

Anvil Range Mining Complex 2006 Waste Rock and Seepage Monitoring Report

2006/07 Task 14

Prepared for:

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Project Reference Number:
SRK 1CD003.085

June 2007



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SRK Project Number 1CD003.085

June 2007

Executive Summary

Title: Anvil Range Mining Complex: 2006 Waste Rock and Seepage Monitoring Report – 2006/07 Task 14

Consultant: SRK Consulting (Canada) Inc.

Status: Final

Date: June 2007

Size: 29 Pages of text (including cover, introductory and reference list); 18 Pages of Figures (including one flysheet), 3 Appendices containing 19 pages (including 9 non-standard 11 x 17 pages and 3 flysheets).

Digital File: PDF format; 7.6 MB

Objectives and Primary Findings:

This report summarizes the waste rock and seepage monitoring results from the 2006 monitoring program and compares the current year's results with results from previous monitoring.

Water quality at toe seepage and select routine monitoring stations indicates that water quality in drainage from the Faro and Vangorda waste rock dumps appears to have stabilized year-over-year, with considerable seasonal variation at several monitoring stations.

Water quality of drainage from the Grum Dump toe seeps also appears to be stable, with dissolved zinc concentrations typically in the range of 1.7 to 5.2 mg/L over the past several years, and isolated samples having dissolved zinc concentrations up to 60 mg/L. However, downgradient monitoring at routine monitoring station V15 demonstrated a sustained increase in zinc concentrations over the 2006 monitoring period, from 0.05 mg/L to greater than 0.5 mg/L, and it is expected that this increase will continue in 2007.

Future Work Recommendations:

It is recommended that waste rock and seepage monitoring be continued at the same level as carried out in 2005 and 2006.

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1 Introduction

Waste rock and pit seepage surveys, and monitoring of temperature and oxygen instrumentation installed as part of the Anvil Range geochemical monitoring program were continued in 2006. In addition, routine monitoring of selected waste rock and pit seepage stations was carried out by site environmental staff as a requirement of the water licence. This report presents results of the 2006 seep surveys, a review of the 2006 and historical routine seepage monitoring data, and results of the instrumentation monitoring.

This report has been prepared as part of the ongoing technical evaluation for the closure planning of the Anvil Range Mining Complex.

2 Methods

2.1 Waste Rock Seepage Surveys

Sample locations were established in June 2002 by walking the toes of all waste rock dumps where the rock rests on original ground, and looking for any flowing seeps that emerged from these areas. Additional seeps were located by slowly driving along accessible roads and ramps in the Faro Pit complex that were below waste rock dumps or ore stockpiles. Most of the seeps were flowing, or were inferred to have been recently flowing based on observations of moisture along flow paths, or on ponded water surfaces at the elevation of pond spill points.

Subsequent seep surveys at each of the waste rock dumps were carried out in September 2002, and in both spring and fall of 2003 and 2004. Stations established in June 2002 were revisited and sampled as appropriate. Some seeps were found to flow intermittently, and new intermittent seeps were located during the follow-up surveys. At the end of 2004, there were approximately 80 seep locations that had been sampled at least once during the 2002-2004 waste rock seepage monitoring program (SRK 2006a).

As part of planning for 2005 field work, the waste rock seepage working group discussed the value of continuing to monitor waste rock seepage at the established stations. On the basis of these discussions, SRK carried out a review of previously-sampled seepage stations to assess which stations should continue to be monitored on a twice-yearly basis. Summaries of the rationale for maintaining or eliminating each station from the monitoring program were compiled in a draft memorandum that was circulated and subsequently revised to reflect feedback from the working group (see Appendix A in SRK 2006b). Sites identified for continued monitoring were visited in May and September of 2006, and samples were collected as flow conditions permitted.

Several sites where waste rock seepage stations coincided with water licence sampling stations were identified for elimination pending review of sampling practices employed by site staff. This review

was carried out at the beginning of both May 2005 and 2006 field visits, and in both years it was found that field filtration of dissolved metal samples was not being carried out as part of water licence sampling. As the protocol for the waste rock seepage survey includes field filtration of dissolved metal samples, it was decided that the water licence stations would continue to be sampled on an interim basis as part of the waste rock seepage monitoring program.

The review of monitoring stations also recommended allowance for a limited number of supplementary samples, to be collected at the investigator's discretion, to characterize intermittent surface flows that daylight only under ideal flow conditions.

Samples were collected for analyses of routine parameters (pH, conductivity, acidity, alkalinity, chloride and sulphate), and dissolved metals (dissolved metals by ICP-OES). The samples were filtered and preserved in the field according to standard methods for collection of environmental samples. Field pH, conductivity, redox, and temperature measurements were taken at each station using a WTW meter. Flow estimates were made using the bucket and stopwatch method, by estimating the velocity and cross sectional area of the seep, or by visual estimation.

The sampling locations were marked for later reference with flagging tape and were surveyed using a hand-held GPS. The locations are shown in Figures 1 and 2. Photographs were taken to document the general appearance of the station, and any precipitates along the flow paths.

Duplicates and field blanks were collected as a check on the quality of the field methods and laboratory results.

2.2 Historical Waste Rock Seepage Monitoring

Waste rock seep surveys have been completed both by the operator, as prescribed in water licences, and by various regulatory authorities since approximately 1986 at the routine sample locations shown in Figures 1 and 2. Deloitte & Touche has continued to collect seep samples on a regular basis as part of water licence routine monitoring programs.

The historical water quality database was transferred to a Microsoft Access platform, to allow distribution of results to other users. The development of the Access database was coordinated by Gartner Lee Limited (GLL), who report the compiled results in the annual monitoring reports (e.g. GLL 2007) and who continue to maintain the database. Quality assurance and validation of reported historical monitoring results is undertaken as issues are raised.

2.3 Pit Seepage Surveys

Monitoring of seepage and wall rock runoff in the Faro, Grum, and Vangorda pits was carried out in 2003 and 2004 as part of studies relating to future pit lake water quality and treatment requirements. Beginning in 2005, seepage monitoring has also been carried out in the pits, as recommended by the technical working group. It was felt that permanent monitoring stations should be established to allow pit seepage water quality trends to be tracked over time.

Pit seepage surveys were carried out in Faro and Grum pits in May 2006 and in all three pits (Faro, Grum and Vangorda) in September 2006. Pit seep locations are shown in Figures 3 through 5.

Pit seep samples were collected and analysed in the manner described for waste rock seeps in Section 2.1.

2.4 Temperature and Oxygen Monitoring of Waste Rock

Waste rock temperature and oxygen monitoring has been carried out intermittently beginning in February 2003 at seven instrumented drillholes on the Faro, Grum, and Vangorda waste rock dumps (SRK, 2004a). In each drillhole, a thermistor string was installed that measures temperature at discrete locations down hole. In addition, each hole has several plastic tubes installed that permit pore gas to be extracted from discrete locations. The installation of these monitoring facilities is described in detail in SRK 2004a.

In the past, erratic results from some individual monitoring ports have raised the question of whether the ports were blocked or pinched. In February 2006 and May 2006, a hand-operated vacuum pump was used to test whether pore gas was able to move freely through each monitoring tube. Those tubes which allowed a vacuum to develop were inferred as being blocked in some fashion, and the previous results from the blocked ports are considered questionable.

Pore gas oxygen content was measured directly using a Servomex Oxygen Analyser. This instrument was calibrated on a daily basis using ambient air (20.9% oxygen) and pure nitrogen gas (0% oxygen). The instrument was connected to each monitoring tube by means of silicone tubing, and pore gas was drawn through the instrument by means of an integrated pump. The oxygen analyser produced a direct real-time readout of oxygen content which was then manually recorded.

Temperature measurements were collected by connecting an Omega thermistor reader to a switch box at the terminal end of each installed RST Instruments thermistor string. Temperature at individual monitoring points was collected by selecting the appropriate channel on the switch box. The Omega thermistor reader measured resistance across each monitoring point and converted this measured resistance to temperature. The calculated temperature was then displayed on a digital readout, and was manually recorded.

In the 2006/07 field program, monitoring of pore gas oxygen content and waste rock temperature was carried out in May and September 2006, and in February 2007.

3 Results

3.1 Waste Rock Seepage Surveys

The results of the 2002 through 2006 waste rock seepage surveys are provided in Appendix A. Select parameters (ranges of pH, conductivity, flow, sulphate and zinc concentrations for the period of record) are presented in Figures 1 and 2.

3.2 Historical Waste Rock Seepage Monitoring

Locations of the routine seepage monitoring stations are shown in Figure 1 and 2. The results to date of the historical seepage monitoring are provided in Figures 6 through 17. The time series shown in these figures provide a graphical summary of the data that allows trends to be easily identified.

3.3 Pit Seepage Surveys

Locations of the pit seepage monitoring stations are shown in Figures 3 to 5. Results of the 2003 to 2006 pit seepage surveys are included in Appendix B. The purpose of these surveys has been to provide inputs for updates to water quality predictions (such as those presented in SRK 2004b) and to monitor changes in pit seepage water quality over time. Pit seep locations are less consistent than waste rock seep locations, necessitating the establishment of several unique stations to sample available flows. However, there are some stations that have been sampled over several monitoring rounds at locations where seepage has been consistently available. In some areas, for comparison of year-over-year seepage chemistry results, it is necessary to group stations where seepage water interacts with similar pit wall rock types.

3.4 Temperature and Oxygen Monitoring of Waste Rock

The results to date of temperature and oxygen monitoring are provided in Appendix C. Waste rock temperatures recorded in 2006/7 were generally within the range of those recorded previously. Measured 2006 pore gas oxygen concentrations were also similar to those previously measured.

Vacuum testing of all individual sampling tubes in 2005 and 2006 indicated that several monitoring ports were blocked. Many of the blocked ports had a paired port at the same elevation that remained functional at the time of testing; however, three monitoring elevations (1.4, 5.6 and 10 m below surface) at installation 10M3 (Grum Dump) had pairs of monitoring tubes blocked at each elevation.

Installation 30M4 (Vangorda Dump) was found to have blockages in both monitoring ports at 1.4 m depth, however ports sampling both higher and lower elevations appeared to be functioning properly.

Installation 30M1 (Faro Dump) was found to have a blockage in the 30 m monitoring port. This port was not installed in duplicate and may not provide any further data. However, ports sampling both higher and lower elevations appeared to be functioning properly.

4 Discussion

4.1 2002 to 2006 Waste Rock Seepage Surveys

The 2006 freshet occurred in late May, which is typical timing based on the monitoring since 2002. The spring waste rock survey was taken place a week later than in 2005. Based on the small remnant snow drifts on the rock dumps, and the lack of other snow cover, the waste rock runoff likely peaked at the end of the week prior to the waste rock seepage survey.

Fall runoff conditions appeared to be average to slightly dry, based on the number of flowing seeps and the size of previously observed flows. No rainfall events occurred during the fall sampling period. This caused most of the intermittent seeps to be dry at the time the survey was conducted.

4.1.1 Faro Waste Rock Dumps

No new seeps were identified at Faro during the 2006 surveys. The previously-developed grouping of seeps into water types continues to be a useful tool for summarizing the monitoring results.

Water Types

Seepage from the Faro Waste Rock Dumps were divided into three distinct types on the basis of pH and zinc concentrations (Table 1):

- Type 1 seeps had pHs of greater than 6.5 (typically greater than 7), and zinc concentrations of less than 5 mg/L. Other trace metals (e.g. aluminum, iron, manganese) were low or below detection limits.
- Type 2 seeps had pHs typically between 6 and 7, and zinc concentrations from 4 to 595 mg/L. Cadmium, cobalt, iron, manganese, and nickel were also elevated in several of the samples.
- Type 3 seeps typically had pHs of less than 6, and zinc concentrations typically greater than 20 mg/L and as high as 15,800 mg/L. Aluminum, cadmium, cobalt, copper, iron, manganese, and nickel concentrations were also high in several of these samples. Samples with zinc concentrations greater than 900 mg/L are sourced from oxide fines, ore stockpiles, or the immediate area around the mill.

The summary of Faro water type characteristics in Table 1 was prepared from a modified data set. Where values were reported as less than detection, the detection limit was inserted as the analytical value for the purposes of the statistical calculations. Method detection limits are listed in Table 1; these limits were taken from the non-detect results of blank submissions. Any non-detect result that specified a detection limit more than 10X the method detection limit was excluded from the statistical calculations. This arose in cases where samples had high ionic strength. The variation in the number of samples used in the statistical summary is a reflection of this exclusion.

Table 2 lists the seepage stations by each of the three water types. The results boxes in Figure 1 also indicate these groupings by colour.

The Type 1 seeps included samples from below the Upper Parking Lot dump (FD02), along the toe of the Northeast Dump (FD05, 06, and 07), a seep entering the pit below the Northeast Dumps (FD 26), the Zone II East Dump (FD50), the Ranch Zone Dump (FD14), and the Upper Northwest Dump (FD16 and 18). According to the inventory of rock types presented in the 1996 ICAP report (RGI, 1996), these dumps generally contained relatively low proportions of sulphide waste rock, and higher proportions of calc-silicates or intrusives compared to other parts of the Faro Dump. The Intermediate Dump contains higher proportions of sulphide material. The seepage chemistry reflects some buffering by reactive carbonate minerals, which help to maintain neutral pH conditions.

The Type 2 seeps have included samples from several different areas, including ore and low grade ore stockpiles (FD01, 10, 12, 31 and 38), the Main Dump West (FD09, 10, 12, and 31), the Main Dump East (FD08), the Intermediate Dump (FD44 and 48), the Lower Northwest Dump (FD19), seeps entering the pit below the Northeast Dumps (FD21, 22, 24, and 27) and the Ramp Zone Dump (FD14), seeps in the mill area (FD32 and 35), and seeps from below the Faro Valley Dumps (FD40). A common element of all these areas is the presence of sulphides or oxidized schist. Although the pH is typically in the pH 6 to 7 range, it is clear that this drainage is strongly influenced by oxidation of sulphide minerals. However, many of these seeps contain high levels of calcium and magnesium, suggesting that there are still some carbonates present in the source materials. A sample from below the Main Dump West (FD31, Zn = 569 mg/L) contained the highest zinc concentration of Type 2 seeps sampled in 2006, and was likely influenced in part by ore stockpiles upstream of this location. Water quality trends at FD31 is included in Section 4.2.1 under X23 (equivalent station). Samples from FD12, also below Main Dump West, have typically been classified as Type 2 seeps, however in May 2006 the pH of this seep was sufficiently low to be classified as a Type 3 seep. Similarly, water at stations FD23 and FD 30 appear to have made the transition from a Type 2 to a Type 3 water, with a decrease in pH and an increase in zinc concentrations observed in 2005 and 2006 compared with prior monitoring. Type 2 samples outside of the influence of the ore stockpiles and mill area had zinc concentrations below 90 mg/L in 2006.

The Type 3 seeps have included samples from the Oxide Fines Stockpile (FD04, 46), low grade ore stockpiles (FD38), the Medium Grade Stockpile (FD37), the mill area (FD33, 34 and 35), the West Main Dump (FD12, 30, and 36), the Intermediate Dump (FD13, 47, and 49), the Faro Creek Diversion Dyke (FD20), and, on occasion, seeps entering the pit below the Faro Valley Dump (FD40), or the Northeast Dumps (FD21, 22, 23, 24, and 27). Portions of the waste rock or pit benches in all of the above areas contained sulphides or oxidized schist. The seepage quality indicates very little if any neutralizing minerals are available to control the pH and metal concentrations in these seeps. Samples from the Oxide Fines Stockpile (FD04, Zn = 1230 to 10,900 mg/L), the Medium Grade Stockpile (FD37, Zn = 6130 to 15,800 mg/L), and the mill area (FD33, Zn = 1110 to 6770 mg/L) had the highest zinc concentrations. However, zinc concentrations in the remaining acidic seeps ranged from 2.2 to 877 mg/L (overall median of 45 mg/L) indicating that

seeps with high zinc concentrations occur in association with the sulphide waste rock cells and other sulphidic waste rock.

Management activities upgradient of FD40 during Summer 2006 appear to have altered the chemical conditions at this station. In an effort to neutralize acid seepage and mitigate elevated zinc concentrations, a quantity of coarse crushed limestone was used to line an upgradient seepage pathway above the Faro Valley Dump. The geochemical influence of this recently-placed limestone must be taken into consideration when interpreting water quality data from FD40 going forward.

4.1.2 Grum Waste Rock Dumps

The 2006 Grum Dump seepage surveys were conducted by walking the external toe of the dump and selected internal dump toes and looking for toe seeps, as previously described. No new seeps were identified in 2006.

Water Types

Most Grum toe seeps sampled in previous years had neutral to slightly alkaline pHs, and would be classified as Type I seeps under the system described for Faro. However, further division is possible on the basis of sulphate and zinc concentrations.

- Type 1a seeps generally had low to intermediate sulphate (7.0 to 730 mg/L) and low zinc concentrations (<0.005 to 0.4 mg/L). These seeps reflect drainage from calcareous phyllites and till in the northwest draining portion of the dump. Surface mapping in this drainage indicated some sulphides were present in this area, but they were typically in small isolated pockets, and were surrounded by extensive areas of calcareous phyllites.
 - o One station (SRK-GD18) returned a field pH of 6.7 and a zinc concentration of 0.39 mg/L in May 2005. These May 2005 results represent the lowest pH and the highest zinc concentrations observed to date in seepage from the northwest portion of the dump. In May 2006, SRK-GD18 returned a higher pH of 7.1 and a lower zinc concentration of 0.13 mg/L.
 - o An adjacent seep (SRK-GD13) had a field pH (6.9) lower than previously observed and a sulphate concentration (730 mg/L) higher than previously observed during May 2006 monitoring, along with a dissolved zinc concentration near the upper limit of the previously observed range. This station represents the only major flow from the Southwest Dump. In September 2006, the field pH was slightly higher than in May, and sulphate concentrations were slightly lower. However, there is a trend of increasing sulphate concentrations over the 2002 (313 to 386 mg/L) through 2006 (650 to 730 mg/L) period; magnesium and calcium concentrations show a similar pattern, with magnesium concentrations doubling over the 2002-2006 monitoring period. Zinc concentrations do not show this same pattern at this time. Nickel concentrations up to 0.13 mg/L have been observed at SRK-GD13, which is the maximum nickel concentration observed from Type 1a seeps at Grum.

Table 1: Characteristics of Faro Water Types

Parameter	Detection Limit	Type 1					Type 2					Type 3				
		Average	Median	Min	Max	N	Average	Median	Min	Max	N	Average	Median	Min	Max	N
Field pH (s.u.)	0.01	7.13	7.12	6.47	8.14	55	6.55	6.60	2.89	7.51	78	3.87	3.48	2.24	5.96	53
Acidity pH 8.3	1	9	7	1	30.7	55	210	72	15	2160	78	5371	352	27	49500	54
Alkalinity Total	1	140	147	19	322	55	150	92	2	436	78	15	2	1	310	54
Chloride	0.5	1.4	0.9	0.5	5	55	4.9	2.5	0.5	25	71	30.0	1.0	0.5	1050	50
Sulphate	0.5	450	391	3.1	2470	55	2511	2240	334	8180	78	7143	1935	69	59000	54
Calcium	0.05	99	95	7.5	263	55	343	357	49	675	78	227	237	6.5	508	54
Magnesium	0.1	77	69	1.09	378	55	353	243	37	1750	78	337	207	3.8	3210	54
Potassium	2	4.7	3.2	2	24	55	9.1	8.8	2	28.8	78	8.1	6.1	2	40	46
Sodium	2	16.1	5.4	2	150	55	24	18	2	122	78	14	5.4	2	114	46
Aluminum	0.2	0.2	0.2	0.2	0.2	55	0.6	0.2	0.2	19	78	71	9.1	0.2	986	54
Cadmium	0.01	0.01	0.01	0.01	0.01	55	0.07	0.04	0.01	0.62	78	3.2	0.14	0.01	31.6	54
Cobalt	0.01	0.01	0.01	0.01	0.016	55	0.21	0.06	0.01	1.06	78	2.0	0.3	0.01	20	54
Copper	0.01	0.01	0.01	0.01	0.021	55	0.13	0.03	0.01	2.55	78	40	1.6	0.03	559	54
Iron	0.03	0.03	0.03	0.03	0.101	55	17	2.39	0.03	135	78	852	40	0.03	15100	54
Lead	0.05	0.05	0.05	0.05	0.15	55	0.08	0.05	0.05	0.292	78	0.60	0.27	0.05	4.4	48
Manganese	0.005	0.09	0.01	0.005	0.52	55	19	4.1	0.04	84.9	78	116	9	0.16	2360	54
Nickel	0.05	0.05	0.05	0.05	0.121	55	0.37	0.19	0.05	1.84	78	1.8	0.37	0.05	15	53
Zinc	0.005	1.8	1.4	0.01	14	55	110	39	3.88	595	78	1970	110	2.2	15800	54

Note: Units in mg/L except for acidity/ alkalinity in mg CaCO₃ eq/L

Note 2: Detection limits were used for statistical purposes when values were less than detection.

Where detection limits were greater than 10x the minimum detection limit due to high ionic strength, non-detect results were excluded from statistical calculations.

Table 2: Seepage Stations Classified By Water Type

Type 1 (pH >6.5, Zn <5 mg/L)		Type 2 (pH 6 – 7, Zn concentrations ranging from 4 to 595 mg/L)		Type 3 (pH <6, Zn typically >40mg/L)	
ID	Location	ID	Location	ID	Location
SRK-FD02	Upper Parking Lot Dump	SRK-FD1	Ore and Low Grade Ore Stockpiles	SRK-FD04	Oxide Fines Stockpile
SRK-FD05	Toe of Northeast Dump	SRK-FD8	East Main Dump	SRK-FD12 (1 of 6)	Ore and Low Grade Ore Stockpiles; West Main Dump
SRK-FD06	Toe of Northeast Dump	SRK-FD9	Ore and Low Grade Ore Stockpiles; West Main Dump	SRK-FD13	Intermediate Dump
SRK-FD07	Toe of Northeast Dump	SRK-FD10	Ore and Low Grade Ore Stockpiles; West Main Dump	SRK-FD20	Faro Creek Diversion
SRK-FD14 (6 of 7)	Ranch Zone Dump	SRK-FD12 (5 of 6)	Ore and Low Grade Ore Stockpiles; West Main Dump	SRK-FD21 (4 of 8)	Northeast Dumps towards Pit
SRK-FD16	Upper Northwest Dump	SRK-FD14 (1 of 7)	Ranch Zone Dump	SRK-FD22 (1 of 3)	Northeast Dumps towards Pit
SRK-FD17	Upper Northwest Dump	SRK-FD19	Lower Northwest Dump	SRK-FD23 (4 of 7)	Northeast Dumps towards Pit
SRK-FD18	Upper Northwest Dump	SRK-FD21 (4 of 8)	Northeast Dumps towards Pit	SRK-FD24 (1 of 10)	Northeast Dumps towards Pit
SRK-FD26	Northeast Dumps towards Pit	SRK-FD22 (2 of 3)	Northeast Dumps towards Pit	SRK-FD27 (1 of 4)	Northeast Dumps towards Pit
SRK-FD44 (1 of 4)	Intermediate Dump	SRK-FD23 (3 of 7)	Northeast Dumps towards Pit	SRK-FD30 (2 of 6)	West Main Dump
SRK-FD50	Zone II East	SRK-FD24 (9 of 10)	Northeast Dumps towards Pit	SRK-FD33	Mill
		SRK-FD27 (3 of 4)	Northeast Dumps towards Pit	SRK-FD34	Mill
		SRK-FD30 (4 of 6)	West Main Dump	SRK-FD35 (2 of 4)	Mill
		SRK-FD31	Ore + Low Grade Ore Stockpiles, West Main Dump	SRK-FD36	West Main Dump
		SRK-FD32	Mill	SRK-FD37	Medium Grade Stockpile
		SRK-FD35 (3 of 4)	Mill	SRK-FD38 (1 of 2)	Ore and Low Grade Ore Stockpiles
		SRK-FD38 (1 of 2)	Ore + Low Grade Ore Stockpiles	SRK-FD40 (4 of 9)	Faro Valley Dump
		SRK-FD40 (5 of 9)	Faro Valley Dump	SRK-FD46	Oxide Fines Stockpile, Mill
		SRK-FD44 (2 of 4)	Intermediate Dump	SRK-FD47	Intermediate Dump
		SRK-FD48	Intermediate Dump	SRK-FD49 (1 of 2)	Intermediate Dump
		SRK-FD49 (1 of 2)	Intermediate Dump		

Note: Where water type at a sampling station was variable over time, the number of samples of each type is shown, along with the total number of samples collected at a particular station. For example, seven samples have been collected at SRK-FD14, with six samples having Type 1 water quality, and one sample having Type 2 water quality.

- Type 1b seeps generally had zinc concentrations in the range of 2 to 7 mg/L, and sulphate concentrations greater than 500 mg/L. Most of these seeps were towards the southeast, and were below the sulphide cell. However, SRK-GD11, which was theoretically upgradient of the sulphide cell, also fell into this group until 2005. Waste rock mapping completed in September 2002 indicated that significant amounts of sulphide were present above this location, and that sulphidic waste rock was not limited to the sulphide cell. In Spring 2006, SRK-GD11 returned a dissolved zinc concentration of 17.4 mg/L and a field pH of 6.45 and has been reclassified as Type 2 using the Faro system.
- Two stations sampled at the toe of internal dump lifts (SRK-GD17 and –GD20) during Spring 2004 and Spring 2006 were also classified as Type 2. May 2006 zinc concentrations at both stations were considerably lower than observed in 2004, but remained elevated. Field pH was approximately 7.4 at both stations in May 2006.
- One sample of Type 3 water (SRK-GD19) was collected in Spring 2004 from the toe of an internal lift. Under the Faro system, this sample would be considered transitional between Type 2 and Type 3, based on a dissolved zinc concentration of 107 mg/L and a field pH of 5.7. This station has been dry during subsequent surveys.
- Station SRK-GD01 returned dissolved zinc concentrations of 17 mg/L and 10 mg/L in Spring 2004 and Spring 2005 respectively. These spring results are elevated over previously observed zinc concentrations at this station, although sulphate concentrations and field pH were within the range of previous results. In 2006, SRK-GD01 returned zinc concentrations of 3.1 mg/L (May) and 2.8 mg/L (September). These are typical zinc concentrations at SRK-GD01 for the 2002-2006 monitoring period, and appear to indicate that higher concentrations recorded in Spring 2004 and 2005 were not indicative of a trend. As the flow at SRK-GD01 is the single largest source of seepage from Grum Dump, water quality at this station will continue to be closely monitored.

Figure 2 shows the location of seep sampling stations, and provides a graphical summary of the distribution of the different seepage types. Table 3 provides a summary of key characteristics for each of the above seepage types. Full seepage results are included in Appendix A.

4.1.3 Vangorda Waste Rock Dumps

The May 2005 survey of the Vangorda Dump toes identified one new seep (SRK-VD12) at the south end of the dump; however, this seep was dry during the Fall 2005 survey and both surveys in 2006. A sample was also collected during May 2006 from Drain 4 (VD10), which was observed to flow for the first time in 2004; however, this station was dry during the Fall 2006 survey. The observed development of orange-to-dark brown staining in the drain channel over the 2004/2005 period suggests that flow from this drain is frequent, if not continuous. No new seeps were identified at Vangorda in 2006.

Water Types

All of the seeps associated with the Vangorda Waste Rock Dump had very high concentrations of zinc and other metals. Five of the seeps sampled in 2006 had pHs between 6 and 7, and four of the seeps were acidic, with pHs of less than 6.

- The seeps with pHs between 6 and 7 can be classified as Type 2 seeps following the system described for the Faro seeps (Section 4.1.1). At Vangorda, these seeps tended to have higher zinc concentrations (20 to 2580 mg/L) than Faro waste rock seeps, reflecting the high proportion of sulphidic waste rock in the Vangorda Dumps. These seeps also had elevated concentrations of cobalt, iron, manganese, and nickel. Cobalt and nickel concentrations were substantially higher than in Type 2 seeps at Faro.
- The acidic seeps can be classified as Type 3 following the system described for Faro. These seeps also tended to have higher zinc concentrations than observed in waste rock seeps at Faro, with values ranging from 87 to 13,100 mg/L. Aluminum, cadmium, cobalt, copper, iron, manganese and nickel concentrations were also generally very high.

Figure 2 shows the location of seep sampling stations, and provides a graphical summary of the distribution of the different seepage types. Table 4 provides a summary of key characteristics for each of the above seepage types. Trends in water quality from the Vangorda dump drains sampled as part of the routine monitoring program carried out by site staff are discussed in Section 4.2.

4.2 Historical Seepage Monitoring

4.2.1 Faro Site

Locations of the routine seepage monitoring stations are shown in Figure 1. Data for these stations are available in the MS Access database maintained by GLL. Graphs of key parameters are provided in Figures 6 to 11. Plotted values typically represent dissolved concentrations; where only total concentration was reported, this value was used for plotting purposes. Where reported concentrations were below method detection levels, the detection level values were plotted; this causes plotted values for some trace metals to decline over time as lower detection levels were achieved, and is not necessarily indicative of declining concentrations of these parameters.

Station X23

Station X23 is located east of the mill, in the original Faro Creek channel, below the East Main Dump, the Oxide Fines Stockpile, and the Medium Grade Stockpile. Interpretation of trends in this data is complicated by the deposition and removal of some of the stockpiled ore, and by leakage of pit water into the old Faro Creek channel from a drainage ditch during operations (RGI 1996).

This station has been monitored for select parameters since 1986, and for a full suite of parameters since 1989. The data are summarized in Figure 6.

Table 3: Characteristics of Grum Water Types

Parameter	Detection Limits	Type 1a					Type 1b					Type 2			Type 3	
		Average	Median	Min	Max	N	Average	Median	Min	Max	N	Min	Max	N	Value	N
Field pH (s.u.)	0.01	7.39	7.37	6.73	7.85	24	7.36	7.45	6.65	8.06	35	6.20	7.47	7	5.73	1
Acidity pH 8.3	1	9	7.0	1.0	40	25	21	19	1.0	69	35	12.6	198	7	238	1
Alkalinity Total	1	315	336	108	473	25	508	552	255	700	35	130	619	7	39	1
Chloride	0.5	1.9	1.6	0.50	5.0	25	2.8	2.4	0.50	5.0	35	0.52	5.0	7	0.58	1
Sulphate	0.5	338	362	7.0	731	25	1271	1220	332	2170	35	566	2770	7	1710	1
Calcium	0.05	151	153	42	286	25	324	337	115	477	35	170	416	7	321	1
Magnesium	0.1	70	70	23	156	25	236	216	70	438	35	128	413	7	167	1
Potassium	2	2.5	2.2	2.0	4.1	25	7.2	7.0	2.5	12	35	3.4	20	7	6.5	1
Sodium	2	3.1	3.0	2.0	5.9	25	11	11	2.0	18	35	3.9	15	7	4.5	1
Aluminum	0.2	0.20	0.20	0.20	0.20	25	0.20	0.20	0.20	0.20	35	0.20	0.20	7	0.28	1
Cadmium	0.01	0.01	0.01	0.01	0.01	25	0.01	0.01	0.01	0.01	35	0.01	0.09	7	0.18	1
Cobalt	0.01	0.01	0.01	0.01	0.01	25	0.01	0.01	0.01	0.05	35	0.03	0.45	7	0.70	1
Copper	0.01	0.01	0.01	0.01	0.01	25	0.01	0.01	0.01	0.04	35	0.01	0.12	7	2.1	1
Iron	0.03	0.04	0.03	0.03	0.21	25	0.03	0.03	0.03	0.04	35	0.03	27	7	46	1
Lead	0.05	0.05	0.05	0.05	0.05	25	0.05	0.05	0.05	0.05	35	0.05	0.05	7	0.14	1
Manganese	0.005	0.12	0.007	0.005	1.9	25	0.15	0.062	0.005	1.00	35	0.576	6.62	7	7.5	1
Nickel	0.05	0.07	0.05	0.05	0.13	25	0.41	0.36	0.22	0.92	35	0.10	1.46	7	2.7	1
Zinc	0.005	0.035	0.008	0.005	0.389	25	3.9	3.0	1.7	17.2	35	9.2	110	7	107	1

Note: Units in mg/L except for acidity/ alkalinity in mg CaCO₃ eq/L

Note 2: Detection limits were used for statistical purposes when values were less than detection. Where detection limits were greater than 10x the minimum detection limit due to high ionic strength, non-detect results were excluded from statistical calculations.

Table 4: Characteristics of Vangorda Water Types

Parameter	Detection Limits	Type 2					Type 3				
		Average	Median	Min	Max	N	Average	Median	Min	Max	N
Field pH (s.u.)	0.01	6.33	6.24	5.89	7.08	25	4.32	3.99	2.55	5.93	35
Acidity pH 8.3	1	697	224	38	6230	25	8501	5390	213	28700	35
Alkalinity Total	1	131	141	8	351	25	25	2.0	1.0	127	35
Chloride	0.5	0.95	0.62	0.50	2.5	18	54	0.50	0.50	1000	19
Sulphate	0.5	3776	2690	323	18600	25	20553	15000	1550	67700	35
Calcium	0.05	342	393	71	534	25	428	449	196	530	35
Magnesium	0.1	508	370	27	2790	25	2141	879	105	7400	35
Potassium	2	8.9	11	2.0	20	24	11	10	4.0	28	19
Sodium	2	8.3	9	2.0	20	24	8.3	5.2	2.3	20	19
Aluminum	0.2	0.34	0.20	0.20	2.00	24	52	15	0.40	339	32
Cadmium	0.01	0.15	0.08	0.04	1.1	25	4.1	1.1	0.10	23	35
Cobalt	0.01	1.9	0.88	0.06	10	25	11.5	6.0	0.30	38	35
Copper	0.01	0.02	0.02	0.01	0.07	23	9	0.67	0.02	180	23
Iron	0.03	99	7.4	0.03	1070	25	1187	807	0.12	4100	35
Lead	0.05	0.13	0.07	0.05	1.0	25	0.8	0.59	0.10	2.5	22
Manganese	0.005	149	44	3.3	1200	25	1307	338	18	4030	35
Nickel	0.05	2.8	2.4	0.11	7.2	25	9.4	5.0	0.8	26	35
Zinc	0.005	341	125	20	2580	25	3923	1750	87	13100	35

Note: Units in mg/L except for acidity/ alkalinity in mg CaCO₃ eq/L

Note 2: Detection limits were used for statistical purposes when values were less than detection. Where detection limits were greater than 10x the minimum detection limit due to high ionic strength, non-detect results were excluded from statistical calculations.

Sulphate concentrations increased in stages, from less than 2000 mg/L in 1986 to approximately 6000 mg/L in 2000/2001, followed by a slight decrease to approximately 4000 mg/L in 2002 and 2003. Since mid-2004, sulphate concentrations at X23 have varied seasonally between approximately 5000 and 7000 mg/L (Figure 6). The higher sulphate concentrations observed since 2004 correspond to a slight decrease in pH from an average of approximately 7 to an average of approximately 6.5, and changes in the major ion chemistry from calcium-dominated to magnesium-dominated. Peak concentrations of iron (200 mg/L), zinc (1000 mg/L), and several other metals (e.g. aluminum, cadmium, cobalt, and copper) were also observed during this period. These observations indicate that the seepage chemistry continues to be in a state of transition, and that concentrations could continue to increase over time. However, concentrations of most parameters exhibited similar seasonal patterns and magnitudes in both 2004 and 2005, and did not increase significantly.

Station X26

Station X26 is the discharge from the dewatering sump for the Zone II pit, which is completely filled in and buried by waste rock. The sump is operated over an approximately 3 month period during the summer, and water levels are allowed to fluctuate between depths of 60 and 52 metres below the current ground surface. The variable water table in the backfilled Zone II pit causes repeated wetting and submergence of backfill and former pit walls, and sulphides in the former pit walls and backfill may contribute oxidation products to the water sampled at X26. Results from this station are shown in Figure 7.

Monitoring data showed an initial decrease in sulphate concentrations over the first two years of monitoring (1991 to 1993), followed by a gradual and relatively steady increase over the past 13 years of monitoring with concentrations around 3000 mg/L in 2005 and 2006. pHs were relatively stable, in the range of 6 to 6.5. Zinc concentrations increased from approximately 50 to 100 mg/L, and iron concentrations followed a similar trend.

There is a weak seasonal pattern in metal concentrations, with generally higher concentrations occurring later in the summer, when dewatering levels are at a minimum. Based on this variation, it is possible that there is some stratification of concentrations in the flooded zone of the pit, or that oxidation products leached from backfill and pit walls are responsible for this increase.

Station FCO/A30

Station A30 (SRK-FD40) is located along the north wall of the pit, below the Faro Valley Dump. The current location is accessed by hiking down from the Faro Valley Dump. In earlier years, the station was a sump, which may have received drainage from other seepage along the pit walls. Station FCO is located immediately upstream of the Faro Valley Dump, and maybe somewhat influenced by leakage through mineralized rock in the road and berm that comprise the Faro Creek Diversion. Both stations have relatively high flows, and these flows contact waste rock along the flowpath between A30 and FCO. Results for these two stations are provided in Figure 8.

Sulphate concentrations at A30 increased from approximately 200 mg/L in 1989 to 600 mg/L in 1997, and ranged from 100 to 600 mg/L for the subsequent period through 2003. Since 2004, average and peak sulphate concentrations at A30 have increased, with a maximum concentration of 1340 mg/L recorded in May 2005. Sulphate concentrations in 2006 ranged from 350 to 1100 mg/L. pHs decreased from pH 7.5 in 1989 to pH 3 in 1998. Monitoring from 2001 through 2006 recorded fluctuating pHs, with several pH values near 3 and several in the range of 5.6 to 7.5. Zinc concentrations followed similar trends to sulphate, reaching peaks of approximately 100 mg/L in 1998, and then varying from approximately 10 to 100 mg/L since that time. The wide variations in seepage chemistry may reflect differences in the amount of vertical versus lateral flow through the pile. In addition, interpretation of 2006 water quality results is confounded by alkaline additions from placement of limestone upgradient during summer 2006, as discussed in Section 4.1.1.

Station SP5/6

Station SP5/6 (equivalent to SRK-FD26) is located below the Upper North East Dump. Flows at this station are substantial, and may be due to leakage from the Faro Creek Diversion. Results for this station are provided in Figure 9.

Sulphate concentrations ranged from 200 mg/L to 1000 mg/L, and were variable. Zinc concentrations ranged from approximately 2 mg/L to 5 mg/L, and calcium, magnesium, and zinc concentrations were strongly correlated with sulphate. Variations in concentrations appear to be weakly correlated to flows, with lower concentrations occurring in the June samples, and higher concentrations occurring in the fall samples.

Stations NE1, NE2 and W5

Stations W5, NE1 and NE2 are located along the toe of the Northeast Dump. W5 was monitored from 1989 to 1991, and then again since 2004, and was probably sampled close to the toe of the dump. Therefore, it is likely that this station is equivalent to SRK-FD05 and -FD06. NE1 and NE2 are monitored in the regular seepage program, but are collected approximately 100 metres downstream of the toe, and may be influenced by interaction with the till in that area. Results for all three stations are provided in Figure 10. Data from SRK-FD05 and FD06 are shown in the W5 graphs.

Sulphate concentrations in W5 increased from approximately 300 mg/L in 1987 to 1989 to approximately 400 mg/L in the more recent samples. One sample collected from SRK-FD06B had a peak value of 1160 mg/L sulphate in spring 2006. Samples collected in the fall from SRK-FD05 and W5 had sulphate concentrations between 250 and 350 mg/L. Zinc concentrations increased from much less than 1 mg/L in 1989/90 to seasonably-variable concentrations of 0.5 to 4 mg/L in the last few years. The sample collected from SRK-FD06B in spring 2006 had a peak Zn value of 14.4 mg/L. Field pHs during this period were neutral, and concentrations of other metals were generally low.

Sulphate concentrations at NE1 were stable within the range of 70 to 130 mg/L from 1997 through 2003, and then increased to range between 100 and 290 mg/L since 2004. Metal concentrations at this station were low throughout the monitoring period.

Sulphate concentrations in NE2 increased from approximately 100 mg/L in 1997 to variable concentrations between 400 and 900 mg/L since mid-2000. Metal concentrations at this station were low throughout the monitoring period.

Station W8/W10

Station W8 is located in Upper Guardhouse Creek, which flows under and alongside an approximately 50 metre section of the Northwest Dump. This station is equivalent to SRK-FD16. Station W10 is located approximately 100 metres upstream from this station and is unaffected by

mining activities. Results for W8 (including data from SRK-FD16), and W10 are provided in Figure 11.

Results for both stations indicate consistently neutral pHs, low sulphate and low metal concentrations. There is little if any increase in concentration between W10 and W8.

4.2.2 Grum Site

The routine monitoring stations at Grum are shown in Figure 2. Station V2 has been monitored on a regular basis since 1988, with monitoring at V2A since 1997 and at V15 since 1995. The routine stations are located along the road access and are between 200 and 800 metres below the toe of the dumps, where dilution of toe seepage by surface water and interaction of toe seepage with soils along the flow-paths could be expected. As such, results from these stations are not directly comparable to seepage at the toes of the dumps. The routine seepage monitoring data were available from the MS Access database maintained by GLL. Graphs of key parameters are provided in Figures 12 and 13. Plotted values represent dissolved concentrations; where only total concentration was reported, this value was used for plotting purposes. Where reported concentrations were below method detection levels, the detection level values were plotted, causing plotted values for some trace metals to decline over time as lower detection levels were achieved. As such, these changes are not necessarily indicative of declining concentrations of these parameters.

Stations V15 and V2

Station V15 represents surface runoff and groundwater seepage discharging from a sedimentation pond below the toe of the waste dump at the upper limit of Tributary A. The area immediately upgradient is a groundwater discharge zone for one of the Grum Dump catchments, and toe seeps at stations SRK-GD04 and SRK-GD21 are intermittently present as surface discharges. Water at station V15 has been in close contact with soils and sediments, and chemical interaction with these materials is likely significant. Results for these stations are provided in Figure 12.

Sulphate concentrations at Station V15 increased gradually between 1996 and 2000 (from 100 mg/L to 300 mg/L), and then more rapidly in 2000 and 2001, reaching levels in the range of 1000 mg/L by June 2001. Sulphate concentrations remained at approximately 1000 mg/L until 2004, and then increased to approximately 2000 mg/L by fall of 2005, with a March 2005 spike to approximately 3000 mg/L. Sulphate concentrations remained at approximately 2000 mg/L through 2006. The increase in sulphate concentrations corresponded to increases in calcium and magnesium concentrations, with calcium concentrations generally exceeding magnesium concentrations. pHs was stable in the range of 7.5 to 8 throughout the monitoring period.

Station V2 is located upstream of Vangorda Creek in the original Grum Creek channel, and is fed by discharge from the sedimentation pond at V15, as well as by seepage losses from the Grum Creek diversion and local runoff.

Sulphate concentrations at V2 increased from less than 50 mg/L in the late 1980s (i.e. prior to dump construction) to approximately 150 mg/L in 1998. In 1998, concentrations started to increase rapidly, reaching 600 to 700 mg/L by 2000. Sulphate concentrations remained between 600 and 700 mg/L from 2000 through mid-2004 then increased to approximately 800 to 1200 mg/L by 2005/2006. pHs were in the range of 7 to 8.5 throughout this period. The increase in sulphate concentrations was accompanied by an increase in both calcium and magnesium concentrations. Calcium remained the dominant cation.

Zinc concentrations at stations V15 and V2 were highly variable, with typical concentrations ranging from less than 0.01 to 0.1 mg/L prior to 1998, from 0.1 to 1 mg/L from 1998 through 2002, and from 0.01 to 0.1 mg/L from 2002 on. V15 has shown an increasing Zn trend over 2006, with late 2006 concentrations up to 0.5 mg/L. Occasional outliers of greater than 1 mg/L have been recorded at both stations during and prior to 2002, and appear to be correlated with elevated aluminum and TSS concentrations. Concentrations of other metals (e.g. cadmium, iron, cobalt, and copper) were variable, but generally low, and have remained constant or declined in recent years.

Station V2A

Station V2A represents the downstream extent of the largest seepage flows that originate at the toe of the dump, at stations SRK-GD01 and SRK-GD02. Station V2A is sampled where water diverted from Grum Creek discharges into Moose Pond via a culvert. Sample frequency was irregular at this station prior to 2002. Results for this station are provided in Figure 13.

Sulphate concentrations at Station V2A increased erratically between 1996 and 1999 (from 100 mg/L to 400 mg/L). No monitoring was conducted at V2A during 2000, and sulphate concentrations had jumped to 800 mg/L by the next monitoring event in June 2001. Sulphate concentrations at V2A then varied seasonally between 300 and 900 mg/L from 2001 to late 2006, with peaks of approximately 900 mg/L sulphate occurring during the summer period since 2004. The seasonally-fluctuating sulphate concentrations were mirrored by calcium and magnesium concentrations over the 2001-2006 period. pHs were stable in the range of 7.5 to 8.5 throughout the monitoring period.

Zinc concentrations at Station V2A were highly variable, with typical concentrations ranging from less than 0.01 to 0.1 mg/L prior to 2000. Zinc concentrations from 2001 to present appeared to follow a pattern of annual peaks during June freshet (0.2 to 3.4 mg/L) and lows associated with late winter flows (0.05 to 0.08 mg/L). Zinc concentrations at V2A peaked during summer 2005, ranging from 0.7 to 1.3 mg/L and 2006 concentrations show a similar seasonal pattern with somewhat lower absolute concentrations. Other metal concentrations (e.g. cadmium, iron, cobalt, and copper) were variable, but generally low, and did not change significantly over time.

4.2.3 Vangorda Site

The routine seepage monitoring stations at Vangorda are the three drains shown in Figure 2, as well as a Vangorda Creek monitoring station below all mine inputs (not shown on Figure 2). Results for these stations were available from the MS Access database maintained by GLL. Graphs of key parameters are provided in Figures 14 to 17. Plotted values represent dissolved concentrations; where only total concentration was reported, this value was used for plotting purposes. Where reported concentrations were below method detection levels, the detection level values were plotted; this causes plotted values for some trace metals to decline over time as lower detection levels were achieved, and is not necessarily indicative of declining concentrations of these parameters.

Drains 3, 5 and 6 (Stations V30, V32 and V33)

Three of the drains (Drain 3, 5 and 6) at Vangorda have been monitored as part of the routine monitoring programs since 1994. The other drains (Drains 1, 2 and 4) have historically been consistently dry. Results are shown in Figures 14 to 16.

Results for station V30 (Drain 3, SRK-VD03) are provided in Figure 14. Seepage from this station had pHs close to 6 throughout the monitoring period. Sulphate concentrations increased from 2500 mg/L in 1994 to a peak concentration of 6200 mg/L in fall 2004 and had decreased to approximately 4500 mg/L in 2006. Zinc concentrations were highly variable in the range of 150 to 600 mg/L from 1994 through spring 2000. Station V30 was not monitored again until spring 2002 and zinc concentrations have been more stable since that time, in the range of 300 to 600 mg/L.

Results for station V32 (Drain 5, SRK-VD04) are provided in Figure 15. pHs at this station have decreased from approximately 5 in 1994 to approximately 3 over the 2003 through 2006 period, with one value of 2.2 reported. Sulphate concentrations increased substantially during this period from approximately 5000 mg/L in 1994 to greater than 60,000 mg/L in 2006, with a peak of 93,000 mg/L reported in 2004. The high sulphate concentrations were supported by a similar magnitude of increase in magnesium concentrations as well as substantial increases in iron, manganese and zinc concentrations. Recent iron and manganese concentrations have been in the range of 3000 to 3500 mg/L, and zinc concentrations have been approximately 12000 mg/L. Concentrations of aluminum, and cadmium increased until 2005, up to 360 and 18 mg/L, respectively, and were slightly lower in 2006. Cobalt (40 mg/L) and nickel (26 mg/L) concentrations were relatively stable over the 2002 through 2006 monitoring period. Concentrations of copper declined from a peak of 0.5 mg/L in 2003 to values of approximately 0.02 mg/L in 2006. Lead concentrations were highest between 1997 and 2000 (10 mg/L) and have decreased to approximately 1 mg/L in 2005/2006.

Results from Station V33 (Drain 6, SRK-FD05) are provided in Figure 16. pHs were in the range of 6 to 7 from 1994 to 1999, dropped to approximately 6 in the 2000 to 2002 samples, and further decreased to between 5 and 6 since 2004, with a single low value of 3.2 reported in 2005. Sulphate concentrations were in the range of 2000 to 5000 mg/L from 1994 to 2000, and then increased to a peak of approximately 90,000 mg/L in 2004, and concentrations between 40,000 and 60,000 mg/L in 2006. Magnesium concentrations increased over time, beginning in 2001, and were correlated with

sulphate concentrations. Concentrations of iron, zinc and several other metals have increased slightly since 2000, with zinc concentrations in the range of 3000 to 10,000 mg/L in recent years.

Station V27

Station V27 is the first routine monitoring station in Vangorda Creek downstream of the Vangorda and Grum Waste Rock dumps and other mine-related sources. Although interpretation of the surface water sampling stations is not directly relevant to the seepage monitoring program, the low flows observed in seeps from the Vangorda Dump suggest that some water could be leaving the system via the subsurface. Station V27 is sufficiently lower in elevation that it could be reasonably expected to pick-up any contaminants that are transported via the groundwater system. However, Vangorda Creek flows are very large, so significant changes in loading would be needed before any changes from the dumps could be observed. Also, arrival of Vangorda Dump contaminants at Vangorda Creek may not yet have occurred, as groundwater movement in the soils underlying the dump is expected to be slow. In addition, any loading entering the creek from the Grum dump would contribute to loads at this location. Results for station V27 are presented in Figure 17.

Results for this station indicated consistently neutral pHs, and generally low sulphate concentrations from 1991 to 2002. A sulphate concentration of 125 mg/L was recorded in spring 2002 but concentrations have been decreasing since that time to a range of 30 – 60 mg/L in 2005/2006. Metal concentrations were generally very low, and have exhibited a slightly decreasing trend since 2002. Copper and zinc concentrations in Vangorda Creek were near or above CCME guidelines for aquatic life, and detection limits for several other parameters were too high to evaluate whether they meet CCME criteria.

4.3 Temperature and Oxygen Monitoring of Waste Rock

There were no significant changes in the temperature and oxygen monitoring data compared to data previous years (see SRK 2006b). Therefore, further interpretation of the data is not warranted at this time. The seasonal differences in oxygen concentrations show that continuing a round of winter data collection is important for understanding seasonal and annual variations in sulphide oxidation rates.

5 Conclusions

Seeps associated with the Faro Waste Rock Dumps showed a wide range of pH and zinc concentrations. The highest zinc concentrations (>200 mg/L, as high as 15,800 mg/L) were associated with the ore stockpiles and mill area. High zinc concentrations were also associated with the sulphide cells on the Main Dumps (up to 900 mg/L). A large number of seeps associated with the waste rock were acidic or partially buffered, and had zinc concentrations in the range of 20 to 530 mg/L. A moderate number of seeps at Faro had alkaline pHs, and zinc concentrations of less than 5 mg/L. These were associated with dumps that contained relatively little sulphide waste rock. Cadmium, cobalt, copper, iron, manganese and nickel concentrations in some of the seeps are at concentrations that significantly exceed receiving water quality criteria.

Seeps associated with the Grum Waste Rock Dumps had consistently neutral to alkaline pHs. Seeps draining to the southeast had zinc concentrations ranging from 2 to 17 mg/L and elevated sulphate concentrations. Seeps draining to the northwest had zinc concentrations ranging from 0.02 to 0.13 mg/L, dissolved nickel concentrations up to 0.13 mg/L, and generally lower, but increasing, sulphate concentrations. The seeps to the Southeast were located below the sulphide cell, or below sulphidic waste identified in the SRK September 2002 surface mapping programs. Zinc concentrations remained within stable ranges at all southeast draining seeps in 2006. No other trace metals of concern have been identified in the Grum seepage to date.

Seeps associated with the Vangorda Waste Rock Dumps were acidic to partially buffered, and contained high to very high zinc concentrations (from 20 to 13,100 mg/L). Sulphate and zinc concentrations have increased since the routine seepage monitoring programs were initiated in 1994, but concentrations appear to have stabilized within broad ranges of seasonal variation since 2004. Other trace metals significantly exceeding receiving water quality criteria in the Vangorda seepage include aluminum cadmium, cobalt, copper, iron, manganese and nickel. Cobalt and nickel are notably higher compared to acidic seeps at Faro.

Routine monitoring station X23 below the Faro Main Dump showed similar seepage chemistry to that observed in 2005. Field pH, sulphate, major ion and trace metal concentrations measured in 2006 all showed seasonal variability, as previously observed, and did not exceed extreme values recorded in 2005.

Routine monitoring of stations V2 and V2A (southeast of Grum Dump) in 2006 showed similar pH conditions and major and trace element concentrations as observed in 2005. However, a dramatic increase in zinc concentration at station V15 (upgradient of V2) was observed, with dissolved zinc concentration steadily increasing from the previously-observed maximum of about 0.05 mg/L in December 2005 to over 0.5 mg/L in October 2006. The trend in dissolved zinc concentrations at station V15 appears to show a classic case of breakthrough of an attenuated chemical species, and the results reviewed to date do not suggest that the breakthrough process has run its course. For a

detailed discussion of the evolution of Grum Dump seepage chemistry, see the 2006 AMP Event #4 Response: Status Report (SRK, 2007).

Pit seepage monitoring was carried out during 2006 to supplement the existing pit seep monitoring record. Detailed evaluation of the 2006 monitoring results was not carried out.

There were no significant changes in the temperature and oxygen monitoring data compared to data previous years (see SRK 2006b). Therefore, further interpretation of the data is not warranted at this time.

This report, **1CD003.085 – Anvil Range Mining Complex- 2006 Waste Rock and Seepage Monitoring Report: 2006/07 Task 14** was prepared by SRK Consulting (Canada) Inc.

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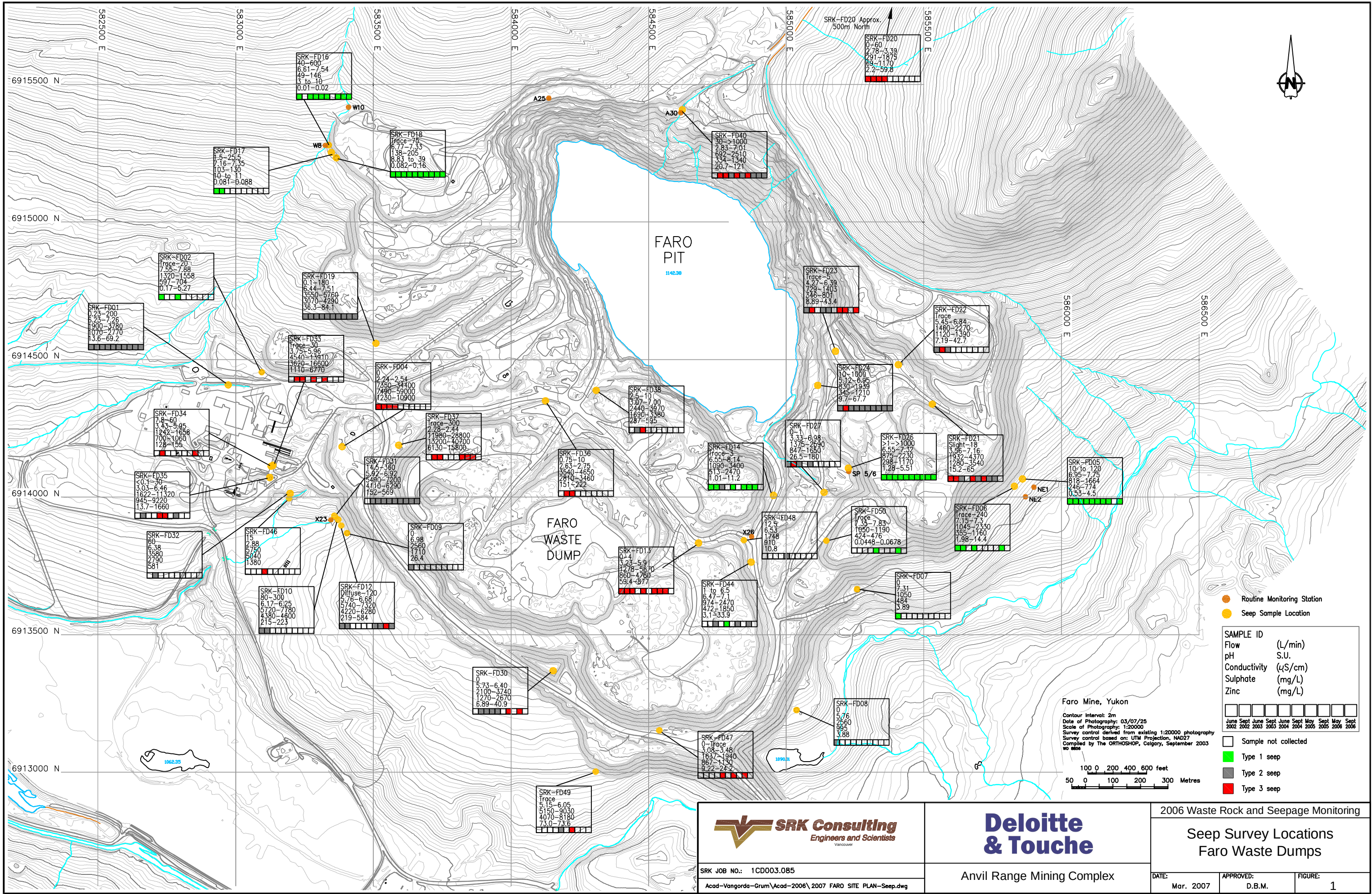
Reviewed by

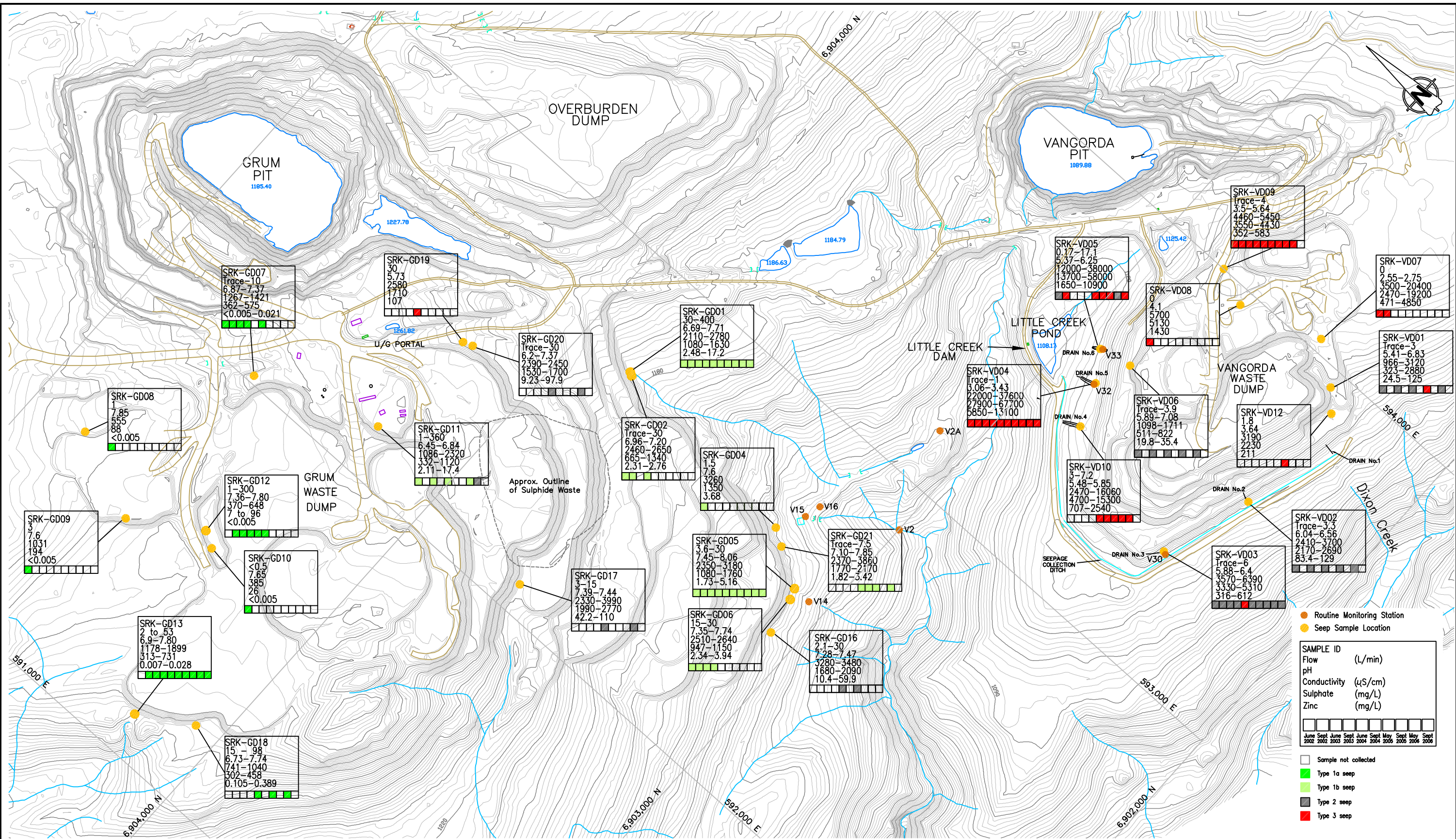
Kelly Sexsmith, P.Geo. (B.C.)

6 References

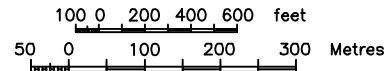
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Figures

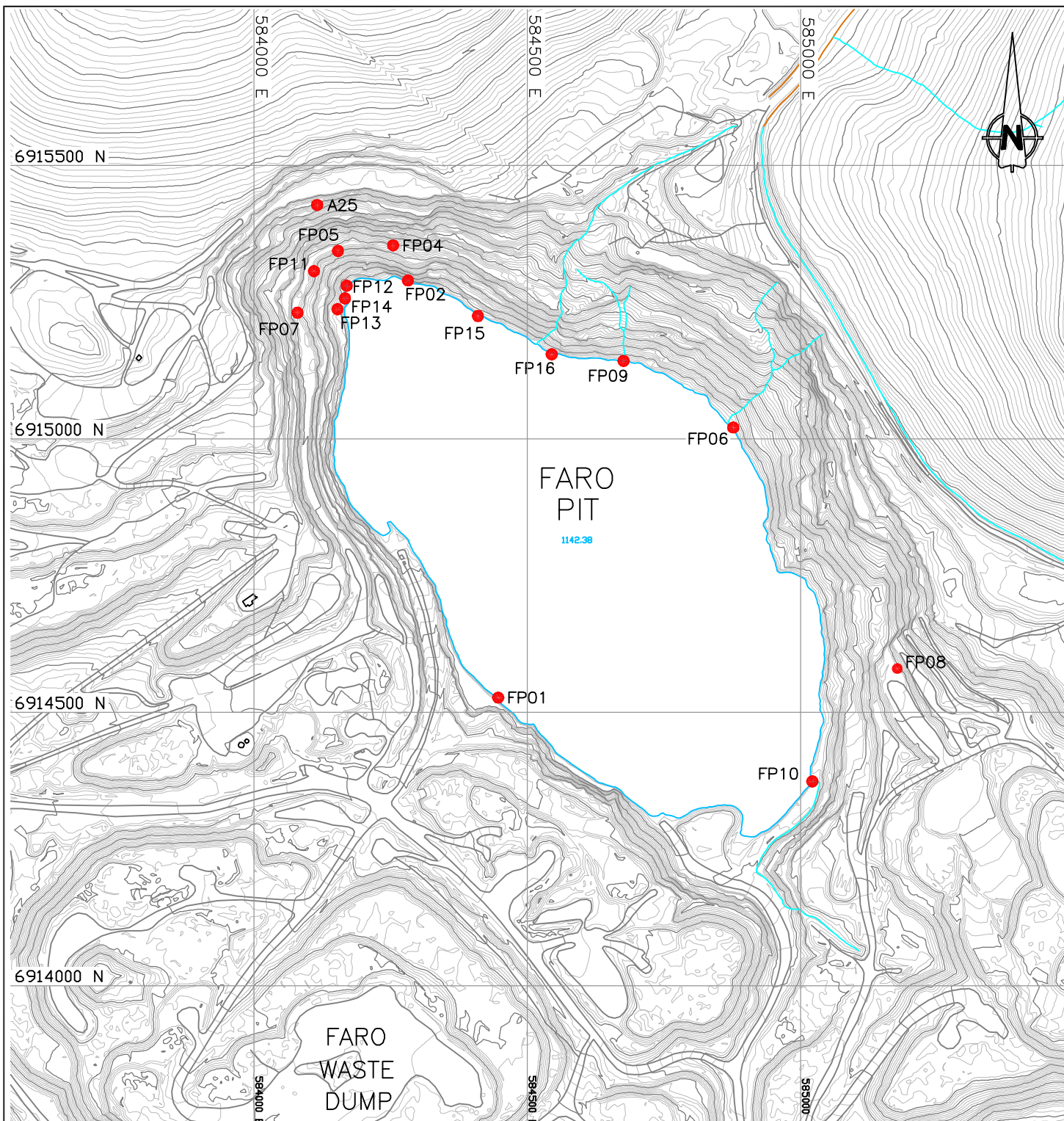




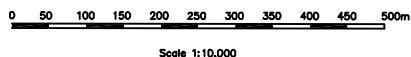
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Survey control derived from existing 1:20000 photography
Survey control based on: UTM Projection, NAD27
Compiled by The ORTHOSHOP, Calgary, September 2003
WO 8856



 SRK Consulting Engineers and Scientists Vancouver	Deloitte & Touche		2006 Waste Rock and Seepage Monitoring		
			Seep Survey Locations Vangorda & Grum Waste Dumps		
SRK JOB NO.: 1CD003.085 Acad-Vangorda-Grum\Acad-2007\site_plan_2006-Seep.dwg	Anvil Range Mining Complex		DATE: Mar. 2007	APPROVED: D.B.M.	FIGURE: 2

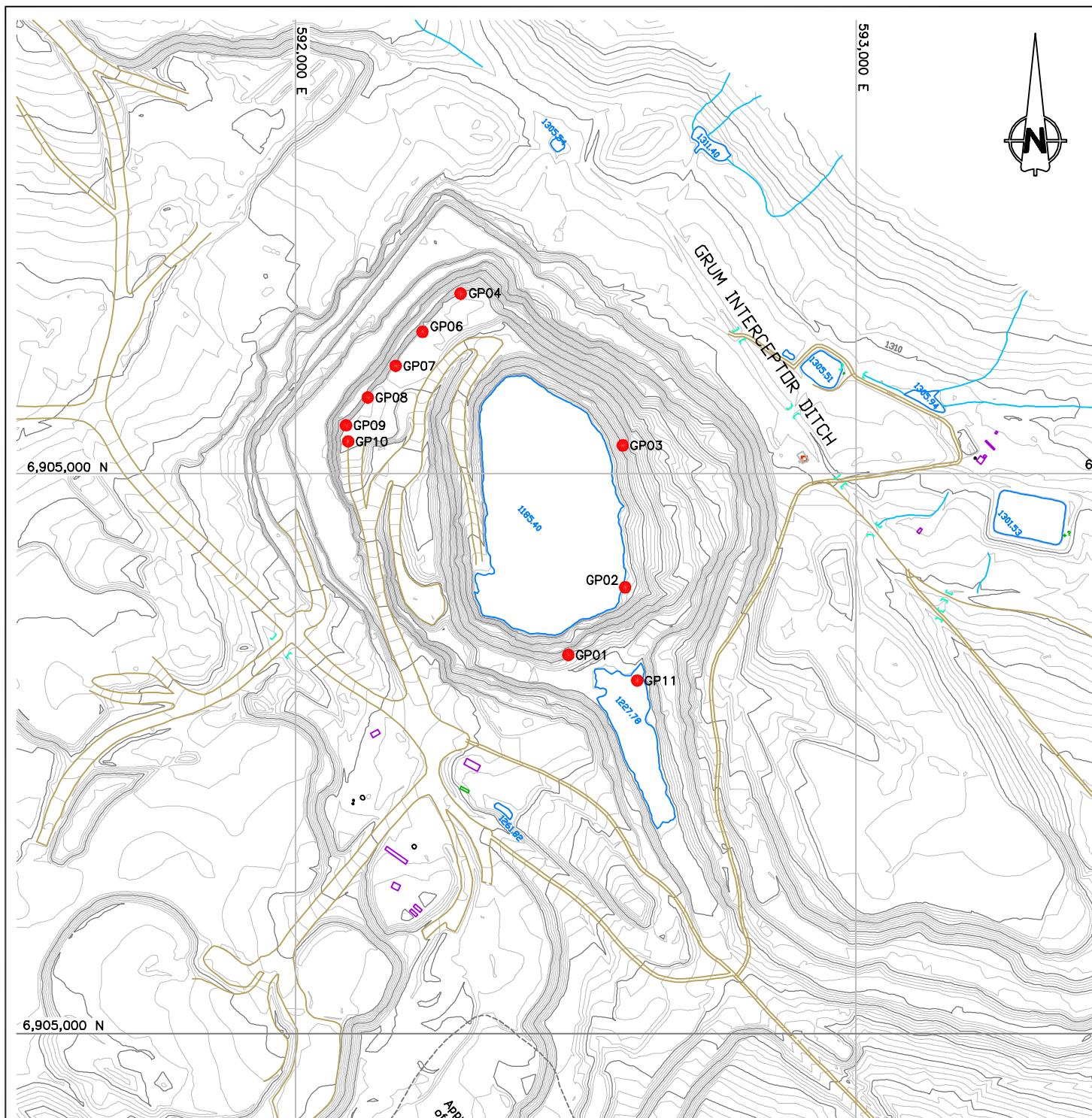


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 Compiled by The ORTHOSHOP, Calgary, September 2003
 WO 8856



● Seep Sample Location

 SRK Consulting <i>Engineers and Scientists</i> Vancouver	 Deloitte & Touche	2006 Waste Rock and Seepage Monitoring		
		Seep Survey Locations Faro Pit		
SRK JOB NO.: 1CD003.085 Acad-Vangorda-Grum\Acad-2007\2007 FARO SITE PLAN-Seep.dwg	Anvil Range Mining Complex	DATE: Mar. 2007	APPROVED: D.B.M.	FIGURE: 3



0 50 100 150 200 250 300 350 400 450 500m

Scale 1:10,000

● Seep Sample Location

Contour Interval: 2m
Date of Photography: 03/07/25
Scale of Photography: 1:20000
Survey control derived from existing 1:20000 photography
Survey control based on: UTM Projection, NAD27
Compiled by The ORTHOSHOP, Calgary, September 2003
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**Deloitte
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2006 Waste Rock and Seepage Monitoring

Seep Survey Locations
Grum Pit

SRK JOB NO.: 1CD003.085

Acad-Vangorda-Grum\Acad-2007\site_plan_2006-Seep.dwg

Anvil Range Mining Complex

DATE:

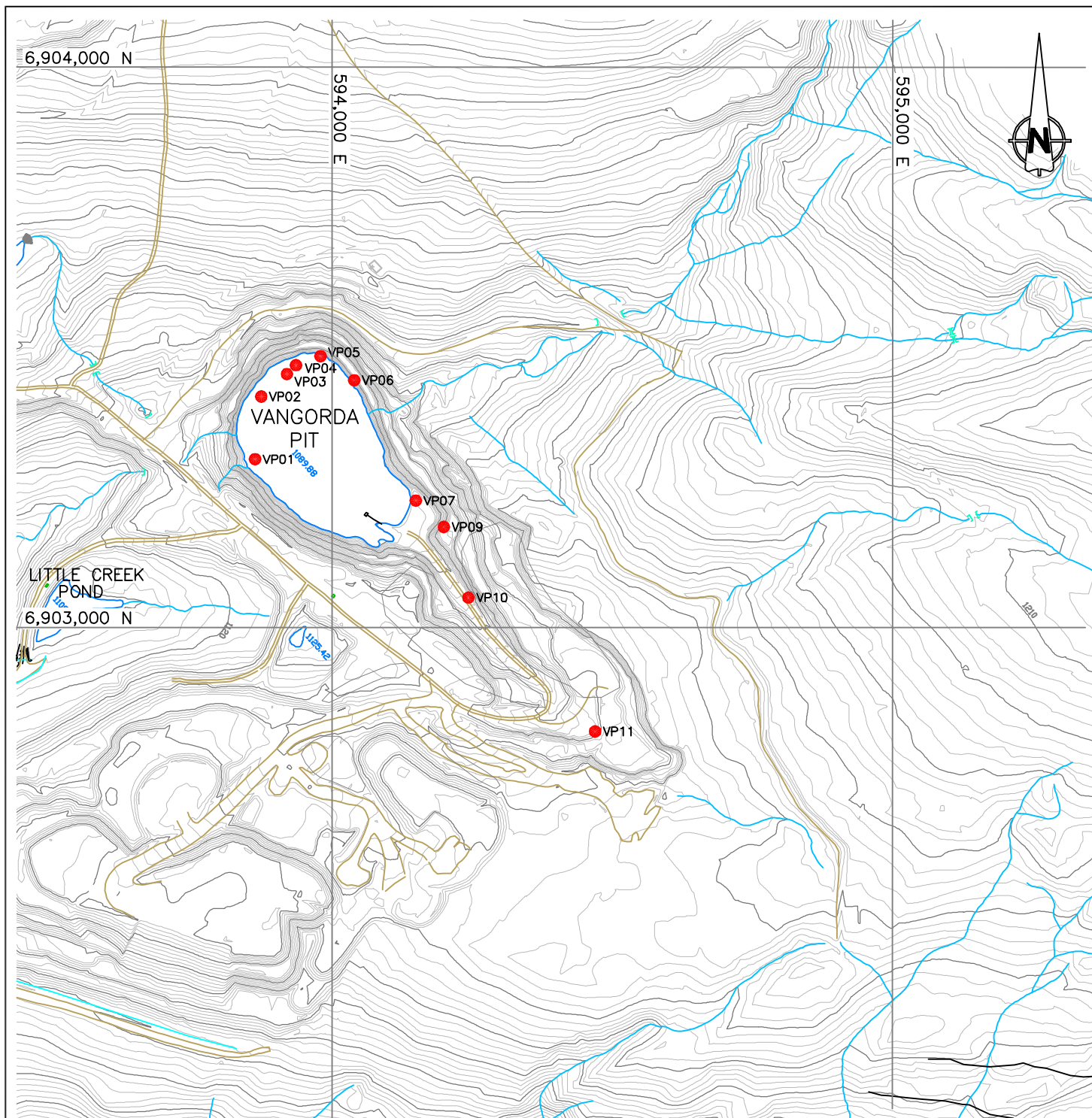
Mar. 2007

APPROVED:

D.B.M.

FIGURE:

4



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 Survey control based on: UTM Projection, NAD27
 Compiled by The ORTHOSHOP, Calgary, September 2003
 no base

0 50 100 150 200 250 300 350 400 450 500m

Scale 1:10,000

● Seep Sample Location



**Deloitte
& Touche**

2006 Waste Rock and Seepage Monitoring

**Seep Survey Locations
Vangorda Pit**

SRK JOB NO.: 1CD003.085

Acad-Vangorda-Grum\Acad-2007\site_plan_2006-Seep.dwg

Anvil Range Mining Complex

DATE:

Mar. 2007

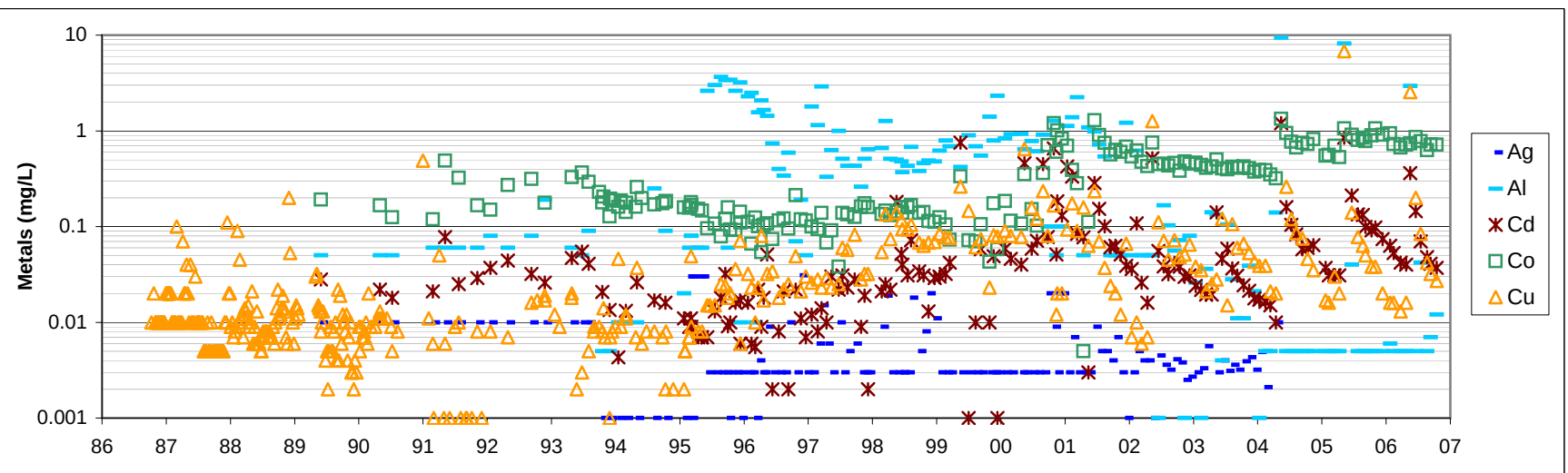
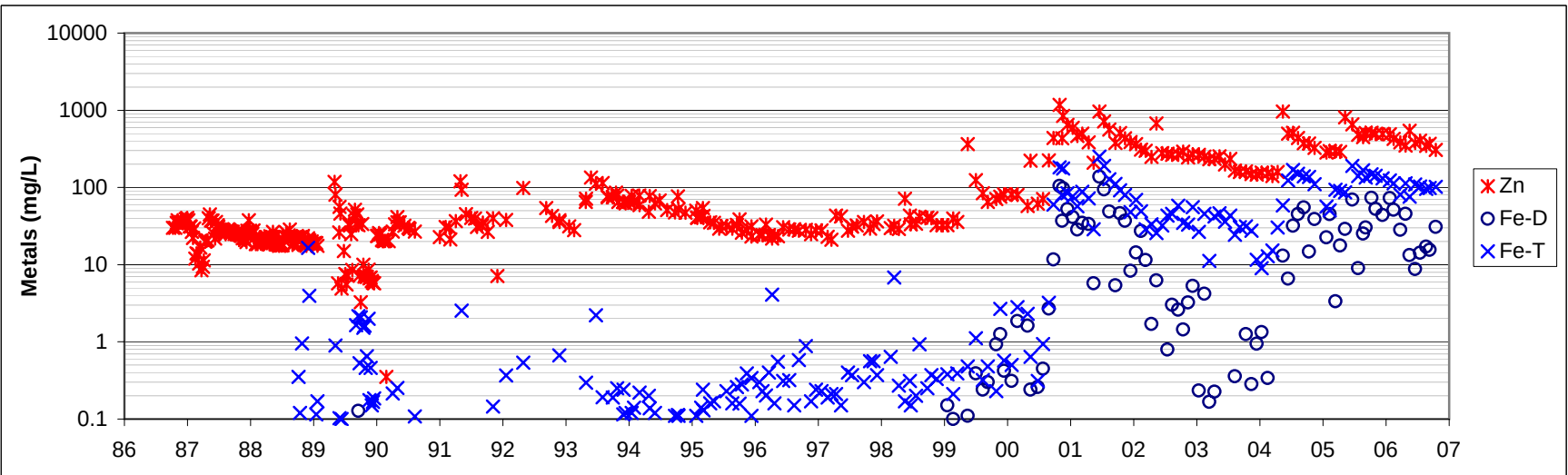
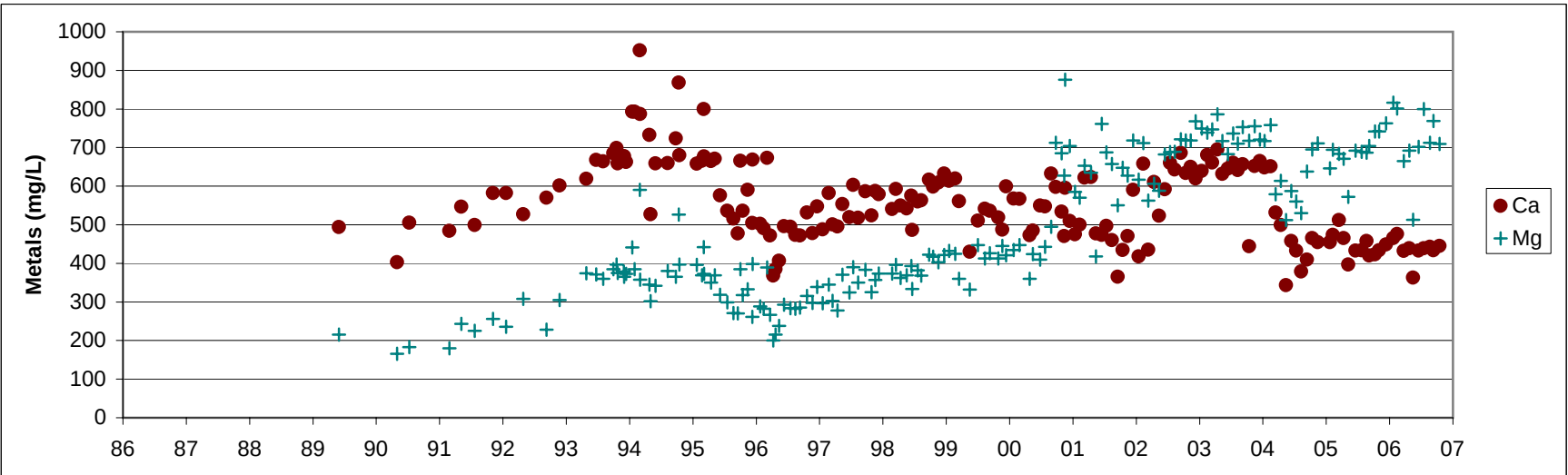
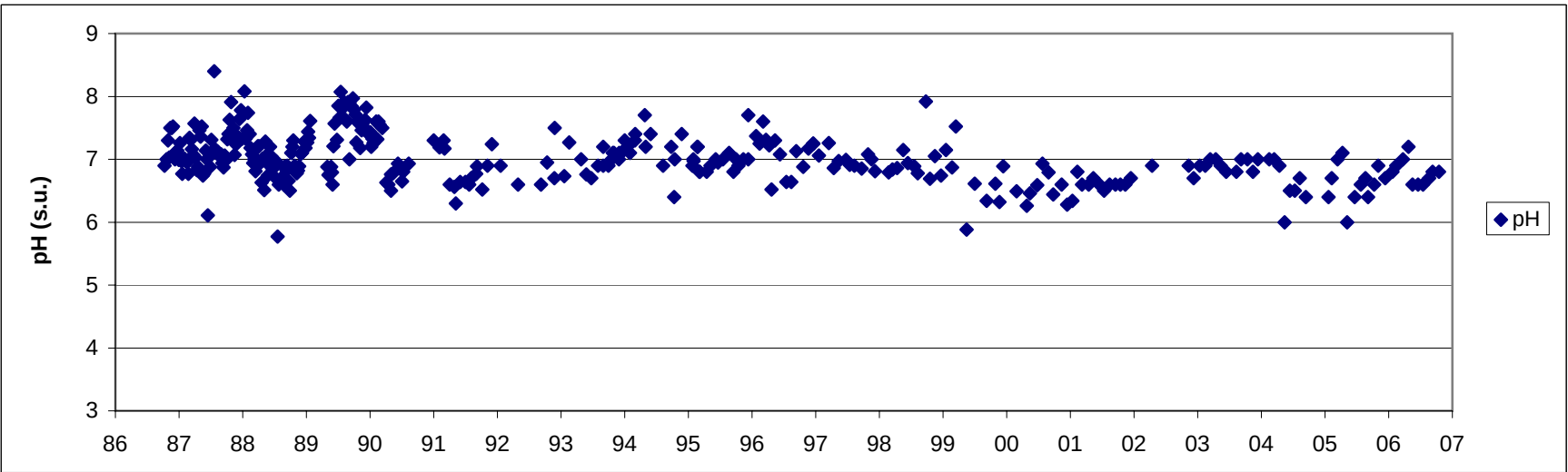
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D.B.M.

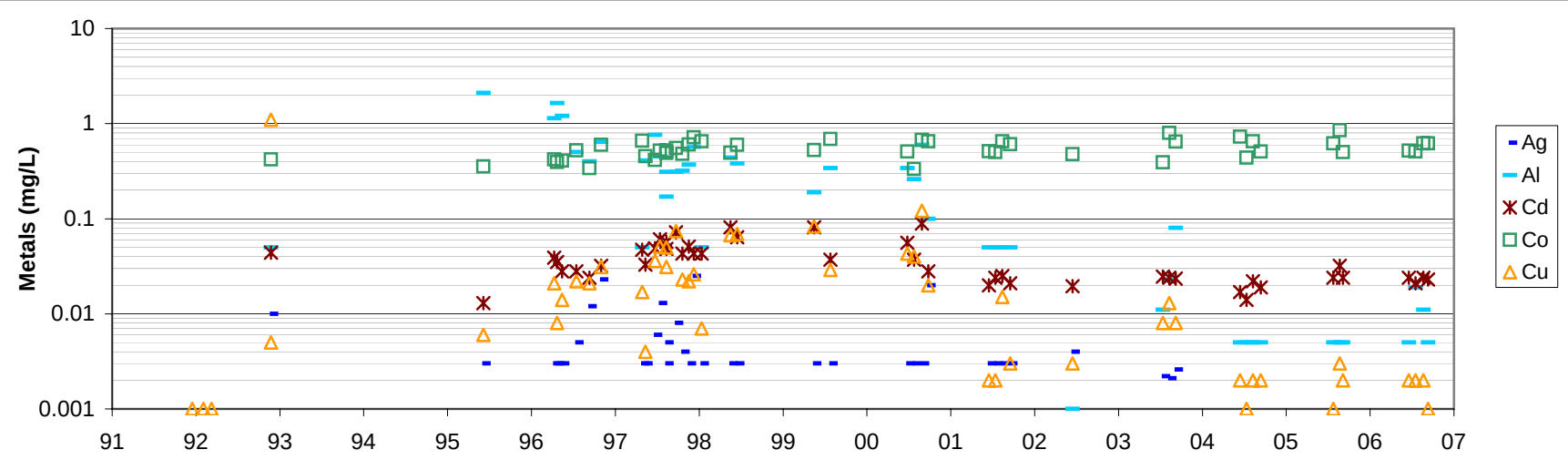
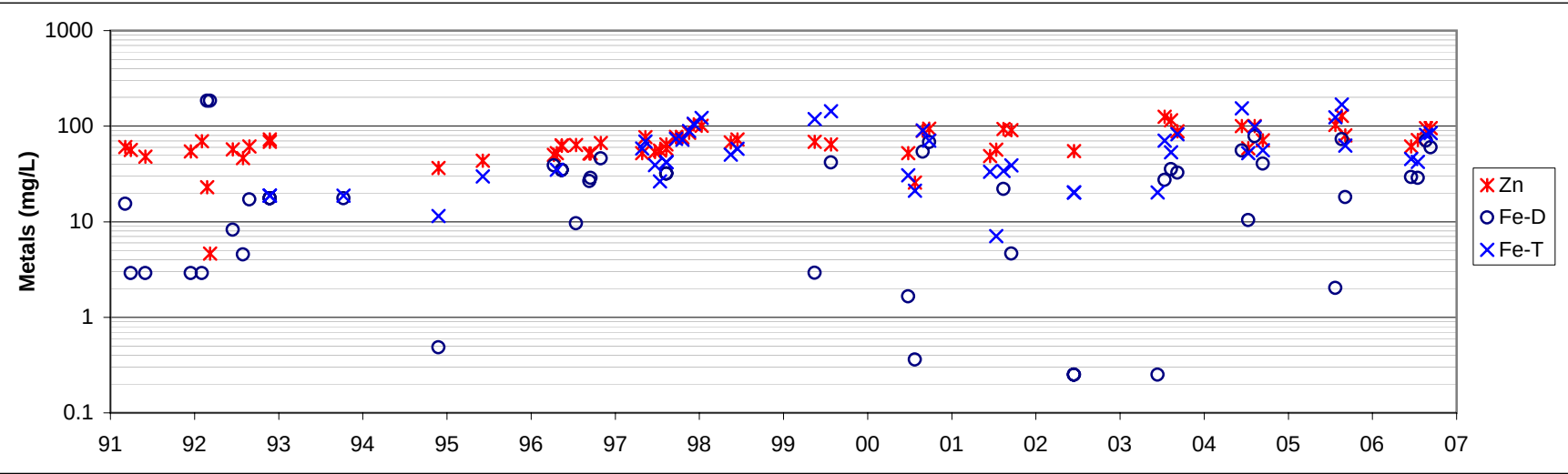
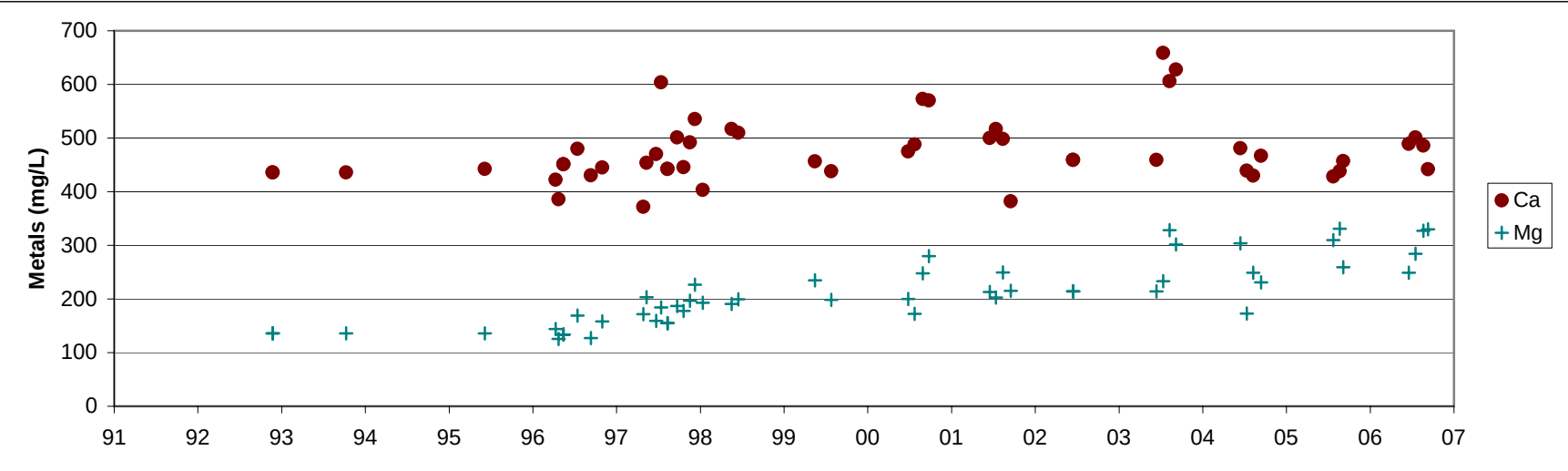
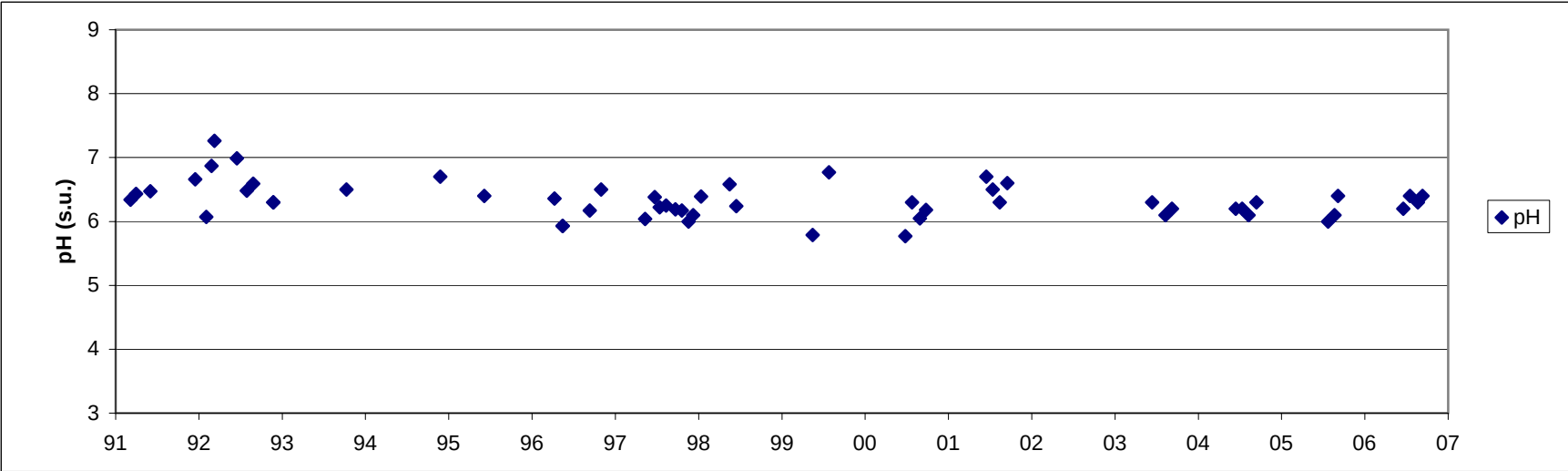
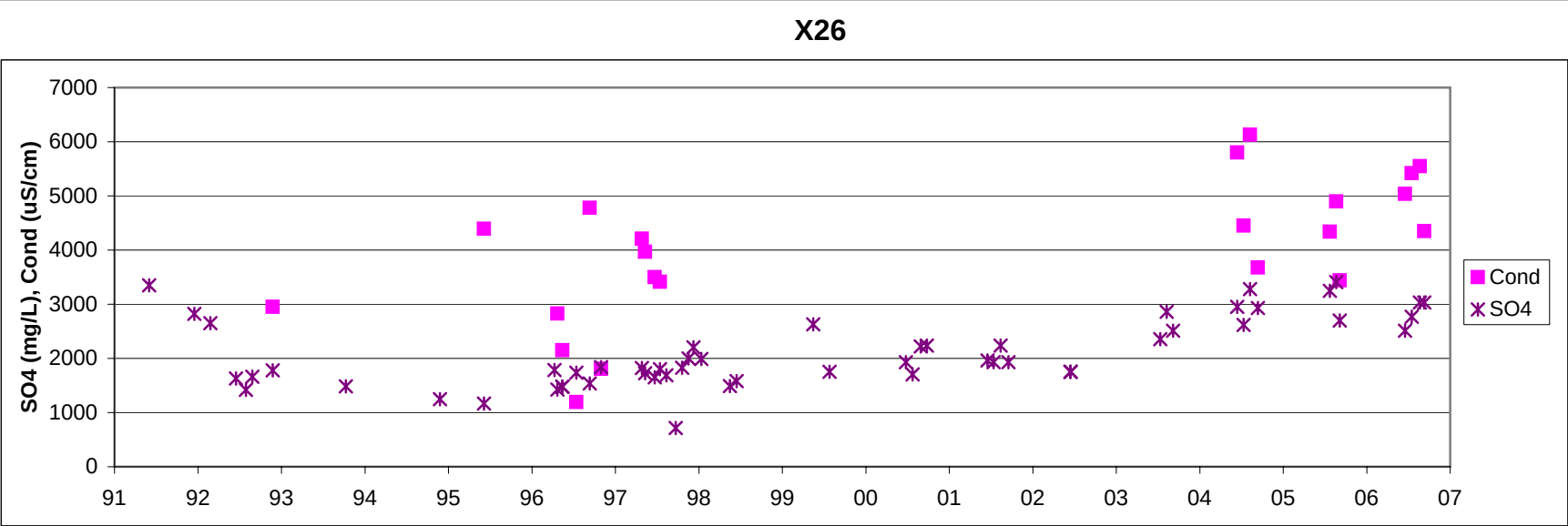
FIGURE:

5

The scatter plot displays two data series over time from 1986 to 2007. The y-axis represents both SO4 concentration in mg/L and Conductivity (Cond) in uS/cm, with a scale from 0 to 14,000. The x-axis represents years from 86 to 07. The 'Cond' series, marked with blue squares, shows a general increase from around 1,000 uS/cm in the late 1980s to a peak of approximately 12,000 uS/cm in 2006, followed by a slight decline. The 'SO4' series, marked with red crosses, remains relatively stable between 1,000 and 4,000 mg/L until around 2000, after which it shows a significant increase, peaking at over 10,000 mg/L in 2006. Both series exhibit high inter-annual variability.



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	Faro Seepage Station X23			
DELOITTE & TOUCHE INC.	PROJECT 1CD003.085	DATE March 2007	APPROVED	FIGURE 6



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Anvil Range Mining Complex
2006 Waste Rock and Seepage Monitoring Report

Faro Seepage Station
X26

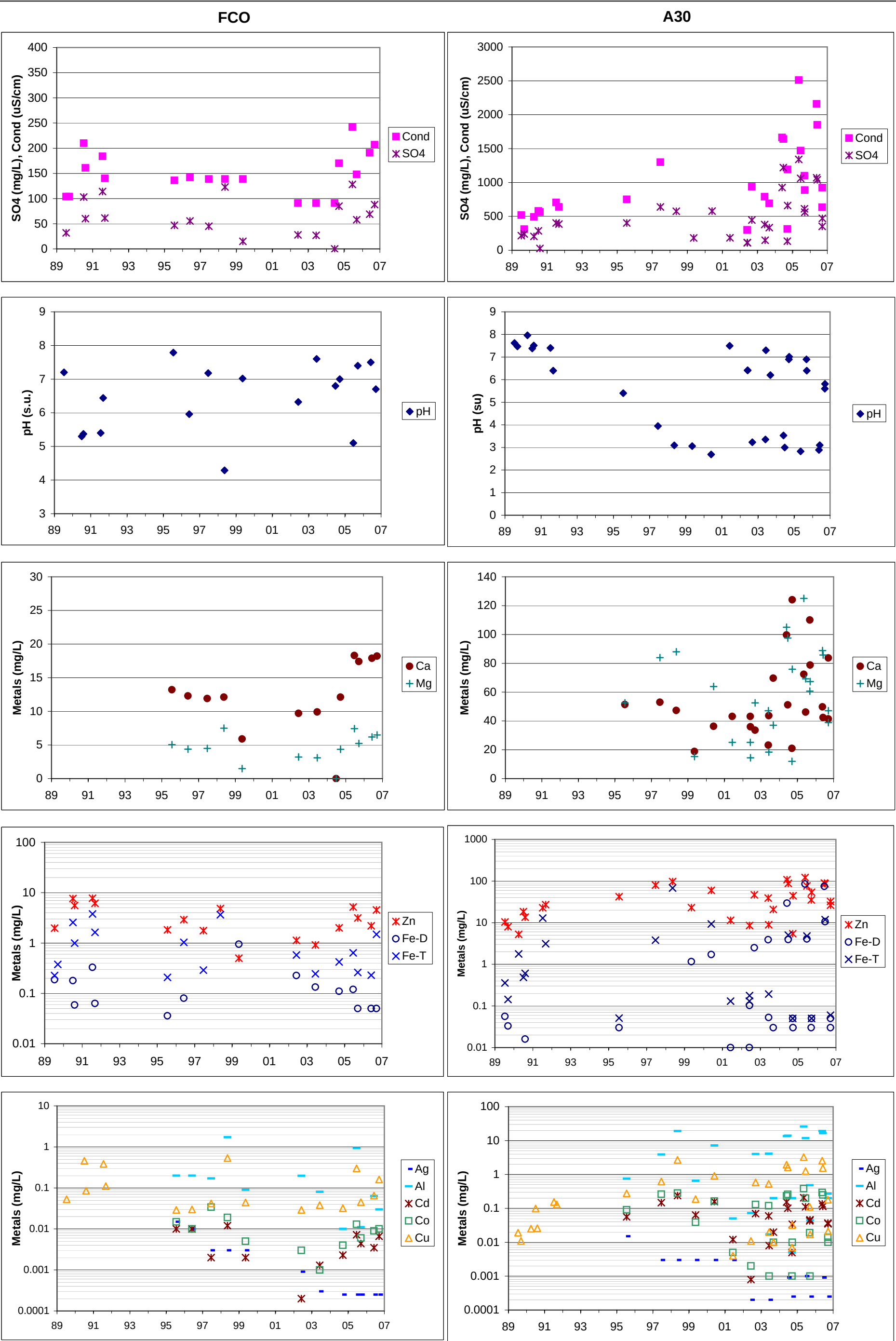
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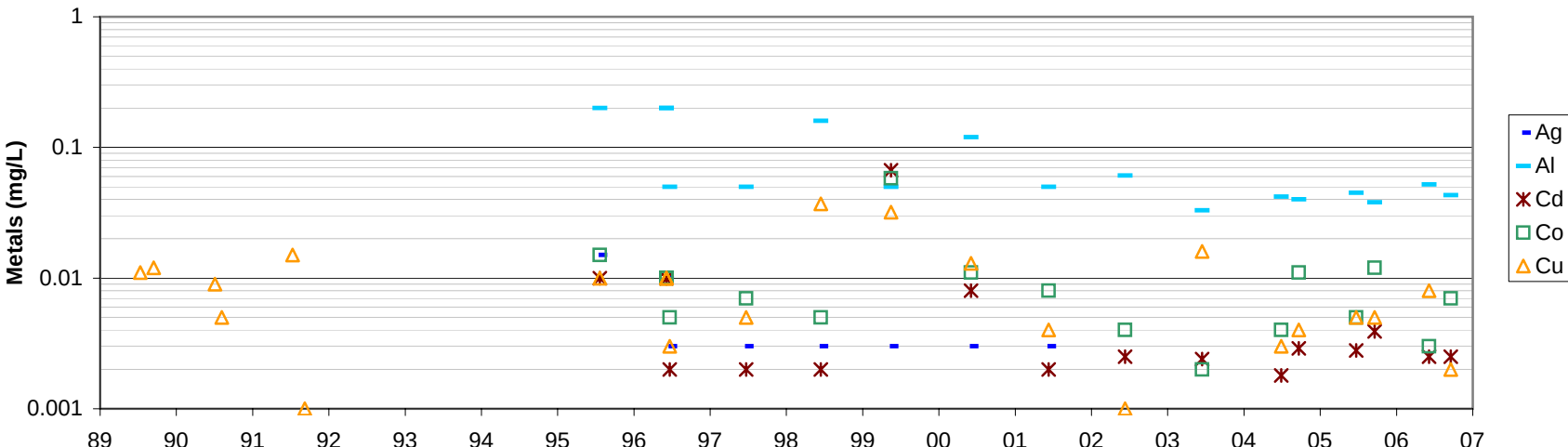
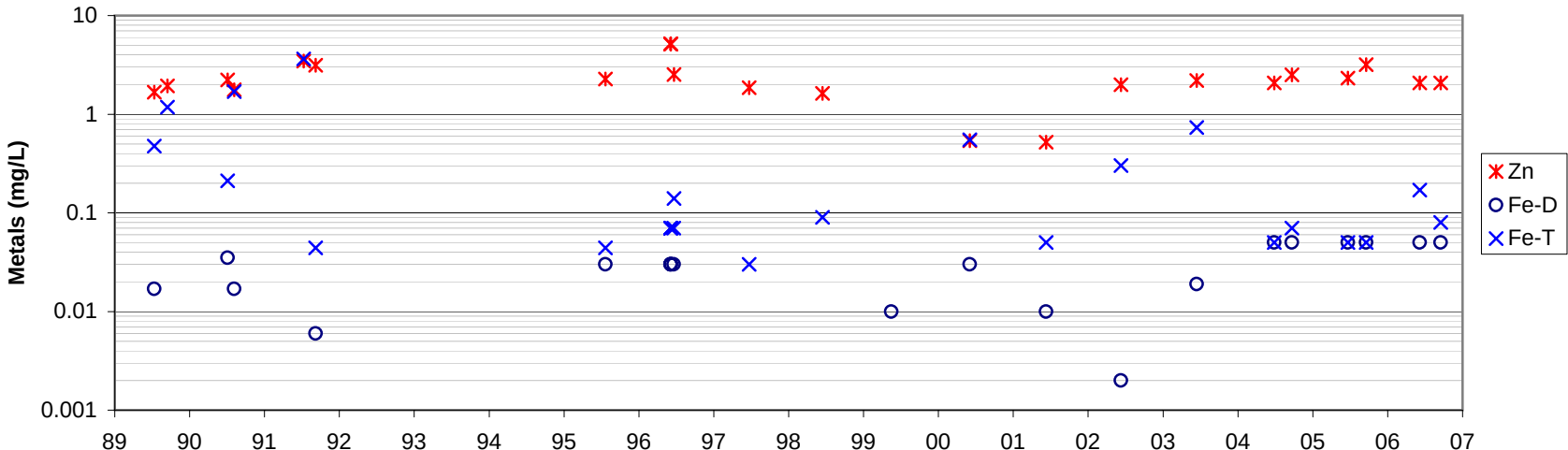
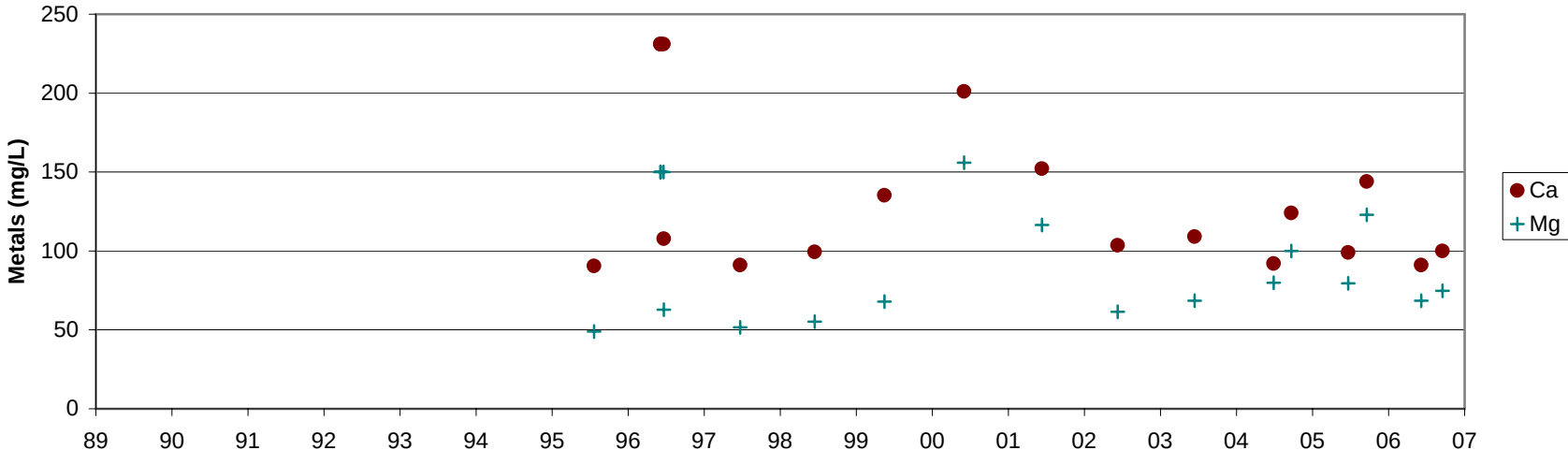
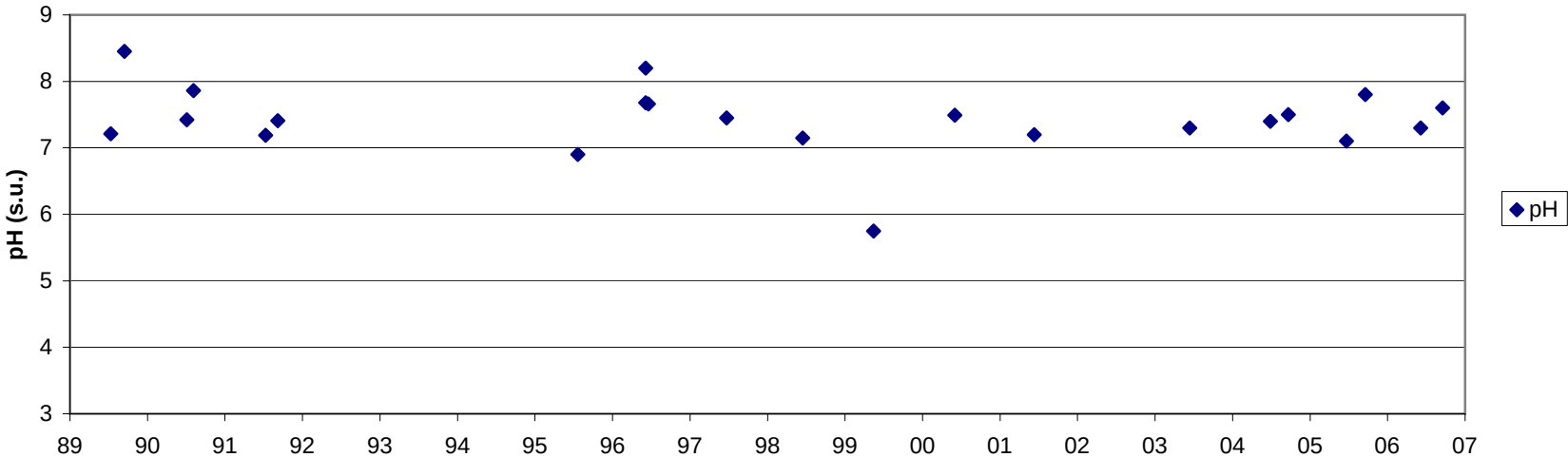
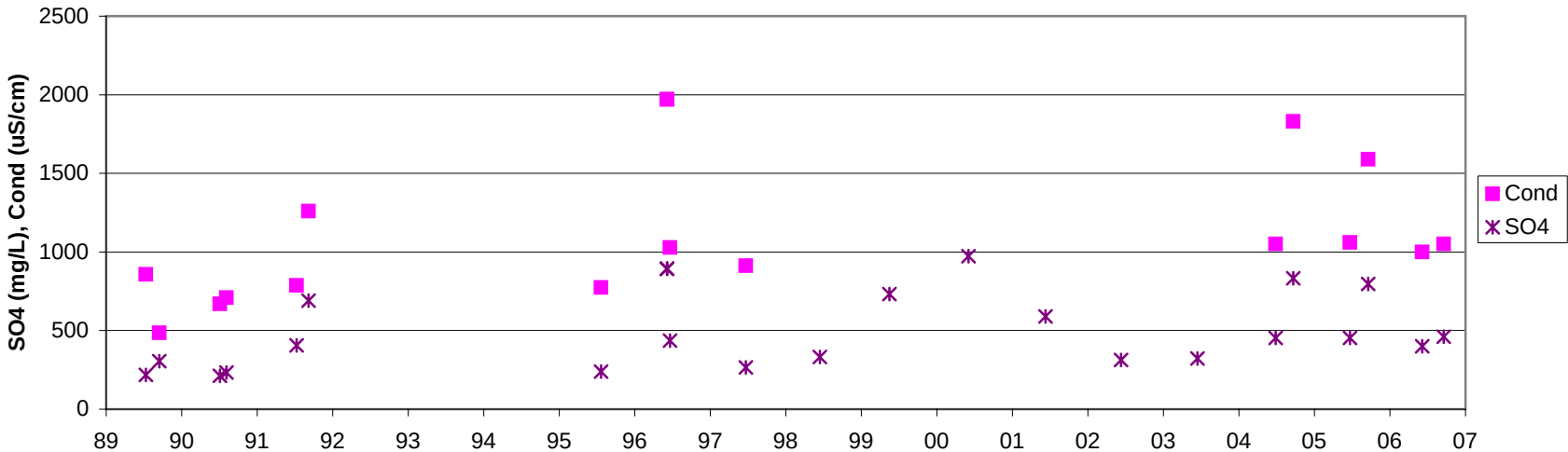
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FIGURE

7



SP5-6



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Anvil Range Mining Complex
2006 Waste Rock and Seepage Monitoring Report

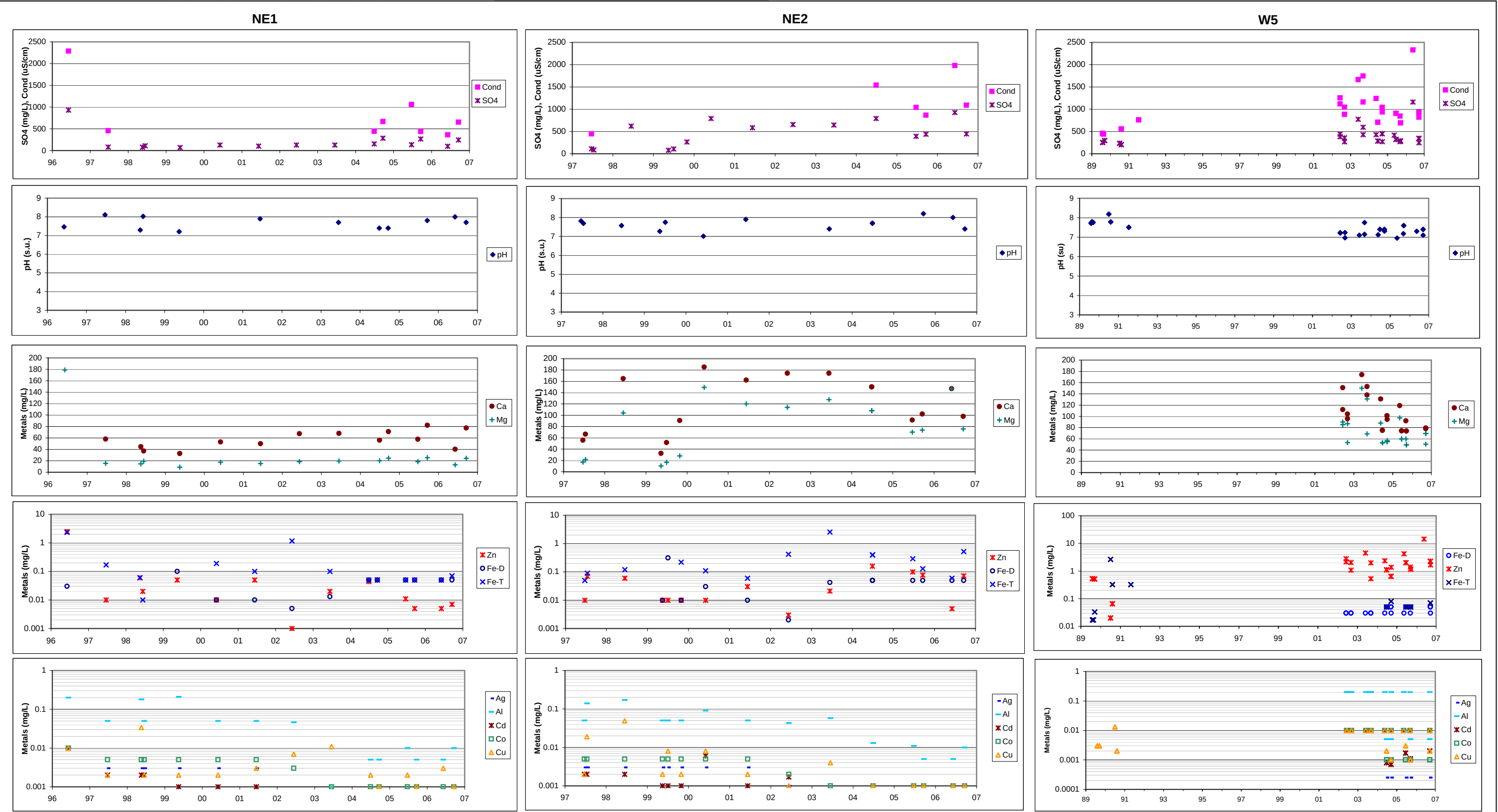
Faro Seepage Station
SP5-6

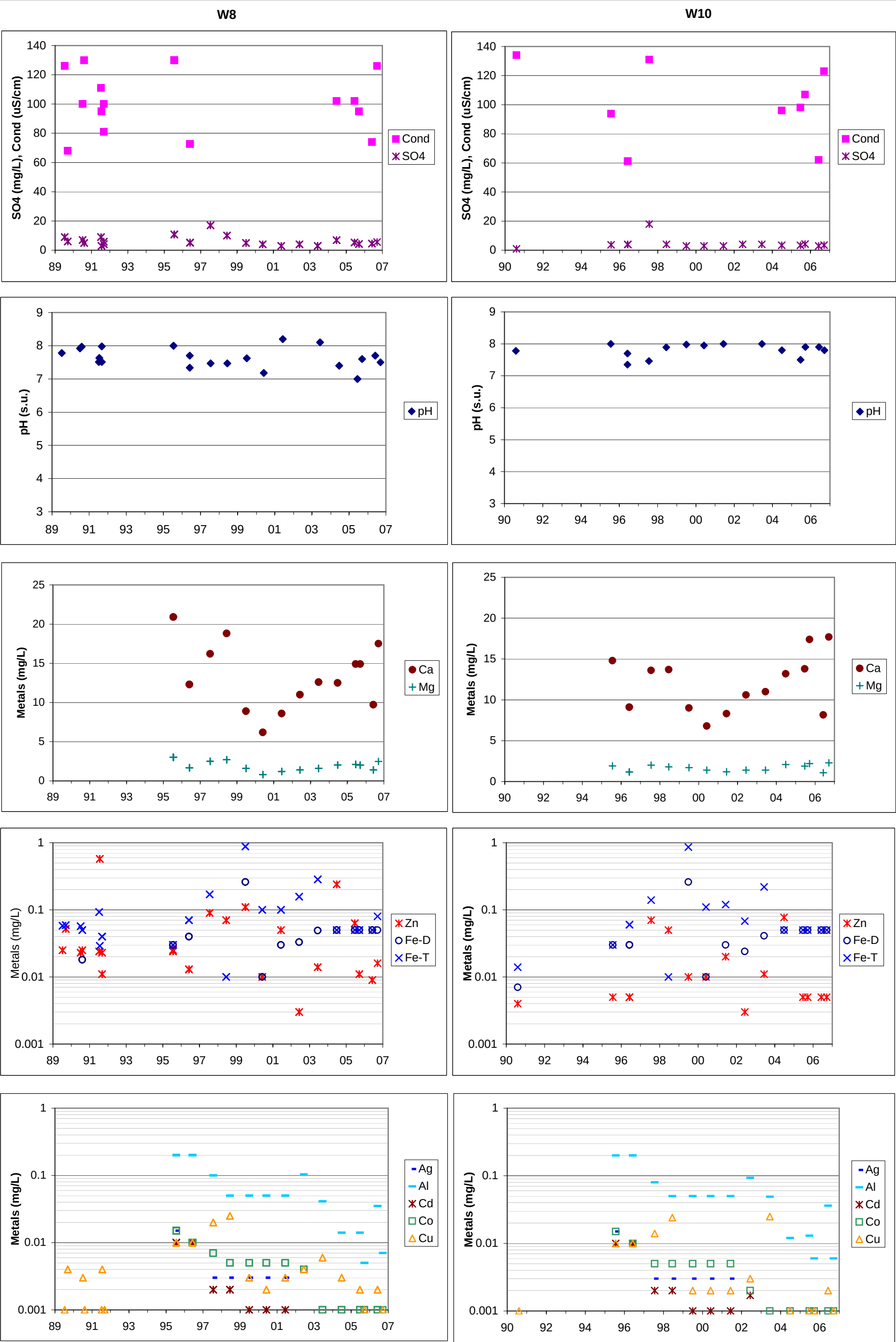
PROJECT
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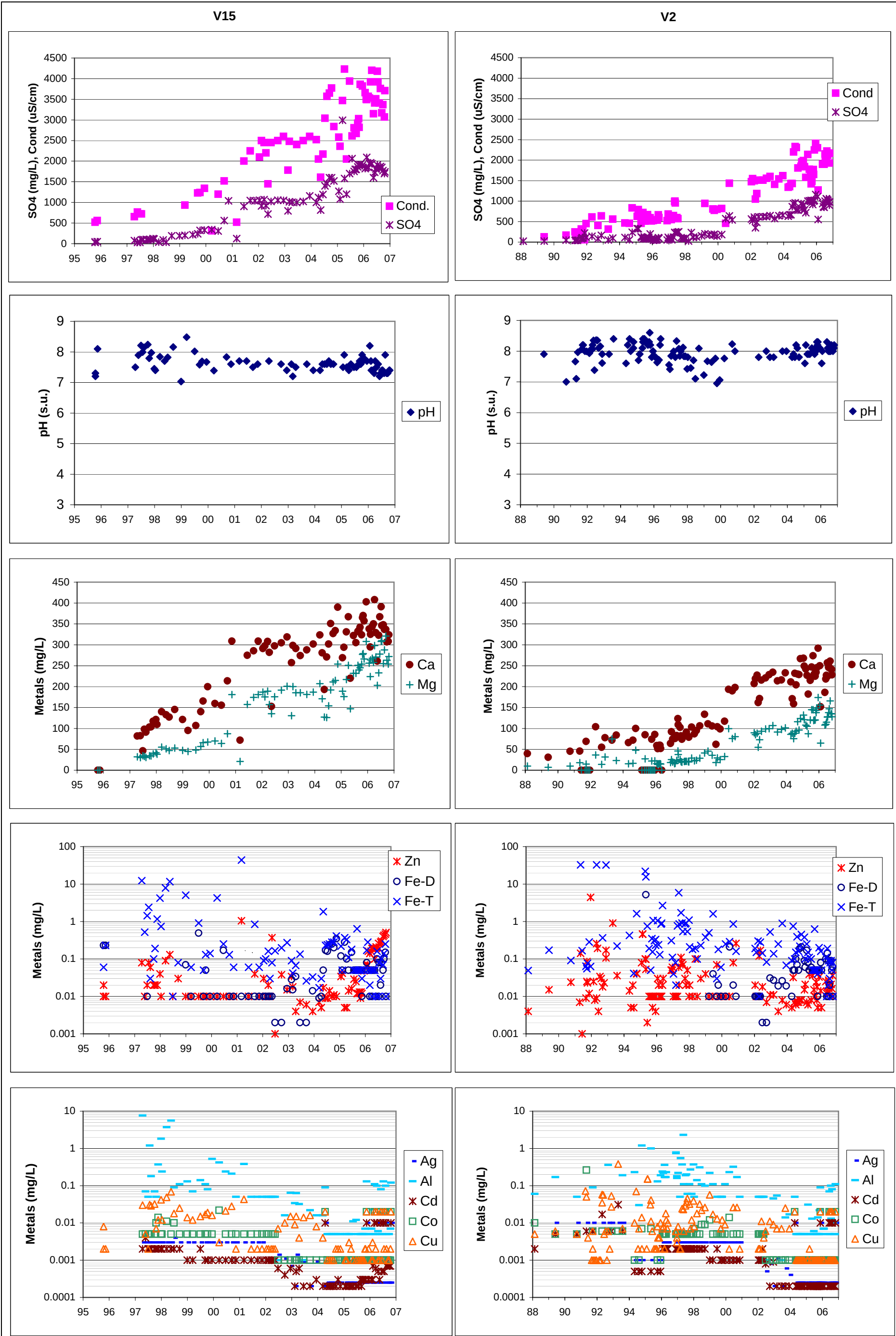
DATE
March 2007

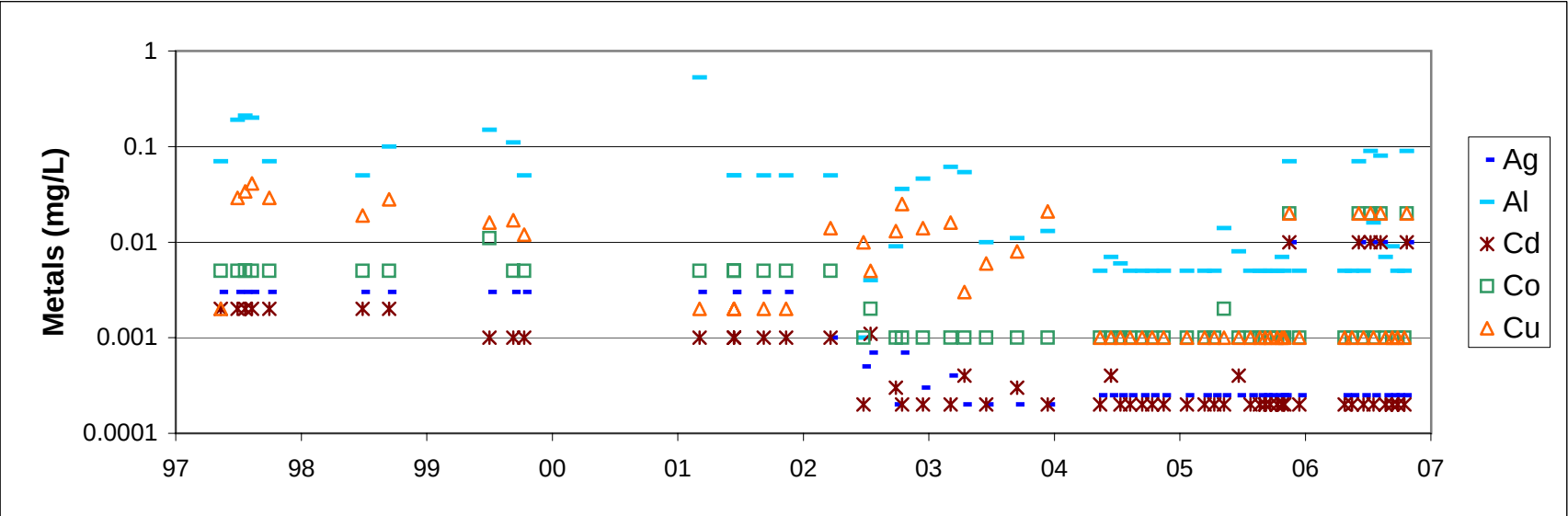
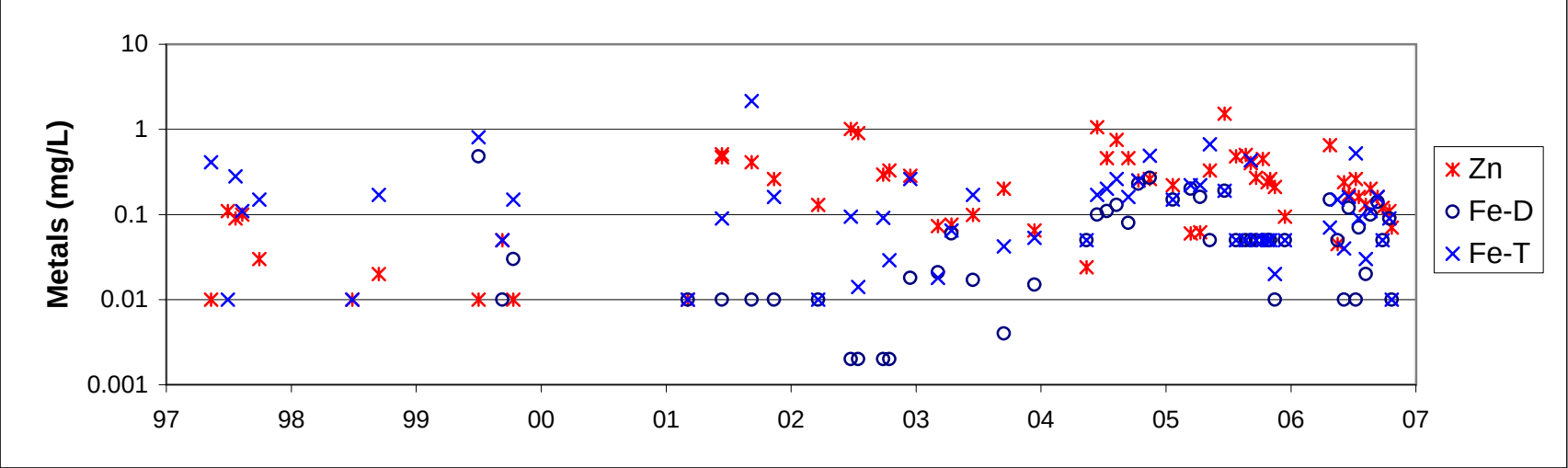
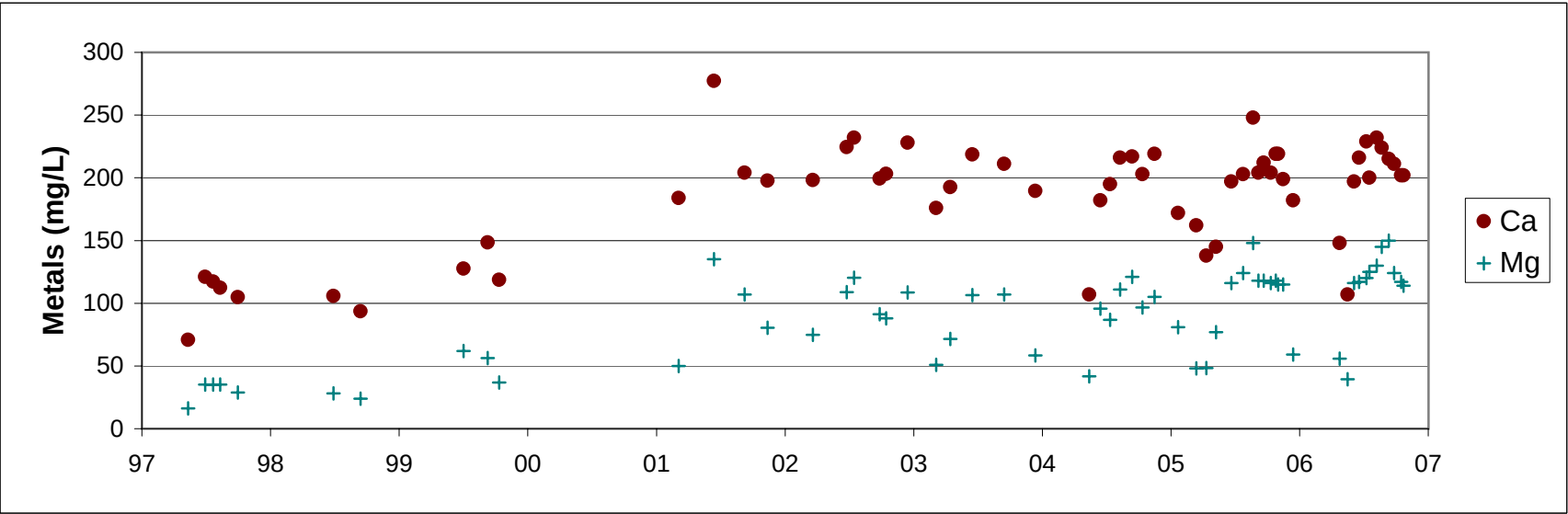
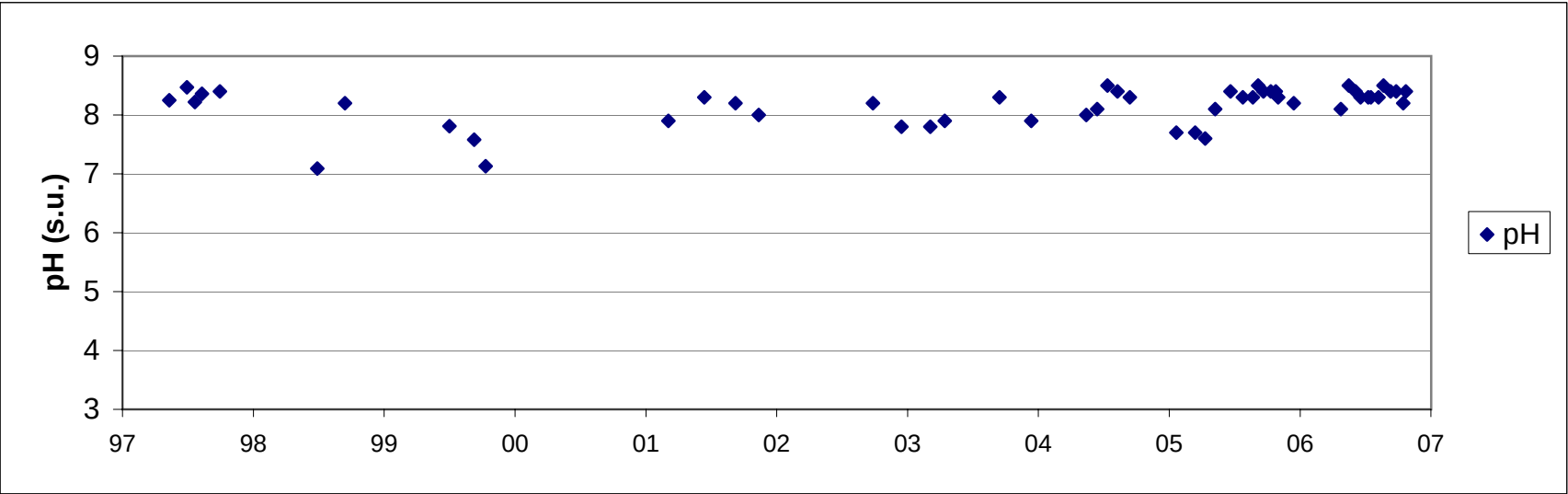
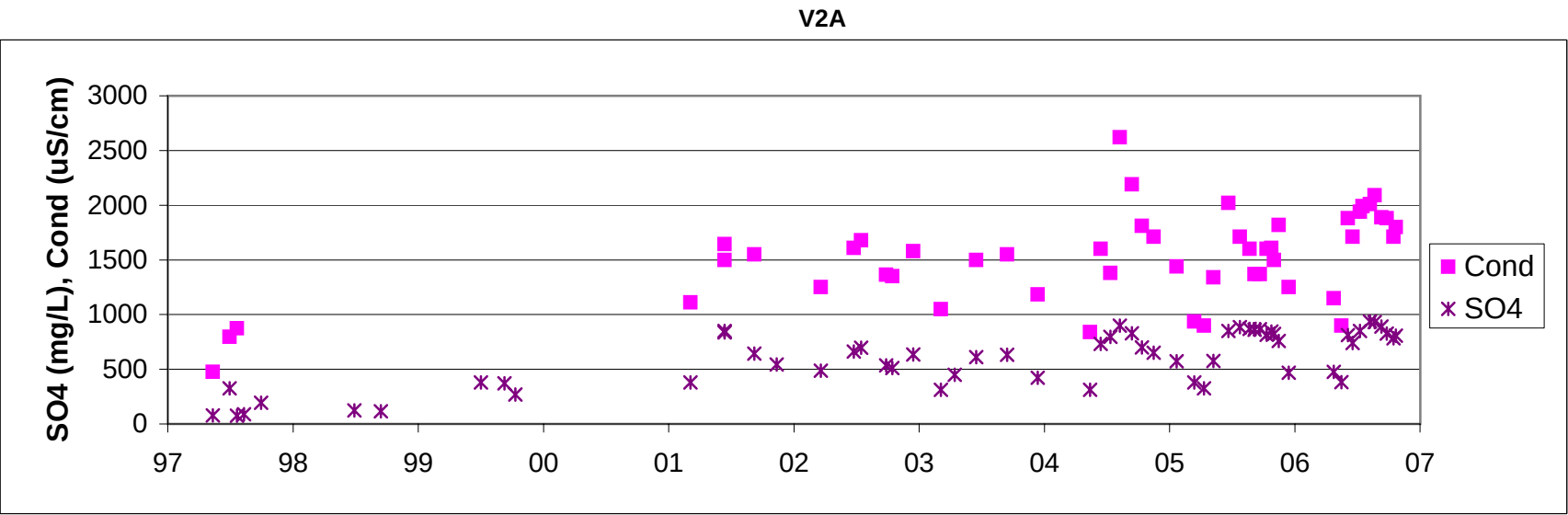
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FIGURE 9









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2006 Waste Rock and Seepage Monitoring Report

Grum Seepage Station
V2A

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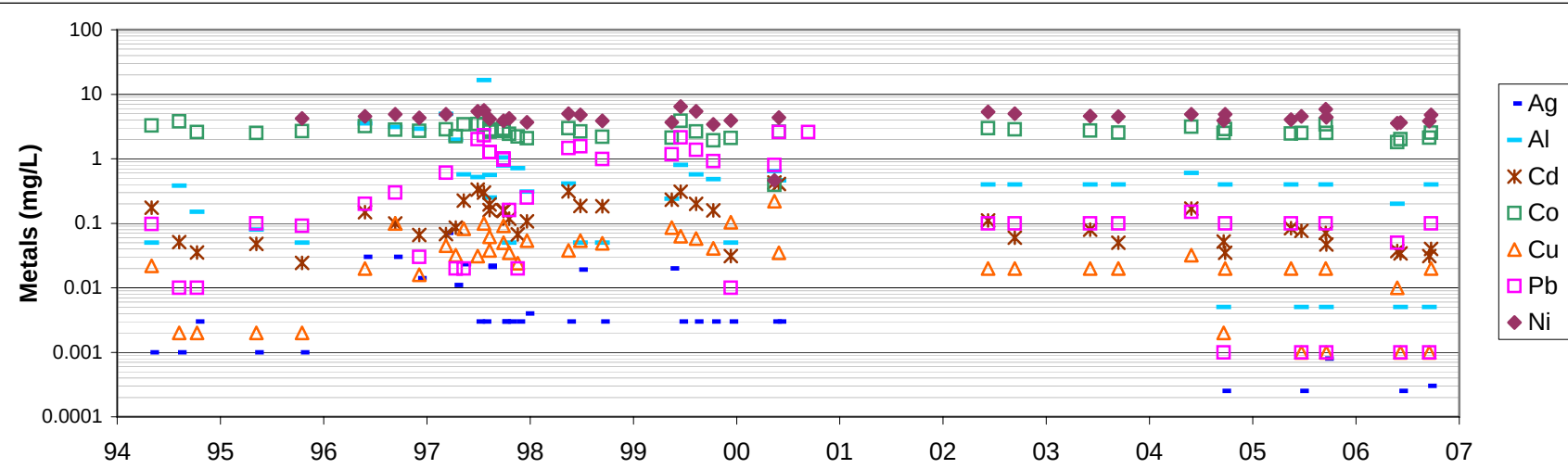
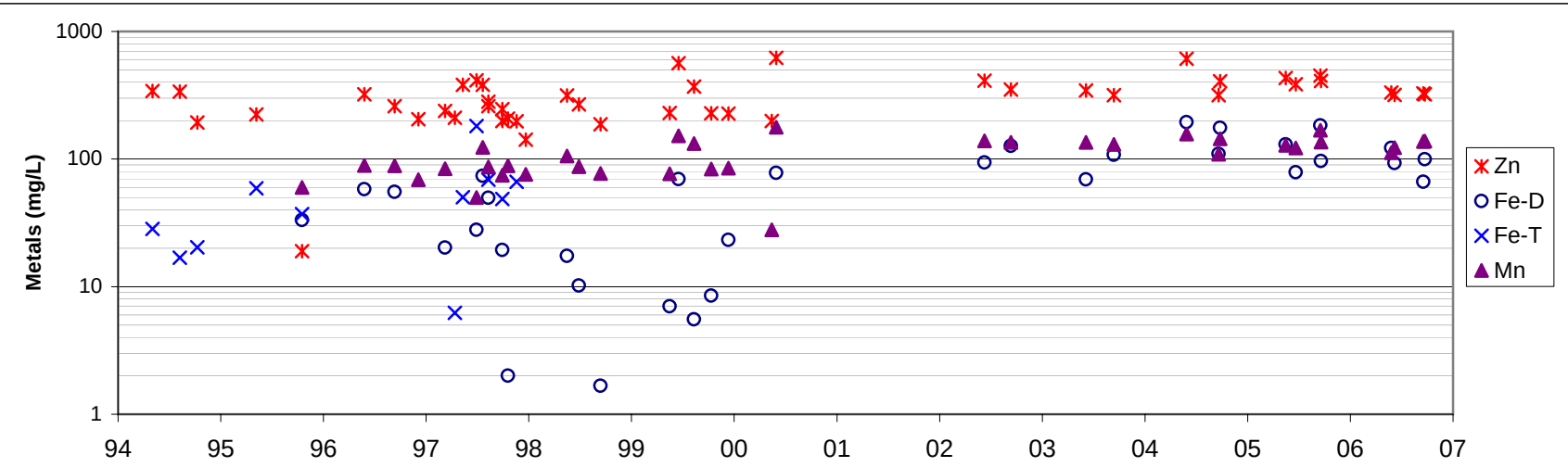
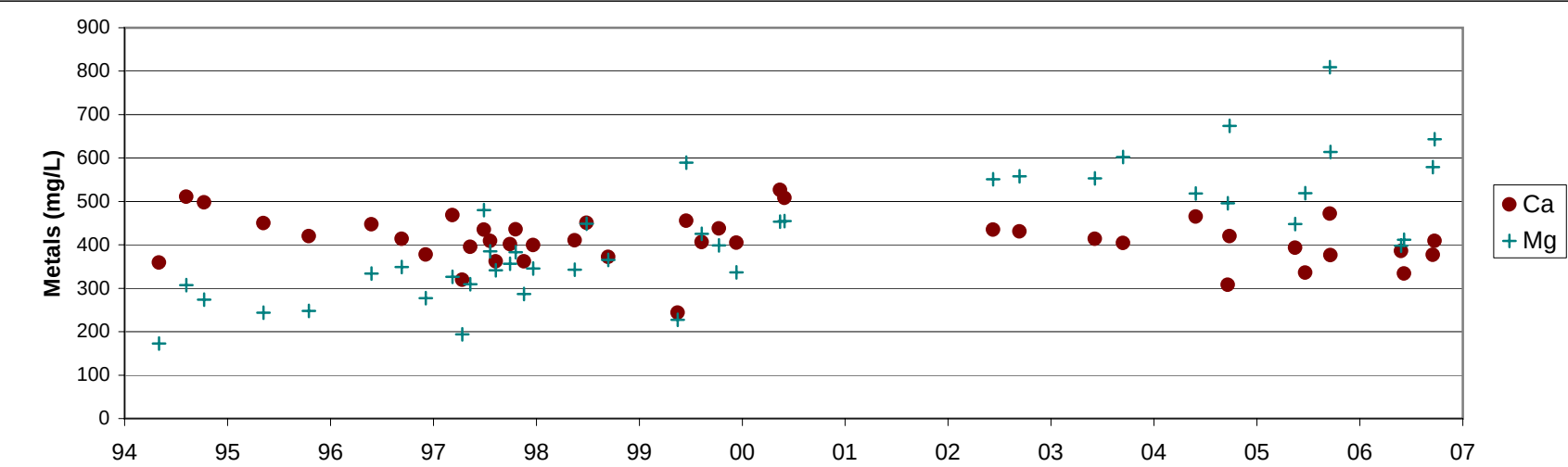
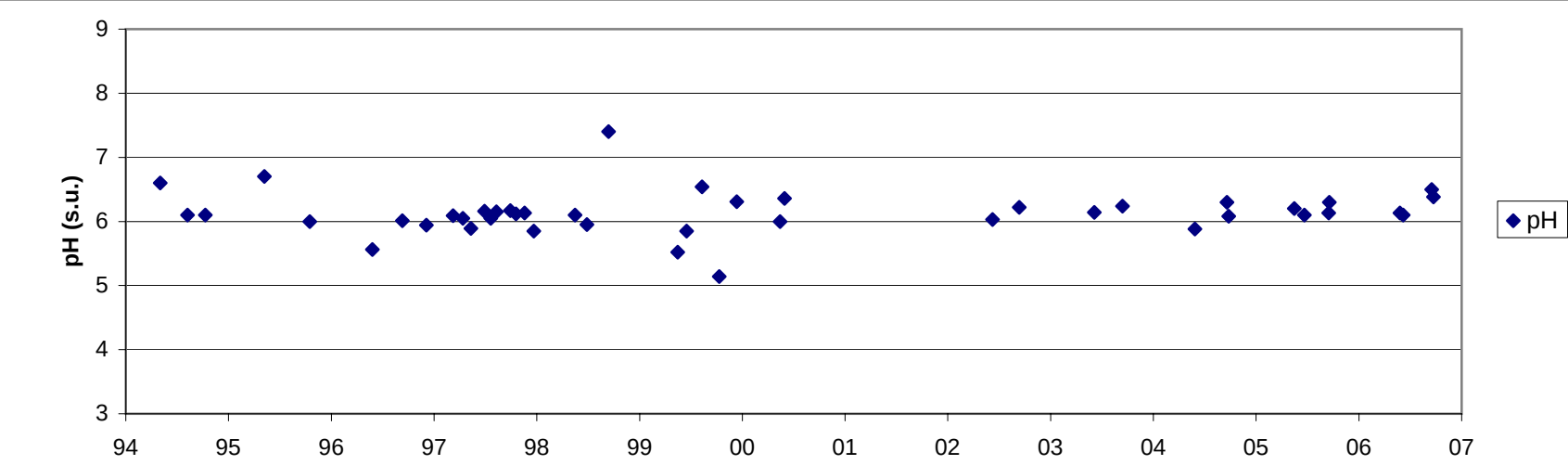
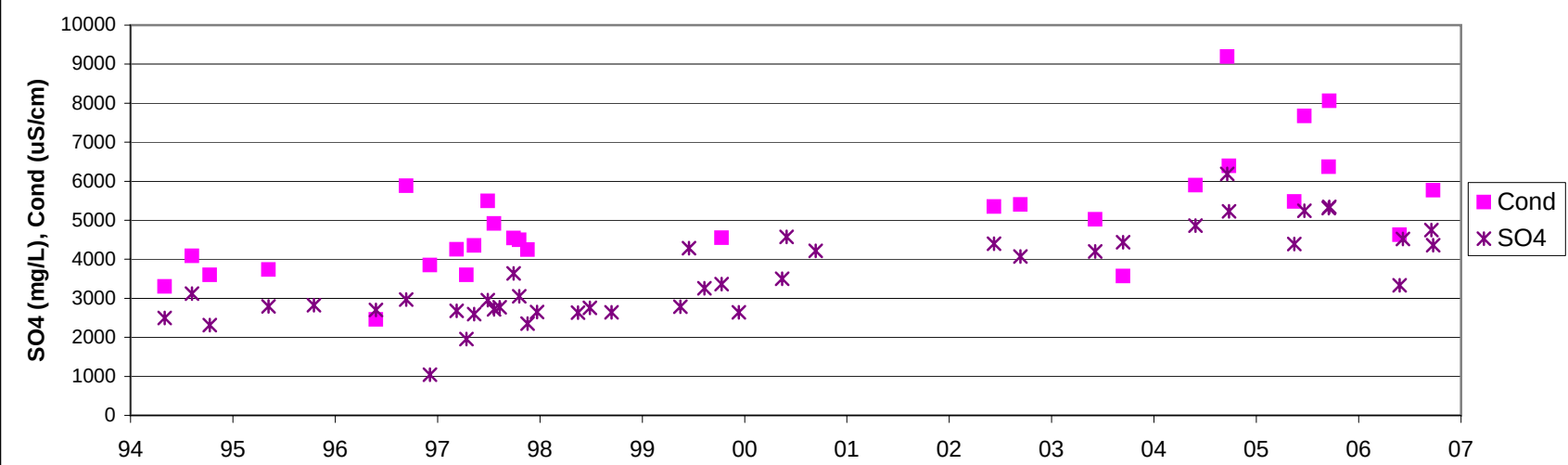
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FIGURE

13

V30



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2006 Waste Rock and Seepage Monitoring Report

Vangorda Seepage Station
V30

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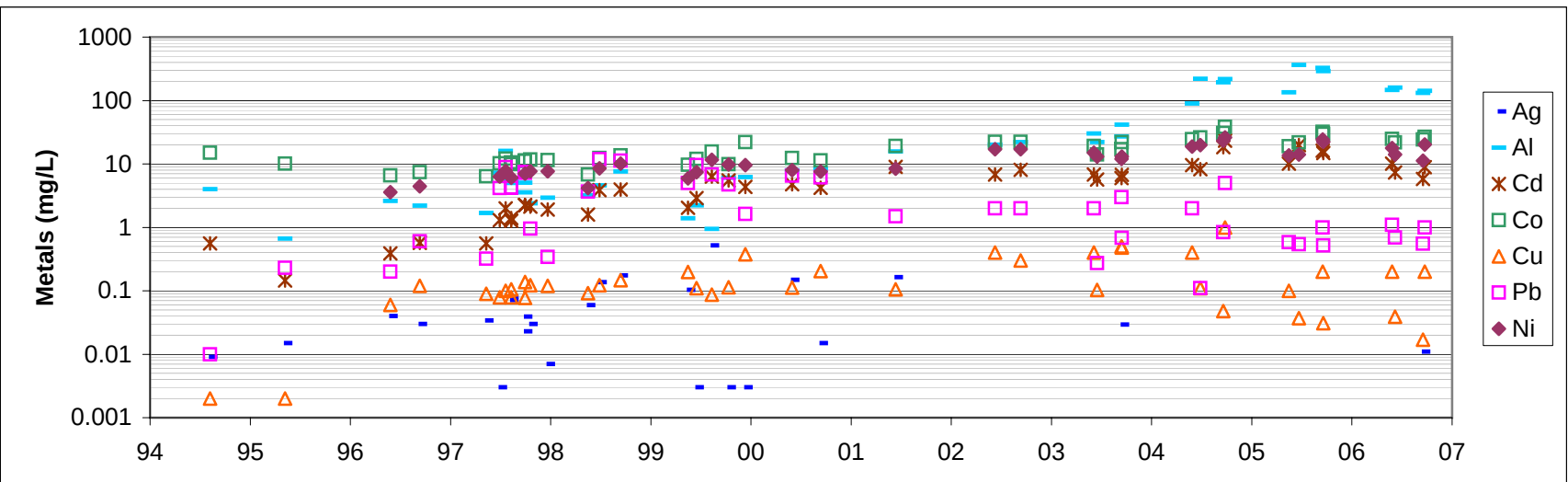
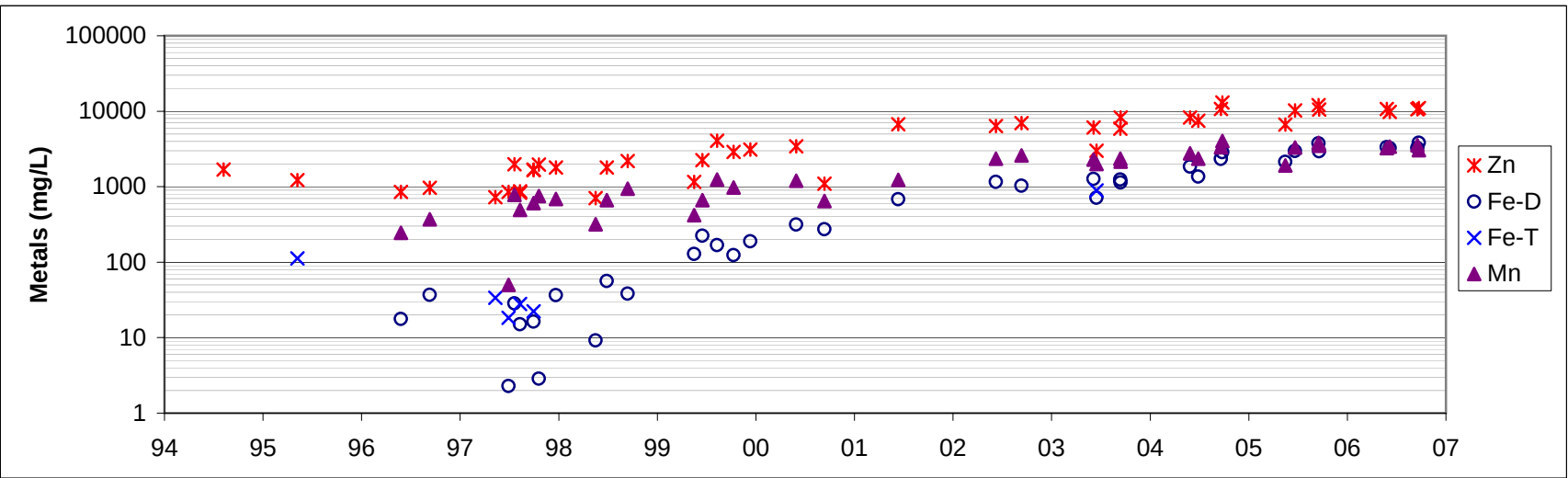
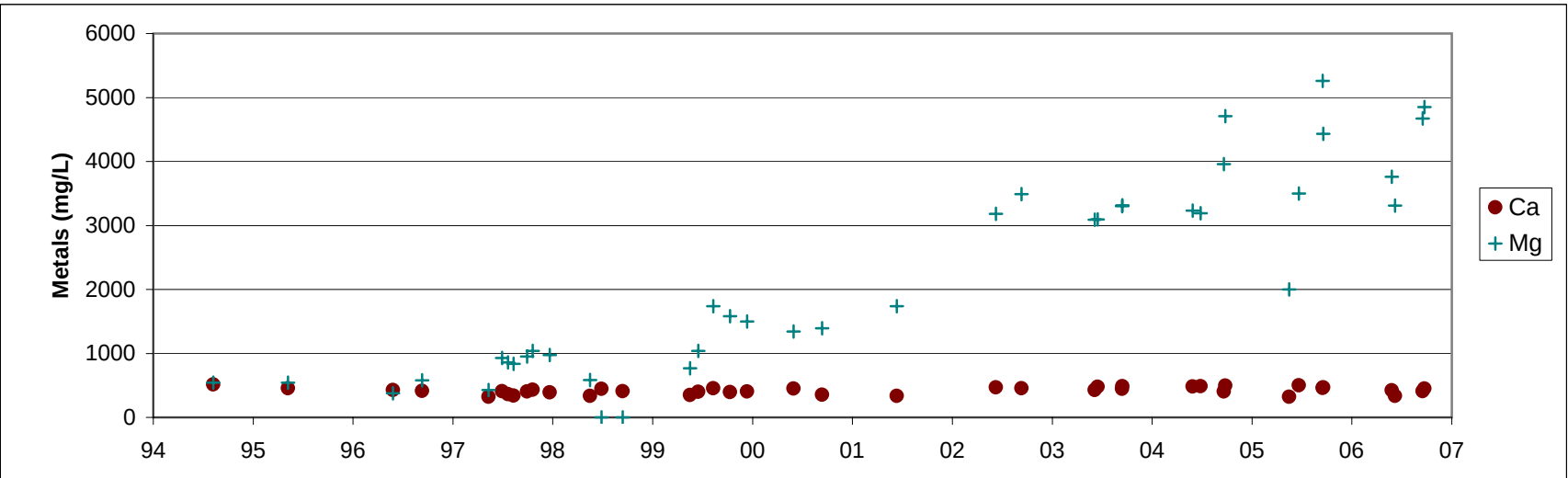
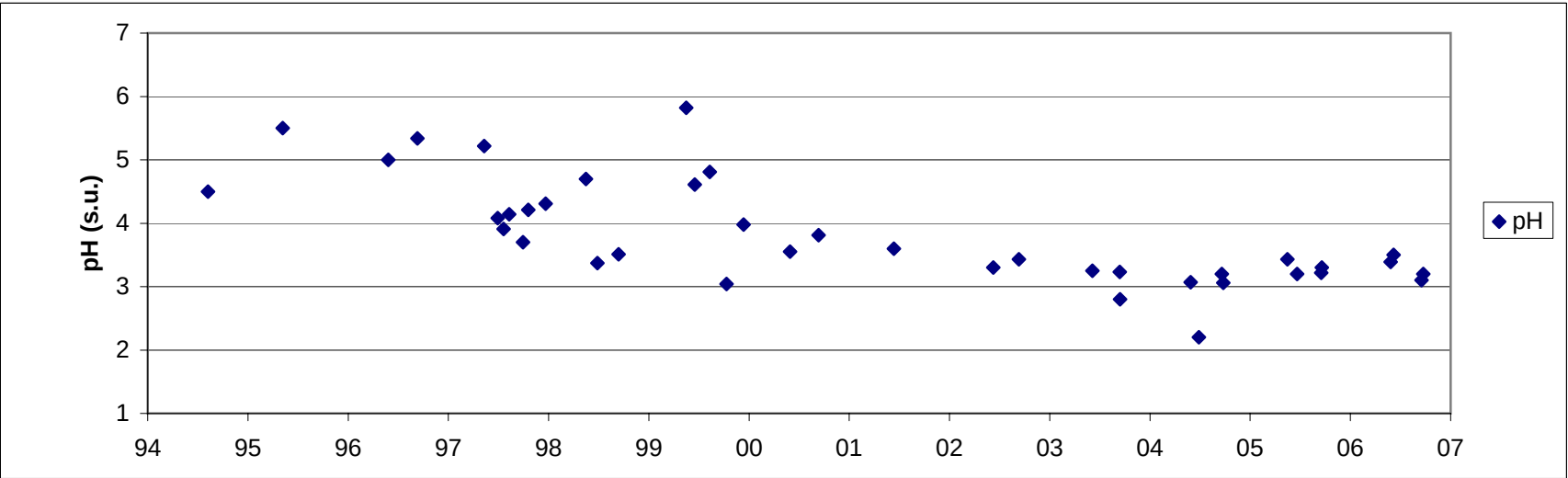
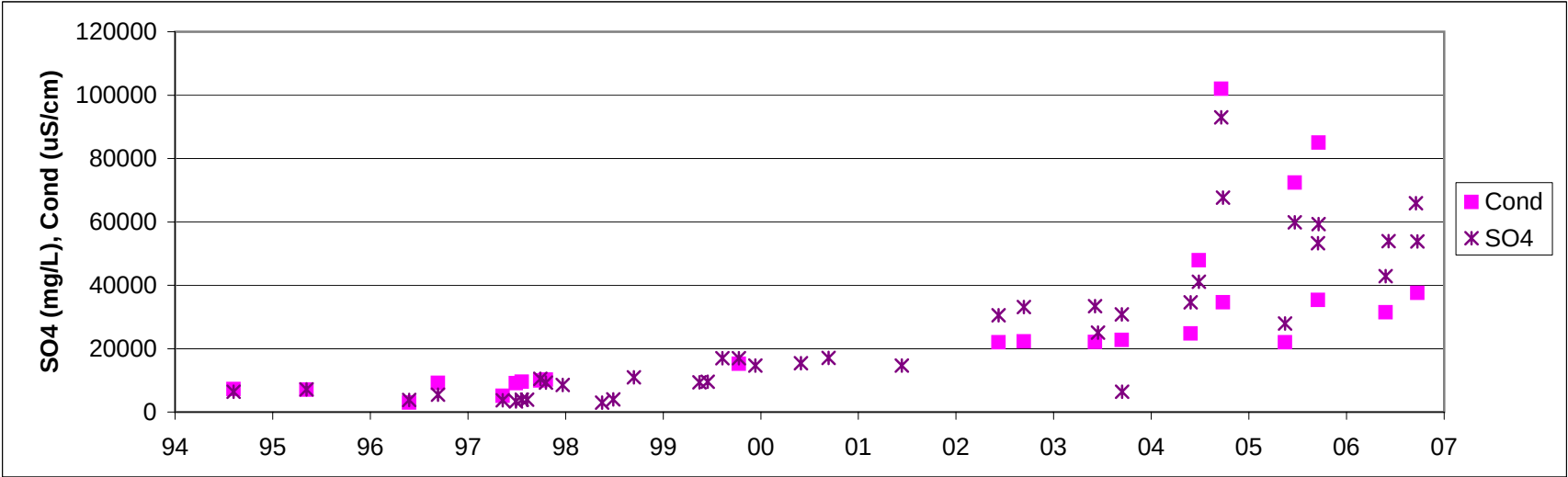
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FIGURE

14

V32



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2006 Waste Rock and Seepage Monitoring Report

Vangorda Seepage Station
V32

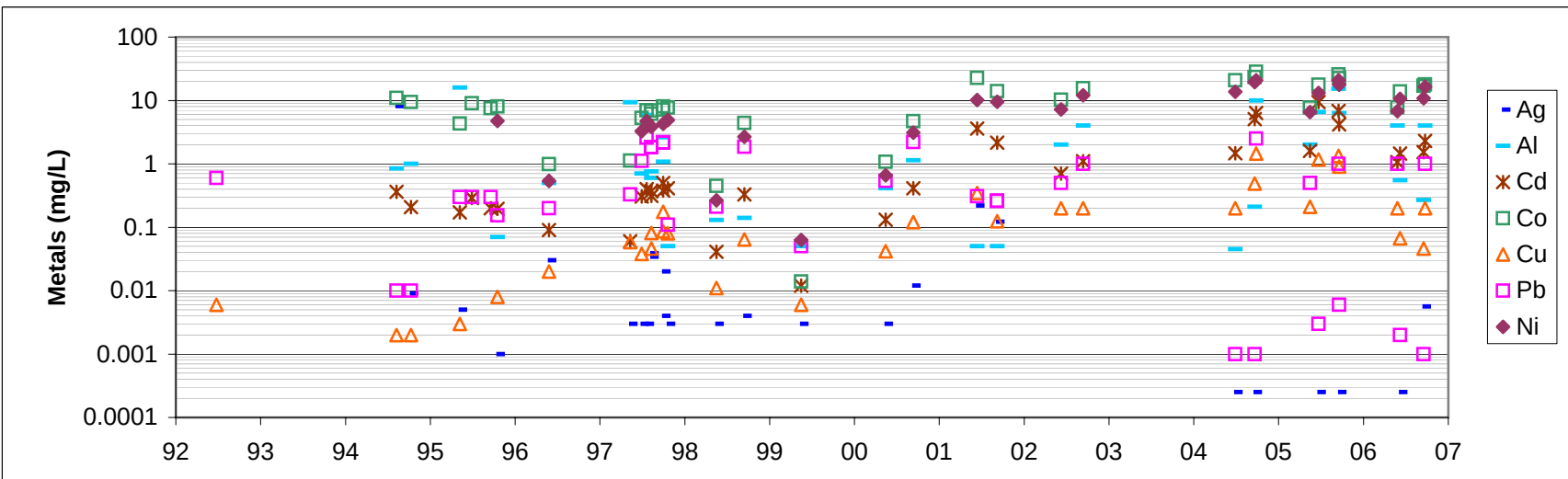
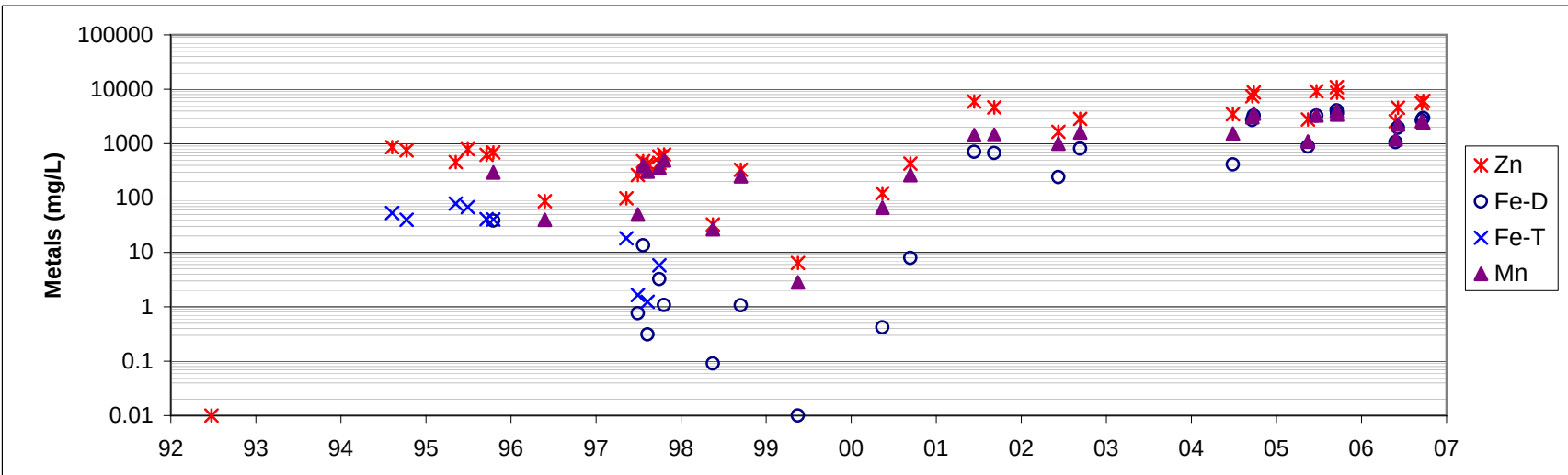
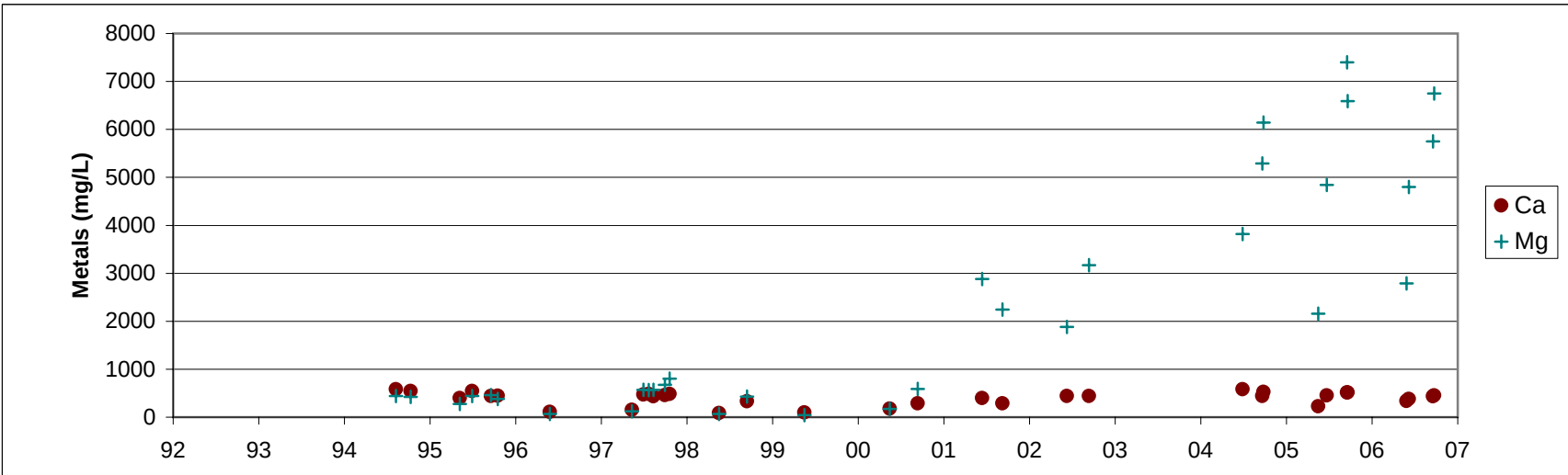
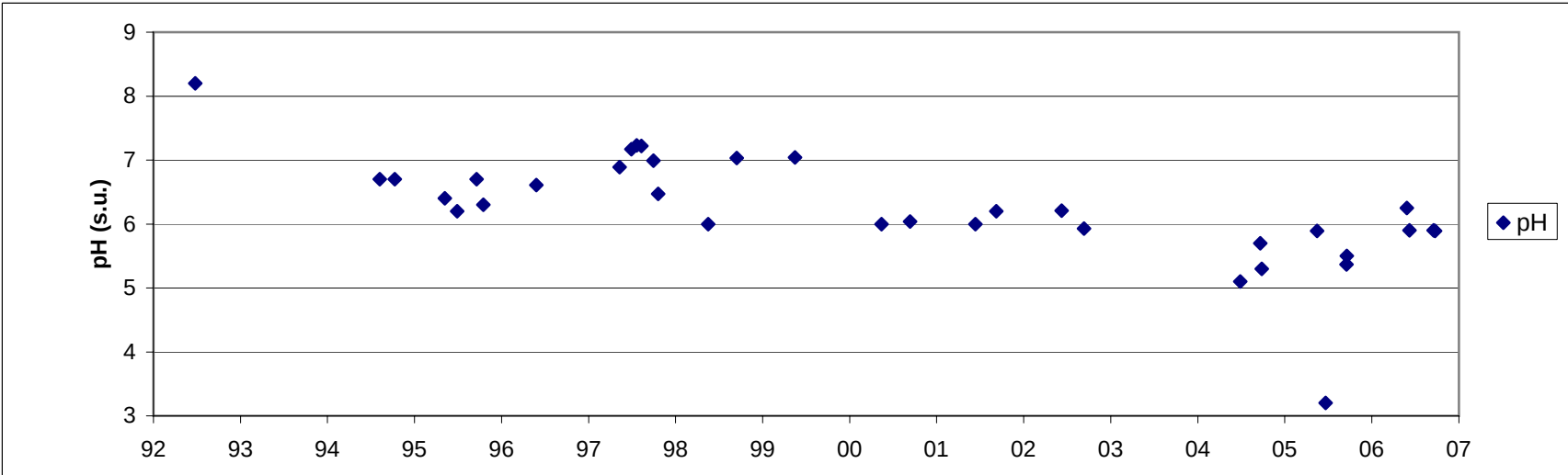
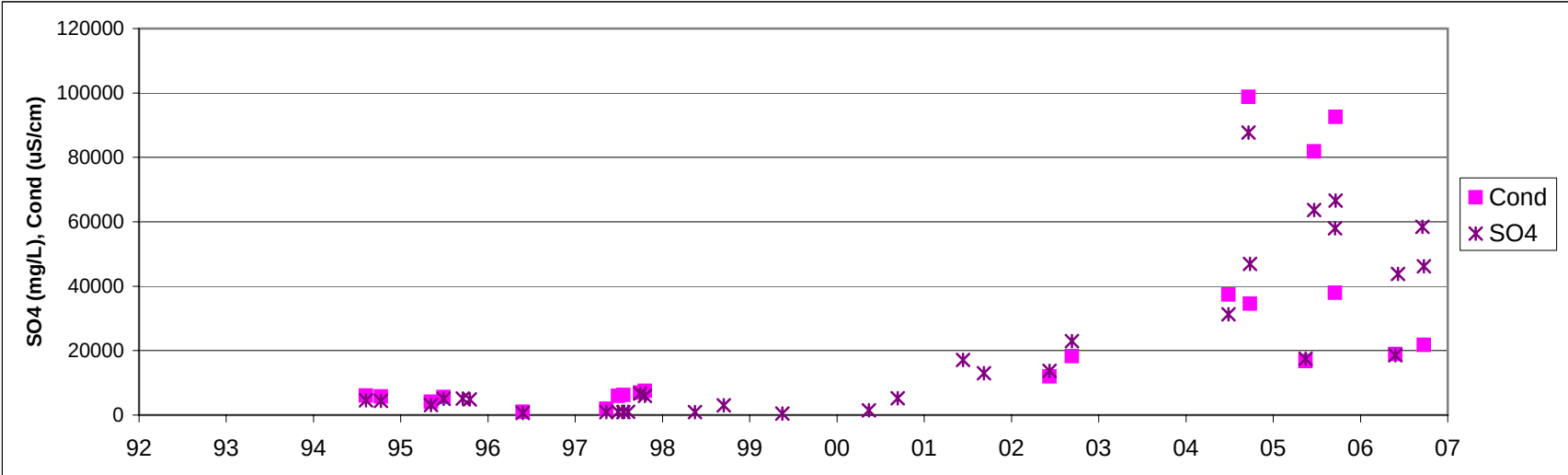
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FIGURE
15

V33



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Anvil Range Mining Complex
2006 Waste Rock and Seepage Monitoring Report

Vangorda Seepage Station
V33

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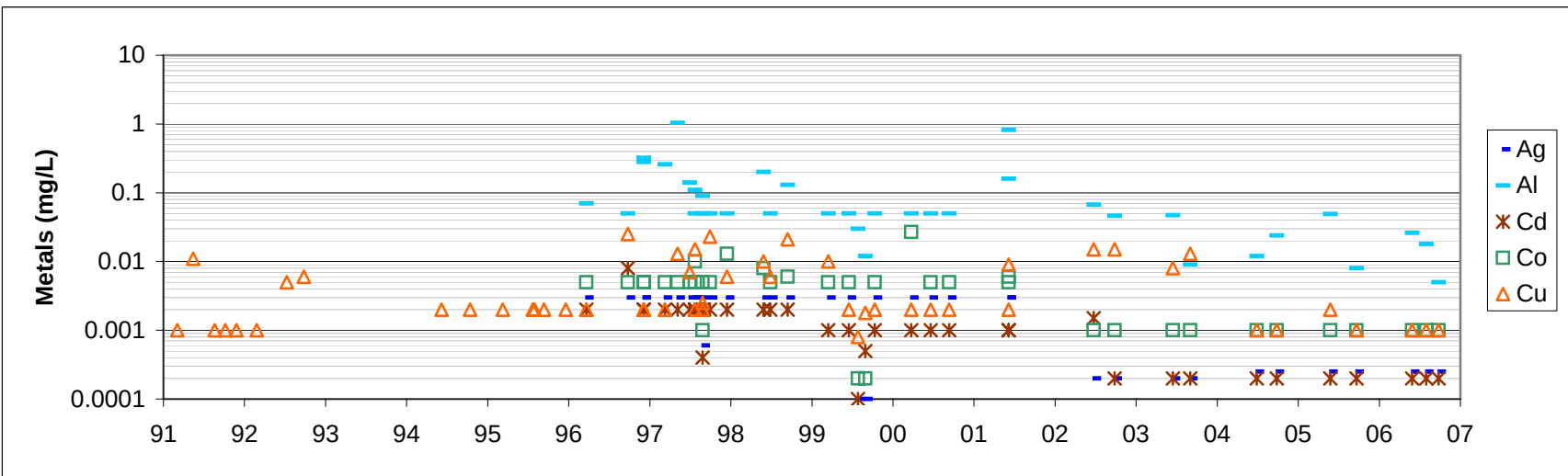
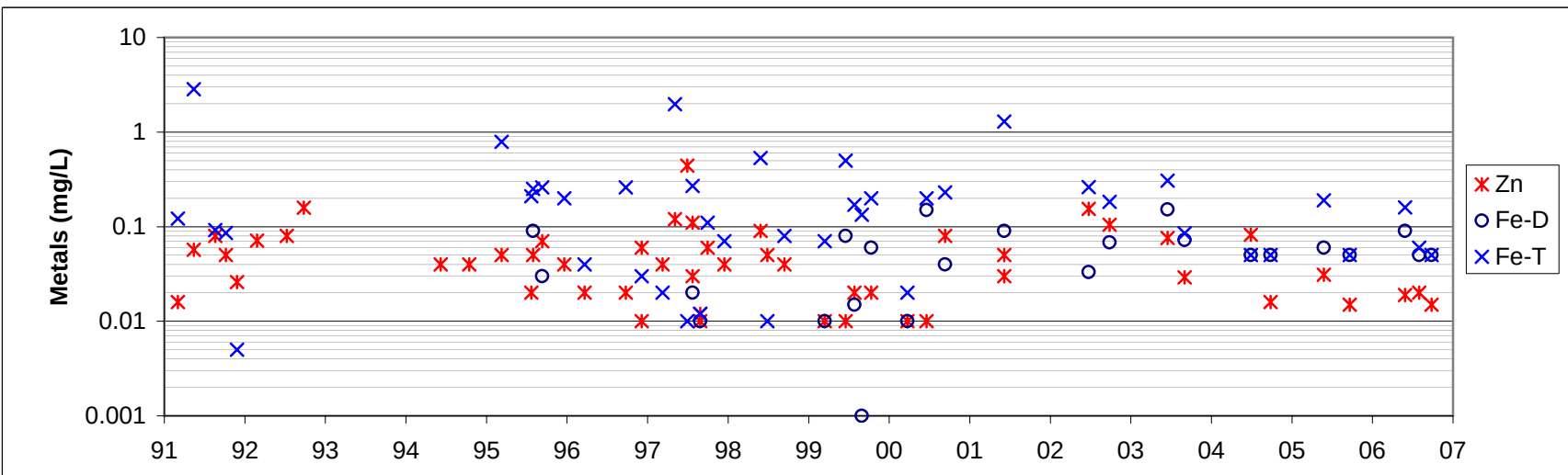
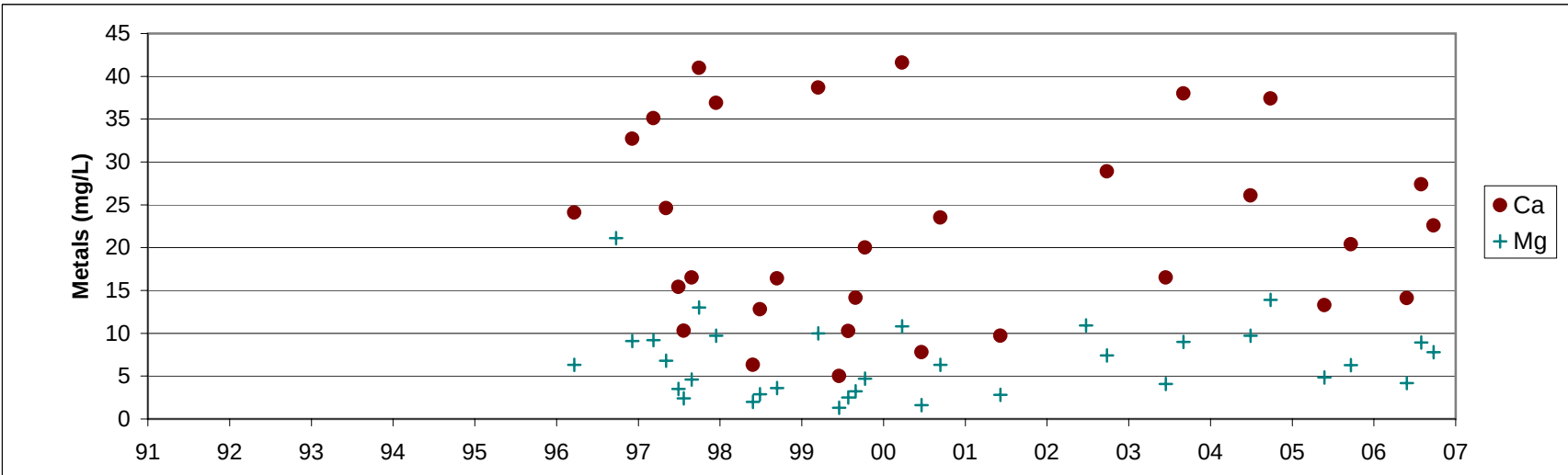
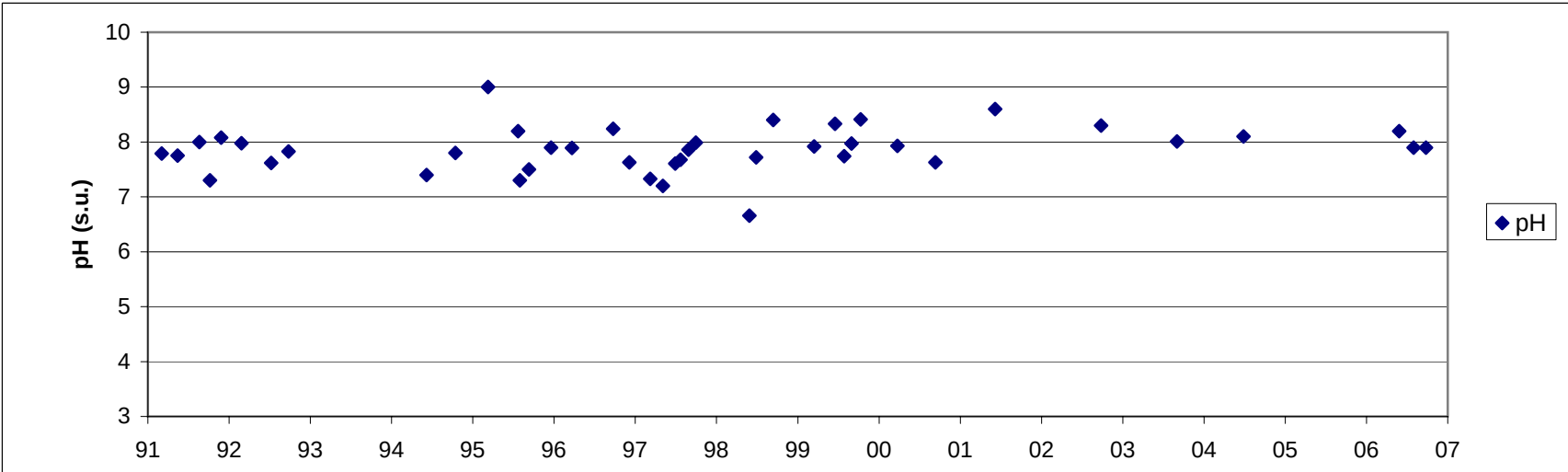
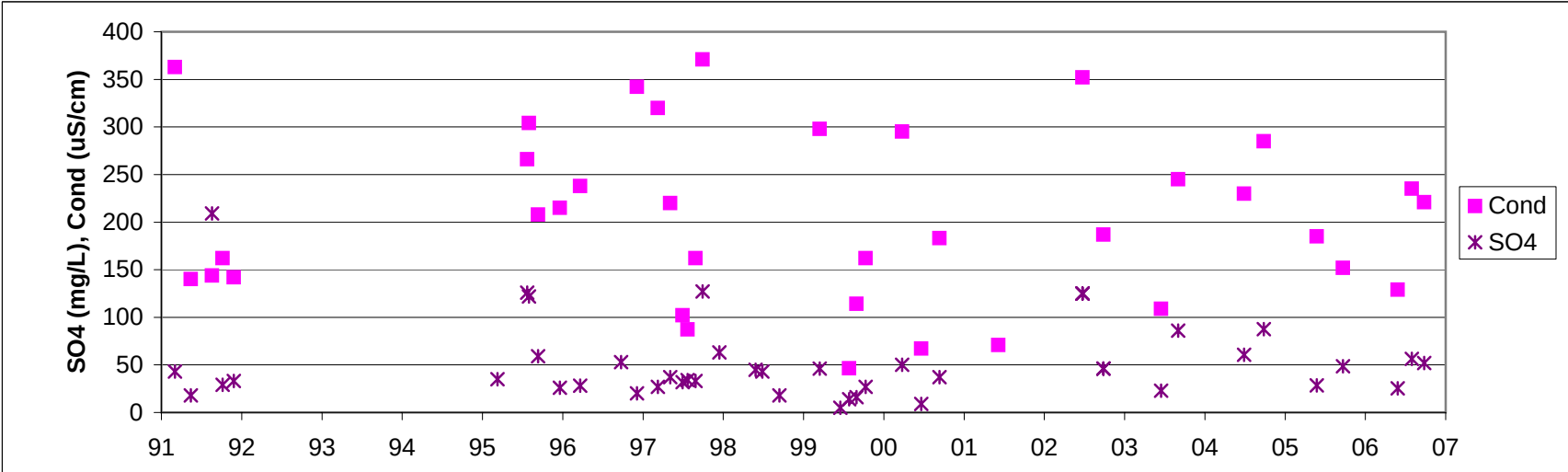
DATE
March 2007

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FIGURE

16

V27

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Anvil Range Mining Complex
2006 Waste Rock and Seepage Monitoring Report

Vangorda Water Sampling Station
V27

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1CD003.08!

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March 2007

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FIGURE

17

Appendix A
Results of Waste Rock Seepage Monitoring Results

Sample ID	Date Sampled	pH (WTW)	Cond (uS/cm)	Temp (C)	ORP (mV)	Flow (L/min)	Cond (uS/cm)	Lab pH	Acidity (to pH 8.3) CaCO3	Alkalinity< Total CaCO3	Chloride Cl	Sulphate SO4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	V	Zn	Water Type
		Min. detection level																																										
	Units	s.u.	uS/cm	OC	mV	L/min	uS/cm	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
SRK-FD01	6/10/2002	6.69	3670	13.2	139	6	3560	7.55	72	365	4.5	2220	<0.2	<0.2	<0.2	0.02	<0.005	<2	<0.1	0.02	543	<0.01	0.02	<0.01	0.36	0.23	0.03	244	3.41	<0.03	0.08	<0.3	11	<0.2	5.91	<0.01	30	2.86	<0.2	<0.03	<0.04	<0.03	34.6	2
SRK-FD01	9/11/2002	6.59	1900	4.2	212	0.5	1800	7.41	22	97	4.3	1070	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	0.02	272	<0.01	0.02	<0.01	0.38	0.07	0.02	87.4	2.06	<0.03	0.05	<0.3	6	<0.2	2.94	<0.01	17	1.11	<0.2	<0.03	<0.01	<0.03	13.6	2
SRK-FD01	6/4/2003	7.26	3340	13.2	198	-	3230	7.76	36	297	4.6	2260	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	0.02	492	<0.01	0.03	<0.01	5.02	<0.05	0.02	241	3.94	<0.03	0.06	<0.3	10	<0.2	5.46	<0.01	25	2.35	<0.2	<0.03	<0.01	<0.03	21.9	2
SRK-FD01	9/13/2003	6.97	3180	3.4	312	30	3050	7.48	70	223	3.9	1960	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	0.05	463	<0.01	0.03	0.03	2.53	0.06	0.03	214	3.09	<0.03	0.08	<0.3	7	<0.2	4.6	<0.01	28	2.27	<0.2	<0.03	<0.01	<0.03	36.8	2
SRK-FD01	5/31/2004	6.23	3580	1.9	355	200	3520	7.46	88.2	226	3.28	2410	0.24	<0.2	<0.2	0.031	<0.005	<0.2	<0.1	0.041	501	<0.01	0.038	0.054	2.8	<0.05	0.043	248	3.34	<0.03	0.119	<0.3	8.1	<0.2	5.11	<0.01	26.7	2.73	<0.3	<0.03	<0.01	<0.03	57.8	2
SRK-FD01	9/27/2004	6.93	3710	3	384	56	3560	7.4	67.4	252	<5	2370	<0.2	<0.2	<0.3	0.045	0.007	<0.2	<0.1	0.022	569	<0.01	0.015	0.02	6.29	<0.05	0.024	287	1.95	<0.03	0.088	<0.3	8.6	<0.2	5.5	<0.02	29.9	2.93	<0.2	<0.03	<0.01	<0.03	35.1	2
SRK-FD01	5/18/2005	6.48	3580	5.2	372	0.23	3440	7.50	96.9	220	<5.0	2420	0.31	<0.20	<0.20	0.034	<0.0050	<0.20	<0.10	0.045	508	<0.010	0.036	0.069	4.77	<0.050	0.035	281	3.70	<0.030	0.103	<0.30	9.7	<0.20	5.30	<0.010	34.2	2.76	<0.20	<0.030	<0.010	<0.030	60.8	2
SRK-FD01	9/16/2005	6.58	3780	3.4	374	45	3490	7.51	71.6	225	<5.0	2560	0.24	<0.20	<0.20	0.033	<0.0050	<0.20	<0.10	0.036	604	<0.010	0.037	0.027	8.30	<0.050	0.017	317	2.35	<0.030	0.126	<0.30	6.4	<0.20	5.86	<0.010	23.1	2.11	<0.20	<0.030	<0.010	<0.060	43.8	2
SRK-FD01	5/24/2006	6.93	2530	1.9	127	15	3920	6.85	121	235	3.3	2770	0.24	<0.2	<0.2	0.030	<0.005	<0.2	<0.1	0.041	519	<0.01	0.042	0.061	6.60	<0.05	0.029	318	4.19	<0.03	0.126	<0.3	9.1	<0.2	4.67	<0.01	26.7	2.77	<0.2	<0.03	<0.01	<0.03	69.2	2
SRK-FD01	9/21/2006	6.92	2520	2.4	110	30.5	3380	7.73	39.5	249	<10	2300	<0.20	<0.20	<0.20	0.033	<0.0050	<0.20	<0.10	0.016	434	<0.010	0.020	0.013	5.86	<0.050	0.027	245	1.15	<0.030	0.077	<0.30	6.6	<0.20	4.50	<0.010	29.9	2.03	<0.20	<0.10	<0.010	<0.030	22.0	2
SRK-FD02	6/10/2002	7.88	1558	1.6	248	20	1520	8.2	4	165	1.2	704	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	248	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	40.5	0.028	<0.03	<0.05	<0.3	5	<0.2	4.5	<0.01	96	1.4	<0.2	<0.03	<0.01	<0.03	0.166	1
SRK-FD02B	9/13/2003	7.55	1320	5.9	421	Trace	1230	8	14	155	0.9	597	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	0.01	223	<0.01	<0.01	<0.01	<0.03	0.15	0.01	26.8	0.422	<0.03	<0.05	<0.3	4	<0.2	3.92	<0.01	28	0.927	<0.2	<0.03	<0.01	<0.03	5.27	1
SRK-FD04	6/10/2002	2.32	23500	17.3	460	No Flow	22600	2.33	39900	<1	240	43300	857	<8	87	<0.4	<0.2	<10	<4	14.4	504	1.1	9.8	559	9170	<2	0.8	1000	811	<2	6	<20	<80	<8	82	<0.6	<80	0.5	<20	<2	<0.4	<2	9210	3
SRK-FD04	9/11/2002	2.54	7350	6.2	460	ponded	6370	2.7	5780	<1	78	7490	137	<1	9	<0.05	<0.03	<1	<0.5	1.68	160	0.22	1.38	55.4	1420	<0.3	0.2	190	125	<0.2	0.8	<2	<10	<1	16.4	<0.05	<10	0.22	<1	<0.2	<0.05	<0.2	1230	3
SRK-FD04	9/13/2003	2.39	34400	5	600	None	32300	2.38	49500	<1	1050	59000	986	<10	17	<0.5	<0.3	<10	<5	15.5	398	0.9	11.3	132	15100	<3	1.3	2220	448	<2	9	22	<100	<10	39	<0.5	<100	<0.3	<10	<2	<0.5	<2	10900	3
SRK-FD04B	6/6/2003	2.24	22000	15.6	613	0	21900	2.4	28700	<1	<0.5	32300	27	<10	<10	<0.5	<0.3	<10	<5	7	449	<0.5	20	<0.5	1300	<3	<0.5	3210	2360	<2	15	<20	<100	<10	23	<0.5	<100	<0.9	<10	<2	<0.5	<2	6380	3
SRK-FD05	6/12/2002	7.23	1252	1.2	317	10	1240	7.87	16	215	2.4	440	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	151	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	90	0.057	<0.03	0.06	<0.3	5	<0.2	5.74	<0.01	8	0.64	<0.2	<0.03	<0.01	<0.03	2.15	1
SRK-FD05	9/10/2002	6.97	882	1.9	225	60	875	7.65	18	172	1.3	266	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	<0.01	104	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	53.4	<0.005	<0.03	<0.05	<0.3	3	<0.2	5.29	<0.01	5	0.439	<0.2	<0.03	<0.01	<0.03	1.08	1
SRK-FD05B	6/5/2003	7.1	1664	1.3	473	Abundant	1590	7.72	17	241	2	774	<0.2	<0.2	<0.2	0.04	<0.005	<0.2	<0.1	<0.01	174	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	150	0.193	<0.03	0.06	<0.3	5	<0.2	5.48	<0.01	9	0.734	<0.2	<0.03	<0.01	<0.03	4.51	1
SRK-FD05C	9/12/2003	7.75	1161	8.8	361	30	1150	8.2	3	190	1.9	427	<0.2	<0.2	<0.2	0.04	<0.005	<0.2	<0.1	<0.01	153	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	68.9	<0.005	<0.03	<0.05	<0.3	3	<0.2	5.29	<0.01	7	0.701	<0.2	<0.03	<0.01	<0.03	0.526	1
SRK-FD05	5/27/2004	7.12	1239	1.4	349	30	1270	7.89	11.7	228	1.72	428	<0.2	<0.2	<0.2	0.039	<0.005	<0.2	<0.1	<0.01	131	<0.01	<0.01	<0.01	<0.03	<0.05	0.037	87.9	0.438	<0.03	<0.05	<0.3	4.2	<0.2	5.22	<0.01	6.7	0.571	<0.2	<0.03	<0.01	<0.03	2.33	1
SRK-FD05	9/24/2004	7.31	935	3.4	307	82	885	8.02	3.8	203	<2.5	270	<0.2	<0.2	<0.2	0.024	<0.005	<0.2	<0.1	<0.01	94.6	<0.01	<0.01	<0.01	<0.03	<0.05	0.018	57	<0.005	<0.03	<0.05	<0.3	4.3	<0.2	5.57	<0.01	5	0.418	<0.2	<0.03	<0.01	<0.03	1.36	1
SRK-FD05	5/18/2005	6.95		2.6		120	1160	7.81	8.5	220	0.98	416	<0.20	<0.20	<0.20	0.035	<0.0050	<0.20	<0.10	<0.010	119	<0.010	<0.010	<0.010	<0.030	<0.050	0.022	97.3	<0.0050	<0.030	<0.050	<0.30	3.3	<0.20	5.11	<0.010	5.4	0.447	<0.20	<0.030	<0.010	<0.030	4.21	1
SRK-FD05	9/13/2005	7.18	844	5.6	352	26	810	7.92	5.3	168	0.76	270	<0.20	<0.20	<0.20	0.024	<0.0050	<0.20	<0.10	<0.010	92.1	<0.010	<0.010	<0.010	<0.030	<0.050	0.023	59.8	<0.0050	<0.030	<0.050	<0.30	2.5	<0.20	4.86	<0.010	4.4	0.368	<0.20	<0.030	<0.010	<0.030	1.38	1
SRK-FD05	9/20/2006	7.1	818	2.4	309	35.5	799	7.94	4.6	179	0.76	246	<0.20	<0.20	<0.20	0.022	<0.0050	<0.20	<0.10	<0.010	79.3	<0.010	<0.010	<0.010	<0.030	<0.050	0.017	50.4	<0.0050	<0.030	<0.050	<0.30	2.3	<0.20	4.65	<0.010	4.0	0.317	<0.20	<0.030	<0.010	<0.030	1.66	1
SRK-FD06	6/12/2002	7.21	1118	1.5	217	10	1110	7.97	12	209	2.4	382	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	<0.01	112	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	85.3	0.036	<0.03	<0.05	<0.3	4	<0.2	5.3	<0.01	7	0.466	<0.2	<0.03	<0.01	<0.		

Sample ID	Date Sampled	pH (WTW)	Cond (uS/cm)	Temp (C)	ORP (mV)	Flow (L/min)	Cond (uS/cm)	Lab pH	Acidity (to pH 8.3) CaCO3	Alkalinity< Total CaCO3	Chloride Cl	Sulphate SO4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	V	Zn	Water Type
		Min. detection level																																										
		Units	s.u.	uS/cm	OC	mV	L/min	uS/cm	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		
SRK-FD18	6/13/2002	6.98	177	1.6	307		173	8.01	11	55	0.5	28	<0.2	<0.2	<0.2	0.06	<0.005	<0.2	<0.1	<0.01	26.4	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	4.6	<0.005	<0.03	<0.05	<0.3	<2	<0.2	5.35	<0.01	<2	0.095	<0.2	<0.03	<0.01	<0.03	0.102	1
SRK-FD18	9/12/2002	7.33	173	3.2	334	1.5	170	7.72	4	65	<0.5	19	<0.2	<0.2	<0.2	0.06	<0.005	<0.2	<0.1	<0.01	26.3	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	4.3	<0.005	<0.03	<0.05	<0.3	<2	<0.2	6.21	<0.01	2	0.099	<0.2	<0.03	<0.01	<0.03	0.101	1
SRK-FD18	6/5/2003	7.12	152	1.1	515	75	151	7.51	5	57	1.1	21	<0.2	<0.2	<0.2	0.06	<0.005	<0.2	<0.1	<0.01	22	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	4	<0.005	<0.03	<0.05	<0.3	<2	<0.2	5.04	<0.01	<2	0.084	<0.2	<0.03	<0.01	<0.03	0.082	1
SRK-FD18	9/11/2003	6.82	141	4	536	Trace	142	8.15	2	61	0.8	11	<0.2	<0.2	<0.2	0.08	<0.005	<0.2	<0.1	<0.01	21.9	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	3.4	<0.005	<0.03	<0.05	<0.3	<2	<0.2	6.55	<0.01	<2	0.083	<0.2	<0.03	<0.01	<0.03	0.119	1
SRK-FD18	5/27/2004	6.89	170	1.2	450	12.5	157	7.96	3.2	54.3	<0.5	28	<0.2	<0.2	<0.2	0.068	<0.005	<0.2	<0.1	<0.01	24.2	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	4.14	<0.005	<0.03	<0.05	<0.3	<2	<0.2	4.71	<0.01	<2	0.0912	<0.2	<0.03	<0.01	<0.03	0.113	1
SRK-FD18	9/26/2004	6.77	148	3.1	572	0.25	150	7.67	7.5	67.6	<0.5	9.15	<0.2	<0.2	<0.2	0.087	<0.005	<0.2	<0.1	<0.01	23.6	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	3.45	<0.005	<0.03	<0.05	<0.3	<2	<0.2	6.62	<0.01	2.1	0.0883	<0.2	<0.03	<0.01	<0.03	0.163	1
SRK-FD18	5/16/2005	7.06	205	1.5	544	30	208	7.84	3.1	71.1	<0.50	39.2	<0.20	<0.20	<0.20	0.081	<0.0050	<0.20	<0.10	<0.010	33.0	<0.010	<0.010	0.010	<0.030	<0.050	<0.010	5.73	<0.0050	<0.030	<0.050	<0.30	<2.0	<0.20	4.38	<0.010	<2.0	0.123	<0.20	<0.030	<0.010	<0.030	0.137	1
SRK-FD18	9/13/2005	6.83	149	5	671	60	149	7.97	3.1	55.9	<0.50	12.3	<0.20	<0.20	<0.20	0.073	<0.0050	<0.20	<0.10	<0.010	21.8	<0.010	<0.010	<0.010	<0.030	<0.050	<0.010	3.64	<0.0050	<0.030	<0.050	<0.30	<2.0	<0.20	5.26	<0.010	<2.0	0.0873	<0.20	<0.030	<0.010	<0.030	0.102	1
SRK-FD18	5/23/2006	6.91	164	1.2	324	22	164	7.46	5.3	52.6	<0.5	29.8	<0.2	<0.2	<0.2	0.086	<0.005	<0.2	<0.1	<0.01	24.0	<0.01	<0.01	0.016	0.059	<0.05	<0.01	4.66	0.0105	<0.03	<0.05	<0.3	<2	<0.2	4.51	<0.01	2.1	0.111	<0.2	<0.03	<0.01	<0.03	0.111	1
SRK-FD18	9/20/2006	7.06	138	3.8	222	6	138	7.89	3.4	68.8	<0.50	8.83	<0.20	<0.20	<0.20	0.084	<0.0050	<0.20	<0.10	<0.010	21.7	<0.010	<0.010	<0.010	<0.030	<0.050	<0.010	3.53	<0.0050	<0.030	<0.050	<0.30	<2.0	<0.20	5.93	<0.010	<2.0	0.0881	<0.20	<0.030	<0.010	<0.030	0.129	1
SRK-FD19	6/13/2002	6.98	5030	0	259	30	4710	7.52	91	394	2	3380	<0.2	<0.2	<0.2	0.04	<0.005	<0.2	<0.1	<0.01	595	<0.01	0.06	0.06	<0.05	0.03	584	16.5	<0.03	0.35	<0.3	11	<0.2	6.44	<0.01	22	3.28	<0.3	<0.03	<0.01	<0.03	43.9	2	
SRK-FD19	9/11/2002	6.87	5110	0.2	283	30	4900	7.21	115	386	1.6	3810	<0.4	<0.4	<0.4	0.04	<0.01	<0.4	<0.2	<0.02	628	<0.02	0.06	0.12	2.94	<0.1	0.03	574	19.3	<0.06	0.3	<0.6	10	<0.4	6.3	<0.02	20	3.29	<0.4	<0.06	<0.02	<0.06	51.3	2
SRK-FD19	6/6/2003	7.32	3550	1.3	444	30	4710	7.76	68	407	2.3	3670	<0.2	<0.2	<0.2	0.04	<0.005	<0.4	<0.1	<0.01	584	<0.01	0.04	<0.01	0.07	<0.05	0.03	536	16.1	<0.03	0.27	<0.3	9	<0.2	5.95	<0.01	18	2.95	<0.2	<0.03	<0.01	<0.03	40.8	2
SRK-FD19B	9/13/2003	7.25	5240	0.3	470	5.2	5070	7.75	67	403	2.5	3860	<0.2	<0.2	<0.2	0.05	<0.005	<0.5	<0.1	<0.01	598	<0.01	0.06	<0.01	0.07	<0.05	0.02	538	19.2	<0.03	0.3	<0.3	8	<0.2	6.23	<0.02	18	3.02	<0.2	<0.03	<0.01	<0.03	44.9	2
SRK-FD19	5/27/2004	6.65	4340	0.2	397	150	3940	7.45	90.3	279	1.55	3070	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	0.028	456	<0.01	0.128	0.016	<0.03	<0.05	0.062	484	11.7	<0.03	0.341	<0.3	9	<0.2	4.3	<0.01	19.7	3	<0.2	<0.03	<0.01	<0.03	52.9	2
SRK-FD19	9/26/2004	6.44	5690	1.1	461	0.1	5470	7.51	114	406	<10	4110	<0.2	<0.2	<0.2	0.059	<0.005	<0.4	<0.1	<0.02	617	<0.01	0.057	<0.01	0.125	<0.05	0.029	667	24	<0.03	0.464	<0.3	9.9	<0.2	6.6	<0.01	20.9	3.49	<0.4	<0.03	<0.01	<0.03	68.7	2
SRK-FD19	5/16/2005	7.04	4350	0.3	446	120	4290	7.58	114	259	<5.0	3170	<0.20	<0.20	<0.20	0.029	<0.0050	<0.20	<0.10	0.043	448	<0.010	0.150	0.054	<0.030	<0.050	0.039	401	14.0	<0.030	0.356	<0.30	6.9	<0.20	4.10	<0.010	15.3	2.29	<0.20	<0.030	<0.010	0.048	64.3	2
SRK-FD19	9/13/2005	6.91	5760	0.5	425	17	5100	7.51	128	414	<10	4290	<1.0	<1.0	<1.0	0.052	<0.025	<1.0	<0.50	<0.050	675	<0.050	0.076	<0.050	<0.15	<0.25	0.062	702	28.0	<0.15	0.49	<1.5	12	<1.0	6.47	<0.050	26	3.82	<1.0	<0.15	<0.050	<0.15	83.8	2
SRK-FD19	5/23/2006	7.51	4960	0.1	249	180	4870	7.50	92.1	403	<2.5	3550	<0.2	<0.2	<0.2	0.029	<0.005	<0.2	<0.1	0.011	445	<0.01	0.064	0.019	<0.03	<0.05	0.038	580	16.4	<0.03	0.418	<0.3	10.6	<0.2	4.20	<0.01	21.8	2.80	<0.2	<0.03	<0.01	<0.03	36.3	2
SRK-FD19	9/20/2006	7.22	5750	0.2	152	2	5590	7.58	123	436	<25	4070	<0.60	<0.60	<0.60	0.043	<0.015	<0.60	<0.30	<0.030	634	<0.030	0.073	<0.030	0.116	<0.15	0.039	736	30.8	<0.090	0.50	<0.90	10.7	<0.60	6.85	<0.030	21.0	3.31	<0.60	<0.090	<0.030	<0.090	84.1	2
SRK-FD20	6/13/2002	3.18	555	8.2	492	0.5	572	3.18	135	<1	0.6	193	9.1	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	10.2	0.01	0.05	0.99	16.9	<0.05	0.01	9.1	0.603	<0.03	0.06	<0.3	<2	<0.2	10.8	<0.01	2	0.046	<0.2	<0.03	<0.01	<0.03	7.93	3
SRK-FD20	9/13/2002	2.78	1875	0.9	586	60	1820	2.82	8750	12	<0.5	1170	46.8	<0.2	<0.2	0.04	0.006	<0.2	<0.1	0.08	35.2	0.07	0.25	8.06	173	<0.05	0.08	35.8	2.31	<0.03	0.24	0.7	<2	<0.2	16.7	<0.01	4	0.145	<0.2	<0.03	<0.01	<0.03	59.8	3
SRK-FD20	6/5/2003	3.39	291	2.3	723	0	189	4.2	28	<1	0.6	69	1.8	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	6.45	<0.01	<0.01	0.24	1.45	<0.05	<0.01	3.8	0.161	<0.03	<0.05	<0.3	<2	<0.2	9.49	<0.01	2	0.044	<0.2	<0.03	<0.01	<0.03	2.2	3
SRK-FD20	9/12/2003	2.93	834	2.2	778	2	771	3.66	176	<1	<0.5	248	11.3	<0.2	<0.2	0.04	<0.005	<0.2	<0.1	0.02	18	0.02	0.06	1.94	32.2	<0.05	0.03	13.2	0.672	<0.03	0.08	<0.3	<2	<0.2	13.9	<0.01	3	0.095	<0.2	<0.03	<0.01	<0.03	13.4	3
SRK-FD21	6/13/2002	4.57	4370	7.1	418	1.5	4130	4.51	283	8	0.8	3540	27.3	<0.2	<0.2	<0.01	0.009	<0.2	<0.1	0.17	410	<0.01	0.28	2.59	0.06	0.09	0.11	504	6.79	<0.03	0.53	<0.3	14	<0.2	8.54	<0.01	14	1.73	<0.3	<0.03	<0.01	<0.03	65	3
SRK-FD21B	9/13/2002	5.21	2860	1.6	371	slight	2820	5.37	35	8	<0.5	1980	1.5	<0.2	<0.2	<0.01	<0.005	<0.3	<0.1	0.05	322	<0.01	0.03	0.3	<0.03																			

SRK.Seepage.Survey.Summary.Tables.2002-2006.xls

		Field Parameters					Physical Tests		Dissolved Anions				Dissolved Metals																																
Sample ID	Date Sampled	pH (WTW)	Cond (uS/cm)	Temp (C)	ORP (mV)	Flow (L/min)	Cond (uS/cm)	Lab pH	Acidity (to pH 8.3) CaCO3	Alkalinity- Total CaCO3	Chloride Cl	Sulphate SO4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	V	Zn	Water Type	
Min. detection level							2.0	0.010	1.0	1.0	0.50	0.50	0.20	0.20	0.20	0.010	0.0050	0.20	0.10	0.010	0.050	0.010	0.010	0.010	0.030	0.050	0.010	0.10	0.0050	0.030	0.050	0.30	2.0	0.20	0.050	0.010	2.0	0.0050	0.20	0.030	0.010	0.030	0.0050		
Units		s.u.	uS/cm	OC	mV	L/min	uS/cm	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
SRK-GD01	6/11/2002	6.69	2170	1.8	272	100	2080	7.66	38	337	1.7	1220	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	283	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	141	0.059	<0.03	0.26	<0.3	5	<0.2	3.98	<0.01	7	0.914	<0.2	<0.03	<0.01	<0.03	5.07	1b	
SRK-GD01	9/11/2002	6.91	2490	2.5	272	340	2460	7.27	69	497	1.5	1200	<0.2	<0.2	<0.2	0.06	<0.005	<0.4	<0.1	<0.01	351	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	216	0.062	<0.03	0.29	<0.3	8	<0.2	4.09	<0.01	9	1.31	<0.2	<0.03	<0.01	<0.03	2.48	1b	
SRK-GD01	6/4/2003	6.93	2670	2.4	488	105	2530	7.82	25	534	2.2	1320	<0.2	<0.2	<0.2	0.05	<0.005	<0.2	<0.1	<0.01	316	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	223	0.044	<0.03	0.43	<0.3	8	<0.2	4.36	<0.01	10	1.3	<0.2	<0.03	<0.01	<0.03	4.58	1b	
SRK-GD01	09/14/2003	7.26	2610	2.5	459	150	2530	8.09	16	559	2.4	1210	<0.2	<0.2	<0.2	0.05	<0.005	<0.2	<0.1	<0.01	367	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	233	0.053	<0.03	0.34	<0.3	8	<0.2	4.46	<0.01	10	1.48	<0.2	<0.03	<0.01	<0.03	2.98	1b	
SRK-GD01	5/28/2004	7.71	2110	2.1	414	400	2030	7.44	44.2	255	1.17	1080	<0.2	<0.2	<0.2	0.037	<0.005	<0.2	<0.1	<0.01	259	<0.01	0.05	<0.01	<0.03	<0.05	0.018	146	0.998	<0.03	0.43	<0.3	5.4	<0.2	2.83	<0.01	5	0.912	<0.2	<0.03	<0.01	<0.03	17.2	1b	
SRK-GD01	9/23/2004	7.06	2780	3.6	285	180	2700	7.77	23	583	<5	1270	<0.2	<0.2	<0.2	0.043	<0.005	<0.2	<0.1	<0.01	348	<0.01	<0.01	<0.01	<0.03	<0.05	0.027	239	0.056	<0.03	0.351	<0.3	8.3	<0.2	4.08	<0.01	10.1	1.36	<0.2	<0.03	<0.01	<0.03	3.69	1b	
SRK-GD01	5/15/2005	7.06	2220	1.6	460		2170	7.69	21.8	290	<5.0	1100	<0.20	<0.20	<0.20	0.051	<0.0050	<0.20	<0.10	<0.010	291	<0.010	0.016	<0.010	<0.030	<0.050	0.022	173	0.353	<0.030	0.295	<0.30	4.2	<0.20	2.93	<0.010	5.3	0.897	<0.20	<0.030	<0.010	0.037	10.7	1b	
SRK-GD01	9/16/2005	7.63	2540	2.9	402	100	2730	7.79	19.1	566	<5.0	1390	<0.20	<0.20	<0.20	0.035	<0.0050	<0.20	<0.10	<0.010	332	<0.010	<0.010	<0.010	<0.030	<0.050	0.022	248	0.0502	<0.030	0.355	<0.30	5.7	<0.20	3.90	<0.010	9.1	1.14	<0.20	<0.030	<0.010	<0.050	3.11	1b	
SRK-GD01	5/26/2006	6.76	2360	2.5	317	30	3130	7.85	34.9	588	<5	1630	<0.2	<0.2	<0.2	0.040	<0.005	<0.2	<0.1	<0.01	343	<0.01	<0.01	<0.01	0.038	<0.05	0.015	289	0.0828	<0.03	0.336	<0.3	8.0	<0.2	3.23	<0.01	11.1	1.19	<0.2	<0.03	<0.01	<0.03	3.10	1b	
SRK-GD01	9/19/2006	7.17	2420	3	187	30	2620	7.63	22.5	552	1.23	1320	<0.20	<0.20	<0.20	0.043	<0.0050	<0.20	<0.10	<0.010	317	<0.010	<0.010	<0.010	<0.030	<0.050	0.030	253	0.0449	<0.030	0.334	<0.30	6.9	<0.20	3.83	<0.010	10.0	1.23	<0.20	0.099	<0.010	<0.030	2.76	1b	
SRK-GD02	6/11/2002	7.02	2460	3.2	235	30	2430	8.02	19	494	1.8	1100	<0.2	<0.2	<0.2	0.04	<0.005	<0.2	<0.1	<0.01	302	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	206	0.121	<0.03	0.34	<0.3	8	<0.2	3.74	<0.01	10	1.2	<0.2	<0.03	<0.01	<0.03	2.76	1b	
SRK-GD02	9/11/2002	6.96	2540	4	298	2	1580	7.56	27	278	0.9	665	<0.2	<0.2	<0.2	0.04	<0.005	<0.4	<0.1	<0.01	335	<0.01	<0.01	<0.01	<0.03	<0.05	0.01	213	0.114	<0.03	0.32	<0.3	7	<0.2	3.89	<0.01	9	1.26	<0.2	<0.03	<0.01	<0.03	2.31	1b	
SRK-GD02	9/14/2003	7.2	2650	2.2	444	Trace	2580	8.07	16	574	2.4	1340	<0.2	<0.2	<0.2	0.06	<0.005	<0.2	<0.1	<0.01	380	<0.01	<0.01	<0.01	<0.03	<0.05	0.01	251	<0.005	<0.03	0.29	<0.3	8	<0.2	4.45	<0.01	10	1.58	<0.2	<0.03	<0.01	<0.03	2.31	1b	
SRK-GD04	6/11/2002	7.6	3260	2.5	248	1.5	3220	8.06	18	477	1.9	1350	<0.2	<0.2	<0.2	0.02	<0.005	<0.2	<0.1	<0.01	352	<0.01	0.03	<0.01	<0.03	<0.05	0.04	347	0.207	<0.03	0.42	<0.3	10	<0.2	3.65	<0.01	16	1.59	<0.2	<0.03	<0.01	<0.03	3.68	1b	
SRK-GD05	6/11/2002	7.74	2670	3.1	273	7.5	2570	8.14	13	527	2.2	1220	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	358	<0.01	<0.01	<0.01	<0.03	<0.05	0.04	211	0.189	<0.03	0.59	<0.3	8	<0.2	5.66	<0.01	14	1.52	<0.2	<0.03	<0.01	<0.03	3.54	1b	
SRK-GD05	9/11/2002	7.45	2550	3.7	292	30	2470	7.88	28	600	1.9	1080	<0.2	<0.2	<0.2	0.02	<0.005	<0.3	<0.1	<0.01	349	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	199	0.008	<0.03	0.51	<0.3	7	<0.2	6.06	<0.01	11	1.41	<0.2	<0.03	<0.01	<0.03	2.65	1b	
SRK-GD05B	6/4/2003	7.8	2550	3.9	421	20	2480	8.04	15	638	2.4	1230	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	312	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	199	0.007	<0.03	0.38	<0.3	7	<0.2	5.51	<0.01	12	1.36	<0.2	<0.03	<0.01	<0.03	1.73	1b	
SRK-GD05B	09/14/2003	7.84	2610	1.7	402	21	2510	8.11	14	627	2.8	1180	<0.2	<0.2	<0.2	0.03	<0.005	<0.2	<0.1	<0.01	337	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	212	0.013	<0.03	0.44	<0.3	7	<0.2	5.66	<0.01	11	1.48	<0.2	<0.03	<0.01	<0.03	2.02	1b	
SRK-GD05	5/28/2004	7.83	3180																																										

Sample ID	Date Sampled	Field Parameters					Physical Tests		Dissolved Anions				Dissolved Metals																													Water Type				
		pH (WTW)	Cond (uS/cm)	Temp (C)	ORP (mV)	Flow (L/min)	Cond (uS/cm)	Lab pH	Acidity (to pH 8.3) CaCO3	Alkalinity- Total CaCO3	Chloride Cl	Sulphate SO4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti		V	Zn		
Min. detection level							2.0	0.010	1.0	1.0	0.50	0.50	0.20	0.20	0.20	0.010	0.0050	0.20	0.10	0.010	0.050	0.010	0.010	0.010	0.030	0.050	0.010	0.10	0.0050	0.030	0.050	0.30	2.0	0.20	0.050	0.010	2.0	0.0050	0.20	0.030	0.010	0.030	0.0050			
Units		s.u.	uS/cm	OC	mV	L/min	uS/cm	s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	
SRK-GD13	9/12/2002	7.8	1190	4.6	201	10	1190	7.73	29	388	0.9	386	<0.2	<0.2	<0.2	0.11	<0.005	<0.2	<0.1	<0.01	168	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	71.4	0.007	<0.03	<0.05	<0.3	3	<0.2	5.69	<0.01	3	0.823	<0.2	<0.03	<0.01	<0.03	0.028		1a	
SRK-GD13	6/4/2003	7.35	1178	1.5	414	4	1150	8.05	7	402	1.4	313	<0.2	<0.2	<0.2	0.09	<0.005	<0.2	<0.1	<0.01	153	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	70.6	0.053	<0.03	0.07	<0.3	<2	<0.2	5.05	<0.01	3	0.788	<0.2	<0.03	<0.01	<0.03	0.007		1a	
SRK-GD13	9/14/2003	7.26	1268	1.6	418	9	1230	8.24	2	392	1.6	338	<0.2	<0.2	<0.2	0.11	<0.005	<0.2	<0.1	<0.01	178	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	80.8	<0.005	<0.03	<0.05	<0.3	<2	<0.2	5.32	<0.01	4	0.9	<0.2	<0.03	<0.01	<0.03	0.007		1a	
SRK-GD13	5/28/2004	7.65	1212	1.9	417	15	1080	7.94	12.2	269	1.05	360	<0.2	<0.2	<0.2	0.098	<0.005	<0.2	<0.1	<0.01	142	<0.01	0.012	<0.01	0.205	<0.05	<0.01	66.1	0.608	<0.03	0.129	<0.3	<2	<0.2	3.75	<0.01	2.4	0.758	<0.2	<0.03	<0.01	<0.03	0.0114		1a	
SRK-GD13	9/24/2004	7.41	1500	3.7	519	8	1500	8.04	8.6	447	<5	468	<0.2	<0.2	<0.2	0.118	<0.005	<0.2	<0.1	<0.01	206	<0.01	<0.01	<0.01	<0.03	<0.05	0.014	94	<0.005	<0.03	0.13	<0.3	2.6	<0.2	5.83	<0.01	3.7	1.04	<0.2	<0.03	<0.01	<0.03	0.0159		1a	
SRK-GD13	5/18/2005					53	1510	7.93	10.9	311	0.66	561	<0.20	<0.20	<0.20	0.084	<0.0050	<0.20	<0.10	<0.010	198	<0.010	<0.010	<0.010	<0.030	<0.050	<0.010	109	0.0694	<0.030	0.098	<0.30	2.4	<0.20	4.38	<0.010	4.5	0.983	<0.20	<0.030	<0.010	<0.030	0.0186		1a	
SRK-GD13	9/16/2005	7.36	1704	2.3	406	2	1600	8.06	7.6	427	<5.0	620	<0.20	<0.20	<0.20	0.105	<0.0050	<0.20	<0.10	<0.010	286	<0.010	<0.010	<0.010	<0.030	<0.050	<0.010	136	<0.0050	<0.030	0.107	<0.30	2.4	<0.20	6.22	<0.010	4.9	1.17	<0.20	<0.030	<0.010	<0.050	0.0229		1a	
SRK-GD13	5/25/2006	6.9	1899	2.5	245	36.4	1880	7.83	17.7	463	<2.5	731	<0.2	<0.2	<0.2	0.066	<0.005	<0.2	<0.1	<0.01	256	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	156	0.0420	<0.03	0.132	<0.3	3.5	<0.2	5.08	<0.01	5.9	1.30	<0.2	<0.03	<0.01	<0.03	0.0258		1a	
SRK-GD13	9/19/2006	7.26	1813	2.1	189	2	1800	7.84	12.2	473	0.89	649	<0.20	<0.20	<0.20	0.077	<0.0050	<0.20	<0.10	<0.010	235	<0.010	<0.010	<0.010	<0.030	<0.050	0.012	139	<0.0050	<0.030	0.088	<0.30	2.3	<0.20	5.21	<0.010	4.5	1.02	<0.20	0.051	<0.010	<0.030	0.0175		1a	
SRK-GD16	5/28/2004	7.47	3280	3.4	504	30	3040	7.72	43	619	2.14	1680	<0.2	<0.2	<0.2	0.041	<0.005	<0.2	<0.1	<0.01	382	<0.01	0.03	<0.01	<0.03	<0.05	0.048	253	1.75	<0.03	0.701	<0.3	7	<0.2	4.59	<0.01	12	1.67	<0.2	<0.03	<0.01	<0.03	10.4		2	
SRK-GD16	5/18/2005	7.28			439	2.1	3480	7.62	93.2	602	<5.0	2090	<0.20	<0.20	<0.20	0.032	<0.0050	<0.20	<0.10	0.089	416	<0.010	0.096	0.026	<0.030	<0.050	0.045	338	4.93	<0.030	0.501	<0.30	6.1	<0.20	6.71	<0.010	15.4	1.69	<0.20	<0.030	<0.010	<0.030	59.9		2	
SRK-GD17	5/28/2004	7.44	3990	5.1	397	15	3740	7	158	195	1.99	2770	<0.2	<0.2	<0.2	0.014	<0.005	<0.2	<0.1	0.061	356	<0.01	0.214	<0.01	<0.03	<0.05	0.088	413	3.1	<0.03	1.08	<0.3	11.5	<0.2	1.31	<0.01	6.2	1.21	<0.2	<0.03	<0.01	<0.03	110		2	
SRK-GD17	5/25/2006	7.39	2330	5.8	118	3	3000	7.67	57.6	177	<2.5	1990	<0.2	<0.2	<0.2	<0.01	<0.005	<0.2	<0.1	0.027	288	<0.01	0.121	<0.01	<0.03	<0.05	0.060	319	1.47	<0.03	0.507	<0.3	9.4	<0.2	0.99	<0.01	5.4	0.916	<0.2	<0.03	<0.01	<0.03	42.2		2	
SRK-GD18	5/28/2004	7.74	741	3	403	15	742	8.07	5.9	108	0.74	302	<0.2	<0.2	<0.2	0.023	<0.005	<0.2	<0.1	<0.01	80.4	<0.01	<0.01	<0.01	<0.03	<0.05	0.014	43.8	0.038	<0.03	0.051	<0.3	3	<0.2	1.57	<0.01	<2	0.359	<0.2	<0.03	<0.01	<0.03	0.105		1a	
SRK-GD18	5/18/2005	6.73		3	399	97.5	1040	8.09	6.5	141	<0.50	458	<0.20	<0.20	<0.20	0.024	<0.0050	<0.20	<0.10	<0.010	129	<0.010	<0.010	<0.010	<0.030	<0.050	<0.010	78.2	0.0416	<0.030	<0.050	<0.30	3.9	<0.20	1.89	<0.010	3.3	0.527	<0.20	<0.030	<0.010	<0.030	0.389		1a	
SRK-GD18	5/25/2006	7.07	953	2.1	259	50	950	7.92	6.6	115	<0.5	418	<0.2	<0.2	<0.2	0.024	<0.005	<0.2	<0.1	<0.01	123	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	68.6	0.0527	<0.03	<0.05	<0.3	4.1	<0.2	1.46	<0.01	4.3	0.498	<0.2	<0.03	<0.01	<0.03	0.132		1a	
SRK-GD19	5/29/2004	5.73	2580	1.1	336	30	2500	5.75	238	38.7	0.58	1710	0.28	<0.2	<0.2	0.011	<0.005	<0.2	<0.1	0.178	321	<0.01	0.696	2.11	46.4	0.135	0.045	167	7.52	<0.03	2.65	<0.3	6.5	<0.2	3.69	<0.01	4.5	1.02	<0.3	<0.03	<0.01	<0.03	107		3	
SRK-GD20	5/29/2004	6.2	2450	1.7	322	30	2410	7.59	198	130	0.9	1530	<0.2	<0.2	<0.2	0.012	<0.005	<0.2	<0.1	0.063	346	<0.01	0.446	0.12	27.3	<0.05	0.027	150	6.62	<0.03	1.46	<0.3	6.5	<0.2	4.04	<0.01	4.7	1.32	<0.2	<0.03	<0.01	<0.03	97.9		2	
SRK-GD20	5/25/2006	7.37	2390	9.8	109	trace	2580	7.87	12.6	132	<2.5	1700	<0.2	<0.2	<0.2	0.013	<0.005	<0.2	<0.1	<0.01	249	<0.01	0.030	<0.01	<0.03	<0.05	0.065	308	0.576	<0.03	0.104	<0.3	19.6	<0.2	0.54	<0.01	7.4	0.744	<0.2	<0.03	<0.01	<0.03	9.23		2	
SRK-GD21	5/28/2004	7.47	3390	3.4	394	7.5	3140	7.86	27.6	393	1.26	1990	<0.2	<0.2	<0.2	0.036	<0.005	<0.2	<0.1	<0.01	315	<0.01	0.026	<0.01	<0.03	<0.05	0.066	403	0.271	<0.03	0.345	<0.3	12.3	<0.2	2.3	<0.01	14.9	1.53	<0.2	<0.03	<0.01	<0.03	2.52		1b	
SRK-GD21	9/24/2004	7.1	3860	4	536	Trace	3770	8.1	6.3	628	<5	2170	<0.2	<0.2	<0.2	0.016	<0.005	<0.2	<0.1	<0.01	365	<0.01	<0.01	<0.01	<0.03	<0.05	0.041	438	0.0619	<0.03	0.409	<0.3	10	<0.2	3.89	<0.01	17.1	1.63	<0.2	<0.03	<0.01	<0.03	1.82		1b	
SRK-GD21	5/15/2005	7.74	2490	2.7	438	6	2950	8.10	7.9	356	<5.0	1770	<0.20	<0.20	<0.20	0.025	<0.0050	<0.20	<0.10	<0.010	277	<0.010	0.012	<0.010	<0.030	<0.050	0.047	340	0.0983	<0.030	0.290	<0.30	8.2	<0.20	1.66	<0.010	11.4	1.16	<0.20	<0.030	<0.010	0.053	2.63		1b	
SRK-GD21	5/25/2006	7.85	2370	10.5	118	trace	2890	8.08	9.8	400	<2.5	1670	<0.2	<0.2	<0.2	0.018	<0.005	<0.																												

SRK.Seepage.Survey.Summary.Tables.2002-2006.xls

Appendix B
Results of Pit Seepage Monitoring Results

Sample ID	Date Sampled	Location		Field Parameters					Physical Tests		Dissolved Anions				Dissolved Metals																														
		Easting (NAD27)	Northing (NAD27)	pH	Cond uS/cm	Temp °C	ORP mV	Flow L/min	Cond uS/cm	pH	Acidity (to pH 8.3) mg CaCO3/Lng	Alkalinity- Total CaCO3/l	Cl mg/L	SO4 mg/L	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	V	Zn
															0.2	0.2	0.2	0.01	0.005	0.2	0.1	0.01	0.05	0.01	0.01	0.01	0.01	0.03	0.05	0.01	0.1	0.005	0.03	0.05	0.3	2	0.2	0.05	0.01	2	0.005	0.2	0.03	0.01	0.03
				Method Detect				2	0.01	1	1	0.5	0.5	0.2	0.2	0.2	0.01	0.005	0.2	0.1	0.01	0.05	0.01	0.01	0.01	0.01	0.03	0.05	0.02	0.1	0.005	0.03	0.05	0.3	2	0.2	0.05	0.01	2	0.005	0.2	0.03	0.01	0.03	0.005
03-GP01	6/9/2003	592306	6905309	8.05	1928	12.7	635	2	1850	7.8	37	373	<0.5	989	<0.2	<0.2	<0.2	0.01	<0.005	<0.2	<0.1	<0.01	239	<0.01	0.01	<0.01	<0.03	<0.05	0.02	167	0.015	<0.03	0.51	<0.3	3	<0.2	2.37	<0.01	6	1.14	<0.2	<0.03	<0.01	<0.03	6.69
03-GP02	6/9/2003	592241	6905243	7.28	1456	13.7	622	Trace	1550	7.51	51	189	<0.5	932	<0.2	<0.2	<0.2	0.01	<0.005	<0.2	<0.1	<0.01	197	<0.01	0.1	<0.01	<0.03	<0.05	0.02	112	0.224	<0.03	1.03	<0.3	3	<0.2	3.46	<0.01	8	1.41	<0.2	<0.03	<0.01	<0.03	14.3
03-GP04	6/9/2003	592220	6905228	8.21	1896	15.4	617	1	1780	8.08	20	266	<0.5	1050	<0.2	<0.2	<0.2	0.01	<0.005	<0.2	<0.1	<0.01	268	<0.01	0.02	<0.01	<0.03	<0.05	0.03	144	0.013	0.06	0.17	<0.3	5	<0.2	1.94	<0.01	6	1.78	<0.2	<0.03	<0.01	<0.03	0.073
03-GP05	6/9/2003	592123	6905120	7.88	1289	3.7	586	3	1240	7.65	36	223	<0.5	627	<0.2	<0.2	<0.2	0.01	<0.005	<0.2	<0.1	<0.01	158	<0.01	0.02	<0.01	<0.03	<0.05	0.03	96.9	<0.005	<0.03	0.07	<0.3	3	<0.2	1.78	<0.01	5	1.47	<0.2	<0.03	<0.01	<0.03	0.03
03-GP06	6/9/2003	592081	6905001	8.36	1755	11.2	462	Trace	1660	8.13	11	264	2.7	995	<0.2	<0.2	<0.2	0.01	<0.005	<0.2	<0.1	<0.01	90	<0.01	<0.01	<0.01	<0.03	<0.05	0.05	235	<0.005	<0.03	<0.05	<0.3	4	<0.2	1.21	<0.01	5	0.403	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP01	5/31/2004	592057	6904872	7.81	946	12	349	Trace	935	8.29	<1.0	139	0.78	359	<0.2	<0.2	<0.2	0.014	<0.0050	<0.2	<0.1	<0.01	94.9	<0.01	<0.01	<0.01	<0.03	<0.05	0.023	70.9	<0.0050	<0.03	0.092	<0.3	2.9	<0.2	0.949	<0.01	<2	0.465	<0.2	<0.03	<0.01	<0.03	0.0188
04-GP02	5/31/2004	592025	6904962	7.96	1174	8.6	360	15	1190	8.29	<1.0	210	2.3	456	<0.2	<0.2	<0.2	0.011	<0.0050	<0.2	<0.1	<0.01	117	<0.01	<0.01	<0.01	<0.03	<0.05	0.017	97.1	<0.0050	<0.03	0.108	<0.3	3.9	<0.2	0.879	<0.01	3	0.498	<0.2	<0.03	<0.01	<0.03	0.0238
04-GP03	5/31/2004	592009	6905010	8	764	5.5	337	15	757	8.31	<1.0	187	0.86	225	<0.2	<0.2	<0.2	0.017	<0.0050	<0.2	<0.1	<0.01	64.8	<0.01	<0.01	<0.01	<0.03	<0.05	0.02	59.6	<0.0050	<0.03	0.08	<0.3	3.6	<0.2	1.11	<0.01	<2	0.289	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP04	5/31/2004	592659	6905112	7.95	341	4.3	354	60	346	8.28	<1.0	145	<0.50	34.7	<0.2	<0.2	<0.2	0.109	<0.0050	<0.2	<0.1	<0.01	46	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	9.78	<0.0050	<0.03	<0.05	<0.3	<2	<0.2	5.72	<0.01	6.9	0.314	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP05	5/31/2004	592765	6904941	7.87	1097	17.4	corded	Trace	1190	7.87	3.3	99.2	0.76	590	<0.2	<0.2	<0.2	0.342	<0.0050	<0.2	<0.1	<0.01	185	<0.01	<0.01	<0.01	<0.03	<0.05	<0.01	34.8	0.0252	<0.03	<0.05	<0.3	5.2	<0.2	1.4	<0.01	14.7	0.745	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP06	6/1/2004	592123	6905120	7.41	1744	12.4	296	0.1	1770	7.96	2.3	297	1.5	853	<0.2	<0.2	<0.2	0.011	<0.0050	<0.2	<0.1	<0.01	103	<0.01	<0.01	<0.01	<0.03	<0.05	0.036	206	0.0149	<0.03	0.056	<0.3	3.8	<0.2	1.33	<0.01	4.1	0.516	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP07	6/1/2004	592146	6905136	8.09	1059	8	310	5	1090	8.14	<1.0	245	0.84	403	<0.2	<0.2	<0.2	0.024	<0.0050	<0.2	<0.1	<0.01	83.9	<0.01	<0.01	<0.01	<0.03	<0.05	0.03	98.2	0.0083	<0.03	<0.05	<0.3	2.5	<0.2	0.887	<0.01	<2	0.418	<0.2	<0.03	<0.01	<0.03	<0.005
04-GP08	6/1/2004	592169	6905153	8.34	1206	7.9	294	Trace	1280	8.04	3.7	268	0.61	513	<0.2	<0.2	<0.2	0.015	<0.0050	<0.2	<0.1	<0.01	144	<0.01	0.011	<0.01	<0.03	<0.05	0.022	89.3	0.0168	<0.03	0.052	<0.3	2.9	<0.2	1.58	<0.01	4	1.37	<0.2	<0.03	<0.01	<0.03	0.0133
04-GP10	6/1/2004	592301	6905303	8.45	1518	7.3	corded	9	1520	7.92	5.8	273	<0.50	716	<0.2	<0.2	<0.2	0.011	<0.0050	<0.2	<0.1	<0.01	173	<0.01	0.022	<0.01	<0.03	<0.05	<0.01	109	0.0216	<0.03	0.418	<0.3	2.7	<0.2	1.44	<0.01	2.7	0.805	<0.2	<0.03	<0.01	<0.03	7.5
04-GP11	6/1/2004	592236	6905238	7.5	1442	10.8	324	0.25	1480	7.61	13.4	217	<0.50	733	<0.2	<0.2	<0.2	0.014	<0.0050	<0.2	<0.1	<0.01	176	<0.01	0.101	<0.01	<0.03	<0.05	0.022	99.6	0.158	<0.03	1.03	<0.3	3	<0.2	3.06	<0.01	5.8	1.25	<0.2	<0.03	<0.01	<0.03	12
04-GP12	01-Jun-04	592222	6905215	7.94	1709	14.6	306	0.1	1680	8.05	4	280	0.63	849	<0.2	<0.2	<0.2	0.018	<0.0050	<0.2	<0.1	<0.01	216	<0.01	0.018	<0.01	<0.03	<0.05	0.019	121	0.0102	0.046	0.13	<0.3	4.8	<0.2	1.74	<0.01	4.8	1.45	<0.2	<0.03	<0.01	<0.03	0.0326
04-GP13	01-Jun-04	592611	6904459	8.28	789	12.8	306	0	775	8.29	<1.0	91.8	0.74	350	<0.2	<0.2	<0.2	0.043	<0.0050	<0.2	<0.1	<0.01	103	<0.01	<0.01	<0.01	<0.03	<0.05	0.011	34.3	0.558	<0.03	<0.05	<0.3	2.9	<0.2	0.726	<0.01	8.3	0.35	<0.2	<0.03	<0.01	<0.03	0.0307
04-GP14	01-Jun-04	592480	6904642	6.78	1371	3.9	259	15	1340	6.67	173	28.5	1.18	782	<0.2	<0.2	0.34	0.03	<0.0050	<0.2	<0.1	0.098	113	<0.01	0.529	1.73																			

Appendix C

Thermal and Pore Gas Monitoring Results

Location: Faro
Hole ID: 60M1

Date		19-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	26-May-06	22-Sep-06	26-Feb-07
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)
0.7	0.7A	19.6	17.1	18.9	19.2	7.6	18.6	10.1	5.7	19.6	15.5	15.4	20
0.7	0.7B	19.6	16.9	18.9	19.2	7.5	18.6	10	5.2	19.6	15.9	15.3	20
1.4	1.4A	19.7	17.1	19.1	18.3	6.7	18.6	10.6	5.1	19.7	14.9	16	20
1.4	1.4B	19.7	17.5	19.1	18.3	6.6	18.6	10.6	5.1	19.8	14.9	16	20
2.8	2.8A	18.5	15.7	15.3	17.2	5.9	15.1	8.1	1.8	17.4	13.7	12.1	17.9
2.8	2.8B	18.5	15.7	15	17.3	5.9	14.7	7.8	2.2	17.4	13.5	12	17.8
5.6	5.6A	14.9	15.7	13.4	15.5	6	14.5	6.4	3.9	17.5	12.4	12.4	18.2
5.6	5.6B	15.6	15.5	13.2	15.2	6.3	14.3	5.7	4	17.5	12.3	12.1	18.3
10	10B ⁽¹⁾	17	12.2	11.1	14	9.2	10.7	7.7	4.2	13.6	10.4	10.4	14.9
10	20 ⁽¹⁾	16.8	12.2	11.1	14.1	9.3	10.7	7.3	3.7	13.2	11.4	10.6	14.9
20	10A ⁽¹⁾	10	5.5	5.8	6.4	3.7	6.9	2.8	1.7	15.1	3.8	9.3	16.2
30	30	20.9	9.5	8.4	8.9	9	8.5	9.7	11.3	blocked	11.2	10.1	10.5
40	40	19.8	19.8	19	19.5	19.3	19.3	19.5	19.2	19.3	19.3	19.4	19.5
60	60	19.8	19.4	17.6	18.8	18.9	18.3	18.6	18.1	19.6	18.4	18.1	20.2

Note: (1) Port 20 and Port 10 A labels reversed

Location: Faro
Hole ID: 30M1

Date		19-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	26-May-06	22-Sep-06	26-Feb-07
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)
0.7	0.7A	19.4	16.6	16.8	17.4	16.4	19	17.8	16	19.4	16.8	16.9	20.9
0.7	0.7B	19.4	16.6	16.8	plugged	16.4	19	17.8	15.9	19.4	16.8	16.9	20.9
1.4	1.4A	19.3	16.6	16.7	plugged	16.4	19	17.8	16	blocked	16.8	16.9	19.9
1.4	1.4B	19.3	16.6	16.8	plugged	16.4	19	18	16	19.4	16.8	16.9	20
2.8	2.8A	19.3	16.6	16.8	17.3	16.6	19	17.9	16.1	blocked	17	17	20
2.8	2.8B	19.3	16.6	16.8	17.3	16.6	19	17.9	16.1	19.5	17	17	20.8
5.6	5.6A	19.7	17	17.6	17.3	17.9	19.4	17.8	16.4	19.6	17.4	16.8	20.2
5.6	5.6B	19.7	17	17.6	plugged	17.9	19.4	17.8	16.4	19.7	17.4	16.8	20.1
10	10A	19.4	16.1	17.6	17	16.9	19.1	16.2	16.3	19.5	16.1	16.8	19.8
10	10B	19.4	16.1	17.7	plugged	16.9	19.1	16.2	16.3	19.5	16.1	16.8	19.8
20	20	20.2	16.1	19.7	plugged	16.4	19.3	14.8	18.4	19.9	17.2	20	20.2
30	30	12.9	7.4	12.7	10.1	6.7	9.1	not recorded	9.2	13.3	7.4	13.1	12.2

Notes : ** indicates suspect value

-grey cells indicate monitoring points that were found to be plugged during February 2006 or subsequent monitoring

Location: Grum

Hole ID: 10M2

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)
0.7	0.7	20.6	20.1	20.6	Not recorded	20.6	20.6	20.3	17.7	20.6	20.4	20.4
1.4	1.4A	14.8	10	10.2	Not recorded	*0.2	14.3	10.3	14.1	7.8	0	4.8
1.4	1.4B	10	8.8	9.8	Not recorded	20.3	13.2	10	14	7.3	blocked	
2.8	2.8A	0.6	14.7	2.5	Not recorded	*0.2	3.5	2.3	3.1	0.3	blocked	
2.8	2.8B	3.4	11.6	2.5	Not recorded	3.5	3.5	2.1	3.1	0.3	blocked	
5.6	5.6A	1	10.9	12.7	Not recorded	10.2	10.4	7.5	12.4	0.5	7.6	1.6
5.6	5.6B	1	11.1	12.7	Not recorded	10.2	10.4	7.5	12.4	blocked	blocked	blocked
10	10	1.3	15.1	12.3	Not recorded	15.2	9.6	not recorded	13.1	1	blocked	blocked

Location: Grum

Hole ID: 10M3

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)
0.7	0.7A	20.6	20.6	20.5	20.6	20.7	20.7	20.7	20.6	20.9	20.7	19.2
0.7	0.7B	20.6	20.6	20.5	20.6	20.7	20.7	20.7	20.6	20.9	20.7	19.3
1.4	1.4A	19	18.9	20.1	20.5	20.1	19.7	20.2	18.7	18.3	blocked	blocked
1.4	1.4B	18.9	18.7	20.1	plugged	20	19.5	20.2	18.8	18.2	blocked	blocked
2.8	2.8A	16.3	16	13.7	16.1	16.6	13.1	20.4	14.4	15.7	15.5	14.7
2.8	2.8B	15.9	16	13.7	16.2	16.6	13.2	17.2	14.4	15.6	15.5	14.7
5.6	5.6A	13.7	15	14.6	plugged	15.8	14.2	18.8	17.1	blocked	15.7	15.7
5.6	5.6B	13.7	15	14.6	14.4	15.8	14.2	16	17	blocked	15.7	15.7
10	10A	16	13.5	14.5	15.7	14.1	14.4	20.9	17.3	blocked	15.5	17.9
10	10B	16	14.1	14.5	15.7	*18.2	14.4	20.9	17	blocked	blocked	blocked

Location: Grum

Hole ID: 30M3

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)
0.7	0.7A	18.4	20.7	20.5	plugged	20.7	20.3	20.6	20.5	19.2	not recorded	20.8
0.7	0.7B	18.4	20.7	20.5	20.6	20.7	20.4	20.6	20.5	19.3	not recorded	20.8
1.4	1.4A	19.1	20.8	20.5	plugged	20.7	20.3	20.7	20.5	19.2	not recorded	20.7
1.4	1.4B	19	20.6	20.4	20.4	20.7	20.3	20.6	20.2	19.1	not recorded	20.7
2.8	2.8A	17.5	20.5	19.8	20.2	20.5	19.9	20.4	19.8	18.7	not recorded	blocked
2.8	2.8B	17.5	20.5	19.8	20.2	20.5	19.9	20.4	19.7	18.7	not recorded	blocked
5.6	5.6A	15.6	20.5	19.3	20.2	20.5	19.5	20.3	19.7	17.2	not recorded	blocked
5.6	5.6B	15.5	20.5	19.3	20.2	20.5	19.5	20.3	19.7	17.2	not recorded	blocked
10	10A	5.7	15.6	5.4	plugged	18	0	12.1	11.2	9.2	not recorded	blocked
10	10B	5.5	15.9	5.4	0	18	0	12.1	11.4	9.3	not recorded	blocked
20	20A	4.9	4	0	0	0.3	0.4	1.3	0	3.3	not recorded	blocked
20	20B	4.9	3.7	0	0	0.3	0.4	1.3	0	3.4	not recorded	blocked
30	30A	3.7	0.6	0.4	plugged	0.9	1	0.2	1.1	4.6	not recorded	blocked
30	30B	3.8	0.6	0.4	0	0.9	1	0.2	1.1	4.6	not recorded	blocked

Notes : ** indicates suspect value

-grey cells indicate monitoring points that were found to be plugged during February 2006 or subsequent monitoring

Location: Vangorda
Hole ID: 10M4

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	
0.7	0.7	20.6	18.6	19.6	19	18.4	19.8	18.3	18.3	20.8	19.1	19.6	20.8
1.4	1.4	20.9	20.3	20.6	19.9	20.3	20.7	20.1	19.7	20.9	20	20.5	20.8
2.8	2.8A	21	20.7	20.8	20	20.7	20.8	20.3	19.6	20.9	20	20.7	20.8
2.8	2.8B	21	20.7	20.8	20	20.7	20.8	20.3	19.6	20.9	20.1	20.7	20.8
5.6	5.6A	20.8	20.6	20	19.8	20.7	20.1	20.1	18	20.8	19.4	20.1	20.6
5.6	5.6B	20.8	20.7	20	19.8	20.7	20.1	20.1	18	20.8	19.4	20.1	20.6
10	10	20.2	19.3	19.3	17.9	20.1	19.4	Not recorded	17.3	20.5	19.1	19.8	19.7

Location: Vangorda
Hole ID: 30M4

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Depth	Port Label	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	Oxygen (%)	
0.7	0.7A	0	19.9	0.8	2.8	19.3	*2.2	17.4	1.7	0	9.8	9.2	0
0.7	0.7B	0	20	1.1	3.1	19.5	*2.7	17.5	7.9	blocked	10	9.2	0.1
1.4	1.4A	0	17.4	0	0.1	14.6	0	6.4	0	blocked	0.5	0.2	*20.9
1.4	1.4B	0	17.6	0	0.1	14.7	0	8	0.3	blocked	0.5	0.3	0.2
2.8	2.8A	0	0	0	0	0.1	0	0	0	0	0	0	0.2
2.8	2.8B	2.4	15.4	2.3	plugged	*18.6	*8.7	20.8	20.8	blocked	blocked	blocked	blocked
5.6	5.6A	2.4	2.8	2.3	2.1	1.7	1.8	2.3	1.4	2.9	1.4	3.3	0.5
5.6	5.6B	2.3	1	2.3	2.1	1.7	1.8	2.3	1.4	3	1.4	3.4	0.5
10	10A	2.3	6.9	2.2	plugged	*4.4	*2	*2.4 to 17.4	20.9	8.4	5.1	9	10.1
10	10B	8.3	6.9	6.4	plugged	*7.5	*6.9	8.1	4.3	8.4	5.2	8.9	10.1
20	20	0.2	0	0	0	0	0	0	0	0.4	0.09	0	1.3
30	30	14.9	0.4	4.4	2.7	0.7	4.9	0.2	0	14.3	1.3	4	14.5

Notes : ** indicates suspect value

-grey cells indicate monitoring points that were found to be plugged during February 2006 or subsequent monitoring

Location: Faro
Hole ID: 60M1

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	26-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	
0.7	0	3.2	13.5	9.4	4.7	15	7.8	12.2	12.2	0.5	10.1	11.6	-1.2
1.4	-0.1	7.9	14.3	15.6	7.5	14.9	13.6	13.4	15.8	5.9	10.8	15.1	4.2
2.8	0.1	16.9	18.6	23	14.9	17.8	22.5	16.7	22.7	15.6	15.7	22.1	14
5.6	0	29.2	28.1	30.7	27.2	26.6	30.7	26.4	29.2	27.5	26.4	29	26.6
10	-0.1	41.8	41.3	40.6	40.1	39.8	39.3	39.2	38.4	38.8	38.4	37.8	38.1
20	0.1	49.1	49	48.8	48.2	48.1	48.3	49	48.7	48.7	48.8	48.4	47.7
30	-0.1	36	36.3	36.4	36.8	36.8	37.2	37.4	37.7	37.9	38	38.1	38.2
40	-0.1	24.2	24.6	24.9	25.5	35.6	25.9	26.3	26.6	27	27.2	27.5	27.8
60	-0.1	6.3	6.5	7	7	7.1	7.7	7.7	8.3	8.3	8.5	9.1	9

Location: Faro
Hole ID: 30M1

Date		20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	26-May-06	22-Sep-06	26-Feb-07
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	0.1	1.7	7.4	11.2	3.4	11.2	9.6	8.2	12.6	2.8	5.9	11.5	2.3
1.4	-0.1	4	7.2	12.9	5.4	12.9	12.3	7.8	13.8	5.1	6	13.2	4.8
2.8	0.1	8.5	8.5	14.5	9.4	14.5	15.6	10.3	16.1	10.4	9.6	16	10
5.6	0.1	17.3	16.8	18.6	18.3	18.6	20.1	19	20.4	19.9	19.1	20.7	20
10	-0.1	27	27.4	27.4	28.4	27.4	28	28.8	28.5	29.3	29.3	29.1	29.7
20	0.2	34.5	35.5	35.8	34.7	35.8	36	36.3	37.1	35.8	36	37.5	35.4
30	0	34.6	34.2	34.7	34.6	34.7	35.2	35	35.8	36.3	36.1	36.6	37.2

Location: Grum
Hole ID: 10M2 Outside PVC

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	0.1	-4.8	5	4.1	-0.6	5.3	2.9	3.9	8.7
1.4	0.2	-0.2	-0.2	6.6	-0.3	-0.1	5.4	2.4	10
2.8	0.2	1.2	0.3	6.2	0.7	0.5	6	1.6	8.3
5.6	0	3	2	3.9	2.4	2.1	5.2	2.7	5.8
10	0.1	3.3	3.1	2.9	3.3	3.2	3.1	3.8	4.4

terminal
box
corroded

Location: Grum
Hole ID: 10M2 Inside PVC

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	0.1	-3.3	3.7	4.9	Not recorded	3.6	3.2	2.3	7.6	-1.4	1.8	6.2	-2.8
1.4	0.2	-0.3	-0.4	6.6	Not recorded	-0.3	5.1	0.7	8.2	0.1	0.4	6.8	-0.3
2.8	0.2	1.2	0.3	6	Not recorded	0.6	6.6	1.4	7.8	1.8	1.2	7.1	1.4
5.6	0	3.1	2	3.8	Not recorded	2.1	5.1	2.6	5.1	3.5	2.6	4.9	3.2
10	0.1	3.4	3.1	3	Not recorded	3.2	3.1	3.7	3.6	4.1	4	3.8	4

Location: Grum
Hole ID: 10M3

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	
0.7	0.2	-4.9	6.1	6.5	-0.9	7.3	4.2	3.8	8.5	-7.5	2.2	7	-7.4
1.4	0.2	-1.9	2.1	7.9	-1	3	5.9	0.3	8.9	-3.6	-0.1	7.3	-4.2
2.8	0.2	1.1	0	6.8	0.2	0.3	7.1	0.9	8	0.7	0.2	6.7	0.4
5.6	0	3.8	2.2	4.8	2.6	2.2	5.8	2.6	5.3	3.4	2	4.5	3
10	0.1	5	4.6	4.3	4.5	4.3	4.3	4.7	4.5	4.9	4.5	4.1	4.4

Location: Grum
Hole ID: 30M3

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	-0.1	-4.6	5.2	7	-1.3	5.5	4.6	3	8.1	-6.6	1.7	6.4	-7.9
1.4	0	-1.4	1.8	8	-1	2.1	6.5	0.2	8.8	-2.4	0.3	7.1	-3.7
2.8	0.1	2	1	7.5	1.2	1.4	8	1.8	8.6	2.1	1.4	7.9	1.5
5.6	-0.1	6.1	4.7	6.9	5.4	4.7	7.8	5.1	7.6	6.4	5.1	7.4	6.3
10	0.1	9.8	9.4	9.6	10.3	9.3	9.5	10.1	10.2	10.8	10.4	10.3	10.7
20	0.1	11.8	12	11.8	12.3	12.2	12.2	12.3	12.2	12.3	12.7	12.5	12.5
30	0.1	10	9.9	9.8	10.1	10	10	10.3	10.1	10.4	10.5	10.4	10.6

Location: Vangorda
Hole ID: 10M4

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	0.1	-0.7	13	10.2	3.3	14	6.8	10.5	12	-6.8	8.9	10	-6.7
1.4	0	3.7	12.9	15.3	5.6	12.7	11.5	11.1	15.1	-0.9	8.6	12.5	-2.8
2.8	0.2	7.5	12.7	18.4	9	12.2	15.3	11.5	18.5	3.8	9.8	15.3	0.9
5.6	-0.1	16.7	15.2	22.6	14.1	14.4	20.8	13.8	20.8	11.8	12.6	18.2	8.4
10	0	31.6	29.3	29.5	27	27.3	27.6	27.2	27.6	25.8	23.7	23.1	21

Location: Vangorda
Hole ID: 30M4

Date	20-Feb-03	7-Jun-03	16-Sep-03	27-Apr-04	7-Jun-04	30-Sep-04	19-May-05	16-Sep-05	27-Feb-06	28-May-06	22-Sep-06	26-Feb-07	
Bead Depth (m)	Correction factor	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)	Corrected Temp (°C)
0.7	-0.1	-5.3	8.6	7.4	-1.3	10.4	5.4	6.7	9.8	-6.6	5.6	8.3	-6.3
1.4	0	-1.3	6	10.3	-0.6	7.2	8.2	5.4	11.4	-1.5	3.9	10.1	-2.3
2.8	0	3.7	4.5	11.7	3.1	5.5	11.9	4.9	12.6	4	4	12.1	3.5
5.6	-0.1	11.7	9.9	12.5	10.7	10.2	14	10.8	13.4	12.1	10.7	13.5	11.9
10	-0.1	16	16	15.6	16.5	16.4	16.2	16.7	16.4	17.3	17.2	16.8	17.7
20	-0.2	17.3	17.6	17.6	18.4	18.5	18.5	18.9	19	19.4	19.7	18.8	20.4
30	0	13.5	13.8	13.8	14.7	14.7	15	15.7	15.8	16.3	16.5	16.5	17.1