Anvil Range Mine Complex
2006 Annual Environmental Report
Water Licence QZ03-059

Prepared for
Deloitte & Touche Inc.
(acting as Court Appointed Interim Receiver for Anvil Range Mining Corporation)

Submitted by
Gartner Lee Limited

February 2007

Gartner Lee

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11 Deloitte & Touche Inc.
2 Gartner Lee Limited

Gartner Lee

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Summary

The Anvil Range Mine was "shut down" in February 1998 due to poor economic circumstances and projections. The mine owner at that time was Anvil Range Mining Corporation. The owner entered into receivership in April 1998 and, since that time, management of the mine property has been under the direction of Deloitte and Touche Inc. acting as the court appointed Interim Receiver. Mining and ore processing activities have never been restarted and the mine is considered to be permanently closed.

Care and maintenance activities at the Faro and Vangorda Plateau mine sites are regulated under Water Licence QZ03-059. The licence, in general, allows for the continuation of care and maintenance activities and the development of a Final Closure and Reclamation Plan.

The Water Licence requires that a Final Closure and Reclamation Plan (FCRP) for the mine facilities be prepared and submitted to the Board by December 31, 2006. The plan is being prepared under the general management of Indian and Northern Affairs Canada and the Government of Yukon through the Faro Mine Closure Planning Office (FMCPO). The plan is to be submitted by those two governments.

In October 2006, the Interim Receiver wrote to the Yukon Water Board (YWB) to request, on behalf of the two responsible governments, an extension to the timing for submission of the FCRP. The two governments had jointly informed the Interim Receiver that a submission by December 31, 2006 was not possible and requested that the Interim Receiver apply to the YWB for an extension. The extension requested was to February 2009, the expiry of the Water Licence. The YWB granted this request and issued amendment #1 to the Water Licence on December 20, 2006. The amendment also requires quarterly updates to the YWB regarding the FCRP beginning in June 2007. The development of the FCRP will continue to be the responsibility of the FMCPO with no involvement by the Interim Receiver in the development of the closure plan.

The environmental monitoring programs required under the water licence are largely a continuation or a refinement of programs that have been carried out for years under this and previous water licences. These programs include surface water monitoring, groundwater monitoring, biological monitoring and physical stability monitoring. There is also an adaptive management plan that is reviewed on an annual basis as well as a number of specific projects that may require separate reports.

All of the requirements for environmental monitoring and for special projects for 2006 were completed and the results are presented in this report.

The water licence does not allow for any mining or ore processing activities to recommence. Therefore, no tailings or process water were deposited into the mined-out Faro Main Pit or into the Down Valley tailings impoundments in 2006. The backfilled Faro Zone II Pit was dewatered into the Faro Main Pit as

required to maintain an acceptable water level in the Zone II pit. Water from the Faro Main pit and the Intermediate Pond was successfully treated with lime through the on-site water treatment systems and released to the environment according to the terms of the water licence. No pumping or treatment was required at the Vangorda Pit in 2006 because a sufficiently large volume of water had been successfully treated in 2005 to provide a 2-year cycle to 2007.

The summary highlights of the 2006 environmental monitoring programs are as follows:

- All of the required monitoring, projects and reporting were completed;
- The required annual volumes of water were treated and released from the Faro Main pit and the Intermediate Pond; the Vangorda Pit did not require pumping in 2006 because of the large volume pumped in 2005;
- A change to the Faro site water management strategy was design and construction in 2006 of a system that will eliminate the need for operation of the less efficient Down Valley treatment system. The new system will pump water from the Intermediate Pond and emergency tailings area directly to the Mill water treatment system with construction to be completed by freshet 2007; complementary to this pumping system is an upgrade of the Mill water treatment system to a high-density sludge process;
- Compliance of effluent with the maximum allowable discharge criteria was excellent; there were no exceedances of licence discharge limits;
- No substantive or high-risk issues were identified for any of the water retention dams or dykes on the property that were not already being actively managed;
- The benthic invertebrate community remains healthy in Rose Creek;
- Fish populations remain healthy in both Vangorda and Rose Creeks with no negative trends indicated;
- Maintenance programs were successfully completed for the water treatment facilities, pumping systems, dams, diversions, roads and other facilities that are required for the care and maintenance programs; and
- The Adaptive Management Plan was successfully implemented and appropriate investigations and responses were developed; a pro-active strategy will be implemented at Grum Creek (AMP #4) in response to the continued trigger there.

1. Introduction

1.1 Background

The Anvil Range Mine was "shut down" in February 1998 due to poor economic circumstances and projections. The mine owner at that time was Anvil Range Mining Corporation. The owner entered into receivership in April 1998 and, since that time, management of the mine property has been under the direction of Deloitte and Touche Inc. acting as the court appointed Interim Receiver (the "Interim Receiver"). Mining and ore processing activities have never been restarted and the mine is considered to be permanently closed.

Since their appointment in April 1998, the Interim Receiver has successfully maintained compliance with the terms of the water licence by implementing a broad scope of tasks related to environmental protection and environmental monitoring, which have included:

- Pumping and treatment of water from the Faro Main pit and the Faro Zone II pit;
- Treatment of water in the Intermediate Pond (Rose Creek Tailings Facility);
- Compliance with the effluent discharge criteria in the water licences;
- Conversion of mill equipment for use as a water treatment plant;
- Water quality, biological and physical stability monitoring in accordance with and in excess of terms of the water licences;
- Preparation and submission to the Yukon Territory Water Board of monthly water quality reports and annual environmental reports;
- Assistance with large-scale DIAND scrap steel reclamation projects;
- Removal of laboratory and process chemicals, PCB containing equipment, used oil, used tires and residual concentrate from the mine sites;
- Physical maintenance of water retention and diversion structures;
- Undertaking of a Comprehensive Risk Assessment with Annual Updates;
- Completion of comprehensive hydrogeological and geochemical studies of the Rose Creek Tailings Facility;
- Assistance with development of the Final Closure and Reclamation Plan including managing major site investigations such as drilling programs;
- Renewal of the Water Licence;
- Obtaining new permitting to incinerate waste oil for heat and to operate the operational landfill;
- Substantive improvement in the interception of clean water to reduce the volumes of water requiring treatment;
- Emergency responses to major weather events to minimize environmental effects and damage to mine facilities;

- Refurbishments to primary water diversions including the Rose Creek Diversion Canal, the Vangorda Creek Diversion Flume and the Faro Creek Diversion Channel; and
- Design and construction (underway) of a positive change to the water management strategy at the Faro site by pumping water from the Intermediate Pond and emergency tailings area to the Mill water treatment system.

1.2 Summary of Water Licence Requirements

Prior to 2004, activities at the Faro and Vangorda Plateau mine sites were regulated under two separate Water Licences, QZ95-003 (Faro) and IN89-002 (Vangorda Plateau). Both of those water licences expired on December 31, 2003. The regulatory process for renewal of those water licences was initiated in May 2002 and subsequently proceeded through environmental assessment and regulatory review. The result of those activities was the issuance of new Water Licence QZ03-059 (The "Water Licence"). The "new" Water Licence combines activities at both mine sites into one licence that, in general, allows for the continuation of care and maintenance activities and the development of a Final Closure and Reclamation Plan ("FCRP").

Part F, Item 58 of the Water Licence requires that a Final Closure and Reclamation Plan (FCRP) for the mine facilities be prepared and submitted to the Board by December 31, 2006. The plan is being prepared under the general management of Indian and Northern Affairs Canada and the Government of Yukon through the Faro Mine Closure Planning Office (FMCPO). The plan is to be submitted by those two governments.

In October 2006, the Interim Receiver wrote to the Yukon Water Board (YWB) to request, on behalf of the two responsible governments, an extension to the timing for submission of the FCRP. The two governments had jointly informed the Interim Receiver that a submission by December 31, 2006 was not possible and requested that the Interim Receiver apply to the YWB for an extension. The extension requested was to February 2009, the expiry of the Water Licence. The YWB granted this request and issued amendment #1 to the Water Licence on December 20, 2006. The amendment also requires quarterly updates to the YWB regarding the FCRP beginning in June 2007. The development of the FCRP will continue to be the responsibility of the FMCPO with no involvement by the Interim Receiver in the development of the closure plan.

The environmental monitoring programs required under the Water Licence are largely a continuation or a refinement of the programs that were being carried out under the two previous water licences. These programs include surface water monitoring, groundwater monitoring, biological monitoring and physical stability monitoring. There are also several new environmental programs that were introduced in 2004 under the Water Licence. These include an Adaptive Management Plan ("AMP"), regular fisheries monitoring and a number of special projects, each with a unique due date and each requiring a stand alone report.

The Water Licence requirements for 2006 are summarized in Table 1-1. The requirements for 2006 include several reports and special projects.

Table 1-1. Summary of Water Licence Requirements for 2006

Item	Licence Clause	Dates
Monitoring Activities		
Surface Water	54, 59, 60, 61, Sch.A	Varies, weekly to annual
Groundwater	54, 59, Sch.A	Twice per year
Benthic invertebrates & Sediment	64, Sch.B	Vangorda Creek in odd years; Rose Creek in even years
Fish	53	Annual
Physical stability	66, 67	Inspection annual; instrumentation varies
Glaciation in Rose Creek Diversion Canal	69	Monthly during winter
Routine Reporting (from the terms of the Water Licence)		
Monthly data report	11, 12, 15	Monthly – 30 days following
Annual Env. Report	11, 12, 13, 14	Annual – February 28
Comprehensive Risk Assessment	55	Part of Annual Env. Report
Water Treatment Plant Performance Evaluation	65	Part of Annual Env. Report
Physical Stability	66	Part of Annual Env. Report
Maintenance Related to Dam Safety	71	Part of Annual Env. Report
Benthic Invertebrates & Sediment	B.8	Part of Annual Env. Report
Special Reports & Projects		
HazMat Inventory	19	Maintain but do not submit
Terrestrial Effects Study	49	December 31, 2005
Annual Reporting (from submitted plans and studies)		
Fish Monitoring	53	Annual
Adaptive Management Plan	54	Annual
Town of Faro Water Wells Study	50	2006 Annual Env. Report

1.3 Organization of the Report

This annual environmental report for the year 2006 has been prepared according to the provisions of Part A, Section 13 of the Water Licence. This report, including all data presentations and interpretations, was prepared by Gartner Lee Limited ("Gartner Lee") based on information provided by the Interim Receiver, BGC Engineering Inc., SRK Consulting, Laberge Environmental Services and White Mountain Environmental Consulting.

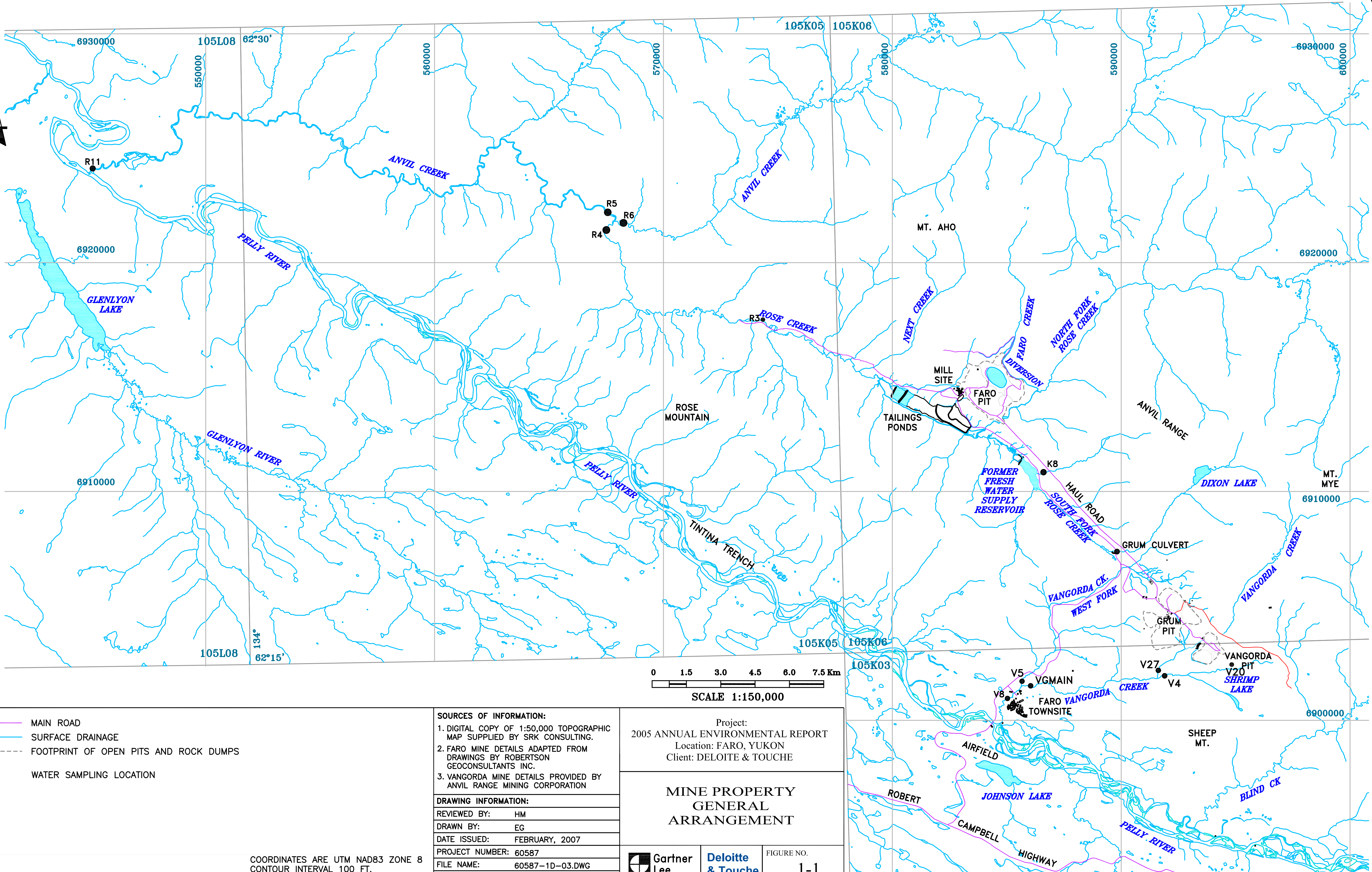
This report is broadly organized into the following sections. Where applicable, the Rose Creek Drainage/Faro mine site and the Vangorda Creek Drainage/Vangorda Plateau mine site are reported separately within these sections:

Summary;
1. Introduction;
2. Water Use;
3. Water Quality Monitoring – Rose Creek Drainage;
   Surface water, groundwater and effluent quality.
4. Water Quality Monitoring – Vangorda Creek Drainage;
   Surface water, groundwater and effluent quality.
5. Water Treatment Plant Performance;
   Three water treatment systems.
6. Biological Monitoring;
   Benthic invertebrates, sediment, fish and wildlife.
7. Physical Stability Monitoring;
   Engineering inspections and instrumentation data review for both mine sites.
8. Maintenance Activities; and
9. Special Projects.

Detailed reports on the following individual monitoring programs and projects as prepared by specialist consultants are summarized within this report. Where these have not previously been submitted to the Water Board, they accompany or are appended to this report:

- Benthic Invertebrates and Sediment, Laberge Environmental Services;
- Fish, White Mountain Environmental Consulting;
- Physical Stability, Faro Mine Site, BGC Engineering Inc.;
- Physical Stability, Vangorda Plateau Mine Site, SRK Consulting;
- Adaptive Management Plan, 2006 Annual Review, Gartner Lee Limited;
- Comprehensive Risk Assessment, Interim Receiver;
- Town of Faro Water Wells 2006 Monitoring Report, Gartner Lee Limited; and
- Terrestrial Effects Study, Gartner Lee Limited.

Figures 1-1, 1-2 and 1-3 illustrate the general layout of the mine property and facilities.



MAIN ROAD

SURFACE DRAINAGE

FOOTPRINT OF OPEN PITS AND ROCK DUMPS

WATER SAMPLING LOCATION

COORDINATES ARE UTM NAD83 ZONE 8
CONTOUR INTERVAL 100 FT.

SOURCES OF INFORMATION:

1. DIGITAL COPY OF 1:50,000 TOPOGRAPHIC MAP SUPPLIED BY SRK CONSULTING.
2. FARO MINE DETAILS ADAPTED FROM DRAWINGS BY ROBERTSON GEOCONSULTANTS INC.
3. VANGORDA MINE DETAILS PROVIDED BY ANVIL RANGE MINING CORPORATION

DRAWING INFORMATION:	
REVIEWED BY:	HM
DRAWN BY:	EG
DATE ISSUED:	FEBRUARY, 2007
PROJECT NUMBER:	60587
FILE NAME:	60587-1D-03.DWG
REVISION:	0

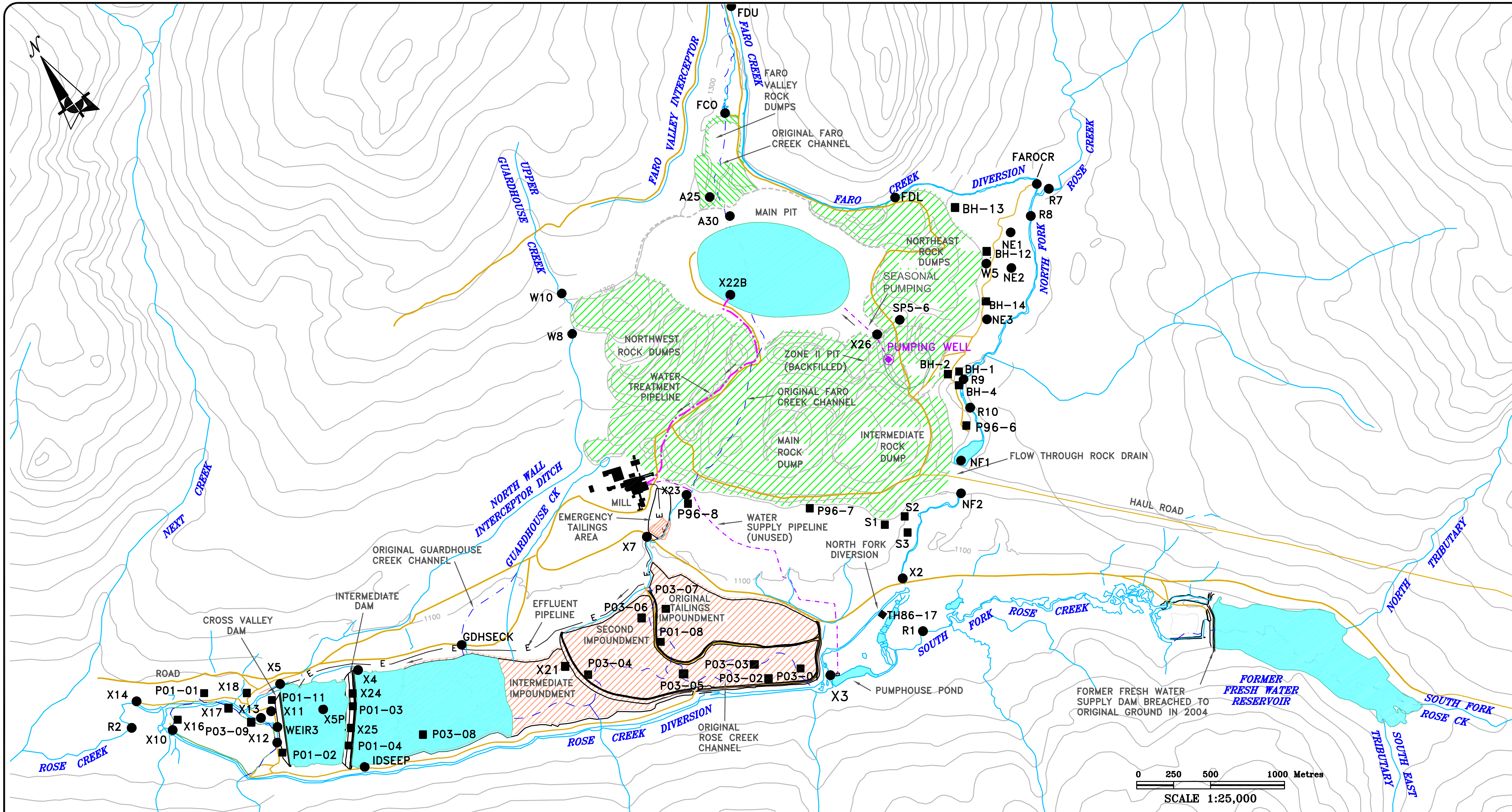
Project:
2005 ANNUAL ENVIRONMENTAL REPORT
Location: FARO, YUKON
Client: DELOITTE & TOUCHE

MINE PROPERTY
GENERAL
ARRANGEMENT

Gartner Lee

Deloitte & Touche

FIGURE NO.
1-1



LEGEND:

- ROADS
- EXISTING SURFACE DRAINAGE
- PRE–MINE DRAINAGE
- E EFFLUENT PIPELINE
- PIPELINE
- WATER TREATMENT PIPELINE
- SURFACE WATER
- WASTE DUMPS
- TAILINGS IMPOUNDMENT
- GROUNDWATER SAMPLING LOCATION
- SURFACE WATER SAMPLING LOCATION

SOURCES OF INFORMATION:

1. DIGITAL COPY OF 1:50,000 TOPOGRAPHIC MAP SUPPLIED BY SRK CONSULTING.
2. MAP COORDINATES ARE UTM NAD83 ZONE 8; CONTOUR INTERVAL 100 FT.
3. FARO MINE DETAILS ADAPTED FROM DRAWINGS BY ROBERTSON GEOCONSULTANTS INC.

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FARO MINE SITE
GENERAL ARRANGEMENT

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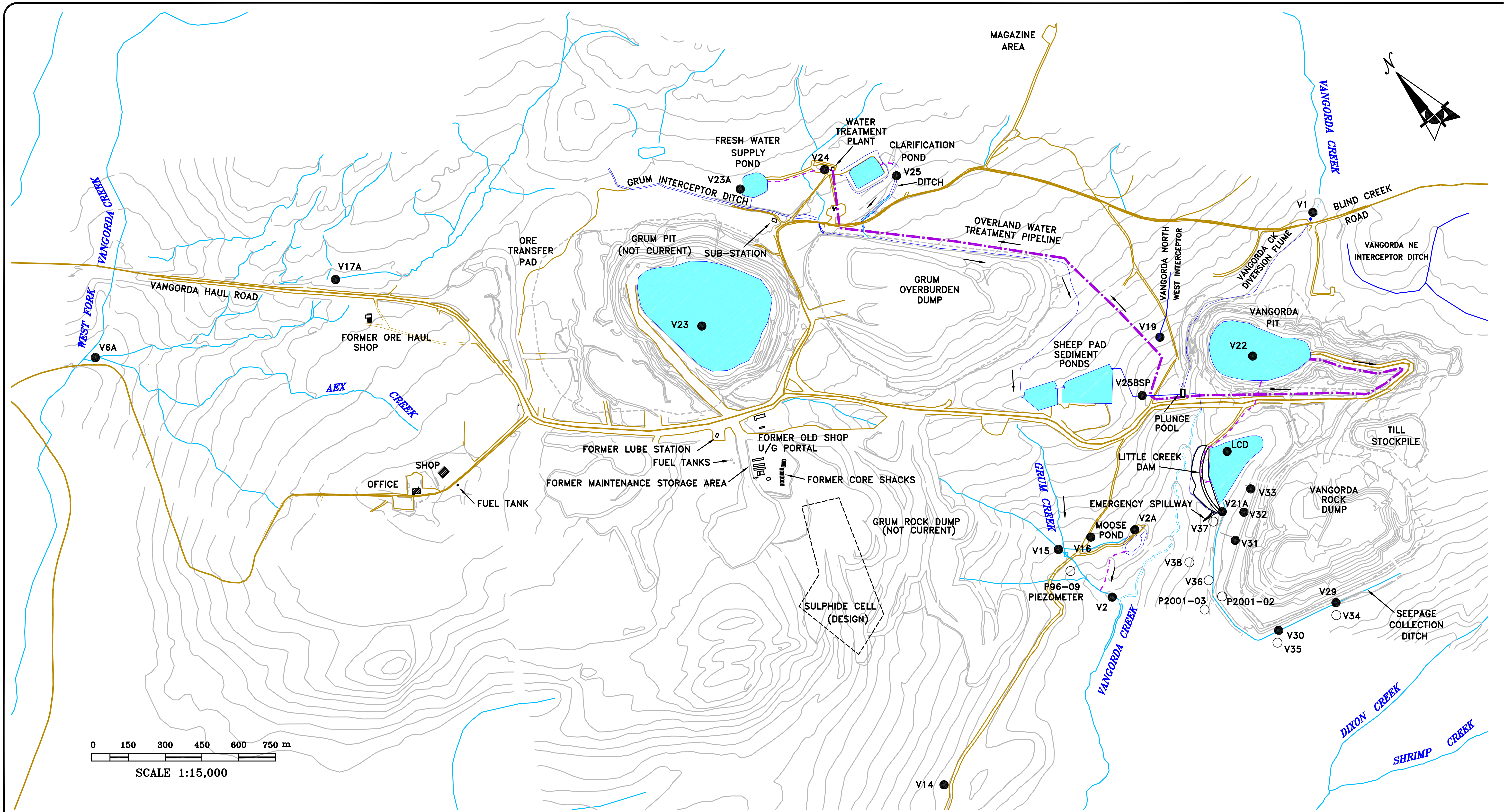
FIGURE NO. 1-2



LEGEND:

- ROADS
- EXISTING SURFACE DRAINAGE
- PRE-MINE DRAINAGE
- EFFLUENT PIPELINE
- PIPELINE
- WATER TREATMENT PIPELINE
- SURFACE WATER
- GROUND WATER SAMPLING LOCATION
- SURFACE WATER SAMPLING LOCATION

DRAIN #2 = V29
DRAIN #3 = V30
DRAIN #4 = V31
DRAIN #5 = V32
DRAIN #6 = V33

GROUNDWATER WELLS = V34 TO V38

SOURCES OF INFORMATION:

1. DIGITAL COPY OF 1:50,000 TOPOGRAPHIC MAP SUPPLIED BY SRK CONSULTING.
2. FARO MINE DETAILS ADAPTED FROM DRAWINGS BY ROBERTSON GEOCONSULTANTS INC.

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2006 ANNUAL ENVIRONMENTAL REPORT

VANGORDA PLATEAU MINE SITE
GENERAL ARRANGEMENT

Gartner Lee
Deloitte & Touche

FIGURE NO. 1-3

2. Water Use

2.1 Rose Creek Drainage

2.1.1 Summary

The Water Licence authorizes the direct use of water from Rose Creek up to a maximum rate of 65,465 m^3/day (Part B, Items 21a and 21b). Information that was provided in the Water Licence Application Report suggested an average annual direct use of water of 4.1 million m^3 per year. The Water Licence specifically recognizes the following water uses:

- Pumping from the Zone II pit;
- Pumping from the Faro Main pit; and
- Diversion through the Intermediate Pond.

Table 2-1 summarizes the total water obtained from Rose Creek in 2006 for the authorized purposes. There was no use of water for unauthorized purposes and actual use was significantly below the allowable limit.

Table 2-1. Summary of 2006 Direct Water Use from Rose Creek

Water Use	**Maximum Rate (m^3/day)**	**Total (million m^3)**
Zone II Pit Pumping	2,074	0.1
Main Pit Pumping	12,781	1.3
Intermediate Pond	6,222	0.6
Total Estimated Water Use	**21,077**	**2.0**
Total Allowable	**65,465**	**4.1**[1]

1. As suggested in the Water Licence Application Report.

For general interest as related to water use, Table 2-2 presents measured monthly precipitation at the Faro airport over the available period of record, 1978 to 2006. The precipitation measured in 2006 was 90% of the 29-year record at 277 mm. Additional information is being developed regarding site-specific climate data through the studies that are underway for development of the FCRP. However, the information is not available for reporting at this time.

Table 2-2. Monthly Precipitation at Faro Airport to 2006

Year	Jan	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (mm)
1978	0.4	**miss.**	trace	4.1	11.6	27.0	38.1	41.6	7.8	32.4	20.2	19.0	
1979	8.9	18.3	20.2	6.7	10.5	68.2	55.4	13.8	13.4	11.6	12.4	34.4	273.8
1980	19.7	2.4	11.7	12.5	10.5	11.1	95.4	33.2	46.7	**miss.**	21.3	13.3	
1981	6.5	23.1	4.0	4.5	7.8	42.8	41.3	22.5	41.9	21.5	17.0	5.4	238.3
1982	10.2	18.0	9.5	4.1	18.2	14.3	58.3	47.3	47.2	42.3	11.8	13.6	294.8
1983	35.7	6.6	9.8	2.2	20.6	55.6	49.1	65.8	21.2	16.3	11.4	3.9	298.2
1984	27.6	24.1	5.9	2.4	38.8	49.0	16.6	64.9	5.5	10.8	10.7	22.5	278.8
1985	22.5	24.8	2.2	13.8	17.2	28.1	62.6	80.8	46.3	20.0	22.2	26.1	366.6
1986	8.4	4.7	34.6	12.9	35.1	12.8	81.8	77.4	44.4	22.7	15.9	5.6	356.3
1987	3.1	14.0	2.8	10	40.1	50.8	92.4	63.5	30.2	26.6	17.8	6.2	357.5
1988	7.0	10.4	17.2	8.2	38.0	37.3	97.2	25.5	43.8	29.0	17.9	16.5	348.0
1989	19.8	3.6	19.8	2.0	17.9	41.0	51.7	16.9	30.8	46.3	39.8	13.8	303.4
1990	14.4	25.8	5.0	7.0	23.4	45.4	30.0	64.4	66.2	22.7	25.4	24.8	354.5
1991	17.2	22.6	16.6	2.8	22.4	30.2	115.4	33.0	48.2	49.6	43.4	40.0	441.4
1992	22.8	24.6	7.6	15.8	14.4	11.4	66.1	34.4	47.8	13.8	18.8	13.0	290.5
1993	22.2	15.0	1.6	6.0	76.7	48.6	50.2	56.0	50.8	35.7	**miss.**	**miss.**	
1994	20.2	8.4	11.4	5.0	39.8	24.2	19.6	25.2	45.6	41.6	24.4	8.0	273.4
1995	8.4	7.8	18.4	5.2	10.9	33.9	73.4	63.4	28.8	12.2	22.3	15.4	300.1
1996	10.2	9.1	27.1	7.2	13.4	20.0	64.4	70.8	52.7	34.8	3.5	5.9	319.1
1997	6.6	8.7	1.4	14	16.5	39.3	86.4	33.2	trace	25.2	6.4	12.4	250.1
1998	7.0	2.8	4.8	4.2	14.4	29.6	19.2	24.2	23.4	24.0	4.6	8.2	166.4
1999	24.4	10.0	15.4	1.8	44.4	64.8	42.0	33.8	27.0	22.4	12.8	21.6	320.4
2000	12.2	2.0	trace	6.0	9.6	39.6	48.1	116.2	102.2	8.6	19.4	5.8	369.7
2001	7.4	3.0	4.0	14.6	30.8	35	58.4	14.2	44.6	28.6	12.2	15.4	268.2
2002	9.2	5.8	9.0	7.0	19.6	19.4	34.9	64.1	38.4	18.2	9.6	9.4	244.6
2003	22.4	8.0	16.0	0.4	7.6	45.2	63.2	30.4	30.8	12.8	32.8	19.9	289.5
2004	31.1	11.4	45.0	4.0	15.6	34.0	13.5	38.0	48.5	33.6	9.8	45.0	329.5
2005	26.7	12.4	2.6	19.5	58.6	41.0	83.8	38.6	36.6	13.0	30.0	10.8	373.6
2006	11.0	7.0	18.5	21.6	16.2	38.0	33.4	33.3	35.6	21.0	33.1	8.3	277.0
Max	35.7	25.8	45	21.6	76.7	68.2	115.4	116.2	102.2	49.6	43.4	45	
Year	1983	1990	2004	2005	1993	1979	1991	2000	2000	1991	1991	2004	
Mean	**15.3**	**11.9**	**12.7**	**7.8**	**24.2**	**35.8**	**56.6**	**45.7**	**39.5**	**24.9**	**18.8**	**15.9**	**307.1**
Min	0.4	2	trace	0.4	7.6	11.1	13.5	13.8	trace	8.6	3.5	3.9	
Year	1978	2000	1978	2003	2003	1980	2004	1979	1997	2000	1996	1983	
St.Dev	9.2	7.9	10.7	5.0	16.6	15.2	26.6	24.2	19.0	11.5	9.9	10.6	

All values expressed in mm as compiled by BGC Engineering Inc.

2.1.2 Zone II Pit

The Zone II Pit is backfilled with waste rock but still serves as a collection point for runoff water. A downhole pump is used to pump water from the backfilled pit on an as-required basis to maintain the water level within the desired range. The pump is operated only in the summer season.

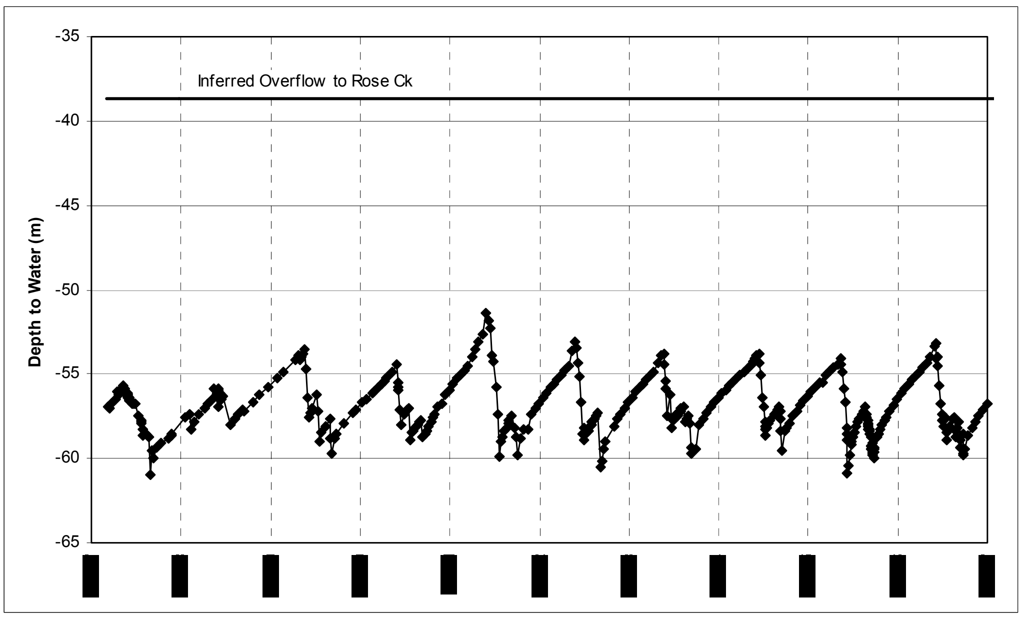
An open riser pipe was installed in the pumping well in March 1997 that allowed direct water level measurements. The measured water levels are illustrated on Figure 2-1. The total volume pumped during 2006 is estimated at 75,250 m^3 based on the measured water levels and an estimated pumping rate of 0.024 m^3/s (380 USgpm). This volume compares to estimates for previous years as follows:

- 1995: Zone II volume pumped = 139,000 m^3
- 1996: Zone II volume pumped = 75,000 m^3
- 1997: Zone II volume pumped = 51,000 m^3
- 1998: Zone II volume pumped = 43,000 m^3

- 1999: Zone II volume pumped = 73,500 m^3
- 2000: Zone II volume pumped = 64,500 m^3
- 2001: Zone II volume pumped = 157,500 m^3
- 2002: Zone II volume pumped = 99,500 m^3
- 2003: Zone II volume pumped = 135,000 m^3
- 2004: Zone II volume pumped = 66,500 m^3
- 2005: Zone II volume pumped = 101,500 m^3

The Water Licence requires that the water level in the Zone II pit be maintained at least 50 m below ground level (Part B, Item 24). This was achieved through 2006, as illustrated on Figure 2-1.

Figure 2-1. Faro Zone II Pit Water Elevation, 1997 to 2006



2.1.3 Main Pit

The recycle water system which provides water from the Faro Main pit to the mill was installed during the summer of 1997 and was utilized to provide an estimated minimum 95% of the water required for processing while the mill was operating prior to February 1998. The system has been used since mine operations ceased to pump water from the Faro Main pit to the mill for treatment in order to maintain the in-pit water level within the desired range.

The water pumping system is made up of the following primary components:

1. Three electric pumps mounted on a floating barge in the pit rated at providing 5,000 USgpm each to the mill (only one or occasionally two pumps are operated at one time);

2. Overhead powerline from the substation adjacent to the mill to the pumps; and
3. 30” sclair pipeline from the barge to the mill with flexible sections near the barge that minimize the risk of damage to the pipeline which might otherwise result from vertical movement of the barge.

The measured Faro Main pit water levels are illustrated on Figures 2-2 and 2-3. The complete filling curve from 1992 to 2006 (Figure 2-2) shows the rate of filling prior to activation of the recycle water system in late July 1997 and the subsequent changes in the water level resulting from pumping for supply of water for processing and/or discharge. The water levels for recent years (Figure 2-3) illustrate seasonal pumping program that has been implemented. Figure 2-3 also illustrates the effect of modifications to the barge mount that were completed in 2002 to allow pumping water to a lower level than was previously possible.

The recommended maximum elevation of 3750 feet above sea level (“asl”) (3859 feet mine datum) as illustrated on Figures 2-2 and 2-3 is approximately 15.2 m (approximately 50 feet) below the low point in the pit perimeter where water would be expected to overflow from the Main pit into the Zone II pit. This safety margin was incorporated into the design of the recycle water system in 1997 as a means of providing containment for an unexpected breach of the Faro Creek diversion into the pit and to reduce the risk of an increase in seepage into the Zone II pit through the fractured and faulted wallrock that separates the two pits.

The Water Licence requires that the water level in the Main pit be maintained below 1178.35 m (3866 ft) mine datum (Part B, Item 23). This was achieved through 2006, as illustrated on Figures 2-2 and 2-3.

Figure 2-2. Faro Main Pit Filling Curve, 1992 to 2006

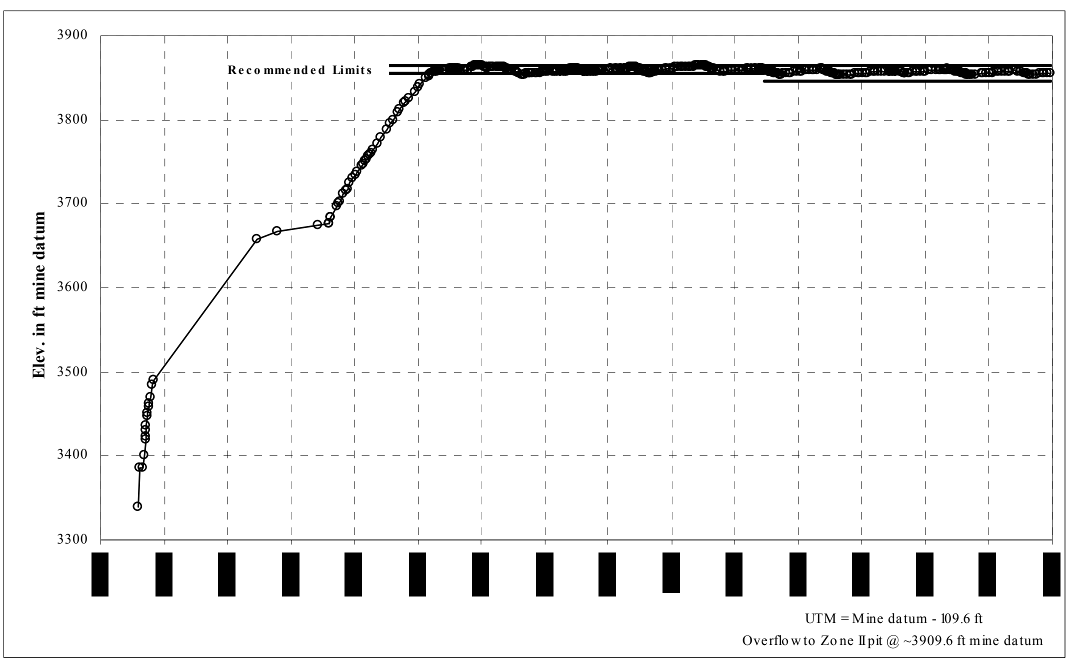
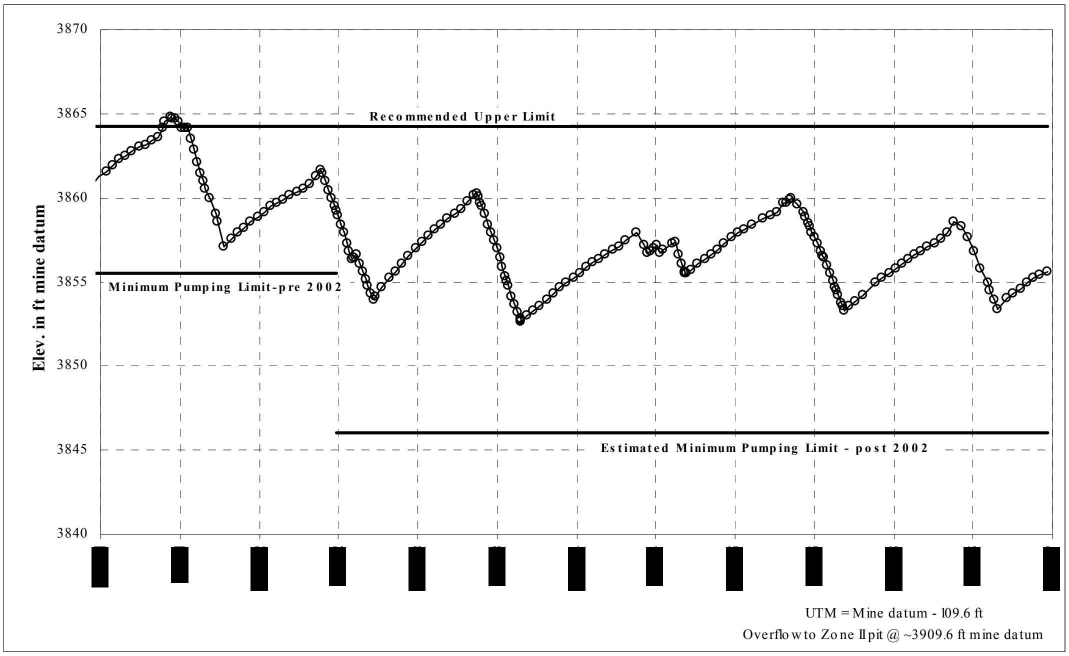


Figure 2-3. Faro Main Pit Water Level, 2001 to 2006



A simple water balance can be described for the Faro Main pit that is based on the known values of pit water level measurements, the height-volume relationship and the dates of pumping. In this case, the water balance parameters are:

- "Zone II water";
- "Net uncontrolled inflows" (groundwater seepage in/out, runoff, precipitation, etc.) calculated from observed changes in the pit pond water elevation during strategic periods;
- "Water pumped"; and
- Overall "net inflow" calculated from the overall change in the water elevation for the year.

The simple water balance could be expressed as follows with application of the subsequent notes:

Zone II Water[1] + Net Uncontrolled Inflows[2] - Water Pumped[3] = Net Inflow[4]

Therefore, the 2006 water balance for the Faro Main pit can be expressed as:

$$0.08 + 1.22 - 1.28 = +0.02 \text{ (in millions } m^3\text{)}$$

Notes (also see Table 2-3):

1. The quantity of water pumped from the Zone II pit into the Main pit in 2006 is estimated to be 75,250 m^3 (Section 2.1.2).

2. The estimated volume of net uncontrolled inflows entering the Main pit from direct precipitation, evaporation, local run off, seepage inflow and seepage losses was 1.22 million m^3 for 2006 (avg. 39 L/s). This estimate was developed from direct measurements of the pond water level during periods in 2006 where the only inflows/outflows were the uncontrolled water and inflow pumped from the Zone II pit. Periods during which there was pumping were estimated from the preceding and subsequent periods. This may provide for a slight underestimate since the pumping periods may coincide with periods of peak inflows. The estimate of net uncontrolled water inflows for 2006 is within the range of calculated values from 1995 to 2005 (1.0 to 2.0 million m^3). Further discussion of net inflows and how these may have been reduced in recent years by maintenance work on water diversions is provided in Section 5 of this report.

3. The quantity of water pumped out is calculated for each pumping period from the know volumes derived from the measured changes in pond level plus the (assumed) net uncontrolled inflow and water pumped from the Zone II pit. The estimated volume pumped in 2006 is 1.28 million m^3. This provides an estimated average flow rate of 12,781 m^3/day (2,345 USgpm average) over the operating period, which would be inclusive of operating variations. This method of estimating the pumping rate is not directly comparable with the rated pump capacity of 5,000 USgpm (per pump). There continued to be increased down-time in 2006 for sludge removal related to excess algae in the influent water (Section 5.2) which leads to a lower average pumping rate.

4. The net inflow of water entering the Main pit (for the year) is accurately tracked via the change in water elevation from January 1 to December 31. This volume is inclusive of all uncontrolled inflows, inflows from the Zone II pit and water pumped out. In 2006, there was a net increase in the pond level of 0.1 m representing a net volume increase of 0.02 million m^3.

Table 2-3. Faro Main Pit Water Balance, 2006

Period (days)	Elevation Change (ft mine datum)	Net Volume Change	ZoneII Inflow	Net Uncontrolled Inflows	Water Pumped OUT
Jan01-May31 (151)	3855.54 - 3858.60 (+6 mm/day)	+510,175 m^3 (+3,379 m^3/day)	Nil	+510,175 m^3 (+3,379 m^3/day)	Nil
Jun01-Sep08 (100)	3858.60 – 3853.39 (-16 mm/day)	-868,632 m^3 (-8,686 m^3/day)	+75,250 m^3 (+2,074 m^3/day) (36 days)	+334,200 m^3 (+3,342 m^3/day) assumed	-1,278,082 m^3 (-12,781 m^3/day) calc.
Sep09-Dec31 (114)	3853.39 – 3855.65 (+6 mm/day)	+376,796 m^3 (+3,305 m^3/day)	Nil	+376,796 m^3 (+3,305 m^3/day)	Nil
Total 2006 (365)	3855.54 – 3855.65 (+0.1 mm/day)	+18,340 m^3 (+50 m^3/day)	+75,250 m^3 (+206 m^3/day)	+1,221,171 m^3 (+3,346 m^3/day)	-1,278,082 m^3 (-3,502 m^3/day)

2.1.4 Intermediate Pond

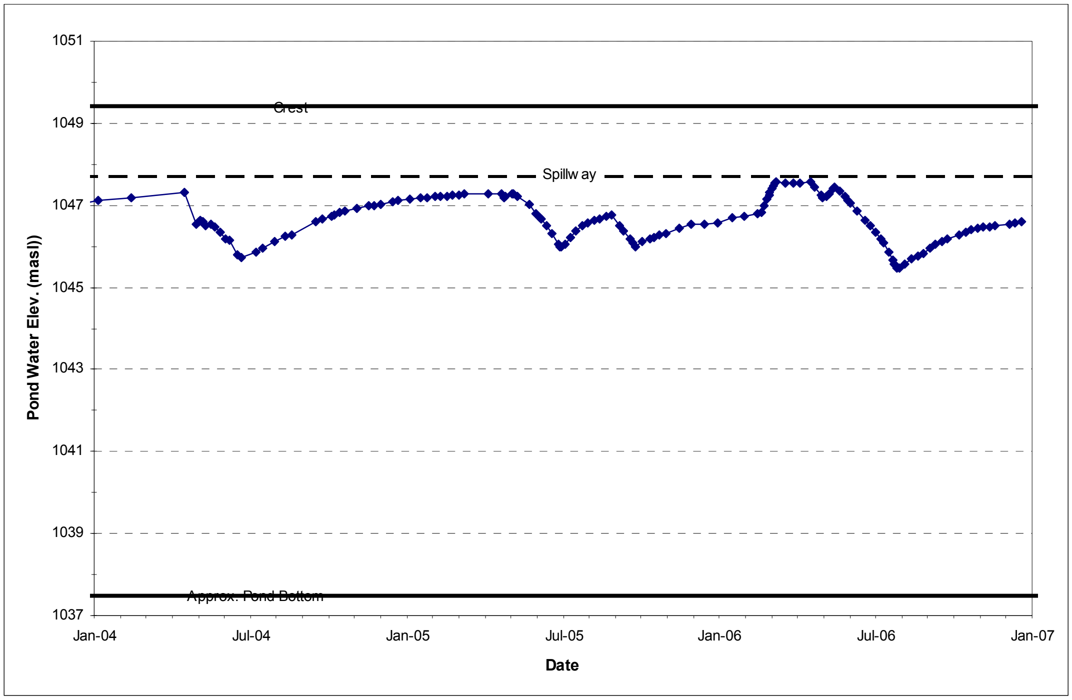
The Intermediate Pond is managed by maintaining the water level below the spillway elevation by periodically syphoning water out into the Cross Valley Pond (with treatment). This practice reduces the environmental and physical stability risks associated with operating a retained water pond at full supply level and was demonstrated to the Yukon Water Board in a technical report previously submitted under Part F, Item 56 of the Water Licence. This is an internal operating practice and the Water Licence does not regulate pond level or discharge rates for the Intermediate Pond.

From February 20 to March 9, non-compliant water was pumped from the Cross Valley Pond into the Intermediate Pond so that the water could undergo treatment through the Down Valley water treatment system prior to discharge to Rose Creek.

An estimated 720,000 m^3 was syphoned (and treated) from the Intermediate Pond in 2006. There were 90 days of syphon operation from April 19 to July 29 (with one week down in each of May and in June to remove treatment sediments from the Cross Valley Pond) at an estimated average flow rate of 7,982 m^3/day (1,464 USgpm average over the operating period). As per the established operating practice, the system was operated to provide storage for the (low) winter inflows.

Figure 2-4 illustrates the water level measurements in the Intermediate Pond from 2004 to 2006. The pond level was 0.04m higher at year end than at the beginning of the year.

Figure 2-4. Intermediate Pond Water Level, 2004-2006



A simple water balance can be described for the Intermediate Pond that is based on the measured pond water levels, the height-volume relationship and the dates of syphon outflow. In this case, the water balance parameters are the quantities of:

- "Net uncontrolled inflows" (groundwater seepage in/out, runoff, precipitation, net inflows from X23/Faro rock dumps, etc.) calculated from observed changes in the pit pond water elevation during strategic periods;
- in 2006, "Water Pumped from Cross Valley Pond";
- "Water syphoned"; and
- Overall "net inflow" calculated from the overall change in the water elevation for the year.

The simple water balance could be expressed as follows with application of the subsequent notes:

Net Uncontrolled Inflows[1] + Water Pumped from Cross Valley Pond - Water Syphoned[2] = Net Inflow[3]

Therefore, the 2006 water balance for the Intermediate Pond pit can be expressed as:

$$+0.48^{1} + 0.16^{2} - 0.63^{3} = +0.01^{4} \text{ (in millions } m^3\text{)}$$

Notes (also see Table 2-4):

1. The estimated volume of net uncontrolled inflows entering the Intermediate Pond from direct precipitation, evaporation, local run off, seepage inflow and seepage losses was 0.48 million m^3 for 2006 (avg. 15 L/s). This estimate was developed from direct measurements of the pond water level during periods in 2006 where the only inflows/outflows were the uncontrolled water. Periods during which there was syphoned outflow and pumped inflow were estimated from the preceding and subsequent periods. This may provide for a slight underestimate since the periods of siphoned outflow may coincide with periods of peak inflows.

2. The water pumped in from the Cross Valley Pond was calculated from the measured change in elevation (increase) of the Intermediate Pond water level over the known pumping period. An estimated total of 0.16 million m^3 was pumped into the Intermediate Pond over 17 days at an average rate of 9,715 m^3/day (1,782 USgpm).

3. The water syphoned out is calculated for each syphoning period from the know volumes derived from the measured changes in pond level plus the net uncontrolled inflow. The estimated volume syphoned in 2006 is 0.63 million m^3. The estimated average flow rate of 6,222 m^3/day (1,141 USgpm) is the average for the entire operating period, inclusive of 2 operational shutdowns (May and June) for sediment removal.

4. The net inflow of water entering the Intermediate Pond (for the year) is accurately tracked via the change in water elevation from January 1 to December 31. This volume is inclusive of all uncontrolled inflows, water pumped in and water syphoned out. In 2006, there was a net increase in the pond level of 0.04 m representing a net volume of 0.01 million m^3.

Table 2-4. Intermediate Pond Water Balance, 2005

Period (days)	Elevation Change (m asl)	Net Volume Change	Net Uncontrolled Inflows	Pumped from Cross Valley Pond	Water Syphoned Out
Jan01-Feb20 (51)	1046.56 - 1046.82 (+2 mm/day)	+60,003 m^3 (+1,177 m^3/day)	+60,003 m^3 (+1,177 m^3/day)	Nil	Nil
Feb21-Mar09 (17)	1046.82 – 1047.57 (-13 mm/day)	+175,146 m^3 (-10,303 m^3/day)	+9,996 m^3 (+588 m^3/day) assumed	+165,150 m^3 (+9,715 m^3/day) (+1,782 USgpm) calc.	Nil
Mar10-Apr18 (40)	1047.57 – 1047.57 (+0 mm/day)	Nil	Nil	Nil	Nil
Apr19-Jul29 (102)	1047.57 – 1045.46 (-6 mm/day)	-472,502 m^3 (-4,632 m^3/day)	+162,180 m^3 (+1,590 m^3/day) assumed	Nil	-634,682 m^3 (-6,222 m^3/day) (-1,141 USgpm) calc.
Jul30-Dec31 (155)	1045.46 – 1046.60 (+2 mm/day)	+246,458 m^3 (+1,590 m^3/day)	+246,458 m^3 (+1,590 m^3/day)	Nil	Nil
Total 2006 (365)	1046.56 – 1046.60 (+0.03 mm/day)	+9,105 m^3 (+25 m^3/day)	+478,637 m^3 (+1,311 m^3/day)	+165,150 m^3 (+452 m^3/day)	-634,682 m^3 (-1,739 m^3/day)

2.1.5 Cross Valley Pond

The Cross Valley Pond is managed by maintaining the water level below the spillway elevation by periodically syphoning water out to Rose Creek. This practice reduces the environmental and physical stability risks associated with operating a retained water pond at full supply level. This water is the final effluent and it is not released unless it meets the maximum allowable discharge limits specified in the Water Licence (Part C, Items 27 through 31).

In early 2006, an estimated 165,150 m^3 of non-compliant water was pumped from the Cross Valley Pond into the Intermediate Pond so that it could undergo treatment through the Down Valley water treatment system prior to discharge to Rose Creek. The volume estimate is described above (Section 2.1.4). The elevated zinc levels in the water originated from treatment sediments, which accumulate at the inflow spillway from the Intermediate Pond (as has been experienced in the past). The pumping program was successful in achieving compliant discharge through 2006 and modifications were made to the sediment management program that will reduce the risk of a recurrence (see Section 5).

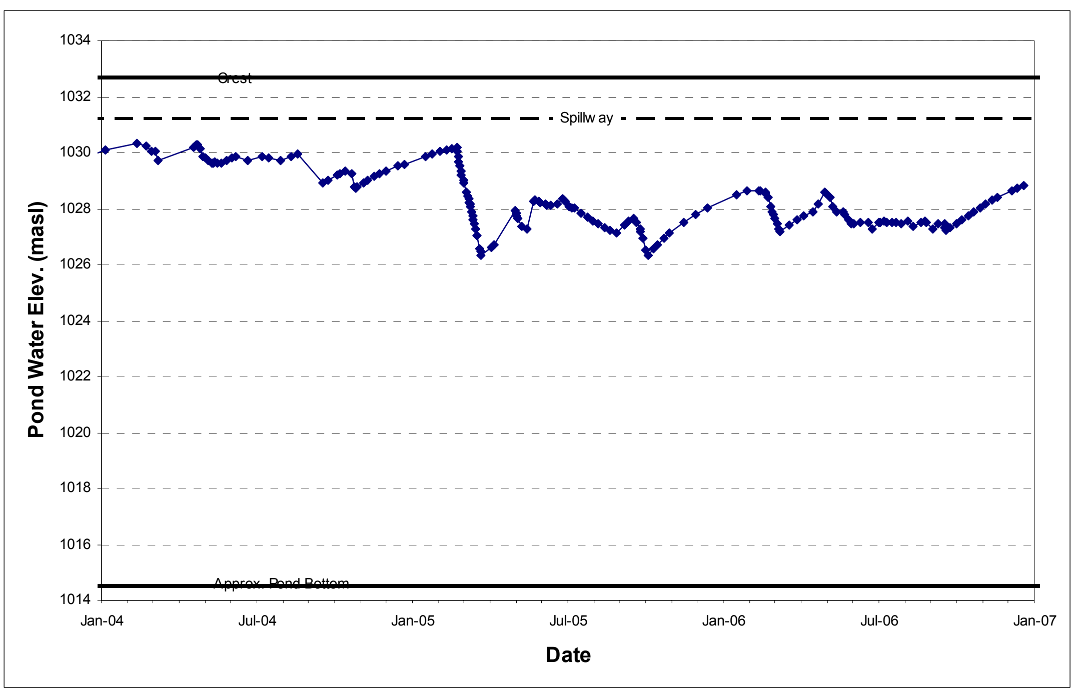
The sources of water entering the Cross Valley pond are:

- surface inflow syphoned (and treated) from the Intermediate pond (Section 2.1.4);
- water that is pumped (and treated) from the Faro Main pit and the mill treatment system (Section 2.1.3);
- groundwater that may possibly discharge into the pond from the underlying aquifer; and
- precipitation and local runoff.

There were 134 days of syphon operation from May 01 to September 22 at an estimated average flow rate of 366 Lps (5,800 USgpm), as measured via staff gauge. As per the established operating practice, the system was operated through the summer to pass (treated) water inflows from the Intermediate Pond and the Main pit/mill treatment system. Site environmental staff recorded staff gauge readings on a daily basis and collected periodic flow measurements at location X5 when the discharge syphon was operating. The measured flow would be inclusive of the North Wall Interceptor (NWI) Ditch, which directs clean water to this location. The NWI flow would be a minor portion (in the order of 1% maximum) of the total measured flow at times when the effluent discharge syphon was operating.

Figure 2-5 illustrates the water level measurements in the Cross Valley Pond from 2004 to 2006. The pond level was 0.54 m higher at year end (2006) than at the beginning of the year.

Figure 2-5. Cross Valley Pond Water Level, 2004-2005



An estimated 4.2 million m^3 of (compliant) water was released via location X5 in 2006. This is inclusive of:

- inflow from the Main Pit (1.3 million m^3);
- inflow from the Intermediate Pond (0.6 million m^3);
- net increase in the pond level by 0.54 m over the course of the year; and
- any other inflows and outflows, including the North Wall Interceptor Ditch.

2.1.6 Seepage at Cross Valley Dam

A continuous flow of seepage emerges to surface at the toe of the Cross Valley Dam. This is generally thought to consist primarily of seepage through the dam and the dam foundation from the Cross Valley Pond with some portion of deeper groundwater flow also. Additional information on this topic is being developed through studies that are currently underway for development of the FCRP. However, the information is not available for reporting at this time.

The total volume of effluent that entered Rose Creek via location X13 in 2006 was estimated to be 0.82 million m^3 at a rate of flow that varied from 19 to 45 Lps, as compiled by BGC Engineering Inc.

2.1.7 Freshwater

No freshwater was drawn from Rose Creek for industrial purposes in 2006. Freshwater from Rose Creek was not used for reagent mixing in the water treatment systems, drinking water or wash water.

Some components of the fresh water supply system that was previously used (during mine operations) to supply water to the mill from Rose Creek remain in place. The system is inoperable and no longer allowed under the terms of the Water Licence.

The previous fresh water dam and reservoir in the South Fork of Rose Creek represented a large component of the fresh water supply system. The dam was breached to original ground level in 2004 and there is no longer any ponding or storage of water in a reservoir. The work, which includes follow up monitoring and reporting, is conducted under a separate water licence that was issued specifically for that project.

The fresh water supply system also includes the following (unused) components which remain largely in place:

1. Pumphouse Pond located at the confluence of the North and South Forks of Rose Creek;
   The pond continues to pass all of the flow from the South Fork and most of the flow from the North Fork (high flows in the North Fork partially spill into the North Fork Diversion). The North Fork channel into the Pumphouse Pond includes several settling/groundwater recharge ponds. The pond itself represents overwintering habitat for fish.
2. Pumphouse Building;
   The building is largely empty. Pumps and motors have been previously removed for alternate use.
3. Freshwater Pipeline; and
   The steel pipeline is buried where it passes under the (former) copper sulphate and bulk explosives manufacturing yard and access road and is then overland to the mill.

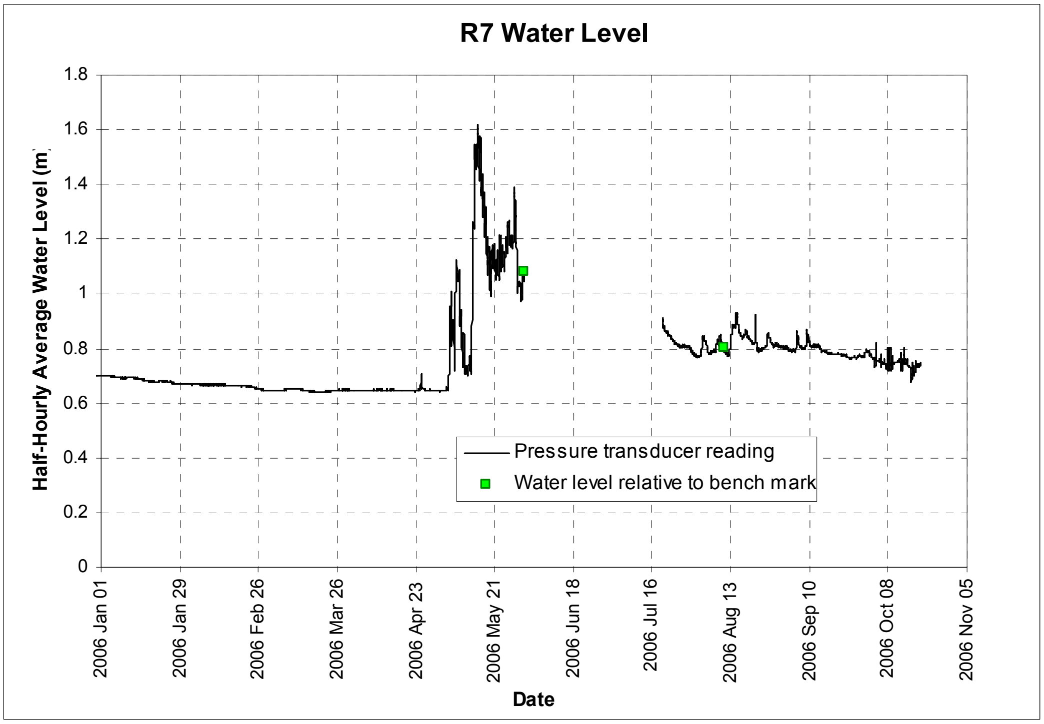
Prior to 2005, there were also two ground water wells, PW3 and PW6, located in the Rose Creek valley near the Pumphouse Pond. In 2005, the wells were capped and surface structures removed.

2.1.8 Continuous Flow Monitoring

Continuous flow monitoring at location R7 in the North Fork of Rose Creek and location X14 in Rose Creek immediately downstream of the tailings facility is a requirement of the Water Licence (Schedule A, Part III). The water levels have been monitored on a continuous basis using a pressure transducer and datalogger since 1996 (R7) and 1994 (X14) excepting periods of malfunction or damage.

These flow records are currently the subject of technical review as part of the FCRP and, therefore, may be amended in future. As an example of the data under review, Figures 2-6 (R7) and 2-7 (X14) are preliminary graphs of 2006 flow rates.

Figure 2-6. Preliminary 2006 Flow Record for Location R7, North Fork Rose Creek



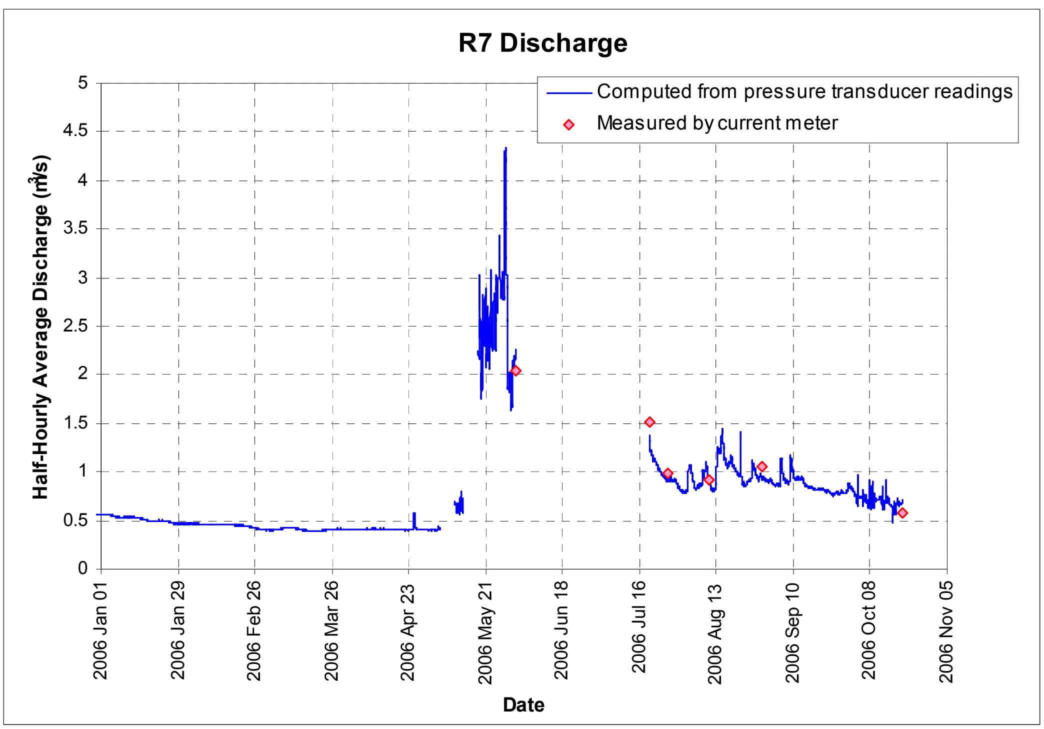
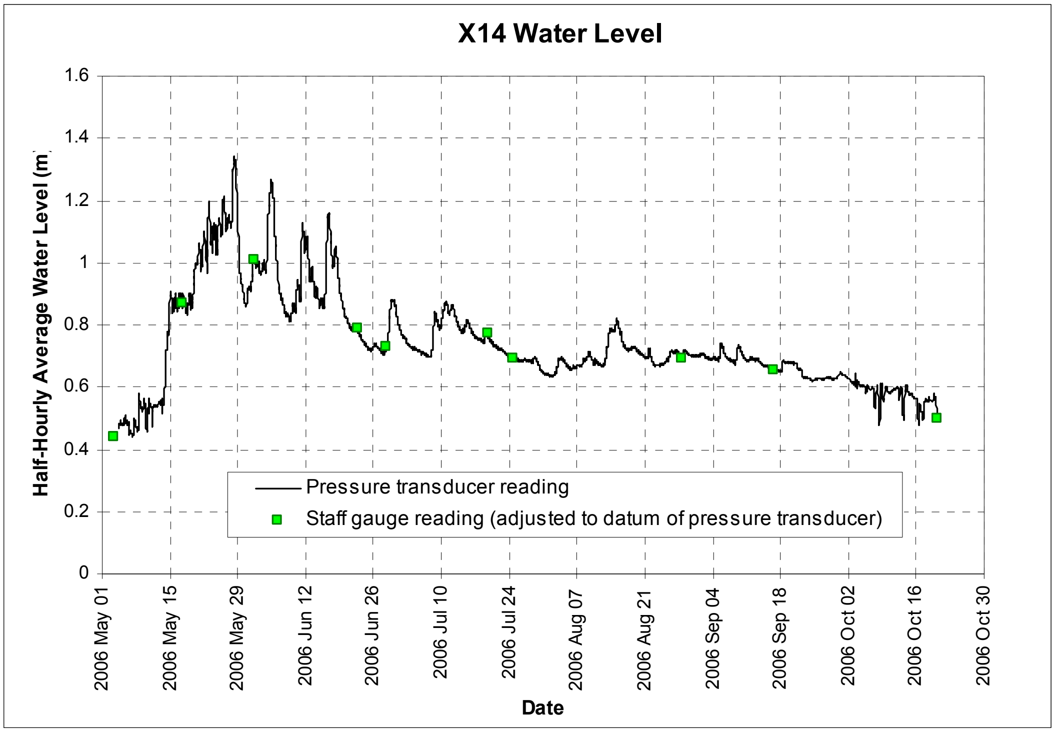
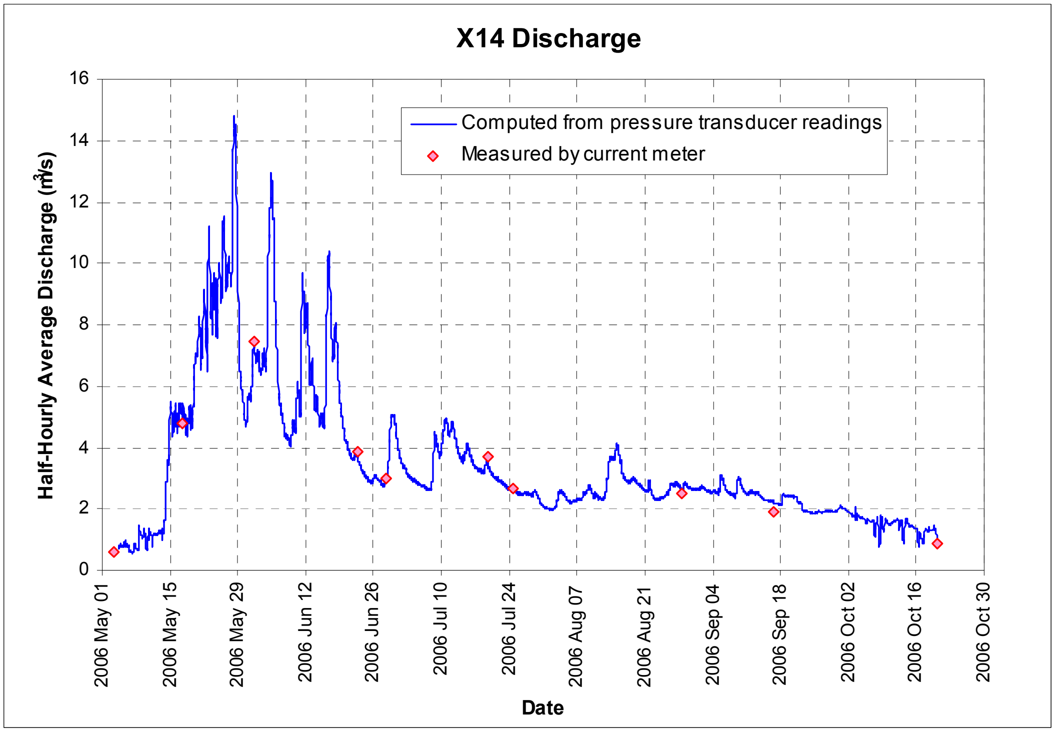


Figure 2-7. Preliminary 2006 Flow Record for Location X14, Rose Creek





2.2 Vangorda Creek Drainage

2.2.1 Summary

The Water Licence authorizes the use of water from Vangorda Creek up to a maximum rate of 19,930 m^3/day (Part B, Items 21a and 21c). Information that was provided in the Water Licence Application suggested an average annual direct use of water of 951,000 m^3 per year. The Water Licence specifically recognizes the following water uses:

- Pumping from the Little Creek Dam Pond;
- Pumping from the Vangorda pit;
- Pumping from the Freshwater Supply Pond; and
- Possible Future Pumping from the Grum pit.

Table 2-5 summarizes the total water obtained from Vangorda Creek in 2006 for the authorized purposes. One of the authorized water uses is possible future pumping from the Grum Pit (300,000 m^3 per year at a rate of 6,000 m^3/day) which was not required in 2006. Therefore, these amounts are not included in the amounts listed in Table 2-5. There was no use of water for unauthorized purposes.

Table 2-5. Summary of 2006 Water Use from Vangorda Creek

Water Use	Maximum Rate (m^3/day)	Total (m^3)
Pumping from Little Creek Dam Pond	1,800	18,000
Pumping from the Vangorda Pit	Nil	Nil
Pumping from Freshwater Supply Pond	Nil	Nil
Possible Future Pumping from the Grum Pit	Not required	Not required
Total Estimated Water Use	**1,800**	**18,000**
Total Allowable Water Use	**13,930**[1]	**651,000**[1,2]

1.Excluding Possible Future Pumping from the Grum Pit.

2. As suggested in the Water Licence Application Report.

Table 2-5 shows that no water was pumped from the Vangorda Pit in 2006. This was following the management strategy that was implemented in 2005, which pumped a sufficiently large volume of water in 2005 to eliminate the need for any pumping in 2006 and 2007 (anticipated). This strategy provides operational and cost benefits, reduces environmental risks and provides for moving the average annual volumes of water on a multi-year basis. In this way, the overall annual volumes pumped will be as anticipated.

For general interest as related to water use, Table 2-2 presents measured monthly precipitation at the Faro airport over the available period of record, 1978 to 2005. The precipitation measured in 2006 was 90% of the 29-year record at 277 mm. Additional information is being developed regarding site-specific climate data through the studies that are underway for development of the FCRP. However, the information is not available for reporting at this time.

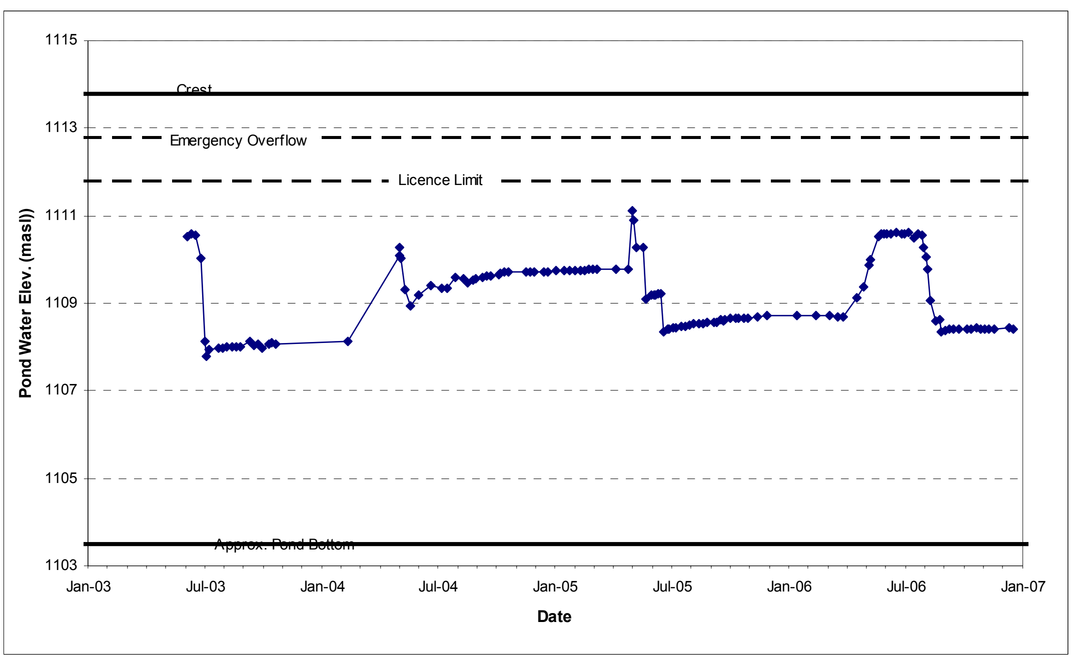
2.2.2 Little Creek Dam Pond

The water that collects in Little Creek Dam Pond is (contaminated) runoff and seepage from the Vangorda waste rock dump. This water is pumped to the Vangorda pit on an as-required basis, typically on only one or two occasions each summer, to maintain the water level below the prescribed "safe" elevations.

An estimated 18,000 m^3 was pumped from Little Creek Dam Pond in 2006. This is estimated from the measured pond elevations and the height-capacity relationship. There were 10 days of pumping between August 6 and August 28 at an estimated average flow rate of 1,800 m^3/day (330 USgpm) average over the pumping period.

Figure 2-8 illustrates the water level measurements in Little Creek Dam Pond from 2003 to 2006. The pond level was approximately 0.3 m lower at year end than at the beginning of the year. The Water Licence requires that the water level in Little Creek Dam Pond be maintained no less than 1 m below the overflow structure (Part B, Item 26). This was achieved through 2006.

Figure 2-8. Little Creek Dam Pond Water Levels, 2003 to 2006



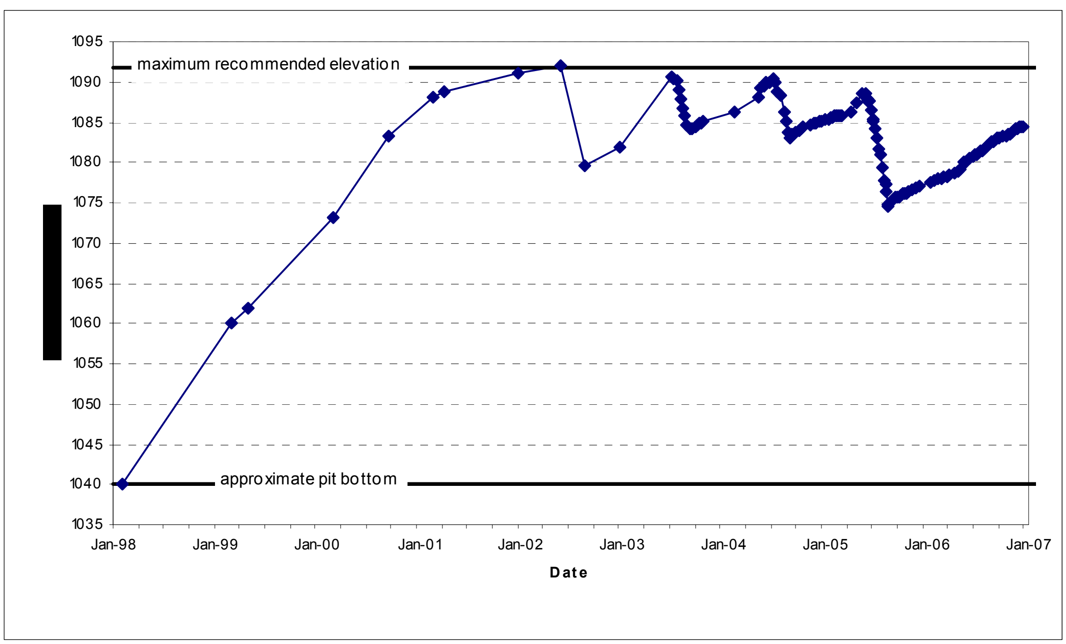
2.2.3 Vangorda Pit

From mine shut down in 1998 to 2001, the water level in the Vangorda pit rose to its recommended "maximum" allowable elevation. This elevation provides approximately 30 m of safety freeboard below the estimated overflow elevation. The pit water is contaminated from rock piles and pit walls. The inflows into the pit include local area runoff, leakage and underflow from the Vangorda Creek Diversion, direct precipitation and water pumped from Little Creek Dam Pond.

In 2002, the Grum/Vangorda water treatment plant was reactivated and a new overland pumping system was installed from the Vangorda pit. From 2002 to 2005, an annual seasonal pumping program was conducted to maintain the pit water level below the maximum recommended elevation. In 2005, a sufficiently large volume of water was pumped to eliminate the need for any pumping in 2006 and 2007 (anticipated). This multi-year cycle will be continued, if practical, as the preferred management strategy for the Vangorda pit.

The filling curve for the Vangorda pit through 2006 is illustrated on Figure 2-9. The Water Licence requires that the water level in the Vangorda pit be maintained below 1092.0 m asl (Part B, Item 25). This was achieved through 2006.

Figure 2-9. Filling Curve for Vangorda Pit, 1998 to 2006



A simple water balance can be described for the Vangorda pit that is based on the known values of pit water level measurements, the height-volume relationship and the dates of pumping. In this case, the water balance parameters are:

- "LCD water inflow";
- "Net uncontrolled inflows" (groundwater seepage in/out, runoff, precipitation, etc.) calculated from observed changes in the pit pond water elevation during strategic periods;
- "Water pumped"; and
- Overall "net inflow" calculated from the overall change in the water elevation for the year.

The simple water balance could be expressed as follows with application of the subsequent notes:

LCD Water[1] + Net Uncontrolled Inflows[2] - Water Pumped[3] = Net Inflow[4]

Therefore, the 2006 water balance for the Vangorda pit can be expressed as:

$$0.02 + 0.37 - 0 = 0.39 \quad (\text{in millions } m^3)$$

Notes (also see Table 2-6):

1. The quantity of water pumped from Little Creek Dam into the Vangorda pit in 2006 is estimated to be 18,000 m^3 (Section 2.2.2).

2. The estimated volume of net uncontrolled inflows entering the Vangorda pit from direct precipitation, evaporation, local run off, seepage inflow and seepage losses is 0.37 million m^3 for 2006 (avg. 12 L/s). This estimate was developed from direct measurements of the pond water level during 2006 where the only inflows/outflows were the uncontrolled water and inflow pumped from Little Creek Dam. The estimate of net uncontrolled water inflows for 2006 is within the range of calculated values from 1998 to 2005 (0.2 to 1.0 million m^3).

3. There was no water pumped from the Vangorda Pit in 2006.

4. The net inflow of water entering the Vangorda pit (for the year) is accurately tracked via the change in water elevation from January 1 to December 31. This volume is inclusive of all uncontrolled inflows, inflows from Little Creek Dam and water pumped out. In 2006, there was a net increase in the pond level of 2.2 m representing a net volume increase of 0.39 million m^3.

Table 2-6: Vangorda Pit Water Balance, 2005

Period (Days)	Elevation Change (m)	Net Volume Change	Water Pumped from Little Creek Dam	Net Uncontrolled Inflows	Water Pumped Out
Jan01-Apr30 (120)	1077.48 – 1078.88 (+4 mm/day)	+68,506 m^3 (+571 m^3/day)	Nil	+68,506 m^3 (+571 m^3/day)	Nil
May01-Jun30 (61)	1078.88 – 1080.92 (+10 mm/day)	+107,875 m^3 (+1,768 m^3/day)	Nil	+107,875 m^3 (+1,768 m^3/day)	Nil
Jul01-Sep30 (92)	1080.92 – 1083.08 (+7 mm/day)	+124,600 m^3 (+1,354 m^3/day)	+18,000 m^3 (+196 m^3/day)	+106,600 m^3 (+1,159 m^3/day) (assumed)	Nil
Oct01-Dec31 (92)	1083.08 – 1084.55 (+5 mm/day)	+84,797 m^3 (+922 m^3/day)	Nil	+84,797 m^3 (+922 m^3/day)	Nil
2006 (365)	1077.48 – 1084.55 (+6 mm/day)	+385,778 m^3 (+1,057 m^3/day)	+18,000 m^3 (+49 m^3/day)	+367,778 m^3 (+1,008 m^3/day)	Nil

2.2.4 Grum/Vangorda Freshwater Supply Pond

During years when the Grum/Vangorda water treatment plant is operated, a relatively small amount of freshwater is drawn from Vangorda Creek for mixing lime in the plant. This water is drawn from the Grum/Vangorda Freshwater Supply Pond which stores some surface runoff that flows into the Grum Interceptor Ditch just upgradient of the water treatment plant. Water is pumped from the pond to the plant on an on-demand basis to maintain an adequate supply of mix water in a storage tank located in the plant.

The Grum/Vangorda water treatment plant was not operated in 2006 and no freshwater was used.

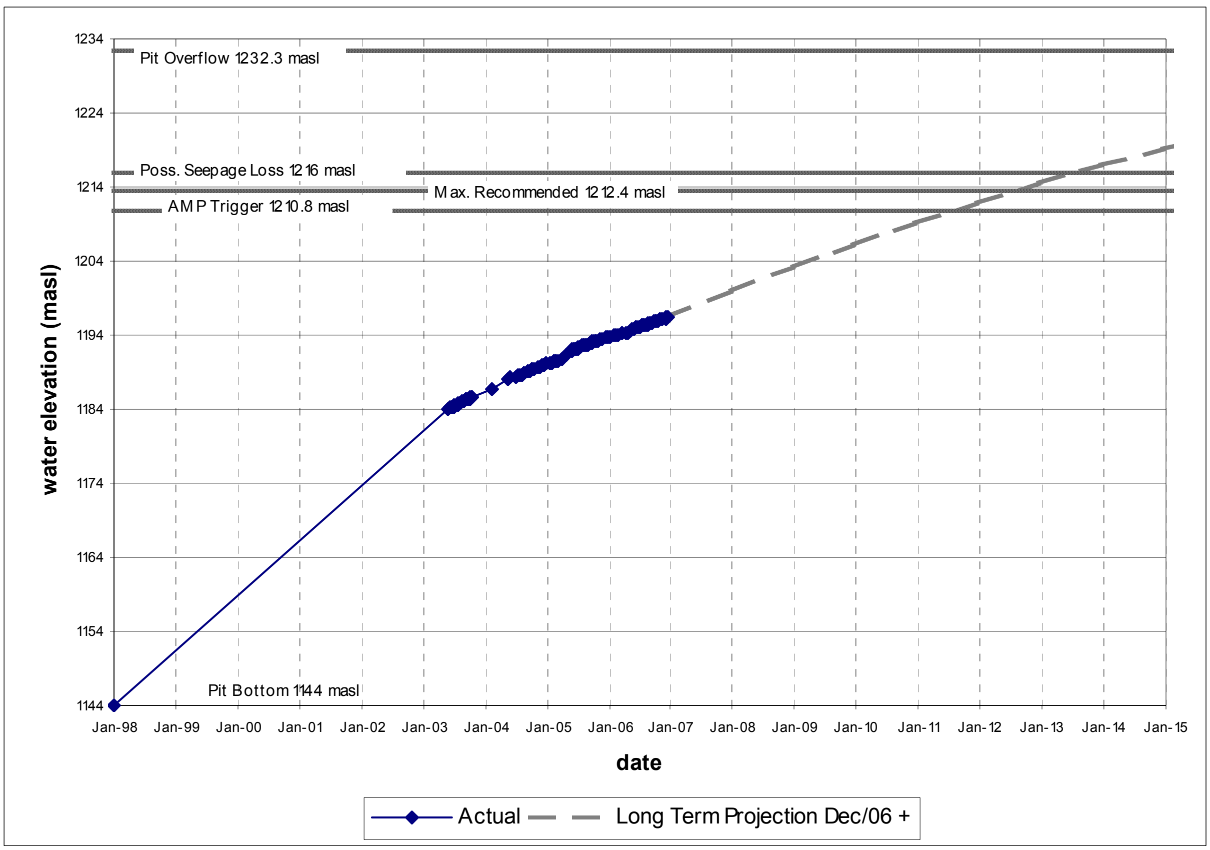
2.2.5 Grum Pit

Since the cessation of mining activities in 1998, the Grum pit has been allowed to accumulate natural runoff water. The rate of filling has been slower than the Vangorda pit because of the relatively smaller inflows and relatively larger size. In 2003, a study was undertaken by Gartner Lee that developed a height-capacity relationship and that recommended a maximum recommended water elevation where treatment or some other intervention should be considered if the water were non-compliant.

The pit filling curve illustrated on Figure 2-10 shows that no “action” levels were reached in 2006. Further, rough conservative projections of the rate of filling indicate that the earliest that the action level prescribed in the Adaptive Management Plan (AMP) might be reached is during 2011. This is projected to be a minimum 2 years prior to the water level reaching the elevation at which subsurface seepage might occur. The projected rate of filling is one of the elements of the Adaptive Management Plan and is also discussed in Section 9.8.

The estimated net quantity of water that accumulated in the Grum pit in 2006, based on the measured elevations and the height-capacity curve, is 319,500 m^3 (10 Lps average).

Figure 2-10. Grum Pit Filling Curve



2.2.6 Effluent Discharge

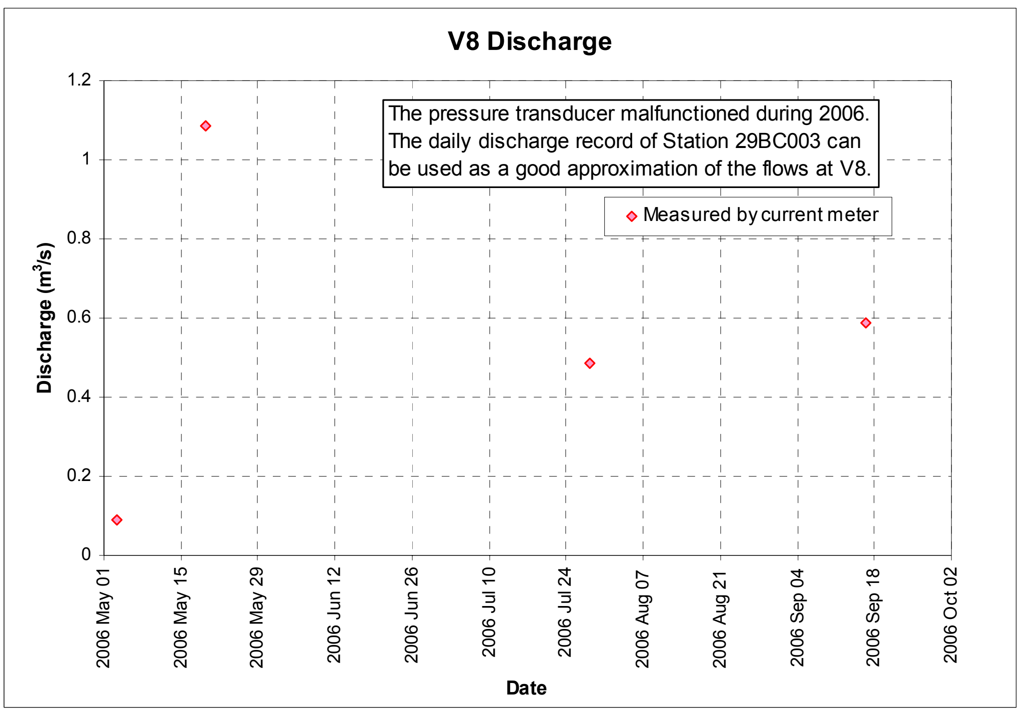
There was no effluent discharged from the Grum/Vangorda water treatment plant in 2006.

2.2.7 Continuous Flow Monitoring

Continuous flow monitoring location V8 in lower Vangorda Creek is a requirement of the Water Licence (Schedule A, Part III). The monitoring location is adjacent to the town between the town access road and the bridge to the town pumphouses. This is below the confluence of the West Fork and the "Main Fork". The water level has been monitored on a continuous basis using a pressure transducer and datalogger since 1996 excepting periods of malfunction or damage.

The flow record is currently the subject of technical review as part of the FCRP and, therefore, may be amended in future. As an example of the data under review, Figure 2-11 illustrates a preliminary graph of 2006 flow rates.

Figure 2-11. Preliminary 2006 Flow Record for Location V8, Lower Vangorda Creek



3. Water Quality Monitoring – Rose Creek Drainage

3.1 Overview of Water Quality Monitoring Program

Water quality is monitored regularly throughout the mine property as described in Part G and Schedule A of the Water Licence. The water quality monitoring program outlined in the Water Licence prescribes the sampling locations, sampling frequency and the minimum parameters to be analysed annually.

The monitoring program is carried out by staff employed at the mine site by the Interim Receiver. Various professional laboratories have been used to provide the sample analyses over the life of the project. Laboratories are selected on the basis of certification with the Canadian Association of Environmental Analytical Laboratories, service and other factors. In 2006, most of the water analyses were conducted by CanTest. The analytical data is managed and maintained through an electronic database that is managed by Gartner Lee Limited.

The monitoring program also makes extensive use of the unique capability for high-quality, on-site zinc analyses to provide immediate feedback to site managers regarding effluent quality. On-site analyses of effluent zinc concentrations are conducted on a daily, or more frequent, basis when treated effluent is being released.

Water sampling frequencies vary from weekly (for treated effluents) to twice per year (for groundwater). The majority of water samples are collected on a monthly or quarterly basis. Continuous flow monitoring via dataloggers is required at two locations in the Rose Creek drainage (R7 and X14). Other locations have various requirements for flow measurement.

Schedule A of the Water Licence, including the descriptions of the monitoring locations, sampling frequencies and minimum parameters, is provided in Appendix 1. UTM coordinates for the sampling locations have been previously provided to the Board and are provided in Appendix 2 for ease of reference. The monitoring locations are also illustrated on Figures 1-1, 1-2 and 1-3. Analytical data for 2006 is provided in Appendix 3 (surface water) and Appendix 4 (groundwater). Bioassay results are provided in Appendix 5. A brief review of the data is provided in the following sections.

3.2 Open Pits, Rock Dumps and Tailings

3.2.1 Main Pit

Main Pit

Water quality in the Faro Main Pit is monitored in the near surface zone at location X22B. In 2006, samples were collected on a monthly basis at this location, for the purpose of monitoring and assessment of pit water quality conditions, and to facilitate management of the annual Faro pit-pumping program. Water quality at this location is generally indicative of buffered acid rock drainage with elevated levels of metals and sulphate at a neutral pH. This is as expected given the presence of mineralized rock dumps and pit walls in the drainage area and the inflow up until to February 1998 of lime treated tailings slurry. A generally progressive increase in zinc concentrations from 1998 to 2003 is consistent with anticipated trends related to the discontinuation of high pH water inflow from the tailings slurry. Zinc concentrations appear to be relatively consistent since 2004.

Sulphate (SO_4) concentrations ranged from 191 mg/L to 774 mg/L at station X22B during 2006, with an average concentration of 627 mg/L. The concentrations of total and dissolved zinc (Zn) at location X22B in 2006 ranged from 6.72 mg/L to 16.4 mg/L and from 6.14 mg/L and 14.8 mg/L, respectively, with average concentrations of 13.5 mg/L and 12.3 mg/L, respectively. Concentrations of SO_4 and Zn observed in 2006 are within ranges typically observed at this site in recent years (Figures 3-1 and 3-2).

In 2006, total cadmium (Cd) concentrations at X22B ranged from 0.0012 mg/L to 0.0058 mg/L, with an average of 0.0036 mg/L. Dissolved Cd concentrations ranged from 0.0002 mg/L to 0.0052 mg/L, with an average concentration of 0.0031 mg/L. A progressively decreasing trend in maximum annual concentrations has been observed at this location since 2003 (Figure 3-3).

Lead (Pb) concentrations remained at low concentrations throughout 2006, with the exception of the May sampling event which exhibited a peak Pb concentration of 0.17 mg/L. Lead concentrations returned to typical values by the next sampling event in June, with total and dissolved lead concentrations of 0.002 mg/L and <0.001 mg/L, respectively.

An experimental program of in-pit fertilization to enhance the biological removal of zinc and other metals was conducted in 2005 as part of the studies underway by the FMCPO for development of the FCRP. The results are not available for reporting at this time.

Figure 3-1. Sulphate at X22B

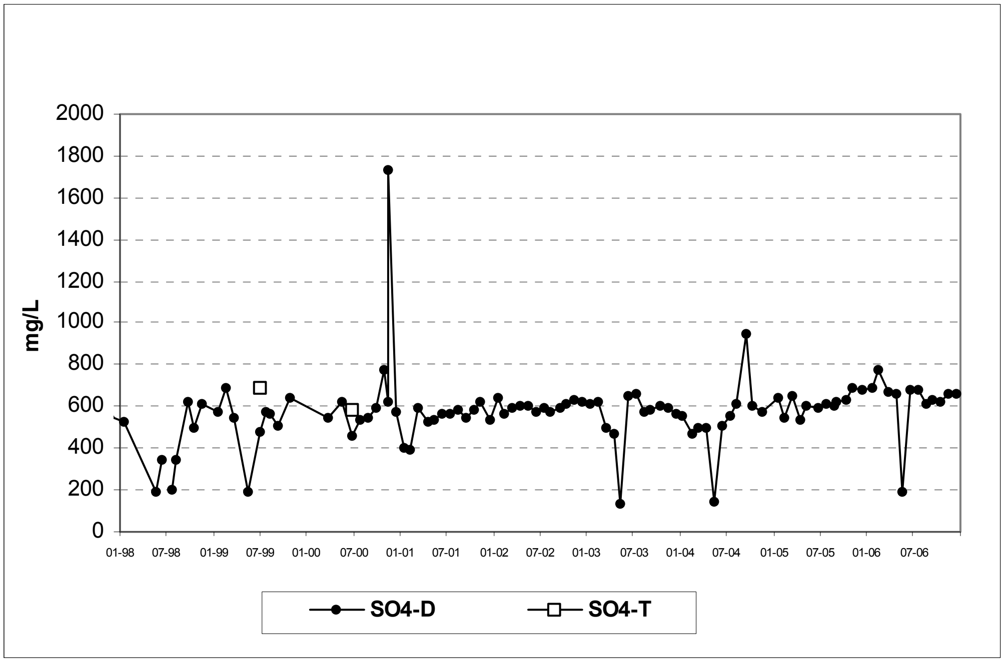


Figure 3-2. Zinc at X22B

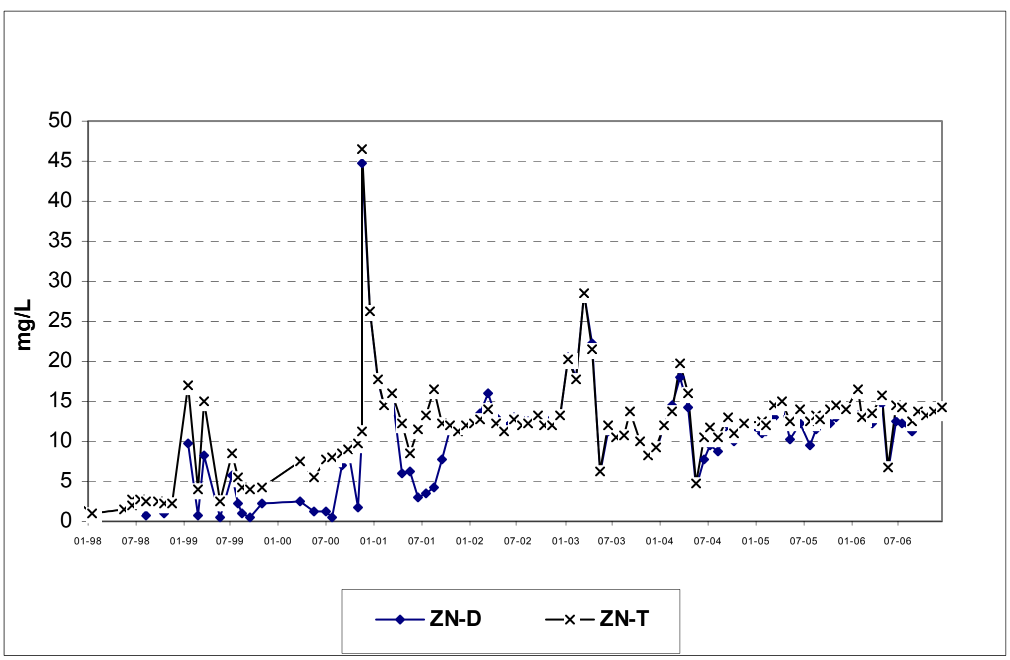
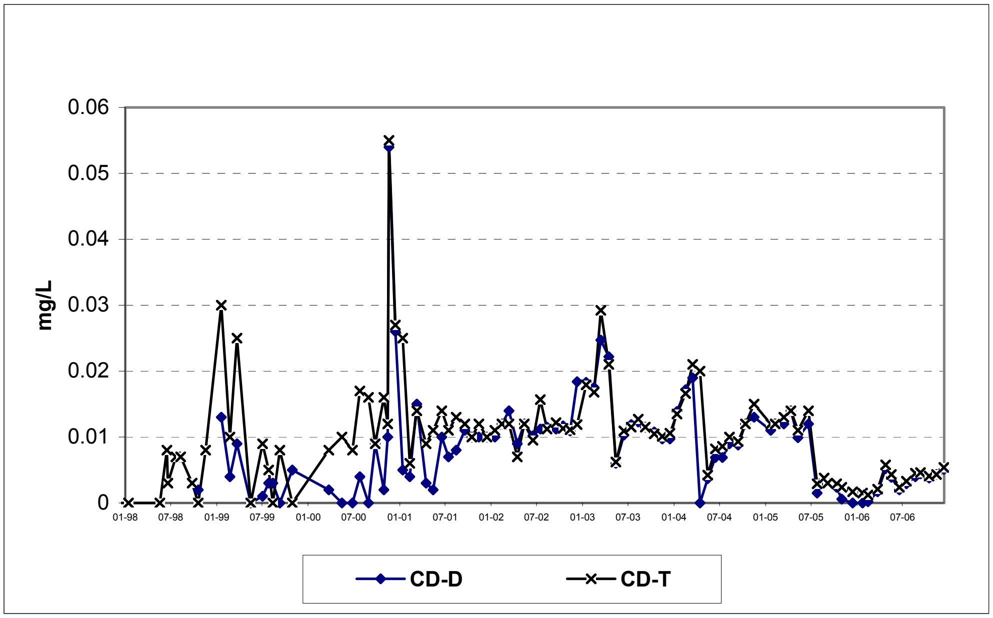


Figure 3-3. Cadmium at X22B



Miscellaneous Surface Seepages

Flow that collects in the Faro Creek channel above the Faro Valley rock dump (location FCO) was sampled in the June and September of 2006. This water flows along the base of the Faro Valley rock dump and into the Main pit. Sulphate, Zn, Cu, and Cd concentrations were comparable to those observed in recent years.

Locations A30 and A25 are seeps into the Main Pit from the Faro pit walls. Location A30 is located immediately below the toe of the Faro Valley rock dump on the north pit wall and station A25 is located on the northwest wall. Both stations were sampled twice in 2006, in June and September. Water quality at station A30 is most likely impacted by acid rock drainage and metals leaching, as indicated by the elevated metal and sulphate concentrations and low pH observed at this site. Concentrations of Cd, Cu, Pb, SO_4 and Zn at station A30 follow a previously established trend, with elevated concentrations observed in June, followed by a decrease in concentration by the fall sampling event. Increased metal and SO_4 concentrations observed in June at this site are most likely associated with spring freshet, due to increased flushing of accumulated oxides within the rock dump. During the two sampling events in 2006, SO_4 concentrations were 352 mg/L and 1040 mg/L and total Zn concentrations were 28.8 mg/L and 90.3 mg/L.

At location A25, SO_4 and total Zn concentrations are generally consistent with those observed since sampling began in 2004, ranging from 17.3 to 29.8 mg/L and 0.005 mg/L to 0.015 mg/L, respectively. Seepage at this location was neutral during both sampling events. Concentrations of As, Cd, and Cu have remained below MDL's (minimum detection limits) since water quality monitoring began at this site in 2004.

Location SP5/6, a surface ditch into the Main Pit from the North East Dumps, was sampled twice in 2006, in spring and fall. Metals and SO_4 concentrations were comparable to those observed over the last four years, however, zinc and SO_4 concentrations decreased slightly between 2005 and 2006.

3.2.2 Zone II Pit

Water chemistry in the backfilled Zone II Pit is monitored at location X26, which is water pumped from the Zone II Pit into the Main Pit. Information at this location can identify changes in water chemistry that may be related to acceleration in the acid rock drainage process within the Zone II pit and also provides information on contaminant loading into the Main pit.

In 2006, four monthly samples were collected at location X26 during periods of active pumping (June to September). During this period, SO_4 concentrations ranged from 2510 mg/L to 3030 mg/L. Although SO_4 concentrations have increased progressively at this location between 2002 and 2005, concentrations observed in 2006 were typically less than those observed in 2005. Location X26 continues to have the highest SO_4 concentration of any of the monitored inflows into the Main Pit.

The concentrations of total and dissolved Zn at location X26 in 2006 ranged from 68.2 mg/L to 111 mg/L and 61.1 mg/L to 95.7 mg/L, respectively, with average concentrations of 88.9 mg/L and 81.0 mg/L, respectively. Zinc concentrations observed in 2006 are typically lower than those observed in 2005. (Figure 3-5)

In 2006, Cd and Pb concentrations at X26 were similar to those observed in recent years. Total and dissolved Cd concentrations ranged from 0.023 mg/L to 0.0025mg/L and 0.021 mg/L and 0.024 mg/L, respectively. Total Pb concentrations ranged from 0.044 mg/L to 0.056 mg/L, with an average concentration of 0.052 mg/L. Dissolved Pb concentrations were all below the MDL.

Figure 3-4. Sulphate at X26

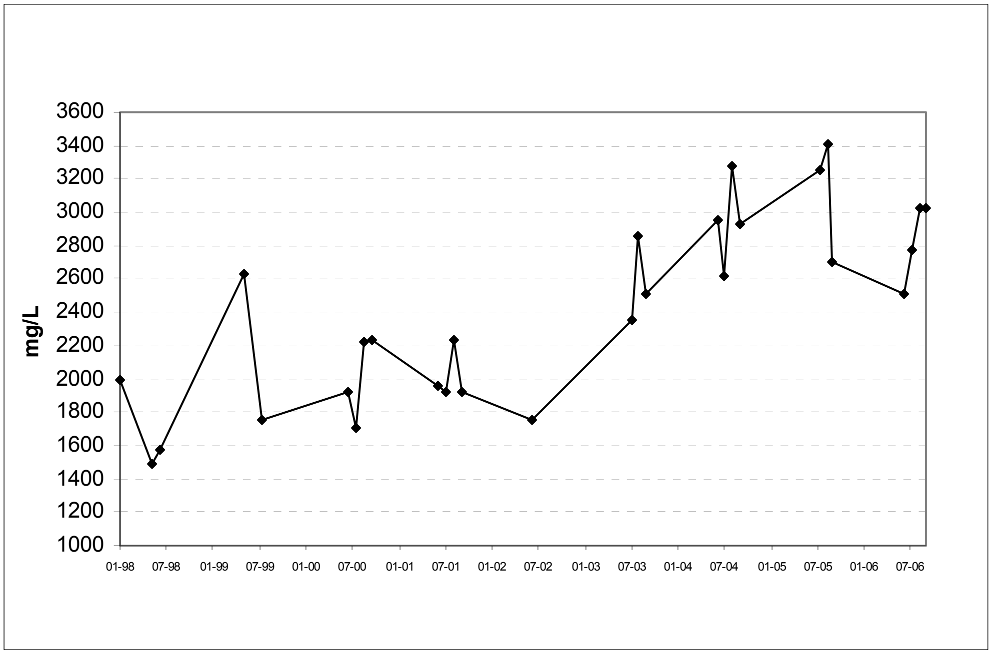
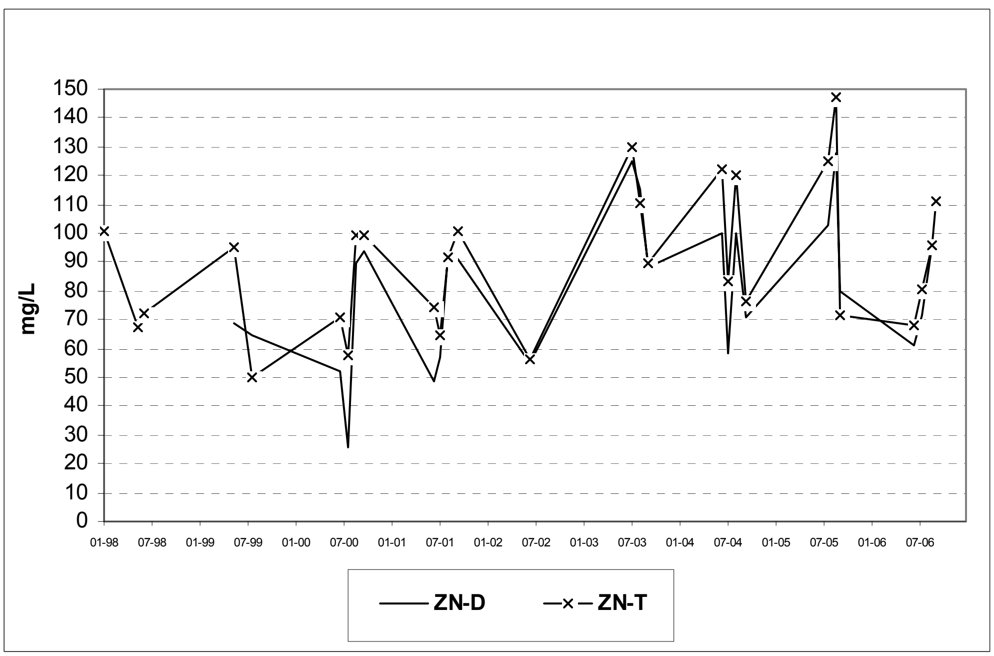


Figure 3-5. Zinc at X26



3.2.3 Rock Dumps

Old Faro Creek Channel

Surface seepage from the toe of the main rock dump area is sampled at location X23 located in the old Faro Creek channel where a large portion of the seepage from the Main and Intermediate rock dumps is assumed to collect. Water quality is typical of buffered acid rock drainage with elevated metals and sulphate at neutral pH. This water flows into the Intermediate Impoundment and receives treatment prior to discharge. New information regarding the possible loss of some portion of this water to the Rose Creek Valley Aquifer is being developed through studies that are currently underway for development of the FCRP. However, this information is in a preliminary state and not available for reporting at this time.

Twelve monthly samples were collected at location X23 in 2006. Sulphate concentrations were generally higher than the previous year, averaging 5,799 mg/L, continuing a generally increasing trend observed at this location since 1998 (Figure 3-6).

The concentrations of total and dissolved Zn at location X23 in 2006 ranged from 307 mg/L to 542 mg/L and 269 mg/L to 520 mg/L, respectively, with average concentrations of 385 mg/L and 347 mg/L, respectively. Zinc concentrations are comparable to those observed over the last two years, with maximum annual concentrations typically observed in the spring (Figure 3-7). Other metals including Cd, Cu, and Pb also peaked in 2006 during the spring (May) suggesting a possible seasonal trend.

Figure 3-6. Sulphate at X23

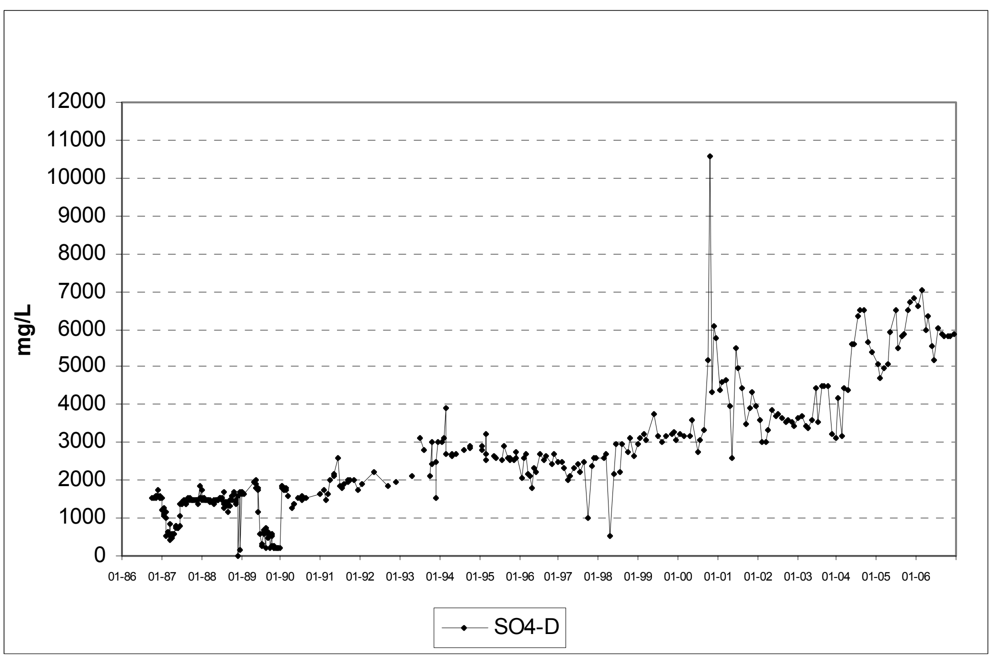
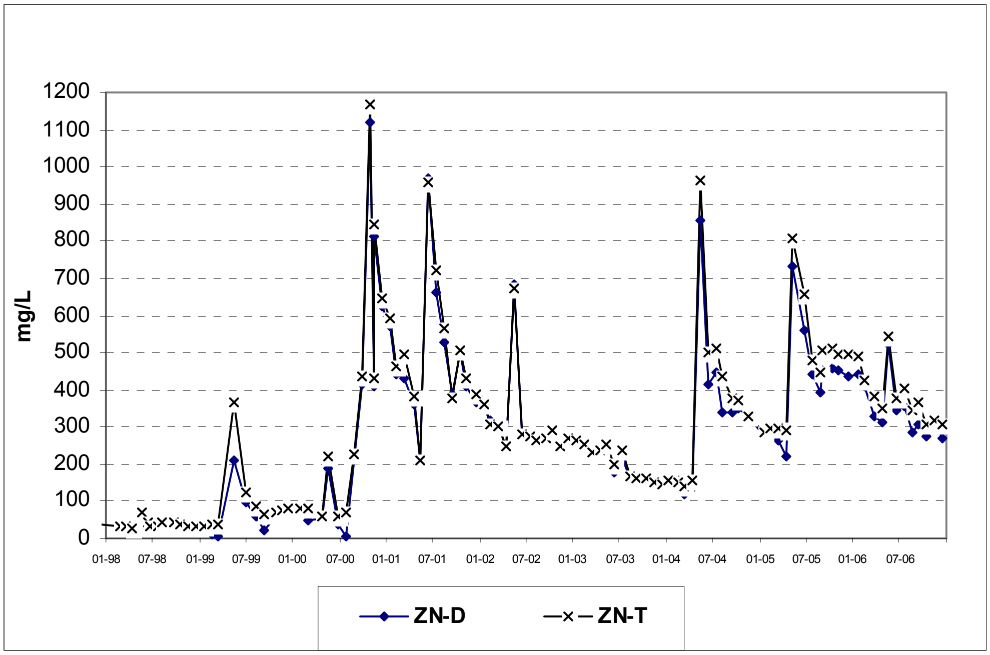


Figure 3-7. Zinc at X23

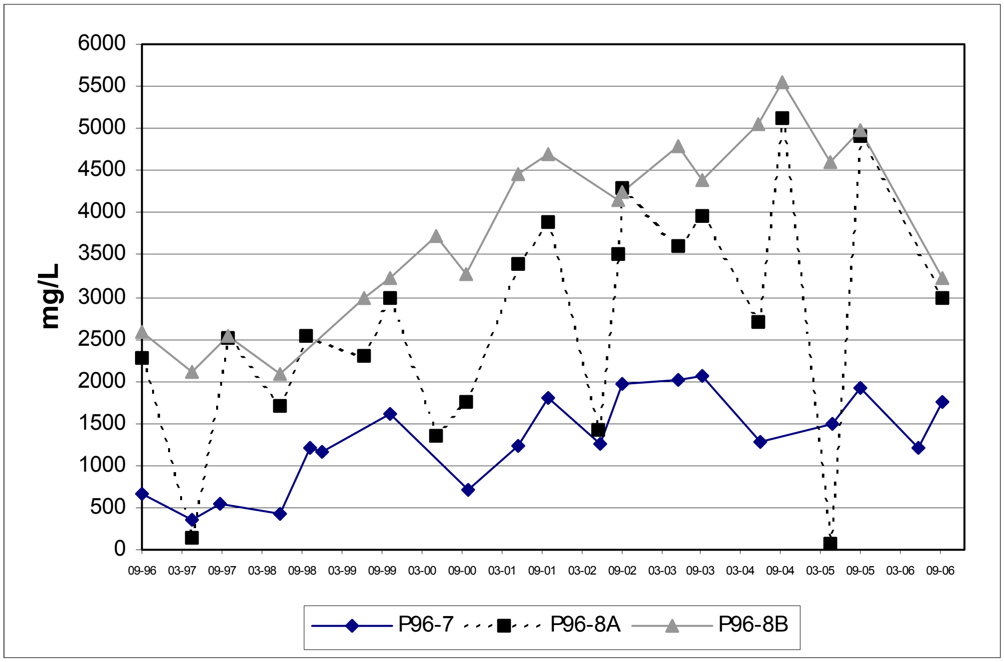


Groundwater: Main Rock Dumps

Well P96-7 is located at the central toe of the Main Waste Dump and wells P96-8A/B are located in the Old Faro Creek Channel adjacent to surface monitoring location X23. Well P96-7 was sampled in the spring and fall of 2006; wells P96-8A/B were sampled during the fall sampling event. Sulphate concentrations in all these wells were comparable to those observed at each location over the last five years, ranging from 1220 mg/L to 3220 mg/L (Figure 3-8). Groundwater within the Main Rock dump was slightly acidic in 2006, ranging from a pH of 6.5 to 7.33.

In 2006, dissolved Zn concentrations at location P96-7 ranged from 0.015 mg/L to 0.033 mg/L. In well P96-8A, the Zn concentration reported during the September sampling event (239 mg/L) is comparable to concentrations observed in recent years, however, the Zn concentration in well P96-8B (375mg/L) is the highest recorded to date at this location, continuing a previously established increasing trend observed at this site since sampling commenced.

Figure 3-8. Sulphate at P96-7, P96-8A and P96-8B



Groundwater: Intermediate Rock Dumps

Wells S1A/B, S2A/B and S3 are located at the toe of the Intermediate Rock Dumps just below the Vangorda haul road. P96-6 is located at the toe just above the Vangorda Haul road. All six sampling points were sampled twice in 2006, in June and September.

Sulphate concentrations in the shallower wells S1A, S2A and S3 ranged from 495 mg/L to 6280 mg/L whereas SO_4 concentrations in deeper wells S1B and S2B ranged from 471 mg/L to 3,230 mg/L. In the shallower wells S1A, S2A, and S3, dissolved Zn concentrations ranged from 142 mg/L to 295 mg/L, whereas Zn concentrations in deeper wells S1B and S2B ranged from 0.112 mg/L to 68.4 mg/L. Sulphate and Zn concentrations in shallower wells exhibit an overall increasing trend from about 2000 (Figures 3-9 and 3-10).

In 2006, the concentrations of SO_4 and Zn at location P96-6 were 268 mg/L and 298 mg/L, and were 0.219 mg/L to 0.84 mg/L, respectively. Both SO_4 and Zn concentrations remained consistent with previous years, with no apparent trends.

Figure 3-9. Sulphate Concentrations in Groundwater Wells S1A, S2A, and S3

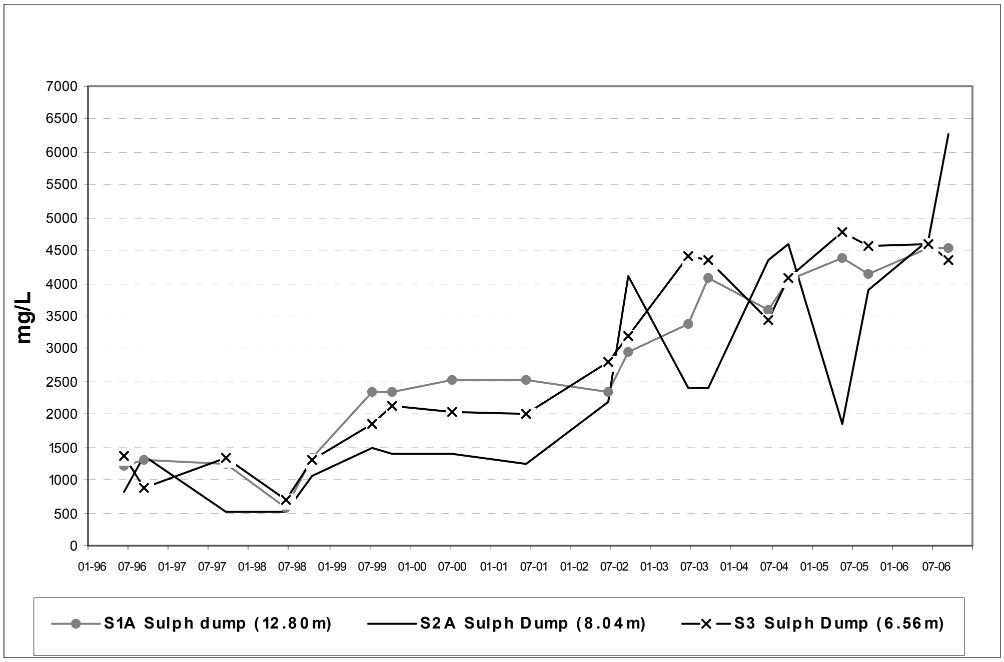
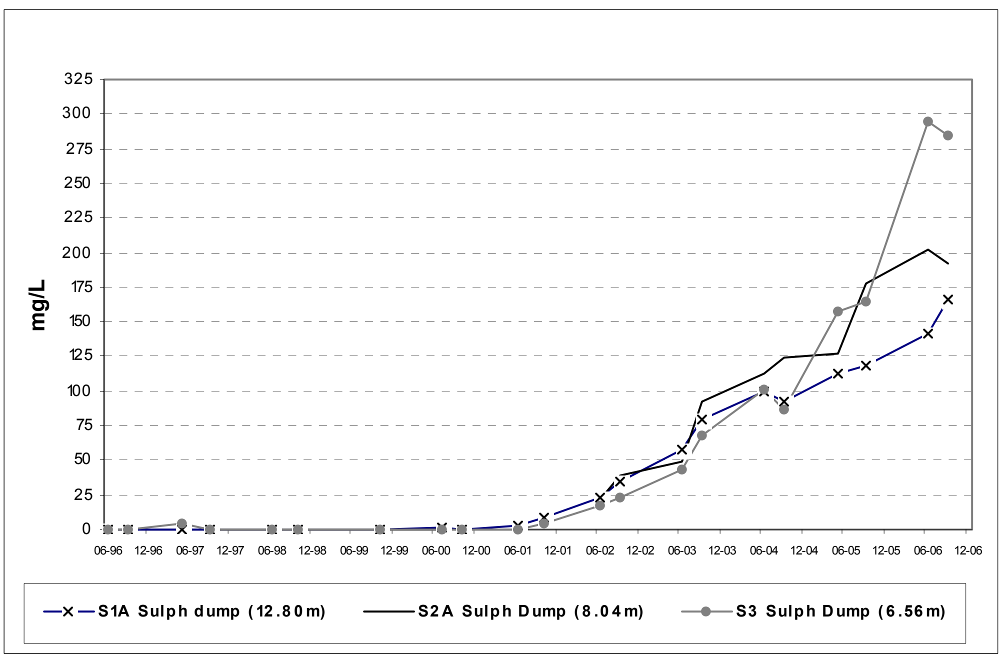


Figure 3-10. Zn in Groundwater Wells S1A, S2A and S3



Groundwater : Zone II Rock Dumps

Wells BH1, BH2 and BH4 are located at the base of the Zone II Rock Dumps. All three locations were sampled in June and September of 2006. Sulphate concentrations at these sampling points ranged from 23 mg/L to 261 mg/L and Zn concentrations ranged from 1.37 mg/L to 10.5 mg/L. In 2006, the highest SO_4 concentrations were observed at BH4, and the highest Zn concentrations were observed at BH2.

Groundwater: Northeast Rock Dumps

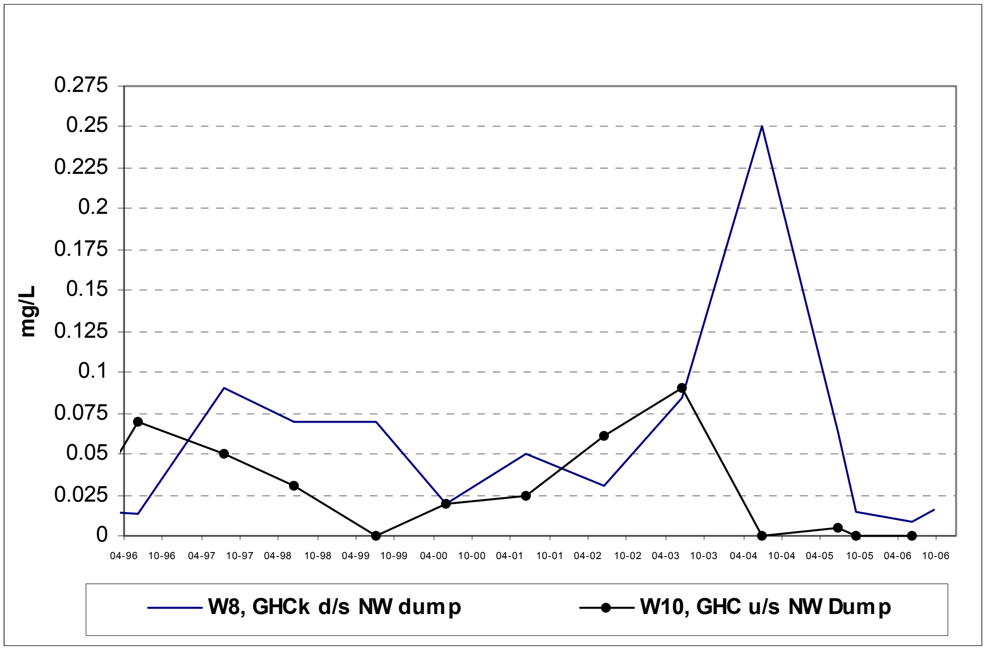
Wells BH12A/B, BH13A/B and BH14A/B are located at the base of the Zone II Rock Dumps. All locations were sampled in June and September of 2006, with the exception of B13A, which was sampled only on September. Sulphate and zinc concentrations at wells BH12A/B and BH13A/B were consistent with concentrations previously observed at this site, ranging from 133mgL to 584 mg/L, and from 0.011 mg/L to 0.683 mg/L, respectively. Well BH14A/B had SO_4 concentrations similar to those typically observed at this site, however, Zn concentrations were higher compared to historical data during the September sampling event, at 0.55 mg/L and 0.39 mg/L.

Miscellaneous Surface Seepages

Locations W10 and W8 are located in Upper Guardhouse Creek where it passes under the northwest corner of the Northwest Rock Dump. Location W10 is immediately upstream of the rock dump and location W8 is immediately downstream. Both seeps were sampled in June and September of 2006. Sulphate concentrations at these two locations are consistent with previous years, remaining relatively low in concentration at 3.01 mg/L to 5.57 mg/L. Total Zn concentrations at these two locations ranged from below the MDL (0.005 mg/L) to 0.018 mg/L, with greater concentrations observed at W8.

Location W5 is located at the toe of the Northeast Rock Dump. This site was sampled in September of 2006, with total and dissolved Zn concentrations of 2.33 mg/L and 2.24 mg/L, respectively. These concentrations are slightly higher than those typically observed during the fall sampling event at this site. Sulphate concentrations were comparable to recently collected data, at 346 mg/L.

Figure 3-11. Zn at W10 and W8



Locations NE1 and NE2 are located at two small intermittent surface flows below the toe of the Northeast rock dumps. Both locations were sampled in June and September 2006. The June and September SO_4 concentrations were 100 mg/L and 245 mg/L for NE1, and 927 mg/L and 445 mg/L for NE2. Total Zn concentrations were <0.005 mg/L and 0.011 mg/L for NE1, and <0.005 mg/L and 0.092 mg/L for NE2. Both SO_4 and Zn concentrations observed at NE1 and NE2 in 2006 are typical for these sites.

3.2.4 Rose Creek Tailings Facility

Intermediate Pond

The Intermediate Impoundment was used for tailings deposition from approximately 1986 to 1992. Following the cessation of tailings deposition into the Down Valley Tailings Facility in 1992 and until 1997, there was a general increase in the concentration of zinc in water flowing through the Intermediate Pond. This trend is attributed to:

1. Removal of a large inflow of alkalinity that previously entered the pond via the tailings slurry;
2. Continued inflow of contaminated water from the rock dumps (location X23) and plantsite (location GHSCK); and
3. Continued flushing of contaminants by run off over beached (exposed) tailings in the upstream portion of the Intermediate Impoundment.

Water treatment in the Down Valley was started in 1992 in order to ensure that surface outflow from the Cross Valley Pond met the maximum allowable discharge limits and the practice of treating outflow from the Intermediate Pond for the removal of zinc continued, on an as-required basis, through 2006. The methods employed for the treatment have involved raising the pH of the Intermediate Pond effluent with lime or sodium hydroxide and subsequently utilizing the Cross Valley Pond for settlement of the treatment sediments. The pH modification has been accomplished at various times by:

- hauling lime slurry mixed in the mill to a gravity feed tank for addition into the outflow spillway;
- delivering lime slurry mixed in the mill to the outflow spillway via an overland pipeline;
- hauling lime slurry mixed in the Grum/Vangorda water treatment plant to the south abutment of the dam for addition into a syphon line;
- adding sodium hydroxide into a syphon line at the south abutment; and
- inflow into the upstream end of the Intermediate pond of water pumped from the Faro Main pit that was pre-treated with lime at the mill.

From 1998 to 2000, the Intermediate Pond received inflow of treated water pumped from the Faro Main pit on a seasonal basis. This periodic inflow of a relatively high volume of high pH water resulted in a general improvement in pond water quality. The method for treatment of water pumped from the Faro Main pit was improved in 2001 by construction and activation of a new treatment system in the mill that utilizes certain fixed equipment for lime treatment and settlement of sediments. Compliant effluent from the mill was delivered into the Intermediate Pond spillway from 2001 through 2005 (i.e. bypassing the Intermediate Pond), which resulted in an apparent negative impact on water quality in the Intermediate Pond due to the removal of the periodic inflow of high pH (treated) water.

Water is syphoned from the Intermediate Pond at the outflow spillway. This maintains the pond water level below the overflow spillway and provides additional safety freeboard. The water is syphoned directly into a mixing tank where lime slurry is added. In 2005, an outflow pipeline was installed which delivers water from the mixing box directly into the Cross Valley Pond at the base of the inflow spillway, where settlement of treatment sediments occurs. The "Down Valley" water treatment system is described in section 5.

Water quality in the Intermediate Pond is monitored at location X4, which is outflow from the pond at the outflow spillway. Outflow in 2006 was exclusively via syphon (i.e. no overflow). Twelve monthly samples were collected in 2006, representing Licence monitoring requirements during periods of outflow, as well as water quality monitoring when no outflow was occurring for site management purposes. IN early 2006, non-compliant water was pumped from the Cross Valley Pond into the Intermediate Pond so that the water would receive treatment prior to release. This is described in Section 2.1.4.

Zinc and sulphate levels in 2006 were generally similar to 2004 and not as high as observed in 2005. Similarly, pH was not as low in 2006 as was observed in 2005. The May 2006 sample returned very low metal concentrations, as been observed for a single spring sample in previous years. This may be due to ice melt affecting the local sampling site for a brief period.

Sulphate concentrations at the Intermediate Pond at ranged from 21.8 mg/L to 1,100 mg/L in 2006, with an average over the year of 831 mg/L. Sulphate concentrations remained relatively consistent from 1998 to 2003, followed by an increasing trend through 2004 and 2005 (Figure 3-12). Sulphate concentrations in 2006 are comparable to those observed in 2005.

The concentrations of total and dissolved Zn at location X4 ranged from 0.54 mg/L to 21.8 mg/L and from 0.49 mg/L to 20.8 mg/L, respectively, with average concentrations of 16.2 mg/L and 15.1 mg/L, respectively. Zinc concentrations within the Intermediate Pond in 2006 were less than the previous year (Figure 3-13).

Since 2002, iron (Fe) concentrations in the Intermediate Pond have followed a seasonal trend with maximum concentrations observed during the winter months and minimum concentrations observed during the summer months. Prior to 2002, Fe concentrations at X4 ranged from <0.01mg/L to 5.48 mg/L. Total and dissolved iron concentrations in 2006 are consistent with those typically observed at this site over the last four years, ranging from 0.15 mg/L to 45.7 mg/L and 0.05 mg/L to 31.5 mg/L, respectively (Figure 3-15).

PH values at location X4 were relatively consistent throughout 2006, ranging from 6.5 to 8.3 (Figure 3-12).

Figure 3-12. Sulphate at X4

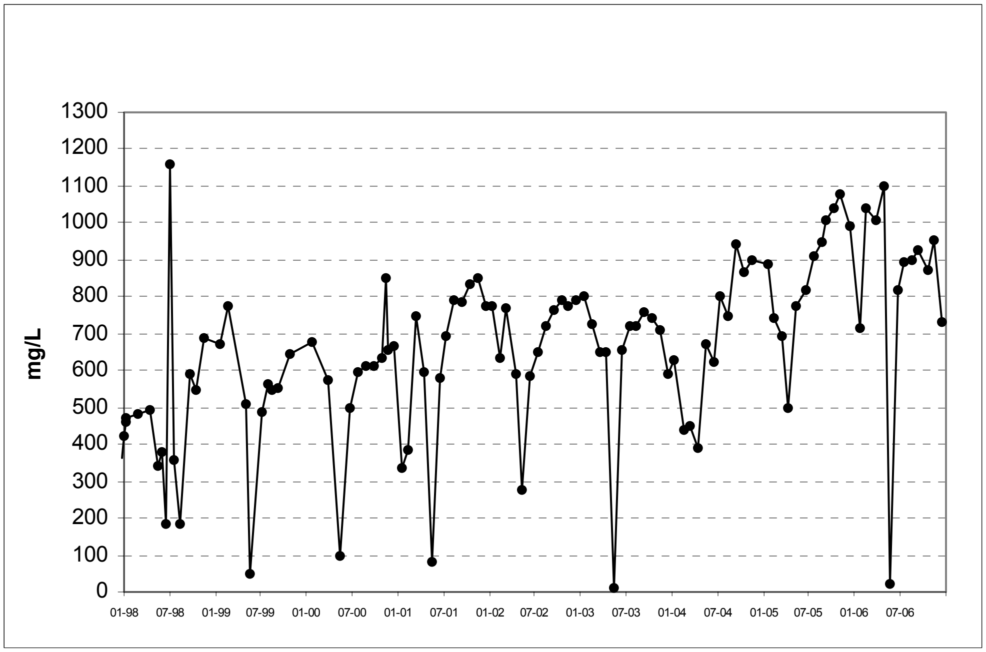


Figure 3-13. Zinc at X4

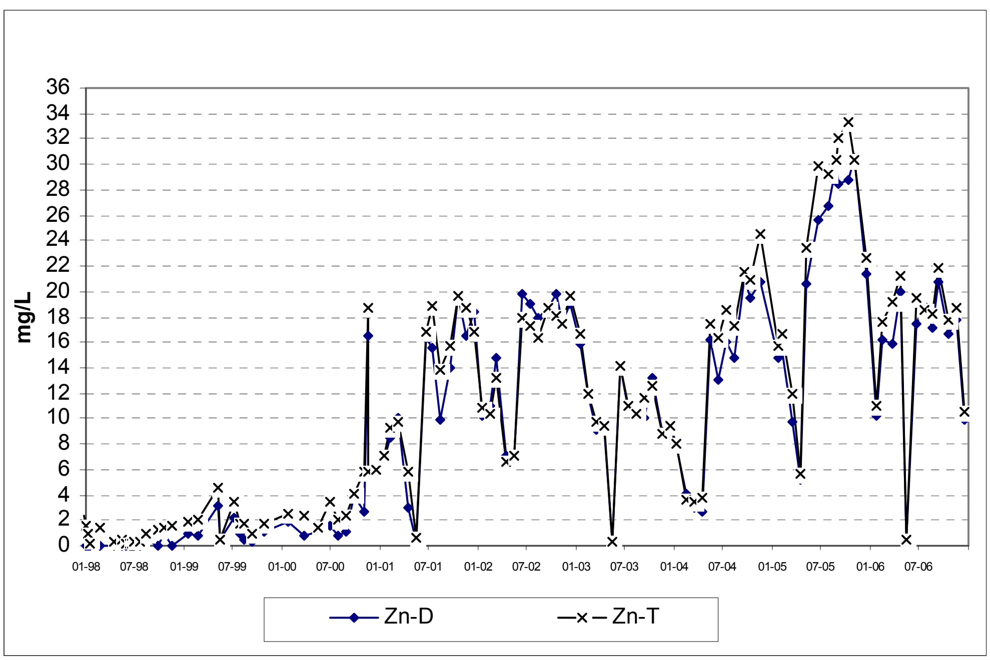


Figure 3-14. Iron at X4

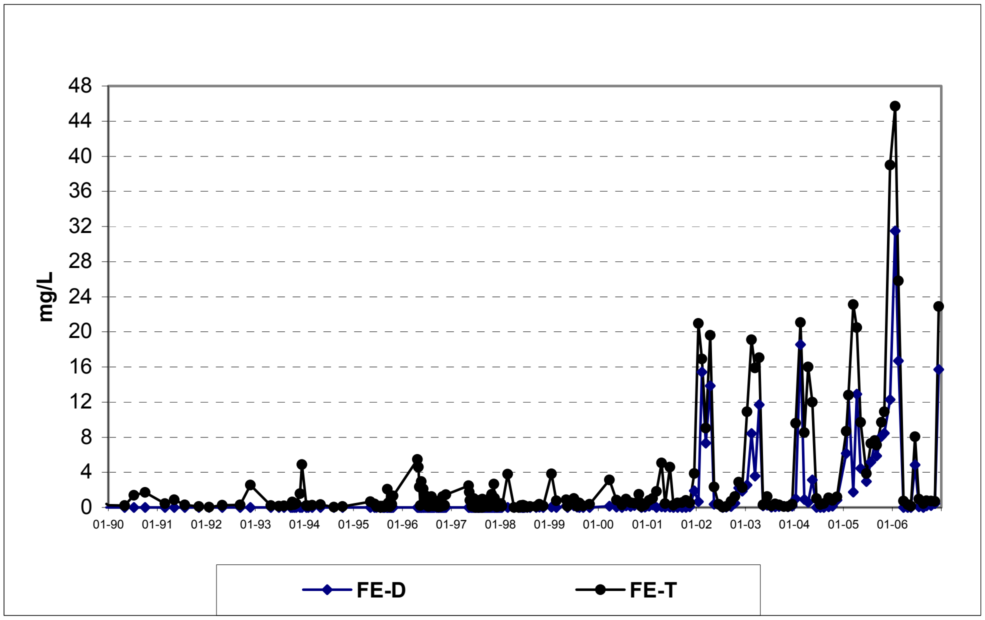
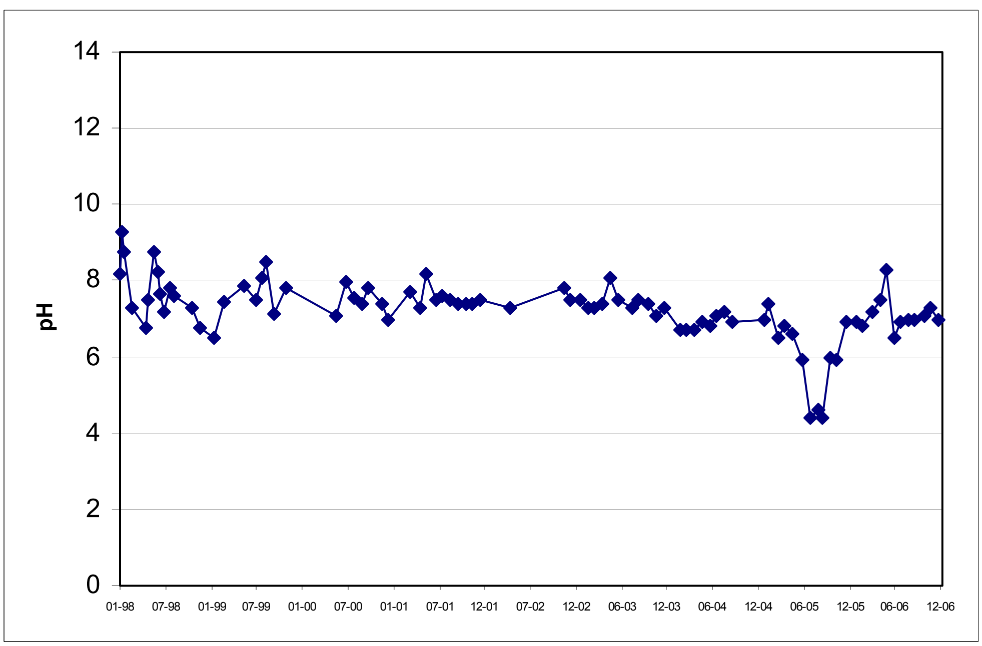


Figure 3-15. PH at X4



Groundwater

Groundwater wells in the Rose Creek Tailings Facility and the underlying native soils (i.e., the aquifer) were sampled twice in 2006, in June and September. Additional sampling of certain wells was conducted in July and August as part of the Adaptive Management Plan (Section 9.8). The nested wells at location X24 (toe of the Intermediate Dam) have been identified as requiring special investigation during 2007 to determine their reliability. Results from these wells have been highlighted to be used with caution in the interim.

Comprehensive studies of groundwater quality within the aquifer underlying the tailings impoundments are underway for development of the FCRP. However, this information is not available for reporting at this time.

The groundwater monitoring wells located at the toe of the Intermediate Dam report generally lower SO_4 and Zn levels than those wells located upgradient, in and under the tailings facility. The SO_4 concentrations at the toe of the Intermediate Dam in 2006 ranged from 34 mg/L to 1570 mg/L and Zn concentrations ranged from <0.005 mg/L to 0.0175 mg/L. Sulphate concentrations on the north side of the valley continued to be higher than in the south and central areas of the valley.

Miscellaneous Surface Seepages

Location X7 is a subsurface seep that emerges to surface just below the mine access road in the old Faro Creek channel. This seep was sampled in June and September of 2006, with SO_4 concentrations of 7220 mg/L and 8250 mg/L, total Zn concentrations of 348 mg/L and 365 mg/L, and a pH of 5.7 for both sampling events.

Lower Guardhouse Creek receives runoff from some areas of the plant site and flows into the Intermediate Impoundment. Lower Guard House Creek is sampled along the lower reaches, immediately upstream of the Intermediate Impoundment, at location GHSCR1. Water chemistry results, including SO_4 and Zn concentrations have remained relatively consistent at this station since 2001.

3.3 Water Quality Entering Rose Creek

3.3.1 Effluent Discharge

The effluent discharge location is surface outflow from the Cross Valley Pond (location X5). The Water Licence requires X5 to be sampled weekly when discharging and X5P (a surface grab of the Cross Valley Pond) to be sampled monthly when there is no discharge.

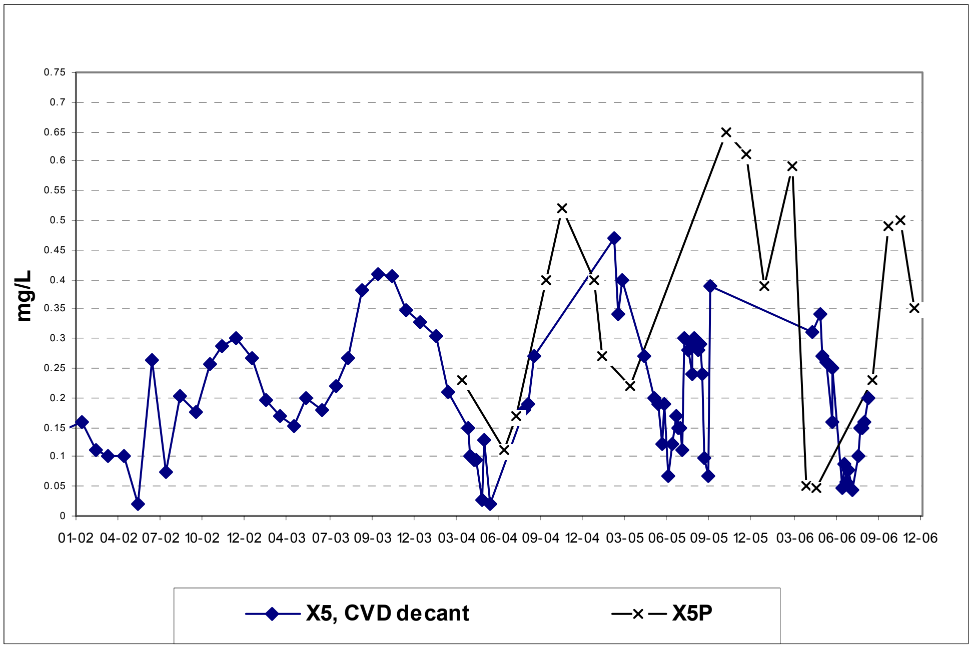
The Down Valley and Mill water treatment systems were successfully operated in 2006 as described in Sections 5.2 and 5.3. The treatment systems and the "polishing" action of the Cross Valley Pond were effective in maintaining compliance with the effluent discharge criteria for water released via location X5. The periods and volumes of effluent release are described in Section 2.

During periods of discharge, total and dissolved Zn released to Rose Creek at location X5 ranged from 0.045 mg/L to 0.34 mg/L and from <0.005 mg/L to 0.32 mg/L, respectively (Figure 3-16). Since 2001, zinc concentrations have remained below the allowable discharge limits, primarily due to the implementation the mill treatment system, which significantly increased treatment efficiency compared treatment methods employed prior to 2001. Licence discharge standards were also met for all other licenced parameters at location X5 in 2006.

In addition to the chemical analyses at the external laboratory, frequent in-house analyses for total zinc were performed on-site to provide site management with an immediate indication of effluent quality. This was appropriate because site-specific experience has shown that total zinc is the critical parameter for achieving compliance. The in-house analyses utilized professional level AA (atomic absorption) equipment operated by trained assayers. In-House analyses for zinc were conducted on a routine daily or more frequent basis during periods of discharge in 2006. The individual results are available at the mine site and were available for review by Water Resources personnel during site visits.

In 2006, three samples were collected at X5/X5P for acute lethality testing using rainbow trout (96-hour LC_{50}). The bioassay sample collected in December was re-sampled in early January due to sampling-handling issues upon arrival to the off site laboratory. All tests passed by >100%, with no mortalities. The December test was conducted on water collected from the Cross Valley Pond, location X5P, as no water was being discharged at that time at location X5.

Figure 3-16. Zinc at X5/X5P



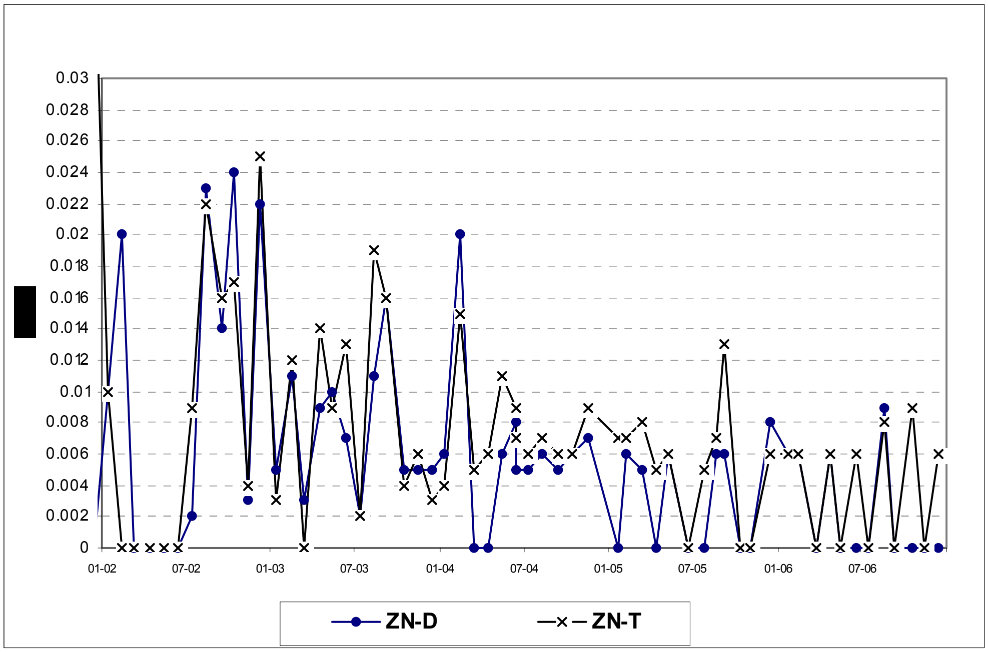
3.3.2 Cross Valley Dam Seepage

Seepage from the Cross Valley Dam is monitored just downgradient of the toe at location X13. There are three individual seepages that report to location X13, which are locations X11, X12 and WEIR3. Location X11 is the primary seepage stream and collects seepage from the north abutment of the Cross Valley Dam and is suspected to also have collected some seepage from the Cross Valley Dam spillway during periods when there was overflow from the pond. Location X12 collects seepage from the south abutment of the Cross Valley dam. Location WEIR3 collects seepage from the central area between locations X11 and X12.

Flow information at these locations and the implications with regards to the geotechnical performance of the Cross Valley Dam are described in the accompanying geotechnical inspection report prepared by BGC Engineering Inc.

In 2006, twelve monthly samples of the Cross Valley Dam seepage discharge (X13) were collected and analysed. Water quality was within the maximum allowable discharge limits throughout 2006. Total Zn concentrations ranged from below the minimum detection limit to 0.009 mg/L (Figure 3-17). Sulphate concentrations ranged from 595 mg/L to 826 mg/L, with an average concentration of 732 mg/L for the year. Both SO_4 and Zn concentrations observed in 2006 are consisted with previous monitoring results.

Figure 3-17. Zn at X13



Routine quarterly bioassay samples for acute lethality testing using rainbow trout (96-hour LC_{50}) were collected in March, June, September and December of 2006 at location X13. Due to sampling handling issues up on arrival to the laboratory in December, location X13 was re-sampled in early January 2007. All tests passed (less than 50% mortality in 100% concentration over 96 hours) and three of the tests had no mortalities.

Locations X11, X12 and WEIR3 were sampled in February and August of 2006. Water quality at X11 in 2006 is typical for this site, with SO_4 concentrations of 1050 mg/L and 1080 mg/L and a total zinc concentration of 0.006 mg/L for both sampling events. At location X12, Zn concentrations were below detection limit and SO_4 concentrations were 514 mg/L and 399 mg/L. Sulphate concentrations at WEIR3 were slightly higher than those recorded in the past 10 years, at 609 mg/L and 650 mg/L. Total Zn was below detection limit at location WEIR3 for both sampling events in 2006. Most other contaminant concentrations were below detection limit in the three Cross Valley Dam seepage locations.

3.3.3 Faro Creek Diversion

The Faro Creek Diversion passes clean water from the Old Faro Creek channel around the northeast side of the Main Pit and into the North Fork of Rose Creek. The upper portion of the Faro Creek Diversion (location FDU) was sampled in the June and September of 2006. Sulphate concentrations at these stations remained very low (1.13 mg/L and 1.97 mg/L), and most contaminant concentrations were below MDL's, including Zn. The mid-section of the Faro Creek Diversion (location FDL) was sampled twice in 2006, in June and September. Sulphate concentrations also remained very low at this location in the diversion channel, at 1.66 mg/L and 2.3 mg/L. Total zinc concentrations were below MDL for both sampling events.

The outfall of the Faro Creek Diversion into the North Fork of Rose Creek was sampled monthly from April to October in 2006 at location FAROCR. In 2006, concentrations of SO_4 were similar to those observed in previous years, with the exception of the April sampling event, which was the highest recorded at this location since sampling commenced at 39.8 mg/L. Sulphate concentrations returned to typical values (for this site) by the next sampling event in May. Total Zn concentrations ranged from 0.008 mg/L to 0.11 mg/L, with an average concentration of 0.031 mg/L. Maximum zinc concentrations at this site are typically associated with spring conditions.

3.3.4 Groundwater

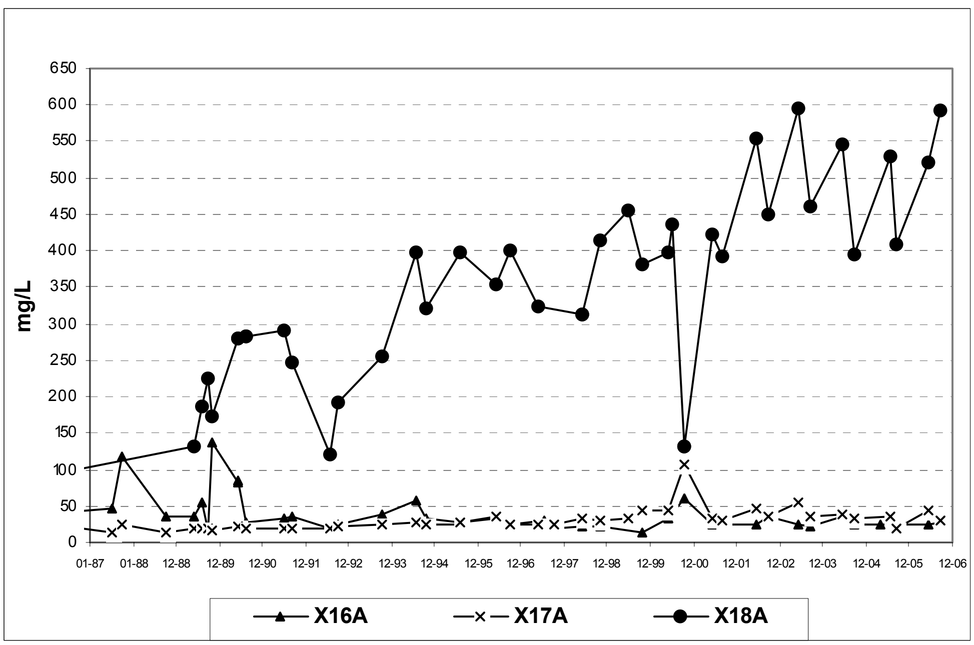
Groundwater quality is monitored below the Cross Valley Dam. Some portion of the monitored groundwater is thought to discharge to surface and enter Rose Creek in the general vicinity of Rose Creek sampling location X14 and some portion is thought to remain in the aquifer as groundwater flow. New information on this topic is being developed through the studies that are underway for development of the FCRP. However, the information is in a preliminary state and not available for reporting at this time.

The groundwater monitoring wells downgradient of the Cross Valley Dam were monitored twice in 2006, in June and September. This included locations X16A/B, X17A/B, X18A/B, P01-01, P01-02, and P01-11. Both SO_4 and Zn concentrations observed in these wells generally fall within ranges typically observed at these locations. The ranges of SO_4 and Zn in 2006 are listed in Table 3-1. Sulphate concentrations continue to decrease with increasing distance downgradient of the tailings facility. Sulphate concentrations on the north side of the valley (X18, P01-01) continue to be higher than in the south and central areas of the valley. This is illustrated for shallower wells X16A, X17A and X18A on Figure 3-18.

Table 3-1. Summary SO_4 and Zn Concentrations in Groundwater Downgradient of the CrossValley Dam (2006)

Well	Max SO_4 (mg/L)	Min SO_4 (mg/L)	Max Dissolved Zn (mg/L)	Min Dissolved Zn (mg/L)
P01-11	983	941	0.005	0.064
X18A/B	604	521	0.149	<0.0025
X17A/B	111	30	0.0201	0.0058
P01-01 A/B	617	289	0.062	<0.01
X16 A/B	28.7	22.1	0.0143	<0.005
P01-02 A/B	94.4	124	0.0056	<0.005

Figure 3-18. SO_4 at X16A, X17A, and X18A



3.4 Receiving and Background Water Quality

3.4.1 North Fork of Rose Creek

There are seven locations in the North Fork of Rose Creek that are monitored regularly: R7, R8, R9, R10, NF1, NF2, and X2. Location R7 is located upstream of the confluence with the Faro Creek diversion and is representative of background reference conditions in the North Fork area. Location R8 is located downstream of the confluence of the North Fork with the Faro Creek diversion and upstream of the Zone II pit area. Location R9 is located approximately adjacent to the area of the Zone II pit. Location R10 is located just downstream of the Zone II pit area. Locations NF1 and NF2 are located immediately upstream and downstream, respectively, of the rock drain in the Vangorda haul road. Location X2 is located at the crossing of the mine access road downstream of the rock drain and the rock dumps. The above locations are sampled monthly with the exception of NF1 and NF2, which are sampled twice yearly, in the spring and fall.

In 2006, water quality at location R7 was within normal ranges typically observed at this location. Total Zn concentrations ranged from below MDL to 0.01 mg/L and SO_4 ranged from 2.14 mg/L to 11.2 mg/L. Most parameters were below the minimum detection limits throughout 2006.

A comparison of water quality at locations R7, R8, R9, R10 and X2 suggests that SO_4 and Zn concentrations undergo a general increase along the North Fork from R7 to X2. Figures 3-19 and 3-20 illustrate this trend for SO_4 and Zn, respectively. Between R7 and R10, along the North Rock Dump and the Zone II area, SO_4 concentrations increase, most notable during winter baseflow periods. A more significant increase in SO_4 is apparent between stations R10 and X2, along the Main/Intermediate Rock Dump area. New information on this topic is being developed through studies that are underway for development of the FCRP; however this information is not available for reporting at this time. Comparison of 2006 Rose Creek water quality to previous sampling years suggests no apparent temporal trends within each sampling location.

Stations R8, R9, R10 and X2 exhibited peaks in Fe and Pb during the month of May in 2006, similar to those observed in 2005.

Figure 3-19. Sulphate at R7, R10, and X2

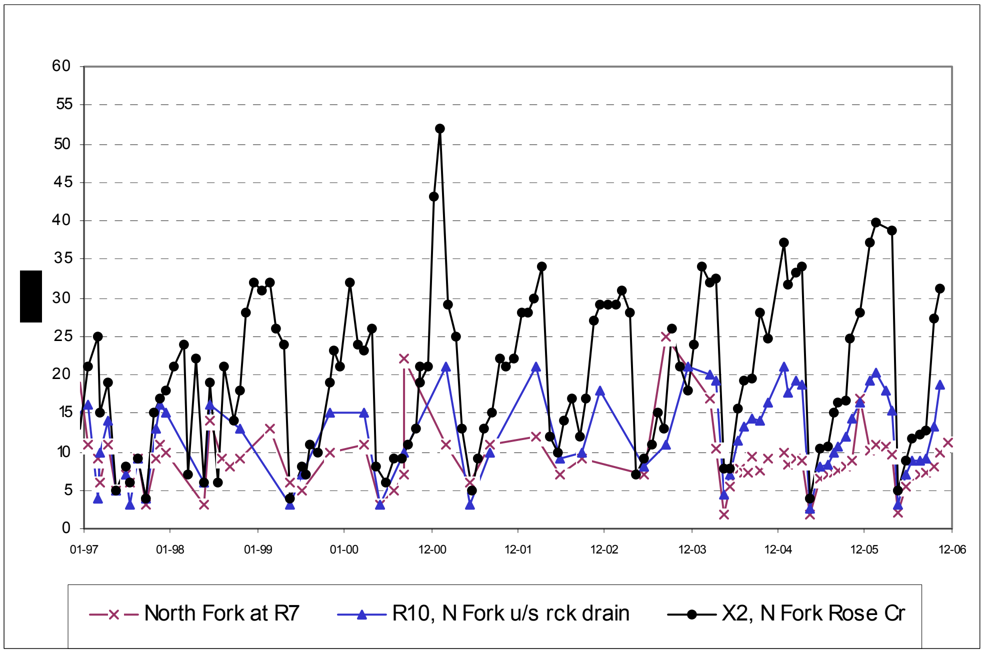
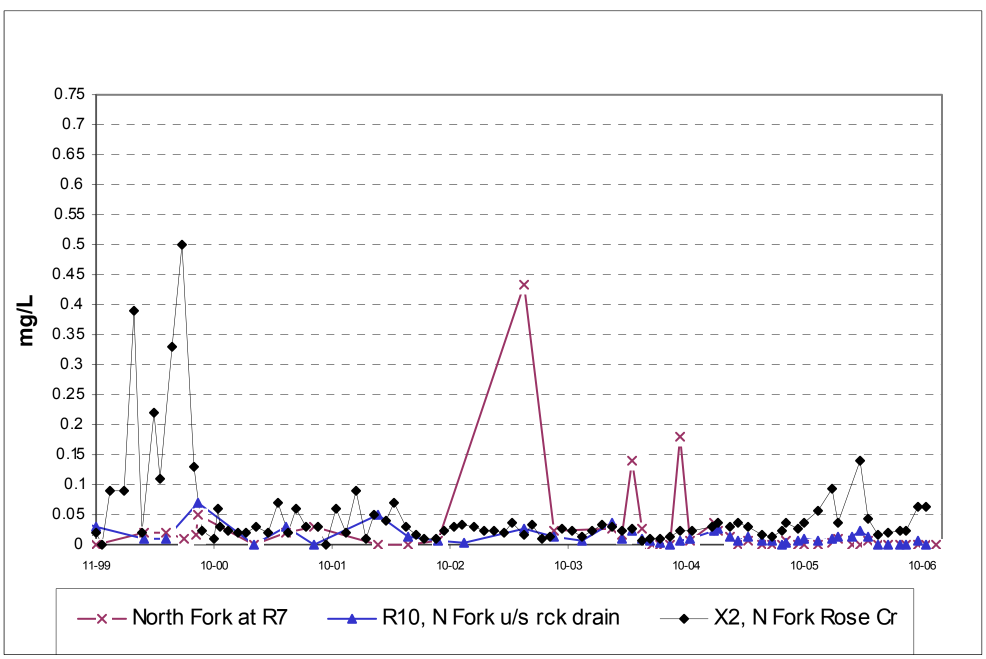


Figure 3-20. Zinc at R7, R10 and X2



A statistical analysis was performed on water quality data from location X2 for SO_4 and Zn for the period of 1996 to present. The objective of the analysis was to determine if there are any trends in the data at X2, particularly in the winter baseflow period. The preliminary analysis revealed that both SO_4 and Zn exhibit seasonal variability with higher concentrations observed in the winter season. This corresponds to the low flow period when groundwater inflows represent a greater portion of the creek flow. Conversely, groundwater influences can be masked in spring, summer and fall by surface water inflows. The analysis also indicated that SO_4 concentrations during the winter months are showing a statistically significant increasing trend (Figure 3-21). Zinc concentrations do not show a statistically significant increasing trend (Figure 3-22). The source of the sulphate and zinc that is observed, primarily during winter baseflow periods, may be groundwater seepage from the Intermediate Rock Dumps. New information on this topic is being developed through the studies that are being undertaken for development of the FCRP. However, this information is in a preliminary state and is not available for reporting at this time.

Figure 3-21. Winter Baseflow Sulphate at X2

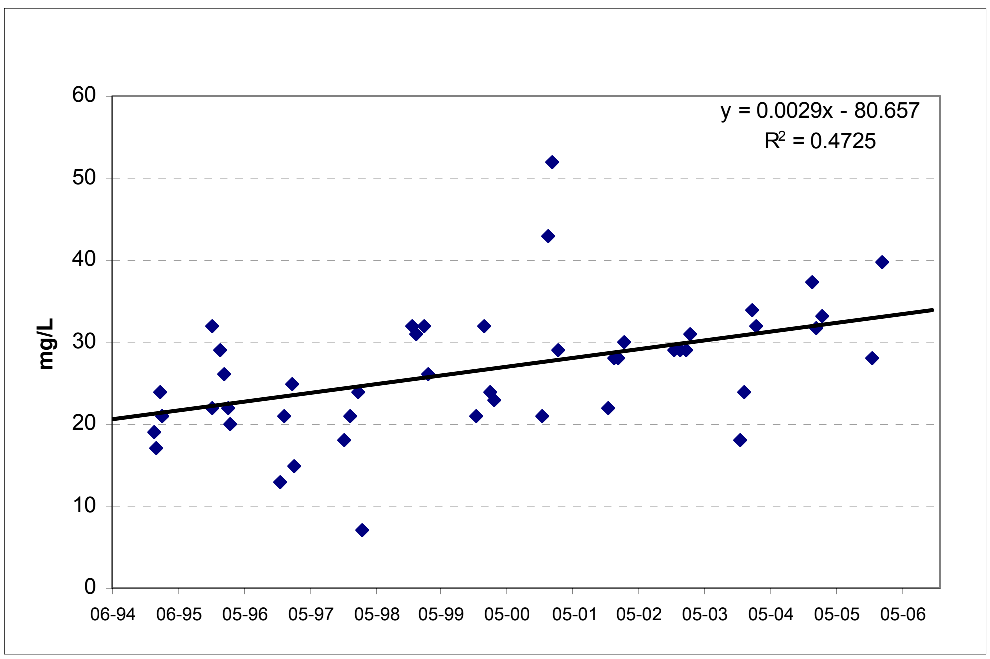
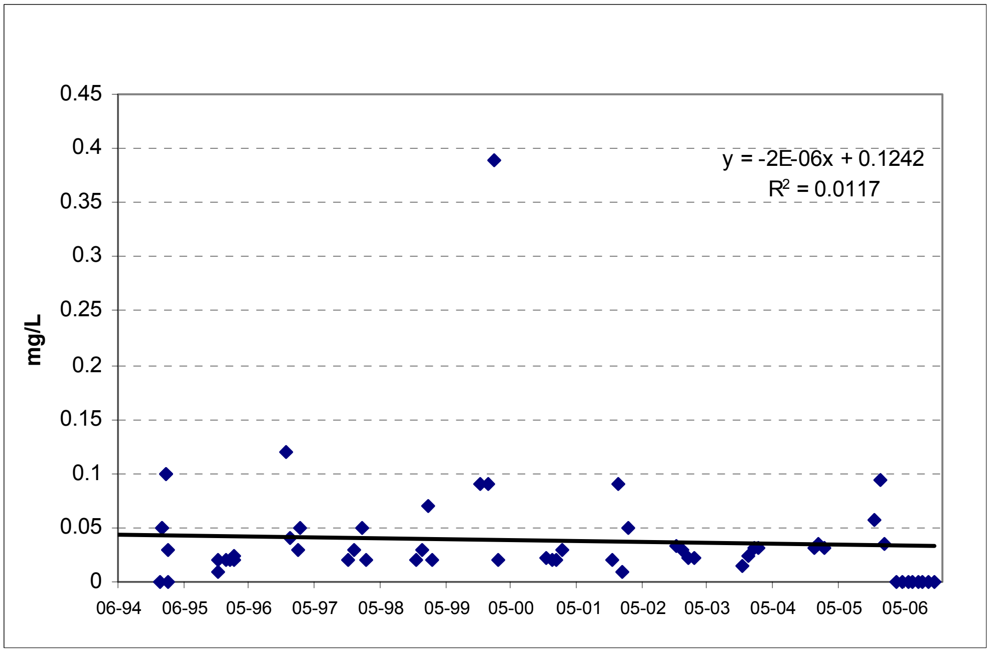


Figure 3-22. Winter Baseflow Zinc at X2



3.4.2 South Fork of Rose Creek

Location Grum Corner (also know as “GCULV”) is the South Fork of Rose Creek at the mine access road crossing. Location K8 is a tributary to the South Fork in the area of the former freshwater reservoir. These locations are sampled on a monthly basis. Location K8 was not sampled in December due to frozen (no flow) conditions. Sulphate concentrations at these two sites remained very low throughout 2006, ranging from 3.57 mg/L to 15.2 mg/L. Total zinc concentrations ranged from below MDL to 0.008 mg/L. Water quality results were forwarded directly to the Ross River Dena Council and to their technical consultant by the Interim Receiver on a monthly basis, as agreed through the Water Licence renewal process.

Location R1 is in the South Fork of Rose Creek below the previous freshwater reservoir area and upstream of the tailings impoundment area. This location was sampled twice in 2006, in February and August. The concentrations of SO_4 were 30 mg/L and 18 mg/L. The concentrations of total Zn were below detection for both sampling events.

3.4.3 Rose Creek Diversion Channel

Rose Creek is monitored at the upstream and downstream extents of the constructed diversion channel that passes Rose Creek around the Rose Creek tailings facility at locations X3 and X10, respectively. Twelve samples (monthly) were collected at each location in 2006.

Location X3 is located at the outflow from the pumphouse pond. The water monitored at location X3 includes all flow from the South Fork of Rose Creek and a majority of the flow from the North Fork of Rose Creek via location X2. A small portion of the flow from the North Fork of Rose Creek bypasses the pumphouse pond during high flow events via a secondary diversion channel that was constructed in previous years. This "bypass" flow enters the Rose Creek diversion channel immediately downstream of the pumphouse pond.

In 2006, SO_4 concentrations at location X3 ranged from 6.1 mg/L to 44.6 mg/L, with an average of 23.8 mg/L. Zinc concentrations at this site followed previously established trends, with maximum concentrations observed during the spring, however, zinc concentrations observed during March and April in 2006 were elevated in comparison to other years, at 0.12 and 0.11 mg/L total zinc, respectively. Zinc concentrations returned to typical concentrations by the next sampling event in May. The average total and dissolved zinc concentrations at location X3 in 2006 were 0.041 mg/L and 0.038 mg/L, respectively.

Location X10 is located near the downstream extent of the Rose Creek diversion channel adjacent to piezometer X16. Total Zn at location X10 ranged from 0.011 mg/L to 0.10 mg/L, with the maximum concentration observed in December being slightly higher than previous years. Sulphate concentrations remain within typical ranges, at 6.39 mg/L to 45.8 mg/L.

Trends in Zn and SO_4 concentrations at location X2, X3, and X10 generally mirror one another, with seasonal fluctuations of both constituents represented by higher concentrations observed during winter months (Figures 3-23 and 3-24). Iron and Pb peaked in concentration at all three stations during the month of May.

Figure 3-23. Sulphate at X2, X3, X10

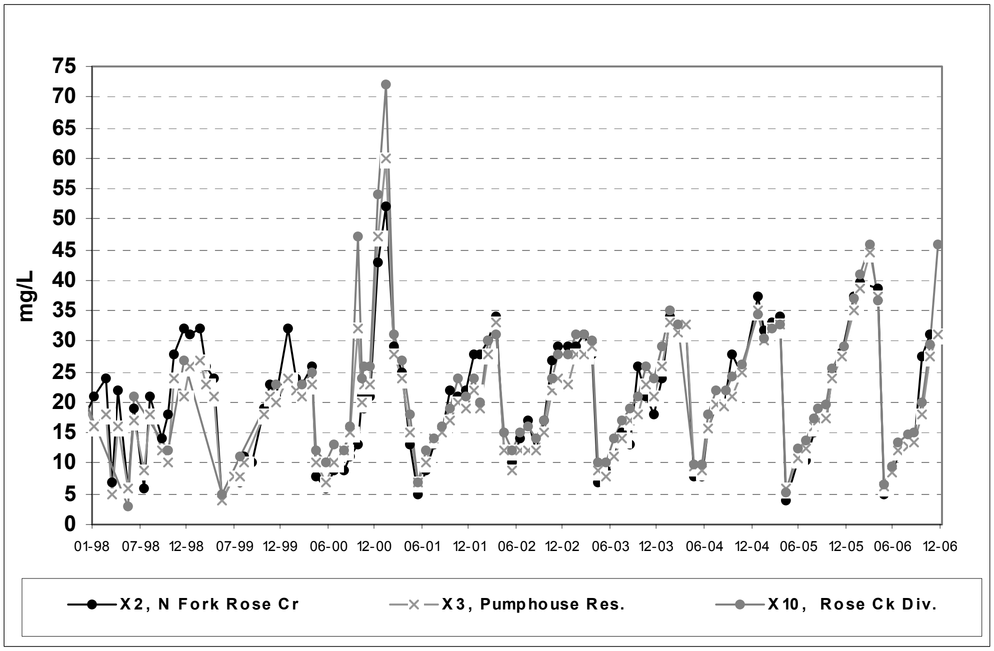
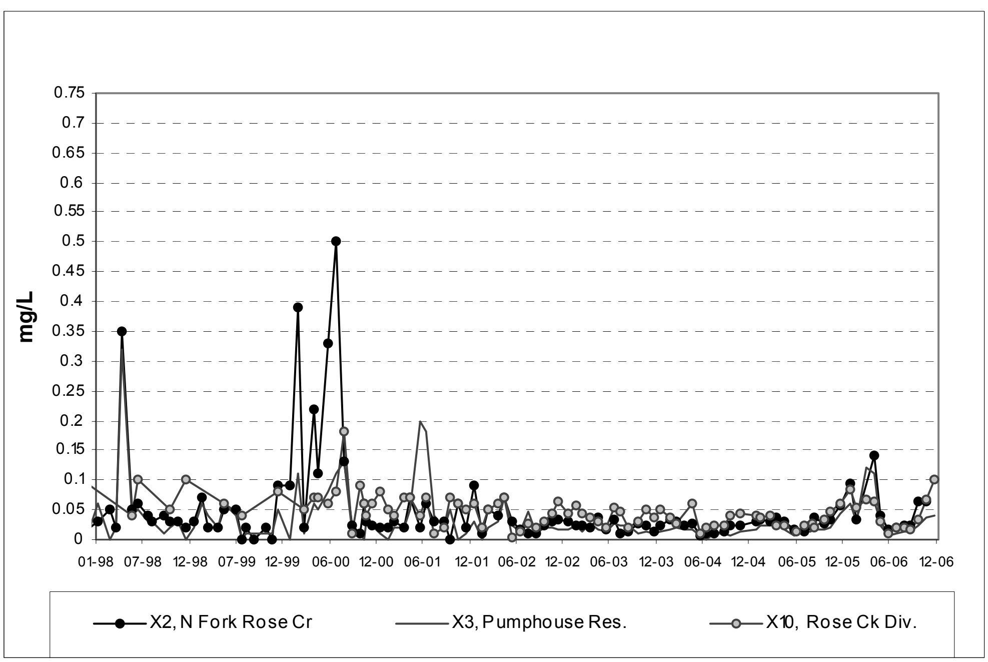


Figure 3-24. Zinc at X2, X3, and X10



3.4.4 Rose Creek Immediately Downstream of the Mine Area

Rose Creek immediately downstream of the confluence with effluent discharges (locations X5 and X13) is monitored at location X14. The Licence requires that X14 be sampled monthly, or weekly when effluent is being released via location X5. Water chemistry at location X14 has typically shown the influence of effluent discharge through elevated concentrations of SO_4 and total Zn that have been elevated in concert with periods of effluent discharge. In 2006, the highest concentrations of SO_4 and Zn were observed during spring, corresponding to effluent released from the Cross Valley Pond.

Water quality at location X14 in 2006 was similar to that observed in recent years at this site. Sulphate concentrations ranged from 17 mg/L to 339 mg/L (Figure 3-25) and total Zn concentrations ranged from 0.016 mg/L to 0.17 mg/L (Figure 3-26). Iron and Pb concentrations at this site exhibited a peak in May, similar to those observed in the Rose Creek Diversion Channel and the North Fork of Rose Creek.

Figure 3-25. Sulphate at X14

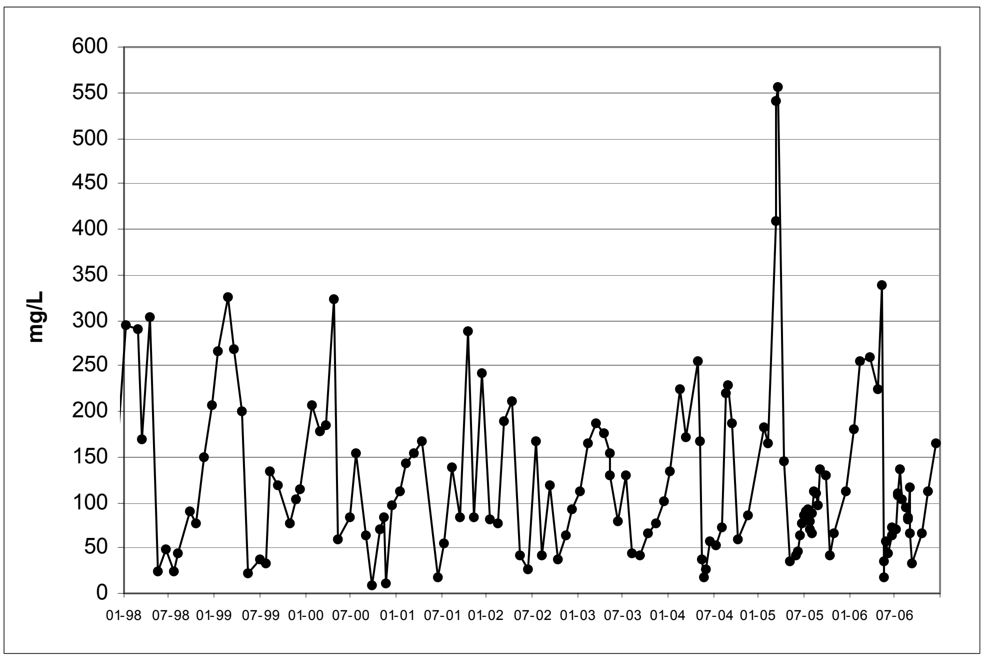
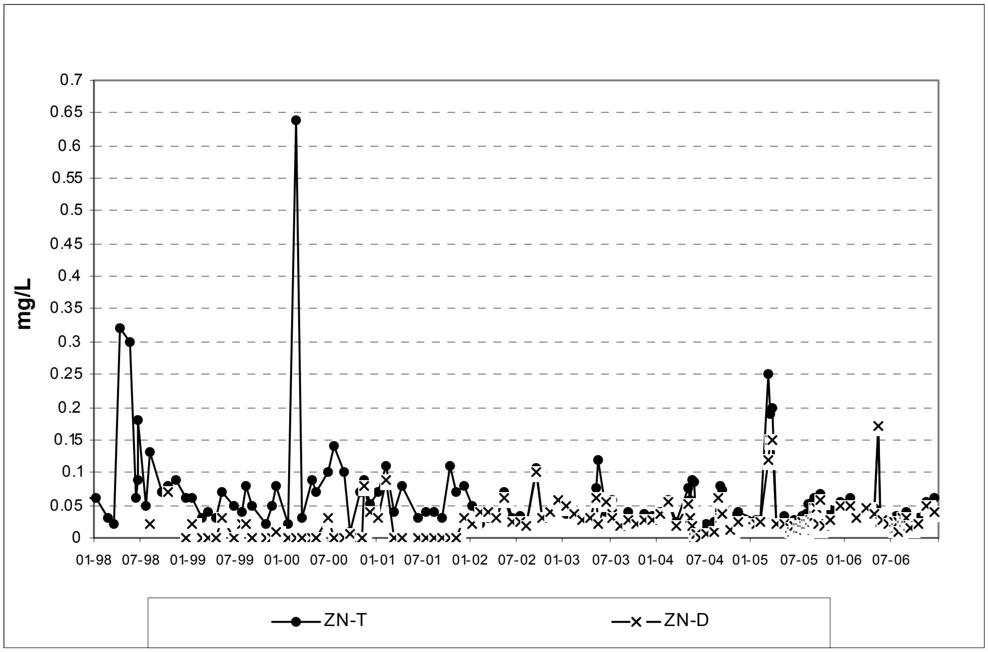


Figure 3-26. Zinc at X14



3.4.5 Rose Creek to Anvil Creek/Anvil Creek

Water sampling at locations R2 through R4 in Rose Creek, and locations R5 and R6 located in Anvil Creek at the confluence with Rose, are sampled twice a year, in summer and winter. Location R11 is located at the mouth of Anvil Creek.

Location R2 approximately coincides with routine monitoring location X14 in Rose Creek below the effluent-mixing zone. Location R2 is approximately 100 m downstream from location X14 with no significant surface inflows in between. Location R3 is in Rose Creek approximately mid-distance from location R2 to the mouth of Rose Creek at the confluence with Anvil Creek. Location R4 is at the mouth of Rose Creek approximately 26 km downstream of the tailings impoundments. Location R5 is in Anvil Creek downstream of the confluence with Rose Creek. Location R6 is in Anvil Creek upstream of the confluence with Rose Creek and is used to represent regional background conditions in the Anvil Creek area.

Since 1996, total Zn and SO_4 concentrations have displayed the following generally anticipated trends:

- concentrations are typically greatest at location R2 and typically decrease to downstream locations R3 and R4 due, presumably, to dilution;
- concentrations at R4 are typically greater than at R6 reflecting the signature of mine area runoff and effluent in Rose Creek;
- concentrations at R5 are typically between those at R4 and R6 reflecting the mixing of Rose and Anvil Creeks; and
- concentrations of SO_4 increase along Anvil Creek from R5 to R11 (2004 to 2006 data only), although Zn does not follow a similar trend.

The trends described above are illustrated by 2006 data as listed in Table 3-2.

Table 3-2. Total Zinc and Sulphate Concentrations in Rose Creek 2006

Location	February Total Zinc	August Total Zinc	February Sulphate	August Sulphate
R2 (near mine)	0.052	0.022	202	88.2
R3 (mid-Rose Ck)	0.022	0.017	143	81.3
R4 (mouth Rose Ck)	0.005	0.011	127	74.9
R6 (Anvil Ck u/s Rose Ck)	0.006	<0.005	20.4	20.0
R5 (Anvil Ck d/s Rose Ck)	-	<0.005	-	21.7
R11 (Mouth of Anvil Ck)	<0.005	<0.005	48.7	40.7

All values expressed as mg/L.

4. Water Quality Monitoring – Vangorda Creek Drainage

4.1 Overview Of Water Quality Monitoring Program

Part G and Schedule A of the Water Licence describe the water quality monitoring program for the Vangorda Plateau mine site. The Water Licence provides the sampling locations, sampling frequencies and the minimum parameters to be analysed.

The monitoring program is carried out by staff employed at the mine site by the Interim Receiver. Various professional laboratories have been used to provide the sample analyses over the life of the project. Laboratories are selected on the basis of certification with the Canadian Association of Environmental Analytical Laboratories, service and other factors. In 2006, most of the water analyses were conducted by CanTest. The analytical data is managed through an electronic database that is managed by Gartner Lee Limited.

The monitoring program also makes extensive use of the unique capability for high-quality, on-site zinc analyses to provide immediate feedback to site managers regarding effluent quality. On-site analyses of effluent zinc concentrations are conducted on a daily, or more frequent, basis when treated effluent is being released.

Water sampling frequencies vary from weekly (for treated effluents) to twice per year (for groundwater). The majority of water samples are collected on a monthly or quarterly basis. Continuous flow monitoring via dataloggers is required at one location, in lower Vangorda Creek (location V8). Other locations have various requirements for flow measurement.

Schedule A of the Water Licence, including the descriptions of the monitoring locations, sampling frequencies and minimum parameters, is provided in Appendix 1. UTM coordinates for the sampling locations have been previously provided to the Board and are provided in Appendix 2 for ease of reference. The monitoring locations are also illustrated on Figures 1-1, 1-2 and 1-3. Analytical data for 2006 is provided in Appendix 6. Bioassay results are provided in Appendix 7. A brief review of the data is provided in the following sections.

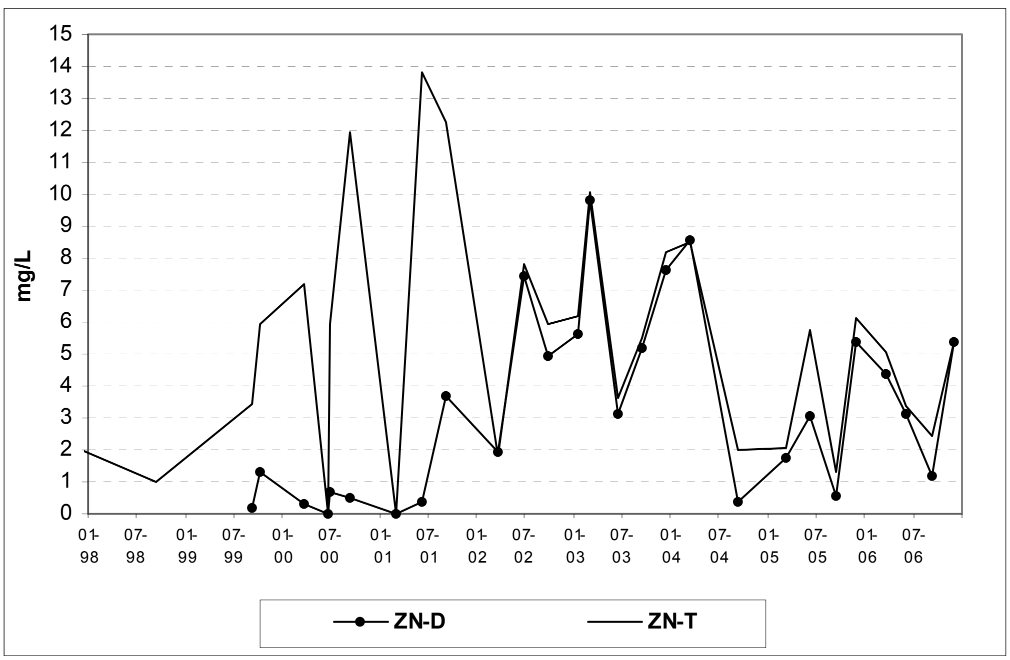
4.2 Open Pits and Rock Dumps

4.2.1 Grum Open Pit

Water quality in the Grum open pit is monitored at location V23 (pit pond). Location V23 has been routinely monitored since mine shut down (February 1998) and represents the accumulation of water in the pit in the absence of dewatering activities.

Four samples were collected at location V23 in 2006, in March, June, September and December. The samples were collected as grab samples from the surface of the pit pond. The concentrations of total and dissolved Zn ranged from 2.44 mg/L to 5.38 mg/L and from 1.21 mg/L to 5.38 mg/L, respectively, in 2006 (Figure 4-1).

Figure 4-1. Zinc at V23



The apparent reduction in Zn concentrations in the surface water of Grum pit during 2004 may be related to the testing of biological pit lake treatment using algae. This test program was undertaken as part of the studies that are underway for development of the FCRP. The information is in a preliminary state, however, and not available for reporting at this time.

The concentration of SO_4 remained consistent with previous years through 2006 ranging from 211 mg/L to 451 mg/L. The pH remained neutral to slightly alkaline in 2006 ranging from 7.8 to 8.4.

4.2.2 Grum Rock Dump

Surface Seepage

Locations V14, V15 and V16 are surface seepages below the toe of the Grum rock dump along the north, central and south areas of the rock dump, respectively.

Two samples were collected at location V14 in June and September 2006. Location V14 reported a pH of 7.3 and 8.0; the concentrations of total Zn were 0.012 mg/L and 0.013 mg/L, and SO_4 concentrations were 836 mg/L and 2,030 mg/L, respectively. Zinc concentrations at V14 are within the range of historical values. The SO_4 concentrations increased between 2002 and 2004, followed by a significantly lower result in 2005. Additional data is required to identify whether a trend is present or these high and low values are isolated events or seasonal trends.

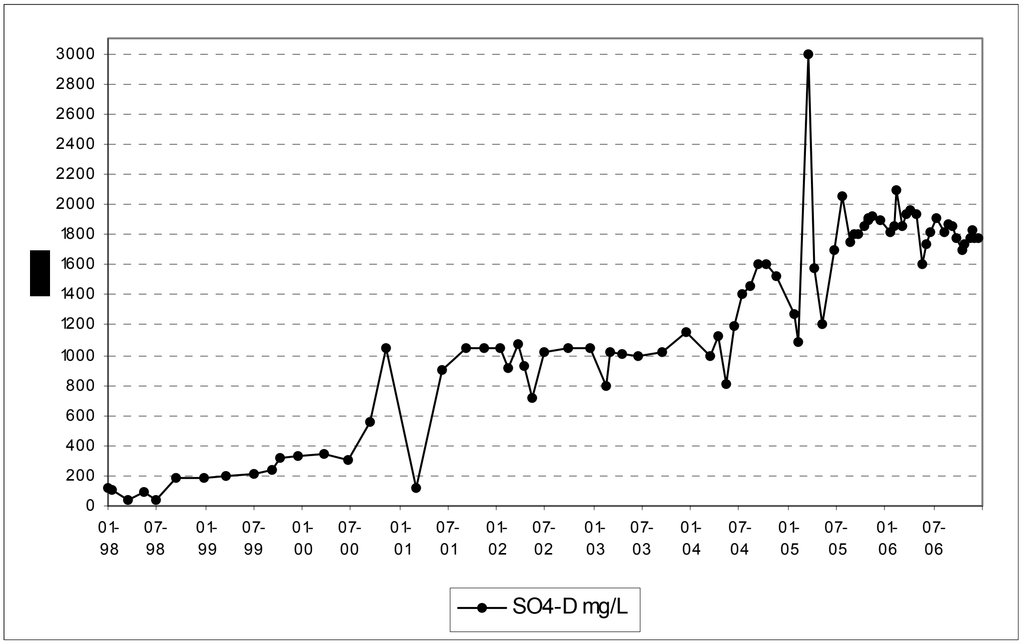
Two samples were collected at location V16 in June and September 2006. Location V16 exhibited pH values similar to location V14 of 8.4 and 7.3. Sulphate concentrations were 684 mg/L and 2,270 mg/L. The SO_4 record shows an increasing trend since 2001. There was neither a corresponding increase in the concentrations of neither total or dissolved Zn nor a corresponding decrease in pH. The Zn concentrations in 2006 were 0.021 mg/L and 0.013 mg/L.

Location V15 is located in a small draw, which naturally collects some surface flow below the rock dump including the area occupied by the sulphide cell. A sump collects flow and promotes settlement of suspended sediment. Flow from this location enters Grum Creek upstream of monitoring location V2.

Samples were collected twice per month at location V15 in 2006, excluding the months of January and May which where sampled monthly. Water pH was consistently neutral to slightly alkaline ranging from 7.2 to 8.2. The concentrations of total and dissolved Zn ranged from 0.081 mg/L to 0.72 mg/L and from 0.067 mg/L to 0.69 mg/L, respectively. Zn concentrations in 2006 are elevated in comparison to previous years.

The concentration of SO_4 ranged from 1,600 mg/L to 2,090 mg/L in 2006 at location V15. A general increasing trend is evident from 1995 (beginning of sample record) to 2006 in observed SO_4 concentrations. The historical concentrations of SO_4 at location V15 are illustrated on Figure 4-2.

Figure 4-2. Sulphate at V15



Water that is sampled at location V15 is a contributing flow to downstream location V2, which is a trigger location in the Adaptive Management Plan. This means that degraded water quality at location V15 would be detected prior to having a detrimental impact in Vangorda Creek. The Adaptive Management Plan is described in Section 9.8.

Groundwater Seepage

Groundwater wells P96-9A and P96-9B are nested in one drill hole in a bedrock valley that is at least 20 m deep near surface monitoring location V15. The ground water wells allow monitoring of ground water flow that is assumed to originate, in part, from the portion of the Grum rock dump that includes the sulphide cell. The deeper installation (P96-9B), which is screened over the interval from 16.5 to 18.0 m below surface, is inoperable due to presumed ground movement or collapse of the hole in 2002.

Piezometer P96-9A was sampled twice in 2006, June and September. The concentrations of dissolved Zn were 0.026 mg/L and 0.091 mg/L and the concentrations of SO_4 were 1,400 mg/L and 1,700 mg/L. An increasing trend in SO_4 has been apparent since 2000, showing a seasonal trend with spring having lower sulphate concentrations.

Additional groundwater monitoring wells were installed in the area of Grum Creek and its tributaries in September 2004. These wells were installed as part of the investigations undertaken for the Adaptive Management Plan as described in Section 9.8.

4.2.3 Vangorda Open Pit

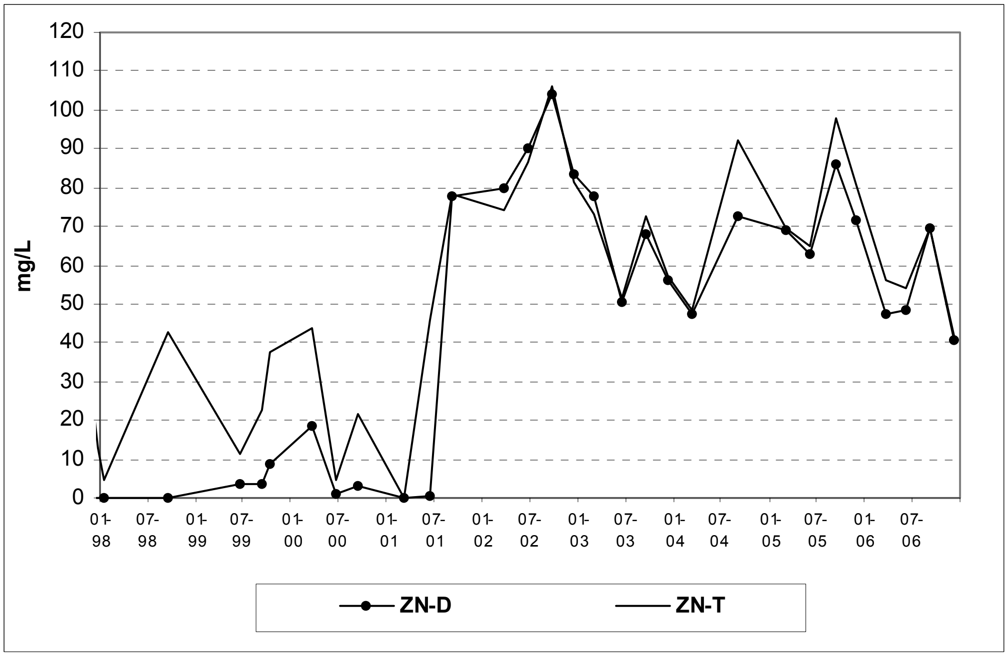
Vangorda pit water is monitored at location V22. During the period of active mining (pre-1998) when pit dewatering was underway, location V22 was sampled at the outflow of the dewatering pipe. Following the suspension of mining activities (and dewatering) in February 1998, location V22 has been sampled in the pit pond. The water that has accumulated in the Vangorda open pit since mine shut down has included natural inflows, water pumped periodically from Little Creek Dam and water pumped/siphoned periodically from the Sheep Pad Pond. From 2002 through 2005, a summer season water pumping and treatment program has been conducted to maintain the pit pond water level within the desired range. Pumping was not required in 2006, and is not anticipated in 2007, due to the low level of drawdown achieved in 2005.

Four samples were collected at location V22 in 2006, in March, June, September and December. These samples were collected as grab samples from the surface of the pit pond. The concentrations of total and dissolved Zn ranged from 41.7 mg/L to 69.7 mg/L and from 40.9 mg/L to 69.7 mg/L, respectively. The sharp increase in Zn in 2002 (Figure 4-3) may be related to maintenance and repairs to one of the freshwater diversions, the Northeast Interceptor Ditch, in 2001. This repair work substantially improved the efficiency of the ditch to pass clean water around the Vangorda pit to Shrimp Creek. It is possible that this work removed a relatively large inflow of clean water and resulted in the increased concentrations observed in the pit. Also, Zn concentrations were observed to increase with depth in a 2000 pit survey and it is possible that the variability of Zn concentrations in surface grab samples is related to seasonal effects such as pond turnover.

The concentrations of SO_4 in 2006 ranged from 504 mg/L to 947 mg/L. These are within the ranges observed since 2002. An increasing trend has been seen since 2001. Winter values (September and December) are elevated in comparison to spring values. Water pH remained neutral in 2006 with values of 6.4 to 7.6.

The water level in the Vangorda pit is maintained below a defined maximum desired level to provide for emergency storage below the overflow elevation to accommodate unforeseen events. This is accomplished through a summer season water pumping and treatment program that was been undertaken from 2002 through 2005. Water is pumped from the Vangorda pit to the Grum/Vangorda water treatment plant and, after treatment and removal of metals, is released to Vangorda Creek via the Grum Interceptor Ditch to the Sheep Pad Pond and monitoring location V25BSP. The pumping and release of water is further described in the Water Treatment Plant Performance Review that is documented in Section 5 of this report.

Figure 4-3. Zinc at V22



4.2.4 Vangorda Rock Dump

Surface Seepage

Six transverse drains were constructed in 1994 that pass toe seepage from the Vangorda rock dump through the till containment berm that rings the dump. These six drains represent monitoring locations V28 through V33. Drain #1 (V28) is considered inoperable and is not part of the Water Licence monitoring schedule.

Drain #2 (V29) was dry in 2006. Flow at this location has been intermittent in the past and 2004/05 was the first two consecutive years sampled.

Drain #3 (V30) was sampled twice in 2006, in June and September. The concentrations of dissolved Zn and SO_4 were 319 mg/L and 327 mg/L and were 4,520 mg/L and 4,750 mg/L, respectively. The pH was near neutral at 6.1 and 6.5. The 2006 SO_4 concentrations at drain #3 were less than the peak values recorded in 2004 and are showing a decreasing trend since 2004.

Drain #4 (V31) was sampled once in 2006, in June. The concentrations of dissolved Zn and SO_4 were 1,040 mg/L and 8,500 mg/L respectively. The pH was slightly acidic at 6.1 for the sampling event. Flow at this location has been intermittent in the past, with 2005 and 2006 being the first consecutive years sampled. Concentrations of dissolved Zn and SO_4 were less than the peak values seen in September 2005.

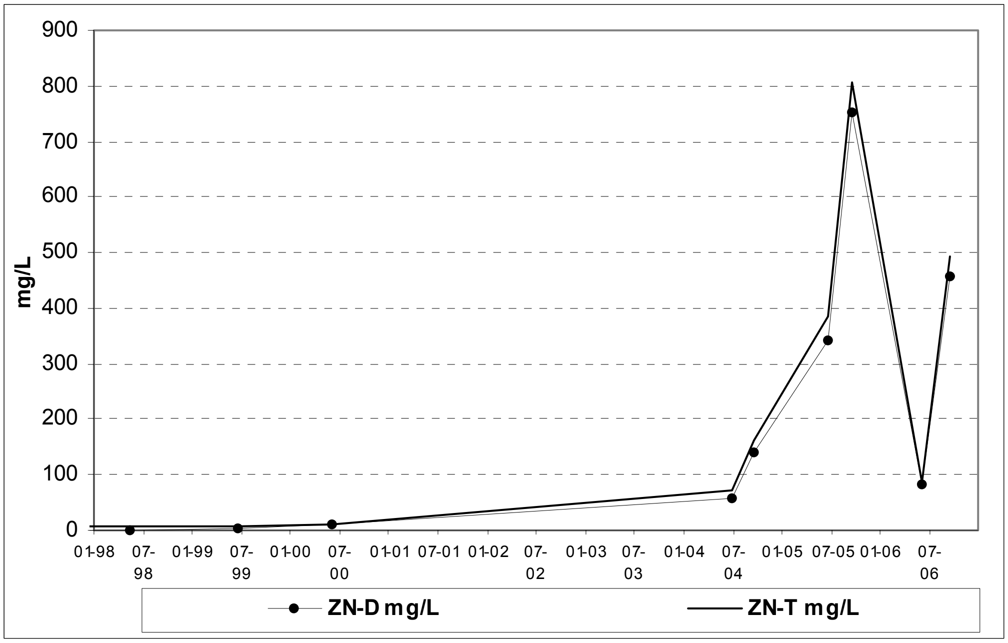
Drain #5 (V32) was sampled on two occasions in 2006 in June and September. Water quality at drain #5 continued to show high metal and SO_4 concentrations at acidic pH. The concentrations of dissolved Zn were 9,820 mg/L and 10,600 mg/L and the concentrations of SO_4 were 53,900 mg/L and 65,900 mg/L. The pH was 3.5 in June and 3.1 in September. Sulphate and Zn concentrations exhibit an increasing trend. Concentrations of Cd exhibit a similar pattern with a maximum concentration of 7.33 mg/L in 2006. The consistently poor water quality at V32 is attributed, in part, to the location of the drain in the (assumed) seepage path of the sulphide cell area of the Vangorda rock dump.

Drain #6 (V33) was sampled on two occasions in 2006, in June and September. Zinc and SO_4 concentrations at drain #6 have decreased over the previous year. The concentrations of dissolved Zn and SO_4 in June and September 2006 were 4,560 mg/L and 5,500 mg/L and were 43,800 mg/L and 58,400 mg/L, respectively. The pH was acidic at 5.9 for both sampling events. The consistently poor water quality at V33 is attributed, in part, to the location of the drain in the (assumed) seepage path of the sulphide cell area of the Vangorda rock dump.

Little Creek Dam (LCD) is the collection point for surface run off from the Vangorda rock dump, toe seepage from the Vangorda rock dump, local area run off from its catchment area and direct precipitation. Prior to the shut down of mining activities in February 1998, the Vangorda pit was dewatered directly into Little Creek Dam and all water was pumped from Little Creek Dam to the water treatment plant for treatment and discharge. Since the mine shut down, water from Little Creek Dam has been pumped into the Vangorda pit. This has been required on a seasonal basis and has occurred once or twice per summer. The water that has accumulated in Little Creek Dam has been non-compliant for Zn and, therefore, has not been discharged into Vangorda Creek.

The pumping procedure has maintained an appropriate water elevation in Little Creek Dam such that the risk of release of non-compliant water was minimized. Little Creek Dam was previously sampled in 2000, 2004 and 2005. LCD was sampled on two occasions in 2006, in June and September. The concentrations of total Zn were 87 mg/L and 492 mg/L and the concentrations of dissolved Zn were 82 mg/L and 459 mg/L, respectively. The concentrations of SO_4 were 815 mg/L and 3,620 mg/L, respectively, and pH was 6.6 and 6.5. The concentration of Zn (Figure 4-4) decreased in June 2006 and increased again in September, possibly due to the effects of ice melt and snow melt during freshet.

Figure 4-4. Zinc at LCD



Groundwater Seepage

Monitoring wells GW94-01 through GW94-04 (monitoring locations V34 through V37) were installed in 1994 around the toe of the Vangorda rock dump to allow monitoring of groundwater seepage below the collector ditch. Each of these piezometers was sampled twice during 2006, in June and September. Piezometer GW94-05 (V38) is inoperable.

Ground water quality in piezometers GW94-01 through GW94-04 continued, in 2006, to show low metal concentrations. The concentrations of dissolved Zn ranged from <0.005 mg/L to 0.113 mg/L in 2006. The concentrations of SO_4 in piezometers GW94-01 to GW94-04 ranged from 61.4 mg/L to 1,480 mg/L in 2006. The concentrations of SO_4 in piezometers GW94-02 and GW94-03 continued, in 2006, to be greater than in GW94-01 and GW94-04.

A series of piezometers (P94-01 through P94-04, V39 to V47) are installed in the till berm which surrounds the base of the rock dump and through which the transverse drains pass seepage water. No water quality monitoring has been performed since 1998.

Two additional monitoring piezometers were installed in 2001 around the toe of the Vangorda rock dump to allow monitoring of groundwater seepage below the collector ditch, P2001-02 and P2001-03. Piezometer P2001-02 is a nested well in one drill hole, P2001-02A and P2001-02B. Each of these piezometers was sampled twice during 2006, in June and September.

Ground water quality in piezometers P2001-02 and P2001-03 continued, in 2006, to show low metal concentrations. The concentrations of dissolved Zn ranged from <0.001 mg/L to 0.039 mg/L in 2006. The concentrations of SO_4 in piezometers wells P2001-02 and P2001-03 ranged from 89 mg/L to 364 mg/L in 2006.

4.3 Water Quality Entering Vangorda Creek

4.3.1 Sheep Pad Pond

Location V25BSP consists of all water that enters Vangorda Creek via the Sheep Pad Pond including water discharged from the water treatment plant/clarification pond and natural runoff. Location V25BSP is a licence discharge location and is a point of compliance for water entering Vangorda Creek from the Sheep Pad Pond. Sampling is undertaken weekly during periods of discharge from the water treatment plant and monthly at other times.

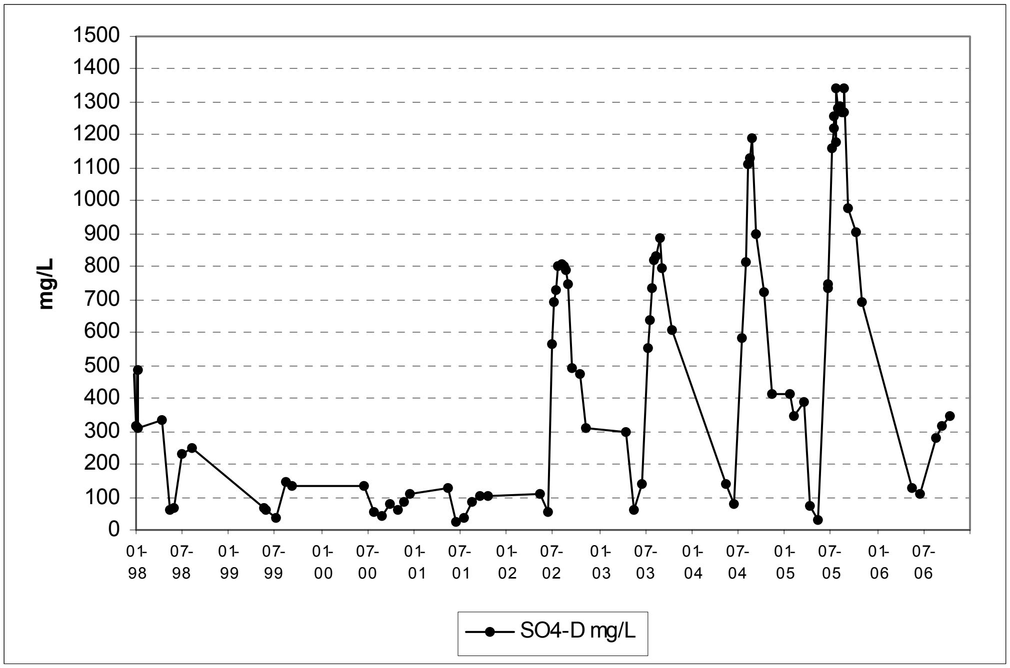
A total of 6 samples were collected at location V25BSP from May to October in 2006. There was no flow during the winter months. The concentrations of total suspended solids at location V25BSP were below the maximum allowable discharge limit of 15 mg/L. Turbidity concentrations ranged from 0.023 to 19 NTU. The maximum allowable discharge limit for Turbidity is 15 NTU, being exceeded once in May 2006 (19 NTU).

The concentrations of total and dissolved Zn ranged from 0.031 mg/L to 0.14 mg/L and from 0.017 mg/L to 0.12 mg/L, respectively, in 2006. All values were less than the discharge criteria of 0.5 mg/L. The highest Zn concentration occurred in October.

The concentrations of SO_4 ranged from 111 mg/L to 346 mg/L with peak concentration occurring during October. This is different than previous years (Figure 4-5). Peak sulphate concentrations were seen in June between 2002 and 2005. In 2006, June represents the minimum of the data set for sulphate concentrations.

Bioassay samples were collected at location V25BSP in June and September. Both samples passed with no mortalities.

Figure 4-5. Sulphate at V25BSP



4.3.2 Vangorda Pit Northwest Interceptor Ditch

Location V19 is the Vangorda pit northwest interceptor ditch, which drains into Vangorda Creek at the plunge pool. Two samples were collected at location V19 in 2006, in June and September. Location V19 returned slightly alkaline to neutral pH values of 8.1 and 7.5, non-detectable levels of total and dissolved Zn (0.006mg/L and <0.005 mg/L) and SO_4 concentrations of 3.4 mg/L and 3.65 mg/L.

4.3.3 Grum Creek

Location V2 is in Grum Creek upstream of entry into Vangorda Creek. The changes to the water management system implemented during 1995 and 1996 diverted a large portion of the Grum Creek catchment area into the Sheep Pad Pond and this, in combination with the interception of shallow ground water by the Grum open pit, reduced the flow in Grum Creek substantially from its original (i.e. pre-mine) levels.

The changes to the water management system implemented during 1995 and 1996 also allowed the diversion of a portion of the remaining Grum Creek water into the Moose pond where the water is observed to seep into the ground. This diversion was put into place as part of the mitigation plan for reducing suspended sediment loadings entering Vangorda Creek via Grum Creek and remained in place through 2006. The diverted Grum Creek water is sampled at location V2A prior to entry into the Moose Pond.

Location V2

Location V2 was sampled monthly in January, February and May, and twice per month in June, July, August, September, October, November and December. The concentration of total suspended solids at location V2 continued to be greatly improved over previous years prior to about 1996. The concentrations of total suspended solids ranged from 1 mg/L to 4mg/L in 2006 and were below the maximum allowable discharge limit of 15 mg/L. PH ranged from 7.6 to 8.3.

The concentrations of total and dissolved Zn at location V2 in 2006 ranged from less than 0.005 mg/L to 0.12 mg/L and from less than 0.005 to 0.051 mg/L, respectively (Figure 4-6).

The concentrations of SO_4 at location V2 in 2006 ranged from 554 mg/L to 1,110 mg/L (Figure 4-7). An increasing trend in the concentration of SO_4 at V2 is evident from 1989 (beginning of sample record) through 2006, with a sharp increase observed in 2000. There has not been a corresponding increase in the concentrations of total or dissolved Zn. This trend in SO_4 is consistent with upstream location V15 (Section 4.2.2). The SO_4 concentrations are higher at location V15, which is reasonable given that it is a smaller flow closer to the suspected source, the Grum rock dump.

The increasing trend in SO_4 concentrations at location V2 triggered the Adaptive Management Plan, when it became effective in 2004. The investigations that have been undertaken are described in Section 9.8.

Quarterly bioassay samples were collected at location V2 in June, September and December. All samples passed with no mortalities at 100% concentration over 96 hours.

Figure 4-6. Grum Creek (V2) Total and Dissolved Zinc (mg/L)

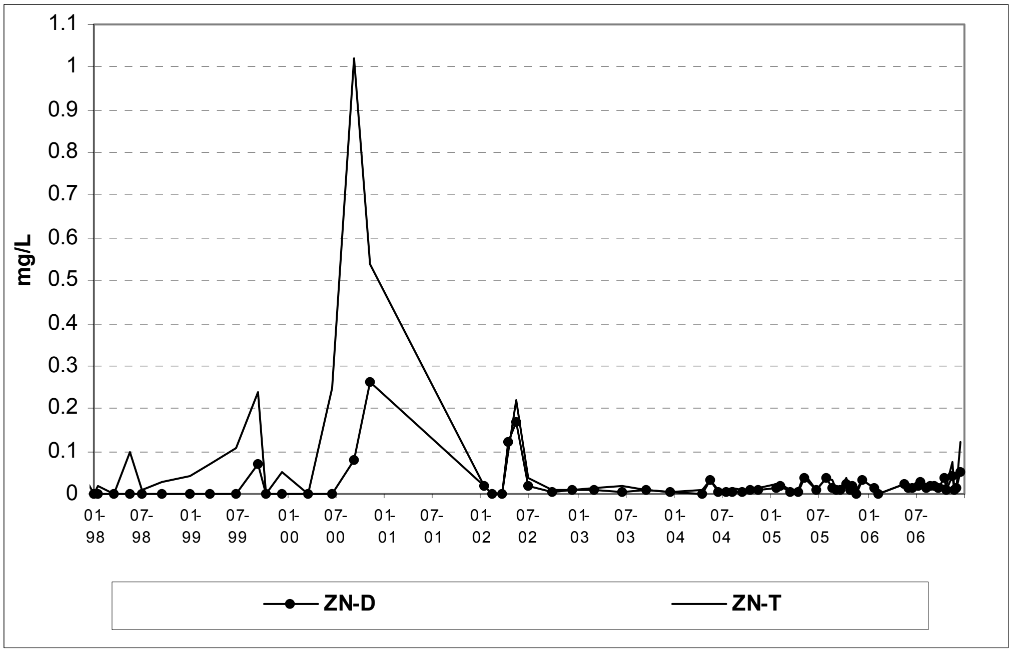
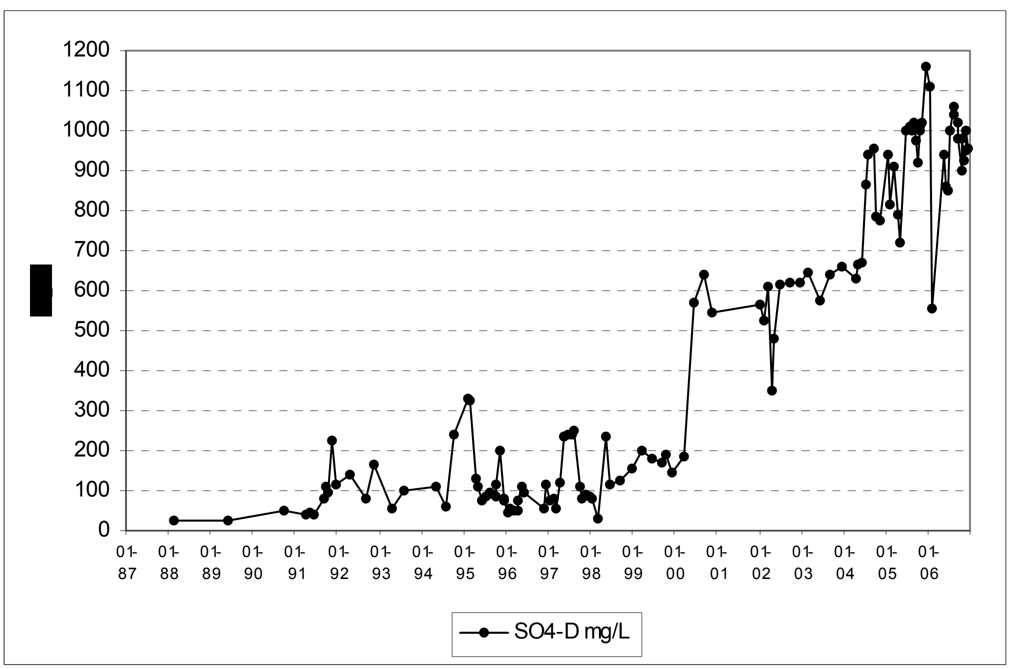


Figure 4-7. Grum Creek (V2) Sulphate



Location V2A

Location V2A was sampled monthly in April and May 2006, and twice per month in June, July, August, September and October 2006. Prior to around 2001, water quality entering the Moose Pond via location V2A was similar to that observed at location V2 in Grum Creek. Since about 2001, this trend has not been observed. Higher concentrations of Zn are observed entering the Moose Pond via location V2A than are present in Grum Creek at location V2. This has been attributed to the collection and diversion of a seep from the toe of the Grum rock dump into the Moose Pond. Presently, this water is managed by enabling it to go to ground in the Moose Pond while undertaking additional data collection and investigations.

The concentrations of total and dissolved Zn at location V2A ranged from 0.061 mg/L to 0.36 mg/L and from 0.045 mg/L to 0.65 mg/L, respectively (Figure 4-8). Seasonal zinc trends continued in 2006 with peak concentrations observed in spring (April) followed by decline and return to lower winter concentrations. The concentrations of SO_4 at location V2A ranged from 381mg/L to 937 mg/L in 2006, which is consistent with 2005 (Figure 4-9).

Figure 4-8. V2A Total and Dissolved Zinc (mg/L)

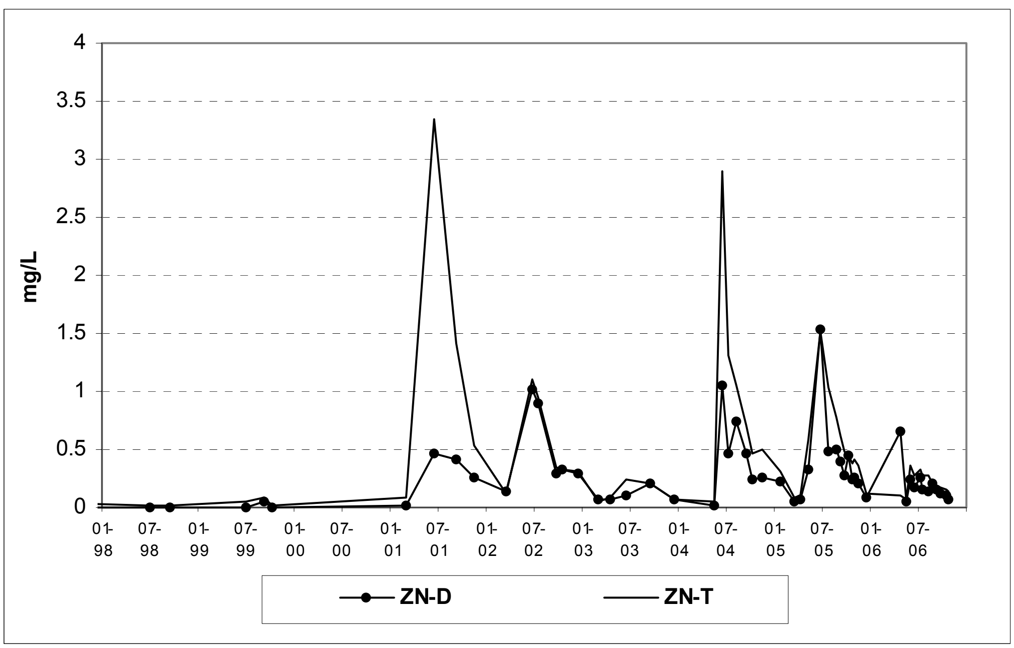
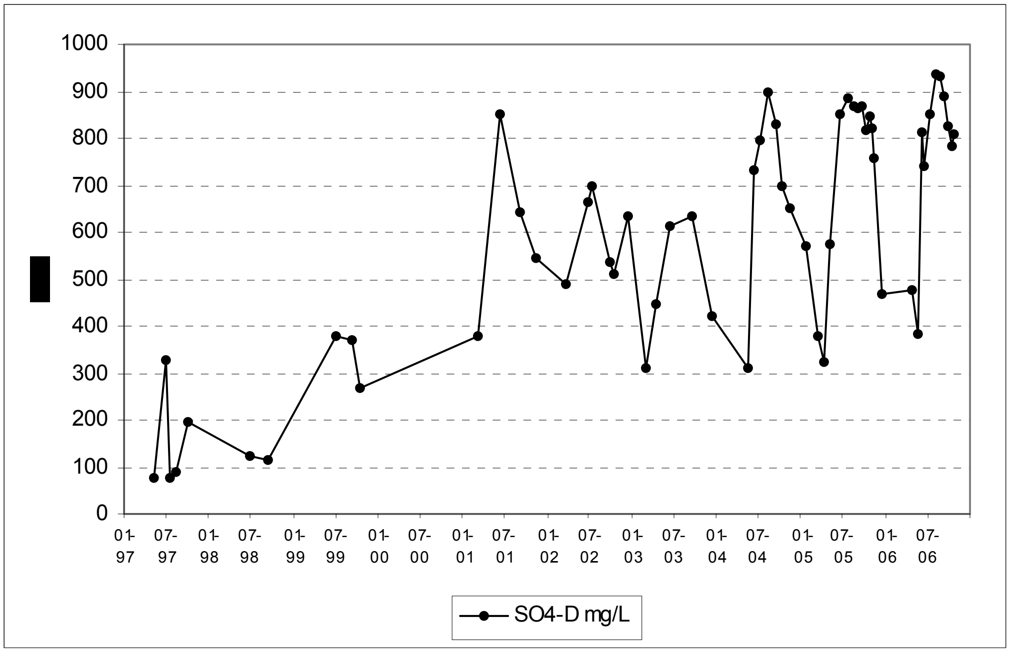


Figure 4-9. V2A Sulphate (mg/L)



4.3.4 AEX Creek

Location V17A is sampled at a small stream that crosses the Vangorda haul road containing natural run off from the slopes north of the Grum pit as well as surface run off from the north side of the Ore Transfer Pad. This stream then passes into AEX Creek.

Two samples were collected at location V17A in 2006, in June and September. The concentrations of SO_4 were 7.77 and 12.9 mg/L, consistent with previous data. The concentrations of total Zn were 0.008 mg/L and 0.009 mg/L. The peak Zn concentration seen in September 2005 is an order of magnitude higher than any other value on record and is suspected of being an outlier. In 2006, total Zn returned to lower historical concentrations.

Location V6A is AEX Creek immediately upstream of its entry into the West Fork of Vangorda Creek. This water includes the tributary sampled at location V17A. Location V6A was sampled twice in 2006, in June and September. The concentrations of total Zn were 0.013 mg/L and 0.026 mg/L and dissolved Zn were 0.013 mg/L and 0.024 mg/L. The concentrations of SO_4 were 13.6 mg/L and 20.1 mg/L. These concentrations are consistent with those observed since mine shut down in 1998.

4.4 Receiving and Background Water Quality

4.4.1 Shrimp Creek

Location V20 is near the downstream end of the Vangorda northeast interceptor ditch, which passes clean run off water that would originally have flowed directly into Vangorda Creek around the east and south sides of the Vangorda pit and rock dump area. This diverted water then enters Shrimp Creek. Flow at location V20 has, historically, been intermittent and an investigation conducted in 2002 identified the cause of this poor performance as ditch leakage into Vangorda pit. In response to this, physical maintenance work was performed to the ditch in the summer of 2002, which resulted in the effective diversion of water around the Vangorda pit, per the original intent for the ditch.

One sample was collected at location V20 in June 2006. The concentrations of Zn and SO_4 at location V20 remained at low levels in 2006, consistent with previous data. Total and dissolved Zn concentrations in the month of June were 0.013 mg/L and 0.012 mg/L, respectively. The concentration of SO_4 was 6.98 mg/L.

Location V4 is Shrimp Creek upstream of the confluence with the Main Fork of Vangorda Creek. This location provides reference information regarding water quality in the Shrimp Creek area and includes inflows from the upstream tributary sampled at location V20.

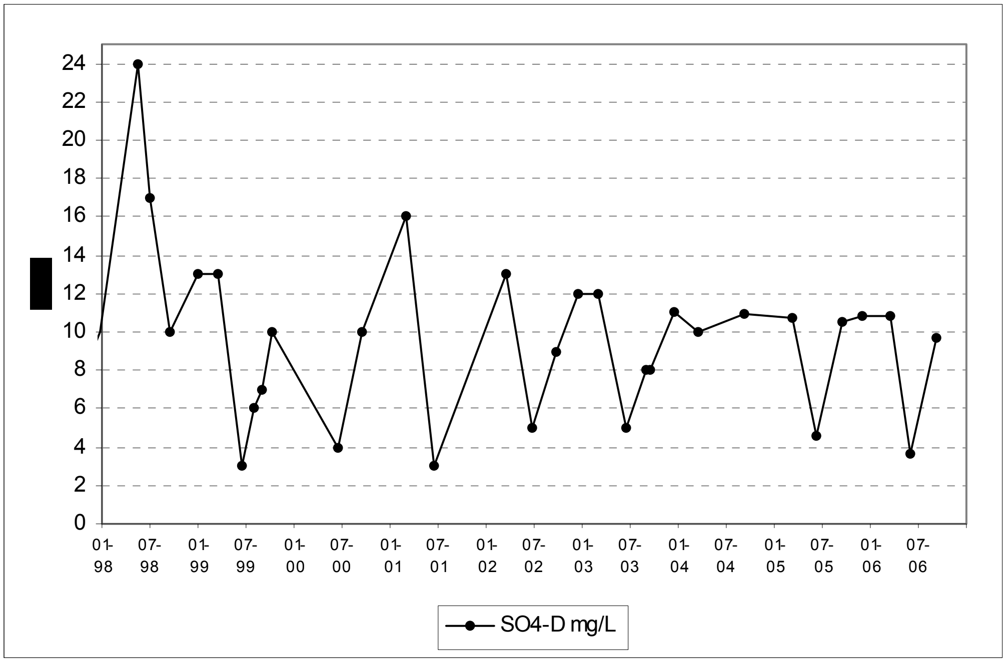
Location V4 was sampled three times, in May, August and September of 2006. Total and dissolved Zn concentrations were less than detectable (<0.005 mg/L). Sulphate concentrations ranged from 22.5 mg/L to 50.5 mg/L. These sulphate concentrations are generally consistent with historical data.

4.4.2 Upper Vangorda Creek

"Upper" Vangorda Creek is the primary receiving water for mine site discharges and is sampled upstream of mine activities at V1, and locally downstream of mine activities at V27, just above the confluence with Shrimp Creek. There is no known fish habitat in "upper" Vangorda Creek due to downstream impasses near the town of Faro.

Location V1 is the Main Fork of Vangorda Creek immediately upstream of mine activities. This location provides background reference information for Vangorda Creek upstream of the mine site. Location V1 was sampled three times in 2006, in March, June and September. During 2006, SO_4 concentrations ranged from 3.62 mg/L to 10.8 mg/L, and total Zn concentrations ranged from less than 0.005 mg/L to 0.038 mg/L. Zinc concentrations in 2006 are similar those previously recorded at this site. Sulphate concentrations are also similar to historical concentrations, including a seasonal SO_4 trend, with slightly higher concentrations observed during winter months (Figure 4-10).

Figure 4-10. Sulphate at V1



Location V27 is the Main Fork of Vangorda Creek upstream of the confluence with Shrimp Creek and provides information regarding effects of the mine facilities on Vangorda Creek. All surface water from the Grum rock dump, the Grum Interceptor Ditch/Sheep Pad Pond, and the Vangorda Northeast Interceptor Ditch reports to location V27 via Grum Creek or the Vangorda Creek plunge pool. Extremely steep terrain creates unsafe access to this sampling location at some times of the year (particularly winter and spring freshet) and water sampling is conducted accordingly, with maximum recognition of worker safety.

In 2006, location V27 was sampled in May, August and September. The concentrations of total Zn for the sampling events ranged from 0.018 mg/L to 0.023 mg/L. Sulphate concentrations ranged from 25.3 mg/L to 56.4 mg/L. These concentrations are consistent with previous data.

4.4.3 Lower Vangorda Creek

The West Fork of Vangorda Creek represents natural run off and some mine site drainage originating from location V6A in AEX Creek, the Vangorda haul road and a small portion of the Grum rock dump. Water quality in the West Fork of Vangorda Creek is monitored at location V5.

The Main Fork of Vangorda Creek represents natural run off including Shrimp Creek via location V4, drainage from the mine site via location V27 plus a relatively large area of natural runoff below the mine site. Water quality in the Main Fork of Vangorda Creek is monitored at location VGMAIN.

"Lower" Vangorda Creek is the juvenile fish rearing habitat in the first 1 to 2 km above the Pelly River and downstream of the confluence of the West and Main Forks. Water quality in lower Vangorda Creek is monitored at location V8.

Water quality information that was collected in 2006 for each of locations V5, VGMAIN and V8 is described in the following sections and recent data for total suspended solids, total Zn and SO_4 is illustrated on Figures 4-11, 4-12 and 4-13, respectively. Additional information regarding water quality in Lower Vangorda Creek in a longer-term context is described in Section 4.4.4.

West Fork

Location V5 is the West Fork of Vangorda Creek just upstream of the confluence with the Main Fork. Location V5 receives drainage from AEX Creek (location V6A) and, thereby, potential influences from surface drainage from the north portion of the Ore Transfer Pad. Both AEX Creek and the West Fork of Vangorda Creek receive run off from the Vangorda ore haul road and the mine access road. Road maintenance activities such as re-surfacing or application of dust suppression products or spills could potentially affect water quality at V5. There is a small portion of the Grum rock dump that drains into the West Fork of Vangorda Creek between AEX Creek and location V5. This portion of the Grum rock dump does not include any part of the sulphide cell.

Ten samples were collected at location V5 throughout 2006. Total suspended solids (TSS) concentrations are similar to those recorded in recent years, ranging from 2 mg/L to 249 mg/L. In 2006, TSS concentrations continued to follow a previously established seasonal trend with maximum annual concentrations observed during spring peak flow conditions. The source of the sediment flushed into the creek during freshet originated from "non-mine" areas such as the landslide area and the old ski hill area.

Total and dissolved Zn concentrations at location V5 ranged from <0.005 mg/L to 0.046 mg/L and from <0.005 to 0.015 mg/L, consistent with recent years.

In 2006, concentrations of SO_4 and hardness at location V5 continued to exhibit a general seasonal trend with greater concentrations associated with winter months, when surface run off is at a minimum. This trend is attributed to the presence in the West Fork catchment area of certain rock types that influence surface run off and ground water discharge to surface. Sulphate and hardness concentrations were consistent with recent years, ranging from 35.4 mg/L to 174 mg/L and from 136 mg/L to 416 mg/L $CaCO_3$, respectively.

Main Fork

Location VGMAIN is located in the Main Fork of Vangorda Creek immediately upstream of the confluence with the West Fork. This location provides important information regarding the relative impacts of the Main and West Forks on the fish-rearing habitat in lower Vangorda Creek. Although Licence location V27 is also in the Main Fork, location V27 is over 6 km upstream of the fish rearing habitat and it is difficult to apply water chemistry data from location V27 in an analysis of lower Vangorda Creek because of the potential for numerous and unquantified impacts on the Main Fork downstream of location V27.

Eleven (monthly) samples were collected from February to December at location VGMAIN in 2006. Total suspended solids concentrations typically remained <1 mg/L throughout 2006, with a peak concentration of 10 mg/L during freshet, less than observed TSS at location V5 in the West Fork.

In 2006, the concentrations of total and dissolved Zn at location VGMAIN ranged from 0.01 mg/L to 0.025 mg/L and from less than 0.005 mg/L to 0.028 mg/L, respectively, which were within the ranges observed in recent years.

In 2006, peak concentrations of SO_4 and hardness were observed during winter months, during periods of low flow. These trends are similar to those observed in 2004. Sulphate and hardness concentrations at location VGMAIN ranged from 32.9 mg/L and 202 mg/L and from 109 mg/L to 342 mg/L $CaCO_3$, respectively, in 2006.

Lower Vangorda Creek

Location V8 is in lower Vangorda Creek downstream of the confluence of the West Fork (location V5) and the Main Fork (location VGMAIN). Twelve monthly samples were collected at this station in 2006.

Total suspended solid concentrations at this site ranged from less than 1 mg/L to 54 mg/L in 2006, with the highest concentrations recorded in May, corresponding to peak concentrations observed at upstream monitoring location V5 (Figure 4-11). The source of the sediment flushed into the creek during freshet originated from "non-mine" areas such as the landslide area and the old ski hill area.

In 2006, total and dissolved Zn concentrations at location V8 ranged from 0.01 mg/L to 0.028 mg/L and from less than 0.05 to 0.026 mg/L, respectively. These concentrations are consistent within the ranges typically observed at this site in recent years (Figure 4-12).

As is observed at upstream locations V5 and VGMAIN, SO_4 and hardness concentrations at location V8 increased in the winter months of 2006, during periods of low flow and minimal surface runoff. Sulphate and hardness concentrations at location V8 ranged from 35 mg/L to 204 mg/L and from 118 mg/L to 402 mg/L $CaCO_3$, respectively, in 2006 (Figure 4-13).

Figure 4-11. Lower Vangorda Creek (V5, VGMAIN, V8) Total Suspended Solids

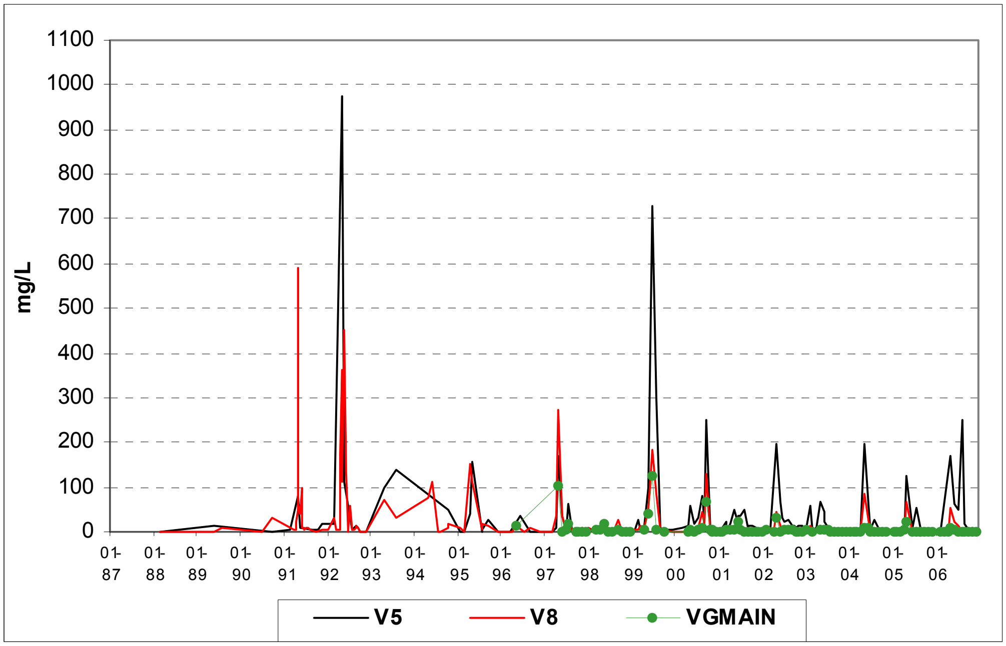


Figure 4-12. Lower Vangorda Creek (V5, VGMAIN, V8) Total Zinc

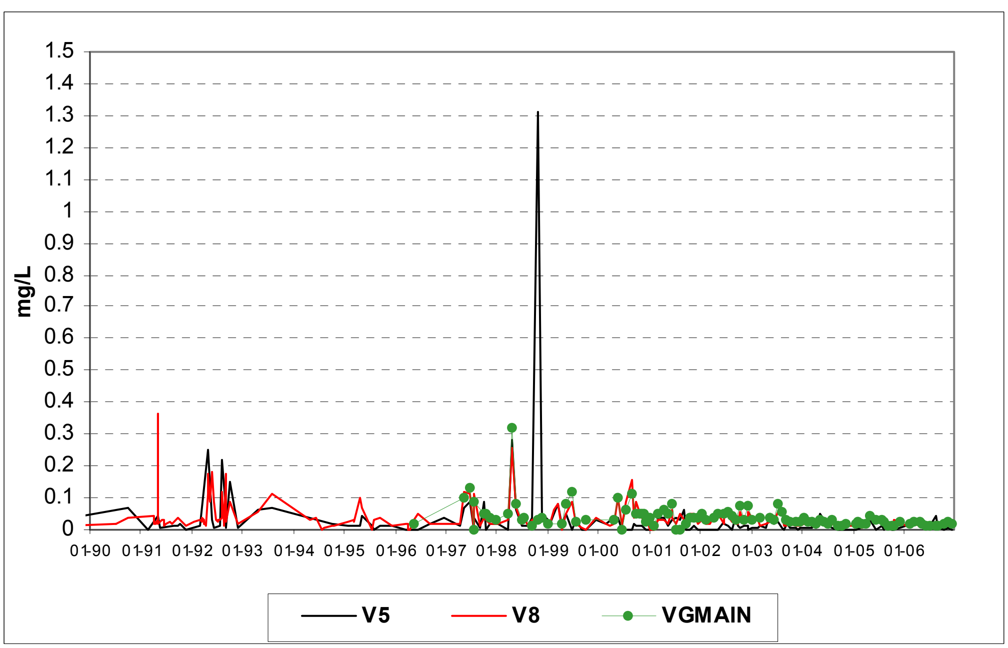
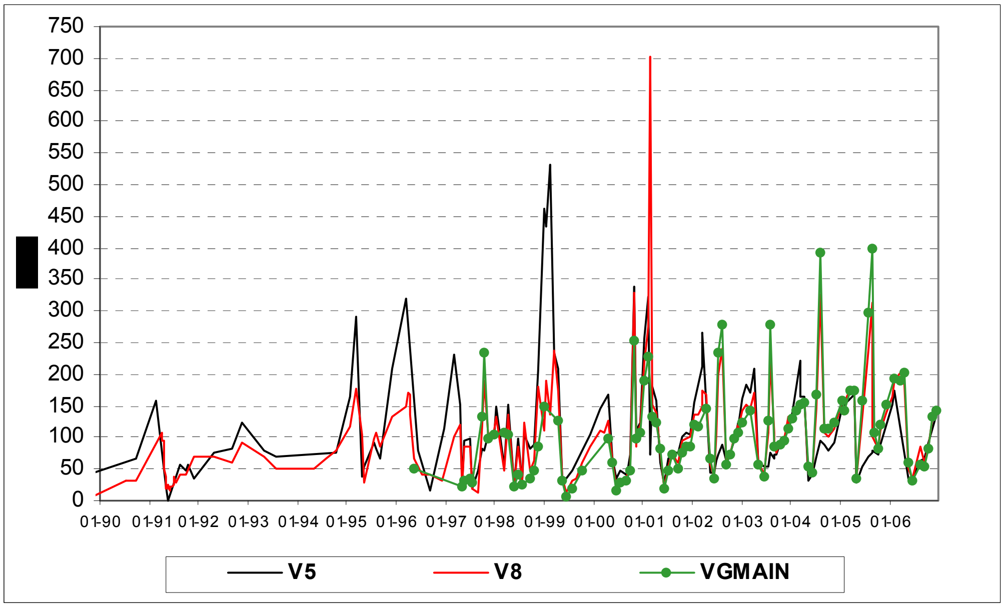


Figure 4-13. Lower Vangorda Creek (V5, VGMAIN, V8) Sulphate



4.4.4 Long Term Trends In Lower Vangorda Creek

The long-term trends in water quality in lower Vangorda Creek (location V8) from 1988 to 2006 indicate that mining activities on the Vangorda Plateau have had an observable influence on concentrations of total suspended solids, total Zn, total lead and ammonia in lower Vangorda Creek. It is also evident that water quality in the West Fork has a significant effect on water quality in the fish-rearing habitat, particularly in terms of total suspended solids and SO_4. The information also confirms that there are significant concentrations of suspended sediments that can enter Vangorda Creek downstream of the mine site that are not related to mine activities.

Concentrations of SO_4, total suspended solids and total Zn at locations V5 and V8 (for which the monitoring records extend back to 1988) are illustrated on Figures 4-14, 4-15 and 4-16, respectively, for the period from 1988 to 2006.

1988 to 1990

During the period from 1988 to 1990 (3 years), there was a relatively small amount of work done in overburden stripping for the Grum Open Pit. Although relatively few water samples were collected during this period, water quality at location V8 could be taken as representative of conditions largely unaffected by mine operations. This is evident through relatively low concentrations of total suspended solids, total Zn, ammonia, total lead and arsenic, although the concentration of total Zn was recorded at, or just greater than, the federal recommended guideline for the protection of freshwater aquatic life (CCME) on two occasions. The average concentration of total suspended solids during this period was 12 mg/L with a peak value of 30 mg/L. The average and peak concentrations of total Zn were 0.02 mg/L and 0.04 mg/L, respectively.

1991 to 1992

During 1991 and 1992, a substantial overburden stripping program was carried out on the Vangorda Plateau, mining was performed in the Vangorda Open Pit and the Vangorda ore haul road was constructed. The mining activity is reflected in the water quality in lower Vangorda Creek. The concentrations of total suspended solids, total Zn, total lead and ammonia all show an increase in average and peak values during this period. The average concentration of total suspended solids during this period was 62 mg/L with a peak value of 590 mg/L. The average and peak concentrations of total Zn were 0.06 mg/L and 0.36 mg/L, respectively.

1993 to 1994

During 1993 and 1994, no mining operations were performed on the Vangorda Plateau. Although fewer water samples were collected during this period than during the previous operating period, reduced levels of total suspended solids and total Zn were observed in lower Vangorda Creek. The apparently reduced levels were generally greater than those observed during the period preceding mine activities (1988 to 1990). The average concentration of total suspended solids during 1993 and 1994 was 40 mg/L with a peak value of 112 mg/L. The average and peak concentrations of total Zn were 0.03 mg/L and 0.11 mg/L, respectively.

1995 to 1997

During 1995, 1996 and 1997, mining activities on the Vangorda Plateau were resumed including discharge of treated effluent from the water treatment plant. Even in light of the resumption of mine operations, water chemistry in lower Vangorda Creek during this period did not show a return to the chemistry observed during the previous period of mine operations on the Vangorda Plateau (1991 and 1992). The concentrations of total suspended solids, total Zn, total lead, ammonia and arsenic observed from 1995 through 1997 remained similar to those observed during the shut down period of 1993 and 1994 with the exception of a peak concentration of total suspended solids. During the period from 1995 to 1997, the average concentration of total suspended solids was 29 mg/L with a peak value of 271 mg/L. The average and peak concentrations of total Zn were 0.04 mg/L and 0.12 mg/L, respectively.

1998 to 2006

During the period from 1998 to 2006, mining activities were terminated. There was no discharge of effluent from the water treatment plant until the summer of 2002. Water quality in lower Vangorda Creek (V8) from 1998 to 2006 was generally consistent with the two preceding periods (mine shut down in

1993/1994 and mine operation from 1995 to 1997) although some isolated high peak concentrations of total suspended solids, total Zn and total arsenic were observed. During the period from 1998 to 2006, the average concentration of total suspended solids was 11 mg/L with a peak value of 184 mg/L. The average and peak concentrations of total Zn were 0.031 mg/L and 0.26 mg/L, respectively.

Sulphate concentrations show the influence of re-activation of the Grum/Vangorda Water Treatment Plant in 2002 through annual summer peaks that correspond to periods of effluent release. The general seasonal trend of higher concentrations in the low-flow, winter season also continues.

Figure 4-14. V5 and V8 Long Term Sulphate

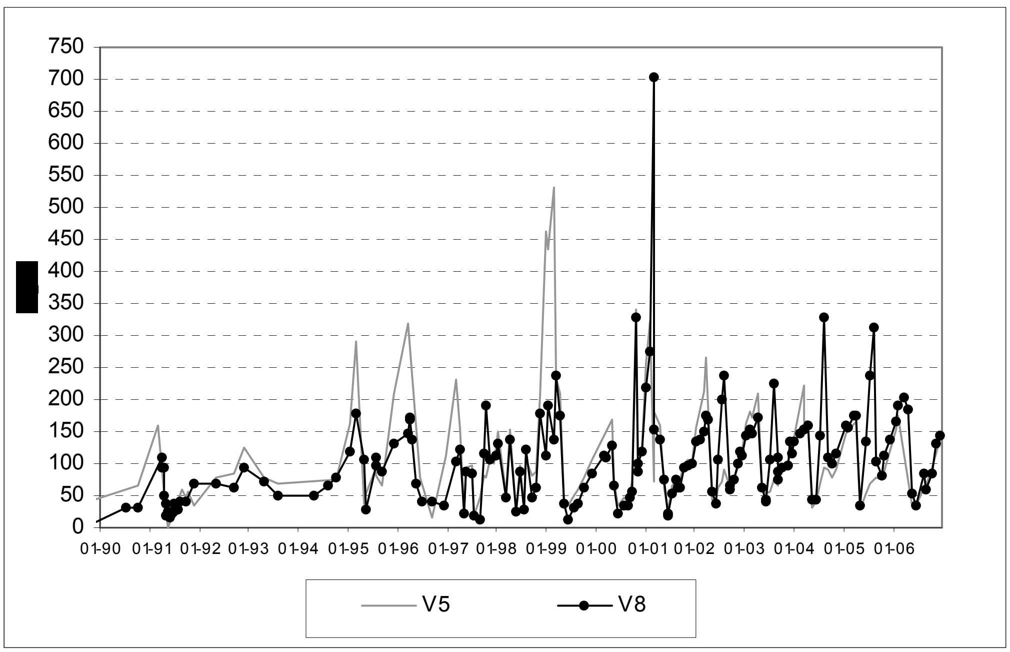


Figure 4-15. V5 and V8 Long Term Suspended Solids Trends

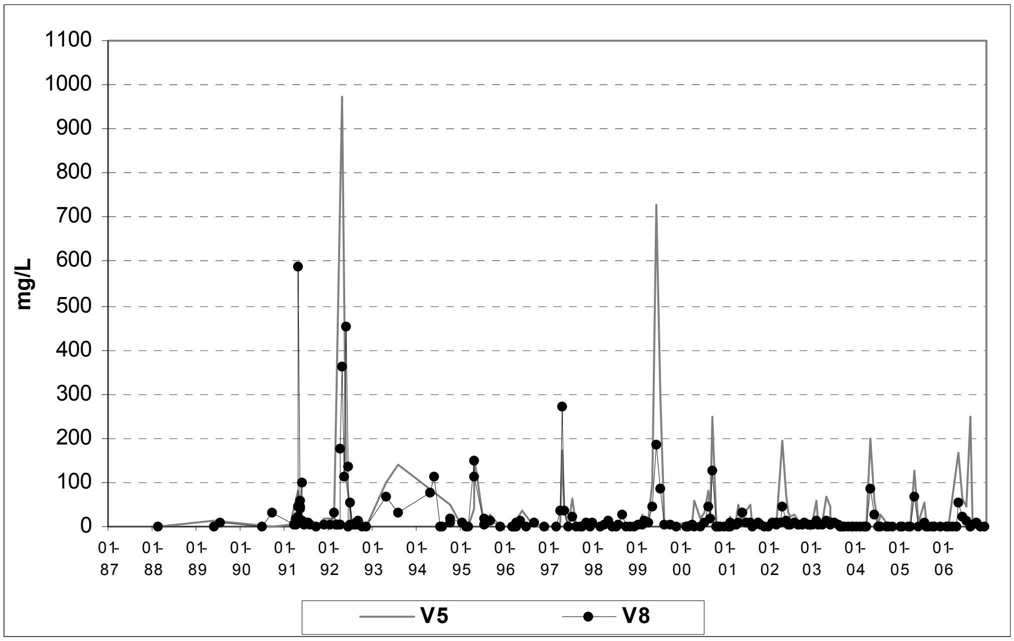
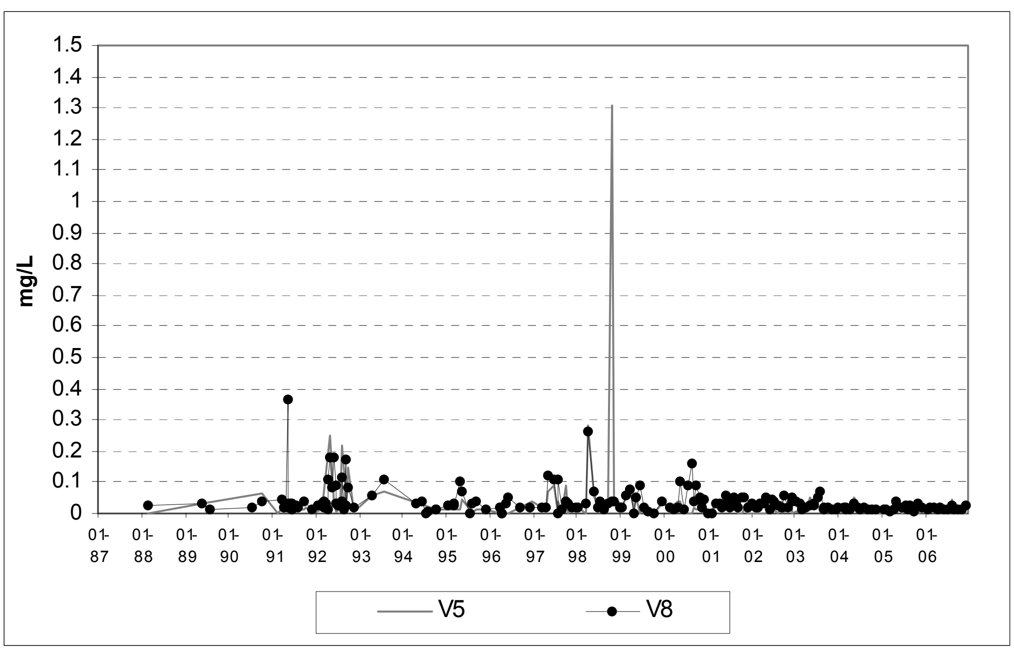


Figure 4-16. V5 and V8 Long Term Zinc Trends



5. Water Treatment Plant Performance

5.1 Introduction

5.1.1 Overview of Water Treatment Strategy

Providing adequate treatment for mine water that can not be released directly to the receiving environment is one of the fundamental purposes of the care and maintenance activities that are regulated under the Water Licence. The Water Licence provides the maximum allowable concentrations of contaminants in any water released to the receiving environment.

Heavy metals, most notably zinc, that are mobilized into water from tailings, rock piles and open pit walls are the primary contaminants of concern and the focus for water treatment. Water treatment for removal of heavy metals has been accomplished at three locations:

1. Grum/Vangorda Water Treatment Plant;
   Treats water from the Vangorda pit.
2. Mill Water Treatment System; and
   Treats water pumped from the Faro Main pit.
3. Down Valley Water Treatment System.
   Treats water siphoned from the Intermediate Pond of the Rose Creek Tailings Facility.

Water that is treated through the Mill and Down Valley water treatment systems is combined in the Cross Valley Pond prior to discharge into Rose Creek as a single effluent stream (location X5). Water that is treated through the Grum/Vangorda water treatment plant is released into Vangorda Creek via the Grum Interceptor Ditch (location V25BSP).

All three treatment systems reduce metal concentrations in water through pH-modification with lime followed by settlement of treatment sediments, either with or without the aid of flocculants. PH "normalization" after treatment is through natural atmospheric processes.

The water treatment systems are operated in a coordinated manner during the summer season. Each system is operated to reduce water levels in the source ponds to the point where treatment is not required until the subsequent summer season. This seasonal process has been undertaken since 1998 and will be required until such time in the future when the FCRP may reduce or eliminate some treatment requirements. Improvements to the general process and to the treatment systems have been implemented annually and will continue to be implemented as opportunities are identified. In the case of the Vangorda pit, the water level was lowered sufficiently in 2005 that pumping was not required in 2006 and is not anticipated in 2007.

5.1.2 Change in Management Strategy for 2007

A change to the operation of the two "Faro" water treatment systems (Down Valley and Mill) is planned for 2007. The change would see water from the Intermediate Pond and emergency tailings area pumped directly to the Mill water treatment system such that the Down Valley system would not be required.

The benefits to this approach lie primarily in taking full advantage of the efficiencies that have been established in the Mill system. The Down Valley system is a portable system that does not provide the high level of controlled lime conditioning, flocculation and settlement that is provided in the Mill. As a result, the lime usage in the Down Valley system is very high and the confidence, although acceptable, is not as high as for the Mill system.

Also, the Down Valley system generates a large volume of treatment sediments that accumulate in the Cross Valley Pond. The sediments are effectively contained and subsequently removed from an inflow area that has been constructed in recent years. However, removal of the sediments is an on-going cost and resourcing issue and has, in the past, created water quality issues in the Cross Valley Pond.

Further, elimination of primary reliance on the Down Valley system will be expected to reduce manpower and support costs.

Also, in 2007 water will be piped directly from the emergency tailings area (including rock dump seepage via location X23) to the pond area of the Intermediate Impoundment. This will deliver the full volume of poor quality water to the intermediate Pond, without losses to groundwater. This would be anticipated to further aggravate the inefficiencies of the Down Valley treatment system by further increasing lime usage and further increasing the volume of treatment sediments entering the Cross Valley Pond. This lends additional support to the importance of the change in management strategy that is planned for 2007.

This change is planned for initial implementation in 2007. Piping, pumping and treatment equipment was under installation at year-end with the intent of being operational prior to freshet 2007. The equipment includes:

- Barge mounted vertical turbine pump at the Intermediate Pond;
- Pipeline from Intermediate Pond to the Mill;
- Dual sump water collection system with cutoff trench at the emergency tailings area;
- Pump and pipeline from the emergency tailings area to the Mill;
- Gravity-feed pipeline from the emergency tailings area to the Intermediate Pond;
- Tie-in of High Intensity Conditioner and additional lime conditioning (ex floatation) cells;

- Installation of new lime distribution pumps and pipes; and
- Other various piping and instrumentation in the mill.

The Down Valley system will remain in place on a standby status in 2007 to be used if necessary while initial “start-up” issues are resolved in the mill.

5.1.3 Coordinated Operating Procedures

The treatment systems are operated in a coordinated manner through one management system. There are a number of coordinated procedures that enhance the efficiency of the process as a whole as described below.

Personnel and Safety

Each treatment system is operated by one or two 24-hour dedicated operators to ensure that lime mixing and other activities proceed smoothly. A dedicated 2-man crew is present for 12-hour day and night shifts at the Grum/Vangorda Water Treatment Plant. One operator is present at each of the the Mill and Down Valley systems linked to the security guardhouse via radio and routine safety checks. A site foreman and site manager is on call at all times.

On weekdays, an extended work crew is present that includes electrical and mechanical maintenance personnel, equipment operations and a site foreman. This extended crew completes routine maintenance and any required repairs related to the treatment systems and other related facilities. The maintenance personnel (electrical and mechanical) service all of the treatment systems and schedule time and parts ordering in a coordinated manner.

The operators maintain a logbook at each location of activities and pH readings related to operation of the treatment system and related facilities. The logbooks are reviewed as part of the annual performance review.

A centralized first aid/security attendant is present on-site at all times when one of the treatment systems is operating (i.e., 24-hours/day). The attendant is located in the Faro guardhouse and linked to each of the treatment locations via radio and scheduled safety checks.

The process is managed by the site manager who oversees all of the treatment systems and ensures that activities are carried out in a coordinated and efficient manner.

All of the activities related to water treatment are carried out according to comprehensive site-wide contingency, emergency response and safety plans. Safety plans are managed in a coordinated manner that is consistent for each treatment system.

Water Quality Sampling

WTP operators record manual pH readings at key locations within the treatment systems on a routine basis. This provides a frequent check on the installed pH probes that, in some cases, control the automated lime-addition circuitry.

Water samples for in-house use are also collected at key locations within the treatment systems on a routine basis, typically several times per day. These samples are analysed in-house each morning for total zinc. This verifies compliance and serves as a management control tool for operating the systems.

The analytical procedures for the on-site analyses have been established and in practice since 1998 and use professional grade AA (atomic absorption) equipment operated by trained and experienced assayers utilizing standard procedures to provide high quality analyses of total zinc. A logbook of zinc analyses is maintained by the assayers at the mine site. The logbook is available for review by Water Resources personnel during their site visits.

Finally, water samples are collected for external analysis on a weekly schedule when treated water is being released, as required by the Water Licence. The external analyses provide final verification of compliance and can also serve as a calibration check on the in-house assay procedures. Quarterly acute lethality tests (LC_{50} bioassays) are required for effluents.

Treatment Chemicals

Lime and flocculant are ordered in bulk to provide for all three systems. This allows for better pricing for purchase and transportation of lime. The Grum/Vangorda treatment system requires pulverized lime since there is no grinding mill and coarse lime typically plugs the lime mixing system. The Down Valley treatment system is not considered to be sensitive to pulverized versus coarse lime.

Clean Water Diversions

The diversion of clean water around the mine developments is an important component of the water treatment systems for two primary reasons.

1. Most importantly, a higher level of environmental protection is provided by minimizing the amount of clean water that may become contaminated. Even though this water would receive treatment to meet the effluent discharge criteria, the levels of zinc and, possibly, other contaminants released would likely be greater than the initial background levels.
2. Secondly, extra costs would be incurred to treat an increased volume of contaminated water. These extra costs would come from increased lime consumption, increased manpower, increased electrical power and increased operating costs.

Each of the water treatment systems has associated clean water diversions, which are described in subsequent sections for each treatment system.

Contaminated Water Collection

The collection of water that requires treatment is an important component of the water treatment systems. This prevents contamination of the receiving water. To a large degree, the water that requires treatment on the Anvil Mine property naturally collects in the various ponds from which the influent into each treatment system is drawn.

There are also several important contaminated water collection systems that are described in subsequent sections for each treatment system.

5.2 Mill Water Treatment System

5.2.1 Overview

The Faro pit pumping/treatment program has become established as an annual seasonal (summer) program. The program uses a water pumping system that was initially installed in 1997 to provide recycle water to the mill (an estimated minimum 95%) prior to mine shut down in February 1998. Since mine shut down, the system has been used exclusively to pump water from the Faro Main Pit for treatment and release to Rose Creek. This program maintains the in-pit water level within the pre-determined “safe” range that protects against an inadvertent release of contaminated water.

The water pumping system is made up of the following primary components:

1. Three electric pumps mounted on a floating barge in the pit rated at providing 5,000 USgpm each to the mill (only one or occasionally two pumps are utilized for effluent discharge);
2. 30” sclair pipeline from the barge to the mill with flexible sections near the barge to prevent damage to the pipeline which might otherwise result from vertical movement of the barge; and
3. Overhead powerline from the substation adjacent to the mill to the pumping barge. A new line was installed in 2005 that provides the electricity required for the pumps in a more efficient and safe manner.

From 1997 through 2001, water pumped from the Main pit was mixed with lime slurry in an open mix box at the mill and allowed to flow to the Intermediate Impoundment for settlement of lime sediments. This was an inefficient use of lime but provided for pre-treatment of a dominant inflow into the Intermediate Pond such that the requirement for treatment at the outflow of the Intermediate Pond was reduced compared to what would otherwise have been required. That is, pre-treatment of the Main pit water provided a large inflow of high-pH water into the Intermediate Pond.

In 1997 and 1998, outflow from the Intermediate Pond (location X4) became compliant with the Water Licence (<0.5 mg/L zinc) following approximately 4 to 6 weeks of inflow of pre-treated water from the Main pit. As a result, lime treatment of the outflow was discontinued for the remainder of those pumping/treatment programs. The lag-time was anticipated given the need for displacement of non-compliant water that was in the pond initially. In 1999, 2000 and 2001, the concentration of zinc in the Intermediate Pond effluent (location X4) was reduced but not to the licence limit and, therefore, treatment of the effluent in the outflow spillway was continued for the duration of the pumping/treatment program.

This manner of treatment was an inefficient use of lime and created risk at the Intermediate Dam by having the pond water constantly at the full supply level. The risk was related to both the physical stability of the dam and to the lack of any emergency freeboard to contain and hold high or unexpected flow events. Therefore, to mitigate these risks and to provide for a more efficient treatment process, part of the mill was "retrofitted" in 2001 to serve as a water treatment system. This included both activation of existing equipment and installation of new equipment. Further refinements and optimizations have been implemented since 2001.

The general objective for the mill treatment system is to remove zinc from the Main pit water such that the effluent is compliant with the Water Licence (0.5 mg/L total zinc) at a flow rate that is high enough to treat the required annual volume of water in the summer season. Compliant effluent can be discharged either into the Cross Valley Pond or into Rose Creek via the Cross Valley Dam outflow spillway (location X5). In the event of an upset condition in the plant that results in temporarily non-compliant effluent, the plant water can be released into the Intermediate Pond. Treatment sediments are temporarily stored in the plant and periodically removed from the system.

The clarity and quality of the influent water (from the Main pit) has, to date, been acceptable for reagent mixing and there has been no need for a freshwater supply for this purpose.

The mill treatment system was constructed and debugged in 2001 and has been successfully operated since 2002. Water treatment has continued to be required at the outflow from the Intermediate Pond (Down Valley Treatment System). The volume of water requiring treatment in the Down Valley is reduced, however, because water pumped from the Main pit bypasses the Intermediate Pond.

The mill treatment system includes the following primary components:

1. New 24-inch influent pipeline from the Main pit;
2. Existing lime handling, storage and mixing system;
3. Lime conditioning in two sets of flotation cells operated in parallel with automated control on lime addition;
4. New 24-inch pipeline to settlement tanks;

5. Two settlement tanks (previous thickener and clarifier) operated in series or in parallel with optional lime and flocculant addition;
6. New instrumentation and control systems;
7. New flocculant mixing and distribution system;
8. Sediment storage tank (previous clarifier);
9. New 24-inch effluent pipeline with optional discharge into the Cross Valley Pond or the Cross Valley dam outflow spillway; and
10. treatment sediment removal and storage system (installed 2005).

The new system provides many benefits over the previous treatment methods that include:

- Reduction in lime consumption (and resultant cost savings);
- Increased confidence in achieving objectives;
- Improved control on operating parameters including automated controls;
- Incorporation of contingency/emergency procedures;
- Reduction in deposition of treatment sediments in Cross Valley Pond;
- Productive use of existing infrastructure; and
- Substantial reduction in the volume of water requiring treatment at the Cross Valley Pond.

In 2007, a change is planned for the Mill water treatment system through the introduction of water from the Down Valley. This is described in Section 5.1.2.

5.2.2 Clean Water Diversions

Clean water is diverted around the Main pit to as great a degree as practical through the Faro Creek Diversion and the Faro Valley Interceptor Ditch. Additionally, in 2005 water diversions above the north area of the Faro Main pit were upgraded, to improve the diversion of clean water away from the pit and into the catchment area of the North Wall Interceptor Ditch.

Faro Creek Diversion

The Faro Creek Diversion collects water from the original Faro Creek channel upstream of the Main pit and diverts the water around the northeast side of the Main pit and into the North Fork of Rose Creek. Some flow in the old Faro Creek drainage area cannot be collected by gravity into the Faro Creek Diversion and continues to flow directly into the Faro Main Pit. During historical mine operations, this excess flow was pumped around the pit perimeter at times.

Important maintenance work was performed on sections of the diversion channel in 2002 and 2003 that is considered to have substantially reduced leakage from the channel into the Main pit. The work consisted of bottom grading, excavation of a pilot channel for low winter flows and placement of a geomembrane liner and rip rap erosion protection in select locations. Follow up work has also been completed since

2003 that includes maintenance of roadside ditches and grading of the road surface away from weaker areas of the pit wall.

Site management noted a reduction in pit inflows following the 2002/03 work. A review of whether the benefits of this work are evident in a simple water balance for the pit is provided in Section 5.2.4, Water Quantities.

Faro Valley Interceptor Ditch

Runoff from the hillsides north and northwest of the Faro Valley Rock Dump is intercepted by the Faro Valley Interceptor Ditch and directed into the Faro Creek Diversion. The ditch is a simple excavation into the native surficial soil and rock.

Important maintenance work has been performed on the ditch from 2002 through 2005 that substantially restored its effectiveness in passing clean runoff water to the Faro Creek Diversion. The work consisted primarily of bottom grading and excavation of slumped and eroded sections of the ditch.

These improvements to the Faro Valley Interceptor Ditch also contribute to the improvements and benefits described for the Faro Creek Diversion.

5.2.3 Contaminated Water Collection - Zone II Pit

Contaminated water is collected in the backfilled Zone II pit. This water is runoff and seepage through the various rock dumps that lie within the catchment area of the Zone II Pit. Water accumulates in the pit and is pumped into the Main pit at the south end. Pumping is typically required on an occasional basis through the summer season only.

5.2.4 2006 Operations

Water Quantities

An estimated 1.28 million m^3 was treated through the Mill in 2006. There were 99 pumping days from June 1 to September 8, inclusive of occasional brief shut downs for maintenance and more frequent shit downs for removal of treatment sediments).

The water level in the Main pit was lowered by approximately 1.6 m during the pumping period and ended the year at an estimated 3855.65 ft asl (mine datum), which was 0.03 m higher than at the start of the year. As a result, the storage volume created is adequate to contain the anticipated inflows until the scheduled restart of pumping in summer 2007. The pit water levels have been illustrated on Figures 2-2 and 2-3.

The volume pumped from the pit in 2006 was the lowest since 2000 (Table 5-1), with the exception of 2004, which was lower. The volume pumped in 2004 was considerably less due to issues regarding cyanide analyses, which were resolved early in 2005. Table 5-1 also lists the annual change in pit level, estimated annual net inflows and annual precipitation. These values suggest that the 2006 pumping program maintained an overall constant water elevation with a relatively low volume of water pumped out.

It is of interest to investigate whether the maintenance work on the clean water diversion ditches results in a noticeable difference in the amount of water entering the Faro Main Pit, as calculated through the pit water balance.

The estimated volumes of annual net inflows are plotted against annual precipitation on Figure 5-1. The plot suggests that there is a consistent linear relationship between net inflows and precipitation for the five years up to 2003 (R^2=0.87). Figure 5-1 suggests that there may be a different relationship between net inflows and precipitation for 2004 and 2005 wherein the net inflows are less than preceding years. This can reasonably be linked to the maintenance work performed on the Faro Pit diversions, primarily from 2003 through 2005. If true, then this simply confirms the observations of site management. For 2006, the natural inflows entering the pit versus total precipitation is close to the relationship for 1999-2003, which is not necessarily as supportive of the effects of the maintenance work. Another means of demonstrating this trend is the "Inflow Factor" listed in Table 5-1, which shows a lower factor for 2004 and 2005 than for other years.

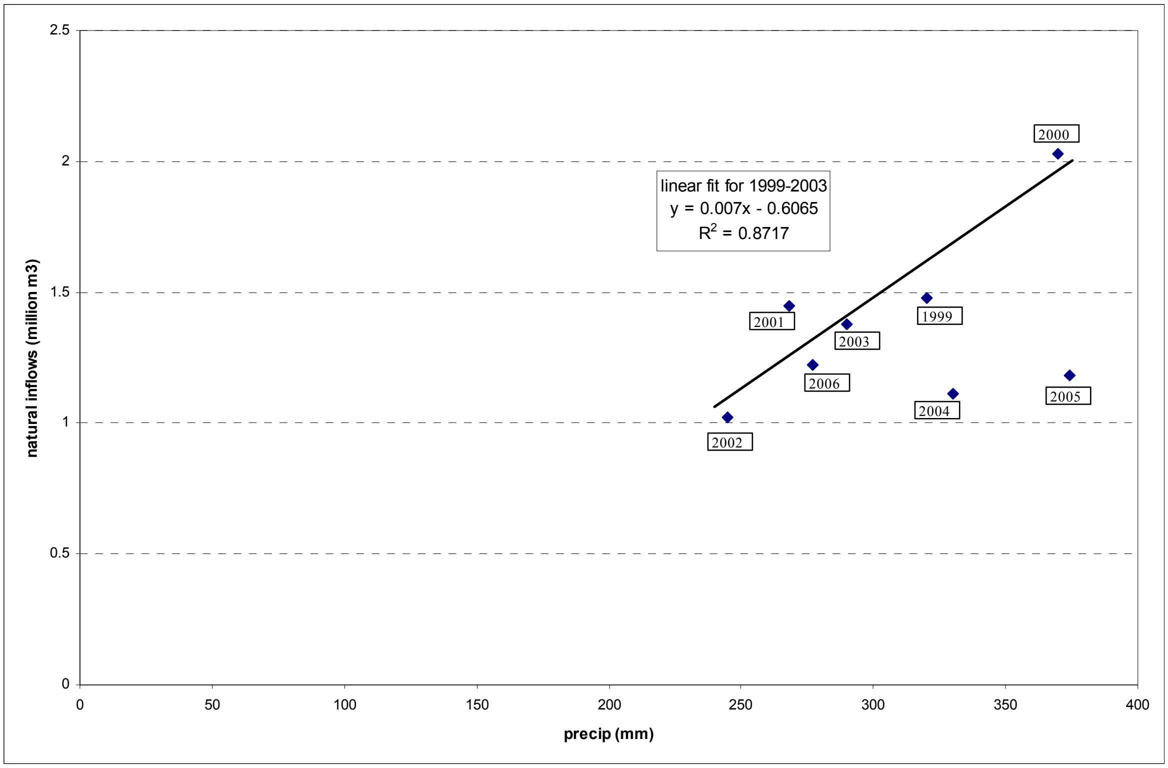
Continued annual assessments of inflows, and particularly the detailed analyses being conducted for the FCRP, may confirm or disprove this suggestion.

Table 5-1. Summary Main Pit Water Volumes

Year	Water Treated[1] (million m^3)	Annual Change in Pit Level[1]	Natural Inflows[1] (million m^3)	Annual Precipitation[2] (mm)	Inflow Factor[3] (million L/mm)
1999	1.06	+0.9 m	1.48	320	4.6
2000	1.80	+0.6 m	2.03	370	5.5
2001	1.93	-0.7 m	1.45	268	5.4
2002	1.94	-1.5 m	1.02	245	4.2
2003	1.76	-0.5 m	1.38	290	4.8
2004	0.78	+0.7 m	1.11	330	3.4
2005	1.62	-2.1 m	1.18	374	3.2
2006	1.28	+0.0 m	1.22	277	4.4

Notes: 1. As reported in the Annual Environmental Reports.
2. At the Faro airport as compiled by BGC Engineering Inc. as summarized from Table 2-2.
3. Calculated as natural inflows divided by annual precipitation.

Figure 5-1. Main Pit Precipitation versus Natural Inflows



Lime Usage

A total of 200 t (220 short tons) of lime was utilized in 2006 for an overall lime usage rate of 0.16 g/L. Lime usage has been reported in these Annual Environmental Reports since 2004 as listed in Table 5-2.

Table 5-2. Mill WTP Lime Usage

Year	Est. Lime Usage (g/L)
2004	0.12
2005	0.11
2006	0.16

Table 5-2 shows that lime usage was higher in 2006 than 2004 or 2005. It is thought that residual algae from the in-pit nutrient fertilization tests resulted in an additional demand for lime in 2006.

Water Quality

In order to monitor the treatment performance of the Mill, water samples of the (treated) Mill outflow were routinely collected and analysed in-house each morning for total zinc. This verified compliance and served as a management control tool for plant operations. Water samples were collected more frequently and at additional locations as required to manage the system. The Water Licence does not regulate the quality of water within the Mill water treatment system.

WTP operators recorded manual pH readings at the outflow of the Mill at least twice per day as a check on the automated pH monitoring probes. The pH readings through 2006 ranged from 10.1 to 10.9. Manual checks were recorded more frequently and at additional locations as required to manage the system.

Water that is treated in the Mill was not discharged directly to Rose Creek in 2006. The water was released into the southeast corner of the Cross Valley Pond, using a new inflow area that had been prepared for this purpose in early 2005. The inflow area provides a discharge/stilling well (vertical culvert pipe) to dissipate the energy of the incoming water and a (rock) bermed settlement area to contain solids and to further still the water prior to flowing into the pond.

This practice replaced the previous practice of releasing (treated) mill water into the Intermediate Dam spillway where it would then mix with water syphoned from the Intermediate Pond as it flowed into the Cross Valley Pond. The new system is intended to provide the following advantages:

- the reduction of flows in the spillway reduces the risk of water “short-circuiting” from the inflow spillway to the outflow syphons;
- the reduction of flows in the spillway allows for better settlement and containment of solids from the (treated) Intermediate Pond water;
- the energy dissipation structures provide for good settlement and containment of any residual solids in the (treated) mill water;
- improved containment of solids facilitates more effective removal of those solids from the pond; and
- improved containment of solids reduces the risk that metals might be remobilized within the pond as a result of wave action.

Site management’s observations in 2005 and 2006 confirmed that the new practice worked well and successfully provided the anticipated benefits over previous practices.

The water released from the Cross Valley Pond (location X5) is the final effluent discharged to Rose Creek and includes both water treated in the Mill and water siphoned (and treated) from the Intermediate Pond. Water quality for the final effluent (location X5) is described in Section 3.3. In 2006, the intake of the effluent discharge syphon was suspended on a floating raft that maintained a consistent depth of water over the intake. This ensured that effluent was discharged from the near-surface zone of the pond, as desired.

Treatment Sediments

Treatment sediments from the Mill were deposited in the Intermediate Pond of the Rose Creek Tailings Facility from 2001 to 2004. This was accomplished by periodically flushing the sediment storage tank in the Mill into the pipeline that passes across the emergency tailings to below the mine access road.

A sediment management study was completed by SRK Consulting and submitted to the Water Board in 2004 as required under Part F, Item 51 of the Water Licence. The study recommended that sediments from the Mill be deposited within a containment berm on the Original Impoundment. This location is already disturbed by mining development (tailings) and provides an adequately large working space. The 2004 sediment study provided an estimated annual sediment production rate of 4,400 m^3/month for the mill, based largely on data from the 2003 operating season.

The disposal area and a gravity-operated pipeline from the mill were constructed during winter 2004/05 to take advantage of frozen conditions on the tailings for construction of a containment berm. The containment berm was constructed by excavation of tailings (cut and fill) to a size estimated to contain sediment for several years of operation of the Mill and Down Valley water treatment systems.

The disposal area was successfully utilized in 2006. In 2006, as was also experienced in 2005, a greater than "normal" amount of sediments were pumped from the Mill. This was the result of the fertilizer test program in the Main pit, as described below under "Operating Issues".

2006 Operating Issues

The largest negative operating issue in 2006, as was the case in 2005, was a large amount of algae entering the system from the Faro Main pit. Because of the 2005 experience, this issue was planned for in 2006 and was managed in an effective manner, primarily by frequent cleaning of the settlement tanks.

An in-pit fertilization program was conducted in 2005 to test the degree of natural biological removal of zinc that might be achieved in the long-term (i.e., for the FCRP). The program generated an unexpectedly large quantity of algae in 2005 that caused disruptions and operating problems in the Mill water treatment system. Once inside the water treatment system, the algae prevented effective mixing and settlement and effectively "clogged-up" the system. The in-pit fertilization program was suspended early in 2005 for this reason.

The in-pit fertilization program was not repeated in 2006 but the presence of a large quantity of algae remained. The primary clarifier and thickener tanks were cleaned on a daily basis through most of the 2006 operating season, which required approximately 2 hours per day of downtime. The operator's logbook records observations of plugged screens and a "fish" smell in the water. Algae is thought to also have played a role in the higher lime usage observed in 2006.

In addition to the items noted above, the operator's log book describes minor maintenance issues that were not of the type that affected the overall performance of the system. The issues were all managed to prevent any negative effect on the treatment system.

Some general maintenance issues that were addressed in 2006 included the following:

- Repair and replacement of several sections of the effluent outflow pipe between the mill and the Cross Valley Pond;
- Installation of stairs to the thickener and clarifier underflow tunnels (replacing the previous ladders) as a safety measure;
- Screens were installed on the thickener and clarifier underflow pumps to prevent plugging of pipelines; and
- The outdoor drop box for treatment sediments was stabilized to prevent movement due to soil slumping.

Comments for 2007 Operations

In 2007, water from the Down Valley (Intermediate Pond) and emergency tailings area is planned to be treated through the Mill water treatment system. This will eliminate the reliance on continuous operation of the Down Valley treatment system. This represents a change to the Mill treatment system through the introduction of a large flow of water of poorer quality than the Faro pit water. The treatment process is expected to perform well, based on past experience with this water.

The performance of the Mill system as regards to water quality and mechanical availability has continued to be excellent. The expansion of the system to include the Down Valley water will require additional equipment with calibration and maintenance requirements. There is no reason to anticipate any major mechanical issues beyond some generally anticipated "start-up" issues that can be managed by careful monitoring and management of the system as it is brought on-line.

The operators maintain a detailed log book of activities and pH readings. The on-site laboratory provides daily zinc assays for management of the system. The site manager maintains a monthly status report that also documents unusual events or repairs. These practices should continue and be expanded as necessary to provide the same level of control and reporting on the Down Valley water.

Accurate flow monitors should be installed and monitored on all of the Mill inflow pipelines: Faro pit, Intermediate Pond, and emergency tailings area. Especially in light of the proposed introduction of additional water flows into the mill in 2007, this will maintain accurate water balances for the water management systems.

Two primary pipelines suffered damage due to rapid freezing in November 2006 and will require repair prior to use in 2007. These are the Faro Pit water pipeline to the mill and the Mill effluent pipeline to the Down Valley. Site management has pre-reserved a sclair fusing machine and technician to complete these repairs in spring.

5.3 Down Valley Water Treatment System

5.3.1 Overview

The Intermediate Impoundment was used for tailings deposition from 1986 to 1992. Following the cessation of tailings deposition in 1992 and until 1997, there was a general increase in the concentration of zinc in water flowing through the Intermediate Pond. This was the anticipated trend attributed to:

- The removal of a large inflow of alkalinity that previously entered the pond via the tailings slurry;
- The continued inflow of contaminated rock dump seepage water via location X23; and
- The continued flushing of contaminants by run off over beached (exposed) tailings in the upstream portion of the Intermediate Impoundment.

Water treatment at the outflow of the Intermediate Pond (the “Down Valley”) was started in 1992 to ensure that surface outflow from the Cross Valley Pond met the allowable discharge limits. Water treatment has continued, on an as-required basis, since that time. The methods employed for the treatment have involved raising the pH of the Intermediate Pond effluent with lime or sodium hydroxide and subsequently utilizing the Cross Valley Pond for settlement of the treatment sediments. The pH modification has been accomplished at various times by:

- Hauling lime slurry mixed in the mill to a gravity feed tank for addition into the outflow spillway;
- Delivering lime slurry mixed in the mill to the outflow spillway via an overland pipeline;
- Hauling lime slurry mixed in the Grum/Vangorda Water Treatment Plant to the south abutment of the dam for addition into a syphon line;
- Adding sodium hydroxide into a syphon line at the south abutment;
- Inflow into the upstream end of the Intermediate Pond of water pumped from the Faro Main Pit that was pre-treated with lime at the mill in conjunction with supplemental treatment with lime slurry delivered to the outflow spillway; and
- Mixing of lime slurry at the Intermediate Dam outflow spillway and addition into overflow or syphoned outflow entering the Cross Valley Pond.

From late 1997 through 2001 (the second to last bullet above), water flowing from the Intermediate Pond was treated with lime slurry delivered to the outflow spillway via either an overland pipeline or tanker truck to a stationary tank (~10,000 gal) with gravity feed into the spillway. This was an inefficient use of lime and an awkward and labour intensive system. The overland pipeline was prone to breaks, sanding up and freezing. Haulage via tanker truck required numerous trips and near-continuous attendance at the gravity drain tank/valve. Settlement of lime in either the overland pipeline or the stationary tank was also problematic as regards to sanding of pipes and valves and inefficient use of lime. Additionally, this approach produced a large build up of sediment at the base of the spillway due to inefficient lime mixing and general overaddition of lime.

In 2002, the manner of treatment at the Intermediate Dam outflow spillway was upgraded with the installation of a treatment system which mixes lime slurry from dry lime for direct addition into the contaminated water. Water is syphoned from the Intermediate Pond into a mixing tank where the lime slurry is added. Water from the mixing tank then flows into the Cross Valley Pond for settlement of treatment sediments. Refinements and improvements to this system have been implemented since 2002 and the system continued to be effectively used through 2006.

The system consists of the following primary components:

- 14-inch syphon line from the Intermediate Pond to the water mixing box;
- dry lime hopper with capacity of approximately 3 tons;
- portable water pump and associated pipeline to provide lime mix water (from the Cross Valley Pond);
- lime feed pump and pipeline from lime tank to water mixing box;
- pipeline from the water mixing box to the Cross Valley Pond;
- portable diesel generator; and
- portable office for operator use.

The system was operated successfully through 2006 to maintain the Intermediate Pond level below the overflow spillway, per the established management strategy.

In 2007, a change is planned for the Down Valley water treatment system through the pumping of water to the Mill treatment system. This would ultimately eliminate the need for the Down Valley system. This is described in Section 5.1.2.

5.3.2 Clean Water Diversions

Clean water is diverted around the Intermediate Pond to as great a degree as practical through the North Wall Interceptor Ditch and the Rose Creek Diversion Canal.

North Wall Interceptor Ditch

The North Wall Interceptor Ditch intercepts clean runoff from the north side of the Rose Creek Valley and diverts it around the north abutment of the Cross Valley Dam.

The North Wall Interceptor Ditch is an open ditch excavated in a variety of materials, ranging from silty sand and gravel till to coarse sand and gravel alluvium and bedrock. The ditch has performed reasonably well although erosion and sedimentation have caused partial blocking of this ditch at times. Periodic maintenance and repairs have been completed as required. In 2005, water diversions above the north area of the Faro Main pit were upgraded, which will improve the diversion of clean water away from the pit and into the catchment area of the North Wall Interceptor Ditch.

Rose Creek Diversion Canal

The Rose Creek Diversion Canal passes Rose Creek water around the Rose Creek Tailings Facility. The Diversion was developed in two stages, referred to as the Upper and Lower Diversions. The Upper Diversion was constructed in 1974 in conjunction with the development of the Second Tailings Impoundment. The Lower Diversion is an extension of the Upper Diversion. It was constructed in 1980-81 in conjunction with the development of the Intermediate Impoundment.

Water from both the South and North Forks of Rose Creek enters the upper section of the Rose Creek Diversion Channel. The upper section is a predominantly straight channel that includes a number of drop weirs in addition to riprap for erosion protection.

The lower section passes water along the south side of the Intermediate Impoundment and returns flow into the natural Rose Creek Channel downstream of the Cross Valley Dam. The lower section includes a series of boulder-lined drop structures and a sharp corner at the downstream end. The lower section is constrained by natural slopes on the south side and by a till dyke on the north side. The crest of the diversion dam, which diverts the flow from the upper section into the lower section, was constructed approximately 1 m lower than the crest of the adjacent diversion canal dyke, and armoured with riprap. This was done to ensure that any flows in excess of the design flow overtop the diversion dam at that location into the Intermediate Impoundment. In 2004, the containment dyke (roadway) along portions of the lower section was rebuilt to restore the freeboard necessary to safely pass the design (1:500 year) flood.

The canal is prone to ice build up over the winter and clearing of ice has been required on occasion. Visual inspection and instrumentation have been used to monitor the condition of the canal. Repairs to the backslope and dyke crest have been completed to maintain conformance with design parameters.

5.3.3 Contaminated Water Collection

Contaminated water flows to the Intermediate Pond by gravity drainage via (lower) Guardhouse Creek, the old Faro Creek channel and across exposed tailings. Lower Guardhouse Creek is a small portion of the original catchment of Guardhouse Creek that receives some of the runoff from the plantsite area. The old Faro Creek channel is a drainage path for seepage from the rock dumps and plantsite areas. These channels are relatively short and lie completely within the Intermediate Pond cachment area such that little maintenance is required. Maintenance work has been focused on maintaining culverts at road crossings.

The changes planned for 2007 include the ability to capture contaminated water from the Faro rock piles (location X23) and the emergency tailings area in the old Faro Creek channel. This is described in Section 5.1.2. The new system would provide the ability to pass this water directly to the Intermediate Pond via a gravity flow pipe, thereby eliminating seepage losses to the aquifer. The new system would also provide the ability to pump this water directly to the Mill water treatment system, thereby reducing contaminant loading into the Intermediate Pond.

5.3.4 2006 Operations

Water Quantities

An estimated 634,700 m^3 was treated through the Down Valley system in 2006 over 102 operating days from April to July. This includes an estimated 165,000 m^3 of water that was pumped from the Cross Valley Pond in early 2006.

The water level in the Intermediate Pond was about the same (+0.01 m) at year-end as at the beginning of the year. The storage volume created is adequate to contain the anticipated inflows until the scheduled restart of dewatering in 2007. The pond water levels have been illustrated on Figure 2-4.

The estimated volume moved in 2006 is consistent with the volumes estimated for 2004 (0.64 million m^3) and 2005 (0.69 million m^3).

Lime Usage

A total of 308 t (340 short tons) of lime was utilized for an overall lime usage rate of 0.48 g/L. This is more than the lime usage estimated for the Mill system, due to the less efficient treatment method.

The higher lime usage in the Down Valley is related to the higher target pH (typically 10.5 to 11.0), which is necessary to achieve treatment because of the absence of intimate lime conditioning and flocculation.

Lime usage has been reported in these Annual Environmental Reports since 2004 as listed in Table 5-3.

Table 5-3. Down Valley WTP Lime Usage

Year	Est. Lime Usage (g/L)
2004	0.26
2005	0.34
2006	0.48

Water Quality

Water that is treated in the Down Valley system is not discharged directly to Rose Creek. The lime treated water is released into the Cross Valley Pond at the base of the inflow spillway. An inflow area was developed by construction of a rock berm at the base of the inflow spillway. The berm dissipates inflow energy and promotes more effective settlement and containment of treatment sediments. The berm also directs inflow water towards the centre of the pond to minimize the risk of water "short-circuiting" to the outflow syphons. The Water Licence does not regulate the quality of water within the Down Valley water treatment system.

The "sludge containment area" was enhanced in 2006 by the placement of additional rip rap rock and grading of berms. The experience of site management in 2006 confirmed that this practice worked well and successfully provided benefits in sludge recovery and water quality in the Cross Valley Pond.

In order to monitor the performance of the Down Valley system routine manual pH measurements in the mixing box (where mixed lime is added into the water siphoned from the Intermediate Pond) are recorded in a logbook on an hourly basis. The target pH is generally 10.5 to 11.0. The pH readings through 2006 indicate that this was achieved with very few upsets. The target pH is substantially higher than for the other treatment systems because of the lower level of lime conditioning and absence of flocculation.

The water released from the Cross Valley Pond (location X5) is the final effluent discharged to Rose Creek and includes both Intermediate Pond water treated through the Down Valley system and (treated) water from the Faro Pit/Mill. Water quality for the final effluent (location X5) is described in Section 3.3. In 2006, the intake of the effluent discharge syphon was suspended on a floating raft that maintained a consistent depth of water over the intake. This ensured that effluent was discharged from the near-surface zone of the pond, as desired.

Treatment Sediments

In 2002, a large quantity of treatment sediments had accumulated in the Cross Valley Pond at the base of the inflow spillway. The sediments were negatively affecting water quality in the Cross Valley Pond through resuspension on windy days. A large portion of the sediments (that portion that was accessible) was removed in 2002 to the Main pit to restore the efficiency of the Cross Valley Pond for settlement of treatment sediments.

A sediment management study was completed by SRK Consulting and submitted to the Water Board in 2004 as required under Part F, Item 51 of the Water Licence. The study recommended that sediments from the Down Valley system be deposited within a containment berm on the Original Impoundment. This location is already disturbed by mining development (tailings) and provides an adequately large working space. The 2004 sediment study provided an estimated annual sediment production rate of 1,400 m^3/month for the Down Valley system, based largely on data from the 2003 operating season.

The disposal area, including gravity-feed pipeline from the Mill, was constructed during winter 2004/05 to take advantage of frozen conditions on the tailings for construction of a containment berm. The containment berm was constructed by excavation of tailings (cut and fill) to a size estimated to contain sediment from several years of operation of the Mill and Down Valley water treatment systems.

Treatment sediments were excavated from the Cross Valley Pond, following established practices, and hauled by truck to the new disposal area in 2006. An estimated 17,000 m^3 was moved in March. A further 300 m^3 was removed in May.

Beginning in summer 2006, a vacuum truck system was used to enhance the sediment recovery process. A vacuum truck was used to recover sediment from the pond inflow area and pump the sediment to a contained inner storage cell. This procedure increases the amount of sediment recovered from the Cross Valley Pond (as compared to simple excavation) and facilitates loading of the recovered sediment into trucks. The 30-ton crane was used to extend the reach of the suction intake further into the Cross Valley Pond.

Sediment that had been consolidated in the storage cell was hauled (by truck) to the disposal area in November and December. This timing takes advantage of frozen conditions for accessibility to the disposal area. An estimated 1,580 m^3 (132 truck loads) had been moved at year-end with an estimated 30 truck loads remaining to be hauled in January.

2006 Operating Issues

The operator's log book describes minor maintenance issues that were not of the type that affected the overall performance of the system. The issues were all managed to prevent any negative effect on the treatment system.

Some general maintenance issues that were addressed in 2006 included the following:

- Installation of an agitator from an (ex) floatation cell in the Mill for use in the Down Valley treatment box; and
- Maintenance and placement of rip rap rock at the sediment containment cell and the inflow to the Cross Valley Pond.

Comments for 2007 Operations

In 2007, water from the Down Valley (Intermediate Pond) and emergency tailings area is planned to be treated through the Mill water treatment system. This will eliminate the reliance on continuous operation of the Down Valley treatment system. This represents a change to the Down Valley treatment system as it will be operated only on an as-needed, standby basis. The Mill treatment process is expected to perform well, based on past experience with this water.

The performance of the Mill system as regards to water quality and mechanical availability has continued to be excellent. The expansion of the system to include the Down Valley water will require additional equipment with calibration and maintenance requirements. There is no reason to anticipate any major mechanical issues beyond some generally anticipated "start-up" issues that can be managed by careful monitoring and management of the system as it is brought on-line.

The operators maintain a detailed log book of activities and pH readings in the Mill water treatment plant. The on-site laboratory provides daily zinc assays for management of the system. The site manager maintains a monthly status report that also documents unusual events or repairs. These practices should continue and be expanded as necessary to provide the same level of control and reporting on the Down Valley water.

Accurate flow monitors should be installed and monitored on all of the Mill inflow pipelines: Faro pit, Intermediate Pond, and emergency tailings area. Especially in light of the proposed introduction of additional water flows into the mill in 2007, this will maintain accurate water balances for the water management systems.

The Down Valley system should remain in place through 2007 such that it can be started-up quickly on an emergency basis, if necessary.

5.4 Grum/Vangorda Water Treatment System

5.4.1 Overview

The Grum/Vangorda Water Treatment Plant (the "WTP") is a conventional lime treatment system that was constructed in 1990. The WTP was successfully utilized during mine operations at the Vangorda Plateau mine site (1990 through 1997) to treat water pumped from the Grum and Vangorda pits. The WTP was closed when mine operations were suspended in early 1998 and was reactivated in 2002.

The need for reactivation of the WTP stemmed from the level of water in the Vangorda pit. In early 2002, the water level had reached the maximum desired elevation and, therefore, the water level needed to be drawn down in order to maintain adequate emergency storage capacity. The maximum desired water elevation was suggested to be 1091.8 m in a memo prepared by Gartner Lee Limited dated February 13, 2001. This memo brings hydrologic data forward from the 1996 Integrated Comprehensive Abandonment Plan that provided a rationale an elevation of 1091.8 m, approximately 30.7 m below the assumed overflow elevation out of the pit.

From 2002 through 2005, the WTP was operated during the summer season fundamentally as it had been during mine operations (pre-1998) although some mechanical and electrical upgrades were installed. Water was pumped to the WTP from the Vangorda pit on a seasonal summer basis to draw the pit water level down so that it remained below the recommended maximum elevation. There was no other water at the Vangorda Plateau mine site that required treatment through the WTP since water from Little Creek Dam is incorporated into the Vangorda pit.

In 2006, the WTP was not operated because a sufficiently large volume of water from the Vangorda pit had been treated in 2005 such that the pit did not require pumping in 2006 and pumping is not anticipated for 2007. Operation of the WTP is scheduled again for 2008.

The WTP was designed by Cominco Engineering Services Limited (CESL) and constructed in 1990. The process is a "conventional" lime treatment system that was designed to treat 2,000 USgpm (454 m^3/hr) at the water influent quality predicted for mine operations. The primary components of the treatment system are as follows:

- Lime storage silo;
  Capacity of approximately 40 tons,
- Freshwater supply for reagent mixing;
  Was initially groundwater and changed to clean surface water for 2002.
- Lime mixing system;
  Does not include any grinding or heat-controlled slaking.

- Lime addition system;
  Can be managed manually or by automated pH control circuitry.
- Dual lime conditioning tanks;
  Provides total 14 minutes strong mixing at maximum design flow (2,000 USgpm/454 m^3/hr).
- Flocculant mixing system;
  Can be managed manually or by automated control circuitry.
- Flocculant addition system;
  Can be managed manually or by automated control circuitry.
- Flocculant agitation tank;
  Provides 2 minutes light mixing at maximum design flow (2,000 USgpm/454 m^3/hr).
- Clarification pond influent pipe; and
  Was initially underground and changed to above ground for 2002.
- Clarification pond.
  Provides design 36 hours retention time at maximum design flow (2,000 USgpm/454 m^3/hr*).*

When the plant was reactivated in 2002, there was some uncertainty regarding the flow rate that could be achieved, given that the influent water quality was substantially poorer than it had been during mine operations. However, four years of performance data (2002 to 2005) have demonstrated that the initially designed flow rate of 2,000 USgpm (454 m^3/hr) remains valid.

5.4.2 Changes from Previous Operations

There are several substantial changes to the current water pumping and treatment systems as compared to previous operations (i.e. pre-1998). The most significant of those are summarized as follows:

Influent Water Quality: The general quality of the current influent is substantially poorer than pre-1988 due to the source of the water. Prior to 1998, the source of influent was a combination of water from the Vangorda pit/Little Creek Dam and the Grum pit whereas the single source of influent since reactivation of the plant has been the Vangorda pit, which has historically (and currently) contained poorer quality water than Grum pit. For example, the average concentration of total zinc in WTP influent through 1996 and 1997 was 18.6 mg/L as compared to the concentration of total zinc in the Vangorda Pit in 2005 which ranged from 65 mg/L to 98 mg/L.

Pumping System: The current pumping system was installed in 2001 in preparation for reactivation of the WTP. The system is an overland system from the Vangorda pit that replaces the previously utilized buried pipeline from Little Creek Dam. The new system reduces the risk of environmental contamination due to pipeline breaks by providing for visual inspection of the pipeline and, specifically, by eliminating the buried haul road crossing where the pipeline of raw WTP influent lay directly atop the culvert passing clean Vangorda Creek water in the opposite direction. Additionally, the new system is capable of delivering 2,000 USgpm (454 m^3/hr) to the WTP whereas the previous system could deliver an estimated 1,200 USgpm (272 m^3/hr) which was acceptable at that time given that WTP influent was also sourced from the Grum pit. The new system includes an automatic shut-off for emergency conditions such as a break in the pipe.

WTP Operators: Dedicated operator attention has been provided since reactivation of the plant. During previous operations, the WTP was operated by the pit dewatering crew, who also had numerous other duties around the mine site (related primarily to dewatering the pits). Since reactivation, a dedicated crew of two persons, operator and supervisor, have been fully dedicated to operating the system on a 24-hour basis. Additionally, a site foreman is dedicated to managing the WTP operating crews and other maintenance activities required for successful operation of the WTP.

2001 Preparatory Work: A large portion of the preparatory work for reactivation of the WTP was completed in 2001, in anticipation of the need for operation in 2002. This work can be summarized as follows:

- design and installation of an overland pipeline from the Vangorda pit to the Grum/Vangorda Water Treatment Plant;
- installation of an overhead powerline to the pumping station in the Vangorda pit;
- design, construction and installation of a barge with primary pump station in the Vangorda pit;
- design and installation of a booster pump station at the top of the pit perimeter;
- excavation of treatment sediments from the clarification pond to the Vangorda pit;
- cleaning of sloughed soil and placement of rip rap in the Grum Interceptor Ditch;
- placement of a rip rap apron at the inflow to the Sheep Pad Pond;
- mechanical and electrical checks and maintenance in the Water Treatment Plant;
- installation of a new inlet pipe and header into the Clarification Pond;
- modifications to the freshwater supply pond for supply of reagent mix water; and
- in-pit field testing of lime treatment of Vangorda pit water.

5.4.3 Clean Water Diversions

Clean water is diverted around the Vangorda pit to as great a degree as practical via the following systems:

Vangorda Creek Diversion Flume

The Vangorda Creek Diversion Flume is a 2.4 m diameter half-culvert placed in a rock cut channel on the upper benches of the north wall of the pit. The upper reach of the channel is cut into native soils beyond the pit wall. The flume passes the substantial flow of Vangorda Creek around the pit to its natural channel below the mine haul road. The flume was constructed in 1991 and has experienced localized failures and damage due to soil slumping , rock falls and large flow events.

Substantial restorative and repair work has been completed from 2002 to 2006 that has resulted in the general restoration of a continuous positive grade, reduction in risks of rock falls, reduction in risk of overtopping, and a general improvement in the physical condition and stability of the flume sections. In 2005, an emergency overflow channel was excavated at the headworks dam that would allow extreme flood flows to pass directly into the Vangorda pit, thereby reducing the risks of overtopping and damage to the flume.

Northeast Interceptor Ditch

The Northeast Interceptor Ditch is an open ditch excavated into the native soils with plastic liners in certain locations where water has been observed, in the past, to seep into the ground and resurface into the Vangorda pit. Important maintenance work was performed on this ditch in 2001, which substantially restored its effectiveness in diverting clean water around the pit northeast area of the pit to Shrimp Creek.

The maintenance work is thought to have caused, at least in part, positive effects in the Vangorda pit. Specifically, the reduction of clean water seeping into the pit is thought to have caused, at least in part, the sharp increase in zinc concentration that was observed in 2002 (Section 4.2.3). This positive effect is also likely related to the interception of clean water from the Old Vangorda Creek channel beginning in 2002.

Northwest Interceptor Ditch

The Northwest Interceptor Ditch is an open ditch excavated into the native soils and surficial bedrock above the Vangorda Creek Diversion Flume at the top of the northwest wall of the Vangorda pit. This ditch passes clean water around the northwest area of the pit to Vangorda Creek.

Important maintenance was performed on this ditch in 2003, which restored some ditch efficiency although the nature of the ground in the area allows for some continued leakage into the Vangorda Creek Diversion Flume and the Vangorda pit.

Old Vangorda Creek Channel

Natural runoff water collects in the old Vangorda Creek channel immediately above the Vangorda pit. This is a small catchment area that lies below the Vangorda Creek Diversion Flume. Without intervention, this clean water flows into the Vangorda pit and becomes contaminated by flushing contaminants from the pit walls. Since 2002, this water has been pumped into the Vangorda Creek Diversion Flume during the summer season from a natural depression in the old Vangorda Creek channel. This is a reactivation of a procedure that was previously utilized during mine operations.

The interception and diversion of this water is thought to have caused, at least in part, positive effects in the Vangorda pit. Specifically, the reduction of clean water entering the pit is thought to have caused, at least in part, the sharp increase in zinc concentration that was observed in 2002 (Section 4.2.3). This positive effect is also likely related to the maintenance work completed at the Northeast Interceptor Ditch in 2001.

5.4.4 Contaminated Water Collection

Contaminated water is actively collected from two locations related to the WTP.

Vangorda Rock Dump Seepage Collector Ditch

Runoff and seepage water from the Vangorda rock dump is contaminated with metals and requires treatment before it can be released to Vangorda Creek. An open ditch around the toe of the rock dump intercepts runoff and seepage water that would otherwise enter Vangorda Creek directly. The ditch directs water into Little Creek Dam Pond where it becomes incorporated into the treatment system.

Little Creek Dam

Little Creek Dam is a water retention dam that forms Little Creek Dam Pond. The water retained behind Little Creek Dam originates from the Vangorda rock dump seepage collector ditch and from direct runoff and seepage from the Vangorda rock dump.

This water is pumped into the Vangorda pit as required where it is incorporated into the treatment system. Pumping has typically been required on one or two occasions during the summer.

5.4.5 2006 Operations

WTP Start Up

The WTP was not operated in 2006.

The Clarification Pond was drained of water at the end of the 2005 treatment season, following the established shut down procedure. Some runoff and precipitation water accumulated in the pond during 2006. The start up phase for the WTP at the beginning of the 2008 treatment season will follow the established procedure of filling the Clarification Pond with treated water (90% full) for final testing. At this time, the WTP is placed on-hold pending verification from the external laboratory that the pond water is compliant.

Water Quantities

An estimated 924,352 m^3 accumulated in the Vangorda Pit in 2006 from runoff, precipitation and water pumped from Little Creek Dam. A minor amount of water was pumped from the Sheep Pad Pond prior to freshet to provide access for sediment removal. The water level in the Vangorda pit ended the year at an elevation of 1084.55 m asl, which was 2.2 m higher than at the start of the year. This water level remained well below the maximum recommended elevation of 1091.8 m asl. The pit water levels are illustrated on Figure 2-9.

Substantive maintenance work was completed on the Vangorda clean water diversion ditches in 2003 and 2004. This work provided a visibly improved catchment of clean water, especially in the northeast diversion ditch. It is of interest to investigate whether this work results in a noticeable difference in the amount of water entering the Vangorda Pit, as calculated through the Vangorda pit water balance.

The estimated volumes of annual net inflows are plotted against annual precipitation on Figure 5-2. The plot suggests that there is a consistent exponential relationship between net inflows and precipitation for the five years up to 2002 (R^2=0.92). This is representative of the period before the substantive maintenance work was completed on the northeast, and other, diversion ditches.

Figure 5-2 suggests that 2003 is different than all of the other years plotted and the reason for this is unknown. We note, however, that the frequency and procedure for monitoring the pit water level were upgraded in mid-2003 such that the data for the first-half of 2003 contain a greater degree of extrapolation that may skew some of the indications.

Figure 5-2 does not clearly suggest that 2004, 2005 and 2006 show a different relationship between precipitation and estimated natural inflows. We note, however, that the natural inflows for 2004 include an unknown volume representative of a 12-hour diversion of Vangorda Creek into the pit during a flood event. This would have the effect of artificially increasing the estimated natural inflows. The data for 2005 and 2006 place this year with lower natural inflows, which could be related to a general reduction of inflows. If true, then this would confirm the observations of site management, who have suggested a noticeable effect. Continued annual assessments of inflows will confirm or disprove this suggestion.

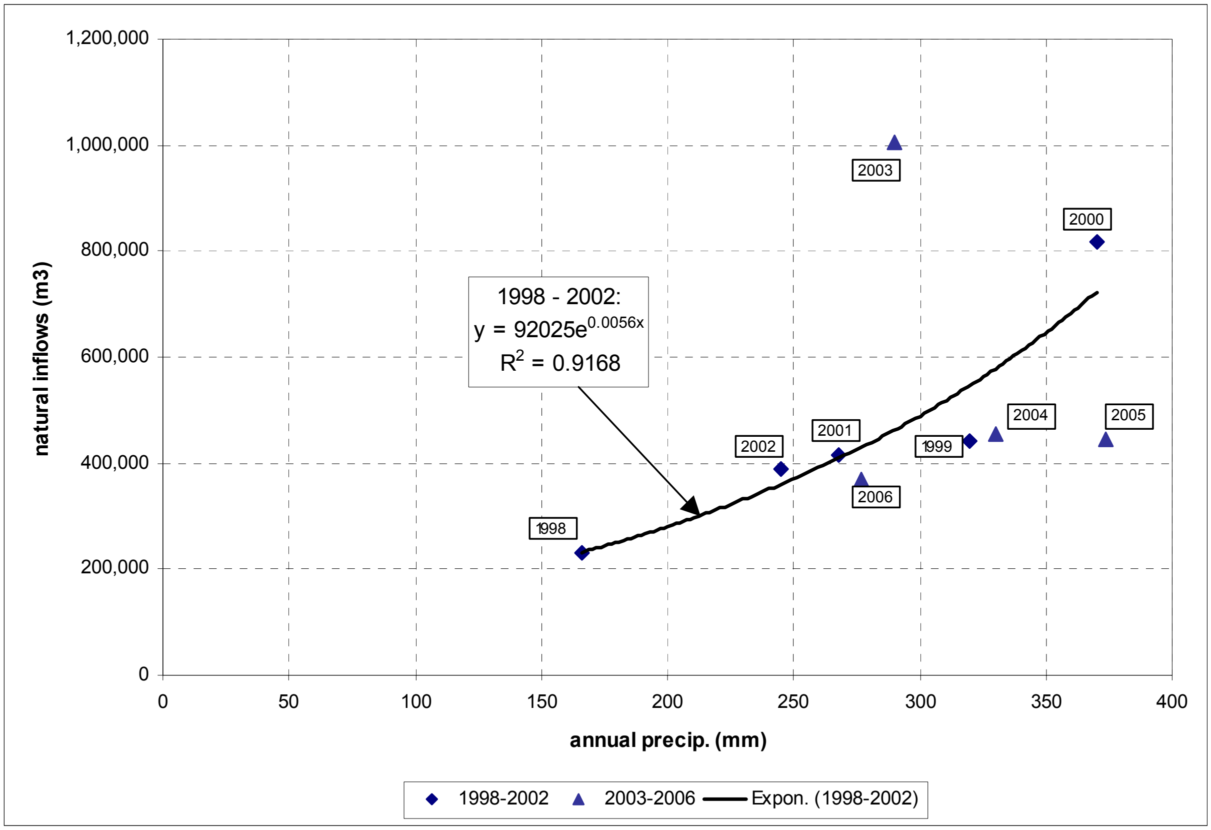
Because the water balance presented herein is coarse and based, in part, on generalized inputs compiled over a number of years, the true effect of the improvements to the Vangorda Pit diversions are thought to be understated.

Table 5-4. Summary Vangorda Pit Water Volumes

Year	Water Treated[1] (m^3)	Annual Change in Pit Level	Natural Inflows[2] (m^3)	Annual Precipitation[3] (mm)
1998	Nil	+20.0 m	231,100	166
1999	Nil	+13.2 m	441,500	320
2000	Nil	+14.8 m	817,000	370
2001	Nil	+3.0 m	417,000	268
2002	894,000	-7.0 m	389,000	245
2003	750,000	+4.4 m	1,006,500	290
2004	556,000	-1.1 m	456,500[4]	330
2005	924,500	-7.8 m	446,000	374
2006	Nil	+2.2 m	368,000	277

Notes: 1. As reported in the Annual Environmental Reports.
2. As estimated from the Vangorda pit water balance.
3. At the Faro airport as compiled by BGC Engineering Inc. as summarized from Table 2-2.
4. Includes the inflow of a portion of Vangorda Creek for ~12 hrs related to extreme flooding.

Figure 5-2. Natural Inflows to Vangorda Pit



Treatment Sediments

At the end of the 2003 treatment season, treatment sediments from both the 2002 and 2003 treatment seasons had accumulated in the Clarification Pond. A study on sediment management options was completed by SRK Consulting and submitted to the Water Board in 2004 as required under Part F, Item 51 of the Water Licence. The study recommended that sediments be deposited on-land within a containment berm on the Grum Overburden Dump. This location is near the WTP, is already disturbed by mining development and provides an adequately large working space.

The initial disposal cell was prepared in April 2004. A containment berm was constructed using the till overburden to a height of approximately 0.5 m enclosing an area of approximately 30 m X 30 m (900 m^2). Sediment was excavated from the Clarification Pond to the disposal area in April and May 2004 which filled the cell. A snow fence was installed around the perimeter of the storage cell to discourage wildlife from entering the area. A new cell was constructed in September 2004. The treatment sediments produced during the 2004 treatment season were excavated from the Clarification Pond to the disposal area in December 2004. This filled the new cell to approximately 90% capacity.

Sediments continued to be moved in February 2005 using First Nations contactors. An estimated 8,000 m^3 was moved. This required the construction of an additional cell, for which the fencing was later completed in summer. An estimated 3,000 m^3 of the total was placed into the new cell, which was full at the end of February.

Sediments that accumulated in the Clarification Pond during 2005 will remain in the pond through 2006 to provide for maximum compaction and resulting volume reduction. The sediments will be removed prior to the 2008 treatment season.

Comments for Future Operations

There are no substantive planned or recommended changes for future operations, planned in 2008. The performance of the WTP as regards water quality and mechanical availability has been excellent. The WTP operators maintained a detailed log book of activities and pH readings. The site manager maintained a monthly status report that also documented unusual events or repairs.

The plant and related equipment should undergo a thorough mechanical and electrical check before re-activation in 2008.

6. Biological Monitoring

6.1 Benthic Invertebrates

The biological monitoring program as described in Schedule 'B' of the Water Licence requires that the established program for monitoring benthic invertebrates be carried out in alternating years in the Rose Creek and the Vangorda Creek drainage systems. In 2006, the program was conducted in the Rose Creek drainage by Laberge Environmental Services of Whitehorse. A detailed report discussing the results of the benthic invertebrate sampling program can be found in Appendix 8. A summary of the report findings follows.

Eight sampling stations in Rose Creek, identified as stations R1, R2, R3, R4, R5, R6, R6-A, and R7, were sampled for benthic invertebrates. Sampling was conducted using artificial substrate samplers, which were installed in the stream and left to colonize for a period of five weeks. The samplers were then removed, and the invertebrates removed for identification.

The phyla Diptera was the dominant order at all sites, ranging from 39% of the population at site R4, to 78% of the population at R1. The order Ephemeroptera was sub-dominant at 6 of the 8 sites, with the order Plecoptera sub-dominant at the remaining 2 sites. The sub-dominance of Ephemeroptera is significant, as the order is sensitive to chemical pollution, and its presence indicates favourable water and sediment conditions.

Populations were down at four of the sites as compared with 2004. This may be explained, however, by strong flows that occurred during the sampling period. These flows may have washed away many of the invertebrates during the colonization period, in addition to loss during retrieval of the samplers.

The general trend in the data indicates an increase in both the size of the populations, and the diversity of those populations, over the eighteen-year sampling period, along with an increase in the number of sensitive taxa over that period.

6.2 Stream Sediments

The Water Licence requires that stream sediment sampling for metals concentrations be carried out in conjunction with benthic invertebrate sampling. Laberge Environmental Services collected sediment samples in conjunction with there July field visit. A detailed report discussing the findings of the stream sediment sampling is provided in Appendix 8.

Metals levels in sediment were highest at site R2. As this site is directly downstream of the tailings impoundment, it receives the greatest impact from mining related activities. Concentrations of metals were lower downstream at sites R3 and R4. The Interim Sediment Quality Guideline for arsenic, cadmium, copper, and zinc was exceeded at most sites, however concentrations were generally below the probable effects level. In general, it appears metals concentrations at all sites have been decreasing since about 1983.

6.3 Fish

The Water Licence for the mine site also requires an annual fish monitoring program be undertaken. Fish sampling was completed in August 2007 by White Mountain Environmental Consulting of Whitehorse. The complete report, prepared by White Mountain Consulting, is available in Appendix 9.

Fish sampling sites include R1, R2, R4, and R8 (replacing R6) on or near Rose Creek, and V8 and B1, on Vangorda Creek and Blind Creek, respectively. Each site consists of a 100 m stretch of stream. Fish habitat characteristics including velocity, channel configuration, bank stability, temperature, cover and riparian vegetation were recorded at each site.

Sampling methods consisted mainly of electrofishing. Gee type minnow trapping, as well as beach seining and angling, were also used to a lesser extent.

Sampling resulted in Arctic grayling and slimy sculpin being captured at all sites, burbot being captured at 3 sites (R2, R8 and V8), juvenile Chinook salmon being captured at 2 sites (B1, V8), and no round whitefish captured.

Arctic grayling and slimy sculpin were collected from each site and submitted for metals testing. Metals concentrations were generally found to be lower in 2006 than in any previous sampling.

7. Physical Stability Monitoring

7.1 Faro Mine Site

The geotechnical monitoring program required under Part G, Item 66 of the Water Licence was performed in 2006 by BGC Engineering Inc. (BGC). The full report prepared by BGC accompanies this report under separate cover.

The geotechnical instrumentation installed in and around the Rose Creek Diversion Canal, the Intermediate Dam, the Cross Valley Dam and the Freshwater Dam was monitored by site personnel. The raw data and an interpretation of the data are included in the BGC report (Part G, Items 66 and 67 of the Water Licence).

BGC staff undertook three inspections (May, August and September) of various facilities. The inspections looked at the geotechnical performance and stability of the following structures:

- Cross Valley Dam and emergency spillway;
- Intermediate Dam and emergency spillway;
- Rose Creek Diversion Channel; dike crest, top of backslope and toe of slope;
- North Valley Wall Interceptor Ditch;
- North Fork Rose Creek flow-through rock drain;
- Selected portions of the Faro rock dumps;
- Secondary tailings impoundment; and
- Faro Creek Diversion Channel above the Faro Pit.

The annual inspection does not include the Fresh Water Supply Dam as it has in the past. The dam was breached in 2003 and inspection of the breach and channel works constructed during the breach is reported by BGC under a separate water licence.

BGC presented their observations, conclusions and recommendations resulting from the field inspection and interpretation of instrumentation data in their report. Although the physical structures that were inspected appeared to be functioning acceptably well, some maintenance work was recommended.

7.2 Vangorda Plateau Mine Site

The annual geotechnical/physical monitoring program that is required under Part G, Item 66 of the Water Licence was performed, in 2006, by Steffen, Robertson and Kirsten (Canada) Inc. ("SRK") who have conducted all of these inspections in the past. The full report prepared by SRK accompanies this report under separate cover.

The geotechnical instrumentation installed in and around the Vangorda rock dump and Little Creek Dam was monitored by site personnel. The raw data and an interpretation of the data are included in the SRK report (Part G, Item 66 of the Water Licence).

SRK conducted a site inspection in September. The inspection looked at the geotechnical performance and stability of the following structures:

- Vangorda rock dump and seepage collection system;
- Little Creek Dam;
- Vangorda Creek diversion;
- embankments of the WTP Clarification Pond;
- WTP Freshwater Supply Pond;
- Grum Interceptor Ditch;
- Sheep Pad Ponds; and
- lower slopes of the Grum rock dump.

SRK presented their observations, conclusions and recommendations resulting from the field inspection and interpretation of instrumentation data in their report. Although the physical structures that were inspected appeared to be functioning acceptably well, some maintenance work was recommended.

8. Maintenance Activities

8.1 General

Some maintenance tasks are routine activities that are performed by on-site personnel on a routine basis. These may include:

- Mechanical maintenance of light and heavy equipment;
- Steaming of road culverts;
- Minor repairs and cleaning of debris and ice from ditches;
- Road grading and general road maintenance to maintain safe access;
- Repairs and maintenance of electrical instrumentation;
- Replacement and maintenance of flow monitoring weirs;
- Maintenance of Anvil Range-owned houses in Faro;
- Management provisions for a safe workplace; and
- Other routine activities.

These routine activities are not described further in this report. However, a number of more substantive maintenance tasks were undertaken in 2006 that are described below. All of these tasks were completed in consultation with the Water Inspector and with input, as appropriate, from the Interim Receiver, the Faro Mine Closure Planning Office and technical consultants. These tasks were completed using mine-owned equipment and employee operators or First Nations contractors, wherever possible.

8.2 Site Operating Manuals

Updates to a number of the site operating manuals were initiated in 2006, with completion planned for 2007. These included:

- Emergency Response Manual;
- Employee Health and Safety Manual;
- Environmental Lab Sampling and Assay Procedures;
- Water Treatment Operation Manuals; and
- Communications Systems Maintenance Procedures .

8.3 Rip Rap Rock

Tim Moon contracting of Ross River blasted and screened an estimated 10,000 m^3 of rip rap for general (future) use on the property. The rip rap was obtained from the rock quarry on the west side of the Grum rock dump. This task represented an efficient way of providing good quality rip rap rock to serve the needs of the site for some time into the future.

8.4 Waste Oil

A waste oil burning permit was issued in 2005 that allows for the burning of waste oil generated on-site in the approved incinerator. A waste oil separator was installed on-site. Waste oil was subsequently tested according to the terms of the permit and burned for heating in the maintenance building that is utilized in the winter season. An estimated 300 L/day was being consumed.

In 2006, two new enviro-tanks were installed and all used oil was transferred from the old tanks to the new. The old tanks were disassembled. New piping was installed directly from the new tanks to the burner.

Improvements were made to the incinerator through 2006 to improve fire-protection and reduce filter clogging.

Residual filter sludge and glycol are stored on site pending their final disposal.

8.5 Emergency Tailings Area

Work was undertaken that will provide better control of the highly contaminated water that passes through the emergency tailings area. This water includes seepage from the toe of the Faro rock piles at location X23. The intent is to reduce seepage losses of contaminated water to the Rose Creek valley aquifer by piping this water directly to the Intermediate Pond and providing the means to pump this water directly to the Mill water treatment system, if desired.

Investigations and designs were completed through the summer and construction begun in the fall of the system that provides:

- A dual sump system with cut-off trench to retain water just above the rock canyon;
- A gravity-feed pipeline to pass water directly to the Intermediate Pond (thereby eliminating seepage losses to the aquifer);
- A pump and pipeline from the catchment sump directly to the Mill water treatment system; and
- An overflow release to allow flow from the sump into the existing ditch, if desired.

Construction continued at year-end with the intent of having the system operational for freshet 2007.

8.6 Faro Site Miscellaneous Tasks

Various other maintenance tasks were completed at the Faro site as follows:

- Repairs were made to one area of the containment berm for the sediment disposal cell on the Original Tailings Impoundment.
- The Faro Lube Station building and associated piping was removed in 2006.
- Ice clearing was required at the Faro Creek diversion channel in March and December. During summer, rock was placed over exposed bentomat in the base of the channel as a maintenance task.
- The North Wall Interceptor ditch culvert above the Cross Valley Pond required extensive ice clearing and steaming through all winter months.
- A crack on the lower road of the Original Tailings dam was identified by site staff and subsequently remediated under the guidance of BGC Engineering.
- The landfill was operated according to the Operating Plan and was inspected by Yukon Government with no concerns raised.
- Survey prisms were professionally installed and monitored on the east wall of the Faro Main pit as an enhanced means of monitoring the rate of regression. The work is conducted and monitoring results reviewed under the guidance of Golder Associates.
- Maintenance work to the clean water diversion ditches above the Faro Main pit was conducted by C. MacLeod Contracting of Ross River.
- Wood and other debris was removed from the upstream face of the Rose Creek rock drain by Tim Moon Contracting of Ross River.
- Maintenance work was completed to restore the 1:500 year flood capacity at the Intermediate Dam outflow spillway. This work was completed under the guidance of BGC Engineering.

8.7 Vangorda Creek Diversion Flume

General upgrading to a portion of the rock/soil wall overlooking the flume was continued in 2006 for the purpose of improving physical stability of the wall and providing better management of runoff water.

In October, a new liner product, "Collegence", was installed in the lower flume area for testing through the winter and freshet of 2007. If effective, the product could represent an alternative to the CMP sections that have been used to date to contain creek flow within the flume.

Excavation of ice from the flume was required throughout the winter months (February, March, October, November and December) to prevent overflow. Some flume CMP sections required repair during summer due to ice damage.

Ice was also excavated from the drop box in April to maintain adequate flow. Following ice removal, a trash rack was installed at the entrance to the drop box inflow culvert to reduce the risk of recurrence.

8.8 Vangorda Site Miscellaneous Tasks

Various other maintenance tasks were completed at the Vangorda Plateau site as follows:

- The treatment sediments in the treatment sediment disposal area on the Grum overburden dump were pushed up to create additional storage capacity within the existing cells and cell #2 was widened by approximately 20 m by extending the containment berm. This work created an estimated 26,200 m^3 of storage space in the existing cells.
- Sediments were excavated from the inflow to the Sheep Pad Pond (est. 400 m^3) prior to freshet to reduce the risk of elevated total suspended solids entering Vangorda Creek.
- Portions of the till berm at the Vangorda rock dump were graded to reduce the risk of excess sediment entering and blocking the seepage collection ditch.
- An estimated 24,000 L of sludge and residual fuel was removed from old gasoline and fuel tanks on the Vangorda property to the waste oil storage/burning system. The old tanks were subsequently disassembled and disposed.
- The clean water diversion in the old Vangorda Creek channel above the Vangorda pit was operated to reduce clean water inflows into the pit. A gasoline-powered pump was used to pump water into the Vangorda Creek flume.
- Ice clearing and steaming of culverts was required extensively at the Moose Pond and Grum Creek area through February, March and April. The Vangorda pit ramp also required ice clearing to allow access in April and November.
- Treatment sediments were removed from the Clarification Pond discharge sump to reduce the risk of sediment loss to the Grum Interceptor Ditch. Geotextile and rip rap rock were subsequently installed.

8.9 Other Activities

Several other site maintenance activities were undertaken in 2006 that are not requirements of the Water Licence but are of general interest. These included:

- Removal of overhead beams from the (ex) concentrate loadout area;
- Removal of old powerlines and powerpoles on the Faro site;
- Consolidation of used tires (estimate 630) at the landfill area and soliciting of interest for sales;
- Sale and removal from site of various mill equipment and machinery;
- Final removal from the mine property of all (bagged) residual zinc concentrate for processing at the metal smelter in Trail, BC;
- A scrap steel program (managed by DIAND) that continued the cutting of heavy steel for off-site recycle; and
- Major technical studies and field programs (managed by the Faro Mine Closure Office) related to development of the FCRP, including extensive drill programs.

9. Studies and Plans

9.1 Overview

There are a number of studies and plans that are required under Parts A and F of the Water Licence. The concepts for these studies and plans were generally initiated through the Environmental Assessment and regulatory review process that led to their inclusion into the Water Licence. The studies and plans have various timelines, including some had been completed by 2006, as summarized in Table 9-1. A brief description of the status of each of the studies and plans that are listed in the Water Licence is provided in Table 9-1 with additional discussion following.

Table 9-1. Summary of Studies and Plans

Study or Plan	Submittal Date	Status
A.16, Contingency Plans.	30 days after effective date of Water Licence.	Complete.
F.49, Terrestrial Effects Study.	December 31, 2005.	Complete.
F.50, Town of Faro Water Supply Study.	2005 Annual Report (by February 28, 2006).	Complete.
F.51, Water Treatment Sludge Management	June 30, 2004.	Complete.

Study.		
F.52, Grum Pit Water Management Plan.	June 30, 2004.	Complete.
F.53, Aquatic Life Sampling and Testing Program.	April 30, 2004.	Complete. Annual Report Appended.
F.54, Adaptive Management Plan.	June 30, 2004.	Complete. Annual Report Appended.
F.55, Comprehensive Risk Assessment	Updated annually in the annual report.	Annual Update Below.
F.56, Rose Creek Tailings Facility Water Management Plan	March 31, 2005.	Complete.
F.57, Plan for the Management of Oxide Fines	July 30, 2004 or 90 days prior to work	Report Submitted. Followup Report to be Provided.
F.58, Final Closure and Reclamation Plan	February 2009.	Underway by FMCPO.

9.2 Contingency Plans

Part A, Item 16 of the Water Licence requires that Contingency Plans be submitted to the Board by 30 days after the effective date of the Water Licence. The Contingency Plans are to address fuel spills, pipeline breaks, loss of electrical power, pump failure, loss of road access to the site, and loss of communications to the site. The plans are also to include a communication plan that "addresses how communities and downstream water users will be notified of accidents, malfunctions and spills at the site". The plans were completed and were submitted to the Board on time.

The plans are to be kept current and revisions are to be submitted to the Water Board within 10 days of revision. The plan was reviewed in 2006 and no revisions to the initial submission were necessary.

9.3 Terrestrial Effects Study

Part F, Item 49 of the Water Licence describes a Terrestrial Effects Study that is to be completed and submitted to the Board by December 31, 2005. The study was completed according to the description provided to the Board in the Water Licence Renewal Application. A project report containing substantive information that had undergone technical review and discussion with the First Nations was submitted to the Board on time.

Because of the complex scheduling of various aspects of the project, not all technical results were available at December 31, 2005. Written updates on the project were provided to the Board in December 2005 and June 2006. A final submission was provided on September 29, 2006. That submission consisted of 2 reports and concluded that "Given the results of the HHERA (Human Health Risk Assessment), there is no need for short-term mitigation to ensure animals and people are adequately protected from risks while the Final Closure and Reclamation Plan is being developed".

The cover letter from the September 2006 submission is provided in Appendix 10.

9.4 Town of Faro Water Supply Study

Part F, Item 50 of the Water Licence describes a study to "determine the relationship between water flowing in Vangorda Creek and water obtained from the Town of Faro water supply wells and to assess the potential for contamination from Vangorda creek to enter the wells". The results of the study were submitted to the Board as part of the annual report for the year 2005, as required.

The study recommended that follow-up monitoring be conducted 2006 and a report on that monitoring program is provided as Appendix 11.

9.5 Water Treatment Sludge Management Study

Part F, Item 51 of the Water Licence requires that a water treatment sludge management plan be submitted to the Board by June 30, 2004. This plan was completed and was submitted to the Board on time.

There are no further requirements for submissions under this plan.

9.6 Grum Pit Water Management Plan

Part F, Item 52 of the Water Licence requires that a water management plan for the Grum pit be submitted to the Board by June 30, 2004. This plan was completed and was submitted to the Board on time.

There are no further requirements for submissions under this plan.

9.7 Aquatic Life Sampling and Testing Program

Part F, Item 53 of the Water Licence requires that a plan for an aquatic life sampling and testing program be submitted to the Board by April 30, 2004. This plan was completed and was submitted to the Board on time.

There are no further requirements for submissions under this plan. The sampling and testing work that is described in the plan was carried out in 2006 and is reported herein, in Section 6.3 and Appendix 9.

9.8 Adaptive Management Plan

Part F, Item 54 of the Water Licence requires that an adaptive management plan for the facilities authorized by the Water Licence be submitted to the Board by June 30, 2004. This plan was completed and was submitted to the Board on time.

The Plan provides for the submission of an annual review of the program each year. The annual review for 2006, as prepared by Gartner Lee Limited, is provided in Appendix 12. The Summary of that report is repeated below for ease of reference.

Excerpted Summary from Appendix 12:
The Water Licence for the Anvil Range Mine (QZ03-059) provides primarily for the continuation of environmental care and maintenance activities to the end of 2008, when a Final Closure and Reclamation Plan is scheduled to be in place. In addition to water and facilities that will receive active management, there are other waters and facilities on the mine site that are recognized as representing potential environmental risks but which do not require immediate intervention. Long term management of these waters and facilities will be addressed in the Final Closure and Reclamation Plan. However, a short term management strategy is required to monitor for potential degradation of conditions to the point where active intervention might be necessary prior to the end of 2008 and to provide a framework for ensuring that appropriate management actions are implemented.

Such a strategy is provided for in the Water Licence through the Adaptive Management Plan ("AMP"). A conceptual AMP was developed and reviewed by parties to the Environmental Assessment and Water Licencing processes through 2002 and 2003. The Water Licence then required that a detailed AMP Implementation Protocol be developed that follows from the conceptual plan. The AMP Implementation Protocol was filed with the Water Board in June 2004. The Implementation Protocol also requires that an annual review of the AMP program be undertaken. The annual review provides a mechanism whereby any necessary or beneficial modifications to the AMP program can be identified and proposed to the Water Board on a regular basis.

Eight AMP "events" were developed through the Environmental Assessment and Water Licence Renewal processes. These events represent possible future environmental conditions that would require a management response, if they were to occur.

The eight events are as follows with a summary for 2006 activities:

1. Degraded Groundwater Quality in Rose Creek Valley Aquifer;
   Four new triggers activated in 2006 at the 2003 Multi-level Wells: sulphate at P03-09-3 and P03-04-4 and dissolved zinc at P03-04-2 and P03-04-3.
2. Degraded Water Quality in Vangorda Creek Downstream of the Mine Facilities;
   Two triggers were activated in 2006 for sulphate and TSS. Data analysis demonstrated that the sulphate trigger was due to winter low-flow conditions resulting in elevated levels of sulphate. Assessment of the TSS trigger confirmed that the elevated TSS was originating from "non-mining sources" downstream of the old ski hill.
3. Degraded Water Quality in Rose Creek Downstream of the Mine Facilities;
   One trigger was activated in 2006 for sulphate. Data analysis demonstrated that this was due to elevated sulphate concentrations during the winter low flow period, consistent with historical trends at this location.
4. Degraded Seepage Quality from the Grum Rock Dump;
   No new triggers at V2 in 2006. A consistent rise in dissolved zinc concentration observed at V15 in 2006. The transfer of water from station V15 to station V2A will be in implement 2007, via Grum Creek diversion.
5. Degraded Water Quality in the North Fork of Rose Creek;
   Two triggers activated in 2006 for sulphate and zinc. Specifically projected continued elevated winter sulphate concentrations and increasing zinc concentrations, both above their respective thresholds. A comprehensive analysis of these triggers is presently underway, incorporating new information that has been generated as part of the ongoing development of the Final Closure and Reclamation Plan by the Faro Mine Closure Planning Office. Based on this analysis, an appropriate response plan will be developed and filed with the Water Board.
6. Water level in Grum Pit Reaches Maximum Desired Elevation;
   No triggers were activated in 2006.
7. Disruption of Fannin Sheep Migration Through the Mine Site; and
   No triggers were activated in 2006.
8. Wind Dispersed Tailings Result in Adverse Effects in the Terrestrial Environment.
   No triggers were activated in 2006.

Other than the specific recommendations listed above, the AMP program functioned in 2006 as intended and no other changes should be made.

9.9 Comprehensive Risk Assessment

Part F, item 55 of the Water Licence requires that the Comprehensive Risk Assessment that was submitted as part of the Water Licence Application be updated annually and submitted to the Board as part of the annual report (i.e., by February 28 of the following year).

The following update to the Comprehensive Risk assessment has been prepared by the Interim Receiver.

The Interim Receiver's planning and financial year runs from April 1 to March 31 and is aligned with the fiscal year of the Federal Government. As a result, this update to the Comprehensive Risk Assessment (CRA) refers to the fiscal year timeframe as work in this area is aligned with this reporting period.

In 2001, funding was approved by DIAND to initiate the development of a CRA for the entire Anvil Range mine complex with the objective of providing a framework for prioritizing and managing environmental issues over the next five years. The basis of the need for this assessment was that historically, the annual planning process for care and maintenance activities focused on short-term compliance and management issues. It was recognized however, by the Interim Receiver, that a proactive, risk-based perspective was essential in managing environmental issues on this property. This would involve the ability to identify and address issues that may not present an immediate concern with respect to non-compliance but that have the potential to develop into serious problems if left unaddressed.

The risk assessment process continues to form part of the Interim Receiver's management approach. It has proven particularly helpful in identifying priorities related to care and maintenance activities, and investigations required to address information gaps. It has also been useful as a tool to communicate those priorities to mine site management and DIAND.

In 2001, the first CRA was completed. The process utilized well-defined risk assessment methodology and involved the prioritization of the site elements that posed a risk to human health and the environment. At that time, a total of 106 key elements, grouped in categories (i.e. dams, diversions, ponds, dumps, tailings, water, infrastructure, buildings & yards) were identified and ranked according to their risk profile. Participation in the process included outside engineering consultants who were familiar with the site through many years of site assessment and inspection activities. There was also significant input from DIAND Water Resources (Whitehorse personnel) and Anvil Range Mine management, as well as Deloitte & Touche personnel with expertise in this area. The process involved extensive efforts to define and understand the risks at the mine with considerable input and discussion amongst the participants.

The CRA process is dynamic, and requires regular updating and evaluation to ensure that it is relevant, and addresses issues in order of highest priority. CRA updates are conducted annually and involve a review of each risk element to reassess controls, and the studies and activities that were conducted over the previous year. The review process can result in changes to the risk classifications assigned to the risk elements. The results of the annual review process are integrated into the prioritization and planning process for each fiscal year.

As such, the 2001 CRA was reviewed and updated to reflect the 2002-2003, 2003-2004, 2004-2005 Care and Maintenance Activities as well as the results of numerous special projects completed during the timeframe. A major part of the 2004-2005 review was to re-align the existing rankings with the new Indian and Northern Affairs Canada (INAC) – Northern Affairs Contaminated Site Program Risk Matrix. Re-alignment required an adjustment in terminology and risk categories, however the overall methodology for annual assessment remained the same.

This process was also conducted for the 2005-2006 operating field season. As a result a number of additional studies were completed, the following being of particular importance:

- Preparation of an operation plan for the management of the waste dump and acquiring a formal permit for the operation of the dump. Rehabilitation of the dump was carried out in line with the Operations Manual.
- Completion of additional borrow source investigations to complement the work that was carried out over the last several years.
- Continued ARD monitoring and laboratory studies including spring and fall seep surveys which have been ongoing since the 2002-03 operating year.
- Continued dump water wells investigations involving snow surveys in April/May and monitoring installed instrumentation. This program has been on-going since 2003-2004.
- Overall site water balance investigation. The work includes an update of the preliminary model that was prepared in 2002-2003.
- Monitoring tailings and Vangorda Waste Dump cover trials.
- Evaluation relating to the Plug Dam investigations and design to further enhance the conceptional design that was prepared in the fall of 2004.
- Continuation of the bioremediation field program relating to the Grum Pit.
- Carrying out a conceptional design for an inflow and outflow channel from the Faro Pit with emphasis on the Outflow channel portion.
- Continuation of seepage investigations with particular emphasis relating to the ETA Seeps contaminant loading.
- Re-evaluation of the rate of regression of the Faro Pit wall to reassess the life expectancy of the Faro Creek diversion located near pit wall.

- Continuation of the tailing ground water studies including monitoring of wells that have been installed since the 2002-2003 operating year.
- Further investigation of the Rose Creek Dam upgrades with particular emphasis on the Cross Valley Dam seismic stability.
- Further evaluation of the North Fork Rock Drain with particular emphasis on failure mode analysis.
- Evaluation of the fish habitat located above the north Fork Rock Drain relating to the presence of fish above the drain.
- Re-evaluation of the Probable Maximum Precipitation (PMP) and Probable Maximum Flood (PMF) for the mine site. This is a follow up on the work carried out in 2003.
- Field investigation and design of the Rose Creek Diversion to upgrade to PMF requirements as determined above.
- Implementation of Phase 2 of the Terrestrial effects study. Initial work was carried out the previous year.
- Further field investigation to develop Soil Contamination Remediation Plan. The work complements the previous work and resulted in a reasonable estimate of the quantity of hydrocarbon-contaminated soils to be remediated in the future.
- Continued monitoring relating to Town of Faro drinking water investigation that was carried out in the previous year.
- Removal of the Ore Concentrate Loadout facility and disposition of the lead concentrate stored in the facility.
- Removal of reagents with proper disposition as part of the program to eliminate obsolete hazardous materials stored on the mine site.
- Continuation of the determination of how the oxide fines should be managed with emphasis on confirmation of the volume of oxide fines now stored on site.
- Continuation of the scrap steel recovery program to remove significant quantities of scrap steel from the property and send for recycling.

In May 2006, the CRA was updated to reflect the 2005-06 care and maintenance activities as well as the information gained through the numerous studies undertaken. As a result of the above, the risk classification of a number of elements was impacted. Specifically, as illustrated in the Table 9-2 as well as in the attached Summary Risk Assessment Classification Matrix (Figure 9-1), when compared against the 2001 Risk Assessment results, significant changes, in terms of number of elements, were observed in the "High", "Moderately High", and "Moderate" risk categories, which experienced a 28%, 28% and 31% decrease in the number of elements, respectively. This shift impacted the "Low" risk category, which is the combined "Low" and "Lowest Risk" categories from the original CRA framework, as evidenced by an increase of 72% in the number of elements in these categories.

The Emergency Tailings Area is the only risk element ranked as a "Very High" risk due to the anticipated consequence costs. One element was added in the 2005/06 review: Faro Treatment Plants Sediments (Sludge) Containment Cell which relates to costs associated with increased sediment management requirements. One element was retired during the 2005/06 review, which brings the total number of retired elements to eight, since 2001. Retired elements include the North Fork Rose Creek Diversion, Fresh Water Reservoir, Copper Sulphate Plant Pond, South Fork Rose Creek, FWSD Access Road, Copper Sulphate Plant, Bulk Explosives Plant, and Grum Miscellaneous Buildings & Yards.

The Risk Classification Matrix for Elements on the Anvil Range Mine Site for the 2005-06 Review is provided in Appendix 13.

Table 9-2 . Summary of Changes in Risk Classification

Number of elements in category	2001 Risk Assessment	2002-03 Update	2003-04 Update	INAC Risk Matrix	2004-05 Update	2005-06 Update	% Change from 2001
Highest Risk	1	1	0	**Very High**	3	1	0%
High	29	16	15	**High**	18	21	27.6% Decrease
Moderately High	25	28	26	**Moderately High**	19	18	28.0% Decrease
Moderate	26	26	21	**Moderate**	18	18	30.8% Decrease
Low	25	34	38	**Low**	43	43	72.0% Increase
Lowest Risk	0	1	2				
Element no longer exists or poses no risk	N/A	N/A	5	**Elements Retired Since 2001, and No Longer Pose a Risk**	7	8	
TOTAL	**106**	**106**	**107**		**108**	**109**	

Through the planned 2005 – 2006 care and maintenance activities and special projects, the elements included in this risk assessment will continue to be monitored and addressed with the aim of continued risk reduction. The risk assessment document will be updated in May 2007 to reflect ongoing activities at the mine site as well as the information gained through further studies. A further update on this work will be provided in the 2006 Annual Environmental Report to the Water Board.

Figure 9-1. Summary Risk Assessment Classification Matrix July 2006 Update (reflecting the 2005-2006 care and maintenance activities and investigations)

Likelihood of the Event	Consequence Severity: Low	Minor	Moderate	Major	Critical
Almost Certain	IV.1; IV.6;	IV.12; VI.3; VII.22;	IV.4; IV.7; VI.8;		V.5;
Likely	IV.5;	III.13; IV.9; IV.11; VII.10; VII.23;	III.4; IV.3; IV.8; VII.21; VIII.11; VIII.16;	II.1; V.7;	
Possible	VII.13;	V.4; V.9; VII.24; VIII.4; VIII.15;	II.7; II.8; III.5;	I.3; III.1; III.9; III.10; VI.7; VIII.2; VIII.3; VIII.7; VIII.18;	I.2; V.1; V.2; V.3; VI.1; VI.2; VI.6;
Unlikely	I.10; II.4; II.5; II.9; II.10; III.7; III.14; V.6; VII.3; VII.6; VII.7; VII.8; VII.12; VII.14; VII.15; VIII.5;	I.1; I.6; I.8; I.11; III.8; III.12; III.15; V.8; VII.1; VII.2; VII.4; VII.16; VII.18; VIII.6; VIII.8; VIII.17;	I.4; I.7; II.2; III.2; VII.5; VII.19;	IV.2; VI.5; VII.25; VIII.1;	I.12;
Very Unlikely	I.9; II.6; VII.9; VII.20;	I.5; III.11; VII.17; VIII.13;	IV.10; VIII.12;		

II.3; III.3; III.6; VI.4; VII.11; VIII.9; VIII.10; VIII.14;

Note: Likelihood and consequence categories reflect the realignment to INAC risk

Risk Ranking Legend:		Changes in 2005/06 Review (Completed July 06)
Very High	Black	Risk ranking did not change
High	Blue	Risk ranking changed due to 2005/06 care and maintenance activities
Moderately High	Green	Risk ranking changed due to the overall consequence cost
Moderate	Purple	Risk ranking changed due to the review of legal consequences
Low	Brown	Risk ranking changed due to the review of likelihood ratings
Element Retired	Turquoise	Risk ranking changed due to the addition/modification of an event
	Grey	New element added in 2005/06 review

9.10 Rose Creek Tailings Facility Water Management Plan

Part F, Item 56 of the Water Licence describes a water management plan for the Rose Creek Tailings Facility that is to be completed and submitted to the Board by March 31, 2005. This plan was completed and was submitted to the Board on time.

There are no further requirements for submissions under this plan.

9.11 Plan for the Management of Oxide Fines

Part F, Item 57 of the Water Licence requires that a long term plan for the management of oxide fines be submitted to the Board by July 30, 2004 or no later than 90 days prior to the proposed implementation date, whichever comes first. This plan was completed and was submitted to the Board on time.

The Plan provides for the submission of a design report to the Water Board at least 90 days prior to the commencement of work.

9.12 Final Closure and Reclamation Plan

Part F, Item 58 of the Water Licence requires that a Final Closure and Reclamation Plan (FCRP) for the mine facilities be prepared and submitted to the Board by December 31, 2006. The plan is being prepared under the general management of Indian and Northern Affairs Canada and the Government of Yukon through the Faro Mine Closure Planning Office (FMCPO). The plan is to be submitted by those two governments.

In October 2006, the Interim Receiver wrote to the Yukon Water Board (YWB) to request, on behalf of the two responsible governments, an extension to the timing for submission of the FCRP. The two governments had jointly informed the Interim Receiver that a submission by December 31, 2006 was not possible and requested that the Interim Receiver apply to the YWB for an extension. The extension requested was to February 2009, the expiry of the Water Licence. The YWB granted this request and issued amendment #1 to the Water Licence on December 20, 2006. The amendment also requires quarterly updates to the YWB regarding the FCRP beginning in June 2007. The development of the FCRP will continue to be the responsibility of the FMCPO with no involvement by the Interim Receiver in the development of the closure plan.

9.13 Community Liaison Committee

The Community Liaison Committee is a voluntary continuation of the Technical Advisory Committee (TAC) that was a requirement of a previous water licence. The Interim Receiver arranges for an annual summer meeting and site tour in Faro and distributes other information of interest throughout the year.

The distribution list for the committee includes:

- The Department of Fisheries and Oceans;
- The Department of Indian Affairs and Northern Development;
- Environment Canada;
- Faro Mine Closure Planning Office;
- Selkirk First Nation;
- Selkirk Renewable Resources Council;
- Ross River Dena Council;
- Town of Faro;
- Type II Mines Office;
- Yukon Government;
- Yukon Conservation Society; and
- Yukon Salmon Committee.

The third annual meeting of the Community Liaison Committee was held in Faro on July 5, 2006. The Interim Receiver provided a presentation on the care and maintenance activities and the Faro Mine Closure Planning Office provided an update on its activities. A tour of the mine site was provided by the Interim Receiver.

Appendices

Appendix 1

Schedule A of Water Licence QZ03-059

Appendix 2

UTM Coordinates for Surface Water Sampling Locations

Appendix 3

2006 Surface Water Quality Data – Rose Creek Drainage

Appendix 4

2006 Groundwater Quality Data – Rose Creek Drainage

Appendix 5

2006 Bioassay Results – Rose Creek Drainage

Appendix 6

2006 Water Quality Data – Vangorda Creek Drainage

Appendix 7

2006 Bioassay Results – Vangorda Creek Drainage

Appendix 8

Biological and Sediment Monitoring Program at Rose Creek, Faro, YT, 2006, Laberge Environmental Services, November 2006

Appendix 9

2006 Aquatic Life Sampling and Testing Program for the Anvil Range Mine Site, Rose and Vangorda Creek Watersheds, Faro, Yukon,

To meet the Requirements of Water Licence QZ03-059, Conducted During August 2006, White Mountain Environmental Consulting, December 2006

Appendix 10

TE Letter September 2006

Appendix 11

Town of Faro Water Wells Report

Appendix 12

Anvil Range Mine Adaptive Management Plan – Annual Review for 2006, Gartner Lee Limited, February 2007

Appendix 13

Risk Classification Matrix for Elements on the Anvil Range Mine Site for the 2005-06 Review, Interim Receiver