Deloitte
& Touche

Faro Mine Complex
2008 S-Cluster Groundwater Investigation and Option Assessment

2008/09 Task 24 - FINAL

Prepared for

Deloitte and Touche Inc.

On behalf of

Faro Mine Closure Planning Office

Prepared by

SRK Consulting
Engineers and Scientists

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Executive Summary

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The objectives of the 2008 S-cluster program were to provide additional lithologic, water quality and hydraulic information for the Shallow and Deep Aquifers, as well as to assess the feasibility of using pumping wells for groundwater interception. Based on this information, an assessment of collection options was completed.

Eight monitoring wells were installed using sonic and diamond drilling methods and four pumping wells were attempted using air-rotary drilling methods. Two pairs of nested monitoring wells were installed in close proximity to the North Fork of Rose Creek (NFRC). An additional three drillholes were completed in weathered bedrock using diamond drilling techniques with core recovery. A fourth diamond drillhole was attempted but had to be terminated in sediments due to drilling problems.

Three pumping wells were installed, two in weathered bedrock and overlying permeable sediments of the Deep Aquifer, and the third in the Shallow Aquifer. The three pumping wells were pump tested to assess performance. All water collected during pumping tests had zinc concentrations greater than 1 mg/L and was collected and disposed of in the Rose Creek tailings facility.

Results of the Shallow Aquifer pumping test indicated that pumping as an interception method was not feasible due to the low saturated thickness (ie. there was not enough water depth, nor optimal hydraulic parameters, to operate the pumping well efficiently). Results of the Deep Aquifer pumping tests suggest that interception by pumping is feasible, but would likely require pumping wells with spacing on the order of 10m.

Water quality data collected from the 2008 nested monitoring wells close to the NFRC indicate that groundwater with zinc concentrations greater than 100 mg/L is within approximately 5m of the NFRC in the immediate S-cluster area. Water quality at the nested monitoring wells located 200m down gradient of the S-cluster suggest that the groundwater at this distance is impacted (zinc concentrations of about 0.5 mg/L), but not nearly as significantly as in the S-cluster area (zinc concentrations up to 400 mg/L). The plume of contaminated groundwater is likely moving underneath the NFRC in permeable materials and discharging to the NFRC at indeterminate locations.

The options assessment concluded that a shallow sump or interceptor trench is the most appropriate method for interception in the Shallow Aquifer. In the Deep Aquifer, pumping wells could be used for interception. For both aquifers, an adaptive management approach is recommended, culminating in the use of cut-off walls if the interceptor trench and pumping wells are determined to be insufficient. Ultimately, as part of the closure plan, the NFRC in this area will be isolated in a lined channel, therefore protecting the NFRC itself. Contaminated groundwater will continue to move down the NFRC valley and long-term groundwater interception will still be required, though complete capture may not be necessary due to the planned installation of a collection system below the Intermediate Dam.

The Faro Technical Advisory Team (TAT) recommended immediate installation of the Shallow Aquifer interception sump and activation of the two Deep Aquifer pumping wells. Deloitte & Touche accepted these recommendations and construction of the Shallow Aquifer System commenced in January 2009. The system is intended to be in operation by February 28, 2009, with contaminated water discharged to the Faro Pit via a heat traced, insulated pipeline.

Table of Contents

List of Tables

List of Photos

List of Figures

List of Appendices

1 Introduction and Scope of Report

The North Fork of Rose Creek (NFRC) is in close proximity to the toe of the Faro Waste Rock Dump at the Faro Mine Complex in the south central Yukon. Previous investigations found that concentrations of zinc and other metals, such as iron and manganese, in the area known as the S-cluster or S-wells area (Figure 1), were highly elevated and likely contributing to loads within the NFRC. Immediate implementation of a seepage interception system (SIS) was recommended in the report entitled "Seepage Investigation at the S – Cluster Area below the Faro Waste Dump" (SRK, 2006b). A preliminary review of data collected since completion of that report indicates zinc levels have continued to increase significantly in 2006 and 2007 (with zinc concentrations reaching up to 360 mg/L in June 2007).

In early 2008, a program of work was developed that would provide an assessment of collection/treatment options for the S-cluster area and, based on this assessment, to facilitate the development and execution of a field program that would guide the detailed design of a seepage collection system. This work was carried out under Deloitte & Touche Task 24, which is identified as Project 1.12 by the Faro Mine Closure Planning Office.

The scope of the program included:

- Groundwater collection system options assessment;
- Field program design and execution;
- Data analysis; and
- Reporting and recommendations.

The options assessment considered the following specific issues:

- The feasibility of using a passive collection and treatment method (bioreactor) for the shallow aquifer system; and
- For the deep aquifer, whether or not collection is warranted, whether or not active operation would be required through the winter and whether passive treatment methods would be feasible.

A surface and groundwater monitoring program is presented as part of the recommended options.

The report is organized as follows:

- A background review is presented of previous investigations and conclusions on groundwater conditions in the S-cluster area.
- The objectives and scope of the 2008 field program are described.
- The results of the 2008 field program and interpretations are presented.

- An updated assessment of groundwater management options is presented, including detailed conceptual designs.
- A description of the proposed groundwater management actions at the S-cluster area is provided in the context of the overall management options assessment.
- Conclusions and recommendations for future work.

Drill logs, testing results and water quality analyses are compiled in the appendices.

2 Background

The S-cluster area at the Faro Mine has been the focus of field investigations and various assessments since 2004, when Dr. Christoph Wels of Robertson GeoConsultants (RGC) identified significant increases in groundwater contaminant concentrations in the historic S-wells (RGC, 2004). Groundwater quality data for the original S-wells are available from 1986 to present. Since 2004, it has been recognized that groundwater in the S-cluster area is becoming increasingly contaminated by seepage from the adjacent waste rock dumps. Detailed surveys of NFRC surface water in the S-cluster area clearly indicated a significant increase in contaminant load as the NFRC passes through this area.

In 2004 and 2005, SRK completed a field programs consisting of the installation of monitoring wells, hydraulic testing, test pitting and seismic surveys (SRK, 2006a, 2006b). The results of these studies identified the presence of two aquifers: a narrow sand and gravel “shallow aquifer” and a more widespread “deep aquifer”, consisting of weathered bedrock and permeable sand and gravel immediately overlying bedrock. The two aquifers are separated by 10+ meters of relatively low permeability sandy silt to silt. The proximity of highly contaminated water to the NFRC, and the possibility that this groundwater was or could discharge directly into the NFRC, led to the conclusion that seepage interception was probably necessary.

Conceptual options for seepage collection were presented in the form of an adaptive management plan (AMP). This AMP outlined a relatively simple initial SIS, monitoring and triggers that would require review and, potentially, system upgrade or modification. Multiple levels of system upgrade were identified, in the event that system bypass or failure occurred, culminating in what was considered the final step of isolating the NFRC from groundwater through re-engineering of the stream channel.

Subsequent to the 2005 program, multiple discussions with Deloitte & Touche, the Technical Advisory Team (TAT) and the Independent Peer Review Panel (IPRP) were held regarding uncertainties with regards to contaminant distribution, methods for, and effectiveness of, seepage collection options, as well as how seepage collection would integrate with the final mine closure plan. The primary concerns focused on the potential for bedrock flow and the anticipated capture efficiencies of the proposed systems. Under the mine closure options that were being reviewed, it was expected that capture efficiencies of greater than 99% would be required to achieve closure objectives. It was recommended that further study focus on characterizing potential bedrock flow.

In 2008, the broad closure plan concepts for the Faro Mine were selected. In terms of contaminated groundwater, the primary groundwater collection system in this plan includes a cutoff wall and groundwater collection system below the Rose Creek Tailings Facility (Down Valley SIS), towards which contaminated groundwater coming out of the Faro mine area will trend. Additional groundwater collection systems would be installed in areas of highly contaminated groundwater, such as the S-cluster. The purpose of these relatively small collection systems will be to capture highly contaminated groundwater closer to the source, in areas where groundwater collection could be focused, before groundwater becomes diluted with relatively lower concentration groundwater or becomes relatively difficult to intercept until reporting to the final Down Valley system.

Contaminated groundwater reports to the NFRC valley from multiple, known, high concentration areas (e.g., S-cluster, Zone II) and may also get to the valley in lower concentrations as more spatially dispersed groundwater flow. As the NFRC is a tributary to Rose Creek, the primary surface water feature crossing below the site, and is itself considered an important ecological component in the area, further protection of the NFRC against the effects of contaminated groundwater seepage were presented in the closure plan. This protection consists of isolating the NFRC by re-aligning it in a lined channel, to separate it from groundwater. Implementation of this re-alignment will likely be some years in the future and implementation of local groundwater interception could be initiated relatively sooner. This would provide both the opportunity to start collecting contaminated groundwater immediately and allow time to “fine tune” the systems themselves, which could prove beneficial to future groundwater collection system designs.

Water quality at X2, the NFRC surface water monitoring station down gradient of the S-cluster, has been monitored since the late 1980’s. In September 2008, Gartner Lee Limited presented a report titled “***Anvil Range Adaptive Management Plan – Event #5 Follow-up Work, Water License QZ03-059***”, which presented a comprehensive summary of trends in water quality at X2, but also discussed certain contaminant concentrations which had exceeded trigger levels. Sulphate concentrations had exceeded trigger levels in 2005, 2006 and 2007 and an increasing trend in sulphate levels was observed, based on 2003 to 2006 data. Zinc concentrations reached a threshold concentration exceedence in October 2006. Both sulphate and zinc concentrations were found to peak during winter low flow, when groundwater contributions are at their maximum. Contaminant loads in the NFRC were recognized as increasing where the NFRC passes below the S-cluster area.

The purpose of the 2008 field program was to obtain more detailed information regarding the distribution of contaminants and to identify seepage collection options that could be implemented as soon as possible.

3 Field Program and Results

3.1 Program Objectives

The 2008 field program was designed to both provide information to further the understanding of hydraulic connection and contaminant distribution between and within the shallow and deep aquifers, and assess potential effectiveness of deep pumping systems. The program had the following specific components and objectives:

1. Provide better delineation of the shallow aquifer by completing a test pitting program in the shallow aquifer.
2. Gain a better understanding of contaminant distribution along the NFRC. Install monitoring wells close to the NFRC both within the S-cluster area and down gradient.
3. Provide improved hydrogeologic characterization of weathered bedrock in the deep aquifer by completing diamond drillholes and packer testing.
4. Develop improved understanding of both shallow and deep aquifer hydraulic parameters and connectivity by completing pumping tests in both aquifers.

In the following sections, general program results and methodologies are presented, followed by results specific to each of the shallow and deep aquifer. Figure 2 is a site map, which includes the locations of all test borings that will be described in the following sections, including those completed as part of the 2008 program.

3.2 Drilling and Installations

Both monitoring wells (8) and pumping wells (4) were completed for the 2008 program, using two different drills and drilling methods:

- Sonic drilling was completed by SDS-Boart Drilling Services of Calgary, Alberta. Drilling equipment included one Nodwell-mounted sonic drill and one Nodwell-mounted support vehicle.
- Air rotary / diamond drilling was completed by Geotech Drilling of Prince George, BC. Drilling equipment included one track-mounted Fraste drilling unit capable of 4-inch and 6-inch ODEX air-rotary and HQ/NQ diamond drilling, a 900 CFM/350psi air compressor to support air-rotary drilling and one Marooka tracked support vehicle.

Drilling was overseen by Dan Mackie and Jacek Scibek of SRK. Table 1 summarises the drilling results. The twelve drill hole locations are shown on Figure 2.

Table 1: 2008 Drillhole Summary

ID	Type	Easting	Northing	Grnd Elev. (masl)	Stick-up Elevation (masl)	Screen Depth (mbgs)	Material
SRK08-SP7a	Sonic MW	584429.0	6913095.0	1081.00	1081.74	14.02 to 17.07	W. BR
SRK08-SP7b	Sonic MW	584432.5	6913094.0	1081.00	1081.73	4.88 to 7.92	Silty sand & gravel
SRK08-SP8a	Sonic MW	584294.0	6912955.0	1077.00	1077.74	3.05 to 6.10	W. BR
SRK08-SP8b	Sonic MW	584291.0	6912951.0	1077.00	1077.78	7.62 to 10.67	Sand
SRK08-BR1	Bedrock MW (core)	584477.8	6913127.8	1086.50	1087.30	27.74 to 33.83	W. BR
SRK08-BR2	Attempted Bedrock MW	584487.6	6913125.0	1086.50	1087.00	12.19 to 18.29	sand & gravel
SRK08-BR3	Bedrock MW	584397.4	6913150.8	1096.30	1096.90	6.10 to 12.19	W. BR
SRK08-BR4	Bedrock MW (core)	584449.5	6913138.5	1087.30	1088.00	15.09 to 21.49	W. BR
SPW1	Deep Aquifer PW	584509.9	6913113.0	1086.50	1087.45	19.51 to 24.23	W. BR & overlying snd & grvl
SPW2	Deep Aquifer PW	584467.2	6913132.0	1086.53	1087.53	9.75 to 12.95	W. BR
SPW4	Shallow Aquifer PW	584503.0	6913115.0	1086.40	1087.16	2.44 to 3.96	Silty snd & grvl

Notes and Abbreviations:
Coordinates are UTM NAD 83; elevations meters above sea level (masl); meters below ground surface (mbgs)
Coordinates based on hand-held GPS readings. Accuracy generally +/- 5m
MW = Monitoring Well PW = Pumping Well
BR = Bedrock W.BR = Weathered Bedrock Snd = Sand Grvl = Gravel

For drillholes completed using sonic methods, continuous soil and rock samples were logged for lithology and photographed as they came out of the ground. Upon reaching the drillhole target depth, the inner core casing was removed and monitoring wells installed through the outer casing. Monitoring wells completed in sonic drillholes are 2-inch diameter PVC with 10 or 20-slot PVC screens. Screen sandpacks use 10/20 or 20/40 filter sand, cover the area of each screen and extend a minimum of 0.5 m above the top of the screen. A 0.5 m bentonite chip seal was installed on top of filter sand and the remaining annular space was filled with bentonite grout, to ground surface.

For drillholes completed using the 4-inch air-rotary down hole hammer and ODEX casing advancer through overburden, soil and rock cuttings were collected from return air at the wellhead. Cuttings were logged for lithology and photographed. The drilling “fluid” is air, so drilling water is not introduced to the formation.

For drillholes completed using HQ wireline triple tube diamond drilling methods, core was recovered from the drill, photographed and measured in the split tube, moved to core boxes, then photographed and measured again. Core logging was completed on each 1.5m drill run, using the "basic" SRK geotechnical logging procedures, which included Total Core Recovery (TCR), lithology, Rock Quality Designation (RQD), fracture frequency, field Intact Rock Strength (IRS), joint type and qualitative number of sets, foliation and mechanical breaks, and qualitative strength of micro defects. All core was photographed as splits and in core boxes. Monitoring wells installed after diamond or air-rotary drilling are 2-inch diameter PVC with similar sand pack and annular seals to completions in sonic drillholes.

Pumping well drillholes were completed using a 6-inch down hole air-hammer with an ODEX casing advancer. Pumping wells were completed with 4-inch construction, using stainless steel, continuous wrap Johnson screens connected to 4-inch threaded PVC riser pipe. PVC sumps were included on each pumping well. Table 2 summarises pumping well completion details.

Table 2: Pumping Well Construction Details

ID	Screen Depth (mbgs)	Screen Length (m)	Screen Slot Size (slots/inch)	Sump Length (m)
SPW1	19.51 to 24.23	4.72	15	1.68
SPW2	9.75 to 12.95	3.20	15	1.07
SPW4	2.44 to 3.96	1.52	15	1.52

Abbreviations:
meters (m)
meters below ground surface (mbgs)

In general, pumping wells were completed within weathered bedrock. In SPW2, the down hole hammer was lost in the drillhole and could not be retrieved. The annular space around the lost hammer was backfilled with filter sand, but used a larger volume than estimated, indicating that the drillhole had been washed out to some degree. The well screen was installed on top of this sand backfill.

SPW1 and SPW2 well screens were developed using a jet tool and surging water pressures, then airlifted. SPW4 has a very limited available drawdown (i.e. there is not a very significant water column in the well) and was developed using a Waterra Hydrolift pump.

Well logs for all drillholes are included in Appendix A-1. Photographs of sonic and diamond drill core are included on the CD in Appendix D. Figures 3 and 4 are geologic cross-sections through the S-wells area based on all available data. Cross-section locations are shown on Figure 2.

3.3 Hydraulic Testing Methodologies

All new installations were tested using one or more methods. Falling head slug tests were conducted on bedrock drillholes during drilling using a pneumatic packer to isolate test zones. Once monitoring wells were installed, multiple slug tests were conducted in each location using solid PVC slugs. In each pumping well, constant drawdown tests were conducted once the well was developed. Methodologies and results for each test type are described below. Data sheets with hydraulic test analyses are included in Appendix B.

Packer-Isolated Falling Head Tests

In bedrock drillholes BR1, BR3 and BR4, packer isolated, falling head slug tests were completed over various intervals as they were drilled. BR2 did not reach bedrock due to drilling difficulties. Bedrock drillhole falling head test methodology included:

- Upon drilling to the bottom depth of a desired test zone, rods were pulled back approximately one meter and the drillhole was flushed with fresh water until water returning to surface was clear and relatively free of suspended material;
- Drill rods were pulled back to expose the desired test zone;
- A pneumatic wireline packer was installed in the drillhole and inflated;
- A vented datalogger was installed down the drill rods and water levels monitored until stable;
- The drill rods were quickly filled with water;
- Water levels were recorded until re-attaining the static level; and
- Equipment was withdrawn and drilling re-started.

Slug Tests

Each of the new 2-inch PVC overburden and bedrock monitoring wells was slug tested once the monitoring well was installed and developed. Slug tests in each drillhole included:

- Static water levels were measured prior to each test and a datalogger installed;
- A solid PVC slug was introduced or withdrawn from the monitoring well as quickly as possible by either dropping the slug directly in the monitoring well for falling head tests or rapidly pulling the slug out using a rope for rising head tests; and
- Wherever possible, falling head and rising head tests were completed in each monitoring well using two different size slugs, for a total of four tests.

Pumping Tests

Pumping tests were conducted in pumping wells PW1, PW2 and PW4. PW1 and PW2 were tested using 0.75 horsepower Grundfos submersible pumps purchased for this and subsequent projects. PW4 was tested using a Waterra Hydrolift pump as there was insufficient water depth in the well to use a submersible pump. Initial pumping rates were estimated from water levels monitored during development and adjusted during pumping. Pumped water was directed to a series of storage tanks and was disposed of periodically in the Rose Creek Valley tailings impoundment. Test duration was limited by available storage tank volume. Flows were measured with a combination of manual measurements made by timing the filling of a bucket at the discharge line and an inline electromagnetic flow meter. Water levels were monitored at multiple locations using dataloggers with periodic manual measurements, though problems occurred with settings on some of the dataloggers, limiting utility of all the data. Testing incorporated a combination of step tests to assess well efficiency and relatively longer constant rate tests to observe drawdown at distant monitoring wells. The following summarises pumping tests completed:

- In PW1, a step test was conducted for a total of 313 minutes with four approximately one hour-long rate steps of 0.3, 0.6, 1.0 and 1.3 L/s.
- In PW1, a 400 minute "constant" rate test was conducted using a rate of approximately 0.88 L/s from time 0 to 300 minutes and approximately 1.25 L/s from 300 to 400 minutes. Recovery was monitored for approximately 800 minutes.
- During the PW1 constant rate test, drawdown and recovery were monitored in six observation wells, including bedrock monitoring well BR1.
- In PW2, a three hour step test was continued as a constant rate test for an additional five hours.
- The PW2 rates for each one-hour long step were approximately 0.3, 0.6 and 1.0 L/s. The constant rate test following the step test had a discharge rate of 0.6 L/s.
- During the PW2 step and constant rate test, drawdown and recovery are available from the pumping well and one observation well. Data from additional observation wells could not be used.
- In PW4 a constant rate test was conducted using a Waterra Hydrolift pump at a rate of about 0.03 L/s (0.5 USgpm) for approximately 171 minutes. There was insufficient water depth in the well to use a submersible pump.
- During the PW4 constant rate test, drawdown and recovery was observed in the pumping well and at one observation well, SRK05-SP4b, located about 3 m from PW4.

3.4 Shallow Aquifer

The shallow aquifer is a relatively shallow, narrow feature (base ~3.5 meters below ground surface and only about 20 to 30 meters wide) identified in the 2005 program and interpreted to be the remnant of a pre-mining surface drainage that was covered by the Faro waste rock dumps. A single monitoring well intersects this aquifer, SRK05-SP4b, and has shown some of the highest zinc concentrations in the S-wells area (>350 mg/L). Prior to the 2008 program, the aquifer was not well delineated.

3.4.1 Test Pitting

A test pitting program was completed in August, 2008 to provide better delineation of the shallow aquifer. Test pits were completed using the site excavator, a John Deere 345. Nine test pits were completed, positioned along two alignments. Test pit locations are shown on Figure2. Figure 5 shows cross sections through the test pits. Test pit logs are included in Appendix A-2.

Test pitting allowed the lateral extent of the shallow aquifer to be fairly well constrained. On the west side, test pits TP08-2 and TP08-6 were relatively very dry compared to the next test pit to the east and remained open to maximum excavation depth of about six to seven meters (m) below the ground surface. On the east side, test pits TP08-4 and TP08-9 were similar to TP08-2 and TP08-6, relatively dry and stable at maximum excavation depths. Lithologies in all of these test pits were dominated by sandy silts with occasional cobbles or boulders.

Test pits between those mentioned above all had water inflows at varying rates. Test pits TP08-1, TP08-7 and TP08-8 had significant inflow leading to sloughing of test pit walls and significant test pit instability. Inflow was on the order of one litre/second (L/s), coming from sand and gravel units, often at two to three meters below ground surface. A dark brown to black horizon with organics was typically intersected immediately above water bearing units. The depth to water bearing units increases upslope, from less than 1 m below ground surface near the alignment of the 2005 monitoring wells, up to two to three meters below the ground surface towards the toe of the waste rock dump.

Overall, the shallow aquifer has an approximate width of 25 m and maximum thickness of about 3.5 m (as measured at SRK05-SP4b).

3.4.2 Drilling and Testing

A single pumping well was completed in the shallow aquifer, PW4, and one steel piezometer was installed in an excavated pit, SRK08-DP1. Table 3 summarizes shallow aquifer completions. Locations are shown on Figure 2.

Table 3: Shallow Aquifer Details

ID	Completion Date	Type*	Screen Depth (mbgs)	Screen Length (m)	Screen Slot Size (PW-slots/inch MW-slot width)	Sump Length (m)
PW4	2008	PW	2.44 to 3.96	1.52	15	1.52
SP4b	2005	MW	0.6 to 3.5	2.9	0.010 or 0.020	0.6
SRK08-DP1	2008	MW	5.0 to 5.4	0.4	n/a – 1/8” holes	0.0

PW4 is located less than five meters to the west of SP4b. Drill cuttings collected during air-rotary drilling for PW4 identified dominantly silt to fine sand to a depth of about 2 meters, overlying a water bearing silty medium sand with gravel. Materials became increasingly silty below approximately 3 meters, producing less water than materials above. The pumping well screen was set in water bearing materials with a sump in the underlying silts. Static water level measurements indicated a saturated thickness on the order of 1.5 to 2 meters.

During development of PW4, the water level in the pumping well was rapidly drawn down. Approximately 1,900 litres were removed from the well during development, the water clear at the end with a zinc concentration >400 mg/L, as measured by the Faro lab. The potentially low yield, combined with the low saturated thickness, indicated that use of an available Grundfos submersible pump to conduct a pumping test would likely dry out the pump. An electric Waterra Hydrolift pump was used to conduct a pumping test.

PW4 was pumped at an average rate of approximately 0.03 L/s (0.4 USgpm) for 170 minutes, when the generator ran out of fuel. Water levels were monitored in the pumping well and SP4b. Drawdown data and straight line curve matches to PW4 and SP4b are shown on Figure 6.

Straight line curve matches suggest that the same T and S parameters cannot be used to match data to both drawdown curves. It is possible that, had the test been continued for a longer period of time, additional drawdown at SP4b may have occurred, but data suggests drawdown at both locations had stabilized. Transmissivity at PW4 is approximately $2x10^{-5}$ m^2/s (K of $6x10^{-6}$ m/s) with a high storativity value of 0.013, while at SP4b about $2x10^{-4}$ m^2/s (K of $6x10^{-5}$ m/s) with a storativity of $6x10^{-3}$.

Four slug tests were conducted on SP4b. Results had a tight range of parameters when curves were matched, with transmissivity values ranging from $1x10^{-4}$ to $2x10^{-4}$ m^2/s (K from $4x10^{-5}$ to $6x10^{-5}$ m/s). Slug testing results compare well with slug tests completed in 2005. Slug testing results are compiled in Appendix B.

These results suggest that, while heterogeneity may be present in the shallow aquifer, as could be expected, PW4 may be a relatively inefficient pumping well due to the position of the screen. It is possible that the shallow aquifer is characterized by vertical heterogeneity. Pumping wells installed in the shallow aquifer are not considered to be a practical interception methodology.

3.4.3 NFRC Marsh Observations

In the past, the marshy area between the lower road and the NFRC has been a challenge in terms of site access, but has not been the focus of specific investigation. During the 2008 program, this marshy area was particularly wet due to unusually high summer precipitation. During drilling of SPW1 and SPW4, springs and seeps were observed when the drilling was progressing through the shallow aquifer. Air being pushed into the aquifer materials during drilling caused flows at some seeps to visibly increase as well as the formation of a few new seeps, including air bubbling up through the lower road itself.

These observations suggest that some percentage of the shallow aquifer flux “daylights” or discharges directly into the marshy areas. Seeps and standing water were surveyed with a Garmin hand-held GPS and are included on Figure 2. Samples were collected from four locations, A-SC to D-SC, including active springs and standing water, and submitted to the site lab for analysis. Results are presented in Section 3.7. All of these surface water samples had total zinc concentrations greater than 50 mg/L.

3.5 Deep Aquifer

The deep aquifer has been characterized along the alignment of 2005 drilling as a relatively less permeable unit than the Shallow Aquifer, consisting of weathered bedrock, immediately overlying permeable sediments and isolated permeable lenses. The objective of the 2008 program was to further characterize the weathered bedrock and assess the feasibility of using pumping wells for interception.

3.5.1 Bedrock Drilling and Testing

Four bedrock holes were attempted in 2008. Three, BR1, BR3 and BR4, successfully reached bedrock. Details of all bedrock drillholes are listed in Table 4.

Table 4: Bedrock Drillholes

ID	Completion Date	Drilled Length (m)	Bedrock Depth (m)	Cored Interval (m)	MW Screen Depth (m.b.g.s.)
BR1	2008	34.4	12.2	12.2 – 34.4	26 – 31.8
BR2	2008	25.3	n/a	n/a	11 – 16
BR3	2008	14.3	4.0	n/a	6.1 – 12.2
BR4	2008	46.6	15.2	15.2 – 46.6	15.1 – 21.5

BR1 and BR4 were cored to depth, with hydraulic testing conducted during drilling. BR1 was drilled at an inclination of 70 degrees from horizontal, on an azimuth directed towards and below SP5 and PW2. BR3 encountered significant weathered bedrock and coring was not possible. Additionally, due to the depth of water in BR3 and high permeabilities, hydraulic testing was difficult. All water used during drilling of BR3 was lost to the formation. BR2 was attempted with lesser success. BR2, inclined at 60 degrees from horizontal and oriented towards SP4a, was terminated at a drill length of approximately 25 meters in overburden materials due to drilling difficulties. The relatively soft and bouldery overburden led to numerous casing breaks and the drillhole was terminated after multiple attempts to reach bedrock. Drilling logs for all four bedrock holes are included in Appendix A-1. BR4 was cored and tested successfully.

Drill core from BR1 and BR4 provide the best indications of bedrock characteristics. Qualitative observations in BR3 that weathered bedrock was weak and permeable are also indicative of shallow bedrock conditions, but are not as useful as results from BR1 and BR4.

In BR1, oxidized joint surfaces were observed to a depth of approximately 8 meters drilled below the overburden – bedrock contact. RQD averaged 30% with a high of 48%. Core recovery was moderate. Joint counts ranged from 5 to a high of 22 per 1.5 meter run and were oriented dominantly about 45 degrees to core axis. Breaks along foliation surfaces were also common. Below 8 meters drilled depth, joint counts decreased significantly, often to 0, with no indications of oxidation, but rock became significantly weaker, characterized as leached or decomposed, often clayey gouge. Core recovery was poorer than in shallower zones. Rubble zones became more predominant. The clayey gouge and very weak rock intersected between about 22 and 25 meters drilled depth (73-85 ft) is interpreted as a fault zone (Photo 1, below).

Photo 1: Close-ups of BR1 Fault Zone

Above and below this likely fault zone, bedrock is more competent. Photo 2 shows core from above and below the fault, including the highly weathered bedrock near the overburden-bedrock contact.

Photo 2: BR1 Core with Fault and Weathered Zone

In BR4, a vertical drillhole, oxidized joint surfaces were observed to a depth of approximately 4 meters below the overburden – bedrock contact. RQD average 50% in these rocks, but ranged from a low of 0 just below the contact to highs of about 80%. Core recovery was poor to moderate with joint counts ranging to a high of about 10 per run, with some foliation breaks and many mechanical breaks. Rock strength generally did not deteriorate with depth. Below the apparent weathered zone, joint counts averaged about 3 per 1.5 meter run, with RQD values in the 90 to 100% range. Mechanical break counts were high, averaging 20 per 1.5 meter run. As with BR1, rock became greyish and "leached" at depth with numerous quartz veins, but strength remained relatively high.

Photo 3: BR4 Core

Packer-isolated falling head tests were conducted over multiple depth ranges in both BR1 and BR4. Data were analyzed using the Bower-Rice method for slug tests. Curve matches were made to the normalized head range of 0.2 to 0.3 of normalized head, as recommended by Butler (1998). Slug tests were also conducted in monitoring wells, once installed. Table 4 summarizes all test results.

Table 5: Bedrock Drillhole Hydraulic Testing Results

Packer-isolated Falling Head Tests					
	Test Vertical Depth (m.b.g.s.)		Zone Depth in Bedrock (m)		
ID	**From**	**To**	**From**	**To**	**K (m/s)**
BR1	22.3	32.3	10.8	20.9	$9x10^{-6}$
BR1	17.4	32.3	5.9	20.9	$2x10^{-6}$
BR1	17.4	22.3	5.9	10.8	$4x10^{-6}$
BR1	12.6	16.6	1.1	5.2	$9x10^{-6}$
BR4	34.4	46.6	19.2	31.4	$4x10^{-5}$
BR4	30.7	37.5	15.5	22.3	$1x10^{-5}$
BR4	22.2	28.3	7.0	13.1	$5x10^{-6}$
BR4	16.1	22.2	0.9	7.0	$3x10^{-5}$
Monitoring Well Slug Tests					
BR1	26.0	31.8	14.6	20.3	$2x10^{-5}$
BR3	6.1	12.2	2.1	8.2	$2x10^{-5}$
BR4	15.1	21.5	-0.1	6.3	n/a

Analysis of the bedrock testing data suggests:

- Bedrock hydraulic conductivity is consistently high to depths of 30 meters into bedrock.
- Bedrock hydraulic conductivity varies laterally.

The tight range of bedrock K values is somewhat suspect, as all observations suggest that K should have decreased at greater depths. Precautions were taken during testing to ensure proper test procedures, such as surface testing of the packer equipment, test inflation pressures of a minimum of 200 psi and, in certain instances, multiple tests completed with the packer slightly offset, to ensure that high apparent test flows were not due to packer bypass.

Similarity between the slug test data and packer-isolated falling head test data for BR1 provides further support for validity of packer testing data, albeit only a single value. The slug test data is about 25% higher than the falling head test data in the similar test interval. While it is somewhat surprising that the relatively shorter slug testing zone has a higher K value than the longer falling head test zone, the numbers are considered close when taking into account potential analytical error in the falling head tests.

In sum, these data suggest that shallow bedrock in the S-wells area, at a minimum, does have the potential to transmit significant flow.

3.5.2 Pumping Wells and Testing

Two pumping wells were installed in the deep aquifer, PW1 and PW2. Details were presented in Section 3.4.2 and are repeated in Table 5 for these two wells.

Table 6: Deep Aquifer Pumping Wells

ID	Screen Depth (mbgs)	Screen Length (m)	Screen Slot Size (slots/inch)	Sump Length (m)
SPW1	19.51 to 24.23	4.72	15	1.68
SPW2	9.75 to 12.95	3.20	15	1.07

PW1 was screened in weathered bedrock and immediately overlying sediments. Drilling problems were encountered on PW2. Loose sediments resulted in the ODEX casing snapping and then, later, the downhole hammer was lost in the drillhole. The pumping well screen was constructed on top of the hammer, the entire area around the hammer filled with sand. The ultimate result of this is that the screen was not installed to as great a depth as desired, but is still within the upper weathered bedrock. Bedrock was intersected at a depth of 11.3 meters. The overlying materials are boulders with gravel and silt.

As described in section 3.3, pumping tests were completed in both PW1 and PW2. Step tests were conducted first, to allow determination of appropriate pumping rates for longer term tests. Constant rate tests followed. In the case of the PW2, the constant rate test was essentially a continuation of the step test. Total duration of constant rate tests was limited by available storage for discharge water. Both pumping wells had zinc concentrations of greater than 1 mg/L (as measured at the site lab), requiring all discharge water to be collected and disposed of in the Rose Creek Valley tailings impoundment. Two storage tanks were available for discharge water management: a 1,000 litre wheeled tank and a second 4,000 litre stationary plastic tank. Water was discharged directly into the smaller tank, and then periodically pumped to the larger tank. Generally speaking, it took longer to move and dump the larger tank that it did to fill the smaller one, so test duration was limited to a maximum equivalent to the time it took to fill the larger tank. In summary:

- PW1 was tested for 400 minutes at rates up to a maximum of approximately 1.25 L/s (20 USgpm).
- PW2 was pumped at rates up to 0.95 L/s (15 USgpm) for a three hour step test, then a constant rate test was conducted for an additional 4.5 hours at a rate of 0.6 L/s (9.4 USgpm).

Step test results indicate that PW1 is generally more efficient than PW2. This may be due in some part to the screen placement in PW2. Based on the available drawdown at the time of testing, PW1 is capable of a sustained pumping rate on the order of 0.6 to 1.2 L/s (10 to 20 USgpm) and PW2 is capable of a sustained pumping rate on the order of 0.6 L/s (10 USgpm). Step test results are summarised in Figure 7.

Results of the PW1 constant rate test are summarised in Figure 8. Observation data is available from the pumping well and 5 deep aquifer monitoring wells: SP4a, BR1, SP5, S3 and SP7a. The following general observations are presented:

- Maximum drawdown at PW1 was on the order of 10m. Drawdown at SP4a, ~3 m from PW1, was approximately 6 m.
- Drawdown at distances on the order of 40 m was 0.1 m. Minor, but measureable.
- Drawdown on the order of 10 cm was observed in BR1, which is screened approximately 14 m below the overburden – bedrock interface and has a grout annular seal above the screen. This drawdown response suggests reasonable connectivity in reasonably deep weathered bedrock.
- Water levels in monitoring wells at distance from PW1 show recovery after test termination, but then water levels continue to decline, suggesting the local water table was declining during the test.
- Data for PW1 and SP4a on the composite plot should overlap to a close degree if the aquifer is truly homogeneous and isotropic. The fact that they don’t supports the idea that the aquifer is somewhat heterogeneous, though still with reasonable connectivity.
- Generally wet conditions at site could be expected to have influenced test results, but leakage effects cannot be assumed with confidence.

Monitoring well SP4b, located in the shallow aquifer, almost immediately above PW1, did show a very minor change in water level during the test (max of 1 cm) but did not recover on test termination. Considering the reasonably high transmissivity of the shallow aquifer, it is reasonable to think that a drawdown of this magnitude would have recovered on test termination. Additionally, at such a close distance (< 5m horizontally) much greater drawdown would have been expected if there were any significant connectivity between the aquifers. The observed change in water level may have been due to a general water table decline in the S-cluster area. Therefore, it is considered reasonable to assume that the shallow and deep aquifers are not well connected, if connected at all.

Results of the PW2 test are shown on Figure 9. Unfortunately, observation data is only available from SP5. The composite plot (top) provides insight into aquifer heterogeneity. As with PW1 test results, the two data plots do not overlap, suggesting aquifer heterogeneity. While curve matches on the composite plot are imperfect, matches to late time data are generally reasonable. For PW2 itself, mismatch with earlier time data may be a result of well inefficiency, or of error with flow measurements. Recovery data match reasonably well for both data sets at late times and is considered the most reliable. The storativity value in this match is anomalously high and considered unreasonable. Cause is unknown at this time.

Aquifer parameters from the two tests are summarised in Table 7. For the PW1 test, parameters were determined from PW1 and SP4a.

Table 7: Aquifer Parameters from Pumping Tests

Test	Transmissivity (m^2/s)	Hydraulic Conductivity (K)	Specific Capacity (L/s/m)
PW1	$2x10^{-4}$	$1x10^{-5}$	0.13
PW2	$5x10^{-4}$	$5x10^{-5}$	0.25

In general, pumping wells in the deep aquifer could be effective for interception if spaced closely, on the order of 10m. Heterogeneity could result in some wells being more effective than others, but this can only be assessed by pumping of any individual well. Based on weathered bedrock conductivities, pumping wells completed in weathered bedrock may be effective, at least in the areas that have been assessed. Available drawdown (saturated thickness) above the bedrock interface may have a significant influence on capture efficiency.

3.6 Areas Down Gradient of the S-wells

Two sets of nested monitoring wells were completed at locations down gradient of the primary S-wells alignment, SRK08-SP7a&7b and SRK08-SP8a&8b. At both locations, the “a” monitoring well is the deeper of the completions and was screened in weathered bedrock. The purpose of these two locations was to obtain lithologic and water quality information closer to the NFRC. Locations are shown on Figure 2. Completion logs are included in Appendix A-2. Photos of sonic core are included with site photos on the CD in Appendix D. Completion details are summarised in Table 7, including hydraulic conductivity values obtained through slug testing.

Table 8: Down Gradient Monitoring Well Details

ID	Screen Lithology	Screen Depth (mbgs)	Hydraulic Conductivity (m/s)	Depth to Water (m.b.g.s.)*
SP7a	W. BR	14.02 to 17.07	$4x10^{-7}$	1.17
SP7b	Silty sand & gravel	4.88 to 7.92	$8x10^{-7}$	1.15
SP8a	W. BR	3.05 to 6.10	$1x10^{-6}$	0.71
SP8b	Sand	7.62 to 10.67	$8x10^{-6}$	0.95

*Static water levels taken multiple days after installation and prior to slug testing.

SRK08-SP7a was screened in relatively dry, grey-brown weathered bedrock. While oxidized fractures were noted in the first meter of bedrock, weathering was not as pervasive at this location as was observed in the bedrock drillholes up gradient (ie. BR1, BR4, etc.). Water produced from this zone had a field pH of 5.9 and an EC of 2,880 µS.

SRK08-SP7b was screened in a rusty orange stained coarse sand and gravel lens. Water produced from this zone was also a rusty orange color and had a field pH of 6 and EC of 6,200 µS. This shallow water bearing zone was separated from the deeper monitoring well completion by approximately 6 m of compact, grey silty sand to sandy silt with gravel. Above this monitoring zone, materials were grey, wet sand and gravel with silt. Lithology in this drillhole was generally heterogeneous, with no significant aquitard layer between the permeable materials in which the screen was set and ground surface.

The SRK08-SP7 monitoring wells are located within 5 m of the bank of the NFRC. While surveys of monitoring well elevations, nor the NFRC in this vicinity, have yet been completed, field observation suggests that these water levels are very close to that of the NFRC itself. The water levels are too close to determine gradient between the monitoring wells at this time.

SRK08-SP8a was screened in weathered bedrock with similar appearance to that found at SP7a. Weathered bedrock with oxidized fractures was found in the upper 1 m of bedrock, below which bedrock became greyish and generally more competent. Water from this monitoring well had a field pH of about 6 and EC of 1,720 µS.

SRK08-SP8b was screened across multiple layers of rusty orange medium to coarse sand and gravel separated by a 30 cm layer of greyish sandy silt diamict. In sharp contrast to the SP7 location, sandy materials are generally present at all depths and lie directly on bedrock. Above the 8b screen zone, materials were mixed organics and fine sand, likely representing various buried meanders of the NFRC. Water from this monitoring well had a field pH of about 6 and EC of 1,220 µS.

The SRK08-SP8 monitoring wells are approximately 10 m from the bank of the NFRC and again, surveys have not yet been completed, though monitoring well water levels may be higher than the NFRC water level. The two monitoring wells are completed on relatively level ground, and a downwards gradient between the monitoring wells is considered a reasonable assumption at this time. Compared to the NFRC, qualitative observations suggest that groundwater gradients may be appropriate to have groundwater discharging into the NFRC at this location.

3.7 Water Quality

Water samples have been collected twice from the wells installed in 2008, the first time as part of the field program and a second time on November 3, 2008 by AECOM, which included all of the 2008 locations, plus selected 2005 monitoring wells. Sulphate and zinc results from the November 3 sampling round (with a few noted exceptions) are summarized in Table 9. Results from May 2008 are reported for the remaining 2005 monitoring wells that were not sampled in the autumn. Results from sampling of surface seeps and standing water in the marshy area between the lower road and NFRC are also included. It should be noted that the site lab typically analyzes only for total metals. The marsh samples were not filtered or treated with preservatives, so should be viewed only as indicative of potential groundwater influence.

Laboratory analysis reporting sheets for samples collected as part of the field program are located in Appendix C.

Figures 10 to 13 show updated mps of zinc and sulphate concentration distribution for the shallow and deep aquifers. Figure 14 is a cross-section along section line 4, showing zinc concentration.

Table 9: Summary of Groundwater Quality

ID	Field pH	Field EC (µS/cm)	Sulphate (mg/L)	Zinc (mg/L)
S1a	6.06	6475	6100	288
S1b	n/a	n/a	500	0.0528
S2a	6.74	6085	5000	325
S2b	6.62	5877	5900	375
S3	7.1	6380	5900	422
SRK05-SP4a	6.48	894	190	1.03
SRK05-SP4b	6.92	6055	5600	368
SRK05-SP5	5.97	6380	6100	367
SRK08-SP6	6.85	2436	1200	0.0083
SRK08-SP7a	6.81	3503	2300	2.56
SRK08-SP7b	7.36	6010	5300	125
SRK08-SP8a*	6.19	1720	1470	0.444
SRK08-SP8b*	6.25	1220	481	0.359
SRK08-BR1	6.07	3705	3300	1.13
SRK08-BR2	6.98	4100	2400	36.3
SRK08-BR3	6.52	3520	1800	0.0426
SRK08-BR4	6.06	6556	6500	367
SPW1	6.08	940	210	1.14
SPW2	7.03	6402	5900	336
SPW4*	n/a	6260	5780	355
Marsh Samples				
A-SC	5.40	>4000	n/a	>50
B-SC	5.88	>4000	n/a	>50
C-SC	6.61	>4000	n/a	>50
D-SC	6.62	>4000	n/a	>50
May 2008 Sampling				
SRK05-SP1a	5.69	1432	629	1.78
SRK05-SP1b	6.1	1021	277	0.254
SRK05-SP2	6.5	386	35.3	0.172
SRK05-SP3a	n/a	1123	362	1.22
SRK05-SP3b	n/a	967	283	0.692

Notes and Abbreviations:
* SRK-08SP8a & 8b and SPW4 were not sampled on November 3, 2008. Results from the 2008 field program are presented.
Milligrams per litre = mg/L.

Water quality and flows were measured in June 2008 at the four NFRC S-cluster stations used as part of the 2005 program. These stations, shown on Figure 2, were used to assess changes in loading to the NFRC as it passes below the S-cluster area. Table 10 summarises water quality results for these stations for the June 2008 monitoring round. As surface water sampling dates did not coincide with groundwater sampling, zinc and sulphate concentrations at X2 are listed in Table 11 for the period overlapping the field program for reference. These results provide an indication of variation that was observed at X2 during the field program period.

Table 10: June 2008 NFRC Surface Water Flow and Quality

ID	Discharge (m^3/s)	Sulphate (mg/L)	Zinc (mg/L)
SC-1	3.206	6.52	0.0059
SC-2	3.314	6.54	0.0133
SC-3	3.19	7.43	0.0196
SC-4	2.766	7.53	0.0229
X2	n/a	7.92	0.0229

Notes and Abbreviations:
Cubic metres per second = m^3/s
Milligrams per litre = mg/L

Table 11: X2 Water Quality for 2008 Field Program Period

Date	Sulphate (mg/L)	Zinc - D (mg/L)
June 12, 2008	7.92	0.0229
June 16, 2008	8.35	0.015
July 14, 2008	7.3	0.018
August 11, 2008	11.7	0.022
September 15, 2008	10.1	0.016
October 15, 2008	14.6	0.032

The following observations are presented regarding water quality:

- NFRC surface water sulphate and dissolved zinc concentrations are generally much lower than S-cluster groundwater concentrations.
- In June 2008, NFRC dissolved zinc concentrations increased by almost four times between the upper and lower S-cluster station. Sulphate concentrations increased, but by a much lower factor.
- X2 water quality data suggests that conditions were reasonably stable during the 2008 field program, such that the June 2008 surface water quality data could be used to assess conditions during the period of the 2008 field program.
- The pH for all groundwater monitoring locations remains circum-neutral, with the exception SRK05-SP5 and SRK05-SP1a. SRK05-SP5 coincides with the highest concentrations in the deep aquifer while SRK05-SP1a has relatively low concentrations and is distant from the areas of high concentrations (>100 m). The cause for these low pH values is uncertain, but considering other areas with high contaminant concentrations do not necessarily have low pHs (eg. SP4b), the levels may not indicate anything about development of ARD chemistry.
- Contaminant concentrations at the historic S-wells (S1, S2 and S3) continue to remain high, with the exception of S1b, the shallow completion at that location.
- The shallow aquifer (SRK05-SP4b and PW4) has some of the highest concentrations.
- SRK08-BR2, the failed bedrock drillhole with a screen completed in overburden approximately 5 m above the inferred bedrock contact, but in reasonably close proximity to SP4a, has highly

elevated zinc and sulphate concentrations relative to SP4a. This may indicate hydraulic connection between weathered bedrock and permeable lenses somewhat above the immediate bedrock – overburden contact. Some of these potential lenses or relatively coarse grained areas have been interpreted from drill logs and are shown on Figures 3 and 4.

- Zinc concentrations in marsh surface water samples are much higher than NFRC concentrations.
- Along the primary monitoring well alignment (along the access road) high concentrations in the deep aquifer are relatively constrained spatially. High concentrations (on the order of 367 mg/L) are focused in the vicinity of SRK05-SP5 and BR4 and decrease rapidly laterally. At SRK08-SP6, about 40 m to the west of BR4, the zinc concentration is 0.0083 mg/L. At SRK05-SP4a, about 30 m to the east of SRK05-SP5, the zinc concentration is about 1 mg/L. Further to the east, SRK05-SP1, SP2 and SP3 indicate variability but the highest values remain less than 2 mg/L. Zinc concentrations in BR1, screened deep in weathered bedrock below SP5, has a zinc concentration of about 1 mg/L, suggesting that deeper weathered bedrock is less impacted.
- Data from SRK08-SP7a & 7b, located close to the NFRC, down gradient of the primary monitoring well alignment and SRK08-SP8a & 8b, located approximately 200 m down stream of the S-cluster, suggest that the contaminant plume at least extends to, and most likely under, the NFRC. SRK08-SP7b, the shallow monitoring well on the edge of the NFRC at the S-cluster, has a zinc concentration of 125 mg/L, about half that observed at the historic S-wells, but still highly elevated. Further down gradient, at SRK08-SP8a & 8b, sulphate and zinc concentrations are low relative to SRK08-SP7 and the historic S-wells, but are elevated, suggesting that the front edge of the contaminant plume extends to this distance. The fact that the concentrations are relatively low here suggests that either the main plume has not broken through to this distance or that the groundwater is being diluted by water from the NFRC.

Water quality data was compared over time and between stations to determine if different sources or characteristics for the shallow vs. deep aquifer could be identified. Comparison of element ratios, general composition in Piper plots and spatial variation was assessed. No specific distinguishing characteristic could be identified that clearly shows differentiation between the shallow and deep aquifers. Figure 15 shows plots of sulphate to zinc ratios for all of the S-cluster monitoring wells. The time trends of SO4/Zn-D ratio for the historic S-wells shows a similar pattern as has been described before, with breakthrough of zinc (ie. rapid decrease of ratio) occurring around 2000 at most locations.

S1B is somewhat anomalous compared to other historic S-wells, with much lower zinc and sulphate concentrations.

Comparing ratios using the November 2008 data, no clear distinction can be seen between the shallow and deep aquifers.

3.8 Updated Hydrogeologic Conceptual Model

Based on additional data collected in 2008, the hydrogeologic conceptual model for the S-wells area can be updated. A primary conclusion of the 2005 investigation was the identification of two distinct aquifers, the shallow and deep aquifers that have been discussed earlier. Data from 2008 program suggests that, while the two aquifers are present and separated along the primary alignment of 2005 drilling, the distinction becomes blurred down gradient, closer to the NFRC.

Two aquifers emerge from the waste rock dumps: the shallow aquifer and the deep aquifer. Both receive recharge and contaminant influx from the up gradient waste rock dumps. The Shallow Aquifer is an approximately 25m wide by 3m thick sand and gravel lens, with a hydraulic conductivity on the order of $1x10^{-4}$ m/s. The entire aquifer is considered to be highly contaminated, with zinc concentrations ranging up to 400 mg/L.

Immediately down gradient of the 2005/2008 alignment, where the shallow aquifer was initially identified, ground surface drops on the order of a meter into the marshy areas adjacent to the NFRC. It is in this area that, during 2008 drilling through the shallow aquifer, springs were noted, due to the compressed air used with the rotary drilling. The shallow aquifer is interpreted to daylight, at least in part, to ground surface in this area.

The Deep Aquifer is laterally extensive, characterized as weathered bedrock and overlying permeable sediments. The deep aquifer essentially extends across the entire S-wells area, a length on the order of 350m, but the area currently delineated by a zinc concentration of 1 mg/L is approximately 250m wide with an average thickness on the order of 15m, including the portion of weathered bedrock that is currently highly contaminated. Hydraulic conductivity of the permeable sediments and upper weathered bedrock portion (to a depth of 10m) is approximately $1x10^{-5}$ m/s, decreasing to $1x10^{-6}$ m/s below 10m.

Depth to bedrock decreases away from the waste rock dumps, from on the order of 20m near the 2005/2008 drilling alignment to less than 15m near the NFRC in the S-wells area and less than 10 m further down the NFRC valley.

In the area immediately adjacent to the NFRC, the shallow aquifer is considered to pinch out and only a single, heterogeneous aquifer is present below the NFRC itself. This single aquifer is comprised of weathered bedrock and interbedded heterogeneous permeable sediments. Hydraulic conductivity is assumed to range between 1x10-5 and 1x10-6 m/s, similar to and possibly slightly lower than areas closer to the waste rock dumps.

Groundwater entering the S-wells area in permeable materials below the bed of the NFRC combines with groundwater flowing into the area via the Shallow and Deep Aquifers described herein. Groundwater departing the S-wells area may be affected by a rising bedrock surface and relatively constricted nature of the valley itself, with a component potentially up welling into the NFRC channel and some component flowing in permeable materials below the creek bed.

3.9 Updated Load Estimates

Loading estimates for the shallow and deep aquifers, as well as estimates of loading to the NFRC in the S-cluster area, were presented with data from the 2005 field program. Data collected during 2008 was used to update these estimates.

In 2005, the shallow aquifer was estimated to have a cross-sectional area of approximately 75 m^2. 2008 data suggests that this area remains appropriate. In 2005, the deep aquifer was subdivided into high and low concentration areas, the cutoff between the two given a value of 1 mg/L. The high concentration area was estimated in 2005 as 90 m^2. The low concentration area was estimated as 595 m^2. Based on 2008 data, the area of the shallow aquifer is considered reasonable, but both the high and low concentration areas for the Deep Aquifer are significantly larger. Based on the interpreted concentration contours shown on Figure 14, areas for different zinc concentration zones were calculated and are tabulated in Table 12.

Table 12: S-Cluster Aquifer Areas

	Zinc Concentration (mg/L)				
Aquifer	**≥ 300**	**10 to 300**	**1 to 10**	**0.1 to 1**	**Total**
Shallow (m^2)	75	n/a	n/a	n/a	75
Deep (m^2)	800	1,450	5,200	7,500	~15,000

Based on concentration data listed previously in Table 8, the aquifer dimension data from Table 12 and 2008 data on aquifer characteristics, loading from the S-wells area is significant:

Table 13: Maximum Loads for Shallow and Deep Aquifer

	mg/L		m^2		m/s	L/s	Load (t/yr)	
Aquifer	**Zn**	**SO4**	**Area**	**Gradient**	**K**	**Flux**	**Zn**	**SO4**
Shallow	300	5600	75	0.086	1.0E-04	$6.5x10^{-1}$	6	1078
Deep V. High Concentration	300	6000	800	0.04	1.0E-05	$3.2x10^{-1}$	3	573
Deep High Concentration	1	500	7000	0.04	1.0E-05	$2.8x10^{0}$	0	1
Deep Low Concentration	0.1	100	7500	0.04	1.0E-06	$3.0x10^{-1}$	0.001	0.003

NFRC flow and water quality from the four stations below the S-wells area were used to update the assessment of loading to the NFRC in the S-wells area. The same survey locations were measured in June, 2008. Table 14 summarises loading for each year.

Table 14: Summary of Zinc and Sulphate Loading to NFRC from S-Cluster Area

	NFRC Station	**SC-1**	**SC-2**	**SC-3**	**SC-4**
August, 2005	Flow (m^3/s)	1.656	1.346	1.496	1.51
	Zn-D (mg/L)	0.0063	0.0079	0.0158	0.0168
	SO4 (mg/L)	10.8	10.8	12.7	13.5
	Zn Load (mg/s)	10	11	24	25
	SO_4 Load (mg/s)	17885	14537	18999	20385
June, 2008	Flow (m^3/s)	3.206	3.314	3.19	2.766
	Zn-D (mg/L)	0.0059	0.0133	0.0196	0.0229
	SO4 (mg/L)	6.52	6.54	7.43	7.53
	Zn Load (mg/s)	19	44	63	63
	SO_4 Load (mg/s)	20903	21674	23702	20828
Increase in load from upstream station					
August, 2005	Zn-D (mg/s)	n/a	0.2	13.0	1.7
June, 2008		n/a	25.2	18.4	0.8
August, 2005	SO_4 (mg/s)	n/a	-3348	4462	1386
June, 2008		n/a	770	2028	-2874

Abbreviations:
Cubic metres per second = m^3/s
Milligrams per litre = mg/L
Milligrams per second = mg/s

It should be noted that NFRC flows in June 2008 were roughly twice as high as measured in August 2005. In fact, the summer of 2008 was very wet and the NFRC had very high flows for a significant portion of the summer. In addition, the relative change in flows between stations is essentially opposite between the two years. In 2005, flows decreased between stations SC-1 and SC-2, then increased to SC-4. In 2008, the flows increased from SC-1 to SC-2, then decreased to SC-4.

In terms of water quality, comparison of zinc and sulphate concentrations at each station indicates some significant differences. Sulphate concentrations were higher at all stations in 2005 compared to 2008. In 2008, zinc concentrations were lower at SC-1 than in 2005, but are higher in 2008 at the other three stations. In terms of load, 2008 had higher zinc and sulphate loads at all stations.

In the 2005 assessment, downstream changes in load were interpreted to be affected to some degree by variations in stream loss and stream gain between reaches, resulting from a complex system of groundwater – surface water interaction. While these mechanisms likely still exist in 2008, the relationship appears different. In 2005, decrease in discharge occurred only between stations SC-1 and SC-2. In 2008, discharge increased from SC-1 to SC-2, then decreased to SC-4. Despite this loss in flow, the only decrease in load is that of sulphate between stations SC-3 and SC-4. It should be noted that measurement error on these streamflow values is approximately +/- 10%, so the flow could essentially be about the same between SC-1 and SC-4. The apparent switch in gains and losses between 2005 and 2008 may just be measurement noise and the flows relatively similar through each of these reaches on both years.

In 2005, multiple loading scenarios were used to assess potential contributions of the shallow and deep aquifers to the NFRC. Results of these scenarios suggested that seepage from the shallow and deep aquifers, diluted with clean groundwater, could result in the observed increase in NFRC load. These scenarios, plus additional scenarios, have been used with 2008 data to improve understanding of the system.

Four scenarios were assessed in 2005:

1. The required groundwater concentrations to match observed changes in concentrations between SC-2 and SC-4 with the measured increase in NFRC discharge between those two stations.
2. The required shallow aquifer groundwater concentrations to match observed changes in concentrations between SC-2 and SC-4 using the estimated shallow aquifer flux.
3. The required groundwater concentrations to match observed changes in concentrations between SC-2 and SC-4 using the combined shallow and deep aquifer flux.
4. The flux of “unimpacted” groundwater needed to mix with estimated shallow groundwater load to match observed changes in concentration between SC-2 and SC-4.

These scenarios were re-assessed using 2008 data, with some modification. The updated scenarios are based on the 2005 scenarios, when plausible, with modifications indicated by the letter “B”. “A” scenarios are those of the 2005 assessment. Numbering for additional scenarios begins at 5.

1a. Not feasible with 2008 data. Flows decrease.

1b. Similar to 2005 scenario “1” using increase in flow measured between SC-1 and SC-2.

2a. Same as 2005 scenario “2” using updated shallow aquifer flux.

2b. Similar to 2005 scenario “2” using load increase from SC-1 to SC-4.

3. Same as 2005 scenario “3” using updated estimate of combined shallow and deep aquifer flux.

4. Same as 2005 scenario “4” using updated estimate of shallow aquifer flux.

5. Modified version of 2005 scenario “4” using load increase from SC-1 to SC-4, instead of increase from SC-2 to SC-4.

6. Modified version of 2005 scenario “2” using load increase from SC-1 to SC-2.

7. Modified version of 2005 scenario “4” using load increase from SC-1 to SC-2.

The results of these scenarios are presented in Table 15. Red numbers are inputs; black numbers are calculated.

Table 15: Results of NFRC Loading Scenarios

Scenario	Assumed Seepage Contributions		Inferred Seepage Concentrations	
	Description	L/s	SO_4 (mg/L)	Zn_D (mg/L)
1A	"Observed" Gain in Q SC-2 to SC-4		Flow Decreases	
1B	"Observed" Gain in Q SC-1 to SC-2	108	-8	0.18
2A	Shallow GW Concentrations if Shallow GW Seepage	0.75	-1,127	26
2B	Required Shallow Seepage for SC-1 to SC-4 Load Increase	0.12	6,200	360.0
3	GW Concentrations if All GW reports to NFRC btwn SC-2 to SC-4	8.4	-101	2.3
4	Shallow S-Cluster Seepage Plus	0.75	6,200	360.0
	Unimpacted GW for SC-2 to SC-4	71	100	0.00
5	Shallow S-cluster Seepage Plus	0.75	6,200	360.0
	Unimpacted GW for SC-1 to SC-4	16	100	0.01
6	Required Shallow Seepage for SC-1 to SC-2 Load Increase	0.07	6,200	360.0
7	Shallow S-cluster Seepage Plus	0.75	6,200	360.0
	Unimpacted GW for SC-1 to SC-2	9.3	100	0.01

Abbreviations: Litres per second = L/s Milligrams per litre = mg/L

The results of these scenarios provide a number of insights into the interaction of groundwater with the NFRC and, consequently, the flow dynamics of the S-cluster groundwater system. Most importantly, the updated scenarios support the previous conclusions that A. either a large percentage of contaminated groundwater is NOT reporting to the NFRC, or B. contaminated groundwater is being diluted by relatively “unimpacted” inflows.

Water quality results from some of the 2008 monitoring locations provide further constraint on possible loading. The down-gradient monitoring wells installed in 2008 (SRK08-SP7a & 7b and SRK08-SP8a & 8b) indicate that contaminant plumes have reached the NFRC, but are most likely to be trending underneath the NFRC itself, to some degree at least. Water quality measured in seeps and marsh water immediately below the lower road and in-line with the shallow aquifer, suggest that the shallow aquifer is daylighting to some degree into the marshy area itself.

These results and observations suggest that, of all the scenarios presented, scenarios 4, 5 and 7 could be considered the most probable. In these scenarios, discharge from the shallow aquifer could explain the observed NFRC loads. While a relatively minor flux from the deep aquifer could be contributing to observed loads, particularly further down gradient from the S-cluster area itself, it is not considered to be a significant component of the loading directly at the S-cluster area, at this time.

It should be noted that sulphate and zinc concentrations at the SRK08-SP8a&b locations suggest that, while zinc concentrations are not yet highly elevated, they could increase to 100’s of mg/L. This could likely result in not only greater contamination of the NFRC, but contamination of groundwater from the S-wells area to X2 and perhaps beyond.

4 Options Assessment

An objective of the 2008 program was to assess a number of seepage collection options that could be implemented in the S-cluster area. These options included:

- Pumping wells;
- Cut-off walls;
- Shallow sumps and trenches;
- Permeable reactive barriers; and
- Stream isolation.

As stream isolation has been included in the final mine closure plan, it is not discussed here. Isolation will be a specific engineering issue and is not within the scope of this report. The effectiveness of stream isolation is considered good.

In order to determine the most appropriate groundwater collection option, it is important to clearly define the objectives of collection. Based on the results presented herein and the anticipated final mine closure plan, the following points are considered to define the objectives for groundwater collection:

1. Reduce groundwater loading to the NFRC to get concentrations at X2 below trigger levels.
2. Minimize risk of loading to NFRC down gradient of X2.
3. Reduce groundwater load as much as practically feasible ("ALARA" approach – As Low As is Reasonably Achievable).

As the Down Valley groundwater collection system will be designed to capture whatever load may escape from the mine, capture efficiencies approaching 99% are not required at the S-cluster. That being said, it is still important that collection systems be sufficient to minimize loading to the NFRC up gradient of the Down Valley collection system.

Collection options are presented by aquifer, but the separate collection systems will in reality be combined to some degree.

The shallow aquifer characteristics can be summarised as:

- 25 m wide and a maximum of 3.5 m deep, immediately below ground surface in the vicinity of the lower road.
- Relatively high permeability sand and gravel aquifer.
- Maximum flux is estimated as ~0.75 L/s.
- Average zinc concentrations are 360 mg/L.
- Average sulphate concentrations 6,000 mg/L.

The deep aquifer characteristics can be summarised as:

- Total area on the order of 15,000m^2. High to very high concentration zones (>1 mg/L) have combined area on the order of 8,000m^2.
- The deep aquifer is lower permeability than the shallow aquifer, and characterized as weathered bedrock and overlying permeable sediments. Sediments can be heterogeneous and weathered bedrock may extend to depths of at least 10m.
- Flux from the high and very high concentration zones is about 3 L/s.
- Maximum zinc concentration for the very high concentration zone is about 350 mg/L.
- Maximum sulphate concentration for the very high concentration zone is about 6,000 mg/L.

Interaction between the two aquifers is limited to the relatively flat boggy area alongside the NFRC in the S-cluster area, if interaction occurs at all. Up-gradient, the aquifers are separated by 10+ m of silty fine sand to silt materials.

In both the Shallow and Deep Aquifers, contaminant concentrations are continuing to increase, such that current load estimates do not indicate peaks.

Available options are discussed in Tables 16 and 17, for the Shallow and Deep Aquifers, respectively.

The majority of the options presented could be utilized successfully if sufficient time and funds were available. From a practicality perspective, a shallow sump for the Shallow Aquifer would be the simplest and likely most successful approach to take at this time. The bioreactor concept should be assessed if possible, to potentially alleviate long term water treatment requirements, but at this time cannot be assumed to be a workable option. Pumping wells are not recommended for the Shallow Aquifer due to the limited available drawdown. A high number of wells would be required to fully intercept groundwater without causing frequent equipment failures due to high on/off cycling rates. A down gradient cutoff wall would significantly improve collection effectiveness.

In terms of the deep aquifer, the sump, permeable reactive barrier and bioreactor options are not considered practical, due to the depth of the aquifer and extension into the underlying weathered bedrock. A stable sump would likely have very large dimensions and is not considered practical. The permeable reactive barrier and bioreactor options would likely be difficult to implement to the required depths, require additional feasibility studies and, likely, extensive long term maintenance.

Pumping wells and/or a cut-off wall with bedrock grouting are considered viable options. Pumping wells with a spacing of less than 10m and completed a minimum of 10m into weathered bedrock could be implemented relatively easily, and use relatively simple technologies.

Considering the uncertainty in regards to option performance, an adaptive management approach is recommended for both the Shallow and Deep Aquifers. As will be described in Section 5, a shallow collector trench has been installed in the shallow aquifer. Monitoring of pumped water and water quality down gradient of the collector trench will be used to assess system performance. If monitoring indicates that interception is insufficient, a cut-off wall can be installed on the down gradient side of the sump. Conceptual designs for the Shallow Aquifer collector trench are presented in Figures 16 and 17.

For the Deep Aquifer, existing pumping wells are appropriately positioned for immediate interception of highly contaminated groundwater. Monitoring of pumping at these two locations and water quality at nearby monitoring wells can provide information on pumping effectiveness. As will be described in Section 5, these wells will be integrated into the system currently being installed. In general, the following general adaptive management approach could be implemented:

1. Use existing pumping wells for at least a couple of months to determine capture efficiency and areal coverage. If determined to be insufficient,
2. Install additional pumping wells in areas of known high contaminant levels with reasonable hydraulic parameters. If determined to be insufficient,
3. Install additional pumping wells in intermediate positions. If determined to be insufficient,
4. Install cut-off wall and permeable collector trench.

A final Adaptive Management Plan should be developed incorporating current water quality triggers. The AMP presented in the 2006 S-cluster report (SRK, 2006) could be used as a base.

In the lower elevation, marshy area closer to the NFRC, the effects of up gradient pumping may not provide an adequate level of collection to decrease groundwater load close to the NFRC. If pumping of existing wells was determined to be insufficient, additional pumping wells would be installed closer to the NFRC. These wells may only need to be operated until groundwater in this area was determined to be of sufficient quality to minimize risk to the NFRC. Before implementing these additional wells, pumping wells located in the up gradient high concentration areas should be operated for a sufficient period of time to allow assessment of effectiveness.

Ultimately, the NFRC will be re-aligned into a lined channel. This will protect the NFRC, but contaminated groundwater would continue to flow down the existing NFRC valley. Groundwater collection in the S-Cluster area would be continued in perpetuity.

In addition, a groundwater collection system will be installed down gradient of the Intermediate Dam. This system will be designed to provide a high level of interception. Therefore, while collection at the S-Cluster is still recommended, bypass of a relatively low amount of contaminated groundwater would not be considered to indicate system failure. The required level of collection in the S-cluster area will have to be determined based on ecological requirements.

Figure 18 is a map showing the conceptual layout of Deep Aquifer collection components.

Table 16: Shallow Aquifer Collection Options

Option	Description	Water Disposal	Comments
Pumping Wells	10 to 15 shallow, low yield pumping wells capture water. Water directed to central transfer station for pumping to treatment location.	Pipeline required to treatment location. Final treatment location uncertain.	Effectiveness of pumping wells limited by low available drawdown. Numerous pumping wells required to attain significant capture, but achievable. Pumping system consisting of numerous wells would likely require a high level of active management to optimize. Periodic replacement of pumps and treatment of well screens would be required. Power required.
Sump	Permeable collector trench or pit backfilled with permeable material intersecting entire aquifer with central pumping station.	Pipeline required to treatment location. Final treatment location uncertain.	Limited aquifer depth and width suggest sump could intersect entire aquifer. Effectiveness limited only by efficiency of porous drain material and positioning of pump. Fine materials must be filtered out to keep efficiency high. Single pumping station simplifies active management. Power required.
Cut-off Wall	Sheet pile or slurry cut-off wall with up-gradient collector system (sump or permeable trench with pump) installed to aquifer bottom across entire aquifer width.	Pipeline required to treatment location. Final treatment location uncertain.	Limited depth of aquifer simplifies installation. After installation of cut-off wall, installation of up-gradient collector system would be simplified. Low permeability materials below aquifer provide good base. Proper construction minimizes potential for contaminant bypass. Cut-off wall could be combined with pumping wells or sump options. Power required.
Permeable Reactive Barrier	Reactive media installed either across entire aquifer area or used with funnel and gate system. Reactive material causes contaminants to precipitate in place.	In-situ treatment. No pipeline required.	Type and source of reactive material unknown. Additional testing required to determine feasibility. Periodic replacement of reactive material required. Technology has been proven at other sites in North America but a high level of uncertainty exists regarding feasibility. Significant active management required at onset. Benefit is in-situ treatment.
Bioreactor	A series of trenches intersecting the aquifer are used to inject nutrients that allow bacteria to chemically alter water quality causing contaminants to precipitate in place.	In-situ treatment. No pipeline required.	Uncertainty with groundwater travel times and DO present most significant challenge to assessing feasibility. Technology in use at other sites in Yukon. Test system could be installed relatively easily using sumps. Contaminant precipitation could cause long term decrease in aquifer permeability. Long term effectiveness uncertain. High level of active management required at onset.

Table 17: Deep Aquifer Collection Options

Option	Description	Water Disposal	Comments
Pumping Wells	Upwards of 5-10 pumping wells in high concentration zone connected to central transfer pumping station.	Pipeline required to treatment location. Final treatment location uncertain.	Pumping tests indicate reasonable aquifer lateral connectivity. Pumping wells will work in deep aquifer but somewhat limited by available drawdown. Permeable bedrock may provide opportunity to have deep well sumps, thereby improving available drawdown. Active management required at onset. Automatic pumping controls recommended. Power required.
Sump	Permeable collector trench or pit backfilled with permeable material intersecting entire aquifer with central pumping station.	Pipeline required to treatment location. Final treatment location uncertain.	Not practical given significant depth of aquifer, even if limited to high concentration zone. Permeable trench option feasible but may not capture bedrock contamination. Grouting of bedrock along alignment may be required. Fewer pumps required that pumping wells alone. Power required.
Cut-off Wall	Sheet pile or slurry cutoff wall with upgradient collector system (sump or permeable trench with pump) installed to aquifer bottom across entire aquifer width.	Pipeline required to treatment location. Final treatment location uncertain.	Significant depth and need to capture weathered bedrock groundwater complicates approach. Grouting of bedrock likely required if cannot be excavated or deep pumping water levels cannot be maintained.
Permeable Reactive Barrier	Reactive media installed either across entire aquifer area or used with funnel and gate system. Reactive material causes contaminants to precipitate in place.	In-situ treatment. No pipeline required.	Type and source of reactive material unknown. Depth requirements may be too challenging. Additional testing required to determine feasibility. Periodic replacement of reactive material required. Technology has been proven at other sites in North America but a high level of uncertainty exists regarding feasibility. Significant active management required at onset. Benefit is in-situ treatment.
Bioreactor	A series of trenches or pumps intersecting the aquifer are used to inject nutrients that allow bacteria to chemically alter water quality causing contaminants to precipitate in place.	In-situ treatment. No pipeline required.	Uncertainty with groundwater travel times and DO present most significant challenge to assessing feasibility. Technology in use at other sites in Yukon. System test more difficult than shallow aquifer due to depth. Contaminant precipitation could cause long term decrease in aquifer permeability. Long term effectiveness uncertain. Not considered viable option.

5 Short-term Actions

Based on the field program results, the Faro Technical Advisory Team (TAT), the TAT provided the following recommendations in October 2008:

- Collection of near surface aquifer water from S-cluster area should be implemented as soon as practicable. In addition to the concerns about gradual increases in zinc loadings via groundwater and the associated AMP requirements, the work this summer has shown that that there is a high likelihood of surface discharges. The water license prohibits discharge of water exceeding 0.5 mg/L zinc to Rose Creek and specifically references “all points of entry” which would include diffuse surface discharge from the S-cluster area.
- A conceptual S-cluster capture system is expected to consist of:
  - Install interim collection system this fall – sump/trench in the shallow aquifer, pump from 2 existing deep aquifer wells to the sump. Pump from sump to Faro Pit.
  - This would constitute a first phase of groundwater collection system that would be expanded/improved as necessary in 2009.
  - Opportunities for alternate treatment methods which would compliment the collection system should be investigated beginning in 2009.
  - Further details on the collection system components are described below.
- The water collected from the S-cluster area should be directed to the Faro pit in the short term.
- Discharge of the S-cluster water to the Faro Pit for more than two years will cause the currently estimated treatment capacity of the Faro mill system to be exceeded. Several options for the longer term management of the S-cluster water need to be considered:
  - The basis for the current estimates of treatment capacity need to be re-examined, and options for upgrading the Faro mill system to treat the additional load should be considered.
  - The S-cluster area will be a source of relatively low flow – high strength water, similar to the interim collection system at the Emergency Tailings Area (ETA) and the Zone II pit pumpback. In general, it is more efficient to collect and treat high strength sources directly rather than diluting them first. As the proportion of these low flow – high strength sources increases, storing and diluting them in the Faro Pit or Intermediate Pond becomes less efficient. Options for a separate treatment system for roughly 200 gpm of high strength sources should be considered.
  - The S-cluster water will require year-round collection. The ETA water is in fact also a year-round source, and the current approach of collecting only the summer flow is a compromise. As the year-round proportion of the sources increases, the economics of instituting year-round treatment improve. Options for year-round treatment should be considered.

Based on these recommendations, it is expected that the contaminated water collection system will consist of the following components:

- A 6 to 7 m deep sump should be constructed to intercept the shallow aquifer and covered with an insulated shack.
- Pump from two groundwater wells using pumps already on-site. These should be re-installed and set up to discharge to the sump. The well-heads and the piping from the wells to the sump will need to be insulated and heat traced.
- A pump should be installed in this sump and sized to be capable of pumping 50 USgpm to the Faro pit.
- Temporary (08/09 winter) power from diesel generator situated on haul road above S-Wells. Fuel consumption is expected to be in the range of 2- 3 litres per hour. Capacity for up to 4 days (300 litres) would allow unattended operation over weekend periods through the winter.
- The collected water should flow via insulated and heat traced pipeline to Faro Pit. The pipeline must gravity drain in both directions if there is a system failure.
- Consider installing a steel section in the pipeline as it passes the generator. This would allow use of exhaust heat to warm the flow.
- A control system should be designed for subsequent integration into a sitewide system, The minimum components include:
    - Low water shut off.
    - System off - warning light (= high water alert).
    - Remote alarm (to guardhouse – minimum, to pager or phone alert in Faro – strongly preferred).
    - Flow meter with totalizer.
- An oxygen sensor is required at the shack as this system will be situated at the toe of an ARD rock pile, or staff should use personal gas monitors.

Deloitte & Touche accepted these recommendations and, during the winter of 2008/2009, construction of the shallow aquifer collection system was initiated. As of February 10, 2009, the shallow collection sump has been constructed, a heat traced and insulated pipeline has been installed from the S-cluster area to the Faro Pit and an automated pumping control system is under construction. The two existing Deep Aquifer pumping wells will be connected to the Shallow Aquifer pumping system, which will direct contaminated water to the Faro Pit. The system is intended to be operational by February 28, 2009. Photo 4 shows the exterior of the pumping/control container that will be located at the S-cluster.

Photo 4: Shallow Aquifer Pumping System Under Construction

6 Conclusions and Recommendations

The results of the 2008 investigation indicate that highly contaminated groundwater is localized within the Shallow Aquifer and a limited area of the Deep Aquifer. Lesser contaminated water in the Deep Aquifer is extensive. Contaminated groundwater is in close proximity to the NFRC and likely flowing underneath the NFRC itself. The Shallow Aquifer is interpreted to daylight below the primary 2005/2008 drilling alignment and the two aquifers merge into a single aquifer just up gradient of the NFRC.

Weathered bedrock is relatively permeable to depths of at least 10m along the primary 2005/2008 drilling alignment, becoming on the order of 1m closer to the NFRC. Pumping well tests indicate that interception of contaminated water in weathered bedrock, and overlying sediments is feasible but will require additional wells to be completely effective. The use of pumping wells in the Shallow Aquifer is not considered feasible.

An assessment of interception options suggests that a sump/collector trench would be most practical for interception in the Shallow Aquifer. Interception in the Deep Aquifer could be initiated with the existing pumping wells, but will require additional wells to attain better effectiveness.

An adaptive management approach is recommended, focusing initially on the Shallow Aquifer collection sump and Deep Aquifer pumping wells. Additional pumping wells in the Deep Aquifer would be added as required. If monitoring indicated that pumping alone was not achieving interception requirements, cut-off walls should be installed. Additional pumping wells may be required closer to the NFRC, at least temporarily.

In October, 2008 the TAT recommended immediate installation of the Shallow Aquifer interception sump and use of the existing Deep Aquifer pumping wells. Following the installation of this system, a monitoring program should be initiated, including both regular water quality sampling of existing monitoring wells and the installation of water level dataloggers to assess seasonal water level fluctuations and, once operational, the effectiveness of the existing Deep Aquifer pumping wells. Deloitte & Touche accepted these recommendations and construction of the Shallow Aquifer System commenced in January 2009, and the system is intended to be in operation by February 28, 2009.

This report, "**Faro Mine Complex, 2008 S-Cluster Groundwater Investigation and Option Assessment, 2008/09 Task 24 - FINAL**," was prepared by SRK Consulting (Canada) Inc.

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AND STAMPED

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Reviewed by

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AND STAMPED

Cam Scott, P.Eng.
Principal Engineer

7 References

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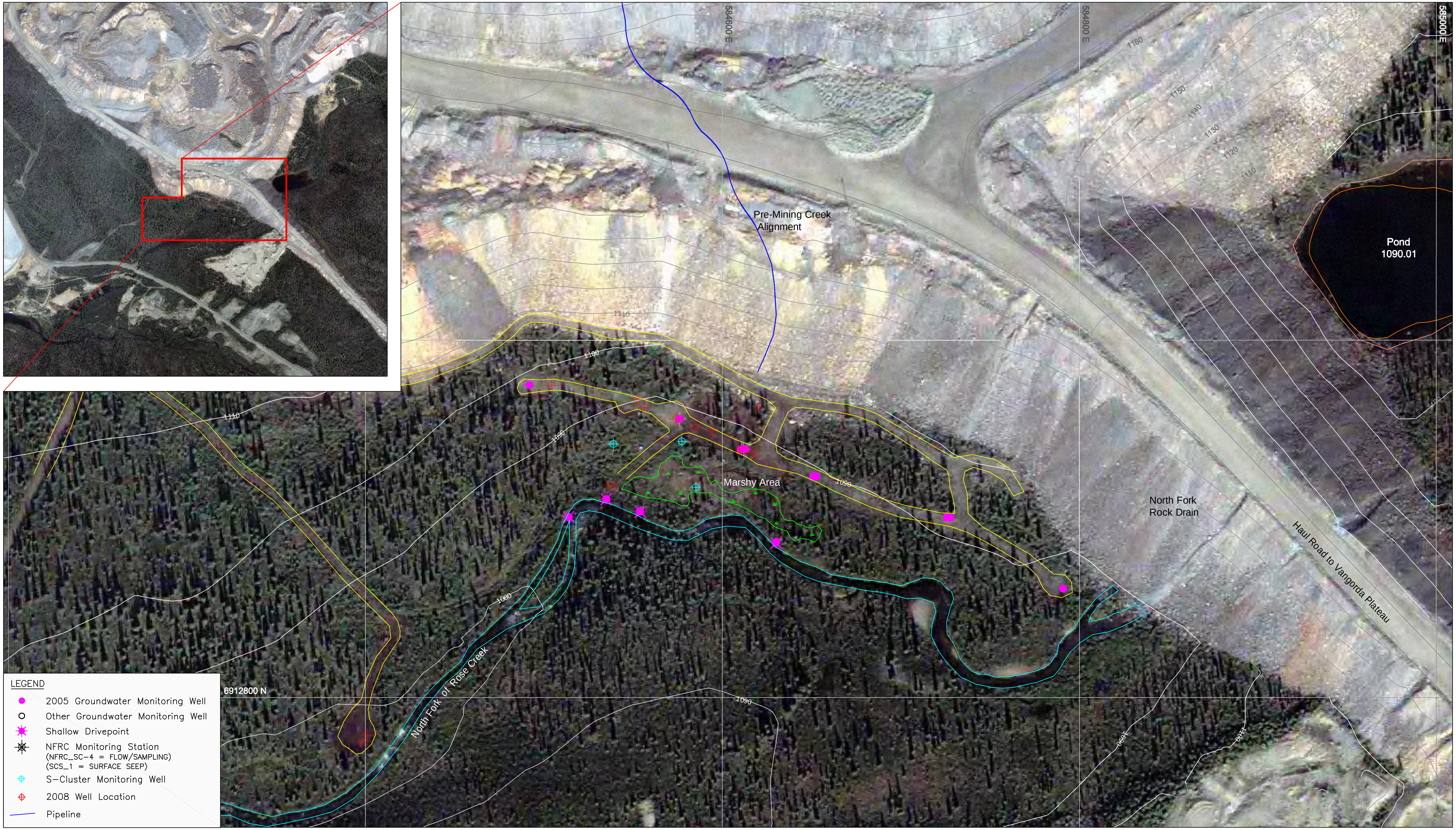
Figures



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Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003 WO 8856

Notes:

1. All dimensions and elevations are in Metres.

1:2,000

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SRK JOB NO.: 1CD003.112

FILE NAME: S–Wells location map.dwg

Deloitte & Touche

FARO MINE COMPLEX

S-Wells Shallow Aquifer Groundwater Collection

S-Wells Area
General Location Map

DATE: Jan. 2009
APPROVED: DM
FIGURE: 1

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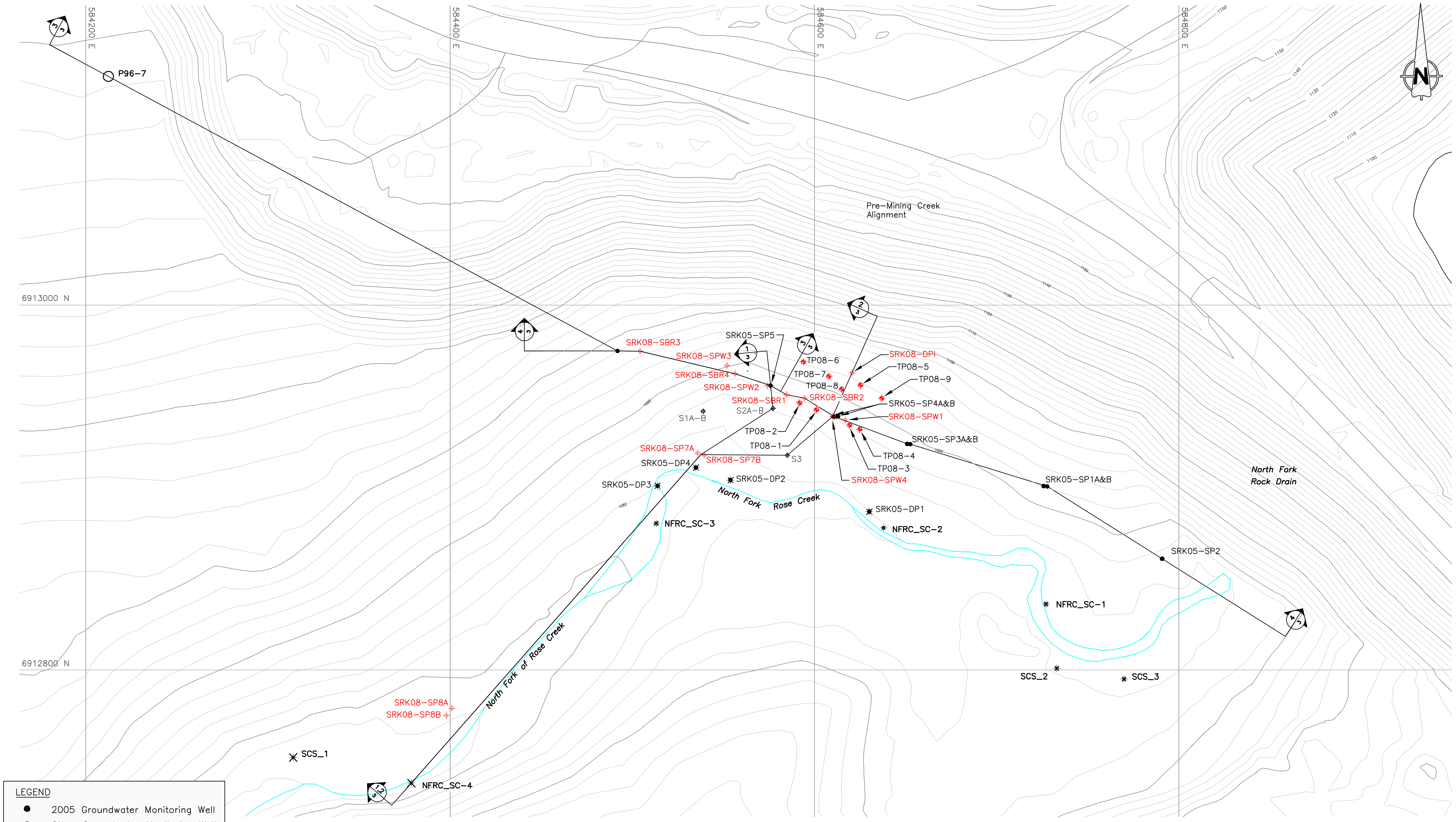

LEGEND

●	2005 Groundwater Monitoring Well
○	Other Groundwater Monitoring Well
✹	Shallow Drivepoint
✳	NFRC Monitoring Station (NFRC_SC-4 = FLOW/SAMPLING) (SCS_1 = SURFACE SEEP)
⊕	S-Cluster Monitoring Well
SRK08-SP8B ⊕	2008 Well Location
TP08-4 ✚	2008 Test Pit Location

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Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

1:2,000 0 20 40 60 80 100 M

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FILE NAME: 2008 FARO SITE PLAN DM2.dwg

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2008 S-Cluster Groundwater Investigation

S-Well Site Map

DATE: Jan. 2009
APPROVED: DM
FIGURE: 2

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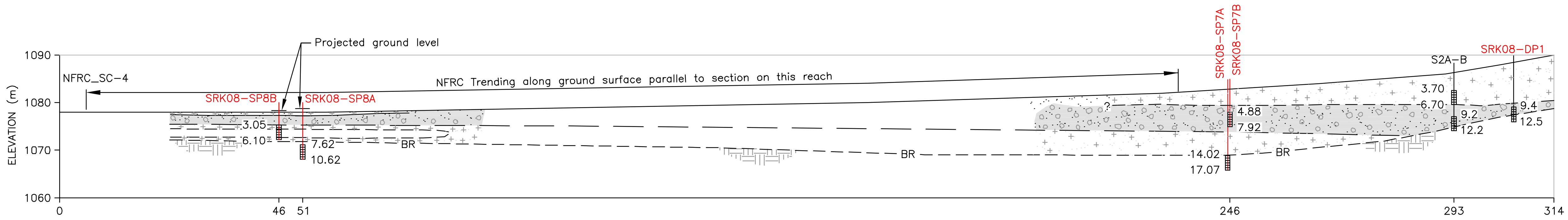
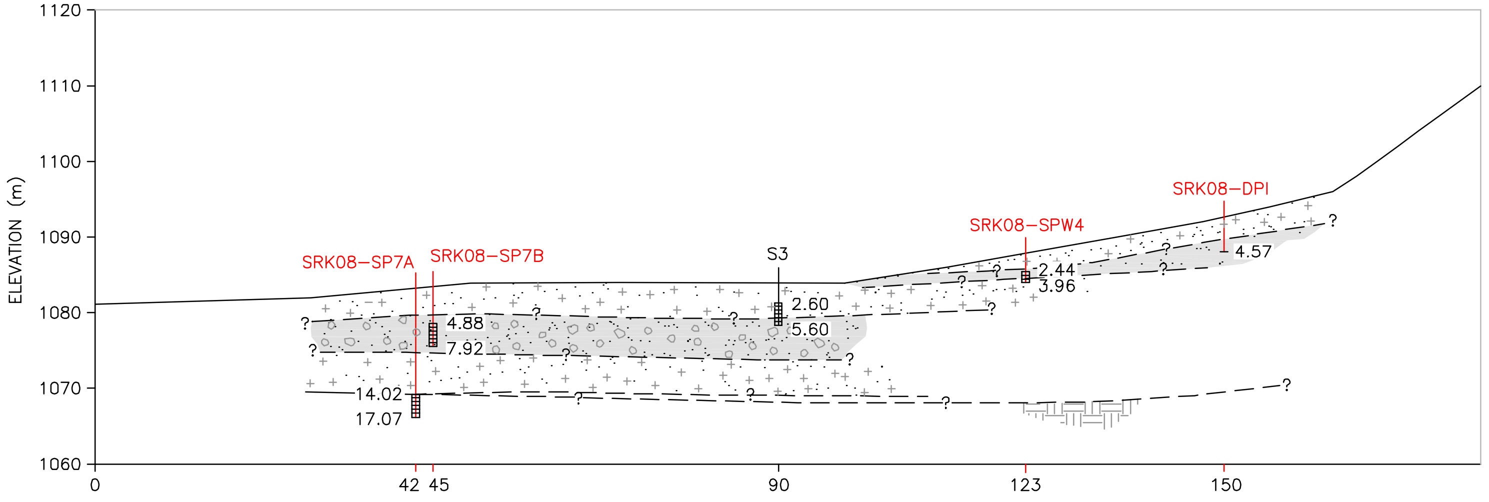


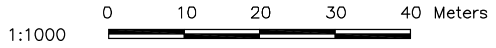
SECTION 1



SECTION 2

Legend:

▨ Silty Sand
▨ Sand and Gravel
▨ Bedrock
7.62 Top of Screen (metres below ground surface)
10.62 Bottom of Screen (metres below ground surface)
SRK08-DP1 2008 Drillhole
S3 Previous Drillhole



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SRK JOB NO.: 1CD003.112
FILE NAME: 2008 FARO SITE PLAN DM2.dwg

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2008 S-Cluster Groundwater Investigation

Cross Sections 1 and 2

DATE: Jan. 2009
APPROVED: DM
FIGURE: 3

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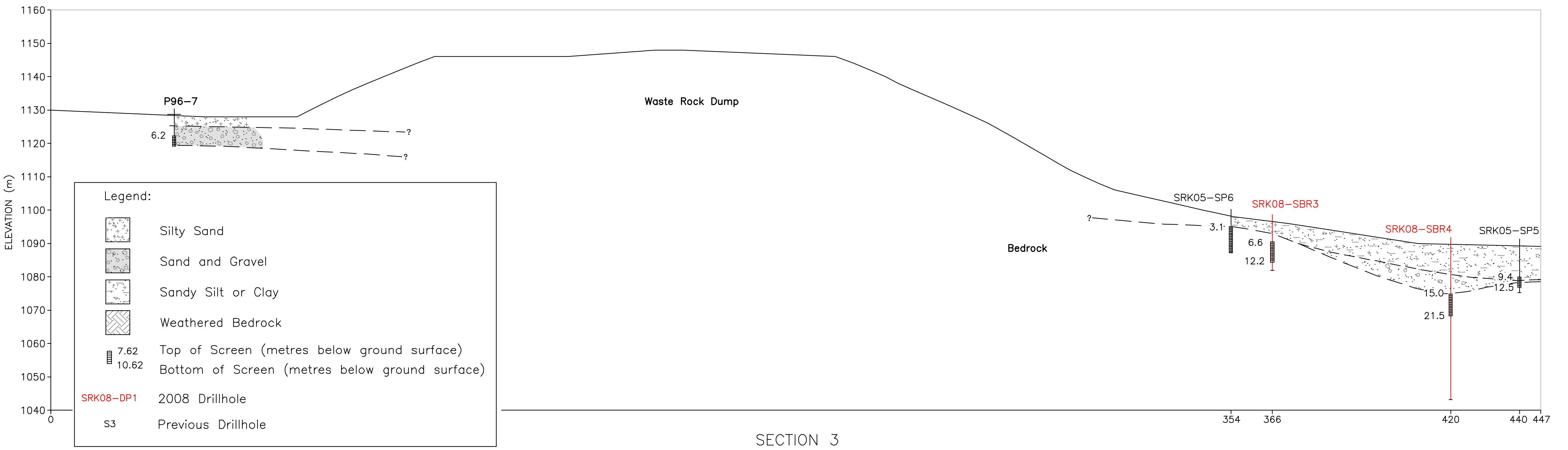
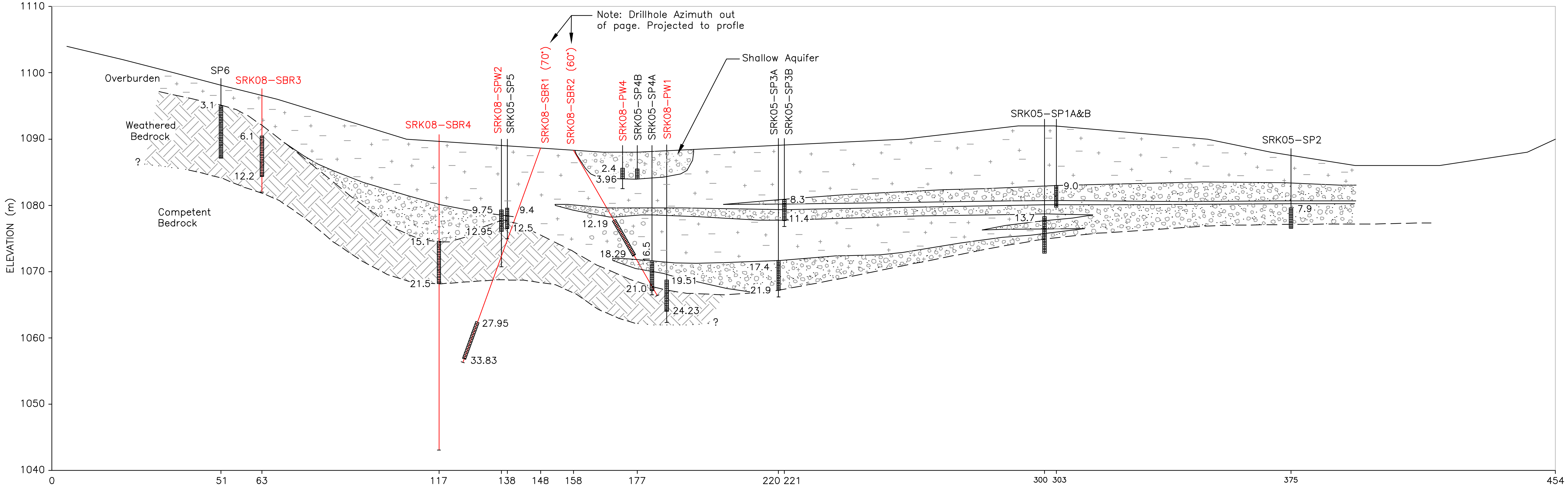


SECTION 3



SECTION 4
(2X Vertical exaggeration)

1:1250
0 25 50 75 100 Meters

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SRK JOB NO.: 1CD003.112
FILE NAME: 2008 FARO SITE PLAN DM2.dwg

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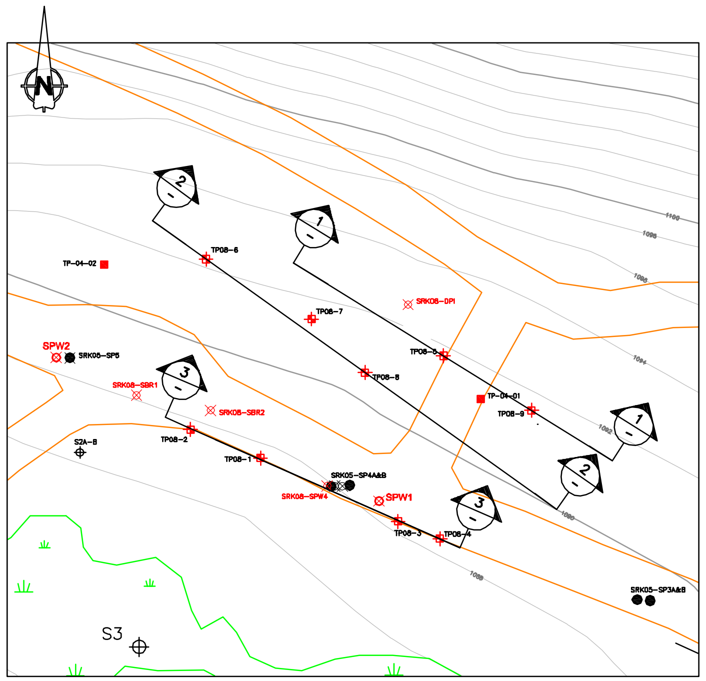
2008 S-Cluster Groundwater Investigation

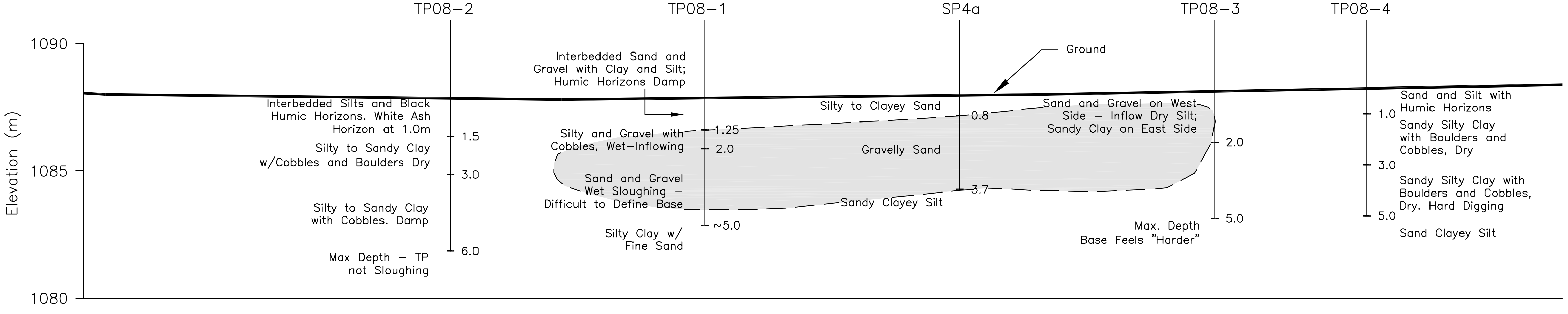
Cross Sections 3 and 4

DATE:	APPROVED:	FIGURE:
Jan. 2009	DM	4

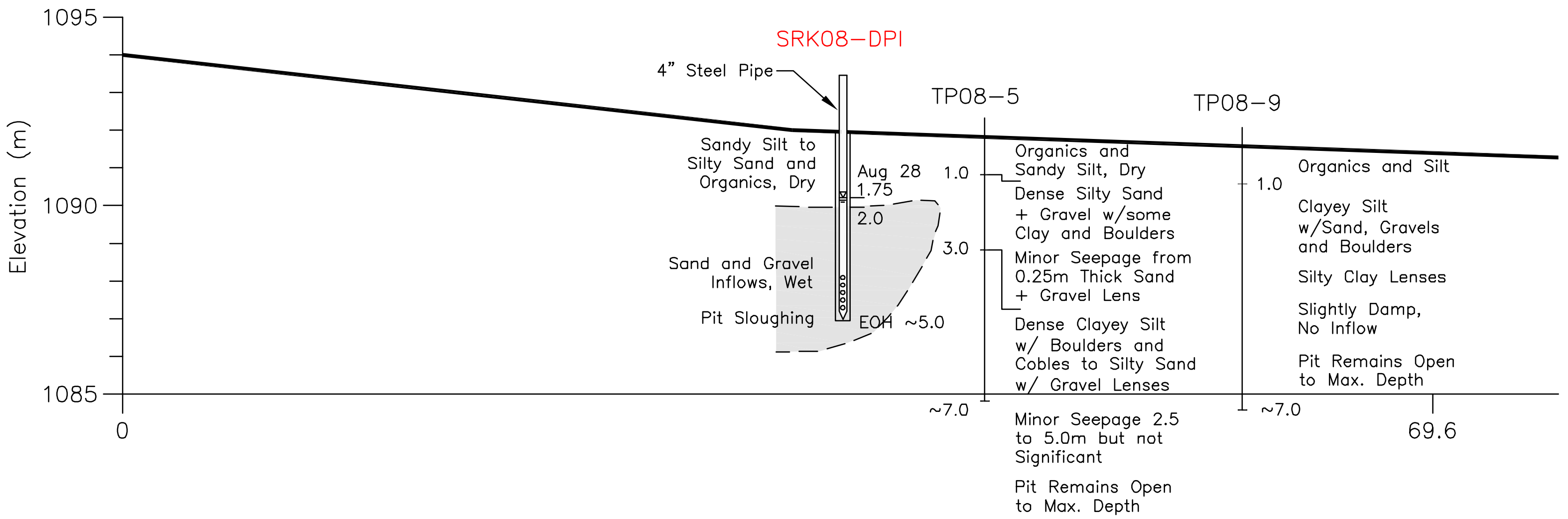
J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\2008 FARO SITE PLAN DM2.dwg



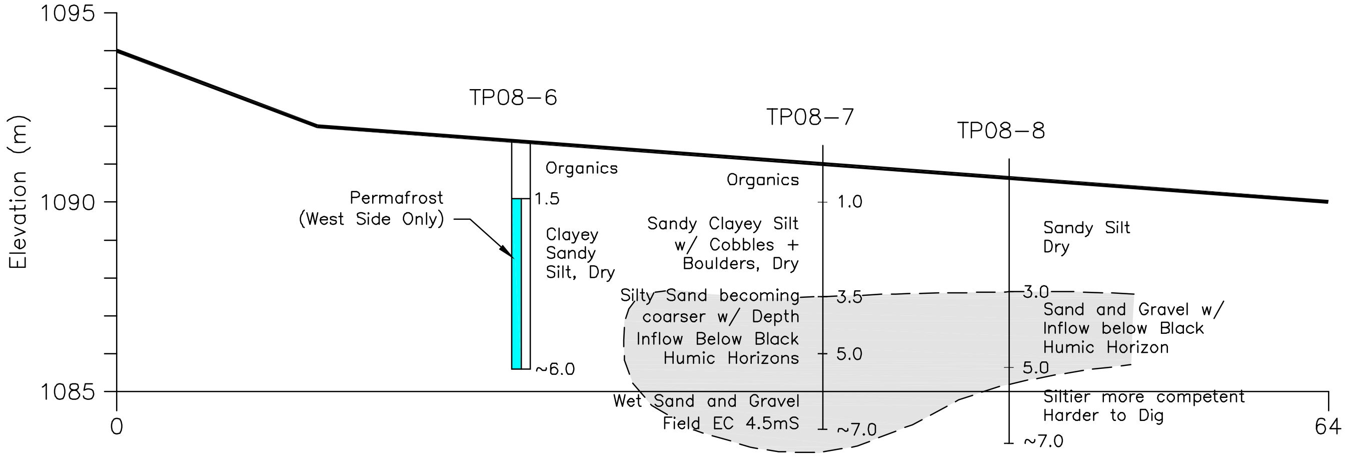
Cross Section Locations
(All Sections Looking North)
Scale A



Section 3
Scale B



Section 1
Scale C – 2X Vertical Exaggeration



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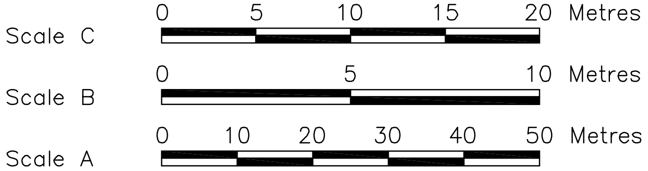
Scale C – 2X Vertical Exaggeration



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Vancouver B.C.

SRK JOB NO.: 1CD003.112

FILE NAME: S–Aquifer_Location and profiles.dwg

Deloitte & Touche

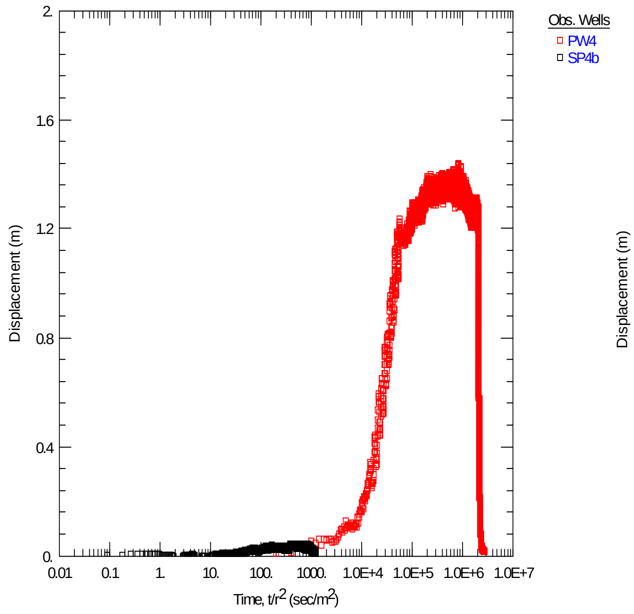
FARO MINE COMPLEX

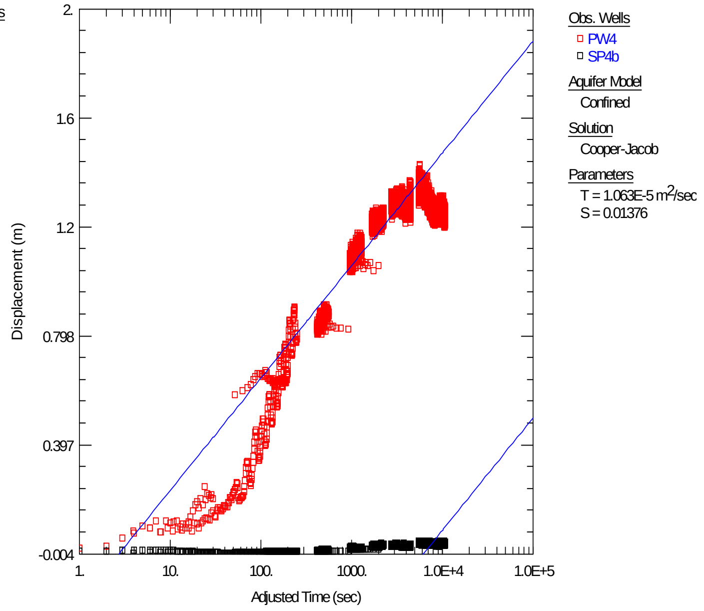
S-Wells Shallow Aquifer Groundwater Collection

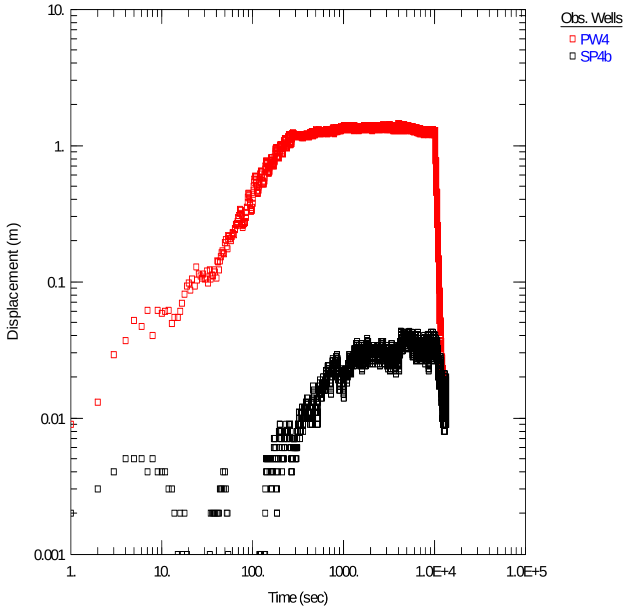
Shallow Aquifer
Test Pit Cross Sections

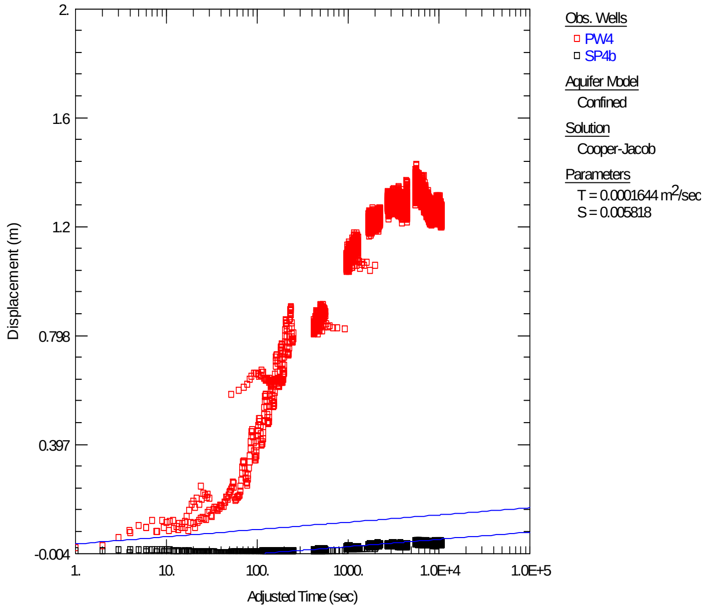
DATE:	APPROVED:	FIGURE:
Jan. 2009	DM	5

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Aquifer_Location and profiles.dwg









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Deloitte & Touche

S-Well Shallow Aquifer Groundwater Collection

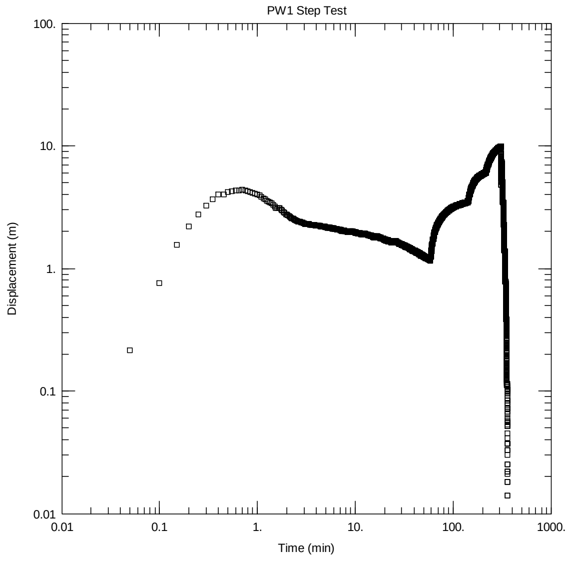
PW4 Pumping Test Data

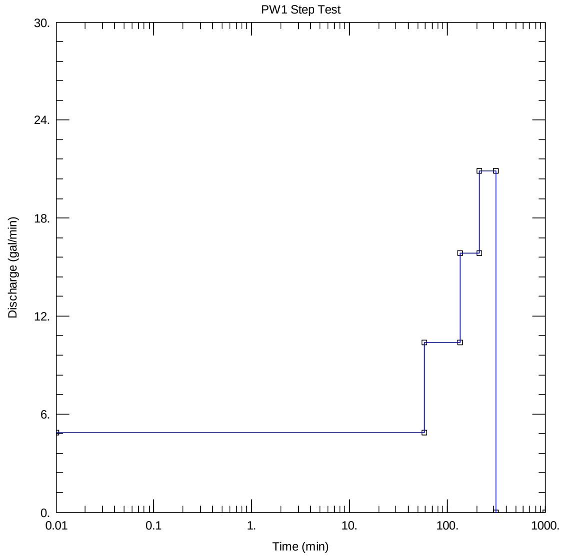
Job No: 1CD003.112

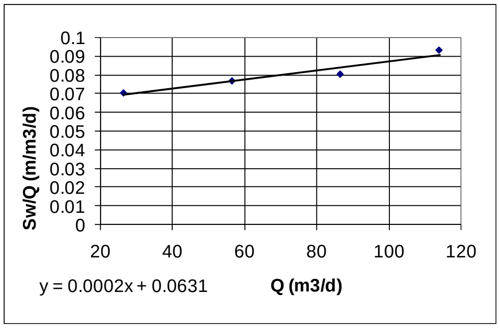
Filename: Fig 6-7-9-15_test results_20090211. ppt

FARO MINE COMPLEX

Date:	Approved:	Figure:
January 2009	DM	6

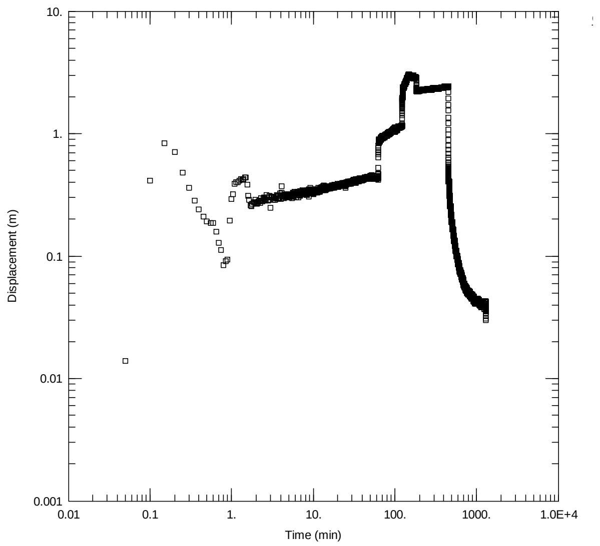


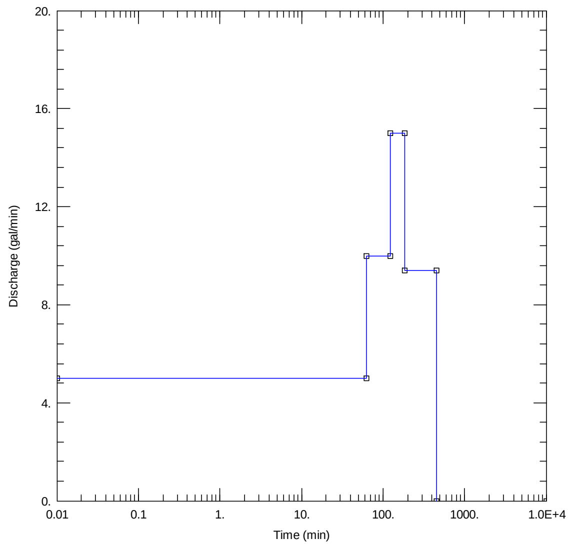


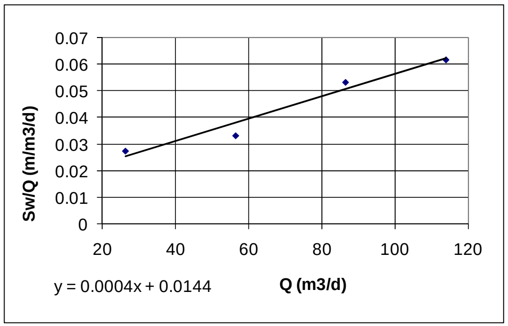


Q (m3/d)	Q (g/min)	Borehole Efficiency (%)
5	1	98
10	2	97
15	3	95
20	4	94
25	5	93

PW1







PW2

Q (m3/d)	Q (g/min)	Borehole Efficiency (%)
5	1	88
10	2	78
15	3	71
20	4	64
25	5	59

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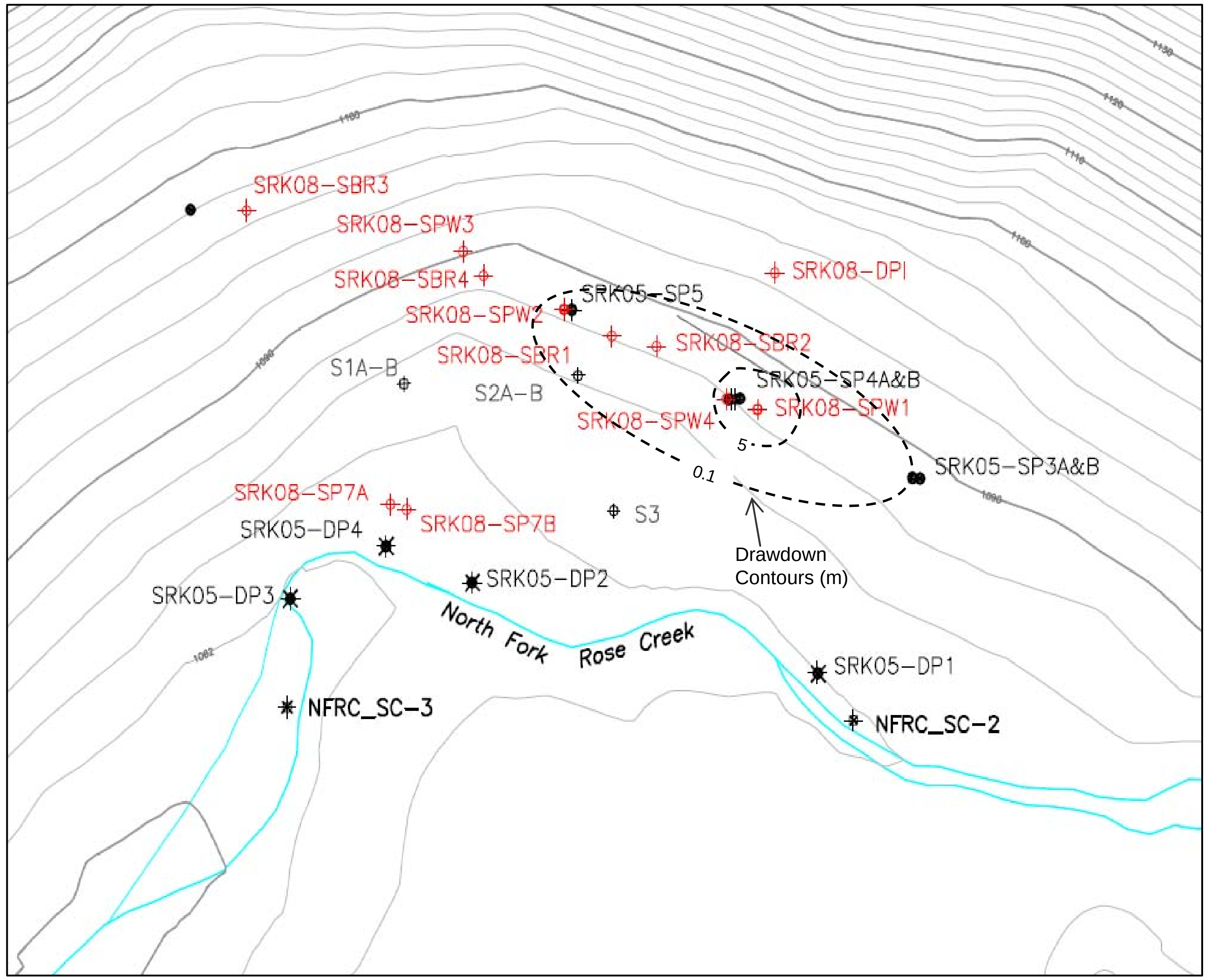
S-Well Shallow Aquifer Groundwater Collection

PW1 and PW2 Step Test Results

Job No: 1CD003.112
Filename: Fig 6-7-9-15_test results_20090211.ppt

FARO MINE COMPLEX

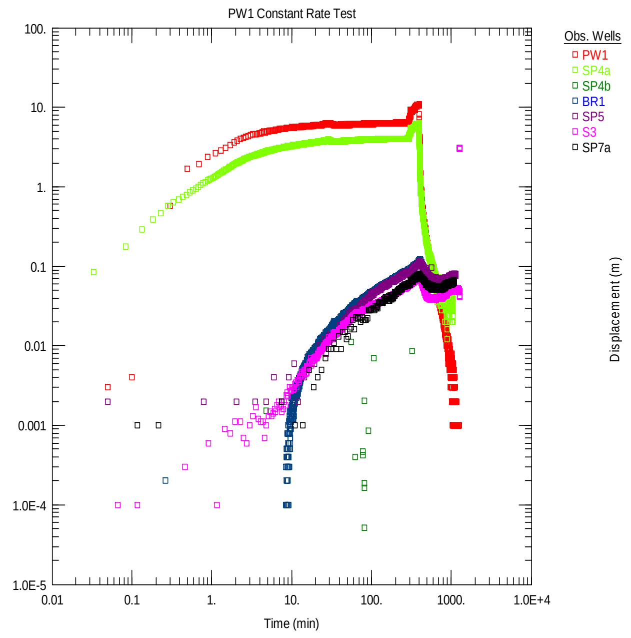
Date: January 2009
Approved: DM
Figure: 7



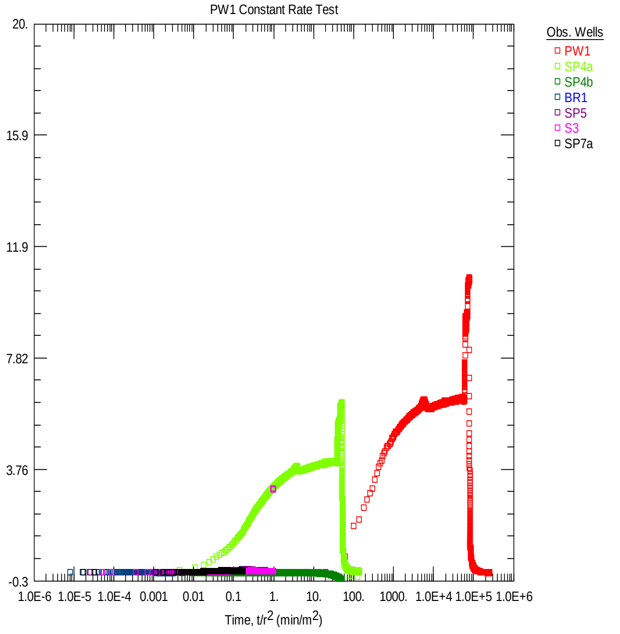
Drawdown @ ~398 minutes

Well	Drawdown (m)	Distance from PW1 (m)
PW1	10.74	n/a
SP4a	6.19	4.4
BR1	0.12	47
SP5	0.11	45
S3	0.07	37
SP7a	0.07	82

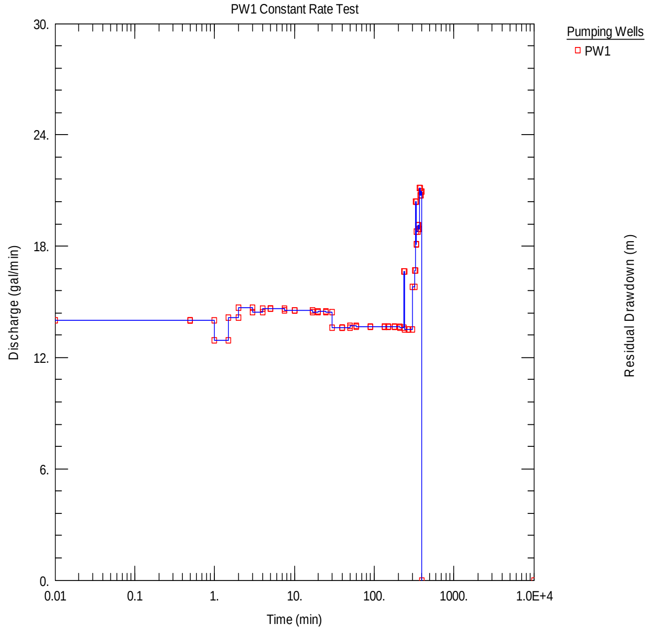
Drawdown



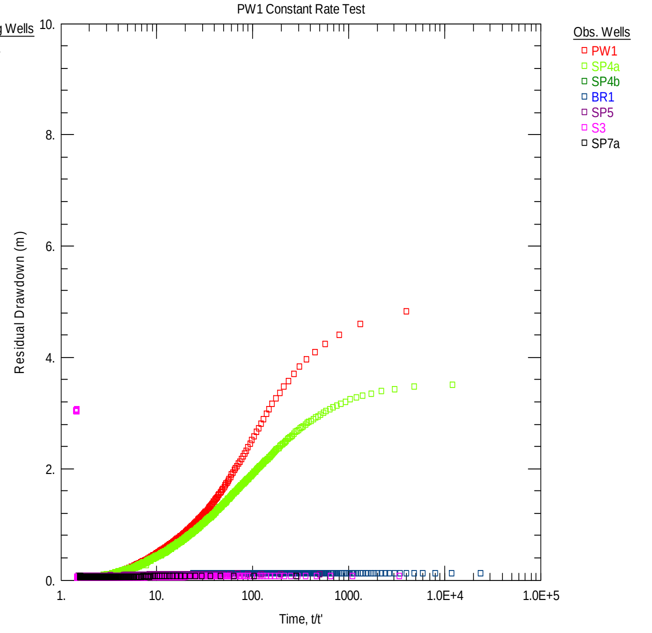
Composite Drawdown



Pumping Rate



Recovery



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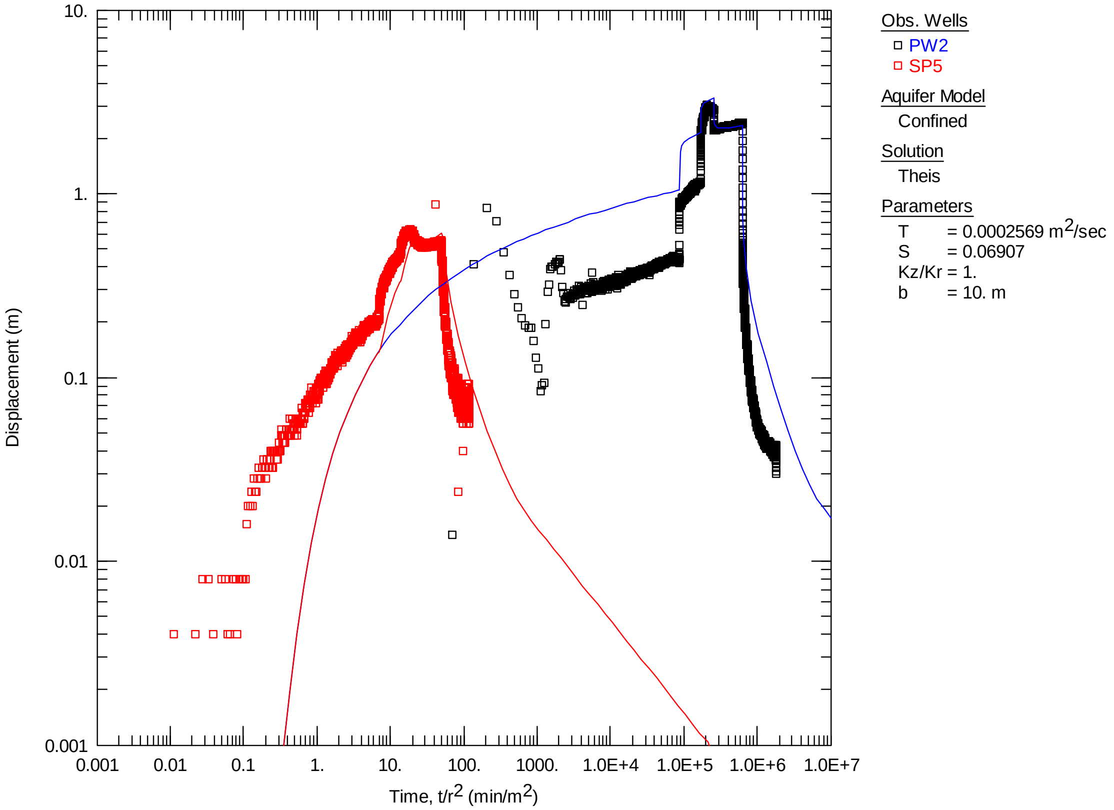
S-Well Shallow Aquifer Groundwater Collection

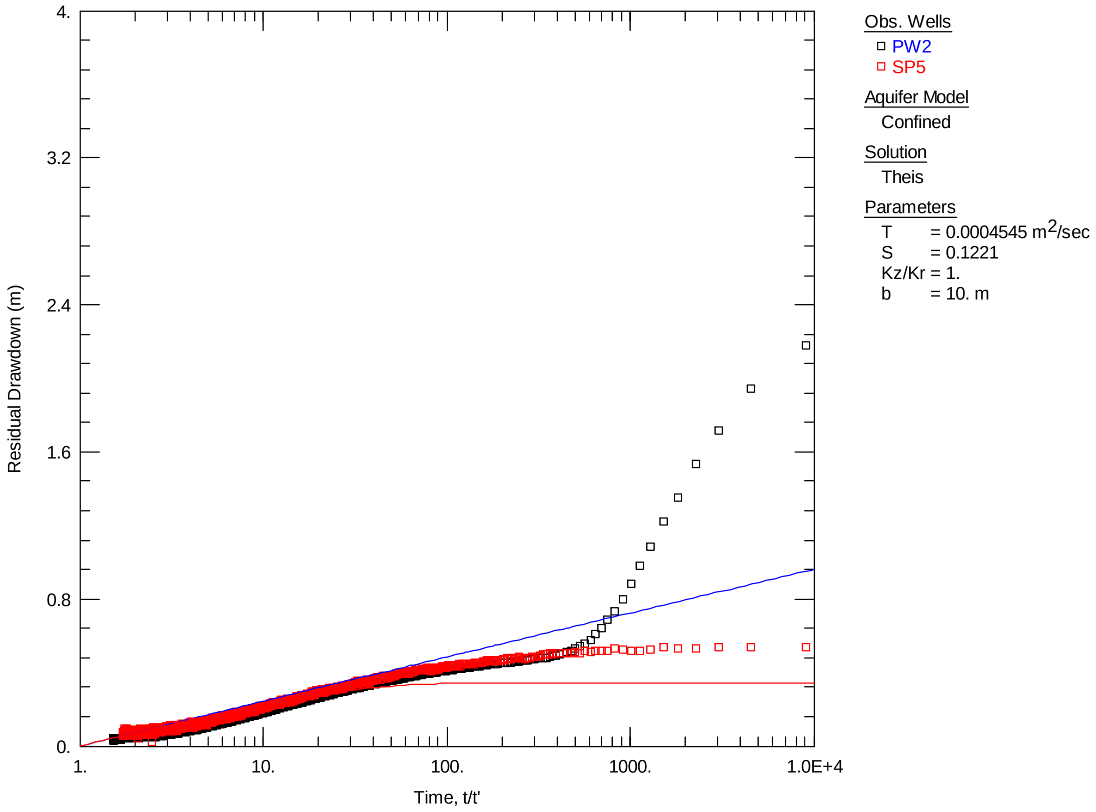
PW1 Constant Rate Test

Job No: 1CD003.112
Filename: Fig 8_PW1 drawdown data.ppt

FARO MINE COMPLEX

Date: January 2009
Approved: DM
Figure: 8





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S-Well Shallow Aquifer Groundwater Collection

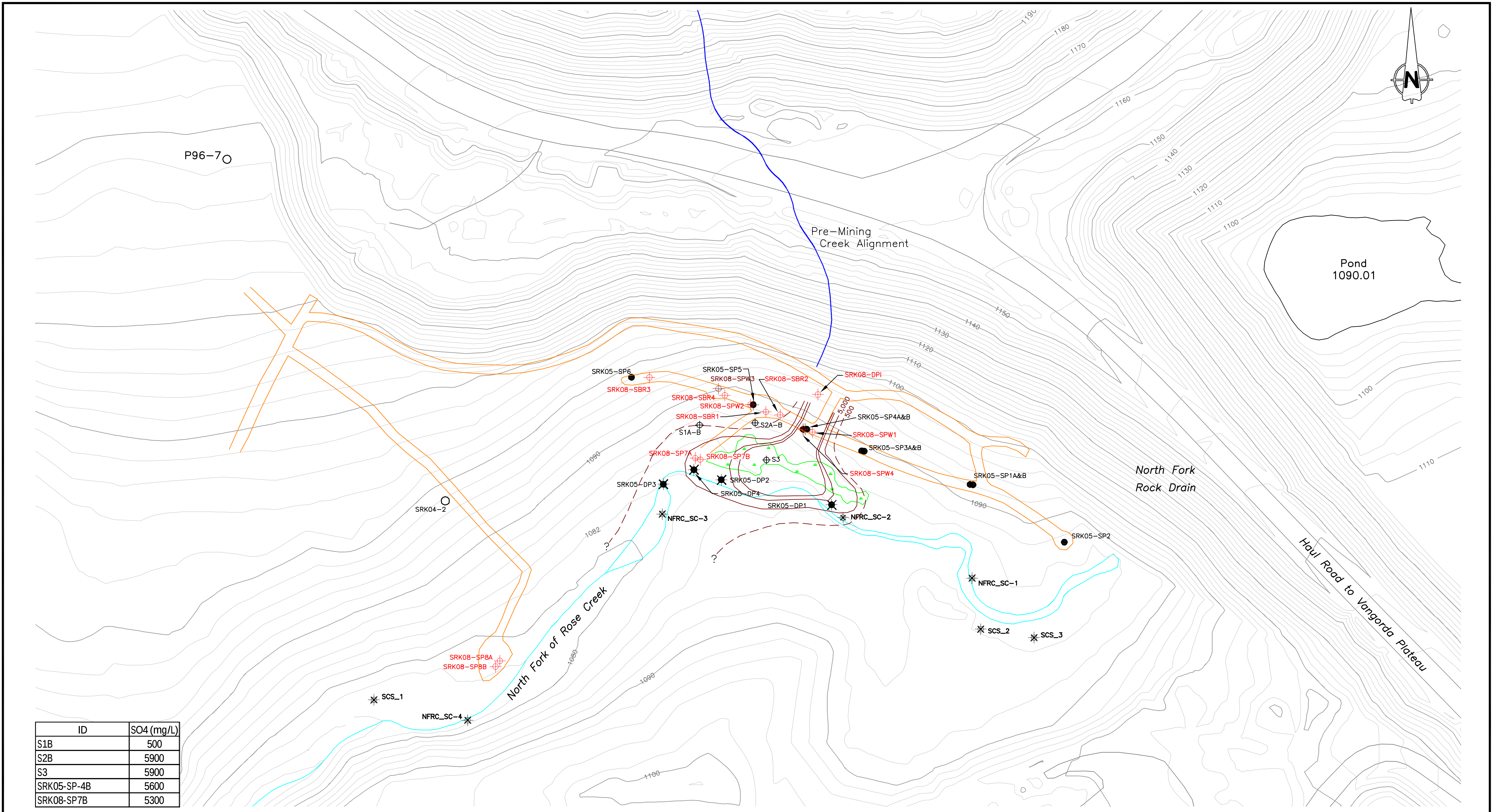
PW2 constant Rate Test Results

Job No: 1CD003.112

Filename: Fig 6-7-9-15_test results_20090211.ppt

FARO MINE COMPLEX

Date:	Approved:	Figure:
January 2009	DM	9



ID	SO4 (mg/L)
S1B	500
S2B	5900
S3	5900
SRK05-SP-4B	5600
SRK08-SP7B	5300

LEGEND

- ● 2005 Groundwater Monitoring Well
- ○ Other Groundwater Monitoring Well
- ✱ Shallow Drivepoint
- ✳ NFRC Monitoring Station
  (NFRC_SC–4 = FLOW/SAMPLING)
  (SCS_1 = SURFACE SEEP)
- ⊕ S–Cluster Monitoring Well
- SRK08–SP8A ⊕ 2008 Well Location

SRK CONSULTING
Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

0 50 100 150 Metres

1:2500

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S-Wells Shallow Aquifer Groundwater Collection

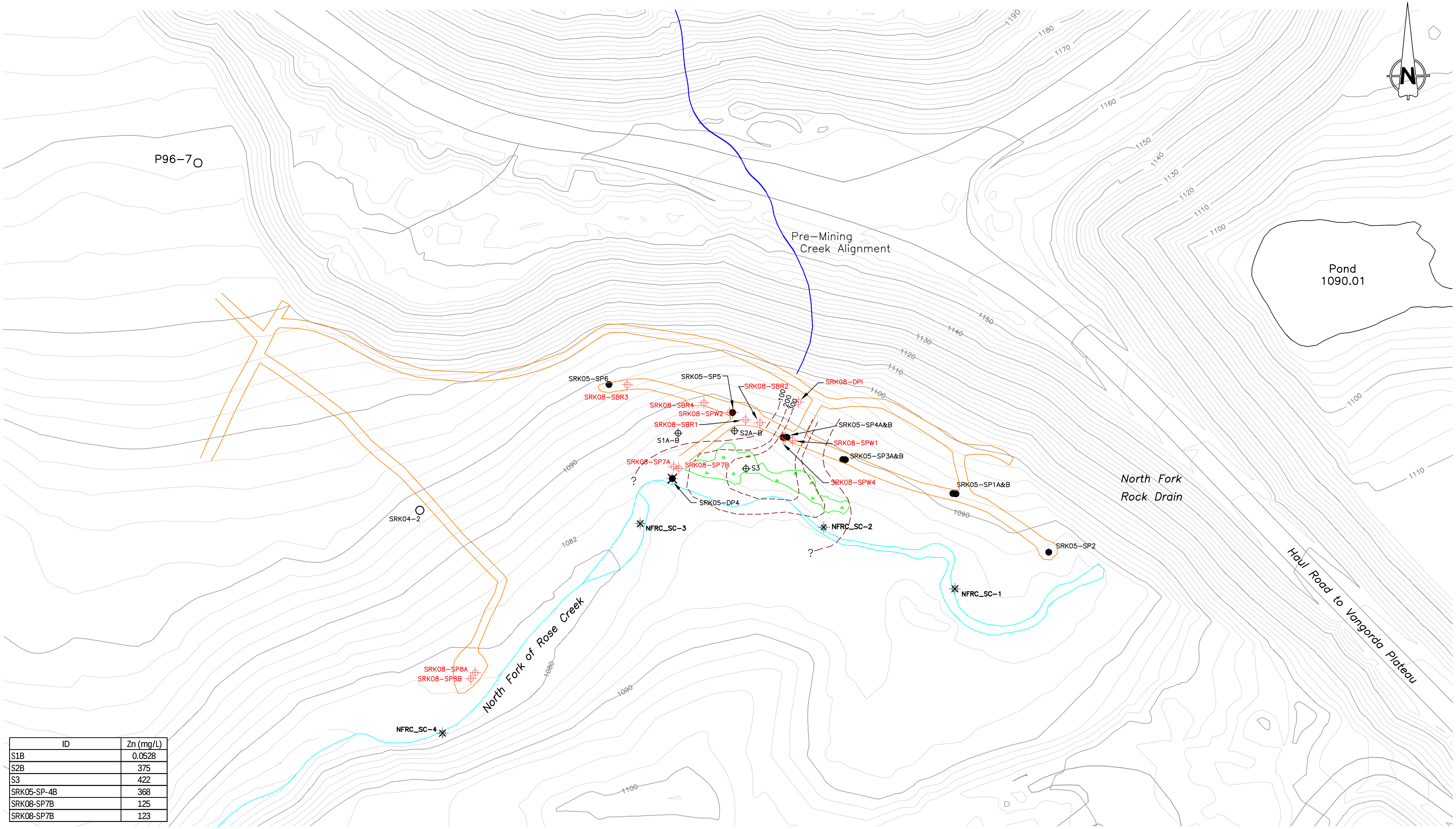
Shallow Sulphate

SRK JOB NO.:	1CD003.112
FILE NAME:	S–Cluster Conc Maps.dwg

FARO MINE COMPLEX

DATE:	APPROVED:	FIGURE:
Jan. 2009	DM	10

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Cluster Conc Maps.dwg



ID	Zn (mg/L)
S1B	0.0528
S2B	375
S3	422
SRK05-SP-4B	368
SRK08-SP7B	125
SRK08-SP7B	123

LEGEND

- ● 2005 Groundwater Monitoring Well
- ○ Other Groundwater Monitoring Well
- ✱ Shallow Drivepoint
- ✳ NFRC Monitoring Station (NFRC_SC–4 = FLOW/SAMPLING) (SCS_1 = SURFACE SEEP)
- ⊕ S–Cluster Monitoring Well
- SRK08–SP8A ⊕ 2008 Well Location

SRK CONSULTING
Faro Mine, Yukon
Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

1:2500

0 50 100 150 Metres

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S-Wells Shallow Aquifer Groundwater Collection

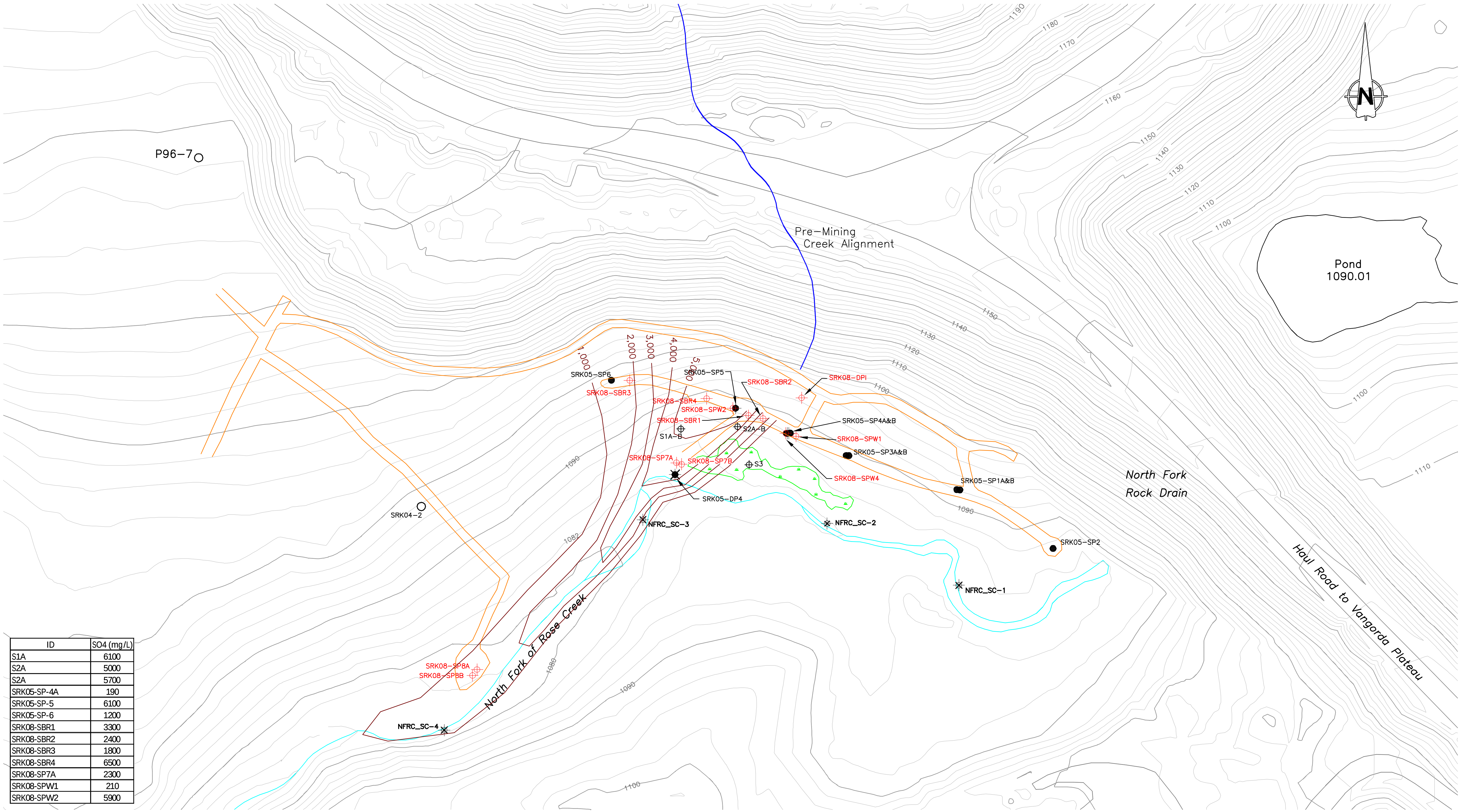
Shallow Zinc

SRK JOB NO.: 1CD003.112
FILE NAME: S–Cluster Conc Maps.dwg

FARO MINE COMPLEX

DATE: Jan. 2009
APPROVED: DM
FIGURE: 11

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad–Faro\2008 Acad Dwgs\S–Cluster Conc Maps.dwg



ID	SO4 (mg/L)
S1A	6100
S2A	5000
S2A	5700
SRK05-SP-4A	190
SRK05-SP-5	6100
SRK05-SP-6	1200
SRK08-SBR1	3300
SRK08-SBR2	2400
SRK08-SBR3	1800
SRK08-SBR4	6500
SRK08-SP7A	2300
SRK08-SPW1	210
SRK08-SPW2	5900

LEGEND

- ● 2005 Groundwater Monitoring Well
- ○ Other Groundwater Monitoring Well
- ☒ Shallow Drivepoint
- ✳ NFRC Monitoring Station
  (NFRC_SC-4 = FLOW/SAMPLING)
  (SCS_1 = SURFACE SEEP)
- ⊕ S-Cluster Monitoring Well
- SRK08-SP8A ⊕ 2008 Well Location

SRK CONSULTING
Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

1:2500

0 50 100 150 Metres

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S-Wells Shallow Aquifer Groundwater Collection

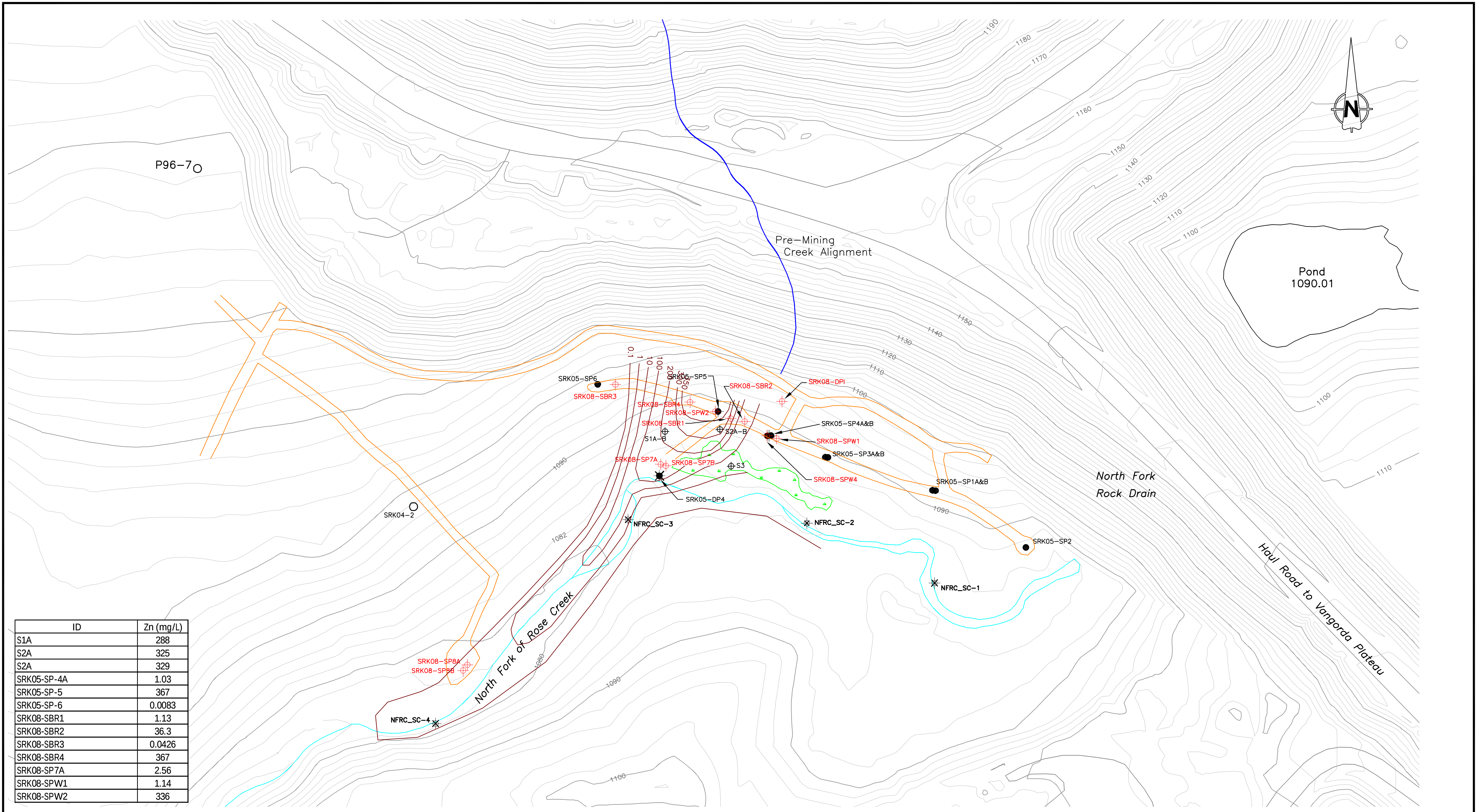
Deep Sulphate

SRK JOB NO.: 1CD003.112
FILE NAME: S-Cluster Conc Maps.dwg

FARO MINE COMPLEX

DATE: Jan. 2009
APPROVED: DM
FIGURE: 12

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Cluster Conc Maps.dwg



ID	Zn (mg/L)
S1A	288
S2A	325
S2A	329
SRK05-SP-4A	1.03
SRK05-SP-5	367
SRK05-SP-6	0.0083
SRK08-SBR1	1.13
SRK08-SBR2	36.3
SRK08-SBR3	0.0426
SRK08-SBR4	367
SRK08-SP7A	2.56
SRK08-SPW1	1.14
SRK08-SPW2	336

LEGEND

- ● 2005 Groundwater Monitoring Well
- ○ Other Groundwater Monitoring Well
- ✱ Shallow Drivepoint
- ⁎ NFRC Monitoring Station
  (NFRC_SC–4 = FLOW/SAMPLING)
  (SCS_1 = SURFACE SEEP)
- ⊕ S–Cluster Monitoring Well
- SRK08–SP8A ⊕ 2008 Well Location

SRK CONSULTING
Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

1:2500

0 50 100 150 Metres

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Vancouver B.C.

SRK JOB NO.: 1CD003.112
FILE NAME: S–Cluster Conc Maps.dwg

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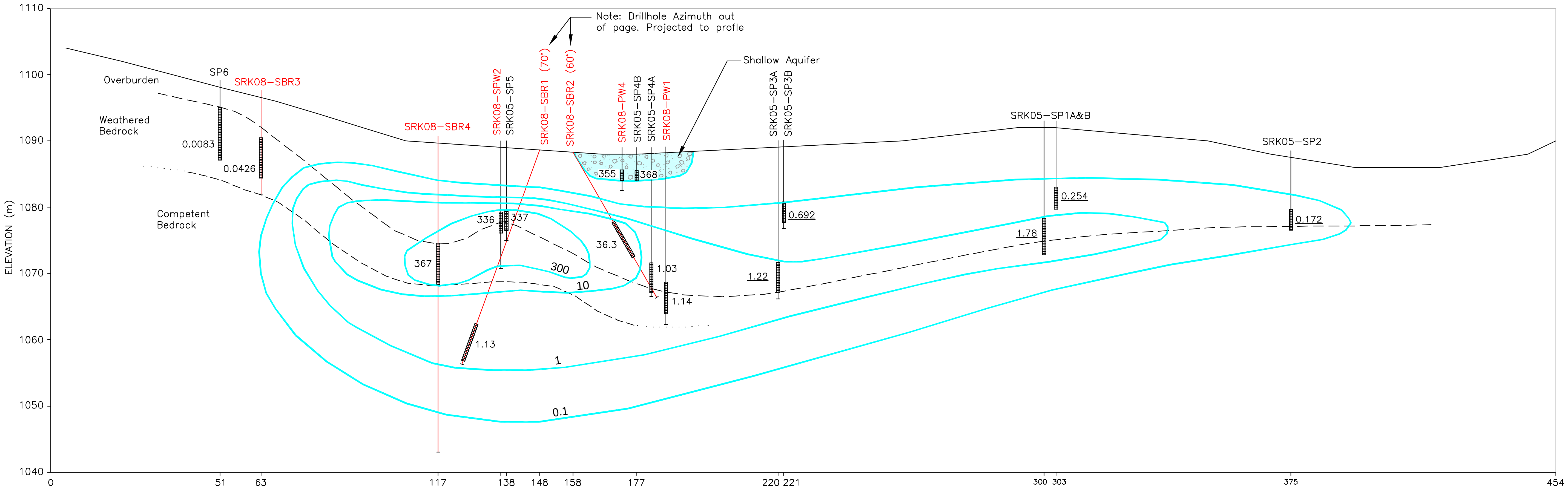
FAROMINE COMPLEX

S-Wells Shallow Aquifer Groundwater Collection

Deep Zinc

DATE: Jan. 2009
APPROVED: DM
FIGURE: 13

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Cluster Conc Maps.dwg



SECTION 4
(2X Vertical exaggeration)

Legend:

▨	Silty Sand
▨	Sand and Gravel
▨	Sandy Silt or Clay
▥ 367	Zinc Concentration (mg/L) from Nov. 2008
▥ 1.78	Zinc Concentration (mg/L) from May 2008
1	Zinc Concentration Contour (mg/Zn)
SRK08–DP1	2008 Drillhole
S3	Previous Drillhole

1:1250 0 25 50 75 100 Meters

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& Touche

2008 S-Cluster Groundwater Investigation

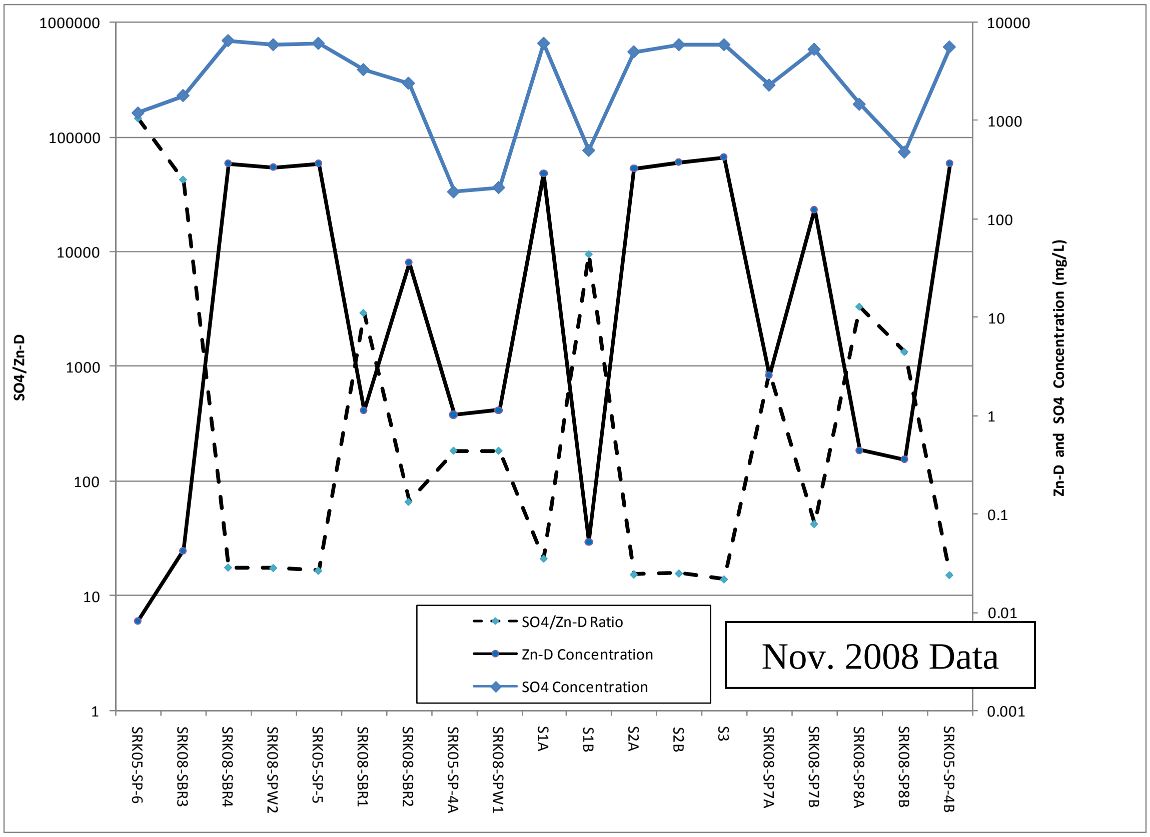
Cross Section With Zinc Concentration Distribution

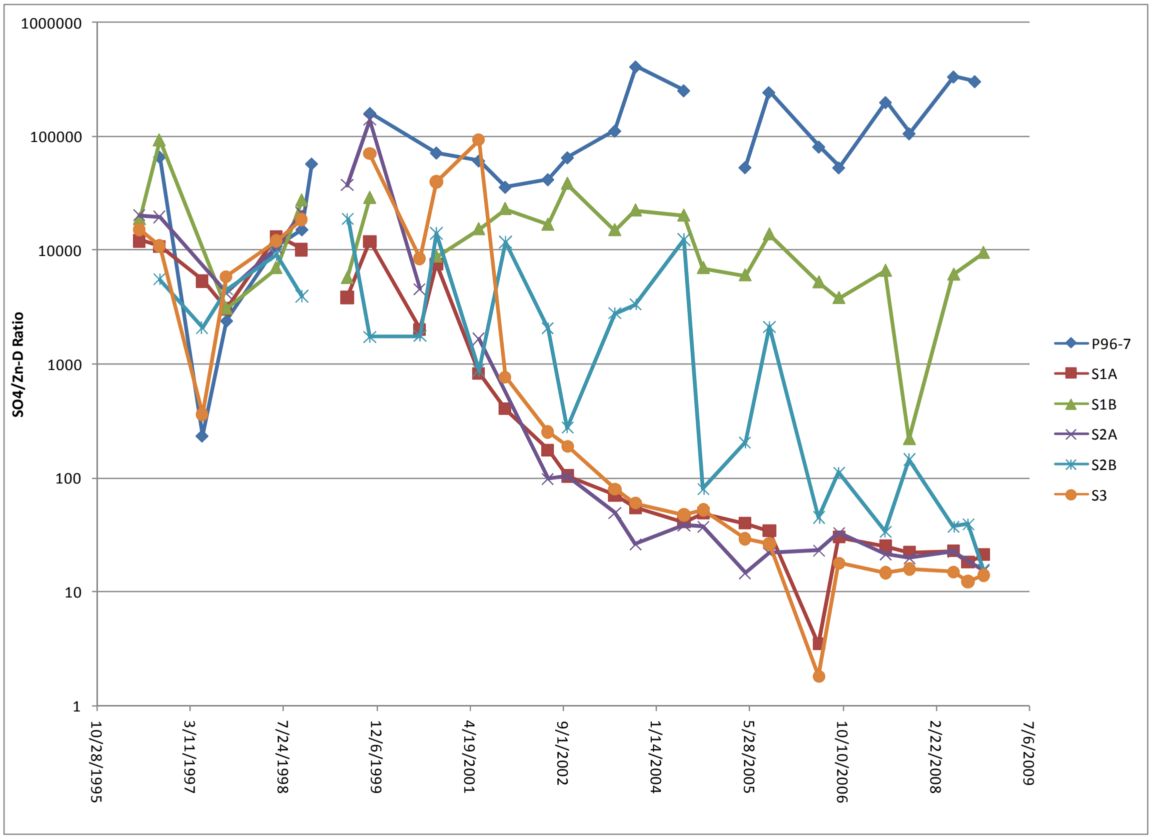
SRK JOB NO.: 1CD003.112
FILE NAME: 2008 FARO SITE PLAN DM2.dwg

FARO MINE COMPLEX

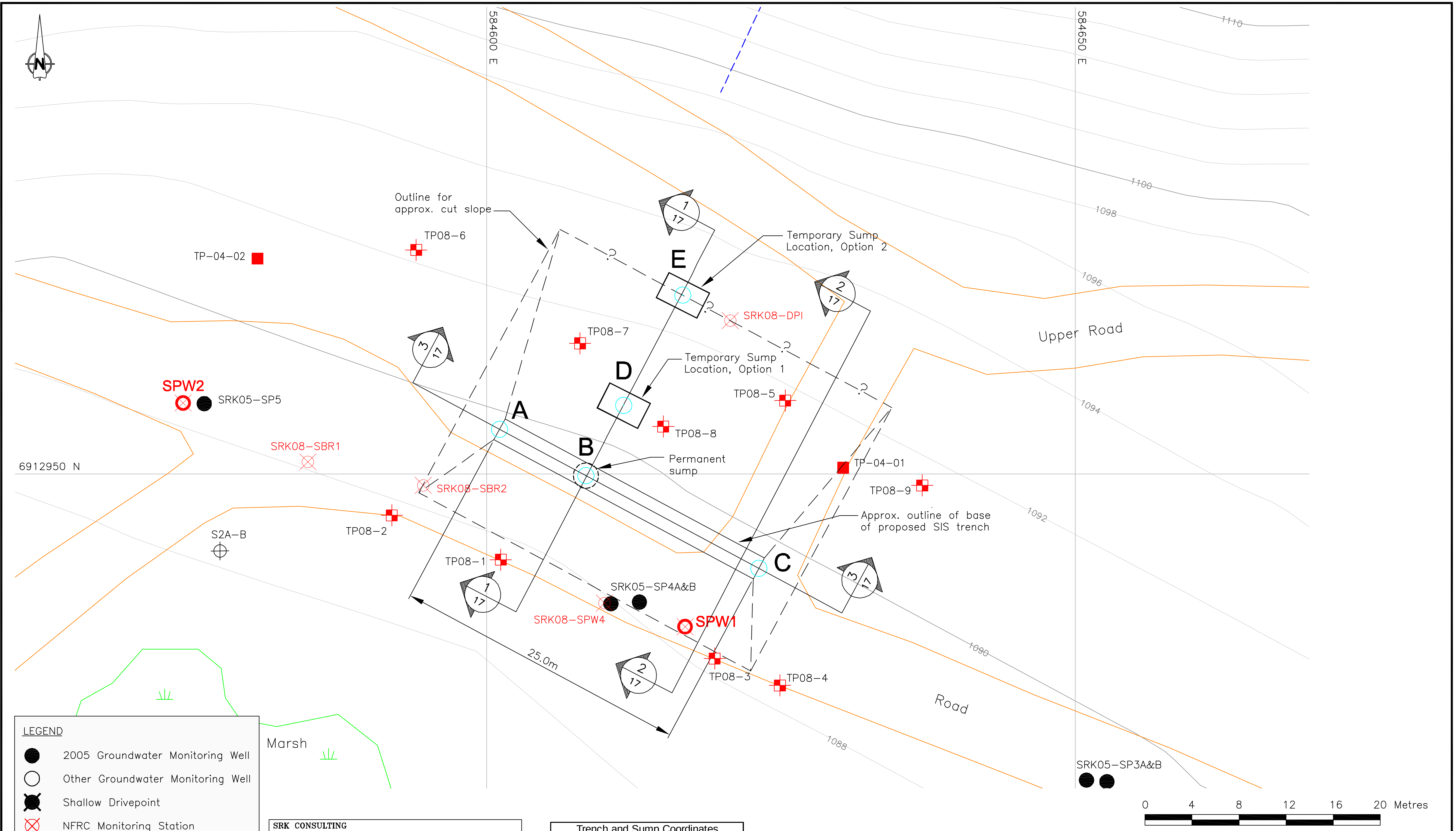
DATE: Jan. 2009
APPROVED: DM
FIGURE: 14

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\2008 FARO SITE PLAN DM2.dwg





SRK Consulting Engineers and Scientists VANCOUVER	**Deloitte & Touche**	S-Well Shallow Aquifer Groundwater Collection **S-Cluster Sulphate/Zinc Ratio Comparison**
Job No: 1CD003.112 Filename: Fig 6-7-9-15_test results_20090211. ppt	FARO MINE COMPLEX	Date: January 2009 Approved: DM Figure: 15



LEGEND

- ● 2005 Groundwater Monitoring Well
- ○ Other Groundwater Monitoring Well
- ⊗ Shallow Drivepoint
- ⊗ NFRC Monitoring Station
- ⊕ S–Cluster Monitoring Well
- ■ Test Pit (2004)
- ⊞ Test Pit (2008)

SRK CONSULTING
Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856

Trench and Sump Coordinates

Points	Easting	Northing
A	584,601.08	6,912,953.79
B	584,608.42	6,912,949.85
C	584,623.11	6,912,941.97
D	584,611.63	6,912,955.83
E	584,616.65	6,912,965.19

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SRK JOB NO.: 1CD003.112
FILE NAME: S–Aquifer_Location and profiles.dwg

Deloitte & Touche

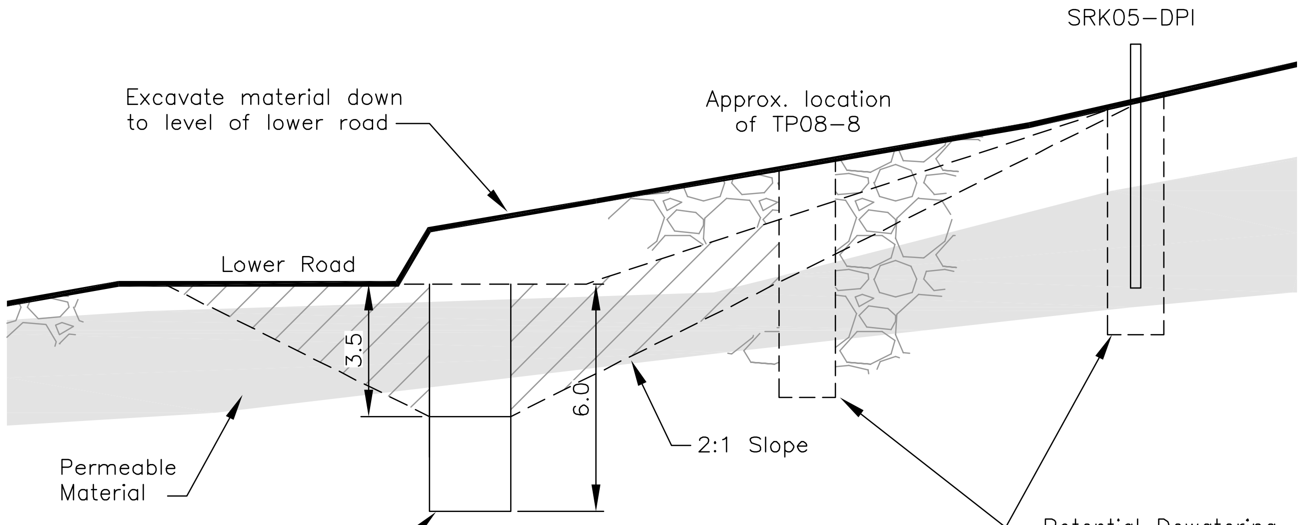
FARO MINE COMPLEX

2008 S-Cluster Groundwater Investigation

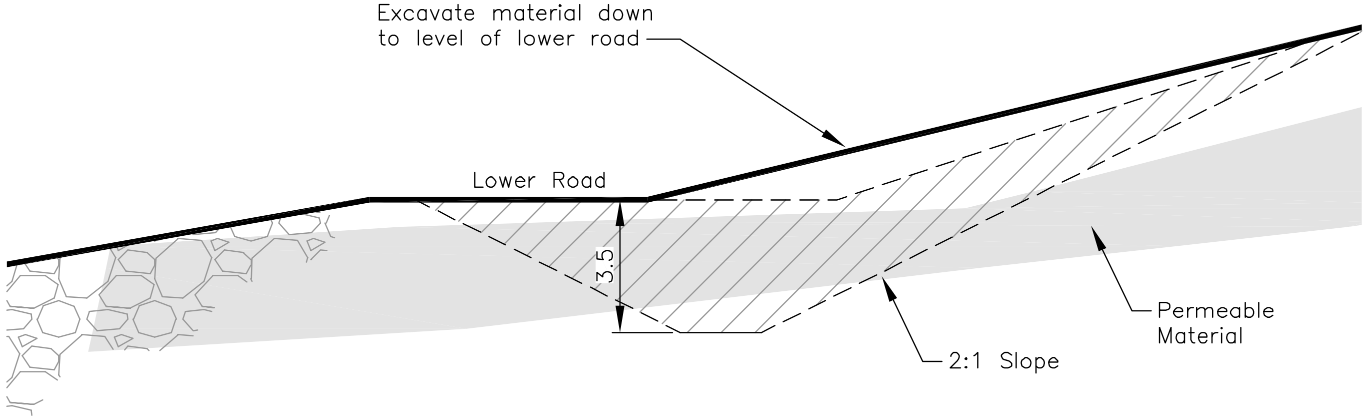
Location Map for Conceptual Shallow Aquifer Interceptor Sump

DATE: Jan. 2009
APPROVED: DM
FIGURE: 16

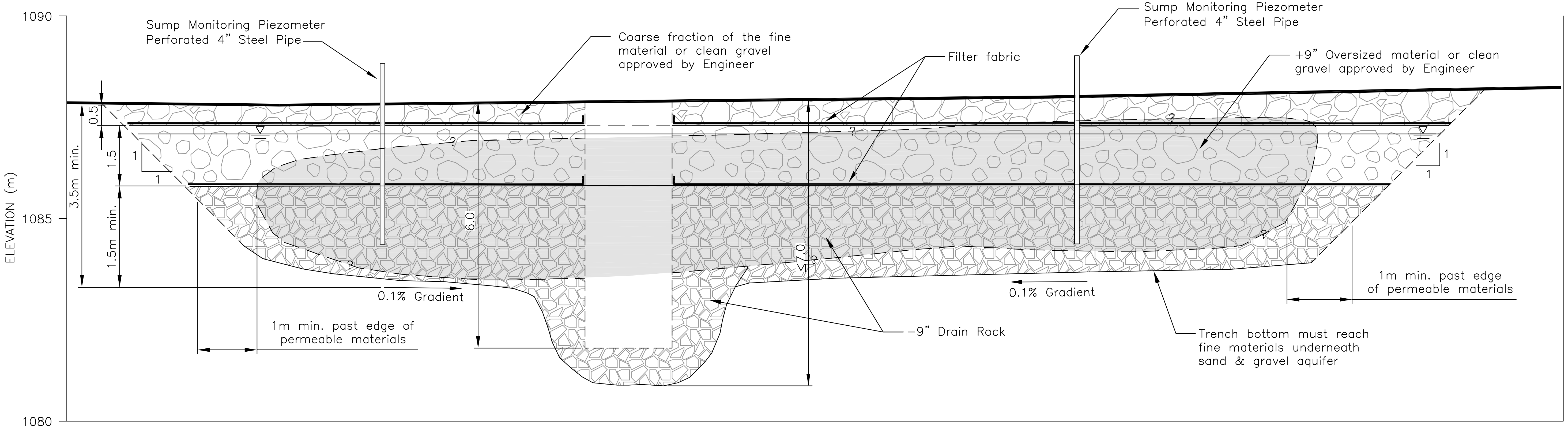
J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Aquifer_Location and profiles.dwg



Section 1/16
Scale A

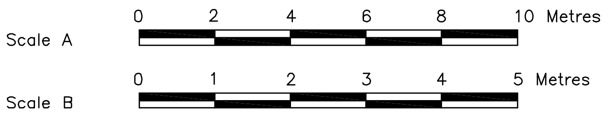


Section 2/16
Scale A



Section 3/16 – Trench and Pipes detail

(Front View looking up slope)
Scale B



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Vancouver B.C.

SRK JOB NO.: 1CD003.112
FILE NAME: S–Aquifer_Location and profiles.dwg

Deloitte & Touche

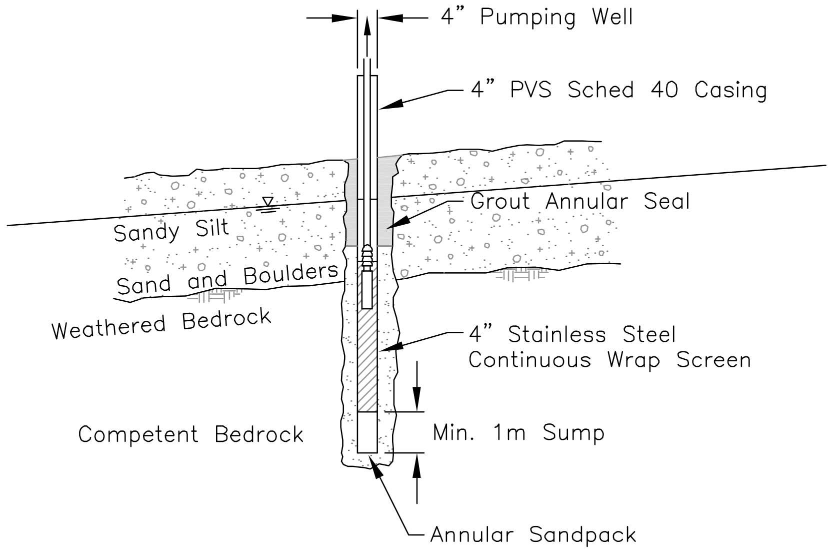
FARO MINE COMPLEX

S-Wells Shallow Aquifer Groundwater Collection

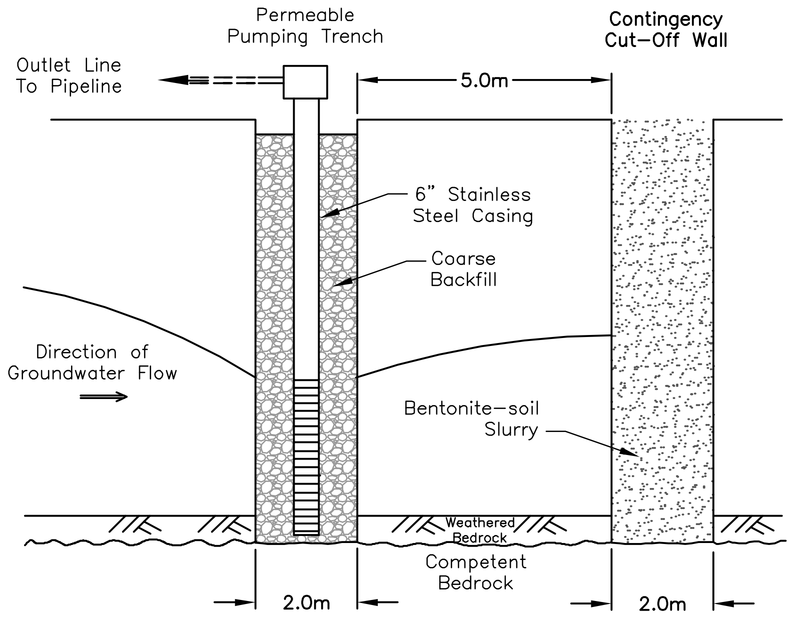
Conceptual Cross Sections Through Shallow Aquifer Interceptor Sump

DATE: Jan. 2009
APPROVED: DM
FIGURE: 17

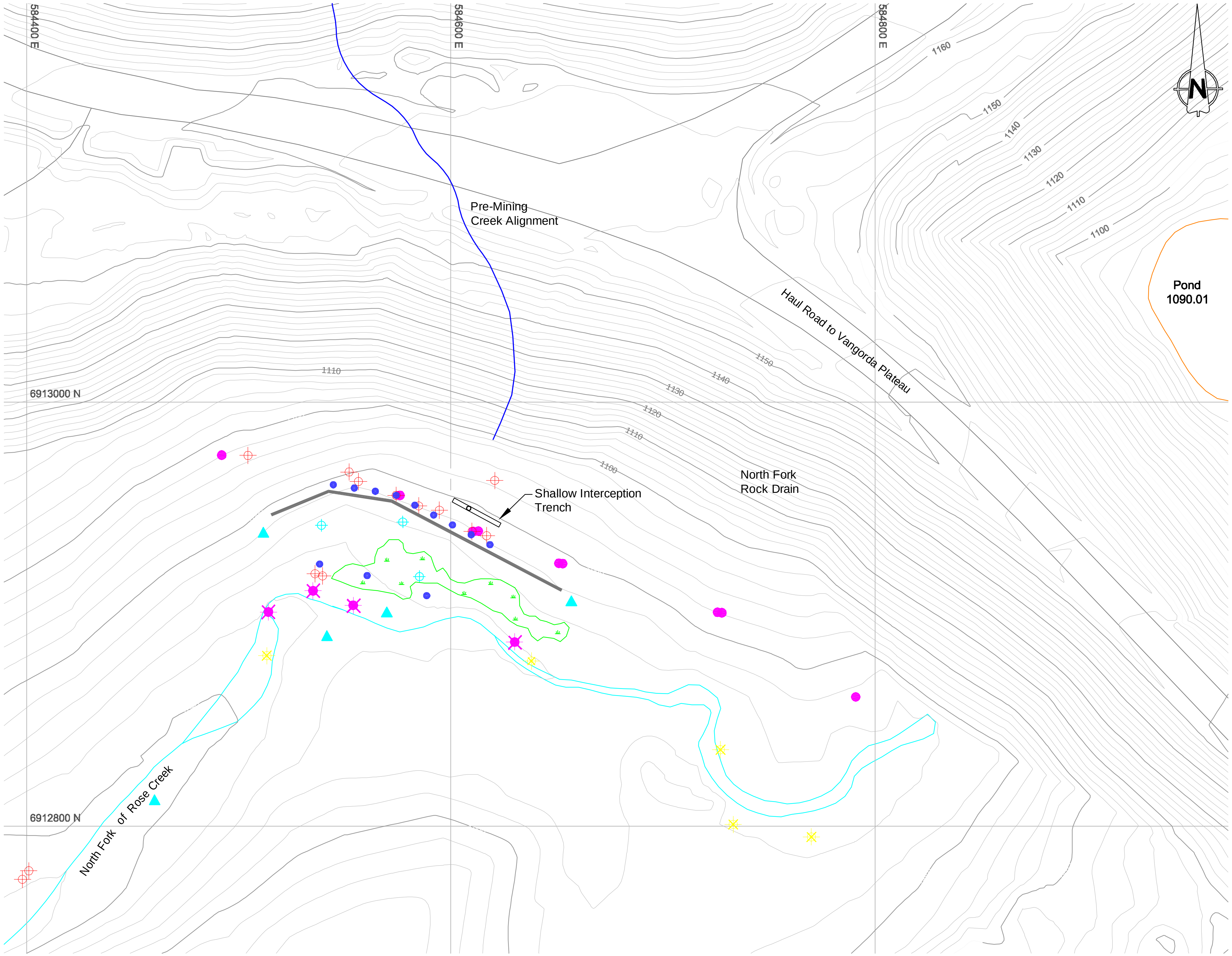
J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\S-Aquifer\S-Aquifer_Location and profiles.dwg



Permeable Collector Trench with Cut-off Wall
(NTS)



Pumping Well for Bedrock
(NTS)



LEGEND

●	2005 Groundwater Monitoring Well
○	Other Groundwater Monitoring Well
✖	Shallow Drivepoint
✳	NFRC Monitoring Station (NFRC_SC-4 = FLOW/SAMPLING) (SCS_1 = SURFACE SEEP)
⌖	S-Cluster Monitoring Well
SRK08-SP8A ⌖	2008 Well Location
•	Pumping Well
▲	Monitoring Well

SRK CONSULTING
Faro Mine, Yukon

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20,000
Survey control derived from existing 1:20,000 photography
Survey control based on: UTM Projection, NAD27, Zone 8
Compiled by The ORTHOSHOP, Calgary, September 2003 WO 8856

Notes:

1. All dimensions and elevations are in Metres.

1:2,000 0 50 100 Metres

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2008 S-Cluster Groundwater Investigation

Map Showing Conceptual Layout of Deep Aquifer Interception System

SRK JOB NO.: 1CD003.112
FILE NAME: Conceptual Layout.dwg

FARO MINE COMPLEX

DATE: Jan. 2009
APPROVED: DM
FIGURE: 18

J:\01_SITES\FARO\1000_Deloitte_from GE_Projects\Acad-Faro\2008 Acad Dwgs\Conceptual Layout.dwg

Appendix A-1

Drill Logs

SRK Consulting
Engineers and Scientists

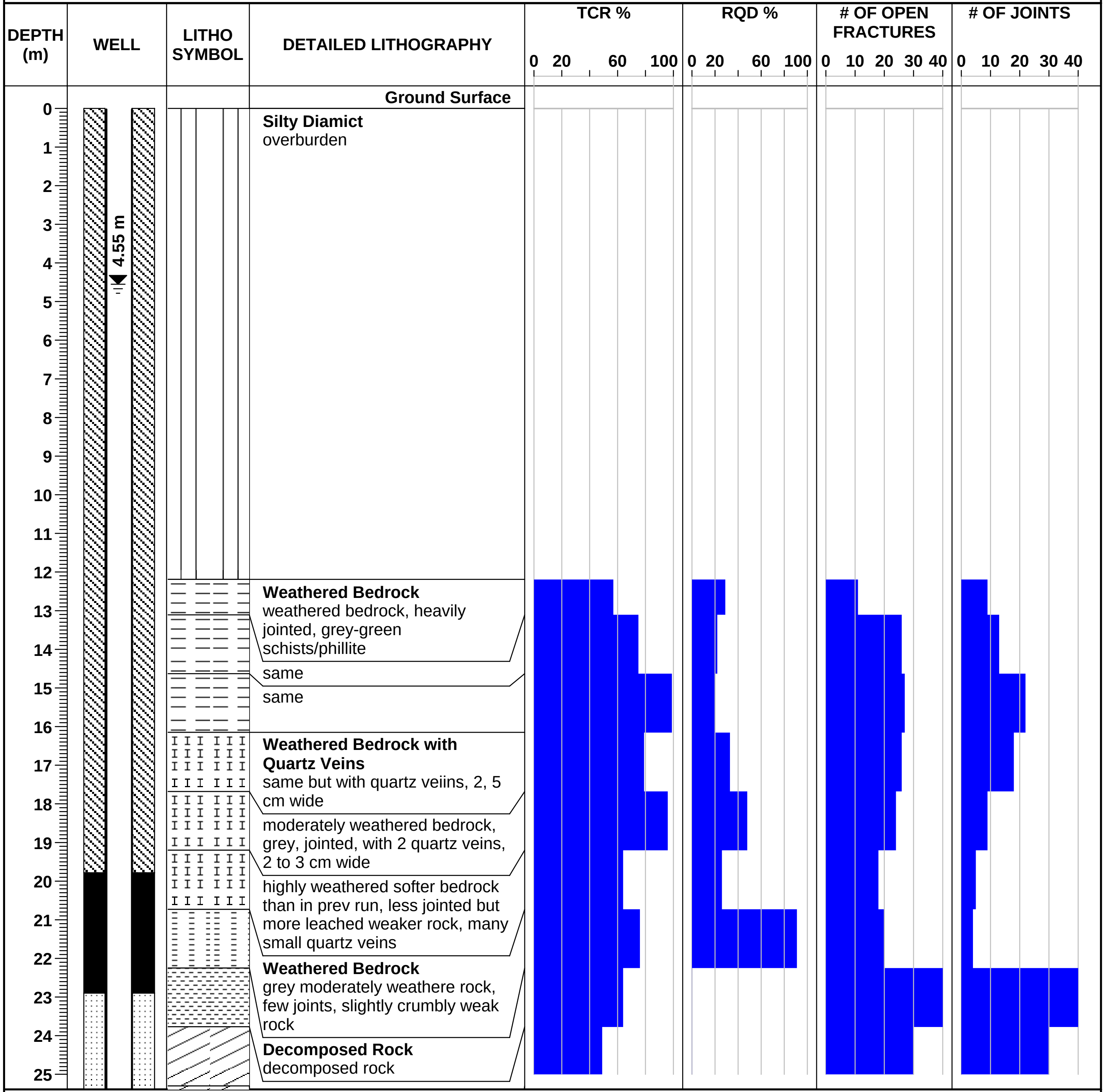
MONITORING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Sept. 2, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SBR1

EASTING: 584477.8
NORTHING: 6913127.8
ELEVATION: 1086.5 masl



Ground Surface

Silty Diamict
overburden

Weathered Bedrock
weathered bedrock, heavily jointed, grey-green schists/phillite

same

same

Weathered Bedrock with Quartz Veins
same but with quartz veiins, 2, 5 cm wide

moderately weathered bedrock, grey, jointed, with 2 quartz veins, 2 to 3 cm wide

highly weathered softer bedrock than in prev run, less jointed but more leached weaker rock, many small quartz veins

Weathered Bedrock
grey moderately weathere rock, few joints, slightly crumbly weak rock

Decomposed Rock
decomposed rock

NOTES:
70 degree inclination, 270 azimuth
Stickup 0.80 m
Elevation in header is ground elevation

HQ core (96.6 mm drill core)
2" PVC monitoring well
Grout annular seal

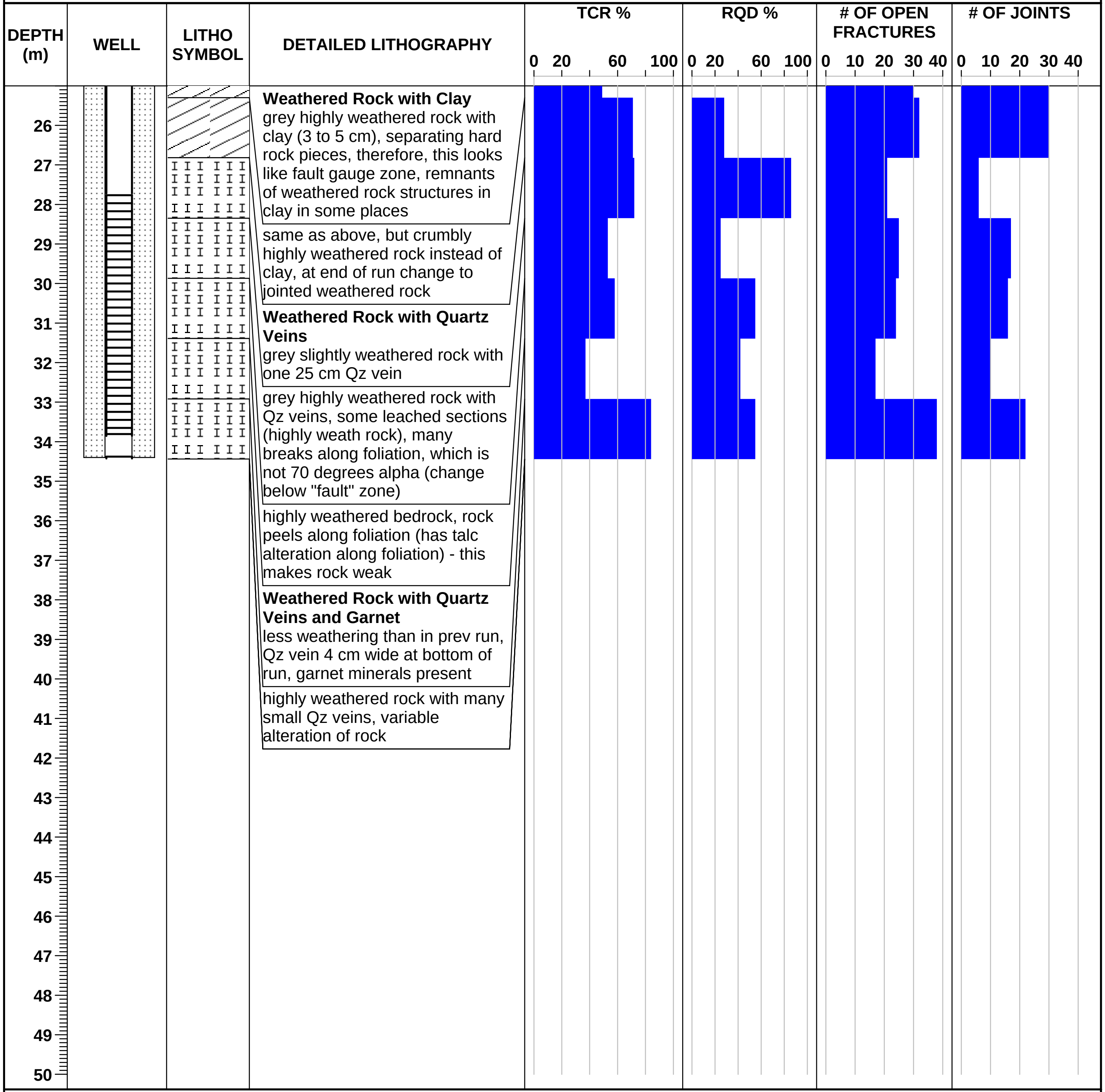
Reviewed By: DM
FILE

SRK Consulting
Engineers and Scientists

MONITORING WELL LOG

SHEET 2 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche
DATE: Sept. 2, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SBR1
EASTING: 584477.8
NORTHING: 6913127.8
ELEVATION: 1086.5 masl



Weathered Rock with Clay
grey highly weathered rock with clay (3 to 5 cm), separating hard rock pieces, therefore, this looks like fault gauge zone, remnants of weathered rock structures in clay in some places

same as above, but crumbly highly weathered rock instead of clay, at end of run change to jointed weathered rock

Weathered Rock with Quartz Veins
grey slightly weathered rock with one 25 cm Qz vein

grey highly weathered rock with Qz veins, some leached sections (highly weath rock), many breaks along foliation, which is not 70 degrees alpha (change below "fault" zone)

highly weathered bedrock, rock peels along foliation (has talc alteration along foliation) - this makes rock weak

Weathered Rock with Quartz Veins and Garnet
less weathering than in prev run, Qz vein 4 cm wide at bottom of run, garnet minerals present

highly weathered rock with many small Qz veins, variable alteration of rock

NOTES:

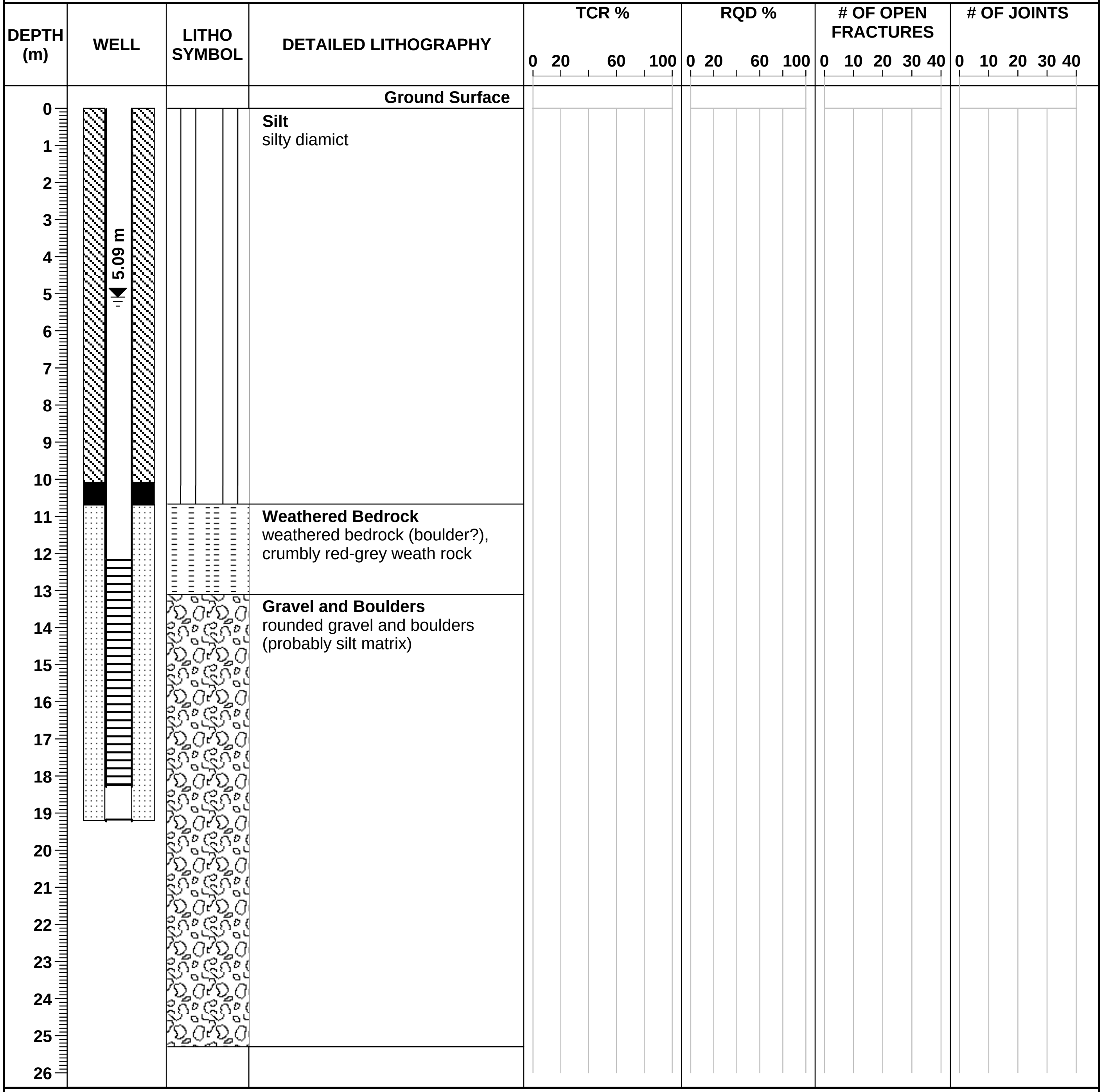
Reviewed By: DM
FILE

SRK Consulting Engineers and Scientists

MONITORING WELL LOG

SHEET 1 of 1

PROJECT No: 1CD003.112	**DATE: Sept. 10, 2008**	**EASTING: 584487.6**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: 6913125**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SBR2**	**ELEVATION: 1087.3 masl**



Ground Surface

Silt
silty diamict

Weathered Bedrock
weathered bedrock (boulder?), crumbly red-grey weath rock

Gravel and Boulders
rounded gravel and boulders (probably silt matrix)

NOTES: Hole terminated in overburden due to casing breaks

60 degree inclination, 135 azimuth	HQ core (96.6 mm drill core)
Stickup 0.50 m	2" PVC monitoring well
Elevation in header is ground elevation	Grout annular seal

Reviewed By: DM

FILE

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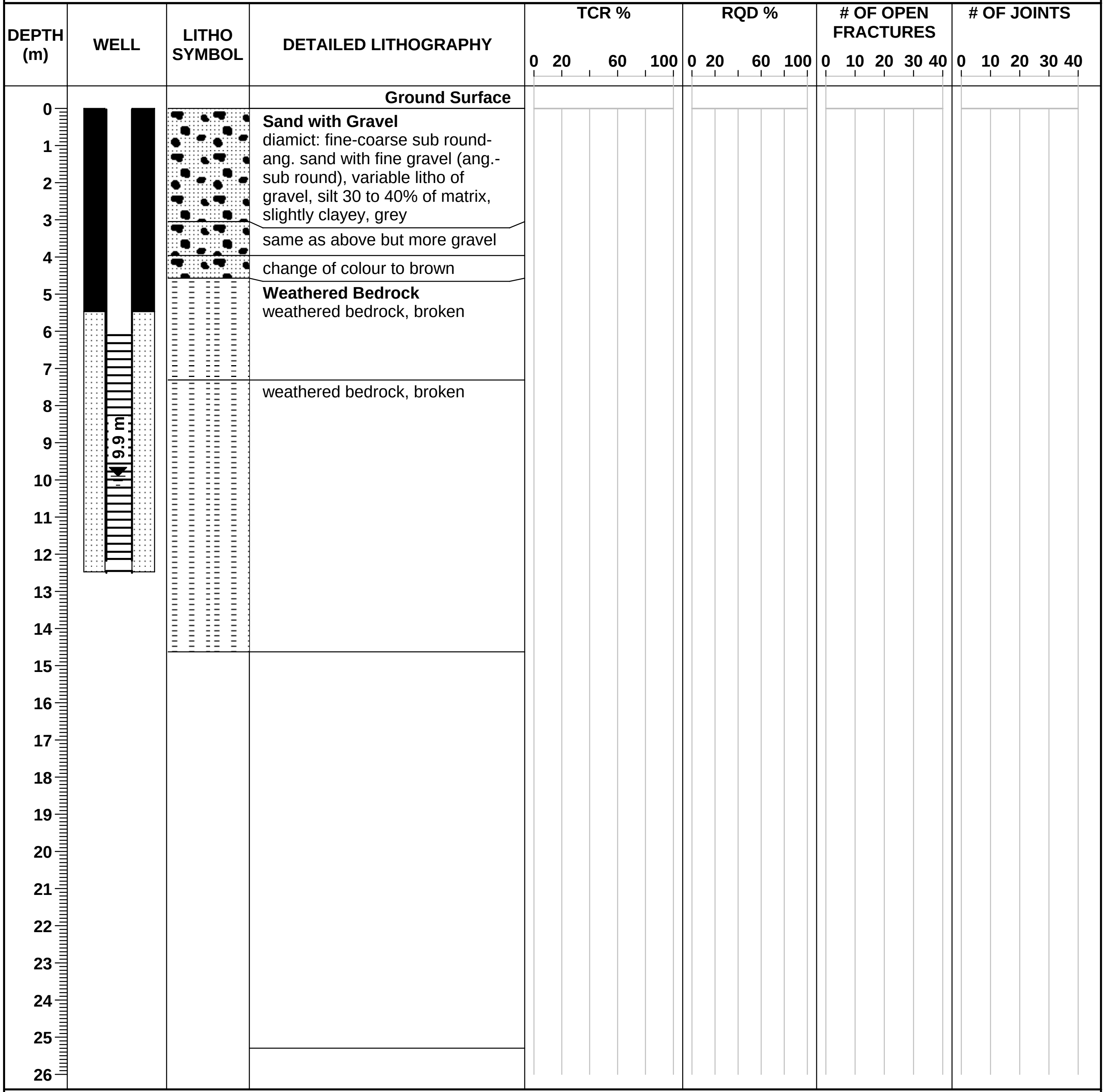
MONITORING WELL LOG

SHEET 1 of 1

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Sept. 12, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SBR3

EASTING: 584397.35
NORTHING: 6913150.8
ELEVATION: 1096.3 masl



Ground Surface

Sand with Gravel
diamict: fine-coarse sub round-ang. sand with fine gravel (ang.-sub round), variable litho of gravel, silt 30 to 40% of matrix, slightly clayey, grey

same as above but more gravel

change of colour to brown

Weathered Bedrock
weathered bedrock, broken

weathered bedrock, broken

NOTES: No core recorded despite numerous attempts

90 degree inclination
Stickup 0.60 m
Elevation in header is ground elevation

HQ core (96.6 mm drill core)
2" PVC monitoring well
Grout annular seal

Reviewed By: DM

FILE

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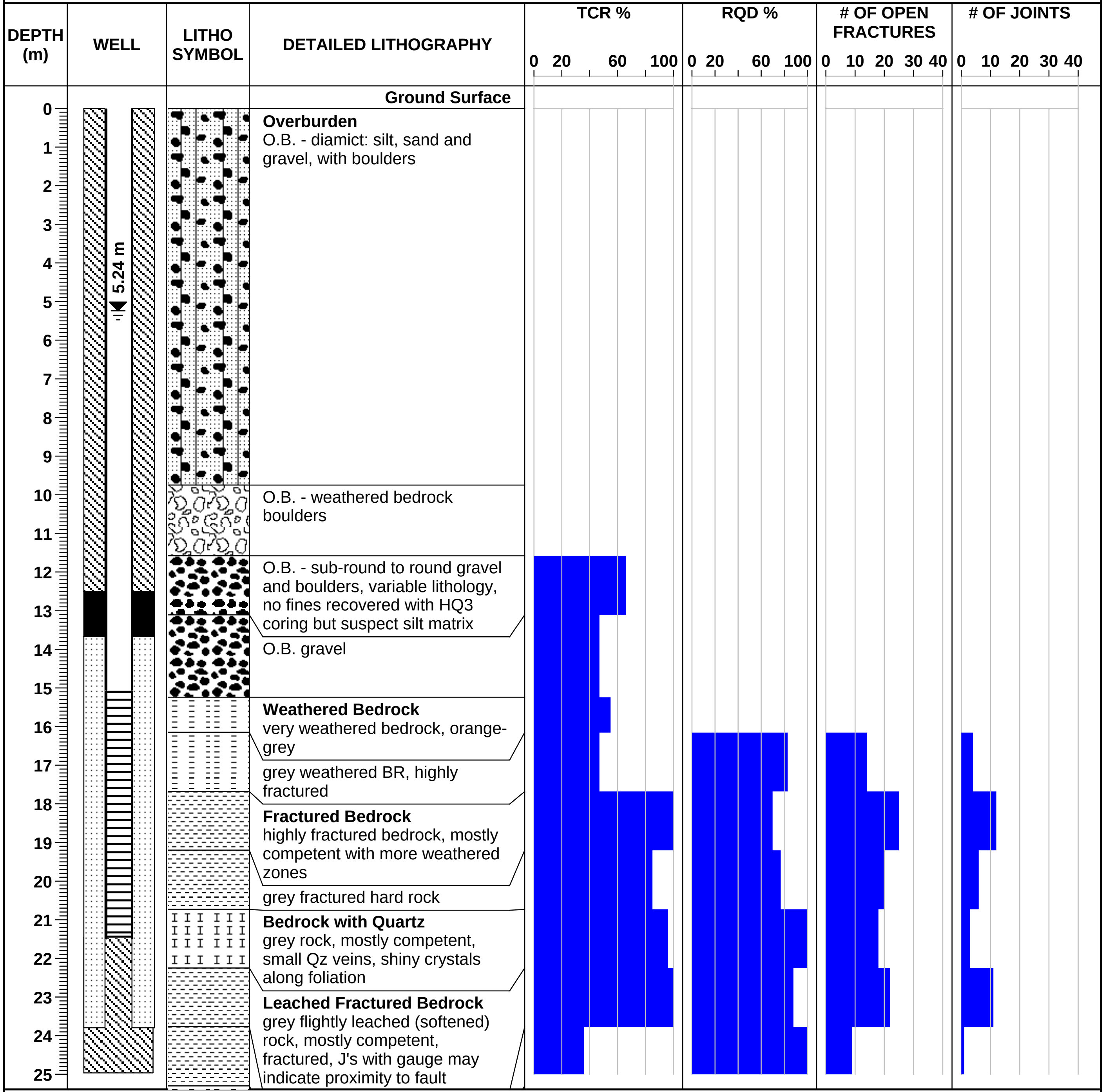
MONITORING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Sept. 14, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SBR4

EASTING: 584449.45
NORTHING: 6913138.5
ELEVATION: 1087.3 masl



Ground Surface

Overburden
O.B. - diamict: silt, sand and gravel, with boulders

O.B. - weathered bedrock boulders

O.B. - sub-round to round gravel and boulders, variable lithology, no fines recovered with HQ3 coring but suspect silt matrix

O.B. gravel

Weathered Bedrock
very weathered bedrock, orange-grey

grey weathered BR, highly fractured

Fractured Bedrock
highly fractured bedrock, mostly competent with more weathered zones

grey fractured hard rock

Bedrock with Quartz
grey rock, mostly competent, small Qz veins, shiny crystals along foliation

Leached Fractured Bedrock
grey flightly leached (softened) rock, mostly competent, fractured, J's with gauge may indicate proximity to fault

NOTES:
90 degree inclination
Stickup 0.70 m
Elevation in header is ground elevation

HQ core (96.6 mm drill core)
2" PVC monitoring well
Grout annular seal

Reviewed By: DM
FILE

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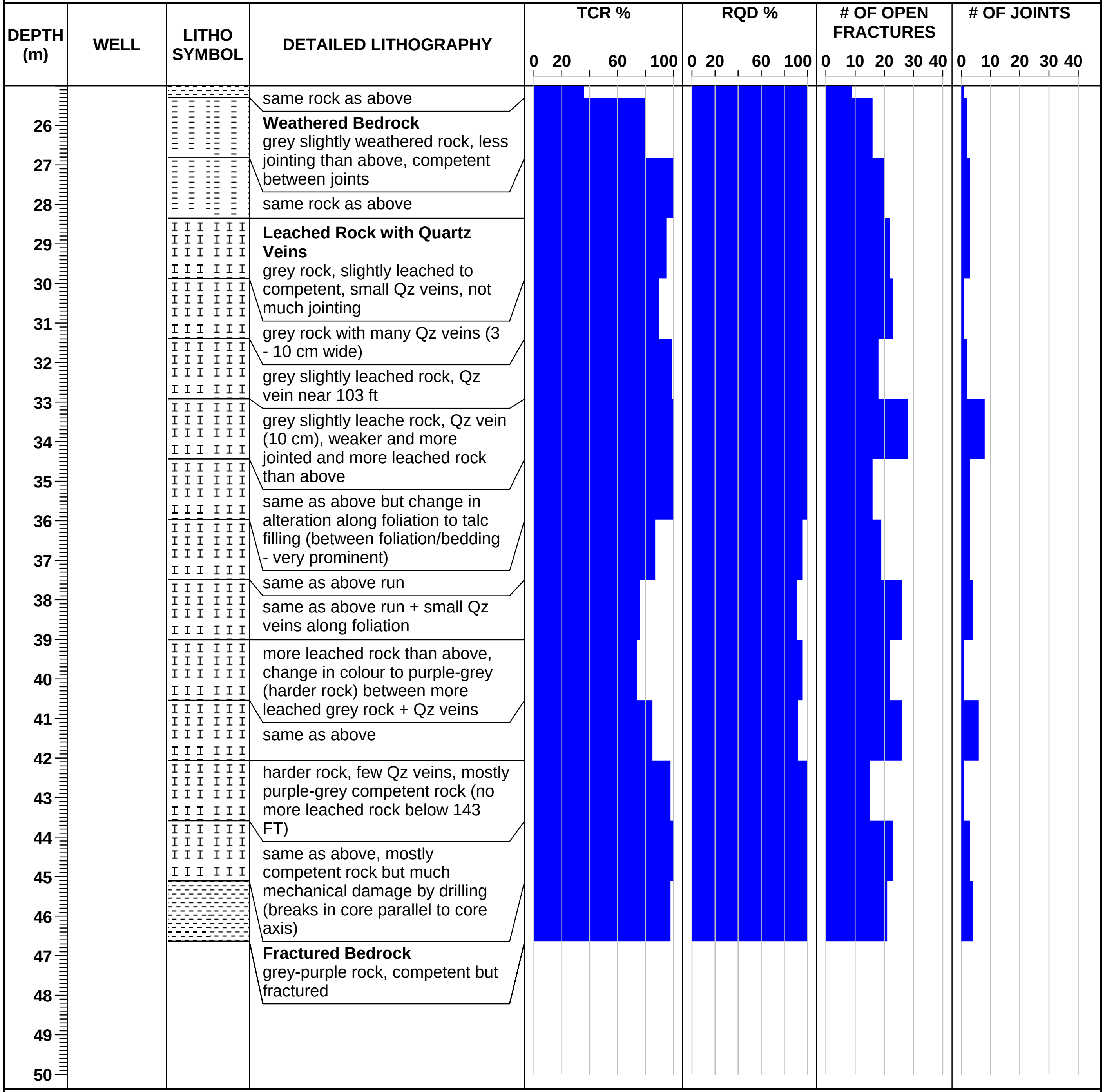
MONITORING WELL LOG

PROJECT No: 1CD003.112	**DATE: Sept. 14, 2008**	**EASTING: 584449.45**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: 6913138.5**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SBR4**	**ELEVATION: 1087.3 masl**



same rock as above

Weathered Bedrock
grey slightly weathered rock, less jointing than above, competent between joints

same rock as above

Leached Rock with Quartz Veins
grey rock, slightly leached to competent, small Qz veins, not much jointing

grey rock with many Qz veins (3 - 10 cm wide)

grey slightly leached rock, Qz vein near 103 ft

grey slightly leache rock, Qz vein (10 cm), weaker and more jointed and more leached rock than above

same as above but change in alteration along foliation to talc filling (between foliation/bedding - very prominent)

same as above run

same as above run + small Qz veins along foliation

more leached rock than above, change in colour to purple-grey (harder rock) between more leached grey rock + Qz veins

same as above

harder rock, few Qz veins, mostly purple-grey competent rock (no more leached rock below 143 FT)

same as above, mostly competent rock but much mechanical damage by drilling (breaks in core parallel to core axis)

Fractured Bedrock
grey-purple rock, competent but fractured

NOTES:

Reviewed By: DM	FILE

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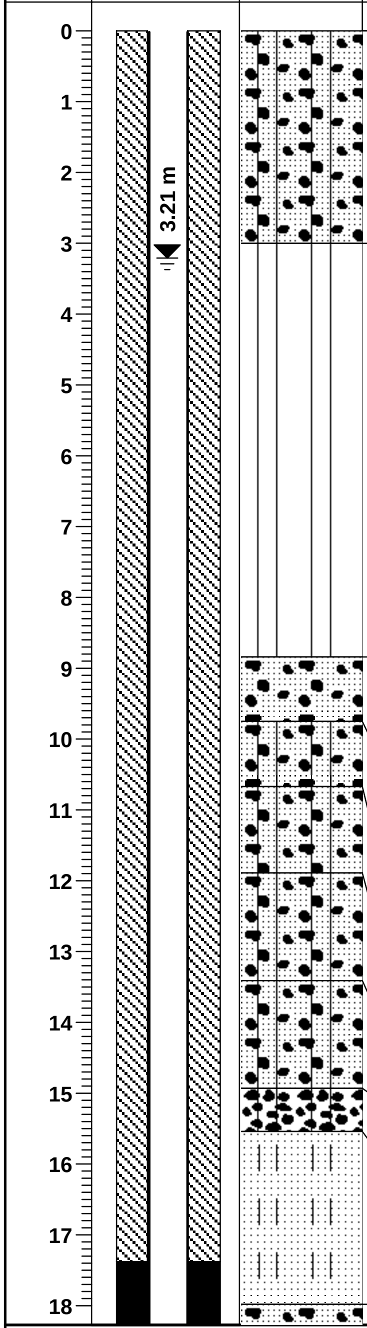
PUMPING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112	**DATE: Sept. 5, 2008**	**EASTING: 584510**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: 6913113**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SPW1**	**ELEVATION: 1086.5 masl**



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Ground Surface			
Silty Sand and Gravel Silty sand and gravel	**SHALLOW AQUIFER**	**N/A**	**0.95 m stickup**
Diamict silty diamict	**AQUITARD**		**4" schedule 40 PVC casing**
Sand and Gravel grey, coarse sand and fine gravel, with silty fine sand (sub-round to sub-ang gravel, grey green)			**Grout annular seal**
Silty Sand and Gravel diamict: grey-green, silt to silty fine sand, coarse sand, fine gravel (sub round-sub ang) with cobbles			
silty fine sand to med sand, with fine sub-round to sub ang gravel, with cobbles		**N/A**	
diamict: silt, grey coarse sand and fine-crs gravel (v angular to sub-angular)			
diamict: grey silty fine sand, coarse sand, with sub-round-angular fine gravel			
Silt with Gravel silt with gravel/cobbles			
Silty Sand slightly silty fine to coarse sand with fine gravel			**1 m bentonite chips on sandpack**

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM

FILE

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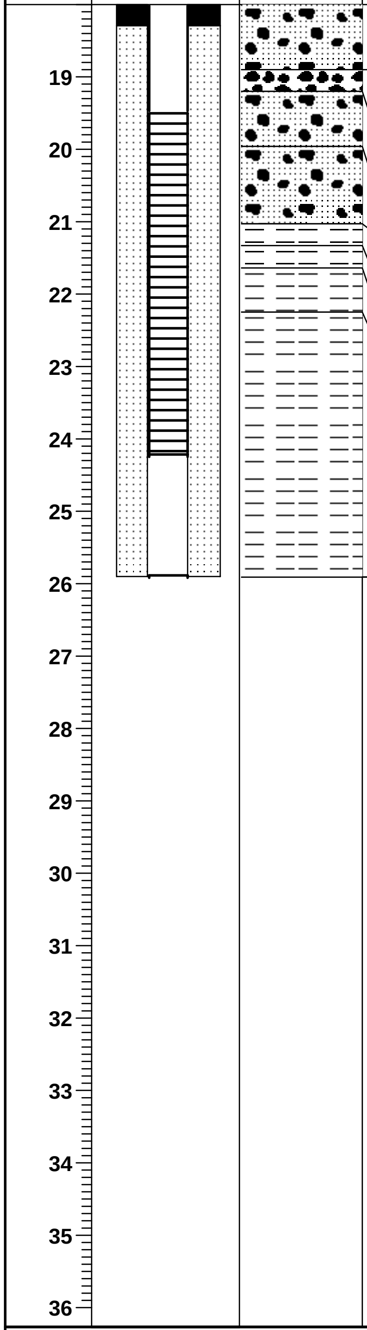
PUMPING WELL LOG

SHEET 2 of 2

PROJECT No: 1CD003.112	**DATE: Sept. 5, 2008**	**EASTING: 584510**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: 6913113**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SPW1**	**ELEVATION: 1086.5 masl**



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Sand and Gravel sand and gravel			**PVC - stainless steel adaptor**
Gravel diamict: fine grained and large amount of coarse gravel	**DEEP AQUIFER**		**10/20 filter sand**
Sand and Gravel sand and gravel			
med-coarse sand and gravel		**1 x 10-5**	**4.7 m 4" stainless steel 15-slot Johnson screen**
Bedrock bedrock (colour change to light grey)			
grey bedrock cuttings			
dark grey bedrock cuttings			
light grey bedrock cuttings			**1.5 m sump**
			End cap

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM

FILE

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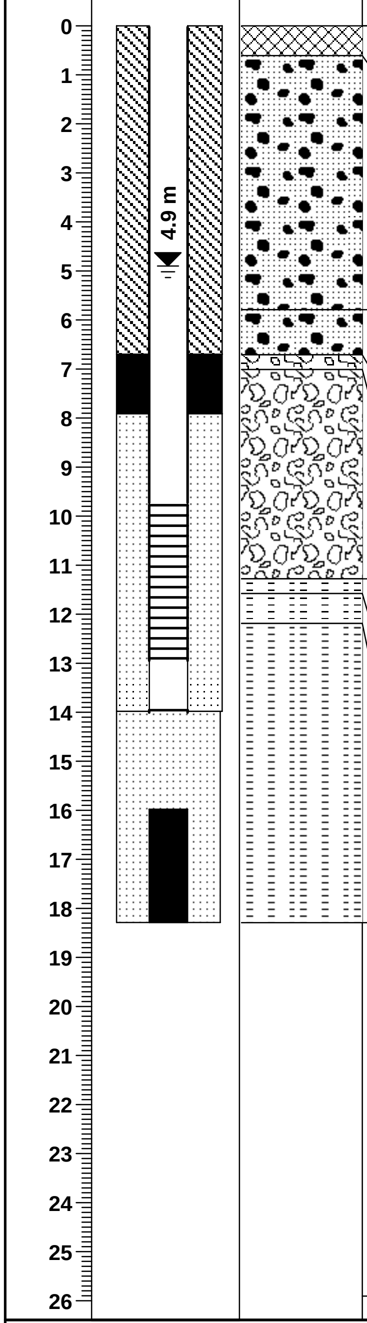
PUMPING WELL LOG

SHEET 1 of 1

PROJECT No: 1CD003.112	**DATE: Sept. 15, 2008**	**EASTING: 584467.2**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: 6913132**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SPW2**	**ELEVATION: 1086.53 masl**

DEPTH (m) | **WELL** | **LITHO SYMBOL** | **DETAILED LITHOGRAPHY** | **HYDROSTRATIGRAPHY** | **K (m/s)** | **COMMENTS**



DETAILED LITHOGRAPHY

Ground Surface

Soil Fill
soil fill / silty-clayey diamict

Sand and Gravel
diamict: grey-olive green silty (20% silt) fine-med sand, coarse sand and gravel (sub-round to angular), with cobbles; variable gravel litho

diamict: same composition as above but change colour to grey (10 to 15% silt content)

Boulder
boulder/gravel (part of diamict)

diamict: grey (same as above units)

Weathered Bedrock
weathered bedrock (orange-grey bedrock cuttings)

weathered bedrock (orange-grey bedrock cuttings)

weathered bedrock/possibly some gravel near top of bedrock (orange-grey bedrock cuttings of BR and some fine rounded gravel))

HYDROSTRATIGRAPHY

AQUITARD

DEEP AQUIFER

K (m/s)

5 x 10-5

COMMENTS

1.0 m PVC stickup

4" schedule 40 PVC casing

Grout to ground surface

1.2 m bentonite chips on sandpack

PVC - stainless steel adaptor

3.2 m 4" stainless steel 15-slot Johnson screen

10/20 filter sand

0.9 m sump
End cap

EOH 18.3 m, downhole hammer lost in drill hole, backfilled with sand ~ 13.7 to 18.3 m

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM | FILE

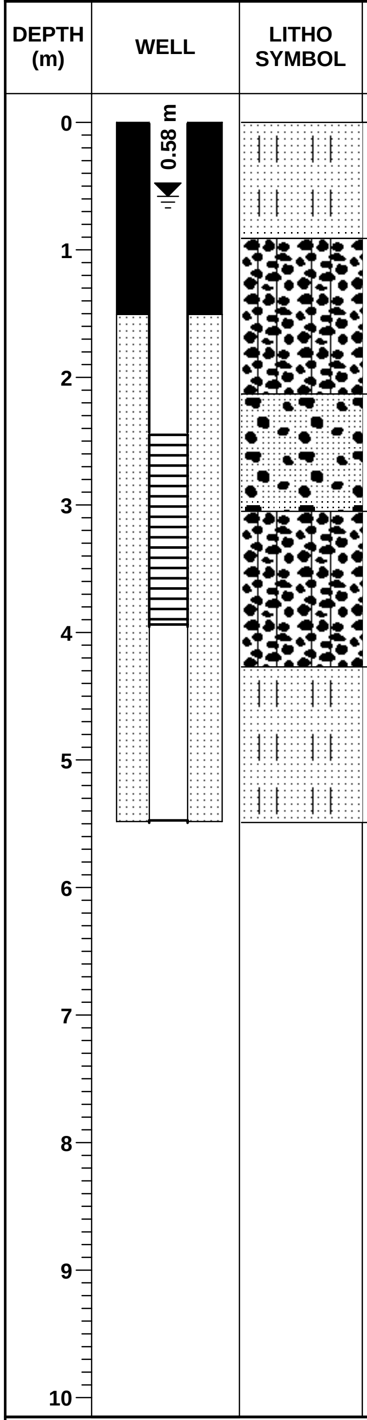
PUMPING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Sept. 5, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SPW4

EASTING: 584503
NORTHING: 6913115
ELEVATION: 1086.4 masl



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Ground Surface			
Silt/Sand silt/fine sand	**SHALLOW AQUIFER**		**0.76 m PVC stickup** **4" schedule 40 PVC casing**
Silt and Gravel diamict: silt and gravel			**Bentonite chips to surface** **10/20 filter sand**
Sand and Gravel grey medium-coarse sand and fine gravel, silt < 10%, sub round-angular gravel)			
Silty Gravel grey gravel, silty		**6 x 10-6**	**1.5 m 4" stainless steel 15-slot Johnson screen**
Silty Sand grey silty sand, high silt content			**1.5 m sump** **End cap**

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM

FILE

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PUMPING WELL LOG

SHEET 2 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Sept. 5, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SPW4

EASTING: 584503
NORTHING: 6913115
ELEVATION: 1086.4 masl

DEPTH (m)	WELL	LITHO SYMBOL	DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM
FILE

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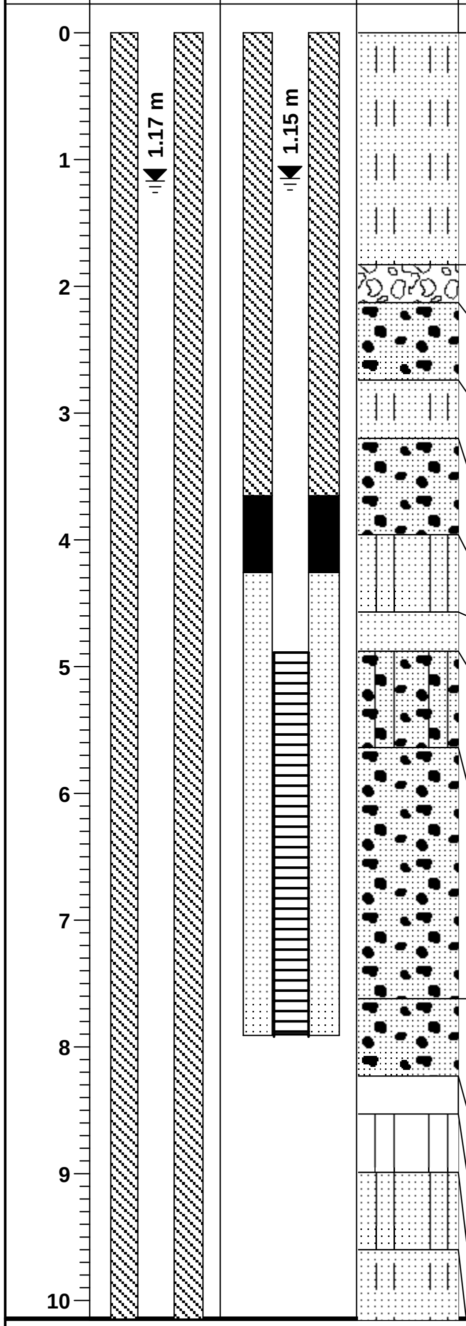
MONITORING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112	**DATE: Aug. 21, 2008**	**EASTING: See**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: Notes**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SP7 A & B**	**ELEVATION: 1081 masl**



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Ground Surface			
Silty Sand silty fine sand, coarse sand, cobbles, organics	**AQUIFER**		**7a - 0.74 m stickup** **7b - 0.73 m stickup** **2" schedule 40 PVC riser pipe**
Boulder boulder			
Sand with Gravel coarse sand and gravel, trace silt			
Silty Sand grey fine sand to silt with coarse gravel			
Sand and Gravel coarse sand and gravel with cobbles (yellow)			**7b - 0.6 m bentonite chip seal on sand. Grout to surface**
Sandy Silt grey silt with fine sand			
Sand orange coarse sand			**10/20 filter sand**
Silty Sand and Gravel grey coarse sand and gravel with silt and cobbles; washed gravel and crs sand at end of run		**8 x 10-7**	**20-slot 2" PVC screen**
Sand with Gravel brown-orange-rusty coarse sand and gravel with few cobbles (sub-rounded to sub angular crs sand and f grav but rounded crs gravel + cobbles)			**Geo-sock**
Sand and Gravel rusty-orange coarse sand and gravel with cobbles (includes 0.1 m thick silt+gravel layer)			
Sand rusty medium sand with cobbles	**AQUITARD**		
Silt grey silt and fine sand with some clay			

NOTES: NAD 83 (hand-held Garman GPS)

7a 584429, 6913095, ground elev = 1081 masl
7b 584433, 6913094, ground elev = 1081 masl

Monitoring wells about 3 m apart

Reviewed By: DM FILE

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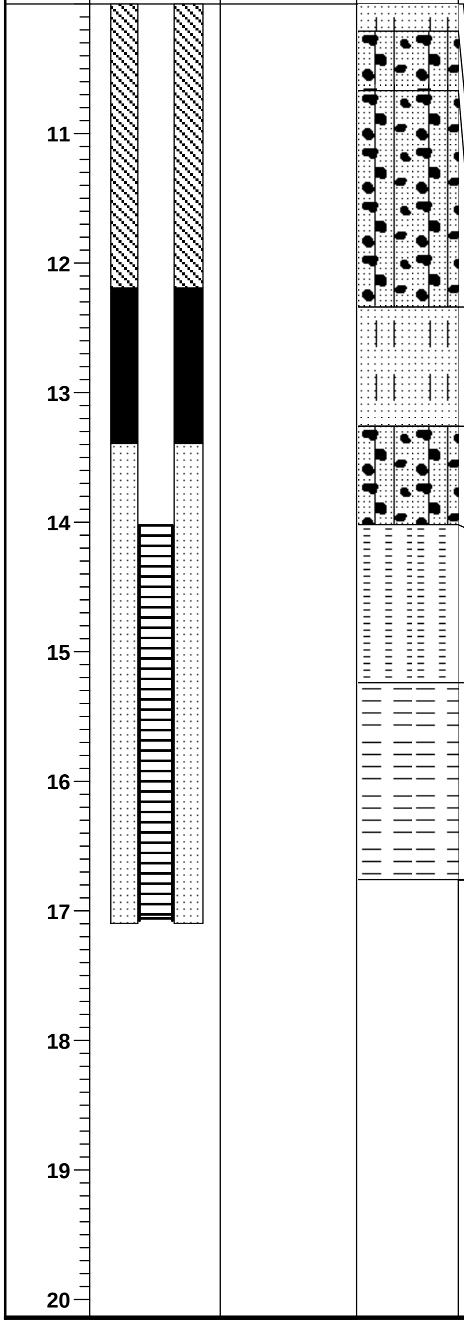
MONITORING WELL LOG

SHEET 2 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche
DATE: Aug. 21, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SP7 A & B
EASTING: See
NORTHING: Notes
ELEVATION: 1081 masl



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Sandy Silt grey silty med-crs sand with gravel	AQUIFER		
Silty sand grey silty fine sand with cobbles, compacted			
Silty Sand with Gravel grey silty med-crs sand with gravel			
grey v silty fine sand with fine gravel (compacted)			
Silty Sand dark grey silty fine sand, soft			7a - 1.2 m bentonite chip seal on sand. Grout to surface
Silty Sand with Gravel grey silty fine sand with gravel and cobbles, compacted			10/20 filter sand
Weathered Bedrock grey-brown weathered bedrock	AQUIFER	4 x 10-7	20-slot 2" PVC screen
Competent Bedrock competent bedrock			Geo-sock

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM

FILE

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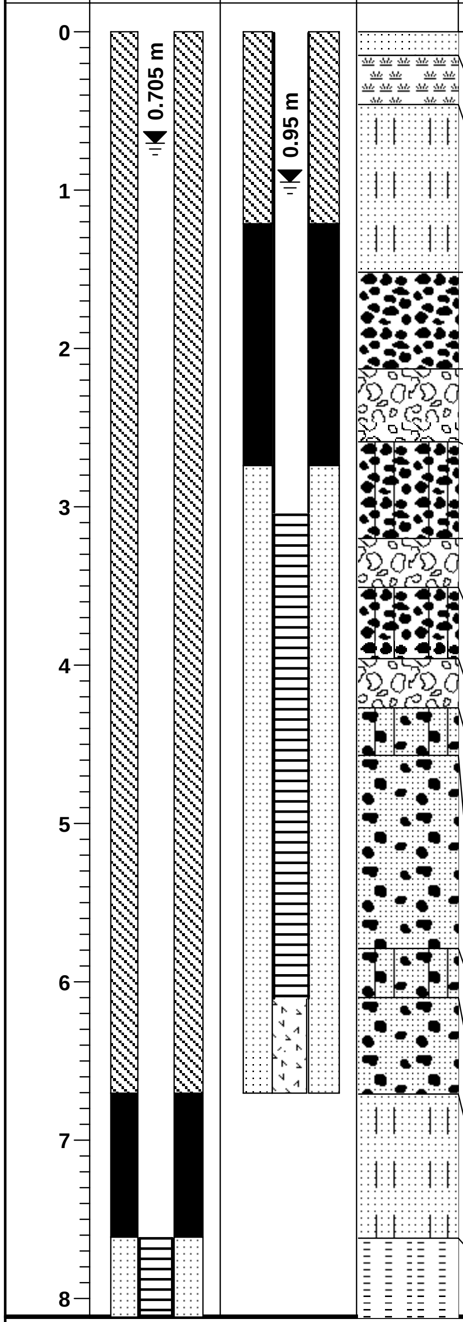
MONITORING WELL LOG

SHEET 1 of 2

PROJECT No: 1CD003.112	**DATE: Aug. 22, 2008**	**EASTING: See**
SITE: FARO	**LOGGED BY: J. Scibek**	**NORTHING: Notes**
CLIENT: Deloitte & Touche	**DRILL HOLE: SRK08-SP8 A & B**	**ELEVATION: 1077 masl**

DEPTH (m) | **WELL A** | **WELL B** | **LITHO SYMBOL** | **DETAILED LITHOGRAPHY** | **HYDROSTRATIGRAPHY** | **K (m/s)** | **COMMENTS**



DETAILED LITHOGRAPHY

Ground Surface

Sand
grey-brown med sand

Organic Soil
silty organic soil, brown

Silty Sand
dark grey silty fine sand with wood debris (20%), silt with sand is compacted

Gravel
sub-angular gravel with angular boulder pieces

Boulder
boulder pieces, coarse grey rock

Gravel and Silt
orange-brown fine gravel with cobbles and silt

Boulder
boulder (angular frag, shattered by sonic drill)

Gravel and Silt
orange fine-crs gravel and silt (50% silt)

Boulder
boulder

Silt, Sand, Gravel
diamict: silt and grey crs-med sand with fine gravel (> 50% silt); washed rounded gravel at end of run due to drilling process

Sand with Gravel
orange-brown med-crs sand with gravel, trace silt

Silty Sand and Greavel
grey-orange fine silty sand and gravel

Sand with Gravel
orange coarse sand with gravel

Silty Sand
grey fine-med silty sand with 10 cm silt and fine sand layers)

HYDROSTRATIGRAPHY

AQUIFER UNIT

MINOR AQUITARD

AQUIFER UNIT

K (m/s)

8 x 10-6

COMMENTS

8a - 0.7 m stickup

8b - 0.78 m stickup

2" schedule 40 PVC riser pipe

8b - 1.5 m bentonite chip seal on sand. Grout to surface

10/20 filter sand

20-slot 2" PVC screen

Geo-sock

8b - BR cuttings

8a - 1.0 m bentonite chip seal on sand. Grout to surface

NOTES: NAD 83 (hand-held Garman GPS)

8a 584294, 6912955, ground elev = 1077 masl
8b 584291, 6912951, ground elev = 1077 masl

Monitoring wells about 4 m apart

Reviewed By: DM | FILE

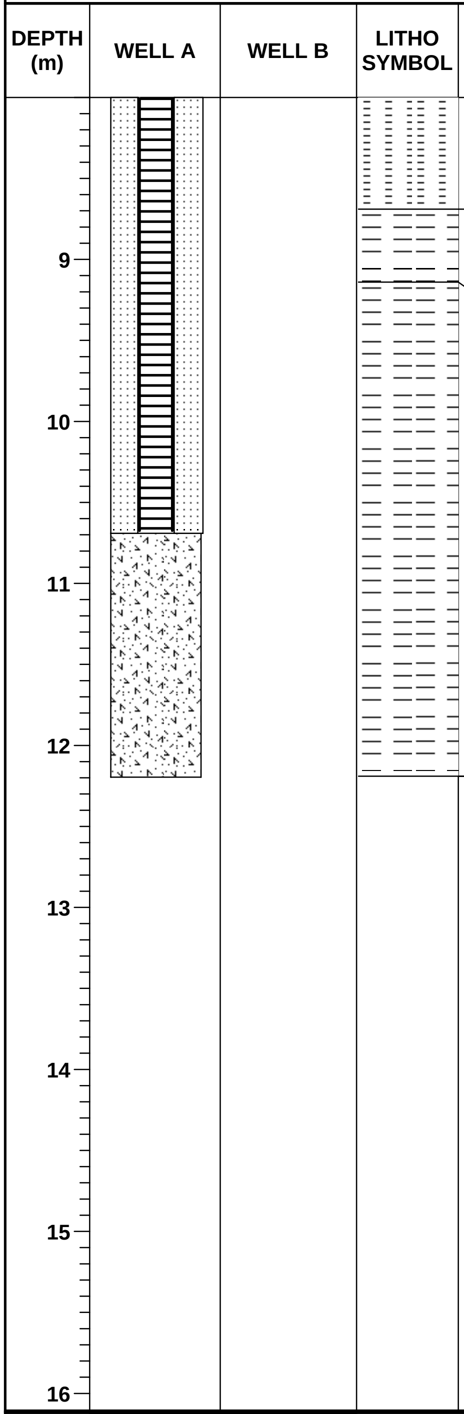
MONITORING WELL LOG

SHEET 2 of 2

PROJECT No: 1CD003.112
SITE: FARO
CLIENT: Deloitte & Touche

DATE: Aug. 22, 2008
LOGGED BY: J. Scibek
DRILL HOLE: SRK08-SP8 A & B

EASTING: See
NORTHING: Notes
ELEVATION: 1077 masl



DETAILED LITHOGRAPHY	HYDROSTRATIGRAPHY	K (m/s)	COMMENTS
Weathered Rock grey-orange weathered rock, ang frags, shattered by drilling			10/20 filter sand
Bedrock light grey rock (powder, ang frags from drilling)			20-slot 2" PVC screen
bedrock		1 x 10-6	Geo-sock 8a - BR cuttings to 12.2 m EOH

NOTES: NAD 83 (hand-held Garman GPS)

Reviewed By: DM

FILE

Appendix A-2

Test Pit Logs

FIELD TEST PIT LOG

BORING NO. TP08-1
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008
ELEV. ~ 1086 masl (GPS)

PROJECT NAME: FARO 1CD003.112 **STATION #:** TP08-1
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 5 m
WATER LEVEL DEPTH:
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Silty Sand and Gravel** Interbedded sand and gravel with clay and silt. Humic horizons. Damp	▦
	Sand and Gravel Sand and Gravel with cobbles. Wet. Inflowing water	▩
2	**Sand and Gravel** Sand and Gravel. Wet. Sloughing. Difficult to define base	▩
4		
	Clay Silty clay w/ fine sand	▨
6		
8		
10		
12		
14		
16		
18		
20		

FIELD TEST PIT LOG

BORING NO. TP08-2
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008
ELEV. ~ 1086 masl (GPS)

PROJECT NAME: **FARO 1CD003.112** **STATION #:** TP08-2
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 6 m
WATER LEVEL DEPTH:
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Interbedded silts and black humic horizons. White ash horizon at 1m.	▨
2	**Clay** Dense, plastic silt to sandy clay w/ cobbles and boulders. Dry	▨
4	**Clay** Silty to sandy clay w/cobbles. Damp. Little inflow. Max. depth 6m. Not sloughing.	▨
6		
8		
10		
12		
14		
16		
18		
20		

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FIELD TEST PIT LOG

BORING NO. TP08-3
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008

ELEV. ~ 1087 masl (GPS)

PROJECT NAME: **FARO 1CD003.112** **STATION #:** TP08-3

INSPECTOR (SIGNED): D. Mackie

EQUPMENT USED: John Deere 345

PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 2 m **DEPTH:** ~ 5 m

WATER LEVEL DEPTH: ~ 2 m

CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Silt** Silt and oganics	▥
2	**Sand and Gravel** Sand and gravel on west side with significant inflow. Dry silt to sandy clay on east side. West side sloughing.	⁘
4		⁘
6		
8		
10		
12		
14		
16		
18		
20		

FIELD TEST PIT LOG

BORING NO. TP08-4
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008
ELEV. ~ 1087 masl (GPS)

PROJECT NAME: **FARO 1CD003.112** **STATION #:** TP08-4
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 5 m
WATER LEVEL DEPTH:
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Organics. Silty. Some sand. Dry	▨
	Silty Clay Sandy silty clay w/ boulders and cobbles. Dry.	▨
2		
	Silty Clay Dense Sandy silty clay w/ boulders and cobbles. Dry.	▨
4		
6		
8		
10		
12		
14		
16		
18		
20		

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FIELD TEST PIT LOG

BORING NO. TP08-5
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008
ELEV. ~ 1091 masl (GPS)

PROJECT NAME: FARO 1CD003.112 **STATION #:** TP08-5
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 7 m
WATER LEVEL DEPTH: ~ 2.5 m
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Organics and sandy silt. Dry	▨
2	**Silty Sand** Dense silty sand and gravel w/ clay and boulders. Minor seepage from 0.25m sandy lense. Black humic horizon at 3m. Minor inflow from below.	▨
4 6	**Clayey Silt** Dense clayey silt to silty sand w/ boulders and cobbles. Gravel lenses. Minor seepage 2.5 to 5m. Not significant.	▨
8 10 12 14 16 18 20		

FIELD TEST PIT LOG

BORING NO. TP08-6
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008

ELEV. ~ 1091 masl (GPS)

PROJECT NAME: **FARO 1CD003.112** **STATION #:** TP08-6
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 6 m
WATER LEVEL DEPTH: ______________
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Organics sand and silt; some clay. Permafrost at 1.5m on west side. Dry to slightly damp.	▨
2	**Silt** Sandy, clayey silt with cobbles and boulders	▨
4 6	**Sandy Silt** Sandy silt with gravel becoming more clayey with depth.	▨
8 10 12 14 16 18 20		

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FIELD TEST PIT LOG

BORING NO. TP08-7
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008

ELEV. ~ 1089 masl (GPS)

PROJECT NAME: FARO 1CD003.112 **STATION #:** TP08-7

INSPECTOR (SIGNED): D. Mackie

EQUPMENT USED: John Deere 345

PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 2 m **DEPTH:** ~ 6 m

WATER LEVEL DEPTH: ~ 3.5 m

CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Organics	
2	**Sandy Silt** Sandy clayey silt with cobbles and boulders	
4	**Silt** Silt with Increasing sand and gravel. Minor seepage below 3.5. Black humic horizons with water inflow below. Becoming easier to dig.	
6	**Sand and Gravel** Wet Sand and gravel. More water from west side of pit. Inflow to ~7m (max extent of hoe). Field EC 4.5 mS but silty, muddy water grabbed from pit bottom	
8		
10		
12		
14		
16		
18		
20		

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FIELD TEST PIT LOG

BORING NO. TP08-8
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008
ELEV. ~ 1089 masl (GPS)

PROJECT NAME: FARO 1CD003.112
STATION #: TP08-8
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 2 m **DEPTH:** ~ 6 m
WATER LEVEL DEPTH: ~ 1 m
CHECKED BY: DM
DATE: Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Sandy Silt** Dry sandy silt	▥
2		▥
4	**Sand and Gravel** Wet sand and gravel with Black humic horizon 0. 1 to 1.5 m thick. Inflow zone below black horizon.	●
6	**Silty Sand** Siltier, Possibly becoming more competent, harder to dig	▦
8		
10		
12		
14		
16		
18		
20		

FIELD TEST PIT LOG

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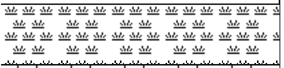
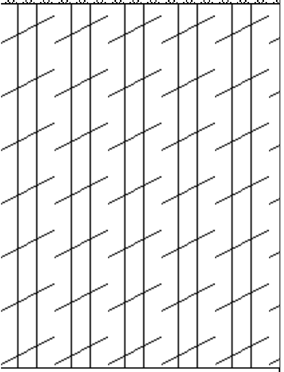
BORING NO. TP08-9
SHEET 1 of 1
DATE: START Aug. 7, 2008
END Aug. 7, 2008

ELEV. ~ 1091 masl (GPS)

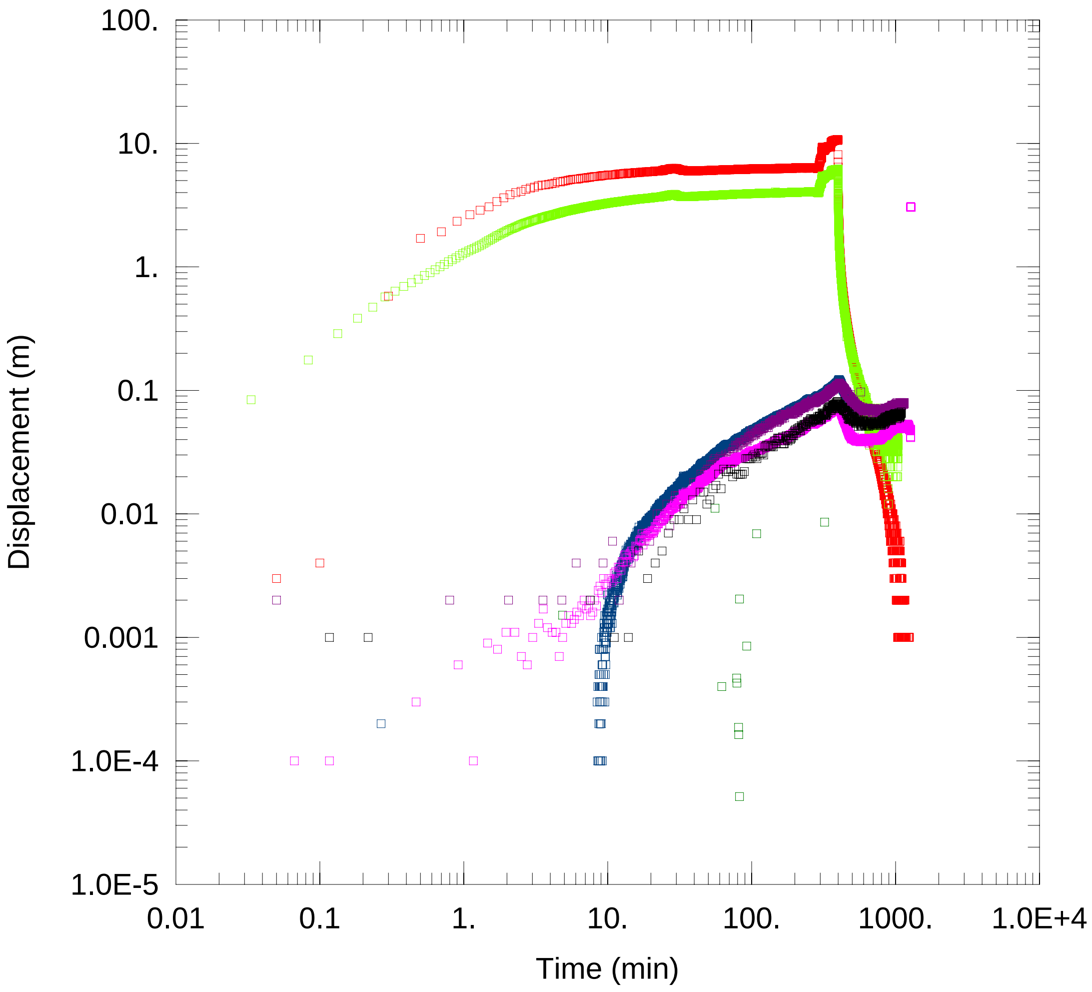
PROJECT NAME: **FARO 1CD003.112**
STATION #: TP08-9
INSPECTOR (SIGNED): D. Mackie
EQUPMENT USED: John Deere 345
PIT DIMENSIONS: **LENGTH:** 3 m **WIDTH:** 1.5 m **DEPTH:** ~ 7 m
WATER LEVEL DEPTH:
CHECKED BY: DM **DATE:** Jan. 29, 2009

DEPTH (m)	DESCRIPTION	Litho Symbol
	Ground Surface	
0	**Organics** Organics and Silt	
2	**Clayey Silt** Clayey silt w/ sand, gravel and boulders. Silty clay lenses. Slightly damp. No signfiicant inflow. Pit remains open to maximum depth.	
4		
6		
8		
10		
12		
14		
16		
18		
20		

Appendix B

Hydraulic Testing Data Sheets

Pumping Tests



PW1 CONSTANT RATE TEST

Data Set: I:\...\PW1CR.rev4.aqt
Date: 01/29/09 Time: 11:53:57

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: PW1
Test Date: Sept 20, 2008

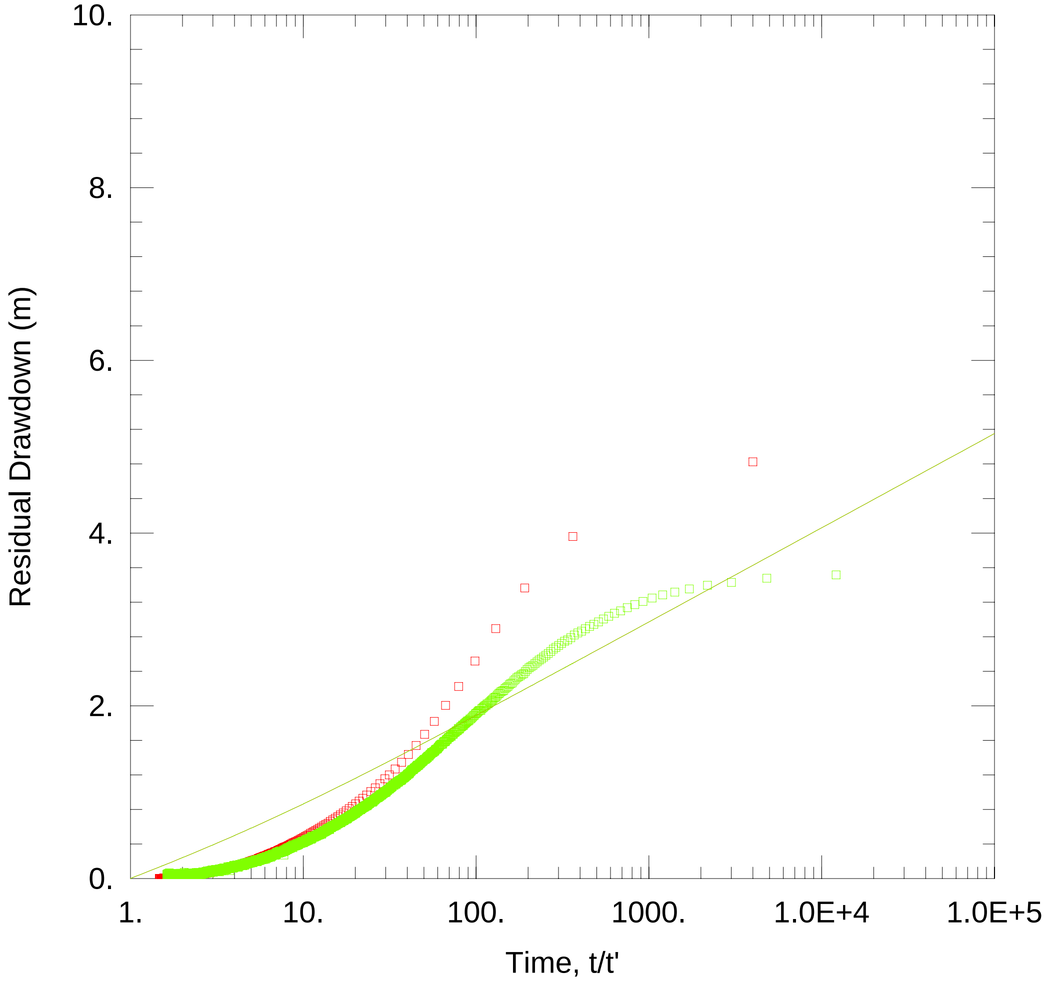
WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	584507.7	6913114.4

Observation Wells

Well Name	X (m)	Y (m)
□ PW1	584507.7	6913114.4
□ SP4a	584505	6913115
□ SP4b	584503.2	6913116
□ BR1	584465.4	6913130
□ SP5	584468	6913132
□ S3	584478	6913094
□ SP7a	584429	6913095



PW1 CONSTANT RATE TEST

Data Set: I:\...\PW1CR_recoverymatch.aqt
Date: 01/29/09 Time: 11:51:36

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: PW1
Test Date: Sept 20, 2008

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW1	584507.7	6913114.4

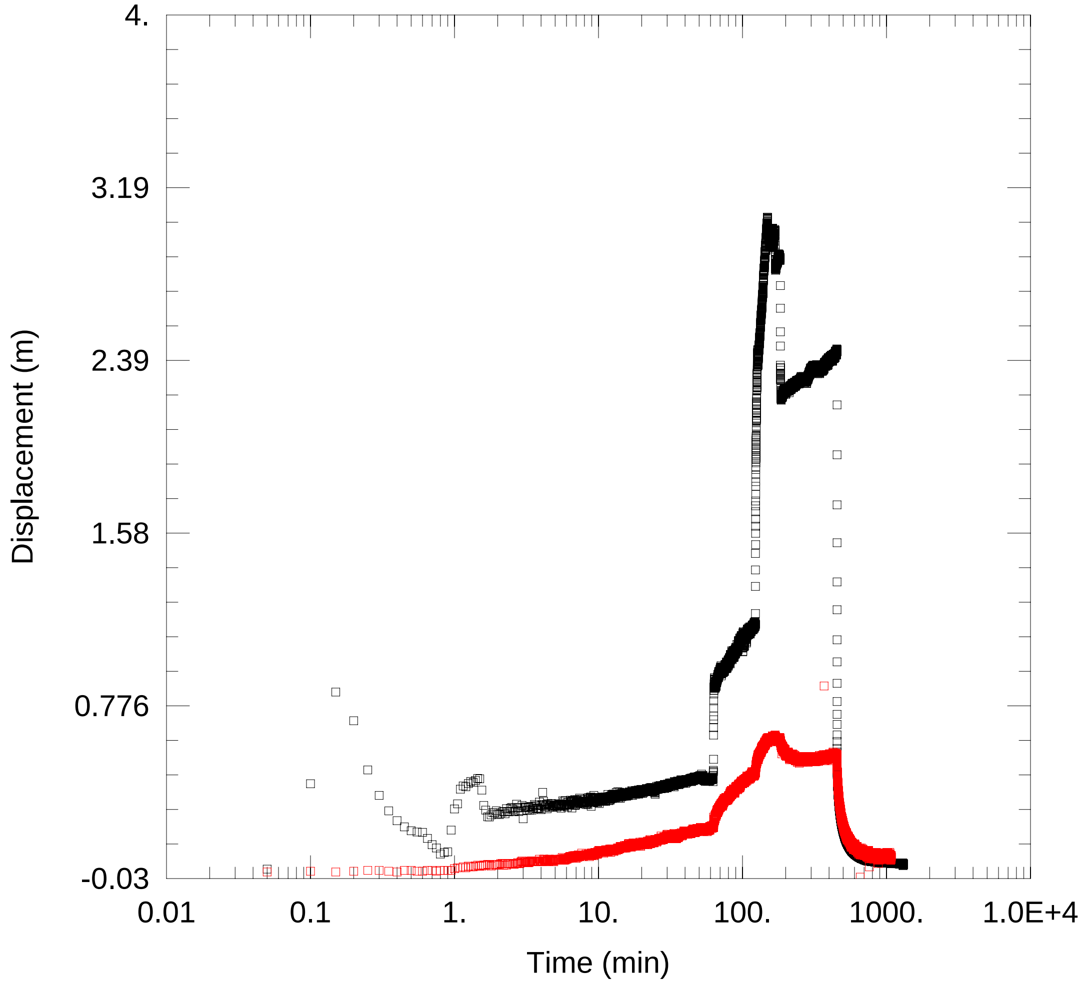
Observation Wells

Well Name	X (m)	Y (m)
□ PW1	584507.7	6913114.4
□ SP4a	584505	6913115

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0002219 m^2/sec
S = 1.634E-30
Kz/Kr = 1.
b = 35. m



WELL TEST ANALYSIS

Data Set: I:\...\PW2 Recovery.aqt
Date: 01/29/09 Time: 11:58:41

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: PW2
Test Date: Sept 17, 2008

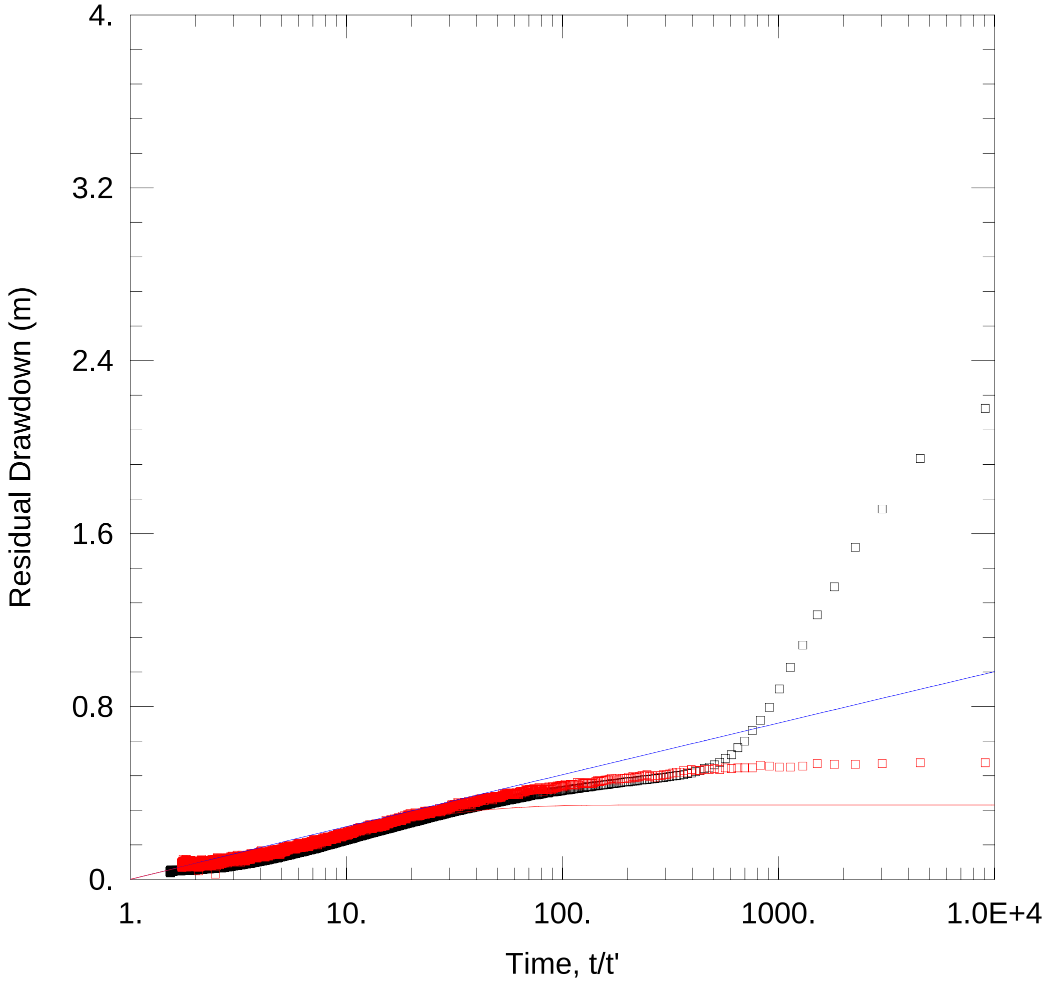
WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW2	0	0

Observation Wells

Well Name	X (m)	Y (m)
□ PW2	0	0
□ SP5	3	0



WELL TEST ANALYSIS

Data Set: I:\...\PW2 stop to CR.rev1.aqt
Date: 01/29/09 Time: 11:55:48

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: PW2
Test Date: Sept 17, 2008

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
PW2	0	0

Observation Wells

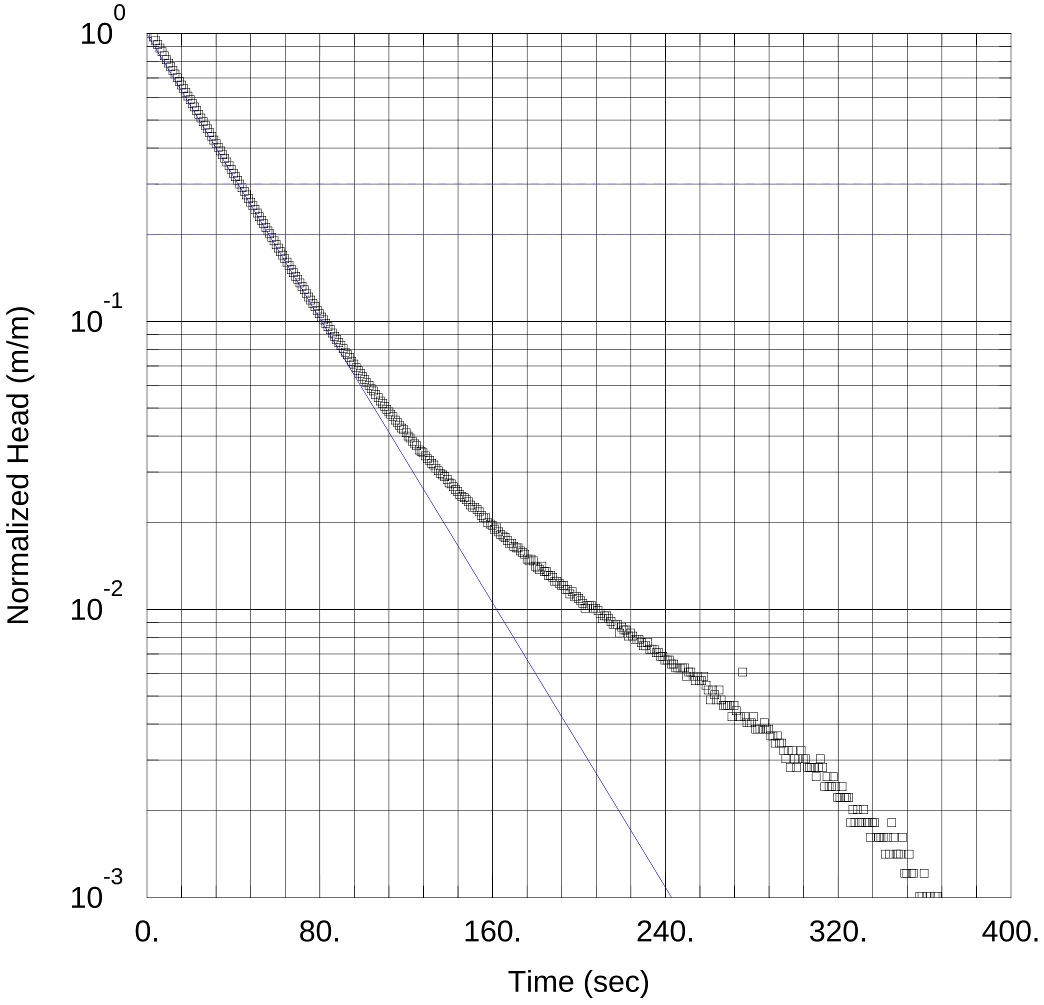
Well Name	X (m)	Y (m)
□ PW2	0	0
□ SP5	3	0

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0004545 m^2/sec
S = 0.1221
Kz/Kr = 1.
b = 10. m

Packer-Isolated Falling Head Tests



WELL TEST ANALYSIS

Data Set: P:\...\BR1_FHTest_44-58.aqt
Date: 01/27/09 Time: 11:08:01

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

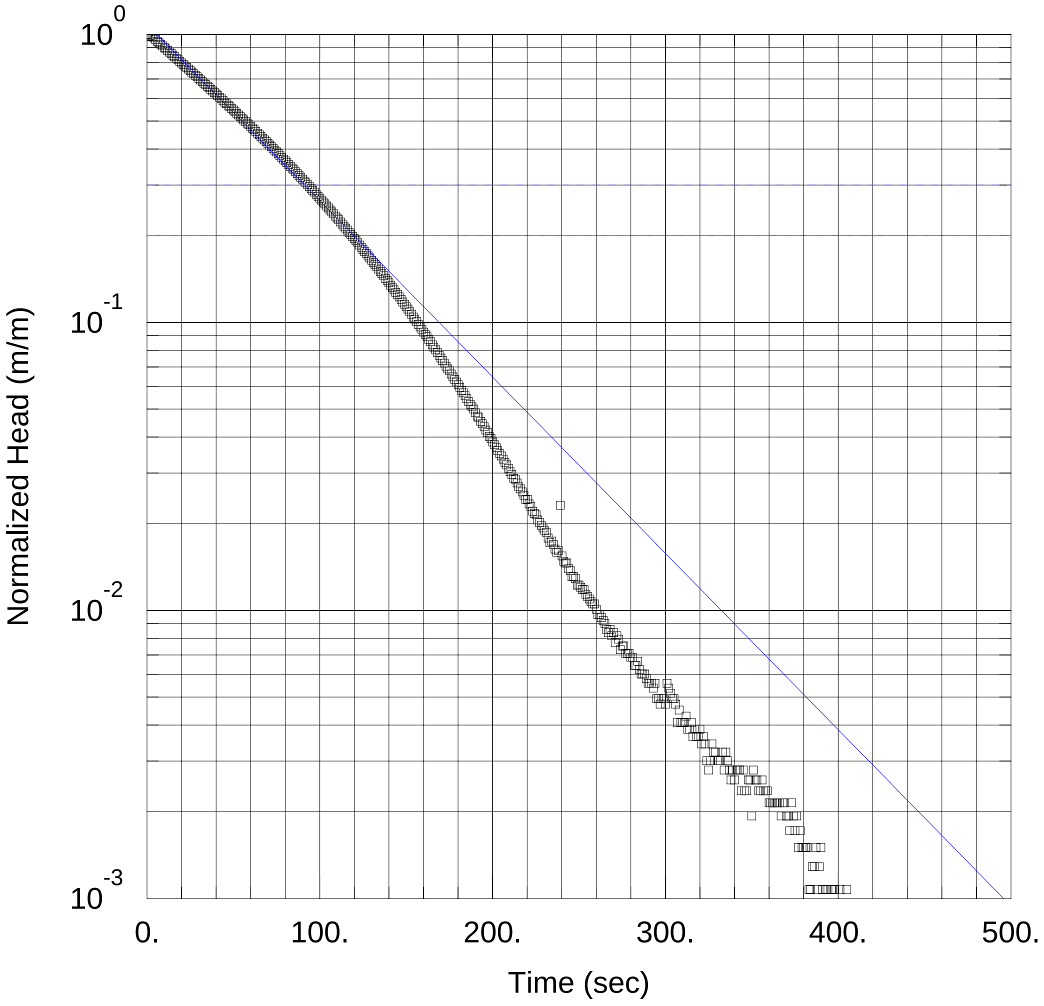
Saturated Thickness: 17.6 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR1_44-58_FH)

Initial Displacement: 4.95 m
Static Water Column Height: 17.6 m
Total Well Penetration Depth: 12.25 m
Screen Length: 4.2 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 9.107E-6 m/sec
y0 = 4.921 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_FHTest_61-78.aqt
Date: 01/27/09 Time: 11:07:46

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

Saturated Thickness: 23.7 m
Anisotropy Ratio (Kz/Kr): 1.

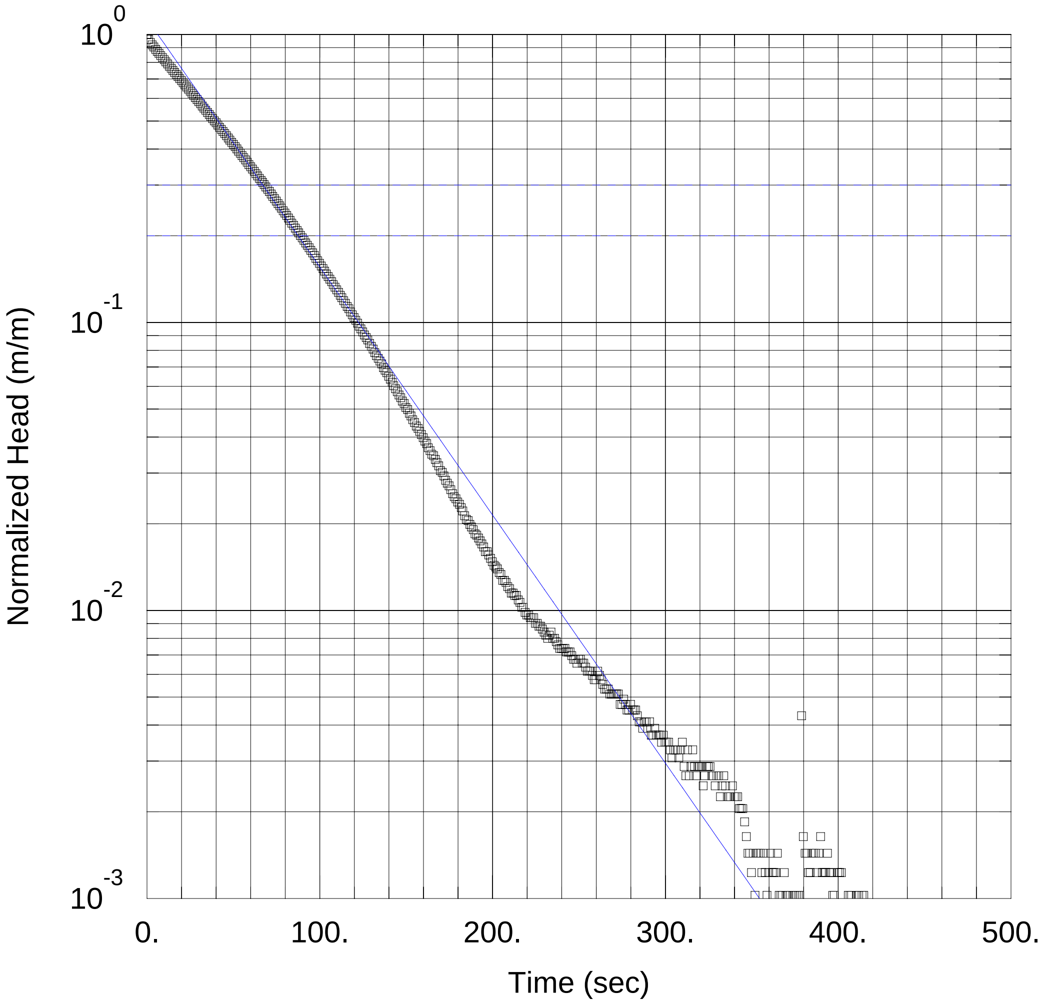
WELL DATA (BR1_61-78_FH)

Initial Displacement: 4.655 m
Total Well Penetration Depth: 18.45 m
Casing Radius: 0.0257 m
Static Water Column Height: 23.7 m
Screen Length: 5.2 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.923E-6 m/sec
y0 = 5.047 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_FHTest_61-113.aqt
Date: 01/27/09 Time: 11:07:28

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

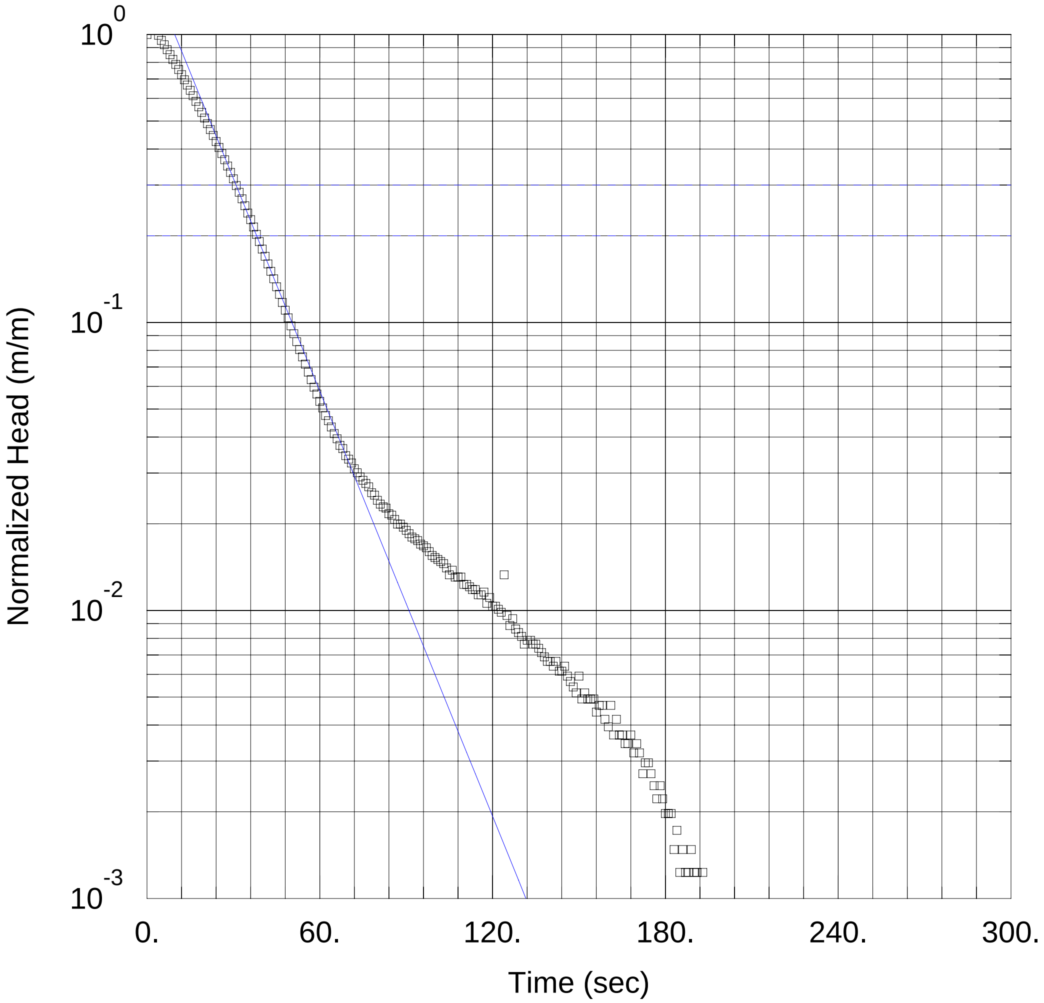
Saturated Thickness: 34.4 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR1_44-58_FH)

Initial Displacement: 4.877 m
Static Water Column Height: 34.4 m
Total Well Penetration Depth: 29.09 m
Screen Length: 15.84 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.171E-6 m/sec
y0 = 5.526 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_FHTest_78-113.aqt
Date: 01/27/09 Time: 11:06:53

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR1 Falling Head
Test Date: September 2008

AQUIFER DATA

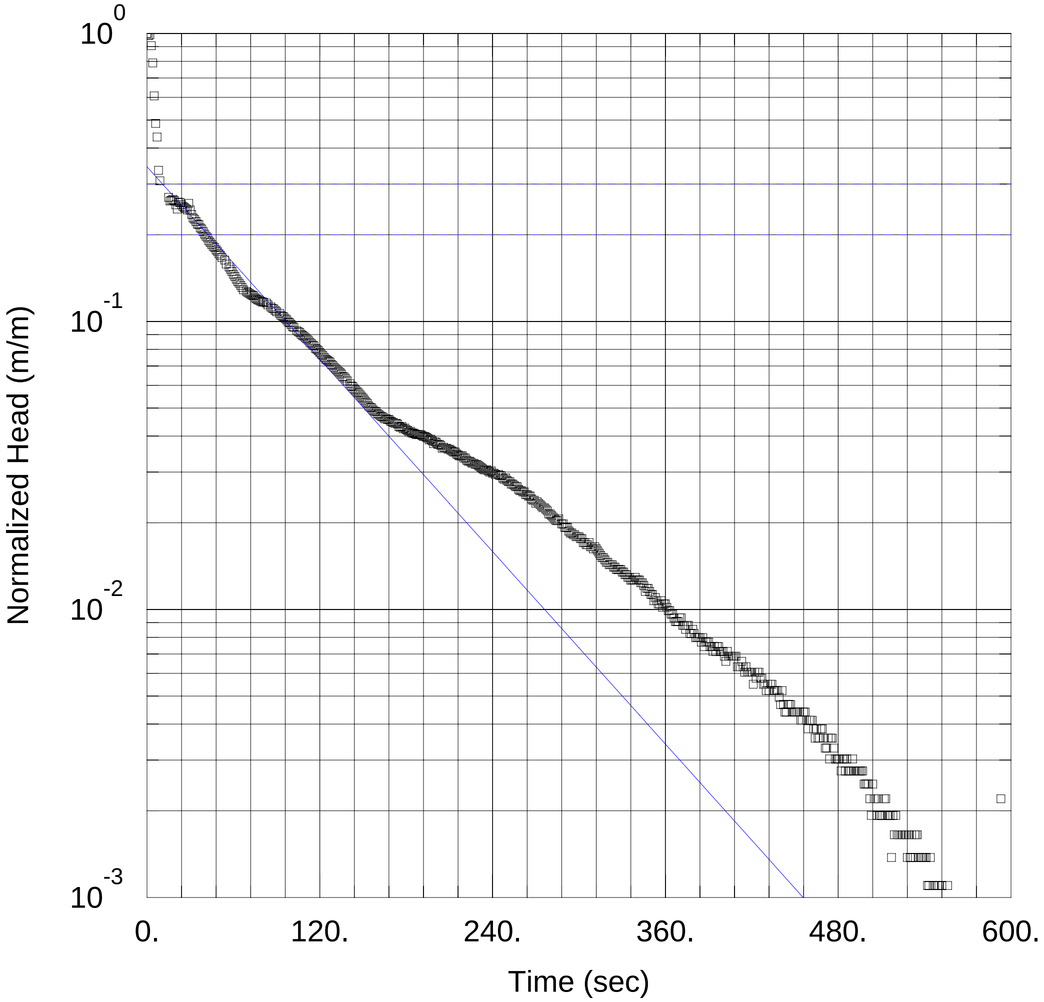
Saturated Thickness: 34.4 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR1_44-58_FH)

Initial Displacement: 4.06 m
Static Water Column Height: 34.4 m
Total Well Penetration Depth: 29.01 m
Screen Length: 10.66 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 8.795E-6 m/sec
y0 = 7.019 m



WELL TEST ANALYSIS

Data Set: P:\...\BR3_FHTest.aqt
Date: 01/27/09 Time: 11:08:46

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR3 Falling Head

AQUIFER DATA

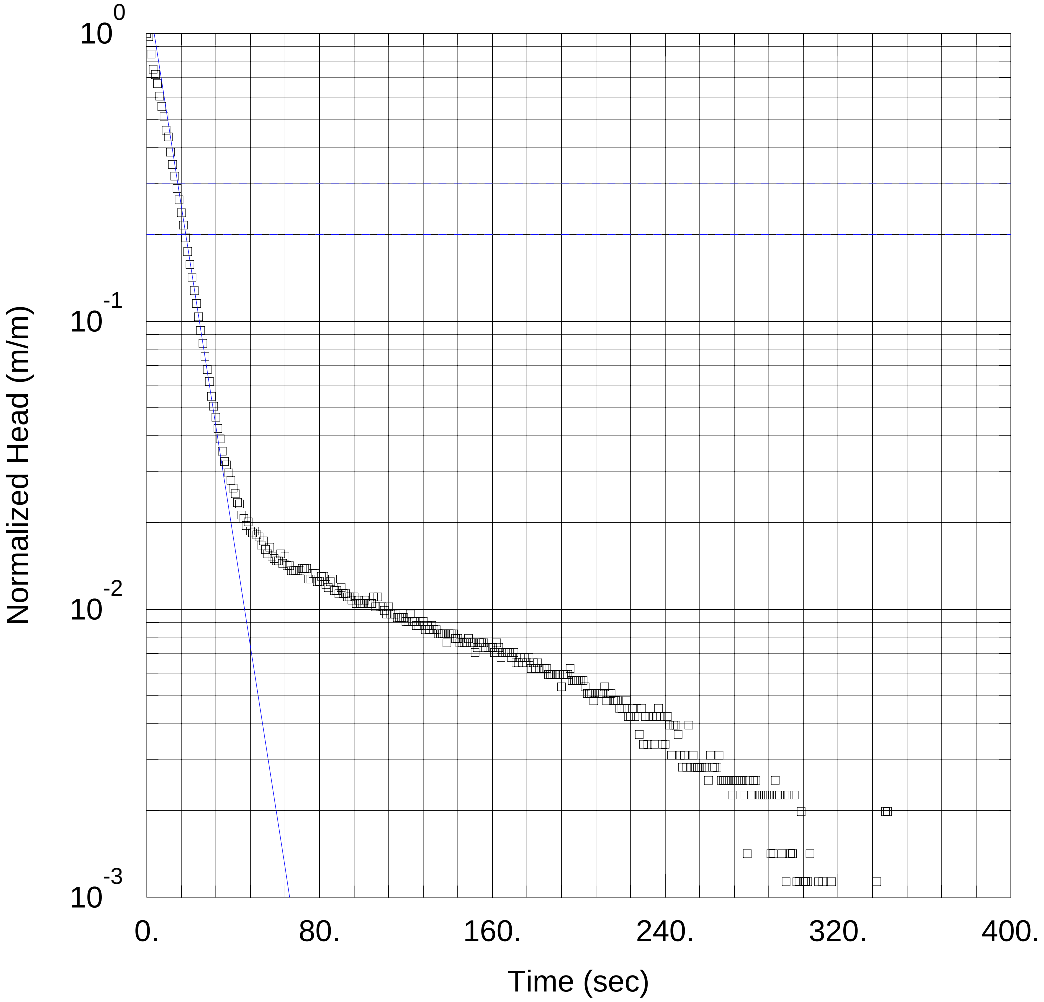
Saturated Thickness: 1.5 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR3 FHT)

Initial Displacement: 3.636 m
Static Water Column Height: 1.5 m
Total Well Penetration Depth: 6. m
Screen Length: 6. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 3.015E-6 m/sec
y0 = 1.252 m



WELL TEST ANALYSIS

Data Set: P:\...\BR4_FHTest_53-73.aqt
Date: 01/27/09
Time: 11:09:36

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

Saturated Thickness: 22.25 m
Anisotropy Ratio (Kz/Kr): 1.

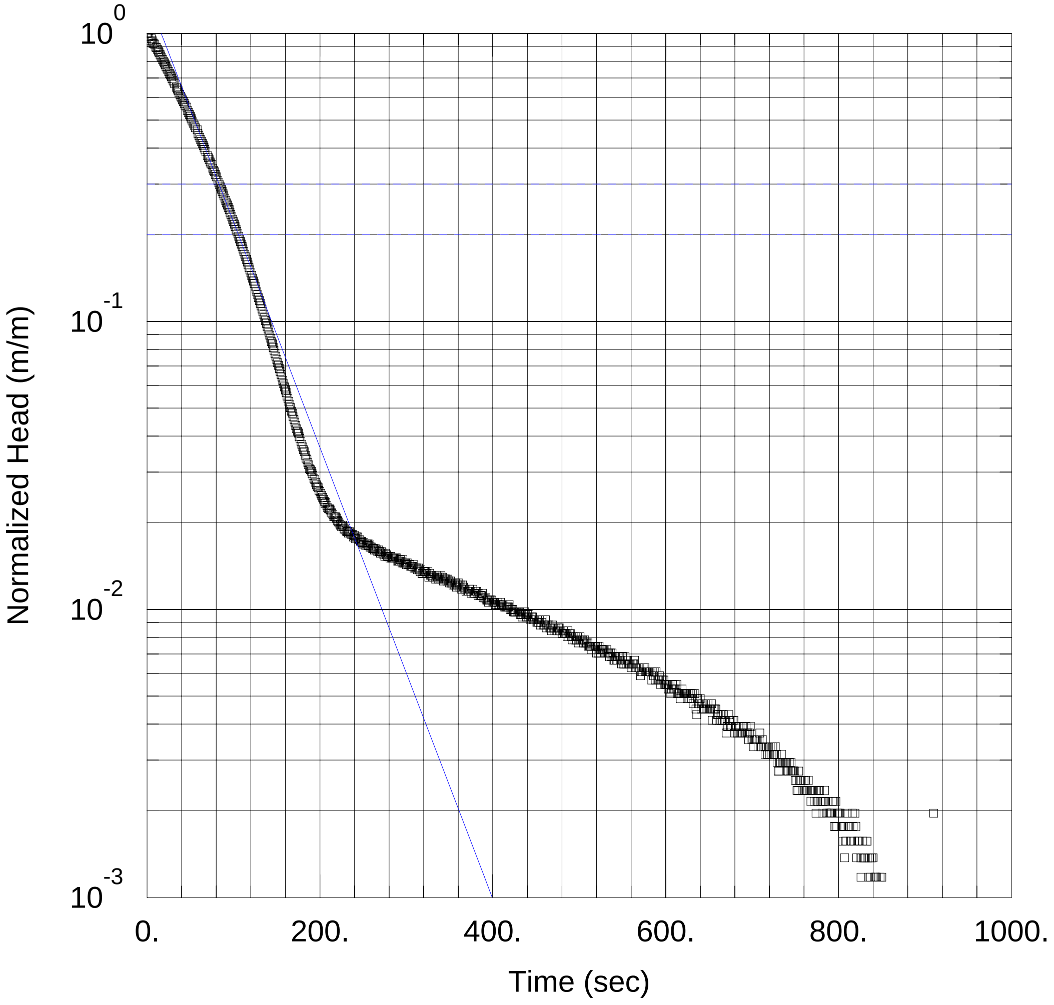
WELL DATA (BR4 53-73)

Initial Displacement: 3.535 m
Total Well Penetration Depth: 16.3 m
Casing Radius: 0.0257 m
Static Water Column Height: 22.25 m
Screen Length: 6.09 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.617E-5 m/sec
y0 = 5.158 m



WELL TEST ANALYSIS

Data Set: P:\...\BR4_FHTest_73-93.aqt
Date: 01/27/09
Time: 11:09:46

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

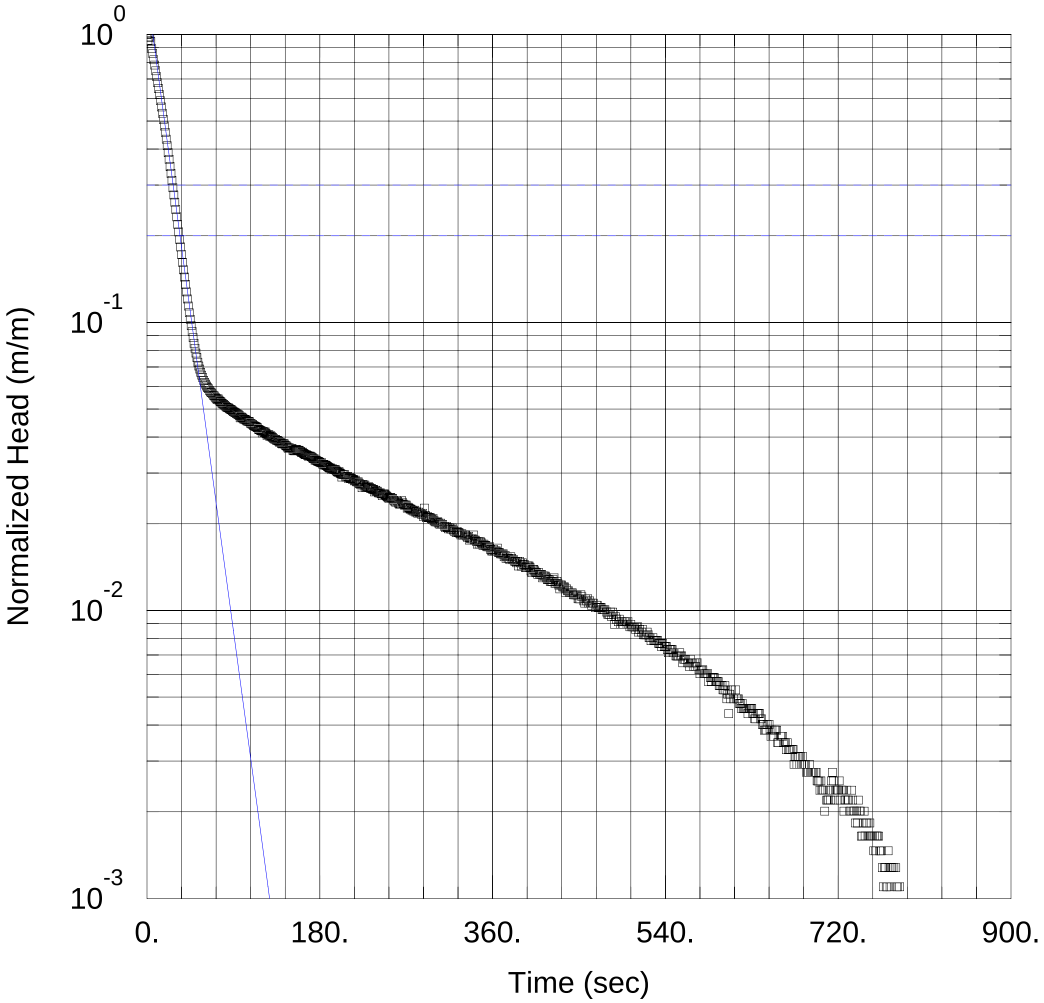
Saturated Thickness: 28.34 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR4 73-93)

Initial Displacement: 5.101 m
Static Water Column Height: 28.34 m
Total Well Penetration Depth: 28.49 m
Screen Length: 6.09 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 5.175E-6 m/sec
y0 = 6.86 m



WELL TEST ANALYSIS

Data Set: P:\...\BR4_FHTest_101-123.aqt
Date: 01/27/09
Time: 11:09:56

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

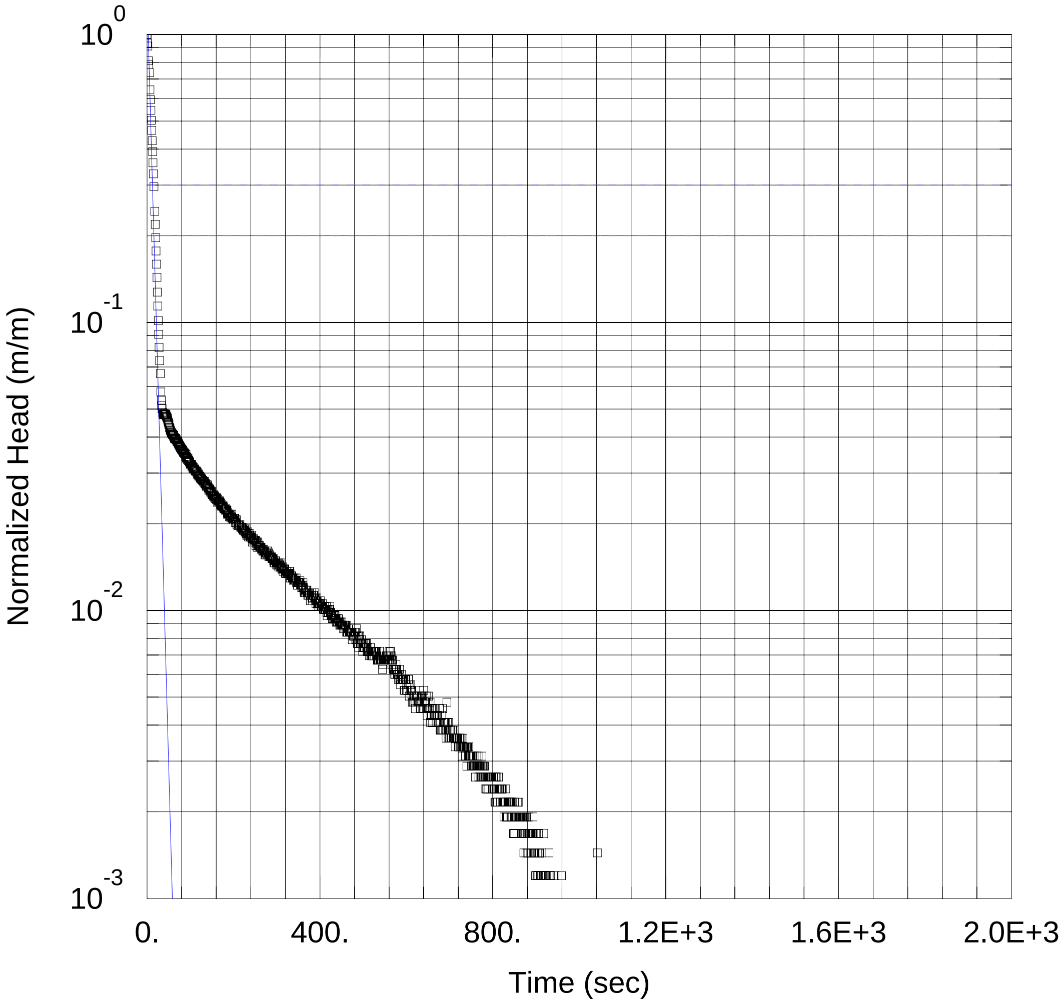
Saturated Thickness: 37.5 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR4 101-123)

Initial Displacement: 5.471 m
Static Water Column Height: 37.5 m
Total Well Penetration Depth: 31.54 m
Screen Length: 6.7 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 1.334E-5 m/sec
y0 = 7.698 m



WELL TEST ANALYSIS

Data Set: P:\...\BR4_FHTest_126-153.aqt
Date: 01/27/09 Time: 11:10:07

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR4 Falling Head

AQUIFER DATA

Saturated Thickness: 46.6 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (BR4 126-153)

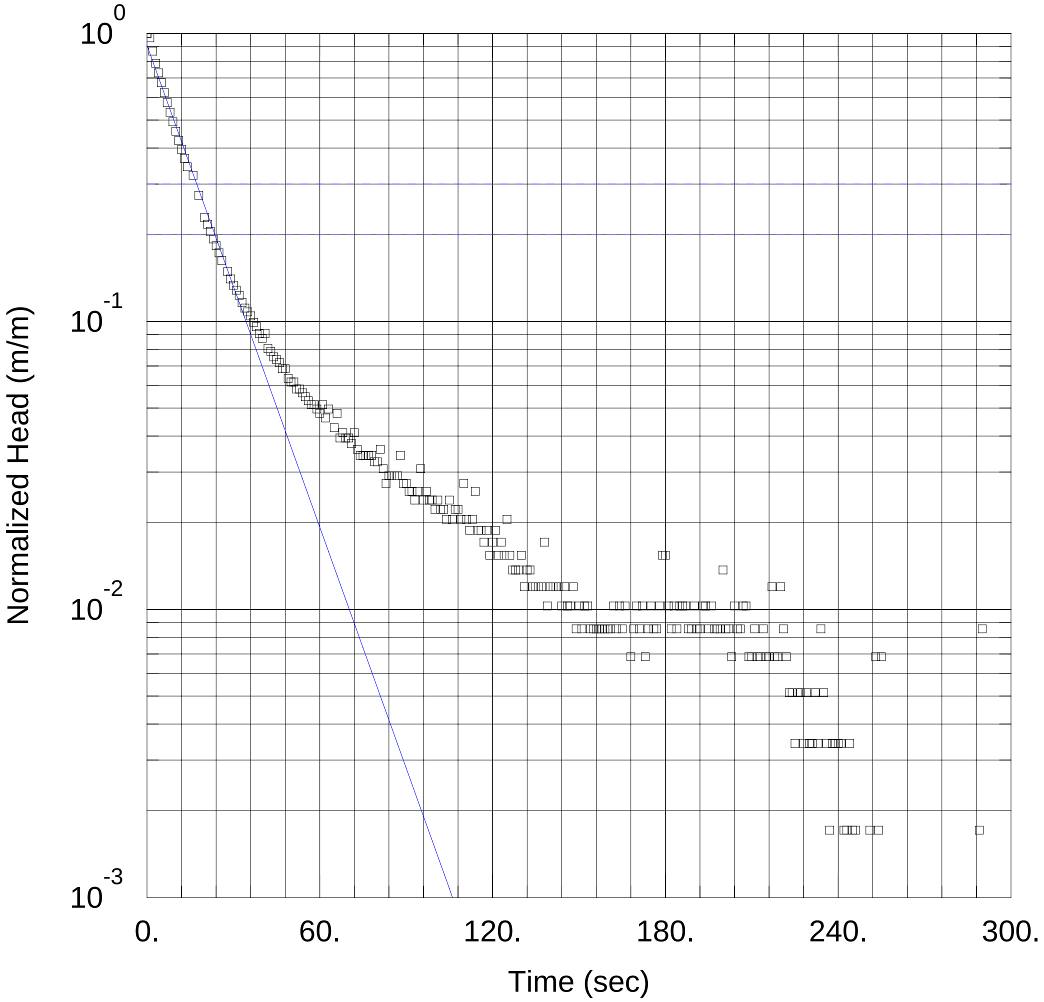
Initial Displacement: 4.167 m
Total Well Penetration Depth: 36.69 m
Casing Radius: 0.0257 m
Static Water Column Height: 46.4 m
Screen Length: 8.23 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.439E-5 m/sec
y0 = 5.963 m

Slug Tests



WELL TEST ANALYSIS

Data Set: P:\...\BR1_test1.aqt
Date: 01/27/09 Time: 11:11:41

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR1- Slug Tests
Test Date: September 2008

AQUIFER DATA

Saturated Thickness: 26.73 m Anisotropy Ratio (Kz/Kr): 1.

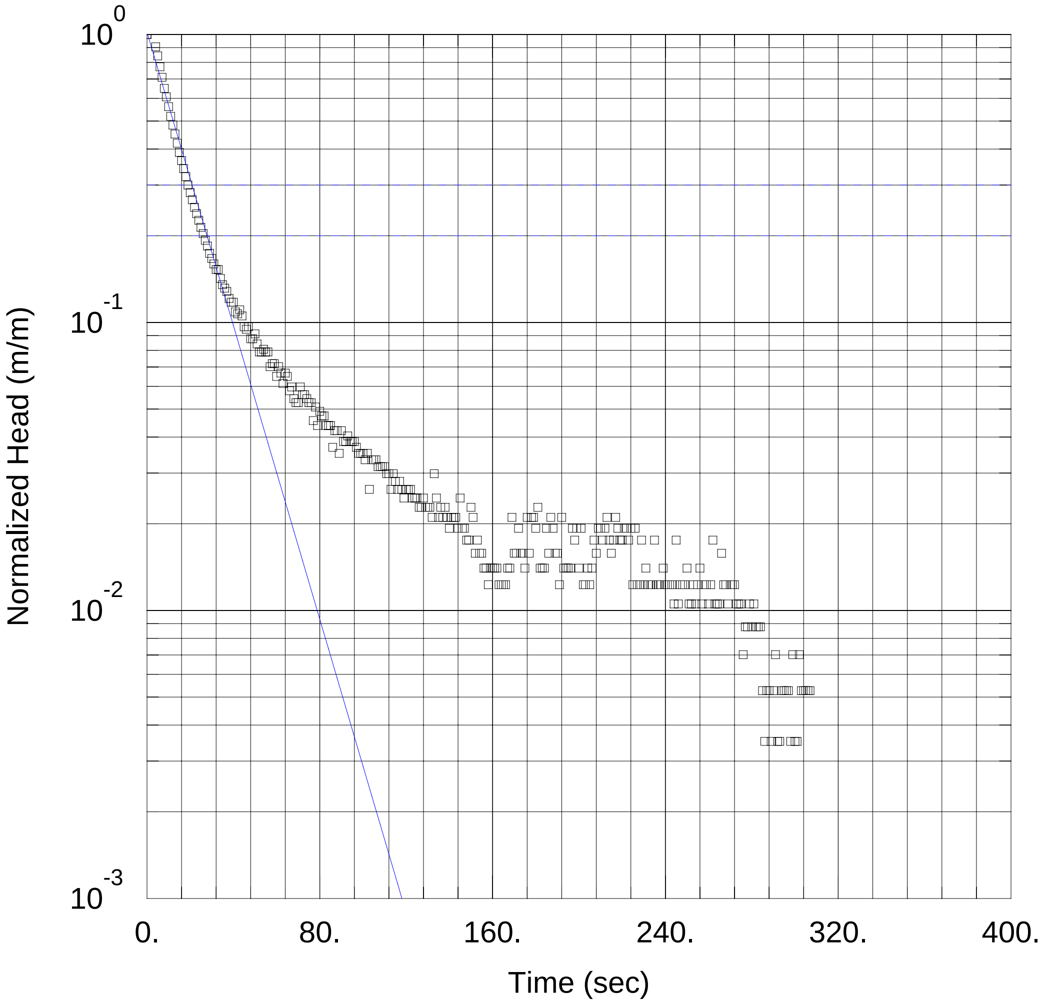
WELL DATA (Test 1)

Initial Displacement: 0.584 m
Static Water Column Height: 26.73 m
Total Well Penetration Depth: 26.73 m
Screen Length: 5.73 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.934E-5 m/sec y0 = 0.5311 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_test2.aqt

Date: 01/27/09 Time: 11:11:56

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

Saturated Thickness: 26.73 m Anisotropy Ratio (Kz/Kr): 1.

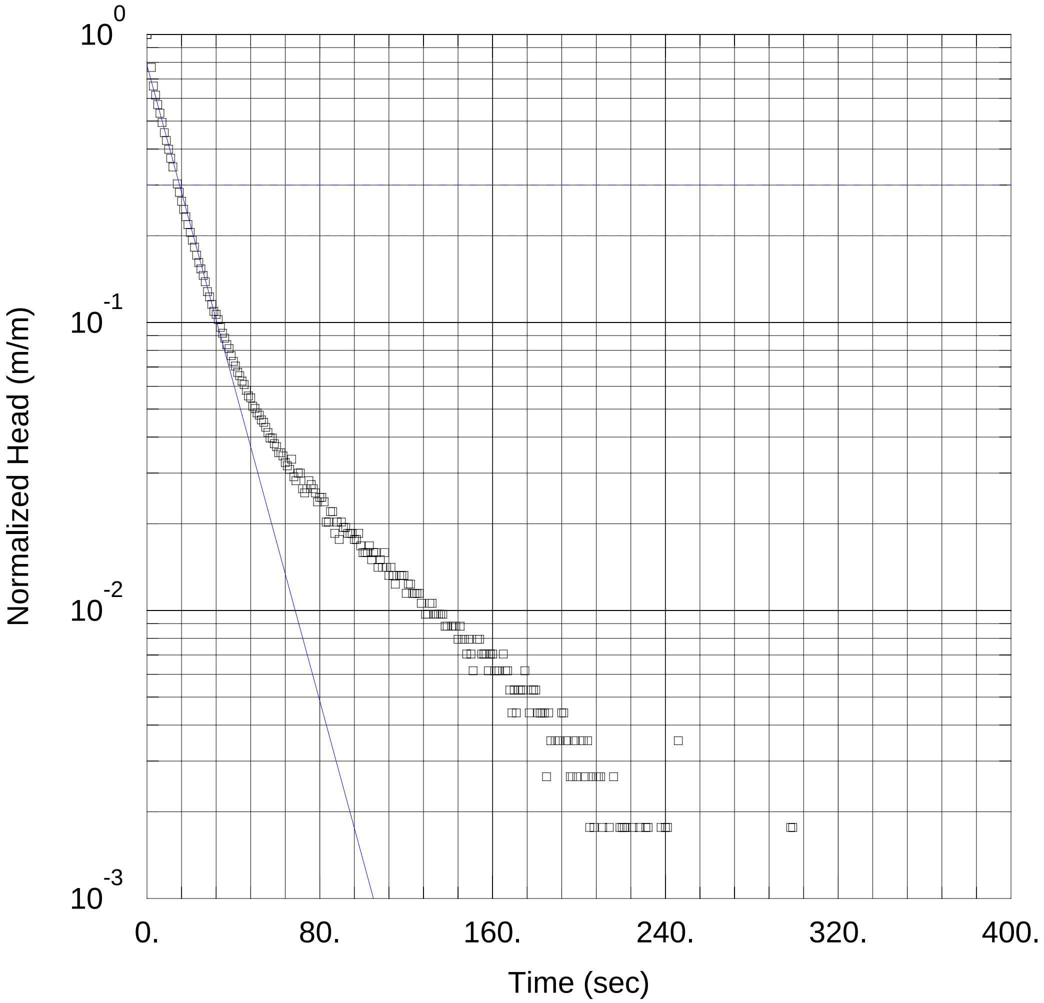
WELL DATA (Test 2)

Initial Displacement: 0.57 m
Total Well Penetration Depth: 26.73 m
Casing Radius: 0.0257 m
Static Water Column Height: 26.73 m
Screen Length: 5.73 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 1.768E-5 m/sec y0 = 0.5817 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_test3.aqt
Date: 01/27/09 Time: 11:12:07

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

Saturated Thickness: 26.73 m
Anisotropy Ratio (Kz/Kr): 1.

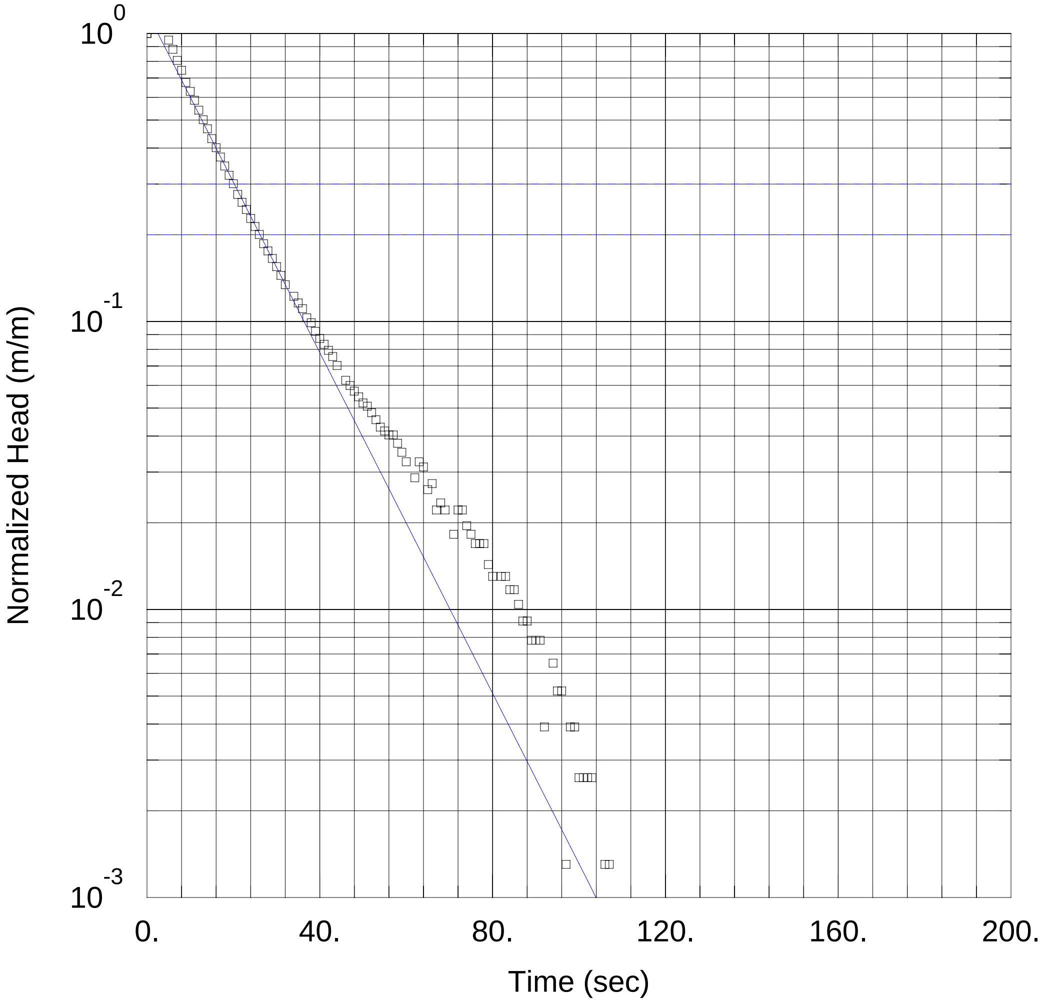
WELL DATA (Test 3)

Initial Displacement: 1.134 m
Static Water Column Height: 26.73 m
Total Well Penetration Depth: 26.73 m
Screen Length: 5.73 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.914E-5 m/sec
y0 = 0.8857 m



WELL TEST ANALYSIS

Data Set: P:\...\BR1_test4.aqt
Date: 01/27/09 Time: 11:12:22

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

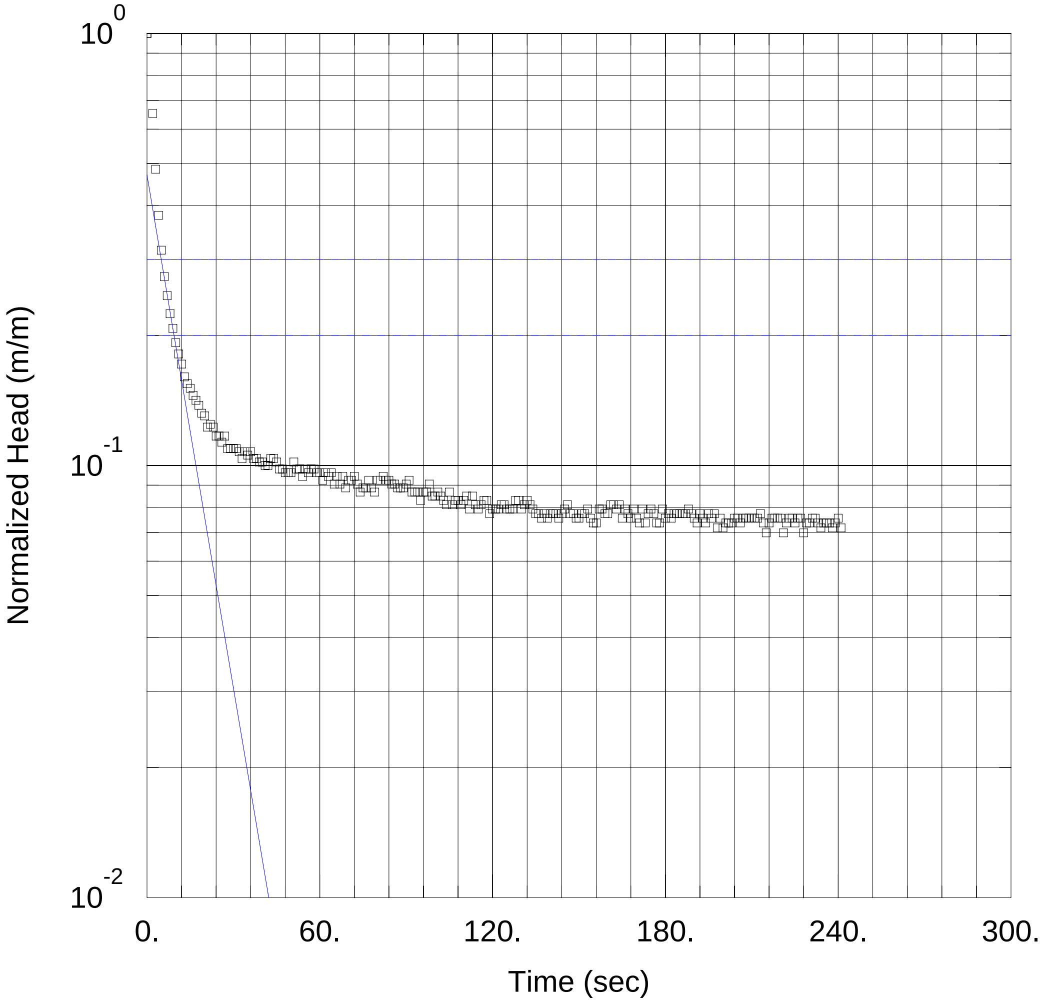
Saturated Thickness: 26.73 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (Test 4)

Initial Displacement: 0.768 m
Static Water Column Height: 26.73 m
Total Well Penetration Depth: 26.73 m
Screen Length: 5.73 m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.051E-5 m/sec
y0 = 0.9121 m



WELL TEST ANALYSIS

Data Set: P:\...\BR2_test1.aqt

Date: 01/27/09 Time: 11:13:28

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: BR2 Slug tests
Test Date: September 2008

AQUIFER DATA

Saturated Thickness: 18.33 m Anisotropy Ratio (Kz/Kr): 1.

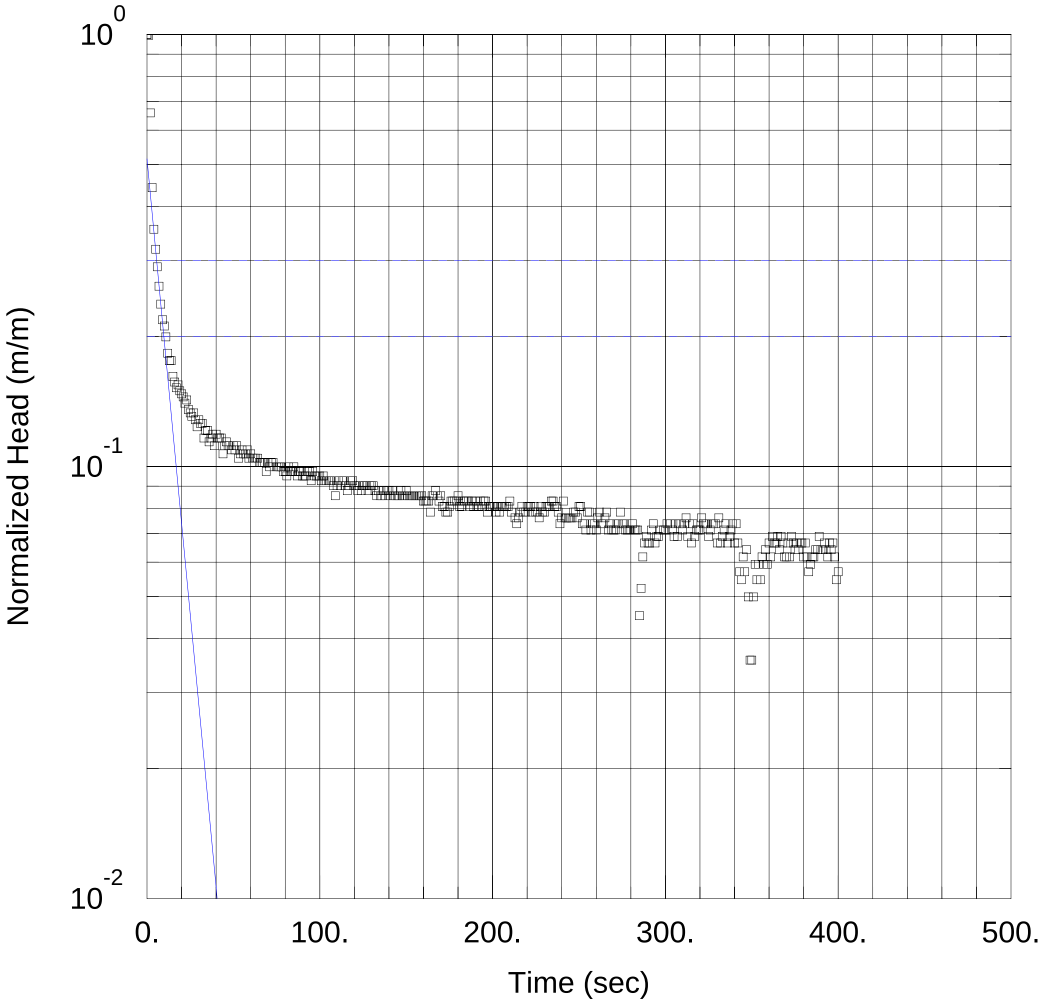
WELL DATA (Test 1)

Initial Displacement: 0.53 m
Total Well Penetration Depth: 13.24 m
Casing Radius: 0.0257 m
Static Water Column Height: 13.33 m
Screen Length: 6. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.151E-5 m/sec y0 = 0.2493 m



WELL TEST ANALYSIS

Data Set: P:\...\BR2_test2.aqt
Date: 01/27/09
Time: 11:13:41

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

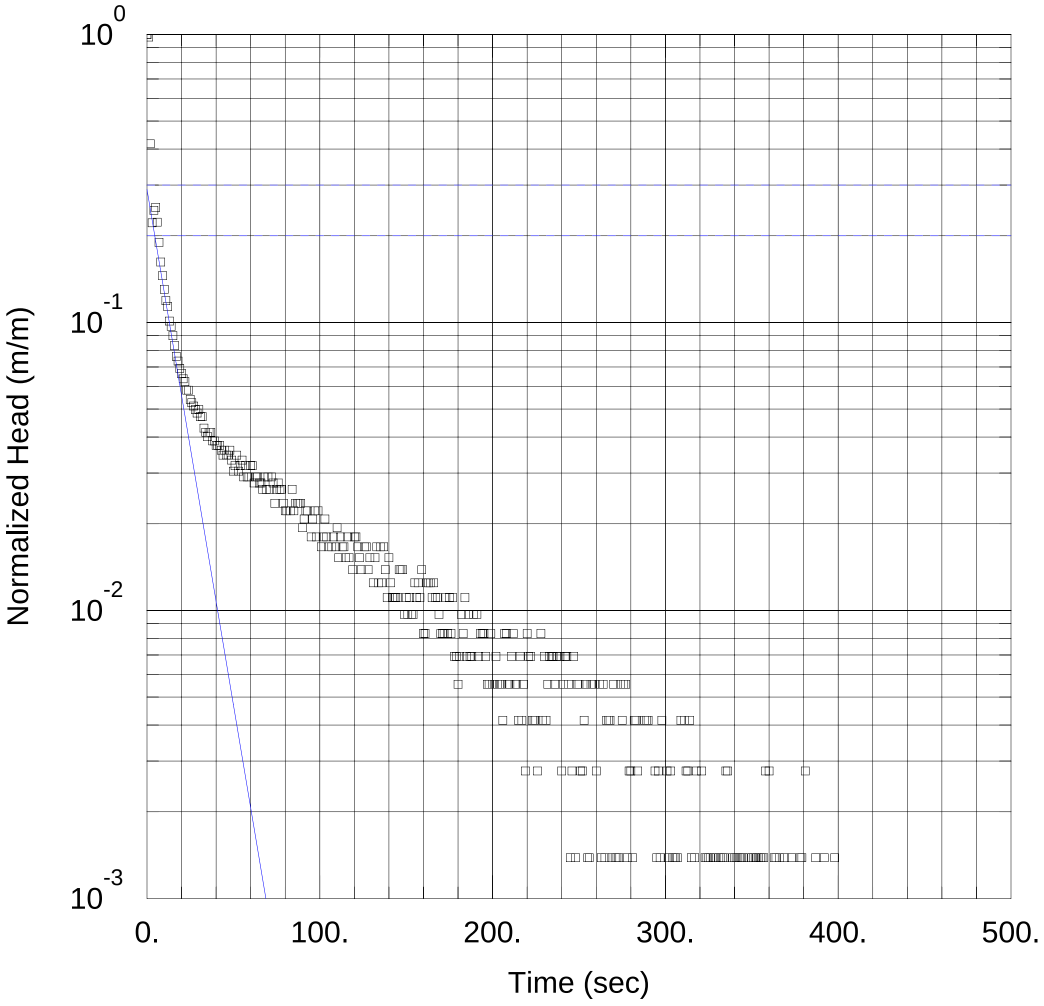
Saturated Thickness: 18.33 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (Test 2)

Initial Displacement: 0.421 m
Static Water Column Height: 13.33 m
Total Well Penetration Depth: 13.24 m
Screen Length: 6. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.29E-5 m/sec
y0 = 0.2169 m



WELL TEST ANALYSIS

Data Set: P:\...\BR2_test3.aqt
Date: 01/27/09
Time: 11:13:51

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

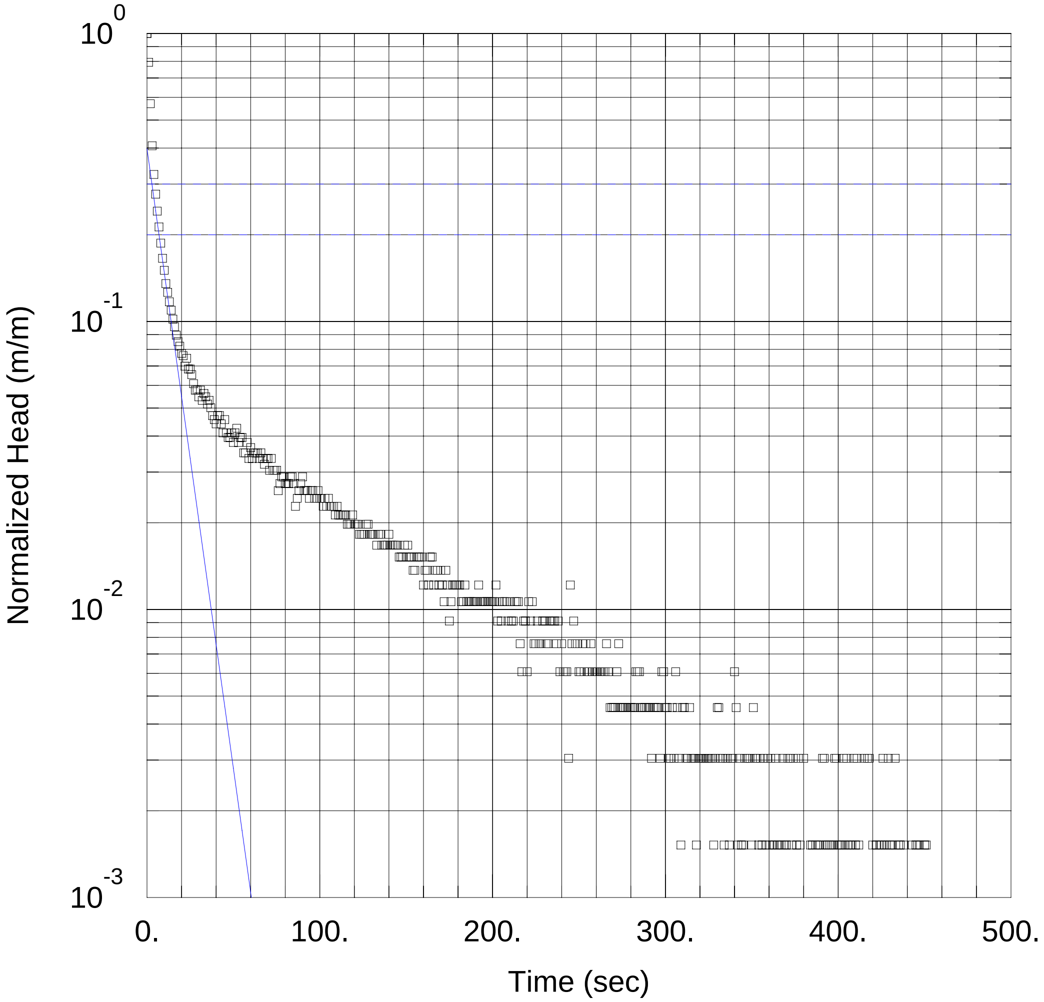
Saturated Thickness: 18.33 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (Test 3)

Initial Displacement: 0.722 m
Static Water Column Height: 13.33 m
Total Well Penetration Depth: 13.24 m
Screen Length: 6. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 1.945E-5 m/sec
y0 = 0.2093 m



WELL TEST ANALYSIS

Data Set: P:\...\BR2_test4.aqt

Date: 01/27/09 Time: 11:14:01

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 3

AQUIFER DATA

Saturated Thickness: 18.33 m Anisotropy Ratio (Kz/Kr): 1.

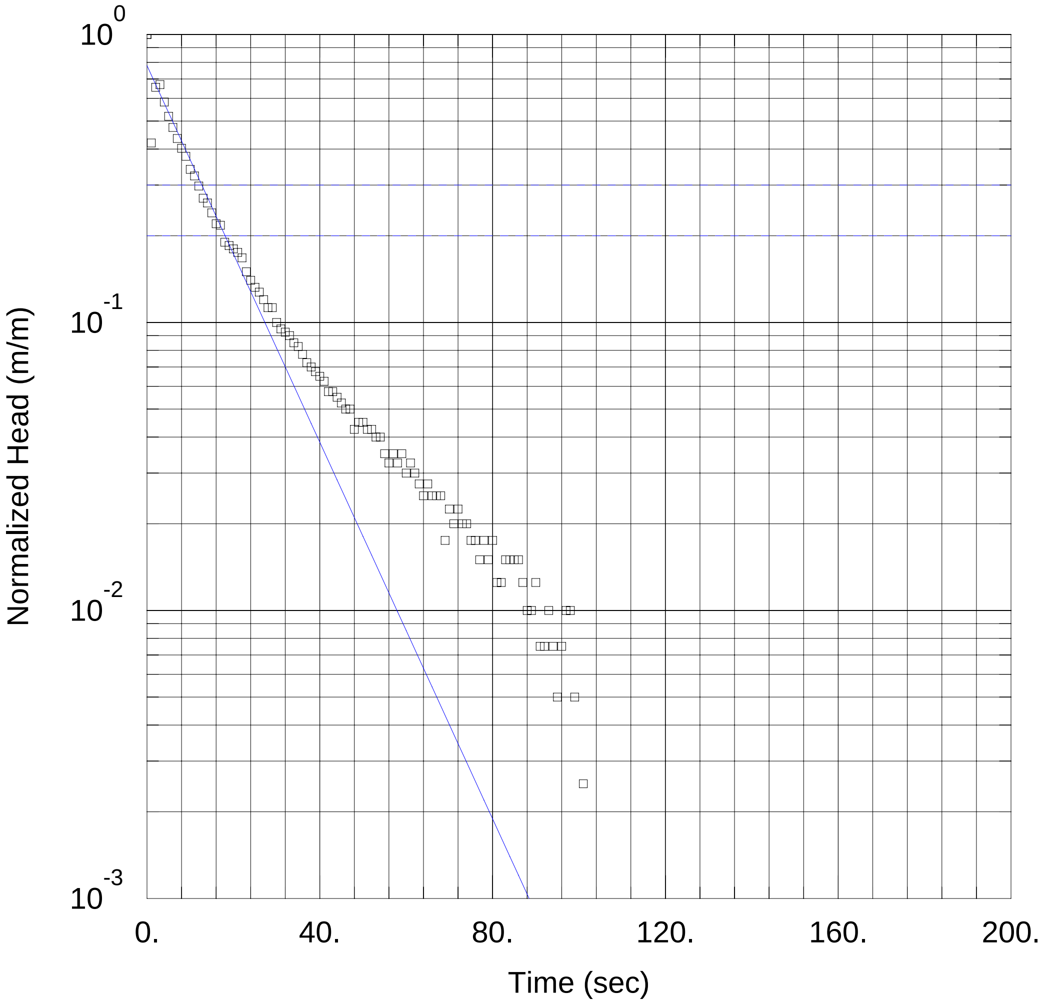
WELL DATA (Tes 4)

Initial Displacement: 0.658 m
Total Well Penetration Depth: 13.24 m
Casing Radius: 0.0257 m
Static Water Column Height: 13.33 m
Screen Length: 6. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 2.34E-5 m/sec y0 = 0.2621 m



SP4B TEST 1

Data Set: P:\...\2008 Test1.aqt
Date: 01/27/09 Time: 11:15:44

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: SP4b
Test Date: Sep 3, 2008

AQUIFER DATA

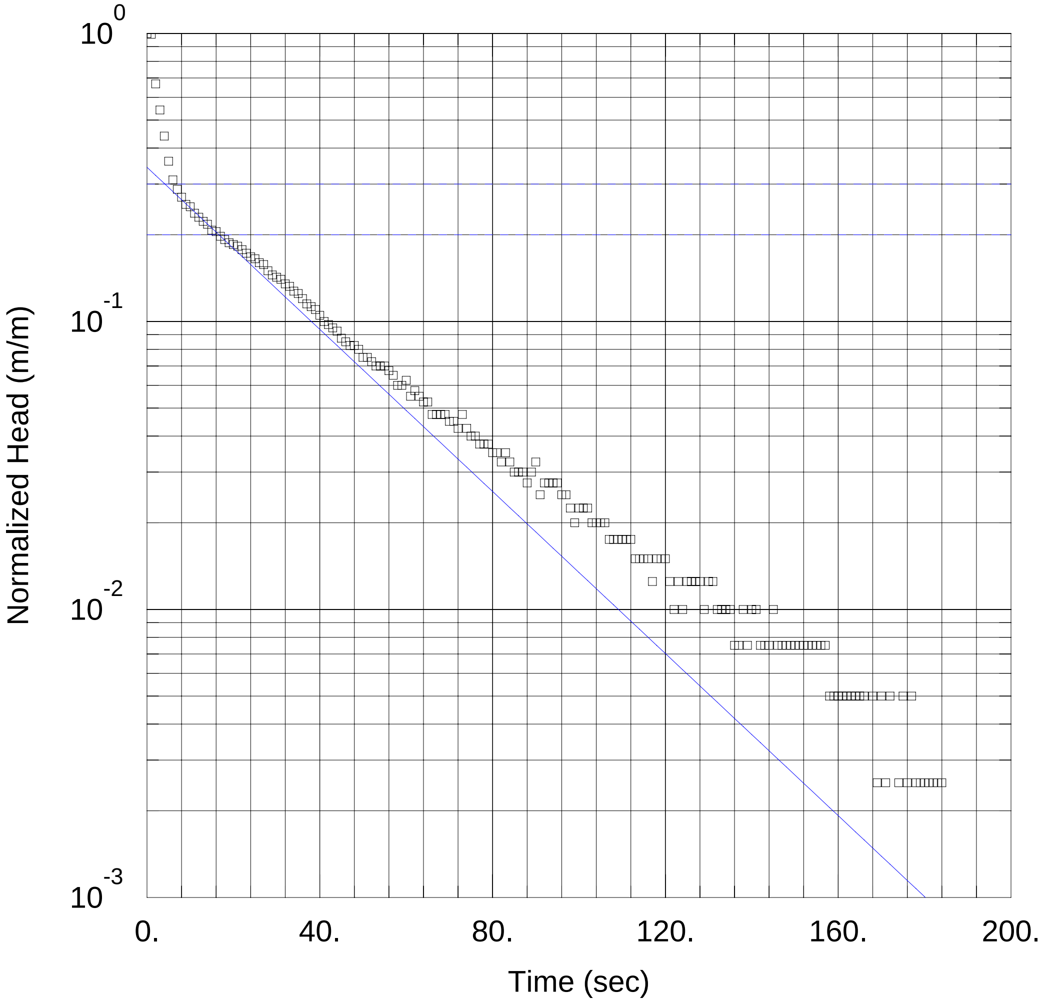
Saturated Thickness: 2.9 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP4b)

Initial Displacement: 0.4 m
Static Water Column Height: 3.5 m
Total Well Penetration Depth: 2.9 m
Screen Length: 2.9 m
Casing Radius: 0.025 m
Well Radius: 0.05 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.525E-5 m/sec
y0 = 0.3118 m



SP4B TEST 1

Data Set: P:\...\2008 Test2.aqt

Date: 01/27/09 Time: 11:15:53

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: SP4b
Test Date: Sep 3, 2008

AQUIFER DATA

Saturated Thickness: 2.9 m
Anisotropy Ratio (Kz/Kr): 1.

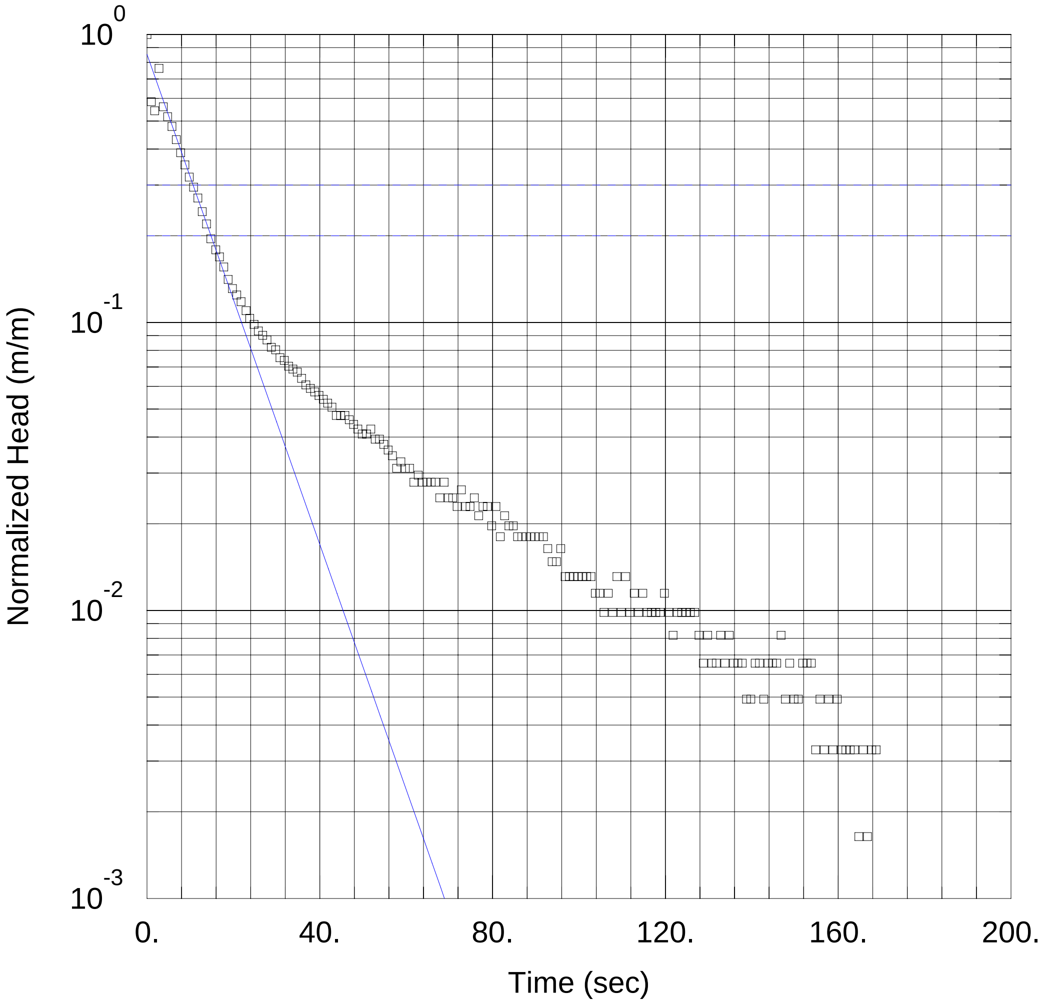
WELL DATA (SP4b)

Initial Displacement: 0.4 m
Static Water Column Height: 3.5 m
Total Well Penetration Depth: 2.9 m
Screen Length: 2.9 m
Casing Radius: 0.025 m
Well Radius: 0.05 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 1.087E-5 m/sec
y0 = 0.1372 m



SP4B TEST 1

Data Set: P:\...\2008 Test3.aqt
Date: 01/27/09 Time: 11:16:04

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: SP4b
Test Date: September 2008

AQUIFER DATA

Saturated Thickness: 2.9 m
Anisotropy Ratio (Kz/Kr): 1.

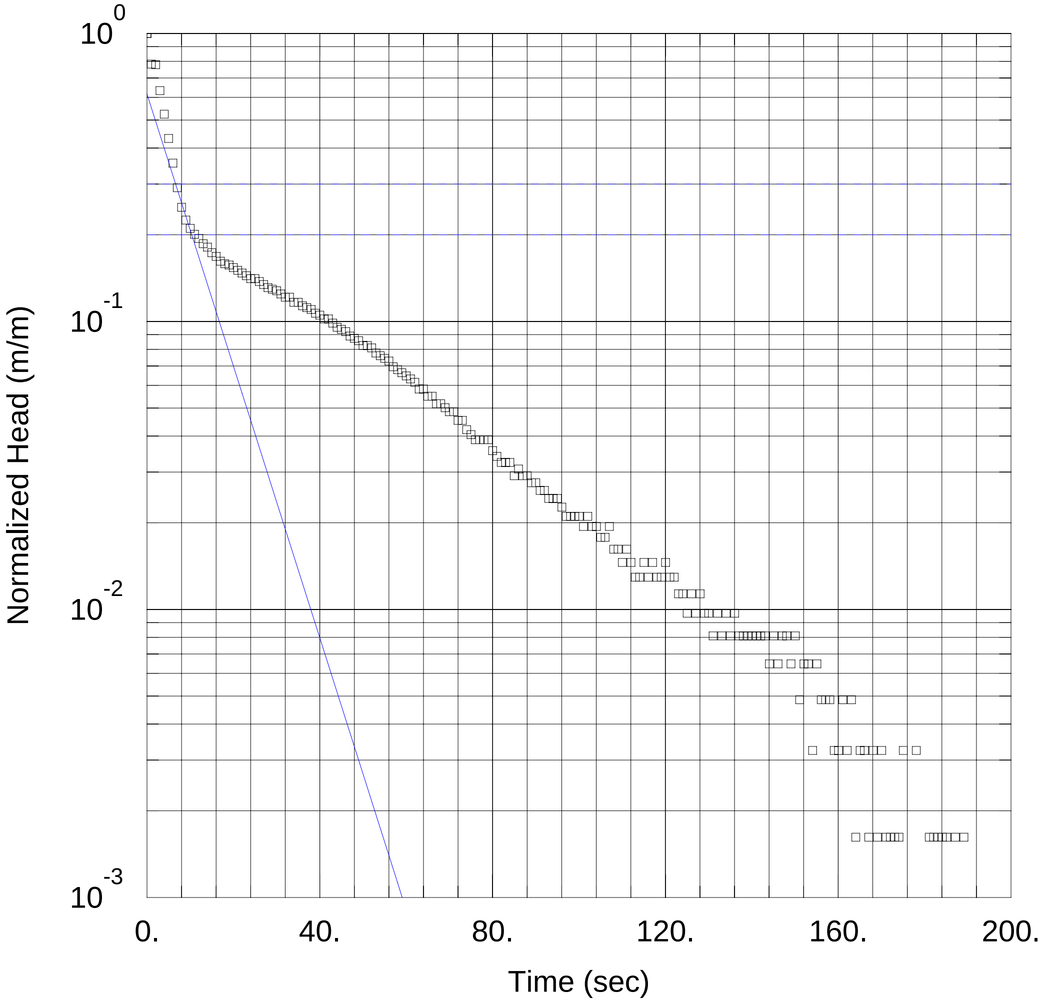
WELL DATA (SP4b)

Initial Displacement: 0.61 m
Static Water Column Height: 3.5 m
Total Well Penetration Depth: 2.9 m
Screen Length: 2.9 m
Casing Radius: 0.025 m
Well Radius: 0.05 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 3.286E-5 m/sec
y0 = 0.5203 m



SP4B TEST 1

Data Set: P:\...\2008 Test4.aqt

Date: 01/27/09 Time: 11:15:33

PROJECT INFORMATION

Company: SRK
Client: D&T
Project: 1CD003.112
Location: Faro S-Cluster
Test Well: SP4b
Test Date: Sep 3, 2008

AQUIFER DATA

Saturated Thickness: 2.9 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP4b)

Initial Displacement: 0.618 m
Total Well Penetration Depth: 2.9 m
Casing Radius: 0.025 m

Static Water Column Height: 3.5 m
Screen Length: 2.9 m
Well Radius: 0.05 m

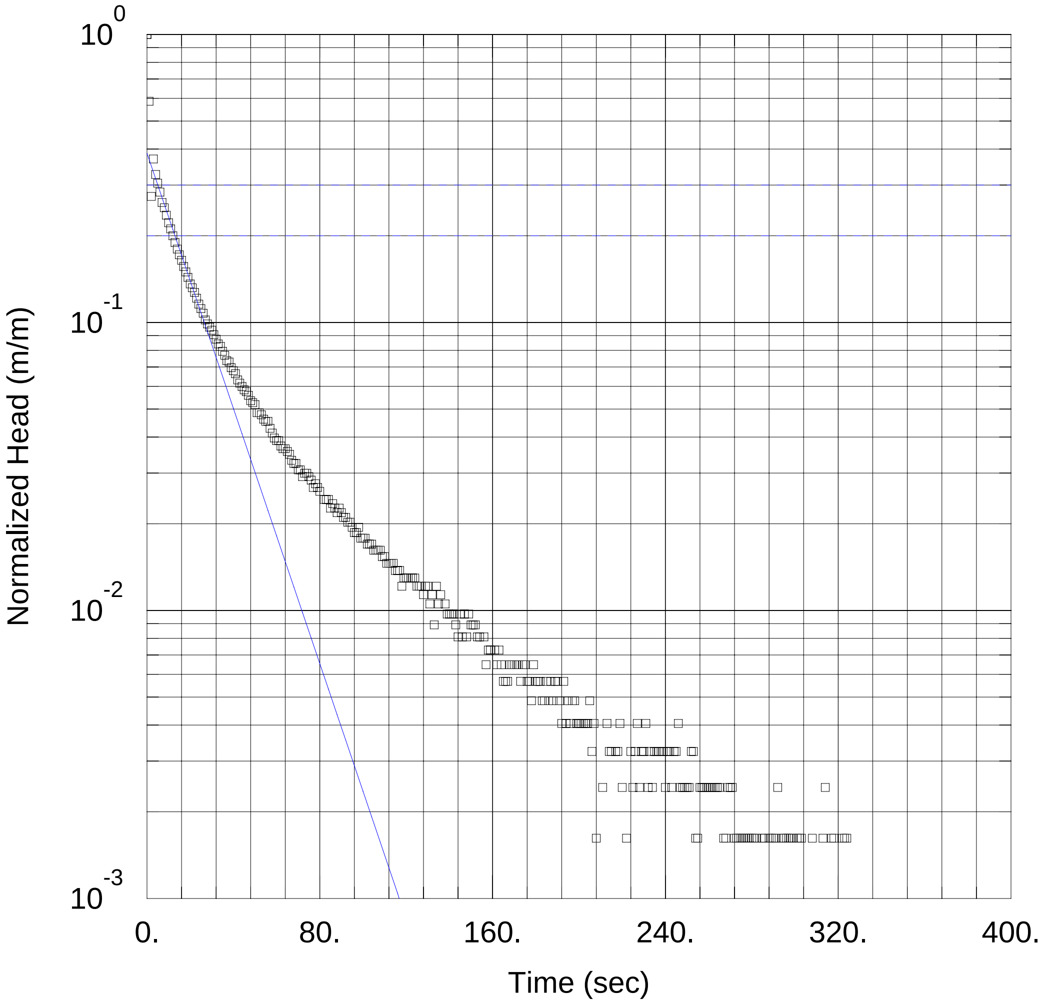
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 3.647E-5 m/sec

y0 = 0.381 m



WELL TEST ANALYSIS

Data Set: P:\...\SP7a_Test1.aqt
Date: 01/27/09 Time: 11:18:07

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP7a

AQUIFER DATA

Saturated Thickness: 15.1 m
Anisotropy Ratio (Kz/Kr): 1.

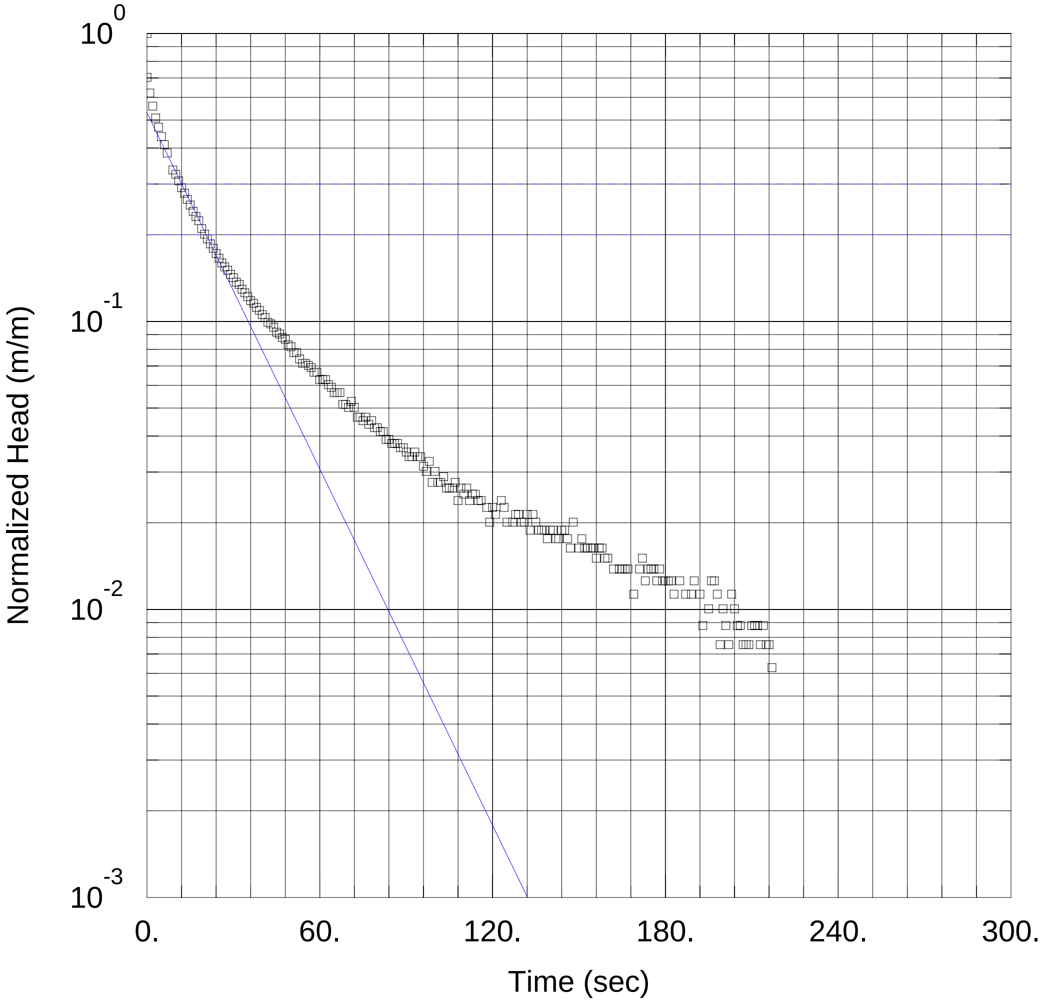
WELL DATA (test 1)

Initial Displacement: 1.235 m
Static Water Column Height: 15.1 m
Total Well Penetration Depth: 15.1 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.624E-5 m/sec
y0 = 0.4778 m



WELL TEST ANALYSIS

Data Set: P:\...\SP7a_Test2.aqt
Date: 01/27/09 Time: 11:18:19

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 2

AQUIFER DATA

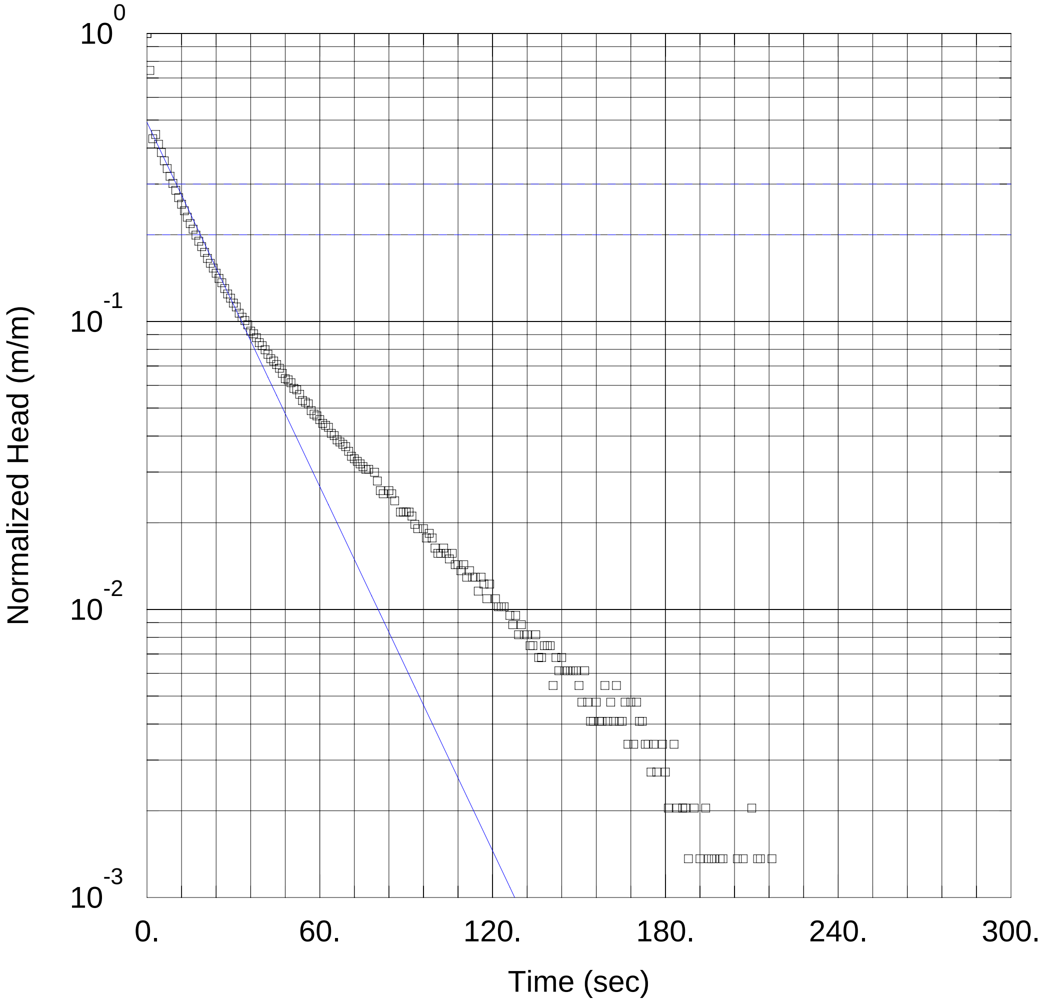
Saturated Thickness: 15.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (test 2)

Initial Displacement: 0.796 m
Total Well Penetration Depth: 15.1 m
Casing Radius: 0.0257 m
Static Water Column Height: 15.1 m
Screen Length: 3. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.443E-5 m/sec
y0 = 0.4226 m



WELL TEST ANALYSIS

Data Set: P:\...\SP7a_Test3.aqt
Date: 01/27/09 Time: 11:18:32

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 2

AQUIFER DATA

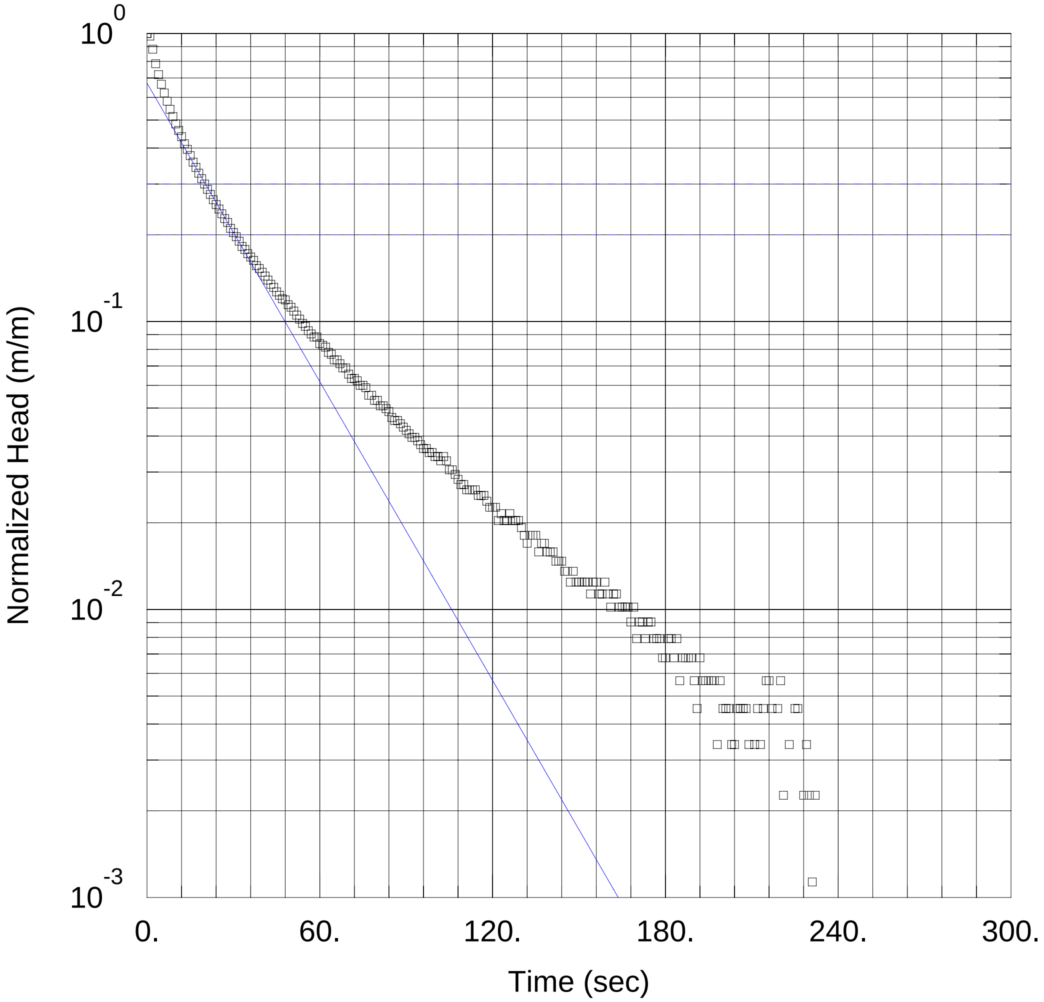
Saturated Thickness: 15.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (test 3)

Initial Displacement: 1.469 m
Static Water Column Height: 15.1 m
Total Well Penetration Depth: 15.1 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 2.497E-5 m/sec
y0 = 0.7216 m



WELL TEST ANALYSIS

Data Set: P:\...\SP7a_Test4.aqt
Date: 01/27/09
Time: 11:18:41

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: Test 2

AQUIFER DATA

Saturated Thickness: 15.1 m
Anisotropy Ratio (Kz/Kr): 1.

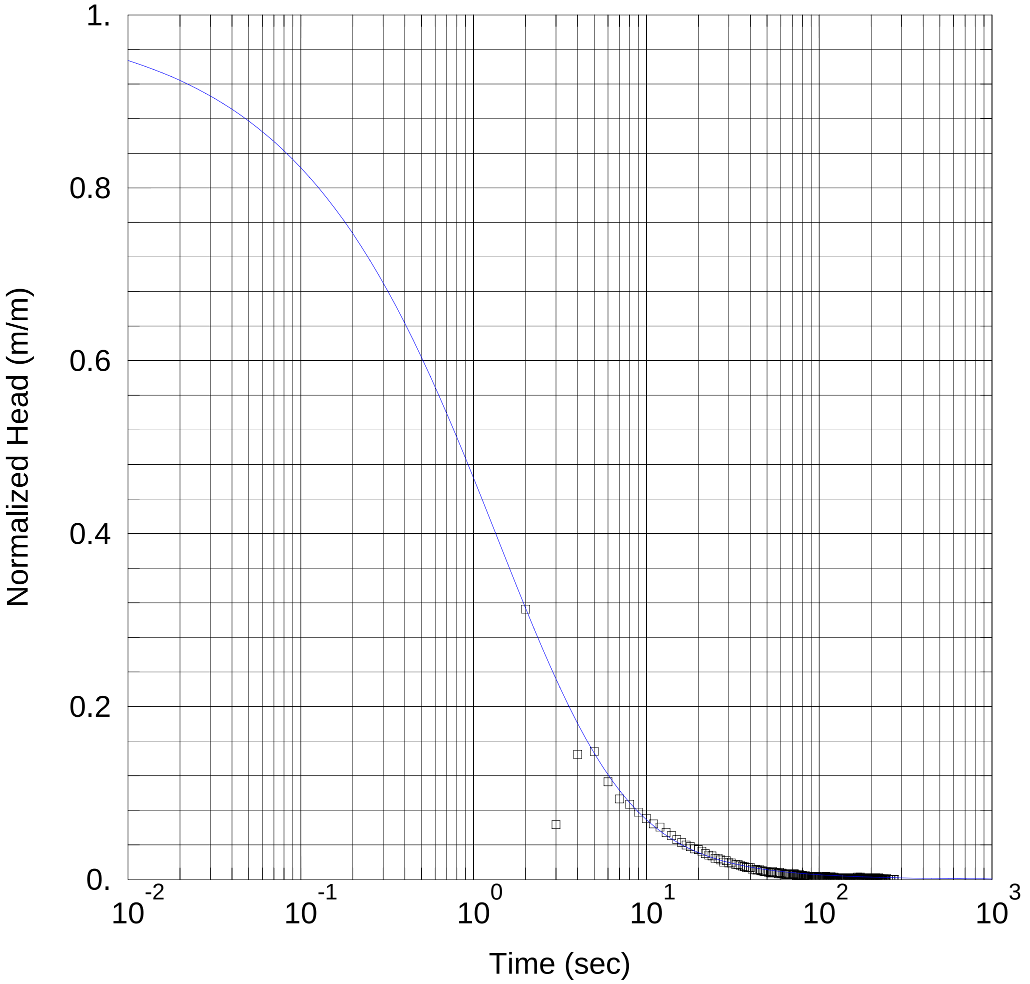
WELL DATA (test 4)

Initial Displacement: 0.884 m
Static Water Column Height: 15.1 m
Total Well Penetration Depth: 15.1 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 2.047E-5 m/sec
y0 = 0.5944 m



WELL TEST ANALYSIS

Data Set: P:\...\SP7b_Test1.aqt
Date: 01/27/09 Time: 11:18:52

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP7b Slug

AQUIFER DATA

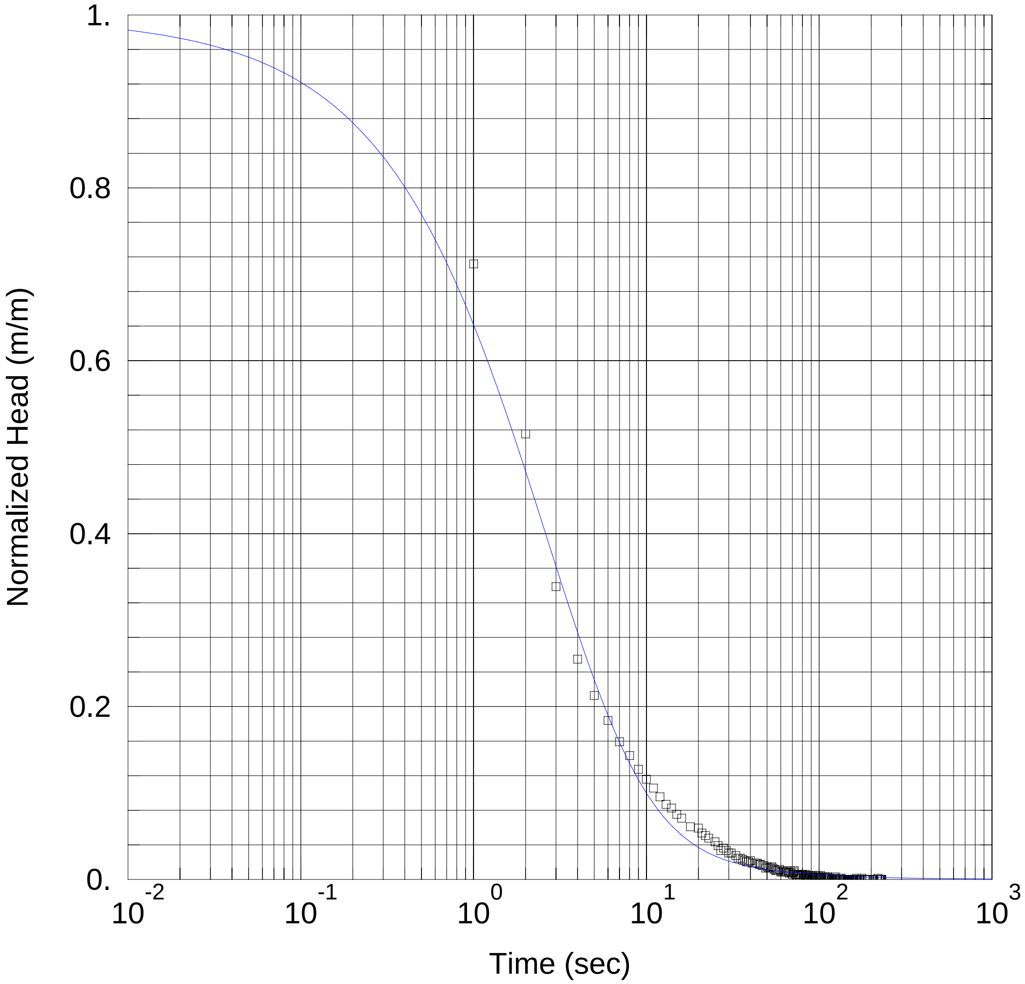
Saturated Thickness: 6.12 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP7b_Test1)

Initial Displacement: 1.107 m
Total Well Penetration Depth: 6.12 m
Casing Radius: 0.0257 m
Static Water Column Height: 1. m
Screen Length: 3. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.0003273 m^2/sec
S = 0.1



WELL TEST ANALYSIS

Data Set: P:\...\SP7b_Test2.aqt

Date: 01/27/09	Time: 11:19:04

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP7b Slug

AQUIFER DATA

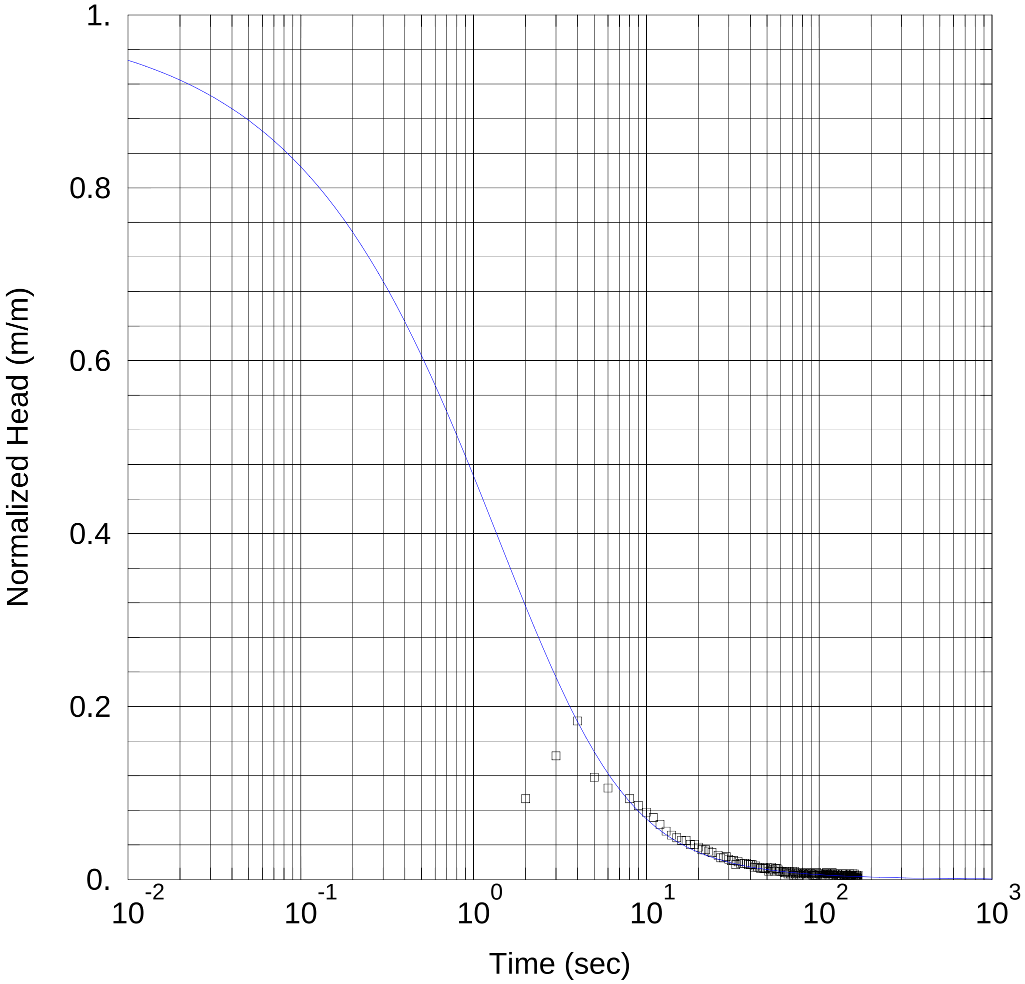
Saturated Thickness: 6.12 m	Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP7b_Test2)

Initial Displacement: 0.691 m	Static Water Column Height: 1. m
Total Well Penetration Depth: 6.12 m	Screen Length: 3. m
Casing Radius: 0.0257 m	Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined	Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.0003458 m^2/sec	S = 0.006438



WELL TEST ANALYSIS

Data Set: P:\...\SP7b_Test3.aqt

Date: 01/27/09 Time: 11:19:13

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP7b Slug
Test Date: September 2008

AQUIFER DATA

Saturated Thickness: 6.12 m
Anisotropy Ratio (Kz/Kr): 1.

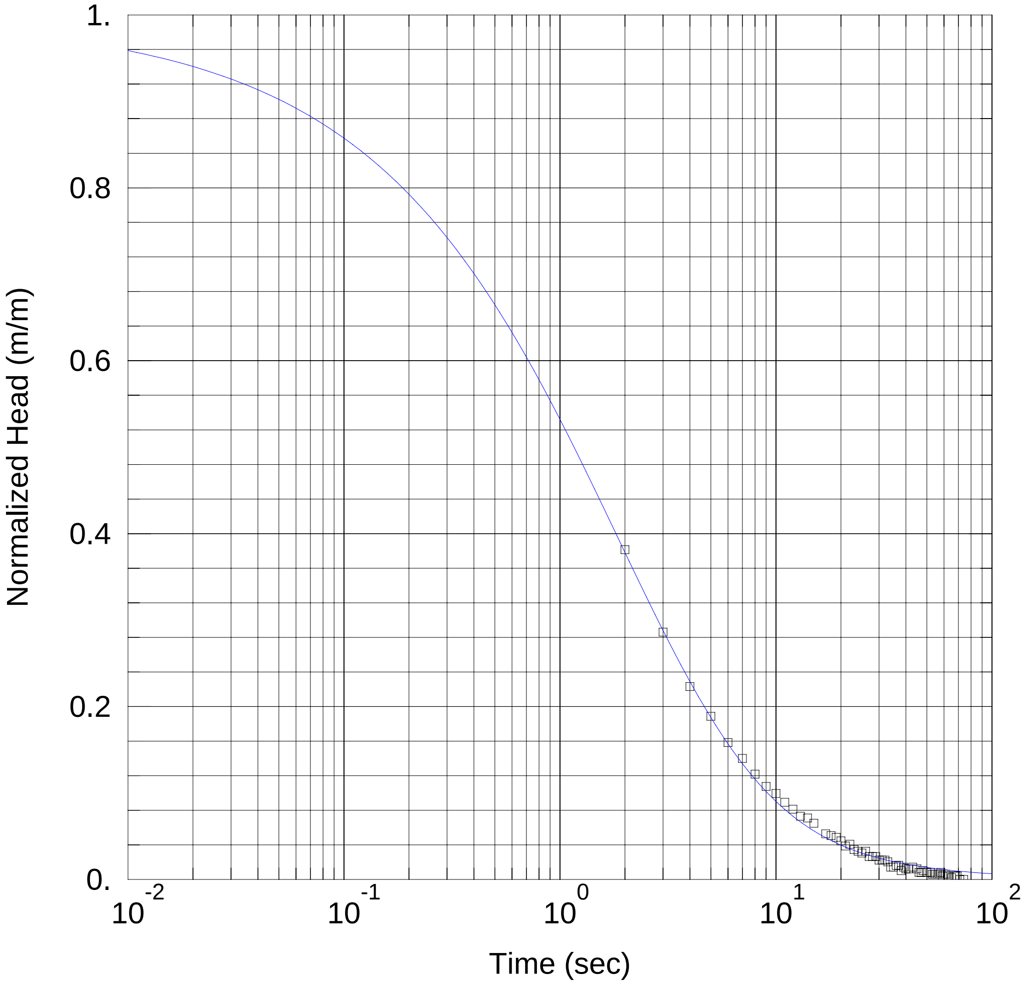
WELL DATA (SP7b_Test3)

Initial Displacement: 0.644 m
Static Water Column Height: 1. m
Total Well Penetration Depth: 6.12 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0003237 m^2/sec
S = 0.1



WELL TEST ANALYSIS

Data Set: P:\...\SP7b_Test4.aqt
Date: 01/27/09 Time: 11:17:58

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP7b Slug

AQUIFER DATA

Saturated Thickness: 6.12 m
Anisotropy Ratio (Kz/Kr): 1.

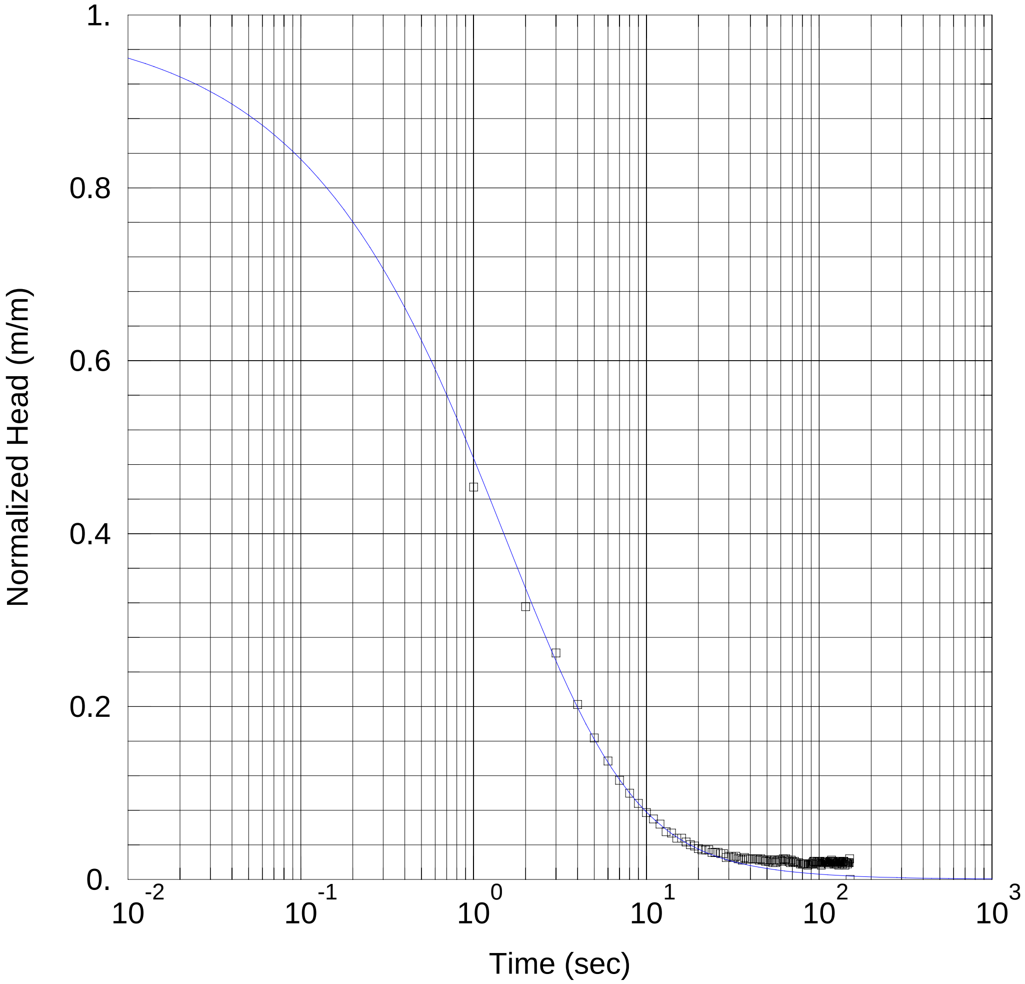
WELL DATA (SP7b_Test4)

Initial Displacement: 0.493 m
Total Well Penetration Depth: 6.12 m
Casing Radius: 0.0257 m
Static Water Column Height: 1. m
Screen Length: 3. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0002728 m^2/sec
S = 0.07108



WELL TEST ANALYSIS

Data Set: P:\...\SP8a_Test 1.aqt

Date: 01/27/09 Time: 11:22:13

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8a Slug

AQUIFER DATA

Saturated Thickness: 10.76 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8a-Test1)

Initial Displacement: 0.672 m
Total Well Penetration Depth: 10.76 m
Casing Radius: 0.0257 m

Static Water Column Height: 10.76 m
Screen Length: 3. m
Well Radius: 0.0257 m

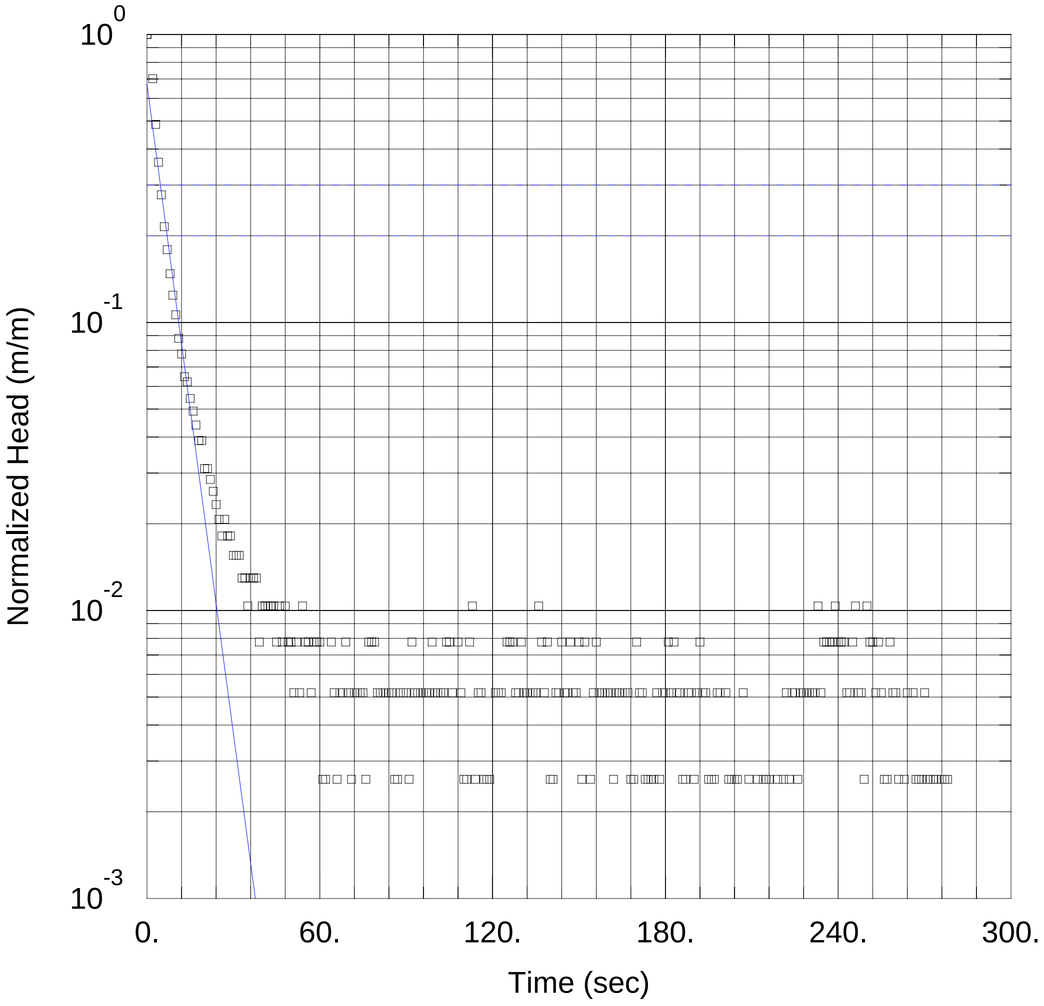
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Bredehoeft-Papadopulos

T = 0.0002939 m^2/sec

S = 0.1



WELL TEST ANALYSIS

Data Set: P:\...\SP8a_Test 2.aqt

Date: 01/27/09 Time: 11:22:27

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8a Slug

AQUIFER DATA

Saturated Thickness: 10.76 m Anisotropy Ratio (Kz/Kr): 1.

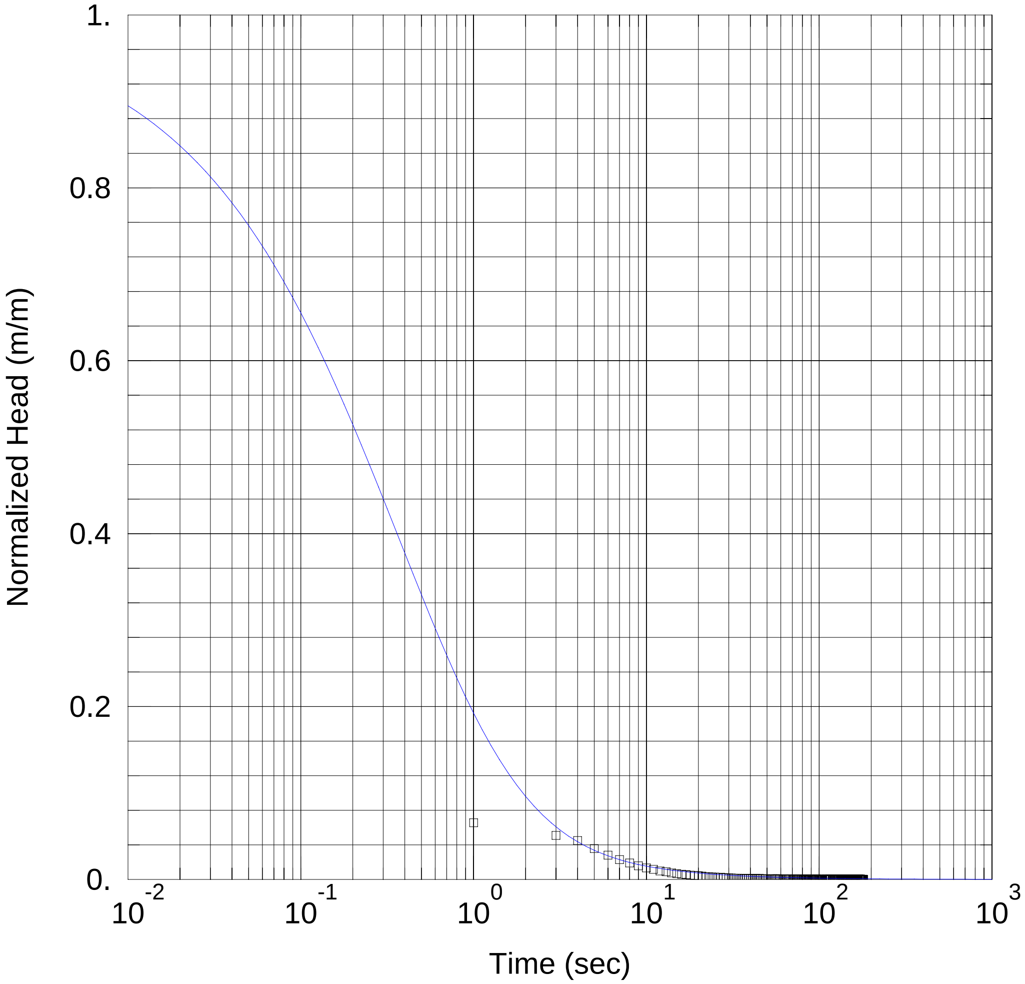
WELL DATA (SP8a-Test2)

Initial Displacement: 0.386 m
Total Well Penetration Depth: 10.76 m
Casing Radius: 0.0257 m
Static Water Column Height: 10.76 m
Screen Length: 3. m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 8.515E-5 m/sec y0 = 0.259 m



WELL TEST ANALYSIS

Data Set: P:\...\SP8a_Test 3.aqt
Date: 01/27/09 Time: 11:22:46

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8a Slug

AQUIFER DATA

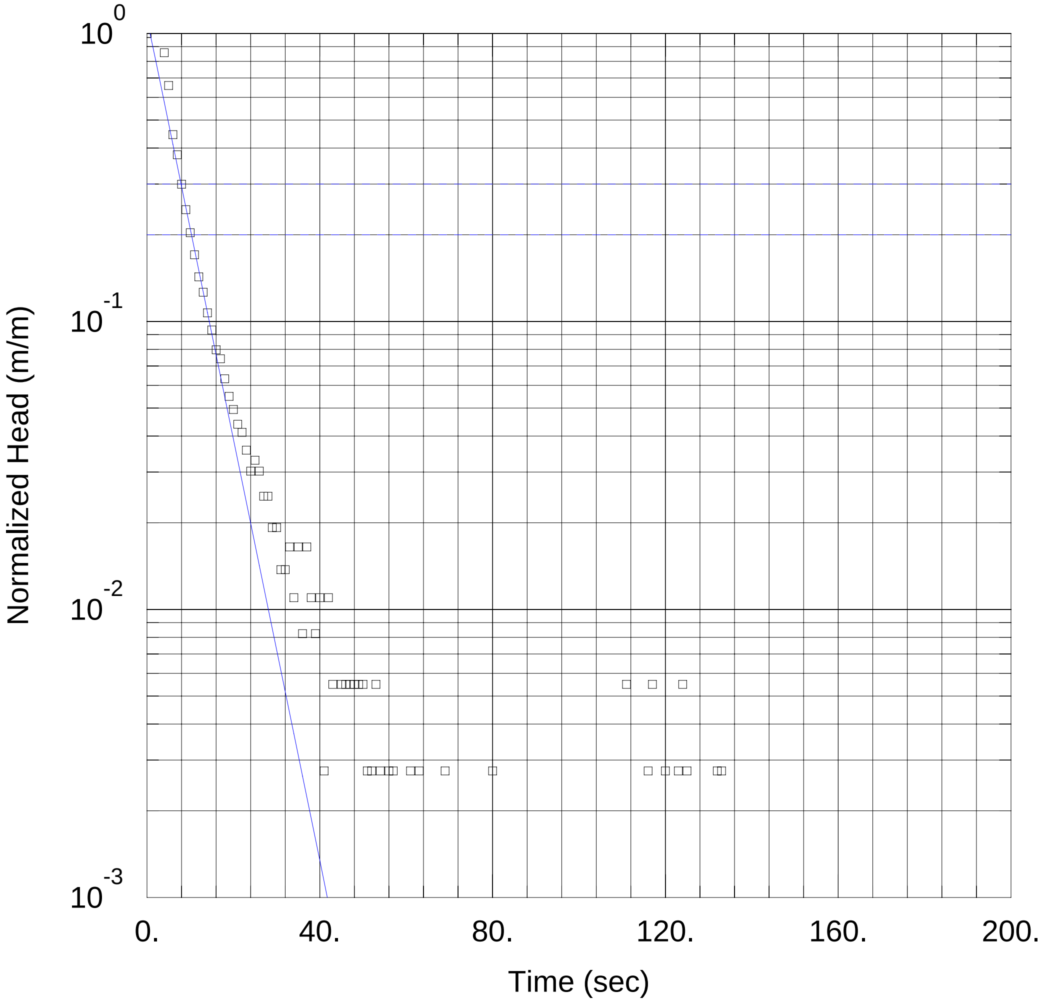
Saturated Thickness: 10.76 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8a-Test3)

Initial Displacement: 6.131 m
Static Water Column Height: 10.76 m
Total Well Penetration Depth: 10.76 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Cooper-Bredehoeft-Papadopulos
T = 0.001219 m^2/sec
S = 0.1



WELL TEST ANALYSIS

Data Set: P:\...\SP8a_Test 4.aqt
Date: 01/27/09
Time: 11:22:58

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8a Slug

AQUIFER DATA

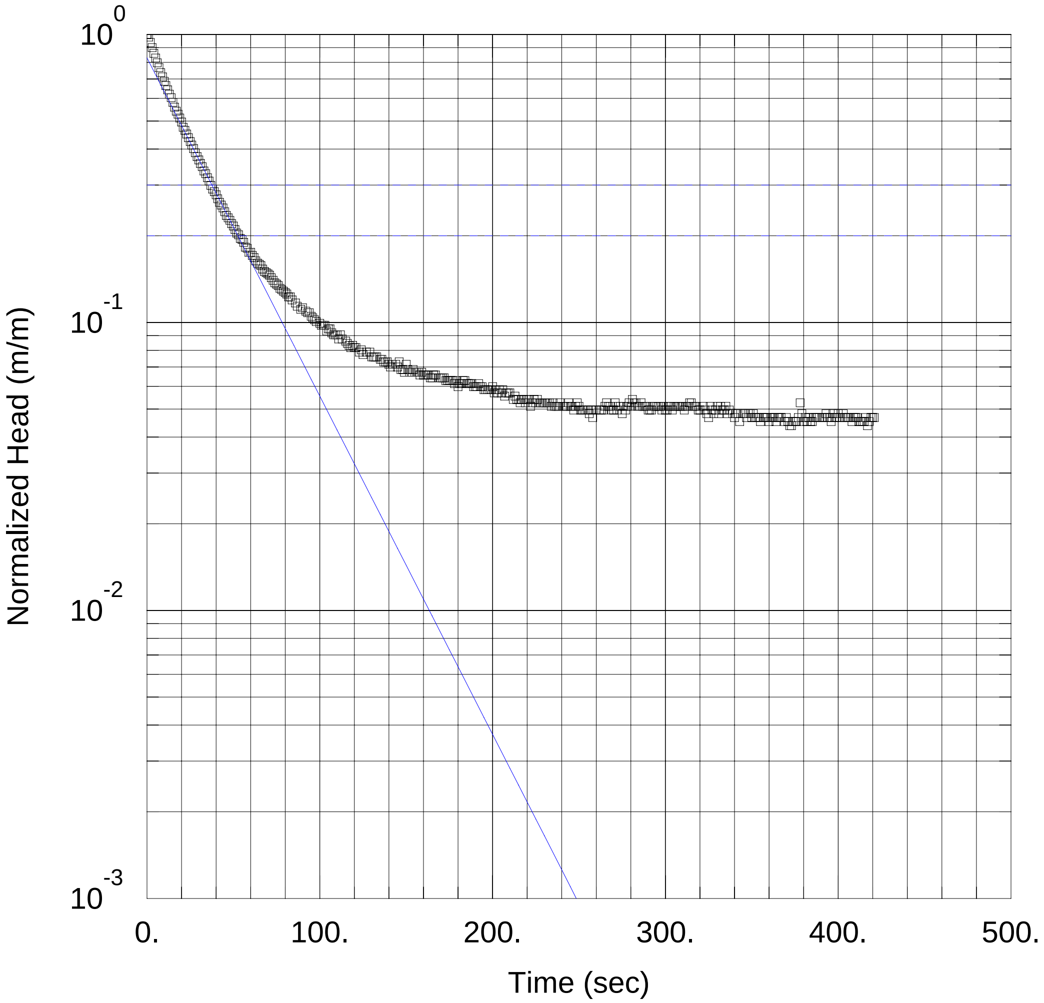
Saturated Thickness: 10.76 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8a-Test4)

Initial Displacement: 0.364 m
Static Water Column Height: 10.76 m
Total Well Penetration Depth: 10.76 m
Screen Length: 3. m
Casing Radius: 0.0257 m
Well Radius: 0.0257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 8.286E-5 m/sec
y0 = 0.4119 m



WELL TEST ANALYSIS

Data Set: P:\...\SP8b_Test1.aqt
Date: 01/27/09 Time: 11:23:20

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8b Slug

AQUIFER DATA

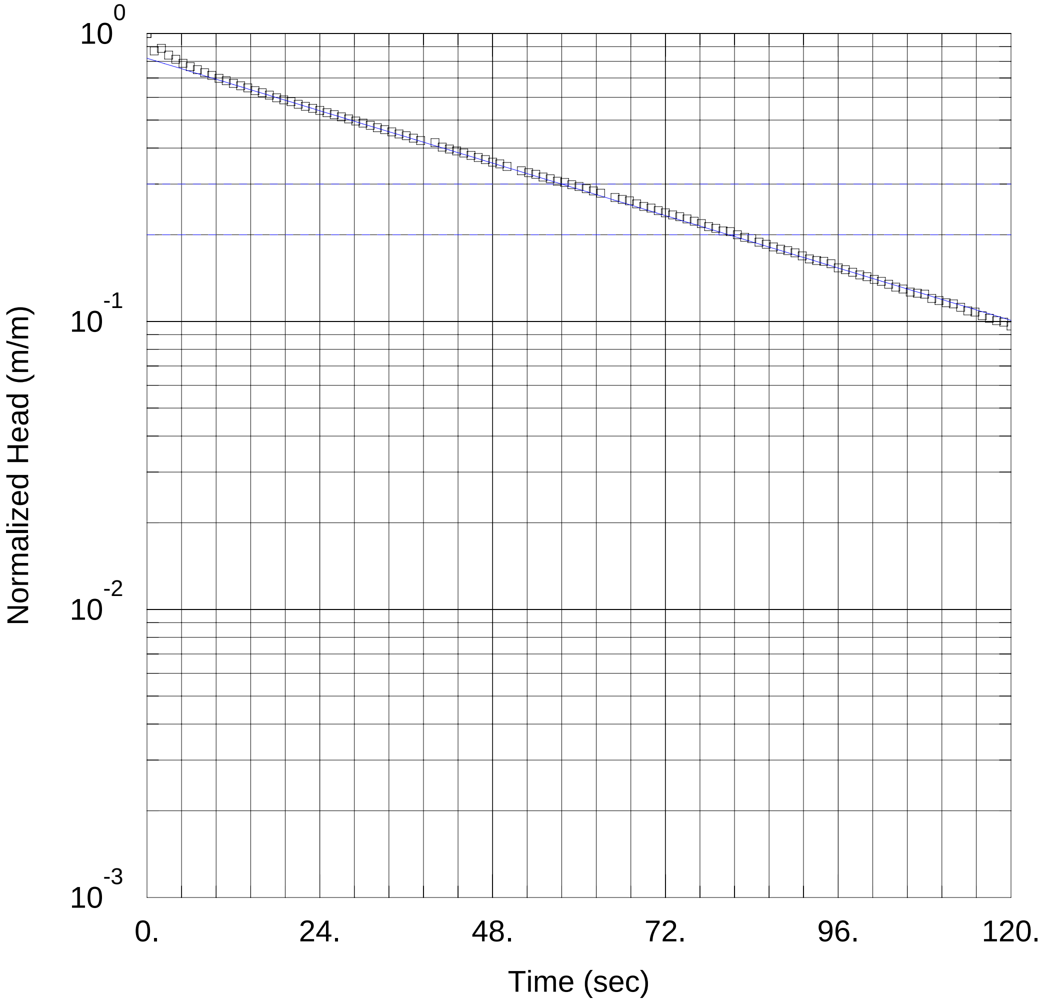
Saturated Thickness: 8.27 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8b_Test1)

Initial Displacement: 0.685 m
Static Water Column Height: 4.27 m
Total Well Penetration Depth: 4.27 m
Screen Length: 3. m
Casing Radius: 0.257 m
Well Radius: 0.257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice
K = 0.0004783 m/sec
y0 = 0.5676 m



WELL TEST ANALYSIS

Data Set: P:\...\SP8b_Test2.aqt

Date: 01/27/09 Time: 11:23:33

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8b Slug

AQUIFER DATA

Saturated Thickness: 8.27 m

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8b_Test2)

Initial Displacement: 0.965 m
Total Well Penetration Depth: 4.27 m
Casing Radius: 0.257 m
Static Water Column Height: 4.27 m
Screen Length: 3. m
Well Radius: 0.257 m

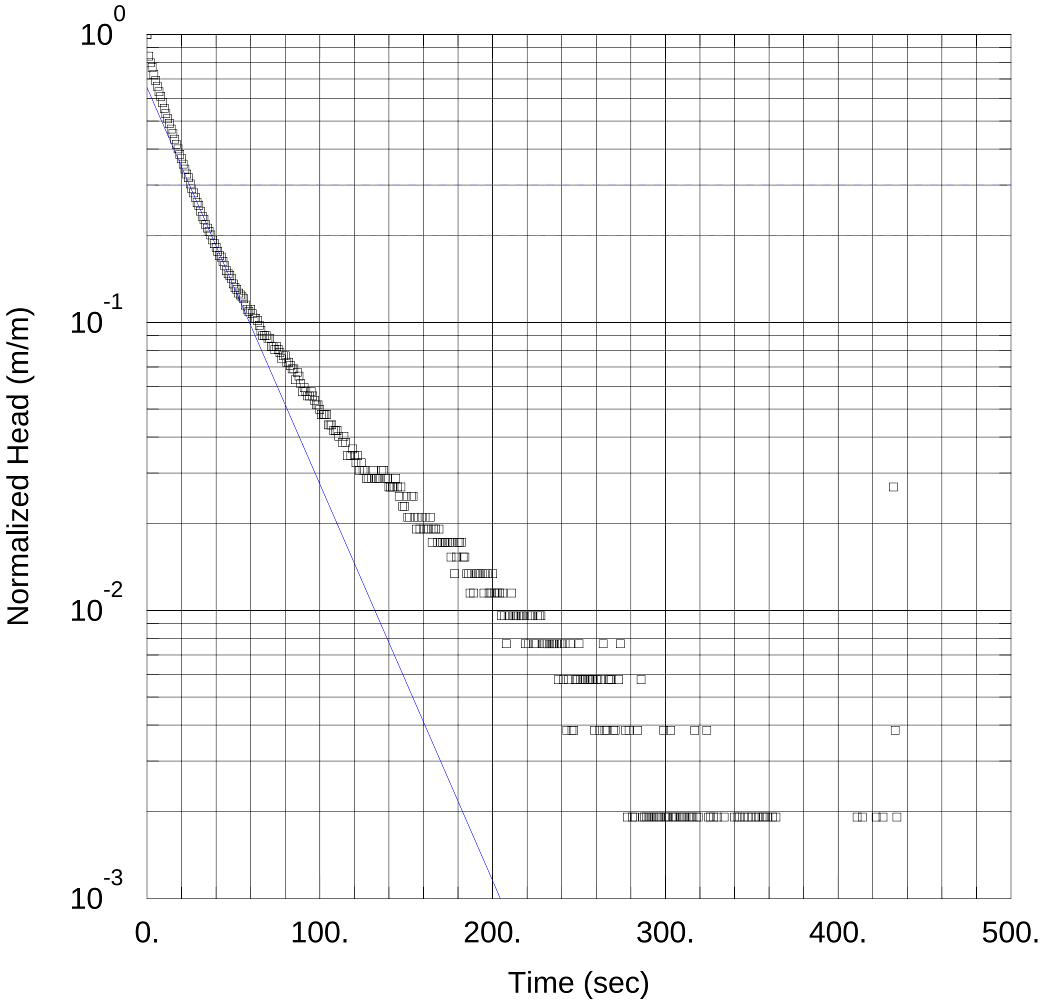
SOLUTION

Aquifer Model: Confined

Solution Method: Bouwer-Rice

K = 0.0003089 m/sec

y0 = 0.791 m



WELL TEST ANALYSIS

Data Set: P:\...\SP8b_Test3.aqt
Date: 01/27/09
Time: 11:23:42

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8b Slug

AQUIFER DATA

Saturated Thickness: 8.27 m
Anisotropy Ratio (Kz/Kr): 1.

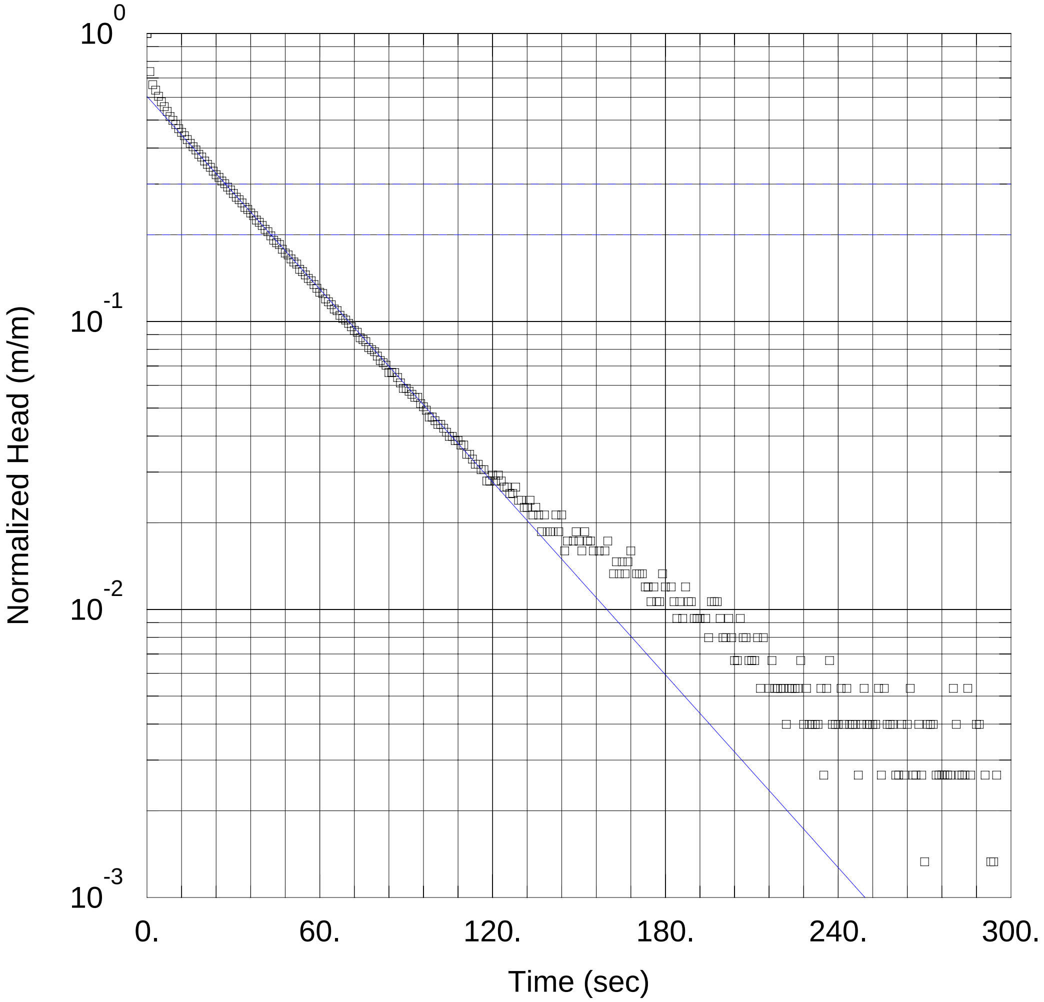
WELL DATA (SP8b_Test3)

Initial Displacement: 0.522 m
Static Water Column Height: 4.27 m
Total Well Penetration Depth: 4.27 m
Screen Length: 3. m
Casing Radius: 0.257 m
Well Radius: 0.257 m

SOLUTION

Aquifer Model: Confined
Solution Method: Bouwer-Rice

K = 0.0005607 m/sec
y0 = 0.3416 m



WELL TEST ANALYSIS

Data Set: P:\...\SP8b_Test4.aqt
Date: 01/27/09 Time: 11:22:02

PROJECT INFORMATION

Company: SRK Consulting
Client: Faro
Location: Faro Mine
Test Well: SP8b Slug
Test Date: September 2008

AQUIFER DATA

Saturated Thickness: 8.27 m Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (SP8b_Test4)

Initial Displacement: 0.752 m
Total Well Penetration Depth: 4.27 m
Casing Radius: 0.257 m
Static Water Column Height: 4.27 m
Screen Length: 3. m
Well Radius: 0.257 m

SOLUTION

Aquifer Model: Confined Solution Method: Bouwer-Rice

K = 0.0004544 m/sec y0 = 0.4544 m

Appendix C
Field Program Water Quality Data

Certificate of Analysis

SRK CONSULTING (CANADA) INC.
ATTN: DAN MACKIE
SUITE 2200
1066 WEST HASTINGS ST.
VANCOUVER BC V6E 3X2

Reported On: 06-OCT-08 11:32 AM

Lab Work Order #: **L686337**   **Date Received:** **23-SEP-08**

Project P.O. #:
Job Reference: FARO S-CLUSTER
Legal Site Desc:
CofC Numbers: 47805

Other Information:

Comments: Some of the metals detection limits were increased due to high levels of metals in these samples.

Lindsay Jones
LINDSAY JONES
Account Manager

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L686337-1	L686337-2			
	Sample ID	L686337-1	L686337-2			
	Description					
	Sampled Date	19-SEP-08	18-SEP-08			
	Sampled Time	14:00	15:00			
	Client ID	SRK08-SPW1	SRK08-SPW2			
WATER						
Physical Tests	Colour, True (CU)	92.5				
	Conductivity (uS/cm)	946				
	Hardness (as CaCO3) (mg/L)	496	5270			
	pH (pH)	6.85				
	Total Suspended Solids (mg/L)	<3.0				
	Total Dissolved Solids (mg/L)	682				
	Turbidity (NTU)	16.3				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	276				
	Ammonia as N (mg/L)	0.0624				
	Bromide (Br) (mg/L)	0.069				
	Chloride (Cl) (mg/L)	30.1				
	Fluoride (F) (mg/L)	0.030				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	4.01				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0463	<0.10			
	Antimony (Sb)-Dissolved (mg/L)	0.00023	<0.010			
	Arsenic (As)-Dissolved (mg/L)	0.00593	<0.010			
	Barium (Ba)-Dissolved (mg/L)	0.0315	0.0224			
	Beryllium (Be)-Dissolved (mg/L)	0.0011	<0.050			
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010	<0.050			
	Boron (B)-Dissolved (mg/L)	<0.020	<1.0			
	Cadmium (Cd)-Dissolved (mg/L)	0.00017	0.0333			
	Calcium (Ca)-Dissolved (mg/L)	123	485			
	Chromium (Cr)-Dissolved (mg/L)	<0.0060	<0.050			
	Cobalt (Co)-Dissolved (mg/L)	0.0128	0.036			
	Copper (Cu)-Dissolved (mg/L)	0.00082	<0.010			
	Iron (Fe)-Dissolved (mg/L)	20.7	0.093			
	Lead (Pb)-Dissolved (mg/L)	0.00130	<0.0050			
	Lithium (Li)-Dissolved (mg/L)	0.070	<0.50			
	Magnesium (Mg)-Dissolved (mg/L)	46.0	986			
	Manganese (Mn)-Dissolved (mg/L)	1.53	71.8			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00048	<0.0050			
	Nickel (Ni)-Dissolved (mg/L)	0.0289	2.12			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.60			
	Potassium (K)-Dissolved (mg/L)	5.5	11.7			
	Selenium (Se)-Dissolved (mg/L)	<0.0020	<0.10			
	Silicon (Si)-Dissolved (mg/L)	15.9	11.5			

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L686337-1	L686337-2			
	Sample ID	L686337-1	L686337-2			
	Description					
	Sampled Date	19-SEP-08	18-SEP-08			
	Sampled Time	14:00	15:00			
	Client ID	SRK08-SPW1	SRK08-SPW2			
WATER						
Dissolved Metals	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.0010			
	Sodium (Na)-Dissolved (mg/L)	17.0	37.6			
	Strontium (Sr)-Dissolved (mg/L)	0.667	2.22			
	Thallium (Tl)-Dissolved (mg/L)	<0.00020	<0.010			
	Tin (Sn)-Dissolved (mg/L)	<0.00020	<0.010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020			
	Uranium (U)-Dissolved (mg/L)	0.000750	0.0068			
	Vanadium (V)-Dissolved (mg/L)	<0.0020	<0.10			
	Zinc (Zn)-Dissolved (mg/L)	1.35	330			

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

COLOUR-TRUE-VA	Water	Color (True) by Spectrometer	APHA 2120 "Color"

This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit.

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

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

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

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

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

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

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-VA	Water	Ammonia by Color	APHA 4500-NH3 "Nitrogen (Ammonia)"

This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.

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

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

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

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

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

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

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

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

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

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Fort St. John, BC #2 - 8820 100th Street V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286
Calgary, AB #2 - 21 Highfield Circle SE T2G 5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430
Burlington, ON 5420 Mainway Drive, Unit 5 L7L 6A4 Tel: 905-331-3111 Toll Free: 1-888-257-3684 Fax: 905-331-4567

47805

CHAIN OF CUSTODY FORM

PAGE ______ OF ______

SEND REPORT TO:

CLIENT: SRK CONSULTING ATTN.: DAN MACKIE
ADDRESS: 2200 1096 WEST HASTING St
CITY: VANCOUVER PROV.: BC POSTAL CODE: V6E 3X2
TELEPHONE: 604 681 4196 FAX: SAMPLER: B Green
PROJECT NAME & NO.: FARO S CLUSTER QUOTE NO.:
PO NO.: ALS CONTACT:
REPORT FORMAT: ☐ HARDCOPY ☒ EMAIL - ADDRESS: dmackie@srk.com
☐ FAX ☐ EXCEL ☐ PDF ☐ OTHER:

L686337

ANALYSIS REQUESTED:

FOR LAB USE ONLY	SAMPLE IDENTIFICATION	DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	GENERAL	DISS METALS													NOTES (sample specific comments, due dates, etc.)
	SRK08_SPW1	2008/09/19	1400	GW	1														
	SRK08-SPW1	2008/09/19	1400	GW		1													
	SRK08-SPW2	2008/09/18	1500	GW		1													

TURN AROUND REQUIRED: ☑ ROUTINE ☐ **RUSH - SPECIFY DATE:** ______ (surcharge may apply)

SEND INVOICE TO: ☑ SAME AS REPORT **INVOICE FORMAT:** ☐ HARDCOPY ☐ PDF ☐ FAX
☐ DIFFERENT FROM REPORT (provide details below)

SPECIAL INSTRUCTIONS:

RELINQUISHED BY:	DATE / TIME	RECEIVED BY:	DATE / TIME
Ben Green	DATE 20 sept 08 TIME 1500 hrs		DATE 9/23/08 TIME 2:28 PM
RELINQUISHED BY:	DATE TIME	RECEIVED BY:	DATE TIME

FOR LAB USE ONLY

COOLER SEAL INTACT? ☑ YES ☐ NO ☐ N/A
SAMPLE TEMPERATURE: 10 °C
FROZEN? ☐ YES ☑ NO
COOLING METHOD? ☐ ICEPACKS ☑ ICE ☐ NONE

ALS COPY

SEE WHITEPAPER FOR SOURCE VERSION 08

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

SRK CONSULTING (CANADA) INC.

ATTN: DAN MACKIE

SUITE 2200
1066 WEST HASTINGS ST.
VANCOUVER BC V6E 3X2

Reported On: 19-SEP-08 05:13 PM
Revision: 1

Lab Work Order #: **L678707** **Date Received:** **05-SEP-08**

Project P.O. #:	1CD003.112
Job Reference:	FARO GROUNDWATER 2008
Legal Site Desc:	
CofC Numbers:	C064218

Other Information:

Comments:
Some of the metals detection limits were increased due to high levels of metals in these samples.

Lindsay Jones

LINDSAY JONES
Account Manager

Grouping	Analyte	L678707-1	L678707-2	L678707-3	L678707-4	L678707-5
	Sample ID	L678707-1	L678707-2	L678707-3	L678707-4	L678707-5
	Description					
	Sampled Date	31-AUG-08	31-AUG-08	30-AUG-08	30-AUG-08	02-SEP-08
	Sampled Time					
	Client ID	SRK08-SP7A	SRK08-SP7B	SRK08-SP8A	SRK08-SP8B	SRK08-P9
WATER						
Physical Tests	Colour, True (CU)	141	151	147	73.9	<5.0
	Conductivity (uS/cm)	3260	6610	2740	1300	1290
	Hardness (as CaCO3) (mg/L)	2000	5160	1140	745	762
	pH (pH)	6.31	6.41	6.39	6.78	7.90
	Total Suspended Solids (mg/L)	215	108	349	315	104
	Total Dissolved Solids (mg/L)	3420	8430	2610	1020	1010
	Turbidity (NTU)	658	539	662	595	84.5
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	225	61.9	427	284	269
	Ammonia as N (mg/L)	0.203	0.458	0.293	0.266	0.0232
	Bromide (Br) (mg/L)	<5.0	<5.0	<5.0	<0.050	<0.050
	Chloride (Cl) (mg/L)	<50	<50	<50	1.38	1.77
	Fluoride (F) (mg/L)	<2.0	<2.0	<2.0	0.260	0.133
	Sulfate (SO4) (mg/L)	2140	5680	1470	481	487
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.85	18.4	7.44	3.01	3.64
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0313	0.063	0.0273	0.0393	<0.0020
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.0020	<0.00050	<0.00020	<0.00020
	Arsenic (As)-Dissolved (mg/L)	0.00523	0.0028	0.00586	0.00076	0.00029
	Barium (Ba)-Dissolved (mg/L)	0.0298	0.0346	0.0212	0.0466	0.111
	Beryllium (Be)-Dissolved (mg/L)	<0.0025	<0.010	<0.0025	<0.0010	<0.0010
	Bismuth (Bi)-Dissolved (mg/L)	<0.0025	<0.010	<0.0025	<0.0010	<0.0010
	Boron (B)-Dissolved (mg/L)	<0.050	<0.20	<0.050	<0.020	<0.020
	Cadmium (Cd)-Dissolved (mg/L)	<0.00025	<0.0010	<0.00025	<0.00010	<0.00010
	Calcium (Ca)-Dissolved (mg/L)	485	489	287	192	243
	Chromium (Cr)-Dissolved (mg/L)	<0.0025	<0.010	<0.0025	<0.0010	<0.0010
	Cobalt (Co)-Dissolved (mg/L)	0.0223	0.0430	0.00654	0.00770	0.00128
	Copper (Cu)-Dissolved (mg/L)	0.00065	<0.0020	0.00064	0.00043	0.00178
	Iron (Fe)-Dissolved (mg/L)	50.8	76.5	29.2	20.7	<0.030
	Lead (Pb)-Dissolved (mg/L)	<0.00025	<0.0010	<0.00025	<0.00010	0.00011
	Lithium (Li)-Dissolved (mg/L)	0.072	0.16	0.079	0.048	0.012
	Magnesium (Mg)-Dissolved (mg/L)	191	956	102	64.6	37.7
	Manganese (Mn)-Dissolved (mg/L)	4.22	75.8	1.68	1.50	0.133
	Molybdenum (Mo)-Dissolved (mg/L)	0.00075	0.0015	0.00035	0.00089	0.00549
	Nickel (Ni)-Dissolved (mg/L)	0.0536	0.329	0.0154	0.0105	0.0101
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.60	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	8.9	11.5	5.1	5.3	6.1
	Selenium (Se)-Dissolved (mg/L)	<0.0050	<0.020	<0.0050	<0.0020	<0.0020
	Silicon (Si)-Dissolved (mg/L)	15.7	13.4	14.4	13.1	6.00
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.00020	<0.000050	<0.000020	<0.000020

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L678707-6	L678707-7	L678707-8	L678707-9	L678707-10
	Description					
	Sampled Date	26-AUG-08	26-AUG-08	27-AUG-08	27-AUG-08	29-AUG-08
	Sampled Time					
	Client ID	SRK08-P11A	SRK08-P11B	SRK08-P12A	SRK08-P12B	SRK05-SP6
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	10.4	<5.0	124	9.1	7.2
	Conductivity (uS/cm)	707	879	1240	819	2070
	Hardness (as CaCO3) (mg/L)	391	492	647	402	1270
	pH (pH)	7.92	7.74	6.25	6.38	7.72
	Total Suspended Solids (mg/L)	699	63.6	431	711	1010
	Total Dissolved Solids (mg/L)	504	665	597	685	1860
	Turbidity (NTU)	1290	80.9	534	1300	1320
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	273	175	154	380	147
	Ammonia as N (mg/L)	0.0293	0.0498	0.0831	0.0378	0.0219
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	0.67	<0.50	0.57
	Fluoride (F) (mg/L)	0.210	0.134	0.222	0.217	0.138
	Sulfate (SO4) (mg/L)	210	330	154	86.9	1160
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	3.97	3.08	3.89	3.70	8.79
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0034	0.0026	0.0956	0.0704	0.0458
	Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00020	0.00031	<0.00020	<0.00050
	Arsenic (As)-Dissolved (mg/L)	0.00011	<0.00020	0.00112	<0.00020	<0.00050
	Barium (Ba)-Dissolved (mg/L)	0.0562	0.0407	0.0574	0.0965	0.0633
	Beryllium (Be)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	<0.0010	<0.0025
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	<0.0010	<0.0025
	Boron (B)-Dissolved (mg/L)	<0.010	<0.020	<0.020	<0.020	<0.050
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	0.00043	<0.00010	0.00011	<0.00025
	Calcium (Ca)-Dissolved (mg/L)	127	151	177	115	347
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.0010	0.0087	0.0032	<0.0025
	Cobalt (Co)-Dissolved (mg/L)	0.00126	0.00159	0.00982	0.0109	<0.00050
	Copper (Cu)-Dissolved (mg/L)	0.00081	0.00089	0.00051	0.00061	0.00244
	Iron (Fe)-Dissolved (mg/L)	0.178	0.073	17.9	3.83	<0.030
	Lead (Pb)-Dissolved (mg/L)	0.000088	0.00010	0.00013	<0.00010	<0.00025
	Lithium (Li)-Dissolved (mg/L)	0.0085	<0.010	0.102	0.084	<0.025
	Magnesium (Mg)-Dissolved (mg/L)	17.9	27.8	49.6	28.2	97.5
	Manganese (Mn)-Dissolved (mg/L)	0.0854	1.30	0.991	0.784	0.0837
	Molybdenum (Mo)-Dissolved (mg/L)	0.00141	0.00171	0.00154	0.00026	<0.00025
	Nickel (Ni)-Dissolved (mg/L)	0.00143	0.0149	0.0127	0.0066	<0.0025
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	3.6	3.7	3.9	3.8	4.7
	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0020	<0.0020	<0.0020	<0.0050
	Silicon (Si)-Dissolved (mg/L)	6.55	6.94	10.8	9.48	5.31
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000020	<0.000020	<0.000020	<0.000050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L678707-11				
	Description					
	Sampled Date	29-AUG-08				
	Sampled Time					
	Client ID	SRK08-DP5				
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	14.7				
	Conductivity (uS/cm)	7240				
	Hardness (as CaCO3) (mg/L)	6000				
	pH (pH)	6.83				
	Total Suspended Solids (mg/L)	689				
	Total Dissolved Solids (mg/L)	10200				
	Turbidity (NTU)	860				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	111				
	Ammonia as N (mg/L)	0.164				
	Bromide (Br) (mg/L)	<25				
	Chloride (Cl) (mg/L)	<250				
	Fluoride (F) (mg/L)	<10				
	Sulfate (SO4) (mg/L)	6230				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	29.8				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.13				
	Antimony (Sb)-Dissolved (mg/L)	<0.010				
	Arsenic (As)-Dissolved (mg/L)	<0.010				
	Barium (Ba)-Dissolved (mg/L)	0.0322				
	Beryllium (Be)-Dissolved (mg/L)	<0.050				
	Bismuth (Bi)-Dissolved (mg/L)	<0.050				
	Boron (B)-Dissolved (mg/L)	<1.0				
	Cadmium (Cd)-Dissolved (mg/L)	0.0753				
	Calcium (Ca)-Dissolved (mg/L)	407				
	Chromium (Cr)-Dissolved (mg/L)	<0.050				
	Cobalt (Co)-Dissolved (mg/L)	0.967				
	Copper (Cu)-Dissolved (mg/L)	0.015				
	Iron (Fe)-Dissolved (mg/L)	13.9				
	Lead (Pb)-Dissolved (mg/L)	<0.0050				
	Lithium (Li)-Dissolved (mg/L)	<0.50				
	Magnesium (Mg)-Dissolved (mg/L)	1210				
	Manganese (Mn)-Dissolved (mg/L)	69.0				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0050				
	Nickel (Ni)-Dissolved (mg/L)	2.37				
	Phosphorus (P)-Dissolved (mg/L)	<0.90				
	Potassium (K)-Dissolved (mg/L)	15.3				
	Selenium (Se)-Dissolved (mg/L)	<0.10				
	Silicon (Si)-Dissolved (mg/L)	8.54				
	Silver (Ag)-Dissolved (mg/L)	<0.0010				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L678707-1 31-AUG-08 SRK08-SP7A	L678707-2 31-AUG-08 SRK08-SP7B	L678707-3 30-AUG-08 SRK08-SP8A	L678707-4 30-AUG-08 SRK08-SP8B	L678707-5 02-SEP-08 SRK08-P9
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	21.3	32.8	17.0	14.0	14.8
	Strontium (Sr)-Dissolved (mg/L)	1.40	1.96	1.12	0.687	1.62
	Thallium (Tl)-Dissolved (mg/L)	<0.00050	<0.0020	<0.00050	<0.00020	<0.00020
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.0020	<0.00050	<0.00020	<0.00020
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.020	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00295	0.00167	0.00153	0.00250	0.00779
	Vanadium (V)-Dissolved (mg/L)	<0.0050	<0.020	<0.0050	<0.0020	<0.0020
	Zinc (Zn)-Dissolved (mg/L)	1.64	96.8	0.444	0.359	0.0100

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L678707-6	L678707-7	L678707-8	L678707-9	L678707-10
	Description					
	Sampled Date	26-AUG-08	26-AUG-08	27-AUG-08	27-AUG-08	29-AUG-08
	Sampled Time					
	Client ID	SRK08-P11A	SRK08-P11B	SRK08-P12A	SRK08-P12B	SRK05-SP6
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	6.9	8.3	29.7	15.7	46.0
	Strontium (Sr)-Dissolved (mg/L)	0.399	0.407	1.06	0.705	0.834
	Thallium (Tl)-Dissolved (mg/L)	<0.00010	<0.00020	<0.00020	<0.00020	<0.00050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00020	<0.00020	<0.00020	<0.00050
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00163	0.00125	0.00197	0.00128	0.00320
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0020	<0.0020	<0.0020	<0.0050
	Zinc (Zn)-Dissolved (mg/L)	0.0028	0.0058	0.978	0.207	0.0726

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L678707-11				
	Description					
	Sampled Date	29-AUG-08				
	Sampled Time					
	Client ID	SRK08-DP5				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	67.5				
	Strontium (Sr)-Dissolved (mg/L)	1.83				
	Thallium (Tl)-Dissolved (mg/L)	<0.010				
	Tin (Sn)-Dissolved (mg/L)	<0.010				
	Titanium (Ti)-Dissolved (mg/L)	<0.030				
	Uranium (U)-Dissolved (mg/L)	0.0025				
	Vanadium (V)-Dissolved (mg/L)	<0.10				
	Zinc (Zn)-Dissolved (mg/L)	376				

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

<table>
<tr><th>ALS Test Code</th><th>Matrix</th><th>Test Description</th><th>Analytical Method Reference(Based On)</th></tr>
<tr><td>ALK-COL-VA</td><td>Water</td><td>Alkalinity by Colourimetric (Automated)</td><td>APHA 310.2</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.</td></tr>
<tr><td>ALK-PCT-VA</td><td>Water</td><td>Alkalinity by Auto. Titration</td><td>APHA 2320 "Alkalinity"</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.</td></tr>
<tr><td>ANIONS-BR-IC-VA</td><td>Water</td><td>Bromide by Ion Chromatography</td><td>APHA 4110 "Determination of Anions by IC</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.</td></tr>
<tr><td>ANIONS-CL-IC-VA</td><td>Water</td><td>Chloride by Ion Chromatography</td><td>APHA 4110 "Determination of Anions by IC</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.</td></tr>
<tr><td>ANIONS-F-IC-VA</td><td>Water</td><td>Fluoride by Ion Chromatography</td><td>APHA 4110 "Determination of Anions by IC</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.</td></tr>
<tr><td>ANIONS-SO4-IC-VA</td><td>Water</td><td>Sulfate by Ion Chromatography</td><td>APHA 4110 "Determination of Anions by IC</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.</td></tr>
<tr><td>CARBONS-TOC-VA</td><td>Water</td><td>Total organic carbon by combustion</td><td>APHA 5310 "TOTAL ORGANIC CARBON (TOC)"</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".</td></tr>
<tr><td>COLOUR-TRUE-VA</td><td>Water</td><td>Color (True) by Spectrometer</td><td>APHA 2120 "Color"</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit.</td></tr>
<tr><td>EC-PCT-VA</td><td>Water</td><td>Conductivity (Automated)</td><td>APHA 2510 Auto. Conduc.</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.</td></tr>
<tr><td>HARDNESS-CALC-VA</td><td>Water</td><td>Hardness</td><td>APHA 2340B</td></tr>
<tr><td colspan="4">Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.</td></tr>
<tr><td>MET-DIS-ICP-VA</td><td>Water</td><td>Dissolved Metals in Water by ICPOES</td><td>EPA SW-846 3005A/6010B</td></tr>
<tr><td colspan="4">This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma -</td></tr>
</table>

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-COL-VA	Water	Ammonia by Color	APHA 4500-NH3 "Nitrogen (Ammonia)"

This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.

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

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

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

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

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

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

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

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

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

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#2 - 8820 100th Street, **Fort St. John**, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

www.alsenviro.com

CHAIN OF CUSTODY FORM

PAGE 1 OF 1

SEND REPORT TO:

COMPANY: SRK Consulting
ADDRESS: 2200-1066 West Hastings St.
CITY: Vancouver PROV: BC POSTAL CODE: V6E3X2
TEL: FAX: CONTACT: Dan Mackie
PROJECT NAME AND NO.: **Faro Groundwater 2008** SAMPLER: DM/JS
QUOTE NO.: PO NO.: **1CD003.112** ALS CONTACT: Andre Langlais
REPORT FORMAT: **PDF, Excel, CC: reports to gfagerlund@srk.com and dmackie@srk.com**

ANALYSIS REQUESTED:

SAMPLE IDENTIFICATION	DATE / TIME COLLECTED YYYY-MM-DD	TIME	MATRIX	**See attached parameter list**	**Diss. Metals (filter/preserved)**	**Routine**	NOTES (sample specific comments, due dates, etc.)
SRK08-SP7a	31-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-SP7b	31-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-SP8a	30-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-SP8b	30-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-P9	2-Sept-08		water	X	X	X	possible high zinc and sulphates
SRK08-P11a	26-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-P11b	26-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-P12a	27-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-P12b	27-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK05-SP6	29-Aug-08		water	X	X	X	possible high zinc and sulphates
SRK08-DP5	29-Aug-08		water	X	X	X	possible high zinc and sulphates

TURN AROUND REQUIRED: Routine
SPECIFY DATE: (surcharge may apply)
SEND INVOICE TO: SRK
INVOICE FORMAT:

RELINQUISHED BY:	DATE:	4-Sept-08	RECEIVED BY:	DATE:	
Dan Mackie	TIME:			TIME:	
RELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:	
	TIME:			TIME:	

SPECIAL INSTRUCTIONS:

Samples preserved as per ALS requirements

FOR LAB USE ONLY

Cooler Seal Intact? __Yes __No __N/A
Sample Temperature: ____ °C
Frozen? __Yes __No
Cooling Method? __Icepacks __Ice __None

Certificate of Analysis

SRK CONSULTING (CANADA) INC.
ATTN: DAN MACKIE
SUITE 2200
1066 WEST HASTINGS ST.
VANCOUVER BC V6E 3X2

Reported On: 24-SEP-08 05:09 PM

Lab Work Order #: **L684850** **Date Received:** **19-SEP-08**

Project P.O. #:
Job Reference: 1CD003.112
Legal Site Desc: FARO MINE-S-CLUSTER
CofC Numbers: C064219

Other Information:

Comments: Please note that some of the detection limits were increased due to high levels of metals in these samples.

Lindsay Jones

LINDSAY JONES
Account Manager

	Sample ID	L684850-1	L684850-2	L684850-3	L684850-4	L684850-5
	Description					
	Sampled Date	15-SEP-08	12-SEP-08	15-SEP-08	17-SEP-08	11-SEP-08
	Sampled Time					
	Client ID	SRK 08- SPW2	SRK 08- SBR3	SRK 08- SBR4	SRK 08- P14	SRK 08- SBR2
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	29.5	<5.0	7.1	<5.0	19.3
	Conductivity (uS/cm)	6400	2150	4260	921	3450
	Hardness (as CaCO3) (mg/L)	5230	1230	3190	570	2430
	pH (pH)	7.39	7.95	7.34	8.14	7.48
	Total Suspended Solids (mg/L)	206	<3.0	176	397	80.8
	Total Dissolved Solids (mg/L)	7790	1830	4870	660	3500
	Turbidity (NTU)	69.8	4.09	77.7	410	72.6
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	190	371	155	211	232
	Ammonia as N (mg/L)	0.0630	0.0068	0.101	0.0236	0.225
	Bromide (Br) (mg/L)	<5.0	<0.50	<5.0	<0.050	<5.0
	Chloride (Cl) (mg/L)	<50	<5.0	<50	<0.50	<50
	Fluoride (F) (mg/L)	<2.0	<0.20	<2.0	0.061	<2.0
	Sulfate (SO4) (mg/L)	5340	1060	3130	294	2320
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.050	0.0057	0.381	<0.0020	0.021
	Antimony (Sb)-Dissolved (mg/L)	<0.0050	<0.00050	<0.0050	0.00022	<0.0010
	Arsenic (As)-Dissolved (mg/L)	<0.0050	0.00055	<0.0050	0.00033	0.0011
	Barium (Ba)-Dissolved (mg/L)	0.0236	0.0438	0.0738	0.0890	0.0685
	Beryllium (Be)-Dissolved (mg/L)	<0.025	<0.0025	<0.025	<0.0010	<0.0050
	Bismuth (Bi)-Dissolved (mg/L)	<0.025	<0.0025	<0.025	<0.0010	<0.0050
	Boron (B)-Dissolved (mg/L)	<0.50	<0.050	<0.50	<0.020	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	0.0269	<0.00025	0.0162	<0.00010	0.00470
	Calcium (Ca)-Dissolved (mg/L)	517	270	343	173	396
	Chromium (Cr)-Dissolved (mg/L)	<0.025	<0.0025	<0.025	<0.0010	<0.0050
	Cobalt (Co)-Dissolved (mg/L)	0.0363	0.00144	0.102	0.00034	0.0412
	Copper (Cu)-Dissolved (mg/L)	0.0108	0.00241	<0.0050	0.00360	0.0030
	Iron (Fe)-Dissolved (mg/L)	<0.15	<0.030	2.12	<0.030	7.97
	Lead (Pb)-Dissolved (mg/L)	<0.0025	0.00048	<0.0025	0.00021	0.00502
	Lithium (Li)-Dissolved (mg/L)	<0.25	0.048	<0.25	<0.010	0.107
	Magnesium (Mg)-Dissolved (mg/L)	956	135	566	33.5	349
	Manganese (Mn)-Dissolved (mg/L)	66.5	0.118	37.7	0.0393	20.9
	Molybdenum (Mo)-Dissolved (mg/L)	<0.0025	0.00031	0.0051	0.00187	0.00577
	Nickel (Ni)-Dissolved (mg/L)	1.88	0.0107	1.11	0.0021	0.228
	Phosphorus (P)-Dissolved (mg/L)	<1.5	<0.30	<1.5	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	14	5.4	13	<2.0	9.6
	Selenium (Se)-Dissolved (mg/L)	<0.050	<0.0050	<0.050	<0.0020	<0.010
	Silicon (Si)-Dissolved (mg/L)	12.3	4.53	10.2	4.94	10.7
	Silver (Ag)-Dissolved (mg/L)	<0.00050	<0.000050	<0.00050	<0.000020	<0.00010
	Sodium (Na)-Dissolved (mg/L)	42	35.9	29	3.6	31.8

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L684850-6	L684850-7	L684850-8	L684850-9
	Description				
	Sampled Date	08-SEP-08	17-SEP-08	18-SEP-08	09-SEP-08
	Sampled Time				
	Client ID	SRK 08- SBR1	SRK 08- P15	SRK 08- P16	SRK 08- SPW4
Grouping	**Analyte**				
WATER					
Physical Tests	Colour, True (CU)	39.1	<5.0	<5.0	12.4
	Conductivity (uS/cm)	2880	1600	1050	6780
	Hardness (as CaCO3) (mg/L)	2000	1030	654	5160
	pH (pH)	7.27	8.04	8.08	7.18
	Total Suspended Solids (mg/L)	121	909	1080	1210
	Total Dissolved Solids (mg/L)	2890	1280	752	8640
	Turbidity (NTU)	126	1070	1340	1580
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	256	365	284	171
	Ammonia as N (mg/L)	0.108	0.0174	0.179	0.0533
	Bromide (Br) (mg/L)	<2.5	<0.050	<0.050	<5.0
	Chloride (Cl) (mg/L)	<25	1.10	0.81	<50
	Fluoride (F) (mg/L)	<1.0	0.085	0.060	<2.0
	Sulfate (SO4) (mg/L)	1840	578	331	5780
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.022	<0.0050	0.0031	<0.10
	Antimony (Sb)-Dissolved (mg/L)	<0.0010	0.00056	0.00028	<0.010
	Arsenic (As)-Dissolved (mg/L)	0.0081	0.00055	0.00043	<0.010
	Barium (Ba)-Dissolved (mg/L)	0.0337	0.0858	0.136	0.0307
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0025	<0.0010	<0.050
	Bismuth (Bi)-Dissolved (mg/L)	<0.0050	<0.0025	<0.0010	<0.050
	Boron (B)-Dissolved (mg/L)	<0.10	<0.050	<0.020	<1.0
	Cadmium (Cd)-Dissolved (mg/L)	<0.00050	<0.00025	<0.00010	0.101
	Calcium (Ca)-Dissolved (mg/L)	485	267	189	411
	Chromium (Cr)-Dissolved (mg/L)	<0.0050	<0.0025	<0.0010	<0.050
	Cobalt (Co)-Dissolved (mg/L)	0.0091	0.00072	0.00058	<0.010
	Copper (Cu)-Dissolved (mg/L)	0.0039	0.00216	0.00072	0.028
	Iron (Fe)-Dissolved (mg/L)	24.4	0.062	<0.030	<0.060
	Lead (Pb)-Dissolved (mg/L)	0.0402	<0.00025	<0.00010	<0.0050
	Lithium (Li)-Dissolved (mg/L)	0.078	<0.025	<0.010	<0.50
	Magnesium (Mg)-Dissolved (mg/L)	192	88.3	44.4	1000
	Manganese (Mn)-Dissolved (mg/L)	3.25	0.0618	0.0617	91.8
	Molybdenum (Mo)-Dissolved (mg/L)	0.00091	0.00148	0.00252	<0.0050
	Nickel (Ni)-Dissolved (mg/L)	0.0647	0.0221	0.0033	2.58
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.60
	Potassium (K)-Dissolved (mg/L)	9.2	<2.0	2.6	13.5
	Selenium (Se)-Dissolved (mg/L)	<0.010	<0.0050	<0.0020	<0.10
	Silicon (Si)-Dissolved (mg/L)	11.3	5.23	4.15	12.7
	Silver (Ag)-Dissolved (mg/L)	<0.00010	<0.000050	<0.000020	<0.0010
	Sodium (Na)-Dissolved (mg/L)	20.6	4.3	7.1	33.5

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L684850-1	L684850-2	L684850-3	L684850-4	L684850-5
	Description					
	Sampled Date	15-SEP-08	12-SEP-08	15-SEP-08	17-SEP-08	11-SEP-08
	Sampled Time					
	Client ID	SRK 08- SPW2	SRK 08- SBR3	SRK 08- SBR4	SRK 08- P14	SRK 08- SBR2
Grouping	**Analyte**					
WATER						
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	2.02	0.730	1.38	0.710	1.52
	Thallium (Tl)-Dissolved (mg/L)	<0.0050	<0.00050	<0.0050	<0.00020	<0.0010
	Tin (Sn)-Dissolved (mg/L)	<0.0050	<0.00050	<0.0050	<0.00020	<0.0010
	Titanium (Ti)-Dissolved (mg/L)	<0.050	0.010	<0.050	<0.010	0.010
	Uranium (U)-Dissolved (mg/L)	0.00720	0.0177	0.00376	0.00324	0.0112
	Vanadium (V)-Dissolved (mg/L)	<0.050	<0.0050	<0.050	<0.0020	<0.010
	Zinc (Zn)-Dissolved (mg/L)	233	0.0232	119	0.0317	28.6

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L684850-6	L684850-7	L684850-8	L684850-9	
	Description					
	Sampled Date	08-SEP-08	17-SEP-08	18-SEP-08	09-SEP-08	
	Sampled Time					
	Client ID	SRK 08- SBR1	SRK 08- P15	SRK 08- P16	SRK 08- SPW4	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	1.93	0.942	0.746	1.87	
	Thallium (Tl)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00020	<0.010	
	Tin (Sn)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00020	<0.010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.010	0.010	<0.020	
	Uranium (U)-Dissolved (mg/L)	0.00230	0.0179	0.0116	0.0037	
	Vanadium (V)-Dissolved (mg/L)	<0.010	<0.0050	<0.0020	<0.10	
	Zinc (Zn)-Dissolved (mg/L)	1.13	0.0076	0.0060	355	

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC
This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.			
COLOUR-TRUE-VA	Water	Color (True) by Spectrometer	APHA 2120 "Color"
This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).			
		Ammonia by Color	APHA 4500-NH3 "Nitrogen (Ammonia)"

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
NH3-COL-VA	Water		

This analysis is carried out, on unpreserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using the phenate colourimetric method.

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

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

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

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

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TSS-VA	Water	Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

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

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TURBIDITY-VA	Water	Turbidity by Meter	APHA 2130 "Turbidity"

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

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

RUSH
Requires priority proces

REQUEST FORM
68-9878

COC # C064219

Page 1 of 1

REPORT TO:
COMPANY: SRK Consulting
CONTACT: Dan Mackie
ADDRESS: 2200-1066 W Hastings St
PHONE: 604 601 8415 FAX:

INVOICE TO: SAME AS REPORT ? [✓ YES] / NO
COMPANY:
CONTACT:
ADDRESS:
PHONE: FAX:

Lab Work Order # (lab use only) L684850

REPORT FORMAT / DISTRIBU
STANDARD ✓ OTHER ____
PDF ____ EXCEL ✓ CUSTOM ____ FAX ____
EMAIL 1: dmackie @ srk.com
EMAIL 2:

INDICATE BOTTLES: FILTERED / PRESERVED (F/P) → → →

CLIENT / PROJECT INFORMATION:
JOB #: 1CD003.112
PO /AFE:
Legal Site Description: Faro Mine - S-cluster
QUOTE #:
SAMPLER (Initials):

SERVICE REQUESTED
REGULAR SERVICE (DEFAULT)
RUSH SERVICE (2-3 DAYS) ✓
PRIORITY SERVICE (1 DAY or ASAP)
EMERGENCY SERVICE (<1 DAY / WEEKEND) - CONTACT ALS

ANALYSIS REQUEST

Sample #	SAMPLE IDENTIFICATION (This description will appear on the report)	DATE	TIME	SAMPLE TYPE	Routine 1000 ml	Metals 250 ml										HAZARDOUS ?	HIGHLY CONTAMINATED ?	NUMBER OF CONTAINERS
1	SRK 08-SPW2	SEP 15 '08		~~Routine~~ Water	✓	✓												2
2	SRK 08-SBR3	SEP 12 '08		Water	✓	✓												2
3	SRK 08-SBR4	SEP 15 '08		Water	✓	✓												2
4	SRK 08-P14	SEP 17 '08		—"—	✓	✓												2
5	SRK08-SBR2	SEP 11 '08		—"—	✓	✓												2
6	SRK08-SBR1	SEP 8 '08		—"—	✓	✓												2
7	SRK08-P15	SEP 17 '08		—"—	✓	✓												2
8	SRK08-P16	SEP 18 '08		—"—	✓	✓												2
9	SRK08-SPW4	SEP 9 '08		—"—	✓	✓												2

GUIDELINES / REGULATIONS

SPECIAL INSTRUCTIONS / HAZARDOUS DETAILS

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

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the reverse page of the white report copy.

RELINQUISHED BY: Jacek Scibek	DATE & TIME: SEP 19 10:40	RECEIVED BY:	DATE & TIME: 08/09/19 10:40	**SAMPLE CONDITION (lab use only)**	
				TEMPERATURE 7°C	SAMPLES RECEIVED IN GOOD CONDITION ? YES / NO (if no provide details)
RELINQUISHED BY:	DATE & TIME:	RECEIVED BY:	DATE & TIME:		

REFER TO BACK PAGE FOR REGIONAL LOCATIONS AND SAMPLING INFORMATION

WHITE - REPORT COPY, PINK - FILE COPY, YELLOW - CLIENT COPY

GENF14.00

Your Project #: 80632-6
Site#: FARO
Site: FARO
Your C.O.C. #: 38471-03, 38471-01

Attention: Kai Woloshyn
GARTNER LEE
2251 - 2nd AVENUE
WHITEHORSE, YT
CANADA Y1A 5W1

Report Date: 2008/11/17

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A861389
Received: 2008/11/07, 16:25

Sample Matrix: Water
Samples Received: 14

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	14	2008/11/13	2008/11/13	BRN SOP-00264 R2.0	Based on SM2320B
Chloride by Automated Colourimetry	14	N/A	2008/11/13	BRN-SOP 00234 R1.0	Based on EPA 325.2
Conductance - water	14	N/A	2008/11/13	BRN SOP-00264 R2.0	Based on SM-2510B
Hardness (calculated as CaCO3)	14	N/A	2008/11/14		
Ion Balance	14	N/A	2008/11/14		
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	14	N/A	2008/11/14	BRN SOP-00206	Based on EPA 200.8
Elements by ICPMS Low Level (dissolved) (1)	14	N/A	2008/11/14	BRN SOP-00206	Based on EPA 200.8
Filter and HNO3 Preserve for Metals	14	N/A	2008/11/13	BRN WI-00006 R1.0	Based on EPA 200.2
pH Water	14	N/A	2008/11/13	BRN SOP-00264 R2.0	Based on SM-4500H+B
Sulphate by Automated Colourimetry	14	N/A	2008/11/13	BRN-SOP 00243 R1.0	Based on EPA 375.4

* Results relate only to the items tested.

(1) SCC/CAEAL

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ROB MACARTHUR, BBY Customer Service
Email: rob.macarthur@maxxamanalytics.com
Phone# (604) 444-4808 Ext:253

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Total cover pages: 1

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

Maxxam Job #: A861389
Report Date: 2008/11/17

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		M67633		M67634		M67635		M67636	M67637		M67638		
Sampling Date		2008/11/05		2008/11/05		2008/11/05		2008/11/05	2008/11/05		2008/11/03		
	Units	**SRK08-P10A**	**RDL**	**SRK08-P12A**	**QC Batch**	**SRK08-P12B**	**QC Batch**	**SRK08-P14**	**SRK08-P16**	**RDL**	**SRK08-SBR1**	**RDL**	**QC Batch**
Preparation													
Filter and HNO3 Preservation	N/A	FIELD	N/A	FIELD	ONSITE	FIELD	ONSITE	FIELD	FIELD	N/A	FIELD	N/A	ONSITE
Calculated Parameters													
Ion Balance	N/A	0.92	0.01	0.97	2728988	1.1	2728988	0.97	0.95	0.01	0.91	0.01	2728988
Misc. Inorganics													
Alkalinity (Total as CaCO3)	mg/L	430	0.5	580	2730144	330	2730144	210	320	0.5	240	0.5	2730144
Anions													
Dissolved Sulphate (SO4)	mg/L	2000	50	170	2732564	76	2738484	490	400	5	3300	50	2732564
Dissolved Chloride (Cl)	mg/L	59	5	1.2	2732547	1.9	2732547	1.7	1.4	0.5	5.3	0.5	2732547
Physical Properties													
Conductivity	uS/cm	3400	1	1200	2730143	730	2730143	1200	1200	1	4200	1	2730143
pH	pH Units	7.6		6.6	2730138	6.6	2730138	7.8	8.0		7.1		2730138

Maxxam ID		M67639	M67640		M67641		M67642		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SBR2**	**SRK08-SBR3**	**QC Batch**	**SRK08-SBR4**	**QC Batch**	**SRK08-SP7A**	**RDL**	**QC Batch**
Preparation									
Filter and HNO3 Preservation	N/A	FIELD	FIELD	ONSITE	FIELD	ONSITE	FIELD	N/A	ONSITE
Calculated Parameters									
Ion Balance	N/A	0.89	1.0	2728988	0.92	2728988	0.99	0.01	2728988
Misc. Inorganics									
Alkalinity (Total as CaCO3)	mg/L	330	460	2730144	140	2730144	210	0.5	2730144
Anions									
Dissolved Sulphate (SO4)	mg/L	2400	1800	2738484	6500	2732564	2300	50	2738484
Dissolved Chloride (Cl)	mg/L	4.9	1.8	2732547	5.4	2732547	4.6	0.5	2732547
Physical Properties									
Conductivity	uS/cm	3600	3400	2730143	7100	2730143	3500	1	2730143
pH	pH Units	7.3	7.8	2730138	7.2	2730138	7.1		2730138

N/A = Not Applicable
RDL = Reportable Detection Limit

Maxxam Job #: A861389
Report Date: 2008/11/17

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		M67643	M67644		M67645		M67646		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SP7B**	**SRK08-SP7C**	**RDL**	**SRK08-SPW1**	**RDL**	**SRK08-SPW2**	**RDL**	**QC Batch**
Preparation									
Filter and HNO3 Preservation	N/A	FIELD	FIELD	N/A	FIELD	N/A	FIELD	N/A	ONSITE
Calculated Parameters									
Ion Balance	N/A	0.90	0.99	0.01	0.98	0.01	0.96	0.01	2728988
Misc. Inorganics									
Alkalinity (Total as CaCO3)	mg/L	57	52	0.5	290	0.5	210	0.5	2730144
Anions									
Dissolved Sulphate (SO4)	mg/L	5800	5300	50	210	5	5900	50	2732564
Dissolved Chloride (Cl)	mg/L	6.8	6.7	0.5	1.5	0.5	6.7	0.5	2732547
Physical Properties									
Conductivity	uS/cm	6400	6300	1	880	1	6700	1	2730143
pH	pH Units	6.7	6.7		6.8		7.1		2730138

N/A = Not Applicable
RDL = Reportable Detection Limit

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67633	M67634		M67635	M67636	M67637		M67638		
Sampling Date		2008/11/05	2008/11/05		2008/11/05	2008/11/05	2008/11/05		2008/11/03		
	Units	**SRK08-P10A**	**SRK08-P12A**	**RDL**	**SRK08-P12B**	**SRK08-P14**	**SRK08-P16**	**RDL**	**SRK08-SBR1**	**RDL**	**QC Batch**
Misc. Inorganics											
Dissolved Hardness (CaCO3)	mg/L	2140	650	0.5	419	685	681	0.5	3160	0.5	2727773

RDL = Reportable Detection Limit

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

Maxxam Job #: A861389
Report Date: 2008/11/17

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67633	M67634		M67635	M67636	M67637		M67638		
Sampling Date		2008/11/05	2008/11/05		2008/11/05	2008/11/05	2008/11/05		2008/11/03		
	Units	**SRK08-P10A**	**SRK08-P12A**	**RDL**	**SRK08-P12B**	**SRK08-P14**	**SRK08-P16**	**RDL**	**SRK08-SBR1**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS											
Dissolved Aluminum (Al)	mg/L	0.021	0.063	0.001	0.0551	0.0041	0.0050	0.0002	0.019	0.001	2730132
Dissolved Antimony (Sb)	mg/L	0.0003	0.0002	0.0001	0.00003	0.00022	0.00014	0.00002	0.0002	0.0001	2730132
Dissolved Arsenic (As)	mg/L	0.0004	0.0006	0.0001	0.00008	0.00025	0.00034	0.00002	0.0029	0.0001	2730132
Dissolved Barium (Ba)	mg/L	0.0342	0.0352	0.0001	0.0845	0.0971	0.156	0.00002	0.0241	0.0001	2730132
Dissolved Beryllium (Be)	mg/L	<0.00005	0.00071	0.00005	0.00039	<0.00001	<0.00001	0.00001	0.00085	0.00005	2730132
Dissolved Bismuth (Bi)	mg/L	<0.00003	<0.00003	0.00003	<0.000005	<0.000005	<0.000005	0.000005	<0.00003	0.00003	2730132
Dissolved Boron (B)	mg/L	<0.3	<0.3	0.3	<0.05	<0.05	<0.05	0.05	<0.3	0.3	2730132
Dissolved Cadmium (Cd)	mg/L	0.00041	<0.00003	0.00003	0.000054	0.000040	0.000044	0.000005	<0.00003	0.00003	2730132
Dissolved Chromium (Cr)	mg/L	<0.0005	0.0008	0.0005	0.0002	0.0002	0.0001	0.0001	0.0006	0.0005	2730132
Dissolved Cobalt (Co)	mg/L	0.00813	0.00806	0.00003	0.00397	0.000390	0.000221	0.000005	0.0126	0.00003	2730132
Dissolved Copper (Cu)	mg/L	0.0012	<0.0003	0.0003	0.00017	0.00283	0.00033	0.00005	0.0008	0.0003	2730132
Dissolved Iron (Fe)	mg/L	0.011	14.8	0.005	5.99	0.009	0.003	0.001	37.5	0.005	2730132
Dissolved Lead (Pb)	mg/L	0.00020	0.00017	0.00003	0.000020	0.000088	0.000032	0.000005	0.00026	0.00003	2730132
Dissolved Lithium (Li)	mg/L	0.009	0.100	0.003	0.0867	0.0070	0.0059	0.0005	0.088	0.003	2730132
Dissolved Manganese (Mn)	mg/L	0.395	0.840	0.0003	0.586	0.0386	0.0135	0.00005	5.12	0.0003	2730132
Dissolved Mercury (Hg)	mg/L	<0.00005	<0.00005	0.00005	<0.00001	0.00001	0.00001	0.00001	0.00006	0.00005	2730132
Dissolved Molybdenum (Mo)	mg/L	0.0021	0.0003	0.0003	0.00014	0.00150	0.00170	0.00005	0.0006	0.0003	2730132
Dissolved Nickel (Ni)	mg/L	0.0164	0.0165	0.0001	0.00544	0.00131	0.00176	0.00002	0.0785	0.0001	2730132
Dissolved Phosphorus (P)	mg/L	<0.01	0.02	0.01	<0.002	<0.002	<0.002	0.002	<0.01	0.01	2730132
Dissolved Selenium (Se)	mg/L	0.0003	<0.0002	0.0002	<0.00004	0.00215	0.00228	0.00004	<0.0002	0.0002	2730132
Dissolved Silicon (Si)	mg/L	7.4	9.7	0.5	9.1	4.8	3.5	0.1	9.0	0.5	2730132
Dissolved Silver (Ag)	mg/L	<0.00003	<0.00003	0.00003	0.000010	0.000006	<0.000005	0.000005	<0.00003	0.00003	2730132
Dissolved Strontium (Sr)	mg/L	1.29	1.04	0.0003	0.734	0.956	0.931	0.00005	2.89	0.0003	2730132
Dissolved Thallium (Tl)	mg/L	0.00003	0.00004	0.00001	0.000052	0.000005	0.000012	0.000002	<0.00001	0.00001	2730132
Dissolved Tin (Sn)	mg/L	0.00005	<0.00005	0.00005	0.00002	0.00004	0.00006	0.00001	<0.00005	0.00005	2730132
Dissolved Titanium (Ti)	mg/L	0.004	0.015	0.003	0.0014	0.0006	0.0006	0.0005	0.005	0.003	2730132
Dissolved Uranium (U)	mg/L	0.0315	0.00064	0.00001	0.00103	0.00376	0.0144	0.000002	0.00150	0.00001	2730132
Dissolved Vanadium (V)	mg/L	<0.001	<0.001	0.001	<0.0002	<0.0002	<0.0002	0.0002	<0.001	0.001	2730132
Dissolved Zinc (Zn)	mg/L	0.0819	1.00	0.0005	0.229	0.0078	0.0092	0.0001	1.13	0.0005	2730132
Dissolved Zirconium (Zr)	mg/L	0.0007	0.0008	0.0005	0.0027	<0.0001	0.0002	0.0001	<0.0005	0.0005	2730132
Dissolved Calcium (Ca)	mg/L	730	178	0.05	119	206	193	0.05	754	0.05	2734256
Dissolved Magnesium (Mg)	mg/L	76.2	50.2	0.05	29.4	41.6	48.4	0.05	309	0.05	2734256
Dissolved Potassium (K)	mg/L	13.9	3.16	0.05	3.66	0.97	2.11	0.05	9.81	0.05	2734256
Dissolved Sodium (Na)	mg/L	97.5	24.9	0.05	15.8	3.79	8.03	0.05	25.6	0.05	2734256
Dissolved Sulphur (S)	mg/L	661	54	3	31	166	133	3	1060	3	2734256

RDL = Reportable Detection Limit

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67639	M67640		M67641		M67642		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SBR2**	**SRK08-SBR3**	**RDL**	**SRK08-SBR4**	**RDL**	**SRK08-SP7A**	**RDL**	**QC Batch**
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	2330	2190	0.5	5530	0.5	2440	0.5	2727773

RDL = Reportable Detection Limit

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67639	M67640		M67641		M67642		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SBR2**	**SRK08-SBR3**	**RDL**	**SRK08-SBR4**	**RDL**	**SRK08-SP7A**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.023	0.013	0.001	0.06	0.01	0.026	0.001	2730132
Dissolved Antimony (Sb)	mg/L	0.0004	<0.0001	0.0001	<0.001	0.001	<0.0001	0.0001	2730132
Dissolved Arsenic (As)	mg/L	0.0014	0.0004	0.0001	0.002	0.001	0.0047	0.0001	2730132
Dissolved Barium (Ba)	mg/L	0.0353	0.0207	0.0001	0.023	0.001	0.0258	0.0001	2730132
Dissolved Beryllium (Be)	mg/L	0.00011	<0.00005	0.00005	<0.0005	0.0005	0.00056	0.00005	2730132
Dissolved Bismuth (Bi)	mg/L	<0.00003	<0.00003	0.00003	<0.0003	0.0003	<0.00003	0.00003	2730132
Dissolved Boron (B)	mg/L	<0.3	<0.3	0.3	<3	3	<0.3	0.3	2730132
Dissolved Cadmium (Cd)	mg/L	0.00428	<0.00003	0.00003	0.0559	0.0003	0.00014	0.00003	2730132
Dissolved Chromium (Cr)	mg/L	<0.0005	<0.0005	0.0005	0.005	0.005	<0.0005	0.0005	2730132
Dissolved Cobalt (Co)	mg/L	0.0274	0.00289	0.00003	0.171	0.0003	0.0264	0.00003	2730132
Dissolved Copper (Cu)	mg/L	0.0004	0.0014	0.0003	0.004	0.003	<0.0003	0.0003	2730132
Dissolved Iron (Fe)	mg/L	14.3	0.099	0.005	1.51	0.05	54.8	0.005	2730132
Dissolved Lead (Pb)	mg/L	0.00761	0.00005	0.00003	<0.0003	0.0003	0.00027	0.00003	2730132
Dissolved Lithium (Li)	mg/L	0.071	0.077	0.003	0.18	0.03	0.080	0.003	2730132
Dissolved Manganese (Mn)	mg/L	20.1	0.104	0.0003	74.9	0.003	6.31	0.0003	2730132
Dissolved Mercury (Hg)	mg/L	0.00005	<0.00005	0.00005	<0.0005	0.0005	<0.00005	0.00005	2730132
Dissolved Molybdenum (Mo)	mg/L	0.0029	0.0003	0.0003	0.003	0.003	<0.0003	0.0003	2730132
Dissolved Nickel (Ni)	mg/L	0.296	0.0180	0.0001	2.42	0.001	0.0739	0.0001	2730132
Dissolved Phosphorus (P)	mg/L	<0.01	<0.01	0.01	<0.1	0.1	<0.01	0.01	2730132
Dissolved Selenium (Se)	mg/L	0.0003	0.0006	0.0002	<0.002	0.002	<0.0002	0.0002	2730132
Dissolved Silicon (Si)	mg/L	10.7	5.8	0.5	11	5	13.1	0.5	2730132
Dissolved Silver (Ag)	mg/L	<0.00003	<0.00003	0.00003	<0.0003	0.0003	<0.00003	0.00003	2730132
Dissolved Strontium (Sr)	mg/L	1.57	1.23	0.0003	2.06	0.003	1.74	0.0003	2730132
Dissolved Thallium (Tl)	mg/L	0.00002	0.00004	0.00001	<0.0001	0.0001	<0.00001	0.00001	2730132
Dissolved Tin (Sn)	mg/L	<0.00005	<0.00005	0.00005	<0.0005	0.0005	<0.00005	0.00005	2730132
Dissolved Titanium (Ti)	mg/L	0.004	0.005	0.003	<0.03	0.03	0.005	0.003	2730132
Dissolved Uranium (U)	mg/L	0.0144	0.0310	0.00001	0.0049	0.0001	0.00323	0.00001	2730132
Dissolved Vanadium (V)	mg/L	<0.001	<0.001	0.001	<0.01	0.01	<0.001	0.001	2730132
Dissolved Zinc (Zn)	mg/L	36.3	0.0426	0.0005	367	0.005	2.56	0.0005	2730132
Dissolved Zirconium (Zr)	mg/L	<0.0005	<0.0005	0.0005	<0.005	0.005	<0.0005	0.0005	2730132
Dissolved Calcium (Ca)	mg/L	435	464	0.05	457	0.5	577	0.05	2734256
Dissolved Magnesium (Mg)	mg/L	302	251	0.05	1070	0.5	242	0.05	2734256
Dissolved Potassium (K)	mg/L	7.23	7.06	0.05	13.2	0.5	8.29	0.05	2734256
Dissolved Sodium (Na)	mg/L	21.7	62.4	0.05	54.1	0.5	21.2	0.05	2734256
Dissolved Sulphur (S)	mg/L	759	673	3	2110	30	847	3	2734256

RDL = Reportable Detection Limit

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67643	M67644		M67645		M67646		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SP7B**	**SRK08-SP7C**	**RDL**	**SRK08-SPW1**	**RDL**	**SRK08-SPW2**	**RDL**	**QC Batch**
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	4970	5010	0.5	428	0.5	5310	0.5	2727773

RDL = Reportable Detection Limit

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

Maxxam Job #: A861389
Report Date: 2008/11/17

LOW LEVEL DISSOLVED METALS - WATER (WATER)

Maxxam ID		M67643	M67644		M67645		M67646		
Sampling Date		2008/11/03	2008/11/03		2008/11/03		2008/11/03		
	Units	**SRK08-SP7B**	**SRK08-SP7C**	**RDL**	**SRK08-SPW1**	**RDL**	**SRK08-SPW2**	**RDL**	**QC Batch**
Dissolved Metals by ICPMS									
Dissolved Aluminum (Al)	mg/L	0.077	0.104	0.004	0.052	0.001	0.05	0.01	2730132
Dissolved Antimony (Sb)	mg/L	<0.0004	<0.0004	0.0004	0.0001	0.0001	<0.001	0.001	2730132
Dissolved Arsenic (As)	mg/L	0.0130	0.0130	0.0004	0.0036	0.0001	0.002	0.001	2730132
Dissolved Barium (Ba)	mg/L	0.0337	0.0346	0.0004	0.0260	0.0001	0.018	0.001	2730132
Dissolved Beryllium (Be)	mg/L	0.0004	0.0003	0.0002	0.00117	0.00005	<0.0005	0.0005	2730132
Dissolved Bismuth (Bi)	mg/L	<0.0001	<0.0001	0.0001	<0.00003	0.00003	<0.0003	0.0003	2730132
Dissolved Boron (B)	mg/L	<1	<1	1	<0.3	0.3	<3	3	2730132
Dissolved Cadmium (Cd)	mg/L	0.0001	<0.0001	0.0001	0.00004	0.00003	0.0382	0.0003	2730132
Dissolved Chromium (Cr)	mg/L	<0.002	<0.002	0.002	<0.0005	0.0005	<0.005	0.005	2730132
Dissolved Cobalt (Co)	mg/L	0.0473	0.0471	0.0001	0.00996	0.00003	0.0306	0.0003	2730132
Dissolved Copper (Cu)	mg/L	<0.001	<0.001	0.001	<0.0003	0.0003	0.006	0.003	2730132
Dissolved Iron (Fe)	mg/L	75.2	76.0	0.02	22.3	0.005	0.07	0.05	2730132
Dissolved Lead (Pb)	mg/L	0.0002	0.0008	0.0001	0.00015	0.00003	0.0006	0.0003	2730132
Dissolved Lithium (Li)	mg/L	0.19	0.19	0.01	0.065	0.003	0.16	0.03	2730132
Dissolved Manganese (Mn)	mg/L	78.7	79.6	0.001	1.16	0.0003	80.5	0.003	2730132
Dissolved Mercury (Hg)	mg/L	<0.0002	<0.0002	0.0002	<0.00005	0.00005	<0.0005	0.0005	2730132
Dissolved Molybdenum (Mo)	mg/L	<0.001	<0.001	0.001	<0.0003	0.0003	<0.003	0.003	2730132
Dissolved Nickel (Ni)	mg/L	0.310	0.313	0.0004	0.0273	0.0001	2.16	0.001	2730132
Dissolved Phosphorus (P)	mg/L	<0.04	<0.04	0.04	<0.01	0.01	<0.1	0.1	2730132
Dissolved Selenium (Se)	mg/L	0.0009	<0.0008	0.0008	<0.0002	0.0002	0.002	0.002	2730132
Dissolved Silicon (Si)	mg/L	15	14	2	15.0	0.5	13	5	2730132
Dissolved Silver (Ag)	mg/L	<0.0001	<0.0001	0.0001	<0.00003	0.00003	<0.0003	0.0003	2730132
Dissolved Strontium (Sr)	mg/L	2.04	2.07	0.001	0.529	0.0003	2.07	0.003	2730132
Dissolved Thallium (Tl)	mg/L	<0.00004	<0.00004	0.00004	<0.00001	0.00001	<0.0001	0.0001	2730132
Dissolved Tin (Sn)	mg/L	<0.0002	<0.0002	0.0002	<0.00005	0.00005	<0.0005	0.0005	2730132
Dissolved Titanium (Ti)	mg/L	0.01	0.01	0.01	0.006	0.003	0.04	0.03	2730132
Dissolved Uranium (U)	mg/L	0.00091	0.00094	0.00004	0.00056	0.00001	0.0068	0.0001	2730132
Dissolved Vanadium (V)	mg/L	<0.004	<0.004	0.004	<0.001	0.001	<0.01	0.01	2730132
Dissolved Zinc (Zn)	mg/L	123	125	0.002	1.14	0.0005	336	0.005	2730132
Dissolved Zirconium (Zr)	mg/L	<0.002	<0.002	0.002	<0.0005	0.0005	<0.005	0.005	2730132
Dissolved Calcium (Ca)	mg/L	468	469	0.2	106	0.05	492	0.5	2734256
Dissolved Magnesium (Mg)	mg/L	923	933	0.2	39.9	0.05	990	0.5	2734256
Dissolved Potassium (K)	mg/L	12.0	12.0	0.2	4.19	0.05	12.4	0.5	2734256
Dissolved Sodium (Na)	mg/L	32.1	33.3	0.2	9.45	0.05	40.7	0.5	2734256
Dissolved Sulphur (S)	mg/L	1920	1960	10	75	3	2040	30	2734256

RDL = Reportable Detection Limit

LOW LEVEL DISSOLVED METALS - WATER (WATER) Comments

Sample M67633-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67634-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67638-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67639-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67640-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67641-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67642-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67643-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67644-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67645-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67646-01 Elements by ICPMS Low Level (dissolved): Detection limits raised due to sample matrix.

Sample M67641-01 Na, K, Ca, Mg, S by CRC ICPMS (diss.): Detection limits raised due to sample matrix.

Sample M67643-01 Na, K, Ca, Mg, S by CRC ICPMS (diss.): Detection limits raised due to sample matrix.

Sample M67644-01 Na, K, Ca, Mg, S by CRC ICPMS (diss.): Detection limits raised due to sample matrix.

Sample M67646-01 Na, K, Ca, Mg, S by CRC ICPMS (diss.): Detection limits raised due to sample matrix.

Maxxam Job #: A861389
Report Date: 2008/11/17

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2730132	Dissolved Arsenic (As)	2008/11/14	101	75 - 125	95	75 - 125	<0.00002	mg/L	NC	25
2730132	Dissolved Beryllium (Be)	2008/11/14	105	75 - 125	99	75 - 125	<0.00001	mg/L	5.5	25
2730132	Dissolved Cadmium (Cd)	2008/11/14	100	75 - 125	98	75 - 125	<0.000005	mg/L	8.2	25
2730132	Dissolved Chromium (Cr)	2008/11/14	102	75 - 125	97	75 - 125	<0.0001	mg/L	NC	25
2730132	Dissolved Cobalt (Co)	2008/11/14	100	75 - 125	96	75 - 125	<0.000005	mg/L	0.4	25
2730132	Dissolved Copper (Cu)	2008/11/14	NC	75 - 125	102	75 - 125	<0.00005	mg/L	NC	25
2730132	Dissolved Lead (Pb)	2008/11/14	104	75 - 125	101	75 - 125	<0.000005	mg/L	NC	25
2730132	Dissolved Lithium (Li)	2008/11/14	110	75 - 125	100	75 - 125	<0.0005	mg/L	1.9	25
2730132	Dissolved Nickel (Ni)	2008/11/14	100	75 - 125	97	75 - 125	<0.00002	mg/L	1.6	25
2730132	Dissolved Selenium (Se)	2008/11/14	NC	75 - 125	100	75 - 125	<0.00004	mg/L	NC	25
2730132	Dissolved Uranium (U)	2008/11/14	111	75 - 125	102	75 - 125	<0.000002	mg/L	3.9	25
2730132	Dissolved Vanadium (V)	2008/11/14	102	75 - 125	92	75 - 125	<0.0002	mg/L	NC	25
2730132	Dissolved Zinc (Zn)	2008/11/14	NC	75 - 125	100	75 - 125	<0.0001	mg/L	0.6	25
2730132	Dissolved Aluminum (Al)	2008/11/14					<0.0002	mg/L	5.9	25
2730132	Dissolved Antimony (Sb)	2008/11/14					<0.00002	mg/L	NC	25
2730132	Dissolved Barium (Ba)	2008/11/14					<0.00002	mg/L	4.8	25
2730132	Dissolved Bismuth (Bi)	2008/11/14					<0.000005	mg/L	NC	25
2730132	Dissolved Boron (B)	2008/11/14					<0.05	mg/L	NC	25
2730132	Dissolved Iron (Fe)	2008/11/14					<0.001	mg/L	1.1	25
2730132	Dissolved Manganese (Mn)	2008/11/14					<0.00005	mg/L	0.7	25
2730132	Dissolved Mercury (Hg)	2008/11/14					0.00002, RDL=0.00001	mg/L	NC	25
2730132	Dissolved Molybdenum (Mo)	2008/11/14					<0.00005	mg/L	NC	25
2730132	Dissolved Phosphorus (P)	2008/11/14					<0.002	mg/L	NC	25
2730132	Dissolved Silicon (Si)	2008/11/14					<0.1	mg/L	4.9	25
2730132	Dissolved Silver (Ag)	2008/11/14					<0.000005	mg/L	NC	25
2730132	Dissolved Strontium (Sr)	2008/11/14					<0.00005	mg/L	4.4	25
2730132	Dissolved Thallium (Tl)	2008/11/14					<0.000002	mg/L	11.8	25
2730132	Dissolved Tin (Sn)	2008/11/14					<0.00001	mg/L	NC	25
2730132	Dissolved Titanium (Ti)	2008/11/14					<0.0005	mg/L	NC	25
2730132	Dissolved Zirconium (Zr)	2008/11/14					<0.0001	mg/L	15.0	25
2730143	Conductivity	2008/11/13			98	80 - 120	<1	uS/cm	0.4	25
2730144	Alkalinity (Total as CaCO3)	2008/11/13	100	80 - 120	98	80 - 120	<0.5	mg/L	0.7	25
2732547	Dissolved Chloride (Cl)	2008/11/13	109	80 - 120	99	80 - 120	<0.5	mg/L	NC	20
2732564	Dissolved Sulphate (SO4)	2008/11/13	NC	75 - 125	89	80 - 120	<0.5	mg/L	11.2	20
2734256	Dissolved Calcium (Ca)	2008/11/14					<0.05	mg/L	4.1	25
2734256	Dissolved Magnesium (Mg)	2008/11/14					<0.05	mg/L	2.0	25
2734256	Dissolved Potassium (K)	2008/11/14					<0.05	mg/L	0.6	25
2734256	Dissolved Sodium (Na)	2008/11/14					<0.05	mg/L	2.3	25

GARTNER LEE
Client Project #: 80632-6
Site Reference: FARO

Maxxam Job #: A861389
Report Date: 2008/11/17

QUALITY ASSURANCE REPORT

			Matrix Spike		Spike		Blank		RPD	
QC Batch	**Parameter**	**Date**	**% Recovery**	**QC Limits**	**% Recovery**	**QC Limits**	**Value**	**Units**	**Value (%)**	**QC Limits**
2734256	Dissolved Sulphur (S)	2008/11/14					<3	mg/L	0.4	25
2738484	Dissolved Sulphate (SO4)	2008/11/15	108	75 - 125	94	80 - 120	0.9, RDL=0.5	mg/L	6.1	20

N/A = Not Applicable
NC = Non-calculable
RDL = Reportable Detection Limit
RPD = Relative Percent Difference

Maxxam Analytics

Maxxam Analytics International Corporation o/a Maxxam Analytics
8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5 Tel:(604) 444-4808 Toll-free:(800) 440-4808 Fax:(604) 444-4511 www.maxxamanalytics.com

CHAIN OF CUSTODY RECORD

Page 1 of 2

INVOICE INFORMATION:

Company Name: #2448 AECOM
Contact Name: Kai Woloshyn
Address: 2251 - 2nd AVENUE
WHITEHORSE YT Y1A 5W1
Phone: (867)633-6474 Fax: (867)633-6321
Email: kai.woloshyn@aecom.com

REPORT INFORMATION (If differs from invoice):

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

PROJECT INFORMATION:

Quotation #: A80323
P.O. #:
Project #: 40632-6
Project Name:
Site Location: FARO
Sampled By:

Laboratory Use Only:

MAXXAM JOB #: A861389
BOTTLE ORDER #: 38471
CHAIN OF CUSTODY #: C#38471-03-01
PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA:

CCME

SPECIAL INSTRUCTIONS

ultra low level metals

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (If applies to entire submission) ☐
Date Required: Time Required:
Rush Confirmation Number: (call lab for #)

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Dissolved Metals	General chemistry	(pH, conductivity	chloride, sulphate	hardness, ion balance	alkalinity)					# of Bottles	Comments
1		SRK08-P10A	Nov 5 '08	Water	N	Y	✓	X									2	
2		SRK08 -P12A																
3		SRK08 -P12B																
4		SRK08 -P14																
5		SRK08 - P16																
6		SRK08 -SBR1	Nov 3 '08															
7		SRK08 -SBR2																
8		SRK08 -SBR3																
9		SRK08 -SBR4																
10		SRK08 -SP7A																

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
Kai Woloshyn	08/11/06	10:30			
			AS	Nov 7/08	10:25

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
☐	4, 8, 7	☐ OK ☐ SIF	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Maxxam Analytics

Maxxam Analytics International Corporation o/a Maxxam Analytics
8577 Commerce Court, Burnaby, British Columbia Canada V5A 4N5 Tel:(604) 444-4808 Toll-free:(800) 440-4808 Fax:(604) 444-4511 www.maxxamanalytics.com

CHAIN OF CUSTODY RECORD

Page 2 of 2

INVOICE INFORMATION:

Company Name: #2448 AECOM
Contact Name: Kai Woloshyn
Address: 2251 - 2nd AVENUE
WHITEHORSE YT Y1A 5W1
Phone: (867)633-6474 Fax: (867)633-6321
Email: kai.woloshyn@aecom.com

REPORT INFORMATION (if differs from invoice):

Company Name:
Contact Name:
Address:
Phone: Fax:
Email:

PROJECT INFORMATION:

Quotation #: A80323
P.O. #:
Project #: 80632-6
Project Name:
Site Location: FARO
Sampled By:

Laboratory Use Only:

MAXXAM JOB #:
BOTTLE ORDER #: 38471
CHAIN OF CUSTODY #: C#38471-01-01
PROJECT MANAGER: ROB MACARTHUR

REGULATORY CRITERIA: CLMR

SPECIAL INSTRUCTIONS: ultra low level metals

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ______ Time Required: ______
Rush Confirmation Number: ______ *(call lab for #)*

ANALYSIS REQUESTED (Please be specific):

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Dissolved Metals	General Chemistry (pH, conductivity, alkalinity, chloride, sulphate, hardness, ion balance)							# of Bottles	Comments
1		SRK08 -SP7B	Nov 3,08	Water	N	Y	↓	↓							2	
2		SRK08 -SP7C	↓	↓	↓	↓	↓	↓							↓	
3		SRK08 -SPW1	↓	↓	↓	↓	↓	↓							↓	
4		SRK09 -SPW2	↓	↓	↓	↓	↓	↓							↓	
5																
6																
7																
8																
9																
10																

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:
Kai Woloshyn	08/11/06	10:30			

Laboratory Use Only

Time Sensitive	Temperature (°C) on Receipt	Condition of Sample on Receipt	Custody Seal Intact on Cooler?
☐		☐ OK ☐ SIF	☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

Appendix D

Drilling and Site Photographs (on attached CD)