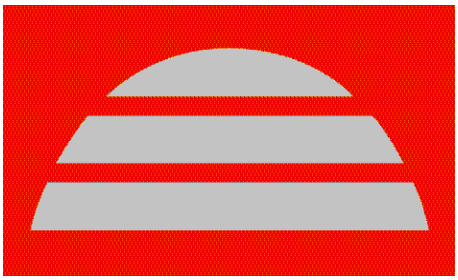

Rasp Mine
Monthly Environmental Monitoring Report
August 2018

INTRODUCTION

Broken Hill Operations Pty Ltd (BHOP) [a wholly owned subsidiary of CBH Resources Limited (CBH)] owns and operates the Rasp Mine (the Mine), which is located centrally within the City of Broken Hill on Consolidated Mine Lease 7 (CML7).

Mining has been undertaken within CML7 since 1885. The existing operations at the Rasp Mine include underground mining operations, a processing plant producing zinc and lead concentrates and a rail siding for concentrate dispatch. These operations are undertaken in accordance with Project Approval 07_0018 granted 31 January 2011, under Part3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

As the holder of an Environmental Protection Licence, 12559, BHOP is required, under Section 66(6) of the NSW *Protection of the Environment Operations Act 1997,* to publish pollution monitoring data. In addition BHOP is required to publish data in accordance with its Project Approval 07_0018 Schedule 4 Condition 9. These documents can be found on the Rasp Mine web site.

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1 Air Quality

The following criteria as listed in the Project Approval (MOD4 6 September 2017) apply to air quality monitoring:

Long Term Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion
Total solid particles (TSP)	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	25 µg/m^3

Short Term Criterion for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Long Term Criteria for Deposited Dust

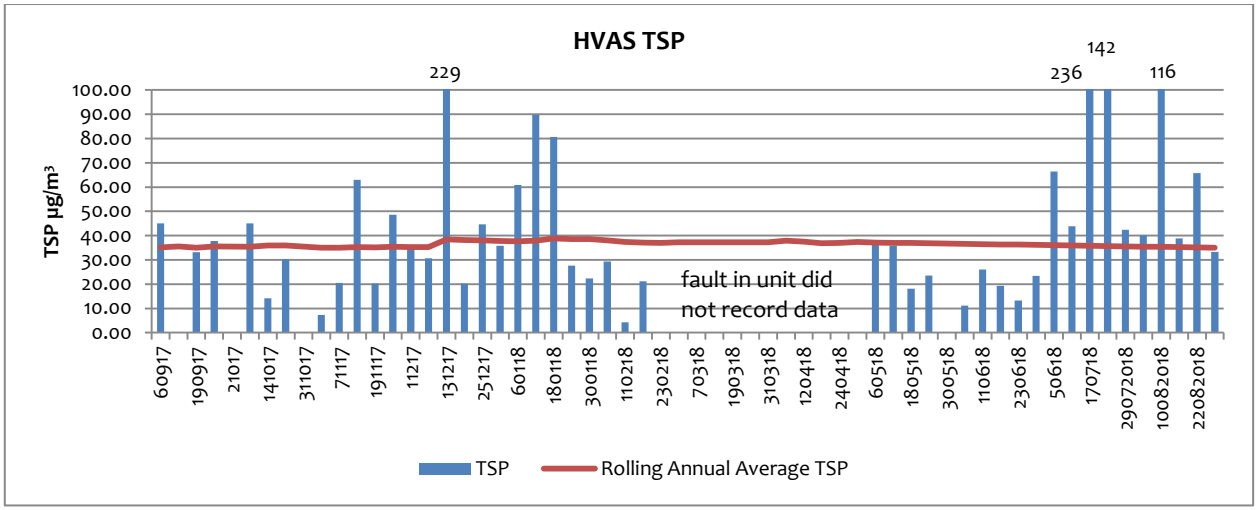
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

1.1 High Volume Air Samplers

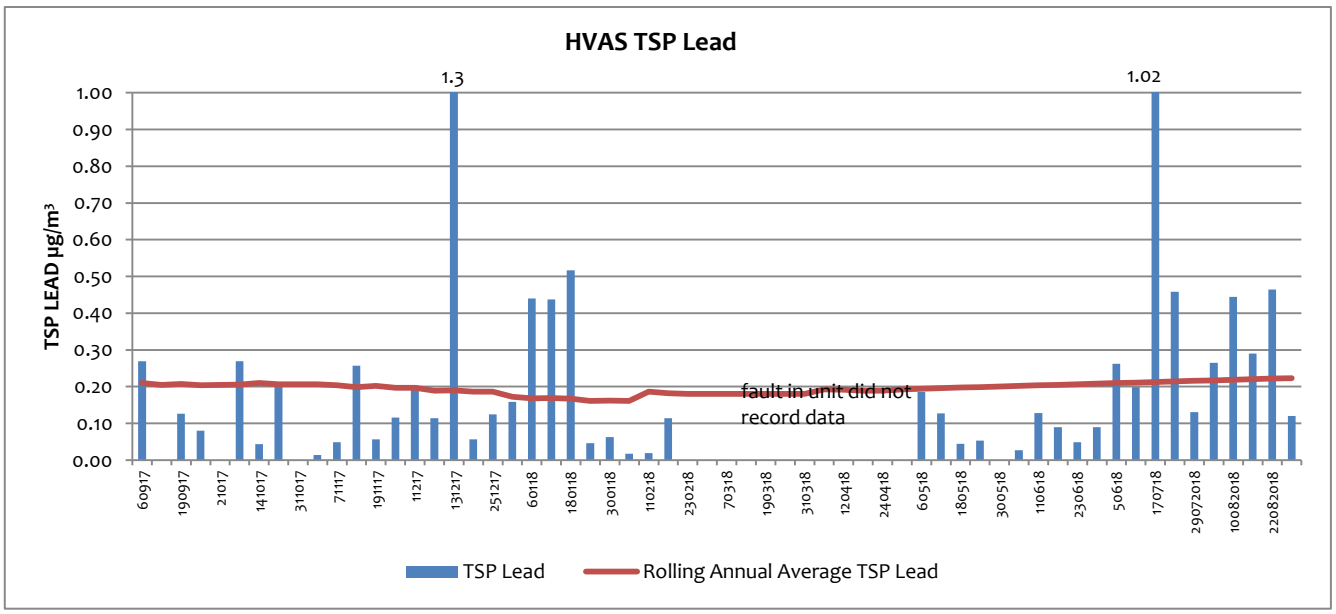
There are three high volume air samplers used to measure ambient air quality at the Rasp Mine – HVAS (EPL10) and HVAS1 (EPL11) are located at the Silver Tank, central and to the south of the mine lease, and HVAS2 (EPL12) is located adjacent to and north of Blackwood Pit. A map indicating these locations can be found on the Rasp Mine web site. HVAS samples for total suspended particulates (TSP) and lead dust, and HVAS1 and HVAS2 sample for particulate matter less than 10 microns (PM_{10}) and lead dust.

HVAS (EPL10) - Silver Tank (On Site) Results for August

DATE	TSP (µg/m^3)	Lead (µg/m^3)
4-08-2018	40.10	0.27
10-08-2018	116.00	0.44
16-08-2018	38.90	0.29
22-08-2018	65.80	0.46
28-08-2018	33.30	0.12

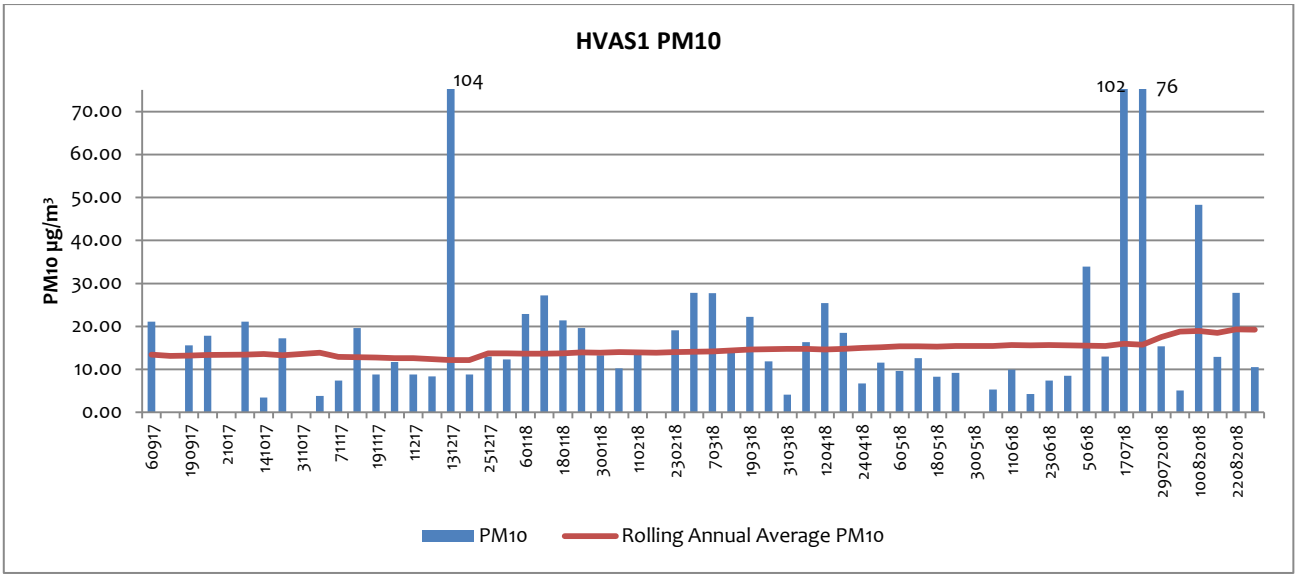


HVAS (EPL10) is located on the Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. Overall the trend for TSP at this location remains consistent with the previous 12 months. Results for both TSP and Lead were elevated on August 10 and 22 due to gusting winds from the North on those days. The rolling annual average TSP at 28 August is 35.00 µg/m^3 which is below the annual criterion of 90 µg/m^3. The rolling annual average for TSP Lead at 28 August is 0.22 µg/m^3 which is below the criterion of 0.5 µg/m^3.



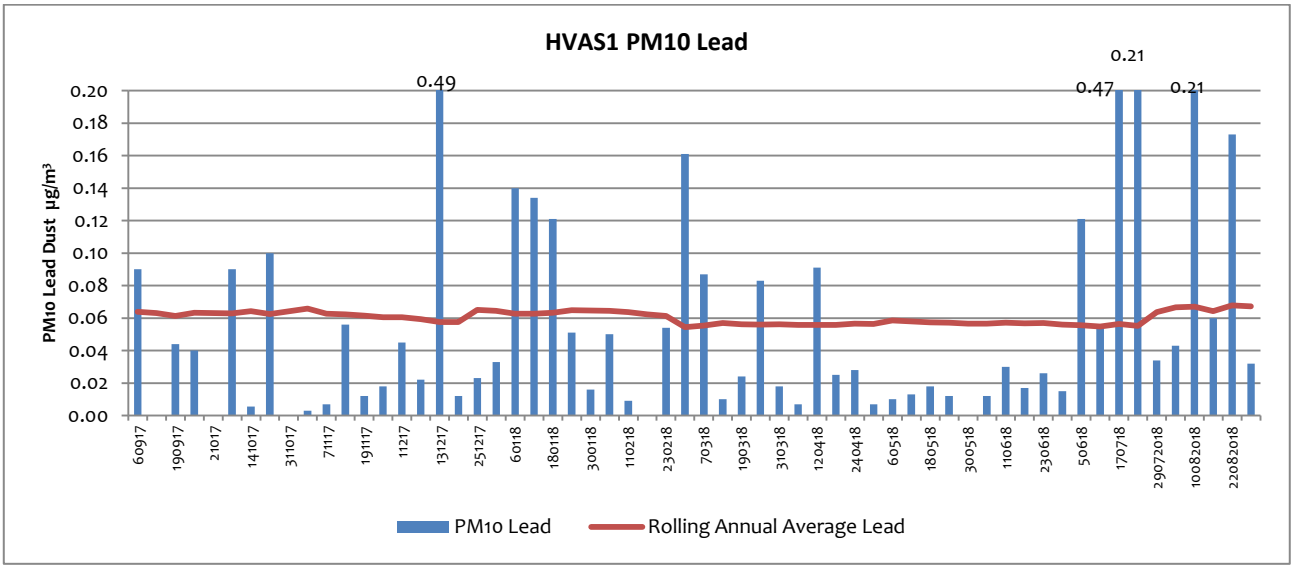
HVAS1 (EPL11) - Silver Tank (On Site) Results for August

DATE	PM10 (µg/m^3)	PM10 Lead (µg/m^3)
4-08-2018	5.10	0.04
10-08-2018	48.30	0.21
16-08-2018	12.90	0.06
22-08-2018	27.80	0.17
28-08-2018	10.50	0.03



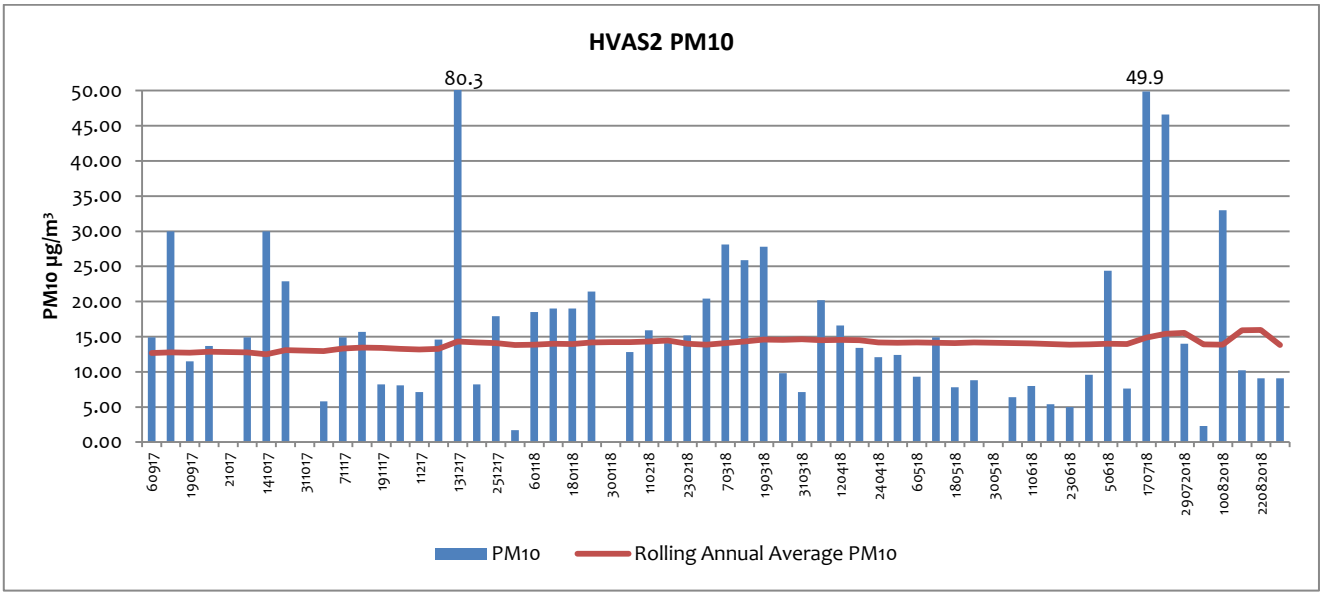
HVAS (EPL11) is located on the Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. Results for both PM10 and PM10 Lead were elevated on August 10 and 22 due to gusting winds from the North on those days. The rolling annual average for PM10 to 28 August is 19.2 µg/m^3 which is below the PM10 annual average criterion of 25 µg/m^3 required at the nearest residential location.

There is no guideline for assessing PM10 lead dust. The rolling annual average for PM10 lead is relatively stable.



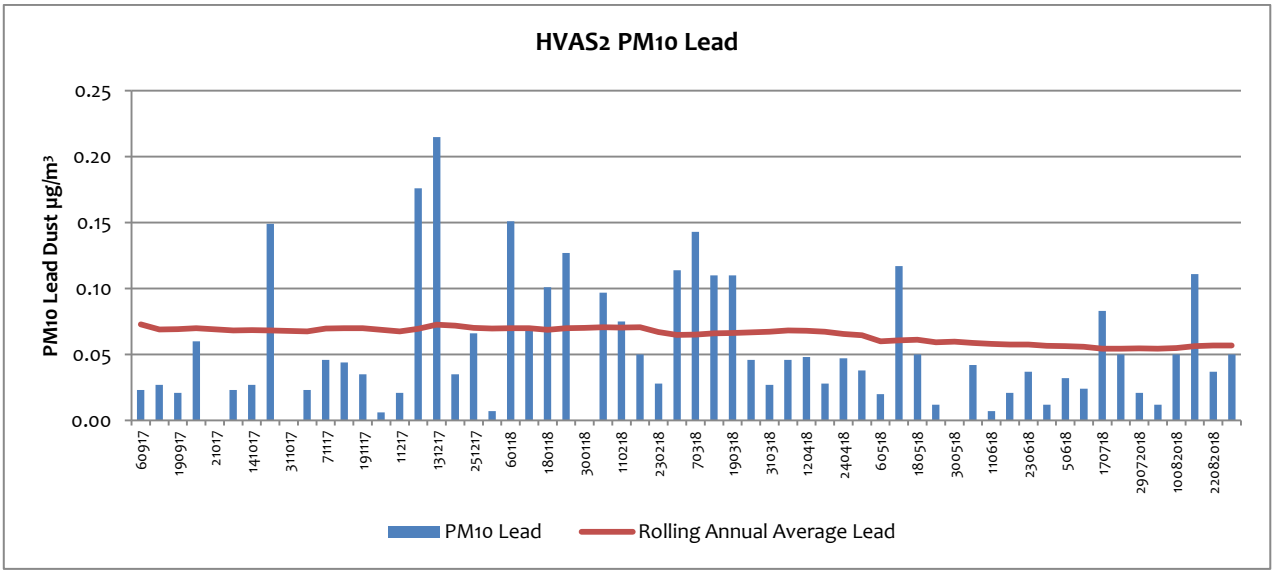
HVAS2 (EPL12) - Blackwood Pit (On Site) Results for August

DATE	PM10 (µg/m^3)	Lead (µg/m^3)
4-08-2018	2.30	0.01
10-08-2018	33.00	0.05
16-08-2018	10.20	0.11
22-08-2018	9.10	0.04
28-08-2018	9.10	0.05



HVAS2 (EPL12) is located on the Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. The recorded annual average PM10 to 28 August is 13.83 µg/m^3 which is below the PM10 annual average criterion 25 µg/m^3 required at the nearest residential location. Overall the trend for PM10 at this location remains consistent with the previous 12 months.

There is no guideline for assessing PM10 lead dust. The trend for lead dust at this location has been decreasing over the previous 12 months.



1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

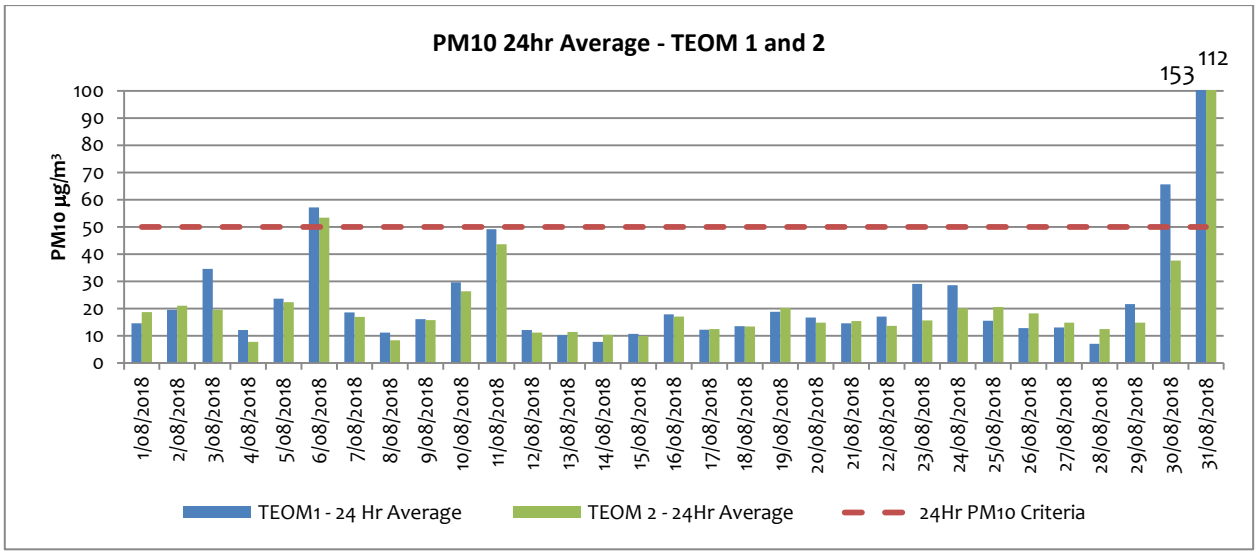
There are two Tapered Element Oscillating Microbalance (TEOM) sampling units used to measure ambient air quality at the Rasp Mine – TEOM1 (EPL13) is located off-site within the perimeter fence of Essential Water south of the mine lease, and TEOM2 (EPL14) is located on-site adjacent to Blackwood Pit to the north of the mine lease. A map indicating these locations can be found on the Rasp Mine web site. TEOM1 and TEOM2 operate continuously and sample for particulate matter less than 10 microns (PM_{10}) in size.

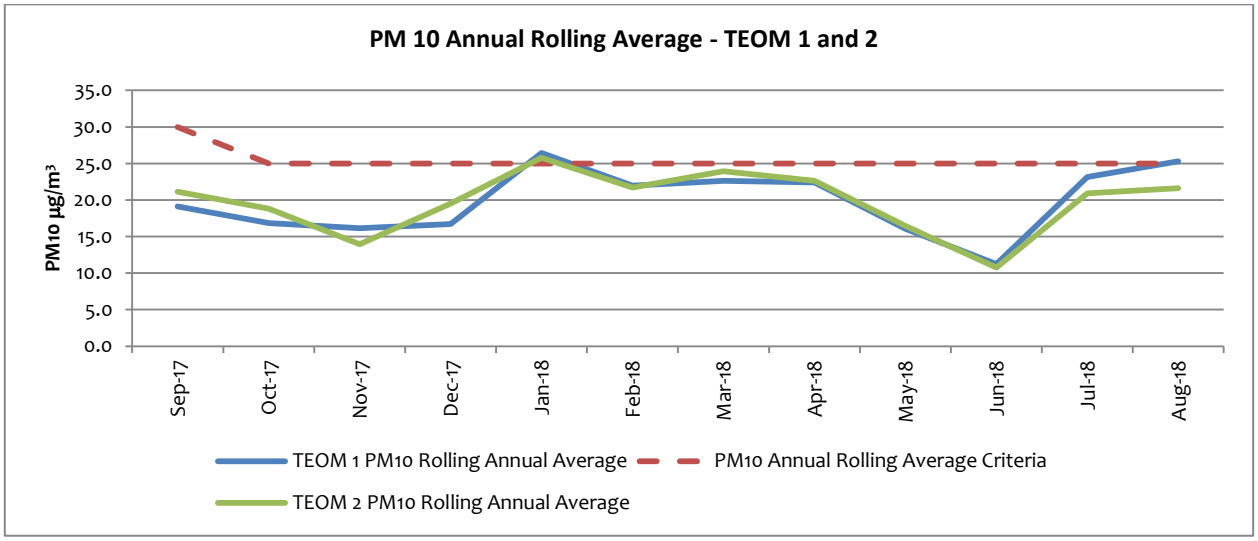
TEOM1 (EPL13) (Off Site) and TEOM2 (EPL14) (On Site) Results for August

Particulate Matter <10 Microns 24Hr Average				
Date	**TEOM 1 (µg/m³)**	**Compliant with 50µg/m³ 24hr average?**	**TEOM 2 (µg/m³)**	**Compliant with 50µg/m³ 24hr average?**
01-08-18	14.55	Y	18.64	Y
02-08-18	19.54	Y	21.05	Y
03-08-18	34.57	Y	19.56	Y
04-08-18	12.12	Y	7.68	Y
05-08-18	23.64	Y	22.28	Y
06-08-18	57.13	Y_1	53.4	Y_1
07-08-18	18.6	Y	16.92	Y
08-08-18	11.18	Y	8.28	Y
09-08-18	16.07	Y	15.71	Y
10-08-18	29.62	Y	26.36	Y
11-08-18	49.16	Y	43.62	Y
12-08-18	12.1	Y	11.21	Y
13-08-18	10.25	Y	11.44	Y
14-08-18	7.79	Y	10.3	Y
15-08-18	10.68	Y	9.89	Y
16-08-18	17.88	Y	17.05	Y
17-08-18	12.26	Y	12.49	Y
18-08-18	13.52	Y	13.39	Y
19-08-18	18.82	Y	20.22	Y
20-08-18	16.66	Y	14.79	Y
21-08-18	14.61	Y	15.34	Y
22-08-18	17.07	Y	13.6	Y
23-08-18	29.02	Y	15.65	Y
24-08-18	28.54	Y	20.07	Y
25-08-18	15.53	Y	20.55	Y
26-08-18	12.84	Y	18.17	Y
27-08-18	13.08	Y	14.86	Y
28-08-18	7.02	Y	12.39	Y
29-08-18	21.58	Y	14.85	Y
30-08-18	65.64	Y_1	37.63	Y
31-08-18	152.81	Y_1	112.4	Y_1

$_1$ = Monitoring results affected by general dust storms and high winds, particularly from the North.

The TEOM1 monitoring unit is located off-site from the Rasp Mine and the criteria as listed in the Project Approval 07_0018 apply at this point. There are two criteria listed for PM10, a 24 hour average criteria of 50 ug/m^3 and an annual average criteria of 25 ug/m^3. TEOM 1 and TEOM 2 returned elevated 24 hour average readings, on some occasions above the 25 ug/m^3 criteria, on August 6, 30 and 31 which was due to high regional dust levels generated by strong winds on these days when winds from the North exceeded 50 km/hr. The Annual Rolling Average in August has increased for both TEOMs, with TEOM1 slightly exceeding the 25 ug/m^3 limit, due to the influence of the unusually high readings as a result of the windy conditions.





Note 1: Criteria change to 25µg/m^3 in September 2017 as per PA MOD4.

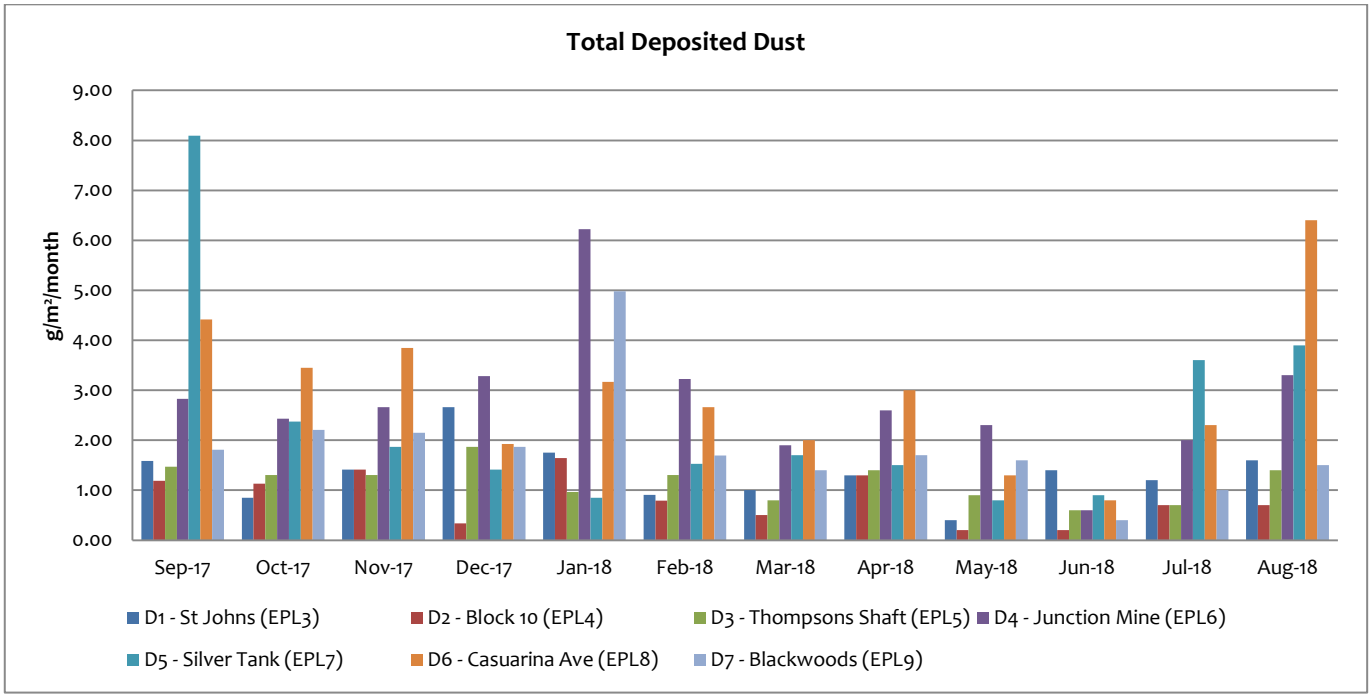
1.3 Dust Deposition Sampling

There are seven dust deposition gauges to measure ambient air quality at the Rasp Mine – D1 to D7. D1 and D6 are located off-site, D1 near the St Johns training facility north of the Rasp Mine and D6 in Casuarina Avenue south of the Rasp Mine. D2 to D5 and D7 are located on the mine lease in various locations. A map indicating these locations can be found on the Rasp Mine web site. Dust samples are collected monthly and analysed for total deposited dust and deposited lead dust.

Dust Deposition Gauges (D1 (EPL3) to D7 (EPL9)) – Results for August

Total Deposited Dust (g/m^2/Month)							
Date	D1 (off site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off site)	D7 (on site)
August 2018	1.6	0.7	1.4	3.3	3.9	6.4	1.5
Background (2010)	4.0	3.1	4.3	5.7	-1	5.8	-1
Compliant?	Y	N/A	N/A	N/A	N/A	N	N/A

Note: "1"= background not available N/A = not applicable as dust deposition unit is located on site

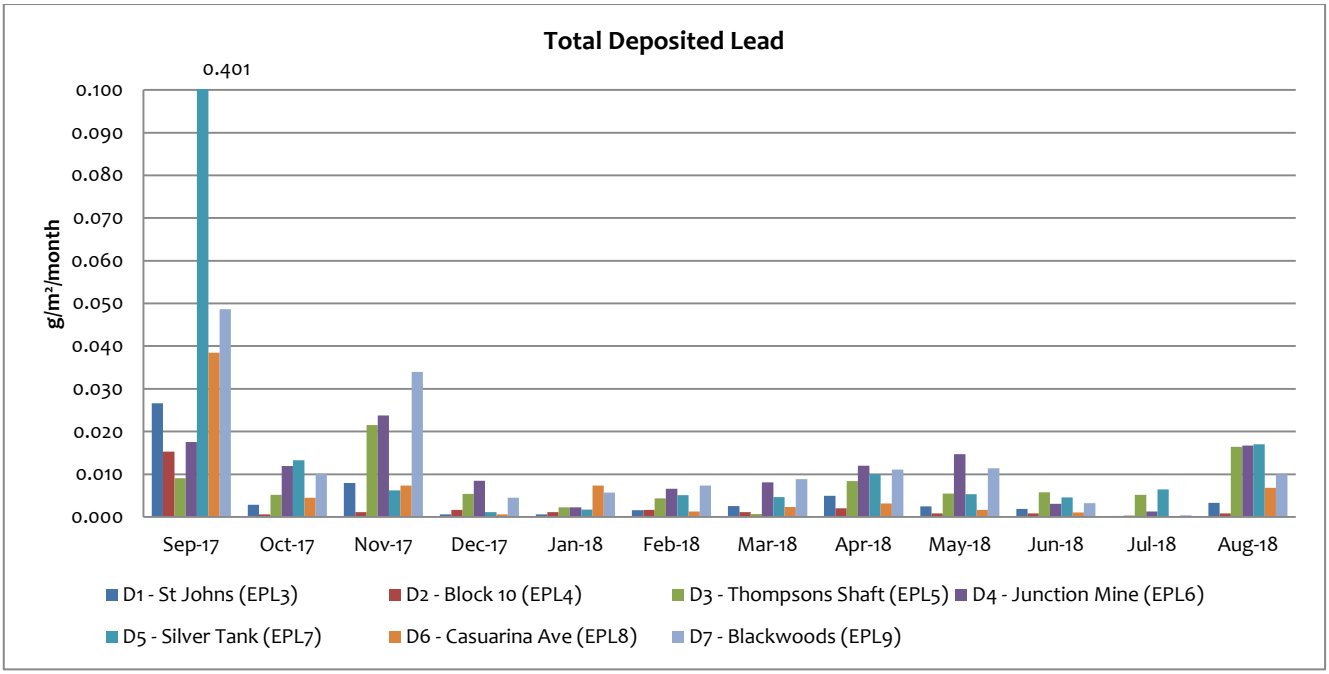


Elevated dust levels are expected at this time of year when the region experiences gusting winds from the North. The highest reading for the month was recorded in the dust gauge at Casuarina Avenue which is located on the southern edge of the city. The Casuarina Avenue dust gauge is sited adjacent to a bare block frequently trafficked by vehicles and bare of any effective ground cover which may account for the high dust level returned for August and previous months.

The Rasp Mine is in compliance with criteria.

Total Deposited Lead (g/m^2/Month)							
Date	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
August 2018	0.003	0.001	0.016	0.017	0.017	0.007	0.01
Background (2010)	0.003	0.005	0.005	0.006	-1	0.004	-1

Note: "1"= background not available



There are no guidelines for deposited lead dust. As with Total Deposited Dust levels, Total Deposited Lead levels have increased slightly in the August.

1.4 Ventilation Outlets and Bag House Monitoring

There are three locations to measure pollutants from exhausts or stacks, these include the Primary Ventilation Shaft and Shaft 6, both measuring pollutants from underground firings, and the Baghouse Stack at the crusher measuring dust. All are located on site; the Primary Ventilation Shaft is located centrally and to the north of the mine lease and Shaft 6 is located centrally within the lease. The Primary Crusher Baghouse Stack is located within the area of the processing plant to the east of the lease. A map indicating these locations can be found on the Rasp Mine web site. Samples are collected quarterly and analysed for a number parameters listed in below. Reference to the item required in the Rasp Mine Environment Protection Licence (EPL) is provided below.

Quarterly sampling is undertaken in March, June, September and December.

The following criteria apply:

Primary Ventilation Shaft (EPL1) and Shaft 6 (EPL56)

	Unit	Criteria
Nitrogen Oxides	mg/m^3	350
Volatile Organic Compounds	mg/m^3	40

Primary Ventilation Shaft (EPL1), Shaft 6 (EPL56) and Crusher Baghouse (EPL2)

	Unit	Criteria
Total Suspended particles	mg/m^3	20
Type 1 and Type 2[1]	mg/m^3	1

Note 1: "Type 1 substance" means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements.
"Type 2 substance" means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements.

Primary Vent Shaft (EPL1), Crusher Baghouse (EPL2) and Vent Shaft 6 (EPL56) Results for August

There are no results for August; sampling is scheduled for September.

2 Noise

2.1 Blasting (Vibration and Overpressure)

There are 6 vibration monitors at various locations to measure for vibration and overpressure from blast firings. These include V1 to V5 which are located off-site and V6 which is located on-site near Shaft 4. A map indicating these locations can be found on the Rasp Mine web site. In addition there are 2 roving monitors, which may be used to monitor vibration and overpressure at particular locations as required. Monitors operate continuously and are automatically triggered when a blast occurs. The following conditions apply as listed in the PA 07_0018 and EPL 12559:-

Blasting Criteria (Western Mineralisation and Main Lodes excluding Block 7)

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance (for production and development blasts)
Residence on privately owned land (7am-7pm)	115	5	5% of the total number of blasts over a 12-month period[1]
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Public Infrastructure	-	100	0%

Note 1: Does not apply until completion of Pollution Reduction Program on the EPL at the end of 2018. Applies to EPL criteria in the period for the Annual Return 3 Nov to 2 Nov the following year and to DPE criteria in the reporting period 1 Jul to 30 Jun each year.

Blasting Criteria (Block 7)

Location	Airblast Overpressure (dB(Lin Peak)	Ground Vibration (mm/s)	Allowable Exceedance (for production and development blasts)
Residence on privately owned land (7am-7pm)	115	3 (interim)	5% of the total number of blasts over a 12-month period[1]
(7am-7pm)	120	10	0%
(7pm-10pm)	105	-	-
(10pm-7am)	95	-	-
Broken Hill Bowling Club, Italio (Bocce) Club, Heritage Items within CML7	-	50	0%
Perilya Southern Operations	-	100	0%
Public Infrastructure	-	100	0%

Note 1: Applies to EPL criteria in the period for the Annual Return 3 Nov to 2 Nov the following year and to DPE criteria in the reporting period 1 Jul to 30 Jun each year.

In addition the following conditions also apply:-

- Production blasts may occur between 6.45 am and 7.15 pm on any day
- 1 production blast per day, with 6 per week averaged over a calendar year

- 6 development blasts per day, with 42 per week averaged over a calendar year

Blasting Data Summary Results for June

Total Blasts:

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 4.6 per week over the previous calendar year
- The number of Development blasts averaged 34.6 per week over the previous calendar year

Western Mineralisation and Main Lodes (excluding Block 7):

- 1 Blast recorded >5 mm/s
- 0 Blasts recorded >10 mm/s
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)
- 0 Blasts recorded an over pressure level over 115dBL (7am to 7pm)
- 0 Blasts recorded an over pressure level over or 120 dBL at any time
- Percentage of development blasts over 5 mm/sec = 0% (1 September 2017 until 31 August 2018)
- Percentage of production blasts over 5 mm/sec = 4.1% (1 September 2017 until 31 August 2018)

Block 7:

- 0 Blasts recorded >3 mm/s
- 0 Blasts recorded >10 mm/s
- 0 Blasts recorded >50 mm/s at V6
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)
- 0 Blasts recorded an over pressure level over 115 dBL (7am to 7pm)
- Percentage of development blasts over 3mm/sec = 0% (1 September 2017 until 31 August 2018)
- Percentage of production blasts over 3mm/sec = 9.8% (1 September 2017 until 31 August 2018) (criteria does not apply in this period as not a regulator reporting period)

There was no blasting in Block 7 during June. However, during the last 12 months 5 blasts in Block 7 have exceeded 3 mm/s - 3.54 (Sept), 3.07 (Dec), 3.1 (Dec), 3.1 (Jan) and 3.45 (Jan).

2.2 Noise

Noise monitoring is undertaken as per the NSW Noise Policy for Industry at a frequency of once per annum. A noise assessment was conducted in November 2017, and is next due in Q4 2018.

3 Water

3.1 Groundwater

There are eighteen sampling locations for groundwater. GW01 (EPL37) to GW16 (EPL52) are piezometers installed at various locations around the mine site and are sampled quarterly. There are also two sampling locations for water pumped from underground mining, Shaft 7 (EPL53) and Kintore Pit (EPL54), which are sampled monthly. A map indicating these locations can be found on the Rasp Mine web site. Groundwater monitoring is scheduled for completion in May, June, September and January. No limits are applied in the EPL to the results from groundwater monitoring.

Groundwater Monitoring Requirements

EPA Identification Number	Frequency	Parameters to be analysed
Shaft 7 EPL53	Monthly	alkalinity (calcium carbonate ($CaCO_3$)), cadmium (Cd), calcium (Ca), chloride (Cl), electrical conductivity (EC), iron (Fe), lead Pb), magnesium (Mg), manganese (Mn), pH, sodium (Na), sulphate (SO4), total dissolved solids (TDS) and zinc (Zn)
Kintore Pit (U/G dewatering) EPL54	Monthly	
Piezometers EPL37 (GW01) to EPL52 (GW16)	Quarterly	

Shaft 7 (EPL53) and Kintore Pit (EPL54) Results for August

Sample Point	pH	EC (µS/cm^2)	TDS (mg/l)	Alkalinity ($CaCO_3$) (mg/l)	SO4 (mg/l)	Cl (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	Cd (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Fe (mg/l)
Shaft 7 (EPL53)	6.1	12000	11600	10	4990	1320	495	265	1540	2.18	0.915	264	829	1.44
Kintore Pit (EPL54)	6.1	11700	9560	12	4900	1290	470	247	1520	2.28	1.74	245	909	2.52

Groundwater Bores (EPL37 - EPL52) Results for August

Ground water sampling not required in August.

3.2 Surface Water Sample Record

There are seven sampling locations for surface water, these include surface water basins located on the mine lease to capture and retain rainfall and two locations up and down stream of an ephemeral creek located south of the mine lease boundary. A map indicating these locations can be found on the Rasp Mine web site. Sampling is undertaken in October (highest rainfall month as recorded by Bureau of Meteorology) and April.

Surface Water Monitoring Requirements

Description	Frequency	Parameters to be Analysed
Federation Way Culvert EPL29/S31-1	2 x per year , six months apart	cadmium (Cd), chloride (Cl), electrical conductivity (EC), lead Pb), manganese (Mn), pH, sodium (Na), sulphate (SO4), total dissolved solids (TDS) and zinc (Zn)
Ryan Street Dam EPL31/S49	2 x per year , six months apart	
Adjacent Olive Grove EPL32/S1A	2 x per year , six months apart	
Adjacent Bowls Club EPL33 /S9-B2	2 x per year , six months apart	
Horwood Dam EPL34/Horwood Dam	2 x per year , six months apart	
Upstream Bonanza St EPL35	2 x per year , six months apart	
Downstream Sydney Rd EPL36	2 x per year , six months apart	

Surface Water Monitoring Results

Surface water sampling was not required in August.

4 Weather Data

The weather station continuously monitors the following parameters as per Point 55 of the Environmental Protection Licence.

The following parameters are required to be recorded each month as listed in the EPL 12559:-

Rasp Mine Weather Station (EPL55) Monitoring Requirements

Parameter	Sampling method	Units of measure	Averaging period	Frequency
Temperature at 10 metres	AM-4	degrees Celsius	15 minutes	Continuous
Wind Direction at 10 metres	AM-4	degrees in a clockwise direction from True North	15 minutes	Continuous
Wind Speed at 10 metres	AM-4	metres per second	15 minutes	Continuous
Rainfall	AM-4	millimetres	1 hour	Continuous
Sigma theta[1]	AM-2 & AM-4	degrees	15 minutes	Continuous

Note 1: The onsite weather station currently does not report Sigma theta.

Weather Data Summary for August

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (m/s)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Aug-18	9.6	17.9	0.2	4.9	SSW	201	0.0
02-Aug-18	8.8	20.1	1.5	14.1	NNE	23	0.0
03-Aug-18	8.6	17.6	0.3	13.4	NW	314	0.3
04-Aug-18	8.1	16.2	0.8	14.6	North	5	0.0
05-Aug-18	7.1	21.4	2.1	20.0	North	5	0.0
06-Aug-18	6.9	13.5	1.2	16.6	NW	316	0.0
07-Aug-18	4.9	14.0	0.5	9.4	NW	317	0.0
08-Aug-18	7.3	17.1	0.3	13.4	NW	315	0.0
09-Aug-18	8.6	18.0	0.3	9.9	North	4	0.0
10-Aug-18	11.4	21.3	2.2	18.3	North	354	0.0
11-Aug-18	6.9	15.2	0.9	13.4	WSW	246	0.0
12-Aug-18	3.9	13.8	0.5	9.6	SW	225	0.0
13-Aug-18	6.8	15.1	0.2	6.2	SW	227	0.0
14-Aug-18	7.6	18.7	0.2	11.0	North	4	0.0
15-Aug-18	11.4	21.2	0.7	13.1	NW	318	0.0
16-Aug-18	8.2	15.4	0.5	6.7	SW	223	0.0
17-Aug-18	8.3	16.9	0.2	8.5	North	354	0.0
18-Aug-18	7.8	14.6	0.7	12.5	SW	229	0.0
19-Aug-18	5.2	13.2	1.2	11.7	SSW	203	0.0

Date	Temperature		Wind Speed		Predominant Wind		Rainfall (mm)
20-Aug-18	3.1	13.2	0.2	5.9	West	272	0.0
21-Aug-18	5.3	15.2	0.2	7.9	NW	317	0.0
22-Aug-18	7.4	18.0	0.2	9.5	North	354	0.0
23-Aug-18	9.5	20.8	0.9	12.2	NE	43	0.0
24-Aug-18	10.1	20.1	0.7	11.4	ESE	112	0.0
25-Aug-18	8.8	17.9	1.4	10.6	SE	135	0.0
26-Aug-18	7.1	18.6	0.9	8.4	SSW	201	0.0
27-Aug-18	5.9	17.1	0.1	6.5	SSE	158	0.0
28-Aug-18	7.0	18.7	0.1	6.2	ENE	67	0.0
29-Aug-18	10.1	22.2	0.7	11.4	NNE	24	0.0
30-Aug-18	13.9	22.4	0.4	15.3	NNE	26	0.0
31-Aug-18	10.8	16.3	0.3	18.0	NW	316	0.3

5. Data Log

Sample	Result Received
Hi Volume Samples	3-09-2018
TEOM	26-09-2018
Dust Deposition	26-09-2018
Vents & Bag House	NA
Water	9-08-2018
Blast vibration and overpressure	9-08-2018
Weather	26-09-2018
Date posted to web site	12-10-2018

5 Correction Log

No corrections made.