



Environmental Monitoring Results Summary

Quarter 1 2016

Name of Mine:	CSA Mine
Environment Protection Licence:	EPL 1864
Licensee Name and Operator:	Cobar Management Pty Ltd
Licensee Address:	PO Box 31, Cobar NSW 2835
Mining Lease:	Consolidated Mining Lease 5
Name of Lease Holder:	Isokind Pty Ltd

Contents

1	INTRODUCTION.....	3
1.1	Scope.....	3
1.2	Regulatory Context.....	3
1.3	Licence Condition Limits	3
2	WEATHER CONDITIONS.....	4
3	AIR QUALITY	4
3.1	Depositional Dust.....	4
3.1.1	Impact Assessment Criteria.....	4
3.1.2	Quarterly Monitoring Results Analysis	5
4	WATER QUALITY	6
4.1	Impact Assessment Criteria	6
4.2	Surface Water Quarterly Monitoring Analysis.....	7
5	REFERENCES	9

1 INTRODUCTION

Cobar Management Pty Ltd (CMPL) operates the CSA Mine, which is located 11 km north of Cobar, New South Wales. CMPL, a wholly owned Australian subsidiary of Glencore operates the CSA Mine, an underground copper mine, which produces up to 1.1 million tonnes of copper ore and in excess of 185,000 tonnes of copper concentrate per annum.

Minerals present in the CSA ore body are mainly chalcopyrite, with lesser cubanite, pyrite and pyrrhotite as well as very minor bornite, sphalerite and galena with traces of silver. Quartz, siltstone clasts, calcite, magnetite and chlorite form the gangue to the sulphide minerals.

The ore is processed on site using SAG and ball mills in closed circuit with hydro cyclones. Once ground, ore slurry is concentrated through a conventional flotation circuit. From here the concentrated slurry is thickened, filtered, dried and stockpiled. Concentrate is transported by rail in purpose built, fully enclosed, steel containers to Port Waratah (Newcastle) for storage and export shipment by ocean freight.

1.1 Scope

This report provides a summary of environmental monitoring results at the CSA Mine for the period of the January 1st to March 31st 2016 and is undertaken in accordance with the CSA Mine Environmental Monitoring Program.

1.2 Regulatory Context

Environmental Protection Licence (EPL) holders are required under the *Protection of the Environment Operations Act 1997* to make publicly available their monitoring results for those parameters specified in the EPL. Although CSA Mine does not have any reportable parameters under EPL 1864, it has taken the approach of reporting all environmental monitoring results in order to maintain transparency and to provide the community with relevant information relating to environmental management at the CSA Mine.

EPL 1864 is available on the CSA website www.csamine.com.au or on the Office of Environment and Heritage website www.environment.nsw.gov.au.

Any emissions of listed chemicals to air, water or land are required to be reported in the National Pollutant Inventory (NPI). Data on emissions is collated and published annually. The data is not included in this report but can be accessed via the NPI website; www.npi.gov.au.

1.3 Licence Condition Limits

EPL 1864 does not prescribe any discharge or emission limits for any pollutants at the CSA Mine. However, discharge or emission limits can be imposed by statute, primarily the *Protection of the Environment Operations (Clean Air) Regulation 2010*, or the *Protection of the Environment Operations (General) Regulation 2009*.

In keeping with leading practice principles, where no discharge or emissions limits are prescribed, the CSA Mine adopts recognised impact assessment criteria to measure monitoring results against. Impact assessment criteria are detailed in Sections 3.1.1 and Section 4.1 of this report.

2 WEATHER CONDITIONS

A summary of weather conditions for the reported quarter is presented in Table 1. Weather conditions may influence monitoring results, hence they can be utilised for the analysis of results and interpretation. Rainfall parameters were measured on site at the Tailings Storage Facility rain gauge, and temperature parameters were measured by the NSW Bureau of Meteorology at the Cobar weather station.

Table 1. Summary of weather conditions for the reported quarter

	Jan	Feb	March
Total Rainfall (mm) (Site)	28	0	44.5
Rainfall average (mm) (Cobar)	45.7	43.0	35.9
Total number of wet days	2	0	4
Average minimum temperature (°C)	20.6	20.2	17.1
Average maximum temperature (°C)	34.1	33.3	30

3 AIR QUALITY

Operations at the CSA Mine may influence air quality through coarse dust particle emissions generated from the operation of equipment mechanically disturbing rock and soil materials (e.g. driving vehicles over dirt roads, crushing and grinding ore) or when wind blows over bare ground and around stockpiles.

Fine particles from vehicle exhausts, mobile equipment and the use of explosives may also be produced.

3.1 Depositional Dust

The air quality monitoring program at the CSA Mine consists of 10 depositional dust gauges placed at strategic locations around the mine's operational areas. The gauges are collected monthly and sent to a NATA accredited laboratory for analysis.

These gauges measure the total coarse dust particles fallen from the atmosphere in a month. They are a useful indicator of broad scale changes to the local air quality. They are influenced by both mining and non-mining conditions.

3.1.1 Impact Assessment Criteria

EPL 1864 does not prescribe any limits for depositional dust at the CSA Mine. The CSA Mine utilises the impact assessment criteria of 4 g/m²/month for mineral content, which is set out in the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (NSW EPA 2005).

3.1.2 Quarterly Monitoring Results Analysis

The impact assessment level for mineral content ($4 \text{ g/m}^2/\text{month}$) was not exceeded during the monitoring period. A summary of the monitoring results at all 10 locations from the January 1st to March 31st are found below.

The dust monitoring sampling periods have been changed from previous year's quarterly reports, from once a month sampling to once every two months.

Figure 1: Depositional dust monitoring results for 2016 1st quarter

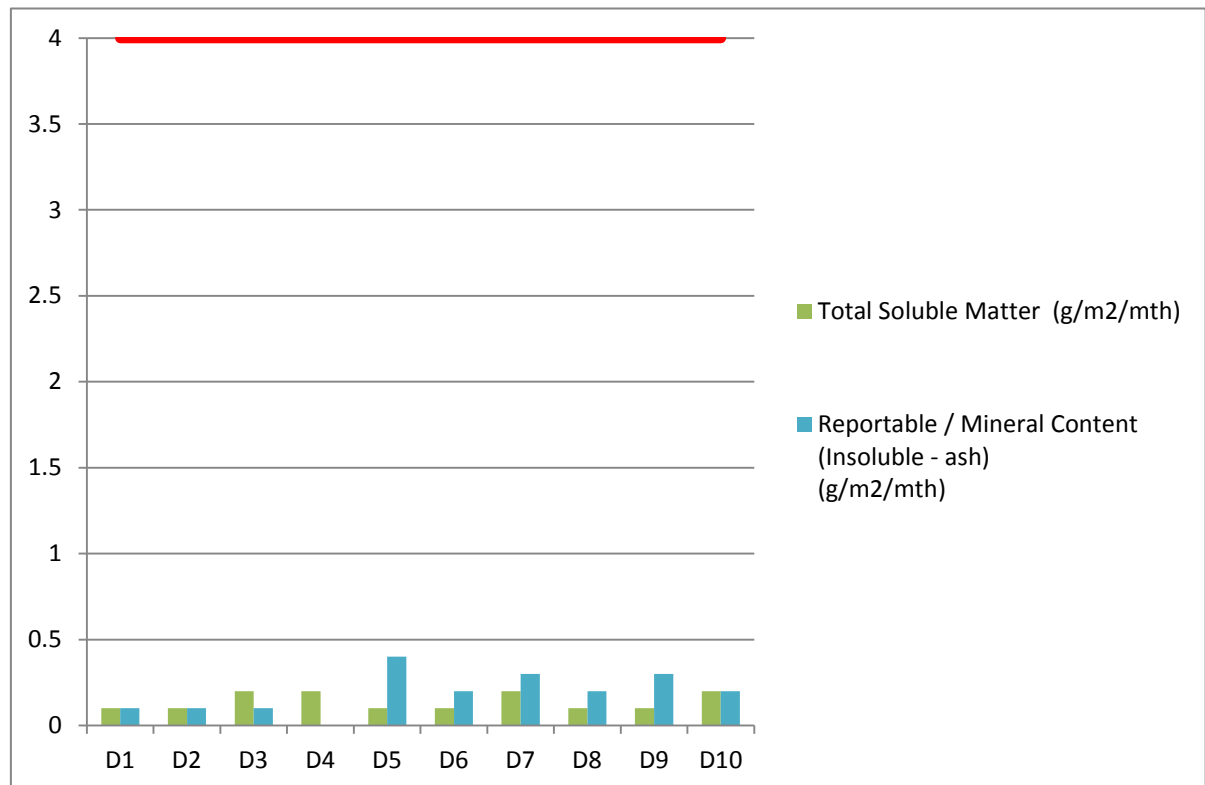
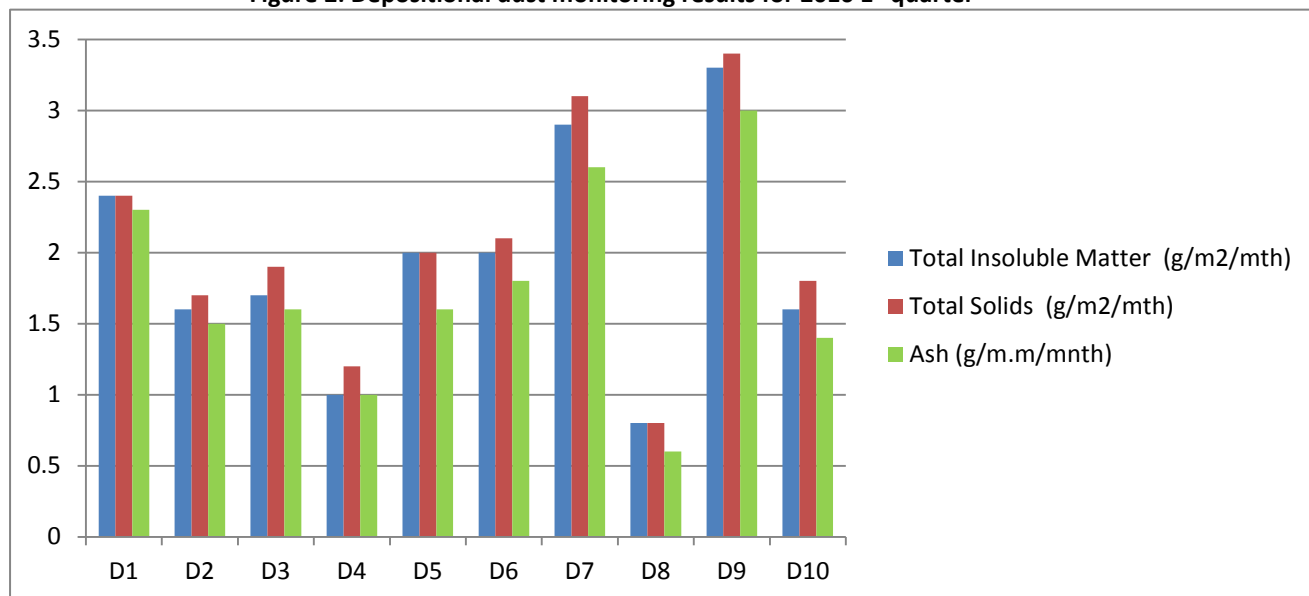


Figure 1 compares the dust levels at all monitoring locations to the assessment criteria of 4 g/m^2 . According to Figure 1 all monitoring locations fell below this limit during the first quarter of 2016.

Figure 2 displays the composition of depositional dust at CSA Mine. The majority of depositional dust onsite at CSA Mine is organic ash matter and a small portion the reportable mineral content. This data highlights that mining activities are not having a significant impact on dust generation and air quality in the area surrounding CSA Mine.

Figure 2: Depositional dust monitoring results for 2016 1st quarter

4 WATER QUALITY

Surface water resources are monitored for quality and levels once every two month (January and March). Surface water is monitored at all site surface water dams across the CSA Mine Lease (CML5). Samples are analysed by an external NATA accredited laboratory for determination of sulphates and metal content. Electrical conductivity (EC) and pH parameters are measured in the field at the time of sample collection.

The CSA Mine is a zero discharge operation and all runoff from the site is captured within containment dams, as a result any impact to nearby water sources is not expected from mining operations.

4.1 Impact Assessment Criteria

EPL 1864 does not prescribe any limits for water quality at the CSA Mine. Historical trend analysis is used for assessing and interpreting monitoring results. Assessment criteria set out in the *Australian and New Zealand Guidelines for Irrigation and General Use* (ANZECC 2000) are used as a guide for interpreting water quality.

Table 2 - Impact assessment criteria

ANZECC (2000) <i>Guidelines for Irrigation and General Water Use</i>	
pH	6-9
Electrical Conductivity (uS/cm)	7,700
Copper (mg/L)	5
Iron (mg/L)	10
Lead (mg/L)	5
Sulphates (mg/L)	1,000
Zinc (mg/L)	5

4.2 Surface Water Quarterly Monitoring Analysis

A summary of the surface water quality monitoring results for quarter 1 2016 is displayed in Table 3. Results highlighted in red are outside the recommended impact assessment criteria in the ANZECC guidelines.

During the monitoring period, pH levels varied between monitoring locations (as a result of variations in catchment conditions) and within specific locations over the monitoring period (as a result of variations in climate conditions). During the reporting period, the pH ranged from 3.45 within the contaminated catchment runoff dam (S1) to 8.17 within the tailings dam decant and stormwater overflow dam (S15). The ANZECC guideline value for pH was exceeded during this reporting period at sampling locations S1, S8, S9 and S13. All these dams make up part of the site contaminated catchment area and exceedances are expected at these locations. Electrical conductivity ranged from 26 to 68 $\mu\text{S}/\text{cm}$ within the clean water catchments S15 and S16, and one exceedance of the ANZECC guideline (7,700 $\mu\text{S}/\text{cm}$) with a value of 34,800 $\mu\text{S}/\text{cm}$ at the tailings decant dam (S5). This exceedance is expected as the decant dam captures water runoff from the tailings dam which has a high metals content due to copper ore processing.

The contaminated catchment S1 also had elevated copper, zinc and sulphate concentrations, as did the site process water dam. The process water dam contains water used in the copper extraction process and is expected to have elevated levels of metals. The facility is fully lined to prevent seepage into the surrounding soil.

Lead concentrations recorded throughout the reporting period at all samplings areas did not exceed their adopted ANZECC guideline.

Table 3 - Surface water results for Q1 2016, highlighted cells indicate levels which are outside of the ANZECC Guidelines.

Sample Location	Month Sampled	Storage Capacity	pH	EC (uS/cm)	SO4 (mg/L)	Cu (mg/L)	Pb (mg/L)	Zn (mg/L)	Fe (mg/L)
ANZECC Guidelines Stock water Trigger Values (low risk)			6-9	7700 mg/L (general use)	1000 mg/L	5 mg/L (lowest trigger value)	5 mg/L	5 mg/L	10 mg/L
Clean Water									
Old CSA Spoils Dam (S1) Excised Area	January	90%	3.57	1440	889	9.02	0.047	45.3	3.31
	March	20%	3.45	1580	1150	18.8	0.028	81.9	2.97
Raw Water Storage Tank (S2)	January	---	7.85	549	40	0.003	<0.001	0.113	0.24
	March	---	8.01	462	31	0.003	0.004	0.878	0.15
Borrow Pit Dam (S4)	January	10%	7.80	1360	398	1.68	0.284	0.619	15.6
	March	25%	7.36	2630	975	0.514	0.008	5.49	0.20
TSF Decant Dams (combined) (S5)	January	10%	8.17	34800	17600	0.350	<0.010	0.137	1
	March	<5%	7.58	3140	949	0.030	0.001	0.015	3.36
Railway Dam (S8)	January	25%	4.24	545	254	13.4	0.014	4.33	0.77
	March	15%	4.13	486	225	21.2	0.011	4.83	0.11
Retention Dam (S9)	January	5%	3.89	707	337	1.16	0.586	10.8	1.03
	March	0%	Dry						
North Runoff Dam (S10)	January	20%	6.11	294	100	0.363	0.359	1.79	2.96
	March	<5%	6.08	279	100	0.410	0.059	2.99	0.98
TSF Stormwater Collection Dam (S11)	January	20%	7.47	400	104	0.350	0.001	0.097	0.26
	March	10%	7.47	338	112	0.563	<0.001	0.188	<0.05
Old Smelter Runoff Dam (S13)	January	10%	6.54	456	137	0.328	0.066	1.61	1.64
	March	<5%	5.19	334	110	0.495	0.021	3.30	0.64
Pork Pie Dam (S14)	January	10%	7.81	1020	219	25.7	1.58	7.27	212
	March	85%	7.75	2420	844	0.572	0.007	10.4	0.13
Old Mine Dam (N) MPL1093 (S15)	January	55%	7.02	26	<1	0.032	0.005	0.097	2.08
	March	5%	7.31	43	<1	0.010	<0.001	0.026	0.60
Old Mine Dam (S) MPL 1094 (S16)	January	5%	6.77	26	3	0.102	0.203	0.067	4.30
	March	20%	7.45	68	2	0.031	0.022	0.023	0.98

5 REFERENCES

- Australian and New Zealand Conservation Council (ANZECC) (2000) *Australian and New Zealand Guidelines for fresh and marine water quality*
- NSW Environment Protection Authority (EPA) (2005) *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*
- NSW Environment Protection Authority (2012) *Requirements for Publishing Pollution Monitoring Data*
- Office of Environment and Heritage (2011) *Environment Protection Licence 1864*
- *The Protection of the Environment Operations (Clean Air) Regulation 2010*
- *The Protection of the Environment Operations Act 1997*