



## **TSP EXCEEDANCE REPORT**

### **MONITORING PERIOD**

**ON 6<sup>TH</sup> AND 8<sup>TH</sup> DECEMBER 2011**

<b>Revision</b>	<b>Prepared</b>	<b>Reviewed</b>	<b>Approved</b>	<b>Date</b>	<b>Description</b>
1	N. Norrish	A Leonard			

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## 1. INTRODUCTION

On the 20<sup>th</sup> December 2011, the Esperance Ports Sea and Land (EPSL) became aware of laboratory results detailing dust, measured as Total Suspended Particles (TSP) exceeding the Esperance Ports Sea and Land Environmental Licence criteria (refer to Table 1). Consistent with the latest Licence (L5099/1974/13) issued on the 24<sup>th</sup> February 2011 (amended 28<sup>th</sup> July 2011) requirement of Condition 9, which requires an exceedance report to be submitted to the DEC, within seven working days (on 4<sup>th</sup> January 2012).

**Table 1. Emission Concentration Targets from the Esperance Ports Sea and Land Licence (L5099/1974/13) issued on 24<sup>th</sup> February 2011 (amended 28<sup>th</sup> July 2011)**

<b>Emission</b>	<b>Ambient concentration target</b>
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 exceeded the Licence target of 90 µg/m<sup>3</sup> (Table 1) for TSP on 6<sup>th</sup> December 2011 and on the 8<sup>th</sup> December 2011. The recorded TSP at the monitoring sites (refer to Figure 1) is as follows:

Exceedance A:

Site 1: 99 µg/m<sup>3</sup> (between 1354 hrs on 6/12/2011 to 1448 hrs on 7/12/2011)

Exceedance B:

Site 2: 96 µg/m<sup>3</sup> (between 1400 hrs on 8/12/2011 to 1343 hrs on 9/12/2011)

Note: to reflect the practical reporting errors, values exceeding 100 µg/m<sup>3</sup> are rounded to the nearest 10 µg/m<sup>3</sup> by MPL analytical laboratory.



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

## 2.1 Port Activities

The following Port activities occurred during the monitoring period:

### Exceedance A:

- MV Pearler was alongside Berth 2 between 1430 5th December 2011 and 0400 8th December 2011, being loaded with nickel containers;
- 27354 tonnes of iron ore averaged across 3 trains;
- 164 tonnes of nickel sulphide, averaged across 2 trucks; and
- 691 tonnes of formed sulphur was out-loaded across 9 trucks.

### Exceedance B:

- MV Pearler was alongside Berth 2 between 1430 hrs on 5th December 2011 and 0400 hrs on 8th December 2011, being loaded with nickel containers;
- MV Stx Ivy was alongside Berth 2 between 0518 hrs on 8th December 2011 and 0054 hrs on 13th December 2011, being unloaded with fertiliser;
- MV Dong A EOS was alongside Berth 3 between 0900 hrs on 8th December 2011 and 2155 hrs on 11th December 2011, being loaded with iron ore;
- MV Proteus was alongside Berth 1 between 1353 hrs on 8th December 2011 and 1910 hrs on 11th December 2011, being loaded with grain (canola).
- 27079 tonnes of iron ore averaged across 3 trains;
- 166 tonnes of nickel sulphide, averaged across 2 trucks; and
- 931 tonnes of formed sulphur was out-loaded across 12 trucks.

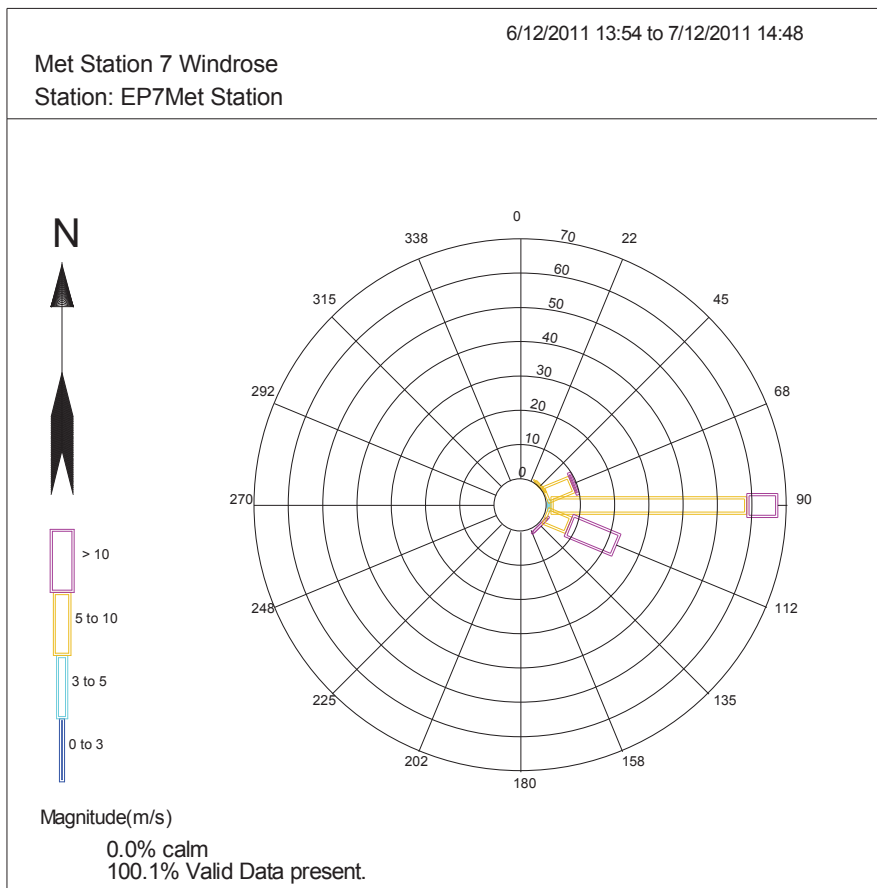
## 2.2 Meteorological Activities

### Exceedance A:

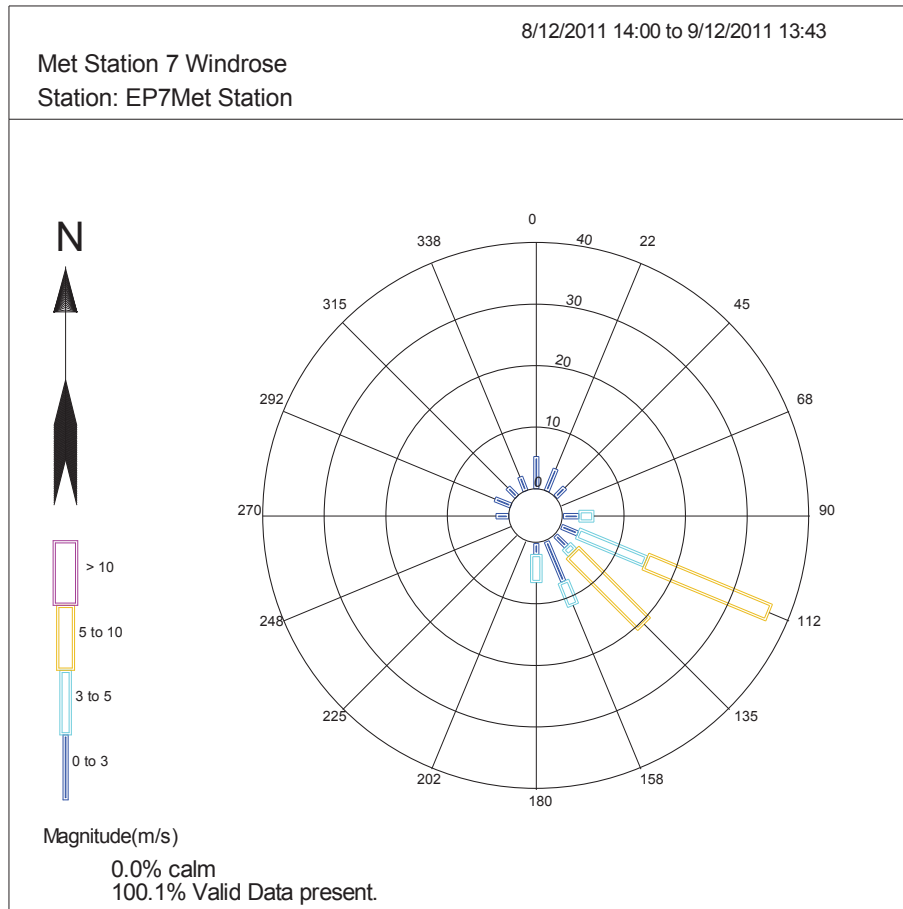
The wind directions for the 24 hour period in which the exceedance occurred are in the wind arc from NE (10%), E (68%), ESE (21%) and SSE (1%) (Figure 2). The maximum hourly average wind speed of 13.6 m/s (49 km/h) was recorded from the ESE between 1600 and 1700 hours on the 6<sup>th</sup> December. The 'Beaufort Wind Force Scale' is a measure of understanding wind speeds in descriptive terminology. A wind speed of 49 km/h is described as 'strong winds' (40-50 km/h) (BOM, 2011).

Exceedance B:

The wind directions for the 24 hour period in which the exceedance occurred are in the wind arc from W (2%), WNW (3%), NW (2%), NNW (2%), N (5%), NNE (4%), NE (2%), E (5%), ESE (37%), SE (21%), SSE (12%) and S (5%) (Figure 2). The maximum hourly average wind speed of 8.1 m/s (29 km/h) was recorded from the ESE between 1400 and 1500 hours on the 8<sup>th</sup> December. The 'Beaufort Wind Force Scale' is a measure of understanding wind speeds in descriptive terminology. A wind speed of 29 km/h is described as 'moderate winds' (20-29 km/h) (BOM, 2011).



**Figure 2. Wind rose for the monitoring period 1354 hrs on 6/12/2011 to 1448 hrs on 7/12/2011. Raw data source: EP7 monitoring station, Berth 3**



**Figure 3. Wind rose for the monitoring period 1400 hrs on 8/12/2011 to 1343 hrs on 9/12/2011. Raw data source: EP7 monitoring station, Berth 3**

### 2.3 Reason for exceedance

#### Exceedance A:

The exceedance at Sites 1 is most likely due to strong easterly and ESE winds (maximum of 49 km/h from ESE) mobilising particles from the Esperance foreshore located a few metres upwind. Other sources that may have contributed include the Port reclaim area and Dempster Head. At Site 1 iron (2% Fe in TSP) and nickel (0.002% Ni in TSP) contributed less than 3% of the TSP, indicating iron ore loading and nickel container loading did not contribute to the exceedances.

#### Exceedance B:

The exceedance at Site 2 are most likely due to moderate winds mobilising particles from grain loading activities on Berth 1, and from the unsealed surfaces within the Port, including the reclaim areas and Dempster Head. Iron (2.1% Fe in TSP) and nickel (0.009% Ni in TSP) contributed less than 3% of the TSP, indicating that iron ore and nickel container loading did not contribute to the exceedances.

### **3. CONCLUSIONS**

The exceedances between the 6<sup>th</sup> and 7<sup>th</sup> December 2011 at Site 1 is most likely due to strong winds from the E and ESE. The exceedance between 8<sup>th</sup> and 9<sup>th</sup> December at Site 2 is most likely to be due to moderate winds mobilising particulates from grain loading activities on Berth 1 and from unsealed surfaces within the Port and Dempster Head. The proportion of iron and nickel levels contributing to the TSP at each site was less than 3% indicating there no correlation between the ship loading on Berths 2 and 3 and the exceedances. The moderate to strong winds from the E and ESE are typical of summer winds in Esperance.

#### **3.1 Corrective Action**

The event is due to meteorological conditions mobilising particulates from the unsealed surfaces in the Port and from Dempster Head. EPSL already implements a dust binding agent on unsealed surfaces. No further action can be practically taken by EPSL to further reduce dust. EPSL has been expecting CBH to increase dust controls during grain ship loading.

**APPENDIX A    MPL LABORATORY REPORT**



Part of the EnviroLab Group



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## CERTIFICATE OF ANALYSIS 117428

**Client:**

**Esperance Ports - Sea and Land**

PO Box 35  
Esperance  
WA 6450

**Attention:** N Norrish

**Sample log in details:**

Your Reference:  
No. of samples:  
Date samples received:  
Date completed instructions received:  
Location:

**Dust Analysis**

18 High Volume Filters  
12/12/11  
12/12/11

**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: 19/12/11  
Date of Preliminary Report: Not issued  
Issue Date: 19/12/11

**Results Approved By:**

  
\_\_\_\_\_  
Dr Monika Buerger  
Supervisor – Micro, Asbestos, Dust

MPL Reference: 117428  
Revision No: R 00

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**Client Reference:     Dust Analysis**

Metals in High Volume Filters	UNITS	PQL	117428-1	117428-2	117428-3	117428-4	117428-5
Our Reference:	--	--	EPL473	EPL474	EPL475	EPL476	EPL477
Your Reference	--	--	Site 4	Site 3	Site 2	Site 1	Site 5
Field Sheet Number	--	--	6/12/2011	6/12/2011	6/12/2011	6/12/2011	6/12/2011
Date Sampled			EPL473	EPL474	EPL475	EPL476	EPL477
FilterNo							
Dust	mg/filter	0.1	120	130	140	160	130
Dust in Air	µg/m <sup>3</sup>	0.1	75	81	84	99	81
Iron	µg/filter	5	1,200	2,200	630	330	290
Iron in Air	µg/m <sup>3</sup>	0.005	0.76	1.3	0.38	0.20	0.18
Nickel	µg/filter	2	3	4	5	<2	3
Nickel in Air	µg/m <sup>3</sup>	0.002	0.002	0.002	0.003	<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	2,200	2,800	3,300	1,800	1,700
Sulfur in Air	µg/m <sup>3</sup>	0.02	1.3	1.7	2.0	1.1	1.1
Zinc	µg/filter	5	590	600	480	520	530
Zinc in Air	µg/m <sup>3</sup>	0.002	0.36	0.37	0.29	0.32	0.32

Metals in High Volume Filters	UNITS	PQL	117428-6	117428-7	117428-8	117428-9	117428-10
Our Reference:	--	--	EPL478	EPL479	EPL480	EPL481	EPL482
Your Reference	--	--	Blank	Site 4	Site 3	Site 2	Site 1
Field Sheet Number	--	--	6/12/2011	7/12/2011	7/12/2011	7/12/2011	7/12/2011
Date Sampled			EPL478	EPL479	EPL480	EPL481	EPL482
FilterNo							
Dust	mg/filter	0.1	5.0	84	94	110	130
Dust in Air	µg/m <sup>3</sup>	0.1	[NA]	55	62	73	87
Iron	µg/filter	5	250	580	890	580	330
Iron in Air	µg/m <sup>3</sup>	0.005	[NA]	0.38	0.58	0.38	0.22
Nickel	µg/filter	2	<2	2	2	8	3
Nickel in Air	µg/m <sup>3</sup>	0.002	[NA]	<0.002	<0.002	0.005	0.002
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	860	1,900	1,900	7,400	3,200
Sulfur in Air	µg/m <sup>3</sup>	0.02	[NA]	1.2	1.3	4.8	2.1
Zinc	µg/filter	5	620	580	540	540	570
Zinc in Air	µg/m <sup>3</sup>	0.002	[NA]	0.38	0.36	0.35	0.38

**Client Reference:     Dust Analysis**

Metals in High Volume Filters Our Reference: Your Reference Field Sheet Number Date Sampled Filter No	UNITS	PQL	117428-11 EPL483 Site 5 7/12/2011 EPL483	117428-12 EPL484 Blank EPL484	117428-13 EPL485 Site 4 8/12/2011 EPL485	117428-14 EPL486 Site 3 8/12/2011 EPL486	117428-15 EPL487 Site 2 8/12/2011 EPL487
Dust	mg/filter	0.1	93	5.3	84	130	150
Dust in Air	µg/m <sup>3</sup>	0.1	62	[NA]	55	83	96
Iron	µg/filter	5	300	270	[NA]	[NA]	3,100
Iron in Air	µg/m <sup>3</sup>	0.005	0.20	[NA]	[NA]	[NA]	2.0
Nickel	µg/filter	2	2	2	[NA]	[NA]	14
Nickel in Air	µg/m <sup>3</sup>	0.002	<0.002	[NA]	[NA]	[NA]	0.009
Lead	µg/filter	5	<5	<5	[NA]	[NA]	<5
Lead in Air	µg/m <sup>3</sup>	0.005	<0.005	[NA]	[NA]	[NA]	<0.005
Lithium	µg/filter	2	<2	<2	[NA]	[NA]	<2
Lithium in Air	µg/m <sup>3</sup>	0.001	<0.001	[NA]	[NA]	[NA]	<0.001
Sulfur	µg/filter	50	1,800	820	[NA]	[NA]	7,100
Sulfur in Air	µg/m <sup>3</sup>	0.02	1.2	[NA]	[NA]	[NA]	4.6
Zinc	µg/filter	5	540	570	[NA]	[NA]	560
Zinc in Air	µg/m <sup>3</sup>	0.002	0.36	[NA]	[NA]	[NA]	0.36

Metals in High Volume Filters Our Reference: Your Reference Field Sheet Number Date Sampled Filter No	UNITS	PQL	117428-16 EPL488 Site 1 8/12/2011 EPL488	117428-17 EPL489 Site 5 8/12/2011 EPL489	117428-18 EPL490 Blank EPL490	117428-19 Lab Blank
Dust	mg/filter	0.1	130	50	4.9	[NA]
Dust in Air	µg/m <sup>3</sup>	0.1	87	32	[NA]	[NA]
Iron	µg/filter	5	[NA]	[NA]	[NA]	280
Nickel	µg/filter	2	[NA]	[NA]	[NA]	<2
Lead	µg/filter	5	[NA]	[NA]	[NA]	<5
Lithium	µg/filter	2	[NA]	[NA]	[NA]	<2
Sulfur	µg/filter	50	[NA]	[NA]	[NA]	920
Zinc	µg/filter	5	[NA]	[NA]	[NA]	630

**Client Reference: Dust Analysis**

MethodID	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.

QUALITY CONTROL	UNITS	PQL	METHOD	Blank	Duplicate Sm#	Duplicate results Base    Duplicate    %RPD
Metals in High Volume Filters						
Dust Type				[NT]	[NT]	[NT]
Air Volume	m <sup>3</sup>			[NT]	117428-1	1630    1630    RPD: 0
Weight of Filter (initial)	mg	0.02	DUST-004	[NT]	117428-1	3558.60    3558.60    RPD: 0
Weight of Filter (final)	mg	0.02	DUST-004	[NT]	117428-1	3681.20    3681.20    RPD: 0
Dust	mg/filter	0.1	DUST-004	[NT]	117428-1	120    120    RPD: 0
Dust in Air	µg/m <sup>3</sup>	0.1		[NT]	117428-1	75    75    RPD: 0
Iron	µg/filter	5	DUST-004	[NT]	117428-1	1200    1100    RPD: 9
Iron in Air	µg/m <sup>3</sup>	0.005		[NT]	117428-1	0.76    0.68    RPD: 11
Nickel	µg/filter	2	METALS-02 0	[NT]	117428-1	3    3    RPD: 0
Nickel in Air	µg/m <sup>3</sup>	0.002		[NT]	117428-1	0.002    <0.002
Lead	µg/filter	5	METALS-02 0	[NT]	117428-1	<5    <5
Lead in Air	µg/m <sup>3</sup>	0.005		[NT]	117428-1	<0.005    <0.005
Lithium	µg/filter	2	METALS-02 0	[NT]	117428-1	<2    <2
Lithium in Air	µg/m <sup>3</sup>	0.001		[NT]	117428-1	<0.001    <0.001
Sulfur	µg/filter	50	DUST-004	[NT]	117428-1	2200    2000    RPD: 10
Sulfur in Air	µg/m <sup>3</sup>	0.02		[NT]	117428-1	1.3    1.2    RPD: 8
Zinc	µg/filter	5	DUST-004	[NT]	117428-1	590    530    RPD: 11
Zinc in Air	µg/m <sup>3</sup>	0.002		[NT]	117428-1	0.36    0.33    RPD: 9

**Report Comments:**

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.