

Rasp Mine  
Monthly Environmental Monitoring Report  
September 2019



## 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 <sup>3</sup>
Particulate matter < 10 µm (PM <sub>10</sub> )	Annual	25 µg/m <sup>3</sup>

### Short Term Criterion for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10 µm (PM <sub>10</sub> )	24 hour	50 µg/m <sup>3</sup>

### Long Term Criteria for Deposited Dust

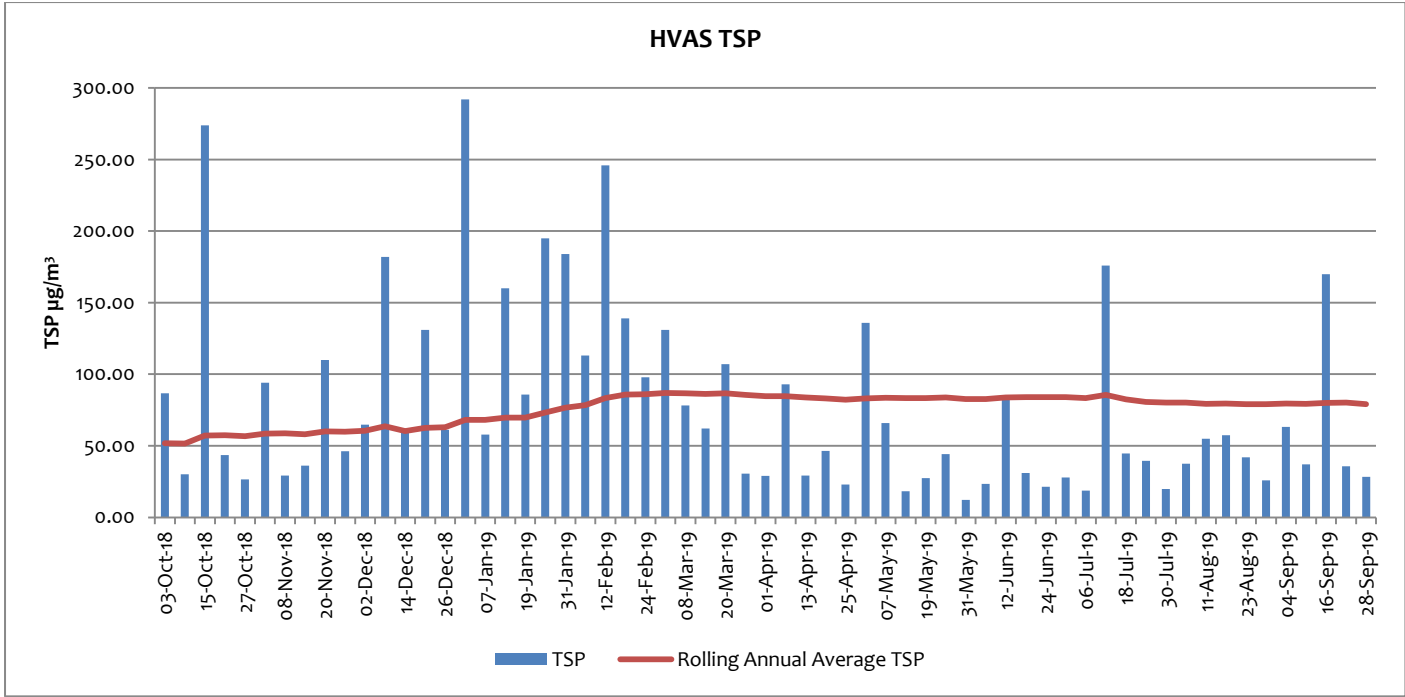
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

### 1.1 High Volume Air Samplers

There are four 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) and HVAS3 (EPL57) are located adjacent to and north of Blackwood Pit. A map indicating these locations can be found on the Rasp Mine web site. HVAS and HVAS3 sample for total suspended particulates (TSP) and lead dust, and HVAS1 and HVAS2 sample for particulate matter less than 10 microns (PM<sub>10</sub>) and lead dust.

#### *HVAS (EPL10) - Silver Tank (On Site) Results for September*

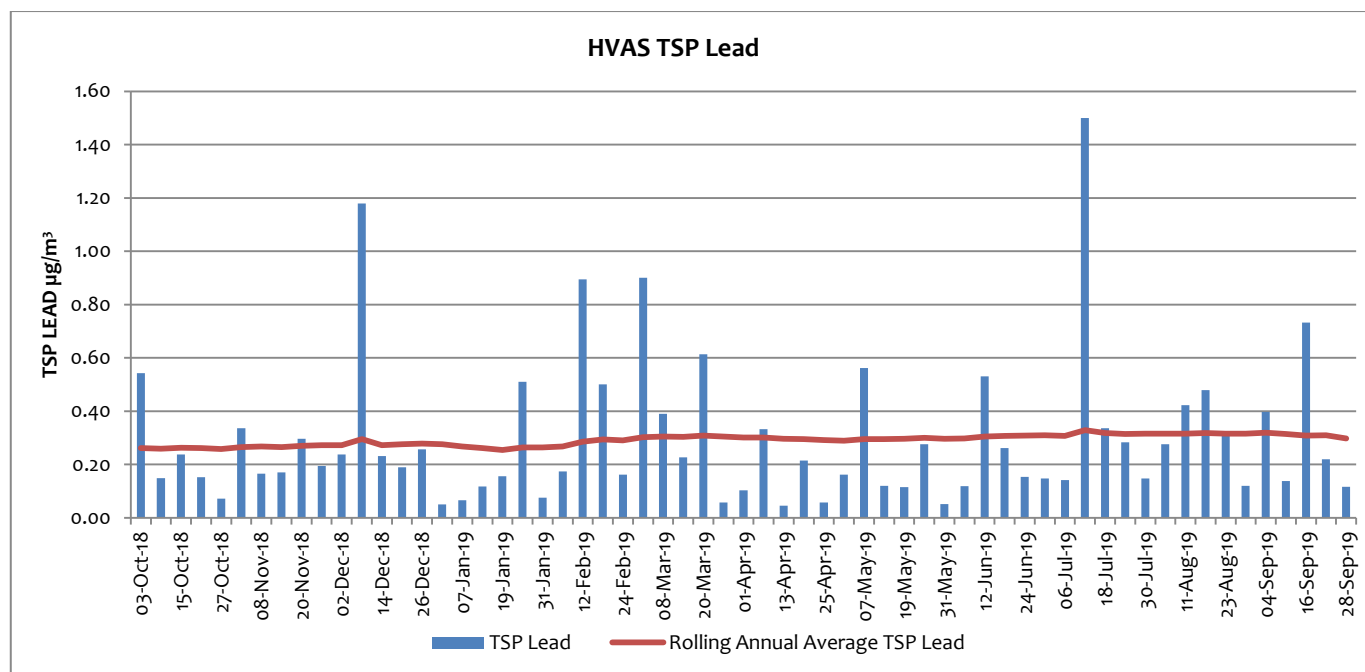
DATE	TSP (µg/m <sup>3</sup> )	Lead (µg/m <sup>3</sup> )
4-09-2019	63.20	0.40
10-09-2019	37.00	0.14
16-09-2019	170.00	0.73
22-09-2019	35.70	0.28
28-09-2019	28.20	0.12



HVAS (EPL10) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. There was an elevated dust level recorded at HVAS on 16 September with a maximum wind speed for the day of 44.3 km/hr and the predominant wind direction was from the South. Overall the trend for TSP at this location has risen over the 12 months to September although it has started to trend downwards in the last couple of months.

The rolling annual average for TSP to September is 79.00 µg/m<sup>3</sup> which is below the long term annual average criteria of 90 µg/m<sup>3</sup>.

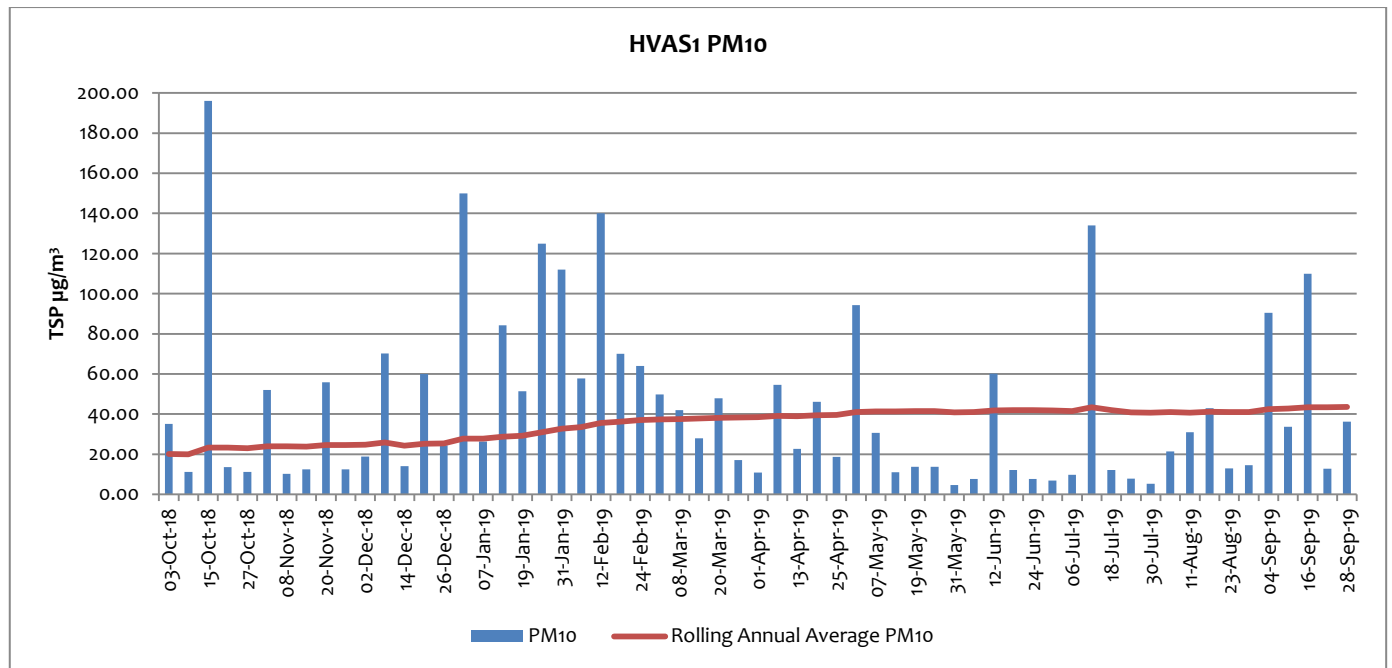
Dust is controlled on site using the application of dust suppressant and the watering of haul roads.



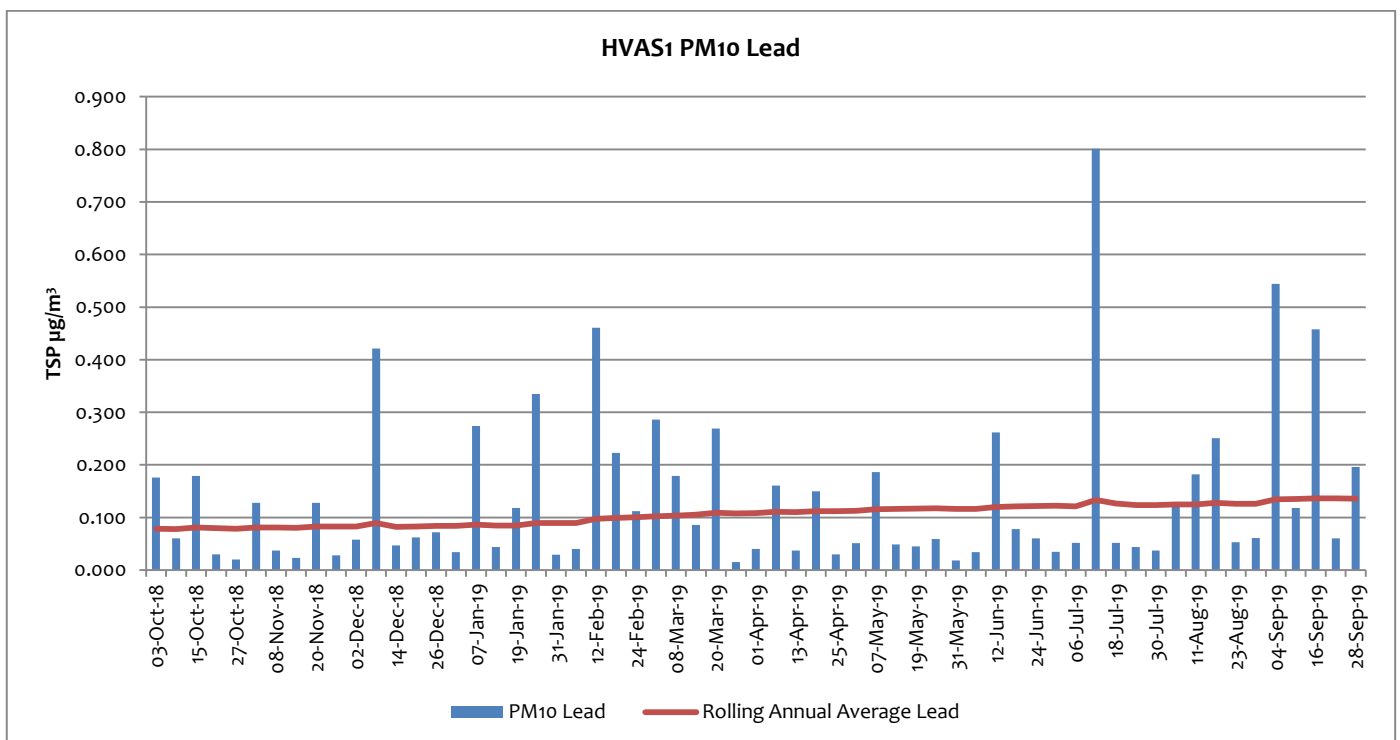
There was an elevated lead dust level recorded at HVAS on 16 September with a maximum wind speed for the day of 44.3 km/hr and the predominant wind direction was from the South. The rolling annual average for TSP Lead to September was  $0.30 \mu\text{g}/\text{m}^3$ .

#### ***HVAS1 (EPL11) - Silver Tank (On Site) Results for September***

DATE	PM10 ( $\mu\text{g}/\text{m}^3$ )	PM10 Lead ( $\mu\text{g}/\text{m}^3$ )
4-09-2019	90.50	0.54
10-09-2019	33.60	0.12
16-09-2019	110.00	0.46
22-09-2019	12.80	0.06
28-09-2019	36.20	0.20



HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. There were elevated PM10 dust levels recorded on two occasions during the month. The first was  $90.5 \mu\text{g}/\text{m}^3$  on 4 September with maximum wind speed for the day of  $31.1 \text{ km/hr}$  and the predominant wind direction was from the NW. The second elevated result of  $110.0 \mu\text{g}/\text{m}^3$  was recorded on 16 September with maximum wind speed for the day of  $44.3 \text{ km/hr}$  and the predominant wind direction was from the South. Overall the trend for PM10 dust at this location has risen over the previous 12 months from  $20.2 \mu\text{g}/\text{m}^3$  to  $43.5 \mu\text{g}/\text{m}^3$  which is above the  $\text{PM}_{10}$  annual average criterion of  $25 \mu\text{g}/\text{m}^3$  required at the nearest residential location. The increase in  $\text{PM}_{10}$  annual average would be a result of severe drought and dusty conditions over this period. Calculation of the rolling annual average includes results from days when there were dust storm events.





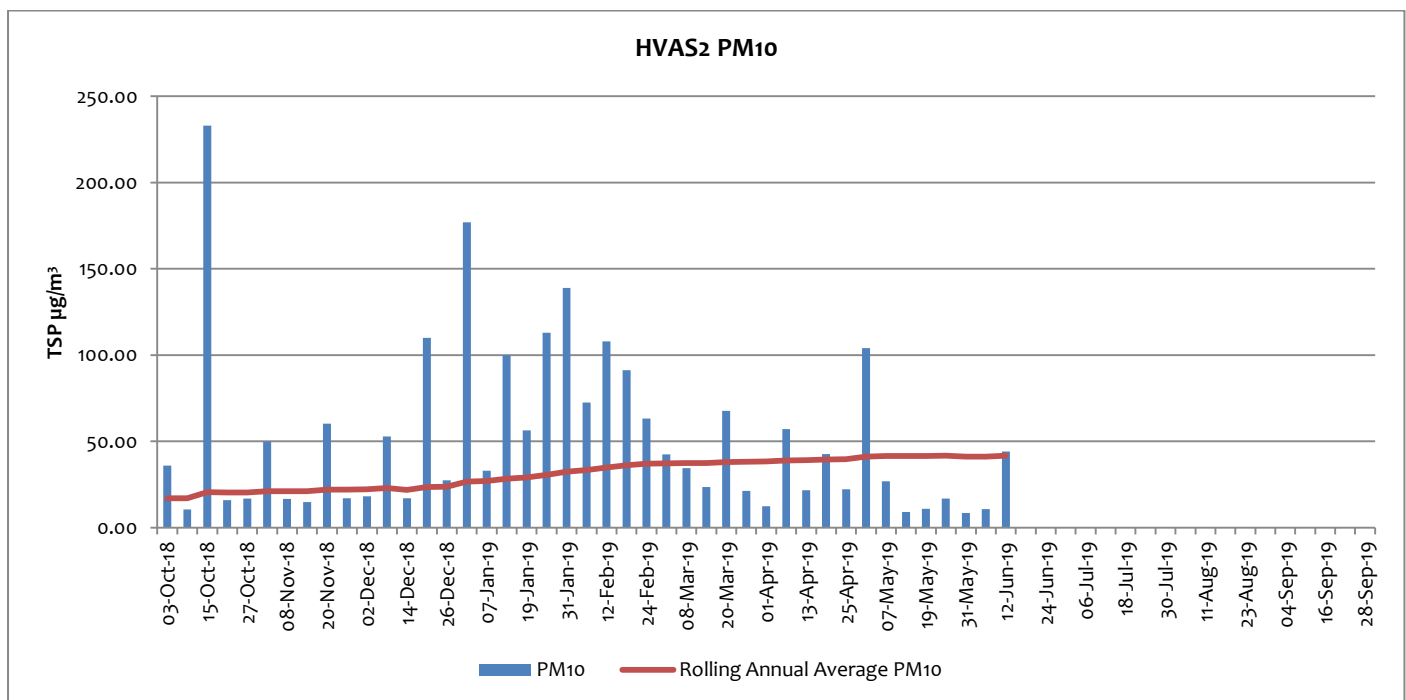
There is no guideline for assessing PM<sub>10</sub> lead dust; the trend for PM<sub>10</sub> lead dust at this location has risen over the previous 12 months from 0.05 µg/m<sup>3</sup> to 0.14 µg/m<sup>3</sup> and is likely the result of drought conditions and windy weather transporting lead contaminated dust from the Broken Hill environs. There were elevated PM<sub>10</sub> lead dust levels of 0.544 µg/m<sup>3</sup> and 0.458 µg/m<sup>3</sup> recorded on 4 and 16 September.

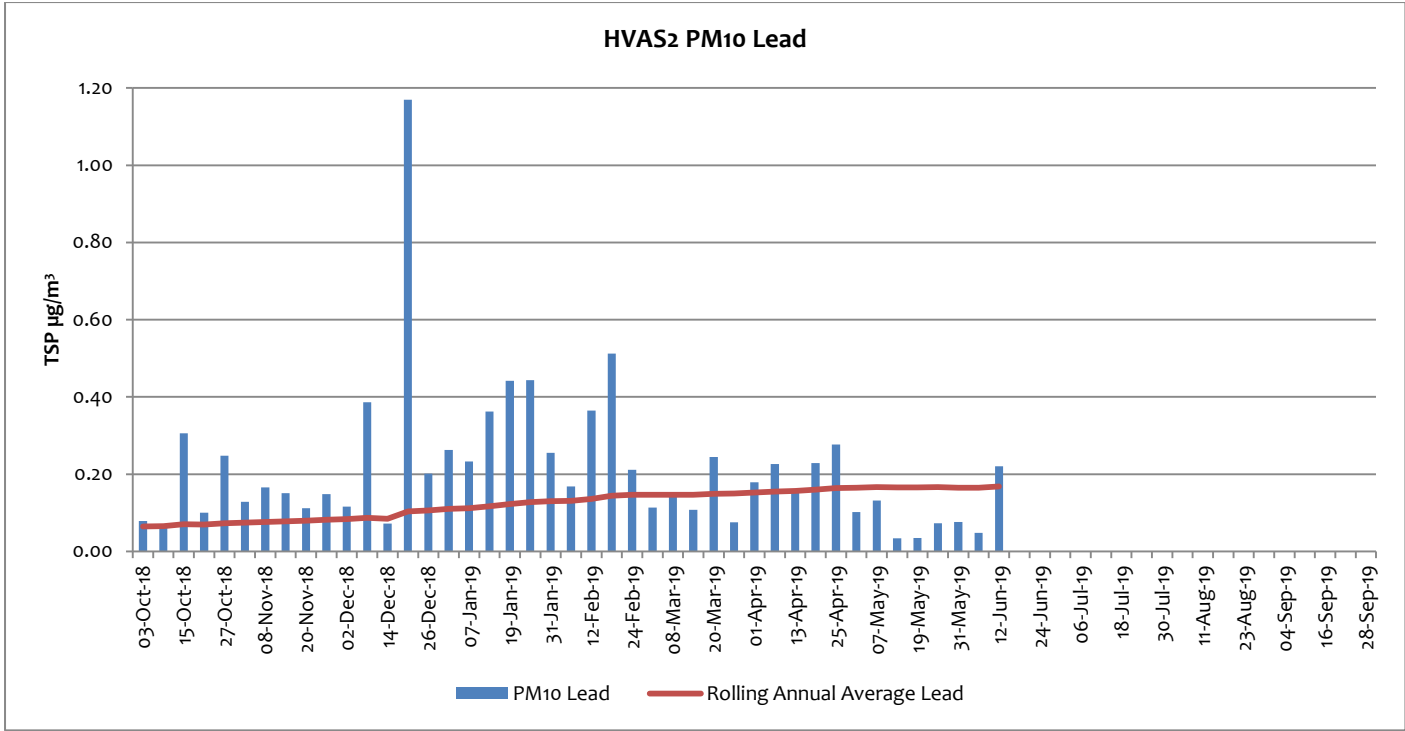
#### ***HVAS 2 (EPL12) - Blackwood Pit (On Site) Results for September***

DATE	PM10 (µg/m <sup>3</sup> )	Lead (µg/m <sup>3</sup> )
4-09-2019	NS	NS
10-09-2019	NS	NS
16-09-2019	NS	NS
22-09-2019	NS	NS
28-09-2019	NS	NS

HVAS2 (EPL12) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS2 has been decommissioned while Embankment 2 TSF2 construction works are undertaken. A real-time PM<sub>10</sub> monitor is in place adjacent to the HVAS2 location.

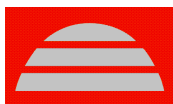
The rolling annual average PM<sub>10</sub> to June is 41.74 µg/m<sup>3</sup> is above the PM<sub>10</sub> annual average criterion 25 µg/m<sup>3</sup> required at the nearest residential location. Calculation of the rolling annual average includes results from days when there were dust storm events.





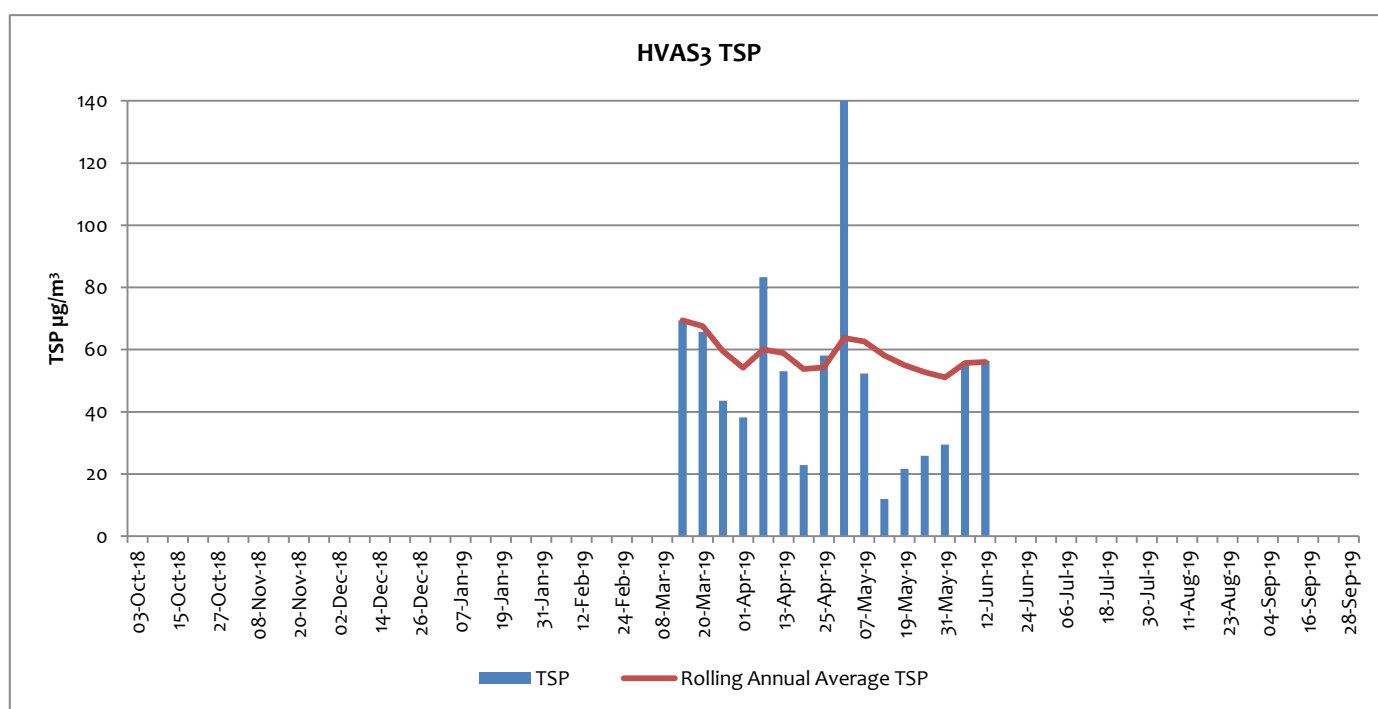
There is no guideline for assessing PM10 lead dust; the Annual Rolling Average for lead dust at this location has increased over the previous 12 months from 0.07 µg/m³ to 0.16 µg/m³ at the end of June 2019.





**HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for September**

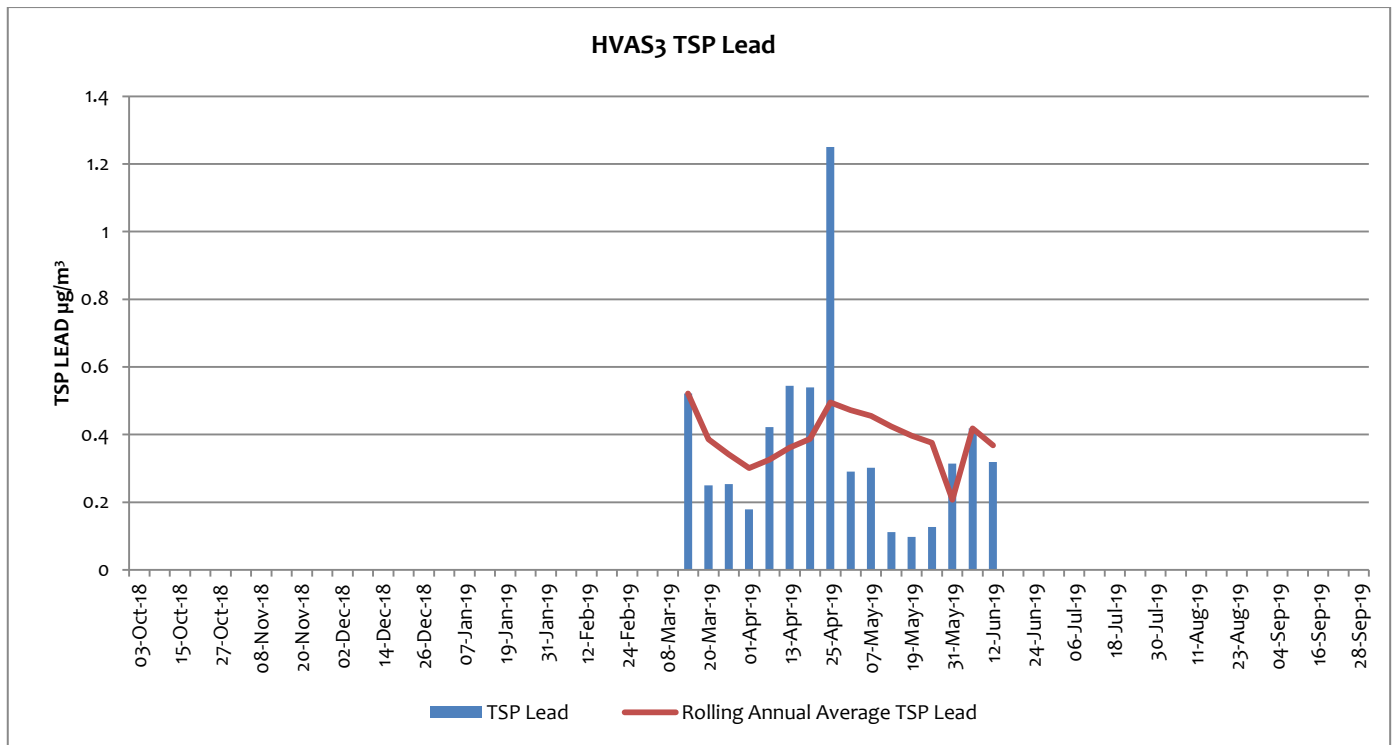
DATE	TSP ( $\mu\text{g}/\text{m}^3$ )	PM10 Lead ( $\mu\text{g}/\text{m}^3$ )
4-09-2019	NS	NS
10-09-2019	NS	NS
16-09-2019	NS	NS
22-09-2019	NS	NS
28-09-2019	NS	NS



HVAS3 (EPL57) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS3 (EPL57) was included in EPL 12559 on 14 March 2019 to provide for monitoring of TSP Dust on the northern boundary of the site at Blackwoods Pit TSF2. HVAS3 has been decommissioned while Embankment 2 TSF2 construction works are undertaken. A real-time PM10 monitor is in place adjacent to the HVAS2 location.

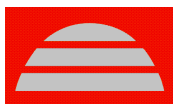
The rolling annual average for TSP to June is  $56.05 \mu\text{g}/\text{m}^3$  which is below the long term annual average criteria of  $90 \mu\text{g}/\text{m}^3$ .

The rolling annual average for TSP Lead to June is  $0.37 \mu\text{g}/\text{m}^3$ .



## 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<sub>10</sub>) in size.



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

Particulate Matter <10 Microns 24Hr Average				
Date	TEOM 1 ( $\mu\text{g}/\text{m}^3$ )	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?	TEOM 2 ( $\mu\text{g}/\text{m}^3$ )	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?
01-Sep-19	12.2	Y	NS	Y
02-Sep-19	21.9	Y	NS	Y
03-Sep-19	24.8	Y	NS	Y
04-Sep-19	24.6	Y	NS	Y
05-Sep-19	36.0	Y	NS	Y
06-Sep-19	NS <sup>1</sup>	Y	NS	Y
07-Sep-19	11.9	Y	NS	Y
08-Sep-19	17.2	Y	NS	Y
09-Sep-19	21.6	Y	NS	Y
10-Sep-19	17.0	Y	NS	Y
11-Sep-19	14.9	Y	NS	Y
12-Sep-19	26.0	Y	NS	Y
13-Sep-19	16.1	Y	NS	Y
14-Sep-19	10.1	Y	NS	Y
15-Sep-19	10.8	Y	NS	Y
16-Sep-19	18.8	Y	NS	Y
17-Sep-19	9.2	Y	NS	Y
18-Sep-19	10.4	Y	NS	Y
19-Sep-19	25.3	Y	NS	Y
20-Sep-19	NS <sup>1</sup>	Y	NS	Y
21-Sep-19	8.2	Y	NS	Y
22-Sep-19	7.0	Y	NS	Y
23-Sep-19	7.9	Y	NS	Y
24-Sep-19	10.7	Y	NS	Y
25-Sep-19	10.2	Y	NS	Y
26-Sep-19	11.2	Y	NS	Y
27-Sep-19	31.5	Y	NS	Y
28-Sep-19	8.1	Y	NS	Y
29-Sep-19	16.5	Y	NS	Y
30-Sep-19	12.2	Y	NS	Y

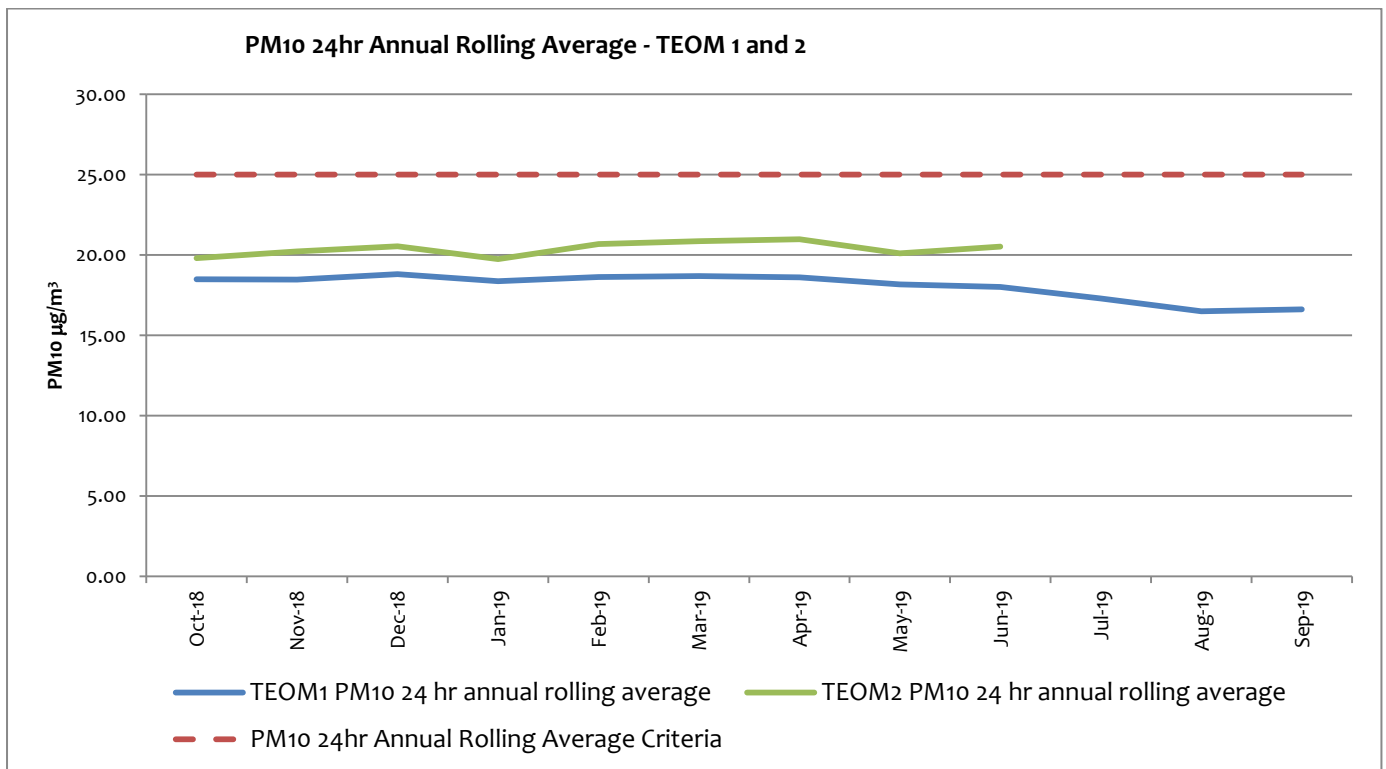
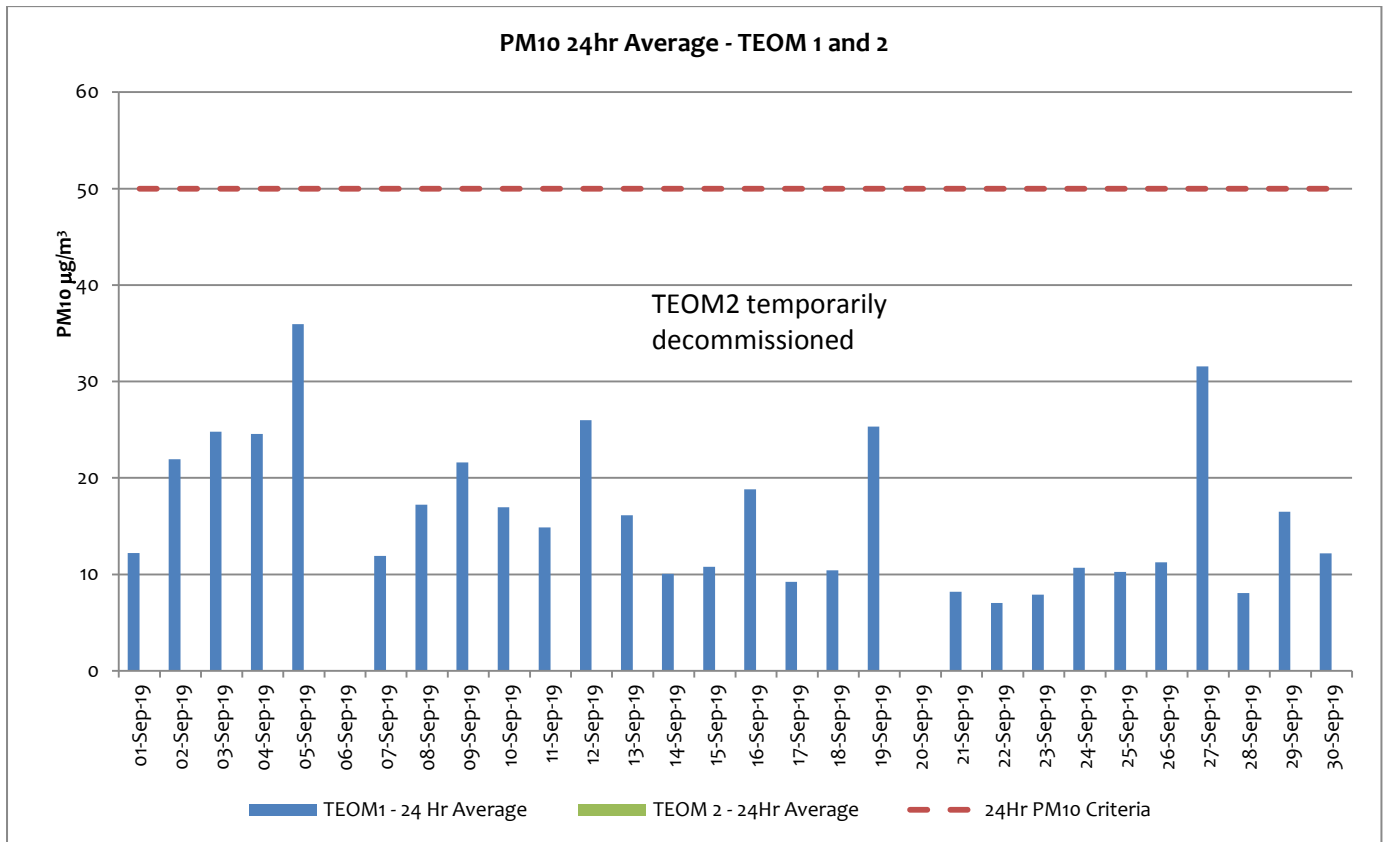
NS<sup>1</sup> – no sample collected due to dust storm (external Event) rendering data invalid.

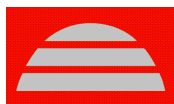
Project Approval 07\_0018 apply at TEOM1 and 2, with two criteria listed for PM10, a 24 hour average criteria of 50  $\mu\text{g}/\text{m}^3$  and an annual average criteria of 25  $\mu\text{g}/\text{m}^3$ .

TEOM2 was decommissioned from 19 June due to Embankment 2 TSF2 construction works. The decommissioning is in accordance with dust management strategies agreed with the EPA which includes the operation of a real-time PM10 monitor north of the construction works. Both Project Approval and Environment Protection Licence criteria exclude dust storms and other extraordinary events. The graphs provided below exclude results impacted by dust storms and external events.



The PM<sub>10</sub> 24-hour rolling average has fallen to 16.62 µg/m<sup>3</sup> for TEOM1 and remained stable at 20.52 µg/m<sup>3</sup> for TEOM2 as the rolling average has not been calculated while the unit has been decommissioned.





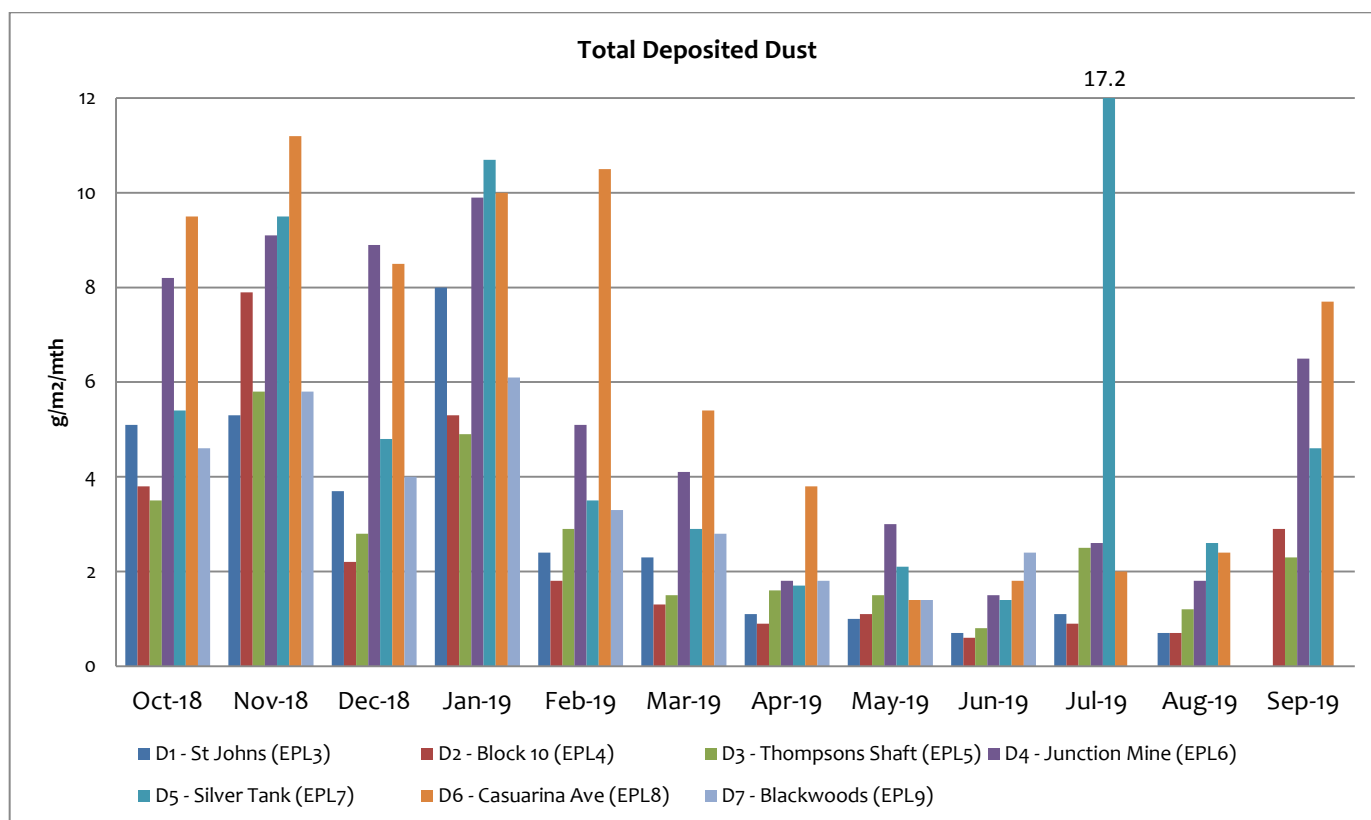
### 1.3 Dust Deposition Sampling

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.

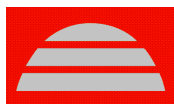
#### *Dust Deposition Gauges (D1 (EPL3) to D7 (EPL9)) – Results for September*

Total Deposited Dust (g/m <sup>2</sup> /Month)							
Date	D1 (off site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off site)	D7 (on site)
September 2019	NS	2.9	2.3	6.5	4.6	7.7	NS
Background (2010)	4.0	3.1	4.3	5.7	- <sup>1</sup>	5.8	- <sup>1</sup>
Compliant?	Y	N/A	N/A	N/A	N/A	Y	N/A

**Note:** “1” = background not available, N/A = not applicable as dust deposition unit is located on site, NS = No sample

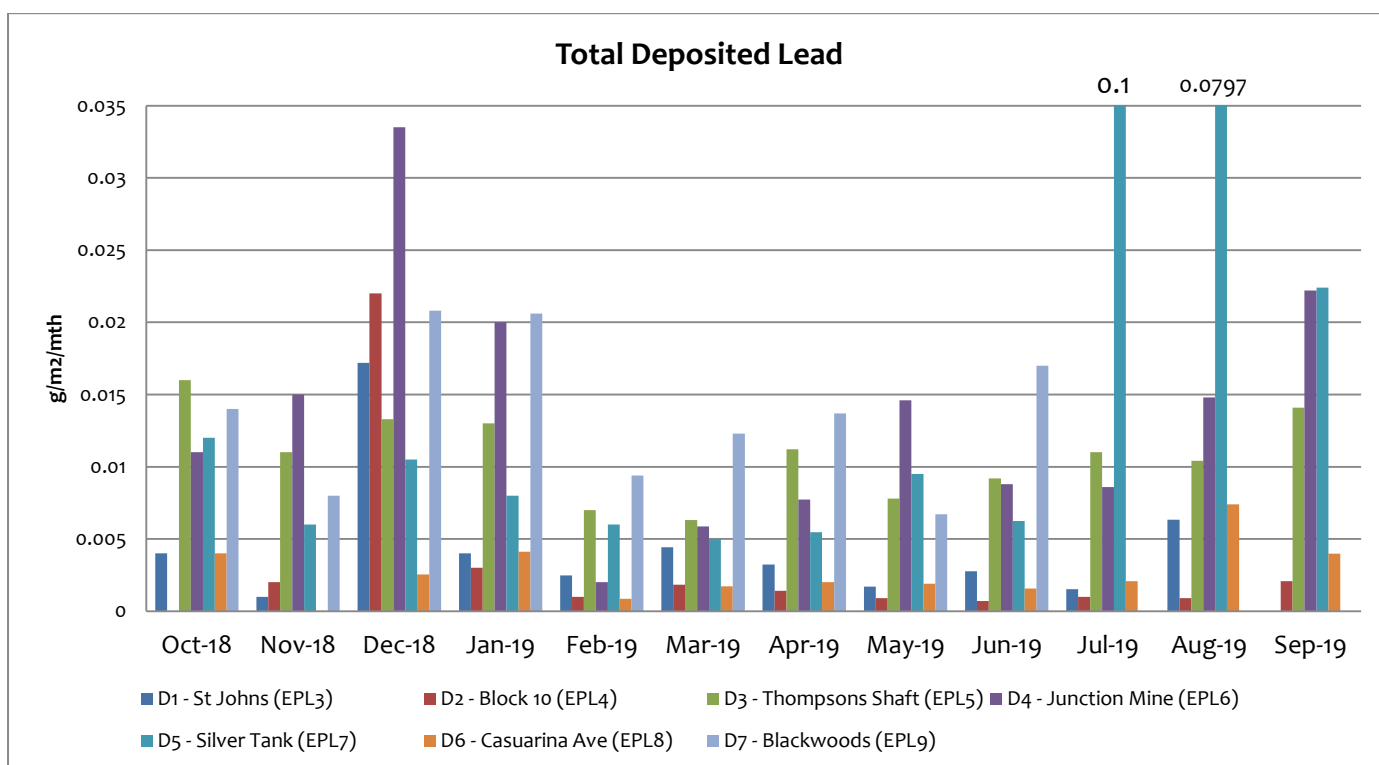


Dust results at Casuarina Avenue and Junction Mine were the highest of the dust gauges in September. A dust storm from the South was recorded in Broken Hill on 16 September.



Total Deposited Lead (g/m <sup>2</sup> /Month)							
Date	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
September 2019	NS	0.00208	0.0141	0.022	0.0224	0.00399	NS
Background (2010)	0.0034	0.005	0.005	0.006	- <sup>1</sup>	0.004	- <sup>1</sup>

Note: "<sup>1</sup>"= background not available, NS = No sample

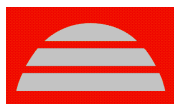


There are no guidelines for deposited lead dust. Lead results in September were highest at Silver Tank and Junction Mine. The predominant wind direction for the month was from the WSW although there were high winds recorded from the South on 9 and 16 September. The Junction Mine location is also surrounded by dust generating locations which may have contributed to the dust and lead concentrations recorded. There was no sample collected for D1 – St Johns (EPL3) as the dust gauge was destroyed and the dust gauge stand stolen sometime in September. A replacement stand and gauge were installed at the location and are checked on a weekly basis.

Dust suppressant is applied to unsealed areas of the site.

## 1.4 Ventilation Outlets and Bag House Monitoring

There are two locations to measure pollutants from exhausts or stacks; these include the Primary Ventilation Shaft, measuring pollutants from underground firings, and the Baghouse Stack at the crusher measuring dust. Each are located on site; the Primary Ventilation Shaft is located centrally and to the north of the mine lease and the Primary Crusher Baghouse Stack is located within the area of the processing plant to the east of the lease. Shaft 6 (EPL56) was removed as a monitoring location with the variation of EPL12559 in March 2019 as it became an intake rather than an exhaust in April 2018. 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.



The following criteria apply:

**Primary Ventilation Shaft (EPL1)**

	Unit	Criteria
Nitrogen Oxides	mg/m <sup>3</sup>	350
Volatile Organic Compounds	mg/m <sup>3</sup>	40

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

	Unit	Criteria
Total Suspended particles	mg/m <sup>3</sup>	20
Type 1 and Type 2 <sup>1</sup>	mg/m <sup>3</sup>	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) and Crusher Baghouse (EPL2) Results for September 2019**

No monitoring conducted in September.

## 2 Noise

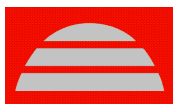
### 2.1 Blasting (Vibration and Overpressure)

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 <sup>1</sup>
(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)
<b>Residence on privately owned land (7am-7pm)</b>	115	3 (interim)	5% of the total number of blasts over a 12-month period <sup>1</sup>
<b>(7am-7pm)</b>	120	10	0%
<b>(7pm-10pm)</b>	105	-	-
<b>(10pm-7am)</b>	95	-	-
<b>Broken Hill Bowling Club, Italio (Bocce) Club, Heritage Items within CML7</b>	-	50	0%
<b>Perilya Southern Operations</b>	-	100	0%
<b>Public Infrastructure</b>	-	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 September 2019***

#### **Total Blasts:**

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 4.15 per week over the previous calendar year
- The number of Development blasts averaged 36.1 per week over the previous calendar year

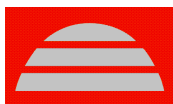
#### **Western Mineralisation and Main Lodes (excluding Block 7):**

- 0 Blasts 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% (August 2018 to July 2019)
- Percentage of production blasts over 5 mm/sec = 5.1% (October 2018 to September 2019)

#### **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)
- 0 Blasts recorded an over pressure level over or 120 dBL at any time





- Percentage of development blasts over 3mm/sec = 0% (October 2018 to September 2019)
- Percentage of production blasts over 3mm/sec = 0% (October 2018 to September 2019) (criteria does not apply in this period as not a regulator reporting period)

There was no blasting in Block 7 during September.

## 2.2 Noise

Noise monitoring is undertaken as per the NSW Noise Policy for Industry at a frequency of once per annum. Annual noise monitoring was conducted in December 2018.

## 3 Water

### 3.1 Groundwater

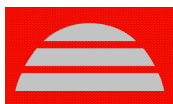
There are eighteen sampling locations for groundwater. GW01 (EPL37) to GW16 (EPL52) are piezometers installed at various locations around the mine site and are sampled quarterly. There are also two sampling locations for water pumped from underground mining, Shaft 7 (EPL53) and Kintore Pit (EPL54), which are sampled monthly. A map indicating these locations can be found on the Rasp Mine web site. Groundwater monitoring is scheduled for completion in March, 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 <sub>3</sub> )), cadmium (Cd), calcium (Ca), chloride (Cl), electrical conductivity (EC), iron (Fe), lead Pb), magnesium (Mg), manganese (Mn), pH, sodium (Na), sulphate (SO <sub>4</sub> ), 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 September

Sample Point	pH	EC (µS/cm <sup>2</sup> )	TDS (mg/l)	Alkalinity (CaCO <sub>3</sub> ) (mg/l)	SO <sub>4</sub> (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)	6.05	12800	13200	21	5280	1510	528	286	1730	2.32	2.11	303	928	2.99
Kintore Pit (EPL54)	6.03	12400	12500	3	5190	1430	492	253	1590	2.44	1.68	283	1040	8.32



**Groundwater Bores (EPL37 - EPL52) Results for September**

Sample Point	pH	EC ( $\mu\text{S}/\text{cm}^2$ )	TDS (mg/l)	Alkalinity ( $\text{CaCO}_3$ ) (mg/l)	SO <sub>4</sub> (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)
GW01 (EPL37)	-Bore Dry-													
GW02 (EPL38)	-Bore Dry-													
GW03 (EPL39)	5.25	14600	12700	1	4750	3200	547	357	2190	1.46	4.04	288	265	19.0
GW04 (EPL40)	6.40	13500	13200	73	4610	1890	534	413	2070	0.0932	0.599	38.8	19.9	5.93
GW05 (EPL41)	6.32	16400	16700	108	5970	1980	508	648	2600	0.668	3.90	370	295	34.2
GW06 (EPL42)	6.31	13900	11900	51	4710	1860	534	432	2060	0.820	1.60	260	173	41.8
GW07 (EPL43)	6.06	11800	9210	26	4470	1580	529	296	1700	2.35	0.15	256	306	0.49
GW08 (EPL44)	5.95	13100	13300	14	4860	1880	544	300	1660	2.13	0.964	702	748	23.1
GW09 (EPL45)	6.57	11400	10200	86	4400	1550	602	527	1380	1.22	0.709	95.1	144	5.20
GW10 (EPL46)	7.14	14100	11800	274	4420	1980	590	525	2200	0.167	0.259	4.54	24.7	14.6
GW11 (EPL47)	6.44	10100	8860	68	4090	1250	402	409	1390	2.03	0.082	11.4	158	0.76
GW12 (EPL48)	6.30	13600	12000	68	5190	1630	449	557	2040	1.56	0.014	81.3	183	0.12
GW13 (EPL49)	-Bore Dry-													
GW14 (EPL50)	-Bore Dry-													
GW15 (EPL51)	-Bore Dry-													
GW16 (EPL52)	-Bore Dry-													



### 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 (SO <sub>4</sub> ), 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/S34	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

No monitoring required.

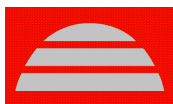
## 4 Weather Data

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	AM-2 & AM-4	degrees	15 minutes	Continuous



*Weather Data Summary for September*

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Sep-19	12.4	22.9	3.9	27.4	NW	299	0
02-Sep-19	9.5	24.7	7.5	28.8	SW	217	0
03-Sep-19	18.1	27.8	5.4	24.9	WNW	294	0
04-Sep-19	15	28.5	5.1	31.1	NW	298	0
05-Sep-19	13.4	29.1	6	36.6	SSW	202	0
06-Sep-19	7.5	16.5	11.4	50.3	WSW	245	0
07-Sep-19	5.8	15.7	10	30.7	WSW	245	0
08-Sep-19	6.8	17.2	10	39.5	SW	227	0
09-Sep-19	6.9	14.9	7.7	40	South	182	0
10-Sep-19	5.6	16.1	4.2	15.3	SSE	158	0
11-Sep-19	9.6	21.2	4.5	15.3	NE	50	0.01
12-Sep-19	13.7	25.1	5.5	36.8	NW	295	0
13-Sep-19	10.6	23.6	3	23.7	South	183	0
14-Sep-19	10	24.2	3.5	18.6	South	172	0
15-Sep-19	16.7	27.2	4.3	26.5	WNW	289	0.01
16-Sep-19	6.5	22.7	7.6	44.3	South	176	0
17-Sep-19	3.9	13.5	5.2	37.5	SSE	157	0
18-Sep-19	6.4	20.2	2.7	20.3	ENE	75	0
19-Sep-19	12.6	26.5	7.1	41.6	NNE	38	0
20-Sep-19	14	29.4	9.6	47.9	NE	46	0
21-Sep-19	9	16.7	7.3	29	West	273	0
22-Sep-19	6.8	16.4	2.2	24.1	WNW	281	0
23-Sep-19	8.3	17.2	3.5	24.7	SSW	203	0
24-Sep-19	6.1	18.2	1.7	18	SE	136	0
25-Sep-19	8.9	20.1	4.3	22.3	East	93	0
26-Sep-19	13.1	23.3	2	15.8	NE	51	0
27-Sep-19	13.5	26.5	4.1	25	NW	288	0
28-Sep-19	10	21.4	4.4	22.7	SSE	160	0
29-Sep-19	9.5	21.5	3.9	19.5	South	181	0
30-Sep-19	10.1	19.8	4.2	23.2	SE	136	0



## 5 Data Log

Sample	Result Received
Hi Volume Samples	24-10-2019
TEOM	28-10-2019
Dust Deposition	17-10-2019
Vents & Bag House	2-07-2019
Water	14-10-2019
Blast vibration and overpressure	1-10-2019
Weather	1-10-2019
Date posted to web site	15-11-2019

## 6 Correction Log

Nil corrections.