

Rasp Mine  
Monthly Environmental Monitoring Report  
May 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

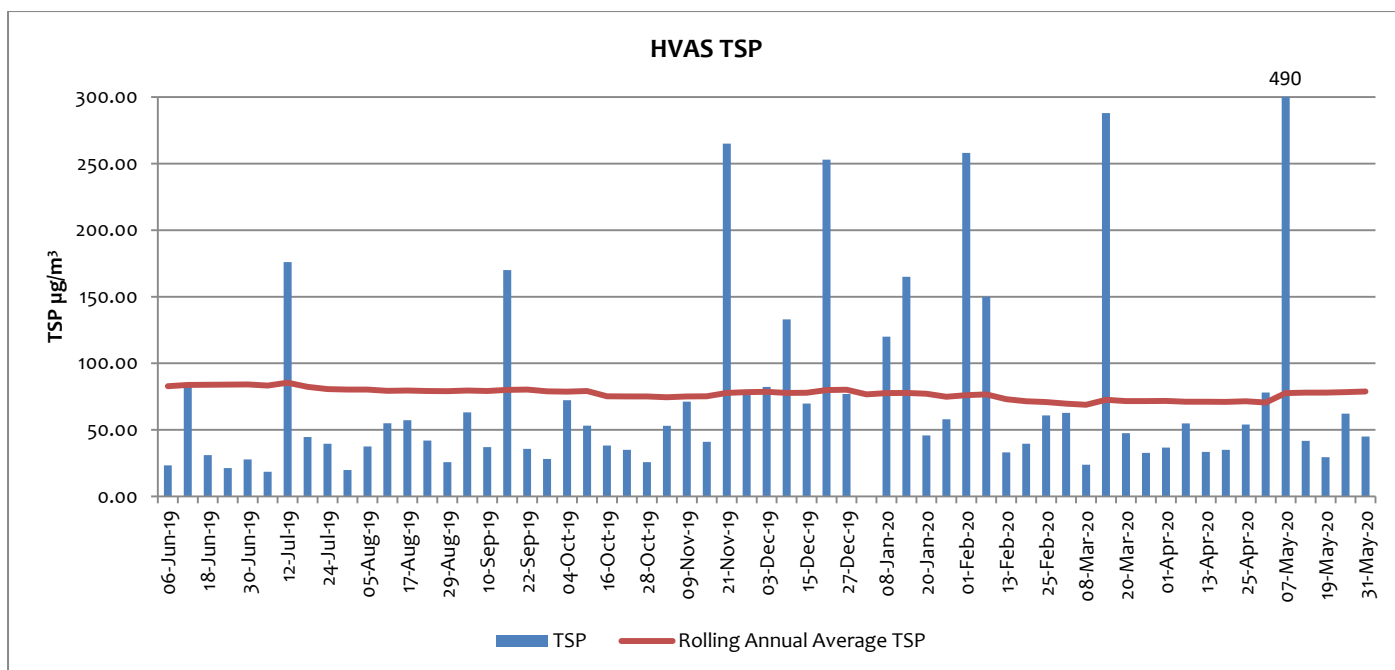
| Pollutant      | Averaging Period | Maximum Project Contribution | Maximum Total Deposited Dust Level |
|----------------|------------------|------------------------------|------------------------------------|
| Deposited dust | Annual           | 2 g/m <sup>2</sup> /month    | 4 g/m <sup>2</sup> /month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

### 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 May***

| DATE      | TSP<br>(µg/m <sup>3</sup> ) | Lead<br>(µg/m <sup>3</sup> ) |
|-----------|-----------------------------|------------------------------|
| 1-05-2020 | 78.00                       | 0.43                         |
| 7-05-2020 | 490.00                      | 0.69                         |
| 13-5-2020 | 41.70                       | 0.32                         |
| 19-5-2020 | 29.50                       | 0.16                         |
| 25-5-2020 | 62.20                       | 0.29                         |
| 31-5-2020 | 45.00                       | 0.24                         |



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.

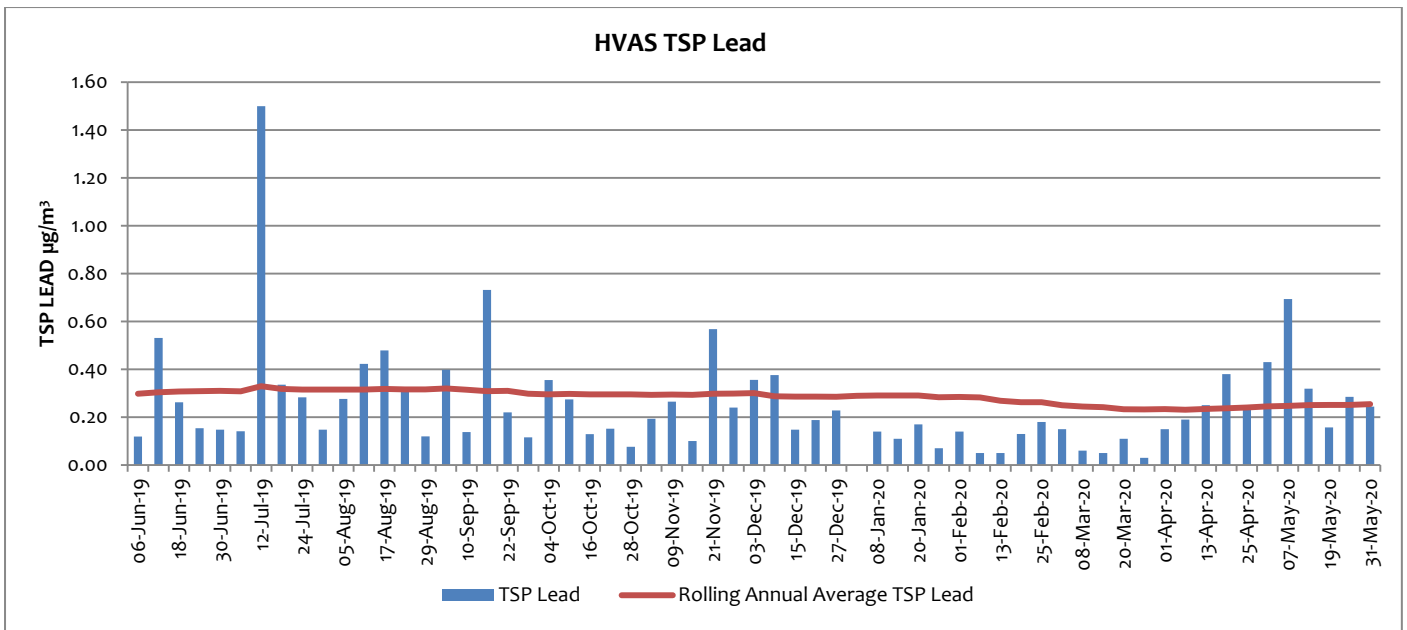
Results for May were low but for the one dust storm event captured during the 7 May monitoring event which was also recorded at other dust monitors. The annual rolling average for TSP at this location has fallen slightly over the 12 months to 78.87 µg/m<sup>3</sup> at the end of May after starting at 82.76 µg/m<sup>3</sup> in June 2019.

The rolling annual average for TSP to May 2020 is below the long term annual average criteria of 90 µg/m<sup>3</sup>. 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.

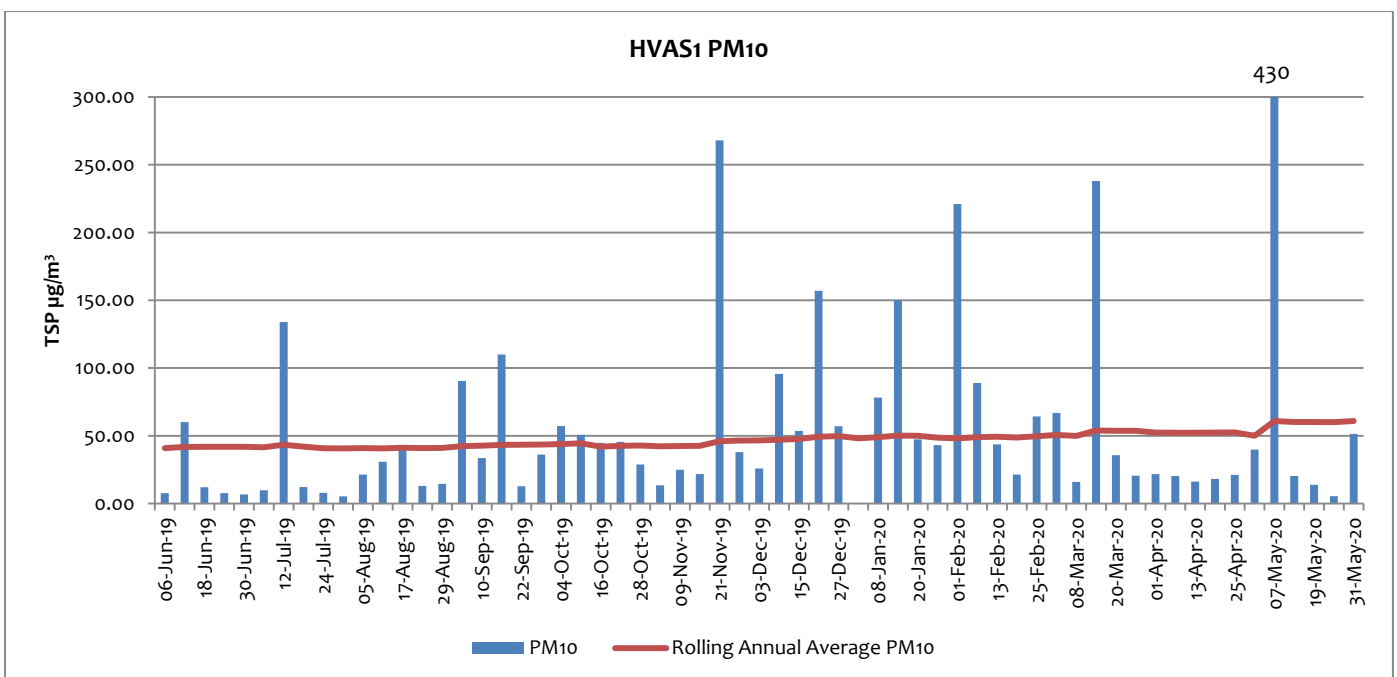
There was one elevated TSP Lead level of 0.69 µg/m<sup>3</sup> recorded on 7 May. The wind was from the NW during the dust storm and from the South at other times of the day. It is likely that both onsite and offsite sources contributed to the Lead collected at this location.

The rolling annual average for TSP Lead at 31 May was 0.25 µg/m<sup>3</sup>, down from the June 2019 rolling average result of 0.30 µg/m<sup>3</sup>.



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

| DATE      | PM <sub>10</sub><br>(µg/m <sup>3</sup> ) | PM <sub>10</sub> Lead<br>(µg/m <sup>3</sup> ) |
|-----------|--|---|
| 1-05-2020 | 39.80                                    | 0.19  |
| 7-05-2020 | 430.00                                   | 0.60  |
| 13-5-2020 | 20.30                                    | 0.13  |
| 19-5-2020 | 13.80                                    | 0.06  |
| 25-5-2020 | 5.50                                     | 0.02  |
| 31-5-2020 | 51.40                                    | 0.18  |

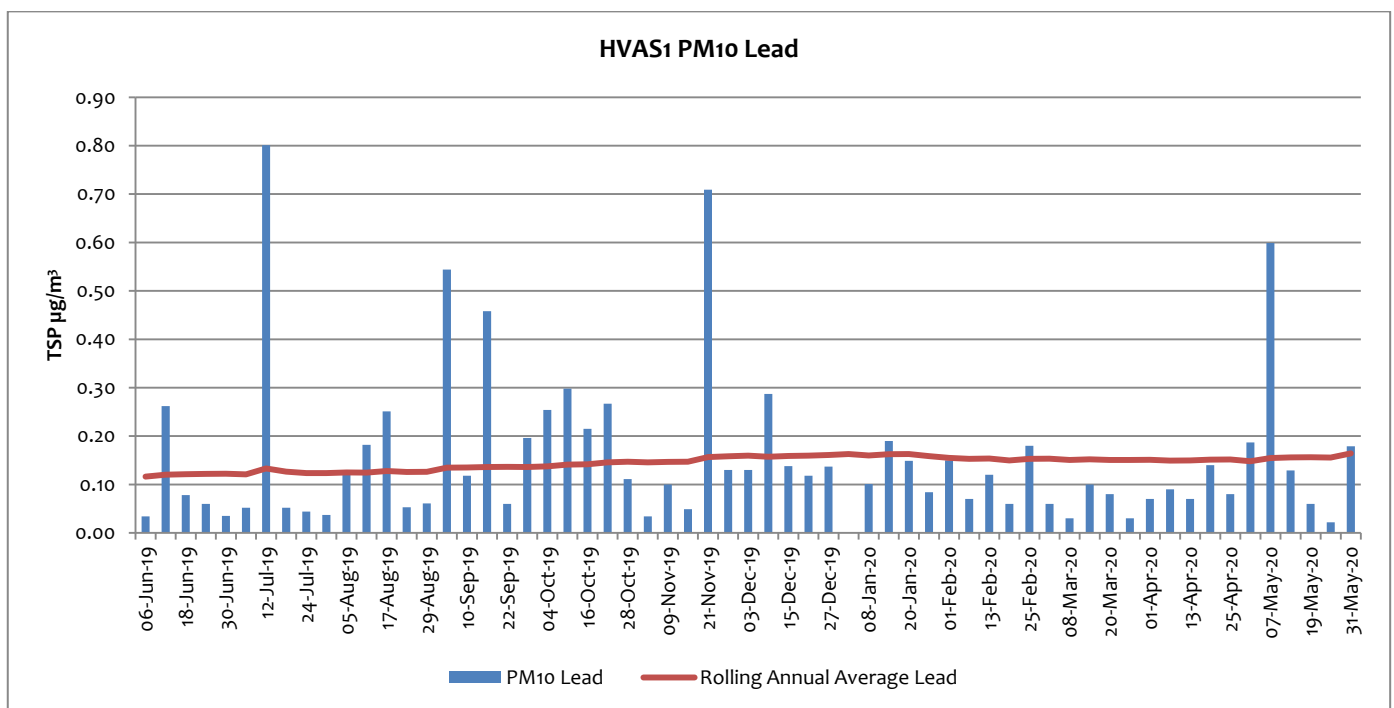




HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location.

Results for May were low but for the one dust storm event captured during the 7 May monitoring event which was also recorded at other dust monitors. The annual rolling average for PM<sub>10</sub> at this location has risen over the 12 months from 41.0 µg/m<sup>3</sup> in June 2019 to 60.9 µg/m<sup>3</sup> in May 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 0.16 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 was an elevated PM<sub>10</sub> lead dust level of 0.60 µg/m<sup>3</sup> recorded on 7 May. The wind was from the NW during the dust storm and from the South at other times of the day. It is likely that both onsite and offsite sources contributed to the Lead collected at this location.



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

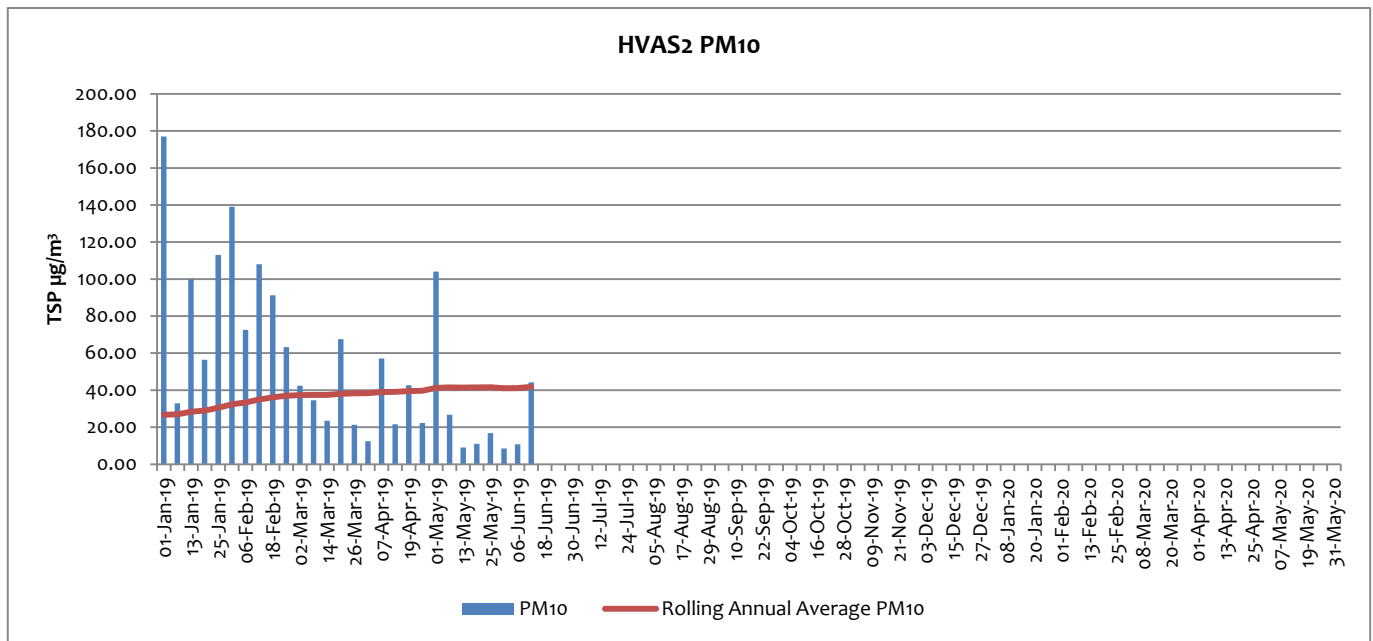
| DATE      | PM <sub>10</sub> (µg/m <sup>3</sup> ) | PM <sub>10</sub> Lead (µg/m <sup>3</sup> ) |
|-----------|---------------------------------------|--|
| 1-05-2020 | NS                                    | NS   |
| 7-05-2020 | NS                                    | NS   |
| 13-5-2020 | NS                                    | NS   |
| 19-5-2020 | NS                                    | NS   |
| 25-5-2020 | NS                                    | NS   |



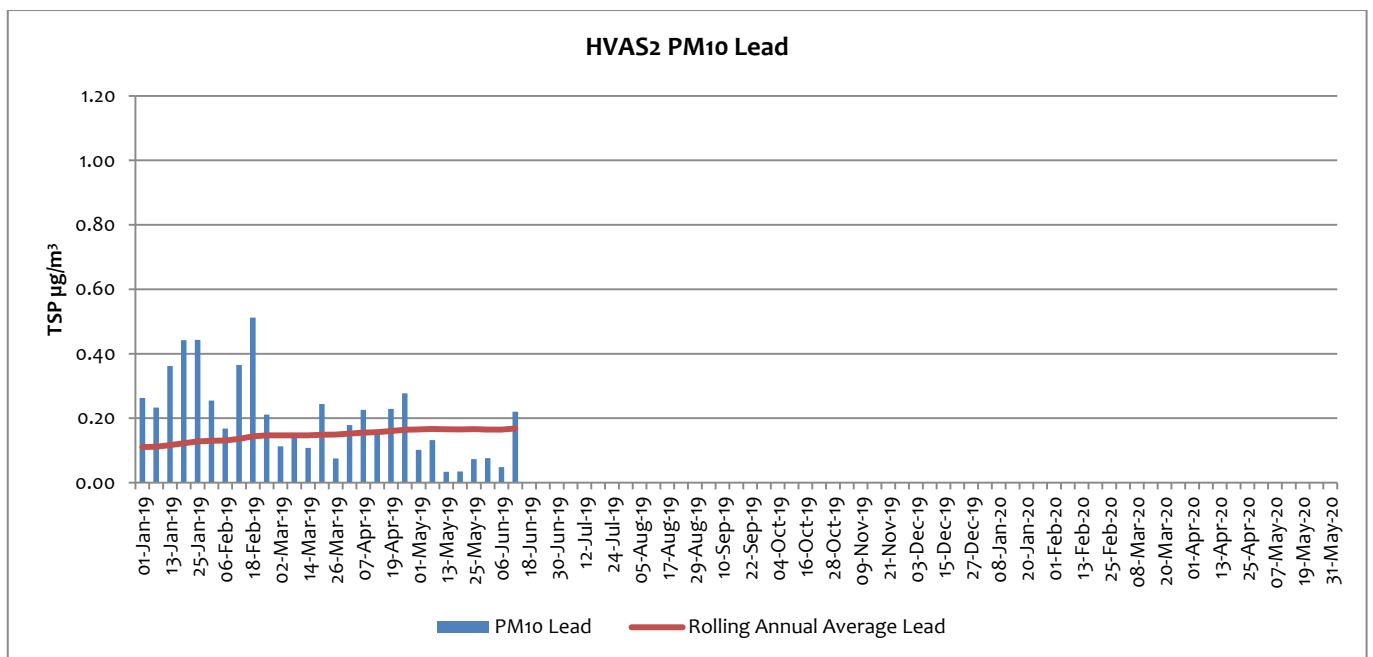
|           |    |    |
|-----------|----|----|
| 31-5-2020 | NS | NS |
|-----------|----|----|

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.



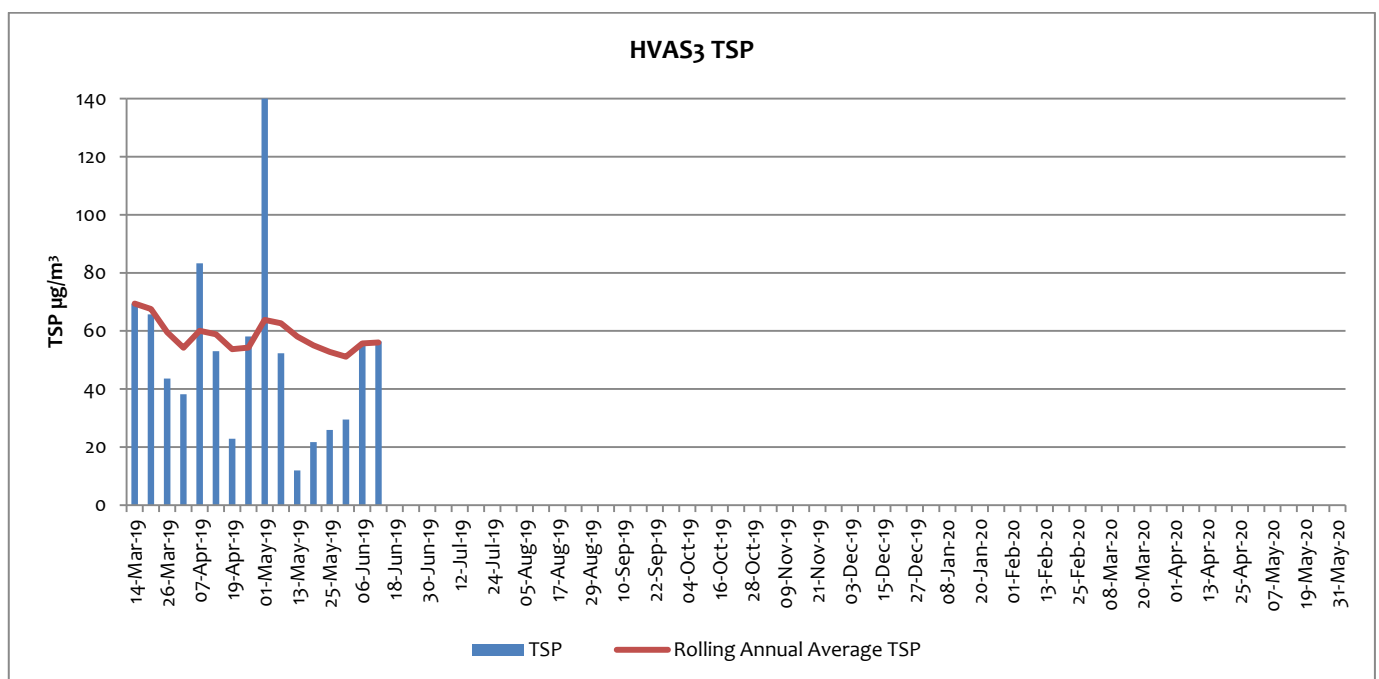


**HVAS 3 (EPL57) - Blackwood Pit (On Site) Results for May**

| DATE      | TSP ( $\mu\text{g}/\text{m}^3$ ) | PM <sub>10</sub> Lead ( $\mu\text{g}/\text{m}^3$ ) |
|-----------|----------------------------------|--|
| 1-05-2020 | NS                               | NS   |
| 7-05-2020 | NS                               | NS   |
| 13-5-2020 | NS                               | NS   |
| 19-5-2020 | NS                               | NS   |
| 25-5-2020 | NS                               | NS   |
| 31-5-2020 | NS                               | NS   |

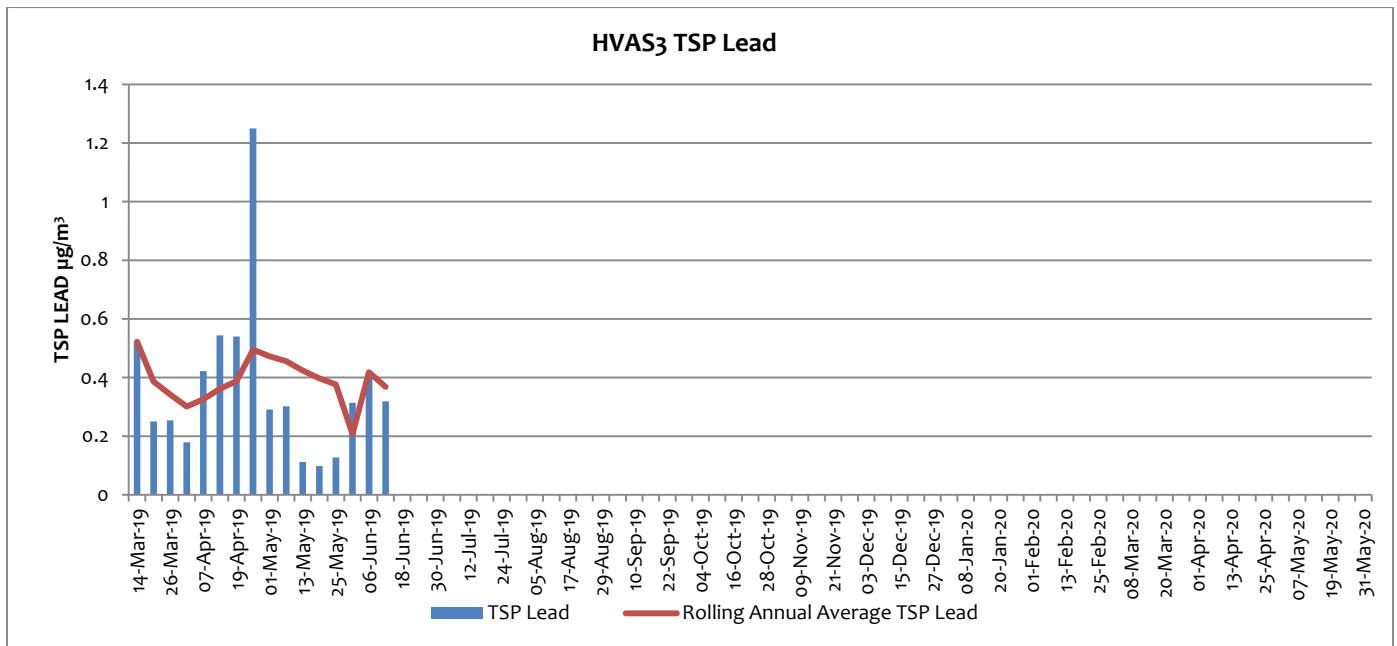
HVAS3 (EPL57) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS3 (EPL57) was included in EPL 12559 on 14 March 2019 to provide for monitoring of TSP Dust on the northern boundary of the site at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



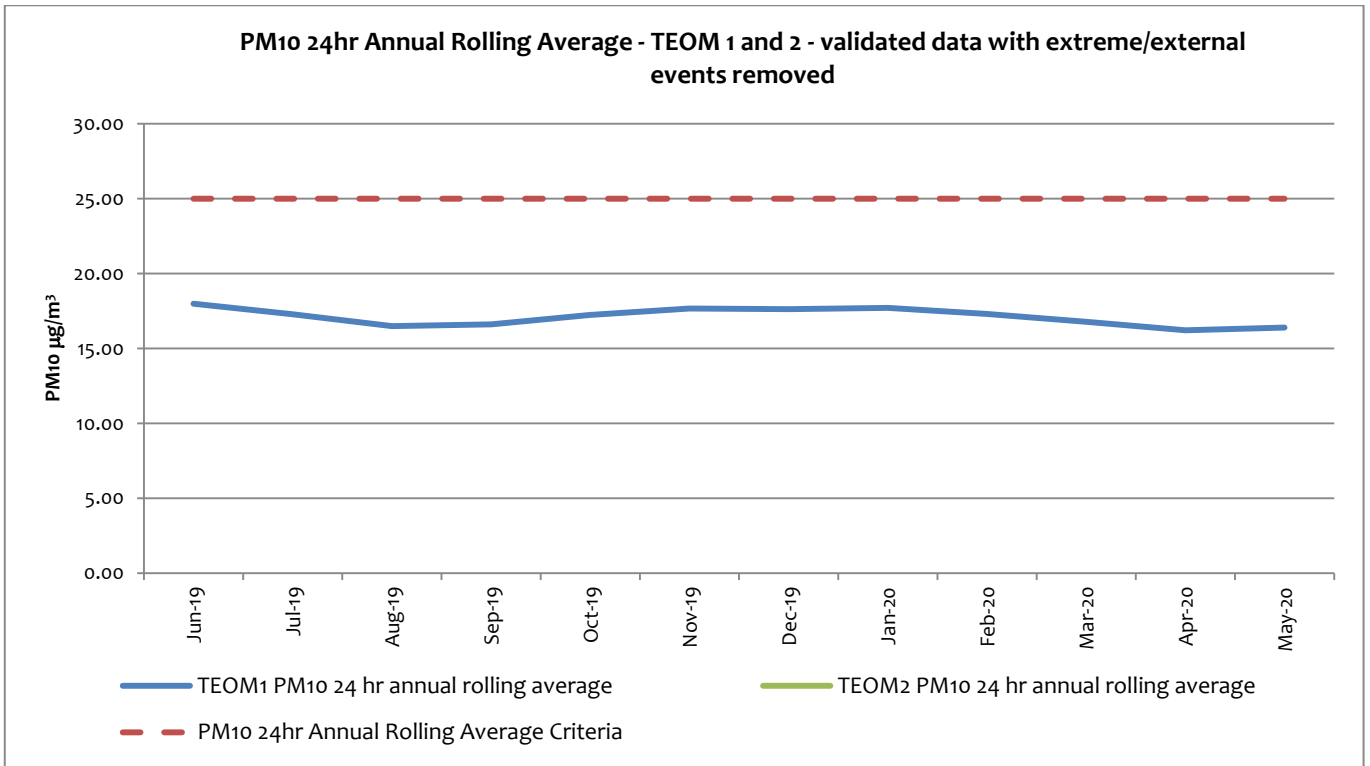
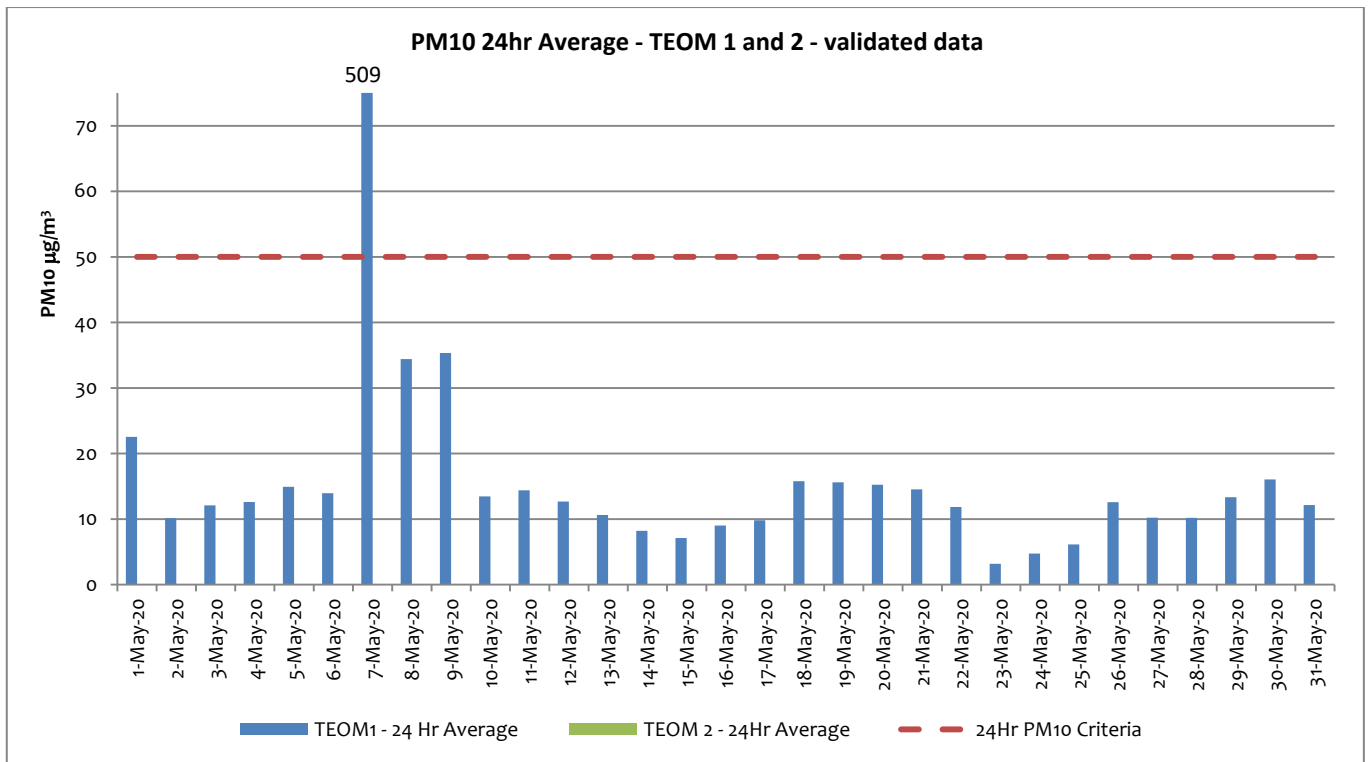
**TEOM1 (EPL13) (Off Site) and TEOM2 (EPL14) (On Site) Validated Results for May**

| Particulate Matter <10 Microns 24Hr Average |  |  |  |  |
|---|--|--|--|--|
| Date  | TEOM 1<br>( $\mu\text{g}/\text{m}^3$ ) | Compliant with<br>50 $\mu\text{g}/\text{m}^3$<br>24hr average? | TEOM 2<br>( $\mu\text{g}/\text{m}^3$ ) | Compliant with<br>50 $\mu\text{g}/\text{m}^3$<br>24hr average? |
| 1-May-20                                    | 22.5                                   | Y  | NS                                     | Y  |
| 2-May-20                                    | 10.1                                   | Y  | NS                                     | Y  |
| 3-May-20                                    | 12.1                                   | Y  | NS                                     | Y  |
| 4-May-20                                    | 12.6                                   | Y  | NS                                     | Y  |
| 5-May-20                                    | 14.9                                   | Y  | NS                                     | Y  |
| 6-May-20                                    | 14.0                                   | Y  | NS                                     | Y  |
| 7-May-20                                    | 509.0                                  | Y  | NS                                     | Y  |
| 8-May-20                                    | 34.4                                   | Y  | NS                                     | Y  |
| 9-May-20                                    | 35.3                                   | Y  | NS                                     | Y  |
| 10-May-20                                   | 13.5                                   | Y  | NS                                     | Y  |
| 11-May-20                                   | 14.4                                   | Y  | NS                                     | Y  |
| 12-May-20                                   | 12.7                                   | Y  | NS                                     | Y  |
| 13-May-20                                   | 10.6                                   | Y  | NS                                     | Y  |
| 14-May-20                                   | 8.2                                    | Y  | NS                                     | Y  |
| 15-May-20                                   | 7.1                                    | Y  | NS                                     | Y  |
| 16-May-20                                   | 9.0                                    | Y  | NS                                     | Y  |
| 17-May-20                                   | 9.8                                    | Y  | NS                                     | Y  |
| 18-May-20                                   | 15.8                                   | Y  | NS                                     | Y  |
| 19-May-20                                   | 15.6                                   | Y  | NS                                     | Y  |
| 20-May-20                                   | 15.2                                   | Y  | NS                                     | Y  |
| 21-May-20                                   | 14.5                                   | Y  | NS                                     | Y  |
| 22-May-20                                   | 11.9                                   | Y  | NS                                     | Y  |
| 23-May-20                                   | 3.2                                    | Y  | NS                                     | Y  |
| 24-May-20                                   | 4.7                                    | Y  | NS                                     | Y  |
| 25-May-20                                   | 6.1                                    | Y  | NS                                     | Y  |
| 26-May-20                                   | 12.6                                   | Y  | NS                                     | Y  |
| 27-May-20                                   | 10.2                                   | Y  | NS                                     | Y  |
| 28-May-20                                   | 10.2                                   | Y  | NS                                     | Y  |
| 29-May-20                                   | 13.3                                   | Y  | NS                                     | Y  |
| 30-May-20                                   | 16.1                                   | Y  | NS                                     | Y  |
| 31-May-20                                   | 12.1                                   | 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. There was one dust storm on 7 May when the 24hr dust level average was 509.0  $\mu\text{g}/\text{m}^3$ . On 7 May the predominant wind direction was from the NW during the dust storm and from the South at other times of the day.

The PM<sub>10</sub> 24-hour rolling annual average for data with external elevated dust events removed at May 2020 is 16.40  $\mu\text{g}/\text{m}^3$  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  $\mu\text{g}/\text{m}^3$ .





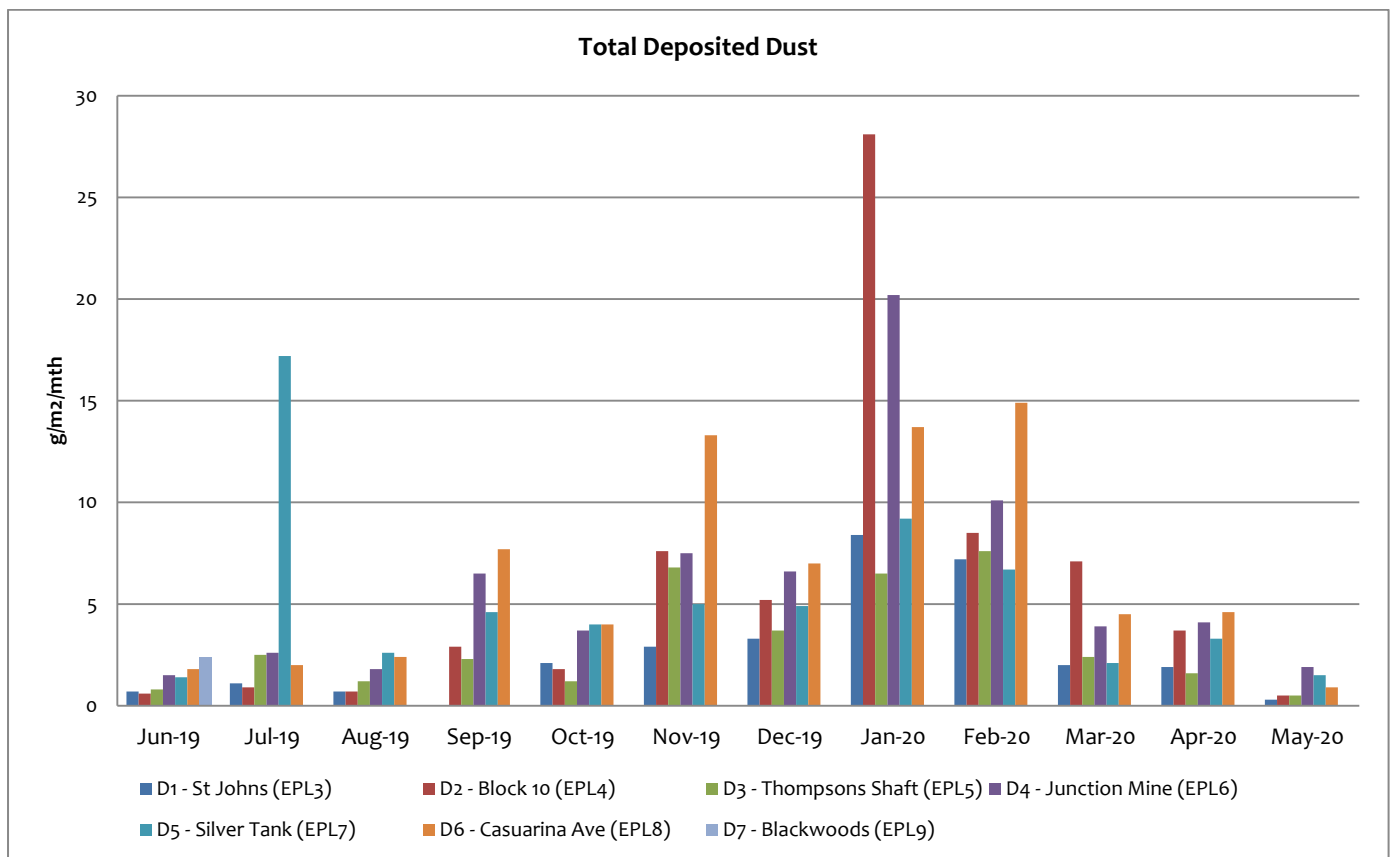
### 1.3 Dust Deposition Sampling

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 May*

| Total Deposited Dust (g/m <sup>2</sup> /Month) |                  |                 |                 |                 |                 |                  |                 |
|--|------------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|
| Date   | D1<br>(off site) | D2<br>(on site) | D3<br>(on site) | D4<br>(on site) | D5<br>(on site) | D6<br>(off site) | D7<br>(on site) |
| May 2020                                       | 0.3              | 0.5             | 0.5             | 1.9             | 1.5             | 0.9              | NS              |
| Background (2010)                              | 4.0              | 3.1             | 4.3             | 5.7             | - <sup>1</sup>  | 5.8              | - <sup>1</sup>  |
| Compliant?                                     | Y                | N/A             | N/A             | N/A             | N/A             | Y                | N/A             |

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

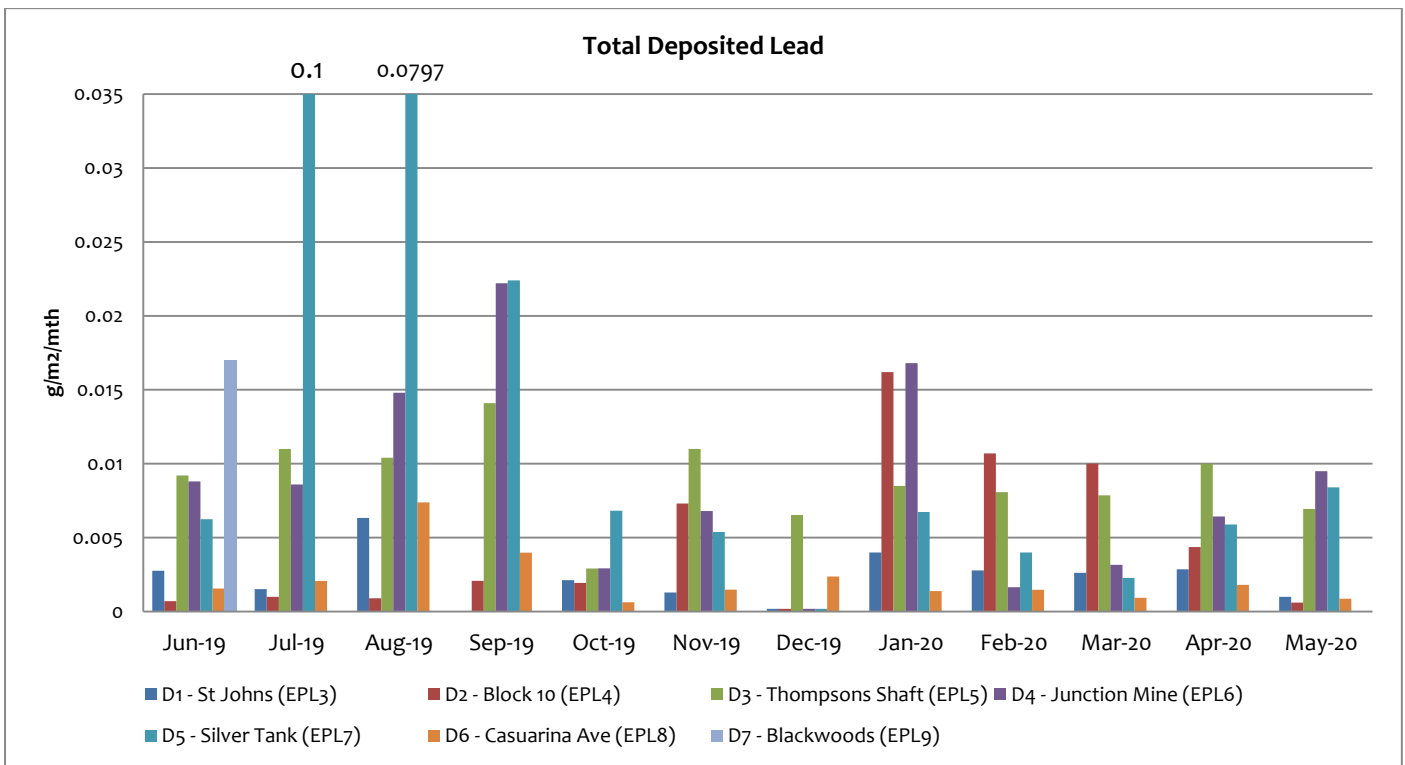


The highest dust levels recorded in Dust Gauges in May were at the D4 Junction Mine and D5 Silver Tank dust gauges, although these levels are lower than recorded in previous months. There was one dust storm impacting Broken Hill on 7 May when the wind direction was predominantly from the NW. The predominant wind direction for May was from the South/SSW.



| Total Deposited Lead (g/m <sup>2</sup> /Month) |                  |                 |                 |                 |                 |                  |                 |
|--|------------------|-----------------|-----------------|-----------------|-----------------|------------------|-----------------|
| Date   | D1<br>(off Site) | D2<br>(on site) | D3<br>(on site) | D4<br>(on site) | D5<br>(on site) | D6<br>(off Site) | D7<br>(on site) |
| May 2020                                       | 0.0010           | 0.00061         | 0.00694         | 0.010           | 0.0084          | 0.00087          | 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 May were highest at the D3 Thompsons Shaft, D4 Junction Mine and D5 Silver Tank gauges. The predominant wind direction for the month of May was from the South. The D3 Thompson’s Shaft and D3 Junction Mine gauges can be impacted from operations around the Blackwood’s TSF which includes the transport of concentrate containers and the loading of trains, although winds from the West and NW may have contributed dust from offsite sources. The D5 Silver Tank gauge collects dust from offsite locations when the wind direction is from the South/SSW.

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 May**

Monitoring of the Primary Bent Shaft (EPL1) and the Crusher Baghouse (EPL2) emissions is conducted on a quarterly basis and was last conducted on 12 March 2020. The measured results from this monitoring event were below the licence criteria. The next monitoring event was scheduled for June.

## 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                                   | -                       | -  |



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

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

In addition the following conditions also apply:-

- Production blasts may occur between 6.45 am and 7.15 pm on any day
- 1 production blast per day, with 6 per week averaged over a calendar year
- 6 development blasts per day, with 42 per week averaged over a calendar year

### ***Blasting Data Summary Results for May***

**Total Blasts:**

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 4.23 per week over the previous calendar year
- The number of Development blasts averaged 35.87 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 = 0%
- Percentage of production blasts over 5 mm/sec = 5.6%

**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%

The percentage of production blasts over 5 mm/sec in the Western Mineralisation and Main Lodes exceed the licence limit of 5% but compliance 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 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 May

| 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) | 6.6  | 11900                    | 11700      | 24                                     | 4940                   | 1710      | 487       | 278       | 1660      | 2.25      | 0.598     | 269       | 828       | <0.05     |
| Kintore Pit     | 6.63 | 12700                    | 13000      | 6                                      | 5390                   | 1680      | 487       | 272       | 1720      | 3.32      | 0.954     | 326       | 1200      | 1.74      |





(EPL54)

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

Quarterly groundwater monitoring was not required in May.

### 3.2 Surface Water Sample Record

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

#### Surface Water Monitoring Requirements

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

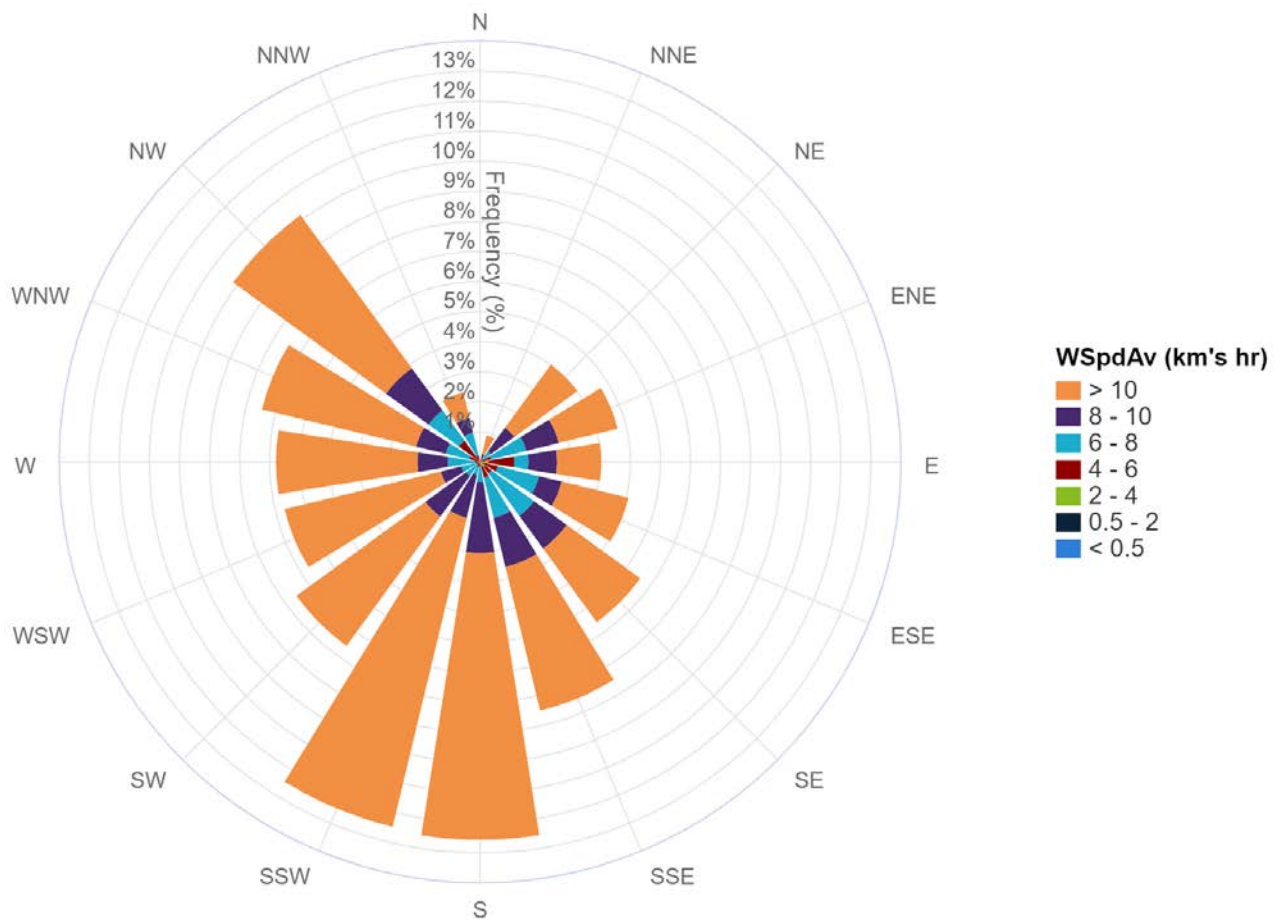
| Parameter | Sampling method | Units of measure | Averaging period | Frequency |
|-----------|-----------------|------------------|------------------|-----------|
|-----------|-----------------|------------------|------------------|-----------|



| 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 May were from the South and SSW.

**Broken Hill Operations Windrose Chart - May 2020**





*Weather Data Summary for May*

| Date      | Temperature<br>@ 10m (°C) |      | Wind Speed<br>@ 10m (km/hr) |      | Predominant Wind<br>Direction @ 10m |        | Rainfall<br>(mm) |
|-----------|---------------------------|------|-----------------------------|------|-------------------------------------|--------|------------------|
|           | Min                       | Max  | Min                         | Max  | Cardinal                            | Degree | Total            |
| 01-May-20 | 5.9                       | 15.5 | 8.3                         | 45.1 | West                                | 271    | 0.00             |
| 02-May-20 | 9.6                       | 17.6 | 9.3                         | 39.0 | SW                                  | 230    | 0.00             |
| 03-May-20 | 8.2                       | 13.7 | 6.1                         | 24.4 | South                               | 177    | 0.00             |
| 04-May-20 | 6.8                       | 14.6 | 4.8                         | 17.5 | SSE                                 | 157    | 0.00             |
| 05-May-20 | 7.8                       | 18.0 | 3.5                         | 20.0 | NE                                  | 45     | 0.00             |
| 06-May-20 | 10.4                      | 22.1 | 7.3                         | 39.7 | NNE                                 | 23     | 0.00             |
| 07-May-20 | 15.4                      | 25.1 | 5.8                         | 49.6 | South                               | 181    | 0.00             |
| 08-May-20 | 12.4                      | 21.2 | 2.6                         | 23.2 | NW                                  | 311    | 0.00             |
| 09-May-20 | 8.9                       | 15.1 | 6.5                         | 35.2 | SW                                  | 229    | 0.00             |
| 10-May-20 | 7.0                       | 14.2 | 3.8                         | 25.5 | South                               | 181    | 0.00             |
| 11-May-20 | 8.4                       | 15.4 | 2.9                         | 18.5 | NE                                  | 45     | 0.00             |
| 12-May-20 | 8.6                       | 17.6 | 3.7                         | 20.0 | West                                | 272    | 0.00             |
| 13-May-20 | 7.5                       | 15.1 | 7.5                         | 29.4 | South                               | 179    | 0.00             |
| 14-May-20 | 5.2                       | 12.7 | 5.8                         | 19.8 | SSE                                 | 160    | 0.00             |
| 15-May-20 | 5.2                       | 14.8 | 5.3                         | 21.5 | SE                                  | 137    | 0.00             |
| 16-May-20 | 7.9                       | 18.0 | 1.7                         | 19.0 | SE                                  | 134    | 0.00             |
| 17-May-20 | 8.6                       | 18.4 | 3.0                         | 22.4 | ESE                                 | 111    | 0.00             |
| 18-May-20 | 11.1                      | 21.2 | 6.2                         | 25.9 | NE                                  | 42     | 0.00             |
| 19-May-20 | 10.4                      | 22.9 | 5.2                         | 26.5 | SSW                                 | 201    | 0.00             |
| 20-May-20 | 7.9                       | 14.5 | 4.6                         | 30.5 | SSW                                 | 202    | 0.00             |
| 21-May-20 | 6.5                       | 12.6 | 6.4                         | 36.8 | SSW                                 | 201    | 0.00             |
| 22-May-20 | 7.3                       | 12.9 | 6.4                         | 26.3 | South                               | 184    | 0.00             |
| 23-May-20 | 9.4                       | 13.7 | 4.9                         | 29.9 | South                               | 185    | 0.00             |
| 24-May-20 | 6.8                       | 11.6 | 7.0                         | 33.8 | South                               | 182    | 0.00             |
| 25-May-20 | 7.8                       | 13.1 | 2.3                         | 21.1 | SSE                                 | 158    | 0.00             |
| 26-May-20 | 8.4                       | 14.1 | 1.4                         | 24.8 | NW                                  | 316    | 0.00             |
| 27-May-20 | 8.9                       | 16.1 | 3.0                         | 16.0 | NW                                  | 314    | 0.00             |
| 28-May-20 | 10.8                      | 18.4 | 1.8                         | 15.2 | West                                | 269    | 0.00             |
| 29-May-20 | 10.2                      | 18.8 | 4.3                         | 16.2 | NNE                                 | 25     | 0.00             |
| 30-May-20 | 9.7                       | 18.7 | 4.5                         | 38.9 | South                               | 180    | 0.00             |
| 31-May-20 | 10.5                      | 36.1 | 3.4                         | 32.9 | NW                                  | 312    | 0.00             |
| 31-May-18 | 10.5                      | 36.1 | 3.4                         | 32.9 | NW                                  | 312    | 0.00             |



## 5 Data Log

| Sample                           | Result Received |
|----------------------------------|-----------------|
| Hi Volume Samples                | 1-07-2020       |
| TEOM                             | 26-06-2020      |
| Dust Deposition                  | 1-07-2020       |
| Vents & Bag House                | 9-04-2020       |
| Water                            | 1-06-2020       |
| Blast vibration and overpressure | 1-06-2020       |
| Weather                          | 5-06-2020       |
| Date posted to web site          | 15-07-2020      |

## 6 Correction Log

No corrections required.