

Monthly Environmental Data July 2016

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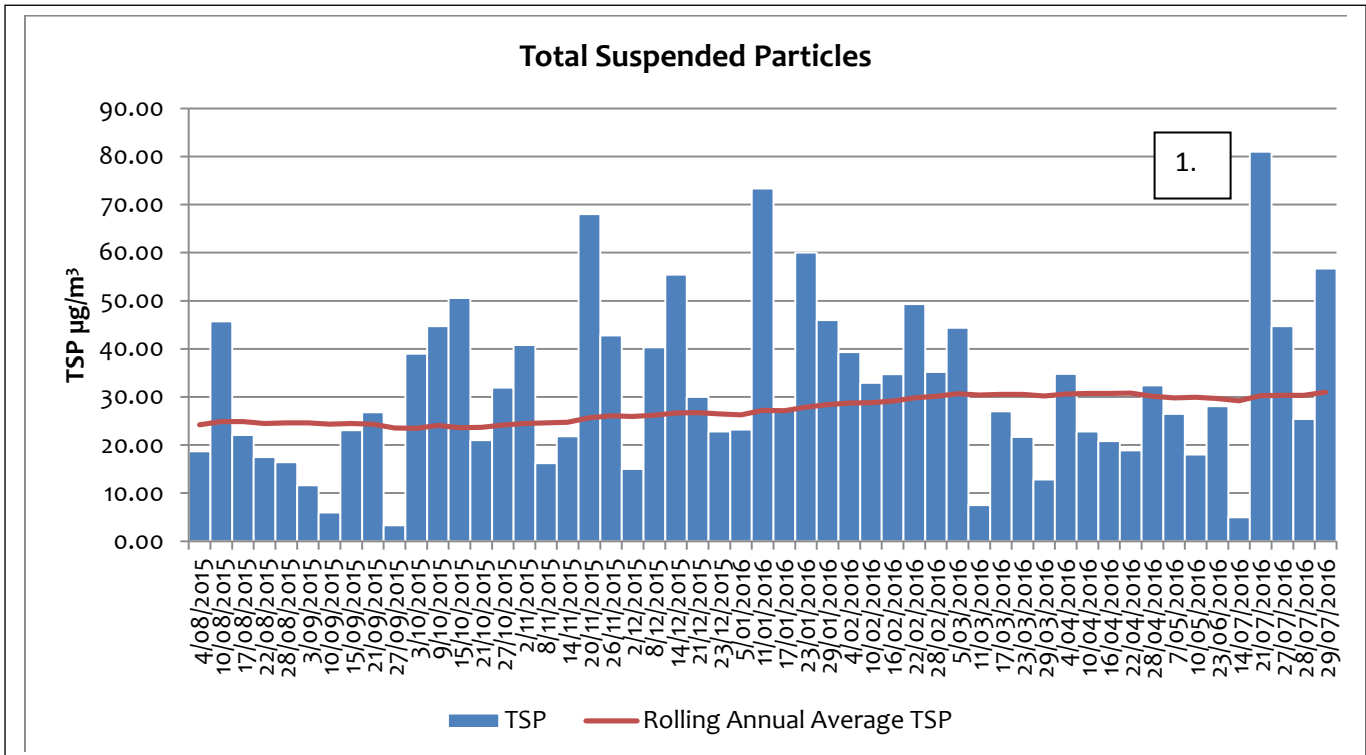
1 Air Quality

1.1 High Volume Air Samplers

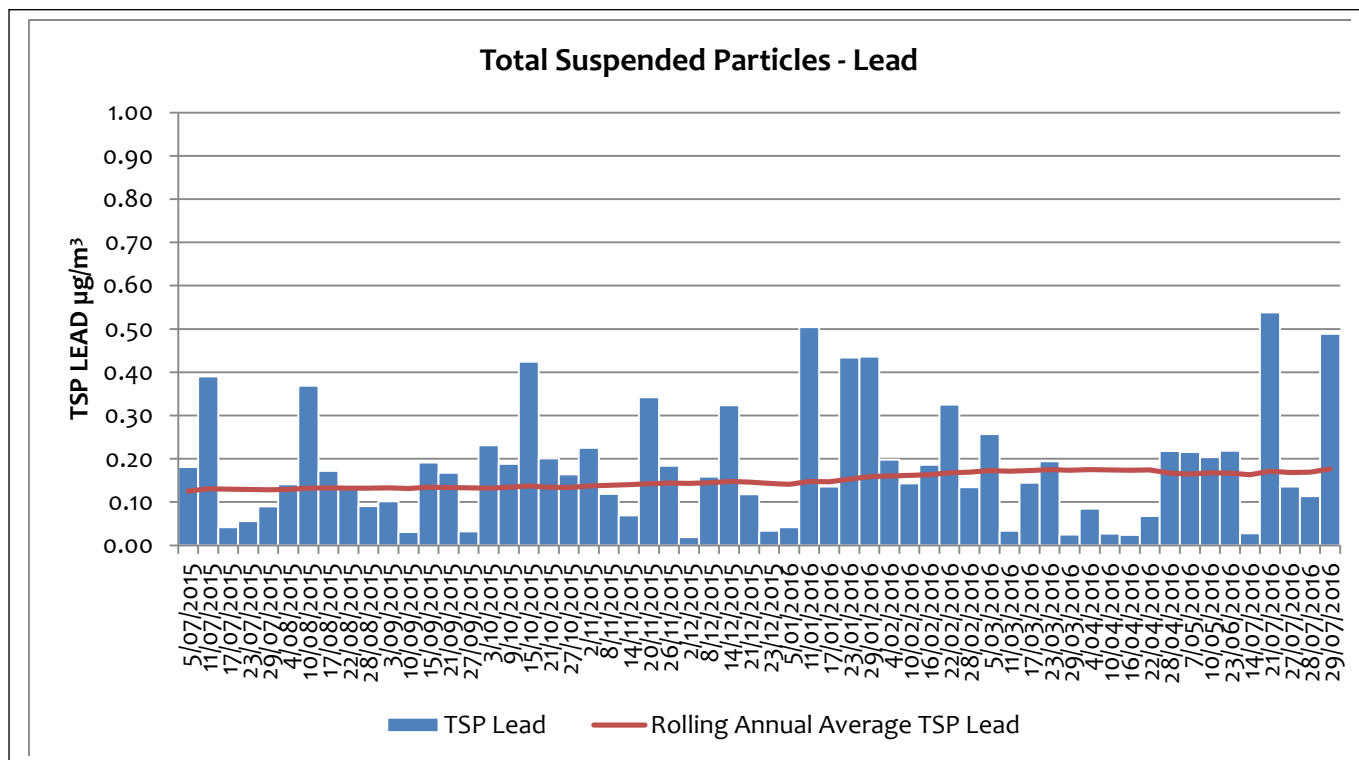
High volume air samplers at Silver Tank both failed calibration during May 2016. Both units were sent back to Ecotech in Melbourne for repair. The units were underservice for the duration of May. In early June the transformer located at Silver Tank failed thus rendering the local power source for high volume samplers 1 and 2 under service. A back up genset was put in place to power the samplers however heavy diesel particulate contamination was found on the resulting filters. The EPA were approached on the 29 June proposing to shift the monitors to the closest operational switchboard near the change rooms. The EPA indicated their preferred option would be to leave the hi vols in situ and run a sufficient lead to them to provide power and avoid contamination (provided it can be done safely). Longer leads were put in place however subsequent samples found the genset was faulting under high voltage. The load on the genset was increased in an attempt to mitigate the high voltage faults and the supply was run through two separate UPS units but the problem persisted. Diagnosis was a possible fault with the genset. With all of the available gensets already in use the next alternative was to pair the high volume samplers with another genset close by. Another unit was in place operating at the essential communications hut adjacent the weather station. The high volume units are currently being trialled here. The first samples collected have again shown signs of diesel contamination even with 10 meters of separation between the genset and the samplers. As of the 27 June the ETA of the new transformer is 1 month as it will have to be engineered and custom built.

EPL10 - SILVER TANK HI VOL TSP - ON SITE

DATE	TSP ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
14/07/2016	5.00	0.03
21/07/2016	81.00	0.54
27/07/2016	44.70	0.14
28/07/2016	25.40	0.11
29/07/2016	56.70	0.49

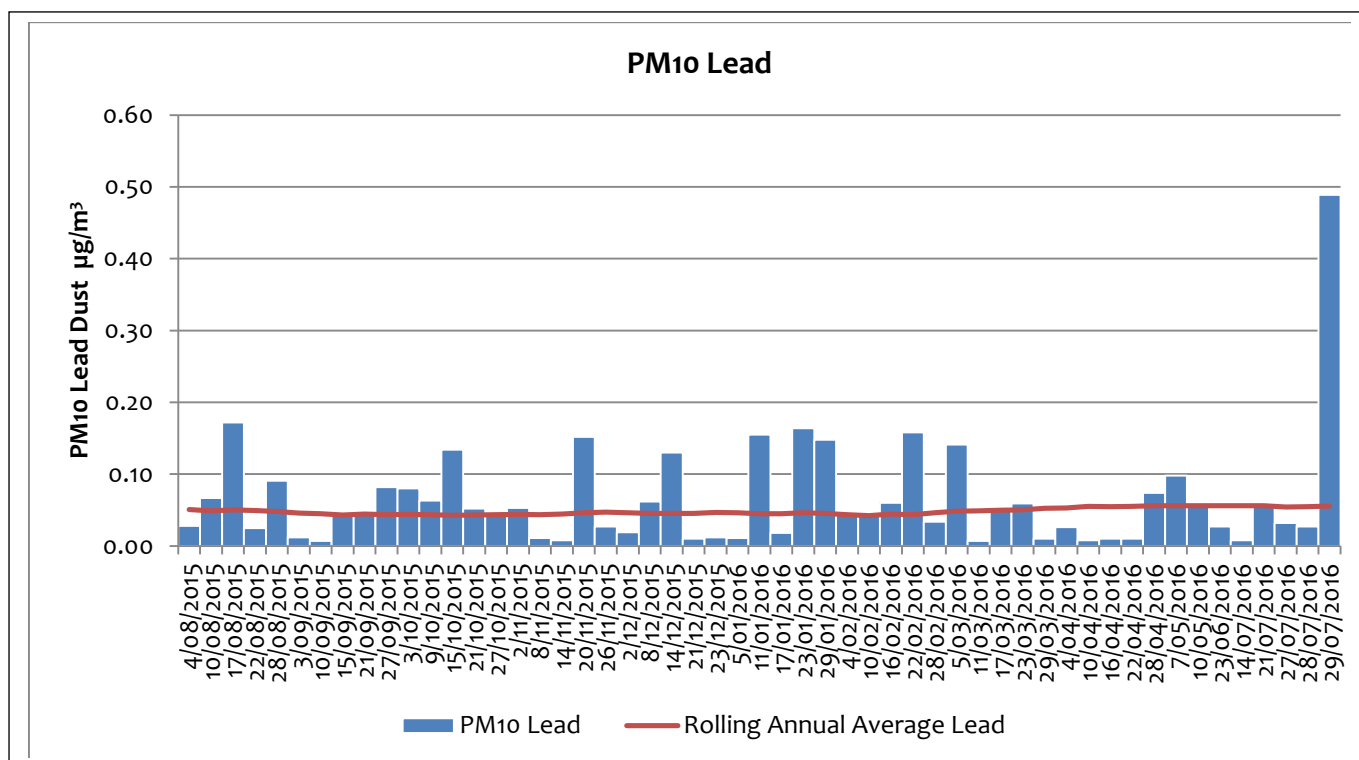
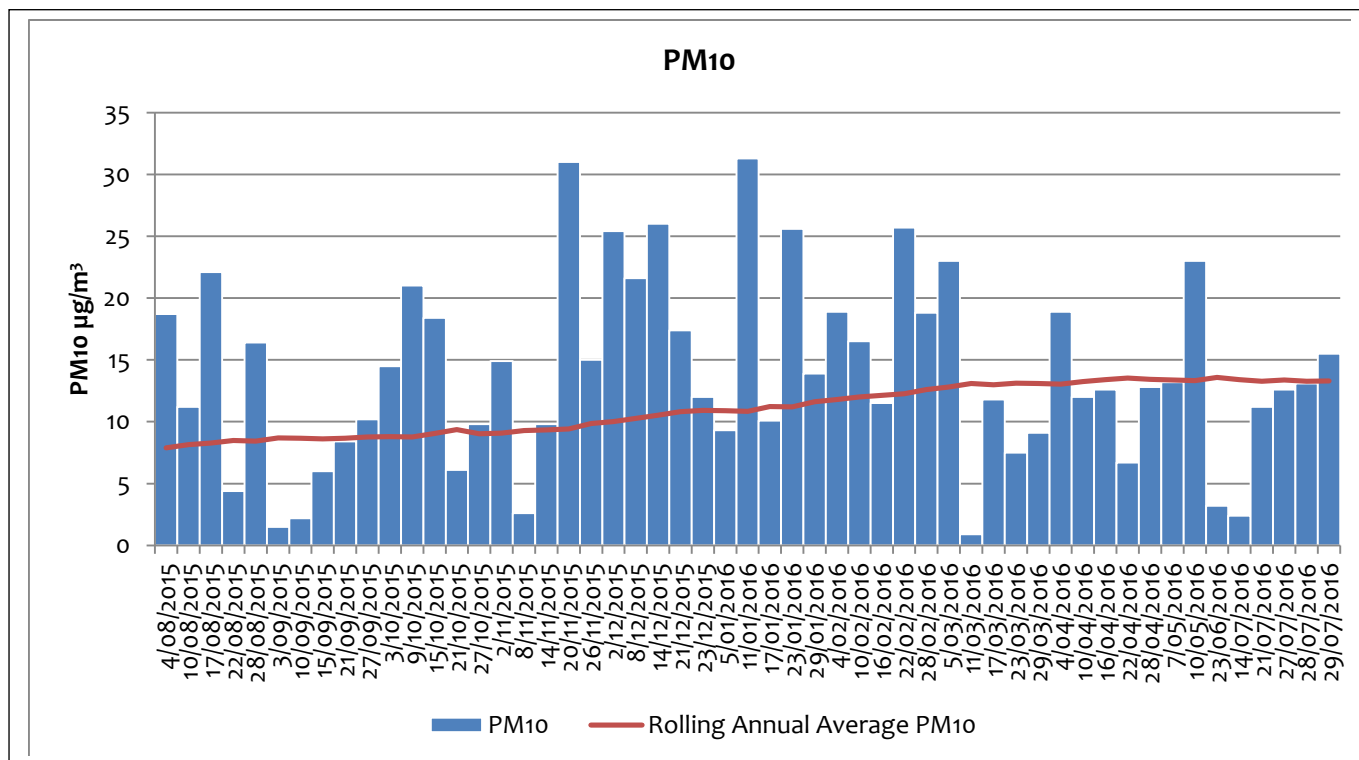


1. The spike on the 21st of July coincided with maintenance being performed on a genset from which the high volume samplers were powered. Some diesel contamination was found on the filters as a result of the diesel generator running nearby approximately 10m away. Values are still well below the Environment Protection Licence limit of 90 $\mu\text{g}/\text{m}^3$ as an annual average.



EPL11 - Silver Tank Hi Vol PM10 - On Site

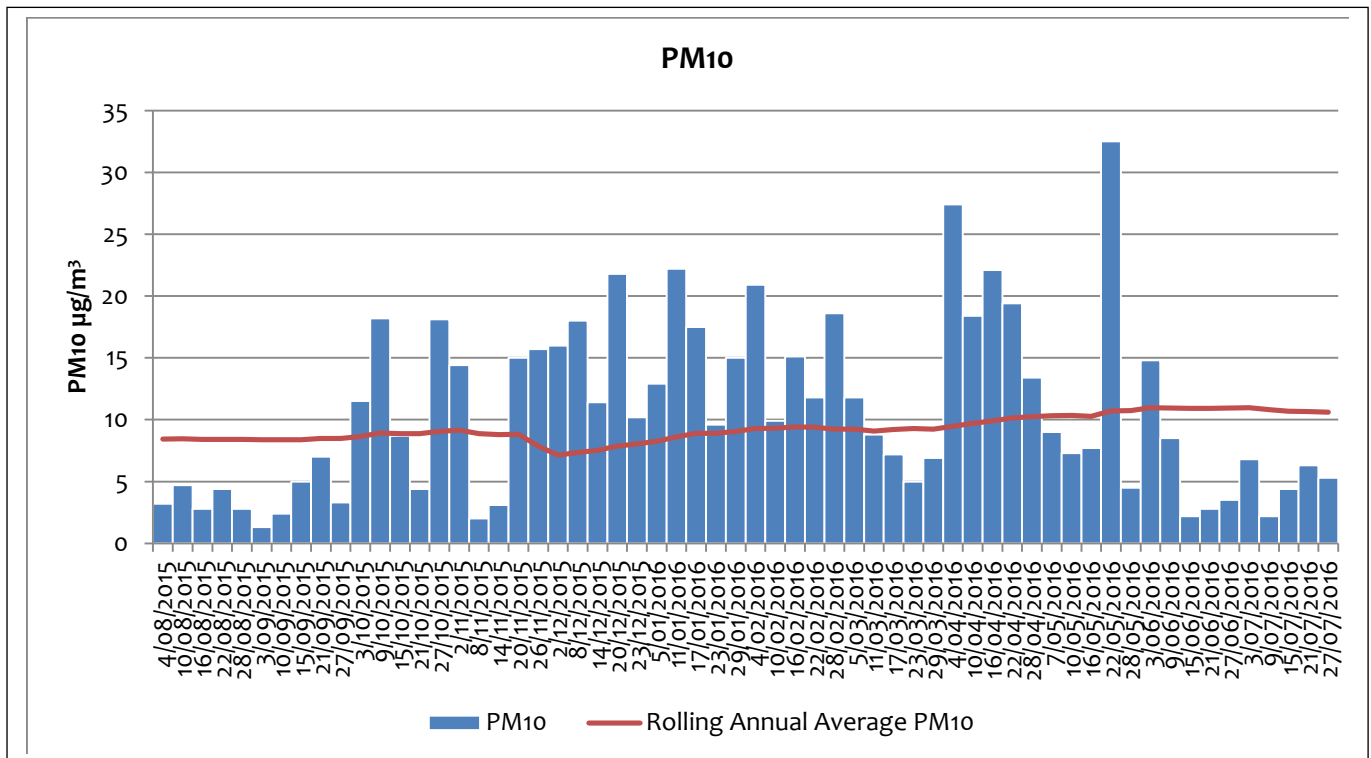
DATE	PM10 ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
14/07/2016	2.40	0.01
21/07/2016	11.20	0.06
27/07/2016	12.60	0.03
28/07/2016	13.10	0.03
29/07/2016	15.50	0.49



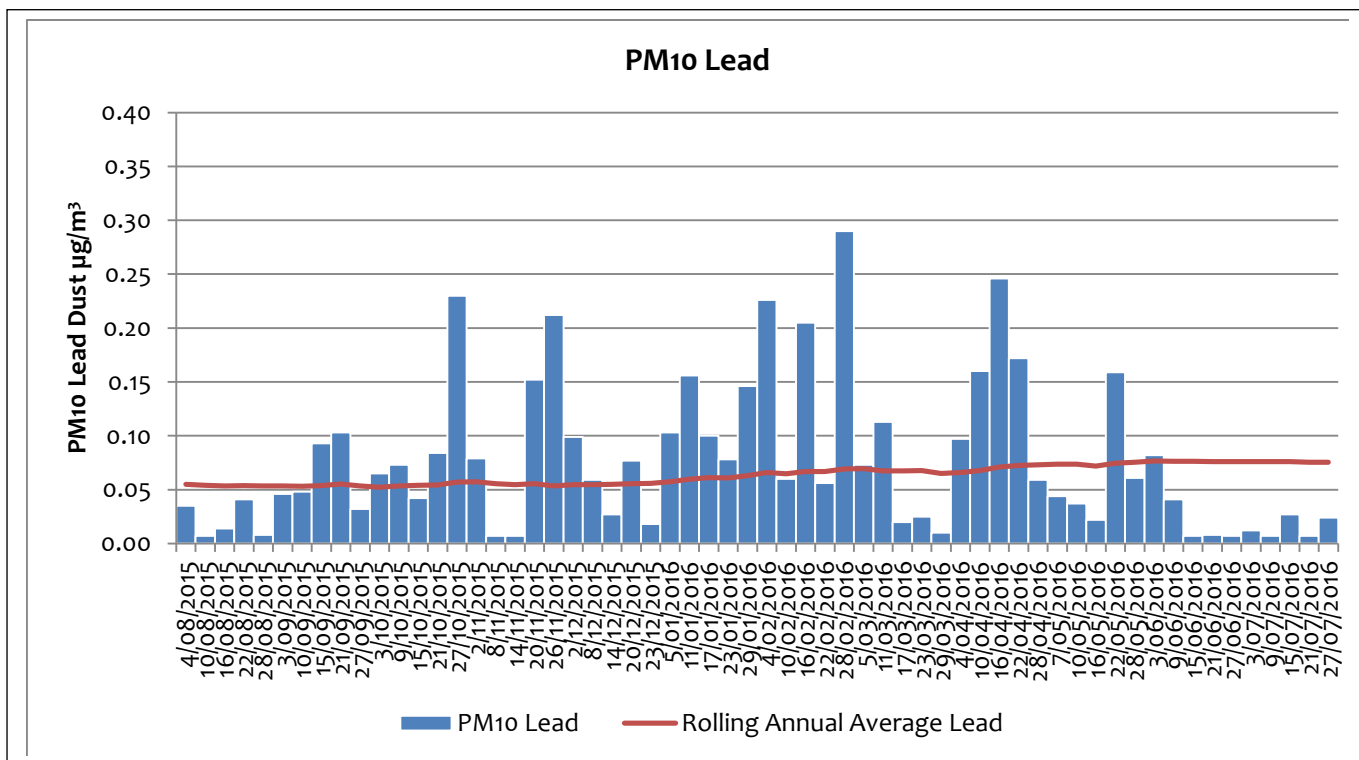
1. A spike in lead concentration occurred on July 29. A concentration of $0.49\mu\text{g}/\text{m}^3$ was recorded which may have been due to vehicles passing close by during servicing of a diesel genset which was powering the high volume sampler. Values are still below the Environment Protection Licence limit of $0.50\mu\text{g}/\text{m}^3$ averaged over 1 year.

EPL12 - Blackwoods Pit Hi Vol PM10 – On Site

DATE	PM10 ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
3/07/2016	6.80	0.01
9/07/2016	2.20	0.01
15/07/2016	4.40	0.03
21/07/2016	6.30	0.01
27/07/2016	5.30	0.02



1. The Environment Protection Licence limit for PM10 is 50 $\mu\text{g}/\text{m}^3$ averaged over 1 day.

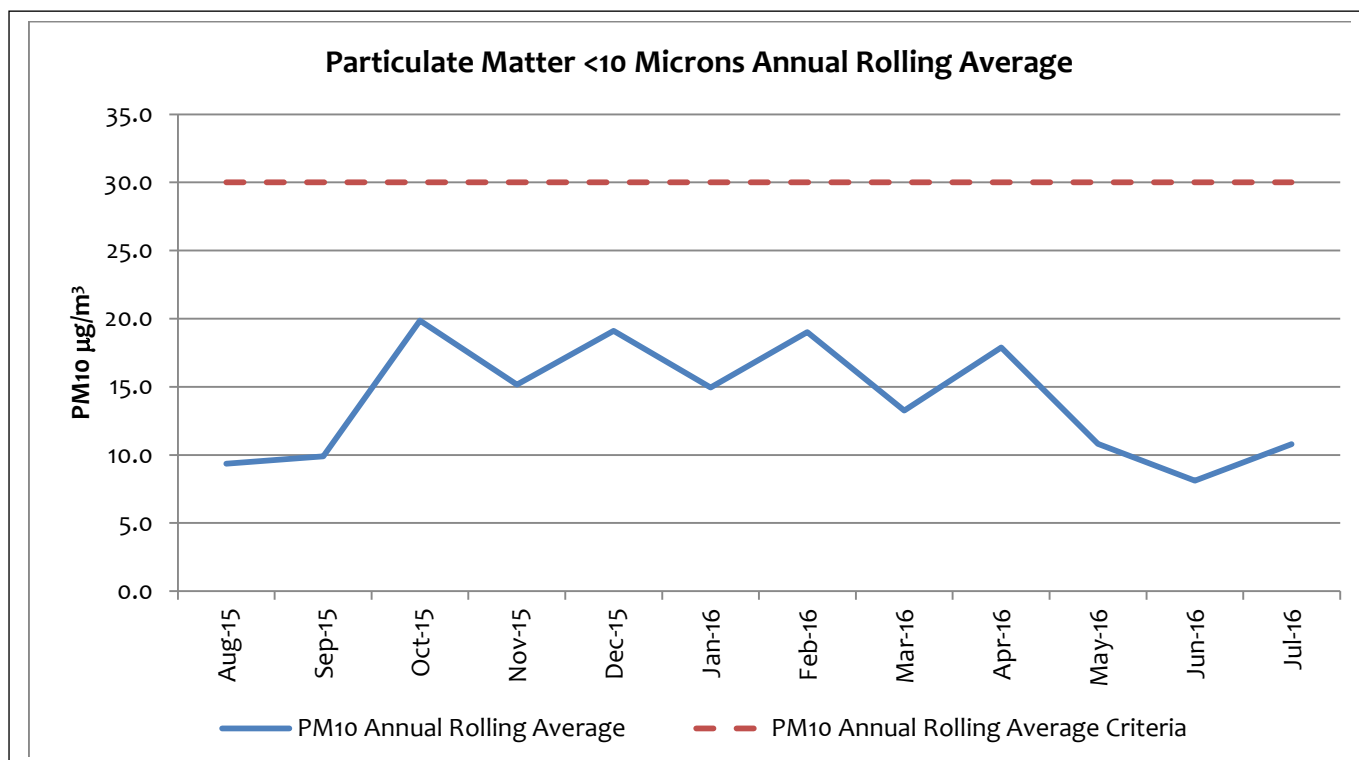
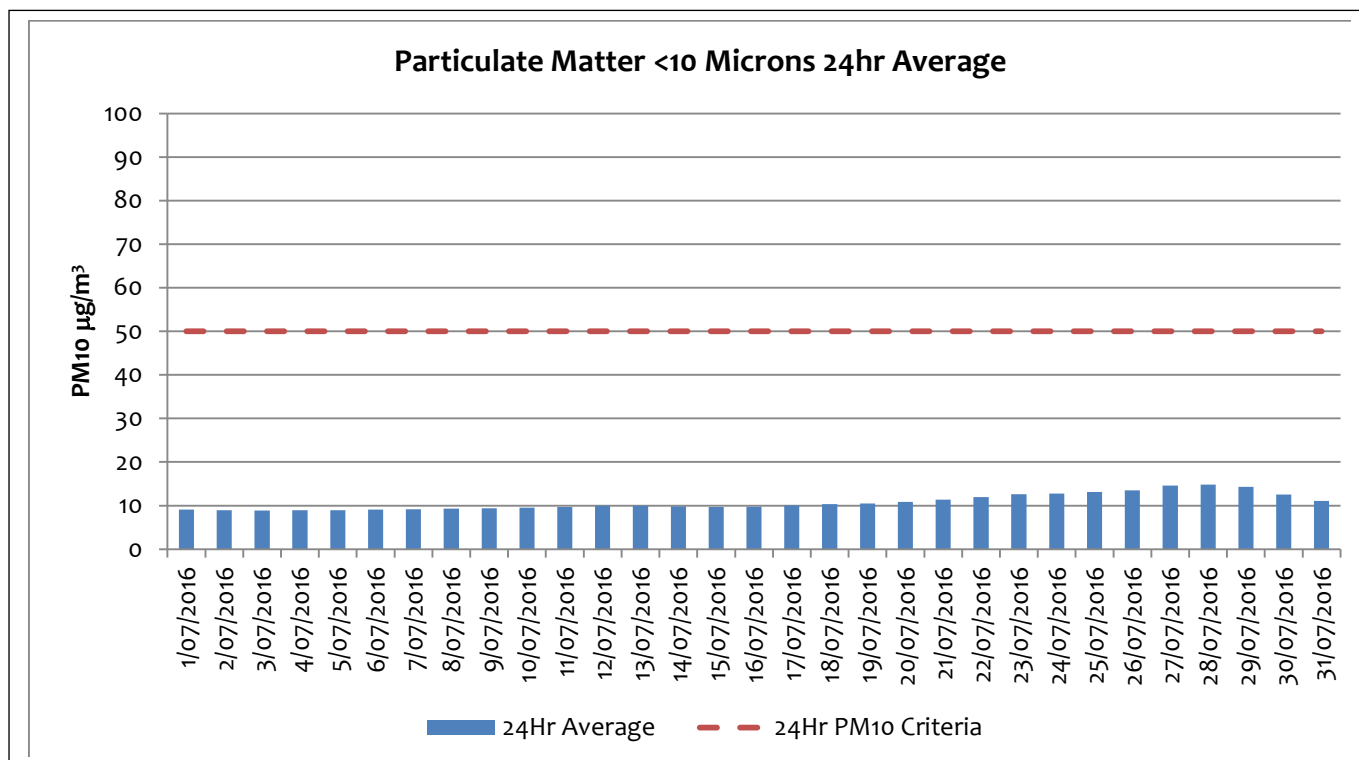


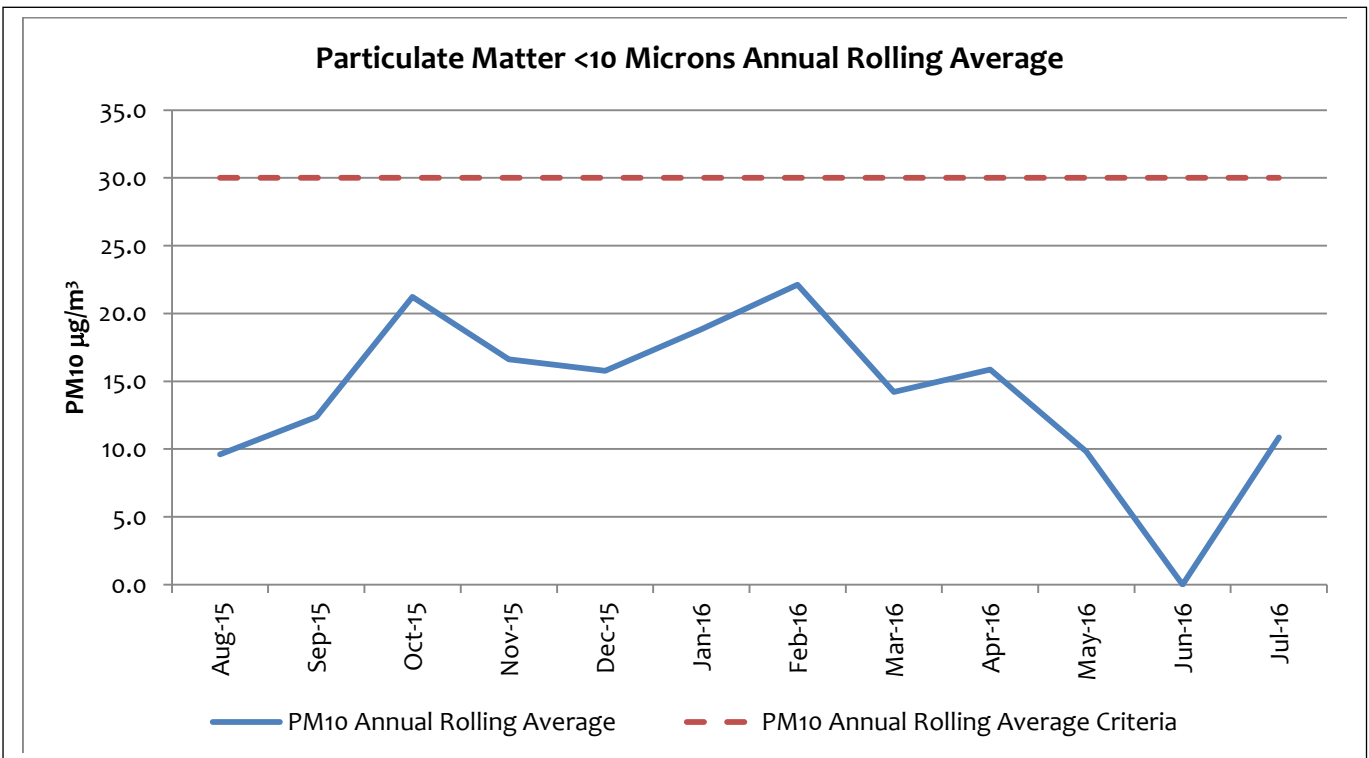
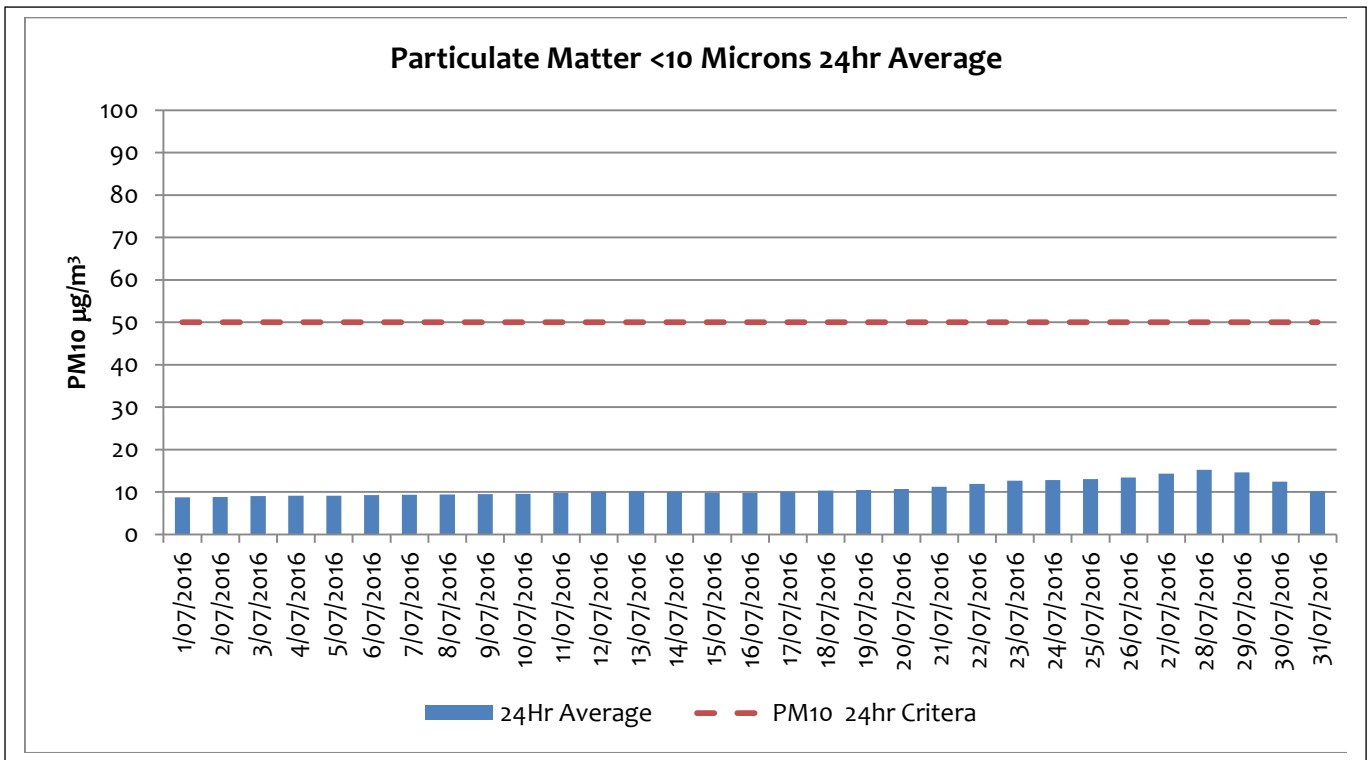
1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

Particulate Matter <10 Microns 24Hr Average		
Date	TEOM 1 - EPL 13 ($\mu\text{g}/\text{m}^3$) Essential Water – Off Site	TEOM 2 – EPL 14 ($\mu\text{g}/\text{m}^3$) Blackwoods Pit – On Site
1/07/2016	9.05	8.74
2/07/2016	8.92	8.83
3/07/2016	8.85	9.04
4/07/2016	8.90	9.10
5/07/2016	8.94	9.14
6/07/2016	9.07	9.27
7/07/2016	9.19	9.37
8/07/2016	9.29	9.42
9/07/2016	9.37	9.49
10/07/2016	9.49	9.56
11/07/2016	9.71	9.80
12/07/2016	9.95	10.05
13/07/2016	9.99	10.17
14/07/2016	9.82	10.05
15/07/2016	9.65	9.79
16/07/2016	9.78	9.79
17/07/2016	10.05	10.02
18/07/2016	10.33	10.32
19/07/2016	10.46	10.48
20/07/2016	10.82	10.73
21/07/2016	11.37	11.21
22/07/2016	11.96	11.91
23/07/2016	12.61	12.65
24/07/2016	12.78	12.80
25/07/2016	13.09	13.00
26/07/2016	13.51	13.40
27/07/2016	14.59	14.29
28/07/2016	14.81	15.21
29/07/2016	14.29	14.63
30/07/2016	12.52	12.43
31/07/2016	11.08	10.15

PM10 $\mu\text{g}/\text{m}^3$ 12 Month Rolling Average												
	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
TEOM 1 EPL13 Essential Water Off Site	9.4	9.9	19.8	15.2	19.1	15.0	19.0	13.3	17.9	10.8	8.1	10.8
TEOM 2 EPL14 Blackwoods Pit On Site	9.6	12.4	21.2	16.6	15.8	18.8	22.1	14.2	15.9	9.8	N/A	10.9

EPL13 – Essential Water – Off Site (TEOM1)

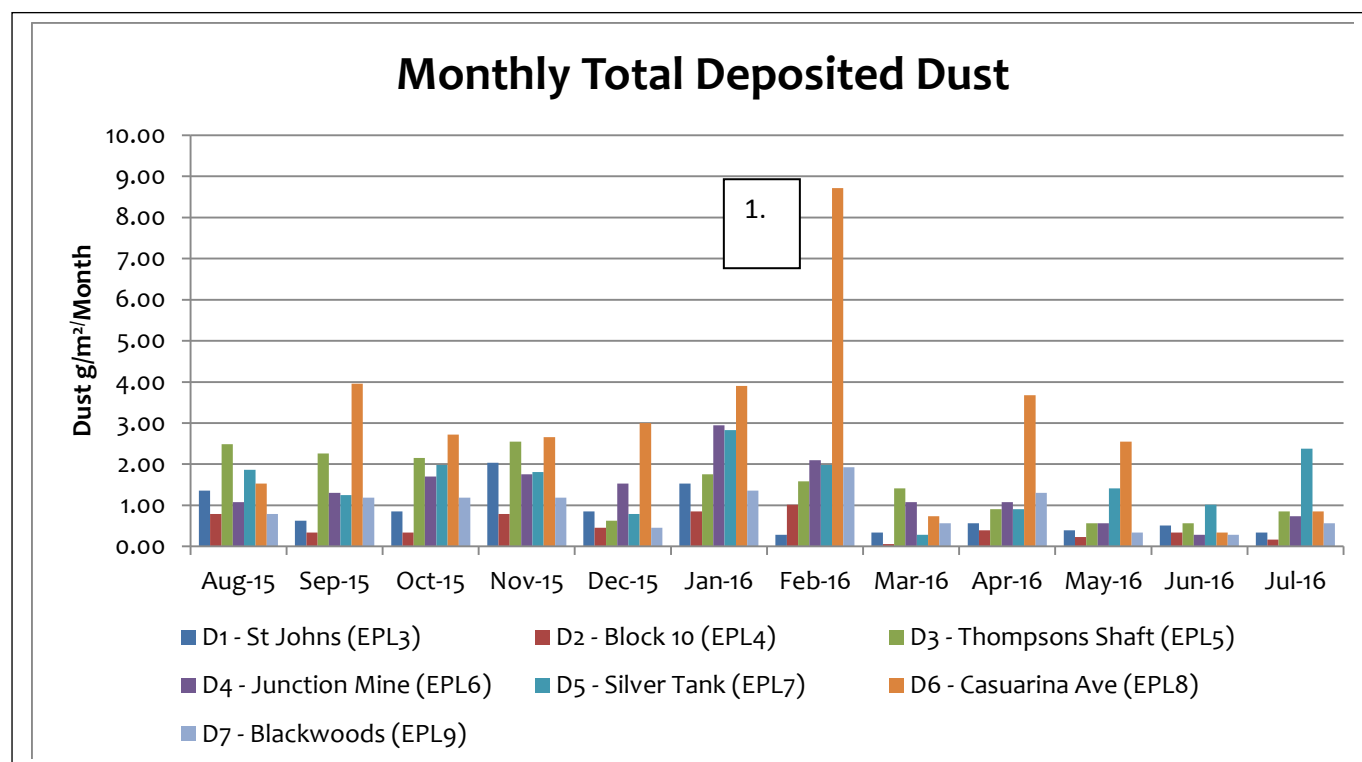




TEOM 2 was calibrated by an external manufacturer's technician on May 5. The technician failed to reset the machine which lead to the machine failing to record data for the remainder of May and the whole of June. The error was found by the Environmental Officer during the monthly data download.

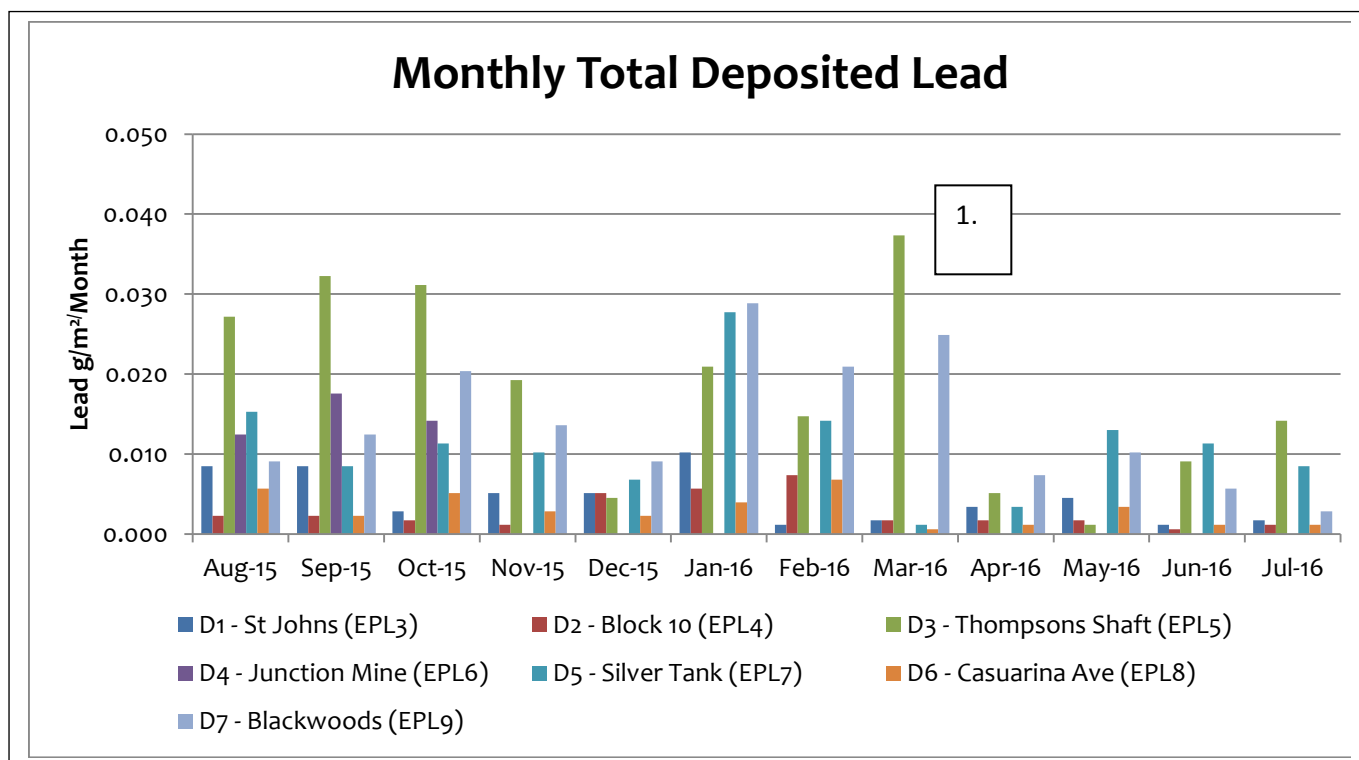
1.3 Dust Deposition Sampling

Total Deposited Dust (g/m ² /Month)							
Date	D1 (off site)	D2	D3	D4	D5	D6 (off site)	D7
July 2016	0.34	0.17	0.85	0.74	2.38	0.85	0.57
Background Average	4.0	3.1	4.3	5.7	n/a	5.8	n/a



1. When the sample for February was collected the sample stand had been relocated within the back yard of the residence. The resident was asked to move the stand back to its original location. Contamination from a nearby greenhouse is suspected. The maximum allowable total concentration of deposited dust is 4g/m²/month as per the site Environment Protection Licence.

Total Deposited Lead (g/m ² /Month)							
Date	D1 (Off Site)	D2	D3	D4	D5	D6 (Off Site)	D7
July 2016	0.002	0.001	0.014	0.000	0.008	0.001	0.003
Background Average	0.0000	0.001	0.0018	0.0040	0.0010	0.0020	0.0100



1. Samples at Thompson's shaft spiked in lead concentration in August, September, October and again in March. Nearby vegetation and buildings have been identified as potential sources. Nearby vegetation was removed in September and October. A clean up of the haul road adjacent Thompsons Shaft was also carried out in September. The haul road will continue to be monitored. Further investigation is required with regard to nearby buildings, it is suspected the paint on the buildings contains lead and is in poor condition. There is also exposed remnant ore body at the surface in this location which may also contribute as a slightly higher than background influence. The dust bottle location was moved approximately 10m away from the buildings and has delivered a lower total deposited lead reading for December however levels are slightly higher again in January. Essential Water were performing earth works near the western boundary of the site during January which may have contributed in some way. Additionally some lead shipping containers were cleaned during January at the rail load out. The latest monthly results from April onwards have been much lower and coincide with the annual application of dust suppression chemical.

2 Blasting (Vibration and Overpressure)

Note: *Vibration is recorded in Peak Particle Velocity (ppv), Overpressure is recorded in Decibels (dBL)*

July Summary Block 7, Zinc Lode:

- 0 production firings
- 18 development firings
- 0 Blast recorded a ppv of >3mm/s
- 0 Blasts recorded a ppv of >10mm/s
- 0 Blasts recorded an over pressure level over 115dBL
- 0 Blasts recorded an over pressure above 120dBL

12 Month Summary of Zinc Lode:

- % of all blasts over 3mm/sec = **1.86%** (licence requirement <5%) calculated from 1st August 2015 until 31st July, 2016;
- % of production blasts over 3mm/sec = **2.77%** (licence pollution reduction plan target <5%) calculated from 1st August 2015 until 31st July, 2016.

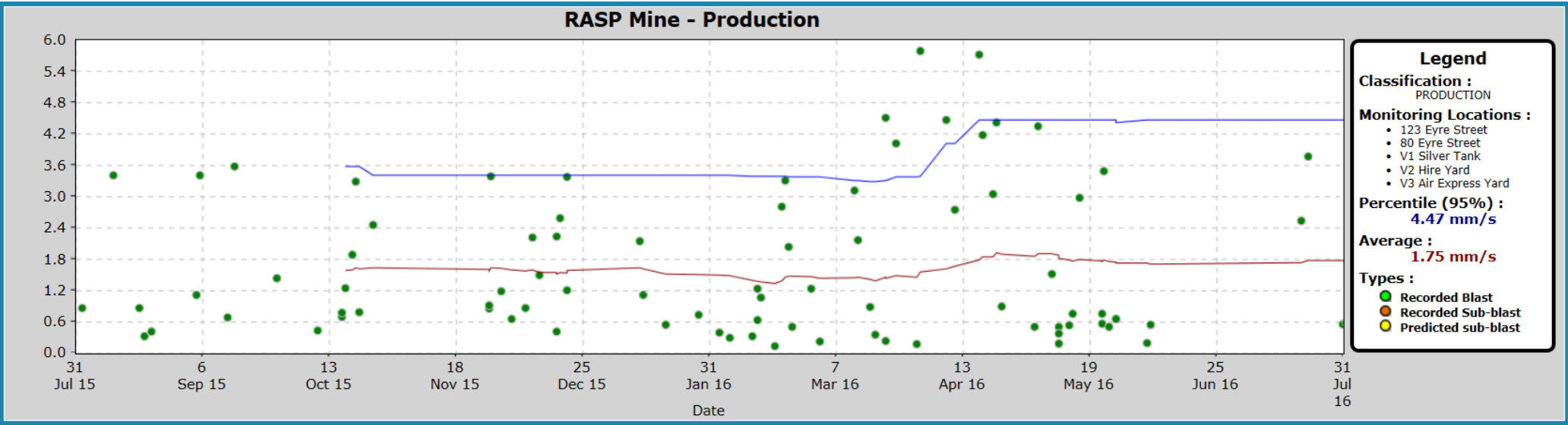
July Summary Rest of Mine, Western Mineralisation and Main Lode:

- 7 production firings
- 157 development firings
- 1 Blasts recorded a ppv of >5mm/s
- 0 Blasts recorded a ppv of >10mm/s
- 0 Blasts recorded an over pressure level over 115dBL
- 0 Blasts recorded an over pressure above 120dBL

12 Month Summary Rest of Mine, Western Mineralisation and Main Lode:

- % of all blasts over 5mm/sec = **0.38%** (licence requirement <5%) calculated from 1st August 2015 until 31st July, 2016;
- % of production blasts over 5mm/sec = **5.76%** (licence pollution reduction plan target <5%) calculated from 1st August 2015 until 31st July, 2016.
-

12 Month Production Blast Progress Chart



Noise

Noise monitoring is undertaken as per the NSW Industrial Noise Policy at a higher frequency of once per annum. A noise assessment was conducted during July 2016 data is currently being analysed by EMM. The final report is due in August.

3 Water

3.1 Ground Water Sampled 12/07/2016

		UG FEED	SHAFT 7
pH Value	pH Unit	6.53	6.49
Electrical Conductivity @ 25°C	µS/cm	14000	11200
Total Dissolved Solids @180°C	mg/L	13700	7220
Hydroxide Alkalinity as CaCO3	mg/L	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	14	21
Total Alkalinity as CaCO3	mg/L	14	21
Sulfate as SO4 - Turbidimetric	mg/L	5000	4360
Chloride	mg/L	1800	1210
Calcium	mg/L	477	462
Magnesium	mg/L	286	222
Sodium	mg/L	1640	1290
Cadmium	mg/L	3.18	1.91
Lead	mg/L	2.84	1.69
Manganese	mg/L	468	328
Zinc	mg/L	1020	1010
Iron	mg/L	<0.10	<0.10

3.2 Surface Water Sampled 21/07/2016

		S49 RYAN ST DAM	S44 RAIL OUT	S1A OLIVE GROVE	S31-1 FEDERATION WAY	S9-B2 BOWLS CLUB	HORWOOD DAM
pH Value	pH Unit	6.12	6.29	6.4	6.04	6.32	6.2
Electrical Conductivity @ 25°C	µS/cm	754	1940	429	938	508	10600
Total Dissolved Solids @180°C	mg/L	605	1480	300	659	326	9610
Hydroxide Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	3	12	15	6	12	9
Total Alkalinity as CaCO3	mg/L	3	12	15	6	12	9
Sulfate as SO4 - Turbidimetric	mg/L	312	751	163	423	168	3890
Chloride	mg/L	8	115	6	13	29	1390
Calcium	mg/L	96	284	64	108	54	485
Magnesium	mg/L	6	24	4	5	5	277
Sodium	mg/L	12	110	8	12	25	1520
Cadmium	mg/L	0.352	0.176	0.0586	0.802	0.0879	2.14
Lead	mg/L	0.449	0.732	0.436	1.72	1.01	2.74
Manganese	mg/L	18.9	9.26	2.68	24.5	4.4	363
Zinc	mg/L	48.1	20.1	8.92	98.1	12.5	552
Iron	mg/L	0.22	0.16	0.49	<0.05	0.35	1.17

3.3 Surface Water Sample Record

Insufficient rainfall for opportunistic surface water sampling during July 2016

Surface Water Table Nov 2015 to Nov 2016

EPA Identification Number	Frequency	Comment
EPL29 (Federation Way culvert)	2 x Per year when contains water	Sampled 9/5/16 & 21/7/16
EPL31 (Ryan Street Dam)	2 x Per year when contains water	Sampled 9/5/16 & 21/7/16
EPL32 (S1-A adjacent olive grove)	2 x Per year when contains water	Sampled 9/5/16 & 21/7/16
EPL33 (Horwood Dam)	2 x Per year when contains water	Sampled 11/1/16, 10/2/16 & 9/5/16
EPL34 (Upstream Bonanza St)	2 x Per year when contains water	Sampled 1/8/16
EPL35 (Downstream Sydney Rd)	2 x Per year when contains water	Sampled 1/8/16

4 Weather Data

BHOP – Automatic Weather Station was unavailable for June. The new weather station was installed on June 15. The weather station continuously monitors the following parameters as per point 55 of the Environmental Protection Licence.

POINT 55

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 continuous data can be viewed at any time at the following web site using the username and password.

www.loggermonitor.com/login

user: CBHAdmin

pass: brokenhill

Summary reports for all licence parameters are available from the website however due to the 15 minute data being very large daily summary data was also obtained from the Bureau of Meteorology Broken Hill on the following page:

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9 am					3 pm							
		Min	Max				Dir	Spd	Time	Temp	RH	Cld	Dir	Spd	MSLP	Temp	RH	Cld	Dir	Spd	MSLP	
		°C	°C					km/h	local	°C	%	g th		km/h	hPa	°C	%	g th		km/h	hPa	
1	Fr						S	31	14:22				WSW	17	1026.6				SSW	19	1025.6	
2	Sa						SW	20	13:53				SSW	9	1031.5				WSW	11	1029.0	
3	Su						NNE	24	09:28				NNE	15	1028.6				NE	11	1023.7	
4	Mo						NW	30	23:49				ENE	19	1016.3				W	11	1012.1	
5	Tu						SW	48	00:55				WNW	28	1013.3				SW	30	1016.3	
6	We						SW	39	00:22				WSW	22	1022.9				SW	22	1021.5	
7	Th						SW	24	13:45				WSW	11	1023.6				SW	11	1020.1	
8	Fr						SW	26	11:17				SW	13	1023.3				SSW	15	1021.9	
9	Sa						ENE	35	21:10				ENE	19	1025.0				NE	13	1021.7	
10	Su						NNE	56	16:42				NNE	28	1017.7				NNE	35	1011.8	
11	Mo						NW	61	11:20				NW	39	1011.1				NW	35	1009.6	
12	Tu						WNW	74	12:39				NW	37	1013.0				WNW	46	1014.1	
13	We						SW	41	11:33				W	19	1028.0				SW	20	1028.6	
14	Th						SSW	26	13:47				SSW	9	1035.2				SSW	11	1032.1	
15	Fr						SSE	30	11:50				Calm		1034.2				SE	13	1031.5	
16	Sa						SE	33	11:07				E	22	1032.3				SE	24	1028.1	
17	Su						NE	31	15:51				NE	11	1027.6				ENE	15	1023.3	
18	Mo						NNW	35	11:15				NNW	17	1022.8				NW	15	1020.0	
19	Tu						SSE	30	20:39				ENE	17	1021.5				Calm		1018.3	
20	We						SE	31	01:10				SE	6	1020.1				SE	13	1018.6	
21	Th						N	33	23:11				NNE	11	1018.2				N	17	1013.7	
22	Fr						NW	65	10:48				NNW	35	1007.1				NW	33	1004.4	
23	Sa						W	54	00:12				WNW	22	1015.4				W	17	1015.2	
24	Su						WNW	69	14:13				NNE	15	1015.0				WNW	43	1012.1	
25	Mo						NW	50	15:00				NW	19	1020.1				NW	31	1017.8	
26	Tu						WNW	50	22:20				NW	11	1020.0				NW	24	1015.7	
27	We						WNW	57	01:36				WSW	20	1021.8				SW	20	1023.9	
28	Th						W	20	13:23				SSW	6	1031.0				WNW	9	1027.3	
29	Fr						NW	28	13:09				N	9	1026.9				W	15	1023.8	
30	Sa						NNW	33	11:37				NNE	9	1023.2				NNW	19	1019.2	
31	Su						NW	31	10:39				N	7	1019.5				NNW	11	1016.7	
Statistics for July 2016																						
Mean														16	1022.3					19	1019.9	
Lowest														Calm	1007.1					Calm	1004.4	
Highest								WNW	74					NW	39	1035.2				WNW	46	1032.1
Total																						

IDCJDW2020.201607 Prepared at 13:00 GMT on Sunday 14 August 2016

Legend

Dir = Direction, **Spd**=Wind Speed, **Temp**=Temperature, **RH**=Relative Humidity, **CLD**=Cloud, **MSLP**=Mean Sea Level Pressure

5 Data Log

Sample	Result Received	Date Published
Hi Volume Samples	12/8/2016	19/8/2016
TEOM	Real time	19/8/2016
Dust Deposition	16/8/2016	19/8/2016
Water	19/7/16	19/8/2016
Blast Vibration and overpressure	Real Time	19/8/2016

6 Correction Log

There are no corrections for the previous month

7 Attachments

Field monitoring data for July has been entered in to google forms. There are no attachments.