Monthly Environmental Data August 2015

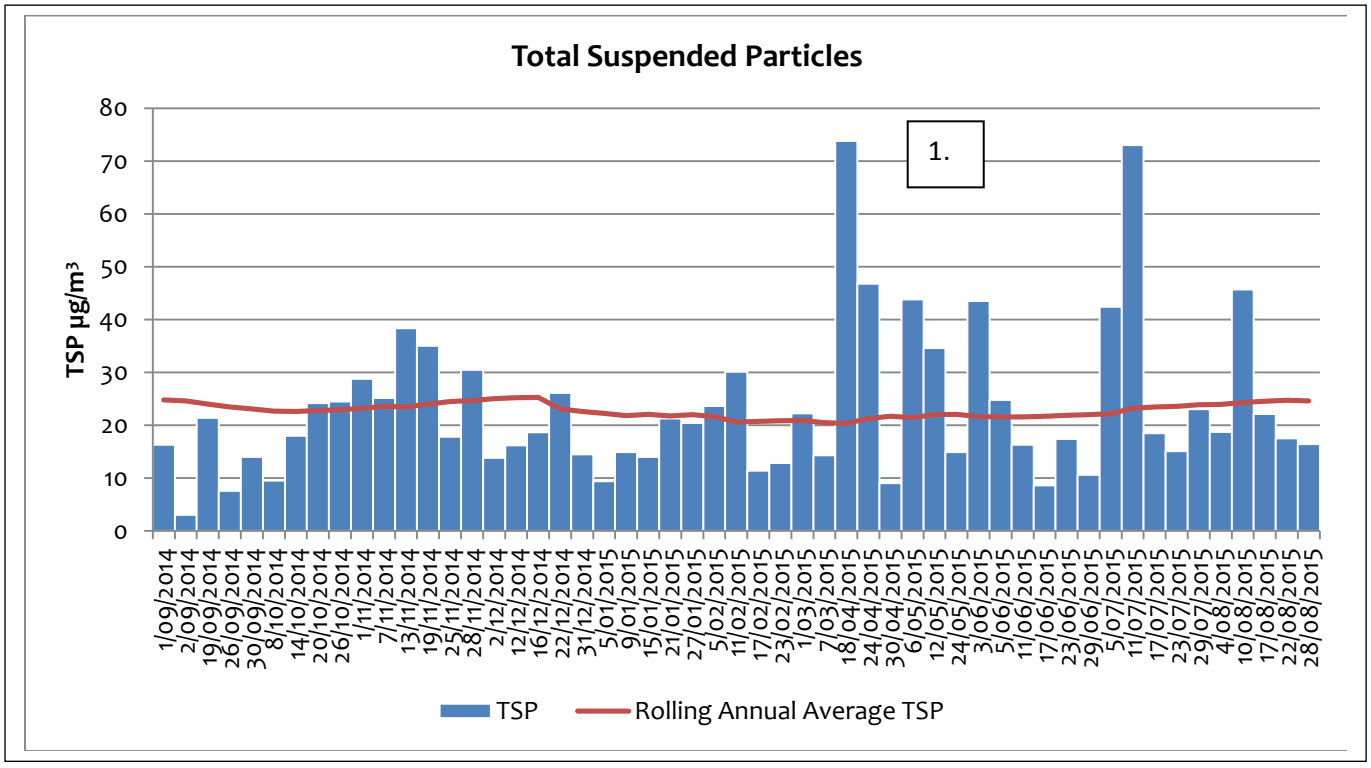
Contents

1 Air Quality

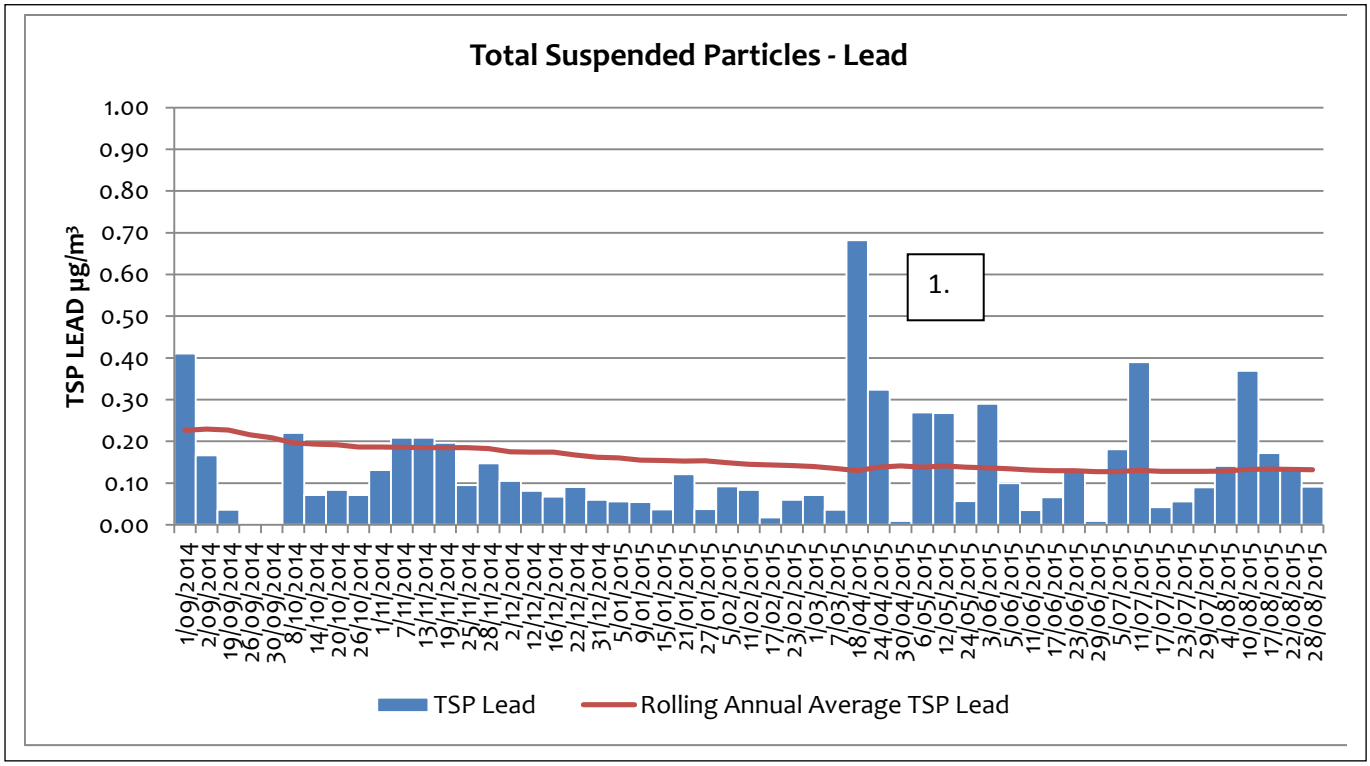
1.1 High Volume Air Samplers

EPL10 - SILVER TANK - ON SITE

DATE	TSP (µg/m^3)	Lead (µg/m^3)
4/08/2015	18.70	0.14
10/08/2015	45.70	0.37
17/08/2015	22.10	0.17
22/08/2015	17.50	0.13
28/08/2015	16.40	0.09



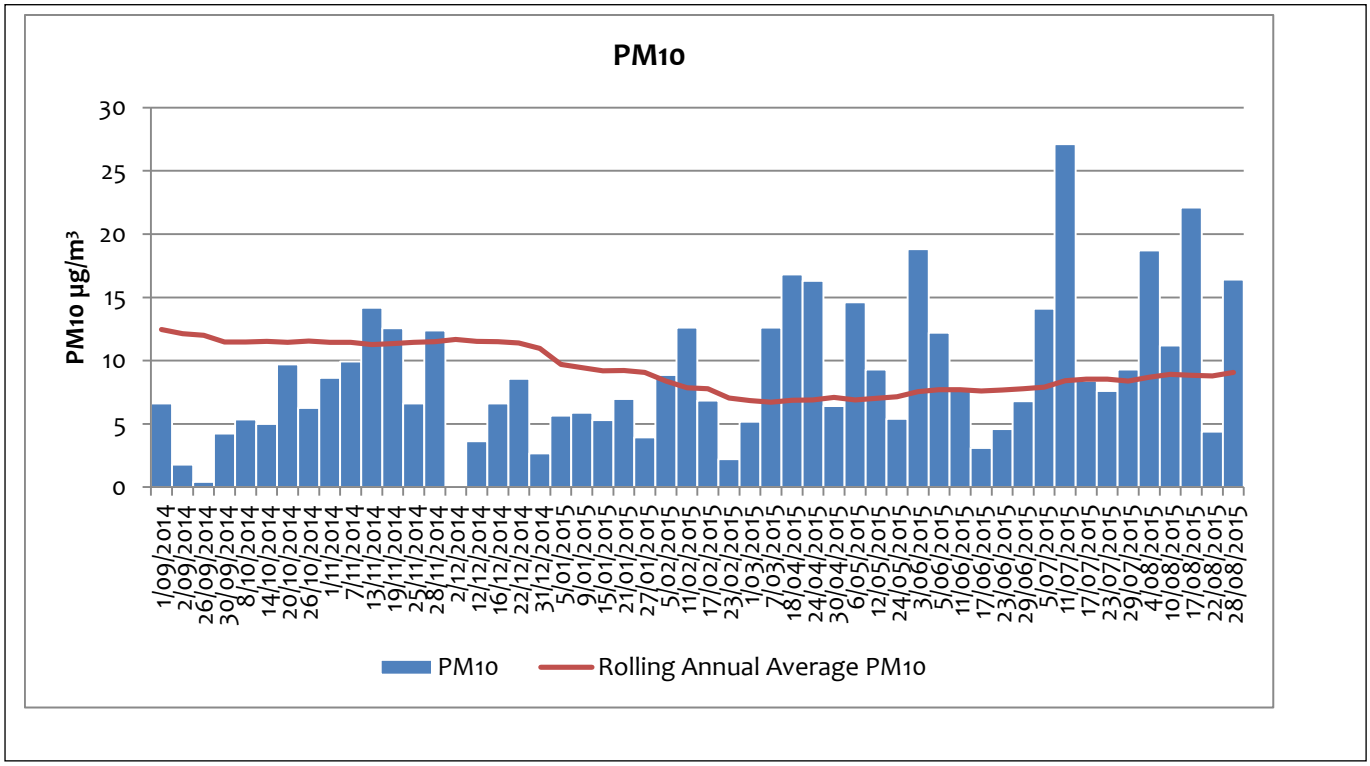
1. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination. The spike on the 11th July also occurred when conditions were considered normal with 15km/h winds from a SE direction. Lab QC was okay, this may have been due to earthmoving activity (grading) in the local area.

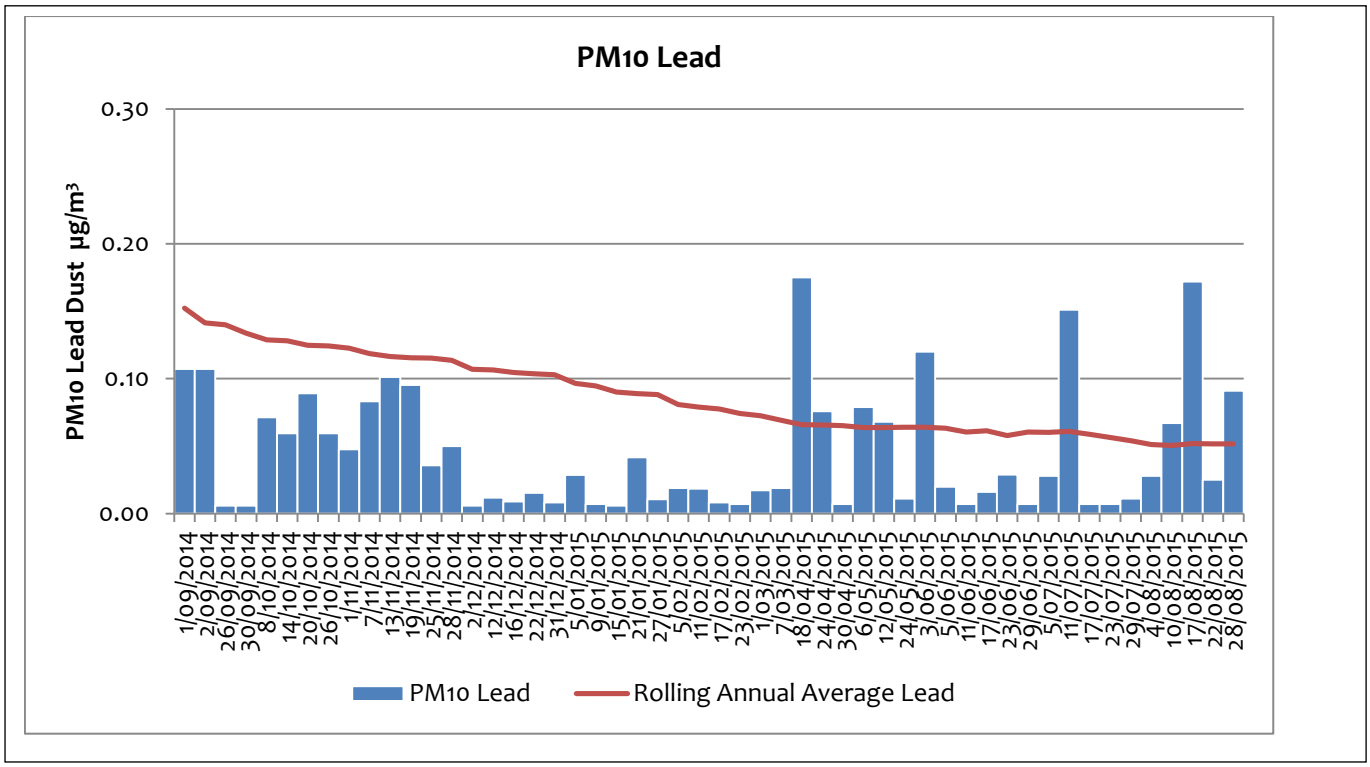


2. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination.

EPL11 - Silver Tank - On Site

DATE	PM10 (µg/m³)	Lead (µg/m³)
4/08/2015	18.70	0.03
10/08/2015	11.20	0.07
17/08/2015	22.10	0.17
22/08/2015	4.40	0.03
28/08/2015	16.40	0.09

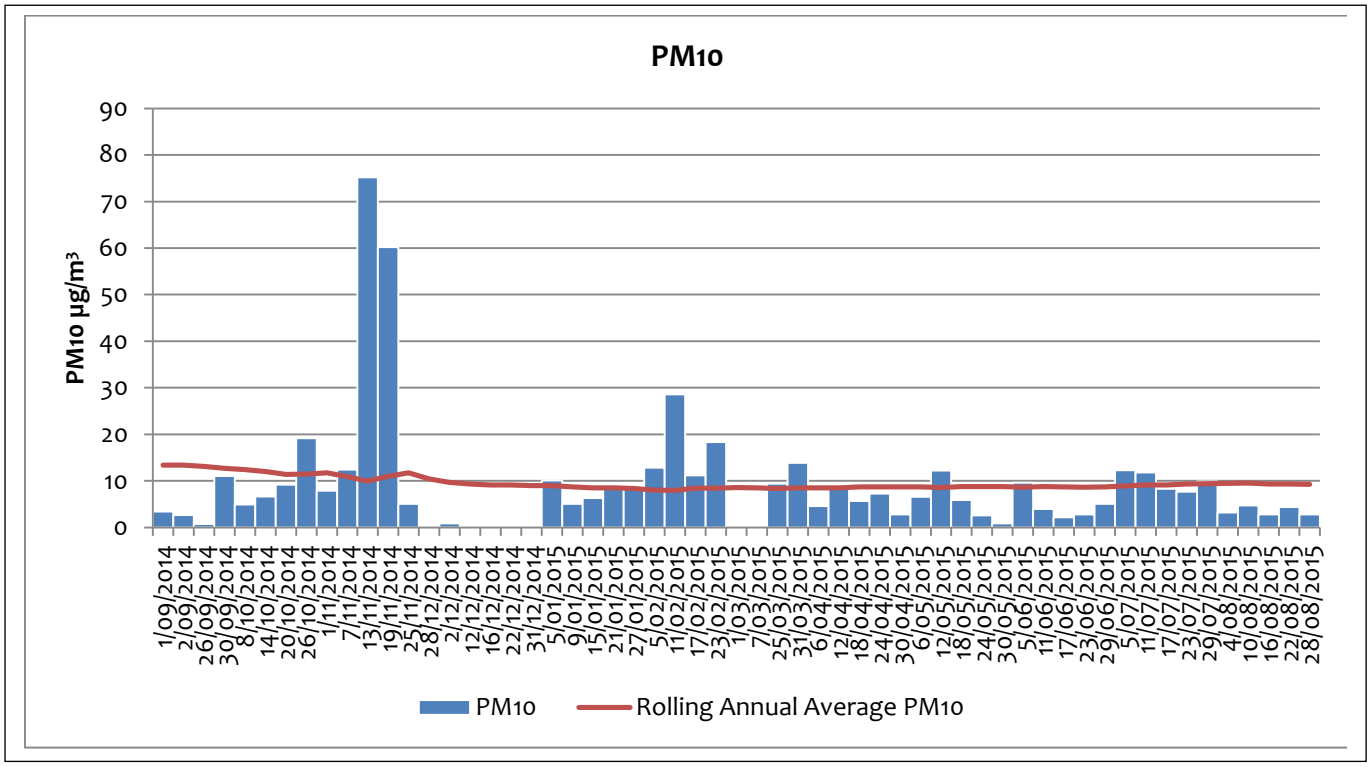

PM10
PM10 µg/m³
30
25
20
15
10
5
0
1/09/2014
2/09/2014
26/09/2014
30/09/2014
8/10/2014
14/10/2014
20/10/2014
26/10/2014
1/11/2014
7/11/2014
13/11/2014
19/11/2014
25/11/2014
28/11/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
17/02/2015
23/02/2015
1/03/2015
7/03/2015
18/04/2015
24/04/2015
30/04/2015
6/05/2015
12/05/2015
24/05/2015
3/06/2015
5/06/2015
11/06/2015
17/06/2015
23/06/2015
29/06/2015
5/07/2015
11/07/2015
17/07/2015
23/07/2015
29/07/2015
4/08/2015
10/08/2015
17/08/2015
22/08/2015
28/08/2015
PM10
Rolling Annual Average PM10


PM10 Lead
PM10 Lead Dust µg/m³
0.30
0.20
0.10
0.00
1/09/2014
2/09/2014
26/09/2014
30/09/2014
8/10/2014
14/10/2014
20/10/2014
26/10/2014
1/11/2014
7/11/2014
13/11/2014
19/11/2014
25/11/2014
28/11/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
17/02/2015
23/02/2015
1/03/2015
7/03/2015
18/04/2015
24/04/2015
30/04/2015
6/05/2015
12/05/2015
24/05/2015
3/06/2015
5/06/2015
11/06/2015
17/06/2015
23/06/2015
29/06/2015
5/07/2015
11/07/2015
17/07/2015
23/07/2015
29/07/2015
4/08/2015
10/08/2015
17/08/2015
22/08/2015
28/08/2015
PM10 Lead
Rolling Annual Average Lead

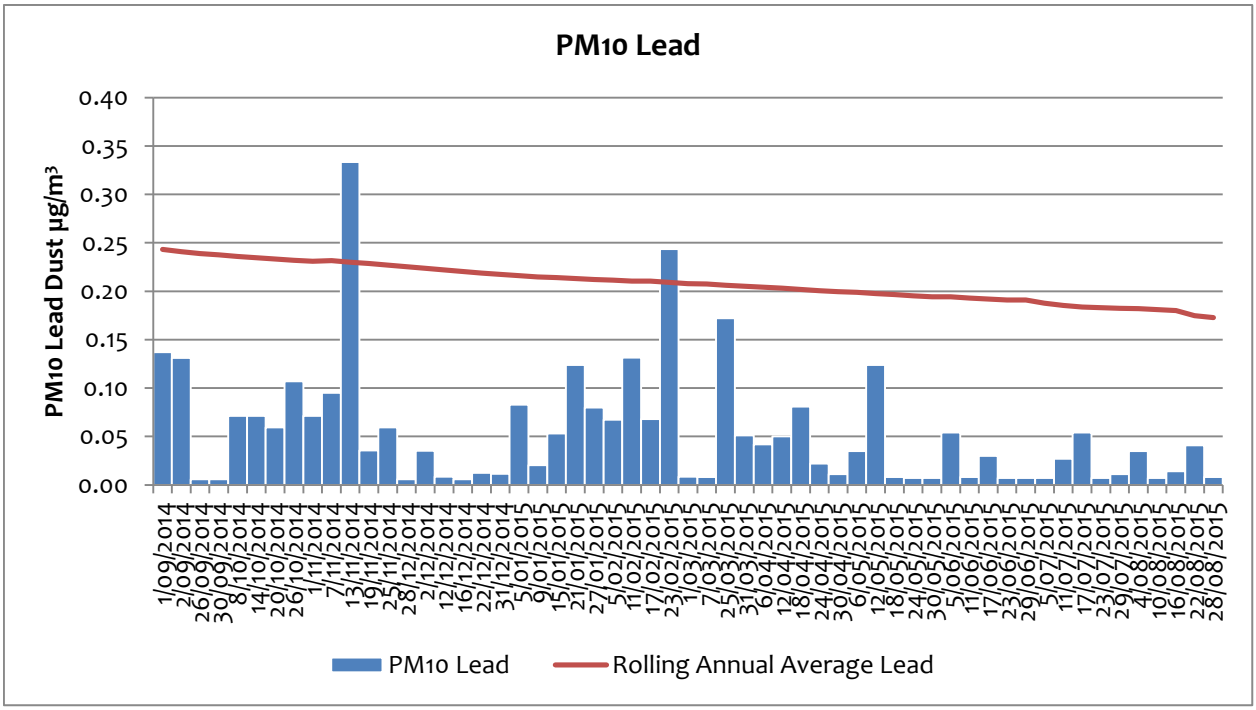
1.

EPL12 - Blackwoods Pit – On Site

DATE	PM10 (µg/m^3)	Lead (µg/m^3)
4/08/2015	3.2	0.035
10/08/2015	4.7	0.007
16/08/2015	2.8	0.014
22/08/2015	4.4	0.041
28/08/2015	2.8	0.008



1. High dust values in November coincide with road works that were carried out by Broken Hill City Council on Federation Way in the vicinity of Blackwoods Pit.

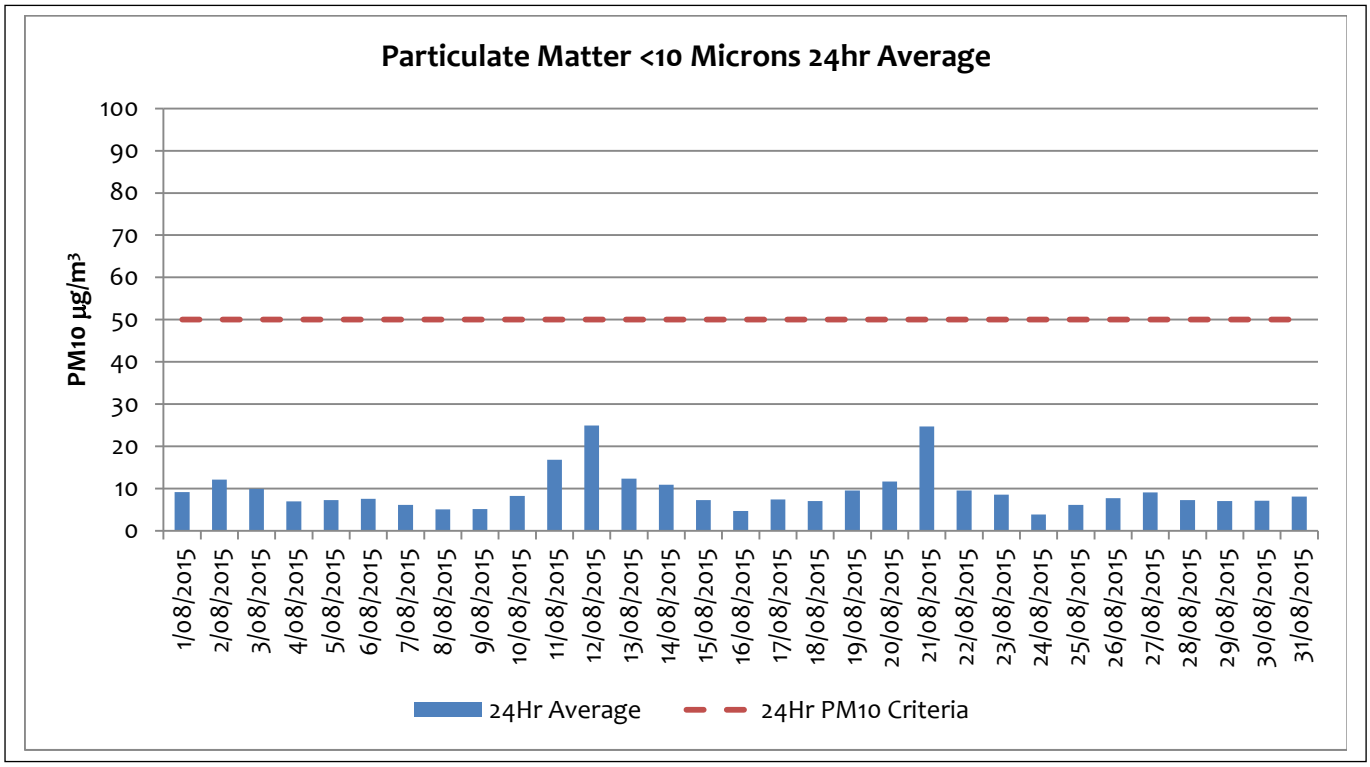

PM10 Lead
PM10 Lead Dust µg/m³
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1/09/2014
2/09/2014
26/09/2014
30/09/2014
8/10/2014
14/10/2014
20/10/2014
26/10/2014
1/11/2014
7/11/2014
13/11/2014
19/11/2014
25/11/2014
28/12/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
17/02/2015
23/02/2015
1/03/2015
7/03/2015
25/03/2015
31/03/2015
6/04/2015
12/04/2015
18/04/2015
24/04/2015
30/04/2015
6/05/2015
12/05/2015
18/05/2015
24/05/2015
30/05/2015
5/06/2015
11/06/2015
17/06/2015
23/06/2015
29/06/2015
5/07/2015
11/07/2015
17/07/2015
23/07/2015
29/07/2015
4/08/2015
10/08/2015
16/08/2015
22/08/2015
28/08/2015
PM10 Lead
Rolling Annual Average Lead

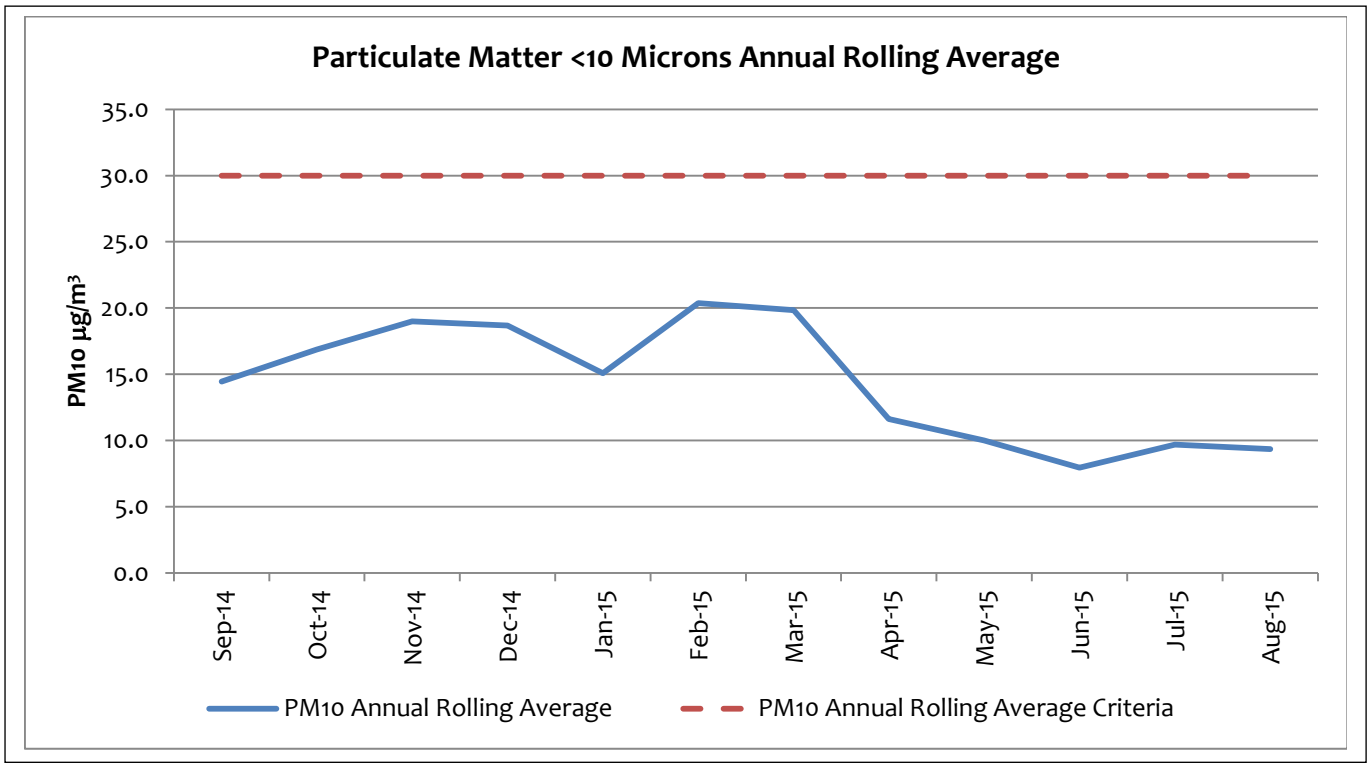
1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

Particulate Matter <10 Microns 24Hr Average		
Date	TEOM 1 - EPL 13 (μg/m^3) Essential Water – Off Site	TEOM 2 – EPL 14 (μg/m^3) Blackwoods Pit – On Site
1/08/2015	**9.19**	**9.47**
2/08/2015	**12.15**	**10.01**
3/08/2015	**9.94**	**9.90**
4/08/2015	**7.00**	**9.95**
5/08/2015	**7.27**	**10.01**
6/08/2015	**7.63**	**10.09**
7/08/2015	**6.18**	**10.15**
8/08/2015	**5.07**	**10.25**
9/08/2015	**5.16**	**5.34**
10/08/2015	**8.30**	**10.68**
11/08/2015	**16.81**	**10.82**
12/08/2015	**24.97**	**10.67**
13/08/2015	**12.38**	**10.25**
14/08/2015	**10.93**	**10.08**
15/08/2015	**7.31**	**10.01**
16/08/2015	**4.74**	**10.14**
17/08/2015	**7.46**	**10.48**
18/08/2015	**7.06**	**10.67**
19/08/2015	**9.59**	**10.78**
20/08/2015	**11.67**	**10.99**
21/08/2015	**24.71**	**11.07**
22/08/2015	**9.53**	**10.32**
23/08/2015	**8.55**	**9.47**
24/08/2015	**3.85**	**8.13**
25/08/2015	**6.18**	**8.67**
26/08/2015	**7.77**	**9.91**
27/08/2015	**9.10**	**8.42**
28/08/2015	**7.32**	**8.28**
29/08/2015	**7.06**	**7.49**
30/08/2015	**7.17**	**7.32**
31/08/2015	**8.14**	**8.09**

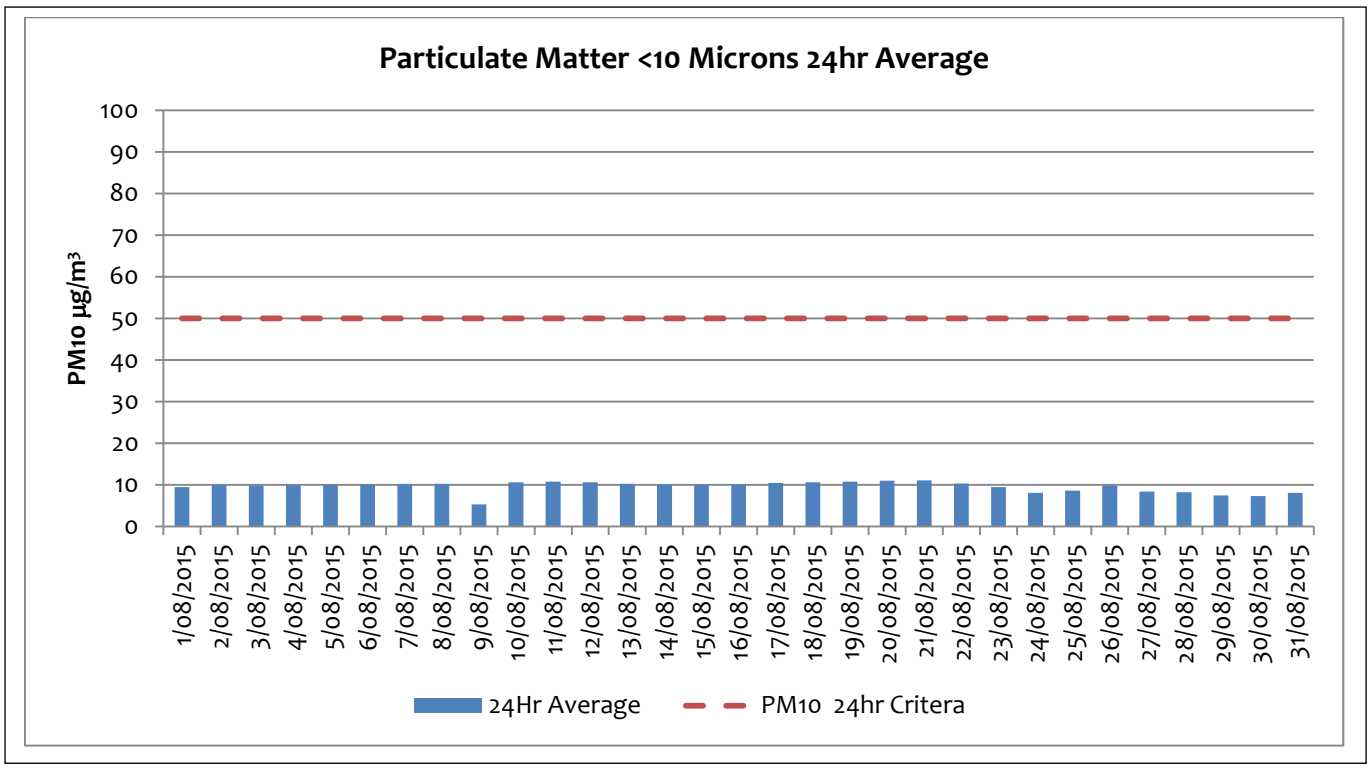
PM10 μg/m^3 12 Month Rolling Average												
	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15
TEOM 1 EPL13 Essential Water Off Site	14.4	16.9	19.0	18.7	15.1	20.4	19.8	11.6	10.0	8.0	9.7	9.4
TEOM 2 EPL14 Blackwoods Pit On Site	27.2	15.7	20.8	27.4	16.5	21.6	22.0	15.1	10.9	9.0	10.3	9.6

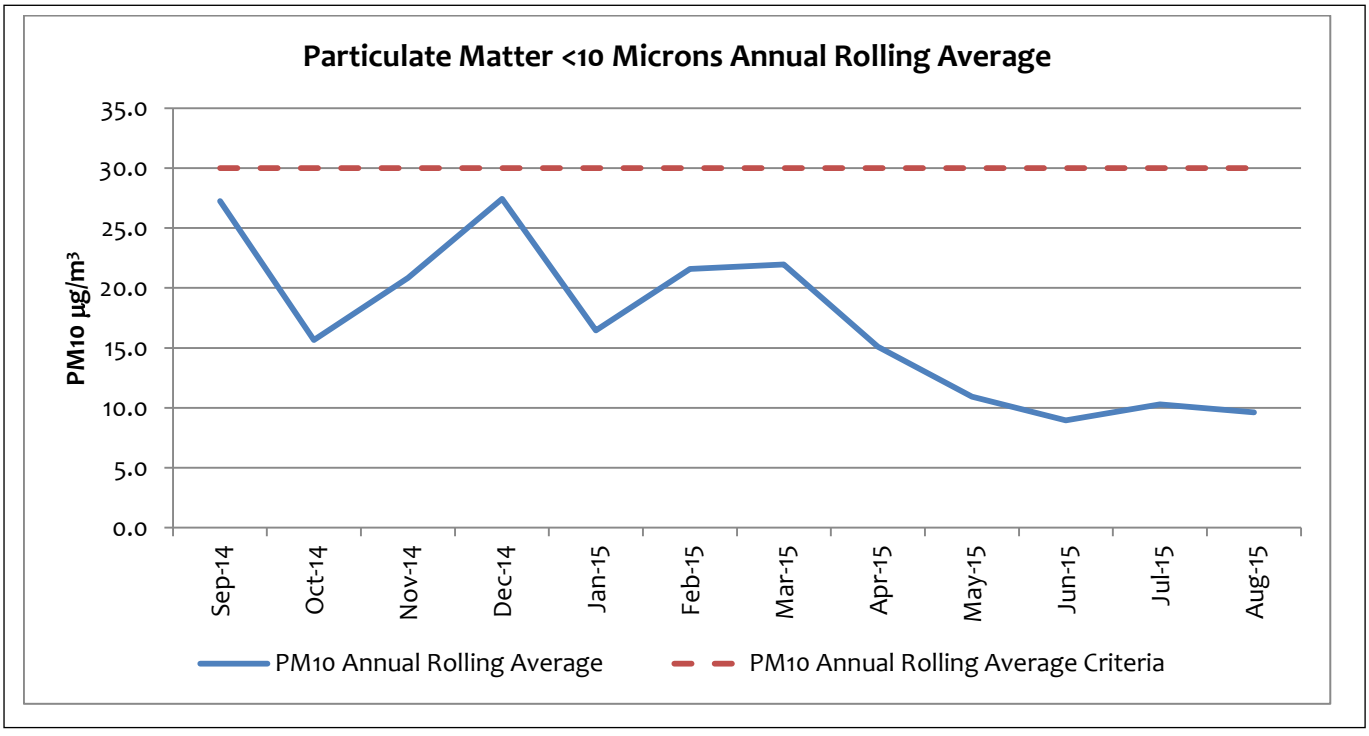
EPL13 – Essential Water – Off Site





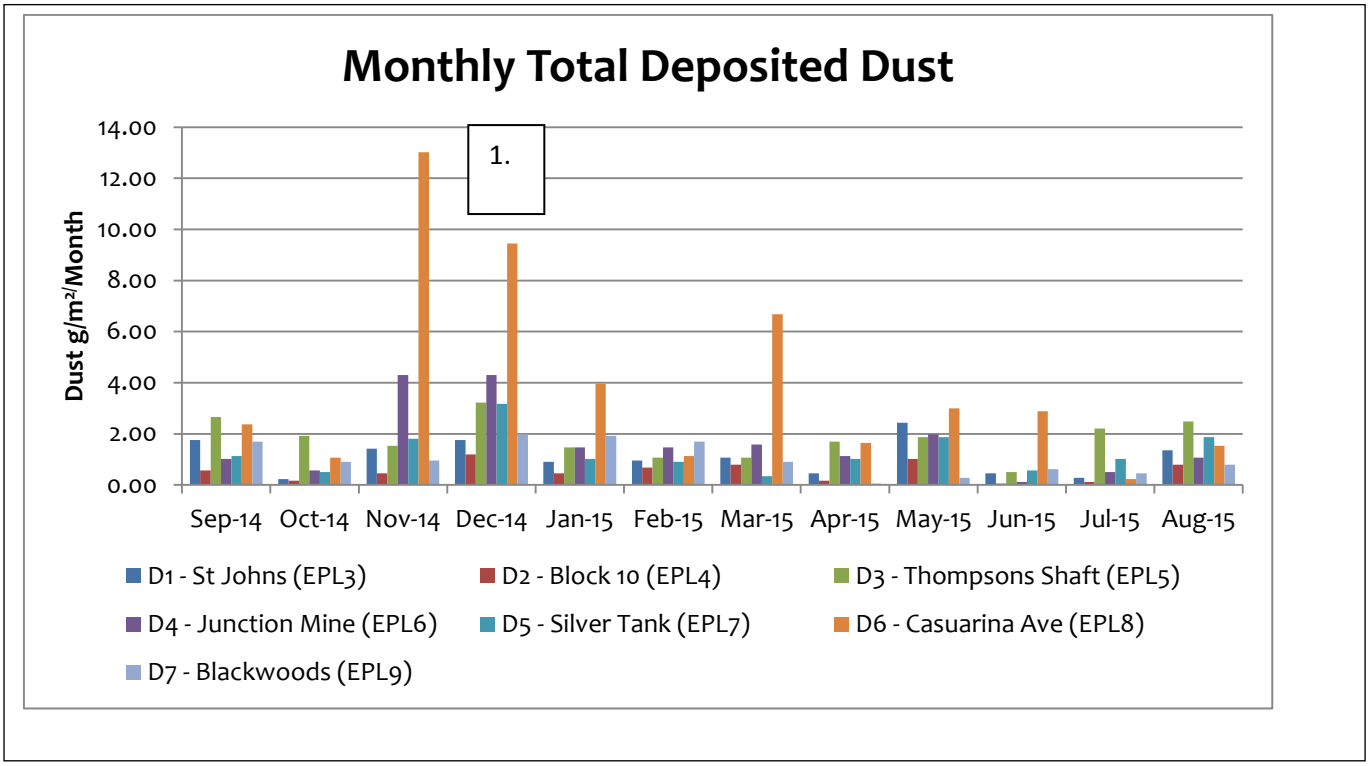
EPL14 – Blackwoods Pit – On Site





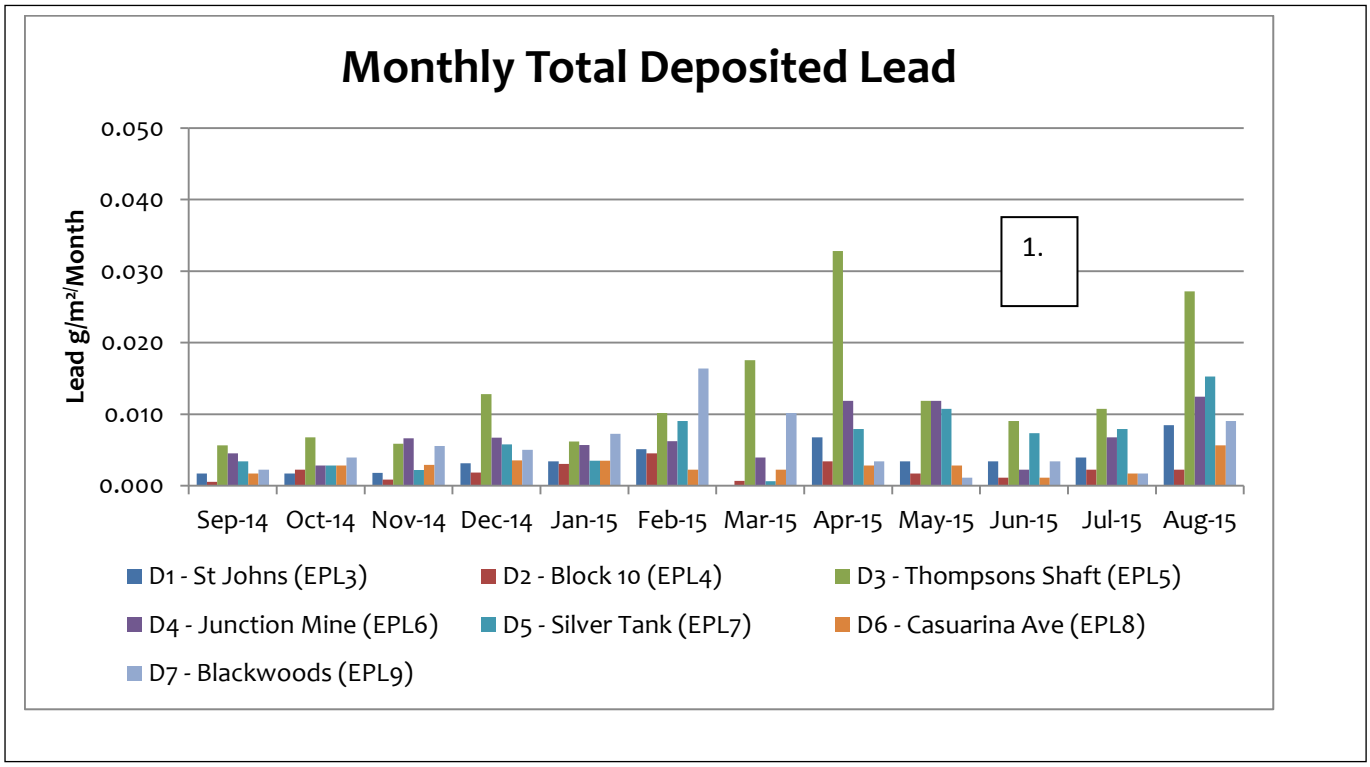
1.3 Dust Deposition Sampling

Total Deposited Dust (g/m$^{2/}$Month)							
Date	D1 (off site)	D2	D3	D4	D5	D6 (off site)	D7
August 2015	1.36	0.79	2.49	1.08	1.87	1.53	0.79
Background Average	4.0	3.1	4.3	5.7	n/a	5.8	n/a



1. Samples at Casuarina Ave appear to have been tampered with in November and December 2014 as well as March 2015. These jars had large volumes of water present when collected.

Total Deposited Lead (g/m$^{2/}$Month)							
Date	D1 (Off Site)	D2	D3	D4	D5	D6 (Off Site)	D7
August 2015	0.008	0.002	0.027	0.012	0.015	0.006	0.009
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 April and August. Nearby vegetation and roofs have been identified as potential sources. Nearby vegetation has been removed.

2 Blasting (Vibration and Overpressure)

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

Block 7 will not have 12 months of data until May next year, therefore no calculation on percentage of blasts over 5mm/sec can be given.

August Summary Block 7, Zinc Lode:

- 0 production firings
- 47 development firings
- 0 Blasts 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

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

- 5 production firings
- 131 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 = **0.40%** (licence requirement <5%) calculated from 1st October 2014 until September 17, 2015.

3 Noise

Quarterly noise monitoring is continuing as per the Pollution Reduction Program on EPL 12559. Three noise assessments have been undertaken since November last year. EMGA Mitchell McLennan Pty Limited (EMM) completed the analysis for all assessments. The latest report concluded as follows:

EMM has completed a noise monitoring assessment of operational noise from RASP Mine activities at 15 assessment locations as per the site's EPL (12559). A review of the meteorological data from the site's weather station identified that noise limits were inapplicable for three of the 16 operator attended measurements due to meteorological conditions as per the site's EPL. Notwithstanding, the monitoring assessment for this third quarterly survey found that noise from RASP Mine operations (including the crushing plant) satisfied the relevant noise limits at all locations. Furthermore, site noise was inaudible during seven of the 16 measurements. The monitoring results showed that where site noise was audible, the total LAeq (15-min) noise levels (all sources) satisfied the relevant noise limits for most measurements, and hence reaffirming compliance at the relevant locations. It was also demonstrated that during all daytime measurements, site contribution was below the relevant night-time limits at all relevant locations. In summary, no non-compliances were observed during this quarter of monitoring.

The latest round of noise monitoring is now mostly complete, however EMM has indicated there may need to be some supplementary monitoring to get accurate data for analysis

4 Water

4.1 Ground Water Sampled 24/8/2015

Analyte grouping/Analyte	Units	UG feed	Shaft 7	Ryan st S49	S1 A	S31-1	Upstream 1	S9 B2	S44	Horwoods
pH Value	pH Unit	6.3	6.45	5.72	6.5	5.96	6.61	6.5	6.24	6.34
Electrical Conductivity @ 25°C	µS/cm	10800	12000	795	208	940	57	607	911	10800
Total Dissolved Solids @180°C	mg/L	10200	11400	632	130	732	32	402	650	9920
Hydroxide Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	12	24	2	12	3	12	13	8	8
Total Alkalinity as CaCO3	mg/L	12	24	2	12	3	12	13	8	8
Sulfate as SO4 - Turbidimetric	mg/L	4680	4990	372	61	454	5	212	360	4490
Chloride	mg/L	909	999	6	4	7	3	24	33	939
Calcium	mg/L	515	495	75	18	74	5	60	108	449
Magnesium	mg/L	229	253	7	2	6	<1	7	12	272
Sodium	mg/L	1220	1280	12	6	14	3	30	46	1350
Cadmium	mg/L	2.36	1.88	0.471	0.0289	0.967	0.0011	0.0703	0.211	2.37
Lead	mg/L	0.676	2.48	0.434	0.112	1.18	0.016	0.22	0.269	2.43
Manganese	mg/L	304	376	22.7	1.64	34.3	0.046	4.42	4.68	339
Zinc	mg/L	1020	980	82.3	5.66	128	0.023	15.5	19	848
Iron	mg/L	2.43	0.12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

4.2 Surface Water

Insufficient rainfall for opportunistic surface water sampling during August 2015

Surface Water Table Nov 2014 to Nov 2015

EPA Identification Number	Frequency	Comment
EPL29	2 x Per year when contains water	Sampled 24/8/15
EPL30	2 x Per year when contains water	Sampled 24/8/15
EPL31	2 x Per year when contains water	Sampled during January and August
EPL32	2 x Per year when contains water	Sampled 24/8/15
EPL33 Horwood Dam	2 x Per year when contains water	Sampled in May and August
EPL34 Upstream	2 x Per year when contains water	Sampled 24/8/15
EPL35 Downstream	2 x Per year when contains water	Sampled 24/8/15

5 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 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	mm	mm	hours		km/h	local	°C	%	8th		km/h	hPa	°C	%	8th		km/h	hPa
1	Sa		25.7				WNW	48	12:36				NNW	28	1017.2	24.8	19	4	NW	26	1014.2
2	Su	6.8	14.7	0.8			SSW	44	12:42	8.2	91	7	SSW	30	1019.3				SW	24	1019.7
3	Mo	3.9	15.3	0.2			SSW	43	10:45	8.2	89	7	WSW	24	1025.9				SW	22	1024.2
4	Tu	4.8	12.7	0.2			SW	39	17:18	7.4	89	2	SSW	15	1028.0				SW	19	1024.9
5	We	4.7	15.6	0.2			SW	54	13:59	7.3	91	8	W	28	1023.1				WSW	33	1019.7
6	Th	4.7	12.3	0.4			SSW	31	10:46	7.7	87	7	SSW	17	1026.0				SW	15	1025.2
7	Fr	7.8	11.7	0			SE	24	08:46	9.7	70	8	SSE	17	1028.6				SSW	13	1026.2
8	Sa	6.7	15.4	0			SE	20	14:31	8.9	78	7	Calm		1026.7				S	7	1022.6
9	Su	1.4	17.7	0.4			N	39	23:07	8.9	60	1	NNE	19	1021.8				NNW	17	1016.3
10	Mo	7.8		0			W	44	11:39	11.7	53	1	W	24	1016.7				WNW	26	1014.5
11	Tu		18.4				WNW	70	21:22				NNW	13	1016.1				N	28	1009.7
12	We	5.2	15.1	1.6			WSW	74	14:05	6.6	95	8	WNW	31	1010.4				SW	33	1013.3
13	Th	3.1	17.3	0.6			W	30	13:47	8.3	74	1	SW	15	1025.2				WSW	13	1023.4
14	Fr	2.5	19.6	0			SW	24	15:00	10.2	83	1	SSE	9	1029.2				W	9	1027.0
15	Sa	7.3	18.7	0			SE	28	15:44	12.4	70	1	ENE	15	1032.5				SSW	19	1029.8
16	Su	3.2	19.8	0.2			W	24	14:39	14.2	59	1	ENE	7	1029.7				WSW	11	1024.9
17	Mo	3.4	18.6	0			SW	39	13:56	9.9	79	1	SSW	15	1024.2				WSW	24	1020.8
18	Tu	5.9	17.9	0			SW	33	12:43	9.8	72	1	ENE	13	1024.8				WSW	22	1022.0
19	We	5.9	20.1	0			NNW	31	13:47	10.5	91	6	NE	19	1024.7				NW	17	1022.1
20	Th	10.4	24.1	0.6			NNE	43	09:46	13.4	50	6	NNE	24	1023.3				NNE	24	1019.2
21	Fr	13.2	26.0	0			NNW	57	11:12	17.7	41	7	NNE	33	1015.6				NNW	24	1012.5
22	Sa	10.1	19.8	0			E	26	10:03	15.3	80	2	ESE	20	1018.8				NE	17	1016.7
23	Su	9.3	16.7	6.8			ESE	41	23:00	11.9	100	8	SSW	4	1019.1				SSE	15	1014.8
24	Mo	9.5	10.5	35.4			SSW	57	13:09	10.6	100	8	SSW	37	1015.8				SSW	37	1018.4
25	Tu	3.3	13.9	1.2			SSW	37	12:21	5.8	97	7	SSW	22	1025.1				S	15	1023.0
26	We	3.5		0			NW	37	14:12	10.1	80	5	SW	2	1025.4				NW	9	1021.9
27	Th			0			SSW	31	10:18				SSW	17	1024.9				SW	24	1023.3
28	Fr		13.7	0			SSW	26	06:59				S	13	1028.2				S	17	1025.3
29	Sa	6.2	15.4	0			SSE	30	13:48	7.7	84	7	SSW	9	1027.5				SE	13	1024.8
30	Su	2.0	15.6	0			S	37	13:57	10.8	47	1	ESE	15	1026.4				S	15	1022.8
31	Mo	2.1	19.3	0			WSW	24	13:39	13.4	49	0	ESE	2	1022.7				WSW	11	1019.0
Statistics for August 2015																					
Mean		5.7	17.2							10.2	76	4		17	1023.3	24.8	19	4		19	1020.7
Lowest		1.4	10.5	0						5.8	41	0	Calm		1010.4	24.8	19	4	S	7	1009.7
Highest		13.2	26.0	35.4			WSW	74		17.7	100	8	SSW	37	1032.5	24.8	19	4	SSW	37	1029.8
Total				48.6																	

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Legend

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

6 Data Log

Sample	Date sent to lab	Result Received	Date Published
Hi Volume Samples	2/9/2015	8/9/2015	17/9/2015
TEOM	Real time	-	17/9/2015
Dust Deposition	2/9/2015	9/9/2015	17/9/2015
Water	25/8/2015	14/9/2015	17/9/2015
Blast Vibration and overpressure	Real Time	-	17/9/2015

7 Correction Log August 2015

There are no data corrections for July 2015. However there have been some improvements in the reported data. Concentrations of dust and lead as a component of dust in the hi vol analysis are now NATA accredited. Concentration was previously calculated in house from reported totals on the filter papers. This calculation is now performed by the laboratory.