Monthly Environmental Data November 2015

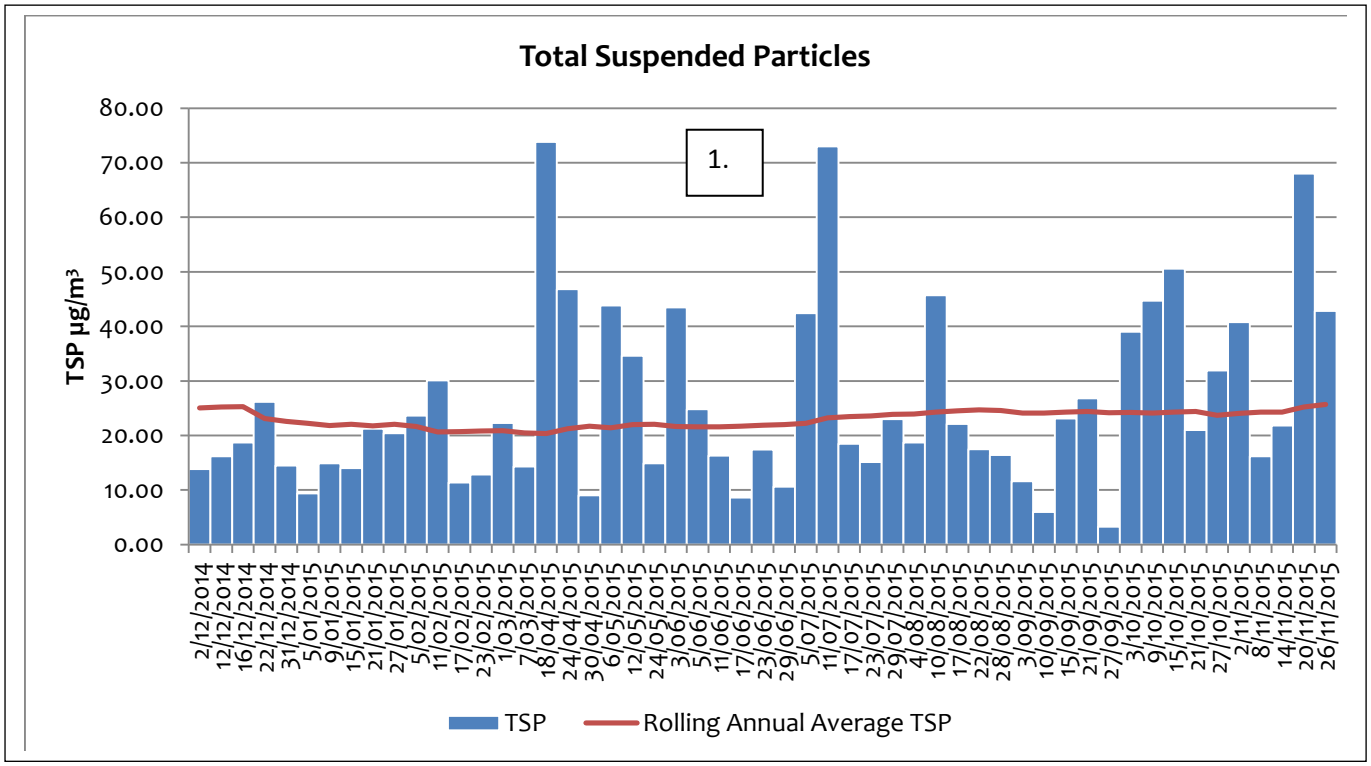
Contents

1 Air Quality

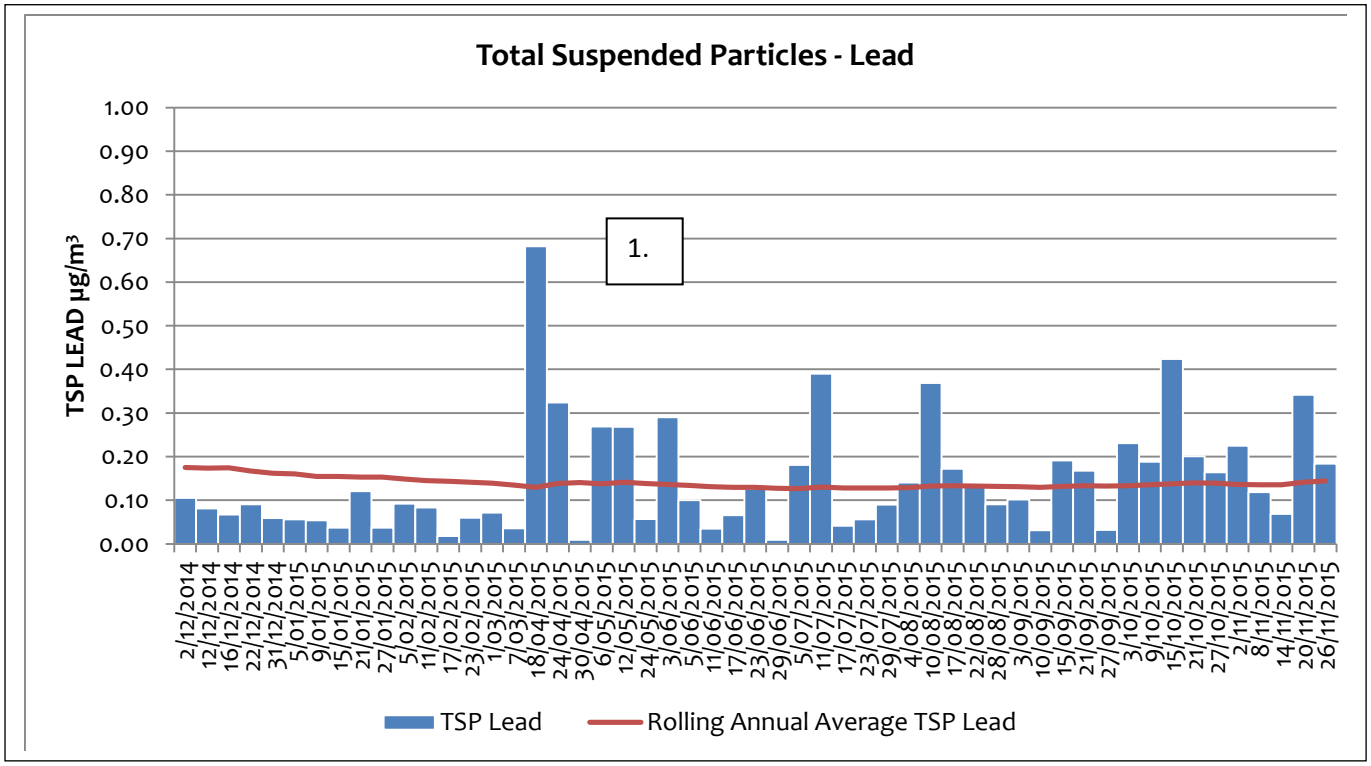
1.1 High Volume Air Samplers

EPL10 - SILVER TANK - ON SITE

DATE	TSP (µg/m^3)	Lead (µg/m^3)
2/11/2015	40.80	0.23
8/11/2015	16.20	0.12
14/11/2015	21.80	0.07
20/11/2015	68.00	0.34
26/11/2015	42.80	0.18



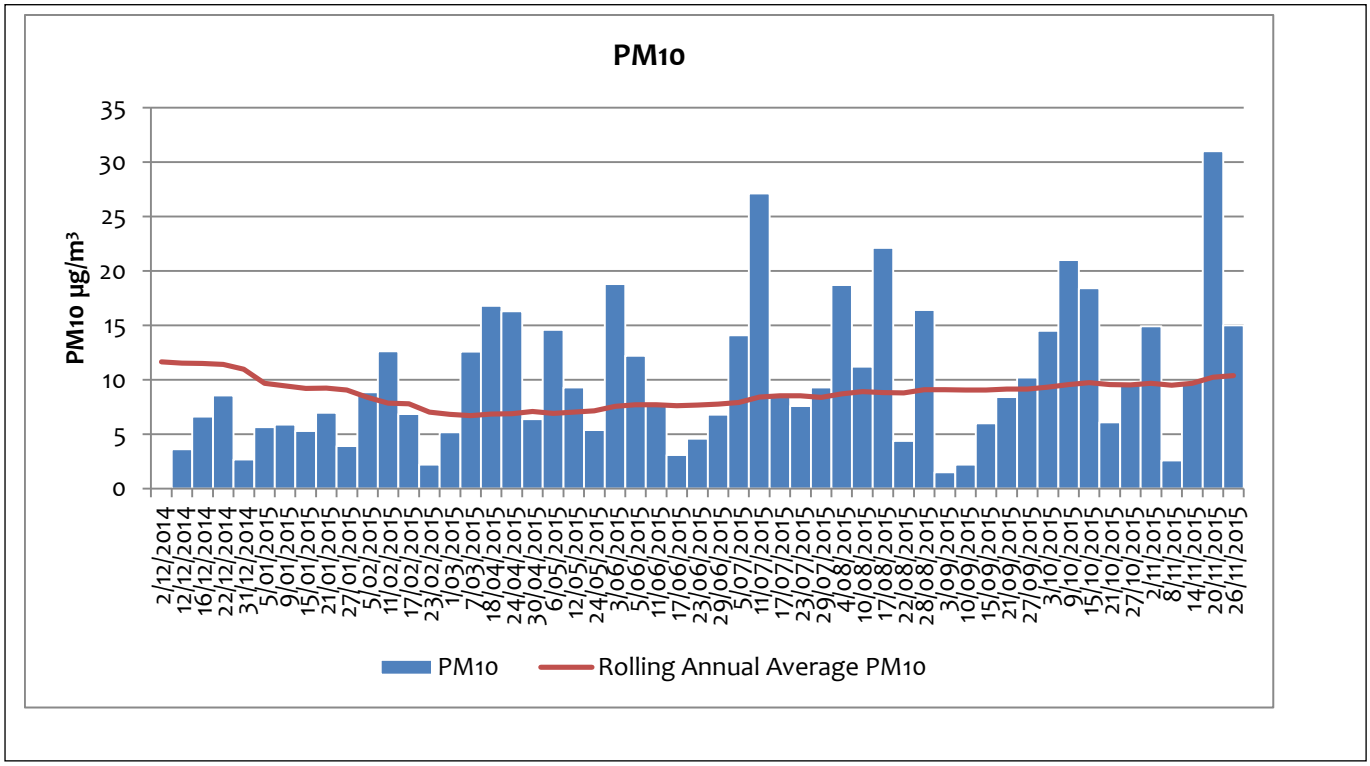
1. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination. The spike on the 11th July also occurred when conditions were considered 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. The spike on the 20th November coincides with 70kmh gusts coming from a westerly direction.



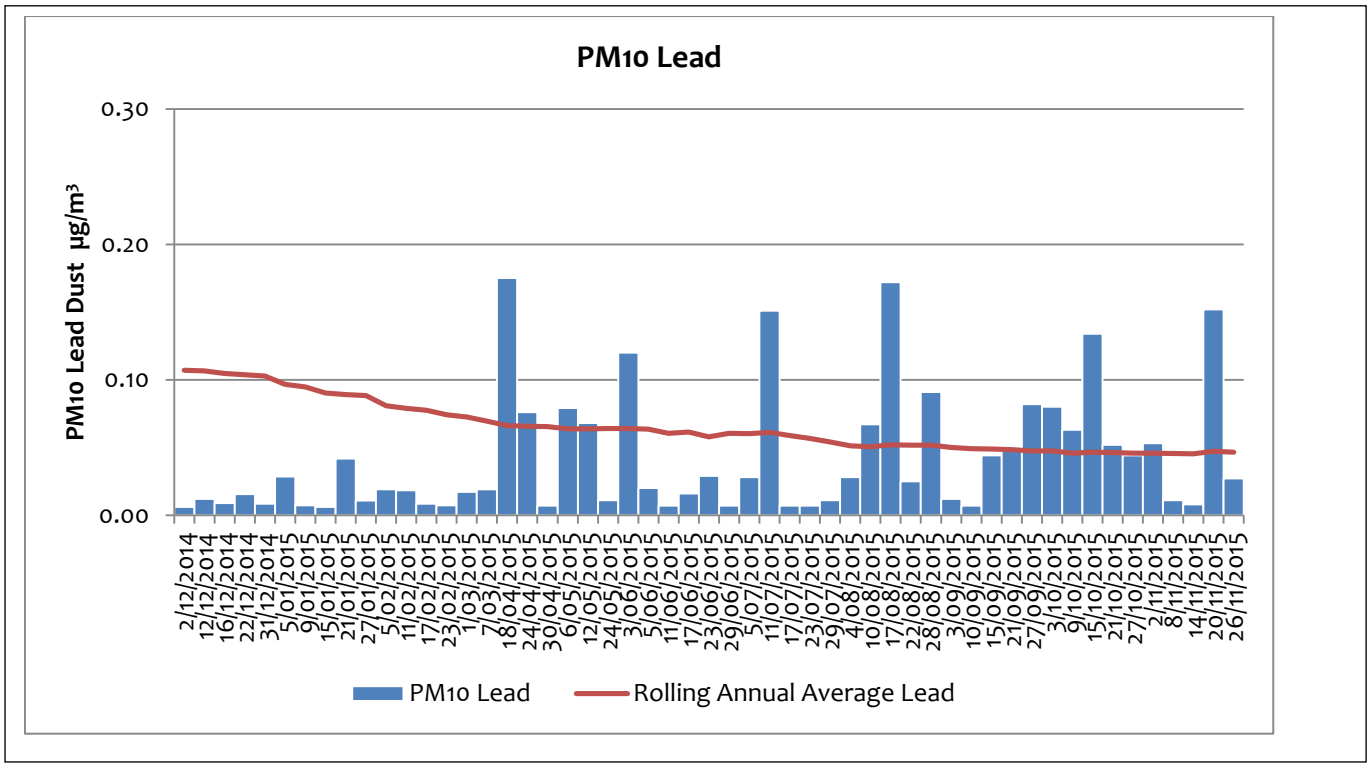
2. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination.

EPL11 - Silver Tank - On Site

DATE	PM10 (µg/m^3)	Lead (µg/m^3)
2/11/2015	14.90	0.05
8/11/2015	2.60	0.01
14/11/2015	9.80	0.01
20/11/2015	31.00	0.15
26/11/2015	15.00	0.03



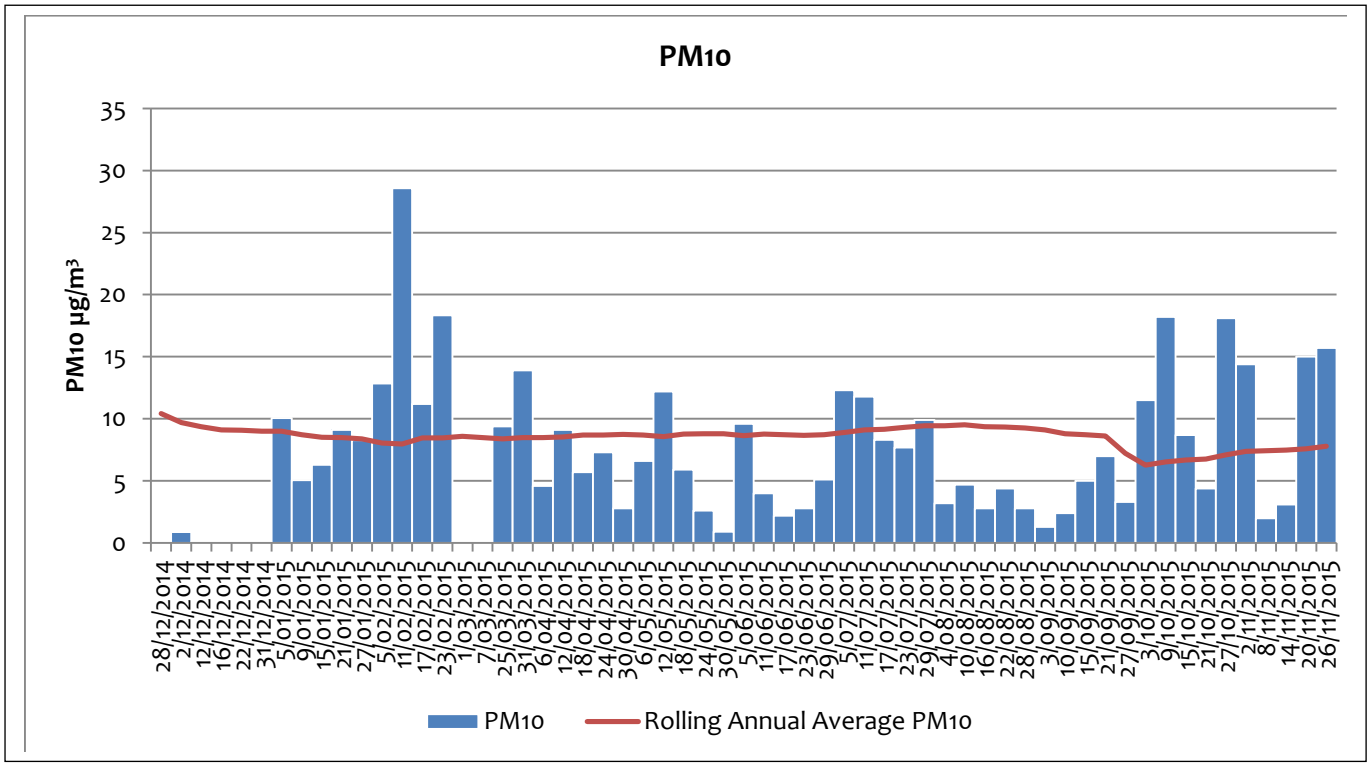
The spike on the 20th November coincides with 70kmh gusts coming from a westerly direction.

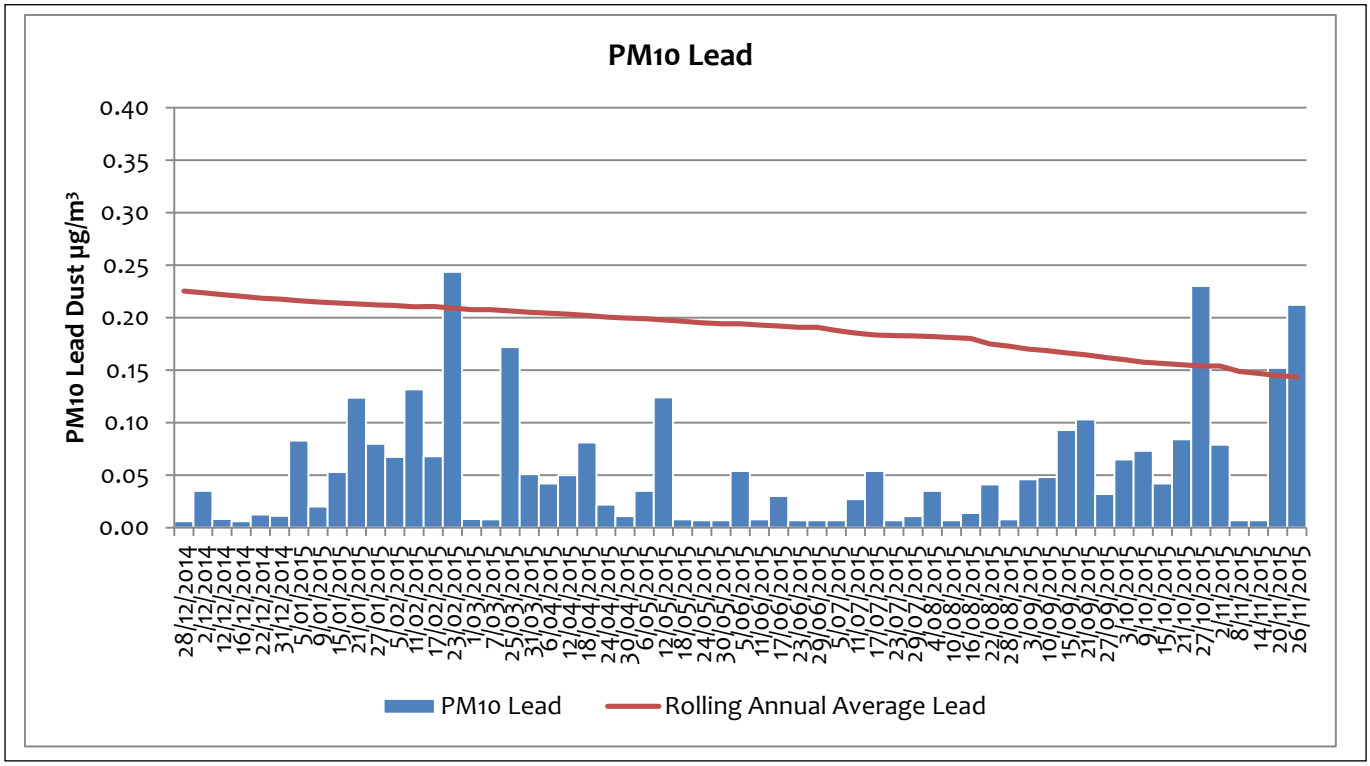


The spike on the 20th November coincides with 70kmh gusts coming from a westerly direction.

EPL12 - Blackwoods Pit – On Site

DATE	PM10 (µg/m^3)	Lead (µg/m^3)
2/11/2015	14.4	0.079
8/11/2015	2.00	0.01
14/11/2015	3.10	0.01
20/11/2015	15.00	0.15
26/11/2015	15.70	0.21



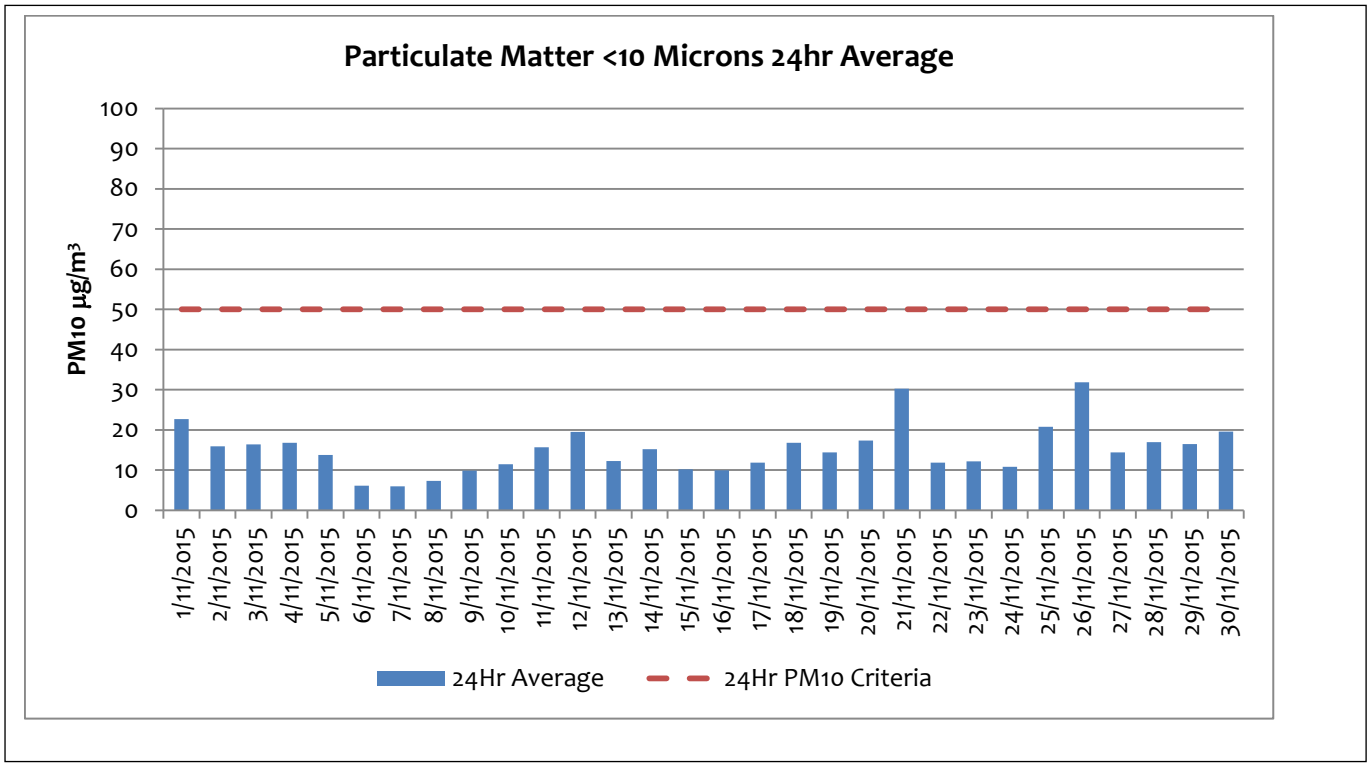

PM10 Lead
PM10 Lead Dust µg/m³
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
28/12/2014
2/12/2014
12/12/2014
16/12/2014
22/12/2014
31/12/2014
5/01/2015
9/01/2015
15/01/2015
21/01/2015
27/01/2015
5/02/2015
11/02/2015
17/02/2015
23/02/2015
1/03/2015
7/03/2015
25/03/2015
31/03/2015
6/04/2015
12/04/2015
18/04/2015
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
3/10/2015
9/10/2015
15/10/2015
21/10/2015
27/10/2015
2/11/2015
8/11/2015
14/11/2015
20/11/2015
26/11/2015
PM10 Lead
Rolling Annual Average Lead

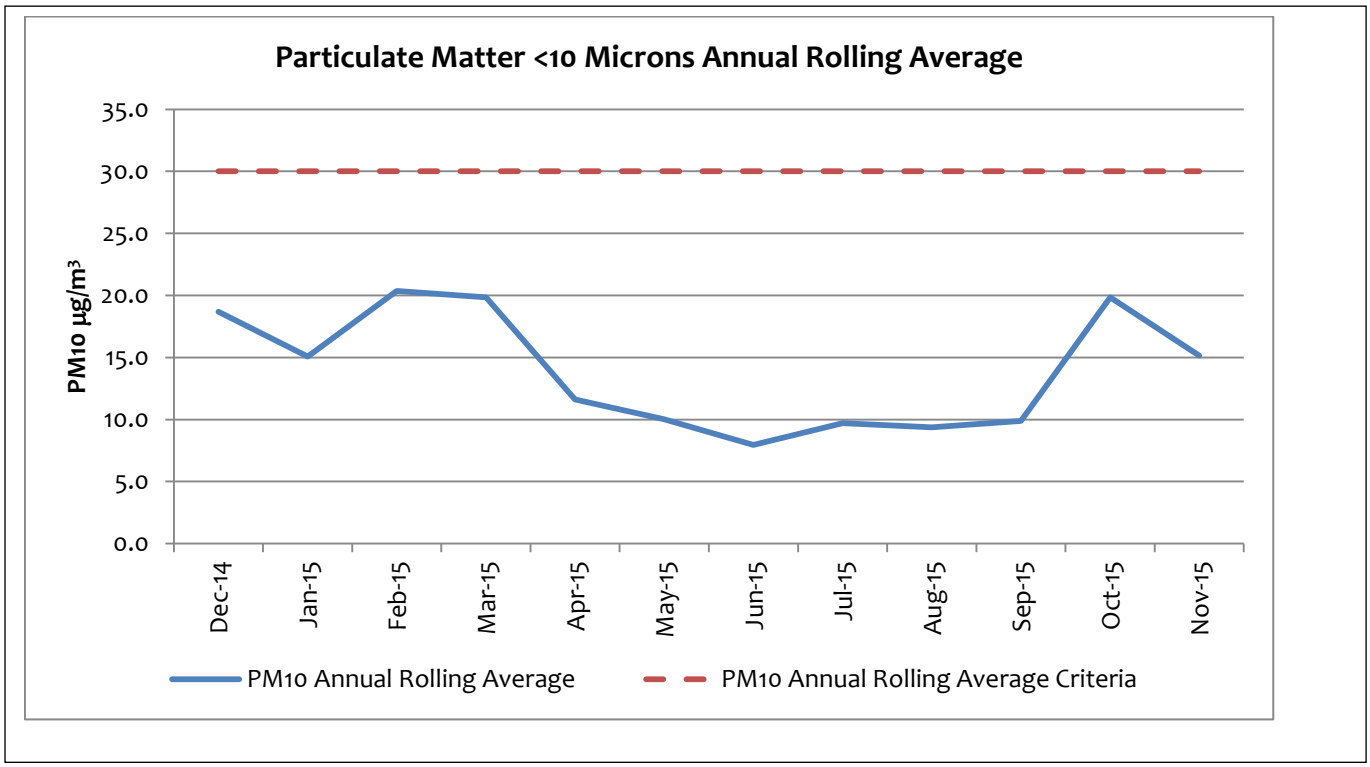
1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

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
1/11/15	**22.71**	**14.24**
2/11/15	**15.90**	**21.21**
3/11/15	**16.42**	**14.43**
4/11/15	**16.81**	**13.55**
5/11/15	**13.75**	**13.54**
6/11/15	**6.13**	**5.94**
7/11/15	**5.96**	**8.88**
8/11/15	**7.29**	**10.57**
9/11/15	**9.88**	**11.73**
10/11/15	**11.47**	**12.17**
11/11/15	**15.68**	**26.55**
12/11/15	**19.52**	**19.76**
13/11/15	**12.25**	**11.75**
14/11/15	**15.23**	**15.41**
15/11/15	**10.18**	**15.41**
16/11/15	**9.97**	**15.47**
17/11/15	**11.86**	**10.82**
18/11/15	**16.76**	**11.51**
19/11/15	**14.41**	**14.81**
20/11/15	**17.38**	**24.32**
21/11/15	**30.22**	**35.34**
22/11/15	**11.83**	**15.18**
23/11/15	**12.13**	**16.28**
24/11/15	**10.78**	**12.90**
25/11/15	**20.80**	**14.85**
26/11/15	**31.87**	**32.21**
27/11/15	**14.38**	**18.25**
28/11/15	**16.94**	**17.28**
29/11/15	**16.47**	**16.92**
30/11/15	**19.61**	**25.18**

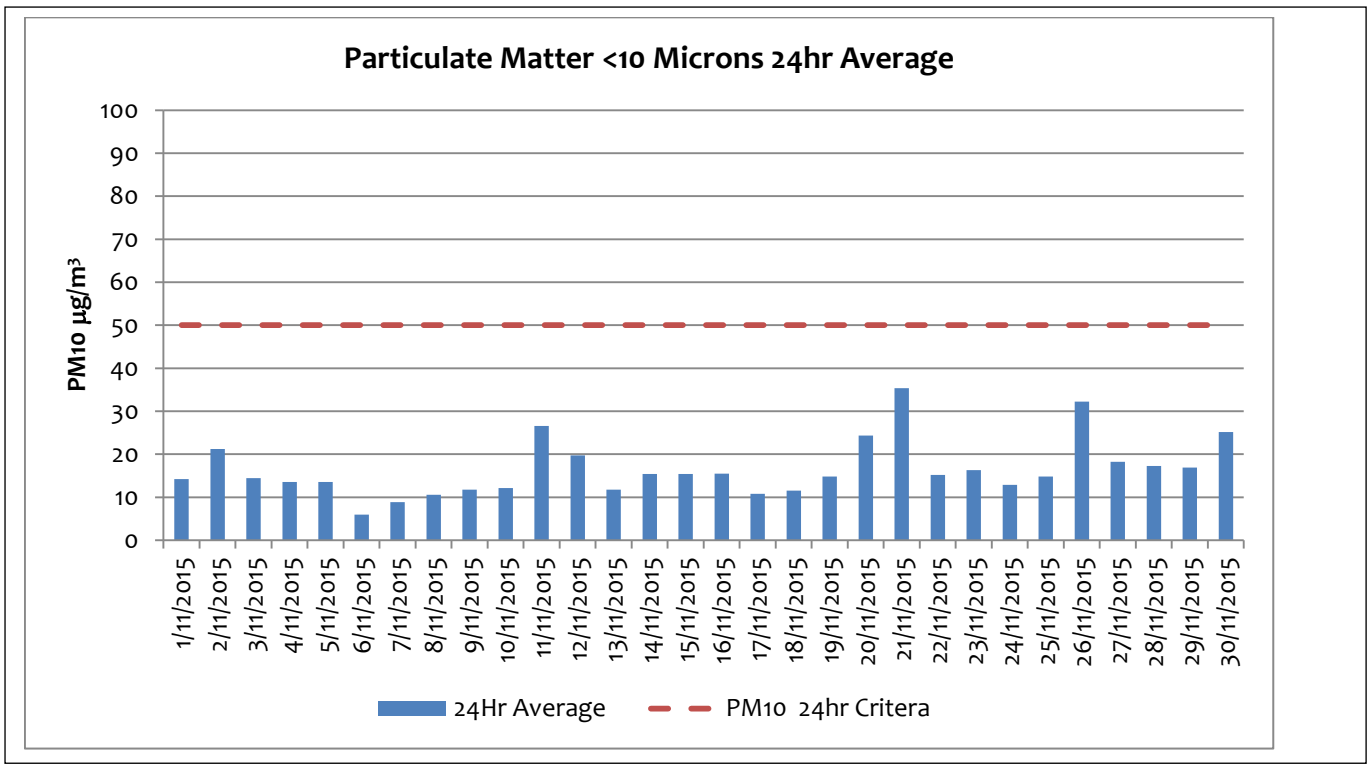
PM10 μg/m^3 12 Month Rolling Average												
	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15
TEOM 1 EPL13 Essential Water Off Site	18.7	15.1	20.4	19.8	11.6	10.0	8.0	9.7	9.4	9.9	19.8	15.2
TEOM 2 EPL14 Blackwoods Pit On Site	27.4	16.5	21.6	22.0	15.1	10.9	9.0	10.3	9.6	12.4	21.2	16.6

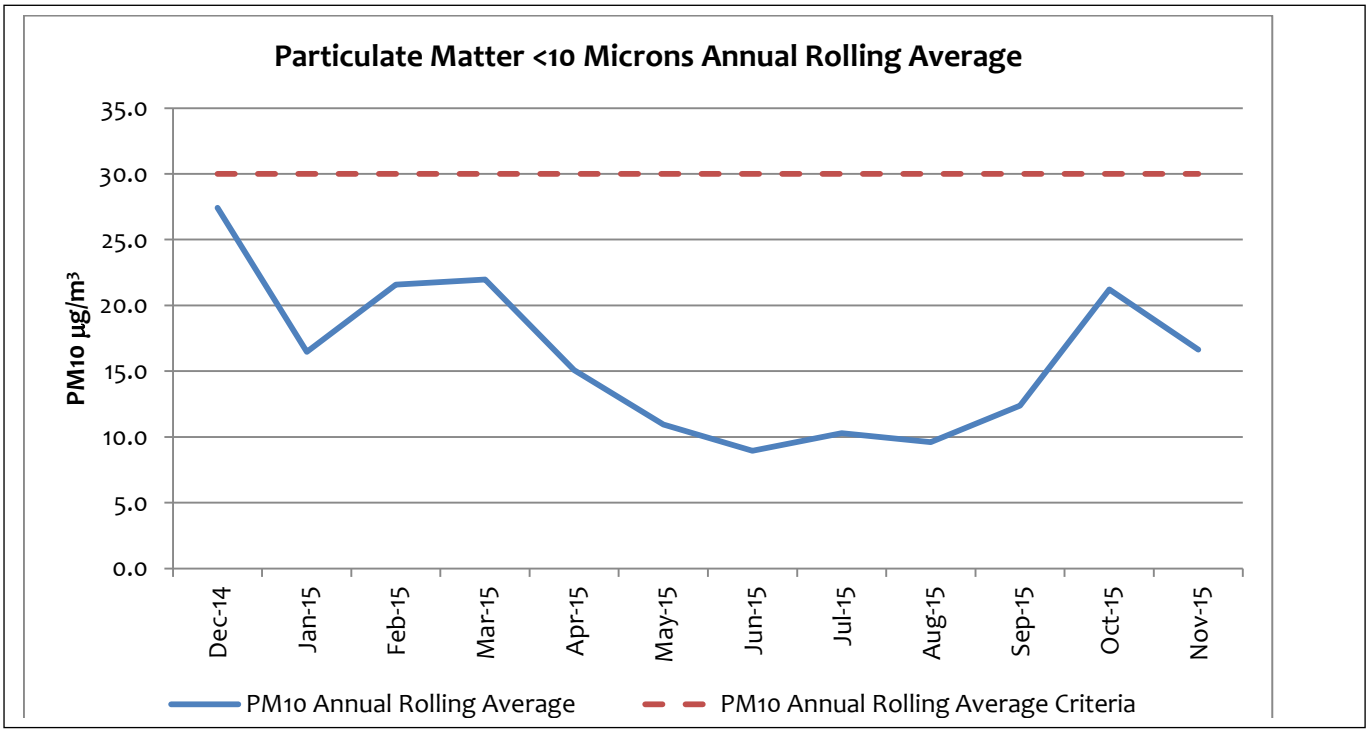
EPL13 – Essential Water – Off Site





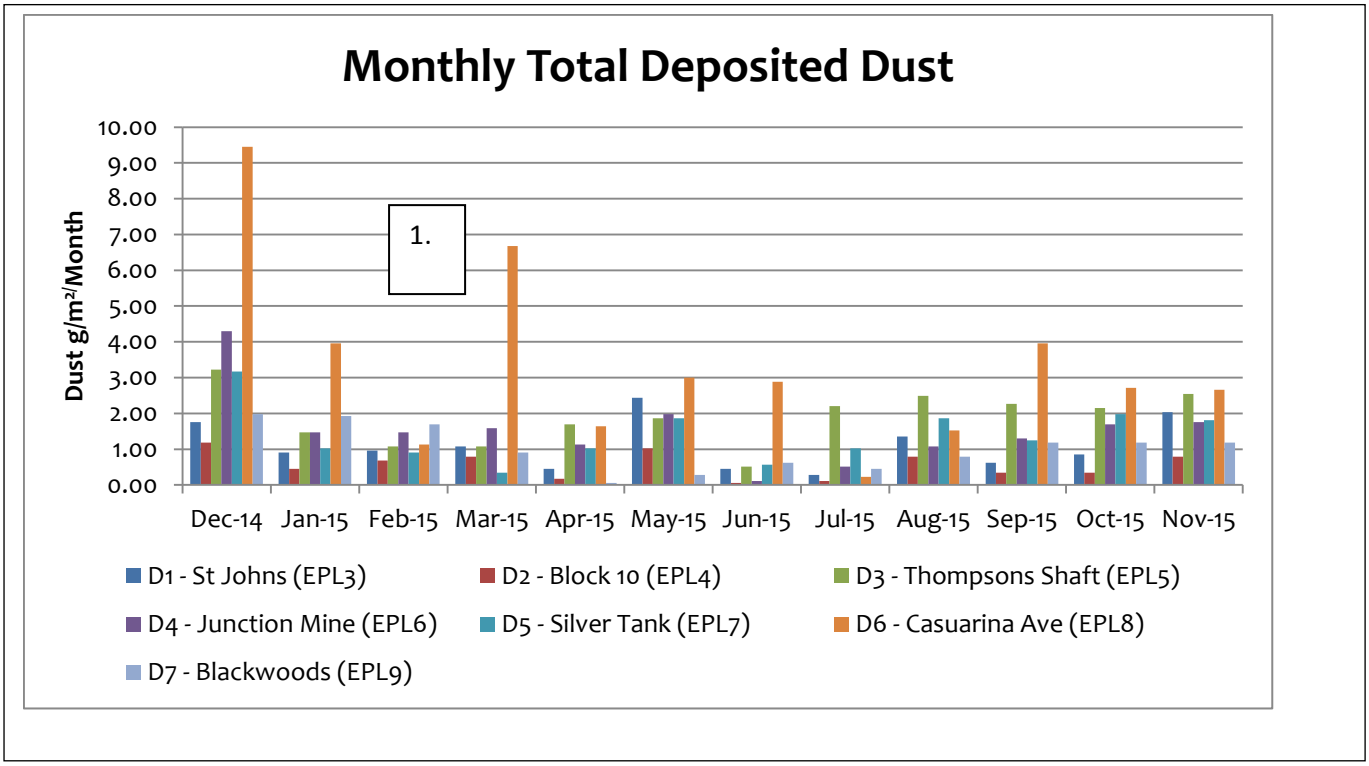
EPL14 – Blackwoods Pit – On Site





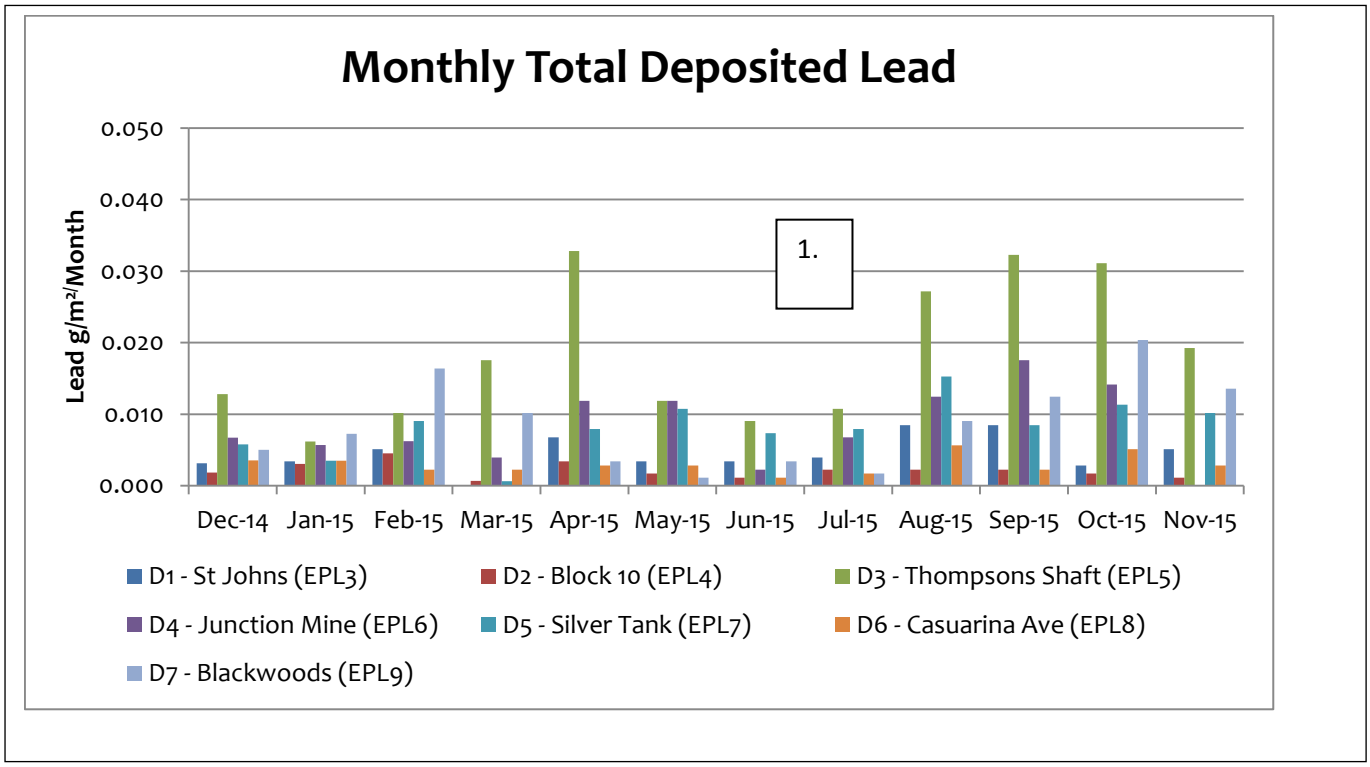
1.3 Dust Deposition Sampling

Total Deposited Dust (g/m$^{2/}$Month)							
Date	D1 (off site)	D2	D3	D4	D5	D6 (off site)	D7
Nov 2015	2.04	0.79	2.55	1.75	1.81	2.66	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
Nov 2015	0.005	0.001	0.019	0.000	0.010	0.003	0.014
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 buildings have been identified as potential sources. Nearby vegetation was removed in September. 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.

2 Blasting (Vibration and Overpressure)

<u>Note:</u> 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.

November Summary Block 7, Zinc Lode:

- 1 production firings
- 45 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

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

- 7 production firings
- 154 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 = **0.37%** (licence requirement <5%) calculated from 1st January 2015 until December 24, 2015.

3 Noise

Quarterly noise monitoring is continuing as per the Pollution Reduction Program on EPL 12559. Four 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 one of the 18 operator-attended measurements due to meteorological conditions as per the site's EPL. The monitoring assessment for this fourth survey found that noise from RASP Mine operations (including the crushing plant) satisfied the relevant night-time noise limits at all locations. Furthermore, site noise was inaudible at two of the 15 locations. The monitoring results showed that where site noise was audible, the total $L_{Aeq(15\text{-}min)}$ noise levels (all source) satisfied the relevant night-time noise limits for five of the measurements, and hence reaffirming compliance at the relevant locations. In summary, no non-compliances were observed during this session of monitoring.

A final summary report will be produced by EMM for submission to the EPA by January 31 2016.

4 Water

4.1 Ground Water Sampled 2/11/2015

		UG FEED	SHAFT 7
pH Value	pH Unit	6.45	6.58
Electrical Conductivity @ 25°C	µS/cm	10100	11200
Total Dissolved Solids @180°C	mg/L	9610	12500
Hydroxide Alkalinity as CaCO3	mg/L	<1	<1
Carbonate Alkalinity as CaCO3	mg/L	<1	<1
Bicarbonate Alkalinity as CaCO3	mg/L	27	22
Total Alkalinity as CaCO3	mg/L	27	22
Sulfate as SO4 - Turbidimetric	mg/L	4580	4910
Chloride	mg/L	1140	1220
Calcium	mg/L	528	529
Magnesium	mg/L	228	265
Sodium	mg/L	1240	1290
Cadmium	mg/L	1.98	1.57
Lead	mg/L	0.336	2.15
Manganese	mg/L	231	351
Zinc	mg/L	773	975
Iron	mg/L	0.92	0.14

4.2 Surface Water

Insufficient rainfall for opportunistic surface water sampling during October 2015

Surface Water Table Nov 2015 to Nov 2016

EPA Identification Number	Frequency	Comment
EPL29 (S31-1)	2 x Per year when contains water	No sample - dry
EPL30 (S44)	2 x Per year when contains water	No sample - dry
EPL31 (S49)	2 x Per year when contains water	No sample - dry
EPL32 (S1-A)	2 x Per year when contains water	No sample - dry
EPL33 Horwood Dam	2 x Per year when contains water	No sample – low water
EPL34 Upstream	2 x Per year when contains water	No sample - dry
EPL35 Downstream	2 x Per year when contains water	No sample - dry

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 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 Min °C	Temps Max °C	Rain mm	Evap mm	Sun hours	Max wind gust Dir	Max wind gust Spd km/h	Max wind gust Time local	9 am Temp °C	9 am RH %	9 am Cld 8th	9 am Dir	9 am Spd km/h	9 am MSLP hPa	3 pm Temp °C	3 pm RH %	3 pm Cld 8th	3 pm Dir	3 pm Spd km/h	3 pm MSLP hPa
1	Su						WNW	72	09:28				NNW	20	1008.0				WSW	30	1004.9
2	Mo						W	39	14:40				SSW	24	1012.6				WNW	20	1011.5
3	Tu						NNE	43	20:07				NNE	24	1013.8				NNW	6	1010.8
4	We						WNW	89	13:22				NNE	28	1008.8				WSW	17	1006.6
5	Th						W	44	15:13				WSW	20	1007.9				WNW	28	1007.0
6	Fr						SW	39	09:03				SSW	28	1013.4				WSW	22	1011.8
7	Sa						SSW	35	16:31				S	17	1019.0				S	19	1017.1
8	Su						S	50	16:06				E	20	1020.2				SSE	26	1017.2
9	Mo						ESE	39	14:22				ENE	28	1016.9				ESE	22	1013.5
10	Tu						S	46	19:20				NNE	15	1014.1				SSW	26	1011.8
11	We						SE	35	06:51				SSE	24	1015.4				SE	11	1013.1
12	Th						SW	69	06:53				SSE	17	1014.8				WNW	17	1011.7
13	Fr						SW	50	15:19				SSW	35	1015.2				S	24	1012.4
14	Sa						S	59	11:36				S	33	1017.1				S	30	1014.8
15	Su						S	46	12:40				SSE	22	1017.9				S	26	1014.3
16	Mo						ENE	30	10:04				SE	4	1015.7				NE	7	1012.5
17	Tu						NW	48	11:01				N	26	1015.5				WSW	22	1012.8
18	We						NW	50	10:42				NNW	28	1015.3				NW	19	1013.0
19	Th						NW	52	09:35				NW	28	1015.0				NW	28	1011.7
20	Fr						W	70	14:50				SW	13	1013.2				WNW	43	1009.5
21	Sa						S	50	07:51				S	37	1021.7				SSW	28	1018.8
22	Su						SSW	46	14:45				S	20	1019.6				W	17	1015.6
23	Mo						SSW	46	02:09				S	30	1019.2				SSW	19	1016.6
24	Tu						W	35	14:19				SSE	13	1018.6				NE	9	1014.0
25	We						NW	61	15:20				N	26	1009.1				NW	31	1003.1
26	Th						SW	57	00:33				SSW	39	1011.9				S	11	1013.8
27	Fr						SSE	37	08:20				SSE	24	1019.2				SSW	15	1015.9
28	Sa						W	35	16:01				ESE	15	1017.4				W	13	1014.1
29	Su						SW	41	14:51				SE	17	1015.6				WNW	24	1011.2
30	Mo						NNW	56	13:31				N	31	1008.4				NNW	22	1006.7
Statistics for November 2015																					
Mean														23	1015.0					21	1012.3
Lowest													SE	4	1007.9				NNW	6	1003.1
Highest							WNW	89					SSW	39	1021.7				WNW	43	1018.8
Total																					

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	7/12/15	16/12/15	24/12/2015
TEOM	Real time	-	24/12/2015
Dust Deposition	9/12/15	16/12/15	24/12/2015
Water	3/11/15	10/11/15	24/12/2015
Blast Vibration and overpressure	Real Time	-	24/12/2015

7 Correction Log November 2015

There are no data corrections for November 2015.