Monthly Environmental Data September 2015

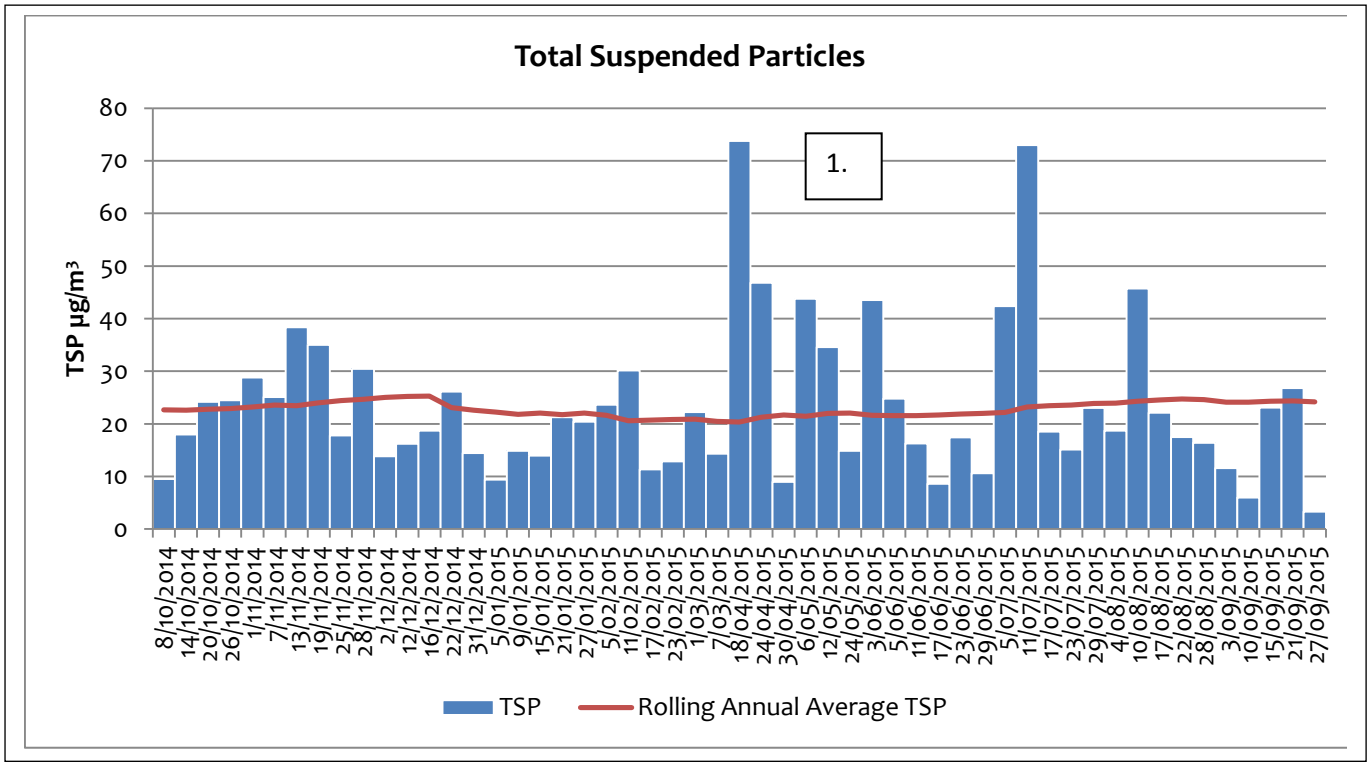
Contents

1 Air Quality

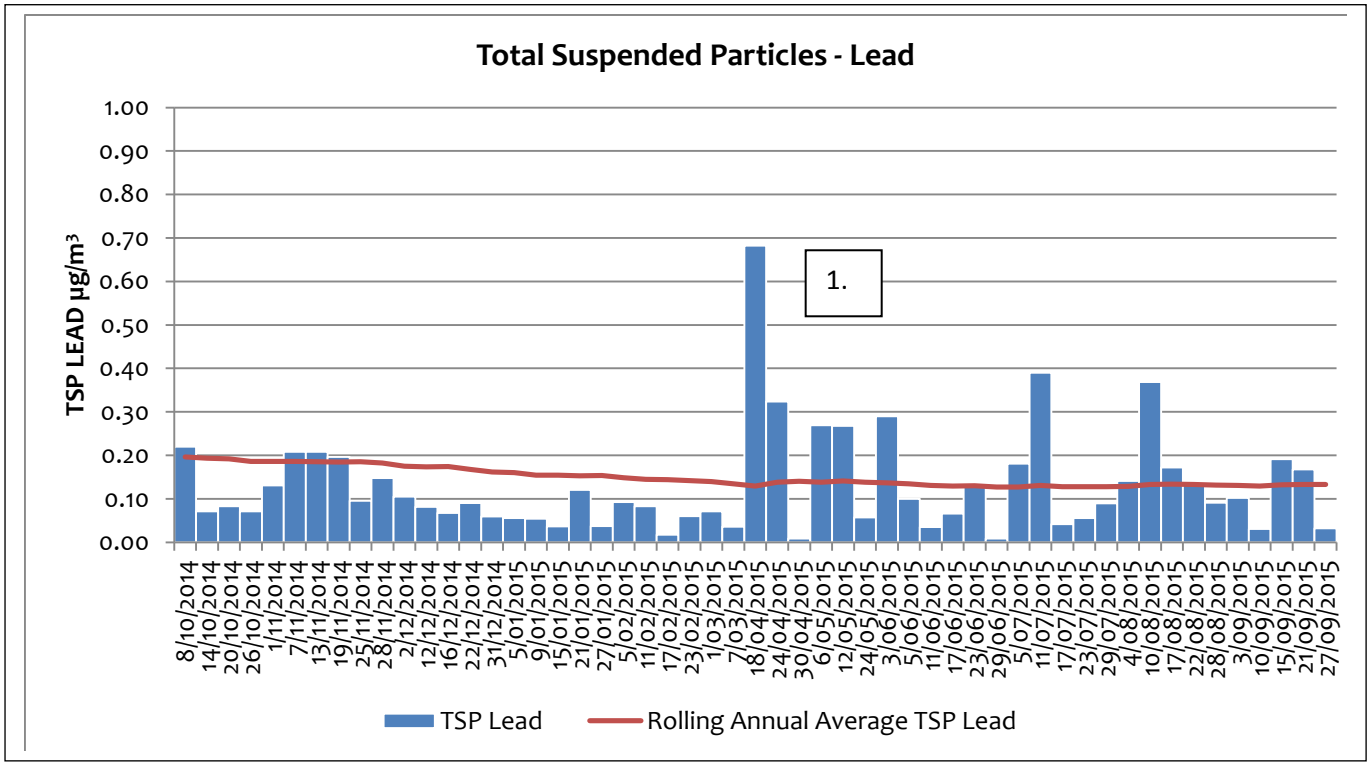
1.1 High Volume Air Samplers

EPL10 - SILVER TANK - ON SITE

DATE	TSP (µg/m^3)	Lead (µg/m^3)
3/09/2015	11.60	0.10
10/09/2015	6.00	0.03
15/09/2015	23.10	0.19
21/09/2015	26.80	0.17
27/09/2015	3.30	0.03



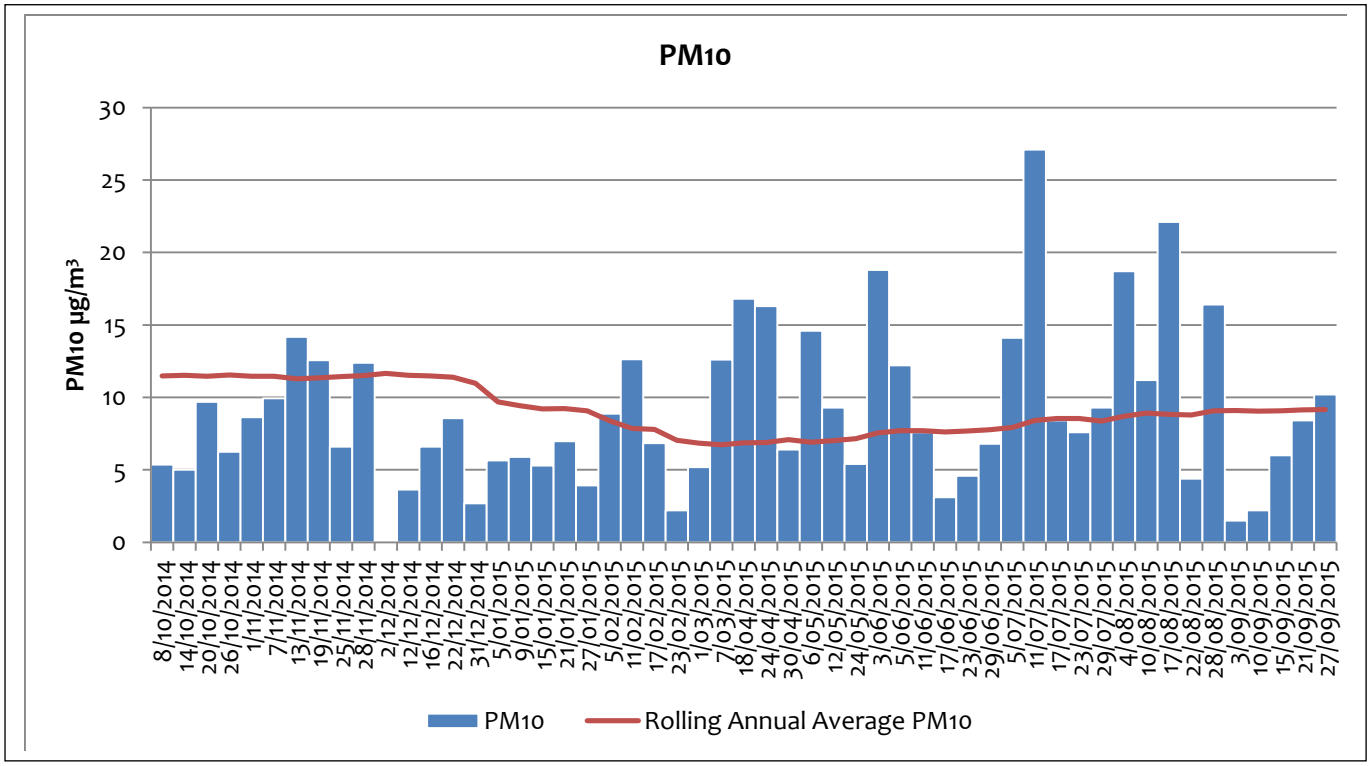
1. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination. The spike on the 11th July also occurred when conditions were considered 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.

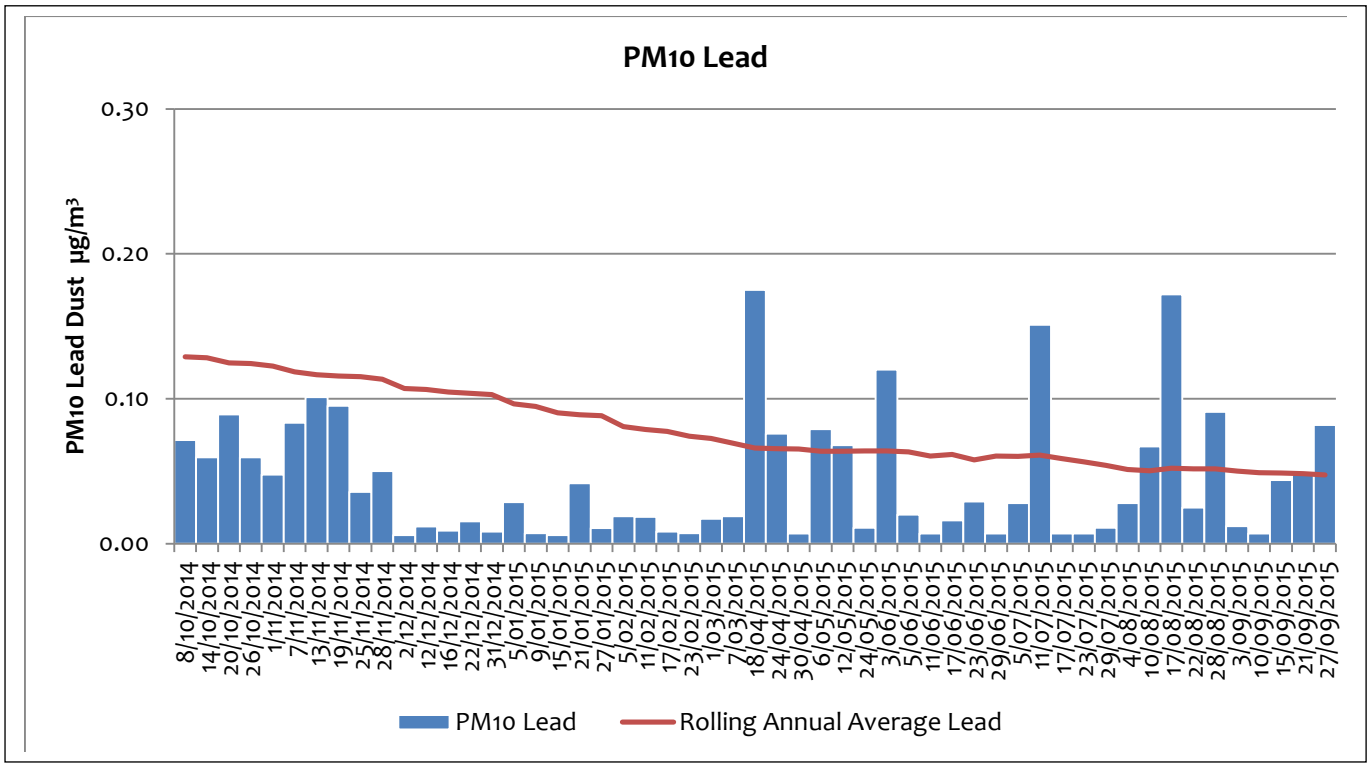


2. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination.

EPL11 - Silver Tank - On Site

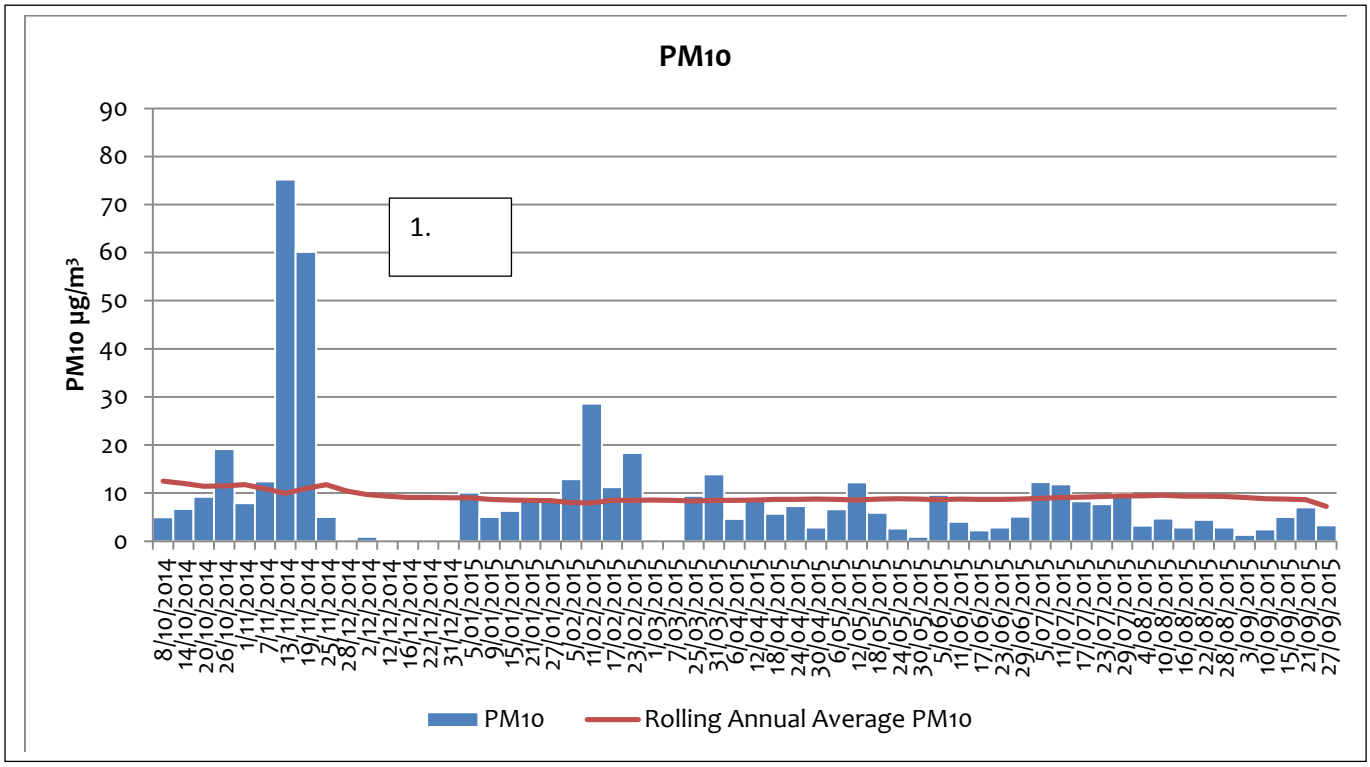
DATE	PM10 (µg/m^3)	Lead (µg/m^3)
3/09/2015	1.50	0.01
10/09/2015	2.20	0.01
15/09/2015	6.00	0.04
21/09/2015	8.40	0.05
27/09/2015	10.20	0.08


PM10
PM10 µg/m³
30
25
20
15
10
5
0
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
3/09/2015
10/09/2015
15/09/2015
21/09/2015
27/09/2015
PM10
Rolling Annual Average PM10

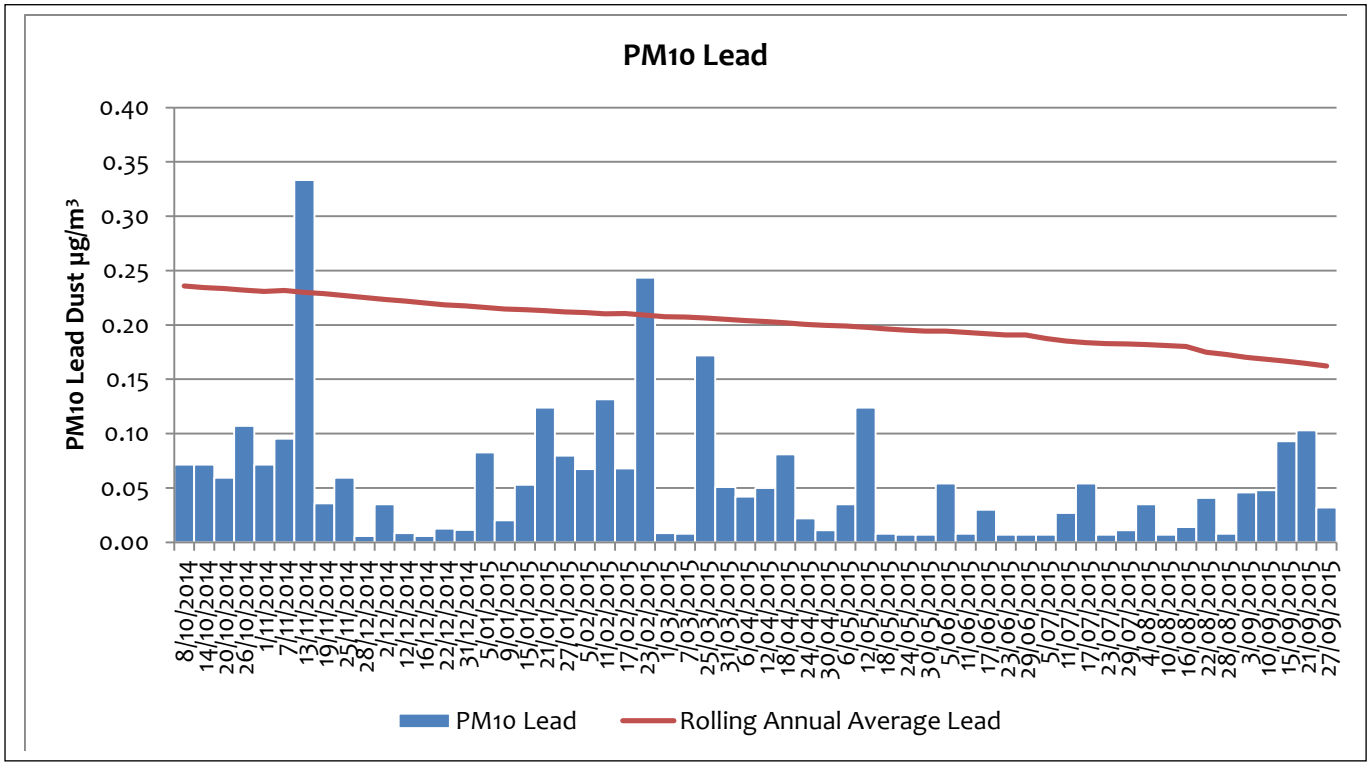

PM10 Lead
PM10 Lead Dust µg/m³
0.30
0.20
0.10
0.00
8/10/2014
14/10/2014
20/10/2014
26/10/2014
1/11/2014
7/11/2014
13/11/2014
19/11/2014
25/11/2014
28/11/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
17/02/2015
23/02/2015
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
3/09/2015
10/09/2015
15/09/2015
21/09/2015
27/09/2015
PM10 Lead
Rolling Annual Average Lead

EPL12 - Blackwoods Pit – On Site

DATE	PM10 (µg/m^3)	Lead (µg/m^3)
3/09/2015	1.30	0.05
10/09/2015	2.40	0.05
15/09/2015	5.00	0.09
21/09/2015	7.00	0.10
27/09/2015	3.30	0.03



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.

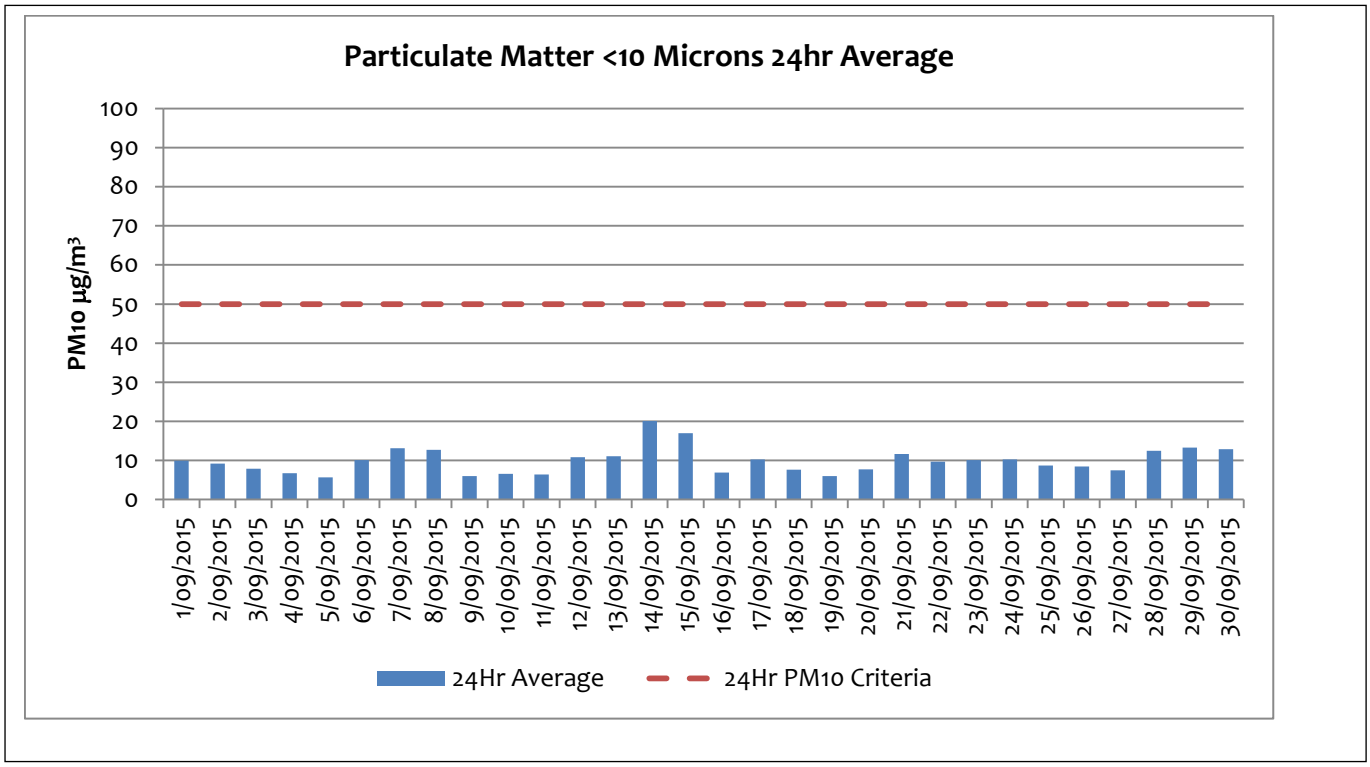

PM10 Lead
PM10 Lead Dust µg/m³
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
8/10/2014
14/10/2014
20/10/2014
26/10/2014
1/11/2014
7/11/2014
13/11/2014
19/11/2014
25/11/2014
28/12/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
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
3/09/2015
10/09/2015
15/09/2015
21/09/2015
27/09/2015
PM10 Lead
Rolling Annual Average Lead

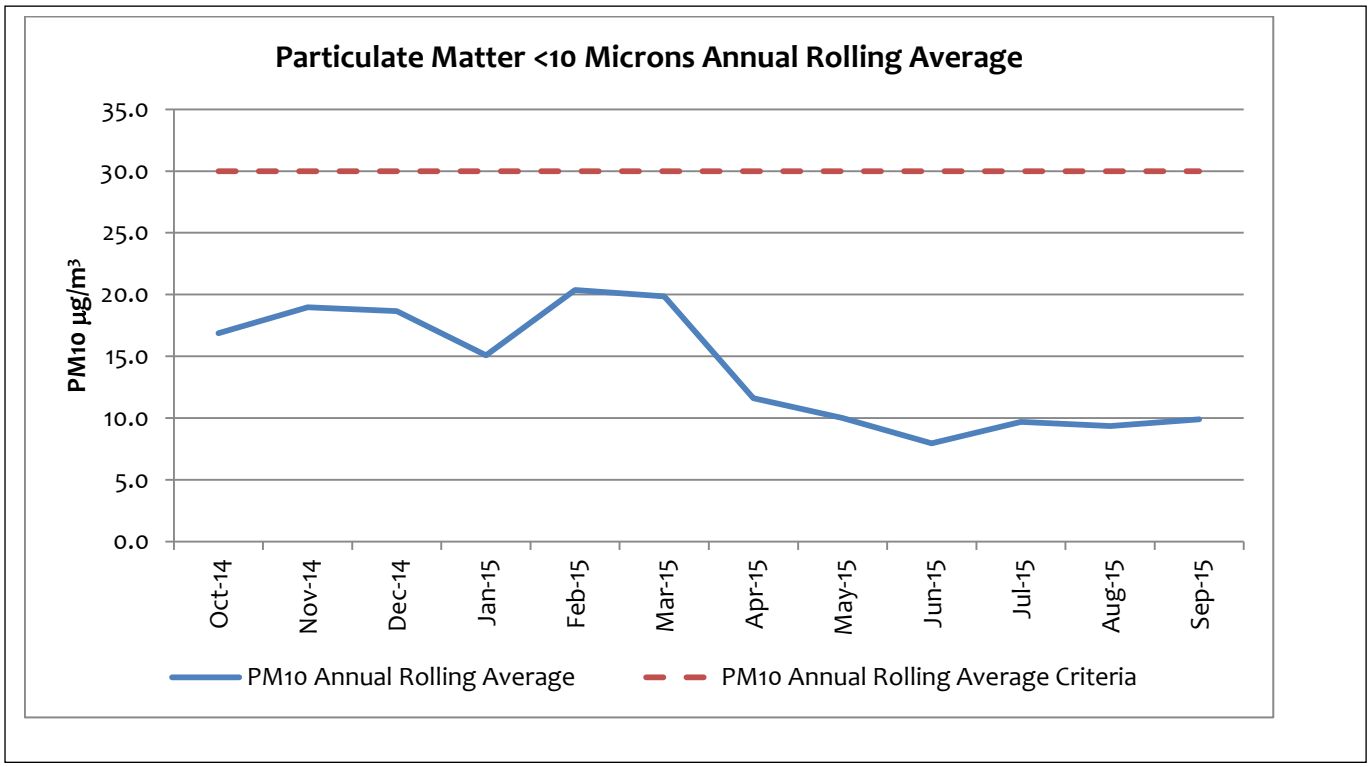
1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

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
1/09/2015	**9.93**	**8.43**
2/09/2015	**9.18**	**7.74**
3/09/2015	**7.93**	**12.32**
4/09/2015	**6.76**	**5.08**
5/09/2015	**5.69**	**5.44**
6/09/2015	**10.14**	**8.60**
7/09/2015	**13.12**	**16.39**
8/09/2015	**12.69**	**16.15**
9/09/2015	**5.99**	**7.92**
10/09/2015	**6.56**	**6.47**
11/09/2015	**6.39**	**7.11**
12/09/2015	**10.83**	**14.13**
13/09/2015	**11.12**	**14.37**
14/09/2015	**20.07**	**14.34**
15/09/2015	**17.01**	**14.72**
16/09/2015	**6.89**	**10.46**
17/09/2015	**10.23**	**14.69**
18/09/2015	**7.64**	**14.67**
19/09/2015	**6.00**	**14.77**
20/09/2015	**7.72**	**15.33**
21/09/2015	**11.63**	**15.92**
22/09/2015	**9.68**	**16.14**
23/09/2015	**10.11**	**15.28**
24/09/2015	**10.27**	**13.27**
25/09/2015	**8.73**	**12.11**
26/09/2015	**8.49**	**11.76**
27/09/2015	**7.45**	**7.72**
28/09/2015	**12.46**	**13.44**
29/09/2015	**13.32**	**16.13**
30/09/2015	**12.92**	**16.40**

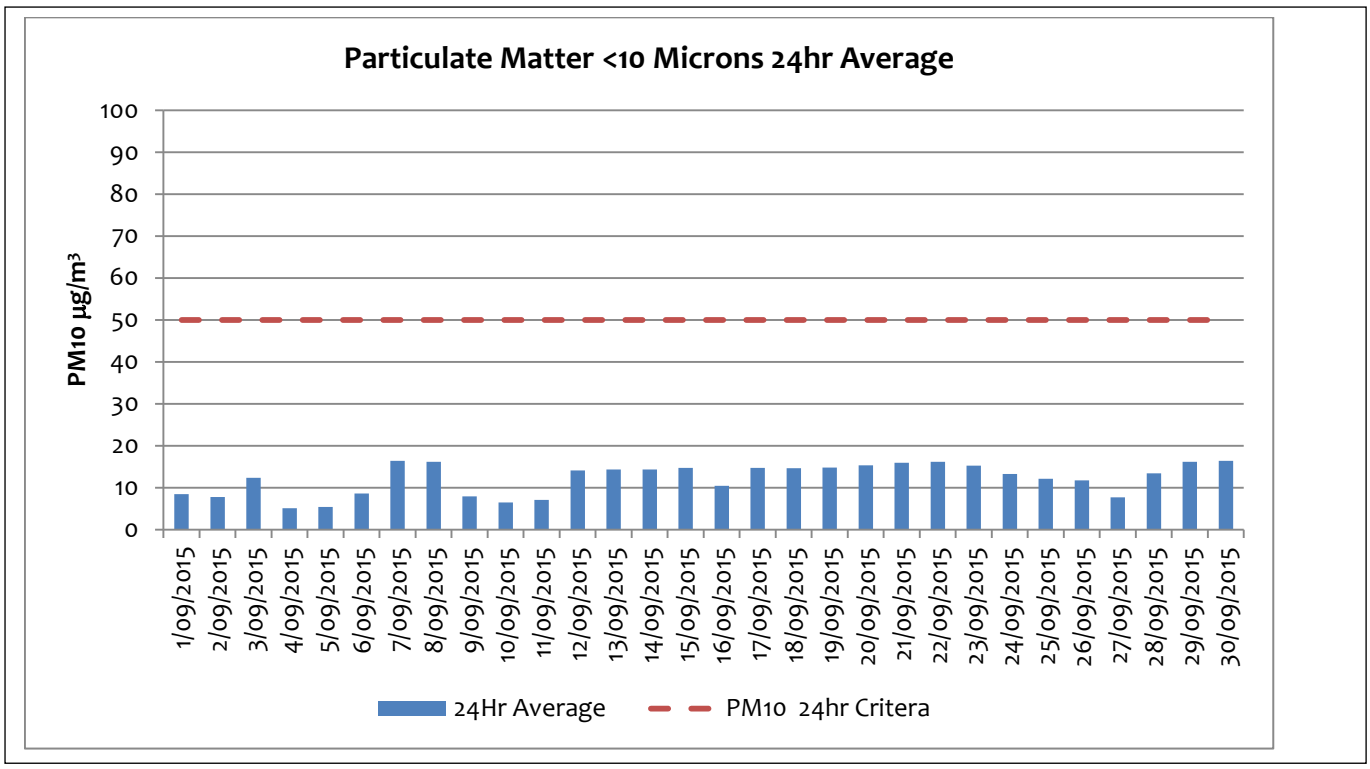
PM10 μg/m^3 12 Month Rolling Average												
	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15
TEOM 1 EPL13 Essential Water Off Site	16.9	19.0	18.7	15.1	20.4	19.8	11.6	10.0	8.0	9.7	9.4	9.9
TEOM 2 EPL14 Blackwoods Pit On Site	15.7	20.8	27.4	16.5	21.6	22.0	15.1	10.9	9.0	10.3	9.6	12.4

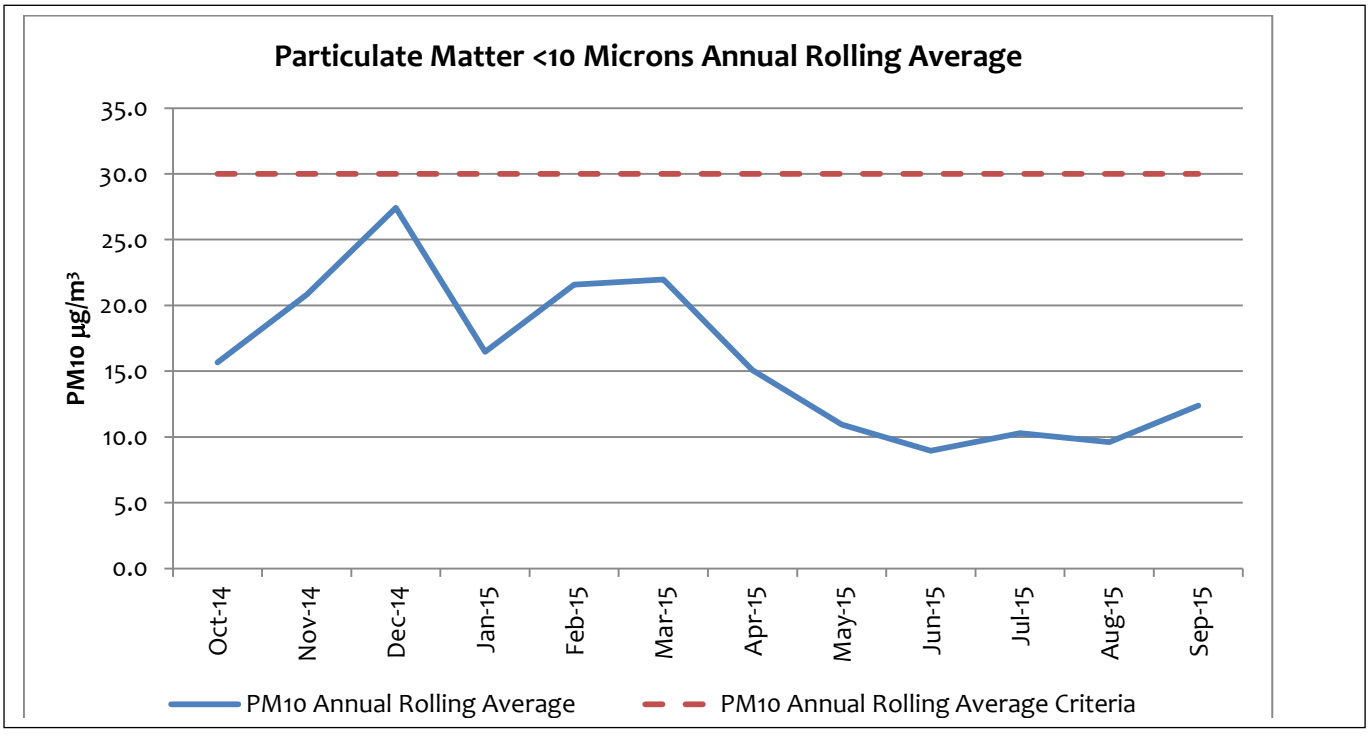
EPL13 – Essential Water – Off Site





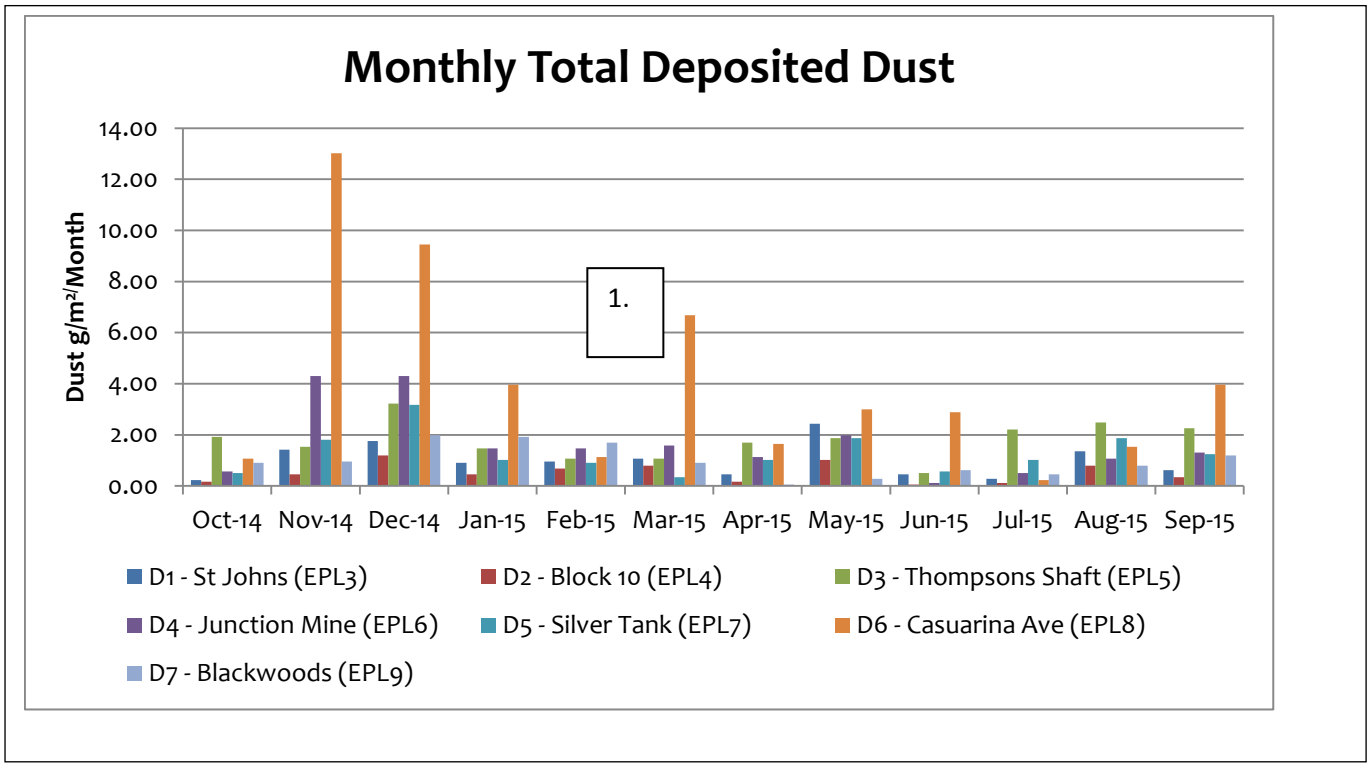
EPL14 – Blackwoods Pit – On Site





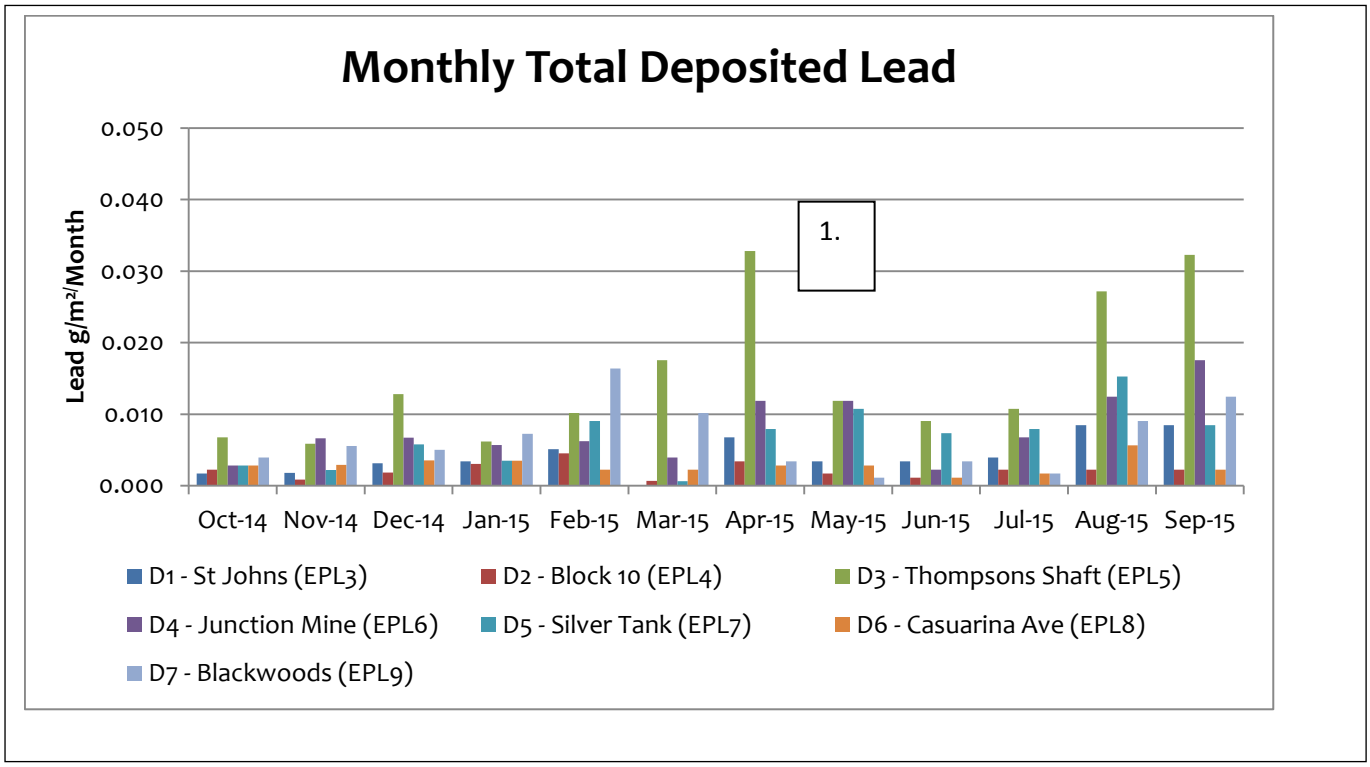
1.3 Dust Deposition Sampling

Total Deposited Dust (g/m$^{2/}$Month)							
Date	D1 (off site)	D2	D3	D4	D5	D6 (off site)	D7
Sept 2015	0.62	0.34	2.26	1.30	1.24	3.96	1.19
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
Sept 2015	0.008	0.002	0.032	0.018	0.008	0.002	0.012
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, August and September. Nearby vegetation and roofs have been identified as potential sources. Nearby vegetation has been removed. A clean up of the haul road passing Thompsons shaft was carried out in September. The haul road will continue to be monitored.

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.

September Summary Block 7, Zinc Lode:

- 0 production firings
- 63 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

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

- 10 production firings
- 113 development firings
- 0 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 = **0.42%** (licence requirement <5%) calculated from 1st October 2014 until October 14, 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, the last lot of data has been sent to EMGA for analysis and reporting.

4 Water

4.1 Ground Water Sampled 2/9/2015

			UG FEED	SHAFT 7	HORWOOD'S DAM	GW03	GW04	GW05	GW06	GW07	GW08	GW09	GW10	GW11
pH Value	pH Unit	0.01	6.58	6.51	6.54	6.09	7.27	6.4	6.48	6.38	6.31	7.7	7.11	7.09
Electrical Conductivity @ 25°C	µS/cm	1	10000	11000	10600	14900	14400	16300	13600	12600	7740	10500	13300	4360
Total Dissolved Solids @180°C	mg/L	10	8340	9330	9230	12600	11700	14600	11800	8860	7250	8410	10900	3360
Hydroxide Alkalinity as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	1	13	24	10	8	246	105	44	33	10	288	180	89
Total Alkalinity as CaCO3	mg/L	1	13	24	10	8	246	105	44	33	10	288	180	89
Sulfate as SO4 - Turbidimetric	mg/L	1	4180	4440	4220	4200	4140	6450	4350	4260	3030	3170	4090	1600
Chloride	mg/L	1	995	1100	1100	2550	2320	2320	1830	1590	1020	1520	1760	405
Calcium	mg/L	1	496	523	498	570	579	521	556	914	597	585	597	186
Magnesium	mg/L	1	226	263	265	390	530	651	471	666	230	426	527	150
Sodium	mg/L	1	1290	1400	1380	2400	2470	2810	2190	1410	729	2180	2140	601
Cadmium	mg/L	0.0001	2.35	1.87	2.19	2	0.0716	1.04	0.76	0.0255	1.62	4.86	0.916	0.296
Lead	mg/L	0.001	0.883	1.75	1.43	2.27	0.123	0.379	0.088	0.022	0.512	0.507	0.022	0.02
Manganese	mg/L	0.001	290	377	347	314	30.9	368	283	0.502	255	368	62.7	46
Zinc	mg/L	0.005	916	934	816	322	19.1	338	183	3.07	400	365	93.5	57.6
Iron	mg/L	0.05	1.89	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.28	<0.05	<0.05	<0.05	0.1

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

Currently the weather station is offsite being calibrated. 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	Tu	6.1		0			N	39	16:18	13.9	58	3	NNE	15	1017.1				N	19	1012.8
2	We						WNW	70	20:52				N	17	1007.1				WNW	30	1005.5
3	Th						SW	59	04:11				SW	33	1017.2				SW	26	1019.1
4	Fr						ENE	31	14:12				S	19	1026.4				S	7	1022.9
5	Sa						WSW	24	11:45				SE	6	1025.6				SSW	9	1021.0
6	Su						NW	46	15:13				N	15	1021.0				NW	26	1016.3
7	Mo						WSW	41	14:35				SSW	26	1024.7				SW	26	1022.9
8	Tu						SW	41	10:21				WSW	20	1027.0				SW	24	1023.9
9	We						SSW	39	05:07				S	24	1030.4				SSW	20	1028.3
10	Th						SSE	26	08:28				SSE	19	1033.3				SSE	13	1028.8
11	Fr						NNE	26	07:56				NNE	19	1028.9				E	9	1024.7
12	Sa						E	22	00:12				N	7	1026.8				WSW	7	1022.6
13	Su						NNE	37	09:16				NNE	26	1024.0				N	19	1019.4
14	Mo						W	54	20:22				N	31	1018.0				NNW	24	1013.1
15	Tu						SW	48	00:02				S	24	1019.7				SW	7	1017.8
16	We						NW	44	13:34				ENE	20	1019.9				NW	22	1016.3
17	Th						S	48	14:15				S	26	1024.4				SSE	28	1024.0
18	Fr						SSE	39	14:50				SSE	17	1029.0				S	20	1024.4
19	Sa						E	26	15:00				ESE	11	1024.3				E	13	1019.3
20	Su						NNW	35	11:44				NNE	20	1019.8				NNW	20	1016.3
21	Mo						SSW	44	05:33				SSW	33	1021.9				SW	26	1019.8
22	Tu						SSW	54	14:15				S	33	1028.3				S	33	1026.6
23	We						SSE	54	11:41				SSE	33	1033.4				SSE	35	1029.6
24	Th						SSE	43	12:16				SSE	26	1030.9				SSE	26	1026.6
25	Fr						ESE	43	11:06				ESE	24	1029.8				E	22	1025.3
26	Sa						E	41	13:08				E	19	1028.0				ESE	15	1023.3
27	Su						ESE	35	10:48				NE	15	1024.5				S	11	1020.9
28	Mo						WNW	39	16:07				NW	15	1020.6				WNW	13	1016.4
29	Tu						SW	33	15:50				SSE	17	1019.6				WSW	15	1016.1
30	We						SSW	37	12:02				S	15	1022.7				SW	15	1020.6
Statistics for September 2015																					
Mean		6.1								13.9	58	3		20	1024.1					19	1020.8
Lowest		6.1		0						13.9	58	3	SE	6	1007.1				#	7	1005.5
Highest		6.1		0			WNW	70		13.9	58	3	#	33	1033.4				SSE	35	1029.6
Total				0.0																	

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	1/10/2015	9/10/2015	15/10/2015
TEOM	Real time	-	15/10/2015
Dust Deposition	30/9/2015	8/10/2015	15/10/2015
Water	3/10/2015	10/10/2015	15/10/2015
Blast Vibration and overpressure	Real Time	-	15/10/2015

7 Correction Log September 2015

There are no data corrections for August 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 is now NATA accredited. Concentration was previously calculated in house from reported totals on the filter papers. This calculation is now performed by the laboratory.