

Rasp Mine  
Monthly Environmental Monitoring Report  
March 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

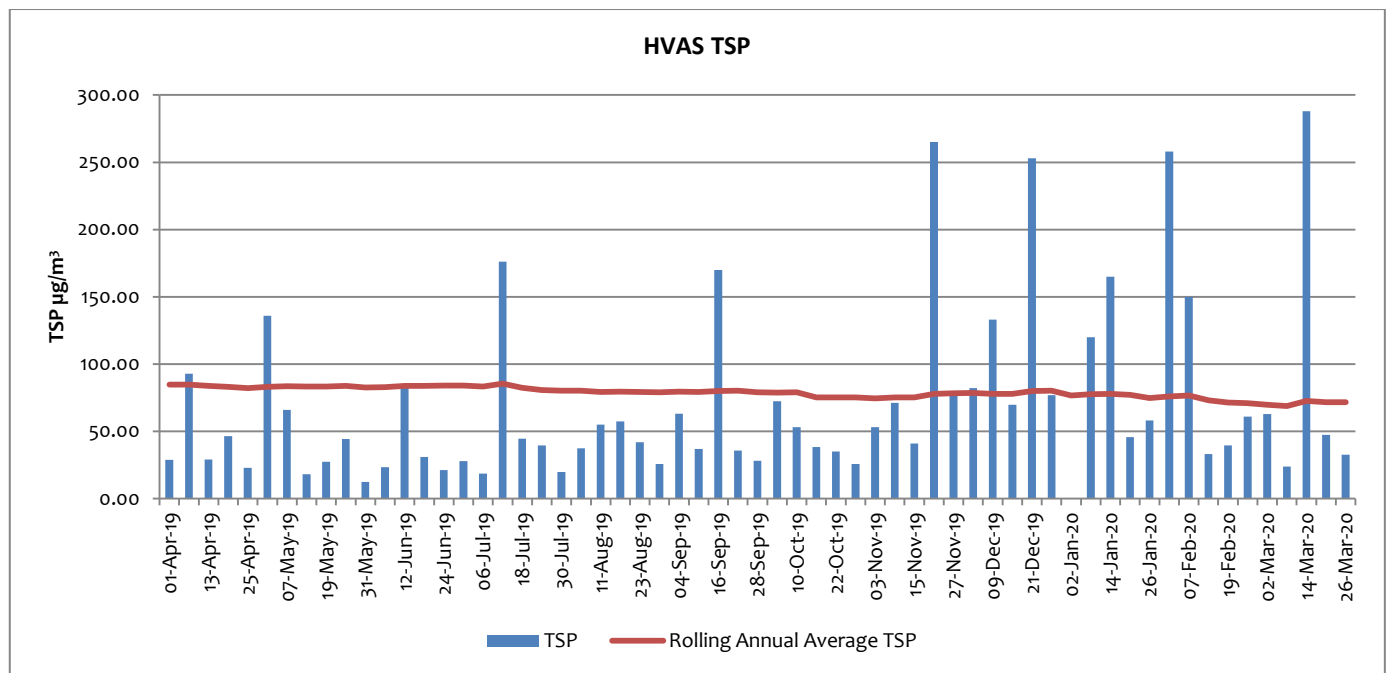
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

### 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 March***

DATE	TSP (µg/m <sup>3</sup> )	Lead (µg/m <sup>3</sup> )
2-03-2020	62.80	0.15
8-03-2020	23.80	0.06
14-03-2020	288.00	0.05
20-03-2020	47.50	0.11
26-03-2020	32.70	0.03

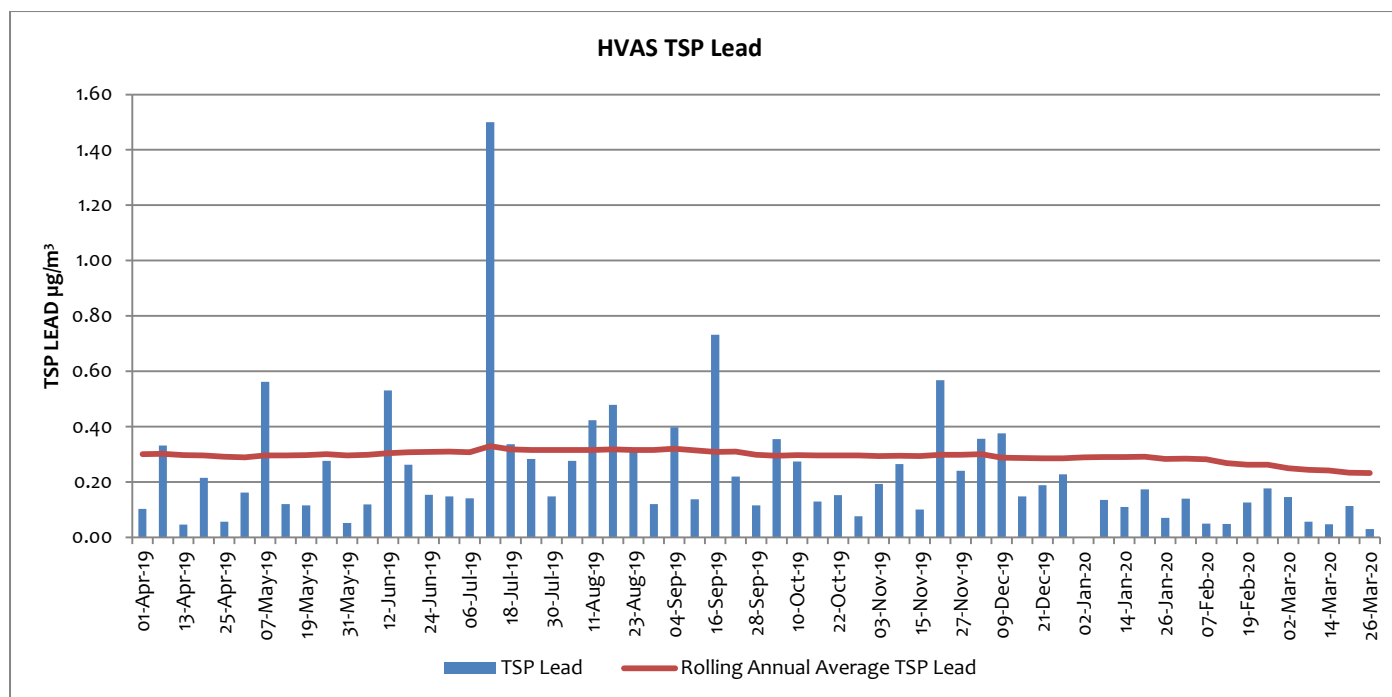


HVAS (EPL10) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

There was an elevated TSP dust level of  $288 \mu\text{g}/\text{m}^3$  recorded on 14 March. There was a dust storm throughout the day on 14 March when the predominant wind direction on was from the SSE and the minimum wind speed for the day was 15 km/hr. TEOM1, situated to the South of the site, also recorded an elevated daily average  $\text{PM}_{10}$  reading of  $241.3 \mu\text{g}/\text{m}^3$  indicating the high dust level was likely the result of a regional dust storm. The annual rolling average for TSP at this location has fallen over the 12 months to  $71.61 \mu\text{g}/\text{m}^3$  at the end of March after starting at a high of  $84.64 \mu\text{g}/\text{m}^3$  in April 2019.

The rolling annual average for TSP to March 2020 is below the long term annual average criteria of  $90 \mu\text{g}/\text{m}^3$ .

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.



The rolling annual average for TSP Lead at 26 March was  $0.23 \mu\text{g}/\text{m}^3$ , down from the previous month's value of  $0.26 \mu\text{g}/\text{m}^3$ .

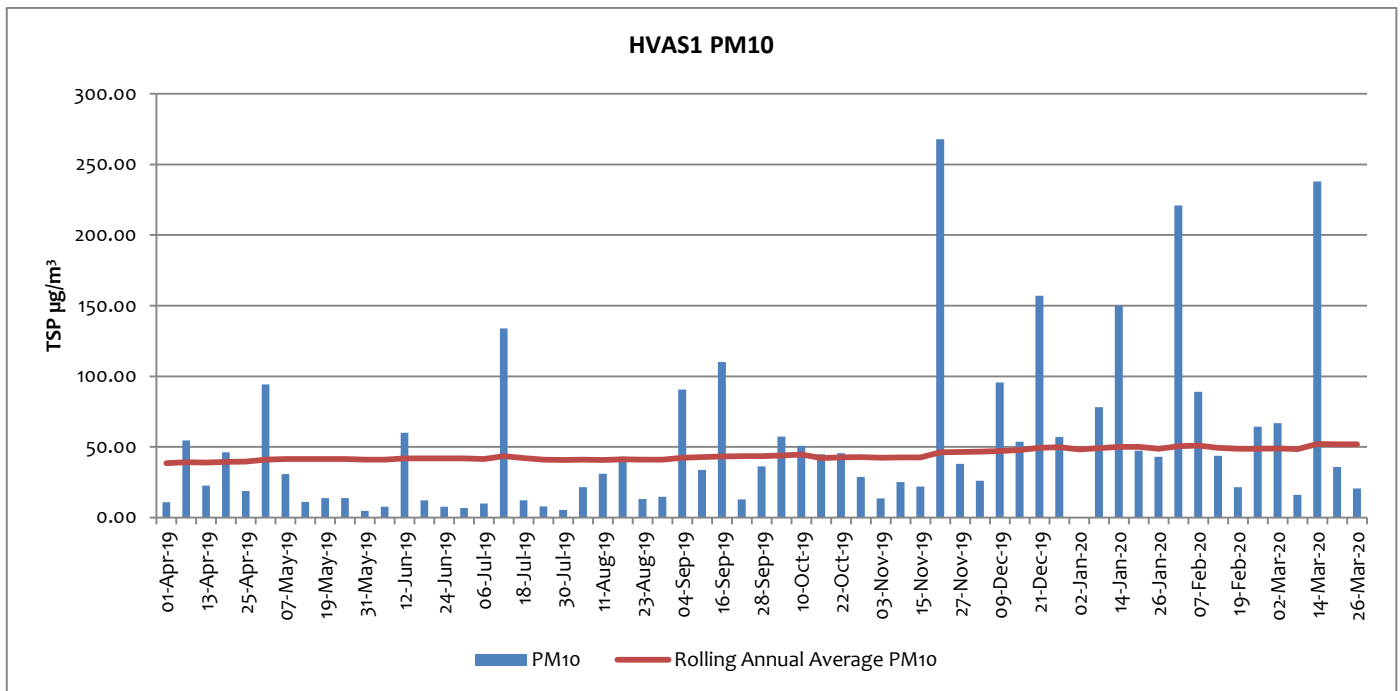
#### **HVAS1 (EPL11) - Silver Tank (On Site) Results for March**

DATE	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ )
2-03-2020	66.90	0.06
8-03-2020	16.00	0.03
14-03-2020	238.00	0.10
20-03-2020	35.70	0.08
26-03-2020	20.60	0.03

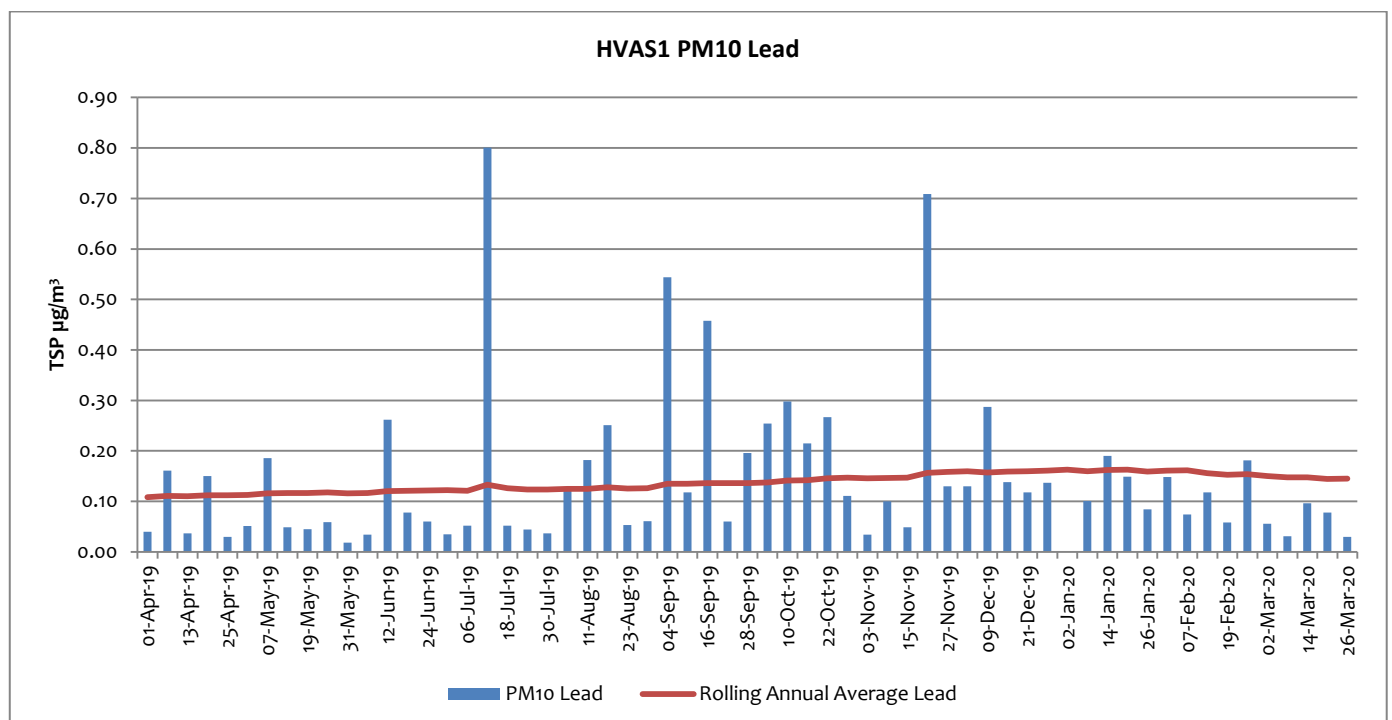
HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

An elevated  $\text{PM}_{10}$  dust level of  $238 \mu\text{g}/\text{m}^3$  was recorded on 14 March. There was a dust storm throughout the day and the predominant wind direction was from the SSE and the minimum wind speed for the day was 15 km/hr. TEOM1, situated to the South of the site, recorded an elevated daily average  $\text{PM}_{10}$  reading of  $241.3 \mu\text{g}/\text{m}^3$  on 14 March indicating the high dust level was likely the result of a regional dust storm. The annual rolling average for  $\text{PM}_{10}$  at this location has risen over the 12 months from  $38.4 \mu\text{g}/\text{m}^3$  in April 2019 to  $51.8 \mu\text{g}/\text{m}^3$  in March 2020.

The annual rolling average for  $\text{PM}_{10}$  at this location exceeds the long term criteria of  $25 \mu\text{g}/\text{m}^3$  but 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 0.11  $\mu\text{g}/\text{m}^3$  to 0.14  $\mu\text{g}/\text{m}^3$  and is likely the result of drought conditions and windy weather transporting lead contaminated dust from the Broken Hill environs. There was an elevated PM<sub>10</sub> lead dust level of 0.10  $\mu\text{g}/\text{m}^3$  recorded on 14 March. As the wind was from the SSE on this day the contribution from the site is likely to be minimal at this location.



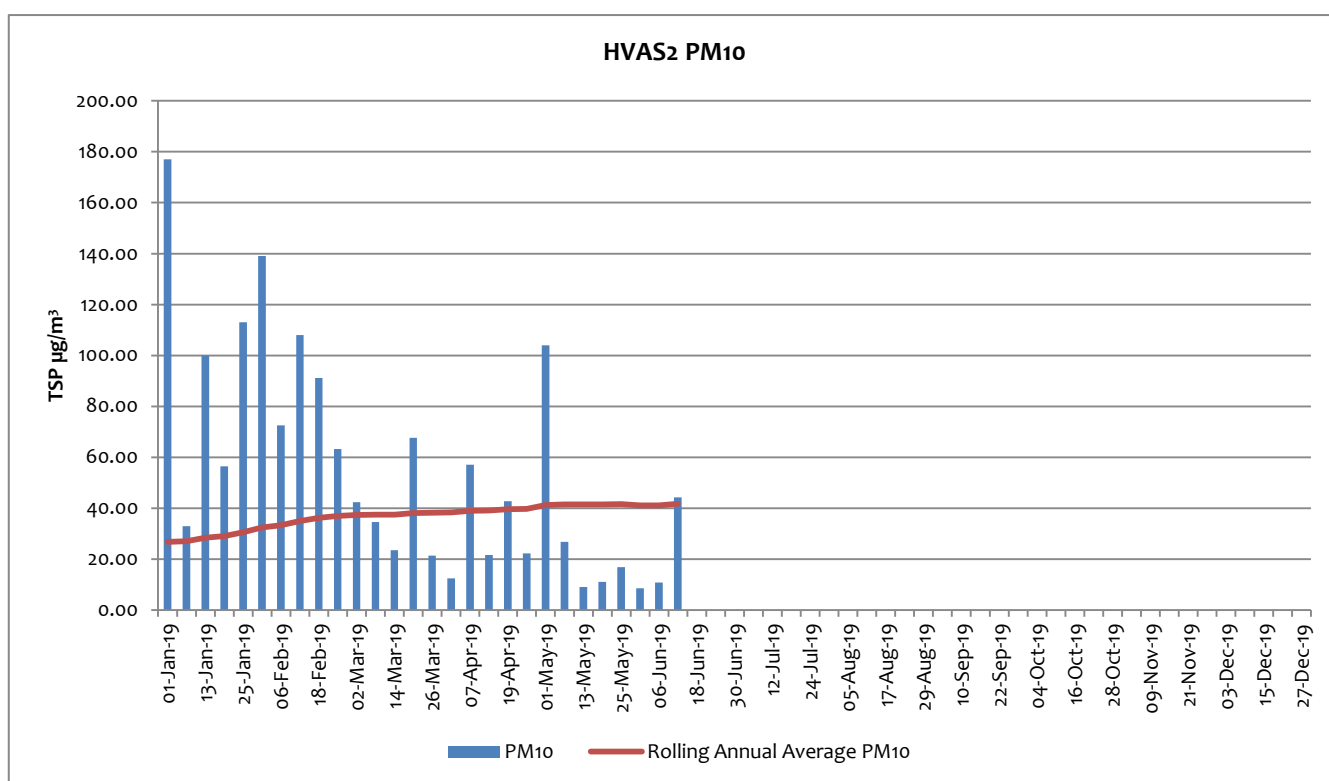


### HVAS 2 (EPL12) - Blackwood Pit (On Site) Results for March

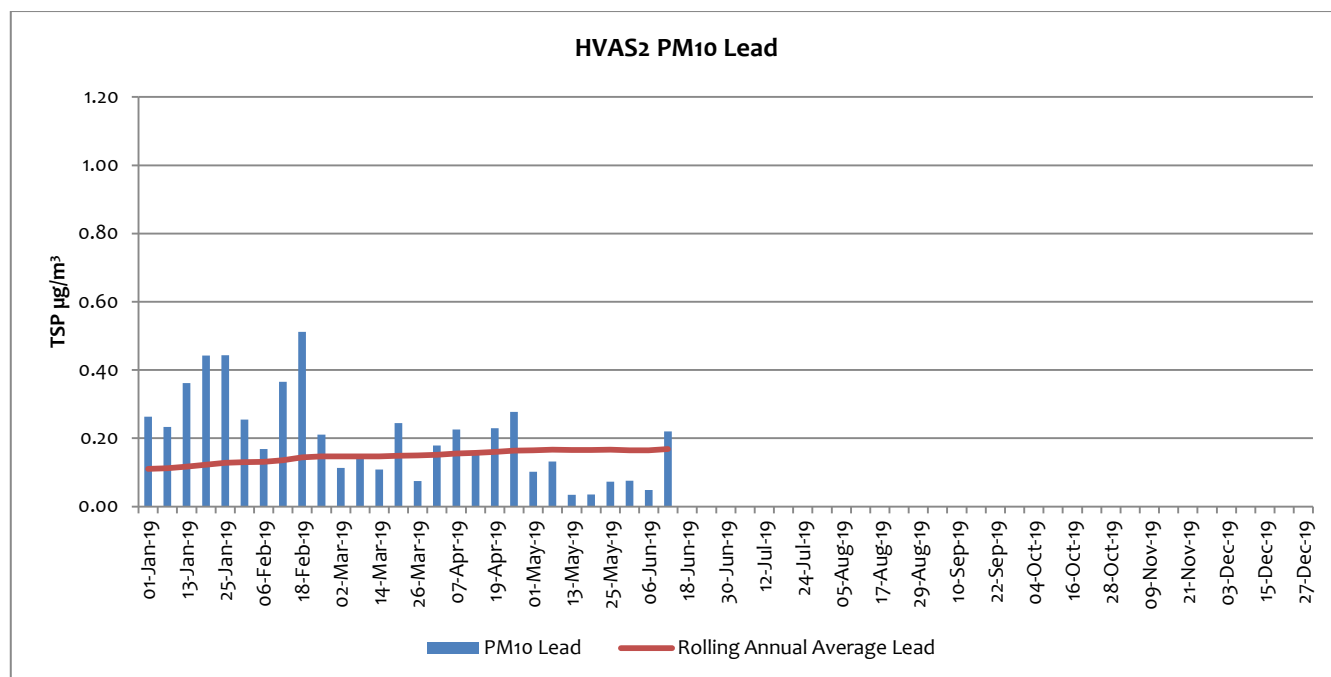
DATE	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> Lead (µg/m <sup>3</sup> )
2-03-2020	NS	NS
8-03-2020	NS	NS
14-03-2020	NS	NS
20-03-2020	NS	NS
26-03-2020	NS	NS

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.

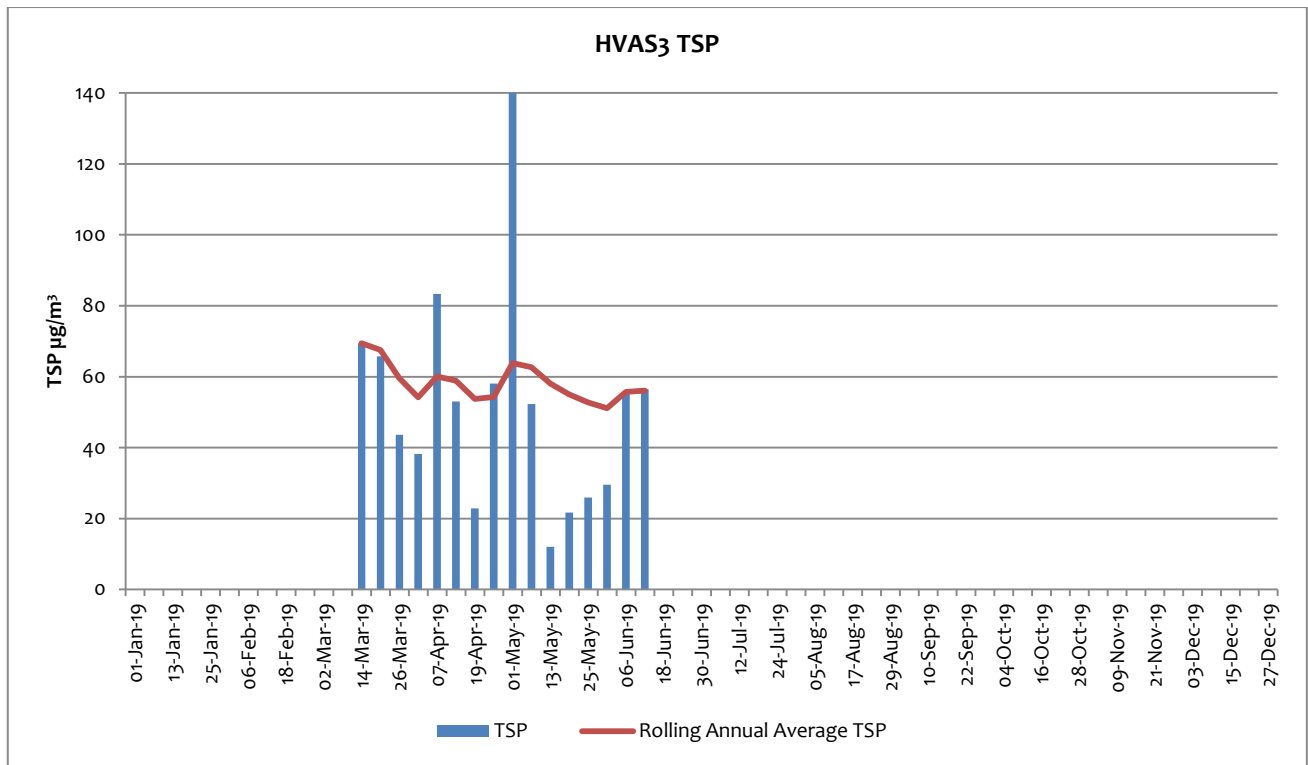


### ***HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for March***

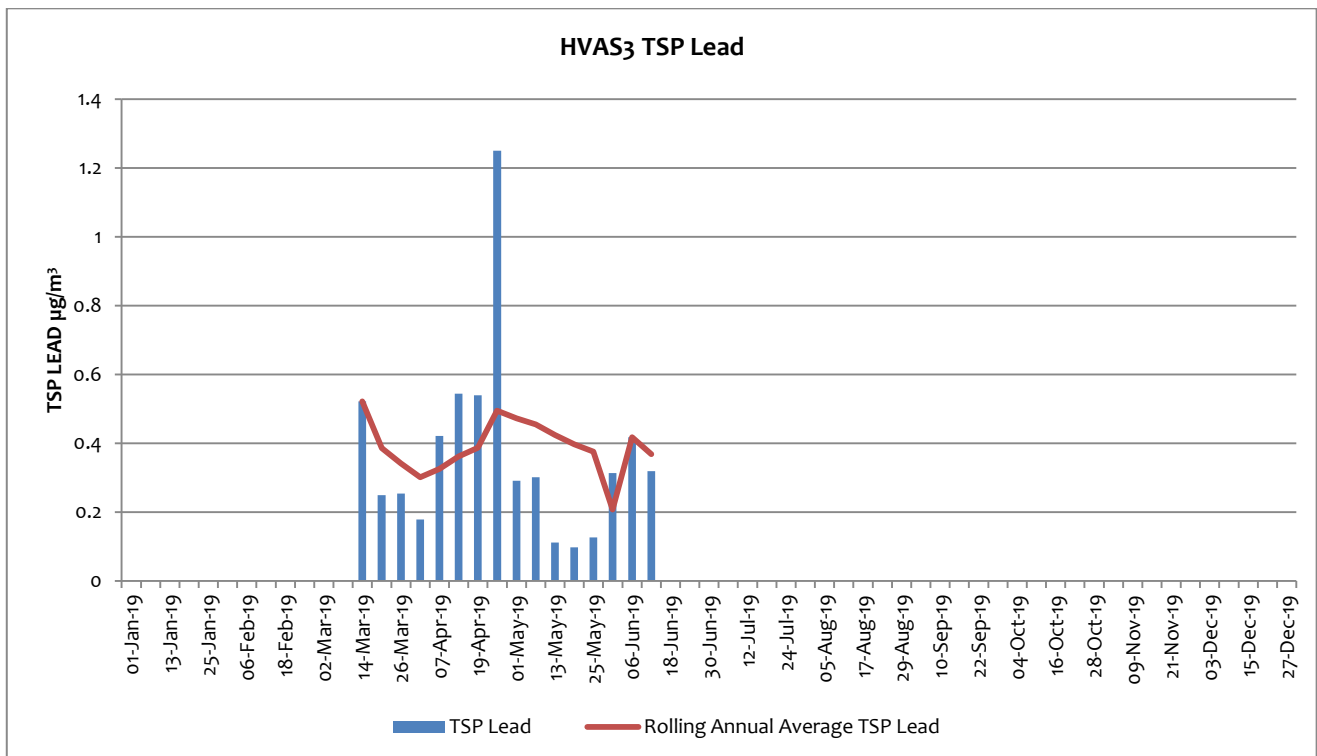
DATE	TSP (µg/m <sup>3</sup> )	PM <sub>10</sub> Lead (µg/m <sup>3</sup> )
2-03-2020	NS	NS
8-03-2020	NS	NS
14-03-2020	NS	NS
20-03-2020	NS	NS
26-03-2020	NS	NS

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 PM<sub>10</sub> monitor is in place adjacent to the HVAS2 location.

The rolling annual average for TSP to June 2019 is 56.05 µg/m<sup>3</sup> which is below the long term annual average criteria of 90 µg/m<sup>3</sup>.



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 PM10 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 PM10, 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.



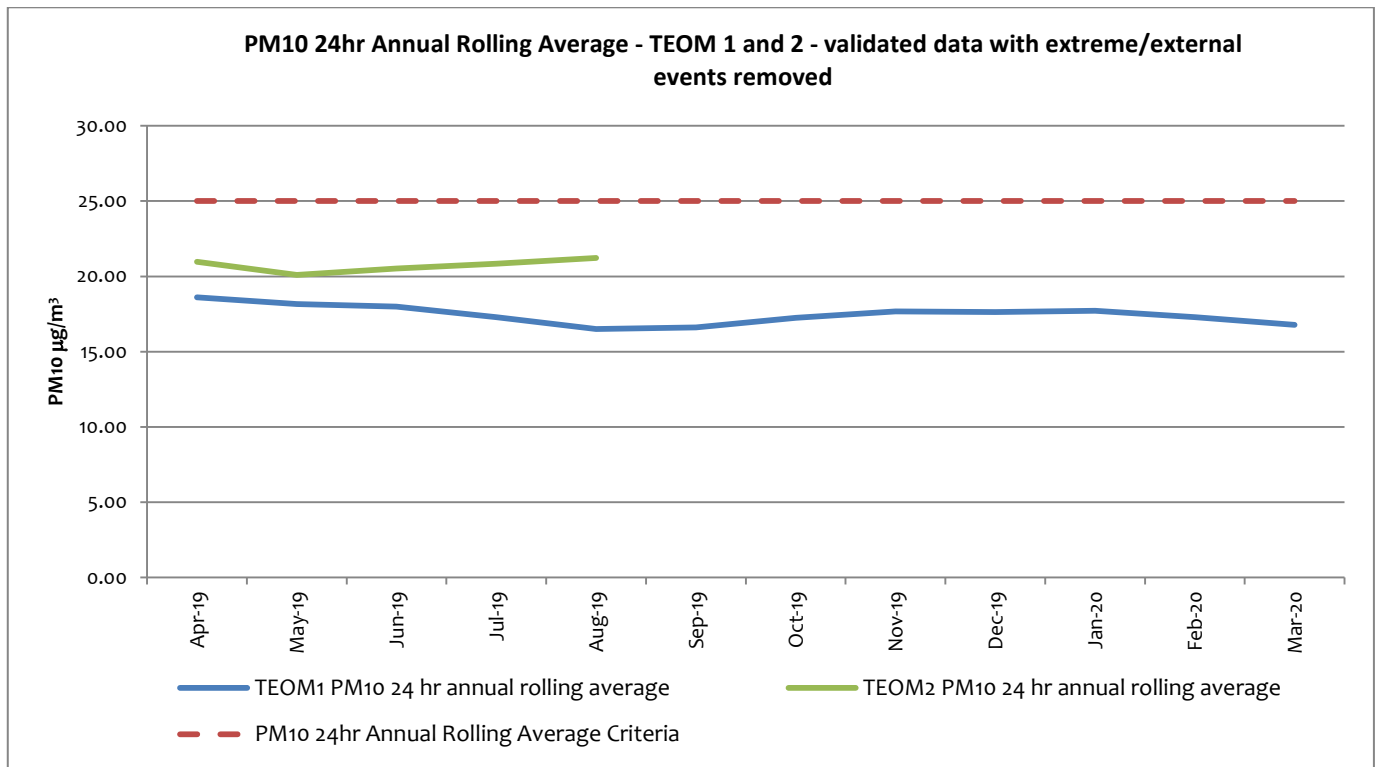
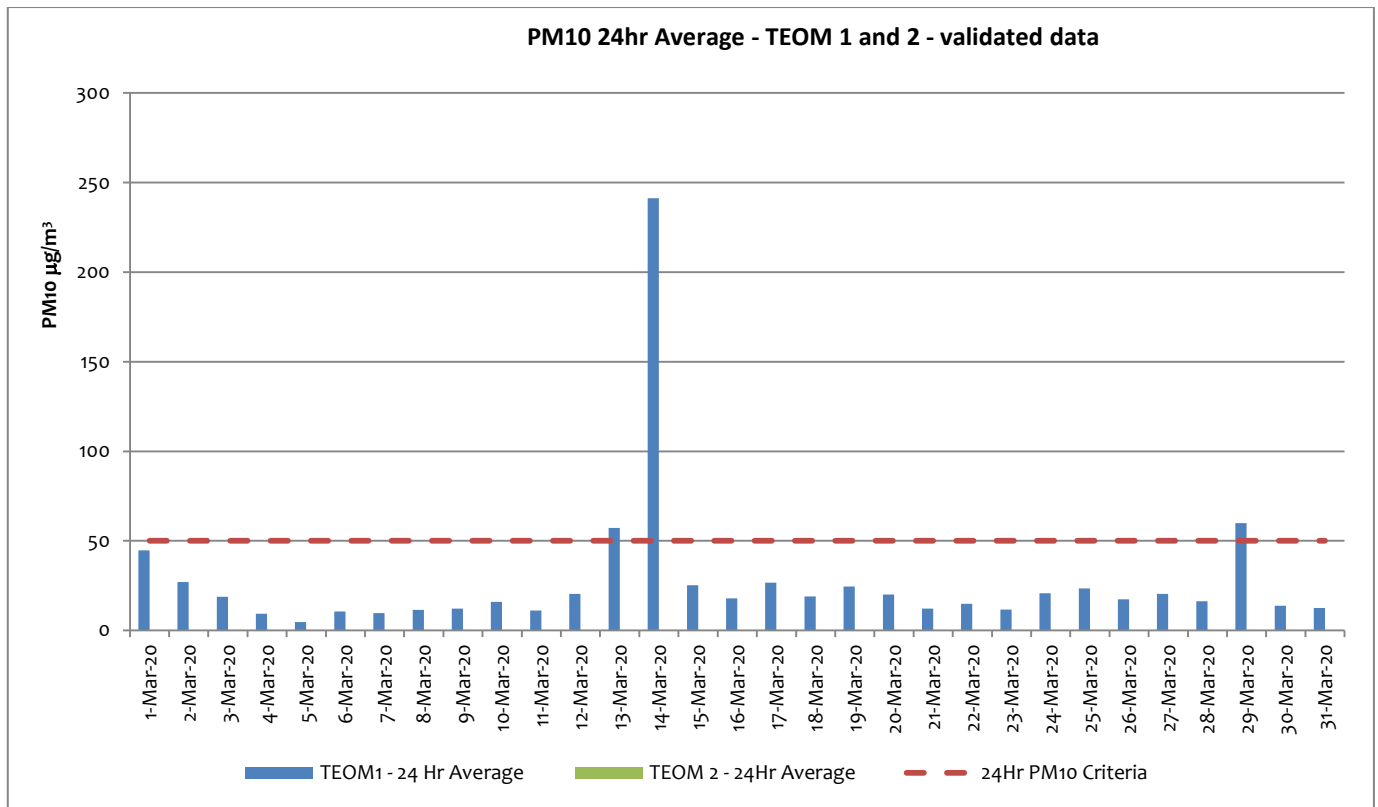
***TEOM1 (EPL13) (Off Site) and TEOM2 (EPL14) (On Site) Validated Results for March***

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-Mar-20	44.7	Y	NS	Y
2-Mar-20	27.1	Y	NS	Y
3-Mar-20	18.9	Y	NS	Y
4-Mar-20	9.4	Y	NS	Y
5-Mar-20	4.6	Y	NS	Y
6-Mar-20	10.6	Y	NS	Y
7-Mar-20	9.8	Y	NS	Y
8-Mar-20	11.5	Y	NS	Y
9-Mar-20	12.2	Y	NS	Y
10-Mar-20	15.9	Y	NS	Y
11-Mar-20	11.1	Y	NS	Y
12-Mar-20	20.3	Y	NS	Y
13-Mar-20	57.3	Y	NS	Y
14-Mar-20	241.3	Y	NS	Y
15-Mar-20	25.2	Y	NS	Y
16-Mar-20	17.9	Y	NS	Y
17-Mar-20	26.6	Y	NS	Y
18-Mar-20	18.9	Y	NS	Y
19-Mar-20	24.5	Y	NS	Y
20-Mar-20	20.0	Y	NS	Y
21-Mar-20	12.3	Y	NS	Y
22-Mar-20	14.9	Y	NS	Y
23-Mar-20	11.6	Y	NS	Y
24-Mar-20	20.7	Y	NS	Y
25-Mar-20	23.4	Y	NS	Y
26-Mar-20	17.3	Y	NS	Y
27-Mar-20	20.4	Y	NS	Y
28-Mar-20	16.4	Y	NS	Y
29-Mar-20	59.9	Y	NS	Y
30-Mar-20	13.9	Y	NS	Y
31-Mar-20	12.6	Y	NS	Y

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

The graph below presenting validated data includes results impacted by dust storms and external events. Minor dust storms occurred throughout March and a day-long dust storm occurred on 14 March. Elevated dust levels for a 24hr average (over 50  $\mu\text{g}/\text{m}^3$ ) were recorded on 13, 14, and 29 March. On these days the wind was blowing from the South, SSE, and NNE respectively, which suggests the dust recorded was the result of regional dust storms.

The PM<sub>10</sub> 24-hour rolling annual average for data with external elevated dust events removed at March is 16.78  $\mu\text{g}/\text{m}^3$  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.





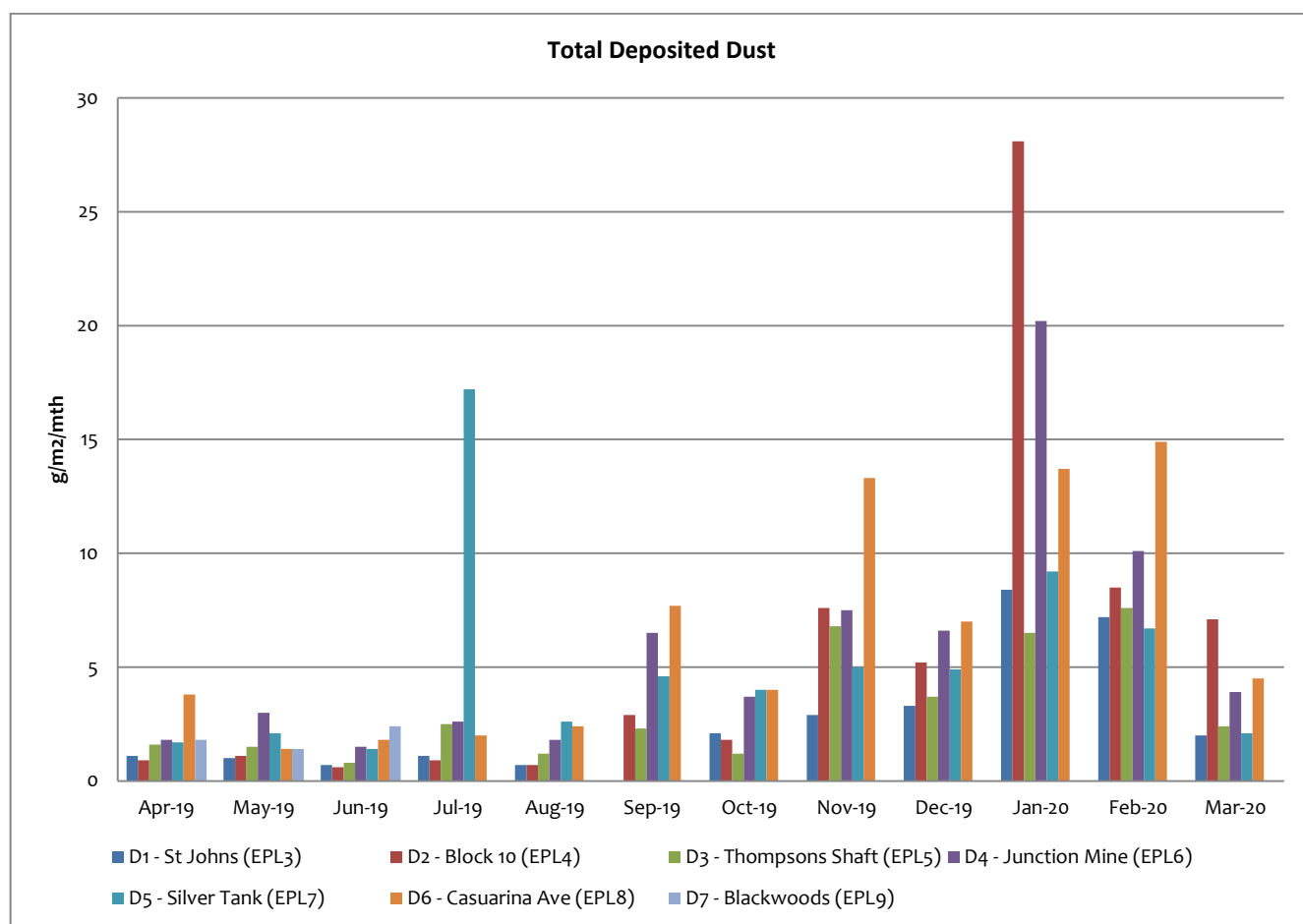
### 1.3 Dust Deposition Sampling

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 March*

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)
March 2020	2.0	7.1	2.4	3.9	2.1	4.5	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



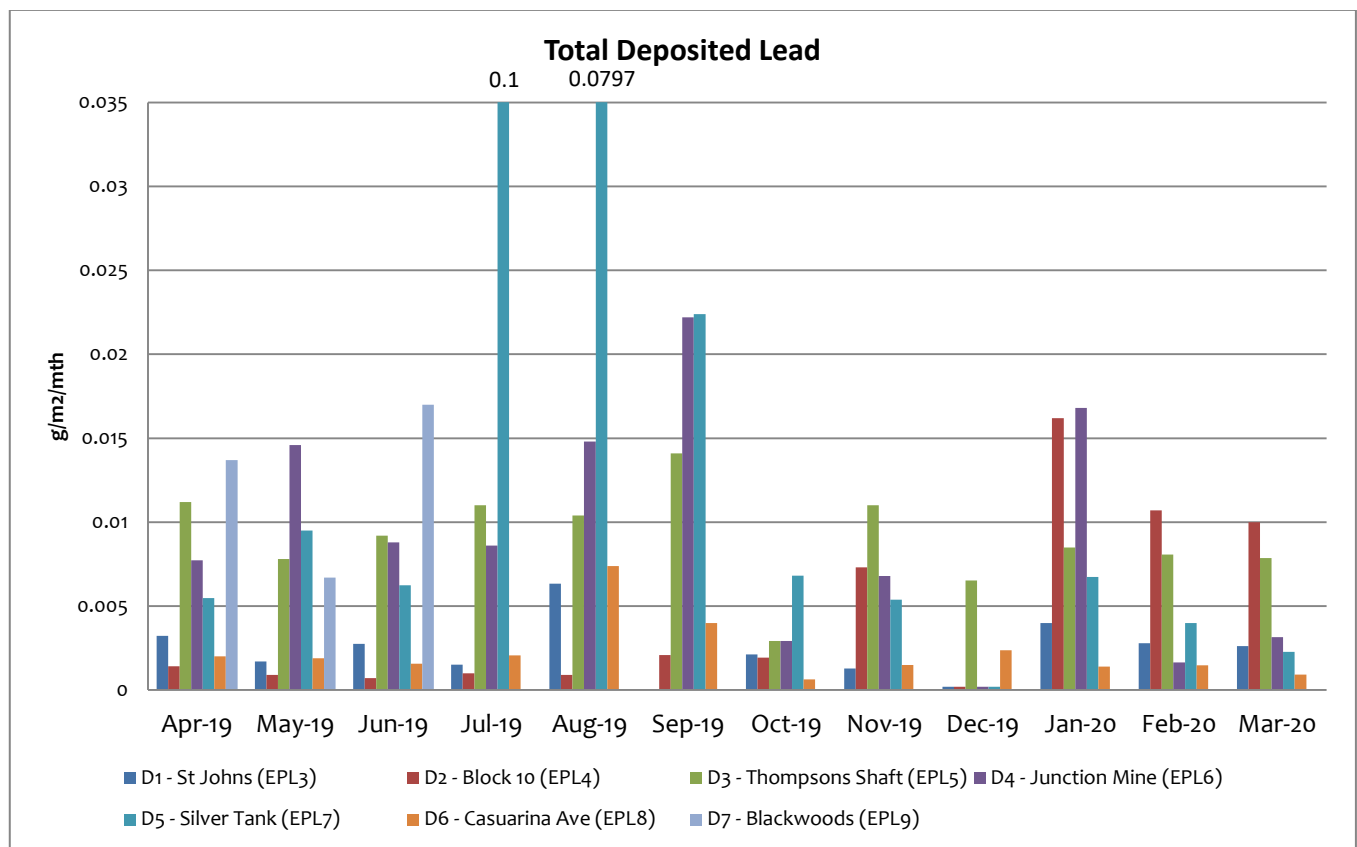
Dust results were elevated for the D2 Block 10 and D6 Casuarina Avenue dust gauges in March. Wind was predominantly from the South with dust storms occurring throughout March. Construction works are being conducted on the Essential Water site where the D2 Block 10 dust gauge is situated.



BHOP is not likely to have contributed significantly to the dust captured in these dust gauges.

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)
March 2020	0.00262	0.01	0.00786	0.003	0.00228	0.00093	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 March were highest at D2 Block 10 and D3 Thompsons Shaft. The predominant wind direction for the month was from the South. Construction works are being conducted on the Essential Water site where the D2 Block 10 dust gauge is situated. The D3 Thompson's Shaft dust gauge is impacted from operations around the Blackwood's TSF which includes the transport of concentrate containers and the loading of trains.

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 March 2020***

Monitoring was conducted at the Primary Bent Shaft (EPL1) and the Crusher Baghouse (EPL2) on 12 March 2020 and measured results were below the licence criteria. Result are provided below.

	Unit	Primary Vent Shaft (EPL1)	Crusher Baghouse (EPL2)
Nitrogen Oxides	mg/m <sup>3</sup>	5.14	NA
Volatile Organic Compounds	mg/m <sup>3</sup>	0.487	NA
Total Suspended particles	mg/m <sup>3</sup>	1.95	3.76
Type 1 and Type 2	mg/m <sup>3</sup>	0.042	0.102

## 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 March**

**Total Blasts:**

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 4.31 per week over the previous calendar year
- The number of Development blasts averaged 36.12 per week over the previous calendar year

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

- 4 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%
- Percentage of production blasts over 5 mm/sec = 5.5%

**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%
- Percentage of production blasts over 3mm/sec = 40.0%

## 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 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.

#### 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 March

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)
Shaft 7 (EPL53)	6.27	13100	14500	20	6040	1750	490	253	1620	2.43	1.24	334	1070	0.74
Kintore Pit (EPL54)	5.95	12700	18500	7	5890	1690	493	246	1580	2.62	1.04	366	1150	2.59

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

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)	6.55	14400	11800	3	4520	3110	572	373	2290	1.33	1.79	280	209	5.4
GW04 (EPL40)	7.34	14200	12100	233	4650	2870	572	551	2370	0.0554	0.401	26.4	14.6	2.91
GW05 (EPL41)	6.67	15100	14300	105	6050	2870	507	657	2620	0.651	0.498	335	272	4.01
GW06 (EPL42)	7.03	13800	11000	53	4780	2720	542	471	2190	0.809	0.192	264	156	0.05
GW07 (EPL43)	7.79	11600	9020	28	4360	1920	530	300	1740	2.04	0.099	244	259	<0.05
GW08 (EPL44)	7.71	13200	13600	16	4900	2670	540	307	1650	1.79	0.686	599	623	0.07
GW09 (EPL45)	6.53	11100	9920	67	4180	1870	597	528	1400	1.23	0.004	93.2	129	0.07
GW10 (EPL46)	6.68	13800	11500	273	4290	2800	583	534	2240	0.184	6.8	0.008	20	<0.05
GW11 (EPL47)	6.67	10200	9010	67	4060	1460	449	532	1750	1.82	0.103	106	136	1.57
GW12 (EPL48)	7.01	13400	12600	67	5060	1960	487	621	2200	1.58	0.004	86.4	175	<0.05
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 in March.

## 4 Weather Data

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

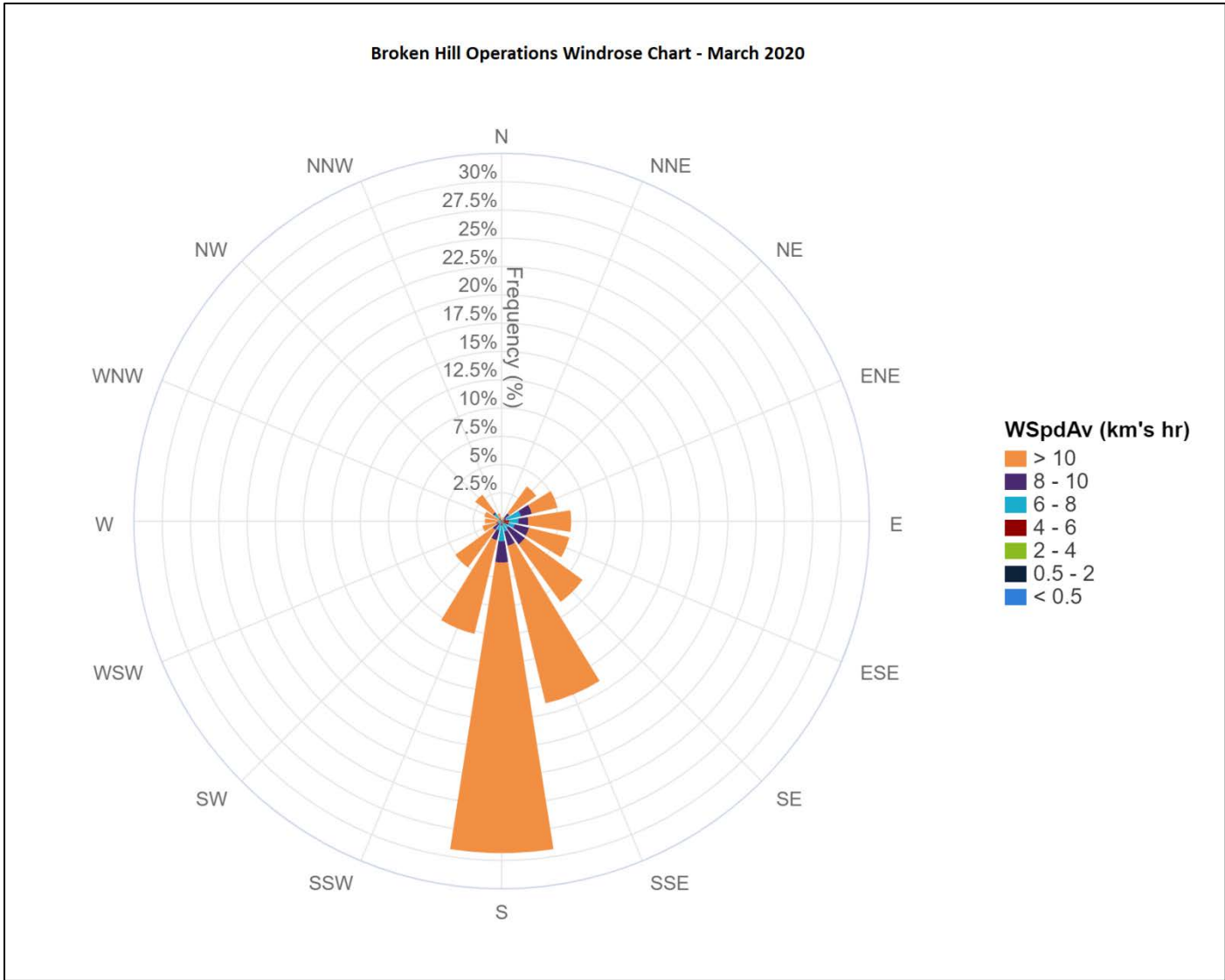
The following parameters are required to be recorded each month as listed in the EPL 12559:-

#### 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 direction for the month of March was from the South.





## Rasp Mine Monthly Environment Monitoring Report

### Weather Data Summary for March

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Mar-20	22.6	33.5	4.5	35.0	NE	43	0.00
02-Mar-20	19.4	23.2	12.1	33.7	SSE	159	0.00
03-Mar-20	13.8	19.4	7.8	29.9	ESE	117	0.40
04-Mar-20	13.5	19.1	4.9	17.7	ESE	113	0.20
05-Mar-20	14.9	20.0	6.9	22.9	SSW	202	0.00
06-Mar-20	13.1	22.1	7.6	26.2	SSE	155	0.00
07-Mar-20	14.6	23.6	7.6	29.4	SSE	157	0.00
08-Mar-20	13.6	25.0	7.1	33.6	South	177	0.00
09-Mar-20	13.4	27.2	6.3	25.6	South	182	0.00
10-Mar-20	18.7	27.6	2.2	20.7	ENE	69	3.20
11-Mar-20	19.3	28.9	3.5	20.8	ENE	66	0.00
12-Mar-20	21.3	30.2	6.3	28.7	NE	44	0.00
13-Mar-20	16.3	32.6	3.4	44.7	South	182	0.40
14-Mar-20	10.3	20.4	15.0	46.6	SSE	165	0.00
15-Mar-20	11.0	22.4	6.7	27.8	SSE	154	0.00
16-Mar-20	15.1	26.2	3.5	18.1	ESE	115	0.00
17-Mar-20	19.6	28.5	4.7	21.2	NE	44	0.00
18-Mar-20	21.0	31.4	2.2	25.8	NNE	20	0.00
19-Mar-20	22.8	32.5	3.7	29.3	NW	316	0.00
20-Mar-20	18.4	28.1	8.0	28.4	South	177	0.00
21-Mar-20	14.1	26.6	4.5	18.1	South	179	0.00
22-Mar-20	14.6	23.5	8.8	30.6	South	178	0.00
23-Mar-20	13.4	21.6	6.1	28.5	SSE	159	0.00
24-Mar-20	14.4	22.6	3.8	22.0	SSE	158	0.00
25-Mar-20	13.1	22.6	6.4	28.0	SSE	160	0.00
26-Mar-20	10.4	22.3	4.4	25.8	SSE	157	0.00
27-Mar-20	14.6	26.9	2.9	16.3	East	89	0.00
28-Mar-20	19.7	28.5	4.9	18.8	NE	44	0.00
29-Mar-20	21.1	30.0	2.3	32.5	NNE	24	0.00
30-Mar-20	15.5	24.4	5.6	30.1	South	176	0.70
31-Mar-20	14.7	26.2	6.6	23.4	ESE	113	0.00



## 5 Data Log

Sample	Result Received
Hi Volume Samples	15-04-2020
TEOM	28-04-2020
Dust Deposition	24-04-2020
Vents & Bag House	9-04-2020
Water	19-03-2020
Blast vibration and overpressure	1-04-2020
Weather	1-04-2020
Date posted to web site	18-05-2020

## 6 Correction Log

Nil corrections.