

Rasp Mine  
Monthly Environmental Monitoring Report  
June 2020



## **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 (DA 07\_0018 MOD7 July 2019) 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

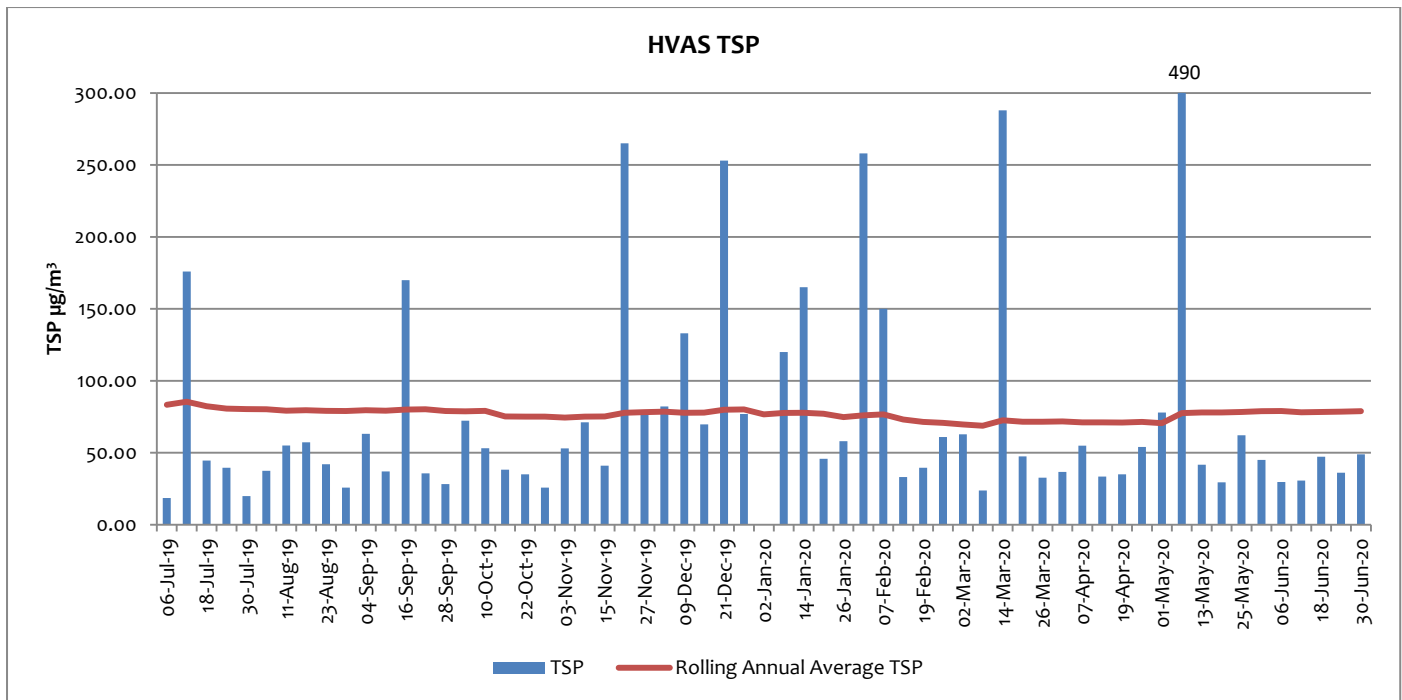
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

### 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 June***

DATE	TSP (µg/m <sup>3</sup> )	Lead (µg/m <sup>3</sup> )
6-06-2020	29.70	0.24
12-06-2020	30.70	0.29
18-06-2020	47.30	0.41
24-06-2020	36.10	0.17
30-06-2020	48.90	0.38



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.

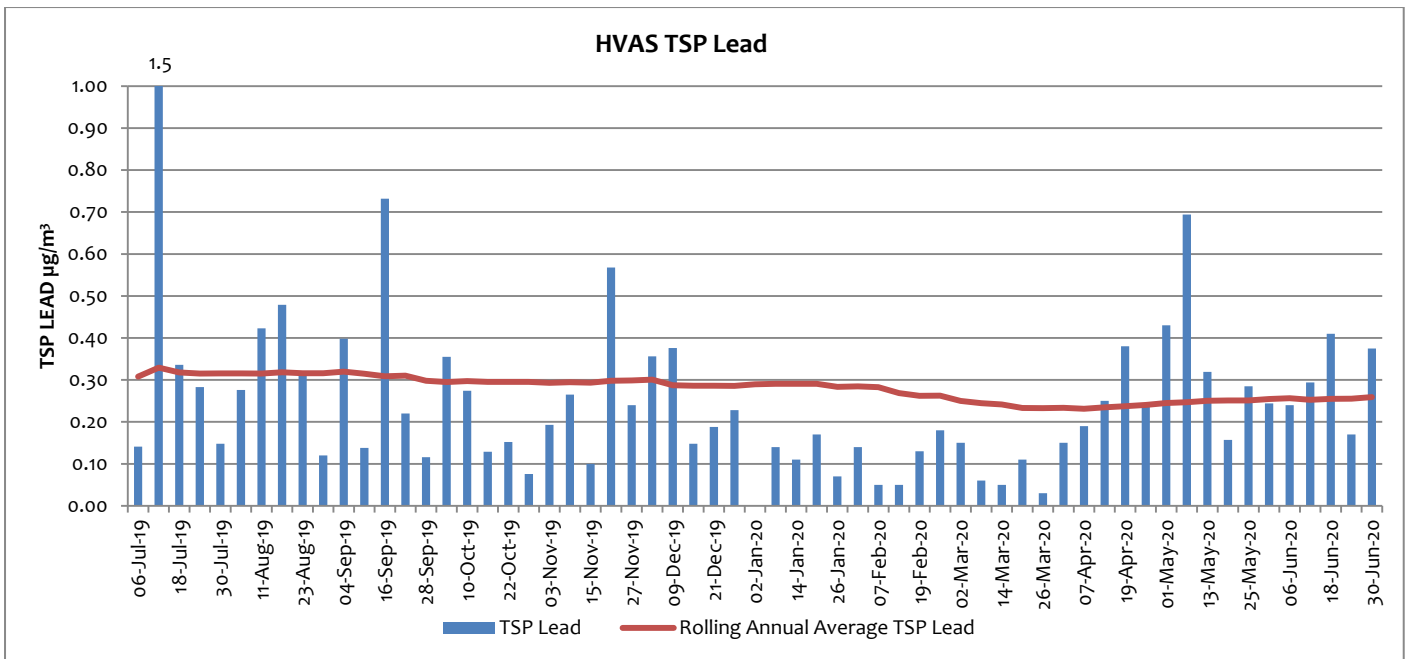
There were no dust storm events producing extreme results in June. The annual rolling average for TSP at this location has fallen over the 12 months to 78.96 µg/m³ at the end of June after starting at 83.33 µg/m³ in July 2019.

The rolling annual average for TSP to June 2020 is below the long term annual average criteria of 90 µg/m³. The annual rolling average for TSP includes data collected during extreme events such as dust storms.

Dust is controlled on site using the application of dust suppressant on free (unused) areas and side tracks, and from the frequent watering of haul roads.

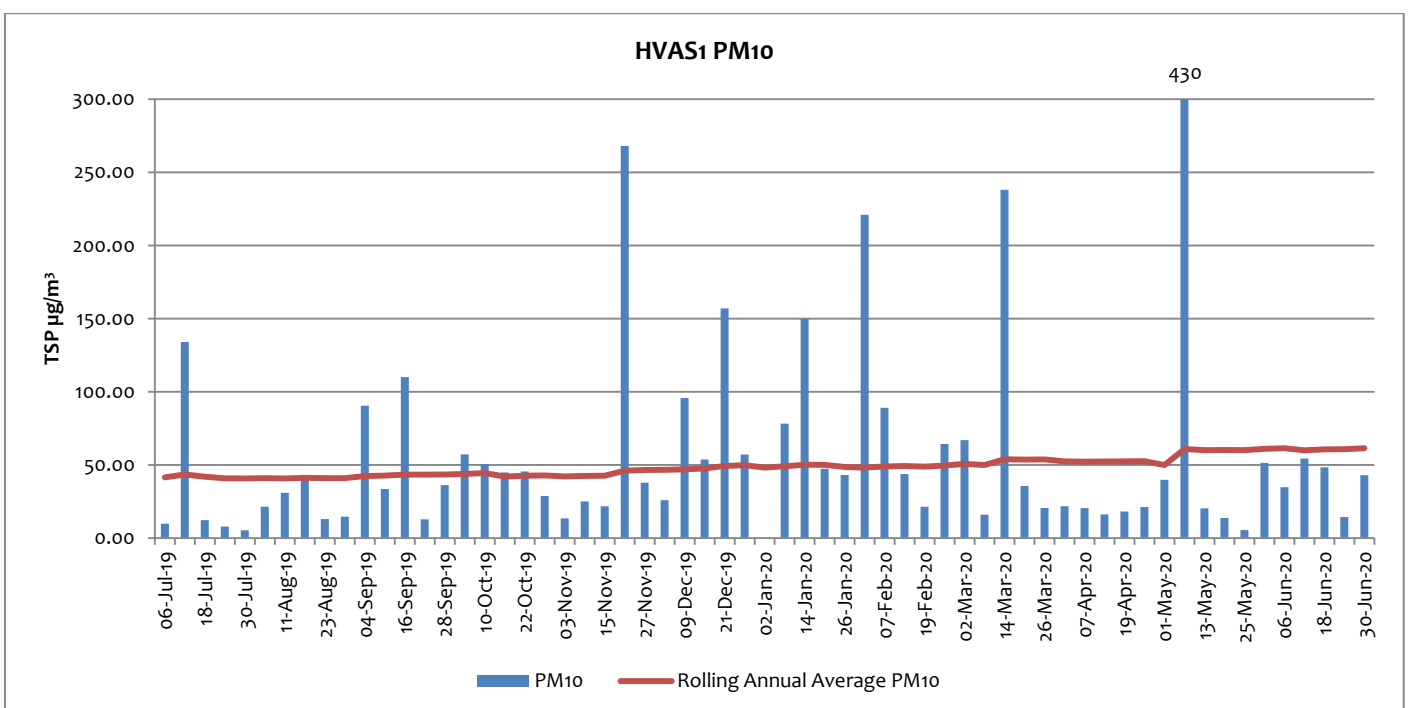
There were slightly elevated TSP Lead levels on 18 and 30 June when the wind was from the NE and NNE, respectively.

The rolling annual average for TSP Lead at 30 June was 0.26 µg/m³, down from the July 2019 rolling average result of 0.32 µg/m³.



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

DATE	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ )
6-06-2020	34.80	0.18
12-06-2020	54.40	0.29
18-06-2020	48.30	0.29
24-06-2020	14.40	0.06
30-06-2020	43.00	0.23

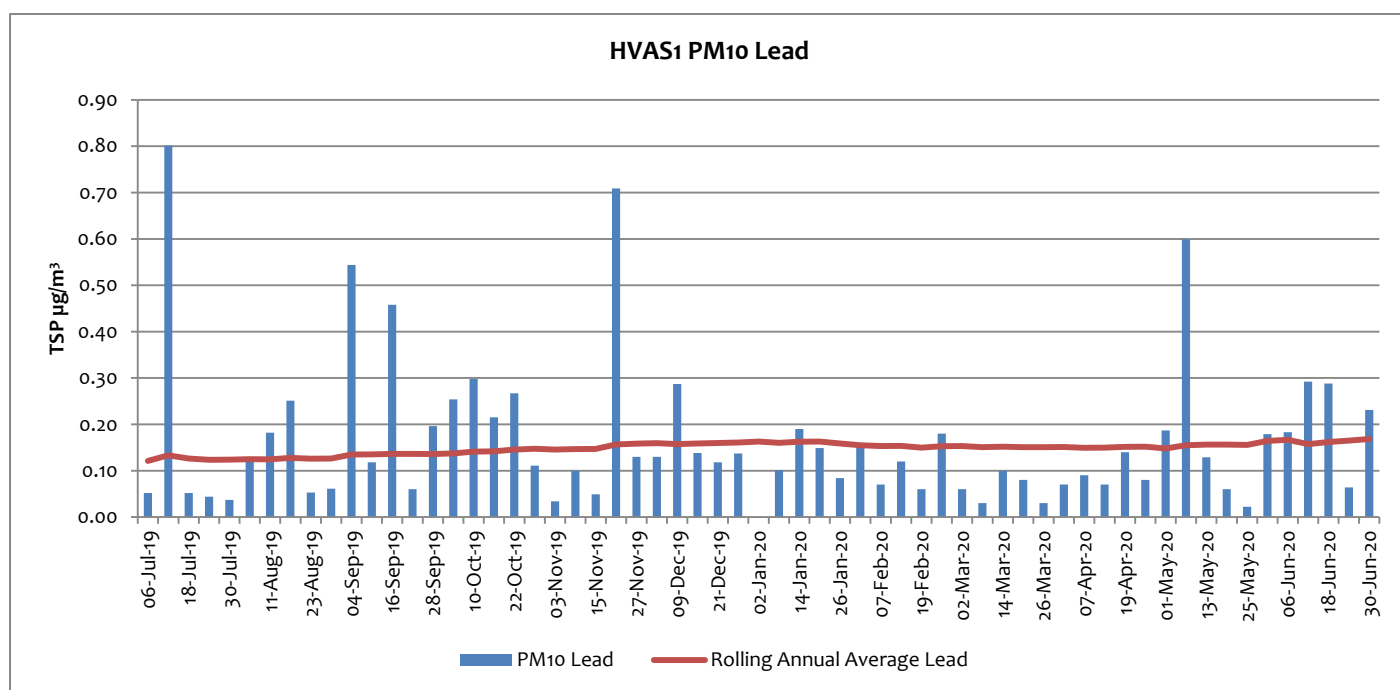




HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

There were no dust storm events producing extreme results in June. The annual rolling average for PM<sub>10</sub> at this location has risen over the 12 months from 40.7 µg/m<sup>3</sup> in July 2019 to 61.4 µg/m<sup>3</sup> in June 2020. While the annual rolling average for PM<sub>10</sub> at this location exceeds the long term criteria of 25 µg/m<sup>3</sup>, the reported data includes results measured from extreme or external events such as dust storms.

There is no guideline for assessing PM<sub>10</sub> lead dust; the rolling annual average for PM<sub>10</sub> lead dust at this location has risen over the previous 12 months from 0.12 µg/m<sup>3</sup> to 0.17 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 level of 0.29 µg/m<sup>3</sup> on 12 June, 0.29 µg/m<sup>3</sup> on 18 June, and 0.23 µg/m<sup>3</sup> on 30 June. The wind on these dates was from the NNE, NE, and NNE, respectively, suggesting there may have been contribution from site activities.



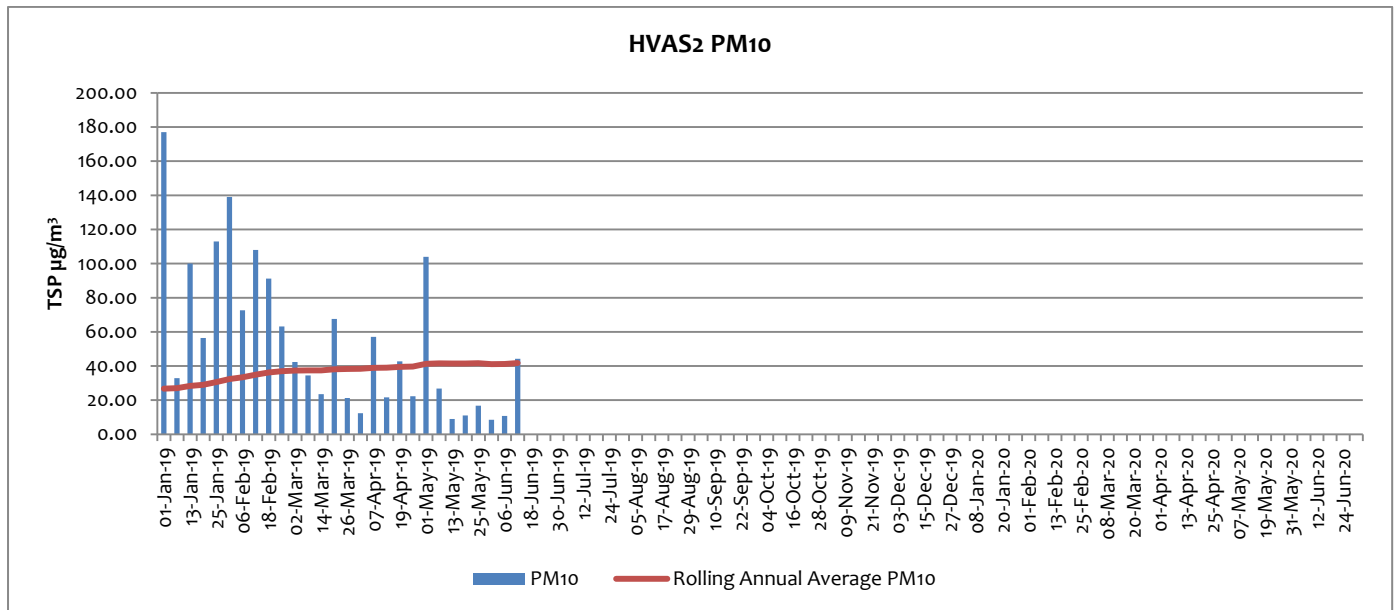
## HVAS 2 (EPL12) - Blackwood Pit (On Site) Results for June

DATE	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> Lead (µg/m <sup>3</sup> )
6-06-2020	NS	NS
12-06-2020	NS	NS
18-06-2020	NS	NS
24-06-2020	NS	NS
30-06-2020	NS	NS

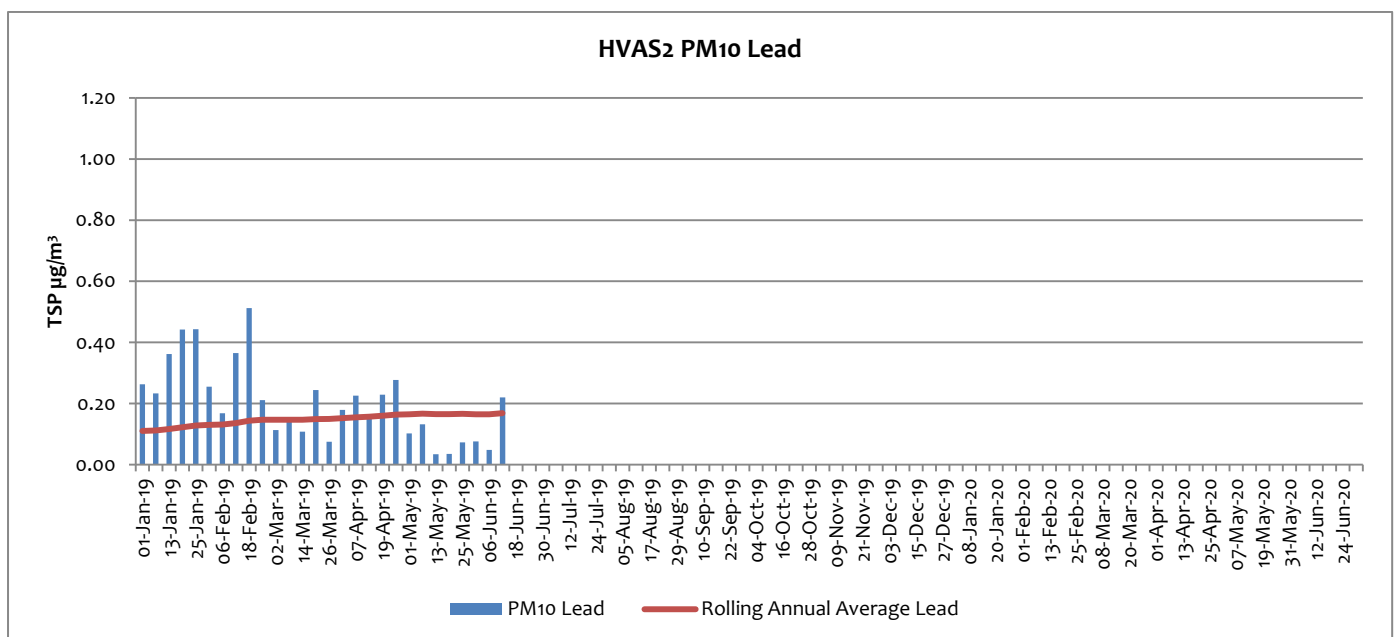


HVAS2 (EPL12) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS2 has been decommissioned while Embankment 2 TSF2 construction works are undertaken. A real-time PM<sub>10</sub> monitor is in place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

The rolling annual average PM<sub>10</sub> dust level to June 2019 is 41.74 µg/m<sup>3</sup>, which is above the PM<sub>10</sub> annual average criterion 25 µg/m<sup>3</sup> required at the nearest residential location. However, the calculation of the rolling annual average includes results from days when there were extreme or external events.



There is no guideline for assessing PM10 lead dust; the Annual Rolling Average for lead dust at this location had increased over the 12 months from 0.07 µg/m<sup>3</sup> to 0.16 µg/m<sup>3</sup> at the end of June 2019.



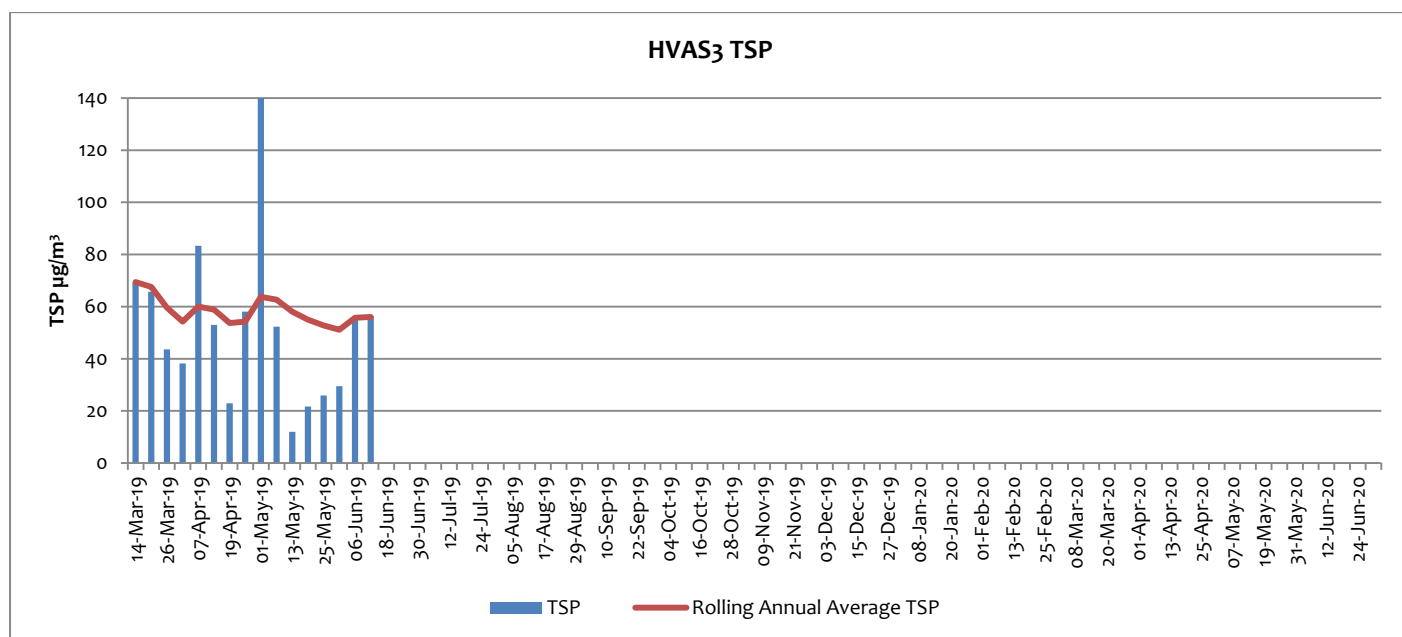


### HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for June

DATE	TSP ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ )
06-06-2020	NS	NS
12-06-2020	NS	NS
18-06-2020	NS	NS
24-06-2020	NS	NS
30-06-2020	NS	NS

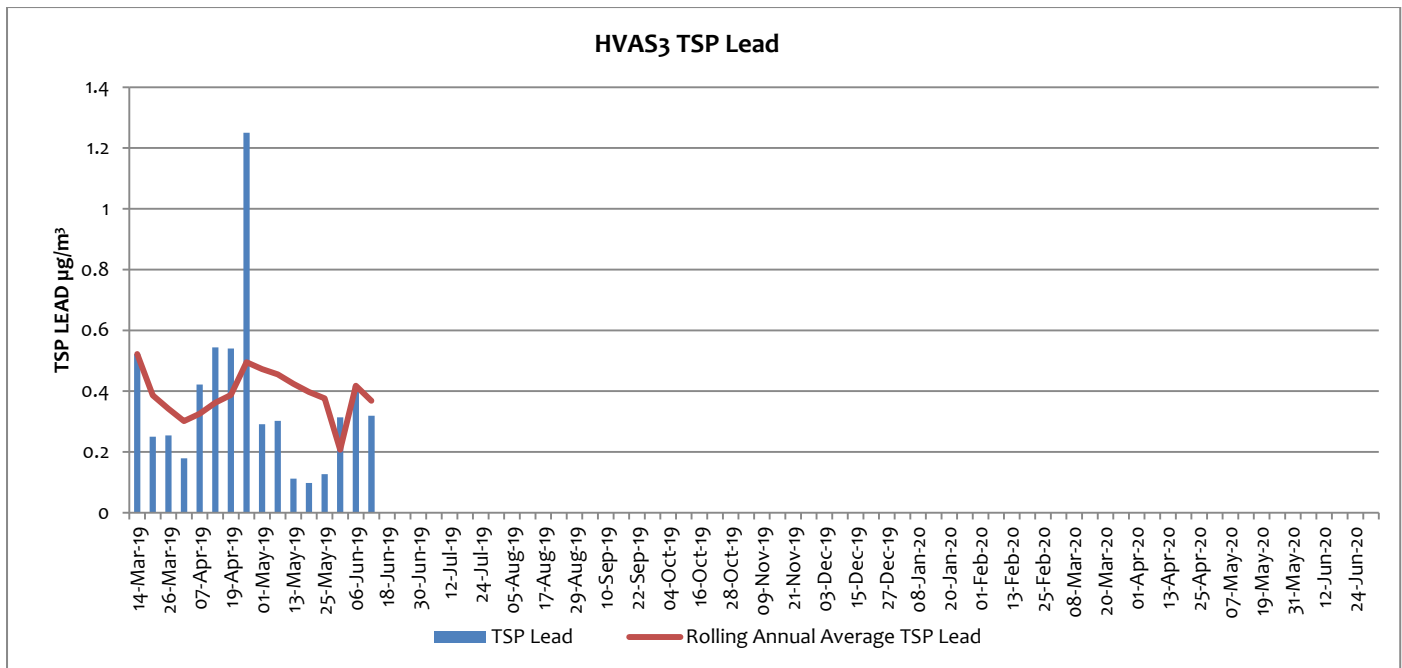
HVAS3 (EPL57) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS3 (EPL57) was included in EPL 12559 on 14 March 2019 to provide for monitoring of TSP Dust on the northern boundary of the site at 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 2019 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 2019 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.

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 PM<sub>10</sub> monitor north of the construction works. Both Project Approval and Environment Protection Licence criteria exclude dust storms and other extraordinary events.

Project Approval 07\_0018 apply at TEOM1 and 2, with two criteria listed for PM<sub>10</sub>, a 24 hour average criteria of 50 ug/m<sup>3</sup> and an annual average criteria of 25 ug/m<sup>3</sup>.

TEOM data is validated by third party consultants using Australian Standards and internal procedures, and is used to populate the table of TEOM monthly data provided below.



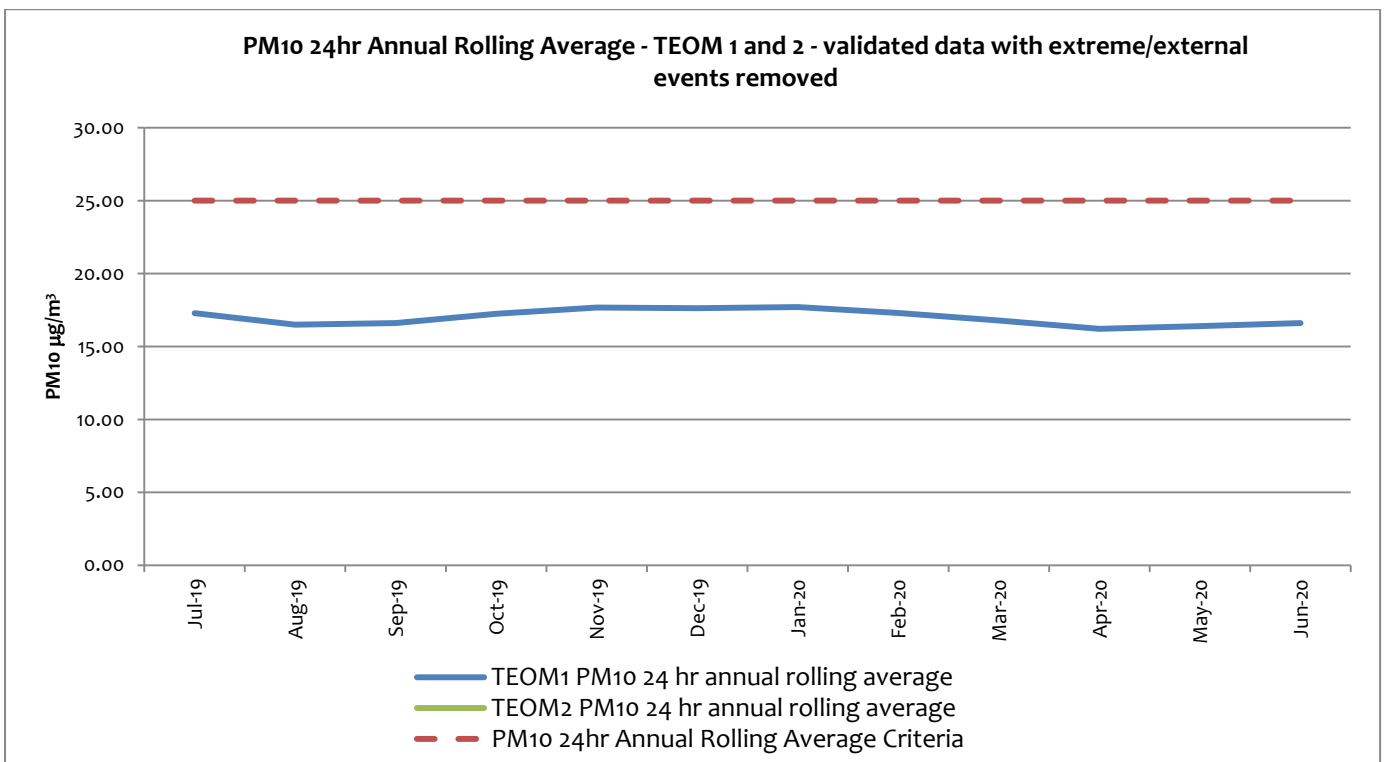
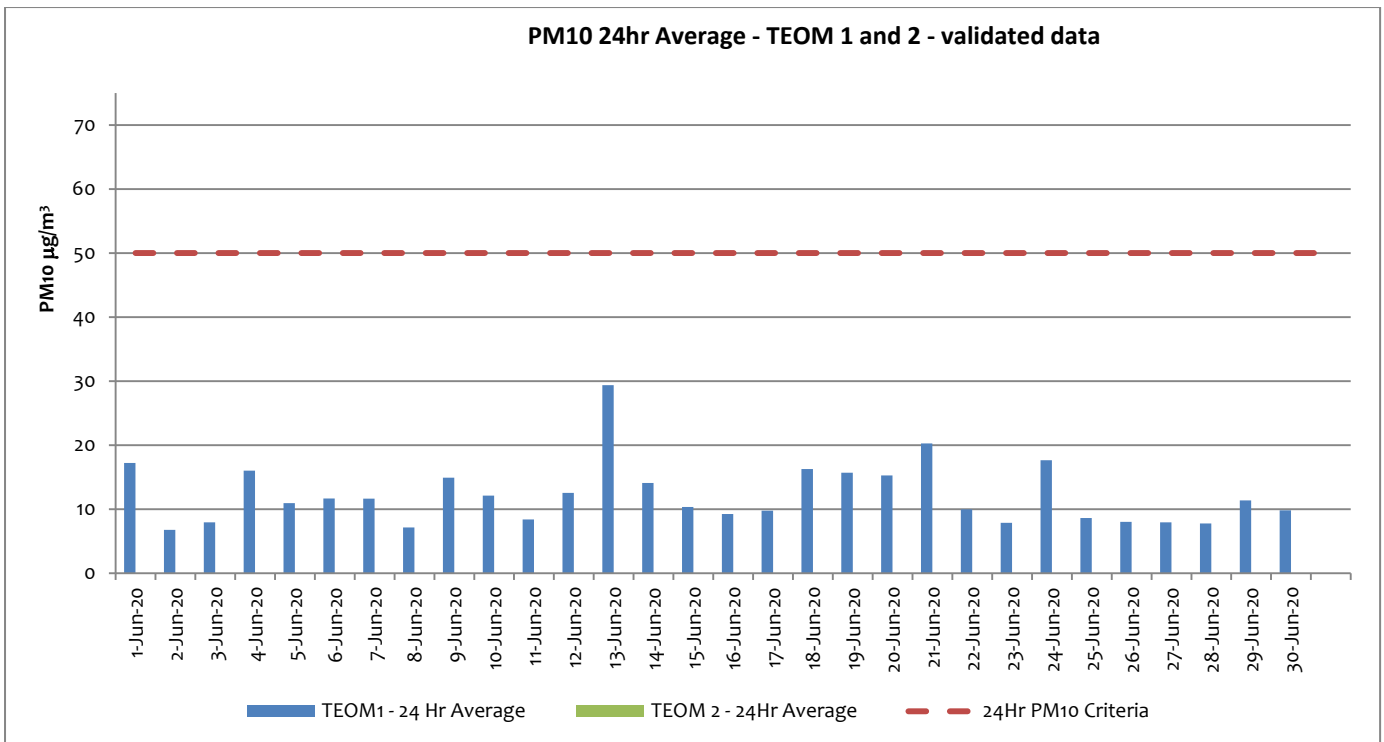
**TEOM1 (EPL13) (Off Site) and TEOM2 (EPL14) (On Site) Validated Results for June**

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?
1-Jun-20	17.2	Y	NS	Y
2-Jun-20	6.8	Y	NS	Y
3-Jun-20	7.9	Y	NS	Y
4-Jun-20	16.0	Y	NS	Y
5-Jun-20	10.9	Y	NS	Y
6-Jun-20	11.7	Y	NS	Y
7-Jun-20	11.7	Y	NS	Y
8-Jun-20	7.1	Y	NS	Y
9-Jun-20	14.9	Y	NS	Y
10-Jun-20	12.1	Y	NS	Y
11-Jun-20	8.4	Y	NS	Y
12-Jun-20	12.6	Y	NS	Y
13-Jun-20	29.4	Y	NS	Y
14-Jun-20	14.1	Y	NS	Y
15-Jun-20	10.4	Y	NS	Y
16-Jun-20	9.2	Y	NS	Y
17-Jun-20	9.8	Y	NS	Y
18-Jun-20	16.3	Y	NS	Y
19-Jun-20	15.7	Y	NS	Y
20-Jun-20	15.3	Y	NS	Y
21-Jun-20	20.3	Y	NS	Y
22-Jun-20	10.0	Y	NS	Y
23-Jun-20	7.9	Y	NS	Y
24-Jun-20	17.7	Y	NS	Y
25-Jun-20	8.6	Y	NS	Y
26-Jun-20	8.0	Y	NS	Y
27-Jun-20	8.0	Y	NS	Y
28-Jun-20	7.8	Y	NS	Y
29-Jun-20	11.4	Y	NS	Y
30-Jun-20	9.8	Y	NS	Y

NS<sup>1</sup> – no sample collected due to temporary decommissioning of TEOM unit.

There were no significant extreme dust events in Broken Hill during June.

The PM<sub>10</sub> 24-hour rolling annual average for data with external elevated dust events removed at June 2020 is 16.61 $\mu\text{g}/\text{m}^3$  for TEOM1 and has remained at 20.52  $\mu\text{g}/\text{m}^3$  for TEOM2 as the rolling average has not been calculated while the unit has been decommissioned. The PM<sub>10</sub> 24-hour rolling annual average for both TEOM sites remain below the annual average criteria of 25  $\mu\text{g}/\text{m}^3$ .





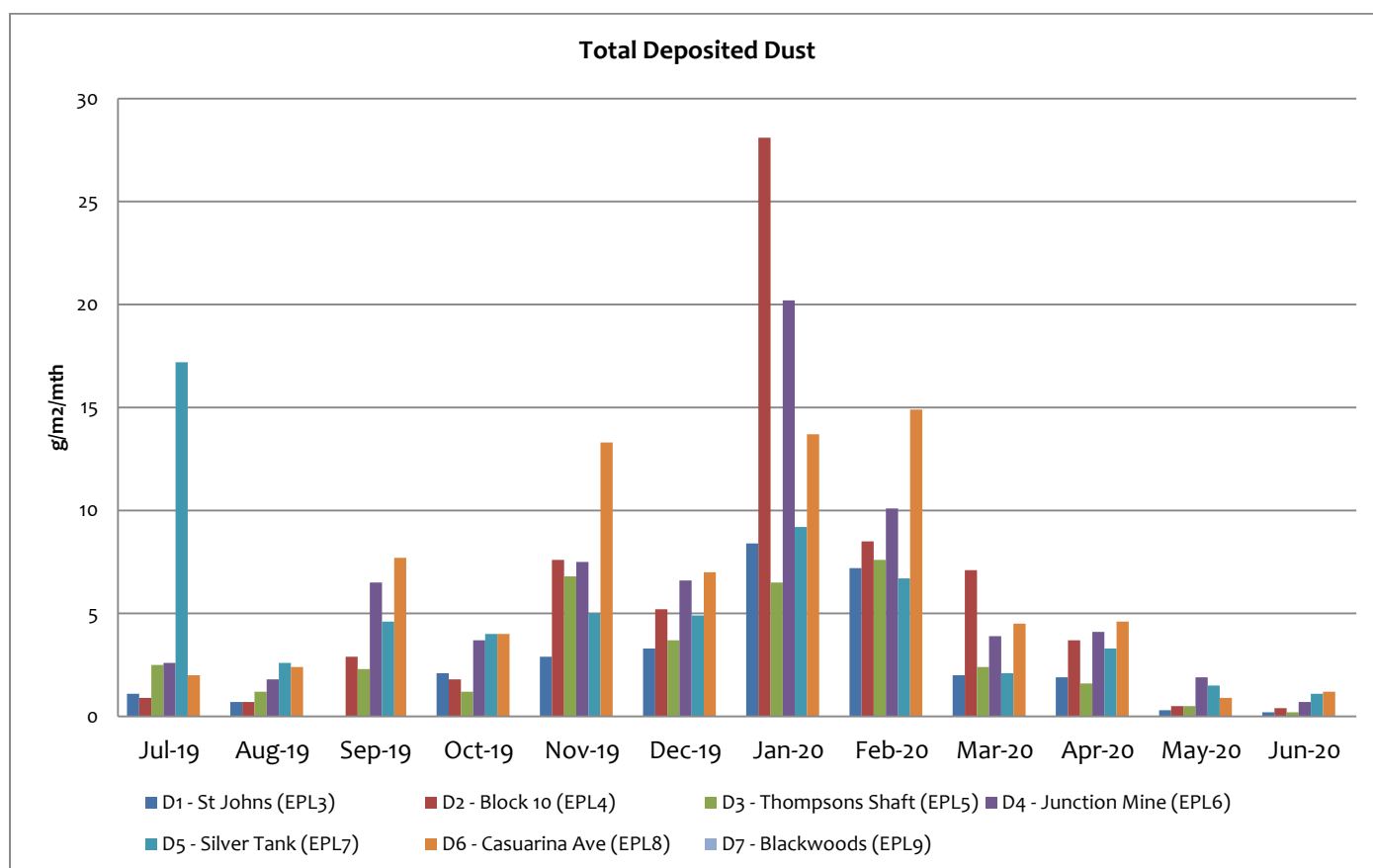
### 1.3 Dust Deposition Sampling

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. DDG7 has been decommissioned since June 2019 due to works on TSF Embankment 2.

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

Total Deposited Dust (g/m <sup>2</sup> /Month)							
Sample Period	D1 (off site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off site)	D7 (on site)
June 2020	0.2	0.4	0.2	0.7	1.1	1.2	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: "<sup>1</sup>" = background not available, N/A = not applicable as dust deposition unit is located on site, NS = No sample

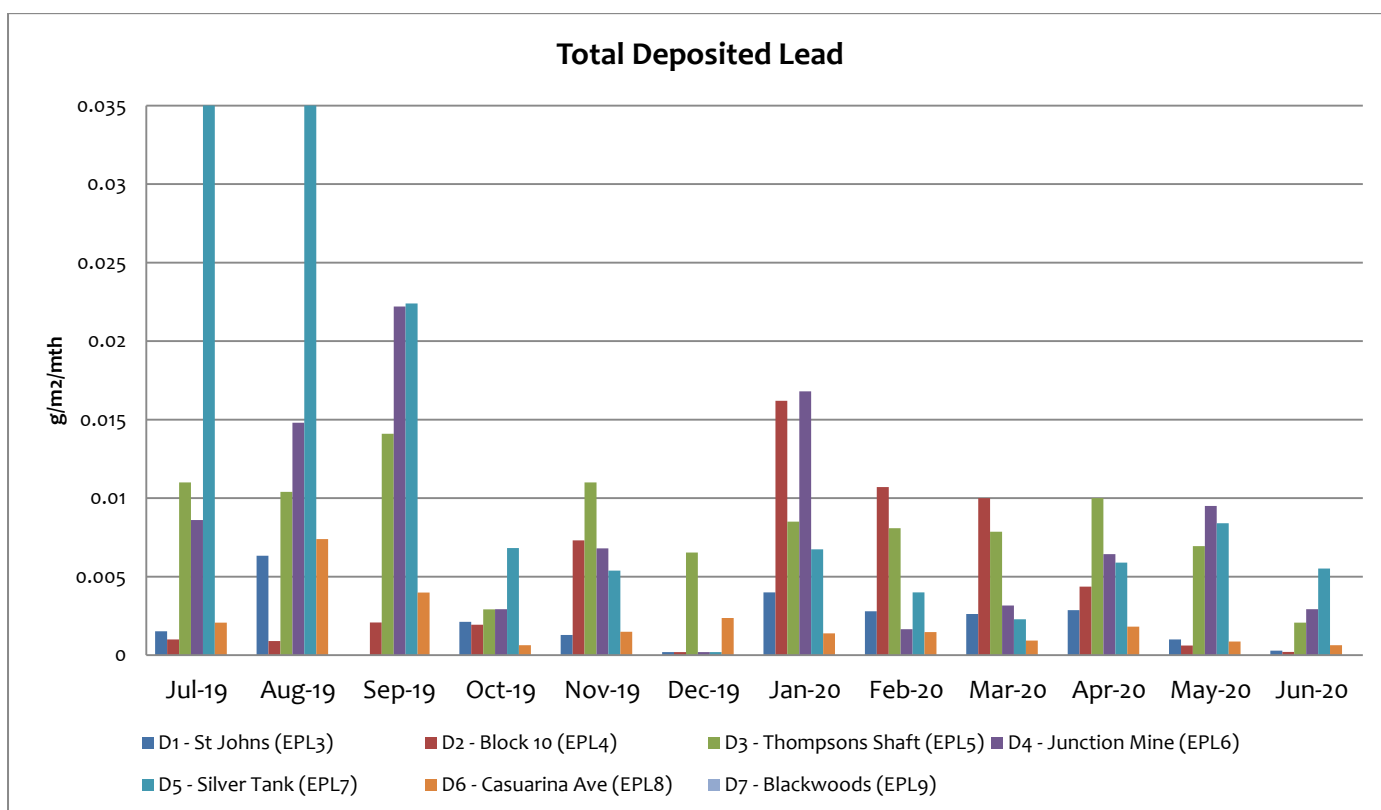


The dust levels recorded in Dust Gauges in June were very low compared to previous months which is likely due to cool weather and lack of extreme dust events or storms. The predominant wind directions for June were from the NW and WSW. The highest dust levels were recorded in the D5 Silver Tank and D6 Casuarina Avenue gauges. The D5 Silver Tank results are likely impacted by site activities and the D6 Casuarina Avenue results by community activities as D6 is a control site.



Total Deposited Lead (g/m <sup>2</sup> /Month)							
Sample Period	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
June 2020	0.00029	0.0002	0.00207	0.003	0.00552	0.00063	NS
Background (2010)	0.0034	0.005	0.005	0.006	<sup>-1</sup>	0.004	<sup>-1</sup>

Note: "1" = background not available, NS = No sample



There are no guidelines for deposited lead dust. Lead results in June were highest in the D5 Silver Tank gauge but very low for most gauges considering results from previous months. The predominant wind directions for the month of June was from the NW and WSW. However, high volume air samplers HVAS and HVAS1 are collocated with D5 and they recorded elevated lead levels during monitoring events when the wind was from the NE and NNE. This suggests there may be contribution from site activities.

Dust suppressant is applied to unsealed areas of the site and roads are frequently watered using water carts.

#### 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. Emissions monitoring is conducted quarterly.

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) 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 June

Monitoring was conducted at the Primary Bent Shaft (EPL1) and the Crusher Baghouse (EPL2) on 16 June 2020 and measured results were below the licence criteria. Result are provided below.

	Unit	Primary Vent Shaft (EPL1)	Crusher Baghouse (EPL2)
Dry Gas Density	Kg/m <sup>3</sup>	1.29	1.29
Moisture	%	2.7	1.3
Molecular weight of stack gases	g/m <sup>3</sup>	1,288	1,288
Temperature	°C	24	15
Nitrogen Oxides	mg/m <sup>3</sup>	5.05	NA
Volatile Organic Compounds	mg/m <sup>3</sup>	0.463	NA
Total Suspended particles	mg/m <sup>3</sup>	9.62	19.0
Type 1 and Type 2	mg/m <sup>3</sup>	0.0762	0.466
Velocity	m/sec	12.2	20.4
Volumetric Flowrate	m <sup>3</sup> /sec	210	8.69

## 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 a number of roving monitors which may be



used to monitor vibration and overpressure at particular locations as required. Monitors operate continuously and are automatically triggered to record 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)
Residence on privately owned land (7am-7pm)	115	3 (interim)	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	-	-
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 4.17 per week over the previous calendar year
- The number of Development blasts averaged 36.37 per week over the previous calendar year

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

- 1 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 for the annual period = 0%
- Percentage of production blasts over 5 mm/sec for the annual period = 5.7%

**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 for the annual period = 0%
- Percentage of production blasts over 3mm/sec for the annual period = 40%

The percentage of production blasts over 5 mm/sec in the Western Mineralisation and Main Lodes exceed the licence limit of 5% but compliance with the Environmental Protection Licence limits is calculated at the end of the reporting period which is November 1 of each year.

The percentage of production blasts over 3 mm/sec in Block 7 exceed the licence limit of 5% but compliance with the Environmental Protection Licence limits is calculated at the end of the reporting period which is November 1 of each year. The limited number of blasts in Block 7 can result in an inflated exceedance of the compliance limit.

## **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 last conducted in October 2019.

The monitoring assessment found that site LAeq, 15min noise contributions satisfied the relevant limits during the measurements at all assessment locations

## **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. Results have remained stable.





### 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 June

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)	6.63	11600	12500	11	5540	1710	515	278	1700	2.58	0.990	263	875	<0.05
Kintore Pit (EPL54)	6.6	12000	13400	8	5690	1710	505	271	1700	3.30	1.67	288	1030	0.26

### Groundwater Bores (EPL37 - EPL52) Results for June

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)
GW01 (EPL37)	-Bore Dry-													
GW02 (EPL38)	-Bore Dry-													
GW03 (EPL39)	6.63	13300	11800	3	4680	2930	567	358	2200	0.951	2.10	262	221	0.07
GW04 (EPL40)	6	12800	11200	161	4780	2620	556	482	2210	0.126	0.007	74.3	27.4	<0.05
GW05 (EPL41)	5.49	14800	14700	104	6340	2670	500	630	2540	0.620	0.170	328	276	<0.05
GW06 (EPL42)	5.4	13000	11900	62	5100	2600	535	457	2120	0.736	0.083	249	154	<0.05
GW07 (EPL43)	6.01	11300	10300	41	4490	1970	542	306	1760	1.87	0.094	219	246	<0.05
GW08 (EPL44)	6.07	13200	13200	40	5340	2700	534	343	2000	1.16	1.56	507	538	<0.05
GW09 (EPL45)	5.3	10600	9780	93	4590	1850	603	530	1390	1.03	0.002	82.0	109	<0.05
GW10 (EPL46)	5.45	13100	10800	283	4450	2630	580	528	2160	0.153	<0.001	11.6	21.4	<0.05
GW11 (EPL47)	6.61	9600	8760	79	4310	1430	405	429	1440	1.62	0.038	96.2	130	<0.05
GW12 (EPL48)	6	12700	11800	74	5520	2000	475	594	2110	1.47	0.005	83.2	178	<0.05
GW13 (EPL49)	-Bore Dry-													



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)
GW14 (EPL50)														
GW15 (EPL51)														
GW16 (EPL52)														

### 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 samples could be collected in June due to insufficient rainfall.



## 4 Weather Data

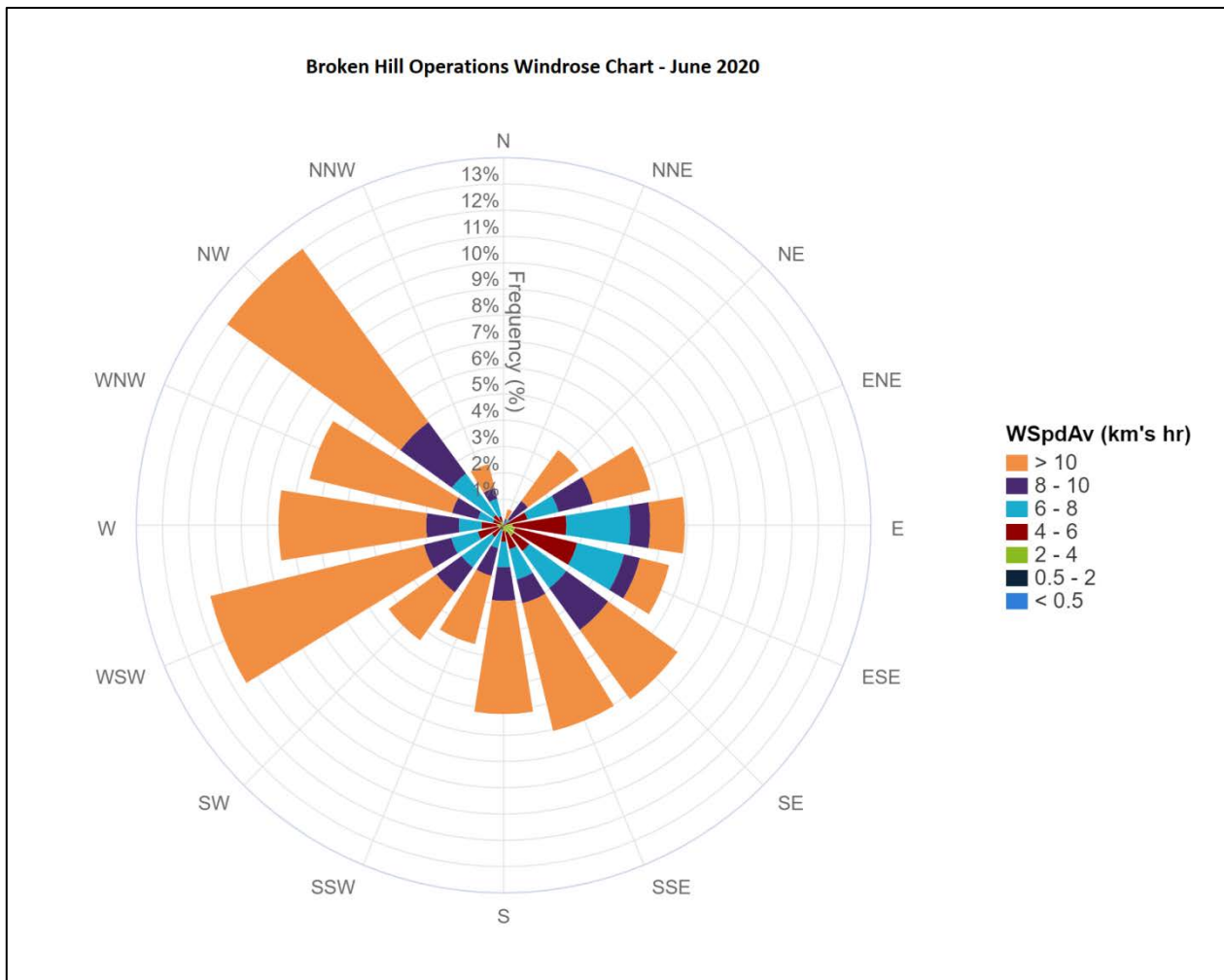
The weather station continuously monitors the following parameters as per Point 55 of the Environmental Protection Licence.

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

The windrose provided below indicates the predominant wind directions for the month of June were from the NW and WSW.



### Weather Data Summary for June

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Jun-20	7.8	12.9	5.9	35.5	SW	230	0.00
02-Jun-20	6.8	13.9	1.7	17.1	WSW	246	0.00
03-Jun-20	6.5	11.8	7.9	29.0	SSE	159	0.00
04-Jun-20	4.1	13.3	2.8	15.4	SE	132	0.00
05-Jun-20	7.3	18.1	2.6	16.3	NE	47	0.00
06-Jun-20	7.5	16.9	3.2	15.9	NNE	21	0.00
07-Jun-20	5.2	13.2	7.7	26.0	SSE	159	0.00
08-Jun-20	2.7	11.1	3.3	22.9	SE	140	0.00
09-Jun-20	4.2	15.9	1.5	15.9	ENE	67	0.00
10-Jun-20	9.0	17.2	1.9	14.8	ESE	110	0.00
11-Jun-20	9.6	16.4	0.6	9.7	East	89	0.00



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12-Jun-20	10.5	18.4	4.1	19.8	NNE	23	0.00
13-Jun-20	8.1	19.3	5.9	43.3	NNE	24	0.50
14-Jun-20	6.9	14.3	3.9	21.5	WNW	291	0.00
15-Jun-20	9.3	17.2	3.8	28.1	NW	312	0.00
16-Jun-20	10.5	17.7	1.7	21.7	NW	312	0.00
17-Jun-20	9.8	16.2	2.7	16.6	ESE	111	0.00
18-Jun-20	8.6	16.9	3.6	16.9	NE	43	0.00
19-Jun-20	10.7	20.4	6.1	31.6	NNE	19	0.00
20-Jun-20	9.0	15.5	3.5	24.5	NW	311	0.00
21-Jun-20	7.9	14.6	8.8	35.4	NW	313	0.00
22-Jun-20	7.3	13.9	6.7	33.4	SW	230	0.00
23-Jun-20	5.1	14.6	1.1	30.0	WSW	244	0.00
24-Jun-20	7.9	14.4	3.6	16.3	NW	311	0.00
25-Jun-20	8.3	15.8	1.4	13.3	West	269	0.00
26-Jun-20	7.4	15.2	2.2	14.6	ESE	114	0.00
27-Jun-20	6.7	12.7	3.6	15.9	East	88	0.00
28-Jun-20	5.3	11.8	3.5	23.7	SE	136	0.00
29-Jun-20	5.0	14.0	1.8	18.3	ENE	65	0.00
30-Jun-20	7.3	17.2	5.4	30.8	NNE	23	0.00



## 5 Data Log

Sample	Result Received
Hi Volume Samples	5-08-2020
TEOM	28-07-2020
Dust Deposition	31-07-2020
Vents & Bag House	24-07-2020
Water	26-06-2020
Blast vibration and overpressure	1-07-2020
Weather	6-07-2020
Date posted to web site	18-08-2020

## 6 Correction Log

No corrections required.