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Appendix F5

KSM Project Open Pit Depressurization Analyses

SEABRIDGE GOLD INC.

KSM PROJECT
PRE-FEASIBILITY STUDY UPDATE

OPEN PIT DEPRESSURIZATION ANALYSES

FINAL

PROJECT NO:	0638-009	DISTRIBUTION:	
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June 15, 2011

Project No.: 0638-009

Jim Smolik
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Toronto, Ontario, M5A 1E1

Dear Mr. Smolik,

Re: KSM Project Pre-Feasibility Study Update - Open Pit Depressurization Analyses

Please find attached the above referenced final report, dated June 15, 2011. We would like to thank you for the opportunity to work on this interesting project.

Yours sincerely,

BGC ENGINEERING INC.
per:

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Project Hydrogeological Engineer

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RT/TC/SAH/st

EXECUTIVE SUMMARY

BGC Engineering Inc. (BGC) carried out open pit depressurization analyses to complement open pit slope geotechnical design studies for the Kerr-Sulphurets-Mitchell (KSM) project. The KSM project represents four large, undeveloped gold and copper porphyry zones: Kerr, Sulphurets, Mitchell, and Iron Cap, located within two glacially modified valleys in the Coast Mountain range of northern British Columbia.

This report summarizes the data used to develop conceptual and numerical hydrogeologic models for the four proposed open pits and presents the predictive simulation results for open pit depressurization. Estimates of the required number of vertical dewatering wells and horizontal drains and associated groundwater extraction rates required to achieve rock mass depressurization objectives over the life of each pit are provided, along with recommendations for pumping well design and staging to assist Seabridge with developing pre-feasibility level estimates of slope depressurization. In addition, it was determined that to achieve the depressurization targets of the upper north slope of Mitchell Pit, an adit and drainage gallery would be required. Recommendations for the adit location are provided, along with anticipated flow rates into the adit.

The conceptual hydrogeologic model described herein was used as the basis for developing a numerical hydrogeologic model in MODFLOW Surfact (version 3.0, HydroGeoLogic, 1998). The numerical model was calibrated to available site wide hydrologic and hydrogeologic data and subsequently used to evaluate the depressurization required to satisfy geotechnical design requirements for the proposed open pit slopes. Hydrologic data comprised stream flow data at five locations and meteorological data at two stations within the modeled project area. Hydrogeologic data used for the numerical model consisted of results from approximately 200 hydrogeologic tests (packer tests and slug tests) carried out within bedrock, a limited number of test results from locations within overburden, and hydraulic head data at 66 monitoring locations.

A systematic trial-and-error approach was used to determine an effective dewatering scheme for the Kerr (mined from Year 14 to Year 36), Sulphurets (mined from Year 7 to Year 13), Mitchell (mined from Year -2 to Year 40), and Iron Cap (mined from Year 38 to Year 52) pits as they develop throughout the life of the mine. The estimated total annual groundwater extraction rate for the best estimate parameter case for Mitchell pit is predicted to decline from a maximum of approximately 13,200 m^3/d in Year 16 to 5,000 m^3/d by year 40. The average annual groundwater extraction rate for Mitchell pit is predicted to be approximately 9,540 m^3/d throughout the life of the pit; 5,340 m^3/d will be captured by vertical wells, 3,220 m^3/d will be captured by the adit and drainage gallery, while the remaining 980 m^3/d will be captured by horizontal drains. Approximately 178 in-pit wells 200 m deep will be required over the life of mine for the Mitchell pit. In addition, it is estimated that approximately 1,370 km of horizontal drains over 42 years of mining will be required to aid in bench-scale and interramp-scale depressurization of the pit slopes. Finally, a 3.5 km long adit located

approximately 450 m behind the ultimate north pit wall and will run from east to west will also be required. Drain holes will be drilled in a fan pattern off of the adit on 50 m spacing.

The average annual groundwater extraction rate for Kerr Pit for the best estimate parameter case from mine year 14 to 36 is predicted to be approximately 1,630 m^3/d; 1,040 m^3/d will be captured by vertical in-pit wells, while the remaining 590 m^3/d will be captured by horizontal drains. Approximately 56 vertical wells 200 m deep will be required throughout the life of the pit. In addition, it is estimated that approximately 100 km of horizontal drains over 22 years of mining will be required to aid in depressurization of the pit slopes.

The average annual groundwater extraction rate for Sulphurets Pit from mine year 7 to 13 is predicted to be 1,130 m^3/d; 780 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 40 vertical wells 200 m deep will be required throughout the life of the pit. In addition, it is estimated that approximately 110 km of horizontal drains over 6 years of mining will be required to aid in depressurization of the pit slopes.

The average annual groundwater extraction rate for Iron Cap pit from mine year 38 to 52 is predicted to be 2,650 m^3/d; 2,300 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 44 vertical wells 200 m deep will be required throughout the life of the pit. In addition, it is estimated that approximately 160 km of horizontal drains over 14 years of mining will be required to aid in depressurization of the pit slopes.

Further optimization of the dewatering system described would likely result in reducing the required number of vertical wells. A detailed evaluation of flows to individual wells was not carried out; however, simulated flow rates for each well generally decrease with time. The number of wells specified herein is deemed conservative and future studies could focus on reducing the number required.

The efficiency of the open pit dewatering systems is sensitive to the hydraulic parameters of the simulated hydrogeologic units used to describe the actual system. To improve confidence in these estimates, it will be necessary to obtain larger scale estimates of rock mass hydraulic conductivity and storage parameters from pumping tests conducted in each open pit area.

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LIMITATIONS

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1.0 INTRODUCTION

BGC Engineering Inc. (BGC) was retained by Seabridge Gold Inc. (Seabridge) to provide open pit depressurization analyses to complement open pit slope geotechnical design studies for a Pre-Feasibility level engineering study being completed for the Kerr-Sulphurets-Mitchell (KSM) property (Drawing 1). The KSM project represents four large, undeveloped gold and copper porphyry zones: Kerr, Sulphurets, Mitchell, and Iron Cap. This report summarizes data used to develop conceptual and numerical hydrogeologic models and presents the results of predictive open pit depressurization analyses, as well as the recommended open pit depressurization system. Model input parameter sensitivities related to the open pit depressurization results are also analyzed and reviewed.

In addition to the pit depressurization assessments, BGC is involved in the open pit slope designs, access and haul road layout and design, geohazard identification and mitigation, and glacial studies for the KSM project study. Mine layout, environmental assessments, and engineering services for the project are being provided by Moose Mountain Technical Services (MMTS), Rescan Environmental Services Ltd. (Rescan), and Klohn Crippen Berger Ltd. (KCBL), respectively. Wardrop Engineering Inc. (Wardrop) is responsible for the compilation of the complete multi-component Pre-Feasibility Study.

1.1. Previous Work

Geological exploration activities have been carried out in the area of the KSM project since the 1960's (Margolis, 1993). BGC carried out a scoping level Preliminary Economic Assessment (PEA) design study for the proposed Mitchell pit in 2008 (BGC, 2008 and 2009a). Rescan conducted environmental baseline studies for the project area in 2008, which included meteorological and hydrological studies. Baseline hydrogeologic investigations prior to 2009 were limited to sampling of groundwater seeps within the KSM pit footprints (Rescan, 2009a), and packer tests and piezometer installations at three boreholes within the proposed Mitchell Waste dump footprint (KCBL, 2009a).

BGC carried out pit depressurization analyses focused on the Mitchell, Kerr and Sulphurets pits in 2010 (BGC, 2010b), based on the results of the 2009 field investigations carried out by BGC, Rescan (Rescan, 2010a) and KCBL (KCBL 2010d). Field investigations carried out in 2010 included additional hydrogeologic testing in the proposed open pit areas; particularly the Kerr, Sulphurets and Iron Cap areas, as well as the waste dump areas (KCBL, 2010e). The results from these field investigations have been incorporated in the pit depressurization analyses update provided herein.

1.2. Current Work

BGC's scope of work included: compiling hydrogeologic data collected by BGC, Klohn Crippen Berger Limited (KCBL) and Rescan Environmental Services Limited (Rescan) in the vicinity of the proposed open pits during the 2008, 2009, and 2010 field seasons; identifying hydrostratigraphic units; estimating hydraulic conductivity and storage parameter values; and formulating a conceptual hydrogeologic model for the project area in the vicinity of the open pits. The conceptual model was used as the basis for developing a numerical hydrogeologic model using MODFLOW Surfact (HydroGeoLogic, 1998). The calibrated numerical model was used to evaluate the effort required to depressurize the open pit slopes to satisfy pore pressure targets identified in pit slope design studies for the proposed Kerr, Sulphurets, Mitchell and Iron Cap open pits (BGC 2011b, BGC 2011c, BGC 2011d, BGC 2011e).

Estimates of the required number of vertical dewatering wells, adits and horizontal drains required to achieve sufficient depressurization of the rock mass, as well as associated groundwater extraction rates are provided. Recommendations for pumping well design and staging are provided to assist Seabridge with estimating pre-feasibility level project costs. Post closure pit lake filling simulations were not carried out, as data was not available regarding pit waste rock backfilling at the time this report was prepared. A separate memorandum will be issued when the timing and volumes of pit backfilling are available, as required to support the environmental assessment.

2.0 OVERVIEW OF SETTING

The KSM study area is located in the Coast Mountains of north-western British Columbia approximately 65 km north-northwest of Stewart, B.C. and approximately 20 km southeast of Eskay Creek Mine, formerly operated by Barrick Gold Corp. Access to the site is by helicopter, staging from the Granduc road via Hyder, Alaska or Bell 2, B.C. (Drawing 1).

The project area is located within a historically active mining region of B.C. In addition to the closed Eskay Creek and Granduc Mines, multiple current and historic exploration targets are situated near the KSM project site.

2.1. Study Area Physiography

The project area lies in the rugged Coastal Mountains, with elevations ranging from 520 meters in the Sulphurets valley to over 2,300 meters above sea level (masl) at the highest peaks (Drawing 2). The tree line lies at about 1,240 masl, below which a mature forest of mostly hemlock and balsam fir is present. Valley glaciers fill the upper portions of the larger valleys from just below the tree line and upwards.

The Mitchell valley (Drawing 2) trends approximately east-west and is typical of glaciated valleys of the B.C. Cordillera, with an open “U”-shaped cross section where gentle upper slopes drop into steeper valley walls which grade into broad and gently sloping valley floors. The valley has been recently de-glaciated; a comparison of B.C. TRIM (1982) topography data with topography compiled in 2008 from orthophotography suggests that the Mitchell glacier has receded approximately 700 m eastward and thinned considerably since 1982 (BGC 2010a).

The Mitchell zone is located in the floor of the Mitchell Creek valley, immediately downstream of the Mitchell glacier. The Iron Cap zone is situated on the north wall of the Mitchell Creek Valley, up slope from the Mitchell Glacier. The rim elevations of the north and south valley slopes are approximately 2,000 masl and 1,700 masl, respectively. The valley floor in the area of the Iron Cap and Mitchell zones ranges from 1,000 masl down to 800 masl. The total relief in the Mitchell valley in the area of the Mitchell mineralized zone ranges from 900 to 1,100 m. The total relief in the Mitchell valley in the area of the mineralized Iron Cap zone is approximately 1,000 m.

The Kerr and Sulphurets zones are located in the upper reaches of the Sulphurets valley (Drawing 2). The Sulphurets valley has also been recently de-glaciated. Geomorphic processes typical of the B.C. Cordillera including fluvial erosion in the valley floor and mass wasting of the valley slopes can be observed in both the Mitchell and Sulphurets valleys.

2.2. Meteorology

The climate is generally that of a temperate or northern coastal rainforest, with subarctic conditions at high elevations. Within similar mountainous terrain an orographic influence of increased precipitation with increased elevation is often observed (Loukas and Quick, 1996) and this same effect is expected within the project area, resulting in highly variable precipitation and air temperature (Rescan, 2009a and 2010d). Meteorology baseline studies for the site began in September 2007 with the installation of an automated meteorological station in Sulphurets Creek at elevation 880 masl and in March 2008 in Teigen Creek at elevation 1,085 masl by Rescan. A wind-only automated station was installed within the proposed Mitchell pit area (elevation of 830 masl) in September 2008. Precipitation and climate have also been monitored within the region at the Unuk River-Eskay Creek (#1078L3D, elevation 887 masl), Bob Quinn (#1200R0J, elevation 610 masl), and Stewart Airport stations (#1067742, elevation 7 masl) (Drawing 1) operated by Environment Canada since 1989, 1977, and 1974, respectively.

The ClimateBC estimated mean annual precipitation for the Sulphurets meteorological station is 1,654 mm based on data collected from October 2008 to October 2009 (Rescan, 2010d). Mean monthly precipitation estimates are provided in Table 1 along with monthly normals from the nearby regional stations.

The length of the snow-free season varies from about May through November at lower elevations and from July through September at higher elevations. Table 2 summarizes the mean monthly air temperature for the KSM Project Area at the Sulphurets Creek and Mitchell Creek stations for the period of record. Average monthly temperature ranges from -8.1°C in December 2008 to 8.3°C in July 2009 at the Sulphurets station and from -10.5°C in December 2008 to 9.0°C in July 2009 at the Mitchell station. These temperatures are generally similar to regional climate normals for the Unuk River-Eskay Creek and Bob Quinn stations.

2.3. Hydrology

The project area is drained by Sulphurets Creek into the Unuk River, which ultimately flows westward to the Pacific Ocean through Alaska (Drawing 1). Approximately 38% of the Sulphurets Creek watershed is glacier covered, and the surface water hydrologic system is described as primarily a glacier-augmented system (Rescan 2009a and 2010e). This type of system behaves similarly to a snow-melt dominated system except that the period of high flows extends from about May to August or September, and low-flow conditions occur only when precipitation is accumulating in the snowpack, usually from December to March.

Rescan installed a series of automated hydrometric stations during 2007 and 2008 to collect continuous water level data at the major streams within the study area. Seven stations are located within the Sulphurets Creek watershed, as shown on Drawing 2 and as described in Table 3 together with peak and low flow rates (modified from Rescan, 2010b).

Rescan began monitoring of the Mitchell Glacier in September 2008 to estimate glacier mass balance and surge potential. The Mitchell Glacier is a medium-sized alpine glacier that forms part of what is known as the Unuk Icefield or the Sulphurets Icefield. Estimates of glacier contributions to streamflow were not available at the time of this analysis.

2.4. Permafrost

BGC prepared a preliminary assessment of permafrost distribution within the KSM project mine area (BGC, 2011a). In mountainous terrain the existence of permafrost is not only a function of average annual temperature and elevation, but also aspect, slope angle and local topography. Snow cover also plays an important role in the development of permafrost as thick snow cover insulates the ground from cold winter air temperatures.

The potential for permafrost at the site has been interpreted at elevations greater than 1600 masl on north facing slopes, and at elevations greater than 1750 to 1850 masl for all slopes in the project area (BGC, 2011a). Therefore, there is potential for permafrost in the upper reaches of Iron Cap, Sulphurets, and Kerr pits.

Thicknesses are estimated to range from only several meters at the lower elevation boundary to potentially more than 150 m thick at elevations of 2000 masl. However, the complex topography along the high mountain ridges likely also results in complex permafrost distribution with depth, and significant variations over relatively short distances.

2.5. Geology

2.5.1. Regional Geology

The KSM project area lies within the Stikinia Terrane (Lechner, 2008), one of almost twenty fault-bounded crustal blocks which make up the B.C. Cordillera (Monger and Price, 2002). The Stikinia Terrane consists of Triassic and Jurassic volcanic island arcs accreted onto the Paleozoic basement of the North American continent. The resulting country rocks are combinations of deformed (folded and faulted) sediments (e.g. sandstones, siltstones), volcaniclastics (e.g. tuffs, pyroclastic breccias), and volcanics (e.g. basalts, andesite flows). Alteration and mineralization of these country rocks has occurred due to intrusions of Jurassic monzonite, granite, and diorite porphyritic rocks.

Eastward of the study area, back-arc basins formed in the Late Jurassic and Cretaceous and the fine black clastic sediments of the Bowser Group accumulated. Early Jurassic sub-volcanic intrusive complexes are common; several host hydrothermal systems enriched with precious and base metals are present. Basalts from Quaternary eruptions can be found throughout the region.

Major folds and faults have formed due to compressional tectonics in the late Cretaceous. The McTagg Antiform occurs to the west of the study area and suggests folding on a regional scale with fold axes generally striking northwest. A major normal or strike-slip fault, the Brucejack fault, is located at the eastern limit of the study area and has been identified as a major topographic lineament. This fault strikes north and dips steeply. The Sulphurets Thrust Fault is a regional scale feature dipping gently west and striking south; it is observed at the contact of the Stuhini (hanging wall) and Hazelton group (footwall) rocks in the study area (see Drawing 3).

2.5.2. Lithologies of the Study Area

Rocks of the KSM project area can be broadly divided into:

1. Triassic marine sedimentary and volcanic rocks of the Stuhini Group.
2. Jurassic sediments and volcanics of the Hazelton Group.
3. Early Jurassic dikes, sills, and plugs of diorite, monzonite, syenite, and granite grouped as the “Mitchell Intrusions”.

The stratigraphy of the Stuhini Group includes a basal sequence of argillite (massive sedimentary rock made up of clay size particles) and sandstone, which are overlain by pillowed volcanic flows and breccias, which are overlain by a sequence of turbidites and graded sandstones similar to the basal stratigraphy. The Hazelton Group is dominated by andesitic flows and breccias deposited in an emergent volcanic chain. Distinct felsic welded tuff horizons of the Mount Dilworth Formation are an important stratigraphic marker in the Hazelton Group, as they are closely associated with the Eskay Creek deposit (Savell, 2008).

An erosional unconformity separates the Stuhini Group from the stratigraphically higher (and younger) Hazelton Group rocks. Within the study area, the spatial distribution of the Stuhini and Hazelton Groups is reversed from their stratigraphic relationships; the Stuhini Group occur at higher elevations within the Mitchell valley as these rocks have been thrust over the Hazelton Group rocks by the Sulphurets Thrust Fault (STF). The contact between the Stuhini and Hazelton in the Sulphurets Thrust Fault footwall is inferred in the Sulphurets valley by Alldrick and Britton (1991) placing the Kerr zone in the Stuhini Group rocks.

The Mitchell Intrusions occur throughout the site and make up a large portion of the north Mitchell valley wall above the Mitchell Deposit stretching east to the Iron Cap deposit, and the Sulphurets-Mitchell Ridge; but do not make up a significant portion of the rocks of the Kerr zone. These rocks are difficult to differentiate from the country rock in areas of intense hydrothermal alteration, such as the lower elevations of the Mitchell valley, below the Mitchell valley floor or below the STF. Where identified, these intrusions occur as sills and plugs of coarse-grained feldspar porphyritic monzonite to low-silica granite (Savell, 2008). Mineralization generally occurs at the margins of these intrusive rocks.

2.5.3. Alteration of the Study Area

Alteration (changes in the mineralogy or texture of rocks) is commonly associated with porphyry style mineralization, such as at the KSM site. The styles of alteration of the KSM study area occur in distinct locations with respect to the main rock types or structural features. Multiple sub-types of alteration may be identified, but general groups can be defined.

Alteration styles of the mid and upper slopes of the Mitchell valley are dominantly potassic (K-feldspar and biotite common). Zones of siliceous (SI) alteration (an increase in quartz) and hornfelsing (MTH) occur adjacent to the Mitchell intrusions. These alterations may increase the intact strength of the affected rocks (BGC, 2011e).

At lower elevations of the Mitchell valley and below the valley floor the rocks are foliated and altered. Phyllic-argillic (quartz, sericite, and pyrite with some illite) or “QSP” alteration occurs in and around the main target zone of the proposed Mitchell pit. Multiple stages of quartz veins result in a stockwork (QSPSTW) in sections of the phyllic-argillic altered rock mass. This “QSP” alteration diminishes to the west in the valley bottom. Propylitic (PR) alteration (chlorite, epidote, and calcite) increases to the west.

The core of the Kerr deposit is intensely altered, primarily to chloritic, phyllic (QSP), and argillic assemblages with anhydrite and gypsum. This pervasive alteration has destroyed the original texture of the rocks and makes identification of protolith nearly impossible (BGC, 2011d). Volcanic rocks outside of the core alteration zone are typically chloritically altered, propylitically altered, or silicified.

Within the Sulphurets zone, the Sulphurets Thrust Fault hanging wall volcanic rocks are typically chloritically or propylitically altered. Intrusives in the STF hanging wall are typically weakly silicified or hornfelsed, increasing their intact strengths (BGC, 2011c). In the STF foot wall two alteration zones have been identified, the first directly below the fault is extensively crackled and contains minor brecciated zones; alteration types in this zone are typically chloritic alteration and silification with some minor argillic alteration. Below this unit the alteration styles do not change significantly, chloritic and silicification are the primary alterations. No hydrothermal brecciation is observed.

Alteration types found in the core of the Iron Cap deposit are dominantly Quartz-Silica-Pyrite (QSP or phyllic) and chloritic with overprinting from silica flooding and hydrothermal brecciation. Above the main Iron Cap zone in the Sulphurets footwall Hazelton Group rocks in the western reaches of the proposed open pit, the alteration types are dominantly potassic (K-feldspar and biotite) (BGC, 2011b). Zones of siliceous alteration and hornfelsing occur adjacent to the Mitchell intrusions. In the Sulphurets thrust fault hanging wall rocks are anticipated to have experienced regional green-schist facies metamorphism.

The intensity of alteration and foliation in the rocks of the KSM project site makes the recognition of the pre-alteration rock types very difficult. This is typical of phyllic-argillic or quartz-sericite (illite)-pyrite altered rocks. Original textures can sometimes be observed in the propylitic altered rocks.

2.5.4. Major Structures of the Study Area

Major geological structures and fabrics of the study area include: north-south striking steeply dipping faults, gently dipping thrust faults, and east-west striking, moderate to steeply dipping foliation/schistosity. Bedding has been observed in some of the sedimentary and volcaniclastic rocks of the Hazelton and Stuhini Groups in the area; whereas it is typically healed due to alteration/metamorphism within the proposed Mitchell, Sulphurets, and Iron Cap pit areas, it appears to be a major fabric element of the rock mass in the Kerr zone.

The Sulphurets and Mitchell thrust faults (MTF) strike to the south-southwest and dip gently (<30°) west-northwest. These faults divide the Stuhini Group (hanging wall of the STF) from the Hazelton Group (footwall of the STF) and the siliceous/hornfelsed/potassic altered rocks (hanging wall of the MTF) from the foliated phyllic-argillic altered rocks (footwall of the MTF). The MTF truncates against the STF to the west. The Kerr zone is located in the footwall of the STF south of its surface trace. The STF intersects the final walls of the proposed Mitchell, Iron Cap and Sulphurets pits.

The Brucejack and Snowfield faults are steeply dipping (>60° to the west) north-south striking faults immediately east of the study area (Margolis, 1993). Other steeply dipping, approximately north-south striking faults are interpreted to the west of the proposed Mitchell pit area, and may be present in the Kerr zone. In addition there are two faults interpreted in the STF hanging wall in the Sulphurets zone, named Main Copper 1 and Main Copper 2.

As mentioned above, bedding appears to play a major role in the structural fabric of the Kerr zone; there are two distinct bedding orientation sets present in the area of the Kerr zone that may form the limbs of an antiformal fold. These zones are separated by a steep normal fault along which the offset is not known. The fold axis that can be interpreted from the “limbs” matches well with regional folding orientation and plunge.

Foliation orientations vary over the project area, and are best developed in phyllic-argillic altered rocks in the core zones of the Mitchell and Iron Cap deposits; it is also found throughout the Sulphurets deposit, although less pervasively. The foliation typically strikes east-west at moderate to steep angles (40° to 80°), dipping to the north in Sulphurets and Mitchell, and to the south in Iron Cap. The orientation of the foliation is noted to sometimes change adjacent to major faults (Margolis, 1993).

3.0 HYDROGEOLOGIC DATA

To support the development of open pit depressurization analyses, BGC compiled hydrogeologic data available from reports, other consultants, and geologic models. The data set is summarized in the following sections.

3.1. Overview

During the 2009 and 2010 summer field seasons BGC carried out packer tests and installed vibrating wire piezometers in NQ-sized geotechnical drill holes completed within the Mitchell (9 drill holes), Kerr (4 drill holes), Sulphurets (5 drill holes), and Iron Cap (3 drill holes) pit areas. Hydrogeologic data from these drill holes, along with the results of field investigations carried out by Rescan and KCBL between 2008 to 2010, comprise the hydrogeologic parameter and water level data currently available for the project area. Field investigations carried out by Rescan and KCBL included packer testing, installing standpipe piezometers, measuring water levels and conducting slug tests at the RES-MW and KC08, KC09, and KC10 borehole locations (Drawing 2) (Rescan 2010a and KCBL 2009a, 2010d and 2010e). Analyses of packer tests carried out by KCBL and Rescan were not reviewed in detail and only reported results are summarized together with BGC test results in this section. Analyses and results for packer tests carried out in the 2010 pit area geotechnical drill holes by BGC (M10-, S10-, K10- and IC10-series) are provided in Appendix B. One 24-hour injection test was carried out by KCBL (KCBL, 2010e) at vertical HQ borehole KC10-33 (Drawing 2) to estimate larger scale bedrock permeability and storage properties in the east abutment of the proposed Water Storage Dam (WSD) foundation area. No other pumping tests have been carried out to date in the project area.

3.2. Bedrock Hydraulic Conductivity Data

Approximately 200 hydraulic tests (packer tests and slug tests) were carried out within the bedrock at the borehole locations shown on Drawing 2 during the 2008, 2009 and 2010 field seasons. Hydraulic conductivity results for single borehole response tests carried out versus depth by location are provided on Drawing 4. Measured hydraulic conductivity results for shallow tests (carried out at 125 m depth or less) within the Mitchell pit and Iron Cap pit areas were often higher (i.e., up to $1x10^{-5}$ m/s at RES-MW04 and a geometric mean of $7x10^{-7}$ m/s and $8x10^{-7}$ m/s, respectively) than those carried out elsewhere (geometric mean of $2x10^{-7}$ m/s for site wide data). The test results are summarized in Table 4.

Bedrock hydraulic conductivity test results versus depth by lithology (sedimentary, volcanic, intrusive or fault zone) are shown in Drawing 5. The majority of the tests were carried out in the Stuhini and Hazelton volcanic and sedimentary rocks. Test results for volcanic rocks at depths less than 125 m were often higher than those for the other grouped units. Geometric mean values for each lithologic unit are presented in Table 4, and range from $1x10^{-7}$ m/s for sedimentary rocks to $4x10^{-7}$ m/s for volcanic rocks at depths of 0 m to 125 m below ground.

As mentioned above, one 24-hour injection test was carried out by KCBL (KCBL, 2010e) at vertical HQ borehole KC10-33 (Drawing 2) to estimate larger scale bedrock permeability and storage properties in the east abutment of the proposed Water Storage Dam (WSD) foundation area. The test was carried out at rates between 50 and 80 L/min by setting a packer at the static water depth and injecting below that over the full borehole depth of 150 m. The results indicated hydraulic conductivity of $1x10^{-6}$ m/s and storativity of 0.028 for the shallow bedrock (i.e., Stuhini group sediments); little to no response at observation wells suggested limited bedrock connectivity in the area tested.

3.2.1. Mitchell Pit

Test results versus depth are plotted on Drawing 6 by borehole and relation to the MTF (above or below) for tests conducted within the proposed Mitchell pit only. In general, the plot shows that the hydraulic conductivity from tests conducted within or above the MTF varied from about $1x10^{-9}$ m/s to $1x10^{-6}$ m/s from ground surface to 400 m bgs, and a meaningful decrease in permeability with depth cannot be distinguished given the small sample population at depths greater than 100 m. Hydraulic conductivity results for tests conducted below the MTF varied from $8x10^{-8}$ m/s to $1x10^{-5}$ m/s at shallow depths (0 to 125 m bgs) within the valley floor and from $3x10^{-10}$ m/s to $4x10^{-7}$ m/s at depths greater than 125 m bgs. The results are also summarized in Table 4.

The Mitchell pit test results versus depth are plotted on Drawing 7 by alteration type where alteration types were known. The data set is small for the number of alteration types plotted; however, test intervals conducted within bedrock of phyllic-argillic (QSPSTW and QSP), chloritic (CL), and propylitic (PR) alterations appear to be of lower hydraulic conductivity at depths greater than 125 m bgs and are typically encountered below the MTF; however, with the data available it is unclear if this effect is related to alteration type, confining stress (i.e., depth) or both. Complete borehole logs for the nine geotechnical holes drilled in the Mitchell Pit and additional details on the 2009 and 2010 field programs are included under separate cover (BGC 2010a, 2011b, 2011c, 2011d, 2011e).

3.2.2. Sulphurets Pit

Test results versus depth are plotted on Drawing 8 by borehole and relation to the STF (above or below) for tests conducted within the proposed Sulphurets pit only. In general, the plot shows that the hydraulic conductivity from tests conducted within or above the STF varied from $5x10^{-9}$ m/s to $1x10^{-5}$ m/s, with a geometric mean of $6x10^{-7}$ m/s or over the depth range tested (i.e., 0 to 250 m bgs). A meaningful decrease in permeability with depth cannot be distinguished given the small sample population. Hydraulic conductivity results for tests conducted below the STF varied from $5x10^{-10}$ m/s to $3x10^{-6}$ m/s, with a geometric mean of $7x10^{-8}$ m/s from ground surface to 350 m bgs (or over the depth range tested) (see Table 4).

The Sulphurets pit test results versus depth are plotted on Drawing 9 by alteration type, where this information was available. The plot shows that there is no obvious correlation between hydraulic conductivity and alteration type.

3.2.3. Kerr Pit

Test results versus depth are plotted on Drawing 10 by borehole within the proposed Kerr pit area only. The data was categorized in the plot by the north and south sections of Kerr pit; however a meaningful trend cannot be distinguished by pit sections. There may be a more conductive zone between depths of 100 m and 200 m; however the data set is small. The test results versus depth are plotted on Drawing 11 by alteration type. The alteration types of the bedrock tested were primarily chloritic, phyllic (QSP), and argillic assemblages.

Meaningful trends in hydraulic conductivity with depth, alteration type, or rock type could not be distinguished based on the small data set for the Kerr Pit area. The geometric mean of all hydraulic test results within the pit area is approximately $2x10^{-7}$ m/s (see Table 4).

3.2.4. Iron Cap Pit

Test results versus depth are plotted on Drawing 12 by borehole within the proposed Iron Cap pit. A trend of decreasing permeability with depth is observed from ground surface to 300 m bgs. Based on the test results presented, the geometric mean of the shallow bedrock (0 to 125 m bgs) is $8x10^{-7}$ m/s, while the geometric mean of the bedrock at depths greater than 125 m is $4x10^{-8}$ m/s. The Iron Cap pit test results versus depth are plotted on Drawing 13 by alteration type. Alteration types of the bedrock tested were phyllic and/or siliceous. Because the alteration types of the zones tested were fairly consistently siliceous, relationships between hydraulic conductivity and alteration cannot be distinguished from the data set.

3.2.5. Summary

The general trend of decreasing hydraulic conductivity with depth (or with increasing confining stress) shown on Drawing 4 and Drawing 5 is commonly observed within bedrock, and is illustrated on Drawing 14 after Rutqvist and Stephannsson (2003). Although there is a general trend of decreasing hydraulic conductivity with depth throughout the KSM site, the hydraulic conductivity is observed to vary across three to four orders of magnitude at any given depth.

The variation in hydraulic conductivity observed at a given depth interval within the Mitchell pit area appears to also be influenced by the location relative to the MTF; bedrock above the MTF generally has a higher hydraulic conductivity at depths greater than 125 m bgs relative to bedrock below the MTF. The variation in hydraulic conductivity observed at a given depth interval within the Sulphurets pit area may also be influenced by the location relative to the STF; bedrock above the STF generally has a higher hydraulic conductivity than the bedrock below the STF.

The general trend of decreasing hydraulic conductivity with depth in the Iron Cap pit area was consistent in the three geotechnical holes tested, while it is difficult to identify a prevailing trend in the bedrock hydraulic conductivity data set for the Kerr pit area.

Although alteration type is strongly associated with the strength of the rocks within the KSM project area, the influence the various types may have on bedrock hydraulic conductivity cannot be determined based on the sample population.

The bedrock hydraulic conductivity test results have also been plotted by pit area versus average test interval Rock Quality Designation (RQD) in Drawing 15. There is no clear correlation between RQD and hydraulic conductivity at the project area.

3.3. Overburden Hydraulic Conductivity Data

Overburden hydraulic conductivity data within the project area is limited to data collected from KCBL boreholes in the proposed Mitchell and Sulphurets waste dump areas (KC08-01, -02, -03, and KC09-09, -10) and within the proposed Kerr pit area (RES-MW13A/B), as well as geophysical surveys carried out under KCBL's scope of work. In general, investigations carried out by others (KCBL, 2009a; KCBL, 2009c, KCBL, 2010d; Rescan, 2009a) suggest that the overburden consists primarily of thin glacial till or colluvium of thicknesses less than 10 m, with occasional fluvial units in the valley bottom. Surficial mapping by KCBL indicates overburden thicknesses of 10 m or greater are generally limited to low elevations within the valleys, where it may be approximately 80 m thick (KCBL 2010c and 2010d). Overburden is generally not present in the proposed open pit footprints (see Drawing 3). Estimated hydraulic conductivity from falling head tests conducted within open boreholes and in standpipe piezometers in the overburden during the 2008 and 2009 drilling programs by Rescan and KCBL ranged from $1x10^{-5}$ m/s to $3x10^{-9}$ m/s, with a geometric mean of $2x10^{-7}$ m/s. All overburden test results are summarized in Table 5.

3.4. Hydraulic Head Data

BGC installed 25 RST Instruments vibrating wire (VW) piezometers within 19 open pit drill holes during the 2009 and 2010 field program. Nine dataloggers (RST single channel VW dataloggers) were installed at six piezometer locations to allow for continuous data collection throughout the year. At three of these locations, both a shallow and deep piezometer was installed to permit an assessment of vertical hydraulic gradients. Manual measurements are obtained at the remaining RST VW piezometers. The open pit VW groundwater elevation data set is provided in Appendix A.

Rescan completed a monitoring well installation field program in 2009 (RES-MW wells on Drawing 2) throughout the project area that comprised 23 monitoring wells at 12 locations. KCBL installed a total of 18 standpipe piezometers during the 2008, 2009, and 2010 field programs throughout the mine site area. Water level data for these additional wells and piezometers collected through the summer of 2010 were provided by Rescan (Rescan 2010b) and KCBL (KCBL, 2010b).

Of the 66 piezometers and monitoring wells listed above, year round data (i.e., winter, spring, summer and fall data) is available at three VW piezometers and 12 monitoring wells installed prior to 2010. Observed hydraulic heads ranged from at or just above ground surface (typically at lower elevations, e.g., RES-MW-04A and B) to 230 m below ground surface (e.g., at K10-05) at higher elevations. Seasonal groundwater levels varied typically by two to three meters with peaks occurring in April and May within the monitoring wells (Rescan 2010a) at low elevations. Groundwater levels varied by up to 25 m in monitoring wells (RES-MW-10A and B), and by as much as 40 m (at M09-097D) in the VW piezometers at greater elevations in the pit areas. Many of the VW piezometers; however, showed limited response to seasonal influences (see Appendix A). Artesian pressures have been observed at several of the VW piezometers along the valley sideslopes (e.g., S10-32 and IC10-014).

3.5. Thermistor Data

Two 50 m long thermistor strings were installed in boreholes IC10-015 and K10-07 during the 2010 field season. Each string comprises 16 beads and dataloggers were installed so that daily data could be collected (BGC, 2011a). Ground temperatures recorded to date at each thermistor do not indicate permafrost conditions.

4.0 CONCEPTUAL HYDROGEOLOGIC MODEL

Hydrogeologic data collected by BGC, KCBL and Rescan for the KSM mine site were compiled to identify hydrostratigraphic units, assess hydraulic conductivity values, and formulate a conceptual hydrogeologic model in the vicinity of the proposed open pits. The conceptual model described below formed the basis for development of the numerical hydrogeologic model.

4.1. Current Conditions

Surface topography can be expected to have a pervasive influence on the underlying mountain flow system (Forster and Smith, 1988). The elevation of the site ranges from approximately 520 meters in Sulphurets Creek valley to over 2,300 meters at the highest peaks. Measured groundwater elevations suggest that the water table is a subdued replica of topography, with depths to groundwater typically being greater in the uplands relative to the valley bottom. Groundwater enters the flow system from infiltration of precipitation and snowmelt, with lesser components supplied by surface water infiltration in creeks and gullies. Groundwater discharge zones are generally restricted to creeks, gullies, and breaks in slope.

The hydrostratigraphy of the site is composed of a thin layer (typically less than 10 m thick) of glacial till or colluvium underlain by bedrock. The geometric mean of hydraulic conductivity data available for these units is $2x10^{-7}$ m/s. Thicker overburden deposits are confined to local sections of the valley bottom and are not present in the vicinity of the proposed open pits.

Site wide, a general trend of decreasing bedrock hydraulic conductivity with depth has been observed (see Drawing 4), although the hydraulic conductivity varies by typically three to four orders of magnitude at any given depth. However, within the Mitchell Pit area, the geometric mean of bedrock hydraulic conductivity from ground surface to 400 m bgs (or over the depth range tested) above the MTF is $1x10^{-7}$ m/s, with no meaningful decrease in hydraulic conductivity with depth (see Drawing 6). The geometric mean of bedrock hydraulic conductivity below the MTF is $2x10^{-6}$ m/s at shallow depths (0 to 125 m bgs) and $3x10^{-9}$ at depths greater than 125 m bgs. Therefore, the current data set suggests that variations in hydraulic conductivity observed at a given depth interval within the Mitchell pit area appear to be more strongly influenced by location relative to the MTF. Likewise, within the Sulphurets Pit area, bedrock hydraulic conductivity may be influenced by location relative to the STF as the geometric mean of test results for bedrock above the STF is $6x10^{-7}$ m/s, while the geometric mean for tests carried out below the STF in the pit area is $7x10^{-8}$ m/s.

The hydrogeological system is dominated by fractured bedrock formations with overburden in the valley bottoms playing a minor role. Groundwater seeps are common on the valley slopes (Rescan, 2010a and 2010b). Permafrost may be present at higher elevations (greater than 1600 masl on north facing slopes and greater than 1750 or 1850 masl on all slopes) within the study area.

4.2. Dewatering and Depressurization

Slope stability analyses of the Mitchell, Kerr, Sulphurets, and Iron Cap pits indicate that specific depressurization targets must be achieved at the bench and interramp scales (BGC 2011b, 2011c, 2011d, 2011e). Depressurization goals are listed in Appendix C for geotechnical design sectors for each pit, and in general, must be attained for an area extending approximately 50 m behind the excavated slope face. In addition, depressurization of the overall pit slope to minimize the potential for rock mass failure is required for the north wall of the Mitchell pit (BGC, 2011e).

The basic principles to consider when designing slope depressurization systems (Hoek and Bray, 1981) are to:

- prevent surface water (including water previously drained from the rock mass, and meteoric water) from entering the slope through open tension cracks, fissures, and discontinuities;
- reduce water pressure in the vicinity of the potential failure surfaces by selective surface and sub-surface drainage; and,
- position the drainage so that it reduces the water pressure in the immediate vicinity of the slope – there is no value gained from draining areas well away from the pit.

Dewatering and depressurization methods common for large open pits include:

- vertical perimeter and in-pit wells;
- in-pit horizontal (or nearly horizontal) drains (i.e., boreholes drilled into the pit slope face); and
- drainage adits with supplemental boreholes drilled from a gallery (Atkinson, 2000; Hoek and Sharp, 1970; Brown, 1982).

The proposed Mitchell pit spans the Mitchell valley (see Drawings 2 and 3), and planned pit excavations reach a maximum depth of approximately 700 m below current ground surface. Therefore, it is expected that perimeter wells, while they typically have a long life and are desirable in that respect, will have limited impacts to dewatering later in the mine life. As a result, in-pit wells and horizontal drains are proposed to achieve the bench and interramp scale Mitchell pit depressurization. In-pit horizontal drains will be the primary depressurization method at depths below the MTF within the pit (elevations lower than approximately 1,100 masl on the south side of Mitchell valley, and elevations lower than approximately 950 masl on the north side of Mitchell valley), to intercept groundwater flows to the pit where the bedrock hydraulic conductivity is low and where vertical wells will not likely be effective.

To achieve the depressurization goals of the upper north slope of Mitchell Pit, results from previous simulations (BGC, 2010b) suggest that an adit and drainage gallery will be required. The topography would allow a dewatering adit to be constructed relatively easily from the valley bottom, extending from the east to the west side of the ultimate Mitchell Pit.

Sulphurets, Kerr, and Iron Cap pits are located high on mountain ridges and slopes, and planned pit excavations reach maximum depths below current ground surface of approximately 400 m, 300 m, and 500 m, respectively. Based on previous simulation results (BGC, 2010b), it is expected that a combination of vertical in-pit wells and horizontal drains will be capable of achieving the depressurization targets for these pits.

5.0 NUMERICAL MODEL 2010 UPDATE

5.1. Overview

This section describes updates to the three-dimensional (3-D) numerical groundwater flow model previously developed for the KSM pit depressurization analyses, and described in BGC, 2010b. The objective during development and calibration of the numerical groundwater flow model was to simulate groundwater flow directions and hydraulic heads by incorporating the controlling features of the conceptual groundwater flow model described in Section 4.0.

5.2. Numerical Model Description

Groundwater Vistas (version 5.41; ESI, 2007), a graphical user interface, was used to develop the MODFLOW Surfact groundwater flow model for the site. MODFLOW is an industry standard 3-D, finite difference groundwater flow model developed by the U.S. Geological Survey (Harbaugh et al, 2000). The model utilized the add-on packages available in Surfact (Version 3.0; HydroGeoLogic, 1998) in order to simulate variably saturated flow and seepage faces.

Inputs to the model include (1) hydraulic parameters that control the flow of water within the model domain, and (2) areal properties and boundary conditions that control the addition and removal of water to and from the model domain.

5.3. Numerical Model Geometry and Grid

The 3-D groundwater flow model domain encompasses the area shown in Drawing 2. The model grid described in BGC, 2010b was refined in the area of the Iron Cap pit to consist of 169 columns and 268 rows, covering an area of approximately 21.5 km by 18 km. Ten model layers were used (rather than nine model layers as described in BGC 2010b) to discretize the domain in the vertical dimension for a total of approximately 452,900 grid blocks; 398,500 of which are active. Uniform 50 m by 50 m grid blocks were defined in the vicinity of the proposed open pits. The horizontal dimensions of grid blocks were expanded away from the pit area by a factor of approximately 1.5 to a maximum of 400 m by 400 m in the outer regions.

In the vertical direction, the upper 425 m was divided into 5 layers increasing in thickness from 20 m in Layer 1 to 200 m in Layer 5. The underlying layers range from 50 m thick in the valley bottoms to 600 m thick below the ridge tops. The base of the model was set at a uniform elevation of -350 masl, which is approximately 600 m below the deepest extent of the proposed open pits. The model grid is shown on Drawing 16.

A groundwater divide was inferred along ridge tops lying at the edge of the hydrogeologic area of interest (see Section 5.6 for discussion of boundary conditions). Grid blocks lying outside of this region were deactivated within the model. Due to the close proximity of the

Iron Cap and Mitchell pits to the northern boundary of the active model domain, model cells were reactivated north of the Mitchell Valley as compared to the previous version of the model (BGC, 2010b) to avoid potential boundary effects.

5.4. Hydrogeologic Units and Parameters

The distribution of hydrogeologic units within the groundwater model is provided in Drawings 17 and 18 and the hydraulic parameters assigned are described in Table 6. The hydraulic conductivity within the Mitchell pit and Sulphurets pit areas were distributed based on proximity to the Mitchell Thrust Fault and Sulphurets Thrust Fault, respectively, as well as depth. Outside of the proposed Mitchell and Sulphurets pit areas, hydraulic conductivity was assigned to decrease with depth. Overburden was assigned to model layers 1 and 2 where it is interpreted to be thicker than 20 m.

The values of hydraulic conductivity assigned to each hydrogeologic unit were initially based on the results of hydraulic testing performed to date and summarized in Table 4. The hydraulic conductivity values were subsequently refined during model calibration in order to better match observed hydraulic head and flow targets.

With the exception of the relatively shallow 24-hour injection test in the WSD foundation area, field data is not available for aquifer storage parameters (i.e., specific storage, Ss and specific yield, Sy); therefore the storage parameters were assigned based on representative values from the literature (Maidment, 1992).

5.5. Areal Properties - Recharge

Areal recharge was assigned to the water table to represent groundwater recharge from precipitation and runoff. To represent the anticipated orographic influence (see Section 2.2) recharge was divided into four zones; valley, mid-slope, uplands, and glacier covered areas. The rates applied to the four zones are shown on Drawing 19 and in Table 7. Recharge applied where glaciers are not present increased from 128 mm/yr in the valleys to 218 mm/yr in the uplands, equivalent to approximately 8% to 13% of mean annual precipitation at Sulphurets Creek. The rates selected were used to remain consistent with regional groundwater modeling being carried out by Rescan (Rescan, 2010c).

Although sub-glacial groundwater flow has been documented in several geographic locations (Sigurdsson, 1990), little work has been done on glacier-scale groundwater flow, and models to date in the literature have not included coupled subglacial-subsurface drainage (Flowers and Clark, 2002). Rates of basal melting are unlikely to exceed the range of 1 mm/yr to 100 mm/yr over extended time periods, whereas surface melting rates in ablation areas are typically up to four orders of magnitude greater (1,000 mm/yr to 10,000 mm/yr; Boulton et al., 1995); a relatively low rate of recharge of 40 mm/yr was applied to glacier covered areas.

Permafrost may be present at high elevations within the study area (see Section 2.4) and could limit groundwater recharge and flow within these areas. However, the limited data available to date suggests permafrost is not present in the pit areas, and thus it has not been incorporated into the model.

5.6. Boundary Conditions

Three types of boundary conditions were assigned to the model domain: specified head boundaries, head-dependent boundaries and no-flow boundaries. The geometry of the pre-development boundary conditions is shown in Drawing 20.

5.6.1. Creeks

Creeks within the model domain, including the Mitchell, McTagg, Ted Morris and Sulphurets Creek, were simulated using the River Package. Water levels and stream bed elevations assigned for each creek were estimated from surface topography, while the conductance was calculated based on assumed channel dimensions and an assumed hydraulic conductivity of $1x10^{-5}$ m/s for the stream bed.

5.6.2. Lakes

Lakes lying within the model domain (i.e., Sulphurets and Bruce Jack Lake) were modeled using a specified-head boundary. The water level was set at the approximate lake elevations (590 m for Sulphurets and 1371 m for Bruce Jack) for each lake.

5.6.3. No-Flow Boundary Conditions

The ridgelines located to the north, east, west and south of the active model domain were set as no-flow boundaries. These ridges represent inferred groundwater divides. A no-flow boundary was also set to the bottom of the model at elevation -350 masl.

6.0 MODEL CALIBRATION

The groundwater model was calibrated using a combination of systematic trial-and-error process (manually varying hydraulic conductivity within observed and expected ranges) and PEST, a parameter estimation program (Doherty 2005), to obtain the best match to hydraulic head measurements recorded in piezometers and to low flow (i.e. winter months December through March) stream flows measured at available surface water gauging stations. The approach and results of the model calibration are discussed in the following sections.

6.1. Calibration Targets

6.1.1. Hydraulic Head Targets

Groundwater elevation data were available for 61 of the 66 instruments at the site within the model domain (see Table 8). Of these 61 targets, 36 are VWPs, standpipe piezometers, or monitoring wells installed within the proposed pit areas. The remaining are standpipe piezometers or monitoring wells located within the Mitchell, McTagg or Sulphurets Creek valleys. Calibration statistics have been calculated by comparing the average observed hydraulic heads with hydraulic heads predicted by the model.

Data at M09-100D (see Appendix A) suggests that it has been stabilizing/declining since drilling occurred, while observed data at M09-99 appears to be questionably low given its proximity to the Mitchell valley floor. As a result, these data were assigned a low matching priority for model calibration.

6.1.2. Creek Flow Measurements

Data available for calibration to creek baseflows are limited to estimated annual low flows at four locations within the site (i.e. gauging stations MC-H1, MCT-H1, TMC-H1, and SL-H1; Drawing 2).

6.2. Calibration Results

Simulated versus measured hydraulic heads for the calibrated model are shown in Drawing 21 for all available hydraulic head data. A normalized root mean square (NRMS) of 10% is generally suggested as a guideline for the maximum difference between simulated and measured target values (NBLM, 2006). The NRMS of the calibration is 6.1% using all measurements, and 4.4% using trusted hydraulic heads measurements only (i.e., excluding M09-100D and M09-99). Based on these results, the model is considered to be adequately calibrated to measured hydraulic heads.

Estimated creek 7-day low flows and model simulated baseflows are provided in Table 9. Predicted baseflow to Mitchell Creek at station MC-H1 is 14,052 m^3/d, while predicted baseflow for McTagg (MCT-H1) and Ted Morris Creek (TMC-H1) is 10,444 m^3/d and 16,998 m^3/d, respectively. Predicted outflows at SL-H1 and BJL-H1 (Sulphurets and Bruce Jack Lake outlets) are 19,583 m^3/d and 6,570 m^3/d, respectively. Simulated flows are generally within 22% of the estimated annual 7-day low flows. The discrepancy between measured and simulated values can partially be attributed to the complexity of in-stream flows in these glacier-augmented systems. Future modeling efforts may focus more on matching stream baseflows when year round contributions of the glaciers to stream flows are better understood.

6.3. Pre-Development Simulation Results

A plot of simulated water table contours for the steady state calibrated model is provided in Drawing 22. In general, the water table is predicted to mimic the surface topography as described in the conceptual model of the hydrogeologic system, and is consistent with regional work carried out by Rescan (Rescan, 2010a). Within the Mitchell Creek watershed, groundwater is predicted to flow from topographically higher regions towards lower lying areas in the center of the valley before discharging to Mitchell Creek. Outside of the Mitchell Creek watershed, groundwater flow is predicted to be directed towards discharge areas located at lakes, and along McTagg, Ted Morris and Sulphurets Creeks.

7.0 PREDICTIVE DEPRESSURIZATION SIMULATIONS

Transient predictive simulations were performed using the calibrated flow model along with production pit shells provided by MMTS (2011) for ten phases of the mine life: pre-production (years -2, and -1), years 1, 2, 3, 4, 5, 10, 20, 30, 40 and life of mine (year 52). The progression of the open pits is shown on Drawings 23 and 24. Mining of the pits occurs as follows:

- Mitchell is mined from Year -2 to Year 40
- Kerr is mined from Year 14 to Year 36
- Sulphurets is mined in Years 7 to 13
- Iron Cap is mined from Year 38 to 52

The proposed mine plan would result in pit footprints of approximately 2 km by 0.5 km for the Kerr pit, 2 km by 1 km for the Sulphurets pit, and 2 km by 1 km for the Iron Cap pit. Ultimate pit slopes of 600 m and 500 m are planned for Sulphurets and Kerr, while slopes of up to 800 m are planned for Iron Cap. In contrast, the proposed mine plan for Mitchell pit would result in an ultimate pit footprint of approximately 3.5 km by 2.3 km, and pit slopes exceeding 1500 m high. The Mitchell pit floor would be excavated to an approximate elevation of 230 masl.

The goals of the simulations were to draw the water table down immediately behind the pit slopes in order to meet the depressurization requirements, as well as to estimate the total groundwater extraction rate required to depressurize the Mitchell, Kerr, Sulphurets and Iron Cap pit walls using vertical wells and/or other techniques. The results of the numerical simulations were used to estimate the number of dewatering wells and horizontal drains required to meet depressurization requirements during the proposed mine life of 52 years. Due to the aggressive depressurization requirements for the north slope of Mitchell pit (see Section 4.2 and Appendix C) an adit and drainage gallery was evaluated for the upper slope.

7.1. Boundary Conditions

Open pit mining operational shells were simulated using head-dependent boundaries constrained to outflow (i.e. drains) for the years specified above. Water levels within drain cells were specified at the depth of mining. Drains representing the pit (see Drawing 25) were turned on (i.e. became active) within the model between consecutive pits (i.e., Mitchell Year 20 pit was turned on in Year 15, Year 30 pit was turned on in Year 25, etc.). The conductance of the drains was set to a high value to allow water to freely drain into the simulated open pits.

For simulations using wells, drain cells were also used to represent vertical dewatering wells within the model. This representation allows the model to predict potential dewatering rates based on generated hydraulic gradients and hydraulic parameters rather than specifying well intake rates *a priori.* All wells were screened across their entire extent. Gridblocks belonging to the well screen were assigned elevated values of hydraulic conductivity. The drain was set at the bottom of the well screen, with the water level set to the desired level (i.e. at the pump intake). The conductance of these cells was also set to a high value to allow water to freely flow into the simulated wells. Dewatering wells of variable depth (on average 200 m deep) were introduced to the model to control groundwater inflows to the pit with the introduction of the expanding pit shells.

The adit and drainage gallery were simulated using drain cells as well. The conductance of both the adit and gallery drain cells was calculated using the Thiem solution and the Peaceman (1983) formula:

$$C = \frac{2\pi K \Delta z}{2.3 \log \frac{R}{r}}$$

$$R = \frac{0.28}{2}\sqrt{(\Delta x)^2 + (\Delta y)^2}$$

Where C is cell conductance, K is the hydraulic conductivity assigned to the gridblock, R is the gridlock effective radius, and r is the borehole or adit opening radius. Depending on whether the simulated opening is vertical or horizontal, the gridblock dimensions, defined as Δx, Δy, and Δz, varied in the calculation. Gallery drains were assumed to be 5-inch diameter, 300 m long, and drilled in fans of three on 50 m spacing along the dewatering adit. The adit was assumed to be 4 m in diameter.

Horizontal drains from the pit face were not explicitly simulated with the model. Rather, residual flows reporting to the open pits (i.e. those flows not intercepted by the adit or wells) were assumed to be those captured by horizontal drains, and required drains were estimated independent of the model, based on the available bench face length per pit phase.

7.2. Open Pit Depressurization Simulation Results

7.2.1. Unmitigated Flows

A simulation that incorporated no mitigative dewatering techniques (i.e. no wells, drains or adits) was performed to provide a minimum bound on the dewatering rate that would be required to keep each open pit “dry” (i.e. to minimize seepage inflows). Flow results for this simulation are presented in Drawing 26 for the proposed Mitchell, Kerr, Sulphurets, and Iron Cap pits. Note that predicted pit wall pore pressures are not reduced sufficiently to make this a viable development scenario for any of the pits, as indicated in the depth to water plots on Drawings 27 through 29. The predicted average annual flows to the pits throughout the life of mine for this simulation are 6,600 m^3/d for Mitchell; 1,200 m^3/d for Kerr; 600 m^3/d for Sulphurets; and 2,100 m^3/d for Iron Cap.

7.2.2. Mitigated Flows

A systematic trial-and-error approach was used to determine the vertical in-pit well scheme for the proposed open pits as each develops throughout the mine life using the pit phases provided. Simulations were attempted without the use of an adit, however, sufficient depressurization could not be achieved for the Mitchell Pit upper north-slope; therefore, simulations were carried out with the adit to determine an effective distance (i.e., 450 m) for an adit behind the slope. Plots of predicted inflows to vertical dewatering wells, the adit and drainage gallery (see Section 7.2.2.1), and residual inflows to horizontal drains are provided in Drawing 30 for the resulting base case dewatering system for the open pits. Depth to water plots at the end of mining for each pit are provided in Drawing 31 (Mitchell and Iron Cap), 32 (for Sulphurets), and 33 (for Kerr), and illustrate that depressurization is achieved for much of the pit area, but that horizontal drains will nonetheless be required. Groundwater contours and cross sections through the open pits along model row 81 and columns 56, 74 and 107 at the end of the mine life are provided in Drawing 34, while resulting well layouts for the pit phases are provided in Appendix D. The well, adit, and drain development summary are provided in Table 10, while annual flows are provided in Table 11 for all pits using the base case dewatering scheme.

The results suggest that flows to vertical wells reduce with time, and that further optimization could be performed to reduce the number of vertical wells required.

7.2.2.1. Mitchell Pit

The total annual groundwater extraction rate for the base case dewatering system is predicted to decline from approximately 13,200 m^3/d in Year 16 to about 5,000 m^3/d by year 40. The average annual groundwater extraction rate for Mitchell pit is predicted to be approximately 9,540 m^3/d throughout the life of the pit; 5,340 m^3/d will be captured by vertical wells, 3,220 m^3/d will be captured by the adit and drainage gallery, while the remaining 980 m^3/d will be captured by horizontal drains. Based on groundwater modeling results, approximately 178 in-pit wells 200 m deep will be required over the life of mine for the Mitchell pit, and the total drilling length for the vertical wells is estimated to be approximately 35,600 m. In addition, it is estimated that approximately 1,370 km of horizontal drains over 42 years of mining will be required to aid in depressurization of the pit slopes. The adit was assumed to be 4 m in diameter, with 5-inch diameter, 300 m long drains installed in fans of three on 50 m spacing along the adit.

7.2.2.2. Kerr Pit

The total annual groundwater extraction rate for the base case dewatering system from mine year 14 to 36 is predicted to vary from approximately 570 m^3/d up to 3,400 m^3/d. The average annual groundwater extraction rate for the Kerr pit is predicted to be approximately 1,630 m^3/d; 1,040 m^3/d will be captured by vertical in-pit wells, while the remaining 590 m^3/d will be captured by horizontal drains. Approximately 56 vertical wells 200 m deep with a total drilling length of 11,200 m will be required throughout the life of the pit. In addition, it is estimated that approximately 100 km of horizontal drains over 22 years of mining will be required to aid in depressurization of the pit slopes.

7.2.2.3. Sulphurets Pit

The total annual groundwater extraction rate from mine year 7 to 13 is predicted to vary from approximately 810 m^3/d up to 1,320 m^3/d. The average annual flow to the Sulphurets pit is predicted to be 1,130 m^3/d; 780 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 40 vertical wells 200 m deep with a total drilling length of 8,000 m will be required throughout the life of the pit. In addition, it is estimated that approximately 110 km of horizontal drains over 6 years of mining will be required to aid in depressurization of the pit slopes.

7.2.2.4. Iron Cap Pit

The total annual groundwater extraction rate from mine year 38 to 52 is predicted to vary from approximately 1,240 m^3/d up to 5,140 m^3/d. The average annual flow to the Iron Cap pit is predicted to be 2,650 m^3/d; 2,300 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 44 vertical wells 200 m deep with a total drilling length of 8,800 m will be required throughout the life of the pit. In addition, it is estimated that approximately 160 km of horizontal drains over 14 years of mining will be required to aid in depressurization of the pit slopes.

7.3. Sensitivity Analyses

Sensitivity simulations were performed to evaluate changes to predicted pit inflows and dewatering rates for each pit for a reasonable range of input parameters. For each set of sensitivity simulations, hydraulic parameters were modified to investigate the impact on the base case mitigated depressurization simulation results. The following seven simulation runs were performed to compare to the base case dewatering results:

1. Hydraulic conductivity of all hydrogeologic units was increased by a factor of five
2. Hydraulic conductivity of all hydrogeologic units was decreased by a factor of five
3. Specific storage (S_s) of all units was increased by a factor of 5, while specific yield (Sy) was increased by a factor of two
4. Recharge for each recharge zone was increased by a factor of two
5. Recharge for the glacier covered areas only was increased by a factor of five
6. Hydraulic conductivity of all hydrogeologic units was increased by a factor of five and specific storage (S_s) of all units was increased by a factor of five, while specific yield (Sy) was increased by a factor of two (i.e., a combination of sensitivity runs 1 and 3)

7. As sensitivity run 6, with recharge in each zone increased by a factor of two (i.e., a combination of sensitivity runs 1, 3, and 4)

Plots of average predicted inflows to the open pits, dewatering wells and horizontal drains for each sensitivity scenario relative to the base case results are provided in Appendix E, and average annual flows for each case are summarized in Table 12. Results of the sensitivity simulations demonstrate that:

- Significant changes in predicted pit inflows and well extraction rates are found for scenarios where hydraulic conductivity is increased (Runs 1, 6, and 7) or decreased (Run 2) relative to the base case for Mitchell Pit. If the bulk hydraulic conductivity of the hydrogeologic units is found to be a factor of five greater than assumed in the base case (Runs 1, 6 and 7), the total predicted amount of groundwater to be handled by the Mitchell pit dewatering system would increase by a factor of 1.5 to 2.1. Residual flows to Kerr, Sulphurets and Iron Cap are lower and nearly cease for these scenarios, due to resulting lowered hydraulic heads at higher elevations, and the more effective vertical wells. If the bulk hydraulic conductivity is decreased by a factor of five relative to the base case (Run 2) the spacing of the vertical wells is less effective at depressurization and increased seepage reports to each pit. Total flows to the proposed pits increase relative to the base case for Kerr, Sulphurets and Iron Cap for this scenario due to higher hydraulic heads within the ridges. Obtaining larger scale estimates of the bulk rock mass hydraulic conductivity within the proposed pit areas (i.e. pumping tests) would remove some of the uncertainty associated with this parameter. It will be important to continue to characterize the permeability of all hydrogeologic units as the mine develops and dewatering wells are installed in order to make any necessary adaptations to the dewatering program (i.e., number, size and depth of wells, adits, drains and spacing).
- The ability to achieve depressurization targets is sensitive to hydraulic conductivity. Depth to water below ground for Mitchell and Iron Cap pits at the end of mining are provided on plots E5 and E6 for sensitivity runs 1 (high K) and 2 (low K), respectively. The plots demonstrate that depressurization goals are more easily met with higher hydraulic conductivity, but more difficult if the bedrock hydraulic conductivity is lower. For Run 2, the low K simulation, the success of the horizontal drains, and the adit and drainage gallery in the case of Mitchell pit, would be crucial to pit slope depressurization. Results are similar for Kerr and Sulphurets pits (not presented).
- Storage is also a sensitive parameter for the hydrogeologic system. Overall groundwater inflows for Mitchell pit increase by a factor of 1.3 relative to the base case when only specific storage and specific yield are increased (Run 3). Residual flows to Kerr, Sulphurets and Iron Cap pit increase by factors of 1.8, 2.4, and 1.7 respectively. Obtaining estimates of bedrock storage properties within the proposed pit areas through pumping tests would again remove some of the uncertainty associated with this parameter.

- Although recharge is an important parameter for the hydrogeologic system, increasing recharge (Run 4 and 5) resulted in flows marginally higher for each pit relative to the base case.

8.0 PFS LEVEL DESIGN OF OPEN PIT DEPRESSURIZATION SYSTEMS

In order to depressurize the proposed Mitchell pit slopes, a combination of vertical in-pit wells, horizontal in-pit drains, and a dewatering adit will be required. In-pit wells and horizontal drains will be used to mitigate groundwater inflows as the pit develops and as benches become established. It is expected that horizontal drains will be very important in the deeper portions of the pit where vertical wells may be less effective due to the lower hydraulic conductivity of the bedrock at depth (see Drawing 31). The adit is required to achieve the depressurization requirements of the Mitchell Pit upper north slope.

In-pit vertical wells and horizontal drains will also be required to lower the water table during mining activities for Kerr, Sulphurets, and Iron Cap pit. The estimated number of vertical dewatering wells that will be needed to achieve depressurization objectives are provided in Tables 10 and 11. The number of wells is approximate and likely conservative; the actual number of wells installed and their locations will need to be modified to account for such factors as:

- poor drilling conditions (i.e. lost holes);
- low (or high) yielding wells;
- topographic or structural controls (e.g. avalanche chutes and/or run-out control plans, dewatering well bench locations and access, etc.); and
- significant changes in pit development strategy

A schematic diagram showing a typical vertical pit dewatering well and horizontal drain specification is provided in Appendix F to support cost estimating for the depressurization system.

At this level of design, BGC has not made specific recommendations on the locations of dewatering/geotechnical berms (i.e. berms that will accommodate dewatering well installation and ongoing maintenance). The distribution of these berms has been left to the discretion of the mining engineers. At future stages of design, and with additional, larger scale investigations to confirm bulk rock mass hydrogeological parameters (i.e. pumping tests) BGC can work with the mine planners, as required, to optimize the locations of these pit slope features. The locations of wells used in the model to achieve depressurization objectives are shown in Appendix D for the pit phases considered as guidance to mine planners for project cost estimation.

8.1. In-Pit Wells

Anticipated yields for Mitchell wells range from 0.3 L/s to 5 L/s (5 US gpm to 81 US gpm), and up to 89 in-pit wells may be operating at once (Table 10). The depths for in-pit wells will be variable and dependent upon factors such as collar elevation relative to the bottom of the pits, duration each well is active, and bedrock hydraulic conductivity. However, it is estimated that the average well depth will be approximately 200 m and that on average each well will be mined out once, requiring a total drilling length of approximately 35,600 m of in-pit wells.

Anticipated yields for Kerr and Sulphurets wells range from 0.2 L/s to 0.9 L/s (4 US gpm to 14 US gpm). Up to 28 and 20 in-pit wells may be operating at once at Kerr and Sulphurets, respectively (Table 10). An average well depth of 200 m was assumed, and on average each well will be mined out once, resulting in a combined total drilling length of approximately 15,200 m of in-pit wells for these pits.

Anticipated yields for Iron Cap wells range from 1.0 L/s to 2.6 L/s (17 US gpm to 42 US gpm), and up to 22 in-pit wells may be operating at once (Table 10). An average well depth of 200 m was assumed, and on average each well will be mined out once, resulting in a total drilling length of approximately 8,800 m of well drilling.

The number of wells proposed does not include any redundancy to facilitate maintenance of the wells. Some level of redundancy in the number of wells will be required to account for well and pump maintenance. The level of redundancy will depend on the ability of pump maintenance personnel to replace the pumps in a timely manner and should be determined by mine planners at future stages of project design based on the tolerable level of risk to the operation.

Simulated flows to vertical wells reduce with time. Further optimization of these simulations could result in reducing the required number of operating wells. The current estimate of required number of vertical wells is deemed conservative.

8.2. Horizontal Drains

In-pit horizontal drains will be required for each pit to meet stability requirements. Horizontal drain layouts will largely need to be field fit. Typically, drains will be installed at fractures along benches where seeps are observed to occur, or in response to increasing or undesirable pressure readings in the pit slope instrumentation network. To meet stability requirements for the majority of the slopes, the water table should be depressurized to approximately 50 m behind the pit wall (see Appendix C); therefore, drain lengths of 100 m are recommended at approximately 50 m spacing. Horizontal drains from the pit face were not explicitly simulated with the model. Rather, residual flows reporting to the open pits (i.e. those flows not intercepted by the adit or wells) were assumed to be those captured by horizontal drains, and required drains were estimated independent of the model, based on the available bench face length per pit shell phase.

To achieve the depressurization goals for Mitchell Pit, primarily at depths below the MTF (i.e., Sector I on Drawing 31), horizontal drains will be relied on to intercept flow to the pit where the bedrock hydraulic conductivity is low and where vertical wells and the adit cannot reduce pore pressures to meet depressurization requirements.

Table 13 provides a horizontal drain schedule for each pit phase available. The estimates assume drains are installed as benches become available for the pit phases reviewed;

approximately 1,700 km of horizontal drains are expected to be required, 80% of which will be located in the Mitchell Pit (see Appendix F for the horizontal drain detail). It is anticipated that only 10 to 30% of the drilled drainholes will collect seepage that would report to the pit.

8.3. Mitchell Pit Upper North Slope Adit

A 3.5 km long adit and drainage gallery, described in Table 14, will be required to achieve depressurization requirements identified by the pit geotechnical design team for the Mitchell pit upper north slope. Based on the simulation results, the adit should be approximately 450 m behind the ultimate pit slope, at a low elevation within the valley. Simulated portals daylight at 900 masl and 850 masl on the east and west sides of the Mitchell Pit. The simulation results indicate that these elevations could be modified ±50 m while still achieving depressurization goals. Drainholes will need to be drilled off of the adit to extend the influence of the drainage gallery. Simulations without the drainholes did not achieve the depressurization goals. Based on the simulation results, the drainholes should be 300 m long drilled in fans of three at locations spaced 50 m along the adit.

9.0 SUMMARY

A 3-D numerical model was used to evaluate the degree of effort required to depressurize the open pit slopes to satisfy geotechnical constraints identified as part of the Kerr, Sulphurets, Iron Cap and Mitchell open pit slope studies (BGC 2011b, BGC 2011c, BGC 2011d, BGC 2011e). Estimates of the required number of vertical dewatering wells, adits and horizontal drains required to achieve sufficient depressurization of the rock mass, as well as associated groundwater extraction rates are provided.

The total annual groundwater extraction rate for the base case dewatering system for Mitchell pit is predicted to decline from approximately 13,200 m^3/d in Year 16 to approximately 5,000 m^3/d by year 40. The average annual groundwater extraction rate for Mitchell pit is predicted to be approximately 9,540 m^3/d throughout the life of the pit; 5,340 m^3/d will be captured by vertical wells, 3,220 m^3/d will be captured by the adit and drainage gallery, while the remaining 980 m^3/d will be captured by horizontal drains. Based on groundwater modeling results, approximately 178 in-pit wells 200 m deep will be required over the life of mine for the Mitchell pit, and the total drilling length for the vertical wells is estimated to be approximately 35,600 m. In addition, it is estimated that approximately 1,370 km of horizontal drains over 42 years of mining will be required to aid in depressurization of the pit slopes. Finally, a 3.5 km long dewatering adit will run from east to west roughly 450 m behind the ultimate pit. Fans of three 300 m long drainholes on 50 m spacing will be drilled off the adit. Simulated portals for the dewatering adit daylight at 900 masl and 850 masl on the east and west sides of the Mitchell Pit, respectively.

The average annual groundwater extraction rate for Kerr Pit for the base case dewatering system from mine year 14 to 36 is predicted to be approximately 1,630 m^3/d; 1,040 m^3/d will be captured by vertical in-pit wells, while the remaining 590 m^3/d will be captured by horizontal drains. Approximately 56 vertical wells 200 m deep with a total drilling length of 11,200 m will be required throughout the life of the pit. In addition, it is estimated that approximately 100 km of horizontal drains over 22 years of mining will be required to aid in depressurization of the pit slopes.

The average annual groundwater extraction rate for Sulphurets Pit from mine year 7 to 13 is predicted to be 1,130 m^3/d; 780 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 40 vertical wells 200 m deep with a total drilling length of 8,000 m will be required throughout the life of the pit. In addition, it is estimated that approximately 110 km of horizontal drains over 6 years of mining will be required to aid in depressurization of the pit slopes.

The average annual groundwater extraction rate for Iron Cap pit from mine year 38 to 52 is predicted to be 2,650 m^3/d; 2,300 m^3/d will be captured by vertical in-pit wells, while the remaining 350 m^3/d will be captured by horizontal drains. Approximately 44 vertical wells 200 m deep with a total drilling length of 8,800 m will be required throughout the life of the pit.

In addition, it is estimated that approximately 160 km of horizontal drains over 14 years of mining will be required to aid in depressurization of the pit slopes.

Further optimization of the dewatering system described would likely result in reducing the required number of vertical wells. A detailed evaluation of flows to individual wells was not carried out; however, simulated flow rates do generally decrease with time. The number of wells specified herein is deemed conservative and future studies could focus on reducing the number required.

The efficiency of the proposed pit dewatering system is sensitive to the hydraulic properties of the bedrock. It will be important to continue to characterize the hydraulic properties of the bedrock as site investigations and design advances at the next stage of the project. Currently available estimates of rock mass hydraulic conductivity in the vicinity of the open pits are limited to point scale measurements (e.g. slug tests and constant rate packer injection tests during drilling). Obtaining larger scale estimates of rock mass hydraulic conductivity and storage properties (i.e. pumping tests) to confirm the feasibility of the proposed depressurization system will be important at the next stage of project design. Monitoring of the rock mass and pore pressure response to dewatering and depressurization measures will be required throughout mining to determine if specified targets are being met. A comprehensive monitoring network of piezometers should be in place as part of the open pit slope instrumentation system, and a dedicated dewatering team will be required to carry out and adapt the dewatering plan throughout the life of mine.

10.0 CLOSURE

We trust the above satisfies your requirements at this time. Should you have any questions or comments, please do not hesitate to contact us.

Yours sincerely,

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TABLES

Table 1. Mean Monthly Precipitation Estimates

Month	Sulphurets Creek (880 m) [a] mm	Teigen Creek (1,085 m) [a] mm	Unuk River- Eskay Creek (1989-2007 climate normal) (887 m) [b] mm	Bob Quinn AGS (1971-2000 climate normal) (610 m) [b] mm	Stewart Airport (1971-2000 climate normal) (7 m) [b] mm
January	193	114	245	60	219
February	125	71	212	41	143
March	83	50	169	27	112
April	80	48	93	25	85
May	71	48	93	29	73
June	77	48	68	34	67
July	92	81	82	57	70
August	111	85	142	50	109
September	201	142	224	86	201
October	275	163	243	102	298
November	168	117	218	62	234
December	178	116	260	69	232
Annual	**1,654**	**1,083**	**2,048**	**642**	**1,843**

Notes:

a. from Rescan, 2010d. Mean monthly precipitation as shown are based on ClimateBC Precipitation Estimate and October 2008 to 2009 data.

b. from Rescan, 2010d. Mean monthly precipitation as shown based on regional meteorological station data set.

Table 2. KSM Mine Site Stations and Regional Mean Monthly Air Temperatures (degrees C)

Month	Sulphurets Creek (880 m) [a]	Mitchell Creek Station (830 m) [a]	Teigen Creek (1085 m) [a]	Unuk River- Eskay Creek (1989-2007 climate normal) (887 m) [a]	Bob Quinn AGS (1971-2000 climate normal) (610 m) [a]	Stewart Airport (1971-2000 climate normal) (7 m) [a]
Oct-08	2.3	1.0	-0.3	0.7	0.7	6.3
Nov-08	0.2	-1.1	-3.2	-4.9	-4.4	0.6
Dec-08	-7.7	-9.0	-12.9	-6.7	-6.8	-2.7
Jan-09	-4.9	-6.2	-9.4	-8.3	-8.2	-3.7
Feb-09	-5.6	-6.9	-9.2	-5.9	-5.7	-1.3
Mar-09	-3.6	-4.9	-7.6	-4.1	-4.1	1.9
Apr-09	2.6	1.3	-0.8	0.5	0.4	5.9
May-09	3.6	5.2	3.7	4.1	3.9	10.5
Jun-09	7.8	9.9	8.6	8.1	7.6	13.7
Jul-09	13.6	14.1	13.8	10.4	9.9	15.1
Aug-09	11.1	11.2	10.4	10.4	10.3	14.3
Sep-09	7.9	7.4	6.3	5.8	5.7	11.1
Oct-09	1.1	2.2	0.0	0.7	0.7	6.3
Nov-09	-3.5	0.0	-4.6	-4.9	-4.4	0.6
Average [b]	2.3	1.8	-0.1	0.9	0.8	6.0
Minimum [b]	-7.7	-9.0	-12.9	-8.3	-8.2	-3.7
Maximum [b]	13.6	14.1	13.8	10.4	10.3	15.1

Notes:

a. From Rescan, 2010d.

b. Average, minimum and maximum values are based on 2008/2009 hydrologic year.

Table 3. Baseline Hydrometric Stations Mean and Low Flow Measurements

Gauging Station	Northing (NAD 83, Zone 9)	Easting (NAD 83, Zone 9)	Median Elevation (masl)	Watershed Area (km^2)	Median Slope (%)	% Glacier Cover	Peak Flows (m^3/s)		Observed Instantaneous Low Flows (m^3/s)			Estimated Annual Low Flows (m^3/s)		Location
							2008 Daily	2009 Daily	2008	2009	2010	7-day	7-day Q10 [c]	
UR-H1	6,262,837	408,007	1,118	400	34	14	95.7	200	n/a	1.96	5.09	1.49	0.88	Lower Unuk River
SC-H1	6,261,490	408,256	1,481	299	47	38	56.8	134	n/a	2.02	3.56	1.09	0.63	Sulphurets Cr. before confluence with Unuk River
SL-H1	6,261,229	420,398	1,610	84	36	48	7.35	52.2	0.44	0.28	0.47	0.29	0.15	Sulphurets Lake at outlet of lake
TMC-H1	6,259,533	416,854	1,565	57	51	49	n/a	29.0	n/a	n/a	n/a	0.19	0.10	Ted Morris Creek south tributary of Sulphurets Creek
MC-H1	6,265,356	421,145	1,662	42	38	54	9.58	46.1	0.41	0.16	n/a	0.14	0.07	Mitchell Creek
MCT-H1	6,265,104	418,685	1,540	32	55	38	9.14	12.80	0.26	0.27	0.36	0.10	0.05	McTagg Creek north tributary of Mitchell Creek
BJL-H1	6,258,899	425,840	1,625	18	32	41	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Bruce Jack Lake at outlet of lake
GC-H1	6,262,834	416,277	1,535	10	54	30	n/a	n/a	n/a	n/a	0.10	0.10	0.05	Gingras Creek near confluence with Sulphurets Lake

Notes:

a. Unless otherwise noted, flows are based on tables 2.4-2 and 2.4-3 in Rescan 2010b.

b. n/a - data not available.

c. Q10 prepresents the estimated low flows at an occurrence of once in every 10 years.

Table 4. Bedrock Hydraulic Conductivity Data Summary

Grouping	Depth (m bgs)	Bedrock Hydraulic Conductivity (m/s)			No. of Tests
		geometric mean	maximum	minimum	
By Pit Area					
Kerr Pit (all data)	0 to 125	1E-07	2E-05	3E-09	12
Kerr Pit (all data)	> 125	4E-07	3E-06	1E-08	8
Kerr Pit (all data)	0 to 350	2E-07	2E-05	3E-09	20
Kerr Pit (all data)	0 to 100	1E-07	1E-06	3E-09	11
Kerr Pit (all data)	100 to 200	2E-06	2E-05	7E-07	5
Kerr Pit (all data)	> 200	1E-07	2E-06	1E-08	4
Sulphurets pit (all data)	0 to 125	1E-07	2E-06	5E-10	12
Sulphurets pit (all data)	> 125	2E-07	1E-05	8E-10	15
Sulphurets Pit (above STF)	0 to 250	6E-07	1E-05	5E-09	9
Sulphurets Pit (below STF)	0 to 350	7E-08	3E-06	5E-10	18
Iron Cap Pit (all data)	0 to 125	8E-07	3E-06	5E-08	5
Iron Cap Pit (all data)	> 125	4E-08	5E-07	8E-09	6
Iron Cap Pit (all data)	0 to 300	2E-07	3E-06	8E-09	11
Mitchell Pit (all)	0 to 125	7E-07	1E-05	1E-09	29
Mitchell Pit (all)	> 125	2E-08	7E-07	3E-10	18
Mitchell Pit - below MTF	0 to 125	2E-06	1E-05	8E-08	18
Mitchell Pit - below MTF	> 125	3E-09	1E-07	3E-10	8
Mitchell Pit - above MTF	0 to 125	1E-07	1E-06	1E-09	15
Mitchell Pit - above MTF	> 125	7E-08	7E-07	2E-08	9
All Data By Lithology					
Sedimentary	0 to 125	1E-07	5E-06	1E-09	72
Intrusive	0 to 125	3E-07	3E-06	8E-09	17
Volcanics	0 to 125	4E-07	1E-05	5E-10	41
Fault Zone	0 to 125	2E-07	3E-07	9E-08	4
No Distinction					
All Data	0 to 125	2E-07	1E-05	5E-10	137
All Data	> 125	1E-07	2E-05	3E-10	70

Notes:

1. "m bgs" indicates meters below ground surface.

Table 5. Overburden Hydraulic Conductivity Data Summary

Borehole ID	Location	Test Midpoint Depth (m)	K (m/s)	Test Type	Material	Note
2009 Field Season						
KC08-01	Mitchell Waste Dump Area	19.78	2.0E-08	FH test	Till	
KC09-10	Sulphurets Valley	4.85	1.2E-07	FH test	Overburden	
KC09-09	Mitchell Waste Dump Area	4.35	2.6E-07	FH test [3]	Moraine	
KC09-09	Mitchell Waste Dump Area	10.48	4.9E-07	FH test [3]	Colluvium	
KC09-09	Mitchell Waste Dump Area	21.70	4.8E-08	FH test [3]	Colluvium	
KC09-09	Mitchell Waste Dump Area	33.55	9.6E-08	FH test [3]	Colluvium	
KC09-09	Mitchell Waste Dump Area	50.00	1.0E-08	FH test [3]	Colluvium	
KC09-09	Mitchell Waste Dump Area	68.10	1.0E-06	FH test [3]	Colluvium	
RES-MW-13A	Kerr Pit Area	41.80	6.1E-08	CH packer test	Colluvium	
RES-MW-13B	Kerr Pit Area	24.65	3.2E-09	FH test	Colluvium	
2008 Field Season						
KC08-01	Mitchell Waste Dump Area	NA	7.0E-06	FH test [2]	Colluvium	4 tests
KC08-02	Mitchell Waste Dump Area	NA	1.0E-05	FH test [2]	Colluvium	2 tests
KC08-02	Mitchell Waste Dump Area	NA	4.0E-06	FH test [2]	Till	5 tests
KC08-03	Mitchell Waste Dump Area	NA	3.0E-06	FH test [2]	Till	7 tests
KC08-03	Mitchell Waste Dump Area	NA	6.0E-08	FH test [2]	Clay	3 tests
2009 field season geomean			7.0E-08			
all data - geomean			2.2E-07			
All data - minimum			3.2E-09			
All data - maximum			1.0E-05			

Notes:

1. "FH" indicates falling head test.
2. This test was carried out in an open borehole so results are approximate at best.

Table 6. Calibrated Hydraulic Parameters Assigned to Hydrogeologic Units

Hydrogeologic Unit	Model Layer(s)	Model Depth Extent (mbgs)	Hydraulic Conductivity (m/s)		Specific Storage (1/m)	Specific Yield (-)
			Horizontal	Kh:Kv		
Outside Mitchell, Sulphurets, and Iron Cap Pit Area						
Till Deposits	1 and 2	0 to 50	7E-07	1	5E-06	0.1
Shallow Stuhini Bedrock	1 to 3	0 to 125	1E-07	1	5E-06	0.10
Stuhini Bedrock	4	125 to 225	9E-09	1	1E-06	0.01
Stuhini Bedrock	5 to 10	225 to -350	1E-09	1	1E-06	0.01
Shallow Hazelton Bedrock	1 to 3	0 to 125	1E-07	1	5E-06	0.10
Hazelton Bedrock	4	125 to 225	2E-08	1	1E-06	0.01
Hazelton Bedrock	5 to 10	225 to -350	1E-09	1	1E-06	0.01
Within Mitchell, Sulphurets, and Iron Cap Pit Area						
Shallow Bedrock below STF and Above MTF	1 and 2	0 to 50	1E-06	1	5E-06	0.10
Bedrock above MTF and below STF - North and South Slopes	3 to 6	50 to varies	2E-08	1	1E-06	0.01
Bedrock Below MTF - Valley Bottom	1 to 3	0 to 125	1E-06	1	5E-06	0.10
Bedrock Below MTF	4 to 6	125 to varies	1E-08	1	1E-06	0.01
Bedrock Below MTF	7 to 10	varies to -350	1E-09	1	1E-06	0.01
Shallow Bedrock Above STF	1 and 2	0 to 50	7E-07	1	5E-06	0.10
Bedrock Above STF	3	50 to 125	1E-07	1	1E-06	0.01
Bedrock Above STF	4 to 6	125 to varies	1E-08	1	1E-06	0.01
Suphurets Zone, STF foot wall	3 to 6	50 to varies	1E-09	1	1E-06	0.01
Shallow Bedrock In Iron Cap Pit Area	1 to 3	0 to 125	1E-07	1	5E-06	0.10
Bedrock In Iron Cap Pit Area	4 to 6	125 to varies	2E-08	1	1E-06	0.01

Notes:
1. "MTF" indicates Mitchell Thrust Fault.
2. "STF" indicates Sulphurets Thrust Fault.

Table 7. Calibrated Recharge Rates Applied to the Numerical Model

Recharge Zone	Rate		
	mm/yr	m/d	% of Mean Annual Precip. at Sulphurets Creek
< 900 masl (valley bottom and no glacier coverage)	128	0.00035	8%
900 to 1,300 masl (mid-slope and no glacier coverage)	173	0.00047	10%
> 1,300 masl (uplands and no glacier coverage)	218	0.00060	13%
glacier coverage	40	0.00011	2%

Table 8. Groundwater Elevation Statistics - Observed vs. Simulated Heads

Monitoring Point ID	Easting (NAD 83, Zone 9)	Northing (NAD 83, Zone 9)	Installation Midpoint Elevation (m)	Observed Head (m) [1]	Simulated Head (m)	Residual (m)	Location	Note
IC10-014	424,689	6,267,436	1,324.4	1,524.9	1,518.6	6.3	Iron Cap Pit	
IC10-016	424,408	6,267,743	1,356.5	1,613.6	1,622.7	-9.1	Iron Cap Pit	
K10-05	421,180	6,258,568	1,662.9	1,679.8	1,709.3	-29.5	Kerr Pit	
K10-06D	421,820	6,259,555	1,034.1	1,362.7	1,323.3	39.3	Kerr Pit	
K10-06S	421,772	6,259,609	1,222.9	1,311.3	1,320.0	-8.7	Kerr Pit	
K10-08	421,583	6,258,769	1,437.1	1,599.1	1,524.9	74.2	Kerr Pit	
KC08-01	419,054	6,264,806	648.1	662.3	675.5	-13.2	Mitchell Valley	
KC08-02	419,151	6,265,219	657.0	659.8	675.2	-15.5	Mitchell Valley	
KC08-03	421,056	6,265,446	683.8	756.4	772.9	-16.5	Mitchell Valley	
KC09-08	421,354	6,265,765	769.6	782.4	829.4	-47.0	Mitchell Valley	
KC09-09-BDRK	420,756	6,265,407	643.0	753.3	784.6	-31.3	Mitchell Valley	
KC09-09-OVB	420,756	6,265,407	733.8	737.1	771.6	-34.5	Mitchell Valley	
KC09-10	419,471	6,262,089	851.5	875.7	855.7	20.1	Sulphurets Valley	
KC09-11	418,148	6,262,742	746.2	768.2	753.1	15.1	Sulphurets Valley	
KC09-12	417,983	6,264,527	580.2	624.9	656.6	-31.7	Mitchell Valley	
KC09-13	417,122	6,263,726	606.1	634.7	675.9	-41.3	Mitchell Valley	
KC10-17	417,646	6,263,878	476.6	564.9	642.3	-77.5	Mitchell Valley	
KC10-18A	417,409	6,264,049	571.2	651.1	676.8	-25.8	Mitchell Valley	
KC10-26	421,142	6,266,000	832.4	966.8	989.9	-23.1	Mitchell Valley	
KC10-28	418,475	6,265,905	668.4	698.2	771.5	-73.3	McTagg Valley	
KC10-32	417,295	6,263,674	513.7	592.7	627.0	-34.2	Mitchell Valley	
KC10-OVB21	419,358	6,265,013	629.0	661.0	675.1	-14.2	Mitchell Valley	
KC10-OVB27	417,701	6,261,496	486.8	525.7	543.2	-17.5	Sulphurets Valley	
M09-095	423,218	6,265,214	587.5	890.4	1,002.3	-111.9	Mitchell Pit	
M09-096D	423,684	6,265,472	682.6	902.4	1,006.6	-104.2	Mitchell Pit	
M09-096S	423,602	6,265,470	866.8	908.5	914.8	-6.3	Mitchell Pit	
M09-097D	423,267	6,266,482	1,080.3	1,267.8	1,323.4	-55.6	Mitchell Pit	
M09-097S	423,184	6,266,421	1,252.1	1,259.5	1,286.8	-27.2	Mitchell Pit	
M09-099	422,970	6,265,791	505.6	751.5	1,003.1	-251.6	Mitchell Pit	3
M09-100D	422,285	6,265,225	555.5	625.6	923.3	-297.7	Mitchell Pit	2
M09-100S	422,341	6,265,243	746.8	792.4	801.4	-8.9	Mitchell Pit	
M09-101	423,471	6,264,732	1,070.6	1,149.5	1,246.0	-96.5	Mitchell Pit	
M09-102a	422,359	6,264,604	904.4	1,081.4	1,199.2	-117.8	Mitchell Pit	
M10-121	422,786	6,266,761	1,245.2	1,491.2	1,456.5	34.7	Mitchell Pit	
RES-MW-04A	421,826	6,265,532	682.7	772.7	787.2	-14.5	Mitchell Valley	
RES-MW-04B	421,822	6,265,534	750.8	769.9	785.5	-15.6	Mitchell Valley	
RES-MW-05A'	424,005	6,266,293	987.6	1,068.1	1,024.1	44.0	Mitchell Pit	
RES-MW-05B	424,003	6,266,293	1,028.4	1,055.9	1,023.8	32.0	Mitchell Pit	
RES-MW-06A	422,850	6,265,320	737.5	817.2	825.3	-8.1	Mitchell Pit	
RES-MW-06B	422,854	6,265,323	791.4	817.0	823.3	-6.3	Mitchell Pit	
RES-MW-07A	422,108	6,262,880	1,376.4	1,442.5	1,404.8	37.7	Sulphurets Pit	
RES-MW-07B	422,110	6,262,884	1,428.2	1,444.8	1,410.3	34.5	Sulphurets Pit	
RES-MW-09A	422,050	6,258,145	1,229.7	1,297.2	1,260.4	36.7	Kerr Pit	
RES-MW-09B	422,045	6,258,144	1,270.0	1,295.1	1,260.8	34.3	Kerr Pit	
RES-MW-10A	423,367	6,264,954	1,098.9	1,119.4	1,129.8	-10.4	Mitchell Pit	
RES-MW-10B	423,372	6,264,953	1,122.4	1,124.5	1,134.3	-9.8	Mitchell Pit	
RES-MW-12A	418,336	6,262,251	616.5	670.7	685.8	-15.2	Sulphurets Valley	
RES-MW-12B	418,340	6,262,248	678.5	691.8	685.8	6.0	Sulphurets Valley	
RES-MW-13A	421,536	6,260,331	924.5	993.9	1,037.9	-44.0	Kerr Pit	
RES-MW-13B	421,540	6,260,334	986.9	1,000.9	1,037.9	-37.0	Kerr Pit	
RES-MW-14A	419,255	6,262,000	773.7	813.1	797.5	15.6	Sulphurets Valley	
RES-MW-14B	419,252	6,262,003	801.0	818.3	803.5	14.8	Sulphurets Valley	
RES-MW-15A	417,276	6,263,374	490.2	560.2	616.6	-56.3	Mitchell Valley	
RES-MW-15B	417,277	6,263,378	568.1	568.2	611.9	-43.7	Mitchell Valley	
S10-27D	422,174	6,263,225	1,179.7	1,511.8	1,474.3	37.5	Sulphurets Pit	
S10-27S	422,131	6,263,160	1,379.4	1,569.2	1,513.6	55.6	Sulphurets Pit	
S10-30	421,665	6,263,009	1,128.5	1,384.8	1,418.8	-33.9	Sulphurets Pit	
S10-31	422,526	6,263,582	1,370.8	1,634.4	1,528.9	105.6	Sulphurets Pit	
S10-32	422,708	6,263,211	1,416.6	1,634.6	1,503.8	130.8	Sulphurets Pit	
S10-33D	421,779	6,263,616	1,389.9	1,600.3	1,488.0	112.3	Sulphurets Pit	
S10-33S	421,760	6,263,639	1,481.0	1,589.5	1,532.5	57.0	Sulphurets Pit	

Notes:
1. Observed head data shown is average of available data, unless otherwise indicated.
2. Observed head data to date indicates water level at piezometer has not stabilized. Matching observed head data deemed of low importance.
3. Observed head appears to be anomolously low. Matching observed head data deemed of low importance.
4. RES-MW-11A/B were not included in the calibration target data set because they were out of the model domain.
5. M09-98 and RES-MW08A were not included in the calibration target data set because they were historically dry.
6. KC09-07 was not included in the calibration target data set because it was artesian and a hydraulic head reading was not available.

Table 9. Measured Low Flows and Simulated Baseflows at Creek Gauging Stations

Gauging Station	Northing (NAD 83, Zone 9)	Easting (NAD 83, Zone 9)	Estimated Annual Low Flow - 7 Day (m^3/s)	Estimated Annual Low Flow - 7 Day (m^3/d)	Calibrated Model Simulated Baseflow (m^3/d)	Simulated Flow as Percentage of Estimated 7 Day Low Flow (%)	Location
MC-H1	6,265,356	421,145	0.14	12,096	14,052	116%	Mitchell Creek
MCT-H1	6,265,104	418,685	0.10	8,640	10,444	121%	McTagg Creek north tributary of Mitchell Creek
TMC-H1	6,259,533	416,854	0.19	16,416	16,998	104%	Ted Morris Creek south tributary of Sulphurets Creek
SL-H1	6,261,229	420,398	0.29	25,056	19,583	78%	Sulphurets Lake at outlet of lake
BJL-H1	6,258,899	425,840	n/a	n/a	6,570	n/a	Bruce Jack Lake at outlet of lake

Notes:

a. Unless otherwise noted, flows are based on tables 2.4-2 and 2.4-3 in Rescan 2010b.

b. N/A - data not available.

Table 10. Annual Summary of Dewatering and Depressurization Measures by Pit

Mine Year	Mitchell					Kerr			Sulphurets			Iron Cap			Annual Summary		
	Operating Vertical Wells [1]	Installed Wells	Horizontal Drains (m)	Adit (m)	Gallery (m)	Operating Vertical Wells [1]	Installed Wells	Horizontal Drains (m)	Operating Vertical Wells [1]	Installed Wells	Horizontal Drains (m)	Operating Vertical Wells [1]	Installed Wells	Horizontal Drains (m)	Operating Vertical Wells [1]	Installed Wells	Horizontal Drains (m)
-4															0	0	-
-3	24	24													24	24	-
-2	24		26,300												24	0	26,300
-1	24		19,800												24	0	19,800
1	45	21	17,000												45	21	17,000
2	45		29,800												45	0	29,800
3	45		20,900												45	0	20,900
4	45		29,000												45	0	29,000
5	45		21,000												45	0	21,000
6	45		19,280						17	17	13,340				62	17	32,620
7	55	10	19,280						17		13,340				72	10	32,620
8	55		19,280	2,361					17		13,340				72	0	32,620
9	55		19,280	1,139					17	10	13,340				72	10	32,620
10	55	25	19,280		36,500				17		13,340				72	25	32,620
11	55		44,340		26,500				20	13	13,600				75	13	57,940
12	55		44,340						20		13,600				75	0	57,940
13	55		44,340			19	19		20		13,600				94	19	57,940
14	79	24	44,340			19		6,814							98	24	51,154
15	79		44,340			19		6,814							98	0	51,154
16	79		44,340			28	19	6,814							107	19	51,154
17	79		44,340			28		6,814							107	0	51,154
18	79		44,340			28		6,814							107	0	51,154
19	79		44,340			28		6,814							107	0	51,154
20	79	40	44,340			28		6,814							107	40	51,154
21	79		38,700			28	18	5,020							107	18	43,720
22	79		38,700			28		5,020							107	0	43,720
23	79		38,700			28		5,020							107	0	43,720
24	79		38,700			28		5,020							107	0	43,720
25	79		38,700			28		5,020							107	0	43,720
26	79		38,700			28		5,020							107	0	43,720
27	79		38,700			28		5,020							107	0	43,720
28	79	24	38,700			28		5,020							107	24	43,720
29	79		38,700			28		5,020							107	0	43,720
30	79		38,700			28		5,020							107	0	43,720
31	79		28,050			28									107	0	28,050
32	79		28,050			28									107	0	28,050
33	79		28,050			28									107	0	28,050
34	89	10	28,050			28									117	10	28,050
35	89		28,050			28									117	0	28,050
36	89		28,050			28									117	0	28,050
37	89		28,050									18	18		107	18	28,050
38	89		28,050									18		30,000	107	0	58,050
39	89		28,050									18		30,000	107	0	58,050
40	89		28,050									18	10	30,000	107	10	58,050
41	89											18		5,575	107	0	5,575
42	89											18		5,575	107	0	5,575
43	89											18		5,575	107	0	5,575
44	89											18		5,575	107	0	5,575
45	89											22	16	5,575	111	16	5,575
46	89											22		5,575	111	0	5,575
47	89											22		5,575	111	0	5,575
48	89											22		5,575	111	0	5,575
49	89											22		5,575	111	0	5,575
50	89											22		5,575	111	0	5,575
51	89											22		5,575	111	0	5,575
52	89											22		5,575	111	0	5,575
Maximum	89					28			20			22			117		
Total		178	1,371,100	3,500	63,000		56	97,900		40	107,500		44	156,900		318	1,733,400

Notes:

1. Number of vertical wells shown during mine year are total operating by year for specific pit. The number of wells presented is conservative; further optimization should result in reducing the number of required wells.
2. Horizontal drains shown as meters drilled during mine year.
3. On average, each vertical well is mined out once and replaced during mine life.
4. Grey highlight indicates years of active mining for pit.
5. Vertical wells are all 200 m deep. See Appendix F for additional approximate well dimensions and materials.

Table 11. Annual Open Pit Flow Summary

Mitchell

Mine Year	Operating Vertical Wells [1]	Total Vertical Well Flow (m^3/d)	Average Flow Per Well (m^3/d)	Average Flow Per Well (USgpm)	Total Adit Flow (m^3/d)	Total Horizontal Drain Flow (m^3/d)
-3	24	1,679	70	13		
-2	24	9,757	407	75		185
-1	24	10,572	441	81		92
1	45	11,387	253	46		0
2	45	10,641	236	43		302
3	45	9,895	220	40		604
4	45	9,148	203	37		907
5	45	8,402	187	34		1,209
6	45	7,656	170	31		1,511
7	55	7,486	136	25		1,340
8	55	7,317	133	24		1,169
9	55	7,148	130	24		997
10	55	6,979	127	23		826
11	55	6,809	124	23	2,764	655
12	55	6,921	126	23	3,275	633
13	55	7,033	128	23	3,787	610
14	79	7,145	90	17	4,298	588
15	79	7,257	92	17	4,809	565
16	79	7,369	93	17	5,320	543
17	79	6,911	87	16	4,893	445
18	79	6,452	82	15	4,466	348
19	79	5,994	76	14	4,038	250
20	79	5,535	70	13	3,611	152
21	79	5,077	64	12	3,183	55
22	79	4,935	62	11	3,156	342
23	79	4,794	61	11	3,129	630
24	79	4,652	59	11	3,102	917
25	79	4,510	57	10	3,075	1,205
26	79	4,369	55	10	3,048	1,492
27	79	3,953	50	9	2,932	1,584
28	79	3,537	45	8	2,815	1,676
29	79	3,122	40	7	2,699	1,768
30	79	2,706	34	6	2,583	1,860
31	79	2,290	29	5	2,467	1,952
32	79	2,637	33	6	2,529	1,959
33	79	2,984	38	7	2,592	1,967
34	89	3,331	37	7	2,655	1,974
35	89	3,677	41	8	2,717	1,981
36	89	4,024	45	8	2,780	1,988
37	89	3,928	44	8	2,655	1,590
38	89	3,832	43	8	2,529	1,193
39	89	3,735	42	8	2,404	795
40	89	3,639	41	8	2,278	398
41	89	3,543	40	7		
42	89	3,554	40	7		
43	89	3,565	40	7		
44	89	3,576	40	7		
45	89	3,588	40	7		
46	89	3,599	40	7		
47	89	3,584	40	7		
48	89	3,569	40	7		
49	89	3,554	40	7		
50	89	3,540	40	7		
51	89	3,525	40	7		
52	89	3,500	39	7		
Average		5,344	107	20	3,220	982

Kerr

Mine Year	Operating Vertical Wells [1]	Total Vertical Well Flow (m^3/d)	Average Flow Per Well (m^3/d)	Average Flow Per Well (USgpm)	Total Horizontal Drain Flow (m^3/d)
13	19	1,050	55	10	
14	19	1,262	66	12	586
15	19	1,475	78	14	672
16	28	1,693	60	11	760
17	28	1,467	52	10	610
18	28	1,241	44	8	459
19	28	1,015	36	7	309
20	28	788	28	5	158
21	28	562	20	4	8
22	28	785	28	5	358
23	28	1,008	36	7	707
24	28	1,232	44	8	1,057
25	28	1,455	52	10	1,407
26	28	1,678	60	11	1,757
27	28	1,469	52	10	1,440
28	28	1,260	45	8	1,124
29	28	1,052	38	7	807
30	28	843	30	6	491
31	28	634	23	4	175
32	28	616	22	4	164
33	28	599	21	4	153
34	28	581	21	4	142
35	28	563	20	4	131
36	28	546	19	4	120
Average		1,036	40	7	591

Sulphurets

Mine Year	Operating Vertical Wells [1]	Total Vertical Well Flow (m^3/d)	Average Flow Per Well (m^3/d)	Average Flow Per Well (USgpm)	Total Horizontal Drain Flow (m^3/d)
6	17	611	36	7	
7	17	674	40	7	239
8	17	737	43	8	278
9	17	800	47	9	318
10	17	863	51	9	357
11	20	926	46	8	396
12	20	849	42	8	425
13	20	772	39	7	454
Average		779	43	8	352

Iron Cap

Mine Year	Operating Vertical Wells [1]	Total Vertical Well Flow (m^3/d)	Average Flow Per Well (m^3/d)	Average Flow Per Well (USgpm)	Total Horizontal Drain Flow (m^3/d)
37	18	1,619	90	17	
38	18	2,239	124	23	537
39	18	2,858	159	29	705
40	18	3,477	193	35	874
41	18	4,097	228	42	1,042
42	18	3,633	202	37	834
43	18	3,169	176	32	626
44	18	2,705	150	28	419
45	22	2,242	102	19	211
46	22	1,778	81	15	3
47	22	1,697	77	14	3
48	22	1,616	73	13	2
49	22	1,536	70	13	2
50	22	1,455	66	12	1
51	22	1,374	62	11	1
52	22	1,239	56	10	0
Average		2,296	119	22	351

Notes:

1. Number of vertical wells shown during mine year are total operating by year for specific pit. The number of wells presented is conservative; further optimization should result in reducing the number of required wells.
2. See Appendix F for vertical well schematic.
3. Grey highlight indicates years of active mining for pit.

Table 12. Sensitivity Run Summary

Run [1]	Average Annual Flow Rate	Mitchell (m3/d)	Kerr (m3/d)	Sulphurets (m3/d)	Iron Cap (m3/d)
Basecase	Residual Pit Inflow (horizontal drains)	982	591	350	348
Sensitivity 1		1,086	30	74	0
Sensitivity 2		2,030	1,792	2,074	2,481
Sensitivity 3		1,690	1,433	1,096	1,197
Sensitivity 4		1,046	705	443	611
Sensitivity 5		993	592	414	630
Sensitivity 6		1,391	142	257	0
Sensitivity 7		1,671	246	333	0
Basecase	Vertical Wells	5,344	1,040	780	2,301
Sensitivity 1		9,724	646	1,137	1,738
Sensitivity 2		2,976	855	954	1,331
Sensitivity 3		6,926	1,563	1,566	3,416
Sensitivity 4		5,732	1,200	1,145	2,586
Sensitivity 5		5,371	1,042	1,050	2,567
Sensitivity 6		11,617	984	1,780	2,238
Sensitivity 7		13,135	1,195	2,229	2,719
Basecase	Adit and Drainage Gallery	3,220	--	--	--
Sensitivity 1		3,377	--	--	--
Sensitivity 2		1,252	--	--	--
Sensitivity 3		3,797	--	--	--
Sensitivity 4		3,177	--	--	--
Sensitivity 5		3,121	--	--	--
Sensitivity 6		4,101	--	--	--
Sensitivity 7		4,871	--	--	--
Basecase	Total (Residual + Wells + Adit)	9,546	1,631	1,130	2,649
Sensitivity 1		14,187	676	1,212	1,738
Sensitivity 2		6,258	2,646	3,028	3,813
Sensitivity 3		12,413	2,996	2,662	4,613
Sensitivity 4		9,955	1,904	1,588	3,196
Sensitivity 5		9,485	1,633	1,463	3,197
Sensitivity 6		17,108	1,126	2,037	2,238
Sensitivity 7		19,677	1,441	2,562	2,719

Notes:

1. Sensitivity Simulation variations from basecase are described as follows:
   - > Sensitivity 1: Raised all hydraulic conductivity units by a factor of 5
   - > Sensitivity 2: Lowered all hydraulic conductivity units by a factor of 5
   - > Sensitivity 3: Raised storage by a factor of 5 and specific yield (Sy) by factor of 2
   - > Sensitivity 4: Raised recharge by factor of 2 for each area
   - > Sensitivity 5: Raised recharge by factor of 5 for glacier covered areas only
   - > Sensitivity 6: Combination of Sensitivity Run 1 and 3 (raised K, S, and Sy)
   - > Sensitivity 6: Combination of Sensitivity Run 1, 3, and 4 (raised K, S, Sy and recharge)

Table 13. Open Pit Horizontal Drain Estimates

Mine Year / Open Pit Phase	Pit	Bench Length Excavated (m)	Drain Length (m)	Drain Spacing (m)	Number of Drains Drilled [2]	Total Drilling Length (m)	Estimated Number of Drains Present at Phase End [3]
-3	Mitchell	0	100	50	0	0	
	Mitchell - North I	0	100	50	0	0	0
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**0**			**0**	**0**	**0**
-2	Mitchell	8,550	100	50	171	17,100	
	Mitchell - North I	4,600	100	50	92	9,200	263
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**13,150**			**263**	**26,300**	**263**
-1	Mitchell	8,500	100	50	170	17,000	
	Mitchell - North I	1,400	100	50	28	2,800	330
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**9,900**			**198**	**19,800**	**330**
1	Mitchell	5,000	100	50	100	10,000	
	Mitchell - North I	3,500	100	50	70	7,000	335
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**8,500**			**170**	**17,000**	**335**
2	Mitchell	12,800	100	50	256	25,600	
	Mitchell - North I	2,100	100	50	42	4,200	465
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**14,900**			**298**	**29,800**	**465**
3	Mitchell	9,450	100	50	189	18,900	
	Mitchell - North I	1,000	100	50	20	2,000	465
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**10,450**			**209**	**20,900**	**465**
4	Mitchell	12,000	100	50	240	24,000	
	Mitchell - North I	2,500	100	50	50	5,000	476
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**14,500**			**290**	**29,000**	**476**
5	Mitchell	10,500	100	50	210	21,000	
	Mitchell - North I	0	100	50	0	0	496
	Sulphurets	0	100	50	0	0	0
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**10,500**			**210**	**21,000**	**496**
06 - 10	Mitchell	46,000	100	50	920	92,000	
	Mitchell - North I	2,200	100	50	44	4,400	1,113
	Sulphurets	33,350	100	50	667	66,700	667
	Kerr	0	100	50	0	0	0
	Iron Cap	0	100	50	0	0	0
	TOTAL	**81,550**			**1,631**	**163,100**	**1,780**
11 - 20	Mitchell	147,800	150	50	2,956	443,400	
	Mitchell - North I	0	300	50	0	0	3,067
	Sulphurets	20,400	100	50	408	40,800	742
	Kerr	23,850	100	50	477	47,700	477
	Iron Cap	0	100	50	0	0	0
	TOTAL	**192,050**			**3,841**	**531,900**	**4,286**
21 - 30	Mitchell	88,800	150	50	1,776	266,400	
	Mitchell - North I	20,100	300	50	402	120,600	2,945
	Sulphurets	0	100	50	0	0	742
	Kerr	25,100	100	50	502	50,200	979
	Iron Cap	0	100	50	0	0	0
	TOTAL	**134,000**			**2,680**	**437,200**	**4,665**
31 - 40	Mitchell	55,700	150	50	1,114	167,100	
	Mitchell - North I	18,900	300	50	378	113,400	2,228
	Sulphurets	0	100	50	0	0	742
	Kerr	0	100	50	0	0	979
	Iron Cap	30,000	150	50	600	90,000	600
	TOTAL	**104,600**			**2,092**	**370,500**	**4,549**
41 - LOM	Mitchell	0	150	50	0	0	
	Mitchell - North I	0	300	50	0	0	2,228
	Sulphurets	0	100	50	0	0	742
	Kerr	0	100	50	0	0	979
	Iron Cap	22,300	150	50	446	66,900	1,046
	TOTAL	**22,300**			**446**	**66,900**	**4,995**
Life of Mine Total		**616,400**			**12,328**	**1,733,400**	
Mitchell Total		**461,400**			**9,228**	**1,371,100**	
Kerr Total		**48,950**			**979**	**97,900**	
Sulphurets Total		**53,750**			**1,075**	**107,500**	
Iron Cap Total		**52,300**			**1,046**	**156,900**	

Notes

1. See Appendix F2 schematic for approximate horizontal drain dimensions and materials.

2. Number of drains drilled for each pit phase is based on bench length excavated and assumed drain spacing. Drains will be mined out as necessary for the pit to expand to the next phase.

3. The number of drains present reflects the numer of drains drilled during the current phase, and drains remaining from previous pit phases. It is only expected that 10 to 30% of the drains present during any given phase will flow.

Table 14. Mitchell Pit North Slope Adit Requirements

Adit:	
Adit East Portal Elevation: [1]	900
Adit West Portal Elevation: [1]	850
Adit distance behind Ultimate Pit (m):	450
Adit Length (m): [1]	3,500
Adit cross-section (m^2):	16
Adit Volume (m^3):	56,000
Drainage Gallery:	
Drain spacing (m):	50
Drain length (m):	300
Assumed number of Fans [2,3] :	3
Total Drain Meterage (m):	63,000

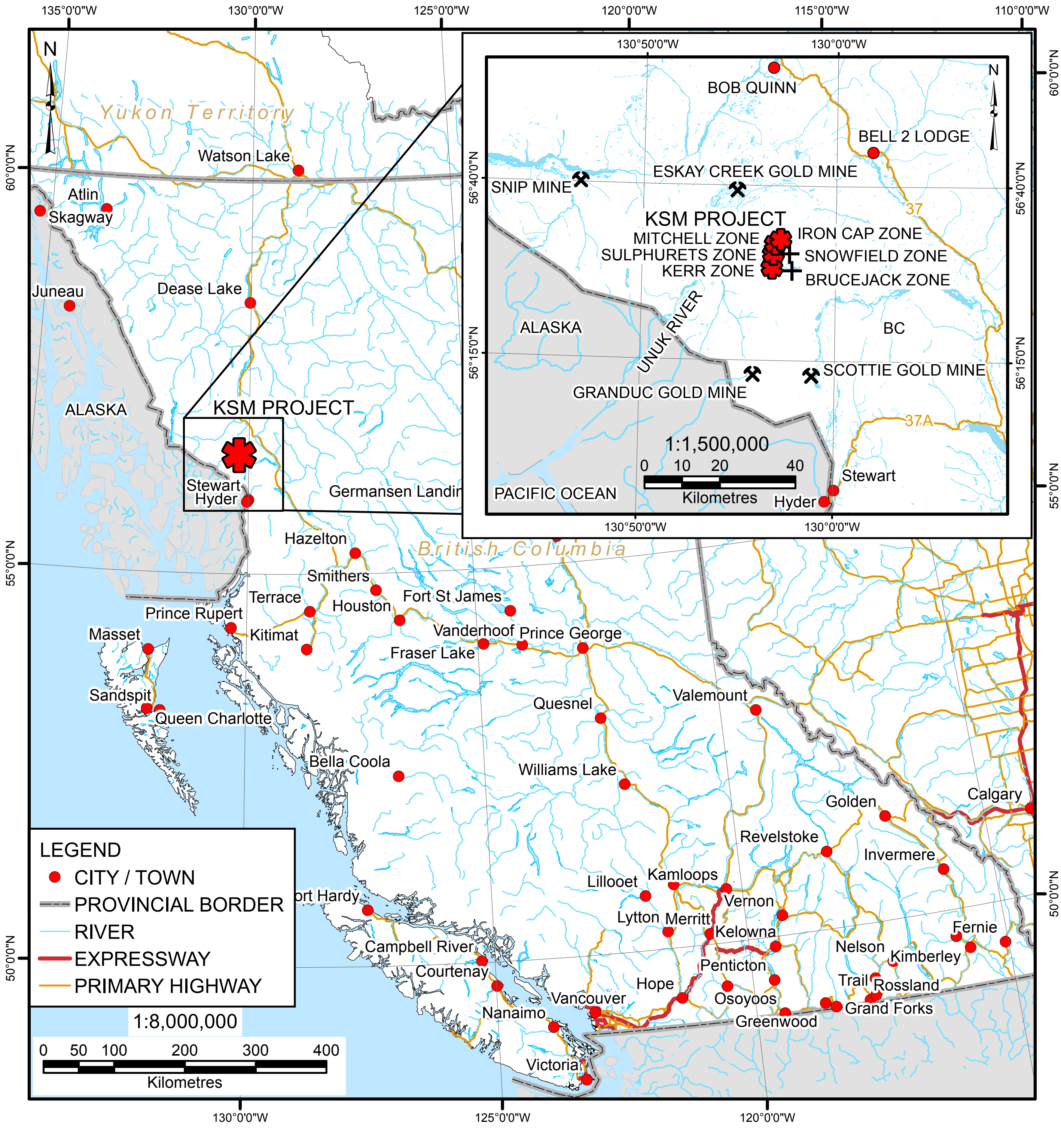
Notes:

1. Portal elevations and adit length are approximate. Portals could be raised or lowered +/- 50 m in elevation.

2. Drains to fan from subhorizontal to vertical (upward from adit). No drains to go deeper than adit to avoid pumping.

3. Assume 4-inch diameter drain hole with 2 inch SCH 80 perforated PVC.

DRAWINGS



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PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
PROJECT LOCATION

CLIENT:
SEABRIDGE GOLD INC.

PROJECT No.:	DWG No.:	REV.:
0638-009	01	A

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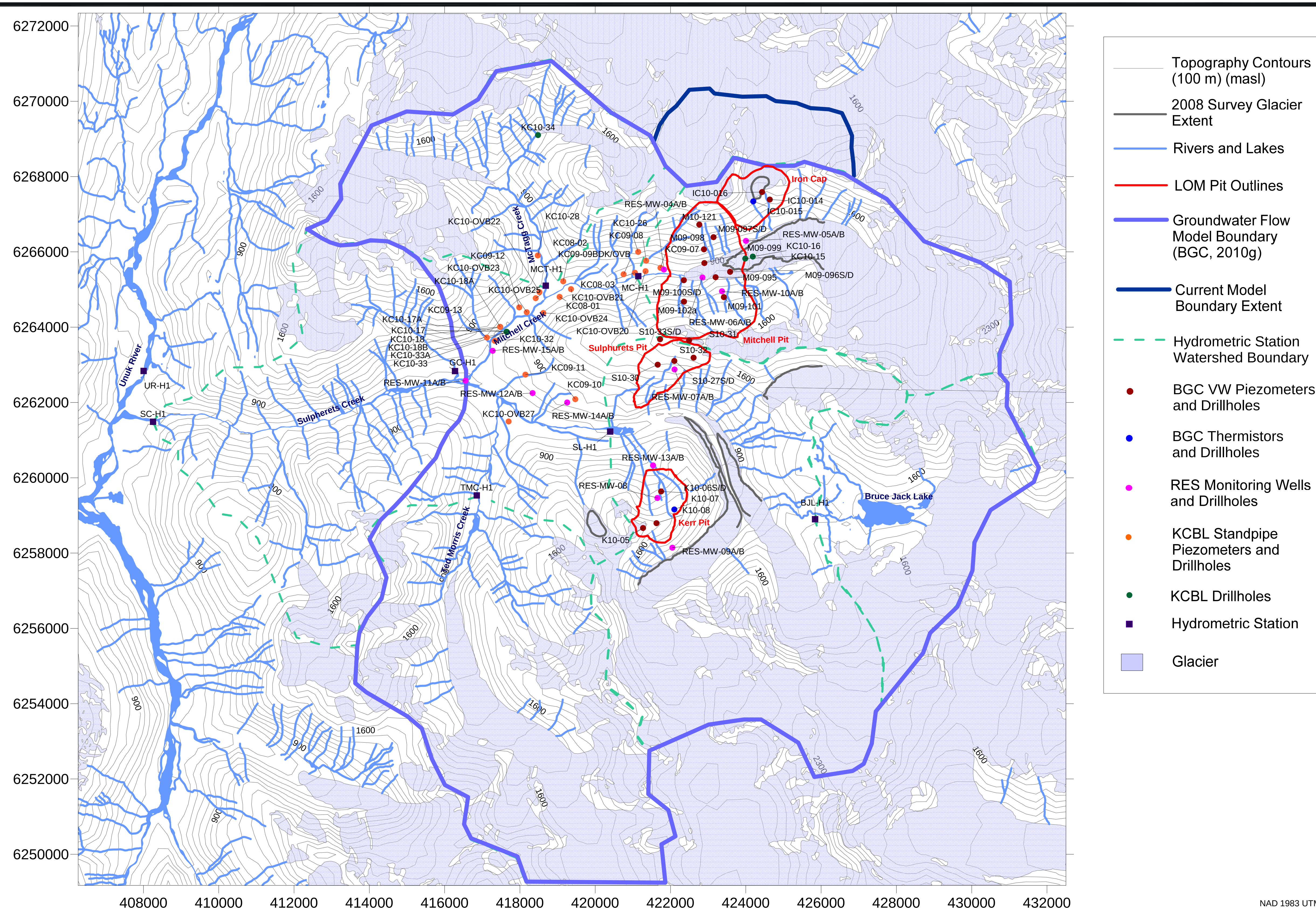

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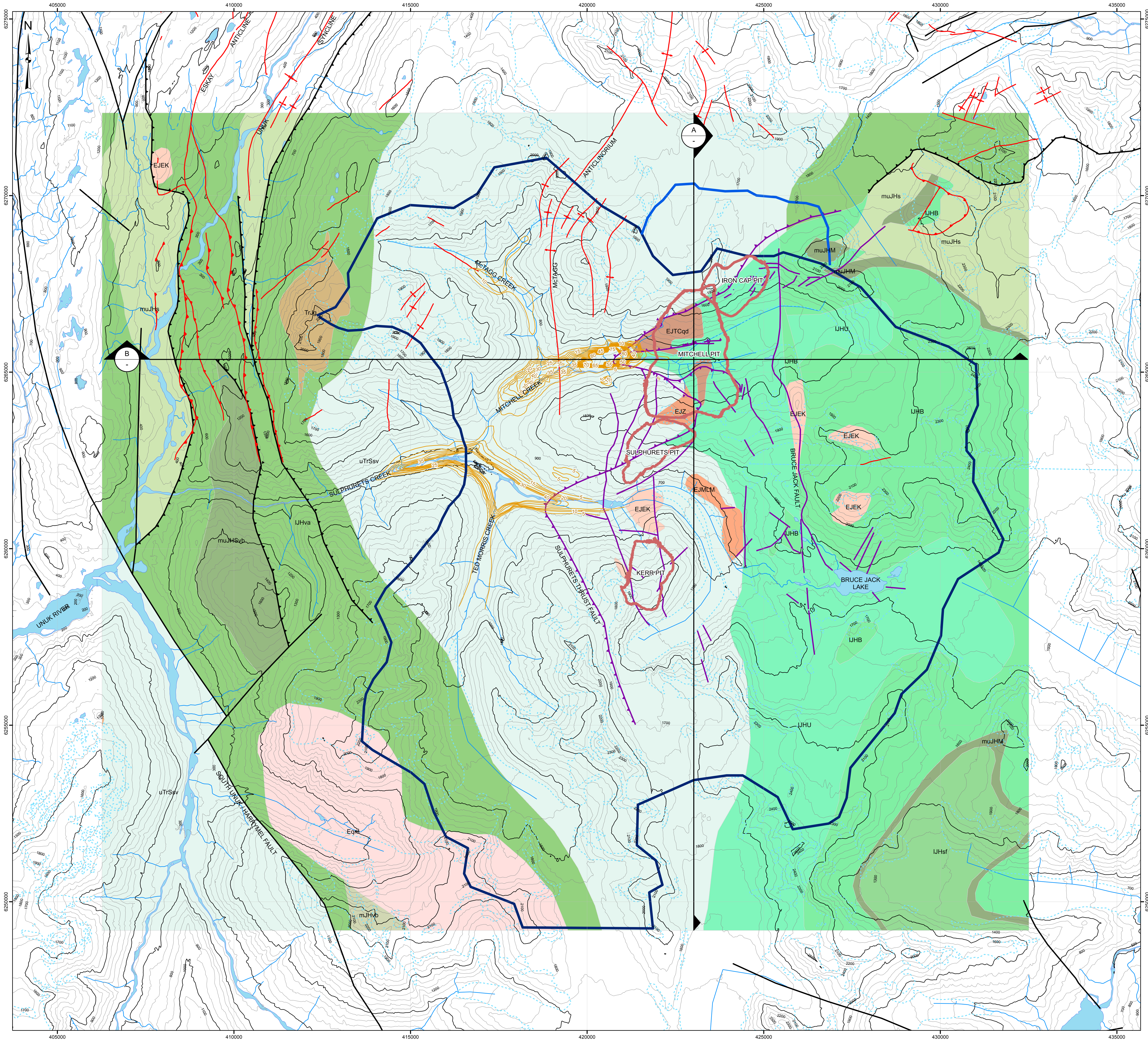
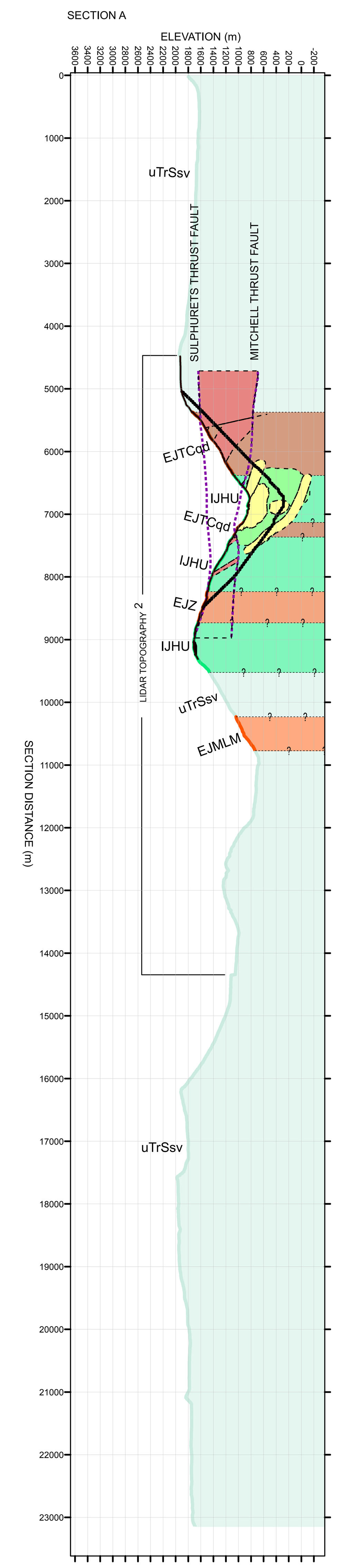




GEOLOGY LEGEND

HAZELTON GROUP

- muJHSvb - MESOZOIC - SALMON RIVER FORMATION BASALTIC VOLCANIC ROCKS
- muJHM - MESOZOIC - MOUNT DILWORTH FORMATION CALC-ALKALINE VOLCANIC ROCKS
- lJHB - MESOZOIC - BETTY CREEK FORMATION VOLCANICLASTIC ROCKS
- lJHU - MESOZOIC - UNUK RIVER FORMATION ANDESITIC VOLCANIC ROCKS
- lJHva - MESOZOIC ANDESITIC VOLCANIC ROCKS
- lJHsf - MESOZOIC MUDSTONE, SILTSTONE, SHALE FINE CLASTIC SEDIMENTARY ROCKS
- muJHvb - MESOZOIC BASALTIC VOLCANIC ROCKS
- muJHs UNDIVIDED SEDIMENTARY ROCKS

STUHINI GROUP

- uTrSsv - MESOZOIC MARINE SEDIMENTARY AND VOLCANIC ROCKS

INTRUSIVE ROCKS

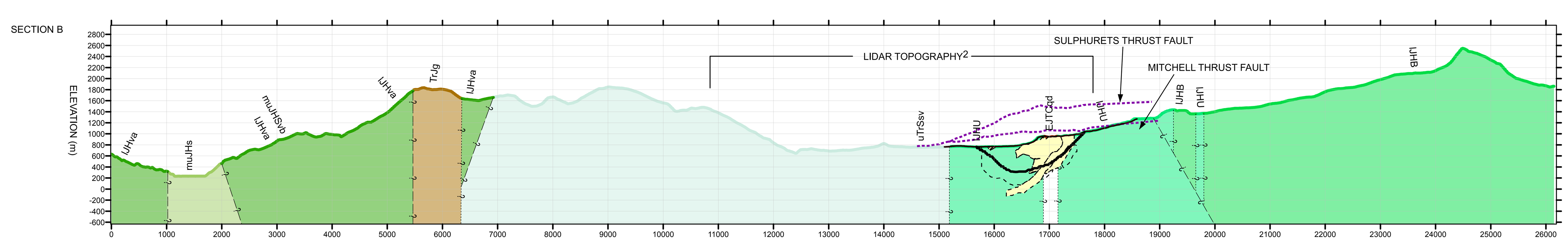
- Eqm - CENOZOIC - COAST PLUTONIC COMPLEX (?) QUARTZ MONZONITIC INTRUSIVE ROCKS
- EJEK - MESOZOIC ESKAY PORPHYRY, KNIPPLE PORPHYRY OR INEL STOCK FELDSPAR PORPHYRITIC INTRUSIVE ROCKS
- EJMLM - MESOZOIC - MELVILLE AND LEHTO PLUTONS, MITCHELL INTRUSIONS, RED BLUFF PORPHYRY STOCK MONZODIORITIC TO GABBROIC INTRUSIVE ROCKS
- EJZ - MESOZOIC - ZIPPA MOUNTAIN PLUTONIC COMPLEX DIORITIC INTRUSIVE ROCKS
- EJTCqd - MESOZOIC - TEXAS CREEK PLUTONIC SUITE QUARTZ DIORITIC INTRUSIVE ROCKS
- TrJg - MESOZOIC UNNAMED INSTRUSIVE ROCKS, UNDIVIDED
- LTrSMK - MESOZOIC - STIKINE, McQUILAN OR KATETE MOUNTAIN PLUTONIC SUITES DIORITIC INTRUSIVE ROCKS

ALTERATION

- QSP ALTERATION
- CHLORITIC / PROPYLITIC ALTERATION
- MONZONITE INTRUSIVE

LEGEND

- SECTION LINE
- 20110318 SERIES 5 PIT CRESTS (SECTION)
- 20110318 SERIES 5 PIT CRESTS (PLAN)
- CURRENT MODEL BOUNDARY EXTENT
- 2010 GROUNDWATER MODEL AREA
- OVERBURDEN THICKNESS ISOPACH
- FAULT / FOLD STRUCTURES (MRDU)
- NORMAL FAULT (SEABRIDGE)
- THRUST FAULT (SEABRIDGE)
- THRUST FAULT - INTERPRETED (SEABRIDGE)
- THRUST FAULT - INFERRED (SEABRIDGE)
- NORMAL FAULT (BCGS)
- THRUST (BCGS)
- FAULT (BCGS)
- PERMANENT SNOW / ICE
- 500m ELEVATION CONTOUR
- 100m ELEVATION CONTOUR
- FAULT - INFERRED (BGC)
- CONTACT - INFERRED (BGC)



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Kilometers

NOTES:
1. GEOLOGICAL BOUNDARIES ACQUIRED FROM BRITISH COLUMBIA GEOLOGICAL SURVEY GEOFILE GF2005-9.
2. TOPOGRAPHIC INFORMATION OUTSIDE LIDAR BOUNDARIES BASED ON GEOBASE DATA, NATURAL RESOURCES CANADA.
3. ALTERATION DEFINED ONLY IN MITCHELL PIT AREA, BASED ON SEABRIDGE GOLD INC. INTERPRETATIONS.
4. OPEN PIT CRESTS WERE PROVIDED BY MMTS MARCH 2011.
5. OVERBURDEN THICKNESS CONTOURS BASED ON MINESITE_STRUCTURAL_GEOLOGY.pdf PROVIDED BY KCBL 12/18/2009.

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PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT PIT DEPRESSURIZATION ANALYSES

TITLE: SITE GEOLOGY AND CROSS-SECTIONS

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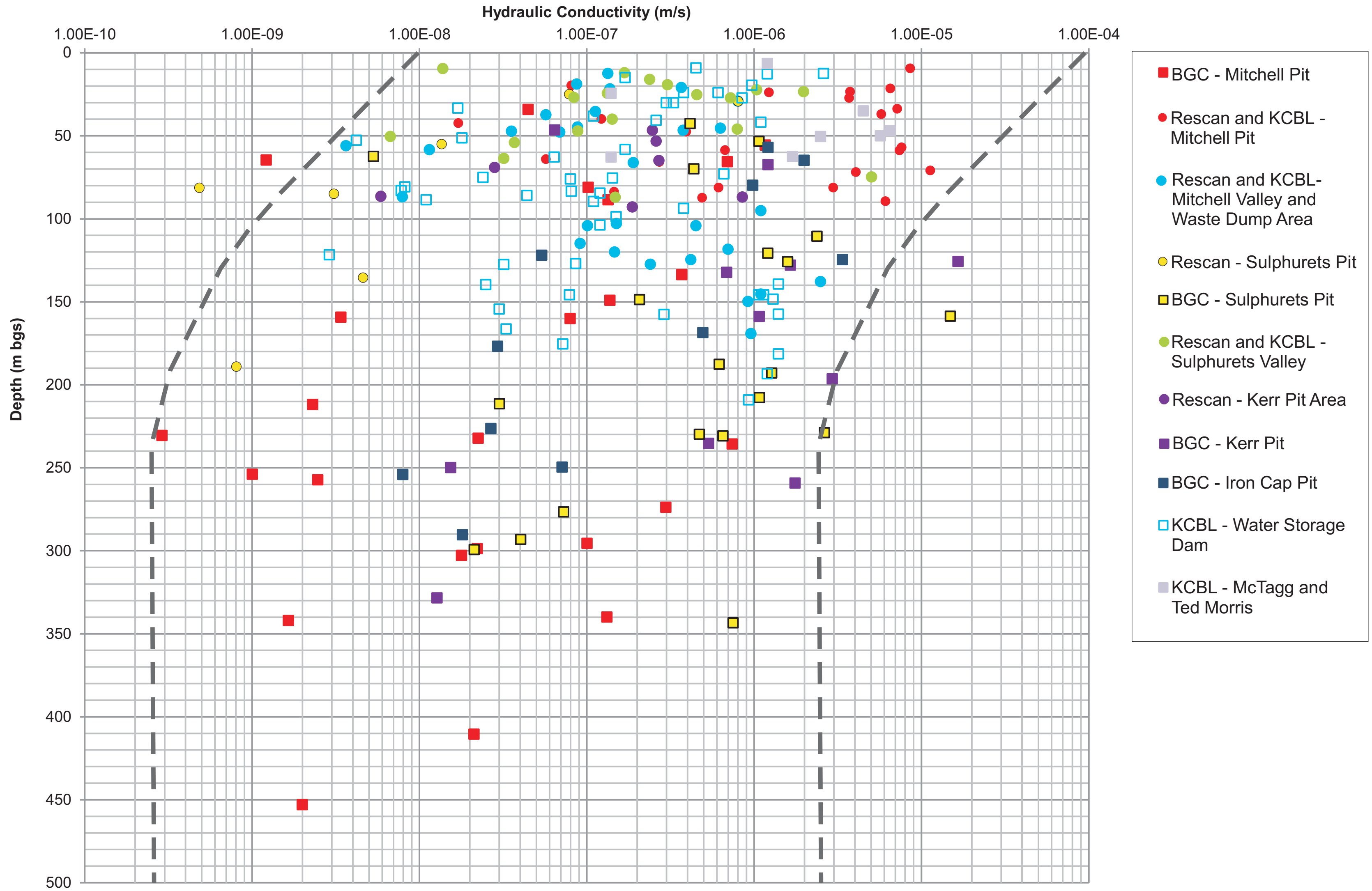

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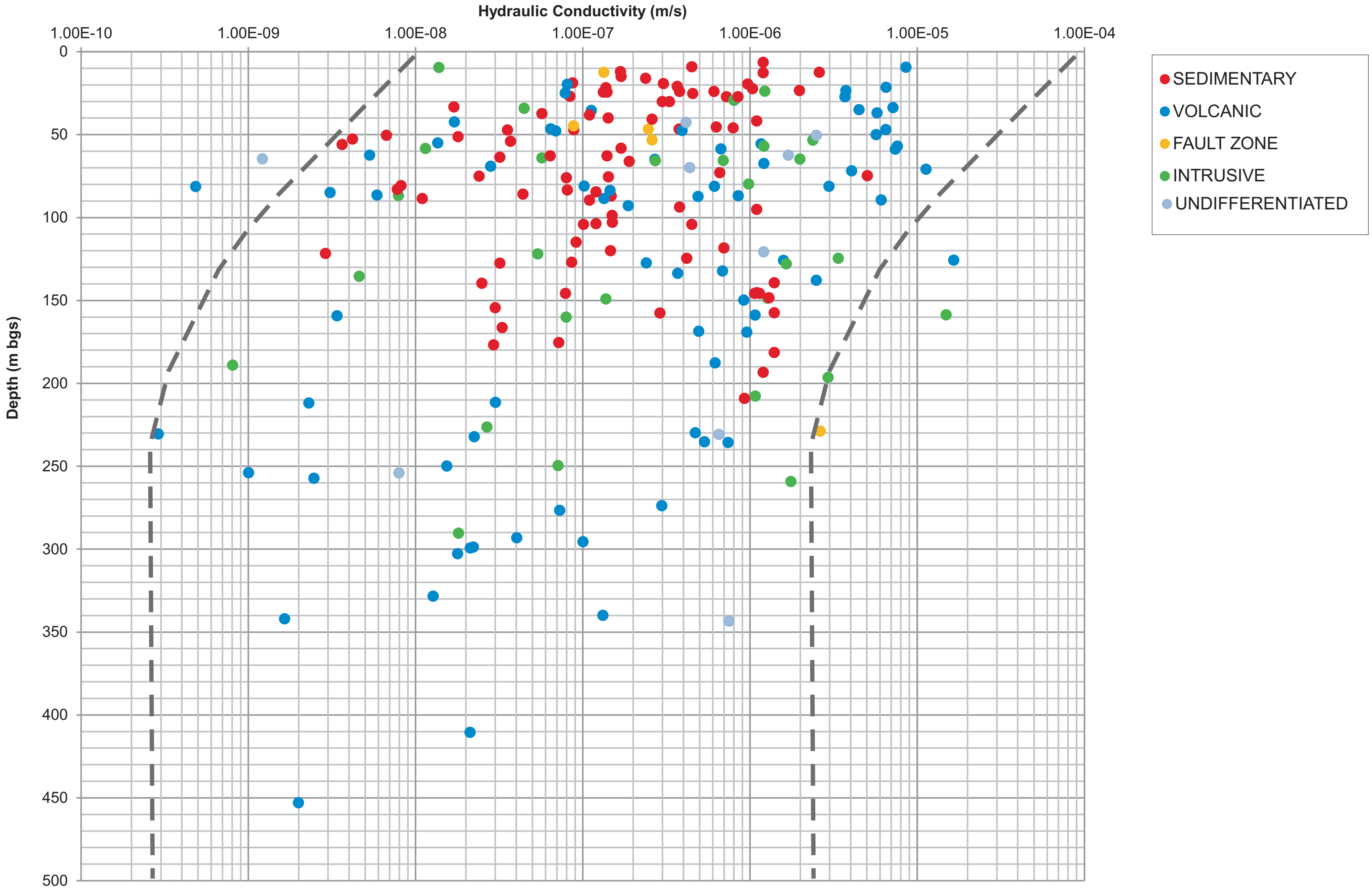

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CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: HYDROGEOLOGIC TEST RESULTS BY LITHOLOGY

PROJECT No.:	DWG No.:	REV.:
0638-009	5	0

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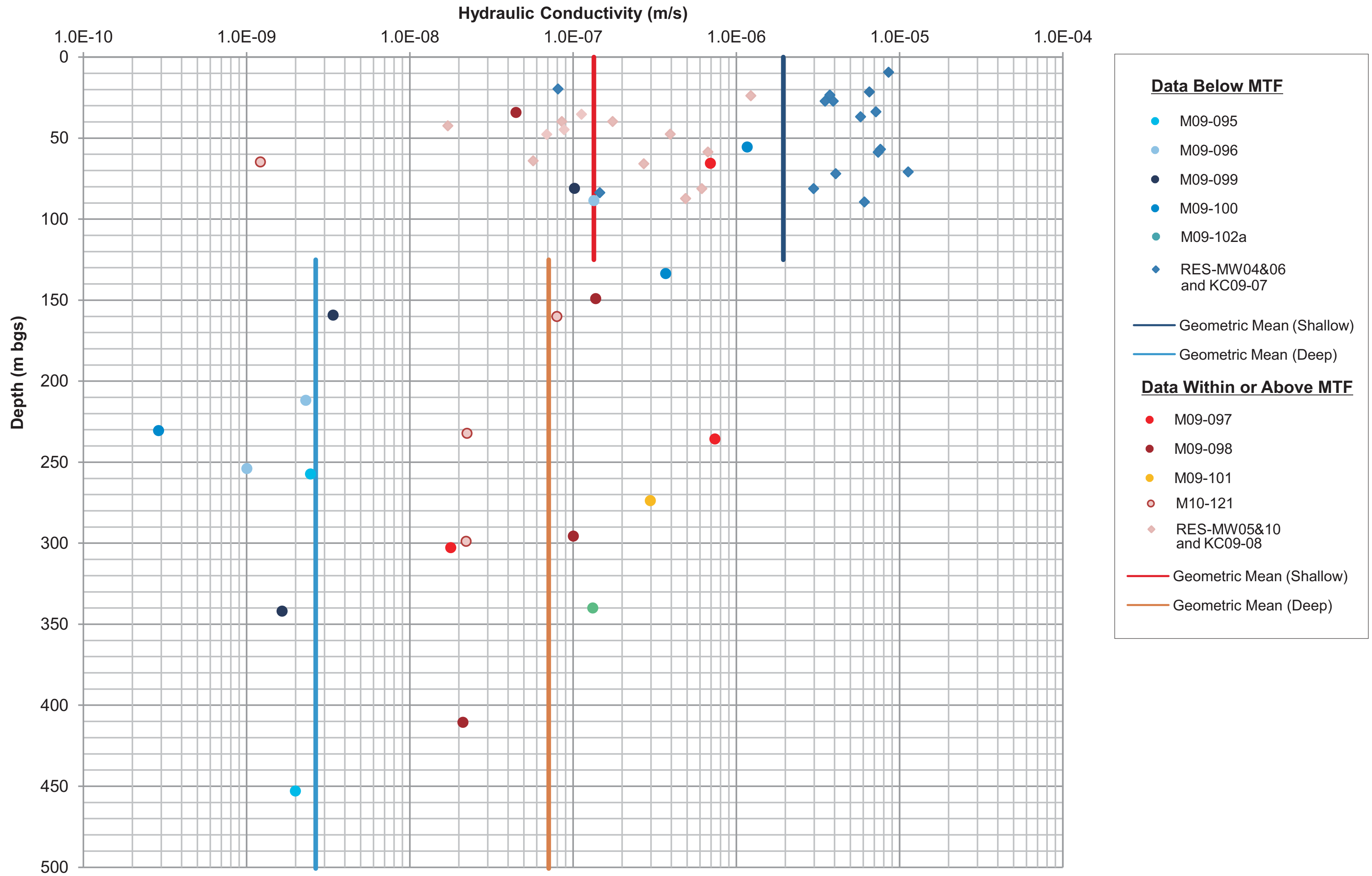

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DATE:	JUNE 2011	CHECKED:	RT
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AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
MITCHELL PIT HYDRAULIC CONDUCTIVITY DATA VS. DEPTH

PROJECT No.:	DWG No.:	REV.:
0638-009	6	0

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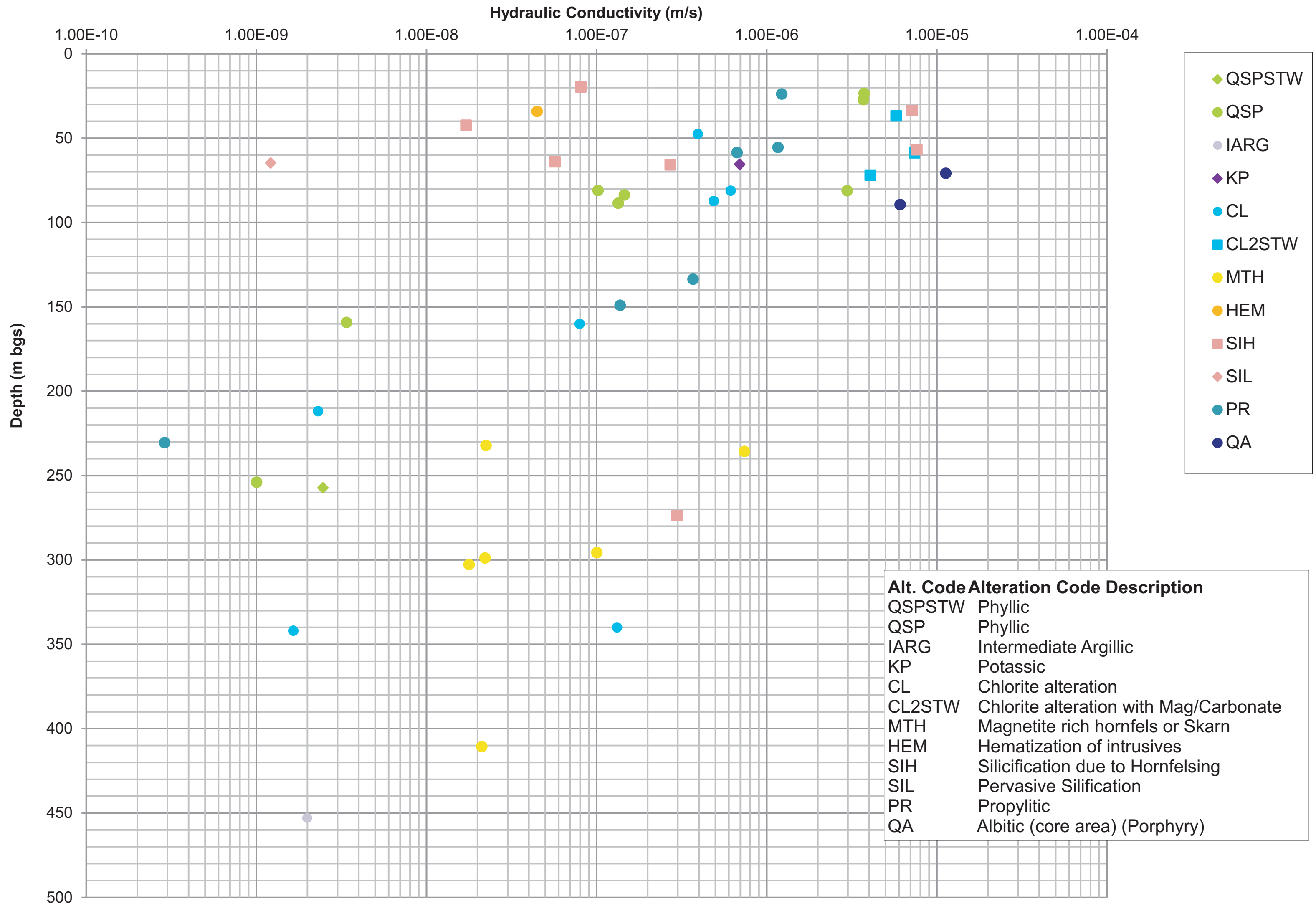

Alt. Code	Alteration Code Description
QSPSTW	Phyllic
QSP	Phyllic
IARG	Intermediate Argillic
KP	Potassic
CL	Chlorite alteration
CL2STW	Chlorite alteration with Mag/Carbonate
MTH	Magnetite rich hornfels or Skarn
HEM	Hematization of intrusives
SIH	Silicification due to Hornfelsing
SIL	Pervasive Silification
PR	Propylitic
QA	Albitic (core area) (Porphyry)

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
MITCHELL PIT HYDRAULIC CONDUCTIVITY DATA
VS. DEPTH GROUPED BY ALTERATION TYPE

PROJECT No.:	DWG No.:	REV.:
0638-009	7	0

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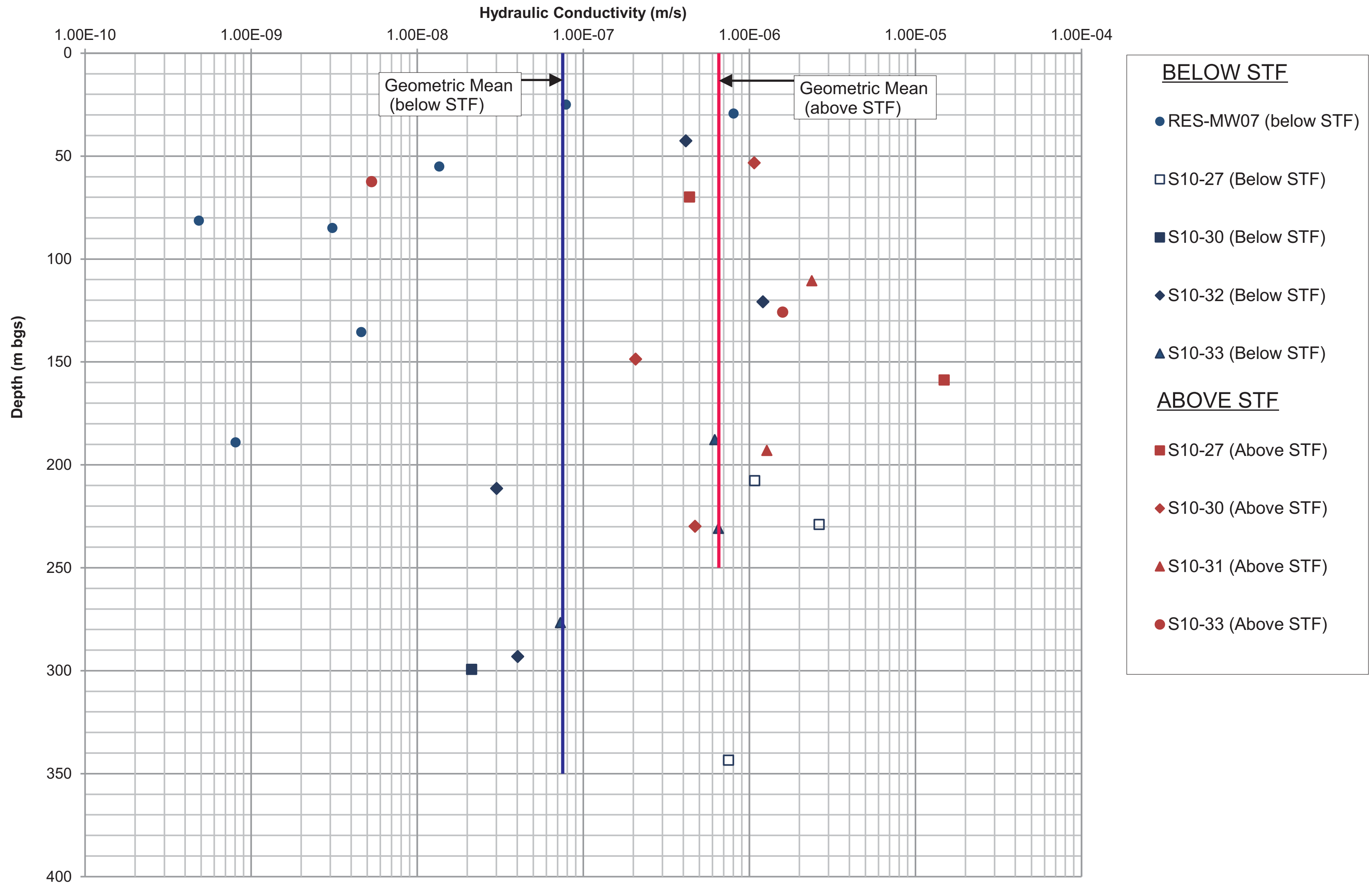

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DATE: JUNE 2011	CHECKED: RT
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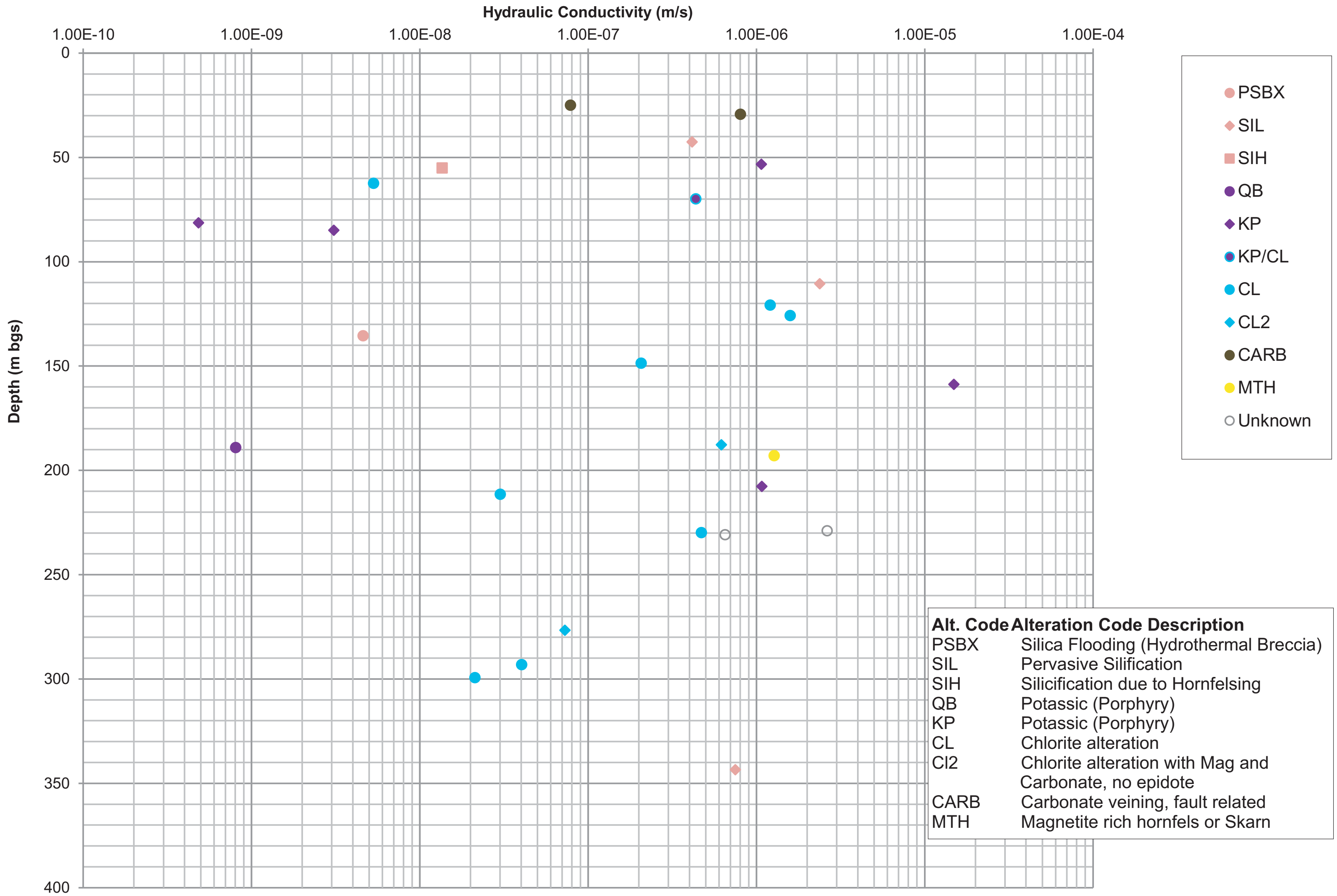
CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SULPHURETS PIT HYDRAULIC CONDUCTIVITY DATA VS. DEPTH

PROJECT No.:	DWG No.:	REV.:
0638-009	8	0



Alt. Code	Alteration Code Description
PSBX	Silica Flooding (Hydrothermal Breccia)
SIL	Pervasive Silification
SIH	Silicification due to Hornfelsing
QB	Potassic (Porphyry)
KP	Potassic (Porphyry)
CL	Chlorite alteration
Cl2	Chlorite alteration with Mag and Carbonate, no epidote
CARB	Carbonate veining, fault related
MTH	Magnetite rich hornfels or Skarn

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SULPHURETS PIT HYDRAULIC CONDUCTIVITY
DATA VS. DEPTH GROUPED BY ALTERATION TYPE

PROJECT No.:	DWG No.:	REV.:
0638-009	9	0

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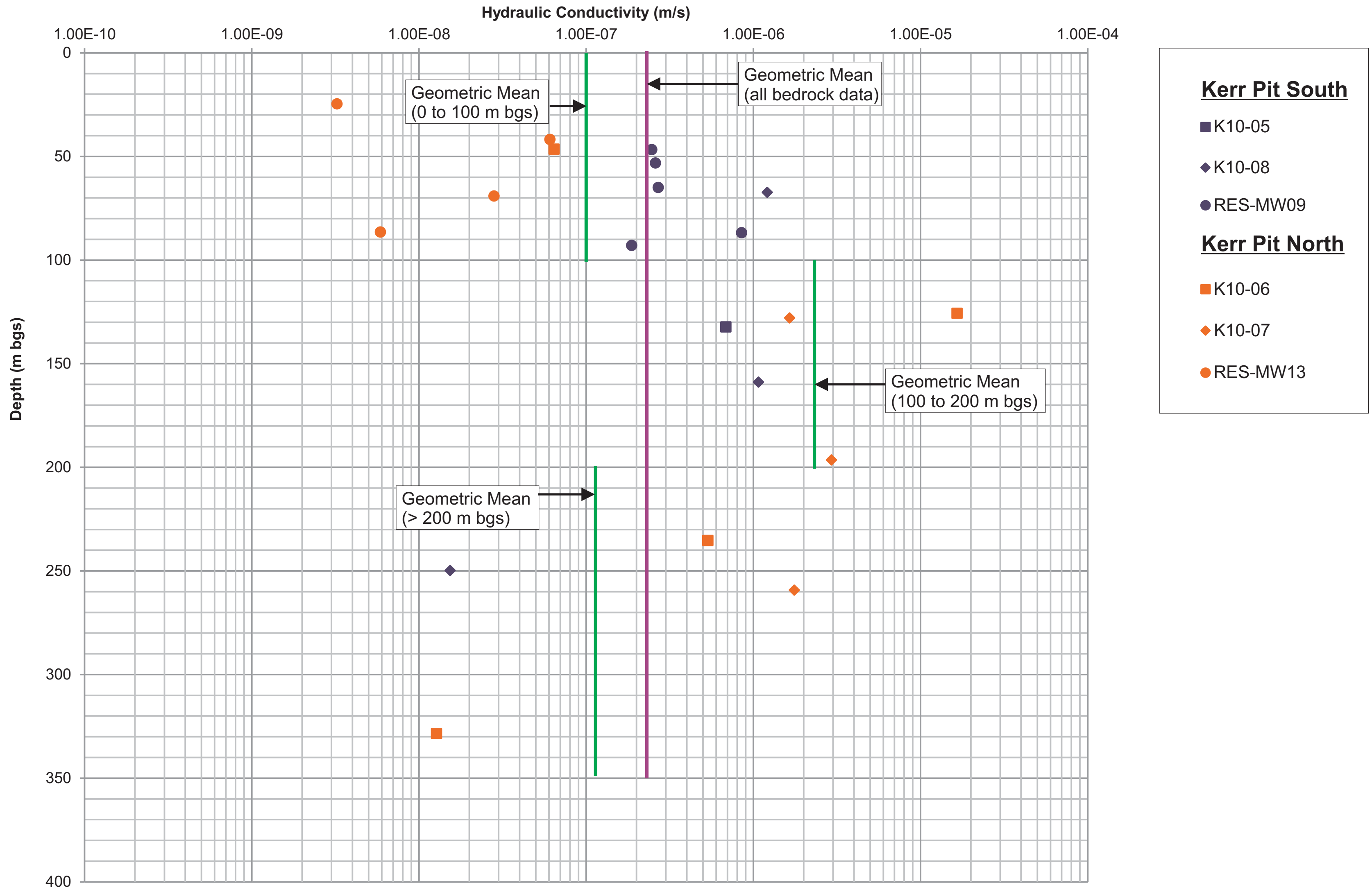

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
KERR PIT HYDRAULIC CONDUCTIVITY
DATA VS. DEPTH

PROJECT No.:	DWG No.:	REV.:
0638-009	10	0

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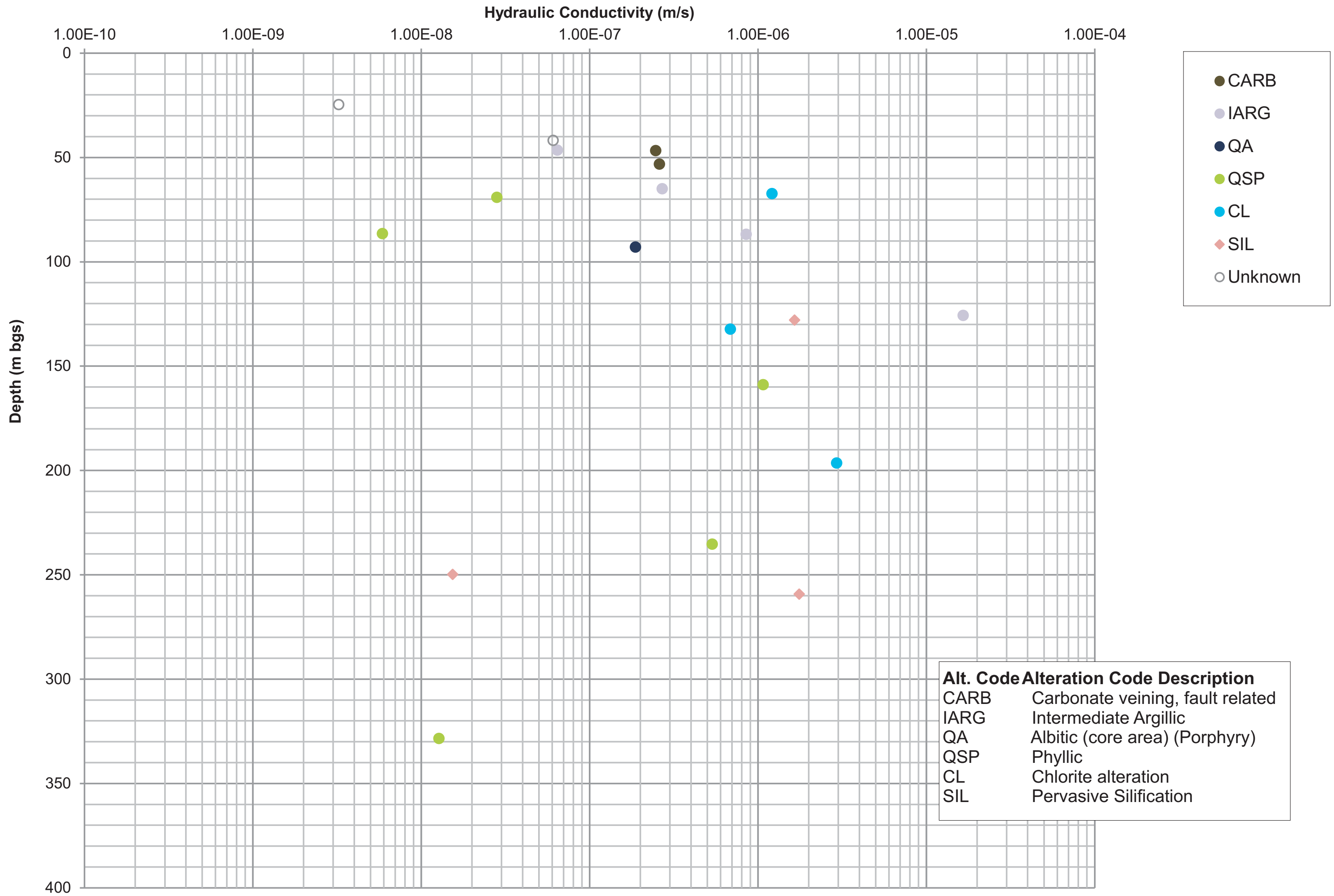

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DATE: JUNE 2011	CHECKED: RT		TITLE: KERR PIT HYDRAULIC CONDUCTIVITY DATA VS. DEPTH GROUPED BY ALTERATION TYPE
DRAWN: RT	APPROVED: TC	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009 / DWG No.: 11 / REV.: 0

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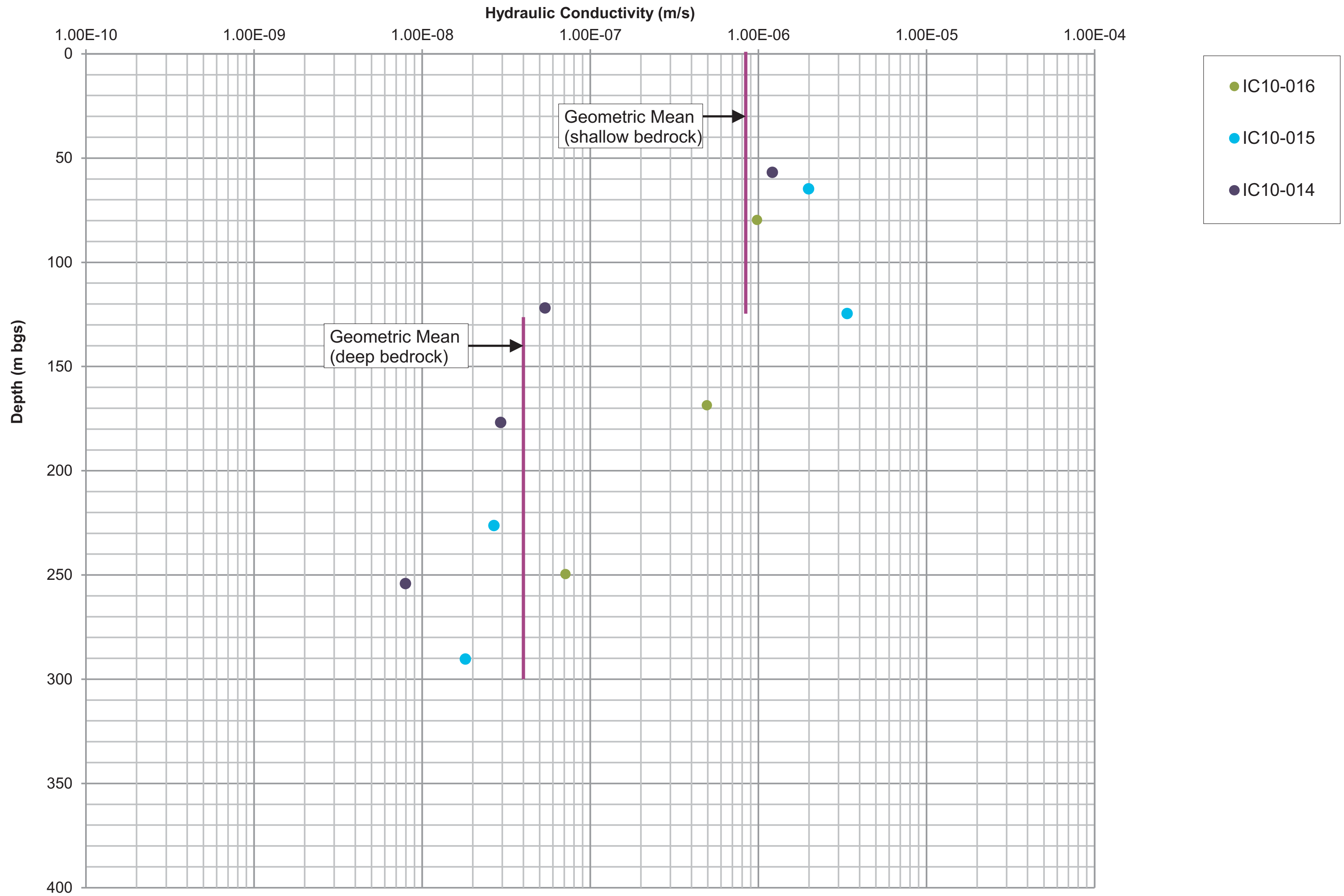

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
IRON CAP PIT HYDRAULIC CONDUCTIVITY
DATA VS. DEPTH

PROJECT No.:	DWG No.:	REV.:
0638-009	12	0

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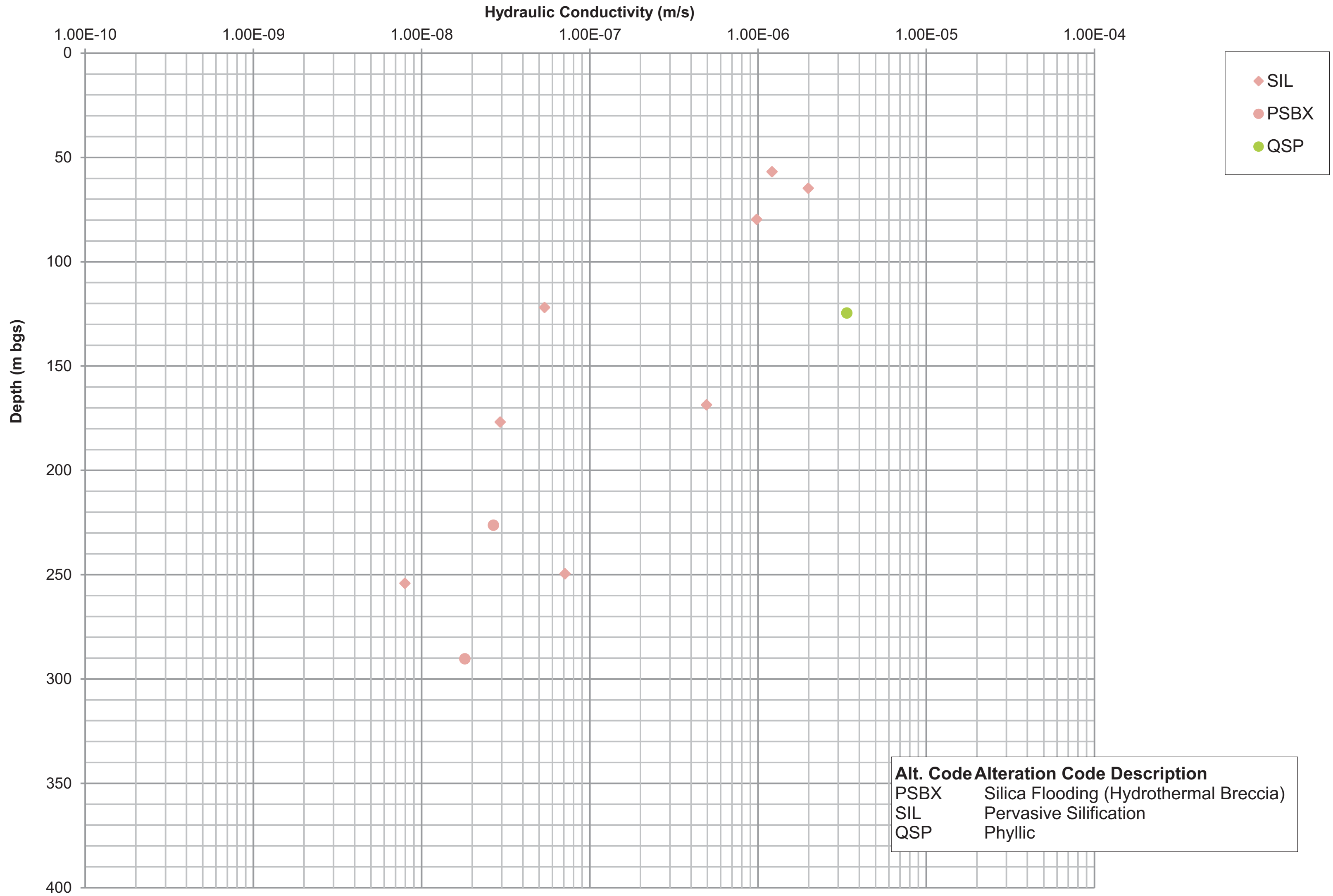

Alt. Code	Alteration Code Description
PSBX	Silica Flooding (Hydrothermal Breccia)
SIL	Pervasive Silification
QSP	Phyllic

SCALE:	NTS	DESIGNED:	RT
DATE:	JUNE 2011	CHECKED:	RT
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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
IRON CAP PIT HYDRAULIC CONDUCTIVITY
DATA VS. DEPTH GROUPED BY ALTERATION TYPE

PROJECT No.:	DWG No.:	REV.:
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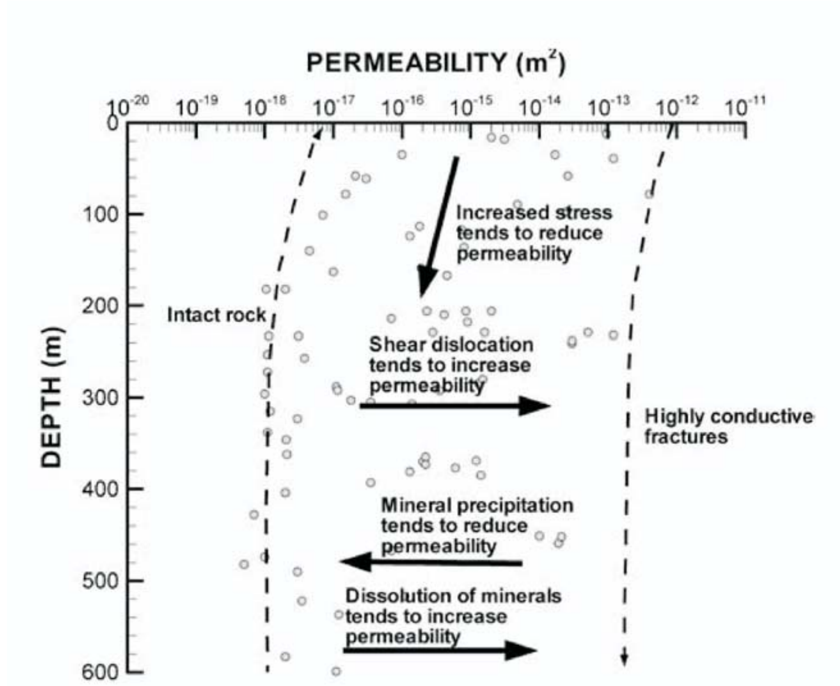

From Rutqvist and Stephansson, 2003.

Figure 11. Permeability measured in short-interval well tests in fractured crystalline rocks in Gidea, Sweden (data points from Wladis et al., 1997). Effects of shear dislocation and mineral precipitation/dissolution processes obscure the dependency of permeability on depth (stress). The permeability values on the left-hand side represent intact rock granite (or flow feature 5 in Figure 7 of paper), whereas the permeability values on the right-hand side represent highly conductive fractures (possibly flow feature 1 in Figure 7 from paper).

Wladis D, Jonnson P, Wallroth T (1997). Regional characterization of hydraulic properties of rock using well test data.Swedish Nuclear Fuel Waste Management Co (SKB) Tech Rep 97-29.

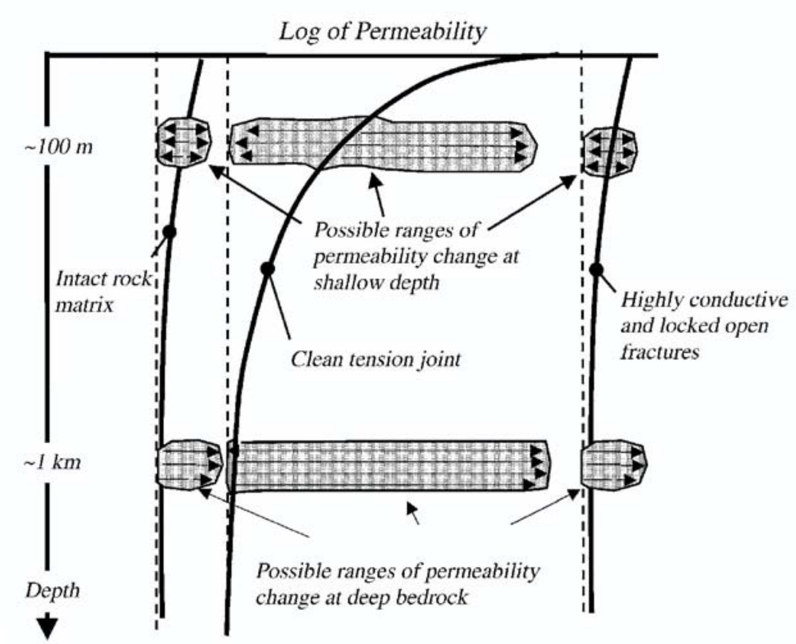

Figure 23. Schematic representation of possible permeability changes at shallow and deep locations in fractured bedrock. The *solid lines* represent the depth- (or stress-) permeability function for intact rock, clean tension joint and highly conductive and locked-open fractures.

SCALE: NTS	DESIGNED: RT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES
DATE: JUNE 2011	CHECKED: RT		TITLE: PERMEABILITY VS. DEPTH FIGURES FROM RUTQVIST AND STEPHANSSON (2003)
DRAWN: RT	APPROVED: TC	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009 DWG No.: 14 REV.: 0

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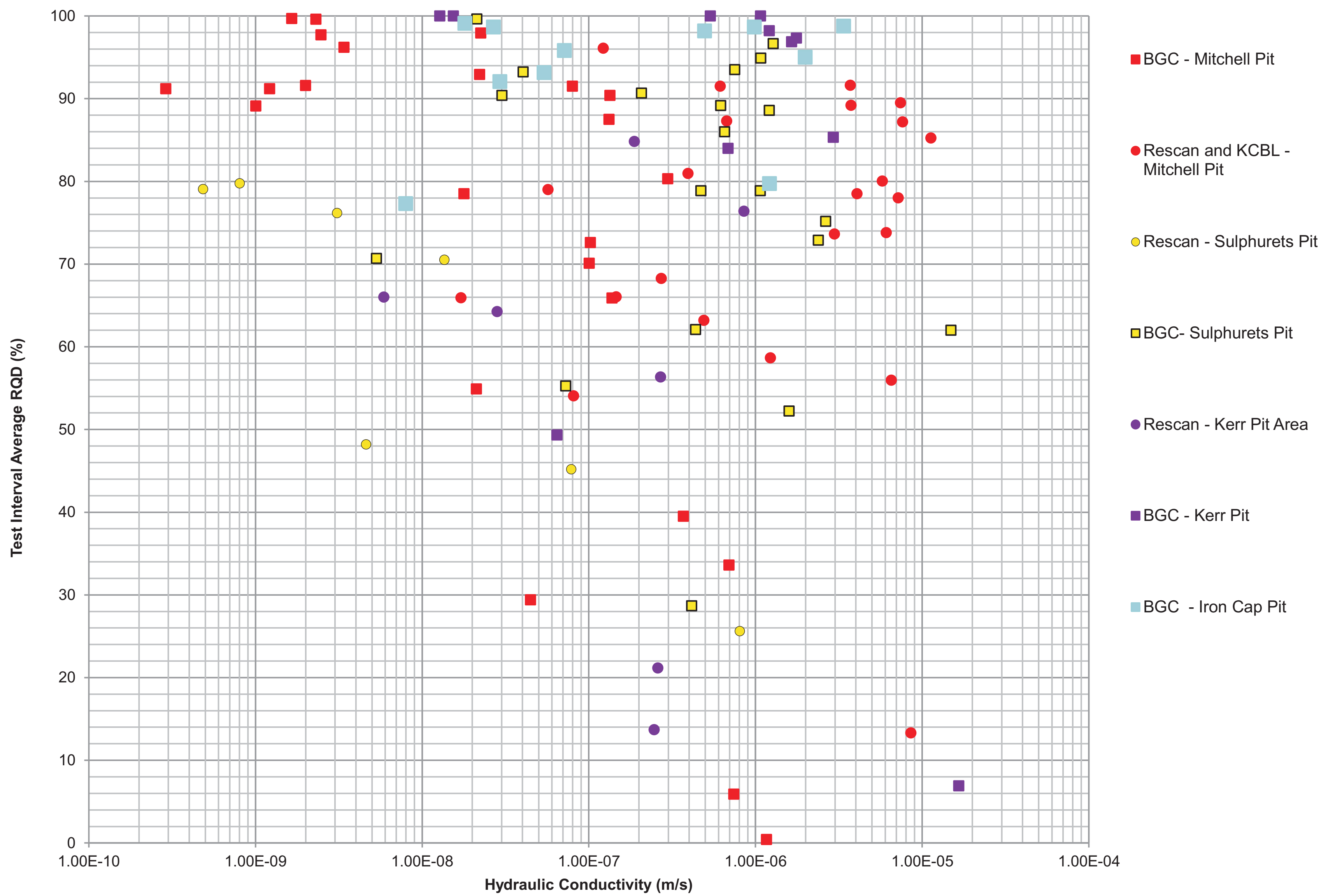

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CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: HYDROGEOLOGIC TEST DATA VS. RQD
BY PIT AREA

PROJECT No.:	DWG No.:	REV.:
0638-009	15	0

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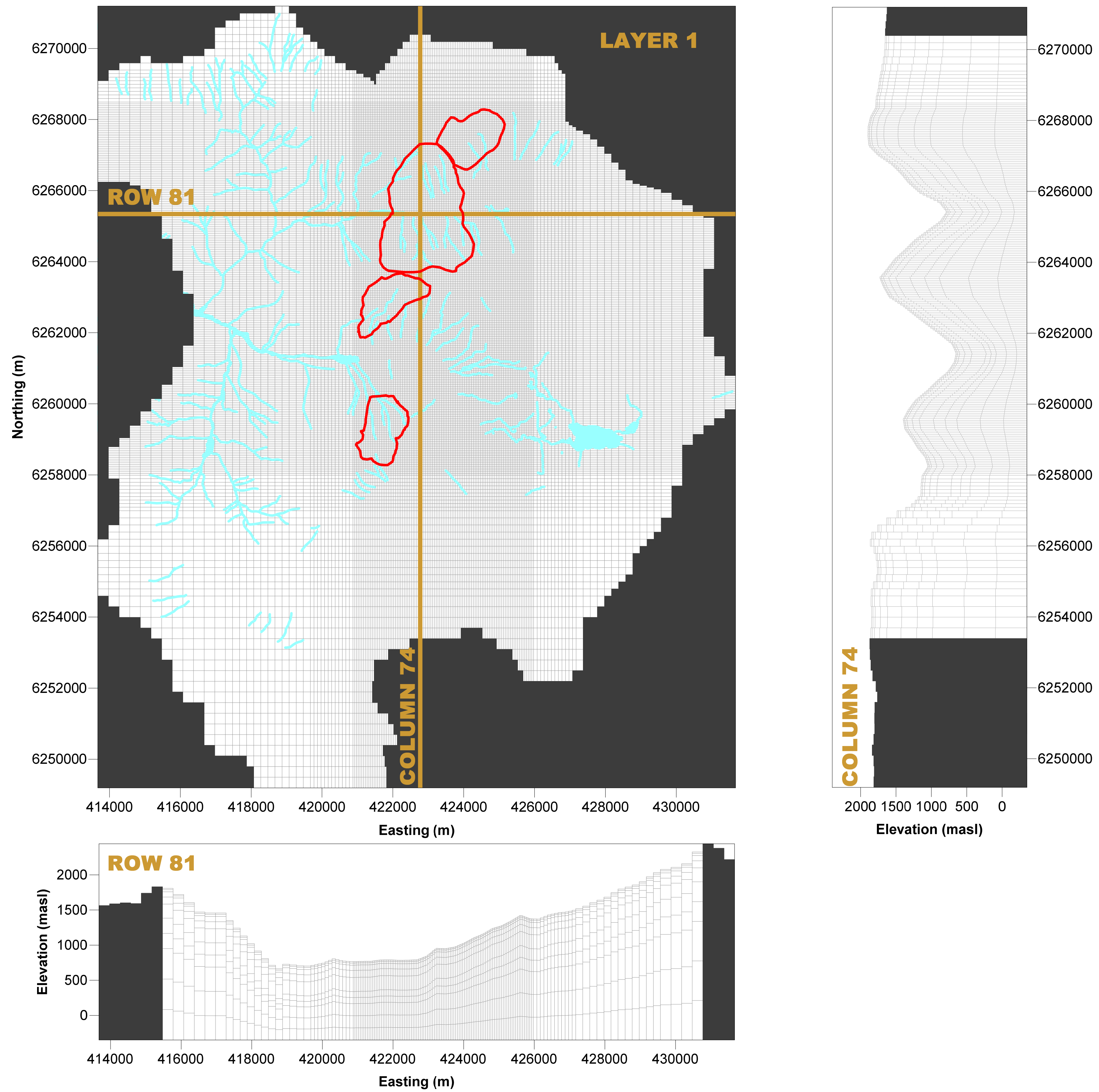

OPEN PITS	red line
HYDROLOGY	cyan
INACTIVE CELLS	dark grey
GRID CELL OUTLINE	grey line

NOTES:

1. CROSS-SECTION VERTICAL EXAGGERATION 2X.
2. MODEL CONSISTS OF 268 ROWS, 169 COLUMNS, AND 10 LAYERS.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	JUNE 2011
DRAWN:	RT
DESIGNED:	RT
CHECKED:	RT
APPROVED:	TC

PROFESSIONAL SEAL:

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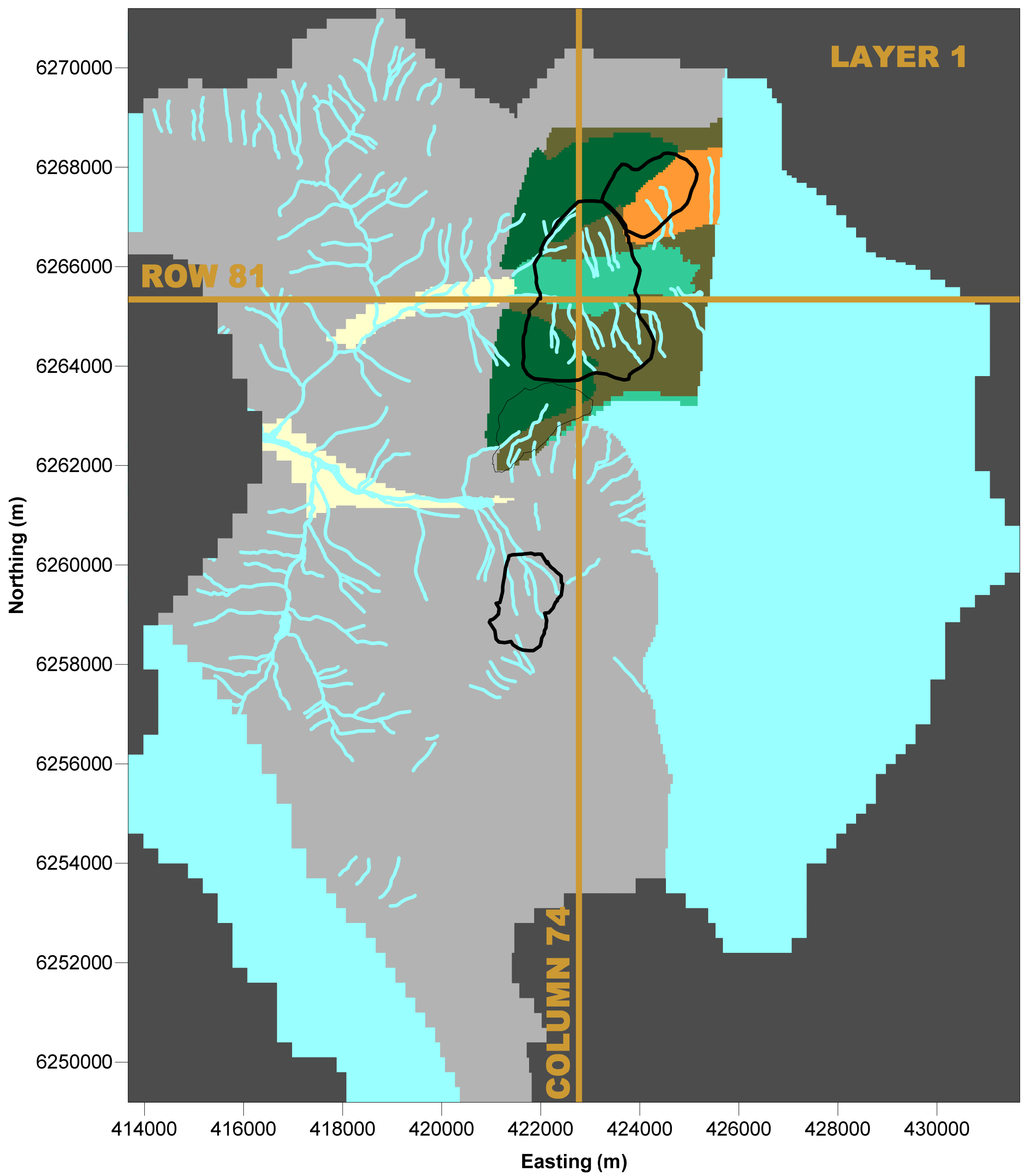
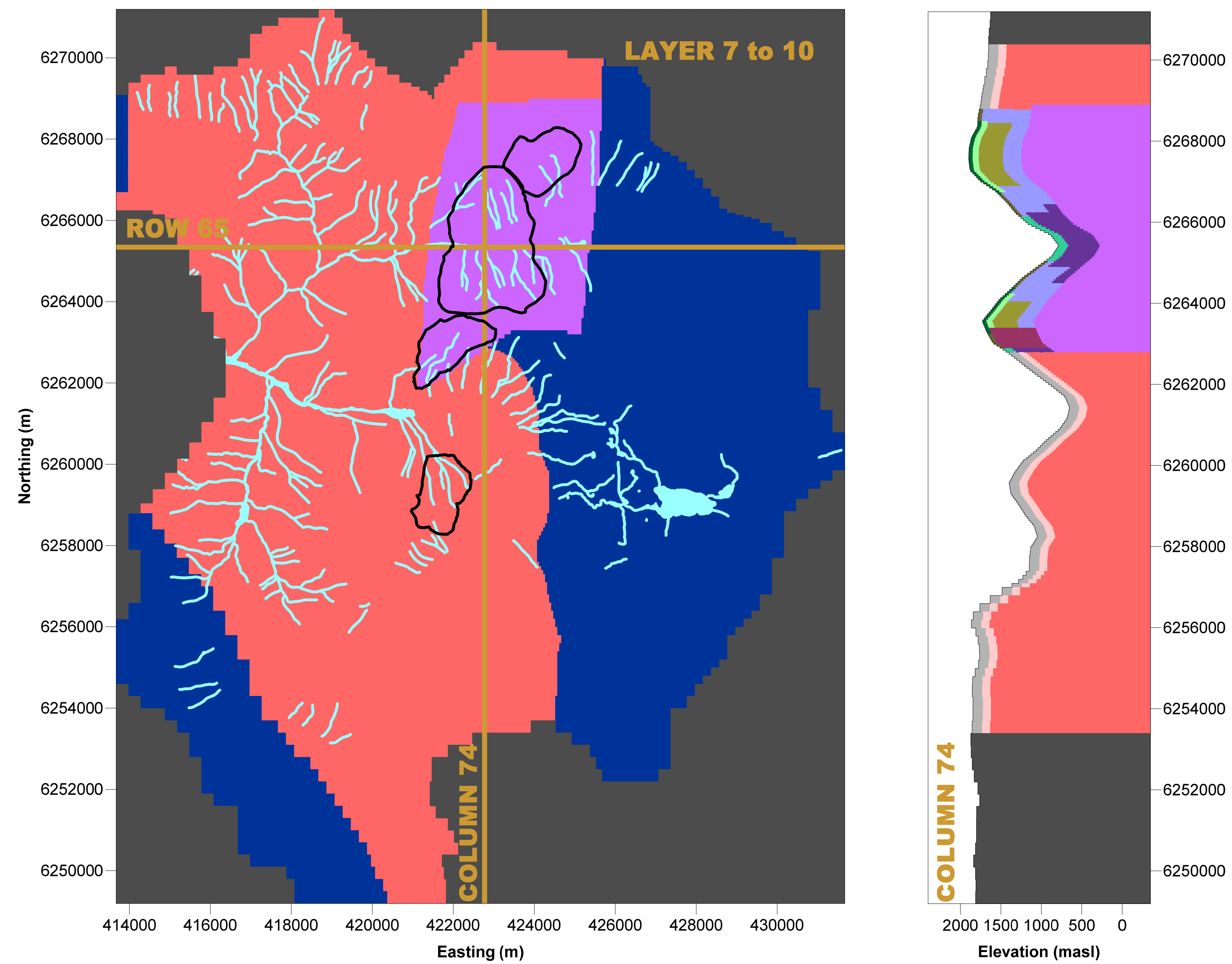
CLIENT: SEABRIDGE GOLD INC.

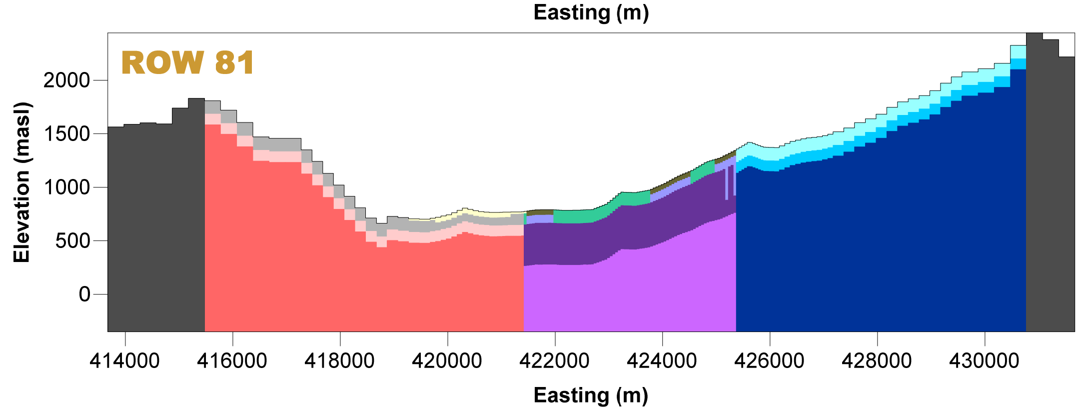
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MODEL GRID

PROJECT No.:	DWG No.:	REV.:
0638-009	16	0







OPEN PITS	(black line)
HYDROLOGY	(light blue)
INACTIVE CELLS	(grey)

NOTES:

1. CROSS-SECTION VERTICAL EXAGGERATION 2X.

HYDRAULIC CONDUCTIVITY ZONE

- Till Deposits
- Shallow Stuhini Bedrock
- Stuhini Bedrock
- Stuhini Bedrock
- Shallow Hazelton Bedrock
- Hazelton Bedrock
- Hazelton Bedrock
- Shallow Bedrock below STF and Above MTF
- Bedrock above MTF and below STF
- Bedrock below MTF - Valley Bottom
- Bedrock below MTF
- Bedrock below MTF
- Shallow Bedrock above STF
- Bedrock above STF
- Bedrock above STF
- Sulphurets Area - STF foot wall
- Shallow Bedrock in Iron Cap Area
- Bedrock in Iron Cap Area

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

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DATE:	JUNE 2011
DRAWN:	RT
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CHECKED:	RT
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PROFESSIONAL SEAL:

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CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MODEL HYDRAULIC CONDUCTIVITY LAYERS 1 AND 7 TO 10

PROJECT No.:	DWG No.:	REV.:
0638-009	17	0

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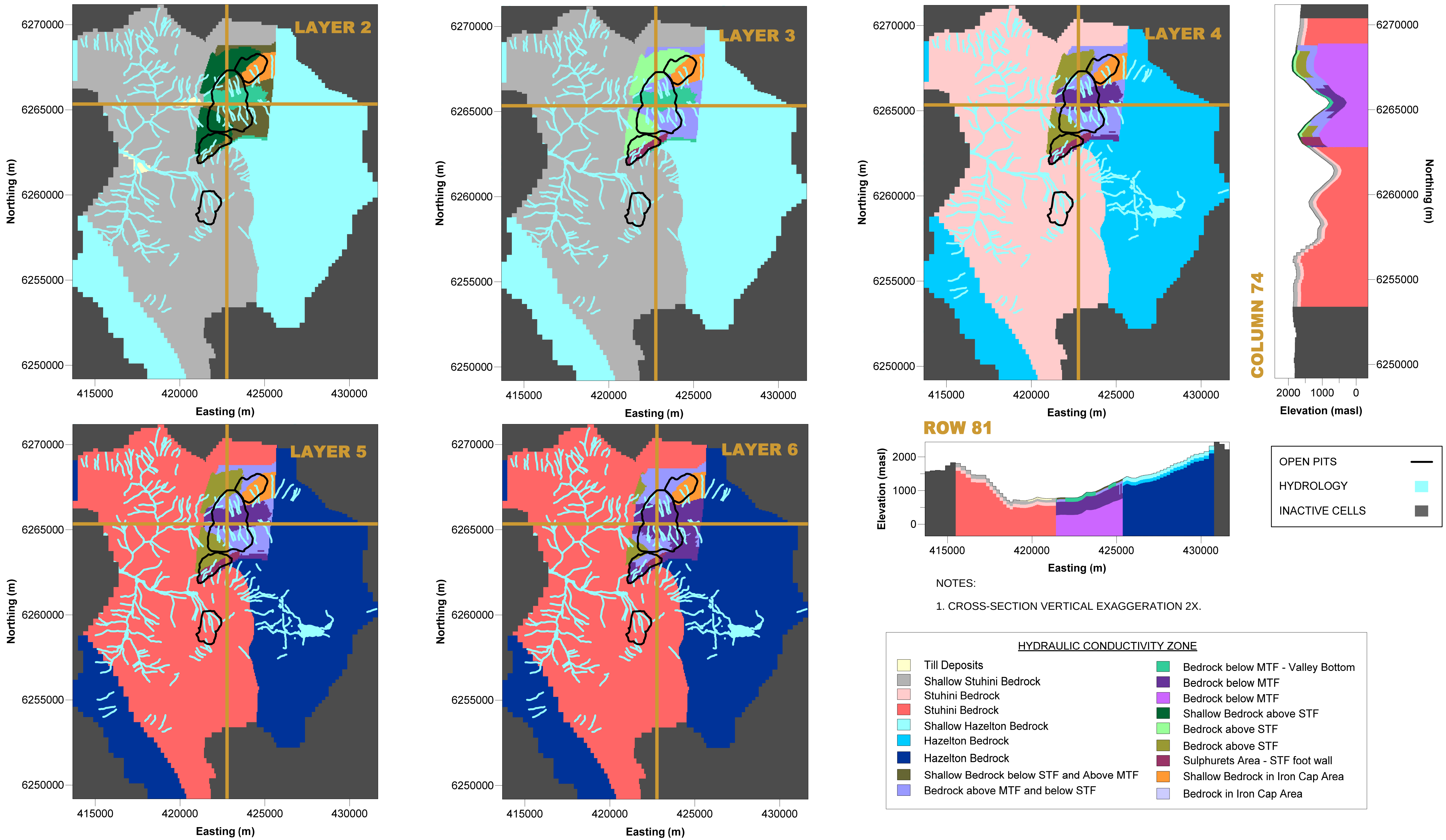

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	JUNE 2011
DRAWN:	RT
DESIGNED:	RT
CHECKED:	RT
APPROVED:	TC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

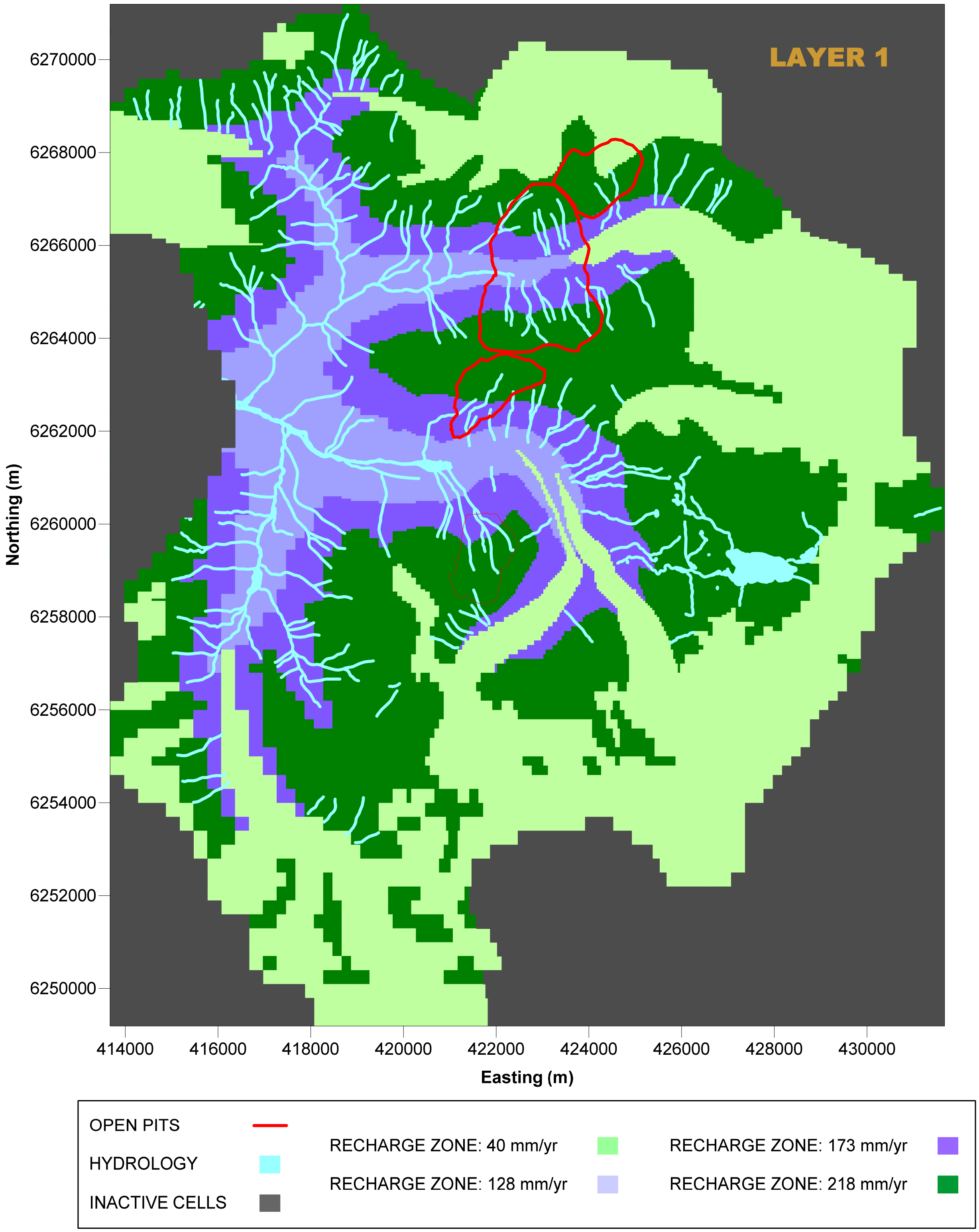
CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MODEL HYDRAULIC CONDUCTIVITY
LAYERS 2 TO 6

PROJECT No.:	DWG No.:	REV.:
0638-009	18	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Hydraulic Conductivity_2.srf



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SCALE:	AS SHOWN	DESIGNED:	RT
DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

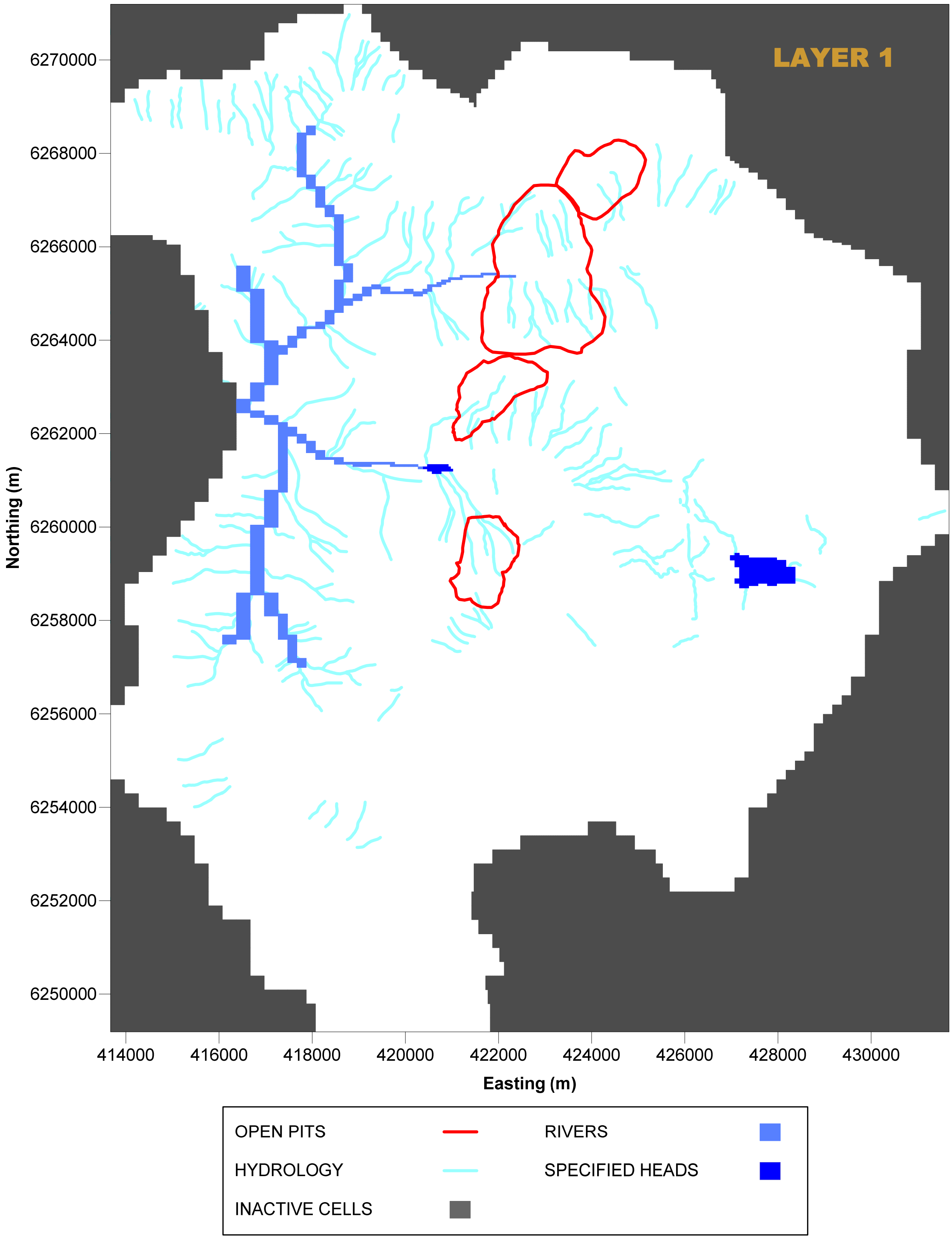
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MODEL PRE-DEVELOPMENT RECHARGE DISTRIBUTION

CLIENT: SEABRIDGE GOLD INC.	PROJECT No: 0638-009	DWG No: 19	REV. 0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pre_Development Recharge.srf



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SCALE:	AS SHOWN	DESIGNED:	RT
DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

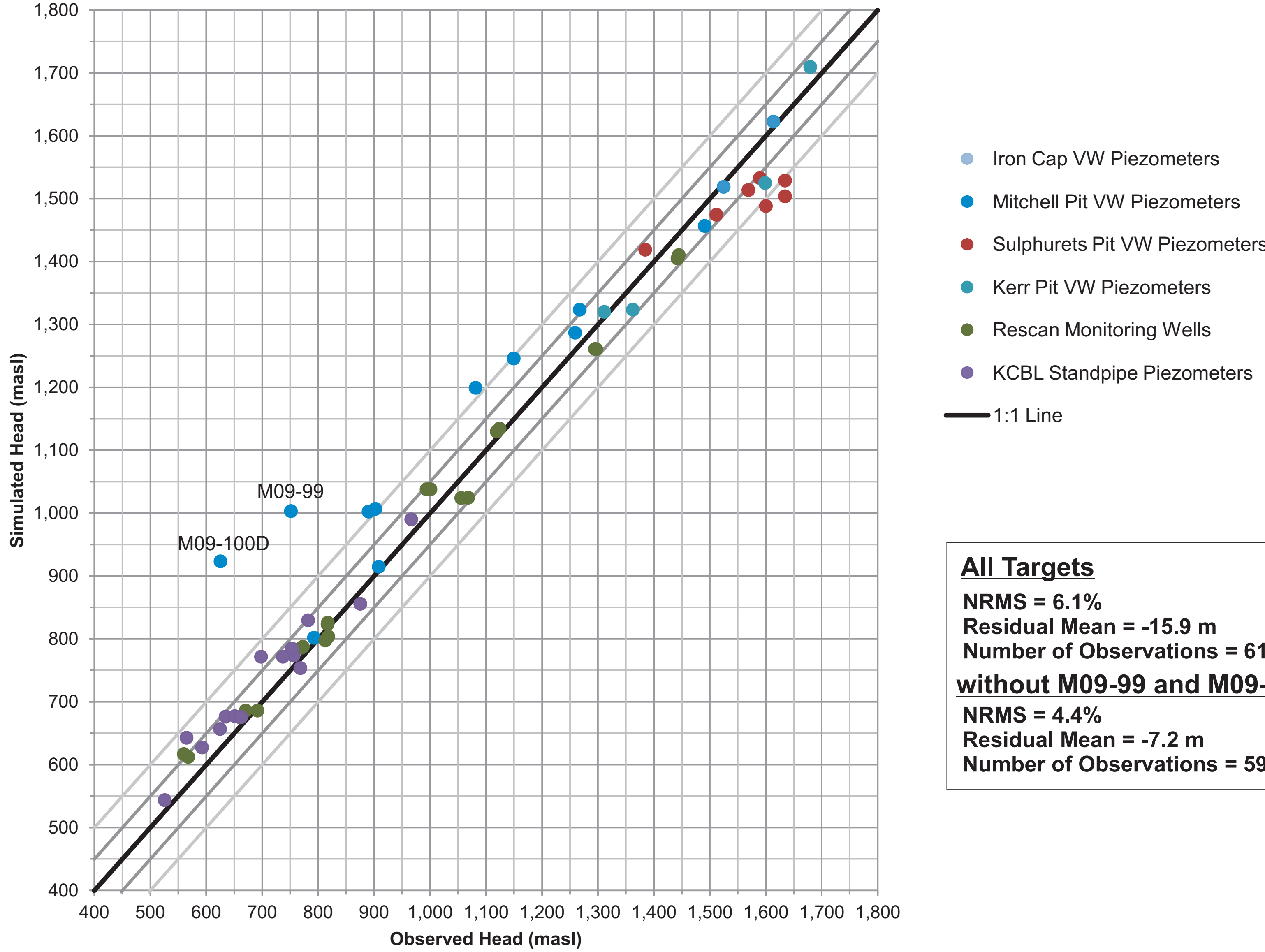
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: PRE-DEVELOPMENT FLOW BOUNDARY CONDITIONS

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	20	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pre_Development BCs.srf



All Targets

NRMS = 6.1%
Residual Mean = -15.9 m
Number of Observations = 61

without M09-99 and M09-100D

NRMS = 4.4%
Residual Mean = -7.2 m
Number of Observations = 59

SCALE: NTS	DESIGNED: RT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES
DATE: JUNE 2011	CHECKED: RT		TITLE: STEADY STATE CALIBRATION RESULTS FOR HYDRAULIC HEAD TARGETS (OBSERVED VS. SIMULATED)
DRAWN: RT	APPROVED: TC	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009; DWG No.: 21; REV.: 0

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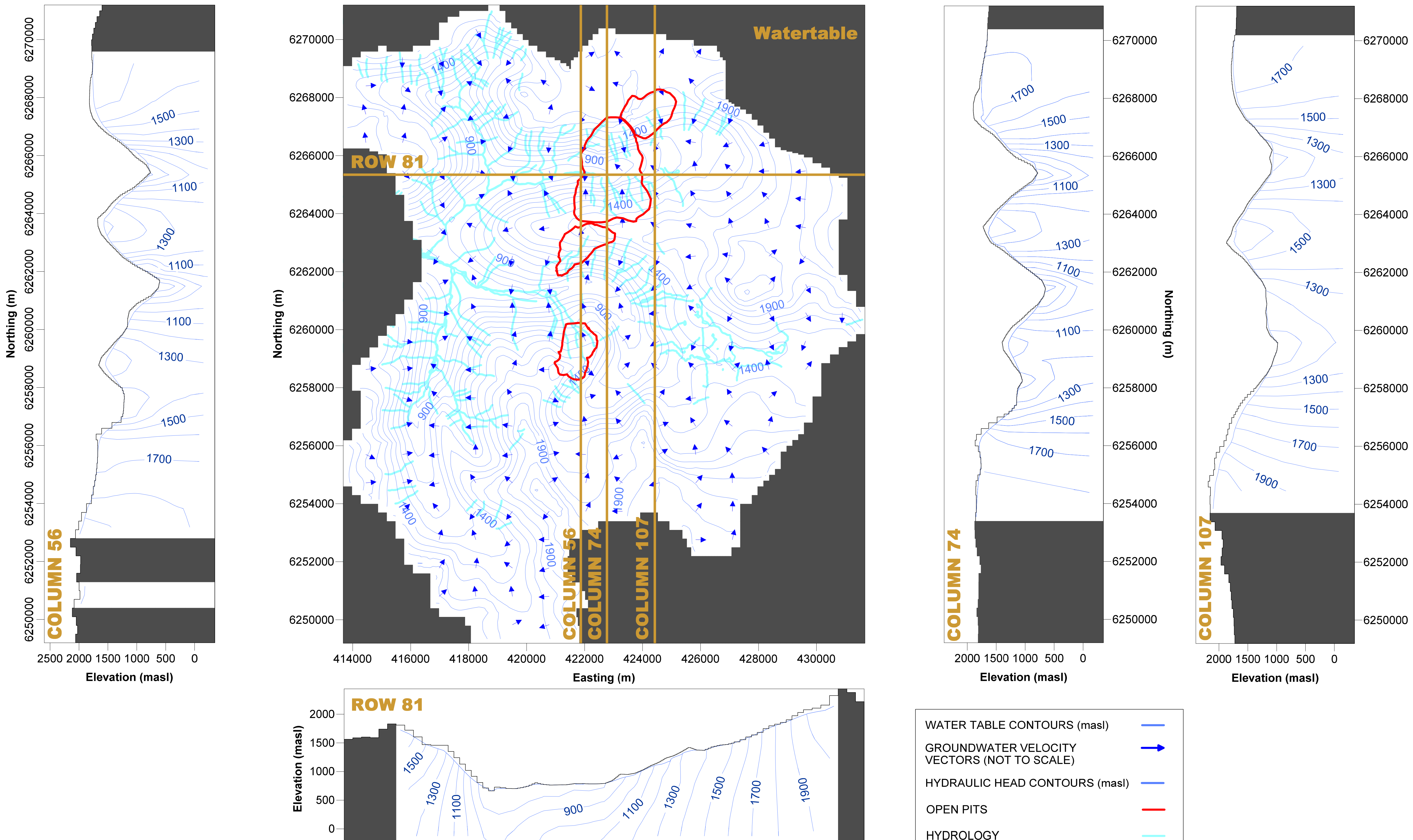
K:\Projects\0638-009 KSM PFS Update-Hydrogeology\05 Reporting\Figures\corel Figures_ksm.cdr



NOTES:

1. CROSS-SECTION VERTICAL EXAGGERATION 2X.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	JUNE 2011
DRAWN:	RT
DESIGNED:	RT
CHECKED:	RT
APPROVED:	TC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

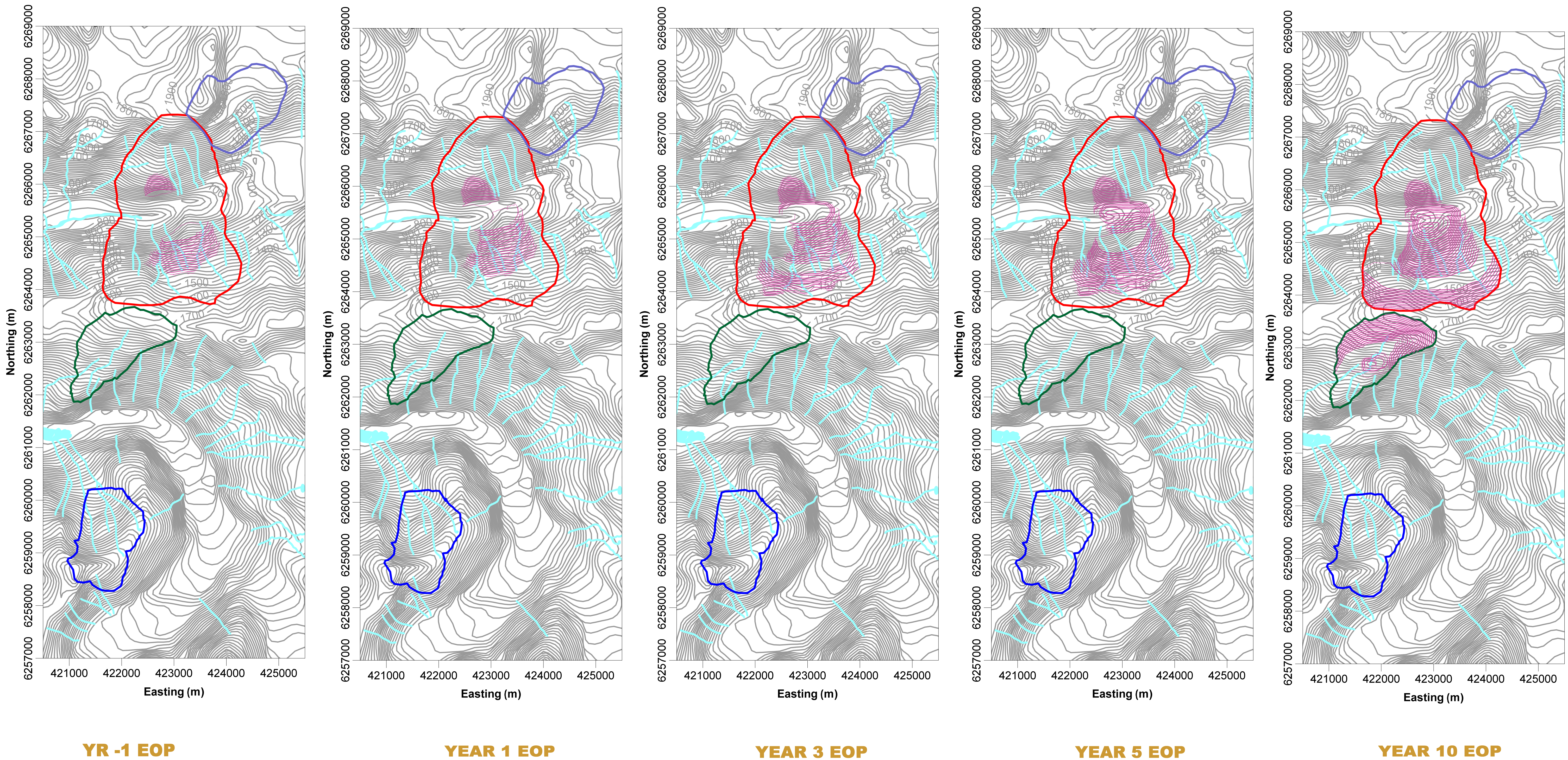
CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: SIMULATED PRE-DEVELOPMENT GROUNDWATER CONTOURS AND HYDRAULIC HEADS

PROJECT No.:	DWG No.:	REV.:
0638-009	22	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pre_Development WT and Head.srf



MITCHELL PIT OUTLINE (FINAL)	IRON CAP PIT OUTLINE (FINAL)	EOP OPEN PIT CONTOURS
SULPHURETS PIT OUTLINE (FINAL)	HYDROLOGY	TOPOGRAPHIC CONTOURS (masl)
KERR PIT OUTLINE (FINAL)	INACTIVE CELLS	

Note: KSM End of Period (EOP) pits shown were provided by MMTS March 2011.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE: AS SHOWN
DATE: JUNE 2011
DRAWN: RT
DESIGNED: RT
CHECKED: RT
APPROVED: TC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

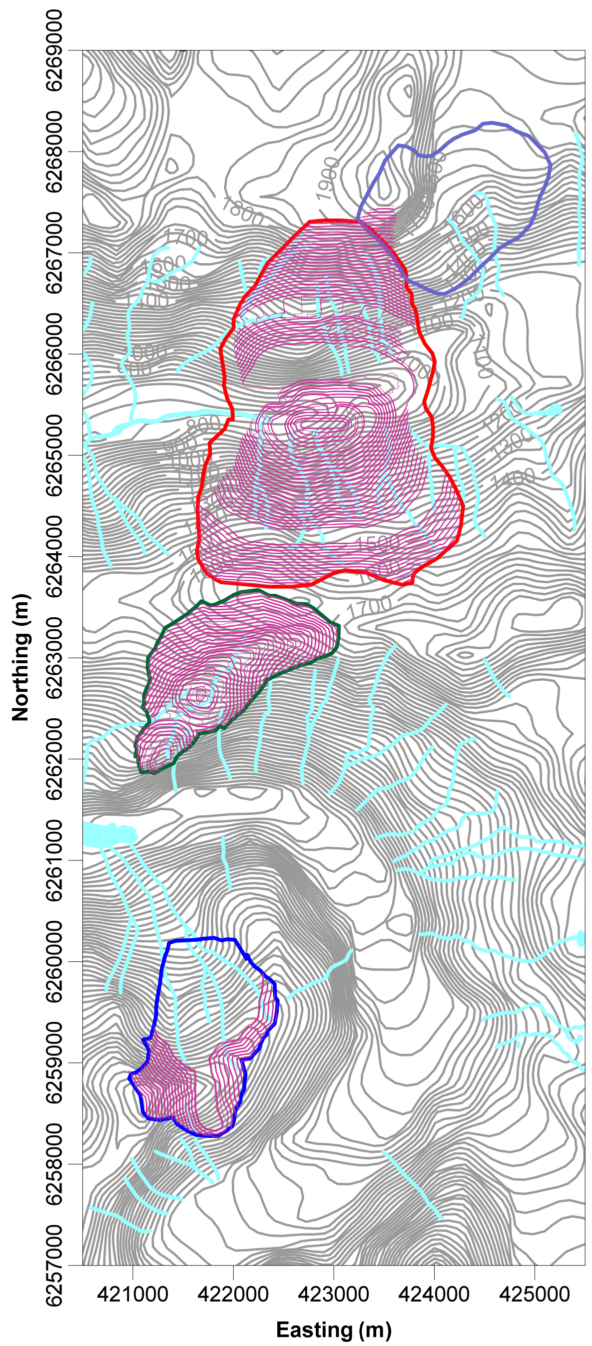
CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

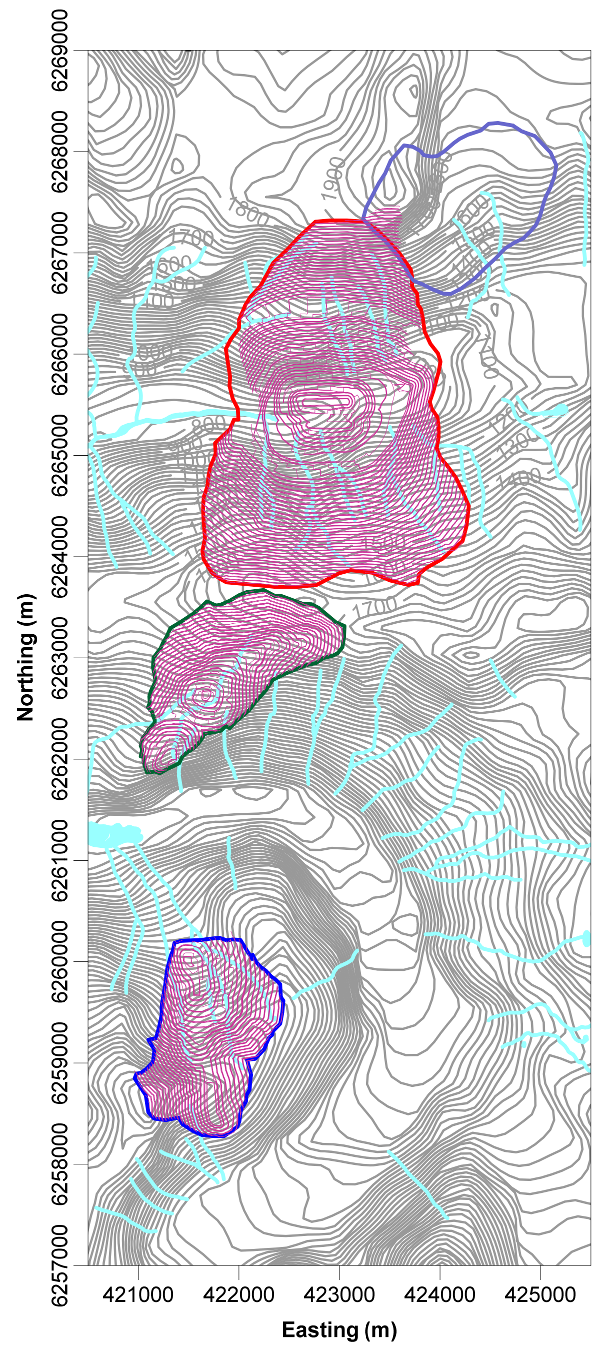
TITLE: OPEN PIT DEVELOPMENT PLAN FOR YEARS -1, 1, 3, 5, and 10

PROJECT No.: 0638-009
DWG No.: 23
REV.: 0

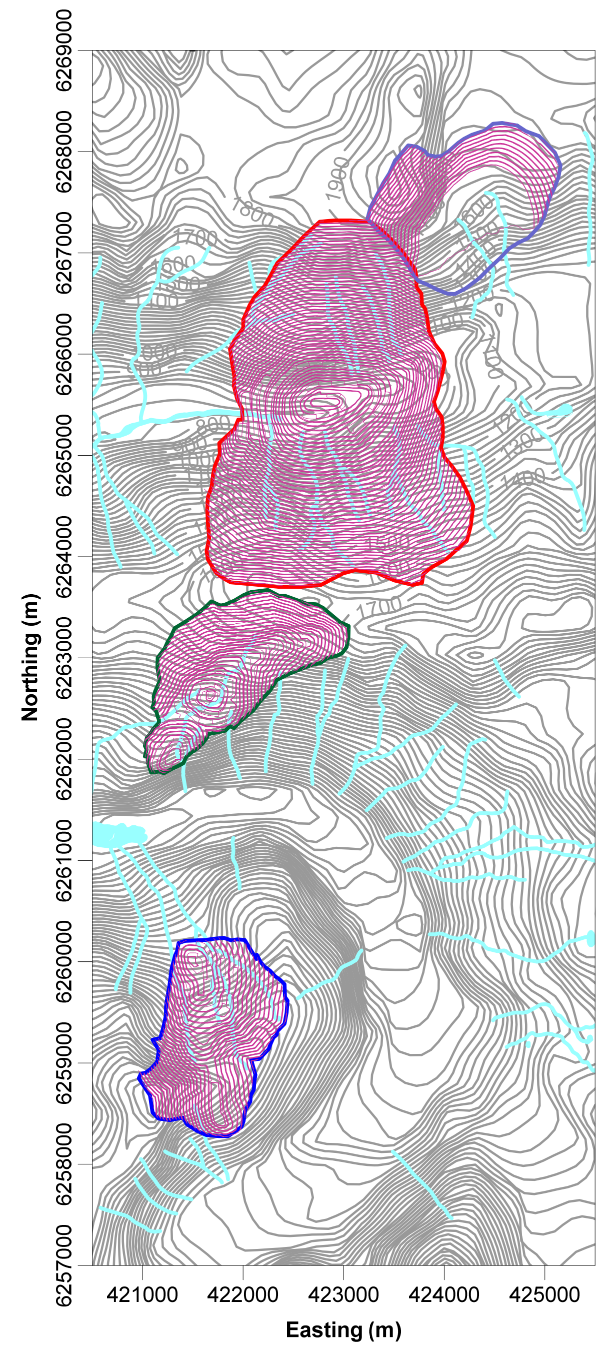
K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pit_Development_Plan.srf



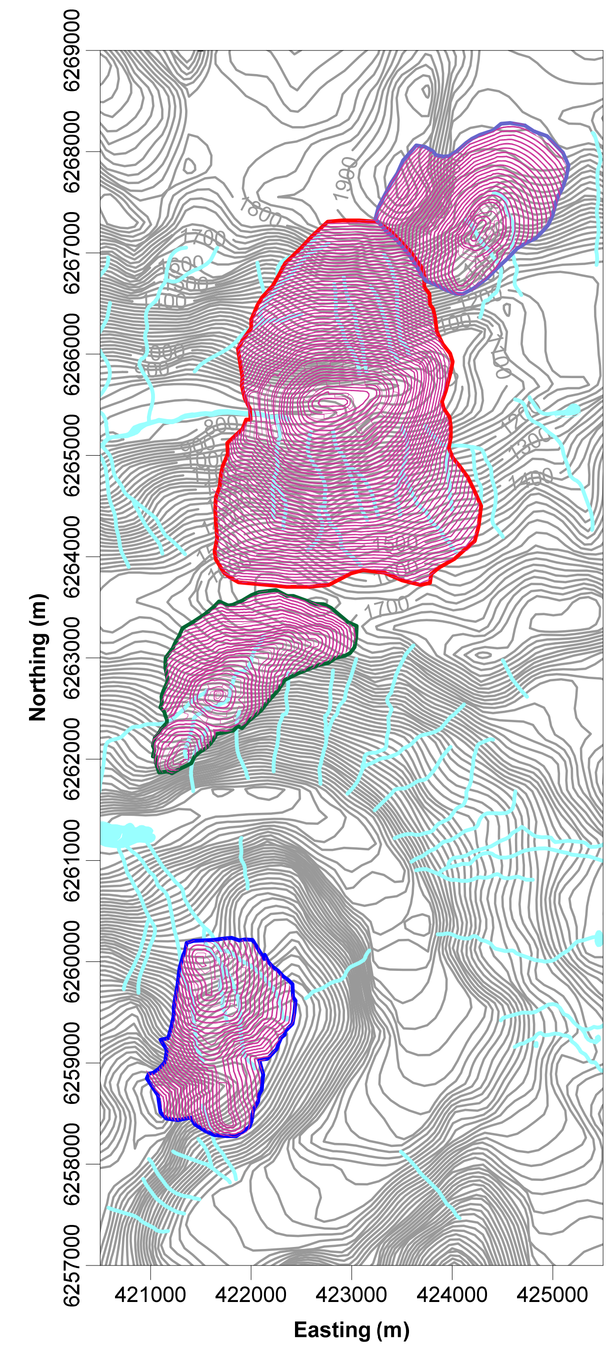
YR 20 EOP



YEAR 30 EOP



YEAR 40 EOP



YEAR 52 (LOM) EOP

MITCHELL PIT OUTLINE (FINAL)	IRON CAP PIT OUTLINE (FINAL)	EOP OPEN PIT CONTOURS
SULPHURETS PIT OUTLINE (FINAL)	HYDROLOGY	TOPOGRAPHIC CONTOURS (masl)
KERR PIT OUTLINE (FINAL)	INACTIVE CELLS	

Note: KSM End of Period (EOP) pits shown were provided by MMTS March 2011.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

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DRAWN:	RT
DESIGNED:	RT
CHECKED:	RT
APPROVED:	TC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

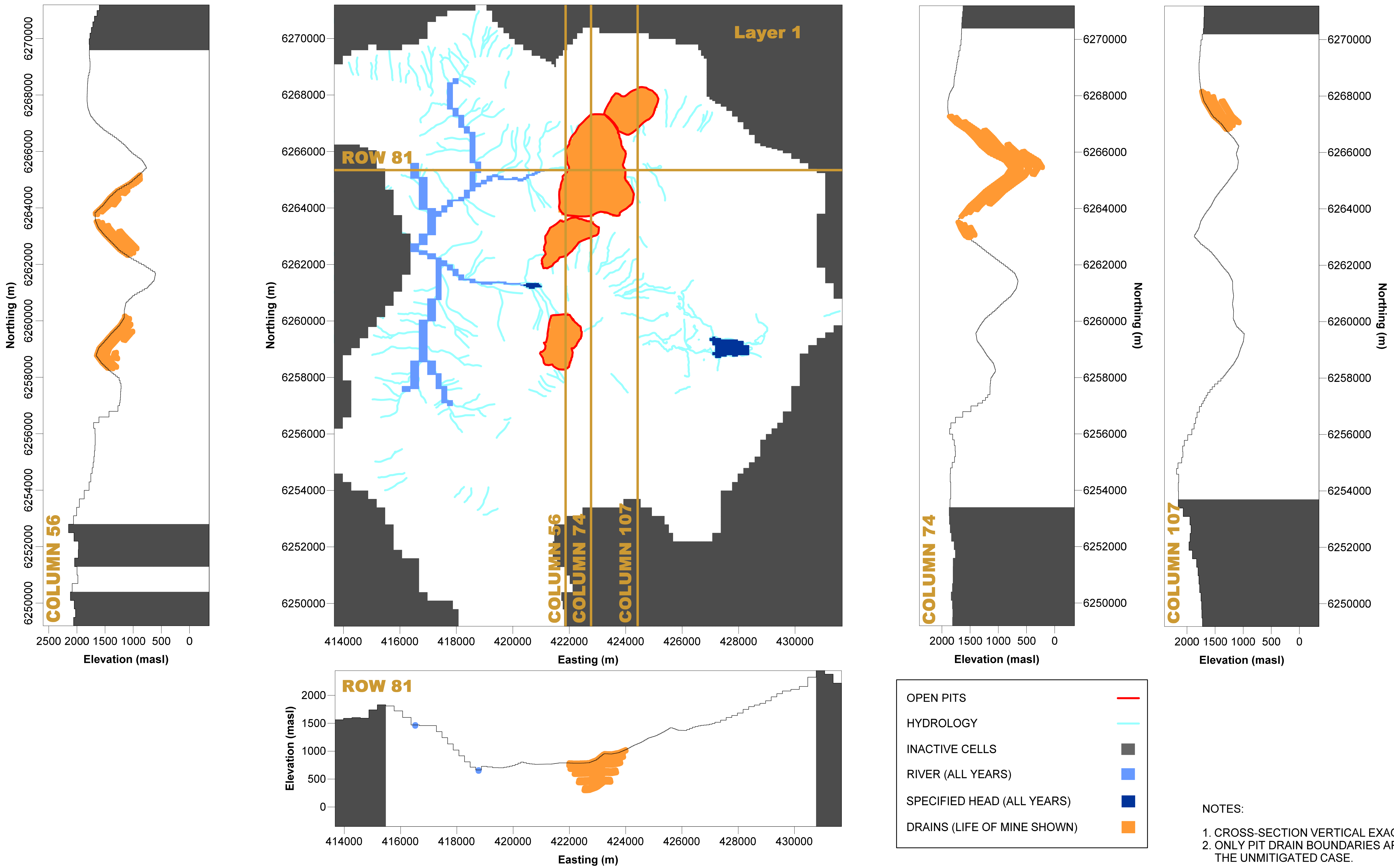
CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: OPEN PIT DEVELOPMENT PLAN FOR
YEARS 20, 30, 40, and LOM

PROJECT No.:	DWG No.:	REV.:
0638-009	24	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pit_Development_Plan2.srf



NOTES:

1. CROSS-SECTION VERTICAL EXAGGERATION 2X.
2. ONLY PIT DRAIN BOUNDARIES ARE SHOWN FOR THE UNMITIGATED CASE.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

SCALE:	AS SHOWN
DATE:	JUNE 2011
DRAWN:	RT
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CHECKED:	RT
APPROVED:	TC

PROFESSIONAL SEAL:

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

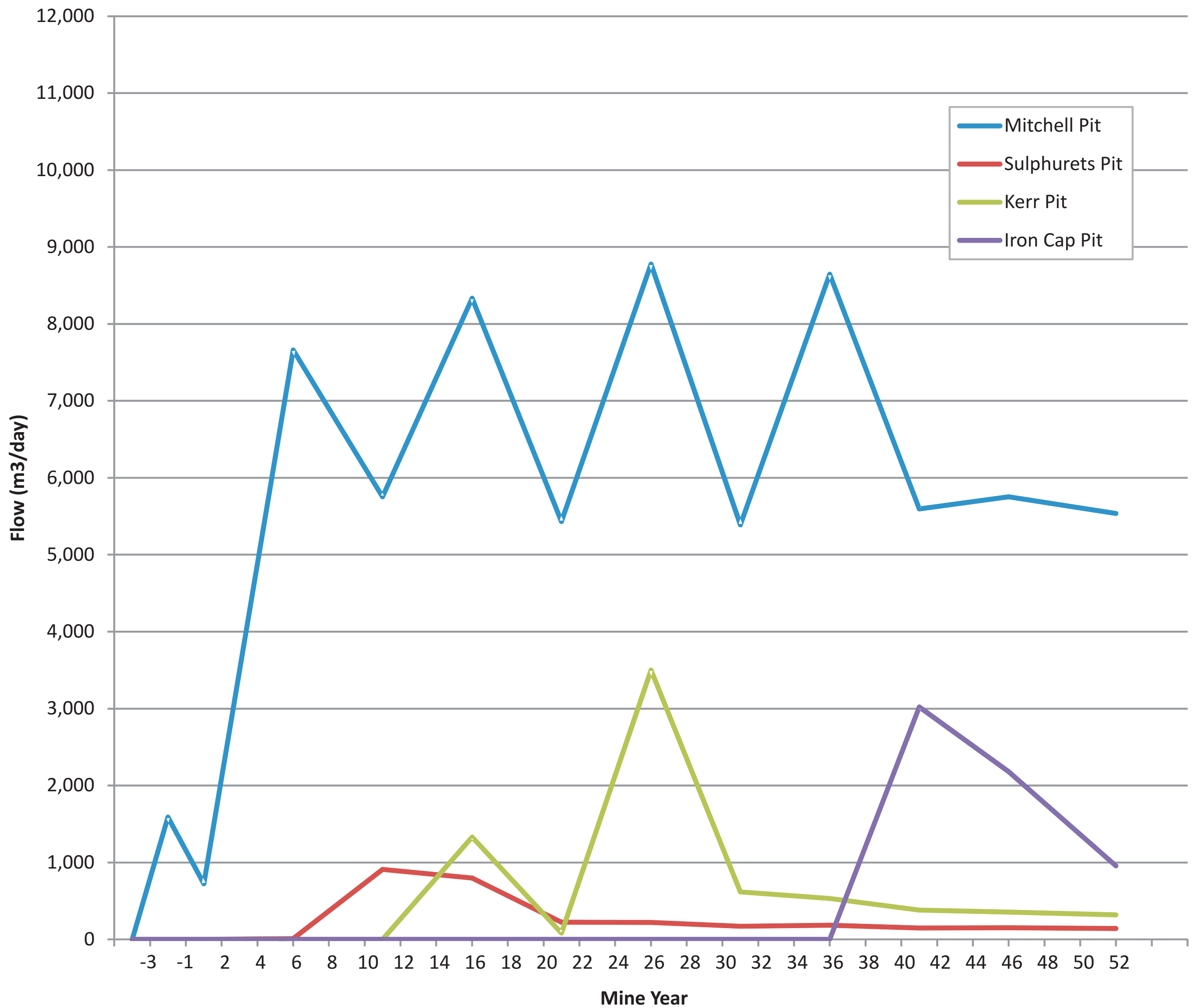
CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: PREDICTIVE SIMULATIONS: BOUNDARY CONDITIONS

PROJECT No.:	DWG No.:	REV.:
0638-009	25	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Post_Development BCs.srf



SCALE: NTS	DESIGNED: RT
DATE: JUNE 2011	CHECKED: RT
DRAWN: RT	APPROVED: TC

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
OPEN PIT FLOW RESULTS
NO MITIGATION

PROJECT No.:	DWG No.:	REV.:
0638-009	26	0

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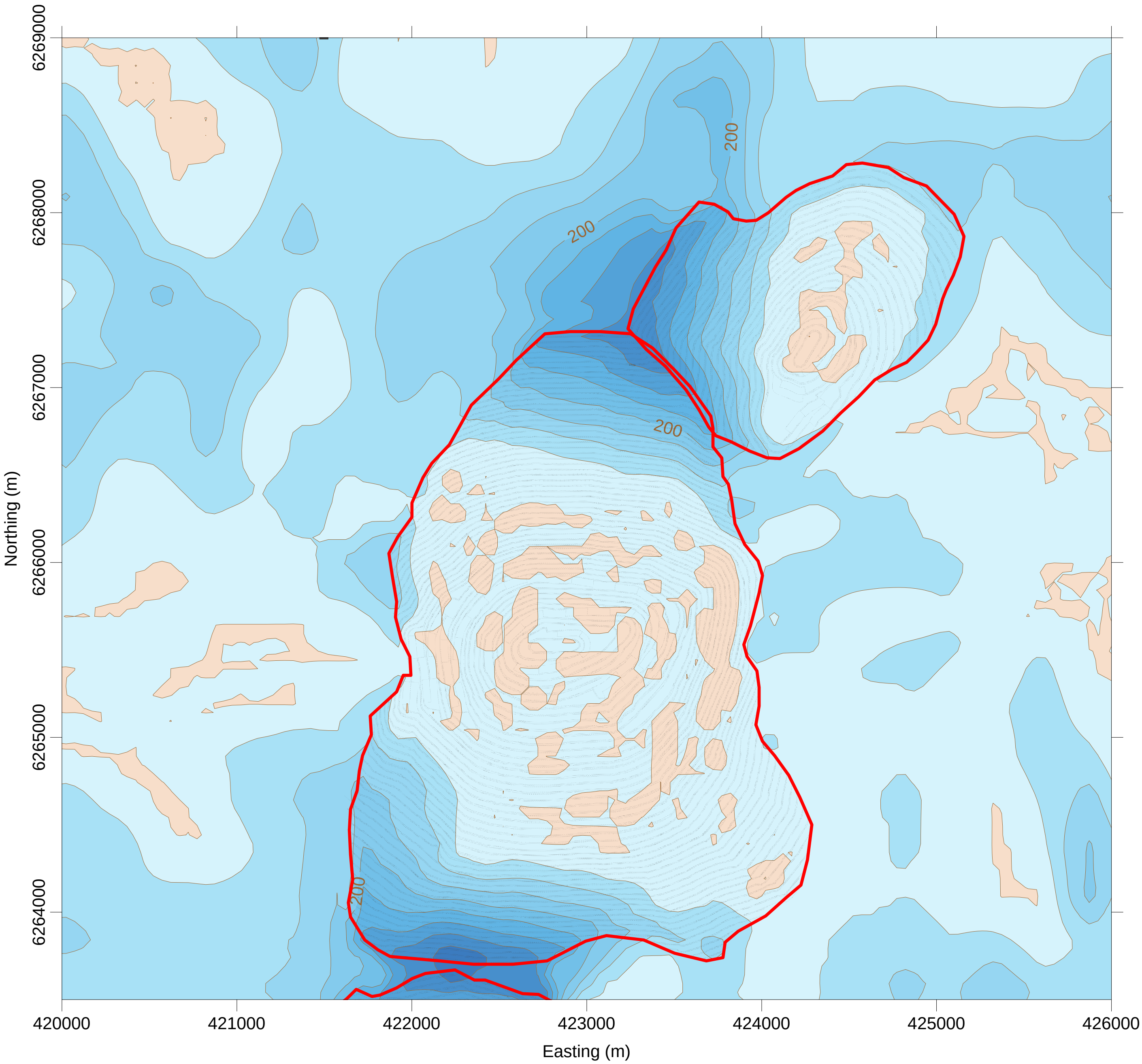
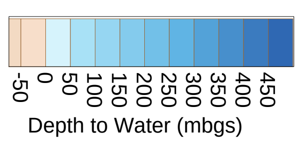


Notes:

1. Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).



LOM PIT 10 m CONTOURS

LOM PIT OUTLINES

INACTIVE CELLS

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DRAWN:	RT	APPROVED:	TC

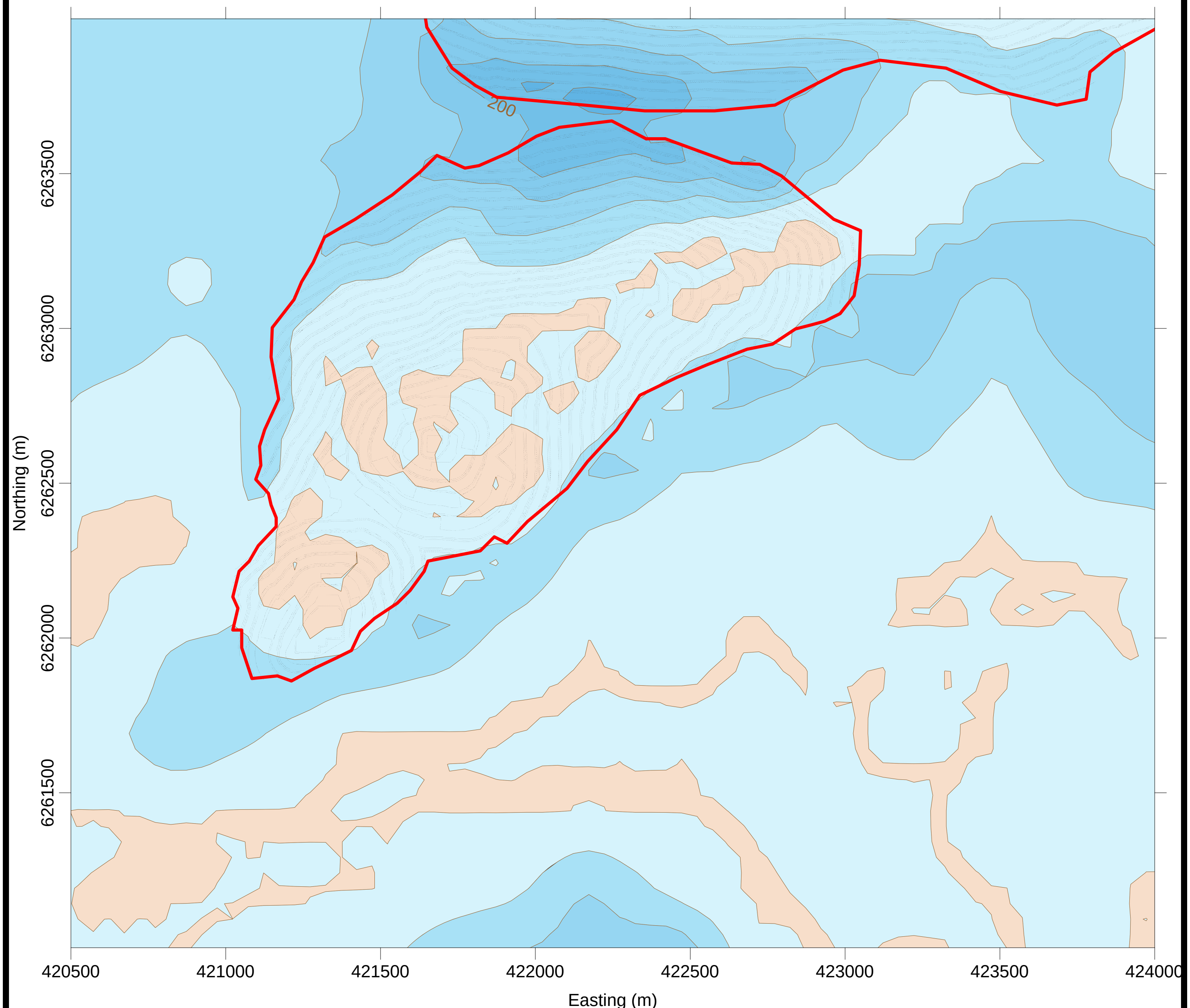
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
DEPTH TO WATER AT END OF MINE LIFE - NO MITIGATION

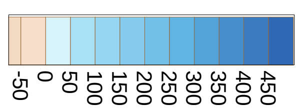
CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	27	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Mitchell_DTW_NOMITIGATION.srf



Notes:

1. *Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).*



LOM PIT 10 m CONTOURS

LOM PIT OUTLINES

INACTIVE CELLS

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SCALE: AS SHOWN	DESIGNED: RT
DATE: JUNE 2011	CHECKED: RT
DRAWN: RT	APPROVED: TC

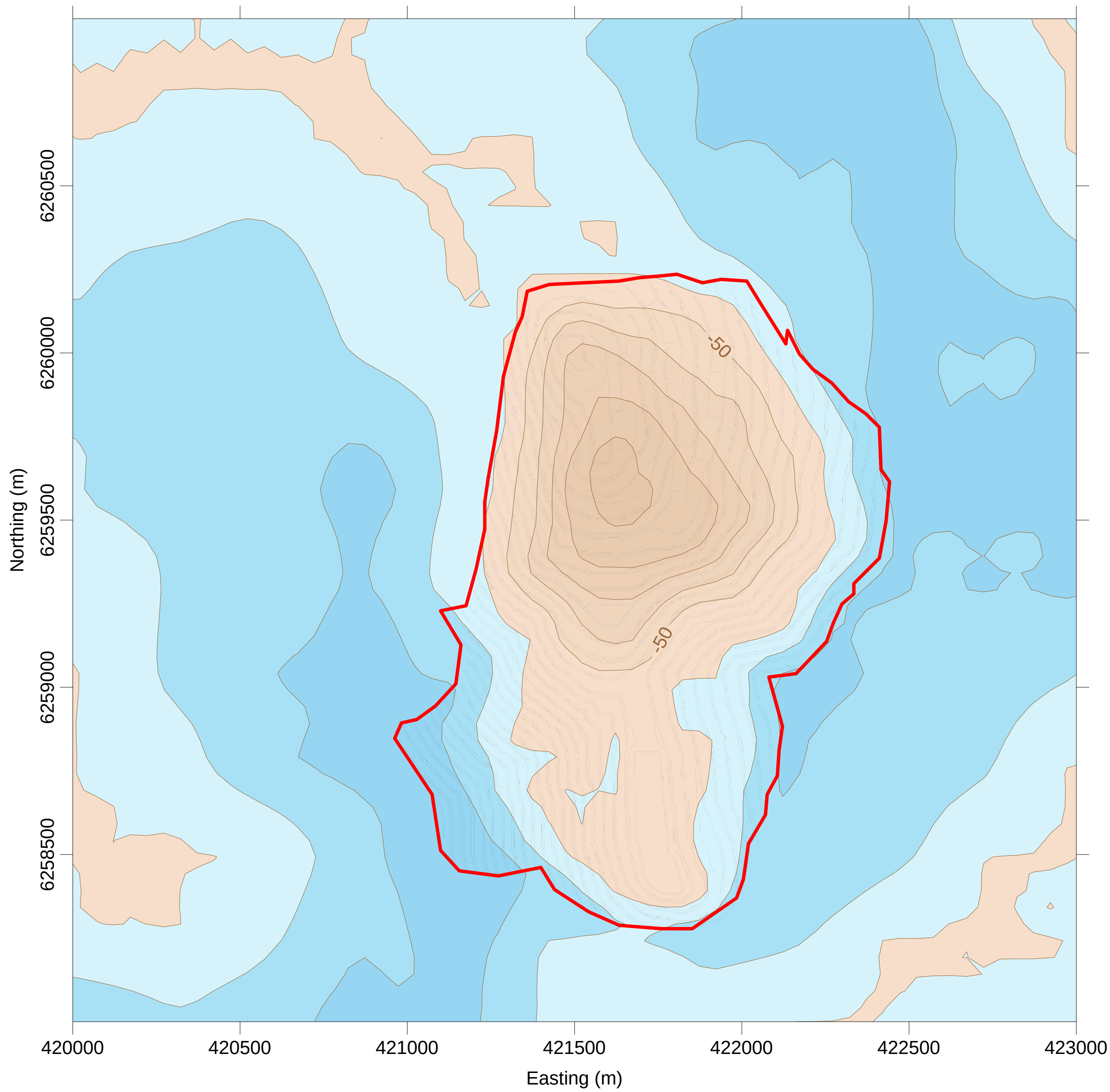
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: SULPHURETS PIT DEPTH TO WATER AT END OF MINING (YEAR 13)
NO MITIGATION

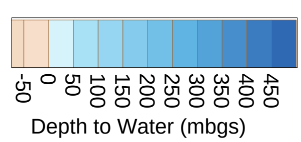
CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	28	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Sulph_DTW_nomitigation.srf



Notes:

1. *Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).*



LOM PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

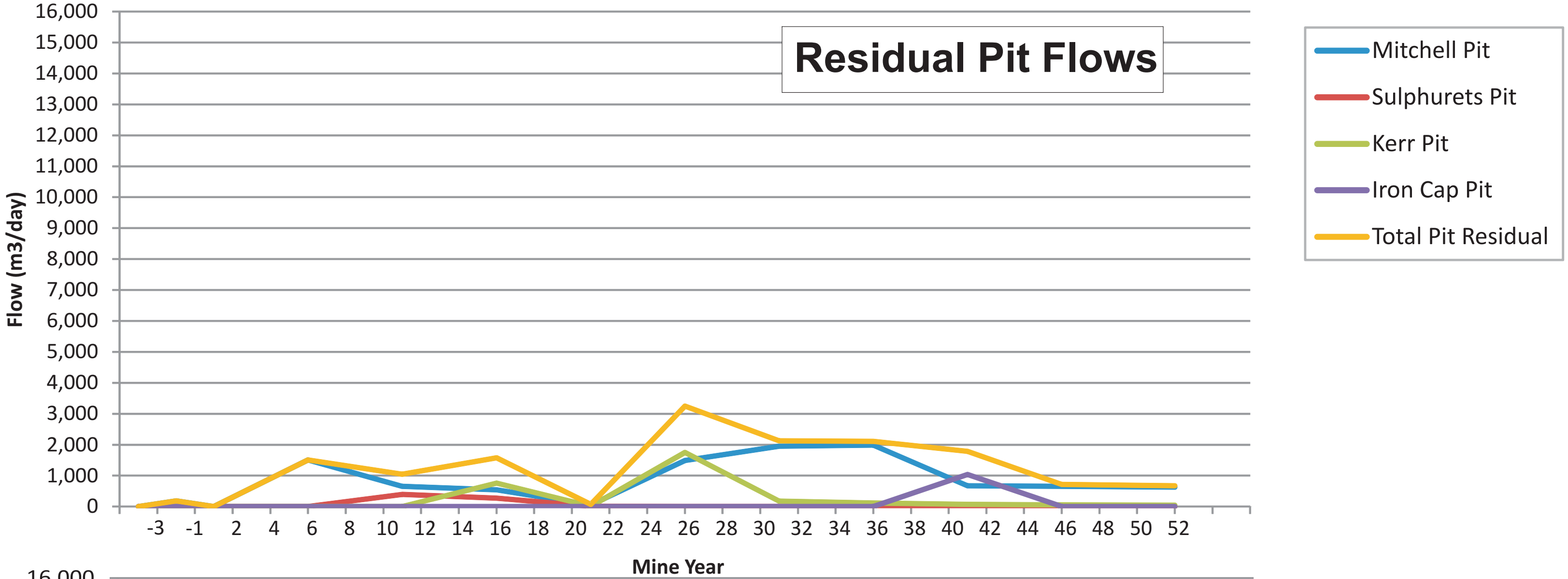
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

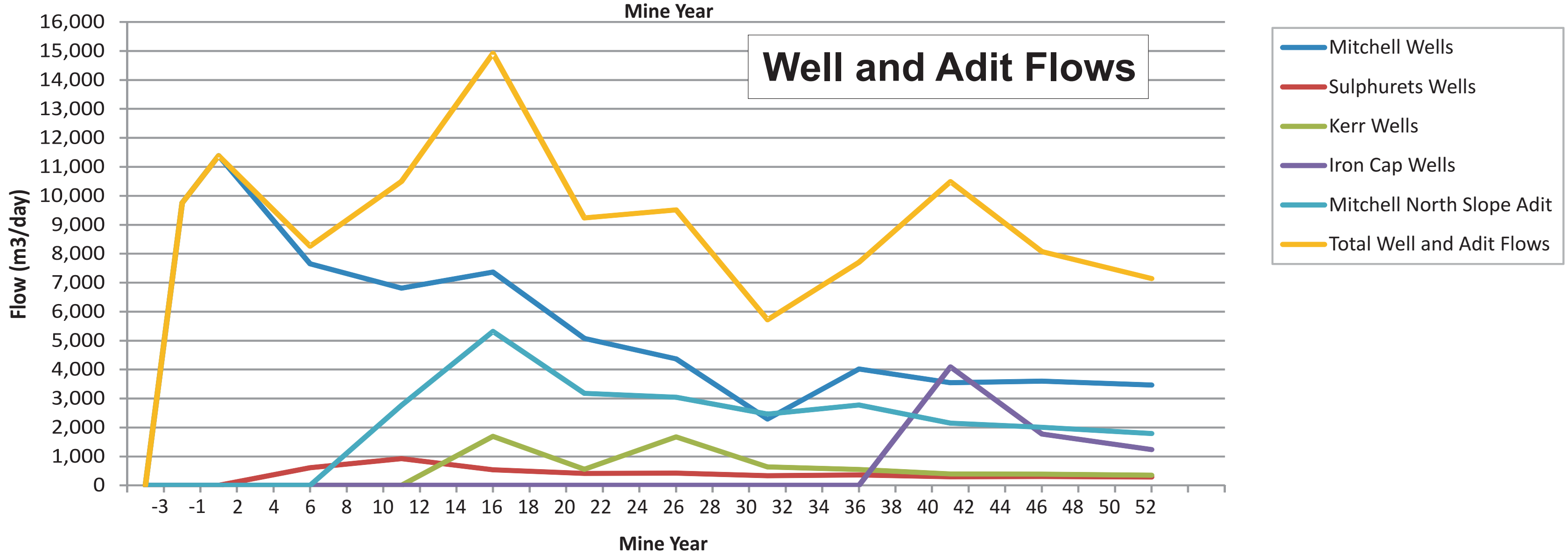
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR PIT DEPTH TO WATER AT END OF MINING (YEAR 36)
NO MITIGATION

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	29	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Kerr_DTW_nomitigation.srf





SCALE: NTS	DESIGNED: RT		
DATE: JUNE 2011	CHECKED: RT		
DRAWN: RT	APPROVED: TC		

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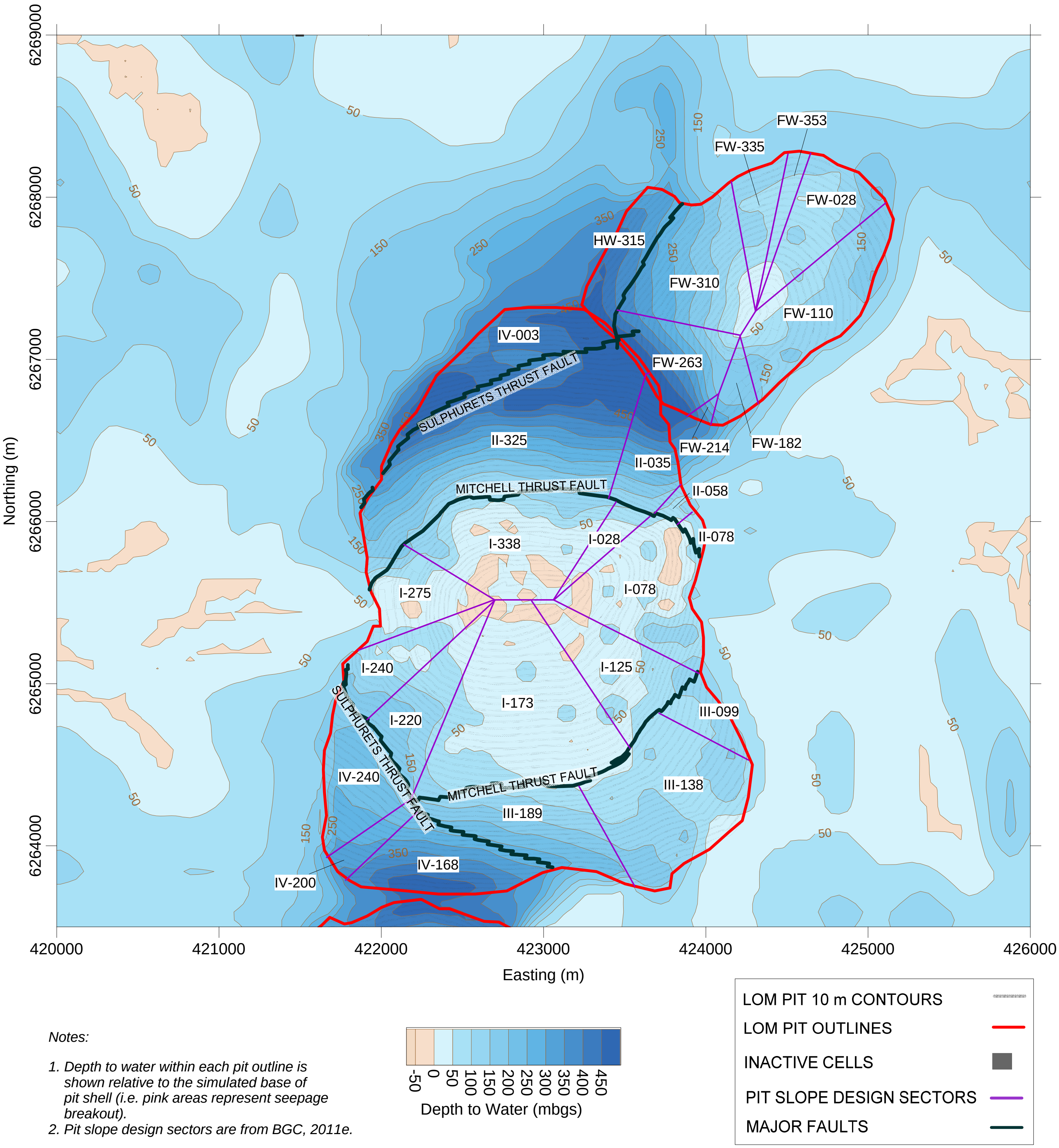
CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
OPEN PIT DEPRESSURIZATION FLOW RESULTS
WITH PLANNED MITIGATION

PROJECT No.:	DWG No.:	REV.:
0638-009	30	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\05 Reporting\Figures\corel Figures_ksm.cdr



Notes:

1. Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).
2. Pit slope design sectors are from BGC, 2011e.

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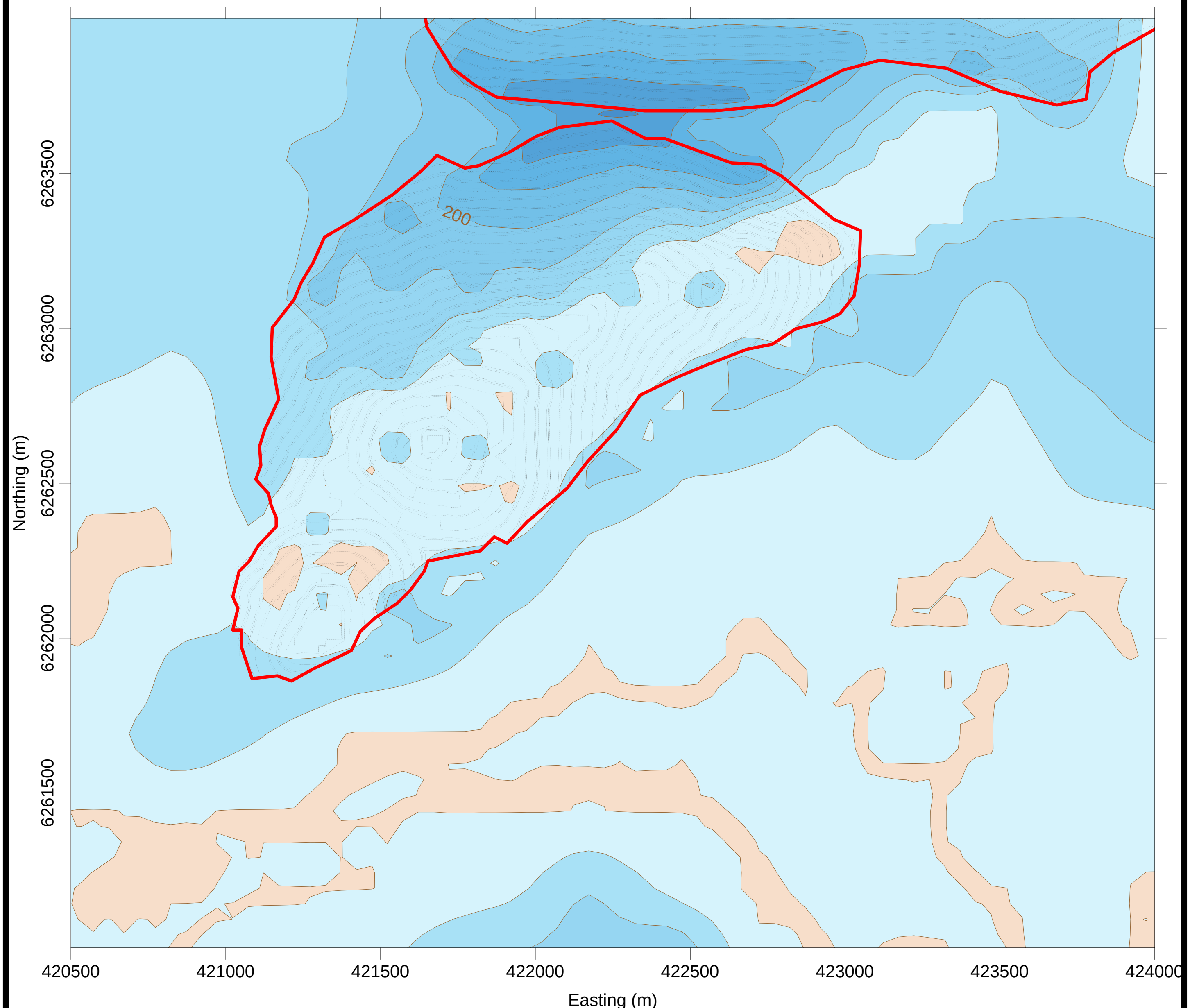
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
DEPTH TO WATER AT END OF MINE LIFE (Year 52)
WITH BASE CASE MITIGATION

CLIENT: SEABRIDGE GOLD INC.

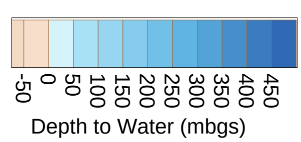
PROJECT No:	DWG No:	REV.
0638-009	31	0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Mitchell_DTW.srf



Notes:

1. Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).



LOM PIT 10 m CONTOURS

LOM PIT OUTLINES

INACTIVE CELLS

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BGC ENGINEERING INC.
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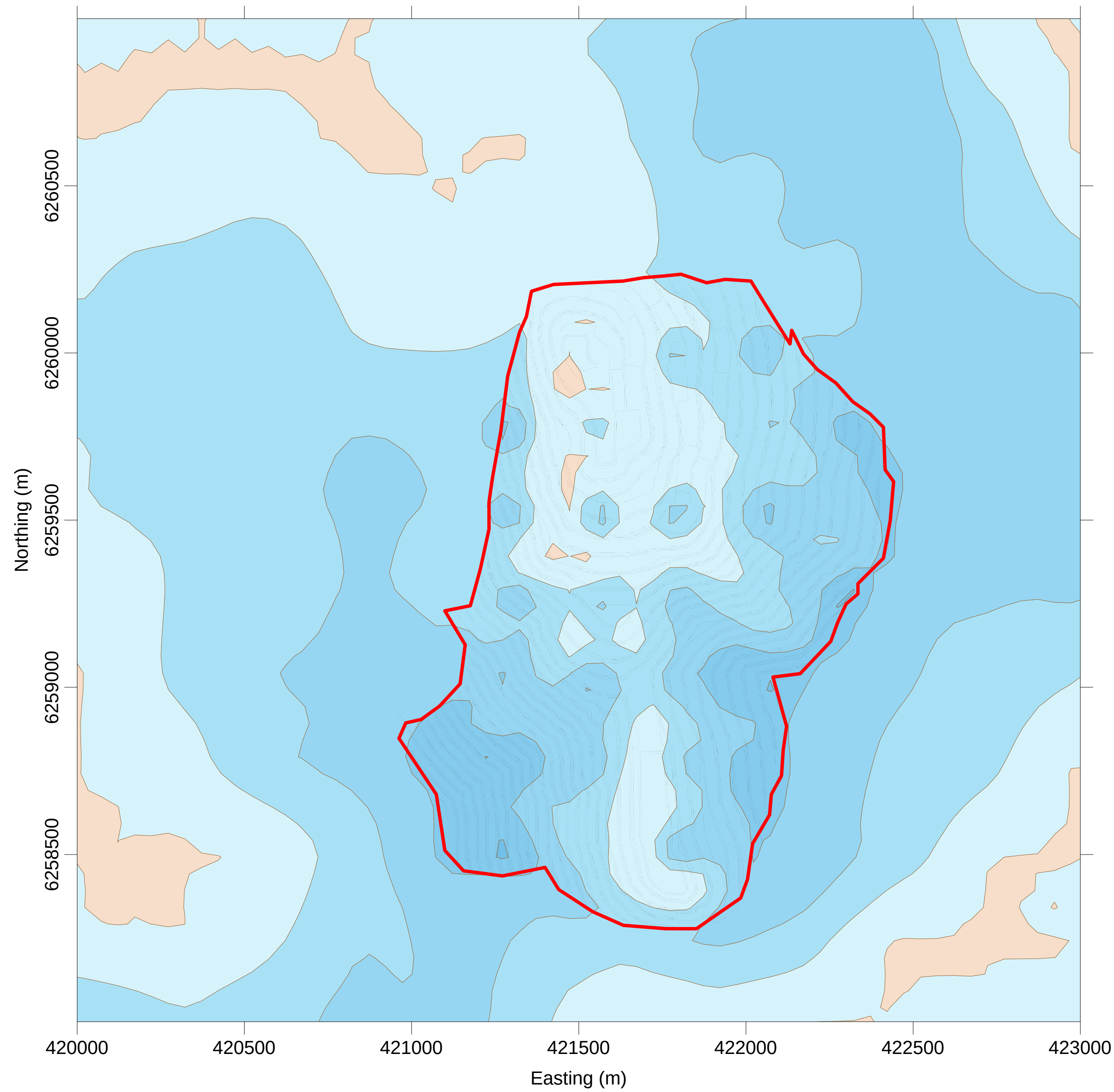
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: SULPHURETS PIT DEPTH TO WATER AT END OF MINING (YEAR 13)
WITH BASE CASE MITIGATION

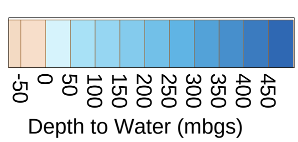
CLIENT: SEABRIDGE GOLD INC.	PROJECT No: 0638-009	DWG No: 32	REV. 0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/SulphPit_DTW.srf



Notes:

1. Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).



LOM PIT 10 m CONTOURS

LOM PIT OUTLINES

INACTIVE CELLS

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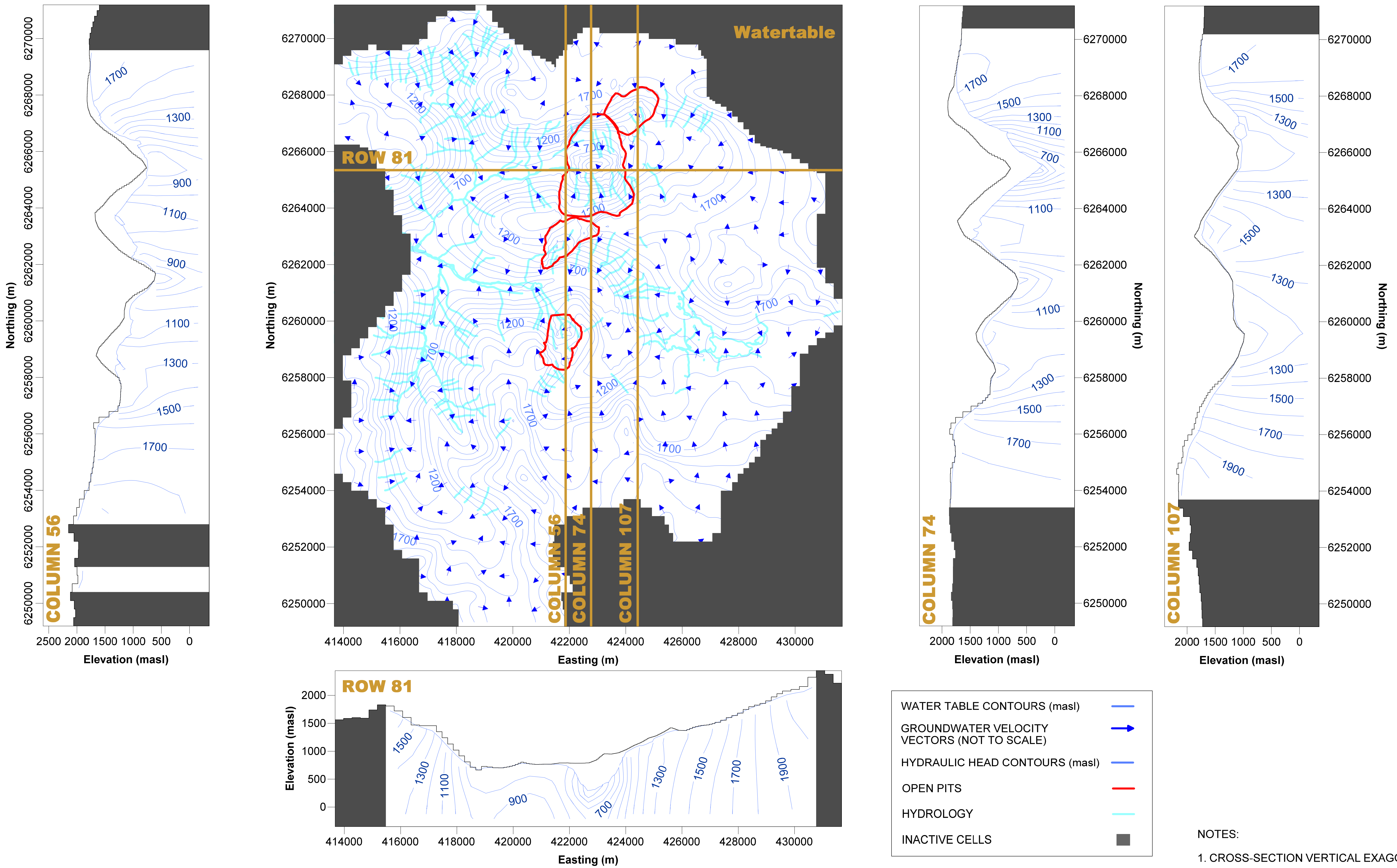
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR PIT DEPTH TO WATER AT END OF MINING (YEAR 36)
WITH BASE CASE MITIGATION

CLIENT: SEABRIDGE GOLD INC.	PROJECT No: 0638-009	DWG No: 33	REV. 0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Kerr_DTW.srf



NOTES:

1. CROSS-SECTION VERTICAL EXAGGERATION 2X.

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REV.	DATE	REVISION NOTES	DRAWN	CHECK	APPR.

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DATE: JUNE 2011
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DESIGNED: RT
CHECKED: RT
APPROVED: TC

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CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: SIMULATED LIFE OF MINE GROUNDWATER CONTOURS AND HYDRAULIC HEADS

PROJECT No.: 0638-009 | DWG No.: 34 | REV.: 0

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Figures/Pre_Development WT and Head.srf

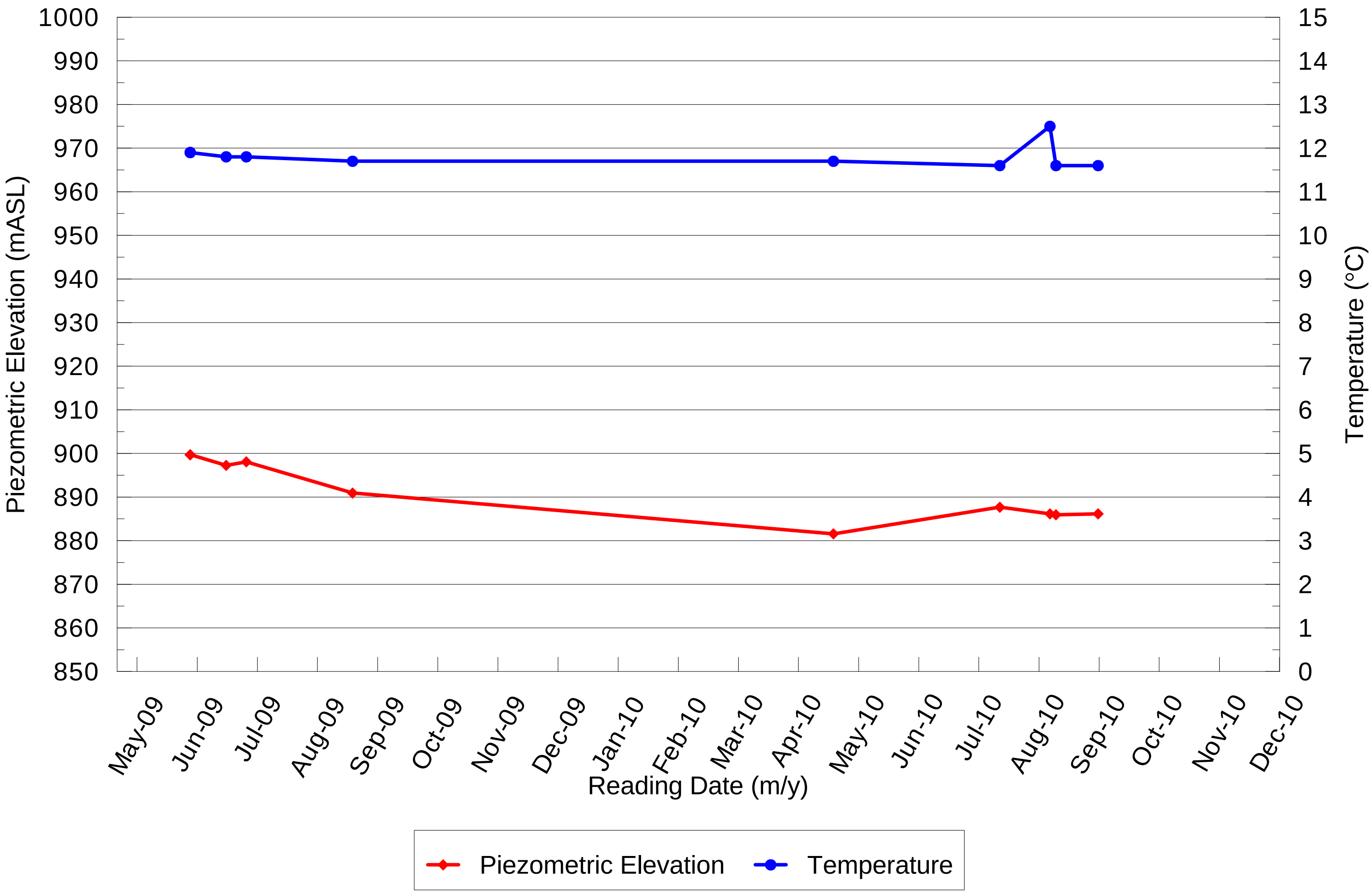
APPENDIX A

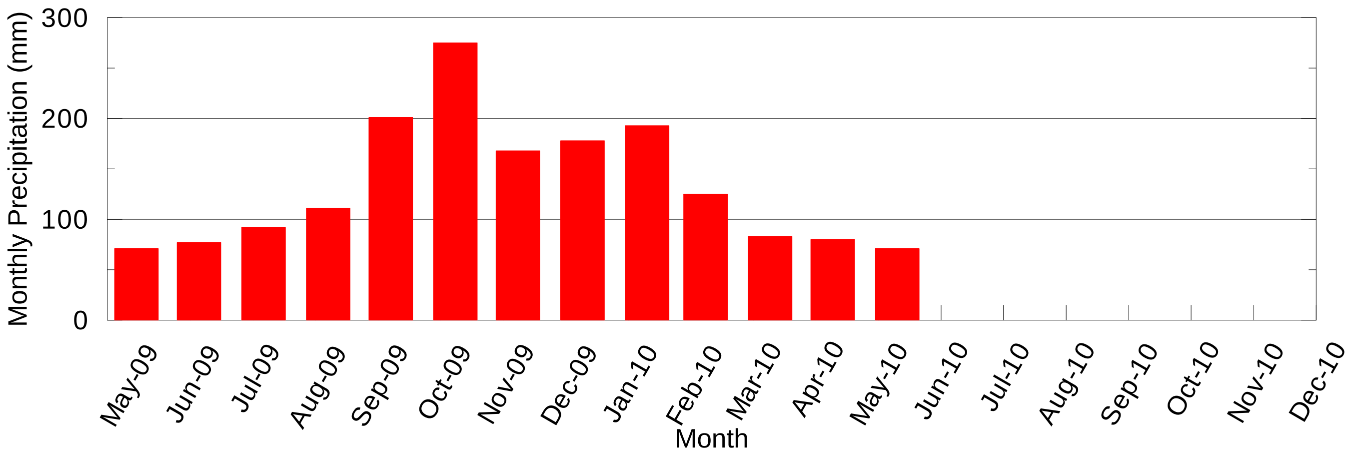
VWP PIEZOMETRIC HEAD DATA PLOTS

Table A1. KSM Open Pit Vibrating Wire Piezometer (VWP) Construction Details

Instrument Name	Instrument Serial Number	Bore Hole ID	Collar Northing m	Collar Easting m	Collar Elevation mASL	VWP Tip Depth m along hole	VWP Tip Northing m	VWP Tip Easting m	Tip Elevation mASL	Installation Date	Instrument_Type
M09-100S	VW11258	M09-100	6265247	422354	793.0	48.3	6265243	422341	746.8	7/6/2009	Grouted-In VWP
M09-096S	VW11259	M09-096	6265470	423582	911.0	48.4	6265470	423602	866.8	6/14/2009	Grouted-In VWP
M09-097S	VW11260	M09-097	6266392	423144	1334.0	95.6	6266421	423184	1252.1	6/25/2009	Grouted-In VWP
M09-098	VW11261	M09-098	6266069	422888	1201.0	101.0	6266115	422877	1111.8	6/27/2009	Grouted-In VWP
M09-101	VW11262	M09-101	6264798	423418	1252.0	200.2	6264732	423471	1070.6	7/16/2009	Grouted-In VWP
M09-096D	VW11263	M09-096	6265470	423582	911.0	250.0	6265472	423684	682.6	6/14/2009	Grouted-In VWP
M09-100D	VW11264	M09-100	6265247	422354	793.0	248.3	6265225	422285	555.5	7/6/2009	Grouted-In VWP
M09-097D	VW11265	M09-097	6266392	423144	1334.0	296.0	6266482	423267	1080.3	6/25/2009	Grouted-In VWP
M09-102a	VW11266	M09-102a	6264680	422360	1239.0	349.0	6264604	422359	904.4	7/18/2009	Grouted-In VWP
M09-099	VW11267	M09-099	6265705	422900	892.0	402.0	6265791	422970	505.6	Jul-09	Grouted-In VWP
M09-095	VW11268	M09-095	6265329	423198	970.0	400.0	6265214	423218	587.5	6/15/2009	Grouted-In VWP
S10-27S	VW14540	S10-27	6263103	422102	1553.3	185.1	6263160	422131	1379.4	7/15/2010	Grouted-In VWP
S10-30	VW14549	S10-30	6263006	421660	1516.6	388.2	6263009	421665	1128.5	7/22/2010	Grouted-In VWP
S10-27D	VW14552	S10-27	6263103	422102	1553.3	399.5	6263225	422174	1179.7	7/15/2010	Grouted-In VWP
S10-32	VW14889	S10-32	6263189	422613	1605.1	212.3	6263211	422708	1416.6	7/29/2010	Grouted-In VWP
S10-31	VW14890	S10-31	6263651	422495	1705.4	343.0	6263582	422526	1370.8	7/25/2010	Grouted-In VWP
K10-06S	VW14892	K10-06	6259638	421752	1314.3	97.9	6259609	421772	1222.9	8/8/2010	Grouted-In VWP
M10-121	VW14893	M10-121	6266727	422764	1535.0	292.6	6266761	422786	1245.2	8/16/2010	Grouted-In VWP
K10-05	VW14894	K10-05	6258667	421271	1864.6	246.6	6258559	421180	1662.9	8/3/2010	Grouted-In VWP
S10-33S	VW14895	S10-33	6263680	421722	1673.0	200.0	6263639	421760	1481.0	8/1/2010	Grouted-In VWP
K10-06D	VW14896	K10-06	6259638	421752	1314.3	300.1	6259555	421820	1034.1	8/8/2010	Grouted-In VWP
S10-33D	VW14897	S10-33	6263680	421722	1673.0	295.7	6263616	421779	1389.9	8/1/2010	Grouted-In VWP
K10-08	VW14898	K10-08	6258796	421628	1728.5	296.1	6258769	421583	1437.1	8/17/2010	Grouted-In VWP
IC10-014	VW14899	IC10-014	6267391	424638	1510.2	197.7	6267436	424689	1324.4	8/21/2010	Grouted-In VWP
IC10-016	VW14900	IC10-016	6267589	424433	1612.2	299.4	6267743	424408	1356.5	8/27/2010	Grouted-In VWP

Notes:
1. All vibrating wires are RST VWP Instruments.





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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-095
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-1	0

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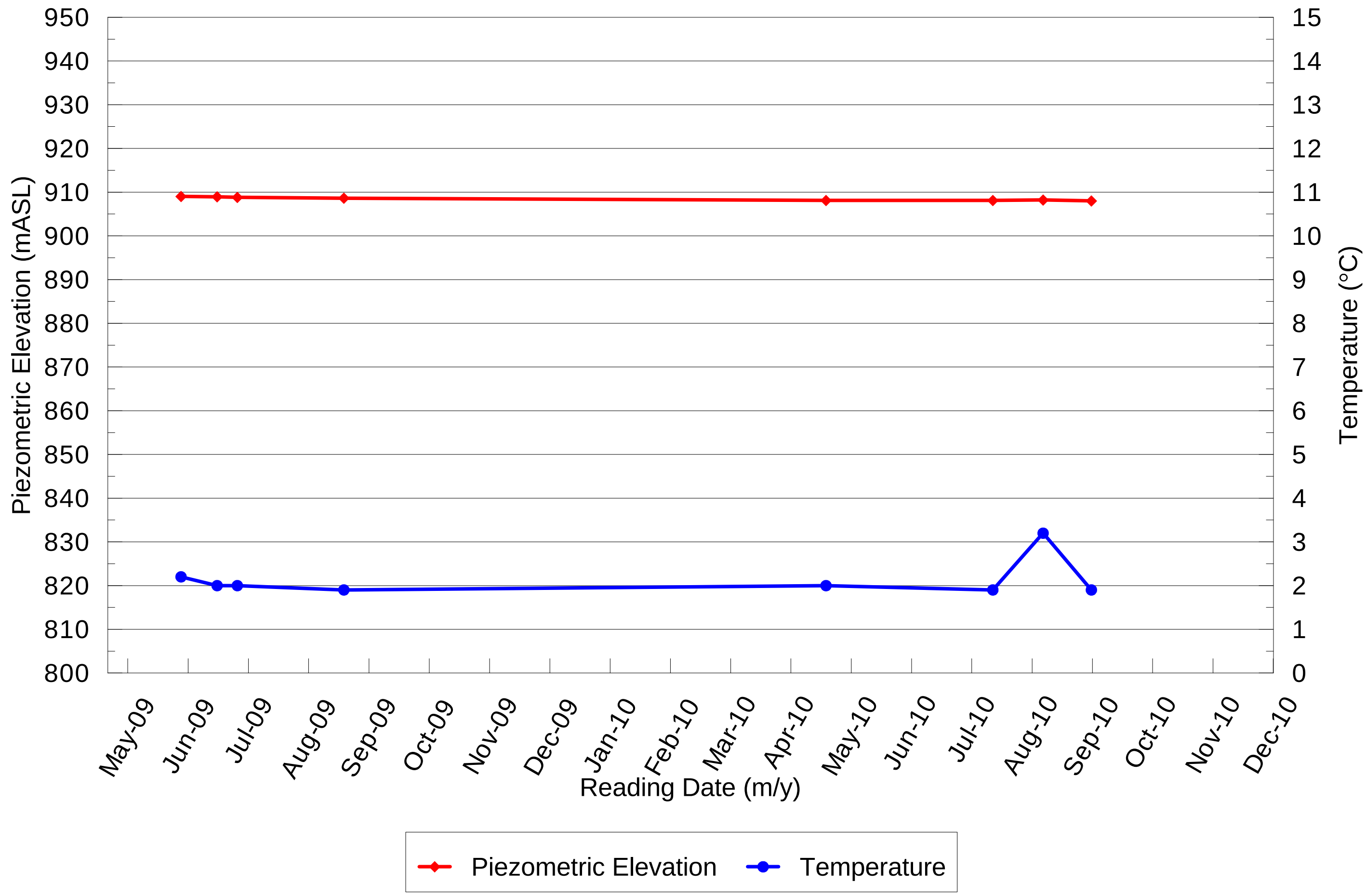

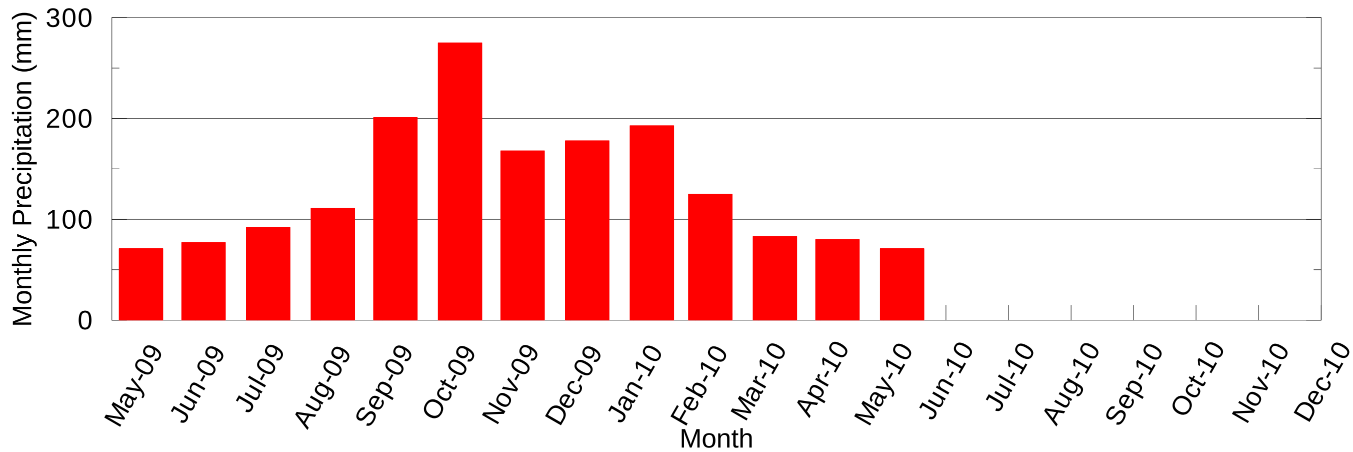

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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
M09-096S
Piezometric Elevation and Temperature

CLIENT:
Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-2	0

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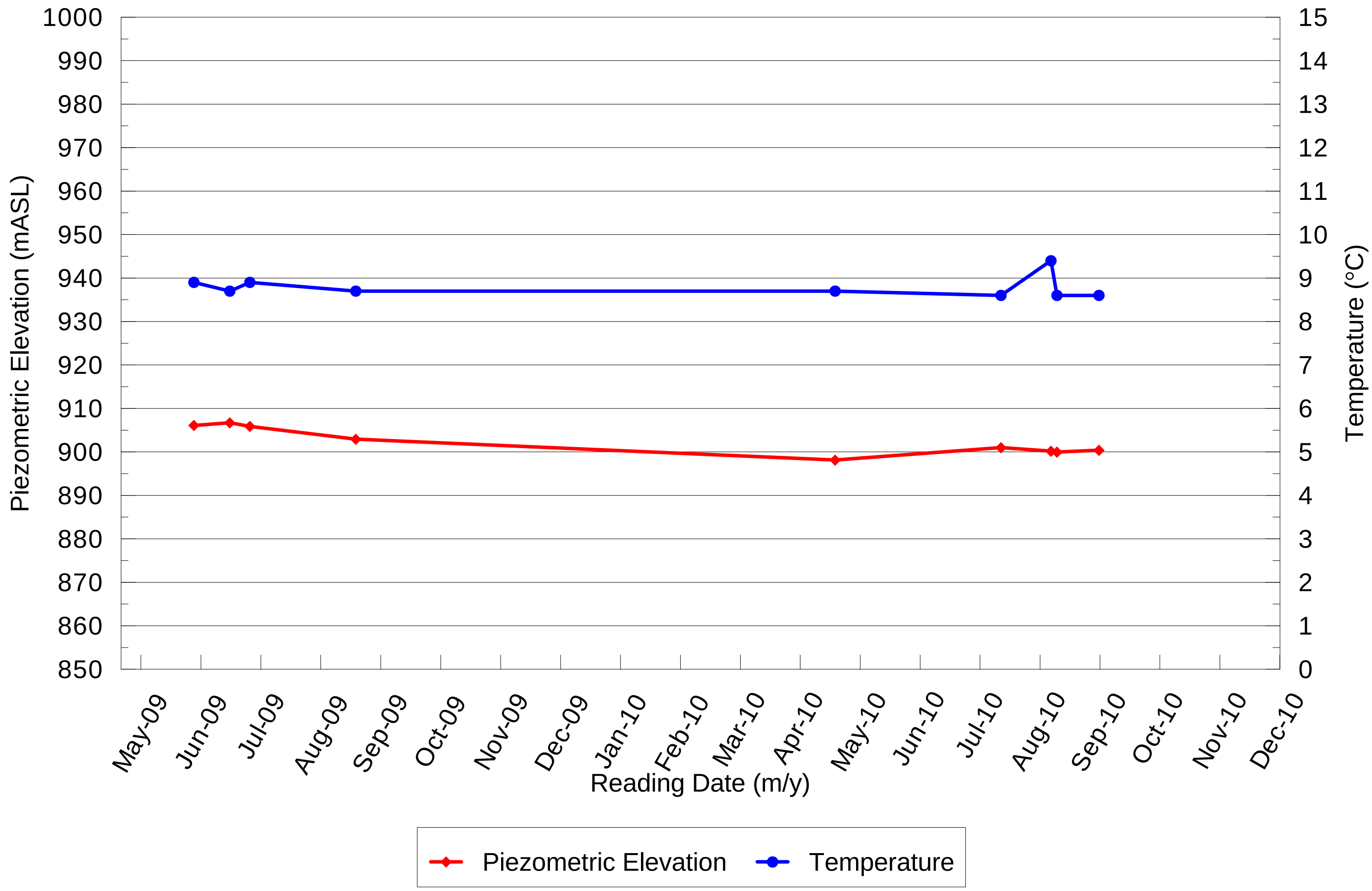

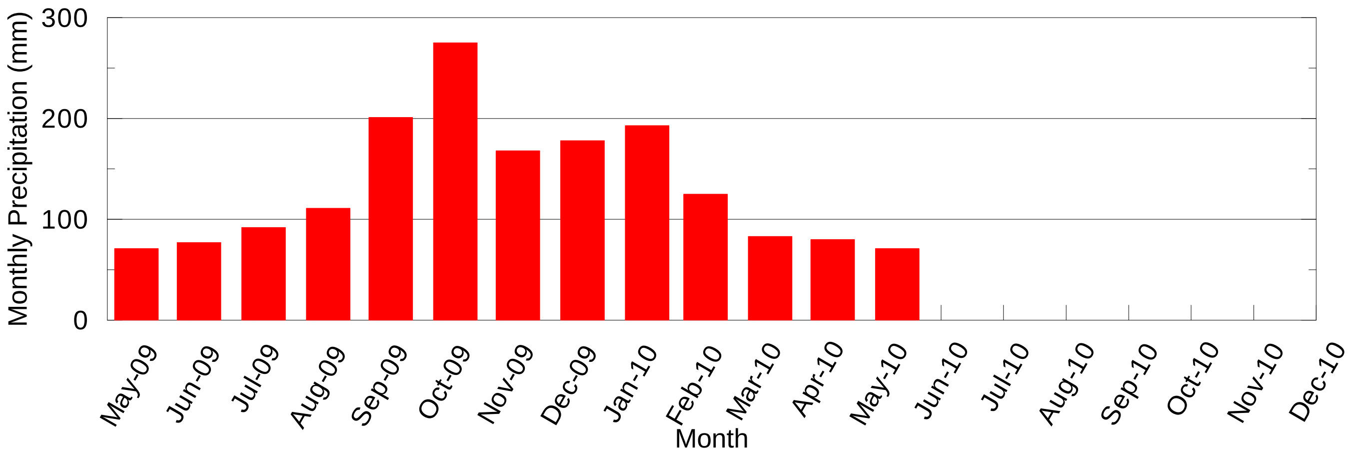

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-096D
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-3	0

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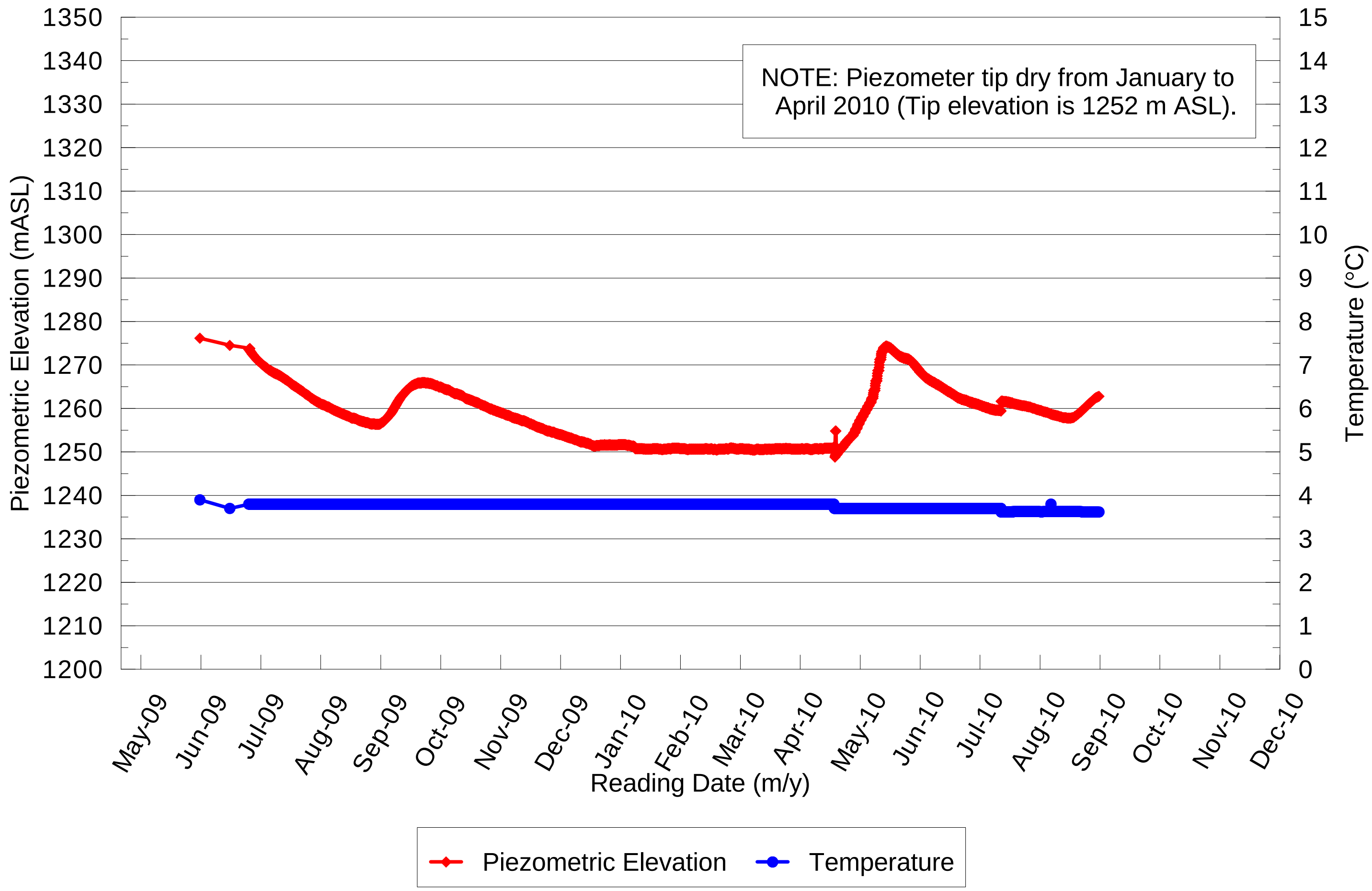

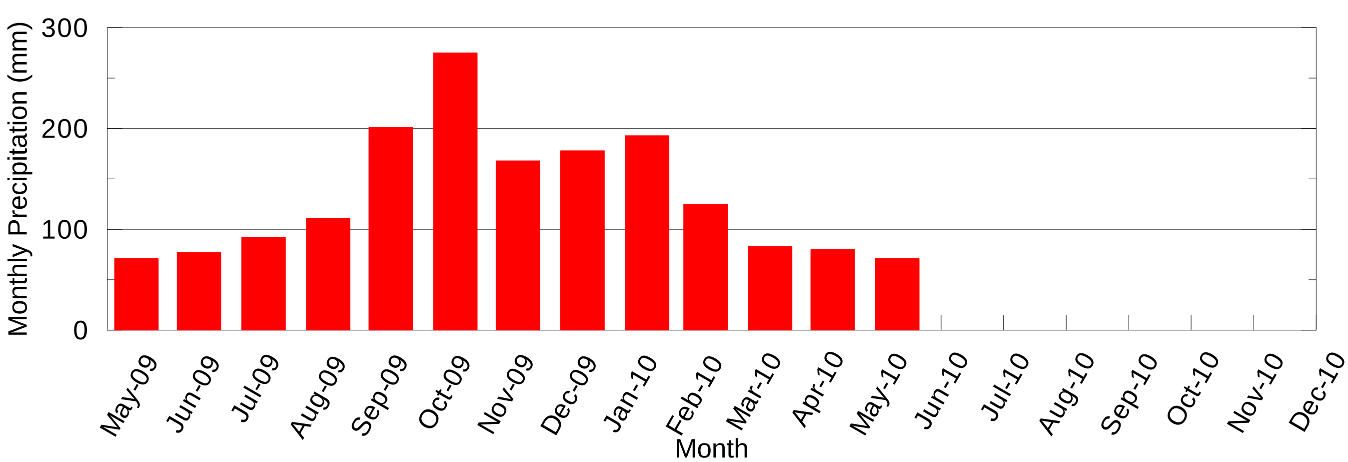

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-097S
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-4	0

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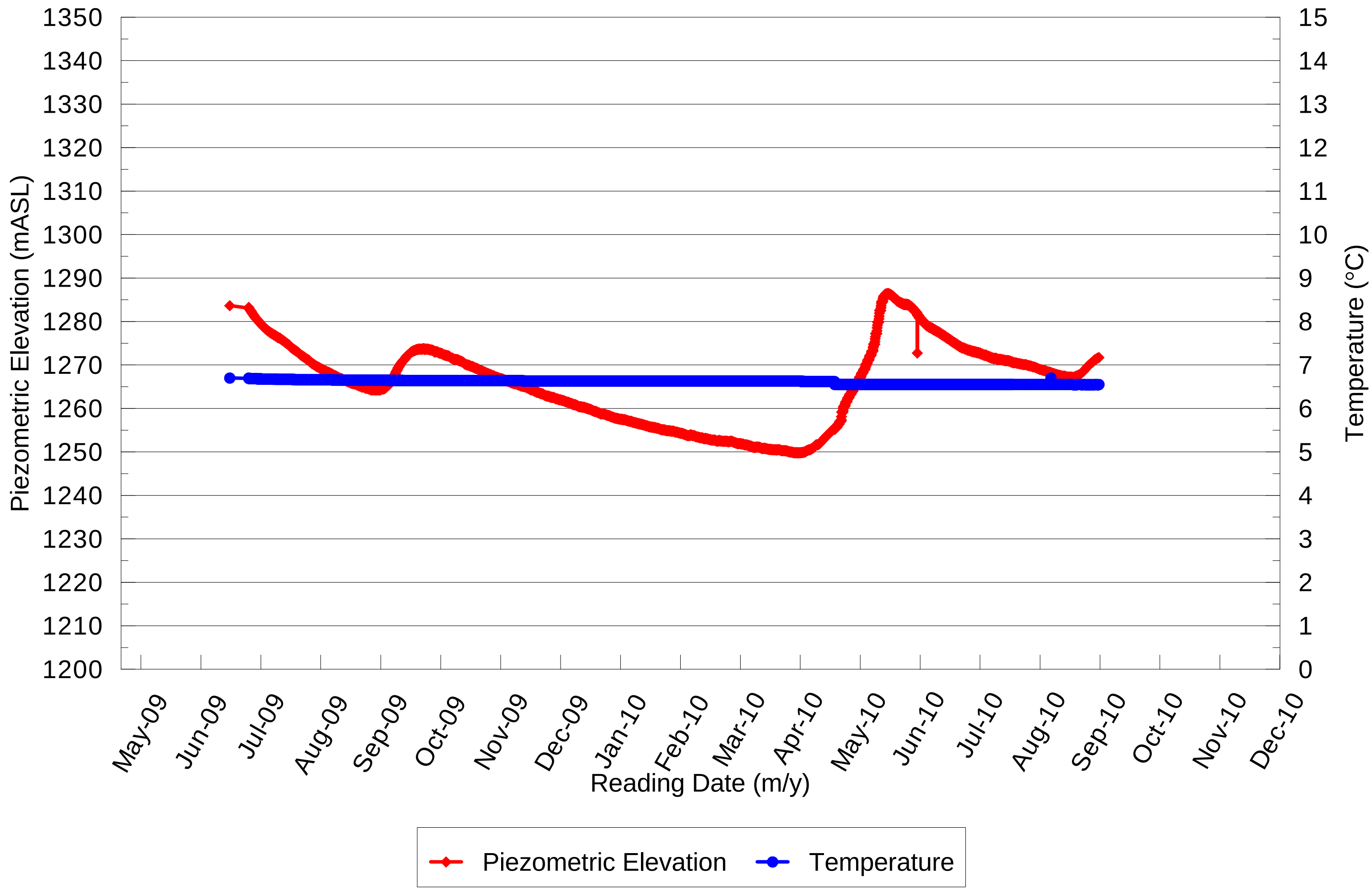

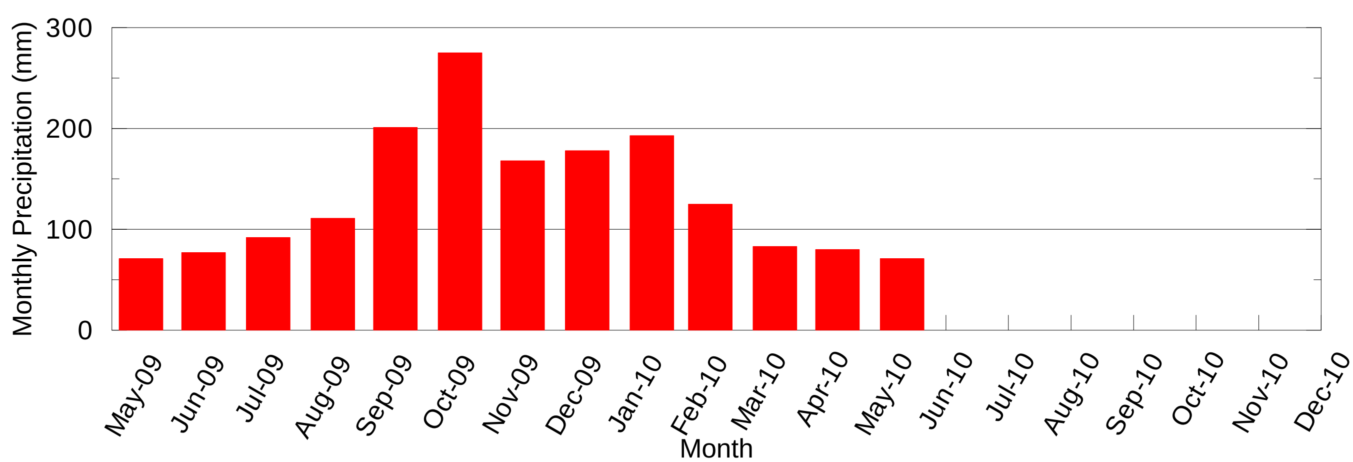

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Edmonton, AB
Phone: (780) 466-0538

PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-097D
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-5	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED NOV 2010

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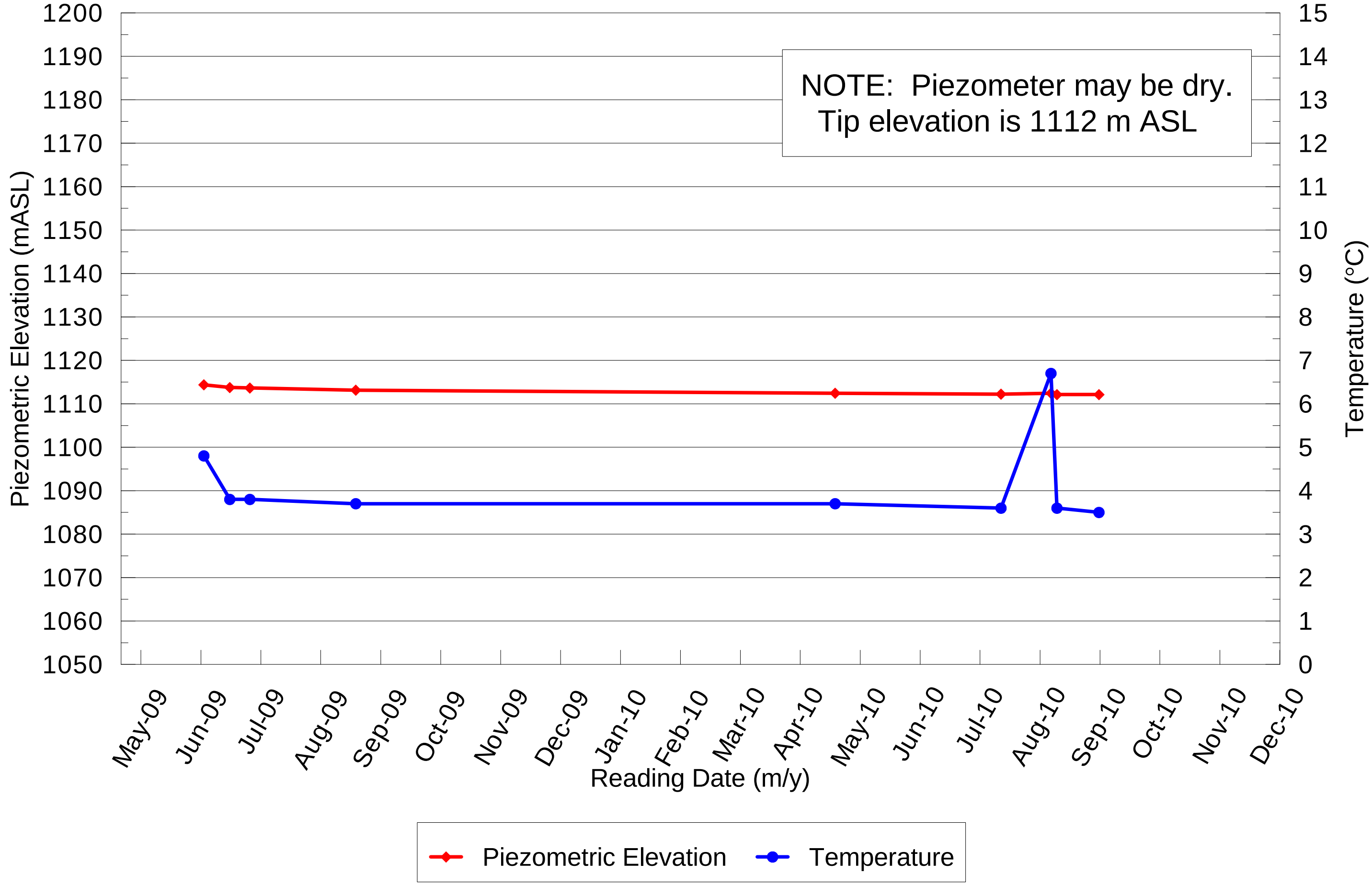

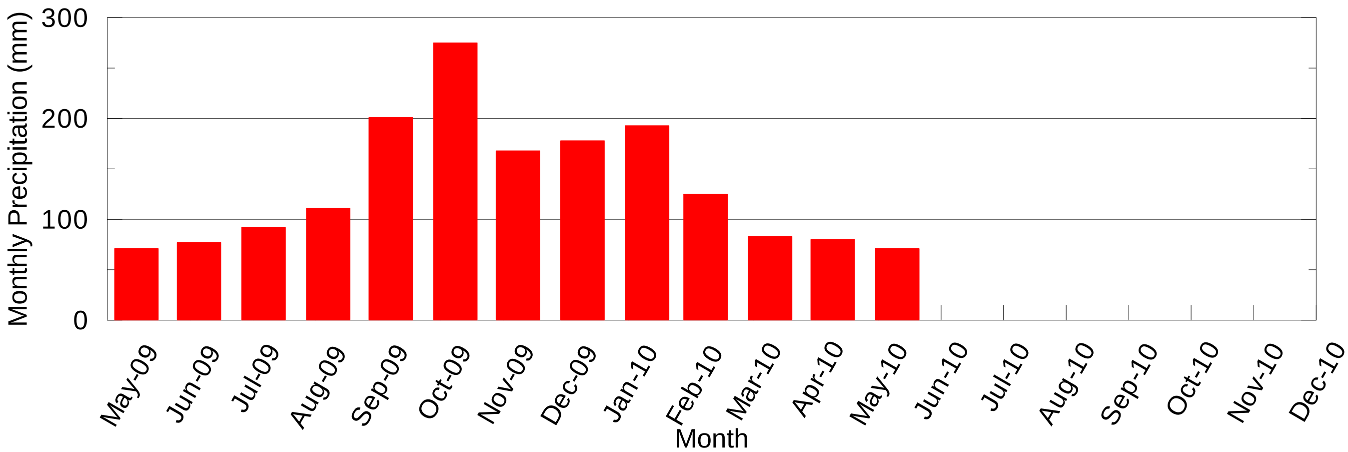

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Edmonton, AB
Phone: (780) 466-0538

PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
M09-098
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-6	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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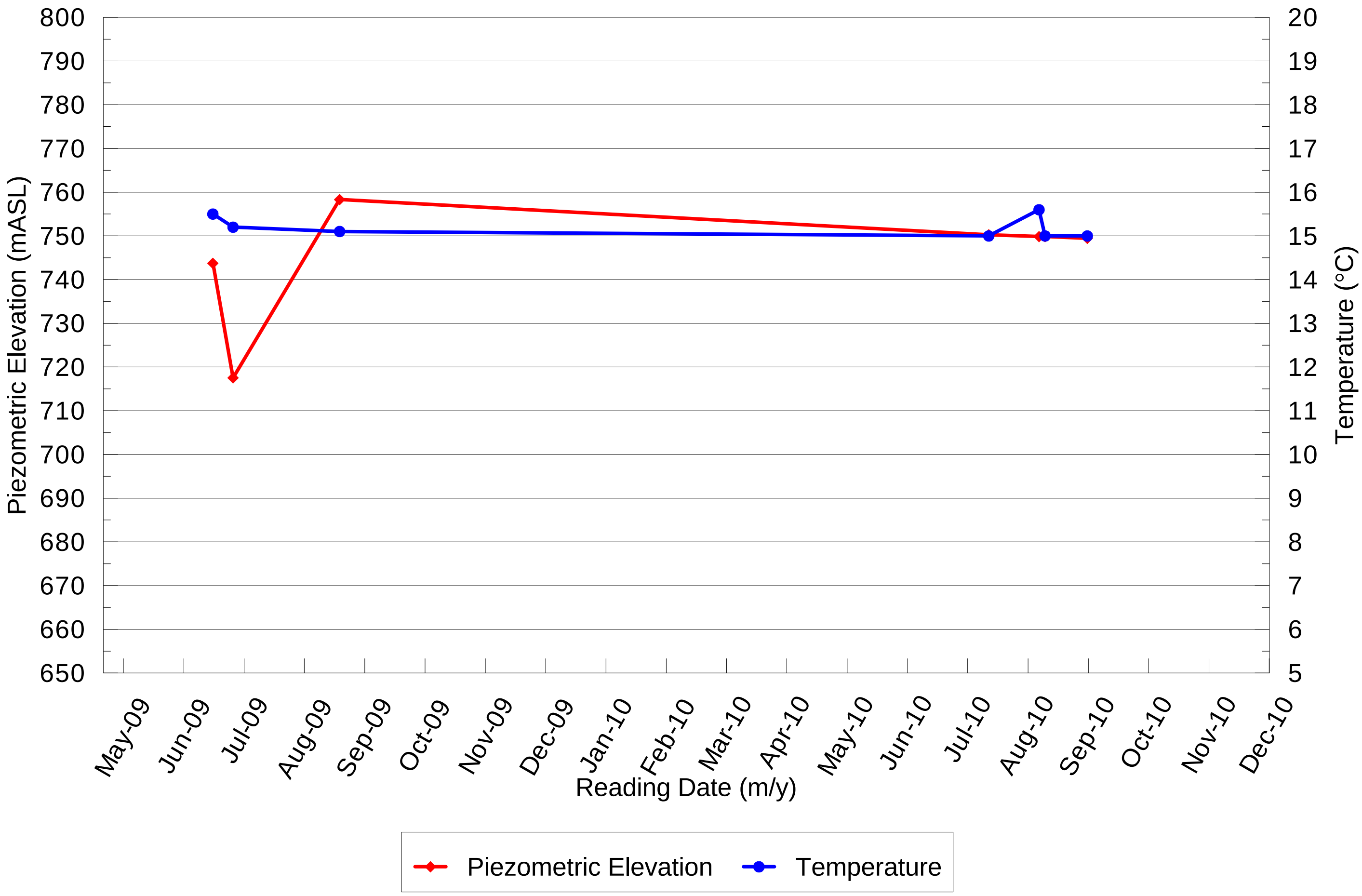

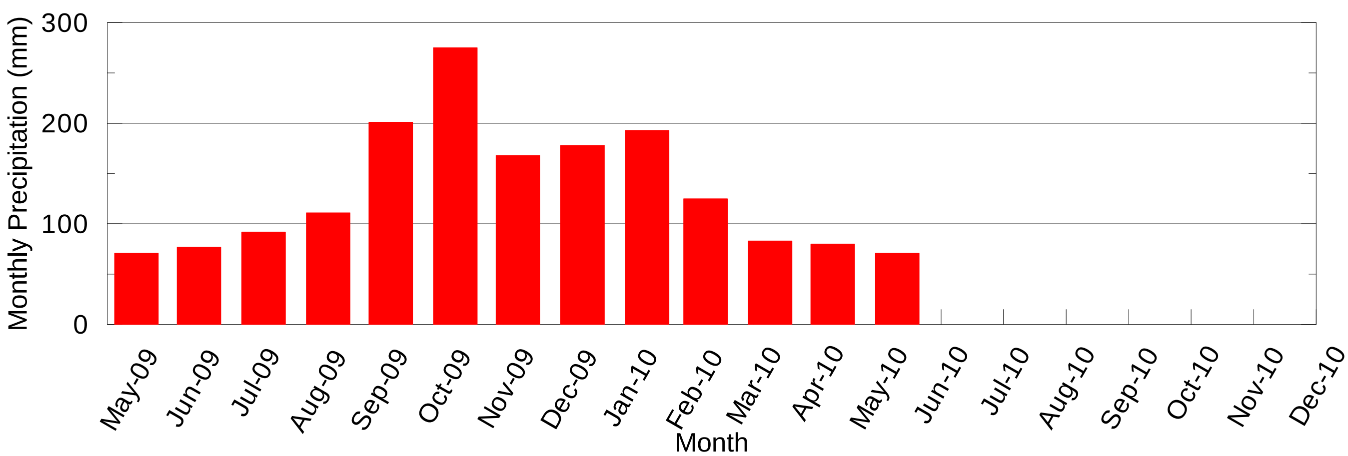

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Edmonton, AB
Phone: (780) 466-0538

PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-099
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-7	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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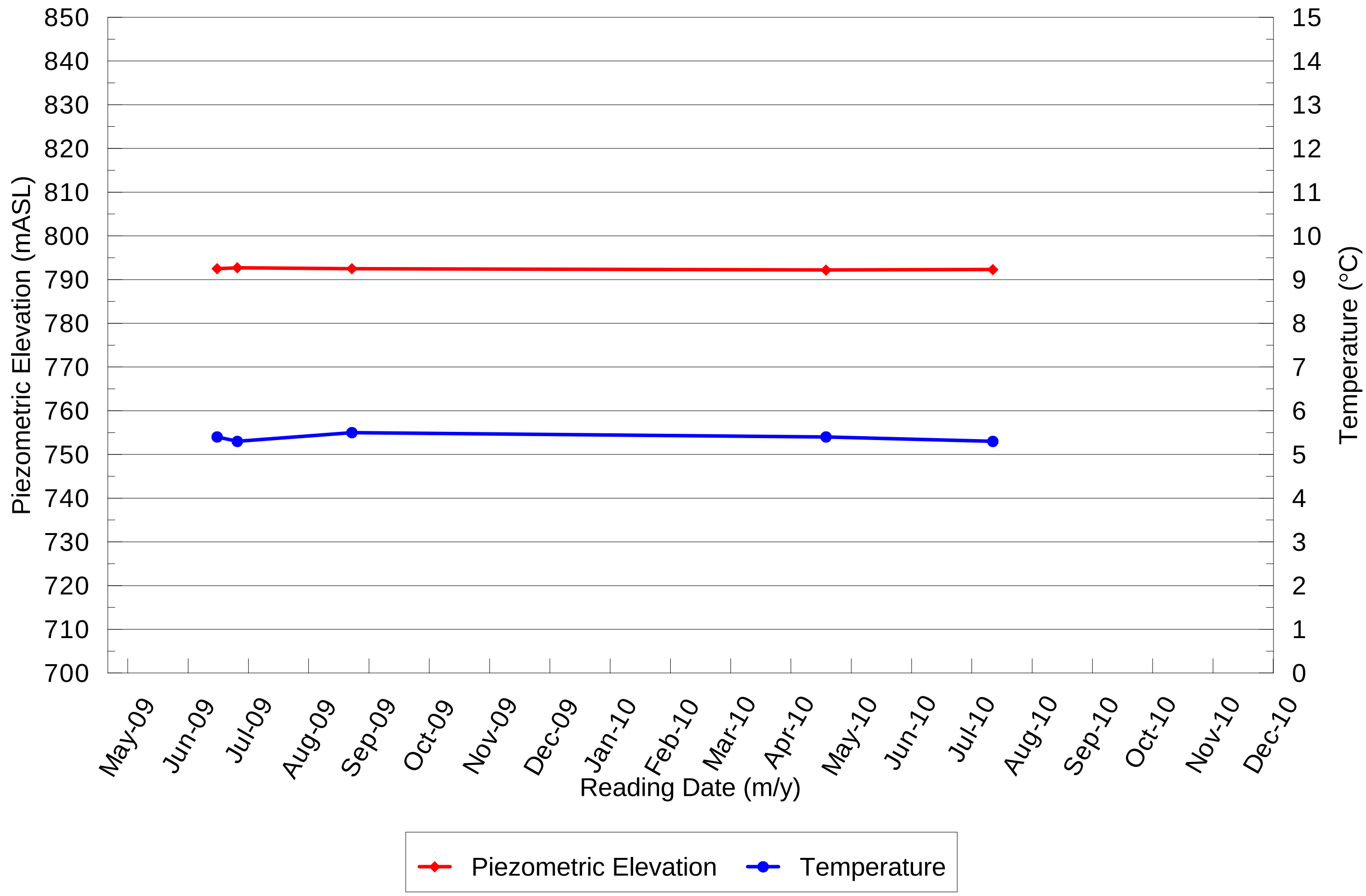

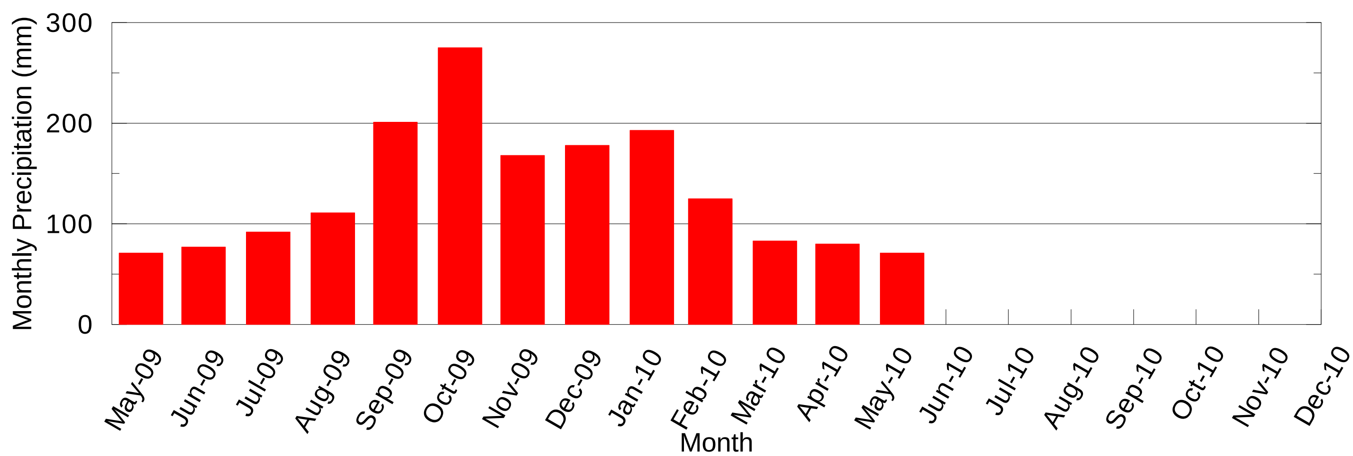

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Edmonton, AB
Phone: (780) 466-0538

PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
M09-100S
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-8	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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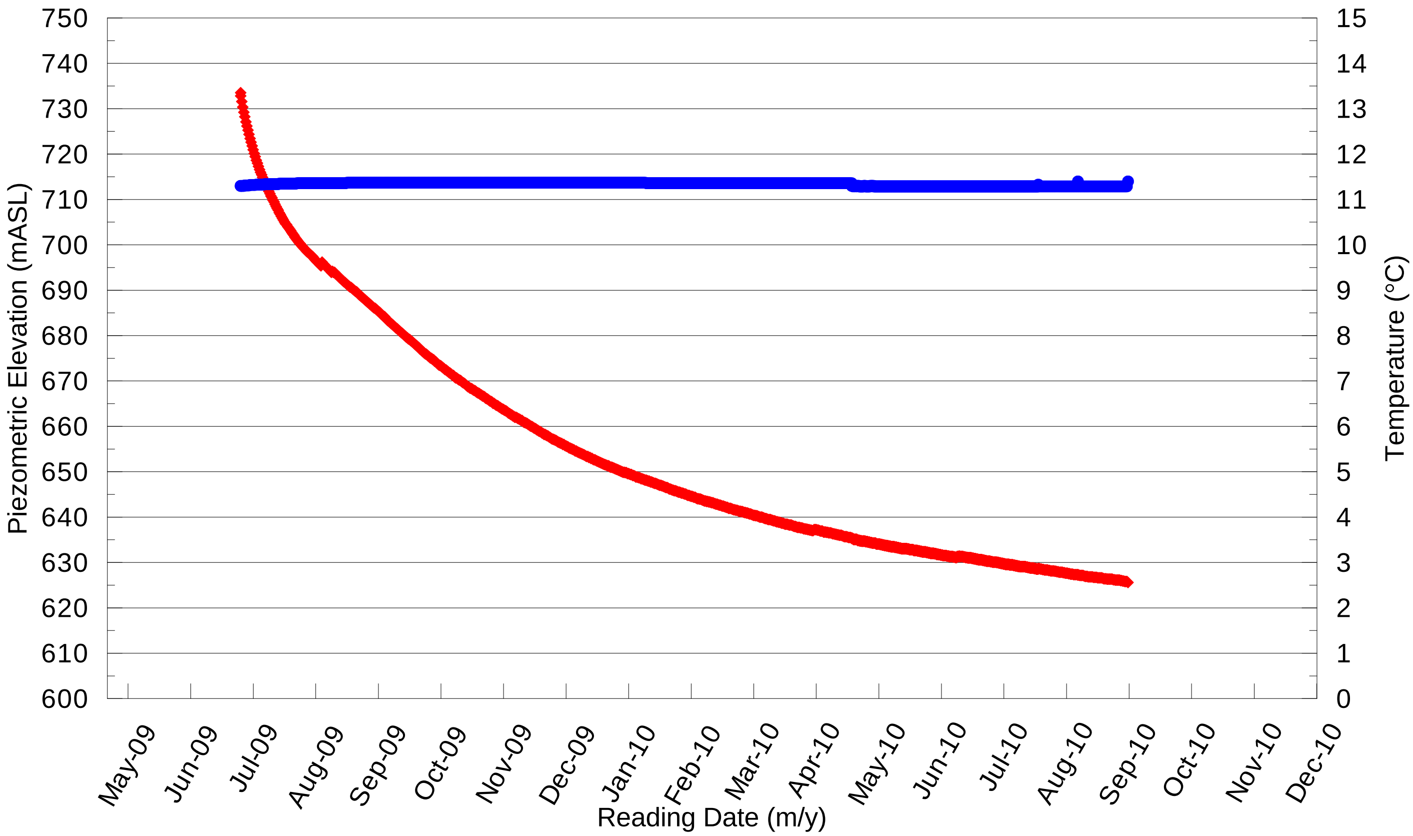

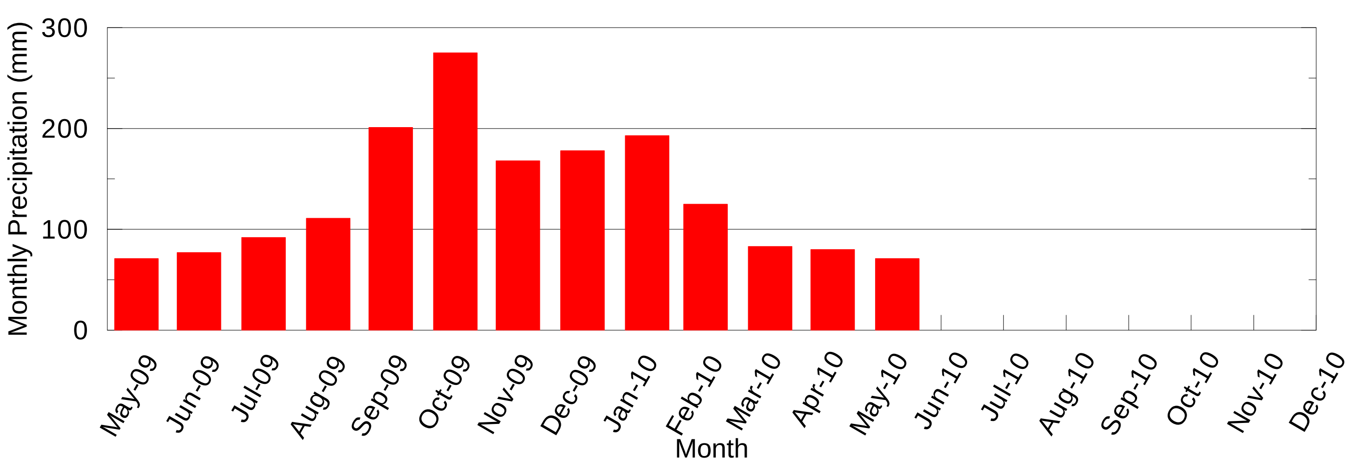

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Phone: (780) 466-0538

PROJECT:
KSM Project
Pre-Feasibility Study Update

TITLE:
M09-100D
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-9	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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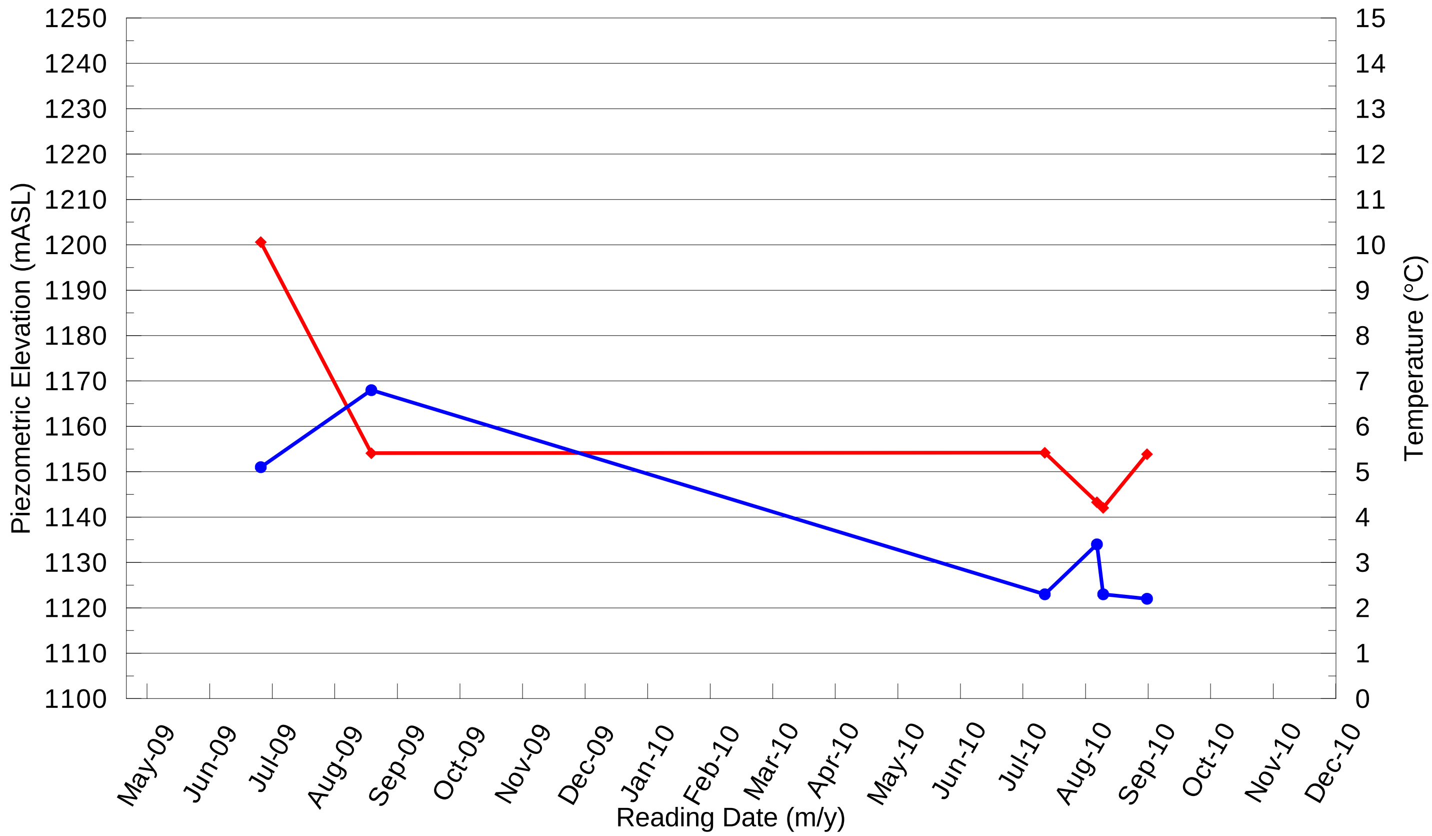

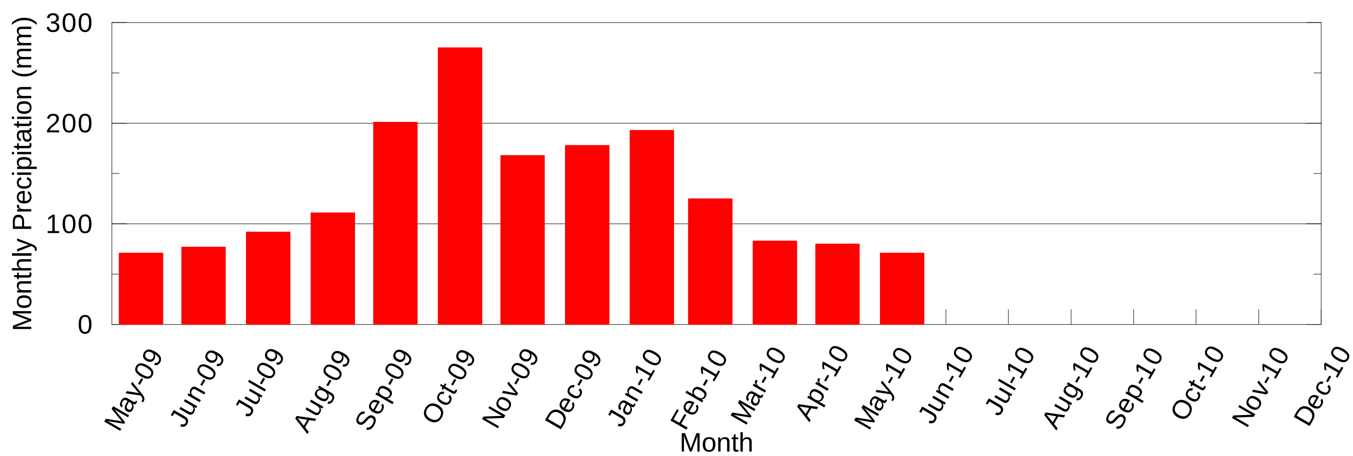

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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

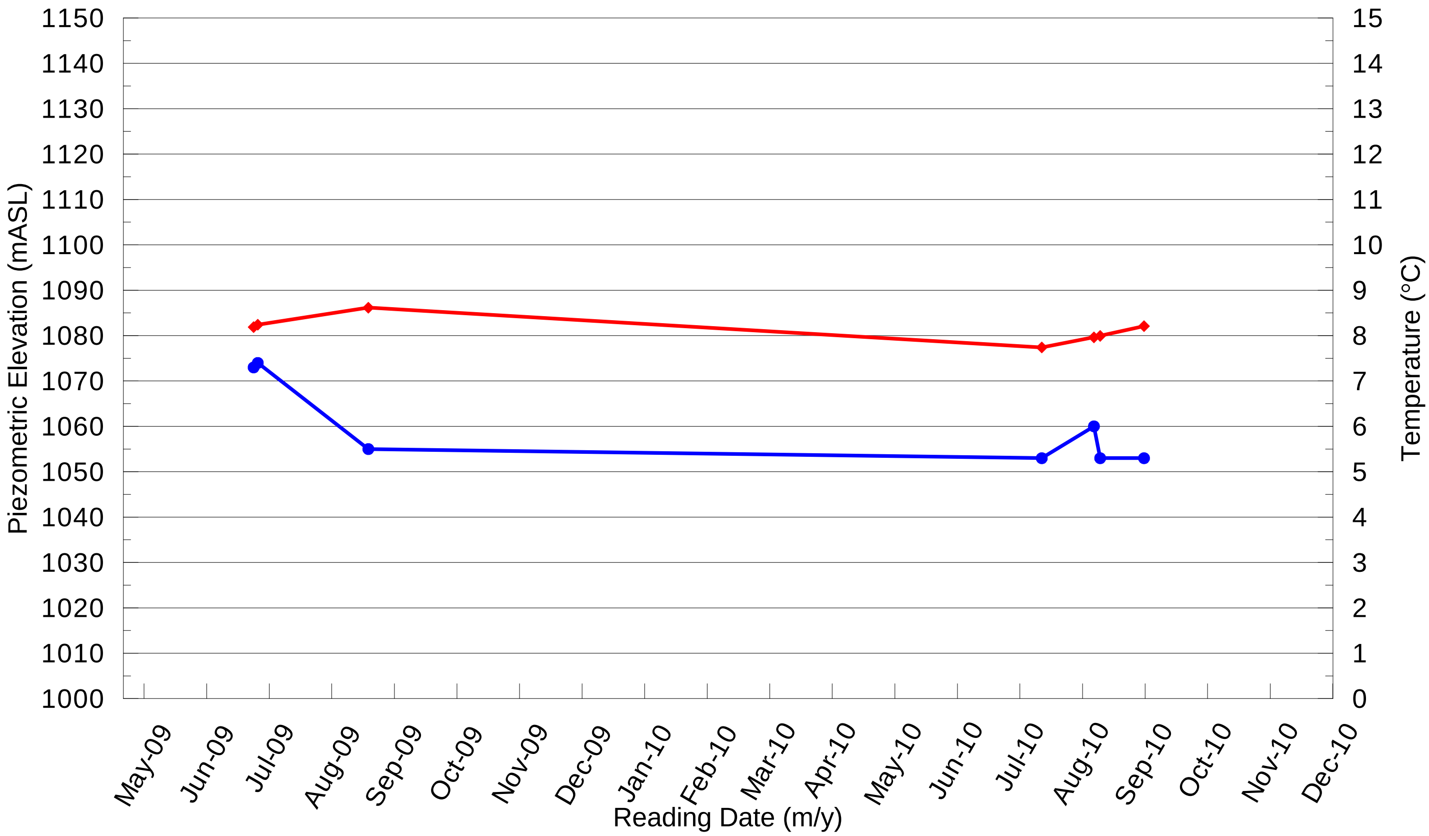
TITLE:
M09-101
Piezometric Elevation and Temperature

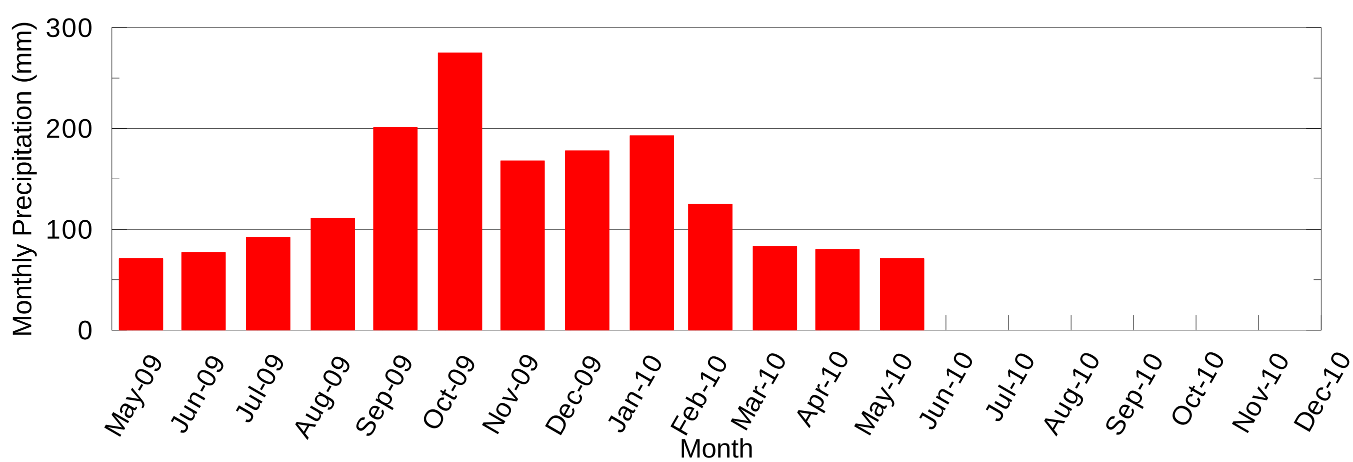
CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-10	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 11262 - Piezometer Elevation Plot.grf





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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: M09-102a
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-11	0

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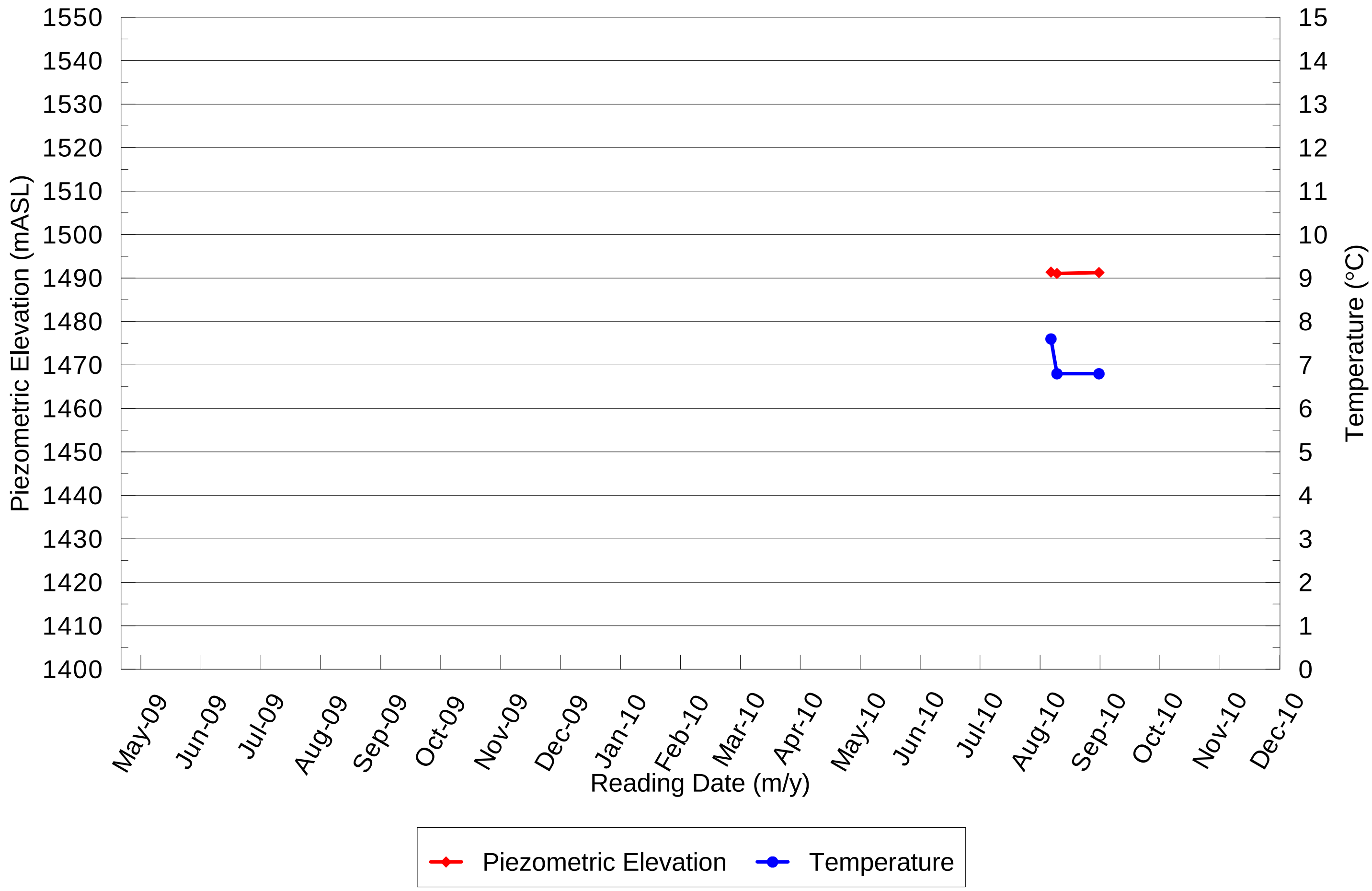
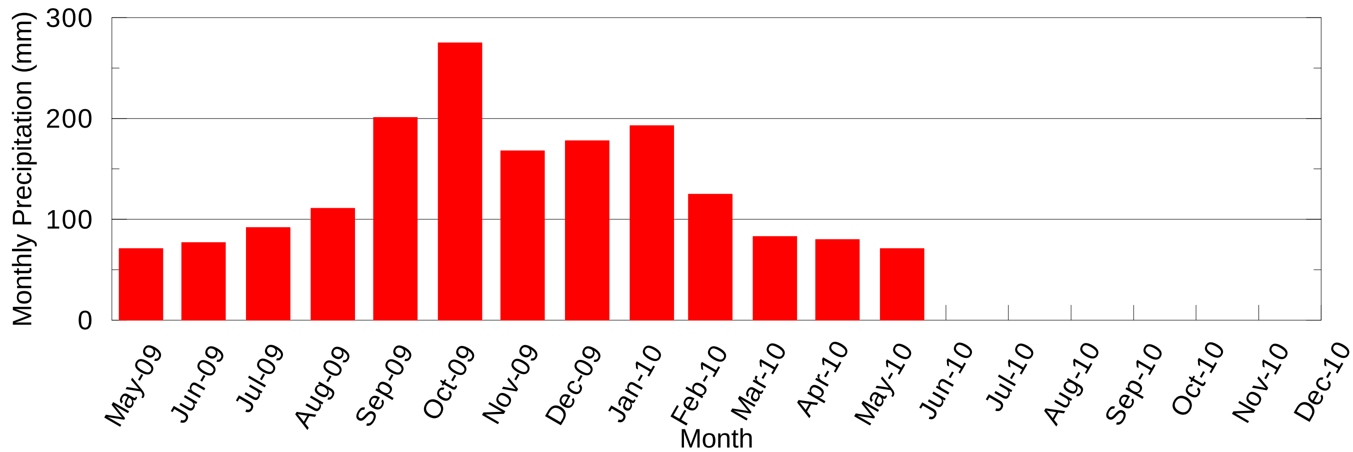
DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011





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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
M10-121
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-12	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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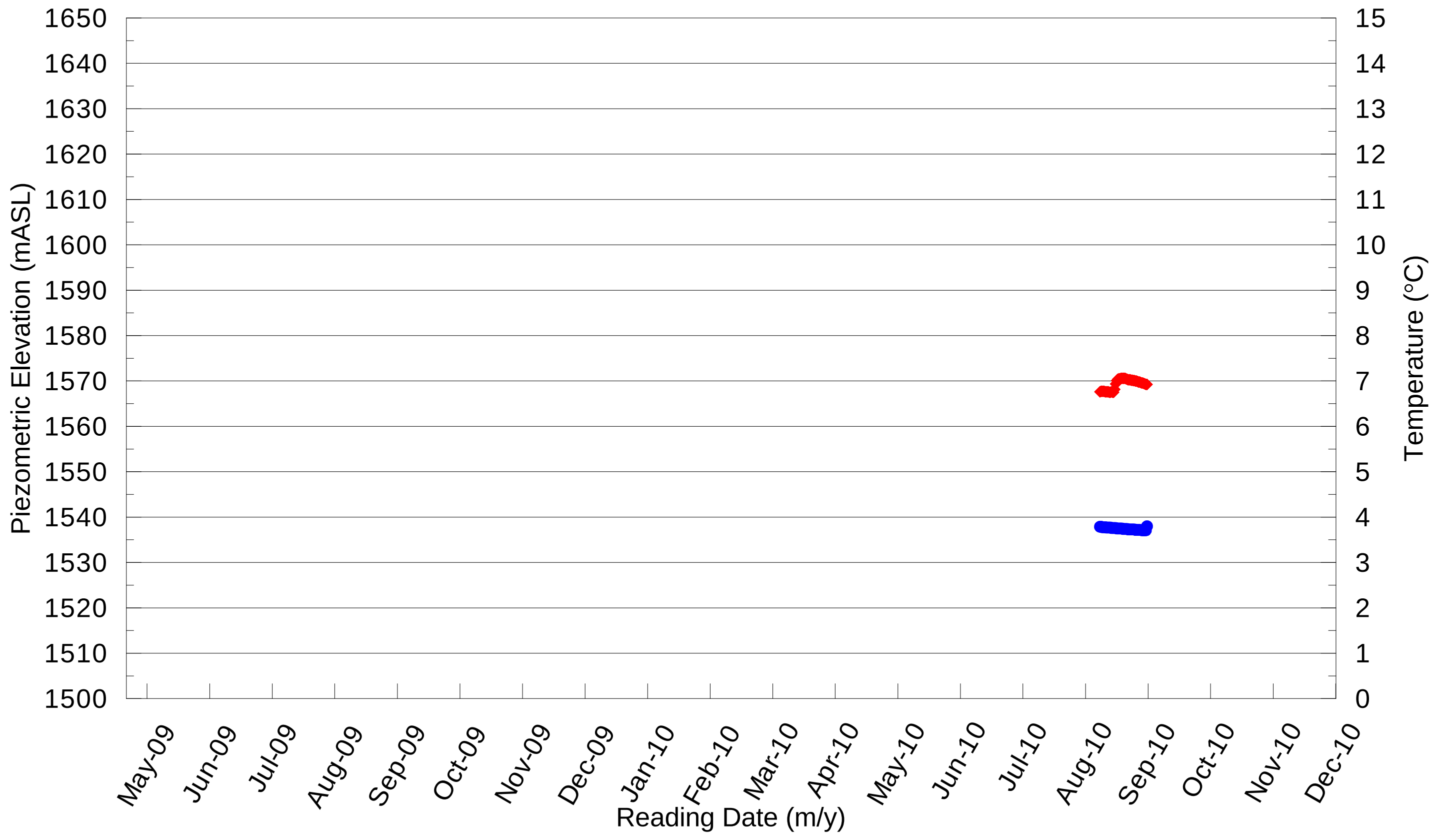

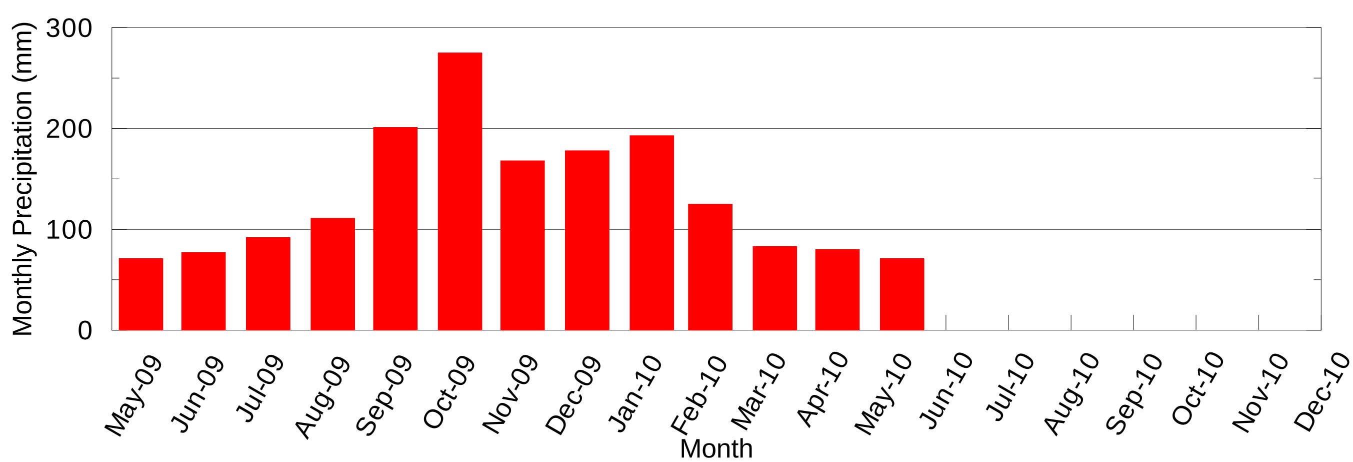

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Edmonton, AB Phone: (780) 466-0538

PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: S10-27S
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-13	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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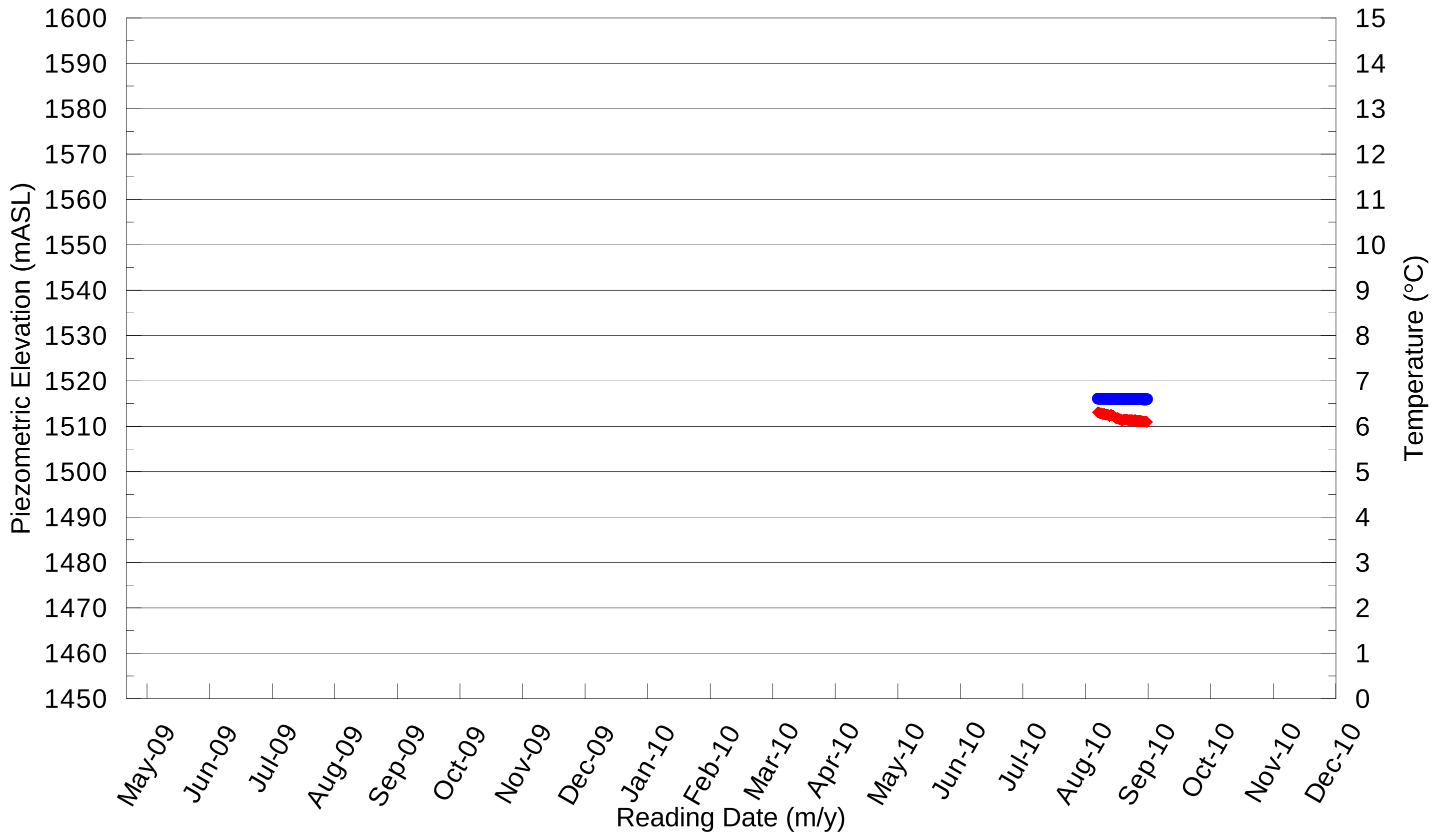

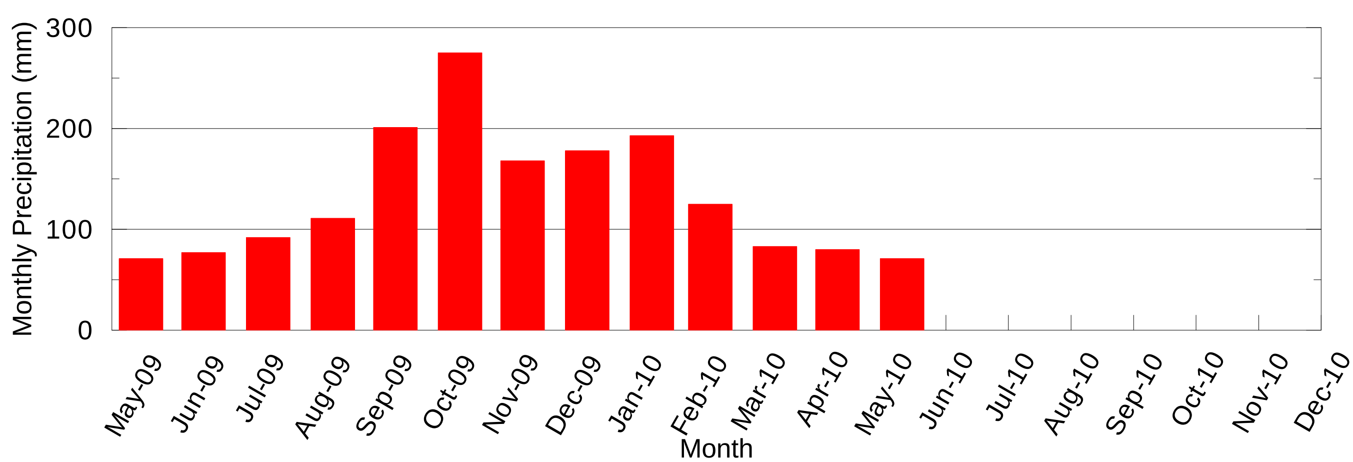

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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

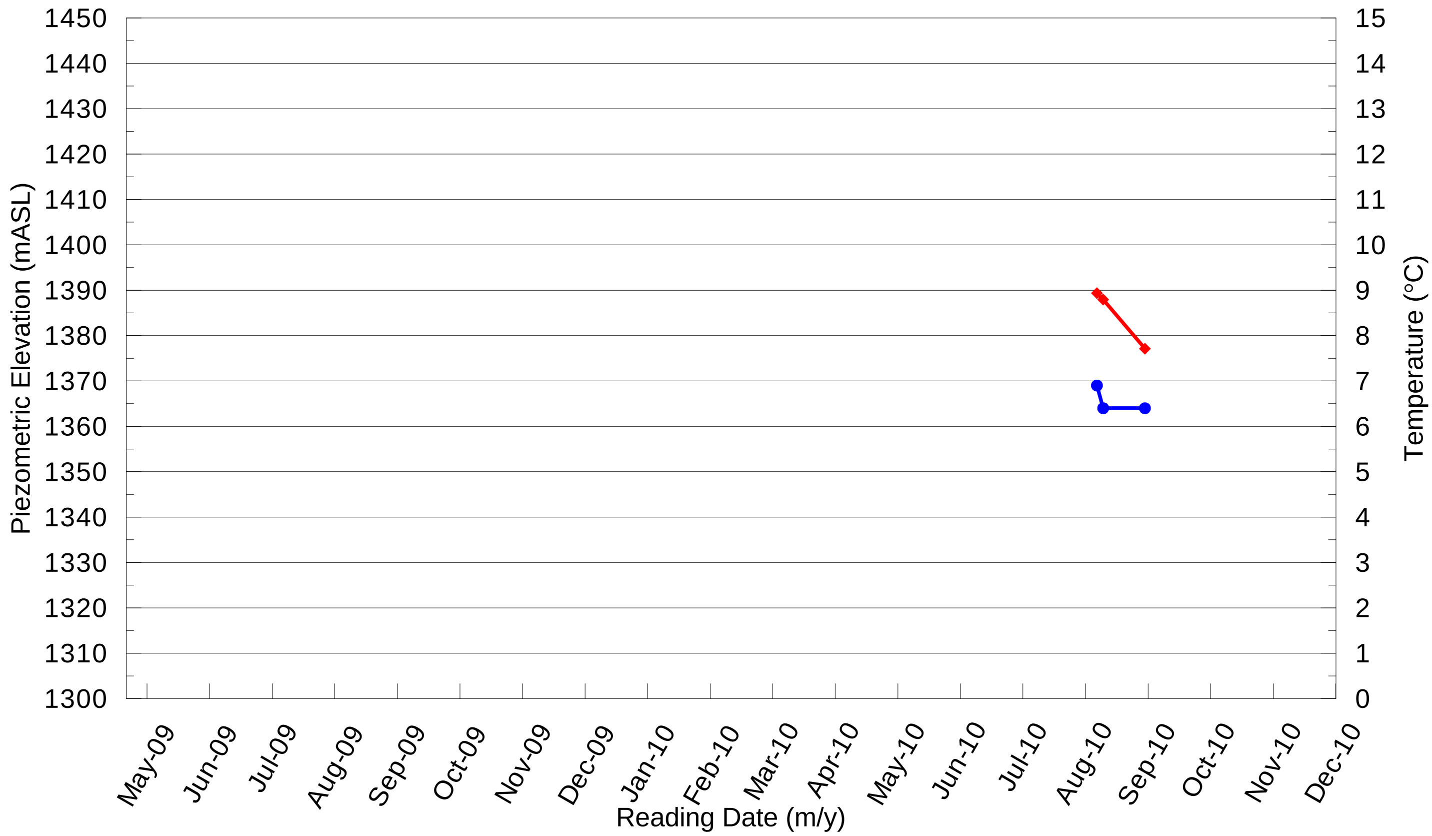
TITLE:
S10-27D
Piezometric Elevation and Temperature

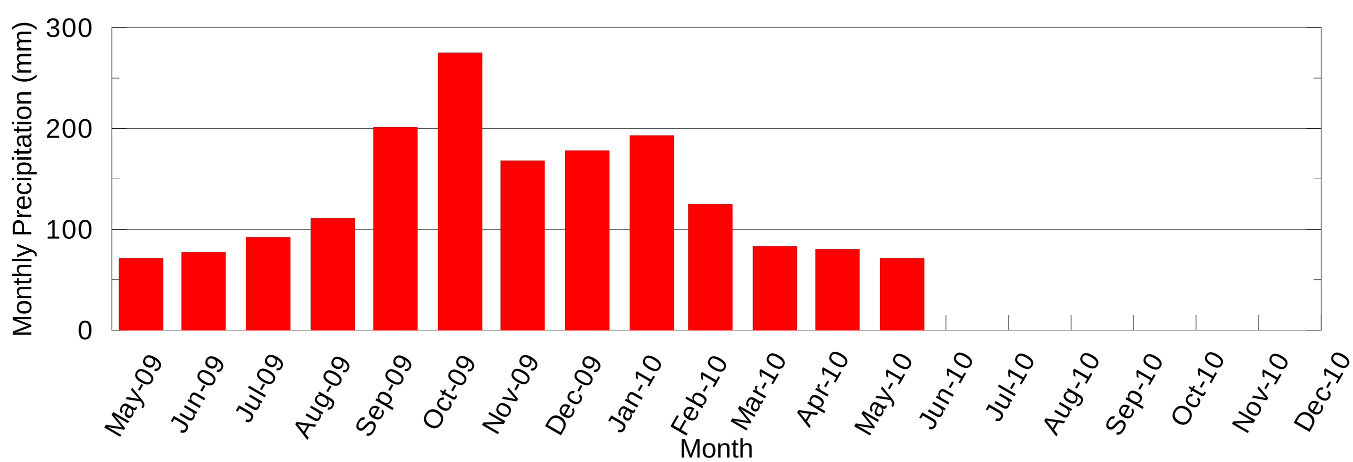
CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-14	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 14552 - Piezometer Elevation Plot.grf

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011





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Phone: (780) 466-0538

PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
S10-30
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-15	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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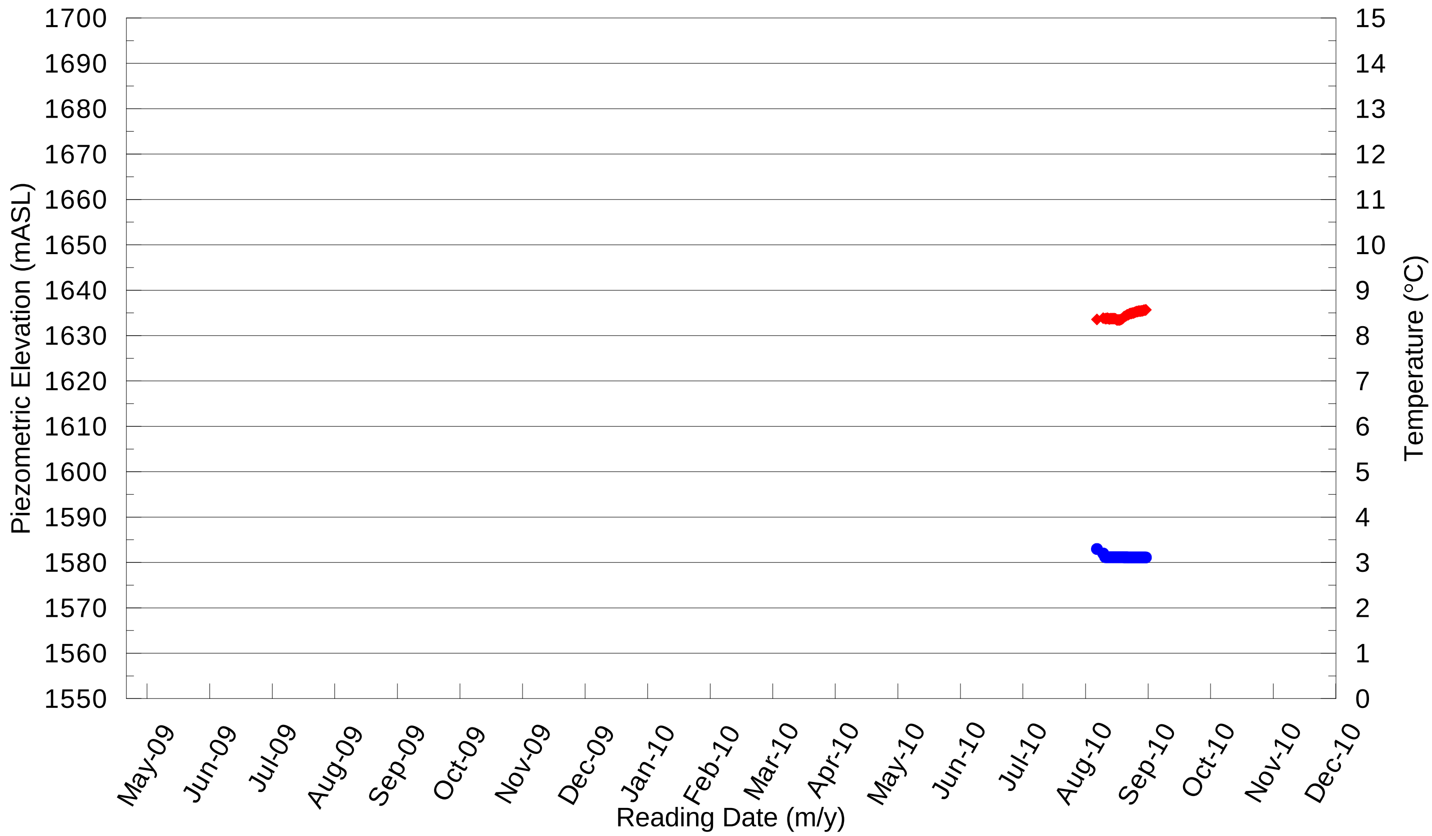

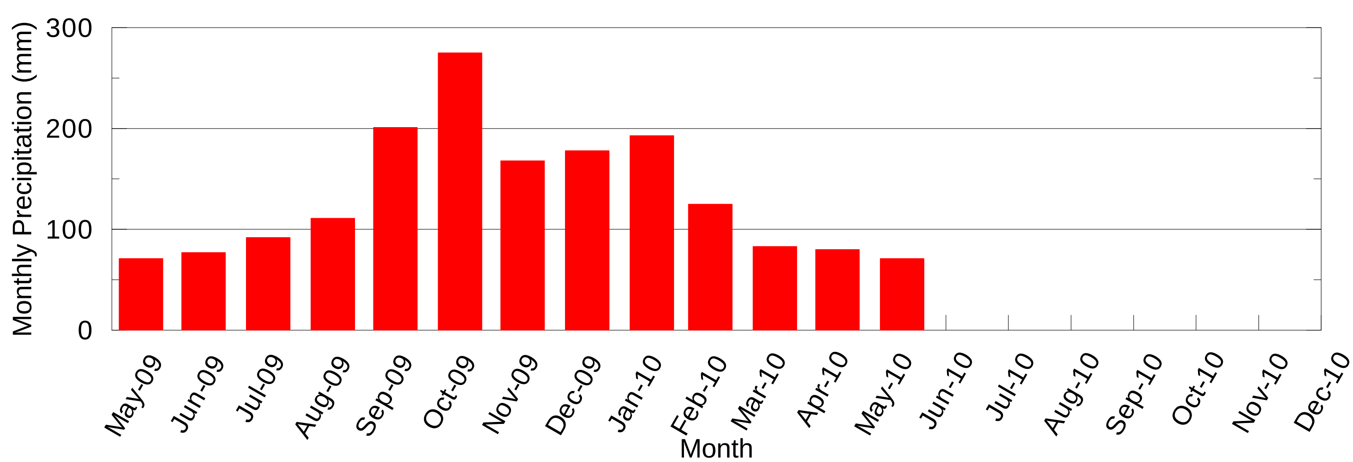

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: S10-31
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-16	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 14890 - Piezometer Elevation Plot.grf

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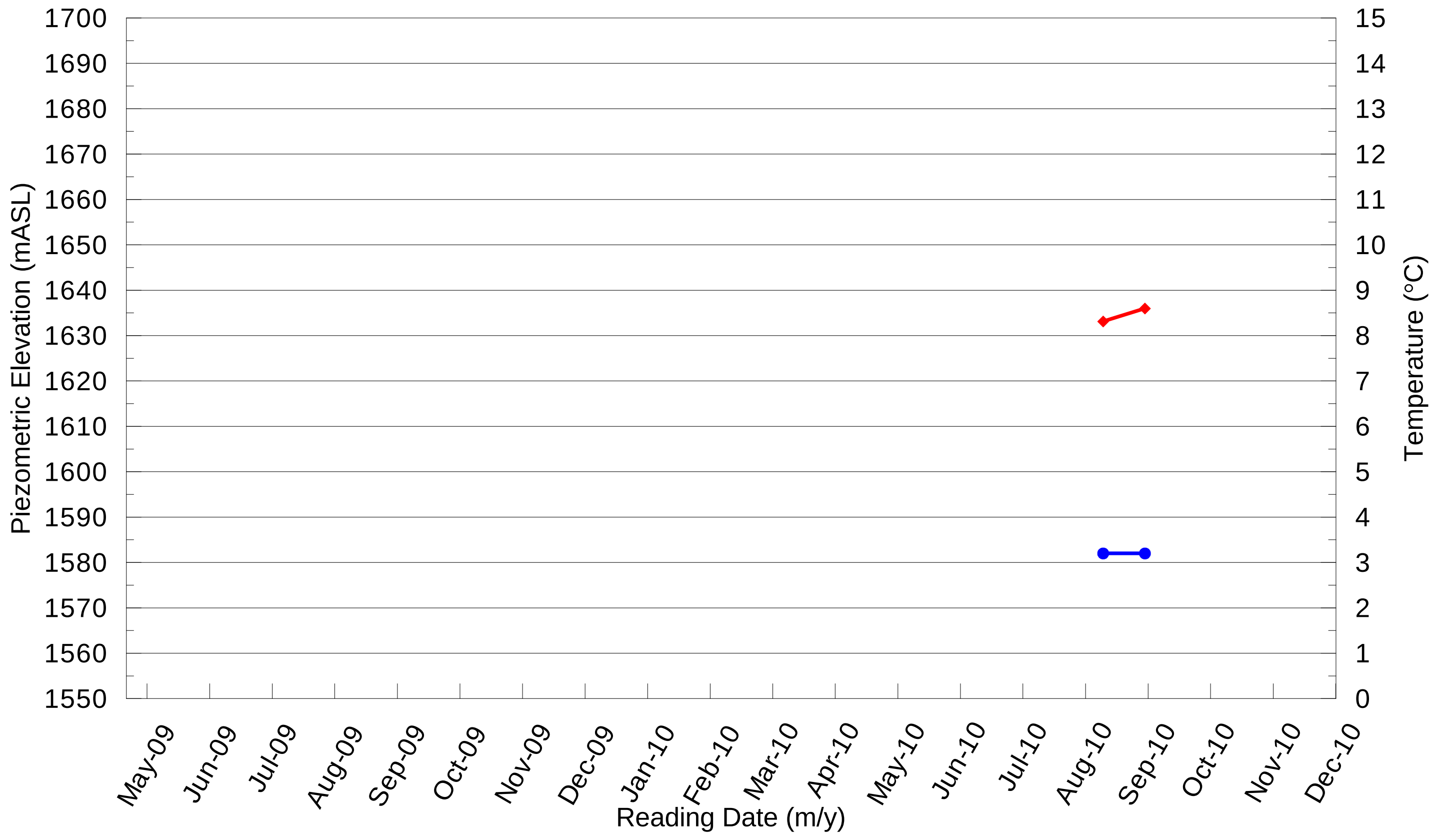

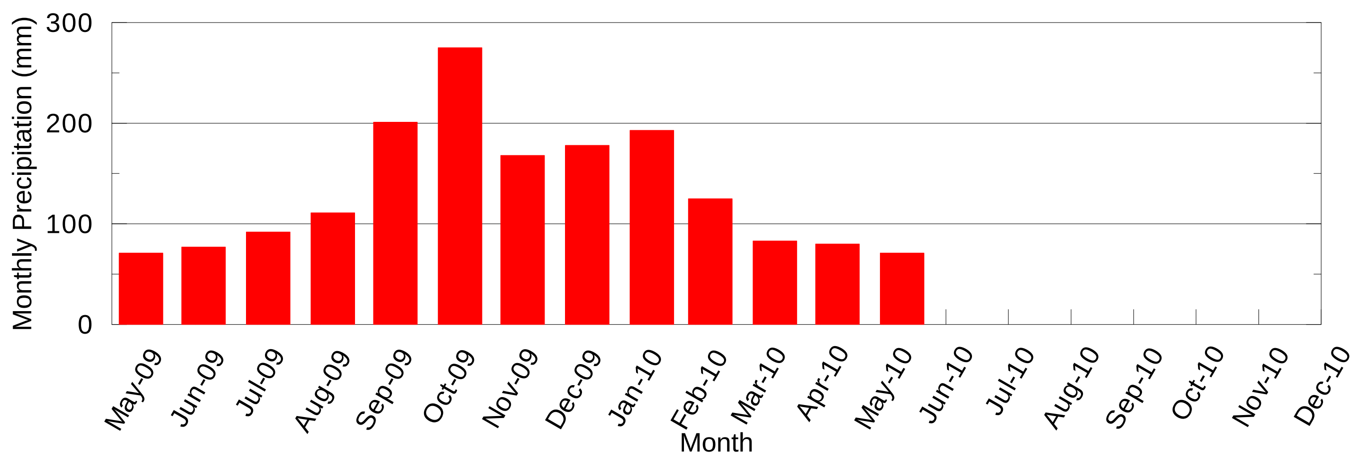

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	DKR	APPROVED:	RT

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Edmonton, AB
Phone: (780) 466-0538

PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: S10-32
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-17	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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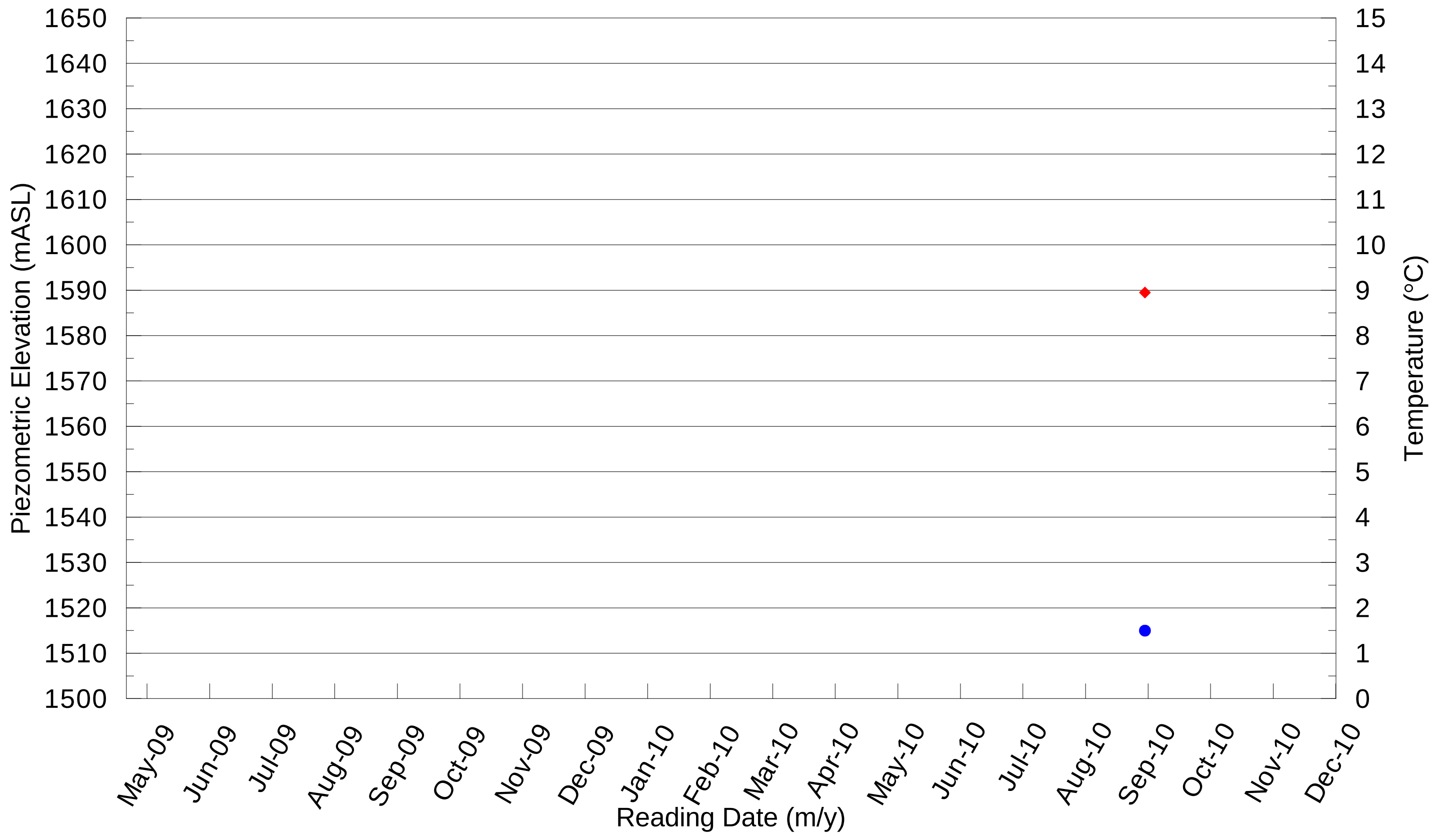

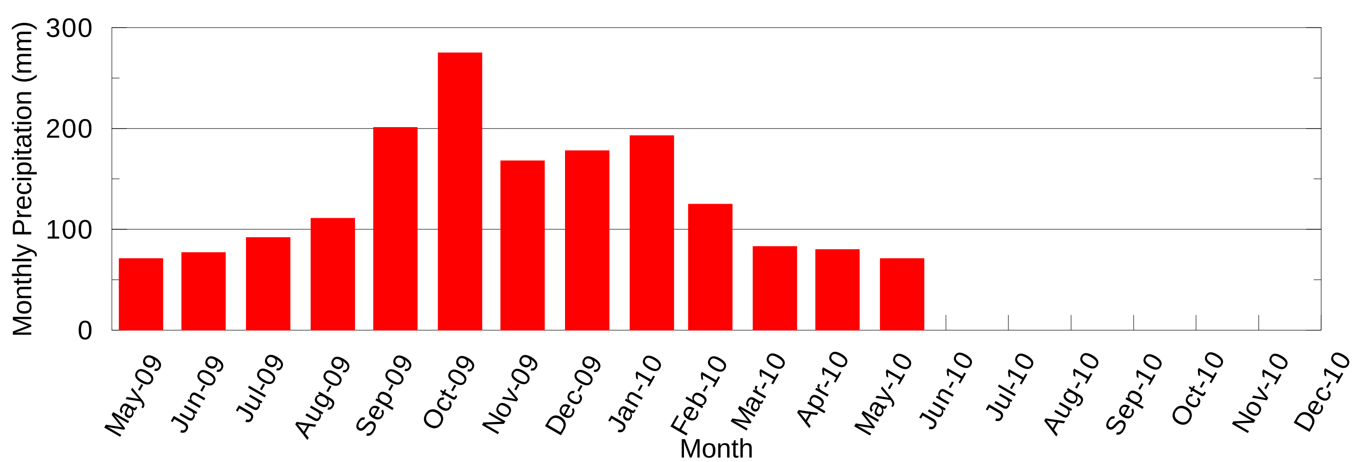

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Phone: (780) 466-0538

PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

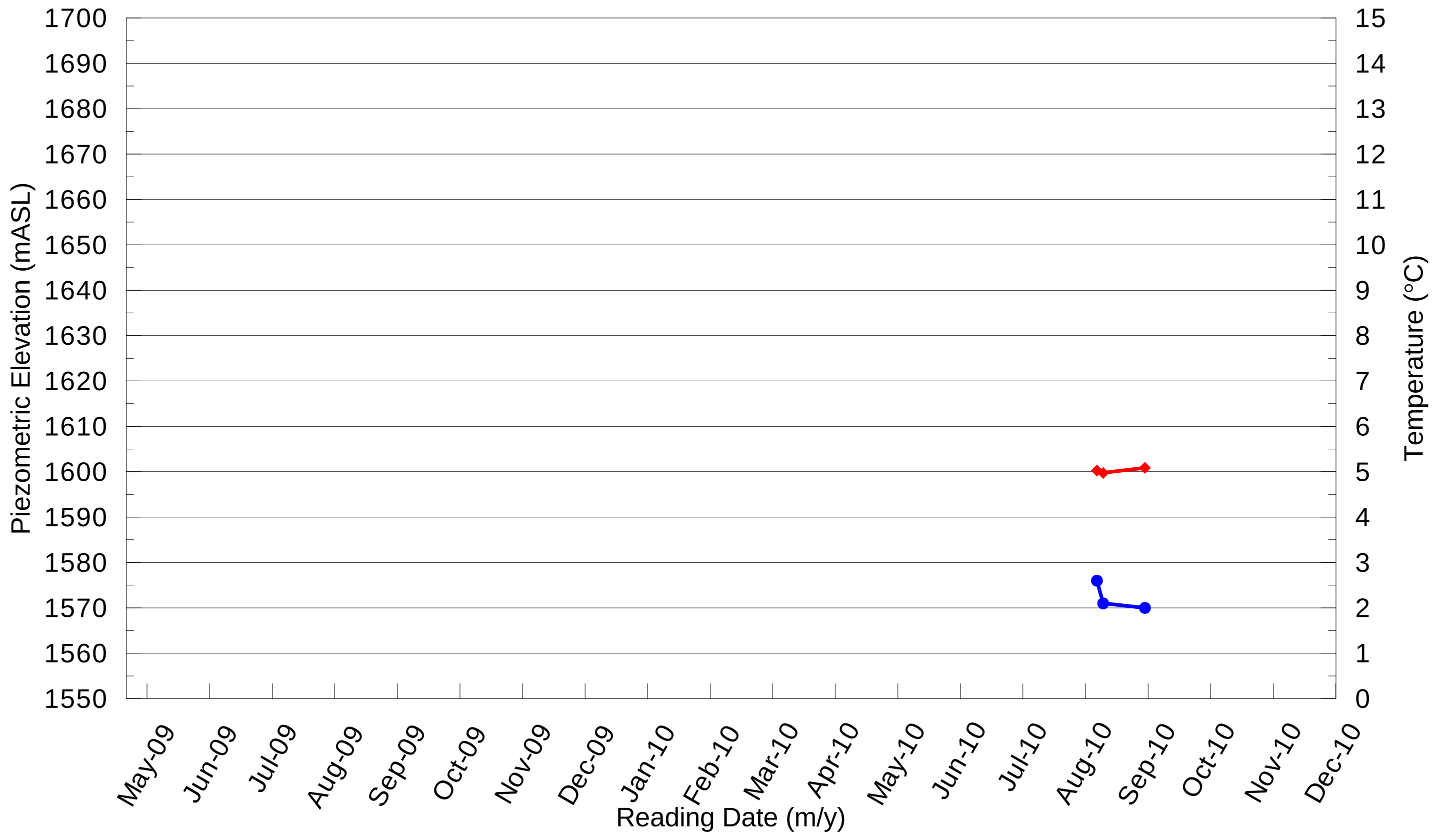
TITLE: S10-33S
Piezometric Elevation and Temperature

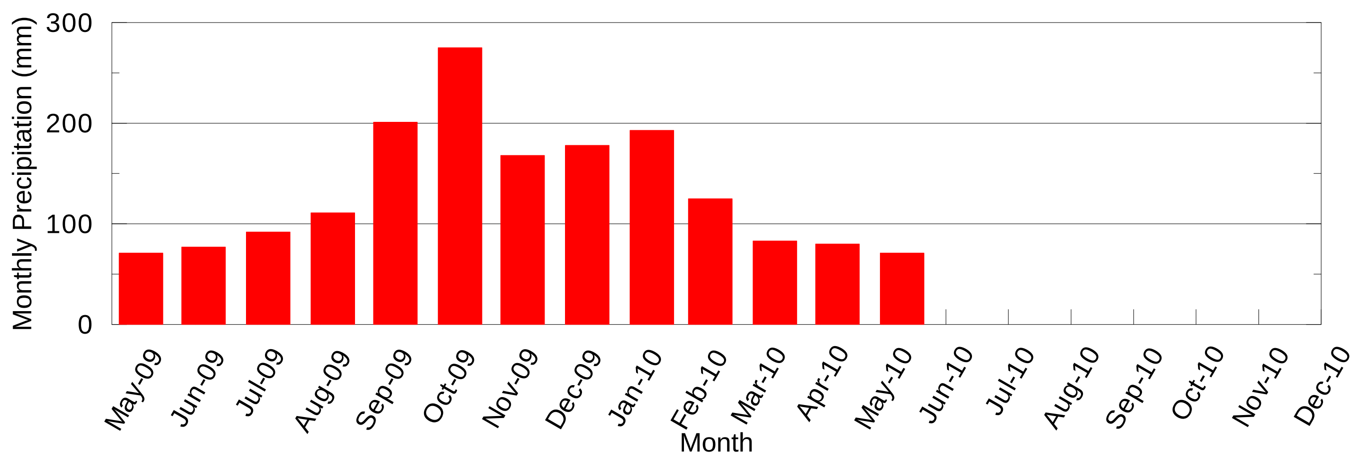
CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-18	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 14895 - Piezometer Elevation Plot.grf

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011





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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
S10-33D
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-19	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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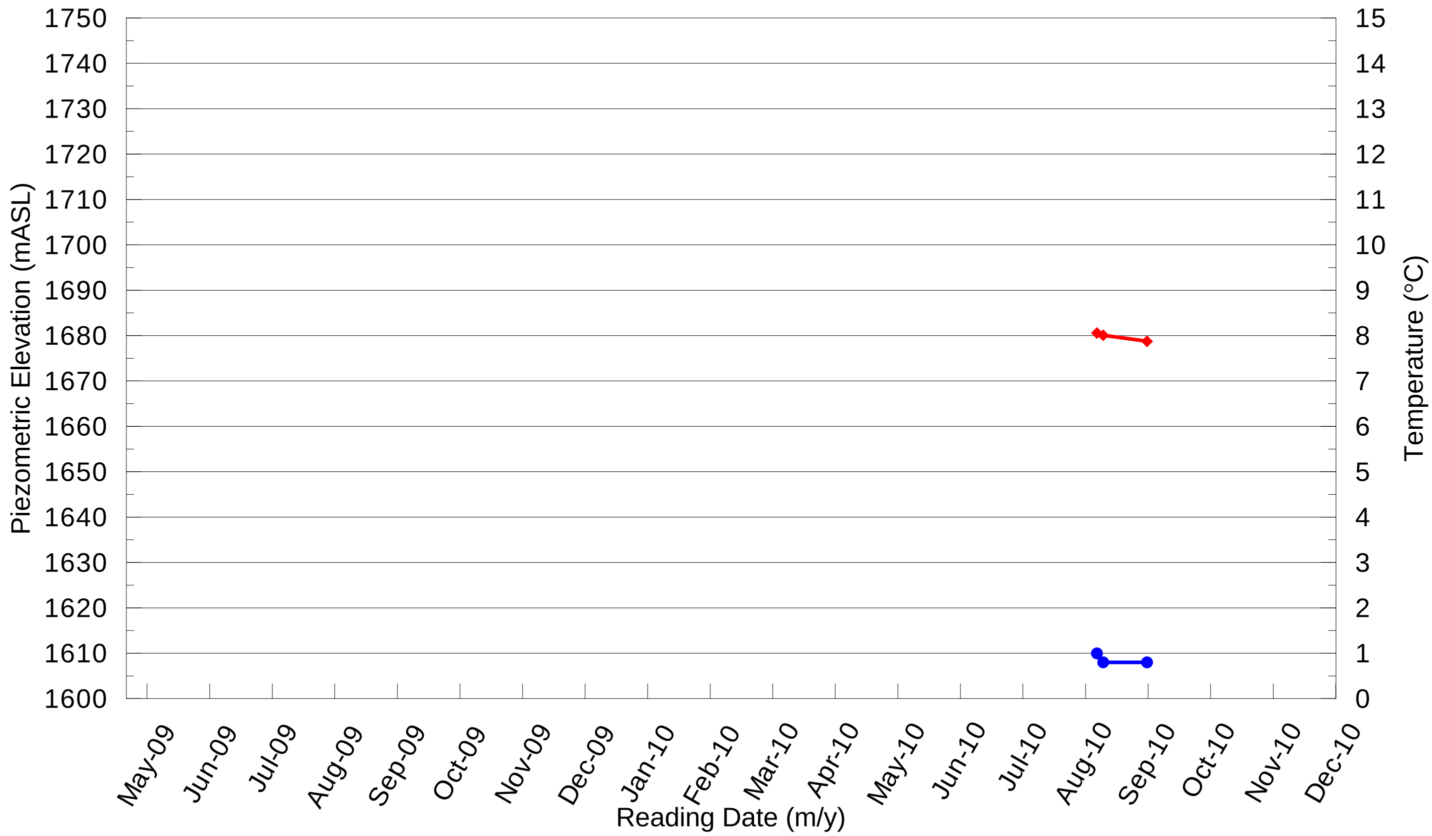

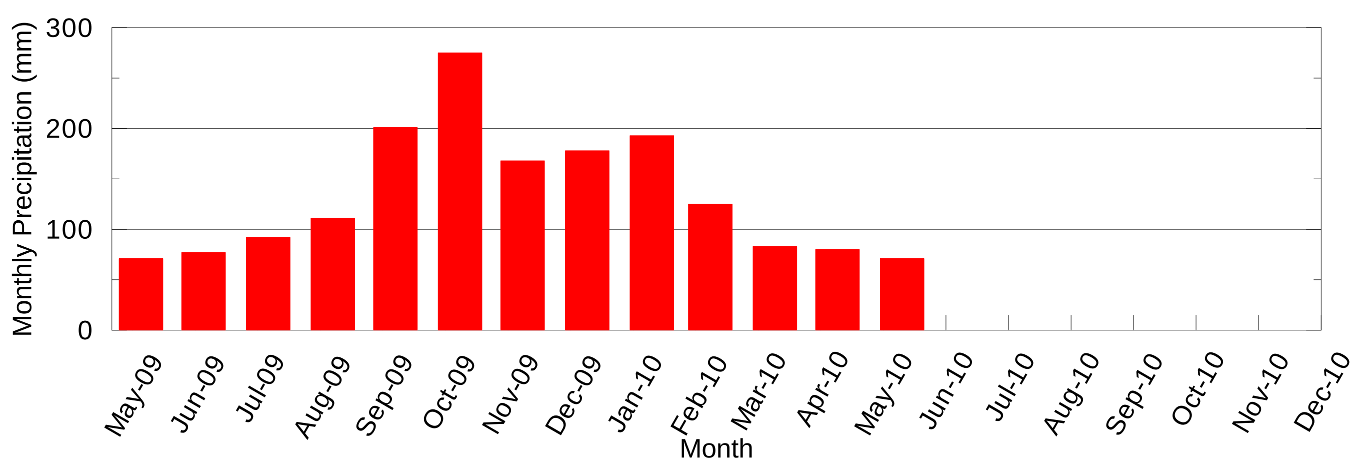

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: K10-05
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-20	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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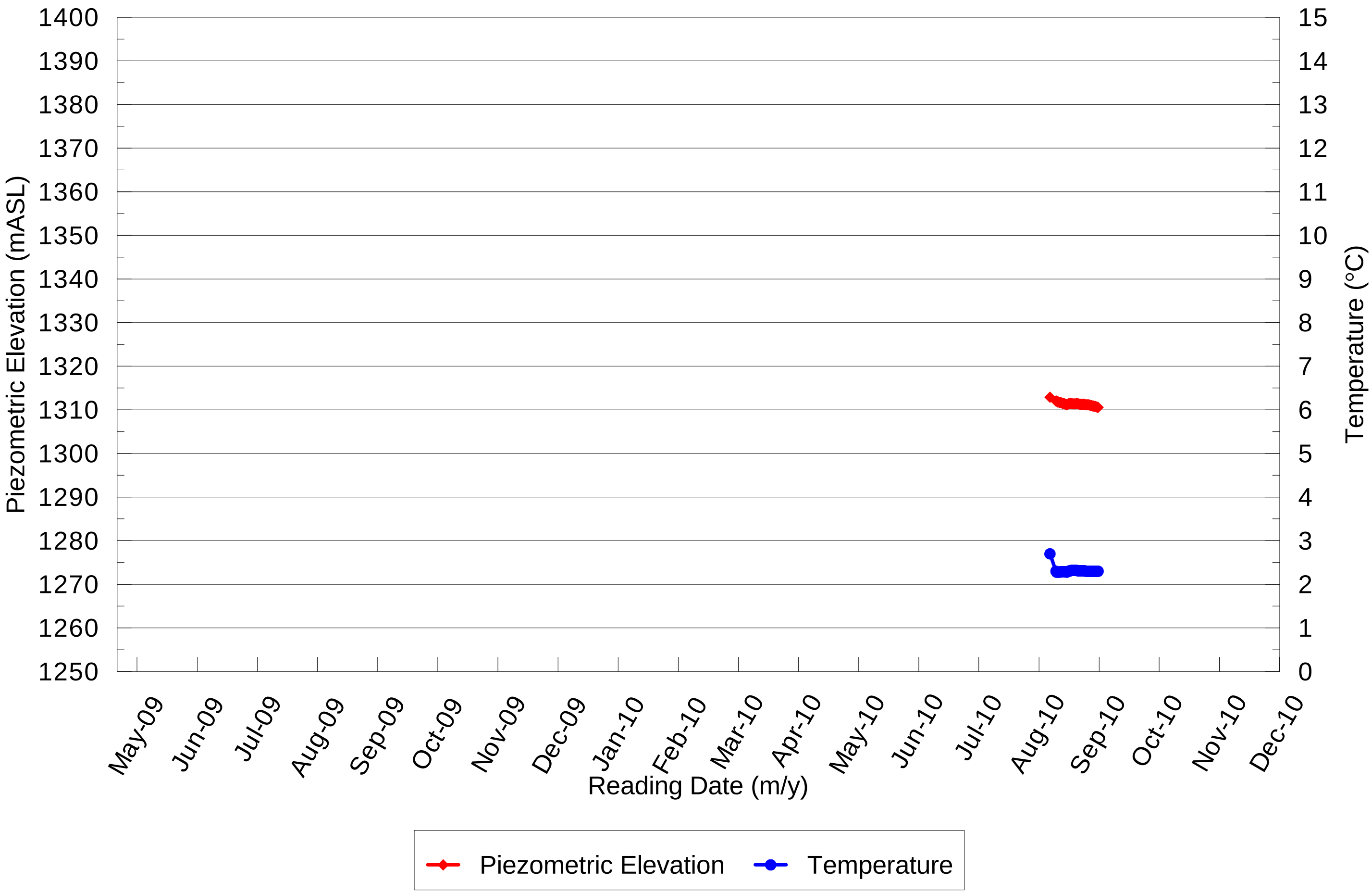

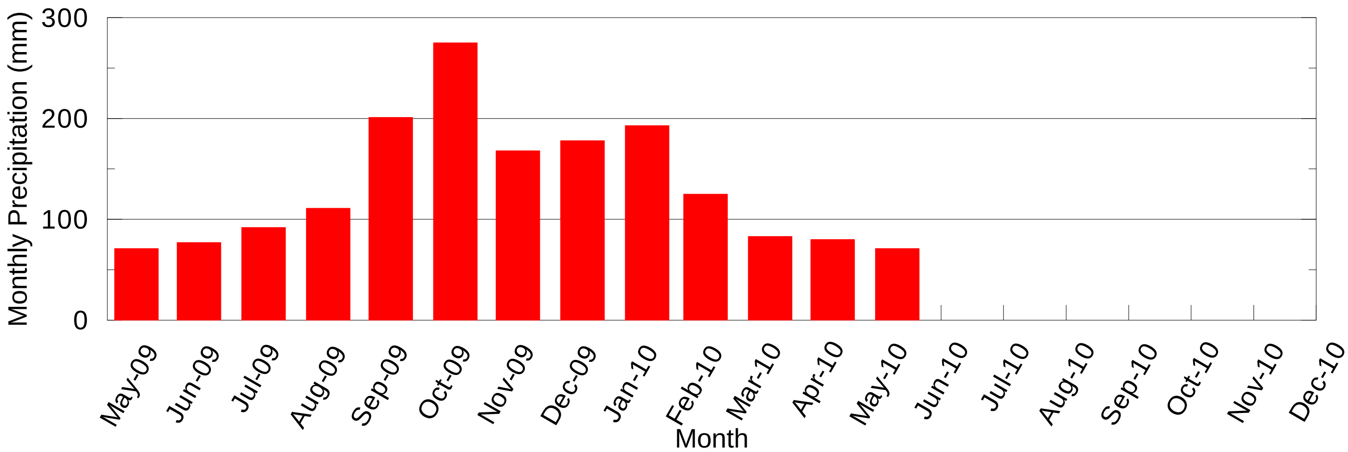

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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
K10-06S
Piezometric Elevation and Temperature

CLIENT:
Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-21	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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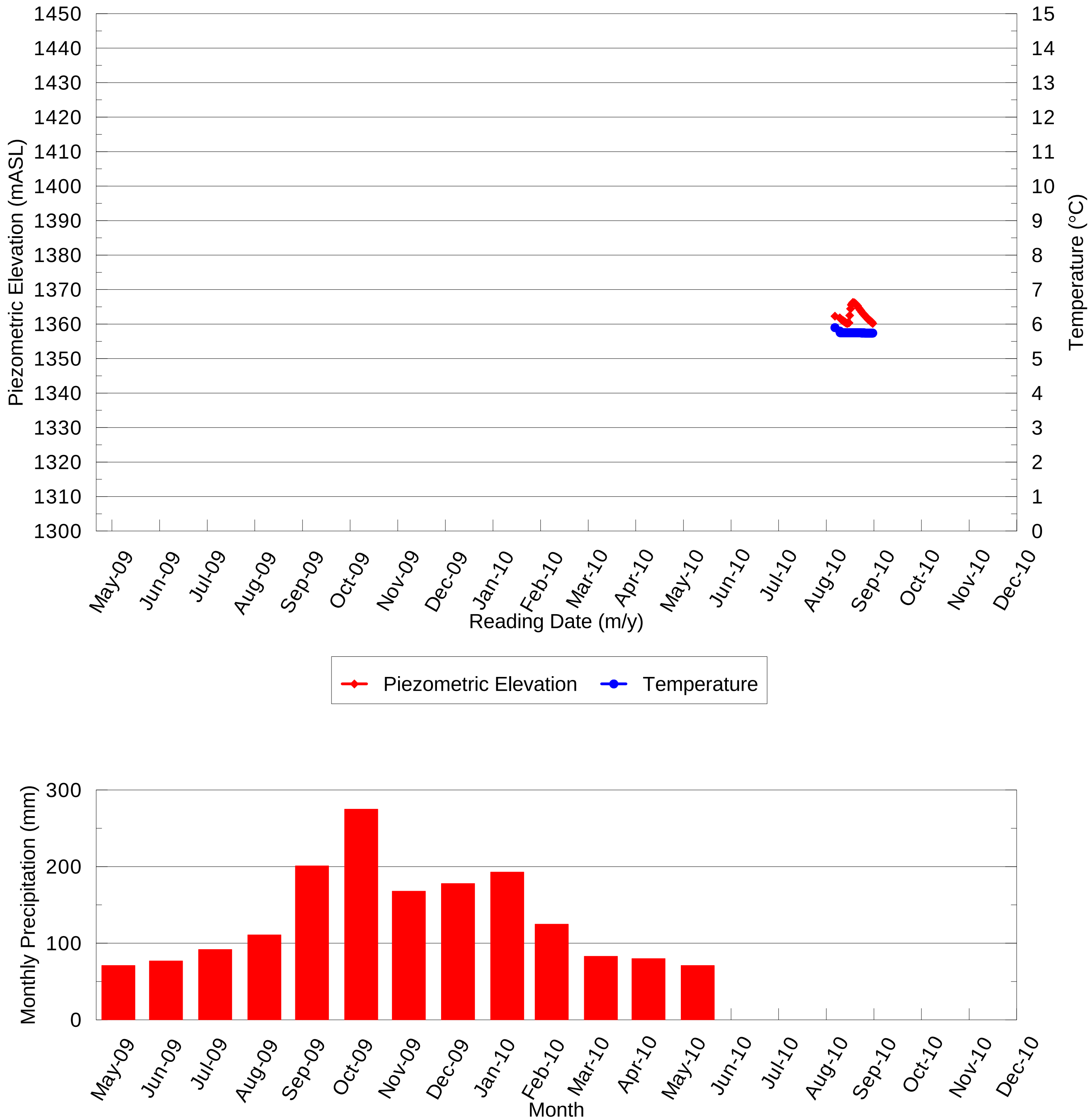

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: K10-06D
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-22	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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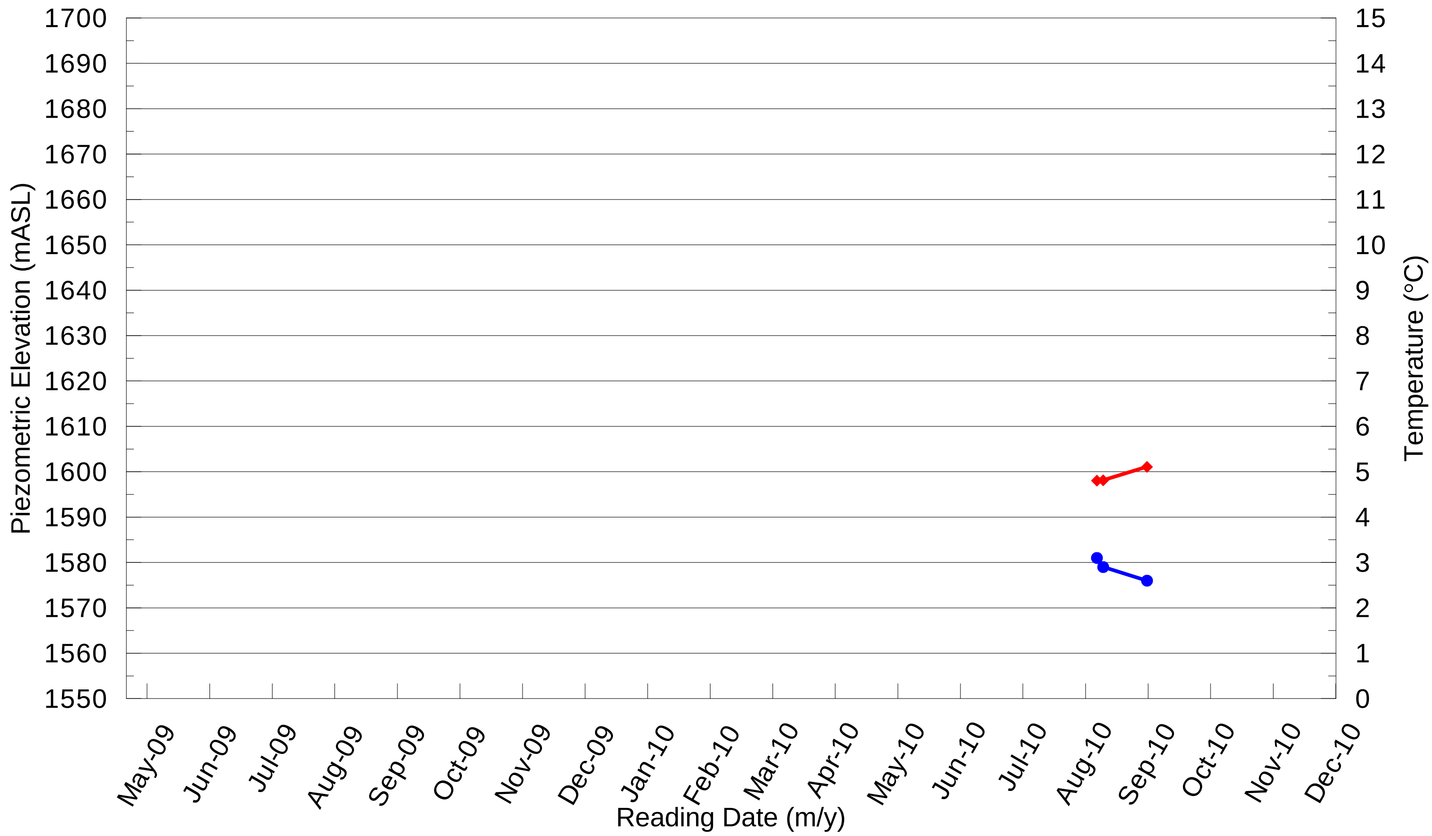

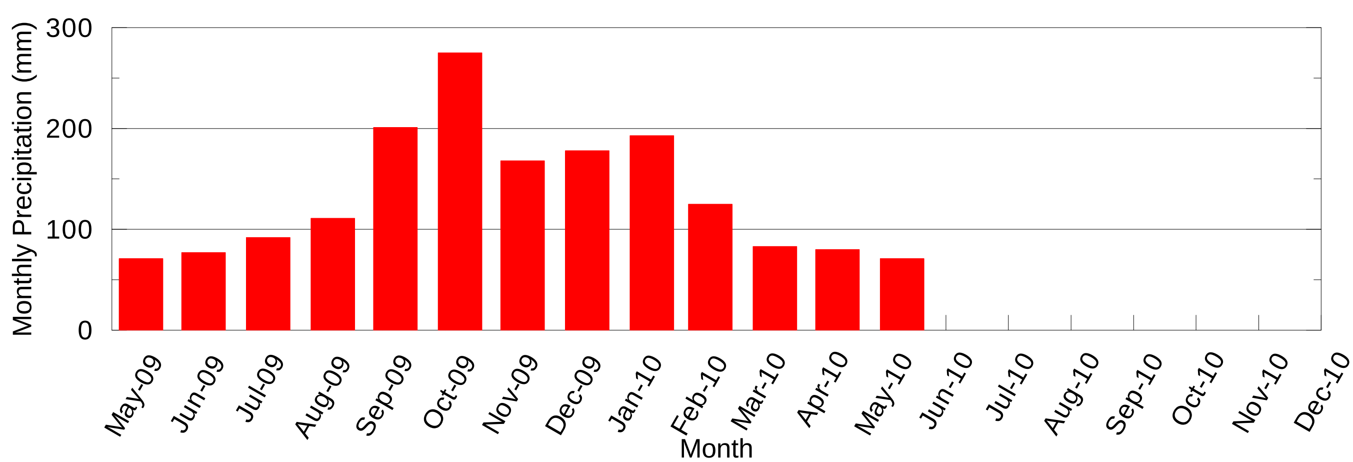

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PROJECT: KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE: K10-08
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-23	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

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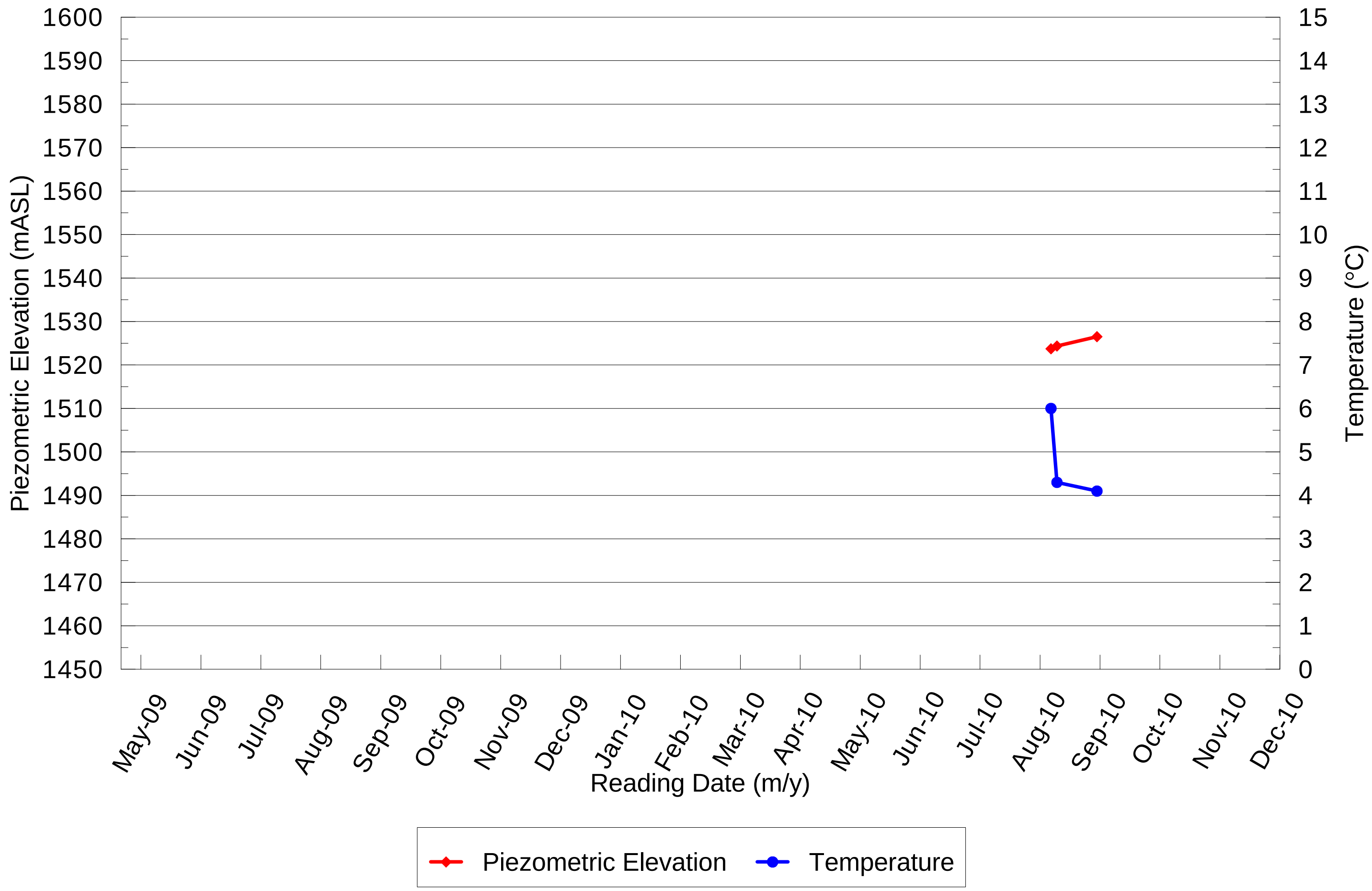

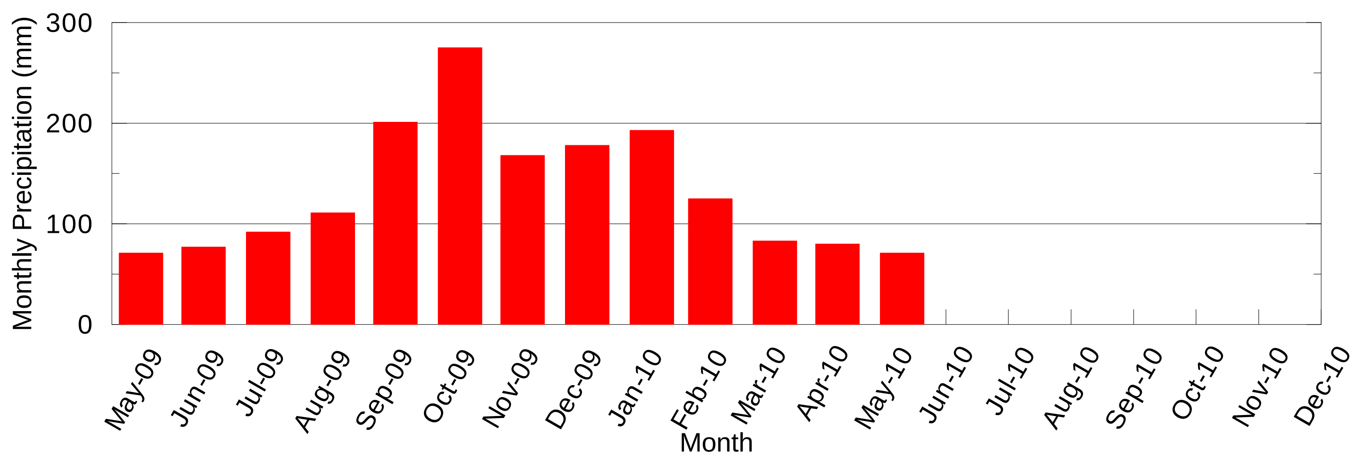

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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

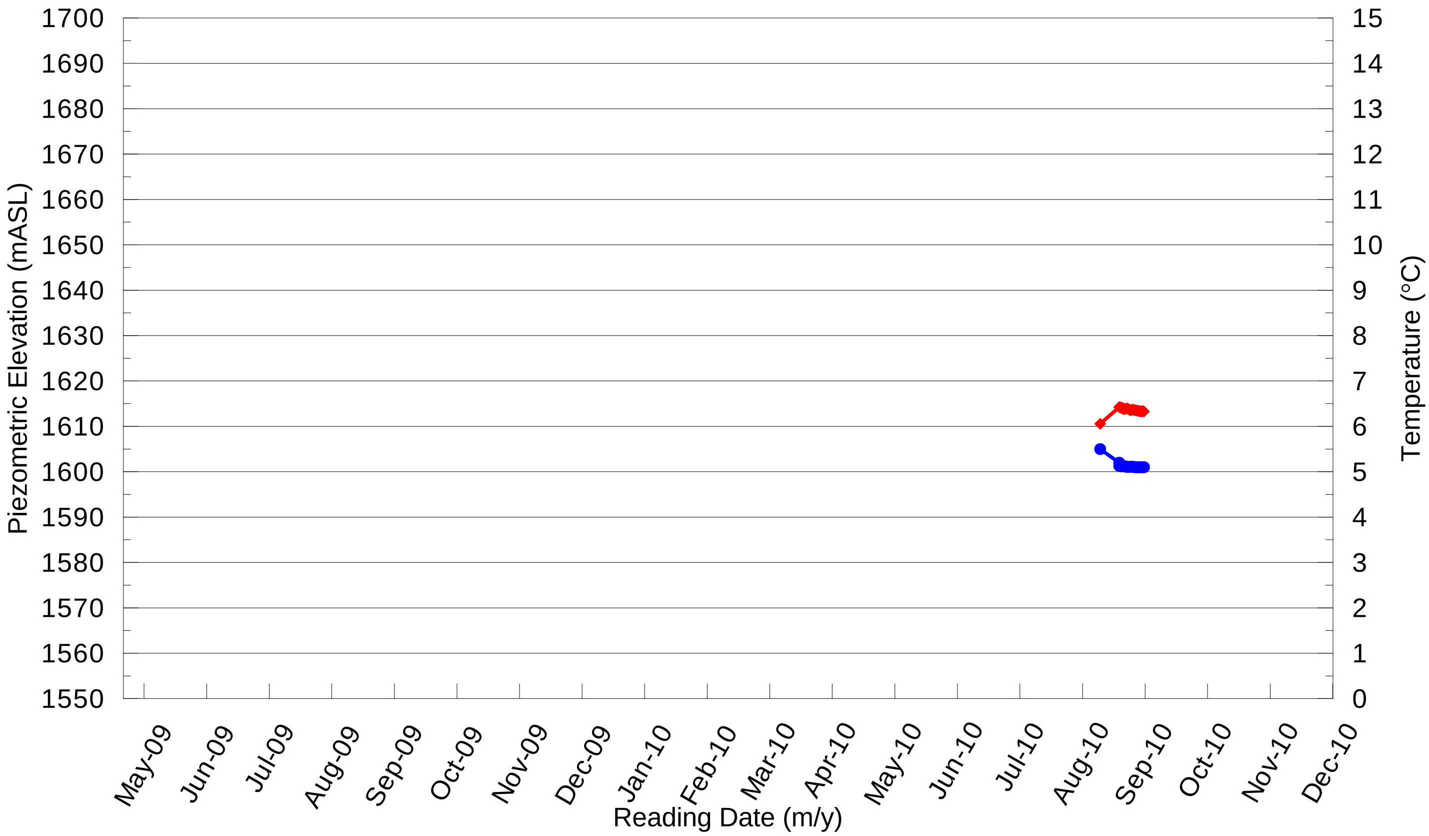
TITLE:
IC10-014
Piezometric Elevation and Temperature

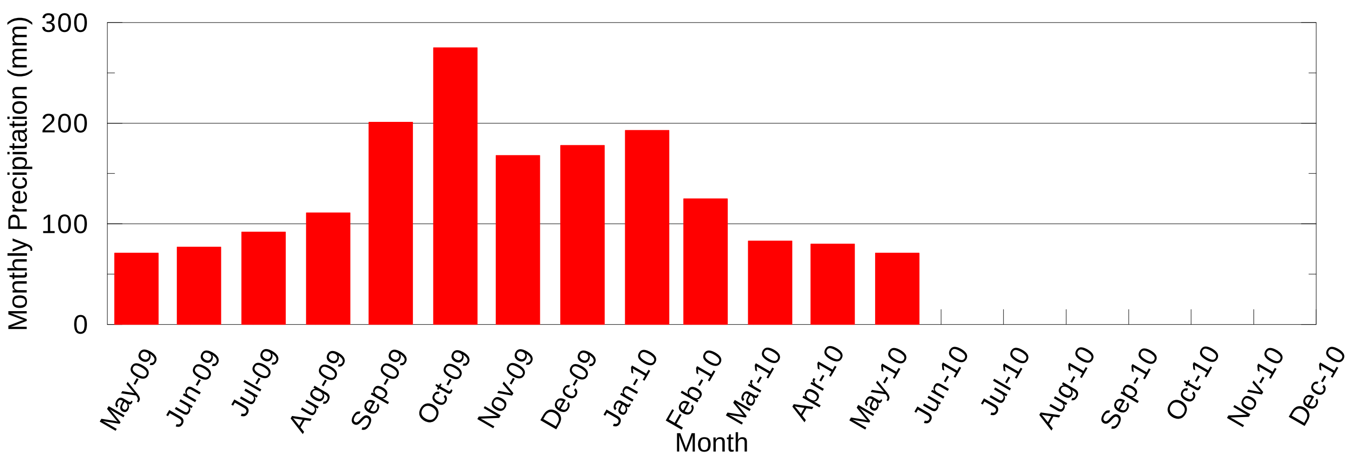
CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-24	0

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 14899 - Piezometer Elevation Plot.grf





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PROJECT:
KSM Project Pre-Feasibility Study Update
Open Pit Depressurization Analyses

TITLE:
IC10-016
Piezometric Elevation and Temperature

CLIENT: Seabridge Gold

PROJECT No.	DWG No.	REV.
0638-009	A-25	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\VWPs\VW 14900 - Piezometer Elevation Plot.grf

DWG TO BE READ WITH BGC REPORT TITLED "KSM PROJECT PREFEASIBILITY STUDY UPDATE" DATED JUNE 2011

APPENDIX B

BGC 2010 PACKER TEST DATA SUMMARY

BGC 2010 Packer Test Summary

Drill Hole	Test #	Drill Hole Collar Easting (m)	Drill Hole Collar Northing (m)	Collar Surface Elevation (masl)	Plunge	Trend	Stickup Height (m)	DTW (mah)	Top of Zone (mah)	Bottom of Zone (mah)	Center of Zone (mah)	Packer Test Interval Midpoint Easting (m)	Packer Test Interval Midpoint Northing (m)	Packer Test Interval Midpt GS Elev (masl)	Packer Test Interval Midpt Elev (masl)	Vertical Depth (m bgs)	Type of Test	Hydraulic Conductivity (m/s)	Lithology	Alteration	Weighted Averages (by Interval Length)			
																					RQD (%)	Longest Stick (m)	Joint Condition (RMR'76)	RMR'76
IC10-014	1	424638	6267391	1510.21	70	49	1.80	0.00	50.05	60.55	55.30	424652	6267404	1516.97	1460.05	56.93	CH	1.2E-06	IU	SIL	79.71	0.41	11.14	55.85
IC10-014	2	424638	6267391	1510.21	70	49	1.80	0.00	110.15	120.65	115.40	424668	6267417	1525.54	1403.57	121.97	CH	5.4E-08	IU	SIL	93.14	0.51	16.00	67.34
IC10-014	3	424638	6267391	1510.21	70	49	1.80	0.00	152.15	180.65	166.40	424681	6267429	1532.49	1355.65	176.85	CH	2.9E-08	SEDS	SIL	92.07	0.63	17.20	71.50
IC10-014	4	424638	6267391	1510.21	70	49	1.80	0.00	222.65	251.15	236.90	424699	6267444	1543.55	1289.40	254.16	CH	8.0E-09	SEDS/FLTZ	SIL	77.30	0.44	12.37	56.76
IC10-015	1	424202	6267339	1616.21	70	298	2.45	15.55	69.40	78.40	73.90	424180	6267351	1614.00	1549.21	64.79	CH	2.0E-06	IU/PSBX	SIL	95.00	1.09	19.00	80.70
IC10-015	2	424202	6267339	1616.21	70	298	2.45	12.15	132.40	141.40	136.90	424161	6267361	1614.63	1490.01	124.62	CH	3.4E-06	IBX	QSP	98.78	1.21	21.33	85.62
IC10-015	3	424202	6267339	1616.21	70	298	2.45	10.00	231.40	240.40	235.90	424131	6267377	1623.31	1396.98	226.32	FH	2.7E-08	PSBX	PSBX	98.67	1.29	20.33	83.58
IC10-015	4	424202	6267339	1616.21	70	298	2.45	10.22	295.90	300.40	298.15	424112	6267387	1628.91	1338.49	290.42	CH	1.8E-08	PSBX	PSBX	99.11	1.04	19.00	83.70
IC10-016	1	424433	6267589	1612.22	59	348	2.00	1.74	58.90	75.40	67.15	424425	6267623	1636.41	1556.66	79.76	CH	9.8E-07	IU	SIL	98.67	1.15	18.09	80.13
IC10-016	2	424433	6267589	1612.22	59	348	2.18	0.00	139.90	150.40	145.15	424417	6267662	1658.56	1489.98	168.59	CH	5.0E-07	VU	SIL	98.19	0.86	16.14	73.66
IC10-016	3	424433	6267589	1612.22	59	348	2.18	0.00	214.90	225.40	220.15	424409	6267700	1675.27	1425.69	249.58	CH	7.1E-08	IU/PPFP	SIL	95.81	0.86	18.57	75.26
K10-05	1	421271	6258667	1864.57	82	227	2.50	46.78	126.15	136.65	131.40	421258	6258655	1869.22	1736.95	132.27	CH	6.9E-07	VU	CL	84.00	0.77	17.71	68.52
K10-06	1	421752	6259638	1314.26	69	142	2.35	18.50	43.80	48.30	46.05	421762	6259625	1320.18	1273.61	46.57	CH	6.4E-08	VU	IARG	49.33	0.28	13.33	49.03
K10-06	2	421752	6259638	1314.26	69	142	2.05	-12.66	112.80	117.30	115.05	421777	6259605	1334.66	1208.90	125.76	CH	1.7E-05	VU	IARG	6.89	0.09	6.24	28.07
K10-06	3	421752	6259638	1314.26	69	142	2.15	-52.73	208.82	211.80	210.31	421798	6259578	1355.38	1120.06	235.32	CH	5.4E-07	VU	QSP	103.82	0.65	20.00	77.13
K10-06	4	421752	6259638	1314.26	69	142	2.15	-14.06	292.82	300.30	296.56	421817	6259554	1368.01	1039.54	328.47	CH	1.3E-08	VU	QSP	101.73	1.29	21.40	88.53
K10-07	2	422106	6259159	1610.40	70	337	2.02	33.71	146.15	150.65	148.40	422086	6259206	1600.97	1472.97	128.01	CH	1.6E-06	PAND	SIL	96.89	0.55	14.67	67.54
K10-07	3	422106	6259159	1610.40	70	337	1.87	33.79	221.15	225.65	223.40	422076	6259229	1598.84	1402.34	196.50	CH	2.9E-06	PAND	CL	85.33	0.41	12.67	61.26
K10-07	4	422106	6259159	1610.40	70	337	1.87	83.86	295.95	300.45	298.20	422066	6259253	1591.29	1332.05	259.24	CH	1.8E-06	PAND	SIL	97.33	1.07	21.67	79.28
K10-08	1	421628	6258796	1728.54	79	230	2.16	36.73	67.82	72.39	70.10	421618	6258787	1729.26	1661.88	67.38	CH	1.2E-06	ANDS	CL	98.22	0.71	12.00	71.38
K10-08	2	421628	6258796	1728.54	79	230	2.16	>100	157.80	162.60	160.20	421605	6258776	1732.33	1573.44	158.89	CH	1.1E-06	VU	QSP	101.88	1.39	22.63	88.14
K10-08	3	421628	6258796	1728.54	79	230	2.16	>100	246.30	252.30	249.30	421592	6258765	1735.85	1485.98	249.87	CH	1.5E-08	VU	SIL	101.50	1.33	23.75	89.85
M10-121	1	422764	6266727	1534.99	82	344	1.66	5.04	65.30	75.80	70.55	422762	6266736	1541.20	1466.79	74.41	CH	very low	SEDS/PSYN	SIL	87.33	0.61	16.29	60.75
M10-121	2	422764	6266727	1534.99	82	344	1.66	5.04	56.30	75.80	66.05	422762	6266736	1540.80	1471.25	69.55	CH	very low	SEDS/PSYN	SIL	90.00	0.55	14.85	60.45
M10-121	3	422764	6266727	1534.99	82	344	1.66	5.04	47.30	75.80	61.55	422762	6266735	1540.39	1475.70	64.69	CH	1.2E-09	SEDS/PSYN/ANDS	SIL	91.19	0.58	15.32	62.57
M10-121	4	422764	6266727	1534.99	82	344	1.66	5.33	137.30	162.80	150.05	422759	6266747	1548.24	1388.06	160.17	CH	8.0E-08	PSYN	CL	91.49	0.48	17.22	69.43
M10-121	5	422764	6266727	1534.99	82	344	1.66	3.80	209.60	226.10	217.85	422756	6266756	1553.16	1320.92	232.24	CH	8.6E-09	ANDS	MTH	97.94	0.78	17.22	80.23
M10-121	5	422764	6266727	1534.99	82	344	1.66	3.80	209.60	226.10	217.85	422756	6266756	1553.16	1320.92	232.24	FH	5.9E-08	ANDS	MTH	97.94	0.78	17.22	80.23
M10-121	6	422764	6266727	1534.99	82	344	1.66	5.82	265.10	293.60	279.35	422754	6266764	1558.86	1260.02	298.84	CH	2.2E-08	ANDS	MTH	92.91	0.57	18.32	72.86
S10-27	1	422102	6263103	1553.29	68	22	0.88	-15.47	62.20	77.20	69.70	422112	6263128	1559.50	1489.54	69.96	CH	4.4E-07	PMON/IVOL	KP/CL	62.07	0.34	10.41	50.42
S10-27	2	422102	6263103	1553.29	68	22	2.05	-16.87	149.20	153.70	151.45	422124	6263156	1573.72	1414.92	158.81	CH	1.5E-05	PMON	KP	62.00	0.36	13.33	52.25
S10-27	3	422102	6263103	1553.29	68	22	2.05	-16.87	191.20	195.70	193.45	422130	6263171	1583.74	1375.97	207.76	CH	1.1E-06	PMON	KP	94.89	0.72	19.33	77.11
S10-27	4	422102	6263103	1553.29	68	22	2.05	-16.87	209.20	215.20	212.20	422132	6263177	1587.53	1358.59	228.94	CH	2.6E-06	FLTZ		75.17	0.39	10.50	51.68
S10-27	5	422102	6263103	1553.29	68	22	2.05	-19.69	302.20	329.20	315.70	422147	6263213	1606.12	1262.63	343.49	CH	7.5E-07	SEDS/IVOL	SIL	93.52	0.77	16.89	75.70
S10-30	1	421660	6263006	1516.61	90	360	2.14	12.13	50.05	60.55	55.30	421660	6263006	1516.78	1463.45	53.33	CH	1.1E-06	IBX	KP	78.86	0.44	15.47	58.42
S10-30	2	421660	6263006	1516.61	90	360	2.05	11.66	146.05	155.05	150.55	421660	6263006	1516.78	1368.11	148.67	CH	2.1E-07	IU	CL	90.67	0.86	22.33	79.61
S10-30	3	421660	6263006	1516.61	90	360	2.60	15.80	227.05	237.55	232.30	421660	6263006	1516.78	1286.91	229.87	CH	4.7E-07	VU	CL	78.86	0.52	14.49	58.98
S10-30	4a	421660	6263006	1516.61	90	360	2.10	7.90	296.05	306.55	301.30	421660	6263006	1516.78	1217.41	299.37	CH	1.1E-08	VU	CL	99.62	1.13	20.43	86.02
S10-30	4b	421660	6263006	1516.61	90	360	2.10	7.90	296.05	306.55	301.30	421660	6263006	1516.78	1217.41	299.37	FH	4.1E-08	VU	CL	99.62	1.13	20.43	86.02
S10-31	1	422495	6263651	1705.38	78	155	1.90	90.00	111.90	116.40	114.15	422505	6263630	1706.20	1595.63	110.57	CH	2.4E-06	PMON	SIL	72.89	0.43	17.67	65.14
S10-31	2	422495	6263651	1705.38	78	155	1.84	98.34	192.90	200.40	196.65	422512	6263614	1707.91	1514.87	193.04	CH	1.3E-06	PMON	MTH	96.67	0.42	19.80	75.28
S10-32	1	422613	6263189	1605.10	62	78	2.55	0.76	40.50	51.00	45.75	422634	6263194	1609.90	1567.25	42.65	CH	4.1E-07	VU/FLTZ	SIL	28.67	0.15	4.59	32.72
S10-32	2	422613	6263189	1605.10	62	78	2.55	-6.33	118.50	130.50	124.50	422670	6263201	1618.52	1497.72	120.80	CH	1.2E-06	VU/SEDS	CL	88.58	0.59	19.88	72.26
S10-32	3	422613	6263189	1605.10	62	78	2.55	-11.25	210.00	220.50	215.25	422712	6263210	1629.12	1417.59	211.52	CH	3.0E-08	VU	CL	90.38	0.46	20.71	72.21
S10-32	4	422613	6263189	1605.10	62	78	2.40	-18.28	289.50	300.00	294.75	422748	6263218	1640.42	1347.25	293.17	CH	4.0E-08	VU	CL	93.24	0.74	13.33	69.33
S10-33	2	421722	6263680	1672.99	73	138	2.30	87.65	126.40	136.90	131.65	421748	6263652	1672.57	1549.40	123.17	CH	high	VU	CL	67.52	0.40	18.43	63.48
S10-33	3	421722	6263680	1672.99	73	138	2.30	87.65	132.40	136.90	134.65	421749	6263651	1672.41	1546.53	125.88	CH	1.6E-06	VU	CL	52.22	0.39	18.00	60.08
S10-33	4	421722	6263680	1672.99	73	138	2.30	84.40	194.90	207.40	201.15	421762	6263637	1670.69	1482.93	187.76	CH	6.2E-07	VU	CL2	89.17	0.61	19.83	72.16
S10-33	5	421722	6263680	1672.99	73	138	2.05	87.00	243.70	251.20	247.45	421771	6263626	1669.28	1438.41	230.87	CH	6.5E-07			86.00	0.61	19.20	72.77
S10-33	6	421722	6263680	1672.99	73	138	2.05	79.40	293.20	298.90	296.05	421780	6263616	1668.55	1391.93	276.62	CH	7.3E-08	VU	CL2	55.26	0.24	15.65	54.09
S10-33	1	421722	6263680	1672.99	73	138	2.00	48.50	65.20	69.70	67.45	421736	6263666	1672.91	1610.49	62.42	FH	5.3E-09	VU	CL	70.67	0.26	18.33	60.79

Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-014
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 18-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13450.00	--
1	50	13457.40	7.40
2	50	13464.60	7.20
3	50	13471.80	7.20
4	50	13479.00	7.20
5	50	13485.90	6.90
6	50	13492.80	6.90
7	50	13499.60	6.80
8	50	13506.40	6.80
9	50	13513.20	6.80
10	50	13520.00	6.80
Stable Ave.	50		6.92

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13526.00	--
1	75	13535.90	9.90
2	75	13545.70	9.80
3	75	13555.40	9.70
4	75	13565.10	9.70
5	75	13575.00	9.90
6	75	13584.50	9.50
7	75	13594.20	9.70
8	75	13603.80	9.60
9	75	13613.40	9.60
10	75	13623.10	9.70
Stable Ave.	75		9.71

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	13630.00	--
1	100	13644.60	14.60
2	100	13659.00	14.40
3	100	13673.60	14.60
4	100	13688.20	14.60
5	100	13702.50	14.30
6	100	13717.20	14.70
7	100	13731.60	14.40
8	100	13745.90	14.30
9	100	13760.50	14.60
10	100	13775.10	14.60
Stable Ave.	100		14.51

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13790.00	--
1	75	13801.50	11.50
2	75	13813.00	11.50
3	75	13824.20	11.20
4	75	13835.50	11.30
5	75	13847.00	11.50
6	75	13858.10	11.10
7	75	13869.30	11.20
8	75	13880.70	11.40
9	75	13891.90	11.20
10	75	13903.20	11.30
Stable Ave.	75		11.29

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	50	13910.00	--
1	50	13917.80	7.80
2	50	13925.50	7.70
3	50	13933.20	7.70
4	50	13941.00	7.80
5	50	13948.70	7.70
6	50	13956.50	7.80
7	50	13964.30	7.80
8	50	13972.00	7.70
9	50	13979.90	7.90
10	50	13987.60	7.70
Stable Ave.	50		7.76

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.00	m
Top of Packer Interval:	50.05	m
Bottom of Packer Interval (or Bottom of Hole):	60.55	m
Packer Inflation Pressure:	402	psi
Rod Stickup Height:	1.8	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 3:00 PM
End Flushing: 3:30 PM
Start Packer Testing: 4:10 PM
End Packer Testing: 5:00 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: IC10-014
Test #: 1

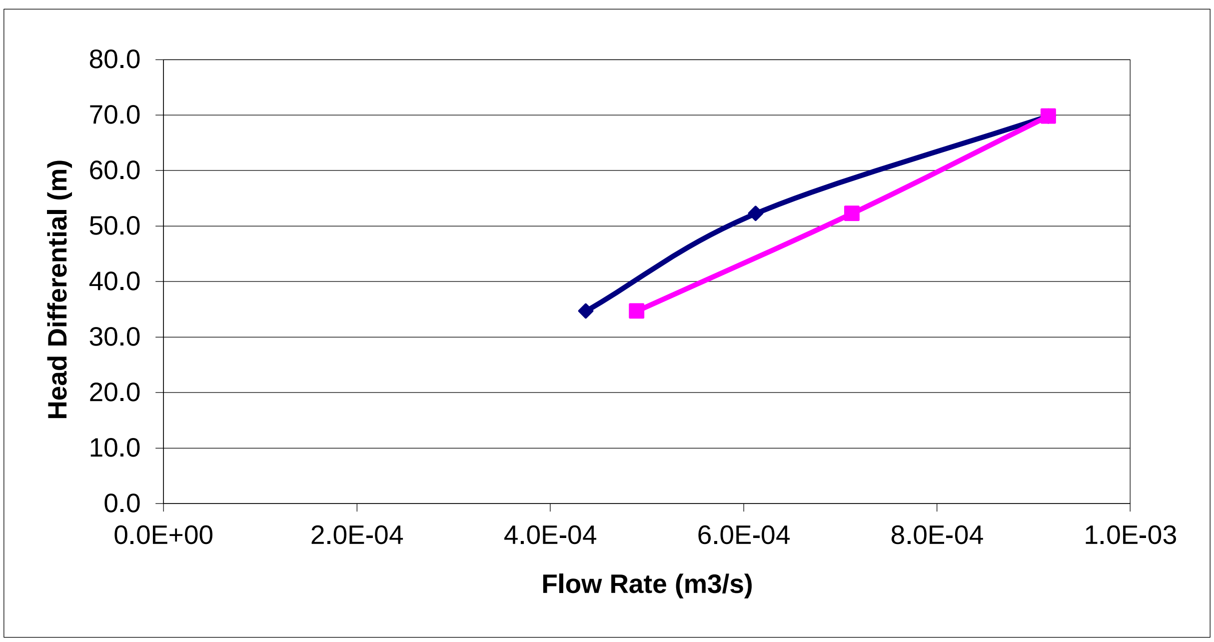
Calculation Input Parameters

Top of Packer Test Interval (mah):	50.1
Bottom of Packer Test Interval (mah):	60.6
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	55
Stickup Height (mah):	1.80
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	4.4E-04	35.2	34.7	1.1E-06
75.0	6.1E-04	52.7	52.2	1.1E-06
100.0	9.2E-04	70.3	69.8	1.2E-06
75.0	7.1E-04	52.7	52.2	1.2E-06
50.0	4.9E-04	35.2	34.7	1.3E-06
			Geo Mean	**1.2.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-014
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 19-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13965.00	--
1	50	13965.30	0.30
2	50	13965.70	0.40
3	50	13965.95	0.25
4	50	13966.20	0.25
5	50	13966.50	0.30
6	50	13966.80	0.30
7	50	13967.10	0.30
8	50	13967.40	0.30
9	50	13967.65	0.25
10	50	13967.95	0.30
Stable Ave.	50		0.28

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13969.00	--
1	75	13969.55	0.55
2	75	13970.05	0.50
3	75	13970.60	0.55
4	75	13971.10	0.50
5	75	13971.60	0.50
6	75	13972.10	0.50
7	75	13972.65	0.55
8	75	13973.20	0.55
9	75	13973.60	0.40
10	75	13974.10	0.50
Stable Ave.	75		0.51

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	13975.00	--
1	100	13975.85	0.85
2	100	13976.75	0.90
3	100	13977.50	0.75
4	100	13978.30	0.80
5	100	13979.20	0.90
6	100	13980.05	0.85
7	100	13980.90	0.85
8	100	13981.70	0.80
9	100	13982.60	0.90
10	100	13983.40	0.80
Stable Ave.	100		0.84

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13984.70	--
1	75	13985.30	0.60
2	75	13985.90	0.60
3	75	13986.50	0.60
4	75	13987.10	0.60
5	75	13987.70	0.60
6	75	13988.25	0.55
7	75	13988.80	0.55
8	75	13989.40	0.60
9	75	13990.00	0.60
10	75	13990.50	0.50
Stable Ave.	75		0.57

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	55	13991.00	--
1	55	13991.35	0.35
2	55	13991.65	0.30
3	55	13992.00	0.35
4	55	13992.30	0.30
5	55	13992.65	0.35
6	55	13993.00	0.35
7	55	13993.30	0.30
8	55	13993.60	0.30
9	55	13993.85	0.25
10	55	13994.15	0.30
Stable Ave.	55		0.31

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.00	m
Top of Packer Interval:	110.15	m
Bottom of Packer Interval (or Bottom of Hole):	120.65	m
Packer Inflation Pressure:	490	psi
Rod Stickup Height:	1.8	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 9:30 AM
End Flushing: 10:00 AM
Start Packer Testing: 10:50 AM
End Packer Testing: 11:40 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **IC10-014**
Test #: **2**

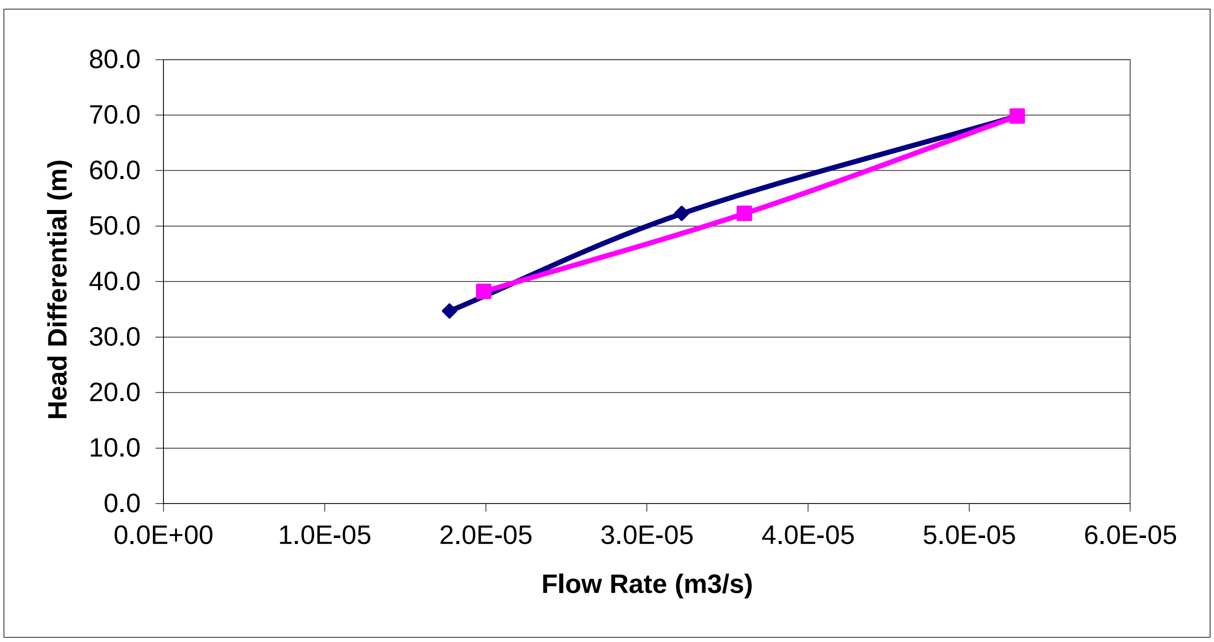
Calculation Input Parameters

Top of Packer Test Interval (mah):	110.2
Bottom of Packer Test Interval (mah):	120.7
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	115
Stickup Height (mah):	1.80
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	1.8E-05	35.2	34.7	4.6E-08
75.0	3.2E-05	52.7	52.2	5.5E-08
100.0	5.3E-05	70.3	69.8	6.8E-08
75.0	3.6E-05	52.7	52.2	6.2E-08
55.0	2.0E-05	38.7	38.2	4.7E-08
			Geo Mean	**5.5.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-014
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 20-Aug-10

Packer Setup Type: Single

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	55	14000.50	--
1	55	14001.45	0.95
2	55	14002.30	0.85
3	55	14003.10	0.80
4	55	14003.80	0.70
5	55	14004.40	0.60
6	55	14005.20	0.80
7	55	14005.90	0.70
8	55	14006.70	0.80
9	55	14007.20	0.50
10	55	14007.90	0.70
Stable Ave.	55		0.70

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	14009.00	--
1	80	14010.00	1.00
2	80	14010.85	0.85
3	80	14011.60	0.75
4	80	14012.50	0.90
5	80	14013.30	0.80
6	80	14014.10	0.80
7	80	14014.90	0.80
8	80	14015.70	0.80
9	80	14016.40	0.70
10	80	14017.10	0.70
Stable Ave.	80		0.81

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	14018.10	--
1	100	14019.00	0.90
2	100	14019.90	0.90
3	100	14020.80	0.90
4	100	14021.70	0.90
5	100	14022.60	0.90
6	100	14023.50	0.90
7	100	14024.20	0.70
8	100	14025.00	0.80
9	100	14025.80	0.80
10	100	14026.60	0.80
Stable Ave.	100		0.85

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	14027.00	--
1	80	14027.60	0.60
2	80	14028.10	0.50
3	80	14028.80	0.70
4	80	14029.30	0.50
5	80	14029.80	0.50
6	80	14030.40	0.60
7	80	14030.90	0.50
8	80	14031.50	0.60
9	80	14032.00	0.50
10	80	14032.60	0.60
Stable Ave.	80		0.54

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	55	14033.00	--
1	55	14033.30	0.30
2	55	14033.60	0.30
3	50	14033.85	0.25
4	60	14034.20	0.35
5	55	14034.55	0.35
6	55	14034.90	0.35
7	55	14035.30	0.40
8	55	14035.65	0.35
9	55	14036.00	0.35
10	55	14036.30	0.30
Stable Ave.	55		0.33

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 0.00 m
Top of Packer Interval: 152.15 m
Bottom of Packer Interval (or Bottom of Hole): 180.65 m
Packer Inflation Pressure: 564 psi
Rod Stickup Height: 1.8 m
Water Flushed (Vol./Time/Until Clean): 1 hr
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 1.2 m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 10:00 AM
End Flushing: 10:30 AM
Start Packer Testing: 11:51 AM
End Packer Testing: 12:41 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **IC10-014**
Test #: **3**

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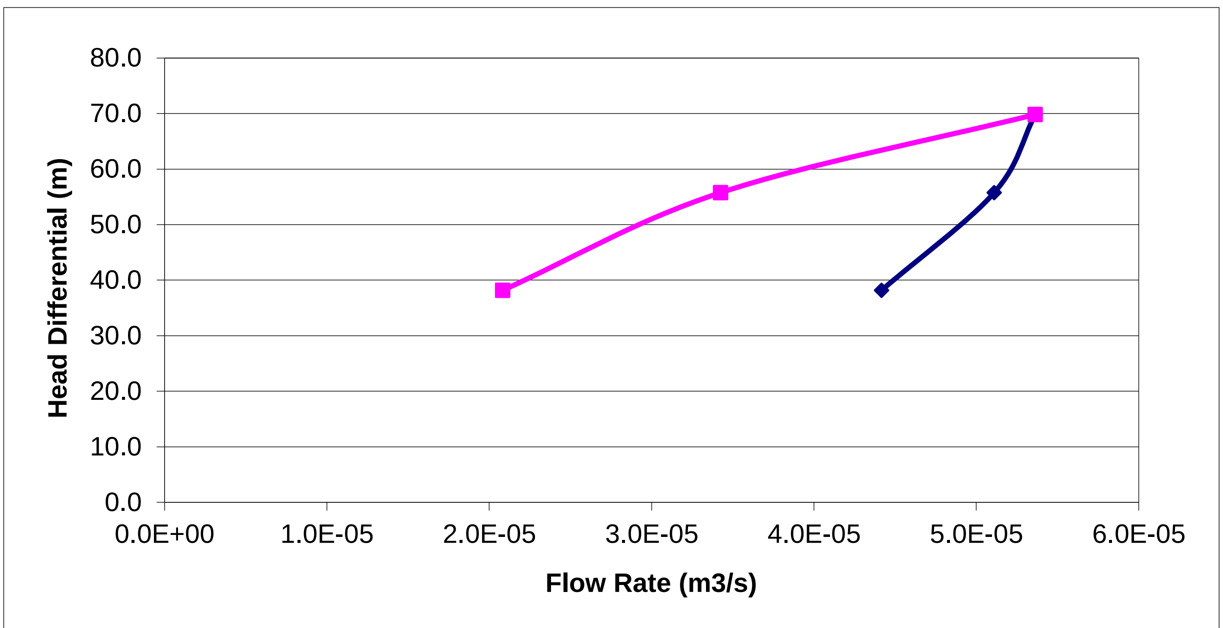
Calculation Input Parameters

Top of Packer Test Interval (mah):	152.2
Bottom of Packer Test Interval (mah):	180.7
L: Length of Test Interval (mah)	28.5
Test Interval Midpoint (mah):	166
Stickup Height (mah):	1.80
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
55.0	4.4E-05	38.7	38.2	4.5E-08
80.0	5.1E-05	56.2	55.8	3.6E-08
100.0	5.4E-05	70.3	69.8	3.0E-08
80.0	3.4E-05	56.2	55.8	2.4E-08
55.0	2.1E-05	38.7	38.2	2.1E-08
			Geo Mean	**3.0.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-014
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 21-Aug-10

Packer Setup Type: Single

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	55	14024.90	--
1	55	14025.10	0.20
2	55	14025.35	0.25
3	55	14025.55	0.20
4	55	14025.75	0.20
5	55	14025.95	0.20
6	55	14026.10	0.15
7	55	14026.30	0.20
8	55	14026.50	0.20
9	65	14026.75	0.25
10	55	14026.85	0.10
Stable Ave.	56		0.19

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	14027.10	--
1	75	14027.30	0.20
2	75	14027.50	0.20
3	75	14027.70	0.20
4	75	14027.90	0.20
5	75	14028.10	0.20
6	75	14028.30	0.20
7	75	14028.50	0.20
8	75	14028.65	0.15
9	75	14028.85	0.20
10	75	14029.00	0.15
Stable Ave.	75		0.19

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	14029.20	--
1	100	14029.50	0.30
2	100	14029.75	0.25
3	100	14030.00	0.25
4	100	14030.25	0.25
5	100	14030.50	0.25
6	100	14030.70	0.20
7	100	14030.95	0.25
8	100	14031.20	0.25
9	100	14031.40	0.20
10	100	14031.65	0.25
Stable Ave.	100		0.24

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	14031.80	--
1	75	14032.00	0.20
2	75	14032.10	0.10
3	75	14032.20	0.10
4	75	14032.40	0.20
5	75	14032.50	0.10
6	75	14032.65	0.15
7	75	14032.85	0.20
8	75	14033.00	0.15
9	75	14033.15	0.15
10	75	14033.30	0.15
Stable Ave.	75		0.16

Pressure Interval 55

Minutes	Pressure	Volume	Δ Volume
0	55	14033.40	--
1	55	14033.50	0.10
2	55	14033.60	0.10
3	55	14033.70	0.10
4	55	14033.80	0.10
5	55	14033.85	0.05
6	55	14033.95	0.10
7	55	14034.05	0.10
8	55	14034.15	0.10
9	55	14034.25	0.10
10	55	14034.30	0.05
Stable Ave.	55		0.09

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.00	m
Top of Packer Interval:	222.65	m
Bottom of Packer Interval (or Bottom of Hole):	251.15	m
Packer Inflation Pressure:	667	psi
Rod Stickup Height:	1.8	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing: 2:50 PM
End Packer Testing: 3:40 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **IC10-014**
Test #: **4**

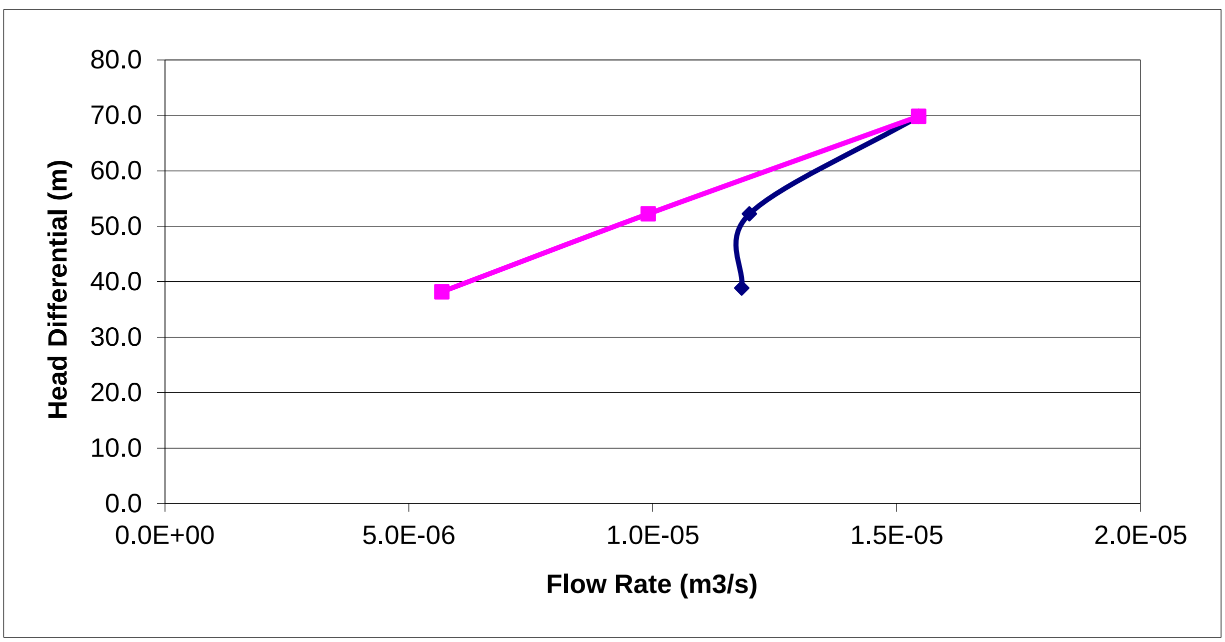
Calculation Input Parameters

Top of Packer Test Interval (mah):	222.7
Bottom of Packer Test Interval (mah):	251.2
L: Length of Test Interval (mah)	28.5
Test Interval Midpoint (mah):	237
Stickup Height (mah):	1.80
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
55.9	1.2E-05	39.3	38.8	1.2E-08
75.0	1.2E-05	52.7	52.2	8.9E-09
100.0	1.5E-05	70.3	69.8	8.6E-09
75.0	9.9E-06	52.7	52.2	7.4E-09
55.0	5.7E-06	38.7	38.2	5.8E-09
			Geo Mean	**8.3.E-09**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-015
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend:
Plunge: 70 deg
Date: 19-Aug-10

Packer Setup Type: Single

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	47.160	--
1	40	47.214	0.054
2	40	47.267	0.053
3	40	47.319	0.052
4	40	47.372	0.053
5	40	47.424	0.052
6	40	47.476	0.052
7	40	47.527	0.051
8	40	47.579	0.052
9	40	47.630	0.051
10	40	47.681	0.051
Stable Ave.	40		0.052

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	47.740	--
1	60	47.806	0.066
2	60	47.870	0.064
3	60	47.934	0.064
4	60	48.000	0.066
5	60	48.063	0.063
6	60	48.125	0.062
7	60	48.190	0.065
8	60	48.252	0.062
9	60	48.316	0.064
10	60	48.380	0.064
Stable Ave.	60		0.064

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	48.453	--
1	80	48.531	0.078
2	80	48.609	0.078
3	80	48.687	0.078
4	80	48.763	0.076
5	80	48.841	0.078
6	80	48.919	0.078
7	80	48.996	0.077
8	80	49.073	0.077
9	80	49.150	0.077
10	80	49.226	0.076
Stable Ave.	80		0.078

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	49.335	--
1	60	49.416	0.081
2	60	49.479	0.063
3	60	49.539	0.060
4	60	49.603	0.064
5	60	49.662	0.059
6	60	49.722	0.060
7	60	49.783	0.061
8	60	49.843	0.060
9	60	49.904	0.061
10	60	49.964	0.060
Stable Ave.	60		0.063

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	50.002	--
1	40	50.030	0.028
2	40	50.062	0.032
3	40	50.093	0.031
4	40	50.125	0.032
5	40	50.157	0.032
6	40	50.190	0.033
7	40	50.222	0.032
8	40	50.254	0.032
9	40	50.288	0.034
10	40	50.320	0.032
Stable Ave.	40		0.032

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 15.55 m
Top of Packer Interval: 69.40 m
Bottom of Packer Interval (or Bottom of Hole): 78.40 m
Packer Inflation Pressure: 450 psi
Rod Stickup Height: 2.45 m
Water Flushed (Vol./Time/Until Clean):
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **IC10-015**
Test #: **1**

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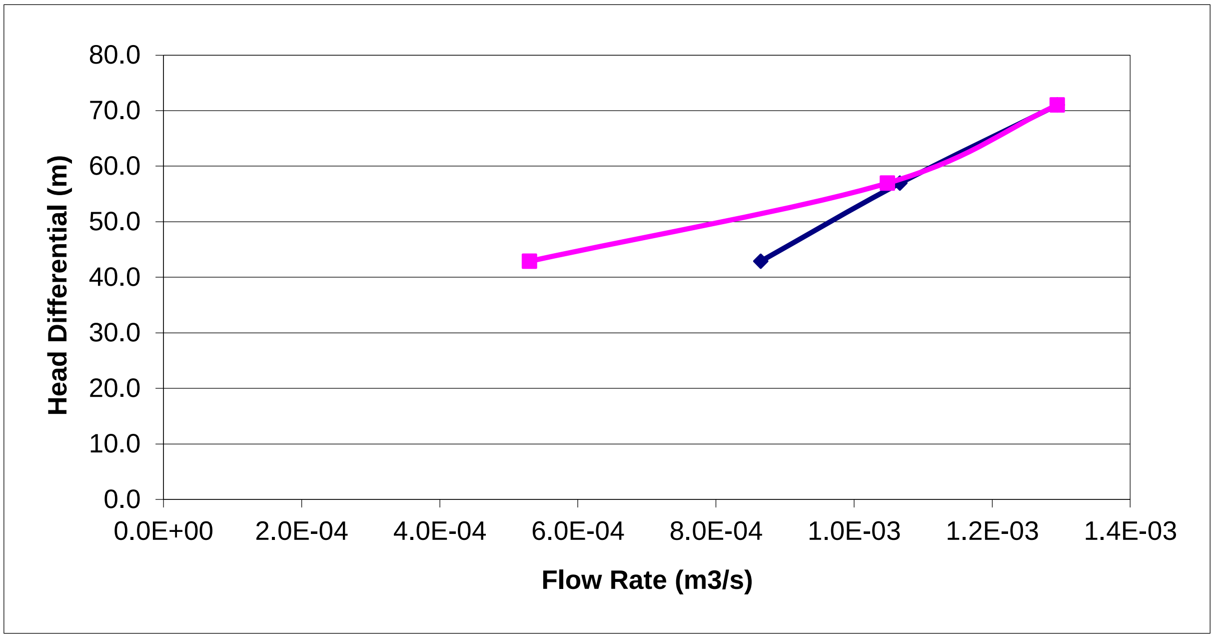
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L \sin(A)}{r}\right)}{2 \times \pi \times L \sin(A) \times dH}$$

Top of Packer Test Interval (mah):	69.4
Bottom of Packer Test Interval (mah):	78.4
L: Length of Test Interval (mah)	9.0
Test Interval Midpoint (mah):	74
Stickup Height (mah):	2.45
Pressure Gauge Height (m above ground):	2.45
Depth to Water Table (mah):	15.55
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
40.0	8.6E-04	28.1	42.9	2.1E-06
60.0	1.1E-03	42.2	56.9	1.9E-06
80.0	1.3E-03	56.2	71.0	1.9E-06
60.0	1.0E-03	42.2	56.9	1.9E-06
40.0	5.3E-04	28.1	42.9	1.3E-06
			Geo Mean	**1.8.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-015
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend:
Plunge: 70 deg
Date: 20-Aug-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	50.653	--
1	60	50.717	0.064
2	60	50.779	0.062
3	60	50.841	0.062
4	60	50.905	0.064
5	60	50.966	0.061
6	60	51.030	0.064
7	60	51.094	0.064
8	60	51.156	0.062
9	60	51.221	0.065
10	60	51.285	0.064
Stable Ave.	60		0.063

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	51.483	--
1	80	51.577	0.094
2	80	51.673	0.096
3	80	51.765	0.092
4	80	51.860	0.095
5	80	51.953	0.093
6	80	52.047	0.094
7	80	52.141	0.094
8	80	52.235	0.094
9			
10			
Stable Ave.	80		0.094

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	52.625	--
1	40	52.688	0.063
2	40	52.746	0.058
3	40	52.808	0.062
4	40	52.868	0.060
5	40	52.928	0.060
6	40	52.989	0.061
7	40	53.048	0.059
8	40	53.110	0.062
9	40	53.170	0.060
10	40	53.230	0.060
Stable Ave.	40		0.060

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	53.372	--
1	40	53.430	0.058
2	40	53.488	0.058
3	40	53.543	0.055
4	40	53.601	0.058
5	40	53.658	0.057
6	40	53.716	0.058
7	40	53.773	0.057
8	40	53.831	0.058
9	40	53.888	0.057
10	40	53.943	0.055
Stable Ave.	40		0.057

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	54.023	--
1	20	54.061	0.038
2	20	54.102	0.041
3	20	54.139	0.037
4	20	54.178	0.039
5	20	54.217	0.039
6	20	54.255	0.038
7	20	54.295	0.040
8	20	54.333	0.038
9	20	54.372	0.039
10	20	54.412	0.040
Stable Ave.	20		0.039

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	54.412	-
1	20	54.450	0.038
2	20	54.490	0.040
3	20	54.529	0.039
4	20	54.568	0.039
5	20	54.609	0.041
6	20	54.647	0.038
7	20	54.687	0.040
8	20	54.727	0.040
9	20	54.766	0.039
10	20	54.806	0.040
Stable Ave.	20		0.039

Measurements

Depth to Water from Top of Stickup:	12.15	m
Top of Packer Interval:	132.40	m
Bottom of Packer Interval (or Bottom of Hole):	141.4	m
Packer Inflation Pressure:	620	psi
Rod Stickup Height:	2.5	m
Water Flushed (Vol./Time/Until Clean):	45 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume:	m^3
Pressure:	psi
Length:	m

Time

Start Flushing:	6:00 AM
End Flushing:	6:45 AM
Start Packer Testing:	8:15 AM
End Packer Testing:	

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: IC10-015
Test #: 2

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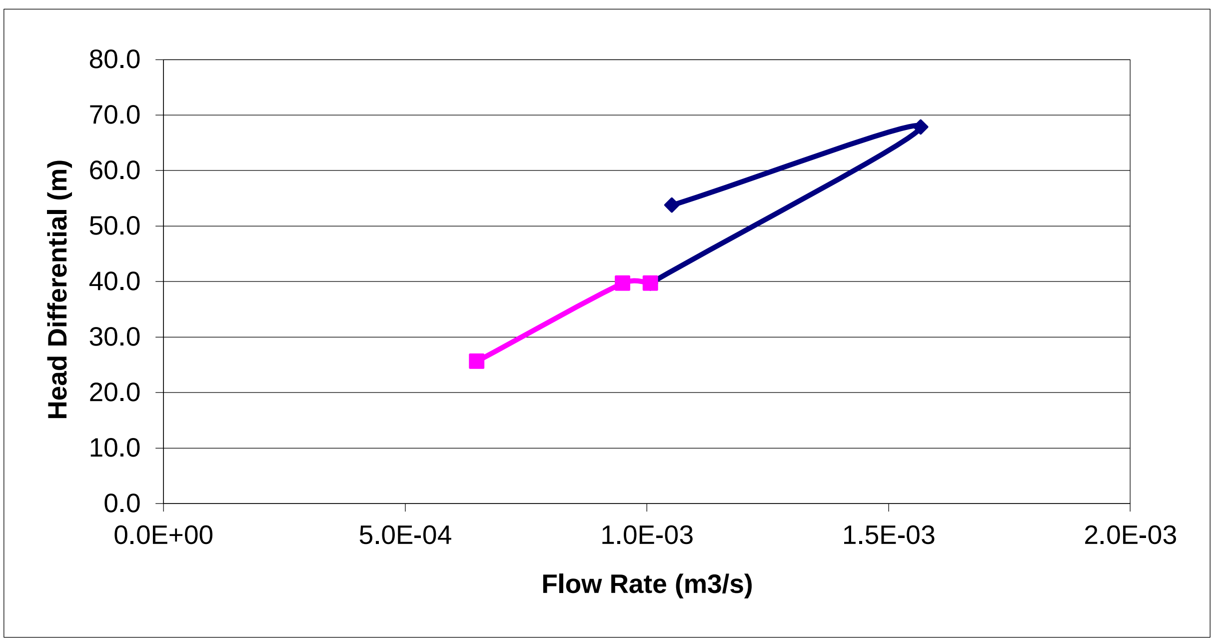
Calculation Input Parameters

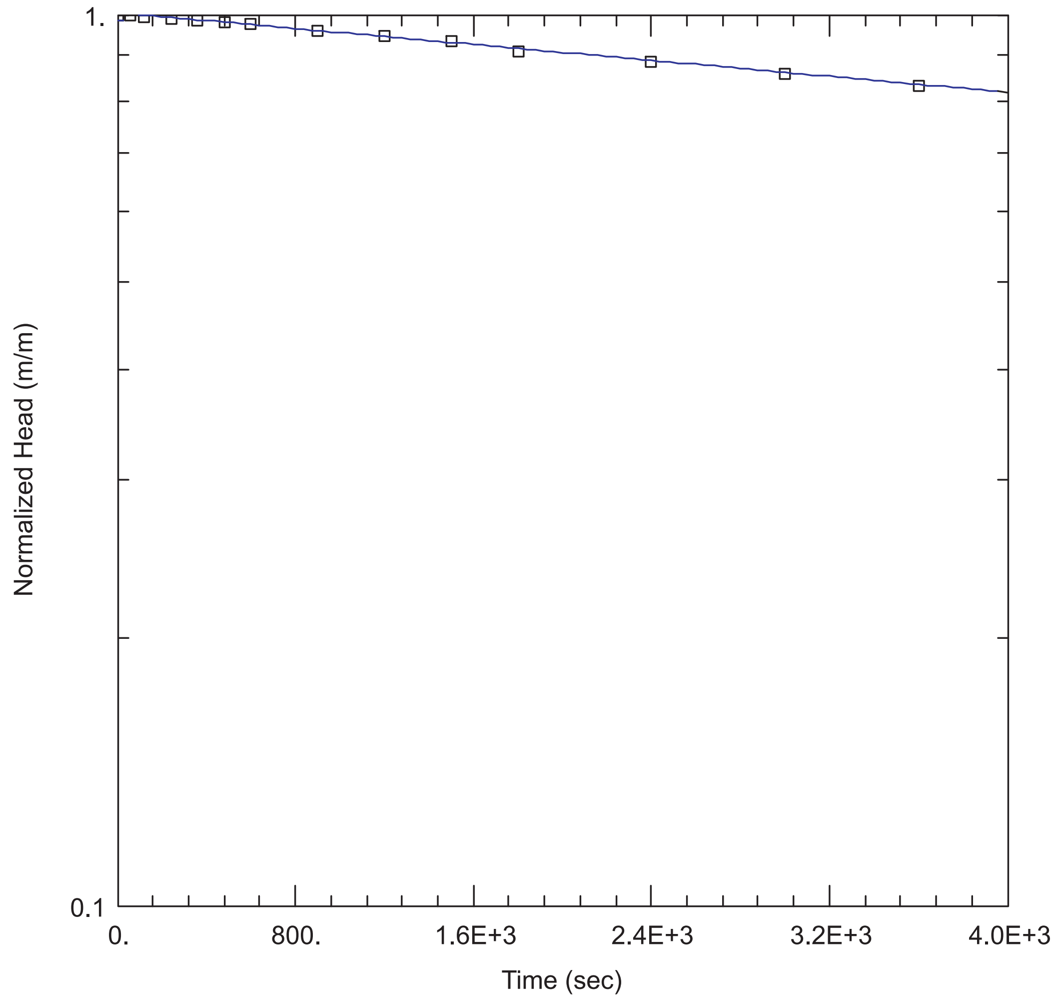
Top of Packer Test Interval (mah):	132.4
Bottom of Packer Test Interval (mah):	141.4
L: Length of Test Interval (mah)	9.0
Test Interval Midpoint (mah):	137
Stickup Height (mah):	2.45
Pressure Gauge Height (m above ground):	2.45
Depth to Water Table (mah):	12.15
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	1.1E-03	42.2	53.8	2.0E-06
80.0	1.6E-03	56.2	67.8	2.4E-06
40.0	1.0E-03	28.1	39.7	2.6E-06
40.0	9.5E-04	28.1	39.7	2.4E-06
20.0	6.5E-04	14.1	25.6	2.6E-06
			Geo Mean	**2.4.E-06**





Obs. Wells

□ IC10-015 Test #3

Solution

Hvorslev

Parameters

K = 2.7E-8 m/sec
y0 = 9.0 m

SCALE: NOT TO SCALE	DESIGNED: RT
DATE: FEBRUARY 2011	CHECKED: RT
DRAWN: RT	APPROVED: APPROVE

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CLIENT: SEABRIDGE GOLD INC.

PROJECT: KSM PRE-FEASIBILITY STUDY
PIT DEPRESSURIZATION ANALYSES

TITLE: IC10-015 Packer Test #3
231.4 to 240.4 m along hole Falling Head Results

PROJECT No.:	FIG. No.:	REV.:
0638-009	Packer Test Appendix	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\Packer Tests\Analysis\FallingHeadTests.cdr

Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-015
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Russell

Collar El.:
Trend:
Plunge: 70 deg
Date: 22-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	54.903	--
1	50	54.904	0.001
2	50	54.904	0.000
3	50	54.904	0.000
4	50	54.905	0.001
5	50	54.905	0.000
6	50	54.905	0.000
7	50	54.906	0.001
8	50	54.906	0.000
9	50	54.906	0.000
10	50	54.906	0.000
Stable Ave.	50		0.0002

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	54.908	--
1	75	54.908	0.000
2	75	54.909	0.001
3	75	54.909	0.000
4	75	54.910	0.001
5	75	54.910	0.000
6	75	54.910	0.000
7	75	54.911	0.001
8	75	54.911	0.000
9	75	54.912	0.001
10	75	54.912	0.000
Stable Ave.	75		0.0004

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	54.914	--
1	100	54.914	0.000
2	100	54.915	0.001
3	100	54.915	0.000
4	100	54.916	0.001
5	100	54.917	0.001
6	100	54.917	0.000
7	100	54.918	0.001
8	100	54.918	0.000
9	100	54.919	0.001
10	100	54.920	0.001
Stable Ave.	100		0.001

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	54.920	--
1	75	54.920	0.000
2	75	54.921	0.001
3	75	54.921	0.000
4	75	54.922	0.001
5	75	54.923	0.001
6	75	54.923	0.000
7	75	54.924	0.001
8	75	54.924	0.000
9	75	54.924	0.000
10	75	54.925	0.001
Stable Ave.	75		0.0005

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	54.925	--
1	50	54.925	0.000
2	50	54.925	0.000
3	50	54.925	0.000
4	50	54.926	0.001
5	50	54.926	0.000
6	50	54.926	0.000
7	50	54.927	0.001
8	50	54.927	0.000
9	50	54.928	0.001
10	50	54.928	0.000
Stable Ave.	50		0.0003

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	10.22	m
Top of Packer Interval:	295.90	m
Bottom of Packer Interval (or Bottom of Hole):	300.40	m
Packer Inflation Pressure:	754	psi
Rod Stickup Height:	2.5	m
Water Flushed (Vol./Time/Until Clean):	25 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing: 3:00 AM
End Flushing: 3:25 AM
Start Packer Testing: 5:25 AM
End Packer Testing: 6:20 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **IC10-015**
Test #: **4**

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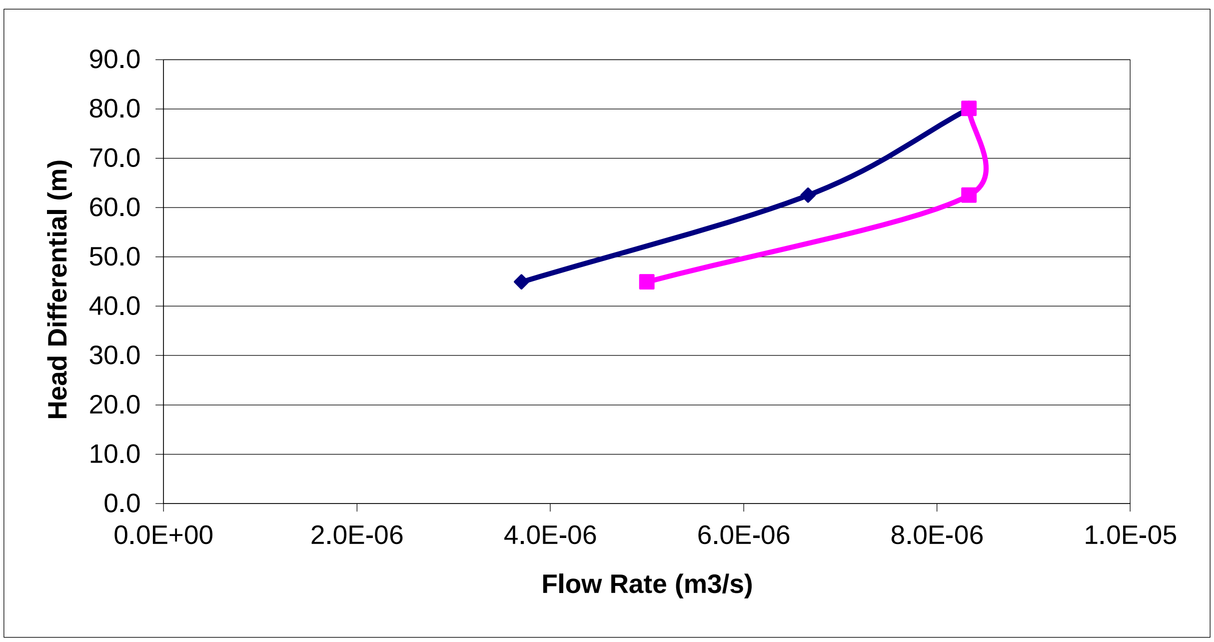
Calculation Input Parameters

Top of Packer Test Interval (mah):	295.9
Bottom of Packer Test Interval (mah):	300.4
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	298
Stickup Height (mah):	2.45
Pressure Gauge Height (m above ground):	2.45
Depth to Water Table (mah):	10.22
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	3.7E-06	35.2	44.9	1.5E-08
75.0	6.7E-06	52.7	62.5	1.9E-08
100.0	8.3E-06	70.3	80.1	1.8E-08
75.0	8.3E-06	52.7	62.5	2.4E-08
50.0	5.0E-06	35.2	44.9	2.0E-08
			Geo Mean	**1.9.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-016
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 59 deg
Date: 23-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	14470.00	--
1	50	14480.70	10.70
2	50	14490.10	9.40
3	50	14499.30	9.20
4	50	14508.50	9.20
5	50	14517.60	9.10
6	50	14526.60	9.00
7	50	14535.80	9.20
8	50	14544.90	9.10
9	50	14554.00	9.10
10	50	14563.00	9.00
Stable Ave.	50		9.30

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	14580.00	--
1	75	14592.50	12.50
2	75	14604.90	12.40
3	75	14617.30	12.40
4	75	14629.60	12.30
5	75	14642.00	12.40
6	75	14654.20	12.20
7	75	14666.80	12.60
8	75	14678.90	12.10
9	75	14691.30	12.40
10	75	14703.40	12.10
Stable Ave.	75		12.34

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	14730.40	--
1	100	14745.40	15.00
2	100	14760.40	15.00
3	100	14775.30	14.90
4	100	14790.20	14.90
5	100	14804.60	14.40
6	100	14819.00	14.40
7	100	14833.50	14.50
8	100	14848.10	14.60
9	100	14862.50	14.40
10	100	14877.00	14.50
Stable Ave.	100		14.66

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	14890.00	--
1	75	14900.60	10.60
2	75	14911.10	10.50
3	75	14922.70	11.60
4	75	14934.60	11.90
5	75	14946.90	12.30
6	75	14958.90	12.00
7	75	14971.00	12.10
8	75	14982.90	11.90
9	75	14994.90	12.00
10	75	15007.10	12.20
Stable Ave.	75		11.71

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	15020.00	--
1	50	15027.20	7.20
2	50	15034.90	7.70
3	50	15042.80	7.90
4	50	15050.20	7.40
5	50	15058.60	8.40
6	50	15066.40	7.80
7	50	15074.20	7.80
8	50	15082.10	7.90
9	50	15090.00	7.90
10	50	15097.70	7.70
Stable Ave.	50		7.77

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 1.74 m
Top of Packer Interval: 58.90 m
Bottom of Packer Interval (or Bottom of Hole): 75.40 m
Packer Inflation Pressure: 477 psi
Rod Stickup Height: 2.0 m
Water Flushed (Vol./Time/Until Clean): 20 min
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 2:30 PM
End Flushing: 2:50 PM
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **IC10-016**
Test #: **1**

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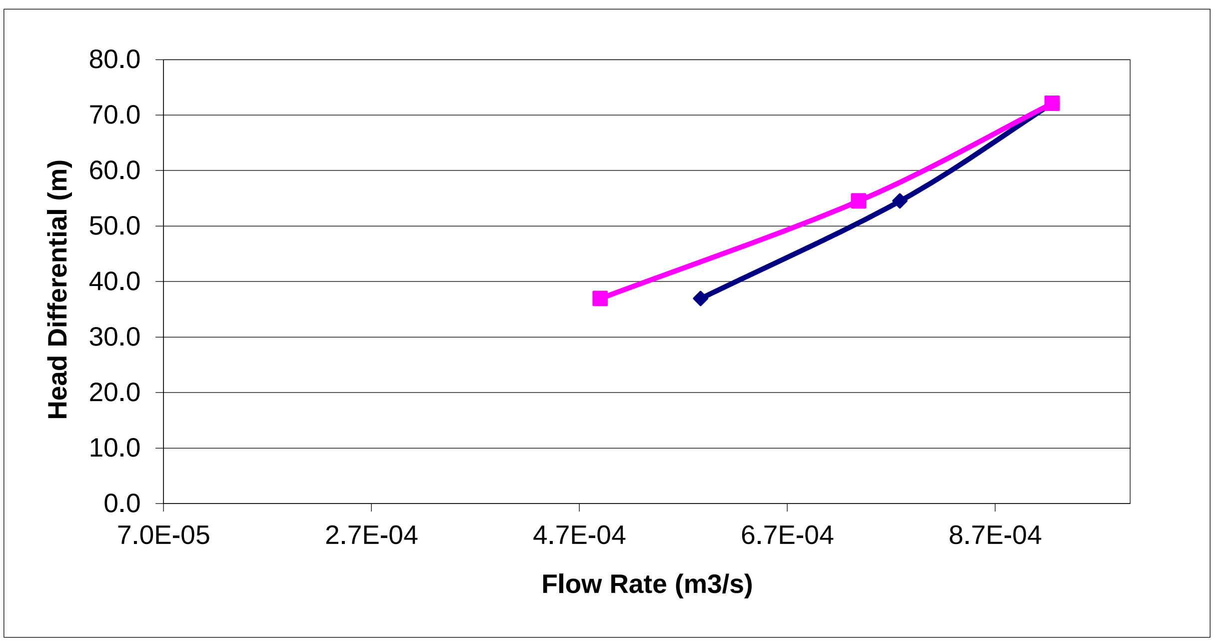
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	58.9
Bottom of Packer Test Interval (mah):	75.4
L: Length of Test Interval (mah)	16.5
Test Interval Midpoint (mah):	67
Stickup Height (mah):	2.00
Pressure Gauge Height (m above ground):	2.00
Depth to Water Table (mah):	1.74
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	59

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	5.9E-04	35.2	36.9	1.1E-06
75.0	7.8E-04	52.7	54.5	9.5E-07
100.0	9.2E-04	70.3	72.1	8.6E-07
75.0	7.4E-04	52.7	54.5	9.0E-07
50.0	4.9E-04	35.2	36.9	8.8E-07
			Geo Mean	**9.3.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-016
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 59 deg
Date: 24-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	15030.20	--
1	50	15033.70	3.50
2	50	15037.30	3.60
3	50	15040.70	3.40
4	50	15044.10	3.40
5	50	15047.60	3.50
6	50	15051.00	3.40
7	50	15054.40	3.40
8	50	15057.80	3.40
9	50	15061.20	3.40
10	50	15064.60	3.40
Stable Ave.	50		3.44

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	15073.00	--
1	75	15077.60	4.60
2	75	15082.10	4.50
3	75	15086.90	4.80
4	75	15091.40	4.50
5	75	15095.60	4.20
6	75	15100.00	4.40
7	75	15104.20	4.20
8	75	15108.50	4.30
9	75	15112.80	4.30
10	75	15117.10	4.30
Stable Ave.	75		4.41

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	15124.00	--
1	100	15129.90	5.90
2	100	15135.90	6.00
3	100	15141.60	5.70
4	100	15147.00	5.40
5	100	15152.50	5.50
6	100	15157.90	5.40
7	100	15163.30	5.40
8	100	15168.80	5.50
9	100	15174.20	5.40
10	100	15179.80	5.60
Stable Ave.	100		5.58

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	15185.00	--
1	75	15189.10	4.10
2	75	15193.10	4.00
3	75	15196.90	3.80
4	75	15200.90	4.00
5	75	15204.80	3.90
6	75	15208.70	3.90
7	75	15212.50	3.80
8	75	15216.40	3.90
9	75	15220.30	3.90
10	75	15224.10	3.80
Stable Ave.	75		3.91

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	15226.00	--
1	50	15228.70	2.70
2	50	15231.30	2.60
3	50	15234.00	2.70
4	50	15236.70	2.70
5	50	15239.30	2.60
6	50	15241.90	2.60
7	50	15244.50	2.60
8	50	15247.20	2.70
9	50	15249.80	2.60
10	50	15252.40	2.60
Stable Ave.	50		2.64

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.00	m
Top of Packer Interval:	139.90	m
Bottom of Packer Interval (or Bottom of Hole):	150.40	m
Packer Inflation Pressure:	517	psi
Rod Stickup Height:	2.2	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 10:15 AM
End Flushing: 2:00 PM
Start Packer Testing: 3:00 PM
End Packer Testing: 3:50 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments: artesian

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Hole #: **IC10-016**
Test #: **2**

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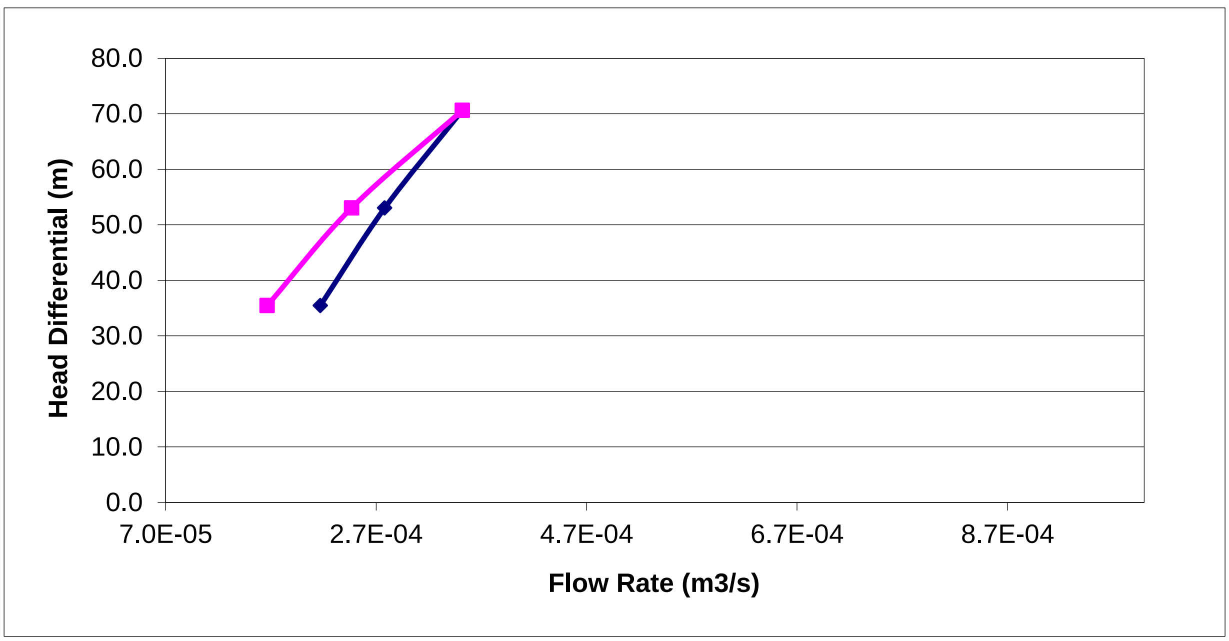
Calculation Input Parameters

Top of Packer Test Interval (mah):	139.9
Bottom of Packer Test Interval (mah):	150.4
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	145
Stickup Height (mah):	2.18
Pressure Gauge Height (m above ground):	2.18
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	59

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	2.2E-04	35.2	35.5	5.9E-07
75.0	2.8E-04	52.7	53.0	5.1E-07
100.0	3.5E-04	70.3	70.6	4.8E-07
75.0	2.5E-04	52.7	53.0	4.5E-07
50.0	1.7E-04	35.2	35.5	4.5E-07
			Geo Mean	**4.9.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # IC10-016
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 59 deg
Date: 25-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	55	15255.00	--
1	50	15256.10	1.10
2	50	15256.95	0.85
3	50	15257.80	0.85
4	50	15258.50	0.70
5	50	15259.30	0.80
6	50	15260.05	0.75
7	50	15260.80	0.75
8	50	15261.50	0.70
9	50	15262.25	0.75
10	50	15263.00	0.75
Stable Ave.	50		0.77

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	80	15264.00	--
1	80	15265.20	1.20
2	75	15266.10	0.90
3	75	15267.00	0.90
4	75	15267.80	0.80
5	75	15268.60	0.80
6	75	15269.40	0.80
7	75	15270.10	0.70
8	75	15270.85	0.75
9	75	15271.55	0.70
10	75	15272.25	0.70
Stable Ave.	76		0.75

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	15273.50	--
1	100	15274.40	0.90
2	100	15275.30	0.90
3	100	15276.15	0.85
4	100	15277.00	0.85
5	100	15277.85	0.85
6	100	15278.60	0.75
7	100	15279.40	0.80
8	100	15280.15	0.75
9	100	15280.90	0.75
10	100	15281.65	0.75
Stable Ave.	100		0.77

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	15282.00	--
1	75	15282.50	0.50
2	75	15283.05	0.55
3	75	15283.50	0.45
4	75	15284.00	0.50
5	75	15284.50	0.50
6	75	15285.00	0.50
7	75	15285.50	0.50
8	75	15286.00	0.50
9	75	15286.40	0.40
10	75	15286.90	0.50
Stable Ave.	75		0.49

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	15287.00	--
1	50	15287.25	0.25
2	50	15287.55	0.30
3	50	15287.85	0.30
4	50	15288.15	0.30
5	50	15288.50	0.35
6	50	15288.80	0.30
7	50	15289.10	0.30
8	50	15289.40	0.30
9	50	15289.70	0.30
10	50	15290.05	0.35
Stable Ave.	50		0.30

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.00	m
Top of Packer Interval:	214.90	m
Bottom of Packer Interval (or Bottom of Hole):	225.40	m
Packer Inflation Pressure:	618	psi
Rod Stickup Height:	2.2	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 2:20 PM
End Flushing: 2:50 PM
Start Packer Testing: 4:00 PM
End Packer Testing: 4:50 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **IC10-016**
Test #: **3**

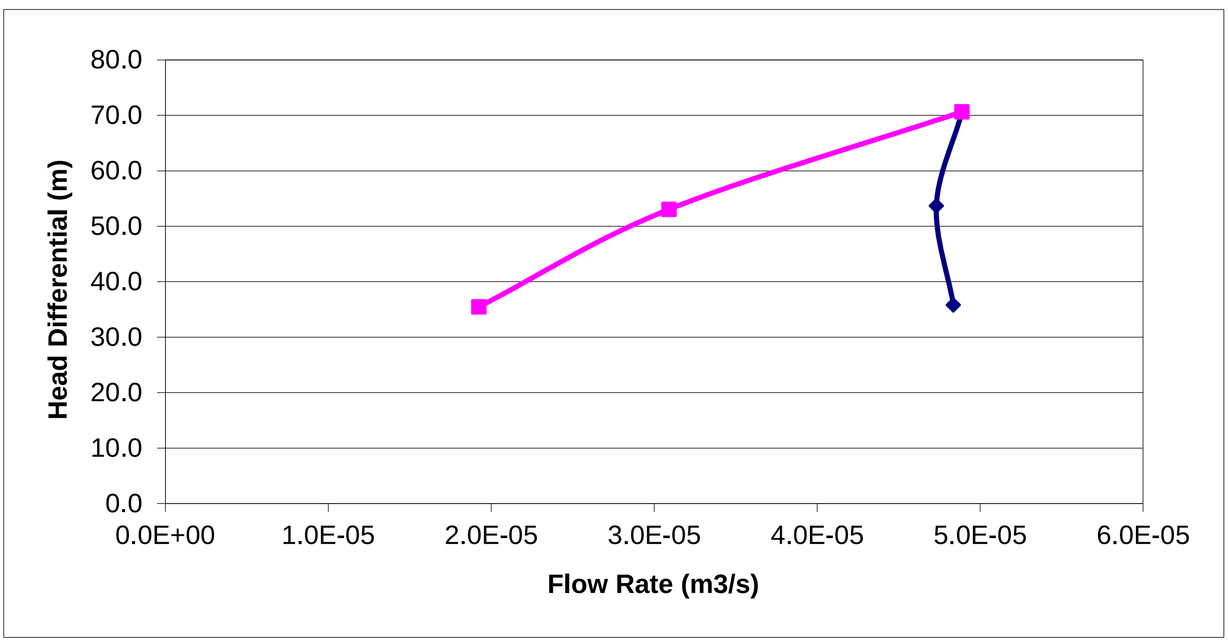
Calculation Input Parameters

Top of Packer Test Interval (mah):	214.9
Bottom of Packer Test Interval (mah):	225.4
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	220
Stickup Height (mah):	2.18
Pressure Gauge Height (m above ground):	2.18
Depth to Water Table (mah):	0.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	59

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.5	4.8E-05	35.5	35.8	1.3E-07
75.9	4.7E-05	53.4	53.7	8.5E-08
100.0	4.9E-05	70.3	70.6	6.7E-08
75.0	3.1E-05	52.7	53.0	5.6E-08
50.0	1.9E-05	35.2	35.5	5.2E-08
			Geo Mean	**7.4.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-05
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Touissant

Collar El.:
Trend: 210
Plunge: 82 deg
Date: 1-Aug-10

Packer Setup Type: Single

Measurements

Depth to Water from Top of Stickup:	46.78	m
Top of Packer Interval:	126.18	m
Bottom of Packer Interval (or Bottom of Hole):	136.65	m
Packer Inflation Pressure:	448	psi
Rod Stickup Height:	2.5	m
Water Flushed (Vol./Time/Until Clean):	10 min	clean
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.3	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 3:30 PM
End Flushing: 3:40 PM
Start Packer Testing: 4:50 PM
End Packer Testing: 6:05 PM

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5597.90	--
1	50	5603.50	5.60
2	50	5609.50	6.00
3	50	5615.90	6.40
4	50	5623.00	7.10
5	50	5629.50	6.50
6	50	5636.00	6.50
7	50	5642.50	6.50
8	50	5649.50	7.00
9	50	5656.10	6.60
10	50	5662.70	6.60
Stable Ave.	50		6.48

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	6092.00	--
1	75	6105.30	13.30
2	75	6118.50	13.20
3	75	6132.10	13.60
4	75	6145.90	13.80
5	75	6159.20	13.30
6	75	6173.00	13.80
7	75	6185.40	12.40
8	75	6198.30	12.90
9	75	6211.10	12.80
10	75	6224.00	12.90
Stable Ave.	75		13.20

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5800.00	--
1	75	5810.50	10.50
2	75	5820.40	9.90
3	75	5830.90	10.50
4	75	5841.60	10.70
5	75	5852.50	10.90
6	75	5864.80	12.30
7	75	5876.50	11.70
8	75	5888.80	12.30
9	75	5900.40	11.60
10	75	5913.30	12.90
Stable Ave.	75		11.33

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	6245.00	--
1	50	6256.50	11.50
2	50	6267.90	11.40
3	50	6279.40	11.50
4	50	6290.60	11.20
5	50	6302.00	11.40
6	50	6313.30	11.30
7	50	6324.60	11.30
8	50	6335.80	11.20
9	50	6347.20	11.40
10	50	6358.40	11.20
Stable Ave.	50		11.34

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	5929.00	--
1	100	5943.20	14.20
2	100	5958.50	15.30
3	100	5973.60	15.10
4	100	5988.50	14.90
5	100	6003.50	15.00
6	100	6018.60	15.10
7	100	6033.20	14.60
8	100	6048.00	14.80
9	100	6062.80	14.80
10	100	6077.80	15.00
Stable Ave.	100		14.88

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Phone: (604) 684 5900

Hole #: **K10-05**
Test #: **1**

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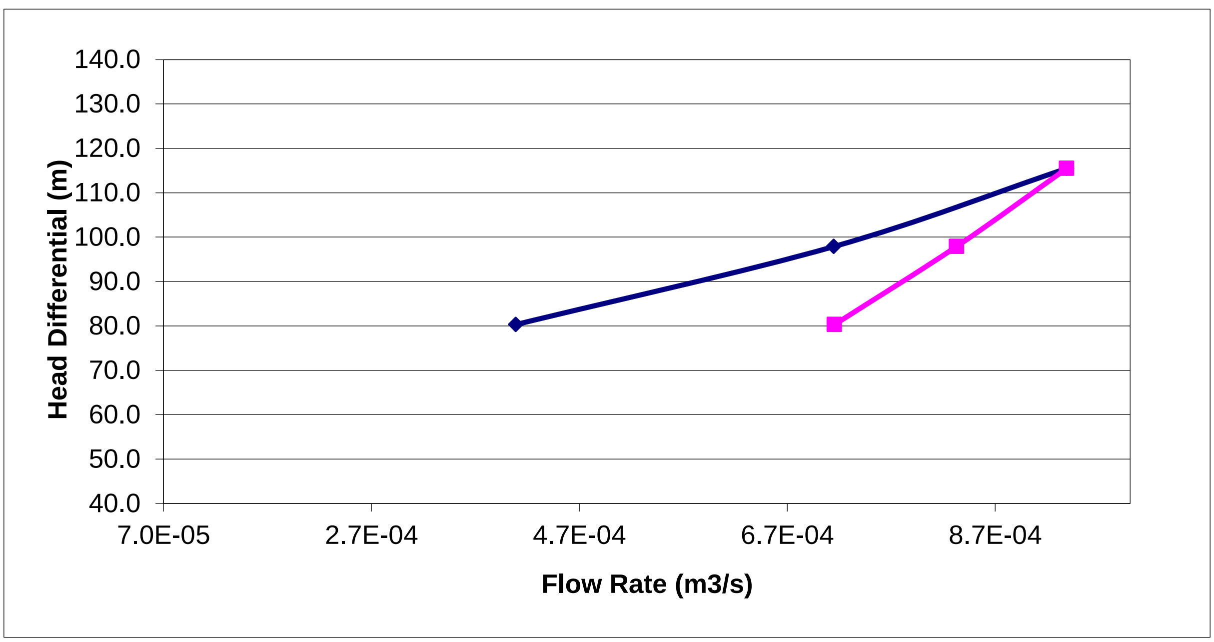
Calculation Input Parameters

Top of Packer Test Interval (mah):	126.2
Bottom of Packer Test Interval (mah):	136.7
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	131
Stickup Height (mah):	2.50
Pressure Gauge Height (m above ground):	1.30
Depth to Water Table (mah):	46.78
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	82

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L \sin(A)}{r}\right)}{2 \times \pi \times L \sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	4.1E-04	35.2	80.3	4.4E-07
75.0	7.1E-04	52.7	97.9	6.3E-07
100.0	9.4E-04	70.3	115.5	7.0E-07
75.0	8.3E-04	52.7	97.9	7.3E-07
50.0	7.2E-04	35.2	80.3	7.7E-07
			Geo Mean	**6.4.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-06
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Russell

Collar El.:
Trend: 150
Plunge: 69 deg
Date: 3-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	79.984	--
1	50	79.985	0.001
2	50	79.985	0.000
3	50	79.986	0.001
4	50	79.986	0.000
5	50	79.987	0.001
6	50	79.988	0.001
7	50	79.988	0.000
8	50	79.989	0.001
9	50	79.989	0.000
10	50	79.990	0.001
Stable Ave.	50		0.001

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	79.990	--
1	75	79.992	0.002
2	75	79.993	0.001
3	75	79.994	0.001
4	75	79.995	0.001
5	75	79.995	0.000
6	75	79.996	0.001
7	75	79.997	0.001
8	75	79.998	0.001
9	75	79.999	0.001
10	75	80.000	0.001
Stable Ave.	75		0.001

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	80.000	--
1	100	80.004	0.004
2	100	80.007	0.003
3	100	80.010	0.003
4	100	80.013	0.003
5	100	80.016	0.003
6	100	80.020	0.004
7	100	80.023	0.003
8	100	80.027	0.004
9	100	80.031	0.004
10	100	80.036	0.005
Stable Ave.	100		0.003

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	80.038	--
1	75	80.041	0.003
2	75	80.044	0.003
3	75	80.046	0.002
4	75	80.049	0.003
5	75	80.051	0.002
6	75	80.053	0.002
7	75	80.055	0.002
8	75	80.057	0.002
9	75	80.059	0.002
10	75	80.062	0.003
Stable Ave.	75		0.002

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	80.063	--
1	50	80.064	0.001
2	50	80.065	0.001
3	50	80.066	0.001
4	50	80.068	0.002
5	50	80.069	0.001
6	50	80.070	0.001
7	50	80.072	0.002
8	50	80.073	0.001
9	50	80.074	0.001
10	50	80.075	0.001
Stable Ave.	50		0.001

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	18.50	m
Top of Packer Interval:	43.80	m
Bottom of Packer Interval (or Bottom of Hole):	48.30	m
Packer Inflation Pressure:	311	psi
Rod Stickup Height:	2.4	m
Water Flushed (Vol./Time/Until Clean):	15 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:	10:15 AM
End Flushing:	10:30 AM
Start Packer Testing:	11:20 AM
End Packer Testing:	12:16 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **K10-06**
Test #: **1**

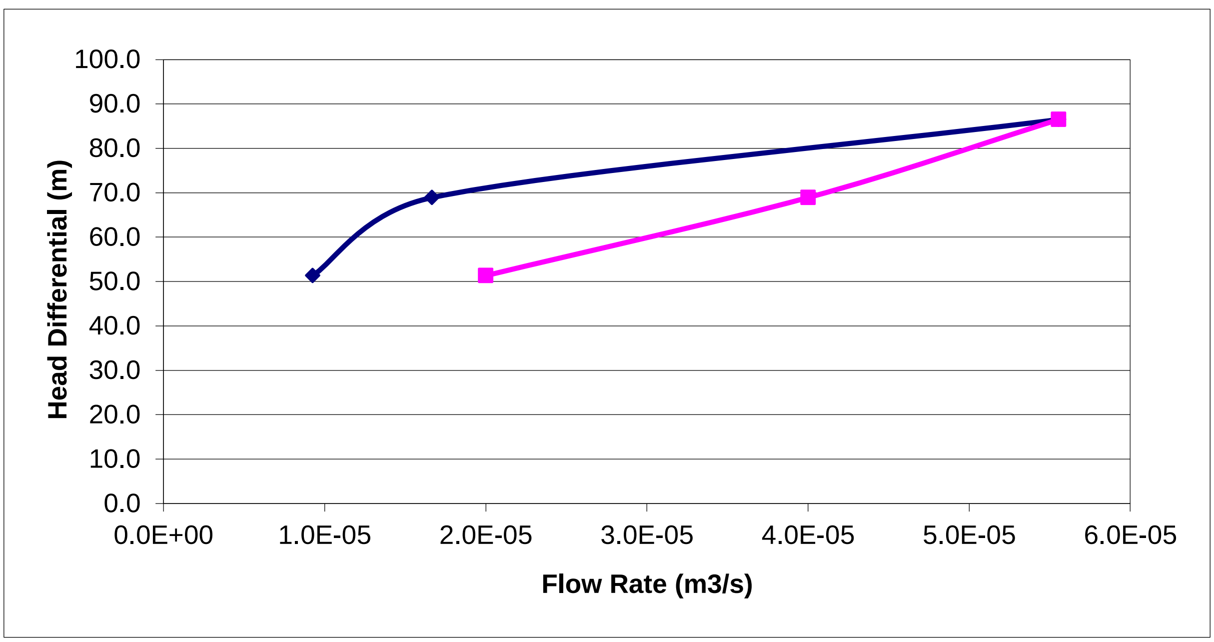
Calculation Input Parameters

Top of Packer Test Interval (mah):	43.8
Bottom of Packer Test Interval (mah):	48.3
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	46
Stickup Height (mah):	2.35
Pressure Gauge Height (m above ground):	1.10
Depth to Water Table (mah):	18.50
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	69

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	9.3E-06	35.2	51.3	3.2E-08
75.0	1.7E-05	52.7	68.9	4.3E-08
100.0	5.6E-05	70.3	86.5	1.1E-07
75.0	4.0E-05	52.7	68.9	1.0E-07
50.0	2.0E-05	35.2	51.3	7.0E-08
			Geo Mean	**6.5.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-06
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Russell

Collar El.:
Trend: 150
Plunge: 69 deg
Date: 4-Aug-10

Packer Setup Type: Single

Measurements

Depth to Water from Top of Stickup:	-12.66	m
Top of Packer Interval:	112.80	m
Bottom of Packer Interval (or Bottom of Hole):	117.30	m
Packer Inflation Pressure:	497	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing: 7:40 AM
Start Packer Testing: 8:10 AM
End Packer Testing:

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	74.820	--
1	50	74.887	0.067
2	50	74.950	0.063
3	50	75.014	0.064
4	50	75.076	0.062
5	50	75.137	0.061
6	50	75.200	0.063
7	50	75.261	0.061
8	50	75.321	0.060
9			
10			
Stable Ave.	50		0.062

Pressure Interval 25

Minutes	Pressure	Volume	Δ Volume
0	25	76.840	--
1	25	76.869	0.029
2	25	76.897	0.028
3	25	76.927	0.030
4	25	76.956	0.029
5	25	76.985	0.029
6	25	77.014	0.029
7	25	77.043	0.029
8	25	77.073	0.030
9	25	77.103	0.030
10	25	77.133	0.030
Stable Ave.	25		0.029

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	75.400	--
1	75	75.481	0.081
2	75	75.559	0.078
3	75	75.638	0.079
4	75	75.717	0.079
5	75	75.794	0.077
6	75	75.874	0.080
7	75	75.954	0.080
8	75	76.033	0.079
9	75	76.111	0.078
10	75	76.190	0.079
Stable Ave.	75		0.079

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0			--
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Stable Ave.			

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	76.230	--
1	50	76.287	0.057
2	50	76.345	0.058
3	50	76.403	0.058
4	50	76.460	0.057
5	50	76.519	0.059
6	50	76.577	0.058
7	50	76.635	0.058
8	50	76.693	0.058
9	50	76.751	0.058
10	50	76.809	0.058
Stable Ave.	50		0.058

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **K10-06**
Test #: **2**

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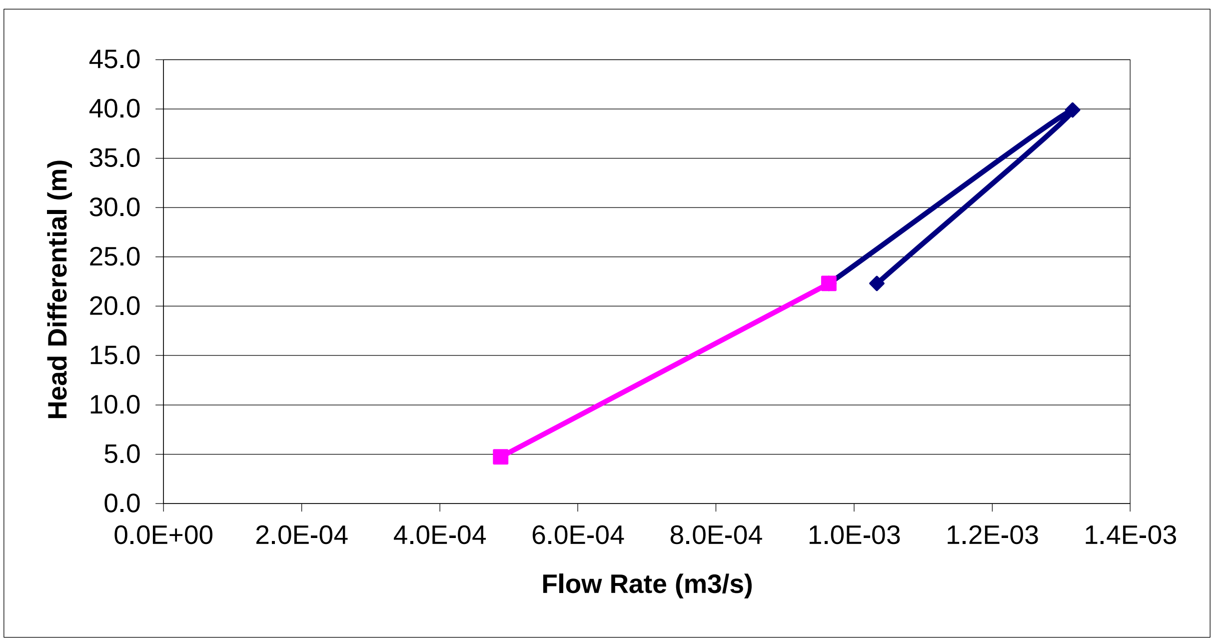
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	112.8
Bottom of Packer Test Interval (mah):	117.3
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	115
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.88
Depth to Water Table (mah):	-12.66
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	69

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	1.0E-03	35.2	22.3	8.3E-06
75.0	1.3E-03	52.7	39.9	5.9E-06
50.0	9.6E-04	35.2	22.3	7.7E-06
25.0	4.9E-04	17.6	4.7	1.8E-05
			Geo Mean	**9.1.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-06
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend: 150
Plunge: 69 deg
Date: 5-Aug-10

Packer Setup Type: Single

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	76.461	--
1	90	76.469	0.008
2	91	76.472	0.003
3	93	76.474	0.002
4	92	76.477	0.003
5	91	76.479	0.002
6	91	76.482	0.003
7	92	76.484	0.002
8	92	76.486	0.002
9	92	76.489	0.003
10	91	76.491	0.002
Stable Ave.	91		0.002

Pressure Interval 110

Minutes	Pressure	Volume	Δ Volume
0	110	76.623	--
1	110	76.626	0.003
2	110	76.630	0.004
3	110	76.633	0.003
4	110	76.636	0.003
5	110	76.639	0.003
6	110	76.643	0.004
7	110	76.646	0.003
8	110	76.649	0.003
9	110	76.652	0.003
10	110	76.656	0.004
Stable Ave.	110		0.003

Pressure Interval 110

Minutes	Pressure	Volume	Δ Volume
0	110	76.500	--
1	111	76.505	0.005
2	110	76.51	0.005
3	113	76.515	0.005
4	112	76.519	0.004
5	112	76.524	0.005
6	112	76.528	0.004
7	111	76.533	0.005
8	112	76.537	0.004
9	111	76.541	0.004
10	112	76.545	0.004
Stable Ave.	111		0.005

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	76.666	--
1	90	76.663	-0.003
2	90	76.665	0.002
3	90	76.667	0.002
4	90	76.669	0.002
5	90	76.671	0.002
6	90	76.673	0.002
7	90	76.675	0.002
8	90	76.678	0.003
9	90	76.681	0.003
10	90	76.683	0.002
Stable Ave.	90		0.002

Pressure Interval 130

Minutes	Pressure	Volume	Δ Volume
0	135	76.561	--
1	135	76.566	0.005
2	135	76.573	0.007
3	135	76.578	0.005
4	135	76.583	0.005
5	135	76.589	0.006
6	135	76.595	0.006
7	137	76.600	0.005
8	137	76.605	0.005
9	137	76.610	0.005
10	137	76.615	0.005
Stable Ave.	136		0.006

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-52.73	m
Top of Packer Interval:	208.82	m
Bottom of Packer Interval (or Bottom of Hole):	211.80	m
Packer Inflation Pressure:	628.83	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	40 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing: 9:00 PM
End Flushing: 9:40 PM
Start Packer Testing: 10:40 PM
End Packer Testing: 11:40 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments: artesian pressures of 75 to 80 psi.

Hole #: **K10-06**
Test #: **3**

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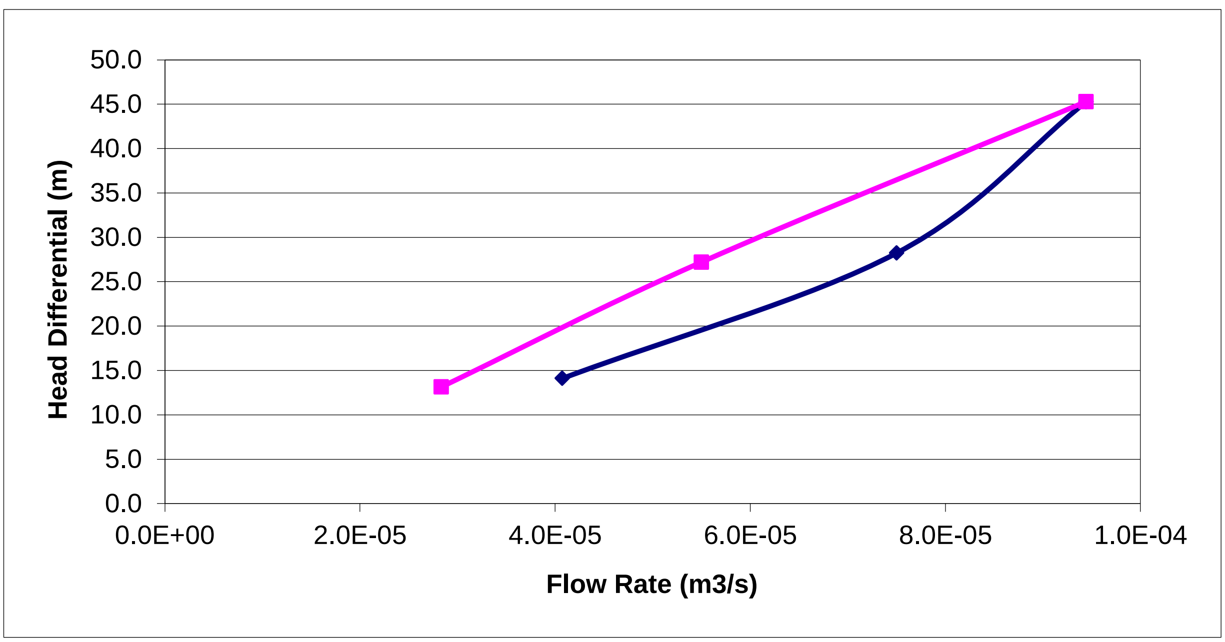
Calculation Input Parameters

Top of Packer Test Interval (mah):	208.8
Bottom of Packer Test Interval (mah):	211.8
L: Length of Test Interval (mah)	3.0
Test Interval Midpoint (mah):	210
Stickup Height (mah):	2.15
Pressure Gauge Height (m above ground):	1.10
Depth to Water Table (mah):	-52.73
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	69

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
91.4	4.1E-05	64.2	14.1	7.1E-07
111.5	7.5E-05	78.4	28.2	6.5E-07
135.7	9.4E-05	95.4	45.3	5.1E-07
110.0	5.5E-05	77.3	27.2	5.0E-07
90.0	2.8E-05	63.3	13.1	5.3E-07
			Geo Mean	**5.8.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-06
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend: 150
Plunge: 69 deg
Date: 7-Aug-10

Packer Setup Type: Single

Pressure Interval 130

Minutes	Pressure	Volume	Δ Volume
0	130	76.327	--
1	130	76.328	0.001
2	133	76.328	0.001
3	133	76.329	0.001
4	133	76.329	0.000
5	133	76.330	0.001
6	133	76.331	0.001
7	133	76.331	0.001
8	133	76.332	0.001
9	133	76.332	0.000
10	133	76.333	0.001
Stable Ave.	132		0.001

Pressure Interval 140

Minutes	Pressure	Volume	Δ Volume
0	142	76.333	--
1	142	76.334	0.001
2	142	76.335	0.001
3	142	76.336	0.001
4	142	76.336	0.001
5	142	76.337	0.001
6	142	76.337	0.001
7	142	76.338	0.001
8	142	76.339	0.001
9	142	76.339	0.001
10	142	76.340	0.001
Stable Ave.	142		0.001

Pressure Interval 150

Minutes	Pressure	Volume	Δ Volume
0	155	76.341	--
1	155	76.342	0.001
2	155	76.342	0.001
3	157	76.343	0.001
4	159	76.343	0.001
5	159	76.344	0.001
6	157	76.345	0.001
7	157	76.345	0.001
8	157	76.346	0.001
9	157	76.346	0.001
10	158	76.347	0.001
Stable Ave.	157		0.001

Pressure Interval 140

Minutes	Pressure	Volume	Δ Volume
0	140	76.348	--
1	140	76.348	0.001
2	140	76.349	0.001
3	140	76.349	0.001
4	140	76.350	0.001
5	140	76.351	0.001
6	140	76.351	0.001
7	140	76.352	0.001
8	140	76.352	0.001
9	140	76.353	0.001
10	140	76.353	0.000
Stable Ave.	140		0.001

Pressure Interval 130

Minutes	Pressure	Volume	Δ Volume
0	130	76.355	--
1	130	76.355	0.001
2	130	76.356	0.001
3	130	76.356	0.000
4	130	76.357	0.001
5	130	76.357	0.001
6	130	76.358	0.001
7	130	76.358	0.001
8	130	76.359	0.001
9	130	76.359	0.000
10	130	76.360	0.001
Stable Ave.	130		0.000

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: -14.06 m
Top of Packer Interval: 292.82 m
Bottom of Packer Interval (or Bottom of Hole): 300.30 m
Packer Inflation Pressure: 755 psi
Rod Stickup Height: 2.1 m
Water Flushed (Vol./Time/Until Clean): 1 hr
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 1.1 m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing: 10:00 PM
End Flushing: 11:00 PM
Start Packer Testing: 12:15 AM
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **K10-06**
Test #: **4**

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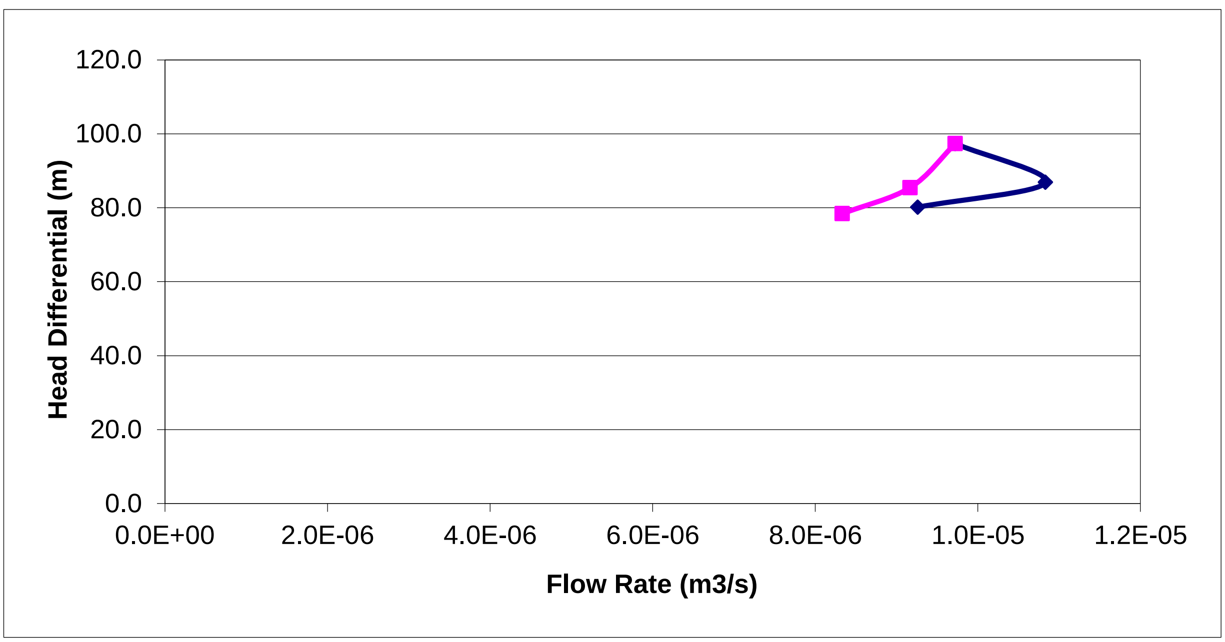
Calculation Input Parameters

Top of Packer Test Interval (mah):	292.8
Bottom of Packer Test Interval (mah):	300.3
L: Length of Test Interval (mah)	7.5
Test Interval Midpoint (mah):	297
Stickup Height (mah):	2.15
Pressure Gauge Height (m above ground):	2.15
Depth to Water Table (mah):	-14.06
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	69

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
132.5	9.3E-06	93.1	80.1	1.4E-08
142.0	1.1E-05	99.8	86.9	1.5E-08
156.9	9.7E-06	110.3	97.3	1.2E-08
140.0	9.2E-06	98.4	85.5	1.3E-08
130.0	8.3E-06	91.4	78.4	1.3E-08
			Geo Mean	**1.3.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-07
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Stein/M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 6-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	9580.30	--
1	50	9586.40	6.10
2	50	9592.50	6.10
3	50	9598.70	6.20
4	50	9604.90	6.20
5	50	9611.20	6.30
6	50	9617.60	6.40
7	50	9624.00	6.40
8	50	9630.40	6.40
9	50	9636.90	6.50
10	50	9643.40	6.50
Stable Ave.	50		6.31

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	9650.00	--
1	75	9660.60	10.60
2	75	9671.80	11.20
3	75	9682.70	10.90
4	75	9693.80	11.10
5	75	9705.00	11.20
6	75	9716.20	11.20
7	75	9727.30	11.10
8	75	9738.20	10.90
9	75	9749.60	11.40
10	75	9761.00	11.40
Stable Ave.	75		11.10

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	9779.00	--
1	100	9793.70	14.70
2	100	9808.70	15.00
3	100	9823.80	15.10
4	100	9838.50	14.70
5	100	9853.30	14.80
6	100	9868.20	14.90
7	100	9883.30	15.10
8	100	9898.00	14.70
9	100	9912.80	14.80
10	100	9927.90	15.10
Stable Ave.	100		14.89

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	9941.00	--
1	75	9954.20	13.20
2	75	9967.10	12.90
3	75	9980.00	12.90
4	75	9993.10	13.10
5	75	10006.20	13.10
6	75	10019.10	12.90
7	75	10032.20	13.10
8	75	10046.00	13.80
9	75	10058.70	12.70
10	75	10071.60	12.90
Stable Ave.	75		13.06

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	10082.00	--
1	50	10092.20	10.20
2	50	10102.40	10.20
3	50	10112.40	10.00
4	50	10122.60	10.20
5	50	10132.60	10.00
6	50	10142.80	10.20
7	50	10152.70	9.90
8	50	10163.00	10.30
9	50	10173.00	10.00
10	50	10183.10	10.10
Stable Ave.	50		10.11

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	33.71	m
Top of Packer Interval:	146.15	m
Bottom of Packer Interval (or Bottom of Hole):	150.65	m
Packer Inflation Pressure:	473	psi
Rod Stickup Height:	2.0	m
Water Flushed (Vol./Time/Until Clean):	ıo return so long flush	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.7	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 6:00 AM
End Flushing: 7:00 AM
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **K10-07**
Test #: **2**

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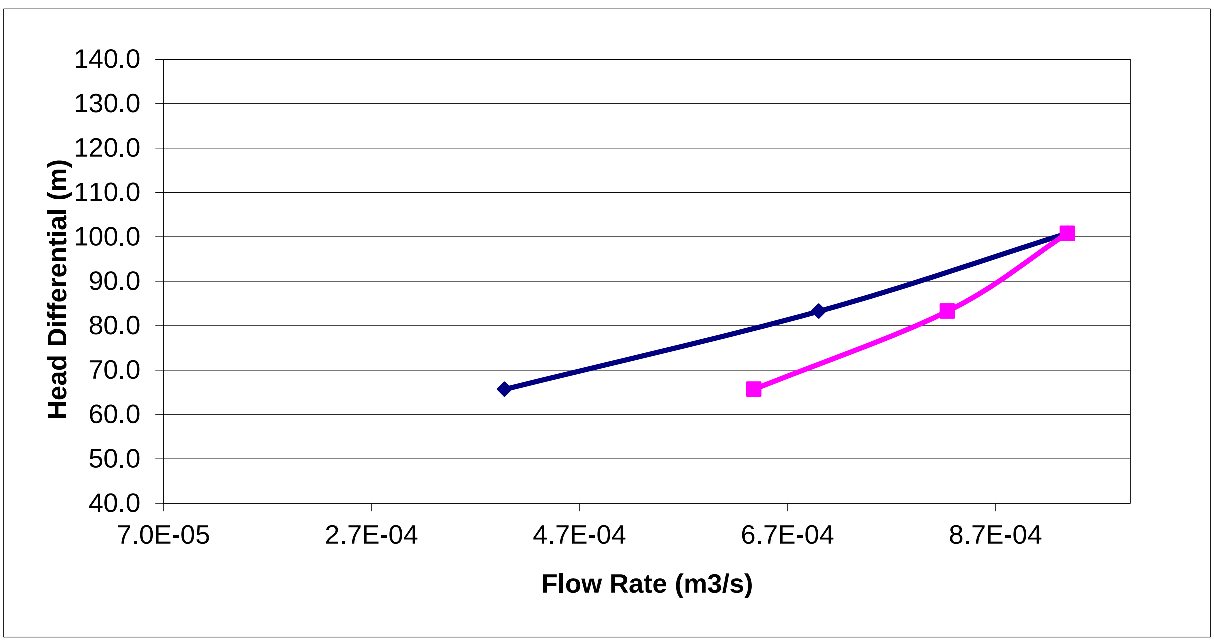
Calculation Input Parameters

Top of Packer Test Interval (mah):	146.2
Bottom of Packer Test Interval (mah):	150.7
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	148
Stickup Height (mah):	2.02
Pressure Gauge Height (m above ground):	0.73
Depth to Water Table (mah):	33.71
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	4.0E-04	35.2	65.7	1.1E-06
75.0	7.0E-04	52.7	83.2	1.5E-06
100.0	9.4E-04	70.3	100.8	1.7E-06
75.0	8.2E-04	52.7	83.2	1.8E-06
50.0	6.4E-04	35.2	65.7	1.7E-06
			Geo Mean	**1.5.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-07
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend:
Plunge: 70 deg
Date: 7-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	10350.00	--
1	50	10363.10	13.10
2	50	10376.50	13.40
3	50	10389.90	13.40
4	50	10403.20	13.30
5	50	10416.50	13.30
6	50	10430.20	13.70
7	50	10443.50	13.30
8	50	10457.00	13.50
9	50	10470.40	13.40
10	50	10483.60	13.20
Stable Ave.	50		13.36

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	10883.00	--
1	75	10899.80	16.80
2	75	10916.40	16.60
3	75	10933.00	16.60
4	80	10950.20	17.20
5	75	10967.00	16.80
6	75	10983.50	16.50
7	75	11000.30	16.80
8	75	11017.00	16.70
9	75	11033.60	16.60
10	75	11050.20	16.60
Stable Ave.	75		16.72

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	10497.00	--
1	75	10513.00	16.00
2	75	10529.00	16.00
3	75	10544.60	15.60
4	75	10560.80	16.20
5	75	10576.60	15.80
6	75	10592.50	15.90
7	75	10608.50	16.00
8	75	10624.20	15.70
9	75	10641.00	16.80
10	75	10656.00	15.00
Stable Ave.	75		15.90

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	11062.00	--
1	50	11076.40	14.40
2	50	11091.10	14.70
3	50	11105.50	14.40
4	50	11120.10	14.60
5	50	11134.60	14.50
6	50	11149.10	14.50
7	50	11163.50	14.40
8	50	11178.00	14.50
9	50	11192.40	14.40
10	50	11206.70	14.30
Stable Ave.	50		14.47

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	10690.00	--
1	100	10708.40	18.40
2	100	10726.40	18.00
3	100	10744.60	18.20
4	100	10762.90	18.30
5	100	10781.10	18.20
6	100	10799.40	18.30
7	100	10817.50	18.10
8	100	10835.80	18.30
9	100	10854.00	18.20
10	100	10872.20	18.20
Stable Ave.	100		18.22

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	33.79	m
Top of Packer Interval:	221.15	m
Bottom of Packer Interval (or Bottom of Hole):	225.65	m
Packer Inflation Pressure:	647.42	psi
Rod Stickup Height:	1.9	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.7	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 6:00 AM
End Flushing: 7:00 AM
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **K10-07**
Test #: **3**

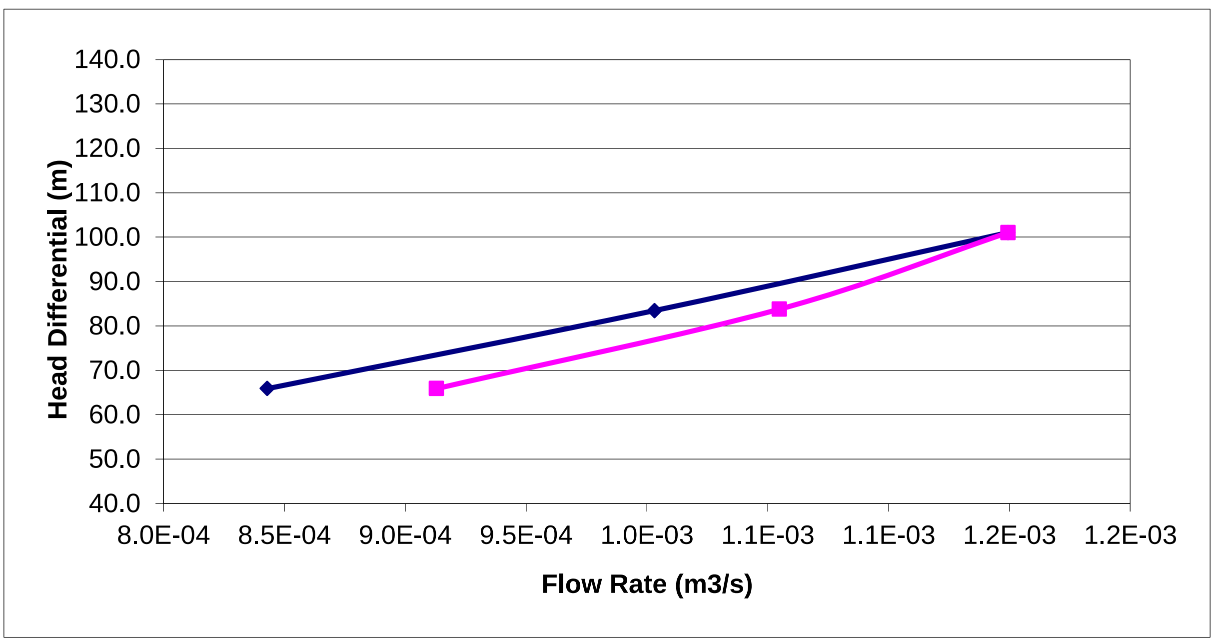
Calculation Input Parameters

Top of Packer Test Interval (mah):	221.2
Bottom of Packer Test Interval (mah):	225.7
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	223
Stickup Height (mah):	1.87
Pressure Gauge Height (m above ground):	0.73
Depth to Water Table (mah):	33.79
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	8.4E-04	35.2	65.9	2.3E-06
75.0	1.0E-03	52.7	83.5	2.1E-06
100.0	1.1E-03	70.3	101.0	2.0E-06
75.5	1.1E-03	53.1	83.8	2.2E-06
50.0	9.1E-04	35.2	65.9	2.5E-06
			Geo Mean	**2.2.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-07
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson

Collar El.:
Trend:
Plunge: 70 deg
Date: 8-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	11789.00	--
1	50	11802.70	13.70
2	50	11816.50	13.80
3	50	11830.00	13.50
4	50	11843.60	13.60
5	50	11859.20	15.60
6	50	11870.60	11.40
7	50	11884.10	13.50
8	50	11897.70	13.60
9	50	11911.10	13.40
10	50	11924.70	13.60
Stable Ave.	50		13.57

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	11943.50	--
1	75	11959.20	15.70
2	75	11974.80	15.60
3	75	11990.30	15.50
4	75	12005.80	15.50
5	75	12021.30	15.50
6	75	12036.90	15.60
7	75	12052.30	15.40
8	75	12067.70	15.40
9	75	12083.30	15.60
10	75	12098.90	15.60
Stable Ave.	75		15.54

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	12146.00	--
1	100	12164.00	18.00
2	100	12182.20	18.20
3	100	12200.50	18.30
4	100	12219.80	19.30
5	100	12238.70	18.90
6	100	12257.90	19.20
7	100	12276.70	18.80
8	100	12295.90	19.20
9	100	12315.00	19.10
10	100	12333.90	18.90
Stable Ave.	100		18.79

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	12688.80	--
1	75	12705.80	17.00
2	75	12722.20	16.40
3	75	12739.30	17.10
4	75	12756.50	17.20
5	75	12773.60	17.10
6	75	12790.80	17.20
7	75	12808.00	17.20
8	75	12825.10	17.10
9	75	12842.10	17.00
10	75	12859.20	17.10
Stable Ave.	75		17.04

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13069.50	--
1	50	13084.30	14.80
2	50	13099.20	14.90
3	50	13113.90	14.70
4	50	13128.70	14.80
5	50	13143.50	14.80
6	50	13158.50	15.00
7	50	13173.30	14.80
8	50	13188.50	15.20
9	50	13203.80	15.30
10	50	13218.70	14.90
Stable Ave.	50		14.92

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	83.86	m
Top of Packer Interval:	295.95	m
Bottom of Packer Interval (or Bottom of Hole):	300.45	m
Packer Inflation Pressure:	750	psi
Rod Stickup Height:	1.9	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing: 12:25 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **K10-07**
Test #: **4**

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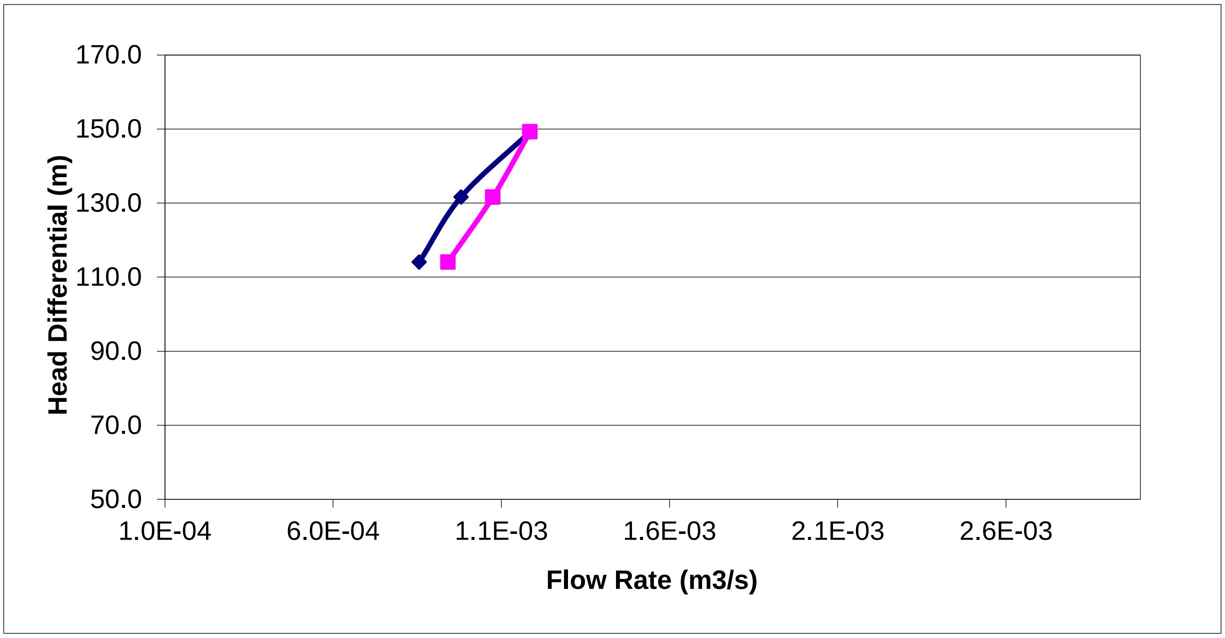
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L \sin(A)}{r}\right)}{2 \times \pi \times L \sin(A) \times dH}$$

Top of Packer Test Interval (mah):	296.0
Bottom of Packer Test Interval (mah):	300.5
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	298
Stickup Height (mah):	1.87
Pressure Gauge Height (m above ground):	1.87
Depth to Water Table (mah):	83.86
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	70

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	8.6E-04	35.2	114.1	1.3E-06
75.0	9.8E-04	52.7	131.6	1.3E-06
100.0	1.2E-03	70.3	149.2	1.4E-06
75.0	1.1E-03	52.7	131.6	1.4E-06
50.0	9.4E-04	35.2	114.1	1.5E-06
			Geo Mean	**1.4.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-08
Design Test Interval:
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend: 250
Plunge: 79 deg
Date: 10-Aug-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	62	77.907	--
1	62	77.942	0.035
2	63	77.977	0.035
3	63	78.012	0.035
4	63	78.047	0.035
5	63	78.081	0.034
6	63	78.114	0.033
7	63	78.149	0.035
8	65	78.184	0.035
9	65	78.216	0.032
10	65	78.251	0.035
Stable Ave.	63		0.034

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	78.287	--
1	80	78.324	0.037
2	80	78.362	0.038
3	80	78.400	0.038
4	80	78.437	0.037
5	80	78.474	0.037
6	80	78.512	0.038
7	80	78.548	0.036
8	80	78.585	0.037
9	80	78.624	0.039
10	80	78.662	0.038
Stable Ave.	80		0.038

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	78.705	--
1	100	78.747	0.042
2	100	78.790	0.043
3	100	78.833	0.043
4	100	78.876	0.043
5	100	78.919	0.043
6	100	78.963	0.044
7	100	79.006	0.043
8	100	79.049	0.043
9	100	79.093	0.044
10	100	79.136	0.043
Stable Ave.	100		0.043

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	79.177	--
1	80	79.216	0.039
2	80	79.254	0.038
3	80	79.294	0.040
4	80	79.332	0.038
5	80	79.371	0.039
6	80	79.410	0.039
7	80	79.449	0.039
8	80	79.489	0.040
9	80	79.527	0.038
10	80	79.566	0.039
Stable Ave.	80		0.039

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	79.602	--
1	60	79.635	0.033
2	60	79.670	0.035
3	60	79.704	0.034
4	60	79.738	0.034
5	60	79.772	0.034
6	60	79.806	0.034
7	60	79.841	0.035
8	60	79.875	0.034
9	60	79.909	0.034
10	60	79.943	0.034
Stable Ave.	60		0.034

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	36.73	m
Top of Packer Interval:	67.82	m
Bottom of Packer Interval (or Bottom of Hole):	72.39	m
Packer Inflation Pressure:	427	psi
Rod Stickup Height:	2.2	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing: 7:30 AM
End Flushing: 8:00 AM
Start Packer Testing: 8:50 AM
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Vancouver, BC Phone: (604) 684 5900

Hole #: **K10-08**
Test #: **1**

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

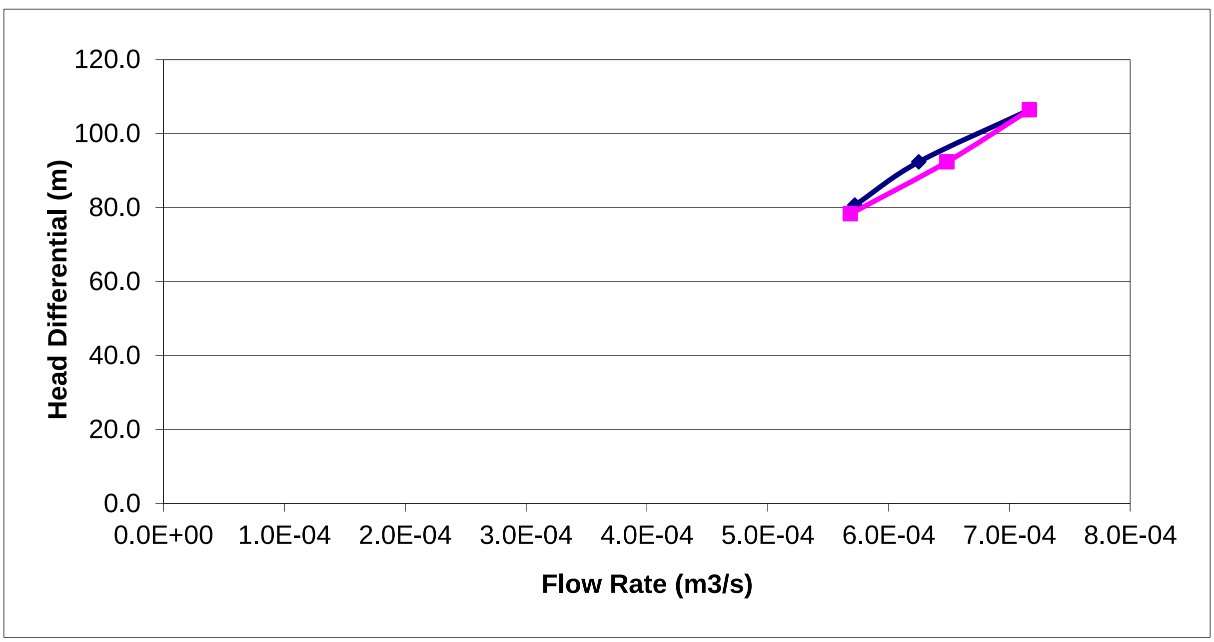
Calculation Input Parameters

Top of Packer Test Interval (mah):	67.8
Bottom of Packer Test Interval (mah):	72.4
L: Length of Test Interval (mah)	4.6
Test Interval Midpoint (mah):	70
Stickup Height (mah):	2.16
Pressure Gauge Height (m above ground):	2.16
Depth to Water Table (mah):	36.73
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	79

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
63.4	5.7E-04	44.6	80.6	1.2E-06
80.0	6.3E-04	56.2	92.3	1.1E-06
100.0	7.2E-04	70.3	106.4	1.1E-06
80.0	6.5E-04	56.2	92.3	1.2E-06
60.0	5.7E-04	42.2	78.3	1.2E-06
			Geo Mean	**1.2.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-08
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Russell/ S. Richards

Collar El.:
Trend: 250
Plunge: 79 deg
Date: 11-Aug-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	65	80.614	--
1	65	80.666	0.052
2	65	80.720	0.054
3	65	80.774	0.054
4	65	80.828	0.054
5	65	80.881	0.053
6	65	80.933	0.052
7	65	80.985	0.052
8	65	81.037	0.052
9	65	81.088	0.051
10	65	81.141	0.053
Stable Ave.	65		0.053

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	81.250	--
1	80	81.306	0.056
2	80	81.362	0.056
3	80	81.417	0.055
4	80	81.472	0.055
5	80	81.527	0.055
6	80	81.582	0.055
7	80	81.637	0.055
8	80	81.692	0.055
9	80	81.747	0.055
10	80	81.802	0.055
Stable Ave.	80		0.055

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	81.863	--
1	100	81.923	0.060
2	100	81.983	0.060
3	100	82.045	0.062
4	100	82.106	0.061
5	100	82.167	0.061
6	100	82.228	0.061
7	100	82.289	0.061
8	100	82.350	0.061
9	100	82.411	0.061
10	100	82.472	0.061
Stable Ave.	100		0.061

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	82.531	--
1	80	82.587	0.056
2	80	82.644	0.057
3	80	82.702	0.058
4	80	82.757	0.055
5	80	82.815	0.058
6	80	82.871	0.056
7	80	82.928	0.057
8	80	82.985	0.057
9	80	83.042	0.057
10	80	83.098	0.056
Stable Ave.	80		0.057

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	83.151	--
1	60	83.203	0.052
2	60	83.254	0.051
3	60	83.306	0.052
4	60	83.358	0.052
5	60	83.410	0.052
6	60	83.461	0.051
7	60	83.513	0.052
8	60	83.564	0.051
9	60	83.617	0.053
10	60	83.668	0.051
Stable Ave.	60		0.052

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	100.00	m
Top of Packer Interval:	157.80	m
Bottom of Packer Interval (or Bottom of Hole):	162.60	m
Packer Inflation Pressure:	563	psi
Rod Stickup Height:	2.2	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing: 1:30 PM
End Packer Testing: 2:20 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **K10-08**
Test #: **2**

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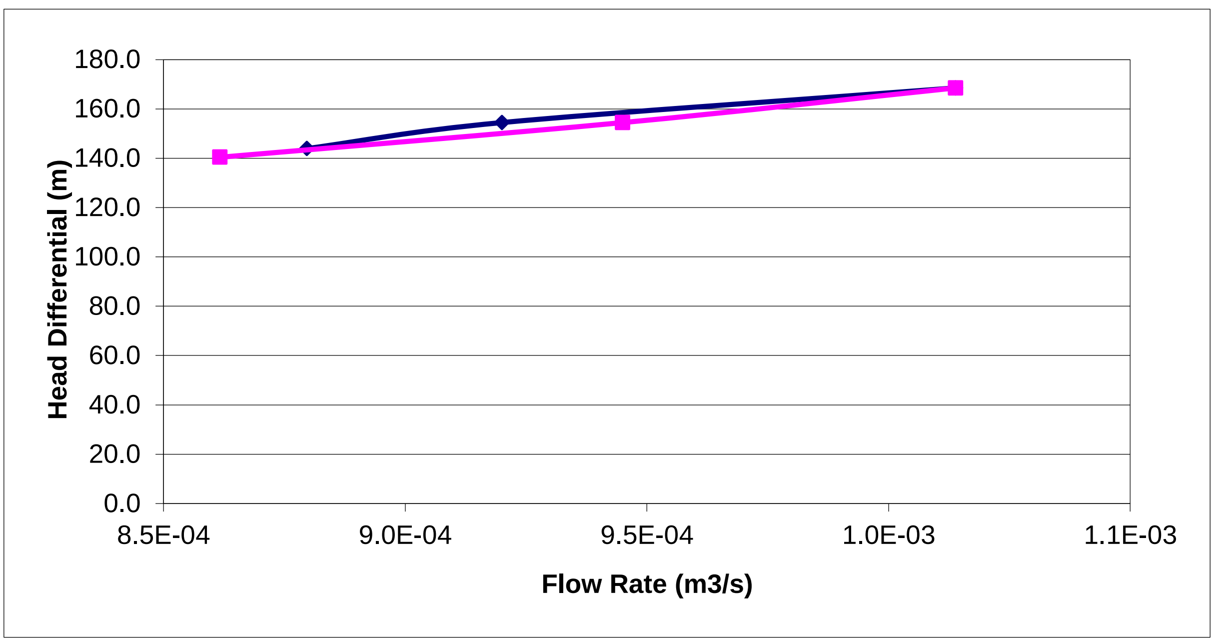
Calculation Input Parameters

Top of Packer Test Interval (mah):	157.8	
Bottom of Packer Test Interval (mah):	162.6	
L: Length of Test Interval (mah)	4.8	
Test Interval Midpoint (mah):	160	
Stickup Height (mah):	2.16	
Pressure Gauge Height (m above ground):	2.16	
Depth to Water Table (mah):	100.00	estimate
Borehole Diameter (mm):	75.7	
r: Borehole Radius (m):	0.03785	
A: Angle From Horizontal (deg):	79	

$$K = \frac{Q \times \ln\left(\frac{L \sin(A)}{r}\right)}{2 \times \pi \times L \sin(A) \times dH}$$

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
65.0	8.8E-04	45.7	143.9	1.0E-06
80.0	9.2E-04	56.2	154.5	9.7E-07
100.0	1.0E-03	70.3	168.5	9.8E-07
80.0	9.4E-04	56.2	154.5	1.0E-06
60.0	8.6E-04	42.2	140.4	1.0E-06
			Geo Mean	**9.9.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # K10-08
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: S. Richards

Collar El.:
Trend: 250
Plunge: 79 deg
Date: 13-Aug-10

Packer Setup Type: Single

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	46.683	--
1	100	46.684	0.001
2	100	46.685	0.001
3	100	46.686	0.001
4	100	46.687	0.001
5	100	46.688	0.001
6	100	46.689	0.001
7	100	46.690	0.001
8	100	46.691	0.001
9	100	46.692	0.001
10	100	46.693	0.001
Stable Ave.	100		0.001

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	46.694	--
1	120	46.695	0.001
2	120	46.696	0.001
3	120	46.697	0.001
4	120	46.698	0.001
5	120	46.699	0.001
6	120	46.700	0.001
7	120	46.701	0.001
8	120	46.702	0.001
9	120	46.703	0.001
10	120	46.704	0.001
Stable Ave.	120		0.001

Pressure Interval 140

Minutes	Pressure	Volume	Δ Volume
0	140	46.705	--
1	140	46.706	0.001
2	140	46.707	0.001
3	140	46.708	0.001
4	140	46.710	0.002
5	140	46.711	0.001
6	140	46.712	0.001
7	140	46.713	0.001
8	140	46.714	0.001
9	140	46.715	0.001
10	140	46.716	0.001
Stable Ave.	140		0.001

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	46.717	--
1	120	46.718	0.001
2	120	46.719	0.001
3	120	46.720	0.001
4	120	46.721	0.001
5	120	46.722	0.001
6	120	46.723	0.001
7	120	46.724	0.001
8	120	46.725	0.001
9	120	46.726	0.000
10	120	46.726	0.001
Stable Ave.	120		0.001

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	46.727	--
1	100	46.728	0.001
2	100	46.729	0.001
3	100	46.730	0.001
4	100	46.731	0.001
5	100	46.732	0.000
6	100	46.732	0.001
7	100	46.733	0.001
8	100	46.734	0.001
9	100	46.735	0.001
10	100	46.736	0.001
Stable Ave.	100		0.001

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: > 100.00 m
Top of Packer Interval: 247.80 m
Bottom of Packer Interval (or Bottom of Hole): 252.30 m
Packer Inflation Pressure: 700 psi
Rod Stickup Height: 2.2 m
Water Flushed (Vol./Time/Until Clean): 45 min
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 1.1 m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing: 8:00 AM
End Flushing: 8:45 AM
Start Packer Testing: 9:30 AM
End Packer Testing: 12:00 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments: depth to water greater than dip tape (> 100 m)

Hole #: **K10-08**
Test #: **3**

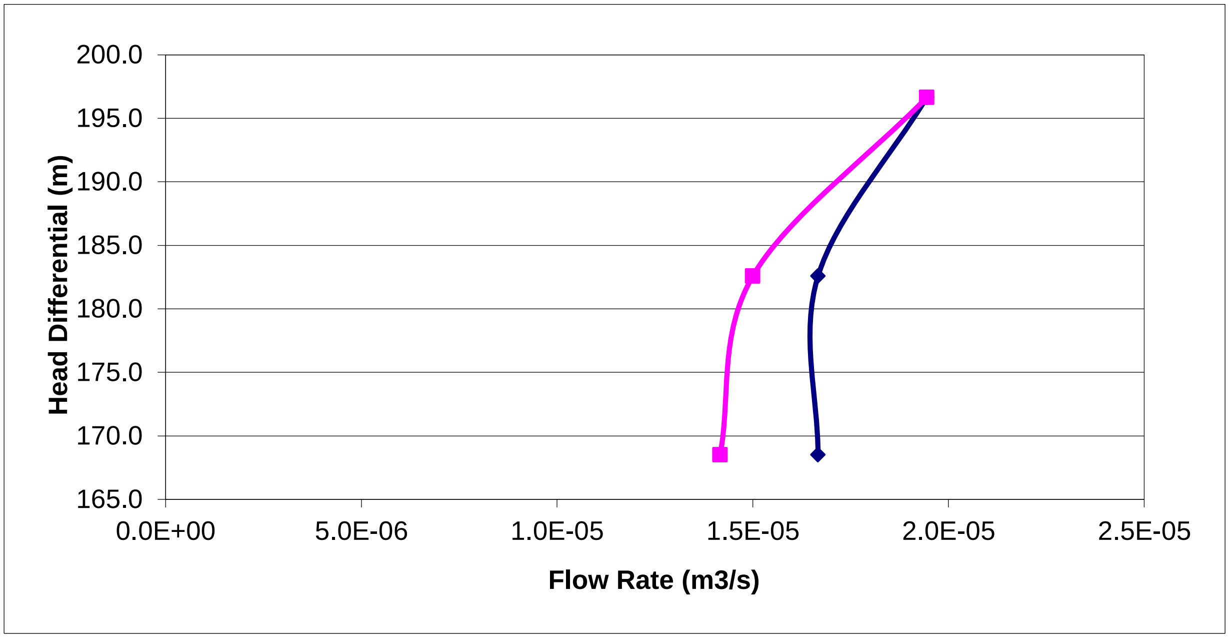
Calculation Input Parameters

Top of Packer Test Interval (mah):	247.8	
Bottom of Packer Test Interval (mah):	252.3	
L: Length of Test Interval (mah)	4.5	
Test Interval Midpoint (mah):	250	
Stickup Height (mah):	2.16	
Pressure Gauge Height (m above ground):	2.16	
Depth to Water Table (mah):	100.00	estimate
Borehole Diameter (mm):	75.7	
r: Borehole Radius (m):	0.03785	
A: Angle From Horizontal (deg):	79	

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
100.0	1.7E-05	70.3	168.5	1.7E-08
120.0	1.7E-05	84.4	182.6	1.6E-08
140.0	1.9E-05	98.4	196.6	1.7E-08
120.0	1.5E-05	84.4	182.6	1.4E-08
100.0	1.4E-05	70.3	168.5	1.4E-08
			Geo Mean	**1.6.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # M10-121
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson

Collar El.:
Trend:
Plunge: 82 deg
Date: 12-Aug-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	13293.45	--
1	60	13293.50	0.050
2	60	13293.53	0.025
3	60	13293.55	0.025
4	60	13293.58	0.025
5	60	13293.60	0.025
6	60	13293.60	0.000
7	60	13293.60	0.000
8	60	13293.60	0.000
9	60	13293.65	0.050
10	60	13293.68	0.025
Stable Ave.	60		0.022

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	13293.83	--
1	90	13293.93	0.100
2	90	13294.00	0.075
3	90	13294.00	0.000
4	90	13294.00	0.000
5	90	13294.10	0.100
6	90	13294.13	0.025
7	90	13294.13	0.000
8	90	13294.14	0.010
9	90	13294.20	0.065
10	90	13294.20	0.000
Stable Ave.	90		0.038

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	13294.30	--
1	120	13294.35	0.055
2	120	13294.45	0.100
3	120	13294.50	0.050
4	120	13294.58	0.075
5	120	13294.60	0.025
6	120	13294.65	0.050
7	120	13294.73	0.075
8	120	13294.80	0.075
9	120	13294.85	0.050
10	120	13294.90	0.050
Stable Ave.	120		0.060

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	13294.90	--
1	90	13295.00	0.100
2	90	13295.03	0.025
3	90	13295.05	0.025
4	90	13295.08	0.025
5	90	13295.13	0.050
6	90	13295.18	0.050
7	90	13295.20	0.025
8	90	13295.20	0.000
9	90	13295.23	0.025
10	90	13295.30	0.075
Stable Ave.	90		0.040

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	13295.33	--
1	60	13295.33	0.000
2	60	13295.33	0.000
3	60	13295.35	0.025
4	60	13295.35	0.000
5	60	13295.38	0.025
6	60	13295.40	0.025
7	60	13295.43	0.025
8	60	13295.45	0.025
9	60	13295.48	0.025
10	60	13295.50	0.025
Stable Ave.	60		0.017

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 5.04 m
Top of Packer Interval: 47.30 m
Bottom of Packer Interval (or Bottom of Hole): 75.80 m
Packer Inflation Pressure: 390 psi
Rod Stickup Height: 1.9 m
Water Flushed (Vol./Time/Until Clean):
Packer Pipe ID/ or Drill Rod ID (circle one): NQ3
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing: 12:25 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: M10-121
Test #: 3

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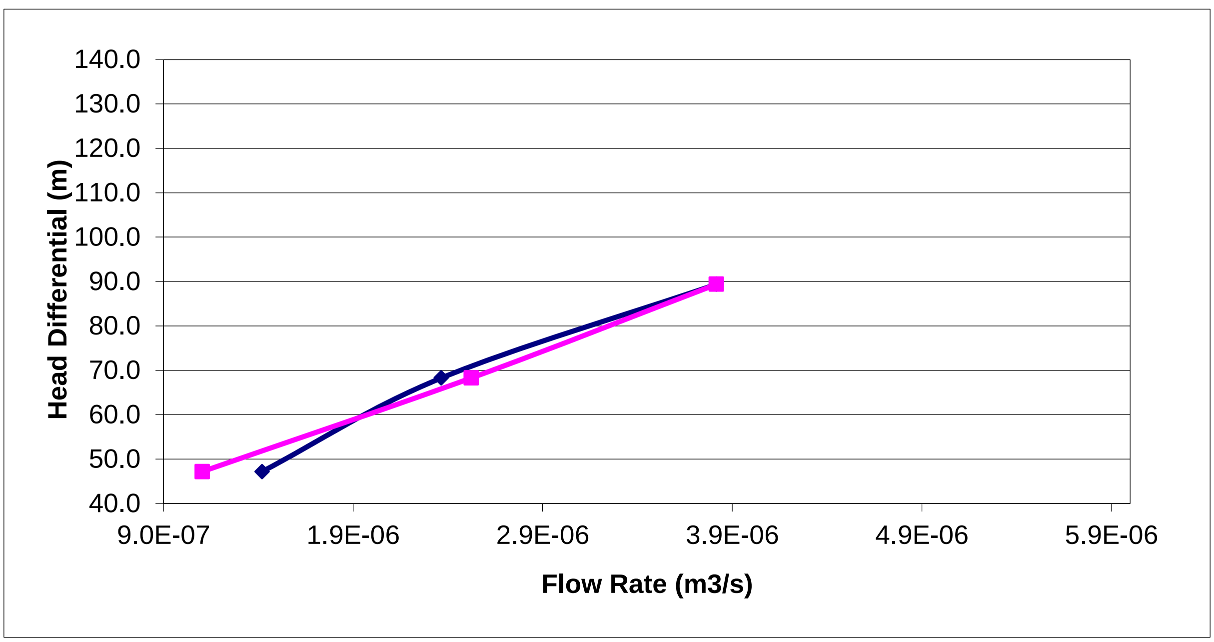
Calculation Input Parameters

Top of Packer Test Interval (mah):	47.3
Bottom of Packer Test Interval (mah):	75.8
L: Length of Test Interval (mah)	28.5
Test Interval Midpoint (mah):	62
Stickup Height (mah):	1.88
Pressure Gauge Height (m above ground):	1.88
Depth to Water Table (mah):	5.04
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	82

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	1.4E-06	42.2	47.2	1.1E-09
90.0	2.4E-06	63.3	68.3	1.3E-09
120.0	3.8E-06	84.4	89.4	1.6E-09
90.0	2.5E-06	63.3	68.3	1.4E-09
60.0	1.1E-06	42.2	47.2	8.7E-10
			Geo Mean	**1.2.E-09**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # M10-121
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson

Collar El.:
Trend:
Plunge: 82 deg
Date: 13-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13323.00	--
1	50	13324.10	1.10
2	50	13325.30	1.20
3	50	13326.40	1.10
4	50	13327.50	1.10
5	50	13328.60	1.10
6	50	13329.60	1.00
7	50	13330.70	1.10
8	50	13331.70	1.00
9	50	13332.70	1.00
10	50	13333.70	1.00
Stable Ave.	50		1.07

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13335.50	--
1	75	13337.30	1.80
2	75	13338.90	1.60
3	75	13340.60	1.70
4	75	13342.20	1.60
5	75	13343.80	1.60
6	75	13345.30	1.50
7	75	13346.90	1.60
8	75	13348.60	1.70
9	75	13350.10	1.50
10	75	13351.70	1.60
Stable Ave.	75		1.62

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	13354.60	--
1	100	13357.40	2.80
2	100	13360.00	2.60
3	100	13362.50	2.50
4	100	13365.00	2.50
5	100	13367.70	2.70
6	100	13370.30	2.60
7	100	13372.80	2.50
8	100	13375.40	2.60
9	100	13378.10	2.70
10	100	13380.80	2.70
Stable Ave.	100		2.62

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13383.40	--
1	75	13385.00	1.60
2	75	13387.30	2.30
3	75	13389.40	2.10
4	75	13391.40	2.00
5	75	13393.30	1.90
6	75	13395.30	2.00
7	75	13397.30	2.00
8	75	13399.30	2.00
9	75	13401.20	1.90
10	75	13403.10	1.90
Stable Ave.	75		1.97

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13404.00	--
1	50	13405.30	1.30
2	50	13406.80	1.50
3	50	13408.30	1.50
4	50	13409.70	1.40
5	50	13411.10	1.40
6	50	13412.40	1.30
7	50	13413.80	1.40
8	50	13415.30	1.50
9	50	13416.70	1.40
10	50	13418.10	1.40
Stable Ave.	50		1.41

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	5.33	m
Top of Packer Interval:	137.30	m
Bottom of Packer Interval (or Bottom of Hole):	162.80	m
Packer Inflation Pressure:	505	psi
Rod Stickup Height:	1.7	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 1:25 AM
End Flushing: 1:55 AM
Start Packer Testing: 1:25 AM
End Packer Testing: 5:45 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **M10-121**
Test #: **4**

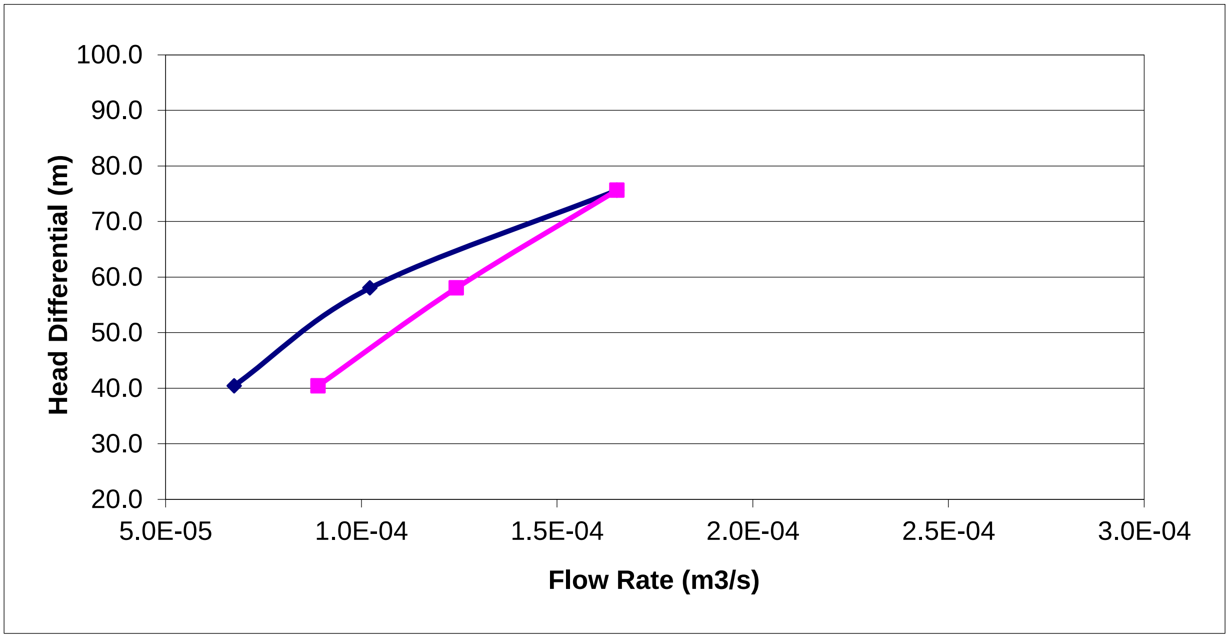
Calculation Input Parameters

Top of Packer Test Interval (mah):	137.3
Bottom of Packer Test Interval (mah):	162.8
L: Length of Test Interval (mah)	25.5
Test Interval Midpoint (mah):	150
Stickup Height (mah):	1.66
Pressure Gauge Height (m above ground):	1.66
Depth to Water Table (mah):	5.33
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	82

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	6.8E-05	35.2	40.4	6.8E-08
75.0	1.0E-04	52.7	58.0	7.2E-08
100.0	1.7E-04	70.3	75.6	9.0E-08
75.0	1.2E-04	52.7	58.0	8.8E-08
50.0	8.9E-05	35.2	40.4	9.0E-08
			Geo Mean	**8.1.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # M10-121
Design Test Interval:
Test #: 5

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson M. Kealty

Collar El.:
Trend:
Plunge: 82 deg
Date: 15-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	∆ Volume
0	50	13423.80	--
1	50	13424.00	0.20
2	50	13424.10	0.10
3	50	13424.30	0.20
4	50	13424.40	0.10
5	50	13424.60	0.20
6	50	13424.70	0.10
7	45	13424.75	0.05
8	50	13424.80	0.05
9	50	13424.90	0.10
10	50	13425.00	0.10
Stable Ave.	50		0.12

Pressure Interval 75

Minutes	Pressure	Volume	∆ Volume
0	75	13425.15	--
1	75	13425.25	0.10
2	75	13425.35	0.10
3	80	13425.50	0.15
4	80	13425.65	0.15
5	75	13425.70	0.05
6	75	13425.85	0.15
7	75	13425.95	0.10
8	75	13426.05	0.10
9	75	13426.20	0.15
10	75	13426.35	0.15
Stable Ave.	76		0.12

Pressure Interval 100

Minutes	Pressure	Volume	∆ Volume
0	100	13426.60	--
1	100	13426.75	0.15
2	100	13426.90	0.15
3	100	13427.10	0.20
4	100	13427.25	0.15
5	100	13427.40	0.15
6	75	13427.55	0.15
7	75	13427.70	0.15
8	100	13427.80	0.10
9	100	13427.95	0.15
10	100	13428.10	0.15
Stable Ave.	95		0.15

Pressure Interval 75

Minutes	Pressure	Volume	∆ Volume
0	75	13428.20	--
1	75	13428.30	0.10
2	75	13428.45	0.15
3	75	13428.55	0.10
4	75	13428.65	0.10
5	75	13428.75	0.10
6	75	13428.85	0.10
7	75	13428.95	0.10
8	75	13429.10	0.15
9	75	13429.25	0.15
10	75	13429.40	0.15
Stable Ave.	75		0.12

Pressure Interval 50

Minutes	Pressure	Volume	∆ Volume
0	50	13429.50	--
1	50	13429.60	0.10
2	50	13429.70	0.10
3	40	13429.75	0.05
4	50	13429.85	0.10
5	50	13430.00	0.15
6	50	13430.10	0.10
7	50	13430.20	0.10
8	50	13430.30	0.10
9	50	13430.40	0.10
10	50	13430.50	0.10
Stable Ave.	49		0.10

Pressure Interval

Minutes	Pressure	Volume	∆ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	3.80	m
Top of Packer Interval:	209.60	m
Bottom of Packer Interval (or Bottom of Hole):	226.10	m
Packer Inflation Pressure:	655	psi
Rod Stickup Height:	1.7	m
Water Flushed (Vol./Time/Until Clean):	45 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ3	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:		m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:	4:53 AM
End Flushing:	5:38 AM
Start Packer Testing:	4:53 AM
End Packer Testing:	10:30 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	∆ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **M10-121**
Test #: **5**

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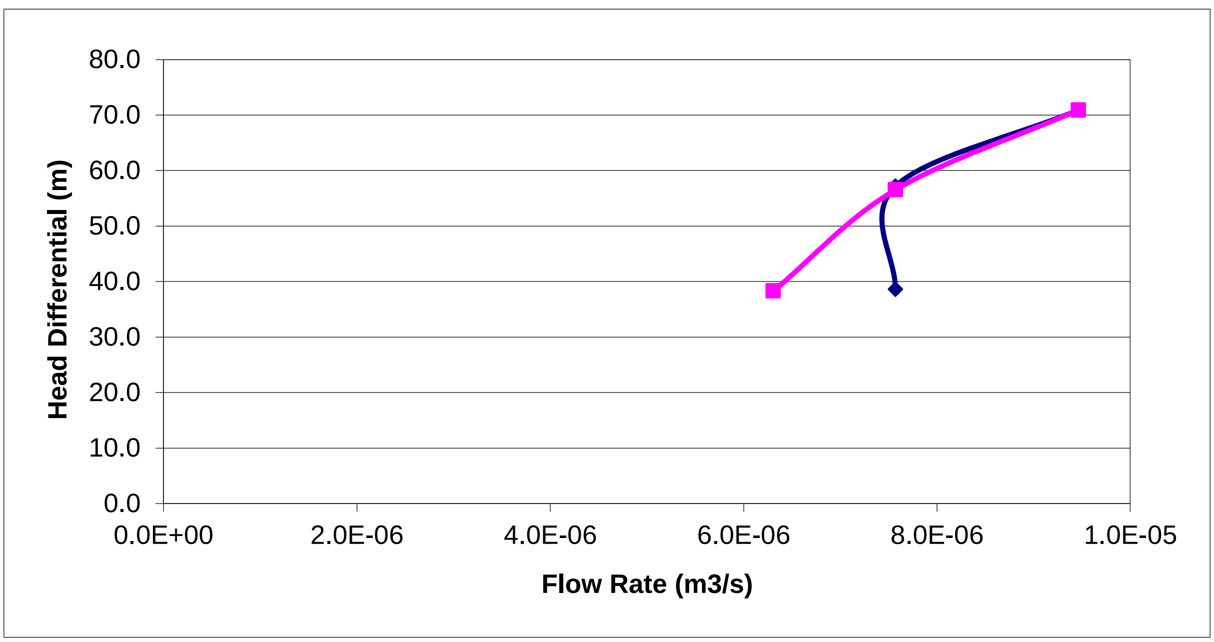
Calculation Input Parameters

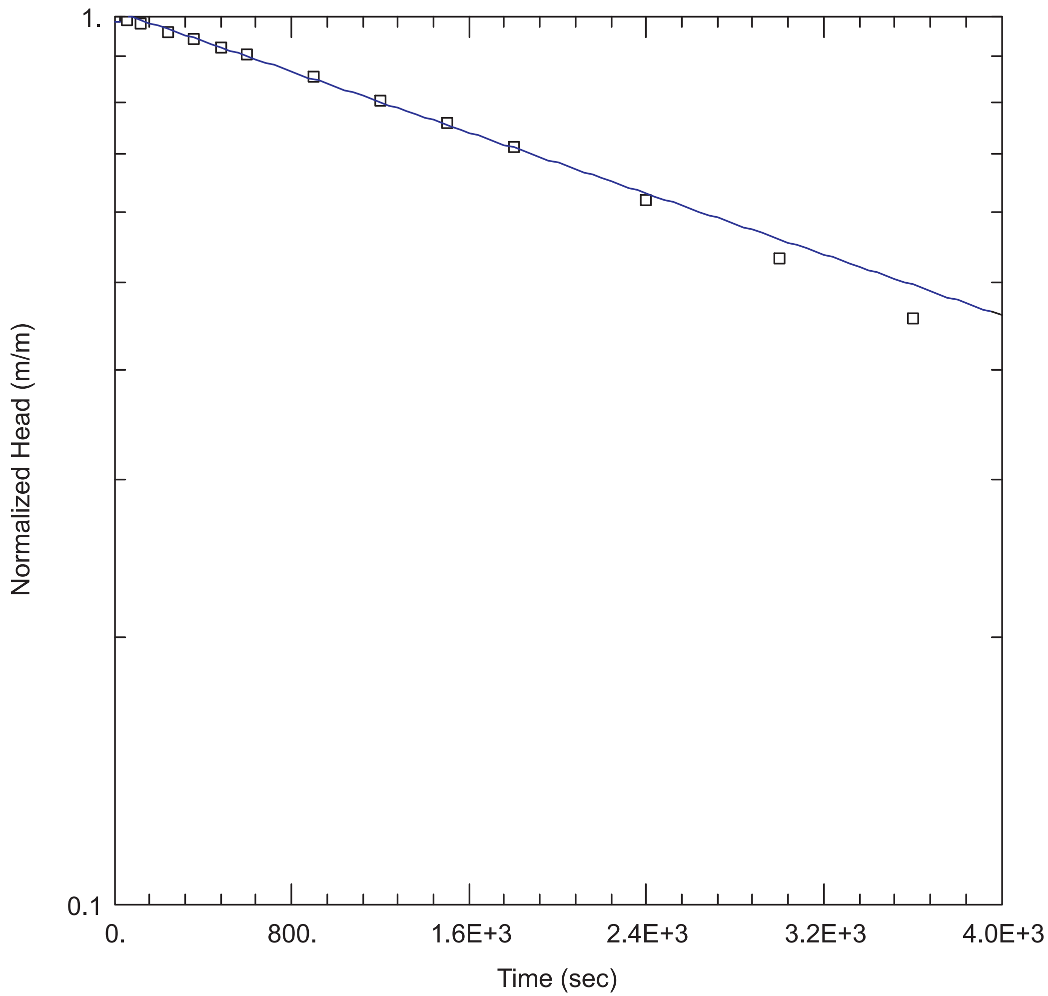
Top of Packer Test Interval (mah):	209.6
Bottom of Packer Test Interval (mah):	226.1
L: Length of Test Interval (mah)	16.5
Test Interval Midpoint (mah):	218
Stickup Height (mah):	1.66
Pressure Gauge Height (m above ground):	1.66
Depth to Water Table (mah):	3.80
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	82

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
49.5	7.6E-06	34.8	38.6	1.2E-08
75.9	7.6E-06	53.4	57.2	7.8E-09
95.5	9.5E-06	67.1	70.9	7.9E-09
75.0	7.6E-06	52.7	56.5	7.9E-09
49.1	6.3E-06	34.5	38.3	9.7E-09
			Geo Mean	**8.9.E-09**





Obs. Wells

□ M10-121 Test #5

Solution

Hvorslev

Parameters

K = 5.9E-8 m/sec

y0 = 3.7 m

SCALE:	NOT TO SCALE	DESIGNED:	RT
DATE:	FEBRUARY 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	APPROVE

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PRE-FEASIBILITY STUDY
PIT DEPRESSURIZATION ANALYSES

TITLE:
M10-121 Packer Test #5
209.6 to 226.1 m along hole Falling Head Results

PROJECT No.:	FIG. No.:	REV.:
0638-009	Packer Test Appendix	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\01 Data\2010\Packer Tests\Analysis\FallingHeadTests2.cdr

Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # M10-121
Design Test Interval:
Test #: 6

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: M. Kealty

Collar El.:
Trend: 365
Plunge: 82 deg
Date: 16-Aug-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13437.50	--
1	50	13438.20	0.70
2	50	13438.90	0.70
3	50	13439.20	0.30
4	50	13439.50	0.30
5	50	13439.80	0.30
6	50	13440.10	0.30
7	50	13440.40	0.30
8			
9			
10			
Stable Ave.	50		0.41

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13440.70	--
1	75	13441.10	0.40
2	75	13441.60	0.50
3	75	13442.20	0.60
4	75	13442.80	0.60
5	75	13443.30	0.50
6	75	13443.90	0.60
7	75	13444.50	0.60
8	75	13445.00	0.50
9	75	13445.60	0.60
10	75	13446.20	0.60
Stable Ave.	75		0.55

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	13447.00	--
1	100	13447.70	0.70
2	100	13448.40	0.70
3	100	13449.10	0.70
4	100	13449.70	0.60
5	100	13450.50	0.80
6	100	13451.20	0.70
7	100	13451.90	0.70
8	100	13452.60	0.70
9	100	13453.30	0.70
10	100	13454.00	0.70
Stable Ave.	100		0.70

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	13454.50	--
1	75	13455.00	0.50
2	75	13455.60	0.60
3	75	13456.10	0.50
4	75	13456.60	0.50
5	75	13457.20	0.60
6	75	13457.70	0.50
7	75	13458.20	0.50
8	75	13458.80	0.60
9	75	13459.30	0.50
10	75	13459.90	0.60
Stable Ave.	75		0.54

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	13460.20	--
1	50	13460.70	0.50
2	50	13461.20	0.50
3	50	13461.60	0.40
4	50	13462.10	0.50
5	50	13462.50	0.40
6	50	13463.00	0.50
7	50	13463.50	0.50
8	50	13463.90	0.40
9	50	13464.40	0.50
10	50	13464.80	0.40
Stable Ave.	50		0.46

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 5.82 m
Top of Packer Interval: 265.10 m
Bottom of Packer Interval (or Bottom of Hole): 293.60 m
Packer Inflation Pressure: 505 psi
Rod Stickup Height: 1.7 m
Water Flushed (Vol./Time/Until Clean): 30 min
Packer Pipe ID/ or Drill Rod ID (circle one): NQ3
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 8:20 AM
End Flushing: 8:50 AM
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **M10-121**
Test #: **6**

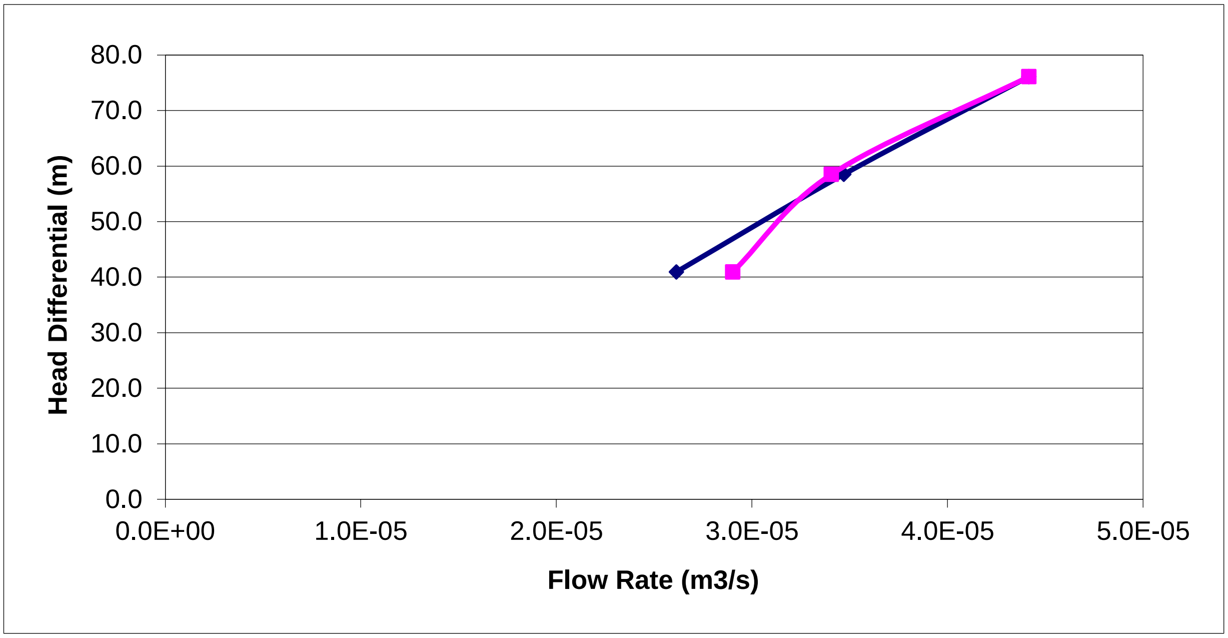
Calculation Input Parameters

Top of Packer Test Interval (mah):	265.1
Bottom of Packer Test Interval (mah):	293.6
L: Length of Test Interval (mah)	28.5
Test Interval Midpoint (mah):	279
Stickup Height (mah):	1.66
Pressure Gauge Height (m above ground):	1.66
Depth to Water Table (mah):	5.82
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	82

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	2.6E-05	35.2	40.9	2.4E-08
75.0	3.5E-05	52.7	58.5	2.2E-08
100.0	4.4E-05	70.3	76.1	2.2E-08
75.0	3.4E-05	52.7	58.5	2.2E-08
50.0	2.9E-05	35.2	40.9	2.6E-08
			Geo Mean	**2.3.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Shallow
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: C. Scott A. Buckingham

Collar El.:
Trend:
Plunge: 68 deg
Date: 7-Jul-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	52.981	--
1	60	52.994	0.013
2	60	53.005	0.011
3	60	53.017	0.012
4	60	53.030	0.013
5	60	53.042	0.012
6	60	53.054	0.012
7	60	53.067	0.013
8	60	53.078	0.011
9	60	53.088	0.010
10	60	53.100	0.012
Stable Ave.	60		0.012

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	53.160	--
1	90	53.180	0.020
2	90	53.197	0.017
3	90	53.215	0.018
4	90	53.233	0.018
5	90	53.250	0.017
6	90	53.268	0.018
7	90	53.286	0.018
8	90	53.303	0.017
9	90	53.322	0.019
10	90	53.340	0.018
Stable Ave.	90		0.018

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	53.385	--
1	120	53.411	0.026
2	120	53.438	0.027
3	120	53.464	0.026
4	120	53.490	0.026
5	120	53.517	0.027
6	120	53.543	0.026
7	120	53.569	0.026
8	120	53.595	0.026
9	120	53.621	0.026
10	120	53.647	0.026
Stable Ave.	120		0.026

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	53.695	--
1	90	53.713	0.018
2	90	53.730	0.017
3	90	53.748	0.018
4	90	53.766	0.018
5	90	53.784	0.018
6	90	53.801	0.017
7	90	53.82	0.018
8	90	53.84	0.017
9	90	53.85	0.018
10	90	53.87	0.017
Stable Ave.	90		0.018

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	53.895	--
1	60	53.905	0.010
2	60	53.915	0.010
3	60	53.925	0.010
4	60	53.936	0.011
5	60	53.946	0.010
6	60	53.956	0.010
7			
8			
9			
10			
Stable Ave.	60		0.010

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: -15.47 m
Top of Packer Interval: 62.20 m
Bottom of Packer Interval (or Bottom of Hole): 77.20 m
Packer Inflation Pressure: 450 psi
Rod Stickup Height: 2.1 m
Water Flushed (Vol./Time/Until Clean): 30 min
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 0.9 m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST --->
FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **S10-27**
Test #: **1**

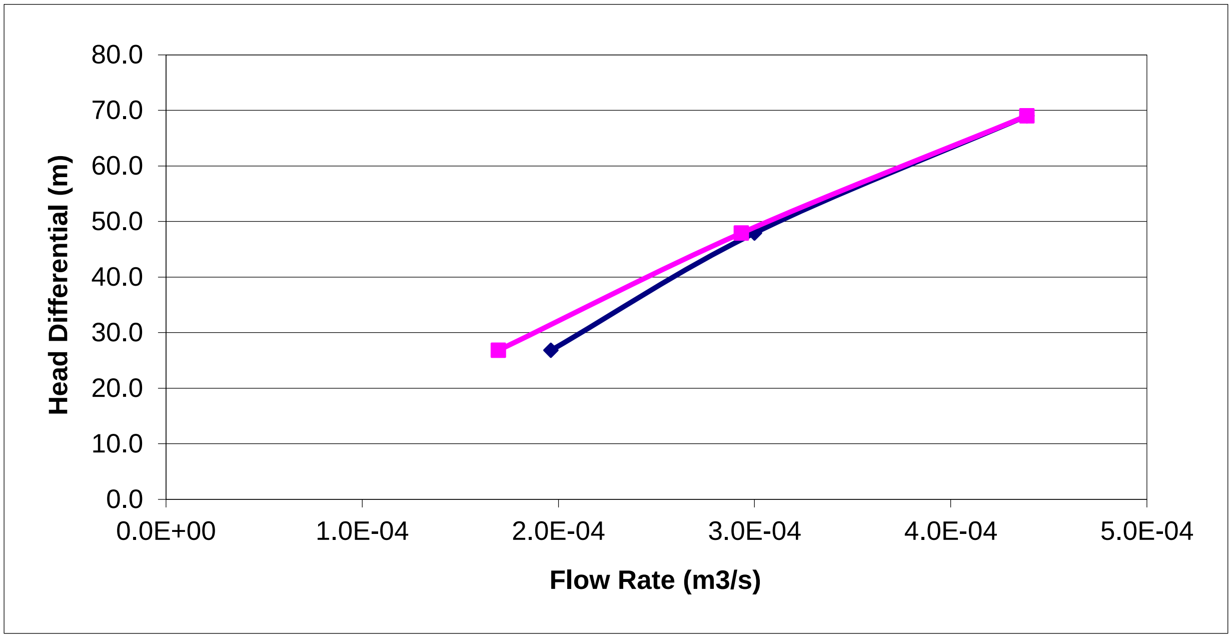
Calculation Input Parameters

Top of Packer Test Interval (mah):	62.2
Bottom of Packer Test Interval (mah):	77.2
L: Length of Test Interval (mah)	15.0
Test Interval Midpoint (mah):	70
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.88
Depth to Water Table (mah):	-15.47
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	68

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	2.0E-04	42.2	26.8	4.9E-07
90.0	3.0E-04	63.3	47.9	4.2E-07
120.0	4.4E-04	84.4	69.0	4.3E-07
90.0	2.9E-04	63.3	47.9	4.1E-07
60.0	1.7E-04	42.2	26.8	4.3E-07
			Geo Mean	**4.4E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Mid-Hole
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson A. Buckingham

Collar El.:
Trend:
Plunge: 68 deg
Date: 7-Jul-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	52.140	--
1	60	52.208	0.068
2	60	52.272	0.064
3	60	52.337	0.065
4	60	52.403	0.066
5	60	52.466	0.063
6	60	52.531	0.065
7	60	52.595	0.064
8	60	52.659	0.064
9	60	52.724	0.065
10	60	52.788	0.064
Stable Ave.	60		0.064

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	52.850	--
1	90	52.936	0.086
2	90	53.024	0.088
3	90	53.111	0.087
4	90	53.199	0.088
5	90	53.285	0.086
6	90	53.370	0.085
7	90	53.455	0.085
8	90	53.540	0.085
9	90	53.624	0.084
10	90	53.709	0.085
Stable Ave.	90		0.086

Pressure Interval 70

Minutes	Pressure	Volume	Δ Volume
0	70	53.880	--
1	70	53.950	0.070
2	70	54.018	0.068
3	70	54.087	0.069
4	70	54.155	0.068
5	70	54.221	0.066
6	70	54.288	0.067
7	70	54.354	0.066
8	70	54.419	0.065
9	70	54.485	0.066
10	70	54.551	0.066
Stable Ave.	70		0.068

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	54.586	--
1	40	54.624	0.038
2	40	54.660	0.036
3	40	54.695	0.035
4	40	54.730	0.035
5	40	54.764	0.034
6	40	54.799	0.035
7	40	54.83	0.035
8	40	54.87	0.035
9	40	54.90	0.035
10	40	54.94	0.034
Stable Ave.	40		0.035

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			--
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Stable Ave.			

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-16.87	m
Top of Packer Interval:	149.20	m
Bottom of Packer Interval (or Bottom of Hole):	153.7	m
Packer Inflation Pressure:	495	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	60 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-27**
Test #: **2**

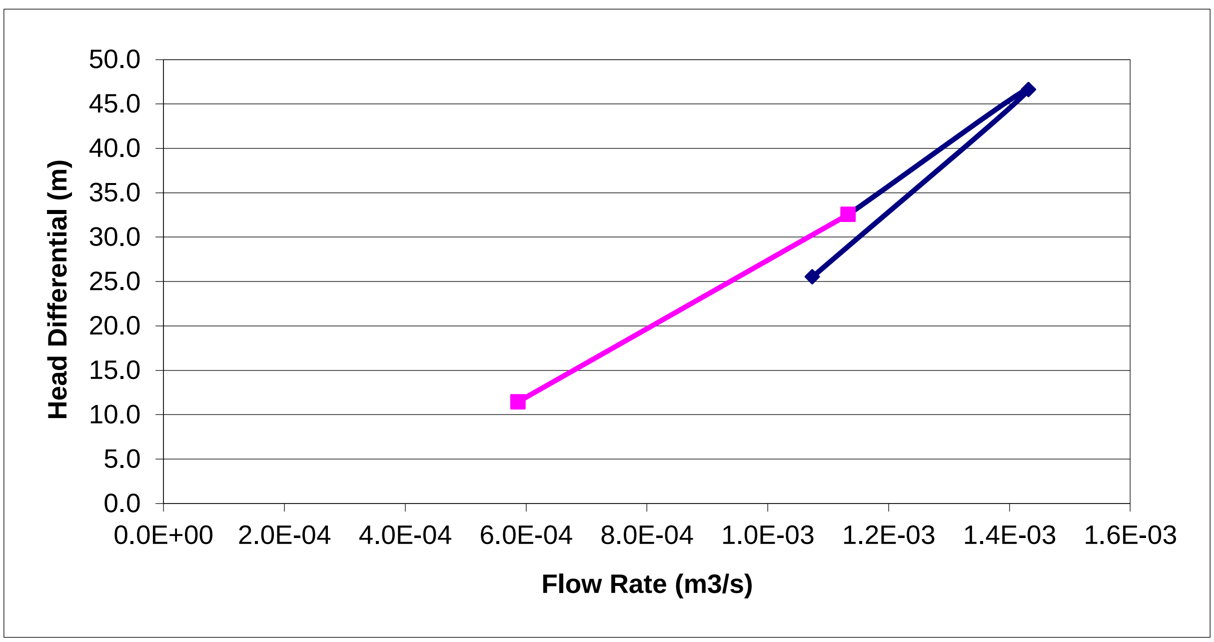
Calculation Input Parameters

Top of Packer Test Interval (mah):	149.2
Bottom of Packer Test Interval (mah):	153.7
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	151
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.88
Depth to Water Table (mah):	-16.87
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	68

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	1.1E-03	42.2	25.5	7.5E-06
90.0	1.4E-03	63.3	46.6	5.5E-06
70.0	1.1E-03	49.2	32.6	6.2E-06
40.0	5.9E-04	28.1	11.5	9.2E-06
			Geo Mean	**7.0.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Below STF
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson

Collar El.:
Trend:
Plunge: 68 deg
Date: 9-Jul-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	55.257	--
1	60	55.266	0.009
2	60	55.279	0.013
3	60	55.290	0.011
4	60	55.302	0.012
5	60	55.314	0.012
6	60	55.325	0.011
7	60	55.337	0.012
8	60	55.348	0.011
9	60	55.359	0.011
10	60	55.370	0.011
Stable Ave.	60		0.012

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	55.405	--
1	90	55.422	0.017
2	90	55.440	0.018
3	90	55.456	0.016
4	90	55.472	0.016
5	90	55.489	0.017
6	90	55.506	0.017
7	90	55.522	0.016
8	90	55.539	0.017
9	90	55.556	0.017
10	90	55.572	0.016
Stable Ave.	90		0.017

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	55.590	--
1	120	55.614	0.024
2	120	55.635	0.021
3	120	55.656	0.021
4	120	55.677	0.021
5	120	55.698	0.021
6	120	55.720	0.022
7	120	55.741	0.021
8	120	55.762	0.021
9	120	55.782	0.020
10	120	55.804	0.022
Stable Ave.	120		0.022

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	55.825	--
1	90	55.841	0.016
2	90	55.857	0.016
3	90	55.873	0.016
4	90	55.888	0.015
5	90	55.904	0.016
6	90	55.920	0.016
7	90	55.94	0.017
8	90	55.95	0.015
9	90	55.97	0.016
10	90	55.98	0.016
Stable Ave.	90		0.016

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	55.990	--
1	60	56.000	0.010
2	60	56.010	0.010
3	60	56.020	0.010
4	60	56.031	0.011
5	60	56.041	0.010
6	60	56.051	0.010
7	60	56.062	0.011
8	60	56.072	0.010
9	60	56.083	0.011
10	60	56.093	0.010
Stable Ave.	60		0.010

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: -15.60 m
Top of Packer Interval: 191.20 m
Bottom of Packer Interval (or Bottom of Hole): 195.7 m
Packer Inflation Pressure: 565 psi
Rod Stickup Height: 2.1 m
Water Flushed (Vol./Time/Until Clean): 150 mins
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 0.9 m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **S10-27**
Test #: **3**

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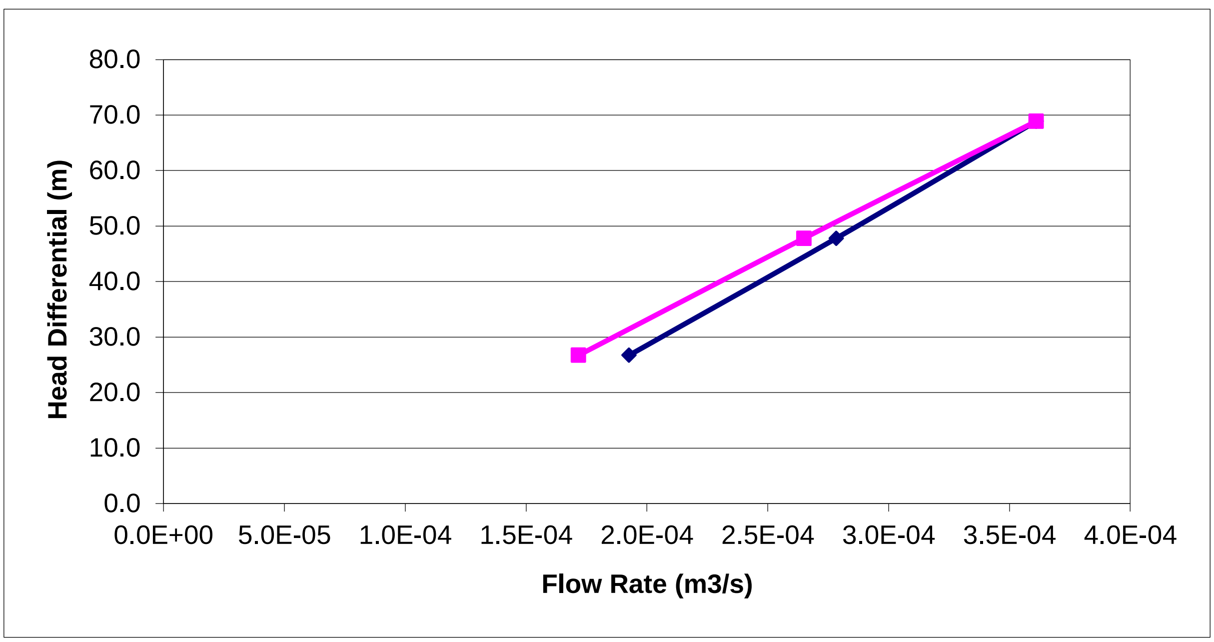
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	191.2
Bottom of Packer Test Interval (mah):	195.7
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	193
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.88
Depth to Water Table (mah):	-15.60
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	68

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	1.9E-04	42.2	26.7	1.3E-06
90.0	2.8E-04	63.3	47.8	1.0E-06
120.0	3.6E-04	84.4	68.9	9.4E-07
90.0	2.6E-04	63.3	47.8	9.9E-07
60.0	1.7E-04	42.2	26.7	1.2E-06
			Geo Mean	**1.1.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Below STF
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: C. Scott

Collar El.:
Trend:
Plunge: 68 deg
Date: 10-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	54.640	--
1	50	54.676	0.036
2	50	54.711	0.035
3	50	54.747	0.036
4	50	54.782	0.035
5	50	54.817	0.035
6	50	54.852	0.035
7	50	54.888	0.036
8	50	54.923	0.035
9			
10			
Stable Ave.	50		0.035

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	55.780	--
1	75	55.802	0.022
2	75	55.822	0.020
3	75	55.842	0.020
4	75	55.861	0.019
5	75	55.880	0.019
6	75	55.900	0.020
7			
8			
9			
10			
Stable Ave.	75		0.020

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	55.040	--
1	75	55.095	0.055
2	75	55.148	0.053
3	75	55.203	0.055
4	75	55.254	0.051
5			
6			
7			
8			
9			
10			
Stable Ave.	75		0.053

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	55.915	--
1	50	55.927	0.012
2	50	55.941	0.014
3	50	55.954	0.013
4	50	55.968	0.014
5	50	55.983	0.015
6	50	55.995	0.012
7			
8			
9			
10			
Stable Ave.	50		0.013

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	55.480	--
1	100	55.516	0.036
2	100	55.550	0.034
3	100	55.586	0.036
4	100	55.623	0.037
5	100	55.658	0.035
6	100	55.691	0.033
7	100	55.724	0.033
8			
9			
10			
Stable Ave.	100		0.035

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-16.87	m
Top of Packer Interval:	209.20	m
Bottom of Packer Interval (or Bottom of Hole):	215.2	m
Packer Inflation Pressure:	600	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	150 mins	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-27**
Test #: **4**

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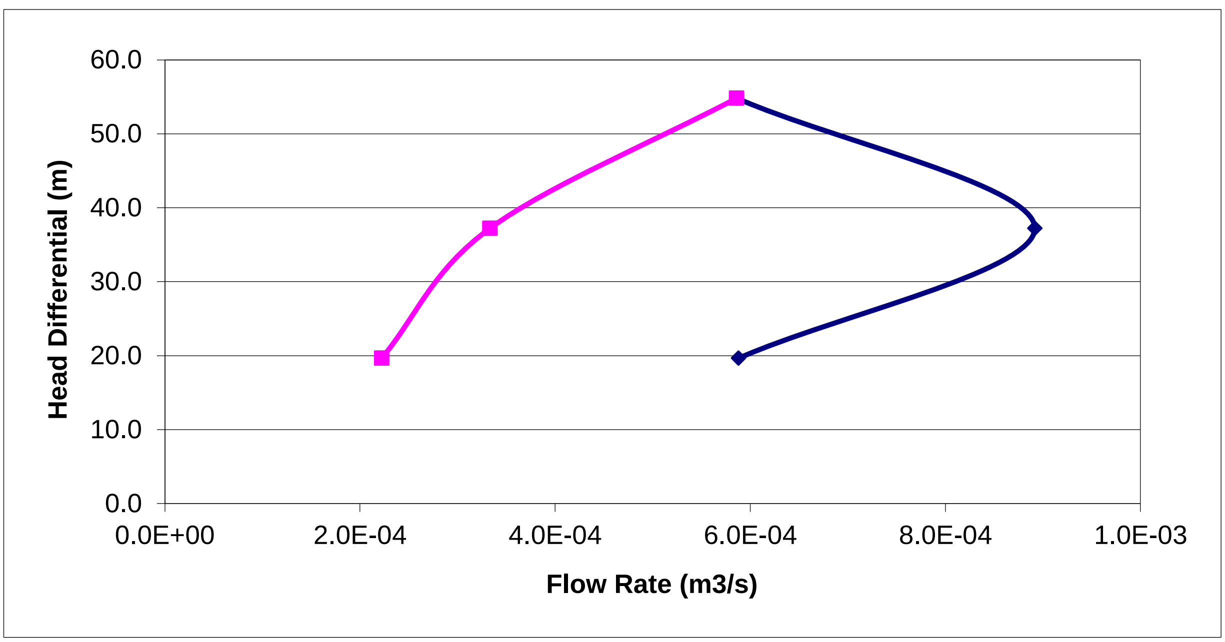
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	209.2
Bottom of Packer Test Interval (mah):	215.2
L: Length of Test Interval (mah)	6.0
Test Interval Midpoint (mah):	212
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	2.05
Depth to Water Table (mah):	-16.87
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	68

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	5.9E-04	35.2	19.7	4.3E-06
75.0	8.9E-04	52.7	37.2	3.4E-06
100.0	5.9E-04	70.3	54.8	1.5E-06
75.0	3.3E-04	52.7	37.2	1.3E-06
50.0	2.2E-04	35.2	19.7	1.6E-06
			Geo Mean	**2.3.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Deep
Test #: 5

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: C. Scott

Collar El.:
Trend:
Plunge: 68 deg
Date: 12-Jul-10

Packer Setup Type: Single

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	54.630	--
1	60	54.647	0.017
2	60	54.664	0.017
3	60	54.681	0.017
4	60	54.698	0.017
5	60	54.716	0.018
6	60	54.733	0.017
7	60	54.750	0.017
8			
9			
10			
Stable Ave.	60		0.017

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	90	54.800	--
1	90	54.837	0.037
2	90	54.873	0.036
3	90	54.910	0.037
4	90	54.946	0.036
5	90	54.983	0.037
6	90	55.020	0.037
7			
8			
9			
10			
Stable Ave.	90		0.037

Pressure Interval 120

Minutes	Pressure	Volume	Δ Volume
0	120	55.110	--
1	120	55.160	0.050
2	120	55.211	0.051
3	120	55.261	0.050
4	120	55.311	0.050
5	120	55.361	0.050
6	120	55.411	0.050
7			
8			
9			
10			
Stable Ave.	120		0.050

Pressure Interval 90

Minutes	Pressure	Volume	Δ Volume
0	95	55.490	--
1	95	55.537	0.047
2	95	55.583	0.046
3	90	55.624	0.041
4	90	55.663	0.039
5	90	55.703	0.040
6	90	55.742	0.039
7	90	55.78	0.040
8	90	55.82	0.040
9			
10			
Stable Ave.	92		0.042

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	55.870	--
1	60	55.895	0.025
2	60	55.920	0.025
3	60	55.945	0.025
4	60	55.970	0.025
5	60	55.995	0.025
6	60	56.020	0.025
7			
8			
9			
10			
Stable Ave.	60		0.025

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: -19.69 m
Top of Packer Interval: 302.20 m
Bottom of Packer Interval (or Bottom of Hole): 329.2 m
Packer Inflation Pressure: 750 psi
Rod Stickup Height: 2.1 m
Water Flushed (Vol./Time/Until Clean): 60 mins
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 0.9 m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-27**
Test #: **5**

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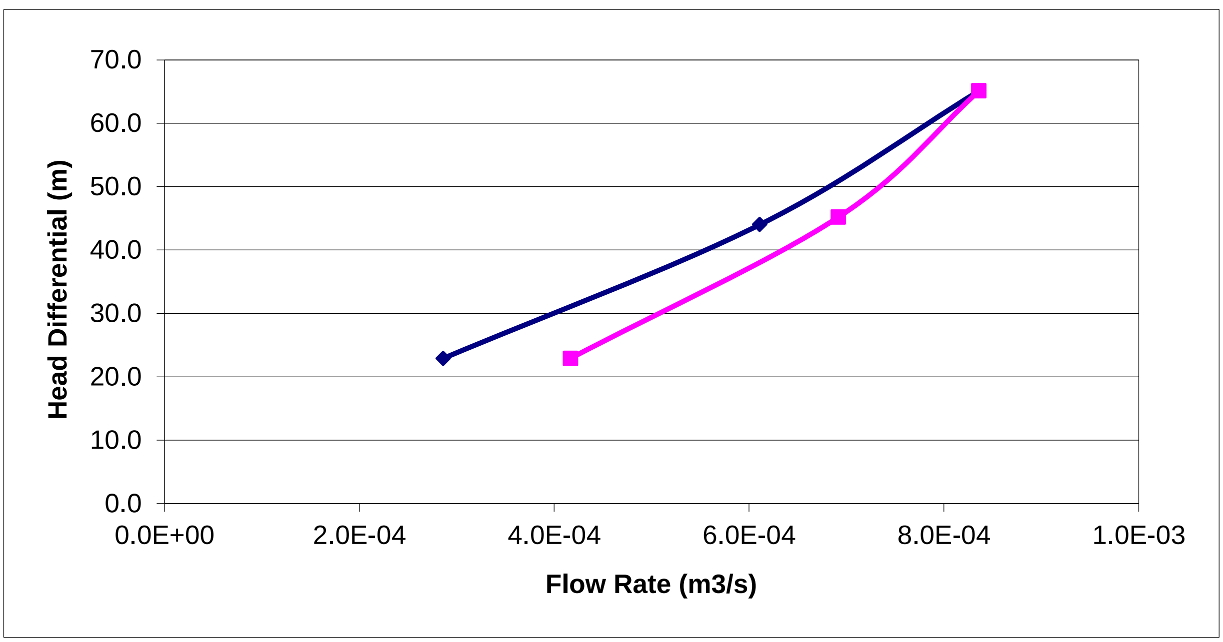
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	302.2
Bottom of Packer Test Interval (mah):	329.2
L: Length of Test Interval (mah)	27.0
Test Interval Midpoint (mah):	316
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.88
Depth to Water Table (mah):	-19.69
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	68

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
60.0	2.9E-04	42.2	22.9	5.2E-07
90.0	6.1E-04	63.3	44.0	5.7E-07
120.0	8.4E-04	84.4	65.1	5.3E-07
91.7	6.9E-04	64.5	45.2	6.3E-07
60.0	4.2E-04	42.2	22.9	7.5E-07
			Geo Mean	**5.6.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: Shallow
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Stein and A. Watson

Collar El.:
Trend:
Plunge: 90 deg
Date: 15-Jul-10

Packer Setup Type: Single

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	4635.00	--
1	42	4645.20	10.20
2	42	4650.30	5.10
3	45	4657.80	7.50
4	40	4665.00	7.20
5	40	4671.90	6.90
6	40	4678.80	6.90
7	40	4685.60	6.80
8	40	4692.60	7.00
9	40	4699.30	6.70
10	40	4706.00	6.70
Stable Ave.	41		7.10

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	4720.00	--
1	60	4729.60	9.60
2	60	4739.40	9.80
3	60	4748.90	9.50
4	60	4758.50	9.60
5	60	4768.00	9.50
6	60	4777.60	9.60
7	60	4787.10	9.50
8	60	4796.70	9.60
9	60	4806.00	9.30
10	60	4815.50	9.50
Stable Ave.	60		9.55

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	4850.00	--
1	80	4863.00	13.00
2	80	4875.80	12.80
3	80	4888.90	13.10
4	80	4902.00	13.10
5	80	4914.90	12.90
6	80	4927.90	13.00
7	80	4941.00	13.10
8	80	4953.80	12.80
9	80	4966.80	13.00
10	80	4980.00	13.20
Stable Ave.	80		13.00

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	5000.00	--
1	60	5010.90	10.90
2	60	5021.70	10.80
3	60	5032.40	10.70
4	60	5043.10	10.70
5	60	5053.80	10.70
6	60	5064.50	10.70
7	60	5075.00	10.50
8	60	5085.70	10.70
9	60	5096.50	10.80
10	60	5107.20	10.70
Stable Ave.	60		10.72

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	5120.00	--
1	40	5128.40	8.40
2	40	5136.70	8.30
3	40	5144.80	8.10
4	40	5153.40	8.60
5	40	5161.60	8.20
6	40	5169.90	8.30
7	40	5178.20	8.30
8	40	5186.50	8.30
9	40	5194.70	8.20
10	40	5203.00	8.30
Stable Ave.	40		8.30

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	12.13	m
Top of Packer Interval:	50.05	m
Bottom of Packer Interval (or Bottom of Hole):	60.55	m
Packer Inflation Pressure:	338	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	until clean	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing: 11:15 PM
End Packer Testing: 12:15 AM

IF NO MEASUREABLE FLOW IN CH TEST --->
FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

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Hole #: **S10-27**
Test #: **1**

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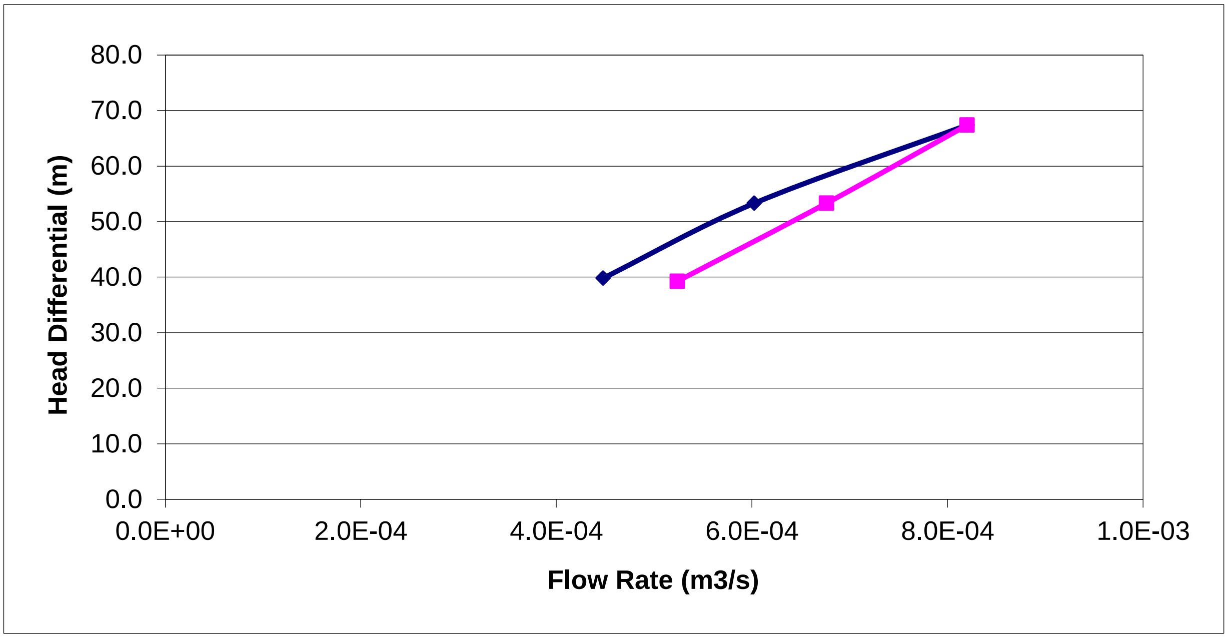
Calculation Input Parameters

Top of Packer Test Interval (mah):	50.1
Bottom of Packer Test Interval (mah):	60.6
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	55
Stickup Height (mah):	2.14
Pressure Gauge Height (m above ground):	1.13
Depth to Water Table (mah):	12.13
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	90

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
40.8	4.5E-04	28.7	39.8	9.6E-07
60.0	6.0E-04	42.2	53.3	9.6E-07
80.0	8.2E-04	56.2	67.4	1.0E-06
60.0	6.8E-04	42.2	53.3	1.1E-06
40.0	5.2E-04	28.1	39.2	1.1E-06
			Geo Mean	**1.0E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: 150
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Toussaint A. Buckingham

Collar El.:
Trend:
Plunge: 90 deg
Date: 17-Jul-10

Packer Setup Type: Single

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	5251.90	--
1	40	5253.95	2.05
2	40	5255.50	1.55
3	40	5257.10	1.60
4	40	5258.65	1.55
5	40	5260.15	1.50
6	40	5261.65	1.50
7	40	5263.15	1.50
8	40	5264.60	1.45
9	40	5266.10	1.50
10	40	5267.80	1.70
Stable Ave.	40		1.54

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	5319.50	--
1	60	5321.35	1.85
2	60	5323.10	1.75
3	60	5324.90	1.80
4	60	5326.70	1.80
5	60	5328.50	1.80
6	60	5330.20	1.70
7	60	5331.90	1.70
8	60	5333.55	1.65
9	60	5335.25	1.70
10	60	5336.90	1.65
Stable Ave.	60		1.74

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	60	5269.30	--
1	60	5271.20	1.90
2	60	5273.15	1.95
3	60	5275.05	1.90
4	60	5277.00	1.95
5	60	5278.95	1.95
6	60	5280.80	1.85
7	60	5282.65	1.85
8	60	5284.50	1.85
9	60	5286.35	1.85
10	60	5288.20	1.85
Stable Ave.	60		1.89

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0	40	5338.20	--
1	40	5339.50	1.30
2	40	5340.50	1.00
3	40	5341.70	1.20
4	40	5342.85	1.15
5	40	5343.95	1.10
6	40	5345.00	1.05
7	40	5346.10	1.10
8	40	5347.15	1.05
9	40	5348.20	1.05
10	40	5349.30	1.10
Stable Ave.	40		1.11

Pressure Interval 80

Minutes	Pressure	Volume	Δ Volume
0	80	5292.40	--
1	80	5295.00	2.60
2	80	5297.50	2.50
3	80	5300.30	2.80
4	80	5302.70	2.40
5	80	5305.20	2.50
6	80	5307.80	2.60
7	80	5310.35	2.55
8	80	5312.65	2.30
9	80	5315.15	2.50
10	80	5317.60	2.45
Stable Ave.	80		2.52

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	11.66	m
Top of Packer Interval:	146.05	m
Bottom of Packer Interval (or Bottom of Hole):	155.05	m
Packer Inflation Pressure:	486	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	1 hour	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.3	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-27**
Test #: **2**

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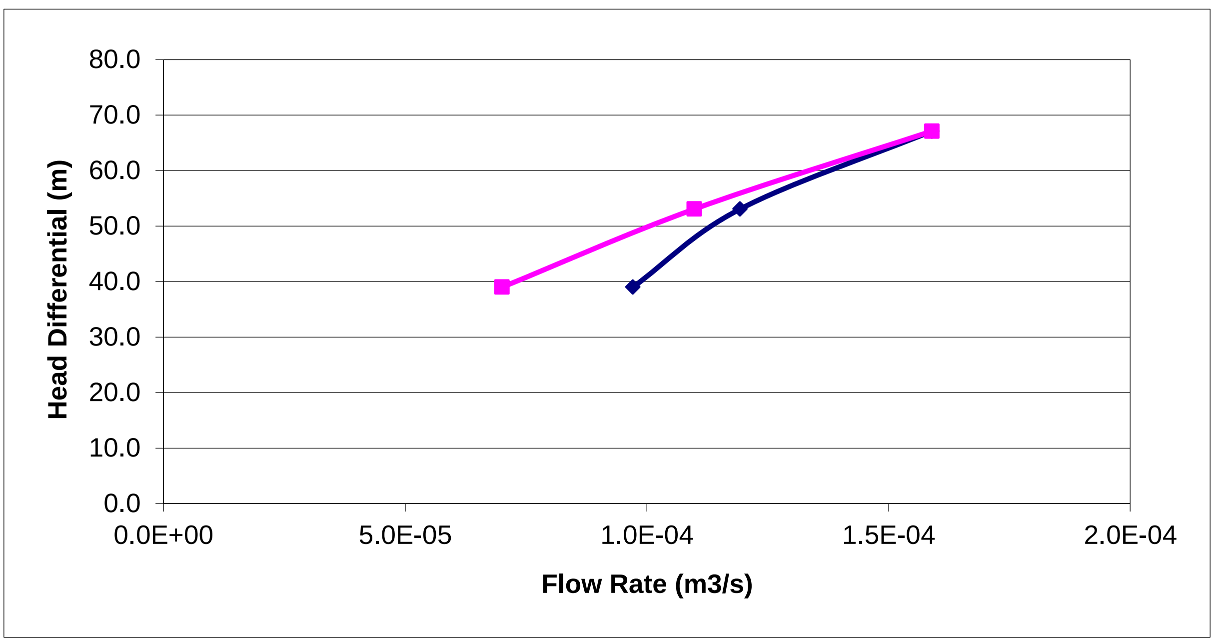
Calculation Input Parameters

Top of Packer Test Interval (mah):	146.1
Bottom of Packer Test Interval (mah):	155.1
L: Length of Test Interval (mah)	9.0
Test Interval Midpoint (mah):	151
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	1.25
Depth to Water Table (mah):	11.66
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	90

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
40.0	9.7E-05	28.1	39.0	2.4E-07
60.0	1.2E-04	42.2	53.0	2.2E-07
80.0	1.6E-04	56.2	67.1	2.3E-07
60.0	1.1E-04	42.2	53.0	2.0E-07
40.0	7.0E-05	28.1	39.0	1.7E-07
			Geo Mean	**2.1.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-27
Design Test Interval: 225
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Stein A. Buckingham

Collar El.:
Trend:
Plunge: 90 deg
Date: 18-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5380.00	--
1	50	5388.70	8.70
2	50	5396.30	7.60
3	50	5403.40	7.10
4	50	5410.20	6.80
5	50	5416.10	5.90
6	50	5420.70	4.60
7	50	5425.40	4.70
8	50	5430.00	4.60
9	50	5434.40	4.40
10	50	5438.80	4.40
Stable Ave.	50		4.54

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5450.00	--
1	75	5461.00	11.00
2	75	5469.60	8.60
3	75	5477.40	7.80
4	75	5485.00	7.60
5	75	5492.50	7.50
6	75	5499.80	7.30
7	75	5507.10	7.30
8	75	5514.20	7.10
9	75	5521.30	7.10
10	75	5528.10	6.80
Stable Ave.	75		7.12

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	5540.00	--
1	100	5547.70	7.70
2	100	5554.90	7.20
3	100	5562.30	7.40
4	100	5569.50	7.20
5	100	5576.60	7.10
6	100	5583.80	7.20
7	100	5590.90	7.10
8	100	5597.80	6.90
9	100	5604.70	6.90
10	100	5611.50	6.80
Stable Ave.	100		7.15

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5610.00	--
1	75	5614.50	4.50
2	75	5618.80	4.30
3	75	5623.20	4.40
4	75	5627.40	4.20
5	75	5631.60	4.20
6	75	5635.90	4.30
7	75	5640.10	4.20
8	75	5644.30	4.20
9	75	5648.50	4.20
10	75	5652.70	4.20
Stable Ave.	75		4.27

Pressure Interval 40

Minutes	Pressure	Volume	Δ Volume
0			--
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Stable Ave.			

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	15.80	m
Top of Packer Interval:	227.05	m
Bottom of Packer Interval (or Bottom of Hole):	237.55	m
Packer Inflation Pressure:	528	psi
Rod Stickup Height:	2.6	m
Water Flushed (Vol./Time/Until Clean):	1 hour	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.1	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-27**
Test #: **3**

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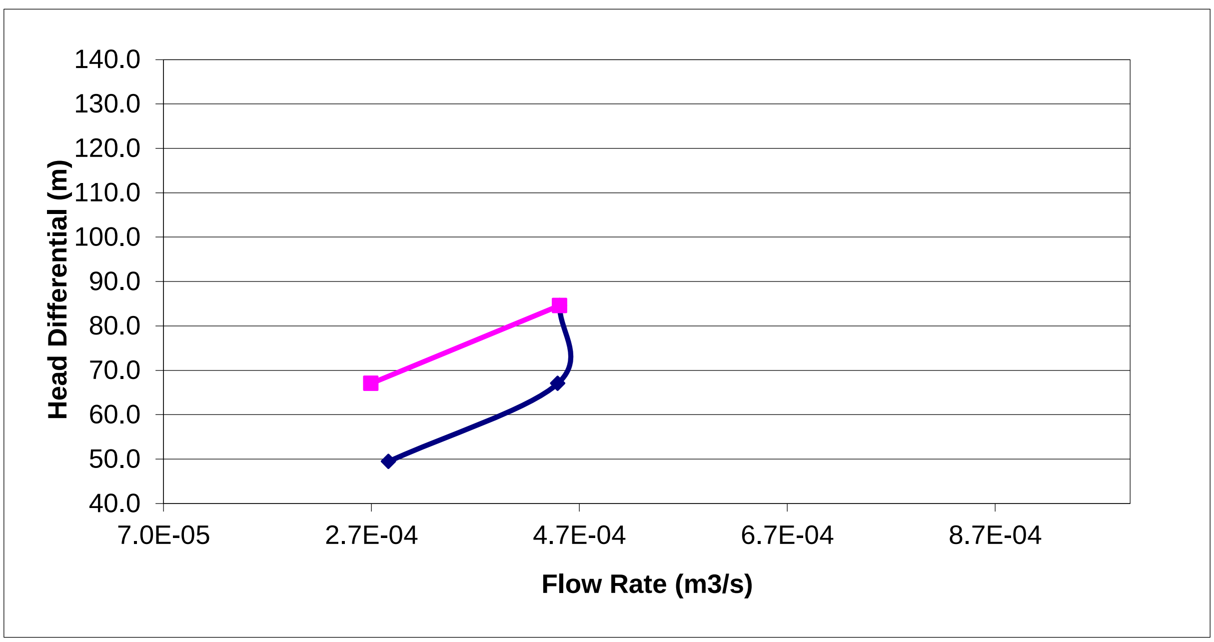
Calculation Input Parameters

Top of Packer Test Interval (mah):	227.1
Bottom of Packer Test Interval (mah):	237.6
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	232
Stickup Height (mah):	2.60
Pressure Gauge Height (m above ground):	1.10
Depth to Water Table (mah):	15.80
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	90

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	2.9E-04	35.2	49.5	4.9E-07
75.0	4.5E-04	52.7	67.0	5.7E-07
100.0	4.5E-04	70.3	84.6	4.5E-07
75.0	2.7E-04	52.7	67.0	3.4E-07
			Geo Mean	**4.6.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-30
Design Test Interval: deep
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Toussaint A. Buckingham

Collar El.:
Trend:
Plunge: 90 deg
Date: 20-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5632.90	--
1	50	5633.10	0.20
2	50	5633.15	0.05
3	50	5633.25	0.10
4	50	5633.33	0.08
5	50	5633.42	0.09
6	50	5633.50	0.08
7	50	5633.60	0.10
8	50	5633.70	0.10
9	50	5633.80	0.10
10	50	5633.88	0.08
Stable Ave.	50		0.09

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5634.15	--
1	75	5634.30	0.15
2	75	5634.40	0.10
3	75	5634.50	0.10
4	75	5634.65	0.15
5	75	5634.80	0.15
6	75	5634.92	0.12
7	75	5635.05	0.13
8	75	5635.20	0.15
9	75	5635.35	0.15
10	75	5635.50	0.15
Stable Ave.	75		0.14

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	5635.70	--
1	100	5635.87	0.17
2	100	5636.00	0.13
3	100	5636.20	0.20
4	100	5636.32	0.12
5	100	5636.47	0.15
6	100	5636.62	0.15
7	100	5636.78	0.16
8	100	5636.95	0.17
9	100	5637.10	0.15
10	100	5637.23	0.13
Stable Ave.	100		0.15

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5637.32	--
1	75	5637.45	0.13
2	75	5637.60	0.15
3	75	5637.72	0.12
4	75	5637.85	0.13
5	75	5637.98	0.13
6	75	5638.10	0.12
7	75	5638.22	0.12
8	75	5638.35	0.13
9	75	5638.47	0.12
10	75	5638.60	0.13
Stable Ave.	75		0.13

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5638.80	--
1	50	5638.85	0.05
2	50	5638.98	0.13
3	50	5639.06	0.08
4	50	5639.18	0.12
5	50	5639.28	0.10
6	50	5639.38	0.10
7	50	5639.48	0.10
8	50	5639.58	0.10
9	50	5639.67	0.09
10	50	5639.77	0.10
Stable Ave.	50		0.10

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup: 7.90 m
Top of Packer Interval: 296.05 m
Bottom of Packer Interval (or Bottom of Hole): 306.55 m
Packer Inflation Pressure: 719 psi
Rod Stickup Height: 2.1 m
Water Flushed (Vol./Time/Until Clean): 2 hours
Packer Pipe ID/ or Drill Rod ID (circle one): NQ
Borehole Outside Diameter: 0.076
Vertical height of gauge above ground: 1.2 m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-30**
Test #: **4**

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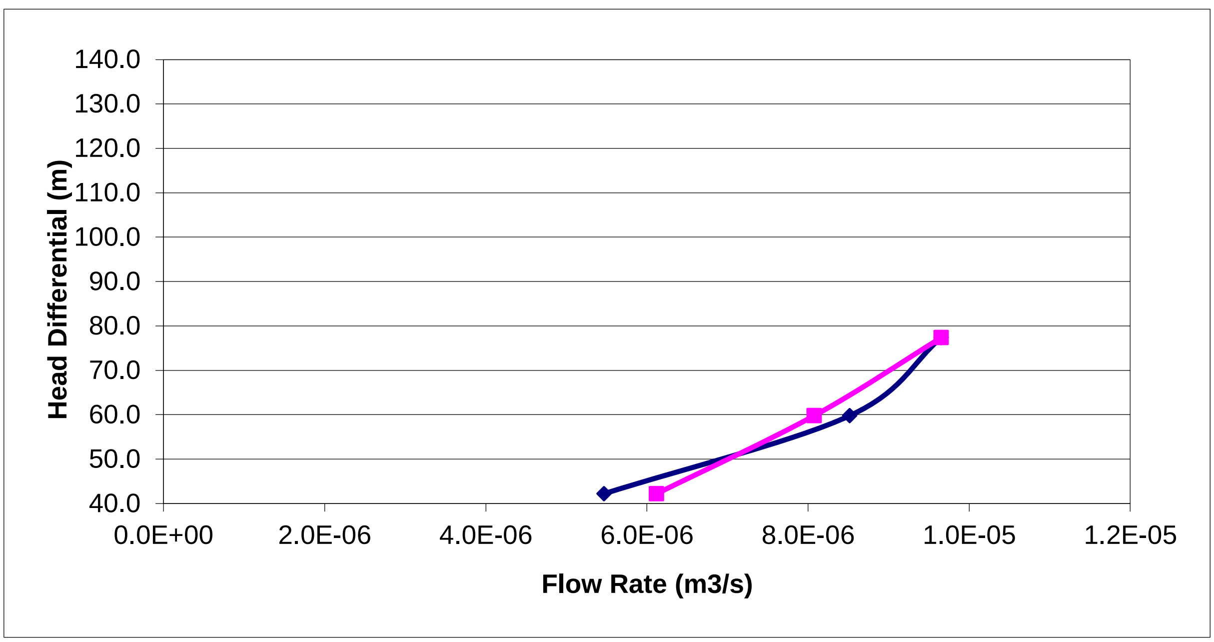
Calculation Input Parameters

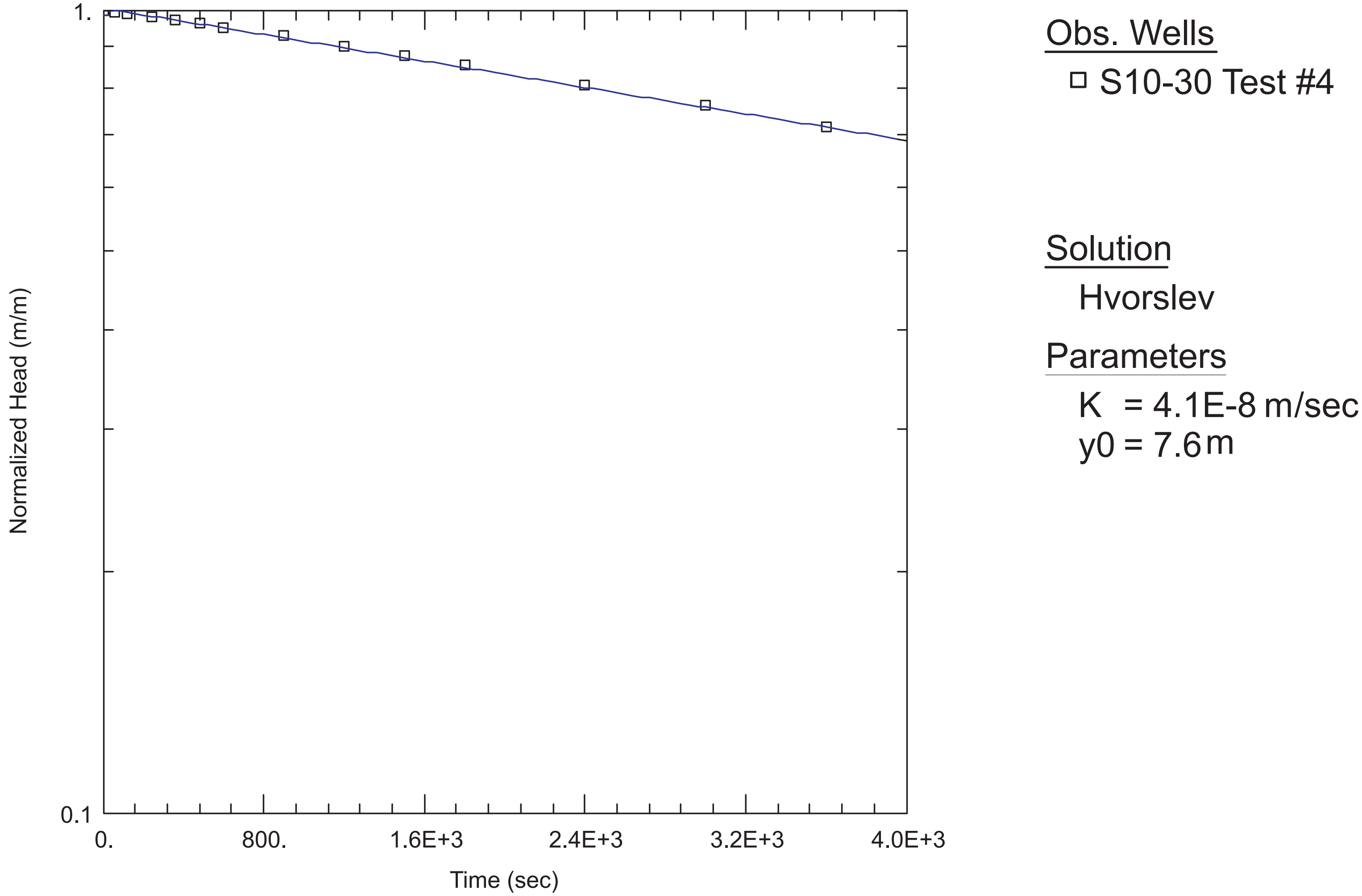
$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	296.1
Bottom of Packer Test Interval (mah):	306.6
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	301
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	7.90
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	90

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	5.5E-06	35.2	42.2	1.1E-08
75.0	8.5E-06	52.7	59.8	1.2E-08
100.0	9.7E-06	70.3	77.4	1.1E-08
75.0	8.1E-06	52.7	59.8	1.2E-08
50.0	6.1E-06	35.2	42.2	1.2E-08
			Geo Mean	**1.2.E-08**





SCALE: NOT TO SCALE	DESIGNED: RT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: KSM PRE-FEASIBILITY STUDY PIT DEPRESSURIZATION ANALYSES
DATE: FEBRUARY 2011	CHECKED: RT		TITLE: S10-30 Packer Test #4 296.05 to 306.55 m along hole Falling Head Results
DRAWN: RT	APPROVED: APPROVE	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009 / FIG. No.: Packer Test Appendix / REV.: 0

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Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-31
Design Test Interval: 100
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Toussaint A. Buckingham

Collar El.:
Trend:
Plunge: 78 deg
Date: 20-Jul-10

Packer Setup Type: Single

Pressure Interval 30

Minutes	Pressure	Volume	Δ Volume
0	30	58.790	--
1	26	58.865	0.075
2	32	58.952	0.087
3	32	59.035	0.083
4	30	59.110	0.075
5	32	59.195	0.085
6			
7			
8			
9			
10			

Stable Ave. 30 0.082

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	18	60.600	--
1	22	60.670	0.070
2	19	60.743	0.073
3	22	60.812	0.069
4	21	60.886	0.074
5			
6			
7			
8			
9			
10			

Stable Ave. 20 0.072

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	11	61.045	--
1	12	61.108	0.063
2	11	61.173	0.065
3	11	61.236	0.063
4	11	61.300	0.064
5	11	61.363	0.063
6	11	61.428	0.065
7	11	61.490	0.062
8			
9			
10			

Stable Ave. 11 0.064

Pressure Interval 0

Minutes	Pressure	Volume	Δ Volume
0			--
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Stable Ave.

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			--
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Stable Ave.

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	90.00	m
Top of Packer Interval:	111.90	m
Bottom of Packer Interval (or Bottom of Hole):	116.4	m
Packer Inflation Pressure:	380	psi
Rod Stickup Height:	1.9	m
Water Flushed (Vol./Time/Until Clean):	1 hour	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-31**
Test #: **1**

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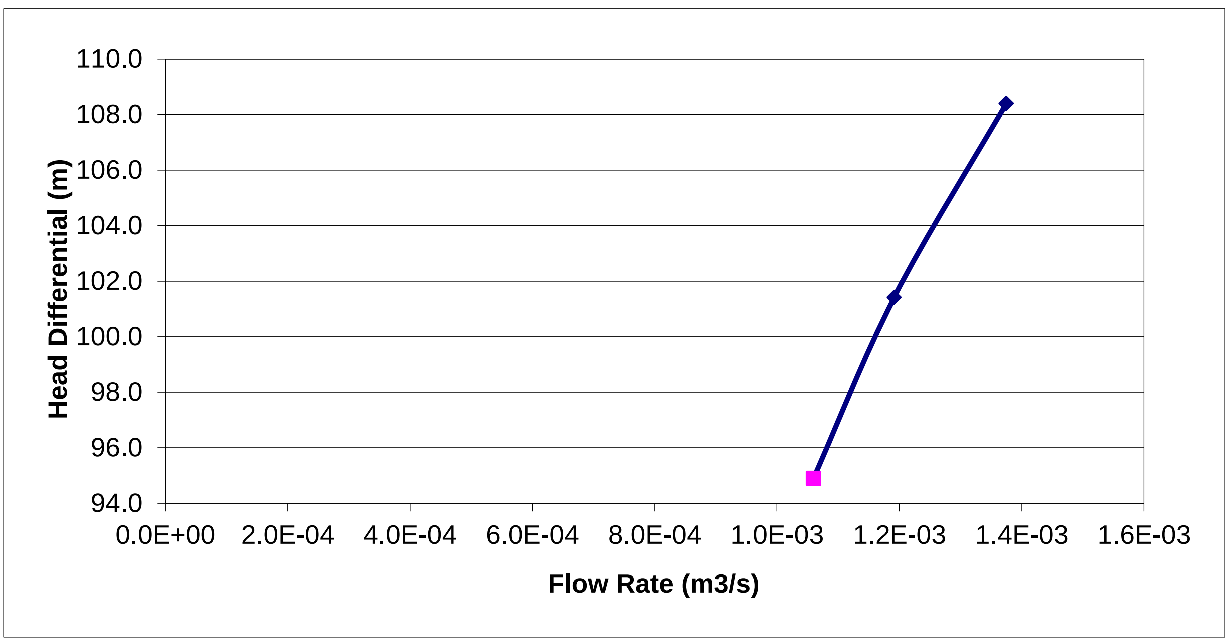
Calculation Input Parameters

Top of Packer Test Interval (mah):	111.9
Bottom of Packer Test Interval (mah):	116.4
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	114
Stickup Height (mah):	1.85
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	90.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	78

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
30.3	1.4E-03	21.3	108.4	2.2E-06
20.4	1.2E-03	14.3	101.4	2.0E-06
11.1	1.1E-03	7.8	94.9	1.9E-06
			Geo Mean	**2.0.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-31
Design Test Interval: 200
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Toussaint A. Buckingham

Collar El.:
Trend:
Plunge: 78 deg
Date: 20-Jul-10

Packer Setup Type: Single

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	62.015	--
1	10	62.082	0.067
2	10	62.130	0.048
3	10	62.190	0.060
4	10	62.244	0.054
5	10	62.299	0.055
6	10	62.355	0.056
7	10	62.409	0.054
8	10	62.464	0.055
9	10	62.518	0.054
10	10	62.573	0.055
Stable Ave.	10		0.055

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	14	64.800	--
1	15	64.870	0.070
2	16	64.940	0.070
3	18	65.000	0.060
4	16	65.049	0.049
5	14	65.112	0.063
6	15	65.176	0.064
7			
8			
9			
10			
Stable Ave.	15		0.063

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	15	62.669	--
1	15	62.728	0.059
2	15	62.792	0.064
3	15	62.844	0.052
4	15	62.911	0.067
5	15	62.968	0.057
6	15	63.023	0.055
7	15	63.087	0.064
8	15	63.142	0.055
9	15	63.201	0.059
10	15	63.263	0.062
Stable Ave.	15		0.059

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	9	65.210	--
1	8	65.257	0.047
2	8	65.308	0.051
3	8	65.363	0.055
4	8	65.417	0.054
5	8	65.470	0.053
6	8	65.526	0.056
7	8	65.586	0.060
8	8	65.633	0.047
9	8	65.686	0.053
10	8	65.740	0.054
Stable Ave.	8		0.05

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	64.270	--
1	20	64.340	0.070
2	20	64.397	0.057
3	20	64.463	0.066
4	20	64.532	0.069
5	20	64.599	0.067
6	20	64.667	0.068
7			
8			
9			
10			
Stable Ave.	20		0.066

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	98.34	m
Top of Packer Interval:	192.90	m
Bottom of Packer Interval (or Bottom of Hole):	200.40	m
Packer Inflation Pressure:	475	psi
Rod Stickup Height:	1.8	m
Water Flushed (Vol./Time/Until Clean):	1 hour	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m3
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-31**
Test #: **2**

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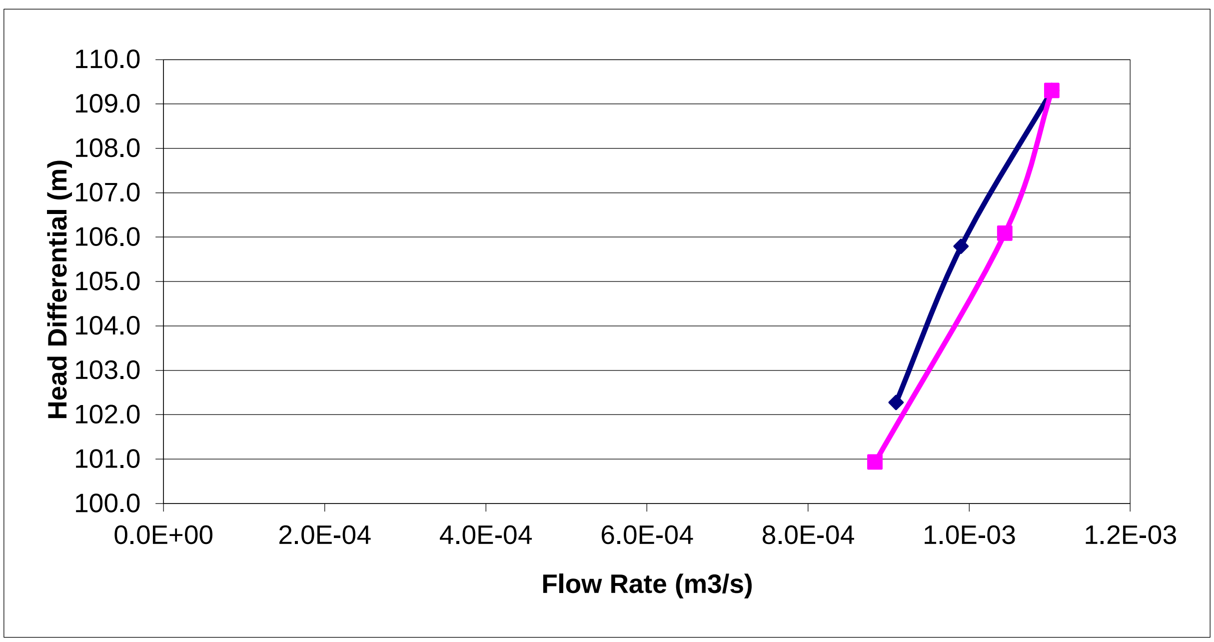
Calculation Input Parameters

Top of Packer Test Interval (mah):	192.9
Bottom of Packer Test Interval (mah):	200.4
L: Length of Test Interval (mah)	7.5
Test Interval Midpoint (mah):	197
Stickup Height (mah):	1.84
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	98.34
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	78

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
10.0	9.1E-04	7.0	102.3	1.0E-06
15.0	9.9E-04	10.5	105.8	1.1E-06
20.0	1.1E-03	14.1	109.3	1.2E-06
15.4	1.0E-03	10.8	106.1	1.1E-06
8.1	8.8E-04	5.7	100.9	1.0E-06
			Geo Mean	**1.1.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-32
Design Test Interval: Shallow
Test #: 1

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Stein

Collar El.:
Trend:
Plunge: 62 deg
Date: 23-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5655.00	--
1	50	5658.80	3.80
2	50	5660.80	2.00
3	50	5662.30	1.50
4	50	5663.80	1.50
5	50	5665.30	1.50
6	50	5666.80	1.50
7	50	5668.30	1.50
8	50	5669.60	1.30
9	50	5671.10	1.50
10	50	5672.50	1.40

Stable Ave. 50 1.46

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5677.00	--
1	75	5680.50	3.50
2	75	5683.60	3.10
3	75	5686.60	3.00
4	75	5689.50	2.90
5	75	5692.40	2.90
6	75	5695.10	2.70
7	75	5697.90	2.80
8	75	5700.80	2.90
9	75	5703.50	2.70
10	75	5706.20	2.70

Stable Ave. 75 2.92

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	5714.00	--
1	100	5720.00	6.00
2	100	5725.80	5.80
3	100	5731.60	5.80
4	100	5737.40	5.80
5	100	5743.10	5.70
6	100	5749.10	6.00
7	100	5755.10	6.00
8	100	5761.10	6.00
9	100	5767.10	6.00
10	100	5773.10	6.00

Stable Ave. 100 5.91

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5777.00	--
1	75	5782.50	5.50
2	75	5785.00	2.50
3	75	5788.40	3.40
4	75	5792.80	4.40
5	75	5797.10	4.30
6	75	5801.40	4.30
7	75	5805.70	4.30
8	75	5810.20	4.50
9	75	5814.60	4.40
10	75	5819.20	4.60

Stable Ave. 75 4.40

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5821.50	--
1	50	5824.80	3.30
2	50	5828.20	3.40
3	50	5831.60	3.40
4	50	5835.00	3.40
5	50	5838.50	3.50
6	50	5842.00	3.50
7	50	5845.30	3.30
8	50	5848.80	3.50
9	50	5852.40	3.60
10	50	5855.80	3.40

Stable Ave. 50 3.43

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	0.76	m
Top of Packer Interval:	40.50	m
Bottom of Packer Interval (or Bottom of Hole):	51.00	m
Packer Inflation Pressure:	340	psi
Rod Stickup Height:	2.6	m
Water Flushed (Vol./Time/Until Clean):	until clean	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:
End Flushing:
Start Packer Testing:
End Packer Testing:

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-32**
Test #: **1**

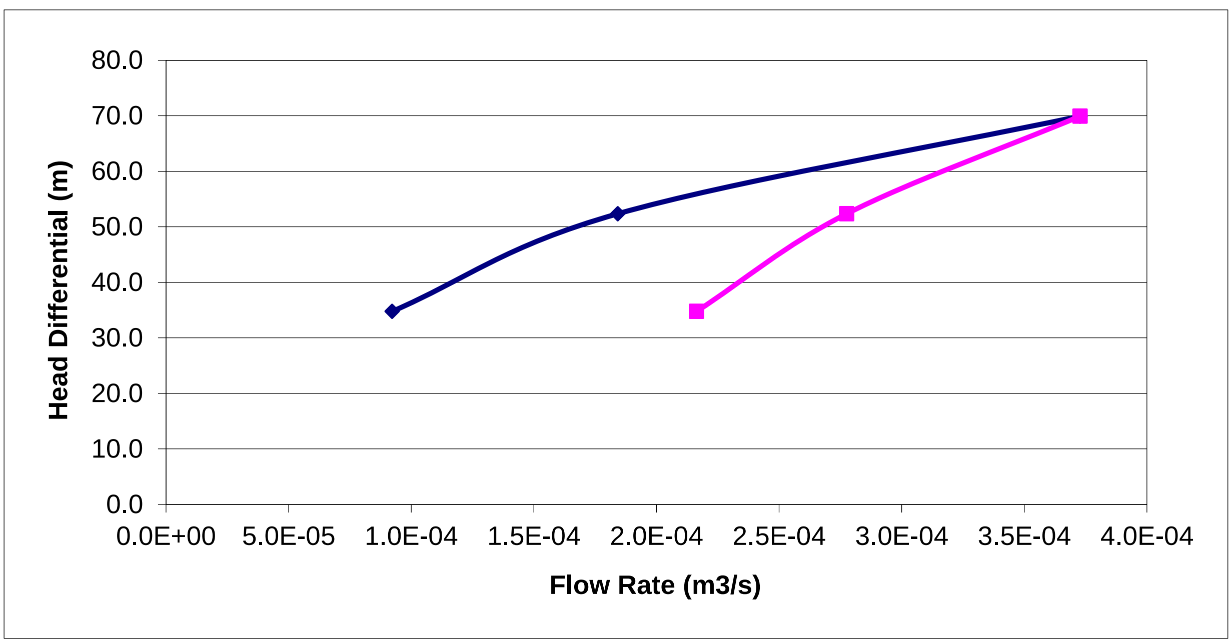
Calculation Input Parameters

Top of Packer Test Interval (mah):	40.5
Bottom of Packer Test Interval (mah):	51.0
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	46
Stickup Height (mah):	2.55
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	0.76
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	62

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	9.2E-05	35.2	34.8	2.5E-07
75.0	1.8E-04	52.7	52.4	3.3E-07
100.0	3.7E-04	70.3	69.9	5.0E-07
75.0	2.8E-04	52.7	52.4	5.0E-07
50.0	2.2E-04	35.2	34.8	5.9E-07
			Geo Mean	**4.2.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-32
Design Test Interval:
Test #: 2

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: D. Stein

Collar El.:
Trend:
Plunge: 62 deg
Date: 24-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	∆ Volume
0	50	5860.00	--
1	50	5867.30	7.30
2	50	5874.10	6.80
3	50	5881.10	7.00
4	50	5888.00	6.90
5	50	5894.60	6.60
6	50	5901.80	7.20
7	50	5908.70	6.90
8	50	5915.50	6.80
9	50	5922.30	6.80
10	50	5929.20	6.90

Stable Ave. 50 6.89

Pressure Interval 75

Minutes	Pressure	Volume	∆ Volume
0	75	5940.00	--
1	75	5950.70	10.70
2	75	5961.20	10.50
3	75	5971.20	10.00
4	75	5981.00	9.80
5	75	5990.70	9.70
6	75	6000.40	9.70
7	75	6010.00	9.60
8	75	6019.60	9.60
9	75	6029.20	9.60
10	75	6039.40	10.20

Stable Ave. 75 9.94

Pressure Interval 100

Minutes	Pressure	Volume	∆ Volume
0	100	6060.00	--
1	100	6072.90	12.90
2	100	6085.50	12.60
3	100	6098.10	12.60
4	100	6110.80	12.70
5	100	6123.00	12.20
6	100	6135.50	12.50
7	100	6148.00	12.50
8	100	6160.50	12.50
9	100	6172.60	12.10
10	100	6184.50	11.90

Stable Ave. 100 12.45

Pressure Interval 75

Minutes	Pressure	Volume	∆ Volume
0	75	6194.00	--
1	75	6202.80	8.80
2	75	6211.50	8.70
3	75	6220.20	8.70
4	75	6228.90	8.70
5	75	6237.50	8.60
6	75	6246.20	8.70
7	75	6254.80	8.60
8	75	6263.40	8.60
9	75	6272.10	8.70
10	75	6280.70	8.60

Stable Ave. 75 8.64

Pressure Interval 50

Minutes	Pressure	Volume	∆ Volume
0	50	6288.00	--
1	50	6293.80	5.80
2	50	6299.60	5.80
3	50	6305.40	5.80
4	50	6311.30	5.90
5	50	6317.00	5.70
6	50	6322.80	5.80
7	50	6328.50	5.70
8	50	6334.30	5.80
9	50	6340.10	5.80
10	50	6345.80	5.70

Stable Ave. 50 5.78

Pressure Interval

Minutes	Pressure	Volume	∆ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-6.33	m
Top of Packer Interval:	118.50	m
Bottom of Packer Interval (or Bottom of Hole):	130.30	m
Packer Inflation Pressure:	460	psi
Rod Stickup Height:	2.6	m
Water Flushed (Vol./Time/Until Clean):	until clean	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing: 7:40 PM
End Flushing: 9:00 PM
Start Packer Testing: 11:00 PM
End Packer Testing: 12:00 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	∆ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-32**
Test #: **2**

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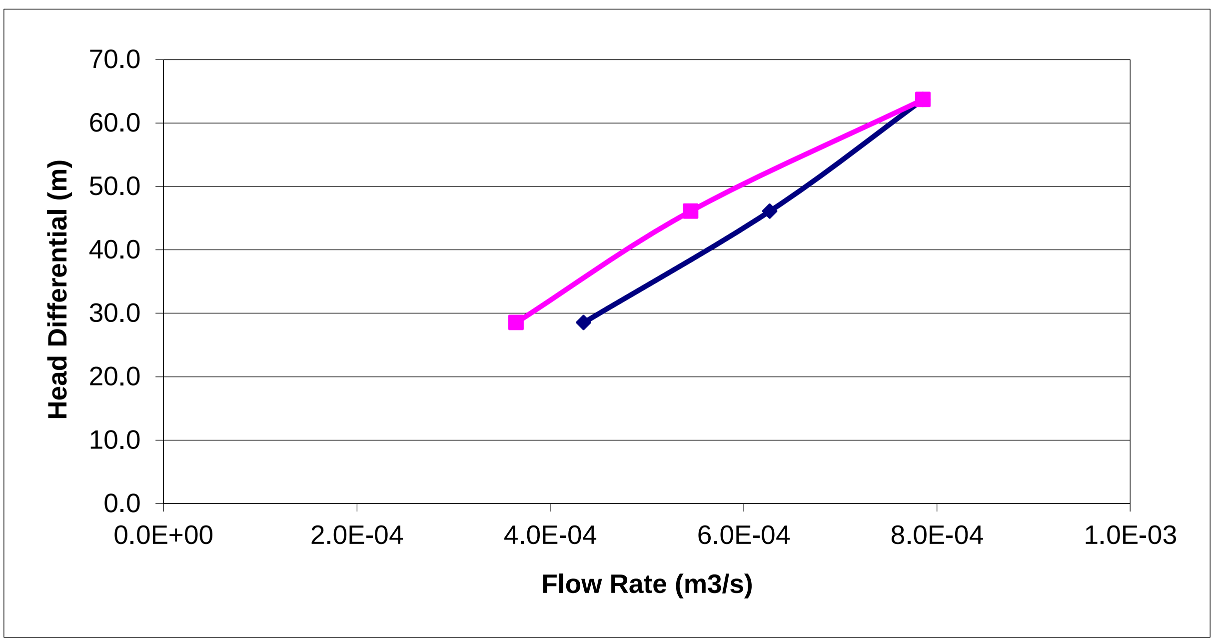
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	118.5
Bottom of Packer Test Interval (mah):	130.3
L: Length of Test Interval (mah)	11.8
Test Interval Midpoint (mah):	124
Stickup Height (mah):	2.55
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	-6.33
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	62

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	4.3E-04	35.2	28.5	1.3E-06
75.0	6.3E-04	52.7	46.1	1.2E-06
100.0	7.9E-04	70.3	63.7	1.1E-06
75.0	5.5E-04	52.7	46.1	1.0E-06
50.0	3.6E-04	35.2	28.5	1.1E-06
			Geo Mean	**1.1.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-32
Design Test Interval:
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Touissant

Collar El.:
Trend:
Plunge: 62 deg
Date: 26-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	6187.40	--
1	50	6187.52	0.12
2	50	6187.72	0.20
3	50	6187.87	0.15
4	50	6188.05	0.18
5	50	6188.18	0.13
6	50	6188.35	0.17
7	50	6188.48	0.13
8	50	6188.61	0.13
9	50	6188.77	0.16
10	50	6188.92	0.15
Stable Ave.	50		0.15

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	6189.20	--
1	75	6189.44	0.24
2	75	6189.68	0.24
3	75	6189.91	0.23
4	75	6190.12	0.21
5	75	6190.40	0.28
6	75	6190.62	0.22
7	75	6190.86	0.24
8	75	6191.11	0.25
9	75	6191.34	0.23
10	75	6191.68	0.34
Stable Ave.	75		0.25

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	6192.80	--
1	100	6193.17	0.37
2	100	6193.50	0.33
3	100	6193.85	0.35
4	100	6194.20	0.35
5	100	6194.55	0.35
6	100	6194.98	0.43
7	100	6195.44	0.46
8	100	6195.78	0.34
9	100	6196.00	0.22
10	100	6196.32	0.32
Stable Ave.	100		0.35

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	6196.80	--
1	75	6197.01	0.21
2	75	6197.33	0.32
3	75	6197.48	0.15
4	75	6197.66	0.18
5	75	6197.88	0.22
6	75	6198.05	0.17
7	75	6198.24	0.19
8	75	6198.45	0.21
9	75	6198.63	0.18
10	75	6198.85	0.22
Stable Ave.	75		0.20

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	6199.00	--
1	50	6199.10	0.10
2	50	6199.20	0.10
3	50	6199.30	0.10
4	50	6199.40	0.10
5	50	6199.50	0.10
6	50	6199.60	0.10
7	50	6199.70	0.10
8	50	6199.80	0.10
9	50	6199.90	0.10
10	50	6200.00	0.10
Stable Ave.	50		0.10

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-11.25	m
Top of Packer Interval:	210.00	m
Bottom of Packer Interval (or Bottom of Hole):	220.50	m
Packer Inflation Pressure:	523	psi
Rod Stickup Height:	2.6	m
Water Flushed (Vol./Time/Until Clean):	40 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:	7:10 AM
End Flushing:	7:50 AM
Start Packer Testing:	9:15 AM
End Packer Testing:	10:50 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-32**
Test #: **3**

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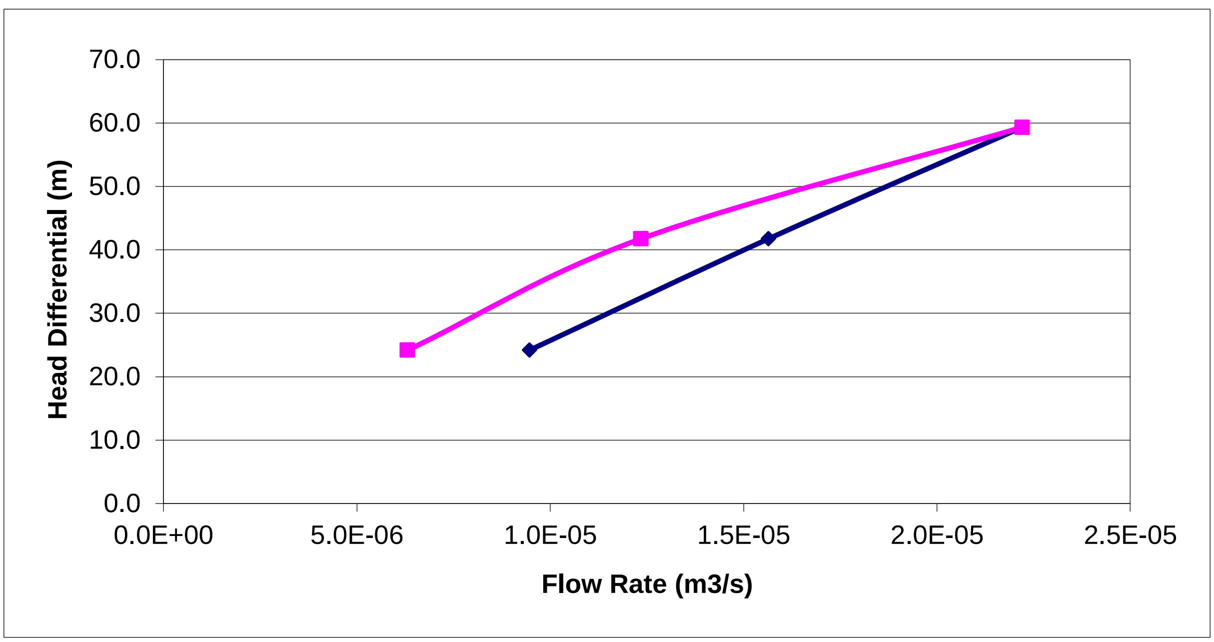
Calculation Input Parameters

Top of Packer Test Interval (mah):	210.0
Bottom of Packer Test Interval (mah):	220.5
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	215
Stickup Height (mah):	2.55
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	-11.25
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	62

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	9.5E-06	35.2	24.2	3.7E-08
75.0	1.6E-05	52.7	41.7	3.5E-08
100.0	2.2E-05	70.3	59.3	3.5E-08
75.0	1.2E-05	52.7	41.7	2.8E-08
50.0	6.3E-06	35.2	24.2	2.5E-08
			Geo Mean	**3.2.E-08**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-32
Design Test Interval:
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: L. Touissant

Collar El.:
Trend:
Plunge: 62 deg
Date: 27-Jul-10

Packer Setup Type: Single

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5612.50	--
1	50	5612.52	0.02
2	50	5612.66	0.14
3	50	5612.84	0.18
4	50	5613.00	0.16
5	50	5613.11	0.11
6	50	5613.22	0.11
7	50	5613.36	0.14
8	50	5613.50	0.14
9	50	5613.63	0.13
10	50	5613.78	0.15

Stable Ave. 50 0.14

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5614.40	--
1	75	5614.71	0.31
2	75	5615.00	0.29
3	75	5615.30	0.30
4	75	5615.58	0.28
5	75	5615.87	0.29
6	75	5616.13	0.26
7	75	5616.42	0.29
8	75	5616.69	0.27
9	75	5616.98	0.29
10	75	5617.23	0.25

Stable Ave. 75 0.28

Pressure Interval 100

Minutes	Pressure	Volume	Δ Volume
0	100	5619.70	--
1	100	5620.09	0.39
2	100	5620.50	0.41
3	100	5620.88	0.38
4	100	5621.23	0.35
5	100	5621.66	0.43
6	100	5622.02	0.36
7	100	5622.45	0.43
8	100	5622.85	0.40
9	100	5623.22	0.37
10	100	5623.60	0.38

Stable Ave. 100 0.39

Pressure Interval 75

Minutes	Pressure	Volume	Δ Volume
0	75	5623.70	--
1	75	5623.99	0.29
2	75	5624.27	0.28
3	75	5624.51	0.24
4	75	5624.80	0.29
5	75	5625.07	0.27
6	75	5625.30	0.23
7	75	5625.59	0.29
8	75	5625.82	0.23
9	75	5626.07	0.25
10	75	5626.41	0.34

Stable Ave. 75 0.27

Pressure Interval 50

Minutes	Pressure	Volume	Δ Volume
0	50	5626.50	--
1	50	5626.60	0.10
2	50	5626.72	0.12
3	50	5626.83	0.11
4	50	5626.95	0.12
5	50	5627.07	0.12
6	50	5627.20	0.13
7	50	5627.30	0.10
8	50	5627.42	0.12
9	50	5627.53	0.11
10	50	5627.65	0.12

Stable Ave. 50 0.11

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	-18.28	m
Top of Packer Interval:	289.50	m
Bottom of Packer Interval (or Bottom of Hole):	300.00	m
Packer Inflation Pressure:	690	psi
Rod Stickup Height:	2.4	m
Water Flushed (Vol./Time/Until Clean):	45 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	1.2	m

Measurment Units

Volume: GAL
Pressure: psi
Length: m

Time

Start Flushing:	6:40 AM
End Flushing:	7:45 AM
Start Packer Testing:	9:45 AM
End Packer Testing:	10:42 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-32**
Test #: **4**

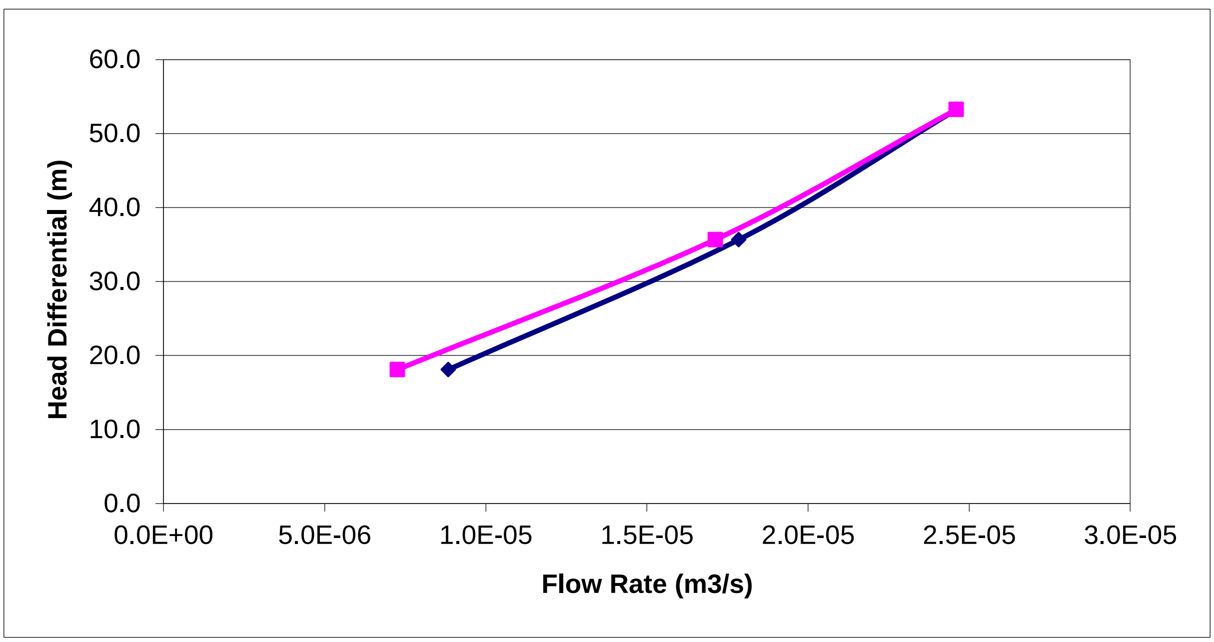
Calculation Input Parameters

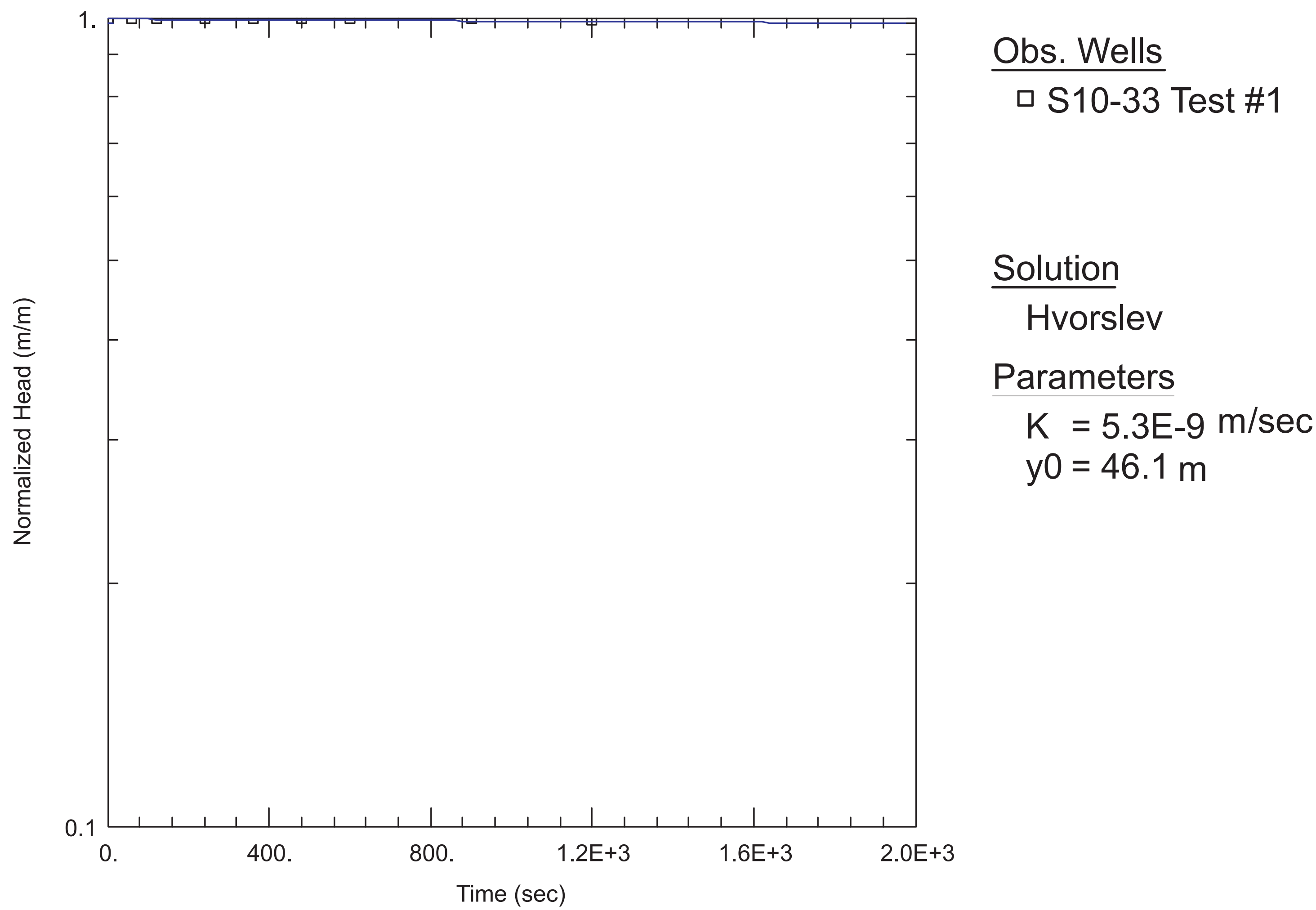
Top of Packer Test Interval (mah):	289.5
Bottom of Packer Test Interval (mah):	300.0
L: Length of Test Interval (mah)	10.5
Test Interval Midpoint (mah):	295
Stickup Height (mah):	2.40
Pressure Gauge Height (m above ground):	1.20
Depth to Water Table (mah):	-18.28
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	62

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
50.0	8.8E-06	35.2	18.1	4.6E-08
75.0	1.8E-05	52.7	35.7	4.7E-08
100.0	2.5E-05	70.3	53.3	4.4E-08
75.0	1.7E-05	52.7	35.7	4.5E-08
50.0	7.3E-06	35.2	18.1	3.8E-08
			Geo Mean	**4.4.E-08**





SCALE: NOT TO SCALE	DESIGNED: RT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: KSM PRE-FEASIBILITY STUDY PIT DEPRESSURIZATION ANALYSES	
DATE: FEBRUARY 2011	CHECKED: RT		TITLE: S10-33 Packer Test #1 65.2 to 69.7 m along hole Falling Head Results	
DRAWN: RT	APPROVED: APPROVE	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009	FIG. No.: Packer Test Appendix; REV.: 0

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Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-33
Design Test Interval: 100
Test #: 3

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: C. Scott

Collar El.:
Trend:
Plunge: 73 deg
Date: 29-Jul-10

Packer Setup Type: Single

Pressure Interval 0

Minutes	Pressure	Volume	Δ Volume
0	0	70.700	--
1	0	70.734	0.034
2	0	70.769	0.035
3	0	70.803	0.034
4	0	70.836	0.033
5	0	70.868	0.032
6	0	70.901	0.033
7	0	70.933	0.032
8	0	70.964	0.031
9	0	70.995	0.031
10	0	71.026	0.031
Stable Ave.	0		0.032

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	12	72.620	--
1	9	72.671	0.051
2	9	72.723	0.052
3	8	72.777	0.054
4	9	72.831	0.054
5	9	72.884	0.053
6	9	72.937	0.053
7	9	72.991	0.054
8	9	73.045	0.054
9	9	73.098	0.053
10	9	73.152	0.054
Stable Ave.	9		0.053

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	71.780	--
1	12	71.834	0.054
2	9	71.880	0.046
3	8	71.928	0.048
4	8	71.978	0.050
5	7	72.024	0.046
6			
7			
8			
9			
10			
Stable Ave.	9		0.049

Pressure Interval 0

Minutes	Pressure	Volume	Δ Volume
0	0	73.190	--
1	0	73.217	0.027
2	0	73.246	0.029
3	0	73.276	0.030
4	0	73.307	0.031
5	0	73.338	0.031
6	0	73.368	0.030
7	0	73.398	0.030
8	0	73.429	0.031
9	0	73.458	0.029
10	0	73.488	0.030
Stable Ave.	0		0.030

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	72.180	--
1	19	72.244	0.064
2	20	72.308	0.064
3	21	72.374	0.066
4	21	72.439	0.065
5	21	72.504	0.065
6			
7			
8			
9			
10			
Stable Ave.	20		0.065

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	87.65	m
Top of Packer Interval:	132.40	m
Bottom of Packer Interval (or Bottom of Hole):	136.9	m
Packer Inflation Pressure:	400	psi
Rod Stickup Height:	2.3	m
Water Flushed (Vol./Time/Until Clean):	40 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m^3
Pressure: psi
Length: m

Time

Start Flushing:	10:10 AM
End Flushing:	10:50 AM
Start Packer Testing:	1:20 PM
End Packer Testing:	2:40 PM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-33**
Test #: **3**

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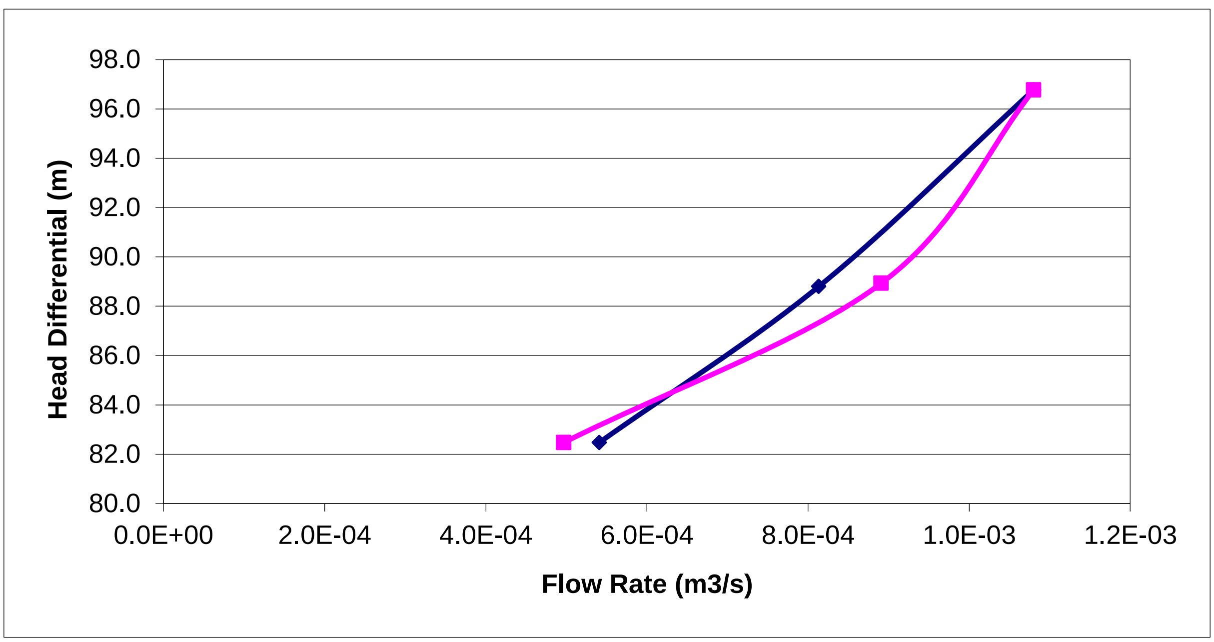
Calculation Input Parameters

Top of Packer Test Interval (mah):	132.4
Bottom of Packer Test Interval (mah):	136.9
L: Length of Test Interval (mah)	4.5
Test Interval Midpoint (mah):	135
Stickup Height (mah):	2.30
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	87.65
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	73

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2\times\pi\times L\sin(A)\times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
0.0	5.4E-04	0.0	82.5	1.1E-06
9.0	8.1E-04	6.3	88.8	1.6E-06
20.3	1.1E-03	14.3	96.8	2.0E-06
9.2	8.9E-04	6.5	88.9	1.8E-06
0.0	5.0E-04	0.0	82.5	1.1E-06
			Geo Mean	**1.5.E-06**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-33
Design Test Interval: 100
Test #: 4

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: C. Scott

Collar El.:
Trend:
Plunge: 73 deg
Date: 30-Jul-10

Packer Setup Type: Single

Pressure Interval 30

Minutes	Pressure	Volume	Δ Volume
0	30	73.840	--
1	29	73.872	0.032
2	30	73.907	0.035
3	31	73.944	0.037
4	29	73.979	0.035
5	31	74.016	0.037
6	30	74.057	0.041
7	28	74.089	0.032
8	31	74.127	0.038
9	31	74.164	0.037
10	32	74.202	0.038
Stable Ave.	30		0.037

Pressure Interval 45

Minutes	Pressure	Volume	Δ Volume
0	45	74.270	--
1	43	74.315	0.045
2	43	74.359	0.044
3	44	74.403	0.044
4	43	74.447	0.044
5	43	74.491	0.044
6	44	74.536	0.045
7	43	74.581	0.045
8			
9			
10			
Stable Ave.	44		0.044

Pressure Interval 60

Minutes	Pressure	Volume	Δ Volume
0	59	74.650	--
1	60	74.703	0.053
2	59	74.753	0.050
3	62	74.816	0.063
4	59	74.866	0.050
5	61	74.923	0.057
6	61	74.978	0.055
7	60	75.034	0.056
8	59	75.091	0.057
9	60	75.147	0.056
10	59	75.203	0.056
Stable Ave.	60		0.055

Pressure Interval 45

Minutes	Pressure	Volume	Δ Volume
0	46	75.290	--
1	47	75.345	0.055
2	46	75.398	0.053
3	46	75.451	0.053
4	46	75.506	0.055
5	46	75.560	0.054
6	46	75.614	0.054
7	46	75.668	0.054
8			
9			
10			
Stable Ave.	46		0.054

Pressure Interval 30

Minutes	Pressure	Volume	Δ Volume
0	30	75.730	--
1	30	75.774	0.044
2	30	75.828	0.054
3	31	75.877	0.049
4	31	75.925	0.048
5	30	75.974	0.049
6	30	76.023	0.049
7	30	76.072	0.049
8			
9			
10			
Stable Ave.	30		0.049

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	84.40	m
Top of Packer Interval:	194.90	m
Bottom of Packer Interval (or Bottom of Hole):	207.4	m
Packer Inflation Pressure:	500	psi
Rod Stickup Height:	2.3	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m^3
Pressure: psi
Length: m

Time

Start Flushing:	8:30 AM
End Flushing:	9:00 AM
Start Packer Testing:	9:40 AM
End Packer Testing:	11:55 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-33**
Test #: **4**

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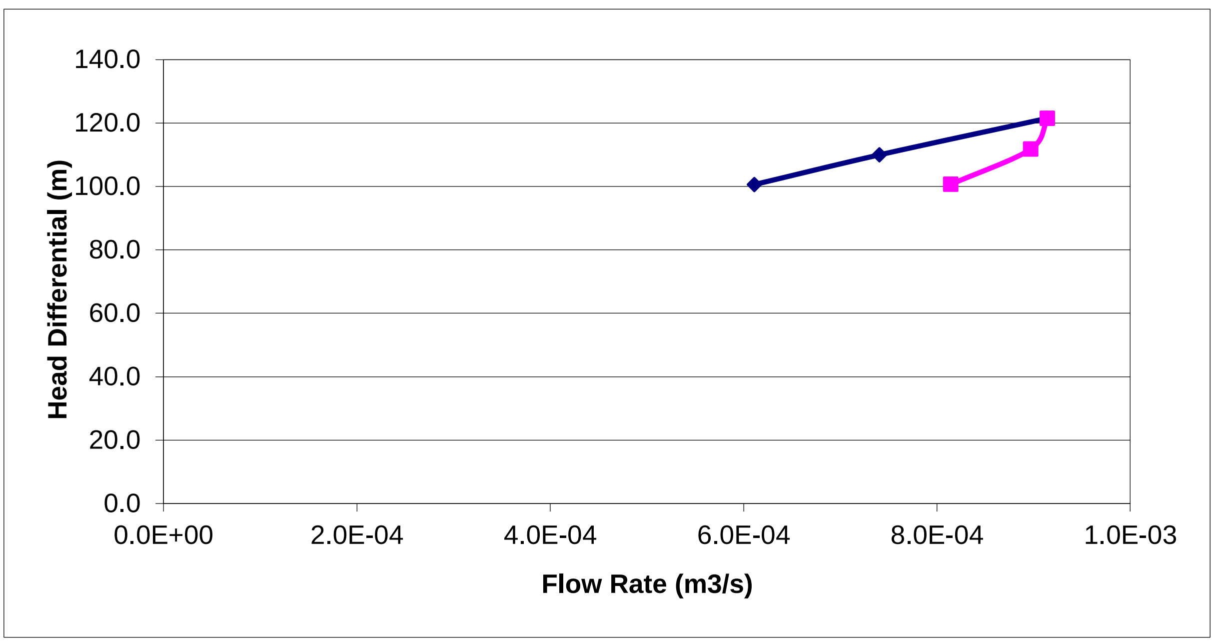
Calculation Input Parameters

Top of Packer Test Interval (mah):	194.9
Bottom of Packer Test Interval (mah):	207.4
L: Length of Test Interval (mah)	12.5
Test Interval Midpoint (mah):	201
Stickup Height (mah):	2.30
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	84.40
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	73

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
30.2	6.1E-04	21.2	100.6	4.7E-07
43.5	7.4E-04	30.6	109.9	5.2E-07
59.9	9.1E-04	42.1	121.5	5.8E-07
46.1	9.0E-04	32.4	111.8	6.1E-07
30.3	8.1E-04	21.3	100.6	6.2E-07
			Geo Mean	**5.2E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-33
Design Test Interval: 100
Test #: 5

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson

Collar El.:
Trend:
Plunge: 73 deg
Date: 31-Jul-10

Packer Setup Type: Single

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	76.667	--
1	10	76.715	0.048
2	10	76.753	0.038
3	10	76.790	0.037
4	10	76.826	0.036
5	10	76.862	0.036
6	10	76.898	0.036
7	10	76.934	0.036
8	10	76.972	0.038
9	10	77.004	0.032
10	10	77.040	0.036
Stable Ave.	10		0.036

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	15	78.155	--
1	15	78.198	0.043
2	15	78.240	0.042
3	15	78.283	0.043
4	15	78.326	0.043
5	15	78.369	0.043
6	15	78.412	0.043
7	15	78.455	0.043
8	15	78.498	0.043
9	15	78.541	0.043
10	15	78.583	0.042
Stable Ave.	15		0.043

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	15	77.100	--
1	15	77.144	0.044
2	15	77.186	0.042
3	15	77.228	0.042
4	15	77.269	0.041
5	15	77.310	0.041
6	15	77.352	0.042
7	15	77.394	0.042
8	15	77.434	0.040
9	15	77.475	0.041
10	15	77.516	0.041
Stable Ave.	15		0.042

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	78.605	--
1	10	78.646	0.041
2	10	78.688	0.042
3	10	78.729	0.041
4	10	78.769	0.040
5	10	78.809	0.040
6	10	78.851	0.042
7	10	78.891	0.040
8	10	78.933	0.042
9	10	78.977	0.044
10	8	79.014	0.037
Stable Ave.	10		0.041

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	77.560	--
1	20	77.705	0.145
2	20	77.750	0.045
3	20	77.794	0.044
4	20	77.839	0.045
5	20	77.883	0.044
6	20	77.929	0.046
7	20	77.973	0.044
8	20	78.018	0.045
9	20	78.063	0.045
10	20	78.109	0.046
Stable Ave.	20		0.059

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	87.00	m
Top of Packer Interval:	243.70	m
Bottom of Packer Interval (or Bottom of Hole):	257.2	m
Packer Inflation Pressure:	540	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume: m^3
Pressure: psi
Length: m

Time

Start Flushing:	12:55 AM
End Flushing:	1:30 AM
Start Packer Testing:	2:57 AM
End Packer Testing:	4:00 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-33**
Test #: **5**

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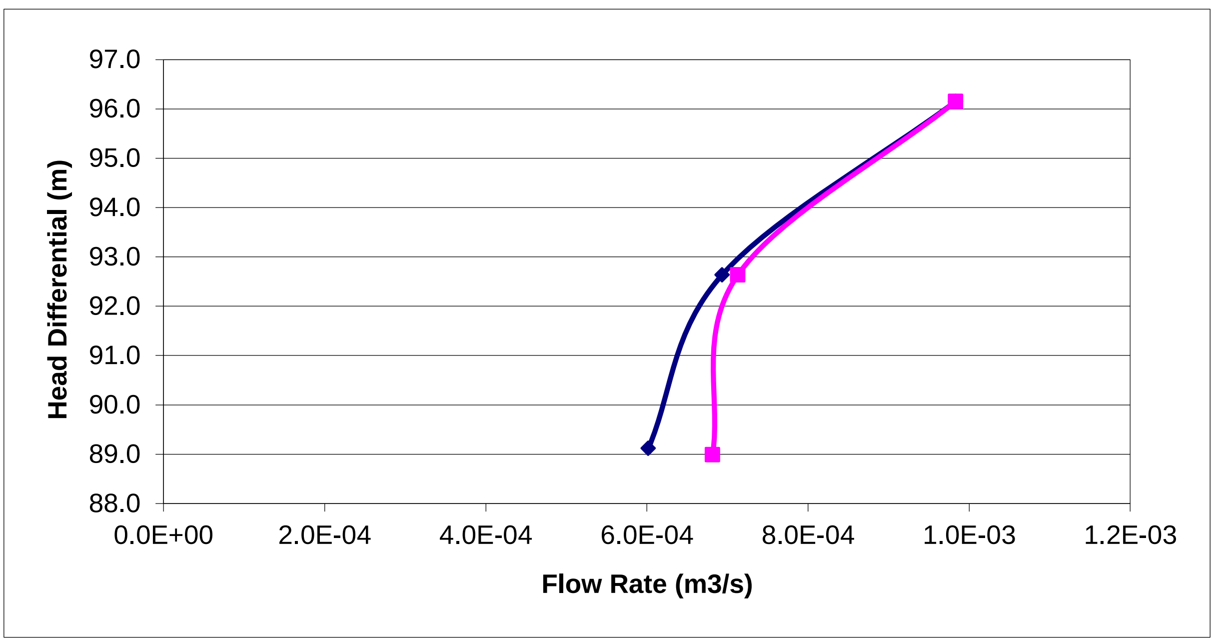
Calculation Input Parameters

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Top of Packer Test Interval (mah):	243.7
Bottom of Packer Test Interval (mah):	257.2
L: Length of Test Interval (mah)	13.5
Test Interval Midpoint (mah):	250
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	87.00
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	73

* mah indicates "meters along hole"

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
10.0	6.0E-04	7.0	89.1	4.9E-07
15.0	6.9E-04	10.5	92.6	5.4E-07
20.0	9.8E-04	14.1	96.2	7.4E-07
15.0	7.1E-04	10.5	92.6	5.5E-07
9.8	6.8E-04	6.9	89.0	5.5E-07
			Geo Mean	**5.7.E-07**



Constant Head (CH) and Falling/Rising Head (F/RH) Packer Test - Field Form

Hole # S10-33
Design Test Interval:
Test #: 6

Client: Seabridge
Project: KSM
Project #: 0638-006
Personel: A. Watson A. Buckingham

Collar El.:
Trend:
Plunge: 73 deg
Date: 31-Jul-10

Packer Setup Type: Single

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	79.630	--
1	10	79.634	0.004
2	10	79.638	0.004
3	10	79.642	0.004
4	10	79.646	0.004
5	10	79.650	0.004
6	10	79.653	0.004
7	10	79.656	0.003
8	10	79.660	0.003
9	10	79.663	0.004
10	10	79.666	0.002
Stable Ave.	10		0.003

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	15	79.671	--
1	15	79.674	0.003
2	15	79.677	0.003
3	15	79.681	0.003
4	15	79.683	0.003
5	15	79.686	0.003
6	15	79.689	0.002
7	15	79.692	0.003
8	15	79.695	0.003
9	15	79.697	0.002
10	15	79.700	0.003
Stable Ave.	15		0.003

Pressure Interval 20

Minutes	Pressure	Volume	Δ Volume
0	20	79.708	--
1	20	79.711	0.003
2	20	79.714	0.003
3	20	79.717	0.003
4	20	79.720	0.003
5	20	79.723	0.002
6	20	79.725	0.002
7	20	79.728	0.003
8	20	79.731	0.003
9	20	79.733	0.002
10	20	79.736	0.002
Stable Ave.	20		0.003

Pressure Interval 15

Minutes	Pressure	Volume	Δ Volume
0	15	79.736	--
1	15	79.739	0.003
2	15	79.742	0.002
3	15	79.744	0.002
4	15	79.746	0.002
5	15	79.748	0.002
6	15	79.750	0.002
7	15	79.752	0.002
8	15	79.755	0.002
9	15	79.757	0.003
10	15	79.759	0.002
Stable Ave.	15		0.002

Pressure Interval 10

Minutes	Pressure	Volume	Δ Volume
0	10	74.759	--
1	10	74.761	0.002
2	10	74.763	0.002
3	10	74.765	0.002
4	10	74.767	0.002
5	10	74.769	0.002
6	10	74.771	0.002
7	10	74.773	0.002
8	10	74.774	0.002
9	10	74.776	0.002
10	10	74.778	0.002
Stable Ave.	10		0.002

Pressure Interval

Minutes	Pressure	Volume	Δ Volume
0			-
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Measurements

Depth to Water from Top of Stickup:	79.40	m
Top of Packer Interval:	293.20	m
Bottom of Packer Interval (or Bottom of Hole):	298.9	m
Packer Inflation Pressure:	620	psi
Rod Stickup Height:	2.1	m
Water Flushed (Vol./Time/Until Clean):	30 min	
Packer Pipe ID/ or Drill Rod ID (circle one):	NQ	
Borehole Outside Diameter:	0.076	
Vertical height of gauge above ground:	0.9	m

Measurment Units

Volume:	m^3
Pressure:	psi
Length:	m

Time

Start Flushing:	9:57 PM
End Flushing:	10:27 PM
Start Packer Testing:	1:07 AM
End Packer Testing:	2:00 AM

IF NO MEASUREABLE FLOW IN CH TEST ---> FALLING HEAD TEST or RISING HEAD TEST

Time (Min)	Depth to H2O	Δ Depth/Min
0		-
1		
2		
4		
6		
8		
10		
15		
20		
25		
30		
40		
50		
60		

Additional Comments:

Hole #: **S10-33**
Test #: **6**

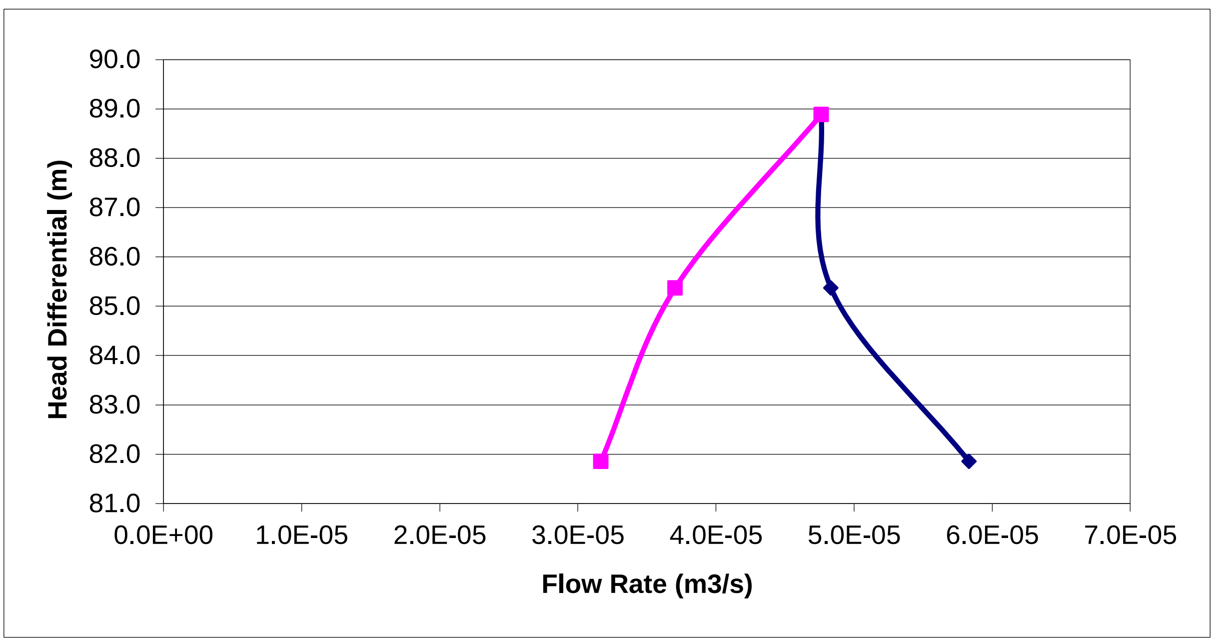
Calculation Input Parameters

Top of Packer Test Interval (mah):	293.2
Bottom of Packer Test Interval (mah):	298.9
L: Length of Test Interval (mah)	5.7
Test Interval Midpoint (mah):	296
Stickup Height (mah):	2.05
Pressure Gauge Height (m above ground):	0.85
Depth to Water Table (mah):	79.40
Borehole Diameter (mm):	75.7
r: Borehole Radius (m):	0.03785
A: Angle From Horizontal (deg):	73

* mah indicates "meters along hole"

$$K = \frac{Q \times \ln\left(\frac{L\sin(A)}{r}\right)}{2 \times \pi \times L\sin(A) \times dH}$$

Pressure (psi)	Q: Flowrate (m^3/s):	Pressure (m of water)	dH: Head Differential (m)	K: Hydraulic Conductivity (m/s)
10.0	5.8E-05	7.0	81.9	1.0E-07
15.0	4.8E-05	10.5	85.4	8.2E-08
20.0	4.8E-05	14.1	88.9	7.8E-08
15.0	3.7E-05	10.5	85.4	6.3E-08
10.0	3.2E-05	7.0	81.9	5.6E-08
			Geo Mean	**7.5.E-08**



APPENDIX C
DEPRESSURIZATION REQUIREMENTS

Table C1: Mitchell Pit Depressurization Requirements

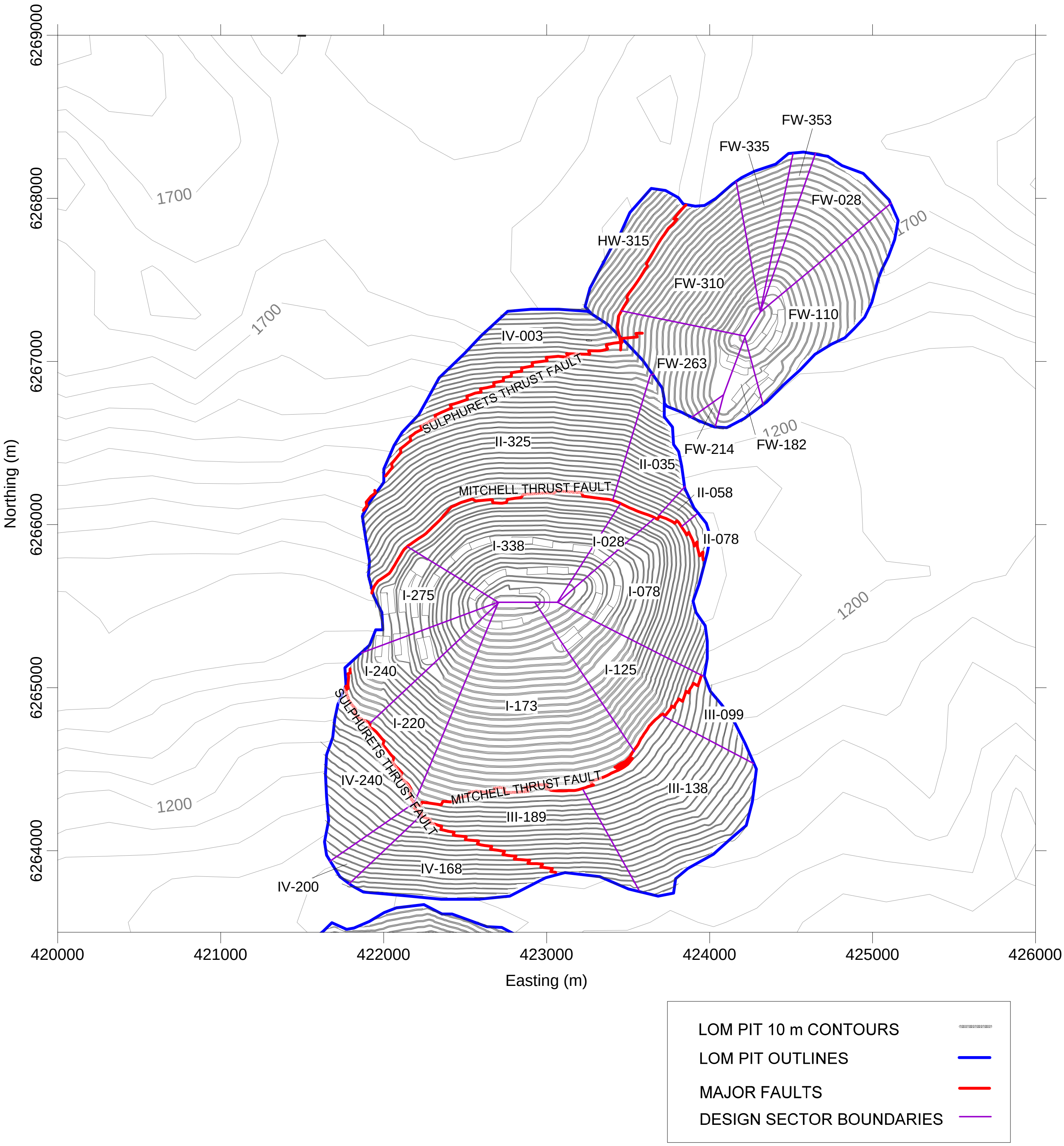
Geotechnical Domain	Design Sector(s)	Description	Expected Max Slope Height (m)	Dewatering Assumption			Min Oa Horizontal Setback to WT[1] (m)	Pre-Mining Conditions	Unmitigated LOM Watertable	Average Horizontal Drain Length (m)[2]	Vertical Wells[3]	Other / Comments
				Bench	Interberm	Overall Slope						
I	I-173	North dipping	1230	Structures Depressurized	Structures Depressurized, Partially depressurized Rock mass	Partially Saturated (50% of potential failure mass saturated)	50	In valley bottom watertable is generally at surface, and above is a subdued replica of topography approximately 50 m bgs at the crest of the proposed pit	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
	I-220	NE Dipping	1080				50	Watertable is at surface in the valley bottom, 100 m bgs at the crest of the proposed pit and a subdued replica of topography in between.	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
	I-240	NE Dipping	660				50	Watertable is at surface in the valley bottom, 50 m bgs at the crest of the proposed pit and a subdued replica of topography in between.	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
	I-275	East dipping, adjacent to OPC	690				50	Watertable is approximately at ground surface for this entire sector, approx paralleling the creek / glacier	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
	I-338	South dipping, high wall	1650				150	Watertable is approx 75 m below ground surface at the crest of the proposed pit, at surface at the current valley bottom, and undulates between surface and 100 m bgs over the existing slope	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	300	Y	A Dewatering Adit and Drainage Gallery are required to achieve the design depressurization of this slope
	I-028	South dipping, high wall	1650				150	Watertable is approx 50 bgs at the crest of the proposed pit, at surface at the current valley bottom, and undulates between those points to a max bgs depth of 100 m	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	300	Y	A Dewatering Adit and Drainage Gallery are required to achieve the design depressurization of this slope
	I-078	West Dipping, adjacent to Mitchell Diversion inlet	660				50	Watertable is approximately at ground surface for this entire sector, approx paralleling the creek / glacier	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
	I-125	NW dipping	1080				50	In valley bottom watertable is basically at surface, and above is a subdued replica of topography approximately 50 m bgs at the crest of the proposed pit	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	150	Y	
II	II-325	South Dipping Upper Section of highwall	1110			Partially depressurized (25% of potential failure mass saturated)	400	Watertable is approx 75 m below ground surface at the crest of the proposed pit, at surface at the current valley bottom, and undulates between surface and 100 m bgs over the existing slope	The unmitigated watertable parallels the pit slope with very little set back for approximately half of the domain, then the set back gradually increases to approximately 350 m behind the pit face	100	Y	A Dewatering Adit and Drainage Gallery are required to achieve the design depressurization of this slope
	II-035	SW Dipping	690				50	Watertable is approx 50 bgs at the crest of the proposed pit, at surface at the current valley bottom, and undulates between those points to a max bgs depth of 100 m	The unmitigated watertable parallels the pit slope with very little set back for approximately half of the domain, then the set back gradually increases to approximately 350 m behind the pit face	100	Y	
	II-058	SW Dipping	270				50	Watertable is approx 50 bgs at the crest of the proposed pit, at surface at the current valley bottom, and undulates between those points to a max bgs depth of 100 m	The unmitigated watertable parallels the pit slope with very little set back for approximately half of the domain, then the set back gradually increases to approximately 150 m behind the pit face at the height of slope	100	Y	
	II-078	SW Dipping	120				50	Watertable is approximately at ground surface for this entire sector, approx paralleling the creek / glacier	The unmitigated watertable parallels the pit slope with very little set back for approximately half of the domain, then the set back gradually increases to approximately 100 m behind the pit face at the height of slope	100	Y	
III	III-099	NW Dipping	240			Partially Saturated (50% of potential failure mass saturated)	50	Subdued replica of topography the groundwater table is approx 50 m bgs	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	100	Y	
	III-138	NW dipping	480				50	Subdued replica of topography the groundwater table is approx 50 m bgs	The unmitigated watertable essentially parallels the pit slope in this domain with little to no set-back.	100	Y	
	III-189	North dipping	570				50	Subdued replica of topography the groundwater table is approx 50 m bgs	The unmigitaged watertable at the base of this domain is approximately at the pit face, and gradually slopes back to approx 300 m behind the pit at the height of slope.	100	Y	
IV	IV-168	North dipping	360			Partially depressurized (25% of potential failure mass saturated)	50	Subdued replica of topography the groundwater table is approx 50 m bgs	The unmitigated watertable in this domain begins approximately 350 m behind the slope at the STF and slopes back into the slope to a maximum elevation of ~1375 masl in the ridgetop.	100	Y	
	IV-200	NE Dipping	360				50	Watertable is at surface in the valley bottom, 100 m bgs at the crest of the proposed pit and a subdued replica of topography in between.	The unmitigated watertable in this domain begins approximately 350 m behind the slope at the STF and slopes back into the slope to a maximum elevation of ~1375 masl in the ridgetop.	100	Y	
	IV-240	NE Dipping	300				50	Watertable is at surface in the valley bottom, 100 m bgs at the crest of the proposed pit and a subdued replica of topography in between.	The unmitigated watertable in this domain begins approximately 200 m behind the slope at the STF and slopes back to a set-back of 350 m at the max height of the pit slope.	100	Y	
	IV-003	Upper Section of highwall	510				600	Watertable is approx 75 m below ground surface at the crest of the proposed pit, at surface at the current valley bottom, and undulates between surface and 100 m bgs over the existing slope	The unmitigated watertable in this domain begins approximately 350 m behind the slope at the STF and slopes back into the slope to a maximum elevation of ~1720 masl in the ridgetop.	100	Y	

Notes:
1. Setback to water estimated from mid-slope of slide analyses assuming 50% of failure mass is saturated.
2. Horizontal drain lengths have been estimated considering a 50% effective length. 100 m drains will likely be required during operations on those slopes where the LOM watertable meets bench and interberm depressurization without them (Domains II, III, and IV)
3. Vertical wells have been modeled based on a nominal spacing, placement has not been optimized wrt pit phasing at this stage of study.

Table C2: Iron Cap Pit Dewatering Assumptions Summary

Geotechnical Unit	Design Sector(s)	Max Slope Height (m)	Depressurization Assumptions					Pre-Mining Conditions	Unmitigated EOL Watertable (No Drains or Wells)	Min Horizontal Drain Length (m)[4]	Vertical Wells	Other / Comments
			Bench	Interberm	IBa Setback to WT[1] (m)	Overall Slope	Oa Setback to WT[2] (m)					
FW	FW-182	180	Structures Depressurized	Structures Depressurized, Partially Saturated Rock mass	50	Partially Saturated (50% of failed mass saturated)	**50**	Subdued replica of topography, shallow depths to water	The watertable in the lower half of this domain is approximately at the pit face, in the upper half it slopes away from the pit face	100	Y	
	FW-214	800			**100**		50	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face to 200 m above the pit toe, then slopes back into the slope to a maximum elevation of 1750 masl	200	Y	
	FW-263	900			**65**		50	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face to 200 m above the pit toe, then slopes back into the slope to a maximum elevation of 1750 masl	130	Y	
	FW-310	600			**90**		50	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face from the pit toe to 150 below the pit crest, after which it slopes back away from the wall	180	Y	
	FW-335	600			50		**50**	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face from the pit toe to 150 below the pit crest, after which it slopes back away from the wall	100	Y	
	FW-353	600			50		**50**	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face from the pit toe to 150 below the pit crest, after which it slopes back away from the wall	100	Y	
	FW-028	600			50		**50**	Shallow depths to water, subdued replica of topography	The watertable is approximately at the pit face from the pit toe to 150 below the pit crest, after which it slopes back away from the wall	100	Y	
	FW-110	260			**80**		50	Subdued replica of topography, will be excavated opposite to slope dip	The watertable in the lower half of this domain is approximately at the pit face, in the upper half it slopes away from the pit face	160	Y	
HW	HW-315	210			50		**50**	Dry based on groundwater model	This sector will be dry based on the 3d groundwater model	100	Y	

Notes:
1. Set back to water for interberm slopes estimated based depressurizing on potentially critical structures, rounded up to the nearest 10 m
2. Setback to water estimated from mid-slope of slide analyses assuming 50% of failure mass is saturated.
3. Setback that will control the overall slope dewatering scheme has been identified in bold text.
4. Horizontal drain lengths have been estimated assuming a 50% effective length.
5. Vertical wells have been modeled based on a nominal spacing, placement has not been optimized for pit phasing at this stage of study.



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PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL AND IRON CAP DESIGN SECTORS

CLIENT: SEABRIDGE GOLD INC.

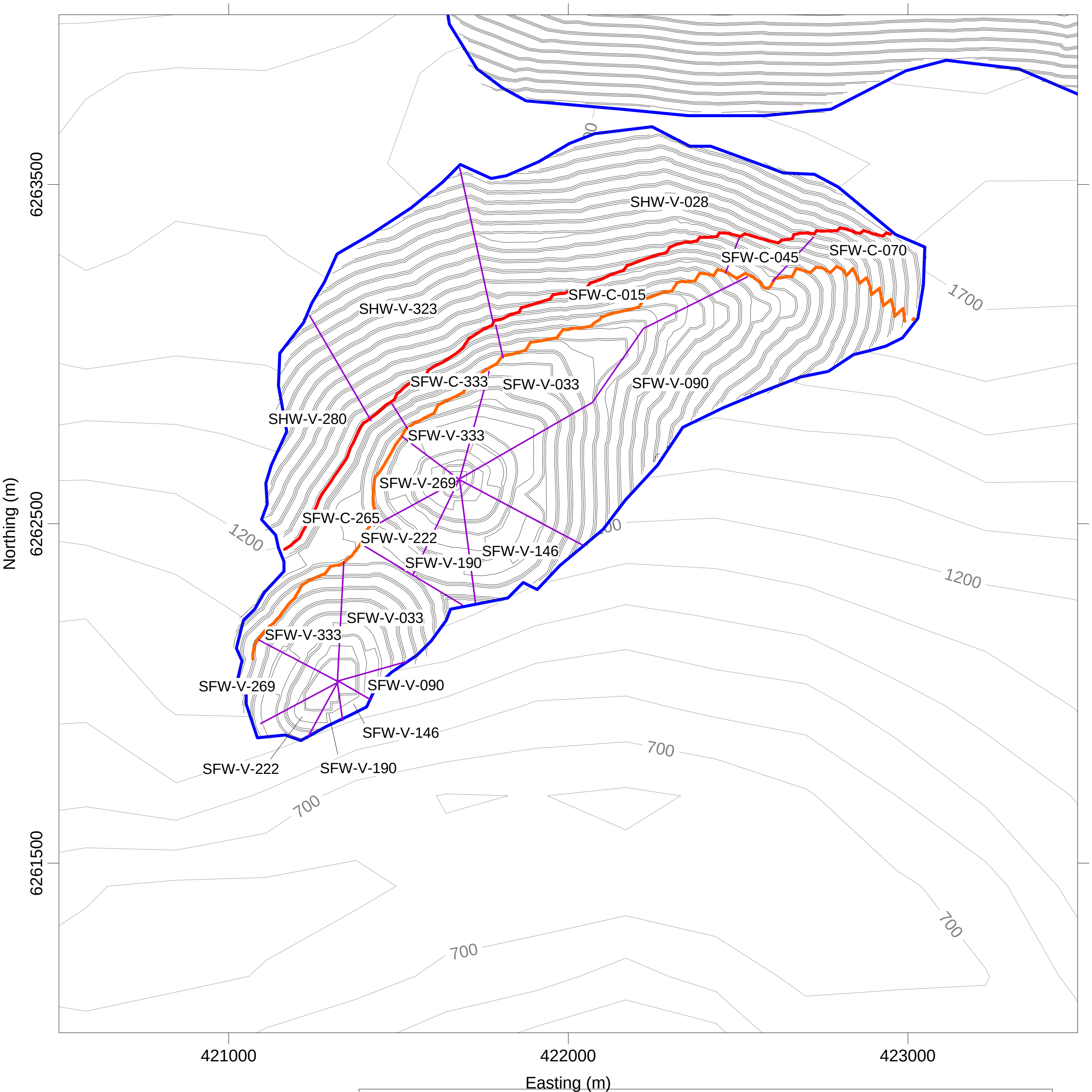
PROJECT No:	DWG No:	REV.
0638-009	C1	A

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Appendices/APPENDIX C/IronCapandMitchell_LOM_DesignSectors.srf

Table C3: Sulphurets Pit Dewatering Assumptions Summary

Geotechnical Unit	Design Sector(s)	Max Slope Height (m)	Depressurization Assumption					Pre-Mining Conditions	Unmitigated EOL Watertable (No Drains or Wells)	Min Horizontal Drain Length (m)[4]	Vertical Wells	Other / Comments
			Bench	Interberm	IBa Setback to WT[1] (m)	Overall Slope	Oa Setback to WT[2] (m)					
SHW-V	SHW-280	300	Structures Depressurized	Structures Depressurized, Partially Saturated Rock mass	40	Partially Saturated (50% of failed mass saturated)	**50**	Watertable is approx 70 m below ground surface at the crest of the proposed pit, and follows topography	At the base of this design sector the watertable is approximately 100 m behind the pit wall, and slopes back into the wall to a maximum elevation of 1450 masl	100	Y	
	SHW-323	420			40		**50**	Watertable is approx 100 m below ground surface at the ridge crest of the proposed pit, and follows topography to ~50 m below at the downhill crest of the pit	At the base of this design sector the watertable is approximately 100 m behind the pit wall, and slopes back into the wall to a maximum elevation of 1450 masl	100	Y	
	SHW-028	120			**80**		50	Watertable is approx 50 m below ground surface, subdued replica of topography	This sector is mostly dry based on the 3d model, the watertable reaches a maximum elevation of 1450 m just above the base of it.	160	Y	
	SHW-075	120			40		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	This sector is dry based on the 3d model	100	Y	
SFW-C	SFW-C-265	270			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is near to the pit face	100	Y	
	SFW-C-333	500			50		**50**	Watertable is approx 70 m below ground surface at the crest of the proposed pit, and follows topography	In this sector the watertable is near to the pit face	100	Y	
	SFW-C-015	500			50		**50**	Watertable is approx 100 m below ground surface at the ridge crest of the proposed pit, and follows topography to ~50 m below at the downhill crest of the pit	In this sector the watertable is near to the pit face	100	Y	
	SFW-C-045	400			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is near to the pit face	100	Y	
	SFW-C-070	250			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is near to the pit face	100	Y	
SFW-V	SFW-190	150			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is approximately at the pit face	100	Y	
	SFW-222	150			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is approximately at the pit face	100	Y	
	SFW-269	150			50		**50**	Watertable is approx 70 m below ground surface at the crest of the proposed pit, and follows topography	In this sector the watertable is approximately at the pit face	100	Y	
	SFW-333	150			50		**50**	Watertable is approx 100 m below ground surface at the ridge crest of the proposed pit, and follows topography to ~50 m below at the downhill crest of the pit	In this sector the watertable is approximately at the pit face for the lower half of the slope, in the upper half it slopes away from the pit face	100	Y	
	SFW-033	400			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is approximately at the pit face	100	Y	
	SFW-090	600			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is approximately at the pit face	100	Y	
	SFW-146	150			50		**50**	Watertable is approx 50 m below ground surface, subdued replica of topography	In this sector the watertable is approximately at the pit face	100	Y	

Notes:
1. Set back to water for interberm slopes estimated based depressurizing on potentially critical structures, rounded up to the nearest 10 m.
2. Setback to water estimated from mid-slope of slide analyses assuming 50% of failure mass is saturated.
3. Setback that will control the overall slope dewatering scheme has been identified in bold text.
4. Horizontal drain lengths have been estimated assuming a 50% effective length.
5. Vertical wells have been modeled based on a nominal spacing, placement has not been optimized for pit phasing at this stage of study.



GEOTECHNICAL DOMAIN BOUNDARY		LOM PIT 10 m CONTOURS	
DESIGN SECTOR BOUNDARY		LOM PIT OUTLINES	
		MAJOR FAULTS	

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PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: SULPHURETS DESIGN SECTORS

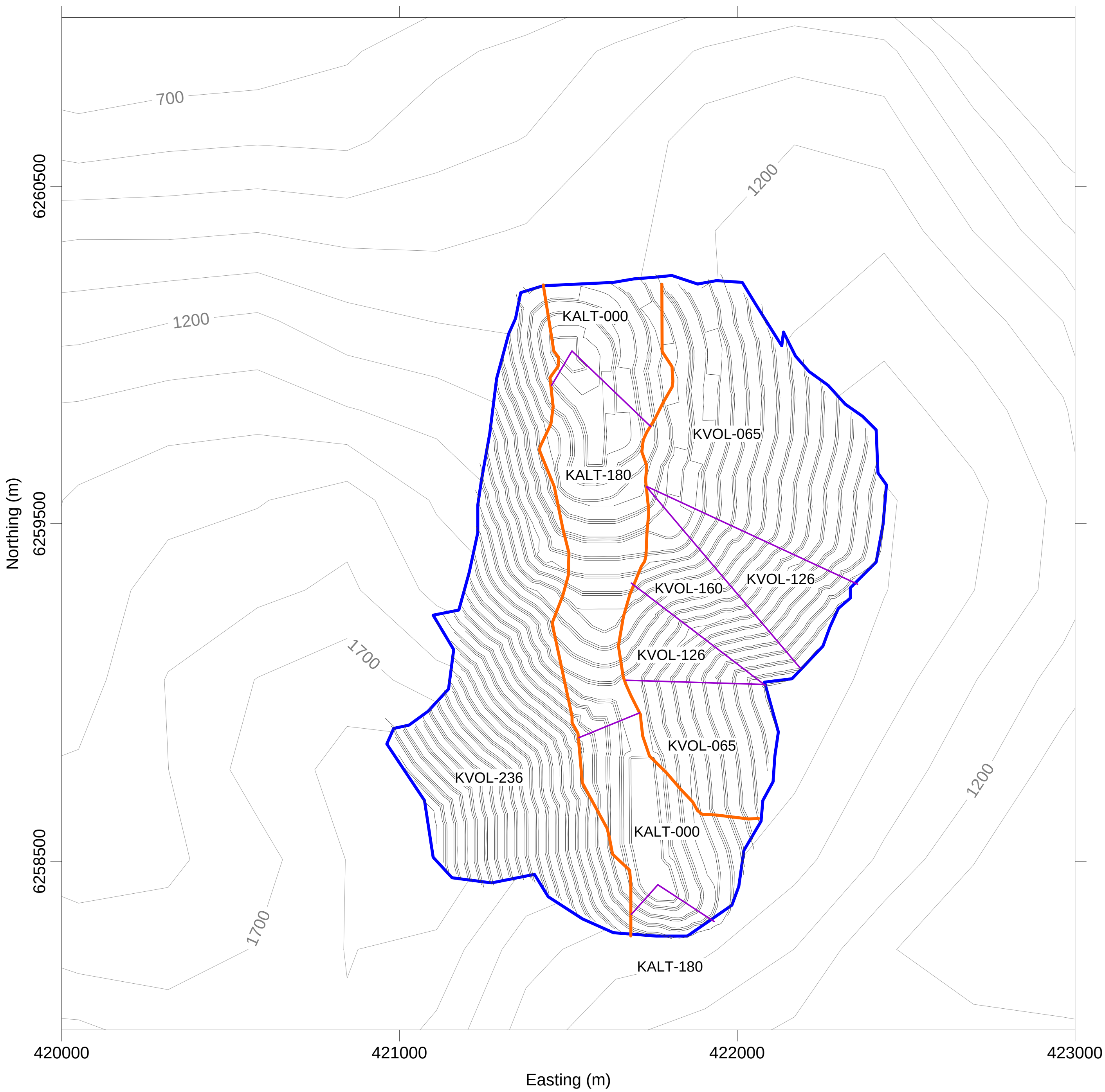
CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	C2	A

K:/Projects/0638-009 KSM PFS Update-Hydrogeology/05 Reporting/Appendices/APPENDIX C/Sulph_Design_Sectors.srf

Table C4: Kerr Pit Dewatering Assumptions Summary

Geotechnical Unit	Design Sector(s)	Max Slope Height (m)	Depressurization Assumptions					Pre-Mining Conditions	Unmitigated EOL Watertable	Min Horizontal Drain Length (m)[4]	Vertical Wells	Other / Comments
			Bench	**Interberm**	**IBa Setback to WT[1] (m)**	**Overall Slope**	**Oa Setback to WT[2] (m)**					
KVOL	KVOL-168	600	Structures Depressurized	Structures Depressurized, Partially Saturated Rock mass	50	Partially Saturated (50% of failed mass saturated)	**50**	Watertable 100 m below surface at top of slope, at the base of this design sector the watertable is at surface	The watertable in this sector is approximately at the pit wall.	100	Y	
	KVOL-200	270			50		**50**	Watertable is near or at surface in this sector	The watertable in this sector is approximately at the pit wall for the lower half of the slope, in the upper half it slopes back into the slope to a maximum set back of 100 m	100	Y	
	KVOL-255	450			50		**50**	Watertable 150 m below surface at ridge top, >100 m below in proposed pit area	The watertable in this sector is at the pit face for the first 2 benches (~60m) then slopes back into the wall to a maximum elevation of 1750 masl	100	Y	
	KVOL-345	240			50		**50**	Watertable is near or at surface in this sector	The watertable in this sector is approximately at the pit wall.	100	Y	
	KVOL-063	210			50		**50**	Watertable 100 m below the surface for this sector	The watertable in this sector dips back into the slope to a maximum set back of 150 m	100	Y	
	KVOL-100	420			50		**50**	Watertable 100 m below surface at top of slope, at the base of this design sector the watertable is at surface	The watertable in this sector is approximately at the pit face below the top 150 m, which are nearly dry based on the 3d model	100	Y	
	KVOL-113	480			**60**		50	Watertable 100 m below surface at top of slope, at the base of this design sector the watertable is at surface	The watertable in this sector is approximately at the pit face below the top 150 m, which are nearly dry based on the 3d model	120	Y	
	KVOL-133	540			**70**		50	Watertable 100 m below surface at top of slope, at the base of this design sector the watertable is at surface	The watertable in this sector is approximately at the pit face below the top 150 m, which are nearly dry based on the 3d model	140	Y	
KALT	KALT-180	420		Structures Depressurized, Partially Depressurized Rock mass	30	Partially Depressurized (25% of failed mass saturated)	**50**	Watertable 100 m below surface at top of slope, at the base of this design sector the watertable is at surface	The watertable in this sector is approximately at the pit wall.	100	Y	
	KALT-000	120			30		**50**	Watertable 100 m below the surface for this sector	The watertable in this sector is approximately at the pit wall.	100	Y	

Notes:
1. Set back to water for interberm slopes estimated based depressurizing on potentially critical structures, rounded up to the nearest 10 m
2. Setback to water estimated from mid-slope of slide analyses assuming 50% of failure mass is saturated
3. Setback that will control the overall slope dewatering scheme has been identified in bold tex
4. Horizontal drain lengths have been estimated assuming a 50% effective length
5. Vertical wells have been modeled based on a nominal spacing, placement has not been optimized for pit phasing at this stage of study



GEOTECHNICAL DOMAIN BOUNDARY	LOM PIT 10 m CONTOURS
DESIGN SECTOR BOUNDARY	LOM PIT OUTLINES

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OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR DESIGN SECTORS

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	C3	A

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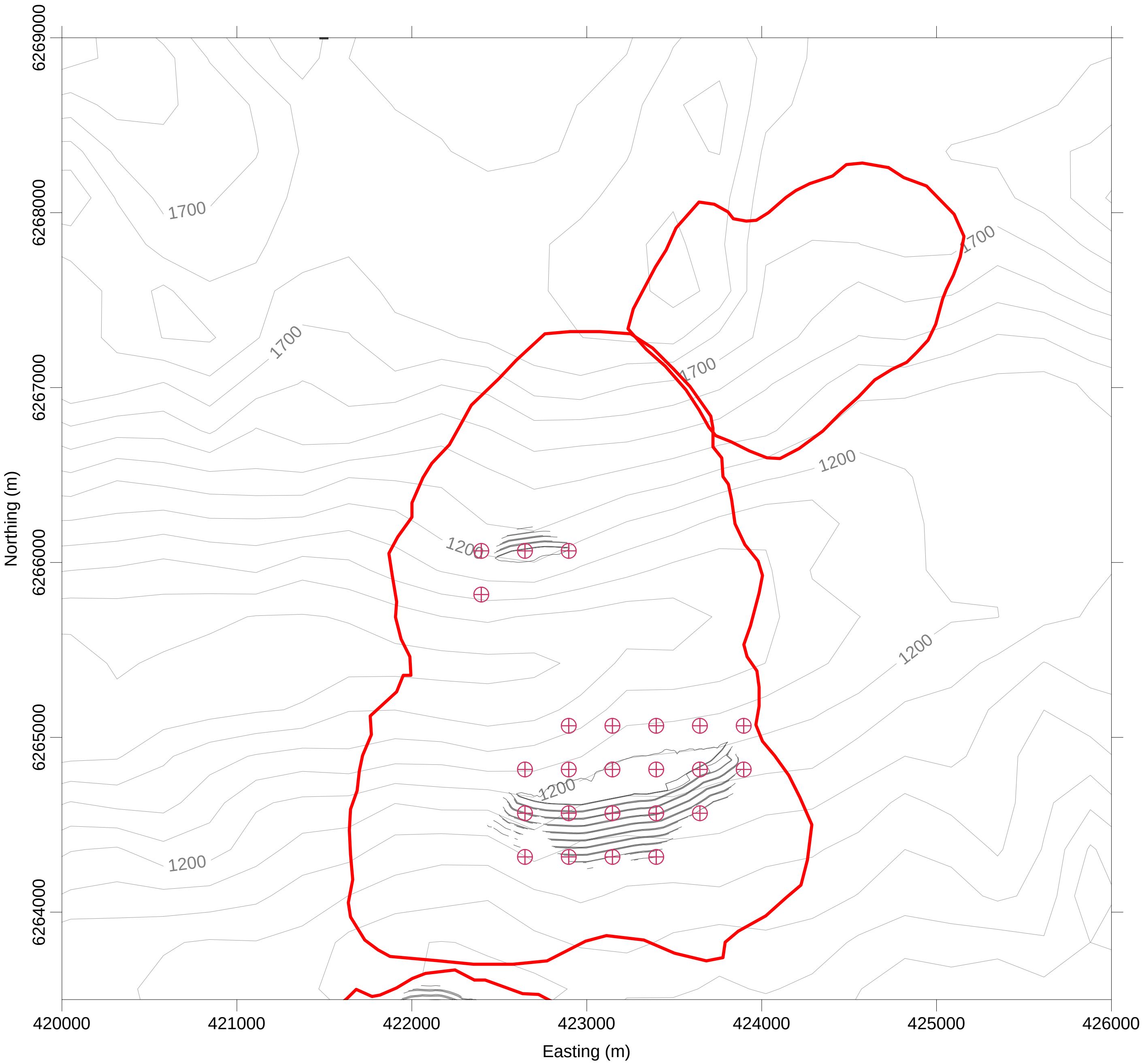
APPENDIX D

OPEN PIT PHASE WELL LAYOUTS



PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS
VERTICAL WELLS

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PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
YEAR -1 PHASE LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D1	0

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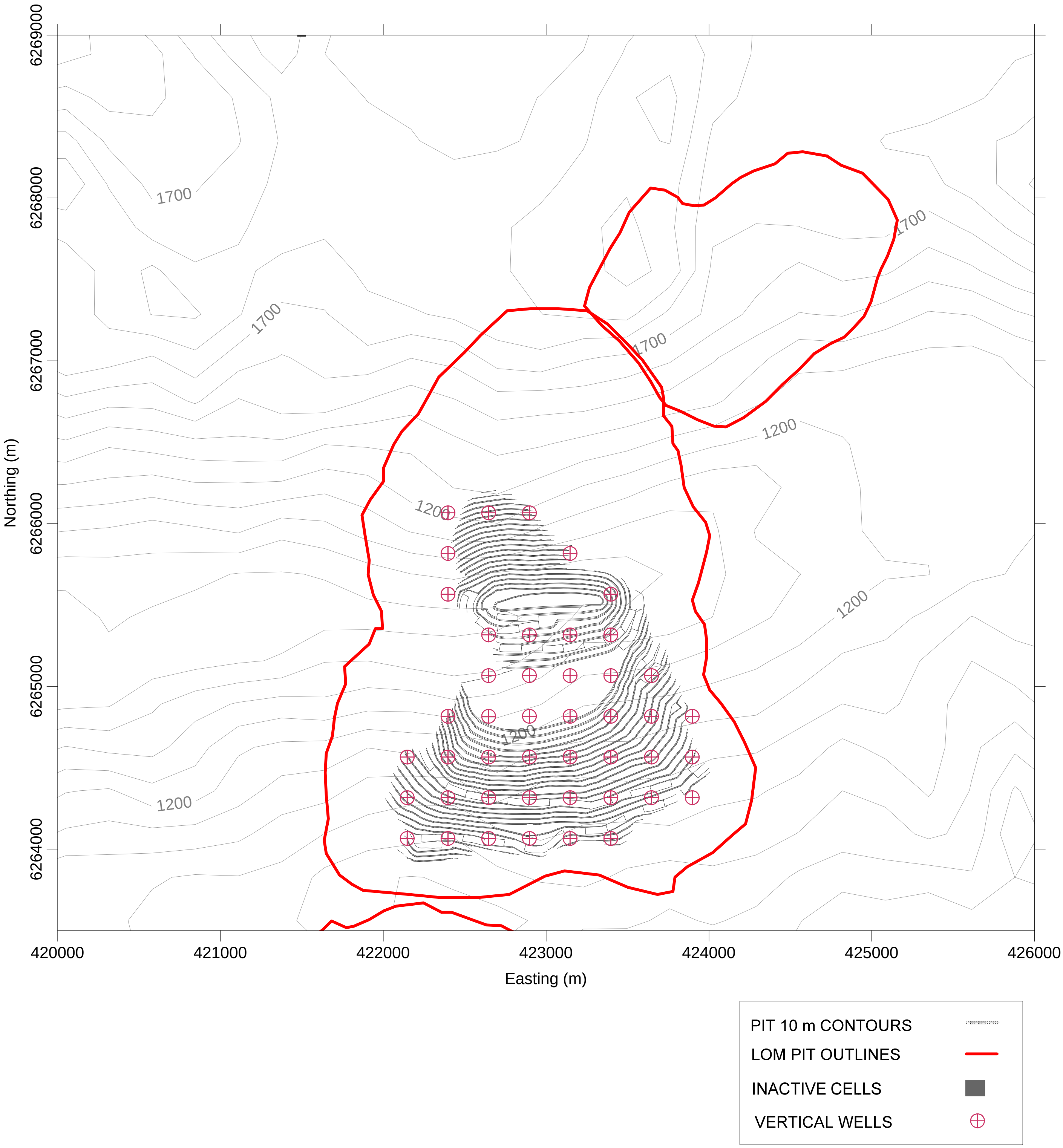

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
YEAR 1 to 5 WELL LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D2	0

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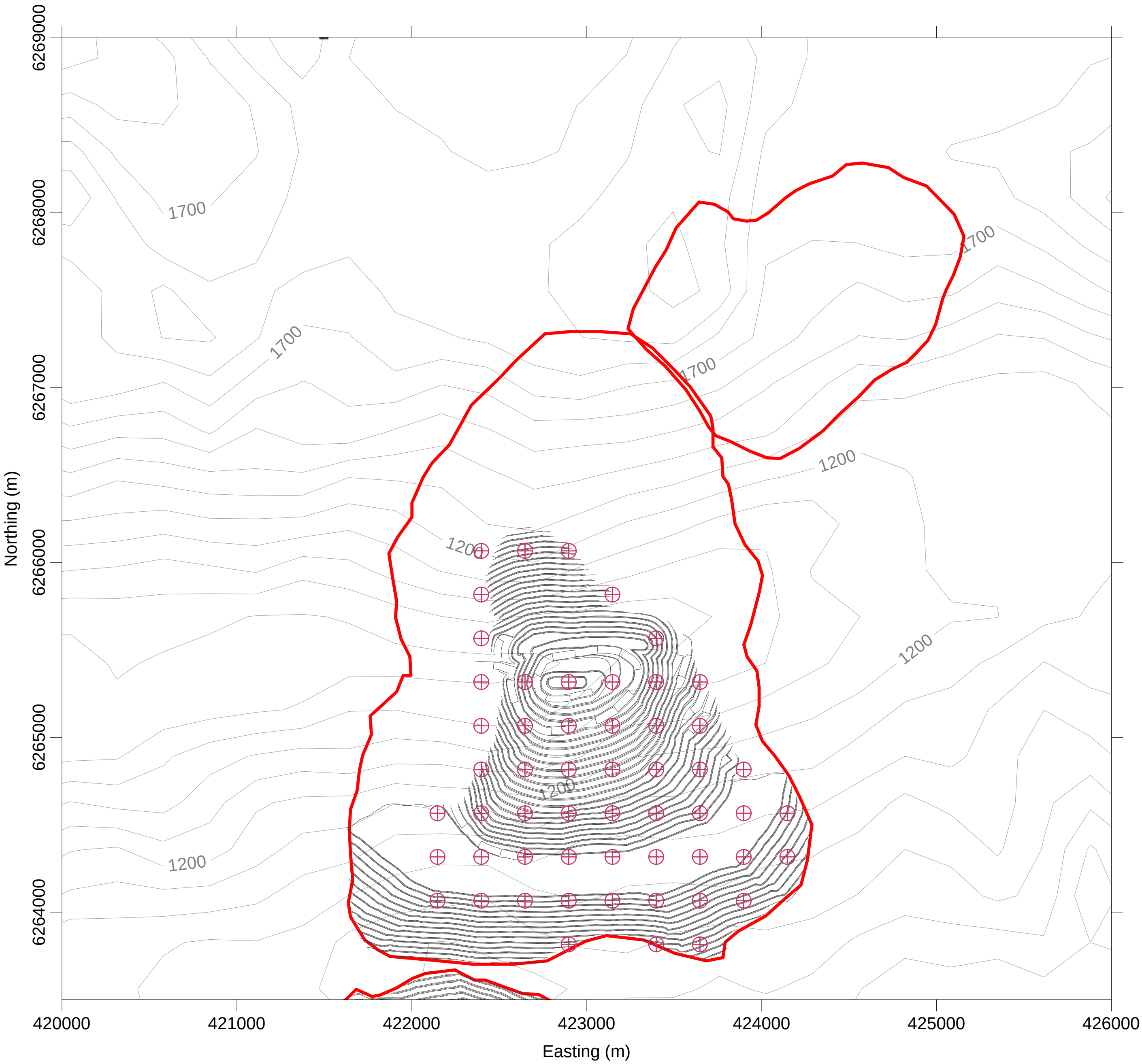

PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS
VERTICAL WELLS

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DATE: JUNE 2011	CHECKED: RT
DRAWN: RT	APPROVED: TC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
YEAR 10 PHASE LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D3	0

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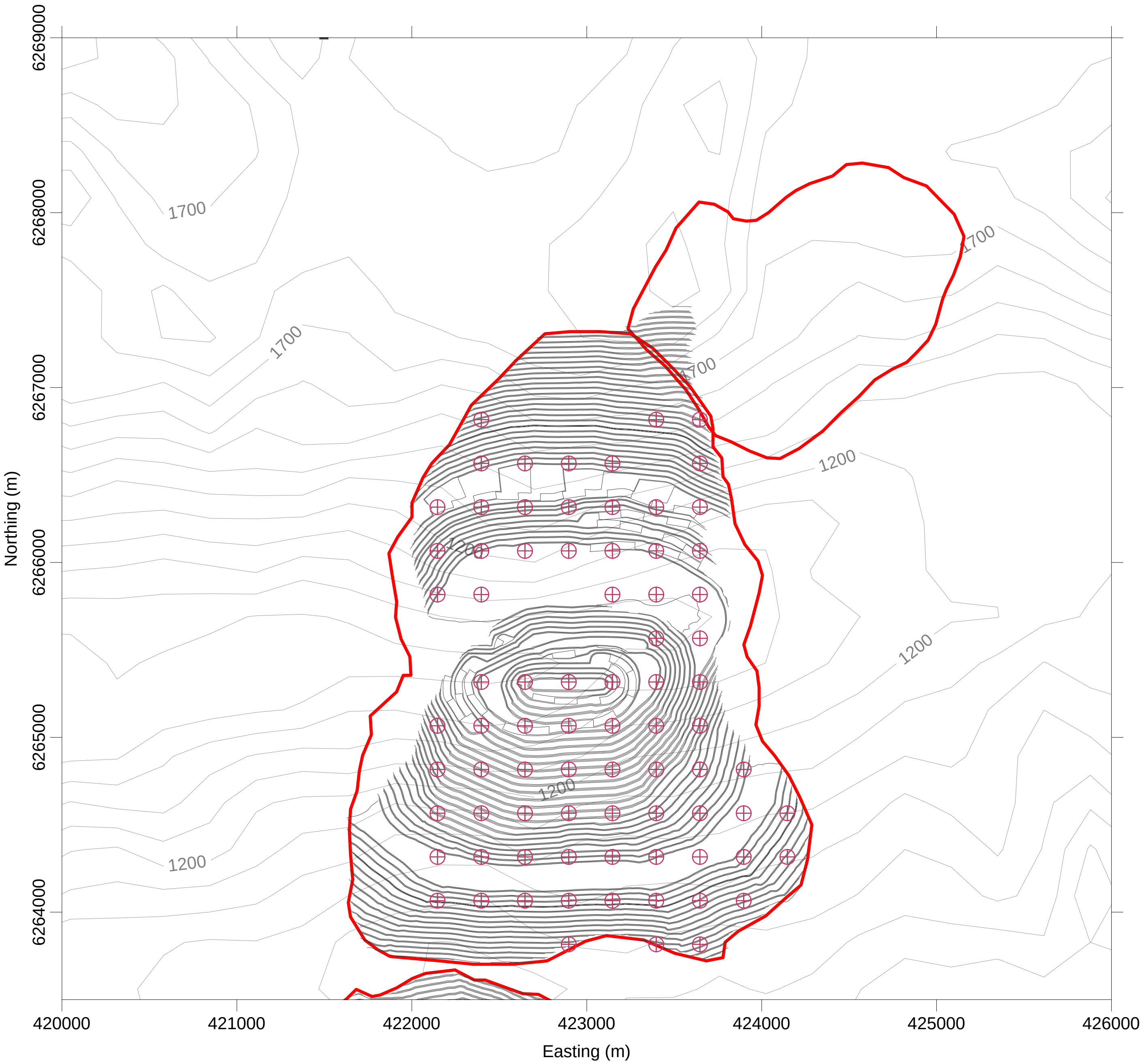

PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS
VERTICAL WELLS

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DATE: JUNE 2011	CHECKED: RT
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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
YEAR 20 PHASE LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D4	0

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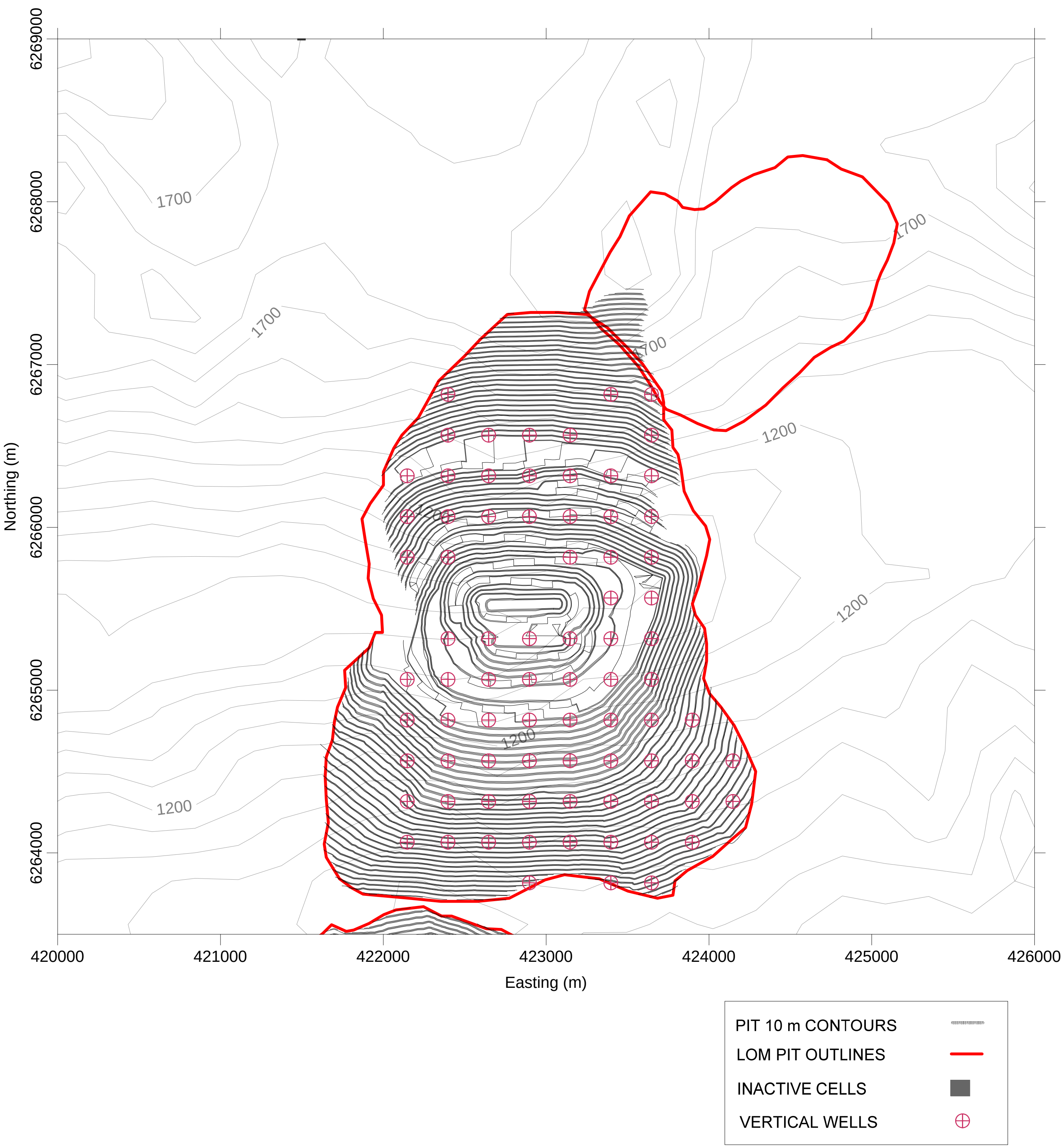

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DATE:	JUNE 2011	CHECKED:	RT
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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
YEAR 30 PHASE LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D5	0

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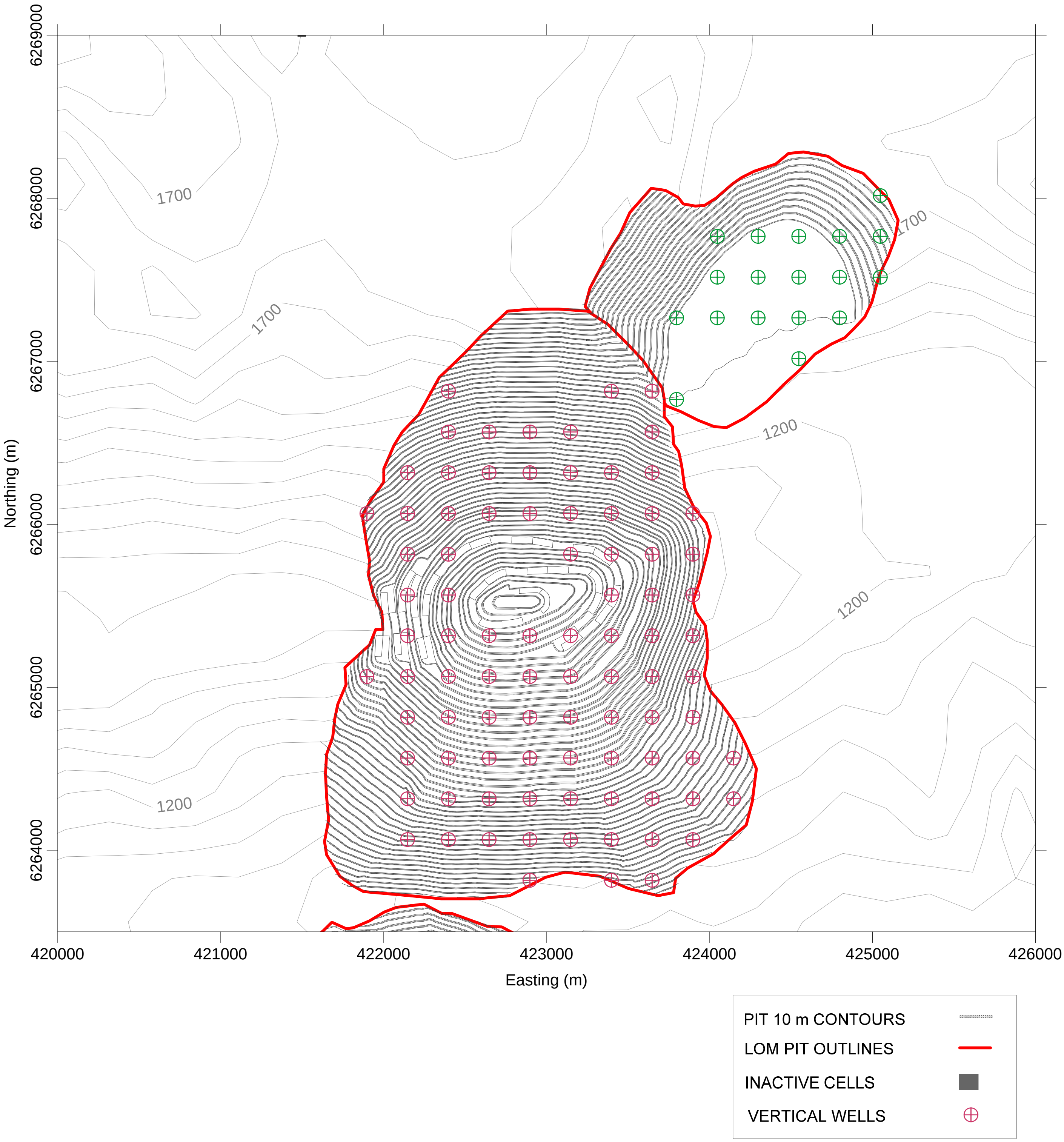

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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL, KERR and IRON CAP PIT
YEAR 40 WELL LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D6	0

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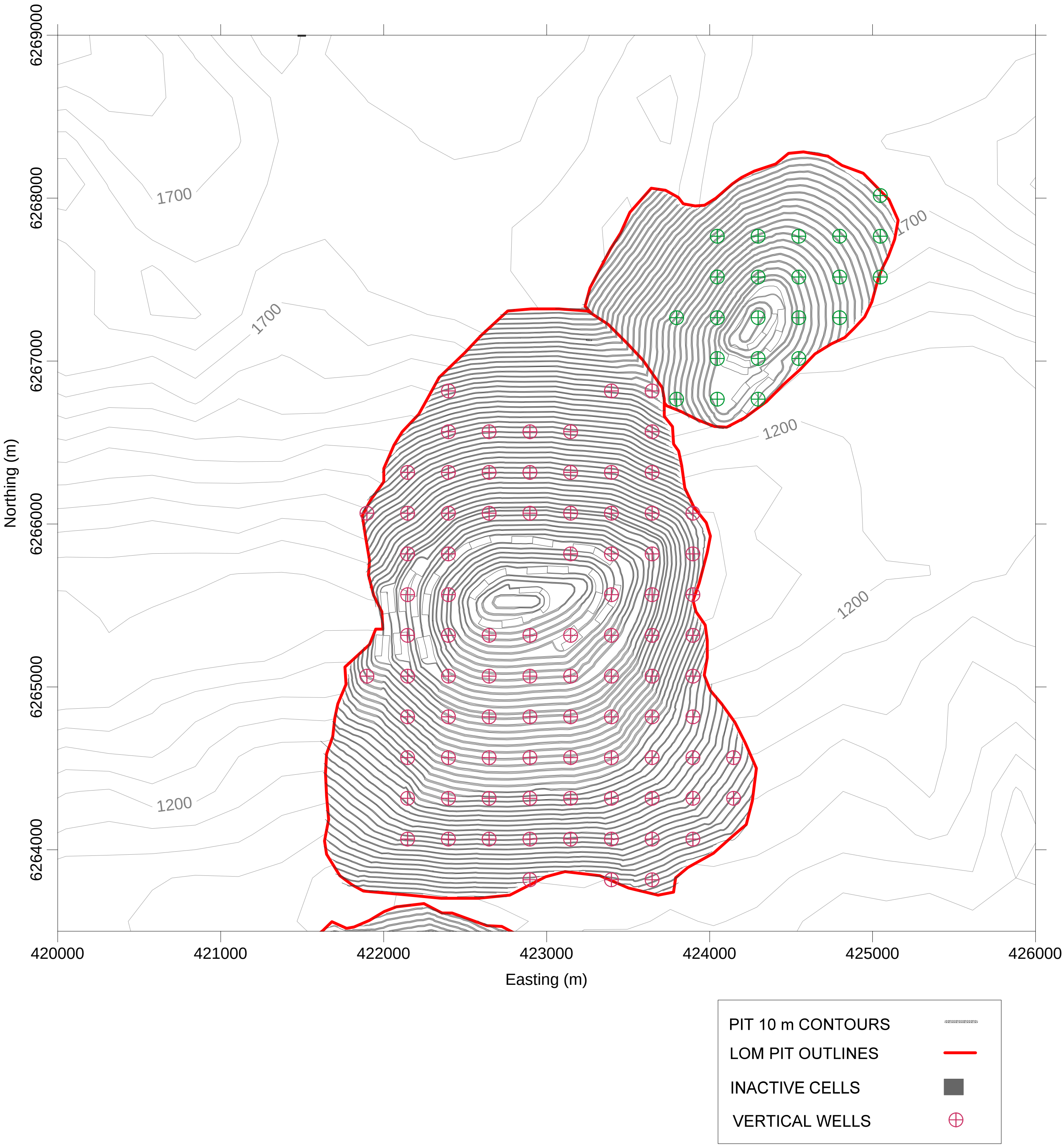

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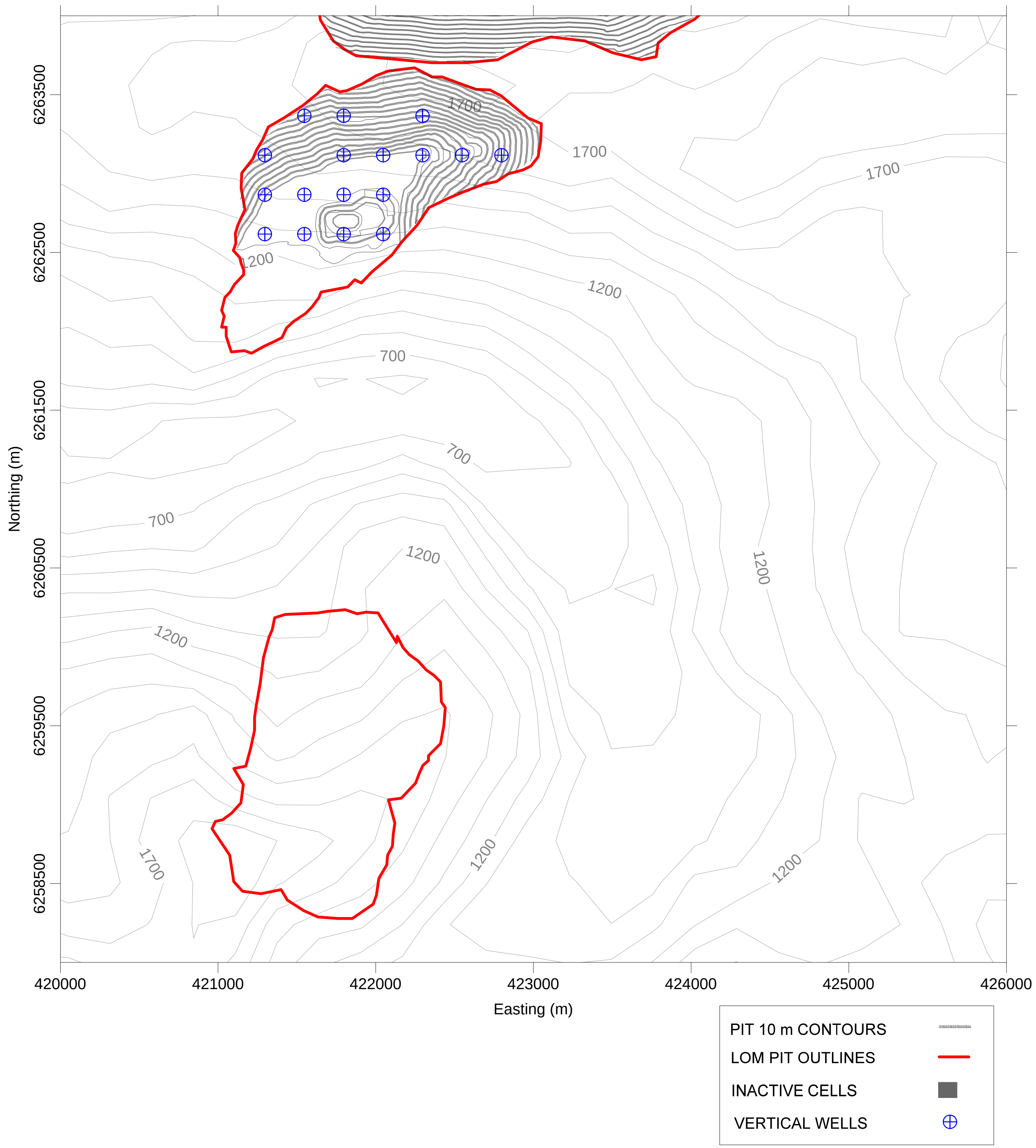
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL, KERR and IRON CAP PIT
END OF MINE LIFE WELL LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D7	0



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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

BGC ENGINEERING INC.
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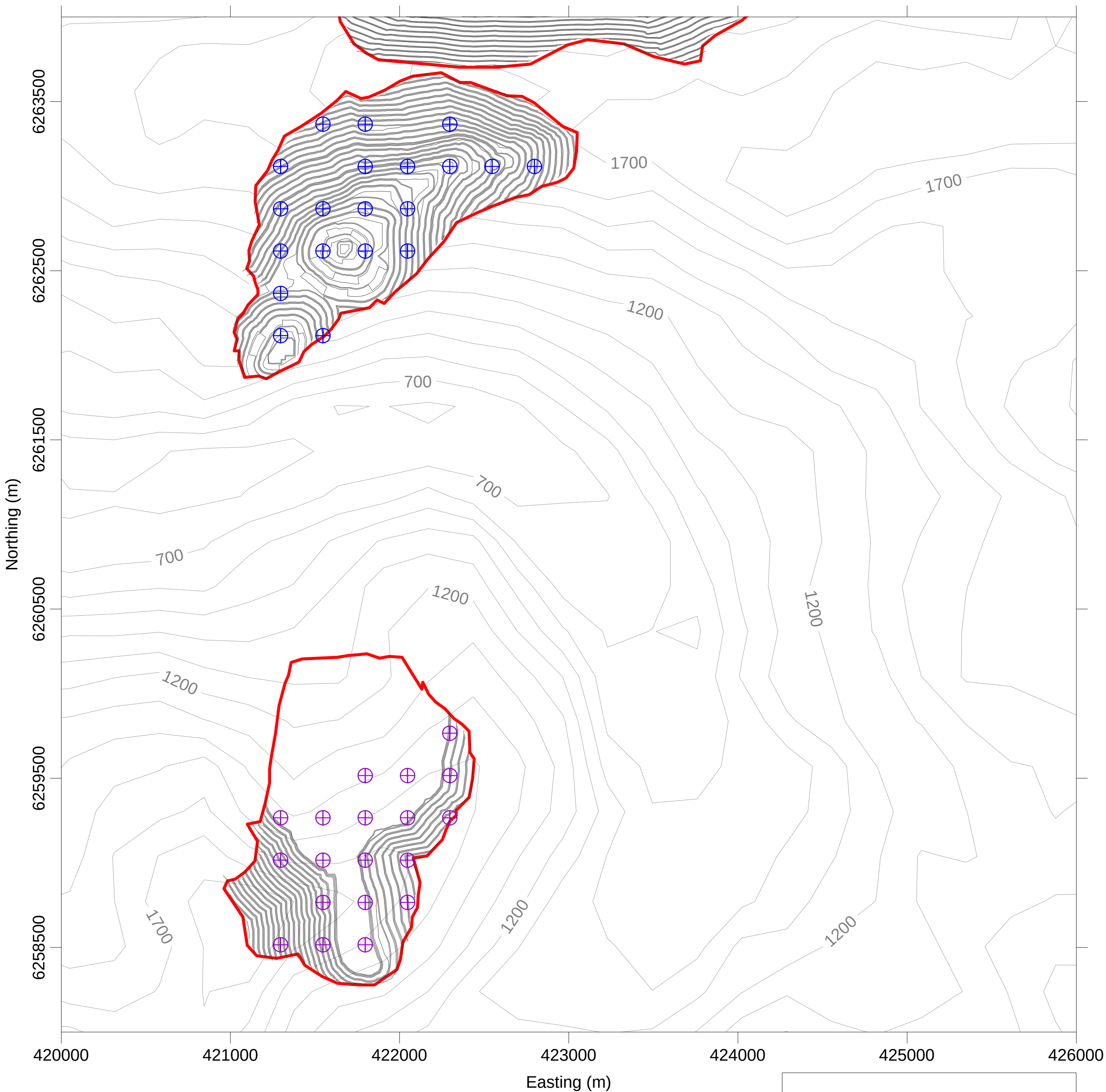
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR AND SULPHURETS PIT
YEAR 10 WELL LAYOUTS

CLIENT: SEABRIDGE GOLD INC.	PROJECT No: 0638-009	DWG No: D8	REV. 0



PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS
VERTICAL WELLS

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BGC ENGINEERING INC.
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PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR AND SULPHURETS PIT
YEAR 20 WELL LAYOUTS

CLIENT: SEABRIDGE GOLD INC.	PROJECT No: 0638-009	DWG No: D9	REV. 0

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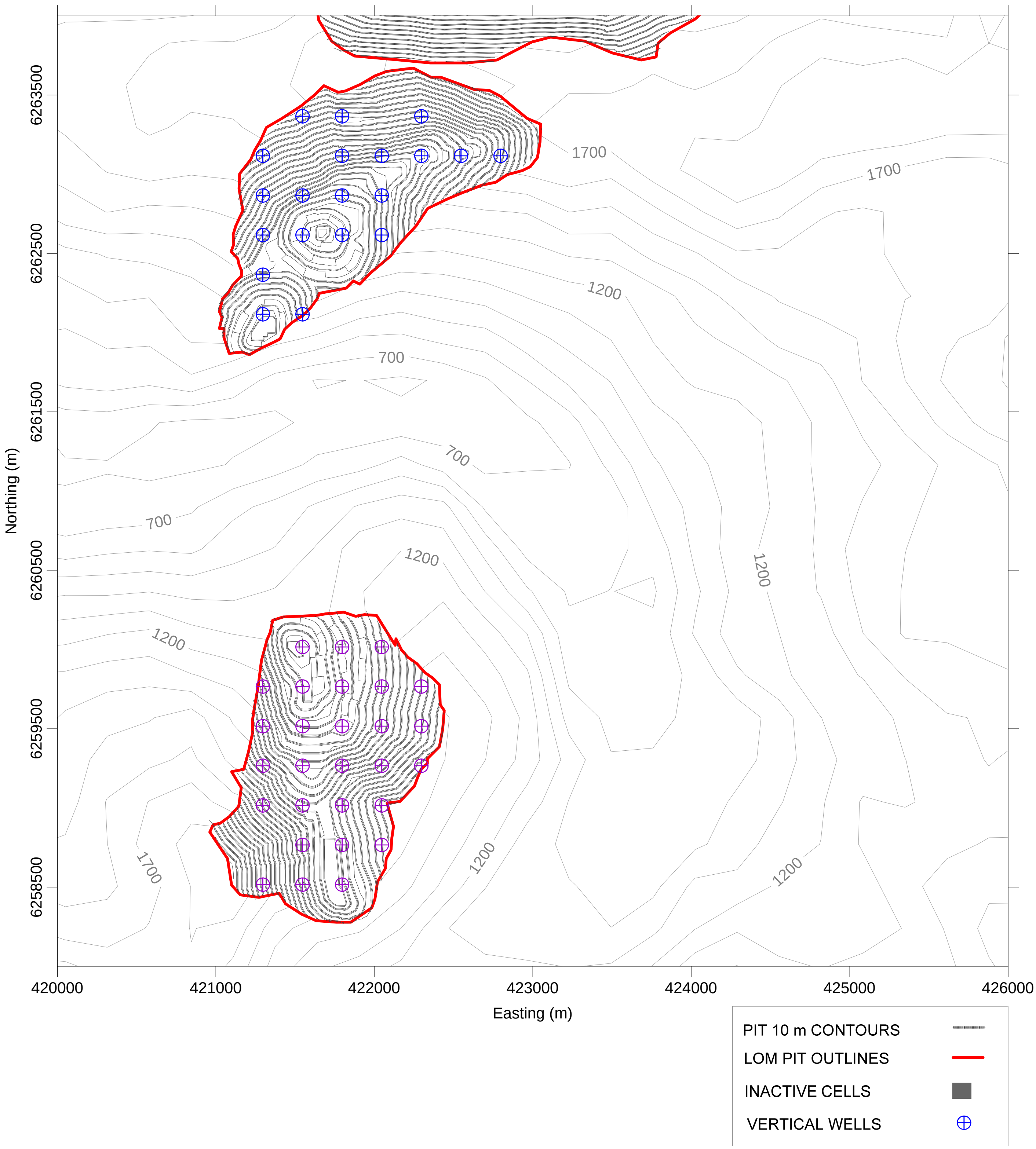

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

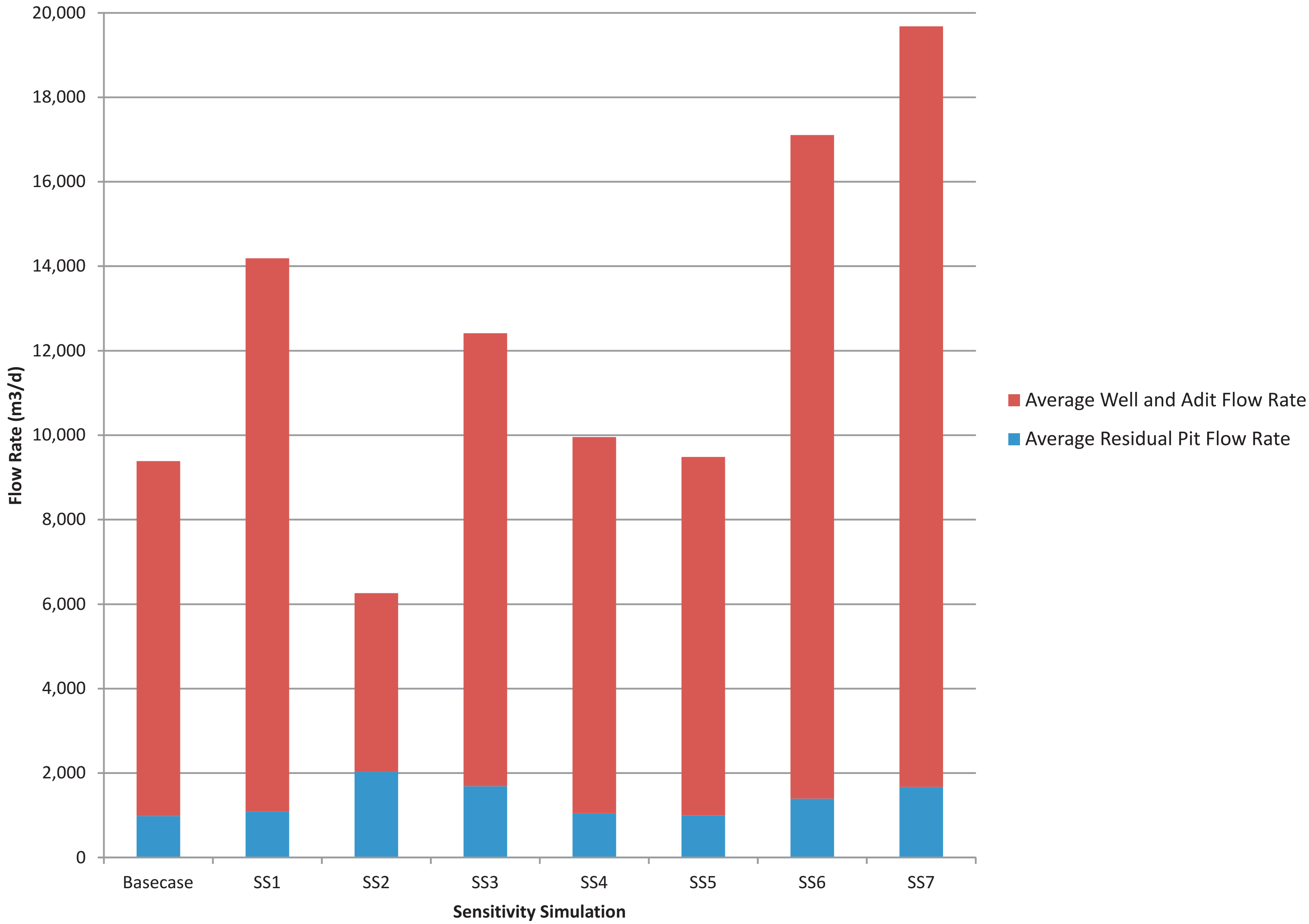
BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: KERR AND SULPHURETS PIT
END OF MINING WELL LAYOUT

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	D10	0

APPENDIX E
SENSITIVITY ANALYSES



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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

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AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SENSITIVITY ANALYSES VS BASE CASE
MITCHELL PIT AVERAGE RESULTS

PROJECT No.:	DWG No.:	REV.:
0638-009	E1	0

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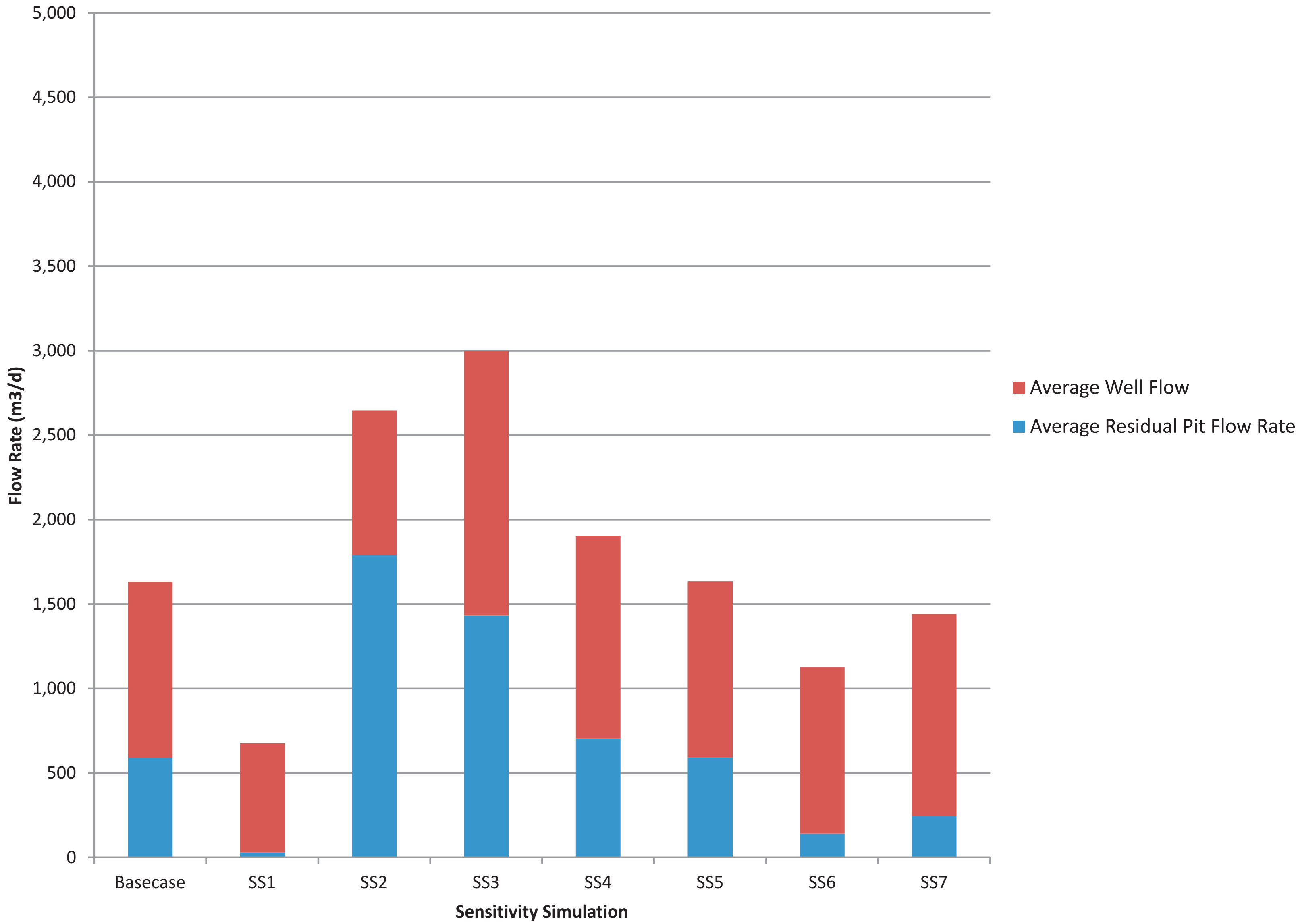

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DATE:	JUNE 2011	CHECKED:	RT
DRAWN:	RT	APPROVED:	TC

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AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SENSITIVITY ANALYSES VS BASE CASE
KERR PIT AVERAGE RESULTS

PROJECT No.:	DWG No.:	REV.:
0638-009	E2	0

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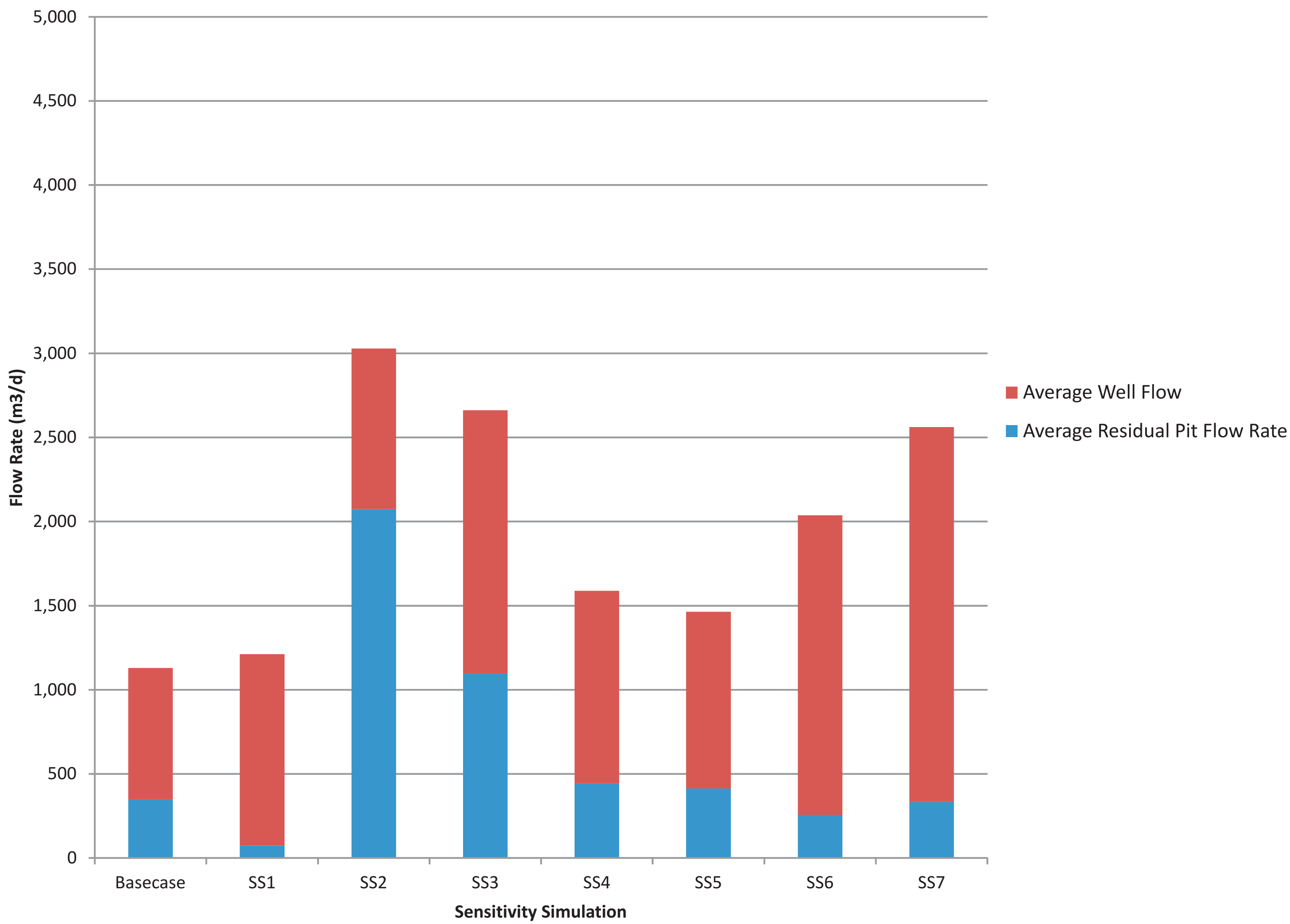

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CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SENSITIVITY ANALYSES VS BASE CASE
SULPHURETS PIT AVERAGE RESULTS

PROJECT No.:	DWG No.:	REV.:
0638-009	E3	0

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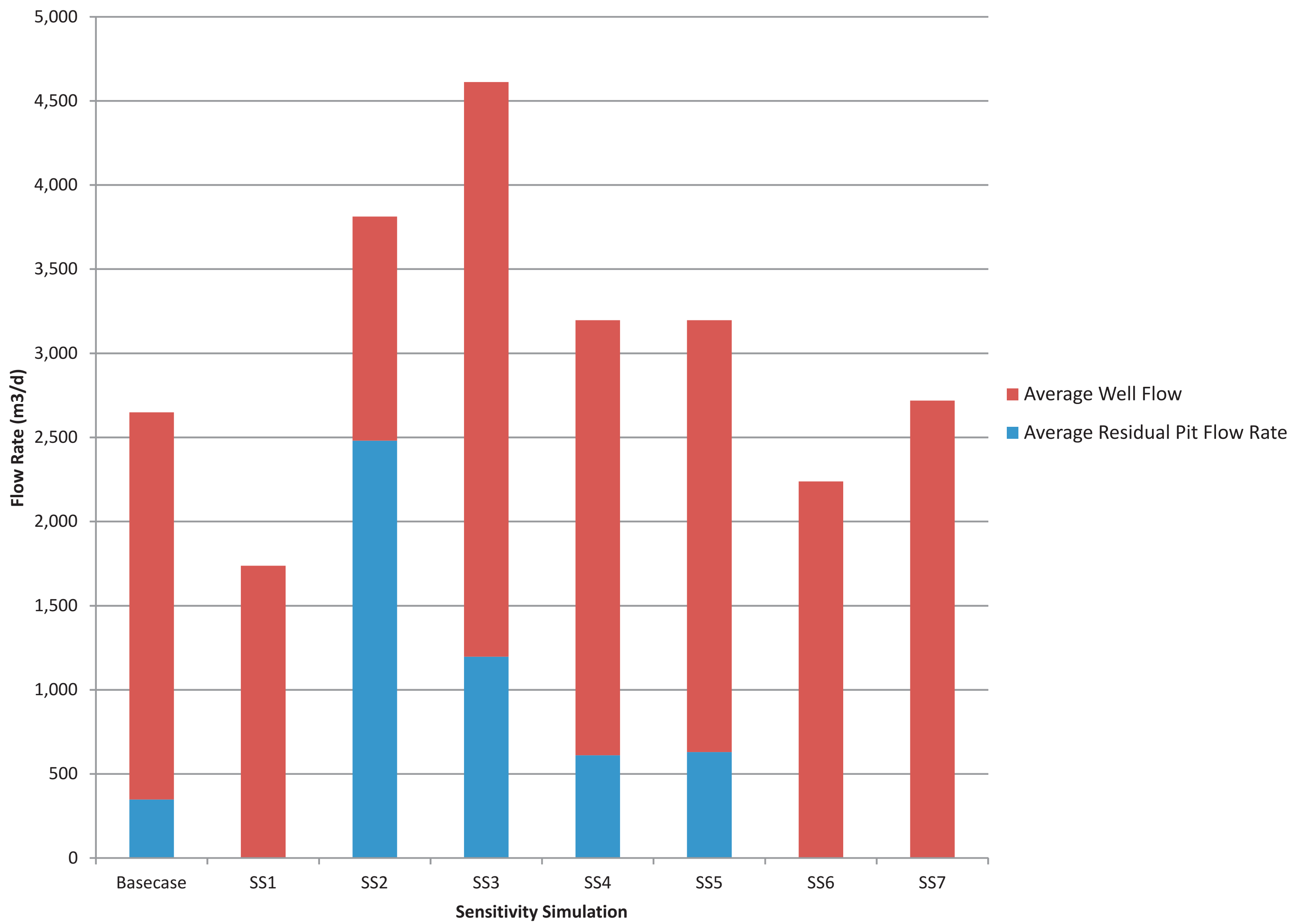

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DATE: JUNE 2011	CHECKED: RT		
DRAWN: RT	APPROVED: TC		

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AN APPLIED EARTH SCIENCES COMPANY

CLIENT:
SEABRIDGE GOLD INC.

PROJECT:
KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE:
SENSITIVITY ANALYSES VS BASE CASE
IRON CAP PIT AVERAGE RESULTS

PROJECT No.:	DWG No.:	REV.:
0638-009	E4	0

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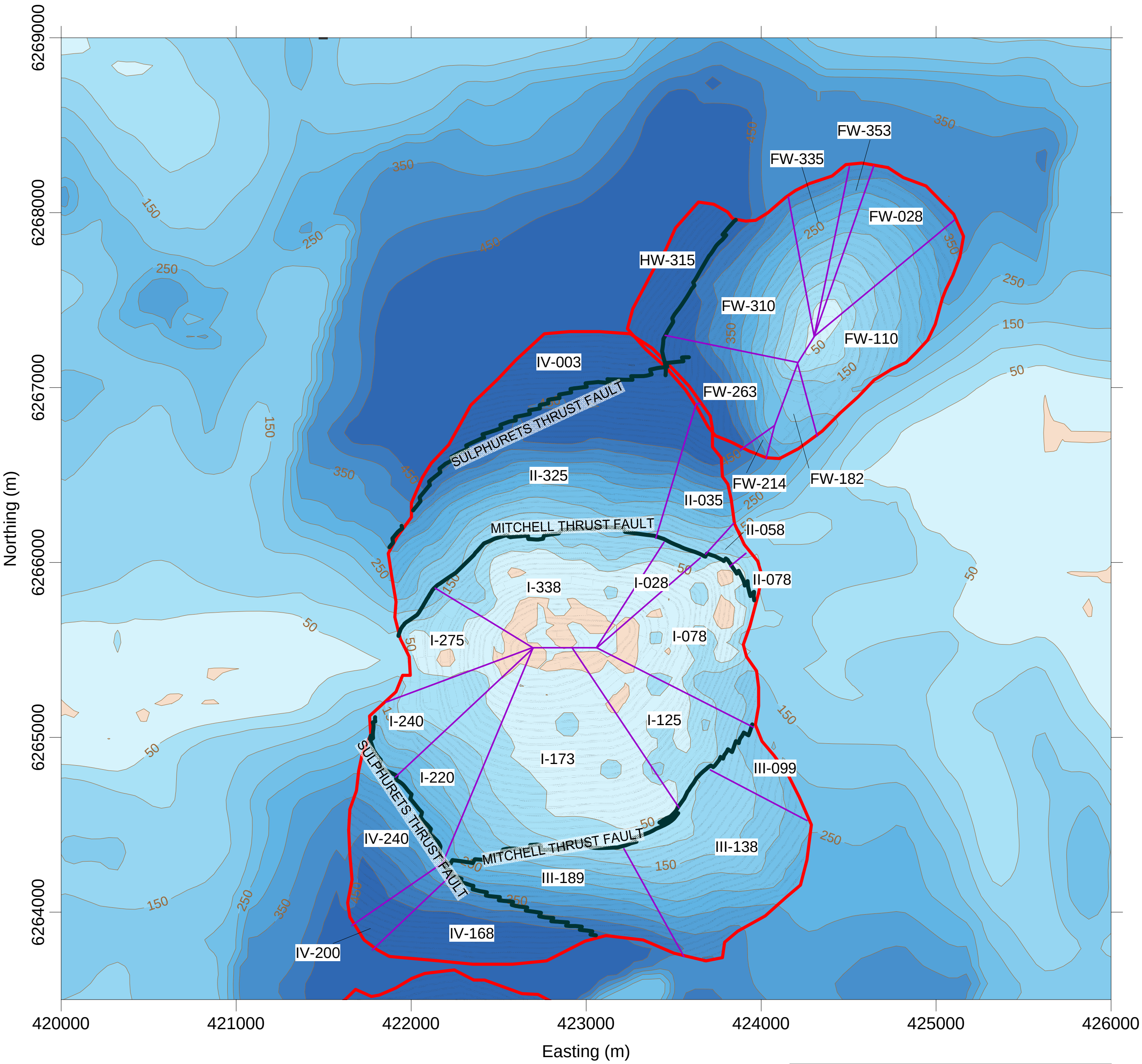

Notes:

1. *Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).*
2. *Pit slope design sectors are from BGC, 2011e.*

Depth to Water (mbgs): -50, 0, 50, 100, 150, 200, 250, 300, 350, 400, 450

LOM PIT 10 m CONTOURS

LOM PIT OUTLINES

INACTIVE CELLS

PIT SLOPE DESIGN SECTORS

MAJOR FAULTS

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DATE:	JUNE 2011	CHECKED:	RT
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BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
DEPTH TO WATER AT END OF MINE LIFE (Year 52)
WITH BASE CASE MITIGATION FOR SENSITIVITY RUN 1 (HIGH K)

CLIENT: SEABRIDGE GOLD INC.

PROJECT No:	DWG No:	REV.
0638-009	E5	0

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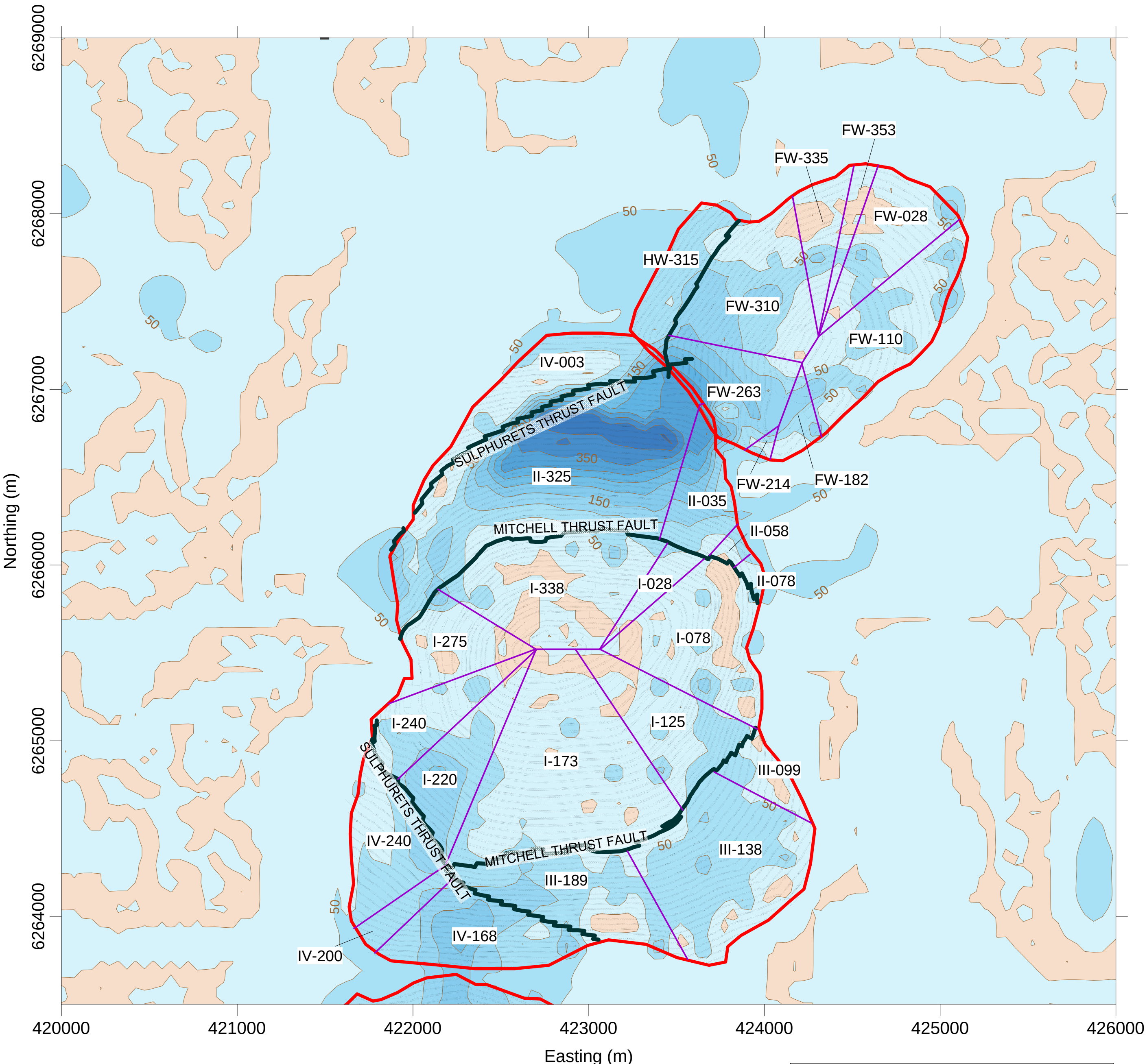

Notes:

1. Depth to water within each pit outline is shown relative to the simulated base of pit shell (i.e. pink areas represent seepage breakout).
2. Pit slope design sectors are from BGC, 2011e.

Depth to Water (mbgs): -50, 0, 50, 100, 150, 200, 250, 300, 350, 400, 450

LOM PIT 10 m CONTOURS
LOM PIT OUTLINES
INACTIVE CELLS
PIT SLOPE DESIGN SECTORS
MAJOR FAULTS

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SCALE: AS SHOWN	DESIGNED: RT
DATE: JUNE 2011	CHECKED: RT
DRAWN: RT	APPROVED: TC

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: MITCHELL and IRON CAP PIT
DEPTH TO WATER AT END OF MINE LIFE (Year 52)
WITH BASE CASE MITIGATION, SENSITIVITY RUN 2 (LOW K)

CLIENT	PROJECT No:	DWG No:	REV.
SEABRIDGE GOLD INC.	0638-009	E6	0

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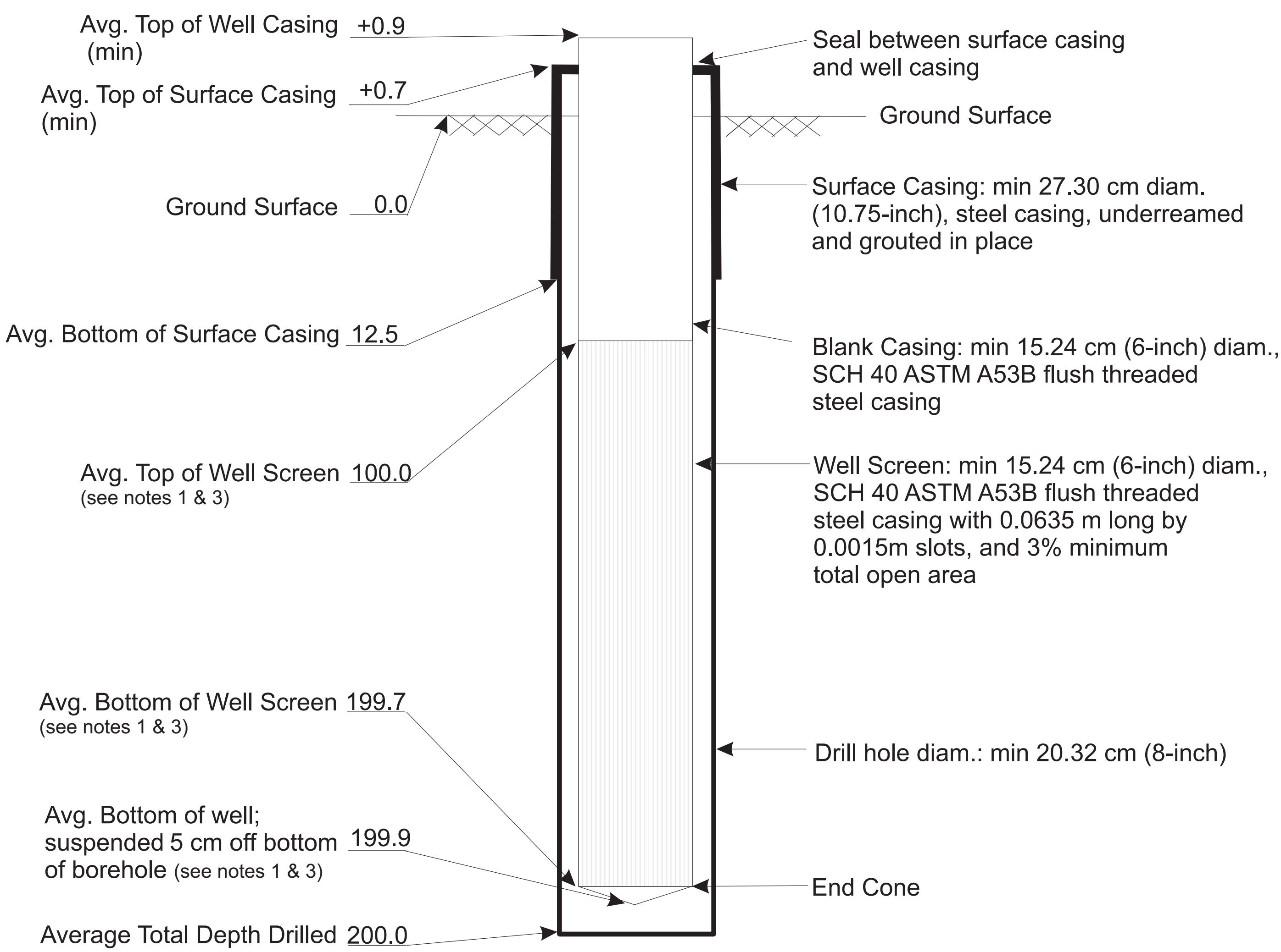
APPENDIX F

PRELIMINARY VERTICAL WELL AND DRAIN DESIGN

Vertical Dewatering Well Design Schematic

Completion Details	Depth (m) (bgs)	Completion Materials and Installation Specifications (note 2)



Notes:
1. Dimensions and depths indicated are for vertical dewatering wells.
2. Material types and specifications noted are based experience at similar sites. Alternate materials may be specified for well construction provided similar material performance can be demonstrated.
3. Anticipated pumping rates per well: 0.3 to 6.3 L/s (5 - 100 US gpm).
4. Drawing is not to scale.

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BGC ENGINEERING INC.
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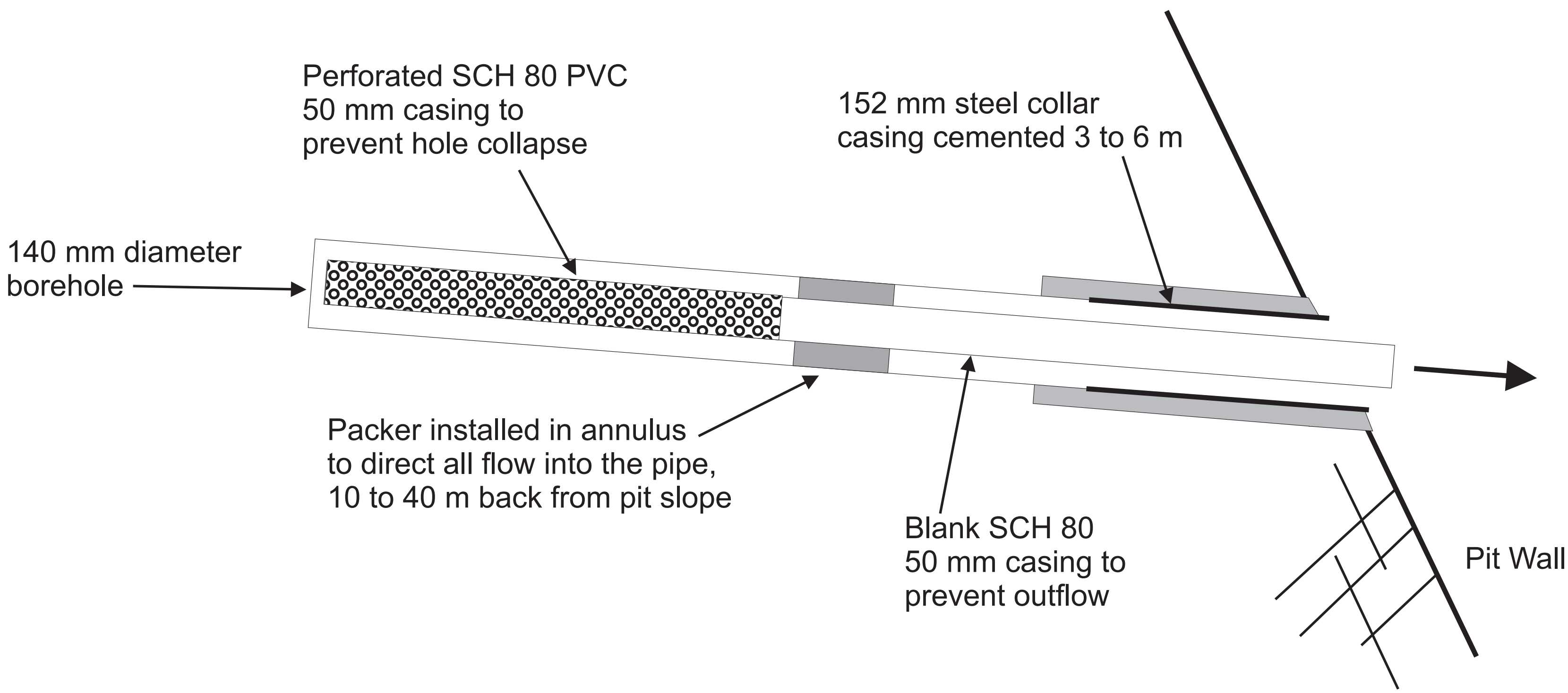
PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE
OPEN PIT DEPRESSURIZATION ANALYSES

TITLE: DEWATERING WELL DESIGN SCHEMATIC

CLIENT: SEABRIDGE GOLD INC.

PROJECT No.:	DWG No.:	REV.:
0638-009	F1	0

K:\Projects\0638-009 KSM PFS Update-Hydrogeology\05 Reporting\Appendices\APPENDIX F\AppendixF_WellSchematic_REV1.cdr



SCALE: NTS	DESIGNED: RT	BGC ENGINEERING INC. AN APPLIED EARTH SCIENCES COMPANY	PROJECT: KSM PROJECT PRE-FEASIBILITY STUDY UPDATE OPEN PIT DEPRESSURIZATION ANALYSES
DATE: JUNE 2011	CHECKED: RT		TITLE: HORIZONTAL DRAIN SCHEMATIC
DRAWN: RT	APPROVED: TC	CLIENT: SEABRIDGE GOLD INC.	PROJECT No.: 0638-009 / DWG No.: F2 / REV.: 0

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