Appendix 6.6-C

Peterson Creek Aquifer Pumping Test

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

KGHM AJAX MINING INC.

AJAX PROJECT EA

PETERSON CREEK AQUIFER PUMPING TEST

FINAL

PROJECT NO.: 1125007-08 DATE: July 31, 2015
DOCUMENT NO.: 1125-007-R06-2015

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY
Suite 500 - 980 Howe Street
Vancouver, BC Canada V6Z 0C8
Telephone (604) 684-5900
Fax (604) 684-5909

July 31, 2015
Project No.: 1125007-08

Nettie Ore
KGHM Ajax Mining Inc.
Suite 200-124 Seymour St
Kamloops, BC, V2C 2E1

Dear Ms. Ore,

Re: Ajax Project EA – Peterson Creek Aquifer Pumping Test - FINAL

Please find attached a copy of the above referenced FINAL report. BGC appreciates the opportunity to be involved in this world class mining project. We look forward to providing continued support to KGHM Ajax Mining Inc.

Should you have any questions or comments, please do not hesitate to contact the undersigned.

Yours sincerely,

BGC ENGINEERING INC.
per:

Cassandra Koenig, M.Sc., P.Geo.
Hydrogeologist

EXECUTIVE SUMMARY

BGC Engineering Inc. (BGC), on behalf of KGHM Ajax Mining Inc. (KAM), conducted a step test followed by constant rate discharge test in pumping well BGC14-PW01, installed near Peterson Creek as part of the scope of work to support the Environmental Assessment for the Ajax Project. One pumping well and one monitoring well were drilled and completed within the mapped extent of the Peterson Creek (PC) Aquifer, down-gradient from the mine site and the proposed East Mine Rock Storage Facility (EMRSF). The pumping well was installed to a depth of 79.2 m (260 ft.) and completed in fine to coarse gravels and sand. The monitoring well was installed to a depth of 75.0 m (246 ft.) and completed in fine to coarse sand and silt.

Water levels were monitored during the step test, constant rate discharge test, and during recovery in the pumping well and eight observation wells using manual methods and Solinst Leveloggers. A temporary staff gauge was installed in Peterson Creek (Lower) and manually measured during the constant rate test to monitoring stream flow rates during the testing periods.

The step rate discharge test was conducted on December 15, 2014, and comprised four steps at increasing discharge rates of 98, 197, 299 and 397 US GPM. The initial two pumping steps were 60 minutes long, while the latter steps were 90 minutes long. The Hantush-Bierschenk well loss solution was used to analyze the results of the step rate test. The pumping well efficiency was estimated to be an average of 92% and specific capacity averaged over the step rate test was 202 m^3/day/m.

The pumping test was conducted during the period from February 16, 2015, at 9:11 am to February 19, 2015, at 9:11 am and was conducted at a constant (average) pumping rate of 251 US gpm. Testing results were analyzed using AQTESOLV, version 4.50 (HydroSOLVE Inc., 2007) and the Theis, Cooper-Jacob and Hantush for unconfined and leaky confined conceptual aquifer models. The best estimate hydraulic conductivity (K) in the PC Aquifer was 3×10^{-5} m/s, with a storage coefficient (S) of 8×10^{-3}. Based on the drilling and testing results, the PC Aquifer is conceptualized as an unconfined and/or discontinuously (leaky) confined, heterogeneous, channel aquifer overlying a bedrock aquifer.

Groundwater samples were collected at the pumping well during the constant rate discharge test after one hour, 1.2 days and 2.2 days of pumping and submitted to ALS Environmental Services of Burnaby, BC for analysis. Samples were analyzed for electrical conductivity (EC), hardness (as $CaCO_3$), pH, total suspended solids (TSS), total dissolved solids (TDS), turbidity, alkalinity, major anions and cations, nutrients, cyanide, total organic carbon (TOC), and total and dissolved metals. Analytical groundwater chemistry results were consistent between the sampling events. The groundwater is described as calcium-magnesium-sodium-sulphate type, neutral in pH, with TDS ranging from 2290 to 2430 mg/L.

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1.0 INTRODUCTION

BGC Engineering Inc. (BGC) was retained by KGHM Ajax Mining Inc. (KAM) to conduct a pumping test in the Peterson Creek (PC) Aquifer to support the Environmental Assessment (EA) being completed for the Ajax Project. The pumping test consisted of: baseline monitoring, step rate discharge testing, constant rate discharge testing, and recovery monitoring.

The purpose of the testing was to:

- Characterize the nature, extent and hydrogeological setting of the PC Aquifer
- Estimate the hydraulic conductivity and storage properties of the PC Aquifer
- Assess the potential hydraulic connection between the PC Aquifer and surface water and between the PC Aquifer and underlying bedrock
- Evaluate potential boundary conditions for the PC Aquifer
- Evaluate the groundwater quality in the PC Aquifer
- Provide data for the numerical groundwater flow model being developed by BGC for the Ajax Project.

This report documents the field work completed during the pumping test program, the pumping test data and analysis, and presents the analytical groundwater quality results compared to the British Columbia Contaminated Sites Regulation (CSR) aquatic life standards for the protection of freshwater aquatic life. Tables, figures and drawings are presented at the end of this report.

2.0 SCOPE OF WORK

The work completed was in accordance with the scope of work outlined in BGC (2014) and consisted of:

- Drilling and installing one monitoring well and one pumping well
- Baseline groundwater level monitoring of the pumping well and surrounding monitoring wells
- Establishing a temporary surface water gauge on Peterson Creek and monitoring the stage of the creek prior to, during and following the pumping test
- Step rate discharge testing
- Constant rate discharge testing
- Recovery monitoring
- Water sampling and preliminary evaluation of the quality of the groundwater pumped during the test.

Permitting for the pumping test was handled by KAM.

3.0 BACKGROUND INFORMATION

3.1. Study Location

The Ajax Project is a proposed open pit copper mine located on the outskirts of Kamloops, B.C.; the proposed pit is approximately 3 km south from the neighbourhood of Aberdeen. The coordinates for the centre of the Ajax Project area are approximately 50°37' north latitude and 120°24' west longitude. Site access is via the Afton Mine haul road, which crosses Lac Le Jeune Road approximately 9 km south of the intersection of Lac Le Jeune Road and Copperhead Drive, off of Highway 1 (Drawing 01).

As shown on Drawing 01, the proposed open pit is adjacent to Jacko Lake and would intersect some of the tributaries to Peterson Creek. The surface expression of the PC Aquifer has been mapped by the British Columbia Ministry of Environment (BC MOE) using data from the provincial water well database (BC MOE, 2015a, b). The mapped location of the PC Aquifer is downstream from Jacko Lake and the major infrastructure proposed for the mine, including the Tailings Storage Facility (TSF), the West Mine Rock Storage Facility (WMRSF), the open pit, the South Mine Rock Storage Facility (SMRSF) and the East Mine Rock Storage Facility (EMRSF). Surface water courses in these areas, including Keynes Creek (TSF) and Humphrey Creek (south end of TSF and east of the SMRSF) are tributaries to Peterson Creek (Drawing 01).

For the purpose of this report, the PC Aquifer is interpreted to be within the extents outlined by the BC MOE mapping as shown on Drawing 01. Additional interpretation of the PC Aquifer extent based on mapping of glaciofluvial deposits by Fulton (1967), local mapping completed by others for the Ajax Project (Keystone, 2008; Knight Piesold, 2014) and aerial photographs of surface expressions, is provided in the Ajax Project Baseline Groundwater Hydrology Assessment (BGC, 2015).

The locations of the monitoring wells, monitoring and pumping well installed for the pumping test program, and the wells monitored during the testing are shown on Drawing 02.

3.2. Geology

A detailed discussion of the site geology in relation to the interpreted site hydrostratigraphy is provided in the Ajax Project Baseline Groundwater Hydrology Assessment BGC (2015); the following sections provide an overview summary in the general project area.

3.2.1. Quaternary Geology

The quaternary materials comprising the surficial deposits within the Ajax Project consist mainly of Kamloops drift deposited through several stages of deglaciation (occurring between 10,000 to 13,000 years ago), associated with the decay of the Cordilleran Ice Sheet. Glaciofluvial materials have been classified as terrace deposits, delta terraces, kettle terraces, rill complexes, and hummocky gravels (Fulton, 1975). All of these deposits can be broadly described as gravel, sandy gravel and sand and are mapped around Peterson Creek. Glacier-

formed drumlinoid moraines that consist of till with lenses of sand, gravel and silt are the most common surficial material within the Ajax Project area (BGC, 2015).

3.2.2. Bedrock Geology

The country rocks of the study area are volcanics, volcaniclastics, and picrite of the Upper Triassic Nicola Group. The interbedded tuffs, breccias, flows, and flow breccias are typically well indurated and weakly metamorphosed (greenschist facies), resulting in a green-grey colour for the Nicola volcanics in the project area (Snyder and Russell, 1994). The ore body is associated with the Iron Mask Batholith, which intrudes the Nicola Group (BGC, 2015, and references therein). Several bedrock aquifers are mapped in the project area as shown on Drawing 01; however are not considered in detail in this report. Additional information on these bedrock aquifers is provided in BGC (2015).

3.3. Peterson Creek Aquifer

The PC Aquifer is interpreted to be a semi-confined sand and gravel aquifer located south-east of the Project site. The sand and gravel units are interpreted to be glaciofluvial in origin and interbedded with glaciolacustrine silt and clay lenses.

The PC Aquifer is underlain by bedrock of the Iron Mask Batholith and is discontinuously overlain by lower-permeability surficial deposits. The thickness of surficial deposits is variable in the project area, from less than 5 m to greater than 80 m. Borehole logs within the PC Aquifer indicate the aquifer can be up to 80 m thick.

Groundwater flow in the project area is interpreted to be controlled by topography, with recharge entering through uplands and discharge occurring to lower lying areas. In the pumping test area, shallow groundwater converges (i.e., from the north and from the south) towards Peterson Creek. Within the PC Aquifer, groundwater flow is interpreted to be directed eastward within the glaciofluvial deposits.

The majority of vertical hydraulic gradients throughout the project area are directed downward (i.e. downward flow of groundwater), however there are upward directed hydraulic gradients (i.e., upward flowing groundwater) measured in local depressions or in low areas adjacent to local topographic highs. The PC Aquifer may be recharged by both the underlying Sugarloaf Hill Bedrock Aquifer (Aquifer No. 0276 on DWG 01 and 02) and from groundwater flow in the overlying quaternary materials. Infiltration from precipitation, snowmelt and anthropogenic irrigation may also contribute to recharge of the aquifer.

The PC Aquifer is classified as low development, high vulnerability and moderate productivity (Class IIIA) (BC MOE, 2015a, b). Water quality in monitoring well MW11-10D, which is interpreted to be completed within the PC Aquifer proximal to the pumping test location, is classified as brackish (TDS 2490 mg/L to 2830 mg/L) and exceeds CSR aquatic life standards for the protection of freshwater aquatic life for sulphate (1640 mg/L to 1740 mg/L) (Knight Piesold, 2013b).

3.4. Pumping Well Location

The location of the pumping test well was selected based on review and interpretation of previously drilled holes in the PC Aquifer (Drawing 03). The selected location was discussed and confirmed with KAM prior to drilling. Longitudinal and transverse interpretive geologic sections developed to support selection of the PC Aquifer pumping test location are provided in BGC (2015); interpretive geologic cross-section A-A', which runs approximately parallel to the aquifer in an east-west direction (refer to Drawing 02) is shown on Drawing 03. The pumping well location and screen interval completion were selected to target the thickest sand and gravel layer (Drawing 03) where high groundwater discharges were observed during airlift testing.

4.0 WELL DRILLING, GRAIN SIZE ANALYSIS, WELL INSTALLATION AND DEVELOPMENT

4.1. General Methodology

Two borehole wells were completed (BGC14-PW01 and BGC14-018) for the pumping test. Drilling services were provided by JR Drilling Central Ltd. (JR), out of Kamloops, BC, using a DR 12 dual rotary drill rig equipped with a 900 cubic feet per minute (cfm)/350 pounds per square inch (psi) air compressor. No drilling additives or muds were used during the drilling process. Stratigraphic horizons were logged from drill return materials. Grab samples of drill returns were collected at approximately 1.5 m (5 ft.) intervals and/or when notable changes in lithology and borehole moisture were encountered. Field particle size (sieve) analyses were completed on selected samples (American Society for Testing and Materials (ASTM), Test Method: D2487), and all samples were provided to the Ajax Geology Department. All samples were retained and are currently being stored in the core shack at the Ajax site.

After groundwater was encountered, airlift testing was conducted at approximately 5 to 10 m intervals in each borehole as drilling progressed. BGC14-PW01 was completed as a pumping well and BGC14-018 as a monitoring well. Both wells were developed by airlifting following installation.

An initial boring was drilled and partially constructed as the monitoring well. A second boring was advanced, and after comparing grain size analyses and reviewing airlift test results, it was determined that the first boring would make a better pumping well. Therefore, the PVC casing was removed from the initial boring, which was then flushed with water, re-drilled, and completed as the pumping well.

The details on drilling, airlift testing, grain size analysis, well construction, and well development activities for the completed pumping and monitoring wells are provided in the following sections.

4.2. Pumping Well

4.2.1. Drilling and Airlift Testing

The drilling of BGC-PW01 (the pumping well) began on December 8th, 2014, and was completed on December 9th, 2014. The flushed out borehole was re-drilled with a 254 mm (10 inch) diameter steel surface casing to a depth of 5.2 m (17 ft.). A 203 mm (8 inch) diameter steel casing was advanced through the 254 mm (10 inch) steel casing to a depth of 79.20 m (260 ft.) using air rotary techniques. The 254 mm (10 inch) diameter steel surface casing was removed and Holeplug 9.5 mm (3/8 inch) bentonite chips were used to fill the annular space between the borehole wall and the 8 inch casing from 5.2 m (17 ft.) to ground surface, creating a surface seal.

During the initial drilling, drill cuttings were logged at the rig by BGC staff. Samples of drill cuttings were collected at 3.1 m (10 ft.) intervals, until air-lifted groundwater discharged from the well collar; thereafter samples were collected every 1.5 m (5 ft.).

A total of 5 airlift tests were completed below a depth of 67.1 m (220 ft.), where water was continually produced during drilling. Table 1 summarizes the airlift testing results.

4.2.2. Grain Size Analyses

To gain a better understanding of the borehole stratigraphy, grain size analyses were performed in the field on samples collected from BGC14-PW01. Grain size analyses were also used to determine the optimal slot size for the stainless steel telescopic well screen.

Samples were laid out on a baking sheet, continuously stirred to avoid particle sticking, and heated using a blow torch until all particles were dry. The dry sample was weighed using a Farberware professional electronic kitchen scale (model #5083276), and poured into a set of sieves. Sieve sizes used for the field-based analyses included: 25 mm, 19 mm, 9.5 mm, 4.75 mm, 2 mm, 0.85 mm, and 0.43 mm. The sieves were shaken manually in a circular motion, slightly upward and downward, and back and forth for approximately 5 minutes. The dry weight of the sample retained on each sieve was recorded. The cumulative percent passed was calculated and the grain size where 60% of the material (D60) and 40% of the material (D40) by weight passing were determined.

Table 2 presents the D60 and D40 millimeter values for BGC14-PW01. The particle size is based on the ASTM D2487 standard. The format of soil descriptions is based upon the Canadian Foundation Engineering Manual, 4th Edition (CFEM 2006), ASTM Standard D2488-09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and ASTM Standard D2487-11 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification Procedure).

4.2.3. Installation and Development

A 152 mm (6 inch) inner diameter, 100-slot, telescopic, stainless steel (standard Johnson 304) screen, was installed from 79.2 m (260 ft.) to 73.1 m (240 ft.) depth. Native materials consisting of coarse sand and fine gravel filled the annular space surrounding the well screen as the 203 mm (8 inch) casing was pulled back to the top of screen at 73.1 m (240 ft.) depth. A 0.61 m (2 ft.) riser was attached above the screen, and a rubber K packer was installed at 72.54 m (238 ft.) depth. See Figure 01 for a schematic diagram of the pumping well installation.

The pumping well was developed by airlifting for 10 hours at a constant rig pressure of 55 psi and 100 RPM. Development started by surging air through the drill rods set at the top of the screen for 45 minutes to remove fine grained material from the screened interval. The air was then released at progressively greater depths down the screen every 0.3 m (1 ft.) for 5 minutes to break up any materials adjacent to the screen, and to ensure good hydraulic communication between the well and the aquifer. The air was then surged back up the screen at the same rate.

The well was surged at a relatively constant air pressure and RPM resulting in a constant discharge at the surface. Water samples were taken with the drill rods set, while surging at the top of the screen until the water was clear with very little visible fine grained materials. The drill rods were then lowered into the well screen as surging continued and water samples were taken every 1.5 m (5 ft.). There was no change in the visible water quality within the screen, and samples were clear with very little visible fine grained materials. The well was surged with air for 30 minutes at the bottom of the screen to “polish” the developed well screen. Samples were taken at 2 minute, 5 minute, 10 minute and 30 minute intervals. All samples showed similar visible fines content and colour. Development was considered complete as there was no apparent improvement in visible fines content or water colour. The drilling logs for the pumping well are provided in Appendix A.

4.3. Monitoring Well

4.3.1. Drilling and Airlift Testing

The drilling and construction of BGC14-018 began on December 4, 2014, and was completed on December 5, 2014. A 254 mm (10 inch) diameter steel surface casing was advanced to a depth of 5.2 m (17 ft.). A 203 mm (8 inch) diameter steel casing was advanced through the 254 mm (10 inch) steel casing to a depth of 80.77 m (265 ft.) using air rotary techniques. Weathered bedrock was encountered at a depth of 80.77 m (265 ft.). The 254 mm (10 inch) diameter steel surface casing was removed and Holeplug 9.5 mm (3/8 inch) bentonite chips were used to fill the annular space between the drill hole wall and the 203 mm (8 inch) casing from 5.2 m (17 ft.) to ground surface.

Air-lifted water was first produced starting at a depth of 59.74 m (196 ft.), but was of insufficient quantity to perform an airlift test. The first airlift test was completed at a depth of 73.15 m

(240 ft.). Airlift testing was performed where possible from 73.15 m (240 ft.) to the end of hole. Results of the airlift testing are provided in Table 3.

4.3.2. Grain Size Analysis

To gain a better understanding of the borehole stratigraphy, grain size analyses were performed in the field sampled collected from BGC14-018. Grain size analyses were also used to determine the optimal slot size for the stainless steel telescopic well screen.

Table 4 presents the D60 and D40 percent passing (by weight) values in millimeters for samples from BGC14-018. The particle size is based on the ASTM D2487 standard. The format of soil descriptions is system is based upon the Canadian Foundation Engineering Manual, 4th Edition (CFEM 2006), ASTM Standard D2488-09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and ASTM Standard D2487-11 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification Procedure).

4.3.3. Installation and Development

A 152 mm (6 inch) inner diameter, 10 slot, telescopic stainless steel screen was installed from 75.0 mm (246 ft.) to 74.1 mm (243 ft.). A 10 slot screen was chosen to limit to the extent practical surrounding fine grained materials from entering the well screen during development. Native materials of coarse sand and fine gravel filled the annular space surrounding the well screen. The 203 mm (8 inch) diameter casing was pulled back to the top of screen at 74.1 m (243 ft.) depth. A 0.61 m (2 ft.) long, 152 mm (6 inch) diameter solid riser pipe was attached above the screen, and a rubber K packer was installed at 73.46 m (241 ft.) depth; see Figure 02 for a schematic of the monitoring well installation.

The monitoring well was developed by airlifting at a rig pressure of 25 psi and 110 RPM. As little air as possible was surged through the well for 30 minutes to avoid pulling fines from above and below the screened materials into the well. Water surged out of the well at a consistent rate of 15 US GPM, similar to the 20 US GPM estimated during airlift testing conducted while drilling and confirming adequate hydraulic connection of the well with the aquifer. The water was medium brown coloured, turbid, and did not improve in clarity during development. Since the well showed good communication with the aquifer, development was stopped after 30 minutes. The drilling log for BGC4-018 is provided in Appendix A.

5.0 HYDROGEOLOGICAL TESTING

Hydrogeological testing, including step rate and constant rate discharges tests, recovery monitoring and groundwater sampling, took place on December 15, 2014, and February 16th to 26th, 2015, and was supported by Aqua Tech Services Inc. (Aqua Tech) staff. During the testing, water levels were monitored manually in BGC14-PW01 using an RST Instruments water level meter supplied by Aqua Tech, and digitally using a M100 Solinst Levelogger (+/- 5 cm accuracy).

Eight additional monitoring wells, including BGC14-018, were monitored manually and digitally using a Solinst water level meter and M10 Solinst Leveloggers (+/- 0.5 cm accuracy). MW11-10S and MW11-10D were monitored with M30 Solinst Leveloggers (+/- 1.5 cm accuracy). A M1.5 Solinst barologger (+/- 0.5 cm H_2O accuracy) located in MW11-10S was used at site to measure changes in barometric pressure during the testing period. Test response data from all leveloggers were compensated using the barologger data.

All Solinst leveloggers and barologgers also record temperature, which is used to automatically compensate the recorded water levels. The temperature accuracy is +/- 0.05°C.

A temporary staff gauge was installed in Peterson Creek (Lower) 24 hours prior to the start of the constant rate test. The locations of the groundwater monitoring wells completed within the surficial deposits, the interpreted PC Aquifer and bedrock and used to monitor the aquifer response to the pumping tests and the location of the temporary staff gauge are listed in Table 5[1] and shown in Drawing 02.

The following sections provide a detailed summary of hydrogeological testing methodologies; results are provided in Section 6.0. A schematic of the pumping test setup is shown in Figure 03.

5.1. Baseline Monitoring

Groundwater elevations in BGC14-018 and the surrounding monitoring wells were monitored and recorded for 24 hours prior to the step rate discharge and constant rate discharge tests conducted in both December 2014 and February 2015, respectively. The purpose of the baseline monitoring was to quantify any pre-test changes in groundwater elevations within the test area and to determine if these changes are correlated to changes in barometric pressure or other influences (such as natural system response to groundwater recharge or discharge, changes in streamflow or effects of other pumping wells).

Baseline groundwater conditions are discussed in the Baseline Groundwater Hydrology Assessment (BGC, 2015). Water levels in the area of the pumping well were considered to be at 'static' levels before both the December 2014 and February 2015 pumping tests. Inspection of the groundwater levels measured before and after the test (Figures 04 and 05) indicates that a general slow groundwater level decline was occurring in the test area; this is interpreted to be due to limited recharge due to winter (i.e. frozen) conditions and is consistent with longer record climate, streamflow and groundwater level monitoring data for the project area (BGC 2015). Data for MW10-11D showed antecedent average declines in groundwater level of 0.002 m/day from December 2011 to March 2012, and an average of 0.0004 m/day for the period December 2013 through February 2014.

[1] Data for MW11-10S indicates that the well has been recovering since 2012. Additionally, the well is considered to be compromised due to clay and silt in the screen. The well was not analyzed as part of the test.

Prior to the step rate test in December 2014, barometric pressure generally increased overnight until approximately an hour prior to the start of pumping in the morning, when the barometric pressure began to decrease. Barometric pressure ranged from 9.315 m H_2O an hour before the step rate test was initiated, to a low of 9.307 m H_20 a couple minutes prior to the beginning of the test. Air temperatures also rose prior to the step test from -7.2 °C to 5.2°C (Figure 04).

Prior to the constant rate discharge test in February 2015, barometric pressure generally increased during the baseline monitoring, from 9.417 H_2O to 9.447 m H_2O. Temperatures increased slightly during the day on February 15, 2015, and decreased overnight from 6.5°C to -12.6°C (Figure 05).

5.2. Step Rate Discharge Pumping Test

The step rate discharge test was conducted at the pumping well to evaluate the maximum sustainable pumping rate for the constant-rate discharge test, the well capacity, and the well efficiency. Based on airlift testing results and observations during airlift development of the pumping well, the maximum sustainable flow rate was predicted to be approximately 300 US GPM.

A 6” Berkeley 7T 500-60, 60 horse power (hp) and up to 500 US GPM pump was installed in BGC14-PW01 to conduct the step discharge test (Appendix B). A check valve is built into the pump to prevent backflow to the well when the pump is switched off. Discharge rates were monitored by a Krohne Digital Magnetic Flow Meter.

The step rate discharge test was conducted on December 15, 2014, beginning at 12:04 pm, and consisted of four pumping steps conducted at increasing discharge rates of 98, 197, 299 and 397 US GPM. The pumping steps were 60 minutes long for the first two pumping rates and 90 minutes for last two rates. The maximum drawdowns obtained at the end of each step were 29.88 m, 32.81 m, 37.13 m, and 41.45 m, respectively. Recovery of the water level was also monitored in the pumping well following the fourth pumping step. Drawdown and recovery data were used to obtain estimates of aquifer properties (see Section 6.1 and Appendix C).

Barometric pressure generally decreased from 9.308 m H_2O to 9.286 m H_2O during the step test (0.02 cm). The effects due to changes in atmospheric pressure appeared to be negligible in comparison to the large observed drawdowns at the pumping well and nearby monitoring wells. Temperature fluctuated in a typical diurnal pattern throughout the step discharge test, rising to a high of 8.6°C and dropping to a low of -1.9°C at the end of the test.

5.3. Step Rate Discharge Test Recovery Monitoring

The pump was shut off on December 15, 2014, at 5:04 pm. Groundwater levels were monitored at the pumping well and observation points from December 15 to 16, 2014, using both dataloggers and manual methods. The recovery of groundwater levels was monitored at the pumping well for 2 hours and 20 minutes, until the water level reached 80% of the pre-test static water level. The pump was removed and the recovery of groundwater levels at the

pumping well and observation wells were monitored by dataloggers until December 16, 2014, at 9:00 am. Full recovery of the pumping well was observed on December 16, 2014, at 9:00 am.

Barometric pressure and temperature continued to decrease from 9.29 m H_2O to 9.28 m H_2O, and -1.9°C to -5.0°C, respectively, during the recovery period.

5.4. Constant Rate Discharge Test

The constant rate discharge test was conducted over a period of 3 days, beginning on February 16, 2015, at 9:11 am and ending on February 19, 2015, at 9:11 am. Based on observations of drawdown and pump performance during the step rate discharge test, and the available discharge area, a maximum sustainable pumping rate of approximately 250 US gpm was estimated for the constant rate discharge test. The pumping rate during the test was monitored simultaneously with depth to water measurements and averaged 251 US gpm. The pumping rate fluctuated between 261 to 246 US gpm during the first 9 hours of the test, and remained between 253 to 248 US gpm for the remainder of the test (Figure 06).

Water levels were monitored in the pumping well (BGC14-PW01) and in eight monitoring wells. The Peterson Creek stream flow was also monitored (Table 5). The totalizer on the pumped well recorded 1,089,938 US gallons discharged during the test. Discharge water was directed to a local depression within the mapped extents of the PC Aquifer for infiltration. The depression is located approximately 1.2 km (3,937 ft.) west of the pumping well (Drawing 02). There was no discernible influence on test data resulting from potential recharge of this water at this location.

Water levels observed at the staff gauge installed on February 15, 2015, at Peterson Creek (Lower) decreased from 0.21 m 24-hours prior to the start of the constant rate test, to 0.14 m approximately 3 hours after the pump was turned off. The water level in the creek continued to decrease to a level of 0.12 m 13 days after the pump was shut off (Figure 07).

Barometric pressure generally decreased from 9.45 m H_2O to 9.35 m H_2O (10 cm) during the constant rate discharge test. The effects on groundwater levels due to changes in atmospheric pressure appeared to be negligible in comparison to the observed drawdowns at the pumping well and nearby monitoring wells. Based on data from MW10-11D, antecedent decline in groundwater levels could be expected to range from 0.001 to 0.006 m. Air temperature fluctuated in a typical diurnal patter throughout the constant rate discharge test, rising to a daytime high of 12.0°C and dropping to an overnight low of -7.1°C.

5.5. Constant Rate Discharge Test Recovery Monitoring

The pump was shut off on February 19, 2015, at 9:11 am. Groundwater levels were monitored manually at the pumping well and monitoring wells for 6 hours after the pump was shut off. The recovery of groundwater levels in the pumping well and monitoring wells was monitored using Solinst Leveloggers until February 26, 2015, at 10:10 am (7 days and 1 hour), until the water level reached 95% of the pre-testing static water level in the pumping well. The pump

was removed and the recovery of groundwater levels at the pumping well and observation wells were monitored by dataloggers until March 3, 2015.

Recovery percentages as of March 3, 2015 for the pumping well and all monitoring wells are shown in Figure 05. The influence of atmospheric pressure changes on groundwater elevation during this period was considered negligible. Based on the MW10-11D pre-test data, a decline on the order of 0.03 m in groundwater levels was possible over the course of the testing period, so complete recovery to pre-test static levels in the short term was not expected

It is noted that a decline in water levels continued in BGC13-021, BGC13-022, DH14-057, and BGC14-005 after the pumping ceased (Figure 05). BGC14-005 began to recover approximately 4 hours after the pump was shut off; DH14-057 began to recover approximately 8 hours after the pump was shut off. BGC13-021 and BGC13-022 continued to decline after the pump was shut off, while groundwater levels in both wells appear to begin to stabilize approximately 3 days after pumping ceased; however, recovery of water levels in these wells was not evident during the monitored recovery period. Review of ongoing groundwater level fluctuations with time at these locations may help to evaluate if the cause of the incomplete recovery is due to slow decline in groundwater levels from seasonal decline of groundwater levels, and/or dewatering of the aquifer, or overlying (i.e. local confining layer or 'aquitard') materials, by the test.

5.6. Water Quality Samples

Three groundwater samples were collected during the constant rate discharge test by KAM field staff. The first sample was collected at the start of pumping on February 16, 2015, at 10:35 am. The second and third samples were collected after 1.2 days and 2.2 days of pumping on February 17, 2015, at 3:15 pm and February 18, 2015, at 3:15 pm, respectively. All samples were shipped in coolers chilled with ice packs the same day of collection to ALS Environmental Services (ALS) in Burnaby, BC.

The samples were analyzed for electrical conductivity (EC), hardness (as $CaCO_3$), pH, total suspended solids (TSS), total dissolved solids (TDS), turbidity, alkalinity, ammonia, bromide, chloride, fluoride, nitrate, nitrite, total Kjeldahl nitrogen, orthophosphate, total and dissolved phosphorus, sulphate, cyanides, total organic carbon (TOC), and total and dissolved metals. The dissolved metals, and dissolved mercury portion of the sample was filtered in the field using a single use, disposable 0.45 micron filter and subsequently preserved for shipping. Preservatives were also added to total metals, cyanide, total mercury, and TOC samples.

Additionally, manual measurements of pH, temperature, dissolved oxygen (DO), oxidation-reduction potential (ORP), specific conductivity, EC, TDS, salinity, and turbidity of the discharge were collected concurrently with sample collection using a YSI Sonde EXO2 multi-parameter instrument (Table 6). Water quality results are provided in Section 6.5.

6.0 ANALYSIS

6.1. Well Efficiency and Specific Capacity

The Hantush-Bierschenk well loss solution was used to analyze the results of the step rate test (Hantush, 1954). The pumping well efficiency was estimated to be an average of 92% and specific capacity averaged over the step rate test was 202 m^3/day/m (Table 7).

6.2. Conceptual Hydrogeologic Model

Based on the available data, in the area of the test, the PC Aquifer is considered to be best conceptualized as either an unconfined heterogeneous, sand and gravel, channel aquifer overlying a bedrock aquifer, or a discontinuous leaky confined or semi-confined (by overlying till and fine grained sediments which supply leakage to the PC Aquifer) heterogeneous, sand and gravel, channel aquifer overlying a bedrock aquifer.

Pre-test groundwater elevations measured in the wells completed in overlying till and diamicton (BGC13-021 and BGC13-022) and in bedrock (BGC14-004, BGC14-005 and DH14-057) are greater than pre-test groundwater elevations in the wells completed deeper in the interpreted PC Aquifer (BGC14-PW01, BGC14-018, and MW11-10D). This suggests that both the bedrock aquifer and zones of the overlying sediments recharge the PC Aquifer, at least near the test well location (Table 5).

6.3. Hydrogeologic Parameters

Estimates of aquifer hydraulic conductivity and storage were made using drawdown data for both step rate and constant rate discharge tests, as well as for available residual drawdown data obtained from recovery monitoring. Hydraulic conductivity, K, and storage coefficient, S, for the PC Aquifer were determined from the drawdown and recovery data from the constant rate discharge test using the Theis (1935) and Copper-Jacob (1946) solutions for unconfined aquifers.

The analyses were carried out using AQTESOLV, version 4.50 (HydroSOLVE, 2007), an industry standard software package for the design and analysis of aquifer tests. Best-fit results for these solutions are summarized in Table 8. Detailed data analyses including curve fits for both the drawdown and recovery portion of the test are provided in Appendix C. Based on these results, the best-fit solutions for K in the PC Aquifer (i.e., ignoring solutions for wells BGC14-004, BGC14-005 and DH14-057 completed in bedrock and for BGC13-021 and BGC13-022 completed in Till/Diamicton) range from 2 x 10^{-5} to 4 x 10^{-5} m/s; with the best estimate of K being 3 x 10^{-5} m/s based on the geometric mean of these solutions (Table 8). The range in the results presented reflects the heterogeneity of the aquifer. S in the sand aquifer is estimated to be approximately 8 x 10^{-3}, however, results ranged from 6 x 10^{-4} to 9- x 10^{-2}.

Based on the results, vertical drainage from desaturation of the unconfined aquifer during pumping, or from vertical leakage from overlying low permeability materials, is interpreted to

have occurred during the pumping period, and therefore interpretation of Theis and Cooper-Jacob solutions focused on the late time response signatures. Derivative curves suggest that slow drainage had dissipated towards the end of the test in most wells (as indicated by the leveling off of the derivative curve at late time). However, in some instances recharge from leakage was indicated. A longer pumping test period may provide better estimates of S.

Significant drawdown was observed in the wells screened in bedrock (BGC14-004, BGC14-005, and DH14-057), suggesting that there is an efficient connection between the aquifer sediments and the upper weathered bedrock.

6.4. Hydrogeologic Boundaries

The results of the 3-day constant rate discharge test do not indicate a direct hydraulic connection with nearby surface water sources (i.e., Peterson Creek), however as discussed above some of the observed well responses indicate the presence of leakage from lower permeability materials confining, or locally confining the aquifer and/or slow drainage from drawdown of the water table in an unconfined aquifer setting. A similar effect could be derived from a nearby surface water source. To investigate the influence of barriers and recharge boundaries on the pumping test results interpretation, the boundaries feature available in AQTESOLV was utilized. Solutions for MW11-10D using the Theis solution (i.e. no leakage) and the Hantush solution (vertical leakage; Hantush 1960) with no flow boundaries placed 50 m north and 50 m south of the pumping well and aligned roughly parallel with the Peterson Creek channel are included in Appendix C. The results of this analysis suggest that a best-fit solution to the pumping test observations will likely involve some form of no flow (or limited flow) boundary (or boundaries) consistent with a channel aquifer bounded by lower hydraulic conductivity materials and some form of leakage (e.g., recharge from an overlying saturated lower permeability unit, or from an underlying bedrock aquifer, or both). This interpretation is consistent with the conceptual hydrogeologic model for the PC Aquifer discussed above.

A distance-drawdown plot and the maximum drawdown in each monitored well for the constant rate discharge test are shown on Figure 08. However, the radius of influence for the test was not estimated from this data due to heterogeneous nature and limited lateral extents of the aquifer in the north-south direction.

Peterson Creek (Lower) drains into the South Thompson River, approximately 8 km downstream of the Ajax Project, which drains westward into Kamloops Lake (Knight Piesold, 2013a). The Thompson River Water Survey of Canada (08LF023) gauge station is located approximately 500 m downstream of the confluence of the South and North Thompson River. Data from the station for the period from February 15, 2015 to March 3, 2015 (i.e., during the constant rate discharge test) is presented in Figure 07. A decreasing trend is observed during the time period of the constant rate pumping test at the gauge station. This suggests that the creeks and rivers in the region are declining in response to reduced infiltration consistent with seasonal precipitation patterns in the project area. Additionally, water chemistry samples from PC Aquifer do not show a Peterson Creek signature (Section 6.5). Therefore, the decreasing

trend observed at the temporary staff gauge at Peterson Creek is not interpreted to be in response to influence from the pumping tests.

6.5. Water Quality

Analyses of groundwater samples collected during the constant-discharge test are summarized in Table 9. Laboratory reports are provided in Appendix D. Overall, the analytical results were similar between the samples (i.e., water quality did not change over the duration of the pumping test) (Figure 09). The groundwater composition can be described as calcium-magnesium-sodium-sulphate type, neutral in pH, with TDS ranging from 2,290 to 2,430 mg/L.

The results of the testing were compared to the generic numerical water standards for aquatic life under the British Columbia government Contaminated Sites Regulation (CSR) Environmental Management Act (Schedule 6, December 1996 includes amendments up to B.C. Reg. 4/2014, January 31, 2014). Analyte concentrations were below the CSR AW freshwater standards, with the exception of sulphate. The CSR freshwater aquatic life water quality standard for dissolved sulphate is 1,000 mg/L. Sulphate concentrations in the samples collected on February 16th, 17th, and 18th, were 1,500, 1,460, and 1,430 mg/L, respectively.

The overall water quality results are consistent with water quality results obtained from MW11-10D, which is screened at a similar depth and in similar materials as BGC14-PW01. Water quality results from BGC14-PW01 had slightly lower TDS, TSS, Sulphate, and Calcium, and slightly higher alkalinity than MW11-10D (Knight Piesold, 2013b).

Groundwater samples were also compared to Peterson Creek surface water samples collected by Knight Piesold (2015) at station PC02.5 (Drawing 02). Hardness, alkalinity, specific conductance, and total dissolved solids values in samples collected from this station have demonstrated seasonal variability (Knight Piesold, 2015), therefore samples were compared to the March 14, 2014 surface water samples. No surface water samples were collected by Knight Piesold in January or February of 2014.

Short term groundwater pumping of the PC Aquifer has a different signature than Peterson Creek (Figure 10). Sulphate concentrations are lower in surface water than in groundwater samples (19% in comparison to 40%). Chloride and potassium have a 3% to 4% higher signature in surface water compared to groundwater samples. Alkalinity is higher in surface water (25%) compared to groundwater samples (7% to 8%). Calcium, magnesium and sodium show similar percentages in both surface water and groundwater samples. Based on these observations, the influence of surface water on the pumping test discharge water quality would therefore be expected to manifest as increasing alkalinity and decreasing sulphate concentrations in the pump discharge water quality. Groundwater quality results indicate no influence of surface water on the discharge water quality for the short duration of pumping.

Analyte concentrations reported for surface water in Figure 10 were below the CSR AW standards for protection of freshwater aquatic life.

7.0 CONCLUSIONS

The main conclusions from the hydrogeological testing program are as follows:

- Based on the pumping test results, the best estimate of the PC Aquifer K is 3×10^{-5} m/s with best-fit solutions between the pumping well and individual monitoring points ranging from 2×10^{-5} m/s to 4×10^{-5} m/s. The range observed in the best-fit solutions is indicative of the heterogeneity of the aquifer. Preliminary estimates for aquifer S varied from 6×10^{-4} to 9×10^{-2} with a best estimate of 8×10^{-3}.
- The analysis of the test results is consistent with the values used for the aquifer during the numerical groundwater flow model calibration process (K of 1.4×10^{-5} m/s, S of 1×10^{-3}), and demonstrates that the hydrogeologic character of the aquifer is well represented at the scale of the numerical modeling performed for the EA (i.e. the pumping test stressed a portion of the aquifer, and the best estimate parameters from this test are within the range of sensitivity studies considered for the aquifer in the modeling study).
- The results of the airlift testing during drilling of BGC14-PW01, indicate that the aquifer may yield flow rates of up to 250 US gpm. The constant rate discharge test demonstrated that the pumping well was capable of producing approximately 251 US gpm over the course of approximately three days.
- The PC Aquifer is best conceptualized as either an unconfined, discontinuous leaky confined or a semi-confined heterogeneous, sand and gravel, channel aquifer overlying a bedrock aquifer.
- The groundwater quality of the dewatering well indicates that groundwater may not be acceptable for direct discharge to the receiving surface water environments due to elevated sulphate concentrations. The overall groundwater quality results are consistent with water quality results previously obtained from MW11-10D.
- The pumping test was deliberately conducted in close proximity to Peterson Creek in order to assess the creek's significance as a potential recharge boundary. While the creek water levels declined during the test, this is more likely attributable to seasonal decline in surface water flows than to a direct response to the pumping test. In addition, water quality analyses of samples collected from the pumping well during the constant rate discharge test suggest that there was no influence of surface water on the discharge water quality for the short duration of pumping.

8.0 CLOSURE

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Yours sincerely,

BGC ENGINEERING INC.
per:

Laura Maharaj, M.Sc., P.Geo. (ON)
Hydrogeologist

Reviewed by:

Trevor Crozier, M.Eng. P.Eng. (ON, BC)
Principal Hydrogeological Engineer

CK/TWC/vc/bm

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TABLES

Table 1: Air Lift Test Results for BGC14-PW01

Air lift Test No.	1	2	3	4	5
Date and Time	12/2/2014 14:30	12/2/2014 15:00	12/3/2014 7:30	12/3/2014 8:00	12/3/2014 8:30
Depth of Air lift test (ft bg)	220	235	250	256	264
Depth of Air lift test (m bg)	67.1	71.6	76.2	78	80.5
Duration of Air lifting prior to test	5 minutes	5 minutes	5 minutes	5 minutes	5 minutes
Colour of discharge prior to test	Brown	Brown	Light Brown	Light Brown	Light Brown
Air lifting Rig Pressure (PSI)	50	50	100	100	100
Rig RPM	1200	1200	1200	1200	1200
Rods spinning (Y/N)	N	N	N	N	N
Rods off bottom of hole (Y/N)	Y	Y	Y	Y	Y
Average Q (US gpm)	20	7	100	70	38

Table 2: D40 and D60 Sieve Analysis of BGC14-PW01 Samples

Sample Depth (ft)	Sample Depth (m)	D60 (mm, approx.)	D40 (mm, approx.)	D60 Description	D40 Description
220	67	5.1	3	FG	CS
225	69	6	2	FG	MS
230	70	7	4.5	FG	FG
235	72	2.7	1.3	CS	< MS
240	73	4.75	2.5	CS	CS
245	75	4	2.3	CS	MS
250	76	5.8	3.2	FG	CS
255	78	4.5	2.5	CS	CS
260	79	4.75	2.6	CS	CS
264	80	5	3.3	FG	CS

Notes: 1) FG = Fine gravel, CS = Coarse sand, MS = Medium sand

2) The smallest sieve was a #20 (0.84 mm), therefore particles smaller than a MS were not segregated for descriptive purposes.

Table 3: Air Lift Test Results for BGC14-018

Air lift Test No.	1	2	3
Date and Time	12/5/2014 9:00	12/5/2014 9:30	12/5/2014 11:00
Depth of Air lift test (ft bg)	240	250	265
Depth of Air lift test (m bg)	73.2	76.2	80.8
Duration of Air lifting prior to test	5 minutes	5 minutes	5 minutes
Colour of discharge prior to test	Brown	Brown	Light Brown
Air lifting Rig Pressure (PSI)	50	50	100
Rig RPM	1200	1200	1200
Rods spinning (Y/N)	N	N	N
Rods off bottom of hole (Y/N)	Y	Y	Y
Average Q (US gpm)	20	10	3.6

Table 4: D40 and D60 Sieve Analysis of BGC14-018 Samples

Sample Depth (ft)	Sample Depth (m)	D60 (mm, approx.)	D40 (mm, approx.)	D60 Description	D40 Description
140	43	8	6	FG	FG
150	46	5.75	3.75	FG	CS
160	49	2.25	<0.85	CS	< MS
170	52	<0.85	<0.85	< MS	< MS
180	55	<0.85	<0.85	< MS	< MS
190	58	<0.85	<0.85	< MS	< MS
196	60	3	1.75	CS	MS
200	61	6.5	2.75	FG	CS
205	62	5.5	3.25	FG	CS
210	64	7	4	FG	CS
215	66	1.5	<0.85	MS	< MS
220	67	<0.85	<0.85	< MS	< MS
225	69	<0.85	<0.85	< MS	< MS
230	70	0.85	<0.85	MS	< MS
235	72	4	3	CS	CS
240	73	5	2.5	CS/FG	CS
245	75	5	2.5	CS/FG	CS
250	76	2	<0.85	CS	< MS
255	78	2.5	1.5	CS	MS
260	79	2.75	1.5	CS	MS
265	81	3.5	1.75	CS	MS

Notes: 1) FG = Fine gravel, CS = Coarse sand, MS = Medium sand

2) The smallest sieve was a #20 (0.84 mm), therefore particles smaller than a MS could not be detected.

Table 5: Groundwater Monitoring Network for Variable and Constant Rate Tests

Well ID	Easting (m) NAD83 UTM Zone 10	Northing (m) NAD83 UTM Zone 10	Bedrock Depth (m bgs)	Monitoring Interval (Sand Pack)	Screened Interval (m bgs)	Screened Material	Hole Depth (m bgs)	Radial Distance from BGC14-PW01 (m)	Groundwater Elevation prior to Constant Rate test (m asl) February 15, 2015
Peterson Creek Staff Gauge	687552	5609280	-	-	-	-	-	189	-
BGC13-021	687756	5609524	-	8.5-13.3	9.2-12.2	SILTY SAND/SAND	42.7	282	862.5
BGC13-022	687168	5609516	-	13.1-17.7	13.7-16.8	CLAY AND GRAVEL	54.3	319	862.7
MW11-10S	687494	5609466	-	19.4 - 28.3	20.2 - 23.2	SILT AND GRAVEL	24.4	9	864.1
BGC14-PW01	687482	5609957	80.5	73.2 – 79.2	73.2 – 79.2	SAND AND GRAVEL	80.5	-	860.6
BGC14-018	687489	5609453	80.8	74.1 – 75.0	74.1 – 75.0	SAND AND GRAVEL	80.8	8	857.7
MW11-10D	687493	5609464	82.9	73.0-81.4	76.2-79.2	SAND AND GRAVEL	85.0	13	860.7
BGC14-004	687746	5609526	43.3	68.3-78.3	72.2-78.3	BEDROCK	78.3	273	863.8
BGC14-005	687161	5609519	63.7	46.0-50.5	47.2-50.5	BEDROCK	50.5	326	862.2
DH14-057	687035	5609442	36.5	35.7 – 40.4	36.5 – 39.5	SAND AND GRAVEL/ BEDROCK	46.1	447	861.3

Notes: 1) Manual and logger measurements in MW11-10S were interpreted to be compromised due to clay in the well screen and were not analyzed as part of the test.

Table 6: Field Chemistry Parameters from BGC14-PW01

Parameter	Unit	Date and Time			PC02.5[1]
		2/16/15 10:35 AM	2/17/15 3:15 PM	2/18/15 3:15 PM	3/13/2014
DO Calibration	%	92.3	90.3	90.4	-
Temperature	°C	10.0	9.2	9.6	0.008
Specific Conductivity	mS/cm	1.87	1.80	1.78	491
Conductivity	mS/cm	2.61	2.58	2.53	257
Total Dissolved Solids (TDS)	g/L	1.70	1.68	1.64	0.32
Salinity	ppt	1.36	1.34	1.31	0.23
Dissolved Oxygen	%	27.5	25	24	76.6
Dissolved Oxygen	mg/L	2.07	2.86	2.70	11.10
pH	-	7.74	7.75	7.75	7.76
Oxidation Reduction Potential (ORP)	mV	20.1	690.7	38.7	50.1
Turbidity	NTU	2.23	1.02	0.55	-

Notes: 1) Water Quality for surface water station PC02.5 from Knight Piesold Ltd., (2015), Ajax Project Baseline Water Quality Report. May 27, 2015.

Table 7: Specific Capacity and Well Efficiency during Step Rate Test in BGC14-PW01

Step	Yield, Q		H-B[1] Drawdown, s		Specific Capacity, Q/s		Well Efficiency
	(usgpm)	(m^3/d)	(ft)	(m)	(gpm/ft)	(m^3/d/m)	%
1	98	534	8.0	2.5	12.2	214	97%
2	196.5	1071	16.7	5.2	11.8	206	93%
3	298.9	1629	26.9	8.4	11.1	194	90%
4	397.05	2164	35.9	11.2	11.1	193	87%
					Average:	**202**	**92%**

Notes: 1) Drawdown calculated using the Hantush-Bierschenk method, Hantush (1964).

Table 8: Constant Rate Discharge Test Analysis Summary

Observation Well	Screened Unit	Distance from BGC14-PW01 (m)	Levelogger Elevation (m asl)	Step Test					Constant Rate Test			
				T (m^2/s)	K (m/s)	S (-)	Ss (m^{-1})	Analysis Method	T (m^2/s)	K (m/s)	S (-)	Analysis Method
BGC13-021	Till/Diamicton	282	862.1	N/A	N/A	N/A	N/A	N/A	5E-03	1E-04	1E-02	Copper-Jacob (1946)
BGC13-022		319	862.1	N/A	N/A	N/A	N/A	N/A	1E-03	2E-05	3E-02	Theis (1935)
BGC14-018	PC Aquifer - Sand and Gravels	8	847.6	N/A	N/A	N/A	N/A	N/A	1E-03	2E-05	9E-02	Theis (1935)
MW11-10D		13	849.3	N/A	N/A	N/A	N/A	N/A	1E-03	2E-05	1E-02	Theis (1935)
BGC14-PW01		-	821.6	1.5E-02	2.7E-04	1E-02	2E-04	Theis (1935)	2E-03	4E-05	6E-04	Copper-Jacob (1946)
BGC14-004	Bedrock	273	859.4	N/A	N/A	N/A	N/A	N/A	8E-04	2E-05	2E-05	Theis (1935)
BGC14-005		326	851.3	N/A	N/A	N/A	N/A	N/A	1E-03	2E-05	1E-03	Theis (1935)
DH14-057*		447	846.6	N/A	N/A	N/A	N/A	N/A	3E-03	6E-05	2E-03	Copper-Jacob (1946)
Geomean (PC Aquifer)[3]									1E-03	3E-05	8E-03	
Maximum (PC Aquifer)									2E-03	4E-05	9E-02	
Minimum (PC Aquifer)									1E-03	2E-05	6E-04	

Notes: 1) K - hydraulic conductivity, S - Storage Coefficient, Ss - Specific Storage; PC Aquifer thickness for interpretation was 53.13 m.

2) m - metres, m asl - metres above sea level, m/s metres per second, "-" dimensionless parameter

3) Summary statistics and means consider only results from wells completed in the PC aquifer, including BGC14-018, BGC14-PW01, and MW11-10D.

* The well screen is completed in the bedrock aquifer, and the sand pack installed around the standpipe screen partially intersects the PC aquifer.

Table 9: Constant Rate Discharge Test Groundwater Quality Results

Analyte	Units	Detection Limit	CSR Freshwater Aquatic Life Standard	Sample No. 1 16-Feb-15 10:35 am	Sample No. 2 17-Feb-15 3:15 pm	Sample No. 3 18-Feb-15 3:15 pm
Physical Tests						
Conductivity	µS/cm	2.0	--	2560	2570	2500
Hardness (as CaCO3)	mg/L	0.50	--	1530	1500	1390
pH	pH	0.10	--	7.95	7.93	7.97
Total Suspended Solids	mg/L	3.0	--	<3.0	<3.0	<3.0
Total Dissolved Solids	mg/L	20	--	2370	2430	2290
Turbidity	NTU	0.10	--	1.88	2.04	1.90
Anions and Nutrients						
Alkalinity, Bicarbonate (as CaCO3)	mg/L	1.0	--	264	274	286
Alkalinity, Carbonate (as CaCO3)	mg/L	1.0	--	<1.0	<1.0	<2.0
Alkalinity, Hydroxide (as CaCO3)	mg/L	1.0	--	<1.0	<1.0	<2.0
Alkalinity, Total (as CaCO3)	mg/L	1.0	--	264	274	286
Ammonia, Total (as N)	mg/L	0.0050	11.3 (pH 7.5 - 8.0)	0.0410	0.0364	0.0346
Bromide (Br)	mg/L	1.0	--	<1.0	<1.0	<1.0
Chloride (Cl)	mg/L	10	1500	<10	<10	<10
Fluoride (F)	mg/L	0.030	3 (Hardness > 50 ug/L)	0.195	0.191	0.186
Nitrate (as N)	mg/L	0.10	400	<0.10	<0.10	<0.10
Nitrite (as N)	mg/L	0.020	0.2 (Cl < 2 mg/L)	<0.020	<0.020	<0.020
Total Kjeldahl Nitrogen	mg/L	0.050		0.207	0.199	0.192
Orthophosphate-Dissolved (as P)	mg/L	0.0010	--	0.0048	0.0055	0.0070
Phosphorus (P)-Total Dissolved	mg/L	0.0020	--	0.0060	0.0052	0.0063
Phosphorus (P)-Total	mg/L	0.0020	--	0.0140	0.0147	0.0149
Sulfate (SO4)	mg/L	6.0	1000	**1500**	**1460**	**1430**
Cyanides						
Cyanide, WAD	mg/L	0.0050	0.05	<0.0050	<0.0050	<0.0050
Cyanide, Total	mg/L	0.0050	--	<0.0050	<0.0050	<0.0050
Cyanide, Free	mg/L	0.0050	--	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon						
Total Organic Carbon	mg/L	0.50	--	3.44	3.46	3.46

Table 9: Constant Rate Discharge Test Groundwater Quality Results

Analyte	Units	Detection Limit	CSR Freshwater Aquatic Life Standard	Sample No. 1 16-Feb-15 10:35 am	Sample No. 2 17-Feb-15 3:15 pm	Sample No. 3 18-Feb-15 3:15 pm
Total Metals						
Aluminum (Al)-Total	mg/L	0.0030	--	0.0036	<0.0030	<0.0030
Antimony (Sb)-Total	mg/L	0.00010	--	0.00022	<0.00010	0.00011
Arsenic (As)-Total	mg/L	0.00010	--	0.00615	0.00584	0.00568
Barium (Ba)-Total	mg/L	0.000050	--	0.00821	0.00783	0.00781
Beryllium (Be)-Total	mg/L	0.00010	--	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Total	mg/L	0.00050	--	<0.00050	<0.00050	<0.00050
Boron (B)-Total	mg/L	0.010	--	0.071	0.068	0.072
Cadmium (Cd)-Total	mg/L	0.000010	--	0.000149	0.000041	0.000037
Calcium (Ca)-Total	mg/L	0.050	--	245	250	238
Chromium (Cr)-Total	mg/L	0.00010	--	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Total	mg/L	0.00010	--	0.00034	0.00019	0.00017
Copper (Cu)-Total	mg/L	0.00050	--	0.00336	0.00291	0.0133
Iron (Fe)-Total	mg/L	0.010	--	0.322	0.323	0.308
Lead (Pb)-Total	mg/L	0.000050	--	0.000498	0.000259	0.000428
Lithium (Li)-Total	mg/L	0.00050	--	0.00964	0.00951	0.00959
Magnesium (Mg)-Total	mg/L	0.10	--	206	215	201
Manganese (Mn)-Total	mg/L	0.000050	--	0.280	0.247	0.229
Mercury (Hg)-Total	mg/L	0.000010	--	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total	mg/L	0.000050	--	0.0231	0.0226	0.0253
Nickel (Ni)-Total	mg/L	0.00050	--	0.00155	0.00118	0.00107
Phosphorus (P)-Total	mg/L	0.050	--	<0.050	<0.050	<0.050
Potassium (K)-Total	mg/L	0.10	--	14.8	15.9	14.3
Selenium (Se)-Total	mg/L	0.00010	--	0.00431	0.00209	0.00169
Silicon (Si)-Total	mg/L	0.050	--	12.6	13.1	12.5
Silver (Ag)-Total	mg/L	0.000010	--	<0.000010	<0.000010	0.000017
Sodium (Na)-Total	mg/L	0.050	--	147	142	139
Strontium (Sr)-Total	mg/L	0.00020	--	1.83	1.71	1.99
Sulfur (S)-Total	mg/L	0.50	--	483	489	464
Thallium (Tl)-Total	mg/L	0.000010	--	0.000018	<0.000010	<0.000010
Tin (Sn)-Total	mg/L	0.00010	--	<0.00010	<0.00010	0.00014
Titanium (Ti)-Total	mg/L	0.010	--	<0.010	<0.010	<0.010
Uranium (U)-Total	mg/L	0.000010	--	0.00436	0.00431	0.00472
Vanadium (V)-Total	mg/L	0.0010	--	0.0026	0.0019	0.0019
Zinc (Zn)-Total	mg/L	0.0030	--	0.107	0.0332	0.0410
Dissolved Metals						
Dissolved Mercury Filtration Location	--	--	--	FIELD	FIELD	FIELD
Dissolved Metals Filtration Location	--	--	--	FIELD	FIELD	FIELD
Aluminum (Al)-Dissolved	mg/L	0.0010	--	0.0016	0.0013	0.0022
Antimony (Sb)-Dissolved	mg/L	0.00010	0.2	0.00021	<0.00010	<0.00010
Arsenic (As)-Dissolved	mg/L	0.00010	0.05	0.00610	0.00589	0.00594
Barium (Ba)-Dissolved	mg/L	0.000050	10	0.00848	0.00814	0.00808
Beryllium (Be)-Dissolved	mg/L	0.00010	0.053	<0.00010	<0.00010	<0.00010
Bismuth (Bi)-Dissolved	mg/L	0.00050	--	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved	mg/L	0.010	50	0.081	0.079	0.071
Cadmium (Cd)-Dissolved	mg/L	0.000010	--	0.000129	0.000038	0.000034
Calcium (Ca)-Dissolved	mg/L	0.050	--	253	245	237

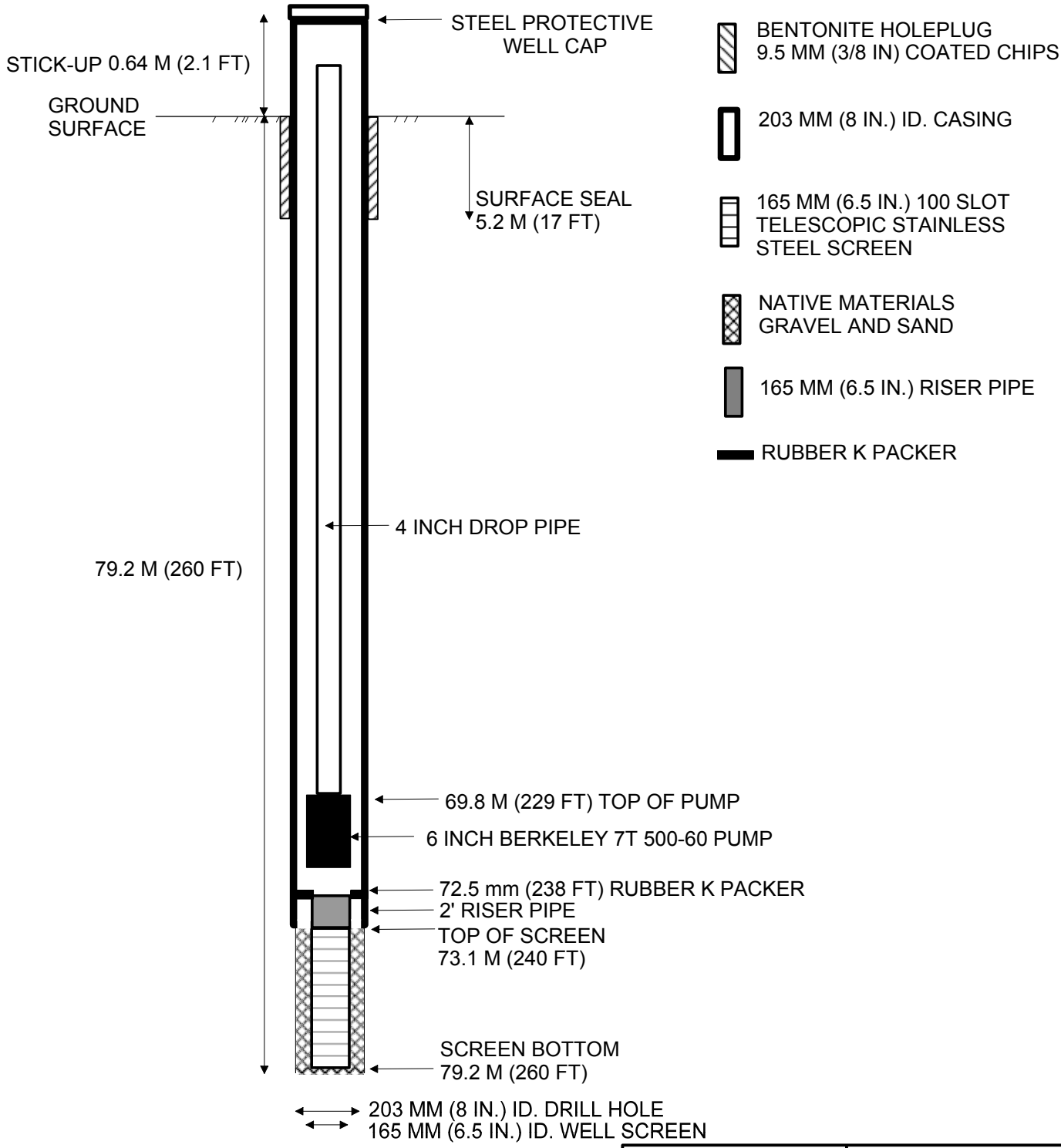
Table 9: Constant Rate Discharge Test Groundwater Quality Results

Analyte	Units	Detection Limit	CSR Freshwater Aquatic Life Standard	Sample No. 1 16-Feb-15 10:35 am	Sample No. 2 17-Feb-15 3:15 pm	Sample No. 3 18-Feb-15 3:15 pm
Chromium (Cr)-Dissolved	mg/L	0.00010	0.01	<0.00010	<0.00010	<0.00010
Cobalt (Co)-Dissolved	mg/L	0.00010	0.04	0.00033	0.00019	0.00017
Copper (Cu)-Dissolved	mg/L	0.00020	0.09	0.00267	0.00221	0.00278
Iron (Fe)-Dissolved	mg/L	0.010	--	0.273	0.307	0.299
Lead (Pb)-Dissolved	mg/L	0.000050	0.11	0.000386	0.000231	0.000285
Lithium (Li)-Dissolved	mg/L	0.00050	--	0.0112	0.0112	0.00988
Magnesium (Mg)-Dissolved	mg/L	0.10	--	218	216	194
Manganese (Mn)-Dissolved	mg/L	0.000050	--	0.270	0.239	0.221
Mercury (Hg)-Dissolved	mg/L	0.000010	0.001	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved	mg/L	0.000050	10	0.0253	0.0251	0.0246
Nickel (Ni)-Dissolved	mg/L	0.00050	1.5	0.00157	0.00116	0.00118
Phosphorus (P)-Dissolved	mg/L	0.050	--	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	0.10	--	16.1	15.7	14.5
Selenium (Se)-Dissolved	mg/L	0.00010	0.01	0.00432	0.00212	0.00174
Silicon (Si)-Dissolved	mg/L	0.050	--	13.0	12.7	12.3
Silver (Ag)-Dissolved	mg/L	0.000010	0.015	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved	mg/L	0.050	--	140	136	143
Strontium (Sr)-Dissolved	mg/L	0.00020	--	2.14	2.04	1.98
Sulfur (S)-Dissolved	mg/L	0.50	--	484	464	437
Thallium (Tl)-Dissolved	mg/L	0.000010	0.003	<0.000010	<0.000010	<0.000010
Tin (Sn)-Dissolved	mg/L	0.00010	--	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved	mg/L	0.010	1	<0.010	<0.010	<0.010
Uranium (U)-Dissolved	mg/L	0.000010	3	0.00499	0.00525	0.00503
Vanadium (V)-Dissolved	mg/L	0.0010	--	0.0024	0.0018	0.0017
Zinc (Zn)-Dissolved	mg/L	0.0010	--	0.0694	0.0295	0.0322

Notes: 1) Detection limit adjusted due to sample matrix effects in underlined values.

2) Bolded value - Analyte exceeds the CSR Freshwater Aquatic Life Standard.

FIGURES



SCALE: NOT TO SCALE	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

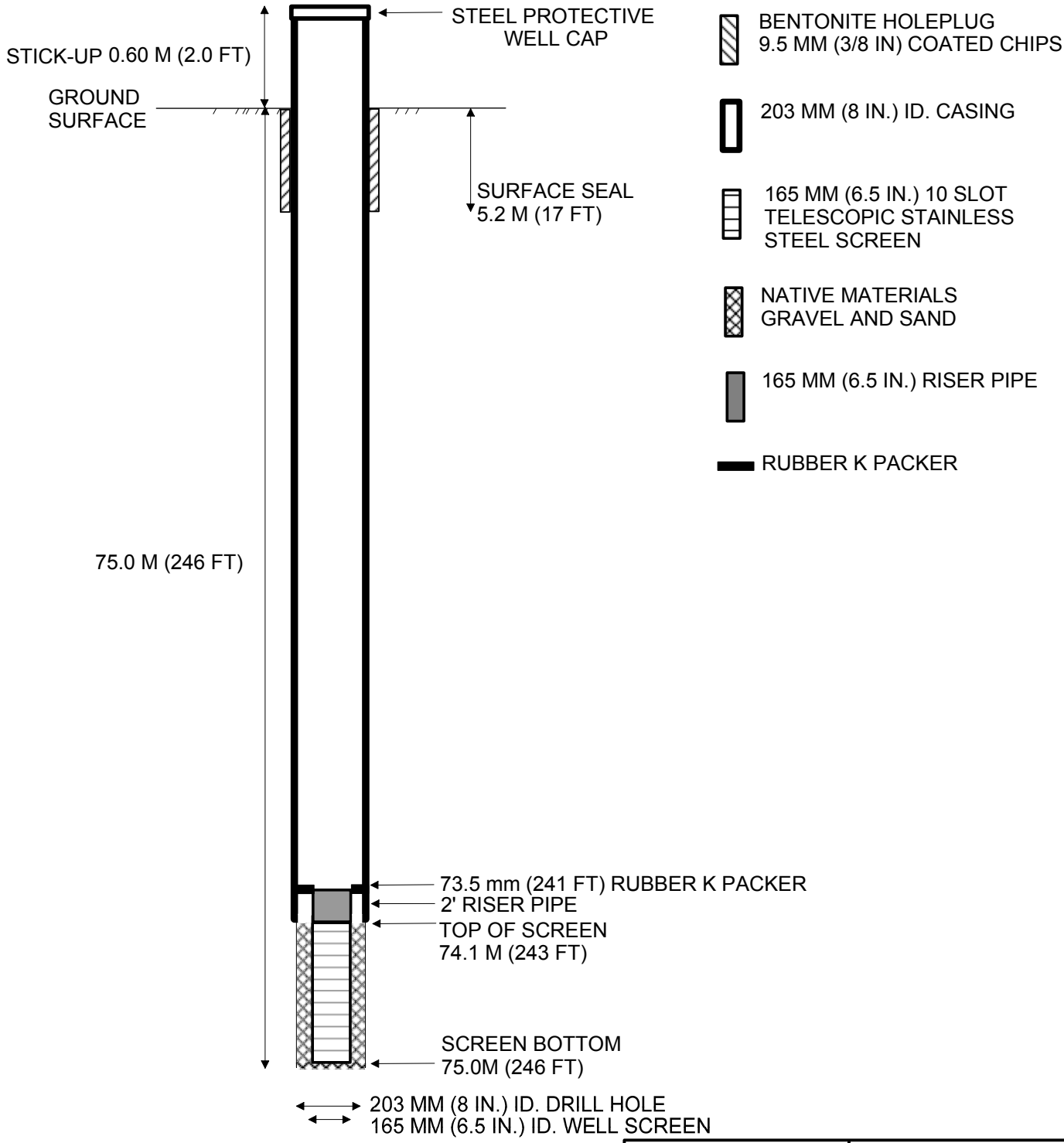
CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: PUMPING WELL COMPLETION SCHEMATIC

FIG No.: 01

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures



SCALE: NOT TO SCALE	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

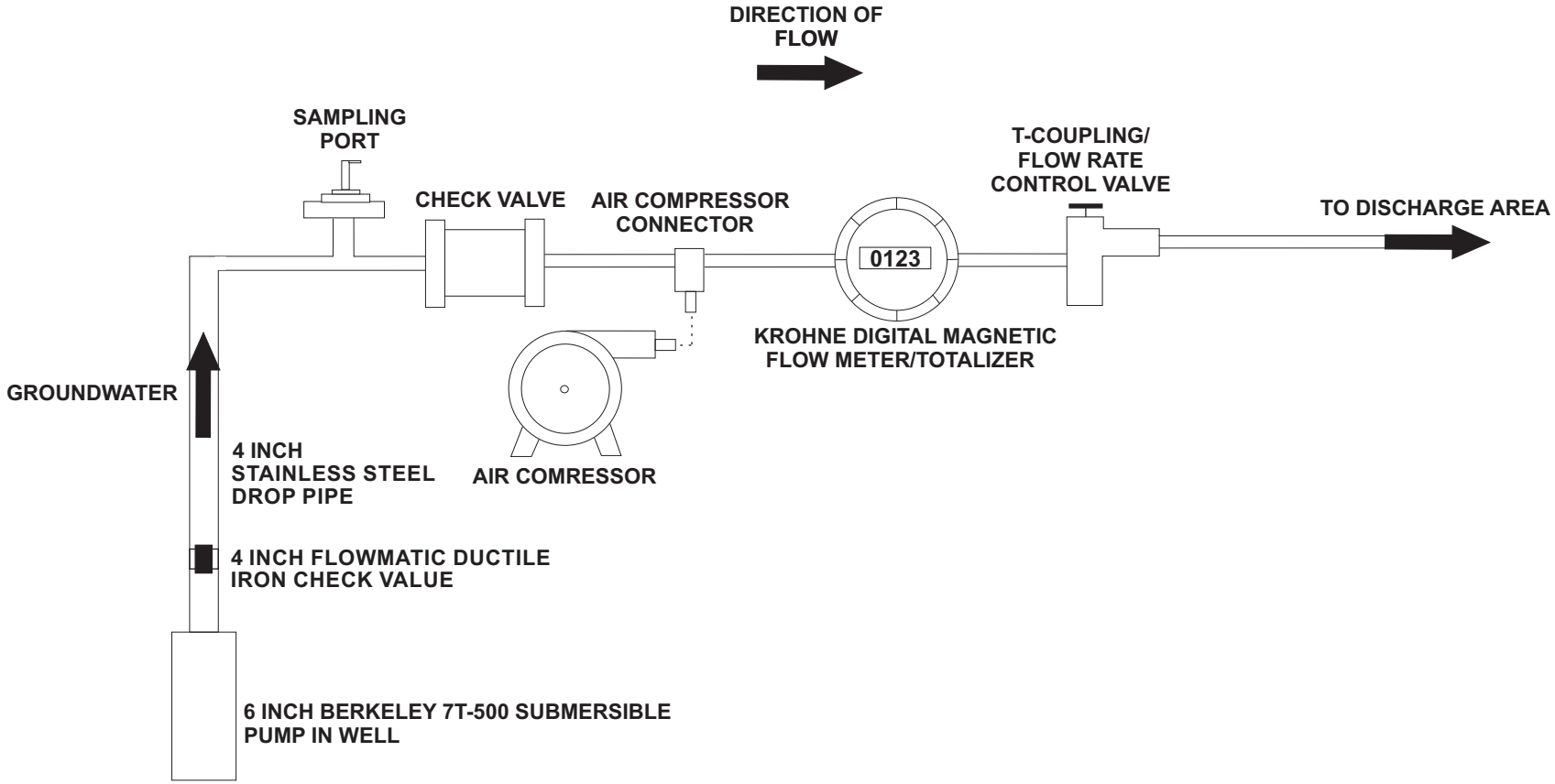
CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: MONITORING WELL COMPLETION SCHEMATIC

FIG No.: 02

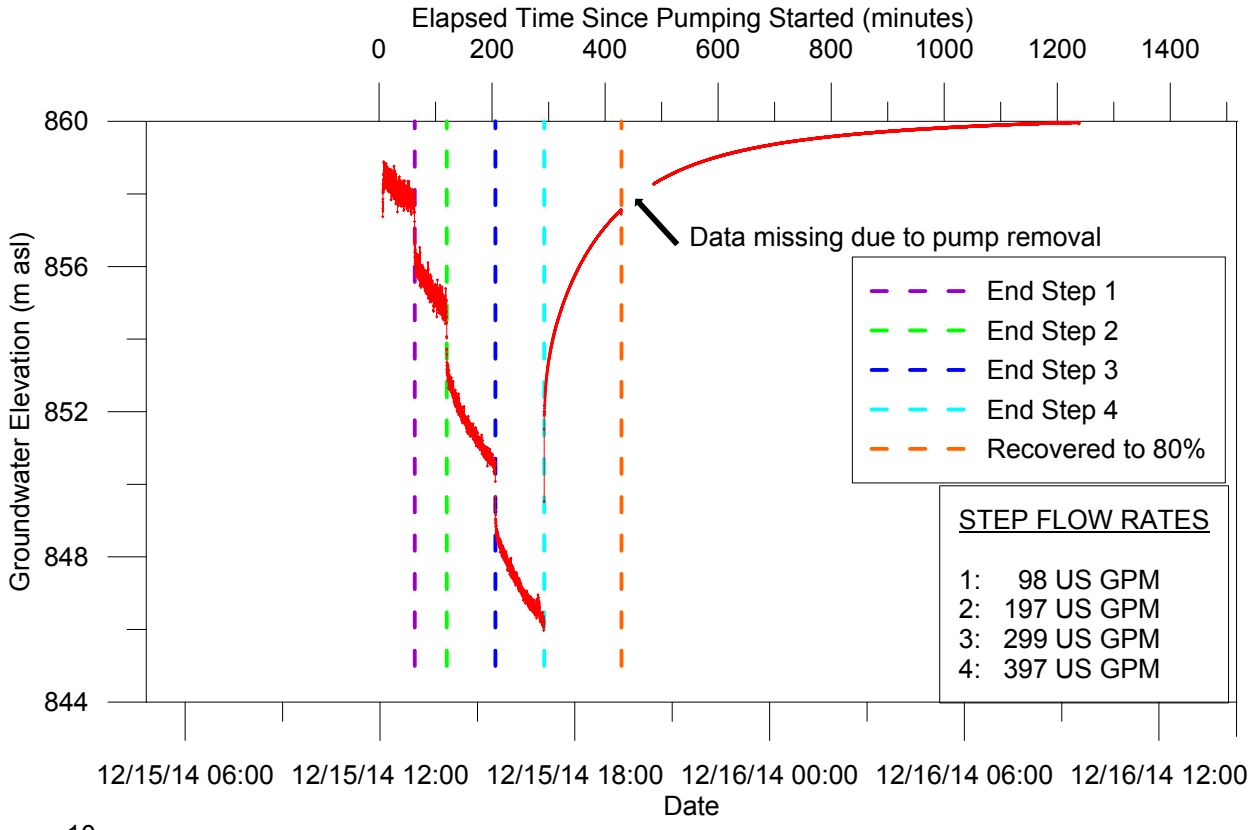
N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures

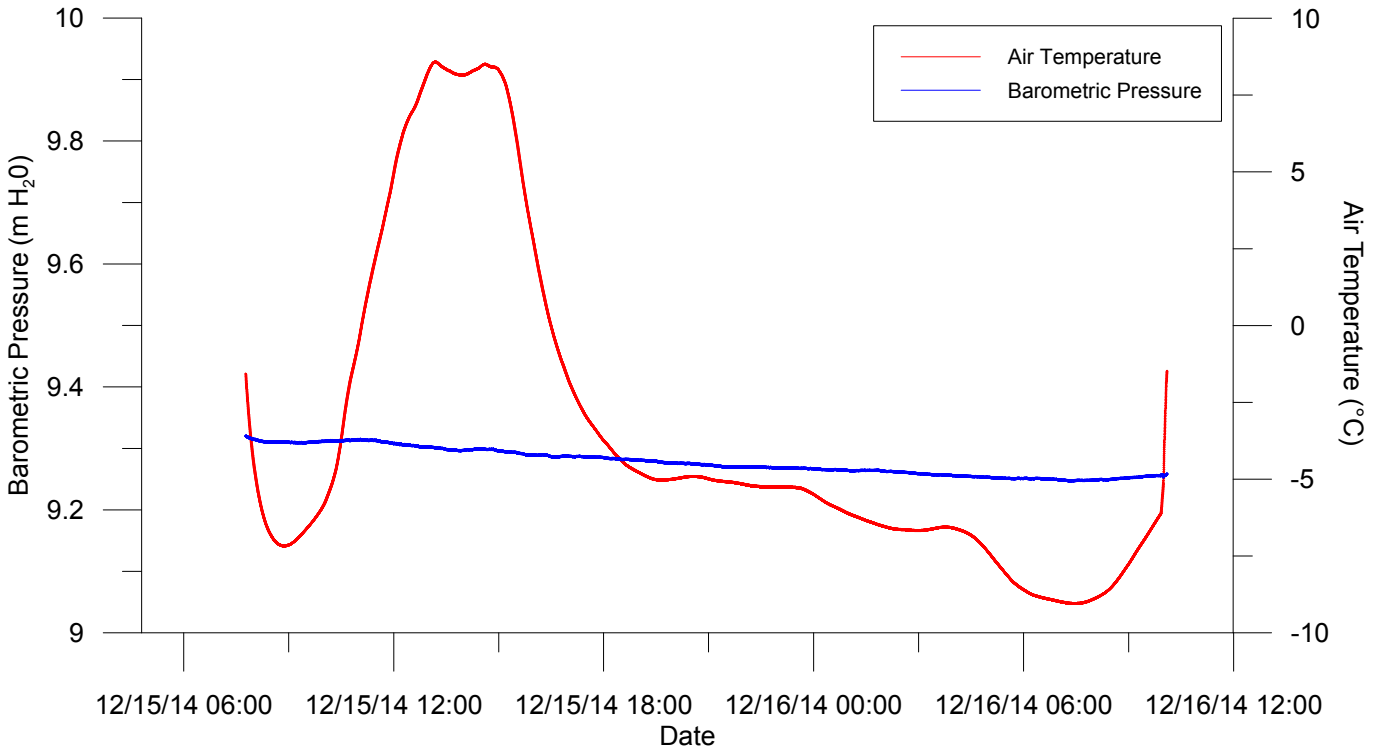


NOTES: 1) THE AIR COMPRESSOR WAS ATTACHED ONCE THE PUMP WAS TURNED OFF AND THE TEST WAS COMPLETED. IT WAS USED ONLY TO BLOW WATER OUT OF THE PIPE.

SCALE: NOT TO SCALE	DRAWN: LM	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: AJAX PROJECT EA PETERSON CREEK AQUIFER PUMPING TEST
DATE: JUL 2015	CHECKED: CK		
PROJECT No.: 1125007-08	APPROVED: TWC	CLIENT: KGHM AJAX MINING INC.	TITLE: PUMPING TEST FLOW DIAGRAM / FIG No.: 03

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures





SCALE: AS SHOWN	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

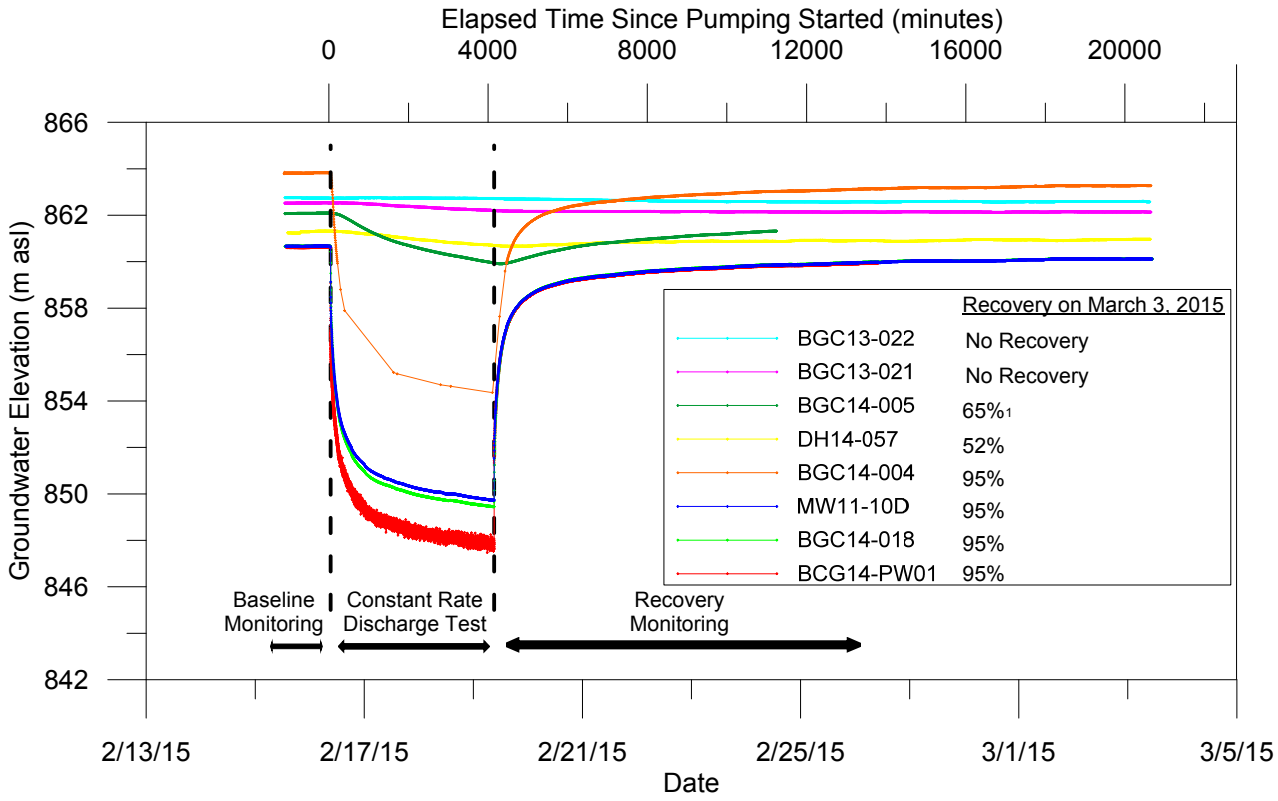
CLIENT: KGHM AJAX MINING INC.

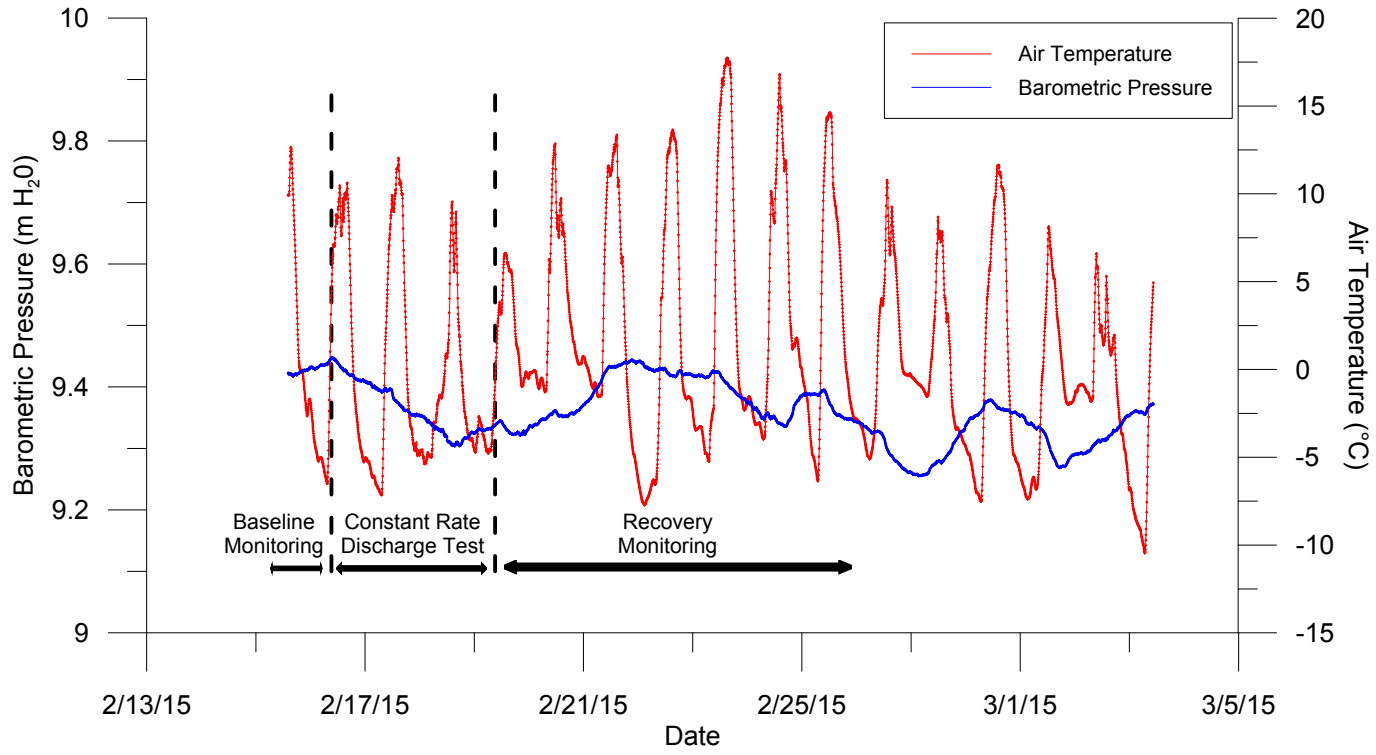
PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: POTENTIOMETRIC, BAROMETRIC AND TEMPERATURE DATA - STEP RATE DISCHARGE TEST

FIG No.: 04

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures





NOTES: 1) BGC14-005 WAS SAMPLED ON FEBRUARY 24, 2015, THEREFORE DATA BEYOND THIS DATE IS NOT PRESENTED.

SCALE: AS SHOWN	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

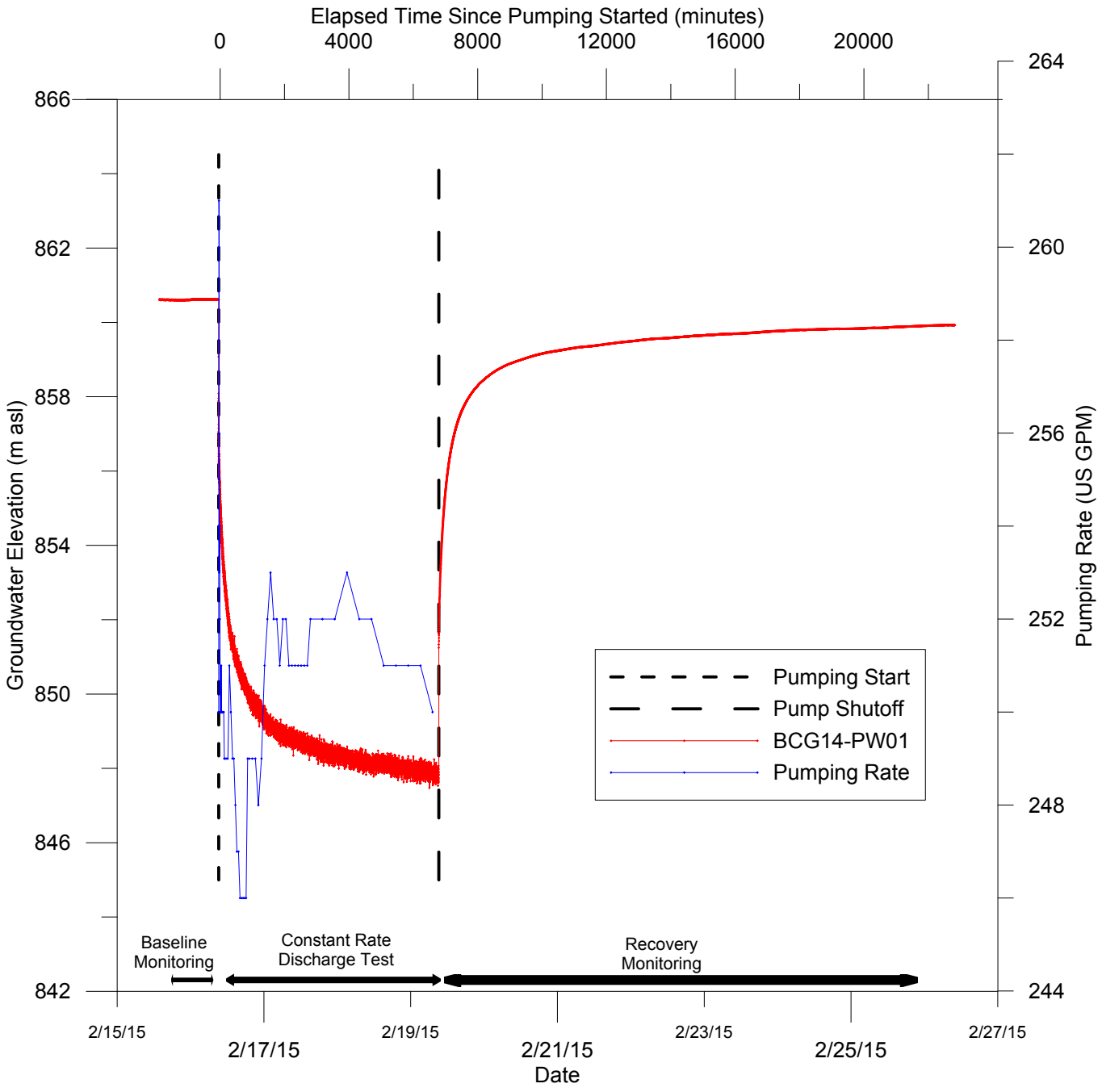
CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: POTENTIOMETRIC, BAROMETRIC AND TEMPERATURE DATA - CONSTANT RATE DISCHARGE TEST

FIG No.: 05

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures



SCALE: AS SHOWN	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: KGHM AJAX MINING INC.

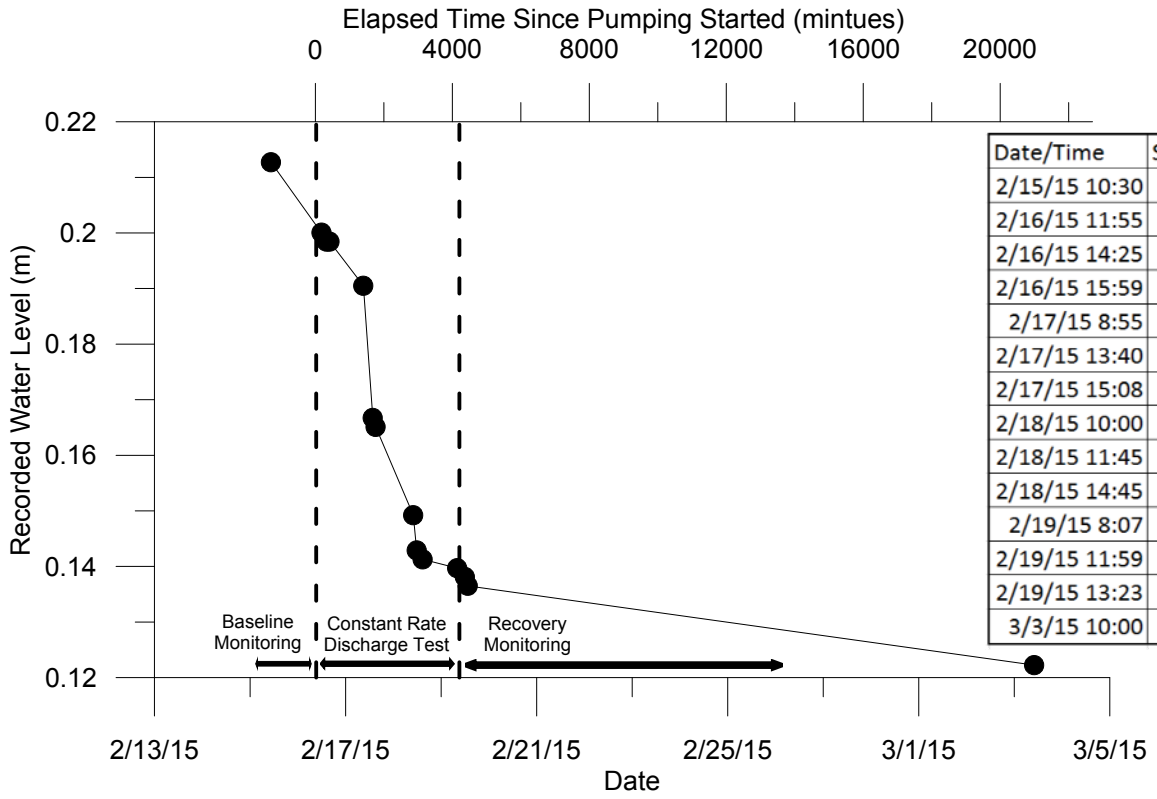
PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: PUMPING RATE AND BGC14-PW01 DRAWDOWN

FIG No.: 06

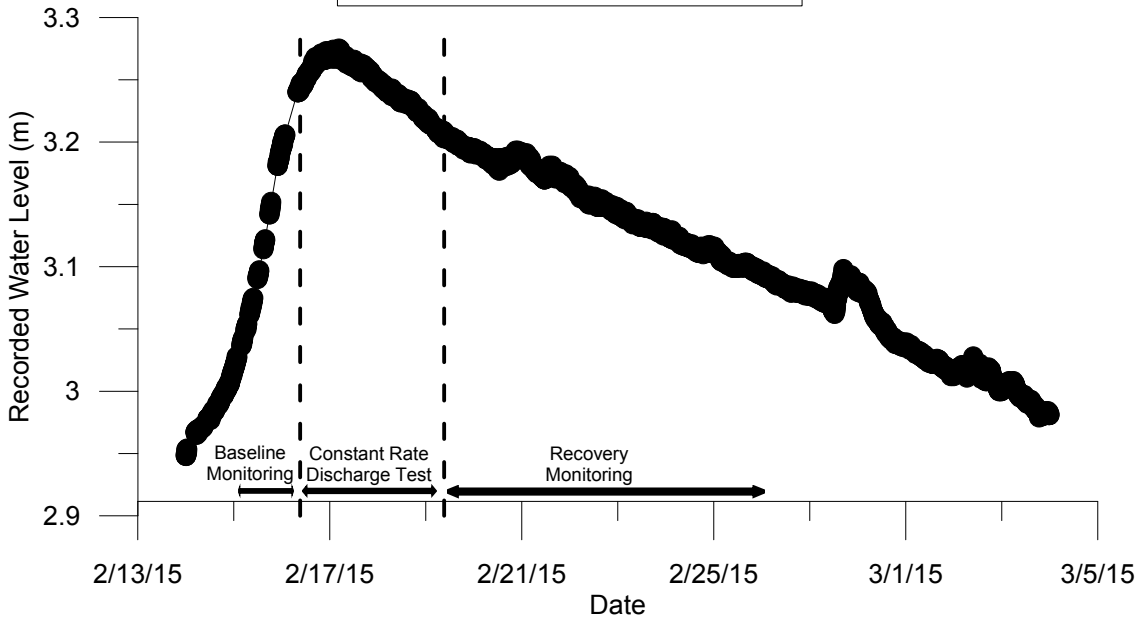
N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures

Peterson Creek Staff Gauge



Date/Time	Staff Gauge (m)
2/15/15 10:30	0.213
2/16/15 11:55	0.200
2/16/15 14:25	0.198
2/16/15 15:59	0.198
2/17/15 8:55	0.191
2/17/15 13:40	0.167
2/17/15 15:08	0.165
2/18/15 10:00	0.149
2/18/15 11:45	0.143
2/18/15 14:45	0.141
2/19/15 8:07	0.140
2/19/15 11:59	0.138
2/19/15 13:23	0.137
3/3/15 10:00	0.122

Hydrometric Data for Thompson River



NOTES: 1) DATA FOR THE HYDROMETRIC STATION AT THOMPSON RIVER PROVIDED BY THE GOVERNMENT OF CANADA WATER OFFICE <https://wateroffice.ec.gc.ca/>. THE DATA IS PRELIMINARY AND SUBJECT TO CHANGE.

SCALE: NOT TO SCALE	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

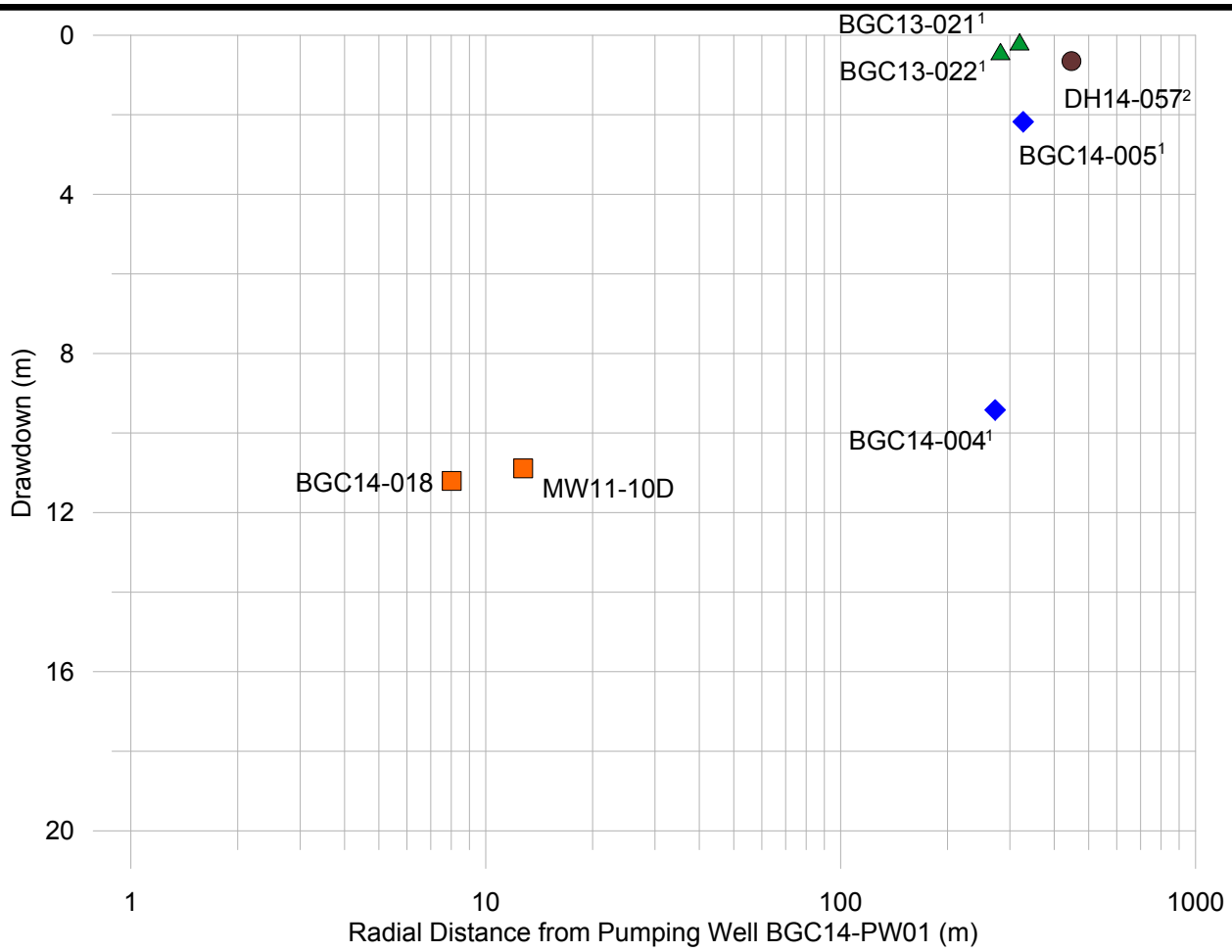
PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

CLIENT: KGHM AJAX MINING INC.

TITLE: STAFF GAUGE AND THOMPSON RIVER HYDROMETRIC STATION DATA

FIG No.: 07

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures



Observation Well ID	Screened Unit	Distance from BGC14-PW01 (m)	Maximum Drawdown (m)	Levelogger Elevation (m asl)
BGC13-021[1]	Till / Diamicton	282	0.41	862.1
BGC13-022[1]		319	0.17	862.1
BGC14-018	PC Aquifer - Sand and Gravels	8	11.21	847.6
MW11-10D		13	10.89	849.3
BGC14-PW01		-	13.13	821.6
DH14-057[2]		447	0.65	846.6
BGC14-004[1]	Bedrock	273	9.42	859.4
BGC14-005[1]		326	2.18	851.3

- TILL/GLACIOFLUVIAL
- PC SAND AQUIFER
- PC AQUIFER/BEDROCK
- BEDROCK

NOTES: 1) BGC13-021 AND BGC13-022 ARE SCREENED IN TILL/DIAMICTION. BGC14-004 AND BGC14-005 ARE SCREENED IN BEDROCK. THESE WELLS WERE EXCLUDED FROM THE INTERPRETATION.
2) DH14-057 WAS COMPLETED IN BEDROCK, HOWEVER THE FILTER PACK EXTENDED INTO THE AQUIFER, AS SUCH THIS WELL MAY RESPOND TO STRESSES IN THE PC AQUIFER.

SCALE: NOT TO SCALE	DRAWN: LM
DATE: JUL 2015	CHECKED: CK
PROJECT No.: 1125007-08	APPROVED: TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

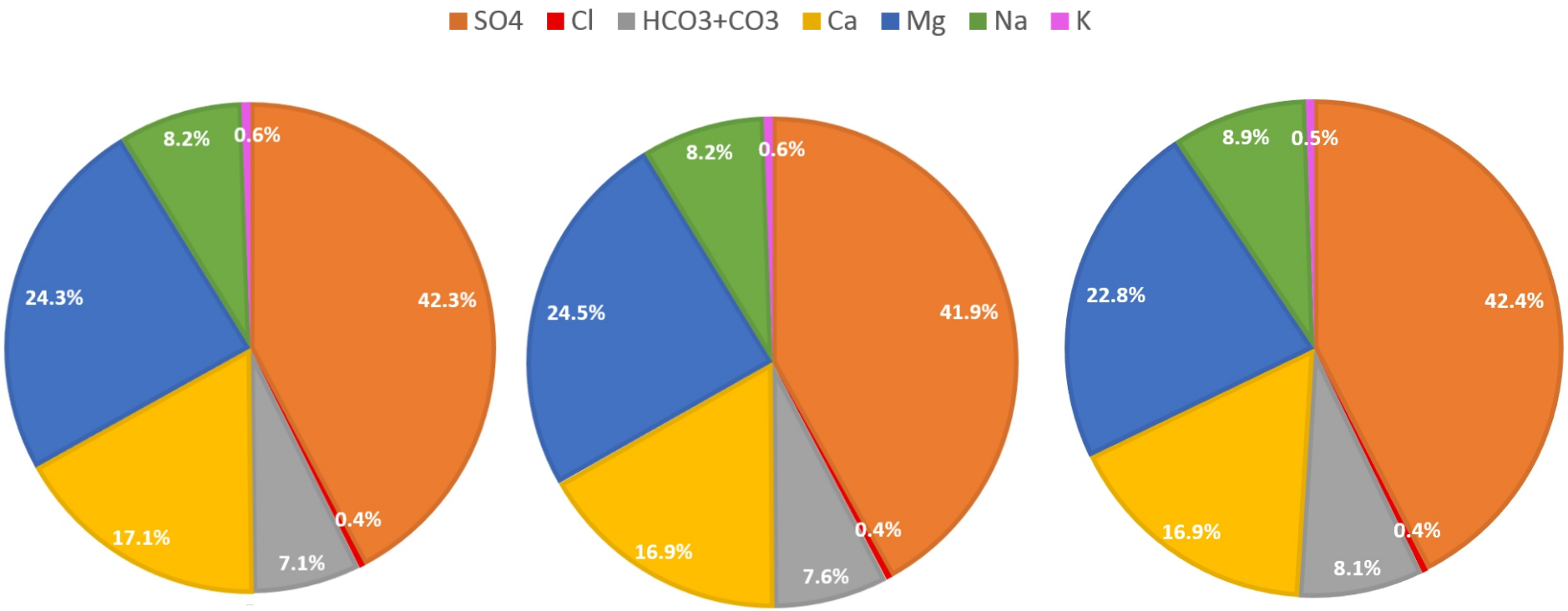
CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: DISTANCE-DRAWDOWN
CONSTANT RATE DISCHARGE TEST
IN BGC14-PW01

FIG No.: 08

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures



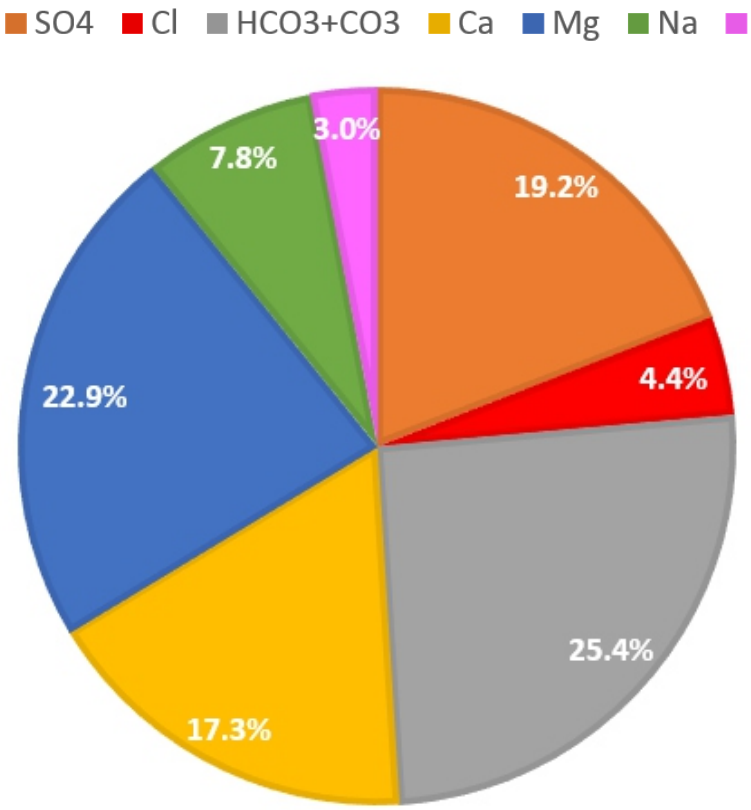
Sample No. 1	
Date Sampled	16-Feb-15
Time	10:35 am
Total meq/L	73.85
Cation/Anion Ratio	0.99
TDS (mg/L)	2370

Sample No. 2	
Date Sampled	17-Feb-15
Time	3:15 pm
Total meq/L	72.47
Cation/Anion Ratio	1.00
TDS (mg/L)	2430

Sample No. 3	
Date Sampled	18-Feb-15
Time	3:15 pm
Total meq/L	70.15
Cation/Anion Ratio	1.04
TDS (mg/L)	2290

SCALE: NOT TO SCALE	DRAWN: LM	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: AJAX PROJECT EA PETERSON CREEK AQUIFER PUMPING TEST
DATE: JUL 2015	CHECKED: CK	CLIENT: KGHM AJAX MINING INC.	TITLE: WATER QUALITY RESULTS AT BGC14-PW01
PROJECT No.: 1125007-08	APPROVED: TWC		FIG No.: 09

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures



PC02.5 Surface Water Station	
Date Sampled	13-Mar-14
Time	-
Total meq/L	10.22
Cation/Anion Ratio	0.96
TDS (mg/L)	319

SCALE: NOT TO SCALE	DRAWN: LM	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: AJAX PROJECT EA PETERSON CREEK AQUIFER PUMPING TEST
DATE: JUL 2015	CHECKED: CK	CLIENT: KGHM AJAX MINING INC.	TITLE: SURFACE WATER QUALITY RESULTS AT PC02.5
PROJECT No.: 1125007-08	APPROVED: TWC		FIG No.: 10

N:\BGC\Projects\1125 KGHM Ajax\006 EA GW scope\08 PC Pumping Test\04 Reporting\Figures

APPENDIX A
BOREHOLE AND WELL COMPLETION LOGS

APPENDIX A
BOREHOLE AND WELL COMPLETION LOGS

TABLE OF CONTENTS

LEGEND FOR WELL LOGS

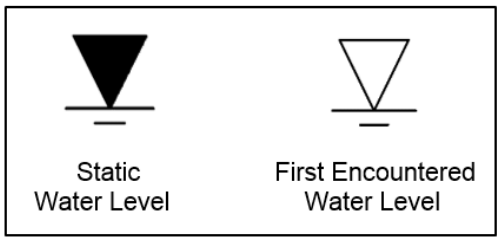
The various parameters depicted on the well logs are described below according to the select headings found on the form.

Depth

Depth below ground surface is measured in meters.

Water Levels

Groundwater levels are represented by the symbols shown below. First encountered water levels are obtained during drilling progress, static water levels are measured after drilling installation is complete.

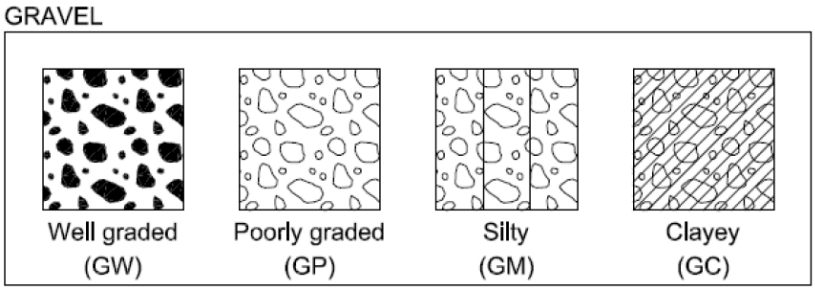


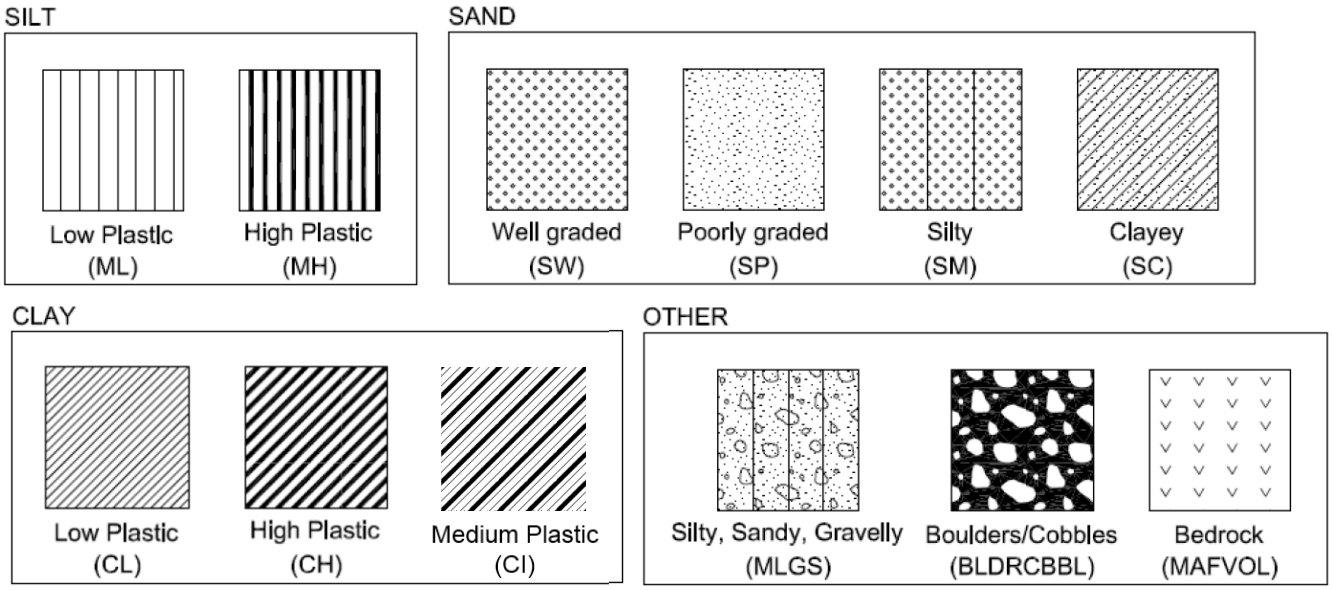
Sample Type and Sample Number

Samples are numbered and represented graphically by the symbol shown below. All samples collected from holes are shown on the logs.

Symbol

Sediment types and rock are represented graphically by the following symbols:





If a specific material is a combination of these categories, the symbol may be a mixture of any of the above symbols. A solid line between symbols represents a change in the geological unit.

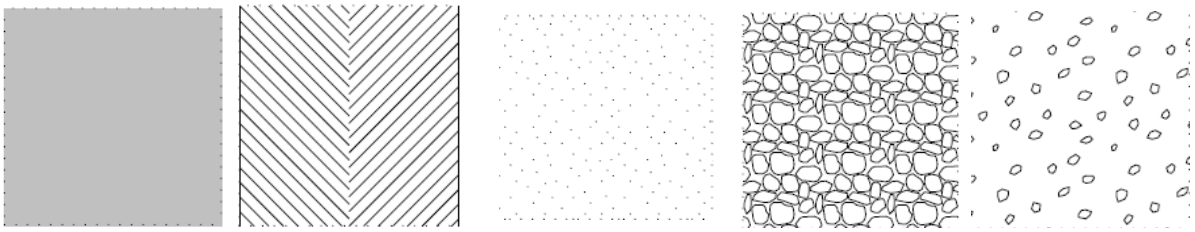
Lithologic Description

Due to the aggressive nature of Dual Rotary drilling, sediments and lithology are considered to be of disturbed nature, and are described using simplified observations, where possible.
Disturbed sediments are classified according to the Unified Soil Classification System (USCS), and are described typically by the following features: primary constituent; particle size range; secondary constituents; gradation; colour; particle shape and angularity; maximum particle size; moisture content; presence of foreign materials.
DTPL = Drier than Plastic Limit, NPL = Near Plastic Limit, WTPL = Wetter than Plastic Limit

Instrument Details

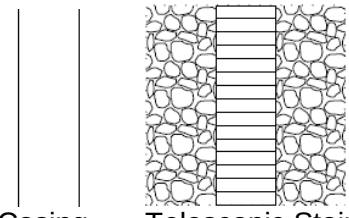
Fill materials placed in the holes are graphically represented by the symbols below.

MATERIALS PLACED DOWN HOLE



Bentonite Chips Bentonite Grout Mix Filter Sand Native Materials Gravel

INSTRUMENTATION



Casing Telescopic Stainless Steel Screen

DRILL HOLE # BGC14-PW01

Project No.: 1125-007

Project: Ajax Project Environmental Assessment

Location: Ajax Project Site

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
887	0				SAND (SM) Fine to coarse, trace gravel, trace silt/clay, poorly graded, subrounded, flat and elongated, brown, dry, heterogenous, maximum size 20 mm. [TILL]	0	Dry	02/12/2014 09:00	
886	1								
885	2								
884	3								
883	4								
882	5					5.2			
881	6		G1						
880	7								
879	8								
878	9								
877	10								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
877	10								
876	11								
875	12								
			G2		GRAVEL (GM) Fine to coarse, and silt, trace clay, poorly graded, subrounded, flat and elongated, brown, dry, heterogeneous, maximum size 25 mm. [TILL]		Dry	02/12/2014 09:30	
874	13								
873	14								
872	15								
871	16								
870	17								
869	18								
868	19								
867	20								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
867	20								
866	21								
			G3		SAND (SM) Fine to coarse, and silt, trace clay, poorly graded, subrounded, flat to elongated, brown, dry. [TILL]		Dry	02/12/2014 10:20	
865	22								
			G4		SILT (ML) Trace fine sand, trace clay, low plasticity, brown, DTPL, blocky, low dry strength. [TILL]		Dry	02/12/2014 10:30	
864	23								
863	24								
					GRAVEL (GM) Fine to coarse, and fine to coarse sand, trace silt/clay, poorly graded, loose, subangular, flat and elongated, dry, brown, grey. [TILL]		Dry	02/12/2014 10:40	
862	25								
861	26								
860	27								
			G5		GRAVEL (GM) Fine to coarse, trace silt, poorly graded, angular, flat and elongated, brown, grey, moist, Maximum size 25mm. [FLUVIAL]		Moist	02/12/2014 10:45	First water encountered at 27.43 m.
859	28								
858	29								
857	30								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
857	30				Trace Clay.				
856	31								
855	32		G6		SAND (SM) Fine to medium, and silt, poorly graded, loose, subrounded, flat and elongated, brown, grey, moist. [TILL]		Moist	02/12/2014 11:30	
854	33								
853	34								
852	35								
851	36								
850	37		G7		GRAVEL (GC) Fine, and fine to coarse sand, some clay, trace silt, angular, flat and elongated, grey, wet. [TILL]		Wet	02/12/2014 11:50	
849	38								
848	39								
847	40		G8		SAND (SM) Fine to coarse, silt, trace gravel, poorly graded, subrounded, flat and elongated, grey,		Moist	02/12/2014 12:00	

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
847	40				moist. [TILL]				
846	41								
845	42								
			G9		CLAY (CH) And fine to coarse sand, trace silt, high plasticity, dark brown, NPL.		Wet	02/12/2014 12:30	
844	43								
843	44								
842	45								
			G10		SAND (SM) Fine to coarse, some silt, trace clay, trace gravel, poorly graded, subangular, flat and elongated, brown, moist, heterogeneous. [TILL]		Moist	02/12/2014 12:45	
841	46								
840	47								
839	48								
			G11				Wet	02/12/2014 13:15 05/12/2014 07:40	
838	49								
837	50								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
837	50								
836	51								
835	52		G12		GRAVEL (GM) Fine to coarse, some sand, trace silt, trace clay, poorly graded, angular, grey, wet, heterogeneous. [TILL]		Wet	02/12/2014 13:20	Trace clay at 53 m may be due to clogged pipes.
834	53								
833	54								
832	55		G13		SAND (SM) Fine to coarse, some clay, trace gravel, poorly graded, subrounded, brown, wet, heterogeneous. [TILL]		Wet	02/12/2014 14:00	
831	56								
830	57								
829	58		G14		GRAVEL (GM) Fine to coarse, some sand, trace silt, trace clay, poorly graded, angular, grey, wet, heterogeneous. [TILL]		Wet	02/12/2014 14:15	
828	59								
827	60		G15		SAND (SC) Fine to medium, and clay, trace silt, poorly graded, subrounded, brown, wet, heterogeneous. [TILL]				

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
827	60								
826	61		G16		GRAVEL (GM) Fine to coarse, some sand, trace silt, poorly graded, angular, grey, wet, heterogeneous. [TILL]		Wet	02/12/2014 14:45	
825	62								
824	63								
823	64		G17		SAND (SC) Fine to medium, and clay, trace silt, poorly graded, subrounded, brown, wet, heterogeneous. [TILL]				
822	65								
			G18		SAND (SM) Fine to coarse, some silt, trace gravel, poorly graded, subrounded, grey, wet, heterogeneous. [TILL]				
821	66						Wet	03/12/2014 07:30	Flowing water from discharge pipe at 67.06 m.
820	67		G19		GRAVEL (GP) Fine to coarse, sandy, poorly graded, angular, flat and elongated, dark grey, wet, heterogeneous, maximum size 25 mm, pink, green, and black clasts. [FLUVIAL]		Wet	02/12/2014 15:15	Air Lift Test #1 20 US GPM 20 US GPM 20 US GPM Average = 20 US GPM
819	68								
			G20						
818	69								
817	70								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
817	70		G21						
816	71								
			G22		Finer gravel.		Wet	03/12/2014 07:50	Air Lift Test #2 7 US GPM
815	72								
814	73		G23			73.15			
813	74								
			G24						
812	75								
811	76		G25				Wet	03/12/2014 07:50	Air Lift Test #3 100 US GPM 100 US GPM 100 US GPM Average = 100 US GPM
810	77								
			G26						
809	78						Wet	03/12/2014 08:00	Air Lift Test #4 75 US GPM 75 US GPM 60 US GPM Average = 70 US GPM
808	79								
			G27		Coarser gravel.	79.24			
807	80								

(Continued on next page)

DRILL HOLE # BGC14-PW01

Coordinates (m): 687482E - 5609457N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.64

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 73.15

Start Date: 08 Dec 2014
Finish Date: 09 Dec 2014
Final Depth (m): 80.46
Depth to Top of Rock (m): 80.46
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
807	80		G28						
					END OF HOLE at 80.46 m. Encountered Weathered Bedrock. NOTES: 1. 6.5" Telescopic Stainless Steel Screen (10 slot) from 73.1 to 79.2 m. 2. Native materals surrounding well screen. 3. 0.61 m riser pipe on top of screen. 4. Bentonite surface seal placed from 0 to 5.18 m. 5. Water level measured on December 11, 2014: 27.645 m below top of casing.		Wet	03/12/2014 08:15	Air Lift Test #5 30 US GPM 53 US GPM 43 US GPM Average = 38 US GPM
806	81								
805	82								
804	83								
803	84								
802	85								
801	86								
800	87								
799	88								
798	89								
797	90								

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: KGHM Ajax Mining Inc.

Print Date: 8/20/2015

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
887	0				GRAVEL (GC) Fine, and clay, sandy, some silt, poorly graded, angular, flat and elongated, brown, dry, heterogeneous, maximum size 10 mm. [TILL]	0			
886	1								
885	2								
884	3								
883	4								
882	5					5.2			
881	6		G1				Dry	04/12/2014 14:00	
880	7								
879	8								
878	9		G2						
877	10								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
877	10								
876	11								
875	12								
			G3		GRAVEL (GM) Fine, sandy, some silt, trace clay, poorly graded, angular, flat and elongated, brown, dry, heterogeneous, maximum size 15 mm. [TILL]		Dry	04/12/2014 14:35	
874	13								
873	14								
872	15								
			G4		SAND (SM) Fine to coarse, some silt, trace gravel, poorly graded, sub angular, flat and elongated, brown dry, heterogeneous, pink, green, and black clasts. [TILL]		Dry	04/12/2014 14:45	
871	16								
870	17								
869	18								
			G5				Dry	04/12/2014 15:05	
868	19								
867	20								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
867	20								
866	21		G6						
865	22				SILT (ML) Trace fine sand, trace clay, low plasticity, brown, DTPL, blockly, low dry strength. [TILL]				
864	23				SAND (SC) Find to coarse, clayey, some silt, trace gravel, poorly graded, sub rounded, flat and elongated, brown, moist, heterogeneous. [TILL]				
863	24								
			G7				Dry	04/12/2014 15:40	
862	25								
861	26					▼			
860	27								
			G8			▽	Moist	04/12/2014 15:45	First water encountered at 27.4 m.
859	28								
858	29								
857	30								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
857	30								
			G9				Wet	04/12/2014 16:15	
856	31								
855	32								
854	33								
			G10		SAND (SM) Fine to coarse, some silt, trace gravel, poorly graded, sub angular, flat and elongated, grey, moist/dry, heterogeneous. [TILL]		Moist/Dry	04/12/2014 16:30	
853	34								
852	35								
851	36								
			G11		SAND (SC) Fine to coarse, and clay, some silt, poorly graded, sub angular, flat and elongated, grey wet, heterogeneous. [TILL]		Wet	05/12/2014 06:30	
850	37								
849	38								
848	39								
			G12		SAND (SM) Fine to medium, silty, trace clay, poorly graded, sub rounded, flat and elongated,		Moist	05/12/2014 06:40	
847	40								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
847	40				grey, moist, heterogeneous. [TILL] Trace gravel at 42.7 m, maximum size 21 mm.				
846	41								
845	42								
			G13				Wet	05/12/2014 07:15	
844	43								
843	44								
842	45								
			G14						
841	46								
840	47								
839	48								
			G15						
838	49								
837	50								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
837	50								
836	51								
835	52		G16		Fine grained sand, some clay.				
834	53								
833	54								
832	55		G17						
831	56								
830	57								
829	58		G18						
828	59								
827	60		G19		Fine to coarse sand, trace gravel.		Wet	05/12/2014 08:10	First water

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
827	60								discharge from pipe at 59.74 m.
826	61		G20						
825	62								
824	63		G21						
823	64		G22						
822	65								
821	66		G23		SILT (ML) Some sand, trace clay, low plasticity, light brown, WTPL, heterogeneous, no dry strength. [TILL] More silt and fine sand at 67.1 m. Trace gravel at 70.1 m.				
820	67		G24						
819	68								
818	69		G25				Wet	05/12/2014 08:20	
817	70								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
817	70		G26						
816	71								
			G27		SAND (SM) Fine to coarse, and silt, trace gravel, poorly graded, angular, brown, wet, heterogeneous. [TILL]		Wet	05/12/2014 08:40	
815	72				Less silt at 73.2 m.				
814	73		G28				Wet	05/12/2014 09:00	Air Lift Test #1 20 US GPM (Estimated from 73.15 m to 74.68 m)
813	74					74.06			
			G29						
812	75					75			
						75.59			
811	76		G30				Wet	05/12/2014 09:30	Air Lift Test #2 10 US GPM
810	77					76.8			
			G31			77.72			
809	78								
808	79								
			G32		SILT (ML) Some sand, trace clay, low plasticity, light brown, WTPL, heterogeneous, low dry strength. [TILL]				
807	80								

(Continued on next page)

DRILL HOLE # BGC14-018

Coordinates (m): 687489E - 5609453N
Ground Elevation (m): 887
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.6

Location: Peterson Creek Aquifer
Drilling Contractor: JR Drilling Central
Drill Method: Dual Rotary
Diameter (m): 0.2
Fluid: Air
Cased To (m): 74.07

Start Date: 04 Dec 2014
Finish Date: 05 Dec 2014
Final Depth (m): 80.77
Depth to Top of Rock (m): 80.77
Logged By: LM
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
807	80								
806	81		G33		END OF HOLE at 80.77 m. Encountered Weathered Bedrock. NOTES: 1. 6.5" Telescopic Stainless Steel Screen (100 slot) from 74.1 to 75.0 m. 2. Native mateirals surrounding well screen. 3. 0.61 m riser pipe on top of screen. 4. Bentonite surface seal placed from 0 to 5.18 m. 5. Water level measured on December 11, 2014: 26.222 m below top of casing.		Wet	05/12/2014 11:00	Air Lift Test #3 5 US GPM 3 US GPM 3 US GPM Average = 3.6 US GPM
805	82								
804	83								
803	84								
802	85								
801	86								
800	87								
799	88								
798	89								
797	90								

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: KGHM Ajax Mining Inc.

Print Date: 8/20/2015

Project No.: 1125-007

Project: Ajax Project Environmental Assessment

DRILL HOLE # BGC14-005

Location: Ajax Project Site

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
878	0				SILT (ML) Sandy, some gravel, sand is fine, well graded, nonplastic, gravel is rounded, light brown with grey clasts. [TILL]	0	Dry	19/02/2014 15:22	
877	1								
876	2	G	G1				Dry	19/02/2014 15:24	
875	3						Dry	19/02/2014 15:26	
874	4								
873	5	G	G2		CLAY (CI) Silty, some fine sand, trace gravel, medium plasticity, light greyish brown. [TILL]		Dry to moist	19/02/2014 15:28	Welding time 15:30 to 15:50.
872	6						Dry	19/02/2014 15:52	
871	7								
870	8	G	G3		SILT (ML) Sandy, some clay, trace gravel, sand is fine, light brown with grey clasts. [TILL]		Dry	19/02/2014 15:55	
869	9								
868	10	G	G4		SAND (SW) Fine, silty, some gravel, well graded, light brown. [TILL]		Dry	19/02/2014 15:59	

(Continued on next page)

DRILL HOLE # BGC14-005

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
867	10				Below 10.67 m - decrease in silt.		Dry	19/02/2014 16:02	Welding time 16:05 to 16:28.
866	11								
865	12						Dry	19/02/2014 16:31	
864	13								
863	14	G	G5		SAND (SP) Trace gravel, trace silt, uniformly graded, light brown. [GLACIOFLUVIAL]		Dry	19/02/2014 16:35	
862	15				Below 15.24 m - increase in gravel content.		Dry	19/02/2014 16:38	
861	16					▼			At 16.08 m - static water level, measured 3/24/2014 15:50.
860	17				Below 16.76 m - slight increase in silt content.		Dry	19/02/2014 16:42	
859	18				Below 18.29 m - silty, dark greyish brown.		Dry to moist	20/02/2014 07:33	
858	19								
	20						Dry	20/02/2014 07:37	

(Continued on next page)

DRILL HOLE # BGC14-005

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
857	20								
	21								
856	22	G	G6		SAND (SM) Fine, some silt, uniformly graded, light brown. [GLACIOFLUVIAL]		Dry	20/02/2014 07:40	
855	23				Below 27.86 m - colour change to grey.		Dry to moist	20/02/2014 07:43	Colour change. Welding time 7:45 to 8:05.
854	24								
							Dry	20/02/2014 08:07	
853	25								
852	26						Dry	20/02/2014 08:11	
851	27								
							Dry	20/02/2014 08:13	
850	28								
849	29	G	G7		SILT (ML) Sandy, sand is fine, uniformly graded, low plasticity, grey to dark grey. [TILL]		Dry	20/02/2014 08:15	Welding time 8:19 to 8:36.
848	30								

(Continued on next page)

DRILL HOLE # BGC14-005

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
	30								
847					Below 30.48 m - trace to some clay, increase in moisture content.		Moist	20/02/2014 08:39	
	31								
846									
	32	G	G8		Below 32.00 m - slight increase in clay to some.		Moist	20/02/2014 08:43	
845									
	33								
844					Below 33.53 m - slight increase in moisture content.		Moist	20/02/2014 08:47	Slightly more moist than above.
	34								
843									
	35						Moist	20/02/2014 08:52	
842						▽	Wet	20/02/2014 08:54	Welding time 8:54 to 9:14.
	36								At 35.66 m - water encountered. Inadequate quantity of water to complete Airlift test.
841							Wet, dark grey, silty	20/02/2014 09:18	
	37								
840									
	38						Wet, dark grey, silty	20/02/2014 09:24	
839									
	39								
838		G	G9				Wet, dark grey, silty	20/02/2014 09:28	
	40								

(Continued on next page)

DRILL HOLE # BGC14-005

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
837	40								
	41				Below 41.15 m - decrease in moisture content.		Moist	20/02/2014 09:32	Welding time 9:33 to 10:00.
836	42								
835	43						Wet, dark grey, silty	20/02/2014 10:05	
834	44				BEDROCK Drill cuttings: fine to medium grained, angular to subrounded, dark grey, slightly weathered. [IRONMASK HYBRID]		Wet	20/02/2014 10:10	
		G	G10				Wet	20/02/2014 10:11	Changing drill bit 10:15 to 10:45.
833	45					44.5			
832		G	G11		Below 45.72 m - fine to coarse, dark grey to orangish brown, multilithic.		Wet, light grey	20/02/2014 10:49	
	46					46.02			
831	47								
		G	G12		Below 47.24 m - light greenish grey.	47.24	Wet, light grey	20/02/2014 10:51	
830	48								
829		G	G13				Wet, light greenish grey	20/02/2014 10:53	AIRLIFT #1 0.7 US GPM 1.0 US GPM 0.8 US GPM Average 0.8 US GPM
828	49								
	50								

(Continued on next page)

DRILL HOLE # BGC14-005

Coordinates (m): 687161E - 5609519N
Ground Elevation (m): 878
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 19 Feb 2014
Finish Date: 20 Feb 2014
Final Depth (m): 50.46
Depth to Top of Rock (m): 43.28
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
	50								
827	51				END OF HOLE AT 50.46 m NOTES: 1. 4" PVC standpipe piezometer installed with screen from 47.24 to 50.46 metres. 2. Filter sand placed from 46.02 to 50.46 metres. 3. Bentonite seal placed from 44.50 to 46.02 metres.				
826	52								
825	53								
824	54								
823	55								
822	56								
821	57								
820	58								
819	59								
818	60								

Project No.: 1125-007

Project: Ajax Project Environmental Assessment

DRILL HOLE # BGC14-004

Location: Ajax Project Site

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
871	0				SAND (SW) Medium, some silt, some gravel, well graded, light brown, trace organics (rootlets). [TILL]	0	Dry	19/02/2014 19:49	Logged from pad fill.
870	1	G	G1		Below 1.52 m - organics no longer present.		Dry	19/02/2014 07:51	
869	2								
868	3				Below 3.04 m - increase in silt content, trace gravel, slightly darker brown matrix.		Dry	19/02/2014 07:52	
867	4								
866	5	G	G2		Below 4.57 m - decrease in silt content, decrease in gravel content, sand is fine, uniform.		Dry	19/02/2014 07:54	Welding time 7:56 to 8:18.
865	6				SILT (MH) Sandy, some fine gravel, sand is coarse, well graded, dark brown matrix with grey clasts. [TILL]		Moist	19/02/2014 08:20	
864	7				Below 7.67 m - sand is medium to coarse, gravel is fine to coarse, increase in moisture.				
863	8	G	G3			▼	Moist	19/02/2014 08:21	At 8.23 m - static water level, measured 5/13/2014 14:44.
862	9				Below 9.14 m - clayey, sand is fine, low plasticity.		Moist	19/02/2014 08:22	
	10								

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
861	10						Moist	19/02/2014 08:23	Welding time 8:24 to 8:43.
860	11								
859	12				Below 12.19 m - decrease in sand content.		Moist	19/02/2014 08:45	
858	13								
857	14	G	G4		Below 13.72 m - increase in gravel content to gravelly.		Moist	19/02/2014 08:47	
856	15	G	G5		At 15.24 m - sand is medium, colour change to dark greyish brown.		Dry to moist	19/02/2014 08:51	
855	16								
854	17	G	G6		GRAVEL (GP) Sandy, sand is medium to coarse, poorly graded, subrounded to subangular, dark brown. [FLUVIAL]		Dry	19/02/2014 08:53	Welding time 8:54 to 9:20. At 17.37 m - water encountered. AIRLIFT #1 10 US GPM 10 US GPM 11 US GPM Average 10 US GPM
853	18	G	G7		Below 18.29 m - sand no longer present, gravel is multilithic.		Wet	19/02/2014 09:23	
852	19								
	20				Below 19.81 m - coarse sand present in cuttings.		Wet, brown silty	19/02/2014 09:25	

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
851	20								
850	21	G	G8		At 21.34 m - gravel size range from 4 to 20 mm.		Wet, brown silty	19/02/2014 09:27	
849	22								
848	23	G	G9		At 22.86 m - maximum particle size is 30 mm.		Wet, clean	19/02/2014 09:29	Welding time 9:30 to 9:45.
847	24								
					Below 24.38 m - sand no longer present.		Wet, clean	19/02/2014 09:48	
846	25								
845	26				At 25.91 m - trace silt.		Wet, dark grey	19/02/2014 09:51	
844	27								
		G	G10		Below 27.43 m - silt no longer present, gravel is dark grey to black, multilithic.		Wet, brown, silty	19/02/2014 09:54	
843	28								
842	29	G	G11		Below 28.96 m - sandy, coarse.		Wet, brown, silty/clayey	19/02/2014 09:56	Welding time 9:57 to 10:22. AIRLIFT #2 80-100 US GPM
	30								

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
841	30						Wet	19/02/2014 10:26	
840	31								
839	32						Wet, clean	19/02/2014 10:29	
838	33								
837	34						Wet, clean	19/02/2014 10:30	Welding time 10:31 to 10:49.
836	35	G	G12				Wet, clean	19/02/2014 10:50	
835	36								
834	37				At 36.58 m - sandy, coarse.		Wet, dark grey	19/02/2014 10:51	
833	38						Wet, clean	19/02/2014 11:04	
832	39								
	40	G	G13				Wet, clean	19/02/2014 11:09	Welding time 11:10 to 11:40.

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
831	40								AIRLIFT #3 33 US GPM 30 US GPM 27 US GPM Average 30 US GPM
830	41						Wet, clean	19/02/2014 11:41	
829	42								
828	43						Wet	19/02/2014 11:43	
827	44								
826	45						Wet, clean	19/02/2014 11:50	
825	46								
824	47						Wet	19/02/2014 11:55	
823	48								
822	49	G	G14				Wet, clean	19/02/2014 11:57	Welding time 11:58 to 12:16.
	50						Wet, light grey	19/02/2014 12:20	

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
821	50						Wet, clean	19/02/2014 12:23	
820	51								
819	52						Wet, clean	19/02/2014 12:26	
818	53								
							Wet, dark grey	19/02/2014 12:29	Welding time 12:36 to 12:55.
817	54						Wet, clean	19/02/2014 12:30	AIRLIFT #4 50 US GPM 60 US GPM 43 US GPM Average 50 US GPM
816	55						Wet	19/02/2014 12:57	
815	56				At 56.39 m - driller described as tough, cohesive drilling, resembled compacted gravel.		Wet	19/02/2014 13:01	
814	57								
813	58						Wet, clean	19/02/2014 13:05	
812	59								
							Wet, clean	19/02/2014 13:08	Welding time 13:09 to 13:32.
	60								

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
811	60								
810	61						Wet	19/02/2014 13:43	
809	62								
					At 62.48 m - maximum particle size is 40 mm.		Wet	19/02/2014 13:48	
808	63								
807	64				BEDROCK Drill cuttings: fine to medium grained, angular to subrounded, dark grey, fresh and unweathered.		Wet, clean water	19/02/2014 13:51	Changing drill bit 13:53 to 14:30.
806	65								
		G	G15		Below 65.53 m - green with orangish speckling, slightly weathered to unweathered.		Wet, light grey, silty	19/02/2014 14:34	
805	66								
804	67					66.9			
		G	G16		Below 67.06 m - orangish brown mineralization (not iron staining), angular.		Wet, light grey	19/02/2014 14:37	
803	68					68.28			
		G	G17		Below 68.58 m - grey.		Wet, cleaner than above	19/02/2014 14:40	
802	69								
	70								

(Continued on next page)

DRILL HOLE # BGC14-004

Coordinates (m): 687746E - 5609526N
Ground Elevation (m): 871
Survey Method: Handheld GPS
Datum: NAD83 UTM ZONE 10U
Stick-up (m): 0.86

Location: EMRSF
Drilling Contractor: JR Drilling Central Ltd.
Drill Method: Dual Rotary
Diameter (m): 0.15
Fluid: Air
Cased To (m): 4.57

Start Date: 18 Feb 2014
Finish Date: 19 Feb 2014
Final Depth (m): 78.33
Depth to Top of Rock (m): 63.70
Logged By: SLP
Reviewed By: TWC

Elevation (m)	Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details Depth (m)	Water Notes	Date + Time	Comments
801	70	G	G18				Wet, light grey	19/02/2014 14:49	
800	71								
		G	G19				Wet, light grey	19/02/2014 14:47	
799	72					72.24			
798	73	G	G20		Below 73.15 m - dark green.		Wet	19/02/2014 14:50	
797	74								
		G	G21		Below 74.68 m - grey to dark grey.		Wet, grey	19/02/2014 14:55	
796	75								
795	76								
		G	G22				Wet, light grey	19/02/2014 15:03	
794	77								
		G	G23				Wet	19/02/2014 15:08	
793	78								
792	79				END OF HOLE AT 78.33 m NOTES: 1. 4" PVC standpipe piezometer installed with screen from 72.24 to 78.33 metres. 2. Filter sand placed from 68.28 to 78.33 metres. 3. Bentonite seal placed from 66.90 to 68.28 metres.		Wet	19/02/2014 15:10	AIRLIFT #5 4 US GPM 4.4 US GPM 4.2 US GPM Average US 4.2 GPM
	80								

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: KGHM Ajax Mining Inc.
Print Date: 6/9/2015

LEGEND FOR TEST HOLE LOGS

The various parameters depicted on the test hole logs are described below according to the select headings found on the form.

Location

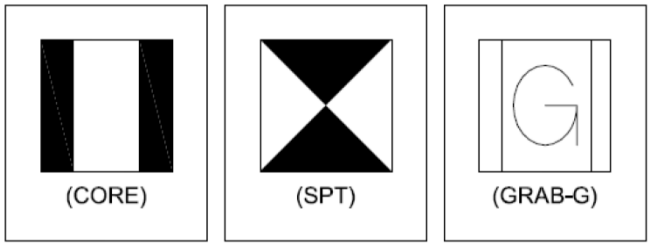
NWRSA: North Waste Rock Storage Area
EWRSA: East Waste Rock Storage Area

Depth

Depth below ground surface is measured in meters.

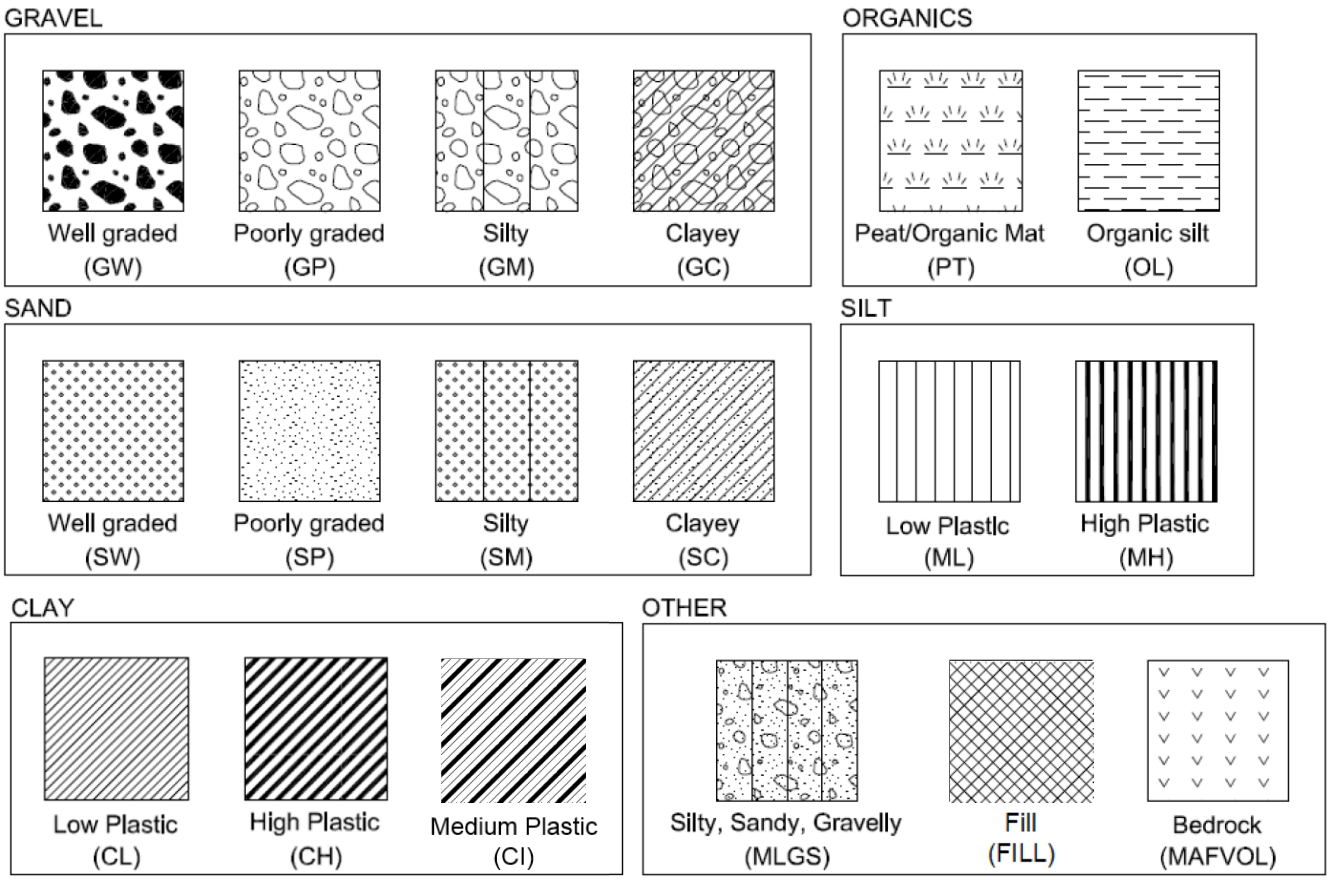
Sample Type and Sample Number

Samples are numbered and represented graphically by the symbols shown below. All samples collected form test holes are shown on the logs; however, not all of them have been tested.



Symbol

Sediment types and rock are represented graphically by the following symbols:



If a specific material is a combination of these categories, the symbol can be a mixture of any of these symbols.

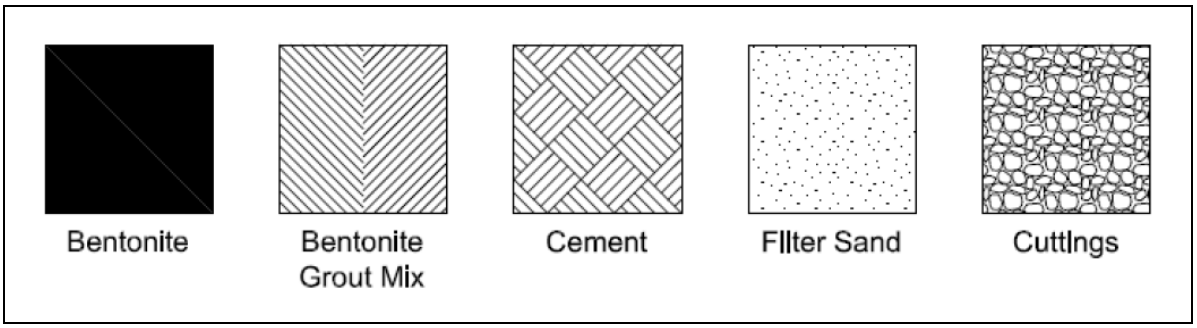
Lithologic Description

Sediments are described according to the Unified Soil Classification System (USCS). Bedrock is described according to the International Society for Rock Mechanics (ISRM 1978).
The following descriptions are typically listed for each main lithological unit on the logs: colour; grain size; hardness; alteration and weathering; vein and faulting characteristics; number of joint sets; typical alpha angles (i.e. angle to the core axis); if applicable, beta angles (i.e. degrees orientation line to lowest point downhole of joint); typical bedding angles; typical joint surface conditions such as shape (planar, curved, undulate, stepped and irregular), joint roughness (polished, slickensided, smooth, rough, very rough) (Barton and Choubey 1977), and Flysch rating (Marinos and Hoek 2001).
Individual representative discontinuities (joints, bedding, shears, minor faults) every 1 to 2 m and every major fault are picked out and described by (where possible) alpha and beta angle, infill type and thickness, joint surface shape and roughness and Joint Roughness Coefficient (JRC).

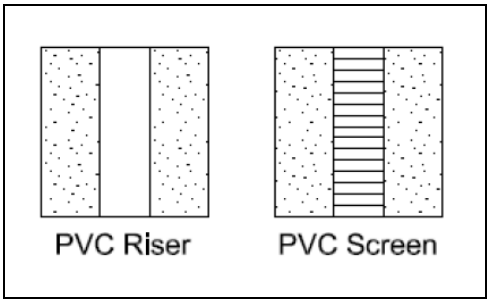
Instrument Details

Fill materials placed in the test holes are graphically represented by the symbols below. Some test holes have installations such as standpipe piezometers. These instruments are shown below in a default filter sand fill.

MATERIALS PLACED DOWN HOLE



INSTRUMENTATION SHOWN IN FILTER SAND



Core Recovery %

Core recovery is expressed as a percentage of the total length drilled or tested for each run. Recovery gives an indication of the quality of the ground being drilled or sampled and the general competency of the material.

RQD %

The Rock Quality Designation (RQD) is defined as the percentage of core recovered of intact pieces of 100 mm or more in length for the total length of core run (Deere and Deere, 1988). Only natural core breaks (i.e. joints) are considered in this calculation. Mechanical breaks due to drilling or handling are ignored.

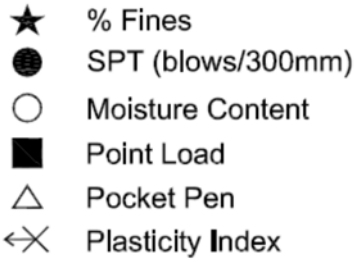
SPT Blows per 150 mm

This section gives numerical representation to the hardness of in-situ ground conditions. A hammer is repeatedly dropped from a fixed elevation which drives a split spoon into the ground collecting a soil sample. The number of blows required to drive the split spoon each 150 mm, for a total length of 450 mm, are counted and recorded. An ‘N-value’ is calculated by adding the total blow count for the last two 150 mm segments. The ‘N-value’ is correlated to the hardness of the soil conditions as shown in the table below. The field description is different for cohesive soils and granular soils.

	Soil Description	SPT 'N' Value	Field Test/Identification
Cohesive Soils	Very Soft	<2	Easily penetrated several inches by fist
	Soft	2 - 4	Easily penetrated several inches by thumb
	Firm	4 - 8	Can be penetrated by thumb with moderate effort
	Stiff	8 - 15	Can be penetrated by thumb but only with great effort
	Very Stiff	15 - 30	Readily indented by thumbnail
	Hard	>30	Indented with difficulty by thumbnail
Granular Soils	Very Loose	0 - 4	None
	Loose	4 - 10	Easily penetrated by 13 mm rod pushed by hand
	Compact	10 - 30	Easily penetrated by 13 mm rod driven by hammer
	Dense	30 - 50	Penetrated by 13 mm rod driven by hammer
	Very Dense	>50	Penetrated few cm's by 13 mm rod driven by hammer

Testing Results Section

This section shows the following field and lab testing results: Natural Moisture Content (%), Particle Size (% Fines – particles smaller than 0.075 mm), Pocket Penetrometer (kPa), Point Load Testing (kPa), SPT N, and Plasticity Index (%). Icons that depict the laboratory results on test logs are shown below.



Point Load Index

Point load test data from the field is converted into point load index values, also referred to as Induced Stress (Is) values (measured in MPa). This refers to adjusting stresses measured within the point load tester to stress induced in the core sample. These Is values are then converted into Is_{50} values, size correcting them to a standard 50 mm diameter core, which allows comparing point load index values of any sized core.

UCS Grade

The Unconfined Compressive Strength (UCS) Grade, (also known as field hardness), is based on simple mechanical tests, which are performed in the field using a rock hammer, pocket knife, and fingernail. The grades vary from extremely strong (Grade R6) to extremely weak (Grade R0), as shown in below. If the rock has undergone sufficient weathering or alteration such that the core has converted to soil, soil hardness grades are used.

UCS Grades for Rock and Soil Hardness (CFEM 2006)

	Grade	Description	Field Identification	UCS (MPa)	Point Load Index (MPa)
Rock Hardness	R6	Extremely Strong	Specimen can only be chipped with flat end of geological hammer.	>250	>10
	R5	Very Strong	Specimen requires many blows with flat end of geological hammer to fracture.	100-250	4-10
	R4	Strong	Specimen requires more than one blow of flat end of geological hammer to fracture.	50-100	2-4
	R3	Medium Strong	Cannot be scraped or peeled with pocket knife; can be fracture with single firm blow of flat end of geological hammer.	25-50	1-2
	R2	Weak	Can be peeled by a pocket knife with difficulty; shallow indentation made by firm blow with point of geological hammer.	5-25	-
	R1	Very Weak	Crumbles under firm blows with point of geological hammer.	1-5	-
	R0	Extremely Weak	Indented by thumbnail.	<1	-

	Grade	Description	Field Identification	SPT N Value	
Soil Hardness	S6	Hard	Indented with difficulty by thumbnail.	>30	-
	S5	Very Stiff	Readily indented by thumbnail.	15-30	-
	S4	Stiff	Readily indented by thumb but penetrated only with great effort.	8-15	-
	S3	Firm	With moderate effort, penetrates several centimeters by thumb.	4-8	-
	S2	Soft	Easily penetrated several centimeters by thumb.	2-4	-
	S1	Very Soft	Easily penetrated several centimeters by fist.	<2	-

Weathering Grade

Weathering and alteration of the rock mass is described according to Bieniawski 1976 parameters defined below.

Alteration and Weathering Rating (Bieniawski 1976)

Degree of Alteration/Weathering	Description	Rating
Fresh	Alteration may result in an improvement in rock competency (e.g. silicification)	W1
Slightly Weathered/Altered	Rock strength unchanged; weathering on joints only	W2
Moderately Weathered/Altered	Rock is discoloured but rock strength only slightly affected; discontinuities are weathered	W3
Highly Weathered/Altered	Rock is discoloured and strength is significantly reduced by weathering	W4
Completely Weathered/Altered	Original fabric and relict structures remain but rock is decomposed and friable	W5
Residual Soil	Original fabric destroyed	W6

Note: If alteration/weathering is > W4 or UCS grade ≤R0, then RQD is 0% for that section. Also, if the UCS grade ≤R0, the number of discontinuities is recorded as the default 99.

Survey Method: Handheld GPS
Co-ordinates (m): 687,168E, 5,609,516N
Ground Elevation (m): 895
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT ***Cased To (m):*** 44.2

Start Date: 11 Jun 13
Finish Date: 13 Jun 13
Final Depth of Hole (m): 54.25
Depth to Top of Rock (m): 41.76
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
0		M1		SILT (ML) Sandy, some gravel, no plasticity, stiff, dark brown, no odour, dry, homogeneous, no cementation, rapid dilatancy, sand is fine, gravel is fine, maximum particle size is 15 mm, flat, subangular, trace rootlets and twigs < 1 mm to 3 mm diameter, grasses. [FILL]			2 3 7
1							
2		M2		SAND (SM) Fine, silty, some gravel, trace clay, well graded, compact, maximum particle size is 20 mm , flat and elongated, subrounded to angular, light brown, no odour, homogeneous, no cementation, multi-lithic. [TILL]			8 15 14
3		M3		SILT (MH) Some clay, some sand, trace gravel, high plasticity, very stiff, light brown, no odour, homogeneous, no cementation, slow to rapid dilatancy, sand is fine, gravel is fine, maximum particle size is 10 mm, equant, subrounded. [TILL]			7 12 14
4				CLAY (CI) Silty, some sand, some gravel, medium plasticity, very stiff, light brown, no odour, wet, homogeneous with some laminations, no cementation, slow dilatancy, sand is fine, gravel is coarse, maximum particle size is 25 mm, equant, subrounded. [TILL]			
5		M4					5 8 14
6		M5		Below 6.10 m - light brownish grey. From 6.10 to 6.56 m - Hydrometer Analysis: 11% gravel, 16% sand, 73% fines.			6 10 13
7							
8		M6		SAND (SP) Fine, some silt, trace gravel, gap graded, compact, maximum particle size is 15 mm, elongated, rounded, dark grey, no odour, wet, homogeneous, no cementation.			5 10 18
9							
10		M7		CLAY and GRAVEL (CL/GC) Silty, sandy, low plasticity, hard, greyish brown, no odour, wet, homogeneous, no cementation, slow dilatancy, gravel is coarse, maximum particle size is 30 mm, flat and elongated, rounded, sand is			9 13 20

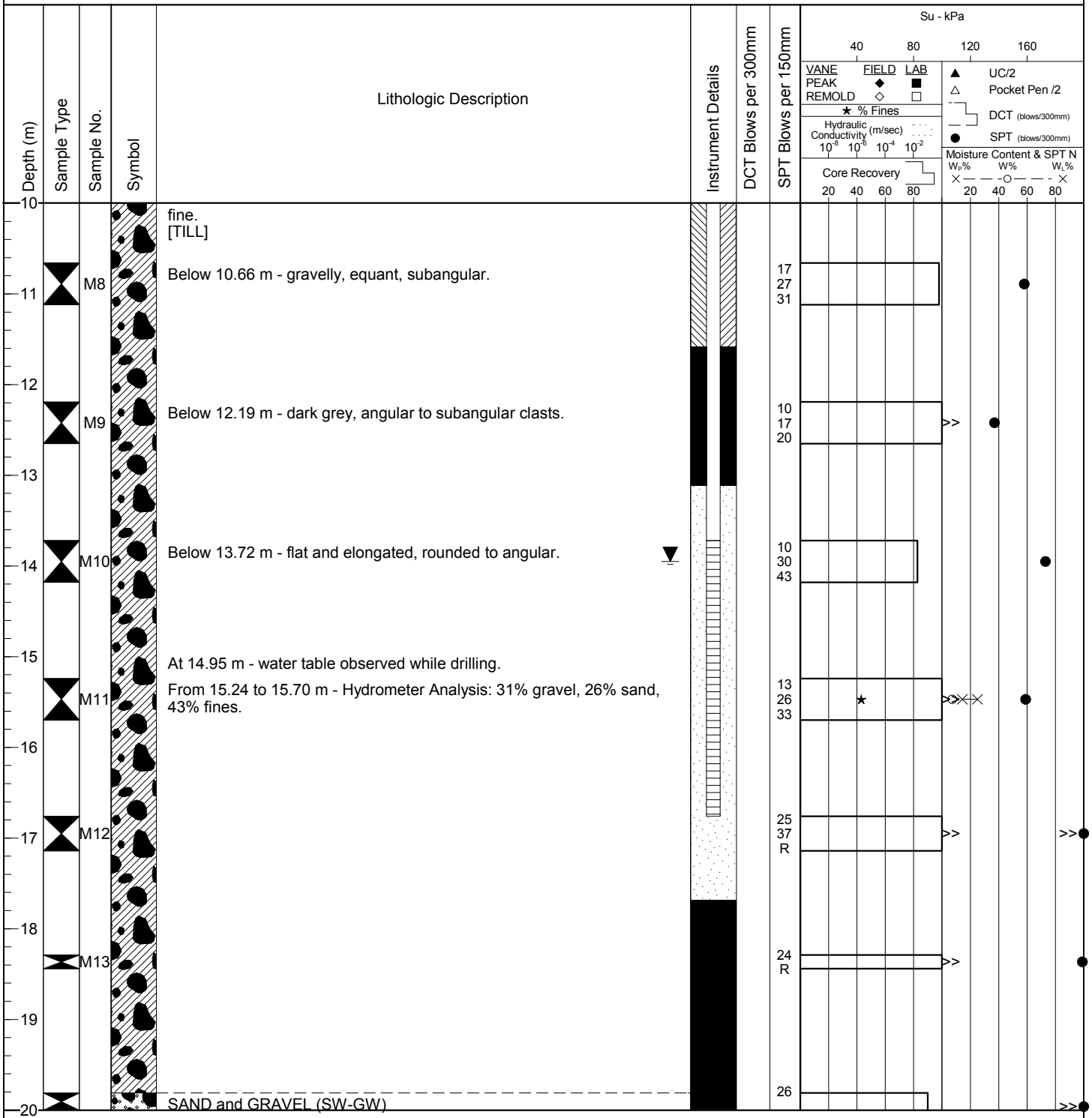
Su - kPa: 40, 80, 120, 160
VANE PEAK / REMOLD — FIELD ◆ ◇ — LAB ■ □
▲ UC/2
△ Pocket Pen /2
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
● SPT (blows/300mm)
Core Recovery: 20, 40, 60, 80
Moisture Content & SPT N — W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

Survey Method: Handheld GPS
Co-ordinates (m): 687,168E, 5,609,516N
Ground Elevation (m): 895
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 44.2

Start Date: 11 Jun 13
Finish Date: 13 Jun 13
Final Depth of Hole (m): 54.25
Depth to Top of Rock (m): 41.76
Logged by: SLP
Reviewed by: TWC



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Survey Method: Handheld GPS
Co-ordinates (m): 687,168E, 5,609,516N
Ground Elevation (m): 895
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
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Casing: HWT **Cased To (m):** 44.2

Start Date: 11 Jun 13
Finish Date: 13 Jun 13
Final Depth of Hole (m): 54.25
Depth to Top of Rock (m): 41.76
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
20		M14		Sand is medium, gravel is fine, silty, trace clay, well graded, very dense, maximum particle size is 20 mm, equant, rounded, dark grey, no odour, wet, homogeneous, no cementation, multi-lithic. [TILL]			62 R
21							
		M15		SAND (SM) Fine, silty, trace gravel, trace clay, uniform, very dense, maximum particle size is 20 mm, flat, subangular, dark grey, no odour, wet, laminated, no cementation.			35 R
22							
23		M16		SILT (ML) Sandy, some clay, no gravel, low plasticity, hard, dark grey, no odour, wet, homogeneous, no cementation, rapid dilatancy, sand is fine.			30 39 R
24							
		M17					29 R
25							
26							
27							
		M18					25 44 R
28							
29							
30							

Su - kPa: 40, 80, 120, 160
VANE PEAK REMOLD — FIELD ◆ ◇ — LAB ■ □
UC/2 ▲ — Pocket Pen /2 △
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
SPT (blows/300mm) ●
Core Recovery 20 40 60 80
Moisture Content & SPT N: W_P% W% W_L% — 20 40 60 80

(Continued on next page)

Survey Method: Handheld GPS
Co-ordinates (m): 687,168E, 5,609,516N
Ground Elevation (m): 895
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT ***Cased To (m):*** 44.2

Start Date: 11 Jun 13
Finish Date: 13 Jun 13
Final Depth of Hole (m): 54.25
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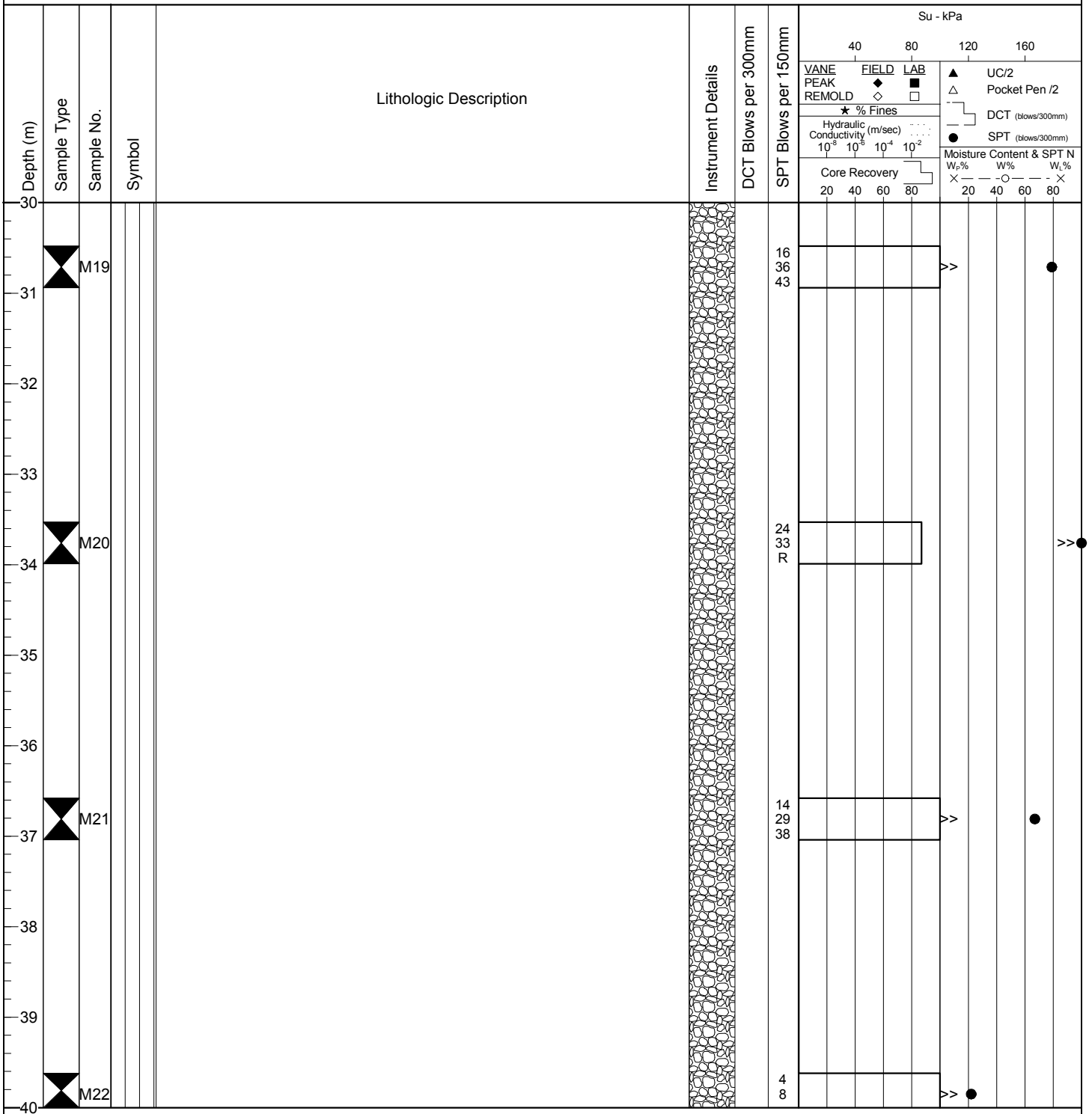
Logged by: SLP
Reviewed by: TWC



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Survey Method: Handheld GPS
Co-ordinates (m): 687,168E, 5,609,516N
Ground Elevation (m): 895
Datum: NAD83
Dip (degrees from horizontal): 90
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Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
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Casing: HWT **Cased To (m):** 44.2

Start Date: 11 Jun 13
Finish Date: 13 Jun 13
Final Depth of Hole (m): 54.25
Depth to Top of Rock (m): 41.76
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
40							14
41							
42				Rock encountered at 41.76 m depth. See BGC13-022 rock log.			
43							
44							
45							
46							
47							
48							
49							
50							

Su - kPa
40 80 120 160
VANE FIELD LAB
PEAK ◆ ■
REMOLD ◇ □
▲ UC/2
△ Pocket Pen /2
★ % Fines
Hydraulic Conductivity (m/sec)
10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
● SPT (blows/300mm)
Core Recovery
20 40 60 80
Moisture Content & SPT N
W_P% W% W_L%
20 40 60 80

Survey Method :Handheld GPS
Co-ordinates (m) : 687,168E, 5,609,516N
Ground Elevation (m) : 895
Datum : NAD83
Dip (degrees from horizontal) : 90
Direction : n/a

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : ODEX/Triple Tube
Core : HQ3
Fluid : Water
Casing : HWT **Cased To (m)** : 44.2

Start Date : 11 Jun 13
Finish Date : 13 Jun 13
Final Depth of Hole (m) : 54.25
Depth to Top of Rock (m) : 41.76
Logged by : SLP
Reviewed by : TWC

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description
40					0 to 41.76 m - See BGC13-022 soil log.
41					
42					BEDROCK Light brownish green, medium grained, microfractured, medium strong (R3), slightly weathered (W2), average joint condition is 12. [IRON MASK HYBRID]
43					
44					
45			2		From 44.20 to 44.28 m - highly fractured rock. At 44.44 m - broken rock for 250 mm.
46			2		At 45.70 m - highly fractured and crushed rock for 260 mm. From 45.70 to 48.36 m - zone of highly fractured rock, redrilled rocks, no fines, recovery is wet, water return is clean.
47			2		Below 46.63 m - light grey.
48			2		
49					
50					Below 49.68 m - highly fractured rock zone for 850 mm, grey.

Instrument Details

Hydraulic Conductivity m/sec: 10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery %
RQD %: 20 40 60 80

UCS - MPa: 50 100 150 200
Point Load
Triaxial
RMR: 20 40 60 80

(Continued on next page)

Survey Method :Handheld GPS
Co-ordinates (m) : 687,168E, 5,609,516N
Ground Elevation (m) : 895
Datum : NAD83
Dip (degrees from horizontal) : 90
Direction : n/a

Drill Designation : Fraste MD-XL
Drilling Contractor : Geotech Drilling
Drill Method : ODEX/Triple Tube
Core : HQ3
Fluid : Water
Casing : HWT **Cased To (m)** : 44.2

Start Date : 11 Jun 13
Finish Date : 13 Jun 13
Final Depth of Hole (m) : 54.25
Depth to Top of Rock (m) : 41.76
Logged by : SLP
Reviewed by : TWC

Depth (m)	Sample Type	Sample No.	Weathering Grade	Symbol	Lithologic Description	Instrument Details
50			2		At 50.65 m - broken and crushed rock, with calcite infill for 1250 mm.	
51			2		Below 51.21 m - dark grey, weak to medium strong (R2-R3).	
52						
53			2		At 52.60 m - minor fault with 130 mm of fault gouge, crushed rock, and clay infill, orientated at 88° to core axis. At 52.73 m - highly fractured rock for 650 mm.	
54					At 53.49 m - highly fractured rock with chlorite infill, 100 mm long, weak (R2). At 53.97 m - highly fractured rock until end of hole.	
					END OF HOLE AT 54.25 m 1. 2" PVC standpipe piezometer installed with screen from 13.72 to 16.76 m. 2. Filter sand placed from 13.11 to 17.68 m. 3. Bentonite seal placed form 11.58 to 13.11 m and hydrated with water. 4. Water level measured on June 13, 2013: 13.95 m below ground surface. 5. SPT hammer type: Automated trip, 140 lbs. N values shown are uncorrected.	
55						
56						
57						
58						
59						
60						

Hydraulic Conductivity m/sec: 10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery %
RQD %: 20 40 60 80
UCS - MPa: 50 100 150 200
Point Load
Triaxial
RMR: 20 40 60 80

Survey Method: Handheld GPS
Co-ordinates (m): 687,756E, 5,609,524N
Ground Elevation (m): 872
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 0

Start Date: 05 Jun 12
Finish Date: 10 May 12
Final Depth of Hole (m): 42.67
Depth to Top of Rock (m):
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
0		M1	SAND (SW) Coarse, silty, some gravel, well graded, loose to compact, dark brown, no odour, dry, homogeneous, no cementation, trace rootlets and grasses < 1 mm diameter, gravel is coarse, maximum particle size is 30 mm, flat, subangular. [FILL]			3 4 4
1			GRAVEL (GM) Fine, sandy, some silt, trace clay, gap graded, compact, maximum particle size is 20 mm, flat and elongated, subangular, grey, no odour, dry, homogeneous, no cementation, multi-lithic, sand is fine. [TILL]			
2		M2				4 4 6
3		M3	Below 3.05 m - rounded to subangular, light brown. From 3.05 to 3.51 m - Particle Size Analysis: 60% gravel, 23% sand, 17% fines.			8 10 11
4						
5		M4	SAND (SM) Fine, silty, trace gravel, well graded, very dense, maximum particle size is 10 mm, equant, subrounded, light brown, no odour, dry, homogeneous, no cementation.			12 25 24
6			CLAY (CI) Silty, trace sand, medium plasticity, very stiff, light to dark brown, no odour, dry to slightly moist, laminated, no cementation, slow dilatancy.			
7		M5	Below 6.10 m - trace gravel, maximum particle size is 30 mm, flat, subangular. From 6.10 to 6.56 m - Hydrometer Analysis: 0% gravel, 8% sand, 92% fines.			16 24 30
8		M6	SAND (SM) Fine, silty, trace gravel, gap graded, dense, maximum particle size is 7 mm, flat and elongated, angular, light brown, no odour, moist, homogeneous, no cementation.			23 20 R
9			CLAY (CH) Silty, high plasticity, very stiff, light brown, no odour, moist, laminated, no cementation, slow dilatancy.			
		M7	SAND (SM) Fine, silty, trace gravel, gap graded, dense, maximum particle size is 5 mm, flat, angular, light brown, no odour, moist, homogeneous, no cementation.			20 R
10			SAND (SM)			

Su - kPa: 40, 80, 120, 160
VANE PEAK / FIELD ◆ / LAB ■ / REMOLD ◇ / □
▲ UC/2
△ Pocket Pen /2
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
● SPT (blows/300mm)
Core Recovery 20 40 60 80
Moisture Content & SPT N
W_P% W% W_L% 20 40 60 80

(Continued on next page)

Survey Method: Handheld GPS
Co-ordinates (m): 687,756E, 5,609,524N
Ground Elevation (m): 872
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 0

Start Date: 05 Jun 12
Finish Date: 10 May 12
Final Depth of Hole (m): 42.67
Depth to Top of Rock (m):
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
10				Fine, silty, clayey, uniform, light brown, no odour, moist, homogeneous with some laminations, no cementation, rapid dilatancy.			
11		M8		SAND and GRAVEL (SP-GP) Sand is medium, gravel is fine, trace silt, gap graded, very dense, maximum particle size is 40 mm, flat and elongated, subangular, light brown matrix with grey and orange clasts, no odour, moist, homogeneous, no cementation, pockets of oxidized sand throughout. [FLUVIAL]			14 28 R
12		M9		SAND (SP) Coarse, trace gravel, no fines, uniform, maximum particle size is 1 mm, flat and elongated, angular, light and dark brown, no odour, moist to wet, homogeneous, no cementation. At 11.58 m - boulder.			R
13				SAND (SW) Medium to coarse, gravelly, some silt, trace clay, well graded, maximum particle size is 30 mm, flat, subangular, light brown with grey clasts, no odour, moist, homogeneous, no cementation, gravel is coarse.			
14		M10		Below 13.72 m - sand is fine to medium, angular, dark grey.			26 49 R
15							
16		M11		CLAY (CI) Silty, sandy, some gravel, medium plasticity, very stiff, dark grey, no odour, moist, homogeneous, no cementation, slow dilatancy, sand pockets throughout (1 mm thick), sand is fine, gravel is coarse, maximum particle size is 30 mm, flat, subrounded. [TILL] From 15.24 to 15.70 m - Hydrometer Analysis: 12% gravel, 22% sand, 66% fines.			7 20 20
17		M12		Below 16.76 m - trace to some sand, gravel is equant, rounded.			9 11 17
18							
19		M13		Below 18.29 m - some gravel, flat, subrounded to subangular.			49 R
20				At 19.81 m - increasing moisture content with depth.			24

Su - kPa: 40, 80, 120, 160
VANE PEAK / REMOLD — FIELD ◆ ◇ — LAB ■ □
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
Core Recovery: 20, 40, 60, 80
▲ UC/2
△ Pocket Pen /2
DCT (blows/300mm)
● SPT (blows/300mm)
Moisture Content & SPT N
W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

Survey Method: Handheld GPS
Co-ordinates (m): 687,756E, 5,609,524N
Ground Elevation (m): 872
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 0

Start Date: 05 Jun 12
Finish Date: 10 May 12
Final Depth of Hole (m): 42.67
Depth to Top of Rock (m):
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
20		M14					R
21							
		M15		SAND (SP) Medium to coarse, uniform, loose, dark brownish grey, no odour, wet, homogeneous, no cementation, comparable to beach sand. Sands within this unit are flowing into the casing.			0 2 3
22							
		M16					3 2 3
23							
24							
25							
26		M17		SAND and SILT (SM) Fine, trace clay, trace gravel, uniform, very dense, medium to light brown, no odour, wet, homogeneous with some laminations, no cementation, comparable to beach sand. Sands are flowing into the casing. From 25.91 to 26.37 m - Particle Size Analysis: 0% gravel, 38% sand, 62% fines.			16 32 R
27							
		M18		SAND and GRAVEL (SP-GP) Sand is coarse, gravel is coarse, trace silt, poorly graded, very dense, maximum particle size is 30 mm, elongated to equant, rounded, brown to grey, orange and black clasts, no odour, wet, homogeneous, no cementation, multi-lithic. Below 27.43 m - Sands are flowing into the casing.			17 50 R
28							
29							
30							

Su - kPa: 40, 80, 120, 160
VANE PEAK / REMOLD — FIELD ◆ ◇ — LAB ■ □
▲ UC/2
△ Pocket Pen /2
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
● SPT (blows/300mm)
Core Recovery: 20, 40, 60, 80
Moisture Content & SPT N — W_P% W% W_L%: 20, 40, 60, 80

(Continued on next page)

Survey Method: Handheld GPS
Co-ordinates (m): 687,756E, 5,609,524N
Ground Elevation (m): 872
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 0

Start Date: 05 Jun 12
Finish Date: 10 May 12
Final Depth of Hole (m): 42.67
Depth to Top of Rock (m):
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
30							
31							
32				Below 32.00 m - gravel is subrounded to subangular. Water is returning clean and clear, at a rate of approximately 45 litres/min during drilling activities.			
33							
34							
35							
36							
37				From 36.58 to 38.71 m - samples were retrieved by HQ coring. GRAVEL and COBBLES (GW) Fine to coarse, well graded, particle size range from 5 to 60 mm (maximum measurable size is core diameter), equant, rounded to subangular, grey to brown, no odour, wet, homogeneous, no cementation, multi-lithic. [FLUVIAL]			
38							
39				Below 39.01 m - sandy, coarse, groundwater return is green in colour.			
40							

Su - kPa: 40, 80, 120, 160
VANE PEAK / REMOLD — FIELD ◆ ◇ — LAB ■ □
▲ UC/2
△ Pocket Pen /2
★ % Fines
Hydraulic Conductivity (m/sec) 10^{-8} 10^{-6} 10^{-4} 10^{-2}
DCT (blows/300mm)
● SPT (blows/300mm)
Core Recovery 20 40 60 80
Moisture Content & SPT N: W_P% W% W_L% 20 40 60 80

(Continued on next page)

Project: AJAX MEMA Support

DRILL HOLE # BGC13-021

Location: EWRSA Dam

Project No. : 1125-003

Survey Method: Handheld GPS
Co-ordinates (m): 687,756E, 5,609,524N
Ground Elevation (m): 872
Datum: NAD83
Dip (degrees from horizontal): 90
Direction: n/a

Drill Designation: Fraste MD-XL
Drilling Contractor: Geotech Drilling
Drill Method: ODEX/Triple Tube
Core: HQ3
Fluid: Water
Casing: HWT **Cased To (m):** 0

Start Date: 05 Jun 12
Finish Date: 10 May 12
Final Depth of Hole (m): 42.67
Depth to Top of Rock (m):
Logged by: SLP
Reviewed by: TWC

Depth (m)	Sample Type	Sample No.	Symbol	Lithologic Description	Instrument Details	DCT Blows per 300mm	SPT Blows per 150mm
40							
41							
42							
				END OF HOLE AT 42.67 m 1. 2" PVC standpipe piezometer installed with screen from 9.17 to 12.22 m. 2. Filter sand placed from 8.53 to 13.31 m. 3. Bentonite seal placed from 7.01 to 8.53 m and hydrated with water. 4. Water level measured on June 13, 2013: 11.06 m below ground surface. 5. Hole terminated before intersecting rock due to difficulty advancing through flowing sands. 6. SPT hammer type: Automated trip, 140 lbs. N values shown are uncorrected.			
43							
44							
45							
46							
47							
48							
49							
50							

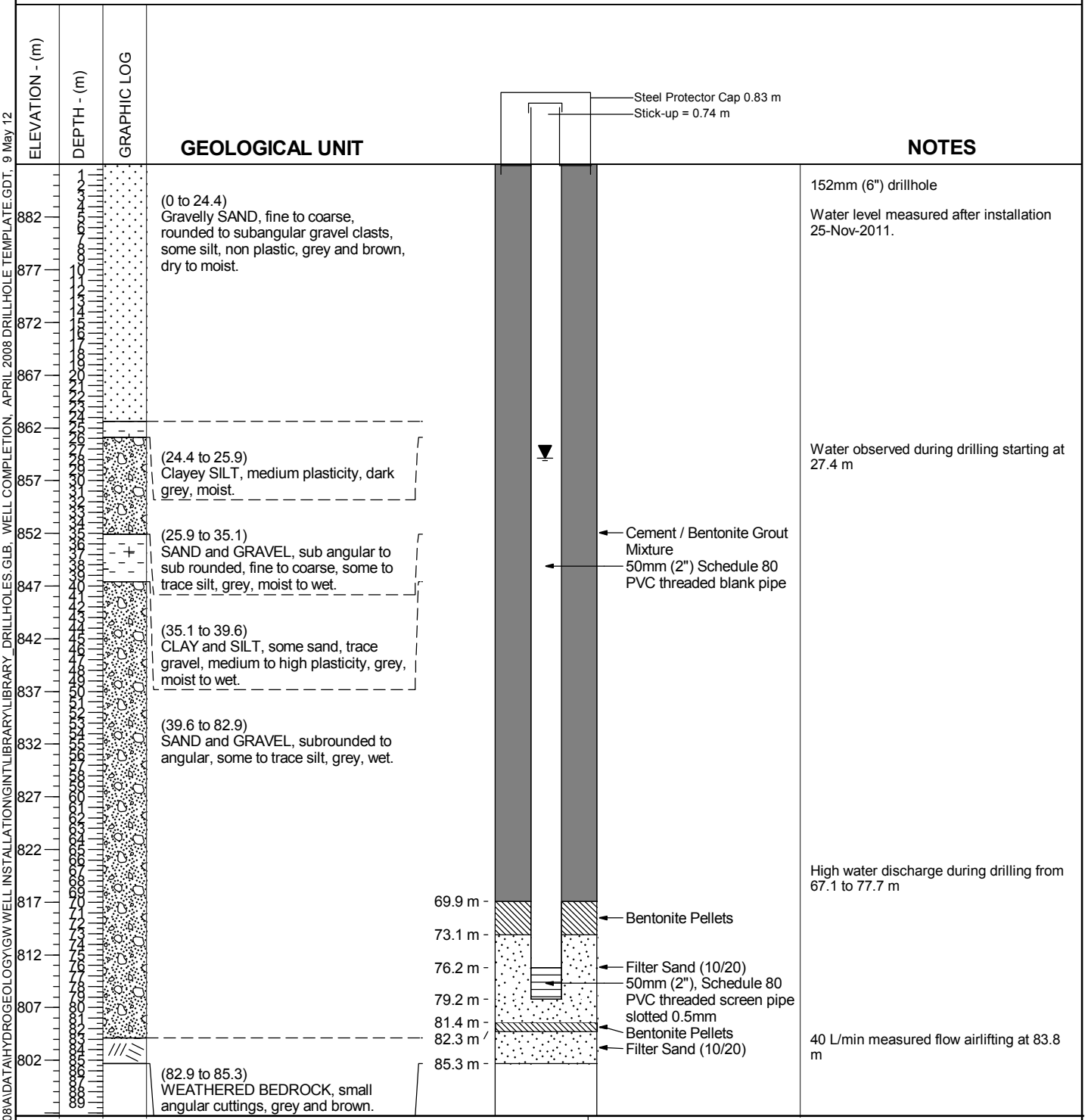
Su - kPa
40 80 120 160
VANE FIELD LAB
PEAK ◆ ■
REMOLD ◇ □
▲ UC/2
△ Pocket Pen /2
★ % Fines
DCT (blows/300mm)
Hydraulic Conductivity (m/sec)
10^{-8} 10^{-6} 10^{-4} 10^{-2}
● SPT (blows/300mm)
Core Recovery
20 40 60 80
Moisture Content & SPT N
W_P% W% W_L%
20 40 60 80

AJAX (SOILONLY) AJAX_SOIL.GDL BGC.GDT 9/26/13

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

Client: KGHM International Ltd.

Project:	**AJAX PROJECT**	Drill Hole No.	**MW11-10D**	**PAGE**	1 of 1
Contractor:	**JR DRILLING LTD**	Sample Type:	**Cuttings**	Date Drilling:	**21-NOV-2011**
Location:	**South East of East Waste Rock Facility**	Total Depth:	**85.3 m**	Date Installation:	**22-NOV-2011**
Coordinates:	**5,609,466 N , 687,494 E (UTM / NAD 83)**	Elevation:	**887 m**	Supervised by:	**DLP**
Drilling Method:	**Air Rotary**			Reviewed by:	**CHS**



GENERAL REMARKS:

REV. 0 - Issued for Report

KGHM AJAX MINING INC.
AJAX PROJECT
MONITORING WELL DETAILS FOR MW11-10D

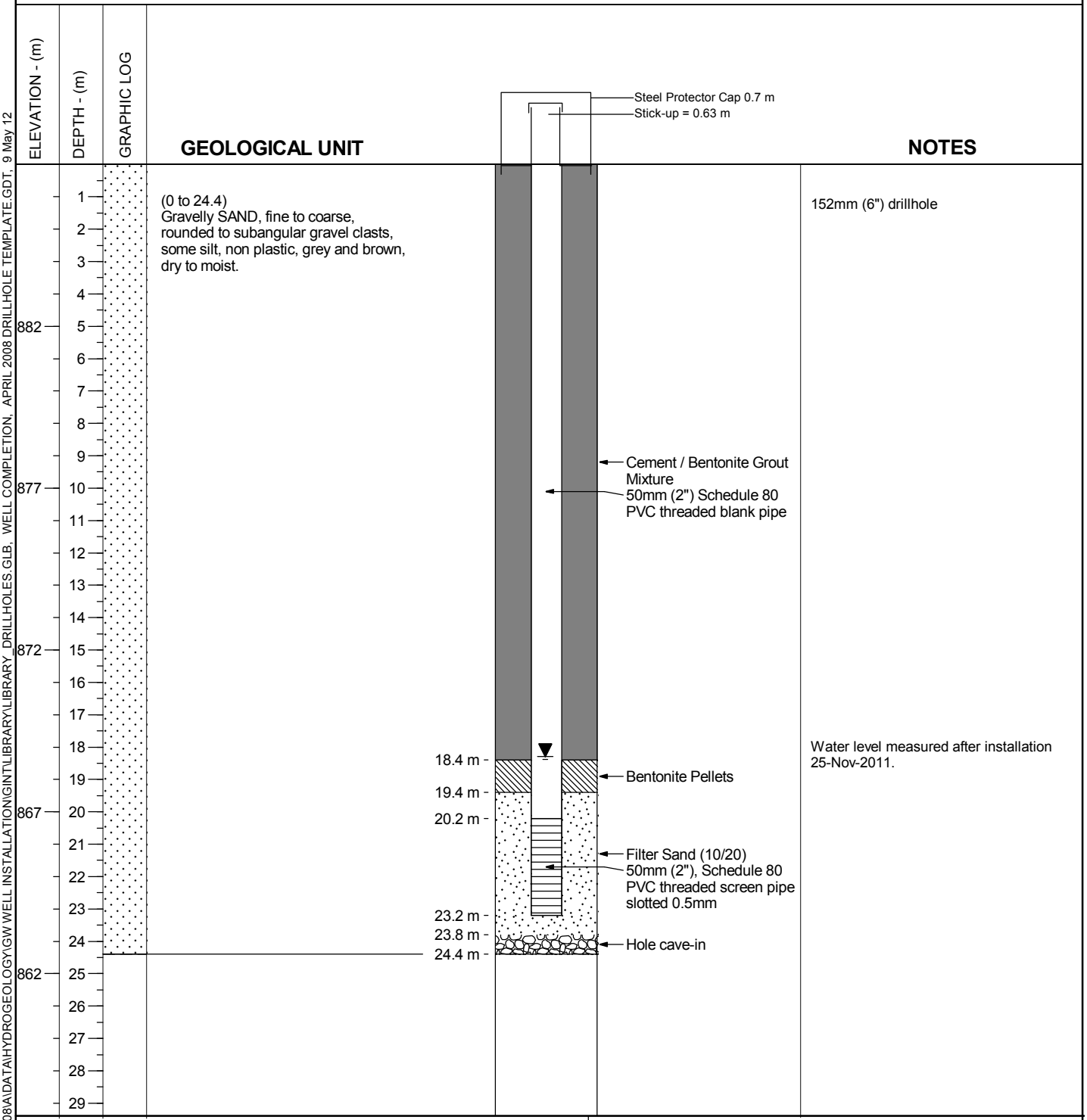
Knight Piésold CONSULTING

PROJECT/ASSIGNMENT NO.	REF. NO.
VA101-246/8	3
FIGURE. 18	REV. 0

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

File:M:\101\00246\08\A\DATA\HYDROGEOLOGY\GW WELL INSTALLATION\GINT\PROJECTS\AJAX-WELL INSTALLATION.GPJ
Library: M:\101\00246\08\A\DATA\HYDROGEOLOGY\GW WELL INSTALLATION\GINTLIBRARY\LIBRARY_DRILLHOLES.GLB, WELL COMPLETION, APRIL 2008 DRILLHOLE TEMPLATE.GDT, 9 May 12

Project:	**AJAX PROJECT**	Drill Hole No.	**MW11-10S**	**PAGE**	1 of 1
Contractor:	**JR DRILLING LTD**	Sample Type:	**Cuttings**	Date Drilling:	**23-NOV-2011**
Location:	**South East of East Waste Rock Facility**	Total Depth:	**24.4 m**	Date Installation:	**24-NOV-2011**
Coordinates:	**5,609,467 N , 687,487 E (UTM / NAD 83)**	Elevation:	**887 m**	Supervised by:	**DLP**
Drilling Method:	**Air Rotary**			Reviewed by:	**CHS**



GENERAL REMARKS:

REV. 0 - Issued for Report

KGHM AJAX MINING INC.
AJAX PROJECT
MONITORING WELL DETAILS FOR MW11-10S

Knight Piésold CONSULTING

PROJECT/ASSIGNMENT NO.	REF. NO.
VA101-246/8	3
FIGURE. 19	REV. 0

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

File:M:\101\00246\08\A\DATA\HYDROGEOLOGY\GW WELL INSTALLATION\GINT\PROJECTS\AJAX-WELL INSTALLATION.GPJ
Library: M:\101\00246\08\A\DATA\HYDROGEOLOGY\GW WELL INSTALLATION\GINTLIBRARY\LIBRARY_DRILLHOLES.GLB, WELL COMPLETION, APRIL 2008 DRILLHOLE TEMPLATE.GDT, 9 May 12

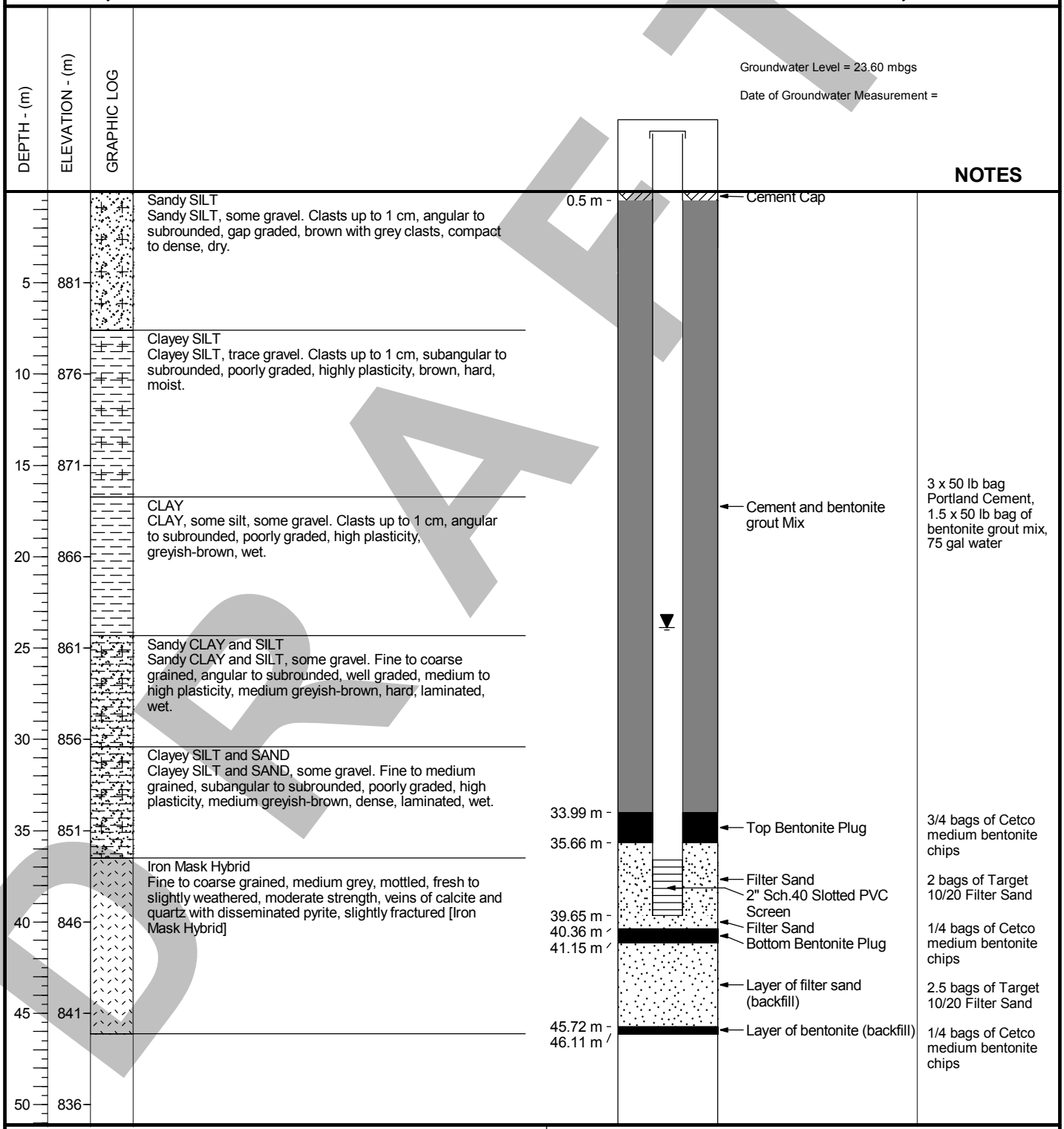
Project: Ajax Project | **Drillhole No.:** DH14-057 | **Page:** 1 of 1

Contractor: Geotech Drilling Services Ltd. | Drill Type: Fraste DR238 | Date Started: 31 October 2014

Drill Hole Dia.: HWT to 39.6m, HQ3 to 46.11m | Total Depth: 46.11 m | Date Completed: 1 November 2014

Coordinates: 5,609,442 N , 687,035 E | Elevation: 885.87 m | Logged by: GH/JAG

Coordinate System: UTM NAD 83 Zone 10 | Azimuth , Inclination: 0 , -90 | Reviewed by: JAS



GENERAL REMARKS:

KGHM Ajax Mining Inc.
Ajax Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-00246/26	1	A

FIGURE -

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

Project: Ajax Project

Contractor: Geotech Drilling Services Ltd.

Drill Hole Dia.: HWT to 39.6m, HQ3 to 46.11m

Coordinates: 5,609,442 N , 687,035 E

Coordinate System: UTM NAD 83 Zone 10

Hole Size HWT to 39.6m, HQ3 to 46.11m

Drillhole No.: DH14-057

Drill Type: Fraste DR238

Total Depth: 46.11 m

Elevation: 885.87 m

Azimuth , Inclination: 0 , -90

Page: 1 of 3

Date Started: 31 October 2014

Date Completed: 1 November 2014

Logged by: GH/JAG

Reviewed by: JAS

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	RUN RECOVERY (%)	SAMPLE NO.	SAMPLE REC. (%)	SAMPLE TYPE	UCS GRADE / BLOW COUNTS (PER 6")	SPT 'N' VALUE	RQD / SPT TEST 'N' VALUES - × (20 40 60 80)	INSTRUMENTATION / WELL DETAILS	DRILLING NOTES
0	885.0		**SANDY SILT** (0 to 7.6 m) Sandy SILT, some gravel. Clasts up to 1 cm, angular to subrounded, gap graded, brown with grey clasts, compact to dense, dry.	ODEX	SPT #1	82		3/15/18/17	33	×		
				ODEX	SPT #2	115		8/14/16/19	30	×		
5				ODEX	SPT #3	86		10/19/33/50+	52	×		
	880.0			ODEX	SPT #4	118		11/22/41/42	63	×		
			CLAYEY SILT (7.6 to 16.72 m) Clayey SILT, trace gravel. Clasts up to 1 cm, subangular to subrounded, poorly graded, highly plasticity, brown, hard, moist.	ODEX	SPT #5	49		9/29/51/53	80	×		
				ODEX	SPT #6	110		9/18/26/48	44	×		
10	875.0			ODEX	SPT #7	115		14/19/30/42	49	×		
				ODEX	SPT #8	110		13/24/30/30	54	×		
				ODEX	SPT #9	110		5/16/40/46	56	×		Start injecting water for drilling
15	870.0			ODEX	SPT #10	41		7/26/40/44	66	×		
			CLAY (16.72 to 24.32 m) CLAY, some silt, some gravel. Clasts up to 1 cm, angular to subrounded, poorly graded, high plasticity, greyish-brown, wet.	ODEX								
				ODEX	SPT #11	115		13/23/24/26	47	×		
				ODEX								

GENERAL REMARKS:

KGHM Ajax Mining Inc.
Ajax Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-00246/26	1	A

FIGURE A-57

Logging conducted according to a combination of the ASTM 2488 standard and the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: Ajax Project
Contractor: Geotech Drilling Services Ltd.
Drill Hole Dia.: HWT to 39.6m, HQ3 to 46.11m
Coordinates: 5,609,442 N , 687,035 E
Coordinate System: UTM NAD 83 Zone 10
Hole Size HWT to 39.6m, HQ3 to 46.11m

Drillhole No.: DH14-057
Drill Type: Fraste DR238
Total Depth: 46.11 m
Elevation: 885.87 m
Azimuth , Inclination: 0 , -90

Page: 2 of 3
Date Started: 31 October 2014
Date Completed: 1 November 2014
Logged by: GH/JAG
Reviewed by: JAS

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	RUN RECOVERY (%)	SAMPLE NO.	SAMPLE REC. (%)	SAMPLE TYPE	UCS GRADE / BLOW COUNTS (PER 6")	SPT 'N' VALUE	RQD / SPT TEST 'N' VALUES - 20 40 60 80	INSTRUMENTATION / WELL DETAILS	DRILLING NOTES
	865.0		**CLAY** (16.72 to 24.32 m) CLAY, some silt, some gravel. Clasts up to 1 cm, angular to subrounded, poorly graded, high plasticity, greyish-brown, wet.	ODEX	SPT #12	111		4/10/13/15	23	×		
				ODEX								
25	860.0		**SANDY CLAY AND SILT** (24.32 to 30.4 m) Sandy CLAY and SILT, some gravel. Fine to coarse grained, angular to subrounded, well graded, medium to high plasticity, medium greyish-brown, hard, laminated, wet.	ODEX	SPT #13	90		3/6/11/15	17	×		
				ODEX								
				ODEX	SPT #14	115		9/20/26/35	46	×		
				ODEX								
30	855.0		**CLAYEY SILT AND SAND** (30.4 to 36.5 m) Clayey SILT and SAND, some gravel. Fine to medium grained, subangular to subrounded, poorly graded, high plasticity, medium greyish-brown, dense, laminated, wet.	ODEX	SPT #15	115		6/6/11/19	17	×		
				ODEX								
				ODEX	SPT #16	115		6/8/12/18	20	×		
35				ODEX								
	850.0		**IRON MASK HYBRID** (36.5 to 46.11 m) Fine to coarse grained, medium grey, mottled, fresh to slightly weathered, moderate strength, veins of calcite and quartz with disseminated pyrite, slightly fractured [Iron Mask Hybrid]	ODEX	SPT #17	106		20/50+	R	●		SPT refusal on bedrock
				ODEX								
				ODEX				R5				

GENERAL REMARKS:

KGHM Ajax Mining Inc.
Ajax Project

Knight Piésold CONSULTING

Project No.	Ref. No.	Rev.
VA101-00246/26	1	A

FIGURE A-57

Logging conducted according to a combination of the ASTM 2488 standard and the Canadian Foundation Engineering Manual, 4th Edition, 2006.

Project: Ajax Project
Contractor: Geotech Drilling Services Ltd.
Drill Hole Dia.: HWT to 39.6m, HQ3 to 46.11m
Coordinates: 5,609,442 N , 687,035 E
Coordinate System: UTM NAD 83 Zone 10
Hole Size HWT to 39.6m, HQ3 to 46.11m

Drillhole No.: DH14-057
Drill Type: Fraste DR238
Total Depth: 46.11 m
Elevation: 885.87 m
Azimuth , Inclination: 0 , -90

Page: 3 of 3
Date Started: 31 October 2014
Date Completed: 1 November 2014
Logged by: GH/JAG
Reviewed by: JAS

DEPTH - (m)	ELEVATION - (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	RUN RECOVERY (%)	SAMPLE NO.	SAMPLE REC. (%)	SAMPLE TYPE	UCS GRADE / BLOW COUNTS (PER 6")	SPT 'N' VALUE	RQD / SPT TEST 'N' VALUES - × (20 40 60 80)	INSTRUMENTATION / WELL DETAILS	DRILLING NOTES
45	845.0		**IRON MASK HYBRID** (36.5 to 46.11 m) Fine to coarse grained, medium grey, mottled, fresh to slightly weathered, moderate strength, veins of calcite and quartz with disseminated pyrite, slightly fractured [Iron Mask Hybrid]	101				R5				
				101				R5				
				100				R5				
	840.0			99				R5				
50			End of Drillhole: 46.11 m Reached Target Depth									
	835.0											
55	830.0											

GENERAL REMARKS:

KGHM Ajax Mining Inc.
Ajax Project

Knight Piésold CONSULTING

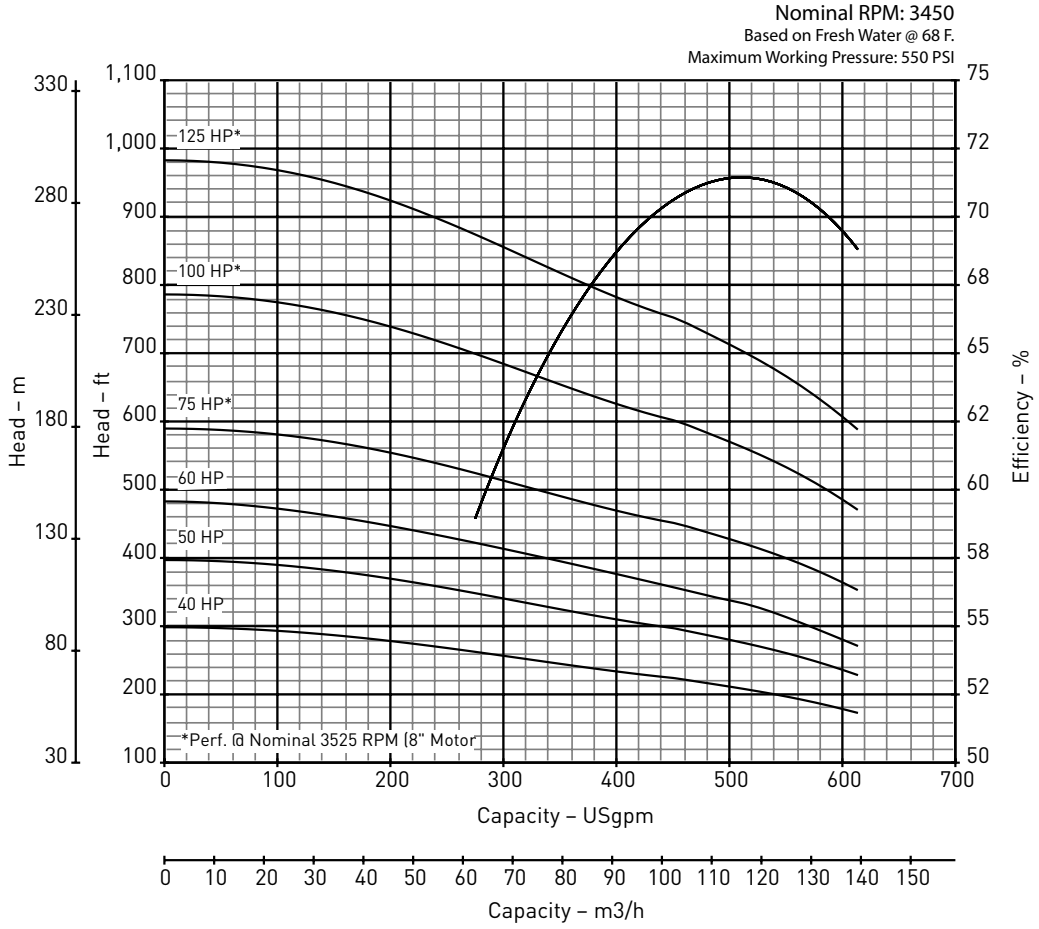
Project No.	Ref. No.	Rev.
VA101-00246/26	1	A

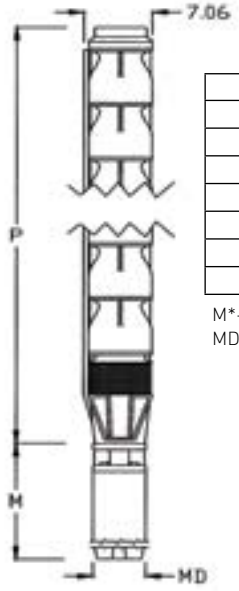
FIGURE A-57

Logging conducted according to a combination of the ASTM 2488 standard and the Canadian Foundation Engineering Manual, 4th Edition, 2006.

APPENDIX B
PUMP SPECIFICATIONS AND PERFORMANCE CURVES

BERKELEY® 7T-500
Submersible Turbine





Outline Dimensions / Weights

HP	Stages	Motor Size	P Length	M* Length	MD* Diameter	Motor Weight	Pump Weight
40	3	6"	32.94	50.30	5.51	239	112
50	4	6"	39.44	52.20	5.51	251	138
60	5	6"	45.94	55.70	5.51	269	164
75	6	8"	53.94	46.79	7.58	430	242
100	8	8"	66.94	54.29	7.58	530	294
125	10	8"	79.94	68.78	7.58	700	346
Note: Dimensions=Inches; Weight=U.S. Lbs.							

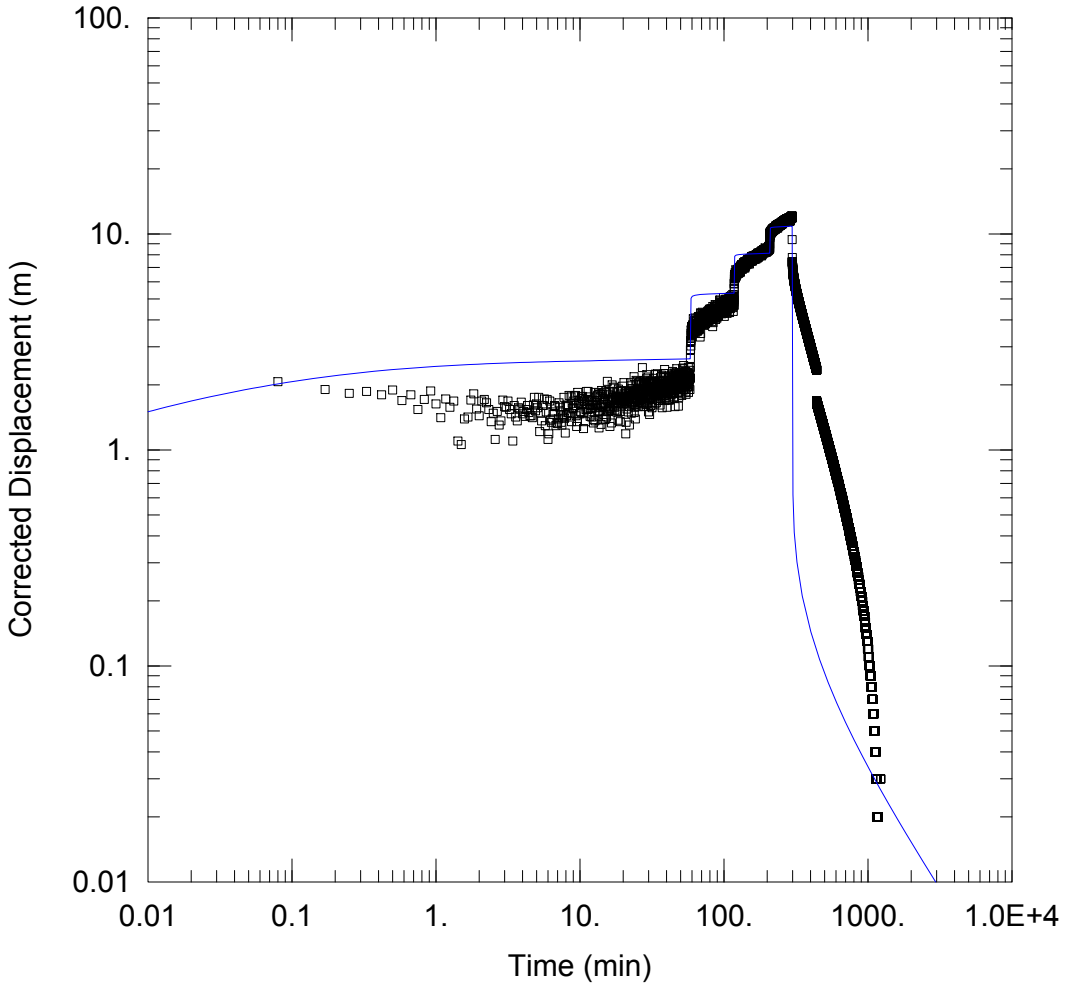
M*-Maximum Length (Pentair Motor)
MD*-Motor Diameter (Pentair Motor)

Specifications

Minimum Well I.D.	8.0 Inches
Minimum Submergence @ BEP (above inlet)	10.0 Feet
Capacity Range	211 - 650 GPM
Discharge	5" F x 6" M NPT
See manufacturer's data for motor cooling requirements	

PENTAIR

APPENDIX C
HYDROGEOLOGIC DATA ANALYSIS



WELL TEST ANALYSIS

Data Set: N:\...\Step Test.aqt
Date: 03/11/15 Time: 18:02:31

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

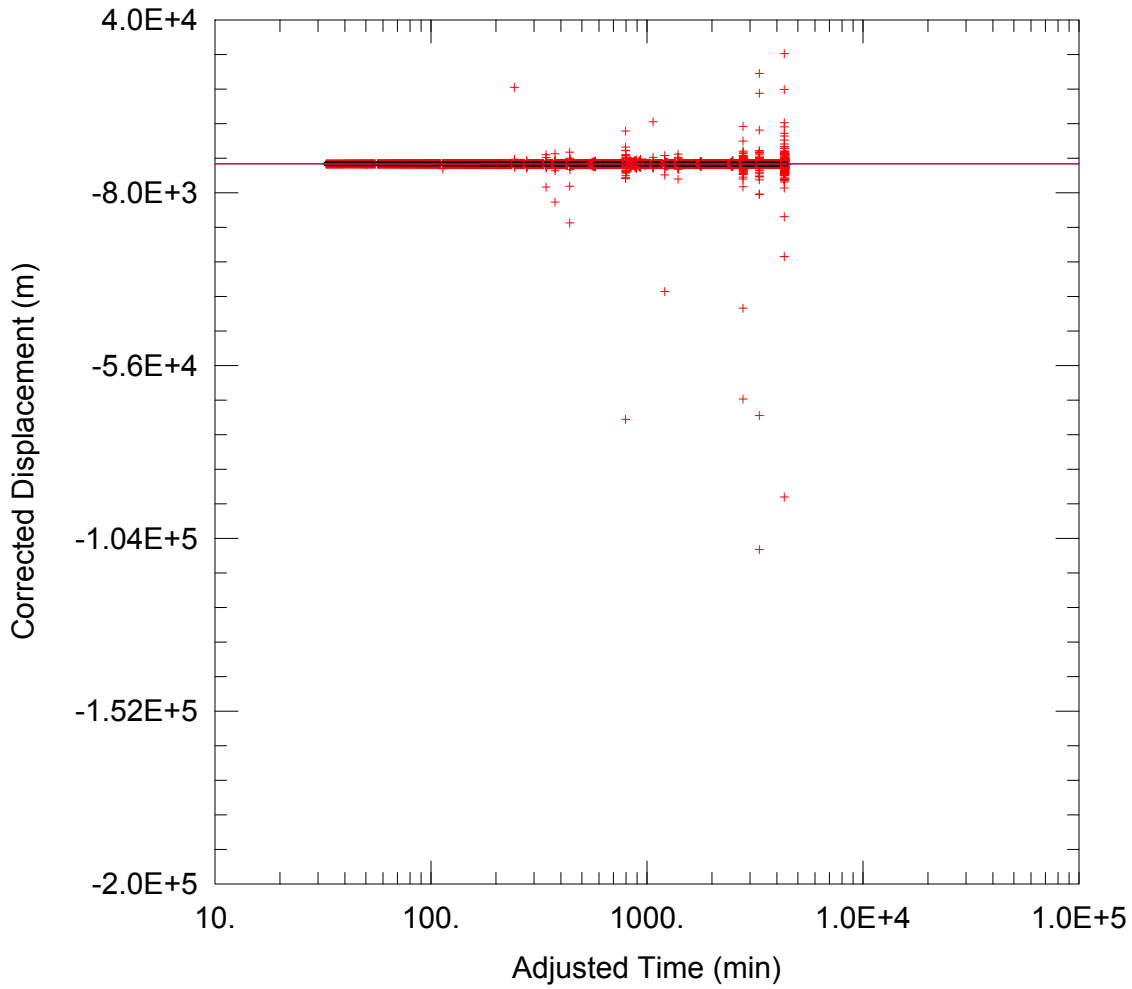
Observation Wells

Well Name	X (m)	Y (m)
▫ BGC14-PW01	687482	5609457

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.01453 m^2/sec
S = 0.01
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: \...\BGC14-PW01_CJ.aqt
Date: 07/15/15 Time: 15:47:55

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

AQUIFER DATA

Saturated Thickness: 53.13 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

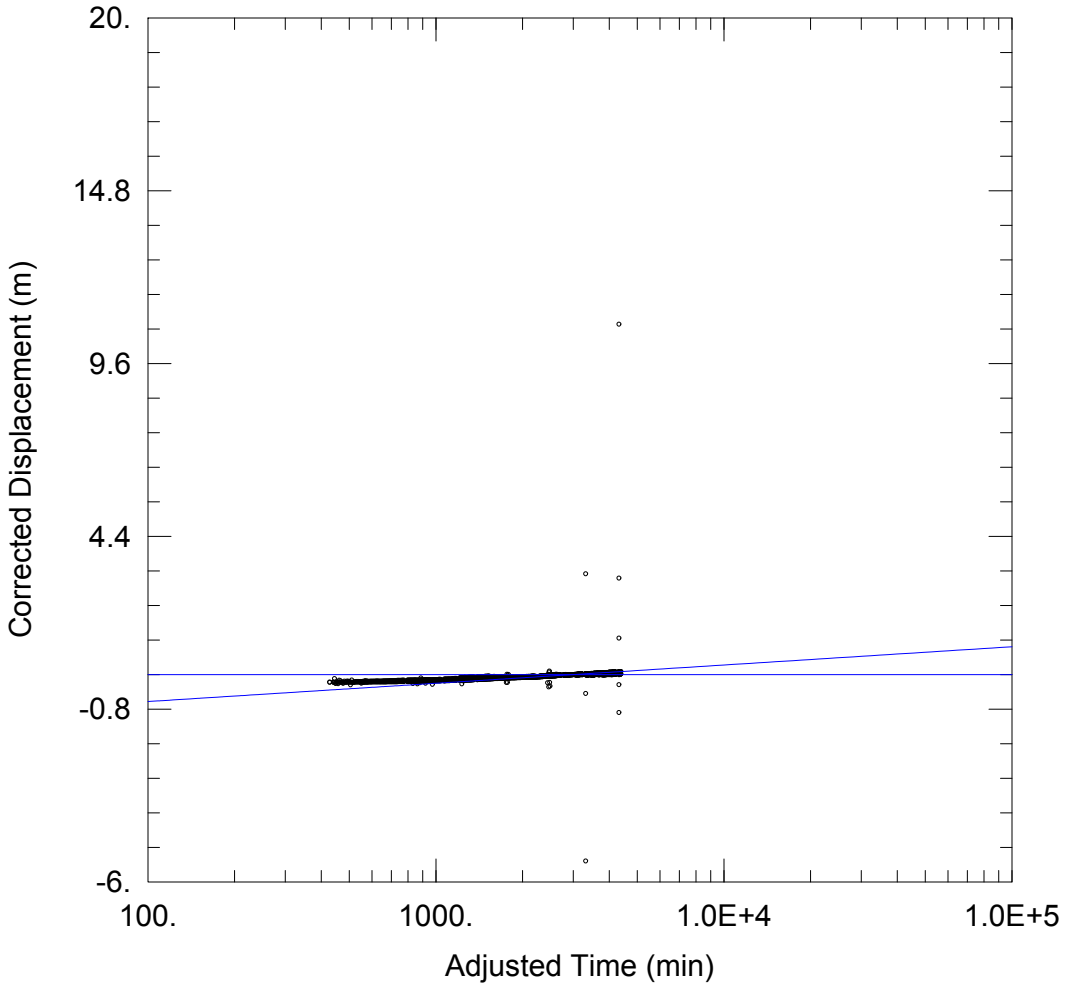
Observation Wells

Well Name	X (m)	Y (m)
◦ BGC14-PW01	687482	5609457

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.00216 m^2/sec S = 0.0005764



WELL TEST ANALYSIS

Data Set: \...\BGC13-021_CJ.aqt
Date: 07/15/15 Time: 15:52:23

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

AQUIFER DATA

Saturated Thickness: 53.13 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

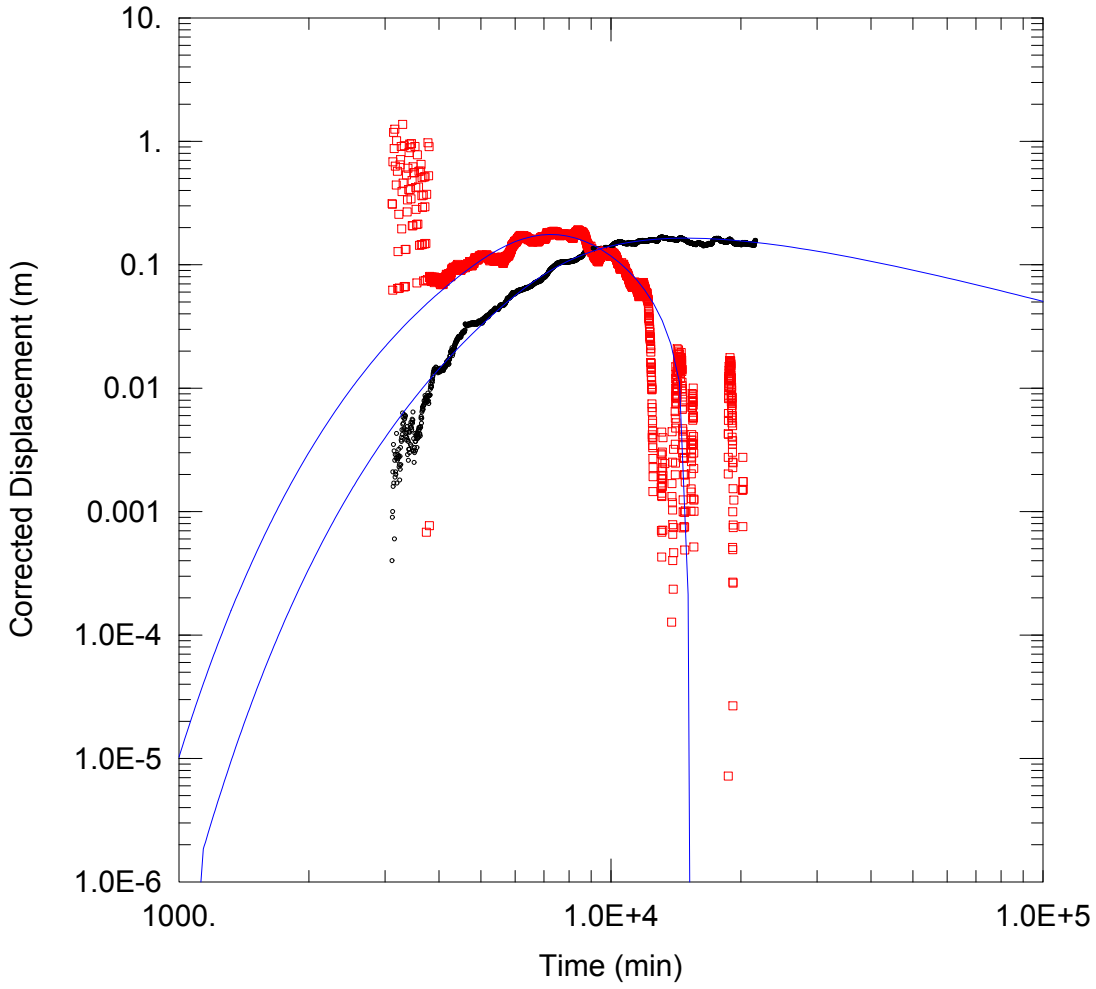
Observation Wells

Well Name	X (m)	Y (m)
◦ BGC13-021	687756	5609524

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.005258 m^2/sec S = 0.009798



WELL TEST ANALYSIS

Data Set: \...\BGC13-022_Theis.aqt
Date: 07/15/15 Time: 15:43:31

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

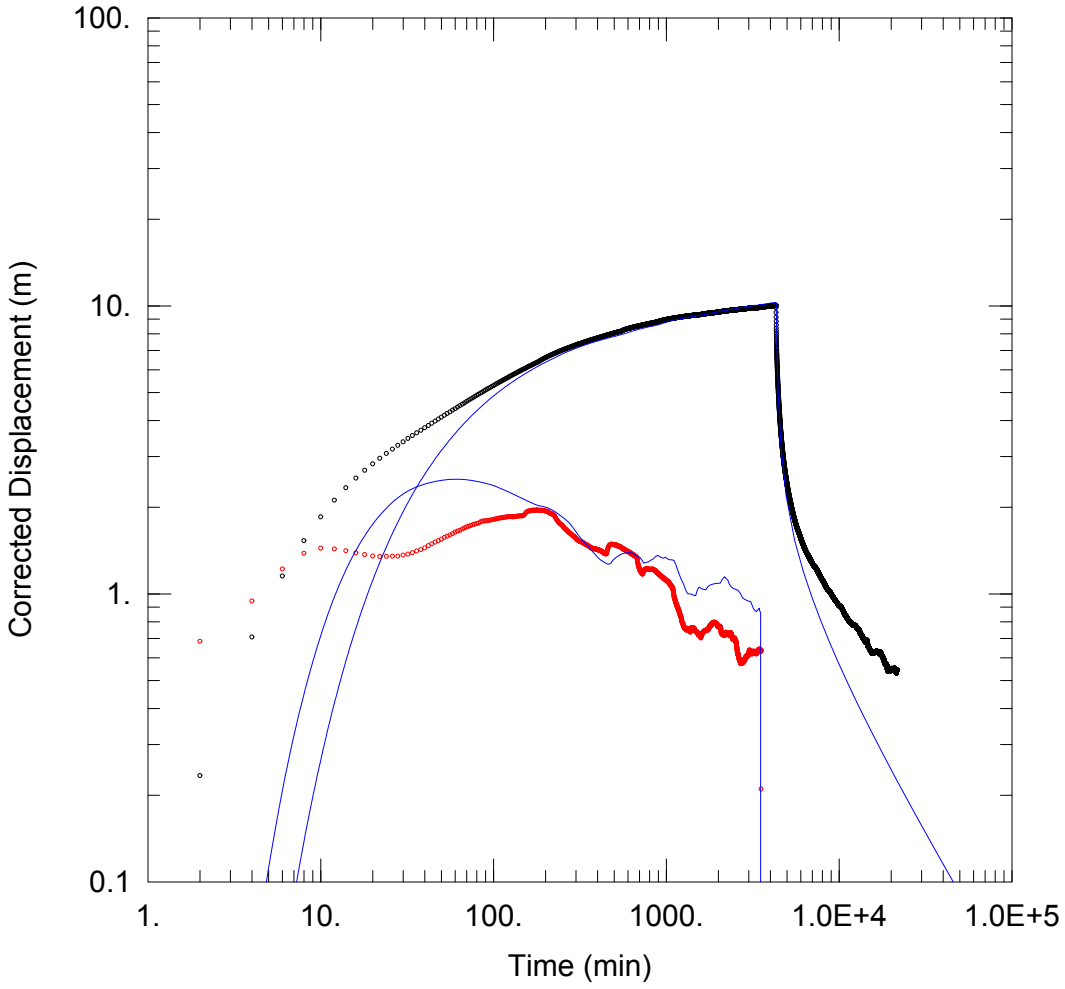
Observation Wells

Well Name	X (m)	Y (m)
◦ BGC13-022	687168	5609516

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.0009683 m^2/sec
S = 0.0285
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: \...\BGC14-018_Theis.aqt
Date: 07/15/15 Time: 15:42:48

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

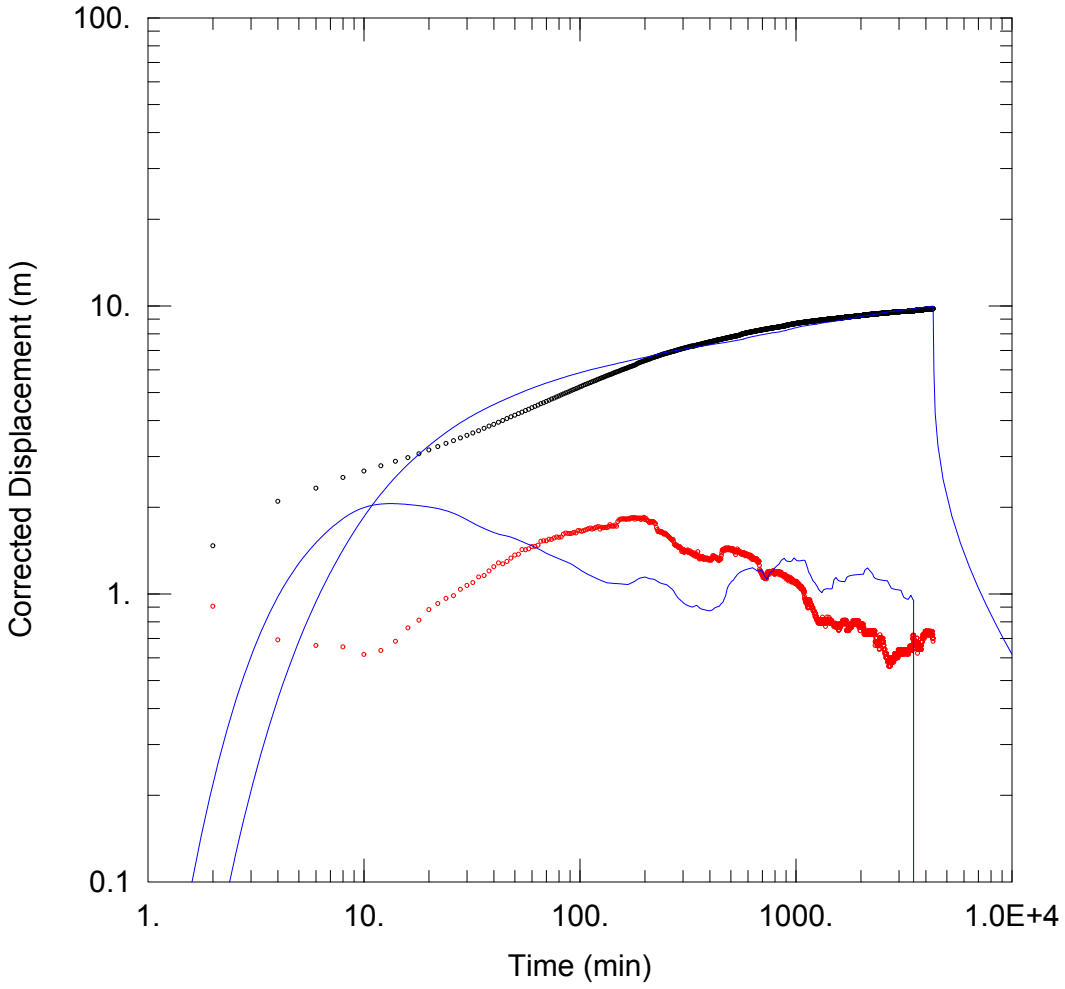
Observation Wells

Well Name	X (m)	Y (m)
◦ BGC14-018	687489	5609453

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.001247 m^2/sec
S = 0.08977
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: \...\MW11-10D_theis.aqt
Date: 07/15/15 Time: 15:42:06

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

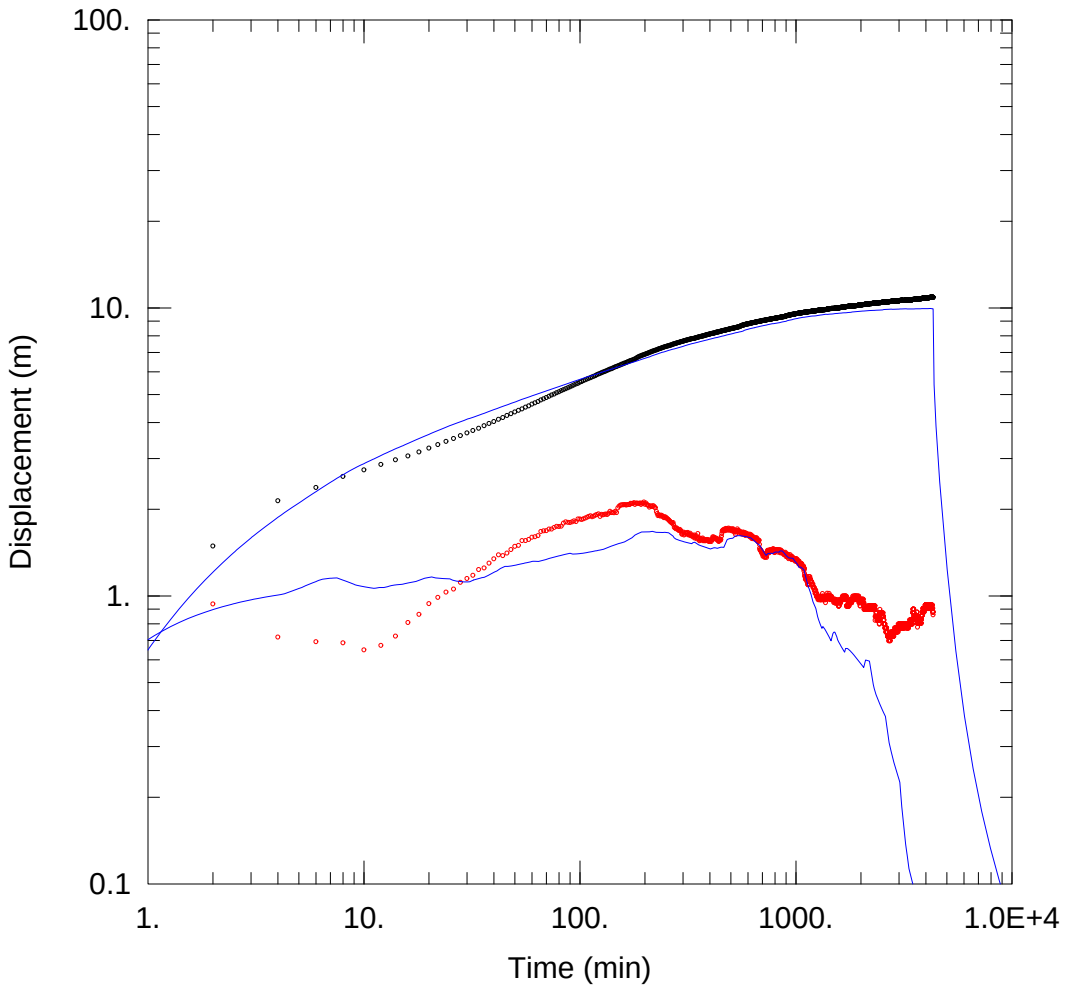
Observation Wells

Well Name	X (m)	Y (m)
◦ MW11-10D	687493	5609464

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.001154 m^2/sec
S = 0.01139
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: N:\...\MW11-10D_Hantush_noflowbdys_twc.aqt
Date: 07/27/15 Time: 20:06:36

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

AQUIFER DATA

Saturated Thickness: 53.13 m
Aquitard Thickness (b'): 1. m
Anisotropy Ratio (Kz/Kr): 1.
Aquitard Thickness (b"): 1. m

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

Observation Wells

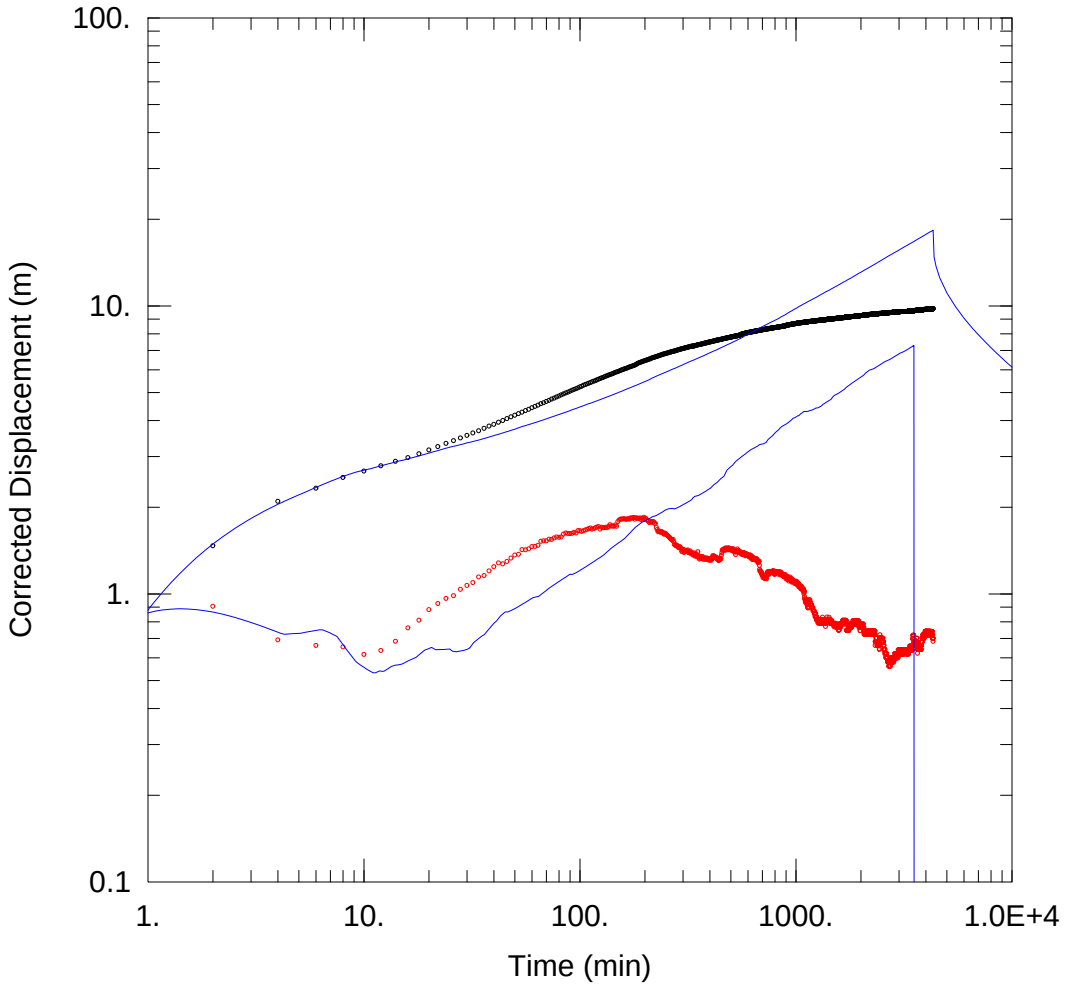
Well Name	X (m)	Y (m)
◦ MW11-10D	687493	5609464

SOLUTION

Aquifer Model: Leaky
Solution Method: Hantush

T = 0.0005366 m^2/sec
r/B' = 0.2114
r/B" = 1.094E-5

S = 0.0003898
ß' = 0.2685
ß" = 0.05741



WELL TEST ANALYSIS

Data Set: N:\...\MW11-10D_theis_noflows_twc.aqt
Date: 07/27/15 Time: 20:09:51

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

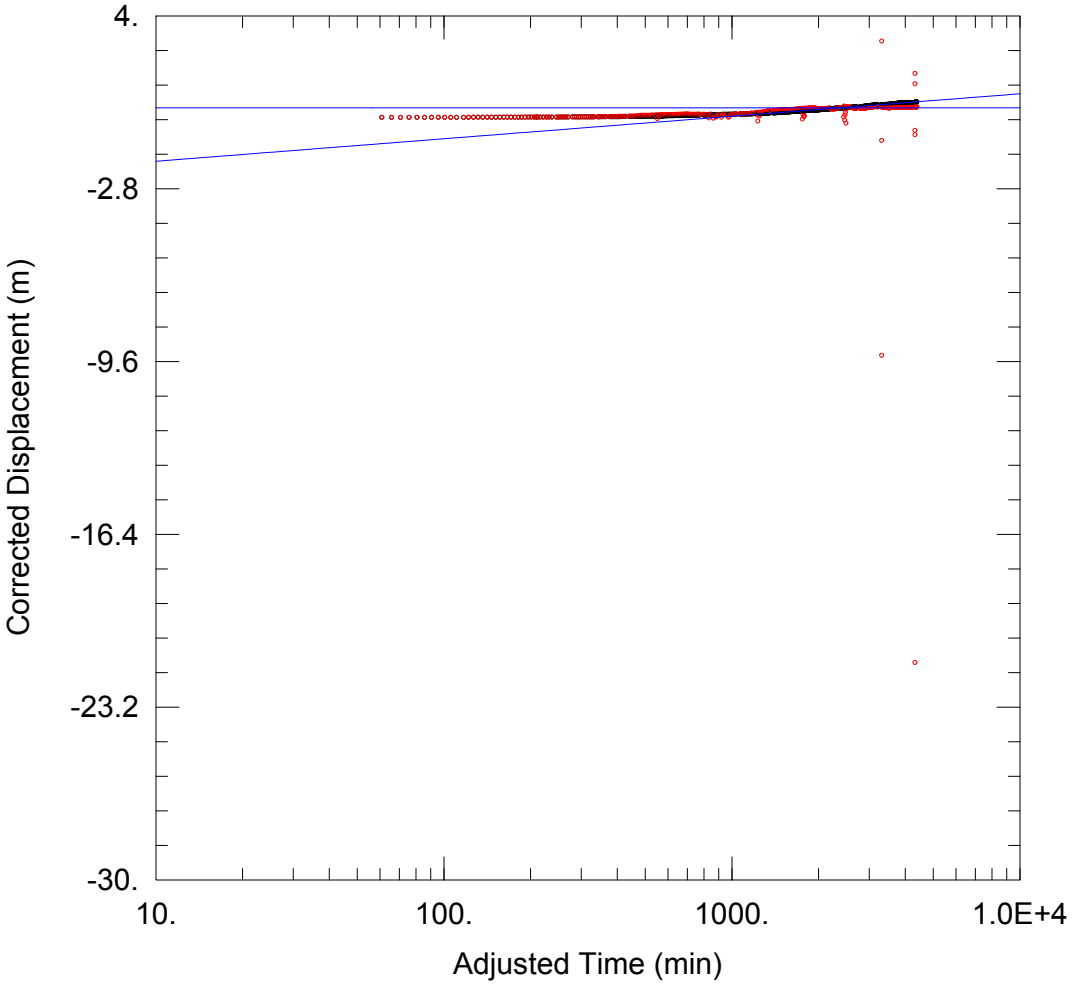
Observation Wells

Well Name	X (m)	Y (m)
◦ MW11-10D	687493	5609464

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.002676 m^2/sec
S = 0.002389
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: \...\DH14-057_CJ.aqt
Date: 07/15/15 Time: 15:56:25

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

AQUIFER DATA

Saturated Thickness: 53.13 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

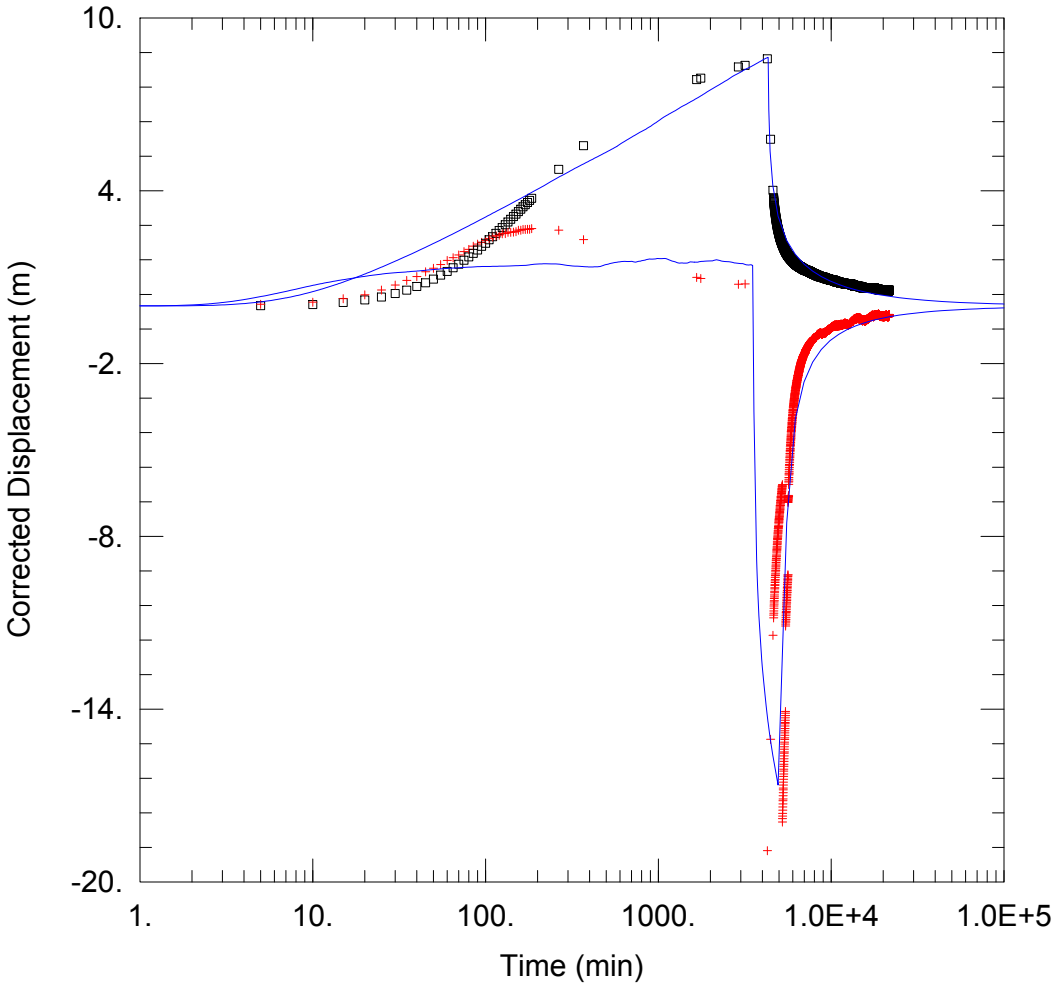
Observation Wells

Well Name	X (m)	Y (m)
◦ DH14-057	687035	5609442

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.003265 m^2/sec S = 0.001926



WELL TEST ANALYSIS

Data Set: \...\BGC14-004_Theis.aqt
Date: 07/15/15 Time: 15:36:35

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

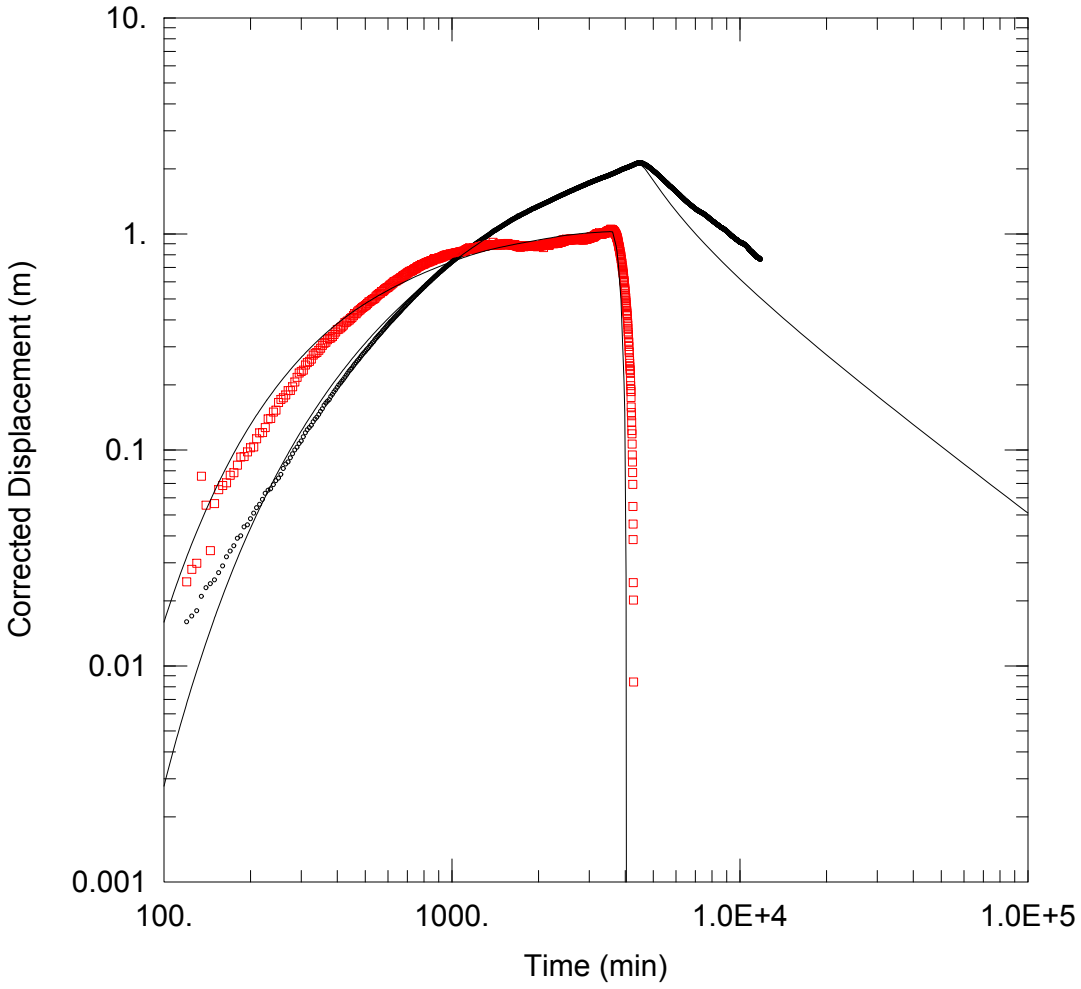
Observation Wells

Well Name	X (m)	Y (m)
▫ BGC14-004	687746	5609526

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.0008377 m^2/sec
S = 2.099E-5
Kz/Kr = 1.
b = 53.13 m



WELL TEST ANALYSIS

Data Set: \...\BGC14-005_Theis DD.aqt
Date: 07/15/15 Time: 15:30:23

PROJECT INFORMATION

Company: BGC Engineering Inc.
Client: KGHM Ajax Mining Inc.
Project: 1125007-08
Location: Kamloops
Test Well: BGC14-PW01

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
BGC14-PW01	687482	5609457

Observation Wells

Well Name	X (m)	Y (m)
◦ BGC14-005	687161	5609519

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.001087 m^2/sec
S = 0.001071
Kz/Kr = 1.
b = 53.13 m

APPENDIX D
WATER QUALITY LABORATORY RESULTS

KNIGHT PIESOLD LTD.
ATTN: Jessica Mackie
1400 - 750 W. Pender Street
VANCOUVER BC V6C 2T8

Date Received: 18-FEB-15
Report Date: 20-FEB-15 16:16 (MT)
Version: FINAL

Client Phone: 604-685-0543

Certificate of Analysis

Lab Work Order #: L1578632

Project P.O. #: 204028
Job Reference: VA101-246/31
C of C Numbers: GH2O16022015
Legal Site Desc:

Ariel Tang, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1578632-1	L1578632-2			
	Description	Groundwater	Groundwater			
	Sampled Date	16-FEB-15	17-FEB-15			
	Sampled Time	10:35				
	Client ID	BGC14-PW01	BGC14-PW01			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	2560	2570			
	Hardness (as CaCO3) (mg/L)	1530	1500			
	pH (pH)	7.95	7.93			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	2370	2430			
	Turbidity (NTU)	1.88	2.04			
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	264	274			
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0			
	Alkalinity, Total (as CaCO3) (mg/L)	264	274			
	Ammonia, Total (as N) (mg/L)	0.0410	0.0364			
	Bromide (Br) (mg/L)	<1.0 DLM	<1.0 DLM			
	Chloride (Cl) (mg/L)	<10 DLM	<10 DLM			
	Fluoride (F) (mg/L)	0.195	0.191			
	Nitrate (as N) (mg/L)	<0.10 DLM	<0.10 DLM			
	Nitrite (as N) (mg/L)	<0.020 DLM	<0.020 DLM			
	Total Kjeldahl Nitrogen (mg/L)	0.207	0.199			
	Orthophosphate-Dissolved (as P) (mg/L)	0.0048	0.0055			
	Phosphorus (P)-Total Dissolved (mg/L)	0.0060	0.0052			
	Phosphorus (P)-Total (mg/L)	0.0140	0.0147			
	Sulfate (SO4) (mg/L)	1500	1460			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050			
	Cyanide, Free (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	3.44	3.46			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0036	<0.0030			
	Antimony (Sb)-Total (mg/L)	0.00022	<0.00010			
	Arsenic (As)-Total (mg/L)	0.00615	0.00584			
	Barium (Ba)-Total (mg/L)	0.00821	0.00783			
	Beryllium (Be)-Total (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.071	0.068			
	Cadmium (Cd)-Total (mg/L)	0.000149	0.000041			
	Calcium (Ca)-Total (mg/L)	245	250			
	Chromium (Cr)-Total (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Total (mg/L)	0.00034	0.00019			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1578632-1	L1578632-2			
	Description	Groundwater	Groundwater			
	Sampled Date	16-FEB-15	17-FEB-15			
	Sampled Time	10:35				
	Client ID	BGC14-PW01	BGC14-PW01			
Grouping	**Analyte**					
WATER						
Total Metals	Copper (Cu)-Total (mg/L)	0.00336	0.00291			
	Iron (Fe)-Total (mg/L)	0.322	0.323			
	Lead (Pb)-Total (mg/L)	0.000498	0.000259			
	Lithium (Li)-Total (mg/L)	0.00964	0.00951			
	Magnesium (Mg)-Total (mg/L)	206	215			
	Manganese (Mn)-Total (mg/L)	0.280	0.247			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.0231	0.0226			
	Nickel (Ni)-Total (mg/L)	0.00155	0.00118			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	14.8	15.9			
	Selenium (Se)-Total (mg/L)	0.00431	0.00209			
	Silicon (Si)-Total (mg/L)	12.6	13.1			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	147	142			
	Strontium (Sr)-Total (mg/L)	1.83	1.71			
	Sulfur (S)-Total (mg/L)	483	489			
	Thallium (Tl)-Total (mg/L)	0.000018	<0.000010			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.00436	0.00431			
	Vanadium (V)-Total (mg/L)	0.0026	0.0019			
	Zinc (Zn)-Total (mg/L)	0.107	0.0332			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0016	0.0013			
	Antimony (Sb)-Dissolved (mg/L)	0.00021	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.00610	0.00589			
	Barium (Ba)-Dissolved (mg/L)	0.00848	0.00814			
	Beryllium (Be)-Dissolved (mg/L)	<0.00010	<0.00010			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.081	0.079			
	Cadmium (Cd)-Dissolved (mg/L)	0.000129	0.000038			
	Calcium (Ca)-Dissolved (mg/L)	253	245			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00033	0.00019			
	Copper (Cu)-Dissolved (mg/L)	0.00267	0.00221			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1578632-1	L1578632-2			
	Description	Groundwater	Groundwater			
	Sampled Date	16-FEB-15	17-FEB-15			
	Sampled Time	10:35				
	Client ID	BGC14-PW01	BGC14-PW01			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Iron (Fe)-Dissolved (mg/L)	0.273	0.307			
	Lead (Pb)-Dissolved (mg/L)	0.000386	0.000231			
	Lithium (Li)-Dissolved (mg/L)	0.0112	0.0112			
	Magnesium (Mg)-Dissolved (mg/L)	218	216			
	Manganese (Mn)-Dissolved (mg/L)	0.270	0.239			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.0253	0.0251			
	Nickel (Ni)-Dissolved (mg/L)	0.00157	0.00116			
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050			
	Potassium (K)-Dissolved (mg/L)	16.1	15.7			
	Selenium (Se)-Dissolved (mg/L)	0.00432	0.00212			
	Silicon (Si)-Dissolved (mg/L)	13.0	12.7			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	140	136			
	Strontium (Sr)-Dissolved (mg/L)	2.14	2.04			
	Sulfur (S)-Dissolved (mg/L)	484	464			
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.00499	0.00525			
	Vanadium (V)-Dissolved (mg/L)	0.0024	0.0018			
	Zinc (Zn)-Dissolved (mg/L)	0.0694	0.0295			

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bromide (Br)	DLM	L1578632-1, -2
Duplicate	Chloride (Cl)	DLM	L1578632-1, -2
Duplicate	Nitrite (as N)	DLM	L1578632-1, -2
Duplicate	Nitrate (as N)	DLM	L1578632-1, -2
Duplicate	Nitrite (as N)	DLM	L1578632-1, -2
Method Blank	Sodium (Na)-Total	MB-LOR	L1578632-1, -2
Matrix Spike	Phosphorus (P)-Total Dissolved	MS-B	L1578632-1, -2
Matrix Spike	Phosphorus (P)-Total	MS-B	L1578632-1, -2
Matrix Spike	Total Organic Carbon	MS-B	L1578632-1, -2
Matrix Spike	Ammonia, Total (as N)	MS-B	L1578632-1, -2
Duplicate	Total Organic Carbon	SP	L1578632-1, -2

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SP	Sample was Preserved at the laboratory

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-CFA-VA	Water	Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-CFA-VA	Water	Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

CN-WAD-CFA-VA	Water	Weak Acid Diss. Cyanide in water by CFA	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F "Fluoride"

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F Fluoride

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

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

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

Reference Information

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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

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

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

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

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

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GH2O16022015

Reference Information

GLOSSARY OF REPORT TERMS

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

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

ALS Environmental

Chain of Custody / Analytical Request Form

www.alsglobal.com

COC # GHZ01602015

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Knight Piesold Ltd.	☐ Standard ☐ Other		Regular (Standard Turnaround Times - Business Days)
Contact:	Jessica Mackie	☑ PDF ☑ Excel ☑ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1400-750 West Pender St	Email 1:	jmackie@knightpiesold.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC, V6C 2T8	Email 2:	lturcotte@knightpiesold.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-685-0543 Fax: 604-685-0147	Email 3:	jmcqueen@knightpiesold.com	
	☐ Yes ☑ No	Email 4:	Nicole.Anderson@kghm.com	
Invoice To	Same as Report ?	**Client / Project Information**		**Analysis Request**
Hardcopy of Invoice with Report?	☑ Yes ☐ No	Job #:	VA101-246/31	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	KGHM Ajax	PO / AFE:	204028	
Contact:	KGHM Accounts Payable (attn: Jody Hays)	LSD:		
Address:	Suite 200-124 Seymour St. Kamloops BC,V6C 3L6			
Phone:	778-471-8130 Email: ajax.ap@kghm.com	Quote #:		
Lab Work Order # (lab use only)	☐ Yes ☐ No	ALS Contact:	Ariel Tang	Sampler: NW

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical Tests&Anions: SpC, pH, TDS, TSS,turbidity,hardness, NO3, NO2, F, Br, Cl, SO4, alkalinity (total, bicarb, carb),T-P, D-P, D Ortho P			Nutrients & TOC (H2SO4): NH4, TKN, TOC	Tot Metals CCMS - Low Level (HNO3)	Diss Metals CCMS - Low Level (HNO3)	Dissolved Mercury low level (HCl)	Total Mercury low level (HCl)	Cyanide (Total, WAD, Free) (NaOH)				Number of Containers
								P	P	F/P	F/P	P	P				
	BGC14 - PW01	16-Feb-15	10:35	Ground	X			X	X	X	X	X	X				7
	BGC14 - PW01	17-Feb-15		Water	X	X	X	X	X	X	X	X	X				7

RUSH

Priority processing

L1578632-COFC

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Low-level metals (CCMS + Hg) and Speciated Alkalinity (Total, dissolved, carbonate and bicarbonate alkalinity)

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Nikki Willer	17-Feb-15	1600		Feb 18	8:30	3 °C				

KNIGHT PIESOLD LTD.
ATTN: Jessica Mackie
1400 - 750 W. Pender Street
VANCOUVER BC V6C 2T8

Date Received: 19-FEB-15
Report Date: 23-FEB-15 17:29 (MT)
Version: FINAL

Client Phone: 604-685-0543

Certificate of Analysis

Lab Work Order #: L1579304

Project P.O. #: 204023
Job Reference: VA101-246/31
C of C Numbers: GH2O18022015A
Legal Site Desc:

Ariel Tang, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1579304-1				
	Description	Ground Water				
	Sampled Date	18-FEB-15				
	Sampled Time	15:15				
	Client ID	BGC14-PW01				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	2500				
	Hardness (as CaCO3) (mg/L)	1390				
	pH (pH)	7.97				
	Total Suspended Solids (mg/L)	<3.0				
	Total Dissolved Solids (mg/L)	2290				
	Turbidity (NTU)	1.90				
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	286				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	286				
	Ammonia, Total (as N) (mg/L)	0.0346				
	Bromide (Br) (mg/L)	<1.0 DLM				
	Chloride (Cl) (mg/L)	<10 DLM				
	Fluoride (F) (mg/L)	0.186				
	Nitrate (as N) (mg/L)	<0.10 DLM				
	Nitrite (as N) (mg/L)	<0.020 DLM				
	Total Kjeldahl Nitrogen (mg/L)	0.192				
	Orthophosphate-Dissolved (as P) (mg/L)	0.0070				
	Phosphorus (P)-Total Dissolved (mg/L)	0.0063				
	Phosphorus (P)-Total (mg/L)	0.0149				
	Sulfate (SO4) (mg/L)	1430				
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050				
	Cyanide, Total (mg/L)	<0.0050				
	Cyanide, Free (mg/L)	<0.0050				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	3.46				
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	0.00011				
	Arsenic (As)-Total (mg/L)	0.00568				
	Barium (Ba)-Total (mg/L)	0.00781				
	Beryllium (Be)-Total (mg/L)	<0.00010				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	0.072				
	Cadmium (Cd)-Total (mg/L)	0.000037				
	Calcium (Ca)-Total (mg/L)	238				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	0.00017				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1579304-1				
	Description	Ground Water				
	Sampled Date	18-FEB-15				
	Sampled Time	15:15				
	Client ID	BGC14-PW01				
Grouping	**Analyte**					
WATER						
Total Metals	Copper (Cu)-Total (mg/L)	0.0133				
	Iron (Fe)-Total (mg/L)	0.308				
	Lead (Pb)-Total (mg/L)	0.000428				
	Lithium (Li)-Total (mg/L)	0.00959				
	Magnesium (Mg)-Total (mg/L)	201				
	Manganese (Mn)-Total (mg/L)	0.229				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.0253				
	Nickel (Ni)-Total (mg/L)	0.00107				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	14.3				
	Selenium (Se)-Total (mg/L)	0.00169				
	Silicon (Si)-Total (mg/L)	12.5				
	Silver (Ag)-Total (mg/L)	0.000017				
	Sodium (Na)-Total (mg/L)	139				
	Strontium (Sr)-Total (mg/L)	1.99				
	Sulfur (S)-Total (mg/L)	464				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	0.00014				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00472				
	Vanadium (V)-Total (mg/L)	0.0019				
	Zinc (Zn)-Total (mg/L)	0.0410				
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	0.0022				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00594				
	Barium (Ba)-Dissolved (mg/L)	0.00808				
	Beryllium (Be)-Dissolved (mg/L)	<0.00010				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	0.071				
	Cadmium (Cd)-Dissolved (mg/L)	0.000034				
	Calcium (Ca)-Dissolved (mg/L)	237				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	0.00017				
	Copper (Cu)-Dissolved (mg/L)	0.00278				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1579304-1				
	Description	Ground Water				
	Sampled Date	18-FEB-15				
	Sampled Time	15:15				
	Client ID	BGC14-PW01				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Iron (Fe)-Dissolved (mg/L)	0.299				
	Lead (Pb)-Dissolved (mg/L)	0.000285				
	Lithium (Li)-Dissolved (mg/L)	0.00988				
	Magnesium (Mg)-Dissolved (mg/L)	194				
	Manganese (Mn)-Dissolved (mg/L)	0.221				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.0246				
	Nickel (Ni)-Dissolved (mg/L)	0.00118				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	14.5				
	Selenium (Se)-Dissolved (mg/L)	0.00174				
	Silicon (Si)-Dissolved (mg/L)	12.3				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	143				
	Strontium (Sr)-Dissolved (mg/L)	1.98				
	Sulfur (S)-Dissolved (mg/L)	437				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00503				
	Vanadium (V)-Dissolved (mg/L)	0.0017				
	Zinc (Zn)-Dissolved (mg/L)	0.0322				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLM	L1579304-1
Duplicate	Nitrate (as N)	DLM	L1579304-1
Matrix Spike	Nitrite (as N)	MS-B	L1579304-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1579304-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1579304-1
Matrix Spike	Orthophosphate-Dissolved (as P)	MS-B	L1579304-1
Matrix Spike	Phosphorus (P)-Total	MS-B	L1579304-1

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.
OR
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BR-L-IC-N-VA	Water	Bromide in Water by IC (Low Level)	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

CN-FREE-CFA-VA	Water	Free Cyanide in water by CFA	ASTM 7237

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-CFA-VA	Water	Total Cyanide in water by CFA	ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

CN-WAD-CFA-VA	Water	Weak Acid Diss. Cyanide in water by CFA	APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F "Fluoride"

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

F-SIE-VA	Water	Fluoride by SIE	APHA 4500-F Fluoride

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode. This method has a significant negative interference (i.e. results could be biased low) when Al3+ is present in the sample at a concentration greater than 2.5 mg/L.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

MET-DIS-LOW-ICP-VA Water Dissolved Metals in Water by ICPOES EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS APHA 3030 B&E / EPA SW-846 6020A

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

MET-TOT-LOW-ICP-VA Water Total Metals in Water by ICPOES EPA 3005A/6010B

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

NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

P-TD-COL-VA Water Total Dissolved P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Dissolved Phosphorus is determined colourimetrically after persulphate digestion of a sample that has been lab or field filtered through a 0.45 micron membrane filter.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter.

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

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

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

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

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

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

SO4-IC-N-VA Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-F-VA Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

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

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

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GH2O18022015A

Reference Information

GLOSSARY OF REPORT TERMS

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

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

L1579304-COFC

Chain of Custody / Analytical Request Form

www.alsglobal.com

COC # GH20180220158A

Page 1 of 1

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Knight Piesold Ltd.	☐ Standard ☐ Other		Regular (Standard Turnaround Times - Business Days)
Contact:	Jessica Mackie	☑ PDF ☑ Excel ☑ Digital ☐ Fax		● Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1400-750 West Pender St	Email 1:	jmackie@knightpiesold.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC, V6C 2T8	Email 2:	tturcotte@knightpiesold.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-685-0543 Fax: 604-685-0147	Email 3:	jmcqueen@knightpiesold.com	
	☐ Yes ☑ No	Email 4:	Nicole.Anderson@kghm.com	
Invoice To	Same as Report ?	**Client / Project Information**		**Analysis Request**
Hardcopy of Invoice with Report?	☑ Yes ☐ No	Job #:	VA101-246/31	Please indicate below Filtered, Preserved or both (F, P, F/P)
Company:	KGHM Ajax	PO / AFE:	204023	
Contact:	KGHM Accounts Payable (attn: Jody Hays)	LSD:		
Address:	Sutie 200-124 Seymour St. Kamloops BC,V6C 3L6			
Phone:	778-471-8130 Fax:	Quote #:		
Lab Work Order # (lab use only)	☐ Yes ☐ No	ALS Contact:	Ariel Tang	Sampler: NW

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Physical Tests&Anions: SpC, pH, TDS, TSS,turbidity,hardness, NO3, NO2, F, Br, Cl, SO4, alkalinity (total, bicarb, carb),T-P, D-P, D Ortho P	Nutrients & TOC (H2SO4): NH4, TKN, TOC	Tot Metals CCMS - Low Level (HNO3)	Diss Metals CCMS - Low Level (HNO3)	Dissolved Mercury low level (HCl)	Total Mercury low level (HCl)	Cyanide (Total, WAD, Free) (NaOH)	Number of Containers
					P	P	F/P	F/P	P	P		
	BGC14 - PW01	18-Feb-15	15:15	Ground Water	X	X	X	X	X	X	X	7

RUSH

Priority processing

Short Holding Time

Rush Processing

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Low-level metals (CCMS + Hg) and Speciated Alkalinity (Total, dissolved, carbonate and bicarbonate alkalinity)

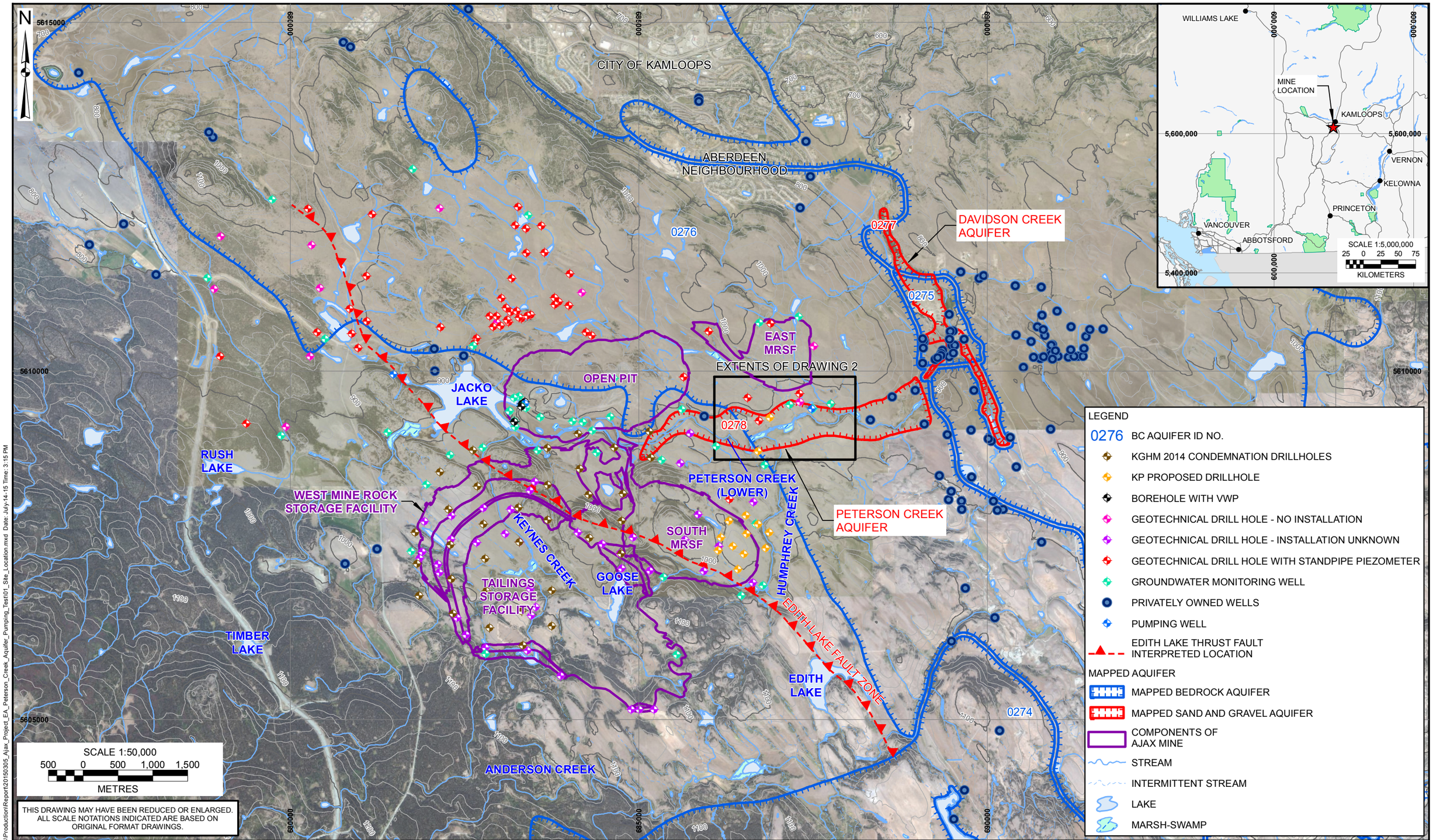
Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Nikki Willier	18-Feb-15	16:30				9.1 °C	DJ	Feb 19/15	8:50	

DRAWINGS



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NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
2. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "AJAX PROJECT EA - PETERSON CREEK AQUIFER PUMPING TEST", AND DATED JULY 2015.
3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS COMPILED FROM KGHM, TRIM AND GEOBASE, DATED MAY 2012. CONTOUR INTERVAL IS 20 m.
4. PROJECTION IS NAD 1983 UTM ZONE 10N.
5. UNLESS BGC AGREES OTHERWISE IN WRITING, THIS DRAWING SHALL NOT BE MODIFIED OR USED FOR ANY PURPOSE OTHER THAN THE PURPOSE FOR WHICH BGC GENERATED IT. BGC SHALL HAVE NO LIABILITY FOR ANY DAMAGES OR LOSS ARISING IN ANY WAY FROM ANY USE OR MODIFICATION OF THIS DOCUMENT NOT AUTHORIZED BY BGC. ANY USE OF OR RELIANCE UPON THIS DOCUMENT OR ITS CONTENT BY THIRD PARTIES SHALL BE AT SUCH THIRD PARTIES' SOLE RISK.
6. KP PROPOSED DRILLHOLES WERE COMPLETED IN 2014, BUT HAVE NOT BEEN SURVEYED. THE FINAL COMPLETIONS ARE NOT SHOWN ON THIS DRAWING.

SCALE:	1:50,000
DATE:	JUL 2015
DRAWN:	RC, MIB
CHECKED:	CK
APPROVED:	TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA - PETERSON CREEK AQUIFER PUMPING TEST

TITLE: SITE LOCATION

PROJECT No.: 1125007-08

DWG No: 01

N

EAST MRSF

0276

BGC13-007

BGC13-008

DH-BGC11-ED-13

BGC14-005

BGC13-022

BGC14-004

BGC13-021

MW11-10S

MW11-10D

BGC14-PW01

BGC14-018

A 03

PIPE LOCATION

DH14-057

DH14-051 (A)

DH-BGC11-ED-14

PC02.5

STAFF GAUGE LOCATION

PETERSON CREEK (LOWER)

HUMPHREY CREEK

0278

BGC14-008D/S

DH14-052 (F)

960 920 900 880 860

686500 687000 687500 688000

5609500 5609000

SCALE 1:5000

100 0 100 200 300

METRES

THIS DRAWING MAY HAVE BEEN REDUCED OR ENLARGED. ALL SCALE NOTATIONS INDICATED ARE BASED ON ORIGINAL FORMAT DRAWINGS.

LEGEND

- GEOTECHNICAL DRILL HOLE - NO INSTALLATION
- GEOTECHNICAL DRILL HOLE WITH STANDPIPE PIEZOMETER
- GROUNDWATER MONITORING WELL
- PUMPING WELL
- MW11-10D UNDERLINED WELLS WERE MONITORED DURING PUMPING
- KP PROPOSED DRILLHOLE
- TEMPORARY STAFF GUAGE
- WATER QUALITY STATION
- PUMPING TEST DISCHARGE PIPE ALIGNMENT
- COMPONENTS OF AJAX MINE
- PUMPING TEST DISCHARGE LOCATION
- MAPPED SUGARLOAF HILL BEDROCK AQUIFER
- MAPPED SAND AND GRAVEL AQUIFER
- 0276 BC AQUIFER ID NO.
- STREAM
- INTERMITTENT STREAM
- LAKE
- MARSH-SWAMP

NOTES:
1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
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3. BASE TOPOGRAPHIC DATA BASED ON CONTOURS COMPILED FROM KGHM, TRIM AND GEOBASE, DATED MAY 2012. CONTOUR INTERVAL IS 20 m.
4. PROJECTION IS NAD 1983 UTM ZONE 10N.
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6. KP PROPOSED DRILLHOLES WERE COMPLETED IN 2014, BUT HAVE NOT BEEN SURVEYED. THE FINAL COMPLETIONS ARE NOT SHOWN ON THIS DRAWING.

SCALE:	1:5000
DATE:	JUL 2015
DRAWN:	RC, MIB
CHECKED:	CK
APPROVED:	TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA - PETERSON CREEK AQUIFER PUMPING TEST

TITLE: PUMPING AND MONITORING WELL LOCATIONS

PROJECT No.: 1125007-08

DWG No: 02

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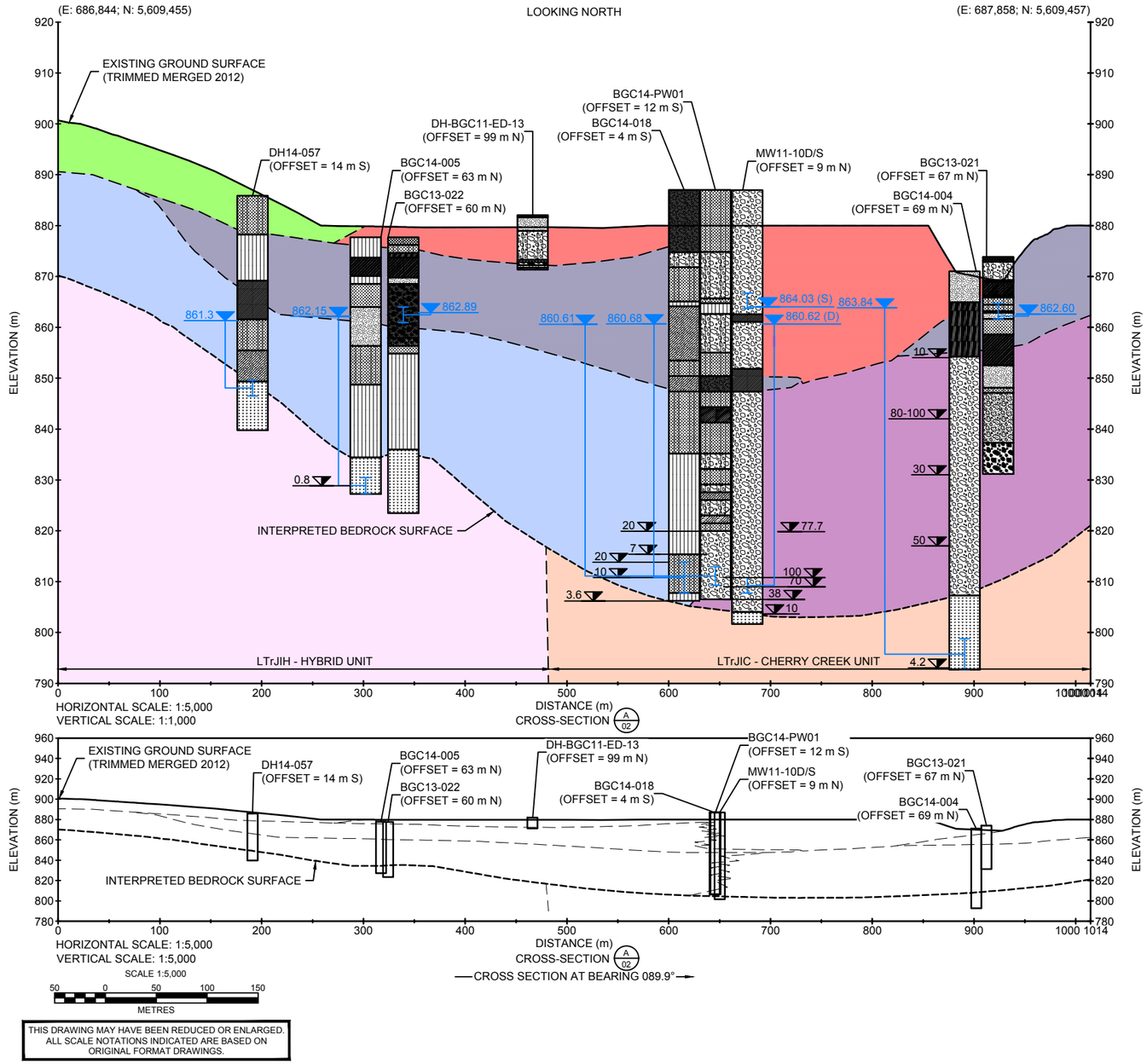

NOTES:
1. DRILL HOLE DATA COMPILED FROM BGC, KAM, KP, KCB, GOLDER AND WRBC. SEE APPENDIX B AND C FOR DETAILED LITHOLOGICAL DESCRIPTIONS.
2. INTERPRETATION OF SURFICIAL STRATIGRAPHY BASED ON BOREHOLE DATA FROM DRILLING INVESTIGATIONS FOR THE AJAX PROJECT COMPLETED BY BGC, KAM, KP, KCB, GOLDER AND WRBC, AND ON SURFICIAL MAPPING BY FULTON (1975), KEYSTONE (2008) AND KP (2014).
3. AFTER MASSEY ET AL (2005).
4. BOREHOLES SHOWN ON THE UPPER SECTION (5X VERTICAL EXAGGERATION) ARE OFFSET TO ALLOW PRESENTATION OF LOGGED UNITS. CORRECT PROJECTIONS ARE SHOWN ON THE LOWER SECTION (NO VERTICAL EXAGGERATION).
5. BOREHOLE ELEVATIONS HAVE BEEN GEOREFERENCED TO AIRBORNE IMAGING LIDAR PRODUCED FOR KGHM AJAX MINING INC. IN APRIL AND MAY OF 2013.
6. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
7. THIS DRAWING MUST BE READ IN CONJUNCTION WITH BGC'S REPORT TITLED "AJAX PROJECT EA - PETERSON CREEK AQUIFER PUMPING TEST," AND DATED JULY 2015.
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SCALE:	AS SHOWN
DATE:	JUL 2015
DRAWN:	AH
CHECKED:	CK
APPROVED:	TWC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT: KGHM AJAX MINING INC.

PROJECT: AJAX PROJECT EA
PETERSON CREEK AQUIFER PUMPING TEST

TITLE: SECTION A - INTERPRETIVE GEOLOGY OF THE PETERSON CREEK AQUIFER IN THE PUMPING TEST LOCATION

PROJECT No.: 1125007-08

DWG No.: 03

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