Anvil Range Mine, Rose Creek Tailings Facility, 2003 Groundwater Quality Update

Draft Report

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Table of Contents

List of Figures (back of report)

List of Tables (back of report)

Appendices

Executive Summary

The Rose Creek Tailings Facility of the Anvil Range Mine contains approximately 54 million tonnes of acid generating tailings that overly a natural aquifer comprised primarily of glaciofluvial sands and gravels. Tailings were deposited into the facility from 1969 to 1992 in three impoundment areas, which contain both exposed and submerged tailings.

A network of groundwater quality monitoring wells is in place that dates back to 1981 ands that has been augmented on several occasions since, including the 2001 and 2003 hydrogeological investigations carried out by the Interim Receiver.

Groundwater and pore water quality data is available from 1981, with routine, twice per year data collection since around 1996. Extensive geochemical testing of the tailings for acid rock drainage assessments have been carried out in 1988, 2001 and 2003. Physical hydrogeological analyses have been developed, including a numerical model developed in 2001, and contaminant transport has been assessed by Environment Canada and others. This information demonstrates that the tailings represent a substantial environmental risk and that leaching of metals into the native aquifer beneath the tailings deposits has occurred although transport of zinc (and other metals) to the downgradient environment is not observed.

In 2003, two projects were completed:

1. A hydrogeological drill investigation to obtain detailed stratigraphic information, collect additional samples of tailings and native soils for physical and geochemcial testing and to install additional groundwater quality monitoring wells; and
2. Spring and fall sampling of groundwater quality in all monitoring wells, including the “new” 2003 wells, to continue the established routine for data collection for identification of temporal trends and spatial distribution of contaminants in groundwater.

Reports documenting the 2003 hydrogeological drill investigation and 2003 soil testing program are available under separate cover. All of the groundwater quality information is provided and described herein in this report.

The 2003 groundwater quality information, including fall sampling of the “new” 2003 monitoring wells, largely confirms previous observations summarized as:

1. SO_4 and Zn are clearly migrating from the tailings into the native soils underlying the tailings impoundments;
2. The migration of SO_4 has clearly proceeded to downgradient of the Cross Valley Dam with diminishing concentrations in the downgradient direction and with SO_4 distributed to depth in the native soils;
3. The migration of Zn continues to be mitigated as compared to SO_4 such that, with occasional exceptions as highlighted below, "elevated" Zn concentrations are not generally observed at the Intermediate Dam;
4. Notwithstanding the above observation, Zn concentrations at the Intermediate Dam were reported in 2003 as high as 0.25 mg/L, although this may be an anomalous outlier as the next highest concentration reported since 2001 is 0.09 mg/L;
5. The migration of Zn within the native soils at concentrations greater then 0.5 mg/L (arbitrary benchmark) appears to be restricted to approximately upgradient of the Second Impoundment Dam; and
6. There are no indications in the data sets collected since 2001 of increasing concentrations of Zn in the native soils at or downgradient of the Intermediate Dam.

1. Introduction

1.1 Overview of Rose Creek Tailings Facility

The Anvil Range mine, located in the central Yukon approximately 200 km NNE of the City of Whitehorse, was an open pit lead and zinc mine that produced lead and zinc mineral concentrates. Mining and milling activities were suspended in January 1998 and the owner, Anvil Range Mining Corporation, entered into receivership in April 1998.

Mill tailings were deposited into the Rose Creek Tailings Facility from mine start up in 1969 to 1992 when tailings deposition into the mined out faro main pit commenced. The Rose Creek Tailings Facility includes three tailings impoundments as illustrated in Figure 1 and described as follows:

1. The Original Impoundment contains tailings that were deposited between 1969 and 1975;
2. Tailings were deposited in the Second Impoundment from 1975 until 1982 and for approximately 5 months in 1986. Mine production was suspended from 1982 to 1986 and, therefore, no tailings were deposited; and
3. The Intermediate Impoundment contains tailings that were deposited between 1986 and 1992. From 1992 to mine closure in 1998, tailings were deposited under water in the mined-out Faro Pit and not in the surface impoundments.

In total, the surface impoundments hold an estimated 54.4 million tonnes of tailings. The tailings are up to 25 m thick and overlie native soils comprised largely of sand/gravel of glacial outwash origin with some glaciolacustrine sediments. Native soils may extend to 60 m below ground surface. A basal silt till unit overlies bedrock beneath the sand and gravel.

Oxidation of the tailings and the release of contaminants into the underlying native soils is occurring and progressing. The primary concern regarding the chemical stability of the tailings solids is that progressive oxidation and flushing of contaminants from the tailings into the native soils will progress to the level where the downgradient surface environment in Rose Creek will be impacted.

In 2001, a comprehensive hydrogeological and geochemical investigation of the Rose Creek Tailings facility was conducted for the purpose of updating the characterization of the hydrogeological system and gechemical state of the tailings. As part of this investigation, twenty two groundwater monitoring wells at eleven locations in and downstream of the tailings impoundments were installed to enhance the monitoring of groundwater quality beyond that being undertaken through an existing network of wells. In 2003, a follow up drill investigation was undertaken using sonic drilling technology to obtain detailed stratigraphic information through the complete soil horizon. As part of this program, 76 additional groundwater monitoring wells were installed at nine locations in and downgradient of the tailings impoundments.

The locations of the pre-existing and "new" 2003 wells are shown on Figure 1. The monitoring wells are completed both within the tailings and in the underlying native soils.

1.2 Overview of Acid Rock Drainage Risk

Acid Rock Drainage is occurring within the Rose Creek Tailings Facility and the risk that the surface environment will be negatively affected by the discharge of contaminated groundwater has been the subject of a number of technical investigations.

Acid rock drainage is caused by the exposure of sulphide minerals to air and water. Impacts to groundwater quality resulting from sulphide oxidation reactions are commonly characterized by high dissolved metal concentrations (depending on the type of sulphide mineral being oxidized) and high sulphate concentrations.

The reaction of sulphide minerals with oxygen also produces acidity. This acidity can be buffered by the addition or presence of lime or by natural "acid consuming minerals" that are present in the tailings and native sediments. Acid consuming minerals are typically carbonates (calcite, siderite etc.) and some hydroxide minerals (gibbsite, goethite etc.). The most common acid consuming mineral is calcite ($CaCO_3$). If these minerals are not present or have been depleted, then acidity generated from sulphide oxidation will allow the pH to decrease. Generally, at acidic pH's, dissolved heavy metals tend to stay in solution, rather than precipitate, which in turn, increases their ability to migrate further downgradient.

As neutralization potential is slowly consumed, sulphide oxidation will involve both chemical and biological processes, including bacterial oxidation, and the pH will decrease in to the acidic range. Bacterial activity will accelerate the oxidation reactions and the rate of oxidation of sulphide minerals will increase exponentially. If oxidation reactions drive pH strongly acidic (less than about 2), then the environment becomes unfavorable for bacterial oxidation. Ferric iron solubility increases and is available as an oxidant in pyrite oxidation reactions. Oxidation by ferric iron is more favorable when conditions are anoxic.

The rate of sulphide oxidation and acid generation is dependent on several factors, including: oxygen content in the unsaturated and saturated zones, degree of saturation, surface area of the exposed sulphide minerals, temperature, presence of acid neutralizing minerals and the type and mineralogy of sulphide minerals present. The rate of sulphide oxidation decreases as oxygen availability and/or temperature decreases.

The transport of metals and acidity from acid generating tailings in groundwater is dependant on physical controls (such as hydraulic gradient and permeability of the tailings) and chemical controls (including pH, Eh, surface complexation reactions and precipitating reactions). A common characteristic of acid rock drainage from sulphidic materials that also contain significant neutralizing potential is elevated zinc in pH-neutral drainage. While dissolved copper and lead precipitate out of solution at lower pH values, zinc typically remains in solution until pH values exceed about 9.5. Thus, zinc remains more mobile than many other heavy metals that may leach from sulphide minerals.

1.3 Overview of Available Groundwater Quality Information

A series of groundwater monitoring wells was installed in 1981 that included several wells that remain accessible and functional: X16A/B, X17A/B, X18A/B. These wells are all located downgradient of the Cross Valley Dam and, although the data record prior to around 1996 is sparse, some data points are available from 1981.

A series of groundwater monitoring wells was installed in 1996, primarily intended to replace some 1981 wells that had become disfunctional or destroyed but that were referenced in the Water Licence: X21 (replaced with P96-5A/B/C), X24 (replaced with P96-4A/B/C/D) and X25 (replaced with P96-3A/B). Locations P96-3 and P96-4 are located at the toe of the Intermediate Dam and location P96-5 is located near the north toe of the Second Impoundment Dam. Routine data is available for these wells from 1996.

A series of groundwater monitoring wells was installed in 2001 as part of a comprehensive hydrogeological and geochemical investigation of the tailings facility: P01-01 to P01-11. These wells are located within each of the impoundments, at the toe of the Intermediate Dam and downgradient of the Cross Valley Dam. Spring and fall data sets are available for the 2001 wells beginning in fall 2001.

A series of groundwater monitoring wells was installed in 2003 as part of a follow up (to 2001) hydrogeological investigation: P03-01 to P03-09. These wells are located within each of the impoundments and downgradient of the Cross Valley Dam. One data set is available (fall 2003) which is the initial data set collected.

All of the available groundwater quality data is compiled and maintained in an electronic database. Sampling of select wells has been conducted by Environment Canada on an approximate once per year basis in recent years and this data is also included in the groundwater quality database.

2. Quality Assurance and Quality Control

2.1 General

The following quality assurance and quality control (QA/QC) procedures were incorporated into the spring and fall 2003 sampling events:

1. Well purging to remove standing water from the well prior to sampling (e.g. to collect fresh formation water). This consisted of either pumping the well dry or removing approximately three well volumes from the well (Tables 1 and 2). As the well volume includes the sand pack in addition to the riser pipe, many wells required purging of between 100 L to 200 L, with occasional wells requiring purging of over 300 L prior to sampling.
2. Collection of samples in order of least potentially contaminated to most potentially contaminated, as practical. In areas of nested monitors, deeper monitors were developed and sampled prior to monitors in tailings. This measure was taken to help reduce the risk of cross contamination.
3. Dissolved metals samples were filtered and preserved with nitric acid in the field. New, disposable 0.45 micron filters were utilized for each monitoring location. Field filtration and preservation reduces the potential for change in metal concentrations in the sample between the time of sample collection and analysis.
4. Field measurements of pH, conductivity and temperature (Tables 1 and 2) were recorded. The pH meter was calibrated daily with pH 7 and pH 4 buffer solutions.
5. Exercising of extreme caution when handling field gear and working at sites with exposed tailings at surface to help prevent raw tailings from impacting groundwater samples collected from within and below the tailings deposit.
6. Internal laboratory QA/QC procedures were also maintained by ALS Laboratories (as reported in the laboratory data sheets provided in Appendices A and B) and include the use of blank samples, matrix spike samples and laboratory surrogate standard samples.

2.2 Relative Percent Differences on Replicates

The Relative Percent Difference ("RPD") is the difference between the sample result and replicate result, divided by the average of the sample result and replicate result. This number is then multiplied by 100 (to make the number a percentage) and the outcome is the RPD. The RPD is not allowed where one or both of the results being compared are less than the practical quantitation limit (PQL). The PQL is 5 times the Method Detection Limit (MDL). An RPD of <50% can be used as a benchmark whereby an RPD of greater than 50% warrants further comment or consideration.

In the spring 2003 groundwater sampling event, six replicate samples were collected, which represented approximately 10% of the sample set. The entire sample set, in this case, included samples from the Rose Creek Tailings Facility and groundwater monitoring wells across the remainder of the property. RPD results for sulphate ranged from nil to 72% and for zinc from nil to 63%. Five of the six RPD results for sulphate and zinc were less than 50%. The RPD > 50% for zinc is not considered applicable because both zinc concentrations under consideration were less that the PQL. The RPD > 50% for sulphate, well P01-04A in the Rose Creek Tailings Facility at 72%, is within the historic ranges observed for sulphate RPD and no further investigation is considered warranted at this time.

In the spring 2003 groundwater sampling event, six samples from the Rose Creek Tailings Facility were collected either as replicates or within 24 hours of sampling by Environment Canada personnel. RPD results for sulphate ranged from 5% to 85% and for zinc from 13% to 117%. Five of the six RPD results for sulphate were less than 50% and three of the six RPD results for zinc were less than 50%. Two of the RPDs > 50% for zinc are not considered applicable because one or both of the zinc concentrations under consideration were less that the PQL. The remaining RDP > 50% for zinc and the sole RPD > 50% for sulphate are for well P01-09D, which is the subject of an individual QA/QC check that is described below.

In the fall 2003 groundwater sampling event (excluding the "new" 2003 wells), six replicate samples were collected, which represented approximately 10% of the sample set. The entire sample set, in this case, included samples from the Rose Creek Tailings Facility and groundwater monitoring wells across the remainder of the property. RPD results for sulphate ranged from 1% to 8% and for zinc from nil to 40%. Therefore, all of the RPD results were less than the benchmark of 50%.

This assessment of RPD values for replicate samples suggests that the repeatability of sample results is acceptable with the exception of the P01-09 wells, which are discussed in more detail below.

2.3 Relative Percent Differences on Ultra Low Flow Method

In the spring 2003 groundwater sampling event, three replicate samples were collected by Environment Canada personnel using an experimental ultra low flow ("ULF") sampling methodology. These three samples were from wells P01-06, P01-09C and P01-09D. RPD results for sulphate were 8%, 103% and 130% and for zinc were 20%, 141% and 164%. The lower RPD results that were less than 50% were both from well P01-06. The higher RPD results that were greater than 50% are from wells P01-09C and P01-09D. The P01-09 wells are the subject of an individual QA/QC check that is described below.

This assessment of RPD values suggests that the ULF method does not represent a substantive difference in repeatability of sample results with the exception of the P01-09 wells, which are discussed in more detail below.

2.4 Inter-Lab Comparison

In the spring 2003 groundwater sampling event, 14 samples were analysed at two different laboratories. The laboratories used were ALS, which has been used by Gartner Lee for all of the sampling events since 2001, and the Pacific Environmental Science Centre (“PERC”), which is internal to Environment Canada. The results for sulphate and zinc were compared using the RPD method.

RPD results for sulphate ranged from 1% to 172% and for zinc from 1% to 107%. 13 of the 14 RPD results for sulphate were less than 50% and the sole outlier (172%) is considered to be unrepresentative because a comparison of two samples from that well (Environment Canada and Gartner Lee) that were anlaysed at ALS returned an RPD for sulphate of 5%. 12 of 14 RPD results for zinc are less than 50% and both of the two higher results are considered to be unrepresentative because one or both of the zinc values under consideration were less than the PQL.

This assessment of RPD values between ALS and PERC suggests that the repeatability of sample results between the laboratories is acceptable.

2.5 P01-09 Monitoring Wells

The P01-09 monitoring wells have consistently returned groundwater quality results indicating the highest contaminant concentrations in the data set and indicating the distribution of substantial contaminant concentrations to depth in the aquifer, which is not in accordance with the postulated hydrogeological models. In order to verify these indications, two individual QA/QC programs (spring and fall) were carried out on the P01-09 monitoring wells by Environment Canada personnel. A memo that summarizes the methodology and results of these investigations is included herein in Appendix C.

In spring 2003, replicate samples and laboratory duplicates were collected and RPD values were calculated as reported above. Also in spring 2003, chemical profiling (pH, temperature and conductivity at 2 m intervals) was completed over the upper 30 m of all four P01-09 wells (A, B, C and D) as well as in other wells within the tailings facility (P01-05B, P01-06, P01-07E and P01-08C).

In fall 2003, additional chemical profiling and groundwater quality sampling was carried out and a downhole camera was used to obtain a visual indication of the condition of the P01-09D monitoring pipe.

The chemical profiling indicated a vertical chemical gradient in the water within the P01-09 wells (B, C and D) in the aquifer as illustrated in Appendix C. Spikes in conductivity were observed in each well at approximately 10 m depth, which is within the tailings, even though each well is screened in the aquifer underlying the tailings. Additionally, the pH in the wells was confirmed to be relatively low and lower than generally would be expected at less than 5.5 in each of the wells profiled.

The downhole camera provided a visual indication of orange staining, indicative of a possible inflow of tailings porewater just below the water table in well P01-09D and within the tailings mass.

All of these observations indicate that the observed gradients and the atypical elevated contaminant concentrations in the deeper wells in the aquifer (B, C and D) could be caused by a leakage of tailings porewater into the PVC monitoring well pipes (as per Appendix C). Wells P01-09A (in tailings) and P01-09B are each in a separate drill hole installed by an auger drill rig. Wells P01-09C and P01-09D (deepest) are in a single drill hole installed by an air rotary drill rig. All of these wells are in close proximity and could be affected by settlement or other minor movements within the tailings mass.

Recommendations for further investigations have been put forward by Environment Canada (per Appendix C).

3. 2003 Groundwater Quality Results

3.1 Introduction

The field information, including static water levels, pH, conductivity, temperature and purge volumes, collected for the 2001 and older wells during the spring and fall groundwater sampling events are listed in Tables 1 and 2, respectively. A summary of the analytical results reported by ALS for the spring and fall sampling events are listed in Table 3 (spring), Table 4 (fall – 2001 and older wells) and Table 5 (2003 wells). The laboratory analytical reports as received from ALS are provided in Appendices A (spring) and B (fall, inclusive of the 2003 wells).

Concentrations of sulphate (“SO_4”) and dissolved zinc (“Zn”) that were measured in the fall (September) 2003 sampling event are illustrated on Figures 2 and 3, respectively. These figures include the first results obtained for the “new” 2003 monitoring wells. A comparison for three parameters (pH, SO_4 and Zn) using the available data from fall 2001 to fall 2003 is listed in Table 6.

The concentrations and distributions of SO_4 and Zn are described in the following sections.

3.2 Upgradient of Tailings Impoundment

In June and September 2003, the concentrations of SO_4 from monitoring well TH86-17 were 16 mg/L and 15 mg/L, respectively, and the concentrations of dissolved zinc were 0.01 mg/L and 0.009 mg/L, respectively.

These concentrations are similar to previous analyses and confirm that this monitoring well appears to be representative of groundwater quality upgradient of the tailings impoundments.

3.3 Original Impoundment

The monitoring wells in the Original Impoundment are: P01-08 A/B/C, P01-10 A/B and P03-07-01 through -08. Well P01-08C is frozen at a depth where an ice lens was encountered during installation (in 2001) above the water table and may be permanently frozen. Well P01-08B is deformed near surface and not accessible with all probes and samplers. The mulit-level bundle installed at location P03-07 was noted, during installation, as possibly being affected by smearing of bentonite in the well screens, which can be assessed by ongoing groundwater quality sampling. Only P07-02 was sampled during the initial sampling event.

3.3.1 Tailings

The wells sampled in tailings in 2003 were: P01-08A and P01-10A.

The concentrations of SO_4 in P01-08A in 2003 were both 239 mg/L, which were similar to previous results. The concentrations of Zn in P01-08A in spring and fall 2003 were 0.006 mg/L and 5.17 mg/L, respectively. The fall concentration of Zn was two orders of magnitude greater than any others in the data set (4) but can not be interpreted as a temporal trend until further data verify the apparent increase. The concentrations of SO_4 in P01-10A in spring and fall 2003 were 2,460 mg/L and 2,380 mg/L, which continued an apparent increasing trend in SO_4 from 298 mg/L in fall 2001. The concentrations of Zn in P01-10A in spring and fall 2003 were 0.016 mg/L and 0.58 mg/L, respectively, which were similar to previous analyses although 0.58 mg/l is the largest analysis in the data set (5).

3.3.2 Native Soils

The wells sampled in native soils in 2003 were: P01-08B, P01-10B and P03-07-02.

The concentrations of SO_4 in the wells P01-08B and P01-10B in fall 2003 were 376 mg/L and 168 mg/L, respectively, and the concentrations of Zn were 26.5 mg/L and 0.404 mg/L, respectively. The concentrations of SO_4 and Zn in well P03-07-02 (fall 2003 only) were 511 mg/L and 0.027 mg/L, respectively. The results are in general agreement with the results from the other wells screened in native soils in this area although the concentration of SO_4 was slightly higher.

The concentrations of SO_4 in the 2001 wells in both spring and fall 2003 were similar to those observed in previous analyses, although the fall 2003 concentration in well P01-10B is the greatest in the data set (5). The concentrations of Zn in the 2001 wells in spring 2003 were similar those observed in previous analyses. However the concentrations of Zn reported for both P01-08B and P01-10B in fall 2003 were substantially (one or two orders of magnitude) greater than any previous analyses. These results can not be interpreted as a temporal trend until further data verify the apparent increases.

3.4 Second Impoundment – Southwest Corner

The monitoring wells in the southwest corner of the Second Impoundment are: P01-09 A/B/C/D, P03-01-01 though –09, P03-02-01 through –09 and P03-03-01 through –09. These wells are all centered around an area of indicated very high contaminant concentrations dating back to a now inoperable 1988 well, BH88-5 and lie within an area of approximately 250 m X 100 m. Well P01-09C is blocked to some downhole instruments and probes by a fallen waterra sampling tube. Well P01-09B is deformed near surface and not accessible with all probes and samplers. The investigations conducted in 2003 by Environment Canada that are described in Section 2 have led to the suggestion that some of P01-09 B, C and D may be contaminated by leakage into the monitoring pipes from tailings porewater. If this is verified by investigations recommended for 2004, then the data sets for these wells may need to be purged.

3.4.1 Tailings

The wells sampled in 2003 in tailings were: P01-09A, P03-01-08&-09, P03-02-07,-08&-09 and P03-03-08&-09 with the 2003 wells sampled in fall only.

The concentration of SO_4 in these wells in fall 2003 ranged from 404 mg/L to 77,600 mg/L. Although the highest concentration was observed in well P01-09A, extreme concentrations were also observed in each of the other wells of at least 14,400 mg/L. The lowest concentration was observed in downgradient (for this group) well P03-03-08. These concentrations are clearly the highest in the 2003 data set, which continues the observations made since 2001.

The concentration of Zn in these wells in fall 2003 ranged from <0.005 mg/L to 5,520 mg/L. The highest concentration was observed in well P01-09A, which was an order of magnitude greater than any other from this group. The next highest Zn concentration was 135 mg/L in upgradient well P03-01-09, in the upper portion of the saturated zone. The lowest concentration was also observed at the upgradient location in well P03-01-08, near the base of the tailings. The higher concentrations in this area are clearly the highest in the 2003 data set, which continues the observations made since 2001.

The multi-level wells in tailings at locations P03-01, P03-02 and P03-03 suggest a trend of decreasing SO_4 and Zn concentrations with depth in the saturated zone of tailings.

The pH of well P01-09A (3.34 in fall 2003) continued to be acidic but was the only pH for this group of wells less than 5. The 2003 concentrations of SO_4 in well P01-09A were generally similar to those observed previously although the fall 2003 concentration is the greatest in the data set (5). The concentrations of Zn in P01-09A in spring and fall 2003 were 4,210 mg/L and 5,520 mg/L, which continued an apparent increasing trend in Zn from 640 mg/L in fall 2001.

3.4.2 Native Soils

The wells sampled in 2003 in native soils were: P01-09B,C&D, P03-01-01 though –07, P03-02-01 through –06 (except –04) and P03-03-01 through -06 with the 2003 wells sampled in fall only.

The concentrations of SO_4 in the 2003 wells in fall 2003 ranged from 18 mg/L to 3,720 mg/L and followed the generally expected trend of decreasing concentration with depth. The lowest concentrations at these 3 locations were generally observed in the upgradient P03-01 wells and the highest concentrations in the P03-02 wells, lateral to P01-09. The concentrations of SO_4 in the P01-09 wells in 2003 ranged from 416 mg/L to 1,560 mg/L, within the range observed in the 2003 wells in this area. However, the P01-09 wells did not display the generally anticipated trend of decreasing concentration with depth. The concentrations of SO_4 in the P01-09 wells in 2003 were generally similar to those reported since 2001 although some 2003 concentrations were the greatest on record.

The concentrations of Zn in the 2003 wells in native soils in fall 2003 ranged from <0.005 mg/L to 45.1 mg/L. Zn concentrations in the P03-01 and P03-02 wells somewhat followed the generally expected trend of decreasing concentration with depth but Zn concentrations in the P03-03 wells did not. The highest concentrations in these 3 locations were generally observed in the downgradient P03-03 wells and the lowest concentrations in the P03-02 wells, lateral to P01-09. The concentrations of Zn in the P01-09 wells in 2003 ranged from 29.3 mg/L to 140 mg/L, greater than the range observed in the 2003 wells in this area. The P01-09 wells did not display the generally anticipated trend of decreasing concentration with depth. The concentrations of Zn in the P01-09 wells in 2003 appear to continue a general increasing trend since fall 2001 with the fall concentrations in wells P01-09B and P021-09C being the greatest in their data sets.

3.5 Second Impoundment – Northern and Eastern Sections

The monitoring wells in the northern and eastern sections of the Second Impoundment are: P01-07 A/B/C/D/E, P03-04-01 though –09, P03-05-01 through –08 and P03-06-01 through –07.

3.5.1 Tailings

The wells sampled in 2003 in tailings were: P01-07A/B, P03-04-08, P03-05-06,-07&-08 and P03-06-06 with the 2003 wells sampled in fall only.

The concentration of SO_4 in these wells in fall 2003 ranged from 432 mg/L to 5,770 mg/L. The lowest concentration was observed in well P01-07A and the highest concentration was observed in well P03-05-07. The P03-06 well did not display the highest concentrations in spite of being located in an area mapped as “predominantly coarse tailings”.

The concentration of Zn in these wells in fall 2003 ranged from 0.005 mg/L to 1.04 mg/L. The lowest concentration was observed in well P03-05-06 and the highest concentration was observed in well P01-07B. The P03-06 well did not display the highest concentrations in spite of being located in an area mapped as “predominantly coarse tailings”.

The pH in well P01-07A continued, in 2003, to be relatively high (9.6/8.6) as has been observed since 2001. The 2003 concentrations of SO_4 in wells P01-07A&B were generally similar to those observed previously. The concentrations of Zn in wells P01-07A&B in 2003 were similar to those previously observed with the exception of Zn in well P01-07B in fall 2003, which was two orders of magnitude higher than any other value in the data set (5). This result can not be interpreted as a temporal trend until further data verify the apparent increase.

There are no apparent increasing or decreasing trends with depth through the saturated zone of tailings in this group of wells.

3.5.2 Native Soils

The wells sampled in 2003 in native soils were: P01-07C,D&E, P03-04-02 though –07, P03-05-01 through –05 and P03-06-01 through -05 with the 2003 wells sampled in fall only.

The concentrations of SO_4 in these wells in fall 2003 ranged from 14 mg/L to 4,340 mg/L and none of the well sets followed the generally expected trend of decreasing concentration with depth. The range of concentrations was somewhat consistent among these four locations with both the highest and lowest individual concentrations observed in the P03-04 wells drilled from the Second Impoundment dam. The 2003 concentrations of SO_4 in the P01-07 wells continued a general increasing trend since 2001.

The concentrations of Zn in these wells in fall 2003 ranged from <0.005 mg/L to 2.12 mg/L. None of the well sets clearly displayed the generally expected trend of decreasing concentration with depth although the trend was partially present in the P03-04, P03-06 and P01-07 wells. The highest concentrations in these 3 locations were generally observed in the P03-04 wells, drilled from the Second Impoundment dam and the lowest concentrations in the P03-05 wells. The 2003 concentrations of Zn in the P01-07 wells were similar to previous results with the exception of Zn in well P01-07C (0.23 mg/L) which was two orders of magnitude greater than any other result in the data set (5). This result can not be interpreted as a temporal trend until further data verify the apparent increase.

3.6 Intermediate Impoundment

The monitoring wells in the Intermediate Impoundment are: X21 A/B/C, P01-05 A/B, P01-06, P03-08-01 through –08.

3.6.1 Tailings

The wells sampled in 2003 in tailings are: X21A, P01-05A and P03-08-06,-07&-08 with the 2003 wells sampled in fall only.

The concentration of SO_4 in these wells in fall 2003 ranged from 47 mg/L to 8,170 mg/L. The concentration of Zn in these wells in fall 2003 ranged from 0.008 mg/L to 12.2 mg/L. The lowest concentrations were observed in the downgradient P03-08 wells and the highest concentrations were observed in well X21A.

The P03-08 wells displayed a general trend of increasing concentrations of SO_4 and Zn with depth in the saturated zone of tailings.

The pH in well X21A in fall 2003 (3.34) was the first recorded strongly acidic pH in this well. The 2003 concentrations of SO_4 in well X21A were within the range observed since 2001. The 2003 concentrations of SO_4 in well P01-05A (1020/729 mg/L) continued a general decreasing trend since 2001. The 2003 concentrations of Zn in wells X21A and P01-05A were similar to those previously observed with the exception of Zn in well P01-05A in fall 2003, which was an order of magnitude higher than any other value in the data set (5). This result can not be interpreted as a temporal trend until further data verify the apparent increase.

3.6.2 Native Soils

The wells sampled in 2003 in native soils were: X21B/C, P01-05B, P01-06 and P03-08-06-01 through -05 (with the exception of –04) with the 2003 wells sampled in fall only.

The concentrations of SO_4 in these wells in fall 2003 ranged from 8 mg/L to 1,910 mg/L. The wells sets at locations X21 and P03-08 displayed the generally expected trend of decreasing concentration with depth. The highest concentration was observed in well P01-06 and the lowest in well X21C. The 2003 concentrations of SO_4 in the X21, P01-05 and P01-06 wells were similar to those reported since 2001.

The concentrations of Zn in these wells in fall 2003 ranged from <0.005 mg/L to 6.87 mg/L The wells sets at locations X21 and P03-08 displayed the generally expected trend of decreasing concentration with depth. The highest concentration was observed in well P01-06 and the lowest in well P03-08-01. The 2003 concentrations of Zn in the X21 and P01-05 wells were similar to previous results although the fall 2003 concentration of Zn in well X21C is the highest in its data set (5). The 2003 concentrations of Zn in well P01-06 (5.27 mg/L and 6.87 mg/L) continued a general increasing trend since fall 2001 (1.02 mg/L).

3.7 Intermediate Dam

The monitoring wells at the toe of the Intermediate Dam are: X24 A/B/C/D, X25 A/B, P01-03 and P01-04 A/B. This location is downgradient of the tailings deposits.

3.7.1 North Area

The wells sampled in 2003 in the north area were: X24 A/C/D and P01-03.

The concentrations of SO_4 in these wells in fall 2003 ranged from 1,050 mg/L to 1,340 mg/L. The highest concentration was observed in well X24D and the lowest in well X24A. The X24 wells, in both spring and fall 2003, continued to display a general trend of increasing SO_4 concentrations with depth. The 2003 concentrations of SO_4 in these wells were similar to those reported since 2001 with the exception of well X24D where a general increasing trend was continued from 1,020 mg/L in fall 2001 to 1,340 mg/L in fall 2003.

The concentrations of Zn in these wells in fall 2003 ranged from 0.005 mg/L to 0.33 mg/L. The highest concentration was observed in well X24D and the lowest in well X24A. As was observed for SO_4, the X24 wells, in both spring and fall 2003, continued to display a general trend of increasing Zn concentrations with depth. The 2003 concentrations of Zn in these wells were similar to those reported since 2001.

3.7.2 Central and South Area

The wells sampled in 2003 in the central and north area were: X25 A/B and P01-04 A/B.

The concentrations of SO_4 in these wells in fall 2003 ranged from 43 mg/L to 399 mg/L. The highest concentration was observed in well P01-04A and the lowest in well P01-04B. The X25 wells, in both spring and fall 2003, continued to display a general trend of increasing SO_4 concentrations with depth (as was observed above for the X24 wells) and the P01-04 wells displayed a trend of decreasing concentration with depth. This difference is attributed to the very deep location of P01-04B near bedrock in a different stratigraphic unit (the basal till). The 2003 concentrations of SO_4 in these wells were similar to those reported since 2001 although a weak decreasing trend may be apparent for well X25A.

The concentrations of Zn in these wells in fall 2003 were all either at or below the method detection limit of 0.005 mg/L as has been observed since 2001.

3.8 Downgradient of the Cross Valley Dam

The monitoring wells downgradient of the Cross Valley Dam are: X16 A/B, X17 A/B, X18 A/B, P01-01 A/B, P01-02 A/B, P01-11 and P03-09-01 though -09.

3.8.1 North Area

The wells sampled in 2003 in the north area were: X18 A/B, P01-01 A/B and P01-11.

The concentrations of SO_4 in these wells in fall 2003 ranged from 413 mg/L to 862 mg/L. The highest concentration was observed in well P01-11 and the lowest in well P01-01B. The X18 and P01 wells continued, in both spring and fall 2003, to display the trends with depth that have been observed since 2001 wherein concentrations increase from the shallow to the deep well at X18 but decrease with depth at P01-01. The 2003 concentrations of SO_4 in these wells were similar to those reported since 2001 with the exception of well P01-11 where a general increasing trend was continued from 573 mg/L in spring 2001 to 862 mg/L in fall 2003.

The concentrations of Zn in these wells in fall 2003 were all at the method detection limit (0.005 mg/L in fall 2003) as has been observed since 2002 with the exception of well P01-11 which reported Zn as high as 0.05 mg/L in fall 2002.

3.8.2 Central and South Area

The wells sampled in 2003 in the north area were: X16 A/B, X17 A/B, P01-02 A/B and P03-09-01 through-09 with the 2003 wells sampled in fall only.

The concentrations of SO_4 in these wells in fall 2003 ranged from 22 mg/L to 443 mg/L. The highest concentration was observed in well P03-09-09 and the lowest in downgradient well X16A. These wells did not display any clear trends with depth although the higher concentrations were generally observed nearer surface in the P03-09 wells. The 2003 concentrations of SO_4 in these wells (excluding the P03-09 wells) were similar to those reported since 2001.

The concentrations of Zn in these wells in 2003 were all at or below the method detection limit (0.005 mg/L in fall 2003) with the exception of well X16A (0.07 mg/L in fall) and well P01-02A (0.014 mg/L in spring). These results are consistent with observations since 2001.

4. Summary of Observations

Upstream Reference

1. Groundwater quality in the upgradient reference wells has been consistent since 2001 with SO_4 from 12 mg/L to 20 mg/L and Zn < 0.01 mg/L;

Saturated Zone of Tailings

2. The ranges of SO_4 and Zn concentrations throughout the saturated zone of tailings over all three impoundments in fall 2003 (inclusive of the 2003 wells) are from 47 mg/L to 77,600 mg/L and from <0.005 mg/L to 5,520 mg/L, respectively;
3. The southwest area of the Second Impoundment continues to display the highest contaminant concentrations and this is generally supported by the new 2003 wells;
4. Several monitoring wells appear to display increasing or decreasing trends in SO_4 and/or Zn concentrations; however the data set is limited, in most instances, to 5 data points from fall 2001 to fall 2003 which makes the identification of trends more difficult pending the collection of ongoing data;

Native Soils Beneath Tailings

5. The ranges of SO_4 and Zn concentrations throughout the native soils beneath the tailings impoundments (i.e. upgradient of the Intermediate Dam) in fall 2003 (inclusive of the 2003 wells) are from 8 mg/L to 4,340 mg/L and from <0.005 mg/L to 45.1 mg/L, respectively;
6. The highest concentrations of SO_4 were observed under the Second Impoundment (both the southwest and north areas) and the highest concentrations of Zn were observed under the southwest area of the Second Impoundment and the Original Impoundment;

Intermediate Dam

7. Groundwater quality on the north side of the valley continues to display higher contaminant concentrations than the valley centre with SO_4 from 1,050 mg/L to 1,340 mg/L and Zn up to 0.33 mg/L in fall 2003;
8. In comparison to the above, groundwater quality in the center and south sides of the valley contained SO_4 from 43 mg/L to 399 mg/L and Zn up to only 0.005 mg/L in fall 2003;
9. Overall, SO_4 and Zn concentrations at the toe of the Intermediate Dam were within the ranges observed in the native soils beneath tailings but were up to two orders of magnitude greater than the upgradient reference wells;
10. There are no clear increasing or decreasing trends in concentrations of SO_4 or Zn from fall 2001 to fall 2003 with the exception of a suggested increasing trend in SO_4 in well X24D;

Downgradient of Cross Valley Dam

11. Groundwater quality on the north side of the valley continues to display higher SO_4 concentrations than the valley centre from 413 mg/L to 862 mg/L in fall 2003, which were generally lower than the concentrations upgradient at the Intermediate Dam;
12. In comparison to the above, groundwater quality in the center and south sides of the valley contained SO_4 from 22 mg/L to 443 mg/L in fall 2003;
13. Zinc concentrations were uniformly at or below the method detection limit of 0.005 mg/L in fall 2003;
14. Goundwater quality at location X16, furthest downgradient of the tailings facility, is similar to the upstream reference wells but contains higher contaminant concentrations with SO_4 from 22 mg/L to 36 mg/L and Zn up to 0.018 mg/L since 2001;
15. There are no clear increasing or decreasing trends in concentrations of SO_4 or Zn from fall 2001 to fall 2003 with the exception of a suggested increasing trend in SO_4 in well P01-11;

"New" 2003 Wells

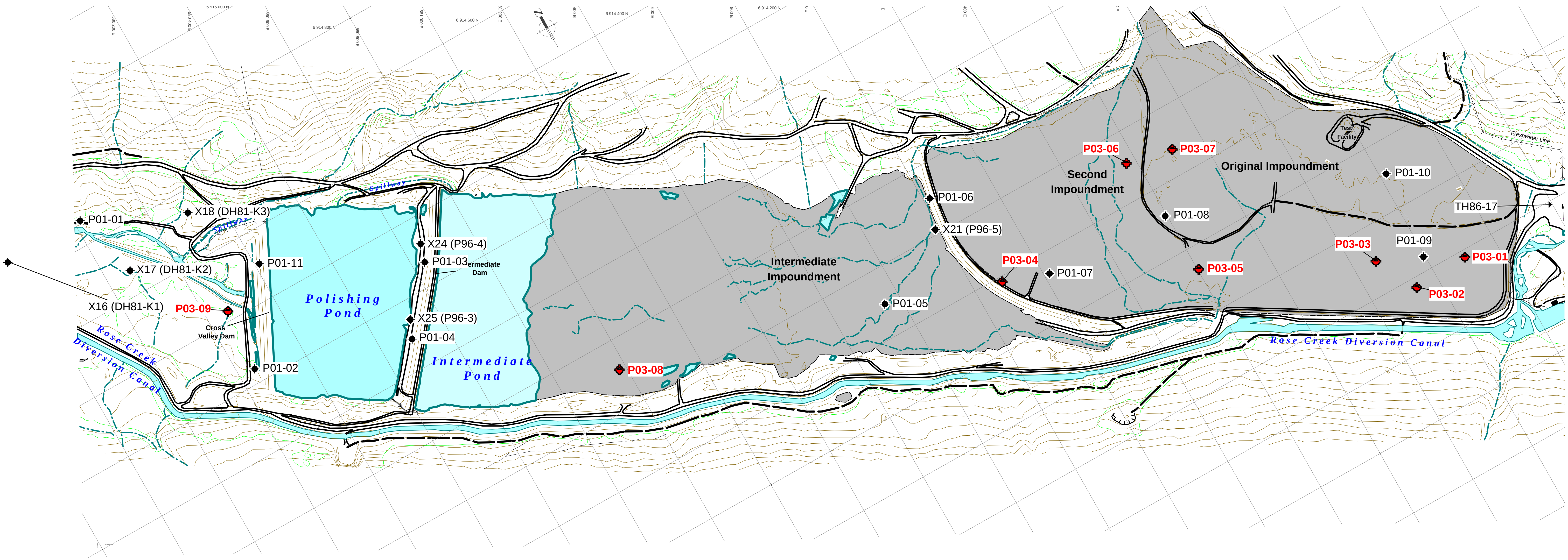
16. The "new" 2003 wells have provided valuable information to the fall 2003 data set as described herein; however, this represents the initial sampling of these wells after installation and, therefore, the results need to be verified by future analysis in spring and fall 2004;
17. The initial results from the "new" 203 wells in the southwest area of the Second Impoundment generally confirm the previous indications that this area contains some of the highest contaminant concentrations in tailings;
18. The initial results from the "new" 2003 wells generally confirm, notwithstanding the investigation of possible leakage of tailings porewater into the deeper P01-09 wells, previous indications that SO_4 and Zn are non-uniformly distributed to depth in the native soils;

Migration of SO_4 and Zn

19. SO_4 and Zn are clearly migrating from the tailings into the native soils underlying the tailings impoundments;
20. The migration of SO_4 has clearly proceeded to downgradient of the Cross Valley Dam with diminishing concentrations in the downgradient direction and with SO_4 distributed to depth in the native soils;
21. The migration of Zn continues to be mitigated as compared to SO_4 such that, with occasional exceptions as highlighted below, "elevated" Zn concentrations are not generally observed at the Intermediate Dam;
22. Notwithstanding the above observation, Zn concentrations at the Intermediate Dam were reported in 2003 as high as 0.25 mg/L, although this may be an anomalous outlier as the next highest concentration reported since 2001 is 0.09 mg/L;

23. The migration of Zn within the native soils at concentrations greater then 0.5 mg/L (arbitrary benchmark) appears to be restricted to approximately upgradient of the Second Impoundment Dam; and
24. There are no indications in the data sets collected since 2001 of increasing concentrations of Zn in the native soils at or downgradient of the Intermediate Dam.

Figures



Legend

- Multi-Level Well Location (2003)
- Existing Monitoring Well Locations (pre-2003)

200 0 200 400 600

Meters

Scale: 1:11,500

Data Sources:

Basemap: Orthoshop, Calgary, AB, January 1991. Based on aerial photography September 17, 1990 at 1:10,000 scale. Based supplied by Robertson Geoconsultants Inc.

Anvil Range Mine, Rose Creek Tailings Facility
2003 Groundwater Quality Update
- Draft Report -

Rose Creek Tailings Facility

Drawn By:	F.K.P.	Approved By:	M.G.
Version No.:	1	Project No.:	GLL 23-576
Date Issued:	Nov. 11/2003	Projection:	UTM Z8, NAD27
Site Name:	Faro	File Name:	23576-F1.WOR

Gartner Lee

Figure No.

1

Tables

Table 1. Spring 2003 Field Information

Faro Mine, June 2-6 2003

Monitor ID	Sample Date	Water Level (m bTOP)	Stickup (m)	Water Level (m bgs)	Development Method	Purge Volume (L)	pH	eH (mV)	Conductivity (uS)	Temp. (^oC)	Comments
P01-01A	02-Jun-03	3.62	0.48	3.14	suction	>150	7.3	95	1,156	2.6	Water becomes turbid with adgitation in well
P01-01B	02-Jun-03	3.77	0.49	3.28	suction	>240	6.7	-18	1,040	3.0	Sulphur odour
X16A	02-Jun-03	3.49	0.83	2.67	suction	>60	7.0	61	297	3.3	
X16B	02-Jun-03	3.87	1.23	2.64	suction	>380	6.9	77	376	3.9	
X17A	02-Jun-03	2.17	0.62	1.55	suction	60	7.0	60	473	3.0	
X17B	02-Jun-03	2.72	1.17	1.55	suction	>350	6.8	-63	579	4.0	
X18A	02-Jun-03	4.16	0.62	3.54	suction + manual	22	6.6	-33	1,193	4.3	Well pumped dry @ 8L, some odour
X18B	02-Jun-03	n/a	0.59	-	suction + manual	80	6.7	-25	1,127	3.7	Ice blocking well, no water level
P01-02A	03-Jun-03	n/a	0.68	-	suction	>130	7.1	46	608	-	PVC pipe crushed (likely due to ice) not able to collect water level
P01-02B	03-Jun-03	1.52 ags	n/a	-1.57	suction	>230	6.8	-16	557	4.0	Blockage in well at 1.42 m bTOP
P01-04B	03-Jun-03	1.07	0.50	0.57	suction	>350	6.5	-30	1,160	3.1	
P01-07A	03-Jun-03	11.61	0.49	11.12	hydrolift+manual	30	9.6	-31	1,748	3.7	Lots of tailings in sample, well pumped dry
P01-07B	03-Jun-03	11.55	0.44	11.11	hydrolift	20	8.2	-121	1,589	3.7	Tailing in sample, leachate odour, well pumped dry
P01-07C	03-Jun-03	11.42	0.44	10.98	hydrolift	98	6.8	-40	1,348	3.1	Tailings in sample
P01-07D	03-Jun-03	11.79	0.49	11.30	downhole pump	>190	6.5	4	1,822	3.3	Developed at 2.5L/min
P01-07E	03-Jun-03	11.80	0.39	11.41	downhole pump	>225	6.4	82	1,734	3.6	Well developed by EC @ 2L/min, sample collected thru EC's pump
P01-11	03-Jun-03	0.52	0.60	-0.08	suction	55	6.7	-60	1,588	3.6	Well pumped dry @ 30L, water grey & turbid at first.
TH86-17	03-Jun-03	6.99	1.04	5.95	suction	>95	7.2	36	198	1.4	
X24A-96	03-Jun-03	3.21	0.80	2.41	suction	>65	6.7	93	1,558	3.0	
X24C-96	03-Jun-03	3.17	0.70	2.47	suction	>60	6.6	97	2,294	2.9	Silty at first, clearing up
X24D-96	03-Jun-03	3.03	0.70	2.33	suction	>200	6.6	96	2,413	3.6	
X25A-96	03-Jun-03	2.44	0.68	1.76	suction	>90	7.1	21	896	3.2	
X25B-96	03-Jun-03	2.32	0.63	1.69	suction	>150	7.1	-1	1,068	3.2	
P01-05A	04-Jun-03	3.38	0.45	2.93	manual	30	6.1	62	1,015	2.5	Leachate odour, water foams. Pumped dry @ 15L
P01-05B	04-Jun-03	3.80	0.52	3.28	suction	>120	6.7		1,629	3.1	Developed at 12 L/min, EC had developed & sampled well before
P01-06	04-Jun-03	5.26	0.49	4.77	hydrolift	>80	6.4		2,640	2.5	Developed at 4.2L/min, slightly turbid, EC developed and sampled before
P01-08A	04-Jun-03	12.66	0.39	12.27	manual	7	7.4		757	4.2	Tubing sand-locks in well, DO NOT LEAVE TUBING IN WELL
P01-08B	04-Jun-03	13.10	0.76	12.34	hydrolift	>130	6.5		920	1.9	Developed at 7L/min, tailings in sample
P01-09A	04-Jun-03	6.50	0.44	6.06	hydrolift	>80	5.9		35,040	4.0	Developed at 3.1L/min, grey tailings, v. turbid, odour. EC developed and sampled before
P01-09B	04-Jun-03	6.49	0.37	6.12	hydrolift	>110	5.4		1,506	4.2	Developed at 2.8L/min, water cleared up, minor tailings
P01-10A	04-Jun-03	10.01	0.49	9.52	manual	14	8.4		4,055	5.2	Some tailings in sample, chemical odour. Pumped dry @ 14L
P01-10B	04-Jun-03	10.48	0.45	10.03	hydrolift	>110	6.9		733	3.7	Turbid, produces fine sand. Developed at 4.2 L/min
X21A-96	04-Jun-03	4.81	0.69	4.12	manual	54	6.1	-57	1,587	2.5	Grey, slightly turbid
X21B-96	04-Jun-03	4.84	0.74	4.10	suction	213	6.5	-70	690	3.2	Developed at 4.5L/min
X21C-96	04-Jun-03	4.89	0.81	4.08	hydrolift	200	7.8	-109	201	2.9	Silty at first, clearing up, developed at 5L/min
BH1	05-Jun-03	3.09	0.14	2.95	manual	2	6.1		396	2.9	Dry @ 1L, ice in well, v. rusty turbid
BH14A	05-Jun-03	4.81	0.16	4.65	manual+suction	15	6.9		3,602	2.7	Pumped dry
BH14B	05-Jun-03	5.50	0.81	4.69	manual+suction	8	6.8		3,501	1.8	Pumped dry

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Table 1. Spring 2003 Field Information

Faro Mine, June 2-6 2003

Monitor ID	Sample Date	Water Level (m bTOP)	Stickup (m)	Water Level (m bgs)	Development Method	Purge Volume (L)	pH	eH (mV)	Conductivity (uS)	Temp. (^oC)	Comments
BH2	05-Jun-03	3.35	0.64	2.71	manual	3	6.2		519	4.8	Dry @ 1L, brown & very turbid
BH4	05-Jun-03	2.40	0.69	1.71	manual	3	5.7		454	1.8	Pumped dry, rusty & slightly turbid
P01-09C	05-Jun-03	6.61	0.38	6.23	downhole pump	>140	5.7		833	4.4	Developed at 4L/min, EC developed and sampled before
P01-09D	05-Jun-03	7.00	0.33	6.67	hydrolift	>170	5.5		1,913	4.1	Developed at 5L/min, EC developed and sampled before
P01-51	05-Jun-03	37.32			hydrolift	>200	7.0		998	3.4	Developed at 1.7L/min, slightly turbid
P01-52A	05-Jun-03	5.01	0.35	4.66	manual+suction	19	7.0		1,220	2.6	Pumped dry at 15L, sample turbid
P01-52B	05-Jun-03	5.01	0.36	4.65	manual+suction	47	7.1		1,205	3.0	Pumped dry at 47L, sulphur odour
P96-8A	05-Jun-03	3.18			suction	>57	6.2		5,030	2.7	
P96-8B	05-Jun-03	3.09			suction	>84	6.2		6,180	3.8	
P96-9A	05-Jun-03	5.55	0.86	4.70	hydrolift	70	6.6		2,360	1.7	Cutoff 0.085m of pipe, future stickup=0.77m
V34	05-Jun-03	8.54			manual	6	7.4		867	4.7	Pumped dry at 6L, slighty turbid
V35	05-Jun-03	8.81	0.45	8.36	manual	15	7.0		2,020	2.8	Pumped dry at 15L
V36	05-Jun-03	8.90	0.44	8.47	manual+suction	34	7.0		1,527	2.7	Pumped dry, slightly turbid
V37	05-Jun-03	9.13	0.46	8.67	manual	15	7.4		876	3.9	Pumped dry at 15L
BH12A	06-Jun-03	2.48	1.01	1.47	suction	20	6.3		2,500	3.9	
BH12B	06-Jun-03	2.53	1.06	1.48	suction	38	6.3		2,461	2.5	Silica sand in well, need to be carefull with pump
P01-04A	06-Jun-03	1.49	0.51	0.98	suction	>250	6.8		1,197	5.1	Well frozen on June 3, allowed to thaw
P96-6	06-Jun-03	11.79	0.73	11.06	downhole pump	?	5.8		1,107	4.6	2-3 m of fine silica sand in well
P96-7	06-Jun-03	8.65	0.70	7.95	manual	4	6.7		3,020	2.4	Pumped dry @ 4L
S1A	06-Jun-03	3.94	1.10	2.84	suction	>100	6.0		5,200	1.8	
S1B	06-Jun-03	4.18			manual	2	6.2		1,212	3.7	Pumped dry @ 1L
S2A	06-Jun-03	3.53	0.32	3.21	manual	24	6.0		4,325	3.1	Pumped dry @ 24L
S2B	06-Jun-03	4.66	1.50	3.16	manual	6	6.4		3,869	4.1	Pumped dry @ 6L
S3	06-Jun-03	2.52			manual	20	5.9		4,639	1.9	Pumped dry @ 20L

Notes: *b TOP* *below Top of Pipe*
bgs *Below Ground Surface*

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Table 2. Fall 2003 Field Information

Faro Mine, September 22-26 2003

Monitor ID	Sample Date	Water Level (m bTOP)	Stickup (m)	Water Level (m bgs)	Development Method	Purge Volume (L)	pH	Conductivity (uS)	Temp. (°C)	Comments
P01-01A	22-Sep-03	3.75	0.48	3.27	suction	>135	7.1	1,285	3.4	clear, not turbid * duplicate
P01-01B	22-Sep-03	3.92	0.49	3.43	suction	>225	7.1	1,132	3.8	clear, not turbid
X16A	22-Sep-03	3.70	0.83	2.88	suction	>55	7.6	325	4.5	clear, no odour, needs tubing
X16B	22-Sep-03	4.55	1.23	3.32	suction	>330	7.4	410	3.9	clear, no odour, needs tubing
X17A	22-Sep-03	2.24	0.62	1.62	suction + manual	>60	7.7	453	3.4	clear
X17B	22-Sep-03	2.80	1.17	1.63	suction	>330	7.3	580	3.6	clear, musty odour
X18A	22-Sep-03	4.48	0.62	3.86	suction + manual	14	7.1	1,235	2.9	well pumped dry @ 14L
X18B	22-Sep-03	4.16	0.59	3.57	suction + manual	63	7.0	1,227	3.0	slightly turbid, musty odour
P01-02A	22-Sep-03	-	0.68	-	suction	>150	7.7	624	3.9	Turbid then clear, PVC crushed unable to attain water level.
P01-02B	22-Sep-03	1.07 ags	n/a	+1.07ags	suction	>204	7.6	564	4.2	Holes drilled to release standing water and prevent freeze up
P01-03	22-Sep-03	2.87	-	-	suction	>90	6.6	2,138	2.8	turbid, some fine sand in sample, greyish-brown colour *duplicate
P01-11	22-Sep-03	0.66	0.60	0.07	suction	>111	7.2	1,782	4.5	greyish-brown colour, slightly turbid
X24A-96	22-Sep-03	3.98	0.80	3.18	suction	>60	6.7	2,016	3.3	clear
X24B-96	22-Sep-03	Dry @ 3.76 - presence of sand on footvalve and water tape from the bottom of the well.								
X24C-96	22-Sep-03	3.93	0.70	3.23	suction	>65	6.7	2,073	3.5	turbid becoming clear throughout duration of purging
X24D-96	22-Sep-03	3.79	0.70	3.09	suction	>196	6.6	2,334	2.7	started green/brown becoming clear - not turbid
X25A-96	23-Sep-03	3.20	0.68	2.52	suction	>84	6.7	862	3.1	clear
X25B-96	23-Sep-03	3.06	0.63	2.43	suction	>138	7.0	1,116	2.4	clear
P01-05A	23-Sep-03	3.39	0.45	2.94	manual	25	7.7	1,187	5.0	pumped dry @15L, black, tailings in sample, white foam produced, hydrocarbon odour
P01-05B	23-Sep-03	3.78	0.52	3.26	suction	>112	6.9	1,541	3.1	clear
P01-04A	23-Sep-03	2.18	-	-	suction	>225	7.1	1,206	2.8	clear
P01-04B	23-Sep-03	1.73	0.50	1.23	suction	>340	6.3	1,177	3.0	clear, strong sulphur odour
P01-07A	23-Sep-03	11.43	0.49	10.94	hydrolift+manual	30	9.7	1,332	3.2	pumped dry @ 20L,grey, tailings in sample, used disposable filters
TH86-17	23-Sep-03	8.53	1.04	7.49	suction + manual	75	7.1	193	4.5	brown/grey slightly turbid
P01-07C	23-Sep-03	11.42	0.44	10.98	hydrolift	135	6.8	1,401	3.2	greyish colour
P01-07D	23-Sep-03	11.79	0.49	11.30	hydrolift	174	6.5	1,716	2.2	clear
P01-06	23-Sep-03	5.20	0.49	4.71	hydrolift	82	6.3	2,501	2.4	slight grey colour
X21A-96	23-Sep-03	4.76	0.69	4.07	manual	51	6.1	5,340	3.0	grey, turbid, tailings and sand in sample
X21B-96	23-Sep-03	4.77	0.74	4.03	hydrolift	105	7.0	1,323	2.7	clear, *duplicate
X21C-96	23-Sep-03	4.84	0.81	4.03	hydrolift	200	7.7	520	2.6	grey, turbid, weak bitter odour
P01-07B	24-Sep-03	11.48	0.44	11.04	manual	25	7.0	1,686	4.1	pumped dry @25L, grey, turbid, tailings in sample, strong sulphur odour. Inline filter failed.
P01-07E	24-Sep-30	11.57	0.39	11.18	downhole pump	>220	6.1	1,806	2.5	180L removed at 1L/min on Sept.23 - 60+L removed Sept.24 @3L/min
P01-08A	24-Sep-03	12.64	0.39	12.25	manual	3	7.7	764	0.8	pumped dry @ 3L - black tailing in sample, inline filter failed
P01-08B	24-Sep-03	13.10	0.76	12.34	hydrolift	>117	6.9	897	1.4	grey, black, tailings in sample - inline filter failed
P01-09A	24-Sep-03	6.39	0.44	5.95	hydrolift	70	5.9	18,100	3.2	blk, tailings in sample - filtered sample light green colour
P01-09B	24-Sep-03	6.74	0.37	6.37	hydrolift	>96	5.3	1,832	3.3	clear, no apparent odour
P01-09C	24-Sep-03	6.93	0.38	6.55	downhole pump	>130	5.5	1,628	3.4	clear

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Table 2. Fall 2003 Field Information

Faro Mine, September 22-26 2003

Monitor ID	Sample Date	Water Level (m bTOP)	Stickup (m)	Water Level (m bgs)	Development Method	Purge Volume (L)	pH	Conductivity (uS)	Temp. (^oC)	Comments
P01-09D	24-Sep-03	7.39	0.33	7.06	hydrolift	165	5.4	1,926	3.5	clear - initial conductivity 15370uS
P01-10B	24-Sep-03	10.52	0.45	10.07	hydrolift	>102	7.0	781	3.0	grey/brown turbid - *duplicate
V34	24-Sep-03	7.39	-		manual	8	7.6	812	2.8	pumped dry @ 8L - grey/brown, turbid
V35	24-Sep-03	7.75	0.45	7.30	manual	17	7.4	1,486	2.6	pumped dry @ 17L - very slightly turbid
V36	24-Sep-03	9.03	0.44	8.60	manual+suction	24	7.0	1,361	1.9	pumped dry @ 18L - greyish colour
V37	24-Sep-03	8.79	0.46	8.33	manual	15	7.9	825	2.3	pumped dry @15L, grey, slightly turbid
P01-51	24-Sep-03	37.32	62.28	-	hydrolift	70	7.7	1,052	4.3	pumped dry @~70L
P01-52A	24-Sep-03	4.82	0.35	4.47	hydrolift	20	7.4	1,165	2.4	pumped dry @ 20L blk, turbid, sulphur odour
P01-52B	24-Sep-03	4.82	0.36	4.46	hydrolift	65	7.2	1,353	2.6	pumped dry @65L - turbid, blk colour, filter failed
P01-10A	25-Sep-03	9.72	0.49	9.23	manual	12	7.2	3,701	2.8	blk, tailings in sample, hydrocarbon/chemical like odour
BH1	25-Sep-03	3.48	0.14	3.34	manual	1	4.7	393	2.0	pumped dry @1L - turbid, orange/brown
BH14A	25-Sep-03		0.16	-0.16	manual	7	6.2	3,060	4.3	pumped dry @ 7L - brown turbid - *duplicate
BH14B	25-Sep-03	4.32	0.81	3.51	manual	13	6.8	2,822	3.7	pumped dry @ 13L - brown, turbid
BH2	25-Sep-03	4.92	0.64	4.28	manual	<1	5.7	471	4.4	pumped dry @ 250ml - turbid, orange/brown drained tubing three times
BH4	25-Sep-03	2.53	0.69	1.84	manual	3	5.64	348.0	4	pumped dry @ 3L - orange/brown colour
P96-9A	25-Sep-03	5.62	0.77	4.85	hydrolift	60	6.5	2,276	6.3	orange becoming clear as purged
BH12A	25-Sep-03	2.38	1.01	1.37	manual	<2	6.5	1,070	2.7	pumped dry @ 2L - greyish/brown colour
BH12B	25-Sep-03	2.43	1.06	1.38	manual	<2	6.8	1,048	3.8	pumped dry @ 2L - greyish/brown colour
P96-6	25-Sep-03	12.97	0.73	12.24	downhole pump	32	6.2	826	3.2	dry @ 32L - clear, orange tinge
S1A	25-Sep-03	4.12	1.10	3.02	suction	>90	5.8	3,962	2.2	clear, sulphur odour
S1B	25-Sep-03	4.02	-	-	manual	4	6.3	2,780	3.2	pumped dry @ 4L - brownish green colour
S2B	25-Sep-03	4.86	0.32	4.54	manual	8	6.2	2,491	3.4	pumped dry @ 8L - brown, turbid
S2A	25-Sep-03	3.77	1.50	2.27	manual + suction	32	5.9	3,448	3.3	pumped dry @ 32 - brown, turbid
S3	25-Sep-03	2.60	-	-	manual	40	5.7	4,000	4.3	pumped dry @ 40 - brown, turbid
P96-7	26-Sep-03	5.63	0.70	4.93	manual	15	6.3	3,050	1.8	pumped dry @ 15L - brown, sand in sample
P96-8A	26-Sep-03	3.15	-	-	suction	>48	6.3	4,751	6.2	clear, very slightly turbid - *duplicate
P96-8B	26-Sep-03	3.07	-	-	suction	>75	5.9	5,230	5.0	clear, very slightly turbid

Notes: *b TOP* *below Top of Pipe*
bgs *Below Ground Surface*

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Table 3. Spring 2003 Ground Water Quality Results

Station		Date	ALK-T mg/L	Sulphate mg/L	COND-L µS/cm	COND-F µS/cm	HARD mg/L	PH-F pH unit	SWL meters
P01-01A									
		Jun/02/2003	199	580	1190	1156	693	7.3	3.14
P01-01B									
		Jun/02/2003	228	399	1070	1040	591	6.7	3.28
P01-02A									
		Jun/03/2003	195	143	599	608	333	7.1	
P01-02B									
		Jun/03/2003	178	125	541	557	276	6.8	1.57
P01-04A									
		Jun/06/2003	293	191	1090		525		
P01-04B									
		Jun/03/2003	595	50	1140	1160	562	6.5	0.57
P01-05A									
		Jun/04/2003	30	1020	1720	1015	683	6.1	2.93
P01-05B									
		Jun/04/2003				1629		6.7	3.28
		Jun/04/2003	218	814	1530		836		
	EC	Jun/04/2003	197	764	1510		718		
P01-06									
		Jun/04/2003				2640		6.4	4.77
		Jun/04/2003	49	1620	2270		1140		
	EC	Jun/04/2003	138	1530	2280		1010		
	EC-ULF	Jun/04/2003	171	1410	2140		981		
P01-07A									
		Jun/03/2003	288	636	1710	1748	24.2	9.6	11.12
P01-07B									
		Jun/03/2003	373	498	1680	1589	189	8.2	11.11
P01-07C									
	EC	Jun/02/2003	169		1180		666		
		Jun/03/2003		662		1348		6.8	10.98
P01-07D									
		Jun/02/2003	151	1070	1750		999		
		Jun/03/2003				1822		6.5	11.3
P01-07E									
		Jun/02/2003	140	1020	1650		948		
	EC	Jun/03/2003	139	973	1680	1734	843	6.4	11.41
P01-08A									
		Jun/04/2003	130	239	1100	757	16.6	7.4	12.27
P01-08B									
		Jun/04/2003	57	375	788	920	393	6.5	12.34
P01-09A									
		Jun/04/2003	<1	56600	826	35040	3560	5.9	6.06
	EC	Jun/04/2003	<1	64500	32700		3630		
P01-09B									
		Jun/04/2003	9	913	1360	1506	276	5.4	6.12
P01-09C									
	EC	Jun/04/2003	20	386	716		189		
	EC-ULF	Jun/04/2003	9	1200	1700		328		
		Jun/05/2003	14	416	781	833	203	5.7	6.23
P01-09D									
	EC-ULF	Jun/04/2003	3	2980	3490		636		
	EC	Jun/04/2003	13	627	1080		293		
		Jun/05/2003	7	1560	1840	1913	354	5.5	6.67

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Table 3. Spring 2003 Ground Water Quality Results

Station	Date	ALK-T mg/L	Sulphate mg/L	COND-L µS/cm	COND-F µS/cm	HARD mg/L	PH-F pH unit	SWL meters
P01-10A								
	Jun/04/2003	102	2460	3780	4055	1680	8.4	9.52
P01-10B								
	Jun/04/2003	291	113	681	733	307	6.9	10.03
P01-11								
	Jun/02/2003	268	812	1580		922		
	Jun/03/2003				1588		6.7	0.08
TH86-17								
	Jun/03/2003	84	16	196	198	96.2	7.2	5.95
X16A								
	Jun/02/2003	144	24	303	297	167	7	2.67
X16B								
	Jun/02/2003	190	27	376	376	222	6.9	2.64
X17A								
	Jun/02/2003	249	54	483	473	279	7	1.55
X17B								
	Jun/02/2003	436	65	829	579	343	6.8	1.55
X18A								
	Jun/02/2003	211	596	1200	1193	738	6.6	3.54
X18B								
	Jun/02/2003	209	577	1200	1127	676	6.7	
X21A-96								
	Jun/04/2003	38	1730	2290	1587	923	6.1	4.12
X21B-96								
	Jun/04/2003	170	446	1100	690	515	6.5	4.1
X21C-96								
	Jun/04/2003	181	8	1760	201	187	7.8	4.08
X24A-96								
	Jun/02/2003	268	725	1470		866		
	Jun/03/2003				1558		6.7	2.41
X24C-96								
	Jun/02/2003	319	1330	2170		1410		
	Jun/03/2003				2294		6.6	2.47
X24D-96								
	Jun/02/2003	346	1340	2300		1590		
	Jun/03/2003				2413		6.6	2.33
X25A-96								
	Jun/02/2003	247	261	1020		424		
	Jun/03/2003				896		7.1	1.76
X25B-96								
	Jun/02/2003	273	332	864		497		
	Jun/03/2003				1068		7.1	1.69

Table 3. Spring 2003 Groundwater Quality Results

Station	Date	AG-D mg/L	AL-D mg/L	AS-D mg/L	B-D mg/L	BA-D mg/L	BE-D mg/L	CA-D mg/L	CD-D mg/L	CO-D mg/L	CR-D mg/L	CU-D mg/L	FE-D mg/L	K-D mg/L
P01-01A														
	Jun/02/2003	<0.00004	<0.01	<0.001	<0.1	0.09	<0.002	208	<0.0001	<0.0006	<0.002	<0.002	<0.03	6
P01-01B														
	Jun/02/2003	<0.00004	<0.01	0.016	<0.1	0.08	<0.002	179	<0.0001	<0.0006	<0.002	<0.002	1.38	4
P01-02A														
	Jun/03/2003	<0.00002	<0.005	0.0008	<0.1	0.05	<0.001	95.7	0.0001	0.0004	<0.001	<0.001	<0.03	3
P01-02B														
	Jun/03/2003	<0.00002	<0.005	0.0031	<0.1	0.03	<0.001	67.7	<0.00005	0.0005	<0.001	<0.001	0.24	3
P01-04A														
	Jun/06/2003	0.0002	<0.03	<0.003	<0.1	0.04	<0.005	164	<0.0003	<0.002	<0.005	<0.005	4.05	4
P01-04B														
	Jun/03/2003	0.00042	<0.01	0.003	<0.1	0.45	<0.002	142	<0.0001	<0.0006	<0.006	<0.002	1.02	4
P01-05A														
	Jun/04/2003	<0.0001	<0.03	0.004	<0.1	<0.02	<0.005	194	<0.0003	0.002	<0.005	<0.005	1.39	16
P01-05B														
	Jun/04/2003	<0.0001	<0.03	0.003	<0.1	0.03	<0.005	261	<0.0003	0.007	<0.005	<0.005	16.7	5
EC	Jun/04/2003	0.0001	<0.03	<0.003	<0.1	0.03	<0.005	220	<0.0003	0.007	<0.005	<0.005	5.27	5
P01-06														
	Jun/04/2003	<0.0001	<0.03	0.015	<0.1	0.02	<0.005	306	<0.0003	0.186	<0.005	<0.005	306	10
EC	Jun/04/2003	0.0002	<0.05	0.013	<0.1	0.02	<0.01	266	<0.0005	0.183	<0.01	<0.01	235	8
EC-ULF	Jun/04/2003	<0.0002	<0.05	0.012	<0.1	0.02	<0.01	263	<0.0005	0.168	<0.01	<0.01	204	8
P01-07A														
	Jun/03/2003	<0.0001	<0.03	0.016	<0.1	<0.02	<0.005	5.9	<0.0005	0.003	<0.005	<0.005	0.04	13
P01-07B														
	Jun/03/2003	<0.0001	<0.03	0.007	<0.1	<0.02	<0.005	30.7	<0.0005	0.007	<0.005	<0.005	0.7	19
P01-07C														
	Jun/02/2003	<0.0002	<0.05	0.016	<0.1	0.1	<0.01	197	<0.0005	0.01	<0.01	<0.01	21	4
P01-07D														
EC	Jun/02/2003	<0.0002	<0.05	<0.005	<0.1	0.09	<0.01	290	<0.0005	0.036	<0.01	<0.01	16.2	5
P01-07E														
	Jun/02/2003	<0.0002	<0.05	<0.005	<0.1	0.03	<0.01	282	0.0012	0.061	<0.01	<0.01	3.71	5
	Jun/03/2003	0.0002	<0.03	<0.003	<0.1	0.03	<0.005	245	0.0012	0.06	<0.005	<0.005	3.37	4
P01-08A														
	Jun/04/2003	<0.00004	0.02	0.004	<0.1	<0.02	<0.002	4.7	<0.0001	0.0009	<0.002	<0.002	0.05	7

Table 3. Spring 2003 Groundwater Quality Results

Station		Date	AG-D mg/L	AL-D mg/L	AS-D mg/L	B-D mg/L	BA-D mg/L	BE-D mg/L	CA-D mg/L	CD-D mg/L	CO-D mg/L	CR-D mg/L	CU-D mg/L	FE-D mg/L	K-D mg/L
P01-08B															
		Jun/04/2003	<0.00004	<0.01	0.003	<0.1	<0.02	<0.002	120	<0.0001	0.0015	<0.002	<0.002	50.6	3
P01-09A															
		Jun/04/2003	<0.02	<5	<0.5	<10	<2	<1	486	<0.05	<0.3	<1	<1	32200	<200
	EC	Jun/04/2003	<0.02	<5	<0.5	<10	<2	<1	491	<0.05	<0.3	<1	<1	32500	<200
P01-09B															
		Jun/04/2003	<0.0002	0.06	<0.005	<0.1	<0.02	<0.01	76.8	0.0051	0.167	<0.01	<0.01	231	3
P01-09C															
	EC	Jun/04/2003	0.0003	<0.03	<0.003	<0.1	<0.02	<0.005	53	0.001	0.085	<0.005	<0.005	63.7	<2
		Jun/04/2003	<0.001	<0.3	<0.03	<0.1	0.02	<0.05	71	<0.003	0.13	<0.05	<0.05	381	4
		Jun/05/2003	<0.0002	<0.05	<0.005	<0.1	<0.02	<0.01	56.4	0.0011	0.087	<0.01	<0.01	65.5	3
P01-09D															
		Jun/04/2003	<0.002	<0.5	<0.05	<0.2	<0.04	<0.1	124	<0.005	0.09	<0.1	<0.1	1470	6
	EC	Jun/04/2003	<0.0001	0.04	<0.003	<0.1	<0.02	<0.005	80.2	0.0012	0.104	<0.005	<0.005	149	4
		Jun/05/2003	<0.001	<0.3	<0.03	<0.1	<0.02	<0.05	80.7	<0.003	0.1	<0.05	<0.05	437	5
P01-10A															
		Jun/04/2003	<0.0002	<0.05	<0.005	<0.1	<0.02	<0.01	88.4	<0.0005	<0.003	<0.01	<0.01	0.08	17
P01-10B															
		Jun/04/2003	<0.00004	<0.01	0.009	<0.1	0.26	<0.002	99.9	<0.0001	0.001	<0.002	<0.002	4.92	3
P01-11															
		Jun/02/2003	<0.0001	<0.03	0.03	<0.1	0.05	<0.005	287	<0.0003	<0.002	<0.005	<0.005	20.3	6
TH86-17															
		Jun/03/2003	<0.00002	<0.005	<0.0005	<0.1	0.05	<0.001	29.2	<0.00005	<0.0003	<0.001	0.002	0.05	<2
X16A															
		Jun/02/2003	<0.00002	<0.005	<0.0005	<0.1	0.09	<0.001	49.4	<0.00005	<0.0003	<0.001	<0.001	<0.03	<2
X16B															
		Jun/02/2003	<0.00002	<0.005	<0.0005	<0.1	0.13	<0.001	60.4	<0.00005	<0.0003	<0.001	0.004	<0.03	<2
X17A															
		Jun/02/2003	<0.00002	<0.005	0.0007	<0.1	0.15	<0.001	74.9	<0.00005	<0.0003	<0.001	<0.001	<0.03	<2
X17B															
		Jun/02/2003	<0.00004	<0.01	<0.001	<0.1	0.26	<0.002	95.8	<0.0001	<0.0006	<0.002	<0.002	1.25	3
X18A															
		Jun/02/2003	<0.00004	<0.01	0.009	<0.1	0.18	<0.002	215	<0.0001	<0.0006	<0.002	<0.002	1.85	6
X18B															
		Jun/02/2003	<0.00004	<0.01	0.002	<0.1	0.15	<0.002	198	<0.0001	<0.0006	<0.002	<0.002	0.88	7

Gartner Lee

Table 3. Spring 2003 Groundwater Quality Results

Station	Date	AG-D mg/L	AL-D mg/L	AS-D mg/L	B-D mg/L	BA-D mg/L	BE-D mg/L	CA-D mg/L	CD-D mg/L	CO-D mg/L	CR-D mg/L	CU-D mg/L	FE-D mg/L	K-D mg/L
X21A-96														
	Jun/04/2003	<0.0001	<0.03	0.006	<0.1	<0.02	<0.005	120	0.0005	0.021	<0.005	<0.005	349	11
X21B-96														
	Jun/04/2003	<0.00004	<0.01	0.004	<0.1	<0.02	<0.002	155	<0.0001	0.0059	<0.002	<0.002	27.6	4
X21C-96														
	Jun/04/2003	<0.0001	<0.03	0.028	<0.1	0.17	<0.005	60.1	<0.0003	<0.002	<0.005	<0.005	0.36	2
X24A-96														
	Jun/02/2003	<0.0001	0.03	<0.003	<0.1	0.02	<0.005	263	0.0007	0.016	<0.005	<0.005	<0.03	5
X24C-96														
	Jun/02/2003	<0.0002	<0.05	<0.005	<0.1	<0.02	<0.01	425	<0.0005	0.045	<0.01	<0.01	0.08	6
X24D-96														
	Jun/02/2003	<0.0001	<0.03	<0.003	<0.1	0.02	<0.005	494	0.0022	0.019	<0.005	<0.005	<0.03	7
X25A-96														
	Jun/02/2003	<0.00004	<0.01	<0.001	<0.1	0.03	<0.002	125	<0.0001	0.0047	<0.002	<0.002	0.25	4
X25B-96														
	Jun/02/2003	<0.00004	<0.01	<0.001	<0.1	0.02	<0.002	157	<0.0001	<0.0006	<0.002	<0.002	0.46	3

Table 3. Spring 2003 Groundwater Quality Results

Station	Date	MG-D mg/L	MN-D mg/L	MO-D mg/L	NA-D mg/L	NI-D mg/L	PB-D mg/L	SB-D mg/L	SE-D mg/L	SN-D mg/L	TI-D mg/L	TL-D mg/L	V-D mg/L	ZN-D mg/L
P01-01A														
	Jun/02/2003	42	0.137	<0.002	23	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
P01-01B														
	Jun/02/2003	34.7	0.13	<0.002	23	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
P01-02A														
	Jun/03/2003	22.8	0.476	0.002	14	0.002	<0.0005	<0.0005	<0.001	<0.0005	<0.01	<0.0002	<0.03	0.014
P01-02B														
	Jun/03/2003	25.9	0.217	<0.001	16	0.002	<0.0005	<0.0005	<0.001	<0.0005	<0.01	<0.0002	<0.03	<0.005
P01-04A														
	Jun/06/2003	28.3	0.71	<0.005	41	<0.005	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.25
P01-04B														
	Jun/03/2003	50.6	0.252	<0.002	72	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
P01-05A														
	Jun/04/2003	48.2	0.193	0.007	206	<0.005	0.008	0.019	<0.005	<0.003	<0.01	<0.001	<0.03	0.023
P01-05B														
	Jun/04/2003	44.7	17.3	<0.005	59	0.005	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.036
	Jun/04/2003	40.9	17.5	<0.005	61	0.006	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.017
P01-06														
	Jun/04/2003	91.4	28	<0.005	39	0.098	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	5.37
	Jun/04/2003	83	26.1	<0.01	41	0.11	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	6.23
	Jun/04/2003	78.7	22.3	<0.01	42	0.11	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	7.58
P01-07A														
	Jun/03/2003	2.3	0.005	0.132	368	<0.005	0.004	0.056	<0.005	<0.003	<0.01	<0.001	<0.03	<0.005
P01-07B														
	Jun/03/2003	27.2	0.113	0.067	354	<0.005	0.006	0.037	<0.005	<0.003	<0.01	<0.001	<0.03	0.021
P01-07C														
	Jun/02/2003	42.6	29.9	<0.01	36	<0.01	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	<0.005
P01-07D														
	Jun/02/2003	66.5	54.3	<0.01	30	0.02	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	0.024
P01-07E														
	Jun/02/2003	59	47.5	<0.01	36	0.06	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	0.03	0.013
	Jun/03/2003	56.2	46.9	<0.005	36	0.06	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.024
P01-08A														
	Jun/04/2003	1.2	0.0189	0.089	165	<0.002	0.011	0.118	<0.002	<0.001	<0.01	<0.0004	<0.03	0.006

Table 3. Spring 2003 Groundwater Quality Results

Station	Date	MG-D mg/L	MN-D mg/L	MO-D mg/L	NA-D mg/L	NI-D mg/L	PB-D mg/L	SB-D mg/L	SE-D mg/L	SN-D mg/L	TI-D mg/L	TL-D mg/L	V-D mg/L	ZN-D mg/L
P01-08B														
	Jun/04/2003	22.7	5.99	<0.002	15	<0.002	0.008	0.003	<0.002	<0.001	<0.01	<0.0004	<0.03	0.03
P01-09A														
	Jun/04/2003	571	196	<1	<200	<1	<0.5	<0.5	<1	<0.5	<1	<0.2	<3	4210
	Jun/04/2003	585	225	<1	<200	<1	<0.5	<0.5	<1	<0.5	<1	<0.2	<3	4800
P01-09B														
	Jun/04/2003	20.5	25.7	<0.01	16	0.21	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	40.8
P01-09C														
	Jun/04/2003	13.7	11.1	<0.005	8	0.09	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	24.3
	Jun/04/2003	36.6	18.6	<0.05	9	0.12	<0.03	<0.03	<0.05	<0.03	<0.01	<0.01	<0.03	141
	Jun/05/2003	15.1	12	<0.01	9	0.1	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	29.3
P01-09D														
	Jun/04/2003	79.3	39.2	<0.1	16	0.2	<0.05	<0.05	<0.1	<0.05	<0.02	<0.02	<0.06	378
	Jun/04/2003	22.4	14.7	<0.005	13	0.107	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	36.9
	Jun/05/2003	36.9	20.3	<0.05	13	0.12	<0.03	<0.03	<0.05	<0.03	<0.01	<0.01	<0.03	140
P01-10A														
	Jun/04/2003	355	0.145	0.04	402	<0.01	0.055	0.028	<0.01	<0.005	<0.01	<0.002	<0.03	0.016
P01-10B														
	Jun/04/2003	14	6.15	0.009	45	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
P01-11														
	Jun/02/2003	49.6	10.7	<0.005	43	<0.005	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.007
TH86-17														
	Jun/03/2003	5.7	0.0121	<0.001	2	<0.001	<0.0005	<0.0005	<0.001	<0.0005	<0.01	<0.0002	<0.03	0.01
X16A														
	Jun/02/2003	10.6	0.0013	0.003	<2	<0.001	<0.0005	<0.0005	0.001	<0.0005	<0.01	<0.0002	<0.03	0.005
X16B														
	Jun/02/2003	17.1	<0.0003	0.002	<2	<0.001	<0.0005	<0.0005	0.003	<0.0005	<0.01	<0.0002	<0.03	<0.005
X17A														
	Jun/02/2003	22.3	0.0069	0.001	2	<0.001	<0.0005	<0.0005	<0.001	<0.0005	<0.01	<0.0002	<0.03	<0.005
X17B														
	Jun/02/2003	25.2	0.286	<0.002	13	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
X18A														
	Jun/02/2003	49.2	2.72	<0.002	24	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	0.005
X18B														
	Jun/02/2003	43.9	1.47	<0.002	20	0.007	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005

Gartner Lee

Table 3. Spring 2003 Groundwater Quality Results

Station	Date	MG-D mg/L	MN-D mg/L	MO-D mg/L	NA-D mg/L	NI-D mg/L	PB-D mg/L	SB-D mg/L	SE-D mg/L	SN-D mg/L	TI-D mg/L	TL-D mg/L	V-D mg/L	ZN-D mg/L
X21A-96	Jun/04/2003	151	26.2	<0.005	63	<0.005	0.016	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	1.06
X21B-96	Jun/04/2003	31	9.67	<0.002	61	0.005	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	0.136
X21C-96	Jun/04/2003	9	0.249	<0.005	3	<0.005	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	<0.005
X24A-96	Jun/02/2003	50.9	15.1	<0.005	26	0.016	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	<0.03	0.008
X24C-96	Jun/02/2003	84.7	33.3	<0.01	34	0.08	<0.005	<0.005	<0.01	<0.005	<0.01	<0.002	<0.03	0.011
X24D-96	Jun/02/2003	87.5	27.6	<0.005	43	0.115	<0.003	<0.003	<0.005	<0.003	<0.01	<0.001	0.03	0.039
X25A-96	Jun/02/2003	27.1	5.62	<0.002	21	0.003	0.002	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005
X25B-96	Jun/02/2003	25.4	0.229	<0.002	43	<0.002	<0.001	<0.001	<0.002	<0.001	<0.01	<0.0004	<0.03	<0.005

Gartner Lee

Table 4. Fall 2003 Groundwater Quality Results

Station	Date	COND	HARD	PH	ACID-T	ALK-T	SO4-T	SWL	pH	Temp
P01-01A	9/22/2003	1250	684	7.96	6	199	520	3.27	7.14	3.40
P01-01B	9/22/2003	1090	585	8.1	4	228	413	3.43	7.14	3.80
P01-02A	9/22/2003	611	305	8.23	1	200	134		7.69	3.90
P01-02B	9/22/2003	548	275	8.12	2	178	119		7.63	4.20
P01-03	9/22/2003	2170	1270	7.91	15	313	1130		6.55	2.80
P01-04A	9/23/2003	1150	565	8.03	7	288	399		7.08	2.80
P01-04B	9/23/2003	1190	558	8.06	12	700	43	1.23	6.29	3.00
P01-05A	9/23/2003	1420	315	7.28	7	41	729	2.94	7.70	5.00
P01-05B	9/23/2003	1530	659	8.01	5	232	714	3.26	6.90	3.10
P01-06	9/23/2003	2600	1080	5.88	364	36	1910	4.71	6.29	2.40
P01-07A	9/23/2003	1530	14.7	8.6	<1	280	432	10.94	9.70	3.20
P01-07B	9/24/2003	1690	161	7.82	6	352	601	11.04	6.98	4.10
P01-07C	9/23/2003	1380	601	7.96	6	190	701	10.98	6.83	3.20
P01-07D	9/23/2003	1840	972	7.77	11	140	1050	11.30	6.45	2.20
P01-07E	9/24/2003	1830	1030	7.7	9	122	1130	11.18	6.06	2.50
P01-08A	9/24/2003	763	27.9	7.64	5	117	239	12.25	7.72	0.80
P01-08B	9/24/2003	801	431	7.23	9	68	376	12.34	6.92	1.40
P01-09A	9/24/2003	35900	3840	3.34	56900	<1	77600	5.95	5.90	3.20
P01-09B	9/24/2003	1910	483	5.46	6570	9	1390	6.37	5.25	3.30
P01-09C	9/24/2003	1590	384	5.67	576	9	1120	6.55	5.50	3.40
P01-09D	9/24/2003	1950	553	5.6	6670	11	1390	7.06	5.41	3.50
P01-10A	9/25/2003	3720	1650	7.98	4	116	2380	9.23	7.15	2.80
P01-10B	9/24/2003	712	294	7.84	7	236	168	10.07	7.02	3.00
P01-11	9/22/2003	1770	935	7.86	12	274	862	0.07	7.16	4.50
TH86-17	9/23/2003	188	75	8.07	<1	76	15	7.49	7.12	4.50
X16A	9/22/2003	318	168	8.15	1	150	22	2.88	7.59	4.50
X16B	9/22/2003	399	217	8.2	1	193	25	3.32	7.35	3.90
X17A	9/22/2003	435	245	8.24	<1	207	35	1.62	7.68	3.40
X17B	9/22/2003	563	310	8.07	4	280	35	1.63	7.25	3.60
X18A	9/22/2003	1200	641	7.95	6	210	461	3.86	7.07	2.90
X18B	9/22/2003	1190	608	8.11	4	203	487	3.57	7.02	3.00
X21A-96	9/23/2003	8350	5040	3.24	1800	7	8170	4.07	6.09	3.00
X21B-96	9/23/2003	1280	564	7.82	8	145	644	4.03	6.96	2.70
X21C-96	9/23/2003	342	181	8.35	<1	183	8	4.03	7.70	2.60
X24A-96	9/22/2003	2070	1200	7.87	14	316	1050	3.18	6.68	3.30
X24C-96	9/22/2003	2110	1260	7.77	18	319	1090	3.23	6.65	3.50
X24D-96	9/22/2003	2420	1420	7.57	27	342	1340	3.09	6.56	2.70
X25A-96	9/23/2003	852	404	8.2	2	255	249	2.52	6.73	3.10
X25B-96	9/23/2003	1040	505	8.02	6	274	339	2.43	7.00	2.40

Gartner Lee

Table 4. Fall 2003 Groundwater Quality Results

Station	Date	AL-D	SB-D	AS-D	BA-D	BE-D	B-D	CD-D	CA-D	CR-D	CO-D	CU-D	FE-D	PB-D	LI-D	MG-D	MN-D
P01-01A	9/22/2003	<0.03	<0.003	<0.003	0.1	<0.005	<0.1	<0.0003	202	<0.005	<0.002	<0.005	<0.03	<0.003	<0.03	44	0.316
P01-01B	9/22/2003	<0.01	<0.001	0.006	0.08	<0.002	<0.1	<0.0001	175	<0.002	<0.0006	<0.002	0.68	<0.001	0.01	36	0.12
P01-02A	9/22/2003	<0.005	<0.0005	0.0006	0.05	<0.001	<0.1	0.00006	86.8	<0.001	0.0003	<0.001	<0.03	<0.0005	0.006	21.3	0.543
P01-02B	9/22/2003	0.029	<0.0005	0.0031	0.03	<0.001	<0.1	<0.00005	66.9	<0.001	0.0005	<0.001	0.33	0.0006	0.006	26.1	0.232
P01-03	9/22/2003	1.33	<0.005	<0.005	0.03	<0.01	<0.1	0.0011	375	<0.01	0.039	<0.01	1.55	<0.005	<0.05	81.9	36.6
P01-04A	9/23/2003	<0.03	<0.003	<0.003	0.02	<0.005	<0.1	<0.0003	179	<0.005	<0.002	<0.005	3.75	<0.003	<0.03	28.3	0.83
P01-04B	9/23/2003	<0.03	<0.003	<0.003	0.43	<0.005	<0.1	<0.0003	140	<0.005	<0.002	<0.005	0.98	<0.003	0.16	51	0.23
P01-05A	9/23/2003	0.99	0.056	0.056	0.32	<0.005	<0.1	0.0033	67.8	0.01	0.004	0.112	23.7	3.66	<0.03	35.4	0.725
P01-05B	9/23/2003	<0.03	<0.003	<0.003	0.03	<0.005	<0.1	<0.0003	203	<0.005	0.007	<0.005	4.65	0.007	<0.03	36.9	17.9
P01-06	9/23/2003	0.09	<0.005	0.015	0.02	<0.01	<0.1	<0.0005	280	<0.01	0.18	<0.01	288	0.007	<0.05	92.6	38.6
P01-07A	9/23/2003	0.03	0.018	0.007	<0.02	<0.005	<0.1	<0.0003	3.2	<0.005	0.003	<0.005	0.1	0.016	<0.03	1.6	0.007
P01-07B	9/24/2003	0.48	0.006	0.01	0.04	<0.005	<0.1	0.0018	27	<0.005	0.007	0.029	7.06	0.809	<0.03	22.8	0.27
P01-07C	9/23/2003	0.21	<0.003	0.016	0.05	<0.005	<0.1	0.0004	179	<0.005	0.01	0.009	18.5	0.199	<0.03	37.5	30.9
P01-07D	9/23/2003	<0.05	<0.005	<0.005	0.08	<0.01	<0.1	<0.0005	281	<0.01	0.035	<0.01	15.7	<0.005	<0.05	65.5	56
P01-07E	9/24/2003	<0.1	<0.01	<0.01	0.03	<0.02	<0.1	0.001	300	<0.02	0.067	<0.02	5.09	0.02	<0.1	67.9	54
P01-08A	9/24/2003	0.9	0.062	0.029	0.19	<0.002	<0.1	0.0069	6.5	0.009	0.0029	0.142	31.4	5.24	<0.01	2.8	0.793
P01-08B	9/24/2003	2.03	0.032	0.059	0.06	<0.005	<0.1	0.0323	125	0.031	0.011	0.521	189	26.4	<0.03	28.9	8.68
P01-09A	9/24/2003	<5	<0.5	<0.5	<1	<1	<5	<0.05	495	<1	<0.3	<1	35900	1.6	<5	633	243
P01-09B	9/24/2003	0.3	<0.01	<0.01	0.03	<0.02	<0.1	0.011	137	<0.02	0.314	<0.02	337	0.01	<0.1	34.4	43.3
P01-09C	9/24/2003	<0.1	<0.01	<0.01	0.03	<0.02	<0.1	0.002	105	<0.02	0.183	<0.02	231	0.02	<0.1	29.7	23.5
P01-09D	9/24/2003	0.2	<0.01	<0.01	<0.02	<0.02	<0.1	0.003	152	<0.02	0.218	<0.02	320	<0.01	<0.1	42.2	28.6
P01-10A	9/25/2003	0.21	0.029	0.006	0.06	<0.01	<0.1	0.0011	92.1	<0.01	0.003	0.02	1.71	0.216	<0.05	344	0.171
P01-10B	9/24/2003	0.74	<0.001	0.012	0.14	<0.002	<0.1	0.0004	81.7	0.002	0.0018	0.006	25.7	0.131	<0.01	22	5.43
P01-11	9/22/2003	0.29	<0.003	0.033	0.05	<0.005	<0.1	<0.0003	288	<0.005	0.002	<0.005	20.9	<0.003	<0.03	52.6	13.9
TH86-17	9/23/2003	0.029	<0.0005	<0.0005	0.04	<0.001	<0.1	<0.00005	22.1	<0.001	<0.0003	0.005	2.5	0.0006	<0.005	4.8	0.0355
X16A	9/22/2003	<0.005	<0.0005	<0.0005	0.09	<0.001	<0.1	0.00009	48.6	<0.001	<0.0003	<0.001	<0.03	<0.0005	<0.005	11.4	0.0006
X16B	9/22/2003	<0.005	<0.0005	<0.0005	0.13	<0.001	<0.1	<0.00005	60.1	<0.001	<0.0003	<0.001	<0.03	<0.0005	<0.005	16.2	<0.0003
X17A	9/22/2003	<0.005	0.0042	0.0006	0.13	<0.001	<0.1	<0.00005	66.4	<0.001	<0.0003	<0.001	<0.03	<0.0005	<0.005	19.3	0.0062
X17B	9/22/2003	<0.005	<0.0005	<0.0005	0.26	<0.001	<0.1	<0.00005	84.7	<0.001	<0.0003	<0.001	0.93	0.0008	0.021	24	0.292
X18A	9/22/2003	<0.03	<0.003	0.003	0.13	<0.005	<0.1	<0.0003	184	<0.005	<0.002	<0.005	1.77	<0.003	<0.03	44.2	0.884
X18B	9/22/2003	<0.01	<0.001	<0.001	0.09	<0.002	<0.1	0.0002	175	<0.002	<0.0006	<0.002	0.13	<0.001	<0.01	41.8	2.07
X21A-96	9/23/2003	3.2	<0.03	<0.03	1	<0.05	<0.5	0.125	387	<0.05	0.04	0.06	1430	3.95	<0.3	990	139
X21B-96	9/23/2003	<0.03	<0.003	0.005	<0.02	<0.005	<0.1	<0.0003	168	<0.005	0.007	<0.005	31	<0.003	<0.03	35.3	13.2
X21C-96	9/23/2003	1.37	<0.0005	0.0278	0.32	<0.001	<0.1	0.00013	56.3	0.002	0.001	0.005	2.26	0.0543	<0.005	9.7	0.305
X24A-96	9/22/2003	<0.03	<0.003	<0.003	0.03	<0.005	<0.1	0.0009	356	<0.005	0.029	<0.005	0.08	<0.003	<0.03	75.9	29.7
X24C-96	9/22/2003	<0.05	<0.005	<0.005	<0.02	<0.01	<0.1	<0.0005	370	<0.01	0.041	<0.01	0.14	<0.005	<0.05	80.6	34
X24D-96	9/22/2003	<0.05	<0.005	<0.005	0.02	<0.01	<0.1	0.0027	425	<0.01	0.022	<0.01	<0.03	<0.005	<0.05	86.2	34
X25A-96	9/23/2003	<0.01	<0.001	<0.001	0.03	<0.002	<0.1	<0.0001	115	<0.002	0.0041	<0.002	0.31	<0.001	<0.01	28.3	5.67
X25B-96	9/23/2003	<0.01	<0.001	<0.001	0.02	<0.002	<0.1	<0.0001	157	<0.002	<0.0006	<0.002	0.53	<0.001	<0.01	27.4	0.187

Table 4. Fall 2003 Groundwater Quality Results

Station	Date	HG-D	MO-D	NI-D	K-D	SE-D	AG-D	NA-D	TL-D	SN-D	TI-D	U-D	V-D	ZN-D
P01-01A	9/22/2003	<0.00005	<0.005	<0.005	5	<0.005	<0.0001	25	<0.001	<0.003	<0.01	0.005	<0.03	<0.005
P01-01B	9/22/2003	<0.00005	<0.002	<0.002	4	<0.002	<0.00004	26	<0.0004	<0.001	<0.01	0.0063	<0.03	<0.005
P01-02A	9/22/2003	<0.00005	0.002	0.002	2	<0.001	<0.00002	12	<0.0002	<0.0005	<0.01	0.0021	<0.03	<0.005
P01-02B	9/22/2003	<0.00005	<0.001	0.002	<2	<0.001	<0.00002	16	<0.0002	<0.0005	<0.01	0.0029	<0.03	<0.005
P01-03	9/22/2003	<0.00005	<0.01	0.07	6	<0.01	<0.0002	41	<0.002	<0.005	0.02	0.006	<0.03	0.011
P01-04A	9/23/2003	<0.00005	<0.005	<0.005	4	<0.005	<0.0001	40	<0.001	<0.003	<0.01	0.003	<0.03	<0.005
P01-04B	9/23/2003	<0.00005	<0.005	<0.005	3	<0.005	0.0004	65	<0.001	<0.003	<0.01	<0.001	<0.03	<0.005
P01-05A	9/23/2003	0.00066	0.029	0.005	10	<0.005	0.0004	147	0.001	<0.003	0.02	0.001	<0.03	2.29
P01-05B	9/23/2003	<0.00005	<0.005	0.006	4	<0.005	<0.0001	50	<0.001	<0.003	<0.01	0.005	<0.03	0.014
P01-06	9/23/2003	<0.00005	<0.01	0.1	7	<0.01	<0.0002	36	<0.002	<0.005	<0.01	0.006	<0.03	6.87
P01-07A	9/23/2003	<0.00005	0.13	<0.005	9	<0.005	<0.0001	310	<0.001	<0.003	<0.01	<0.001	<0.03	0.03
P01-07B	9/24/2003	<0.00005	0.01	<0.005	15	<0.005	<0.0001	336	<0.001	<0.003	<0.01	<0.001	<0.03	1.04
P01-07C	9/23/2003	0.00005	<0.005	0.01	4	<0.005	0.0001	33	<0.001	<0.003	<0.01	0.006	<0.03	0.23
P01-07D	9/23/2003	<0.00005	<0.01	0.02	4	<0.01	<0.0002	36	<0.002	<0.005	<0.01	0.006	<0.03	0.008
P01-07E	9/24/2003	<0.00005	<0.02	0.06	5	<0.02	<0.0004	35	<0.004	<0.01	<0.01	<0.004	<0.03	0.05
P01-08A	9/24/2003	0.00009	0.059	0.004	6	<0.002	0.00033	152	0.0016	0.003	0.01	0.0011	<0.03	5.17
P01-08B	9/24/2003	<0.00005	<0.005	0.016	3	<0.005	0.0014	14	0.009	<0.003	<0.01	0.005	<0.03	26.5
P01-09A	9/24/2003	0.0023	<1	1	<100	<1	<0.02	<100	<0.2	<0.5	<0.5	<0.2	<2	5520
P01-09B	9/24/2003	<0.00005	<0.02	0.39	4	<0.02	0.0017	20	<0.004	<0.01	<0.01	<0.004	<0.03	58.5
P01-09C	9/24/2003	<0.00005	<0.02	0.21	4	<0.02	<0.0004	11	<0.004	<0.01	<0.01	<0.004	<0.03	79.6
P01-09D	9/24/2003	<0.00005	<0.02	0.22	4	<0.02	<0.0004	18	<0.004	<0.01	<0.01	<0.004	<0.03	73.1
P01-10A	9/25/2003	<0.00005	0.04	<0.01	16	<0.01	<0.0002	363	<0.002	<0.005	<0.01	<0.002	<0.03	0.58
P01-10B	9/24/2003	<0.00005	0.008	0.003	3	<0.002	<0.00004	47	<0.0004	<0.001	0.01	0.0149	<0.03	0.404
P01-11	9/22/2003	<0.00005	<0.005	0.005	6	<0.005	0.0003	45	<0.001	<0.003	<0.01	0.003	<0.03	<0.005
TH86-17	9/23/2003	<0.00005	<0.001	0.005	<2	<0.001	<0.00002	<2	<0.0002	<0.0005	<0.01	0.0007	<0.03	0.009
X16A	9/22/2003	<0.00005	0.003	<0.001	<2	0.001	<0.00002	<2	<0.0002	<0.0005	<0.01	0.0017	<0.03	0.007
X16B	9/22/2003	<0.00005	0.002	<0.001	<2	0.002	<0.00002	<2	<0.0002	<0.0005	<0.01	0.0021	<0.03	<0.005
X17A	9/22/2003	<0.00005	0.001	<0.001	<2	<0.001	<0.00002	3	<0.0002	<0.0005	<0.01	0.0028	<0.03	<0.005
X17B	9/22/2003	<0.00005	<0.001	<0.001	<2	<0.001	<0.00002	9	<0.0002	<0.0005	<0.01	0.0017	<0.03	<0.005
X18A	9/22/2003	<0.00005	<0.005	<0.005	6	<0.005	<0.0001	22	<0.001	<0.003	<0.01	0.006	<0.03	<0.005
X18B	9/22/2003	<0.00005	<0.002	0.009	6	<0.002	<0.00004	21	<0.0004	<0.001	<0.01	0.008	<0.03	<0.005
X21A-96	9/23/2003	0.00047	<0.05	<0.05	23	<0.05	0.006	39	<0.01	<0.03	0.15	<0.01	<0.2	12.2
X21B-96	9/23/2003	<0.00005	<0.005	0.008	4	<0.005	0.0002	60	<0.001	<0.003	<0.01	0.004	<0.03	0.12
X21C-96	9/23/2003	<0.00005	0.002	0.003	<2	<0.001	<0.00002	4	<0.0002	<0.0005	0.03	0.0008	<0.03	0.046
X24A-96	9/22/2003	<0.00005	<0.005	0.021	6	<0.005	<0.0001	33	<0.001	<0.003	<0.01	0.008	<0.03	<0.005
X24C-96	9/22/2003	<0.00005	<0.01	0.08	5	<0.01	<0.0002	35	<0.002	<0.005	<0.01	0.006	<0.03	0.007
X24D-96	9/22/2003	<0.00005	<0.01	0.13	6	<0.01	<0.0002	44	<0.002	<0.005	<0.01	0.005	<0.03	0.033
X25A-96	9/23/2003	<0.00005	<0.002	0.003	3	<0.002	<0.00004	23	<0.0004	<0.001	<0.01	0.0089	<0.03	0.005
X25B-96	9/23/2003	<0.00005	<0.002	<0.002	3	<0.002	<0.00004	51	<0.0004	<0.001	<0.01	0.0057	<0.03	<0.005

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-01

Sample ID	P03-01- 01	P03-01- 02	P03-01- 03	P03-01- 04	P03-01- 05	P03-01- 06	P03-01- 07	P03-01- 08	P03-01- 09
Date Sampled	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003
Physical Tests									
Conductivity (uS/cm)	-	-	-	-	-	-	1270	-	-
Hardness CaCO3	297	163	155	129	141	197	56.3	1500	2910
pH	-	-	-	-	-	-	9.39	-	-
Dissolved Anions									
Alkalinity-Total CaCO3	304	137	126	97.8	98.7	<1.0	465	3.9	<1.0
Sulphate SO4	18	24	32	33	48	357	178	4270	14400
Dissolved Metals									
Aluminum D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Antimony D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Arsenic D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Barium D-Ba	0.21	0.1	0.08	0.07	0.07	0.08	0.04	<0.01	<0.1
Beryllium D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05
Bismuth D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Boron D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1
Cadmium D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Calcium D-Ca	89.1	50.1	48.9	40.2	43.6	58.2	13.6	310	448
Chromium D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Cobalt D-Co	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.02	<0.1
Copper D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Iron D-Fe	6.97	0.12	<0.03	<0.03	0.39	72.8	0.27	740	4670
Lead D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.07	<0.5
Lithium D-Li	0.03	<0.01	<0.01	<0.01	0.01	0.01	0.02	0.08	0.2
Magnesium D-Mg	18.1	9.1	8	7	7.9	12.6	5.4	177	434
Manganese D-Mn	0.462	0.473	0.315	0.034	0.341	7.35	0.185	7.25	40.5
Molybdenum D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.26	0.03	<0.3
Nickel D-Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
Phosphorus D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<3
Potassium D-K	5	3	2	<2	<2	2	10	48	82
Selenium D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Silicon D-Si	8.72	3.7	4.7	4.94	6.03	8.08	2.24	1.55	4.8
Silver D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Sodium D-Na	9	5	3	2	3	20	276	589	693
Strontium D-Sr	0.545	0.211	0.202	0.151	0.158	0.231	0.043	0.53	0.74
Thallium D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<3
Tin D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Titanium D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Vanadium D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Zinc D-Zn	<0.005	<0.005	<0.005	<0.005	0.032	3.05	<0.005	<0.005	135

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-02

Sample ID		P03-02- 01	P03-02- 02	P03-02- 03	P03-02- 05	P03-02- 06	P03-02- 07	P03-02- 08	P03-02- 09
Date Sampled		9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003
Physical Tests									
Hardness	CaCO3	222	201	212	1350	2290	1560	2640	2320
Dissolved Anions									
Alkalinity-Total	CaCO3	134	116	74.2	266	17.5	28.8	<1.0	<1.0
Sulphate	SO4	90	110	151	2060	3720	2680	8680	22500
Dissolved Metals									
Aluminum	D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<2
Antimony	D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<2
Arsenic	D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<2
Barium	D-Ba	0.12	0.11	0.15	0.11	<0.01	<0.01	<0.05	<0.1
Beryllium	D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.03	<0.05
Bismuth	D-Bi	<0.2	<0.2	<0.2	<0.2	<0.3	<0.2	<1	<2
Boron	D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<1
Cadmium	D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Calcium	D-Ca	67.9	62.1	65.2	398	344	232	398	393
Chromium	D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Cobalt	D-Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Copper	D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Iron	D-Fe	0.1	0.04	<0.03	16.9	56.6	12.9	2130	10500
Lead	D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.5
Lithium	D-Li	<0.01	<0.01	<0.01	0.02	0.17	0.1	0.22	0.2
Magnesium	D-Mg	12.7	11.2	11.9	85.6	348	237	400	325
Manganese	D-Mn	0.542	0.141	0.056	41.9	2.54	1.28	24.7	63
Molybdenum	D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.2	<0.3
Nickel	D-Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.3	<0.5
Phosphorus	D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<2	<3
Potassium	D-K	4	<2	2	5	52	51	67	61
Selenium	D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<2
Silicon	D-Si	3.76	5.46	6.78	6.68	2.13	1.78	3	1.2
Silver	D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Sodium	D-Na	4	3	3	367	530	465	238	128
Strontium	D-Sr	0.292	0.278	0.313	1.03	0.773	0.523	1.58	0.85
Thallium	D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2	<2
Tin	D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.2	<0.3
Titanium	D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
Vanadium	D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.2	<0.3
Zinc	D-Zn	<0.005	<0.005	0.006	0.009	0.013	0.01	0.04	<0.05

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-03

Sample ID		P03-03- 01	P03-03- 02	P03-03- 03	P03-03- 04	P03-03- 05	P03-03- 06	P03-03- 08	P03-03- 09
Date Sampled		9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003
Physical Tests									
Hardness	CaCO3	162	284	273	344	483	743	114	2510
Dissolved Anions									
Alkalinity-Total	CaCO3	160	<1.0	21.3	24.8	95.9	43.4	<1.0	<1.0
Sulphate	SO4	12	666	313	380	489	763	404	19000
Dissolved Metals									
Aluminum	D-Al	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Antimony	D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Arsenic	D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Barium	D-Ba	0.09	0.02	0.03	0.09	0.12	0.02	0.05	<0.1
Beryllium	D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.05
Bismuth	D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Boron	D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<1
Cadmium	D-Cd	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Calcium	D-Ca	47.7	75.8	80.6	103	148	235	34.1	359
Chromium	D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Cobalt	D-Co	<0.01	0.09	0.21	0.13	<0.01	<0.01	<0.01	<0.1
Copper	D-Cu	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Iron	D-Fe	1.55	172	9.35	19.4	20.9	71.8	0.5	6870
Lead	D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5
Lithium	D-Li	0.01	0.02	0.04	0.03	0.02	0.03	<0.01	0.1
Magnesium	D-Mg	10.3	23	17.5	21.2	27.4	37.7	6.9	391
Manganese	D-Mn	0.239	8.1	13.5	20.9	31.9	7.61	0.624	75.6
Molybdenum	D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Nickel	D-Ni	<0.05	0.12	0.23	0.1	<0.05	<0.05	<0.05	<0.5
Phosphorus	D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<3
Potassium	D-K	3	3	3	2	4	9	<2	41
Selenium	D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<2
Silicon	D-Si	5.26	11	11.7	10.2	10	3.78	4.04	4.9
Silver	D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Sodium	D-Na	6	7	7	13	26	44	9	306
Strontium	D-Sr	0.333	0.304	0.292	0.352	0.528	0.44	0.174	0.71
Thallium	D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<3
Tin	D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Titanium	D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1
Vanadium	D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Zinc	D-Zn	0.03	45.1	5.74	1.66	0.024	0.009	0.052	1.64

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-04

Sample ID	P03-04- 02	P03-04- 03	P03-04- 04	P03-04- 05	P03-04- 06	P03-04- 07	P03-04- 08
Date Sampled	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003
Physical Tests							
Conductivity (uS/cm)	194	1190	206	190	5090	2060	-
Hardness CaCO3	95.6	584	96.1	88.4	1560	560	276
pH	7.75	7.93	8.03	8.06	4.63	4.66	-
Dissolved Anions							
Alkalinity-Total CaCO3	79.9	130	83.4	79	<1.0	<1.0	10.5
Sulphate SO4	16	599	14	16	4340	1390	1380
Dissolved Metals							
Aluminum D-Al	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2
Antimony D-Sb	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2
Arsenic D-As	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2
Barium D-Ba	0.04	0.05	0.04	0.04	<0.02	0.01	0.02
Beryllium D-Be	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005
Bismuth D-Bi	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2
Boron D-B	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1
Cadmium D-Cd	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Calcium D-Ca	28.7	174	29	26.7	452	173	91.7
Chromium D-Cr	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Cobalt D-Co	<0.01	0.04	<0.01	<0.01	<0.02	<0.01	<0.03
Copper D-Cu	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Iron D-Fe	0.17	2.87	0.14	0.15	1510	596	40.5
Lead D-Pb	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.05
Lithium D-Li	<0.01	<0.01	<0.01	<0.01	0.03	0.02	<0.01
Magnesium D-Mg	5.8	36.5	5.7	5.3	105	30.9	11.4
Manganese D-Mn	0.218	23.2	0.22	0.227	15.5	5.25	3.16
Molybdenum D-Mo	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03	<0.03
Nickel D-Ni	<0.05	0.07	<0.05	<0.05	<0.1	<0.05	<0.05
Phosphorus D-P	<0.3	<0.3	<0.3	<0.3	<0.6	<0.3	<0.3
Potassium D-K	<2	3	<2	<2	11	4	3
Selenium D-Se	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2	<0.2
Silicon D-Si	3.71	10.5	3.71	3.48	10.4	5.73	3.78
Silver D-Ag	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Sodium D-Na	3	43	3	3	95	31	21
Strontium D-Sr	0.127	0.46	0.125	0.117	2.35	0.855	0.271
Thallium D-Tl	<0.2	<0.2	<0.2	<0.2	<0.5	<0.2	<0.2
Tin D-Sn	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03	<0.03
Titanium D-Ti	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
Vanadium D-V	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03	<0.03
Zinc D-Zn	0.02	0.029	0.012	0.016	2.12	0.695	0.024

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-05

Sample ID	P03-05- 01	P03-05- 02	P03-05- 03	P03-05- 04	P03-05- 05	P03-05- 06	P03-05- 07	P03-05- 08
Date Sampled	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003	9/26/2003
Physical Tests								
Hardness CaCO3	539	447	428	502	837	928	1770	1610
Dissolved Anions								
Alkalinity-Total CaCO3	153	124	134	151	<1.0	23.6	<1.0	10.5
Sulphate SO4	409	346	312	362	1190	1440	5770	3860
Dissolved Metals								
Aluminum D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2
Antimony D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2
Arsenic D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2
Barium D-Ba	0.05	0.12	0.15	0.19	0.03	<0.01	<0.02	<0.01
Beryllium D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005
Bismuth D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2
Boron D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1
Cadmium D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Calcium D-Ca	163	135	130	153	212	145	218	194
Chromium D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Cobalt D-Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Copper D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Iron D-Fe	3.91	5.19	0.61	0.18	182	46.5	1510	912
Lead D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	<0.05
Lithium D-Li	0.01	<0.01	<0.01	<0.01	0.02	0.02	0.08	0.14
Magnesium D-Mg	32.1	26.5	24.8	29	74.8	137	297	275
Manganese D-Mn	0.432	10.6	11.4	14.3	23.1	0.967	20.2	11.2
Molybdenum D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03
Nickel D-Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
Phosphorus D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.6	<0.3
Potassium D-K	3	2	<2	2	7	32	41	41
Selenium D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.4	<0.2
Silicon D-Si	5.03	6.78	6.71	6.82	8.6	3.68	4.8	3.84
Silver D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Sodium D-Na	22	10	10	12	50	221	257	319
Strontium D-Sr	0.677	0.442	0.453	0.512	0.585	0.077	0.25	0.211
Thallium D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<1	<0.2
Tin D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03
Titanium D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.02	<0.01
Vanadium D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.06	<0.03
Zinc D-Zn	0.009	0.009	<0.005	<0.005	<0.005	0.005	0.07	0.03

Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-06

Sample ID		P03-06- 01	P03-06- 02	P03-06- 03	P03-06- 04	P03-06- 05	P03-06- 06
Date Sampled		8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003
Physical Tests							
Conductivity	(uS/cm)	-	1220	-	-	-	-
Hardness	CaCO3	534	649	443	497	429	495
pH		-	7.93	-	-	-	-
Dissolved Anions							
Alkalinity-Total	CaCO3	168	160	161	129	6.1	18.1
Sulphate	SO4	492	586	967	428	1030	1450
Dissolved Metals							
Aluminum	D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony	D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arsenic	D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium	D-Ba	0.11	0.15	0.03	0.03	0.02	<0.01
Beryllium	D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth	D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Boron	D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium	D-Ca	158	181	121	139	120	116
Chromium	D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt	D-Co	<0.01	0.01	0.07	<0.01	<0.01	<0.01
Copper	D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	D-Fe	<0.03	0.34	8.37	38.9	307	18
Lead	D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	0.15
Lithium	D-Li	<0.01	0.01	0.01	<0.01	<0.01	0.02
Magnesium	D-Mg	33.8	47.8	34.3	36.4	31.4	50.1
Manganese	D-Mn	4.13	10.4	12.5	10.6	8.48	1.46
Molybdenum	D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nickel	D-Ni	<0.05	<0.05	0.12	<0.05	<0.05	<0.05
Phosphorus	D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Potassium	D-K	4	6	2	2	4	6
Selenium	D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silicon	D-Si	4.89	6.37	6.37	5.18	5.4	3.1
Silver	D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	D-Na	58	37	12	23	28	29
Strontium	D-Sr	0.541	0.636	0.377	0.454	0.282	0.205
Thallium	D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tin	D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Titanium	D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc	D-Zn	0.007	0.045	0.165	0.774	0.043	0.609

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-07 and P03-08

Sample ID	P03-07- 02	P03-08- 01	P03-08- 02	P03-08- 03	P03-08- 05	P03-08- 06	P03-08- 07	P03-08- 08
Date Sampled	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003
Physical Tests								
Conductivity (uS/cm)	-	-	-	-	-	-	-	-
Hardness CaCO3	412	242	345	300	186	209	80	71.8
pH	-	-	-	-	-	-	-	-
Dissolved Anions								
Alkalinity-Total CaCO3	181	218	237	227	116	74.1	79.5	61.8
Sulphate SO4	511	33	154	104	147	235	47	57
Dissolved Metals								
Aluminum D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arsenic D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium D-Ba	0.05	0.08	0.24	0.11	0.03	0.05	0.09	0.08
Beryllium D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Boron D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium D-Ca	121	61.7	98.3	84.2	53.2	68.7	21.8	19.2
Chromium D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt D-Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron D-Fe	2.03	<0.03	<0.03	0.06	0.31	<0.03	0.07	<0.03
Lead D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium D-Li	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium D-Mg	26.6	21.4	24.2	21.7	12.9	9.2	6.2	5.8
Manganese D-Mn	5.51	0.353	4.79	4.36	2.58	0.411	0.16	0.094
Molybdenum D-Mo	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	0.08	0.06
Nickel D-Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphorus D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Potassium D-K	<2	3	<2	<2	4	3	4	5
Selenium D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silicon D-Si	5.35	3.73	4.54	4.91	2.63	3.1	2	2.19
Silver D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium D-Na	110	3	12	9	53	31	46	31
Strontium D-Sr	0.771	0.373	0.32	0.293	0.277	0.213	0.227	0.202
Thallium D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tin D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Titanium D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc D-Zn	0.027	<0.005	0.005	0.011	0.165	0.094	0.016	0.008

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Table 5. Initial Groundwater Quality Results for 2003 Wells

P03-09

Sample ID	P03-09- 01	P03-09- 02	P03-09- 03	P03-09- 04	P03-09- 05	P03-09- 06	P03-09- 07	P03-09- 08	P03-09- 09
Date Sampled	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003	8/26/2003
Physical Tests									
Conductivity (uS/cm)	1290	1270	1100	1070	1050	1140	1160	1030	1190
Hardness CaCO3	670	669	561	580	559	594	640	620	625
pH	-	-	-	-	-	-	-	-	-
Dissolved Anions									
Alkalinity-Total CaCO3	359	300	228	160	174	225	168	167	192
Sulphate SO4	390	363	356	365	365	394	423	363	443
Dissolved Metals									
Aluminum D-Al	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Antimony D-Sb	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arsenic D-As	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Barium D-Ba	0.04	0.04	0.05	0.05	0.06	0.08	0.1	0.08	0.08
Beryllium D-Be	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bismuth D-Bi	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Boron D-B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium D-Cd	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium D-Ca	173	173	169	175	168	174	194	189	191
Chromium D-Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cobalt D-Co	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Copper D-Cu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron D-Fe	6.57	6.83	0.04	<0.03	<0.03	<0.03	<0.03	0.07	0.19
Lead D-Pb	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lithium D-Li	0.04	0.03	0.01	0.01	<0.01	0.02	0.01	0.01	0.01
Magnesium D-Mg	57.7	57.4	34	34.9	33.8	38.9	37.9	36	36.2
Manganese D-Mn	0.378	0.398	6.32	6.45	6.37	7.22	7.55	6.42	6.02
Molybdenum D-Mo	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Nickel D-Ni	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phosphorus D-P	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Potassium D-K	3	4	4	4	4	4	4	4	4
Selenium D-Se	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silicon D-Si	7.25	7.41	6.95	6.98	6.74	6.51	7.04	6.47	6.73
Silver D-Ag	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium D-Na	50	50	31	31	30	35	37	35	36
Strontium D-Sr	0.886	0.875	0.451	0.468	0.452	0.548	0.535	0.508	0.518
Thallium D-Tl	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tin D-Sn	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Titanium D-Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium D-V	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc D-Zn	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Table 6. Comparison of Select Groundwater Quality Parameters, 2001 - 2003

	Upgradient	Original Impoundment					Second Impoundment								
MonitorName	**TH86-26 /**	**P01-10A**	**P01-10B**	**P01-08A**	**P01-08B**	**P01-08C**	**P01-09A**	**P01-09B**	**P01-09C**	**P01-09D**	**P01-07A**	**P01-07B**	**P01-07C**	**P01-07D**	**P01-07E**
Depth of Monitor (m)	**TH86-17**	15.2	21	15.5	25.6	29.7	11.7	16.5	22.1	28.4	18	23.5	27.8	34.2	40.4
FALL 2001: pH	7.67	8.52	8.06	7.66	7.17	6.34	3.635	3.74	6.15	4.47	9.13	9.78	7.59	7.21	7.09
Sulphate	16	298	94	206	344	482	20300	711	623	1180	349	360	376	433	580
Zinc	<0.005	0.284	0.009	0.024	0.686	0.73	640	12.4	13.4	43.7	<0.005	<0.005	0.006	0.011	0.017
SPRING 2002: pH	7.87	9.03	7.83	-	-	-	3.39	4.94	6.00	5.46	8.32	7.75	7.71	7.85	6.7
Sulphate	20	402	116	-	-	-	9580	757	440	821	756	835	346	686	672
Zinc	<0.005	<0.03	<0.01	-	-	-	3880	33.7	27	59.5	<0.03	<0.03	<0.01	<0.01	0.01
FALL 2002: pH	8.06	8.20	7.85	8.05	6.07	6.91	3.34	5.27	4.05	4.50	9.02	7.91	7.47	7.15	7.25
Sulphate	12	1030	97	258	666	409	56200	1110	621	950	590	519	402	766	818
Zinc	0.01	0.05	<0.005	0.02	0.6	0.04	4070	45.1	34.4	26.1	0.11	0.05	<0.01	<0.01	0.26
SPRING 2003: pH	7.2	8.4	6.9	7.4	6.5	frozen	5.9	5.4	5.70	5.5	9.6	8.2	6.8	6.5	6.4
Sulphate	16	2460	113	239	375	-	56600	913	416	1560	636	498	662	1070	1020
Zinc	0.01	0.016	<0.005	0.006	0.03	-	4210	40.8	29.3	140	<0.005	0.021	<0.005	0.024	0.013
FALL 2003: pH	8.07	7.98	7.84	7.64	7.23	frozen	3.34	5.46	5.67	5.60	8.6	7.82	7.96	7.77	7.7
Sulphate	15	2380	168	239	376	-	77600	1390	1120	1390	432	601	701	1050	1130
Zinc	0.009	0.58	0.404	5.17	26.5	-	5520	58.5	79.6	73.1	0.03	1.04	0.23	0.008	0.05

	Intermediate Impoundment						Intermediate Dam								
MonitorName	**X21A**	**X21B**	**X21C**	**P01-06**	**P01-05A**	**P01-05B**	**P01-03**	**P01-04A**	**P01-04B**	**X25A**	**X25B**	**X24A**	**X24B**	**X24C**	**X24D**
Depth of Monitor (m)	8.5	14.7	29.4	10.7	10.5	16.4	9.3	34	53.4	9	19.2	6.5		16.5	28.3
FALL 2001: pH	5.41	4.81	8.2	6.02	7.32	7.22	6.98	7.77	8.11	8.16	8.22	8.15	-	8.1	8.12
Sulphate	8900	149	9	2610	1210	780	769	331	30	298	334	579	-	764	1020
Zinc	370	0.828	0.006	1.02	0.145	0.074	0.009	<0.005	<0.005	0.005	<0.005	0.005	-	0.009	0.028
SPRING 2002: pH	5.75	7.41	8.13	6.10	7.51	7.78	7.21	7.66	7.92	8.10	7.88	7.54	7.51	7.25	7.29
Sulphate	2070	434	10	1110	1130	600	1090	377	46	312	333	750	780	1140	1060
Zinc	2.23	0.09	0.015	1.88	<0.03	<0.03	<0.03	<0.01	<0.05	<0.01	<0.01	<0.03	<0.03	<0.03	0.03
FALL 2002: pH	5.5	7.08	8.19	5.83	7.45	7.82	6.92	7.73	7.49	7.90	8.05	7.59	7.18	7.57	7.76
Sulphate	3850	576	7	1880	1040	716	1260	338	44	292	341	39	542	1030	1150
Zinc	6.72	0.09	<0.005	2.58	<0.03	0.01	<0.03	0.09	<0.01	<0.01	<0.01	<0.01	<0.01	<0.03	0.03
SPRING 2003: pH	6.1	6.5	7.8	6.40	6.1	6.7	-	-	6.5	7.10	7.1	6.7	-	6.6	6.6
Sulphate	1730	446	8	1620	1020	814	-	191	50	261	332	725	-	1330	1340
Zinc	1.06	0.136	<0.005	5.37	0.023	0.036	-	0.25	<0.005	<0.005	<0.005	0.008	-	0.011	0.039
FALL 2003: pH	3.24	7.82	8.35	5.88	7.28	8.01	7.91	8.03	8.06	8.20	8.02	7.87	-	7.77	7.57
Sulphate	8170	644	8	1910	729	714	1130	399	43	249	339	1050	-	1090	1340
Zinc	12.2	0.12	0.046	6.87	2.29	0.014	0.011	<0.005	<0.005	0.005	<0.005	<0.005	-	0.007	0.033

	Downgradient of Polishing Pond										
MonitorName	**P01-01A**	**P01-01B**	**P01-02A**	**P01-02B**	**X18A**	**X18B**	**X16A**	**X16B**	**X17A**	**X17B**	**P01-11**
Depth of Monitor (m)	21.4	35.3	14.1	28.4	10.6	28.7	6	34	6.2	25	25
FALL 2001: pH	7.83	7.81	7.84	7.99	7.67	7.83	8.25	8.00	8.26	8.25	-
Sulphate	480	289	156	119	392	438	26	33	31	35	-
Zinc	<0.005	0.006	<0.005	<0.005	0.016	0.008	0.006	0.018	0.022	<0.005	-
SPRING 2002: pH	7.75	7.77	8.09	8.17	7.65	7.67	8.12	8.19	7.97	7.67	7.91
Sulphate	570	402	158	128	553	470	26	28	46	54	573
Zinc	<0.01	<0.01	<0.005	<0.005	<0.01	<0.01	0.005	<0.005	<0.005	<0.005	<0.01
FALL 2002: pH	7.99	8.08	8.10	8.17	7.79	7.96	8.13	8.14	8.13	8.11	7.98
Sulphate	549	399	1430	116	449	550	36	25	36	39	716
Zinc	<0.01	<0.01	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	0.05
SPRING 2003: pH	7.3	6.7	7.1	6.8	6.6	6.7	7.0	6.9	7.0	6.8	6.7
Sulphate	580	399	143	125	596	577	24	27	54	65	812
Zinc	<0.005	<0.005	0.014	<0.005	0.005	<0.005	0.005	<0.005	<0.005	<0.005	0.007
FALL 2003: pH	7.14	7.14	7.69	7.63	7.07	7.02	7.59	7.35	7.68	7.25	7.16
Sulphate	520	413	134	119	461	487	22	25	35	35	862
Zinc	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	<0.005

Notes: Results are expressed as milligrams per litre except where noted.
< indicates less than the detection limit.

Appendices

Appendix A

ALS Analytical Reports – Spring 2003

(Available in Hard Copy Only)

Appendix B

ALS Analytical Reports – Fall 2003

(Available in Hard Copy Only)

Appendix C

V. Enns (Environment Canada), November 6, 2003

Findings To Date and Recommendations for P01-09 Faro Groundwater Monitoring Wells

6 November 2003

PREPARED BY: V. Enns Environment Canada - Yukon

FINDINGS TO DATE and RECOMMENDATIONS FOR P01-09 FARO GROUNDWATER MONITORING WELLS

The P01-09 well series consists of 4 piezometers installed in 2001. Three of these are screened in the aquifer and one in the tailings (9A). Sampling by Gartner Lee Ltd. (GLL) and Environment Canada (EC) during 2001-2002 indicated that there was a lot more variability in the water quality of these wells then one would normally expect for a groundwater well. In particular, samples taken one week apart in Sept. 2003 by GLL and EC showed differences in dissolved zinc levels ranging from 150% to 400%. The data collected since 2001 is summarized in Table 1. During 2003, EC , with the co-operation of the Receiver and GLL, has carried out a series of steps to try and determine what the reasons for this variability were.

In June 2003 a joint EC/GLL sampling program was carried out to see if sampling methodology might in some way explain the differences. Split samples were collected using the Waterra hydrolift and downhole pumps. Samples were collected at high flowrates, low-flow rates and grab samples with no purge. All samples were collected at the well screens except for one, which was collected by EC using a bailer to sample the standing water in the top 1 meter of well 9D (sample D8 in Table 1). The June 2003 samples again showed significant variability in results depending on the sampling method used. The most surprising result was that sample D8 reported over 1800 mg/l zinc (all zinc references here are dissolved) in the shallow standing water in well 9D. By contrast, results at the well screen (at the bottom of the well) ranged from 35 to 422 mg/l.

Since EC only had one sample (D8) of the standing water in one well we repeated the sampling of shallow standing well water in wells 9 B, C and D on 2 Sept. 2003 (samples B10, C10 and D10) and these samples reported 3140, 1470 and 180 mg/l zinc respectively. A sample was also collected in 9B at a depth of 3m since it was noted that there was a spike in the conductivity profile (see Figure 1) at this depth. Zinc in that sample was 581 mg/l (B12). In summary, both sulphate and zinc in the standing water are at levels one to two orders of magnitude higher than samples collected at the well screen after purging.

During the Sept 2003 sampling event, well 9C was purged over 3 well volumes with a pump positioned just below the water surface in the well in order to ensure the standing water was completely purged. Conductivity dropped quickly from 8.8 ms to 1.6 ms. The next day the conductivity profile was re-established in the well, peaking again at 8.6 ms at about 3m below the water surface.

EC also took some down hole video in early Sept. at the 09 holes. We could only get the camera down well 9C because 9D has a Waterra down the hole at 6 metres and well 9B has a very prominent bulge about one meter down the hole. I have attached a still picture captured from the video at the first joint in the PVC pipe which is about 2m or so below the water level in the pipe. The image shows distinct discolouration beginning at the joint and suggests a possible leakage of tailings pore water into the well. The water level in the tailings is about one metre higher than then the water level in the well and so tailings water would leak into (and down) the well if a leakge pathway is present.

The leakage of tailings porewater into the well would account for the pattern of variability in water quality. The low flow purge samples at the well screen (samples C7, D7) would report higher values since the tailings water would be flowing down the well to the screen and mixing with aquifer water at that point. Samples collected above the screen elevation would have more influence from the more heavily contaminated water above them. It appears that the Waterra hydrolift actually causes less agitation of the well volume then manual operation of the Waterra. Perhaps this is because the stroke is short and steady compared to the constantly changing pattern when it is done manually. In any case the hydrolift reported consistently lower contamination compared to the manual operation of the Waterra. This suggests that it does not encourage as much mixing with the overlying heavily contaminated well waters.

If it is the joints that are leaking this would explain why this condition exists in each of the 09 series wells. This begs the question why we are not seeing similar conditions in some of the other 2001 wells. It must be noted that the leaking joint scenario is only a possible explanation at this point. Removing the fallen Waterra from 9D and getting a longer camera cable (we were limited to about 10m) would confirm whether joint discolouration occurs in hole 9D as well. An inflatable packer should be used to confirm that pore water is leaking. Once installed the overlying well water can be pumped out and if the PVC pipe is leaking for any reason this will be evident. A downhole camera could confirm the location of the leakage.

If it is verified that such leakage exists, the well could still be rehabilitated by installing a smaller pipe inside the existing one with a bentonite sleeve to seal off the annulus and isolate the leaking section. Other possibilities undoubtedly exist as well.

RECOMMENDATIONS

1. Other interpretations of these observations and welcomed by EC and should be considered ASAP.

2. As soon as possible inflatable packers should be installed in wells 9B, 9C and 9D to cut off the apparent transport of contaminated water into the native aquifer. At the same time the water above the packers should be removed and the rate and quality of re-filling (due to any leakage) monitored. It is very important that we try and verify what is causing the leakage before any permanent action is taken (i.e. sealing these wells off entirely) so that the potential for occurrence at other well locations can be assessed.

3. If leakage is confirmed then a plan should be developed to try and salvage the wells.

4. The potential for leakage at other well sites should be assessed and an appropriate response plan developed.

TABLE 1

P01-09 Series Wells - Water Quality Summary

Static Water Level ~7m b.g.s.

Thickness of tailings ~ 14 m

ID	SOURCE	WELL ID	Date	pH	Conductivity	Sulphate	Diss. Zinc	Purge Method	Sampling Depth (m) Below SWL	Screen Depth m.b.g.s.	Sreened Interval in
A1	GLL	P01-09A	11-Sep-01	3.6		20300	640	?	at screen	12	tailings
A2	GLL	P01-09A	10-Jun-02	3.4	29900	9580	3880	?	at screen		
A3	GLL	P01-09A	26-Sep-02	3.3	30300	56200	4070	?	at screen		
A4	EP	P01-09A	2-Oct-02	3.7	33700	67024	6448	Waterra - hand	at screen		
A6	GLL	P01-09A	5-Jun-03	3.3	24000	78200	4170	Waterra - hydrolift	at screen		
A7	EP	P01-09A	4-Jun-03	3.3	25400	81220	4290	Pump	at screen		
B1	GLL	P01-09B	11-Sep-01	3.7		711	12	?	at screen	17	native aquifer
B2	GLL	P01-09B	10-Jun-02	4.9	1130	757	34	?	at screen		
B3	GLL	P01-09B	26-Sep-02	5.3	1640	1110	45	?	at screen		
B4	EP	P01-09B	2-Oct-02	5.0	2210	1935	80	Waterra - hand	at screen		
B6	GLL	P01-09B	5-Jun-03	5.3	1360	913	41	Waterra - hydrolift	at screen		
B10	EP	P01-09B/1M	2-Sep-03	3.2	3380	2840	180	bailer	1		
B11	EP	P01-09B	2-Sep-03	4.3	2450	1930	90		at screen		
B12	EP	P01-09B/10M	2-Sep-03	3.7	8290	9580	581		3		
C1	GLL	P01-09C	11-Sep-01	6.2		623	13	?	at screen	23	native aquifer
C2	GLL	P01-09C	10-Jun-02	6.0	793	440	27	?	at screen		
C3	GLL	P01-09C	26-Sep-02	4.1	1010	621	34	?	at screen		
C4	EP	P01-09C	2-Oct-02	5.1	1800	2308	128	Waterra - hand	at screen		
C5	EP	P01-09C	4-Apr-03	5.0	1610	994	163	Pump	9		
C6	EP	P01-09C/1	4-Jun-03	5.6	717	508	26	Pump	at screen		
C7	EP	P01-09C-ULF/1	4-Jun-03	4.9	1760	1606	159	no purge grab	at screen		
C8	GLL	P01-09C-GLL	4-Jun-03	5.2	748	476	29	Pump	at screen		
C10	EP	P01-09C/1M	2-Sep-03	3.5	11600	14200	1470	bailer	1		
C11	EP	P01-09C	2-Sep-03	5.6	1400	898	51	pump	at screen		
D1	GLL	P01-09D	11-Sep-01	4.5		1180	44	?	at screen	29	native aquifer
D2	GLL	P01-09D	10-Jun-02	5.5	1270	821	60	?	at screen		
D3	GLL	P01-09D	26-Sep-02	4.5	1470	950	26	Pump	at screen		
D4	EP	P01-09D	2-Oct-02	5.0	1780	1974	41	Waterra - hand	at screen		
D5	EP	P01-09D	4-Apr-03	4.9	1740	1139	117	Pump	9		
D6	EP	P01-09D/1	4-Jun-03	5.4	1040	672	35	Pump	at screen		
D7	EP	P01-09D-ULF/1	4-Jun-03	4.0	3560	3858	422	no purge grab	at screen		
D8	GLL	P01-09D GLL	5-Jun-03	4.4	1770	1625	142	Waterra - hydrolift	at screen		
D9	EP	P01-09D/1M	4-Jun-03	3.1	11900	18432	1820	bailer	1		
D10	EP	P01-09D/1M	2-Sep-03	3.3	20400	30900	3140	bailer	1		

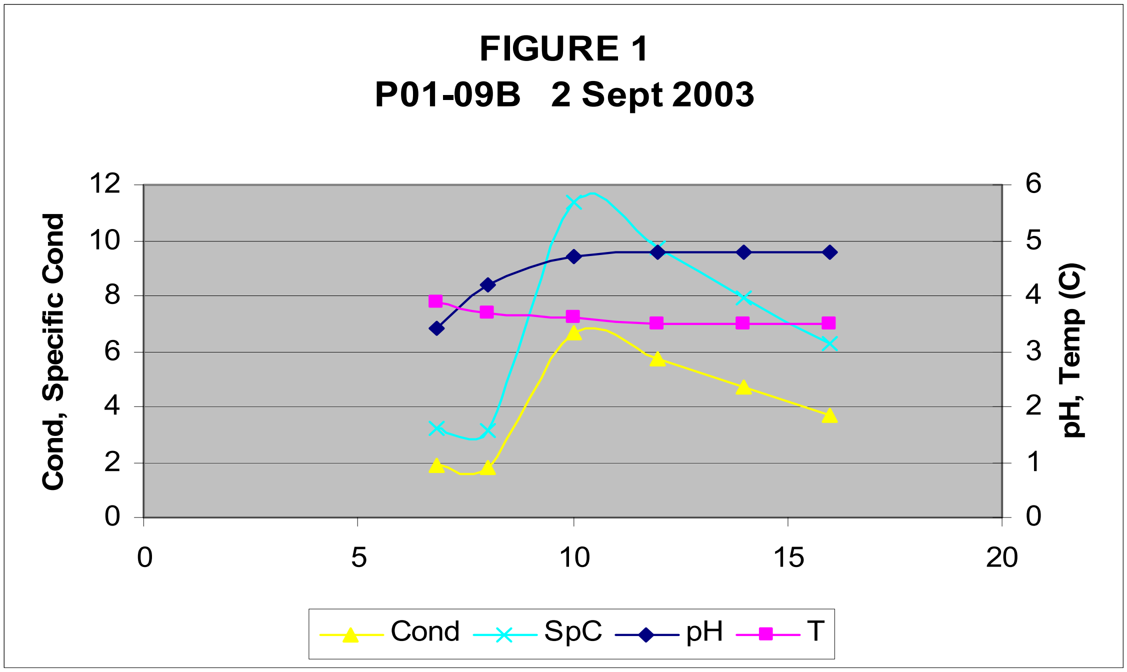
FIGURE 1
P01-09B 2 Sept 2003
Cond, Specific Cond
pH, Temp (C)
0
2
4
6
8
10
12
0
1
2
3
4
5
6
0
5
10
15
20
Cond
SpC
pH
T

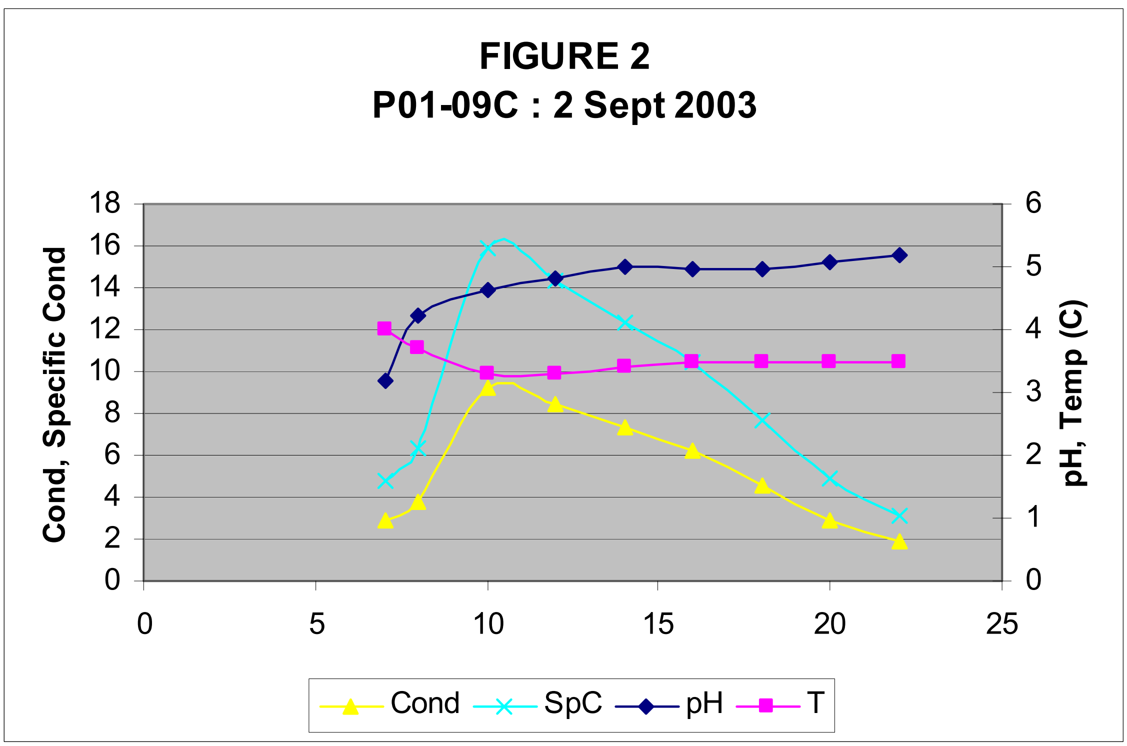
FIGURE 2
P01-09C : 2 Sept 2003
Cond, Specific Cond
pH, Temp (C)
0
2
4
6
8
10
12
14
16
18
0
1
2
3
4
5
6
0
5
10
15
20
25
Cond
SpC
pH
T

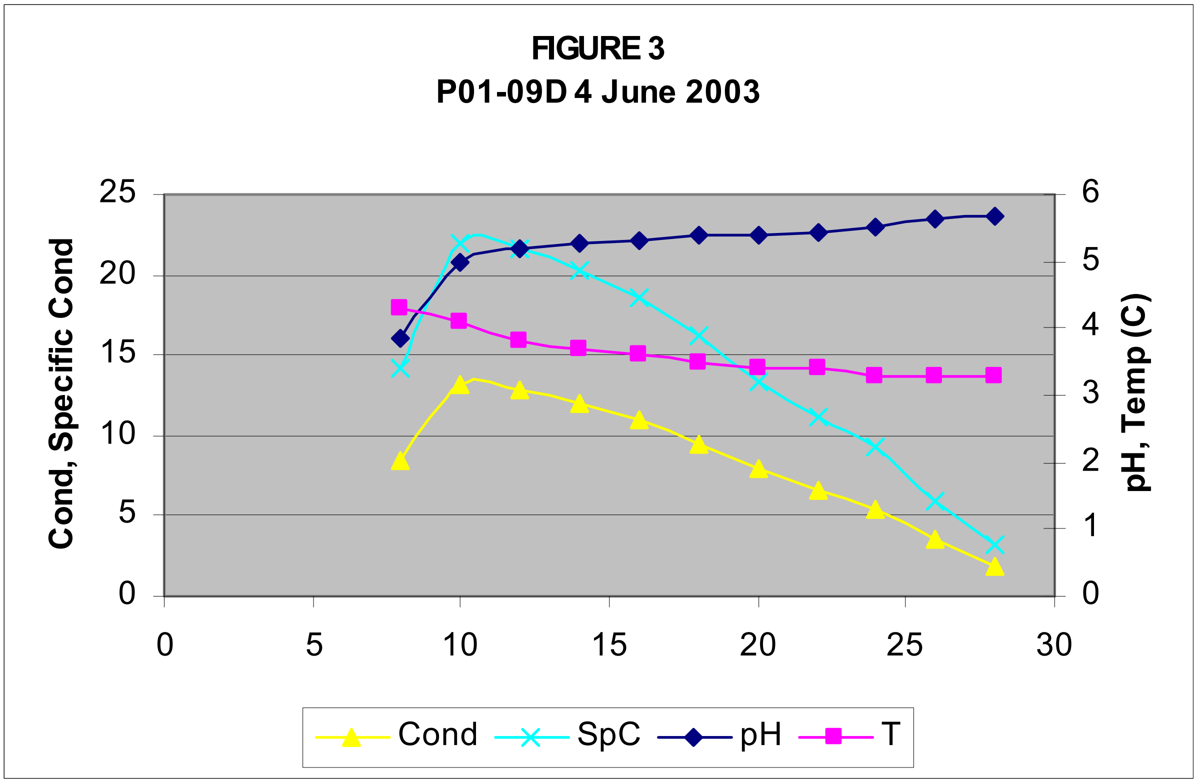
FIGURE 3
P01-09D 4 June 2003
Cond, Specific Cond
pH, Temp (C)
25
20
15
10
5
0
6
5
4
3
2
1
0
0
5
10
15
20
25
30
Cond
SpC
pH
T

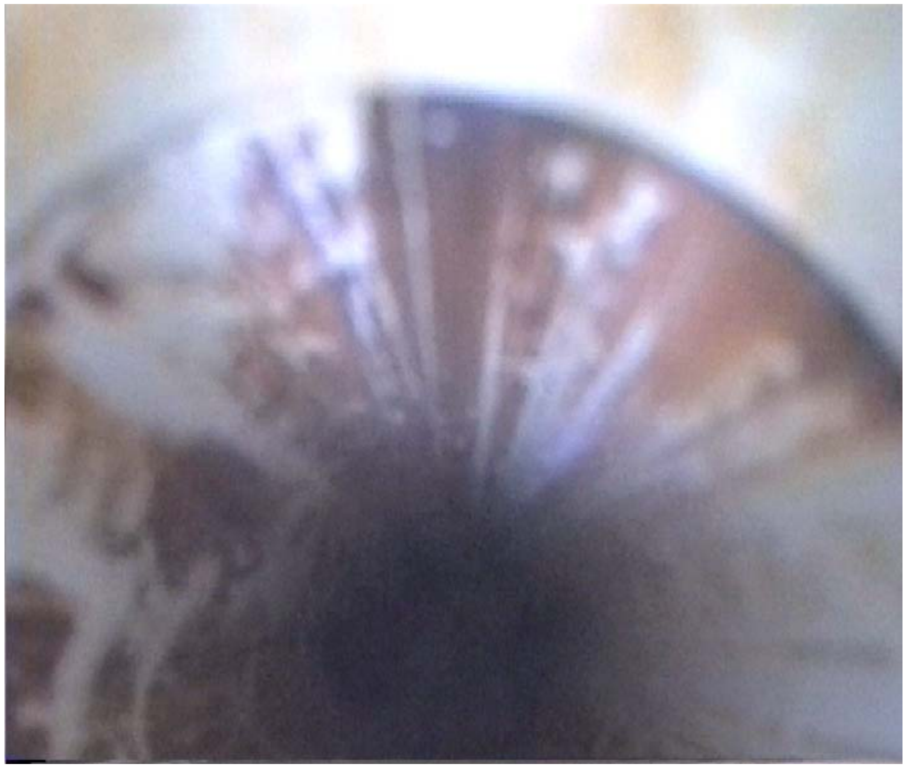

PHOTO 1 P01-09C PVC PIPE JOINT

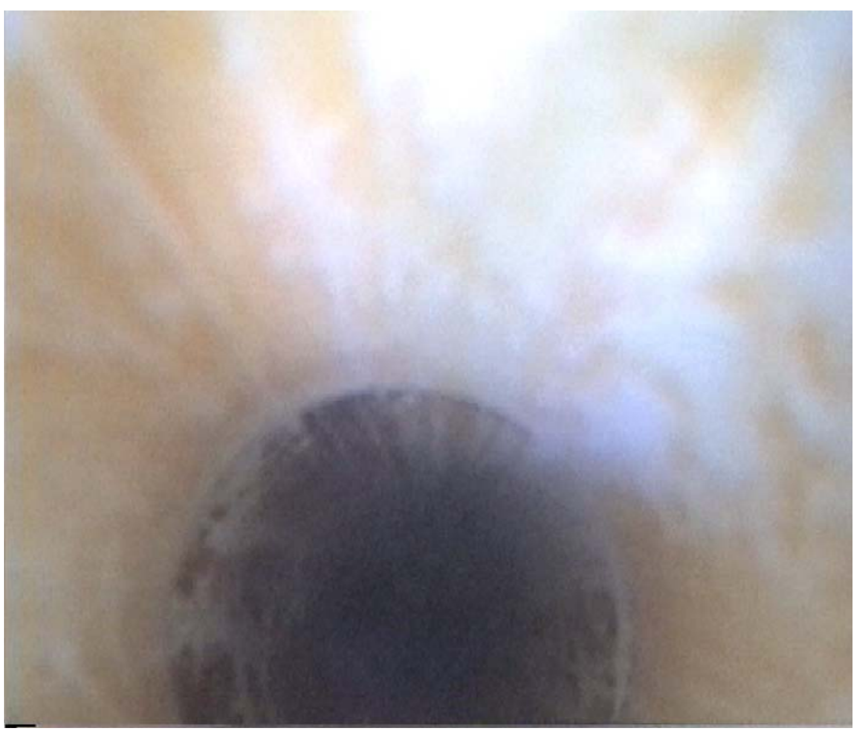

PHOTO 2 P01-09C PVC PIPE JOINT