

Monthly Environmental Data January 2016

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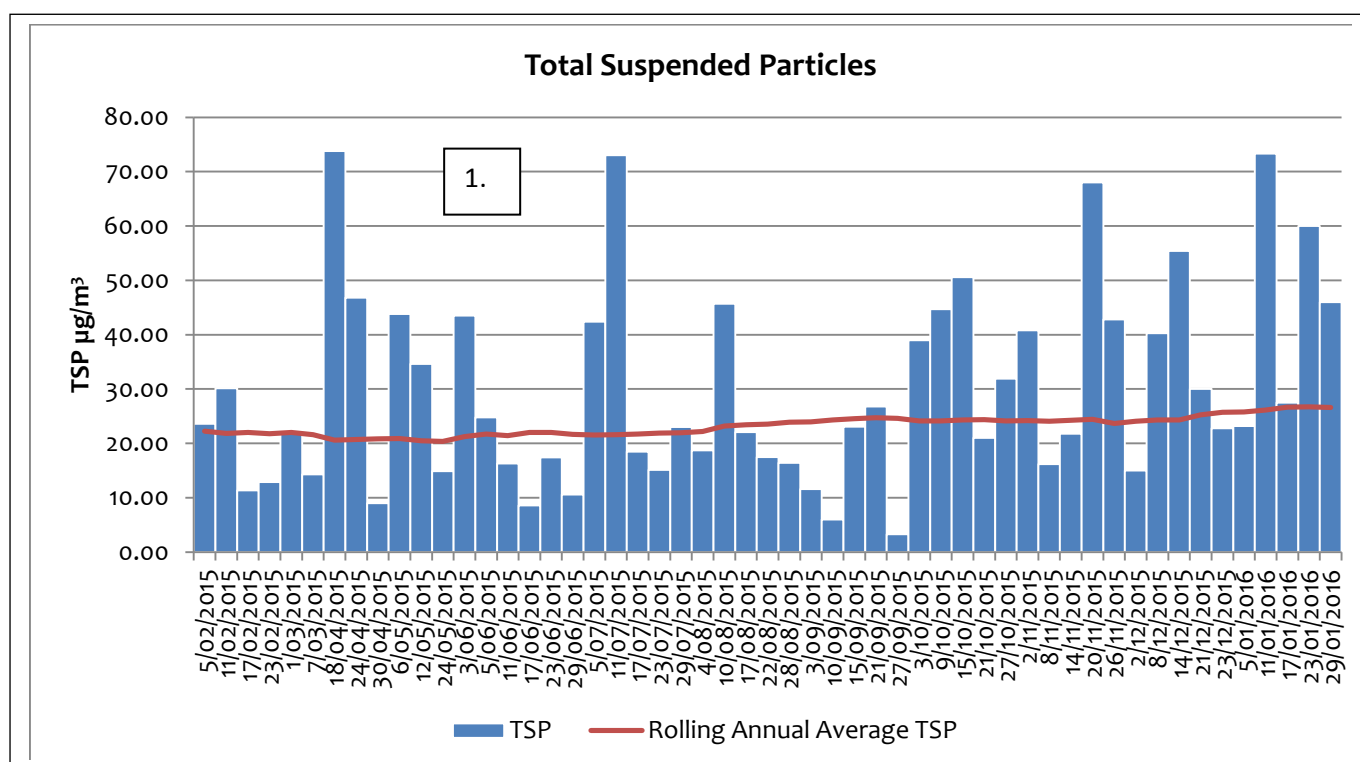
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1 Air Quality

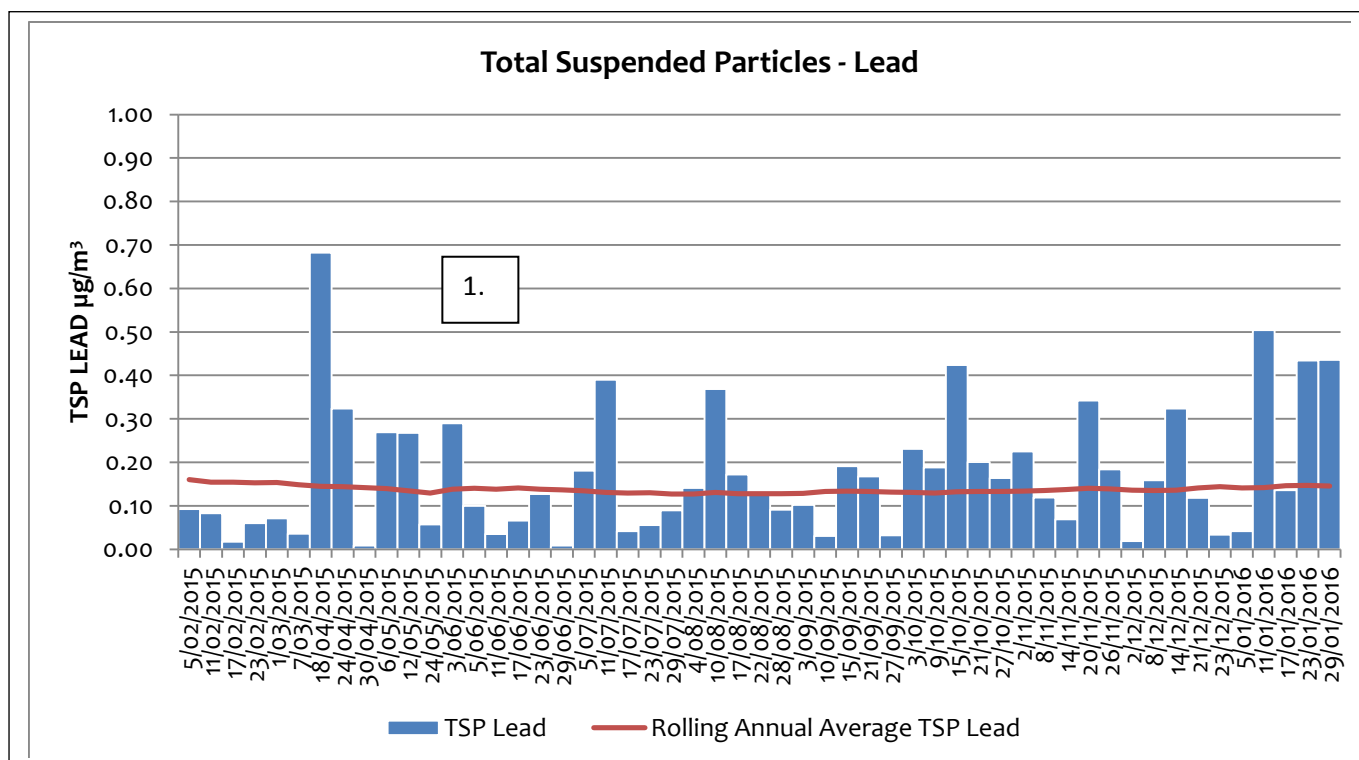
1.1 High Volume Air Samplers

EPL10 - SILVER TANK - ON SITE

DATE	TSP ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
5/01/2016	23.20	0.04
11/01/2016	73.30	0.50
17/01/2016	27.50	0.14
23/01/2016	60.00	0.43
29/01/2016	46.00	0.44



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. On the 11th January gusts were recorded up to 65km/h in a WSW direction.

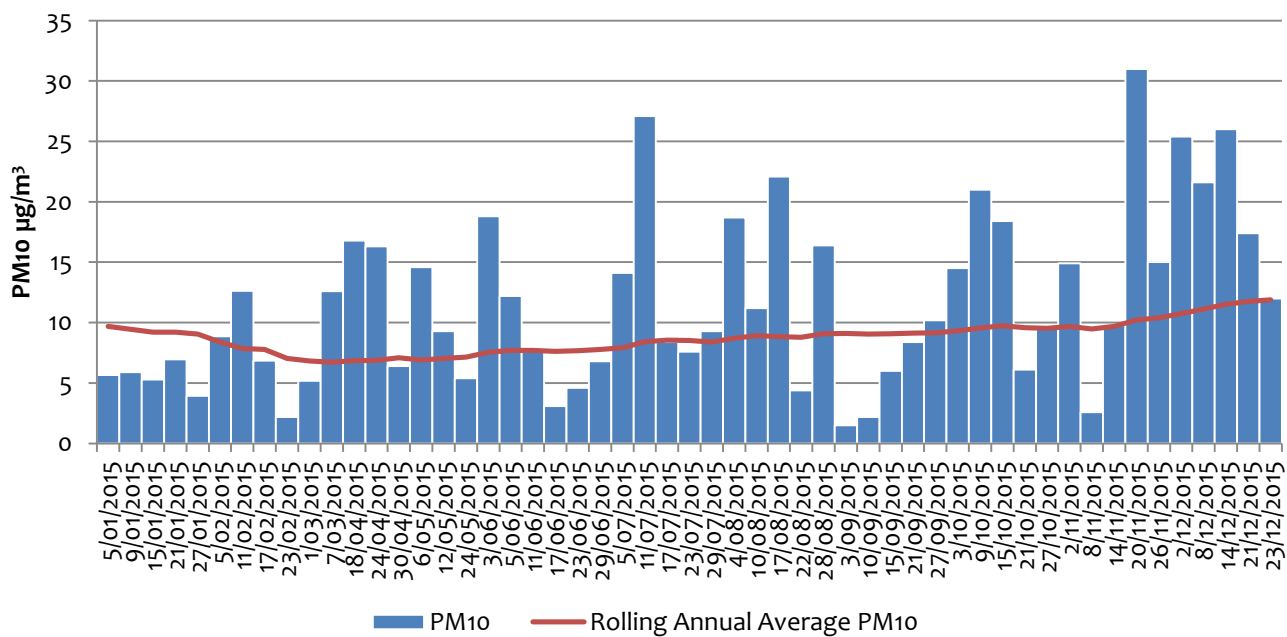


2. Spike on the 18th April was investigated. Lab QC was okay with no evidence of lab contamination. Wind conditions were not extraordinary and it rained. Field sampling methods have been checked to prevent any sample contamination.

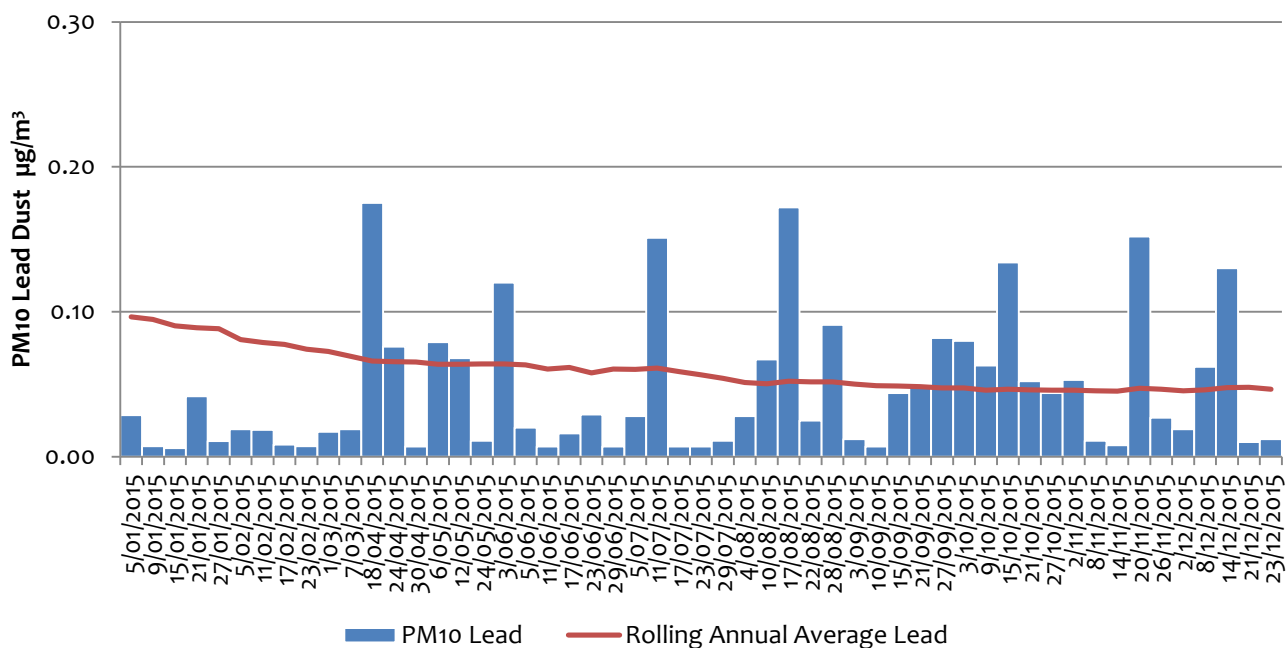
EPL11 - Silver Tank - On Site

DATE	PM10 ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
5/01/2016	9.30	0.01
11/01/2016	31.30	0.16
17/01/2016	10.10	0.02
23/01/2016	25.60	0.16
29/01/2016	13.90	0.15

PM10

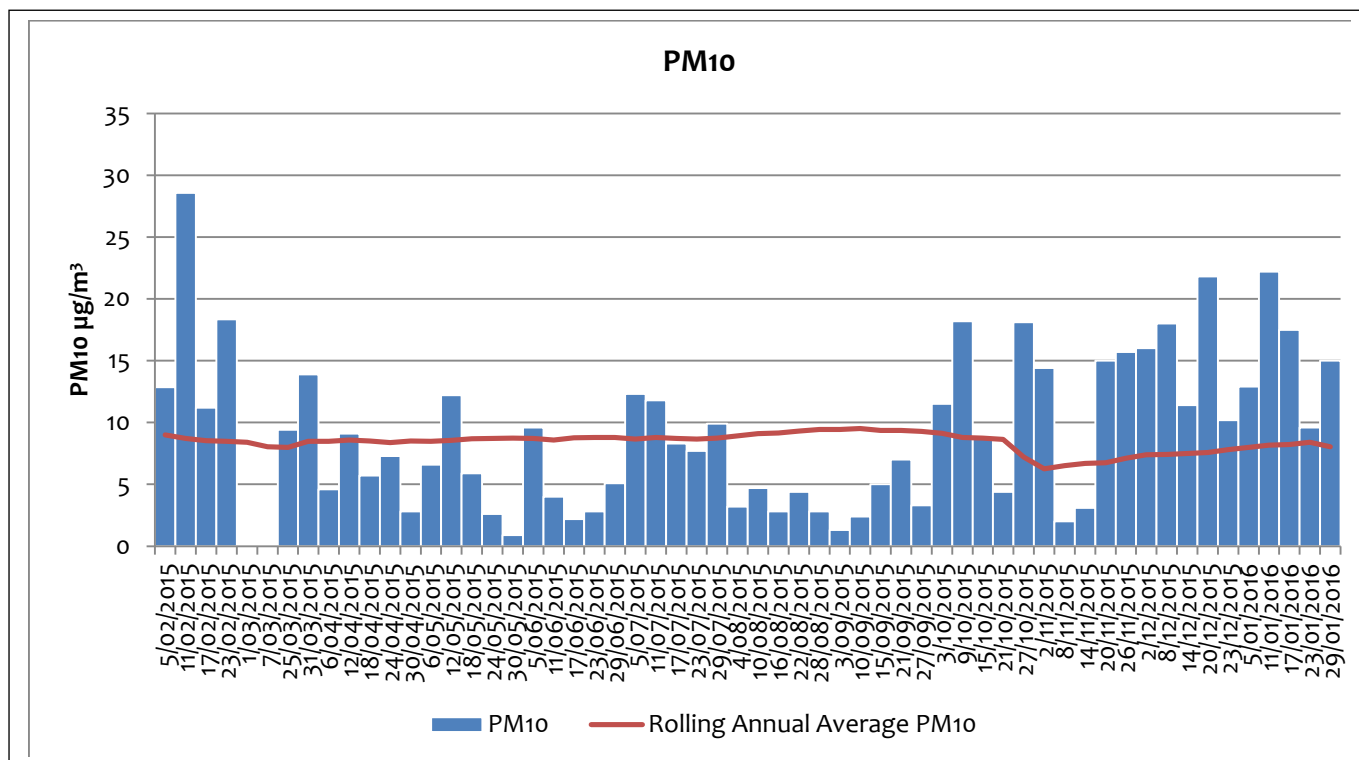


PM10 Lead

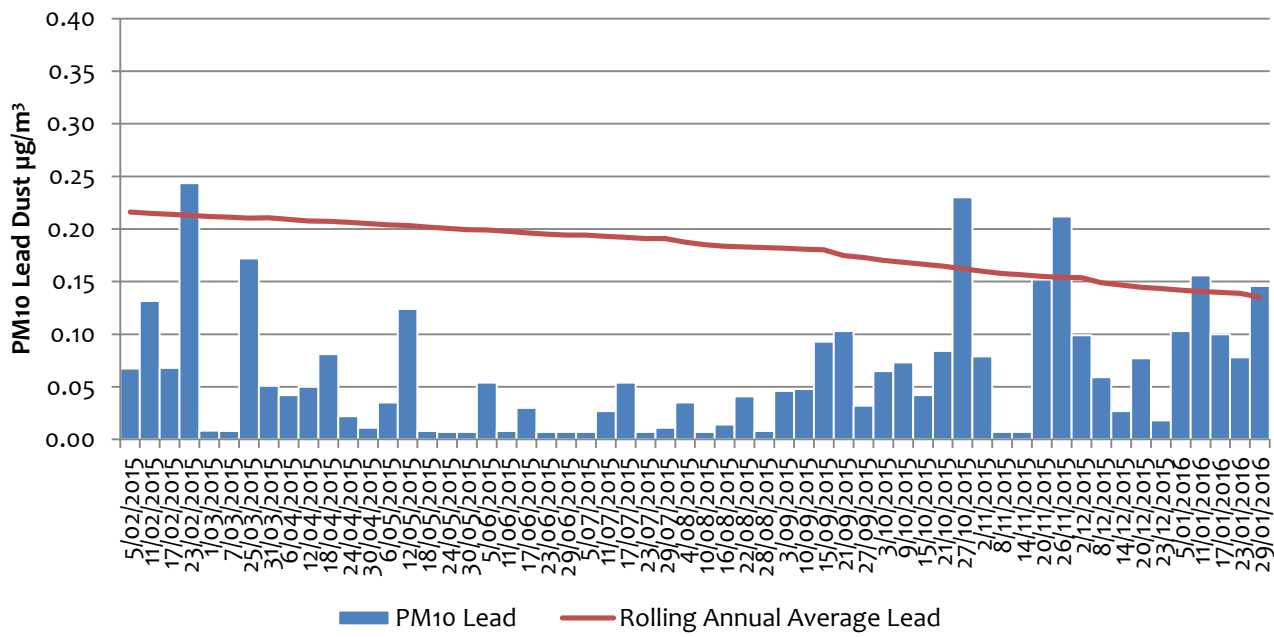


EPL12 - Blackwoods Pit – On Site

DATE	PM10 ($\mu\text{g}/\text{m}^3$)	Lead ($\mu\text{g}/\text{m}^3$)
5/01/2016	12.90	0.103
11/01/2016	22.20	0.156
17/01/2016	17.50	0.1
23/01/2016	9.60	0.078
29/01/2016	15.00	0.146



PM10 Lead

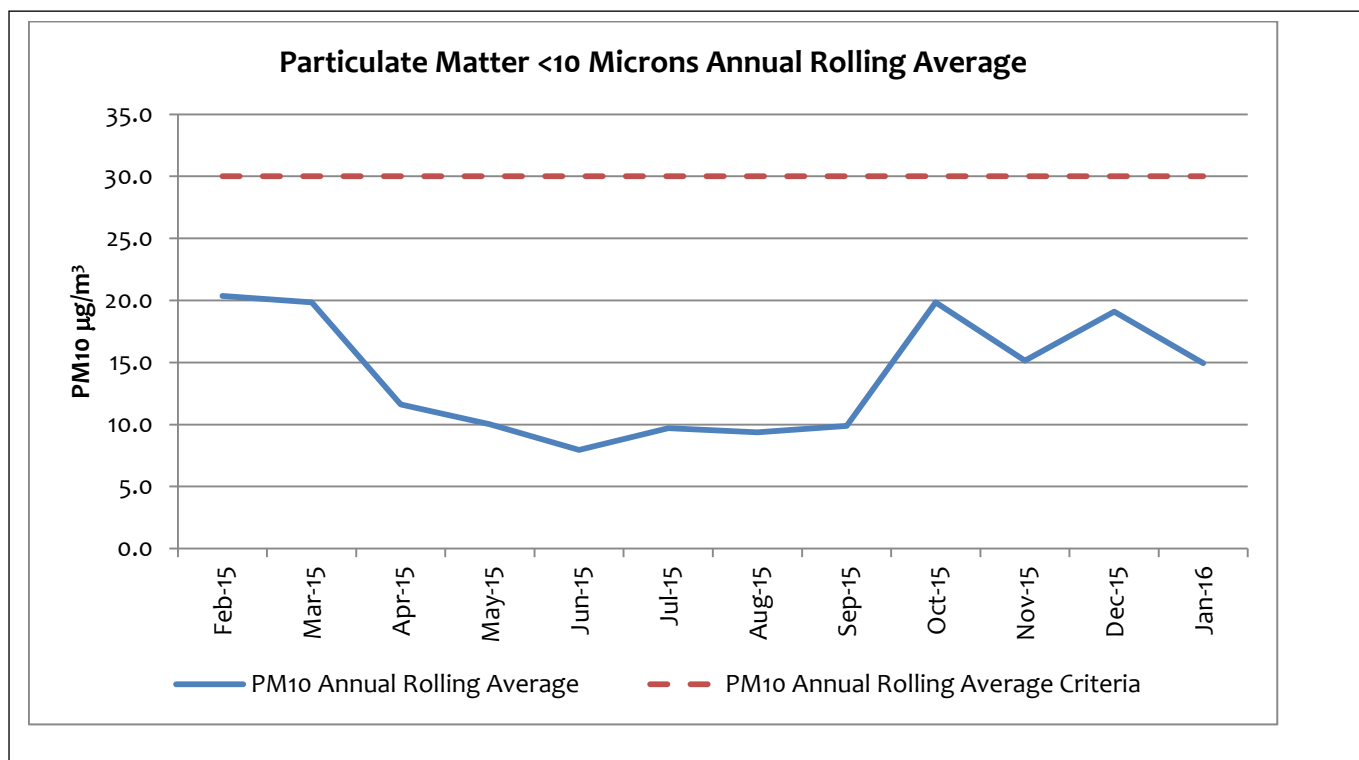
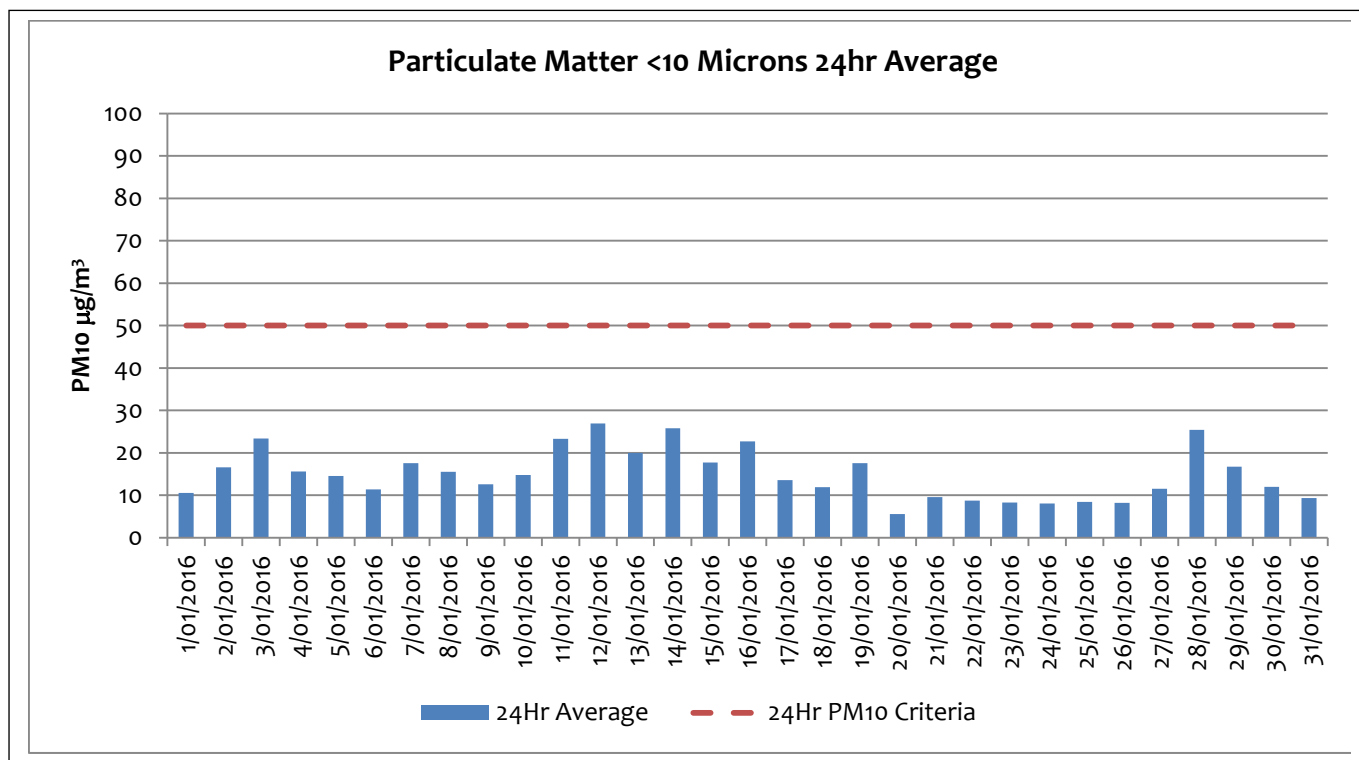


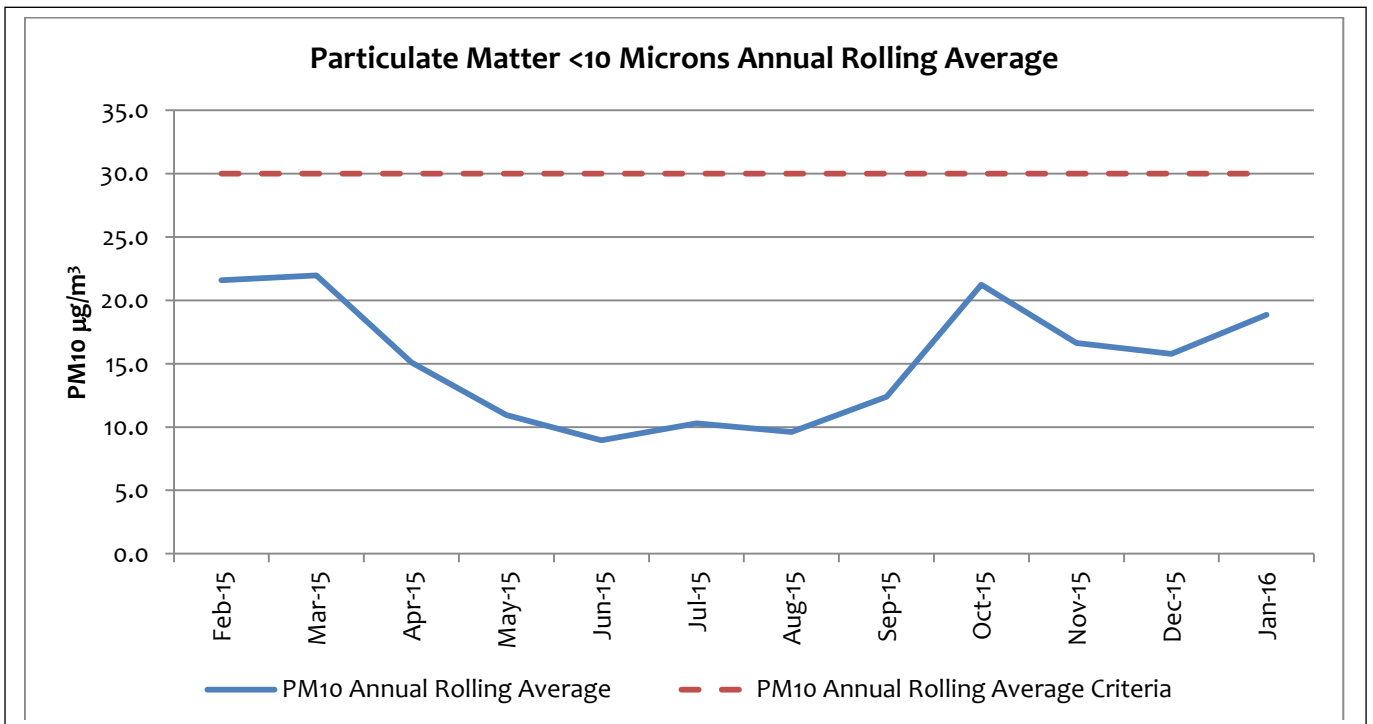
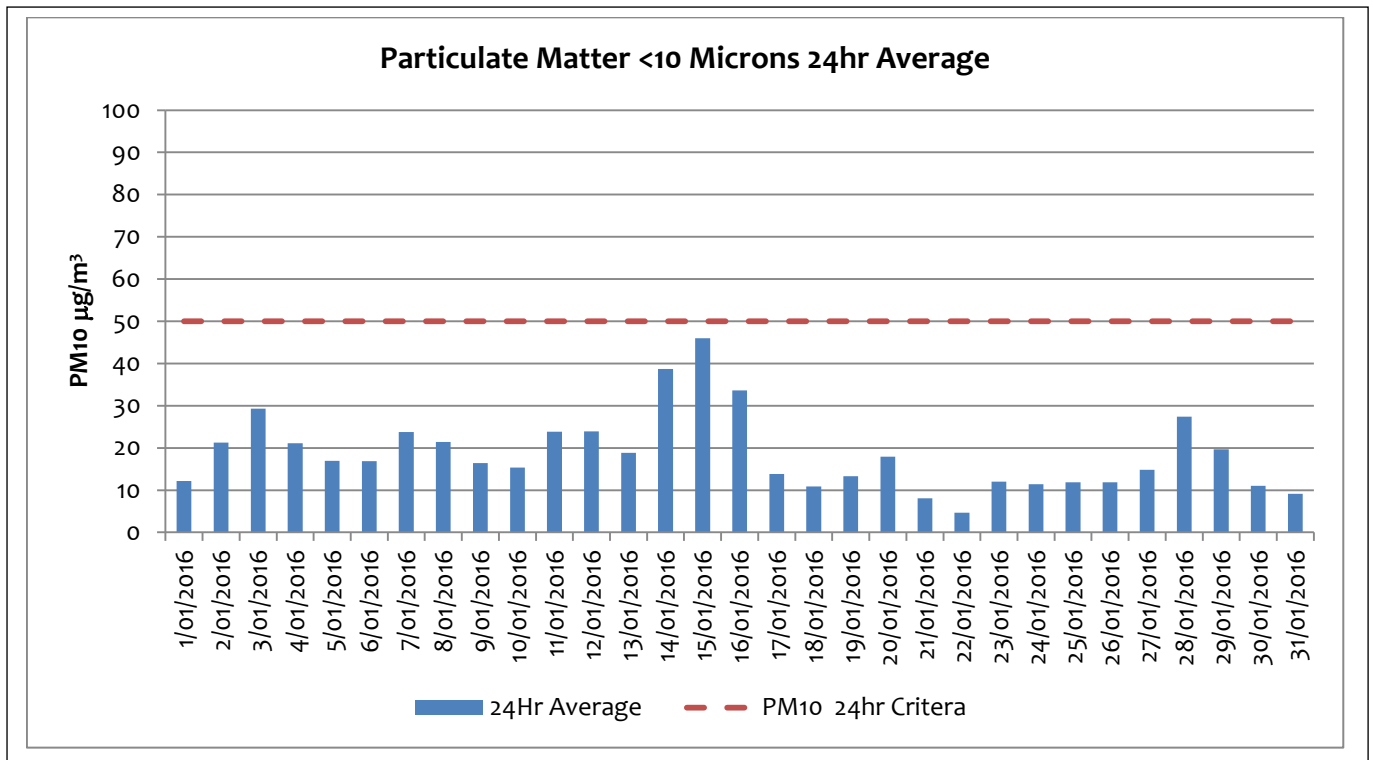
1.2 Tapered Element Oscillating Microbalance Sampling (TEOM)

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
1/01/2016	10.52	12.19
2/01/2016	16.61	21.23
3/01/2016	23.38	29.33
4/01/2016	15.61	21.13
5/01/2016	14.51	16.97
6/01/2016	11.40	16.85
7/01/2016	17.53	23.80
8/01/2016	15.54	21.44
9/01/2016	12.55	16.39
10/01/2016	14.73	15.34
11/01/2016	23.26	23.87
12/01/2016	26.88	23.94
13/01/2016	19.99	18.87
14/01/2016	25.79	38.69
15/01/2016	17.69	45.97
16/01/2016	22.68	33.60
17/01/2016	13.59	13.81
18/01/2016	11.92	10.90
19/01/2016	17.59	13.30
20/01/2016	5.53	17.93
21/01/2016	9.59	8.05
22/01/2016	8.69	4.68
23/01/2016	8.25	11.99
24/01/2016	8.01	11.44
25/01/2016	8.43	11.84
26/01/2016	8.22	11.83
27/01/2016	11.49	14.79
28/01/2016	25.39	27.40
29/01/2016	16.76	19.70
30/01/2016	11.99	11.05
31/01/2016	9.36	9.13

PM10 $\mu\text{g}/\text{m}^3$ 12 Month Rolling Average												
	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16
TEOM 1 EPL13 Essential Water Off Site	20.4	19.8	11.6	10.0	8.0	9.7	9.4	9.9	19.8	15.2	19.1	15.0
TEOM 2 EPL14 Blackwoods Pit On Site	21.6	22.0	15.1	10.9	9.0	10.3	9.6	12.4	21.2	16.6	15.8	18.8

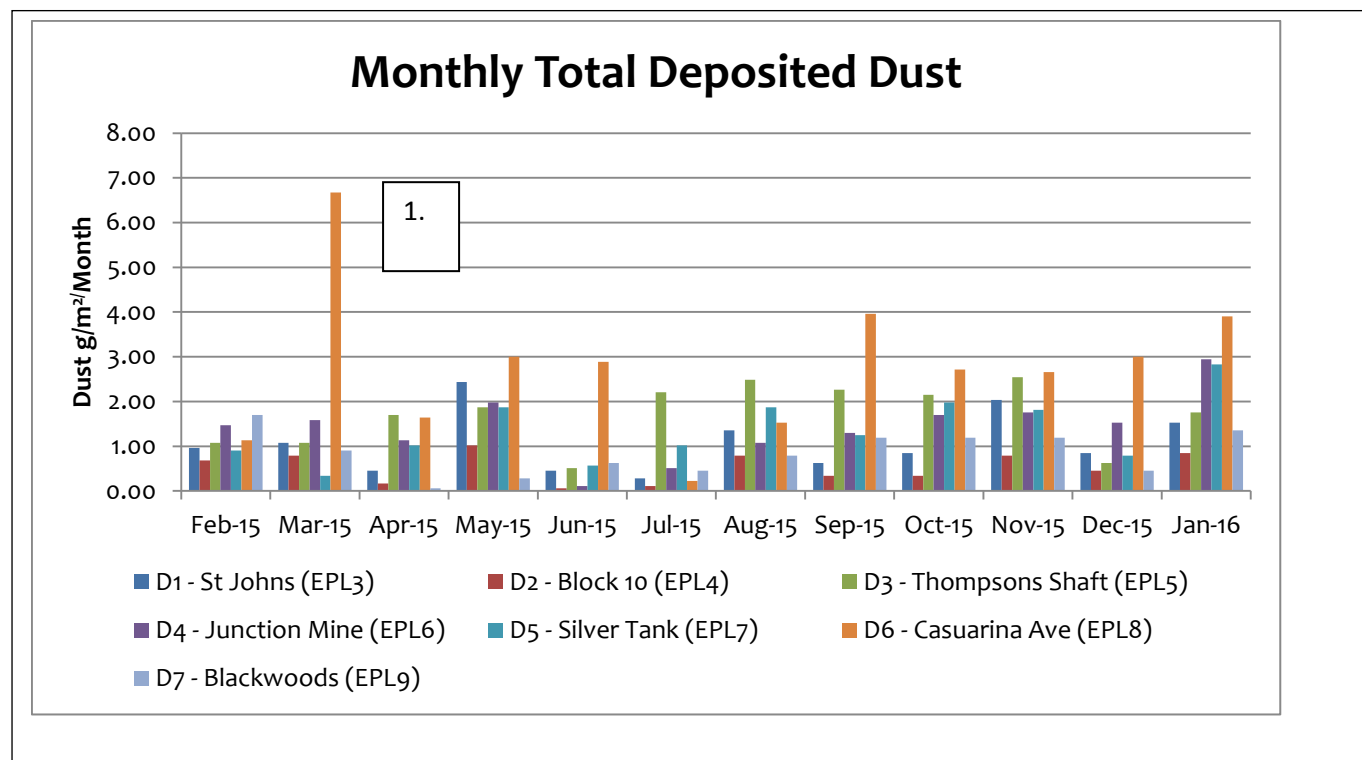
EPL13 – Essential Water – Off Site





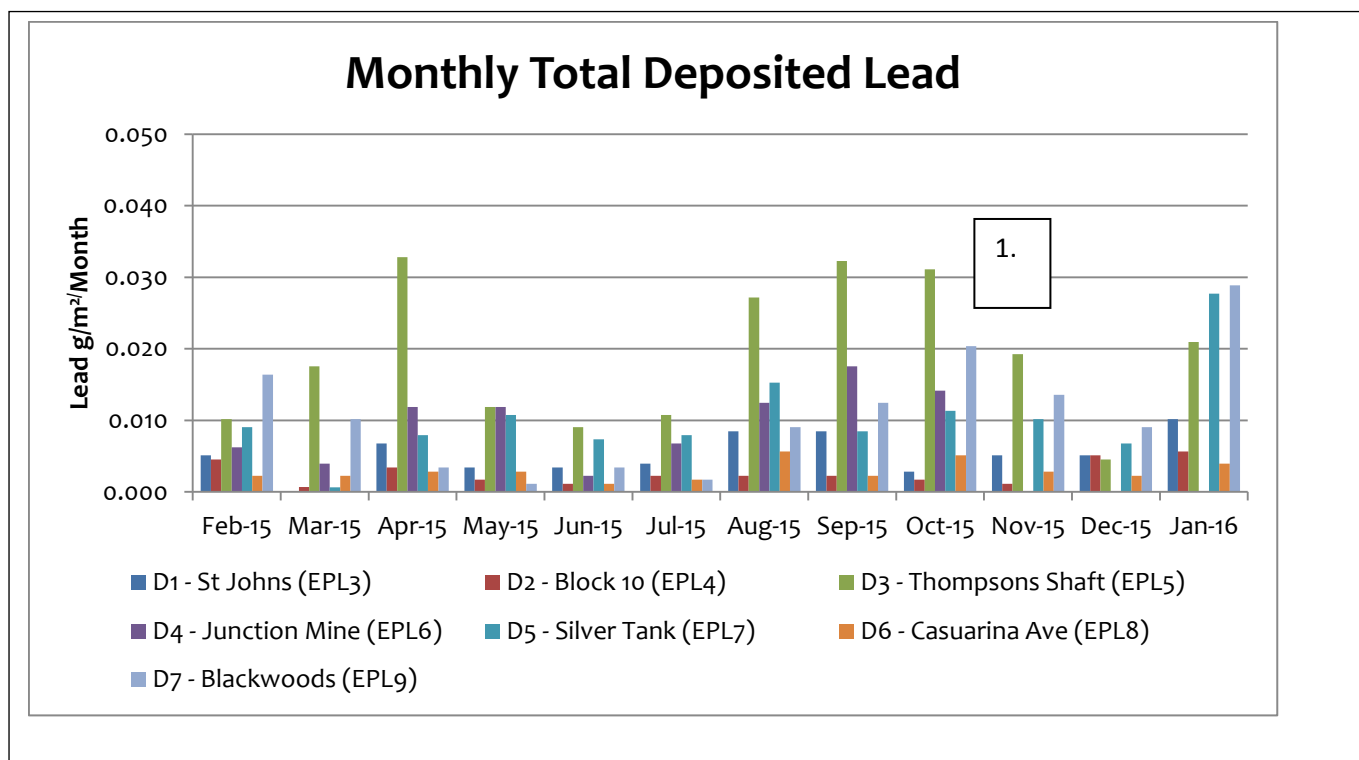
1.3 Dust Deposition Sampling

Total Deposited Dust (g/m ² /Month)							
Date	D1 (off site)	D2	D3	D4	D5	D6 (off site)	D7
Jan 2016	1.53	0.85	1.75	2.94	2.83	3.90	1.36
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 March 2015. This sample had a large volume of water present when collected.

Total Deposited Lead (g/m ² /Month)							
Date	D1 (Off Site)	D2	D3	D4	D5	D6 (Off Site)	D7
Jan 2016	0.010	0.006	0.021	0.000	0.028	0.004	0.029
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 and October. A clean up of the haul road adjacent Thompsons shaft was 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. Notably Silver Tank and Blackwood's were higher than normal. 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 containers were cleaned during January at the rail load out. This not an activity normally conducted on site and involves breaking up of consolidated concentrate in the bottom of the lead containers. This has probably contributed to both the higher levels at Blackwoods and Thompson's shaft.

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 2016, therefore no calculation on percentage of blasts over 5mm/sec can be given (it is based on an annual calculation).

January Summary Block 7, Zinc Lode:

- 1 production firings
- 25 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

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

- 4 production firings
- 138 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 = **0.48%** (licence requirement <5%) calculated from 1st February 2015 until January 31, 2016.

3 Noise

Quarterly noise monitoring is now complete as per the Pollution Reduction Program (PRP) on EPL 12559. Four noise assessments have been undertaken since November 2014. EMGA Mitchell McLennan Pty Limited (EMM) completed the analysis for all assessments.

A final summary report was produced by EMM for submission to the EPA. Currently a licence variation has been sought to close out the PRP.

4 Water

4.1 Ground Water Sampled 11/1/2016

		UG FEED	SHAFT 7	HORWOOD
pH Value	pH Unit	6.75	6.81	6.53
Electrical Conductivity @ 25°C	µS/cm	10100	11700	15800
Total Dissolved Solids @180°C	mg/L	9980	12500	16000
Hydroxide Alkalinity as CaCO ₃	mg/L	<1	<1	<1
Carbonate Alkalinity as CaCO ₃	mg/L	<1	<1	<1
Bicarbonate Alkalinity as CaCO ₃	mg/L	10	15	4
Total Alkalinity as CaCO ₃	mg/L	10	15	4
Sulfate as SO ₄ - Turbidimetric	mg/L	4180	4920	6700
Chloride	mg/L	1190	1500	2310
Calcium	mg/L	425	434	519
Magnesium	mg/L	234	314	411
Sodium	mg/L	1240	1470	2140
Cadmium	mg/L	2.75	1.85	2.84
Lead	mg/L	0.31	2.27	1.65
Manganese	mg/L	289	525	550
Zinc	mg/L	765	973	1090
Iron	mg/L	<0.05	<0.05	<0.05

4.2 Surface Water

Insufficient rainfall for opportunistic surface water sampling during December 2015

Surface Water Table Nov 2015 to Nov 2016

EPA Identification Number	Frequency	Comment
EPL29	2 x Per year when contains water	No sample - dry
EPL30	2 x Per year when contains water	No sample - dry
EPL31	2 x Per year when contains water	No sample - dry
EPL32	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		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	%	g th	km/h	hPa	°C	%	g th	km/h	hPa
1	Fr						E	61	16:18				ENE	7	1011.8				SE	22	1010.7
2	Sa						SSE	44	15:59				SSW	26	1011.7				S	20	1008.5
3	Su						ESE	57	16:56				S	24	1009.9				S	22	1007.3
4	Mo						S	61	16:00				ENE	22	1012.7				ESE	24	1009.4
5	Tu						SSW	54	16:07				S	20	1013.1				SSW	17	1010.5
6	We						SW	54	11:54				SSW	17	1014.6				SSW	35	1012.1
7	Th						S	57	10:34				SSE	22	1016.2				S	28	1015.1
8	Fr						SSE	39	14:07				S	22	1020.3				SSW	11	1017.2
9	Sa						SW	50	16:54				SSW	13	1019.3				S	22	1015.9
10	Su						SSW	37	13:01				ENE	11	1015.9				ESE	11	1012.6
11	Mo						WSW	65	19:22				NNE	4	1010.4				NW	30	1006.9
12	Tu						WNW	46	15:17				NNE	15	1010.4				NNW	19	1007.8
13	We						WSW	70	19:20				NW	31	1011.0				NW	22	1009.2
14	Th						SSW	65	08:28				SSW	46	1017.4				S	35	1019.6
15	Fr						SSE	59	13:52				SSE	39	1026.5				SSE	37	1022.3
16	Sa						ESE	46	14:23				ESE	20	1022.5				ESE	24	1018.9
17	Su						ENE	43	10:13				NNE	24	1018.4				ESE	26	1014.9
18	Mo						SE	39	13:05				N	22	1015.4				N	17	1012.2
19	Tu						NE	50	14:36				NNE	24	1013.7				NNE	20	1009.8
20	We						NE	56	21:46				W	15	1010.1				WNW	22	1007.7
21	Th						W	46	09:23				SW	28	1012.7				NW	17	1008.9
22	Fr						S	56	17:43				SW	17	1010.1				WSW	19	1007.2
23	Sa						SSW	43	11:22				SSW	24	1012.3				SW	22	1011.5
24	Su						S	37	14:30				SSW	20	1013.9				S	19	1010.7
25	Mo						S	46	11:33				SE	22	1013.2				S	24	1010.7
26	Tu						ESE	43	07:46				SE	30	1012.4				S	15	1009.4
27	We						WSW	50	14:48				S	11	1008.2				W	24	1005.0
28	Th						W	70	15:26				SSW	33	1007.6				SW	28	1004.8
29	Fr						WSW	52	16:35				SW	30	1006.6				WSW	28	1003.3
30	Sa						WSW	54	00:32				NW	24	1000.8				SSW	37	1001.3
31	Su						W	52	12:06				WSW	15	1006.8				WNW	30	1004.2
Statistics for January 2016																					
Mean														21	1013.1					23	1010.5
Lowest													NNE	4	1000.8				#	11	1001.3
Highest							#	70					SSW	46	1026.5				#	37	1022.3
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	10/1/2016	18/2/2016	25/2/2016
TEOM	Real time	-	25/2/2016
Dust Deposition	8/2/2016	17/2/2016	25/2/2016
Water	12/1/2016	20/1/2016	25/2/2016
Blast Vibration and overpressure	Real Time	-	25/2/2016

7 Correction Log December 2015

There are no data corrections for December 2015.