

Rasp Mine  
Monthly Environmental Monitoring Report  
March 2022



## 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 MOD9 December 2021) apply to air quality monitoring:

### Long Term Criteria for Particulate Matter

Pollutant	Averaging Period	Criterion
Total solid particles (TSP)	Annual	90 $\mu\text{g}/\text{m}^3$
Particulate matter < 10 $\mu\text{m}$ (PM <sub>10</sub> )	Annual	25 $\mu\text{g}/\text{m}^3$

### Short Term Criterion for Particulate Matter

Pollutant	Averaging Period	Criterion
Particulate matter < 10 $\mu\text{m}$ (PM <sub>10</sub> )	24 hour	50 $\mu\text{g}/\text{m}^3$

### Long Term Criteria for Deposited Dust

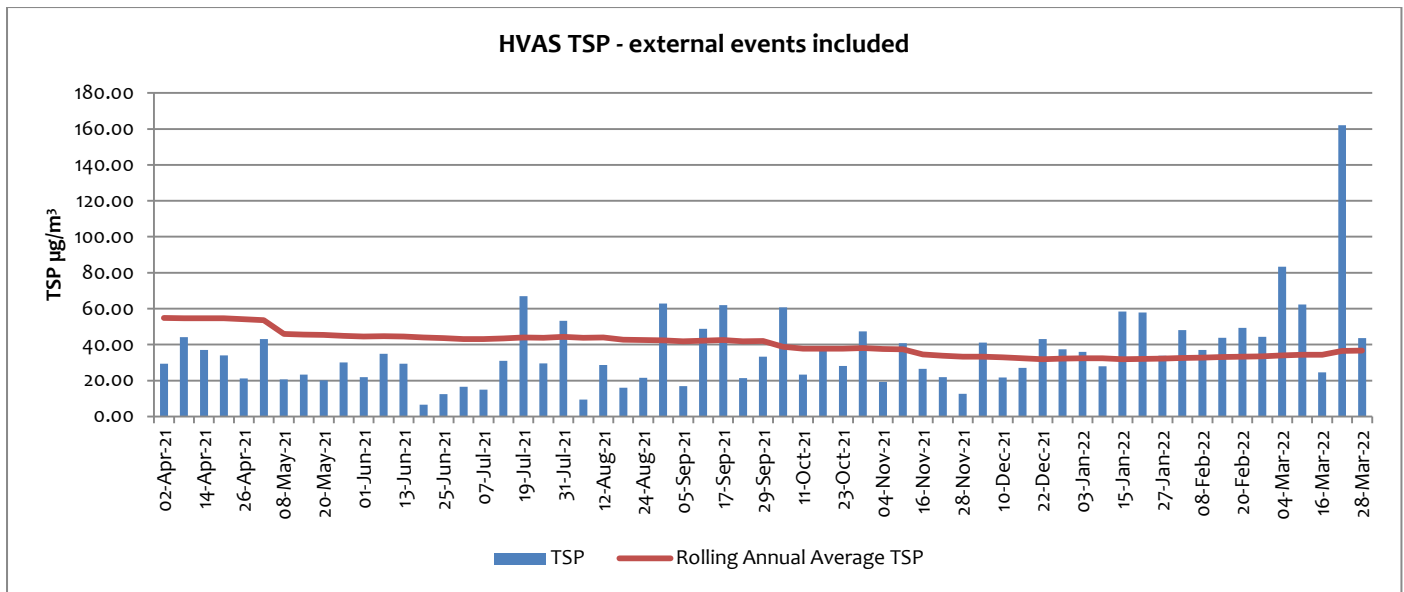
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m <sup>2</sup> /month	4 g/m <sup>2</sup> /month

### 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 2022*

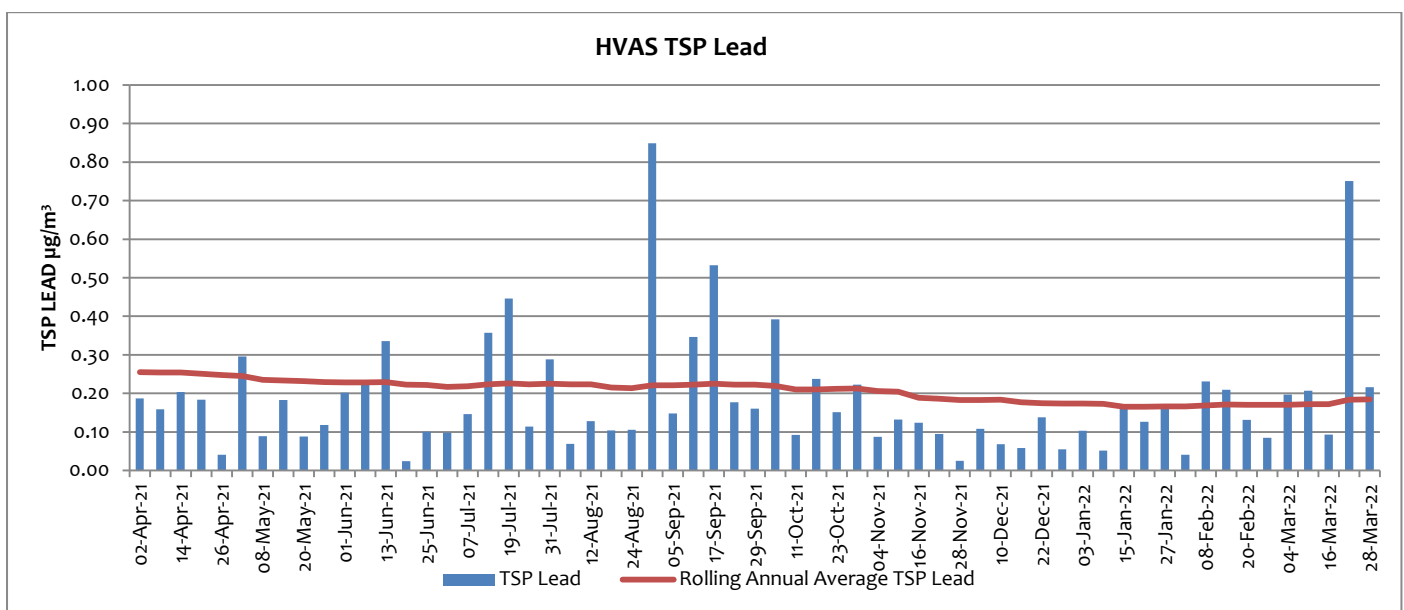
DATE	TSP ( $\mu\text{g}/\text{m}^3$ )	Lead ( $\mu\text{g}/\text{m}^3$ )
04-Mar-22	83.40	0.20
10-Mar-22	62.40	0.21
16-Mar-22	24.60	0.09
22-Mar-22	162.00	0.75
28-Mar-22	43.60	0.22



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.

TSP dust results at HVAS were high for the month of March compared to previous months. There were elevated TSP levels of 83.40  $\mu\text{g}/\text{m}^3$  on 4 March and 162.00  $\mu\text{g}/\text{m}^3$  on 22 March when winds were predominantly from the SW. The contribution of dust on 4 March was due to dust storms which were recorded by other units. As HVAS1 is on the southern boundary of the site and the wind was from the SW on 22 March, the sources of dust were likely from off-site. The annual rolling average for TSP at this location is 36.75  $\mu\text{g}/\text{m}^3$  at the end of March, which whilst higher than previous months, is significantly lower than the average at the beginning of April 2021 which was 54.84  $\mu\text{g}/\text{m}^3$ .

The annual rolling average for TSP is determined using data with extreme dust events included.



TSP Lead dust results at HVAS were slightly higher in the month of March compared to previous months. There were elevated TSP Lead levels of 0.75  $\mu\text{g}/\text{m}^3$  on 22 March when winds were predominantly from the SW so the source was



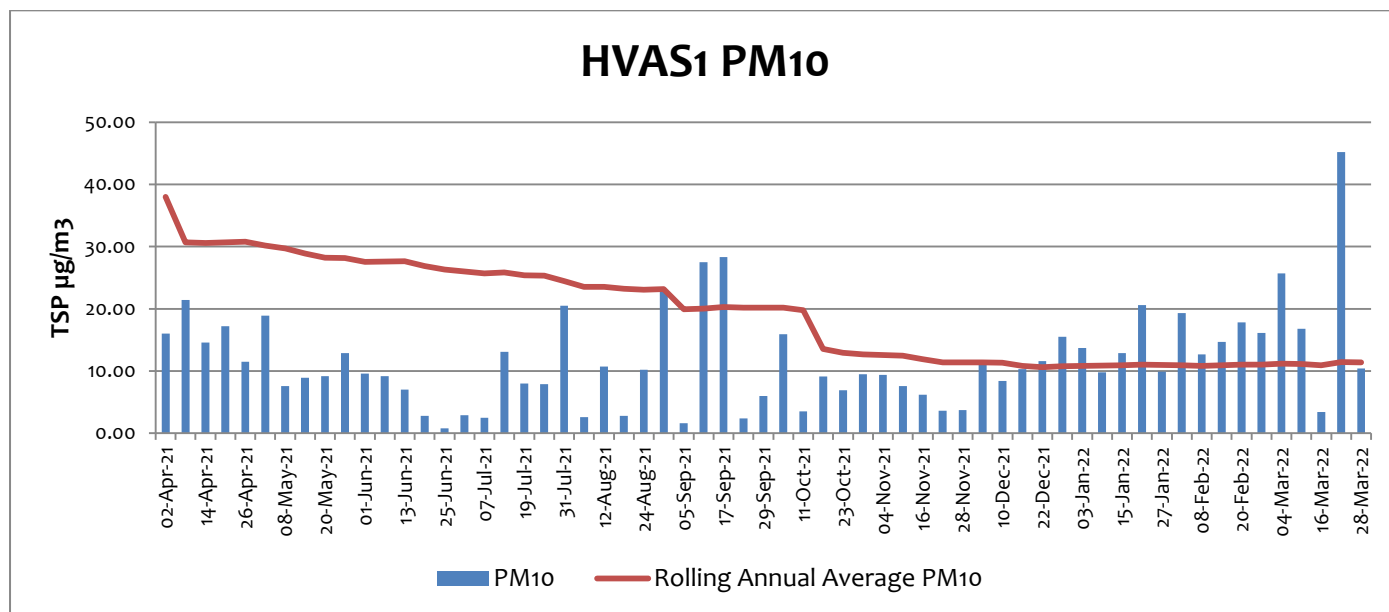
likely off-site. The rolling annual average for TSP Lead in March 2022 was  $0.18 \mu\text{g}/\text{m}^3$  which is lower than the rolling annual average of  $0.26 \mu\text{g}/\text{m}^3$  for TSP Lead in April 2021.

Additional dust suppressant will be applied to trafficked and free areas which can contribute to dust lift-off. Water carts currently apply water to trafficked surfaces in these areas.

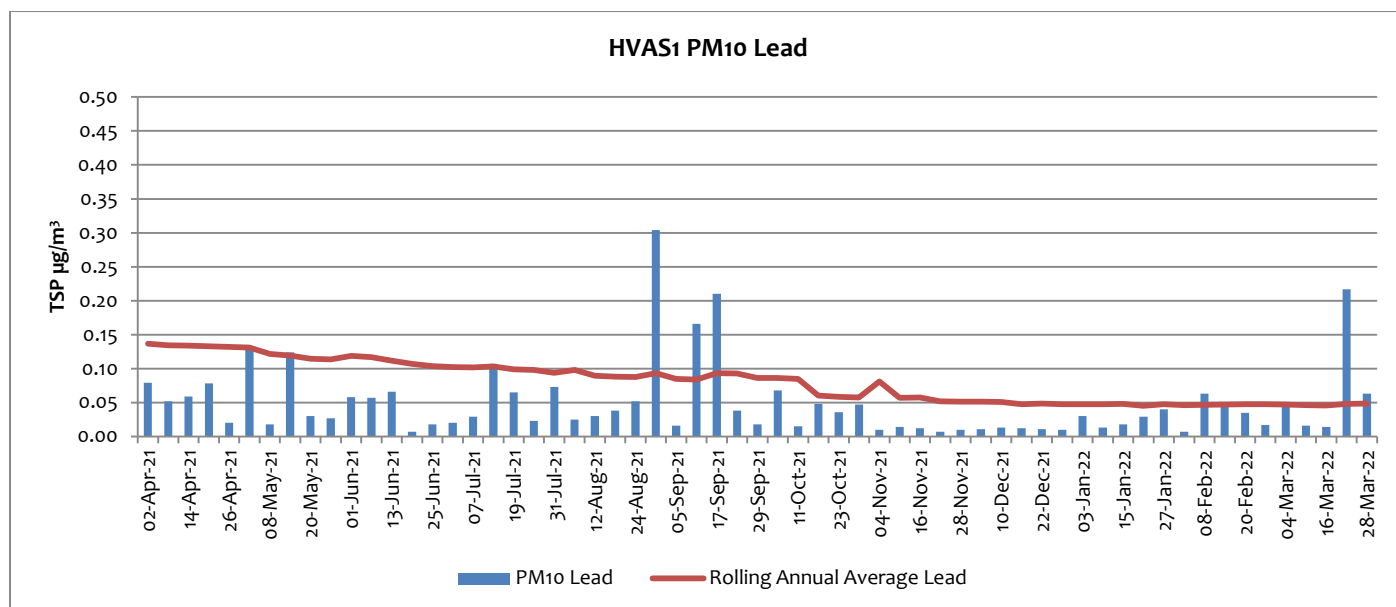
#### HVAS1 (EPL11) - Silver Tank (On Site) Results for March 2022

DATE	PM <sub>10</sub> ( $\mu\text{g}/\text{m}^3$ )	PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ )
04-Mar-22	25.70	0.05
10-Mar-22	16.80	0.02
16-Mar-22	3.40	0.01
22-Mar-22	45.20	0.22
28-Mar-22	10.40	0.06

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.



PM<sub>10</sub> dust results at HVAS1 were elevated in the month of March compared to previous months. There were elevated PM<sub>10</sub> dust levels of  $45.20 \mu\text{g}/\text{m}^3$  on 22 March and  $25.70 \mu\text{g}/\text{m}^3$  on 4 March when winds were predominantly from the SW. The contribution of dust on 4 March was due to dust storms which were recorded by other units. As HVAS1 is on the southern boundary of the site and the wind was from the SW on 22 March, the sources of dust were likely from off-site. The annual rolling average for PM<sub>10</sub> dust at this location is  $11.4 \mu\text{g}/\text{m}^3$  at the end of March 2022, significantly lower than the average at the beginning of April 2021 which was  $38.0 \mu\text{g}/\text{m}^3$ . External and extreme dust events are recorded in measurements.



PM<sub>10</sub> Lead dust results at HVAS1 were slightly higher in the month of March compared to previous months. The high Lead result of 22 March may have been influenced by site activities such as the Kintore Pit haul road although the wind was from the SW and much of the contribution was likely from off-site. The rolling annual average for PM<sub>10</sub> Lead in March was 0.05 µg/m<sup>3</sup>, down from 0.14 µg/m<sup>3</sup> in April 2021.

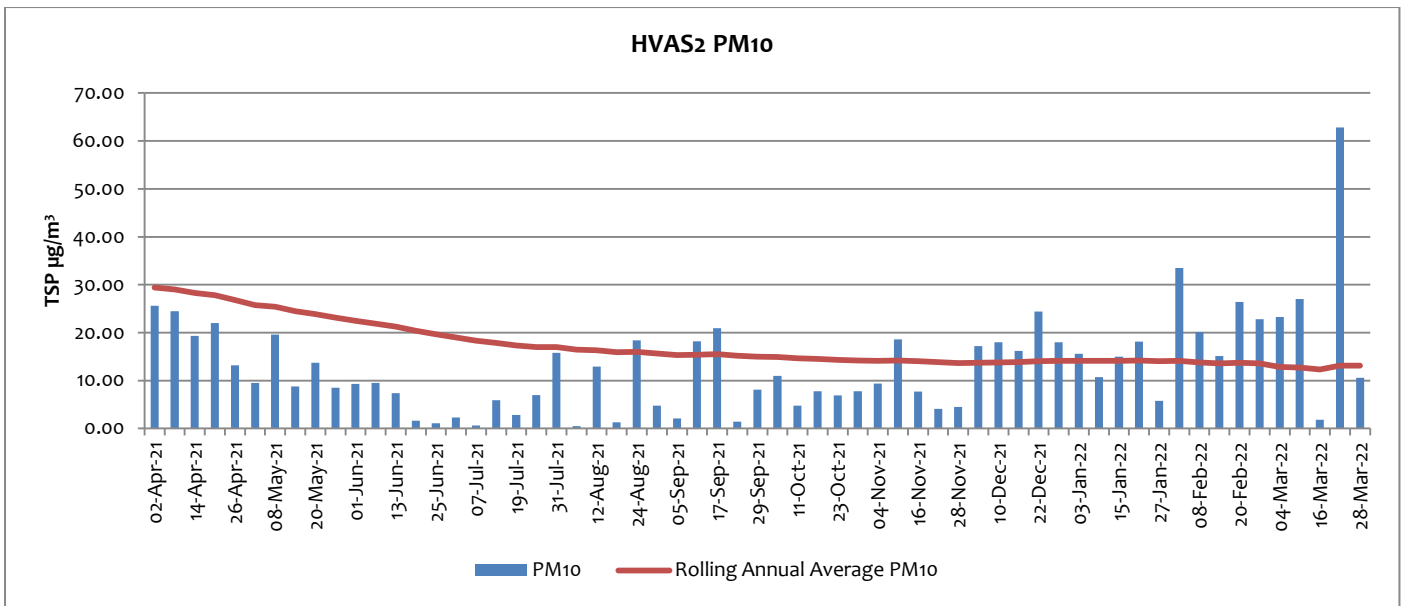
#### ***HVAS 2 (EPL12) - Blackwood Pit (On Site) Results for March 2022***

DATE	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>10</sub> Lead (µg/m <sup>3</sup> )
04-Mar-22	23.30	0.16
10-Mar-22	27.00	0.06
16-Mar-22	1.80	0.008
22-Mar-22	62.80	0.41
28-Mar-22	10.60	0.07

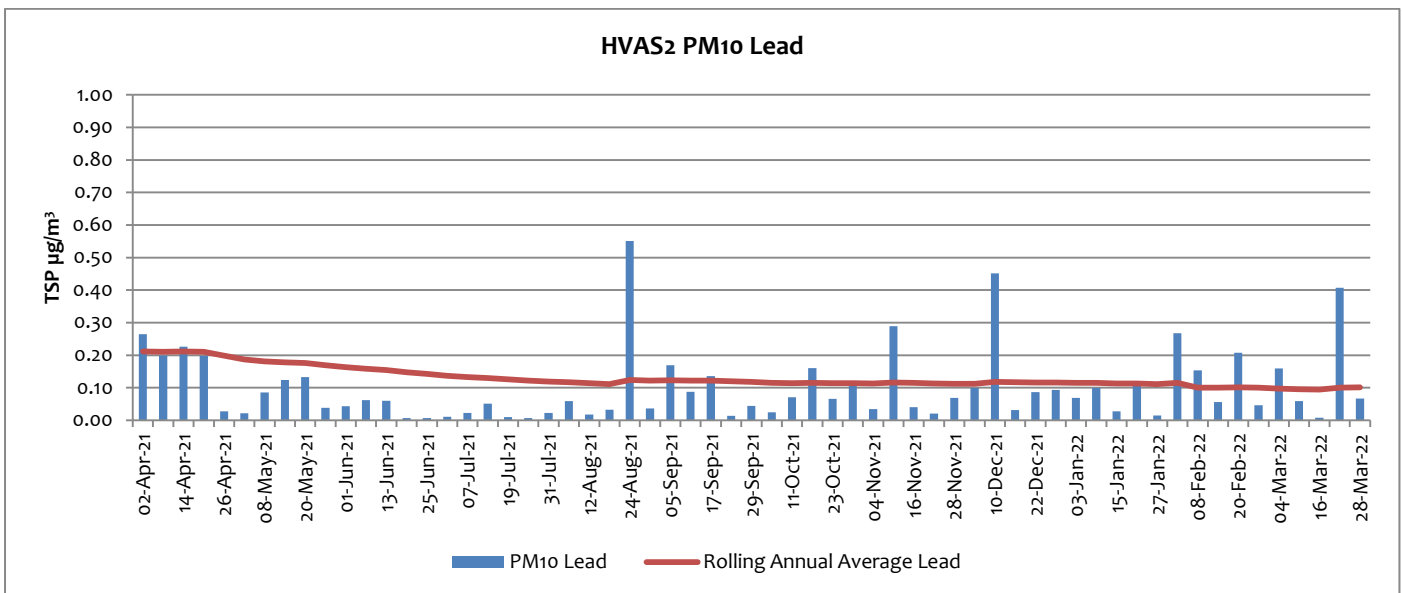
HVAS2 (EPL12) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

PM<sub>10</sub> levels at HVAS2 were elevated in March. Winds were predominantly from the South suggesting there may have been contribution of dust from Blackwoods TSF2, although quarry activities to the South maybe have been a contributing factor. The high dust result of 22 March may have been due to regional dust storms as high dust levels were recorded across all monitoring units. The contribution of dust on 4 March was due to dust storms which were recorded by other units. The tailings surface is kept damp where possible using tailings discharge while the TSF2 surface sprinkler system is being installed. The annual rolling average for PM<sub>10</sub> dust at this location is 13.14 µg/m<sup>3</sup> at the end of March 2022, down from 29.40 µg/m<sup>3</sup> in April 2021.

The annual rolling average for PM<sub>10</sub> dust is determined using data with extreme dust events included.



There were elevated PM<sub>10</sub> lead levels in March when winds were predominantly from the South which would suggest there may have been contribution of Lead from Blackwoods TSF2. The TSF2 sprinkler system is currently under construction and will enable better dust control on the TSF. The rolling annual average for PM<sub>10</sub> Lead in March 2022 was 0.10  $\mu\text{g}/\text{m}^3$  down from 0.27  $\mu\text{g}/\text{m}^3$  in April 2021.



## HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for March 2022

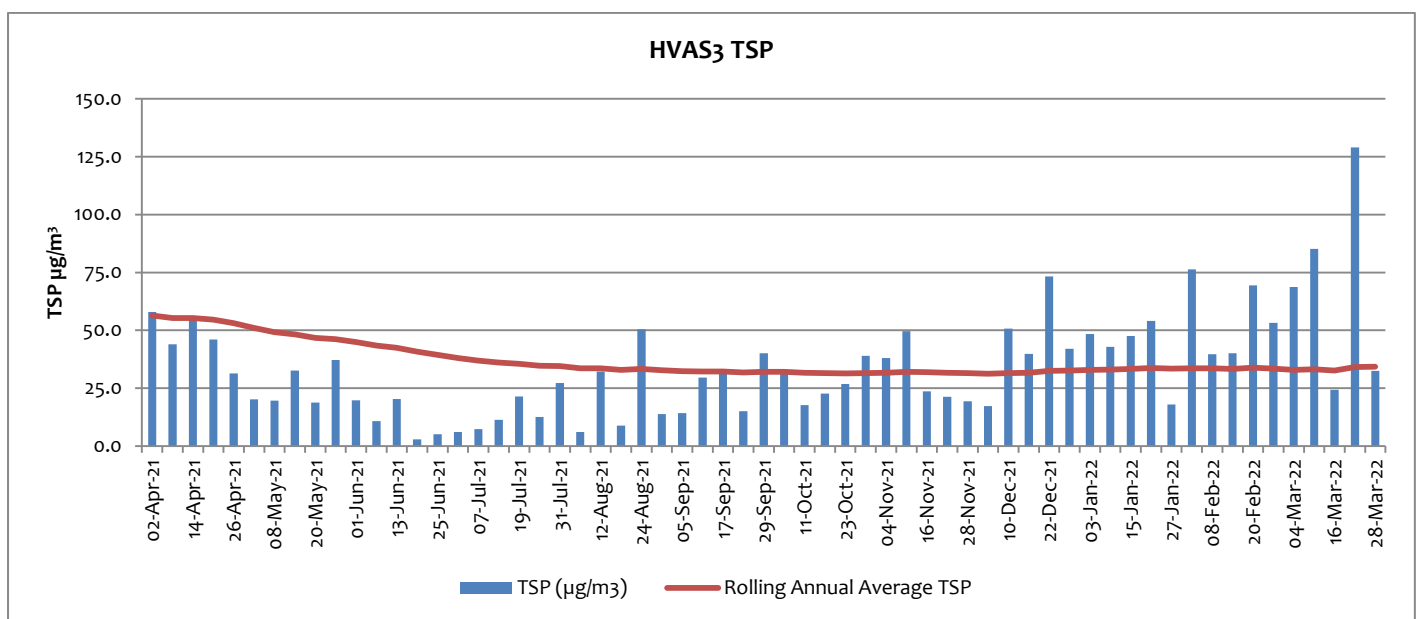
DATE	TSP ( $\mu\text{g}/\text{m}^3$ )	Lead ( $\mu\text{g}/\text{m}^3$ )
04-Mar-22	68.70	0.55
10-Mar-22	85.20	0.39
16-Mar-22	24.30	0.06
22-Mar-22	129.00	1.20
28-Mar-22	32.50	0.18



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.

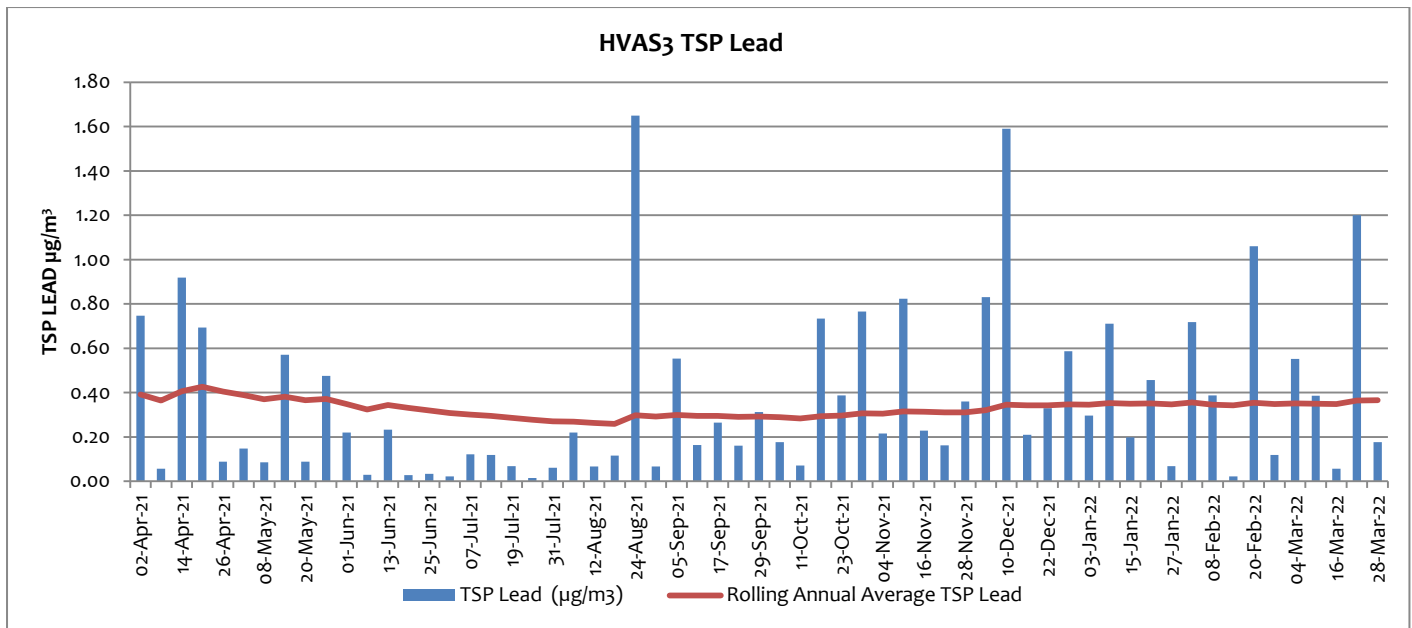
TSP levels were elevated on three occasions in March with results of  $129.00 \mu\text{g}/\text{m}^3$  on 22 March,  $85.2 \mu\text{g}/\text{m}^3$  on 10 March and  $68.70 \mu\text{g}/\text{m}^3$  on 4 March; winds on these days were predominately from the SW, South and SW respectively. High dust levels were recorded in all monitors on 4 and 22 March suggesting there may have been high regional dust levels. On 10 March the wind was from the South and Lead levels were elevated so there was likely contribution from the TSF. The annual rolling average for TSP dust at this location is  $34.31 \mu\text{g}/\text{m}^3$  at the end of March 2022, elevated from previous months but down from the level of  $56.35 \mu\text{g}/\text{m}^3$  in April 2021.

The annual rolling average for TSP is determined using data with extreme dust events included.



TSP Lead levels were elevated in March with results of  $1.20 \mu\text{g}/\text{m}^3$  on 22 March and  $0.55 \mu\text{g}/\text{m}^3$  on 4 March when winds were from the SW which suggests there may have been contribution of dust from Blackwoods TSF2. The TSF2 sprinkler system is currently under construction and will enable better dust control on the TSF. The rolling annual average for TSP Lead in March was  $0.36 \mu\text{g}/\text{m}^3$ , down from  $0.36 \mu\text{g}/\text{m}^3$  in April 2021.





## 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 are designed to operate continuously and sample for particulate matter less than 10 microns ( $\text{PM}_{10}$ ) in size.

TEOM2 was temporarily decommissioned in 19 June 2019 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  $\text{PM}_{10}$  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 criteria apply at TEOM1 and TEOM2, with two criteria listed for  $\text{PM}_{10}$ , a 24 hour average criteria of  $50 \mu\text{g}/\text{m}^3$  and an annual average criteria of  $25 \mu\text{g}/\text{m}^3$ .

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 March 2022***

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-22	7.7	Y	SC	Y
2-Mar-22	7.6	Y	6.2	Y
3-Mar-22	7.4	Y	11.5	Y
4-Mar-22	33.5	Y	33.1	Y
5-Mar-22	15.9	Y	21.3	Y
6-Mar-22	16.5	Y	21.9	Y
7-Mar-22	20.8	Y	21.1	Y
8-Mar-22	43.7	Y	66.0	Y
9-Mar-22	26.1	Y	37.1	Y
10-Mar-22	18.5	Y	34.0	Y
11-Mar-22	18.5	Y	31.0	Y
12-Mar-22	15.0	Y	26.8	Y
13-Mar-22	18.3	Y	20.5	Y
14-Mar-22	38.8	Y	40.1	Y
15-Mar-22	SC	Y	6.9	Y
16-Mar-22	SC	Y	4.0	Y
17-Mar-22	8.3	Y	8.9	Y
18-Mar-22	10.2	Y	13.8	Y
19-Mar-22	8.6	Y	9.7	Y
20-Mar-22	11.5	Y	11.9	Y
21-Mar-22	14.7	Y	12.2	Y
22-Mar-22	41.2	Y	78.8	Y
23-Mar-22	11.1	Y	15.2	Y
24-Mar-22	13.3	Y	15.9	Y
25-Mar-22	17.3	Y	25.6	Y
26-Mar-22	16.1	Y	17.1	Y
27-Mar-22	9.5	Y	7.7	Y
28-Mar-22	11.7	Y	15.7	Y
29-Mar-22	11.5	Y	13.9	Y
30-Mar-22	20.4	Y	28.8	Y
31-Mar-22	75.8	Y	174.0	Y

NS – no sample collected. SC – sample collected.

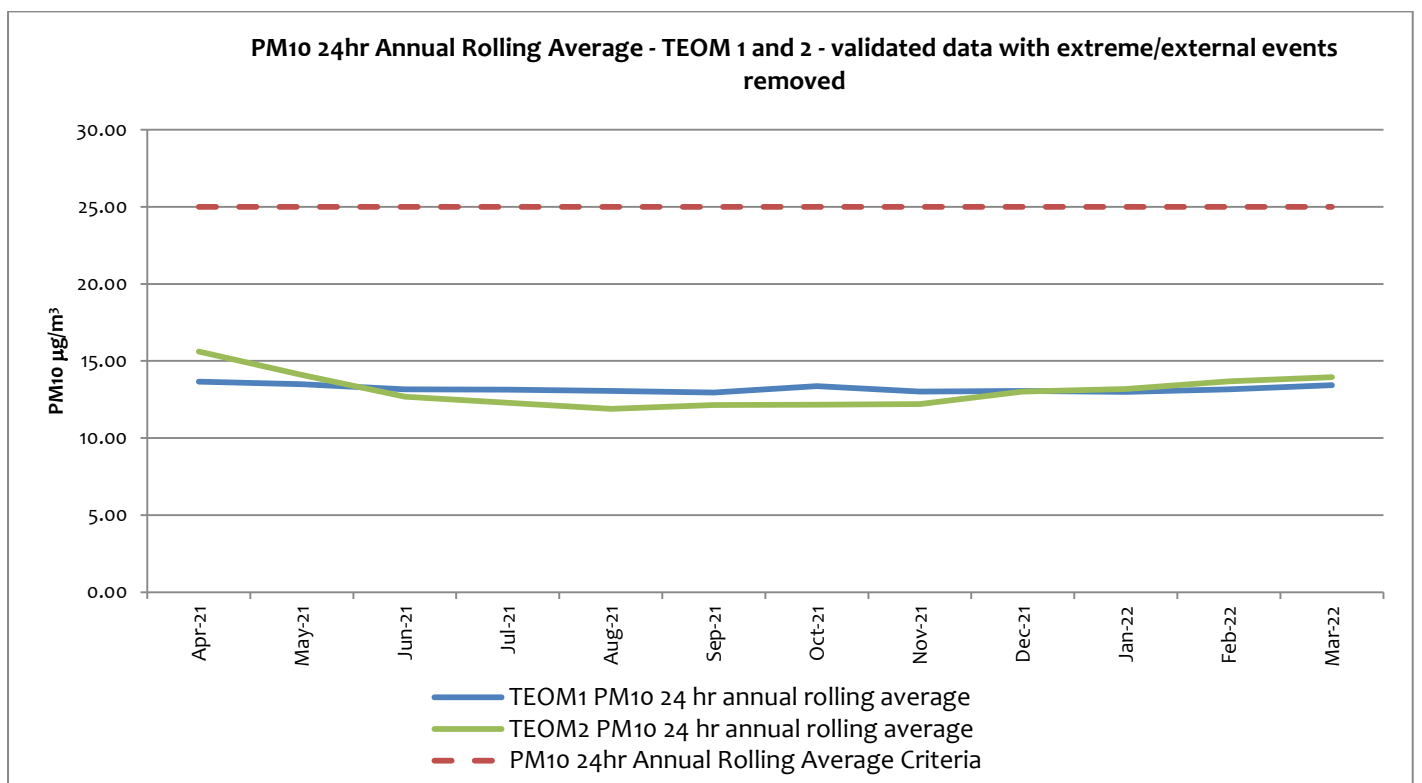
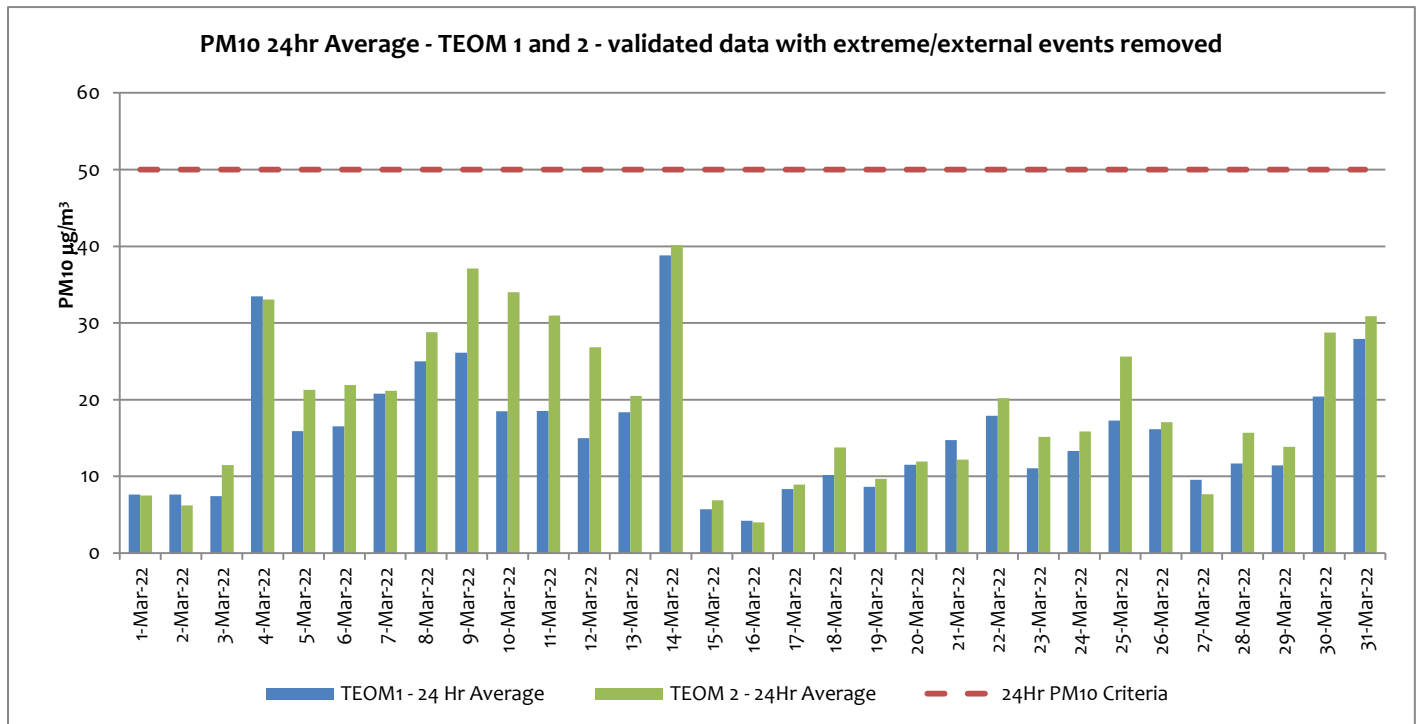
PM<sub>10</sub> dust levels at both TEOM units were low in the month of March although TEOM2 recorded average daily results above 50  $\mu\text{g}/\text{m}^3$  on 8 March, 22 March and at both TEOM sites on 31 March due to dust storms. Power to TEOM2 (and much of central Broken Hill) was lost during a storm on the 28 February and not reinstated until 10am the following morning resulting in low data capture for 1 March. Power to TEOM1 was interrupted intermittently during a storm on the 15 March, resulting in stabilisation of the instrument on over the 15 and 16 March resulting in low data capture for these days.



The rolling annual average for PM<sub>10</sub> with external dust events removed at TEOM1 for the period is 13.43  $\mu\text{g}/\text{m}^3$ , down from 13.67  $\mu\text{g}/\text{m}^3$  at the end of April 2021.

The rolling annual average for PM<sub>10</sub> with external dust events removed at TEOM2 for the period is 13.95  $\mu\text{g}/\text{m}^3$ , down from 15.61  $\mu\text{g}/\text{m}^3$  at the end of April 2021.

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

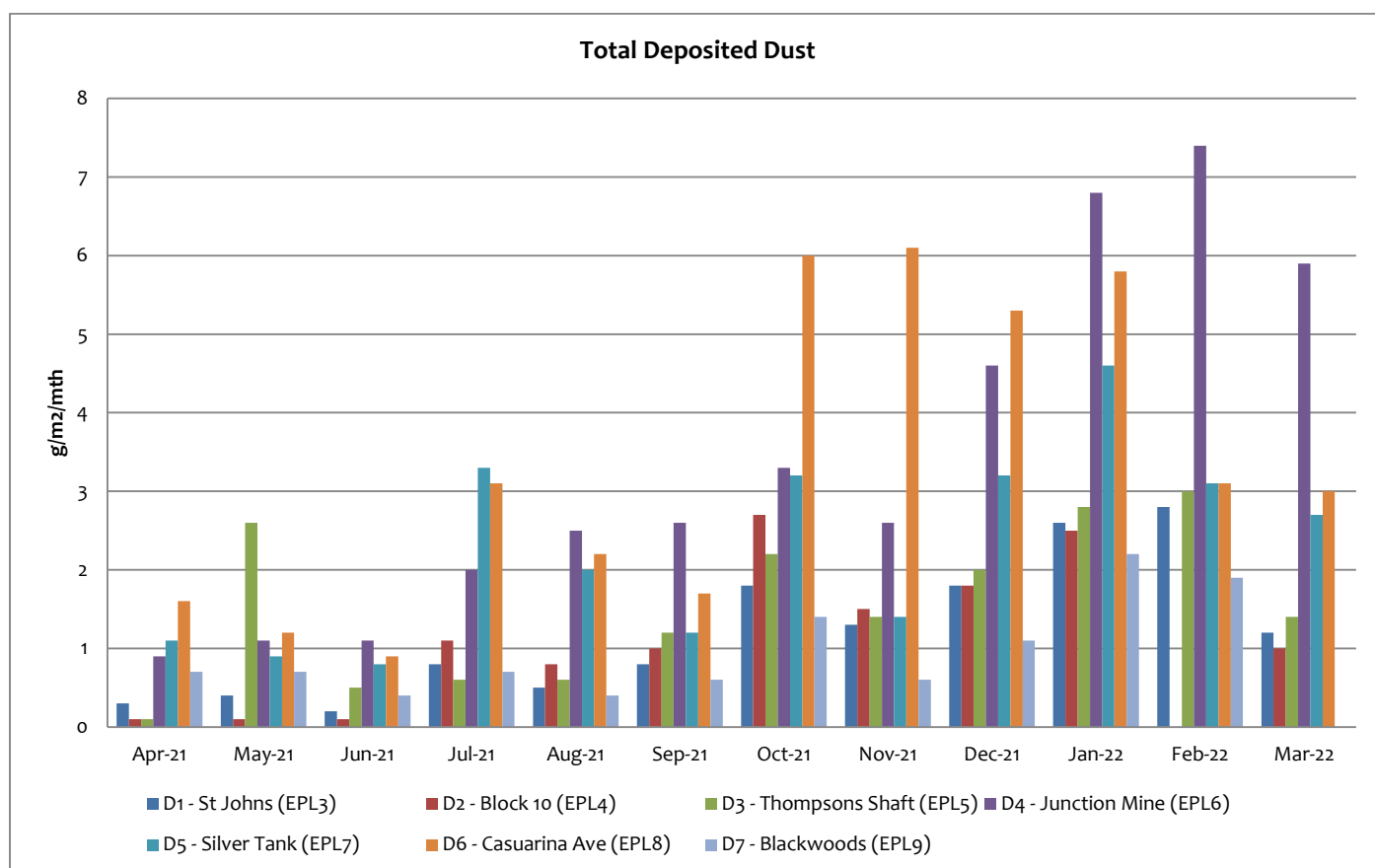
There are seven dust deposition gauges to measure ambient air quality at the Rasp Mine – D1 to D7. D1 and D6 are located off-site, D1 near the St Johns training facility north of the Rasp Mine and D6 in Casuarina Avenue south of the Rasp Mine. D2 to D5 and D7 are located on the mine lease in various 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.

#### *Dust Deposition Gauges D1 (EPL3) to D7 (EPL9) – Results for March 2022*

A sample was collected for D7 (Blackwoods) however the flask was damaged in transit to the lab, voiding the sample for the month of March.

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)
March 2022	1.2	1.0	1.4	5.9	2.7	3.0	NS
Background (2010)	4.0	3.1	4.3	5.7	-1	5.8	-1
Compliant?	Y	N/A	N/A	N	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



The dust levels recorded in Dust Gauges in March 2022 were elevated and are likely due to activities at the site and dust storms during the month. The highest dust levels were recorded in the D4 Junction Mine gauge. The predominant wind direction for March was from the South as shown in the Wind Rose in Section 4.

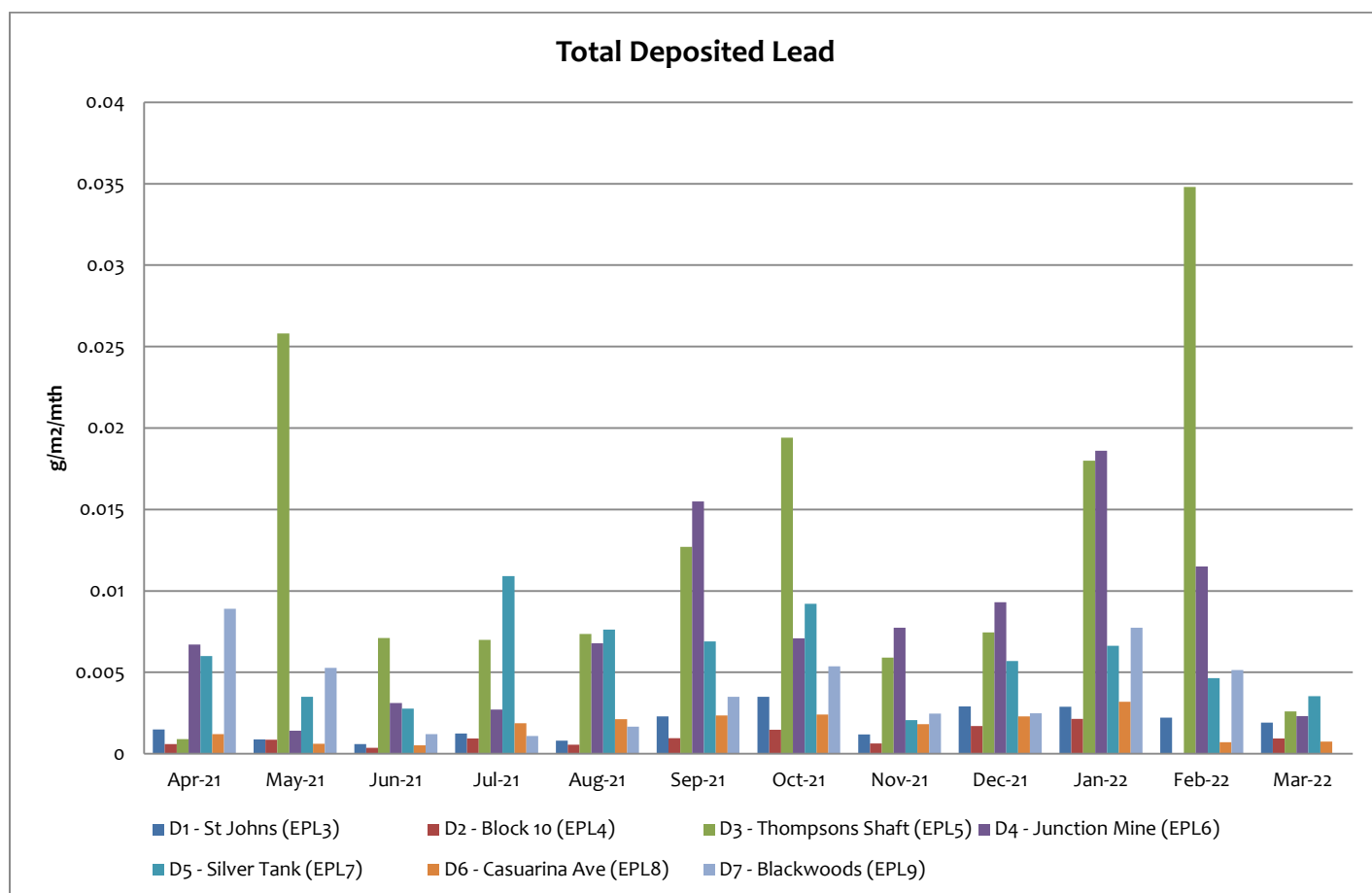


Total Deposited Lead (g/m <sup>2</sup> /Month)							
Sample Period	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
March 2022	0.00192	0.00093	0.0026	0.00232	0.00353	0.000738	NS
Background (2010)	0.0034	0.005	0.005	0.006	- <sup>1</sup>	0.004	- <sup>1</sup>

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

There are no guidelines for deposited lead dust. Lead results in March 2022 were highest in the D5 Silver Tank and D3 Thompsons Shaft gauges but low compared to previous months. Site activities around the Haul Road and Rail Loadout may contribute to elevated Lead levels at D3 Thompsons Shaft and D4 Junction Mine but only minimally as the concentrate containers are loaded with concentrate and their lids are fitted in an enclosed shed. In addition the haul road and loading areas alongside the train is a concrete pad which is regularly swept and watered. A water cart will also attend to the haul road between the concentrate loading shed at the Mill and the rail loadout area when concentrate containers are being transported on site.

Dust suppressant is applied to unsealed areas of the site and roads are frequently watered using water carts in an attempt to control dust emissions. The waste dump adjacent to the rail loadout is treated with dust suppressant to capture any loose dust accumulating on the lower batters and on the upper surface.





## 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 (TSP)	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 2022

Monitoring was conducted at the Primary Vent Shaft (EPL1) and the Crusher Baghouse (EPL2) on 22 February 2022. The monitoring results for the Primary Vent Shaft and the Crusher Baghouse from this monitoring event were below the licence criteria.

	Unit	Primary Vent Shaft (EPL1)	Crusher Baghouse (EPL2)
Dry Gas Density	Kg/m <sup>3</sup>	1.29	1.29
Moisture	%	2.80	1.83
Molecular weight of stack gases	g/m <sup>3</sup>	1,288	1,287
Temperature	°C	20	17.5
Nitrogen Oxides	mg/m <sup>3</sup>	<2.05	NA
Volatile Organic	mg/m <sup>3</sup>	0.757	NA



Compounds			
Total Suspended particles	mg/m <sup>3</sup>	2.81	3.35
Type 1 and Type 2	mg/m <sup>3</sup>	0.0669	0.141
Velocity	m/sec	13.9	24.1
Volumetric Flowrate	m <sup>3</sup> /sec	222	10.02

## 2 Noise

### 2.1 Blasting (Vibration and Overpressure)

There are five compliance vibration monitors at various locations measuring for vibration and overpressure from blast firings. These include V1 to V5 which are located on-site and off-site. 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, Italo (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 2022***

#### **Total Blasts:**

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 2.23 per week over the previous calendar year
- The number of Development blasts averaged 25.79 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 for the annual period = 0%
- Percentage of production blasts over 5 mm/sec for the annual period = 0.9%

#### **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 = 0%

The percentage of production blasts in the Western Mineralisation and Main Lodes producing vibration at monitors over 5 mm/sec for the 12-month period is 0.9%.

There have been two production blasts in Block 7 over the last 12 months, neither of which produced vibration at monitors over 3 mm/sec. No complaints have been received about Block 7 blasts.





## 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 during two consecutive night-time periods from 3 to 5 May 2021.

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 December. 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 2022

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)	No pumping													
Kintore Pit (EPL54)	5.56	14700	15400	6	6800	2180	528	363	1930	3.03	2.86	418	940	0.1



### *Groundwater Bores (EPL37 - EPL52) Results for March 2022*

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)	4.77	13200	13500	<1	6270	1730	372	586	1820	0.34	0.331	364	290	<0.05
GW02 (EPL38)	Bore Dry													
GW03 (EPL39)	5.48	14800	13700	2	5060	3180	577	344	2160	0.797	0.693	350	288	32.6
GW04 (EPL40)	6.39	14200	12200	233	4862	2760	564	487	2150	0.0417	0.035	32.6	13.1	<0.05
GW05 (EPL41)	5.76	14000	12900	39	5330	2680	545	442	2140	1.56	0.388	286	218	<0.05
GW06 (EPL42)	5.9	14600	138000	60	5590	2850	531	472	2180	1.2	0.047	297	180	<0.05
GW07 (EPL43)	6.03	12100	10400	28	4690	1860	519	297	1720	2.95	0.054	222	226	<0.05
GW08 (EPL44)	5.71	9170	9200	4	3710	1420	601	196	1220	1.85	0.582	212	404	<0.05
GW09 (EPL45)	6.25	12000	10500	72	4490	2290	606	479	1520	1.71	<0.001	121	166	<0.05
GW10 (EPL46)	6.21	14900	13000	135	5070	3150	641	533	2170	1.2	<0.001	118	141	<0.05
GW11 (EPL47)	6	8850	7800	47	3640	1160	331	264	1220	1.76	0.238	82	106	<0.05
GW12 (EPL48)	Bore Dry													
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. Based on historical data, sampling is most likely to be undertaken in October (highest rainfall month as recorded by Bureau of Meteorology) and April.

Surface water monitoring was conducted on 1 March 2022 following 22.3mm of rain on 28 of February and on 16 March 2022 following 85.9mm of rain; results for all locations were similar to those seen following previous events.



### 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 for 1 March 2022

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)
S9B-2 (EPL 33)	Dry													
S31-1 (EPL 29)	5.89	2450	3640	4	1940	56	200	31	76	5.36	1.9	183	625	<0.05
S1A (EPL 32)	6.69	904	687	54	335	69	83	18	56	0.314	0.347	7.72	28.7	<0.05
Upstream (EPL 35)	Dry													
Downstream (EPL 36)	7.37	276	248	77	14	19	12	4	34	0.0001	<0.001	<0.001	0.008	<0.05
S49 (EPL 31)	6.53	896	818	10	484	9	118	11	17	0.479	0.262	23	63.4	<0.05
S44 (EPL 30)	7.02	977	807	24	416	76	10	18	73	0.36	0.212	6.43	18.4	<0.05
Horwood Dam (EPL 34)	6.58	9410	12000	10	5190	2300	491	415	1940	6.93	3.12	297	336	<0.05



### Surface Water Monitoring Results for 16 March 2022

Sample Point	pH	EC ( $\mu\text{S}/\text{cm}^2$ )	TDS (mg/l)	Alkalinity ( $\text{CaCO}_3$ ) (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)
<b>S9B-2 (EPL 33)</b>	7.15	395	332	9	142	16	50	4	15	0.0848	0.334	1.28	6.32	<0.05
<b>S31-1 (EPL 29)</b>	6.51	1520	1710	2	609	28	128	16	44	1.92	1.89	67.8	201	<0.05
<b>S1A (EPL 32)</b>	6.61	1200	1240	5	618	32	116	19	36	0.879	1.16	28.6	112	<0.05
<b>Upstream (EPL 35)</b>	6.69	2410	2510	24	1200	158	265	44	151	1.38	0.08	33.3	172	<0.05
<b>Downstream (EPL 36)</b>	7.76	400	318	81	32	54	26	7	42	0.0022	0.002	0.004	0.204	<0.05
<b>S49 (EPL 31)</b>	6.89	512	464	7	226	5	60	6	9	0.23	0.155	8.72	29.7	<0.05
<b>S44 (EPL 30)</b>	7.1	549	442	17	188	30	60	7	30	0.186	0.286	2.02	6.69	<0.05
<b>Horwood Dam (EPL 34)</b>	5.39	4500	4010	1	1810	630	287	110	553	2.11	2	75.8	116	<0.05

## 4 Weather Data

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

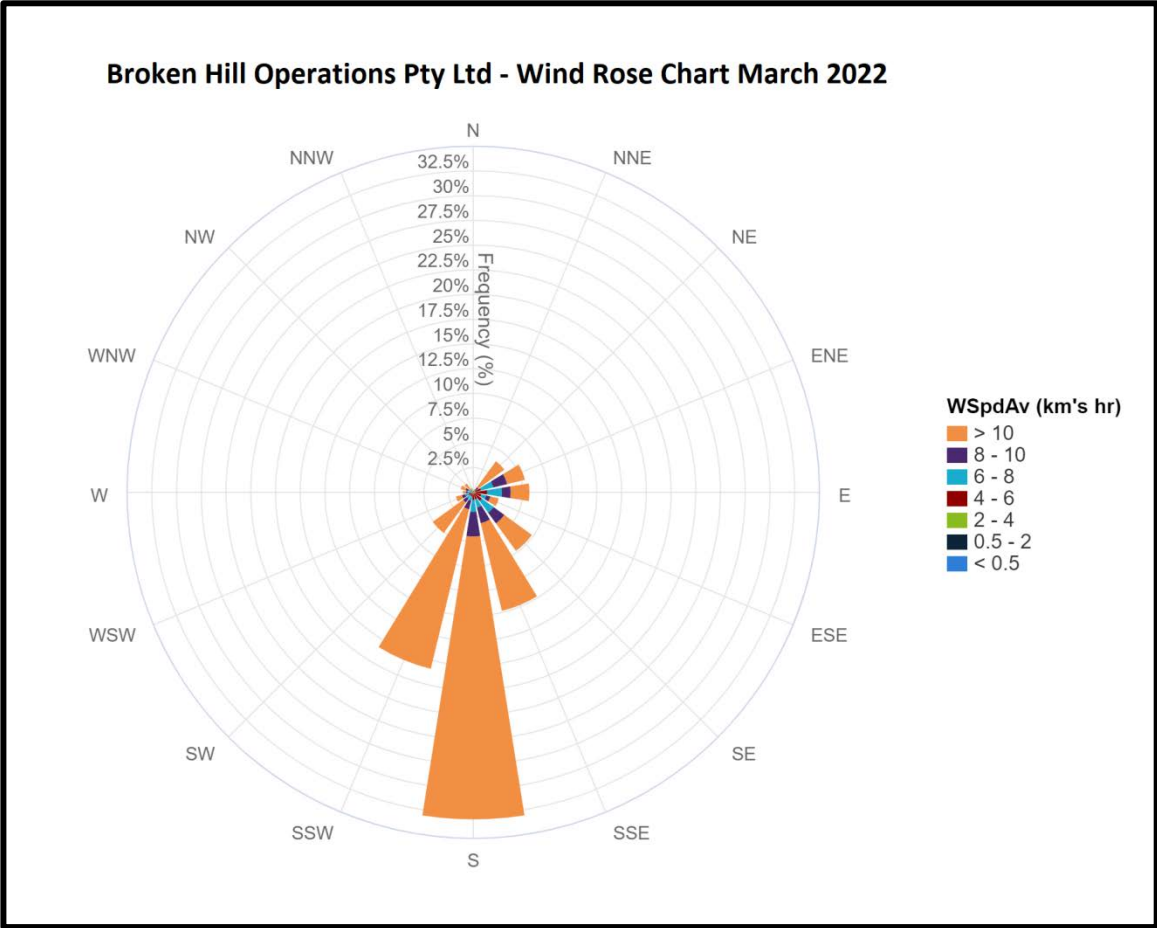
The following parameters are required to be recorded each month as listed in the EPL 12559:

### 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 wind rose provided below indicates the predominant wind directions for the month of March was from the South.





## Rasp Mine Monthly Environment Monitoring Report

### Weather Data Summary for March 2022

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Mar-22	17.8	27.3	1.4	20.4	NE	110	0.00
02-Mar-22	17.9	27.7	3.0	23.3	SSE	166	0.00
03-Mar-22	20.1	29.4	2.8	28.2	ESE	144	0.00
04-Mar-22	23.4	33.0	3.2	30.2	ESE	85	0.00
05-Mar-22	16.6	24.9	8.1	38.8	SSW	194	0.00
06-Mar-22	14.8	24.6	8.7	43.0	South	183	0.00
07-Mar-22	15.6	27.2	8.6	30.6	SSE	184	0.00
08-Mar-22	15.3	24.7	13.4	44.8	South	180	0.00
09-Mar-22	13.1	24.4	9.8	37.3	South	173	0.00
10-Mar-22	13.6	24.3	6.5	34.9	ENE	172	0.00
11-Mar-22	14.4	25.6	6.9	26.5	ENE	155	0.00
12-Mar-22	15.6	28.2	5.9	27.9	NE	159	0.00
13-Mar-22	19.3	30.8	0.5	22.3	South	125	0.00
14-Mar-22	19.3	26.6	7.3	41.6	SSE	101	2.50
15-Mar-22	16.6	26.9	4.0	36.2	SSE	77	83.40
16-Mar-22	16.1	28.2	2.4	20.0	ESE	90	0.00
17-Mar-22	21.7	31.6	3.3	27.9	ENE	110	0.00
18-Mar-22	19.4	29.0	0.9	21.4	NE	152	0.00
19-Mar-22	20.4	29.4	3.0	15.5	NW	130	0.00
20-Mar-22	24.2	31.3	1.7	17.3	South	74	0.00
21-Mar-22	24.7	33.7	2.2	24.9	South	175	0.00
22-Mar-22	21.2	32.7	1.6	44.6	South	249	0.00
23-Mar-22	15.6	22.0	7.2	34.3	SSE	164	0.00
24-Mar-22	12.7	22.9	5.3	22.3	SSE	171	0.00
25-Mar-22	11.8	22.0	6.8	25.8	SSE	175	0.00
26-Mar-22	13.2	26.8	6.5	25.8	SSE	147	0.00
27-Mar-22	17.7	26.0	4.3	24.0	South	78	0.00
28-Mar-22	20.4	28.0	0.6	24.9	NE	163	0.00
29-Mar-22	16.2	27.0	3.9	25.2	NNE	187	0.00
30-Mar-22	13.0	20.0	7.7	36.4	South	192	0.00
31-Mar-22	11.6	20.1	10.0	51.5	ESE	171	0.00

Rainfall of 85.9mm in March 2022.



## 5 Data Log

Sample	Result Received
Hi Volume Samples	20-04-2022
TEOM	28-04-2022
Dust Deposition	28-03-2022
Vents & Bag House	15-03-2022
Noise	14-05-2021
Water	12-04-2022
Blast vibration and overpressure	12-04-2022
Weather	26-04-2022
Date posted to web site	18-05-2022

## 6 Correction Log

No corrections.