



# Comstock Mine Environmental Monitoring Report First Quarterly 2001

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## 1.0 Introduction

The following report has been completed in compliance with Section 3.7.4 *Monitoring Schedule* of the environmental Permit Conditions issued by the Department of Primary Industries, Water and Environment, Tasmania, under the Environmental Management and Pollution Control Act 1994 for the Zeehan Zinc mine, leased by Oceania Tasmania Pty Ltd. This report summarises the required monitoring for the time period of January 2001 to March 2001.

Since September 2000, Zeehan Zinc Pty Ltd has ceased extraction operations at the mine site. There have been limited activities at the site during this time period.

A new 'Development Proposal and Environmental Management Plan' (February 2001) is presently being reviewed by the Department of Primary Industry, Water and Environment.

## 2.0 Water Monitoring

As required by the Permit Conditions, water monitoring of sites W1, W2, W3, and W4 has been completed. The following four sub-sections summarise and interpret the sampling and analysis findings.

### 2.1 W1 – Comstock Creek Upstream

Sampling location W1 is situated upstream of the mine site in Comstock Creek adjacent to historical workings. Due to development on site, W1 location has been relocated to a more appropriate location upstream of the mine site.

Samples were taken on January 15, 2001 and analysed at 'Analytical Services Tasmania' on January 23, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

For comparison purposes, the best recently obtained data is that of June 27, 2000 (recorded as a 'low flow' date) and September 22, 2000 (recorded as a 'high flow' date) by the Honours student Unnikki Meskanen.

The results of this sampling event are quite comparable to a 'low flow' period. The pH remained between 4.5 – 5.0, and the dissolved metals Fe, Mn, and Zn were of similar quality as well.

This sampling event also analysed the 'total' characteristics of these metals, but due to a lack of analysis of this area in the past, no comparisons can be made at this time.

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## **2.2 W2 – Main Adit Inlet**

Sampling location W2 is situated in the collection areas beside the main adit inlet at the base of Allison's decline. These areas contain a sediment screen to reduce sediment flow off site, and limestone to reduce the acidity of the run off.

Due to low precipitation conditions on previous days there was no water at this site during the sampling period, therefore no samples were taken.

## **2.3 W3 – Main Adit Outlet**

Sampling location W3 is situated at the main adit outlet.

Samples were taken on January 15, 2001 and analysed at 'Analytical Services Tasmania' on January 23, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

For comparison purposes, the best recently obtained data is that of June 27, 2000 (recorded as a 'low flow' date) and September 22, 2000 (recorded as a 'high flow' date) by the Honours student Unnikki Meskanen.

The results of this sampling event have shown no direct correlation between 'high flow' and 'low flow' events of the past. The pH has increased in acidity from 4.97 during a 'low flow' event to 3.1. The dissolved metals Al, Cd, Co, Cu, Mn, Ni and Zn have all increased in concentration, while the dissolved metals Cr, Fe, and Pb have all decreased in concentration, some quite dramatically. A lack of sampling and baseline concentrations in the past hinder any accurate interpretation of these results. A more detailed sampling program may be required for this location in the future.

Another set of samples were taken at this location on February 4, 2001 and analysed at 'Analytical Services Tasmania' on February 7, 2001 for all of the required parameters (Figures 2, 3 and 4). Laboratory results are located in Appendix A.

The results of this sampling event have shown no direct correlation with any sampling event of this location in the past. While pH and all of the total metals are comparable to a 'low flow' event (even better in most cases), the dissolved metals are barely detectable. These kind of results indicate an inconsistency in water sampling techniques from 'cradle to grave'. A more detailed examination of sampling procedures will occur in the near future to avoid these inconsistencies.

These sampling events also analysed the 'total' characteristics of these metals, but due to a lack of analysis of this area in the past, no comparisons can be made at this time.

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## **2.4 W4 – Base of Swansea Dump**

Sampling location W4 is situated in a small pool at the base of the Swansea Tramway Waste Rock Dump.

Samples were taken on January 15, 2001 and analysed at 'Analytical Services Tasmania' on January 23, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

The settling pond at the base of the new Swansea Tramway Waste Rock Dump is a fairly recent addition to the mine works area. The pH and TSS at this location is comparable to the results at the W3 location, although the metals are significantly more concentrated. At the time of sampling, no surface water mitigation implements were present. Since this time, drainage patterns and ponds (Plate 1) have been constructed with silt dams and limestone buffers. The next sampling event should show a substantial decrease in all concentrations.

Considering there has been no past sampling in this area, no comparisons can be made at this time.

## **3.0 Erosion Monitoring**

As required by the Permit Conditions, erosion monitoring of sites E1 and E2 has been completed. The following two sub-sections summarise the findings.

### **3.1 E1 – East Wall of Allison's Decline**

This site represents the east wall of Allison's decline.

The walls constructed around Allison's decline are quite stable. With the lack of activity since September, there has been little to no erosion in this area (Plate 2).

Continued site inspections by the mining staff ensure that this will not become an issue in the future.

### **3.2 E2 – Southwestern Batter of Central Dump**

This site represents the southwestern batter of the Central Mine Waste Rock Dump.

During this three-month period, the Central Mine Waste Rock Dump had been periodically rehabilitated as the weather permitted. By the end of March, the dump was near to full rehabilitation, expecting to be completed within the following few weeks (Plate 3). Slope stability is a large part of this rehabilitation plan. Further issues in this area are not expected.

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Continued site inspections by the mining staff ensure that this will not become an issue in the future.

#### **4.0 Rehabilitation Development**

In accordance with the requirements of Mineral Resources of Tasmania, the Department of Primary Industry, Water and Environment, and all related environmental legislation, the Central Mine Waste Rock Dump during the period between January 2001 and March 2001 had progressively been rehabilitated as the weather permitted. The dump structuring will be completed during the month of April, and revegetated at an optimal time.

In accordance with the requirements of Mineral Resources of Tasmania, the Department of Primary Industry, Water and Environment, and all related environmental legislation, the Swansea Tramway Waste Rock Dump during the period between January 2001 and March 2001 had progressively been structured to store segregated waste rock from the mining activities. Drainage patterns and holding ponds have been constructed to collect and treat wastewater run off. Additional control implements pertaining to wastewater and erosion control for the Swansea dump are planned for the following months.

#### **5.0 Summary**

From January 2001 to March 2001, activity at the mine site has been minimal. According to past monitoring, a low impact on the surrounding environment has remained consistent.

With the upcoming increase in activities planned for this site, the monitoring and control of stormwater run-off and buffering implementations is crucial. Additional quality measures should be taken to ensure that future works on site would not adversely impact the surrounding terrestrial and aquatic environment.

#### **6.0 Future Practices**

While activities at the mine site advance, minor areas of improvement have become evident. To increase the quality of this operation now and for the future, additional practices will be implemented into the routine management of the mine.

The following areas of improvement will be considered for the next monitoring report:

- In the event that a required sampling location contains no water (as was the case with W2), repeated attempts by a member of the mining staff to acquire a sample will occur.

- 
- To avoid assumptions and inaccurate interpretations of data, the flow ( $\text{m}^3/\text{s}$ ) at every sampling point will be appropriately estimated during sampling periods.
  - To avoid inconsistencies with sampling results (as was the case with W3 on February 4, 2001), sampling personnel will be trained with the appropriate sampling procedures. This will include recognised surface water sampling techniques and laboratory consultation on sample handling and timing.
  - To achieve a higher understanding and interpretation of the influence of mining activities on surface water, all metals analysis will include testing for 'dissolved' and 'total' characteristics.
  - As a convenient reference and comparison to the past sampling results, all quarterly reports shall include a chart in the Appendix, which summarises all of the sampling results of the past. (See Appendix B)





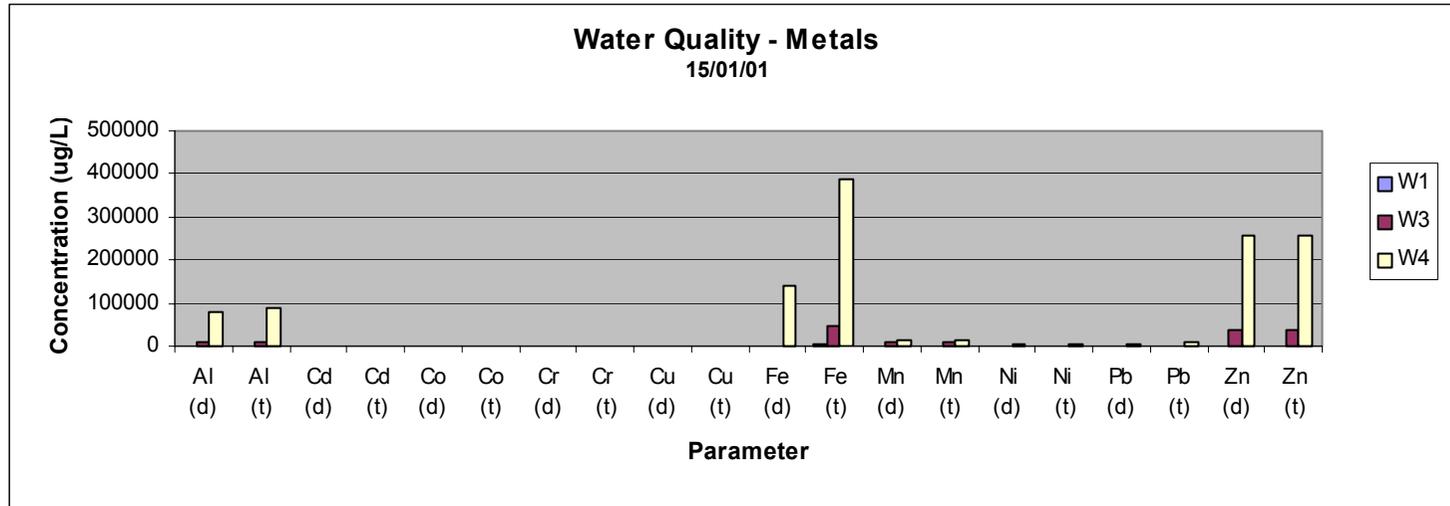
**Table 1.** Water sampling results from 15/01/01 and 04/02/01.

Site	Date	TSS mg/L	Alkalinity (total) CaCO3 mg/L	Acidity CaCO3 mg/L	PH	Al (dissolved) ug/L	Al (total) ug/L	Cd (dissolved) ug/L	Cd (total) ug/L
W1	15/01/2001	2	NA	NA	4.7	234	452	<1	1
W3	15/01/2001	107	NA	NA	3.1	7040	8230	254	254
W4	15/01/2001	132	NA	NA	3	78700	86600	514	530
W3	04/02/2001	86	<1	NA	3.5	<20	1870	<1	18

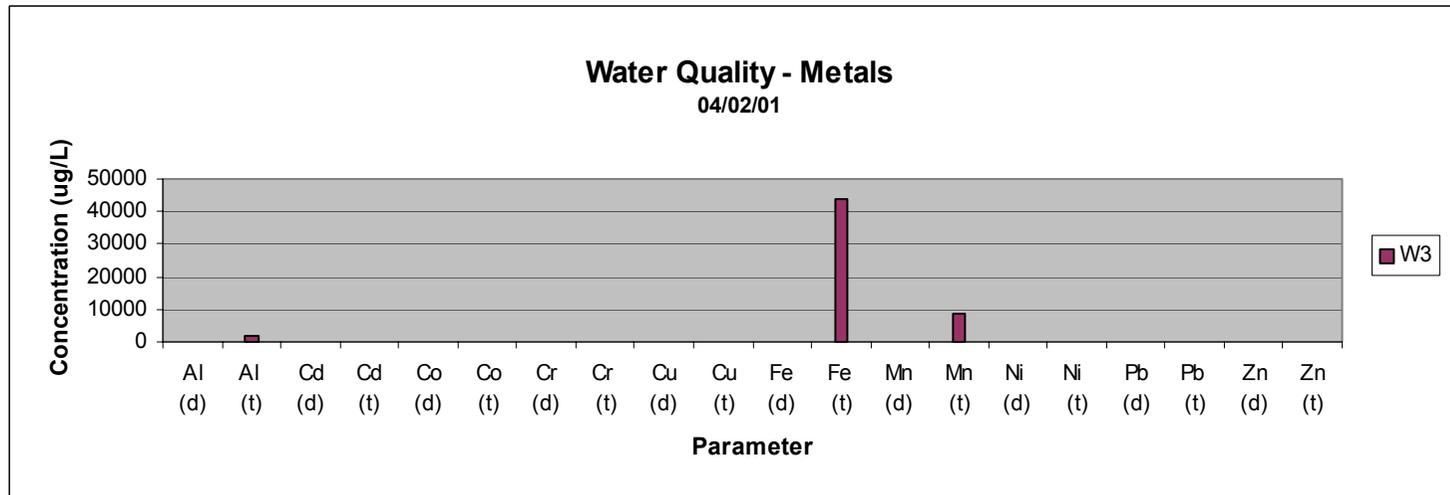
Site	Date	Co (dissolved) ug/L	Co (total) ug/L	Cr (dissolved) ug/L	Cr (total) ug/L	Cu (dissolved) ug/L	Cu (total) ug/L	Fe (dissolved) ug/L	Fe (total) ug/L
W1	15/01/2001	3	3	<1	1	4	6	636	2360
W3	15/01/2001	112	114	1	3	125	128	1010	49000
W4	15/01/2001	1730	1710	92	186	69	73	139000	390000
W3	04/02/2001	<1	50	<1	<1	<1	3	<20	43700

Site	Date	Mn (dissolved) ug/L	Mn (total) ug/L	Ni (dissolved) ug/L	Ni (total) ug/L	Pb (dissolved) ug/L	Pb (total) ug/L	Zn (dissolved) ug/L	Zn (total) ug/L
W1	15/01/2001	285	281	9	11	64	142	345	366
W3	15/01/2001	8680	8660	250	256	91	122	37200	37100
W4	15/01/2001	13400	13000	5260	5150	3200	11600	258000	257000
W3	04/02/2001	<5	8650	<1	95	<5	70	<1	20

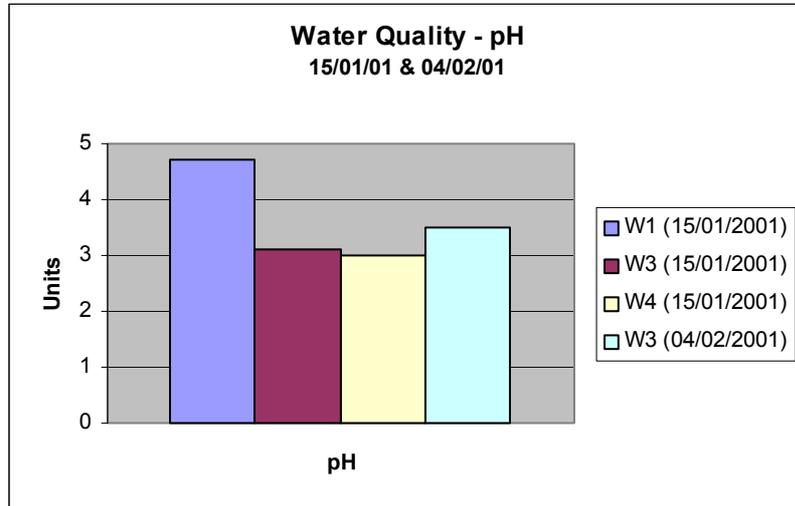
**Figure 1.** Water sampling results for metals on 15/01/01.



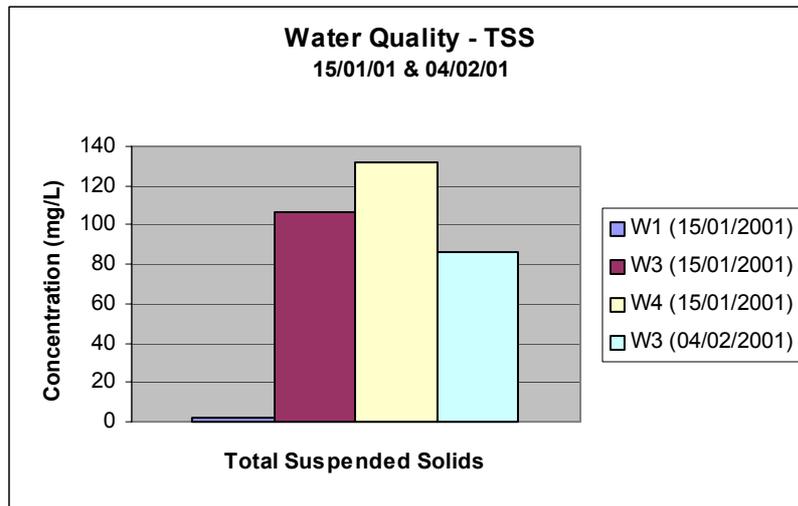
**Figure 2.** Water sampling results for metals on 04/02/01.



**Figure 3.** Water sampling results for pH on 15/01/01 and 04/02/01.



**Figure 4.** Water sampling results for TSS on 15/01/01 and 04/02/01.



**Plate 1.** Swansea Tramway Waste Rock Dump collection pond.



**Plate 2.** Allison's decline.



**Plate 3.** Central Mine Waste Rock Dump.



## **APPENDIX A**

### *Laboratory Analysis of Water Samples*

RECEIVED  
21 MAR 2001



**Facsimile Message**

**TO:** Zeehan Zinc  
**ATTENTION:** Paul Heath  
**PROJECT**  
**FROM:** Sarah Bunce  
**Fax or Email #** (03) 6231 9338  
**Transmitted** Mail , Hand , Fax , or Email   
**by:**  
**SUBJECT:** WATER QUALITY SAMPLE RESULTS

Page: 1 of 5  
Date: 21 March, 2001  
Project #: 15069  
Reference: NA

Dear Paul,

The following 4 pages are the water quality results that you requested and a description of the sites. The results for W1, W3 and W4 were taken on the 15/01/01 and assessed for pH, TSS, Total and Dissolved heavy metals. It cannot be assumed that there had been no rainfall prior to the sampling on 15/01/01 although it is likely. The results from W3, taken by you on 04/02/01, are on the last page. The pH has increased slightly over the previous sampling.

The report dates are at the top of the page and sampling dates are adjacent to the Sample No. by column. I have included the result summary although I believe your main interest is pH.

I hope this is useful.

Regards,

A handwritten signature in cursive script that reads 'SBunce'.

Sarah

## File Note

### Location of Sites

- W1 is located upstream of the mine site in Comstock Creek adjacent to historical workings.
- W3 is located at the main adit outlet
- W4 is located in a small pool at the base of the Swansea Tramway Waste Rock Dump

Sarah Bunce 8/02/01  
F:\Jobs\15069\Sampling\File Note



Tasmania

**ANALYTICAL SERVICES TASMANIA**  
Sandy Bay Laboratory  
c/- Chemistry Department University of Tasmania  
Sandy Bay Tasmania 7005



NATA Accreditation Number: 5589

Report No: 14185      Report Date: 23-Jan-01

Method	Analyte	Units / Sampled On :	Lab.No.:	15902	15903	45904
1001-Water	pH		WI	4.7	3.1	3.0
1005-Water	TSS		IS/OL/01 17.50	2	107	132
1301-Water	Al (Total)	µg/L		452	8230	86600
	Cd (Total)	µg/L		1	254	530
	Co (Total)	µg/L		3	114	1710
	Cr (Total)	µg/L		1	3	186
	Cu (Total)	µg/L		6	128	73
	Fe (Total)	µg/L		2360	48000	390000
	Mn (Total)	µg/L		281	8680	13000
	Ni (Total)	µg/L		11	256	5150
	Pb (Total)	µg/L		142	122	11600
	Zn (Total)	µg/L		365	37100	257000



Tasmania

**ANALYTICAL SERVICES TASMANIA**  
 Sandy Bay Laboratory

 c/- Chemistry Department University of Tasmania  
 Sandy Bay Tasmania 7005

 NATA Accreditation  
 Number: 5589

Report No: 14256

Report Date: 07-Feb-01

Method	Analyte	Units / Sampled On :	Lab.No:	16430	16431	
			16429			
			Sample Id.:	W1	W3	W4
			Units / Sampled On :	15-01-01 17:56	15-01-01 17:06	15-01-01 17:15
1301-Water	Al (Dissolved)	µg/L	234	7040	78700	
	As (Dissolved)	µg/L	<5	<5	76	
	Cd (Dissolved)	µg/L	<1	254	514	
	Co (Dissolved)	µg/L	3	112	1730	
	Cr (Dissolved)	µg/L	<1	1	92	
	Cu (Dissolved)	µg/L	4	125	69	
	Fe (Dissolved)	µg/L	636	1010	139000	
	Mn (Dissolved)	µg/L	285	8680	13400	
	Ni (Dissolved)	µg/L	9	250	5280	
	Pb (Dissolved)	µg/L	64	91	3200	
	Zn (Dissolved)	µg/L	345	37200	258000	



Tasmania

**ANALYTICAL SERVICES TASMANIA**  
 Sandy Bay Laboratory

 c/- Chemistry Department University of Tasmania  
 Sandy Bay Tasmania 7005

 NATA Accreditation  
 Number: 5589

Report No: 14298

Report Date: 21-Feb-01

Method	Analyte	Units / Sampled On :	Lab.No.: Sample Id.: 640201 11:58	16795 w3
1001-Water	pH			3.5
1004-Water	TDS	mg/L		505
1005-Water	TSS	mg/L		86
1101-Water	Alkalinity Total	mg/L CaCO <sub>3</sub>		<1
1301-Water	Al (Dissolved)	µg/L		<20
	Al (Total)	µg/L		1870
	Cd (Dissolved)	µg/L		<1
	Cd (Total)	µg/L		18
	Co (Dissolved)	µg/L		<1
	Co (Total)	µg/L		50
	Cr (Dissolved)	µg/L		<1
	Cr (Total)	µg/L		<1
	Cu (Dissolved)	µg/L		<1
	Cu (Total)	µg/L		3
	Fe (Dissolved)	µg/L		<20
	Fe (Total)	µg/L		43700
	Mn (Dissolved)	µg/L		<5
	Mn (Total)	µg/L		8650
	Ni (Dissolved)	µg/L		<1
	Ni (Total)	µg/L		95
	Pb (Dissolved)	µg/L		<5
	Pb (Total)	µg/L		70
	Zn (Dissolved)	µg/L		<1
	Zn (Total)	µg/L		20

## **APPENDIX B**

### *Water Sampling Data Collection*

## COMSTOCK MINE: Water Sampling Results

Site	Date	TSS	Alkalinity	Acidity	pH	Al	Al	Cd	Cd
		mg/L	(total) CaCO3 mg/L	CaCO3 mg/L		(dissolved) ug/L	(total) ug/L	(dissolved) ug/L	(total) ug/L
Comstock Creek - below adit	22/10/1997						2560		39
Comstock Adit	22/10/1997						2800		42
Comstock Creek - below adit	10/06/1999	59	<1	61		1780	2190	19	19
Comstock Creek - below adit	10/08/1999	59	<1	49		1430	2110	19	20
Comstock Creek - above adit	10/08/1999	6	2	9	6.2	287	370	<1	1
Comstock Adit	8/03/2000	57	<1	98		441	1960	12	14
Upstream (Site 1)	27/06/2000				4.58	0		0	
Comstock Creek - above adit (Site 2)	27/06/2000				6.24	340		0	
Comstock Adit (Site 6)	27/06/2000				4.97	1150		50	
Comstock Creek - below adit (Site 7)	27/06/2000				5.29	630		30	
Adit 2 (Site 8)	27/06/2000				6.15	110		20	
Adit 3 (Site 9)	27/06/2000				6.22	220		10	
Sediment Trap (Site 3)	27/06/2000				3.29	13060		160	
Upstream (Site 1)	22/09/2000				5.46	0		40	
Comstock Creek - above adit (Site 2)	22/09/2000				6.42	580		30	
Comstock Adit (Site 6)	22/09/2000				6.04	10		20	
Comstock Creek - below adit (Site 7)	22/09/2000				5.81	0		20	
Adit 2 (Site 8)	22/09/2000				6.13	160		10	
Adit 3 (Site 9)	22/09/2000				6.39	90		10	
Sediment Trap (Site 3)	22/09/2000				no flow	no flow		no flow	
W1	15/01/2001	2			4.7	234	452	<1	1
W3	15/01/2001	107			3.1	7040	8230	254	254
W4	15/01/2001	132			3	78700	86600	514	530
W3	4/02/2001	86	<1		3.5	<20	1870	<1	18

Site	Date	Co (dissolved) ug/L	Co (total) ug/L	Cr (dissolved) ug/L	Cr (total) ug/L	Cu (dissolved) ug/L	Cu (total) ug/L	Fe (dissolved) ug/L	Fe (total) ug/L
Comstock Creek - below adit	22/10/1997		66		7		<5		59100
Comstock Adit	22/10/1997		76		8		6		67700
Comstock Creek - below adit	10/06/1999	23	23	<1	<1	10	12	351	25100
Comstock Creek - below adit	10/08/1999	25	26	1	<1	14	13	678	30700
Comstock Creek - above adit	10/08/1999	<1	<1	1	<1	11	9	681	1300
Comstock Adit	8/03/2000	37	40	<1	<1	2	2	11700	43100
Upstream (Site 1)	27/06/2000	10		0		30		470	
Comstock Creek - above adit (Site 2)	27/06/2000	30		20		40		600	
Comstock Adit (Site 6)	27/06/2000	40		50		50		19820	
Comstock Creek - below adit (Site 7)	27/06/2000	40		50		40		13410	
Adit 2 (Site 8)	27/06/2000	60		30		40		7440	
Adit 3 (Site 9)	27/06/2000	90		50		0		37640	
Sediment Trap (Site 3)	27/06/2000	350		20		70		2470	
Upstream (Site 1)	22/09/2000	50		40		10		46040	
Comstock Creek - above adit (Site 2)	22/09/2000	60		40		0		48980	
Comstock Adit (Site 6)	22/09/2000	60		0		60		8980	
Comstock Creek - below adit (Site 7)	22/09/2000	50		0		40		9240	
Adit 2 (Site 8)	22/09/2000	90		20		30		34460	
Adit 3 (Site 9)	22/09/2000	30		0		40		1050	
Sediment Trap (Site 3)	22/09/2000	no flow		no flow		no flow		no flow	
W1	15/01/2001	3	3	<1	1	4	6	636	2360
W3	15/01/2001	112	114	1	3	125	128	1010	49000
W4	15/01/2001	1730	1710	92	186	69	73	139000	390000
W3	4/02/2001	<1	50	<1	<1	<1	3	<20	43700

Site	Date	Mn (dissolved) ug/L	Mn (total) ug/L	Ni (dissolved) ug/L	Ni (total) ug/L	Pb (dissolved) ug/L	Pb (total) ug/L	Zn (dissolved) ug/L	Zn (total) ug/L
Comstock Creek - below adit	22/10/1997		10800		147		380		33000
Comstock Adit	22/10/1997		12200		166		373		37700
Comstock Creek - below adit	10/06/1999	4290	4270	47	42	81	147	14700	14900
Comstock Creek - below adit	10/08/1999	4220	4230	51	51	80	155	14400	14900
Comstock Creek - above adit	10/08/1999	129	138	3	4	52	85	284	298
Comstock Adit	8/03/2000	8620	8770	73	75	<5	46	22500	23200
Upstream (Site 1)	27/06/2000	40		40		80		230	
Comstock Creek - above adit (Site 2)	27/06/2000	70		50		140		170	
Comstock Adit (Site 6)	27/06/2000	2780		30		170		13590	
Comstock Creek - below adit (Site 7)	27/06/2000	1970		20		370		9710	
Adit 2 (Site 8)	27/06/2000	6270		70		210		2880	
Adit 3 (Site 9)	27/06/2000	5580		130		190		11670	
Sediment Trap (Site 3)	27/06/2000	820		380		5670		36000	
Upstream (Site 1)	22/09/2000	7560		50		130		24600	
Comstock Creek - above adit (Site 2)	22/09/2000	7720		50		130		25760	
Comstock Adit (Site 6)	22/09/2000	6720		10		180		2840	
Comstock Creek - below adit (Site 7)	22/09/2000	6980		70		190		2730	
Adit 2 (Site 8)	22/09/2000	5470		70		230		11870	
Adit 3 (Site 9)	22/09/2000	120		0		210		650	
Sediment Trap (Site 3)	22/09/2000	no flow		no flow		no flow		no flow	
W1	15/01/2001	285	281	9	11	64	142	345	366
W3	15/01/2001	8680	8660	250	256	91	122	37200	37100
W4	15/01/2001	13400	13000	5260	5150	3200	11600	258000	257000
W3	4/02/2001	<5	8650	<1	95	<5	70	<1	20

22/10/97, 10/06/99, 10/08/99, 08/03/00 (SEMF, Development Proposal and Environmental Management Plan, May 2000)

27/06/00, 22/09/00 (Meskanen, U., Acid Mine Drainage at the Comstock Ag-Pb-Zn Mine, Western Tasmania – Thesis, November 2000)

15/01/01 (Sarah Bunce – SEMF, March 21, 2001)

04/02/01 (Paul Heath – Oceania, March 21, 2001)