



**ESPERANCE PORTS**  
*Sea & Land*

## **TSP EXCEEDANCE REPORT**

### **MONITORING PERIOD**

**21<sup>ST</sup> – 22<sup>ND</sup> MARCH 2011**

<b>Revision</b>	<b>Prepared</b>	<b>Reviewed</b>	<b>Approved</b>	<b>Date</b>	<b>Description</b>
1	C.Field	A.Leonard		13/04/2011	

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## 1. INTRODUCTION

On the 7<sup>th</sup> April 2011, the Esperance Port Sea and Land (ESPL) became aware of laboratory results detailing dust (measured as Total Suspended Particles) marginally exceeding the license criteria (refer to Table 1). Consistent with the latest amended Licence (L5099/1974/13) requirement of Condition 9, this requires an exceedance report to be submitted to the DEC, within seven working days (18<sup>th</sup> April 2011).

**Table 1:** Emission Concentration Targets from DEC Licence Number L5099/1974/13 issued to EPSL on 24<sup>th</sup> February 2011.

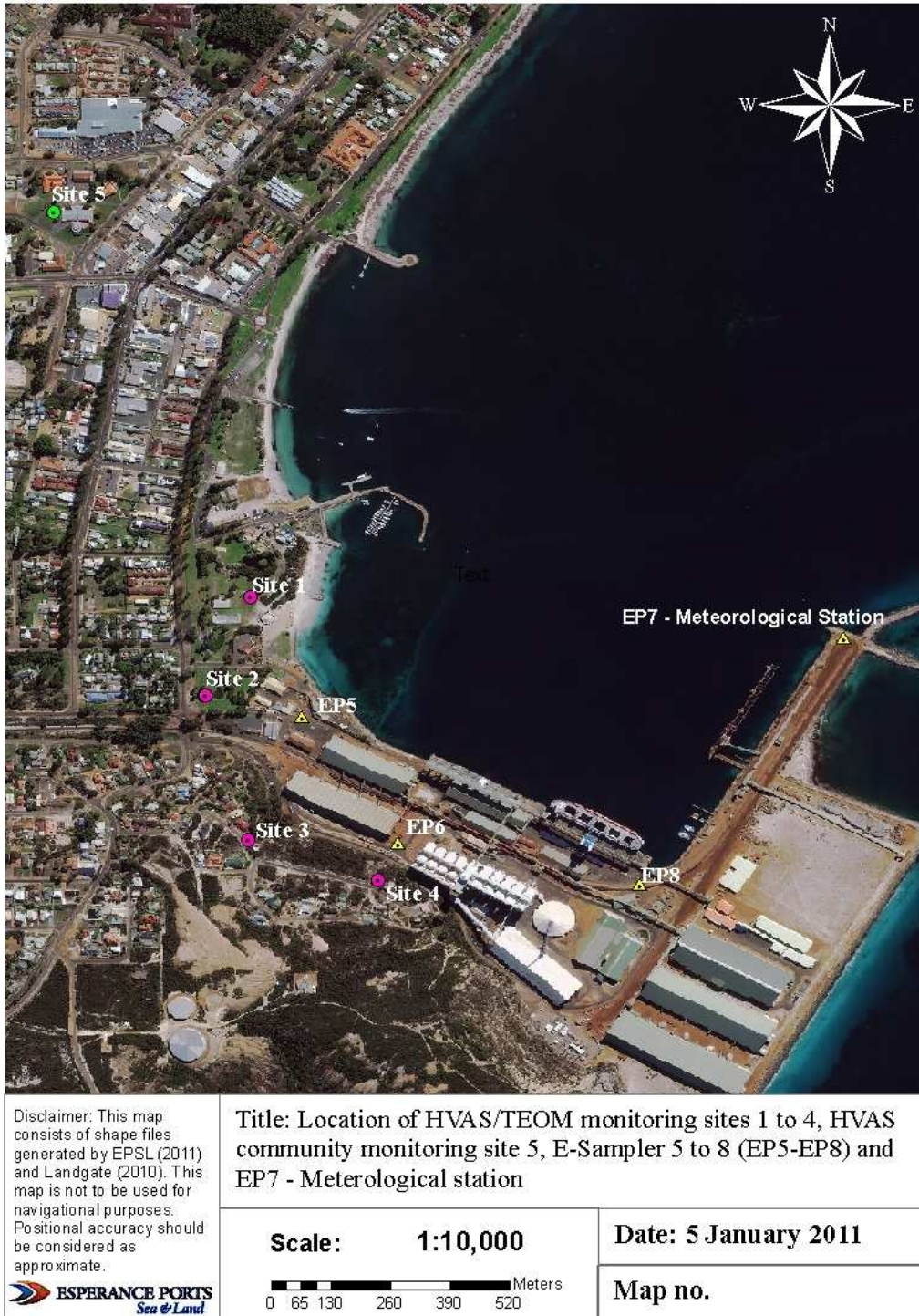
Emission	Ambient concentration target
Nickel in air	0.14 µg/m <sup>3</sup>
Dust as PM <sub>10</sub>	50 µg/m <sup>3</sup>
Dust as TSP	90 µg/m <sup>3</sup>
Silica in air	5 µg/m <sup>3</sup>

## 2. INVESTIGATION

Measured Total Suspended Particulate (TSP) concentrations between 1419 hours on 21/3/2011 and 1415 hours on 22/3/2011 exceeded the TSP license (L5099/1974/13) target (**Table 1**) for TSP). The recorded TSP is as follows:

- Site 2: 97 ug/m<sup>3</sup>

The location of the monitoring locations is illustrated in **Figure 1**.



**Figure 1:** Map of Air Quality Monitoring Stations

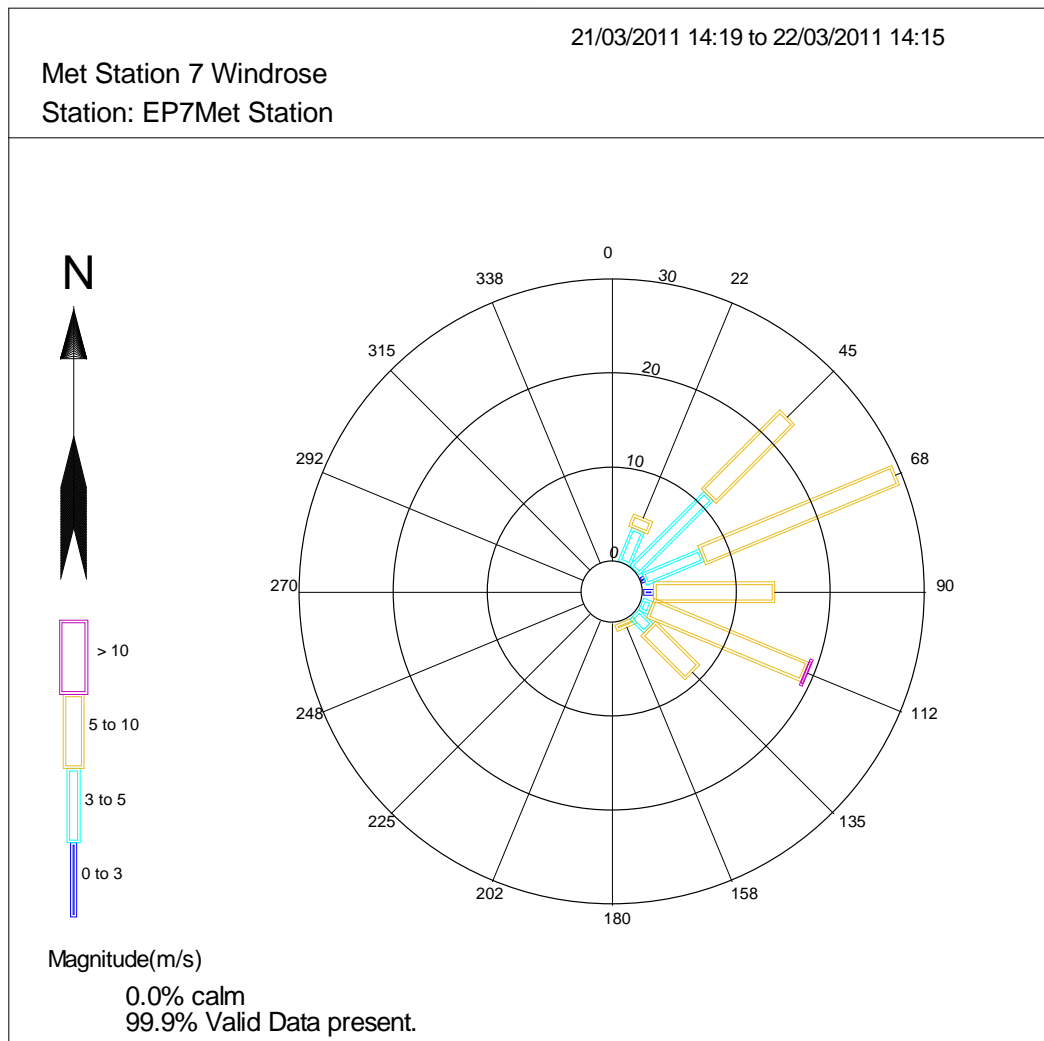
## 2.1 Port Activities

The following Port activities occurred during the monitoring period:

- Aliko was along side Berth 3 being loaded with iron ore between 15:00 hours 19<sup>th</sup> March 2011 to 01:36 hours 22<sup>nd</sup> of March 2011;
- Ocean Glory was alongside Berth 1 being loaded with wheat between 11:03 and 19:46 21<sup>st</sup> March 2011;
- MCL Alger was alongside Berth 2 being loaded with nickel concentrate between 7:05 hours 20<sup>th</sup> March 2011 to 20:40 hours 21<sup>st</sup> March 2011;
- 35,260 tonnes of iron ore averaged across 4 trains; and
- 713 tonnes of nickel concentrate across 11 trucks.

## 2.2 Meteorological Activities

The wind directions for the 24 hour period in which the exceedance occurred are in the wind arc from NNE (5%), NE (24%), ENE (29%), E (14%), ESE (19%) to SE (8%) (**Figure 2**). The maximum hourly average wind speed of 8.88 m/s (17 Knots) was recorded from the ESE between 1619 and 1719 hours on the 21<sup>st</sup> March, typical of the afternoon winds in summer/autumn on the Esperance coast. The 'Beaufort Wind Force Scale' is a measure of understanding wind speeds in descriptive terminology. A wind speed of 17 knots is described as a 'fresh winds' (17-21 knots) (BOM, 2011).



**Figure 2:** Wind rose for the monitoring period 1419 hrs 21/03/2011 to 1415 hrs 22/03/2011. Raw data source: EP7 monitoring station, Berth 3.

### 2.3 Reason for exceedance

The exceedance between the 21<sup>st</sup> and 22<sup>nd</sup> March at site 2 is likely to be due to strong easterly breezes (maximum of 8.8 m/s ESE) carrying dust from grain loading activities. Particulates from the Port beach and unsealed surfaces of Port are also likely to have contributed to the overall levels of TSP.

Site 2 is downwind of the Port beach, unsealed surfaces of the Port and grain loading activity on berth 1. Iron (0.63% Fe in TSP) and nickel (<0.001% Ni in TSP) handling activities constituted less than 1% of the TSP.

The EPSL internal E-samplers are normally used to indicate trends in TSP by measuring light scatter. However, E-sampler 5 (EP5) was producing inaccurate results and the data could not be used in this report. The monthly Ecotech valid data report stated “intermittent instrument faults - Unrealistic data of TSP” from the 9<sup>th</sup> of March 2011. EP5 was dismantled for repairs on 5<sup>th</sup> April 2011.

In the absence of real time TSP data, data for PM10 at site 2 measured by the TEOM (**Figure 4**) was used as a surrogate indicator. This assumes trends in PM10 will indicate likely trends in TSP. This assumption is based on previous exceedance reports which demonstrate that TSP increases during grain shiploading in an easterly wind. Therefore, if TSP rises it would be reasonable to assume PM10 is likely to increase downwind of the operations given a proportion of grain dust is PM10. PM10 data is only used to indicate the likely change in overall dust levels (TSP).

During the load period there was a marked increase in PM10 at Site 2 between 1419 hours and 1919 hours on 21<sup>st</sup> March 2011 (**Figure 4**). Patterns in PM10 are correlated with the loading times. There was a drop in PM10 dust levels after 1019 hours when there was a 39 minute loading delay on Berth 1, due to rain. Wind direction shifted from SE to E and wind speed increased slightly during the loading period but this does not explain the ten fold drop in PM10 levels following cessation of loading at about 2000 hours on the 21/3/2011. The correlation between PM10 and loading times, indicates it is likely that particulates larger than 10  $\mu\text{m}$  (TSP) would also have been correlated to grain loading.

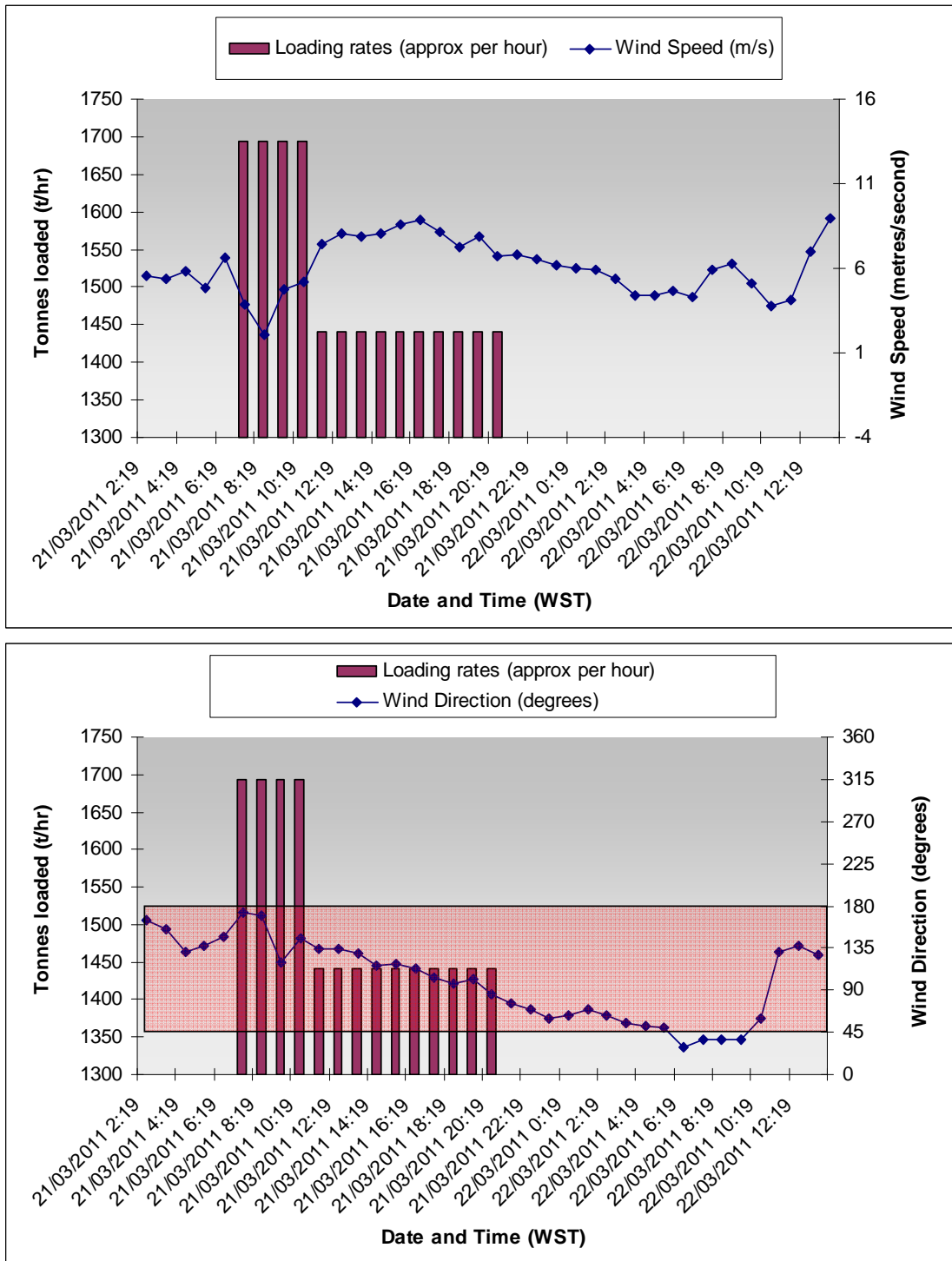
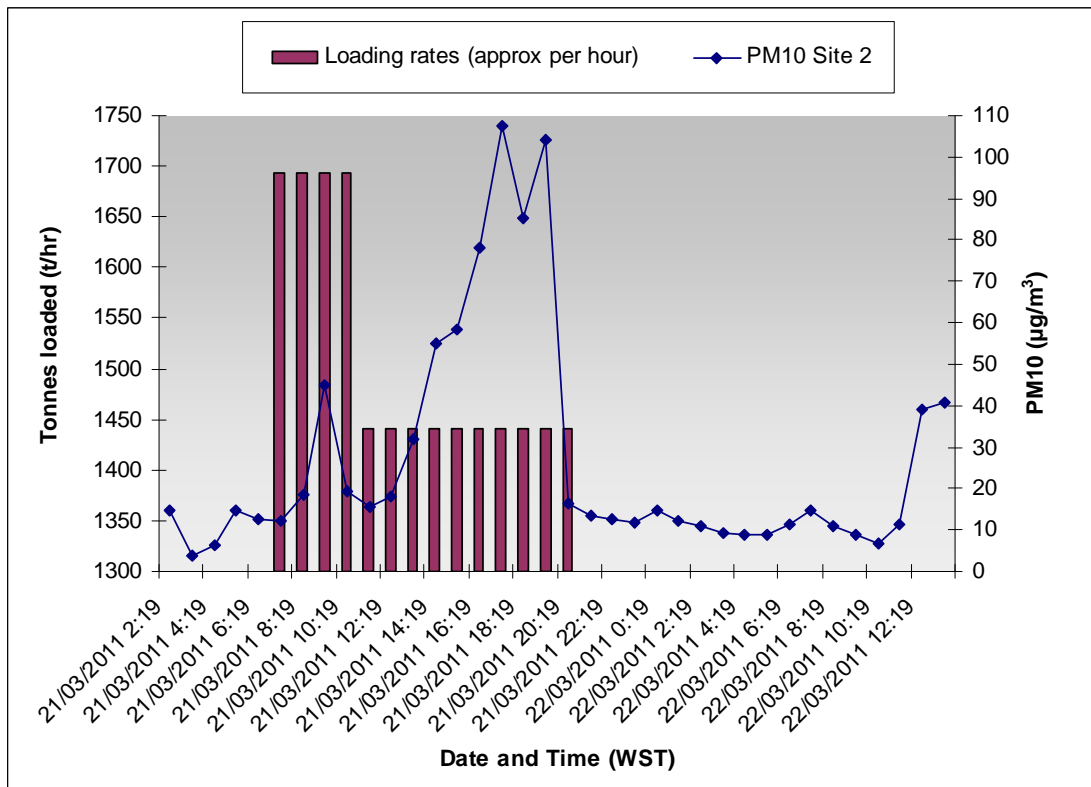


Figure 3: Loading rates in relation to wind direction, wind speed and time/date



**Figure 4:** Loading rates in relation to PM10 levels at site 2 and time/date

### 3. CONCLUSIONS

The exceedance between the 21<sup>st</sup> and 22<sup>th</sup> March at site 2 is likely to be due to strong easterly breezes (maximum of 8.8 m/s ESE) carrying dust from grain loading activities. Particulates from the Port beach and unsealed surfaces of Port are also likely to have contributed to the overall levels of TSP. Patterns in PM10 and grain loading times suggest it likely that dust particulates larger than 10 µm (TSP) would also have been related to loading of wheat on Ocean Glory between 1419 and 1919 on 21<sup>st</sup> March 2011. Iron (0.63% Fe in TSP) and nickel (<0.001% Ni in TSP) handling activities constituted less than 1% of the TSP.

#### 3.1 Corrective Action

CBH began fogging trials on their ship loader on the 20th March 2011 to determine if this will provide an effective means of dust control. The Ocean Glory was the first ship loaded under this trial (commenced loading on 20<sup>th</sup> March 2011 and finished 21<sup>st</sup> March 2011). However, the fogger is only operational on one of the five holds and all five holds were in use on the day of exceedance. There appears to have been a visual decrease in the dust level on this ship hold but more monitoring is required to substantiate the effectiveness of

the foggers to reduce dust before the foggers are installed on the remaining holds (G. Penter, CBH, *pers comm.*, 2011). This monitoring is to be conducted in May 2011. A full review of the effectiveness of the fogging trial under different commodity and meteorological conditions is to be undertaken prior to a determination on full installation on all ship loaders.

## **APPENDIX A      MPL LABORATORY REPORT**

## **CERTIFICATE OF ANALYSIS 110074**

**Client:**

**Esperance Ports - Sea and Land**

PO Box 35

Esperance

WA 6450

**Attention:** A Leonard

**Sample log in details:**

Your Reference:

No. of samples:

Date samples received:

Date completed instructions received:

Location:

**Dust Analysis**

24 High Volume Filters

28/03/11

28/03/11

NA

**Analysis Details:**

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

***Please refer to the last page of this report for any comments relating to the results.***

**Report Details:**

Date results requested by:

4/04/11

Date of Preliminary Report:

Not issued

Issue Date:

12/04/11

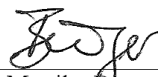
NATA accreditation number 2901. This document shall not be reproduced except in full.

This document is issued in accordance with NATA's accreditation requirements.

Accredited for compliance with ISO/IEC 17025.

**Tests not covered by NATA are denoted with \*.**

**Results Approved By:**



Dr Monika Buerger

Supervisor – Micro, Asbestos, Dust

**Client Reference: Dust Analysis**

Metals in High Volume Filters							
Our Reference:	UNITS	PQL	110074-1	110074-2	110074-3	110074-4	110074-5
Your Reference	--	--	EAP823	EAP824	EAP825	EAP826	EAP827
Location	--	--	Site 4	Site 3	Site 2	Site 1	Site 5
Date Sampled			21/03/11	21/03/11	21/03/11	21/03/11	21/03/11
Dust	mg/filter	0.1	52	52	150	39	30
Dust in Air	µg/m <sup>3</sup>	0.1	33	33	97	25	19
Iron	µg/filter	5	1,100	840	950	630	270
Iron in Air	µg/m <sup>3</sup>	0.005	0.73	0.53	0.61	0.40	0.17
Nickel	µg/filter	2	7	5	9	3	<2
Nickel in Air	µg/m <sup>3</sup>	0.002	0.004	0.003	0.006	<0.002	<0.002
Lead	µg/filter	5	<5	<5	<5	<5	<5
Lead in Air	µg/m <sup>3</sup>	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Lithium	µg/filter	2	<2	<2	<2	<2	<2
Lithium in Air	µg/m <sup>3</sup>	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sulfur	µg/filter	50	1,900	3,000	3,200	1,600	1,100
Sulfur in Air	µg/m <sup>3</sup>	0.02	1.2	1.9	2.1	1.0	0.72
Zinc	µg/filter	5	345	349	244	252	257
Zinc in Air	µg/m <sup>3</sup>	0.002	0.22	0.22	0.16	0.16	0.16

Metals in High Volume Filters							
Our Reference:	UNITS	PQL	110074-6	110074-7	110074-8	110074-9	110074-10
Your Reference	--	--	EAP828	EAP829	EAP830	EAP831	EAP832
Location	--	--	Blank	Site 4	Site 3	Site 2	Site 1
Date Sampled				22/03/11	22/03/11	22/03/11	22/03/11
Dust	mg/filter	0.1	4.8	70	54	49	44
Dust in Air	µg/m <sup>3</sup>	0.1	[NA]	47	36	33	29
Iron	µg/filter	5	160	1,900	1,500	320	770
Iron in Air	µg/m <sup>3</sup>	0.005	[NA]	1.3	1.0	0.22	0.51
Nickel	µg/filter	2	<2	10	7	2	10
Nickel in Air	µg/m <sup>3</sup>	0.002	[NA]	0.007	0.005	<0.002	0.006
Lead	µg/filter	5	<5	<5	<5	<5	<5
Lead in Air	µg/m <sup>3</sup>	0.005	[NA]	<0.005	<0.005	<0.005	<0.005
Lithium	µg/filter	2	<2	<2	<2	<2	<2
Lithium in Air	µg/m <sup>3</sup>	0.001	[NA]	<0.001	<0.001	<0.001	<0.001
Sulfur	µg/filter	50	690	3,900	3,000	510	2,200
Sulfur in Air	µg/m <sup>3</sup>	0.02	[NA]	2.6	2.0	0.34	1.5
Zinc	µg/filter	5	243	255	292	64	260
Zinc in Air	µg/m <sup>3</sup>	0.002	[NA]	0.17	0.20	0.043	0.17

**Client Reference: Dust Analysis**

Metals in High Volume Filters	UNITS	PQL	110074-11	110074-12	110074-13	110074-14	110074-15
Our Reference:	--	--	EAP833	EAP834	EAP835	EAP836	EAP837
Your Reference	--	--	Site 5	Blank	Site 4	Site 3	Site 2
Location	--	--	22/03/11		23/03/11	23/03/11	23/03/11
Date Sampled							
Dust	mg/filter	0.1	35	1.0	55	49	84
Dust in Air	µg/m <sup>3</sup>	0.1	23	[NA]	36	32	56
Iron	µg/filter	5	940	160	690	640	1,800
Iron in Air	µg/m <sup>3</sup>	0.005	0.63	[NA]	0.46	0.42	1.2
Nickel	µg/filter	2	18	<2	<2	3	14
Nickel in Air	µg/m <sup>3</sup>	0.002	0.012	[NA]	<0.002	<0.002	0.009
Lead	µg/filter	5	<5	<5	<5	<5	<5
Lead in Air	µg/m <sup>3</sup>	0.005	<0.005	[NA]	<0.005	<0.005	<0.005
Lithium	µg/filter	2	2	<2	<2	<2	2
Lithium in Air	µg/m <sup>3</sup>	0.001	0.001	[NA]	<0.001	<0.001	0.001
Sulfur	µg/filter	50	2,300	710	1,700	2,400	3,100
Sulfur in Air	µg/m <sup>3</sup>	0.02	1.6	[NA]	1.2	1.6	2.0
Zinc	µg/filter	5	318	241	251	284	303
Zinc in Air	µg/m <sup>3</sup>	0.002	0.21	[NA]	0.17	0.19	0.20

Metals in High Volume Filters	UNITS	PQL	110074-16	110074-17	110074-18	110074-19	110074-20
Our Reference:	--	--	EAP838	EAP839	EAP840	EAP841	EAP842
Your Reference	--	--	Site 1	Site 5	Blank	Site 4	Site 3
Location	--	--	23/03/11	23/03/11		24/03/11	24/03/11
Date Sampled							
Dust	mg/filter	0.1	56	53	0.40	57	41
Dust in Air	µg/m <sup>3</sup>	0.1	37	35	[NA]	36	26
Iron	µg/filter	5	870	750	170	750	520
Iron in Air	µg/m <sup>3</sup>	0.005	0.58	0.50	[NA]	0.47	0.32
Nickel	µg/filter	2	8	3	<2	5	4
Nickel in Air	µg/m <sup>3</sup>	0.002	0.005	0.002	[NA]	0.003	0.002
Lead	µg/filter	5	<5	<5	<5	<5	<5
Lead in Air	µg/m <sup>3</sup>	0.005	<0.005	<0.005	[NA]	<0.005	<0.005
Lithium	µg/filter	2	2	<2	<2	<2	<2
Lithium in Air	µg/m <sup>3</sup>	0.001	0.001	<0.001	[NA]	<0.001	<0.001
Sulfur	µg/filter	50	4,200	3,000	690	1,800	2,200
Sulfur in Air	µg/m <sup>3</sup>	0.02	2.8	2.0	[NA]	1.1	1.3
Zinc	µg/filter	5	303	283	255	283	605
Zinc in Air	µg/m <sup>3</sup>	0.002	0.20	0.19	[NA]	0.18	0.37

**Client Reference: Dust Analysis**

Metals in High Volume Filters	UNITS	PQL	110074-21	110074-22	110074-23	110074-24	110074-25
Our Reference:	--	--	EAP843	EAP844	EAP845	EAP846	Lab Blank
Your Reference	--	--	Site 2	Site 1	Site 5	Blank	
Location							
Date Sampled			24/03/11	24/03/11	24/03/11		
Dust	mg/filter	0.1	36	52	39	3.1	[NA]
Dust in Air	µg/m <sup>3</sup>	0.1	25	32	24	[NA]	[NA]
Iron	µg/filter	5	860	730	560	150	170
Iron in Air	µg/m <sup>3</sup>	0.005	0.60	0.45	0.34	[NA]	[NA]
Nickel	µg/filter	2	5	6	3	<2	<2
Nickel in Air	µg/m <sup>3</sup>	0.002	0.004	0.003	<0.002	[NA]	[NA]
Lead	µg/filter	5	<5	<5	<5	<5	<5
Lead in Air	µg/m <sup>3</sup>	0.005	<0.005	<0.005	<0.005	[NA]	[NA]
Lithium	µg/filter	2	<2	<2	<2	<2	<2
Lithium in Air	µg/m <sup>3</sup>	0.001	<0.001	<0.001	<0.001	[NA]	[NA]
Sulfur	µg/filter	50	2,000	2,200	2,100	780	830
Sulfur in Air	µg/m <sup>3</sup>	0.02	1.4	1.4	1.3	[NA]	[NA]
Zinc	µg/filter	5	607	503	274	259	308
Zinc in Air	µg/m <sup>3</sup>	0.002	0.42	0.31	0.17	[NA]	[NA]

**Client Reference: Dust Analysis**

Method ID	Methodology Summary
<b>DUST-004</b>	Airborne samples analysed according to AS 2985 for Respirable Dust or AS 3640 for Inhalable Dust . Sample results based on volume data supplied by client. Samples tested as received, *accreditation does not cover sampling.
<b>METALS-020</b>	Metals in soil and water by ICP-OES.

**Report Comments:**

This report replaces the one dated 05/04/11 due to changes in precision

INS: Insufficient sample for this test; NT: Not tested; PQL: Practical Quantitation Limit; <: Less than; >: Greater than  
RPD: Relative Percent Difference; NA: Test not required; LCS: Laboratory Control Sample; NR: Not requested  
NS: Not specified; NEPM: National Environmental Protection Measure  
DOL: Sample rejected due to particulate overload

**Quality Control Definitions**

**Blank:** This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

**Duplicate:** This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

**Matrix Spike:** A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

**LCS (Laboratory Control Sample):** This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

**Surrogate Spike:** Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

**Laboratory Acceptance Criteria**

*Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD a matrix spike recoveries for the sample batch were within laboratory acceptance criteria.*

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spike and LCS: Generally 70-130% for inorganics/metals; 60-140% for organics and 10-140% for SVOC and Speciated Phenols is acceptable.

Surrogates: 60-140% is acceptable for general organics and 10-140% for SVOC and Speciated Phenols.