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TASMANIA
Pty Ltd
A.B.N 72 009 524 047

Comstock Mine Environmental Monitoring Report Second 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 April 2001 to June 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. Due to the implementation of a new sampling program at Comstock Mine, the sampling sites W1, W2, W3, and W4 have been renamed as S1, S4, S10, and S13 respectively.

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 May 18, 2001 and analysed at 'Analytical Services Tasmania' on June 1, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

For comparison purposes, the most recently obtained sampling results are that of January 15, 2001 by Sarah Bunce of SEMF Pty. Ltd.

On average, the results of this sampling event show an elevated pH and metals content. The pH has risen from 4.7 to 4.2, and in the case of Zn, concentrations are up 10-fold to 3180 ug/L.

These elevations in water quality are likely due to a higher amount of rainfall in the area. The comparison results were taken in the summer, a

time of less rainfall and ground saturation. This suggests that all recent samples taken will be higher in concentration than those of the past.

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.

Samples were taken on May 18, 2001 and analysed at 'Analytical Services Tasmania' on June 1, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

There is insufficient data to indicate whether sampling has occurred at this site in the past. For these reasons, this sampling event will be treated as the first for sampling location W2.

This site is presumed to be of the worst quality of water simply because of its location. Exposed pyritic material and, until recently, an inappropriately drained dump surrounds this site.

The pH of this area was around 2.5, with the Acidity $CaCO_3$ up to 2760 mg/L. The highest recorded metals were aluminium, iron, and zinc at 164000, 622000, and 161000 ug/L respectively.

It should be noted that at the time of sampling the limestone buffer in the sediment traps had not been changed in more than 3 months and were covered with silt. Immediately after sampling, the existing limestone was removed and replaced with an equal volume of unused limestone.

2.3 W3 – Main Adit Outlet

Sampling location W3 is situated at the main adit outlet.

Samples were taken on May 18, 2001 and analysed at 'Analytical Services Tasmania' on June 1, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

For comparison purposes, the most recently obtained sampling results are that of January 15, 2001 by Sarah Bunce of SEMF Pty. Ltd.

Results from this sampling event show that the water quality from the discharge of this adit is steadily improving. The sample analysis shows that in all cases, the quality has increased by up to 50% from the previous samples taken.

The pH has moved from 3.1 to 3.5, and the TSS has dropped from 107 mg/L to 64 mg/L. In the case of dissolved zinc, January's results were at 37200 ug/L compared to May's results at 13500 ug/L.

Even though the W2 results show an extremely high concentration of pollutants, somewhere in the adit system a natural buffer must be in place to decrease these concentrations. Dilution could not influence these concentrations to this degree.

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 May 18, 2001 and analysed at 'Analytical Services Tasmania' on June 1, 2001 for all of the required parameters (Figures 1, 3 and 4). Laboratory results are located in Appendix A.

For comparison purposes, the most recently obtained sampling results are that of January 15, 2001 by Sarah Bunce of SEMF Pty. Ltd.

As anticipated in the previous quarterly report, the parameter concentrations have lowered, some significantly, due to proper wastewater management. The TSS has been reduced from 132 mg/L to 17 mg/L due to the implementation of silt screens and a twin dam structure for retention. Metals have been reduced due to the buffer capacity of added limestone and low turbidity provided by the dams. For example, the highest concentration analysed was iron at 117000 ug/L, but has dropped from a concentration of 390000 ug/L.

Figure 1. Water sampling results for pH on 18/05/01.

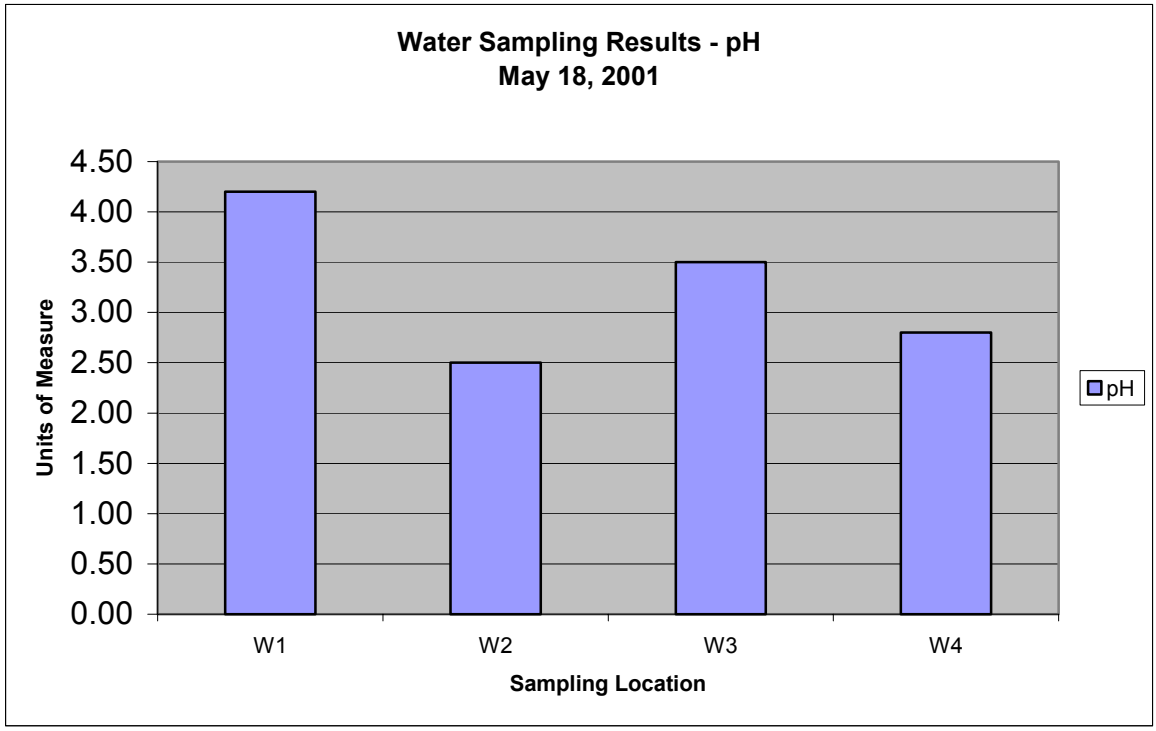


Figure 2. Water sampling results for TSS on 18/05/01.

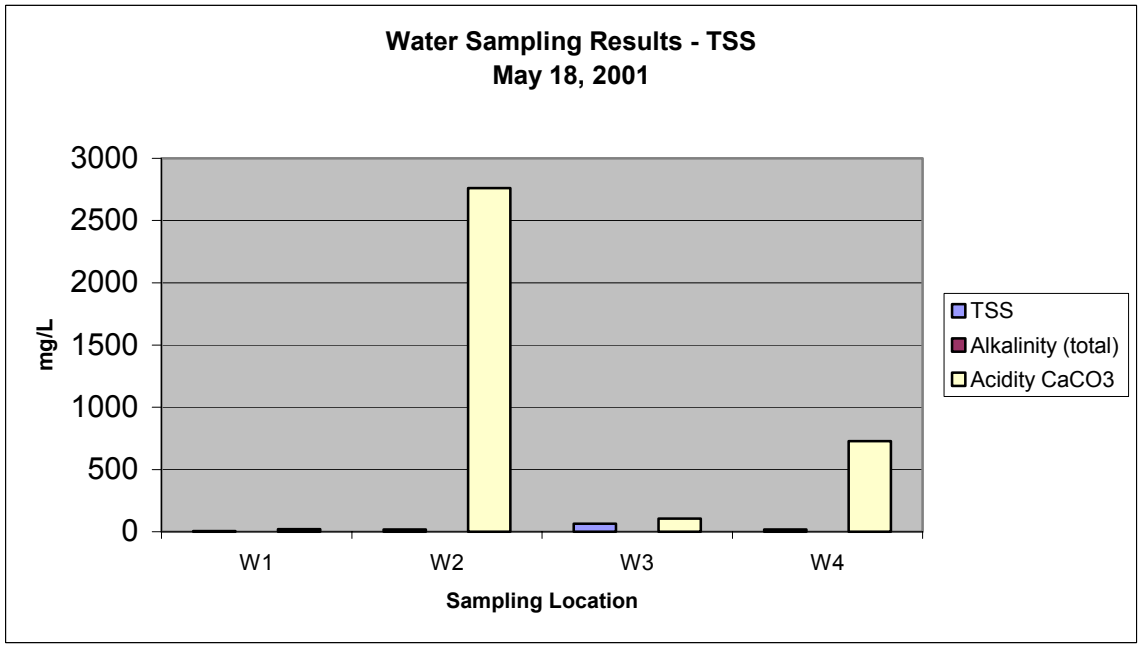
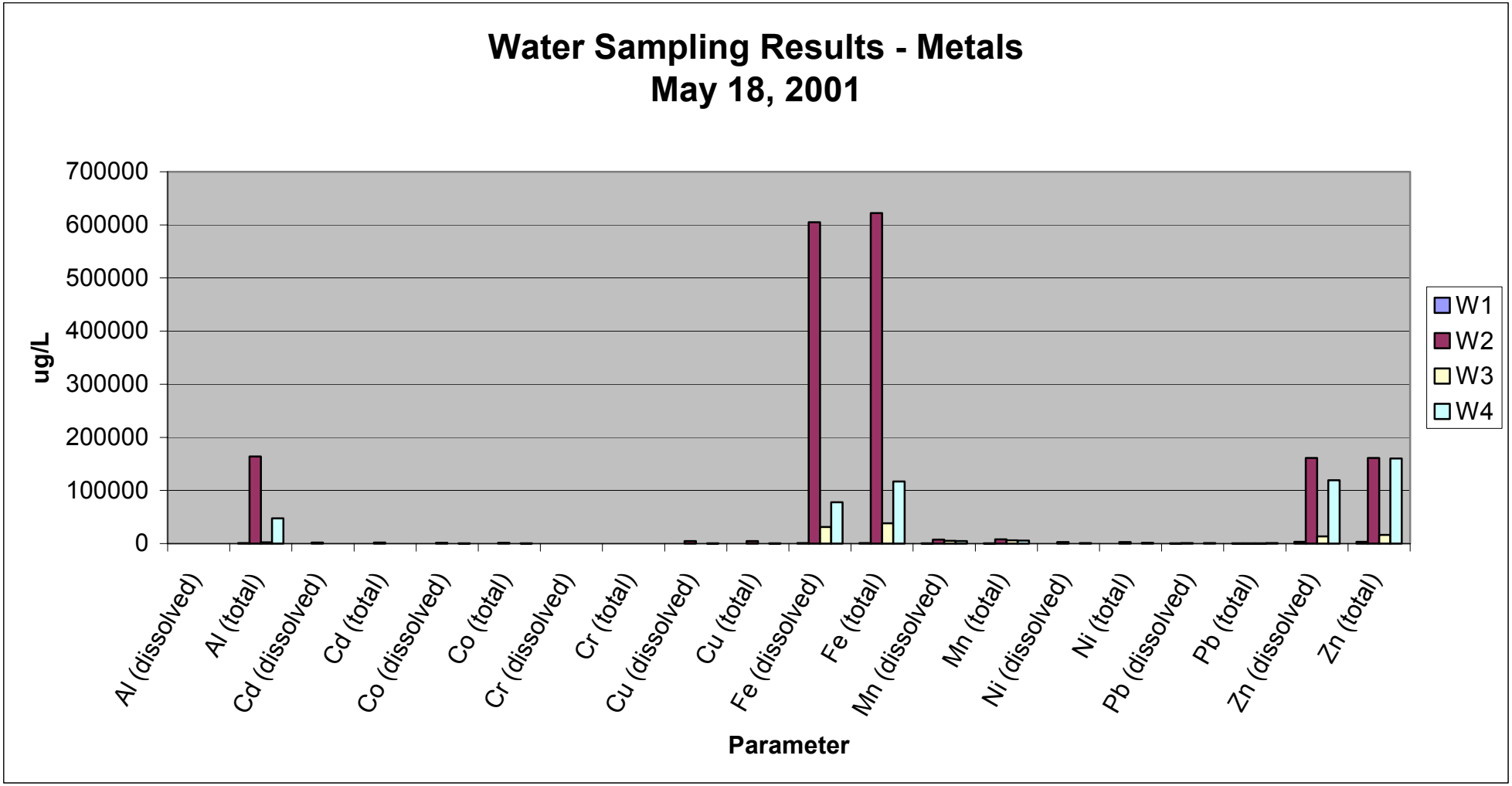


Figure 3. Water sampling results for metals on 18/05/01.



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. The only disturbances since March have been the removal and stabilisation of the Central Waste Rock Dump walls. Further development is required in this area, but will be ceased until the new approval is granted.

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 stabilised as the weather permitted. As of June 30, 2001, temporary drains have been installed on the top of the dump, and directed into a high volume collection ditch. This ditch leads to Treatment Pond #1, which is located opposite of the main entrance. As further funding comes in (when approval is granted), and considering the health and safety of the workers, excavators will finish the drain system and compaction of the dump in preparation for a spring revegetation.

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

4.0 NAG, NAG pH and NAP Tests

For an experienced interpretation of the available data in relation to the Net Acid Generation (NAG), Net Acid Generation pH (NAG pH), and Net Acid Potential (NAP), the following conclusions were derived from D. Lois Koehnken of *Technical Advice on Water*. The complete report is found in Appendix C.

"Based on the available information, the monitoring report to DPIWE for the Central Waste Rock dump should reflect the following findings:

- NAG and NAG pH: The majority of the material believed to be present in the dump has a final NAG value of >5 kg H_2SO_4/t, and a NAG pH of <4.5, resulting in the material being classified as 'Potentially Acid Forming' based on the classification of Miller (1998).

- AMD status: The status of the dump is considered to be actively oxidizing with no buffering capacity available to neutralize the generated sulphuric acid. The acidic conditions in the dump are resulting in the liberation of metals from the dump, particularly aluminium, iron and zinc."

5.0 Summary

From April 2001 to June 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 recently granted approval, more significant activities will soon take place on site. As the activity increases, the environmental responsibility of the site will increase proportionally.

APPENDIX A

Laboratory Analysis of Water Samples

Tasmania

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

NATA Accreditation Number: 5589

Report No: 14986 **Report Date:** 01-Jun-2001 15:50

		Lab.No.:	21052	21053	21054	21055	21056
		Sample Id.:	S1	S2	S4	S5	S6
Method	Analyte	Units / Sampled On :	18/05/01	18/05/01	18/05/01	18/05/01	18/05/01
1001-Water	pH		4.2	5.5	3.5	2.5	3.0
1002-Water	Conductivity	µS/cm	153	141	270	2380	795
1011-Water	TSS	mg/L	4	16	15	19	16
1101-Water	Alkalinity Total	mg/L CaCO3	<1	4	<1	<1	<1
1102-Water	Acidity	mg/L CaCO3	20	11	63	2760	209
1301-Water	Al (Total)	µg/L	1020	905	4040	164000	13400
	As (Dissolved)	µg/L	<5	15	<5	2010	<5
	As (Total)	µg/L	<5	14	<5	2080	6
	Cd (Dissolved)	µg/L	15	7	76	2670	41
	Cd (Total)	µg/L	15	7	75	2740	54
	Co (Dissolved)	µg/L	7	4	11	1230	31
	Co (Total)	µg/L	8	5	11	1250	42
	Cr (Dissolved)	µg/L	<1	<1	3	149	2
	Cr (Total)	µg/L	<1	<1	3	153	3
	Cu (Dissolved)	µg/L	27	22	123	4650	55
	Cu (Total)	µg/L	26	23	122	4780	70
	Fe (Dissolved)	µg/L	866	2290	3780	606000	18300
	Fe (Total)	µg/L	850	2430	3810	622000	24400
	Mn (Dissolved)	µg/L	335	435	269	7620	443
	Mn (Total)	µg/L	335	436	269	7790	597
	Ni (Dissolved)	µg/L	15	8	20	2630	55
	Ni (Total)	µg/L	15	8	22	2680	71
	Pb (Dissolved)	µg/L	593	192	488	852	1520
	Pb (Total)	µg/L	591	198	488	884	2020
	Zn (Dissolved)	µg/L	3180	1180	8180	161000	6840
	Zn (Total)	µg/L	3130	1170	8130	161000	8930

Tasmania

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

NATA Accreditation Number: 5580

Report No: 14986 **Report Date:** 01-Jun-2001 15:50

		Lab.No.:	21057	21058	21059	21060
		Sample id.:	S7	S8	S9	S10
Method	**Analyte**	**Units / Sampled On :**	18/05/01	18/05/01	18/05/01	18/05/01
1001-Water	pH		4.1	3.5	3.2	2.8
1002-Water	Conductivity	µS/cm	168	613	678	1830
1011-Water	TSS	mg/L	<1	64	91	17
1101-Water	Alkalinity Total	mg/L CaCO3	<1	<1	<1	<1
1102-Water	Acidity	mg/L CaCO3	22	105	135	729
1301-Water	Al (Total)	µg/L	1010	2360	11500	47800
	As (Dissolved)	µg/L	<5	106	16	46
	As (Total)	µg/L	<5	129	20	62
	Cd (Dissolved)	µg/L	12	20	164	722
	Cd (Total)	µg/L	16	25	202	932
	Co (Dissolved)	µg/L	6	32	49	448
	Co (Total)	µg/L	8	39	62	579
	Cr (Dissolved)	µg/L	<1	<1	3	33
	Cr (Total)	µg/L	<1	<1	5	43
	Cu (Dissolved)	µg/L	21	7	181	284
	Cu (Total)	µg/L	27	7	229	341
	Fe (Dissolved)	µg/L	608	31100	15900	77600
	Fe (Total)	µg/L	794	38300	20000	117000
	Mn (Dissolved)	µg/L	260	5030	1370	4560
	Mn (Total)	µg/L	337	6080	1740	5770
	Ni (Dissolved)	µg/L	14	62	81	991
	Ni (Total)	µg/L	18	75	107	1280
	Pb (Dissolved)	µg/L	641	231	290	780
	Pb (Total)	µg/L	838	287	375	998
	Zn (Dissolved)	µg/L	2520	13500	11900	119000
	Zn (Total)	µg/L	3250	16600	15800	150000

APPENDIX B

Water Sampling Data Collection

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
S14	10/22/97						2560		39
S10	10/22/97						2800		42
S14	06/10/99	59	<1	61		1780	2190	19	19
S14	08/10/99	59	<1	49		1430	2110	19	20
S2	08/10/99	6	2	9	6.20	287	370	<1	1
S10	03/08/00	57	<1	98		441	1960	12	14
S1	06/27/00				4.58	0		0	
S2	06/27/00				6.24	340		0	
S10	06/27/00				4.97	1150		50	
S14	06/27/00				5.29	630		30	
S12	06/27/00				6.15	110		20	
S11	06/27/00				6.22	220		10	
S3	06/27/00				3.29	13060		160	
S1	09/22/00				5.46	0		40	
S2	09/22/00				6.42	580		30	
S10	09/22/00				6.04	10		20	
S14	09/22/00				5.81	0		20	
S12	09/22/00				6.13	160		10	
S11	09/22/00				6.39	90		10	
S3	09/22/00				no flow	no flow		no flow	
S1	01/15/01	2			4.70	234	452	<1	1
S10	01/15/01	107			3.10	7040	8230	254	254
S13	01/15/01	132			3.00	78700	86600	514	530
S10	02/04/01	86	<1		3.50	<20	1870	<1	18
S10	03/28/01	68	<1		3.40	8250	8430	191	190
S13	03/28/01	163	<1		2.60				
S1	05/18/01	4	<1	20	4.20		1020	<5	<5
S9	05/18/01	16	4	11	5.50		905	15	14
S6	05/18/01	15	<1	63	3.50		4040	<5	<5
S4	05/18/01	19	<1	2760	2.50		164000	2010	2060
S5	05/18/01	16	<1	209	3.00		13400	<5	6
S2	05/18/01	<1	<1	22	4.10		1010	<5	<5
S10	05/18/01	64	<1	105	3.50		2260	106	129
S12	05/18/01	91	<1	135	3.20		11500	16	20
S13	05/18/01	17	<1	729	2.80		47500	46	62

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
S14	10/22/97		66		7		<5		59100
S10	10/22/97		76		8		6		67700
S14	06/10/99	23	23	<1	<1	10	12	351	25100
S14	08/10/99	25	26	1	<1	14	13	678	30700
S2	08/10/99	<1	<1	1	<1	11	9	681	1300
S10	03/08/00	37	40	<1	<1	2	2	11700	43100
S1	06/27/00	10		0		30		470	
S2	06/27/00	30		20		40		600	
S10	06/27/00	40		50		50		19820	
S14	06/27/00	40		50		40		13410	
S12	06/27/00	60		30		40		7440	
S11	06/27/00	90		50		0		37640	
S3	06/27/00	350		20		70		2470	
S1	09/22/00	50		40		10		46040	
S2	09/22/00	60		40		0		48980	
S10	09/22/00	60		0		60		8980	
S14	09/22/00	50		0		40		9240	
S12	09/22/00	90		20		30		34460	
S11	09/22/00	30		0		40		1050	
S3	09/22/00	no flow		no flow		no flow		no flow	
S1	01/15/01	3	3	<1	1	4	6	636	2360
S10	01/15/01	112	114	1	3	125	128	1010	49000
S13	01/15/01	1730	1710	92	186	69	73	139000	390000
S10	02/04/01	<1	50	<1	<1	<1	3	<20	43700
S10	03/28/01	53	55	<1	2	56	56	2220	33600
S13	03/28/01								
S1	05/18/01	7	8	<1	<1	27	26	866	850
S9	05/18/01	4	5	<1	<1	22	23	2290	2430
S6	05/18/01	11	11	3	3	123	122	3780	3810
S4	05/18/01	1230	1250	149	153	4650	4780	605000	622000
S5	05/18/01	42	42	2	3	55	70	18300	24400
S2	05/18/01	8	8	<1	<1	21	27	608	794
S10	05/18/01	32	39	<1	<1	7	7	31100	38300
S12	05/18/01	49	62	3	5	181	229	15900	20000
S13	05/18/01	446	579	33	43	264	341	77600	117000

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
S14	10/22/97		10800		147		380		33000
S10	10/22/97		12200		166		373		37700
S14	06/10/99	4290	4270	47	42	81	147	14700	14900
S14	08/10/99	4220	4230	51	51	80	155	14400	14900
S2	08/10/99	129	138	3	4	52	85	284	298
S10	03/08/00	8620	8770	73	75	<5	46	22500	23200
S1	06/27/00	40		40		80		230	
S2	06/27/00	70		50		140		170	
S10	06/27/00	2780		30		170		13590	
S14	06/27/00	1970		20		370		9710	
S12	06/27/00	6270		70		210		2880	
S11	06/27/00	5580		130		190		11670	
S3	06/27/00	820		380		5670		36000	
S1	09/22/00	7560		50		130		24600	
S2	09/22/00	7720		50		130		25760	
S10	09/22/00	6720		10		180		2840	
S14	09/22/00	6980		70		190		2730	
S12	09/22/00	5470		70		230		11870	
S11	09/22/00	120		0		210		650	
S3	09/22/00	no flow		no flow		no flow		no flow	
S1	01/15/01	285	281	9	11	64	142	345	366
S10	01/15/01	8680	8660	250	256	91	122	37200	37100
S13	01/15/01	13400	13000	5260	5150	3200	11600	258000	257000
S10	02/04/01	<5	8650	<1	95	<5	70	<1	20
S10	03/28/01	6340	6360	109	110	579	631	33700	33900
S13	03/28/01								
S1	05/18/01	285	281	9	11	64	142	345	366
S9	05/18/01	435	436	8	8	192	198	1180	1170
S6	05/18/01	269	269	20	22	488	488	6160	6130
S4	05/18/01	7620	7790	2630	2680	852	684	161000	161000
S5	05/18/01	443	687	55	71	1520	2020	6840	6930
S2	05/18/01	260	337	14	18	641	838	2520	3250
S10	05/18/01	5030	6080	62	75	231	287	13500	16500
S12	05/18/01	1370	1740	81	107	290	375	11900	15800
S13	05/18/01	4560	5770	991	1280	780	998	119000	160000

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,... – Thesis, November 2000)

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

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

03/28/01 (Shane Bartel - Oceania Tasmania)

05/18/01 (Shane Bartel - Oceania Tasmania)

S1 - Comstock Creek - furthest upstream *(was W1)*

S2 - Comstock Creek - upstream beside old workings area

S3 - upper bench adit entrance

S4 - decline adit entrance *(was W2)*

S5 - marsh area east of proposed processing mill location

S6 - collection pond beside proposed processing mill location

S7 - main drainage inlet before treatment pond #1

S8 - discharge from treatment pond #1

S9 - Comstock Creek - before mixing with adit drainage

S10 - main adit drainage before mixing with Comstock Creek *(was W3)*

S11 - 2nd independent adit drainage south of Swansea dump after limestone buffer

S12 - 1st independent adit drainage south of Swansea dump after stormwater mixing

S13 - discharge from second collection dam west of Swansea dump *(was W4)*

S14 - Comstock Creek - downstream of mixing, before lease boundary

APPENDIX C

AMD Status of Central Mine Waste Rock Dump

AMD Status of Central Mine Waste Rock Dump at Oceania Comstock Mine

July 2001

L. Koehnken
Technical Advice on Water

1 Introduction

Oceania Pty Ltd is required to submit 6-monthly reports to the Department of Primary Industry, Water and Environment detailing the quality of mine waste materials at the Central Mine Waste Dump at the Comstock Mine Site. The parameters listed as required in the Monitoring Schedule include:

- NAG,
- NAG pH, and,
- AMD status.

To date, Oceania Pty Ltd has not completed these measurements on material from the Central Mine Waste Dump, however, a large amount of relevant information is contained in a recently completed University of Tasmania Honours Thesis entitled *"Acid Drainage at the Comstock Ag-Pb-Zn Mine, Western Tasmania"* (Meskanen, 2000). Additionally, rock samples from the dump and water samples of seeps from the base of the dump have been collected and analysed for other parameters, which can also be used to provide information about the acid drainage status of the waste rock dump.

The aim of this report is to summarise the available information regarding the acid drainage status of the waste rock dump such that the DPWIE monitoring requirement can be fulfilled. This summary is presented in two parts. First, a synthesis of the acid drainage potential of mine materials as reported by Meskanen (2000) is presented, followed by a discussion of rock and leachate analyses obtained directly from the Central Mine Waste Rock dump.

2 Summary of Acid-Base Accounting at Comstock Mine

Meskanen (2000) collected a range of rock types from and near the decline at the Comstock Mine site and completed a variety of acid-base accounting analyses on the samples. The tests included determining the total sulphur content of the samples, and establishing the Acid Neutralising Capacity (ANC), and the Net Acid Generation (NAG and NAG pH) of the various rock types. The aim of the investigation was to ascertain whether the predominant rock types on the lease site were net acid generating, and what the potential was for the long-term production of acid drainage on the site.

No samples were collected directly from the Central Mine Waste Dump for these analyses, however the waste rock dump can be assumed to contain a combination of the materials sampled, and therefore, the analytical results can be considered to be indicative of the behaviour of the dump. Results from the tests are summarised in Table 1.

Table 1. Summary of acid-base accounting results from Meskanen (2000).

Sample	%S	MPA kg $CaCO_3$/t	ANC kg $CaCO_3$/t	NAPP kg H_2SO_4/t	NAG kg H_2SO_4/t	NAG-pH
Talc	N/A	N/A	<0.01	N/A	1.4	3.4
Shale	0.6	17.2	<0.01	0.7	27.0	2.4
Shale	5.3	164.7	<0.01	5.3	34.2	2.4
Siliceous cap rock	0.5	16.3	<0.01	0.6	4.5	2.9
Talc	1.8	55.6	0.3	1.8	7.6	3.0
Talc	0.04	1.3	<0.01	0.3	0.4	4.0
Talc	N/A	N/A	<0.01	N/A	6.9	2.8
Galena, sphalerite,pyrite	26.4	824.1	<0.01	26.6	N/A	5.8
Pyrite in talc	28.9	901.9	<0.01	29.1	N/A	5.9
Pyrite	49.3	1541.3	<0.01	49.6	23.7	2.5
Galena	33.1	1034.4	<0.01	33.6	N/A	5.9
Sphalerite	17.6	550.3	<0.01	18.2	N/A	6.1

MPA = Maximum Potential Acidity
ANC = Acid Neutralising Capacity (Negative values in Thesis reported here as <0.01)
NAPP = Net Acid Producing Potential
NAG-Net Acid Generation
NAG-pH = Final pH of solution following NAG test

The total sulphur results in Table 1 indicate a wide range of values, and the author cautions that because of the high percentage of organic sulphur in the samples, the sulphur content is probably not a good indicator of potential acid producing behaviour in the samples (Meskanen, 2000).

All other indicators show that the majority of the samples have high acid producing potential, low acid neutralising capacities, and would be expected to generate acid. Static leach column tests also conducted for the thesis indicated that there was no lag-time prior to acid generation in the columns. Meskanen (2000) concluded that the acid drainage producing potential of all samples for which the complete range of analyses were completed was 'likely', with most of the materials being 'Potentially Acid Forming' based on recognised classification schemes (Miller, 1998).

Based on these investigations, and assuming that the Central Waste Rock Dump is composed of a mixture of the rock-types tested, the likelihood that acid drainage will be generated is high.

3 Rock Sample and Water Quality Analyses from Central Waste Rock Dump

In March 2001, three rock samples and three leachate samples were collected by Coffey Geosciences Pty Ltd on behalf of Oceania, and submitted to Sydney Analytical Laboratories for analysis. The samples were collected from the Central Waste Rock Dump during a dry summer period. The analytical results from the samples are presented in Tables 2 and 3.

Table 2. Analytical results from waste rock samples collected from Central Waste Rock Dump during March 2001.

Parameter & units	Sample A	Sample B	Sample C
pH	1.9	2.3	2.1
Copper (mg/kg)	51	36	92
Lead (mg/kg)	6400	2150	4730
Zinc (mg/kg)	1360	800	3400
Cadmium (mg/kg)	22	13	18
Iron (%)	2.7	0.38	3.2
Arsenic (mg/kg)	160	17	195
Mercury (mg/kg)	0.10	0.035	0.11
Sulphate (%)	2.4	1.3	2.0
Total Sulphur (%)	1.4	0.6	1.7
ANC (%$CaCO_3$)	<0.01	<0.01	<0.01

ANC = Acid neutralising capacity

Table 3. Analytical results of leachate from the base of Central Waste Rock Dump during March 2001.

Parameter & units	Sample A	Sample B	Sample C
pH	2.2	2.5	2.2
Total Acidity as $CaCO_3$ (mg/L)	29,100	10,400	18,800
Total Alkalinity as $CaCO_3$ (mg/L)	<1	<1	<1
Sulphate (%)	2.8	1.0	1.8
Aluminium (mg/L)	1900	1180	1350
Arsenic (mg/L)	98	8.6	66
Cadmium (mg/L)	38	15	27
Cobalt (mg/L)	5.5	2.9	3.8
Chromium (mg/L)	3.3	1.0	2.2
Copper (mg/L)	40	18	33
Iron (mg/L)	6400	1520	4300
Manganese (mg/L)	64	11	55
Mercury (mg/L)	<0.0001	<0.0001	<0.0001
Nickel (mg/L)	12	7.3	8.8
Lead (mg/L)	0.67	0.35	0.50
Antimony (mg/L)	0.10	0.03	0.08
Selenium (mg/L)	<0.01	<0.01	<0.01
Zinc (mg/L)	2100	1190	1360

In Table 2, the Total Sulphur results are consistent with the results in Table 1 for the talc, shale and siliceous cap rock samples. The undetectable ANC in the waste rock dump samples are also consistent with the rock types analysed by Meskanen (2000), and the paste pH determined on the rock samples are in the same range as the NAG pH results.

The leachate samples have low pH values, are extremely acidic due to the presence of sulphuric acid, have no alkalinity and contain up to 10 g/L of metals.

The rock and leachate analyses are indicative of a sulphidic waste rock dump that is actively oxidising, resulting in the generation of sulphuric acid and liberation of

metals. There is no buffering capacity available in the waste rock dump to check these reactions.

4 Summary

Based on the available information, the monitoring report to DPIWE for the Central Waste Rock dump should reflect the following findings:

- NAG and NAG pH: The majority of the material believed to be present in the dump has a final NAG value of > 5 kg H_2SO_4/t, and a NAG pH of <4.5, resulting in the material being classified as 'Potentially Acid Forming' based on the classification of Miller (1998).
- AMD status: The status of the dump is considered to be actively oxidising with no buffering capacity available to neutralise the generated sulphuric acid. The acidic conditions in the dump are resulting in the liberation of metals from the dump, particularly aluminium, iron and zinc.

5 References

Meskanen, U., 2000, *Acid Mine Drainage at the Comstock Ag-Pb-Zn-Mine, Western Tasmania.* University of Tasmania Honours Thesis, School of Earth Sciences.

Miller, S., 1998, Predicting Acid Drainage, *Groundwork,* Australian Minerals and Energy Environment Foundation, v2, no. 1, p 8-9.