

Rasp Mine
Monthly Environmental Monitoring Report
December 2019



INTRODUCTION

Broken Hill Operations Pty Ltd (BHOP) [a wholly owned subsidiary of CBH Resources Limited (CBH)] owns and operates the Rasp Mine (the Mine), which is located centrally within the City of Broken Hill on Consolidated Mine Lease 7 (CML7).

Mining has been undertaken within CML7 since 1885. The existing operations at the Rasp Mine include underground mining operations, a processing plant producing zinc and lead concentrates and a rail siding for concentrate dispatch. These operations are undertaken in accordance with Project Approval 07_0018 granted 31 January 2011, under Part3A of the Environmental Planning and Assessment Act 1979 (EP&A Act).

As the holder of an Environmental Protection Licence, 12559, BHOP is required, under Section 66(6) of the NSW *Protection of the Environment Operations Act 1997*, to publish pollution monitoring data. In addition BHOP is required to publish data in accordance with its Project Approval 07_0018 Schedule 4 Condition 9. These documents can be found on the Rasp Mine web site.

TABLE OF CONTENTS

1	AIR QUALITY	3
1.1	HIGH VOLUME AIR SAMPLERS	3
1.2	TAPERED ELEMENT OSCILLATING MICROBALANCE SAMPLING (TEOM).....	9
1.3	DUST DEPOSITION SAMPLING	12
1.4	VENTILATION OUTLETS AND BAG HOUSE MONITORING	13
2	NOISE.....	14
2.1	BLASTING (VIBRATION AND OVERPRESSURE)	14
2.2	NOISE	16
3	WATER	17
3.1	GROUNDWATER.....	17
3.2	SURFACE WATER SAMPLE RECORD	19
4	WEATHER DATA	20
5	DATA LOG	22
6	CORRECTION LOG.....	22



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 ³
Particulate matter < 10 µm (PM ₁₀)	Annual	25 µg/m ³

Short Term Criterion for Particulate Matter

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

Long Term Criteria for Deposited Dust

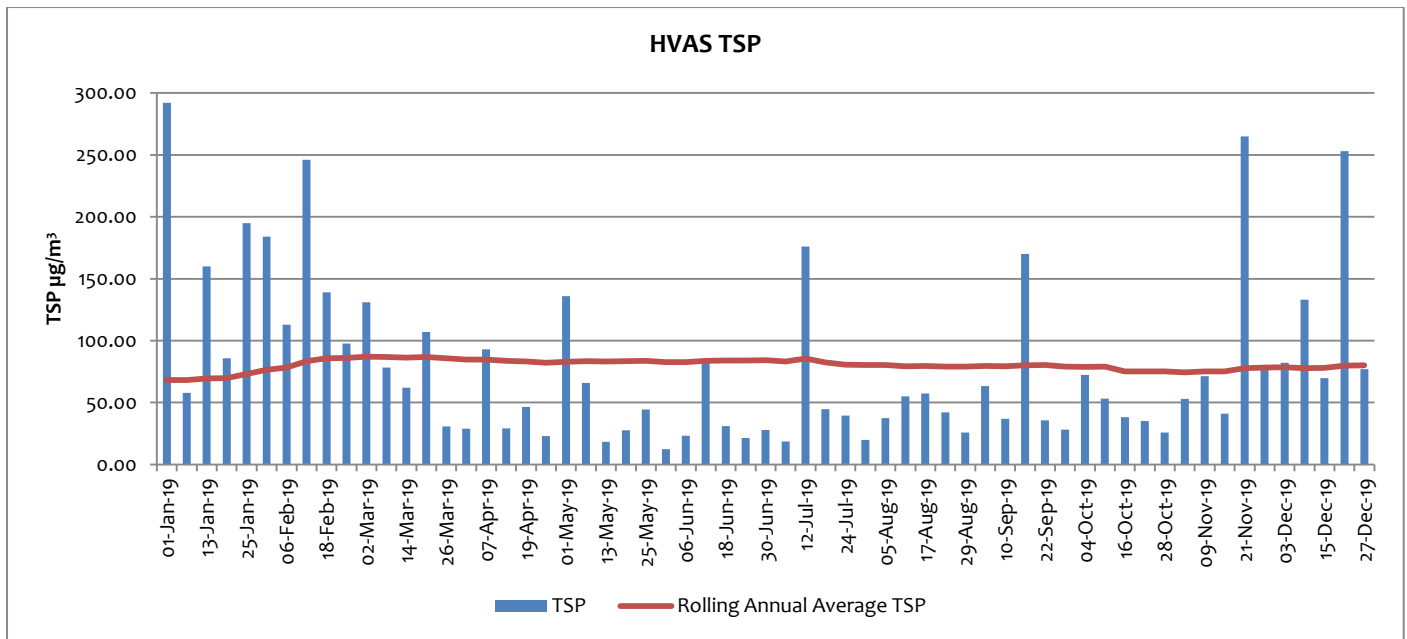
Pollutant	Averaging Period	Maximum Project Contribution	Maximum Total Deposited Dust Level
Deposited dust	Annual	2 g/m ² /month	4 g/m ² /month

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 (PM₁₀) and lead dust.

HVAS (EPL10) - Silver Tank (On Site) Results for December

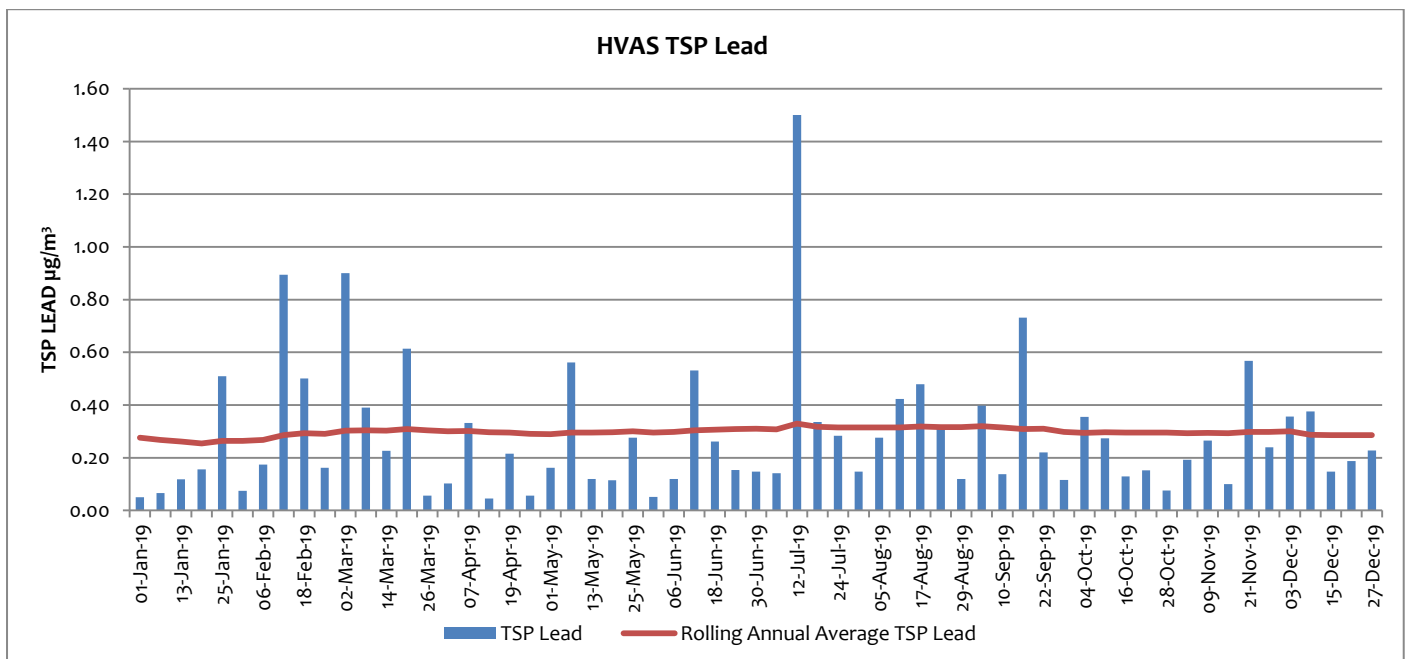
DATE	TSP (µg/m ³)	Lead (µg/m ³)
3-12-2019	82.2	0.36
9-12-2019	133.0	0.38
15-12-2019	69.7	0.15
21-12-2019	253.00	0.19
27-12-2019	77.0	0.23

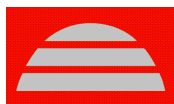


HVAS (EPL10) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. There was an elevated TSP dust level of $253 \mu\text{g}/\text{m}^3$ recorded on 21 December. As the wind was from a southerly direction and reaching a maximum speed of 38.6 km/hr on this day the contribution from the site is likely to be minimal at this location. Overall the trend for TSP at this location has risen over the 12 months to November although it has started to trend downwards in the last few months after reaching $86.97 \mu\text{g}/\text{m}^3$ in March.

The rolling annual average for TSP to December is $80.17 \mu\text{g}/\text{m}^3$ which 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 and the watering of haul roads.

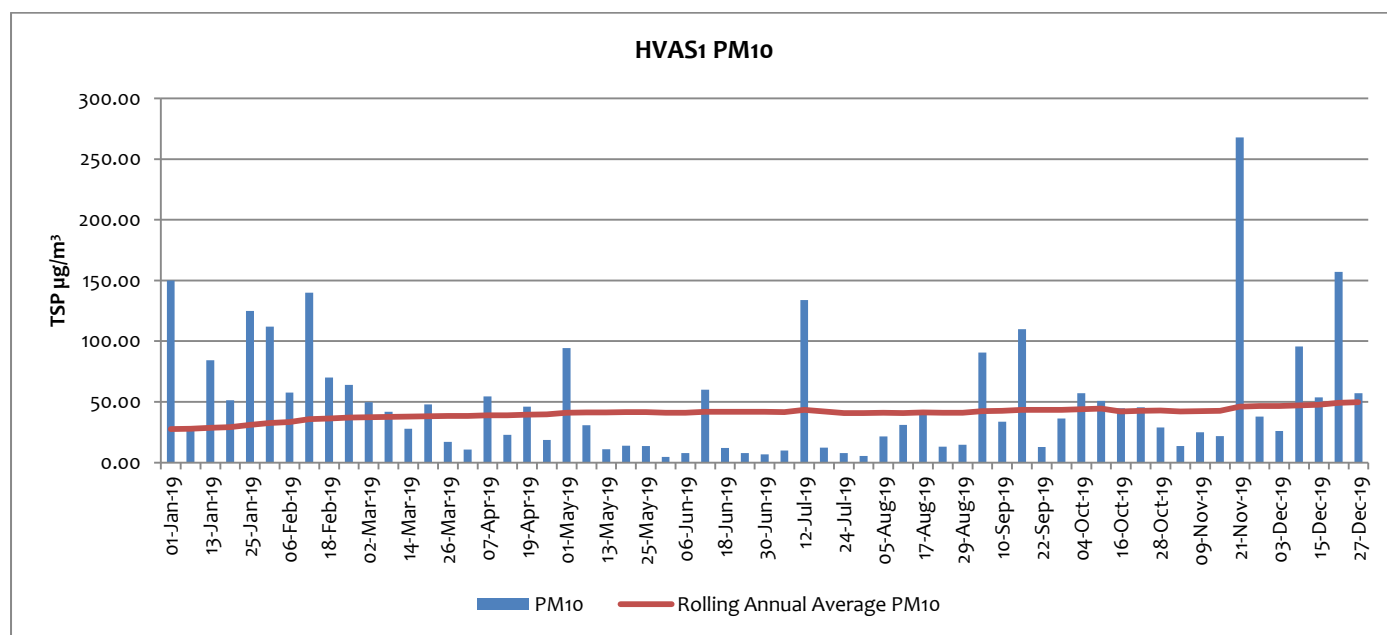




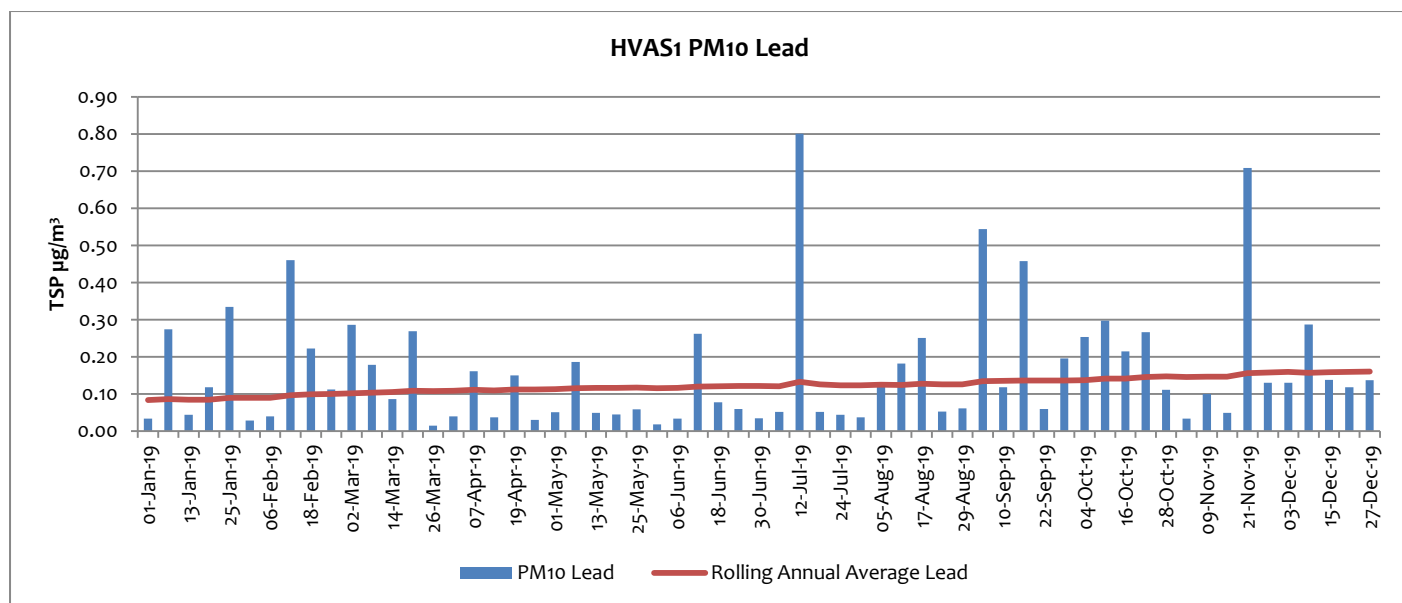
The rolling annual average for TSP Lead to November was $0.29 \mu\text{g}/\text{m}^3$, down from the previous month's value of $0.30 \mu\text{g}/\text{m}^3$.

HVAS1 (EPL11) - Silver Tank (On Site) Results for December

DATE	PM10 ($\mu\text{g}/\text{m}^3$)	PM10 Lead ($\mu\text{g}/\text{m}^3$)
3-12-2019	25.9	0.13
9-12-2019	95.7	0.129
15-12-2019	53.7	0.14
21-12-2019	157	0.12
27-12-2019	57.14	0.14



HVAS1 (EPL11) is located on the southern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. There was an elevated PM10 dust level of $157 \mu\text{g}/\text{m}^3$ recorded on 21 December. As the wind was from a southerly direction and reaching a maximum speed of 38.6 km/hr on this day the contribution from the site is likely to be minimal at this location.



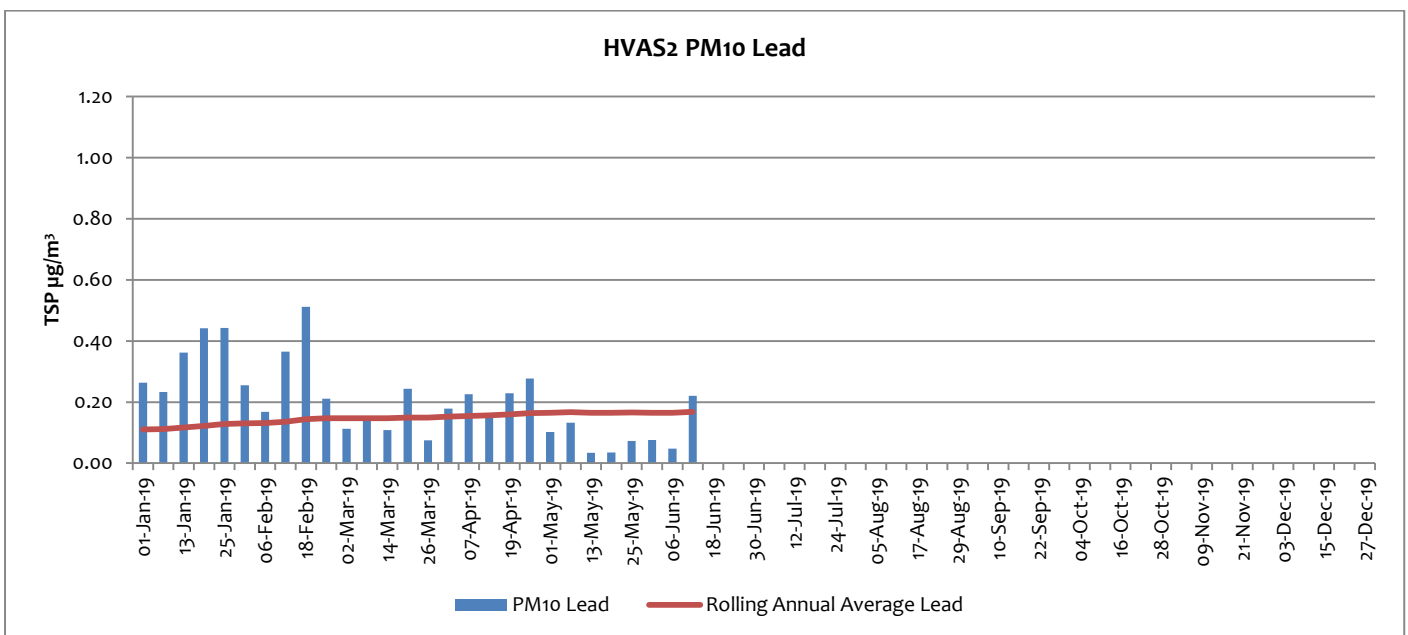
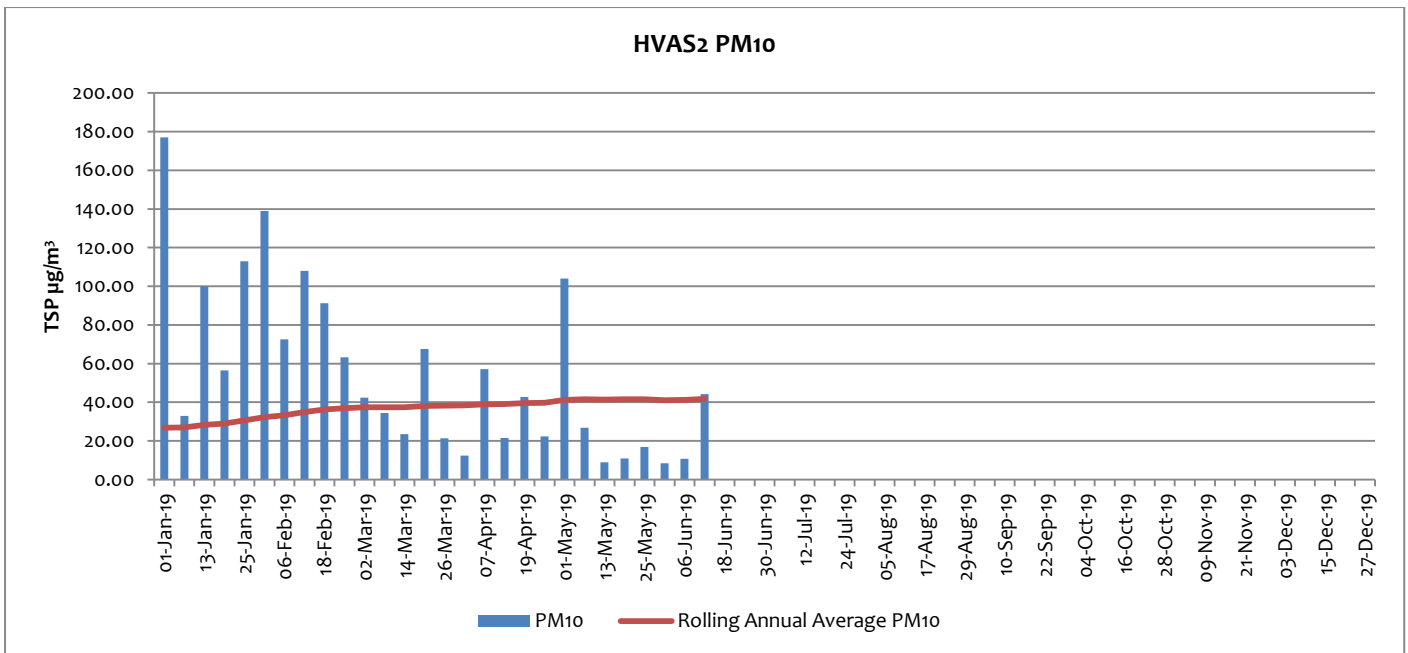
There is no guideline for assessing PM₁₀ lead dust; the trend for PM₁₀ lead dust at this location has risen over the previous 12 months from 0.08 µg/m³ to 0.16 µg/m³ and is likely the result of drought conditions and windy weather transporting lead contaminated dust from the Broken Hill environs. There was an elevated PM₁₀ lead dust level of 0.29 µg/m³ recorded on 9 December. As the wind was from a southerly direction and reaching a maximum speed of 42.9 km/hr 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 December

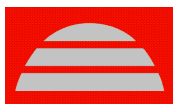
DATE	PM10 (µg/m ³)	Lead (µg/m ³)
3-12-2019	NS	NS
9-12-2019	NS	NS
15-12-2019	NS	NS
21-12-2019	NS	NS
27-12-2019	NS	NS

HVAS2 (EPL12) is located on the northern boundary of Rasp Mine and while limit criteria do not apply at this point, they do apply at the closest residential location. HVAS2 has been decommissioned while Embankment 2 TSF2 construction works are undertaken. A real-time PM₁₀ monitor is in place adjacent to the HVAS2 location.

The rolling annual average PM₁₀ to June is 41.74 µg/m³ is above the PM₁₀ annual average criterion 25 µg/m³ required at the nearest residential location. Calculation of the rolling annual average includes results from days when there were dust storm events.

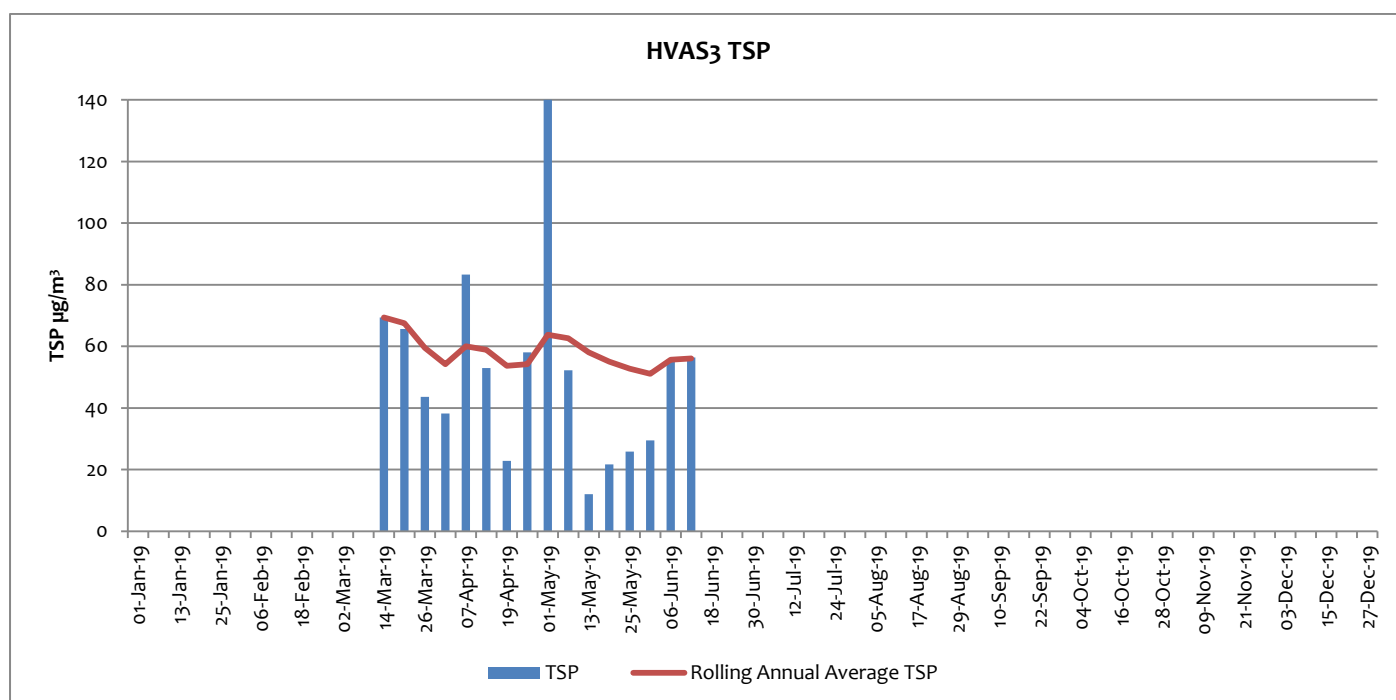


There is no guideline for assessing PM10 lead dust; the Annual Rolling Average for lead dust at this location has increased over the previous 12 months from 0.07 µg/m³ to 0.16 µg/m³ at the end of June 2019.



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

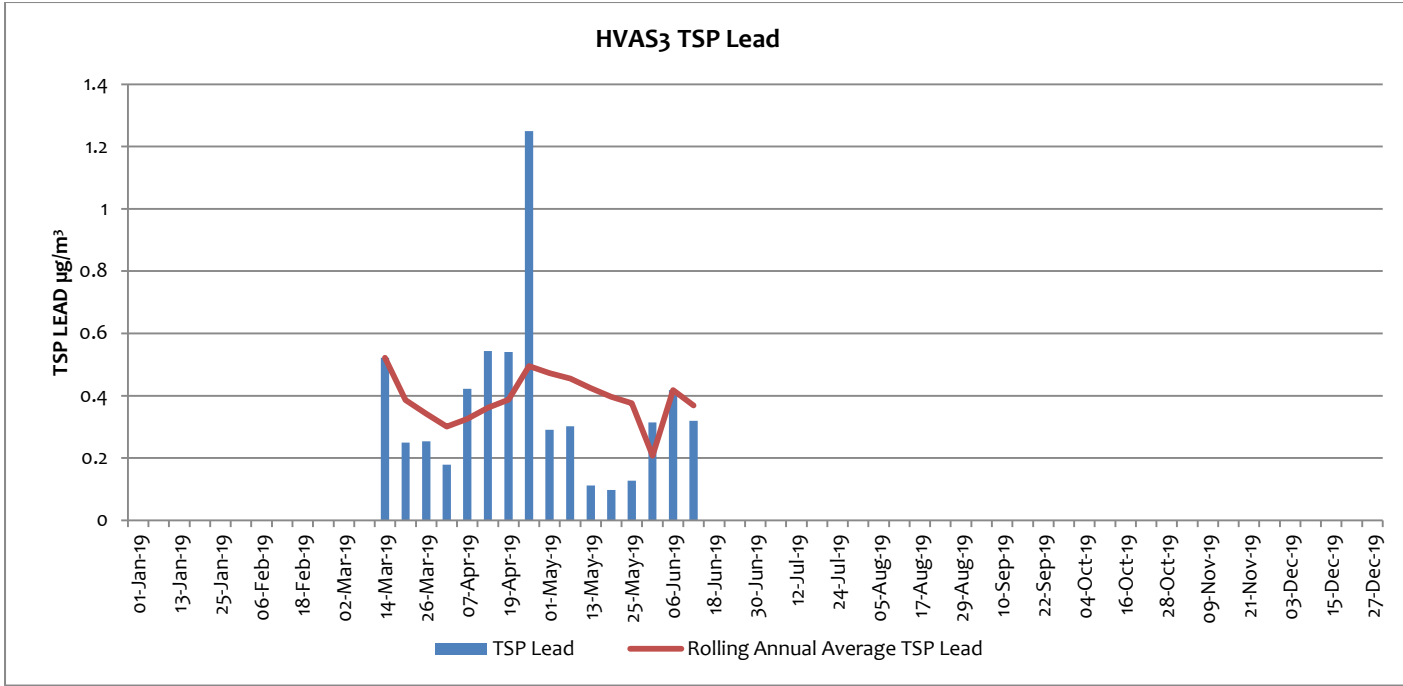
DATE	TSP ($\mu\text{g}/\text{m}^3$)	PM10 Lead ($\mu\text{g}/\text{m}^3$)
3-12-2019	NS	NS
9-12-2019	NS	NS
15-12-2019	NS	NS
21-12-2019	NS	NS
27-12-2019	NS	NS



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

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

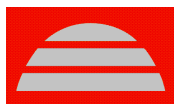
The rolling annual average for TSP Lead to June is $0.37 \mu\text{g}/\text{m}^3$.



1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

There are two Tapered Element Oscillating Microbalance (TEOM) sampling units used to measure ambient air quality at the Rasp Mine – TEOM1 (EPL13) is located off-site within the perimeter fence of Essential Water south of the mine lease, and TEOM2 (EPL14) is located on-site adjacent to Blackwood Pit to the north of the mine lease. A map indicating these locations can be found on the Rasp Mine web site. TEOM1 and TEOM2 operate continuously and sample for particulate matter less than 10 microns (PM₁₀) in size.

*TEOM data is validated by third party consultants using Australian Standards and internal procedures.



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

Particulate Matter <10 Microns 24Hr Average				
Date	TEOM 1 ($\mu\text{g}/\text{m}^3$)	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?	TEOM 2 ($\mu\text{g}/\text{m}^3$)	Compliant with 50 $\mu\text{g}/\text{m}^3$ 24hr average?
01-Dec-19	20.0	Y	NS	Y
02-Dec-19	12.9	Y	NS	Y
03-Dec-19	17.9	Y	NS	Y
04-Dec-19	13.6	Y	NS	Y
05-Dec-19	15.8	Y	NS	Y
06-Dec-19	12.7	Y	NS	Y
07-Dec-19	12.6	Y	NS	Y
08-Dec-19	13.5	Y	NS	Y
09-Dec-19	22.9	Y	NS	Y
10-Dec-19	16.9	Y	NS	Y
11-Dec-19	15.8	Y	NS	Y
12-Dec-19	17.0	Y	NS	Y
13-Dec-19	15.0	Y	NS	Y
14-Dec-19	12.6	Y	NS	Y
15-Dec-19	21.4	Y	NS	Y
16-Dec-19	14.3	Y	NS	Y
17-Dec-19	21.6	Y	NS	Y
18-Dec-19	24.7	Y	NS	Y
19-Dec-19	74.2	Y	NS	Y
20-Dec-19	278.5	Y	NS	Y
21-Dec-19	148.0	Y	NS	Y
22-Dec-19	28.0	Y	NS	Y
23-Dec-19	24.8	Y	NS	Y
24-Dec-19	23.8	Y	NS	Y
25-Dec-19	29.2	Y	NS	Y
26-Dec-19	36.4	Y	NS	Y
27-Dec-19	43.0	Y	NS	Y
28-Dec-19	103.9	Y	NS	Y
29-Dec-19	120.2	Y	NS	Y
30-Dec-19	594.4	Y	NS	Y
31-Dec-19	117.7	Y	NS	Y

NS¹ – no sample collected due to temporary decommissioning of TEOM unit.

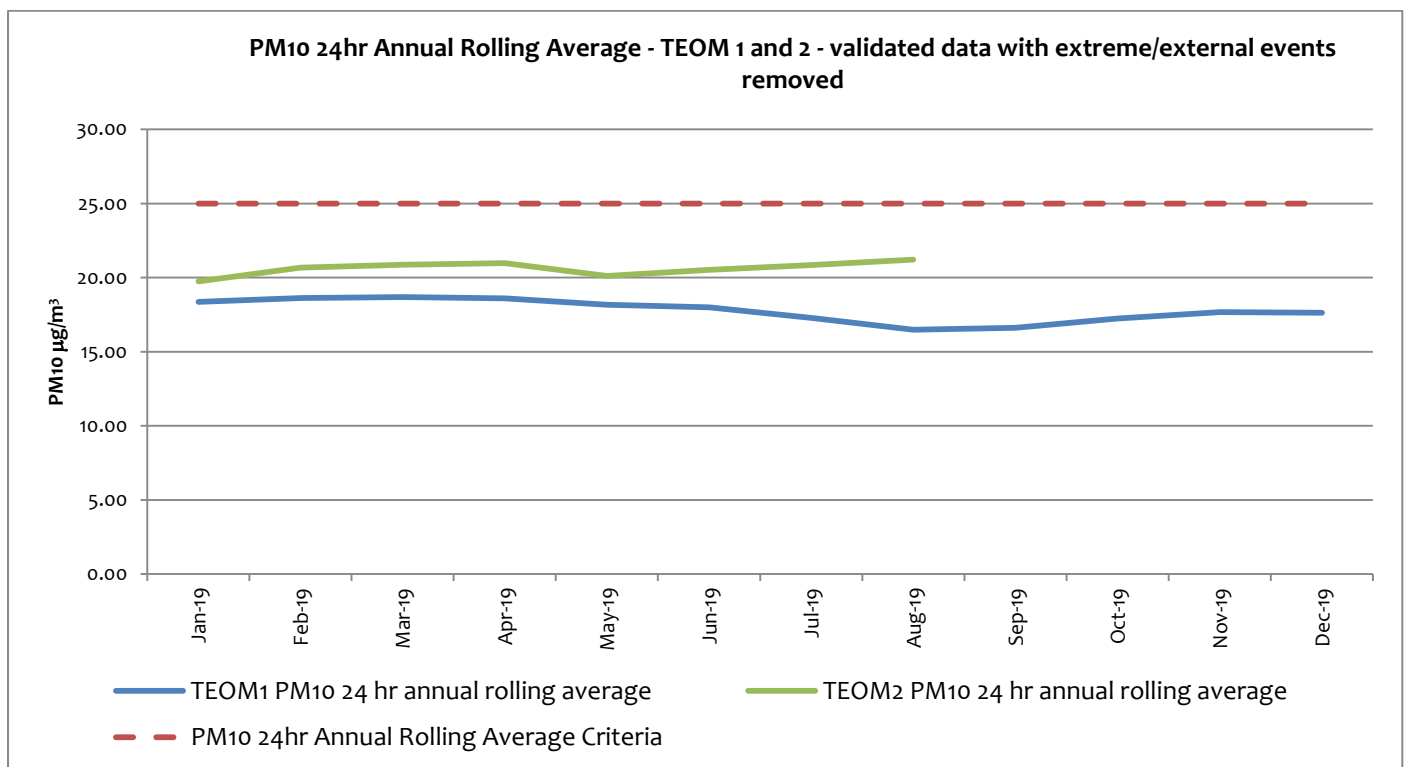
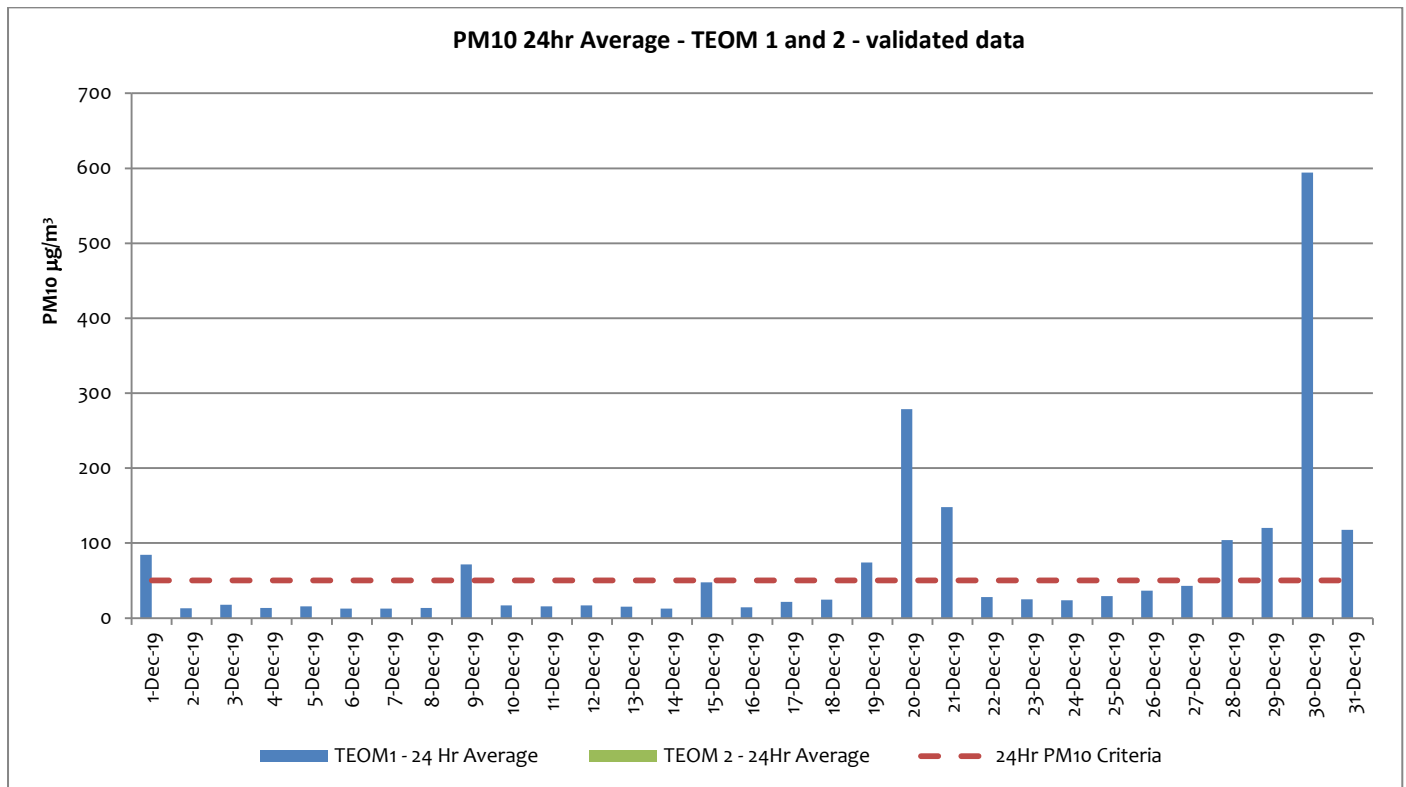
Project Approval 07_0018 apply at TEOM1 and 2, with two criteria listed for PM10, a 24 hour average criteria of 50 $\mu\text{g}/\text{m}^3$ and an annual average criteria of 25 $\mu\text{g}/\text{m}^3$.

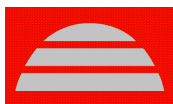
TEOM2 was decommissioned from 19 June due to Embankment 2 TSF2 construction works. The decommissioning is in accordance with dust management strategies agreed with the EPA which includes the operation of a real-time PM10 monitor north of the construction works. Both Project Approval and Environment Protection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



external events. Dust storms occurred from 19 to 21 December and 28 to 31 December and produced conditions where dust levels were elevated throughout each day.

The PM₁₀ 24-hour rolling average (for data with external events removed) has fallen to 17.62 µg/m³ for TEOM1 and remained at 20.52 µg/m³ for TEOM2 as the rolling average has not been calculated while the unit has been decommissioned.





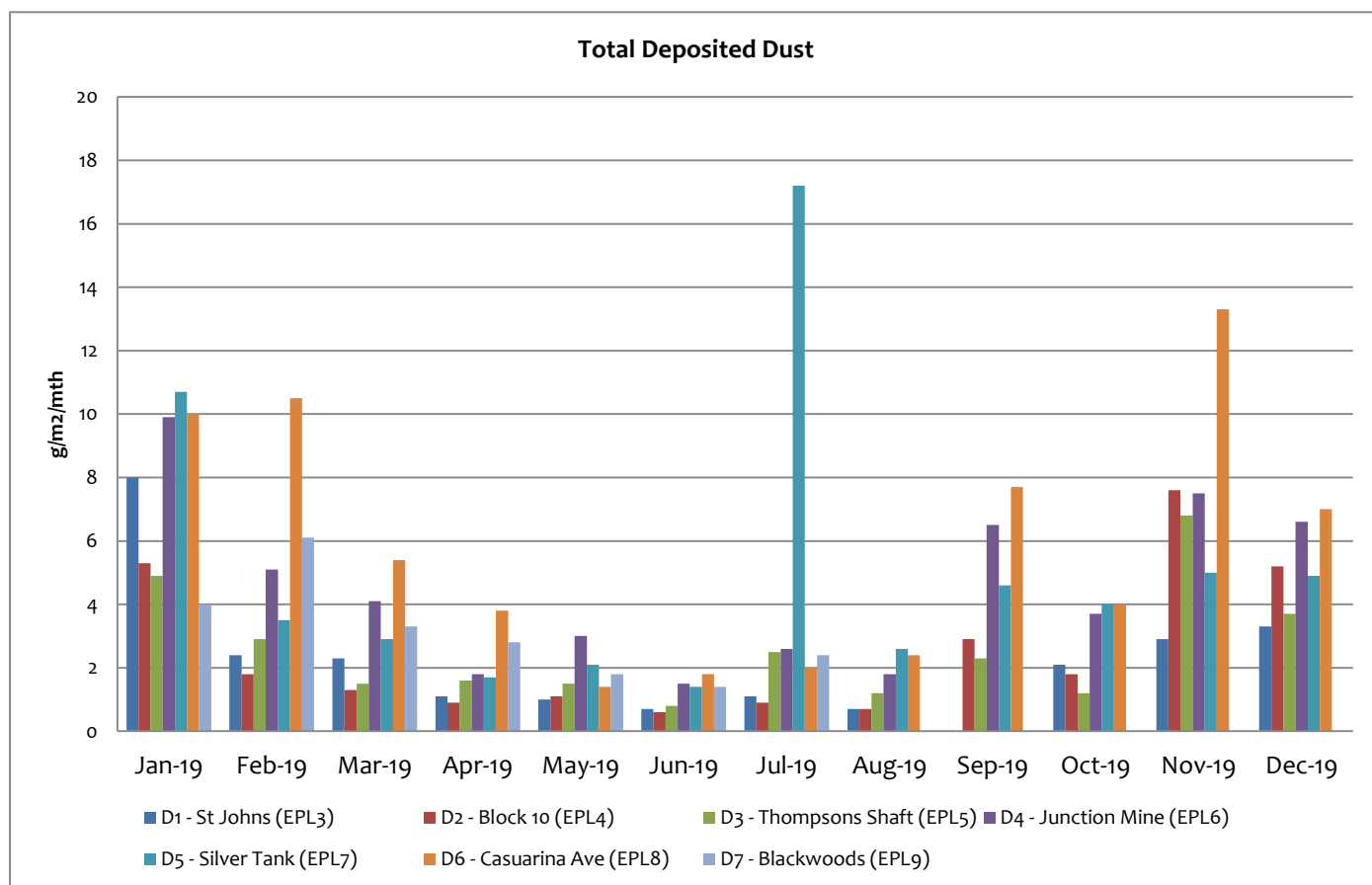
1.3 Dust Deposition Sampling

There are seven dust deposition gauges to measure ambient air quality at the Rasp Mine – D1 to D7. D1 and D6 are located off-site, D1 near the St Johns training facility north of the Rasp Mine and D6 in Casuarina Avenue south of the Rasp Mine. D2 to D5 and D7 are located on the mine lease in various locations. A map indicating these locations can be found on the Rasp Mine web site. Dust samples are collected monthly and analysed for total deposited dust and deposited lead dust.

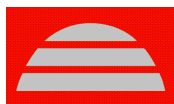
Dust Deposition Gauges (D1 (EPL3) to D7 (EPL9)) – Results for December

Total Deposited Dust (g/m ² /Month)							
Date	D1 (off site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off site)	D7 (on site)
December 2019	3.3	5.2	3.7	6.6	4.9	7.0	NS
Background (2010)	4.0	3.1	4.3	5.7	- ¹	5.8	- ¹
Compliant?	Y	N/A	N/A	N/A	N/A	Y	N/A

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

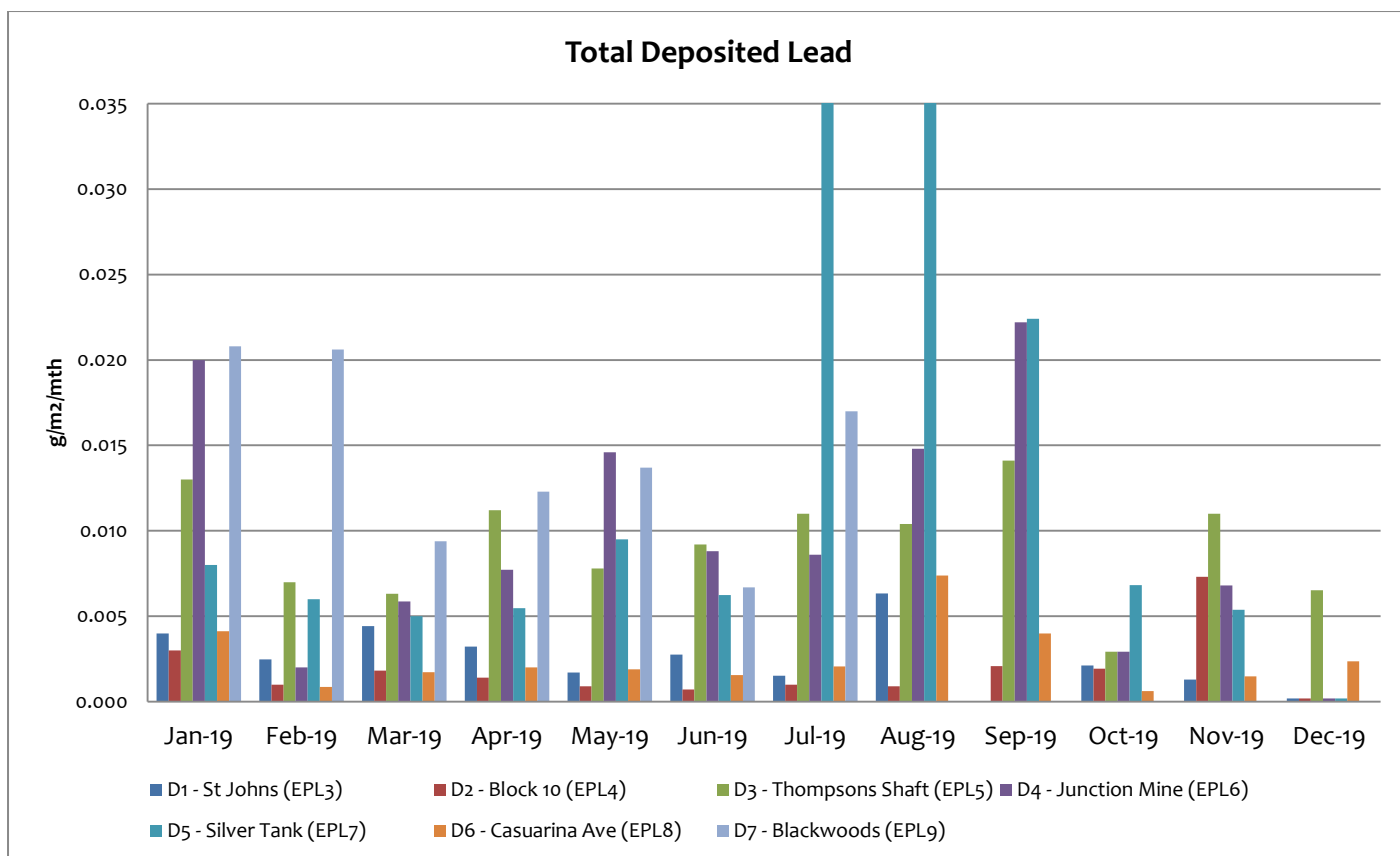


Dust results at Casuarina Avenue and Junction Mine were the highest of the dust gauges in December. Wind was predominantly from the South to SSW with a dust storms from 19 to 21 December and 28 to 31 December so BHOP is not likely to have contributed significantly to the dust captured in these dust gauges.



Total Deposited Lead (g/m ² /Month)							
Date	D1 (off Site)	D2 (on site)	D3 (on site)	D4 (on site)	D5 (on site)	D6 (off Site)	D7 (on site)
November 2019	0.00019	0.00019	0.00653	0.00019	0.00019	0.00237	NS
Background (2010)	0.0034	0.005	0.005	0.006	- ¹	0.004	- ¹

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



There are no guidelines for deposited lead dust. Lead results in December were highest at Thompsons Shaft. The predominant wind direction for the month was from the South. Results for sample D1, D2, D4 and D5 are being reviewed by the lab as they are all the same. For samples D3 and D6 insoluble lead is being reported as there was not enough sample to calculate total lead.

Dust suppressant is applied to unsealed areas of the site.

1.4 Ventilation Outlets and Bag House Monitoring

There are two locations to measure pollutants from exhausts or stacks; these include the Primary Ventilation Shaft, measuring pollutants from underground firings, and the Baghouse Stack at the crusher measuring dust. Each are located on site; the Primary Ventilation Shaft is located centrally and to the north of the mine lease and the Primary Crusher Baghouse Stack is located within the area of the processing plant to the east of the lease. Shaft 6 (EPL56) was removed as a monitoring location with the variation of EPL12559 in March 2019 as it became an intake rather than an exhaust in April 2018. A map indicating these locations can be found on the Rasp Mine web site. Samples are collected quarterly and analysed for a number parameters listed in below. Reference to the item required in the Rasp Mine Environment Protection Licence (EPL) is provided below.



There were no exceedences of criteria for the monitoring in December.

The following criteria apply:

Primary Ventilation Shaft (EPL1)

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

Primary Ventilation Shaft (EPL1) and Crusher Baghouse (EPL2)

	Unit	Criteria
Total Suspended particles	mg/m ³	20
Type 1 and Type 2 ¹	mg/m ³	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 December 2019

	Unit	Primary Vent Shaft (EPL1)	Crusher Baghouse (EPL2)
Nitrogen Oxides	mg/m ³	2.8	NA
Volatile Organic Compounds	mg/m ³	0.181	NA
Total Suspended particles	mg/m ³	2.83	10.0
Type 1 and Type 2	mg/m ³	0.106	0.148

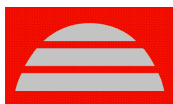
2 Noise

2.1 Blasting (Vibration and Overpressure)

There are 6 vibration monitors at various locations to measure for vibration and overpressure from blast firings. These include V1 to V5 which are located off-site and V6 which is located on-site near Shaft 4. A map indicating these locations can be found on the Rasp Mine web site. In addition there are 2 roving monitors, which may be used to monitor vibration and overpressure at particular locations as required. Monitors operate continuously and are automatically triggered when a blast occurs. The following conditions apply as listed in the PA 07_0018 and EPL 12559:-

Blasting Criteria (Western Mineralisation and Main Lodes excluding Block 7)

Location	Airblast Overpressure (dB(Lin Peak))	Ground Vibration (mm/s)	Allowable Exceedance (for production and development blasts)
Residence on privately owned land (7am-7pm)	115	5	5% of the total number of blasts over a 12-month period ¹



(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 ¹
(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 December

Total Blasts:

- 0 production blasts occurred before 6.45 am or after 7.15 pm
- The number of Production blasts averaged 4.02 per week over the previous calendar year
- The number of Development blasts averaged 36.15 per week over the previous calendar year

Western Mineralisation and Main Lodes (excluding Block 7):

- 0 Blasts recorded >5 mm/s
- 0 Blasts recorded >10 mm/s
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)
- 0 Blasts recorded an over pressure level over 115dBL (7am to 7pm)
- 0 Blasts recorded an over pressure level over or 120 dBL at any time
- Percentage of development blasts over 5 mm/sec = 0%
- Percentage of production blasts over 5 mm/sec = 4.3%

Block 7:

- 0 Blasts recorded >3 mm/s

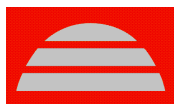


- 0 Blasts recorded >10 mm/s
- 0 Blasts recorded >50 mm/s at V6
- 0 development blasts recorded an over pressure level over 95 dBL (10pm to 7am)
- 0 development blasts recorded an over pressure level over 105 dBL (7pm to 10pm)
- 0 Blasts recorded an over pressure level over 115 dBL (7am to 7pm)
- 0 Blasts 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.

GW11 has displayed increase in Manganese, Lead, Zinc, Iron, Cadmium, Sodium and Chloride over the last couple of sampling events and is likely due to the tailings in TSF2 accessing a structure in the pit wall. The same parameters experienced increases in 2018 in a similar event.

Groundwater Monitoring Requirements

EPA Identification Number	Frequency	Parameters to be analysed
Shaft 7 EPL53	Monthly	alkalinity (calcium carbonate (CaCO ₃)), cadmium (Cd), calcium (Ca), chloride (Cl), electrical conductivity (EC), iron (Fe), lead Pb), magnesium (Mg), manganese (Mn), pH, sodium (Na), sulphate (SO ₄), 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 December

Sample Point	pH	EC (µS/cm ²)	TDS (mg/l)	Alkalinity (CaCO ₃) (mg/l)	SO ₄ (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)	6.21	13600	13400	7	6330	1970	534	290	1690	2.42	1.04	318	1090	4.62
Kintore Pit (EPL54)	6.2	13800	13100	7	6140	1980	537	292	1760	2.53	0.78	318	1050	0.58

Groundwater Bores (EPL37 - EPL52) Results for December

Sample Point	pH	EC (µS/cm ²)	TDS (mg/l)	Alkalinity (CaCO ₃) (mg/l)	SO ₄ (mg/l)	Cl (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	Cd (mg/l)	Pb (mg/l)	Mn (mg/l)	Zn (mg/l)	Fe (mg/l)
GW01 (EPL37)	-Bore Dry-													
GW02 (EPL38)	-Bore Dry-													
GW03 (EPL39)	5.57	15400	12600	3	5160	3070	566	387	2250	1.5	1.54	253	231	<0.05
GW04 (EPL40)	7.35	15300	12000	287	4940	2840	626	565	2510	0.0592	0.008	28.4	13.9	<0.05
GW05 (EPL41)	6.64	17200	15300	127	6610	2960	504	686	25880	0.629	0.273	335	291	<0.05



Rasp Mine Monthly Environment Monitoring Report

Sample Point	pH	EC ($\mu\text{S}/\text{cm}^2$)	TDS (mg/l)	Alkalinity (CaCO_3) (mg/l)	SO ₄ (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)
GW06 (EPL42)	6.69	14600	11100	60	4930	2730	528	467	2080	0.778	0.084	262	170	<0.05
GW07 (EPL43)	6.63	12400	10600	44	4470	1870	521	308	1690	1.98	0.088	242	288	<0.05
GW08 (EPL44)	6.44	13900	12600	23	5290	2500	549	332	1710	1.88	0.561	605	702	<0.05
GW09 (EPL45)	7.13	12300	10800	109	4550	1840	614	584	1510	1.02	<0.001	92.8	124	<0.05
GW10 (EPL46)	7.4	15600	10200	299	4450	2790	589	537	2280	0.158	0.001	1.93	18.6	<0.05
GW11 (EPL47)	6.81	11400	9910	81	4410	1540	505	533	1760	2.33	0.05	135	184	<0.05
GW12 (EPL48)	6.66	14300	12800	79	5550	1970	485	577	2110	1.48	0.009	84.5	186	<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 ₄), 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 December.



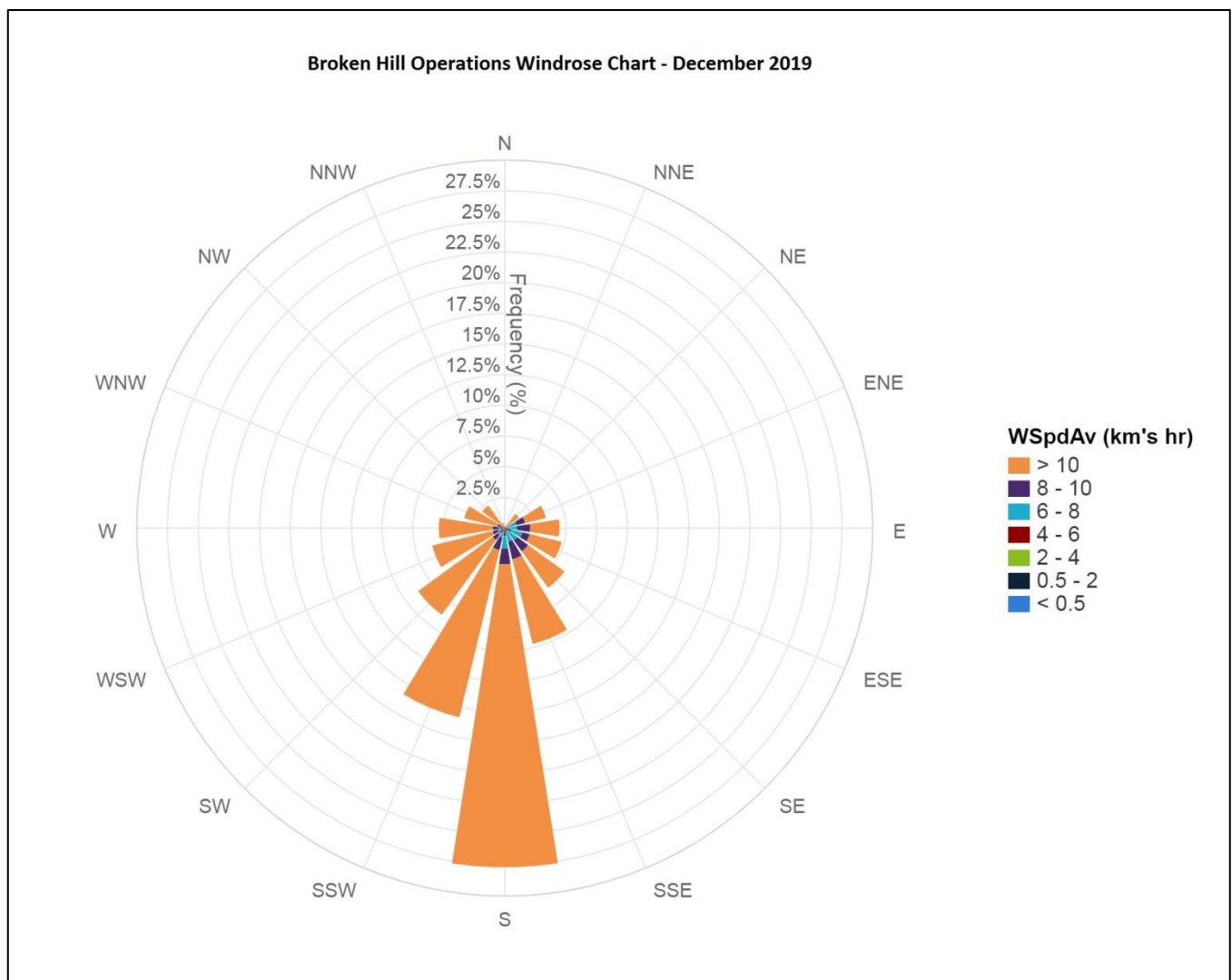
4 Weather Data

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





Rasp Mine Monthly Environment Monitoring Report

Weather Data Summary for December

Date	Temperature @ 10m (°C)		Wind Speed @ 10m (km/hr)		Predominant Wind Direction @ 10m		Rainfall (mm)
	Min	Max	Min	Max	Cardinal	Degree	Total
01-Dec-18	10.6	20.4	6.3	41.1	WSW	249	0.00
02-Dec-18	12.5	20.7	8.6	38.1	SW	225	0.00
03-Dec-18	10.8	25.5	6.2	30.3	SW	226	0.00
04-Dec-18	13.1	28.7	0.5	27.9	South	180	0.00
05-Dec-18	19.9	33.1	1.6	31.3	SSW	200	0.00
06-Dec-18	16.9	27.4	6.9	28.1	South	179	0.00
07-Dec-18	14.0	28.5	1.5	23.9	South	179	0.00
08-Dec-18	20.3	34.9	3.3	20.1	ENE	67	0.00
09-Dec-18	24.0	38.6	4.8	42.9	South	181	0.00
10-Dec-18	19.3	31.5	12.0	32.0	South	178	0.00
11-Dec-18	16.8	29.9	10.6	28.1	South	177	0.00
12-Dec-18	14.7	24.9	10.6	32.1	South	182	0.00
13-Dec-18	11.7	25.4	7.6	30.7	South	181	0.00
14-Dec-18	14.1	29.1	4.8	24.5	South	181	0.00
15-Dec-18	19.8	34.5	3.0	27.4	SSE	158	0.00
16-Dec-18	22.8	35.4	2.6	20.6	SE	134	0.00
17-Dec-18	25.5	36.9	5.1	26.6	East	88	0.00
18-Dec-18	27.6	39.6	3.8	19.7	ENE	64	0.00
19-Dec-18	30.6	41.9	2.0	23.8	NE	42	0.00
20-Dec-18	33.0	42.8	3.0	35.7	WSW	249	0.00
21-Dec-18	23.3	33.6	8.5	38.6	South	179	0.00
22-Dec-18	19.4	33.3	9.1	30.3	SSE	159	0.00
23-Dec-18	24.4	35.7	4.0	25.4	South	177	0.00
24-Dec-18	25.0	35.4	4.9	27.2	South	181	0.00
25-Dec-18	22.8	34.8	4.6	27.5	South	179	0.00
26-Dec-18	23.8	36.1	3.0	22.4	SSE	154	0.00
27-Dec-18	26.9	38.4	4.1	25.1	NE	44	0.00
28-Dec-18	30.1	38.4	2.0	41.3	West	269	0.00
29-Dec-18	29.0	40.0	1.6	28.0	ENE	70	0.00
30-Dec-18	24.8	39.5	6.1	40.2	SSW	204	0.00
31-Dec-18	16.7	27.4	10.2	43.7	South	179	0.00



5 Data Log

Sample	Result Received
Hi Volume Samples	15-01-2020
TEOM	6-02-2020
Dust Deposition	22-1-2020
Vents & Bag House	10-1-2020
Water	27-11-2019
Blast vibration and overpressure	1-12-2019
Weather	1-12-2019
Date posted to web site	26-02-2020

6 Correction Log

Nil corrections.