Eyes)	54	48	-	52 (1)	27 (22)
All	36	47	-	52 (1)	28 (23)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2012 geotechnical holes (GT12-04 and GT12-07).

Hydrogeological testing data indicates that the hydraulic conductivity at the crusher site ranges from 3×10^{-7} to 1×10^{-5} cm/sec. The static water level varies from 5 to 12 m below ground surface.

4.6 PLANT SITE

The proposed plant site is located approximately 600 m south of the open pit. There were no additional holes drilled within the plant site during the 2012 SI program. Five 2011 holes (HC11-GT09 to HC11GT-13) were completed in the facility in the 2011 SI program.

The overburden varies in thickness from 1 to 3 m and is comprised of gravelly, silty sand with some cobbles and boulders. The overburden is typically firm to stiff, moist with angular to sub angular particles.

The bedrock at the plant site is comprised of alternating layers of phyllite and quartz eye schist, except in drillhole HC11GT-13, which is mainly orthogneiss rock. The average RMR and RQD of the bedrock is 54 and 35%, respectively. Rock strength testing indicates that the UCS of the orthogneiss is 100 MPa and the phyllite is 27 MPa. Table 4.10 provides a summary of the rock mass properties at the plant site as grouped by relevant area specific lithology.

Table 4.10 Summary of Rock Mass Properties at the Plant Site

Lithology	Mean RQD (%)	Mean RMR	Mean Rock Strength (MPa) ¹		
			UCS		PLT ²
			Foliation Break	Intact	
Orthogneiss	43	55	-	100 (1)	-
Phyllite	34	54	44 (1)	-	27 (1)
Schists (w/Quartz Eyes)	31	53	-	-	-
All	35	54	44 (1)	100 (1)	27 (1)

NOTES:

1. Values inside the brackets denote the number of samples used for the mean rock strength value calculation.
2. PLT rock strength values are based on the combination of laboratory and field PLT tests of all failure types.
3. Data is based on 2011 geotechnical holes (HC11-GT09 to HC11-GT13).

Piezometers installed at the plant site exhibited hydraulic conductivity values from 5×10^{-7} to 1×10^{-4} cm/sec. The static water level measurements generally range from 2 to 5 m below ground surface.

4.7 ROCK QUARRY

Drillhole GT12-01 was completed at the Rock Quarry area, which is located southwest of the proposed TMF. The overburden encountered in GT12-01 is approximately 6.6 m thick and is comprised of gravels and cobbles, with silt, sand and clay (identified as till).

Bedrock is mainly quartz monzonite intrusives unit with an average RMR and RQD of 57 and 49%, respectively. The UCS strength of the bedrock is approximately 97 MPa based on one UCS sample.

A one-inch diameter piezometer was installed in GT12-01. The static water level was measured after installation at 0.7 m below ground surface. Hydraulic conductivity testing indicates the rock mass permeability ranges from 8×10^{-6} to 3×10^{-6} cm/sec.

5 – CONCLUSIONS

5.1 GENERAL

A site investigation program was carried out in 2012 to collect geotechnical and hydrogeological information. This data was used to supplement information collected during the 2011 SI program (KPL Ref. No.VA101-458/3-1, Rev 0) in order to characterize the foundation conditions of the mine site facilities.

5.1.1 Overburden

A topsoil veneer, 0.1 to 0.5 m thick, covers the Harper Creek project area. The topsoil is comprised of moist, spongy, fibrous, and dark to blackish brown silt and sand with organics. The overall near surface overburden at the site is mainly composed of silty sand and gravel with trace to some cobbles and boulders and trace clay. The overburden is typically stiff to dense, moist, with angular to sub-angular particles. Local variations in overburden composition and thickness occur between the various mine site facilities.

5.1.2 Bedrock Characteristics

The main lithologies encountered throughout the project area are intrusives, orthogneiss, fault zones, phyllites, schists, quartz eye schists and silica altered host rocks.

The intrusives rocks, which include andesite dikes, granodiorite and quartz monzonite, are typically medium grained and hard, and occur as intrusive bodies throughout the property and south of the TMF embankment as part of the Baldy Batholith. The intrusives are regarded as 'GOOD' quality rocks with an average RMR value of 69 and an average RQD of 72%. Laboratory rock tests indicate that the rock mass strength is 120 MPa.

The orthogneiss is light grey to white, foliated, and has a partially mottled texture. Some sulphide mineralization is present. The rock mass is found within the plant site and TMF areas. Logging data indicates 'GOOD' quality rock with a mean RMR of 67 and a mean RQD of 74%. It has an average UCS of 138 MPa.

The fault zones are generally characterized by the presence of rubble and fault gouge material. Fault zone material has an average RMR and RQD of 57 and 60%, respectively.

The phyllites are light grey to green-grey in color, strongly foliated, and generally weak along foliation planes. Pyrite and chalcopyrite are present throughout the rock mass with alteration types varying from calcareous-chlorite to sericite-chlorite-quartz. The phyllites have an average RMR and RQD of 65 and 64%, respectively. The rock strength of phyllite is on average 62 MPa for intact rock, and 25 MPa for samples that broke along foliation planes.

The schists are light grey to green-grey with strongly foliated texture and exhibit weakness along foliation planes. The alteration types vary from sericite-chlorite to sericite-chlorite-fuchsite, with some occurrences of polymictic fragmental-conglomeratic chlorite alteration. The schists have an average RMR of 63 and a mean RQD of 77%. Laboratory test results show rock mass strengths of 68 MPa for failures through intact rock, and 27 MPa for failures through foliation planes.

The quartz eye schists are light grey to green-grey with strongly foliated texture. They are characterized by the presence of quartz eyes throughout the rock mass. Pyrite and chalcopyrite are present throughout the rock mass. The unit has a mean RMR of 63 and a mean RQD of 75%. The rock strength of the unit has an average of 82 MPa for intact rock failures and 39 MPa for failures along foliation.

The silica altered host rocks are characterized by silica alteration overprinting the original lithology of the host rock. This unit has a mean RMR of 66 and a mean RQD of 74%. The rock strength of the silica altered host rocks has been classified as 'AVERAGE', with an average UCS of 75 MPa for intact rock failures and 33 MPa for foliation failures.

5.2 MINE SITE INFRASTRUCTURE GEOTECHNICAL CONDITIONS

The following is a summary of the site investigation program conclusions for each of the major mine site infrastructure components.

5.2.1 Open Pit

The open pit area is covered with a thin veneer of topsoil over bedrock in the southeast areas. The overburden in the northwest area consists of silty sands and gravels, till and weathered bedrock. The overburden depth throughout the pit ranges from 0 to 10 m, with thicker overburden layers present in the northwest pit area.

Bedrock in the open pit is mainly comprised of phyllites and schists, typically light grey to grey-green to dark green-grey in color. A regional fault, the Harper Creek fault, bisects the pit area, running sub-vertically at a south western/north eastern trend.

Groundwater levels vary throughout the open pit, from artesian conditions observed within the south and east regions to 12 m deep in the northwest. The hydraulic conductivity of the rock typically varies from 1×10^{-7} to 5×10^{-4} cm/sec.

5.2.2 TMF

There is a thin veneer of topsoil over the entire TMF area, which is thicker in the central embankment area, located in the valley bottom. The overburden in the TMF area ranges from <1 to 16 m thick. It consists of stiff to dense, moist, sands and gravels with some silt and clay. The west side of the TMF is dominated by lacustrine deposits and tends to be sandier than eastern till deposits, which is silty sand and gravel. The overburden at the central section has similar characteristics to the east but contains thicker topsoil layer due to the low, flat geography of the valley basin.

The dominant bedrock type in the TMF area is orthogneiss with quartz monzonite intercepted along the south side of the embankment area. The bedrock has an overall average RMR of 68, which corresponds to 'GOOD' quality rock, and the rock strength typically ranges from 114 to 206 MPa with an average of 150 MPa.

Generally, the rock mass at the TMF has low permeability, with hydraulic conductivities typically ranging from 1×10^{-7} to 1×10^{-5} cm/sec based on in-situ hydrogeological testing. Static water levels, as measured in the standpipe piezometers installed on site, are close to the ground surface (<2 m below ground surface).

5.2.3 Overburden and Topsoil Stockpiles

The overburden at the Overburden Stockpile site varies in thickness from 2 to 6 m. The bedrock is primarily quartz eye schist interlayered with phyllite. The average RMR of the bedrock is 51 and an average UCS of 49 MPa. Hydrogeological testing indicates that the hydraulic permeability ranges from 9×10^{-5} to 1×10^{-4} cm/sec.

There are four topsoil proposed stockpile sites: North, East, South and West Topsoil Stockpiles. The material characteristics are outlined below:

- North Topsoil Stockpile
 - Overburden is ranges from 1 to 9 m thick and is comprised of sand with gravel
 - Bedrock is alternating phyllite and schists with an average RMR value of 51
- East Topsoil Stockpile
 - Overburden is approximately 6 m thick and is comprised of silty sand and gravel
 - Bedrock is orthogneiss and minor quartz eye schists with an average RMR value of 59
- South Topsoil Stockpile
 - Overburden is approximately 5 m thick and is comprised of sand and gravel
 - Bedrock is quartz monzonite with an average RMR value of 77
- West Topsoil Stockpile
 - Overburden is approximately 3 m thick and is comprised of silt and gravel
 - Bedrock is orthogneiss with an average RMR value of 63

5.2.4 Waste Rock and Low Grade Stockpiles

The overburden at the Non-PAG Waste Rock Stockpile ranges in thickness from 6 to 25 m. It is mainly comprised of silt, sand and gravel, trace clay. The bedrock is comprised of alternating schist, quartz eye schist and phyllite layers. The average RMR of the bedrock is 49. The average UCS is 55 MPa. The hydraulic conductivity ranges from 7×10^{-6} to 1×10^{-5} cm/sec.

The PAG Waste Rock Stockpile is covered by till with thicknesses varying from 5 to 7 m. The bedrock is primarily orthogneiss which has an average RMR and UCS of 65 and 113 MPa, respectively. The hydraulic conductivity ranges from 3×10^{-4} to 1×10^{-6} cm/sec. Data from the 2011 SI program was used to characterize this area as no drillholes were completed at the PAG Waste Rock Stockpile during the 2012 SI program.

The Low Grade Stockpile sites for both Non-PAG and PAG materials are located northwest of the proposed TMF. The overburden at the site varies from 1 to 4 m in thickness and mainly consists of silty sand with gravel. The bedrock at the site is primarily orthogneiss with small layers of quartz eye schist. The average RMR and UCS are 59 and 115 MPa, respectively. The overall hydraulic conductivity at the Low Grade Stockpile areas ranges from 7×10^{-5} to 1×10^{-5} cm/sec.

5.2.5 Crusher and Plant Sites

Overburden in the Crusher Site extends at depths from 5 to 10 m and consists of silty sand and gravel. The bedrock is mainly interbedded phyllites and schists with an average RMR and UCS of 47 and 52 MPa, respectively. The overall hydraulic conductivity ranges from 3×10^{-7} to 1×10^{-5} cm/sec.

The overburden at the Plant Site varies in thickness from 1 to 3 m and is comprised of gravelly, silty sand with some cobbles and boulders based on the 2011 data. The bedrock is found to be alternating layers of phyllite and quartz eye schists. Orthogneiss is present in the south section of the proposed Plant Site. The average RMR and UCS are 54 and 100 MPa, respectively. The overall hydraulic conductivity ranges from 5×10^{-7} cm/s to 1×10^{-4} cm/sec.

5.2.6 Rock Quarry

The overburden at the proposed rock quarry is approximately 6.6 m thick and is described as gravels and cobbles with silt, sand and clay. The bedrock is quartz monzonite with an average RMR and UCS of 57 and 97 MPa, respectively. The hydraulic conductivity ranges from 8×10^{-6} to 3×10^{-6} cm/sec.

6 – REFERENCES

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7 – CERTIFICATION

This report was prepared, reviewed and approved by the undersigned.


Prepared: 
for

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Staff Engineer

Reviewed: 

Greg Magoon, P.Eng.
Project Engineer

 July 25, 2013

Approved: 

Ken Embree, P.Eng.
Managing Principal

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APPENDIX A

OVERBURDEN DRILLING DATA

Appendix A1	Open Pit Drillhole Logs (gINT)
Appendix A2	Tailings Management Facility Drillhole Logs (gINT)

APPENDIX A1

OPEN PIT DRILLHOLE LOGS (GINT)

(Pages A1-1 to A1-10)

Project: HARPER CREEK PROJECT	Drill Hole No. OP12-01	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 17 Jul 12
Location: Open Pit	Total Depth: 11.6 m	Date Completed: 17 Jul 12
Coordinates: 5,711,886 N , 304,697 E (UTM NAD 83)	Elevation: 1593.6 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 9.1) Gravelly SAND, some silt, trace clay, fine to coarse grained, angular to subangular, poorly graded, low plasticity, brown to grey, odourous, loose, moist													
					X	87	SPT01	8/11/21	32							
					X	90	SPT02	38/30/33	63							
1589	5															
1584	10		WEATHERED BEDROCK (9.1 to 11.6) Angular, platy, dark grey, dry rock chips													
			End of Drillhole: 11.6 m													

GENERAL REMARKS:

REV. 0 - Issued for Report

YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR OP12-01	
<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1
FIGURE: Appendix A1-1	REF. NO. 1
	REV. 0

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. OP12-02	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 18 Jul 12
Location: Open Pit	Total Depth: 10.4 m	Date Completed: 18 Jul 12
Coordinates: 5,711,511 N , 304,523 E (UTM NAD 83)	Elevation: 1592.8 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 5.5) SAND, some gravel and clay, fine to coarse grained, poorly graded, dark grey to dark brown, moist													
					X	69	SPT01	12/21/20	41				●			
					X	92	SPT02	11/25/25	50				●			
1588	5		WEATHERED BEDROCK (5.5 to 10.4) Angular, flat, sharp, reddish brown and grey rock chips											Artesian conditions observed		
1583	10															
			End of Drillhole: 10.4 m													

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR OP12-02		
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
REV. 0 - Issued for Report	FIGURE: Appendix A1-2	REV. 0	

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. OP12-03	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 18 Jul 12
Location: Open Pit	Total Depth: 10.4 m	Date Completed: 18 Jul 12
Coordinates: 5,711,426 N , 304,337 E (UTM NAD 83)	Elevation: 1592.6 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 4.9) SAND and GRAVEL, some silt, fine grained to medium, poorly graded, brown to grey, moist			90	SPT01	16/25/32	57							
1588	5		WEATHERED BEDROCK (4.9 to 10.4) Angular, flat, sharp, brown and grey rock chips, dry			0	SPT02	50	50+							
1583	10															
			End of Drillhole: 10.4 m													

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR OP12-03	
	Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix A1-3 REV. 0
REV. 0 - Issued for Report		

File:M:\101100458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT Drill Hole No. **OP12-04** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **SPT** Date Started: **18 Jul 12**
 Location: **Open Pit** Total Depth: **7.2 m** Date Completed: **18 Jul 12**
 Coordinates: **5,711,788 N, 304,364 E (UTM NAD 83)** Elevation: **1629.4 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 3.4) SAND, some road fill, coarse grained, dark brown, poor recovery													
						59	SPT01	6/6/5	11							
			BEDROCK (3.4 to 7.2) Dark grey to grey, sharp rock chips			0	SPT02	50+	50+							
1624	5															
			End of Drillhole: 7.2 m													
1619	10															

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR OP12-04



PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1	REV. 0
FIGURE: Appendix A1-4		

REV. 0 - Issued for Report

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Project: HARPER CREEK PROJECT Drill Hole No. **OP12-05** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **SPT** Date Started: **19 Jul 12**
 Location: **Open Pit** Total Depth: **5.5 m** Date Completed: **19 Jul 12**
 Coordinates: **5,711,767 N, 303,976 E (UTM NAD 83)** Elevation: **1678.6 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 1.4) SAND, trace gravel, coarse grained, brown													
			WEATHERED BEDROCK (1.4 to 4) Grey, flat rock chips, looks weathered			85	SPT01	9/25/25	50							
			BEDROCK (4 to 5.5) Angular, grey, flat rock chips, dry													
1674	5		End of Drillhole: 5.5 m													
1669	10															

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR OP12-05



PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1	REV. 0
FIGURE: Appendix A1-5		

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT

Drill Hole No. **OP12-07**

PAGE **1 of 1**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT**

Date Started: **19 Jul 12**

Location: **Open Pit**

Total Depth: **11.7 m**

Date Completed: **19 Jul 12**

Coordinates: **5,711,262 N, 304,983 E (UTM NAD 83)**

Elevation: **1663.3 m**

Date Well Installed: **N / A**

Drilling Method: **ODEX**

Azimuth, Dip: **0°, 90°**

Supervised by: **DR**

Drilling Rig: **B-54**

Hole size: **4.75"**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		SPT TEST DATA 'N' VALUES ●		DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			20
1658	5	OVERBURDEN (0 to 6.6) SAND, some gravel, fine to coarse grained, poorly graded, dark brown to grey, moist															
1653	10	BEDROCK (6.6 to 11.7) Angular, grey, very wet rock chips															
End of Drillhole: 11.7 m																	

GENERAL REMARKS:

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR OP12-07**



PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix A1-7	REV. 0

REV. 0 - Issued for Report

File M:\101\004\58\07\A\DATA\SI FIELD\DATA\SI FIELD\DRILLHOLE LOGS\2012\GPJ Library: M:\101\004\58\07\A\DATA\SI FIELD\DATA\SI FIELD\DRILLHOLE LOGS\2012\GPJ HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **OP12-08** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **SPT** Date Started: **19 Jul 12**
 Location: **Open Pit** Total Depth: **5.8 m** Date Completed: **19 Jul 12**
 Coordinates: **5,711,267 N, 304,781 E (UTM NAD 83)** Elevation: **1638.6 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			WEATHERED BEDROCK (0 to 2) Brown and grey rock chips with white crystals, looks weathered													
			BEDROCK (2 to 5.8) Very small, angular, flat, grey rock chips													
1634	5					66	SPT01	27/50+ (1" left)	50+							
			End of Drillhole: 5.8 m													
1629	10															

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR OP12-08

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix A1-8	REV. 0

REV. 0 - Issued for Report

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Project: HARPER CREEK PROJECT	Drill Hole No. OP12-09	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N / A	Date Started: 20 Jul 12
Location: Open Pit	Total Depth: 4.3 m	Date Completed: 20 Jul 12
Coordinates: 5,710,860 N , 305,344 E (UTM NAD 83)	Elevation: 1731.8 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 0.6) SAND and GRAVEL, some rock chips, coarse grained, brown, looks weathered WEATHERED BEDROCK (0.6 to 2.6) Angular, brown and grey, very weak, flat rock chips, looks weathered BEDROCK (2.6 to 4.3) Small, hard, light grey rock chips														
			End of Drillhole: 4.3 m														
1727	5																
1722	10																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR OP12-09	
	Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix A1-9 REV. 0
REV. 0 - Issued for Report		

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 Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT Drill Hole No. **OP12-10** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **N / A** Date Started: **20 Jul 12**
 Location: **Open Pit** Total Depth: **4.3 m** Date Completed: **20 Jul 12**
 Coordinates: **5,710,632 N , 304,653 E (UTM NAD 83)** Elevation: **1695.9 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 2.4) SAND, some rock chips, medium to coarse grained, grey, dry, becoming finer with depth														
			BEDROCK (2.4 to 4.3) Angular, dark grey, flat rock chips, very dry														
			End of Drillhole: 4.3 m														
1691	5																
1686	10																

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR OP12-10

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix A1-10	REV. 0

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File M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

APPENDIX A2

TMF DRILLHOLE LOGS (GINT)

(Pages A2-1 to A2-18)

Project: HARPER CREEK PROJECT Drill Hole No. **TMF12-01** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **SPT** Date Started: **20 Jul 12**
 Location: **TMF Upstream Area** Total Depth: **14.9 m** Date Completed: **21 Jul 12**
 Coordinates: **5,706,353 N, 305,287 E (UTM NAD 83)** Elevation: **1686.9 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 11.9) SAND, with silt and gravel, fine to medium grained, rounded to angular, poorly graded, dark brown to grey, moist														
1682	5																
1677	10																
			BEDROCK (11.9 to 14.9) Angular, grey rock chips, dusty														
1672	15		End of Drillhole: 14.9 m														

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-01



PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**
 FIGURE: **Appendix A2-1** REV. **0**

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **TMF12-02** PAGE **1 of 1**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT** Date Started: **21 Jul 12**
Location: TMF Upstream Area Total Depth: **10.1 m** Date Completed: **21 Jul 12**
Coordinates: 5,706,349 N, 305,389 E (UTM NAD 83) Elevation: **1693.8 m** Date Well Installed: **N / A**
Drilling Method: ODEX Azimuth, Dip: **0°, 90°** Supervised by: **DR**
Drilling Rig: B-54 Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
1689	5		OVERBURDEN (0 to 5.2) SAND, some silt and gravel, fine to coarse grained, poorly graded, angular, brownish grey to grey, rock chips towards the end, moist		X	62	SPT01	9/11/15	26								
					X	66	SPT02	14/21/24	45								
					X	92	SPT03	11/13/18	31								
1684	10		BEDROCK (5.2 to 10.1) Small, angular, grey rock chips, very dry														
			End of Drillhole: 10.1 m														
1679	15																

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-02

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix A2-2	REV. 0

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-03	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 21 Jul 12
Location: TMF Upstream Area	Total Depth: 8.5 m	Date Completed: 21 Jul 12
Coordinates: 5,706,172 N , 305,289 E (UTM NAD 83)	Elevation: 1694.0 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 4.3) SAND, some fine silt, trace gravel, fine to coarse grained, rounded, poorly graded, brownish grey to brown, moist														
						63	SPT01	10/10/10	20								
						31	SPT02	9/50+	50+								
						0	SPT03	50+	50+								
1689	5		WEATHERED BEDROCK (4.3 to 5.2) Small, angular, grey rock chips, looks weathered														
			BEDROCK (5.2 to 8.5) Small, angular, grey rock chips														
			End of Drillhole: 8.5 m														
1684	10																
1679	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-03	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix A2-3 REV. 0
REV. 0 - Issued for Report		

File M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-04	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 21 Jul 12
Location: TMF Embankment East	Total Depth: 10.4 m	Date Completed: 22 Jul 12
Coordinates: 5,706,056 N , 304,888 E (UTM NAD 83)	Elevation: 1663.9 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 3.1) Silty SAND and GRAVEL, fine to coarse grained, poorly graded, brown to grey, slightly moist to wet														
			WEATHERED BEDROCK (3.1 to 4.6) Slightly reddish white fine sand with rock chips														
			BEDROCK (4.6 to 10.4) Small, angular, greyish rock chips														
1659	5																
1654	10																
			End of Drillhole: 10.4 m														
1649	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-04	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix A2-4 REV. 0
REV. 0 - Issued for Report		

File M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT Drill Hole No. **TMF12-05** PAGE **1 of 1**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT** Date Started: **22 Jul 12**
Location: TMF Embankment East Total Depth: **8.7 m** Date Completed: **22 Jul 12**
Coordinates: 5,706,016 N , 304,837 E (UTM NAD 83) Elevation: **1666.9 m** Date Well Installed: **N / A**
Drilling Method: ODEX Azimuth, Dip: **0°, 90°** Supervised by: **DR**
Drilling Rig: B-54 Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 3.1) SAND, some gravel, medium to coarse grained, poorly graded, greyish brown, wet to moist, becoming a more grey fine sand and silt with some gravel at the bottom of unit														
			WEATHERED BEDROCK (3.1 to 3.7) Dirty, brown rock chips														
			BEDROCK (3.7 to 8.7) Clean, grey to dark grey rock chips														
1662	5																
			End of Drillhole: 8.7 m														
1657	10																
1652	15																

GENERAL REMARKS:

REV. 0 - Issued for Report

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-05**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix A2-5	REV. 0

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-06	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 22 Jul 12
Location: TMF Embankment East	Total Depth: 10.1 m	Date Completed: 22 Jul 12
Coordinates: 5,706,131 N, 304,806 E (UTM NAD 83)	Elevation: 1660.1 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 7.3) SAND, some gravel, medium to coarse grained, angular, poorly graded, changing into dirty brown chips with some fine silts and sand towards the bottom of the unit		⊗	62	SPT01	17/14/49	63							
					⊗	70	SPT02	25/49/49	98							
1655	5				⊗	87	SPT03	23/28/40	68							
			BEDROCK (7.3 to 10.1) Small, angular, white rock chips, very dry		⊗	63	SPT04	13/35/50+	50+							
1650	10		End of Drillhole: 10.1 m													
1645	15															

GENERAL REMARKS:



YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-06		
<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
	FIGURE: Appendix A2-6	REV. 0

REV. 0 - Issued for Report

File M:\101\004\58\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\004\58\07A\DATA\SI\FIELD\DATA\LIBRARY\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project:	HARPER CREEK PROJECT	Drill Hole No.	TMF12-07	PAGE	1 of 1
Contractor:	WESTECH DRILLING CO.	Sample Type:	SPT	Date Started:	22 Jul 12
Location:	TMF Embankment East	Total Depth:	10.1 m	Date Completed:	22 Jul 12
Coordinates:	5,706,115 N , 304,719 E (UTM NAD 83)	Elevation:	1654.7 m	Date Well Installed:	N / A
Drilling Method:	ODEX	Azimuth, Dip:	0°, 90°	Supervised by:	DR
Drilling Rig:	B-54	Hole size:	4.75"	Reviewed by:	GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
1650	5		OVERBURDEN (0 to 7.3) Silty SAND AND GRAVEL, fine to coarse grained, poorly graded, dark brown to grey, wet to dry														
						80	SPT01	8/18/28	46					●			
						68	SPT02	18/37/37	74						●		
						69	SPT03	15/22/50+	50+					●			
						99	SPT04	16/17/28	45					●			
1645	10		BEDROCK (7.3 to 10.1) White to grey, dry rock chips														
			End of Drillhole: 10.1 m														
1640	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-07	PROJECT/ASSIGNMENT NO.	REF. NO.
REV. 0 - Issued for Report		VA101-458/7-1	1
		FIGURE: Appendix A2-7	REV. 0

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **TMF12-08** PAGE **1 of 1**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT** Date Started: **22 Jul 12**
Location: TMF Embankment Central Total Depth: **9.1 m** Date Completed: **23 Jul 12**
Coordinates: 5,706,206 N, 304,652 E (UTM NAD 83) Elevation: **1647.8 m** Date Well Installed: **N / A**
Drilling Method: ODEX Azimuth, Dip: **0°, 90°** Supervised by: **DR**
Drilling Rig: B-54 Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS
											20	40	60	80		
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1643	5		OVERBURDEN (0 to 6.1) TILL, some gravel and fines (silt/sand), fine to coarse grained, poorly graded, brown to grey, moist, odourless													
			BEDROCK (6.1 to 9.1) Dark grey rock chips													
1638	10		End of Drillhole: 9.1 m													
1633	15															

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-08

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1	
FIGURE: Appendix A2-8	REV. 0	

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **TMF12-09** PAGE **1 of 1**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **SPT** Date Started: **23 Jul 12**
 Location: **TMF Embankment Central** Total Depth: **7.6 m** Date Completed: **23 Jul 12**
 Coordinates: **5,706,173 N, 304,593 E (UTM NAD 83)** Elevation: **1641.2 m** Date Well Installed: **N / A**
 Drilling Method: **ODEX** Azimuth, Dip: **0°, 90°** Supervised by: **DR**
 Drilling Rig: **B-54** Hole size: **4.75"** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 1.8) SAND AND GRAVEL, coarse grained, angular, brown to grey, wet, changing to white grey dusty gravel with very high powdery fines mixed with rock chips towards the bottom of the unit			44	SPT01	5/14/50+	50+								
			BEDROCK (1.8 to 7.6) Dark grey rock chips with a lot of fine powder			0	SPT02	50+	50+								
						0	SPT03	50+	50+								
			End of Drillhole: 7.6 m														
1636	5																
1631	10																
1626	15																

GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-09

PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**
 FIGURE: **Appendix A2-9** REV. **0**

REV. 0 - Issued for Report

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-10	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 23 Jul 12
Location: TMF Embankment Central	Total Depth: 13.4 m	Date Completed: 23 Jul 12
Coordinates: 5,706,259 N, 304,529 E (UTM NAD 83)	Elevation: 1646.2 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 10.4) SAND, some gravel and rock chips, very high fine content (silt), fine to coarse grained, poorly graded, brown to dark grey, moist to dry													
					X	62	SPT01	12/17/22	39							
					X	61	SPT02	13/25/50+	50+							
						0	SPT03	50+	50+							
1641	5				X	97	SPT04	28/23/24	47							
					X	97	SPT05	13/22/27	49							
					X	96	SPT06	15/29/39	68							
1636	10				X	31	SPT07	30/50+	50+							
			BEDROCK (10.4 to 13.4) Angular, dark grey, very dry rock chips													
			End of Drillhole: 13.4 m													
1631	15															

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-10		
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
REV. 0 - Issued for Report	FIGURE Appendix A2-10	REV. 0	

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-11	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 23 Jul 12
Location: TMF Embankment Central	Total Depth: 13.7 m	Date Completed: 24 Jul 12
Coordinates: 5,706,328 N, 304,547 E (UTM NAD 83)	Elevation: 1645.2 m	Date Well Installed: N/A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 10.7) SAND, with gravel/rock chips, high fine content, fine grained to coarse grained, poorly graded, grey to brown, moist to dry														
					X	56	SPT01	7/10/21	31								
					X	99	SPT02	10/18/22	40								
					X	99	SPT03	18/33/28	61								
1640	5				X	62	SPT04	11/25/25	50								
					X	28	SPT05	50+	50+								
					X	72	SPT06	11/20/50+	50+								
1635	10				X	28	SPT07	18/50+	50+								
			WEATHERED BEDROCK (10.7 to 11.3) Very fine powdery white sand with rock chips, weathered layer, very soft														
			BEDROCK (11.3 to 13.7) Angular, dry, grey rock chips														
			End of Drillhole: 13.7 m														
1630	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-11		
	Knight Piésold CONSULTING		PROJECT/ASSIGNMENT NO. VA101-458/7-1
	REF. NO. 1	FIGURE Appendix A2-11	REV. 0
REV. 0 - Issued for Report			

File:M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT

Drill Hole No. **TMF12-12**

PAGE **1 of 1**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT**

Date Started: **24 Jul 12**

Location: **TMF Embankment Central**

Total Depth: **11.6 m**

Date Completed: **24 Jul 12**

Coordinates: **5,706,384 N, 304,475 E (UTM NAD 83)**

Elevation: **1645.2 m**

Date Well Installed: **N / A**

Drilling Method: **ODEX**

Azimuth, Dip: **0°, 90°**

Supervised by: **DR**

Drilling Rig: **B-54**

Hole size: **4.75"**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 8.5) SAND, some angular gravel/rock chips with a lot of fines, trace cobbles, fine to coarse grained, poorly graded, greyish brown, moist to dry, fines increases with depth														
						85	SPT01	7/23/32	55								
						41	SPT02	39/50+	50+								
						65	SPT03	21/47/50+	50+								
						68	SPT04	19/23/28	51								
						55	SPT05	30/45/50+	50+								
			BEDROCK (8.5 to 11.6) Angular, very dry, dark grey rock chips			0	SPT06	50+	50+								
			End of Drillhole: 11.6 m														

GENERAL REMARKS:

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR TMF12-12**



PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**
FIGURE **Appendix A2-12** REV. **0**

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-13	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 24 Jul 12
Location: TMF Embankment West	Total Depth: 8.8 m	Date Completed: 24 Jul 12
Coordinates: 5,706,488 N, 304,117 E (UTM NAD 83)	Elevation: 1665.9 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS			
											20	40			60	80	
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 5.2) SAND, trace gravel/rock chips, fine to coarse grained, poorly graded, dry to moist, odourless, high fines toward the end														
			WEATHERED BEDROCK (5.2 to 6.1) Greyish white dusty powder and dark bedrock chips, dry, looks weathered														
			BEDROCK (6.1 to 8.8) Greyish white dusty powder and dark bedrock chips, dry														
			End of Drillhole: 8.8 m														
1661	5																
1656	10																
1651	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-13	
	Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1
REV. 0 - Issued for Report	FIGURE Appendix A2-13	REV. 0

File M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-14	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 24 Jul 12
Location: TMF Embankment West	Total Depth: 8.8 m	Date Completed: 24 Jul 12
Coordinates: 5,706,818 N , 304,245 E (UTM NAD 83)	Elevation: 1692.4 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 5.3) SAND, trace gravel, high fine content, fine to coarse grained, poorly graded, light golden brown to brown, dry to moist														
						85	SPT01	6/7/14	21								
						99	SPT02	9/18/19	37								
						63	SPT03	11/28/50+	50+								
1687	5		WEATHERED BEDROCK (5.3 to 6.1) Reddish brown rock chips, looks weathered														
			BEDROCK (6.1 to 8.8) Small, hard, brown bedrock chips			0	SPT04	50+	50+								
			End of Drillhole: 8.8 m														
1682	10																
1677	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-14	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE Appendix A2-14 REV. 0
REV. 0 - Issued for Report		

File M:\101100458\07A\DATA\SI\FIELD\DATA\GINT\LIBRARY\CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI\FIELD\DATA\GINT\LIBRARY\CREEK_DRILLHOLE_LOGS_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-15	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 25 Jul 12
Location: TMF Embankment West	Total Depth: 8.8 m	Date Completed: 25 Jul 12
Coordinates: 5,706,698 N , 304,272 E (UTM NAD 83)	Elevation: 1673.4 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 3.1) SAND, some gravel, fine to coarse grained, poorly graded, brown, moist, odourless														
			WEATHERED BEDROCK (3.1 to 6.1) Whitish brown material with angular flat rock chips, looks weathered														
			BEDROCK (6.1 to 8.8) Angular, dark grey, hard, very dry rock chips														
			End of Drillhole: 8.8 m														
1668	5																
1663	10																
1658	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-15		
	Knight Piésold CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
REV. 0 - Issued for Report	FIGURE Appendix A2-15	REV. 0	

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI
 Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-16	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 25 Jul 12
Location: TMF Embankment West	Total Depth: 8.8 m	Date Completed: 25 Jul 12
Coordinates: 5,706,655 N , 304,373 E (UTM NAD 83)	Elevation: 1665.1 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS			
											20	40			60	80	
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 4.3) SAND, trace gravel and brown angular rock chips, high in fines, fine to coarse grained, poorly graded, brown, dry to moist, odourless														
			WEATHERED BEDROCK (4.3 to 5.8) Sandy, dry rock chips, looks weathered														
			BEDROCK (5.8 to 8.8) Angular, dark grey flat, hard rock chips, very dry														
			End of Drillhole: 8.8 m														
1660	5																
1655	10																
1650	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-16		
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
REV. 0 - Issued for Report	FIGURE Appendix A2-16	REV. 0	

File M:\101\00458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\00458\07\A\DATA\SI\FIELD\DATA\LIBRARY\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-17	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 25 Jul 12
Location: TMF Embankment West	Total Depth: 8.7 m	Date Completed: 25 Jul 12
Coordinates: 5,706,553 N , 304,433 E (UTM NAD 83)	Elevation: 1655.5 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 4.4) SAND, some silt and grey gravel/rock chips, high in fines, fine to medium grained, poorly graded, grey, moist to dry, odourless														
			WEATHERED BEDROCK (4.4 to 6.1) Grey chips to dirty brown rock chips with brown sand, looks very weathered														
			BEDROCK (6.1 to 8.7) Competent dark grey hard rock chips														
			End of Drillhole: 8.7 m														
1651	5																
1646	10																
1641	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-17		
REV. 0 - Issued for Report	<i>Knight Piésold</i> CONSULTING		PROJECT/ASSIGNMENT NO. VA101-458/7-1
			REF. NO. 1
	FIGURE Appendix A2-17		REV. 0

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY\HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. TMF12-18	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT	Date Started: 25 Jul 12
Location: TMF Embankment West	Total Depth: 8.8 m	Date Completed: 25 Jul 12
Coordinates: 5,706,485 N , 304,384 E (UTM NAD 83)	Elevation: 1652.3 m	Date Well Installed: N / A
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: DR
Drilling Rig: B-54	Hole size: 4.75"	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			OVERBURDEN (0 to 4.3) Silty SAND, some angular gravel/rock chips, fine grained, poorly graded, dark grey to brown, dry to moist, dense, odourless														
						76	SPT01	6/13/13	26								
						96	SPT02	15/24/27	51								
			WEATHERED BEDROCK (4.3 to 5.2) Angular, dark grey rock chips, looks weathered			0	SPT03	50+	50+								
			BEDROCK (5.2 to 8.8) Angular, dark grey rock chips, very dry														
			End of Drillhole: 8.8 m														
1647	5																
1642	10																
1637	15																

GENERAL REMARKS:	YELLOWHEAD MINING INC. HARPER CREEK PROJECT DRILLHOLE LOG FOR TMF12-18	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE Appendix A2-18 REV. 0
REV. 0 - Issued for Report		

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

APPENDIX B

GEOTECHNICAL DRILLHOLE DATA

Appendix B1	Geotechnical Summary Logs (gINT)
Appendix B2	Geotechnical Drillhole Logs
Appendix B3	Recovery, RQD, RMR, and Estimated UCS vs. Depth

APPENDIX B1

GEOTECHNICAL SUMMARY LOGS (GINT)

(Pages B1-1 to B1-23)

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-01	PAGE 1 of 2
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 26 Jul 12
Location: Rock Quarry	Total Depth: 30.2 m	Date Completed: 28 Jul 12
Coordinates: 5,706,192 N, 303,869 E (UTM NAD 83)	Elevation: 1654.3 m	Date Well Installed: 28 Jul 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: DR/EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
			OVERBURDEN (0 to 6.6) GRAVEL and COBBLES, with silt sand and clay, fine to medium grained angular to subangular, well graded to poorly graded, brown to dark grey, low plasticity, moist to dry, odourless											
1649	5													
			(3C) QUARTZ MONZONITE - BALDY (6.6 to 30.2) Very coarse grained, massive with pink, white, and light grey with interstitial black grains; composed of 45% salmon pink potassium feldspar ranging from 1-9mm, 35% white plagioclase feldspar ranging from 1- 9mm in size; 10-15% pale grey quartz 1-7mm in size and biotite <= 3mm in size; magnetite is disseminated as <=3mm grains, 3-5%; all grains are anhedral in shape	84										
				100										
1644	10			100										
				97										
				99										
1639	15			100										
				98										
				100										
				100										
1634	20			100										
				100										
				96										
				100										

GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-01**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**
FIGURE: **Appendix B1-1** REV. **0**

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **GT12-01** PAGE **2 of 2**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT / DRILL CORE** Date Started: **26 Jul 12**
Location: Rock Quarry Total Depth: **30.2 m** Date Completed: **28 Jul 12**
Coordinates: 5,706,192 N, 303,869 E (UTM NAD 83) Elevation: **1654.3 m** Date Well Installed: **28 Jul 12**
Drilling Method: ODEX / DIAMOND DRILLING Azimuth, Dip: **0°, 90°** Supervised by: **DR/EJH**
Drilling Rig: B-54 Hole size: **HQ3** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS			
											20	40			60	80	
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
1624	30		(3C) QUARTZ MONZONITE - BALDY (6.6 to 30.2) Very coarse grained, massive with pink, white, and light grey with interstitial black grains; composed of 45% salmon pink potassium feldspar ranging from 1-9mm, 35% white plagioclase feldspar ranging from 1- 9mm in size; 10-15% pale grey quartz 1-7mm in size and biotite <= 3mm in size; magnetite is disseminated as <=3mm grains, 3-5%; all grains are anhedral in shape	99					48			■					
				100					53			■					
				100					84			■					
			End of Drillhole: 30.2 m														
1619	35																
1614	40																
1609	45																

GENERAL REMARKS:
Lithologies are based on CME detailed logging.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-01

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-1	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-02	PAGE 1 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 28 Jul 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 3 Aug 12
Coordinates: 5,706,349 N, 304,623 E (UTM NAD 83)	Elevation: 1648.0 m	Date Well Installed: 3 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 60°	Supervised by: EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1643	5		OVERBURDEN (0 to 9.3) GRAVELS and COBBLES, with silt and sand, angular to subangular, well graded, low to medium plasticity, grey to brown, moist, odourless										No SPT was conducted			
1638	10		(10A) ORTHOGNEISS (9.3 to 101.3) Medium to dark grey, quartzofeldspathic in composition; quartz grains are light grey, anhedral to subrounded, 0.5 - 7mm in size; locally quartz is stretched to an oval shape pulled into the foliation plane, and comprise >80% of composition; biotite (~15%) foliations dominate texture along with quartz grains; when foliation is weaker biotite grains are generally rectangular up to 3x9cm in size	100									Switched to coring (HQ3)			
				100												
				97												
				95												
1633	15			98												
				100												
				97												
1628	20			99												
				100												
				100												
				100												

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-02**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-2	REV. 0

REV. 0 - Issued for Report

File:M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101100458\07\1\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012\G.L.B. DRILLHOLE LOG. DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-02	PAGE 2 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 28 Jul 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 3 Aug 12
Coordinates: 5,706,349 N, 304,623 E (UTM NAD 83)	Elevation: 1648.0 m	Date Well Installed: 3 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 60°	Supervised by: EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1618	30		(10A) ORTHOGNEISS (9.3 to 101.3) Medium to dark grey, quartzofeldspathic in composition; quartz grains are light grey, anhedral to subrounded, 0.5 - 7mm in size; locally quartz is stretched to an oval shape pulled into the foliation plane, and comprise >80% of composition; biotite (~15%) foliations dominate texture along with quartz grains; when foliation is weaker biotite grains are generally rectangular up to 3x9cm in size	100					72			80				
				100						89			80			
				100						82			80			
				100						100			80			
				100						100			80			
				97						97			80			
1613	35			100						34			80			
				100						48			80			
				100						64			80			
				100						65			80			
1608	40			100						84			80			
				97						91			80			
				100						92			80			
1603	45			100						97			80			
				99						99			80			
		100						95			80					
								87			80					

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-02

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-2	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-02	PAGE 3 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 28 Jul 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 3 Aug 12
Coordinates: 5,706,349 N, 304,623 E (UTM NAD 83)	Elevation: 1648.0 m	Date Well Installed: 3 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 60°	Supervised by: EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS			
											20	40			60	80	
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
1593	55		(10A) ORTHOGNEISS (9.3 to 101.3) Medium to dark grey, quartzofeldspathic in composition; quartz grains are light grey, anhedral to subrounded, 0.5 - 7mm in size; locally quartz is stretched to an oval shape pulled into the foliation plane, and comprise >80% of composition; biotite (~15%) foliations dominate texture along with quartz grains; when foliation is weaker biotite grains are generally rectangular up to 3x9cm in size	100								98					
				98									100				
				100									72				
				100									100				
				100									97				
				98									83				
1588	60			100									100				
				100									100				
				100									100				
				100									100				
1583	65			99									67				
				100									80				
				100									87				
				83									83				
1578	70			99									100				
				100									87				
				100									96				

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-02**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-2	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-02	PAGE 4 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 28 Jul 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 3 Aug 12
Coordinates: 5,706,349 N, 304,623 E (UTM NAD 83)	Elevation: 1648.0 m	Date Well Installed: 3 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 60°	Supervised by: EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS		
											20	40	60	80				
												SPT TEST DATA 'N' VALUES ●						
												20	40	60	80			
1568	80		(10A) ORTHOGNEISS (9.3 to 101.3) Medium to dark grey, quartzofeldspathic in composition; quartz grains are light grey, anhedral to subrounded, 0.5 - 7mm in size; locally quartz is stretched to an oval shape pulled into the foliation plane, and comprise >80% of composition; biotite (~15%) foliations dominate texture along with quartz grains; when foliation is weaker biotite grains are generally rectangular up to 3x9cm in size	100								100						
						99								99				
						100								100				
						100								100				
						95								91				
						100								91				
1563	85					99								99				
						100								100				
						100								100				
						100								100				
1558	90					100								100				
						98								85				
						98								98				
						100								93				
1553	95					100								97				
						99								97				
				97								97						

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-02**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-2	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **GT12-02** PAGE **5 of 5**
 Contractor: **WESTECH DRILLING CO.** Sample Type: **DRILL CORE** Date Started: **28 Jul 12**
 Location: **TMF Embankment** Total Depth: **101.2 m** Date Completed: **3 Aug 12**
 Coordinates: **5,706,349 N, 304,623 E (UTM NAD 83)** Elevation: **1648.0 m** Date Well Installed: **3 Aug 12**
 Drilling Method: **ODEX / DIAMOND DRILLING** Azimuth, Dip: **0°, 60°** Supervised by: **EJH**
 Drilling Rig: **B-54** Hole size: **HQ3** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
				97												
			End of Drillhole: 101.2 m													
1543	105															
1538	110															
1533	115															
1528	120															

GENERAL REMARKS:
 Depth shown is inclined depth. Lithologies are based on CME detailed logging.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-02



PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-2	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-03	PAGE 1 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 3 Aug 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 7 Aug 12
Coordinates: 5,706,424 N, 304,379 E (UTM NAD 83)	Elevation: 1646.4 m	Date Well Installed: 7 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 180°, 60°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
			OVERBURDEN (0 to 5.2) SILT and SAND, trace subangular to angular gravel, trace cobbles, low plasticity, brown, dry to moist, loose to compact										No SPT was conducted	
			(10A) ORTHOGNEISS (5.2 to 99.4) Med-dark grey, strong foliation; composed of >80% quartz up to 5mm in size, anhedral to sub-rounded, locally oval shaped with long axis parallel to foliation; quartz are primarily light grey and rarely weakly purple; biotite comprises ~15% of unit generally observed as foliation or stretched rectangular crystals up to 3x10mm in size; unit varies from a coarse grained (quartz) zone with strongly apparent foliations (biotite) to areas of fine grained quartz with larger sub-rounded quartz eyes (<=3mm) with less developed foliations; calcite is subtle in groundmass	100					91				Switched to coring (HQ3)	
				94				45						
				99				52						
1641	5			100				81						
1636	10			98				81						
				98				68						
1631	15			95				75						
				100				43						
				98				87						
1626	20			100				75						
				96				28						
				100				77						
				90				0						

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-03**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-3	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-03	PAGE 2 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 3 Aug 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 7 Aug 12
Coordinates: 5,706,424 N, 304,379 E (UTM NAD 83)	Elevation: 1646.4 m	Date Well Installed: 7 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 180°, 60°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
1616	30		(10A) ORTHOGNEISS (5.2 to 99.4) Med-dark grey, strong foliation; composed of >80% quartz up to 5mm in size, anhedral to sub-rounded, locally oval shaped with long axis parallel to foliation; quartz are primarily light grey and rarely weakly purple; biotite comprises ~15% of unit generally observed as foliation or stretched rectangular crystals up to 3x10mm in size; unit varies from a coarse grained (quartz) zone with strongly apparent foliations (biotite) to areas of fine grained quartz with larger sub-rounded quartz eyes (<=3mm) with less developed foliations; calcite is subtle in groundmass	100					89		20	40	60	80		
				100						77		20	40	60	80	
				98						73		20	40	60	80	
				100						86		20	40	60	80	
				98						49		20	40	60	80	
				100						49		20	40	60	80	
1611	35			100						46		20	40	60	80	
				99						94		20	40	60	80	
				100						64		20	40	60	80	
1606	40			100						100		20	40	60	80	
				100						100		20	40	60	80	
				94						92		20	40	60	80	
				100						94		20	40	60	80	
1601	45			94						73		20	40	60	80	
				100						75		20	40	60	80	
		100						100		20	40	60	80			
		100						100		20	40	60	80			

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-03**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-3	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library:W:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-03	PAGE 3 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 3 Aug 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 7 Aug 12
Coordinates: 5,706,424 N, 304,379 E (UTM NAD 83)	Elevation: 1646.4 m	Date Well Installed: 7 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 180°, 60°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
1591	55		(10A) ORTHOGNEISS (5.2 to 99.4) Med-dark grey, strong foliation; composed of >80% quartz up to 5mm in size, anhedral to sub-rounded, locally oval shaped with long axis parallel to foliation; quartz are primarily light grey and rarely weakly purple; biotite comprises ~15% of unit generally observed as foliation or stretched rectangular crystals up to 3x10mm in size; unit varies from a coarse grained (quartz) zone with strongly apparent foliations (biotite) to areas of fine grained quartz with larger sub-rounded quartz eyes (<=3mm) with less developed foliations; calcite is subtle in groundmass	100							0	0		
				96							72			
				100							99			
				100							99			
				100							99			
1586	60			99							98			
				98							93			
				96							96			
				100							85			
1581	65			98							41			
				100							93			
				100							83			
1576	70			100							92			
				98							91			
				100							87			

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-03**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-3	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-03**

PAGE **4 of 5**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **DRILL CORE**

Date Started: **3 Aug 12**

Location: **TMF Embankment**

Total Depth: **101.2 m**

Date Completed: **7 Aug 12**

Coordinates: **5,706,424 N, 304,379 E (UTM NAD 83)**

Elevation: **1646.4 m**

Date Well Installed: **7 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **180°, 60°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1566	80		(10A) ORTHOGNEISS (5.2 to 99.4) Med-dark grey, strong foliation; composed of >80% quartz up to 5mm in size, anhedral to sub-rounded, locally oval shaped with long axis parallel to foliation; quartz are primarily light grey and rarely weakly purple; biotite comprises ~15% of unit generally observed as foliation or stretched rectangular crystals up to 3x10mm in size; unit varies from a coarse grained (quartz) zone with strongly apparent foliations (biotite) to areas of fine grained quartz with larger sub-rounded quartz eyes (<=3mm) with less developed foliations; calcite is subtle in groundmass	100							97					
						97							74			
						100							85			
						99							65			
						98							80			
						100							87			
1561	85					97							91			
						99							44			
						100							86			
1556	90					99							79			
						98							56			
						97							88			
						98							79			
1551	95					100							87			
						100							100			
						100							58			

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-03**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**

FIGURE: **Appendix B1-3** REV. **0**

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-03	PAGE 5 of 5
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 3 Aug 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 7 Aug 12
Coordinates: 5,706,424 N, 304,379 E (UTM NAD 83)	Elevation: 1646.4 m	Date Well Installed: 7 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 180°, 60°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
1541	105	∩ ∩	(3A) GRANODIORITE (99.4 to 101.2) Light grey, fine to coarse grained; composed of 40-50% quartz (pale grey), 30-40% feldspar (white); quartz ranges from 1-7mm with feldspar 1- 3mm; biotite is the primary mafic mineral, <1mm in size, 5-10%; amphibole is <0.5mm and <1% End of Drillhole: 101.2 m	100					100								
1536	110																
1531	115																
1526	120																

GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-03**

Knight Piésold
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PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-3	REV. 0

REV. 0 - Issued for Report

File:M:\101\0045807\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101\0045807\1\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-04	PAGE 1 of 2
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 9 Aug 12
Location: Crusher Site	Total Depth: 38.1 m	Date Completed: 13 Aug 12
Coordinates: 5,710,396 N, 304,159 E (UTM NAD 83)	Elevation: 1620.5 m	Date Well Installed: 13 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
1616	5		OVERBURDEN (0 to 5.9) SILT, SAND and GRAVEL, fine to coarse grained, angular to sub angular, poorly graded, low plasticity, light brown to greyish brown and grey, loose to dense, dry to moist											
1611	10		(9B) SERICITE-CHLORITE QUARTZ SCHIST (5.9 to 31.2) Medium grey with a bleached look overprinting the rock, fine grained, strongly silicified, foliations are weakly visible	98		100	SPT05	50+ (1" left)	50+	0			Switched to coring (HQ3)	
				96					33					
				88					29					
				97					42					
				100					37					
				100					51					
				96					49					
1606	15			98					87					
				100					83					
				100					54					
				100					69					
1601	20			95					62					
				100					38					
									77					

GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-04**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-4	REV. 0

REV. 0 - Issued for Report

File M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-04**

PAGE **2 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **9 Aug 12**

Location: **Crusher Site**

Total Depth: **38.1 m**

Date Completed: **13 Aug 12**

Coordinates: **5,710,396 N, 304,159 E (UTM NAD 83)**

Elevation: **1620.5 m**

Date Well Installed: **13 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1591	30		(9B) SERICITE-CHLORITE QUARTZ SCHIST (5.9 to 31.2) Medium grey with a bleached look overprinting the rock, fine grained, strongly silicified, foliations are weakly visible	100							87					
					96							72				
					100							75				
					91							75				
					100							51				
				(7D) SERICITE-CHLORITE QUARTZ PHYLLITE (31.2 to 32.6) Yellow green to medium grey green, aphanitic with boudinaged pale grey quartz, well developed foliations, massive pale grey quartz cross cuts interval	100							89				
					100							74				
1586	35			(9B) SERICITE-CHLORITE QUARTZ SCHIST (32.6 to 38.1) Grey green, moderatel developed foliations, zones of intense silicification, pale grey quartz and/or dolomite veins are present	98							58				
					100							47				
					96											
			End of Drillhole: 38.1 m													
1581	40															
1576	45															

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-04**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO.
VA101-458/7-1

REF. NO.
1

FIGURE: **Appendix B1-4**

REV.
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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File M:\1011004\5807\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\1011004\5807\1\DATA\SI\FIELD\DATA\LIBRARY\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-05**

PAGE **1 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **16 Aug 12**

Location: **Overburden Stockpile**

Total Depth: **38.4 m**

Date Completed: **17 Aug 12**

Coordinates: **5,711,114 N, 306,344 E (UTM NAD 83)**

Elevation: **1725.9 m**

Date Well Installed: **17 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			OVERBURDEN (0 to 4.6) Silty SAND and GRAVEL, fine to medium grained, angular to subangular, well graded, low plasticity, light to dark brown, dry			75	SPT01	5/7/9	16							
						58	SPT02	8/13/12	25							
						42	SPT03	6/9/6	15							
1721	5		(9C) SERICITE-CHLORITE QUARTZ-FELDSPAR SCHIST (4.6 to 9.7) Light to medium grey, well developed foliations; quartz eyes are 5-7%, subrounded, pale grey, <=2mm; feldspar are sericitized and is dominant and appears fragmented locally; graphitic seams are sporadically noted through interval; kink folding observed; quartz veins folded and fragmented/boudinaged	66		100			52				Switched to coring (HQ3)			
				100		100			12							
						97			45							
						89			41							
1716	10		(1A) FAULT ZONE (9.7 to 14) Strongly broken rock, gouge throughout; rock type has a graphitic influence	89		69			14							
						81			0							
						81			0							
1711	15		(9C) SERICITE-CHLORITE QUARTZ-FELDSPAR SCHIST (14 to 24.6) Light to medium grey, boudinaged quartz observed, strong foliation, chicken pox texture with green porphyroblasts; quartz eyes are 1-3%, pale grey, <4mm	89		100			23							
						95			56							
						100			60							
						94			81							
1706	20					100			73							
						99			100							
									81							

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-05**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO. **VA101-458/7-1**

REF. NO. **1**

FIGURE: **Appendix B1-5**

REV. **0**

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101100458\07\1\DATA\SI\FIELD\DATA\HARPER_CREEK_2012\GLB_DRILLHOLE_LOG_DATA_TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-05**

PAGE **2 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **16 Aug 12**

Location: **Overburden Stockpile**

Total Depth: **38.4 m**

Date Completed: **17 Aug 12**

Coordinates: **5,711,114 N, 306,344 E (UTM NAD 83)**

Elevation: **1725.9 m**

Date Well Installed: **17 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
			(9B) SERICITE-CHLORITE QUARTZ SCHIST (24.6 to 25.7) Light brownish grey, moderate foliation; quartz grains are 70-80%, mainly pale grey but <1% opaline blue, <2mm in size and sub-rounded	98					74							
			(7D) SERICITE-CHLORITE QUARTZ PHYLLITE (25.7 to 27.3) Brownish grey with boudins of grey, very fine grained, folded quartz at the start of interval	100					95							
			(9B) SERICITE-CHLORITE QUARTZ SCHIST (27.3 to 38.4) Varies from locally brownish grey to greenish grey to grey; silty to sandy texture dominates zone, appears to be a meta-sediment; quartz grains vary from <0.5mm to 2mm, pale grey, sub-angular to subrounded, no opaline ones noted; pervasive silicification locally bleaching rock; majority of interval has quartz <1mm average in size	96					71							
1696	30			100					61							
				100					92							
				97					90							
				73					52							
1691	35			91					72							
				100					58							
			End of Drillhole: 38.4 m													
1686	40															
1681	45															

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-05**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO.
VA101-458/7-1

REF. NO.
1

FIGURE
Appendix B1-5

REV.
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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-06**

PAGE **1 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **17 Aug 12**

Location: **Overburden Stockpile**

Total Depth: **35.1 m**

Date Completed: **18 Aug 12**

Coordinates: **5,710,844 N, 306,746 E (UTM NAD 83)**

Elevation: **1751.7 m**

Date Well Installed: **18 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
1751.7	0		OVERBURDEN (0 to 1.8) Silty SAND and GRAVEL, fine to medium grained, angular to subangular, well graded, low plasticity, light to dark brown, dry			25	SPT01	1/1/2	3					
	1.8		(7A) GRAPHITIC PHYLLITE (1.8 to 17.1) Medium to dark grey; strong foliation with kink folds ("S" and "M" folds) represented by grey, <1-2cm quartz veins, boudinaged and fragments of quartz throughout zone; dolomite is the dominant carbonate as veins +/- quartz	99		100	SPT02	54	50+				Switched to coring (HQ3)	
1747	5			95					29					
				95					46					
				95					26					
				100					71					
				97					55					
1742	10			100					63					
				97					35					
				100					41					
				100					29					
1737	15			98					79					
				98					77					
				100					70					
				89					41					
1732	20		(2A) QUARTZ VEIN (17.1 to 19.1) Massive, pale grey, vugs of pyrite, iron carbonate, and dolomite	100					72					
			(9C) SERICITE-CHLORITE QUARTZ-FELDSPAR SCHIST (19.1 to 19.6) Beige; well foliated with grey quartz eyes, 1-3% of unit, rounded, <3mm, kink folds	100					26					
			(9B) SERICITE-CHLORITE QUARTZ SCHIST (19.6 to 24.5) Dark to medium grey, graphitic metasediment; quartz grains are pale to dark grey, <2mm, 60-70% (<1% opaline blue), sub-rounded, boudinaged quartz veins persist	98					72					
				100					91					

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-06**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO.
VA101-458/7-1

REF. NO.
1

FIGURE: **Appendix B1-6**

REV.
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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-06**

PAGE **2 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **17 Aug 12**

Location: **Overburden Stockpile**

Total Depth: **35.1 m**

Date Completed: **18 Aug 12**

Coordinates: **5,710,844 N, 306,746 E (UTM NAD 83)**

Elevation: **1751.7 m**

Date Well Installed: **18 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL/SP**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal/Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1722	30		(7D) SERICITE-CHLORITE QUARTZ SCHIST (24.5 to 26.5) Very fine grained, dark to medium grey, abundant quartz fragments/boudins +/- iron carbonate and dolomite, graphitic seams persist	100												
			(9B) SERICITE-CHLORITE QUARTZ SCHIST (26.5 to 35.1) Pervasive silicification bleaches rock making grains difficult to see locally, medium grey, graphitic seams still present but starts to dissipate; quartz grains are pale grey, <2mm, sub-rounded, 60-70%	100					81							
					98				89							
					100				65							
					100				77							
					100				70							
					100				95							
1717	35		End of Drillhole: 35.1 m													
1712	40															
1707	45															

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-06**



PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**

FIGURE: **Appendix B1-6** REV. **0**

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07\A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07\A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **GT12-07** PAGE **1 of 2**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT / DRILL CORE** Date Started: **25 Aug 12**
Location: Non-PAG Waste Rock Stockpile Total Depth: **42.1 m** Date Completed: **26 Aug 12**
Coordinates: 5,710,224 N, 304,090 E (UTM NAD 83) Elevation: **1601.7 m** Date Well Installed: **26 Aug 12**
Drilling Method: ODEX / DIAMOND DRILLING Azimuth, Dip: **0°, 90°** Supervised by: **KL**
Drilling Rig: B-54 Hole size: **HQ3** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
1597	5		OVERBURDEN (0 to 8.8) Silty SAND and GRAVEL, some clay, fine to coarse grained, subrounded to subangular, well graded, medium plasticity, greyish brown to brown, dense, moist, greyish white to reddish brown towards the end			100	SPT01	4/7/6	13		●			
						75	SPT02	10/12/11	23		●			
						92	SPT03	9/14/16	30		●			
						100	SPT04	9/13/18	31		●			
						88	SPT05	11/17/25	42		●			
						94	SPT06	20/36/50+ (5" left)	50+		●			
						90	SPT07	14/50+ (4" left)	50+		●			
1592	10		WEATHERED BEDROCK (8.8 to 9) Fine grained, grey to dark grey, orange staining			100								
			(7B) SERICITE-CHLORITE PHYLITE (9 to 12.8) Dark grey, moderately developed foliations, very fine-grained, no quartz visible, calcite bands 0.5 to 1 cm wide			78								
			(7A) GRAPHITIC PHYLITE (12.8 to 14.3) Dark grey, aphanitic, kinking and gougey; slipping plane/faulting likely associated with interval			87								
1587	15		(9C) SERICITE-CHLORITE QUARTZ-SCHIST (14.3 to 23.2) Feldspar schist varies from a brownish grey to grey to greenish grey, kink folds throughout, well-developed foliations; quartz grains/eyes; pale grey, 1%, average 2-4mm, up to 8mm, subrounded, some are oval shaped with long axis parallel to foliation; tension fractures throughout			98								
						98								
						100								
1582	20					98								
						94								
						98								
						98								
						98								

GENERAL REMARKS:
 Lithologies are based on CME detailed logging.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-07

PROJECT/ASSIGNMENT NO. **VA101-458/7-1** REF. NO. **1**
 FIGURE: **Appendix B1-7** REV. **0**

REV. 0 - Issued for Report

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-07**

PAGE **2 of 2**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **25 Aug 12**

Location: **Non-PAG Waste Rock Stockpile**

Total Depth: **42.1 m**

Date Completed: **26 Aug 12**

Coordinates: **5,710,224 N, 304,090 E (UTM NAD 83)**

Elevation: **1601.7 m**

Date Well Installed: **26 Aug 12**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **KL**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS
											20	40		
			(8A) SERICITE-CHLORITE SCHIST (23.2 to 27) Greenish grey, strong foliation, sericitized feldspar dominates rock; composition along with chlorite-altered mafics, quartz and carbonate bands (foliation parallel) throughout	98					51					
			(9C) SERICITE-CHLORITE QUARTZ-SCHIST (27 to 29.3) Feldspar schist varies from a brownish grey to grey to greenish grey, kink folds throughout, well-developed foliations; quartz grains/eyes; pale grey, 1%, average 2-4mm, up to 8mm, subrounded, some are oval shaped with long axis parallel to foliation; tension fractures throughout	96					35					
1572	30		(8A) SERICITE-CHLORITE SCHIST (29.3 to 32.7) Greenish grey, strong foliation, sericitized feldspar dominates rock; composition along with chlorite-altered mafics, quartz and carbonate bands (foliation parallel) throughout	98					28					
			(9C) SERICITE-CHLORITE QUARTZ-SCHIST (32.7 to 35.1) Feldspar schist varies from a brownish grey to grey to greenish grey, kink folds throughout, well-developed foliations; quartz grains/eyes; pale grey, 1%, average 2-4mm, up to 8mm, subrounded, some are oval shaped with long axis parallel to foliation; tension fractures throughout	93					7					
			(8A) SERICITE-CHLORITE SCHIST (29.3 to 32.7) Greenish grey, strong foliation, sericitized feldspar dominates rock; composition along with chlorite-altered mafics, quartz and carbonate bands (foliation parallel) throughout	98					0					
			(9C) SERICITE-CHLORITE QUARTZ-SCHIST (32.7 to 35.1) Feldspar schist varies from a brownish grey to grey to greenish grey, kink folds throughout, well-developed foliations; quartz grains/eyes; pale grey, 1%, average 2-4mm, up to 8mm, subrounded, some are oval shaped with long axis parallel to foliation; tension fractures throughout	100					34					
1567	35		(7D) SERICITE-CHLORITE QUARTZ PHYLLITE (35.1 to 39.8) Green grey to yellow green locally, very fine grained (phyllitic) texture, very abundant tension fractures, rare quartz veins and boudinaged quartz, too fine grained to be a schist, feldspar dominant with lesser mafics based on alteration	99					28					
			(9B) SERICITE-CHLORITE QUARTZ SCHIST (39.8 to 42.1) Medium grey, sandy texture, fine grained, quartz grains; 50-60%, pale grey, (trace opaline blue), sub-rounded, moderately developed foliations, fluctuations between silt and sand through interval	100					33					
1562	40		End of Drillhole: 42.1 m						37					
									38					
									0					
1557	45													

GENERAL REMARKS:

Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-07**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO.
VA101-458/7-1

REF. NO.
1

FIGURE
Appendix B1-7

REV.
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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File M:\101\004\58\07\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012\GPI Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY_HARPER_CREEK_2012\G.L.B. DRILLHOLE LOG - DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-08	PAGE 1 of 3
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 11 Oct 12
Location: Southwest of Non-PAG Waste Rock Stockpile	Total Depth: 56.2 m	Date Completed: 13 Oct 12
Coordinates: 5,709,998 N, 302,226 E (UTM NAD 83)	Elevation: 1363.0 m	Date Well Installed: N / A
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: GM
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■				DRILLHOLE NOTES	WELL DETAILS	
											20	40	60	80			
												SPT TEST DATA 'N' VALUES ●					
												20	40	60	80		
			SAND (0 to 1.5) Fine SAND with some gravel, some coarse sand, trace silt, and many cobbles and boulders. Brown, dry, non-plastic, sub-angular to angular grains.		X	42	SPT01	14/20/30	50								
			SAND AND SILT (1.5 to 3.1) Fine SAND and silt with some gravel. Damp, poorly graded, sug-angular to angular grains, brown, low plasticity.		X	100	SPT02	14/33/50+	50+								
1358	5		SAND AND SILT (3.1 to 9.1) Fine SAND, some silt to silty, trace coarse sand, damp to dry, poorly graded, low of medium plasticity.		X	100	SPT03	13/16/19	35								
					X	100	SPT04	50+	50+								
					X	100	SPT05	17/26/35	61								
			SAND AND GRAVEL (9.1 to 15.2) Fine to coarse SAND and some gravel with trace silt. Brown sand and silt with multi-colored, sub-angular to angular rock fragments (medium grey, dark pink, and quartz chips typically). 1.5" zone of green, fine sand and silt at 50'.		X	100	SPT06	37/50+	50+								
1353	10				X	0	SPT07	50+	50+								
					X	0	SPT08	50+	50+								
					X	0	SPT09	50+	50+								
1348	15		GRAVEL AND SAND (15.2 to 18.3) Angular sandy GRAVEL and coarse sand with trace fine sand and silt. Brown, wet, non-plastic.		X	53	SPT10	48/50+	50+								
			GRAVEL (18.3 to 21.3) Angular GRAVEL (rock chips) and some fine to coarse sand. Brown, wet, non plastic.		X	71	SPT11	55/50+	50+								
1343	20				X	100	SPT12	50+	50+								
			SAND (21.3 to 24.4) Fine to coarse SAND with trace silt and clay. Brown, wet, sub-angular to angular/platye grains, medium plasticity.		X	100	SPT13	30/50+	50+								

GENERAL REMARKS:
For detailed well installation details refer to MW12-05. Lithologies are based on KPL Field Interpretation.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-08**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix B1-8	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\1011004\5807\A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\1011004\5807\A\DATA\SI FIELD DATA\LIBRARY\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT

Drill Hole No. **GT12-08**

PAGE **2 of 3**

Contractor: **WESTECH DRILLING CO.**

Sample Type: **SPT / DRILL CORE**

Date Started: **11 Oct 12**

Location: **Southwest of Non-PAG Waste Rock Stockpile**

Total Depth: **56.2 m**

Date Completed: **13 Oct 12**

Coordinates: **5,709,998 N, 302,226 E (UTM NAD 83)**

Elevation: **1363.0 m**

Date Well Installed: **N / A**

Drilling Method: **ODEX / DIAMOND DRILLING**

Azimuth, Dip: **0°, 90°**

Supervised by: **GM**

Drilling Rig: **B-54**

Hole size: **HQ3**

Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1333	30		BEDROCK (24.4 to 39.4)	100									Switched to coring (HQ3)			
			FAULT (29.6) Rubble rock.	89												
				99												
				100												
				100												
1328	35		FAULT (35.7) Gouge.	98												
				100												
				100												
1323	40		FAULT (39.4 to 42.5) Light greenish grey rock with deformation abrupt texture changes across discontinuities. Some rubble and fault gouge in joints.	100												
				98												
1318	45		BEDROCK (42.5 to 56.2)	94												
				100												
				94												
				100												
				99												

GENERAL REMARKS:

For detailed well installation details refer to MW12-05. Lithologies are based on KPL Field Interpretation.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-08**

**Knight Piésold
CONSULTING**

PROJECT/ASSIGNMENT NO.
VA101-458/7-1

REF. NO.
1

FIGURE: **Appendix B1-8**


REV.
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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\101100458\07A\DATA\SI FIELD DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
Library: M:\101100458\07A\DATA\SI FIELD DATA\LIBRARY_HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT Drill Hole No. **GT12-08** PAGE **3 of 3**
Contractor: WESTECH DRILLING CO. Sample Type: **SPT / DRILL CORE** Date Started: **11 Oct 12**
Location: Southwest of Non-PAG Waste Rock Stockpile Total Depth: **56.2 m** Date Completed: **13 Oct 12**
Coordinates: 5,709,998 N, 302,226 E (UTM NAD 83) Elevation: **1363.0 m** Date Well Installed: **N / A**
Drilling Method: ODEX / DIAMOND DRILLING Azimuth, Dip: **0°, 90°** Supervised by: **GM**
Drilling Rig: B-54 Hole size: **HQ3** Reviewed by: **GM**

ELEVATION (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	TOTAL CORE RECOVERY (%)	SAMPLE TYPE	SAMPLE RECOVERY (%)	SAMPLE NO.	SPT BLOW COUNTS Refusal / Penetration	SPT 'N' VALUE / RQD (%)	ROCK HARDNESS	RQD (%) ■		DRILLHOLE NOTES	WELL DETAILS		
											20	40			60	80
											SPT TEST DATA 'N' VALUES ●					
											20	40	60	80		
1308	55		BEDROCK (42.5 to 56.2)	99					47		20	40				
				100					93		20	40	60	80		
				94					43		20	40	60	80		
				99					33		20	40	60	80		
			End of Drillhole: 56.2 m													
1303	60															
1298	65															
1293	70															

GENERAL REMARKS:
 For detailed well installation details refer to MW12-05. Lithologies are based on KPL Field Interpretation.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
DRILLHOLE LOG FOR GT12-08



PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix B1-8	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

File:M:\10110045807\A\DATA\SI\FIELD\DATA\HARPER_CREEK_DRILLHOLE_LOGS_2012.GPJ
 Library: M:\10110045807\A\DATA\SI\FIELD\DATA\SI\LIBRARY\HARPER_CREEK_2012.GLB, DRILLHOLE LOG, DATA TEMPLATE.GDT, 5 Jul 13

APPENDIX B2
GEOTECHNICAL DRILLHOLE LOGS

(Pages B2-1 to B2-14)

PROJECT: HARPER CREEK PROJECT

Client: YELLOWHEAD MINING INC.

Drilling Company: WESTECH DRILLING CO.

Location: ROCK QUARRY

Coordinates : 5706192 N, 303869 E

Drill Hole Number: GT12-01

Drill Type: B-54

Core Diameter: From 0 to 6.6 m 4.5"

Core Diameter: From 6.6 to 30.2 m HQ3

Surface Elevation: 1,654.3 m

5,426 ft

Total Depth: 30.2 m

99 ft

Azimuth: 000 deg

Inclination: 90 deg (down is positive)

Logged By: EJJ

Reviewed By: GM

Date Started: 26-Jul-12

Date Completed: 28-Jul-12

Print Jul/08/13 9:07:30

DRILL RUN DATA											GEOLOGY - COMMENTS				RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)						
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition					Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total	
																			P	A	R	I	W	TOTAL							
0.0	5426.2	0.00	1654.3	21.5	6.55	6.55					OB																				
21.5	5404.7	6.55	1647.8	24.0	7.31	0.76	0.64	84	0.00	0	(3C) QUARTZ MONZONITE - BALDY	Grey	Medium to coarse grained	Verticle joints infilled, soft infill, angular crushed gravels in infill, black specks towards end of run	100	R5	4	160	0	4	4	4	3	15	15	9.4	3.0	7.1	15.0	15	50
24.0	5402.2	7.31	1647.0	29.0	8.83	1.52	1.52	100	0.63	41	(3C) QUARTZ MONZONITE - BALDY	Light grey, dark grey with pink spots	Medium grained	Soft infill, granite dyrite	100	R5	8	190	0	5	4	2	5	16	15	9.4	8.6	7.5	16.0	15	56
29.0	5397.2	8.83	1645.5	34.0	10.35	1.52	1.52	100	1.18	78	(3C) QUARTZ MONZONITE - BALDY	Light/ dark grey, pink	Medium grained	Some weathering, brown at joints, spots of pyrite/shiny black seen through out	75	R4	7	217	0	5	4	3	5	17	15	7.7	15.2	7.8	17.0	15	63
34.0	5392.2	10.35	1644.0	38.9	11.87	1.52	1.48	97	0.82	54	(3C) QUARTZ MONZONITE - BALDY	Light grey w/pink, dark grey	Fine to medium grained	Wet clay infill	125	R5	8	185	0	4	4	4	5	17	15	10.9	10.7	7.4	17.0	15	61
38.9	5387.2	11.87	1642.4	44.0	13.41	1.54	1.52	99	1.09	71	(3C) QUARTZ MONZONITE - BALDY	Light grey w/pink and dark grey spots	Fine to medium grained	Some weathering, brown at joints, shiny black /silver/pyrite speckled throughout	150	R5	3	507	0	4	3	4	5	16	15	12.2	13.9	10.8	16.0	15	68
44.0	5382.2	13.41	1640.9	49.0	14.93	1.52	1.52	100	0.66	43	(3C) QUARTZ MONZONITE - BALDY	Lightgrey w/pink and dark grey spots	Fine to medium grained	Weathered near end of run, spots of pyrite/shiny black seen through out	125	R5	6	253	0	1	2	2	5	10	15	10.9	8.9	8.2	10.0	15	53
49.0	5377.2	14.93	1639.4	54.0	16.45	1.52	1.49	98	1.20	79	(3C) QUARTZ MONZONITE - BALDY	Light grey w/pink and dark grey spots	Fine to medium grained	Infill orange and yellow @ 16.0m	150	R5	2	745	0	1	3	2	6	12	15	12.2	15.5	12.8	12.0	15	68
54.0	5372.2	16.45	1637.9	59.0	17.97	1.52	1.52	100	0.91	60	(3C) QUARTZ MONZONITE - BALDY	Light grey w/pink and dark grey spots	Fine to medium grained	Soft mint green infill, shiny black /silver/pyrite speckled throughout	150	R5	2	760	0	1	4	2	6	13	15	12.2	11.8	12.9	13.0	15	65
59.0	5367.2	17.97	1636.3	63.9	19.49	1.52	1.52	100	0.84	55	(3C) QUARTZ MONZONITE - BALDY	Orange/pink with purple	Medium to coarse grained	Soft mint green infill, one verticle fracture at end of run	100	R5	5	304	0	3	4	2	6	15	15	9.4	10.9	8.8	15.0	15	59
63.9	5362.2	19.49	1634.8	68.9	21.01	1.52	1.52	100	0.33	22	(3C) QUARTZ MONZONITE - BALDY	Orange/pink with purple	Medium grained	Infill is soft mint green and hard milky white, coarse visicles of soft white infill, shiny black/silver seen throughout	100	R5	9	169	0	0	3	4	5	12	15	9.4	5.6	7.2	12.0	15	49
68.9	5357.2	21.01	1633.3	74.0	22.55	1.54	1.44	94	0.22	14	(3C) QUARTZ MONZONITE - BALDY	Grey and orange	Medium grained	Soft orange infill, 21.01 - 21.64 granite w/ visicles infilled w/white soft clay, large vein of compact grey clay @ 21.23, 21.65 -22.55 weathered orange granite turning more pink towards end of run, soft orange infill	100	R5	11	131	0	1	3	4	5	13	15	9.4	4.7	6.7	13.0	15	49
74.0	5352.2	22.55	1631.8	79.0	24.07	1.52	1.46	96	0.68	45	(3C) QUARTZ MONZONITE - BALDY	Light grey w/pink and dark grey spots	Medium grained	Soft orange infill	100	R5	9	162	0	0	3	4	5	12	15	9.4	9.1	7.1	12.0	15	53
79.0	5347.2	24.07	1630.2	84.0	25.59	1.52	1.52	100	0.58	38	(3C) QUARTZ MONZONITE - BALDY	Pink, light grey, dark grey	Medium to coarse grained	Yellow infill, some weathering along fractures, shiny black, silver, pyrite seen throughout	100	R5	11	138	0	1	3	2	6	12	15	9.4	8.1	6.8	12.0	15	51
84.0	5342.2	25.59	1628.7	89.0	27.12	1.53	1.52	99	0.73	48	(3C) QUARTZ MONZONITE - BALDY	Light grey, pink, black, green	Medium grained	Mint green infill, spots of pyrite/shiny black seen through out, granite becoming more green towards end of run, hard white infill in some joints also	100	R5	11	138	0	1	3	2	6	12	15	9.4	9.6	6.8	12.0	15	53
89.0	5337.2	27.12	1627.2	94.0	28.64	1.52	1.52	100	0.81	53	(3C) QUARTZ MONZONITE - BALDY	Green, pink, L/d grey	Fine grained	No infilling, no weathering, shiny black, pyrite seen throughout	100	R5	13	117	0	0	3	6	6	15	15	9.4	10.6	6.6	15.0	15	57
94.0	5332.2	28.64	1625.7	99.0	30.16	1.52	1.52	100	1.27	84	(3C) QUARTZ MONZONITE - BALDY	Blue, grey, pink	Fine grained	No infill between joints, joints possibly mechanical, no weathering	100	R5	8	190	0	0	5	6	6	17	15	9.4	16.5	7.5	17.0	15	65
END OF HOLE																															

DRILL RUN DATA											GEOLOGY - COMMENTS				RMR - DATA (BY RUN)								RMR CALCULATIONS (BY RUN)									
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition					Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total		
																			P	A	R	I	W	TOTAL								
297.5	5147.7	90.66	1569.5	302.5	92.20	1.54	1.51	98	1.31	85	(10A) ORTHOGNEISS	Light to darj grey	Fine grained	Foliated, some green bands, few small white veins, infill is hard white green in some places, no signs of weathering, strong and competent	140	R5	7	216	0	0	3	4	6	13	15	11.7	16.8	7.8	13.0	15	64	
302.5	5143.4	92.20	1568.1	307.5	93.72	1.52	1.49	98	1.49	98	(10A) ORTHOGNEISS	Dark grey	Fine grained	Infill hard, white, foliated with black, blue, green, no signs of weathering	130	R5	1	1490	0	5	3	4	6	18	15	11.2	19.7	17.4	18.0	15	81	
307.5	5139.0	93.72	1566.8	312.5	95.24	1.52	1.52	100	1.42	93	(10A) ORTHOGNEISS	Light to drak grey	Fine grained	Ming green hard infilling, some small white veins, no signs of weathering	140	R5	5	304	0	4	3	4	6	17	15	11.7	18.7	8.8	17.0	15	71	
312.5	5134.7	95.24	1565.5	317.5	96.76	1.52	1.52	100	1.47	97	(10A) ORTHOGNEISS	Dark to light grey mixed with mint green	Fine grained	Hard white infill at 95.72 m, mint green and white, hard at 96.44 m and 96.56 m, a lot of small white veins	140	R5	3	507	0	1	3	4	6	14	15	11.7	19.4	10.8	14.0	15	71	
317.5	5130.4	96.76	1564.2	322.5	98.29	1.53	1.52	99	1.49	97	(10A) ORTHOGNEISS	Dark grey to green	Fine grained	Hard white, no signs of weathering, some small white veins	140	R5	5	304	0	4	3	4	6	17	15	11.7	19.6	8.8	17.0	15	72	
322.5	5126.1	98.29	1562.8	327.5	99.81	1.52	1.48	97	1.48	97	(10A) ORTHOGNEISS	Dark grey and green	Fine grained	Lots of green and white veining, no signs of weathering, some pyrite in places	140	R5	4	370	0	4	3	4	6	17	15	11.7	19.6	9.5	17.0	15	73	
327.5	5121.7	99.81	1561.5	332.5	101.33	1.52	1.47	97	1.47	97	(10A) ORTHOGNEISS	Dark grey	Fine grained	With bands/veins of light grey, mint-green, mustard, infilling, no signs of weathering, near vertical white veining, strong and competent	140	R5	2	735	0	4	3	4	6	17	15	11.7	19.4	12.8	17.0	15	76	
END OF HOLE																																

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DRILL RUN DATA											GEOLOGY - COMMENTS				RMR - DATA (BY RUN)								RMR CALCULATIONS (BY RUN)								
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
																			P	A	R	I	W	TOTAL							
327.0	5116.9	99.66	1560.0	332.0	101.19	1.52	1.52	100	1.52	100	(3A) GRANODIORITE	Grey and light grey with mottled dark grey and white. Some marbling.	Equigranular, fine to medium grained	Trace calcite infilling. Joints at 40 and 45 degrees. Some calcite veins and quartz marbling	25	R3	3	507	0	4	3	2	6	15	15	3.4	20.1	10.8	15.0	15	64
END OF HOLE																															

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DRILL RUN DATA											GEOLOGY - COMMENTS				RMR - DATA (BY RUN)										RMR CALCULATIONS (BY RUN)						
Depth From	Elev. From	Depth From	Elev. From	Depth To	Depth To	Run Length	Recov. Length	Recov. (%)	RQD Length	RQD (%)	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
(ft)	(ft)	(m)	(m)	(ft)	(m)	(m)	(m)	(%)	(m)	(%)									P	A	R	I	W	TOTAL							
100.0	5645.6	30.48	1721.2	105.0	32.00	1.52	1.52	100	1.17	77	(9B) SERICITE-CHLORITE QUARTZ SCHIST	Pearlescent medium grey with greenish grey pieces throughout and heavy quartz marbling and banding to 9 cm in width. Quartz from 31.64 m.	Equigranular, fine grained	Calcite infilling up to 1 cm in width, joints at 30 and 60 degrees, some pyrite and greenish grey staining in joints.	25	R3	6	253	0	3	3	0	6	12	15	3.4	15.1	8.2	12.0	15	54
105.0	5640.6	32.00	1719.7	110.0	33.53	1.52	1.52	100	1.06	70	(9B) SERICITE-CHLORITE QUARTZ SCHIST	Quartz to 32.23 m underlain by light grey to grey, slightly pearlescent.	Equigranular, fine grained	Trace white silt infilling <1 mm, some greenish grey staining on joint surfaces, joints from 40 to 60 degrees, trace pyrite.	35	R3	9	169	0	3	2	2	6	13	15	4.4	13.6	7.2	13.0	15	53
110.0	5635.6	33.53	1718.2	115.0	35.05	1.52	1.52	100	1.45	95	(9B) SERICITE-CHLORITE QUARTZ SCHIST	Grey to light grey, slightly pearlescent.	Equigranular, fine grained	Some calcite infilling <1 mm, joints at 10 and 75 degrees, trace pyrite.	25	R3	9	169	0	3	1	2	6	12	15	3.4	19.1	7.2	12.0	15	57
END OF HOLE																															

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DRILL RUN DATA											GEOLOGY - COMMENTS				RMR - DATA (BY RUN)								RMR CALCULATIONS (BY RUN)								
Depth	Elev.	Depth	Elev.	Depth	Depth	Run	Recov.	Recov.	RQD	RQD	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total
From (ft)	From (ft)	From (m)	From (m)	To (ft)	To (m)	Length (m)	Length (m)	(%)	Length (m)	(%)									P	A	R	I	W	TOTAL							
133.0	5120.6	40.54	1561.2	138.0	42.06	1.52	1.52	100	0.00	0	(9B) SERICITIE- CHLORITE QUARTZ SCHIST	Pearlescent dark grey with grey to greenish grey striations, swirled.	Equigranular, fine grained	Trace calcite infilling <0.5 mm, joints slickensided at 60 to 75 degrees every 1-8 cm,	25	R3	39	39	0	4	0	2	6	12	15	3.4	3.0	5.5	12.0	15	39
END OF HOLE																															

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PROJECT: HARPER CREEK PROJECT

Client: YELLOWHEAD MINING INC.

Drilling Company: WESTECH DRILLING CO.

Location: SOUTHWEST OF NON-PAG WASTE ROCK STOCKPILE

Coordinates : 5709998 N, 302226 E

Drill Hole Number: GT12-08

Drill Type: B-54

Core Diameter: From 0 to 27.4 m 4.5"
Core Diameter: From 27.4 to 56.2 m HQ3

Surface Elevation: 1,363.0 m
4,471 ft

Total Depth: 56.2 m
184 ft

Azimuth: 000 deg

Inclination: 90 deg

(down is positive)

Logged By: GM

Reviewed By: GM

Date Started: 11-Oct-12

Date Completed: 13-Oct-12

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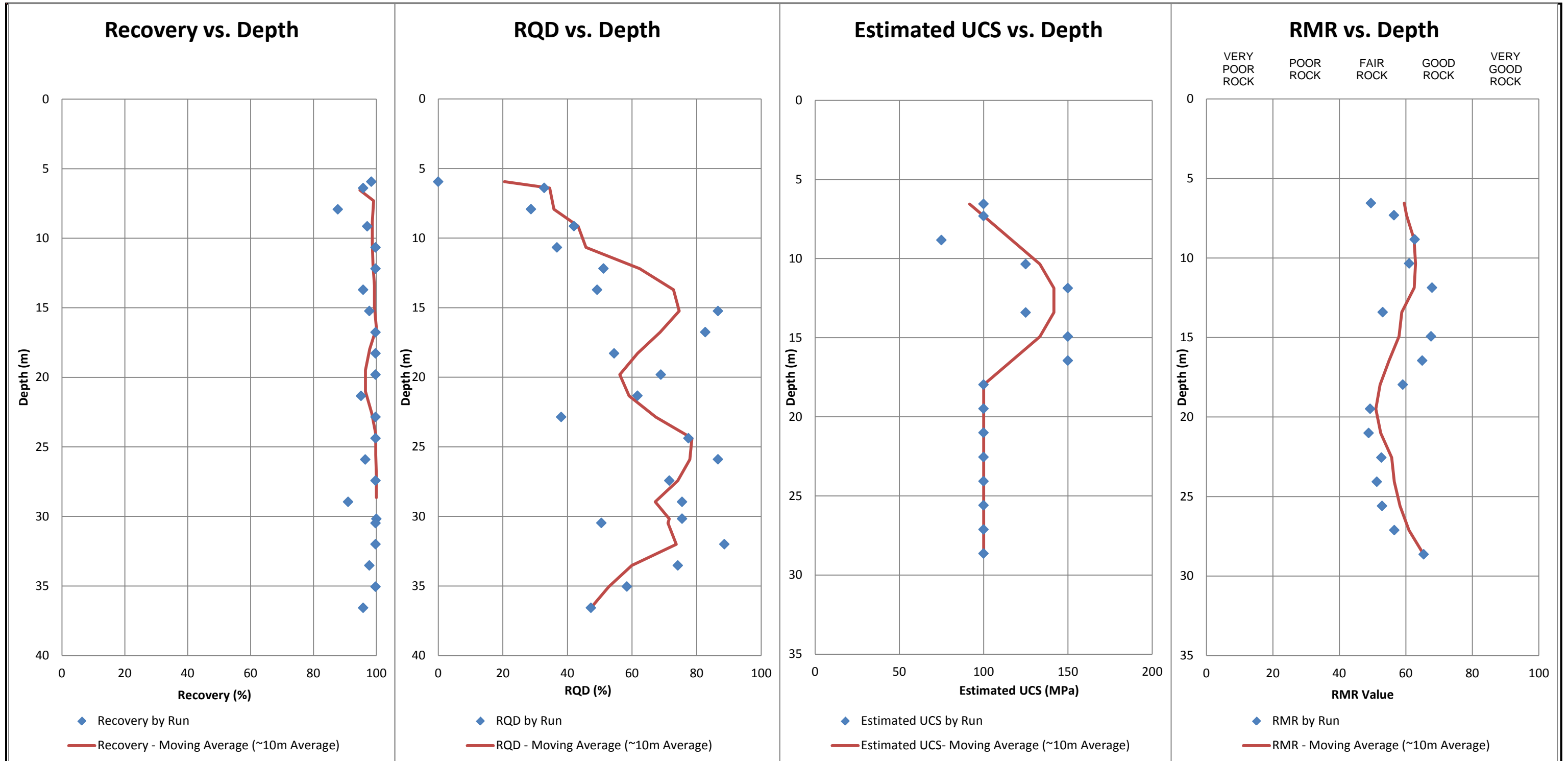
DRILL RUN DATA												GEOLOGY - COMMENTS											RMR - DATA (BY RUN)								RMR CALCULATIONS (BY RUN)					
Depth From (ft)	Elev. From (ft)	Depth From (m)	Elev. From (m)	Depth To (ft)	Depth To (m)	Run Length (m)	Recov. Length (m)	Recov. (%)	RQD Length (m)	RQD (%)	Rock Type (see Leg)	Rock Colour	Rock Grain Size / Texture	Other Notes	UCS (Est.) (MPa)	ROCK CLASS.	# of Joints	Joint Set Spac. (mm)	Joint Condition						Water Rating	RMR-89 UCS Rating	RMR-89 RQD Rating	RMR-89 Joint Spac. Rating	RMR-89 Joint Condition Rating	RMR-89 Water Rating	RMR-89 Total					
																				P	A	R	I	W	TOTAL											
0.0	4470.6	0.00	1363.0	80.0	24.38	24.38					OB																									
80.0	4390.6	24.38	1338.6	90.0	27.43	3.05	0.00	0	0.00	0	ODEX Bedrock				0	R0	0	3048	0	4	0	2	5	11	15	1.0	3.0	20.0	11.0	15	50					
90.0	4380.6	27.43	1335.6	94.3	28.73	1.30	1.32	100	0.41	32	Intrusive	Medium grey to greenish grey.	Medium grained, equigranular/mottled texture.	Quartz veins and blebs ~1 cm thick sporadically located throughout run. Trace pyrite is present. ~20-30% quartz blebs.	120	R5	14	94	0	3	4	4	5	16	15	10.6	7.1	6.3	16.0	15	55					
94.3	4376.4	28.73	1334.3	99.3	30.25	1.52	1.36	89	0.42	28	Intrusive	Medium grey to greenish grey.	Medium grained, equigranular/mottled texture.	Fault zone at 0.87 to 1.04 m. Sporadic quartz veins present throughout run. Vuggy quartz at 1.2 m. ~20-30% quartz blebs.	120	R5	13	105	0	0	3	4	5	12	15	10.6	6.5	6.4	12.0	15	51					
99.3	4371.4	30.25	1332.8	104.3	31.77	1.52	1.51	99	0.88	58	Intrusive	Medium grey with chloritic green bands 1-3 cm thick overprinting texture.	Medium grained, equigranular/mottled texture.	5 cm fault/rubble zone at 0.5 m. Sporadic quartz veins, 0.5-1 cm thick, throughout core. Trace calcite and oxide on joint surfaces. ~20-30% quartz blebs.	120	R5	11	137	0	2	3	2	5	12	15	10.6	11.4	6.8	12.0	15	56					
104.3	4366.4	31.77	1331.2	109.3	33.30	1.52	1.52	100	0.95	62	Intrusive	Medium grey with chloritic green bands 1-3 cm thick overprinting texture.	Medium grained, equigranular/mottled texture.	Sporadic quartz veins, 0.5-1 cm thick throughout run. Longitudinal fracture runs through run, with 1-2 mm calcite infilling. Chlorite staining on joint surfaces. ~20-30% quartz blebs.	120	R5	8	190	0	1	3	2	5	11	15	10.6	12.2	7.5	11.0	15	56					
109.3	4361.4	33.30	1329.7	114.3	34.82	1.52	1.55	100	0.93	61	Intrusive	Medium grey with chloritic green bands 1-3 cm thick overprinting texture.	Medium grained, equigranular/mottled texture.	~20-30% quartz blebs, 1 cm thick quartz vein at 0.3 m.	120	R5	10	155	0	4	3	6	6	19	15	10.6	12.0	7.0	19.0	15	64					
114.3	4356.4	34.82	1328.2	119.3	36.35	1.52	1.50	98	1.30	85	Intrusive	Medium grey with chloritic green bands 1-3 cm thick overprinting texture.	Medium grained, equigranular/mottled texture.	Fault gouge at 0.85-0.89. ~20-30% quartz blebs. Irregular 4 mm thick calcite vein throughout upper half of run. Calcite coating on joint surfaces. Trace pyrite throughout run.	120	R5	9	167	0	3	2	2	6	13	15	10.6	16.9	7.2	13.0	15	63					
119.3	4351.4	36.35	1326.7	124.3	37.87	1.52	1.59	100	1.30	85	Intrusive	Medium grey with chloritic green bands 1-3 cm thick overprinting texture.	Medium grained, equigranular/mottled texture.	~20-30% quartz blebs with 1 cm thick quartz banding throughout. Chlorite and calcite on joint surfaces.	120	R5	7	227	0	4	2	2	6	14	15	10.6	16.9	7.9	14.0	15	64					
124.3	4346.4	37.87	1325.1	129.3	39.39	1.52	1.52	100	0.97	64	Silicified Unit	Medium to light grey. Upper 60 cm shows some chloritic staining.	Fine grained, equigranular.	0.5-1 cm quartz banding throughout run spaced 3-5 cm apart. Upper 60 cm appears partially chloritized while rest of run is silicified with trace epidote alteration and pyrite inclusions. Calcite veinlets present throughout run.	120	R5	8	190	0	4	4	6	6	20	15	10.6	12.5	7.5	20.0	15	66					
129.3	4341.4	39.39	1323.6	134.3	40.92	1.52	1.56	100	0.96	63	Fault Zone	Light greenish grey	Partially banded with deformed banding, irregular grain sizes from fine to medium, abrupt texture changes across fractures.	Deformation in the banding and discontinuous veining suggests a shear zone. Some rubble and gouge in fractures, typically <5 mm thick. Irregular quartz and calcite veining throughout run.	50	R4	8	195	0	3	2	2	6	13	15	5.7	12.3	7.5	13.0	15	54					
134.3	4336.4	40.92	1322.1	139.3	42.44	1.52	1.50	98	0.23	15	Fault Zone	Light greenish grey	Partially banded with deformed banding, irregular grain sizes from fine to medium, abrupt texture changes across fractures.	Deformation in the banding and discontinuous veining suggests a shear zone. Some rubble and gouge in fractures, typically <5 mm thick.	30	R3	16	94	0	1	2	2	6	11	15	3.9	4.8	6.3	11.0	15	41					
139.3	4331.4	42.44	1320.6	144.3	43.97	1.52	1.44	94	0.84	55	Intrusive	Light pinkish grey	Medium grained, partially foliated.	1-2 cm quartz veining throughout run. Chlorite infilling on joint surfaces. Upper 10 cm is continuation of fault zone and is gougey.	50	R4	5	288	0	4	1	2	6	13	15	5.7	10.9	8.6	13.0	15	53					
144.3	4326.4	43.97	1319.0	149.3	45.49	1.52	1.53	100	1.05	69	Intrusive	Medium grey with faint potassic/pink overprinting.	Medium grained, equigranular, partially banding/foliated texture.	~20-30% quartz grains. Shear deformed zone at 0.3-0.6 m. 0.5-1 cm thick calcite veins throughout run every 15-20 cm.	100	R5	10	153	0	1	3	4	6	14	15	9.4	13.5	7.0	14.0	15	59					
149.3	4321.4	45.49	1317.5	154.3	47.01	1.52	1.43	94	0.69	45	Intrusive	Medium grey.	Medium grained, equigranular, mottled. Patches of fine grained altered zones 20-30 cm near bottom of run.	0.7 cm quartz veins every 30 cm. Calcite veinlets throughout run. Run is brittle and fractures along veinlets easily. ~20-30% quartz grains.	120	R5	16	89	0	4	2	2	6	14	15	10.6	9.2	6.2	14.0	15	55					
154.3	4316.4	47.01	1316.0	159.3	48.54	1.52	1.53	100	0.44	29	Intrusive	Medium grey with dark green and pinkish hues throughout.	Medium grained, with partially foliated/flatted grains for texture.	Green and pink hues possibly from chloritic and potassic alteration. 1 cm thick quartz veins spaced every 30-40 cm throughout run. 20-30% quartz grains in rock mass.	120	R5	17	90	0	4	3	4	6	17	15	10.6	6.7	6.2	17.0	15	56					
159.3	4311.4	48.54	1314.5	164.3	50.06	1.52	1.51	99	0.49	32	Intrusive	Medium grey with pinkish hue.	Medium grained.	patches of green chloritization at 0.8 and 1.2 m. 1 cm quartz veins every 30 cm in upper 80 cm. Fractured rock zone at 0.87-1.0 m with calcite infilling. Calcite veinlets throughout lower 1.0 m of core.	100	R5	25	60	0	2	3	1	6	12	15	9.4	7.1	5.8	12.0	15	49					
164.3	4306.4	50.06	1312.9	169.3	51.58	1.52	1.51	99	0.71	47	Intrusive	Medium grey with chloritic green alteration overprinting.	Medium grained.	~20-30% quartz grains throughout matrix. 1 cm quartz veins sporadically located every 20-50 cm throughout the run.	120	R5	13	116	0	4	3	1	6	14	15	10.6	9.4	6.5	14.0	15	56					
169.3	4301.4	51.58	1311.4	174.3	53.11	1.52	1.54	100	1.42	93	Intrusive	Medium grey with chloritic green alteration overprinting.	Medium grained.	~20-30% quartz grains throughout matrix. 4 mm thick fault gouge infill present at 0.93 and 1.2 m. 1-2 mm thick calcite veinlet running ~20-30° TCA through center of run.	120	R5	8	193	0	1	3	1	6	11	15	10.6	18.6	7.5	11.0	15	63					
174.3	4296.4	53.11	1309.9	179.3	54.63	1.52	1.44	94	0.65	43	Intrusive	Medium grey with faint pink and green hues overprinting from potassic and chloritic alteration.	Medium grained, equigranular partially overprinted with banded texture.	Rubble zone at 1.1-1.17 m. Quartz veins, <1 cm thick, spaced sporadically every 20-30 cm. Calcite veinlets present throughout run.	120	R5	11	131	0	1	2	2	6	11	15	10.6	8.8	6.7	11.0	15	52					
179.3	4291.4	54.63	1308.4	184.3	56.16	1.52	1.51	99	0.50	33	Intrusive	Medium grey with faint pink and green hues overprinting from potassic and chloritic alteration.	Medium grained, equigranular partially overprinted with banded texture.	Upper 40 cm silicified, lower consists of quartz veins, <1 cm thick, spaced sporadically every 20-30 cm. Calcite veinlets present throughout run.	120	R5	9	168	0	4	3	4	6	17	15	10.6	7.2	7.2	17.0	15	57					

END OF HOLE

APPENDIX B3

RECOVERY, RQD, RMR, AND ESTIMATED UCS VS. DEPTH

(Pages B3-1 to B3-8)

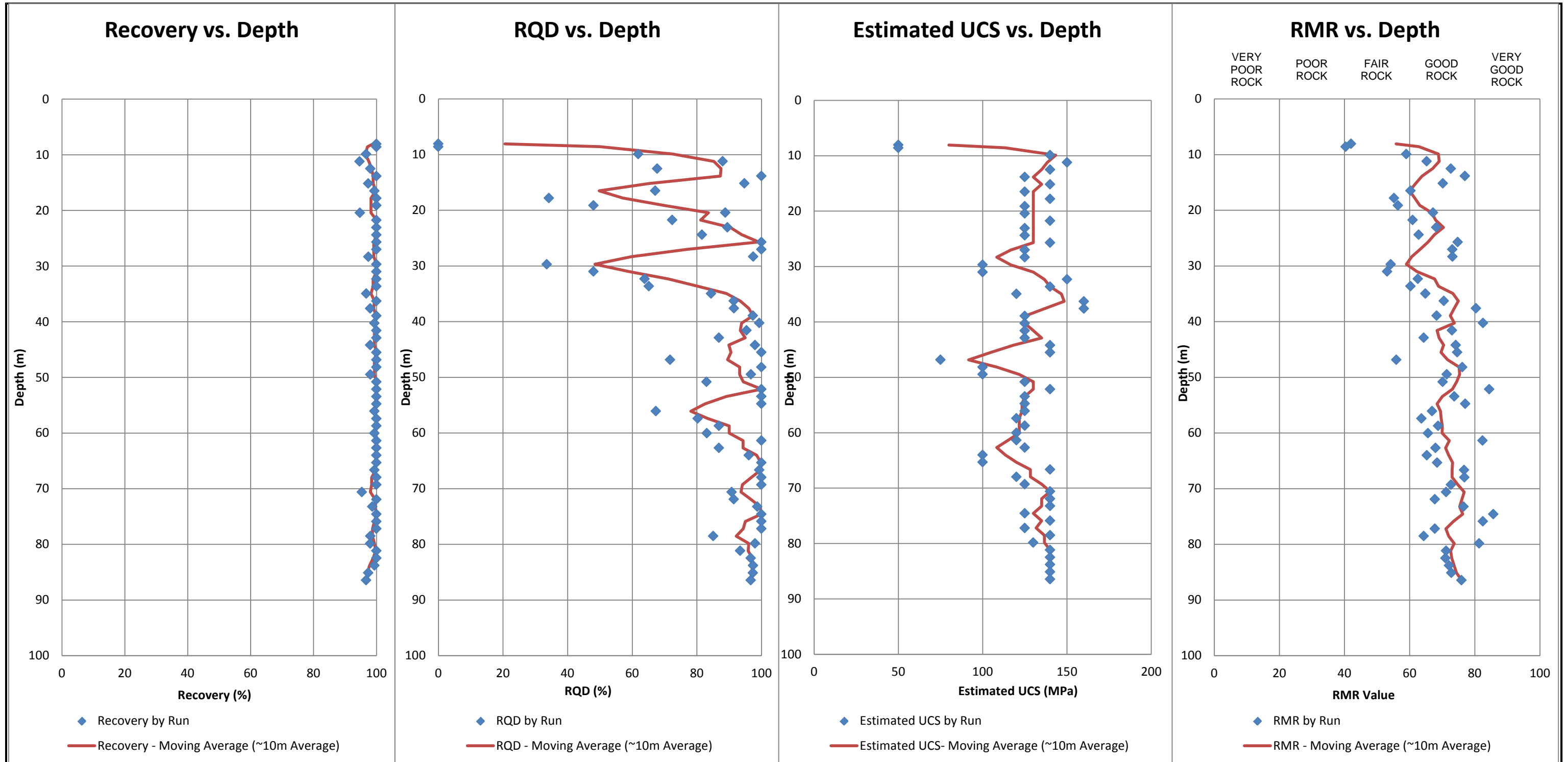


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-01	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
FIGURE B3-1	REF. NO. 1 REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

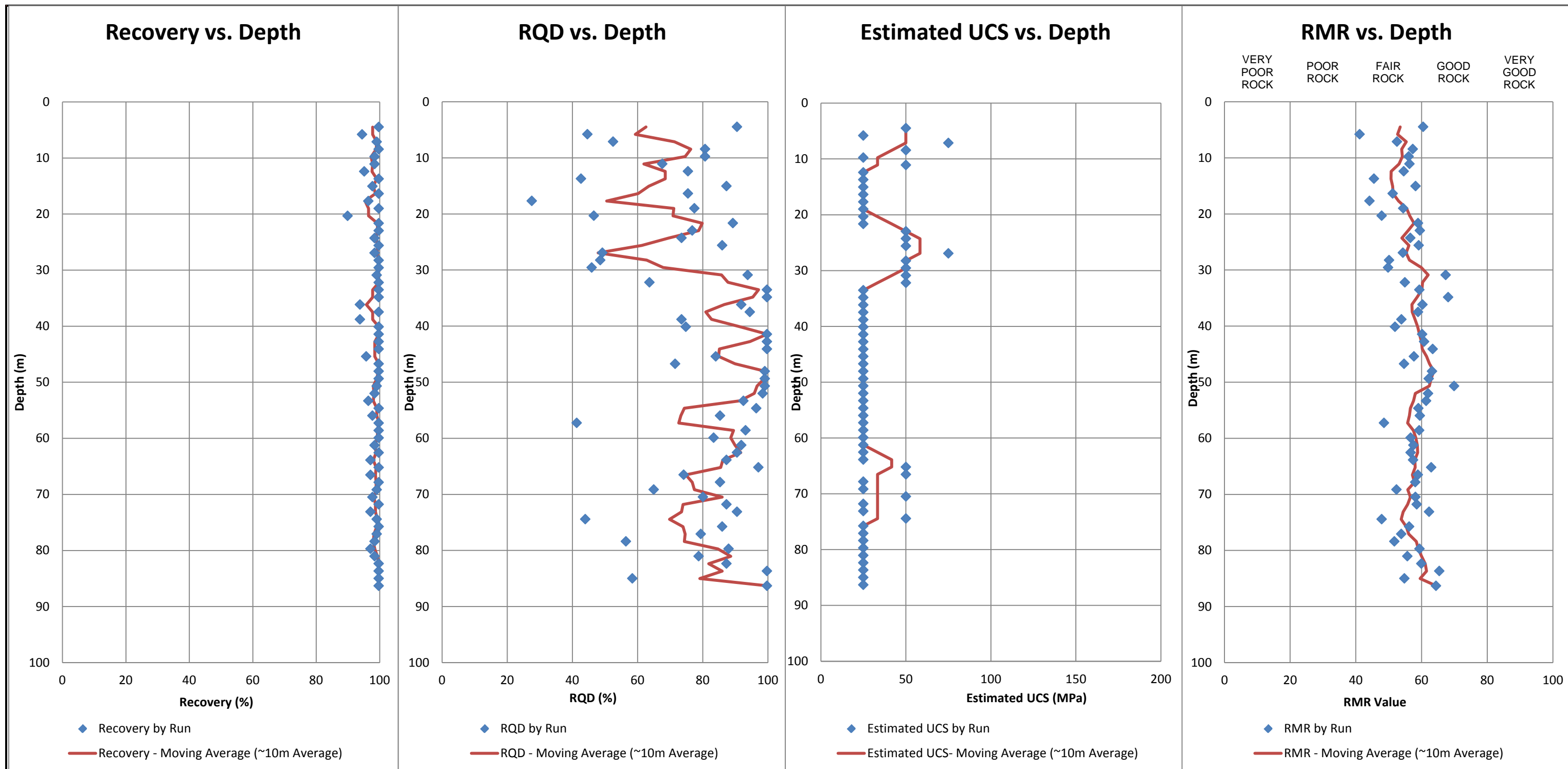


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-02	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
	REF. NO. 1
FIGURE B3-2	
	REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

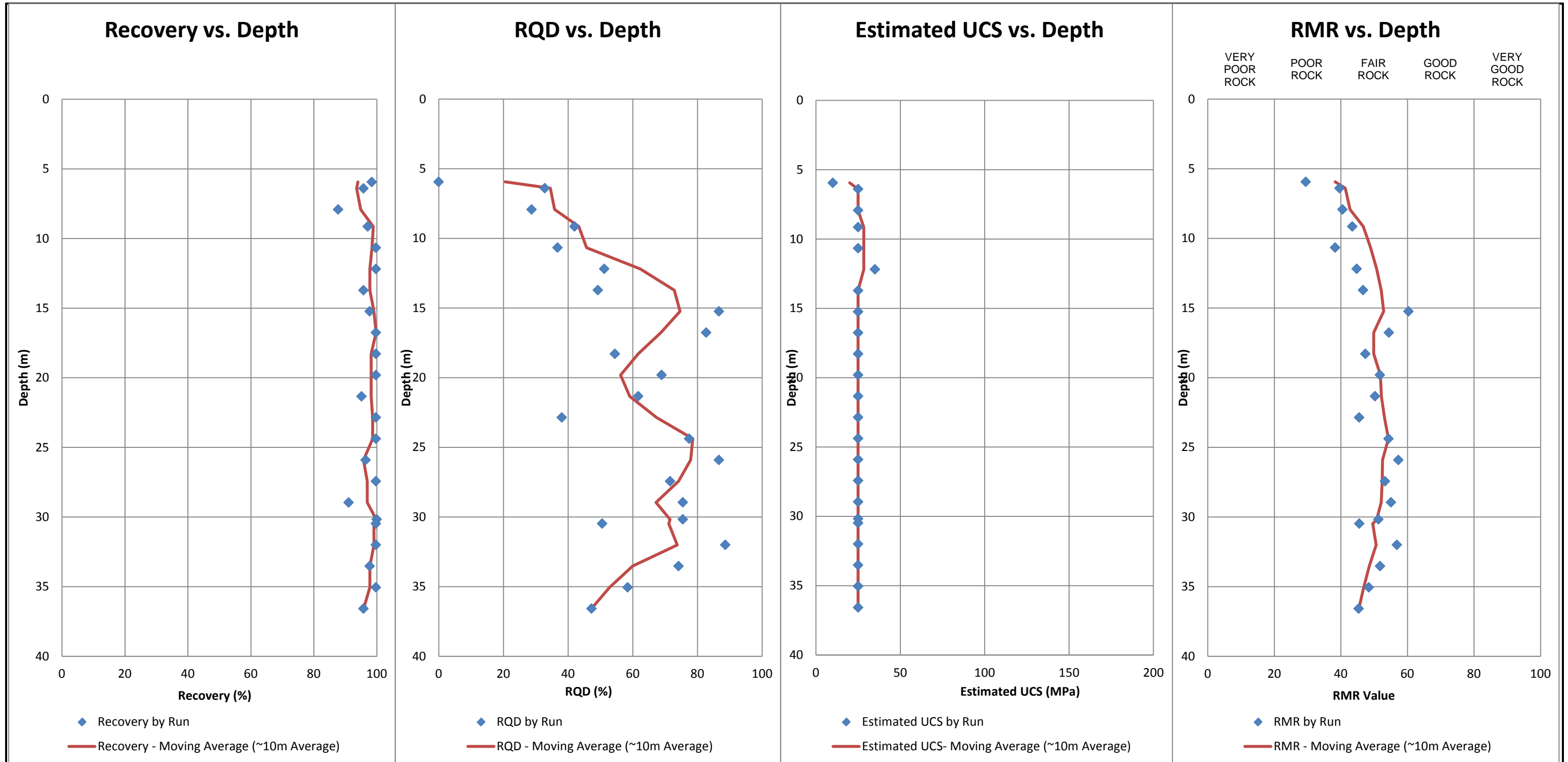


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-03	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
	REF. NO. 1
FIGURE B3-3	
	REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

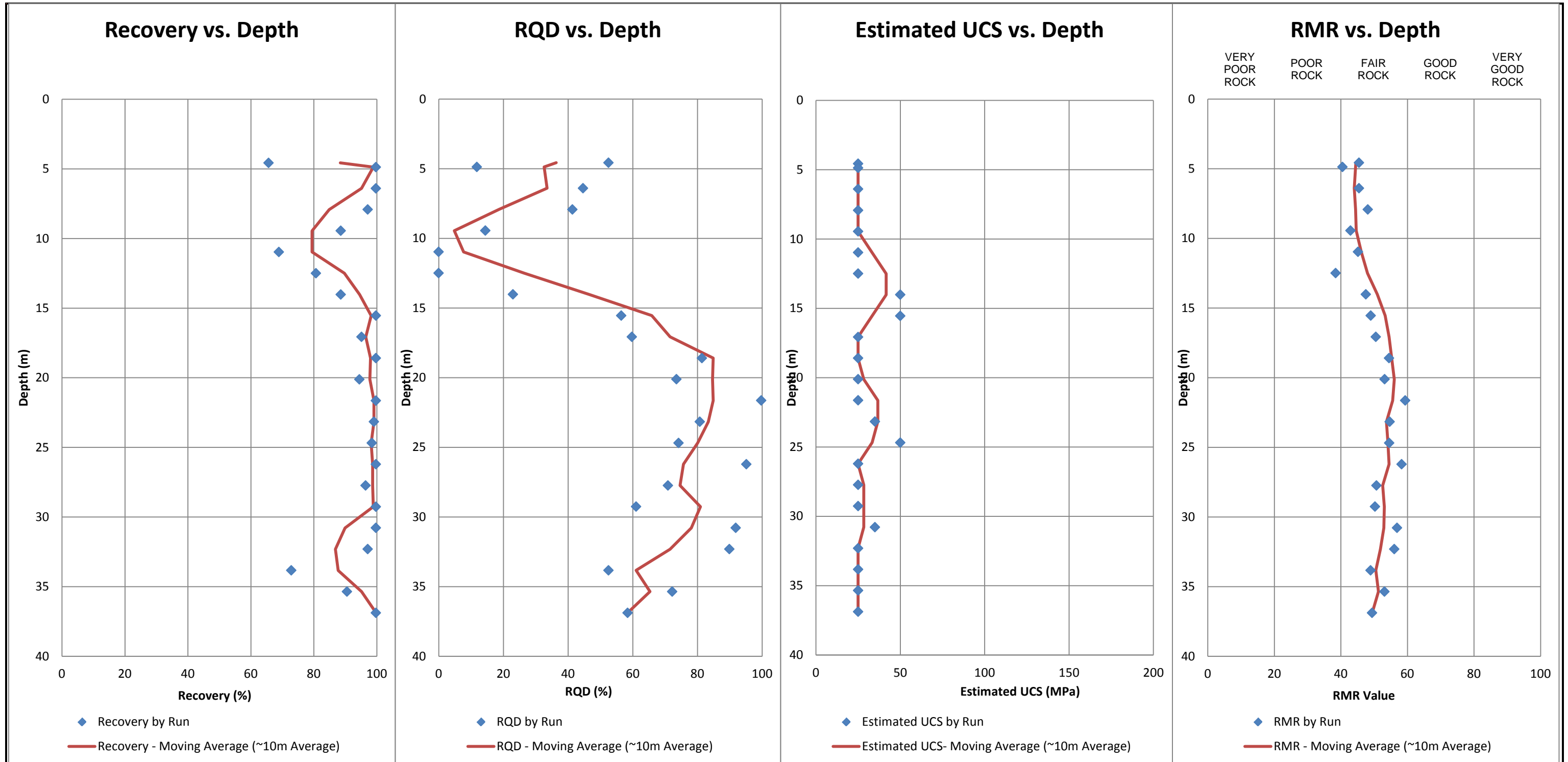


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-04	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
FIGURE B3-4	REF. NO. 1 REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

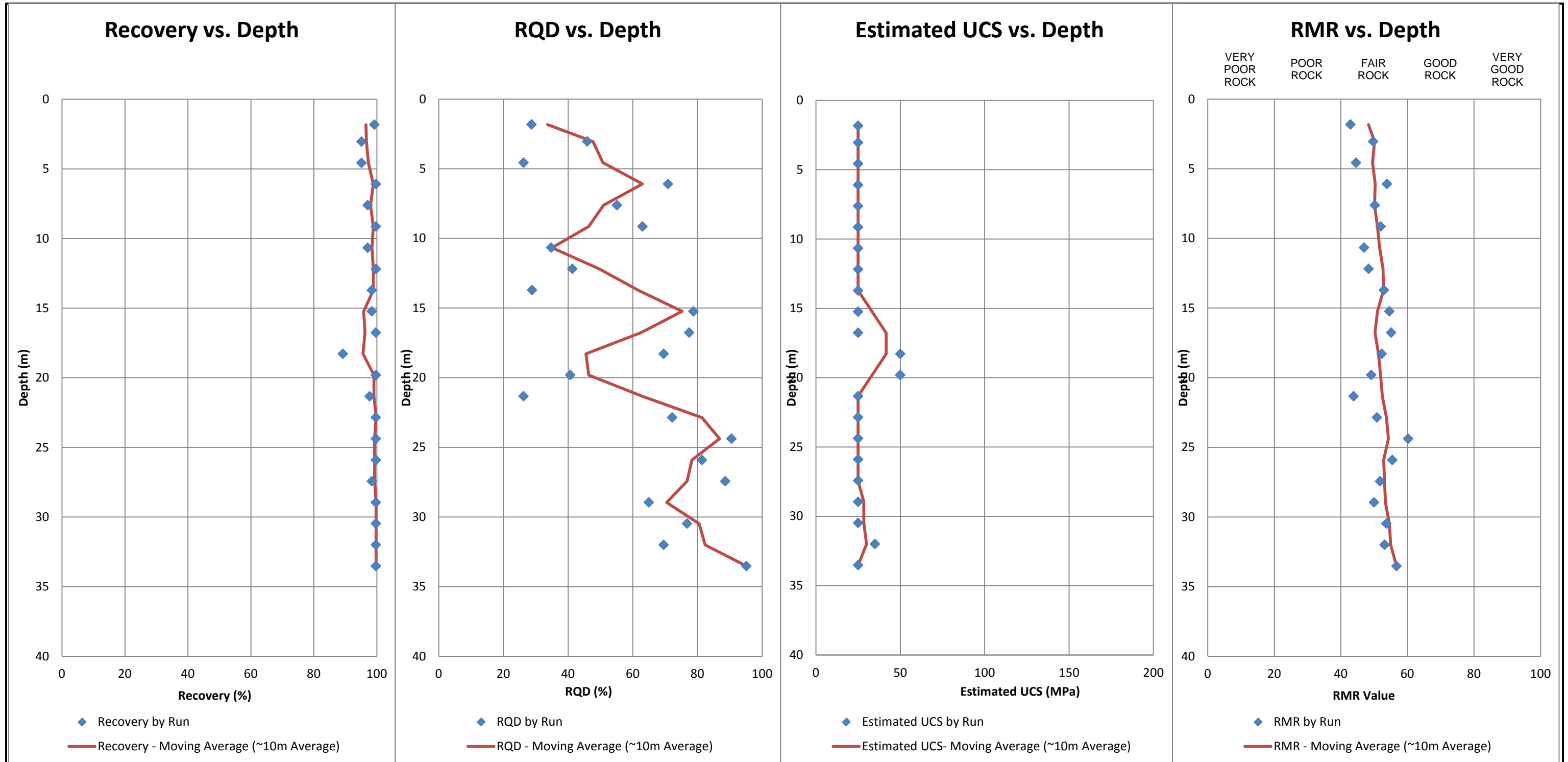


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-05	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
	REF. NO. 1
FIGURE B3-5	REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

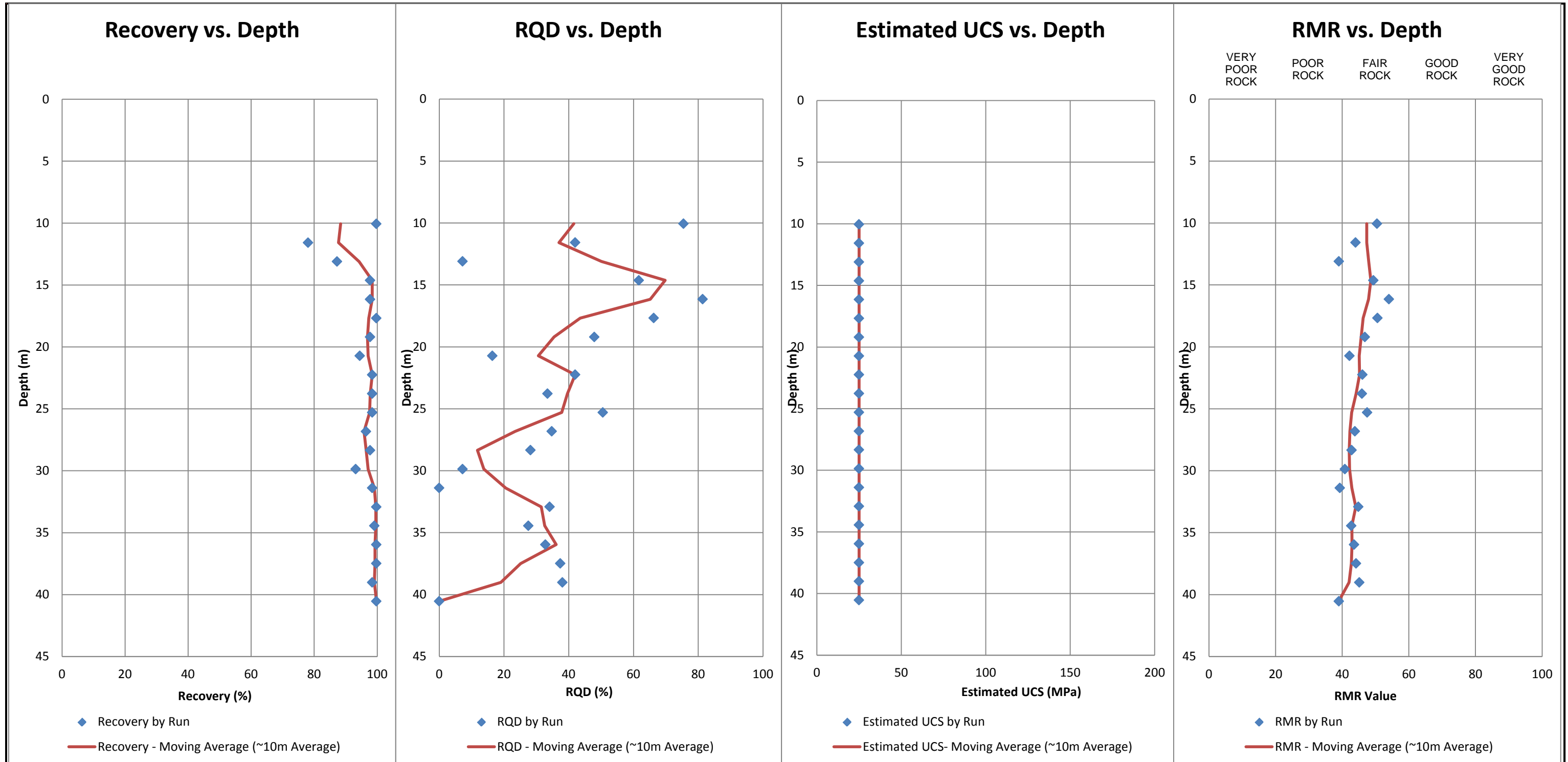


NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-06	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7 REF. NO. 1
FIGURE B3-6	REV 0

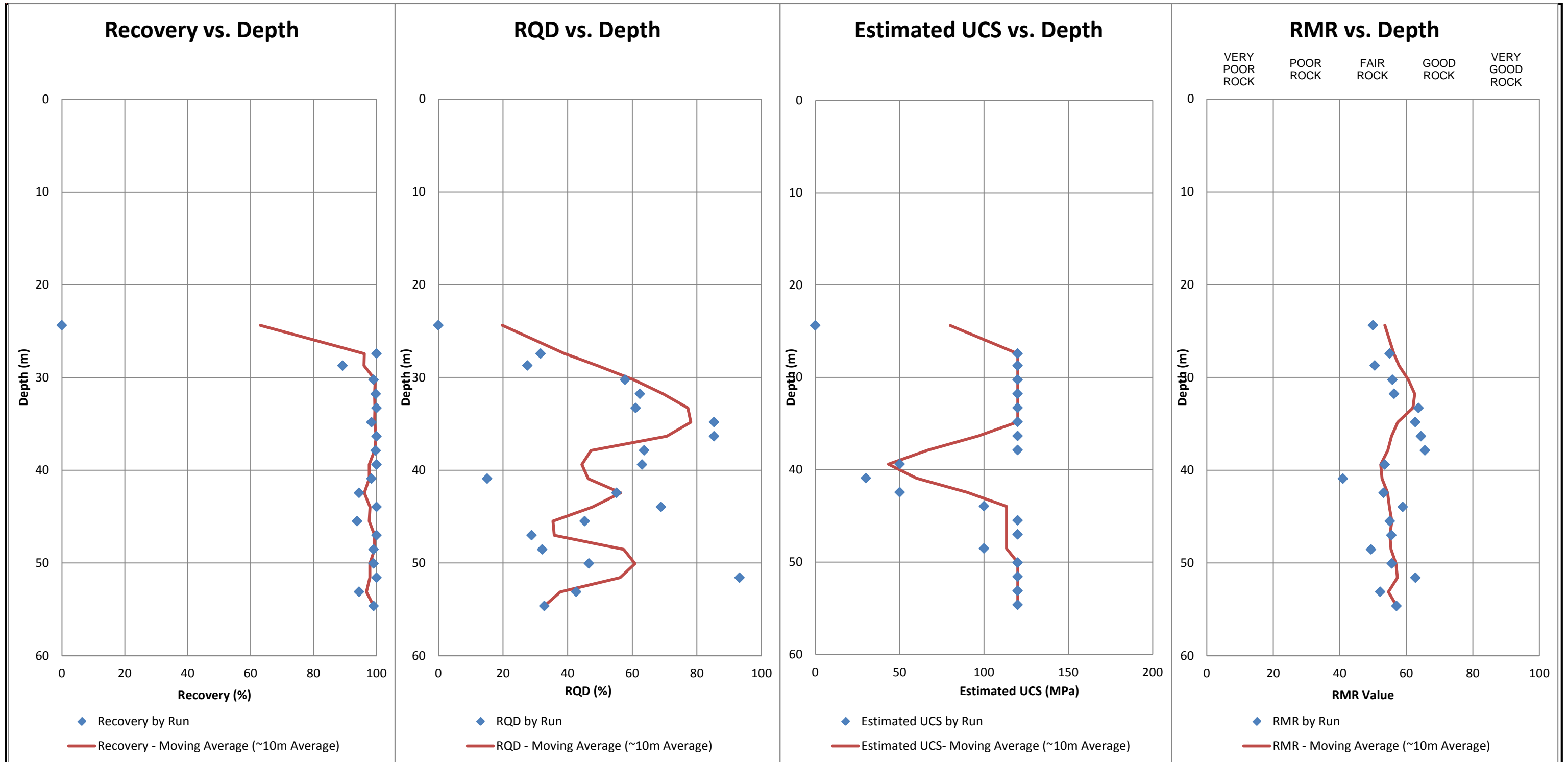
0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



NOTES:
 1. DATA FROM FIELD ESTIMATES.
 2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
 3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-07	
Knight Piésold CONSULTING	P/A NO. VA101-458/7 REF. NO. 1
FIGURE B3-7	
	REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D



NOTES:

1. DATA FROM FIELD ESTIMATES.
2. RECOVERY VALUES ADJUSTED TO REDUCE VALUES IN EXCESS OF 100% TO 100%.
3. "DEPTHS" ARE VERTICAL DRILL HOLE DEPTHS.

YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL INVESTIGATION RECOVERY, RQD, RMR AND ESTIMATED UCS VS. DEPTH FOR GT12-08	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7 REF. NO. 1 FIGURE B3-8 REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

APPENDIX C

HYDROGEOLOGICAL DRILLHOLE DATA

Appendix C1	Lugeon Hydraulic Conductivity Testing Sheets
Appendix C2	Piezometer Installation Details
Appendix C3	Piezometer Completion Response Testing Sheets
Appendix C4	Monitoring Well Installation Details
Appendix C5	Monitoring Well Response Testing Sheets

APPENDIX C1

LUGEON HYDRAULIC CONDUCTIVITY TESTING SHEETS

(Pages C1-1 to C1-23)

LUGEON TEST FIELD DATA SHEET



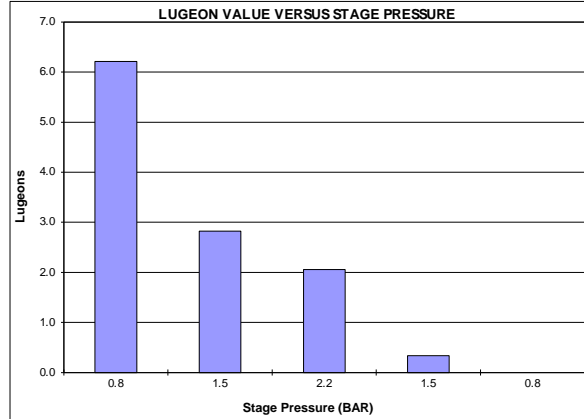
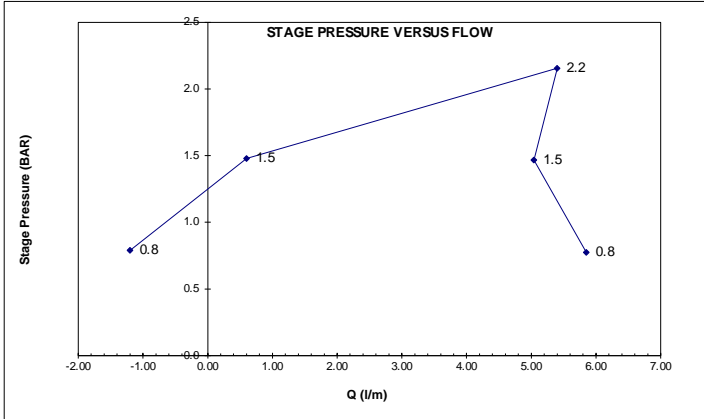
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-01**

AREA: **Rock Quarry** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **59.06** m (DOWNHOLE) **18.01**

DATE: **27-Jul-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **99.00** ft (DOWNHOLE) **30.18** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres							FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1.0		
0.69	0.77	0	65.0	66.0	66.9	67.9	68.5	69.0	70.0	5.9	6.2
		Take litres	1.00	0.90	1.00	0.60	0.50	1.00			
		Average Take l/m	6.00	5.40	6.00	3.60	3.00	6.00			
1.4	1.5	0	75.0	76.2	78.0	78.9	79.5	80.1	81.0	5.0	2.8
		Take litres	1.20	1.80	0.90	0.60	0.60	0.90			
		Average Take l/m	7.20	10.80	5.40	3.60	3.60	5.40			
2.1	2.2	0	90.0	92.0	93.5	94.2	95.3	96.2	98.0	5.4	2.1
		Take litres	2.00	1.50	0.70	1.10	0.90	1.80			
		Average Take l/m	12.00	9.00	4.20	6.60	5.40	10.80			
1.4	1.5	0	0.0	0.8	0.9	1.0	1.0	1.1	1.2	0.60	0.33
		Take litres	0.80	0.10	0.10	0.00	0.10	0.10			
		Average Take l/m	4.80	0.60	0.60	0.00	0.60	0.60			
0.69	0.79	0	5.0	4.9	4.7	4.5	4.2	4.0	3.8	-1.20	
		Take litres	-0.10	-0.20	-0.20	-0.30	-0.20	-0.20			
		Average Take l/m	-0.60	-1.20	-1.20	-1.80	-1.20	-1.20			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, water at ground surface**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 20 minutes, water returned clear**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

Lu= **0.33** K (cm/s) = **3E-06**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

1. Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.

2. Field documentation indicates that the last stage of pressurization had negative take. Only the first 4 stages are used for the analysis.

3. The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.

4. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWiPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

SHEET 1 OF 6

LUGEON TEST FIELD DATA SHEET



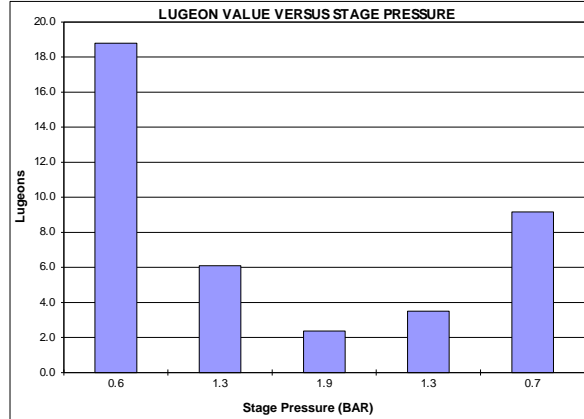
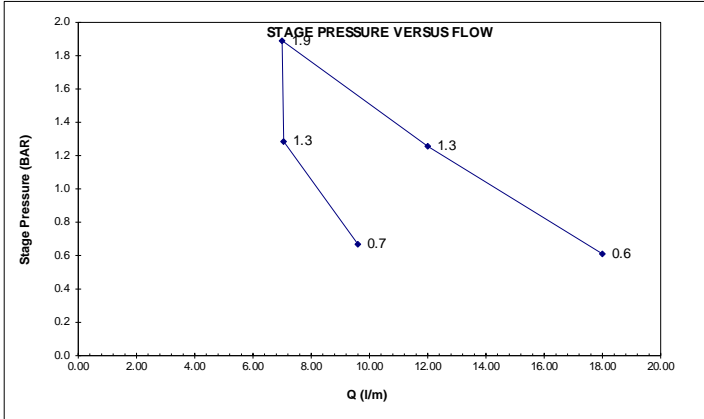
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **1**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **56.00** m (DOWNHOLE) **17.07**

DATE: **29-Jul-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **107.50** m (DOWNHOLE) **32.77**

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres							Average Take l/m	FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1			
0.60	0.61	0	4.0	7.0	10.0	13.0	16.0	19.0	22.0	18.0	18.8	
		Take litres	3.00	3.00	3.00	3.00	3.00	3.00	3			
		0.2	18.00	18.00	18.00	18.00	18.00	18.00	18.00			
1.2	1.3	0	27.0	29.0	31.0	33.0	34.5	36.5	38.5	12.0	6.1	
		Take litres	2.00	2.00	2.00	2.00	1.50	2.00	2.00			
		0.2	12.00	12.00	12.00	9.00	12.00	12.00	12.00			
1.8	1.9	0	42.0	43.5	44.5	45.5	47.0	48.0	49.0	7.0	2.4	
		Take litres	1.50	1.00	1.00	1.00	1.50	1.00	1.00			
		0.2	9.00	6.00	6.00	9.00	6.00	6.00	6.00			
1.2	1.3	0	50.0	50.5	52.8	54.0	55.1	56.1	57.5	7.1	3.5	
		Take litres	0.50	2.30	1.20	1.10	1.00	1.4				
		0.2	3.00	13.80	7.20	6.60	6.00	8.4				
0.60	0.67	0	58.0	59.2	61.0	62.5	64.0	65.0	67.0	9.6	9.2	
		Take litres	1.20	1.80	1.50	1.50	1.00	2				
		0.2	7.20	10.80	9.00	9.00	6.00	12				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **No water level measured, assumed water at ground surface (see additional comments below)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 20 minutes, water returned clear**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	YES
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

Lu= **2.4** K (cm/s) = **2E-05**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

1. Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.

2. No water level measured, assumed water at ground surface. Variations in water level yields the following K value: 13 m (bgs) = 1E-05 cm/s and 33 m (bgs) = 9E-06 cm/s.

3. The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.

4. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

M:\1101\00458\07\VA\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C1 - Lugeon Hydraulic Conductivity Testing Sheets\GT12-01 to 08 Packer Test Sheets_1bc edit - corrected head loss.xlsx\GT12-02 (1)

REV	DATE	ISSUED WITH REPORT	DESCRIPTION	JBC	CHS	KDE
				PREP'D	CHK'D	APP'D
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1				

LUGEON TEST FIELD DATA SHEET



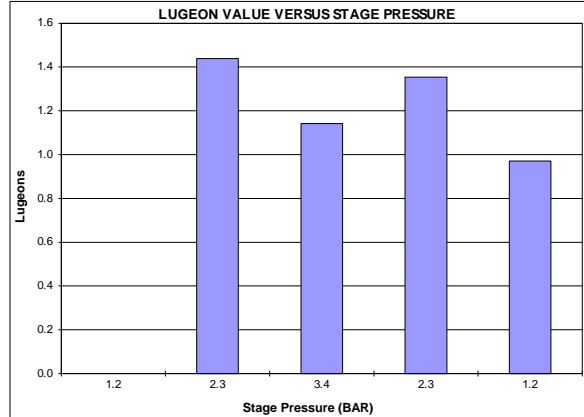
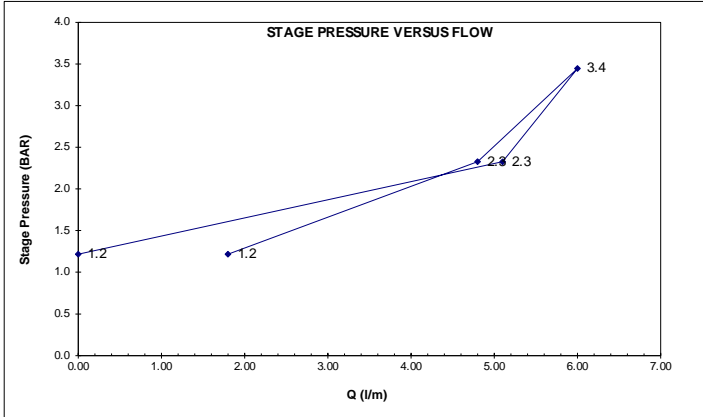
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **2**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **97.50** m (DOWNHOLE) **29.73** m (DOWNHOLE)

DATE: **30-Jul-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **147.50** ft (DOWNHOLE) **44.97** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres								Average Take l/m	FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1.0				
1.1	1.2	0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	0.00	0.00	0.0	0.0
2.2	2.3	0	74.5	75.1	76.0	77.0	77.5	78.2	79.0	0.60	0.90	5.1	1.4
3.4	3.4	0	83.0	84.0	85.0	86.0	87.0	88.0	89.0	1.00	1.00	6.0	1.1
2.2	2.3	0	89.5	90.1	90.9	91.1	92.0	92.7	93.1	0.60	0.80	4.8	1.4
1.1	1.2	0	93.7	94.0	94.2	94.5	94.8	95.1	95.6	0.30	0.50	1.8	0.97



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **No water level measured, assumed water at ground surface (see comments below)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 15 minutes**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	YES
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

Lu= **0.98** K (cm/s) = **1E-05**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.
- No water level measured, assumed water at ground surface. Variations in water level yields the following K value: 1 m (bgs) = 9E-06 cm/s, 4 m (bgs) = 8E-06 cm/s and 8 m (bgs) = 7E-06 cm/s.
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05/JUL/13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

SHEET 3 OF 6

LUGEON TEST FIELD DATA SHEET



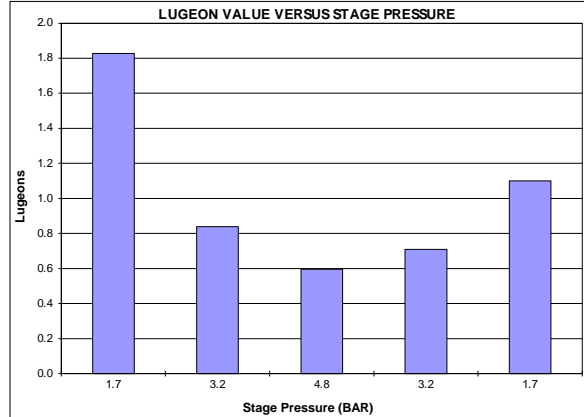
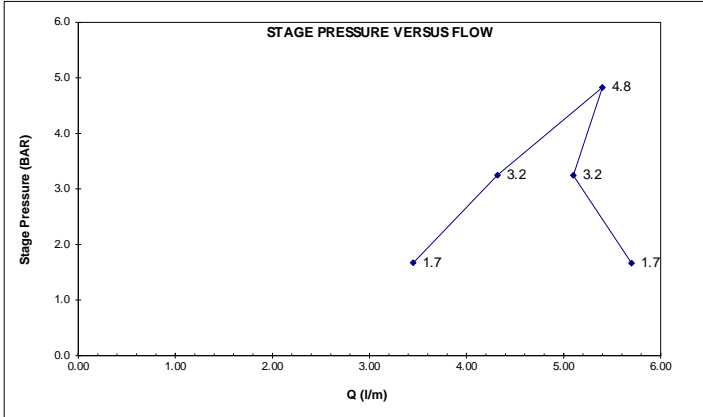
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **3**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **141.00** **42.99** m (DOWNHOLE)

DATE: **31-Jul-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **202.50** **61.74** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres								FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1.0			
1.6	1.7	0	2.5	3.5	4.5	5.1	6.0	6.9	7.2	5.7	1.8	
		0.2	1.00	1.00	0.60	0.90	0.90	0.30				
		0.3	6.00	6.00	3.60	5.40	5.40	1.80				
		Average Take l/m										
3.2	3.2	0	10.5	11.3	12.1	13.0	13.9	15.0	15.7	5.1	0.84	
		0.2	0.80	0.80	0.90	0.90	1.10	0.70				
		0.3	4.80	4.80	5.40	5.40	6.60	4.20				
		Average Take l/m										
4.7	4.8	0	17.0	18.1	19.0	19.9	20.8	21.5	22.3	5.4	0.60	
		0.2	1.10	0.90	0.90	0.90	0.70	0.80				
		0.3	6.60	5.40	5.40	5.40	4.20	4.80				
		Average Take l/m										
3.2	3.2	0	23.0	23.8	24.5	25.1	25.8	26.2	27.0	4.3	0.71	
		0.2	0.80	0.70	0.60	0.70	0.40	0.80				
		0.3	4.80	4.20	3.60	4.20	2.40	4.80				
		Average Take l/m										
1.6	1.7	0	27.6	28.0	28.5	29.1	29.8	30.0	30.5	3.5	1.10	
		0.2	0.40	0.50	0.60	0.70	0.20	0.50				
		0.3	2.40	3.00	3.60	4.20	1.20	3.00				
		Average Take l/m										



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **No water level measured, assumed water at ground surface (see comments below)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 30 minutes, water returned clear**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	YES
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

Lu= **0.60** K (cm/s) = **6E-06**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.
- No water level measured, assumed water at ground surface. Variations in water level yields the following K value: 5 m (bgs) = 5E-06 cm/s, 19 m (bgs) = 4E-06 cm/s and 40 m (bgs) = 3E-06 cm/s.
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

LUGEON TEST FIELD DATA SHEET



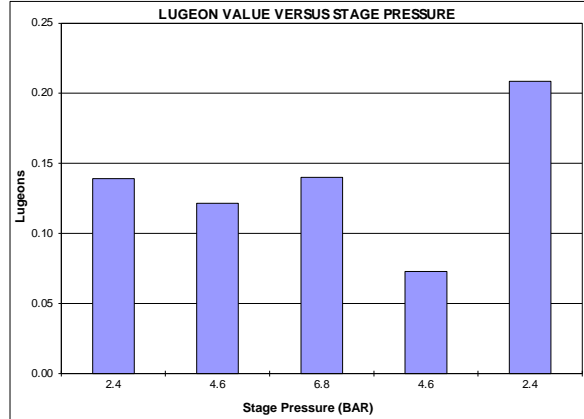
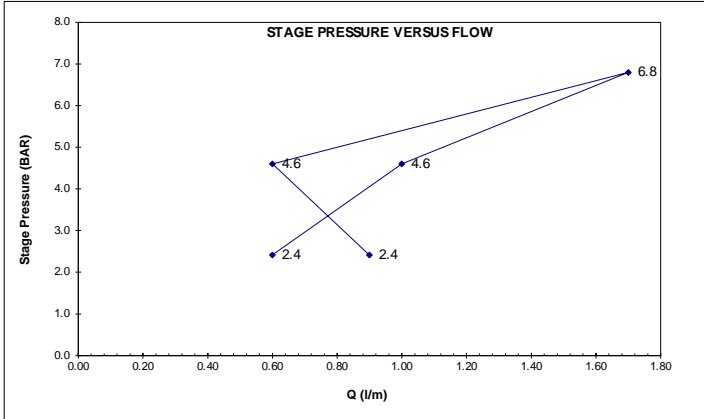
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **4**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **1.49** m (bgs) TOP OF TEST INTERVAL: **194.00** m (DOWNHOLE) **59.15**

DATE: **01-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **252.60** m (DOWNHOLE) **77.01**

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres							Average Take l/m	FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1.0			
2.2	2.4	0	32.4	32.5	32.5	32.6	32.7	32.9	33.0	0.60	0.60	0.14
		0.10	0.10	0.00	0.10	0.10	0.20	0.10				
		0.2	0.60	0.00	0.60	0.60	1.20	0.60				
		0.3	0.60	0.00	0.60	0.60	1.20	0.60				
4.4	4.6	0	34.0	34.1	34.4	34.8	34.9	35.0	35.0	1.0	1.0	0.12
		0.10	0.10	0.30	0.40	0.10	0.10	0.00				
		0.2	0.60	1.80	2.40	0.60	0.60	0.00				
		0.3	0.60	1.80	2.40	0.60	2.40	2.40				
6.6	6.8	0	37.1	37.2	37.5	37.9	38.0	38.4	38.8	1.7	1.7	0.14
		0.10	0.10	0.30	0.40	0.10	0.40	0.40				
		0.2	0.60	1.80	2.40	0.60	2.40	2.40				
		0.3	0.60	1.80	2.40	0.60	2.40	2.40				
4.4	4.6	0	38.8	38.8	38.9	39.0	39.1	39.2	39.4	0.60	0.60	0.07
		0.10	0.00	0.10	0.10	0.10	0.10	0.20				
		0.2	0.00	0.60	0.60	0.60	0.60	1.20				
		0.3	0.00	0.60	0.60	0.60	0.60	1.20				
2.2	2.4	0	39.2	39.2	39.4	39.5	39.6	39.8	39.4	0.90	0.90	0.21
		0.10	0.00	0.20	0.10	0.10	0.20	-0.40				
		0.2	0.00	1.20	0.60	0.60	1.20	-2.40				
		0.3	0.00	1.20	0.60	0.60	1.20	-2.40				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, 3.62 m below stickup (2.13 m stickup)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 10 minutes, water returned clear**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	YES
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

Lu= **0.14** K (cm/s) = **1E-06**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

LUGEON TEST FIELD DATA SHEET



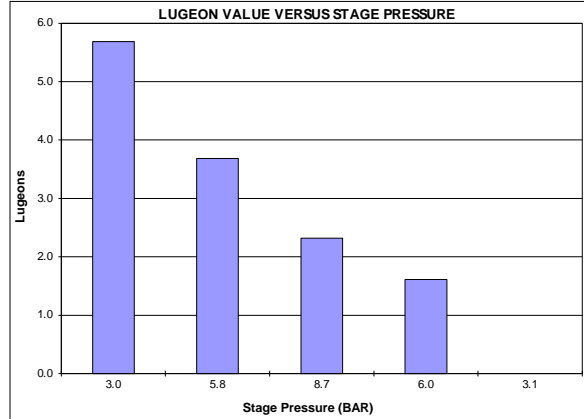
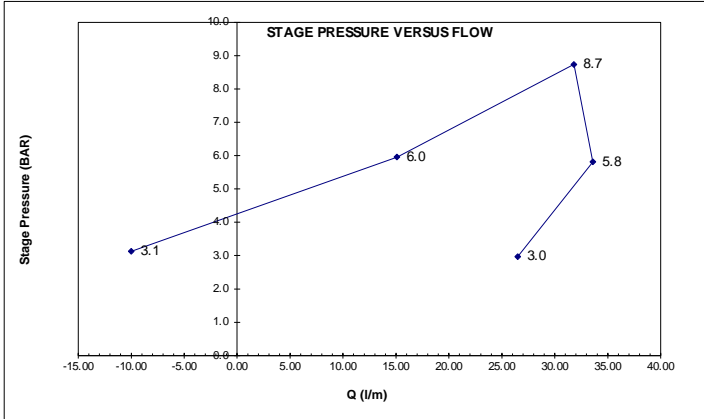
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **5**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **1.49** m (bgs) TOP OF TEST INTERVAL: **256.00** **78.05** m (DOWNHOLE)

DATE: **02-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **307.50** **93.75** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Flowmeter litres								Average Take l/m	FLOW litres/min	LUGEON
			0	0.2	0.3	0.5	0.7	0.8	1.0				
2.9	3.0	0	50.0	56.0	61.0	66.0	69.0	73.0	76.5		26.5	5.7	
			Take litres	6.00	6.00	5.00	5.00	3.00	4.00	3.50			
			Average Take l/m	36.00	30.00	30.00	18.00	24.00	21.00				
5.8	5.8	0	93.0	99.0	105.0	110.0	116.0	121.0	125.0		33.6	3.7	
			Take litres	6.00	6.00	5.00	6.00	5.00	4.00				
			Average Take l/m	36.00	36.00	30.00	36.00	30.00	24.00				
8.7	8.7	0	34.0	41.0	46.0	51.0	57.0	62.0	67.5		31.8	2.3	
			Take litres	7.00	5.00	5.00	6.00	5.00	5.50				
			Average Take l/m	42.00	30.00	30.00	36.00	30.00	33.00				
5.8	6.0	0	72.0	74.5	77.1	79.5	82.0	84.9	87.1		15.1	1.6	
			Take litres	2.50	2.60	2.40	2.50	2.90	2.20				
			Average Take l/m	15.00	15.60	14.40	15.00	17.40	13.20				
2.9	3.1	0	78.0	75.9	74.1	72.2	70.6	69.0	68.0		-10.0		
			Take litres	-2.10	-1.80	-1.90	-1.60	-1.60	-1.00				
			Average Take l/m	-12.60	-10.80	-11.40	-9.60	-9.60	-6.00				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **See Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **No drilling additives, flushed hole for 20 minutes, water returned clear**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

Lu= **1.6** K (cm/s) = **2E-05**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system. Only stable flow measurements were used for the Lugeon calculation at each pressure stage.

- Flow intakes were measured every 10 seconds for 1 minute at each pressure step. Standard procedure is for take measurements to be recorded every minute for 5 - 10 minutes at each pressure step.
- No water level recorded before test. Water level is based on groundwater level for GT12-02 Test 4. Variations in water level yields the following K value: 7 m (bgs) = 1E-05 cm/s and 50 m (bgs) = 9E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **EJH** ANALYZED BY: **EJH** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

LUGEON TEST FIELD DATA SHEET



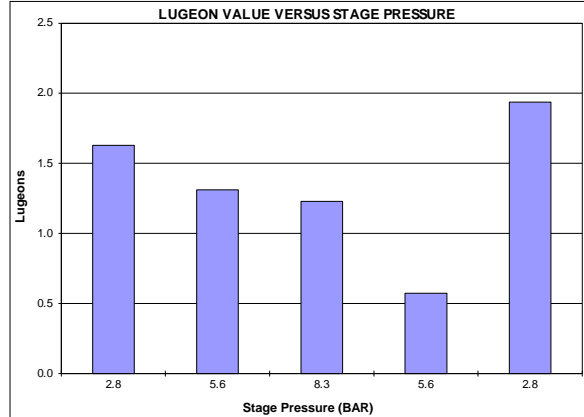
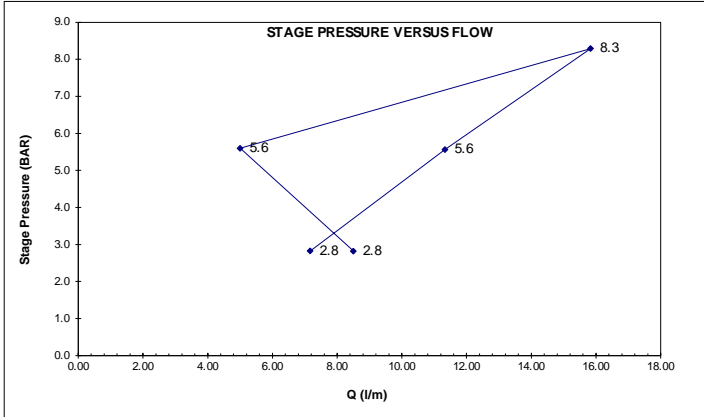
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-02**

AREA: **TMF Embankment** TEST NO: **6**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **281.00** m (DOWNHOLE)

DATE: **02-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **332.00** ft (DOWNHOLE) **101.22** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON	
			2.8	2.8	Flowmeter litres	396.0	413.0	423.0	430.0	437.5			444.5
		Take litres		17.00	10.00	7.00	7.50	7.00					
		Average Take l/m		17.00	10.00	7.00	7.50	7.00					
5.5	5.6	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON	
		Flowmeter litres	486.0	503.0	525.5	537.0	548.5	559.5			11.3	1.3	
		Take litres		17.00	22.50	11.50	11.50	11.00					
		Average Take l/m		17.00	22.50	11.50	11.50	11.00					
8.3	8.3	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON	
		Flowmeter litres	582.0	615.0	642.0	659.0	675.0	689.5			15.8	1.2	
		Take litres		33.00	27.00	17.00	16.00	14.50					
		Average Take l/m		33.00	27.00	17.00	16.00	14.50					
5.5	5.6	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON	
		Flowmeter litres	660.5	662.5	667.0	672.0	677.0	682.0			5.0	0.57	
		Take litres		2.00	4.50	5.00	5.00	5.00					
		Average Take l/m		2.00	4.50	5.00	5.00	5.00					
2.8	2.8	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON	
		Flowmeter litres	561.0	580.0	588.5	597.0	601.0	601.0			8.5	1.9	
		Take litres		19.00	8.50	8.50	4.00	0.00					
		Average Take l/m		19.00	8.50	8.50	4.00	0.00					



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, water level at ground surface**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **1.3** K (cm/s) = **1E-05**

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system

- Small leak out of the flow gauge at P3.
- The most stable takes of the recorded values were used for the Lugeon calculation at each pressure stage.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWiPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **SP/KL** ANALYZED BY: **JBC** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

SHEET 1 OF 6

LUGEON TEST FIELD DATA SHEET



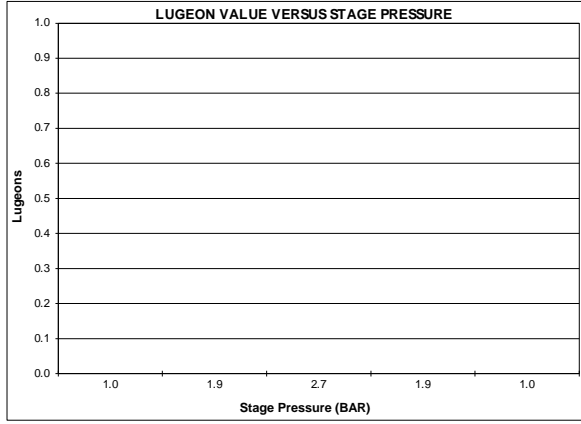
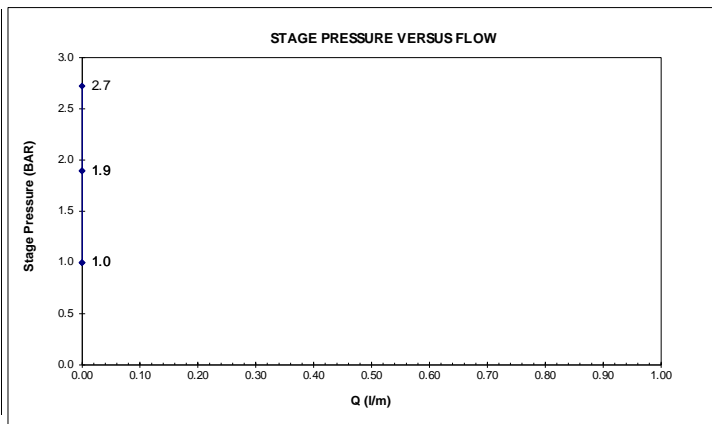
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-03**

AREA: **TMF Embankment** TEST NO: **1**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **26.00** m (DOWNHOLE) **7.93**

DATE: **04-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **77.00** ft (DOWNHOLE) **23.48** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON
			0.90	1.00	Flowmeter litres	565.00	565.00	565.00	565.00	565.00		
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
1.79	1.89	Time min	0	1	2	3	4	5	6	7	0.00	0.00
		Flowmeter litres	566.0	566.0	566.0	566.0	566.0	566.0				
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
2.62	2.72	Time min	0	1	2	3	4	5	6	7	0.00	0.00
		Flowmeter litres	566.5	566.5	566.5	566.5	566.5	566.5				
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
1.79	1.89	Time min	0	1	2	3	4	5	6	7	0.00	0.00
		Flowmeter litres	566.5	566.5	566.5	566.5	566.5	566.5				
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
0.90	1.00	Time min	0	1	2	3	4	5	6	7	0.00	0.00
		Flowmeter litres	566.5	566.5	566.5	566.5	566.5	566.5				
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, water level at ground surface**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **NO TAKE** K (cm/s) = **NO TAKE**

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	NO
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	YES

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³. Packer system: IPI with IVA system
 1. The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

SHEET 2 OF 6

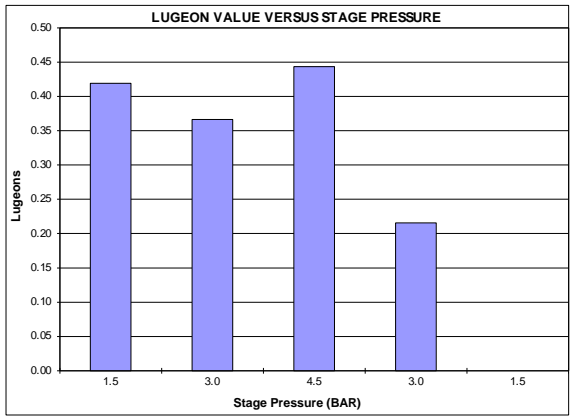
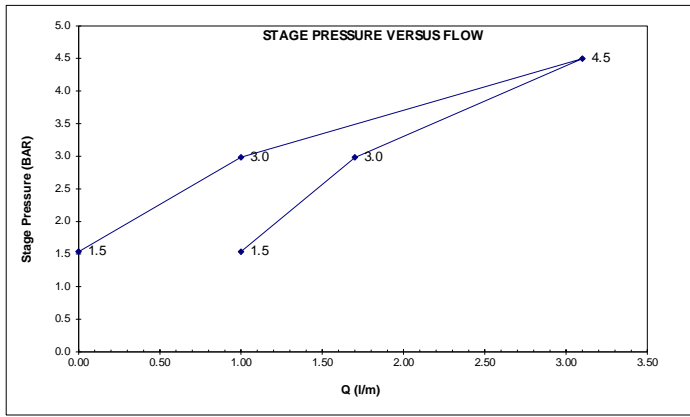
LUGEON TEST FIELD DATA SHEET



PROJECT: HARPER CREEK PROJECT PROJECT NO: VA101-458/7 DRILLHOLE: GT12-03
 AREA: TMF Embankment TEST NO: 2

DIP: 60° (FROM HORIZONTAL) DEPTH GROUNDWATER: 0.0 m (bgs) TOP OF TEST INTERVAL: 76.00 m (DOWNHOLE) 23.17 m (DOWNHOLE)
 DATE: 05-Aug-12 GAUGE HEIGHT ABOVE GROUND: 0.9 m BOTTOM OF TEST INTERVAL: 127.00 ft (DOWNHOLE) 38.72 m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time (min)							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.4	1.5	Flowmeter litres	567.0	568.0	569.0	570.0	570.5	571.5		1.0	0.42
		Take litres		1.00	1.00	1.00	0.50	1.00			
		Average Take l/m		1.00	1.00	1.00	0.50	1.00			
		Time min	0	1	2	3	4	5	6		
2.9	3.0	Flowmeter litres	573.0	575.0	576.5	578.5	580.0	581.5		1.7	0.37
		Take litres		2.00	1.50	2.00	1.50	1.50			
		Average Take l/m		2.00	1.50	2.00	1.50	1.50			
		Time min	0	1	2	3	4	5	6		
4.4	4.5	Flowmeter litres	585.0	588.0	591.5	595.0	597.5	600.5		3.1	0.44
		Take litres		3.00	3.50	3.50	2.50	3.00			
		Average Take l/m		3.00	3.50	3.50	2.50	3.00			
		Time min	0	1	2	3	4	5	6		
2.9	3.0	Flowmeter litres	601.5	602.0	603.0	604.0	605.0	606.0		1.00	0.22
		Take litres		0.50	1.00	1.00	1.00	1.00			
		Average Take l/m		0.50	1.00	1.00	1.00	1.00			
		Time min	0	1	2	3	4	5	6		
1.4	1.5	Flowmeter litres	604.0	604.0	604.0	604.0	604.0	604.0		0.00	0.00
		Take litres		0.00	0.00	0.00	0.00	0.00			
		Average Take l/m		0.00	0.00	0.00	0.00	0.00			
		Time min	0	1	2	3	4	5	6		



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Yes, water level at ground surface
 DRILLING FLUIDS USED/ TIME FOR FLUSHING: Flushed until water returned clear, no drilling additives Lu= 0.29 K (cm/s) = 3E-06
 INTERPRETATION TYPE OF FLOW:
 1 LAMINAR YES
 2 TURBULENT NO
 3 DILATION NO
 4 WASH-OUT NO
 5 VOID FILLING NO
 6 NO TAKE NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system
 1. The most stable takes of the recorded values were used for the Lugeon calculation at each pressure stage.
 2. The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
 3. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: SP/KL ANALYZED BY: SP/KL REVIEWED BY: GM

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

LUGEON TEST FIELD DATA SHEET



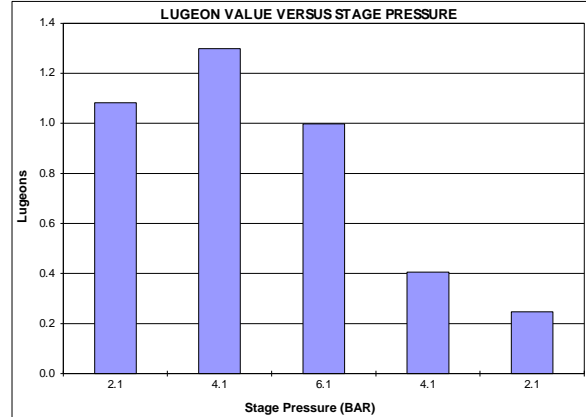
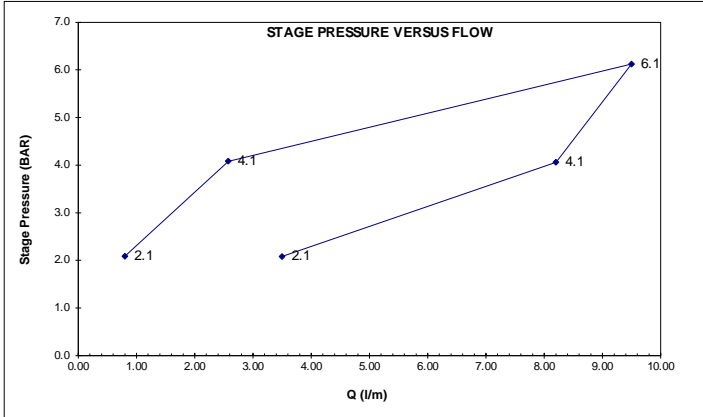
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-03**

AREA: **TMF Embankment** TEST NO: **3**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **126.00** m (DOWNHOLE) **38.41**

DATE: **05-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **177.00** m (DOWNHOLE) **53.96**

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON
			2.0	2.1	Flowmeter litres	602.0	602.0	606.0	609.5	613.0		
		Take litres		0.00	4.00	3.50	3.50	3.00				
		Average Take l/m		0.00	4.00	3.50	3.50	3.00				
4.0	4.1	Flowmeter litres	620.0	629.0	631.0	642.5	649.0	654.8			8.2	1.3
		Take litres		9.00	2.00	11.50	6.50	5.80				
		Average Take l/m		9.00	2.00	11.50	6.50	5.80				
6.1	6.1	Flowmeter litres	659.5	673.5	684.0	693.5	702.5	711.5			9.5	1.00
		Take litres		14.00	10.50	9.50	9.00	9.00				
		Average Take l/m		14.00	10.50	9.50	9.00	9.00				
4.0	4.1	Flowmeter litres	712.3	712.5	714.8	717.2	720.0	722.8			2.6	0.41
		Take litres		0.20	2.30	2.40	2.80	2.80				
		Average Take l/m		0.20	2.30	2.40	2.80	2.80				
2.0	2.1	Flowmeter litres	715.0	715.2	716.0	716.8	718.0	718.8			0.80	0.25
		Take litres		0.20	0.80	0.80	1.20	0.80				
		Average Take l/m		0.20	0.80	0.80	1.20	0.80				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

Lu= **0.25** K (cm/s) = **2E-06**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system

- No water level recorded before test. Water level is based on groundwater level for GT12-03 Test 2.
- Variations in water level yields the following K value: 16 m (bgs) = 1E-06 cm/s and 39 m (bgs) = 9E-07 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

LUGEON TEST FIELD DATA SHEET



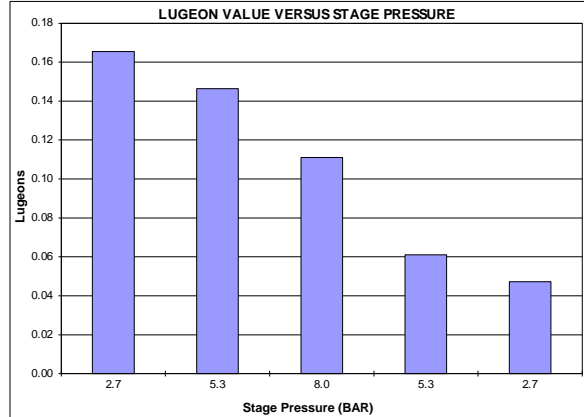
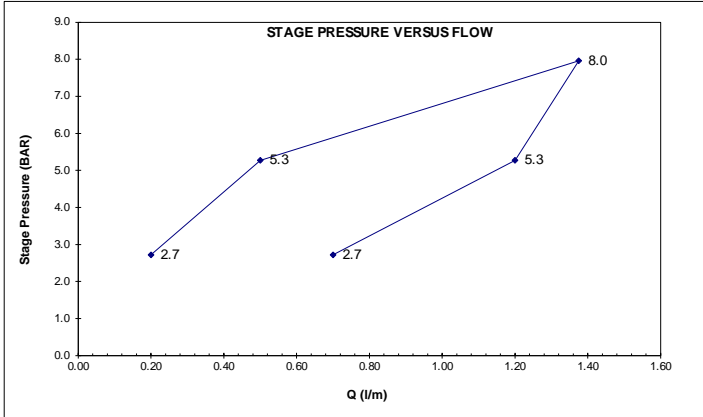
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-03**

AREA: **TMF Embankment** TEST NO: **4**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **176.00** m (DOWNHOLE) **53.66**

DATE: **06-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **227.00** ft (DOWNHOLE) **69.21** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
2.6	2.7	Flowmeter litres	718.0	719.0	719.5	720.0	721.0	721.5		0.70	0.17
		Take litres		1.00	0.50	0.50	1.00	0.50			
		Average Take l/m		1.00	0.50	0.50	1.00	0.50			
5.2	5.3	Flowmeter litres	722.5	724.0	725.0	726.0	727.5	728.5		1.2	0.15
		Take litres		1.50	1.00	1.00	1.50	1.00			
		Average Take l/m		1.50	1.00	1.00	1.50	1.00			
7.9	8.0	Flowmeter litres	730.0	732.5	733.5	735.0	737.0	738.0		1.4	0.11
		Take litres		2.50	1.00	1.50	2.00	1.00			
		Average Take l/m		2.50	1.00	1.50	2.00	1.00			
5.2	5.3	Flowmeter litres	738.5	738.5	739.0	739.5	740.0	740.5		0.50	0.06
		Take litres		0.00	0.50	0.50	0.50	0.50			
		Average Take l/m		0.00	0.50	0.50	0.50	0.50			
2.6	2.7	Flowmeter litres	741.0	741.0	741.0	741.5	742.0	742.0		0.20	0.05
		Take litres		0.00	0.00	0.50	0.50	0.00			
		Average Take l/m		0.00	0.00	0.50	0.50	0.00			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

Lu= **0.047** K (cm/s) = **5E-07**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is based on groundwater level for GT12-03 Test 2.
- Variations in water level yields the following K value: 2 m (bgs) = 4E-07 cm/s, 12 m (bgs) = 3E-07 cm/s, and 28 m (bgs) = 2E-07 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **SP** ANALYZED BY: **SP** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

LUGEON TEST FIELD DATA SHEET



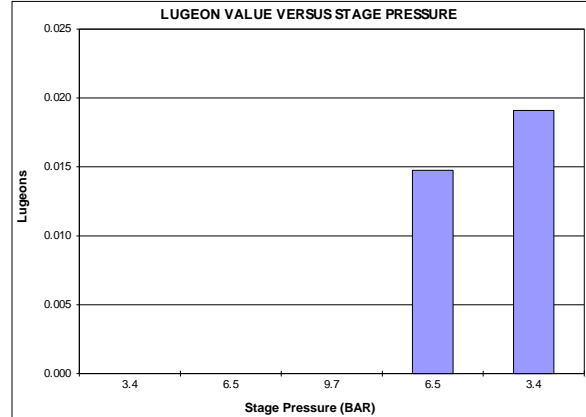
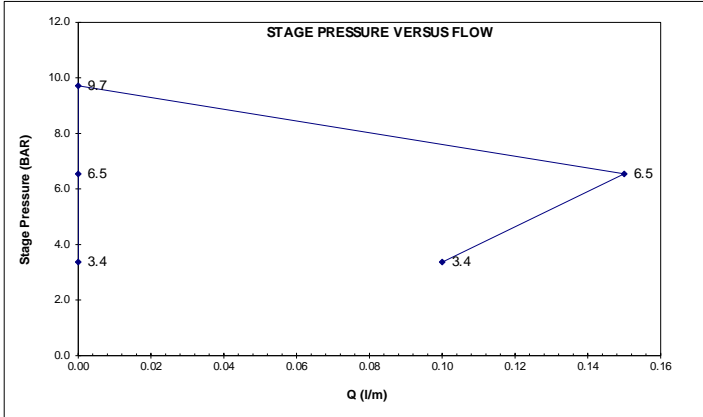
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-03**

AREA: **TMF Embankment** TEST NO: **5**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **1.1** m (bgs) TOP OF TEST INTERVAL: **226.00** **68.90** m (DOWNHOLE)

DATE: **07-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **277.00** **84.45** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON
			3.2	3.4	Flowmeter litres	743.0	743.0	743.0	743.0	743.0		
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
6.3	6.5	Flowmeter litres	743.0	743.0	743.0	743.0	743.0	743.0			0.00	0.00
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
9.5	9.7	Flowmeter litres	743.0	743.0	743.0	743.5	743.5	743.5			0.00	0.00
		Take litres		0.00	0.00	0.50	0.00	0.00				
		Average Take l/m		0.00	0.00	0.50	0.00	0.00				
6.3	6.5	Flowmeter litres	743.5	743.5	743.5	744.0	744.1	744.3			0.15	0.01
		Take litres		0.00	0.00	0.50	0.10	0.20				
		Average Take l/m		0.00	0.00	0.50	0.10	0.20				
3.2	3.4	Flowmeter litres	744.3	744.3	744.4	744.5	744.8	745.0			0.10	0.02
		Take litres		0.00	0.10	0.10	0.30	0.20				
		Average Take l/m		0.00	0.10	0.10	0.30	0.20				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **NO TAKE** K (cm/s) = **NO TAKE**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	YES

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

1. No water level recorded before test. Water level is based on groundwater level for GT12-03 Test 2.

2. The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.

3. The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.

4. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

LUGEON TEST FIELD DATA SHEET



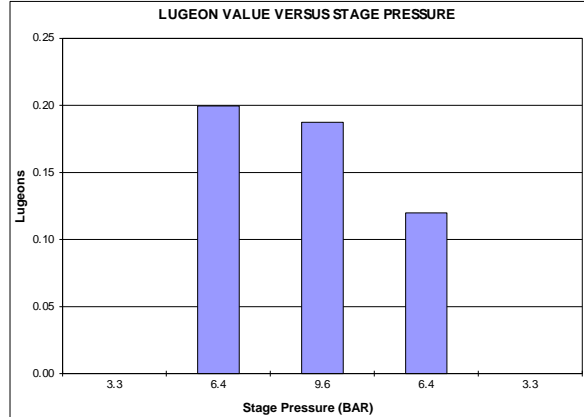
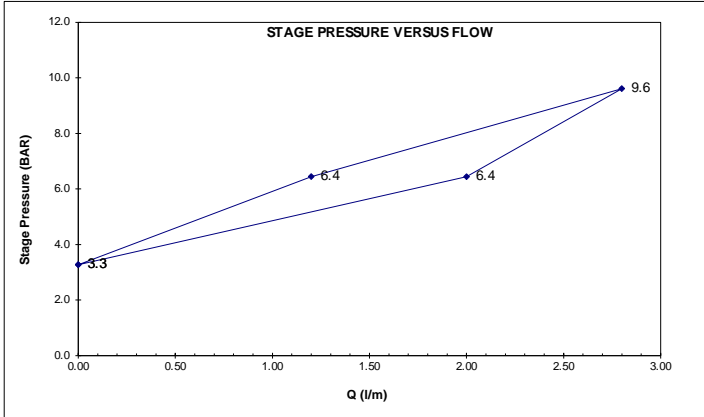
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-03**

AREA: **TMF Embankment** TEST NO: **6**

DIP: **60** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **281.00** m (DOWNHOLE)

DATE: **07-Aug-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **332.00** m (DOWNHOLE) / **101.22** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	0	1	2	3	4	5	6	7	FLOW litres/min	LUGEON
			3.2	3.3	Flowmeter litres	745.5	745.5	745.5	745.5	745.5		
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
6.3	6.4	Flowmeter litres	747.0	749.5	751.5	753.2	755.0	768.0			2.0	0.20
		Take litres		2.50	2.00	1.70	1.80	13.00				
		Average Take l/m		2.50	2.00	1.70	1.80	13.00				
9.5	9.6	Flowmeter litres	760.0	763.2	766.0	768.5	771.2	774.0			2.8	0.19
		Take litres		3.20	2.80	2.50	2.70	2.80				
		Average Take l/m		3.20	2.80	2.50	2.70	2.80				
6.3	6.4	Flowmeter litres	774.0	774.0	774.2	775.0	776.0	777.8			1.2	0.12
		Take litres		0.00	0.20	0.80	1.00	1.80				
		Average Take l/m		0.00	0.20	0.80	1.00	1.80				
3.2	3.3	Flowmeter litres	777.8	777.8	777.8	777.8	777.8	777.8			0.0	0.0
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	YES
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

Lu= **0.10** K (cm/s) = **1E-06**

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³ Packer system: IPI with IVA system, Leak in pressure gauge at first P1 at 2 minutes

- No water level recorded before test. Water level is based on groundwater level for GT12-03 Test 2.
- Variations in water level yields the following K value: 20 m (bgs) = 9E-07 cm/s and 31 m (bgs) = 8E-07 cm/s
- The most stable takes of the recorded values were used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **SP** ANALYZED BY: **SP** REVIEWED BY: **GM**

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET



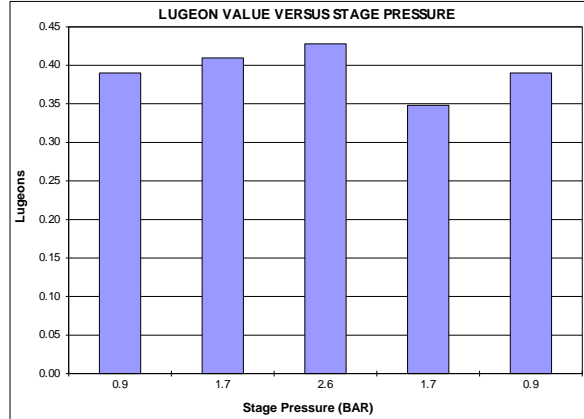
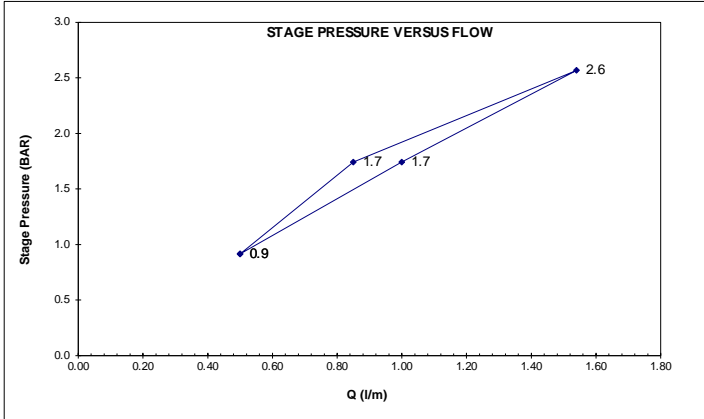
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-04**

AREA: **Crusher Site** TEST NO: **1**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **29.00** **8.84** m (DOWNHOLE)

DATE: **10-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **75.00** **22.87** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
0.83	0.9	Flowmeter litres	777.3	777.8	778.2	778.8	779.0	779.5		0.50	0.39
		Take litres		0.50	0.40	0.60	0.20	0.50			
		Average Take l/m		0.50	0.40	0.60	0.20	0.50			
1.7	1.7	Flowmeter litres	780.5	781.8	782.8	783.5	784.8	785.5		1.0	0.41
		Take litres		1.30	1.00	0.70	1.30	0.70			
		Average Take l/m		1.30	1.00	0.70	1.30	0.70			
2.5	2.6	Flowmeter litres	786.1	788.0	789.5	790.8	792.0	793.8		1.5	0.43
		Take litres		1.90	1.50	1.30	1.20	1.80			
		Average Take l/m		1.90	1.50	1.30	1.20	1.80			
1.7	1.7	Flowmeter litres	793.8	794.1	795.0	796.0	796.8	797.5		0.85	0.35
		Take litres		0.30	0.90	1.00	0.80	0.70			
		Average Take l/m		0.30	0.90	1.00	0.80	0.70			
0.83	0.9	Flowmeter litres	797.5	797.5	797.5	798.0	798.5	799.0		0.50	0.39
		Take litres		0.00	0.00	0.50	0.50	0.50			
		Average Take l/m		0.00	0.00	0.50	0.50	0.50			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **0.39** K (cm/s) = **4E-06**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	YES
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- Variations in water level yields the following K value: 2 m (bgs) = 3E-06 cm/s, 9 m (bgs) = 2E-06 cm/s, and 25 m (bgs) = 1E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET



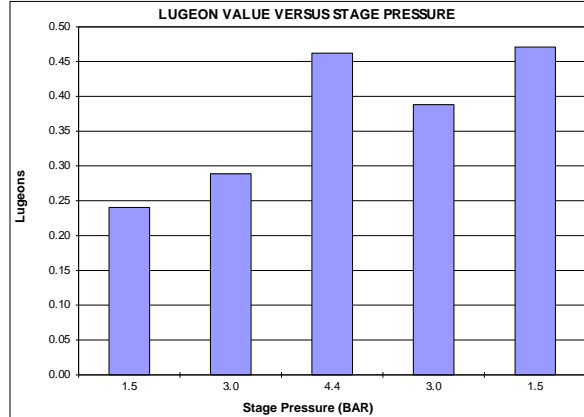
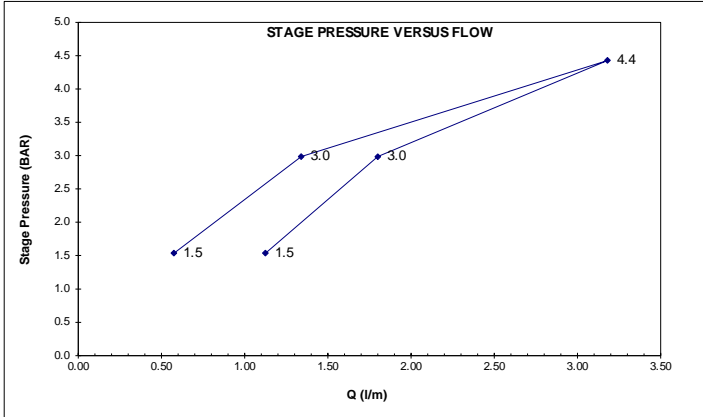
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-04**

AREA: **Crusher Site** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **74.00** **22.56** m (DOWNHOLE)

DATE: **13-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **125.00** **38.11** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.4	1.5	Flowmeter litres	804.5	804.5	804.8	805.1	806.1	806.8		0.57	0.24
		Take litres	0.00	0.30	0.30	0.30	1.00	0.70			
		Average Take l/m		0.00	0.30	0.30	1.00	0.70			
		Time min	0	1	2	3	4	5	6		
2.9	3.0	Flowmeter litres	807.3	809.0	810.3	811.3	812.8	814.0		1.34	0.29
		Take litres	1.70	1.30	1.00	1.00	1.50	1.20			
		Average Take l/m		1.70	1.30	1.00	1.50	1.20			
		Time min	0	1	2	3	4	5	6		
4.3	4.4	Flowmeter litres	815.0	818.0	821.1	824.5	828.0	830.9		3.18	0.46
		Take litres	3.00	3.10	3.40	3.40	3.50	2.90			
		Average Take l/m		3.00	3.10	3.40	3.50	2.90			
		Time min	0	1	2	3	4	5	6		
2.9	3.0	Flowmeter litres	830.9	833.0	833.9	835.5	837.2	839.0		1.80	0.39
		Take litres	2.10	0.90	1.60	1.60	1.70	1.80			
		Average Take l/m		2.10	0.90	1.60	1.70	1.80			
		Time min	0	1	2	3	4	5	6		
1.4	1.5	Flowmeter litres	839.0	839.5	840.4	841.4	842.7	844.0		1.13	0.47
		Take litres	0.50	0.90	1.00	1.00	1.30	1.30			
		Average Take l/m		0.50	0.90	1.00	1.30	1.30			
		Time min	0	1	2	3	4	5	6		



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **0.37** K (cm/s) = **4E-06**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	YES
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- Variations in water level yields the following K value: 2 m (bgs) = 3E-06 cm/s, 9 m (bgs) = 2E-06 cm/s and 29 m (bgs) = 1E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET



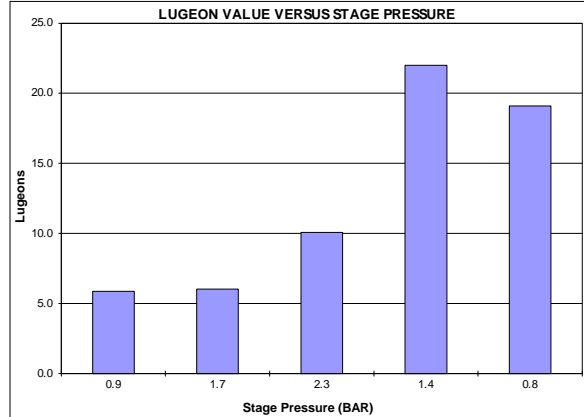
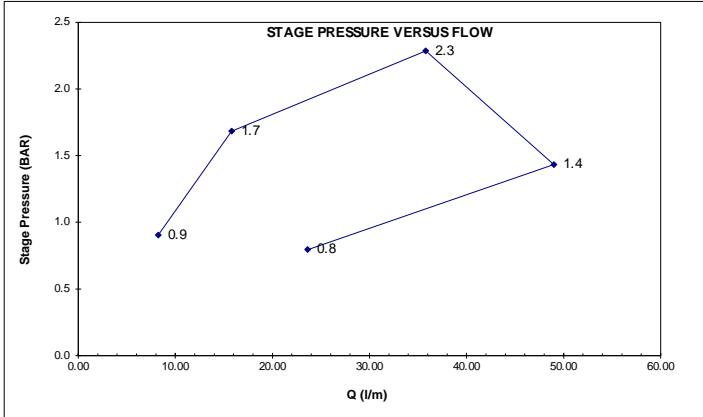
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-05**

AREA: **Overburden Stockpile** TEST NO: **1**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.2** m (bgs) TOP OF TEST INTERVAL: **20.00** m (DOWNHOLE) **6.10** m (DOWNHOLE)

DATE: **17-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **71.00** m (DOWNHOLE) **21.65** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
0.83	0.90	Flowmeter litres	851.5	868.0	875.5	884.1	892.8	901.0		8.3	5.9
		Take litres	16.50	7.50	8.60	8.70	8.20				
		Average Take l/m		16.50	7.50	8.60	8.70	8.20			
1.7	1.7	Flowmeter litres	906.0	923.0	938.5	954.0	969.0	985.0		15.8	6.0
		Take litres	17.00	15.50	15.50	15.00	16.00				
		Average Take l/m		17.00	15.50	15.50	15.00	16.00			
2.4	2.3	Flowmeter litres	992.0	1019.0	1046.5	1079.0	1123.0	1171.0		35.8	10.1
		Take litres	27.00	27.50	32.50	44.00	48.00				
		Average Take l/m		27.00	27.50	32.50	44.00	48.00			
1.7	1.4	Flowmeter litres	1180.0	1224.0	1271.0	1321.0	1373.5	1425.0		49.0	22.0
		Take litres	44.00	47.00	50.00	52.50	51.50				
		Average Take l/m		44.00	47.00	50.00	52.50	51.50			
0.83	0.80	Flowmeter litres	1427.0	1441.0	1463.0	1487.0	1511.0	1535.5		23.6	19.1
		Take litres	14.00	22.00	24.00	24.00	24.50				
		Average Take l/m		14.00	22.00	24.00	24.00	24.50			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, 1.25 m below stickup (1.06 m stickup)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **22.0** K (cm/s) = **2E-04**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	YES
5 VOID FILLING	NO
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³. Packer system: IPI with IVA system

1. The most stable takes of the recorded values were used for the Lugeon calculation at each pressure stage.

2. The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.

3. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET



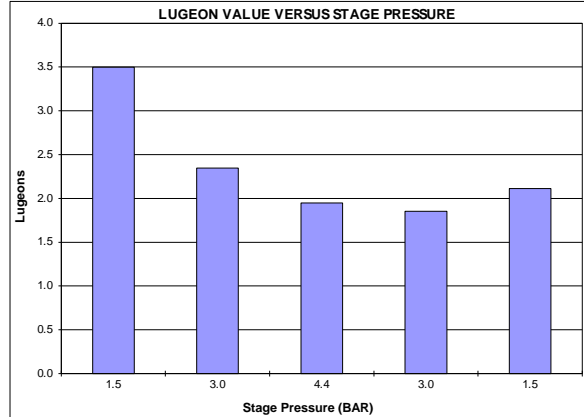
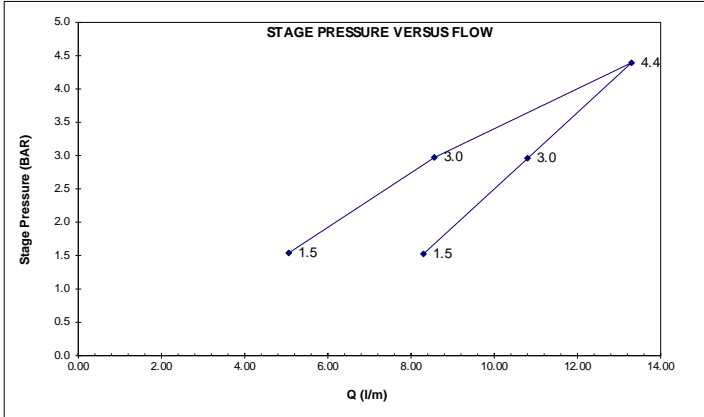
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-05**

AREA: **Overburden Stockpile** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.2** m (bgs) TOP OF TEST INTERVAL: **75.00** m (DOWNHOLE) **22.87** m (DOWNHOLE)

DATE: **17-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **126.00** m (DOWNHOLE) **38.41** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.4	1.5	Flowmeter litres	1681.5	1690.0	1698.5	1706.0	1714.0	1723.0		8.3	3.5
		Take litres		8.50	8.50	7.50	8.00	9.00			
		Average Take l/m		8.50	8.50	7.50	8.00	9.00			
2.9	3.0	Flowmeter litres	1724.5	1735.5	1746.5	1757.5	1768.2	1778.5		10.8	2.3
		Take litres		11.00	11.00	11.00	10.70	10.30			
		Average Take l/m		11.00	11.00	11.00	10.70	10.30			
4.3	4.4	Flowmeter litres	1781.0	1795.5	1809.0	1822.3	1835.0	1847.5		13.3	1.9
		Take litres		14.50	13.50	13.30	12.70	12.50			
		Average Take l/m		14.50	13.50	13.30	12.70	12.50			
2.9	3.0	Flowmeter litres	1850.0	1858.5	1867.0	1878.5	1884.3	1892.8		8.6	1.9
		Take litres		8.50	8.50	11.50	5.80	8.50			
		Average Take l/m		8.50	8.50	11.50	5.80	8.50			
1.4	1.5	Flowmeter litres	1894.0	1898.0	1904.0	1908.8	1914.0	1919.3		5.1	2.1
		Take litres		4.00	6.00	4.80	5.20	5.30			
		Average Take l/m		4.00	6.00	4.80	5.20	5.30			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **See Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives**

Lu= **2.1** K (cm/s) = **2E-05**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system

- No water level recorded before test. Water level is based on groundwater level for GT12-05 Test 1.
- Variations in water level yields the following K value: 7 m (bgs) = 1E-05 cm/s and 20 m (bgs) = 9E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET



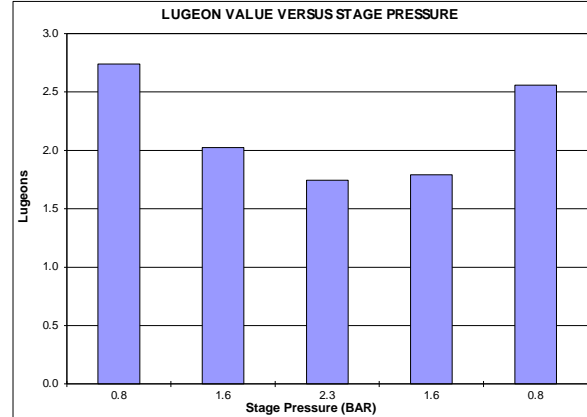
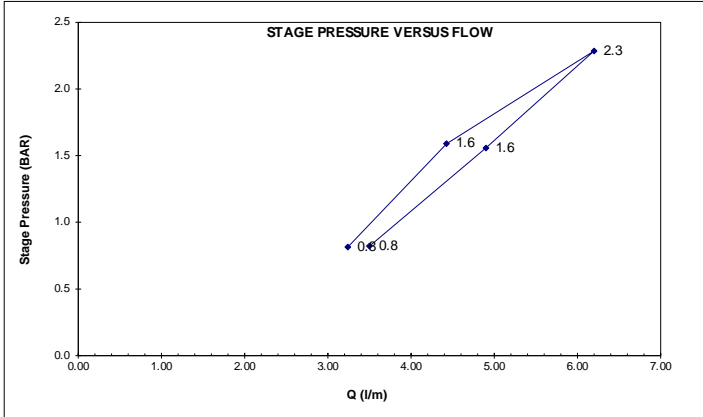
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-06**

AREA: **Overburden Stockpile** TEST NO: **1**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **14.00** m (DOWNHOLE) **4.27**

DATE: **18-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **65.00** ft (DOWNHOLE) **19.82** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
0.76	0.82	Flowmeter litres	1935.0	1939.0	1942.2	1945.5	1949.5	1952.5		3.5	2.7
		Take litres		4.00	3.20	3.30	4.00	3.00			
		Average Take l/m		4.00	3.20	3.30	4.00	3.00			
1.5	1.6	Flowmeter litres	1953.5	1958.2	1963.2	1968.0	1973.0	1978.0		4.9	2.0
		Take litres		4.70	5.00	4.80	5.00	5.00			
		Average Take l/m		4.70	5.00	4.80	5.00	5.00			
2.3	2.3	Flowmeter litres	1978.8	1984.8	1991.0	1997.2	2003.8	2009.8		6.2	1.7
		Take litres		6.00	6.20	6.20	6.60	6.00			
		Average Take l/m		6.00	6.20	6.20	6.60	6.00			
1.5	1.6	Flowmeter litres	2010.8	2014.1	2018.8	2023.0	2027.2	2031.8		4.4	1.8
		Take litres		3.30	4.70	4.20	4.20	4.60			
		Average Take l/m		3.30	4.70	4.20	4.20	4.60			
0.76	0.81	Flowmeter litres	2031.8	2035.0	2038.0	2041.2	2044.4	2048.0		3.2	2.6
		Take litres		3.20	3.00	3.20	3.20	3.60			
		Average Take l/m		3.20	3.00	3.20	3.20	3.60			



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **1.7** K (cm/s) = **2E-05**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	YES
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- Variations in water level yields the following K value: 4 m (bgs) = 1E-05 cm/s and 15 m (bgs) = 9E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREPD	CHKD	APPD
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

SHEET 2 OF 2

LUGEON TEST FIELD DATA SHEET



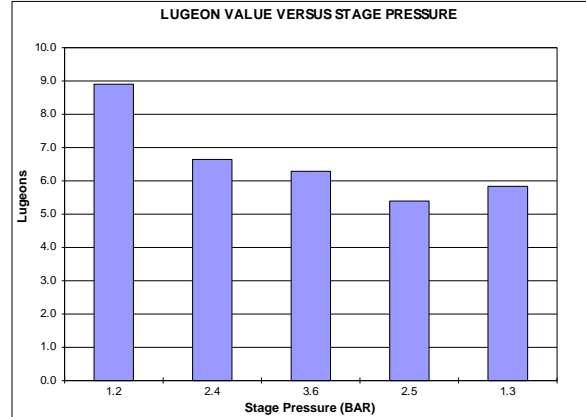
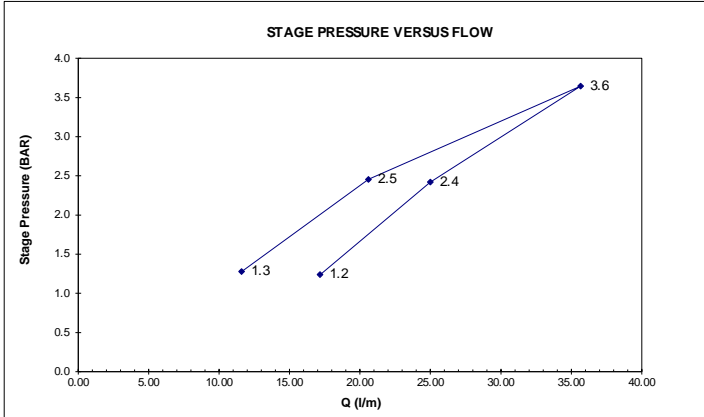
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-06**

AREA: **Overburden Stockpile** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **59.00** **17.99** m (DOWNHOLE)

DATE: **18-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **110.00** **33.54** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.2	1.2	Flowmeter litres	2550.0	2576.0	2594.5	2612.0	2629.0	2646.0			
		Take litres		26.00	18.50	17.50	17.00	17.00			
		Average Take l/m		26.00	18.50	17.50	17.00	17.00			17.2
2.5	2.4	Flowmeter litres	2656.0	2681.0	2702.0	2732.0	2756.0	2781.0			
		Take litres		25.00	21.00	30.00	24.00	25.00			
		Average Take l/m		25.00	21.00	30.00	24.00	25.00			25.0
3.8	3.6	Flowmeter litres	2825.0	2865.0	2902.0	2938.0	2972.0	3035.0			
		Take litres		40.00	37.00	36.00	34.00	63.00			
		Average Take l/m		40.00	37.00	36.00	34.00	63.00			35.7
2.5	2.5	Flowmeter litres	3015.0	3037.0	3057.0	3078.0	3098.0	3118.0			
		Take litres		22.00	20.00	21.00	20.00	20.00			
		Average Take l/m		22.00	20.00	21.00	20.00	20.00			20.6
1.2	1.3	Flowmeter litres	3125.0	3137.0	3149.0	3160.0	3171.5	3183.0			
		Take litres		12.00	12.00	11.00	11.50	11.50			
		Average Take l/m		12.00	12.00	11.00	11.50	11.50			11.6



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **5.8** K (cm/s) = **6E-05**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- Variations in water level yields the following K value: 1 m (bgs) = 5E-05 cm/s, 4 m (bgs) = 4E-05 cm/s, and 9 m (bgs) = 3E-05 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **SP** ANALYZED BY: **SP** REVIEWED BY: **GM**

0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET



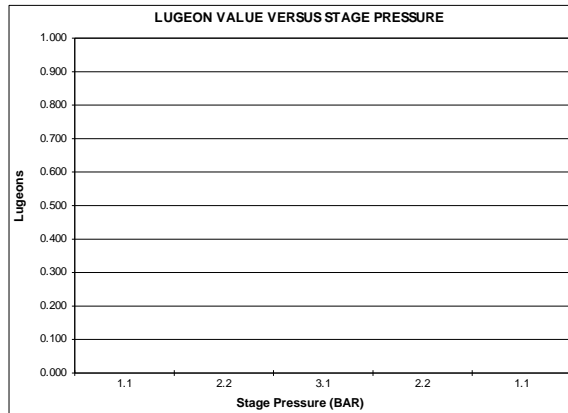
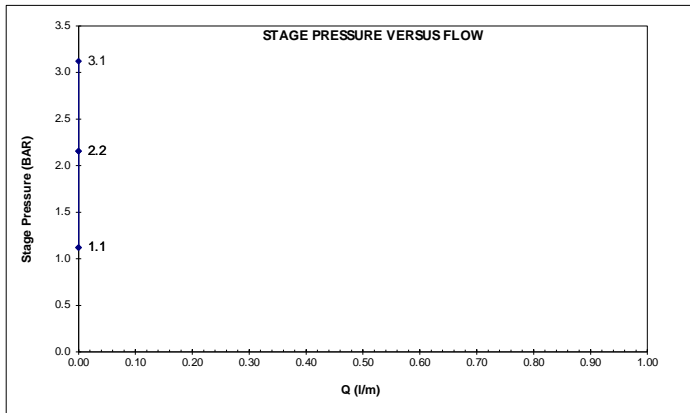
PROJECT: HARPER CREEK PROJECT PROJECT NO: VA101-458/7 DRILLHOLE: GT12-07

AREA: Non-PAG Waste Rock Stockpile TEST NO: 1

DIP: 90° (FROM HORIZONTAL) DEPTH GROUNDWATER: 0.0 m (bgs) TOP OF TEST INTERVAL: 37.00 m (DOWNHOLE) 11.28 m (DOWNHOLE)

DATE: 25-Aug-12 GAUGE HEIGHT ABOVE GROUND: 0.9 m BOTTOM OF TEST INTERVAL: 88.00 ft (DOWNHOLE) 26.83 m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min								FLOW litres/min	LUGEON	
			0	1	2	3	4	5	6			7
1.0	1.1	Flowmeter litres	3185.5	3185.5	3185.5	3185.5	3185.6	3185.7			0.00	0.00
		Take litres		0.00	0.00	0.00	0.10	0.10				
		Average Take l/m		0.00	0.00	0.00	0.10	0.10				
2.1	2.2	Flowmeter litres	3185.7	3185.7	3185.7	3185.7	3185.7	3185.7			0.00	0.00
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
3.0	3.1	Flowmeter litres	3185.7	3185.9	3185.9	3185.9	3185.9	3185.9			0.00	0.00
		Take litres		0.20	0.00	0.00	0.00	0.00				
		Average Take l/m		0.20	0.00	0.00	0.00	0.00				
2.1	2.2	Flowmeter litres	3185.9	3185.9	3185.9	3185.9	3185.9	3185.9			0.00	0.00
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				
1.0	1.1	Flowmeter litres	3185.9	3185.9	3185.9	3185.9	3185.9	3185.9			0.00	0.00
		Take litres		0.00	0.00	0.00	0.00	0.00				
		Average Take l/m		0.00	0.00	0.00	0.00	0.00				



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: Water level assumed at ground surface, see Comments below

DRILLING FLUIDS USED/ TIME FOR FLUSHING: Flushed until water returned clear, no drilling additives Lu= NO TAKE K (cm/s) = NO TAKE

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	YES

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- The most stable takes of the recorded values were used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- The K value for this test is not consistent with the result of GT12-07 Response Test 1, completed over the interval 10.4 to 15.9 m, which yielded a K value of 7×10^{-9} m/s. It is possible that the Lugeon Test may not have been properly conducted (Packer may not have been inflated i.e. Inflation Valve Assembly (IVA) not engaged).
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: KL ANALYZED BY: KL REVIEWED BY: GM

M:\1101\0045807\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C1 - Lugeon Hydraulic Conductivity Testing Sheets\GT12-01 to 08 Packer Test Sheets_jbc edit - corrected head loss.xlsx\GT12-07 (1)

REV	DATE	DESCRIPTION	PREPD	CHKD	APPD
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

LUGEON TEST FIELD DATA SHEET



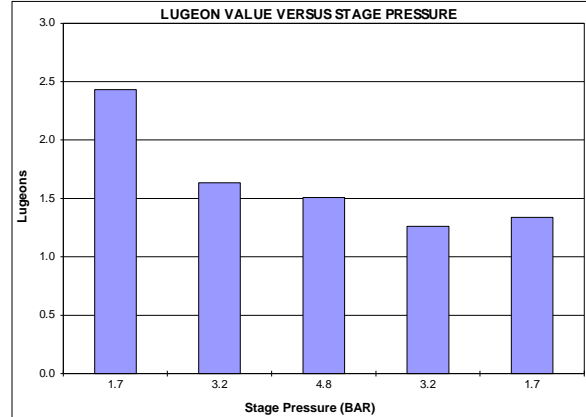
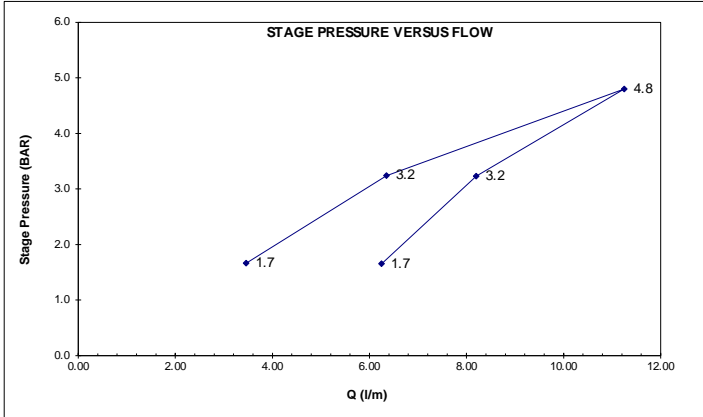
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-07**

AREA: **Non-PAG Waste Rock Stockpile** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **0.0** m (bgs) TOP OF TEST INTERVAL: **87.00** **26.52** m (DOWNHOLE)

DATE: **26-Aug-12** GAUGE HEIGHT ABOVE GROUND: **0.9** m BOTTOM OF TEST INTERVAL: **138.00** **42.07** m (DOWNHOLE)

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON	
			0	1	2	3	4	5	6			7
1.6	1.7	Flowmeter litres	3273.0	3282.0	3289.0	3295.2	3301.3	3307.0				
		Take litres		9.00	7.00	6.20	6.10	5.70				
		Average Take l/m		9.00	7.00	6.20	6.10	5.70			6.3	2.4
3.2	3.2	Flowmeter litres	3314.0	3325.2	3334.0	3342.2	3350.0	3358.0				
		Take litres		11.20	8.80	8.20	7.80	8.00				
		Average Take l/m		11.20	8.80	8.20	7.80	8.00			8.2	1.6
4.8	4.8	Flowmeter litres	3365.0	3379.8	3391.5	3402.7	3414.0	3424.8				
		Take litres		14.80	11.70	11.20	11.30	10.80				
		Average Take l/m		14.80	11.70	11.20	11.30	10.80			11.3	1.5
3.2	3.2	Flowmeter litres	3426.0	3433.5	3440.0	3446.0	3452.6	3458.9				
		Take litres		7.50	6.50	6.00	6.60	6.30				
		Average Take l/m		7.50	6.50	6.00	6.60	6.30			6.3	1.3
1.6	1.7	Flowmeter litres	3458.9	3462.0	3465.8	3469.2	3472.3	3476.2				
		Take litres		3.10	3.80	3.40	3.10	3.90				
		Average Take l/m		3.10	3.80	3.40	3.10	3.90			3.5	1.3



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Water level assumed at ground surface, see Comments below**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives**

Lu= **1.3** K (cm/s) = **1E-05**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	NO
4 WASH-OUT	NO
5 VOID FILLING	YES
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.

- No water level recorded before test. Water level is assumed at ground surface.
- Variations in water level yields the following K value: 7 m (bgs) = 9E-06 cm/s, 10 m (bgs) = 8E-06 cm/s, 14 m (bgs) = 7E-06 cm/s, and 18 m (bgs) = 6E-06 cm/s
- The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
- The maximum pressure for the test exceeded the typically recommended pressure range of 0.5 psi/ft based on the top of test interval. The K value does not appear to be affected by the high pressure.
- Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **KL** ANALYZED BY: **KL** REVIEWED BY: **GM**

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	06JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

SHEET 1 OF 2

LUGEON TEST FIELD DATA SHEET



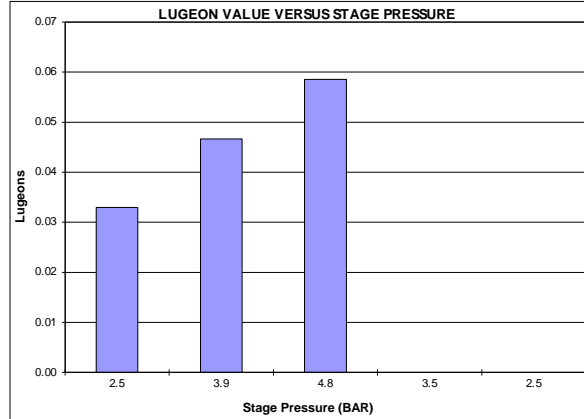
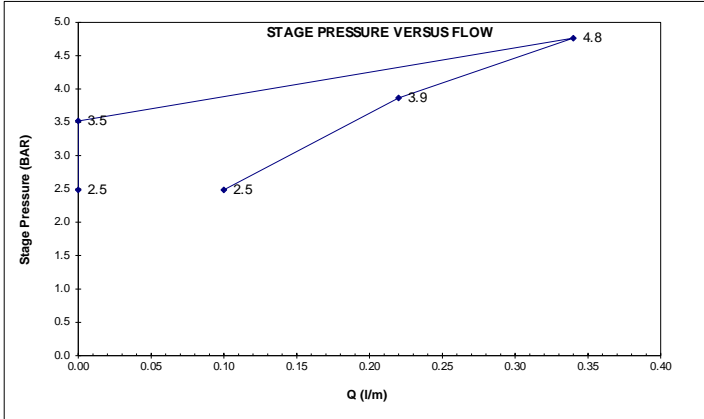
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-08**

AREA: **Southwest of Non-PAG Waste Rock Stockpile** TEST NO: **1**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **10.1** m (bgs) TOP OF TEST INTERVAL: **104.25** m (DOWNHOLE) **31.78**

DATE: **12-Oct-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **144.25** m (DOWNHOLE) **43.98**

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.4	2.5	Flowmeter litres	3578.9	3579.0	3579.1	3579.2	3579.6	3579.9		0.10	0.03
		Take litres	0.10	0.10	0.10	0.10	0.40	0.30			
		Average Take l/m		0.10	0.10	0.10	0.40	0.30			
		Time min	0	1	2	3	4	5	6		
2.8	3.9	Flowmeter litres	3580.9	3581.0	3581.1	3581.5	3581.9	3582.0		0.22	0.05
		Take litres	0.10	0.10	0.10	0.40	0.40	0.10			
		Average Take l/m		0.10	0.10	0.40	0.40	0.10			
		Time min	0	1	2	3	4	5	6		
3.7	4.8	Flowmeter litres	3582.3	3582.9	3583.0	3583.1	3583.6	3584.0		0.34	0.06
		Take litres	0.60	0.10	0.10	0.10	0.50	0.40			
		Average Take l/m		0.60	0.10	0.10	0.50	0.40			
		Time min	0	1	2	3	4	5	6		
2.4	3.5	Flowmeter litres	3584.0	3584.0	3584.0	3584.0	3584.0	3584.0		0.00	0.00
		Take litres	0.00	0.00	0.00	0.00	0.00	0.00			
		Average Take l/m		0.00	0.00	0.00	0.00	0.00			
		Time min	0	1	2	3	4	5	6		
1.4	2.5	Flowmeter litres	3584.0	3584.0	3584.0	3584.0	3584.0	3584.0		0.00	0.00
		Take litres	0.00	0.00	0.00	0.00	0.00	0.00			
		Average Take l/m		0.00	0.00	0.00	0.00	0.00			
		Time min	0	1	2	3	4	5	6		



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, 11.4 m below stickup (1.3 m stickup)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **0.020** K (cm/s) = **2E-07**

INTERPRETATION TYPE OF FLOW:

1 LAMINAR	NO
2 TURBULENT	NO
3 DILATION	YES
4 WASH-OUT	NO
5 VOID FILLING	NO
6 NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.
 1. The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
 2. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

TEST BY: **GM** ANALYZED BY: **JBC** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

LUGEON TEST FIELD DATA SHEET



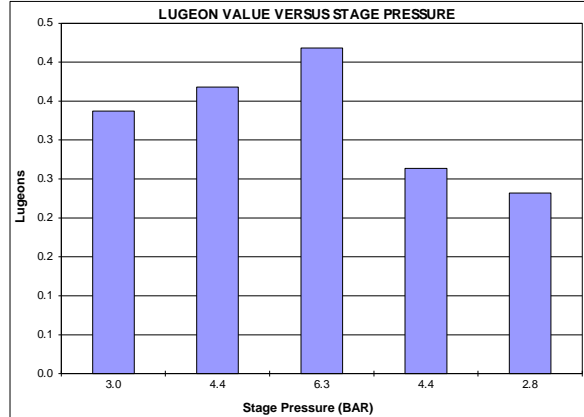
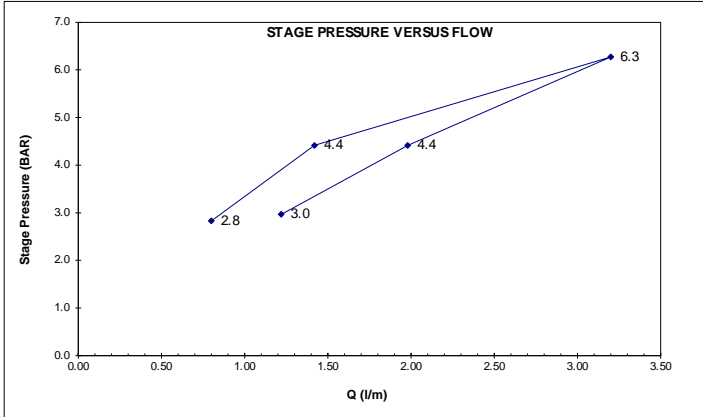
PROJECT: **HARPER CREEK PROJECT** PROJECT NO: **VA101-458/7** DRILLHOLE: **GT12-08**

AREA: **Southwest of Non-PAG Waste Rock Stockpile** TEST NO: **2**

DIP: **90** ° (FROM HORIZONTAL) DEPTH GROUNDWATER: **10.1** m (bgs) TOP OF TEST INTERVAL: **144.25** m (DOWNHOLE) **43.98**

DATE: **13-Oct-12** GAUGE HEIGHT ABOVE GROUND: **1.0** m BOTTOM OF TEST INTERVAL: **184.25** m (DOWNHOLE) **56.17**

GAUGE PRESSURE (BAR)	CORRECTED PRESSURE (BAR)	Time min	Time min							FLOW litres/min	LUGEON
			0	1	2	3	4	5	6		
1.9	3.0	Flowmeter litres	3493.0	3494.5	3495.8	3496.9	3498.0	3499.1			
		Take litres		1.50	1.30	1.10	1.10	1.10			
		Average Take l/m		1.50	1.30	1.10	1.10	1.10			
										1.2	0.3
3.3	4.4	Flowmeter litres	3504.0	3506.0	3508.0	3510.0	3512.0	3513.9			
		Take litres		2.00	2.00	2.00	2.00	1.90			
		Average Take l/m		2.00	2.00	2.00	2.00	1.90			
										2.0	0.4
5.2	6.3	Flowmeter litres	3517.0	3520.1	3523.5	3526.0	3529.8	3531.8			
		Take litres		3.10	3.40	2.50	3.80	2.00			
		Average Take l/m		3.10	3.40	2.50	3.80	2.00			
										3.2	0.4
3.3	4.4	Flowmeter litres	3533.0	3534.0	3535.6	3537.1	3538.9	3540.1			
		Take litres		1.00	1.60	1.50	1.80	1.20			
		Average Take l/m		1.00	1.60	1.50	1.80	1.20			
										1.4	0.26
1.7	2.83	Flowmeter litres	3540.1	3540.9	3541.5	3542.5	3543.2	3544.1			
		Take litres		0.80	0.60	1.00	0.70	0.90			
		Average Take l/m		0.80	0.60	1.00	0.70	0.90			
										0.80	0.23



DEPTH TO GROUNDWATER MEASURED BEFORE TEST? IF NOT, DETERMINED BY: **Yes, 11.4 m below stickup (1.3 m stickup)**

DRILLING FLUIDS USED/ TIME FOR FLUSHING: **Flushed until water returned clear, no drilling additives** Lu= **0.32** K (cm/s) = **3E-06**

INTERPRETATION TYPE OF FLOW:

1	LAMINAR	YES
2	TURBULENT	NO
3	DILATION	NO
4	WASH-OUT	NO
5	VOID FILLING	NO
6	NO TAKE	NO

DRILLING/PACKER TEST/RESULTS COMMENTS: Flowmeter units: m³, Packer system: IPI with IVA system.
 1. The most stable takes of the recorded values are used for the Lugeon calculation at each pressure stage.
 2. Head loss test is not completed for the Packer system used for the test. Head loss plot from SWIPS IPI Manual (Version 2.0, June 2012) is applied for analysis purposes.

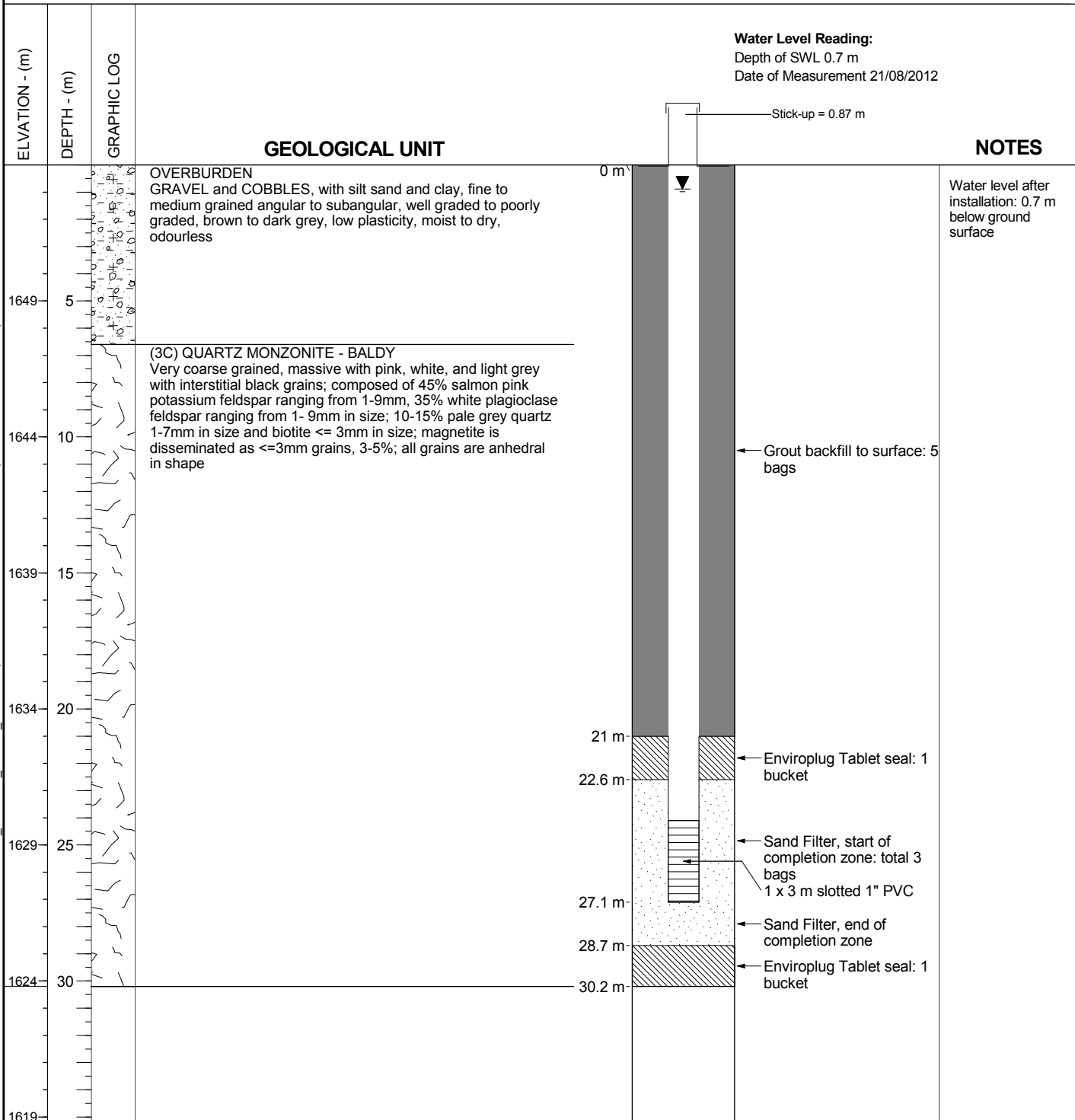
TEST BY: **GM** ANALYZED BY: **JBC** REVIEWED BY: **GM**

0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

APPENDIX C2
PIEZOMETER INSTALLATION DETAILS

(Pages C2-1 to C2-8)

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-01	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 26 Jul 12
Location: Rock Quarry	Total Depth: 30.2 m	Date Completed: 28 Jul 12
Coordinates: 5,706,192 N, 303,869 E (UTM NAD 83)	Elevation: 1654.3 m	Date Well Installed: 28 Jul 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: DR/EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-01**

***Knight Piésold*
CONSULTING**

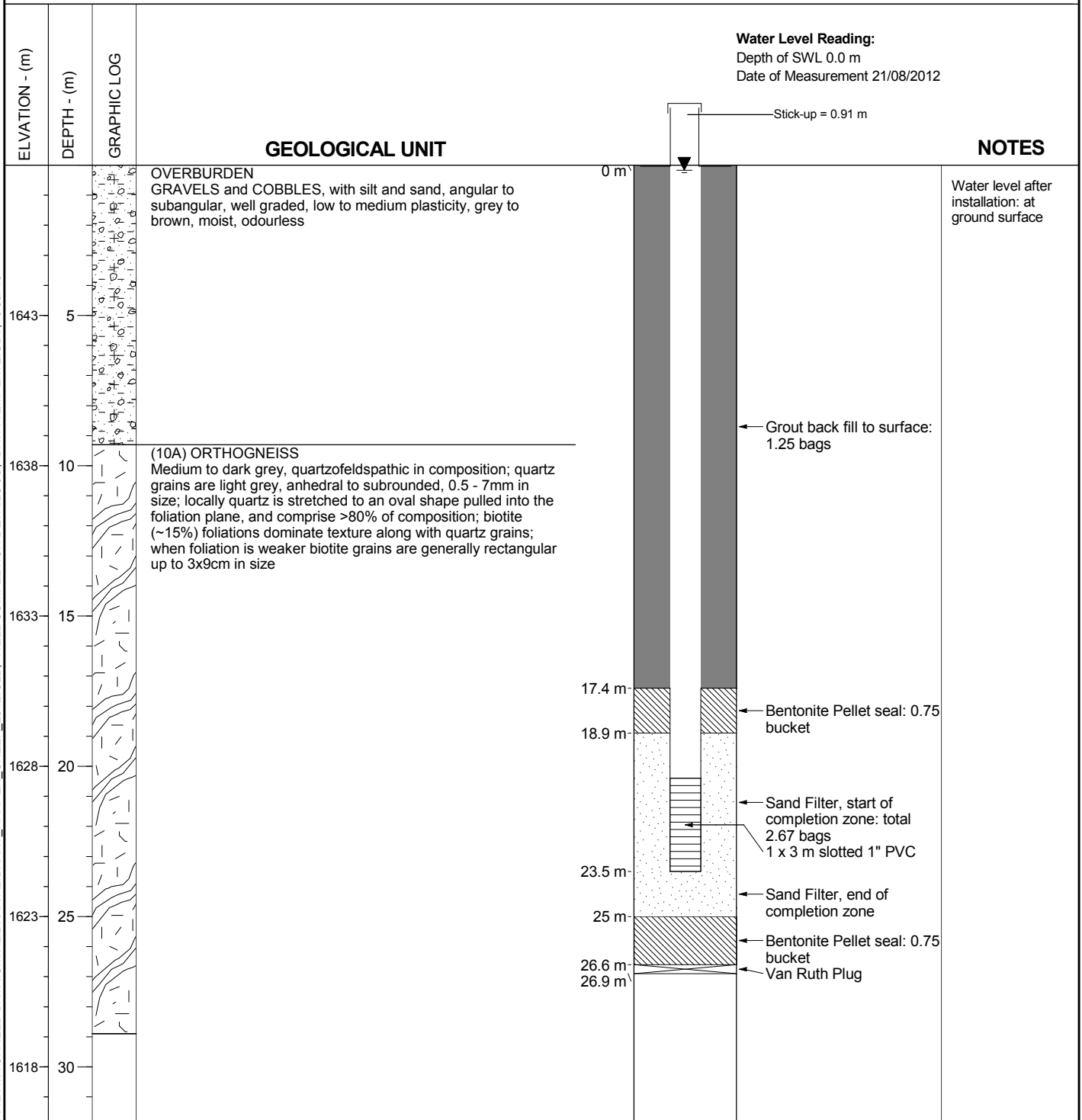
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-1	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Library: M:\101\004\58\07\A\DATA\SI\FIELD\DATA\LIBRARY\HARPER_CREEK_2012.GLB, WELL COMPLETION DETAILS JO. DATA TEMPLATE.GDT, 5 Jul 13

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-02	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 28 Jul 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 3 Aug 12
Coordinates: 5,706,349 N, 304,623 E (UTM NAD 83)	Elevation: 1648.0 m	Date Well Installed: 3 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 60°	Supervised by: EJH
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-02**

***Knight Piésold*
CONSULTING**

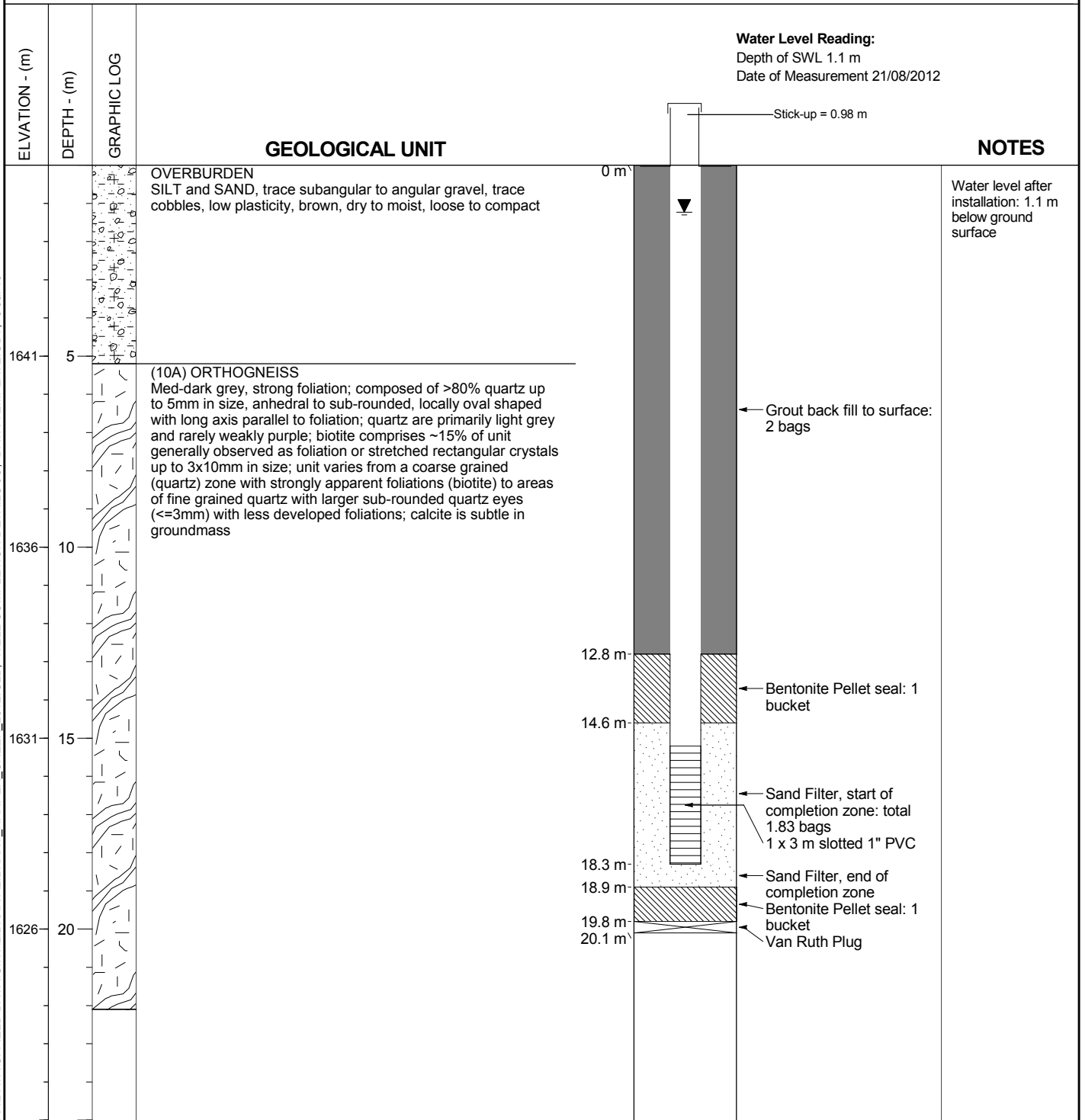
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-2	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Project: HARPER CREEK PROJECT	Drill Hole No. GT12-03	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: DRILL CORE	Date Started: 3 Aug 12
Location: TMF Embankment	Total Depth: 101.2 m	Date Completed: 7 Aug 12
Coordinates: 5,706,424 N , 304,379 E (UTM NAD 83)	Elevation: 1646.4 m	Date Well Installed: 7 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 180°, 60°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Depth shown is inclined depth. Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-03**

***Knight Piésold*
CONSULTING**

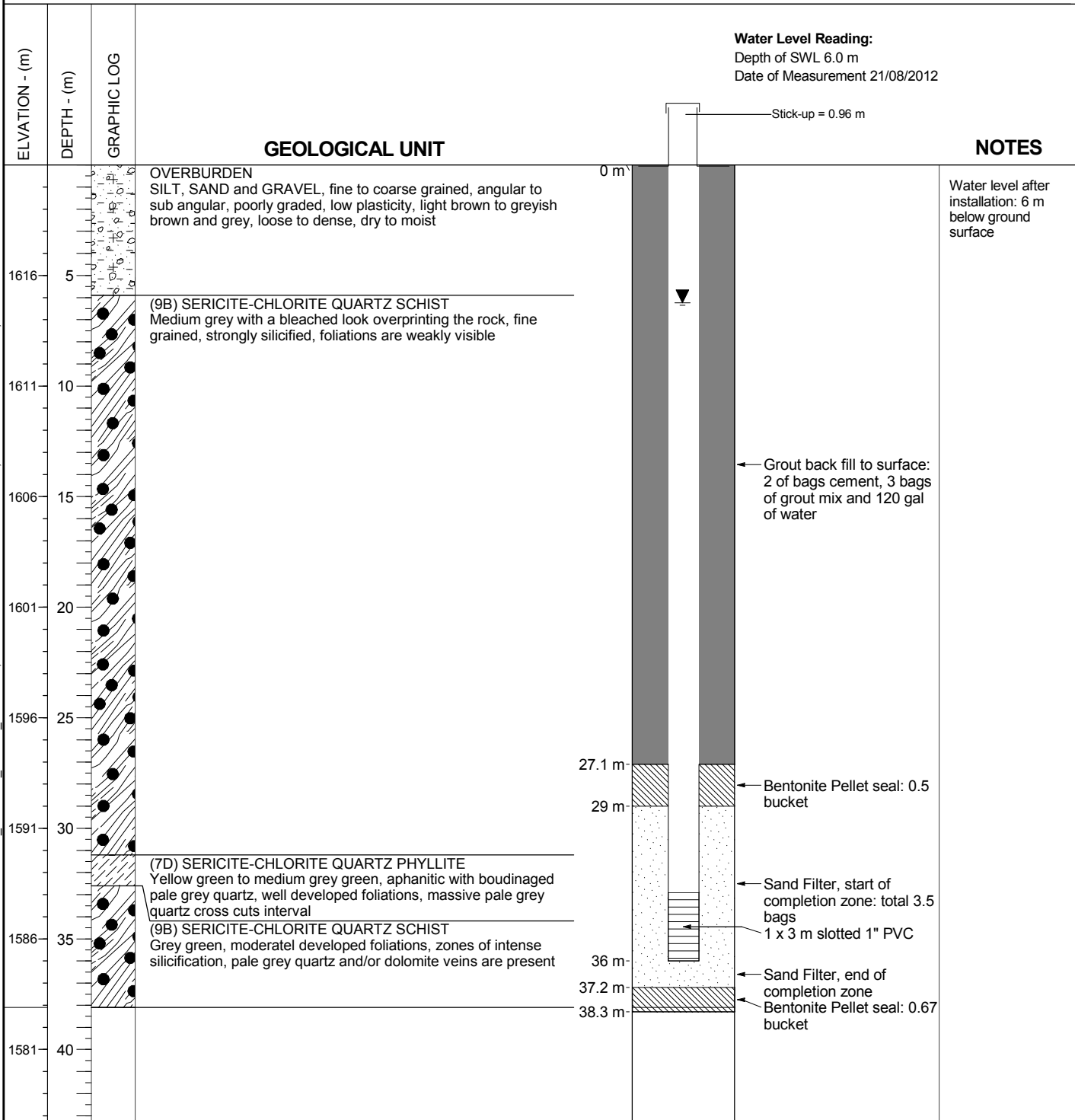
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE: Appendix C3-3	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Project: HARPER CREEK PROJECT	Drill Hole No. GT12-04	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 9 Aug 12
Location: Crusher Site	Total Depth: 38.1 m	Date Completed: 13 Aug 12
Coordinates: 5,710,396 N, 304,159 E (UTM NAD 83)	Elevation: 1620.5 m	Date Well Installed: 13 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-04**

Knight Piésold
CONSULTING

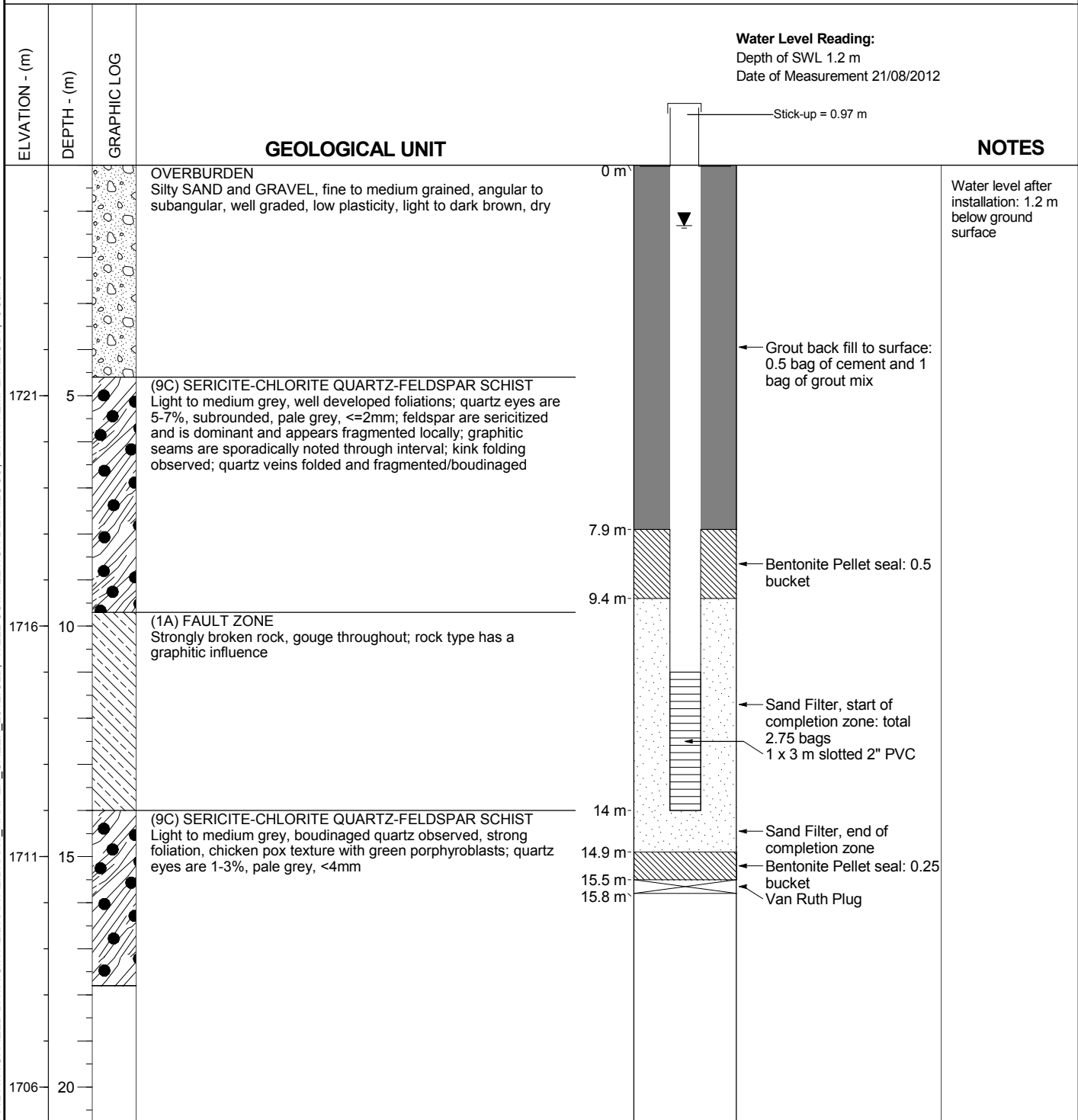
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-4	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Project: HARPER CREEK PROJECT	Drill Hole No. GT12-05	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 16 Aug 12
Location: Overburden Stockpile	Total Depth: 38.4 m	Date Completed: 17 Aug 12
Coordinates: 5,711,114 N , 306,344 E (UTM NAD 83)	Elevation: 1725.9 m	Date Well Installed: 17 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-05**

Knight Piésold
CONSULTING

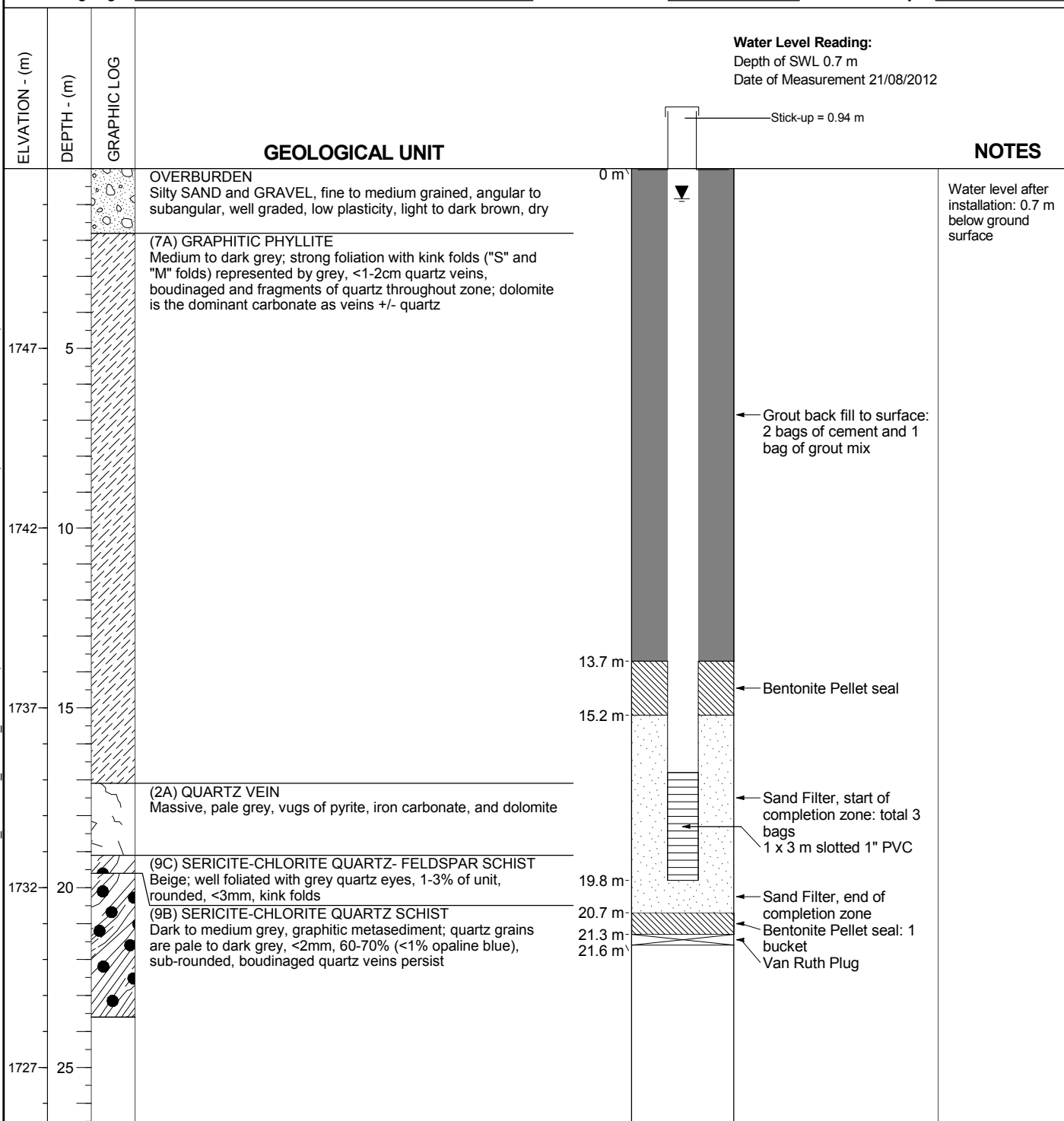
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-5	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Project: HARPER CREEK PROJECT	Drill Hole No. GT12-06	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 17 Aug 12
Location: Overburden Stockpile	Total Depth: 35.1 m	Date Completed: 18 Aug 12
Coordinates: 5,710,844 N, 306,746 E (UTM NAD 83)	Elevation: 1751.7 m	Date Well Installed: 18 Aug 12
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-06**

Knight Piésold
CONSULTING

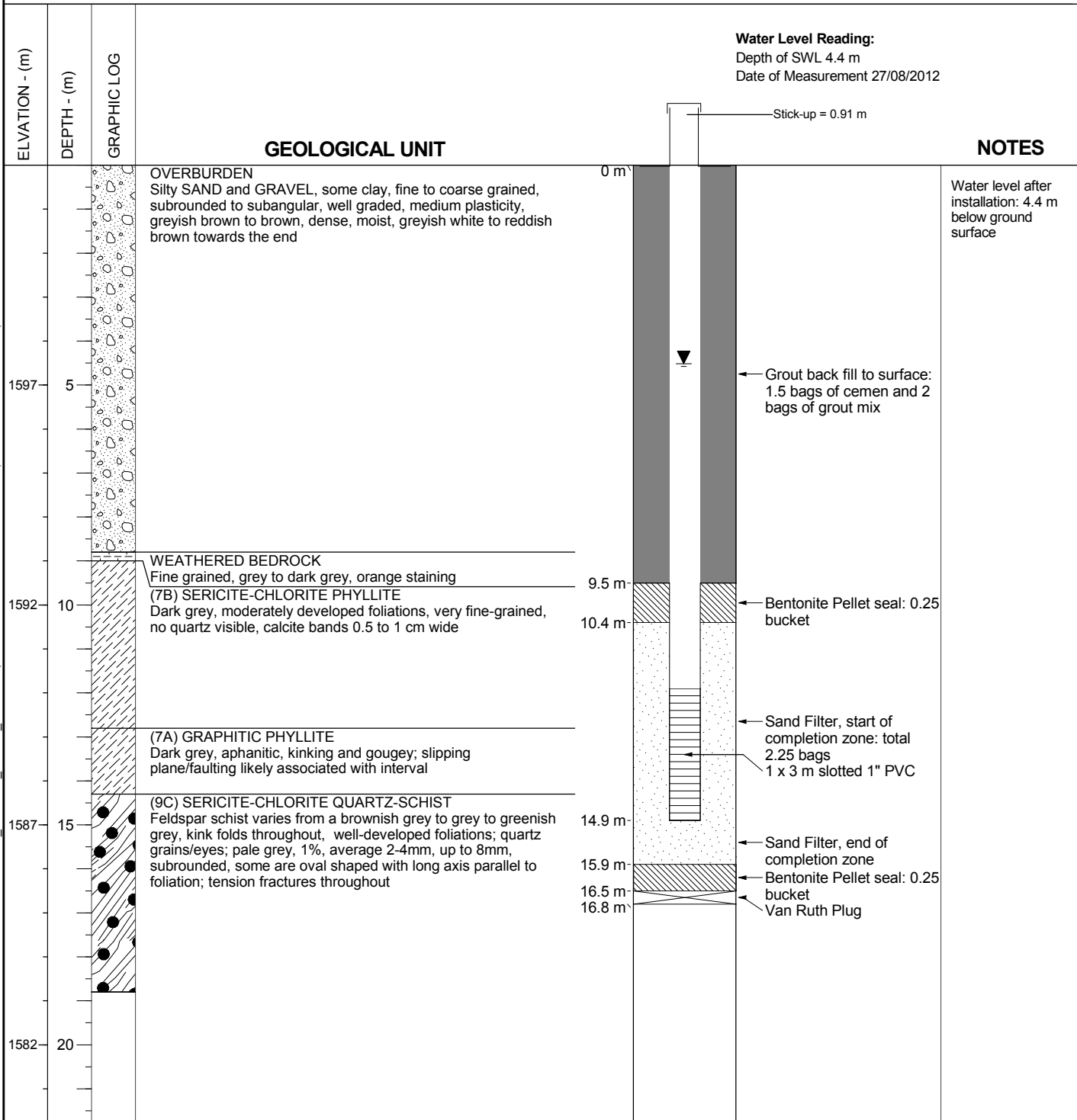
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-6	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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Project:	HARPER CREEK PROJECT	Drill Hole No.	GT12-07	PAGE	1 of 1
Contractor:	WESTECH DRILLING CO.	Sample Type:	SPT / DRILL CORE	Date Started:	25 Aug 12
Location:	Non-PAG Waste Rock Stockpile	Total Depth:	42.1 m	Date Completed:	26 Aug 12
Coordinates:	5,710,224 N , 304,090 E (UTM NAD 83)	Elevation:	1601.7 m	Date Well Installed:	26 Aug 12
Drilling Method:	ODEX / DIAMOND DRILLING	Azimuth, Dip:	0°, 90°	Supervised by:	KL
Drilling Rig:	B-54	Hole size:	HQ3	Reviewed by:	GM



GENERAL REMARKS:
Lithologies are based on CME detailed logging.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-07**

**Knight Piésold
CONSULTING**

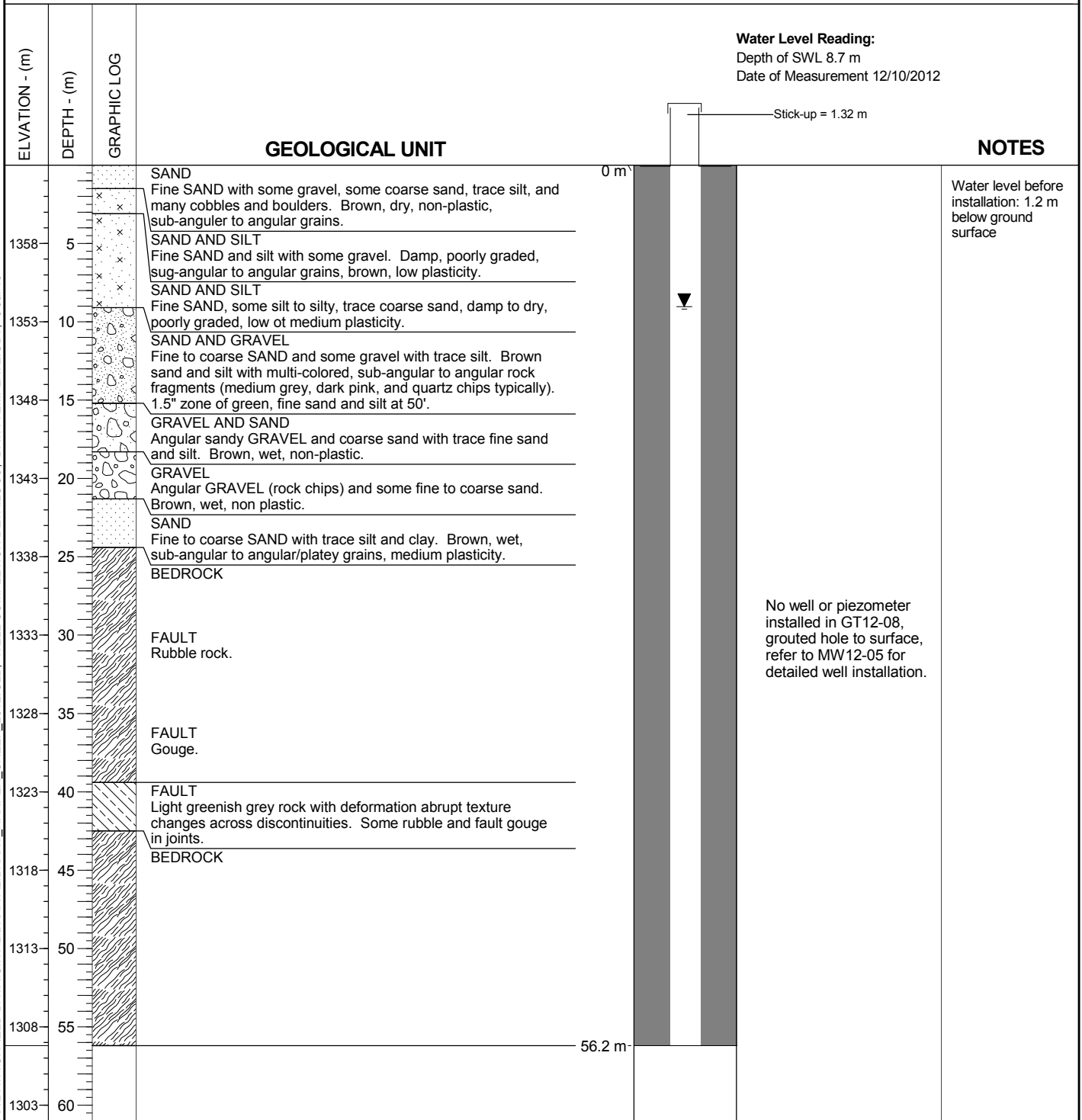
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-7	REV. 0

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REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. GT12-08	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: SPT / DRILL CORE	Date Started: 11 Oct 12
Location: Southwest of Non-PAG Waste Rock Stockpile	Total Depth: 56.2 m	Date Completed: 13 Oct 12
Coordinates: 5,709,998 N, 302,226 E (UTM NAD 83)	Elevation: 1363.0 m	Date Well Installed: N / A
Drilling Method: ODEX / DIAMOND DRILLING	Azimuth, Dip: 0°, 90°	Supervised by: GM
Drilling Rig: B-54	Hole size: HQ3	Reviewed by: GM



GENERAL REMARKS:
For detailed well installation details refer to MW12-05. Lithologies are based on KPL Field Interpretation.

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR GT12-08**

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C3-8	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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APPENDIX C3

PIEZOMETER COMPLETION RESPONSE TESTING SHEETS

(Pages C3-1 to C3-7)

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-01**
Test 1

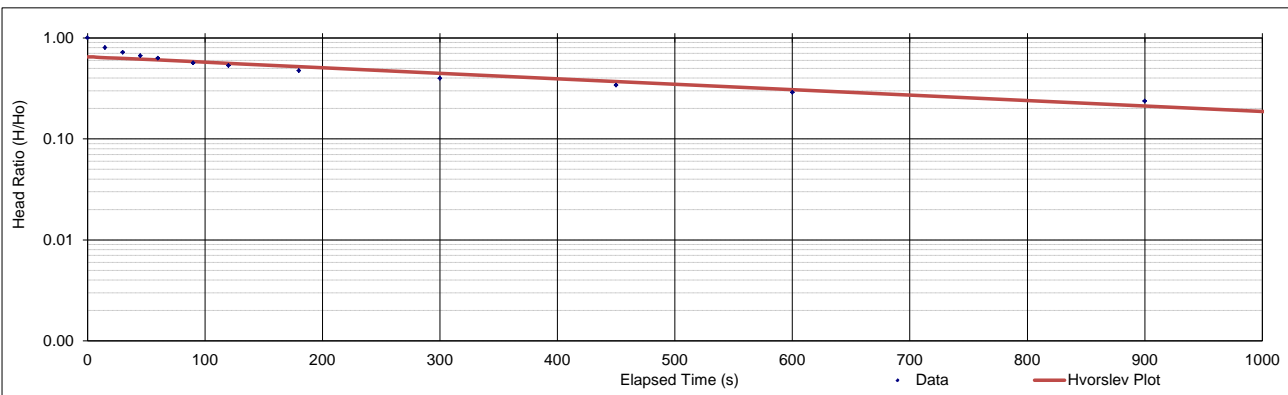
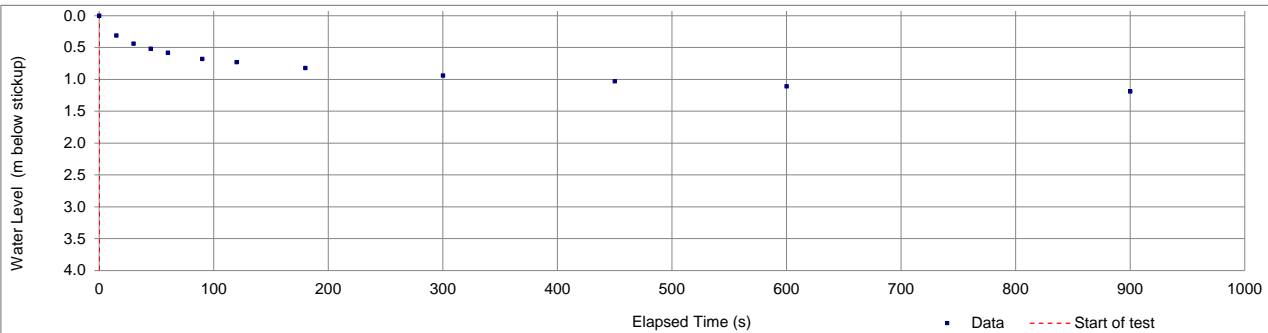
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 22.6 mbgs
Bottom of test zone 28.7 mbgs
Test Length, L 6.1 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 1.56 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 1.56 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T 5E-07 m²/s
Hydraulic Conductivity, K 8E-08 m/s

H/ H_0 Intercept 0.65



TEST COMMENTS:

1. Test was conducted 24 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement was not documented.

M:\1\01\00458\07\A\Report1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-01

REV	DATE	DESCRIPTION	PREPD	CHKD	APPD
0	5JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-02**
Test 1

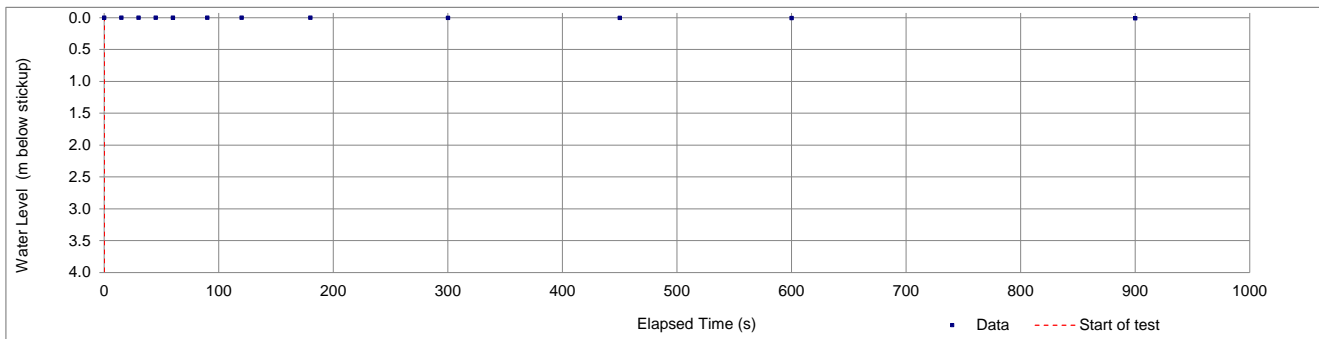
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 18.9 mbgs
Bottom of test zone 25.0 mbgs
Test Length, L 6.1 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 0.29 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 0.29 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T $<6E-08$ m²/s
Hydraulic Conductivity, K $<1E-08$ m/s

H/ H_0 Intercept n/a



TEST COMMENTS:

1. Test was conducted 18 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement was not documented.
3. Testing in GT12-02 indicates a low hydraulic conductivity value and is reported as $<1E-08$ m/s to indicate that the value is likely less than testing can reliably measure.
4. The K value for GT12-02 Lugeon Test 1, completed over interval 17.1 m to 32.8 m, is higher than this test. Higher K value may be a result of borehole damage during drilling or a higher

M:\11\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-02

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APPR'D
0	6JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-03**
Test 1

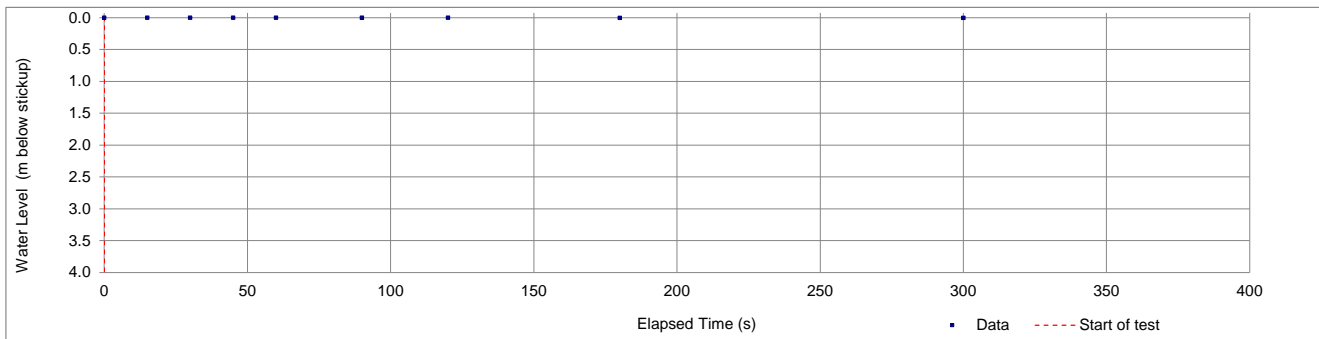
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 14.6 mbgs
Bottom of test zone 18.9 mbgs
Test Length, L 4.3 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 2.12 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 2.12 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T $<4E-08$ m²/s
Hydraulic Conductivity, K $<1E-08$ m/s

H/ H_0 Intercept n/a



TEST COMMENTS:

1. Test was conducted 14 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement was not documented.
3. Testing in GT12-03 indicates a low hydraulic conductivity value and is reported as $<1E-08$ m/s to indicate that the value is likely less than testing can reliably measure.

M:\11\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-03

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	6/JUL/13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-04**
Test 1

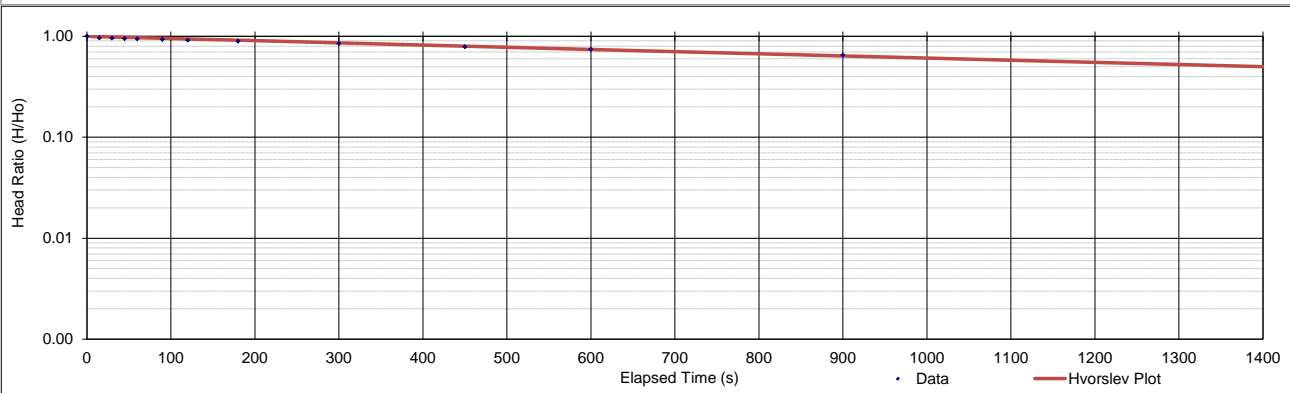
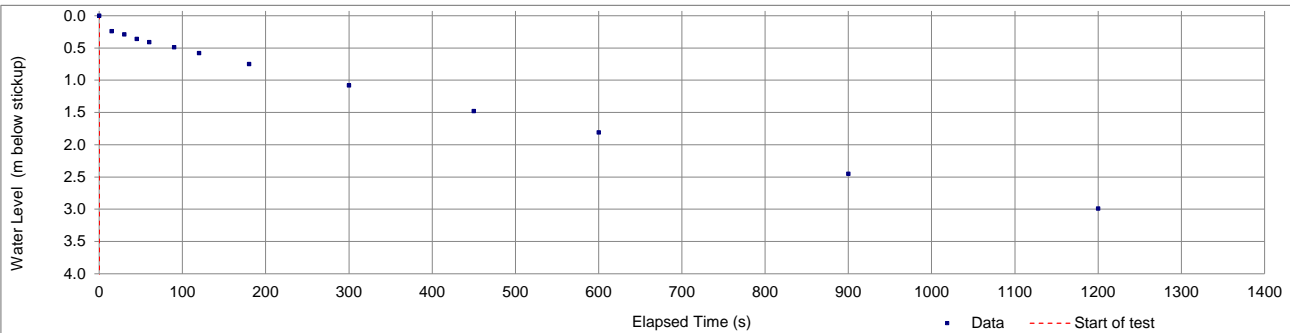
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 29.0 mbgs
Bottom of test zone 37.2 mbgs
Test Length, L 8.2 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 7.00 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 7.00 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T 2E-07 m²/s
Hydraulic Conductivity, K 3E-08 m/s

H/ H_0 Intercept 1.00



TEST COMMENTS:

1. Test was conducted 11 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement is not documented.

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-04

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	5 JUL 13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-05**
Test 1

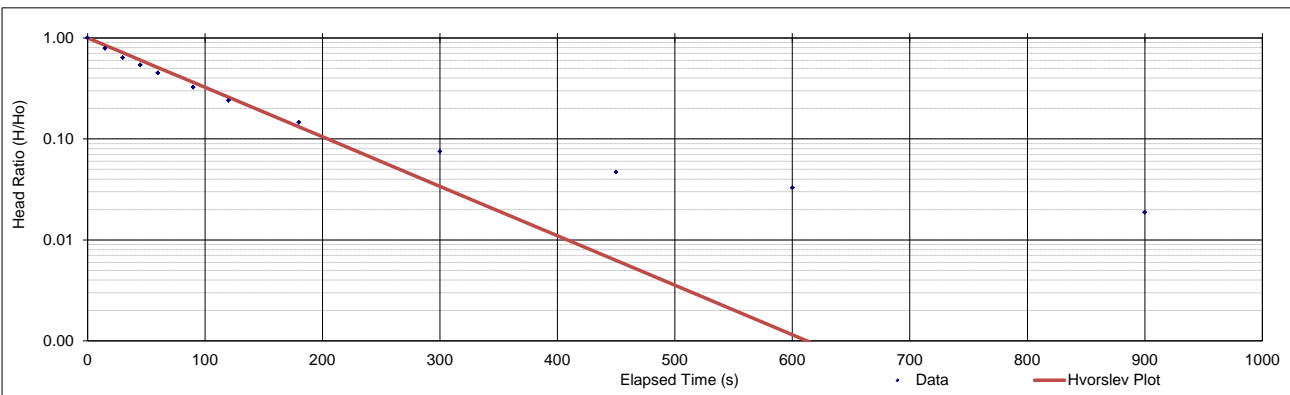
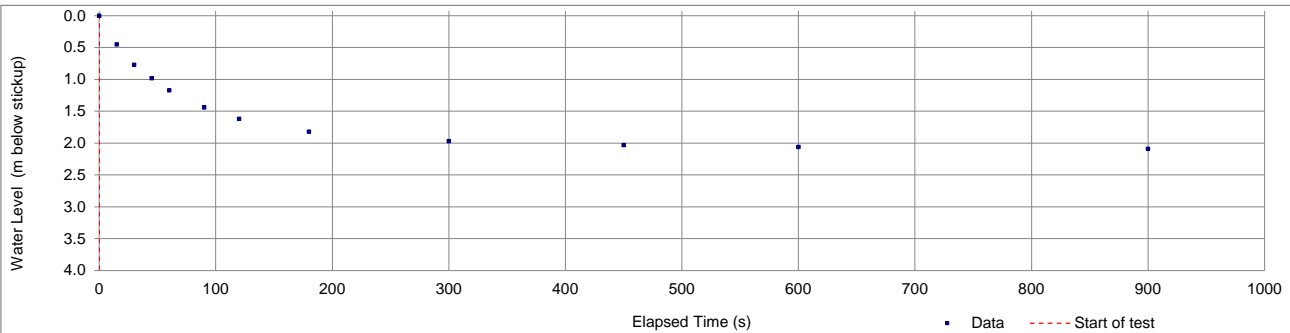
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 14.6 mbgs
Bottom of test zone 18.9 mbgs
Test Length, L 4.3 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 2.13 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 2.13 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T 4E-06 m²/s
Hydraulic Conductivity, K 1E-06 m/s

H/H₀ Intercept 1.00



TEST COMMENTS:

1. Test was conducted 4 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement is not documented.

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-05

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	5JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-06**
Test 1

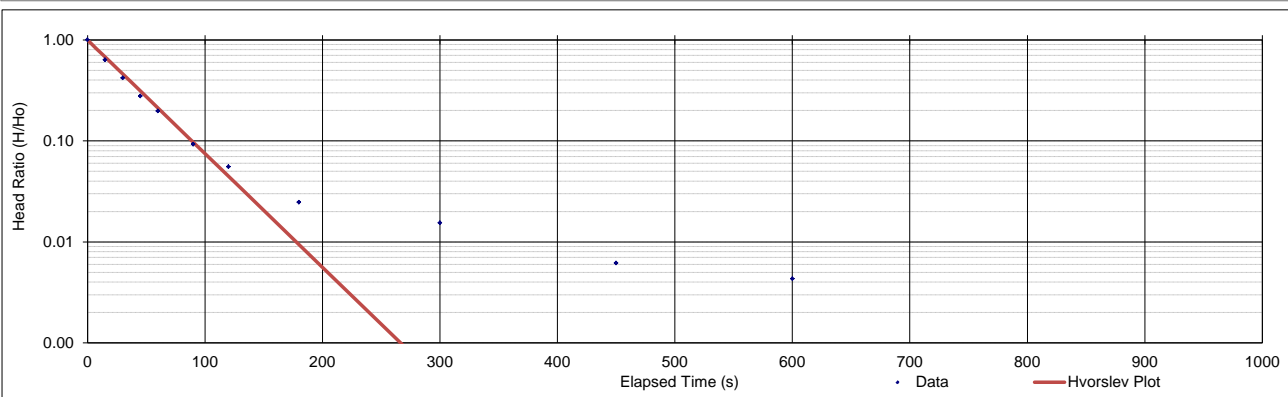
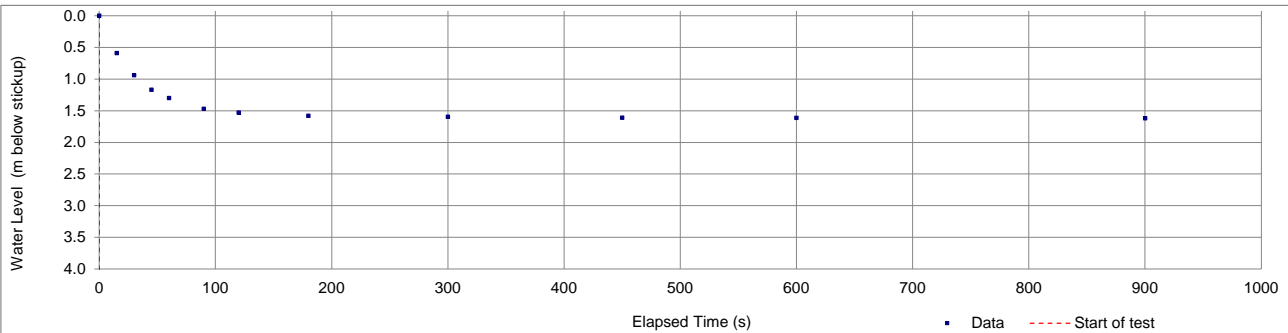
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 21-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 15.2 mbgs
Bottom of test zone 20.7 mbgs
Test Length, L 5.5 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 1.62 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 1.62 m
Expected Change In Water Level, H_e Not Documented

Transmissivity, T $1E-05$ m²/s
Hydraulic Conductivity, K $2E-06$ m/s

H/ H_0 Intercept 1.00



TEST COMMENTS:

1. Test was conducted 3 days after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement is not documented.

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-06

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	5JUL13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING HVORSLEV (1951) METHOD**

Print 07/08/13 9:35

Project No. VA101-458/7
Field Technician KL
Analyst JBC

Monitoring Well/Piezometer **GT12-07**
Test 1

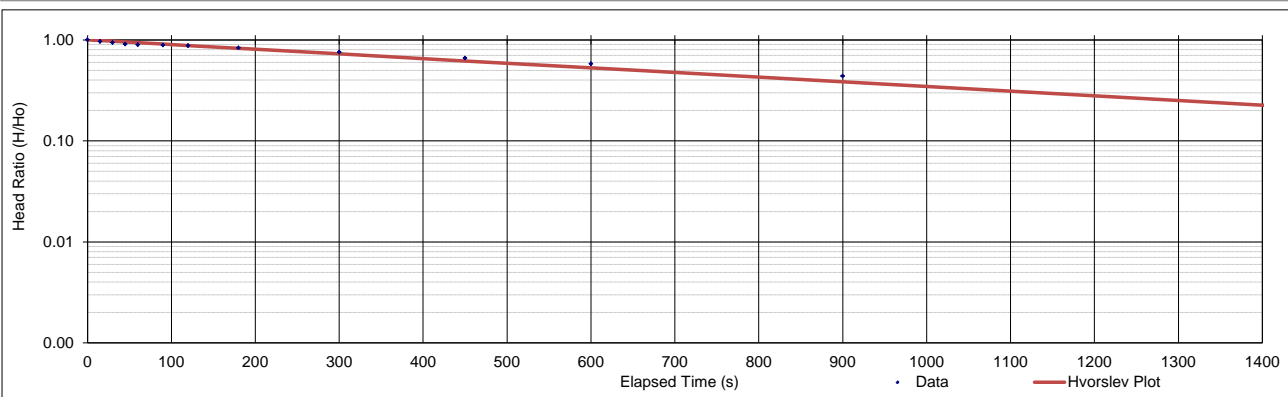
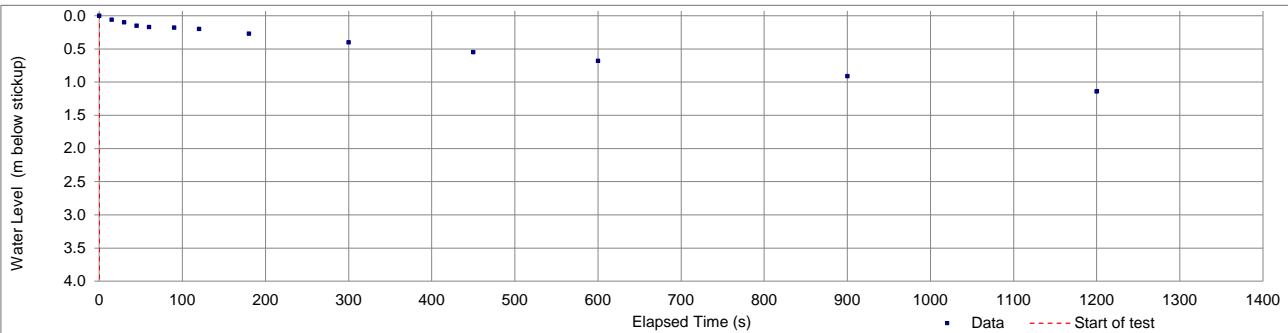
Monitoring Instrument Type Electronic Water Level Meter
Slug Dimensions and Type Not Documented
Test Date 27-Aug-12

Drill-hole diameter, D 0.096 m
Effective diameter of PVC riser pipe, d_e 0.025 m
Top of test zone 10.4 mbgs
Bottom of test zone 15.9 mbgs
Test Length, L 5.5 m
PVC type Sched. 40
Slot size 1" Slot 20 PVC

Slug Injected, Time = 0 Not Documented
Initial water level 1.62 m below stickup
Water level after slug 0.00 m below stickup
Change In Water Level, H_0 1.62 m
Expected Change In Water Level, H_0 Not Documented

Transmissivity, T 4E-07 m²/s
Hydraulic Conductivity, K 7E-08 m/s

H/ H_0 Intercept 1.00



TEST COMMENTS:

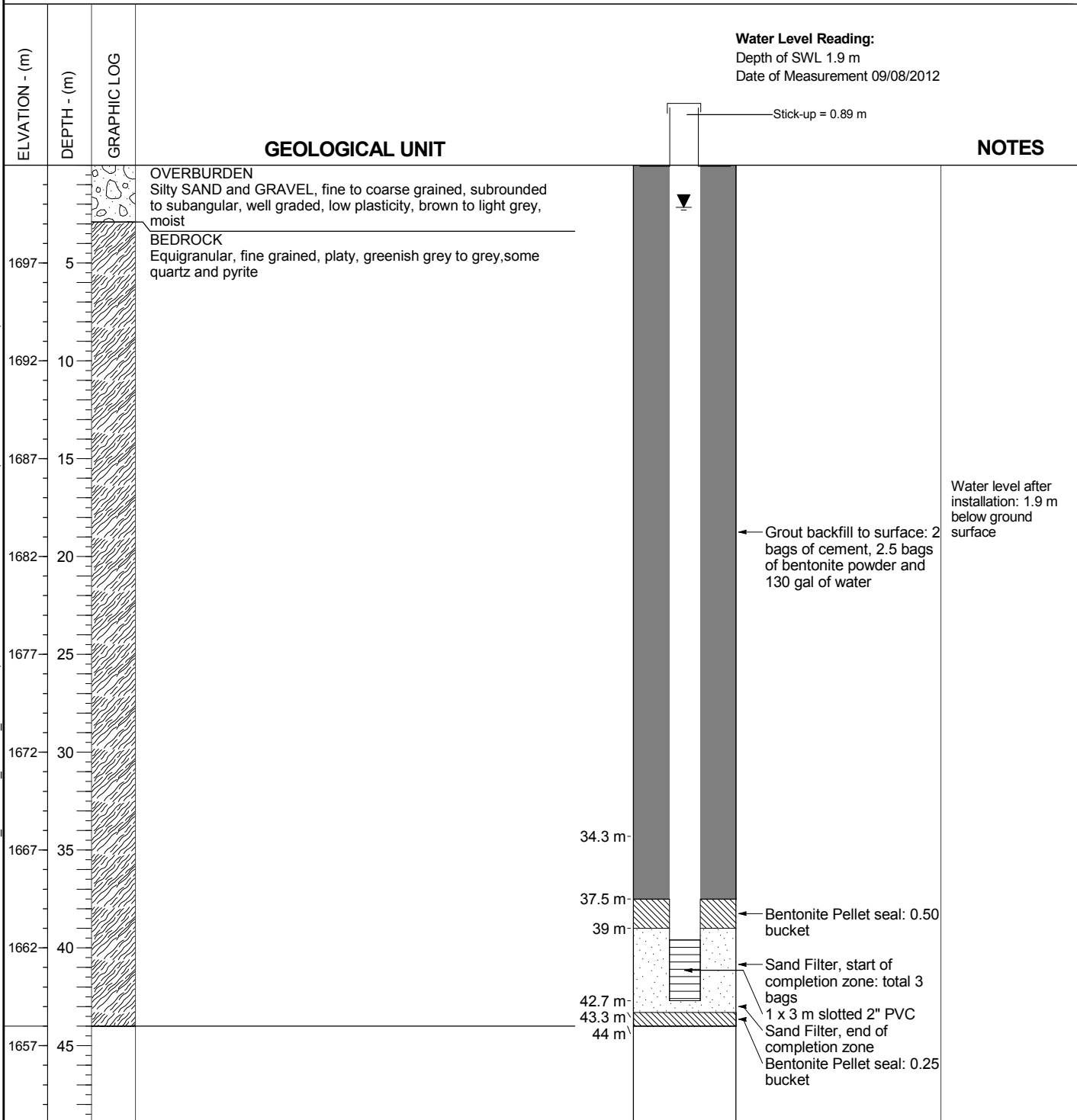
1. Test was conducted 1 day after standpipe piezometer installation.
2. Initial water level was measured on the day of the test but the time of water level measurement is not documented.
3. The K value for this test does not agree with the result of GT12-07 Lugeon Test 1, completed over the interval 11.3 to 26.8 m, which yielded basically no take in that system. It is possible that

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C3 - Piezometer Completion Response Testing Sheets\GT12-01 to 07 Piezo Test Sheets.xlsx\GT12-07

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	5 JUL 13	ISSUED WITH REPORT VA101-458/7-1	JBC	CHS	KDE

APPENDIX C4
MONITORING WELL INSTALLATION DETAILS
(Pages C4-1 to C4-10)

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-01D	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 8 Aug 12
Location: Northwest of Non-PAG Low Grade Stockpile	Total Depth: 44 m	Date Completed: 9 Aug 12
Coordinates: 5,709,413 N, 303,440 E (UTM NAD 83)	Elevation: 1702.3 m	Date Well Installed: 9 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM



GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-01D

Knight Piésold
CONSULTING

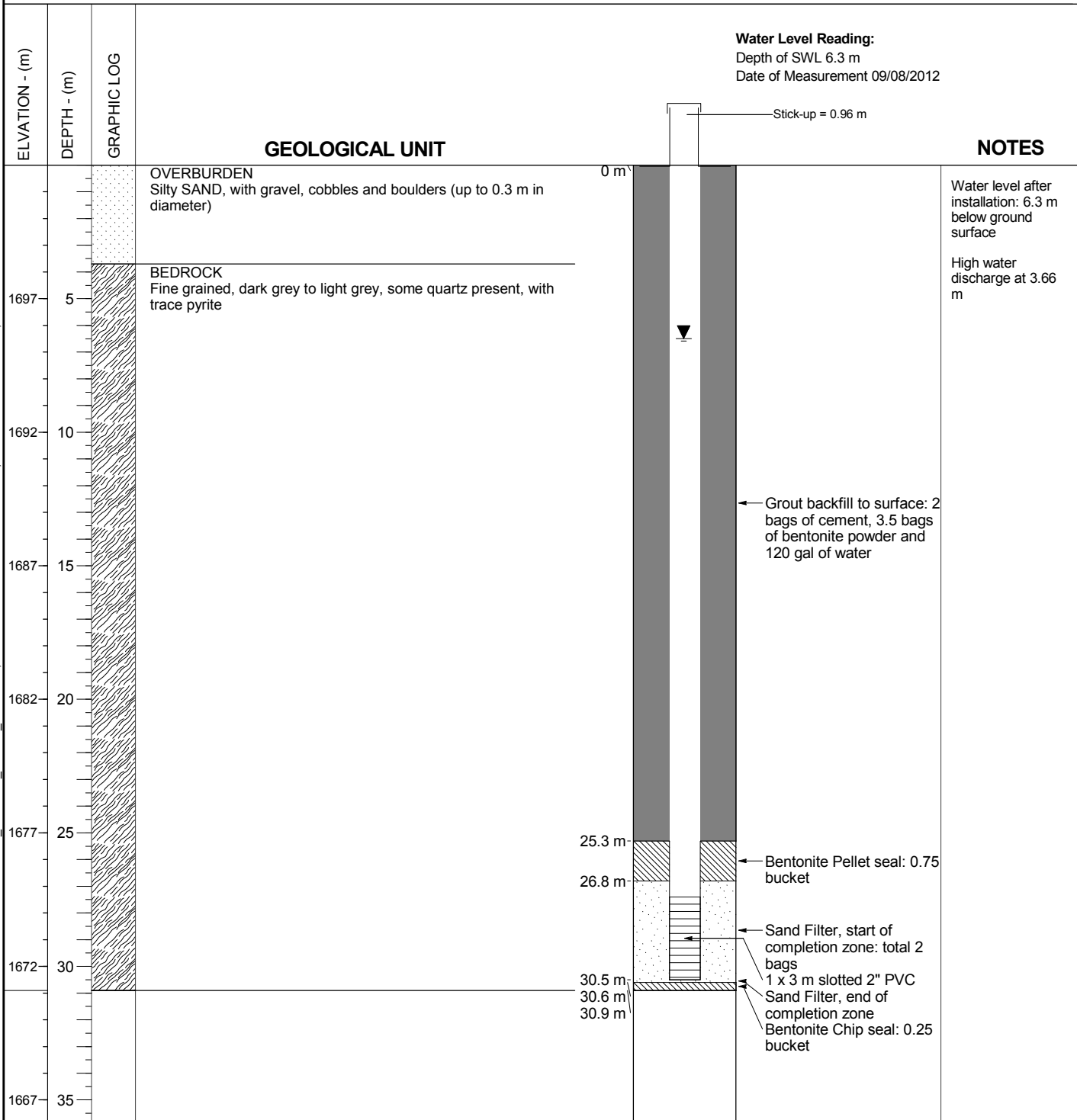
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-1	REV. 0

REV. 0 - Issued for Report

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-01S	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 9 Aug 12
Location: Northwest of Non-PAG Low Grade Stockpile	Total Depth: 30.9 m	Date Completed: 9 Aug 12
Coordinates: 5,709,415 N, 303,434 E (UTM NAD 83)	Elevation: 1702.4 m	Date Well Installed: 9 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM



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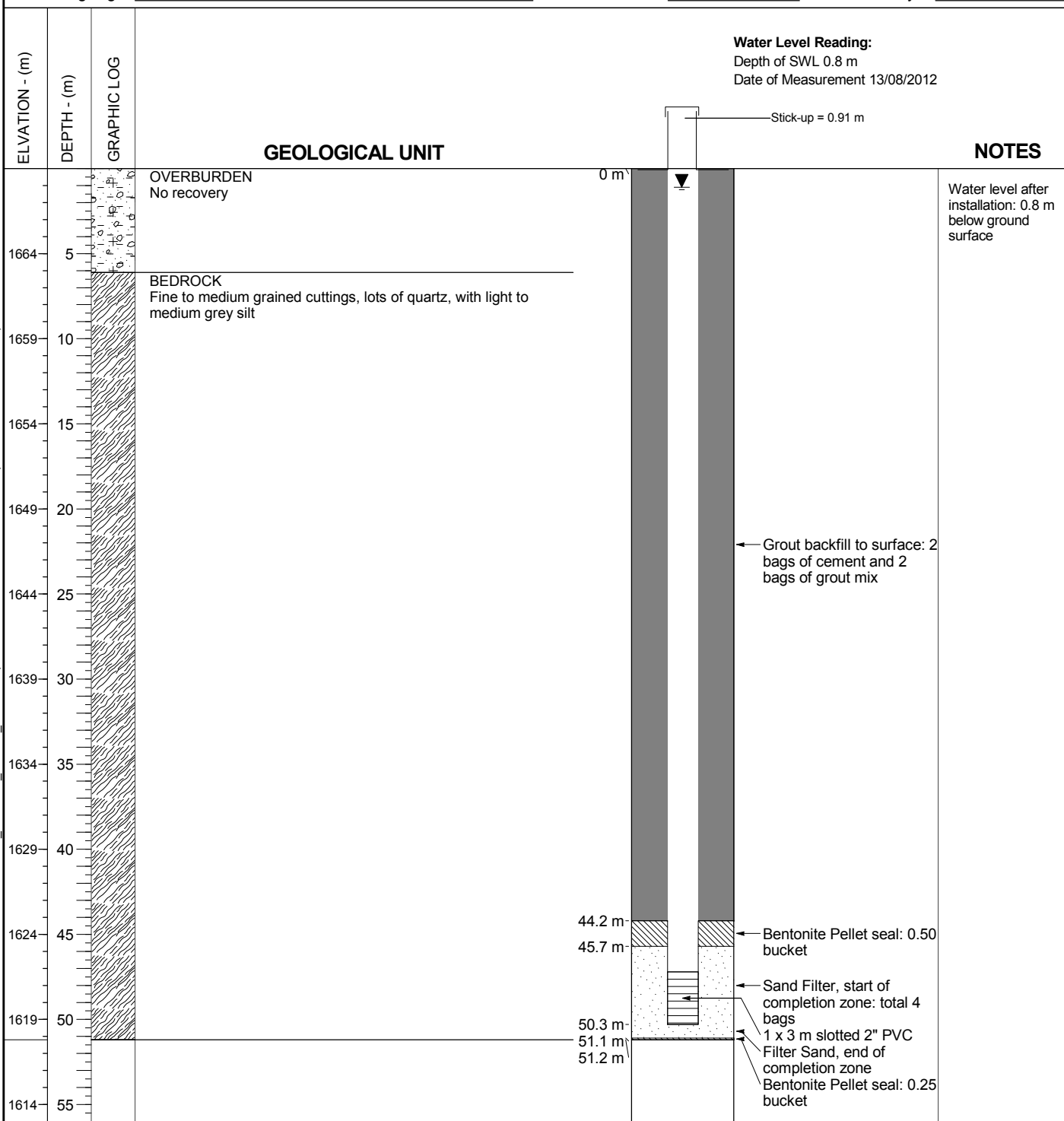
GENERAL REMARKS:

REV. 0 - Issued for Report

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-01S

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-2	REV. 0

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-02D	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 13 Aug 12
Location: East of Overburden Stockpile	Total Depth: 51.2 m	Date Completed: 13 Aug 12
Coordinates: 5,711,320 N, 306,995 E (UTM NAD 83)	Elevation: 1669.1 m	Date Well Installed: 13 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM



GENERAL REMARKS:

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-02D

Knight Piésold
CONSULTING

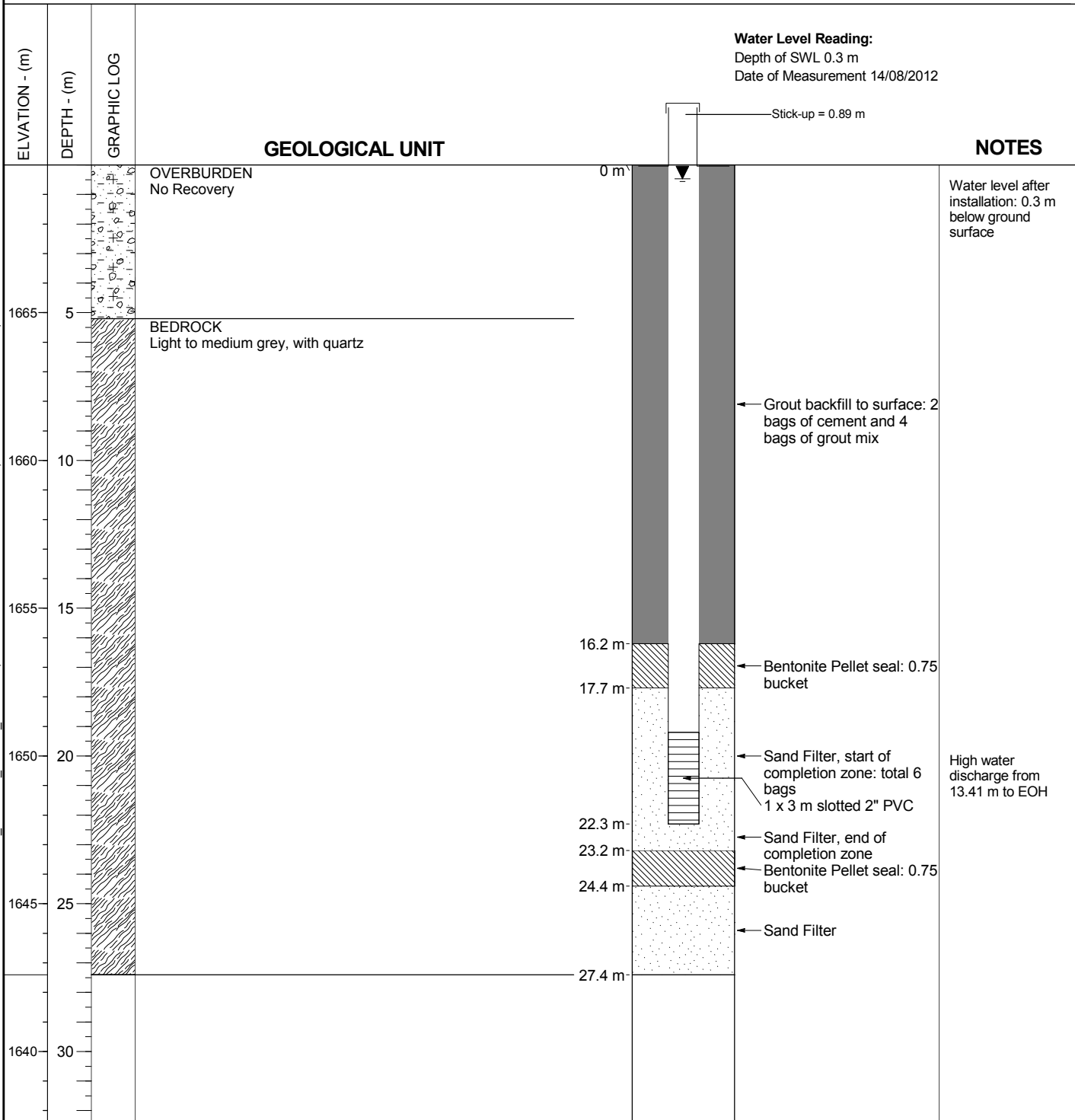
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-3	REV. 0

REV. 0 - Issued for Report

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-02S	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 14 Aug 12
Location: East of Overburden Stockpile	Total Depth: 27.4 m	Date Completed: 14 Aug 12
Coordinates: 5,711,328 N, 306,992 E (UTM NAD 83)	Elevation: 1669.5 m	Date Well Installed: 14 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM

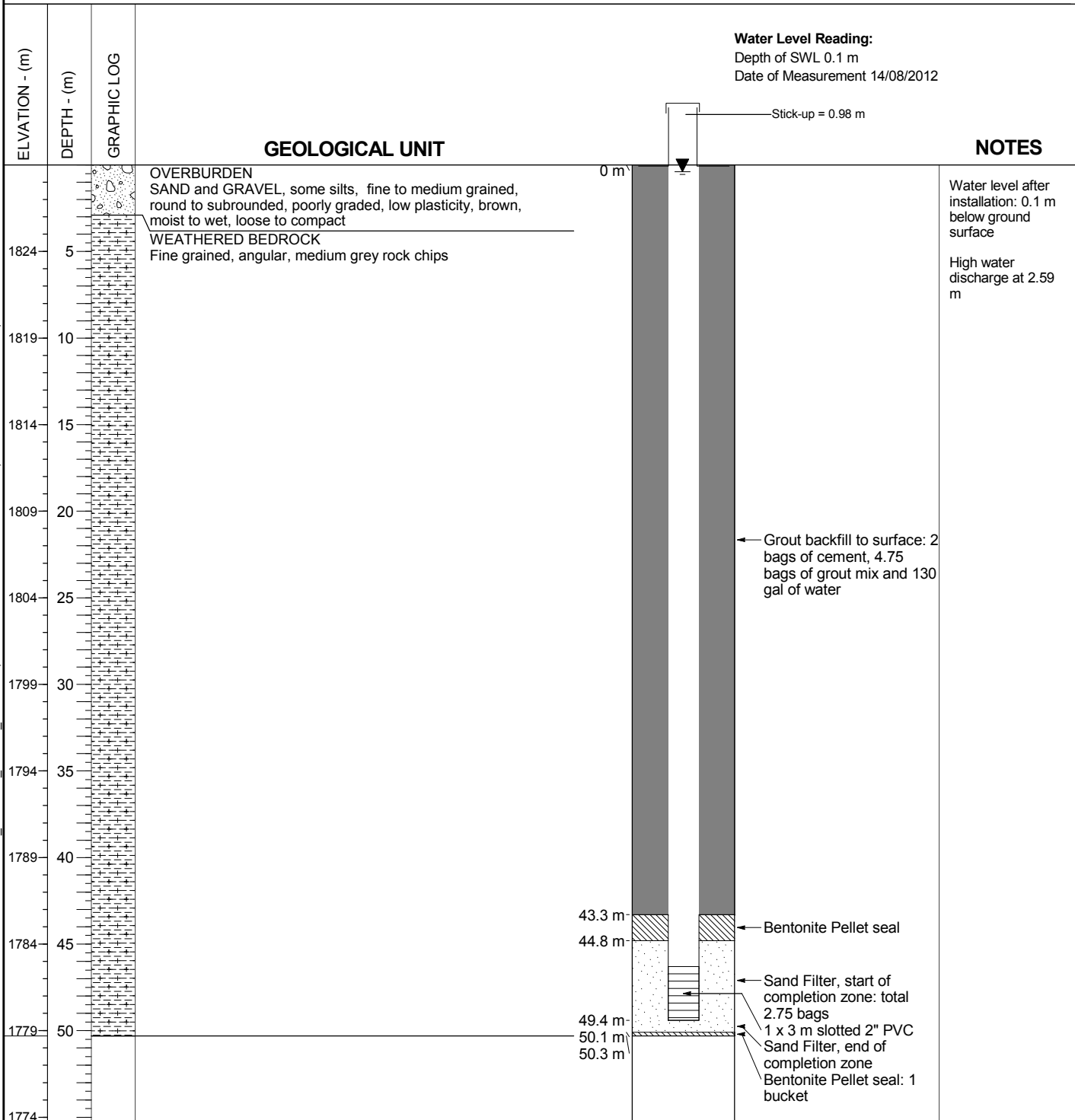


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REV. 0 - Issued for Report	YELLOWHEAD MINING INC. HARPER CREEK PROJECT PIEZOMETER DETAILS FOR MW12-02S	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix C4-4 REV. 0

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-03D	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 14 Aug 12
Location: Northeast of TMF	Total Depth: 50.3 m	Date Completed: 14 Aug 12
Coordinates: 5,708,972 N, 308,111 E (UTM NAD 83)	Elevation: 1828.6 m	Date Well Installed: 14 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM

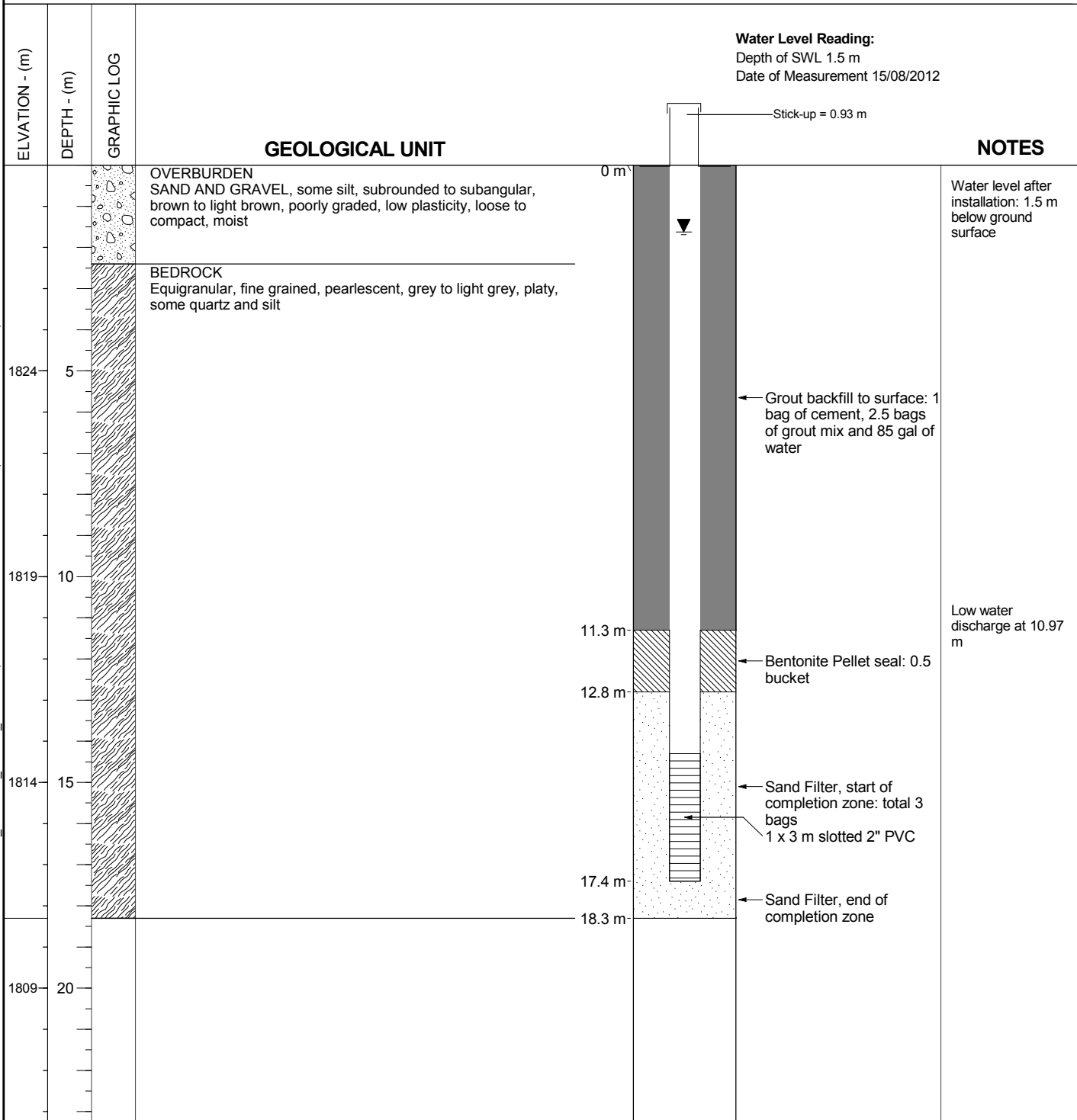


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REV. 0 - Issued for Report	YELLOWHEAD MINING INC. HARPER CREEK PROJECT PIEZOMETER DETAILS FOR MW12-03D	
	<i>Knight Piésold</i> CONSULTING	PROJECT/ASSIGNMENT NO. VA101-458/7-1 REF. NO. 1 FIGURE: Appendix C4-5 REV. 0

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project:	HARPER CREEK PROJECT	Drill Hole No.	MW12-03S	PAGE	1 of 1
Contractor:	WESTECH DRILLING CO.	Sample Type:	N/A	Date Started:	15 Aug 12
Location:	Northeast of TMF	Total Depth:	18.3 m	Date Completed:	15 Aug 12
Coordinates:	5,708,977 N, 308,119 E (UTM NAD 83)	Elevation:	1828.9 m	Date Well Installed:	15 Aug 12
Drilling Method:	ODEX	Azimuth, Dip:	0°, 90°	Supervised by:	KL
Drilling Rig:	B-54	Hole size:	5"	Reviewed by:	GM



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GENERAL REMARKS:

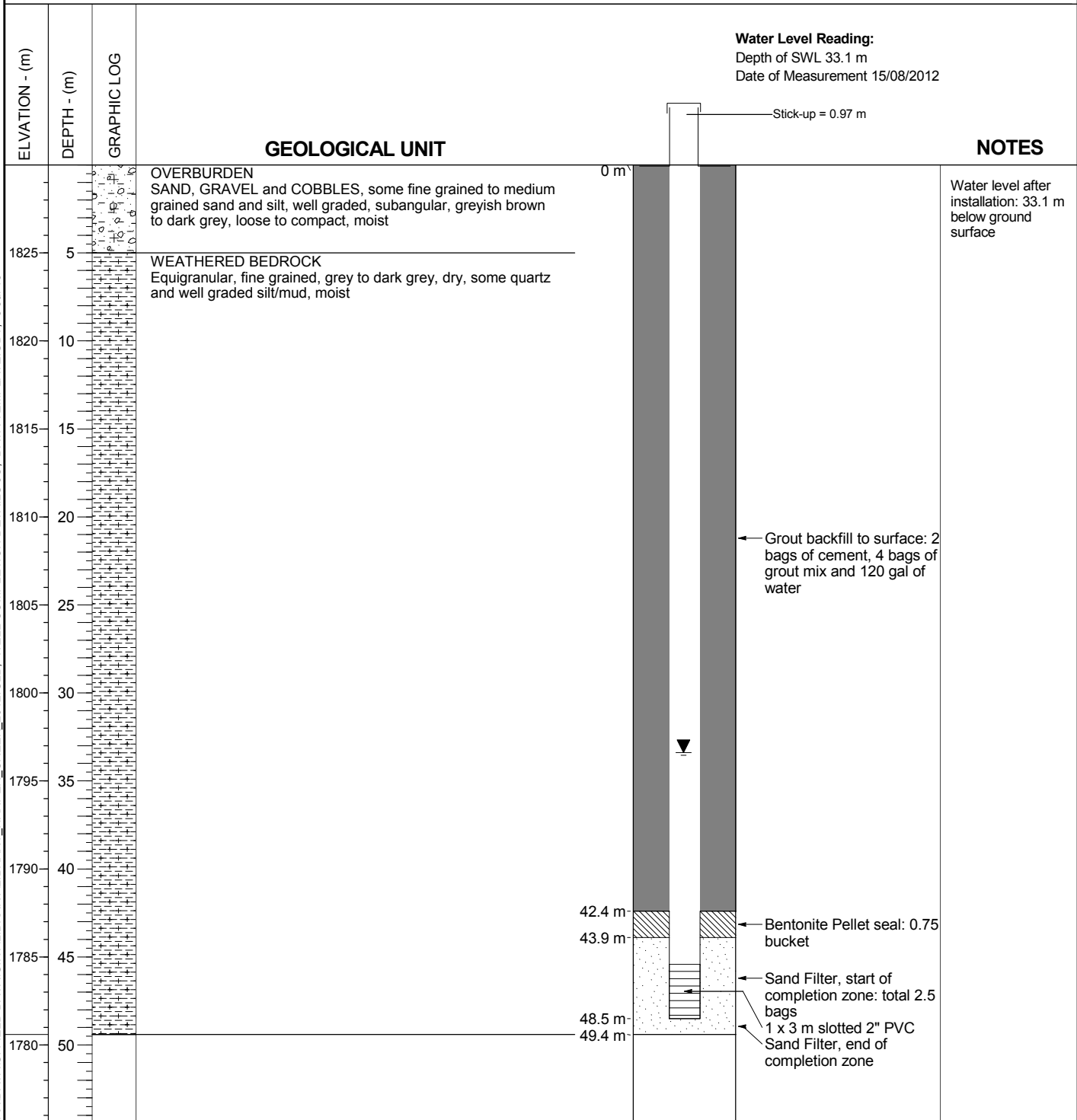
**YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-03S**

***Knight Piésold*
CONSULTING**

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-6	REV. 0

REV. 0 - Issued for Report

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-04D	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 15 Aug 12
Location: East of TMF	Total Depth: 49.4 m	Date Completed: 15 Aug 12
Coordinates: 5,706,350 N, 307,049 E (UTM NAD 83)	Elevation: 1830.4 m	Date Well Installed: 15 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL/SP
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM



GENERAL REMARKS:

**YELLOWHEAD MINING INC.
 HARPER CREEK PROJECT
 PIEZOMETER DETAILS FOR MW12-04D**

Knight Piésold
 CONSULTING

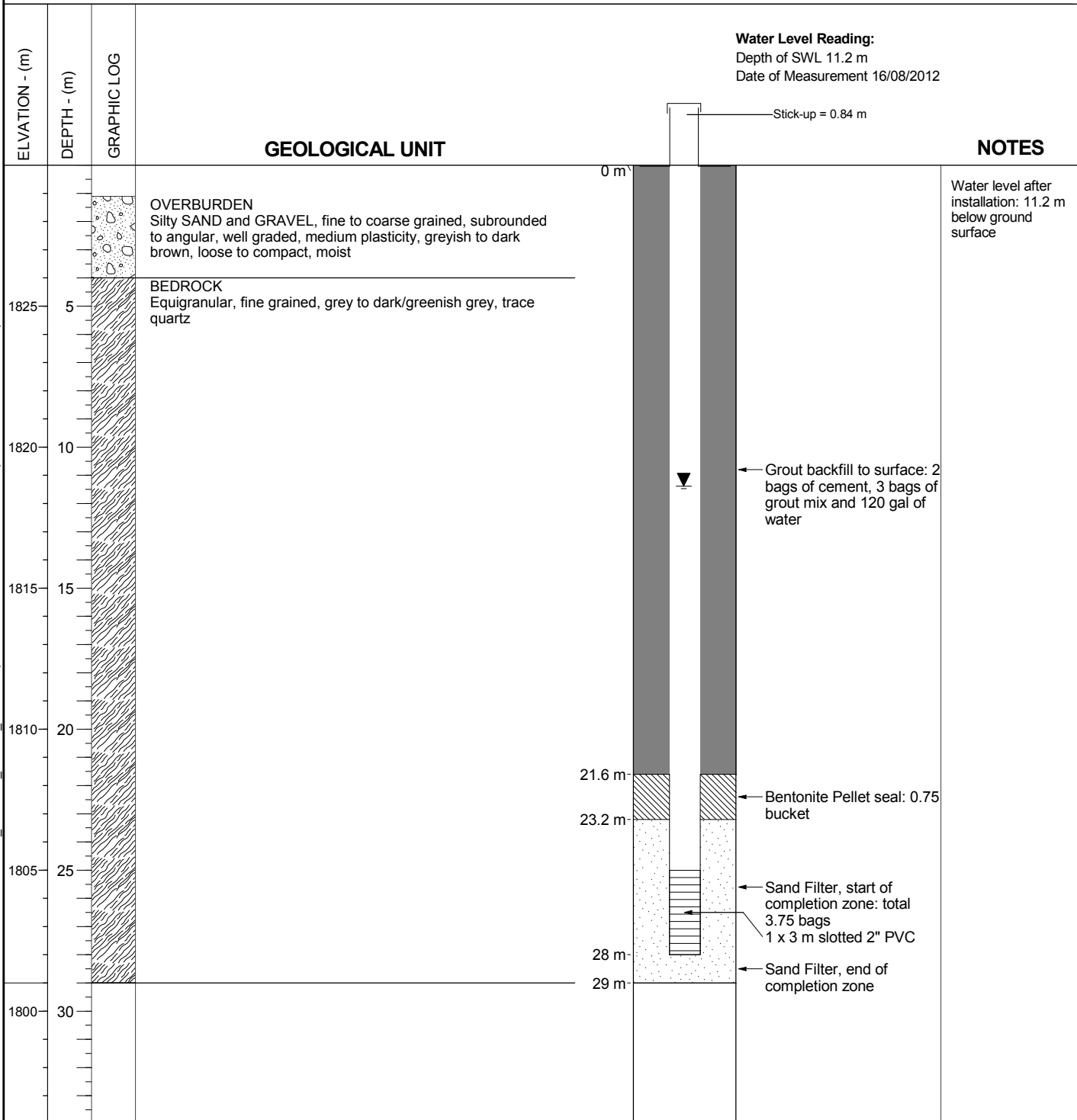
PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-7	REV. 0

REV. 0 - Issued for Report

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Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: HARPER CREEK PROJECT	Drill Hole No. MW12-04S	PAGE 1 of 1
Contractor: WESTECH DRILLING CO.	Sample Type: N/A	Date Started: 16 Aug 12
Location: East of TMF	Total Depth: 29 m	Date Completed: 16 Aug 12
Coordinates: 5,706,357 N, 307,059 E (UTM NAD 83)	Elevation: 1830.2 m	Date Well Installed: 16 Aug 12
Drilling Method: ODEX	Azimuth, Dip: 0°, 90°	Supervised by: KL
Drilling Rig: B-54	Hole size: 5"	Reviewed by: GM



GENERAL REMARKS:

REV. 0 - Issued for Report

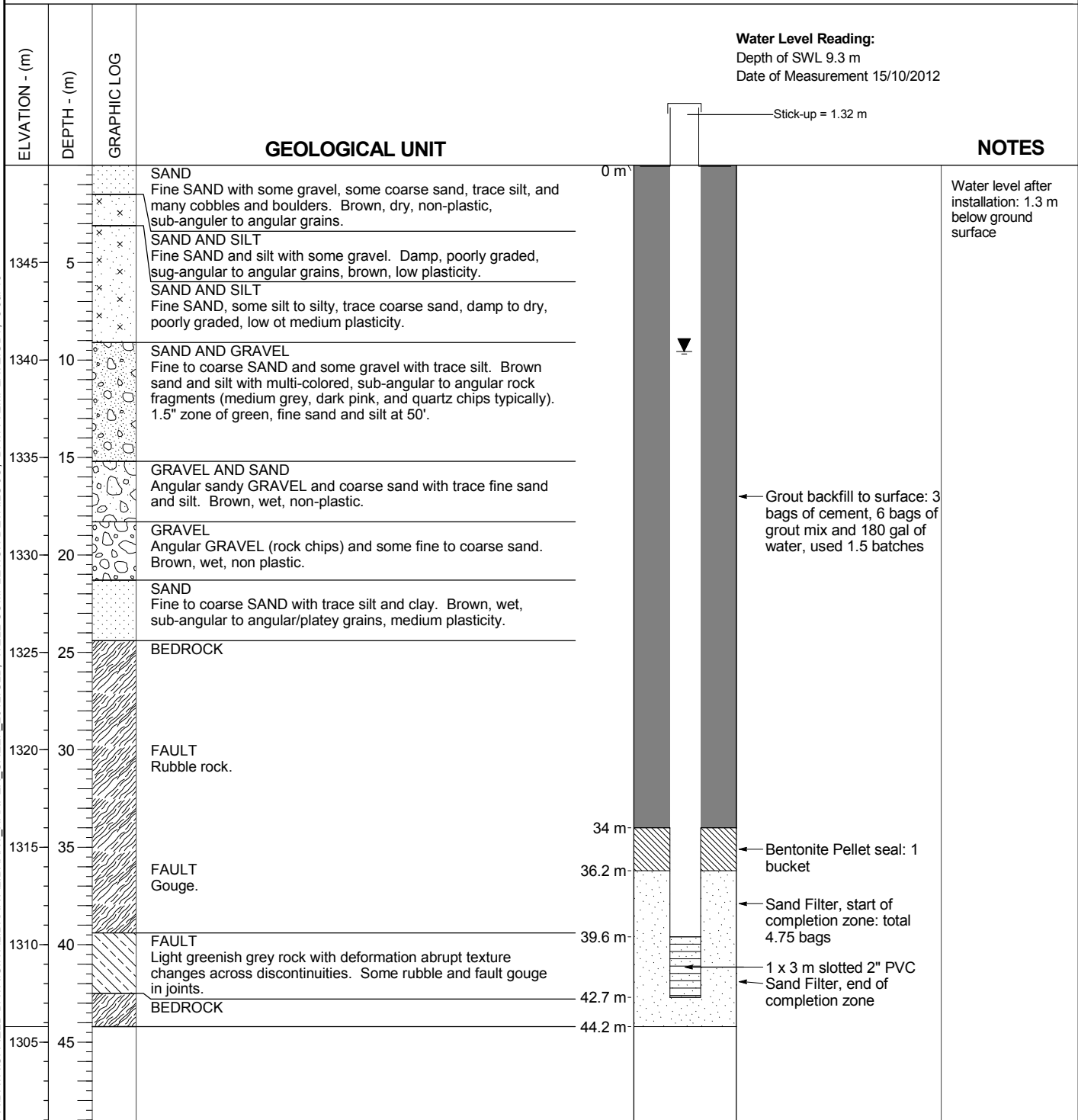
YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-04S

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-8	REV. 0

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Project:	HARPER CREEK PROJECT	Drill Hole No.	MW12-05D	PAGE	1 of 1
Contractor:	WESTECH DRILLING CO.	Sample Type:	N / A	Date Started:	14 Oct 12
Location:	Southwest of Non-PAG Waste Rock Stockpile	Total Depth:	44.2 m	Date Completed:	14 Oct 12
Coordinates:	5,709,946 N , 302,234 E (UTM NAD 83)	Elevation:	1350.0 m	Date Well Installed:	14 Oct 12
Drilling Method:	ODEX	Azimuth, Dip:	0°, 90°	Supervised by:	GM
Drilling Rig:	B-54	Hole size:	5"	Reviewed by:	GM

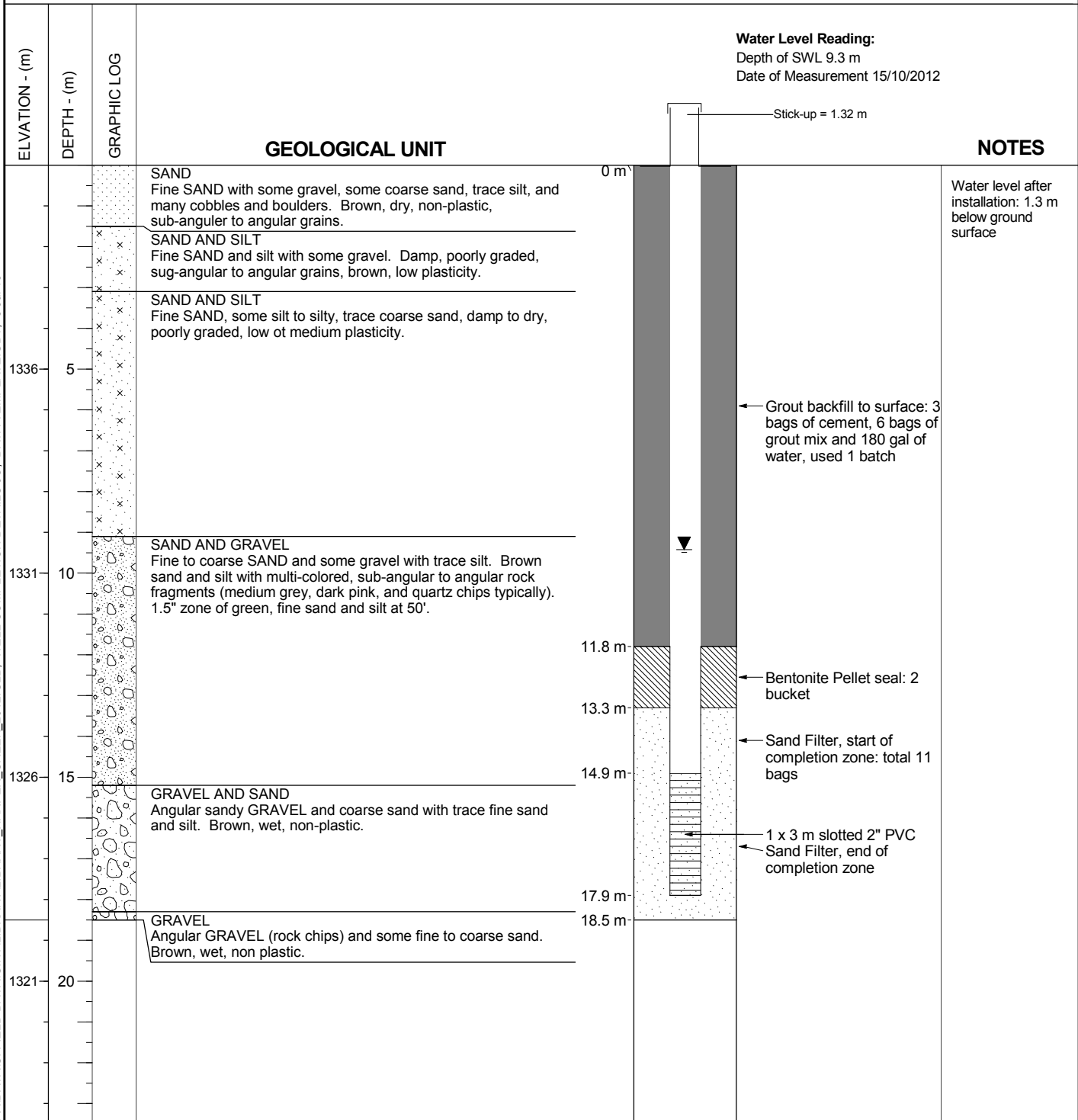


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REV. 0 - Issued for Report	YELLOWHEAD MINING INC. HARPER CREEK PROJECT PIEZOMETER DETAILS FOR MW12-05D	PROJECT/ASSIGNMENT NO.	REF. NO.
		VA101-458/7-1	1
		FIGURE:	REV.
		Appendix C4-9	0

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project:	HARPER CREEK PROJECT	Drill Hole No.	MW12-05S	PAGE	1 of 1
Contractor:	WESTECH DRILLING CO.	Sample Type:	N / A	Date Started:	15 Oct 12
Location:	Southwest of Non-PAG Waste Rock Stockpile	Total Depth:	18.5 m	Date Completed:	15 Oct 12
Coordinates:	5,709,991 N , 302,233 E (UTM NAD 83)	Elevation:	1341.0 m	Date Well Installed:	15 Oct 12
Drilling Method:	ODEX	Azimuth, Dip:	0°, 90°	Supervised by:	GM
Drilling Rig:	B-54	Hole size:	5"	Reviewed by:	GM



GENERAL REMARKS:
Hole GT12-08 (drilled by Westech Drilling Co.) was logged by KP and used for the material description of this hole.

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT
PIEZOMETER DETAILS FOR MW12-05S

Knight Piésold
CONSULTING

PROJECT/ASSIGNMENT NO. VA101-458/7-1	REF. NO. 1
FIGURE Appendix C4-10	REV. 0

REV. 0 - Issued for Report

Logging conducted according to the Canadian Foundation Engineering Manual, 4th Edition, 2006.

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APPENDIX C5
MONITORING WELL RESPONSE TESTING SHEETS

(Pages C5-1 to C5-4)

**Yellowhead Mining Inc.
Harper Creek Project**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING COOPER, BREDEHOEFT AND PAPADOPULOS (1967)**

Project No. VA101-00458/04
Field Technician LD
Analyst KTD

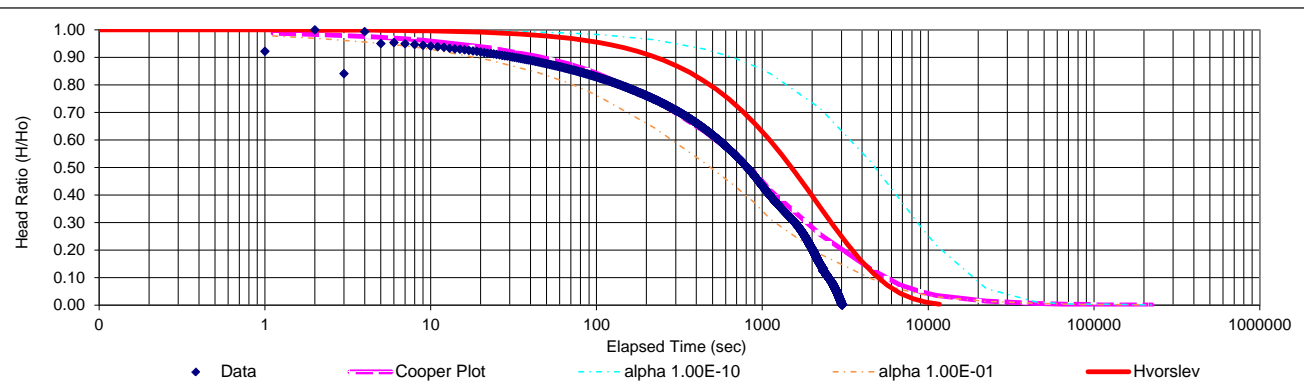
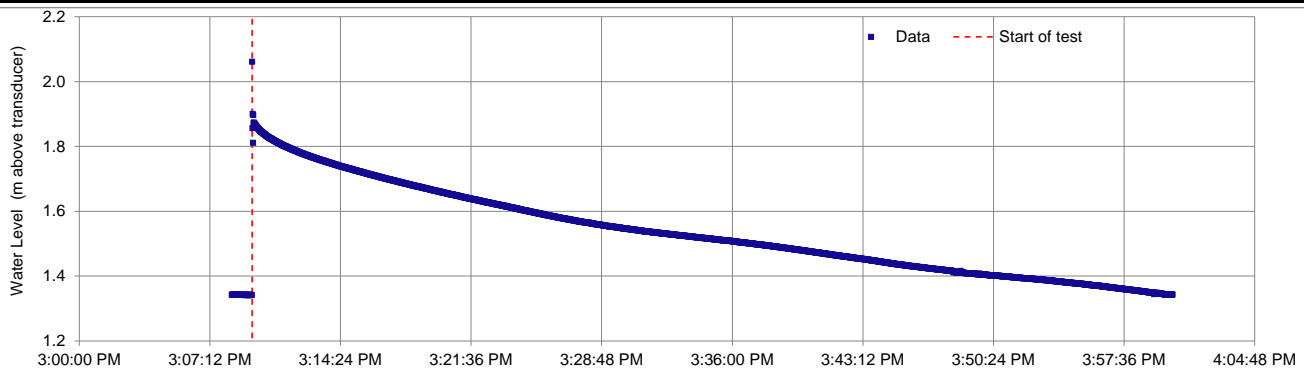
Monitoring Well/Piezometer **MW12-01S**
Test 1 Slug Insertion

Monitoring Instrument Type Solinst Level Logger
Slug Dimensions and Type 2.00 m x 1" Waterra tubing
Test Date 16-Sep-12

Drill-hole diameter, D 0.13 m
Effective diameter of PVC riser pipe, d_e 0.04 m
Top of test zone 28.3 m
Bottom of test zone 31.4 m
Test Length, L 3.1 m
PVC type Schedule 80
Slot size 20 Slot

Slug Injected, Time = 0 3:09:32 PM
Initial water level 1.34 m above transducer
Water level after slug 1.90 m above transducer
Change In Water Level, H_0 0.56 m

Transmissivity, T 4.E-07 m²/s
Hydraulic Conductivity, K 1.E-07 m/s
Storativity, S 4E-03
Alpha 3.6E-02



TEST COMMENTS:

The water level prior to response testing was still recovering (decreasing) from the addition of water during well development. Therefore during the response test the water level was responding to the slug insertion as well as this background change in water level. However, since the background change was considered small compared to the slug insertion, it was ignored for the analysis. The shape of the data is affected but less emphasis was placed on this data.

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C5 - Monitoring Well Response Testing Sheets\MW12-01S Response Testing Analysis-KTD.xlsx|Cooper et al.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	KTD	CHS	KDE

**Yellowhead Mining Inc.
Harper Creek Project**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING COOPER, BREDEHOEFT AND PAPADOPULOS (1967)**

Project No. VA101-00458/04
Field Technician CHS, CM, LD
Analyst KTD

Monitoring Well/Piezometer **MW12-02S**
Test 1 Slug Insertion

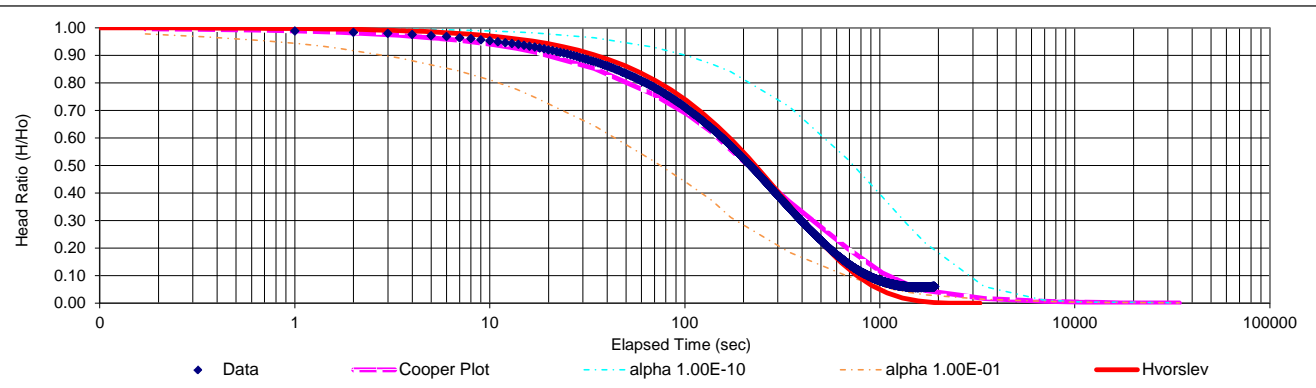
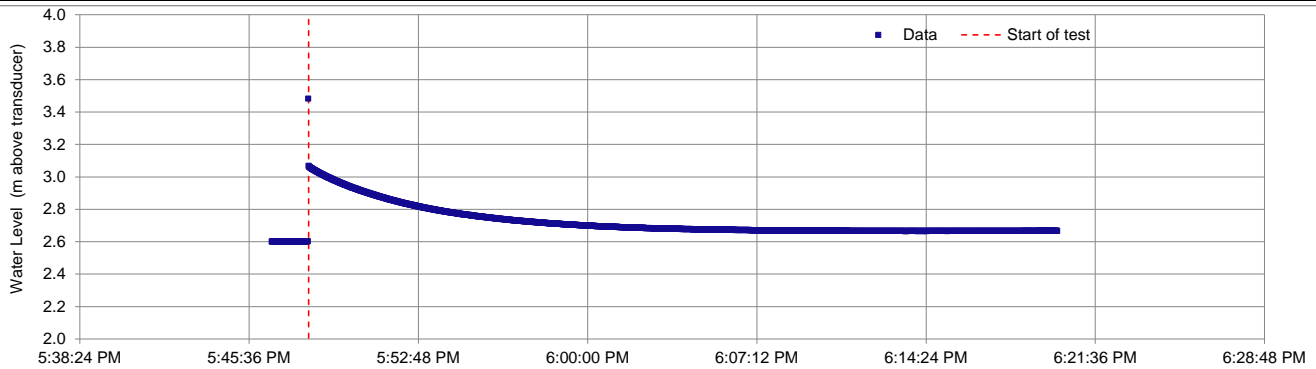
Monitoring Instrument Type Solinst Level Logger
Slug Dimensions and Type 1.66 m x 1" Waterra tubing
Test Date 31-Aug-12

Drill-hole diameter, D 0.13 m
Effective diameter of PVC riser pipe, d_e 0.04 m
Top of test zone 20.1 m
Bottom of test zone 23.2 m
Test Length, L 3.1 m
PVC type Schedule 80
Slot size 20 Slot

Slug Injected, Time = 0 5:48:08 PM
Initial water level 2.64 m above transducer
Water level after slug 3.07 m above transducer
Change in Water Level, H_0 0.43 m

Transmissivity, T $3E-06$ m²/s
Hydraulic Conductivity, K $9E-07$ m/s

Storativity, S $3E-04$ Alpha 2.3E-03



TEST COMMENTS:

M:\1\01\00458\07\A\Report1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C5 - Monitoring Well Response Testing Sheets\MW12-02S Response Testing Analysis-KTD.xlsx|Cooper et al.

0	05JUL13	ISSUED WITH REPORT VA101-4587-1	KTD	CHS	KDE
REV	DATE	DESCRIPTION	PREPD	CHKD	APPD

**Yellowhead Mining Inc.
Harper Creek Project**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING COOPER, BREDEHOEFT AND PAPADOPULOS (1967)**

Project No. VA101-00458/04
Field Technician LD
Analyst KTD

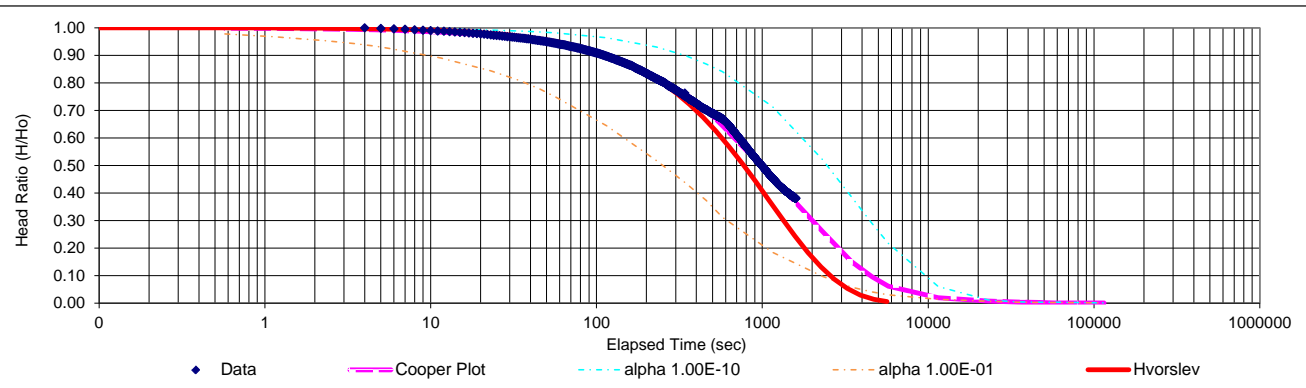
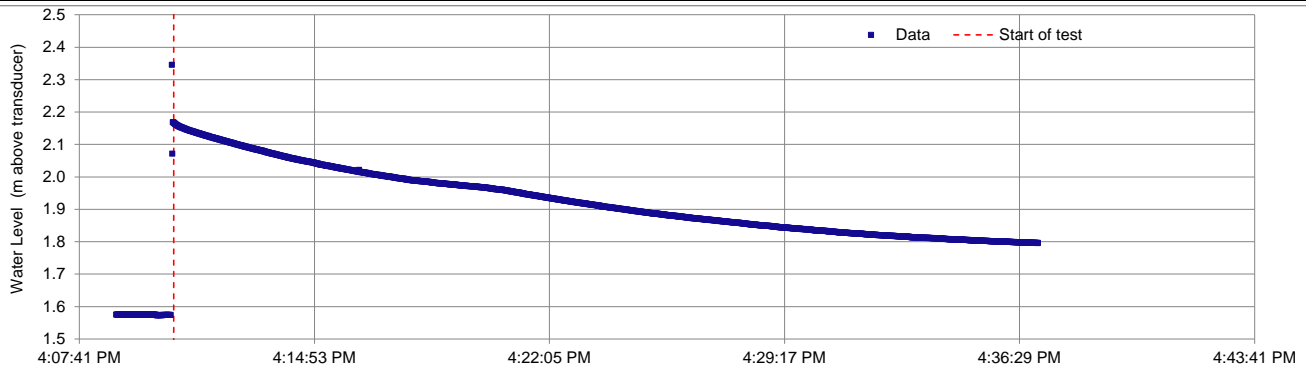
Monitoring Well/Piezometer **MW12-03S**
Test 1 Slug Insertion

Monitoring Instrument Type Solinst Level Logger
Slug Dimensions and Type 1.77 m x 1" Waterra tubing
Test Date 31-Aug-12

Drill-hole diameter, D 0.13 m
Effective diameter of PVC riser pipe, d_e 0.04 m
Top of test zone 14.3 m
Bottom of test zone 17.4 m
Test Length, L 3.1 m
PVC type Schedule 80
Slot size 20 Slot

Slug Injected, Time = 0 4:10:34 PM
Initial water level 1.57 m above transducer
Water level after slug 2.16 m above transducer
Change In Water Level, H_0 0.59 m

Transmissivity, T $8E-07$ m²/s
Hydraulic Conductivity, K $3E-07$ m/s
Storativity, S $2E-05$
Alpha $1.81E-04$



TEST COMMENTS:

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C5 - Monitoring Well Response Testing Sheets\MW12-03S
Response Testing Analysis-KTD.xlsx\Cooper et al.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	KTD	CHS	KDE

**Yellowhead Mining Inc.
Harper Creek Project**

**HYDRAULIC CONDUCTIVITY CALCULATION
USING COOPER, BREDEHOEFT AND PAPADOPULOS (1967)**

Project No. VA101-00458/04
Field Technician CM, LD
Analyst KTD

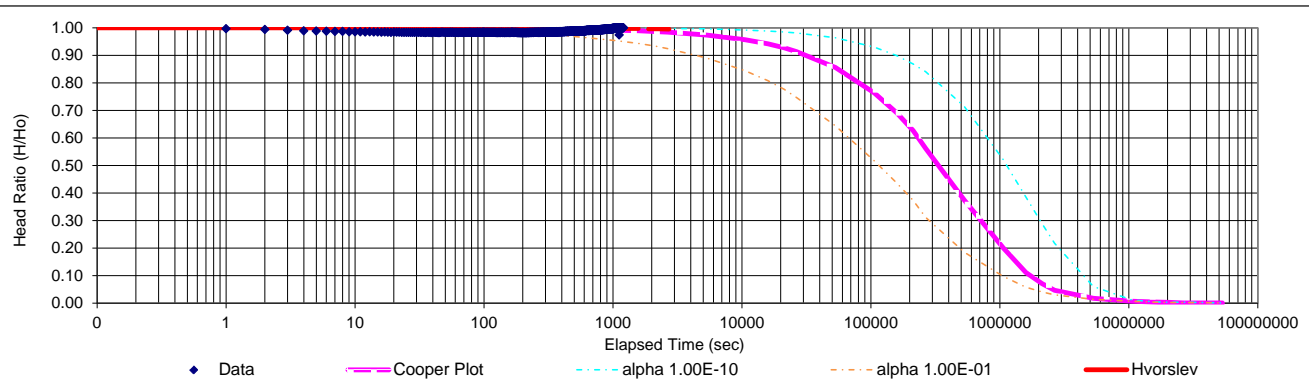
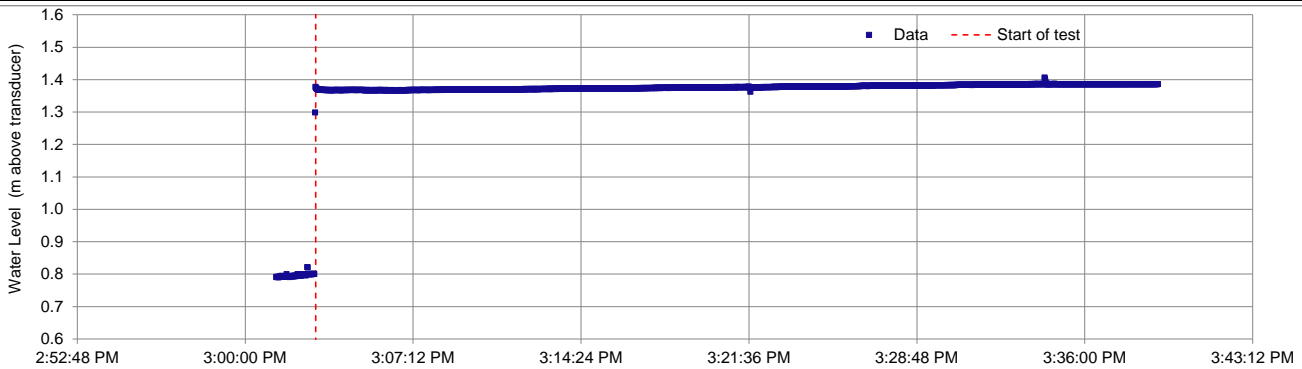
Monitoring Well/Piezometer **MW12-04S**
Test 1 Slug Insertion

Monitoring Instrument Type Solinst Level Logger
Slug Dimensions and Type 1.8 m x 1" Waterra tubing
Test Date 31-Aug-12

Drill-hole diameter, D 0.13 m
Effective diameter of PVC riser pipe, d_e 0.04 m
Top of test zone 25.0 m
Bottom of test zone 28.0 m
Test Length, L 3.1 m
PVC type Schedule 80
Slot size 20 Slot

Slug Injected, Time = 0 3:03:01 PM
Initial water level 0.80 m above transducer
Water level after slug 1.38 m above transducer
Change In Water Level, H_0 0.58 m

Hydraulic Conductivity, K <1E-8 m/s Storativity, S 2E-04 Alpha 1.8E-03



TEST COMMENTS:

1. Testing in MW12-04S indicates a low hydraulic conductivity value. The hydraulic conductivity value is reported as <1E-8 m/s to indicate that the value is likely less than testing can reliably measure.

M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix C - Hydrogeological Drillhole Data\C5 - Monitoring Well Response Testing Sheets\MW12-04S Response Testing Analysis-KTD.xlsx\Cooper et al.

REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D
0	05JUL13	ISSUED WITH REPORT VA101-458/7-1	KTD	CHS	KDE

APPENDIX D

LABORATORY TEST RESULTS

Appendix D1	Soil Lab Testing Results
Appendix D2	Soil Particle Analyses Charts
Appendix D3	Rock Lab Testing Results

APPENDIX D1
SOIL LAB TESTING RESULTS
(Pages D1-1 to D1-80)

APPENDIX D1

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT

2012 GEOTECHNICAL SITE INVESTIGATION
SUMMARY OF 2012 SOIL LABORATORY TEST RESULTS

Print Jul/08/13 9:55:04

Sample Location	Sample I.D.	Sample General Area	Coordinates (Easting, Northing)	Depth (m)	Natural Moisture Content (%)	Percent Passing 3/8" Sieve	Percent Passing #200 Sieve	Atterberg Limits ^[1]			Particle Size Distribution				USCS	Description
								P.L. %	L.L. %	P.I. %	Gravel %	Sand %	Silt %	Clay %		
											+ 5 mm	5 to 0.074 mm	0.074 to 0.002 mm	- 0.002 mm		
GT12-01	SPT #1	Rock Quarry	303869, 5706192	0.91 - 1.52	4.7	92.0	52.5	14	26	12	15.4	32.1	31.3	21.2	CL	Silty SAND with gravel
GT12-01	SPT #2	Rock Quarry	303869, 5706192	2.44 - 3.05	6.3	82.2	43.4	15	29	14	27.5	29.1	23.6	19.8	SC	Clayey SAND with gravel
GT12-01	SPT #3	Rock Quarry	303869, 5706192	3.96 - 4.57	6.1	95.5	55.0	13	30	17	9.8	35.2	31.0	24.0	CL	Sandy lean CLAY
GT12-01	SPT #4	Rock Quarry	303869, 5706192	5.49 - 6.10	6.5	92.0	52.5	14	26	12	15.4	32.1	31.3	21.2	CL	Sandy lean CLAY with gravel
GT12-04	SPT #1	Crusher Site	304159, 5710396	0.61 - 1.22	7.5	71.3	34.6	NP	NP	NP	39.0	26.4	27.4	7.2	GM	Silty GRAVEL with sand
GT12-04	SPT #2	Crusher Site	304159, 5710396	1.22 - 1.83	4.0	77.1	18.7	NP	NP	NP	43.4	37.9	12.7	6.0	GM	Silty GRAVEL with sand
GT12-04	SPT #3 ^[2]	Crusher Site	304159, 5710396	2.74 - 2.80	0.1	89.7	11.3	-	-	-	40.4	48.3	11.3	-	-	-
GT12-04	SPT #4	Crusher Site	304159, 5710396	4.27 - 4.88	7.4	95.3	27.4	22	26	4	19.8	52.8	15.9	11.5	SC-SM	Silty, clayey SAND with gravel
GT12-04	SPT #5 ^[2]	Crusher Site	304159, 5710396	5.94 - 5.97	11.4	100.0	42.9	-	-	-	0.0	39.4	42.9	-	-	-
GT12-05	SPT #1	Overburden Stockpile	306344, 5711114	0 - .61	4.1	74.5	14.2	NP	NP	NP	43.8	42.0	10.2	4.0	GM	Silty GRAVEL with sand
GT12-05	SPT #2	Overburden Stockpile	306344, 5711114	1.07 - 1.68	1.9	81.1	17.7	NP	NP	NP	36.3	46.0	14.1	3.6	SM	Silty SAND with gravel
GT12-05	SPT #3	Overburden Stockpile	306344, 5711114	2.62 - 3.23	6.2	67.7	17.0	NP	NP	NP	48.9	34.1	12.7	4.3	GM	Silty GRAVEL with sand
GT12-06	SPT #1 ^{[2][3]}	Overburden Stockpile	306746, 5710844	0 - 0.61	10.8	100.0	27.9	-	-	-	8.6	63.5	21.9	6.0	-	-
GT12-06	SPT #2	Overburden Stockpile	306746, 5710844	0.91 - 1.07	0.5	99.0	22.6	NP	NP	NP	17.4	60.0	18.2	4.4	SM	Silty SAND with gravel
TMF12-01	SPT #1	TMF - Upstream Area	305287, 5706353	1.22 - 1.83	8.6	66.6	32.3	14	27	13	40.5	27.2	21.3	11.0	GC	Clayey GRAVEL with sand
TMF12-01	SPT #2	TMF - Upstream Area	305287, 5706353	2.74 - 3.35	7.3	90.6	44.8	14	27	13	18.4	36.8	26.0	18.8	SC	Clayey SAND with gravel
TMF12-01	SPT #3	TMF - Upstream Area	305287, 5706353	4.27 - 4.88	8.1	82.6	39.3	14	27	13	26.0	34.7	22.2	17.1	SC	Clayey SAND with gravel
TMF12-01	SPT #4	TMF - Upstream Area	305287, 5706353	5.79 - 6.40	10	89.7	49.9	14	27	13	18.7	31.4	28.1	21.8	SC	Clayey SAND with gravel
TMF12-01	SPT #5	TMF - Upstream Area	305287, 5706353	7.31 - 7.92	7.3	87.1	44.8	14	27	13	20.4	34.8	24.7	20.1	SC	Clayey SAND with gravel
TMF12-01	SPT #6	TMF - Upstream Area	305287, 5706353	8.84 - 9.45	8.8	87.7	50.1	14	27	13	19.0	30.9	27.9	22.2	CL	Sand lean CLAY with gravel
TMF12-01	SPT #7	TMF - Upstream Area	305287, 5706353	10.36 - 10.97	9.2	70.0	27.6	14	27	13	36.9	35.5	18.7	8.9	GC	Clayey GRAVEL with sand
TMF12-01	SPT #8	TMF - Upstream Area	305287, 5706353	11.89 - 12.50	67.0	86.1	35.3	14	27	13	25.1	39.6	23.2	12.1	SC	Clayey SAND with gravel
TMF12-02	SPT #1	TMF - Upstream Area	305389, 5706349	1.22 - 1.83	7.5	87.4	44.3	15	29	14	21.2	34.5	25.6	18.7	SC	Clayey SAND with gravel
TMF12-02	SPT #2	TMF - Upstream Area	305389, 5706349	2.74 - 3.35	7.7	80.5	41.0	15	29	14	27.5	31.5	23.3	17.7	SC	Clayey SAND with gravel
TMF12-02	SPT #3	TMF - Upstream Area	305389, 5706349	4.27 - 4.88	8.9	91.4	48.3	15	25	10	15.2	36.5	27.9	20.4	SC	Clayey SAND with gravel
TMF12-03	SPT #1	TMF - Upstream Area	305289, 5706172	1.22 - 1.83	12.3	76.9	27.8	19	28	9	30.4	41.8	18.4	9.4	SC	Clayey SAND with gravel
TMF12-03	SPT #2	TMF - Upstream Area	305289, 5706172	2.74 - 3.35	9.3	73.5	23.7	22	25	3	33.2	43.1	17.5	6.2	SM	Silty SAND with gravel
TMF12-04	SPT #1	TMF Embankment East	304888, 5706056	1.22 - 1.83	9.2	89.2	40.2	15	24	9	16.9	42.9	23.9	16.3	SC	Clayey Sand with gravel
TMF12-04	SPT #2	TMF Embankment East	304888, 5706056	2.74 - 3.35	4.8	90.7	36.9	-	-	-	17.2	45.9	19.3	17.6	-	-
TMF12-05	SPT #1	TMF Embankment East	304837, 5706016	1.22 - 1.83	8.3	82.1	27.1	17	21	4	25.8	47.1	19.4	7.7	SC-SM	Silty, clayey SAND with gravel
TMF12-05	SPT #2	TMF Embankment East	304837, 5706016	2.74 - 3.35	5.6	76.7	28.4	20	21	1	35.7	35.9	19.9	8.5	SM	Silty SAND with gravel
TMF12-06	SPT #1	TMF Embankment East	304806, 5706131	0.91 - 1.52	4.3	59.1	11.9	-	-	-	50.9	37.2	10.0	1.9	-	-
TMF12-06	SPT #2	TMF Embankment East	304806, 5706131	2.44 - 3.05	5.1	68.7	25.8	-	-	-	41.7	32.5	18.9	6.9	-	-
TMF12-06	SPT #3	TMF Embankment East	304806, 5706131	3.96 - 4.57	5.4	90.4	44.1	15	27	12	18.1	37.8	24.6	19.5	SC	Clayey SAND with gravel
TMF12-06	SPT #4	TMF Embankment East	304806, 5706131	5.49 - 6.10	6.2	92.1	43.7	14	28	14	16.3	40.0	25.1	18.6	SC	Clayey SAND with gravel
TMF12-07	SPT #1	TMF Embankment East	304719, 5706115	1.22 - 1.83	6.6	70.6	14.8	-	-	-	40.6	44.6	13.5	1.3	-	-
TMF12-07	SPT #2	TMF Embankment East	304719, 5706115	2.74 - 3.35	6.3	81.0	40.7	-	-	-	28.4	30.9	22.9	17.8	-	-
TMF12-07	SPT #3	TMF Embankment East	304719, 5706115	4.27 - 4.88	3.7	89.2	45.2	14	27	13	18.8	36.0	25.9	19.3	SC	Clayey SAND with gravel
TMF12-07	SPT #4	TMF Embankment East	304719, 5706115	5.79 - 6.40	5.8	90.0	44.7	14	28	14	19.1	36.2	24.6	20.1	SC	Clayey SAND with gravel
TMF12-08	SPT #1	TMF Embankment Central	304652, 5706206	1.07 - 1.68	4.8	84.3	28.1	-	-	-	25.3	46.6	21.7	6.4	-	-
TMF12-08	SPT #2	TMF Embankment Central	304652, 5706206	2.59 - 3.20	5.4	87.6	44.5	-	-	-	20.6	34.9	27.8	16.7	-	-
TMF12-08	SPT #3	TMF Embankment Central	304652, 5706206	4.11 - 4.72	6.9	97.2	51.5	15	24	9	9.4	39.1	33.0	18.5	CL	Sandy lean CLAY
TMF12-08	SPT #4	TMF Embankment Central	304652, 5706206	5.64 - 6.25	5.9	77.6	36.1	15	27	12	31.6	32.3	20.6	15.5	SC	Clayey SAND with gravel
TMF12-09	SPT #1	TMF Embankment Central	304593, 5706173	1.22 - 1.83	10.4	80.6	19.9	-	-	-	29.0	51.1	17.0	2.9	-	-
TMF12-10	SPT #1	TMF Embankment Central	304529, 5706173	1.22 - 1.83	5.9	70.0	29.3	-	-	-	37.4	33.3	20.9	8.4	-	-
TMF12-10	SPT #2	TMF Embankment Central	304529, 5706173	2.74 - 3.35	3.6	67.1	16.3	-	-	-	46.1	37.6	11.4	4.9	-	-
TMF12-10	SPT #4	TMF Embankment Central	304529, 5706173	5.79 - 6.40	6.3	93.4	49.8	-	-	-	13.6	36.6	29.3	20.5	-	-
TMF12-10	SPT #5	TMF Embankment Central	304529, 5706173	7.31 - 7.92	5.9	90.7	48.0	15	26	11	15.2	36.8	28.0	20.0	SC	Clayey SAND with gravel
TMF12-10	SPT #6	TMF Embankment Central	304529, 5706173	8.84 - 9.45	6.0	89.2	44.6	14	26	12	19.2	36.2	23.7	20.9	SC	Clayey SAND with gravel
TMF12-10	SPT #7	TMF Embankment Central	304529, 5706173	10.36 - 10.97	5.7	56.9	27.8	-	-	-	49.6	22.6	14.4	13.4	-	-
TMF12-11	SPT #1	TMF Embankment Central	304546, 5706328	1.22 - 1.83	8.5	84.6	45.9	15	28	13	22.9	31.2	25.1	20.8	SC	Clayey SAND with gravel
TMF12-11	SPT #2	TMF Embankment Central	304546, 5706328	2.74 - 3.35	8.6	94.0	51.2	15	28	13	12.3	36.5	31.0	20.2	CL	Sandy lean CLAY
TMF12-11	SPT #3	TMF Embankment Central	304546, 5706328	4.27 - 4.88	7.5	82.1	43.3	15	28	13	25.6	31.3	24.8	18.5	SC	Clayey SAND with gravel
TMF12-11	SPT #4	TMF Embankment Central	304546, 5706328	5.79 - 6.40	6.5	75.6	29.7	15	28	13	35.4	34.9	17.1	12.6	GC	Clayey GRAVEL with sand

APPENDIX D1

YELLOWHEAD MINING INC.
HARPER CREEK PROJECT

2012 GEOTECHNICAL SITE INVESTIGATION
SUMMARY OF 2012 SOIL LABORATORY TEST RESULTS

Print Jul/08/13 9:55:04

Sample Location	Sample I.D.	Sample General Area	Coordinates (Easting, Northing)	Depth (m)	Natural Moisture Content (%)	Percent Passing 3/8" Sieve	Percent Passing #200 Sieve	Atterberg Limits ^[1]			Particle Size Distribution				USCS	Description
								P.L. %	L.L. %	P.I. %	Gravel %	Sand %	Silt %	Clay %		
											+ 5 mm	5 to 0.074 mm	0.074 to 0.002 mm	- 0.002 mm		
TMF12-11	SPT #5	TMF Embankment Central	304546, 5706328	7.31 - 7.92	6.5	88.5	47.8	15	28	13	17.7	34.9	23.9	23.9	SC	Clayey SAND with gravel
TMF12-11	SPT #6	TMF Embankment Central	304546, 5706328	9.14 - 9.75	9.8	84.9	43.1	15	28	13	22.6	34.3	23.3	19.8	SC	Clayey SAND with gravel
TMF12-11	SPT #7	TMF Embankment Central	304546, 5706328	10.67 - 11.28	3.9	67.4	21.1	15	28	13	47.7	31.2	11.4	9.7	GC	Clayey GRAVEL with sand
TMF12-12	SPT #1	TMF Embankment Central	304475, 5706384	1.22 - 1.83	4.9	91.1	42.4	-	-	-	18.0	39.6	24.6	17.8	-	-
TMF12-12	SPT #2	TMF Embankment Central	304475, 5706384	2.74 - 3.35	5.2	86.1	45.7	-	-	-	21.3	33.0	25.6	20.1	-	-
TMF12-12	SPT #3	TMF Embankment Central	304475, 5706384	4.27 - 4.88	4.6	85.1	45.5	14	30	16	21.3	33.2	23.3	22.2	SC	Clayey SAND with gravel
TMF12-12	SPT #4	TMF Embankment Central	304475, 5706384	5.79 - 6.40	6.0	81.4	44.6	14	30	16	24.6	30.8	23.4	21.2	SC	Clayey SAND with gravel
TMF12-12	SPT #5	TMF Embankment Central	304475, 5706384	7.31 - 7.92	3.4	72.9	16.9	-	-	-	42.4	40.7	10.6	6.3	-	-
TMF12-13	SPT #1	TMF Embankment West	304117, 5706488	1.22 - 1.83	5.8	84.7	28.4	-	-	-	24.0	47.6	23.7	4.7	-	-
TMF12-13	SPT #2	TMF Embankment West	304117, 5706488	2.74 - 3.35	4.3	91.9	46.4	16	30	14	14.1	39.5	28.1	18.3	SC	Clayey SAND
TMF12-13	SPT #3	TMF Embankment West	304117, 5706488	4.27 - 4.88	6.6	90.0	31.5	16	20	4	18.7	49.8	22.9	8.6	SC-SM	Silty, clayey SAND with gravel
TMF12-14	SPT #1	TMF Embankment West	304245, 5706818	1.37 - 1.98	9.4	87.9	44.1	-	-	-	16.9	39.0	33.0	11.1	-	-
TMF12-14	SPT #2	TMF Embankment West	304245, 5706819	2.90 - 3.51	9.1	92.5	42.8	18	30	12	12.6	44.6	28.8	14.0	SC	Clayey SAND
TMF12-14	SPT #3	TMF Embankment West	304245, 5706819	4.42 - 5.03	9.5	92.9	48.2	28	29	1	11.4	40.4	39.0	9.2	SM	Silty SAND
TMF12-15	SPT #1	TMF Embankment West	304272, 5706698	1.37 - 1.98	3.9	54.7	16.9	-	-	-	54.1	29.0	12.9	4.0	-	-
TMF12-15	SPT #2	TMF Embankment West	304272, 5706698	2.90 - 3.51	3.8	81.6	27.1	-	-	-	28.5	43.4	19.5	8.6	-	-
TMF12-15	SPT #3 ^{[2][3]}	TMF Embankment West	304272, 5706698	4.42 - 5.03	-	69.9	10.7	-	-	-	55.2	34.1	6.4	4.3	-	-
TMF12-16	SPT #1	TMF Embankment West	304373, 5706655	1.22 - 1.83	8.5	88.5	32.0	-	-	-	19.7	48.3	27.2	4.8	-	-
TMF12-16	SPT #2	TMF Embankment West	304373, 5706655	2.74 - 3.35	7.4	86.7	36.4	15	32	17	20.2	43.4	20.0	16.4	SC	Clayey SAND with gravel
TMF12-17	SPT #1	TMF Embankment West	304433, 5706553	1.22 - 1.83	3.5	85.1	37.6	-	-	-	27.1	35.3	22.2	15.4	-	-
TMF12-17	SPT #2	TMF Embankment West	304433, 5706553	2.74 - 3.35	4.1	90.0	46.0	14	31	17	18.3	35.7	23.4	22.6	SC	Clayey SAND with gravel
TMF12-17	SPT #3	TMF Embankment West	304433, 5706553	4.27 - 4.88	2.9	79.9	39.3	14	29	15	27.0	33.7	19.4	19.1	SC	Clayey SAND with gravel
TMF12-18	SPT #1	TMF Embankment West	304384, 5706485	1.37 - 1.98	8.3	93.3	54.7	16	25	9	11.9	33.4	36.2	18.5	CL	Sand lean CLAY
TMF12-18	SPT #2	TMF Embankment West	304384, 5706485	2.90 - 3.51	3.7	89.3	49.8	14	29	15	19.1	31.1	28.4	21.4	SC	Clayey SAND with gravel

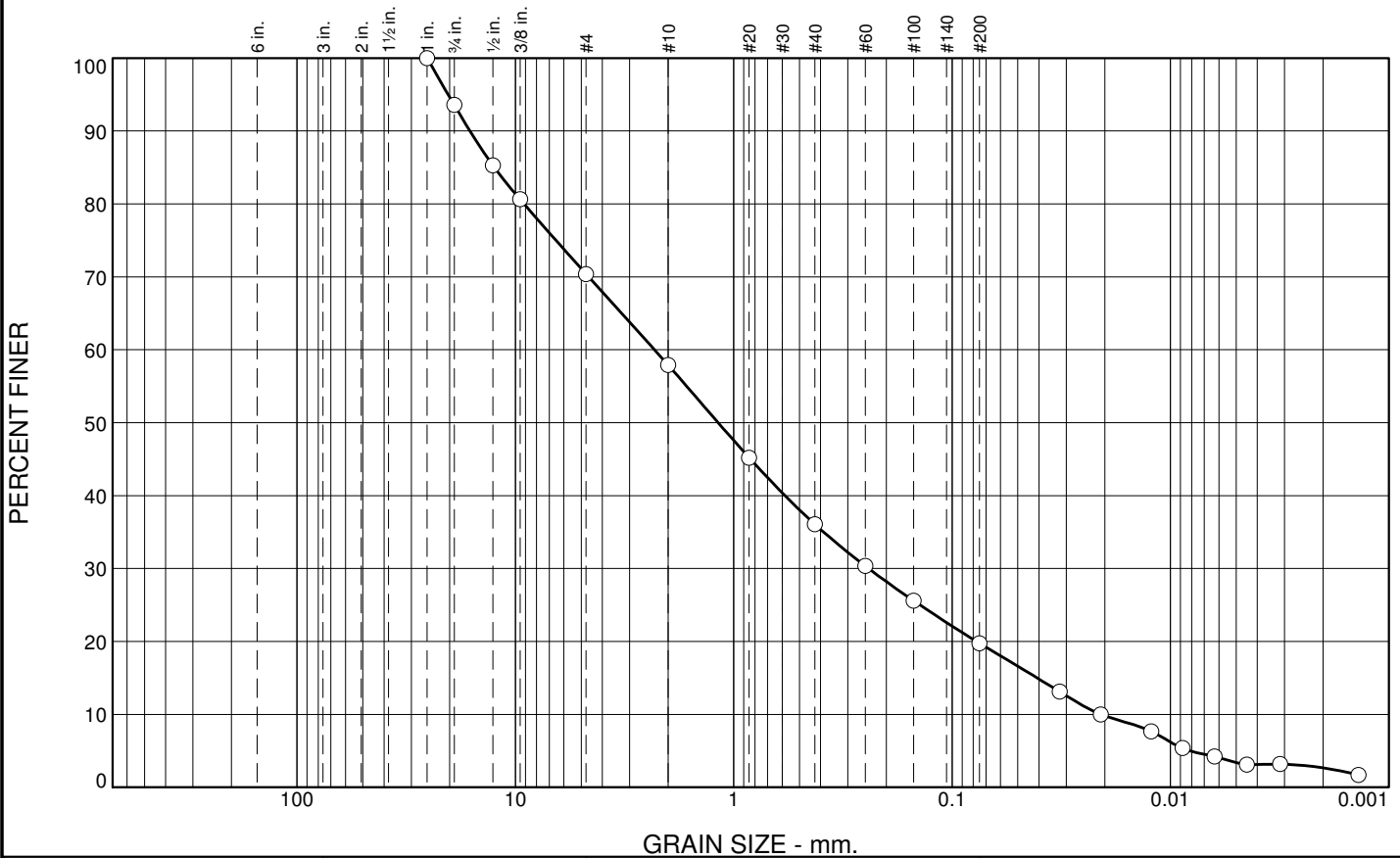
M:\110100458\07\AI\Report1 - 2012 Geotechnical SI Factual Report\Tables\All Report Tables.xlsx\Table 3.5 - Soil Lab Summary

NOTES:

1. NP = NON-PLASTIC.
2. ENTIRE SAMPLE USED FOR PSA.
3. ENTIRE SAMPLE USED FOR PSA AND HYDROMETER.
4. SOIL DESCRIPTIONS PROVIDED BY KP DENVER SOIL TESTING LABORATORY

0	05.A1.13	ISSUED WITH REPORT VA101-4587-1	JBC	DAY	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	23.2	12.5	21.8	16.3	16.4	3.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.6		
.5	85.3		
.375	80.6		
#4	70.4		
#10	57.9		
#20	45.2		
#40	36.1		
#60	30.4		
#100	25.6		
#200	19.8		
0.0321 mm.	13.1		
0.0208 mm.	10.0		
0.0123 mm.	7.7		
0.0088 mm.	5.4		
0.0063 mm.	4.2		
0.0045 mm.	3.1		
0.0031 mm.	3.2		
0.0014 mm.	1.7		

Soil Description

silty SAND with gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D₉₀= 16.1555 D₈₅= 12.5032 D₆₀= 2.3054
D₅₀= 1.1789 D₃₀= 0.2413 D₁₅= 0.0408
D₁₀= 0.0208 C_u= 110.85 C_c= 1.21

Classification

USCS= SM AASHTO= A-1-b

Remarks

Natural moisture = 4.7%

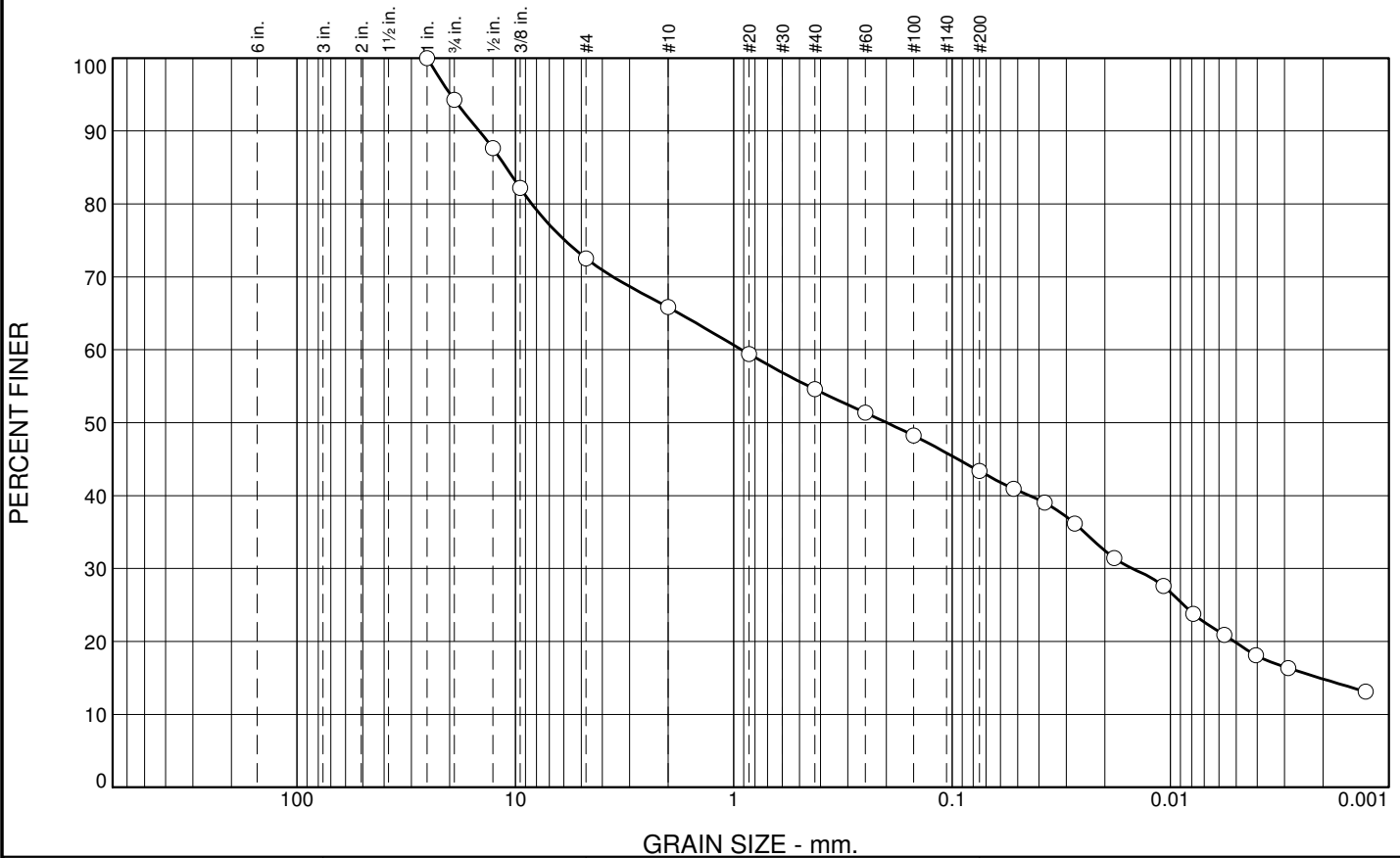
* (no specification provided)

Sample No.: SPT 1 Source of Sample: GT12-01 Date: 9-18-12
Location: Elev./Depth: 3'-5'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
--	--

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.7	21.8	6.7	11.2	11.2	23.6	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.3		
.5	87.7		
.375	82.2		
#4	72.5		
#10	65.8		
#20	59.4		
#40	54.6		
#60	51.4		
#100	48.2		
#200	43.4		
0.0523 mm.	41.0		
0.0377 mm.	39.0		
0.0274 mm.	36.2		
0.0181 mm.	31.4		
0.0108 mm.	27.6		
0.0079 mm.	23.8		
0.0057 mm.	20.9		
0.0041 mm.	18.1		
0.0029 mm.	16.4		
0.0013 mm.	13.1		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 29 PI= 14

Coefficients

D₉₀= 14.6407 D₈₅= 11.0276 D₆₀= 0.9212
D₅₀= 0.1992 D₃₀= 0.0149 D₁₅= 0.0021
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 6.3%

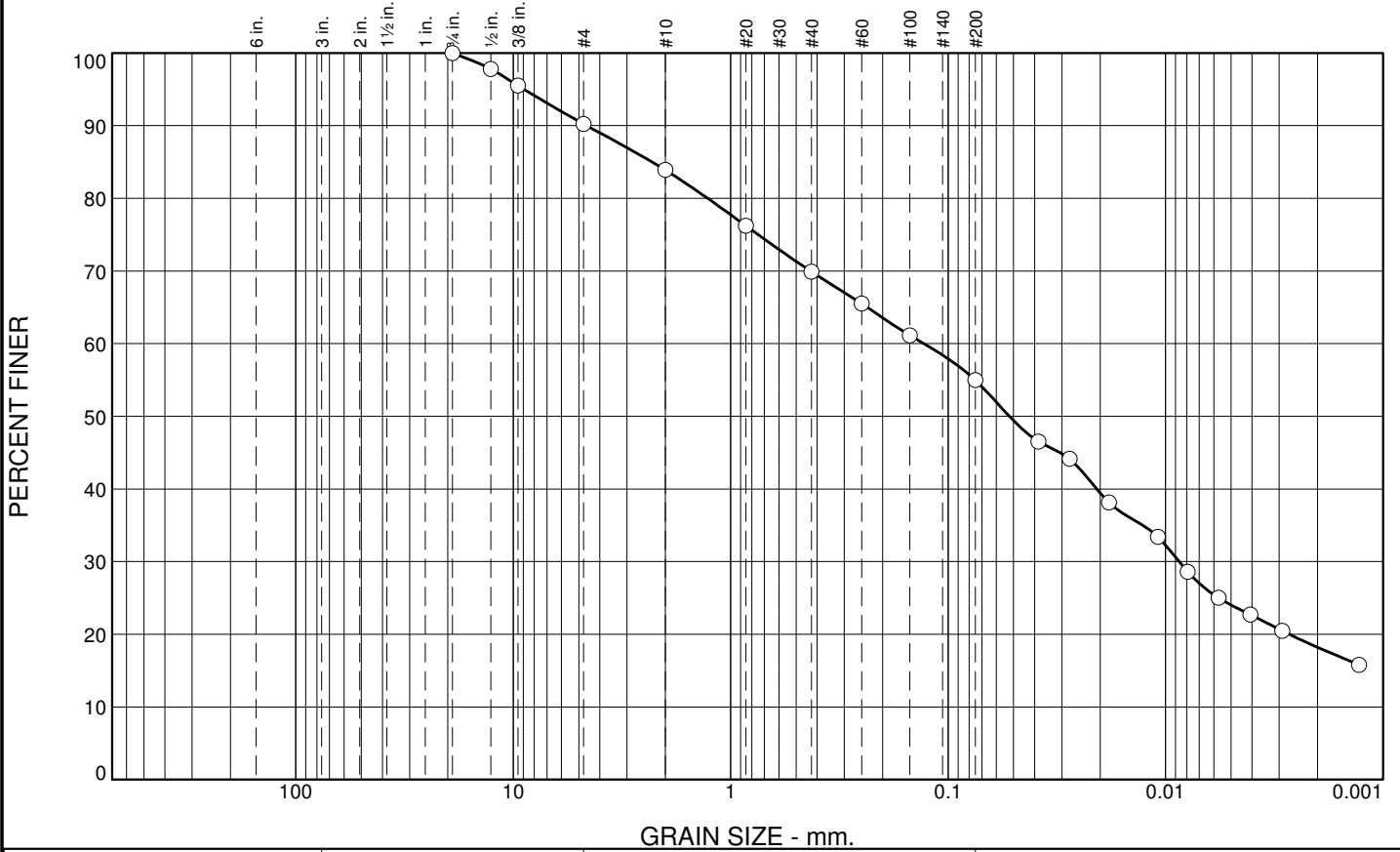
* (no specification provided)

Sample No.: SPT 2 Source of Sample: GT12-01 Date: 9-18-12
Location: Elev./Depth: 8'-10'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
--	---

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.8	6.3	14.0	14.9	31.0	24.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	97.8		
.375	95.5		
#4	90.2		
#10	83.9		
#20	76.2		
#40	69.9		
#60	65.5		
#100	61.1		
#200	55.0		
0.0384 mm.	46.5		
0.0276 mm.	44.1		
0.0182 mm.	38.2		
0.0109 mm.	33.4		
0.0079 mm.	28.6		
0.0057 mm.	25.0		
0.0041 mm.	22.7		
0.0029 mm.	20.5		
0.0013 mm.	15.8		

Soil Description
sandy lean clay

Atterberg Limits
PL= 13 LL= 30 PI= 17

Coefficients
D₉₀= 4.6009 D₈₅= 2.3010 D₆₀= 0.1297
D₅₀= 0.0522 D₃₀= 0.0087 D₁₅=
D₁₀= C_u= C_c=

Classification
USCS= CL AASHTO= A-6(6)

Remarks
Natural moisture = 6.1%

* (no specification provided)

Sample No.: SPT 3 Source of Sample: GT12-01 Date: 9-18-12
Location: Elev./Depth: 13'-15'

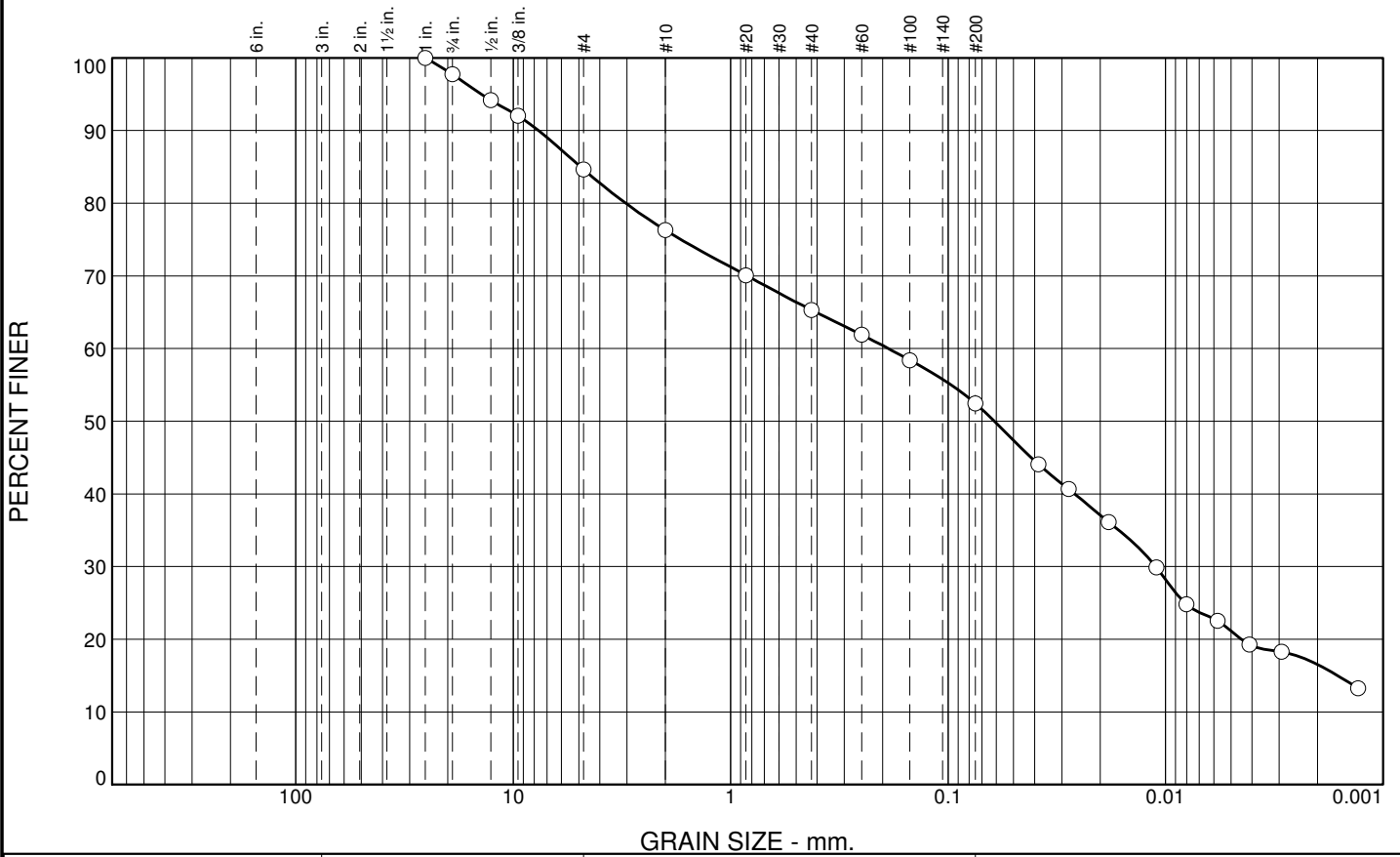


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.3	13.1	8.3	11.0	12.8	31.3	21.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.7		
.5	94.2		
.375	92.0		
#4	84.6		
#10	76.3		
#20	70.1		
#40	65.3		
#60	61.9		
#100	58.4		
#200	52.5		
0.0384 mm.	44.1		
0.0279 mm.	40.7		
0.0183 mm.	36.1		
0.0110 mm.	29.9		
0.0080 mm.	24.8		
0.0058 mm.	22.5		
0.0041 mm.	19.3		
0.0029 mm.	18.3		
0.0013 mm.	13.2		

Soil Description

sandy lean clay with gravel

Atterberg Limits

PL= 14 LL= 26 PI= 12

Coefficients

D₉₀= 7.6606 D₈₅= 4.9059 D₆₀= 0.1882
D₅₀= 0.0612 D₃₀= 0.0111 D₁₅= 0.0016
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(3)

Remarks

Natural moisture = 6.5%

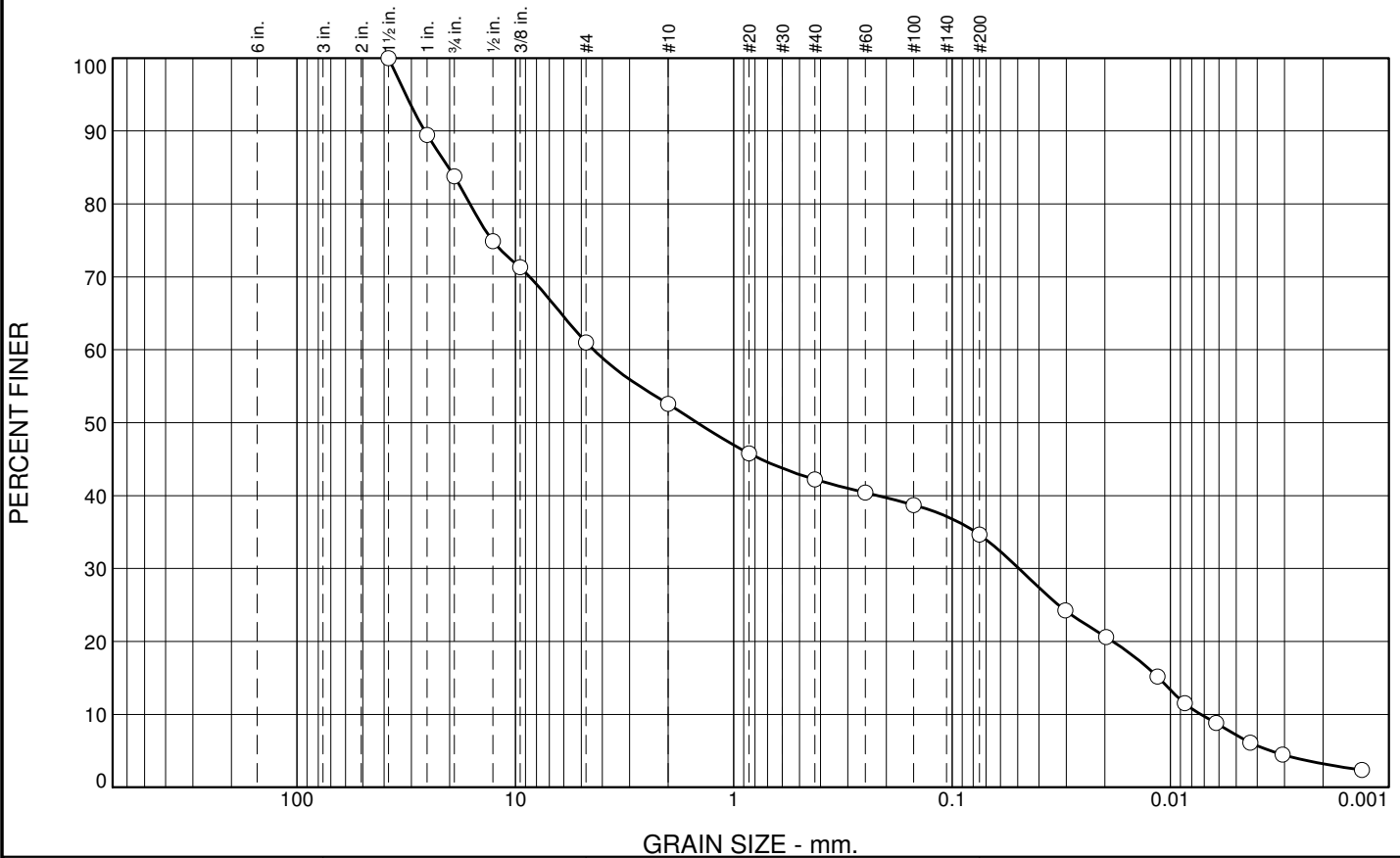
* (no specification provided)

Sample No.: SPT 4 Source of Sample: GT12-01 Date: 9-18-12
Location: Elev./Depth: 18'-20'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
--	---

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.2	22.8	8.4	10.4	7.6	27.4	7.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.5		
.75	83.8		
.5	74.9		
.375	71.3		
#4	61.0		
#10	52.6		
#20	45.8		
#40	42.2		
#60	40.4		
#100	38.7		
#200	34.6		
0.0303 mm.	24.3		
0.0197 mm.	20.6		
0.0115 mm.	15.2		
0.0086 mm.	11.5		
0.0062 mm.	8.8		
0.0043 mm.	6.1		
0.0031 mm.	4.5		
0.0013 mm.	2.4		

Soil Description
silty gravel with sand

Atterberg Limits
 PL= NP LL= NV PI= NP

Coefficients
 D₉₀= 26.0244 D₈₅= 20.2396 D₆₀= 4.3961
 D₅₀= 1.4680 D₃₀= 0.0495 D₁₅= 0.0113
 D₁₀= 0.0073 C_u= 605.02 C_c= 0.08

Classification
 USCS= GM AASHTO= A-2-4(0)

Remarks
 Natural moisture = 7.5%

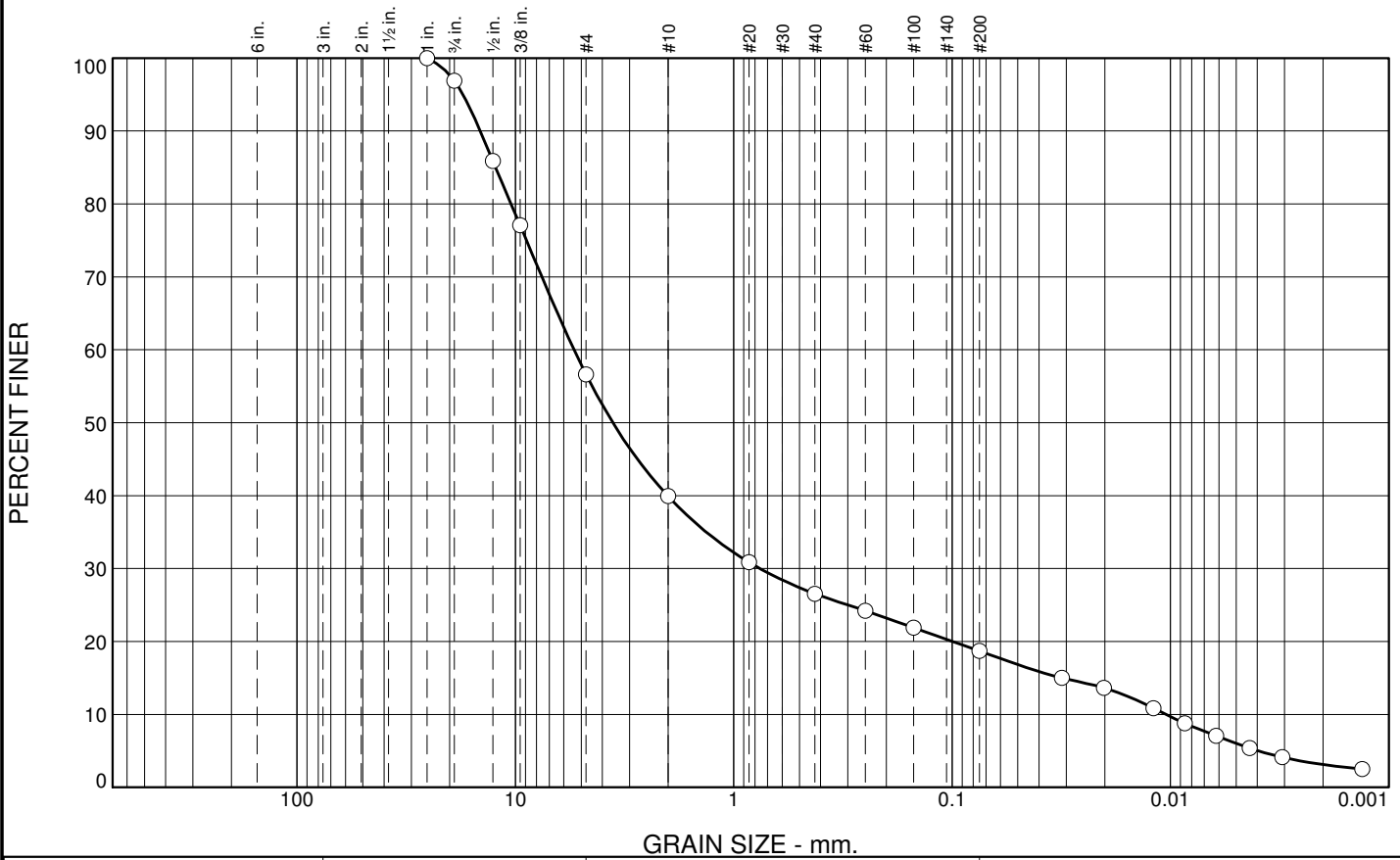
* (no specification provided)

Sample No.: SPT 1 Source of Sample: GT12-04 Date: 9-20-12
 Location: Elev./Depth: 2'-4'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07	Figure
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.1	40.3	16.7	13.3	7.9	12.7	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.9		
.5	85.9		
.375	77.1		
#4	56.6		
#10	39.9		
#20	30.9		
#40	26.6		
#60	24.2		
#100	21.9		
#200	18.7		
0.0314 mm.	15.0		
0.0202 mm.	13.6		
0.0119 mm.	10.9		
0.0086 mm.	8.8		
0.0062 mm.	7.1		
0.0043 mm.	5.4		
0.0031 mm.	4.1		
0.0013 mm.	2.5		

Soil Description

silty gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 14.5014 D₈₅= 12.3429 D₆₀= 5.3882
D₅₀= 3.5774 D₃₀= 0.7569 D₁₅= 0.0312
D₁₀= 0.0105 C_u= 514.83 C_c= 10.16

Classification

USCS= GM AASHTO= A-1-b

Remarks

Natural moisture = 4.0%

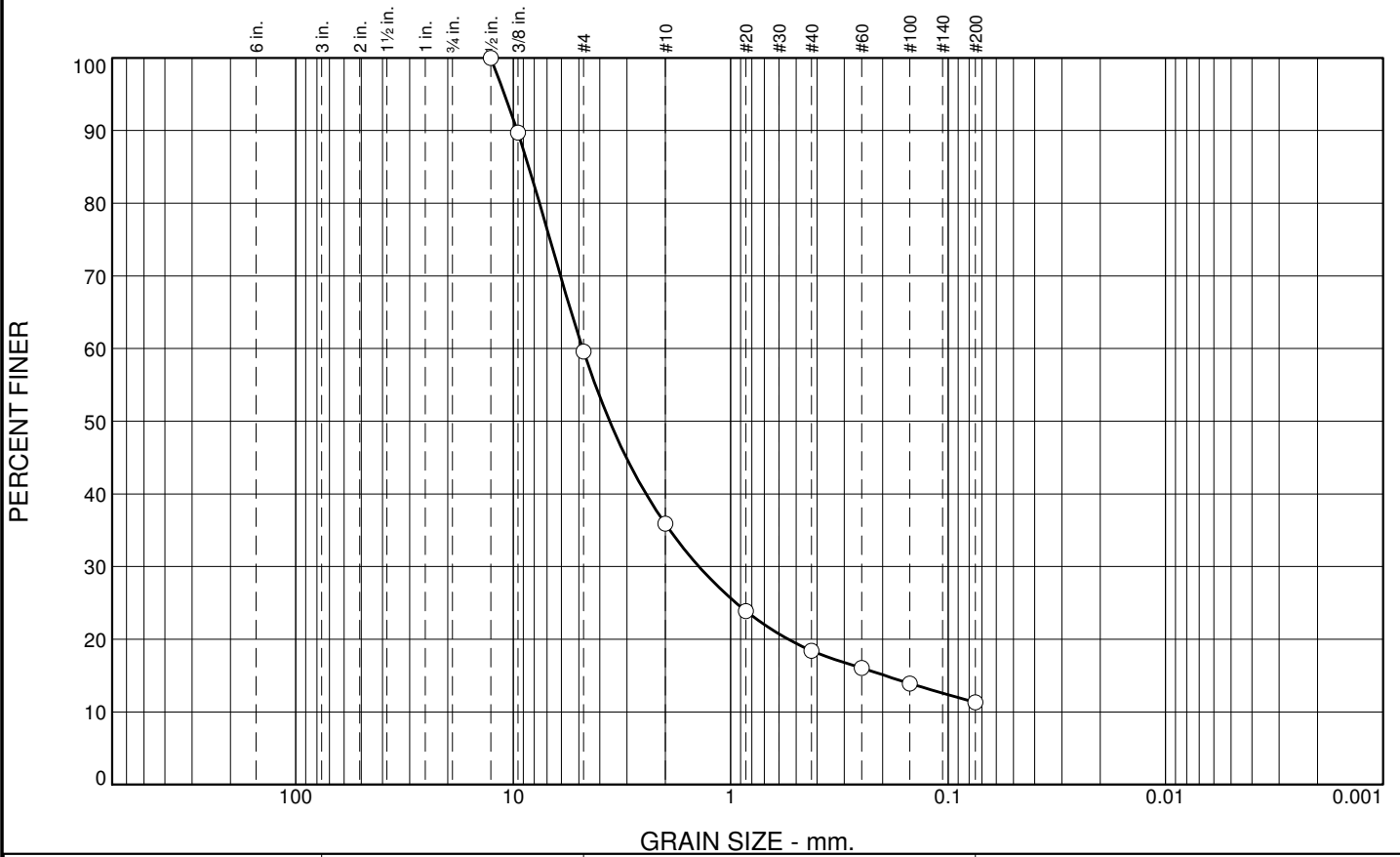
* (no specification provided)

Sample No.: SPT 2 Source of Sample: GT12-04 Date: 9-20-12
Location: Elev./Depth: 4'-6'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
--	--

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	40.4	23.7	17.5	7.1	11.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	89.7		
#4	59.6		
#10	35.9		
#20	23.9		
#40	18.4		
#60	16.0		
#100	13.9		
#200	11.3		

Soil Description

Atterberg Limits
 PL= _____ LL= _____ PI= _____

Coefficients
 D₉₀= 9.5974 D₈₅= 8.4912 D₆₀= 4.7980
 D₅₀= 3.6040 D₃₀= 1.4000 D₁₅= 0.1947
 D₁₀= _____ C_u= _____ C_c= _____

Classification
 USCS= _____ AASHTO= _____

Remarks
 Natural moisture = 0.1%
 Entire sample used for PSA.

* (no specification provided)

Sample No.: SPT 3
Location:

Source of Sample: GT12-04

Date: 9-20-12
Elev./Depth: 9'-9"2"



Client: Yellowhead Mining Inc.
Project: Harper Creek Project

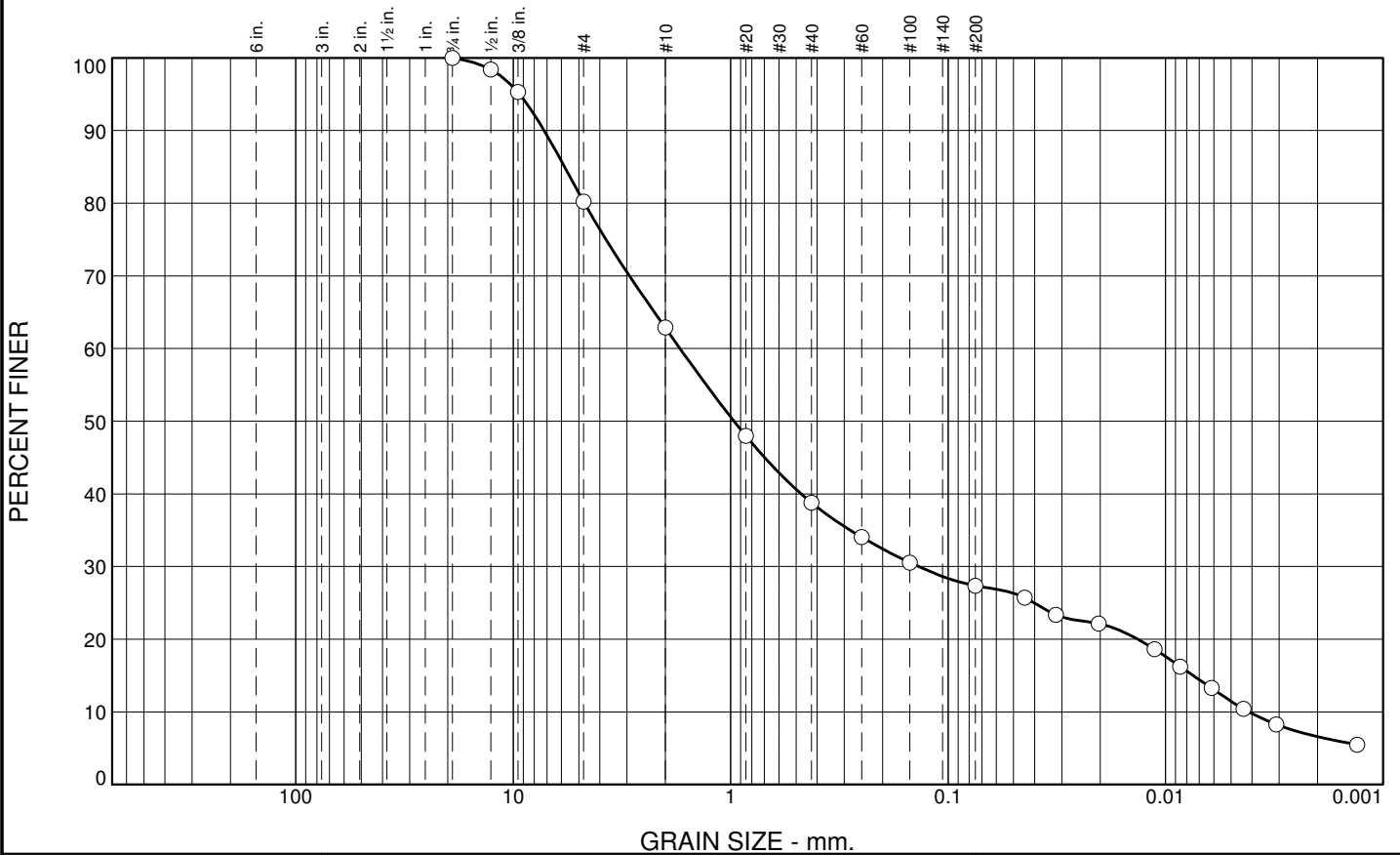
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	19.8	17.3	24.1	11.4	15.9	11.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	98.4		
.375	95.3		
#4	80.2		
#10	62.9		
#20	48.0		
#40	38.8		
#60	34.1		
#100	30.6		
#200	27.4		
0.0445 mm.	25.7		
0.0319 mm.	23.3		
0.0203 mm.	22.2		
0.0112 mm.	18.6		
0.0086 mm.	16.2		
0.0061 mm.	13.3		
0.0044 mm.	10.4		
0.0031 mm.	8.3		
0.0013 mm.	5.5		

Soil Description
silty, clayey sand with gravel

Atterberg Limits
 PL= 22 LL= 26 PI= 4

Coefficients
 D₉₀= 7.2101 D₈₅= 5.8136 D₆₀= 1.7102
 D₅₀= 0.9657 D₃₀= 0.1368 D₁₅= 0.0075
 D₁₀= 0.0041 C_u= 413.72 C_c= 2.65

Classification
 USCS= SC-SM AASHTO= A-2-4(0)

Remarks
 Natural moisture = 7.4%

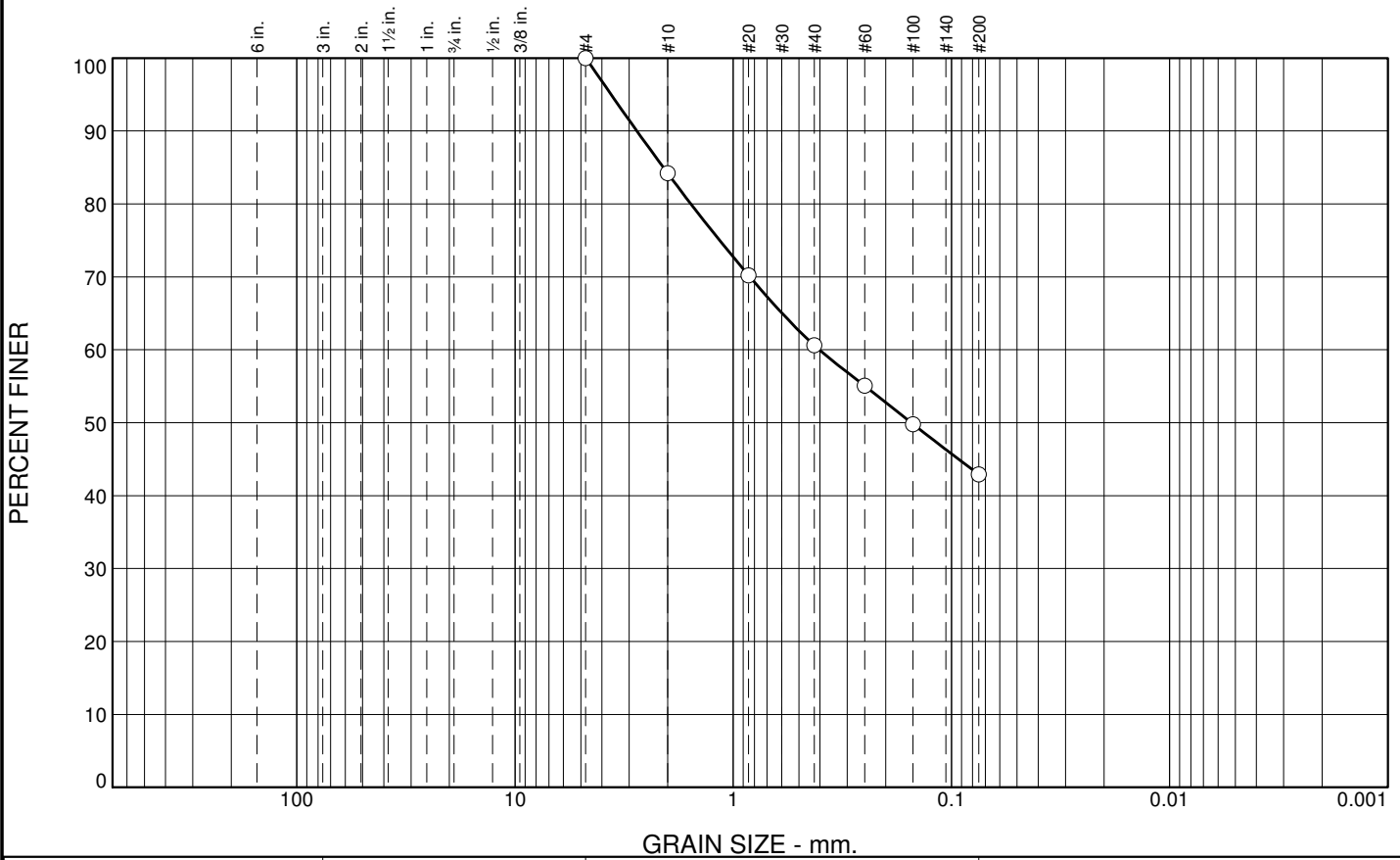
* (no specification provided)

Sample No.: SPT 4 Source of Sample: GT12-04 Date: 9-20-12
 Location: Elev./Depth: 14'-16'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07	Figure
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	15.8	23.6	17.7	42.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	84.2		
#20	70.2		
#40	60.6		
#60	55.1		
#100	49.8		
#200	42.9		

Soil Description

Atterberg Limits
 PL= _____ LL= _____ PI= _____

Coefficients
 D₉₀= 2.7654 D₈₅= 2.0917 D₆₀= 0.4030
 D₅₀= 0.1530 D₃₀= _____ D₁₅= _____
 D₁₀= _____ C_u= _____ C_c= _____

Classification
 USCS= _____ AASHTO= _____

Remarks
 Natural moisture = 11.4%
 Entire sample used for PSA.

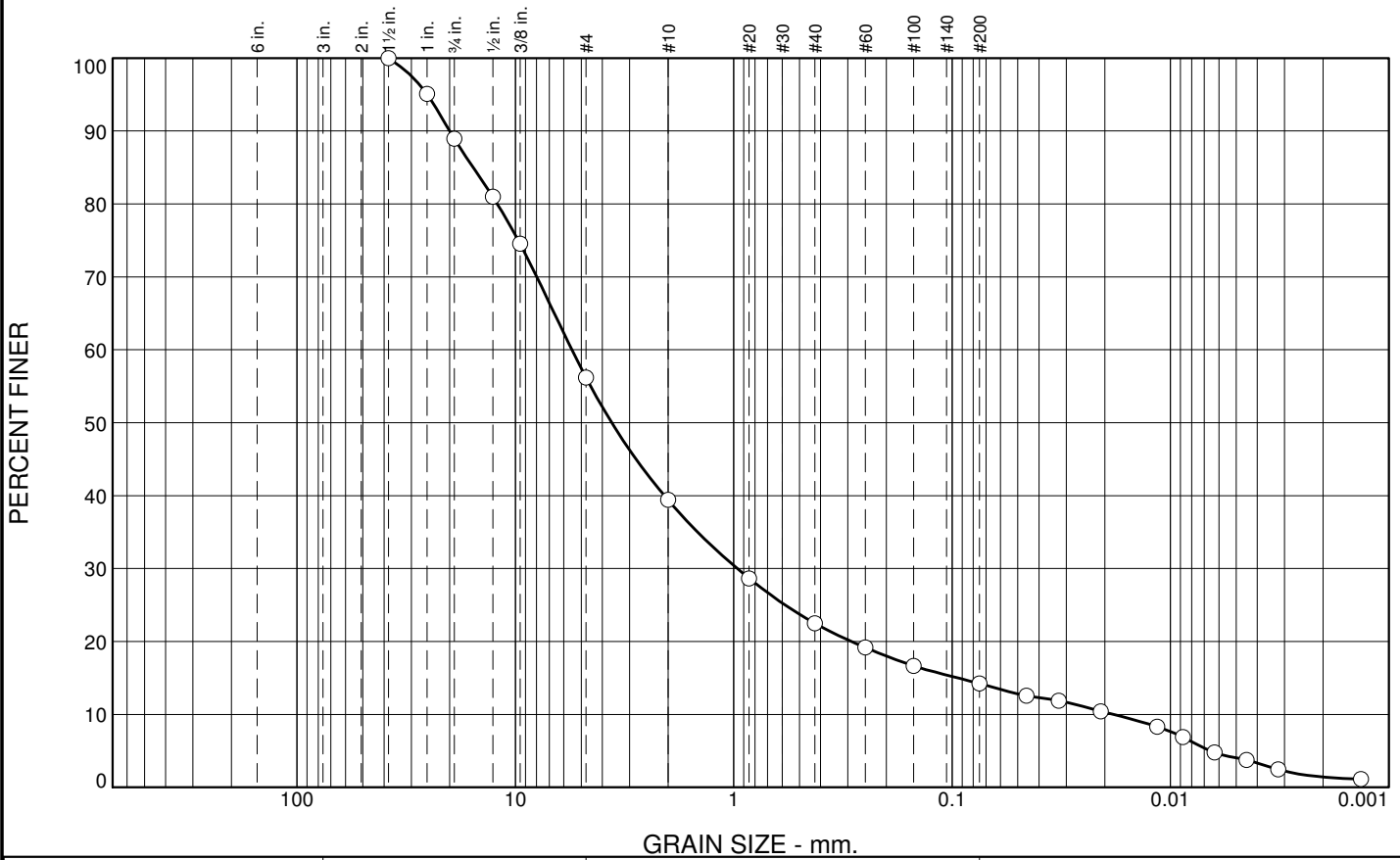
* (no specification provided)

Sample No.: SPT 5 **Source of Sample:** GT12-04 **Date:** 9-20-12
Location: **Elev./Depth:** 19'6"-19'7"

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07
Figure	

Tested By: RV Checked By: RS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.1	32.7	16.8	16.9	8.3	10.2	4.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.1		
.75	88.9		
.5	81.0		
.375	74.5		
#4	56.2		
#10	39.4		
#20	28.7		
#40	22.5		
#60	19.2		
#100	16.7		
#200	14.2		
0.0457 mm.	12.6		
0.0325 mm.	11.9		
0.0208 mm.	10.4		
0.0115 mm.	8.3		
0.0088 mm.	6.9		
0.0063 mm.	4.8		
0.0045 mm.	3.7		
0.0032 mm.	2.5		
0.0013 mm.	1.2		

Soil Description

silty gravel with sand

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 20.0066 D₈₅= 15.6405 D₆₀= 5.5137
D₅₀= 3.6210 D₃₀= 0.9639 D₁₅= 0.0941
D₁₀= 0.0183 C_u= 302.08 C_c= 9.23

Classification

USCS= GM AASHTO= A-1-a

Remarks

Natural moisture = 4.1%

* (no specification provided)

Sample No.: SPT 1 Source of Sample: GT12-05 Date: 9-20-12
Location: Elev./Depth: 0-2'

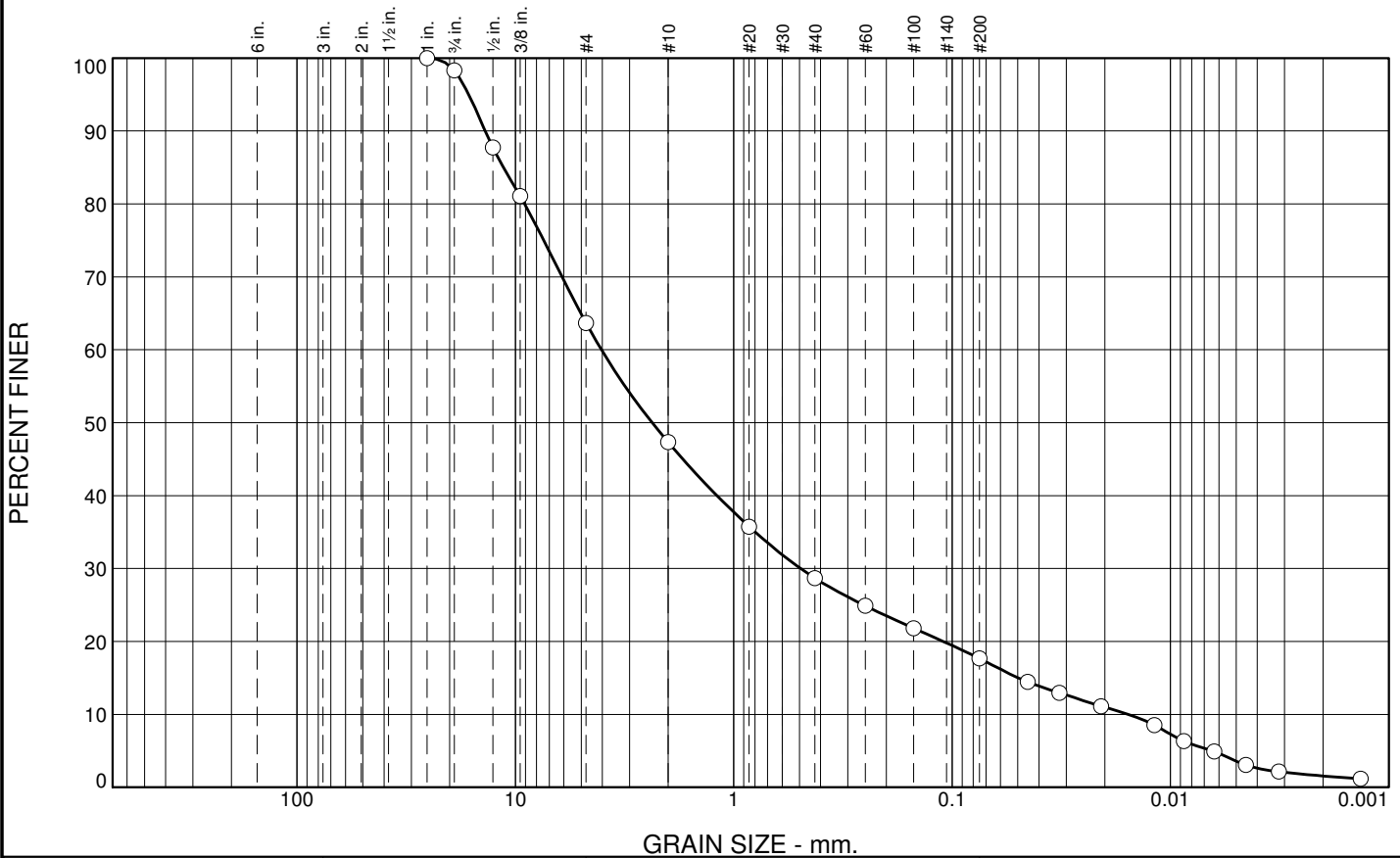


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.7	34.6	16.3	18.7	11.0	14.1	3.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.3		
.5	87.7		
.375	81.1		
#4	63.7		
#10	47.4		
#20	35.7		
#40	28.7		
#60	24.9		
#100	21.8		
#200	17.7		
0.0451 mm.	14.4		
0.0323 mm.	13.0		
0.0208 mm.	11.1		
0.0119 mm.	8.6		
0.0087 mm.	6.3		
0.0063 mm.	4.9		
0.0045 mm.	3.1		
0.0032 mm.	2.2		
0.0013 mm.	1.2		

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D₉₀= 13.7619 D₈₅= 11.3594 D₆₀= 4.0396
D₅₀= 2.3627 D₃₀= 0.4941 D₁₅= 0.0498
D₁₀= 0.0156 C_u= 259.71 C_c= 3.88

Classification

USCS= SM AASHTO= A-1-b

Remarks

Natural moisture = 1.9%

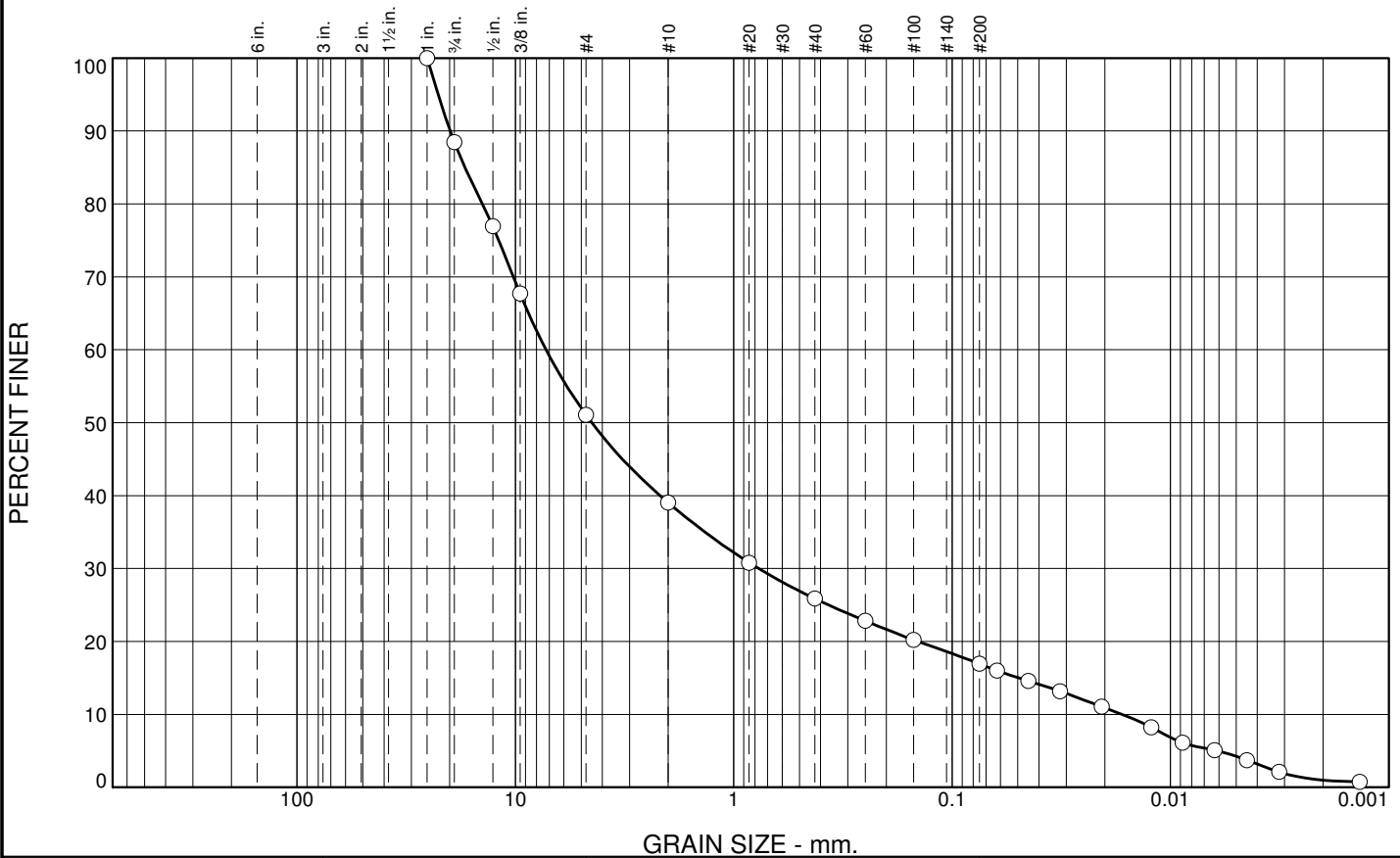
* (no specification provided)

Sample No.: SPT 2 Source of Sample: GT12-05 Date: 9-20-12
Location: Elev./Depth: 3'6"-5'-6"

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p>	<p>Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	11.5	37.4	12.0	13.2	8.9	12.7	4.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	88.5		
.5	76.9		
.375	67.7		
#4	51.1		
#10	39.1		
#20	30.8		
#40	25.9		
#60	22.9		
#100	20.2		
#200	17.0		
0.0623 mm.	16.0		
0.0447 mm.	14.6		
0.0320 mm.	13.2		
0.0207 mm.	11.1		
0.0122 mm.	8.2		
0.0088 mm.	6.1		
0.0063 mm.	5.1		
0.0045 mm.	3.7		
0.0032 mm.	2.1		
0.0014 mm.	0.7		

Soil Description
silty gravel with sand

Atterberg Limits
 LL= NP PI= NP

Coefficients
 D₉₀= 19.8856 D₈₅= 17.0411 D₆₀= 7.2439
 D₅₀= 4.4691 D₃₀= 0.7686 D₁₅= 0.0494
 D₁₀= 0.0167 C_u= 435.06 C_c= 4.90

Classification
 USCS= GM AASHTO= A-1-b

Remarks
 Natural moisture = 6.2%

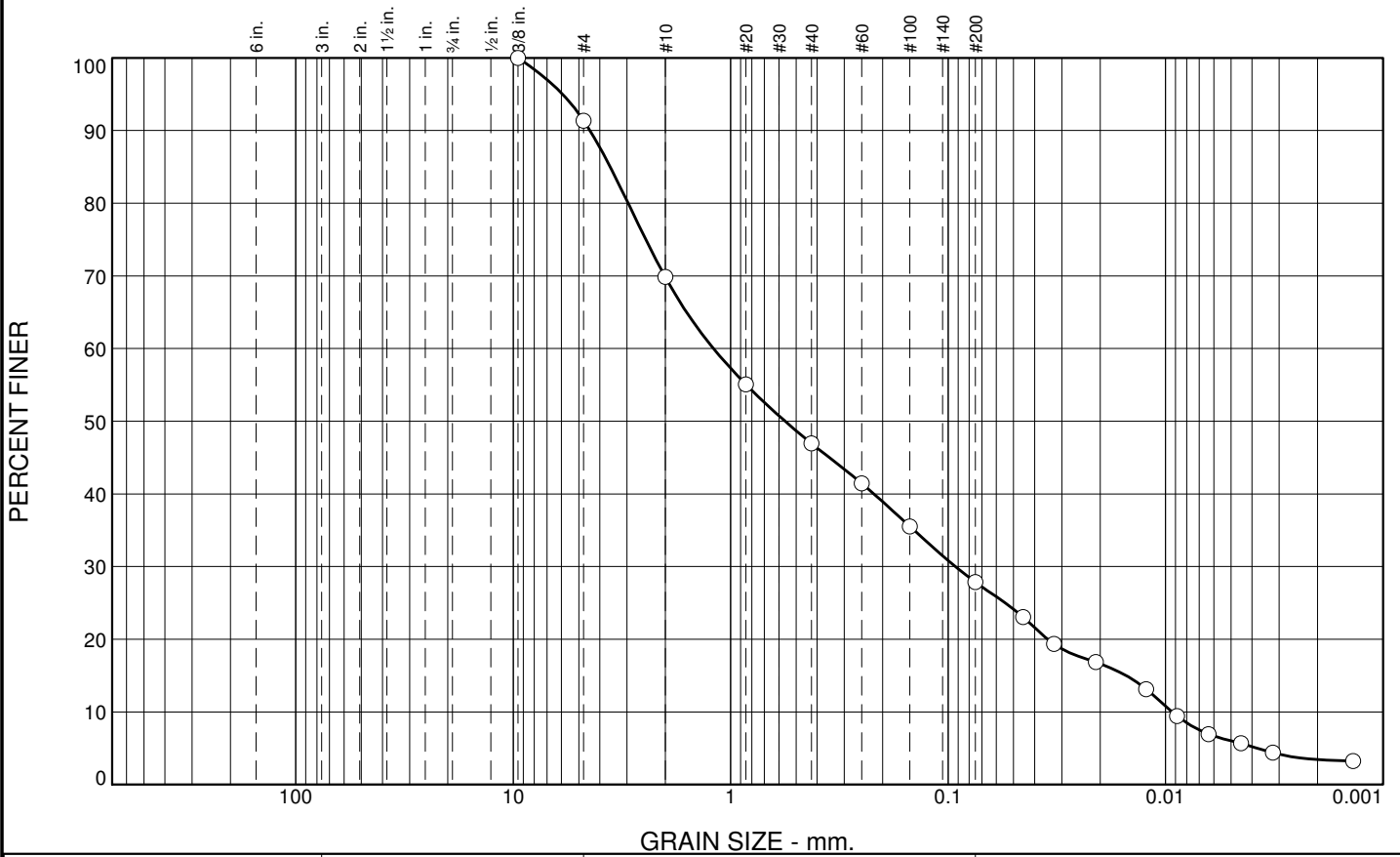
* (no specification provided)

Sample No.: SPT 3 **Source of Sample:** GT12-05 **Date:** 9-20-12
Location: **Elev./Depth:** 8'6"-10'6"

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07
Figure	

Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	8.6	21.5	22.9	19.1	21.9	6.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	91.4		
#10	69.9		
#20	55.1		
#40	47.0		
#60	41.5		
#100	35.5		
#200	27.9		
0.0452 mm.	23.0		
0.0326 mm.	19.3		
0.0209 mm.	16.8		
0.0123 mm.	13.1		
0.0089 mm.	9.4		
0.0063 mm.	7.0		
0.0045 mm.	5.7		
0.0032 mm.	4.4		
0.0014 mm.	3.2		

Soil Description

Atterberg Limits
 LL= _____ PI= _____

Coefficients
 D₉₀= 4.4403 D₈₅= 3.5845 D₆₀= 1.2005
 D₅₀= 0.5621 D₃₀= 0.0925 D₁₅= 0.0152
 D₁₀= 0.0093 C_u= 128.77 C_c= 0.76

Classification
 USCS= _____ AASHTO= _____

Remarks
 Natural moisture = 10.8%
 Entire sample used for PSA and Hydrometer.

* (no specification provided)

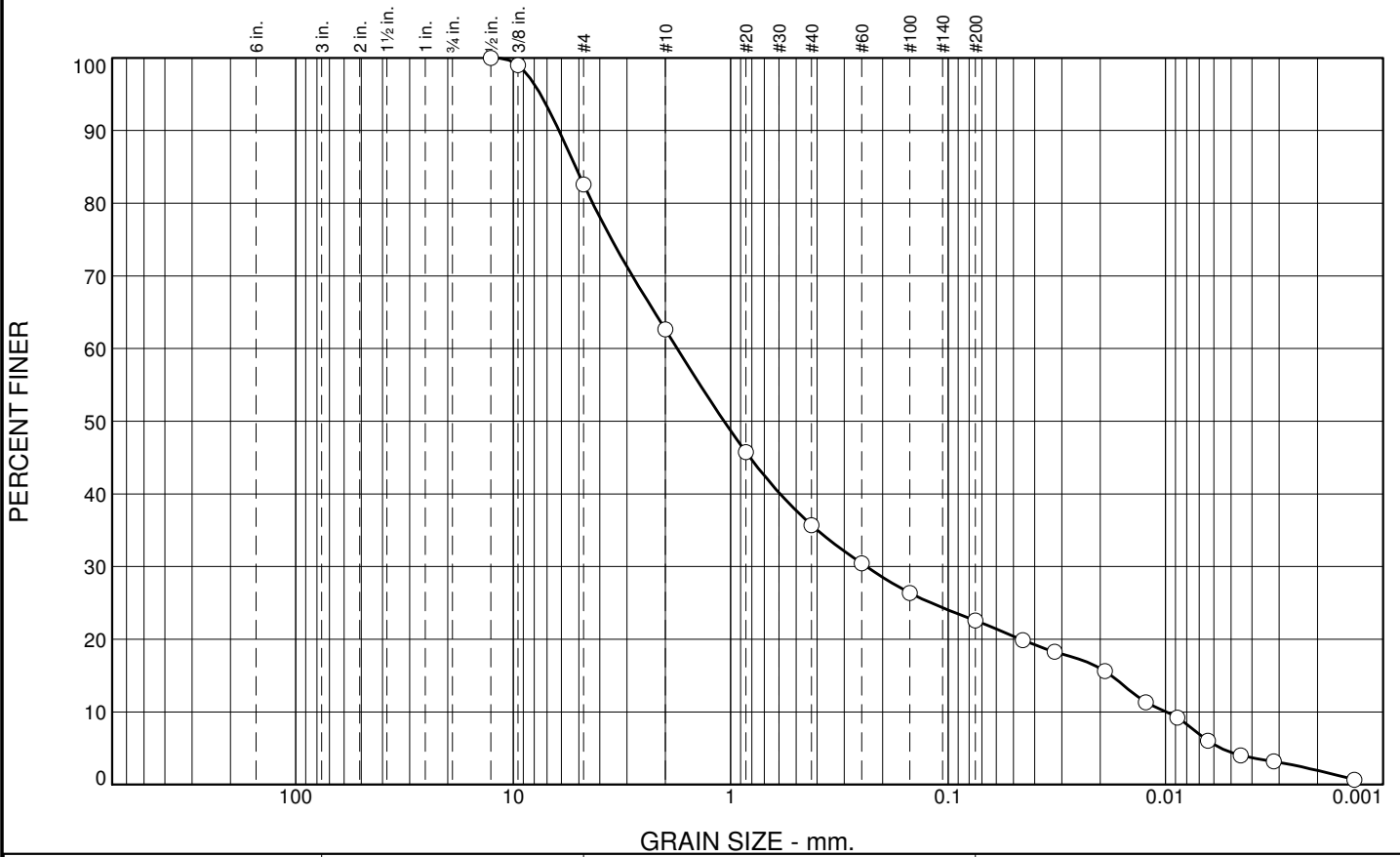
Sample No.: SPT 1 Source of Sample: GT12-06 Date: 9-20-12
 Location: Elev./Depth: 0-2'



Client: Yellowhead Mining Inc.
 Project: Harper Creek Project
 Project No: VA101-00458/07 Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.4	20.0	26.9	13.1	18.2	4.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	99.0		
#4	82.6		
#10	62.6		
#20	45.7		
#40	35.7		
#60	30.4		
#100	26.4		
#200	22.6		
0.0454 mm.	19.9		
0.0324 mm.	18.3		
0.0190 mm.	15.6		
0.0123 mm.	11.3		
0.0088 mm.	9.2		
0.0064 mm.	6.1		
0.0045 mm.	4.0		
0.0032 mm.	3.2		
0.0014 mm.	0.7		

Soil Description

silty sand with gravel

Atterberg Limits

PL= NP LL= NP PI= NP

Coefficients

D₉₀= 6.1668 D₈₅= 5.1734 D₆₀= 1.7619
 D₅₀= 1.0731 D₃₀= 0.2376 D₁₅= 0.0178
 D₁₀= 0.0099 C_u= 177.48 C_c= 3.23

Classification

USCS= SM AASHTO= A-1-b

Remarks

Natural moisture = 0.5%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: GT12-06

Date: 9-20-12
Elev./Depth: 3'-3'6"



Client: Yellowhead Mining Inc.
Project: Harper Creek Project

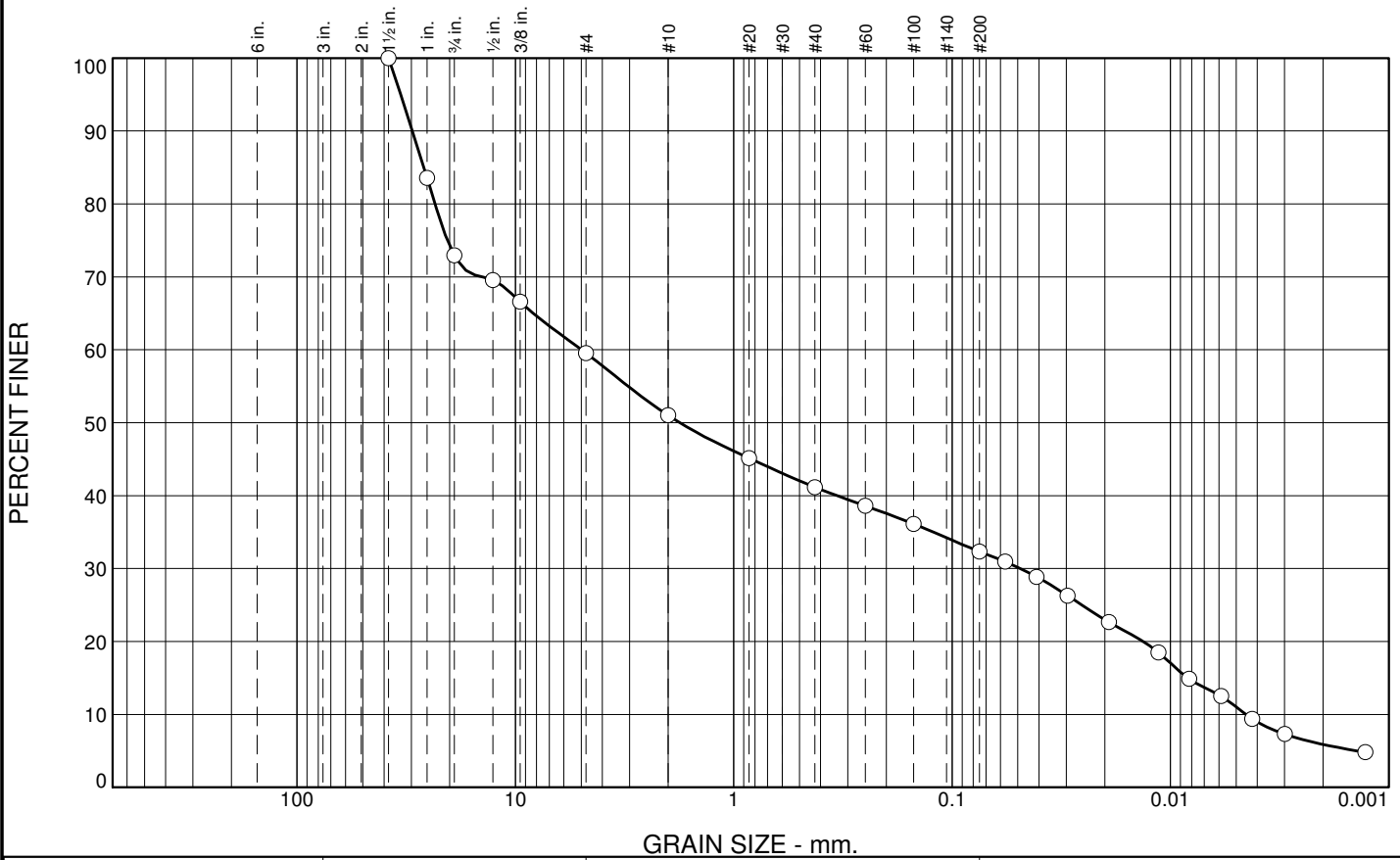
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	27.1	13.4	8.5	9.8	8.9	21.3	11.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	83.6		
.75	72.9		
.5	69.6		
.375	66.6		
#4	59.5		
#10	51.0		
#20	45.1		
#40	41.2		
#60	38.6		
#100	36.1		
#200	32.3		
0.0571 mm.	30.9		
0.0410 mm.	28.9		
0.0296 mm.	26.3		
0.0192 mm.	22.7		
0.0114 mm.	18.5		
0.0082 mm.	14.9		
0.0059 mm.	12.5		
0.0042 mm.	9.4		
0.0030 mm.	7.3		
0.0013 mm.	4.8		

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 29.6602 D₈₅= 26.2771 D₆₀= 4.9881
D₅₀= 1.7688 D₃₀= 0.0486 D₁₅= 0.0083
D₁₀= 0.0045 C_u= 1106.13 C_c= 0.10

Classification

USCS= GC AASHTO= A-2-6(1)

Remarks

Natural moisture = 8.6%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 4'-6"



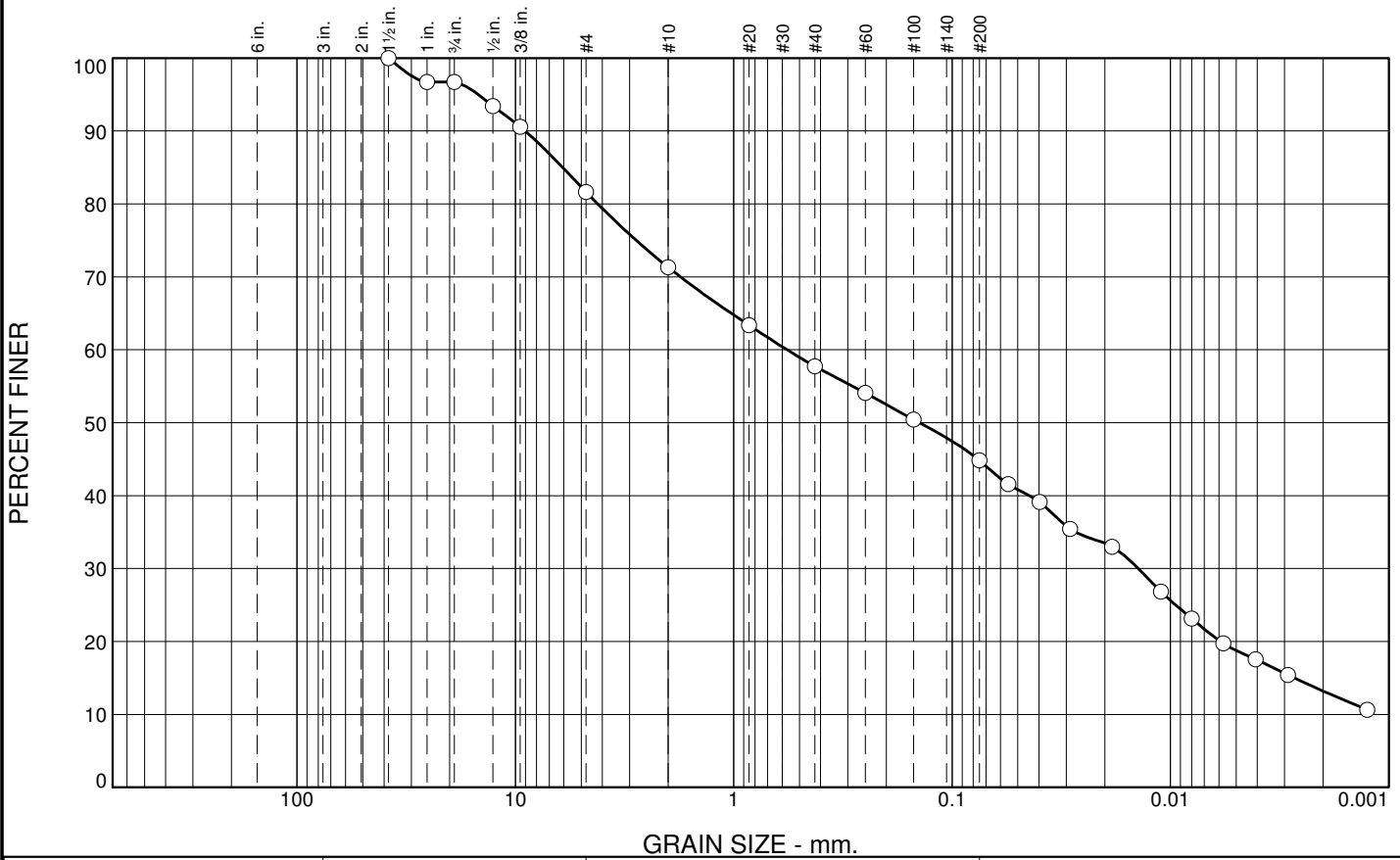
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV/DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	15.1	10.3	13.6	12.9	26.0	18.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.7		
.75	96.7		
.5	93.4		
.375	90.6		
#4	81.6		
#10	71.3		
#20	63.3		
#40	57.7		
#60	54.1		
#100	50.4		
#200	44.8		
0.0553 mm.	41.6		
0.0398 mm.	39.1		
0.0288 mm.	35.4		
0.0185 mm.	33.0		
0.0111 mm.	26.8		
0.0080 mm.	23.2		
0.0057 mm.	19.7		
0.0041 mm.	17.6		
0.0029 mm.	15.4		
0.0013 mm.	10.6		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 9.0237 D₈₅= 6.0844 D₆₀= 0.5699
D₅₀= 0.1414 D₃₀= 0.0140 D₁₅= 0.0027
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.3%

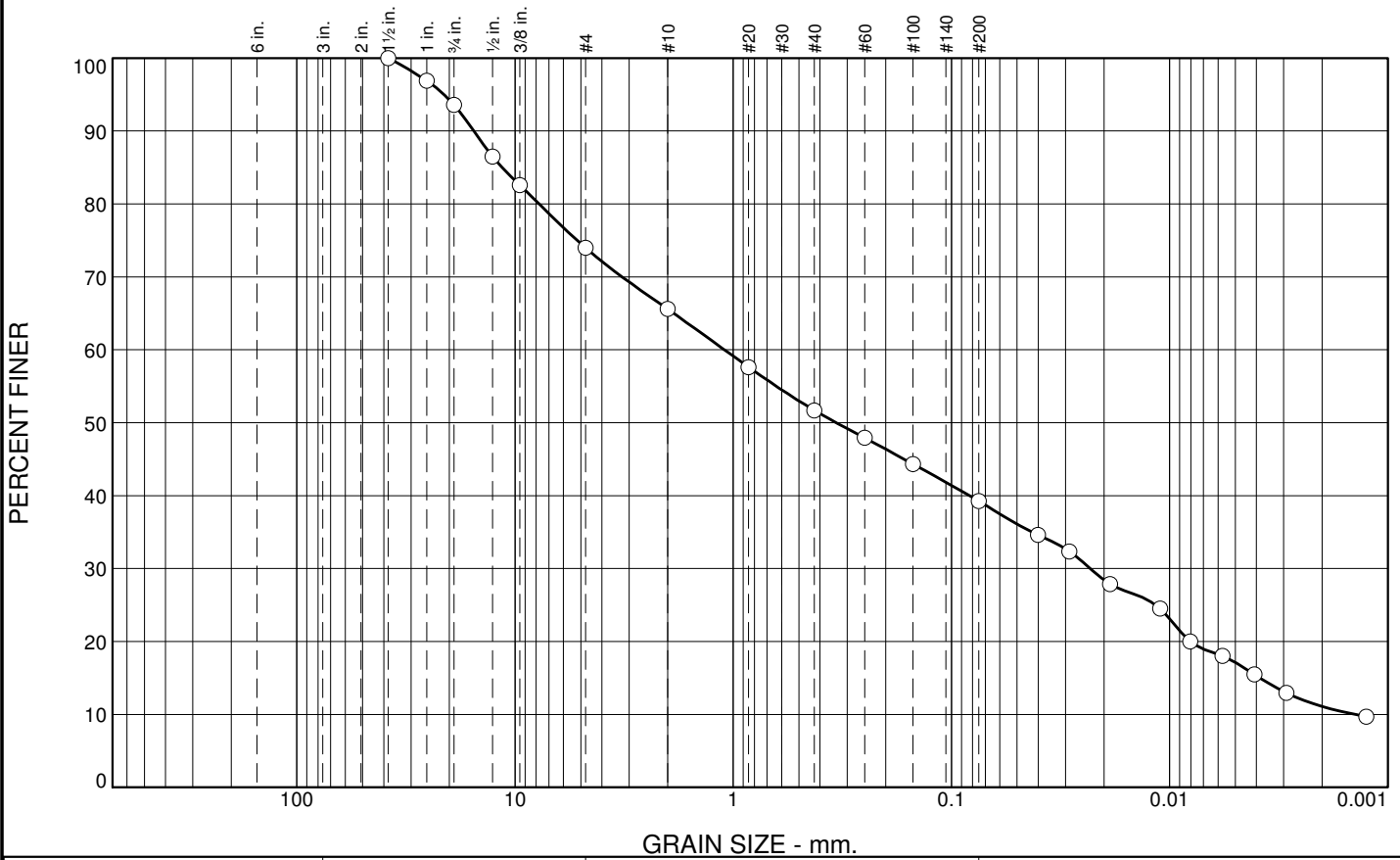
* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-01 Date: 9-5-12
Location: Elev./Depth: 9'-11'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: DB Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	19.6	8.4	13.9	12.4	22.2	17.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.9		
.75	93.6		
.5	86.5		
.375	82.6		
#4	74.0		
#10	65.6		
#20	57.6		
#40	51.7		
#60	47.9		
#100	44.3		
#200	39.3		
0.0401 mm.	34.6		
0.0288 mm.	32.4		
0.0188 mm.	27.9		
0.0111 mm.	24.5		
0.0080 mm.	20.0		
0.0057 mm.	18.0		
0.0041 mm.	15.5		
0.0029 mm.	13.0		
0.0013 mm.	9.7		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 15.4714 D₈₅= 11.4802 D₆₀= 1.0977
D₅₀= 0.3370 D₃₀= 0.0232 D₁₅= 0.0039
D₁₀= 0.0014 C_u= 780.29 C_c= 0.35

Classification

USCS= SC AASHTO= A-6(1)

Remarks

Natural moisture = 8.1%

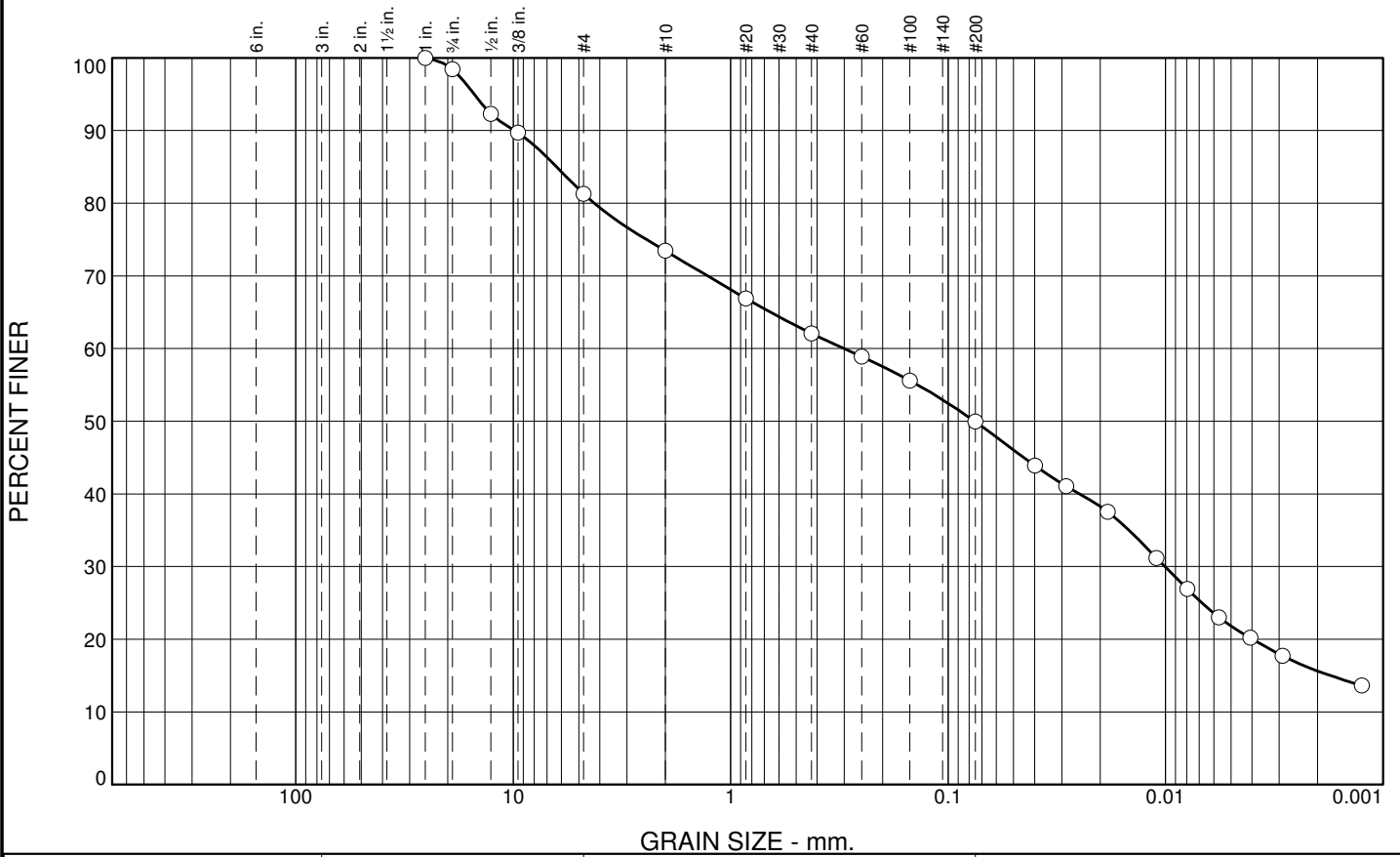
* (no specification provided)

Sample No.: SPT 3 **Source of Sample:** TMF12-01 **Date:** 9-5-12
Location: **Elev./Depth:** 14'-16'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07
Figure	

Tested By: DB Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.6	17.1	7.8	11.4	12.2	28.1	21.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.4		
.5	92.3		
.375	89.7		
#4	81.3		
#10	73.5		
#20	66.9		
#40	62.1		
#60	58.9		
#100	55.6		
#200	49.9		
0.0399 mm.	43.9		
0.0286 mm.	41.1		
0.0184 mm.	37.5		
0.0110 mm.	31.2		
0.0079 mm.	26.9		
0.0057 mm.	23.0		
0.0041 mm.	20.2		
0.0029 mm.	17.7		
0.0012 mm.	13.6		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 9.8578 D₈₅= 6.3261 D₆₀= 0.3019
D₅₀= 0.0755 D₃₀= 0.0101 D₁₅= 0.0017
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Natural moisture = 10.0%

* (no specification provided)

Sample No.: SPT 4
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 19'-21'



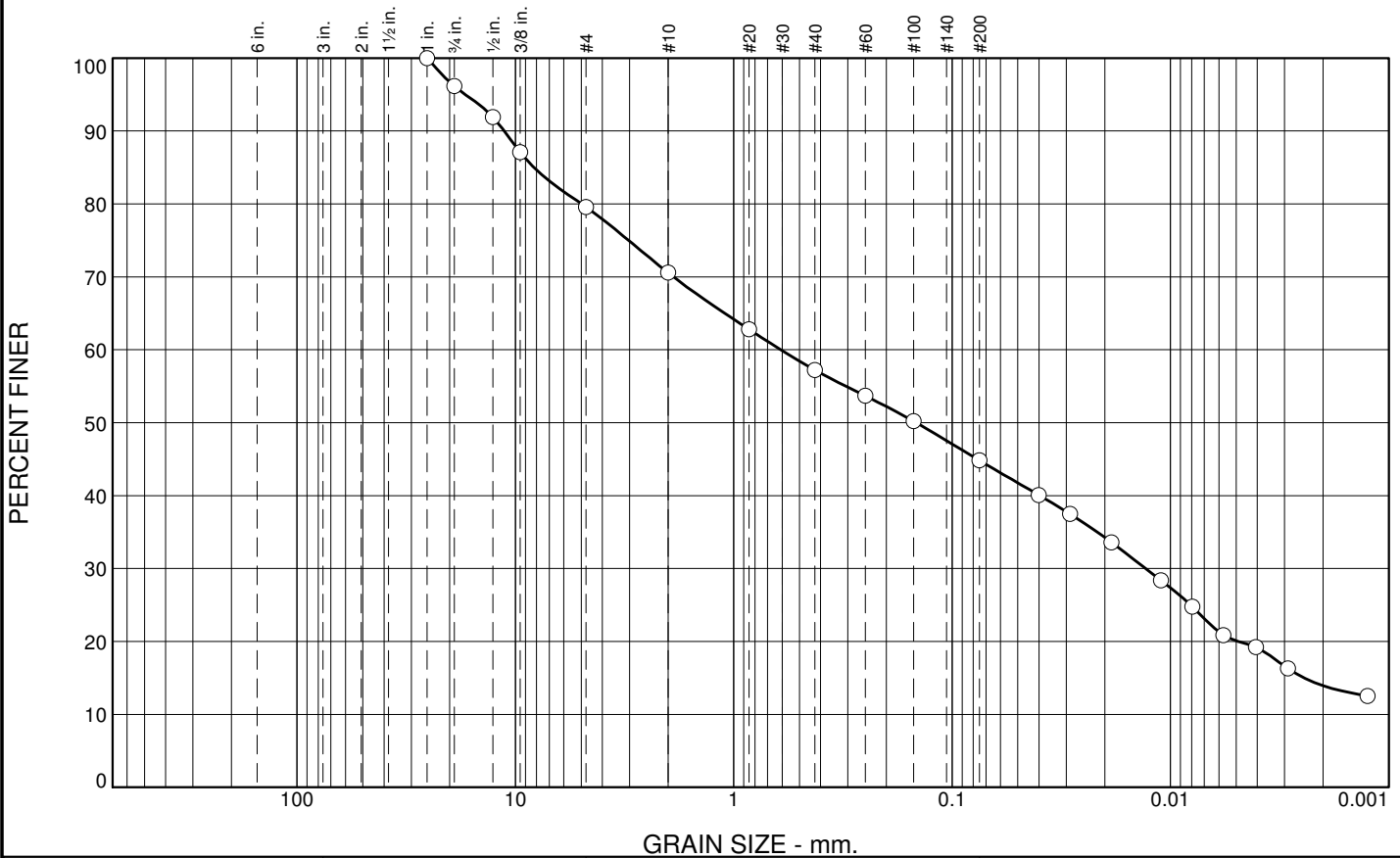
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.8	16.6	9.0	13.4	12.4	24.7	20.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.2		
.5	91.9		
.375	87.1		
#4	79.6		
#10	70.6		
#20	62.8		
#40	57.2		
#60	53.7		
#100	50.2		
#200	44.8		
0.0401 mm.	40.1		
0.0288 mm.	37.5		
0.0186 mm.	33.6		
0.0111 mm.	28.4		
0.0079 mm.	24.8		
0.0057 mm.	20.9		
0.0041 mm.	19.2		
0.0029 mm.	16.3		
0.0012 mm.	12.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 11.2685 D₈₅= 8.2266 D₆₀= 0.6093
D₅₀= 0.1461 D₃₀= 0.0130 D₁₅= 0.0024
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.3%

* (no specification provided)

Sample No.: SPT 5
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 24'-26'



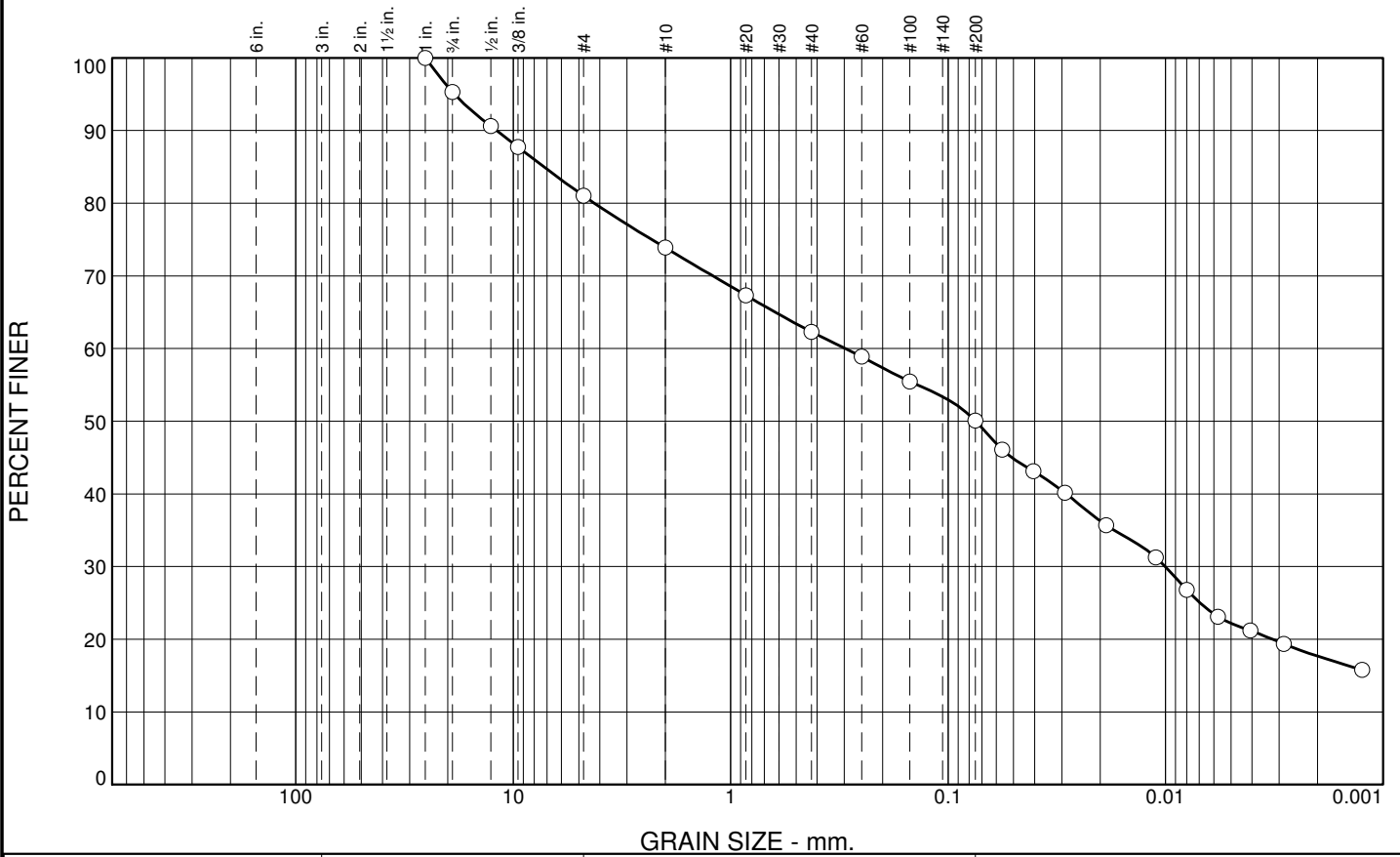
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.7	14.3	7.1	11.6	12.2	27.9	22.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.3		
.5	90.6		
.375	87.7		
#4	81.0		
#10	73.9		
#20	67.3		
#40	62.3		
#60	58.9		
#100	55.5		
#200	50.1		
0.0564 mm.	46.1		
0.0405 mm.	43.1		
0.0291 mm.	40.2		
0.0188 mm.	35.7		
0.0111 mm.	31.3		
0.0080 mm.	26.8		
0.0057 mm.	23.1		
0.0041 mm.	21.2		
0.0029 mm.	19.4		
0.0012 mm.	15.8		

Soil Description
sandy lean clay with gravel

Atterberg Limits
 PL= 14 LL= 27 PI= 13

Coefficients
 D₉₀= 11.9555 D₈₅= 7.2242 D₆₀= 0.2966
 D₅₀= 0.0745 D₃₀= 0.0100 D₁₅=
 D₁₀= C_u= C_c=

Classification
 USCS= CL AASHTO= A-6(3)

Remarks
 Natural moisture = 8.8%

* (no specification provided)

Sample No.: SPT 6
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 29'-31'



Client: Yellowhead Mining Inc.
Project: Harper Creek Project

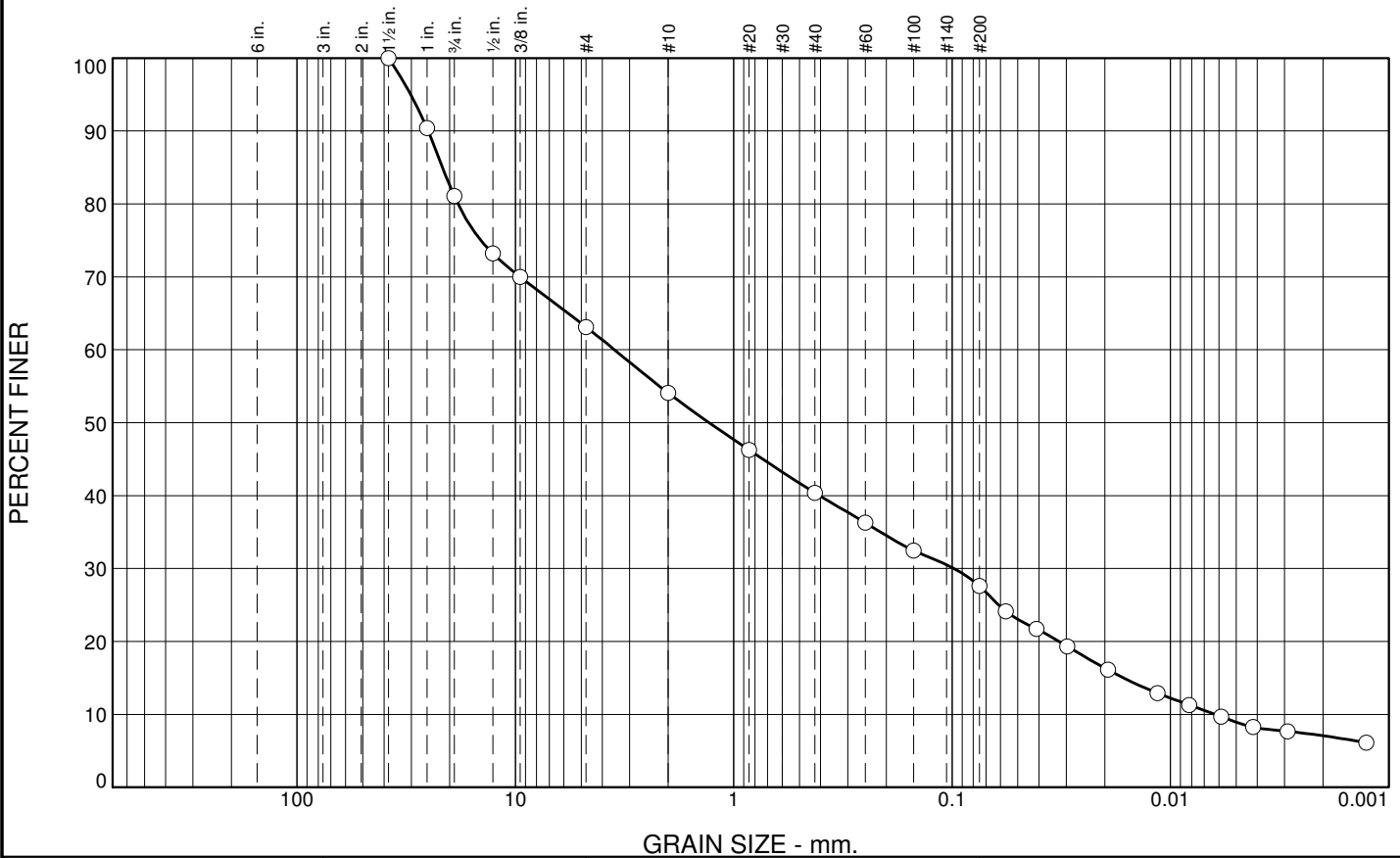
Project No: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.9	18.0	9.0	13.7	12.8	18.7	8.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	90.4		
.75	81.1		
.5	73.2		
.375	70.0		
#4	63.1		
#10	54.1		
#20	46.3		
#40	40.4		
#60	36.3		
#100	32.5		
#200	27.6		
0.0568 mm.	24.1		
0.0411 mm.	21.7		
0.0297 mm.	19.3		
0.0193 mm.	16.1		
0.0114 mm.	12.9		
0.0082 mm.	11.3		
0.0059 mm.	9.7		
0.0042 mm.	8.3		
0.0029 mm.	7.7		
0.0013 mm.	6.1		

Soil Description
clayey gravel with sand

Atterberg Limits
 PL= 14 LL= 27 PI= 13

Coefficients
 D₉₀= 25.0922 D₈₅= 21.5734 D₆₀= 3.5212
 D₅₀= 1.2974 D₃₀= 0.0981 D₁₅= 0.0164
 D₁₀= 0.0063 C_u= 563.12 C_c= 0.44

Classification
 USCS= GC AASHTO= A-2-6(0)

Remarks
 Natural moisture = 9.2%

* (no specification provided)

Sample No.: SPT 7
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 34'-36'



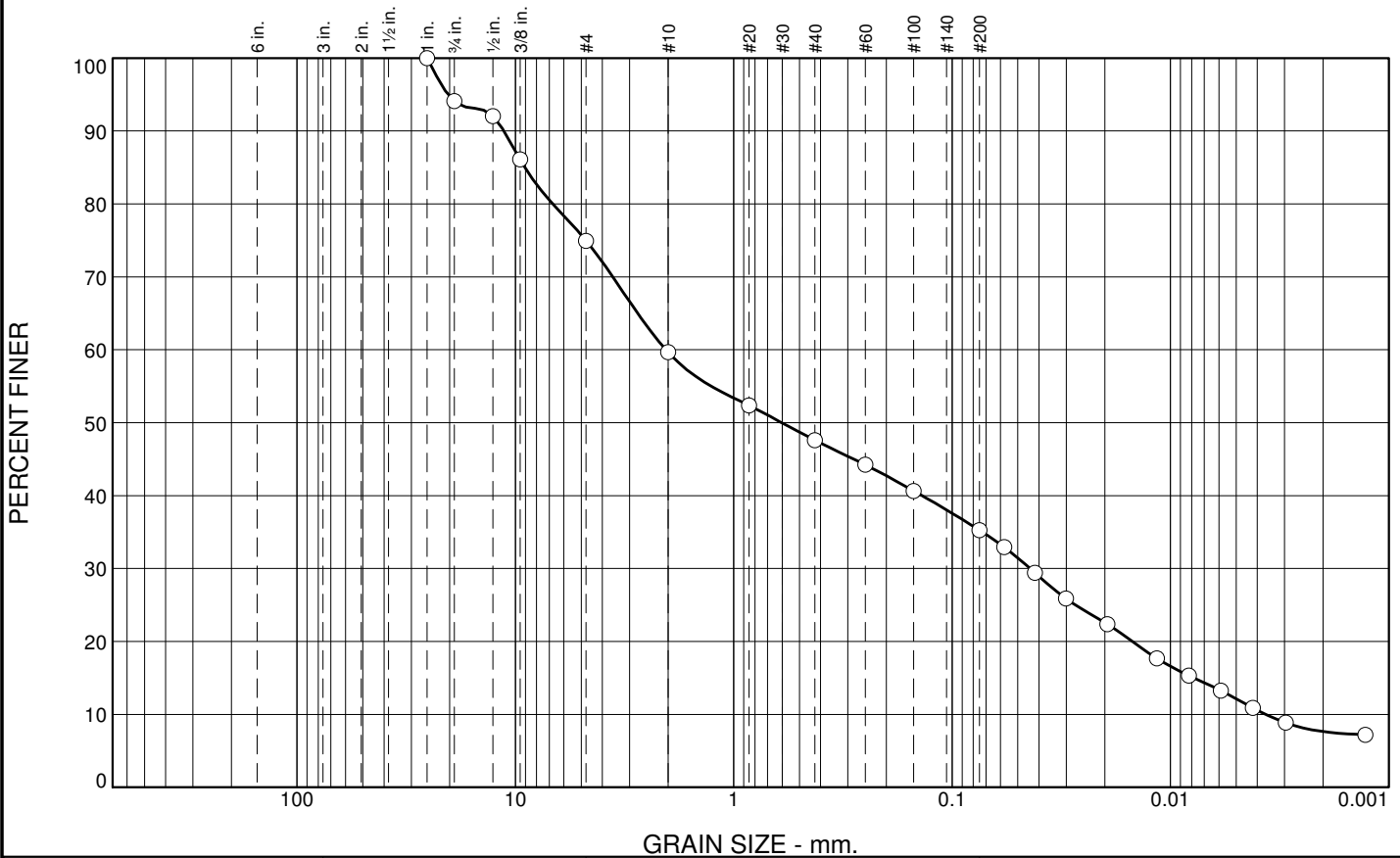
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	5.9	19.2	15.2	12.1	12.3	23.2	12.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	94.1		
.5	92.0		
.375	86.1		
#4	74.9		
#10	59.7		
#20	52.3		
#40	47.6		
#60	44.2		
#100	40.7		
#200	35.3		
0.0577 mm.	32.9		
0.0417 mm.	29.4		
0.0301 mm.	25.9		
0.0194 mm.	22.4		
0.0115 mm.	17.7		
0.0082 mm.	15.3		
0.0059 mm.	13.3		
0.0042 mm.	10.9		
0.0030 mm.	8.9		
0.0013 mm.	7.2		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 11.2971 D₈₅= 9.0552 D₆₀= 2.0454
D₅₀= 0.6026 D₃₀= 0.0439 D₁₅= 0.0078
D₁₀= 0.0037 C_u= 558.96 C_c= 0.26

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

Natural moisture 67%

* (no specification provided)

Sample No.: SPT 8
Location:

Source of Sample: TMF12-01

Date: 9-5-12
Elev./Depth: 39'-41'



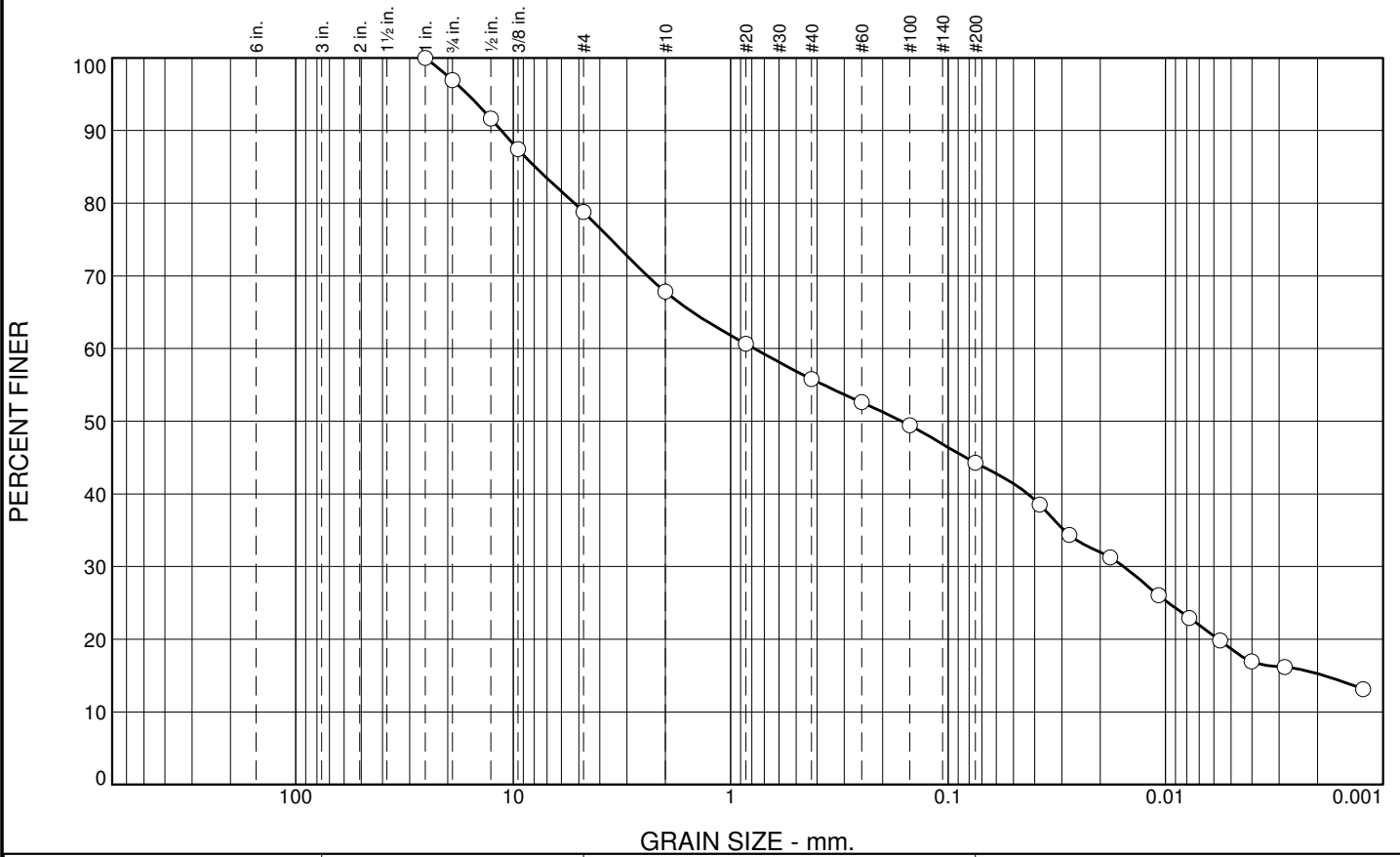
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.1	18.1	11.0	12.0	11.5	25.6	18.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.9		
.5	91.6		
.375	87.4		
#4	78.8		
#10	67.8		
#20	60.6		
#40	55.8		
#60	52.6		
#100	49.4		
#200	44.3		
0.0379 mm.	38.5		
0.0277 mm.	34.4		
0.0180 mm.	31.3		
0.0108 mm.	26.1		
0.0078 mm.	22.9		
0.0056 mm.	19.8		
0.0040 mm.	16.9		
0.0028 mm.	16.2		
0.0012 mm.	13.1		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 29 PI= 14

Coefficients

D₉₀= 11.3614 D₈₅= 7.9237 D₆₀= 0.7782
D₅₀= 0.1634 D₃₀= 0.0156 D₁₅= 0.0019
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.5%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-02

Date: 9-5-12
Elev./Depth: 4'-6"



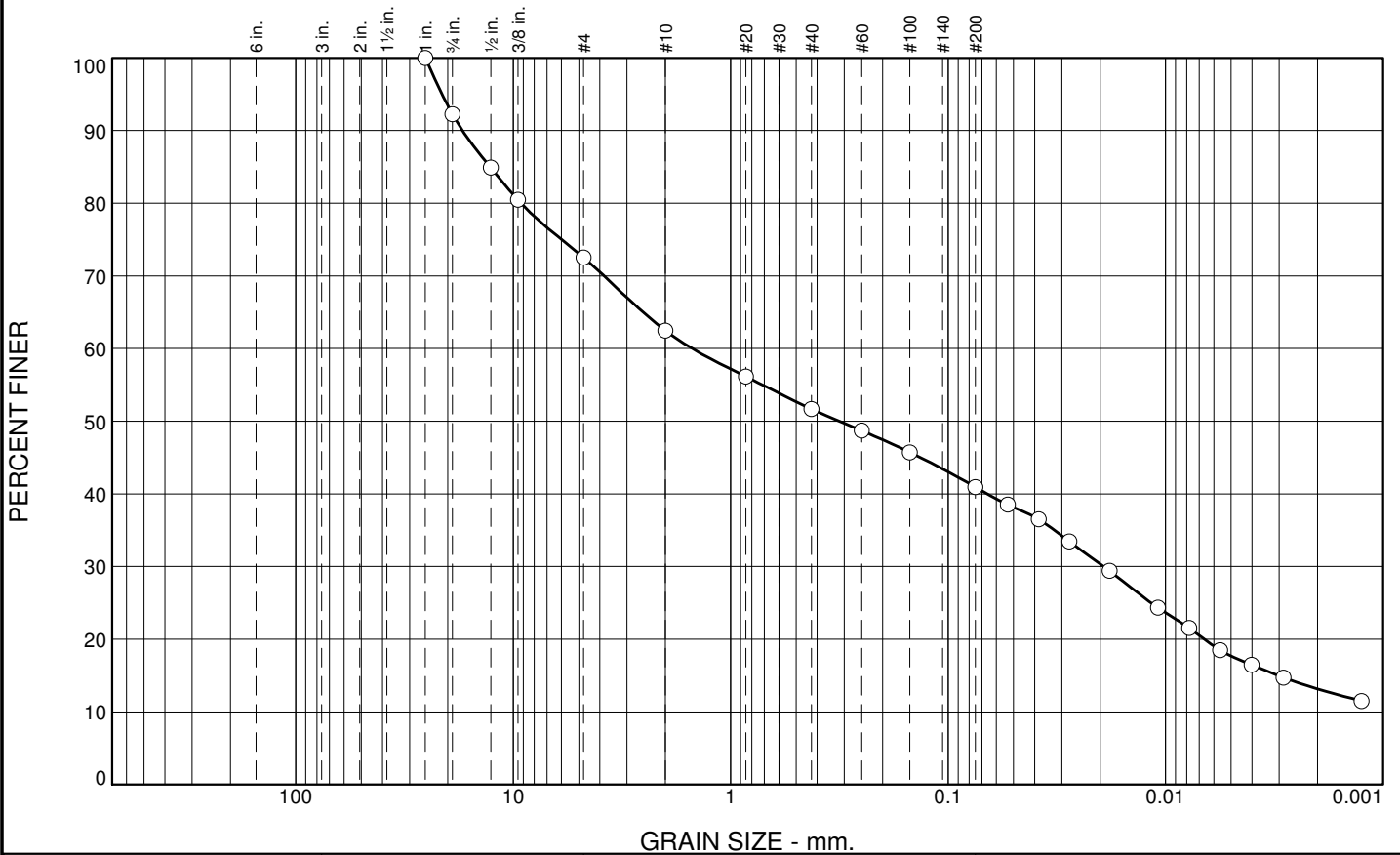
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.7	19.8	10.0	10.8	10.7	23.3	17.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.3		
.5	84.9		
.375	80.5		
#4	72.5		
#10	62.5		
#20	56.1		
#40	51.7		
#60	48.7		
#100	45.7		
#200	41.0		
0.0532 mm.	38.5		
0.0383 mm.	36.5		
0.0277 mm.	33.5		
0.0181 mm.	29.4		
0.0108 mm.	24.3		
0.0078 mm.	21.5		
0.0056 mm.	18.5		
0.0040 mm.	16.5		
0.0029 mm.	14.7		
0.0013 mm.	11.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 29 PI= 14

Coefficients

D₉₀= 17.1359 D₈₅= 12.7948 D₆₀= 1.5042
D₅₀= 0.3167 D₃₀= 0.0193 D₁₅= 0.0030
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.7%

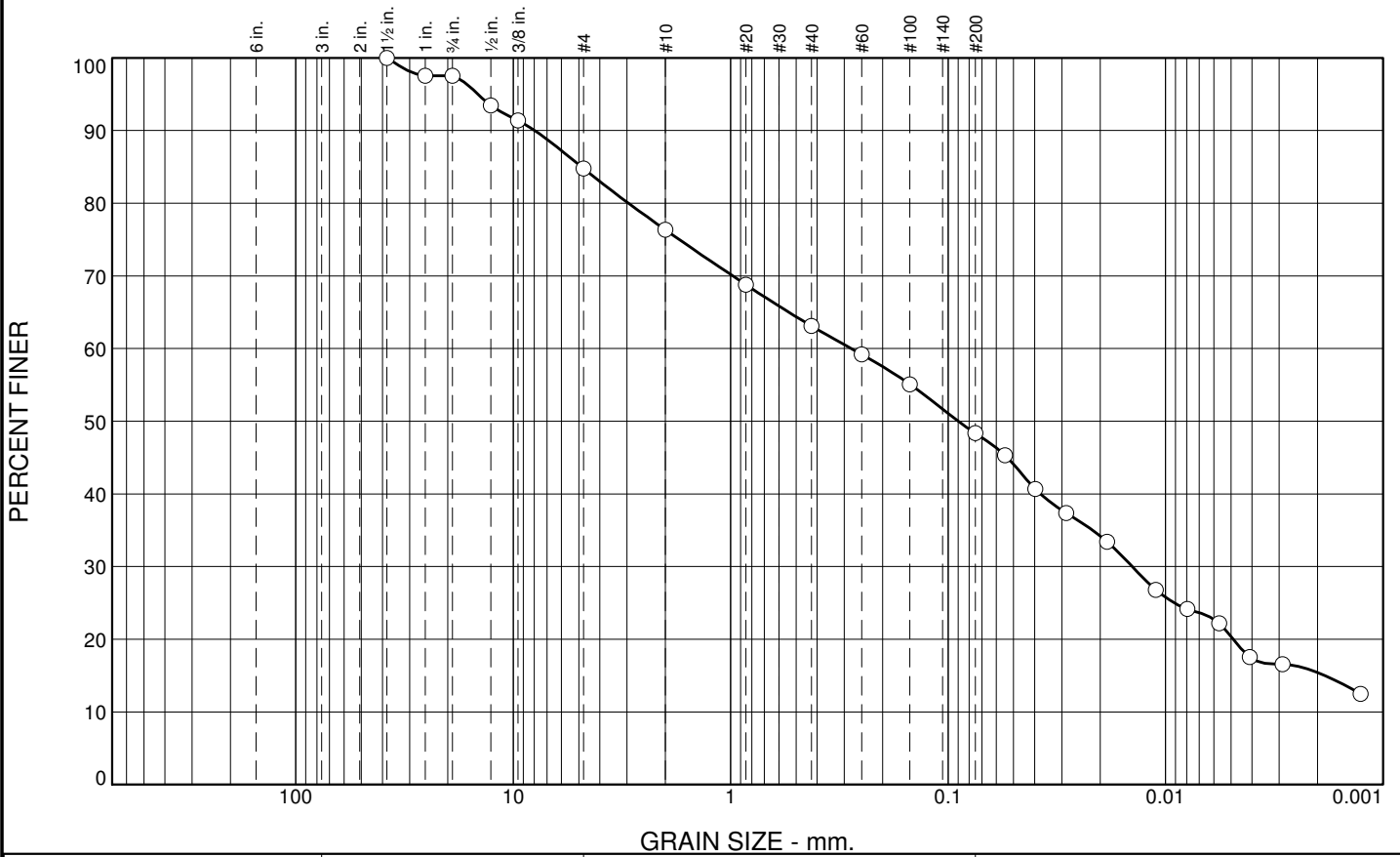
* (no specification provided)

Sample No.: SPT 2 **Source of Sample:** TMF12-02 **Date:** 9-5-12
Location: **Elev./Depth:** 9'-11'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07
Figure	

Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.5	12.7	8.4	13.3	14.8	27.9	20.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.5		
.75	97.5		
.5	93.5		
.375	91.4		
#4	84.8		
#10	76.4		
#20	68.8		
#40	63.1		
#60	59.2		
#100	55.1		
#200	48.3		
0.0547 mm.	45.3		
0.0398 mm.	40.7		
0.0287 mm.	37.4		
0.0185 mm.	33.4		
0.0111 mm.	26.8		
0.0079 mm.	24.2		
0.0057 mm.	22.2		
0.0041 mm.	17.6		
0.0029 mm.	16.6		
0.0013 mm.	12.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 25 PI= 10

Coefficients

D₉₀= 7.9822 D₈₅= 4.8621 D₆₀= 0.2787
D₅₀= 0.0896 D₃₀= 0.0142 D₁₅= 0.0018
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-4(2)

Remarks

Natural moisture = 8.9%

* (no specification provided)

Sample No.: SPT 3
Location:

Source of Sample: TMF12-02

Date: 9-5-12
Elev./Depth: 14'-16'



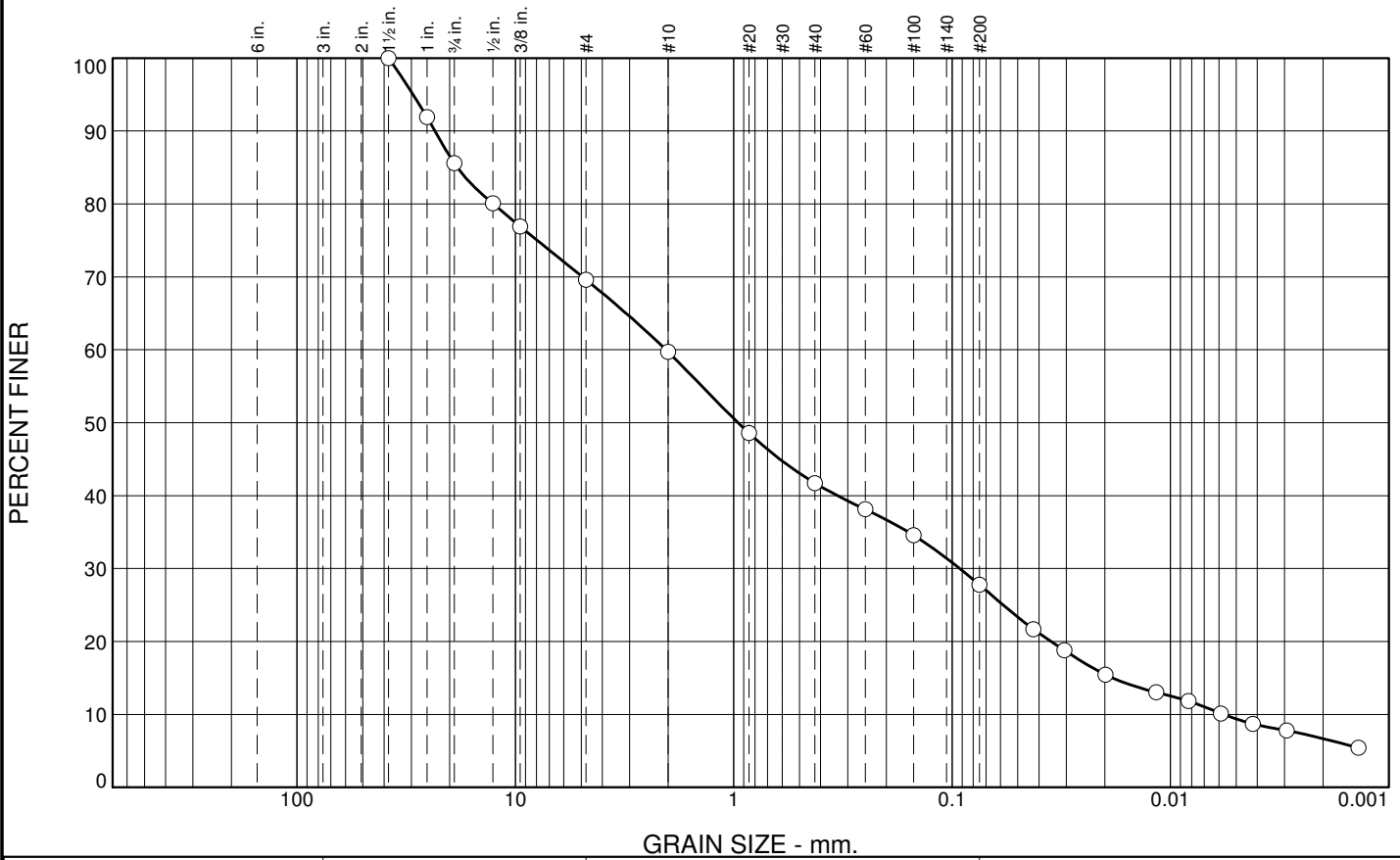
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.4	16.0	9.9	18.0	13.9	18.4	9.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.9		
.75	85.6		
.5	80.1		
.375	76.9		
#4	69.6		
#10	59.7		
#20	48.6		
#40	41.7		
#60	38.1		
#100	34.6		
#200	27.8		
0.0425 mm.	21.7		
0.0306 mm.	18.8		
0.0198 mm.	15.4		
0.0116 mm.	13.0		
0.0083 mm.	11.8		
0.0059 mm.	10.1		
0.0042 mm.	8.7		
0.0029 mm.	7.8		
0.0014 mm.	5.4		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 19 LL= 28 PI= 9

Coefficients

D₉₀= 23.3770 D₈₅= 18.4544 D₆₀= 2.0452
D₅₀= 0.9553 D₃₀= 0.0923 D₁₅= 0.0184
D₁₀= 0.0057 C_u= 358.19 C_c= 0.73

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

Natural moisture = 12.3%

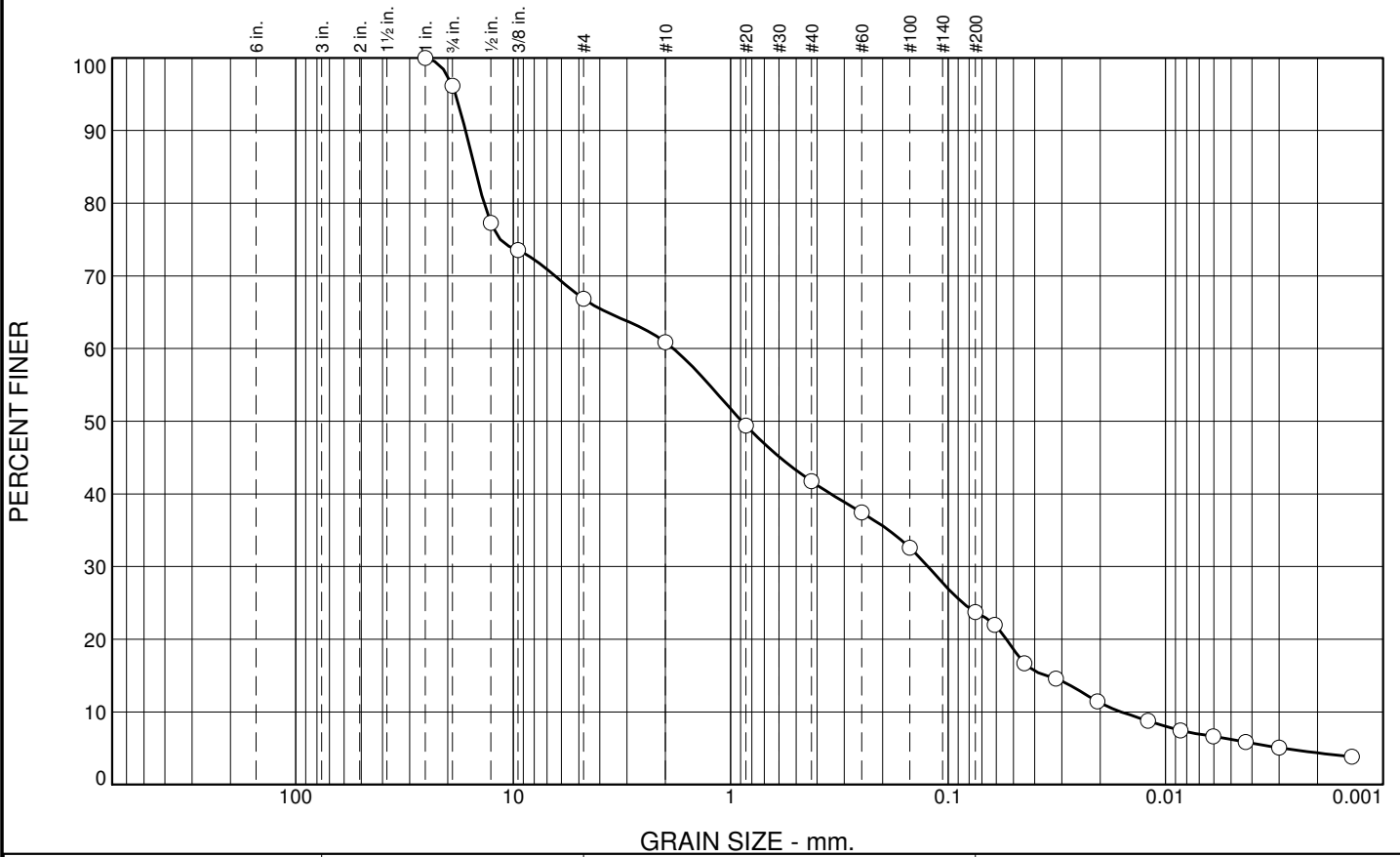
* (no specification provided)

Sample No.: SPT 1 Source of Sample: TMF12-03 Date: 9-5-12
Location: Elev./Depth: 4'-6"

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.9	29.3	5.9	19.2	18.0	17.5	6.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.1		
.5	77.3		
.375	73.5		
#4	66.8		
#10	60.9		
#20	49.4		
#40	41.7		
#60	37.4		
#100	32.6		
#200	23.7		
0.0610 mm.	22.0		
0.0446 mm.	16.7		
0.0319 mm.	14.6		
0.0206 mm.	11.4		
0.0121 mm.	8.8		
0.0085 mm.	7.5		
0.0060 mm.	6.6		
0.0043 mm.	5.9		
0.0030 mm.	5.1		
0.0014 mm.	3.8		

Soil Description
silty sand with gravel

Atterberg Limits
 PL= 22 LL= 25 PI= 3

Coefficients
 D₉₀= 16.5686 D₈₅= 15.0781 D₆₀= 1.8353
 D₅₀= 0.8885 D₃₀= 0.1239 D₁₅= 0.0351
 D₁₀= 0.0160 C_u= 114.92 C_c= 0.52

Classification
 USCS= SM AASHTO= A-1-b

Remarks
 Natural moisture = 9.3%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-03

Date: 9-5-12
Elev./Depth: 9'-11'



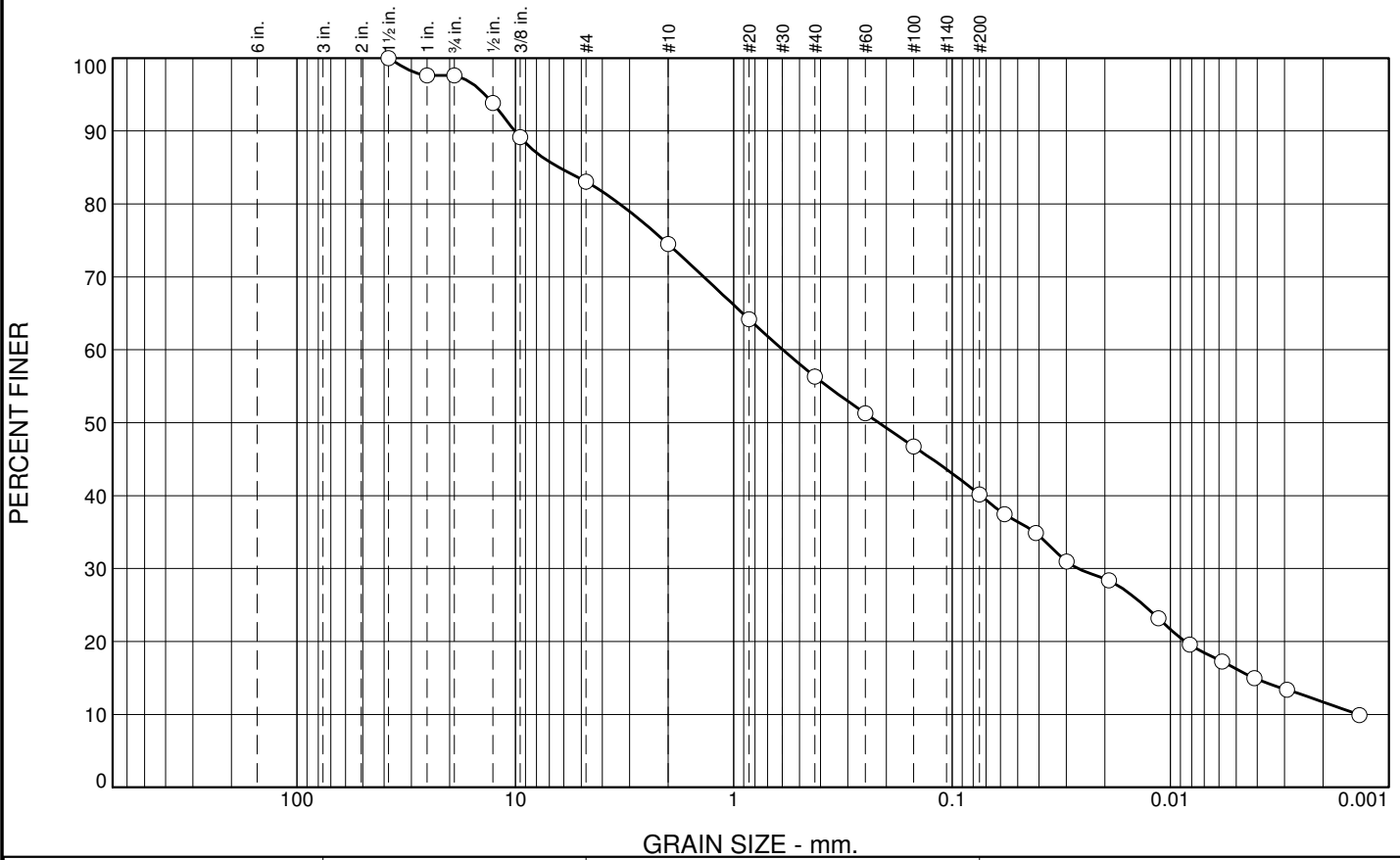
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.4	14.5	8.6	18.2	16.1	23.9	16.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.6		
.75	97.6		
.5	93.8		
.375	89.2		
#4	83.1		
#10	74.5		
#20	64.2		
#40	56.3		
#60	51.3		
#100	46.7		
#200	40.2		
0.0576 mm.	37.5		
0.0413 mm.	34.9		
0.0299 mm.	31.0		
0.0192 mm.	28.4		
0.0114 mm.	23.2		
0.0081 mm.	19.6		
0.0058 mm.	17.3		
0.0041 mm.	15.0		
0.0029 mm.	13.4		
0.0014 mm.	9.9		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 24 PI= 9

Coefficients

D₉₀= 10.0660 D₈₅= 6.3137 D₆₀= 0.5957
D₅₀= 0.2169 D₃₀= 0.0264 D₁₅= 0.0041
D₁₀= 0.0014 C_u= 430.44 C_c= 0.85

Classification

USCS= SC AASHTO= A-4(0)

Remarks

Natural moisture = 9.2%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-04

Date: 9-5-12
Elev./Depth: 4'-6"



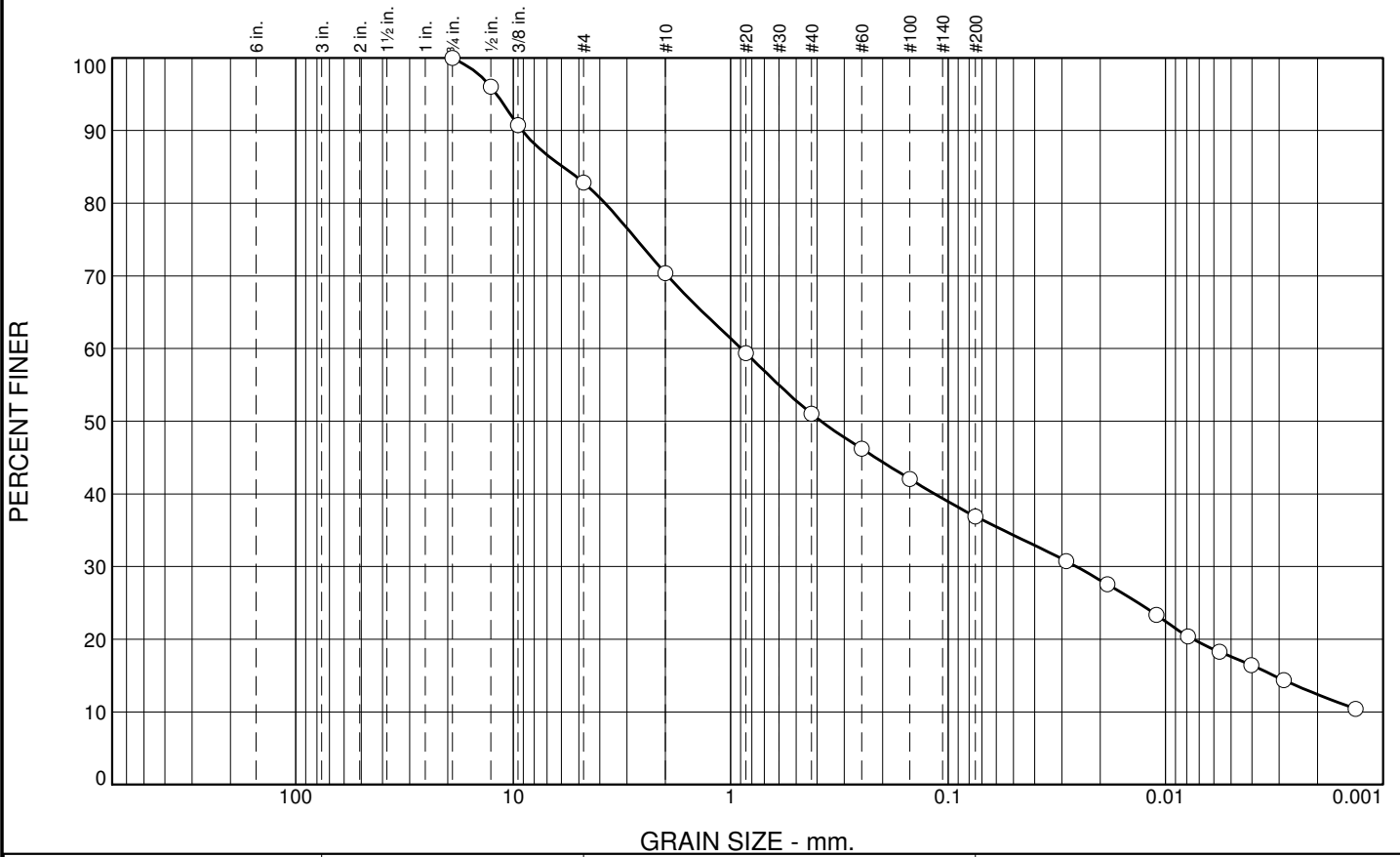
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.2	12.4	19.4	14.1	19.3	17.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.0		
.375	90.7		
#4	82.8		
#10	70.4		
#20	59.4		
#40	51.0		
#60	46.2		
#100	42.0		
#200	36.9		
0.0286 mm.	30.7		
0.0185 mm.	27.6		
0.0110 mm.	23.3		
0.0079 mm.	20.4		
0.0057 mm.	18.3		
0.0040 mm.	16.4		
0.0029 mm.	14.4		
0.0013 mm.	10.4		

Soil Description

Atterberg Limits
 LL= PI=

Coefficients
 D₉₀= 9.1086 D₈₅= 5.9110 D₆₀= 0.8949
 D₅₀= 0.3836 D₃₀= 0.0258 D₁₅= 0.0032
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks

Natural moisture = 4.8%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-04

Date: 9-5-12
Elev./Depth: 9'-11'



Client: Yellowhead Mining Inc.
Project: Harper Creek Project

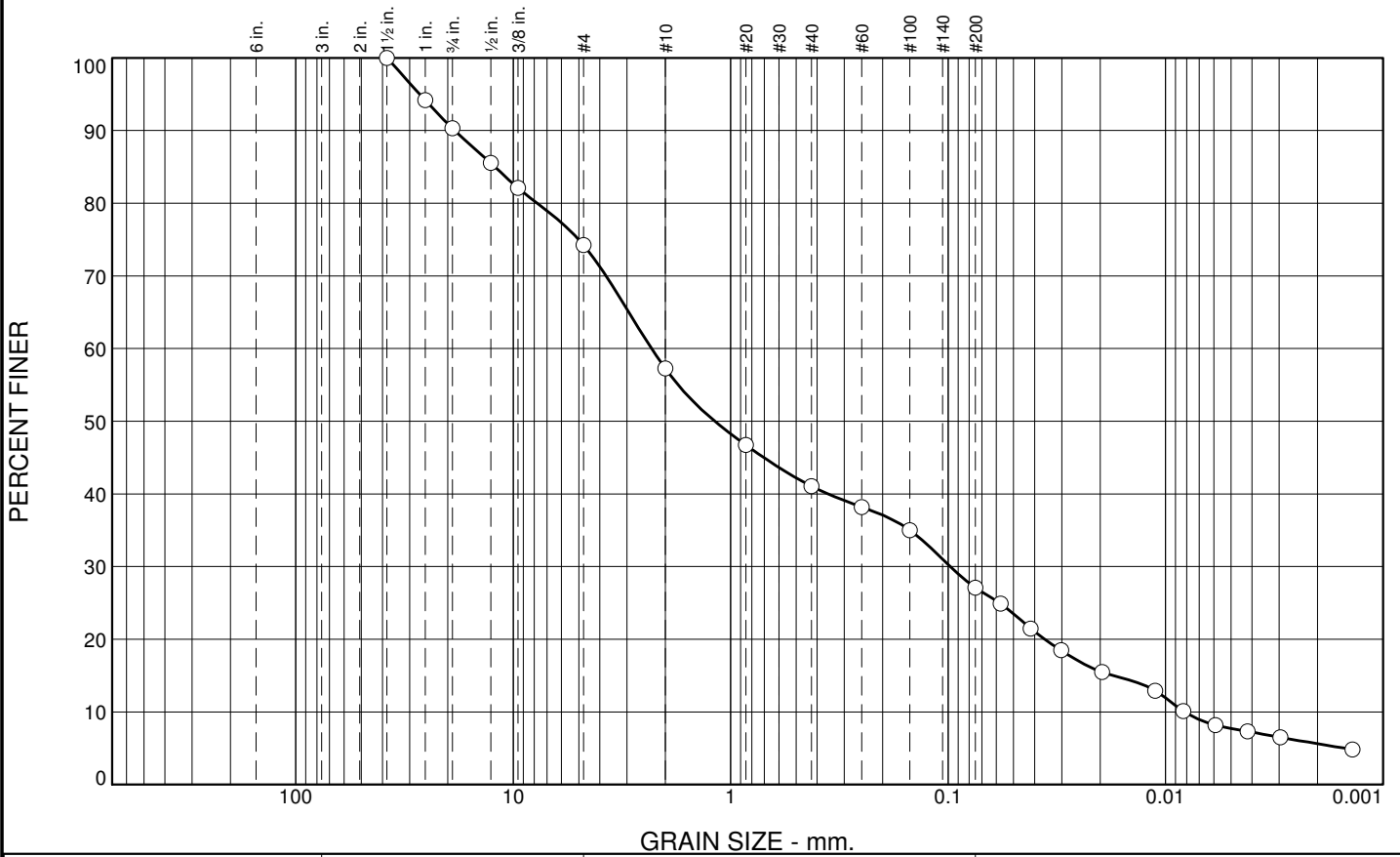
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.7	16.1	16.9	16.2	14.0	19.4	7.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.2		
.75	90.3		
.5	85.5		
.375	82.1		
#4	74.2		
#10	57.3		
#20	46.7		
#40	41.1		
#60	38.2		
#100	35.0		
#200	27.1		
0.0573 mm.	24.9		
0.0417 mm.	21.5		
0.0302 mm.	18.5		
0.0196 mm.	15.5		
0.0112 mm.	12.9		
0.0083 mm.	10.1		
0.0059 mm.	8.2		
0.0042 mm.	7.3		
0.0030 mm.	6.5		
0.0014 mm.	4.8		

Soil Description
silty, clayey sand with gravel

Atterberg Limits
 PL= 17 LL= 21 PI= 4

Coefficients
 D₉₀= 18.5894 D₈₅= 12.1604 D₆₀= 2.3114
 D₅₀= 1.1838 D₃₀= 0.0977 D₁₅= 0.0174
 D₁₀= 0.0082 C_u= 283.00 C_c= 0.51

Classification
 USCS= SC-SM AASHTO= A-2-4(0)

Remarks
 Natural moisture = 8.3%

* (no specification provided)

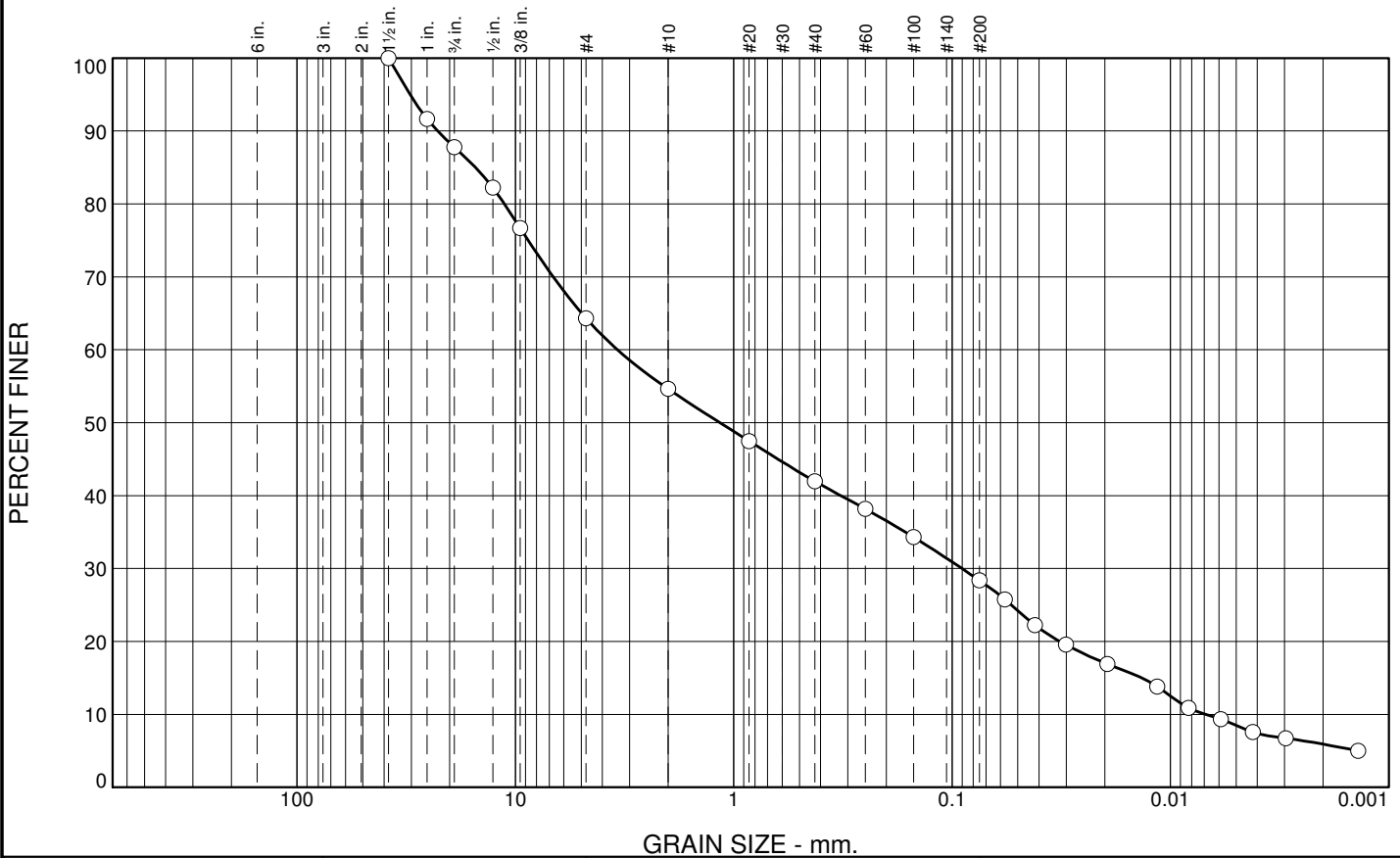
Sample No.: SPT 1 **Source of Sample:** TMF12-05 **Date:** 9-5-12
Location: **Elev./Depth:** 4'-6'



Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07 **Figure**

Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	12.2	23.5	9.7	12.6	13.6	19.9	8.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.7		
.75	87.8		
.5	82.2		
.375	76.7		
#4	64.3		
#10	54.6		
#20	47.5		
#40	42.0		
#60	38.2		
#100	34.3		
#200	28.4		
0.0573 mm.	25.8		
0.0417 mm.	22.2		
0.0301 mm.	19.6		
0.0194 mm.	16.9		
0.0115 mm.	13.8		
0.0083 mm.	10.9		
0.0059 mm.	9.4		
0.0042 mm.	7.6		
0.0030 mm.	6.7		
0.0014 mm.	5.0		

Soil Description
silty sand with gravel

Atterberg Limits
 PL= 20 LL= 21 PI= 1

Coefficients
 D₉₀= 22.7245 D₈₅= 15.2529 D₆₀= 3.4128
 D₅₀= 1.1566 D₃₀= 0.0901 D₁₅= 0.0136
 D₁₀= 0.0069 C_u= 495.31 C_c= 0.35

Classification
 USCS= SM AASHTO= A-2-4(0)

Remarks
 Natural moisture = 5.6%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-05

Date: 9-5-12
Elev./Depth: 9'-11'



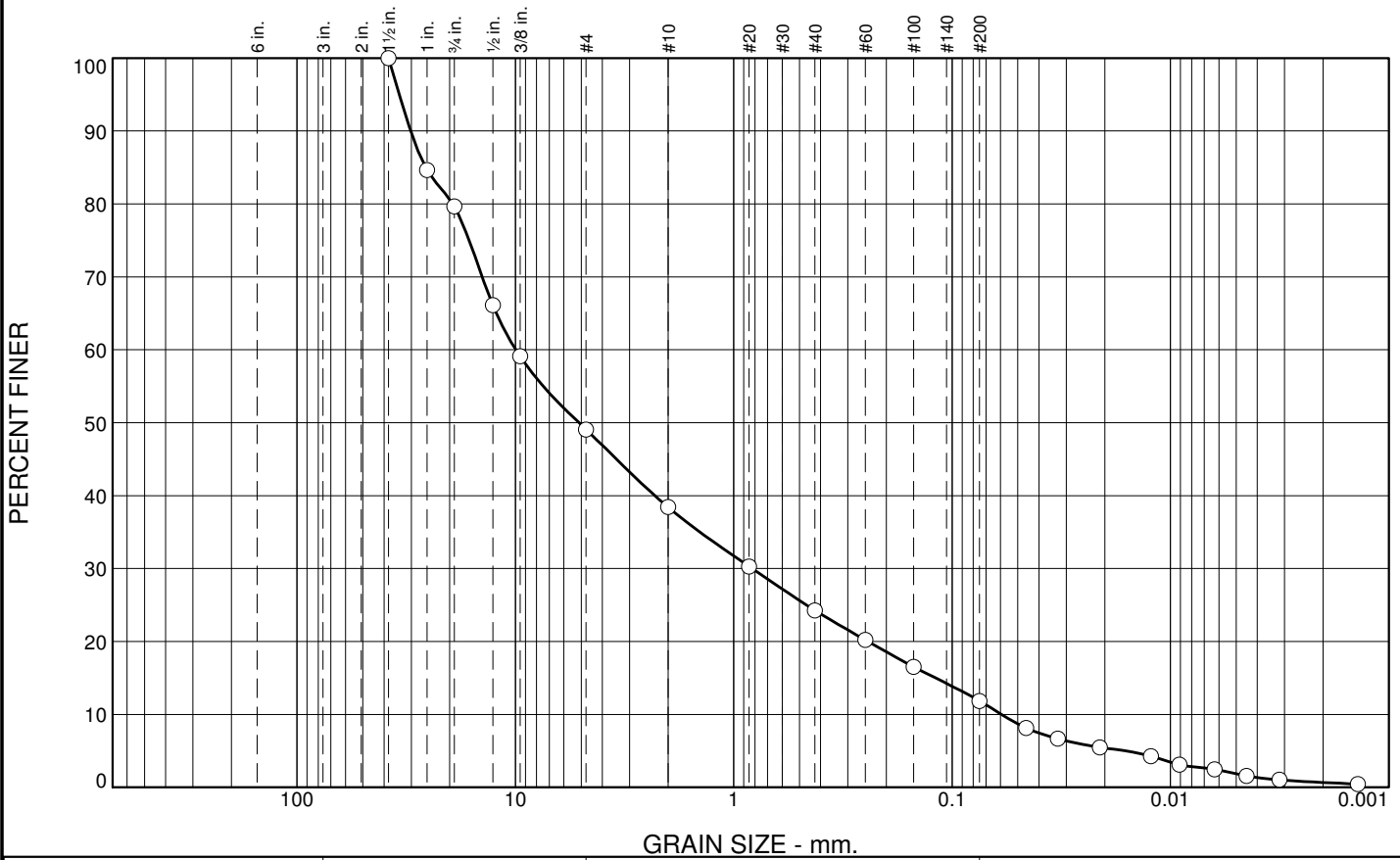
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	20.3	30.6	10.7	14.1	12.4	10.0	1.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	84.6		
.75	79.7		
.5	66.1		
.375	59.1		
#4	49.1		
#10	38.4		
#20	30.3		
#40	24.3		
#60	20.2		
#100	16.5		
#200	11.9		
0.0457 mm.	8.1		
0.0328 mm.	6.7		
0.0210 mm.	5.5		
0.0123 mm.	4.3		
0.0091 mm.	3.1		
0.0063 mm.	2.5		
0.0045 mm.	1.6		
0.0032 mm.	1.0		
0.0014 mm.	0.5		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 30.1877 D₈₅= 25.7862 D₆₀= 9.9590
D₅₀= 5.1179 D₃₀= 0.8222 D₁₅= 0.1191
D₁₀= 0.0594 C_u= 167.79 C_c= 1.14

Classification

USCS= AASHTO=

Remarks

Natural moisture = 4.3%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-06

Date: 9-6-12
Elev./Depth: 3'-5'



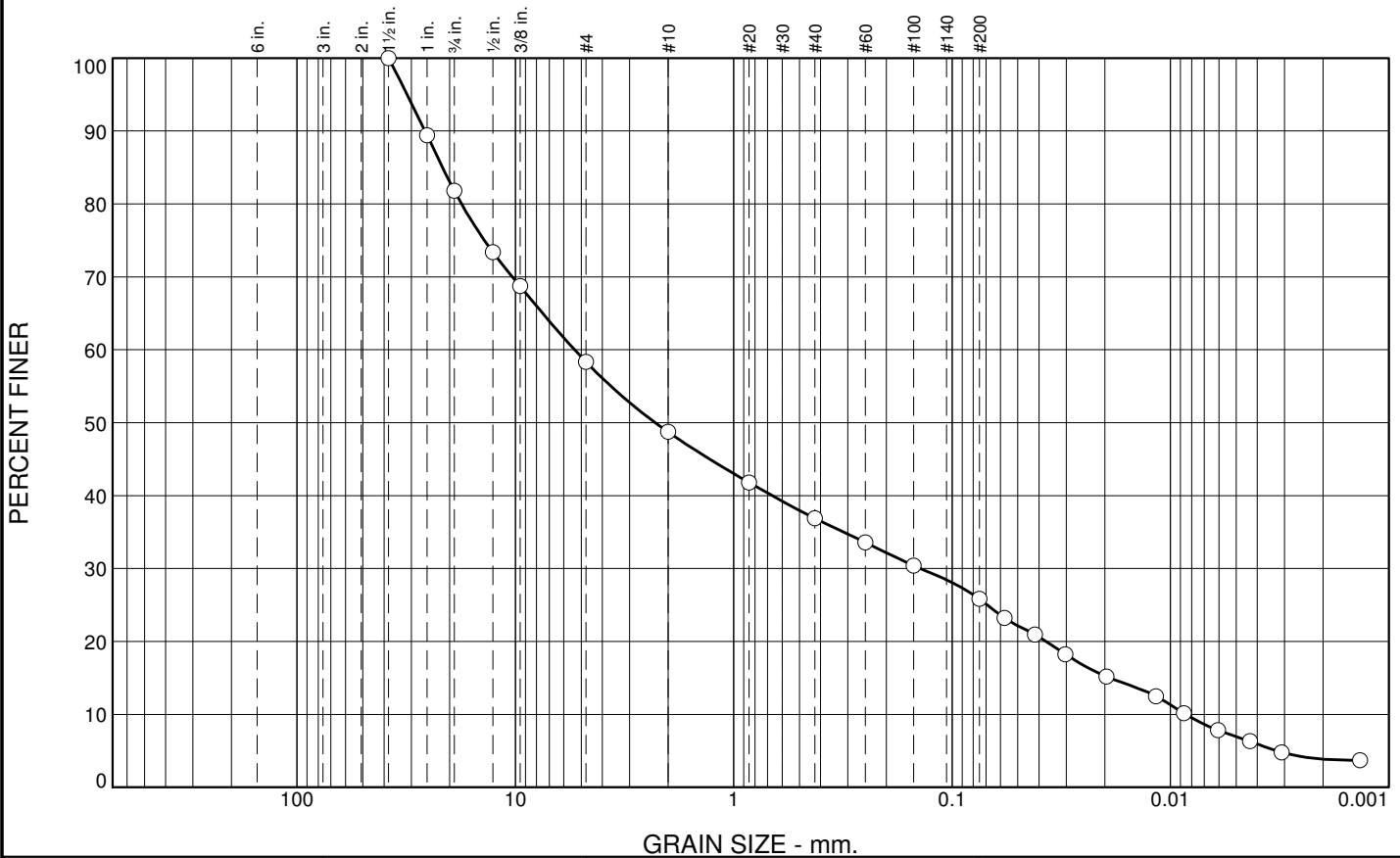
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	18.2	23.5	9.6	11.8	11.1	18.9	6.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	89.4		
.75	81.8		
.5	73.4		
.375	68.7		
#4	58.3		
#10	48.7		
#20	41.8		
#40	36.9		
#60	33.6		
#100	30.4		
#200	25.8		
0.0576 mm.	23.2		
0.0417 mm.	20.9		
0.0303 mm.	18.3		
0.0197 mm.	15.2		
0.0116 mm.	12.5		
0.0087 mm.	10.2		
0.0061 mm.	7.8		
0.0043 mm.	6.3		
0.0031 mm.	4.8		
0.0014 mm.	3.7		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 25.9561 D₈₅= 21.5655 D₆₀= 5.3632
D₅₀= 2.2863 D₃₀= 0.1396 D₁₅= 0.0190
D₁₀= 0.0085 C_u= 629.24 C_c= 0.43

Classification

USCS= AASHTO=

Remarks

Natural moisture = 5.1%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-06

Date: 9-6-12
Elev./Depth: 8'-10'



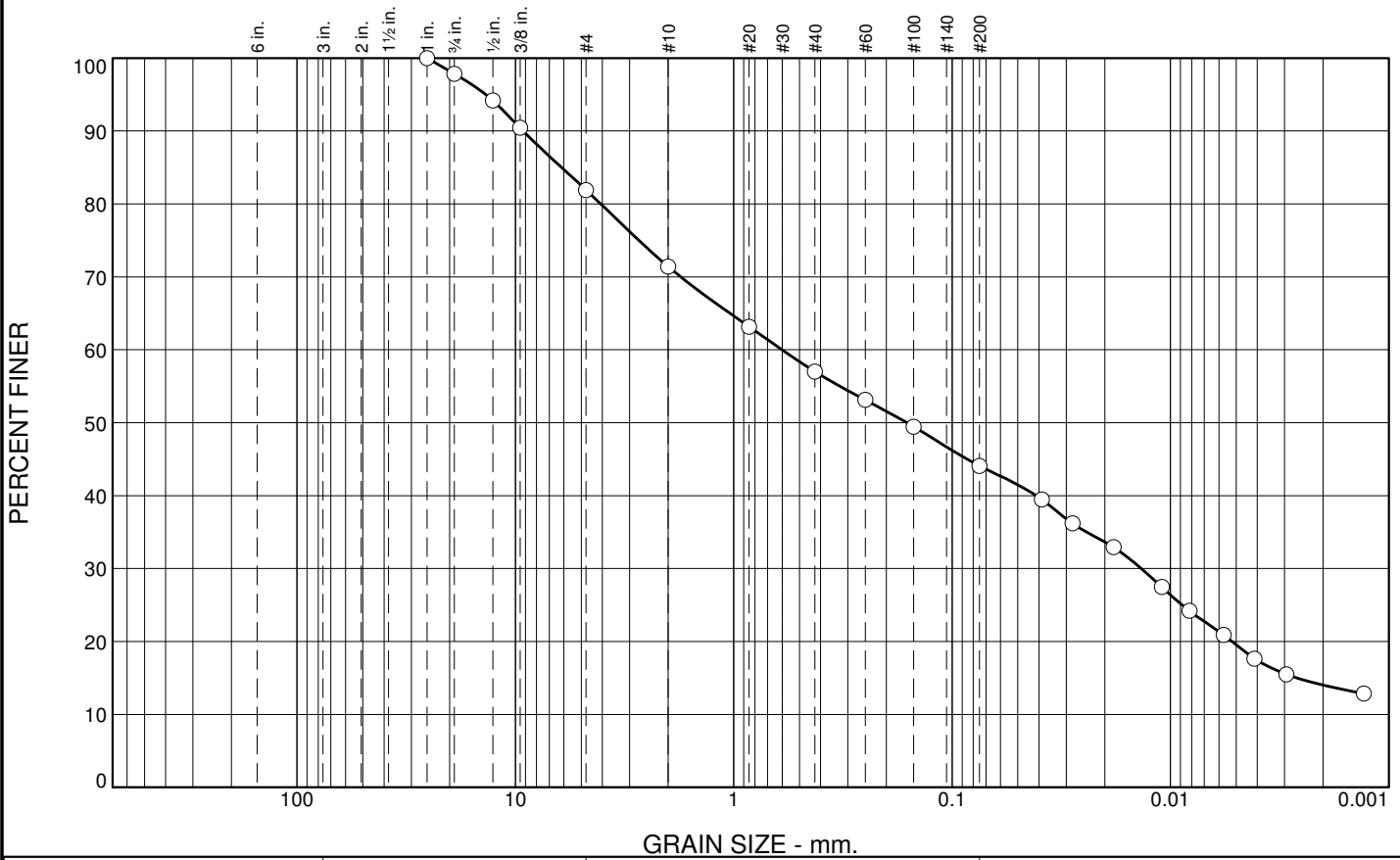
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.2	15.9	10.5	14.4	12.9	24.6	19.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.8		
.5	94.2		
.375	90.4		
#4	81.9		
#10	71.4		
#20	63.2		
#40	57.0		
#60	53.1		
#100	49.5		
#200	44.1		
0.0388 mm.	39.5		
0.0281 mm.	36.2		
0.0182 mm.	32.9		
0.0109 mm.	27.5		
0.0082 mm.	24.2		
0.0057 mm.	20.9		
0.0041 mm.	17.6		
0.0029 mm.	15.5		
0.0013 mm.	12.9		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₉₀= 9.2235 D₈₅= 6.1536 D₆₀= 0.6019
D₅₀= 0.1612 D₃₀= 0.0136 D₁₅= 0.0026
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 5.4%

* (no specification provided)

Sample No.: SPT 3
Location:

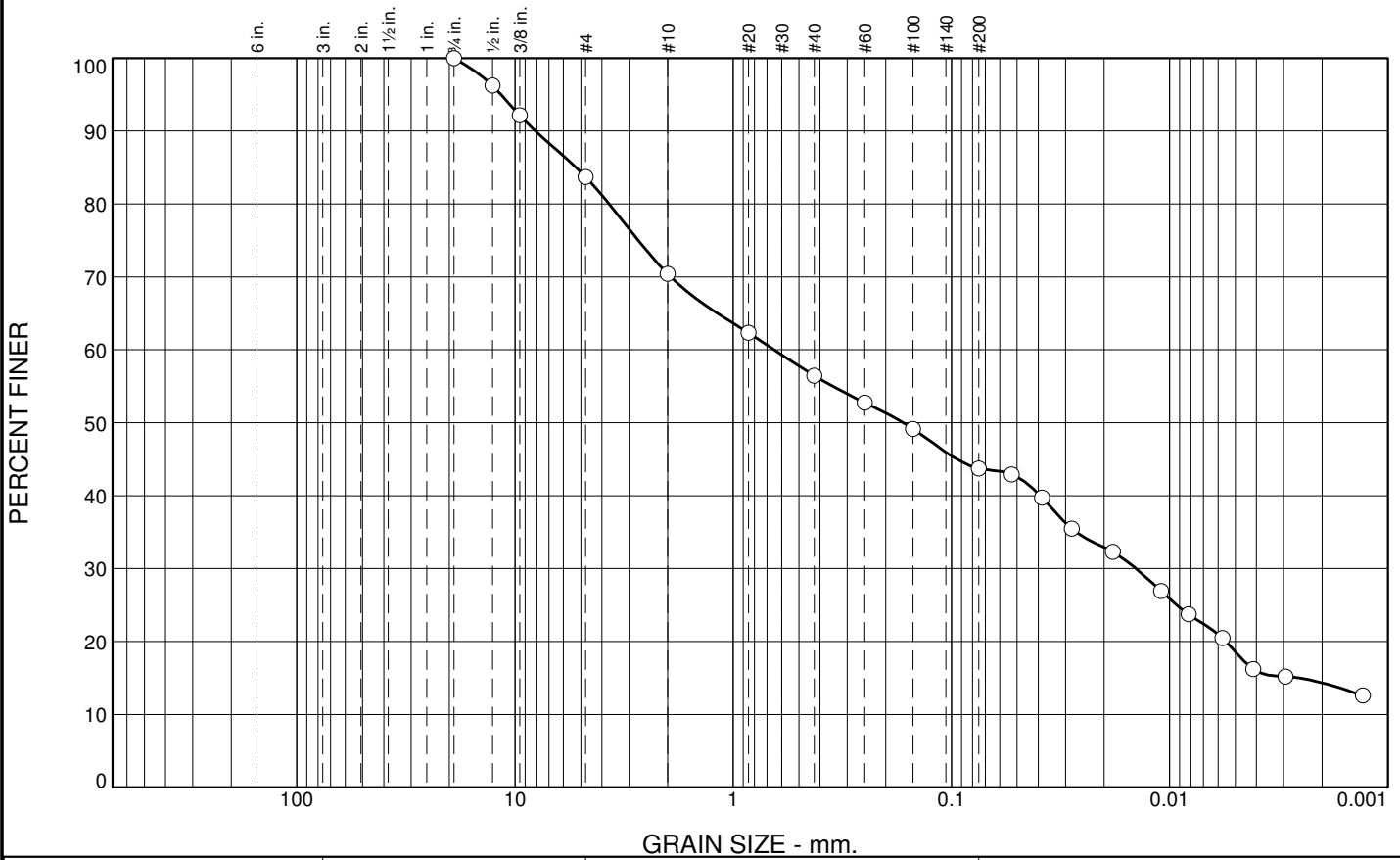
Source of Sample: TMF12-06

Date: 9-6-12
Elev./Depth: 18'-20'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	16.3	13.3	13.9	12.8	25.1	18.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.2		
.375	92.1		
#4	83.7		
#10	70.4		
#20	62.3		
#40	56.5		
#60	52.8		
#100	49.2		
#200	43.7		
0.0529 mm.	42.9		
0.0384 mm.	39.7		
0.0281 mm.	35.5		
0.0182 mm.	32.3		
0.0109 mm.	26.9		
0.0082 mm.	23.7		
0.0057 mm.	20.5		
0.0041 mm.	16.2		
0.0029 mm.	15.2		
0.0013 mm.	12.6		

Soil Description
clayey sand with gravel

Atterberg Limits
PL= 14 LL= 28 PI= 14

Coefficients
D₉₀= 8.0678 D₈₅= 5.2541 D₆₀= 0.6483
D₅₀= 0.1665 D₃₀= 0.0143 D₁₅= 0.0025
D₁₀= C_u= C_c=

Classification
USCS= SC AASHTO= A-6(2)

Remarks
Natural moisture = 6.2%

* (no specification provided)

Sample No.: SPT 4
Location:

Source of Sample: TMF12-06

Date: 9-6-12
Elev./Depth: 23'-25'



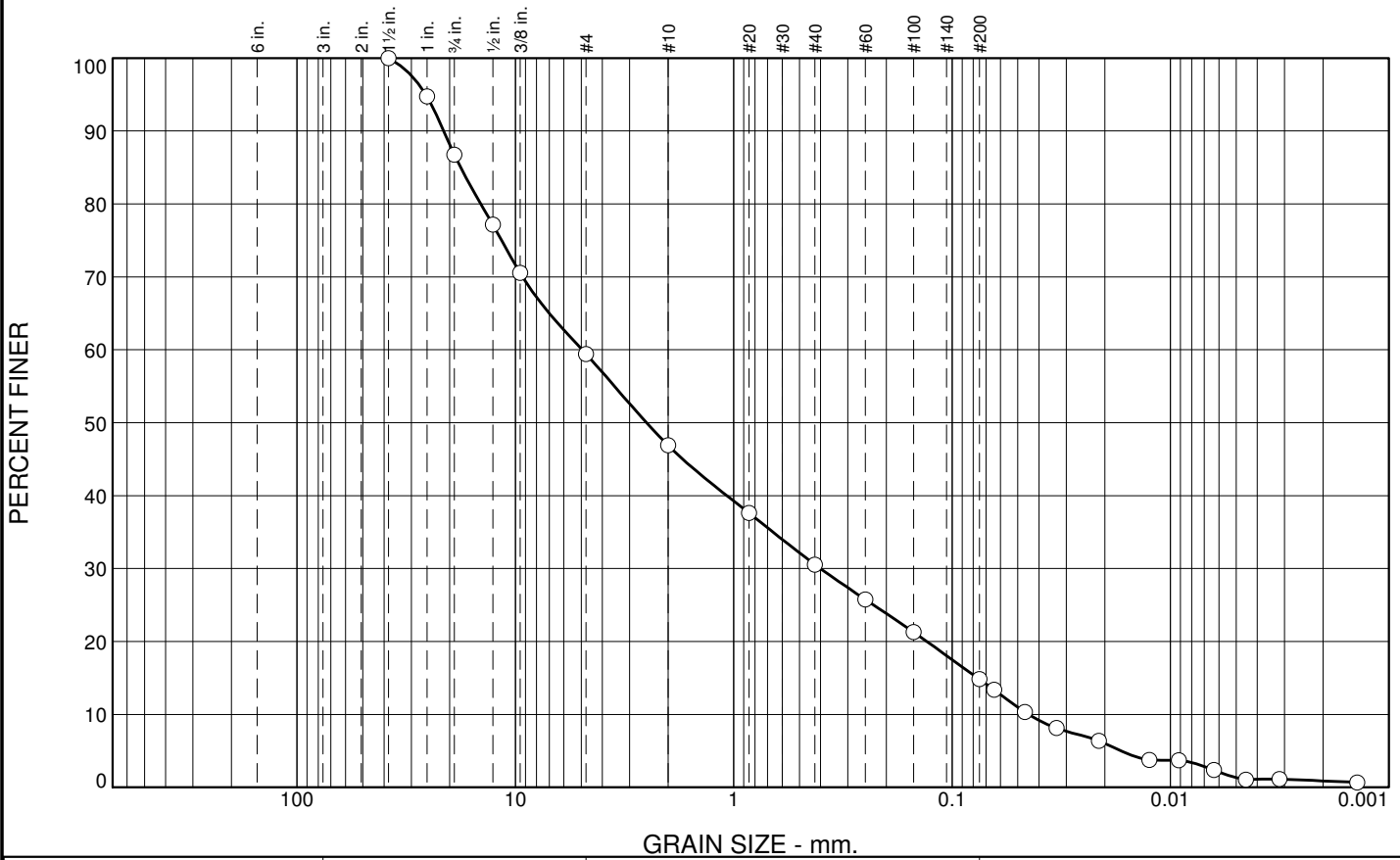
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.2	27.4	12.5	16.4	15.7	13.5	1.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.7		
.75	86.8		
.5	77.2		
.375	70.6		
#4	59.4		
#10	46.9		
#20	37.6		
#40	30.5		
#60	25.8		
#100	21.3		
#200	14.8		
0.0642 mm.	13.4		
0.0464 mm.	10.3		
0.0333 mm.	8.1		
0.0213 mm.	6.4		
0.0125 mm.	3.7		
0.0092 mm.	3.7		
0.0063 mm.	2.4		
0.0045 mm.	1.1		
0.0032 mm.	1.1		
0.0014 mm.	0.7		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 21.3077 D₈₅= 17.8271 D₆₀= 4.9481
D₅₀= 2.5081 D₃₀= 0.4011 D₁₅= 0.0764
D₁₀= 0.0446 C_u= 110.87 C_c= 0.73

Classification

USCS= AASHTO=

Remarks

Natural moisture = 6.6%

* (no specification provided)

Sample No.: SPT 1
Location:

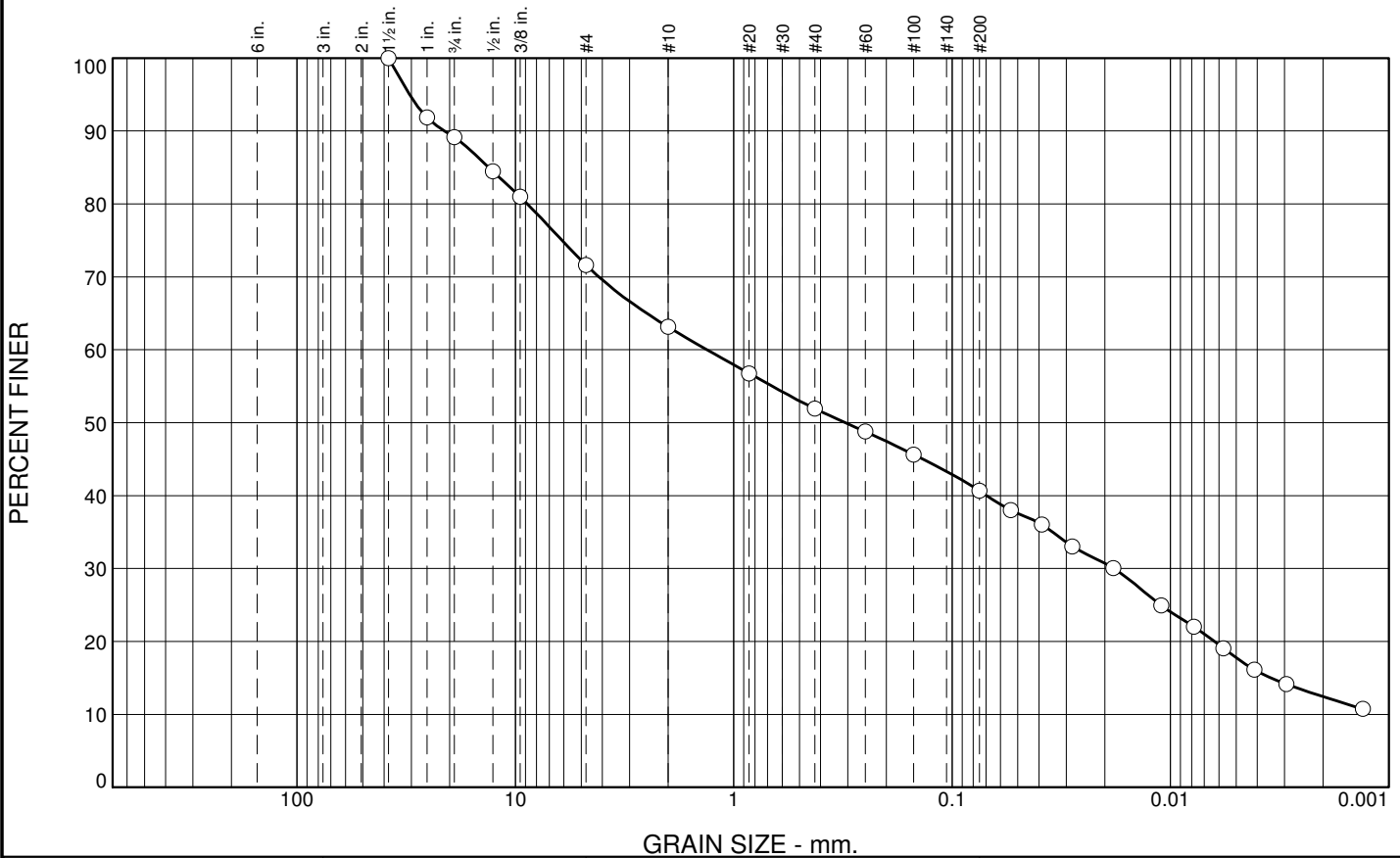
Source of Sample: TMF12-07

Date: 9-6-12
Elev./Depth: 4'-6"

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p>	<p>Figure</p>
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	10.8	17.6	8.5	11.2	11.2	22.9	17.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	91.8		
.75	89.2		
.5	84.4		
.375	81.0		
#4	71.6		
#10	63.1		
#20	56.8		
#40	51.9		
#60	48.8		
#100	45.6		
#200	40.7		
0.0539 mm.	38.0		
0.0388 mm.	36.0		
0.0282 mm.	33.0		
0.0182 mm.	30.1		
0.0110 mm.	24.9		
0.0078 mm.	22.0		
0.0057 mm.	19.1		
0.0041 mm.	16.1		
0.0029 mm.	14.2		
0.0013 mm.	10.8		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 21.0937 D₈₅= 13.2832 D₆₀= 1.3272
D₅₀= 0.3084 D₃₀= 0.0181 D₁₅= 0.0035
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Natural moisture = 6.3%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-07

Date: 9-6-12
Elev./Depth: 9'-11'



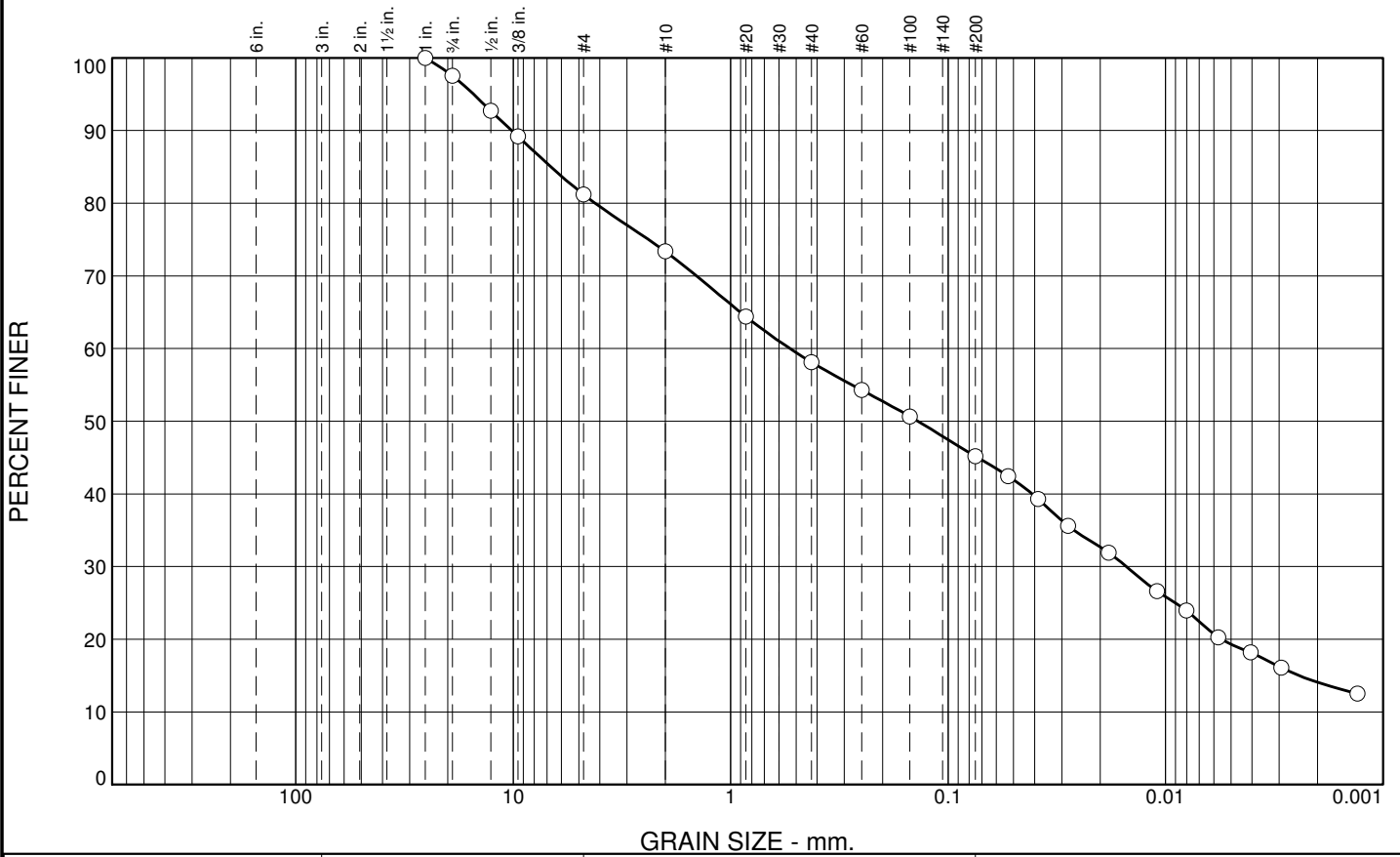
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.5	16.3	7.8	15.3	12.9	25.9	19.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.5		
.5	92.7		
.375	89.2		
#4	81.2		
#10	73.4		
#20	64.4		
#40	58.1		
#60	54.3		
#100	50.7		
#200	45.2		
0.0530 mm.	42.5		
0.0385 mm.	39.3		
0.0281 mm.	35.6		
0.0183 mm.	31.9		
0.0110 mm.	26.6		
0.0080 mm.	24.0		
0.0057 mm.	20.3		
0.0041 mm.	18.2		
0.0029 mm.	16.1		
0.0013 mm.	12.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 27 PI= 13

Coefficients

D₉₀= 10.1683 D₈₅= 6.7086 D₆₀= 0.5342
D₅₀= 0.1377 D₃₀= 0.0152 D₁₅= 0.0024
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 3.7%

* (no specification provided)

Sample No.: SPT 3
Location:

Source of Sample: TMF12-07

Date: 9-6-12
Elev./Depth: 14'-16'



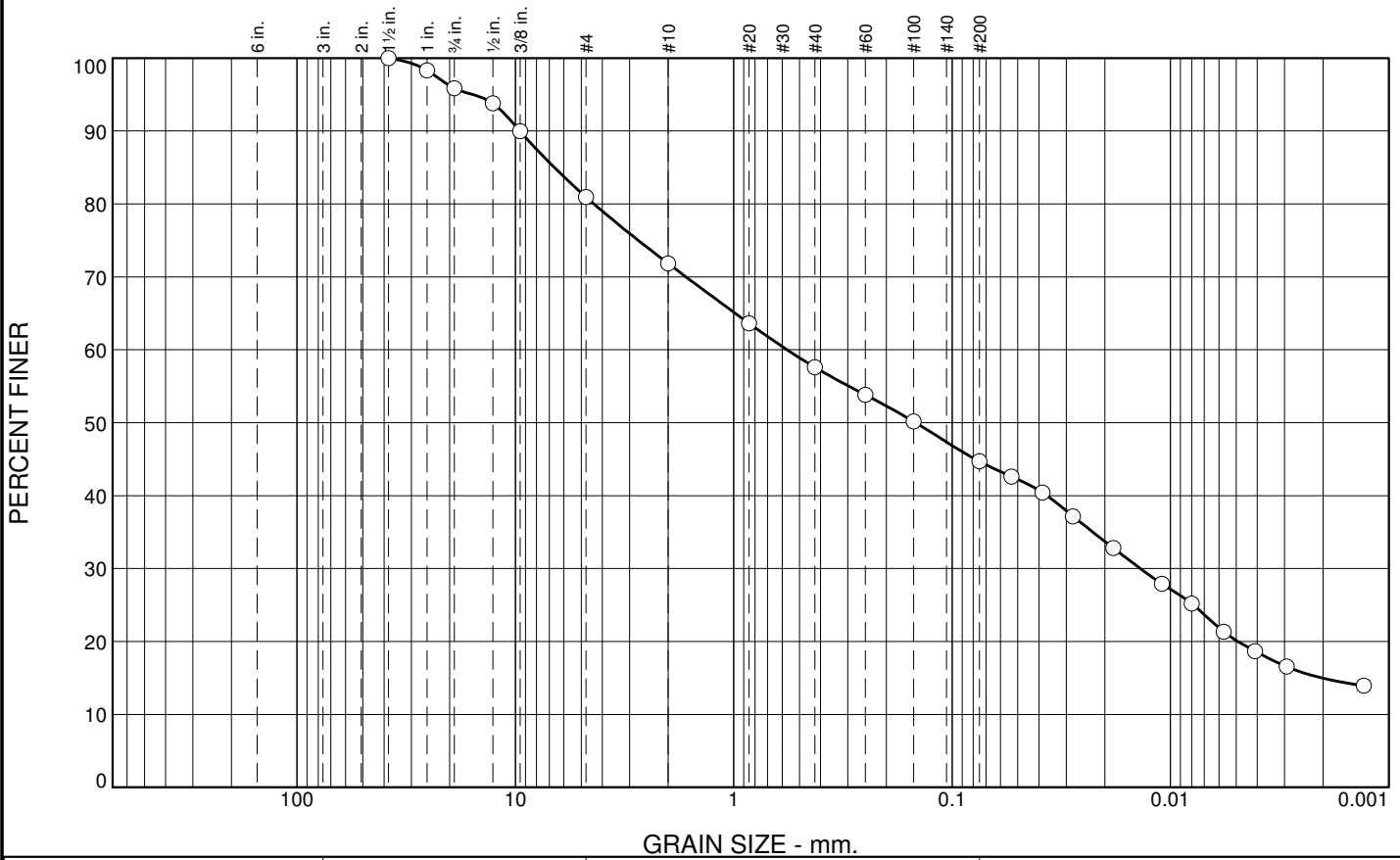
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.2	14.9	9.1	14.2	12.9	24.6	20.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	98.3		
.75	95.8		
.5	93.8		
.375	90.0		
#4	80.9		
#10	71.8		
#20	63.6		
#40	57.6		
#60	53.8		
#100	50.2		
#200	44.7		
0.0535 mm.	42.6		
0.0385 mm.	40.4		
0.0280 mm.	37.2		
0.0183 mm.	32.8		
0.0109 mm.	27.9		
0.0080 mm.	25.2		
0.0057 mm.	21.4		
0.0041 mm.	18.7		
0.0029 mm.	16.5		
0.0013 mm.	13.9		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 28 PI= 14

Coefficients

D₉₀= 9.5441 D₈₅= 6.6449 D₆₀= 0.5699
D₅₀= 0.1470 D₃₀= 0.0137 D₁₅= 0.0020
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Natural moisture = 5.8%

* (no specification provided)

Sample No.: SPT 4
Location:

Source of Sample: TMF12-07

Date: 9-6-12
Elev./Depth: 19'-21'



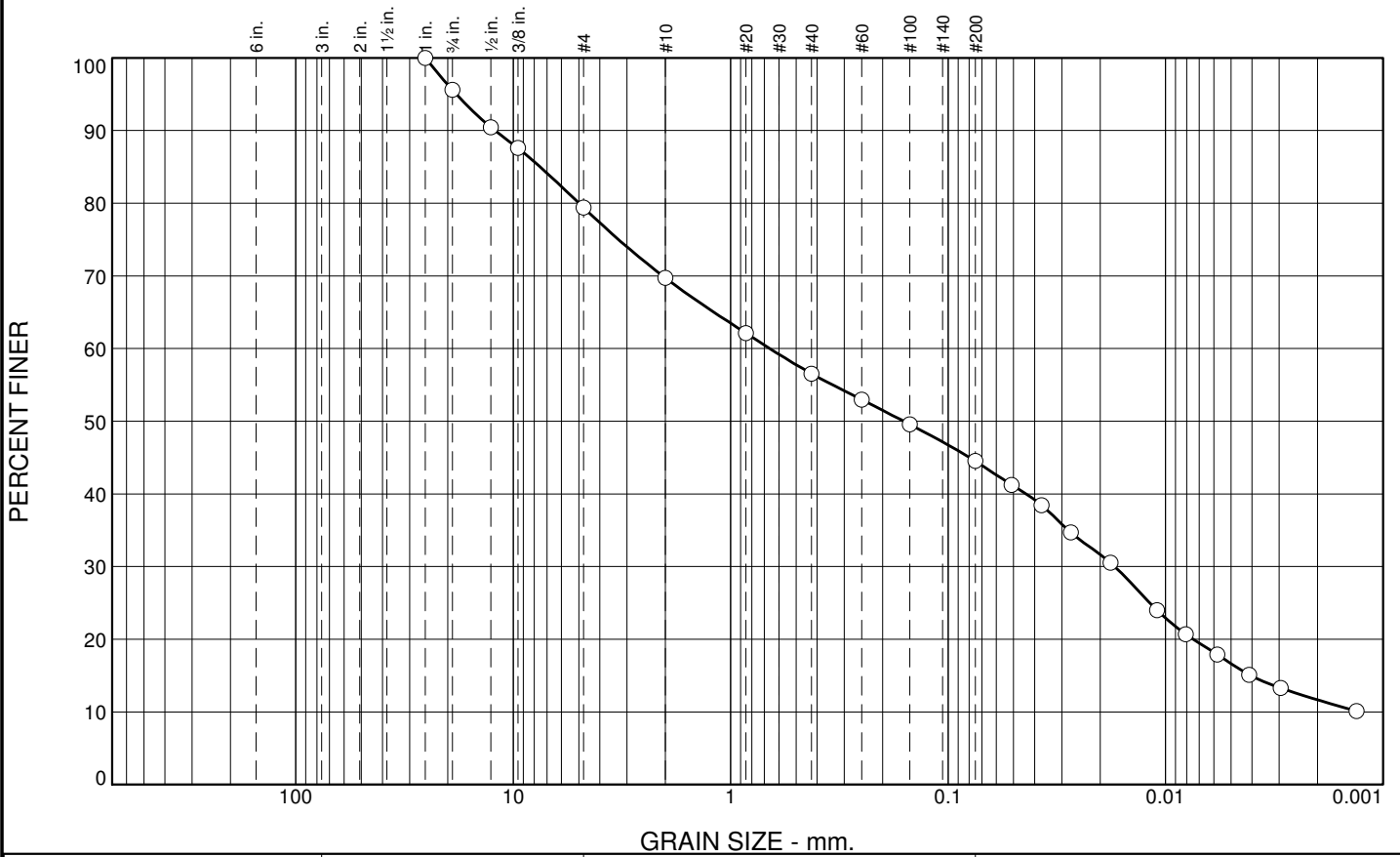
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.4	16.2	9.7	13.1	12.1	27.8	16.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.6		
.5	90.4		
.375	87.6		
#4	79.4		
#10	69.7		
#20	62.1		
#40	56.6		
#60	53.0		
#100	49.6		
#200	44.5		
0.0510 mm.	41.2		
0.0372 mm.	38.4		
0.0273 mm.	34.7		
0.0179 mm.	30.5		
0.0109 mm.	24.0		
0.0081 mm.	20.7		
0.0058 mm.	17.9		
0.0041 mm.	15.1		
0.0030 mm.	13.3		
0.0013 mm.	10.1		

Soil Description

Atterberg Limits
 LL= PI=

Coefficients
 D₉₀= 12.1627 D₈₅= 7.5276 D₆₀= 0.6604
 D₅₀= 0.1600 D₃₀= 0.0171 D₁₅= 0.0041
 D₁₀= C_u= C_c=

Classification
 USCS= AASHTO=

Remarks
 Natural moisture = 5.4%

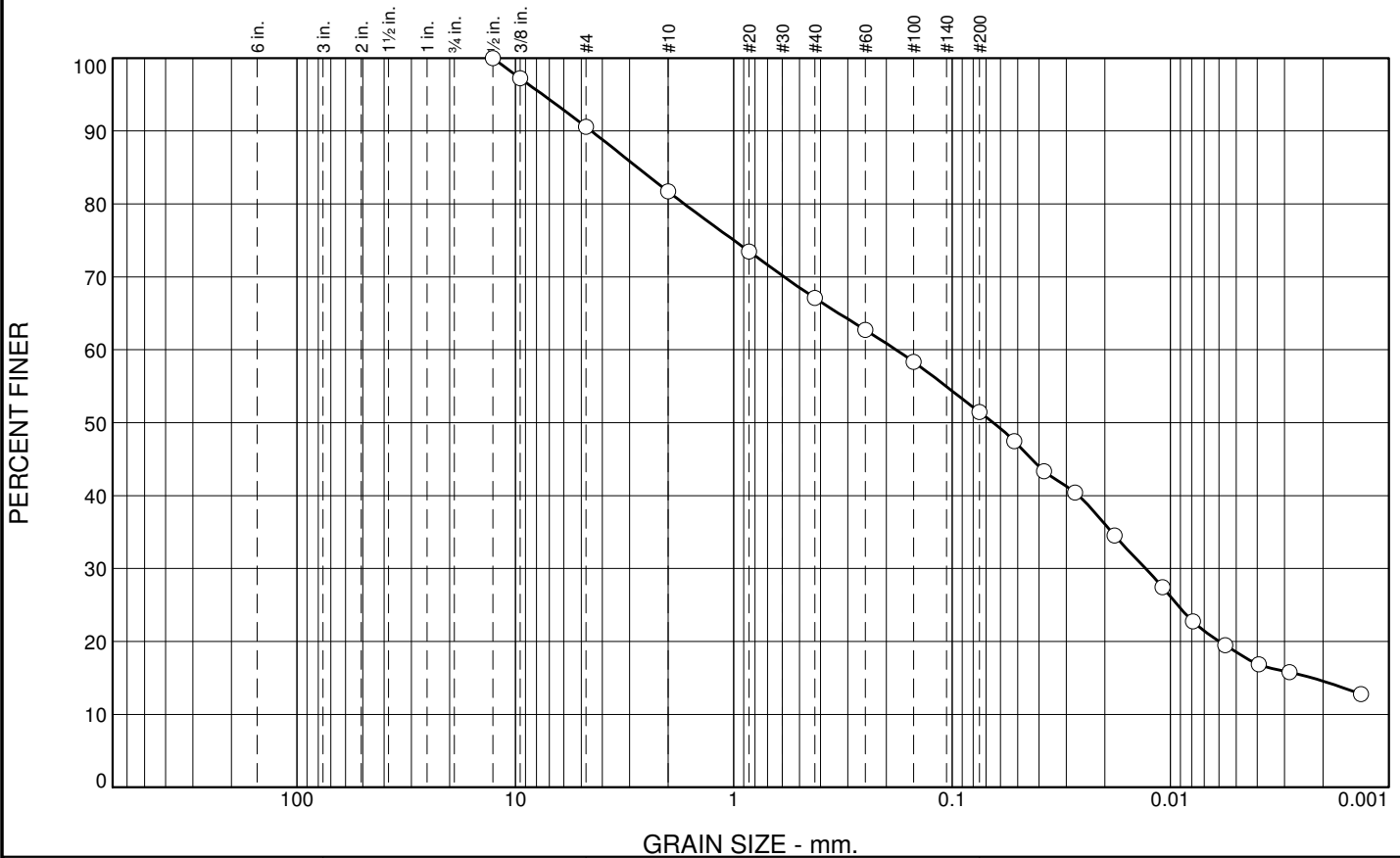
* (no specification provided)

Sample No.: SPT 2 **Source of Sample:** TMF12-08 **Date:** 9-6-12
Location: **Elev./Depth:** 8.5'-10.5'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07	Figure
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	9.4	8.9	14.6	15.6	33.0	18.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.5	100.0		
.375	97.2		
#4	90.6		
#10	81.7		
#20	73.5		
#40	67.1		
#60	62.7		
#100	58.3		
#200	51.5		
0.0519 mm.	47.5		
0.0379 mm.	43.4		
0.0274 mm.	40.4		
0.0180 mm.	34.5		
0.0109 mm.	27.5		
0.0079 mm.	22.7		
0.0056 mm.	19.5		
0.0039 mm.	16.9		
0.0029 mm.	15.8		
0.0013 mm.	12.8		

Soil Description

sandy lean clay

Atterberg Limits

PL= 15 LL= 24 PI= 9

Coefficients

D₉₀= 4.4917 D₈₅= 2.7625 D₆₀= 0.1806
D₅₀= 0.0648 D₃₀= 0.0130 D₁₅= 0.0022
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Natural moisture = 6.9%

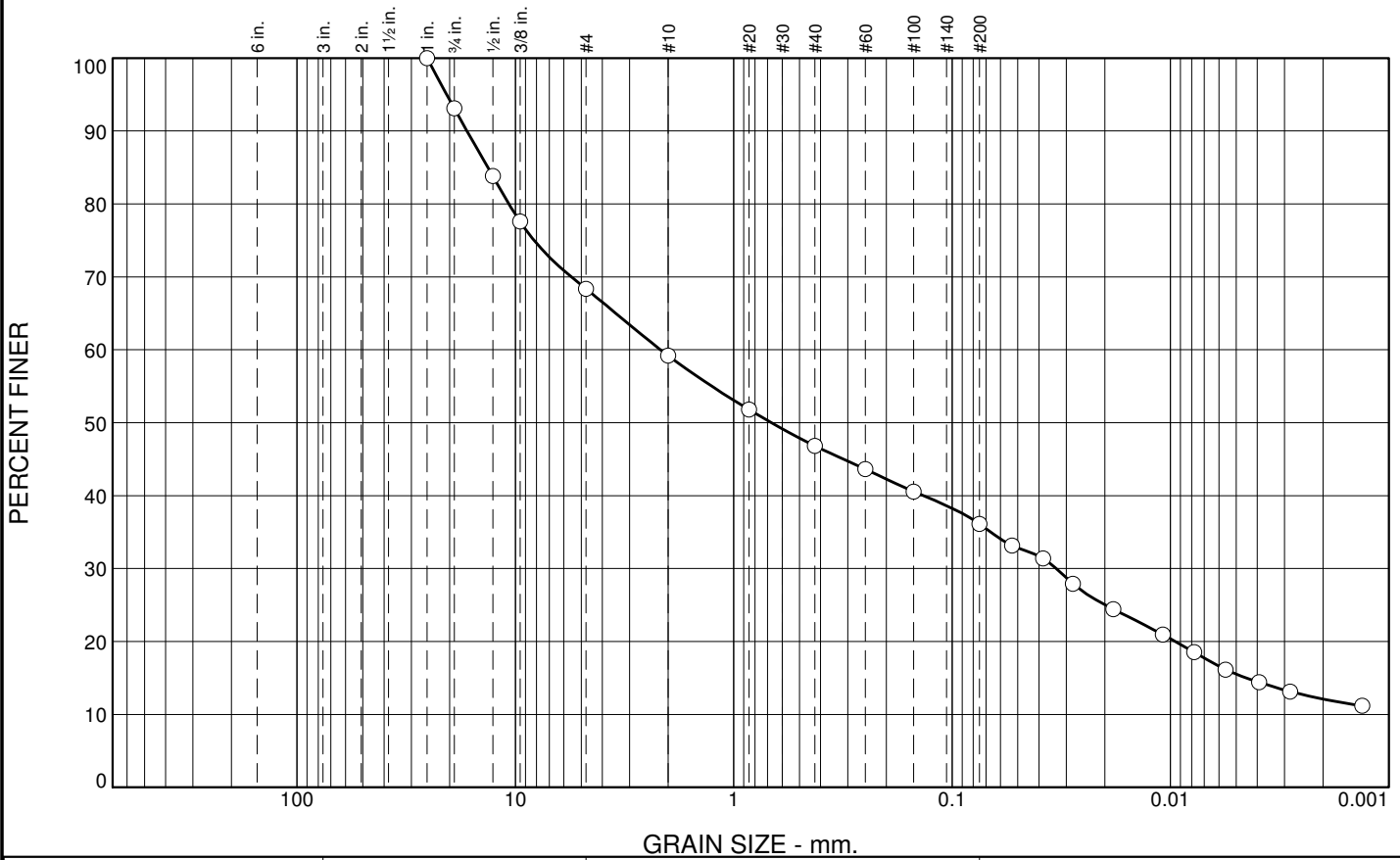
* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-08 Date: 9-6-12
Location: Elev./Depth: 13.5'-15.5'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p>
Figure	

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.9	24.7	9.2	12.4	10.7	20.6	15.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.1		
.5	83.8		
.375	77.6		
#4	68.4		
#10	59.2		
#20	51.8		
#40	46.8		
#60	43.6		
#100	40.5		
#200	36.1		
0.0532 mm.	33.1		
0.0383 mm.	31.4		
0.0280 mm.	27.9		
0.0182 mm.	24.4		
0.0108 mm.	21.0		
0.0078 mm.	18.5		
0.0056 mm.	16.1		
0.0039 mm.	14.4		
0.0028 mm.	13.1		
0.0013 mm.	11.2		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 27 PI= 12

Coefficients

D₉₀= 16.6708 D₈₅= 13.3756 D₆₀= 2.1641
D₅₀= 0.6721 D₃₀= 0.0333 D₁₅= 0.0045
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(1)

Remarks

Natural moisture = 5.9%

* (no specification provided)

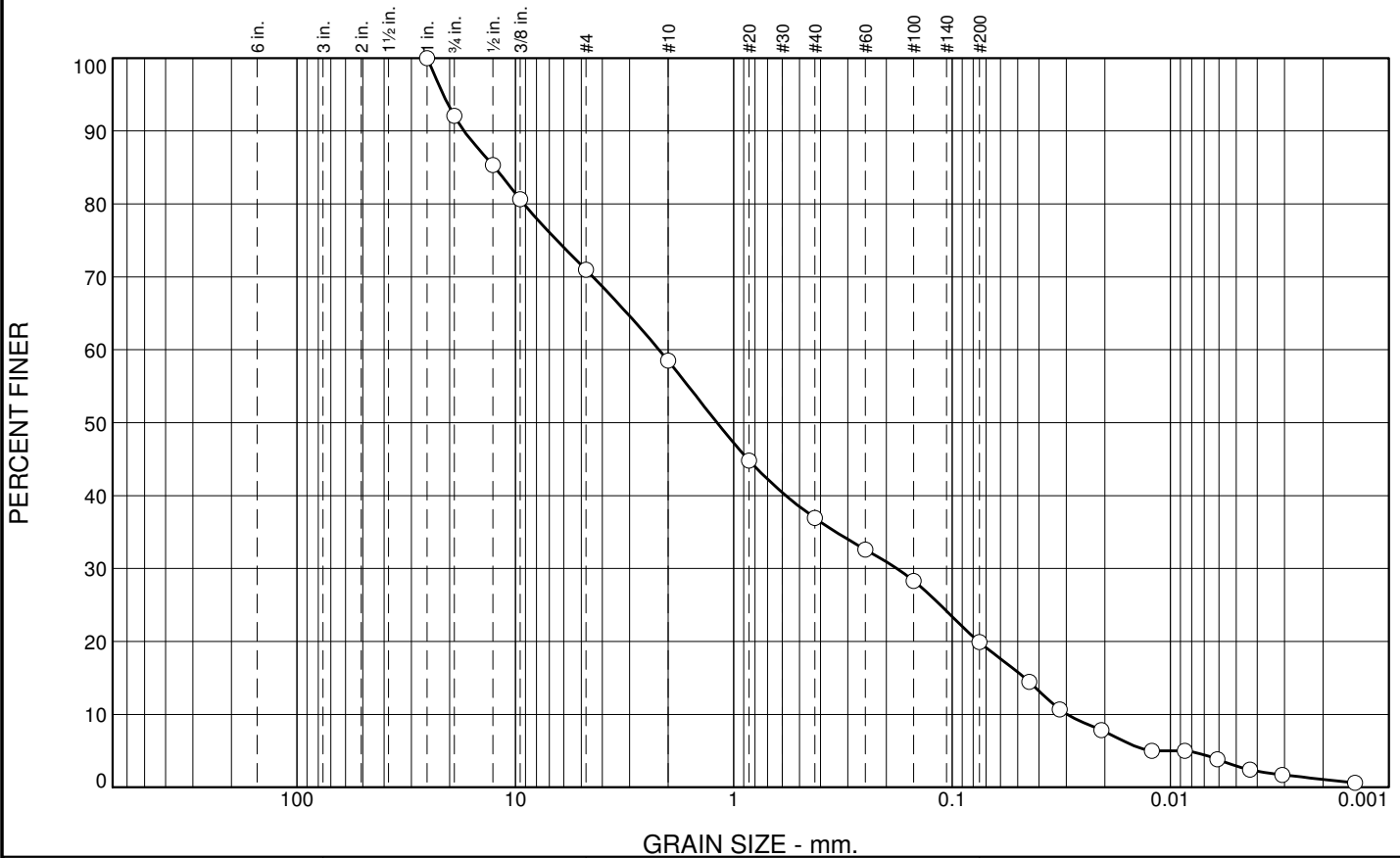
Sample No.: SPT 4 Source of Sample: TMF12-08 Date: 9-6-12
Location: Elev./Depth: 18.5'-20.5'



Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07 Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.9	21.1	12.5	21.6	17.0	17.0	2.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.1		
.5	85.3		
.375	80.6		
#4	71.0		
#10	58.5		
#20	44.8		
#40	36.9		
#60	32.6		
#100	28.3		
#200	19.9		
0.0444 mm.	14.5		
0.0321 mm.	10.7		
0.0207 mm.	7.8		
0.0122 mm.	5.0		
0.0086 mm.	5.0		
0.0061 mm.	3.8		
0.0043 mm.	2.4		
0.0031 mm.	1.7		
0.0014 mm.	0.6		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 17.1910 D₈₅= 12.4375 D₆₀= 2.1991
D₅₀= 1.1930 D₃₀= 0.1793 D₁₅= 0.0465
D₁₀= 0.0297 C_u= 74.05 C_c= 0.49

Classification

USCS= AASHTO=

Remarks

Natural moisture = 10.4%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-09

Date: 9-6-12
Elev./Depth: 4'-6"



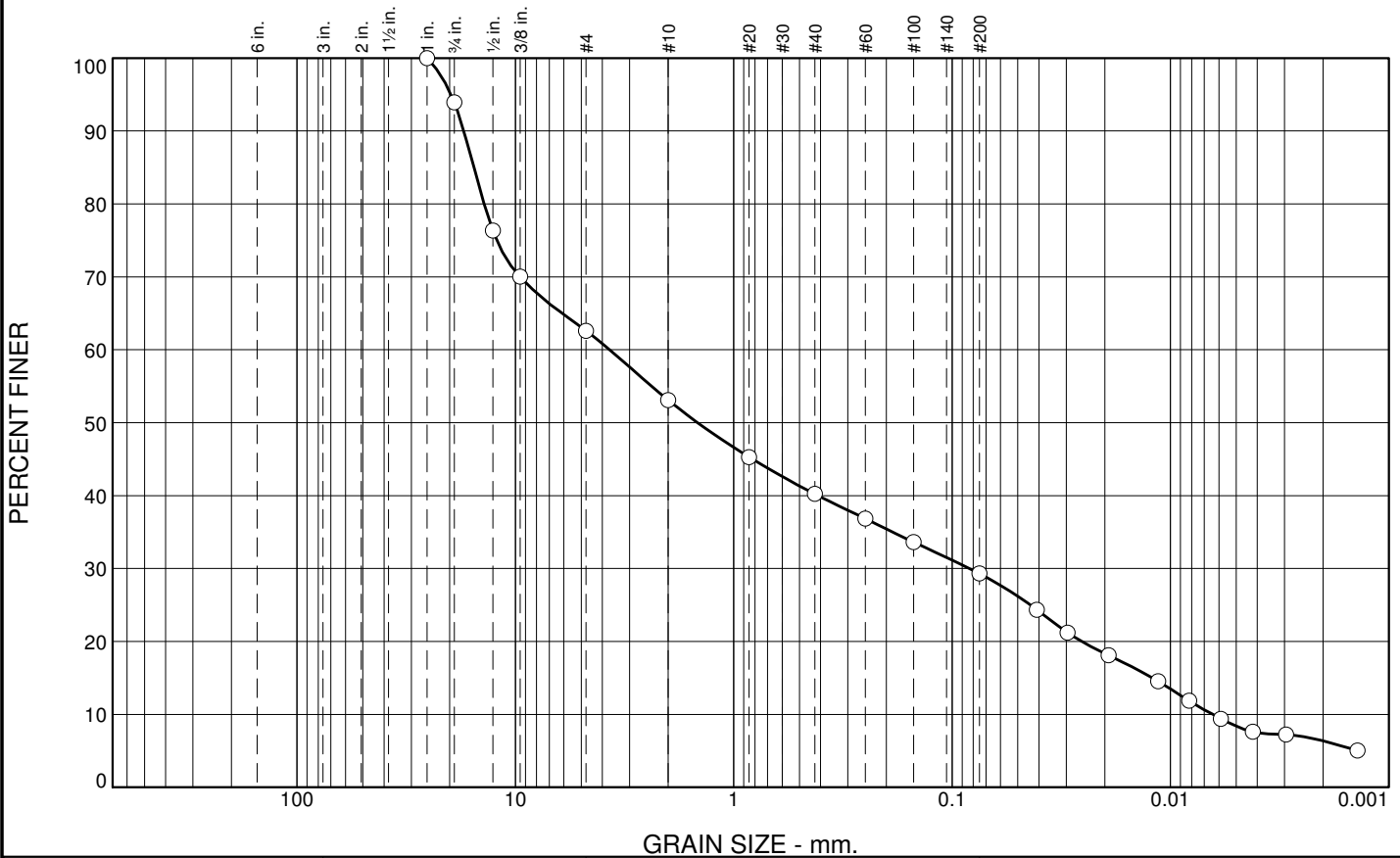
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.1	31.3	9.5	12.9	10.9	20.9	8.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	93.9		
.5	76.3		
.375	70.0		
#4	62.6		
#10	53.1		
#20	45.3		
#40	40.2		
#60	36.8		
#100	33.6		
#200	29.3		
0.0409 mm.	24.3		
0.0296 mm.	21.2		
0.0192 mm.	18.1		
0.0114 mm.	14.5		
0.0082 mm.	11.9		
0.0059 mm.	9.4		
0.0042 mm.	7.6		
0.0030 mm.	7.2		
0.0014 mm.	5.0		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 17.2462 D₈₅= 15.4897 D₆₀= 3.7064
D₅₀= 1.4652 D₃₀= 0.0831 D₁₅= 0.0121
D₁₀= 0.0064 C_u= 579.39 C_c= 0.29

Classification

USCS= AASHTO=

Remarks

Natural moisture = 5.9%

* (no specification provided)

Sample No.: SPT 1
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 4'-6"



Client: Yellowhead Mining Inc.
Project: Harper Creek Project

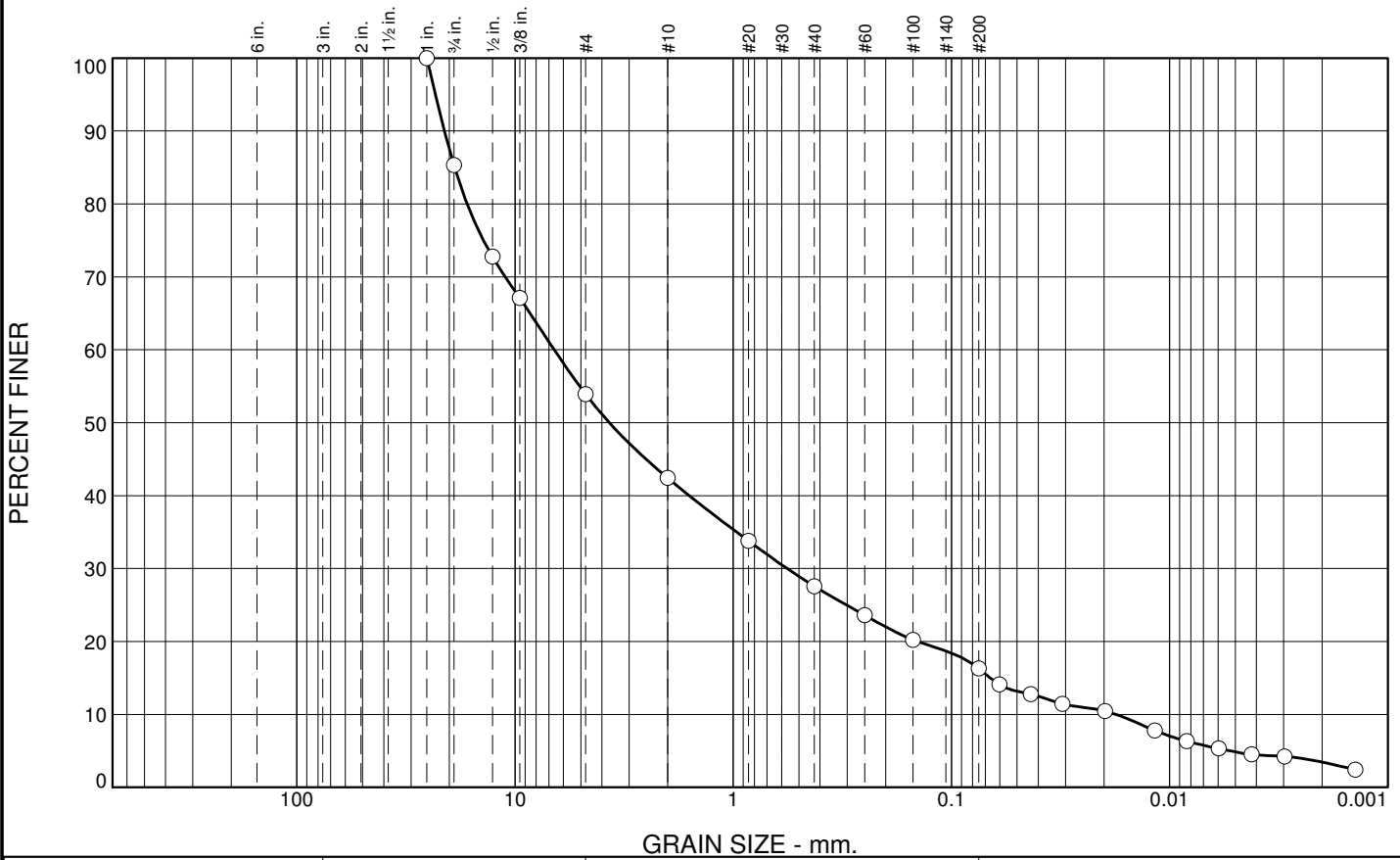
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	14.7	31.4	11.5	14.8	11.3	11.4	4.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	85.3		
.5	72.8		
.375	67.1		
#4	53.9		
#10	42.4		
#20	33.8		
#40	27.6		
#60	23.6		
#100	20.2		
#200	16.3		
0.0603 mm.	14.1		
0.0432 mm.	12.8		
0.0310 mm.	11.5		
0.0198 mm.	10.5		
0.0117 mm.	7.8		
0.0084 mm.	6.3		
0.0060 mm.	5.3		
0.0042 mm.	4.5		
0.0030 mm.	4.2		
0.0014 mm.	2.4		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 21.0504 D₈₅= 18.9137 D₆₀= 6.6124
 D₅₀= 3.6983 D₃₀= 0.5659 D₁₅= 0.0663
 D₁₀= 0.0176 C_u= 376.47 C_c= 2.76

Classification

USCS= AASHTO=

Remarks

Natural moisture = 3.6%

* (no specification provided)

Sample No.: SPT 2
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 9'-11'



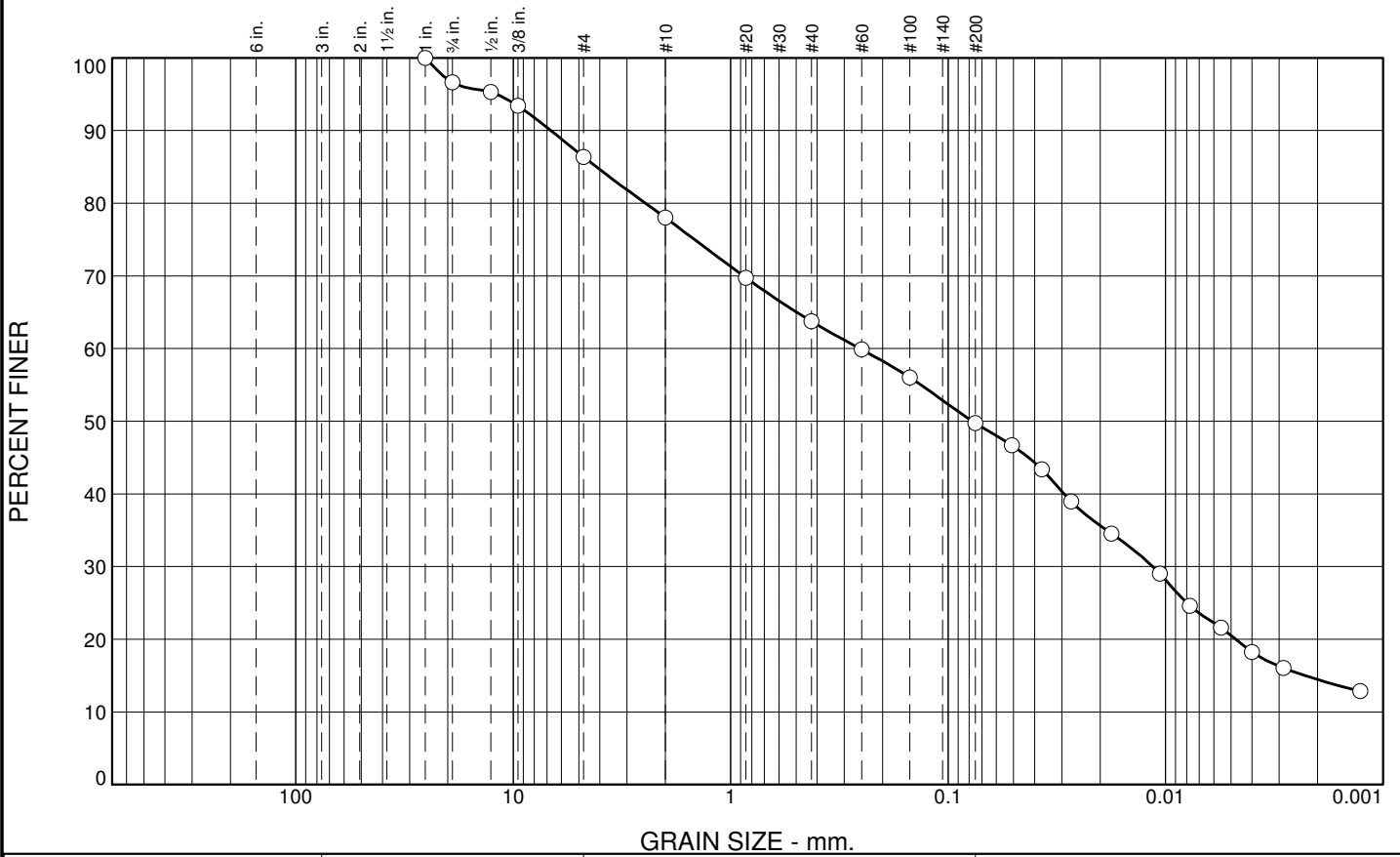
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.4	10.2	8.4	14.3	13.9	29.3	20.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.6		
.5	95.3		
.375	93.4		
#4	86.4		
#10	78.0		
#20	69.7		
#40	63.7		
#60	59.9		
#100	56.0		
#200	49.8		
0.0510 mm.	46.7		
0.0371 mm.	43.4		
0.0271 mm.	39.0		
0.0177 mm.	34.5		
0.0106 mm.	29.0		
0.0077 mm.	24.6		
0.0055 mm.	21.6		
0.0040 mm.	18.3		
0.0029 mm.	16.1		
0.0013 mm.	12.9		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 6.7113 D₈₅= 4.1526 D₆₀= 0.2546
D₅₀= 0.0772 D₃₀= 0.0115 D₁₅= 0.0023
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Natural moisture = 6.3%

* (no specification provided)

Sample No.: SPT 4
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 19'-21'



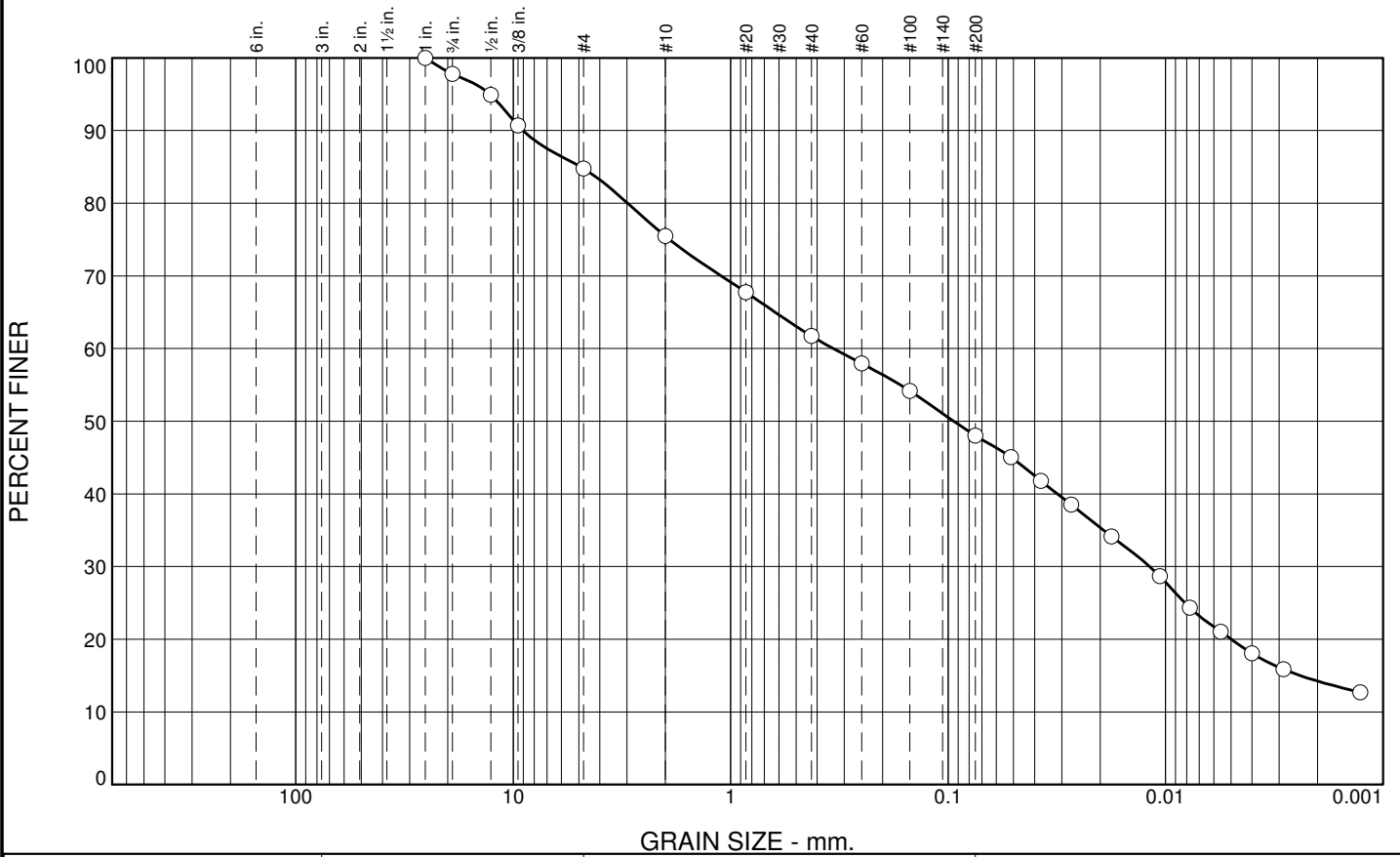
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	2.2	13.0	9.3	13.8	13.7	28.0	20.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	97.8		
.5	94.9		
.375	90.7		
#4	84.8		
#10	75.5		
#20	67.7		
#40	61.7		
#60	58.0		
#100	54.2		
#200	48.0		
0.0514 mm.	45.1		
0.0374 mm.	41.8		
0.0271 mm.	38.5		
0.0177 mm.	34.1		
0.0106 mm.	28.7		
0.0077 mm.	24.3		
0.0056 mm.	21.1		
0.0040 mm.	18.1		
0.0029 mm.	15.9		
0.0013 mm.	12.7		

Soil Description
clayey sand with gravel

Atterberg Limits
 PL= 15 LL= 26 PI= 11

Coefficients
 D₉₀= 9.0328 D₈₅= 4.8972 D₆₀= 0.3372
 D₅₀= 0.0943 D₃₀= 0.0118 D₁₅= 0.0024
 D₁₀= C_u= C_c=

Classification
 USCS= SC AASHTO= A-6(2)

Remarks
 Natural moisture = 5.9%

* (no specification provided)

Sample No.: SPT 5
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 24'-26'



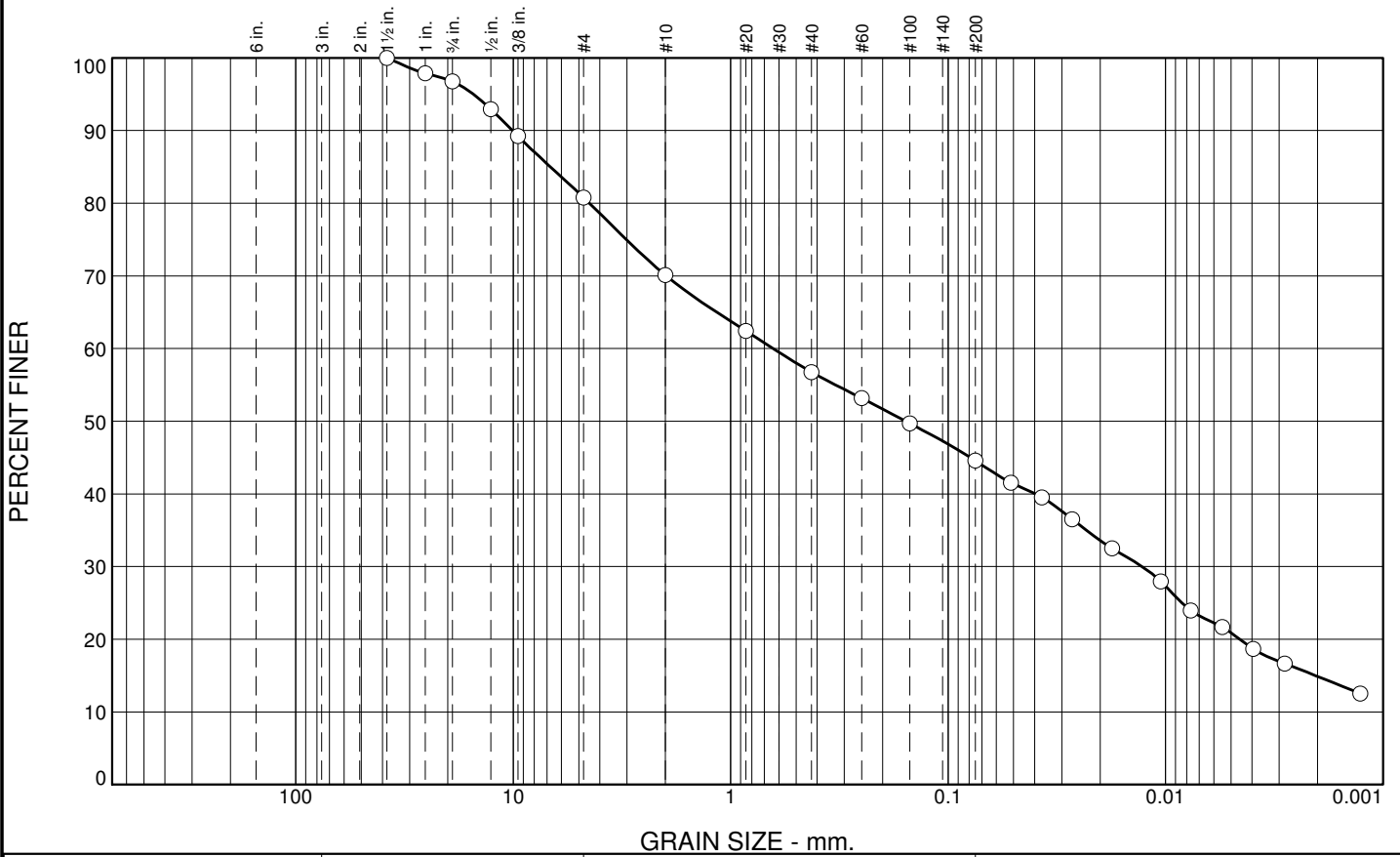
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.2	16.0	10.7	13.3	12.2	23.7	20.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.50	100.0		
1	97.9		
.75	96.8		
.5	93.0		
.375	89.2		
#4	80.8		
#10	70.1		
#20	62.4		
#40	56.8		
#60	53.2		
#100	49.7		
#200	44.6		
0.0514 mm.	41.5		
0.0371 mm.	39.5		
0.0269 mm.	36.5		
0.0176 mm.	32.5		
0.0105 mm.	28.0		
0.0077 mm.	23.9		
0.0055 mm.	21.7		
0.0039 mm.	18.7		
0.0028 mm.	16.6		
0.0013 mm.	12.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 26 PI= 12

Coefficients

D₉₀= 10.0987 D₈₅= 6.7523 D₆₀= 0.6383
D₅₀= 0.1566 D₃₀= 0.0128 D₁₅= 0.0020
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 6.0%

* (no specification provided)

Sample No.: SPT 6
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 29'-31'



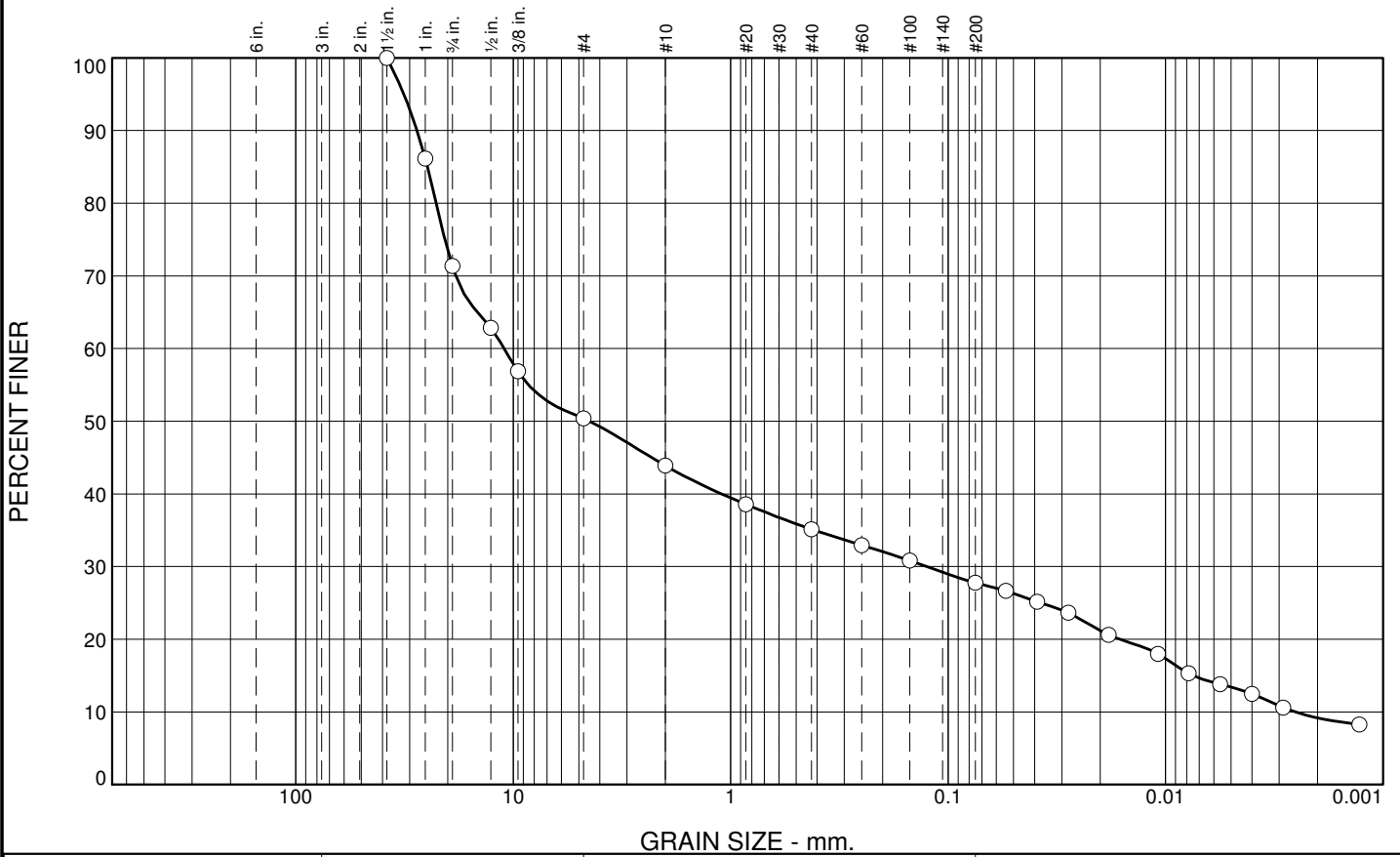
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: DB

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	28.6	21.0	6.5	8.8	7.3	14.4	13.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	86.1		
.75	71.4		
.5	62.9		
.375	56.9		
#4	50.4		
#10	43.9		
#20	38.6		
#40	35.1		
#60	32.9		
#100	30.8		
#200	27.8		
0.0543 mm.	26.7		
0.0390 mm.	25.1		
0.0280 mm.	23.6		
0.0183 mm.	20.6		
0.0108 mm.	18.0		
0.0078 mm.	15.3		
0.0056 mm.	13.8		
0.0040 mm.	12.5		
0.0029 mm.	10.6		
0.0013 mm.	8.3		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 27.6878 D₈₅= 24.8261 D₆₀= 11.0270
D₅₀= 4.4655 D₃₀= 0.1256 D₁₅= 0.0074
D₁₀= 0.0025 C_u= 4361.77 C_c= 0.57

Classification

USCS= AASHTO=

Remarks

Natural moisture = 5.7%

* (no specification provided)

Sample No.: SPT 7
Location:

Source of Sample: TMF12-10

Date: 9-6-12
Elev./Depth: 34'-36'



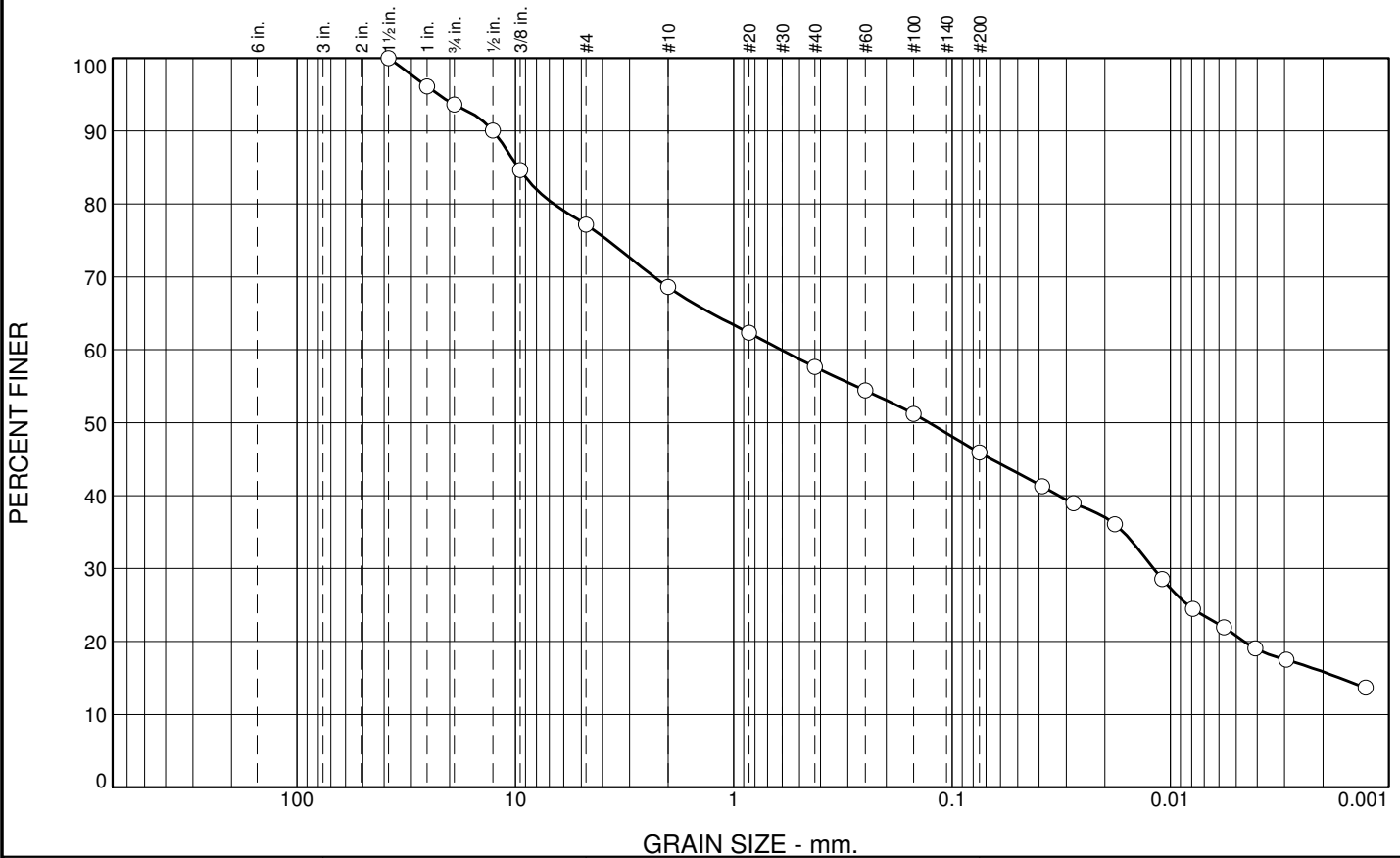
Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV

Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.4	16.5	8.5	11.0	11.7	25.1	20.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.1		
.75	93.6		
.5	90.1		
.375	84.6		
#4	77.1		
#10	68.6		
#20	62.3		
#40	57.6		
#60	54.4		
#100	51.2		
#200	45.9		
0.0387 mm.	41.3		
0.0278 mm.	39.0		
0.0180 mm.	36.1		
0.0109 mm.	28.5		
0.0079 mm.	24.5		
0.0057 mm.	21.9		
0.0041 mm.	19.1		
0.0029 mm.	17.5		
0.0013 mm.	13.7		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 12.6547 D₈₅= 9.7173 D₆₀= 0.6054
D₅₀= 0.1275 D₃₀= 0.0119 D₁₅= 0.0017
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 8.5%

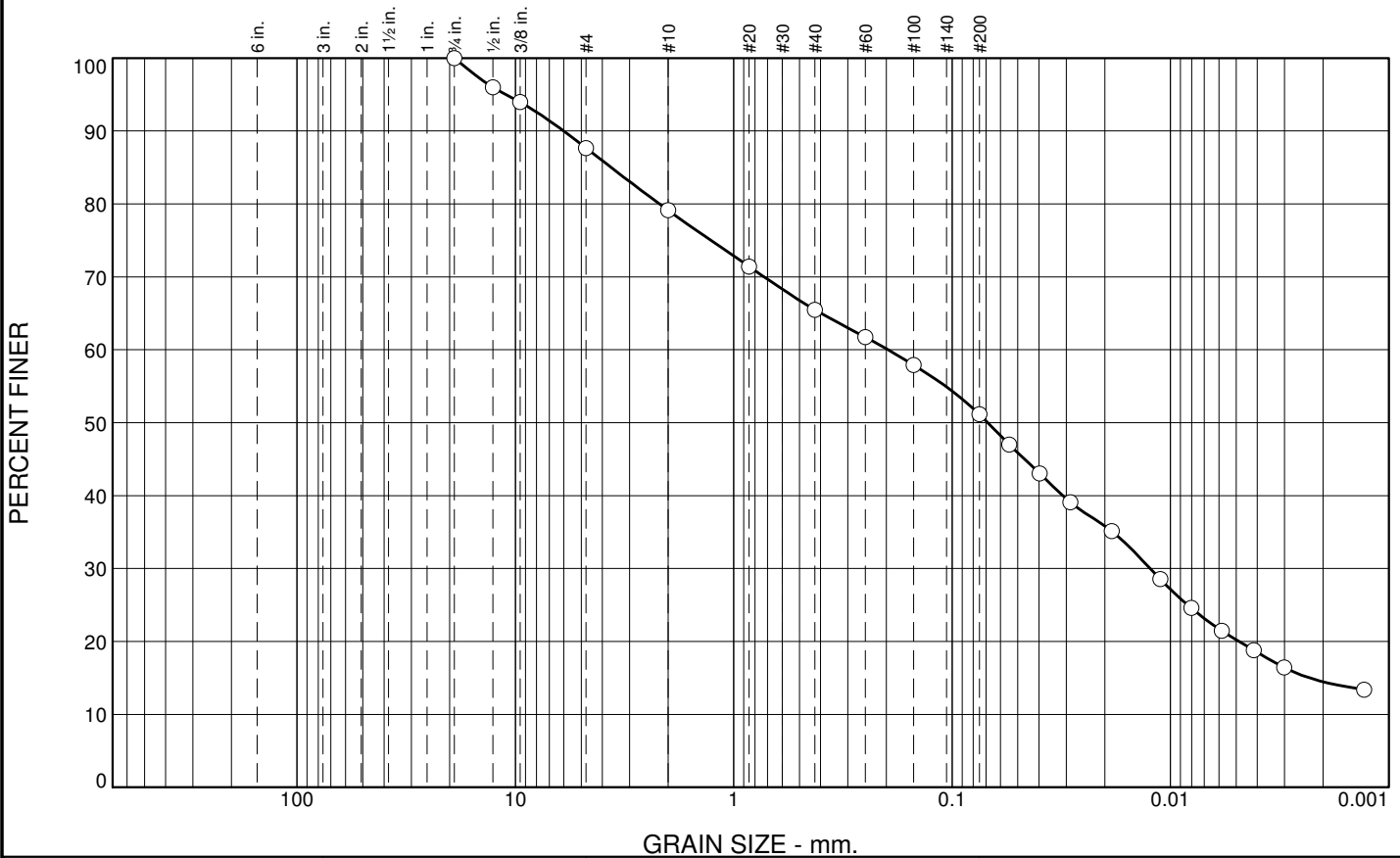
* (no specification provided)

Sample No.: SPT 1 Source of Sample: TMF12-11 Date: 9-10-12
Location: Elev./Depth: 4'-6"

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
--	---

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.3	8.6	13.6	14.3	31.0	20.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	96.0		
.375	94.0		
#4	87.7		
#10	79.1		
#20	71.4		
#40	65.5		
#60	61.7		
#100	57.9		
#200	51.2		
0.0547 mm.	47.0		
0.0397 mm.	43.0		
0.0287 mm.	39.1		
0.0186 mm.	35.1		
0.0111 mm.	28.5		
0.0080 mm.	24.6		
0.0058 mm.	21.5		
0.0042 mm.	18.8		
0.0030 mm.	16.4		
0.0013 mm.	13.4		

Soil Description

sandy lean clay

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 6.0159 D₈₅= 3.6426 D₆₀= 0.1967
D₅₀= 0.0686 D₃₀= 0.0124 D₁₅= 0.0023
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(3)

Remarks

Natural moisture = 8.6%

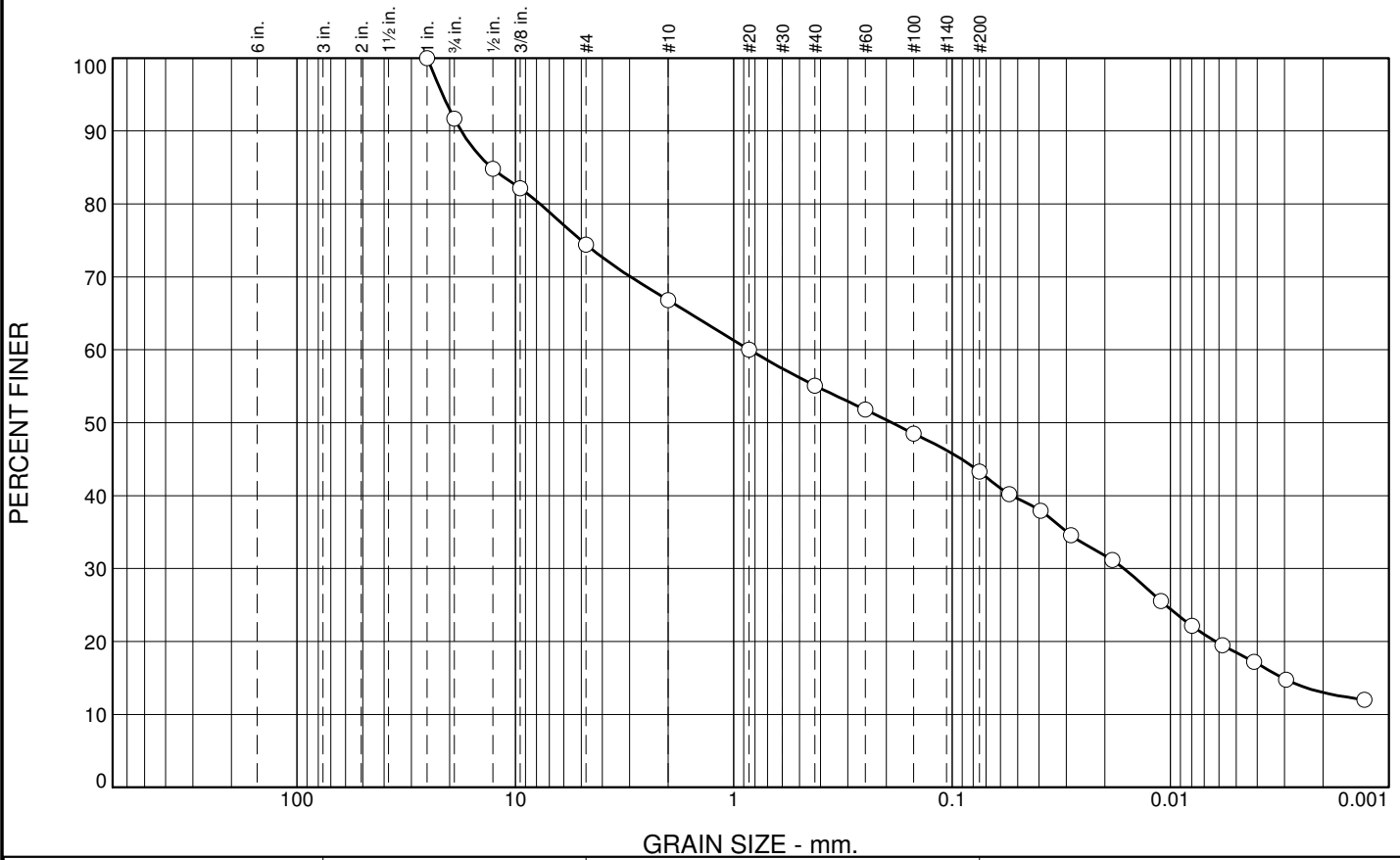
* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-11 Date: 9-10-12
Location: Elev./Depth: 9'-11'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSR

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.3	17.3	7.6	11.7	11.8	24.8	18.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.7		
.5	84.8		
.375	82.1		
#4	74.4		
#10	66.8		
#20	60.0		
#40	55.1		
#60	51.8		
#100	48.5		
#200	43.3		
0.0547 mm.	40.2		
0.0394 mm.	37.9		
0.0285 mm.	34.6		
0.0185 mm.	31.2		
0.0110 mm.	25.5		
0.0080 mm.	22.2		
0.0058 mm.	19.5		
0.0041 mm.	17.2		
0.0030 mm.	14.8		
0.0013 mm.	12.0		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 17.6943 D₈₅= 12.9080 D₆₀= 0.8473
D₅₀= 0.1889 D₃₀= 0.0163 D₁₅= 0.0031
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.5%

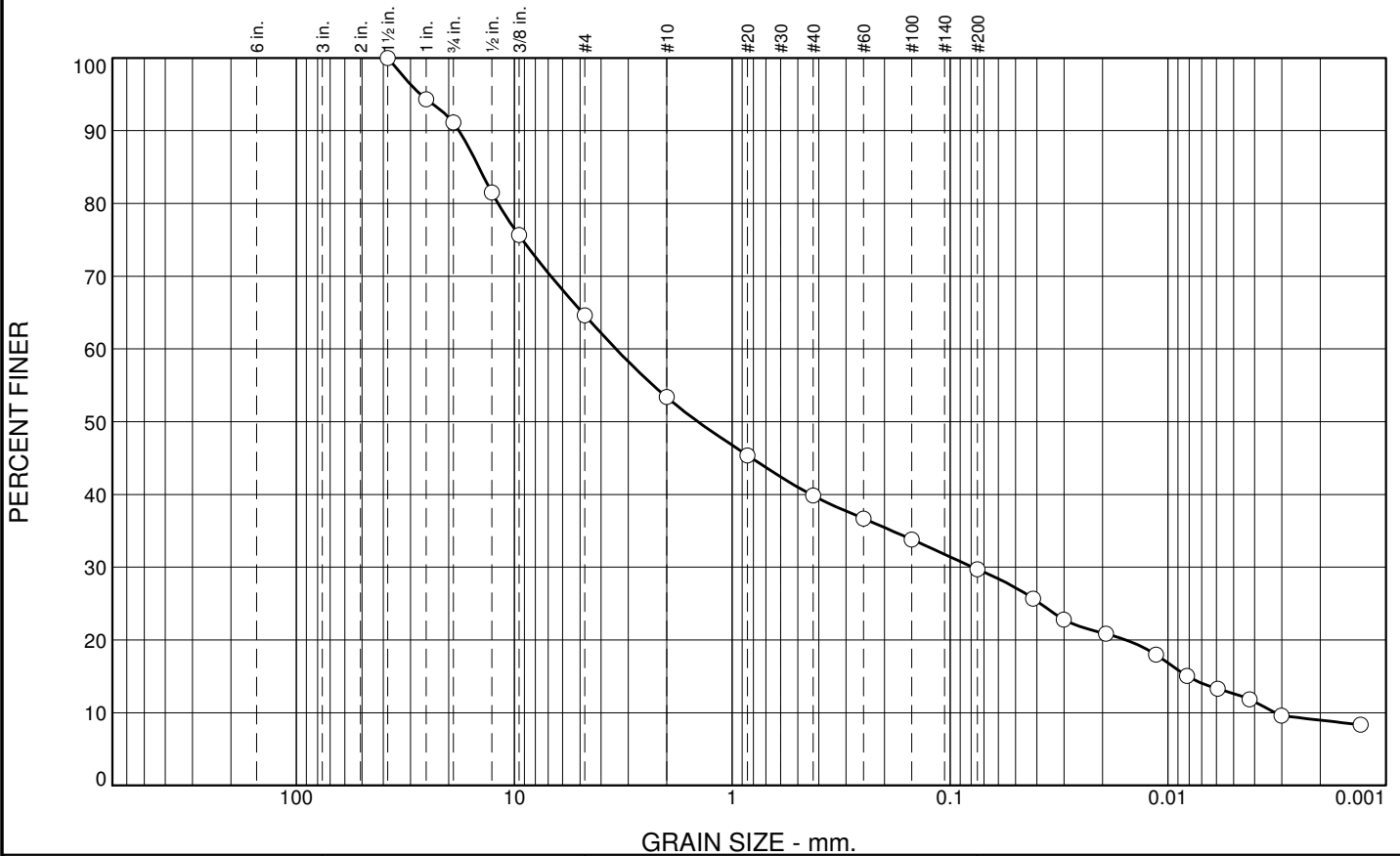
* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-11 Date: 9-10-12
Location: Elev./Depth: 14'-16'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.9	26.5	11.2	13.6	10.1	17.1	12.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.3		
.75	91.1		
.5	81.5		
.375	75.6		
#4	64.6		
#10	53.4		
#20	45.4		
#40	39.8		
#60	36.7		
#100	33.8		
#200	29.7		
0.0416 mm.	25.7		
0.0300 mm.	22.8		
0.0193 mm.	20.9		
0.0114 mm.	18.0		
0.0082 mm.	15.1		
0.0059 mm.	13.3		
0.0042 mm.	11.8		
0.0030 mm.	9.6		
0.0013 mm.	8.4		

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 17.9246 D₈₅= 14.5774 D₆₀= 3.4154
 D₅₀= 1.4350 D₃₀= 0.0785 D₁₅= 0.0081
 D₁₀= 0.0032 C_u= 1060.42 C_c= 0.56

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

Natural moisture = 6.5%

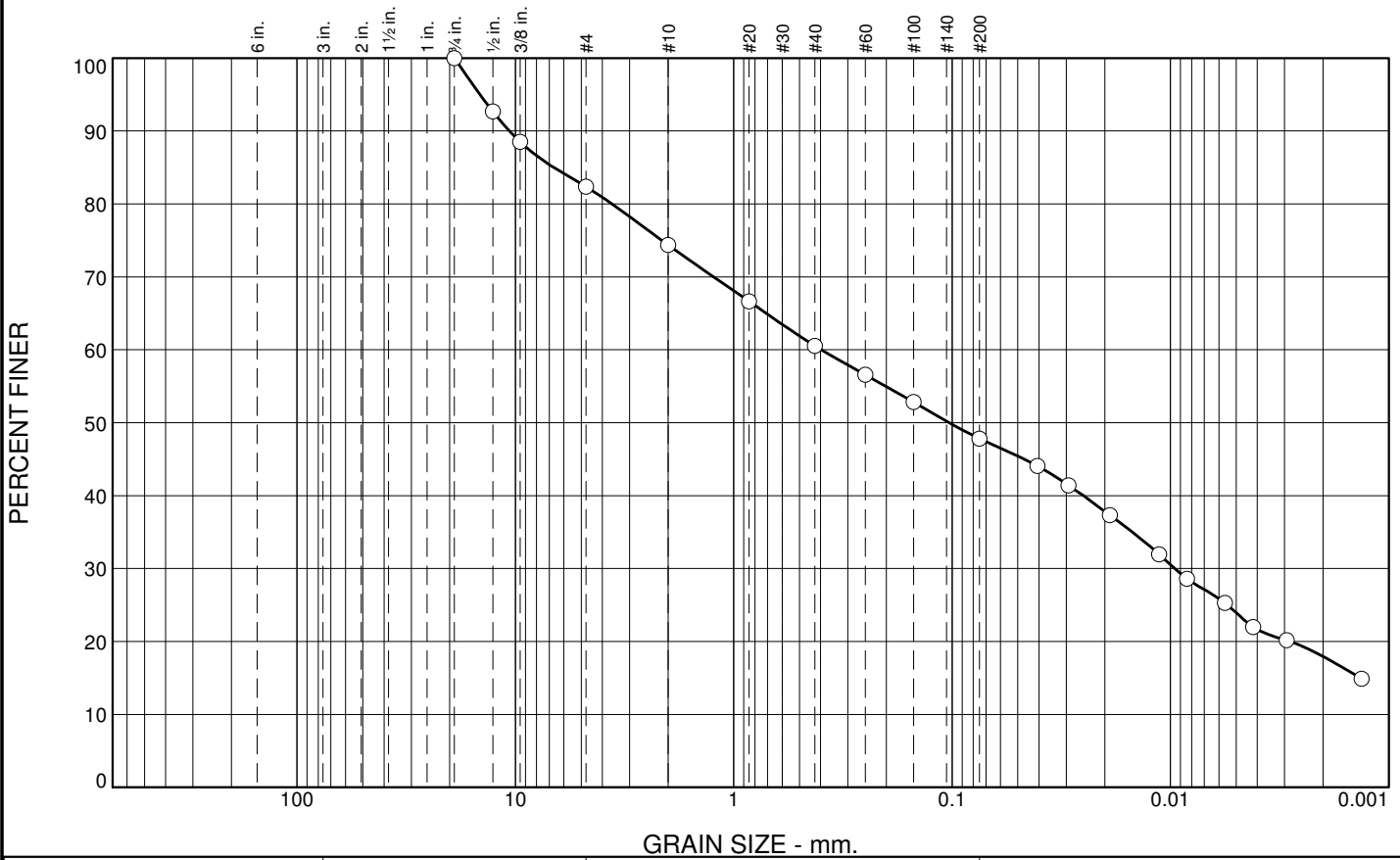
* (no specification provided)

Sample No.: SPT 4 **Source of Sample:** TMF12-11 **Date:** 9-10-12
Location: **Elev./Depth:** 19'-21'

	<p>Client: Yellowhead Mining Inc.</p> <p>Project: Harper Creek Project</p> <p>Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.7	7.9	13.9	12.7	23.9	23.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	92.7		
.375	88.5		
#4	82.3		
#10	74.4		
#20	66.6		
#40	60.5		
#60	56.6		
#100	52.8		
#200	47.8		
0.0407 mm.	44.1		
0.0293 mm.	41.4		
0.0190 mm.	37.3		
0.0113 mm.	31.9		
0.0084 mm.	28.6		
0.0056 mm.	25.3		
0.0042 mm.	22.0		
0.0029 mm.	20.2		
0.0013 mm.	14.9		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 10.6590 D₈₅= 6.6752 D₆₀= 0.3968
D₅₀= 0.1030 D₃₀= 0.0096 D₁₅= 0.0014
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Natural moisture = 6.5%

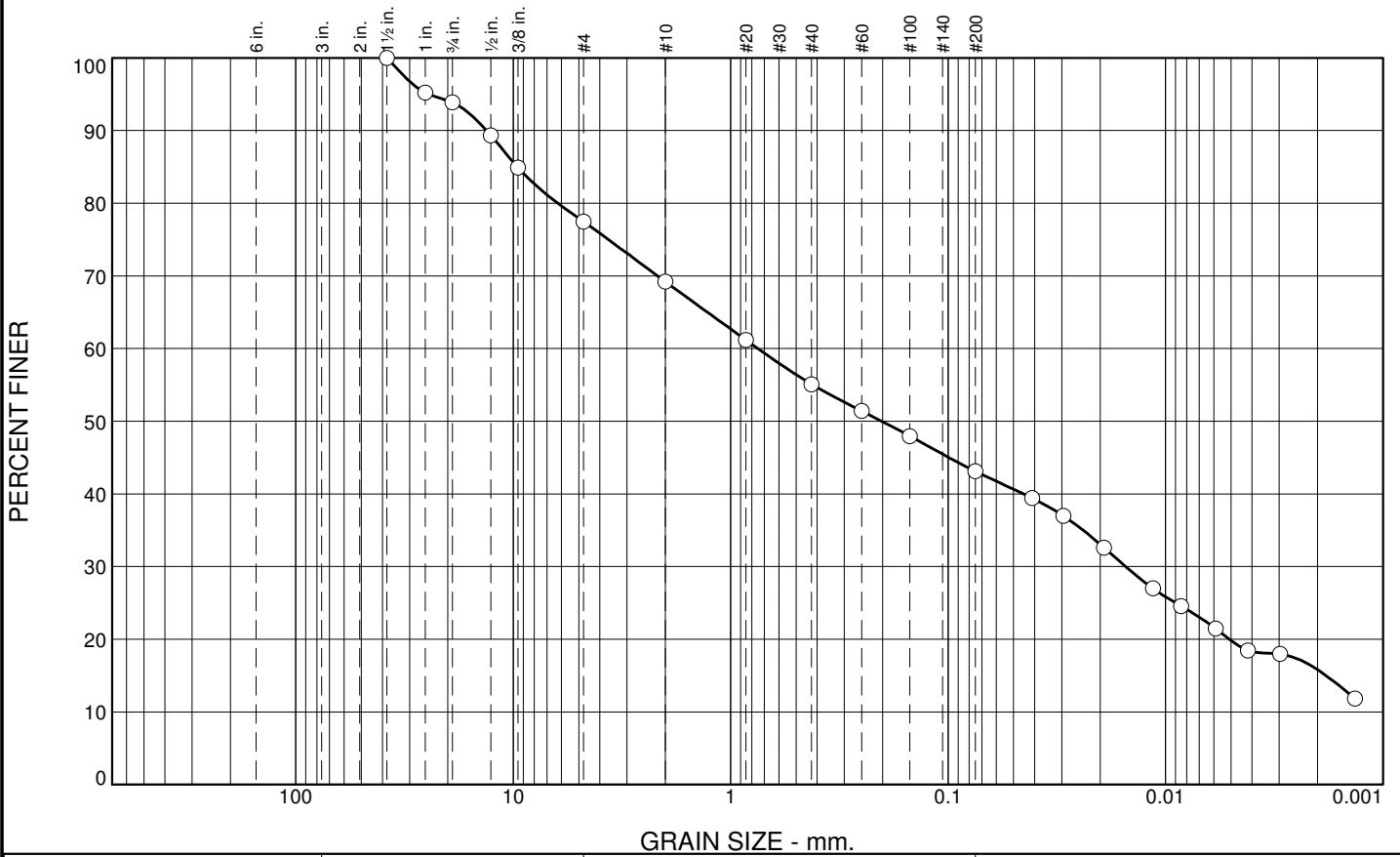
* (no specification provided)

Sample No.: SPT 5 Source of Sample: TMF12-11 Date: 9-10-12
Location: Elev./Depth: 24'-26'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	6.1	16.5	8.2	14.1	12.0	23.3	19.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.2		
.75	93.9		
.5	89.3		
.375	84.9		
#4	77.4		
#10	69.2		
#20	61.2		
#40	55.1		
#60	51.4		
#100	48.0		
#200	43.1		
0.0411 mm.	39.4		
0.0295 mm.	37.0		
0.0192 mm.	32.6		
0.0114 mm.	27.0		
0.0085 mm.	24.5		
0.0059 mm.	21.5		
0.0042 mm.	18.5		
0.0030 mm.	18.0		
0.0013 mm.	11.8		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 13.2789 D₈₅= 9.5814 D₆₀= 0.7495
D₅₀= 0.2022 D₃₀= 0.0152 D₁₅= 0.0018
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 9.8%

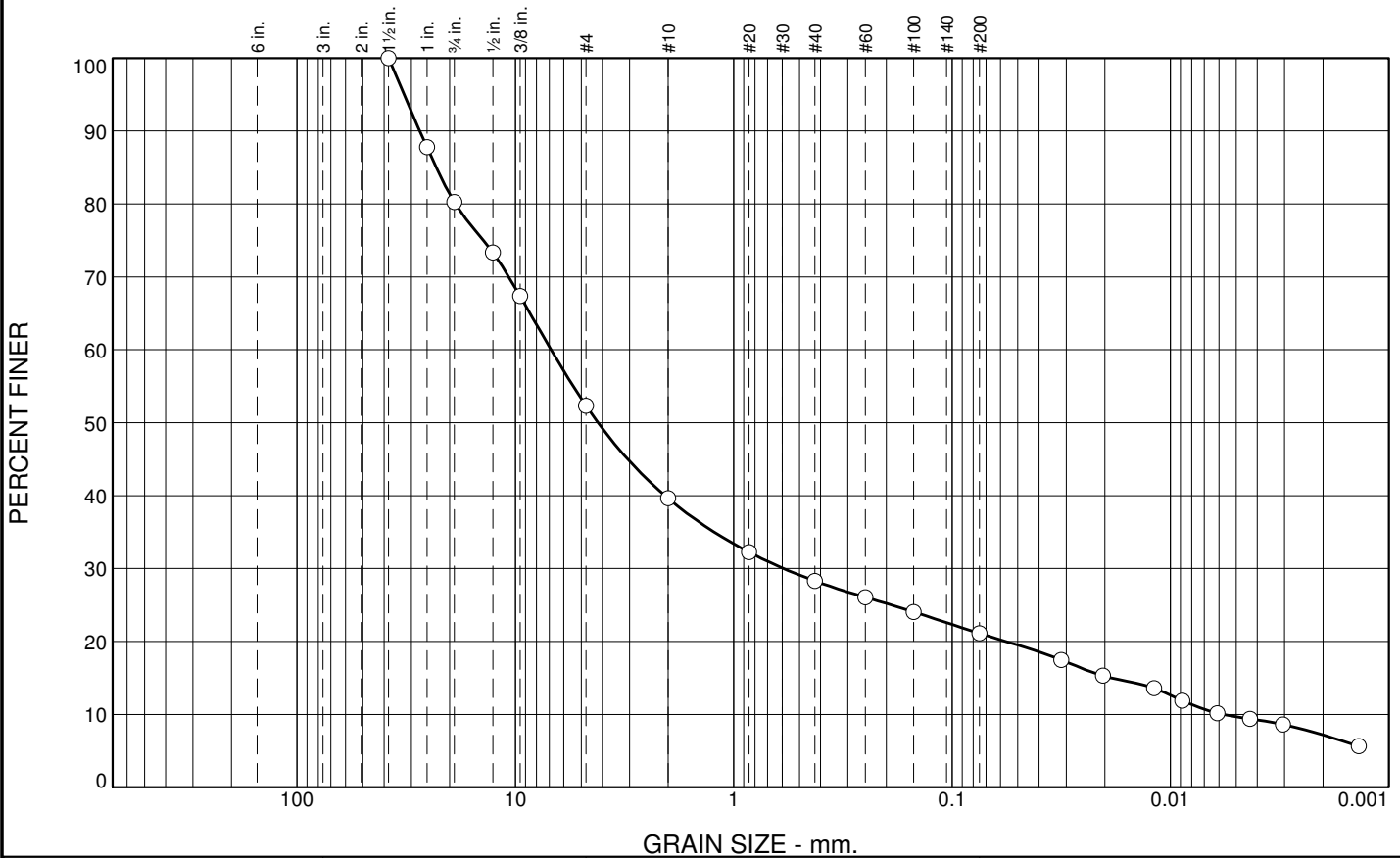
* (no specification provided)

Sample No.: SPT 6 Source of Sample: TMF12-11 Date: 9-11-12
Location: Elev./Depth: 30'-32'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	19.7	28.0	12.7	11.3	7.2	11.4	9.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	87.8		
.75	80.3		
.5	73.3		
.375	67.4		
#4	52.3		
#10	39.6		
#20	32.3		
#40	28.3		
#60	26.1		
#100	24.1		
#200	21.1		
0.0317 mm.	17.5		
0.0204 mm.	15.3		
0.0119 mm.	13.6		
0.0088 mm.	11.9		
0.0061 mm.	10.2		
0.0043 mm.	9.4		
0.0031 mm.	8.6		
0.0014 mm.	5.6		

Soil Description

clayey gravel with sand

Atterberg Limits

PL= 15 LL= 28 PI= 13

Coefficients

D₉₀= 27.4081 D₈₅= 23.0416 D₆₀= 6.8621
D₅₀= 4.1850 D₃₀= 0.5908 D₁₅= 0.0186
D₁₀= 0.0057 C_u= 1195.08 C_c= 8.86

Classification

USCS= GC AASHTO= A-2-6(0)

Remarks

Natural moisture = 3.9%

* (no specification provided)

Sample No.: SPT 7 Source of Sample: TMF12-11 Date: 9-11-12
Location: Elev./Depth: 35'-37'

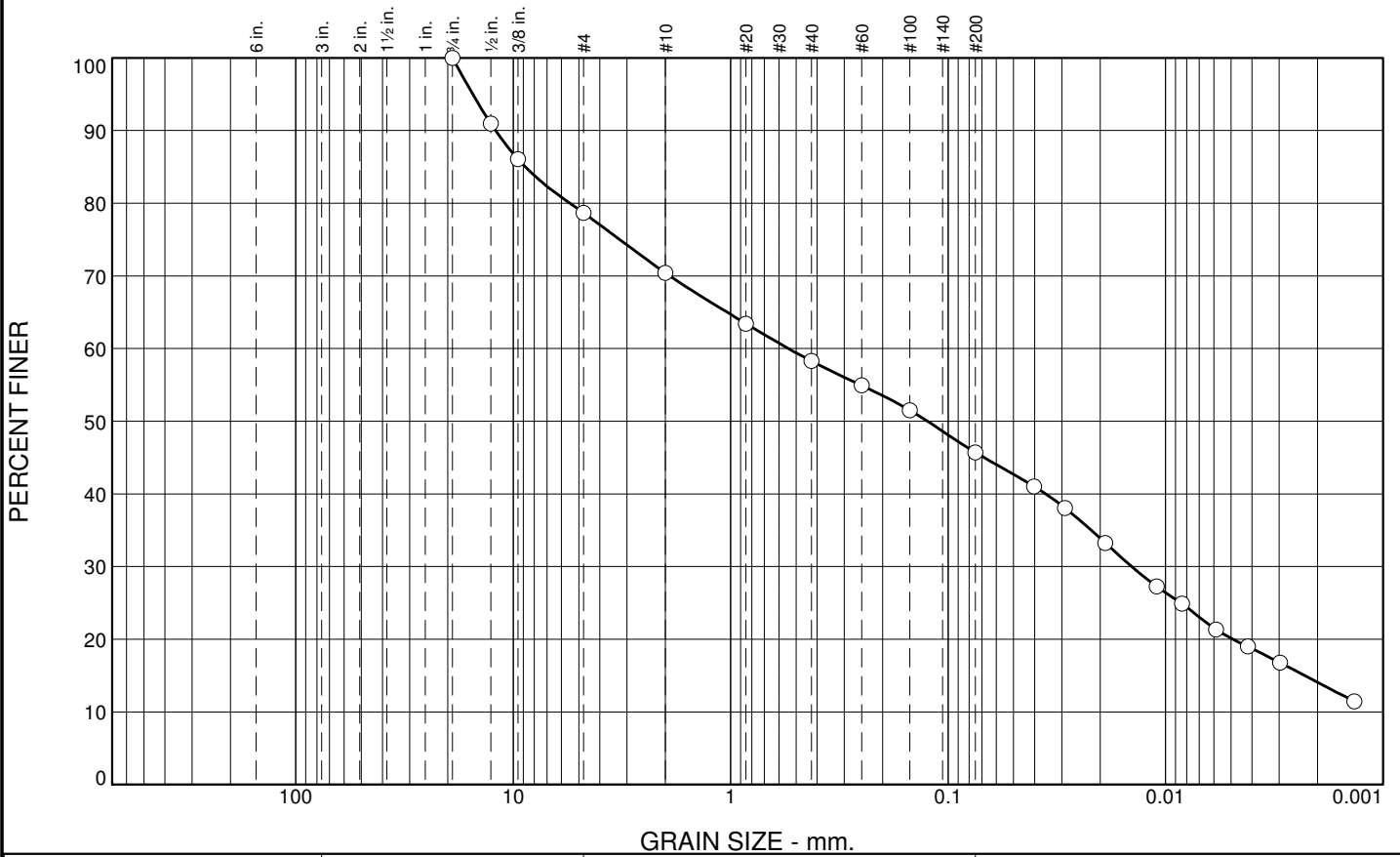


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	21.3	8.3	12.1	12.6	25.6	20.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	91.0		
.375	86.1		
#4	78.7		
#10	70.4		
#20	63.4		
#40	58.3		
#60	54.9		
#100	51.5		
#200	45.7		
0.0402 mm.	41.0		
0.0290 mm.	38.1		
0.0189 mm.	33.3		
0.0110 mm.	27.3		
0.0084 mm.	24.9		
0.0059 mm.	21.3		
0.0042 mm.	19.0		
0.0030 mm.	16.8		
0.0014 mm.	11.4		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 12.0813 D₈₅= 8.8130 D₆₀= 0.5422
D₅₀= 0.1245 D₃₀= 0.0143 D₁₅= 0.0023
D₁₀= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Natural moisture = 5.2%

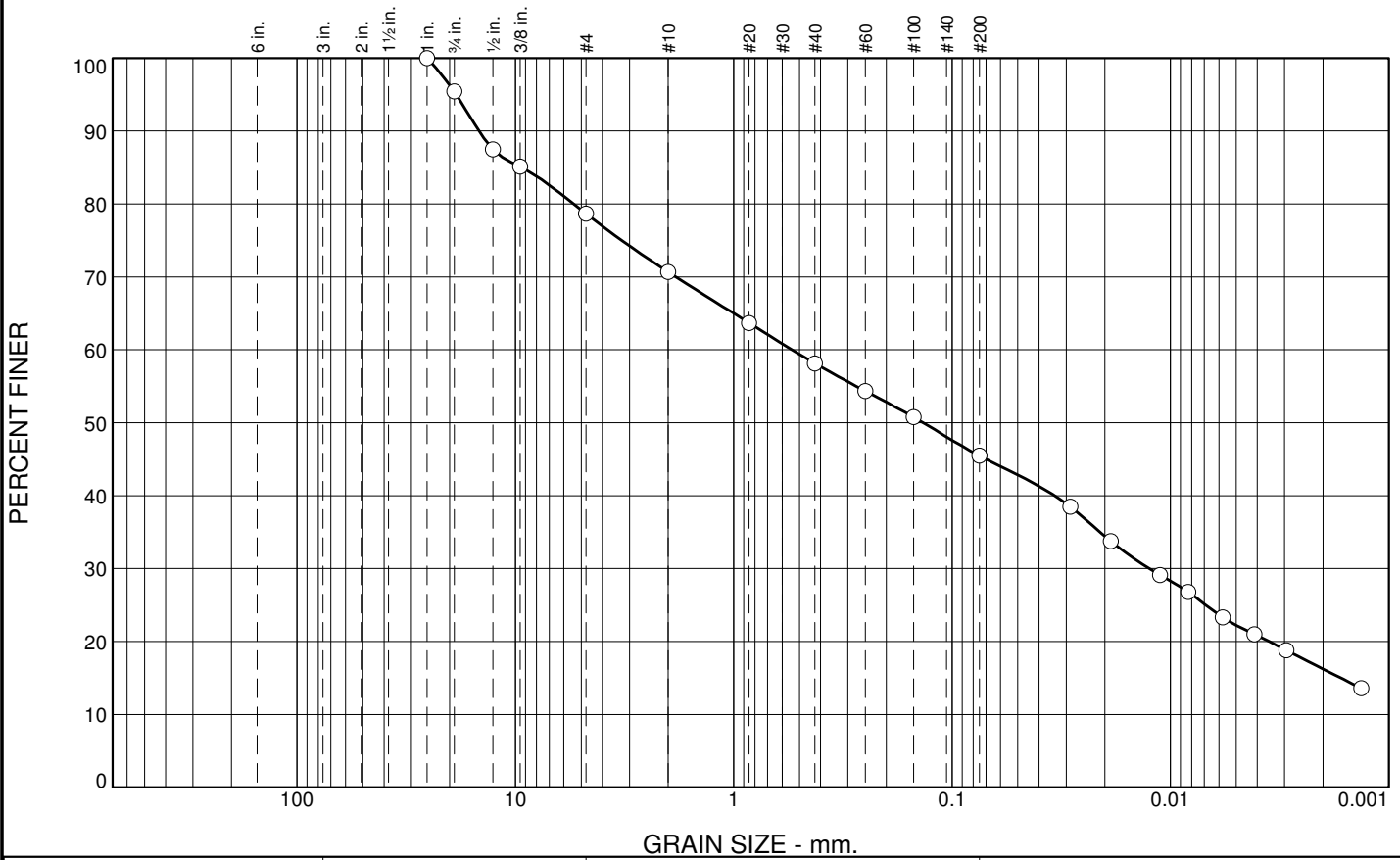
* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-12 Date: 9-11-12
Location: Elev./Depth: 9'-11'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p>	<p>Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.6	16.7	8.0	12.6	12.6	23.3	22.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.4		
.5	87.5		
.375	85.1		
#4	78.7		
#10	70.7		
#20	63.7		
#40	58.1		
#60	54.4		
#100	50.8		
#200	45.5		
0.0288 mm.	38.5		
0.0188 mm.	33.8		
0.0111 mm.	29.1		
0.0083 mm.	26.8		
0.0058 mm.	23.3		
0.0041 mm.	21.0		
0.0029 mm.	18.8		
0.0013 mm.	13.6		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 30 PI= 16

Coefficients

D₉₀= 14.6991 D₈₅= 9.3752 D₆₀= 0.5410
D₅₀= 0.1359 D₃₀= 0.0125 D₁₅= 0.0017
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(4)

Remarks

Natural moisture = 4.6%

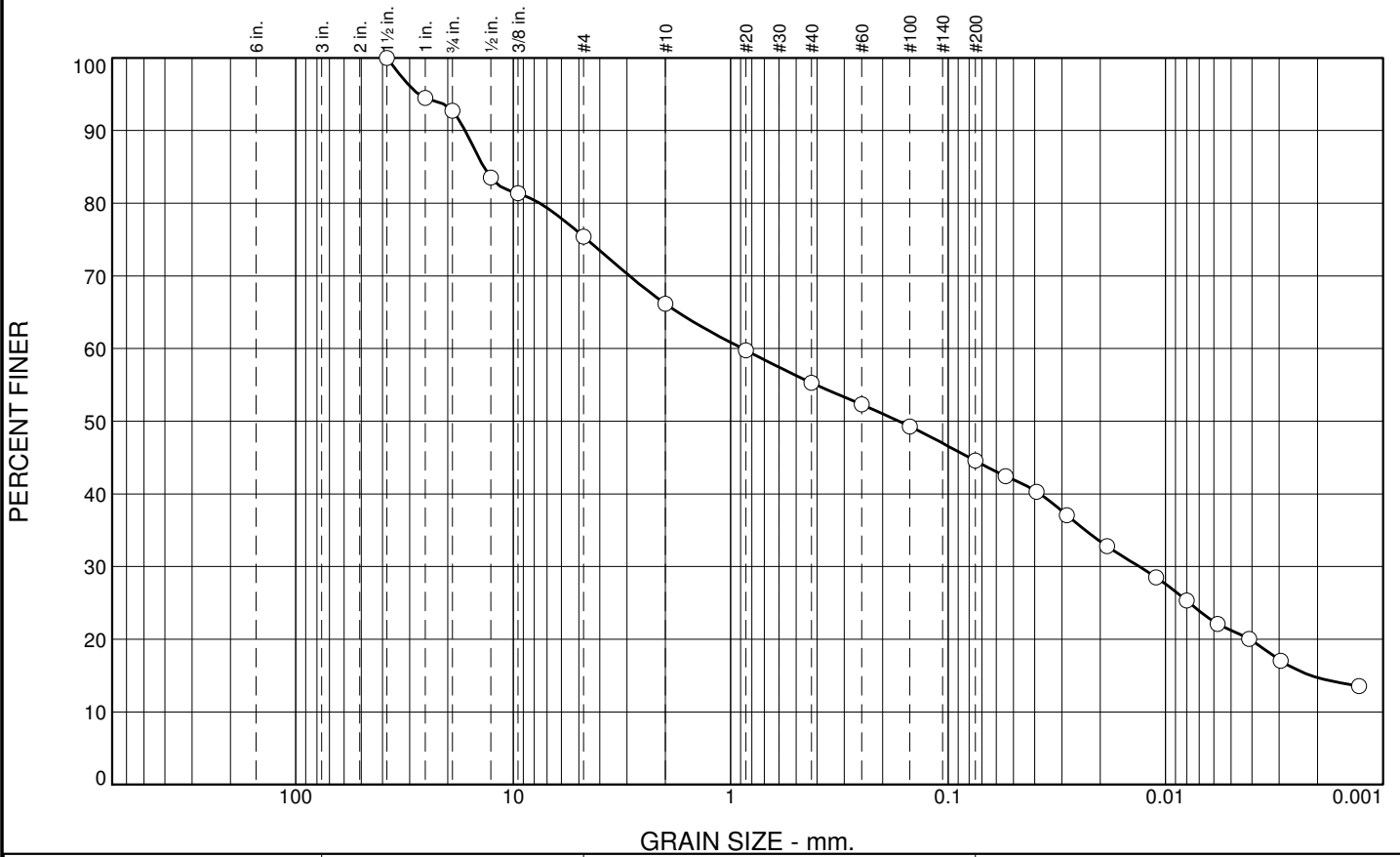
* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-12 Date: 9-11-12
Location: Elev./Depth: 14'-16'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.3	17.3	9.2	10.9	10.7	23.4	21.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	94.5		
.75	92.7		
.5	83.5		
.375	81.4		
#4	75.4		
#10	66.2		
#20	59.7		
#40	55.3		
#60	52.3		
#100	49.3		
#200	44.6		
0.0544 mm.	42.4		
0.0392 mm.	40.3		
0.0285 mm.	37.1		
0.0186 mm.	32.8		
0.0111 mm.	28.5		
0.0080 mm.	25.3		
0.0058 mm.	22.1		
0.0041 mm.	20.0		
0.0030 mm.	17.0		
0.0013 mm.	13.6		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 30 PI= 16

Coefficients

D₉₀= 16.6557 D₈₅= 13.6833 D₆₀= 0.8824
D₅₀= 0.1682 D₃₀= 0.0132 D₁₅= 0.0021
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Natural moisture = 6.0%

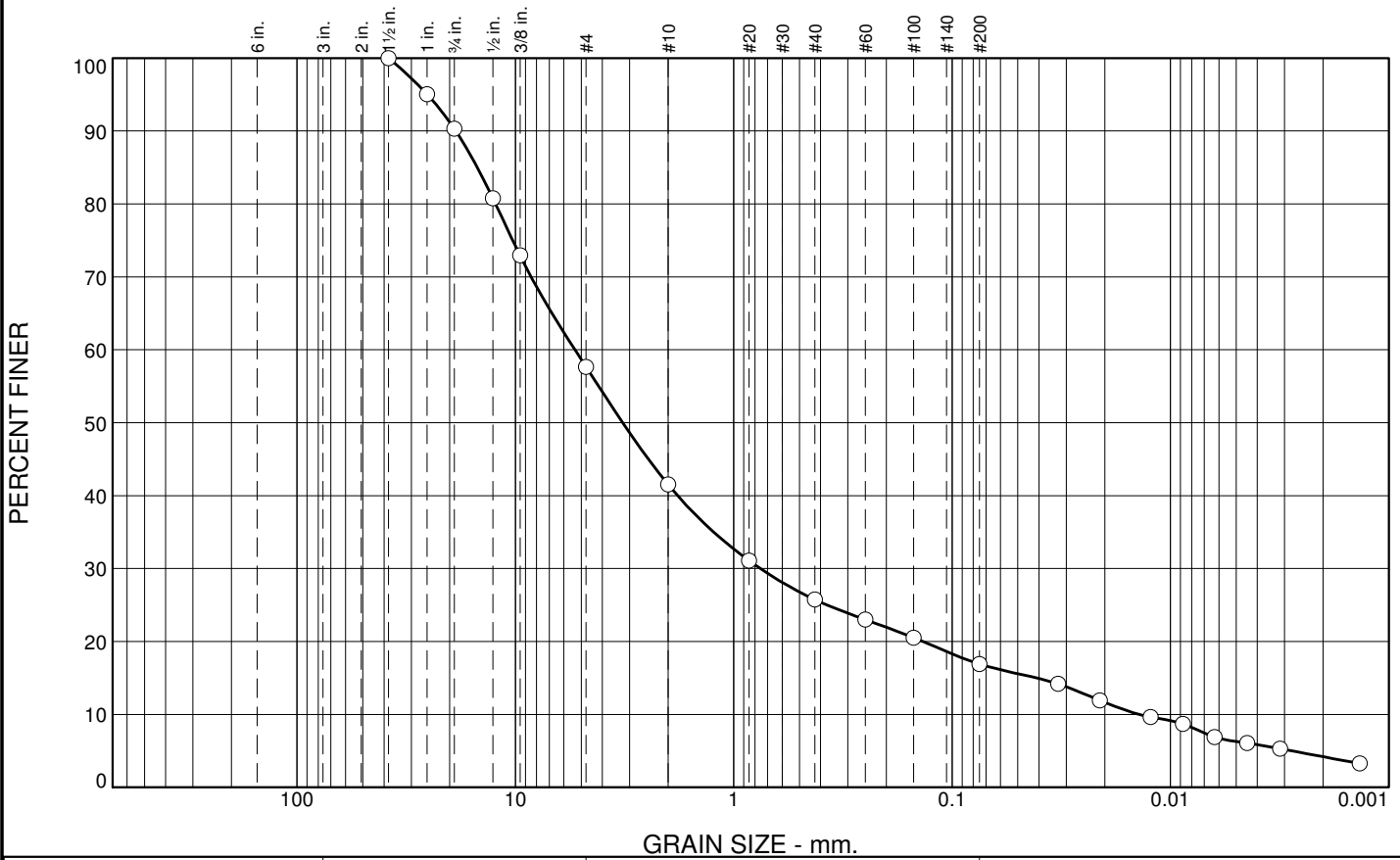
* (no specification provided)

Sample No.: SPT 4 Source of Sample: TMF12-12 Date: 9-11-12
Location: Elev./Depth: 19'-21'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	9.7	32.7	16.1	15.8	8.8	10.6	6.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	95.0		
.75	90.3		
.5	80.8		
.375	72.9		
#4	57.6		
#10	41.5		
#20	31.1		
#40	25.7		
#60	23.0		
#100	20.5		
#200	16.9		
0.0327 mm.	14.2		
0.0210 mm.	11.9		
0.0123 mm.	9.6		
0.0088 mm.	8.7		
0.0063 mm.	6.9		
0.0044 mm.	6.1		
0.0031 mm.	5.3		
0.0014 mm.	3.3		

Soil Description

Atterberg Limits
 LL= PI=

Coefficients
 D₉₀= 18.7374 D₈₅= 14.9669 D₆₀= 5.3438
 D₅₀= 3.2245 D₃₀= 0.7542 D₁₅= 0.0409
 D₁₀= 0.0139 C_u= 385.80 C_c= 7.68

Classification
 USCS= AASHTO=

Remarks
 Natural moisture = 3.4%

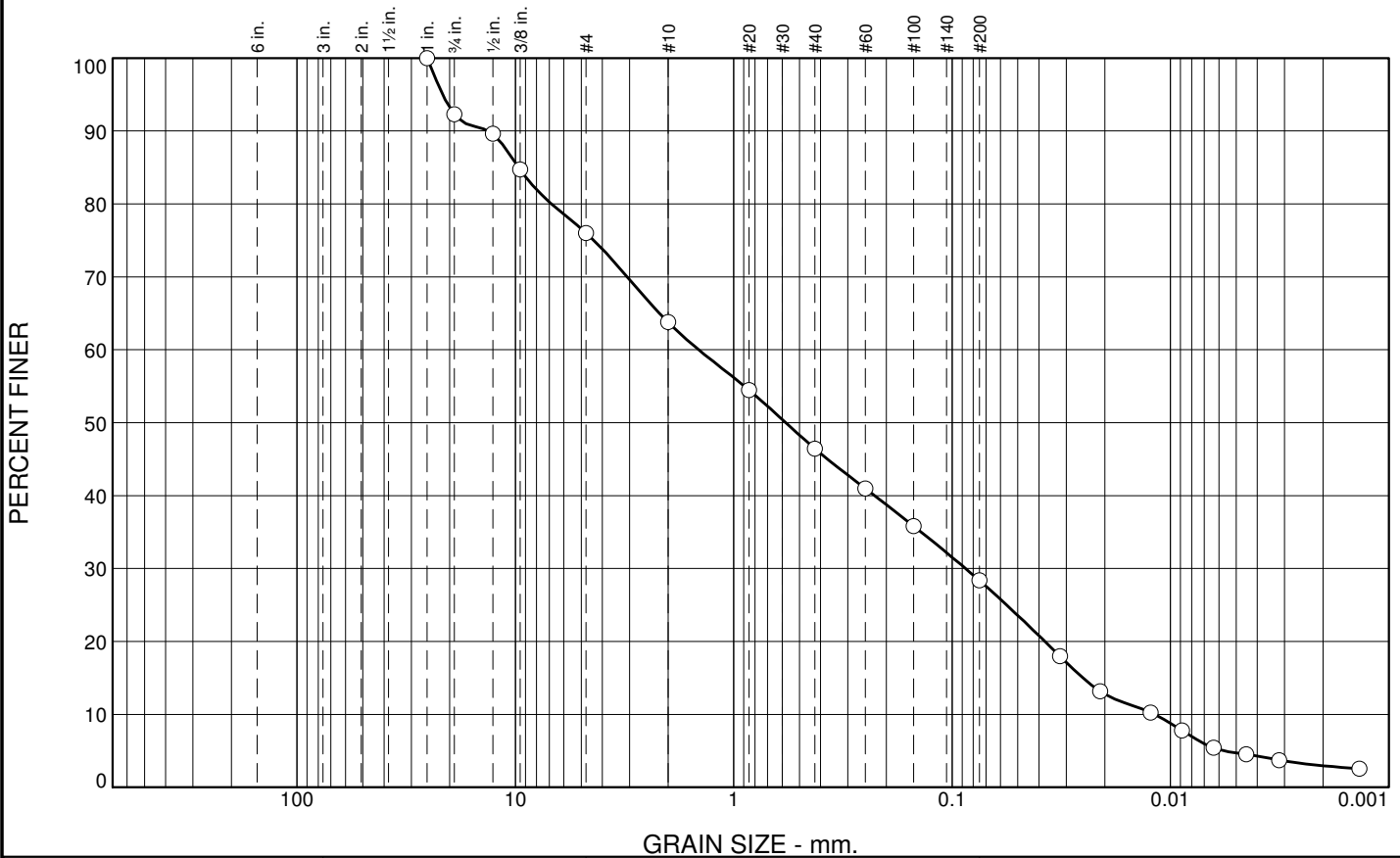
* (no specification provided)

Sample No.: SPT 5 **Source of Sample:** TMF12-12 **Date:** 9-11-12
Location: **Elev./Depth:** 24'-26'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07	Figure
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	7.7	16.3	12.2	17.4	18.0	23.7	4.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	92.3		
.5	89.6		
.375	84.7		
#4	76.0		
#10	63.8		
#20	54.5		
#40	46.4		
#60	41.0		
#100	35.8		
#200	28.4		
0.0321 mm.	18.0		
0.0210 mm.	13.2		
0.0123 mm.	10.3		
0.0089 mm.	7.8		
0.0063 mm.	5.4		
0.0045 mm.	4.5		
0.0032 mm.	3.7		
0.0014 mm.	2.5		

Soil Description

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 13.2851 D₈₅= 9.6785 D₆₀= 1.4484
 D₅₀= 0.5784 D₃₀= 0.0867 D₁₅= 0.0252
 D₁₀= 0.0118 C_u= 122.56 C_c= 0.44

Classification
 USCS= AASHTO=

Remarks

Natural moisture = 5.8%

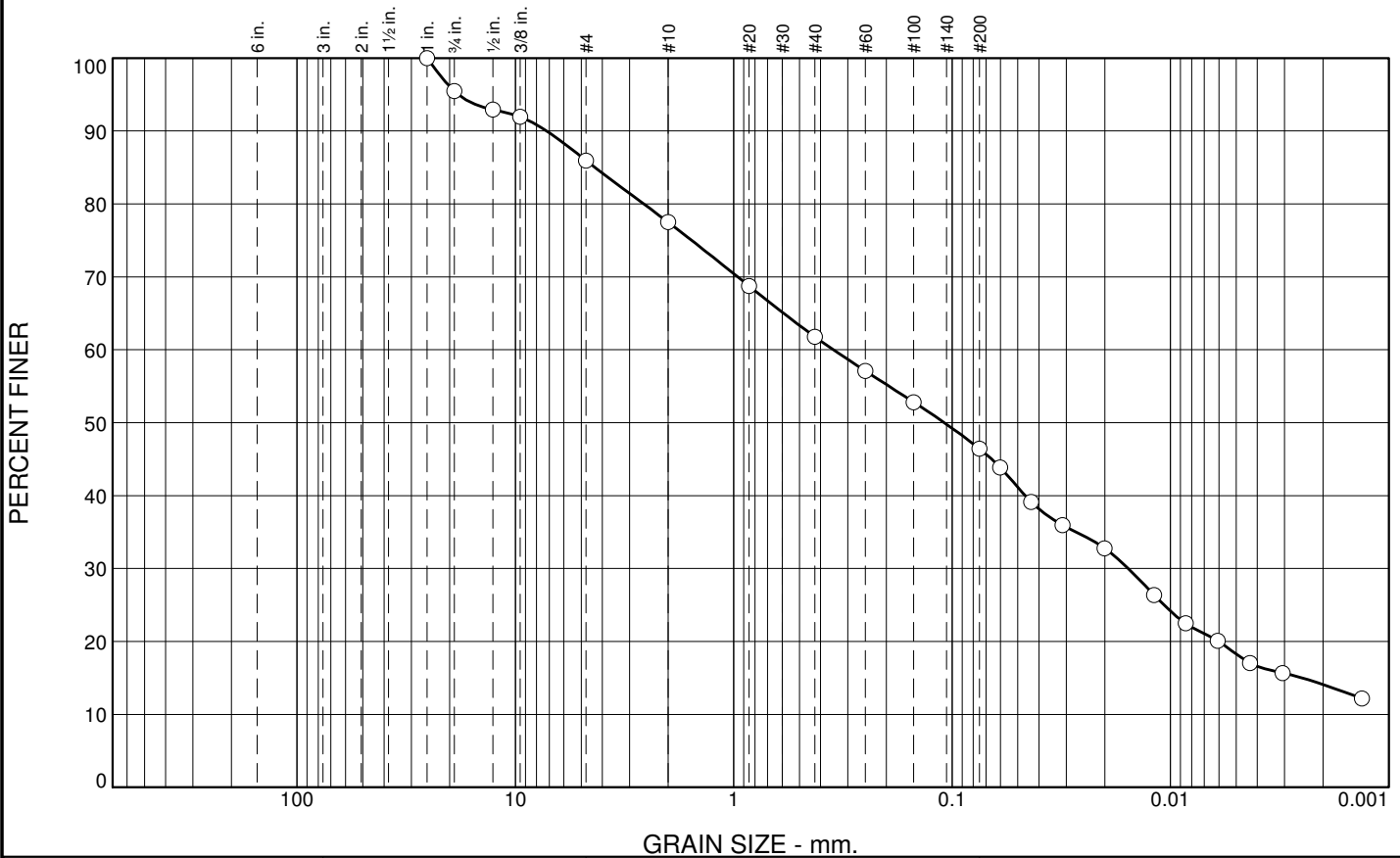
* (no specification provided)

Sample No.: SPT 1 **Source of Sample:** TMF12-13 **Date:** 9-11-12
Location: **Elev./Depth:** 4'-6'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07	Figure
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	4.5	9.6	8.4	15.7	15.4	28.1	18.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	95.5		
.5	92.9		
.375	91.9		
#4	85.9		
#10	77.5		
#20	68.7		
#40	61.8		
#60	57.1		
#100	52.8		
#200	46.4		
0.0602 mm.	43.9		
0.0435 mm.	39.1		
0.0312 mm.	36.0		
0.0200 mm.	32.8		
0.0119 mm.	26.4		
0.0085 mm.	22.5		
0.0061 mm.	20.1		
0.0043 mm.	17.0		
0.0031 mm.	15.7		
0.0013 mm.	12.2		

Soil Description

clayey sand

Atterberg Limits

PL= 16 LL= 30 PI= 14

Coefficients

D₉₀= 7.2032 D₈₅= 4.3269 D₆₀= 0.3500
D₅₀= 0.1086 D₃₀= 0.0156 D₁₅= 0.0025
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Natural moisture = 4.3%

* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-13 Date: 9-11-12
Location: Elev./Depth: 9'-11'

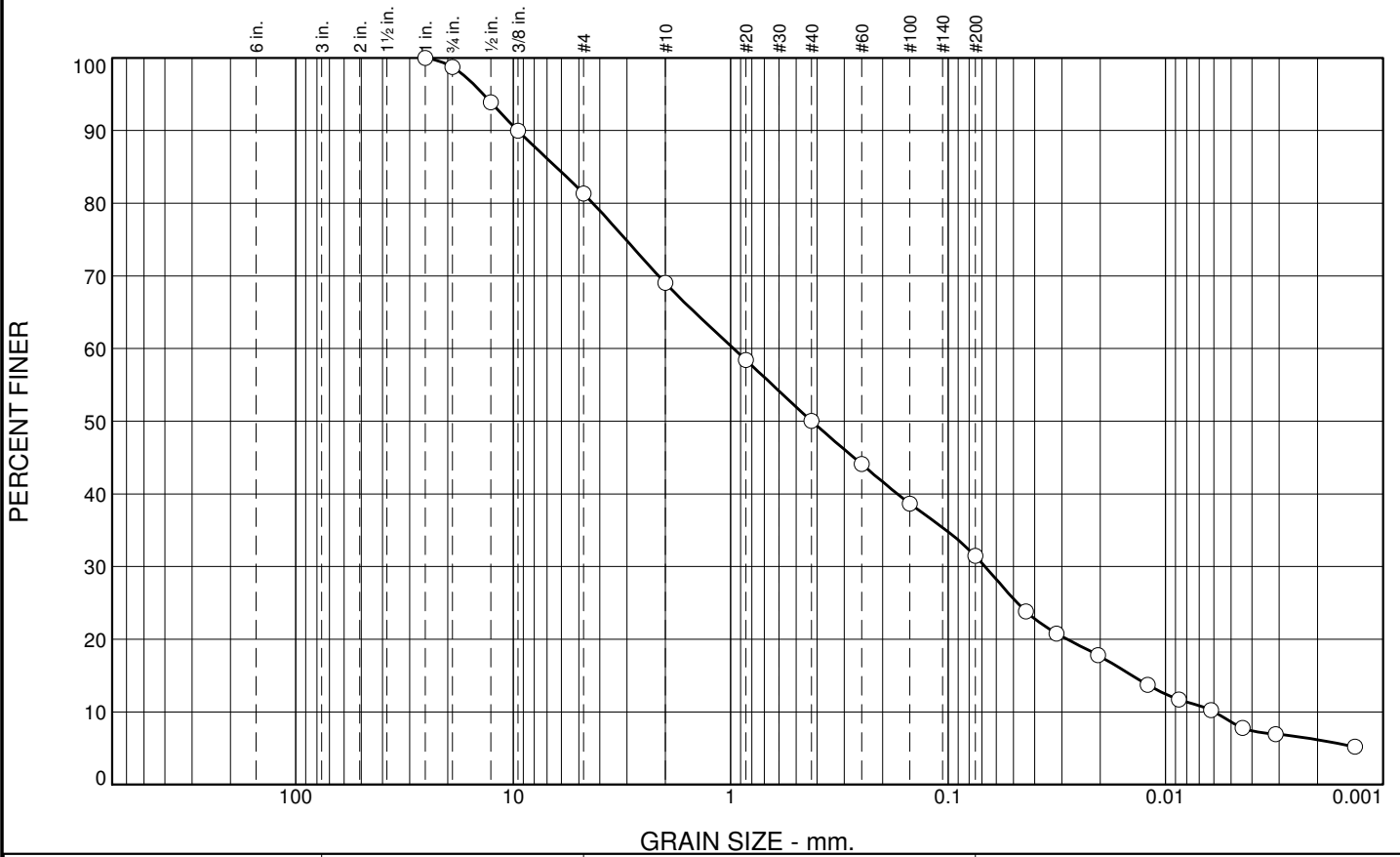


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.2	17.5	12.3	19.0	18.5	22.9	8.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.8		
.5	93.9		
.375	90.0		
#4	81.3		
#10	69.0		
#20	58.4		
#40	50.0		
#60	44.1		
#100	38.7		
#200	31.5		
0.0439 mm.	23.8		
0.0317 mm.	20.8		
0.0204 mm.	17.8		
0.0121 mm.	13.7		
0.0087 mm.	11.7		
0.0062 mm.	10.2		
0.0044 mm.	7.8		
0.0031 mm.	7.0		
0.0013 mm.	5.2		

Soil Description

silty, clayey sand with gravel

Atterberg Limits

PL= 16 LL= 20 PI= 4

Coefficients

D₉₀= 9.5362 D₈₅= 6.3654 D₆₀= 0.9699
D₅₀= 0.4237 D₃₀= 0.0676 D₁₅= 0.0142
D₁₀= 0.0060 C_u= 162.91 C_c= 0.79

Classification

USCS= SC-SM AASHTO= A-2-4(0)

Remarks

Natural moisture = 6.6%

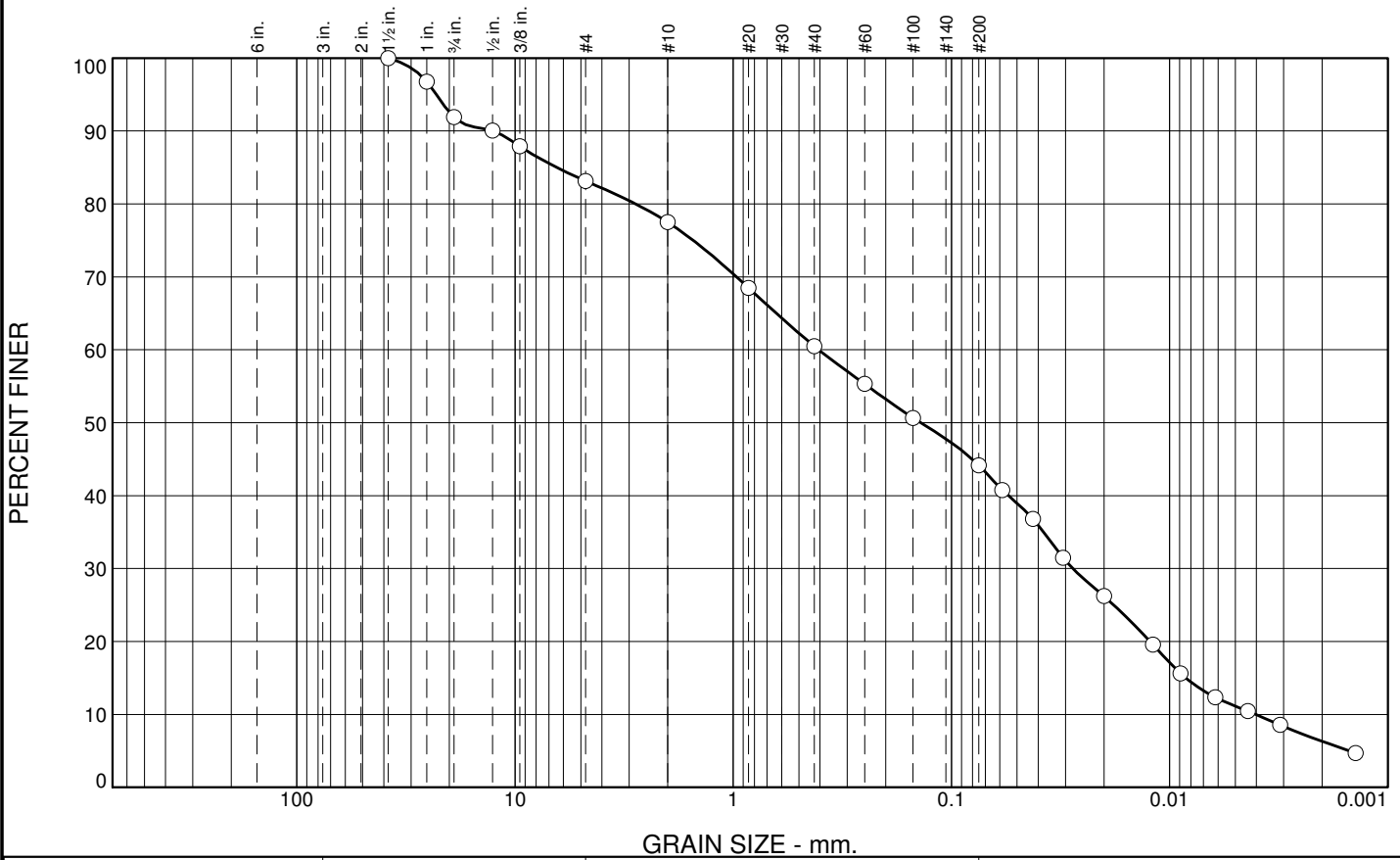
* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-13 Date: 9-11-12
Location: Elev./Depth: 14'-16'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p>
<p>Figure</p>	

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.1	8.8	5.6	17.0	16.4	33.0	11.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.8		
.75	91.9		
.5	90.0		
.375	87.9		
#4	83.1		
#10	77.5		
#20	68.5		
#40	60.5		
#60	55.3		
#100	50.7		
#200	44.1		
0.0584 mm.	40.8		
0.0423 mm.	36.8		
0.0308 mm.	31.5		
0.0200 mm.	26.2		
0.0119 mm.	19.6		
0.0089 mm.	15.6		
0.0062 mm.	12.3		
0.0044 mm.	10.5		
0.0031 mm.	8.6		
0.0014 mm.	4.7		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 12.5993 D₈₅= 6.4322 D₆₀= 0.4056
D₅₀= 0.1385 D₃₀= 0.0278 D₁₅= 0.0084
D₁₀= 0.0040 C_u= 100.70 C_c= 0.47

Classification

USCS= AASHTO=

Remarks

Natural moisture = 9.4%

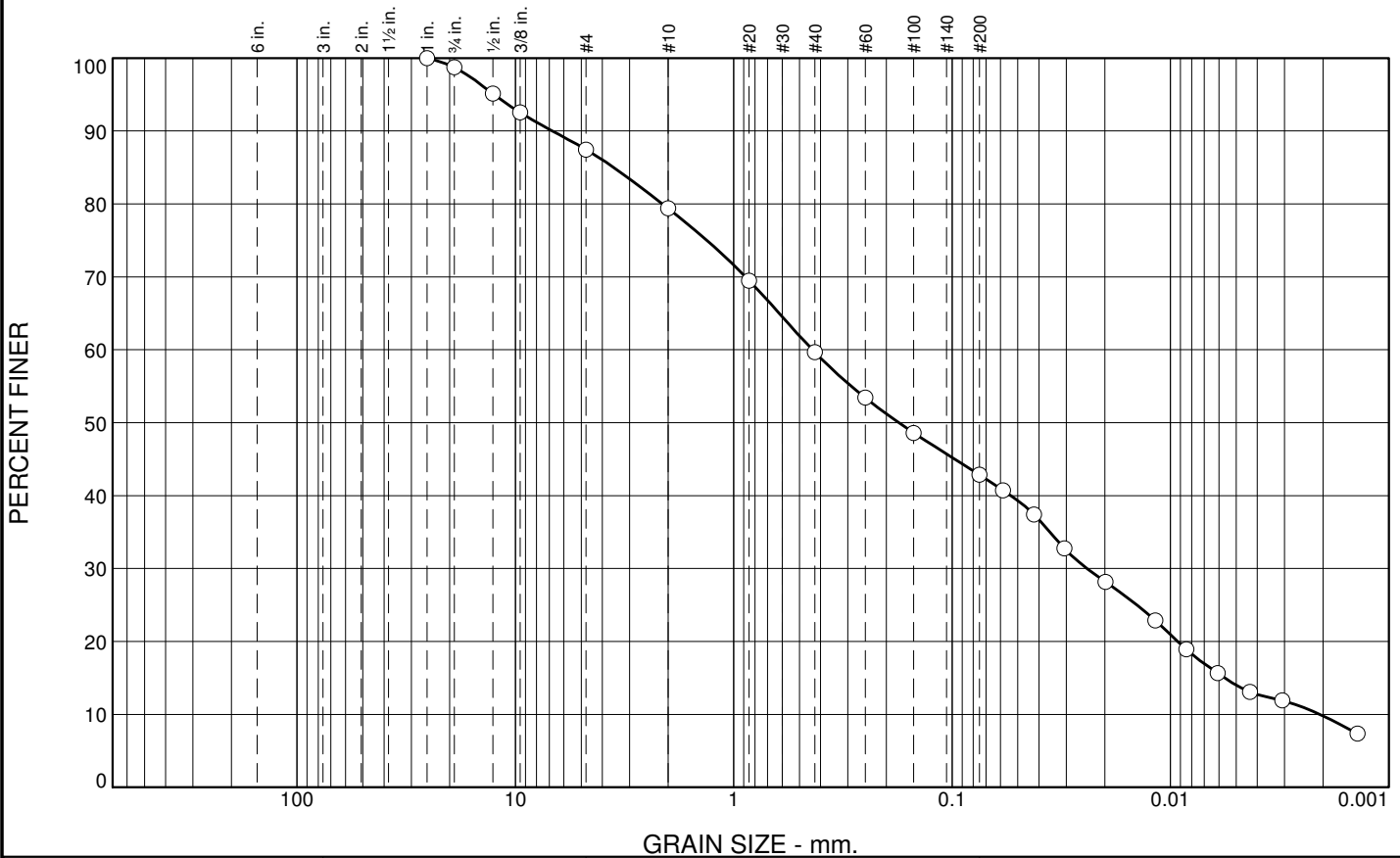
* (no specification provided)

Sample No.: SPT 1 Source of Sample: TMF12-14 Date: 9-11-12
Location: Elev./Depth: 4.5'-6.5'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07
Figure	

Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	11.3	8.0	19.7	16.9	28.8	14.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.7		
.5	95.1		
.375	92.5		
#4	87.4		
#10	79.4		
#20	69.5		
#40	59.7		
#60	53.4		
#100	48.6		
#200	42.8		
0.0585 mm.	40.7		
0.0422 mm.	37.4		
0.0306 mm.	32.8		
0.0198 mm.	28.2		
0.0117 mm.	22.9		
0.0085 mm.	18.9		
0.0061 mm.	15.6		
0.0043 mm.	13.1		
0.0031 mm.	11.9		
0.0014 mm.	7.4		

Soil Description

clayey sand

Atterberg Limits

PL= 18 LL= 30 PI= 12

Coefficients

D₉₀= 6.7708 D₈₅= 3.5545 D₆₀= 0.4358
 D₅₀= 0.1756 D₃₀= 0.0241 D₁₅= 0.0056
 D₁₀= 0.0021 C_u= 210.68 C_c= 0.64

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 9.1%

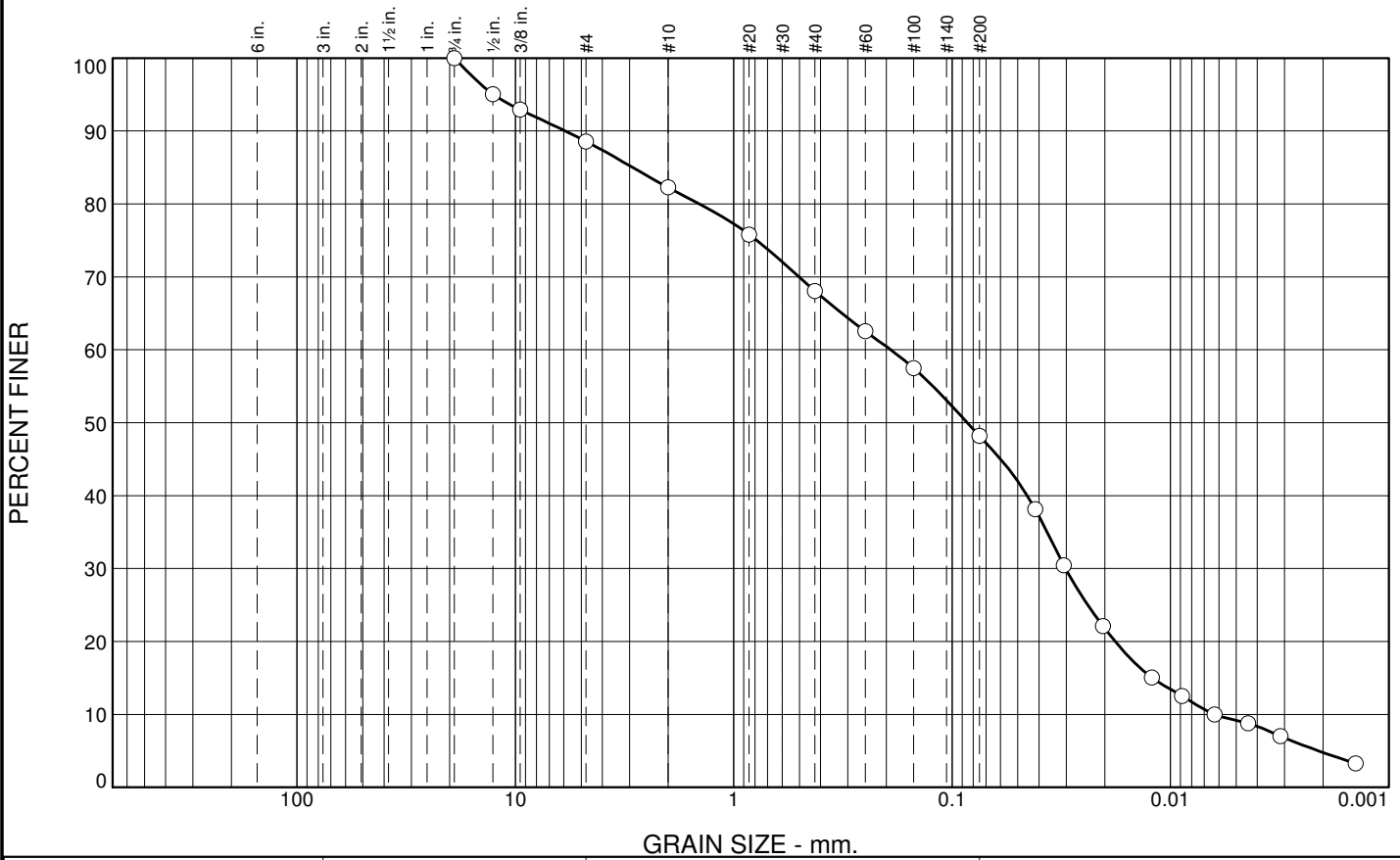
* (no specification provided)

Sample No.: SPT 2 **Source of Sample:** TMF12-14 **Date:** 9-11-12
Location: **Elev./Depth:** 9.5'-11.5'

	Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07	Figure
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.4	6.3	14.2	19.9	39.0	9.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	95.1		
.375	92.9		
#4	88.6		
#10	82.3		
#20	75.8		
#40	68.1		
#60	62.6		
#100	57.5		
#200	48.2		
0.0416 mm.	38.1		
0.0308 mm.	30.5		
0.0204 mm.	22.1		
0.0122 mm.	15.1		
0.0089 mm.	12.5		
0.0063 mm.	10.0		
0.0044 mm.	8.8		
0.0031 mm.	7.0		
0.0014 mm.	3.3		

Soil Description

silty sand

Atterberg Limits

PL= 28 LL= 29 PI= 1

Coefficients

D₉₀= 5.9213 D₈₅= 2.9058 D₆₀= 0.1912
D₅₀= 0.0852 D₃₀= 0.0302 D₁₅= 0.0121
D₁₀= 0.0063 C_u= 30.50 C_c= 0.76

Classification

USCS= SM AASHTO= A-4(0)

Remarks

Natural moisture = 9.5%

* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-14 Date: 9-11-12
Location: Elev./Depth: 14.5'-16.5'

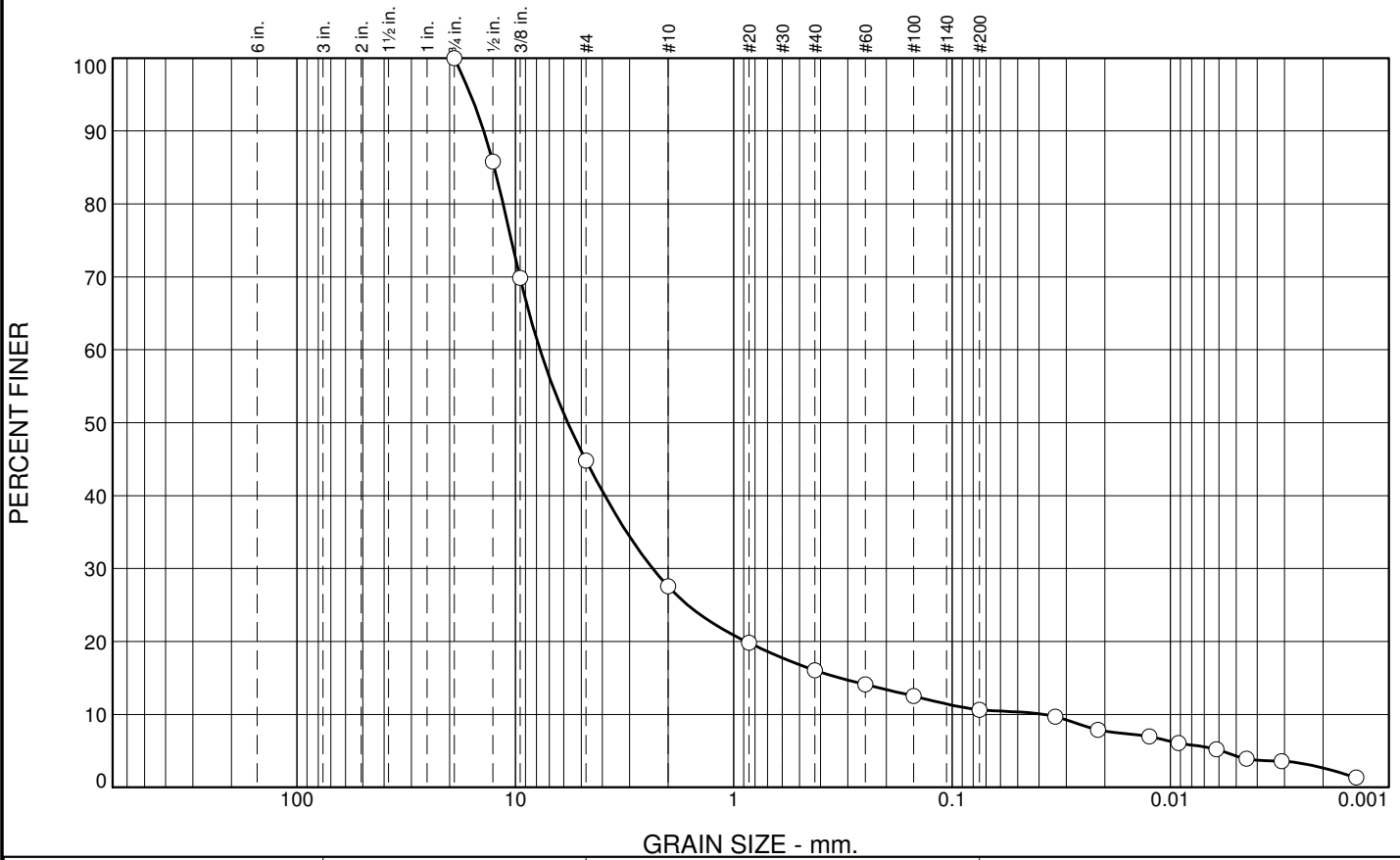


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No: VA101-00458/07

Figure

Tested By: RV Checked By: RSR

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	55.2	17.2	11.5	5.4	6.4	4.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.5	85.8		
.375	69.9		
#4	44.8		
#10	27.6		
#20	19.8		
#40	16.1		
#60	14.1		
#100	12.5		
#200	10.7		
0.0336 mm.	9.7		
0.0215 mm.	7.9		
0.0125 mm.	7.0		
0.0092 mm.	6.1		
0.0062 mm.	5.2		
0.0045 mm.	3.9		
0.0031 mm.	3.6		
0.0014 mm.	1.3		

Soil Description

Atterberg Limits
 LL= PI=

Coefficients
 D₉₀= 13.9594 D₈₅= 12.4975 D₆₀= 7.7153
 D₅₀= 5.7614 D₃₀= 2.3506 D₁₅= 0.3256
 D₁₀= 0.0379 C_u= 203.59 C_c= 18.90

Classification
 USCS= AASHTO=

Remarks
 Entire sample used for PSA and Hydrometer

* (no specification provided)

Sample No.: SPT 3 **Source of Sample:** TMF12-15 **Date:** 9-11-12
Location: **Elev./Depth:** 14.5'-16.5'

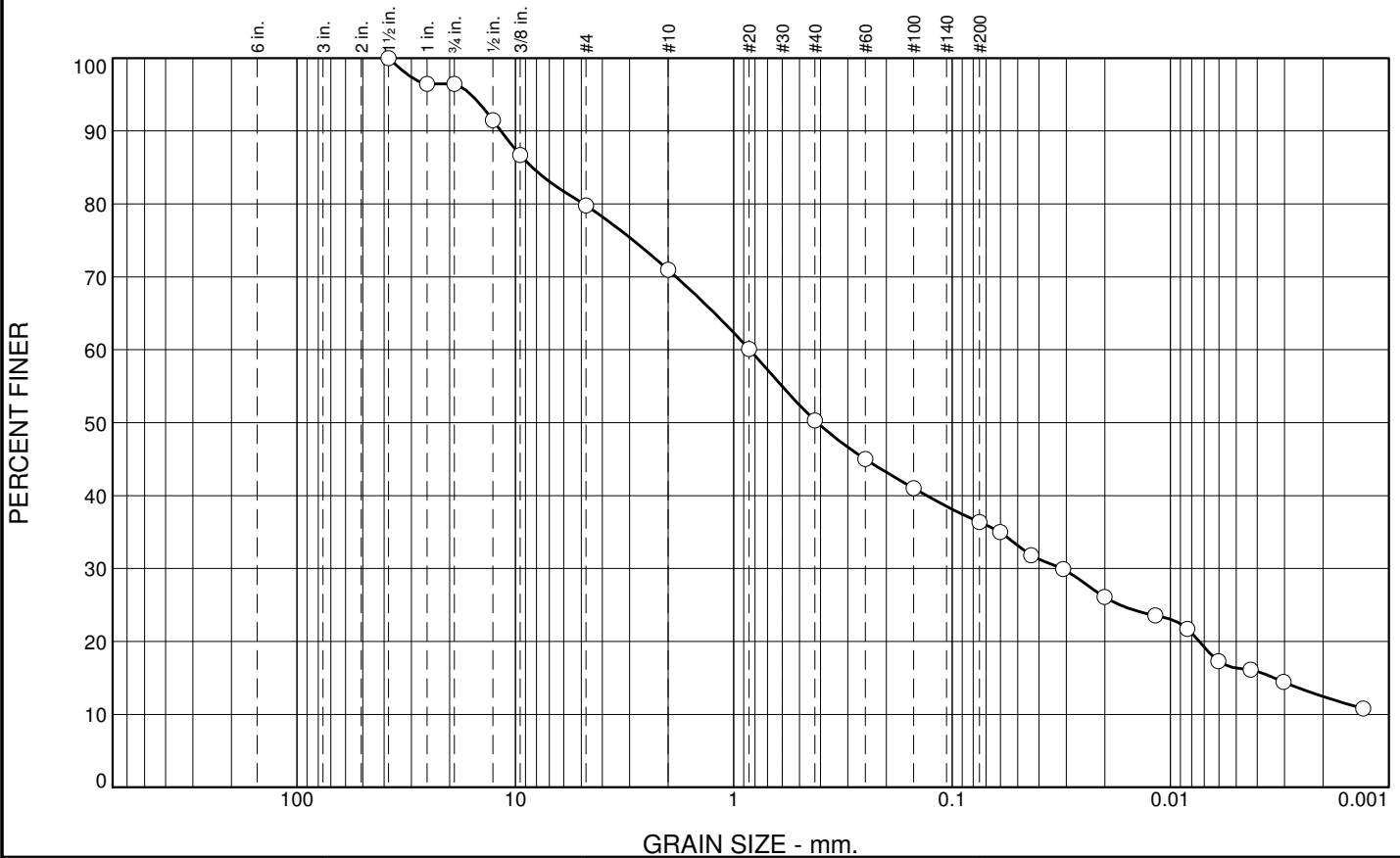


Client: Yellowhead Mining Inc.
Project: Harper Creek Project
Project No.: VA101-00458/07

Figure

Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.6	16.6	8.8	20.7	13.9	20.0	16.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	96.4		
.75	96.4		
.5	91.5		
.375	86.7		
#4	79.8		
#10	71.0		
#20	60.1		
#40	50.3		
#60	45.0		
#100	41.0		
#200	36.4		
0.0603 mm.	35.0		
0.0434 mm.	31.8		
0.0311 mm.	29.9		
0.0201 mm.	26.1		
0.0117 mm.	23.6		
0.0084 mm.	21.7		
0.0060 mm.	17.3		
0.0043 mm.	16.1		
0.0030 mm.	14.5		
0.0013 mm.	10.8		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 15 LL= 32 PI= 17

Coefficients

D₉₀= 11.6518 D₈₅= 8.3700 D₆₀= 0.8452
D₅₀= 0.4138 D₃₀= 0.0315 D₁₅= 0.0033
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 7.4%

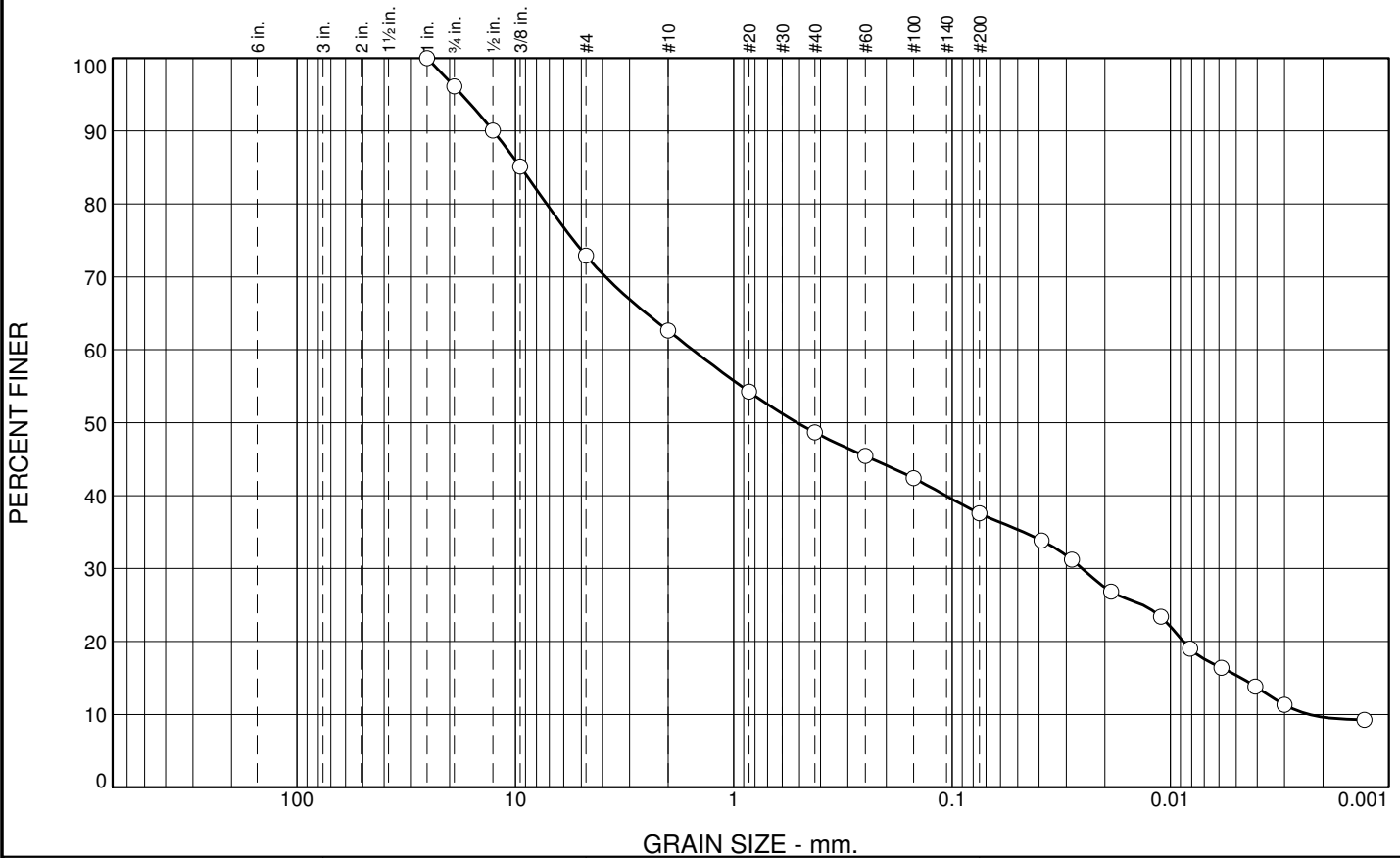
* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-16 Date: 9-18-12
Location: Elev./Depth: 9'-11'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p>	<p>Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.9	23.2	10.3	13.9	11.1	22.2	15.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.1		
.5	90.1		
.375	85.1		
#4	72.9		
#10	62.6		
#20	54.2		
#40	48.7		
#60	45.4		
#100	42.4		
#200	37.6		
0.0390 mm.	33.8		
0.0283 mm.	31.2		
0.0187 mm.	26.8		
0.0111 mm.	23.4		
0.0081 mm.	19.0		
0.0058 mm.	16.4		
0.0041 mm.	13.8		
0.0030 mm.	11.3		
0.0013 mm.	9.3		

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 12.6525 D₈₅= 9.4629 D₆₀= 1.5426
D₅₀= 0.5116 D₃₀= 0.0254 D₁₅= 0.0048
D₁₀= 0.0023 C_u= 671.14 C_c= 0.18

Classification

USCS= AASHTO=

Remarks

Natural moisture = 3.5%

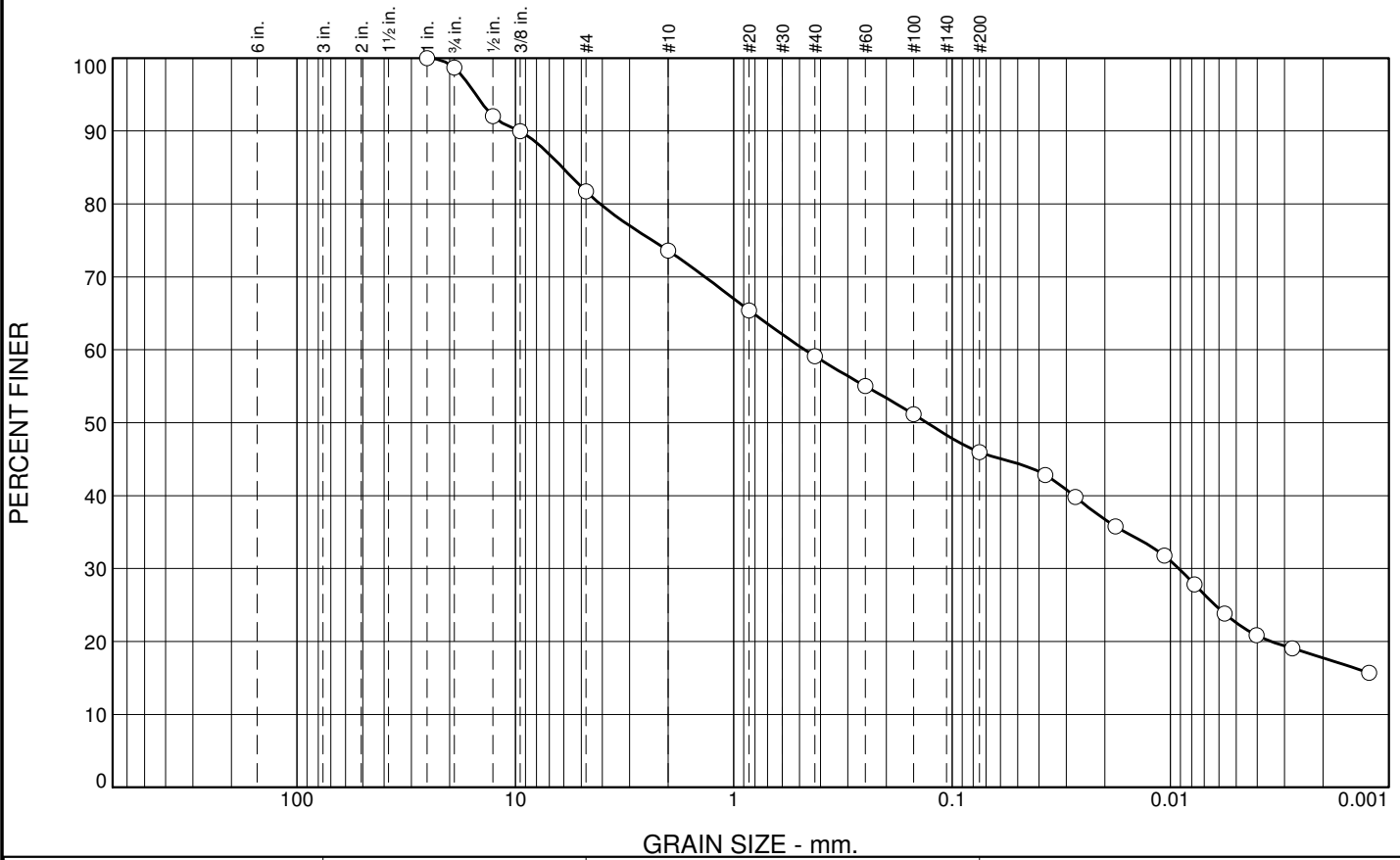
* (no specification provided)

Sample No.: SPT 1 **Source of Sample:** TMF12-17 **Date:** 9-18-12
Location: **Elev./Depth:** 4'-6'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV **Checked By:** RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	1.3	17.0	8.1	14.5	13.1	23.4	22.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	98.7		
.5	92.0		
.375	90.0		
#4	81.7		
#10	73.6		
#20	65.4		
#40	59.1		
#60	55.0		
#100	51.1		
#200	46.0		
0.0374 mm.	42.8		
0.0272 mm.	39.8		
0.0179 mm.	35.8		
0.0107 mm.	31.8		
0.0078 mm.	27.8		
0.0056 mm.	23.8		
0.0040 mm.	20.9		
0.0028 mm.	19.1		
0.0012 mm.	15.7		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 31 PI= 17

Coefficients

D₉₀= 9.5881 D₈₅= 6.0959 D₆₀= 0.4723
D₅₀= 0.1306 D₃₀= 0.0092 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(4)

Remarks

Natural moisture = 4.1%

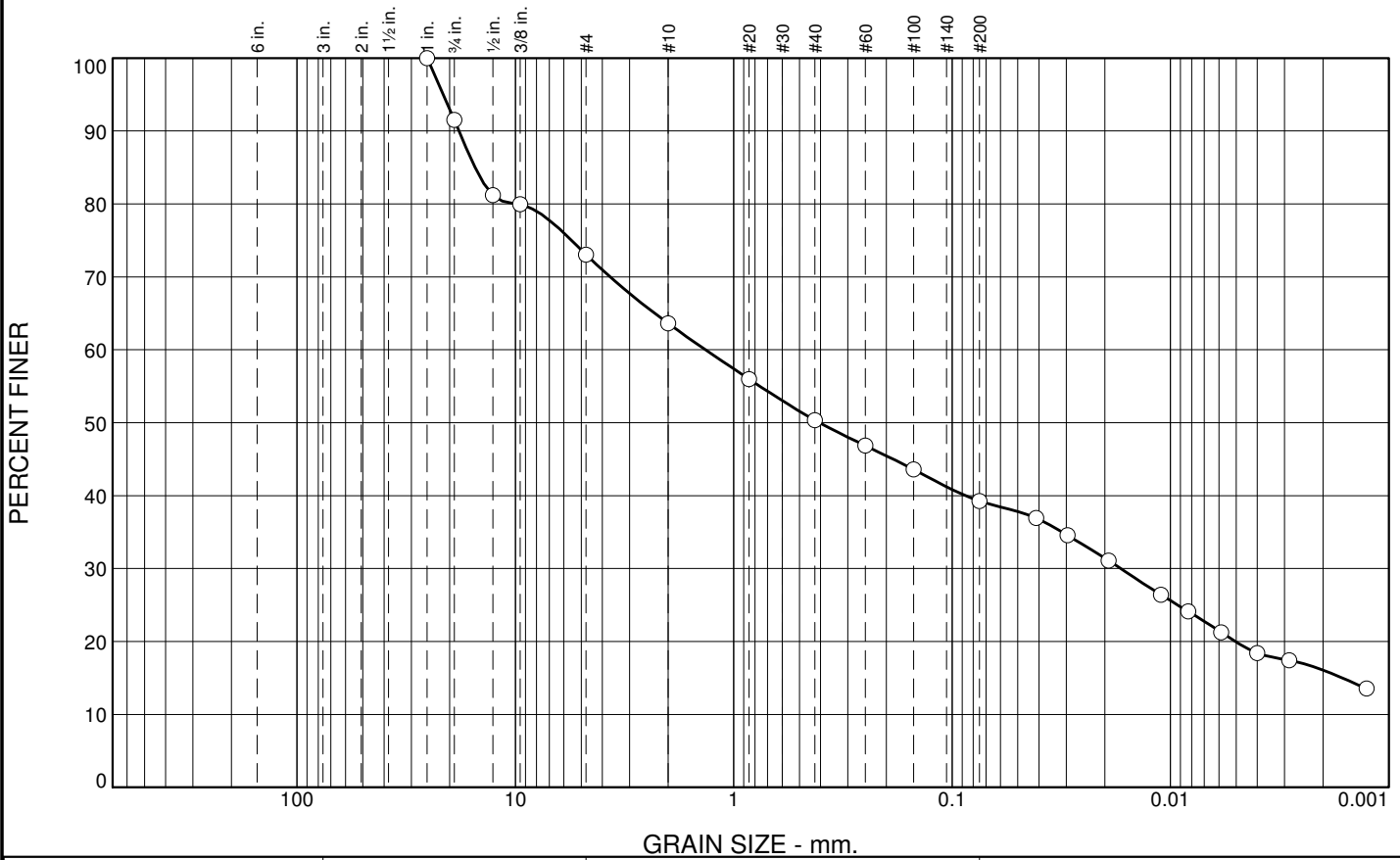
* (no specification provided)

Sample No.: SPT 2 Source of Sample: TMF12-17 Date: 9-18-12
Location: Elev./Depth: 9'-11'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	8.5	18.5	9.4	13.2	11.1	19.4	19.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	91.5		
.5	81.2		
.375	79.9		
#4	73.0		
#10	63.6		
#20	56.0		
#40	50.4		
#60	46.9		
#100	43.6		
#200	39.3		
0.0413 mm.	36.9		
0.0296 mm.	34.6		
0.0192 mm.	31.1		
0.0110 mm.	26.4		
0.0083 mm.	24.1		
0.0059 mm.	21.3		
0.0040 mm.	18.4		
0.0029 mm.	17.4		
0.0013 mm.	13.5		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 29 PI= 15

Coefficients

D₉₀= 18.1466 D₈₅= 15.3054 D₆₀= 1.3482
D₅₀= 0.4044 D₃₀= 0.0169 D₁₅= 0.0016
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(2)

Remarks

Natural moisture = 2.9%

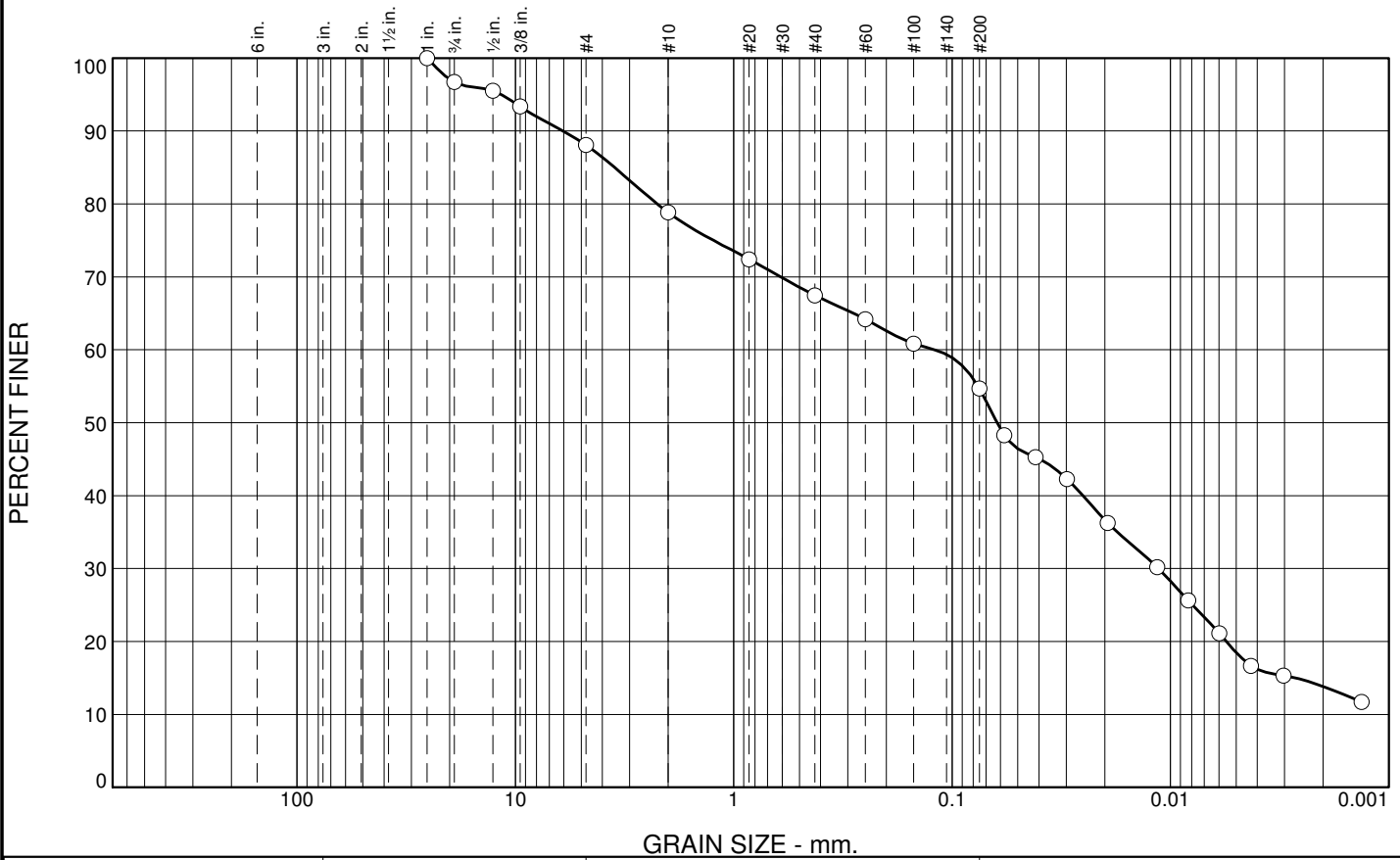
* (no specification provided)

Sample No.: SPT 3 Source of Sample: TMF12-17 Date: 9-18-12
Location: Elev./Depth: 14'-16'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No.: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.3	8.6	9.2	11.4	12.8	36.2	18.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
.75	96.7		
.5	95.5		
.375	93.3		
#4	88.1		
#10	78.9		
#20	72.4		
#40	67.5		
#60	64.2		
#100	60.8		
#200	54.7		
0.0577 mm.	48.3		
0.0415 mm.	45.3		
0.0298 mm.	42.3		
0.0194 mm.	36.3		
0.0115 mm.	30.2		
0.0083 mm.	25.6		
0.0060 mm.	21.1		
0.0043 mm.	16.7		
0.0030 mm.	15.3		
0.0013 mm.	11.7		

Soil Description

sandy lean clay

Atterberg Limits

PL= 16 LL= 25 PI= 9

Coefficients

D₉₀= 6.0585 D₈₅= 3.5138 D₆₀= 0.1204
D₅₀= 0.0623 D₃₀= 0.0113 D₁₅= 0.0027
D₁₀= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(2)

Remarks

Natural moisture = 8.3%

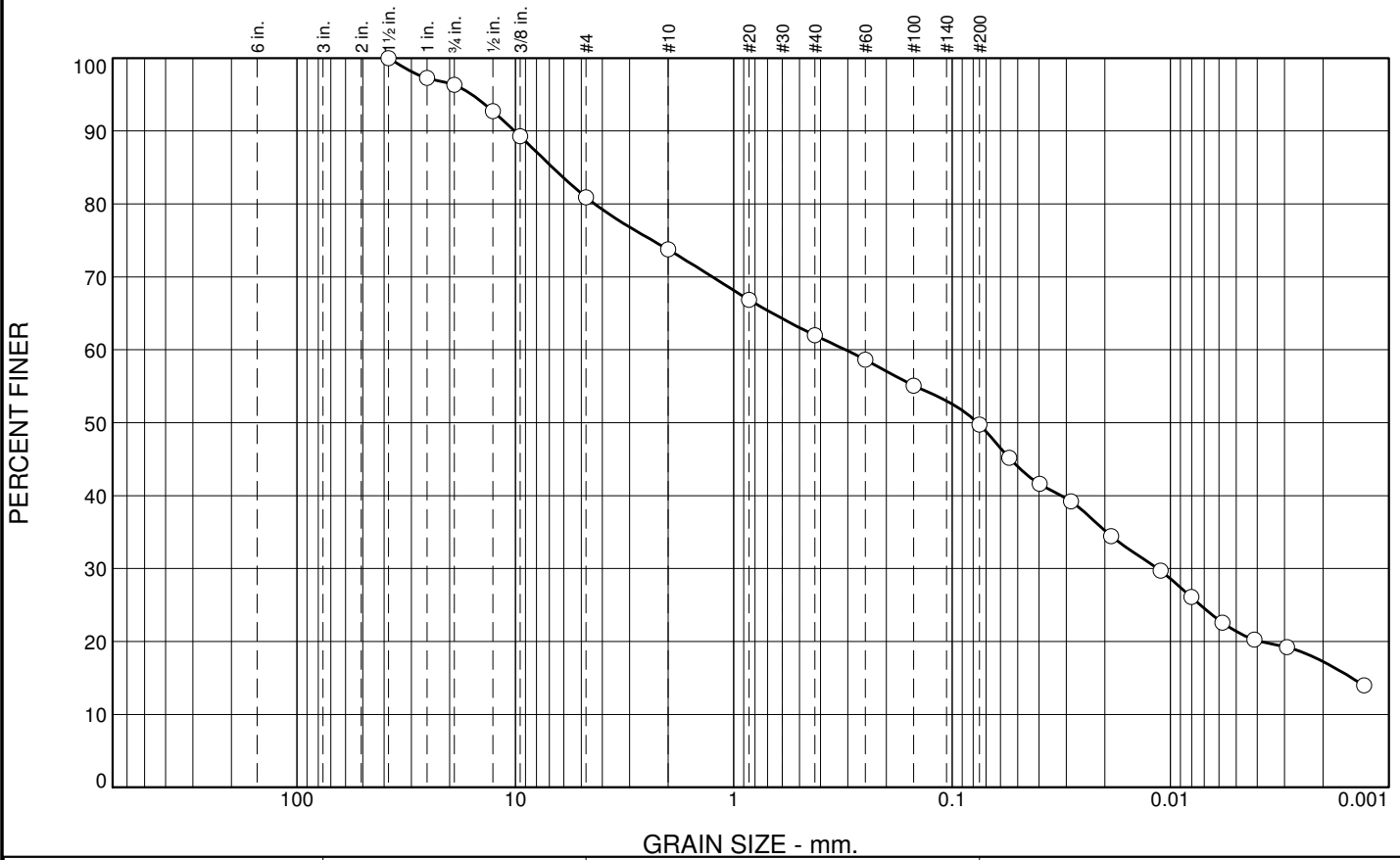
* (no specification provided)

Sample No.: SPT 1 Source of Sample: TMF12-18 Date: 9-18-12
Location: Elev./Depth: 4.5'-6.5'

	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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Tested By: RV Checked By: RSH

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	3.7	15.4	7.1	11.8	12.2	28.4	21.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1	97.3		
.75	96.3		
.5	92.7		
.375	89.3		
#4	80.9		
#10	73.8		
#20	66.9		
#40	62.0		
#60	58.6		
#100	55.1		
#200	49.8		
0.0548 mm.	45.2		
0.0398 mm.	41.6		
0.0286 mm.	39.2		
0.0187 mm.	34.4		
0.0111 mm.	29.7		
0.0080 mm.	26.1		
0.0058 mm.	22.6		
0.0041 mm.	20.3		
0.0029 mm.	19.2		
0.0013 mm.	14.0		

Soil Description

clayey sand with gravel

Atterberg Limits

PL= 14 LL= 29 PI= 15

Coefficients

D₉₀= 10.0897 D₈₅= 6.7590 D₆₀= 0.3083
D₅₀= 0.0765 D₃₀= 0.0114 D₁₅= 0.0015
D₁₀= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(4)

Remarks

Natural moisture = 3.7%

* (no specification provided)

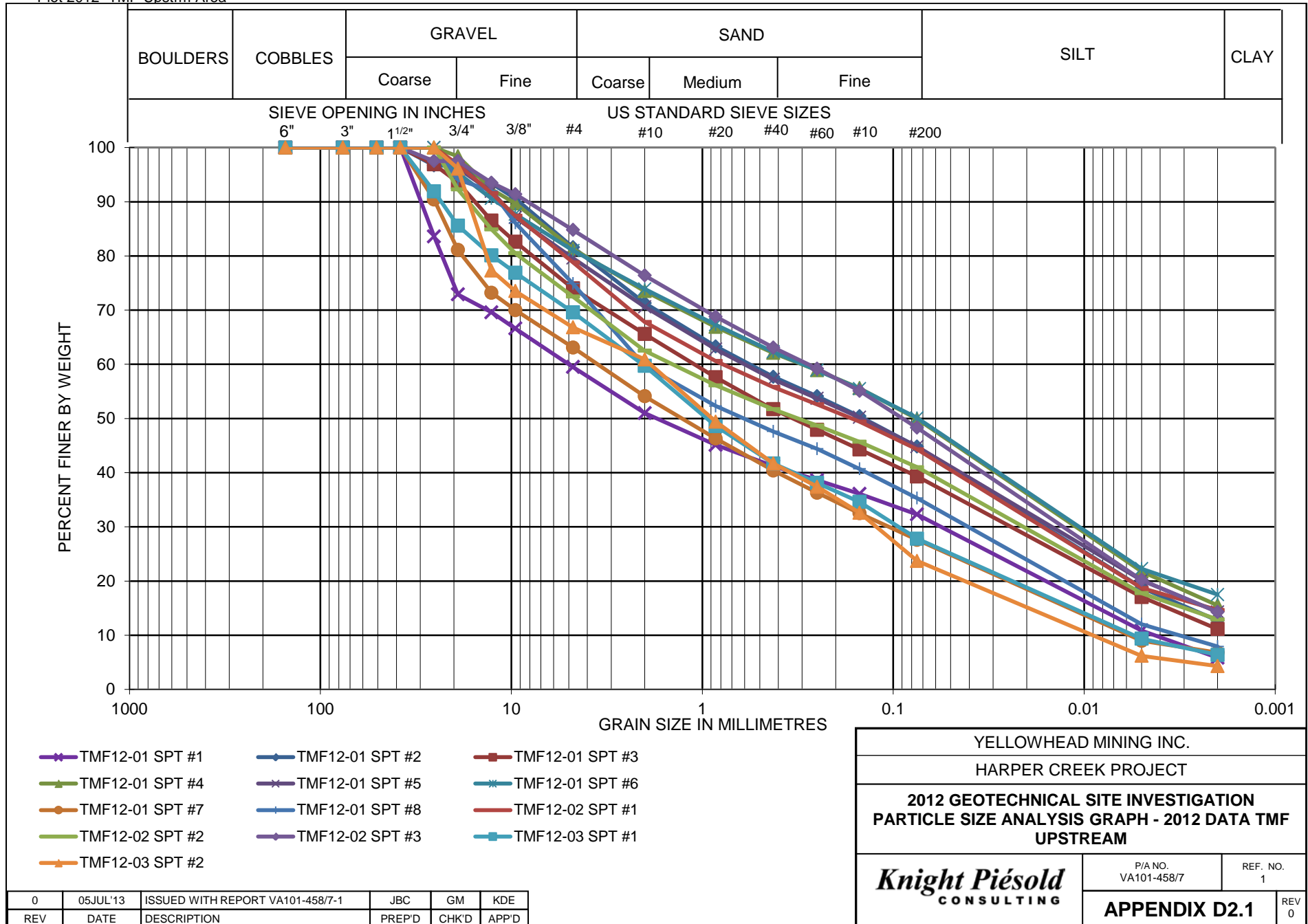
Sample No.: SPT 2 Source of Sample: TMF12-18 Date: 9-18-12
Location: Elev./Depth: 9.5'-11.5'

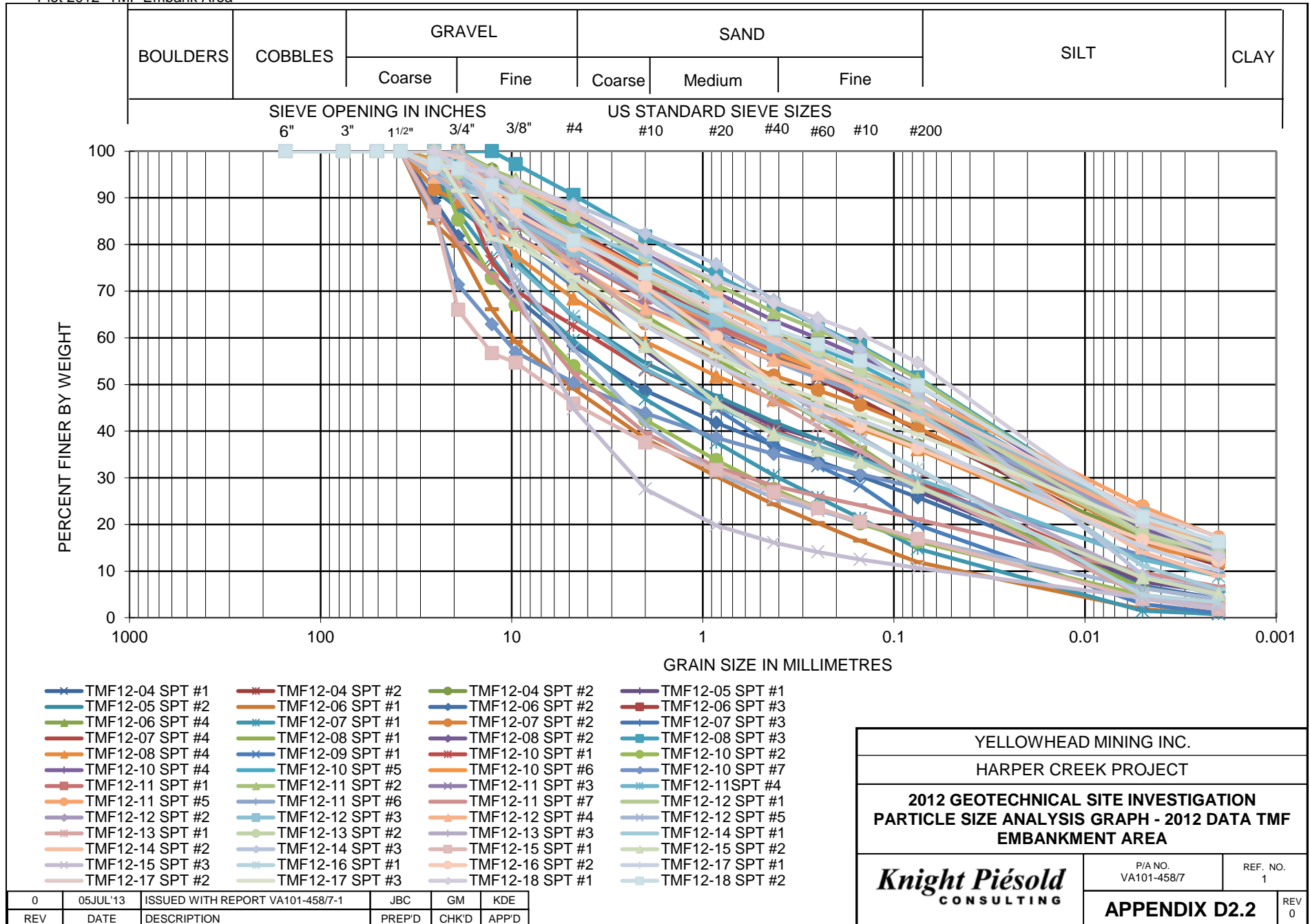
	<p>Client: Yellowhead Mining Inc. Project: Harper Creek Project Project No: VA101-00458/07</p> <p style="text-align: right;">Figure</p>
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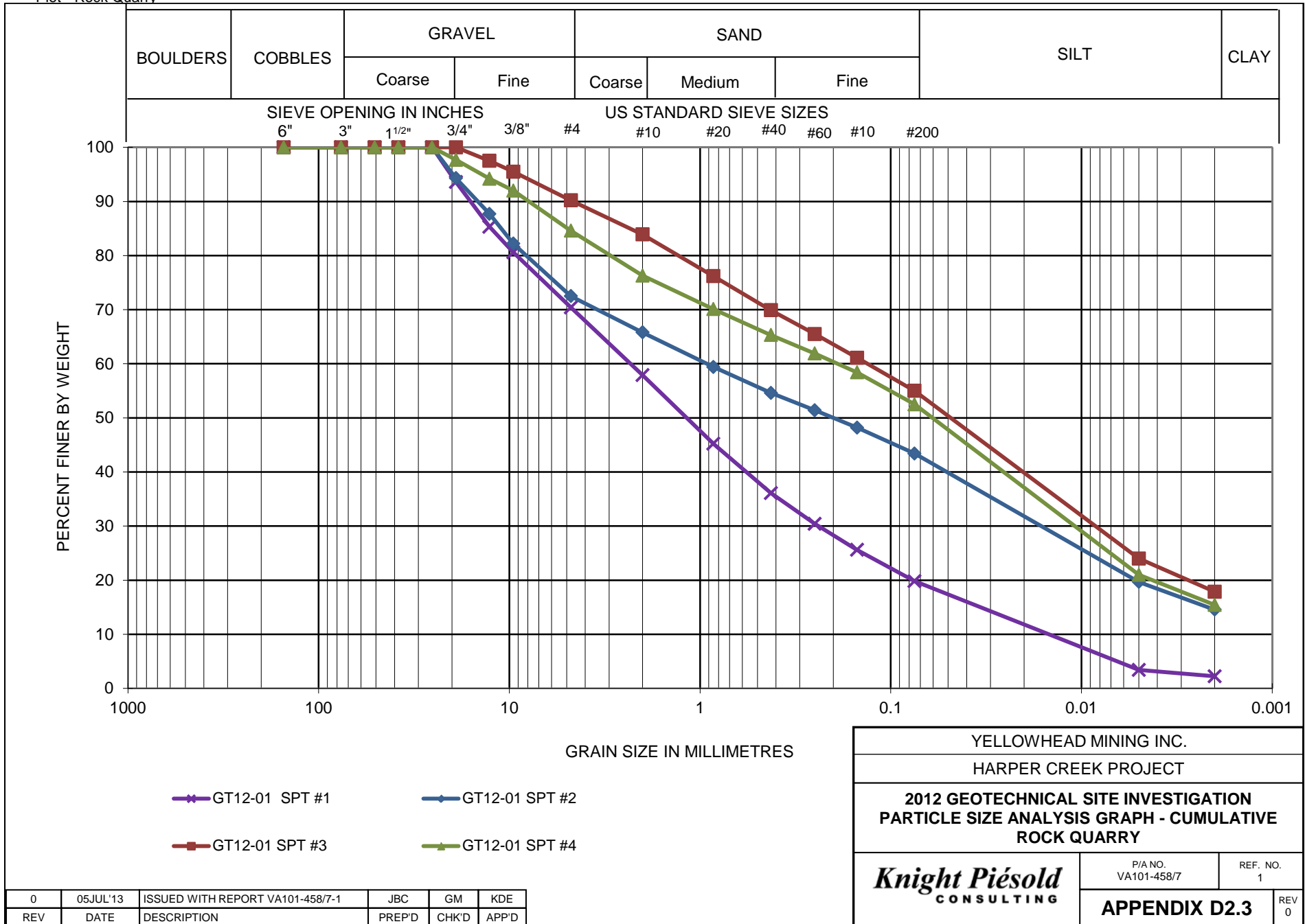
Tested By: RV Checked By: RSH

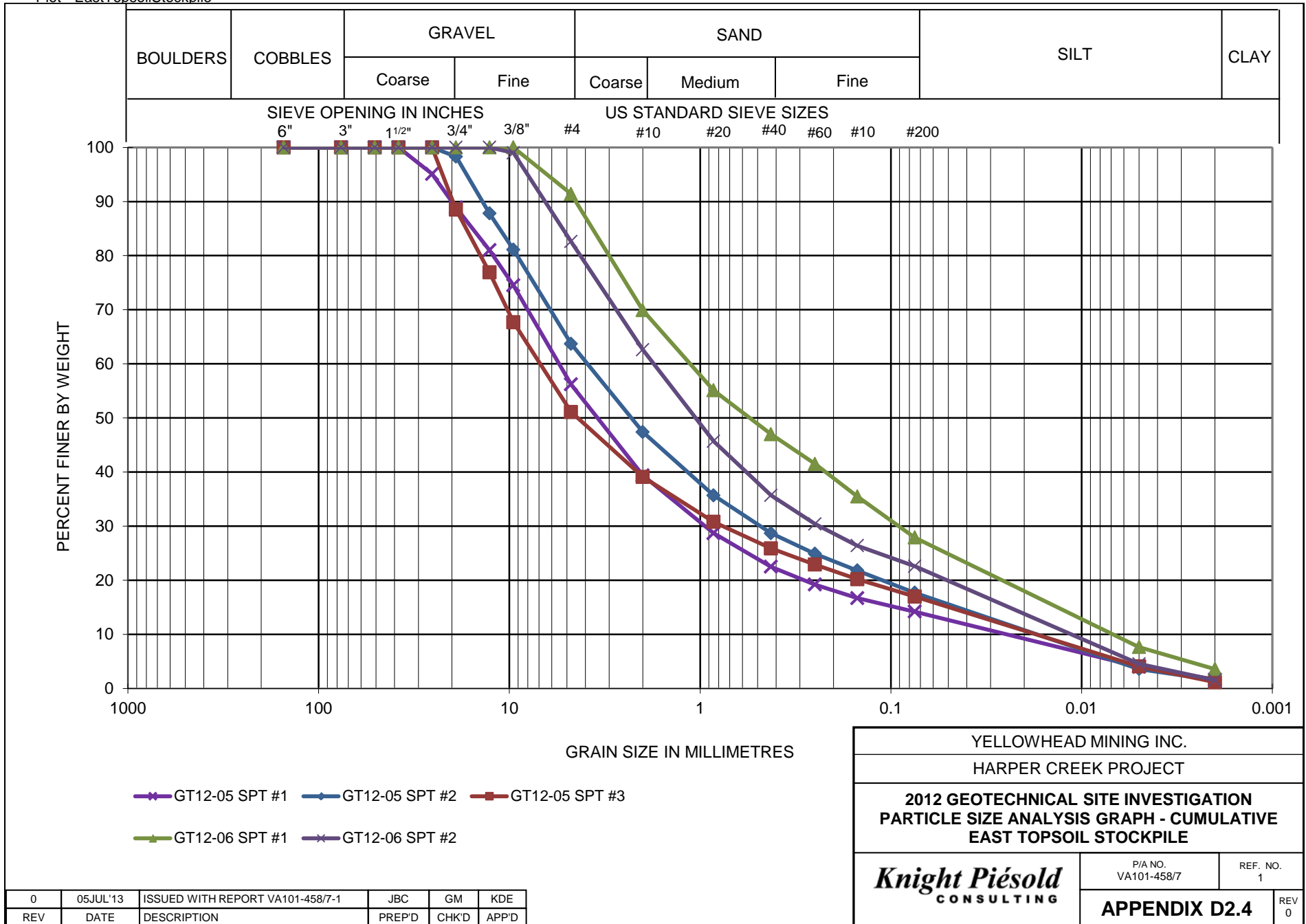
APPENDIX D2
SOIL PARTICLE ANALYSES CHARTS
(Pages D2-1 to D2-15)

M:\101\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix D - Laboratory Test Results\D2 - Soil Particle Size Analyses Charts\PSA graphs by area (2012)\PSA Plot 2012- TMF-Upstrm Area

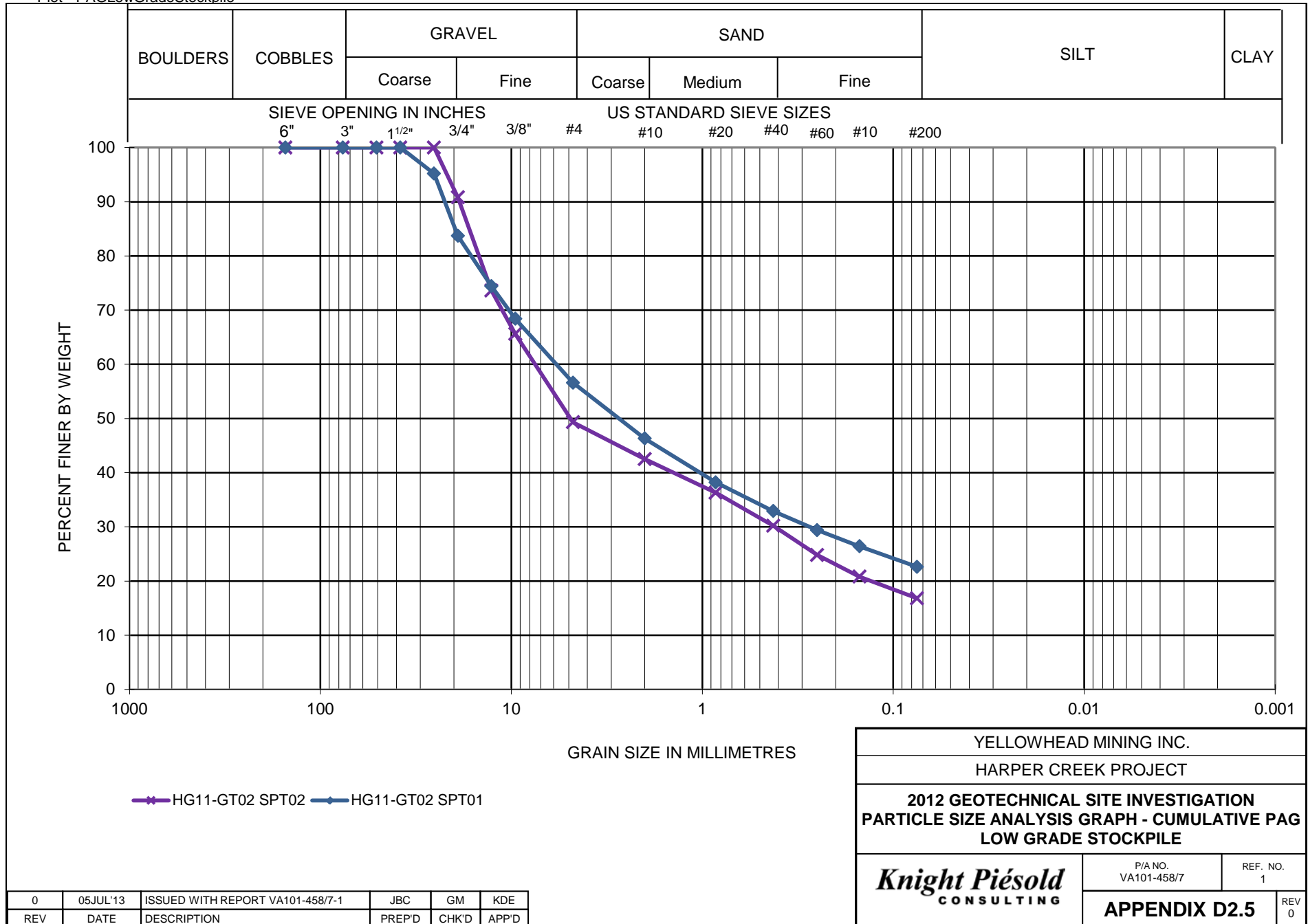






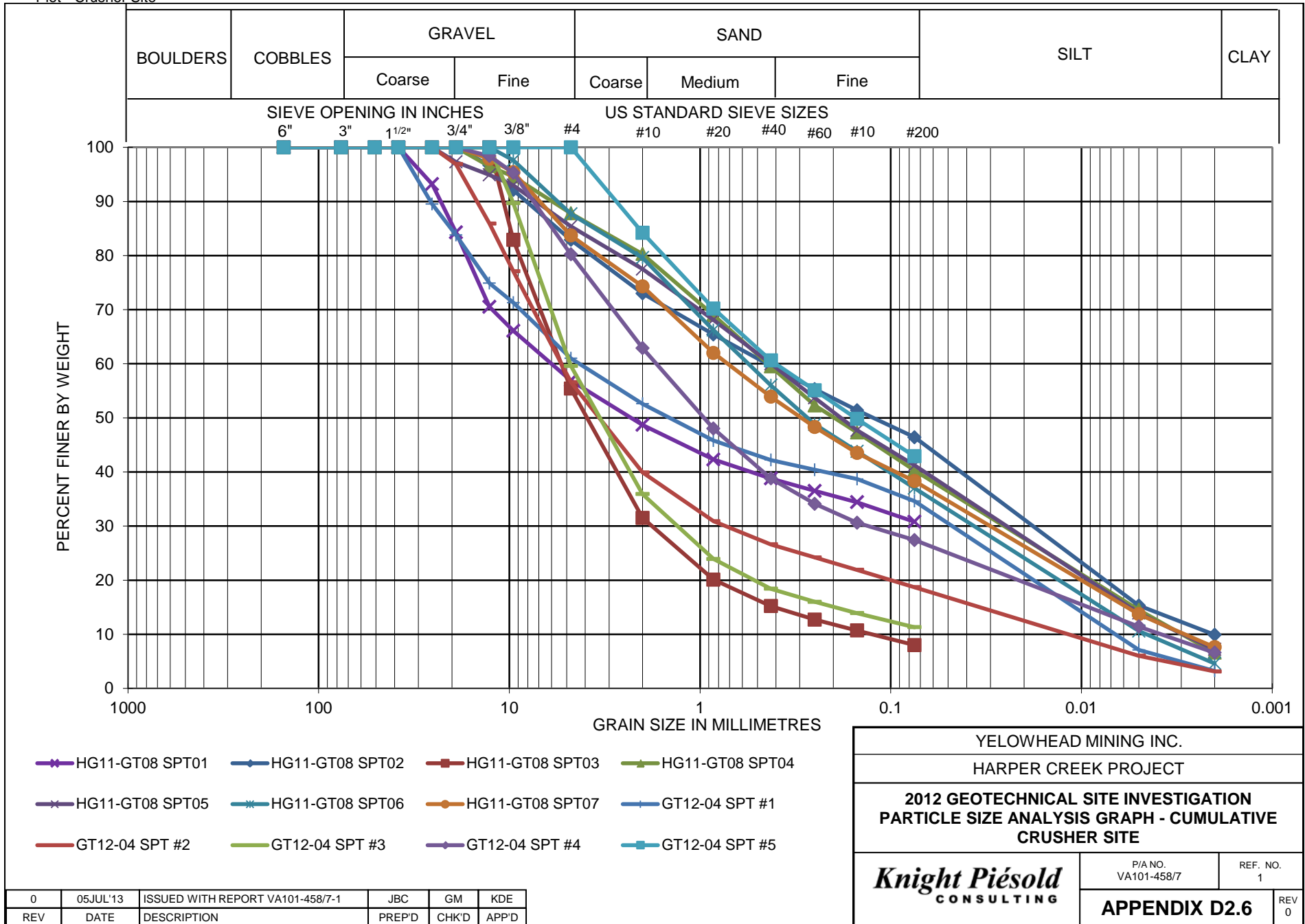


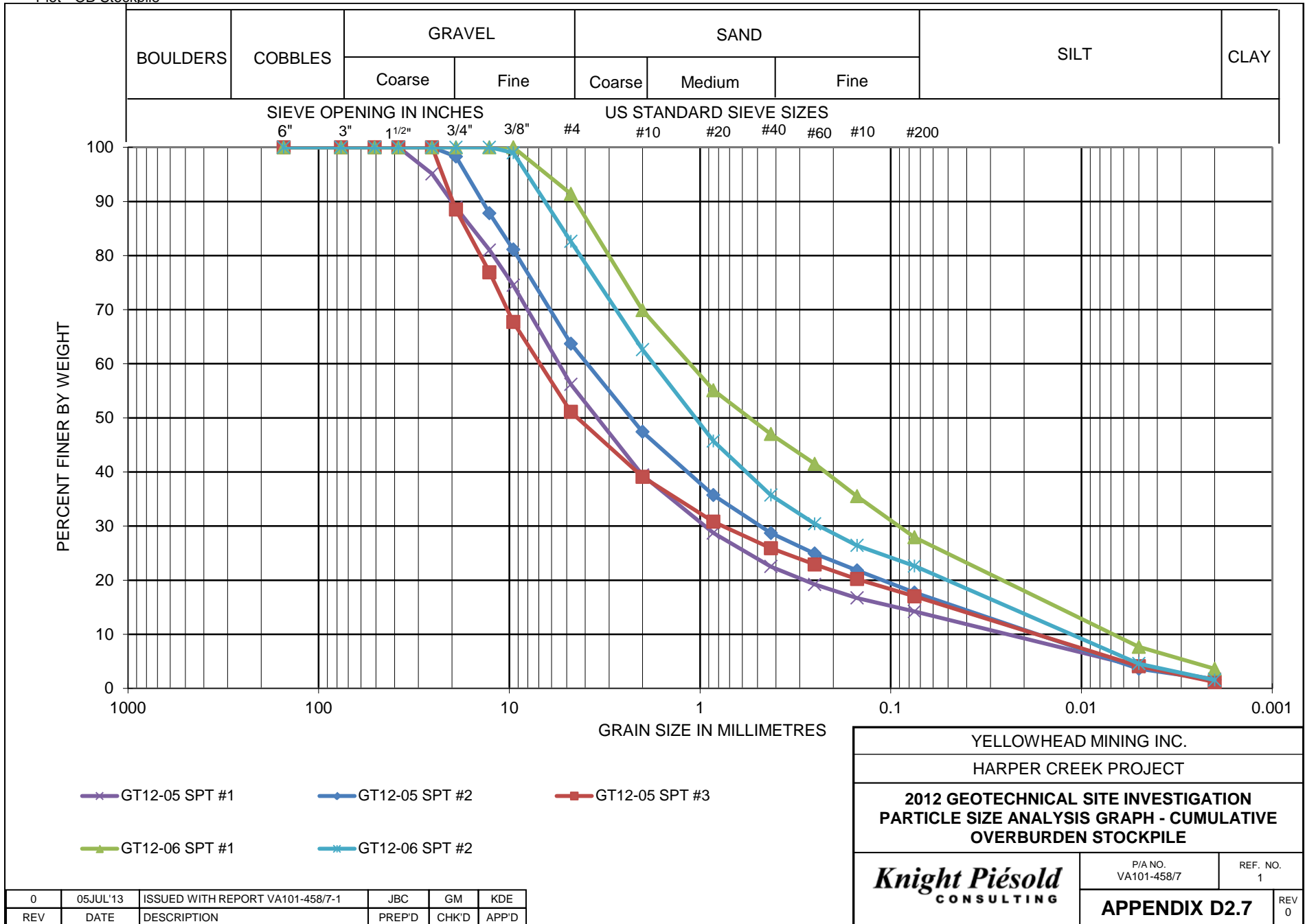
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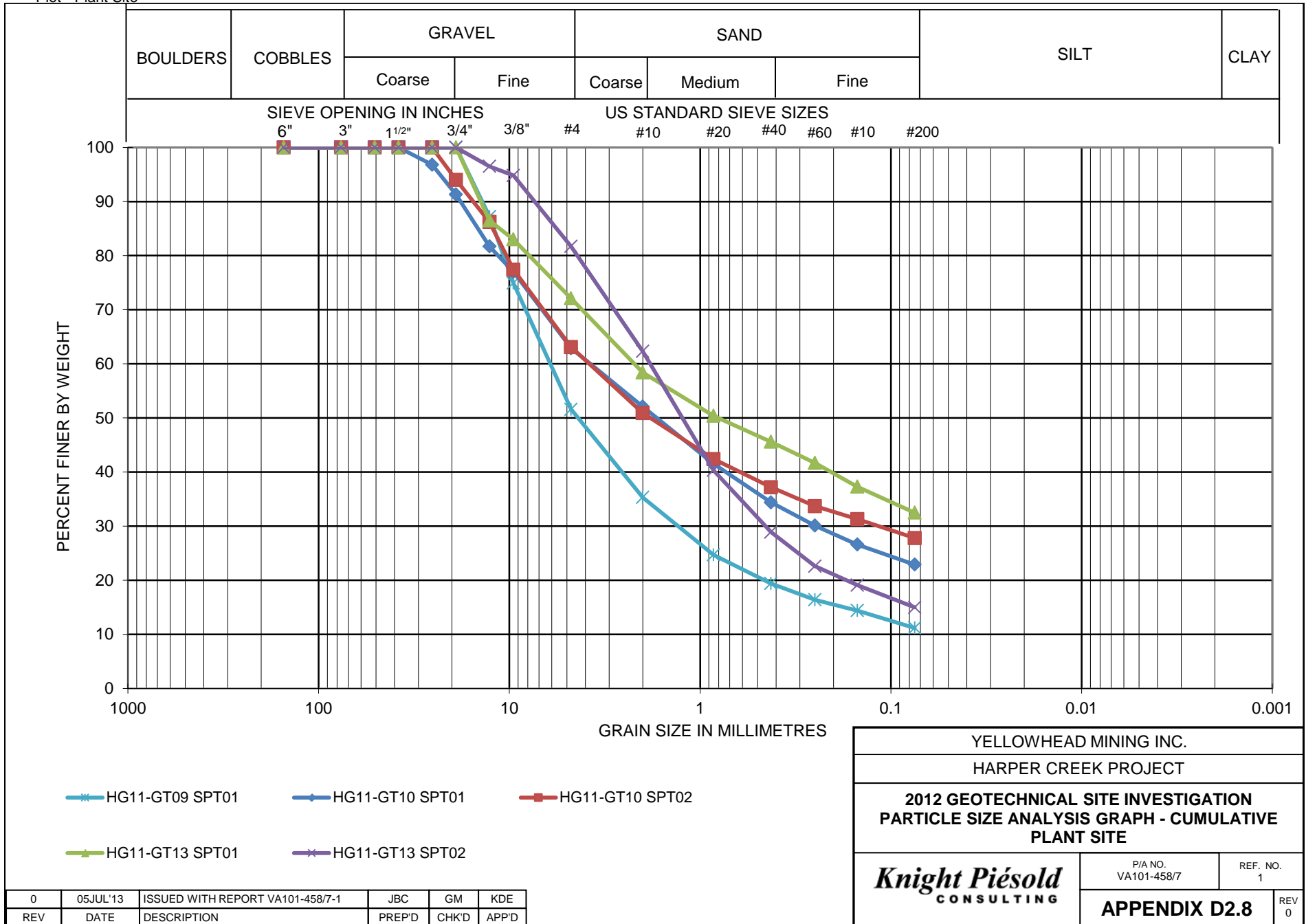


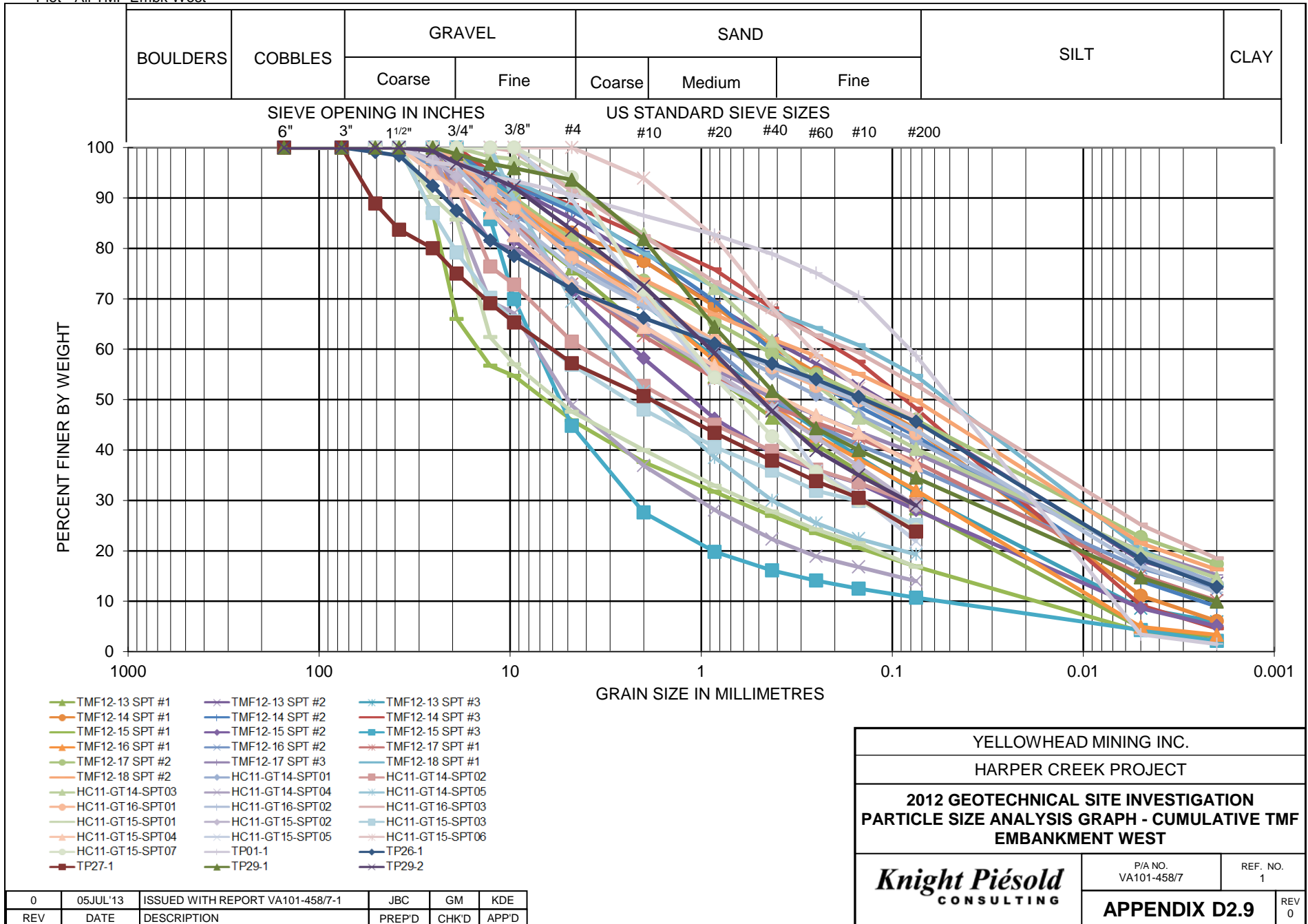
YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL SITE INVESTIGATION PARTICLE SIZE ANALYSIS GRAPH - CUMULATIVE PAG LOW GRADE STOCKPILE	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
	REF. NO. 1
APPENDIX D2.5	
	REV 0

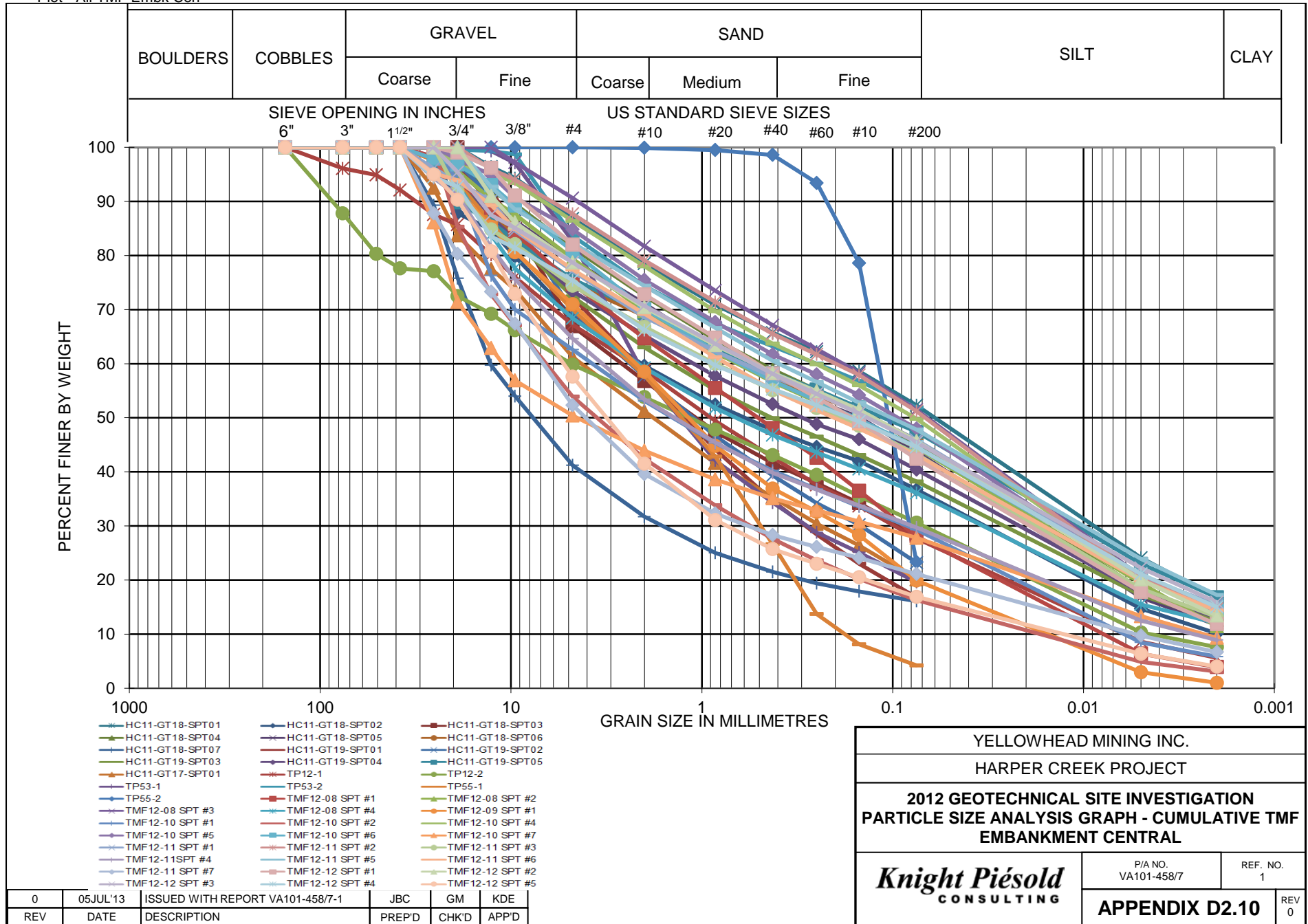
0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

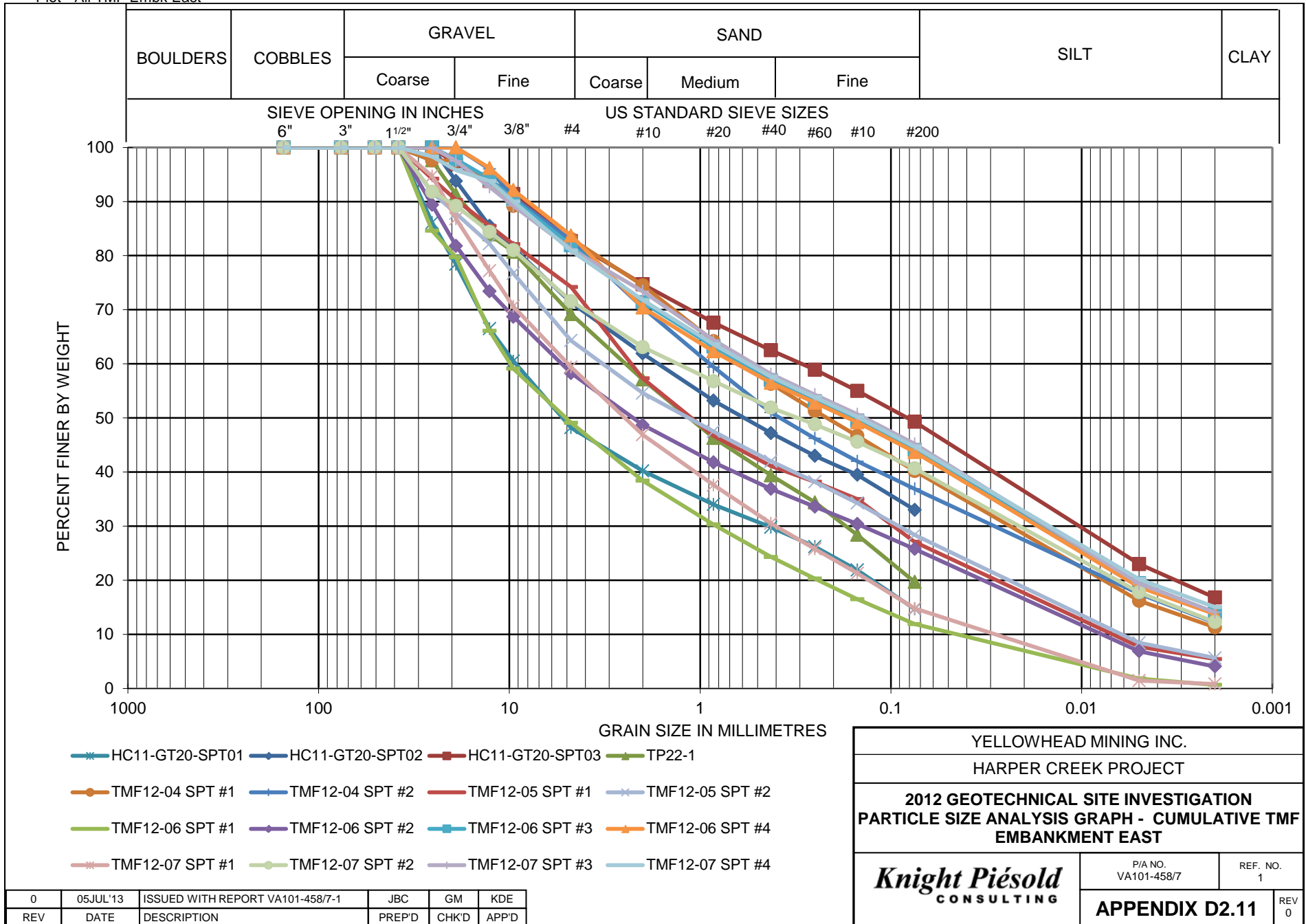




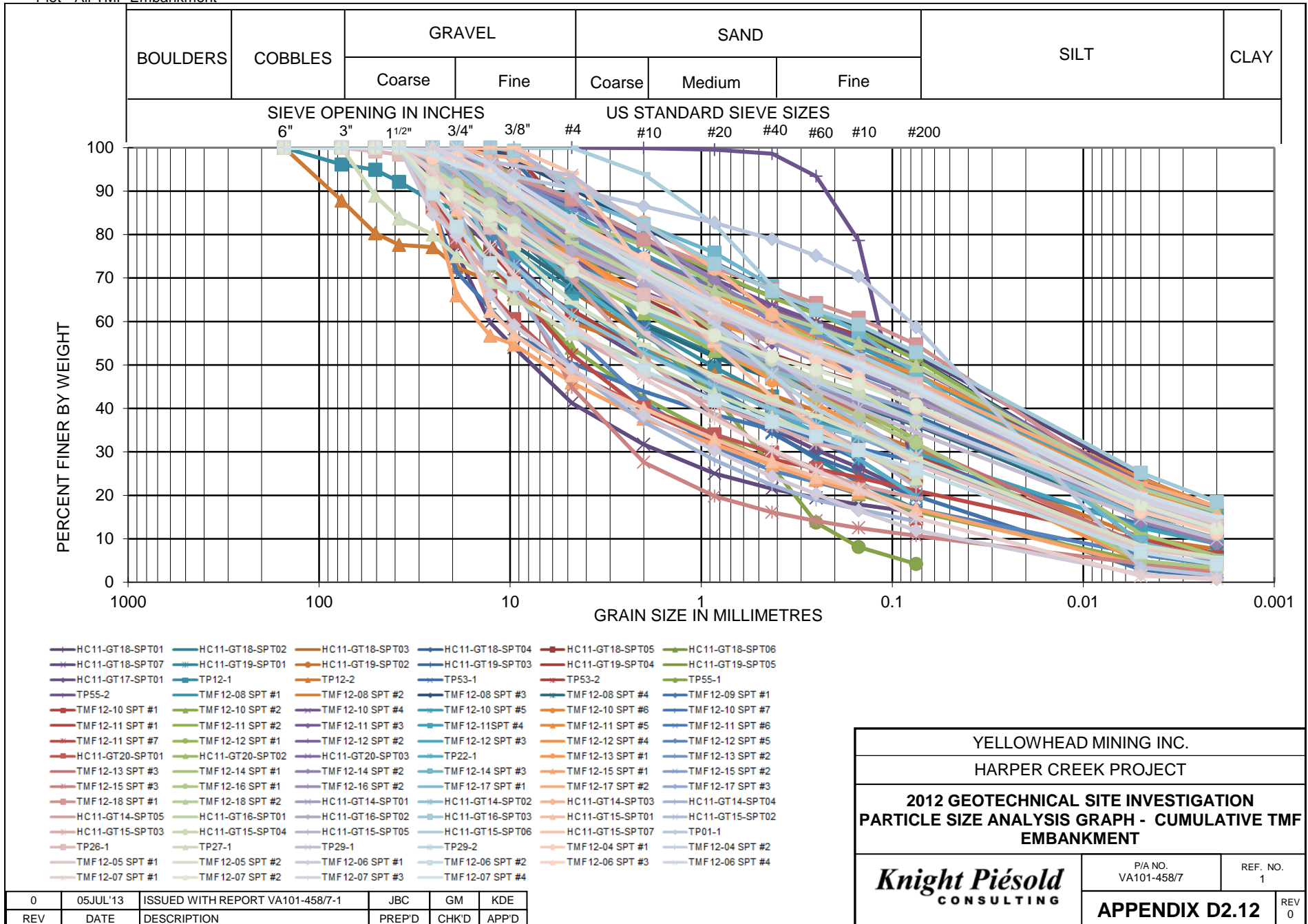


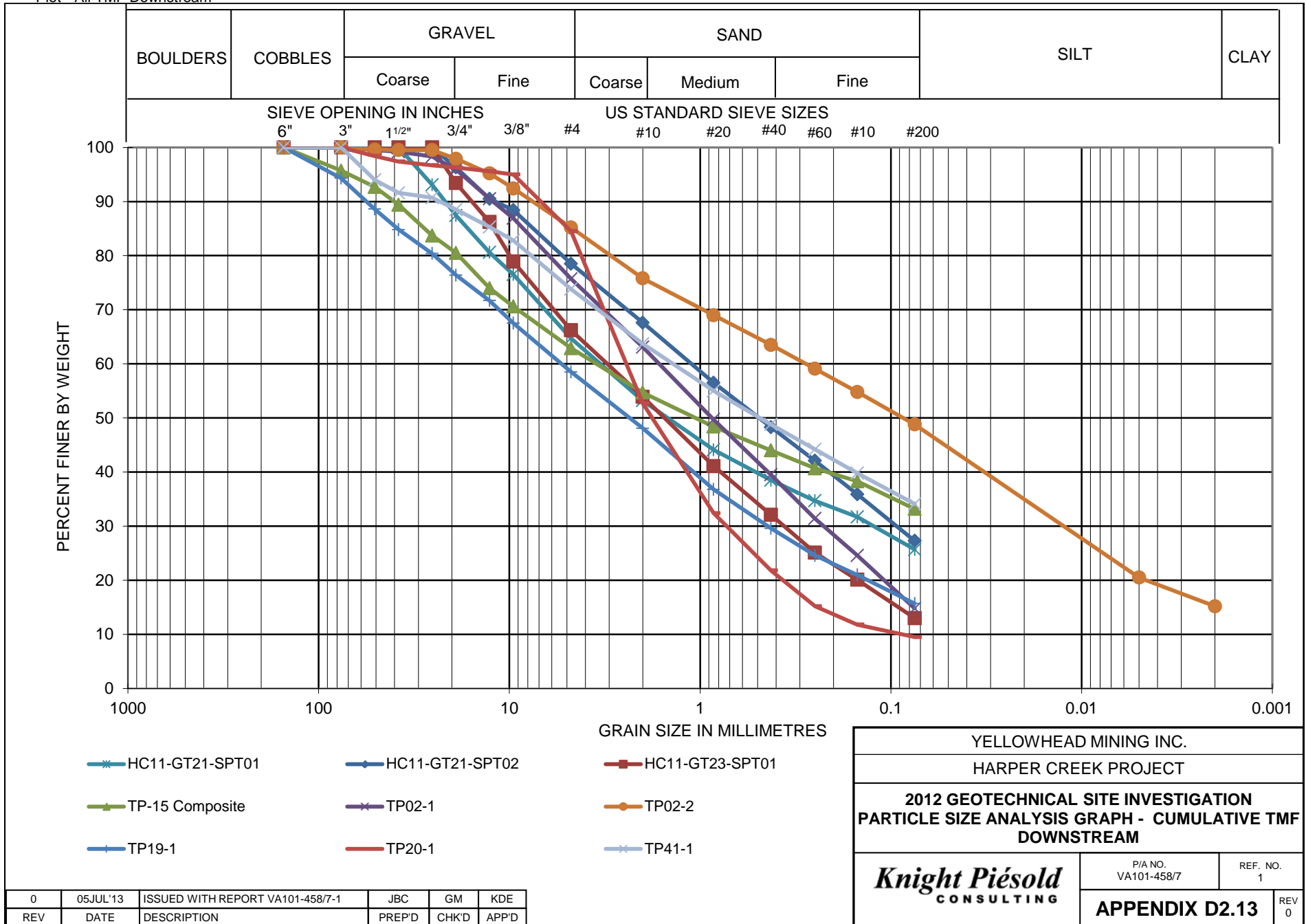


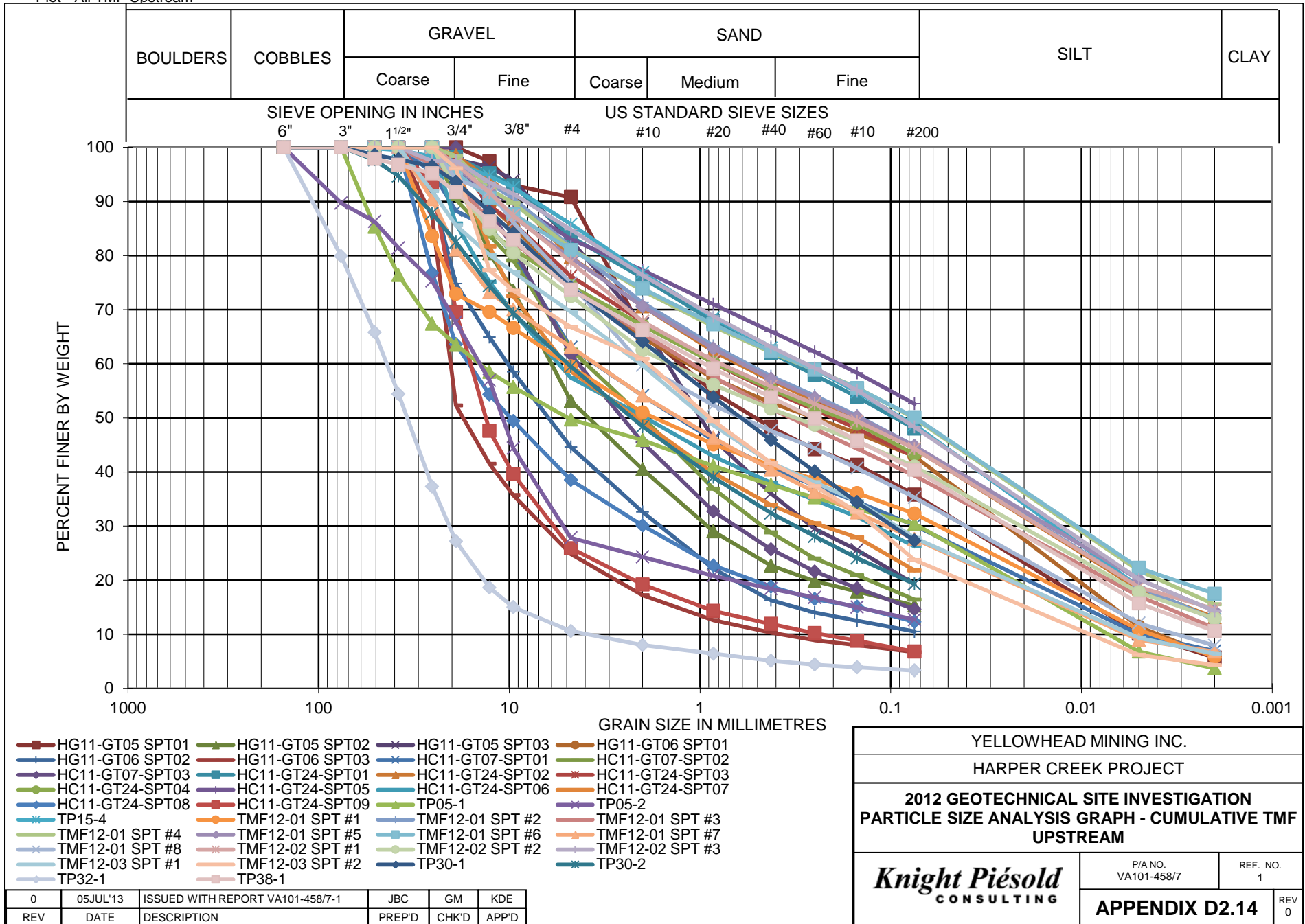


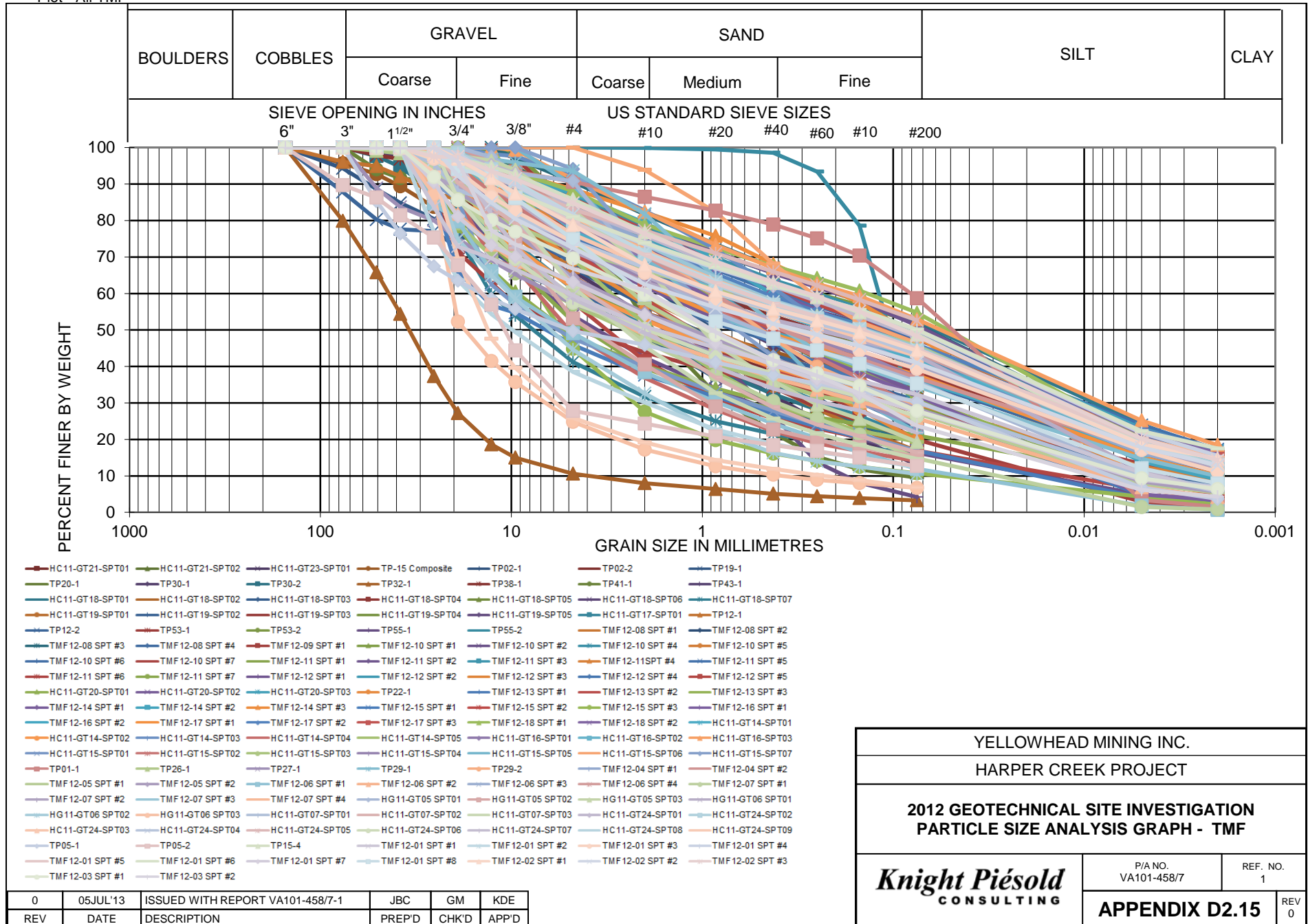


M:\1\01\00458\07\A\Report\1 - 2012 Geotechnical SI Factual Report\Appendices\Appendix D - Laboratory Test Results\D2 - Soil Particle Size Analyses Charts\PSA graphs by area (2012)PSA Plot - All TMF Embankment







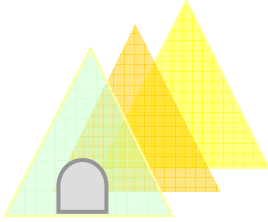


YELLOWHEAD MINING INC.	
HARPER CREEK PROJECT	
2012 GEOTECHNICAL SITE INVESTIGATION PARTICLE SIZE ANALYSIS GRAPH - TMF	
<i>Knight Piésold</i> CONSULTING	P/A NO. VA101-458/7
	REF. NO. 1
APPENDIX D2.15	
	REV 0

0	05JUL'13	ISSUED WITH REPORT VA101-458/7-1	JBC	GM	KDE
REV	DATE	DESCRIPTION	PREP'D	CHK'D	APP'D

APPENDIX D3
ROCK LAB TESTING RESULTS

(Pages D3-1 to D3-11)



P.B. Hughes & Associates

Rock Mechanics Consultants

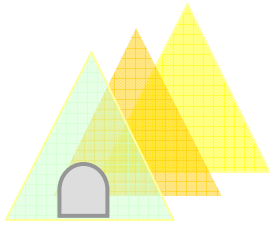
ROCK STRENGTH LABORATORY REPORT

**PREPARED FOR:
KNIGHT PIESOLD LTD.**

**PROJECT:
HARPER CREEK PROJECT
2012 GEOTECHNICAL SITE INVESTIGATIONS**

**CLIENT'S FILE REFERENCE:
VA101-458/07**

October 9, 2012



P.B. Hughes & Associates

Rock Mechanics Consultants

October 9, 2012

12-KPI-01

Knight Piesold Ltd.
750 West Pender Street
Vancouver, BC V6C 2T8

Attention: Mr. Greg Magoon

RE: Rock Strength Laboratory Report for Harper Creek Project

Testing Date: September, 2012

Tested by: Paul Hughes, P.Eng

Tested at: Norman B Keevil Institute of Mining Engineering,
University of British Columbia

Testing Program: Report contains results of six (6) UCS tests with elastic modulus readings.

Equipment: MTS Electro-Hydraulic Testing Machine

Method: ISRM-1979 (UCS & Modulus)

Procedure: UCS samples identified as competent were wet cut and tested per ISRM specifications. Samples were loaded with strain readings up to 420 kN. If sample strength exceeded 420 kN, strain gauges were removed and sample was loaded to failure.

PB Hughes and Associates
1B-2775 Fir Street, Vancouver, British Columbia V6J 3C2
email phughes@mining.ubc.ca Phone: 604-626-9649

Comments:

The testing of the six rock core samples for Unconfined Compressive Strength with elastic modulus are presented within. The tests are performed per ISRM standard; deviation from standards are noted below.

Samples were shipped to the laboratory and tested `as-is`; moisture content and sample weight were not recorded. Rock descriptions were provided by Knight Piesold Ltd.

Samples were left exposed at the laboratory; no effort was made to maintain the samples at their shipped moisture content.

Due to the siliceous nature of G-1, G-4, and G-6, the strain gauges had poor purchase on the samples. Investigation of the stress-strain curve for these samples shows noticeable instantaneous deviations from the near-linear trend. This is likely due to micro-cracking within the rock core causing slippage at the interface of the strain gauges and sample.

Results presented were prepared using data recorded by automated testing software. Calculations of strength and strains were performed in a spreadsheet. Reported modulus and Poisson`s ratio values were interpreted by calculating the slopes of the applied stress vs. axial and circumferential data respectively using a 100 point moving average around the 50% of the UCS load.

In cases where sample strength exceeded the 420 kN limit of the strain gauges, the gauges were removed and the sample was loaded

Comments (continued):

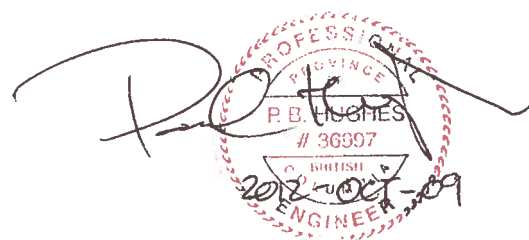
until failure. Sample G-2 exceeded the 420 kN limit; the sample failed at a load of 587 kN. As such, Elastic Modulus and Poisson's ratio values reported are valid as 50% (or greater) of failure load was within the strain gauge measurement range.

Samples were disposed of at the University of British Columbia laboratory after testing.

It should be noted that the values reported are of an experimental and exploratory nature. No particular results can be guaranteed. Worksheets and data files are available upon request.

In closing, if there are any questions or comments with regards to this project, please do not hesitate to contact the undersigned.

PB Hughes & Associates

A handwritten signature in black ink is written over a red circular stamp. The stamp contains the text: "PROFESSIONAL ENGINEER", "BRITISH COLUMBIA", "P. B. HUGHES", "# 36397", and "2012 OCT 09".

Paul Hughes, P.Eng, M.A.Sc



"This document represents an electronic version of the original hard copy document, sealed, signed and dated by Paul Hughes, P.Eng and retained on file. The content of the electronically transmitted document can be confirmed by referring to the original hard copy and filed."

Summary

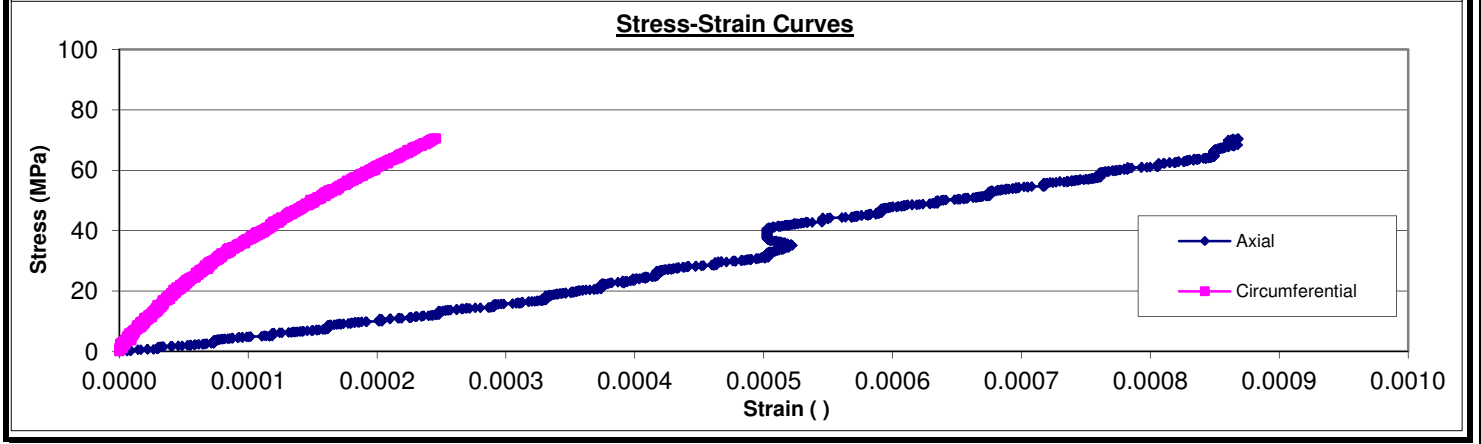
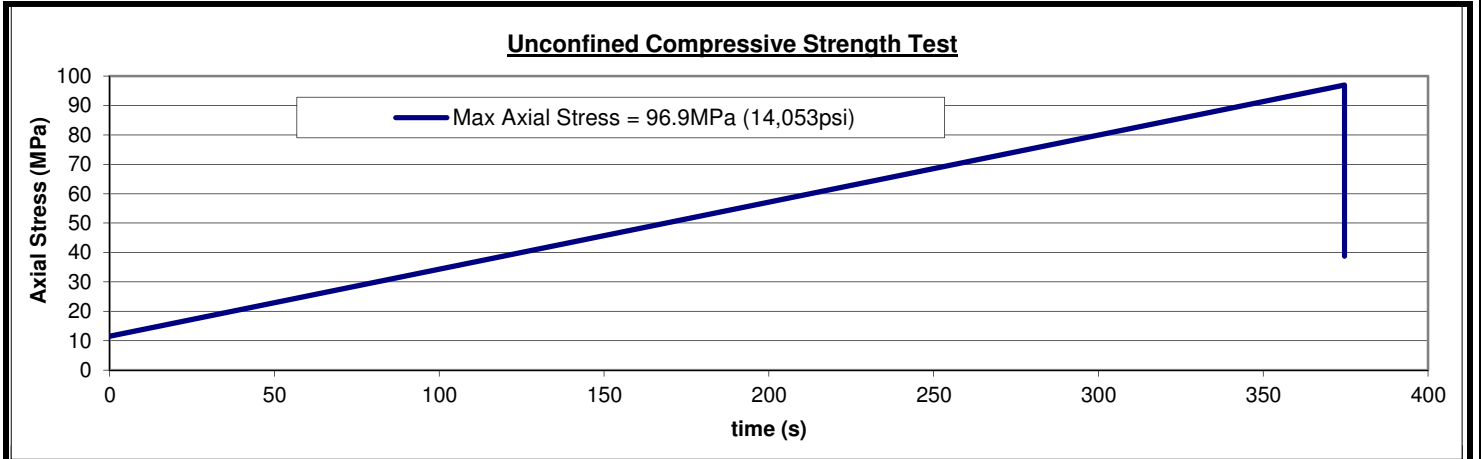
Unconfined Compressive Strength with Elastic Modulus Test Results

Hole ID	Sample ID	Depth From (m)	Depth To (m)	Description	Height H (mm)	Diameter d (mm)	Ratio H/d	UCS		Young Modulus E (GPa)	Poisson Ratio ν ()
								(MPa)	(psi)		
GM12-01	G1	12.00	12.65	Quartz Monzonite	170.62	60.76	2.81	96.9	14053	78.18	0.234
GM12-02	G2	13.91	14.13	Orthogneiss	168.48	60.27	2.80	206.0	29867	72.51	0.242
GM12-03	G3	38.71	39.07	Orthogneiss	169.92	60.20	2.82	136.2	19746	62.16	0.155
GM12-04	G4	19.33	19.58	Schist	167.11	60.63	2.76	51.9	7525	40.82	0.137
GM12-05	G5	19.28	19.53	Shist (quartz-eye)	159.93	60.48	2.64	63.0	9134	15.11	0.124
GM12-06	G6	16.28	16.51	Phyllite	160.79	60.37	2.66	48.9	7094	44.09	0.066

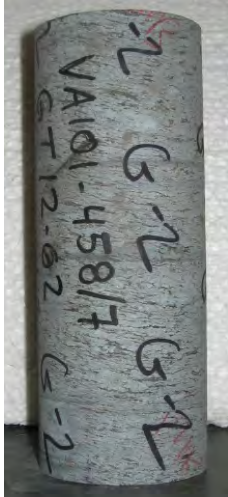

**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-01	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Before Test</p>  </div> <div style="text-align: center;"> <p>After Test</p>  </div> </div>
Sample ID:	G1	
Depth From (m):	12.00	
Depth To (m):	12.65	
Description:	Quartz Monzonite	
Tested By:	P.Hughes	
Young Modulus, E (GPa):	78.18	
Poisson Ratio, ν :	0.23	
Failure Mode:	Shear	

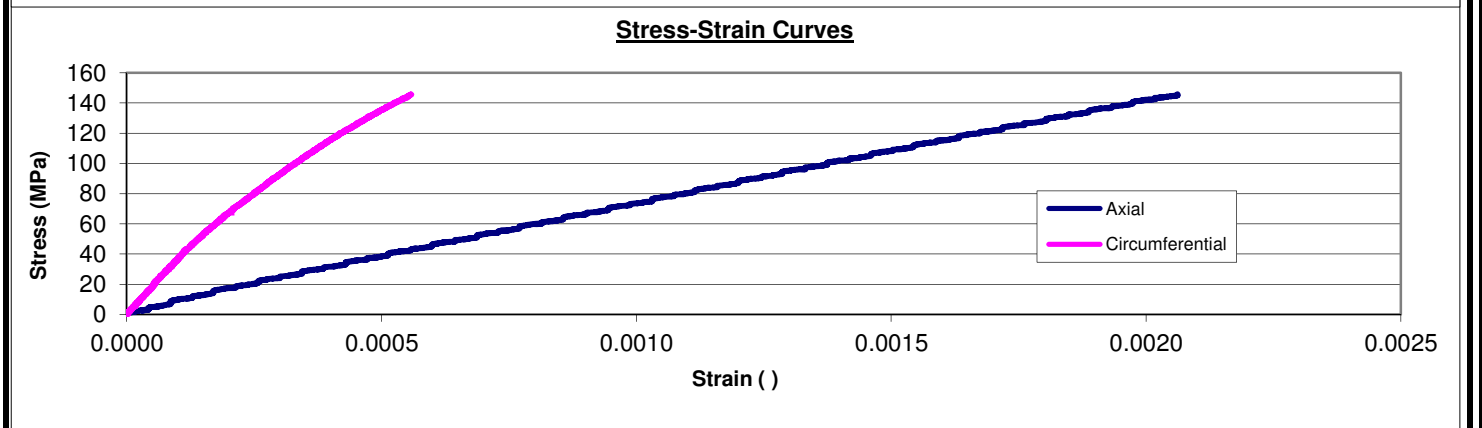
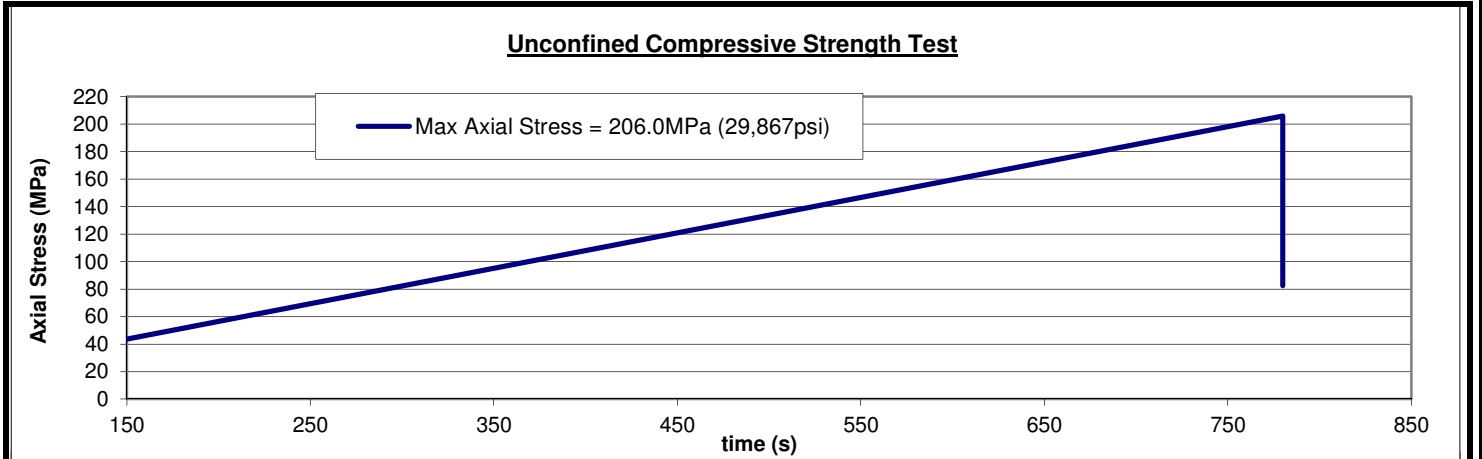
Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.76	2899.5	170.62	2.8	281.0	96.9	14,053





**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-02	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Before Test</p>  </div> <div style="text-align: center;"> <p>After Test</p>  </div> </div>
Sample ID:	G2	
Depth From (m):	13.91	
Depth To (m):	14.13	
Description:	Orthogneiss	
Tested By:	P.Hughes	
Young Modulus, E (GPa):	72.51	
Poisson Ratio, ν :	0.24	
Failure Mode:	Shear	

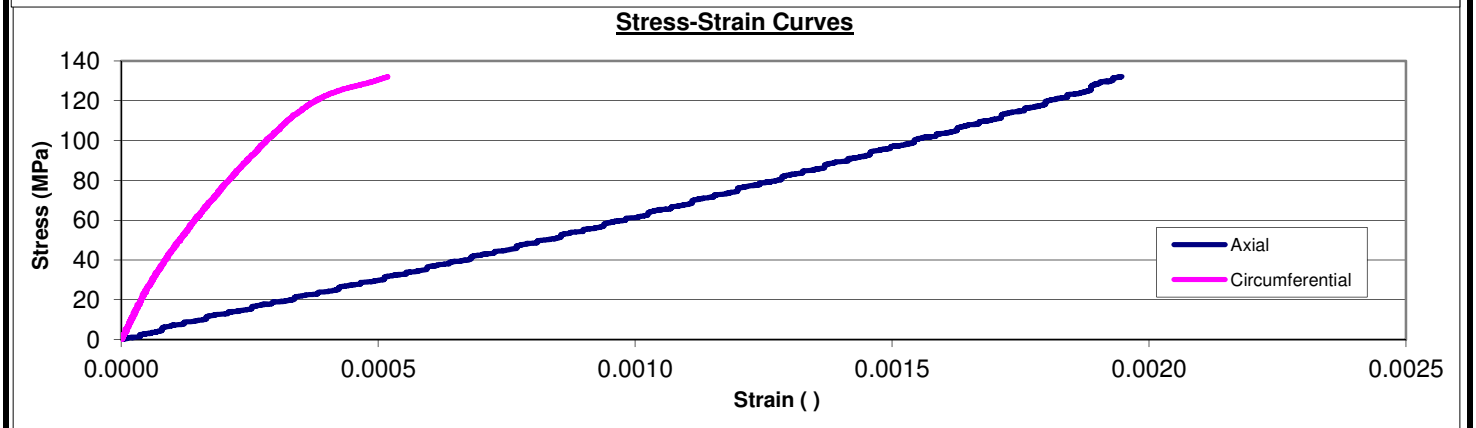
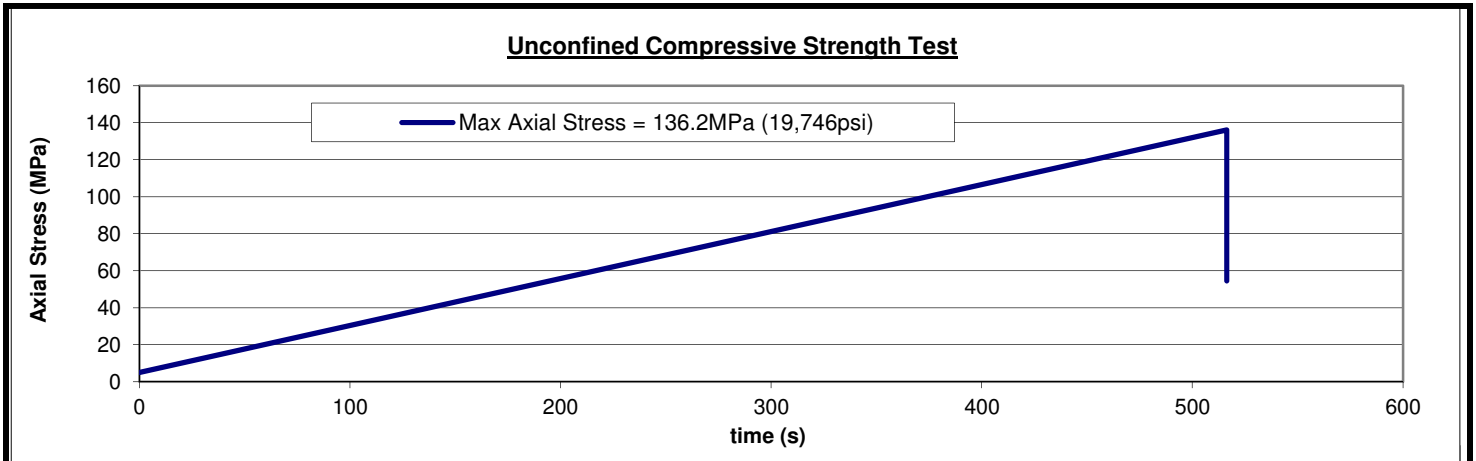
Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.27	2852.9	168.48	2.8	587.6	206.0	29,867



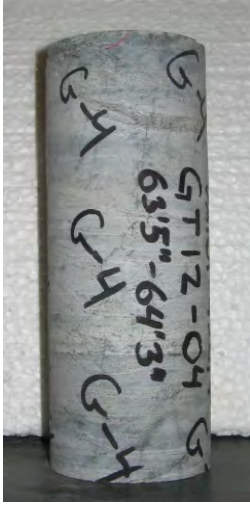

**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-03	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Before Test</p>  </div> <div style="text-align: center;"> <p>After Test</p>  </div> </div>
Sample ID:	G3	
Depth From (m):	38.71	
Depth To (m):	39.07	
Description:	Orthogneiss	
Tested By:	P.Hughes	
Young Modulus, E (GPa):	62.16	
Poisson Ratio, v:	0.15	
Failure Mode:	Shear	

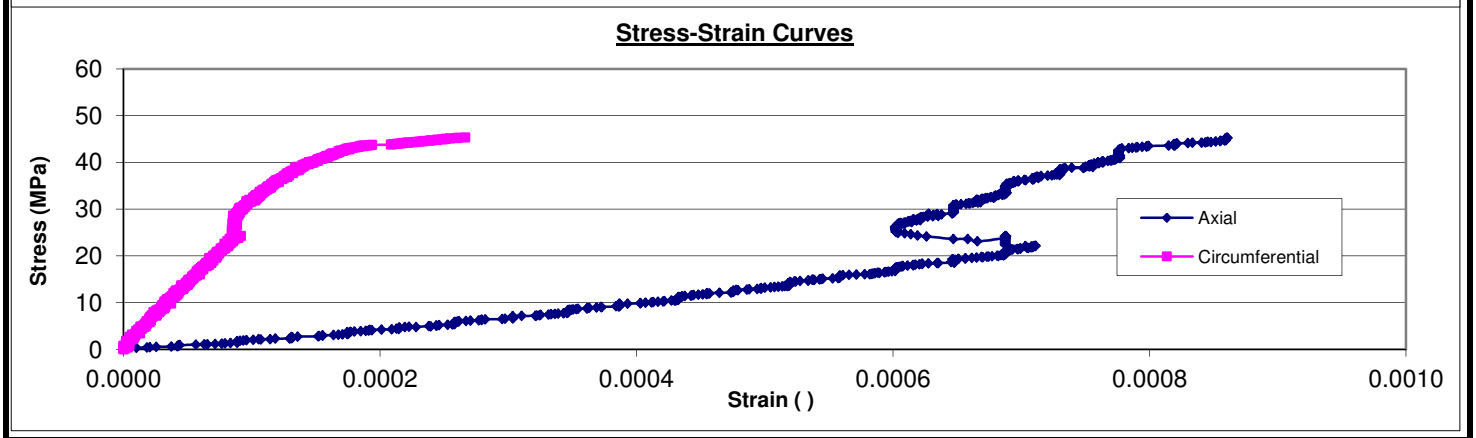
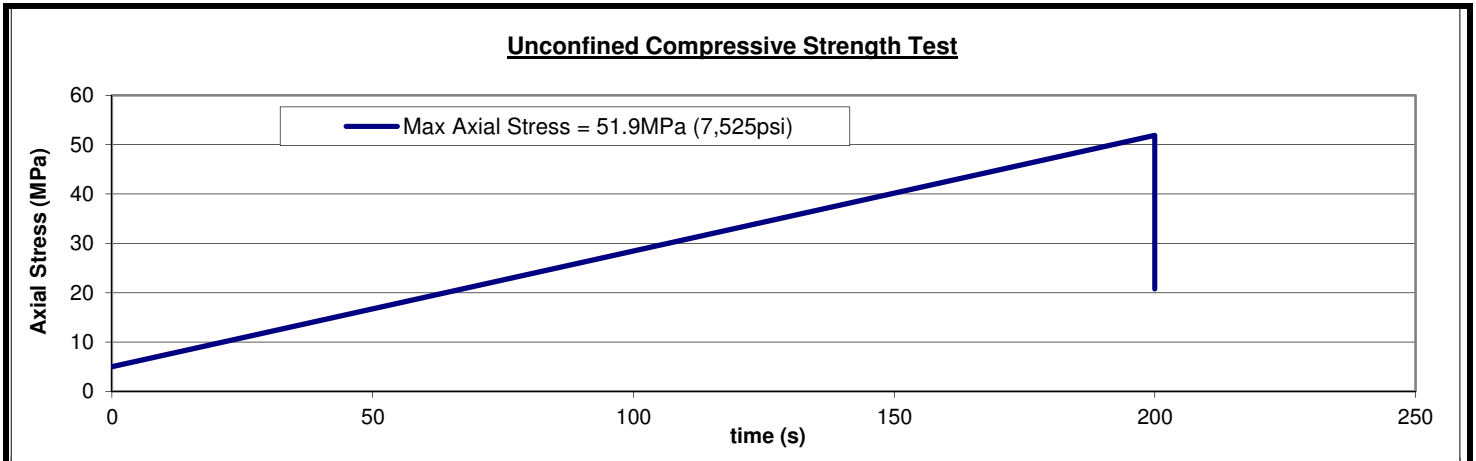
Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.20	2846.3	169.92	2.8	387.6	136.2	19,746



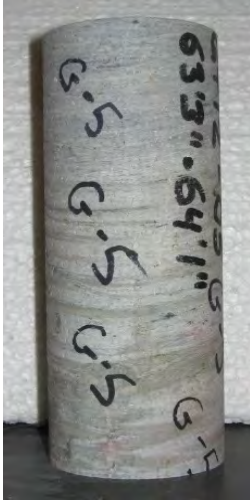
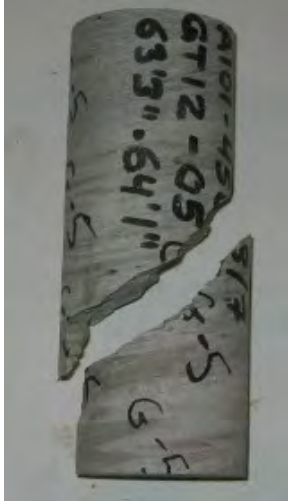
**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-04	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Before Test</p>  </div> <div style="text-align: center;"> <p>After Test</p>  </div> </div>
Sample ID:	G4	
Depth From (m):	19.33	
Depth To (m):	19.58	
Description:	Schist	
Tested By:	P.Hughes	
Young Modulus, E (GPa):	40.82	
Poisson Ratio, ν :	0.14	
Failure Mode:	Shear	

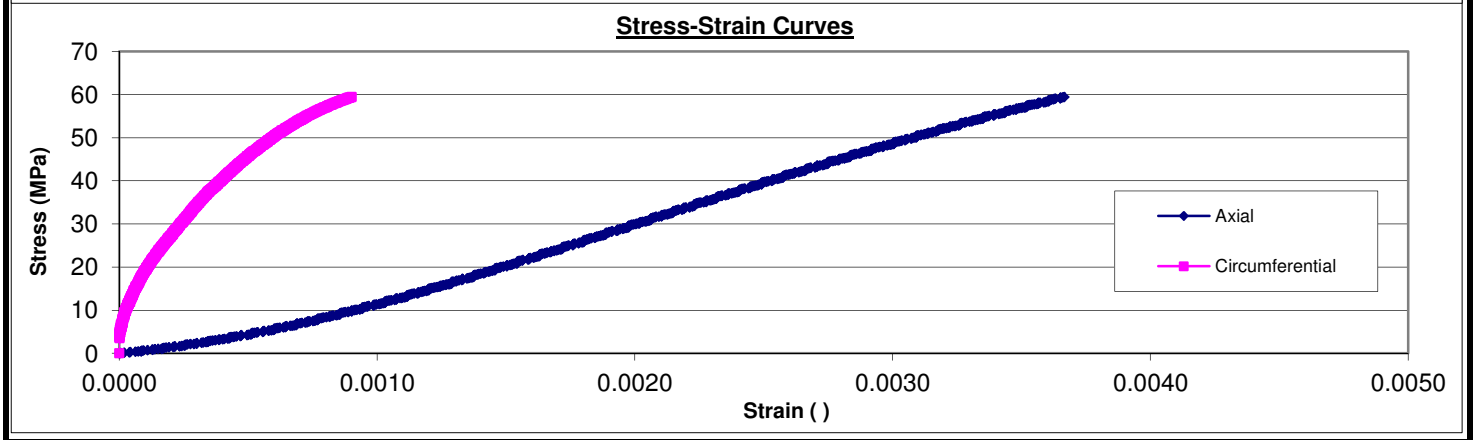
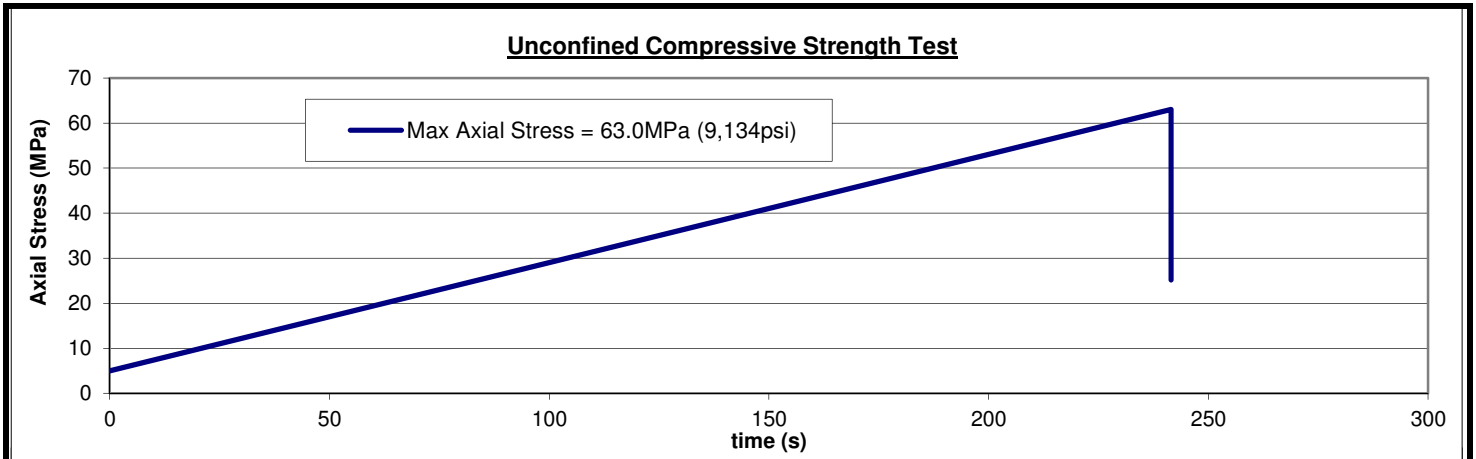
Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.63	2887.1	167.11	2.8	149.8	51.9	7,525



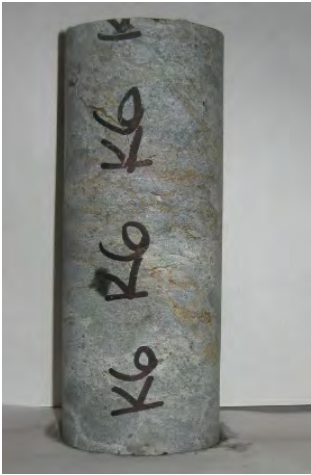

**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-05	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Before Test</p>  </div> <div style="text-align: center;"> <p>After Test</p>  </div> </div>
Sample ID:	G5	
Depth From (m):	19.2786	
Depth To (m):	19.5326	
Description:	Shist (quartz-eye)	
Tested By:	P.Hughes	
Young Modulus, E (GPa):	15.11	
Poisson Ratio, ν :	0.12	
Failure Mode:	Along discontinuity	

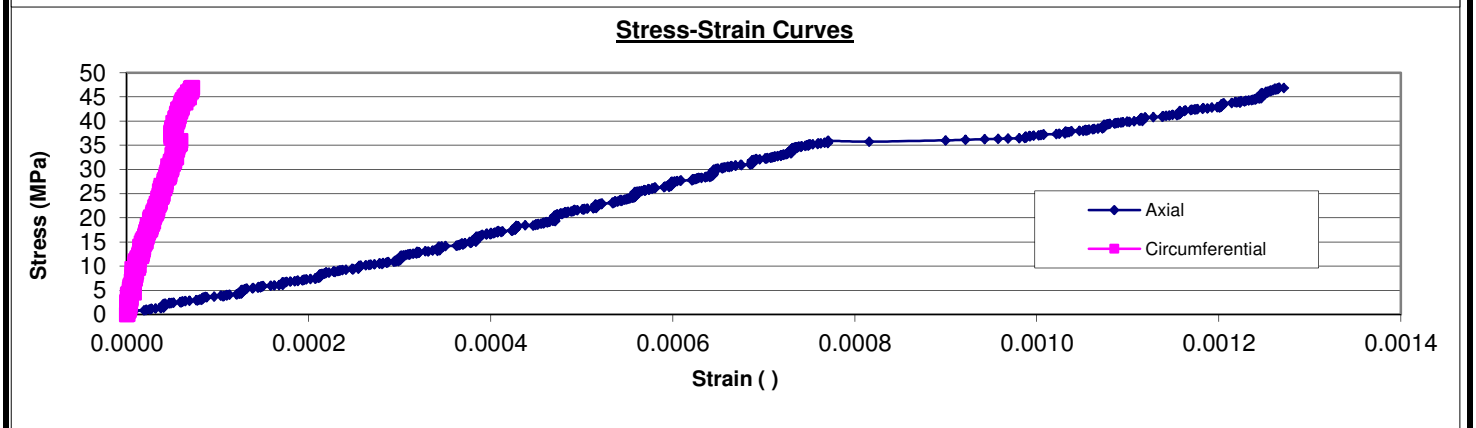
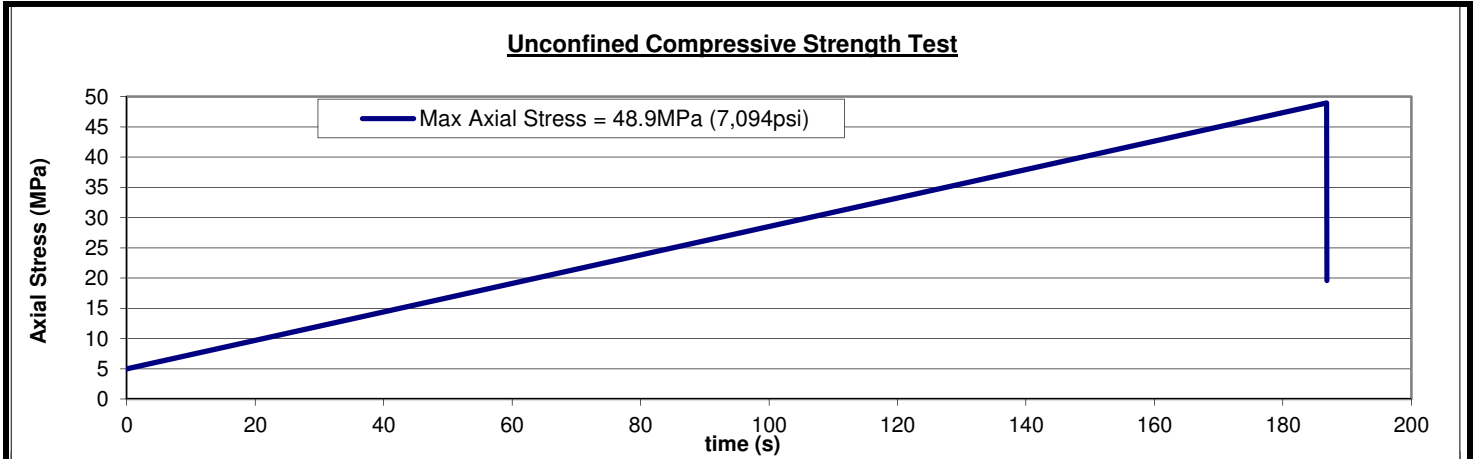
Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.48	2872.9	159.93	2.6	181.0	63.0	9,134



**ELASTIC MODULUS AND UNCONFINED COMPRESSIVE STRENGTH TEST
(ISRM-1979)**

Hole ID:	GM12-06	Before Test		After Test	
Sample ID:	G6				
Depth From (m):	16.2814				
Depth To (m):	16.51				
Description:	Phyllite				
Tested By:	P.Hughes				
Young Modulus, E (GPa):	44.09				
Poisson Ratio, v:	0.07				
Failure Mode:	Shear				

Diameter, (ϕ)	Area, (A)	Height, (h)	Ratio	Peak Load	σ_{UCS}	
(mm)	(mm ²)	(mm)	h/ ϕ	(kN)	(MPa)	(psi)
60.37	2862.4	160.79	2.7	140.1	48.9	7,094



APPENDIX E

CORE AND SPT PHOTOGRAPHS

Appendix E1	Open Pit Drillholes
Appendix E2	TMF Drillholes
Appendix E3	Geotechnical Drillholes

APPENDIX E1

OPEN PIT DRILLHOLES

(Pages E1-1 to E1-3)



PHOTO 1 OP12-01 SPT#1 - 1.07m - 1.68m



PHOTO 2 OP12-01 SPT#2 - 2.59m - 3.20m



PHOTO 3 OP12-02 SPT#1 - 1.07m - 1.68m



PHOTO 4 OP12-02 SPT#2 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 OP12-03 SPT#1 - 1.22m - 1.83m



PHOTO 6 OP12-04 SPT#1 - 2.59m - 3.20m



PHOTO 7 OP12-05 SPT#1 - 1.07m - 1.68m



PHOTO 8 OP12-06 SPT#1 - 1.07m - 1.68m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 OP12-07 SPT#1 - 2.59m - 3.20m



PHOTO 10 OP12-07 SPT#2 - 4.11m - 4.72m



PHOTO 11 OP12-08 SPT#1 - 1.07m - 1.68m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

APPENDIX E2

TMF DRILLHOLES

(Pages E2-1 to E2-22)



PHOTO 1 TMF12-01 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-01 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-01 SPT#3 - 4.27m - 4.88m



PHOTO 4 TMF12-01 SPT#4 - 5.79m - 6.40m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 TMF12-01 SPT#5 - 7.31m - 7.92m



PHOTO 6 TMF12-01 SPT#6 - 8.84m - 9.45m



PHOTO 7 TMF12-01 SPT#7 - 10.36m - 10.97m



PHOTO 8 TMF12-01 SPT#8 - 11.89m - 12.50m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-02 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-02 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-02 SPT#3 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

VA101-458/7-1
Rev 0
July 25, 2013



PHOTO 1 TMF12-03 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-03 SPT#2 - 2.74m - 3.35m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-04 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-04 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-04 SPT#3 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-05 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-05 SPT#2 - 2.74m - 3.35m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

VA101-458/7-1
Rev 0
July 25, 2013



PHOTO 1 TMF12-06 SPT#1 - 0.91m - 1.52m



PHOTO 2 TMF12-06 SPT#2 - 2.44m - 3.05m



PHOTO 3 TMF12-06 SPT#3 - 3.96m - 4.57m



PHOTO 4 TMF12-06 SPT#4 - 5.49m - 6.10m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-07 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-07 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-07 SPT#3 - 4.27m - 4.88m



PHOTO 4 TMF12-07 SPT#4 - 5.79m - 6.40m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-08 SPT#1 - 1.07m - 1.68m



PHOTO 2 TMF12-08 SPT#2 - 2.59m - 3.20m



PHOTO 3 TMF12-08 SPT#3 - 4.11m - 4.72m



PHOTO 4 TMF12-08 SPT#4 - 5.64m - 6.25m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-09 SPT#1 - 1.22m - 1.83m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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PHOTO 1 TMF12-10 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-10 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-10 SPT#4 - 5.79m - 6.40m



PHOTO 4 TMF12-10 SPT#5 - 7.31m - 7.92m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 TMF12-10 SPT#6 - 8.84m - 9.45m



PHOTO 6 TMF12-10 SPT#7 - 10.36m - 10.97m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-11 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-11 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-11 SPT#3 - 4.27m - 4.88m



PHOTO 4 TMF12-11 SPT#4 - 5.79m - 6.40m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 TMF12-11 SPT#5 - 7.31m - 7.92m



PHOTO 6 TMF12-11 SPT#6 - 9.14m - 9.75m



PHOTO 7 TMF12-11 SPT#7 - 10.67m - 11.28m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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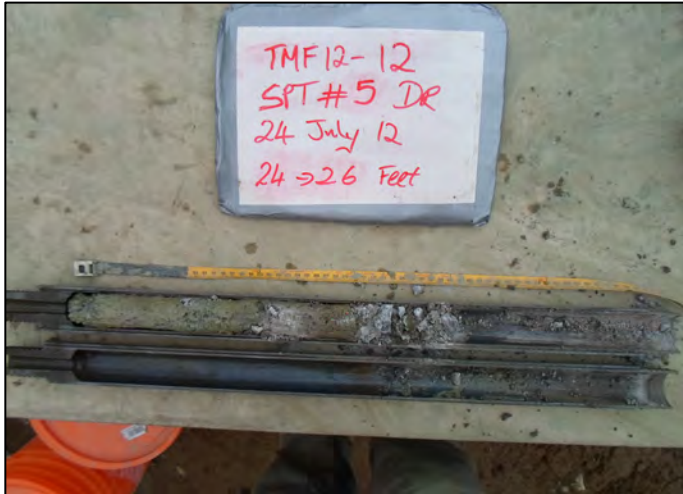


PHOTO 5 TMF12-12 SPT#5 - 7.31m - 7.92m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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PHOTO 1 TMF12-12 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-12 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-12 SPT#3 - 4.27m - 4.88m



PHOTO 4 TMF12-12 SPT#4 - 5.79m - 6.40m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-13 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-13 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-13 SPT#3 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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PHOTO 1 TMF12-14 SPT#1 - 1.37m - 1.98m



PHOTO 2 TMF12-14 SPT#2 - 2.90m - 3.51m



PHOTO 3 TMF12-14 SPT#3 - 4.42m - 5.03m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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PHOTO 1 TMF12-15 SPT#1 - 1.37m - 1.98m



PHOTO 2 TMF12-15 SPT#2 - 2.90m - 3.51m



PHOTO 3 TMF12-15 SPT#3 - 4.42m - 5.03m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-16 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-16 SPT#2 - 2.74m - 3.35m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 TMF12-17 SPT#1 - 1.22m - 1.83m



PHOTO 2 TMF12-17 SPT#2 - 2.74m - 3.35m



PHOTO 3 TMF12-17 SPT#3 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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PHOTO 1 TMF12-18 SPT#1 - 1.37m - 1.98m



PHOTO 2 TMF12-18 SPT#2 - 2.90m - 3.51m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

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APPENDIX E3
GEOTECHNICAL DRILLHOLES
(Pages E3-1 to E3-38)



PHOTO 1 GT12-01 Box #1 - 6.55m - 9.90m



PHOTO 2 GT12-01 Box #2 - 9.90m - 13.41m



PHOTO 3 GT12-01 Box #3 - 13.41m - 16.45m



PHOTO 4 GT12-01 Box #4 - 16.45m - 19.49m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 5 GT12-01 Box #5 - 19.49m - 22.70m



PHOTO 6 GT12-01 Box #6 - 22.70m - 25.70m



PHOTO 7 GT12-01 Box #7 - 25.90m - 29.22m

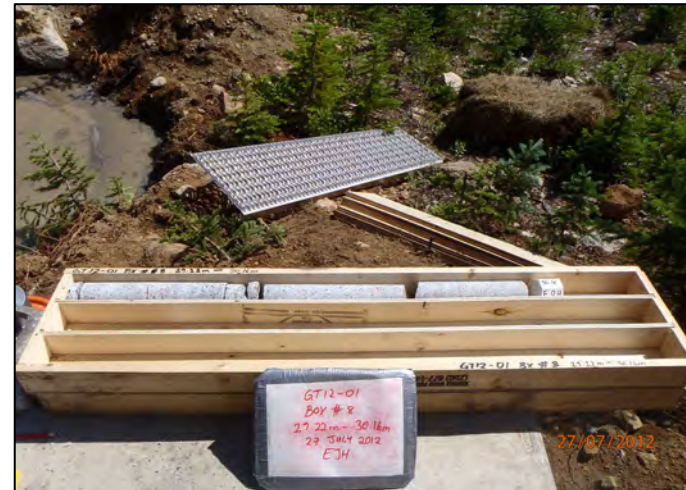


PHOTO 8 GT12-01 Box #8 - 29.22m - 30.17m EOH

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-01 SPT#1 - 0.91m - 1.52m



PHOTO 10 GT12-01 SPT#2 - 2.44m - 3.05m



PHOTO 11 GT12-01 SPT#3 - 3.96m - 4.57m



PHOTO 12 GT12-01 SPT#4 - 5.49m - 6.10m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 GT12-02 Box#1 - 9.30m - 12.58m



PHOTO 2 GT12-02 Box#2 - 12.58m - 15.99m

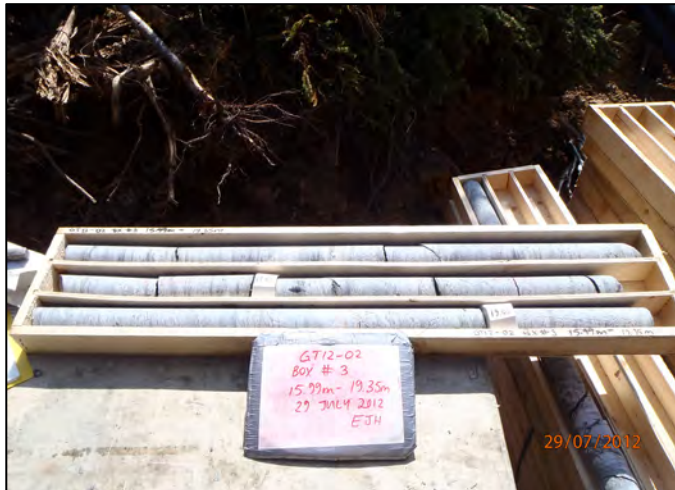


PHOTO 3 GT12-02 Box#3 - 15.99m - 19.35m



PHOTO 4 GT12-02 Box#4 - 19.35m - 22.50m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 GT12-02 Box#5 - 22.50m - 25.90m



PHOTO 6 GT12-02 Box#6 - 25.90m - 29.10m



PHOTO 7 GT12-02 Box#7 - 29.10m - 32.31m



PHOTO 8 GT12-02 Box#8 - 32.31m - 35.40m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-02 Box#9 - 35.40m - 38.43m



PHOTO 10 GT12-02 Box#10 38.43m - 41.58m



PHOTO 11 GT12-02 Box#11 41.58m - 45.94m



PHOTO 12 GT12-02 Box#12 45.94m - 48.09m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 13 GT12-02 Box#13 45.94m - 51.25m



PHOTO 14 GT12-02 Box#14 51.25m - 54.59m



PHOTO 15 GT12-02 Box#15 54.59m - 57.68m



PHOTO 16 GT12-02 Box#16 57.68m - 60.67m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 17 GT12-02 Box#17 60.67m - 63.86m



PHOTO 18 GT12-02 Box#18 63.86m - 66.96m



PHOTO 19 GT12-02 Box#19 66.96m - 70.20m



PHOTO 20 GT12-02 Box#20 70.20m - 73.29m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 21 GT12-02 Box#21 73.29m - 76.45m



PHOTO 22 GT12-02 Box#22 76.45m - 79.53m



PHOTO 23 GT12-02 Box#23 79.53m - 83.04m



PHOTO 24 GT12-02 Box#24 83.04m - 86.25m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

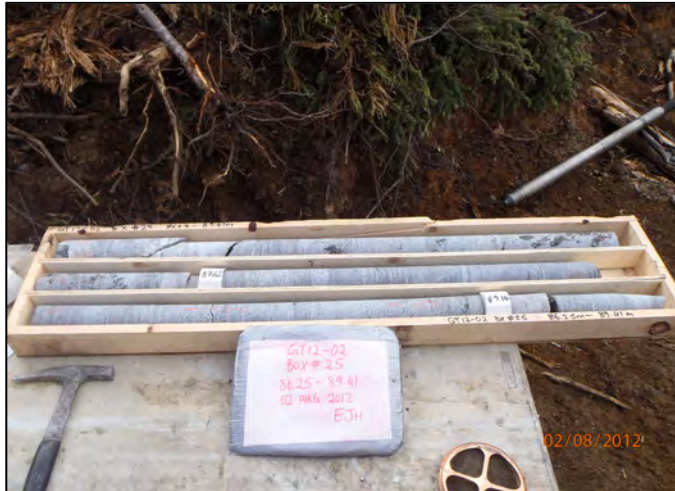


PHOTO 25 GT12-02 Box#25 86.25m - 89.41m



PHOTO 26 GT12-02 Box#26 89.41m - 92.63m



PHOTO 27 GT12-02 Box#27 92.63m - 95.68m

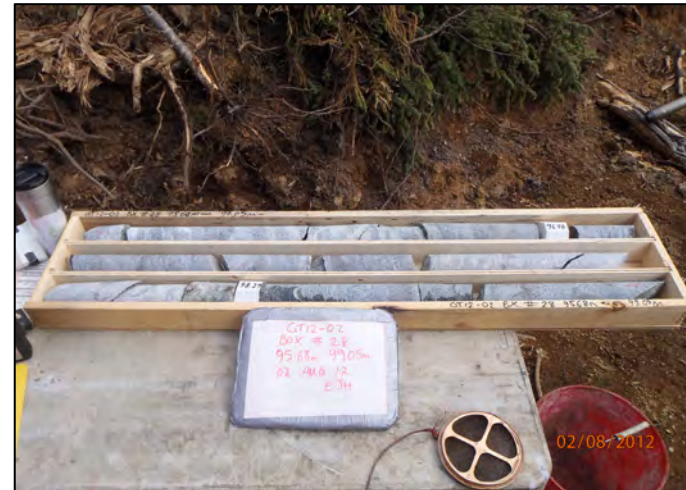


PHOTO 28 GT12-02 Box#28 95.68m - 99.05m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 29 GT12-02 Box#29 99.05m - 101.33m EOH

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 GT12-03 Box#1 - 5.18m - 8.23m



PHOTO 2 GT12-03 Box#2 - 8.23m - 11.28m



PHOTO 3 GT12-03 Box#3 - 11.28m - 14.78m



PHOTO 4 GT12-03 Box#4 - 14.78m - 17.80m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 GT12-03 Box#5 - 17.80m - 21.11m



PHOTO 6 GT12-03 Box#6 - 21.11m - 24.33m



PHOTO 7 GT12-03 Box#7 - 24.33m - 27.79m



PHOTO 8 GT12-03 Box#8 - 27.79m - 30.91m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-03 Box#9 - 30.91m - 34.14m



PHOTO 10 GT12-03 Box#10 - 34.14m - 37.39m



PHOTO 11 GT12-03 Box#11 - 37.39m - 40.84m



PHOTO 12 GT12-03 Box#12 - 40.84m - 44.27m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 13 GT12-03 Box#13 - 44.27m - 47.39m



PHOTO 14 GT12-03 Box#14 - 47.39m - 50.65m



PHOTO 15 GT12-03 Box#15 - 50.65m - 53.95m



PHOTO 16 GT12-03 Box#16 - 53.95m - 57.30m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 17 GT12-03 Box#17 - 57.30m - 60.55m



PHOTO 18 GT12-03 Box#18 - 60.55m - 63.78m



PHOTO 19 GT12-03 Box#19 - 63.78m - 66.90m



PHOTO 20 GT12-03 Box#20 - 66.90m - 70.18m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 21 GT12-03 Box#21 - 70.18m - 73.38m



PHOTO 22 GT12-03 Box#22 - 73.38m - 76.63m



PHOTO 23 GT12-03 Box#23 - 76.63m - 79.85m



PHOTO 24 GT12-03 Box#24 - 79.85m - 83.08m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 25 GT12-03 Box#25 - 83.08m - 86.30m



PHOTO 26 GT12-03 Box#26 - 86.30m - 89.33m



PHOTO 27 GT12-03 Box#27 - 89.33m - 92.60m



PHOTO 28 GT12-03 Box#28 - 92.60m - 95.85m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 29 GT12-03 Box#29 - 95.85m - 98.98m



PHOTO 30 GT12-03 Box#30 - 98.98m - 101.19m EOH

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 GT12-04 Box#1 - 5.94m - 9.37m



PHOTO 2 GT12-04 Box#2 - 9.37m - 12.67m



PHOTO 3 GT12-04 Box#3 - 12.67m - 16.00m



PHOTO 4 GT12-04 Box#4 - 16.00m - 19.33m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 GT12-04 Box#5 - 19.33m - 22.86m



PHOTO 6 GT12-04 Box#6 - 22.86m - 26.08m



PHOTO 7 GT12-04 Box#7 - 26.08m - 29.46m



PHOTO 8 GT12-04 Box#8 - 29.46m - 32.64m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-04 Box#9 - 32.64m - 35.96m



PHOTO 10 GT12-04 Box#10 - 35.96m - 38.10m EOH



PHOTO 11 GT12-04 SPT#1 - 0.61m - 1.22m



PHOTO 12 GT12-04 SPT#2 - 1.22m - 1.83m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 13 GT12-04 SPT#3 - 2.74m - 3.35m

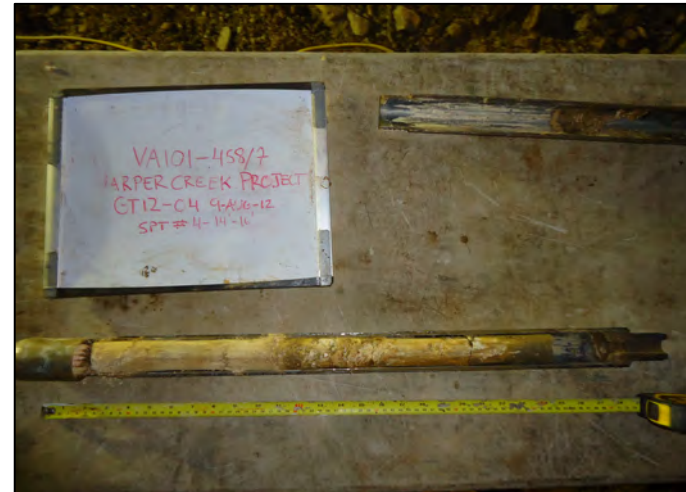


PHOTO 14 GT12-04 SPT#4 - 4.27m - 4.88m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION

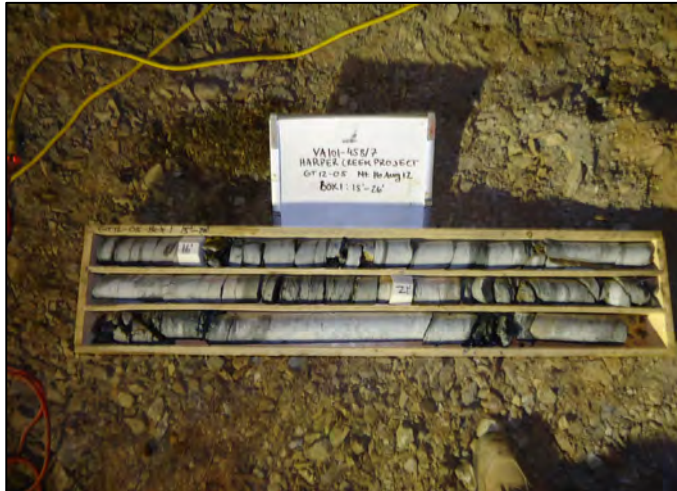


PHOTO 1 GT12-05 Box#1 - 4.57m -7.92m



PHOTO 2 GT12-05 Box#2 - 7.92m -11.63m



PHOTO 3 GT12-05 Box#3 - 11.63m -15.93m



PHOTO 4 GT12-05 Box#4 - 15.93m -19.20m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 GT12-05 Box#5 - 19.20m -22.88m



PHOTO 6 GT12-05 Box#6 - 22.88m -26.21m



PHOTO 7 GT12-05 Box#7 - 26.21m -29.56m



PHOTO 8 GT12-05 Box#8 - 29.56m -32.82m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-05 Box#9 - 32.82m - 36.57m



PHOTO 10 GT12-05 Box#10 - 36.57m - 38.40m EOH



PHOTO 11 GT12-05 SPT#1 - 0m - 0.61m



PHOTO 12 GT12-05 SPT#2 - 1.07m - 1.68m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 13 GT12-05 SPT#3 - 2.62m - 3.20m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 GT12-06 Box#1 - 1.83m - 5.26m

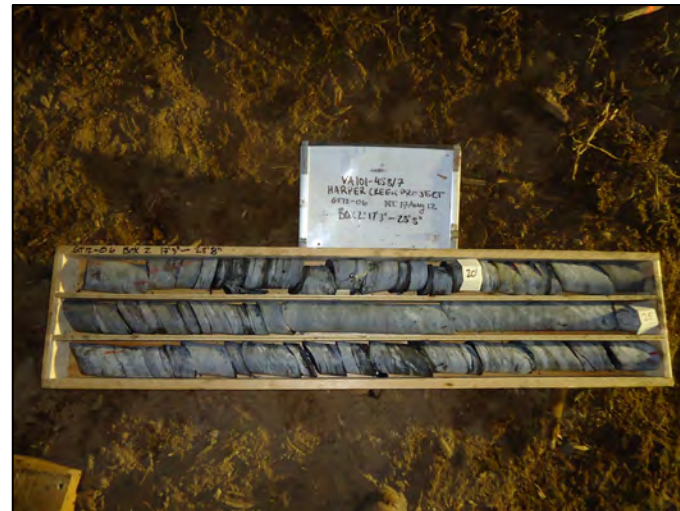


PHOTO 2 GT12-06 Box#2 - 5.26m - 8.74m



PHOTO 3 GT12-06 Box#3 - 8.74m - 12.19m



PHOTO 4 GT12-06 Box#4 - 12.19m - 15.57m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 5 GT12-06 Box#5 - 15.57m - 19.13m



PHOTO 6 GT12-06 Box#6 - 19.13m - 22.53m



PHOTO 7 GT12-06 Box#7 - 22.53m - 25.91m



PHOTO 8 GT12-06 Box#8 - 25.91m - 29.26m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 9 GT12-06 Box#9 - 29.26m - 32.59m



PHOTO 10 GT12-06 Box#10 - 32.59m - 35.05m EOH



PHOTO 11 GT12-06 SPT#1 - 0m - 0.61m



PHOTO 12 GT12-06 SPT#2 - 0.91m - 1.52m

YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION



PHOTO 1 GT12-07 Box#1 - 1.52m - 11.89m



PHOTO 2 GT12-07 Box#2 - 11.89m - 16.79m



PHOTO 3 GT12-07 Box#3 - 16.79m - 21.11m



PHOTO 4 GT12-07 Box#4 - 21.11m - 25.65m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 5 GT12-07 Box#5 - 26.65m - 30.07m



PHOTO 6 GT12-07 Box#6 - 30.07m - 34.54m



PHOTO 7 GT12-07 Box#7 - 34.54m - 39.01m



PHOTO 8 GT12-07 Box#8 - 39.01m - 42.06m EOH

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**

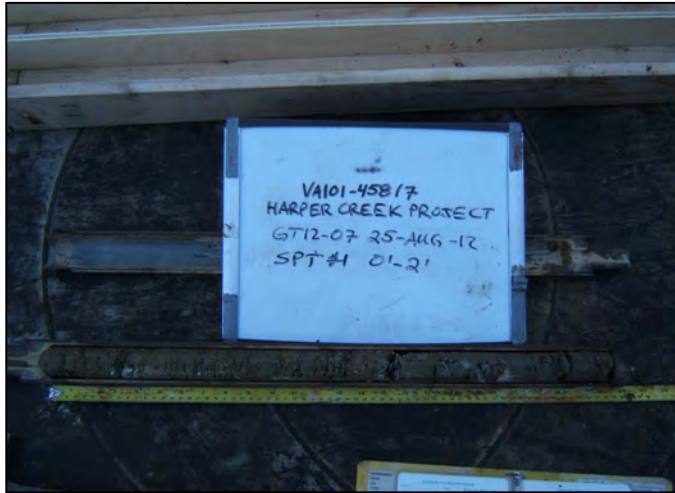


PHOTO 9 GT12-07 SPT#1 - 0m - 0.61m

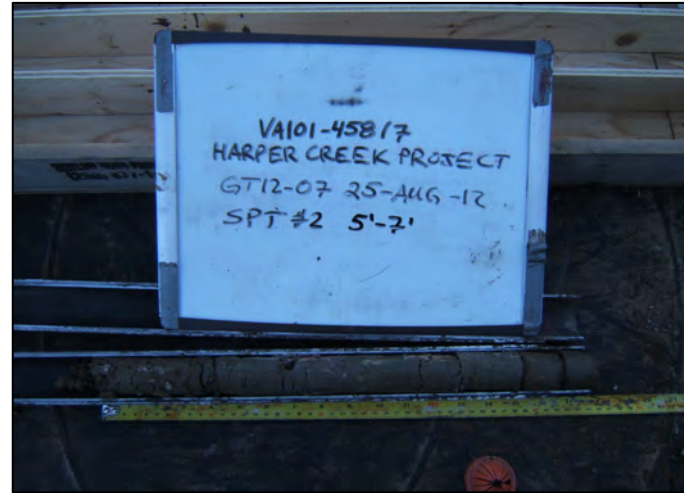


PHOTO 10 GT12-07 SPT#2 - 1.52m - 2.13m

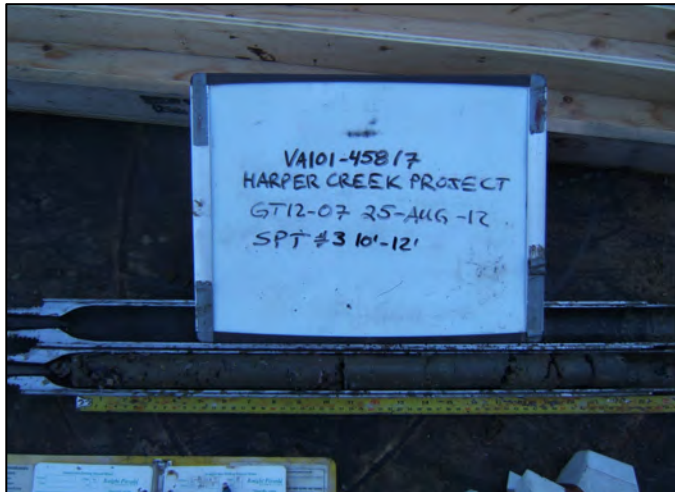


PHOTO 11 GT12-07 SPT#3 - 3.05m - 3.66m



PHOTO 12 GT12-07 SPT#4 - 3.96m - 4.57m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**

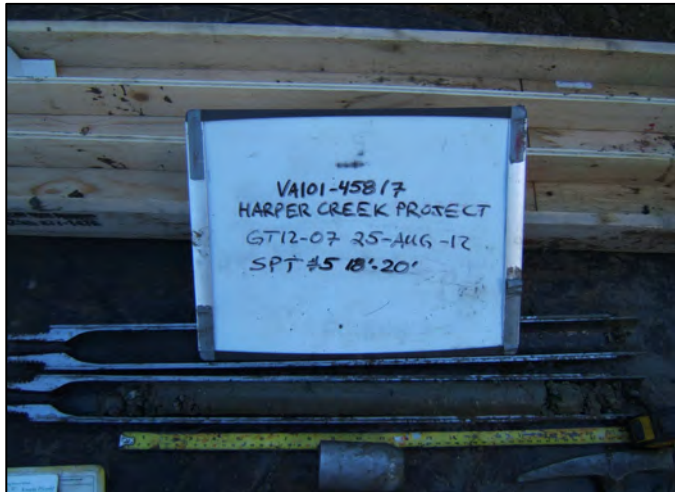


PHOTO 13 GT12-07 SPT#5 - 5.49m - 6.10m



PHOTO 14 GT12-07 SPT#6 - 7.01m - 7.44m



PHOTO 15 GT12-07 SPT#7 - 8.53m - 8.79m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 1 GT12-08 Box #1-2 - 27.43m - 33.98m



PHOTO 2 GT12-08 Box #3-4 - 33.98m - 40.54m



PHOTO 3 GT12-08 Box #5-6 - 40.54m - 47.09m

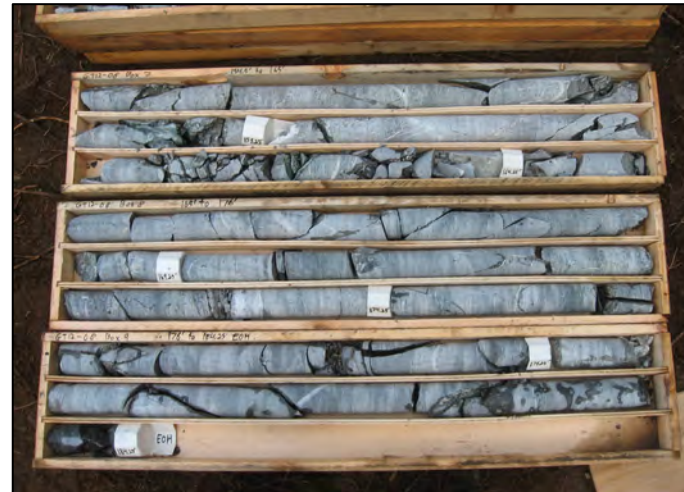


PHOTO 4 GT12-08 Box #7-9 - 47.09m - 56.23m EOH

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 5 GT12-08 SPT #1 - 1.52m - 2.13m



PHOTO 6 GT12-08 SPT #2 - 3.05m - 3.38m



PHOTO 7 GT12-08 SPT #3 - 4.57m - 5.09m



PHOTO 8 GT12-08 SPT #4 - 6.10m - 6.19m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 9 GT12-08 SPT #5 - 7.62m - 8.23m



PHOTO 10 GT12-08 SPT #6 - 9.14m - 9.36m



PHOTO 11 GT12-08 SPT #7 - 10.67m - 10.76m



PHOTO 12 GT12-08 SPT #8 - 12.19m - 12.28m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**



PHOTO 13 GT12-08 SPT #10 - 15.24m - 15.64m



PHOTO 14 GT12-08 SPT #11 - 18.29m - 18.47m



PHOTO 15 GT12-08 SPT #12 - 21.34m - 21.43m



PHOTO 16 GT12-08 SPT #13 - 24.38m - 24.63m

**YELLOWHEAD MINING INC.
HARPER CREEK - 2012 GEOTECHNICAL SITE INVESTIGATION**