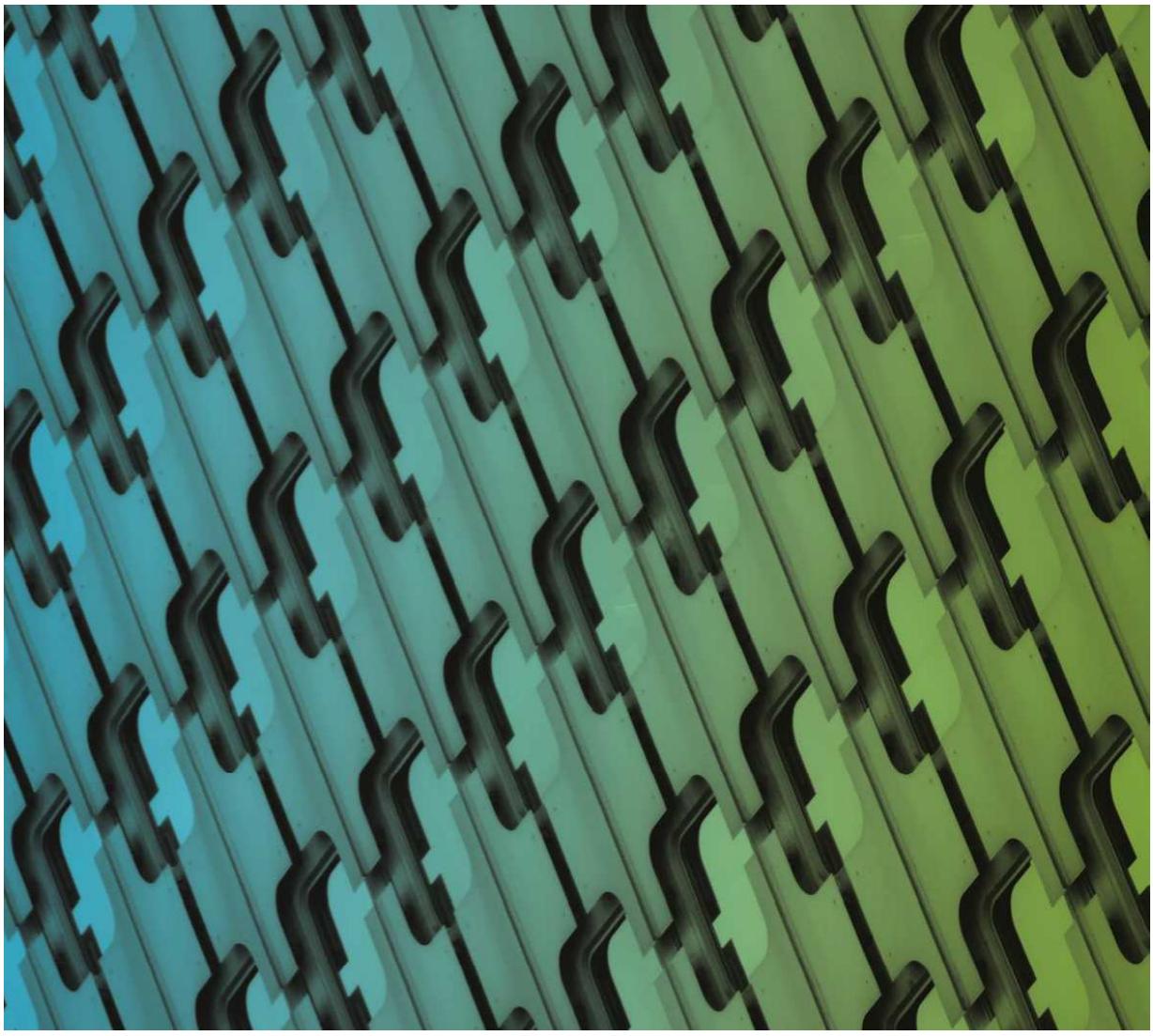
Annual Emissions Testing Report 2013 - Revised

Weston Aluminium



NATA ACCREDITATION No. 2778 (14391)
Accredited for compliance with ISO/IEC 17025
This document is issued in accordance with NATA's accreditation requirements.
This document may not be reproduced except in full.

Annual Emissions Testing Report 2013 - Revised

Weston Aluminium

Client: Weston Aluminium

ABN: 91 075 245 108

Prepared by

AECOM Australia Pty Ltd
17 Warabrook Boulevarde, Warabrook NSW 2304, PO Box 73, Hunter Region MC NSW 2310, Australia
T +61 2 4911 4900 F +61 2 4911 4999 www.aecom.com
ABN 20 093 846 925

30-Jul-2013

AECOM in Australia and New Zealand is certified to the latest version of ISO9001 and ISO14001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

Quality Information

Document Annual Emissions Testing Report 2013 - Revised

Ref http://vpo.au.aecomnet.com/projects/19211_nswb13511/8issueddocs/annual/weston annual emissions testing report 2013_july13_revised.docx

Date 30-Jul-2013

Prepared by James Lang

Reviewed by Chad Whitburn Approved Signatory

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
2.0	31-Jul-2013	Weston Aluminium Annual Emissions Testing Report 2012	Chad Whitburn Principal Professional Scientist	

This page has been left blank intentionally.

Table of Contents

1.0 Introduction 1
2.0 Sampling Plane Requirements 5
3.0 Methodology 7
3.1 NATA Accredited Methods 7
3.2 Deviations from NATA Accredited Methods 8
4.0 Sampling Location 9
4.1 Sampling Location Summary 9
5.0 Equipment Calibration 11
6.0 Results 13

Appendix A
Field Sheets (252 Pages) A

Appendix B
Laboratory Analytical Reports (64 Pages) B

Appendix C
Raw & Calculated Gas Data (35 Pages) C

List of Tables

Table 1 Criteria for Selection of Sampling Planes (AS 4323. 1- 1995) 5
Table 2 AECOM NATA Endorsed Methods 7
Table 3 NATA Method Deviations 8
Table 4 Sampling Location Summary 9
Table 5 Stack 1, Air Emissions Results Summary – 2013 13
Table 6 Air Emission Results Summary, Stacks 2, 3, & 4 – 2013 13
Table 7 Stack 5, Air Emissions Results Summary – 2013 14
Table 8 Stack 6 Air Emissions Results Summary – 2013 14
Table 9 Stack 7 Air Emissions Results Summary – 2013 15
Table 10 Calculated PM_{10} Cut Sizes 15
Table 11 Stack 1 Gas Data Summary, 30 April 2013 15
Table 12 Stack 5 Gas Data Summary, 14 May 2013 16
Table 13 Stack 6 Gas Data Summary, 13 May 2013 16
Table 14 Stack 7 Gas Data Summary, 2 May 2013 16
Table 15 Stack 1 Cyanide Results, 1 May 2013 17
Table 16 Stack 1 Fine Particulate (PM_{10}), Total Particulate, Results, 30 April 2013 18
Table 17 Stack 1 Hazardous Substances, Polycyclic Aromatic Hydrocarbons, Hydrogen Chloride & Chlorine Results, 1 May 2013 19
Table 18 Stack 1 Particulate & Gaseous Fluoride, Sulfuric Acid Mist (H_2SO_4 as SO_3) and Sulfur Dioxide (SO_2 as SO_3) Results, 30 April 2013 20
Table 19 Stack 2 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 29 April 2013 21
Table 20 Stack 3 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 29 April 2013 22
Table 21 Stack 4 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 14 May 2013 23
Table 22 Stack 5 Fine Particulates (PM_{10}), Total Particulates and Hazardous Substances (Metals) Results, 13 May 2013 24
Table 23 Stack 5 Hydrogen Chloride & Chlorine Results, 14 May 2013 25
Table 24 Stack 5 Total Fluoride, Sulfuric Acid Mist (H_2SO_4 as SO_3) & Sulfur Dioxide (SO_2 as SO_3) Results, 14 May 2013 26
Table 25 Stack 5 Dioxins & Furans, Polycyclic Aromatic Hydrocarbons (PAH) Results, 14 May 13 27
Table 26 Stack 6 Total Particulates, Sulfuric Acid Mist (H_2SO_4 as SO_3) and Sulfur Dioxide (SO_2 as SO_3) Results, 13 May 2013 28
Table 27 Stack 6 Total Fluoride and Polycyclic Aromatic Hydrocarbons Results, 13 May 2013 29
Table 28 Stack 7 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 2 May 2013 30
Table 29 Stack 7 Sulfuric Acid Mist (H_2SO_4 as SO_3), Sulfur Dioxide (SO_2 as SO_3) and Polycyclic Aromatic Hydrocarbons Results, 2 May 2013 31
Table 30 Stack 1 Speciated Volatile Organic Compounds Results, 1 May 2013 32

Table 31	Stack 5 Speciated Volatile Organic Compounds Results, 13 May 2013	33
Table 32	Stack 6 Speciated Volatile Organic Compounds Results, 13 May 2013	34
Table 33	Stack 6 Speciated Volatile Organic Compounds Results, 2 May 2013	35
Table 34	Stack 5 Speciated Dioxins & Furans Results, 14 May 2013	36
Table 35	Stack 1 Elemental Metals Results, 1 May 2013	37
Table 36	Stack 5 Elemental Metals Results, 13 May 2013	38
Table 37	Stack 1 Speciated Polycyclic Aromatic Hydrocarbons Results, 1 May 2013	39
Table 38	Stack 5 Speciated Polycyclic Aromatic Hydrocarbon Results, 14 May 2013	40
Table 39	Stack 6 Speciated Polycyclic Aromatic Hydrocarbon Results, 13 May 2013	41
Table 40	Stack 7 Speciated Polycyclic Aromatic Hydrocarbon Results, 2 May 2013	42

1.0 Introduction

AECOM was appointed by Weston Aluminium Pty Ltd to conduct a series of measurements to determine air emissions from five stacks located at their Weston plant in Kurri Kurri, NSW. Emission testing was a compliance requirement of Environmental Protection Licence (EPL) number 6423.

Testing was conducted over the period of April and May 2013 to determine emission concentrations for the following parameters:

Stack 1 (EPL Point 1)

- Total Particulate;
- Fine Particulate (PM_{10});
- Sulfuric Acid Mist (H_2SO_4 as SO_3);
- Sulfur Dioxide (SO_2 as SO_3);
- Chlorine;
- Hydrogen Chloride;
- Gaseous Fluoride;
- Particulate Fluoride;
- Hazardous Substances (Metals);
- Volatile Organic Compounds (VOC);
- Oxides of Nitrogen;
- Carbon Monoxide;
- Cyanide; and
- Polycyclic Aromatic Hydrocarbon (PAH).

Stacks 2, 3, and 4 (EPL Points 2, 3, and 4)

- Total Particulate;
- Fine Particulate (PM_{10}); and
- Hydrogen Fluoride.

Stack 5 (EPL Point 13)

- Total Particulate;
- Fine Particulate (PM_{10});
- Sulfuric Acid Mist (H_2SO_4 as SO_3);
- Sulfur Dioxide (SO_2 as SO_3);
- Chlorine;
- Hydrogen Chloride;
- Hydrogen Fluoride;
- Hazardous Substances (Metals);
- Dioxins and Furans;
- Polycyclic Aromatic Hydrocarbons (PAH);
- Volatile Organic Compounds (VOC);
- Oxides of Nitrogen;

- Oxygen; and
- Carbon Monoxide.

Stack 6 (EPL Point 14)

- Total Particulate;
- Fine Particulate (PM_{10});
- Hydrogen Fluoride;
- Sulfuric Acid Mist (H_2SO_4 as SO_3);
- Sulfur Dioxide (SO_2 as SO_3);
- Volatile Organic Compounds;
- Polycyclic Aromatic Hydrocarbons;
- Oxides of Nitrogen;
- Carbon Monoxide; and
- Oxygen (O_2).

Stack 7 (EPL Point 15)

- Total Particulate;
- Fine Particulate (PM_{10});
- Hydrogen Fluoride;
- Sulfuric Acid Mist (H_2SO_4 as SO_3);
- Sulfur Dioxide (SO_2 as SO_3);
- Polycyclic Aromatic Hydrocarbons (PAH) ;
- Volatile Organic Compounds (VOC); and
- Oxides of Nitrogen.

Laboratory analysis was conducted by the following laboratories, which hold NATA accreditation for the specified tests:

- Steel River Testing Pty. Ltd., NATA accreditation number 18079, performed the following analysis detailed in report number 4514-0-P, 4515-0-M, 4560-0-P, 4560-0-M, 4577-0-P, 000004732 and 000004733.
    - Moisture;
    - Particle Sizing(not NATA Accredited);
    - Fine Particulate (PM_{10}); and
    - Total Particulate.
- Australian Laboratory Services, NATA accreditation number 18079, performed the following analysis detailed in report number EN1301658 and EN1301825.
    - Fluoride;
    - Cyanide;
    - Sulfuric Acid Mist;
    - Sulfur Dioxide;
    - Hydrogen Chloride;
    - Chlorine; and

- Volatile Organic Compounds.

- National Measurements Institute, NATA accreditation number 198, performed the following analysis detailed in report number ORG13_023, DAU13-112, ORG13_027.
  - Dioxins and Furans; and
  - Polycyclic Aromatic Hydrocarbons.
- Leeder Consulting, NATA accreditation number 14429, performed the following analysis detailed in report number M130951 and M131108.
  - Hazardous Substances (Metals)

This page has been left blank intentionally.

2.0 Sampling Plane Requirements

The criteria for sampling planes are specified in AS 4323.1-1995.

Table 1 Criteria for Selection of Sampling Planes (AS 4323. 1- 1995)

Type of flow disturbance	Minimum distance upstream from disturbance, diameters (D)	Minimum distance downstream from disturbance, diameters (D)
Bend, connection, junction, direction change	>2D	>6D
Louvre, butterfly damper (partially closed or closed)	>3D	>6D
Axial fan	>3D	>8D (see Note)
Centrifugal fan	>3D	>6D

NOTE: The plane should be selected as far as practicable from a fan. Flow straighteners may be required to ensure the position chosen meets the check criteria listed in Items (a) to (f) below.

a. The gas flow is basically in the same direction at all points along each sampling traverse.

b. The gas velocity at all sampling points is greater than 3 m/s.

c. The gas flow profile at the sampling plane shall be steady, evenly distributed and not have a cyclonic component which exceeds an angle of 15^{o} to the duct axis, when measured near the periphery of a circular sampling plane.

d. The temperature difference between adjacent points of the survey along each sampling traverse is less than 10% of the absolute temperature, and the temperature at any point differs by less than 10% from the mean.

e. The ratio of the highest to lowest pitot pressure difference shall not exceed 9:1 and the ratio of highest to lowest gas velocities shall not exceed 3:1. For isokinetic testing with the use of impingers, the gas velocity ratio across the sampling plane should not exceed 1.6:1.

f. The gas temperature at the sampling plane should preferably be above the dewpoint.

The sampling planes for Stacks 2, 3, 4 and 7(EPA Identification No. 2, 3, 4 and 15 respectively) were in accordance with AS 4323.1 Section 4.1. Stack 1 (EPA Identification No. 1) did not satisfy the requirements of AS 4323.1 Section 4.1 – 1995 with regard to the upstream and downstream distances from disturbances. To compensate for this, additional sampling points were added in accordance with AS 4323.1 Section 4.2 – 1995.

This page has been left blank intentionally.

3.0 Methodology

3.1 NATA Accredited Methods

The following methods are accredited with the National Association of Testing Authorities (NATA), Accreditation No. 2778 (14391), and are approved for the sampling and analysis of gases and aerosols. Specific details of the methods are available on request.

All sampling and analysis is conducted according to the methods in **Table 2**.

Table 2 AECOM NATA Endorsed Methods

NSW EPA Approved Methods	USEPA Methods	Parameter measured
NSW EPA TM-1 (AS 4323.1-1995)	USEPA (2000) Method 1 under approved circumstances	Selection of sampling positions
NSW EPA TM-2	USEPA (2000) Method 2 or 2C or USEPA (1999) Method 2F or 2G or 2H (as appropriate)	Velocity or volumetric flow rate or temperature or pressure of stack gases
NSW EPA TM-3	USEPA (2000) Method 8 (for sampling and analysis) or APHA (1998) Method 4110B (for analysis only if interference from fluorides, free ammonia and/or dimethyl aniline has been demonstrated to the satisfaction of the Chief Scientist) (as appropriate)	Sulfuric acid mist (H_2SO_4) or sulphur trioxide (SO_3)
NSW EPA TM-4	USEPA (2000) Method 6 or 6A or 6B or USEPA (1996) Method 6C or ISO (1989) Method 7934 or ISO (1992) Method 7935 or ISO (1993) Method 10396 or ISO (1998) Method 11632 (as appropriate)	Sulfur dioxide (SO_2)
NSW EPA TM-7	USEPA (2000) 26A	Chlorine (Cl_2)
NSW EPA TM-8	USEPA (2000) 26A	Hydrogen chloride (HCl)
NSW EPA TM-9	USEPA (2000) Method 13A or 13B (as appropriate)	Fluorine (F_2) or any compound containing fluorine, except where emitted by a primary aluminium smelter while manufacturing aluminium from alumina
NSW EPA TM-12	USEPA (2000) Method 29 or USEPA (2000) Method 102 (for mercury only in hydrogen rich streams) (as appropriate)	Type 1 substances (elements antimony (Sb), arsenic (As), cadmium (Cd), lead (Pb) or mercury (Hg) or any compound containing one or more of those elements)
NSW EPA TM-13	USEPA (2000) Method 29 (Analysis for tin and vanadium to be done by Inductively Coupled Argon Plasma Emission Spectroscopy (ICAP) as defined in USEPA Method 29) or USEPA (1986) Method 7910 (for vanadium only) or USEPA (1986) Method 7911 (for vanadium only) (as appropriate)	Type 2 substances (elements beryllium (Be), chromium (Cr), cobalt (Co), manganese (Mn), nickel (Ni), selenium (Se), tin (Sn) or vanadium (V) or any compound containing one or more of those elements)
NSW EPA TM-14	Cadmium (Cd) or mercury (Hg) or any compound containing one or more of those elements	USEPA (2000) Method 29 or USEPA (2000) Method 102 (for mercury only in hydrogen rich streams) (as appropriate)
NSW EPA TM-15 (AS 4323.2-1995)	USEPA (2000) Method 5 under approved circumstances	Solid particles (Total)

NSW EPA Approved Methods	USEPA Methods	Parameter measured
NSW EPA TM-22	USEPA (2000) Method 4	Moisture content in stack gases
NSW EPA TM-23	USEPA (2000) Method 3	Dry gas density or molecular weight of stack gases
NSW EPA TM-34	USEPA (2000) Method 18 or USEPA (2000) Method 25 or 25A or 25B or 25C or 25D or 25E (as appropriate)	Volatile organic compounds
NSW EPA OM-5	USEPA (1997) Method 201 or 201A (as appropriate)	'Fine' particulates (PM_{10})
NSW EPA OM-6	California EPA Air Resources Board (1997) Method 429	Polycyclic aromatic hydrocarbons (PAHs)
NSW EPA TM-18	USEPA (1995) Method 23	Dioxins and furans
NSW EPA TM-32	USEPA Method 10	Determination of Carbon Monoxide emissions from stationary sources
NSW EPA TM-25	USEPA Method 3A	Determination of Oxygen concentrations from stationary sources
NSW EPA TM-11	USEPA(2000) Method 7C	Determination of Nitrogen dioxide or nitric oxide emissions from stationary sources

3.2 Deviations from NATA Accredited Methods

The following method is not accredited with the National Association of Testing Authorities (NATA), Accreditation No. 2778 (14391). Specific details of the methods are available on request.

All sampling and analysis is conducted according to the method in **Table 3**.

Table 3 NATA Method Deviations

NSW EPA Approved Methods	USEPA Methods	Parameter measured
N/A	USEPA (2011) Other Test Method 29	Sampling and analysis for Hydrogen Cyanide emissions from stationary sources

4.0 Sampling Location

4.1 Sampling Location Summary

Table 4 provides a summary of the location sampled by AECOM during April and May 2013 at the Weston Aluminium plant in Kurri Kurri, NSW.

Table 4 Sampling Location Summary

Discharge Description	Stack 1 (EPA Identification No. 1)	Stack 2 (EPA Identification No. 2)	Stack 3 (EPA Identification No. 3)	Stack 4 (EPA Identification No. 4)	Stack 5 (EPA Identification No. 13)	Stack 6 (EPA Identification No. 14)	Stack 7 (EPA Identification No. 15)
Duct Shape	Circular	Circular	Circular	Circular	Circular	Circular	Circular
Construction Material	Metal	Metal	Metal	Metal	Metal	Metal	Metal
Duct Diameter (mm)	1650	1265	1000	1395	1490	580	1500
Minimum No. Sampling Points	16	12	12	12	12	8	12
Sampling Ports	2	2	2	2	2	2	2
Min. Points/Traverse	8	6	6	6	6	4	6
Disturbance	Yes	No	No	No	No	No	No
Distance from Upstream Disturbance	2D	6D	6D	6D	7D	9D	7D
Type of Disturbance	Fan entry	Fan entry	Fan entry	Fan entry	Fan entry	Bend	Fans
Distance from Downstream Disturbance	4D	6D	7D	4D	7D	5D	2D
Type of Disturbance	Stack Exit	Stack exit	Stack exit	Stack exit	Stack exit	Stack exit	Stack exit
Ideal Sampling Location	No	Yes	Yes	Yes	Yes	Yes	Yes
Correction Factors Applied	Yes	No	No	No	No	No	No
Total No. Points Sampled	20	12	12	12	12	8	12
Points/Traverse	10	6	6	6	6	4	6
Sampling Performed to Standard*	Yes[2]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]

*AS 4323.1 Stationary source emissions Method 1 – Selection of sampling positions

[1] AS 4323.1 Section 4.1

[2] AS 4323.1 Section 4.2

This page has been left blank intentionally.

5.0 Equipment Calibration

AECOM has a calibration schedule to ensure the emission testing equipment is maintained in good order and with known calibration. Equipment used in this project was calibrated according to the procedures and frequency identified in the AECOM calibration schedule. Details of the schedule and the calibration calculations are available on request.

This page has been left blank intentionally.

6.0 Results

A summary of test results for the 2013 annual testing is presented in **Tables 5-9**. Calculated Fine Particulate (PM_{10}) cut sizes for all stacks tested are displayed in **Table 10**. Gas Data summaries are reported in **Tables 11–14**. Detailed results along with gas stream properties during the testing periods can be found in **Tables 15** to **29**. Speciated Volatile Organic Carbons results can be found in **Tables 29** to **32**, Dioxins & Furans results in **Table 34**, Hazardous Substances (Metals) results in **Tables 35** and **36**, and Polycyclic Aromatic Hydrocarbons results in **Tables 37** to **40**.

All emission concentrations are converted to standard conditions of 0^{o}C, dry gas and 1 atm pressure for comparison with regulatory limits outlined in the Weston Aluminium Environmental Protection Licence 6423.

Field notes recorded during the project are attached as **Appendix A**. with Laboratory Analysis Reports attached as **Appendix B**, and Raw & Calculated Gas Data as **Appendix C**.

Table 5 Stack 1, Air Emissions Results Summary – 2013

Parameter	Stack 1 (EPL Point 1)	EPL Limit
Total Particulate (mg/m^3)	0.84	25
Fine Particulate (PM_{10}) (mg/m^3)	<0.17	Not Listed
Hydrogen Chloride (mg/m^3)	<2.1	400
Chlorine (mg/m^3)	<2.1	Not Listed
Particulate Fluoride (mg/m^3)	0.0022	Not Listed
Gaseous Fluoride (mg/m^3)	<0.091	2
Sulfuric Acid Mist (H_2SO_4 as SO_3) (mg/m^3)	<1.8	100
Sulfur Dioxide (SO_2 as SO_3) (mg/m^3)	<8.9	Not Listed
Type 1 and 2 Substances in Aggregate (Metals) (mg/m^3)	0.086	10
Total Polycyclic Aromatic Hydrocarbons (mg/m^3)	0.0061	Not Listed
Volatile Organic Compounds (VOC) (mg/m^3)	<0.2	Not Listed
Total Oxides of Nitrogen (as Equivalent NO_2) (mg/m^3)	5	2500
Carbon Monoxide (CO) (ppm)	8	100
Cyanide	0.3	0.5

Table 6 Air Emission Results Summary, Stacks 2, 3, & 4 – 2013

Parameter	Stack 2 (EPL point 2)	Stack 3 (EPL point 3)	Stack 4 (EPL point 4)	EPL Limit
Total Particulate (mg/m^3)	0.31	1	0.98	Stack 2 – 35.0 Stack 3 – 50.0 Stack 4 – 24.0
Fine Particulate (PM_{10}) (mg/m^3)	<0.29	0.42	0.79	Not Listed
Total Fluoride (mg/m^3)	<0.17	<0.14	0.22	Not Listed

Table 7 Stack 5, Air Emissions Results Summary – 2013

Parameter	Stack 5 (EPL Point 13)	EPL Limit
Total Particulate (mg/m^3)	0.59	10
Fine Particulate (PM_{10}) (mg/m^3)	0.34	Not Listed
Total Fluoride (mg/m^3)	0.031	Not Listed
Hydrogen Chloride (HCl) (mg/m^3)	<3	10
Chlorine (mg/m^3)	<3	Not Listed
Sulfuric Acid Mist (H_2SO_4 as SO_3) (mg/m^3)	<2.3	100
Sulfur Dioxide (SO_2 as SO_3) (mg/m^3)	<12	Not Listed
Type 1 and 2 Substances in Aggregate (Metals) (mg/m^3)	0.098	5
Dioxins and Furans (Lower Bound) (ng/m^3)	0.00032	0.1
Dioxins and Furans (Middle Bound) (ng/m^3)	0.00067	0.1
Volatile Organic Compounds (VOC) (mg/m^3)	<0.2	77
Total Polycyclic Aromatic Hydrocarbons (mg/m^3)	0.03	Not Listed
Total Oxides of Nitrogen (as Equivalent NO_2) (mg/m^3)	3	100
Carbon Monoxide (CO) (mg/m^3)*	28	125
Oxygen (O_2) (%)	20.9	Not Listed

*Limit is based on a 1-hour rolling average. The value reported for the result was the highest recorded rolling 1-hour average during the testing period.

Table 8 Stack 6 Air Emissions Results Summary – 2013

Parameter	Stack 6 (EPL Point 14)	EPL Limit
Total Particulate at 3% O_2 (mg/m^3)	9.5	10
Fine Particulate (PM_{10}) at 3% O2 (mg/m^3)	0.2*	Not Listed
Sulfuric Acid Mist (H_2SO_4 as SO_3) (mg/m^3)	<2.7	Not Listed
Sulfur Dioxide (SO_2 as SO_3) (mg/m^3)	54	Not Listed
Total Polycyclic Aromatic Hydrocarbons (mg/m^3)	0.004	Not Listed
Total Fluoride (mg/m^3)	13	Not Listed
Volatile Organic Compounds (VOC) (mg/m^3)	<0.21	Not Listed
Total Oxides of Nitrogen (as Equivalent NO_2) (mg/m^3)	104	Not Listed
Carbon Monoxide (CO) (mg/m^3)	0.5	Not Listed
Oxygen (%)	13.2	Not Listed

* Result is calculated from Particle Sizing of the Total Particulate catch, as the stack is too hot to accommodate the PM10 Cyclone.

Table 9 Stack 7 Air Emissions Results Summary – 2013

Parameter	Stack 7 (EPL Point 15)	EPL Limit
Total Particulate	1.4	15
Fine Particulate (PM_{10}) (mg/m^3)	<0.25	Not Listed
Sulfuric Acid Mist (H_2SO_4 as SO_3) (mg/m^3)	<2.2	Not Listed
Sulfur Dioxide (SO_2 as SO_3) (mg/m^3)	<11	Not Listed
Total Polycyclic Aromatic Hydrocarbons (mg/m^3)	0.0019	Not Listed
Total Fluoride (mg/m^3)	<0.11	Not Listed
Volatile Organic Compounds (VOC) (mg/m^3)	0.9	Not Listed
Total Oxides of Nitrogen (as Equivalent NO_2) (mg/m^3)	2	Not Listed

USEPA method 201A, section 6.3.5 (Determination of PM_{10} Emissions) and USEPA Conditional Test Method 040, Section 17, Table 2 (Determination of $PM_{2.5}$ Emissions) specifies that results are acceptable provided the calculated aerodynamic cut size (D_{50}) for the test lies between 9.0µm and 11.0µm. Post sampling cut size calculations performed for the sampling conducted are displayed in **Table 10**. The calculated cut size (D_{50}) value meets the above stated criteria.

Table 10 Calculated PM_{10} Cut Sizes

Sampling Location	PM_{10} Cut Size (D_{50})
Stack 1	10.3
Stack 2	11.0
Stack 3	10.4
Stack 4	9.9
Stack 5	8.9
Stack 7	9.6

All of the calculated cut sizes meet the criteria for cut size conditions stated above, with exception to Stack 5.

Cut size, or D_{50}, refers to the aerodynamic diameter of the particles contained in the gas stream which can be captured with a 50% efficiency and is a calculated value. For a Fine Particulate (PM_{10}) test particle sizes of 10µm and less are expected.

The cut size (D_{50}) is calculated prior to testing and is based on the pre-test measurements such as stack gas velocity, stack gas temperature, moisture content of the gas stream and stack gas density. This pre-test calculation of cut size (D_{50}) is used in conjunction with the pre-test measurements, some of which are stated above, to establish the sampling conditions or parameters.

Table 11 Stack 1 Gas Data Summary, 30 April 2013

Parameter	Result	EPL Limit
Period of Sampling	11:16 – 13:16	
Stack Gas Flowrate (m^3/s) (0°C, Dry Gas, 1 atm Pressure)	25	
Oxides of Nitrogen as Equivalent NO_2 (mg/m^3)	5	2500
Oxides of Nitrogen as Equivalent NO_2 (mg/s)	125	
Carbon Monoxide (ppm)	8	100
Carbon Monoxide (mg/m^3)	10	
Carbon Monoxide (mg/s)	250	

Table 12 Stack 5 Gas Data Summary, 14 May 2013

Parameter	Result	EPL Limit
Period of Sampling	10:33 – 14:53	
Stack Gas Flowrate (m^3/s) (0°C, Dry Gas, 1 atm Pressure)	23	
Oxides of Nitrogen as Equivalent NO_2 (mg/m^3)	3	100
Oxides of Nitrogen as Equivalent NO_2 (mg/s)	69	
Carbon Monoxide (mg/m^3)*	10	
Carbon Monoxide (mg/s)	230	
Oxygen (%)	20.97	

*The average CO value over the length of testing has been reported here, not the rolling average.

Table 13 Stack 6 Gas Data Summary, 13 May 2013

Parameter	Result	EPL Limit
Period of Sampling	12:29 – 15:29	
Stack Gas Flowrate (m^3/s) (0°C, Dry Gas, 1 atm Pressure)	1.8	
Oxides of Nitrogen as Equivalent NO_2 (mg/m^3)	104	N/A
Oxides of Nitrogen as Equivalent NO_2 (mg/s)	187.2	
Carbon Monoxide (mg/m^3)	0.5	N/A
Carbon Monoxide (mg/s)	0.9	
Oxygen (%)	13.2	

Table 14 Stack 7 Gas Data Summary, 2 May 2013

Parameter	Result	EPL Limit
Period of Sampling	10:20-12:20	
Stack Gas Flowrate (m^3/s) (0°C, Dry Gas, 1 atm Pressure)	33	
Oxides of Nitrogen as Equivalent NO_2 (mg/m^3)	2	N/A
Oxides of Nitrogen as Equivalent NO_2 (mg/s)	66	

Table 15 Stack 1 Cyanide Results, 1 May 2013

Sampling Conditions:			
Stack internal diameter at test location	1650	mm	
Stack gas temperature (average)	62.3	°C	335.5 K
Stack pressure (average)	1017	hPa	
Stack gas velocity (average, stack conditions)	15	m/s	
Stack gas flowrate (stack conditions)	31	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s	
Cyanide Testing			
Test Period	9:50	-	11:35
Cyanide Mass	0.27	mg	
Gas Volume Sampled	0.901	m^3	
Cyanide Emission*[1]	0.3	mg/m^3	
Cyanide Mass Emission Rate*[2]	7.4	mg/s	
Regulatory Limit	0.5	mg/m^3	
Moisture Content (%)	**3.0**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 16 Stack 1 Fine Particulate (PM_{10}), Total Particulate, Results, 30 April 2013

Sampling Conditions:			
Stack internal diameter at test location	1650	mm	
Stack gas temperature (average)	67.0	°C	340.2 K
Stack pressure (average)	1020	hPa	
Stack gas velocity (average, stack conditions)	15	m/s	
Stack gas flowrate (stack conditions)	31	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s	
Fine Particulate (PM10) Testing			
Test Period	10:20	-	12:06
Fine Particulate (PM10) Mass	<0.2	mg	
Gas Volume Sampled	1.19	m^3	
Fine Particulate (PM10) Emission*[1]	<0.17	mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*[2]	<4.2	mg/s	
Regulatory Limit	NA		
Total Particulate Testing			
Test Period	10:20	-	12:06
Total Particulate Mass	0.8	mg	
Gas Volume Sampled	0.956	m^3	
Total Particulate Emission*[1]	0.84	mg/m^3	
Total Particulate Mass Emission Rate*[2]	21	mg/s	
Regulatory Limit	25	mg/m^3	
Moisture Content (%)	**2.7**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 17 Stack 1 Hazardous Substances, Polycyclic Aromatic Hydrocarbons, Hydrogen Chloride & Chlorine Results, 1 May 2013

Sampling Conditions:			
Stack internal diameter at test location	1650	mm	
Stack gas temperature (average)	62.3	°C	335.5 K
Stack pressure (average)	1017	hPa	
Stack gas velocity (average, stack conditions)	14	m/s	
Stack gas flowrate (stack conditions)	31	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s	
Hazardous Substances (Metals) Testing			
Test Period	9:50	-	11:35
Hazardous Substances (Metals) Mass	0.095	mg	
Gas Volume Sampled	1.11	m^3	
Hazardous Substances (Metals) Emission*[1]	0.086	mg/m^3	
Hazardous Substances (Metals) Mass Emission Rate*[2]	2.1	mg/s	
Regulatory Limit	10	mg/m^3	
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	9:50	-	11:35
Polycyclic Aromatic Hydrocarbons Mass	<0	mg	
Gas Volume Sampled	1.38	m^3	
Polycyclic Aromatic Hydrocarbons Emission*[1]	0.0061	mg/m^3	
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*[2]	0.15	mg/s	
Regulatory Limit	N/A		
Hydrogen Chloride Testing			
Test Period	9:50	-	11:35
Hydrogen Chloride Mass	<2	mg	
Gas Volume Sampled	0.962	m^3	
Hydrogen Chloride Emission*[1]	<2.1	mg/m^3	
Hydrogen Chloride Mass Emission Rate*[2]	<52	mg/s	
Regulatory Limit	400	mg/m^3	
Chlorine Testing			
Test Period	9:50	-	11:35
Chlorine Mass	<2	mg	
Gas Volume Sampled	0.962	m^3	
Chlorine Emission*[1]	<2.1	mg/m^3	
Chlorine Mass Emission Rate*[2]	<52	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**2.2**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 18 Stack 1 Particulate & Gaseous Fluoride, Sulfuric Acid Mist (H_2SO_4 as SO_3) and Sulfur Dioxide (SO_2 as SO_3) Results, 30 April 2013

Sampling Conditions:			
Stack internal diameter at test location	1650	mm	
Stack gas temperature (average)	67.0	°C	340.2 K
Stack pressure (average)	1020	hPa	
Stack gas velocity (average, stack conditions)	15	m/s	
Stack gas flowrate (stack conditions)	31	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	24	m^3/s	
Particulate Fluoride Testing			
Test Period	10:20	-	12:06
Particulate Fluoride Mass	0.022	mg	
Gas Volume Sampled	1.1	m^3	
Particulate Fluoride Emission*1	0.0022	mg/m^3	
Particulate Fluoride Mass Emission Rate*2	0.55	mg/s	
Regulatory Limit	N/A		
Gaseous Fluoride Testing			
Test Period	10:20	-	12:06
Gaseous Fluoride Mass	<0.1	mg	
Gas Volume Sampled	1.1	m^3	
Gaseous Fluoride Emission*1	<0.091	mg/m^3	
Gaseous Fluoride Mass Emission Rate*2	<2.3	mg/s	
Regulatory Limit	2	mg/m^3	
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	10:20	-	12:06
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2	mg	
Gas Volume Sampled	1.12	m^3	
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<1.8	mg/m^3	
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<41	mg/s	
Regulatory Limit	100	mg/m^3	
Sulfur Dioxide (SO2 as SO3) Testing			
Test Period	10:20	-	12:06
Sulfur Dioxide (SO2 as SO3) Mass	<10	mg	
Gas Volume Sampled	1.12	m^3	
Sulfur Dioxide (SO2 as SO3) Emission*1	<8.9	mg/m^3	
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<200	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**4.0**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 19 Stack 2 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 29 April 2013

Sampling Conditions:			
Stack internal diameter at test location	1265	mm	
Stack gas temperature (average)	27.8	°C	301.0 K
Stack pressure (average)	1020	hPa	
Stack gas velocity (average, stack conditions)	13	m/s	
Stack gas flowrate (stack conditions)	17	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	15	m^3/s	
Fine Particulate (PM10) Testing			
Test Period	12:29	-	13:32
Fine Particulate (PM10) Mass	<0.2	mg	
Gas Volume Sampled	0.679	m^3	
Fine Particulate (PM10) Emission*1	<0.29	mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*2	<4.4	mg/s	
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	12:29	-	13:32
Total Particulate Mass	0.2	mg	
Gas Volume Sampled	0.652	m^3	
Total Particulate Emission*1	0.31	mg/m^3	
Total Particulate Mass Emission Rate*2	4.7	mg/s	
Regulatory Limit	35	mg/m^3	
Total Fluoride Testing			
Test Period	12:29	-	13:32
Total Fluoride Mass	<1	mg	
Gas Volume Sampled	0.58	m^3	
Total Fluoride Emission*1	<0.17	mg/m^3	
Total Fluoride Mass Emission Rate*2	<25	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**0.9**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.8**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 20 Stack 3 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 29 April 2013

Sampling Conditions:			
Stack internal diameter at test location	1000	mm	
Stack gas temperature (average)	34.5	°C	307.7 K
Stack pressure (average)	1021	hPa	
Stack gas velocity (average, stack conditions)	13	m/s	
Stack gas flowrate (stack conditions)	10	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	9.1	m^3/s	
Fine Particulate (PM10) Testing			
Test Period	10:32	-	11:35
Fine Particulate (PM10) Mass	0.3	mg	
Gas Volume Sampled	0.715	m^3	
Fine Particulate (PM10) Emission*1	0.42	mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*2	3.8	mg/s	
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	10:32	-	11:35
Total Particulate Mass	0.7	mg	
Gas Volume Sampled	0.671	m^3	
Total Particulate Emission*1	1	mg/m^3	
Total Particulate Mass Emission Rate*2	9.1	mg/s	
Regulatory Limit	50	mg/m^3	
Total Fluoride Testing			
Test Period	10:32	-	11:35
Total Fluoride Mass	<0.1	mg	
Gas Volume Sampled	0.69	m^3	
Total Fluoride Emission*1	<0.14	mg/m^3	
Total Fluoride Mass Emission Rate*2	<1.3	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**2.3**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.8**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 21 Stack 4 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 14 May 2013

Sampling Conditions:		
Stack internal diameter at test location	1395 mm	
Stack gas temperature (average)	34.2 °C	307.4 K
Stack pressure (average)	1010 hPa	
Stack gas velocity (average, stack conditions)	20 m/s	
Stack gas flowrate (stack conditions)	31 m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	27 m^3/s	
Fine Particulate (PM10) Testing		
Test Period	10:36 -	11:38
Fine Particulate (PM10) Mass	0.6 mg	
Gas Volume Sampled	0.755 m^3	
Fine Particulate (PM10) Emission*1	0.79 mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*2	21 mg/s	
Regulatory Limit	N/A	
Total Particulate Testing		
Test Period	10:36-	11:38
Total Particulate Mass	0.9 mg	
Gas Volume Sampled	0.918 m^3	
Total Particulate Emission*1	0.98 mg/m^3	
Total Particulate Mass Emission Rate*2	26 mg/s	
Regulatory Limit	50 mg/m^3	
Total Fluoride Testing		
Test Period	10:36 -	11:38
Total Fluoride Mass	0.211 mg	
Gas Volume Sampled	0.958 m^3	
Total Fluoride Emission*1	0.22 mg/m^3	
Total Fluoride Mass Emission Rate*2	5.9 mg/s	
Regulatory Limit	N/A	
Moisture Content (%)	**1.4**	
Gas Density (dry at 1 atmosphere)	**1.29 kg/m^3**	
Dry Molecular Weight	**28.8 g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 22 Stack 5 Fine Particulates (PM_{10}), Total Particulates and Hazardous Substances (Metals) Results, 13 May 2013

Sampling Conditions:			
Stack internal diameter at test location	1490	mm	
Stack gas temperature (average)	70.0	°C	343.2 K
Stack pressure (average)	1015	hPa	
Stack gas velocity (average, stack conditions)	17	m/s	
Stack gas flowrate (stack conditions)	29	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	22	m^3/s	
Fine Particulate (PM10) Testing			
Test Period	11:09	-	12:40
Fine Particulate (PM10) Mass	0.4	mg	
Gas Volume Sampled	1.18	m^3	
Fine Particulate (PM10) Emission*1	0.34	mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*2	7.6	mg/s	
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	11:09	-	12:40
Total Particulate Mass	0.6	mg	
Gas Volume Sampled	1.02	m^3	
Total Particulate Emission*1	0.59	mg/m^3	
Total Particulate Mass Emission Rate*2	13	mg/s	
Regulatory Limit	10	mg/m^3	
Hazardous Substances (Metals) Testing			
Test Period	11:09	-	12:40
Hazardous Substances (Metals) Mass	0.13	mg	
Gas Volume Sampled	1.33	m^3	
Hazardous Substances (Metals) Emission*1	0.098	mg/m^3	
Hazardous Substances (Metals) Mass Emission Rate*2	2.2	mg/s	
Regulatory Limit	5	mg/m^3	
Moisture Content (%)	**3.8**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.8**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 23 Stack 5 Hydrogen Chloride & Chlorine Results, 14 May 2013

Sampling Conditions:				
Stack internal diameter at test location	1490	mm		
Stack gas temperature (average)	61.6	°C	334.8	K
Stack pressure (average)	1015	hPa		
Stack gas velocity (average, stack conditions)	17	m/s		
Stack gas flowrate (stack conditions)	29	m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23	m^3/s		
Hydrogen Chloride Testing				
Test Period	11:06	-	12:07	
Hydrogen Chloride Mass	<2	mg		
Gas Volume Sampled	0.664	m^3		
Hydrogen Chloride Emission*1	<3	mg/m^3		
Hydrogen Chloride Mass Emission Rate*2	<69	mg/s		
Regulatory Limit	10	mg/m^3		
Chlorine Testing				
Test Period	11:06	-	12:07	
Chlorine Mass	<2	mg		
Gas Volume Sampled	0.664	m^3		
Chlorine Emission*1	<3	mg/m^3		
Chlorine Mass Emission Rate*2	<69	mg/s		
Regulatory Limit	N/A			
Moisture Content (%)	**3.0**			
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**		
Dry Molecular Weight	**28.8**	**g/g-mole**		

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 24 Stack 5 Total Fluoride, Sulfuric Acid Mist (H_2SO_4 as SO_3) & Sulfur Dioxide (SO_2 as SO_3) Results, 14 May 2013

Sampling Conditions:		
Stack internal diameter at test location	1490 mm	
Stack gas temperature (average)	61.3 °C	334.5 K
Stack pressure (average)	1015 hPa	
Stack gas velocity (average, stack conditions)	17 m/s	
Stack gas flowrate (stack conditions)	29 m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23 m^3/s	
Total Fluoride Testing		
Test Period	9:12 -	10:13
Total Fluoride Mass	0.024 mg	
Gas Volume Sampled	0.772 m^3	
Total Fluoride Emission*1	0.031 mg/m^3	
Total Fluoride Mass Emission Rate*2	0.72 mg/s	
Regulatory Limit	N/A	
Sulfuric Acid Mist (H2SO4 as SO3) Testing		
Test Period	9:12 -	10:12
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg	
Gas Volume Sampled	0.865 m^3	
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<2.3 mg/m^3	
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<53 mg/s	
Regulatory Limit	100 mg/m^3	
Sulfur Dioxide (SO2 as SO3) Testing		
Test Period	9:12 -	10:12
Sulfur Dioxide (SO2 as SO3) Mass	<10 mg	
Gas Volume Sampled	0.865 m^3	
Sulfur Dioxide (SO2 as SO3) Emission*1	<12 mg/m^3	
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<280 mg/s	
Regulatory Limit	N/A	
Moisture Content (%)	**1.2**	
Gas Density (dry at 1 atmosphere)	**1.29 kg/m^3**	
Dry Molecular Weight	**28.8 g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 25 Stack 5 Dioxins & Furans, Polycyclic Aromatic Hydrocarbons (PAH) Results, 14 May 13

Sampling Conditions:			
Stack internal diameter at test location	1490	mm	
Stack gas temperature (average)	73.6	°C	346.8 K
Stack pressure (average)	1016	hPa	
Stack gas velocity (average, stack conditions)	17	m/s	
Stack gas flowrate (stack conditions)	30	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23	m^3/s	
Dioxins and Furans Lower Bound Testing			
Test Period	8:32	-	14:33
Dioxins and Furans Lower Bound Mass	0.0015	ng	
Gas Volume Sampled	4.62	m^3	
Dioxins and Furans Lower Bound Emission*1	0.00032	ng/m^3	
Dioxins and Furans Lower Bound Mass Emission Rate*2	0.0075	ng/s	
Regulatory Limit	0.1	ng/m^3	
Dioxins and Furans Middle Bound Testing			
Test Period	8:32	-	14:33
Dioxins and Furans Middle Bound Mass	0.0031	ng	
Gas Volume Sampled	4.62	m^3	
Dioxins and Furans Middle Bound Emission*1	0.00067	ng/m^3	
Dioxins and Furans Middle Bound Mass Emission Rate*2	0.016	ng/s	
Regulatory Limit	0.1	ng/m^3	
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	8:32	-	14:33
Polycyclic Aromatic Hydrocarbons Mass	0.14	mg	
Gas Volume Sampled	4.62	m^3	
Polycyclic Aromatic Hydrocarbons Emission*1	0.03	mg/m^3	
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	0.7	mg/s	
Regulatory Limit	NA	mg/m^3	
Moisture Content (%)	**0.9**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.8**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 26 Stack 6 Total Particulates, Sulfuric Acid Mist (H_2SO_4 as SO_3) and Sulfur Dioxide (SO_2 as SO_3) Results, 13 May 2013

Sampling Conditions:			
Stack internal diameter at test location	580	mm	
Stack gas temperature (average)	552.1	°C	825.3 K
Stack pressure (average)	1013	hPa	
Stack gas velocity (average, stack conditions)	22	m/s	
Stack gas flowrate (stack conditions)	5.8	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	1.8	m^3/s	
Total Particulate Testing			
Test Period	11:54	-	12:56
Total Particulate Mass	4.3	mg	
Gas Volume Sampled	0.943	m3	
Total Particulate Emission*1 at 3% O2	9.5	mg/m3	
Total Particulate Mass Emission Rate*2 at 3% O2	17	mg/s	
Regulatory Limit at 3% O2	10	mg/m3	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Testing			
Test Period	11:54	-	12:56
Sulfuric Acid Mist (H_2SO_4 as SO_3) Mass	<2	mg	
Gas Volume Sampled	0.739	m^3	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Emission*1	<2.7	mg/m^3	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Mass Emission Rate*2	<4.7	mg/s	
Regulatory Limit	N/A		
Sulfur Dioxide (SO_2 as SO_3) Testing			
Test Period	11:54	-	12:56
Sulfur Dioxide (SO_2 as SO_3) Mass	40	mg	
Gas Volume Sampled	0.739	m^3	
Sulfur Dioxide (SO_2 as SO_3) Emission*1	54	mg/m^3	
Sulfur Dioxide (SO_2 as SO_3) Mass Emission Rate*2	95	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**7.8**		
Gas Density (dry at 1 atmosphere)	**1.31**	**kg/m^3**	
Dry Molecular Weight	**29.3**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 27 Stack 6 Total Fluoride and Polycyclic Aromatic Hydrocarbons Results, 13 May 2013

Sampling Conditions:			
Stack internal diameter at test location	580	mm	
Stack gas temperature (average)	528.3	°C	801.5 K
Stack pressure (average)	1014	hPa	
Stack gas velocity (average, stack conditions)	21	m/s	
Stack gas flowrate (stack conditions)	5.6	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	1.8	m^3/s	
Total Fluoride Testing			
Test Period	13:20	-	14:45
Total Fluoride Mass	16.066	mg	
Gas Volume Sampled	1.25	m^3	
Total Fluoride Emission*[1]	13	mg/m^3	
Total Fluoride Mass Emission Rate*[2]	23	mg/s	
Regulatory Limit	N/A		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	13:20	-	14:45
Polycyclic Aromatic Hydrocarbons Mass	<0	mg	
Gas Volume Sampled	0.849	m^3	
Polycyclic Aromatic Hydrocarbons Emission*[1]	0.004	mg/m^3	
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*[2]	0.0071	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**7.1**		
Gas Density (dry at 1 atmosphere)	**1.31**	**kg/m^3**	
Dry Molecular Weight	**29.2**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 28 Stack 7 Fine Particulate (PM_{10}), Total Particulate, Total Fluoride Results, 2 May 2013

Sampling Conditions:			
Stack internal diameter at test location	1500	mm	
Stack gas temperature (average)	23.3	°C	296.5 K
Stack pressure (average)	1019	hPa	
Stack gas velocity (average, stack conditions)	21	m/s	
Stack gas flowrate (stack conditions)	36	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	33	m^3/s	
Fine Particulate (PM10) Testing			
Test Period	9:40	-	10:42
Fine Particulate (PM10) Mass	<0.2	mg	
Gas Volume Sampled	0.794	m^3	
Fine Particulate (PM10) Emission*1	<0.25	mg/m^3	
Fine Particulate (PM10) Mass Emission Rate*2	<8.3	mg/s	
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	9:40	-	10:42
Total Particulate Mass	1.4	mg	
Gas Volume Sampled	0.995	m^3	
Total Particulate Emission*1	1.4	mg/m^3	
Total Particulate Mass Emission Rate*2	46	mg/s	
Regulatory Limit	15	mg/m^3	
Total Fluoride Testing			
Test Period	9:40	-	10:42
Total Fluoride Mass	<0.1	mg	
Gas Volume Sampled	0.87	m^3	
Total Fluoride Emission*1	<0.11	mg/m^3	
Total Fluoride Mass Emission Rate*2	<3.7	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**0.6**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas
*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 29 Stack 7 Sulfuric Acid Mist (H_2SO_4 as SO_3), Sulfur Dioxide (SO_2 as SO_3) and Polycyclic Aromatic Hydrocarbons Results, 2 May 2013

Sampling Conditions:			
Stack internal diameter at test location	1500	mm	
Stack gas temperature (average)	24.3	°C	297.5 K
Stack pressure (average)	1019	hPa	
Stack gas velocity (average, stack conditions)	20	m/s	
Stack gas flowrate (stack conditions)	36	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	33	m^3/s	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Testing			
Test Period	10:55	-	11:58
Sulfuric Acid Mist (H_2SO_4 as SO_3) Mass	<2	mg	
Gas Volume Sampled	0.925	m^3	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Emission*[1]	<2.2	mg/m^3	
Sulfuric Acid Mist (H_2SO_4 as SO_3) Mass Emission Rate*[2]	<73	mg/s	
Regulatory Limit	N/A		
Sulfur Dioxide (SO_2 as SO_3) Testing			
Test Period	10:55	-	11:58
Sulfur Dioxide (SO_2 as SO_3) Mass	<10	mg	
Gas Volume Sampled	0.925	m^3	
Sulfur Dioxide (SO_2 as SO_3) Emission*[1]	<11	mg/m^3	
Sulfur Dioxide (SO_2 as SO_3) Mass Emission Rate*[2]	<360	mg/s	
Regulatory Limit	N/A		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	10:55	-	11:58
Polycyclic Aromatic Hydrocarbons Mass	0.0021	mg	
Gas Volume Sampled	1.1	m^3	
Polycyclic Aromatic Hydrocarbons Emission*[1]	0.0019	mg/m^3	
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*[2]	0.062	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	**1.0**		
Gas Density (dry at 1 atmosphere)	**1.29**	**kg/m^3**	
Dry Molecular Weight	**28.9**	**g/g-mole**	

Notes *1 Emission concentration at Standard conditions of 0°C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Table 30 Stack 1 Speciated Volatile Organic Compounds Results, 1 May 2013

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.099	<2.5
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.099	<2.5
2-Butanone	<0.5	<0.5	<0.5	<0.099	<2.5
Chloroform	<0.5	<0.5	<0.5	<0.099	<2.5
Benzene	<0.5	<0.5	<0.5	<0.099	<2.5
1-heptene	<0.5	<0.5	<0.5	<0.099	<2.5
n-heptane	<0.5	<0.5	<0.5	<0.099	<2.5
Trichloroethene	<0.5	<0.5	<0.5	<0.099	<2.5
MIBK	<0.5	<0.5	<0.5	<0.099	<2.5
Toluene	<0.5	<0.5	<0.5	<0.099	<2.5
2-hexanone	<0.5	<0.5	<0.5	<0.099	<2.5
Chlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
Ethyl Benzene	<0.5	<0.5	<0.5	<0.099	<2.5
m- & p-xylene	<1	<1	<1	<0.2	<5
o-xylene	<0.5	<0.5	<0.5	<0.099	<2.5
Styrene	<0.5	<0.5	<0.5	<0.099	<2.5
Cyclohexanone	<0.5	<0.5	<0.5	<0.099	<2.5
Isopropylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
2-chlorotoluene	<0.5	<0.5	<0.5	<0.099	<2.5
4-chlorotoluene	<0.5	<0.5	<0.5	<0.099	<2.5
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
n-decane	<0.5	<0.5	<0.5	<0.099	<2.5
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.099	<2.5
n-butylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.099	<2.5
Total	**<1**		**<1**	**<0.2**	**<5**

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. i.e. a blank value of <0.5 has had 0.25 subtracted from the analysed value.

Table 31 Stack 5 Speciated Volatile Organic Compounds Results, 13 May 2013

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.1	<2.2
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.1	<2.2
2-Butanone	<0.5	<0.5	<0.5	<0.1	<2.2
Chloroform	<0.5	<0.5	<0.5	<0.1	<2.2
Benzene	<0.5	<0.5	<0.5	<0.1	<2.2
1-heptene	<0.5	<0.5	<0.5	<0.1	<2.2
n-heptane	<0.5	<0.5	<0.5	<0.1	<2.2
Trichloroethene	<0.5	<0.5	<0.5	<0.1	<2.2
MIBK	<0.5	<0.5	<0.5	<0.1	<2.2
Toluene	<0.5	<0.5	<0.5	<0.1	<2.2
2-hexanone	<0.5	<0.5	<0.5	<0.1	<2.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.1	<2.2
m- & p-xylene	<1	<1	<1	<0.2	<4.4
o-xylene	<0.5	<0.5	<0.5	<0.1	<2.2
Styrene	<0.5	<0.5	<0.5	<0.1	<2.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.1	<2.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.1	<2.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.1	<2.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
n-decane	<0.5	<0.5	<0.5	<0.1	<2.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.1	<2.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.1	<2.2
Total	**<1**		**<1**	**<0.2**	**<4.4**

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. i.e. a blank value of <0.5 has had 0.25 subtracted from the analysed value.

Table 32 Stack 6 Speciated Volatile Organic Compounds Results, 13 May 2013

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.11	<0.2
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.11	<0.2
2-Butanone	<0.5	<0.5	<0.5	<0.11	<0.2
Chloroform	<0.5	<0.5	<0.5	<0.11	<0.2
Benzene	<0.5	<0.5	<0.5	<0.11	<0.2
1-heptene	<0.5	<0.5	<0.5	<0.11	<0.2
n-heptane	<0.5	<0.5	<0.5	<0.11	<0.2
Trichloroethene	<0.5	<0.5	<0.5	<0.11	<0.2
MIBK	<0.5	<0.5	<0.5	<0.11	<0.2
Toluene	<0.5	<0.5	<0.5	<0.11	<0.2
2-hexanone	<0.5	<0.5	<0.5	<0.11	<0.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.11	<0.2
m- & p-xylene	<1	<1	<1	<0.21	<0.38
o-xylene	<0.5	<0.5	<0.5	<0.11	<0.2
Styrene	<0.5	<0.5	<0.5	<0.11	<0.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.11	<0.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.11	<0.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.11	<0.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
n-decane	<0.5	<0.5	<0.5	<0.11	<0.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.11	<0.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.11	<0.2
Total	**<1**		**<1**	**<0.21**	**<0.38**

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. i.e. a blank value of <0.5 has had 0.25 subtracted from the analysed value.

Table 33 Stack 6 Speciated Volatile Organic Compounds Results, 2 May 2013

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	4.3	<0.5	4.1	0.8	26
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.097	<3.2
2-Butanone	<0.5	<0.5	<0.5	<0.097	<3.2
Chloroform	<0.5	<0.5	<0.5	<0.097	<3.2
Benzene	<0.5	<0.5	<0.5	<0.097	<3.2
1-heptene	<0.5	<0.5	<0.5	<0.097	<3.2
n-heptane	<0.5	<0.5	<0.5	<0.097	<3.2
Trichloroethene	<0.5	<0.5	<0.5	<0.097	<3.2
MIBK	<0.5	<0.5	<0.5	<0.097	<3.2
Toluene	0.5	<0.5	0.3	0.058	1.9
2-hexanone	<0.5	<0.5	<0.5	<0.097	<3.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.097	<3.2
m- & p-xylene	<1	<1	<1	<0.19	<6.3
o-xylene	<0.5	<0.5	<0.5	<0.097	<3.2
Styrene	<0.5	<0.5	<0.5	<0.097	<3.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.097	<3.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.097	<3.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.097	<3.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
n-decane	<0.5	<0.5	<0.5	<0.097	<3.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.097	<3.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.097	<3.2
Total	**4.8**		**4.4**	**0.9**	**27.9**

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. i.e. a blank value of <0.5 has had 0.25 subtracted from the analysed value.

Table 34 Stack 5 Speciated Dioxins & Furans Results, 14 May 2013

Analyte	Mass ng	Toxic Equivalency Factor (1 - TEFs)	Total Toxic Equivalence (1 - TEQs) ng	Concentration ng/m^3	Total Toxic Equivalence (1-TEQs) ng/m^3
2,3,7,8-TCDF	0.0048	0.1	0.00048	0.001	0.0001
Total TCDF isomers	0.14				
2,3,7,8-TCDD	<0.0008	1	0.0004	<0.00017	0.000087
Total TCDD isomers	0.014				
1,2,3,7,8-PeCDF	0.0015	0.05	0.000075	0.00032	0.000016
2,3,4,7,8-PeCDF	0.0019	0.5	0.00095	0.00041	0.00021
Total PeCDF isomers	0.023				
1,2,3,7,8-PeCDD	<0.001	1	0.0005	<0.00022	0.00011
Total PeCDD isomers	<0.01				
1,2,3,4,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,6,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
2,3,4,6,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,7,8,9-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
Total HxCDF isomers	<0.01				
1,2,3,4,7,8-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,6,7,8-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,7,8,9-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
Total HxCDD isomers	0.011				
1,2,3,4,6,7,8-HpCDF	<0.001	0.01	0.000005	<0.00022	0.0000011
1,2,3,4,7,8,9-Hp CDF	<0.002	0.01	0.00001	<0.00043	0.0000022
Total HpCDF isomers	<0.003				
1,2,3,4,6,7,8-HpCDD	<0.004	0.01	0.00002	<0.00087	0.0000043
Total HpCDD isomers	<0.01				
OCDF	<0.003	0.0001	0.00000015	<0.00065	0.000000032
OCDD	0.024	0.0001	0.0000024	0.0052	0.00000052

I-TEQ$_{DF}$

Lower Bound (excluding LOD Values)	**0.0015**	**ng**
Middle Bound (including half LOD Values)	**0.0031**	**ng**

Table 35 Stack 1 Elemental Metals Results, 1 May 2013

Sample	Total Particulate Metals (mg)	Total Particulate Metals (mg/m^3)	Total Gaseous Metals (mg)	Total Gaseous Metals (mg/m^3)	Total Oxidisable Mercury (mg)	Total Oxidisable Mercury (mg/m^3)	Total (mg)	Total (mg/m^3)	Mass Emission Rate (mg/s)
Antimony	<0.0005	<0.00045	<0.0005	<0.00045			<0.002	<0.0018	<0.044
Arsenic	<0.00009	<0.000081	<0.0005	<0.00045			<0.0015	<0.0014	<0.035
Beryllium	<0.0005	<0.00045	<0.0005	<0.00045			<0.000015	<0.000014	<0.00035
Cadmium	0.0014	0.0013	0.0022	0.002			0.004	0.0036	0.089
Chromium	0.0014	0.0013	0.0029	0.0026			0.004	0.0036	0.089
Cobalt	<0.0001	<0.00009	<0.0005	<0.00045			<0.00015	<0.00014	<0.0035
Copper	0.0035	0.0032	0.0021	0.0019			0.006	0.0054	0.13
Lead	0.034	0.031	0.0027	0.0024			0.04	0.036	0.89
Magnesium	0.056	0.05	0.019	0.017			0.08	0.072	1.8
Manganese	0.021	0.019	0.017	0.015			0.04	0.036	0.89
Mercury	0.00002	0.000018	<0.0005	<0.00045	<0.0005	<0.00045	0.00002	0.000018	0.00044
Nickel	0.002	0.0018	0.0026	0.0023			0.005	0.0045	0.11
Selenium	0.0013	0.0012	0.00054	0.00049			0.002	0.0018	0.044
Thallium	<0.0005	<0.00045	<0.0005	<0.00045			<0.004	<0.0036	<0.089
Tin	<0.00023	<0.00021	<0.0005	<0.00045			<0.001	<0.0009	<0.022
Vanadium	<0.0003	<0.00027	<0.0005	<0.00045			<0.0002	<0.00018	<0.0044
Zinc	0.64	0.58	0.017	0.015			0.7	0.63	16
Total Hazardous Metals*	**0.061**	**0.056**	**0.028**	**0.025**	**<0.00025**	**<0.00045**	**0.095**	**0.086**	**2.1**
Total Metals	**0.76**	**0.69**	**0.066**	**0.059**			**0.88**	**0.79**	**20**

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

Table 36 Stack 5 Elemental Metals Results, 13 May 2013

Sample	Total Particulate Metals (mg)	Total Particulate Metals (mg/m3)	Total Gaseous Metals (mg)	Total Gaseous Metals (mg/m3)	Total Oxidisable Mercury (mg)	Total Oxidisable Mercury (mg/m3)	Total (mg)	Total (mg/m3)	Mass Emission Rate (mg/s)
Antimony	<0.0005	<0.00038	<0.0005	<0.00038			<0.002	<0.0015	<0.034
Arsenic	0.00004	0.00003	<0.0005	<0.00038			0.00004	0.00003	0.00069
Beryllium	<0.0005	<0.00038	<0.0005	<0.00038			<0.000015	<0.000011	<0.00025
Cadmium	0.051	0.038	0.002	0.0015			0.05	0.038	0.87
Chromium	0.0033	0.0025	0.0036	0.0027			0.007	0.0053	0.12
Cobalt	<0.0005	<0.00038	<0.0005	<0.00038			<0.00015	<0.00011	<0.0025
Copper	0.0028	0.0021	0.0023	0.0017			0.005	0.0038	0.087
Lead	0.01	0.0075	0.0042	0.0032			0.01	0.0075	0.17
Magnesium	0.12	0.09	0.014	0.011			0.1	0.075	1.7
Manganese	0.035	0.026	0.018	0.014			0.05	0.038	0.87
Mercury	<0.0005	<0.00038	<0.0005	<0.00038	<0.0005	<0.00038	<0.000025	<0.000019	<0.00044
Nickel	0.0037	0.0028	0.0029	0.0022			0.007	0.0053	0.12
Selenium	0.0017	0.0013	<0.0005	<0.00038			0.0017	0.0013	0.03
Thallium	<0.0005	<0.00038	<0.0005	<0.00038			<0.004	<0.003	<0.069
Tin	0.00045	0.00034	0.0015	0.0011			0.002	0.0015	0.034
Vanadium	0.0006	0.00045	<0.0005	<0.00038			0.0006	0.00045	0.01
Zinc	0.72	0.54	0.017	0.013			0.7	0.53	12
Total Hazardous Metals*	**0.11**	**0.079**	**0.031**	**0.024**	**<0.00025**	**<0.00038**	**0.13**	**0.098**	**2.2**
Total Metals	**0.95**	**0.71**	**0.066**	**0.05**			**0.93**	**0.7**	**16**

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

Table 37 Stack 1 Speciated Polycyclic Aromatic Hydrocarbons Results, 1 May 2013

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	3900	3.9	0.0039	2.8	0.0028	70	0.07
2 - Methylnapthalene	870	0.87	0.00087	0.63	0.00063	16	0.016
Acenaphthylene	99	0.099	0.000099	0.072	0.000072	1.8	0.0018
Acenaphthene	870	0.87	0.00087	0.63	0.00063	16	0.016
Fluorene	1300	1.3	0.0013	0.94	0.00094	23	0.023
Phenanthrene	1100	1.1	0.0011	0.8	0.0008	20	0.02
Anthracene	<20	<0.02	<0.00002	0.015	<0.000015	<0.36	<0.00036
Fluoranthene	65	0.065	0.000065	0.047	0.000047	1.2	0.0012
Pyrene	25	0.025	0.000025	0.018	0.000018	0.45	0.00045
Benz(a)anthracene	<40	<0.04	<0.00004	0.029	<0.000029	<0.72	<0.00072
Chrysene	33	0.033	0.000033	0.024	0.000024	0.59	0.00059
Benzo(b)fluoranthene	28	0.028	0.000028	0.02	0.00002	0.5	0.0005
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.015	<0.000015	<0.36	<0.00036
Benzo(e)pyrene	<260	<0.26	<0.00026	0.19	<0.00019	<4.7	<0.0047
Benzo(a)pyrene	<300	<0.3	<0.0003	0.22	<0.00022	<5.4	<0.0054
Perylene	<340	<0.34	<0.00034	0.25	<0.00025	<6.1	<0.0061
Indeno(123:cd)pyrene	32	0.032	0.000032	0.023	0.000023	0.58	0.00058
Dibenzo(ah)anthracene	50	0.05	0.00005	0.036	0.000036	0.9	0.0009
Benzo(ghi)perylene	<25	<0.025	<0.000025	0.018	<0.000018	<0.45	<0.00045
Sum of reported PAH's	**8400**	**8.4**	**0.0084**	**6.8**	**0.006**	**150**	**0.15**

Table 38 Stack 5 Speciated Polycyclic Aromatic Hydrocarbon Results, 14 May 2013

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	73000	73	0.073	16	0.016	370	0.37
2 - Methylnapthalene	14000	14	0.014	3	0.003	71	0.071
Acenaphthylene	26000	26	0.026	5.6	0.0056	130	0.13
Acenaphthene	1000	1	0.001	0.22	0.00022	5.1	0.0051
Fluorene	6400	6.4	0.0064	1.4	0.0014	32	0.032
Phenanthrene	16000	16	0.016	3.5	0.0035	81	0.081
Anthracene	990	0.99	0.00099	0.21	0.00021	5	0.005
Fluoranthene	1700	1.7	0.0017	0.37	0.00037	8.6	0.0086
Pyrene	990	0.99	0.00099	0.21	0.00021	5	0.005
Benz(a)anthracene	60	0.06	0.00006	0.013	0.000013	0.3	0.0003
Chrysene	140	0.14	0.00014	0.03	0.00003	0.71	0.00071
Benzo(b)fluoranthene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(e)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(a)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Perylene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Dibenzo(ah)anthracene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(ghi)perylene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Sum of reported PAH's	**140000**	**140**	**0.14**	**31**	**0.031**	**710**	**0.71**

Table 39 Stack 6 Speciated Polycyclic Aromatic Hydrocarbon Results, 13 May 2013

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	1600	1.6	0.0016	1.9	0.0019	3.3	0.0033
2 - Methylnapthalene	150	0.15	0.00015	0.18	0.00018	0.31	0.00031
Acenaphthylene	58	0.058	0.000058	0.068	0.000068	0.12	0.00012
Acenaphthene	69	0.069	0.000069	0.081	0.000081	0.14	0.00014
Fluorene	120	0.12	0.00012	0.14	0.00014	0.25	0.00025
Phenanthrene	620	0.62	0.00062	0.73	0.00073	1.3	0.0013
Anthracene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Fluoranthene	430	0.43	0.00043	0.51	0.00051	0.89	0.00089
Pyrene	130	0.13	0.00013	0.15	0.00015	0.27	0.00027
Benz(a)anthracene	32	0.032	0.000032	0.038	0.000038	0.067	0.000067
Chrysene	130	0.13	0.00013	0.15	0.00015	0.27	0.00027
Benzo(b)fluoranthene	58	0.058	0.000058	0.068	0.000068	0.12	0.00012
Benzo(k)fluoranthene	35	0.035	0.000035	0.041	0.000041	0.073	0.000073
Benzo(e)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Benzo(a)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Perylene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Dibenzo(ah)anthracene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Benzo(ghi)perylene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Sum of reported PAH's	**3400**	**3.4**	**0.0034**	**4.2**	**0.0041**	**7.1**	**0.0071**

Table 40 Stack 7 Speciated Polycyclic Aromatic Hydrocarbon Results, 2 May 2013

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	1900	1.9	0.0019	1.7	0.0017	56	0.056
2 - Methylnapthalene	<230	<0.23	<0.00023	0.21	<0.00021	<6.8	<0.0068
Acenaphthylene	<40	<0.04	<0.00004	0.036	<0.000036	<1.2	<0.0012
Acenaphthene	39	0.039	0.000039	0.035	0.000035	1.2	0.0012
Fluorene	85	0.085	0.000085	0.077	0.000077	2.5	0.0025
Phenanthrene	99	0.099	0.000099	0.09	0.00009	2.9	0.0029
Anthracene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Pyrene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benz(a)anthracene	<40	<0.04	<0.00004	0.036	<0.000036	<1.2	<0.0012
Chrysene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(b)fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(e)pyrene	<260	<0.26	<0.00026	0.24	<0.00024	<7.7	<0.0077
Benzo(a)pyrene	<300	<0.3	<0.0003	0.27	<0.00027	<8.9	<0.0089
Perylene	<340	<0.34	<0.00034	0.31	<0.00031	<10	<0.01
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Dibenzo(ah)anthracene	<25	<0.025	<0.000025	0.023	<0.000023	<0.74	<0.00074
Benzo(ghi)perylene	<25	<0.025	<0.000025	0.023	<0.000023	<0.74	<0.00074
Sum of reported PAH's	**2100**	**2.1**	**0.0021**	**3.2**	**0.0019**	**63**	**0.063**

Appendix A

Field Sheets (252 Pages)

Appendix A Field Sheets

AECOM

Weston Aluminium

AECOM's Project Number: 60287751

Emission Source: Stack 1

Date Sampled: 1-May-13

ANALYTE(S)	**METHOD**
Cyanide	USEPA OTM - 29

Observations made during testing period:

Sampling Performed By:

James Lang

for Peter Waddingham

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 1-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Cyanide

Measurement/Observations				
Stack Internal Dimensions: Diameter 1650 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 2.14 m^2 Minimum No. of sampling points= 16	
Distance from sampling plane to nearest disturbances: Upstream (m) = 4 No. Diameters = 2.4 Type of Upstream Disturbance: Fan Downstream (m) = 6 No. Diameters = 3.6 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 20 PM2.5/10= NA No. of sampling traverses/ports sampled = 2 PM2.5/10= NA No. of sampling points on each traverse/port = 10 PM2.5/10= NA	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	111	81		
2	195	165		
3	292	262		
4	413	383		
5	584	554		
6	1066	1036		
7	1238	1208		
8	1358	1328		
9	1455	1425		
10	1539	1509	Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 1-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Cyanide

Sampling time start:	8:55	Sampling port No.:	0	
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	8:55	34	20.4	0.3
2	8:56	34	20.4	0.3
3	8:57	34	20.4	0.3
4	8:58	34	20.4	0.3
5	8:59	34	20.4	0.3
6	9:00	34	20.4	0.3
7	9:01	34	20.4	0.3
8	9:02	34	20.4	0.3
	Averages:	34.0 ppm	20.4 %	0.3 %

Moisture content (M3): 0.97
Moisture percentage (M2): 3.30 %

Measurements

CO:	0.0034 %,(dry)	N_2:	79.3 %,(dry)
CO_2:	0.3 %,(dry)	O_2:	20.4 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0033 %,(wet)	N_2:	76.7 %,(wet)
CO_2:	0.3 %,(wet)	O_2:	19.7 %,(wet)
H_2O:	3.30 %(=M2)		

Therefore, stack gas density (GD) =	1.27 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 1-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Cyanide

Sampling time start: 12:04		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:04	14	20.9	0.0
2	12:05	14	20.9	0.0
3	12:06	14	20.9	0.0
4	12:07	14	20.9	0.0
5	12:08	14	20.9	0.0
6	12:09	14	20.9	0.0
7	12:10	14	20.9	0.0
8	12:11	14	20.9	0.0
	Averages:	14.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.97
Moisture percentage (M2): 2.97 %

Measurements

CO:	0.0014 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0014 %,(wet)	N_2:	76.7 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.3 %,(wet)
H_2O:	2.97 %(=M2)		
Therefore, stack gas density (GD) =	1.27 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 1-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Cyanide

Time :	8:43	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.198	55.0	328.2	16.2
1/2	165	0.201	55.0	328.2	16.3
1/3	262	0.176	55.0	328.2	15.3
1/4	383	0.130	56.0	329.2	13.2
1/5	554	0.144	56.0	329.2	13.9
1/6	1036	0.104	56.0	329.2	11.8
1/7	1208	0.111	56.0	329.2	12.1
1/8	1328	0.131	56.0	329.2	13.2
1/9	1425	0.099	56.0	329.2	11.5
1/10	1509	0.141	55.0	328.2	13.7
2/1	81	0.190	55.0	328.2	15.9
2/2	165	0.239	57.0	330.2	17.9
2/3	262	0.186	58.0	331.2	15.8
2/4	383	0.164	59.0	332.2	14.8
2/5	554	0.181	59.0	332.2	15.6
2/6	1036	0.135	59.0	332.2	13.5
2/7	1208	0.142	59.0	332.2	13.8
2/8	1328	0.148	59.0	332.2	14.1
2/9	1425	0.143	59.0	332.2	13.9
2/10	1509	0.137	59.0	332.2	13.6
Average			57.0	330.2	14.3

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 7 mm
Absolute pressure in stack (hPa) : 1016.69 hPa

AECOM

STACK ANALYSIS
SAMPLING OF CYANIDE

Date: 1-May-13
Client: Weston Aluminium
AECDM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: G4
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.28 x $10^{-5}m^2$
Thimble No: NA
Blank thimble No: NA

Leak Check (Pre-Sampling)
Meter start: 34.3966 Meter finish: 34.3966
Time start: 9:40 Time finish: 9:41

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 35.3888 Meter finish: 35.8888
Time start: 13:44 Time finish: 13:49

Therefore, leakage rate = 100 L/min

(>0.1 l/min. is unacceptable)
Unacceptable

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 34.3987 Time start: 9:50
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Dutlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	11.2	37.0	27.0		Yes
1/2	0:10:00	195	11.3	37.0	27.0		Yes
1/3	0:15:00	292	10.6	37.0	27.0		Yes
1/4	0:20:00	413	9.1	36.0	26.0		Yes
1/5	0:25:00	584	9.6	36.0	26.0		Yes
1/6	0:30:00	1066	8.2	35.0	26.0		Yes
1/7	0:35:00	1238	8.4	35.0	25.0		Yes
1/8	0:40:00	1358	9.1	35.0	25.0		Yes
1/9	0:45:00	1455	7.9	35.0	24.0		Yes
1/10	0:50:00	1539	9.5	34.0	24.0		Yes
2/1	0:55:00	111	11.0	34.0	24.0		Yes
2/2	1:00:00	195	12.3	34.0	23.0		Yes
2/3	1:05:00	292	10.9	34.0	23.0		Yes
2/4	1:10:00	413	10.1	33.0	22.0		Yes
2/5	1:15:00	584	10.7	33.0	22.0		Yes
2/6	1:20:00	1066	9.2	31.0	21.0		Yes
2/7	1:25:00	1238	9.4	29.0	21.0		Yes
2/8	1:30:00	1358	9.7	27.0	20.0		Yes
2/9	1:35:00	1455	9.5	27.0	20.0		Yes
2/10	1:40:00	1539	9.3	27.0	20.0		Yes
Averages				33.3	23.7	no result	

Meter Finish: 35.3883 Time Finish: 11:35
Total Condensate collected: 14 ml Silica gel No(s) used: Z8

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 1-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Cyanide

Time :	12:05	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.177	67.0	340.2	15.6
1/2	165	0.167	68.0	341.2	15.2
1/3	262	0.175	68.0	341.2	15.5
1/4	383	0.133	68.0	341.2	13.6
1/5	554	0.135	68.0	341.2	13.7
1/6	1036	0.152	68.0	341.2	14.5
1/7	1208	0.126	68.0	341.2	13.2
1/8	1328	0.143	68.0	341.2	14.1
1/9	1425	0.128	68.0	341.2	13.3
1/10	1509	0.131	67.0	340.2	13.4
2/1	81	0.208	66.0	339.2	16.9
2/2	165	0.202	67.0	340.2	16.7
2/3	262	0.223	67.0	340.2	17.5
2/4	383	0.195	68.0	341.2	16.4
2/5	554	0.175	68.0	341.2	15.5
2/6	1036	0.169	68.0	341.2	15.3
2/7	1208	0.140	68.0	341.2	13.9
2/8	1328	0.121	68.0	341.2	12.9
2/9	1425	0.122	68.0	341.2	13.0
2/10	1509	0.137	67.0	340.2	13.7
Average			67.7	340.9	14.7

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 10 mm
Absolute pressure in stack (hPa) : 1016.98 hPa

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Cyanide

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 1-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.9925	m^3	Average barometric pressure (P_{BARO})	1016 hPa
Average gas meter temp. ($T_{M,2}$):	28.5	°C		
	301.7	K	Average pressure at meter ($P_{M,2}$)	1016.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9012	m^3		

(B) Cyanide concentration at standard conditions

Blank thimble No.: NA Blank weight: g

Thimble No. used: NA Cyanide Weight 0.00027 g

Final Cyanide Weight (Mp1): 0.00027 g

Cyanide Concentration (C1): $=M_{p1}/MV_4=$ 0.0003 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.3 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.024 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 24 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.012 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 12 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z8

V_v = 6.7 g (from laboratory report) V_w = 14 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0187

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0089

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.97 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Cyanide

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.27 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)} \times \frac{(Ps)}{(1013.25)}$

= 1.038 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.31 m/s

(ii) Average of post-sampling velocities: 14.70 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.50 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.00 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.6 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0074	g/s (0°C, dry gas, 1 atm pressure)		
	=	7.4	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.59	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	590	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.3	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	300	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 1
WESTON ALUMINIUM
1-May-13
CYANIDE

Sampling Conditions:			
Stack internal diameter at test location	1650	mm	
Stack gas temperature (average)	62.3	°C	335.5 K
Stack pressure (average)	1017	hPa	
Stack gas velocity (average, stack conditions)	15	m/s	
Stack gas flowrate (stack conditions)	31	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s	
Cyanide Testing			
Test Period	9:50	-	11:35
Cyanide Mass	0.27	mg	
Gas Volume Sampled	0.901	m^3	
Cyanide Emission*1	0.3	mg/m^3	
Cyanide Mass Emission Rate*2	7.4	mg/s	
Regulatory Limit	0.5	mg/m^3	
Moisture Content (%)	3.0		
Gas Density (dry at 1 atmosphere)	1.29	kg/m^3	
Dry Molecular Weight	28.9	g/g-mole	

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 1

Date Sampled: 30-Apr-13

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15

Observations made during testing period:

Sampling Performed By:

Nic Baldwin

Colin Clarke

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate

Measurement/Observations				
Stack Internal Dimensions: Diameter 1650 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 2.14 m^2 Minimum No. of sampling points= 16	
Distance from sampling plane to nearest disturbances: Upstream (m) = 4 No. Diameters = 2.4 Type of Upstream Disturbance: Fan Downstream (m) = 6 No. Diameters = 3.6 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 20 PM2.5/10= 12 No. of sampling traverses/ports sampled = 2 PM2.5/10= 2 No. of sampling points on each traverse/port = 10 PM2.5/10= 6	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	111	81	73	43
2	195	165	241	211
3	292	262	488	458
4	413	383	1162	1132
5	584	554	1409	1379
6	1066	1036	1577	1547
7	1238	1208		
8	1358	1328		
9	1455	1425		
10	1539	1509	Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate

Sampling time start: 9:28		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	9:28	9	19.5	0.8
2	9:29	9	19.5	0.8
3	9:30	9	19.5	0.8
4	9:31	9	19.5	0.8
5	9:32	9	19.5	0.8
6	9:33	9	19.5	0.8
7	9:34	9	19.5	0.8
8	9:35	9	19.5	0.8
	Averages:	9.0 ppm	19.5 %	0.8 %

Moisture content (M3): 0.97
Moisture percentage (M2): 3.30 %

Measurements

CO:	0.0009 %,(dry)	N_2:	79.7 %,(dry)
CO_2:	0.8 %,(dry)	O_2:	19.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0009 %,(wet)	N_2:	77.1 %,(wet)
CO_2:	0.8 %,(wet)	O_2:	18.9 %,(wet)
H_2O:	3.30 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate

Sampling time start: 12:08		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:08	2	20.7	0.1
2	12:09	2	20.7	0.1
3	12:10	2	20.7	0.1
4	12:11	2	20.7	0.1
5	12:12	2	20.7	0.1
6	12:13	2	20.7	0.1
7	12:14	2	20.7	0.1
8	12:15	2	20.7	0.1
	Averages:	2.0 ppm	20.7 %	0.1 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.39 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.2 %,(dry)
CO_2:	0.1 %,(dry)	O_2:	20.7 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	77.3 %,(wet)
CO_2:	0.1 %,(wet)	O_2:	20.2 %,(wet)
H_2O:	2.39 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1

Test 2:Total Particulate

Time :	9:15	Barometric Pressure :		1022	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.169	72.0	345.2	15.3
1/2	165	0.174	72.0	345.2	15.5
1/3	262	0.174	72.0	345.2	15.5
1/4	383	0.142	72.0	345.2	14.1
1/5	554	0.162	72.0	345.2	15.0
1/6	1036	0.121	72.0	345.2	12.9
1/7	1208	0.129	72.0	345.2	13.4
1/8	1328	0.135	71.0	344.2	13.7
1/9	1425	0.131	71.0	344.2	13.5
1/10	1509	0.127	71.0	344.2	13.2
2/1	81	0.137	69.0	342.2	13.7
2/2	165	0.196	69.0	342.2	16.4
2/3	262	0.169	69.0	342.2	15.2
2/4	383	0.146	69.0	342.2	14.2
2/5	554	0.157	69.0	342.2	14.7
2/6	1036	0.131	69.0	342.2	13.4
2/7	1208	0.138	69.0	342.2	13.8
2/8	1328	0.143	68.0	341.2	14.0
2/9	1425	0.169	68.0	341.2	15.2
2/10	1509	0.177	68.0	341.2	15.6
Average			70.2	343.4	14.4

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9.8 mm
Absolute pressure in stack (hPa) : 1021.04 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: Fine5 Sample Nozzle Area (An): 1.9 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: N2
Page No: 1 of 1 Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 20.3770 Meter finish: 20.3770
Time start: 10:09 Time finish: 10:10

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 21.6842 Meter finish: 21.6842
Time start: 12:10 Time finish: 12:11

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1022 hPa (start); 1020 hPa (finish)
Meter start: 20.3786 Time start: 10:20
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:08:45	73	13.0	30.0	23.0		Yes
1/2	0:09:00	241	13.0	31.0	23.0		Yes
1/3	0:08:00	488	13.0	33.0	23.0		Yes
1/4	0:07:45	1162	13.0	36.0	25.0		Yes
1/5	0:07:45	1409	13.0	36.0	25.0		Yes
1/6	0:07:30	1577	13.0	36.0	26.0		Yes
2/1	0:08:00	73	13.0	37.0	26.0		Yes
2/2	0:09:15	241	13.0	37.0	26.0		Yes
2/3	0:08:15	488	13.0	38.0	27.0		Yes
2/4	0:08:00	1162	13.0	38.0	27.0		Yes
2/5	0:09:00	1409	13.0	38.0	27.0		Yes
2/6	0:09:00	1577	13.0	39.0	27.0		Yes
Averages				35.8	25.4	no result	

Meter Finish: 21.6831 Time Finish: 12:06
Total Condensate collected: 6 ml Silica gel No(s) used: F28

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL PARTICULATE

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: S16 Sample Nozzle Area (An): 1.41 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: T17
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 33.3384 Meter finish: 33.3384
Time start: 10:10 Time finish: 10:11

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 34.3964 Meter finish: 34.3964
Time start: 12:11 Time finish: 12:12

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1022 hPa (start); 1020 hPa (finish)
Meter start: 33.3394 Time start: 10:20
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	11.1	30.0	23.0		Yes
1/2	0:10:00	195	11.2	32.0	23.0		Yes
1/3	0:15:00	292	11.2	33.0	23.0		Yes
1/4	0:20:00	413	10.2	34.0	23.0		Yes
1/5	0:25:00	584	10.9	34.0	23.0		Yes
1/6	0:30:00	1066	9.3	36.0	24.0		Yes
1/7	0:35:00	1238	9.7	38.0	24.0		Yes
1/8	0:40:00	1358	10.0	38.0	25.0		Yes
1/9	0:45:00	1455	9.8	38.0	26.0		Yes
1/10	0:50:00	1539	9.6	38.0	26.0		Yes
2/1	0:55:00	111	10.0	38.0	27.0		Yes
2/2	1:00:00	195	12.0	39.0	27.0		Yes
2/3	1:05:00	292	11.1	39.0	27.0		Yes
2/4	1:10:00	413	10.4	40.0	28.0		Yes
2/5	1:15:00	584	10.7	40.0	28.0		Yes
2/6	1:20:00	1066	9.8	41.0	28.0		Yes
2/7	1:25:00	1238	10.1	41.0	29.0		Yes
2/8	1:30:00	1358	10.3	41.0	29.0		Yes
2/9	1:35:00	1455	11.1	42.0	30.0		Yes
2/10	1:40:00	1539	11.4	42.0	30.0		Yes
Averages				37.7	26.2	no result	

Meter Finish: 34.3959 Time Finish: 12:06
Total Condensate collected: 4 ml Silica gel No(s) used: Z11

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1

Test 2:Total Particulate

Time :	12:26	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.216	64.0	337.2	17.1
1/2	165	0.197	64.0	337.2	16.4
1/3	262	0.181	64.0	337.2	15.7
1/4	383	0.149	64.0	337.2	14.2
1/5	554	0.137	64.0	337.2	13.6
1/6	1036	0.152	64.0	337.2	14.4
1/7	1208	0.109	64.0	337.2	12.2
1/8	1328	0.142	64.0	337.2	13.9
1/9	1425	0.158	63.0	336.2	14.6
1/10	1509	0.136	63.0	336.2	13.6
2/1	81	0.127	64.0	337.2	13.1
2/2	165	0.181	64.0	337.2	15.7
2/3	262	0.196	64.0	337.2	16.3
2/4	383	0.191	64.0	337.2	16.1
2/5	554	0.179	64.0	337.2	15.6
2/6	1036	0.177	64.0	337.2	15.5
2/7	1208	0.141	64.0	337.2	13.8
2/8	1328	0.164	64.0	337.2	14.9
2/9	1425	0.123	62.0	335.2	12.9
2/10	1509	0.183	62.0	335.2	15.7
Average			63.7	336.9	14.8

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9 mm
Absolute pressure in stack (hPa) : 1019.12 hPa

STACK ANALYSIS - PM10 CALCULATIONS

AECOM

Date:	30-Apr-13	Client:	Weston
AECOM's Project No:	60287751	Stack/Duct Description:	Stack 1

1. Gas Analysis

	%		
$\%CO_2$	0.1		
$\%O_2$	20.7		
$\%N_2+\%CO$	79.7		
Fraction Moisture Content, Bws	0.02	M_3=	0.98

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.91
Mol. Wt. of Stack Gas (wet)	28.55

3. Absolute Stack Pressure

	Pascals	In. Hg
Barometric Pressure (Pbar)	102200	30.17
Stack Static Pressure (Pg)	101912	30.09
Absolute Stack Pressure		30.09

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	63.8	146.8
Average Meter Temperature:	30.6	
Stack Gas Viscosity		200.1

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.51	0.0181	18.09	0.30

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.138	82.45	27.14	0.753	1.232	62.09	20.37	101.60	33.33
2	0.161	60.38	19.87	0.723	1.251	43.65	14.32	75.53	24.78
3	0.164	58.36	19.21	0.719	1.254	41.94	13.76	73.16	24.00
4	0.200	38.98	12.83	0.638	1.295	24.88	8.16	50.50	16.57
5	0.194	41.72	13.73	0.657	1.287	27.40	8.99	53.69	17.61
6	0.220	32.44	10.68	0.570	1.324	18.50	6.07	42.93	14.09
7	0.239	27.41	9.02	0.464	1.356	13.71	4.50	37.17	12.20
8	0.264	22.50	7.41	#NUM!	1.404	11.25	3.69	31.59	10.36
9	0.292	18.39	6.05	#NUM!	1.466	9.20	3.02	26.97	8.85
10	0.341	13.50	4.44	#NUM!	1.595	6.75	2.21	20.25	6.64
11	0.389	10.35	3.41	#NUM!	1.745	5.17	1.70	15.52	5.09

Selected Nozzle	Nozzle Diameter (inches)	Nozzle Diameter (m)	Nozzle Area (m^2)	Sample Rate (L/min)
5	0.194	0.005	0.000019	13.8

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 30-Apr-13 Client: Westen
AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

7.Sampling Time Total Run Time 100 Number of points 12

Velocity Head (pitot) Pa	Vel Head in H20	Sqr Root	Dwell time mins
206.99	0.83	0.91	9.4
199.14	0.80	0.89	9.3
147.15	0.59	0.77	8.0
99.08	0.40	0.63	6.5
155.00	0.62	0.79	8.2
138.32	0.56	0.75	7.7
130.47	0.52	0.72	7.5
192.28	0.77	0.88	9.1
199.14	0.80	0.89	9.3
137.34	0.55	0.74	7.7
167.75	0.67	0.82	8.5
192.47	0.73	0.86	8.9
	Average	0.80	100.00
	Square	0.65	

Total time min	Full hours	Full minutes	Seconds
8.8	0	8	45
17.8	0	17	45
25.8	0	25	45
33.5	0	33	30
41.3	0	41	15
48.8	0	48	45
56.8	0	56	45
66.0	1	6	0
74.3	1	14	15
82.3	1	22	15
91.3	1	31	15
100.3	1	40	15

Aerodynamic Cut Size (u_{cyc})
200.9

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0140

Actual D_{50}
10.3

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.3115 m^3

Average gas meter temp. ($T_{M,2}$): 30.6 °C

303.8 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1884 m^3

(B) PM10 concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: N2

Blank weight: g

PM10 Weight <0.0002 g

Final PM10 Weight (Mp1): <0.0002 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ <0.00017 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.17 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.0045 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <4.5 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.0026 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <2.6 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: F28

V_v = 12.6 g (from laboratory report) V_w = 6 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0080

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0168

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.05 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.41 m/s

(ii) Average of post-sampling velocities: 14.78 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.59 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.20 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0042	g/s (0°C, dry gas, 1 atm pressure)		
	=	<4.2	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.11	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<110	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.065	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<65	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.0596 m^3

Average gas meter temp. ($T_{M,2}$): 31.9 °C

305.1 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.9561 m^3

(B) Total Particulate concentration at standard conditions

Blank thimble No.:

Blank weight: g

Thimble No. used: T17

Total Particulate Weight 0.0008 g

Final Total Particulate Weight (Mp1): 0.00080 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.00084 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.84 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.022 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 22 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.013 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 13 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z11

V_v = 16.1 g (from laboratory report) V_w = 4 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0053

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0215

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.73 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Total Particulate

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.027 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.42 m/s

(ii) Average of post-sampling velocities: 14.77 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.59 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.20 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.5 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.021	g/s (0°C, dry gas, 1 atm pressure)		
	=	21	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.55	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	550	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.32	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	320	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 1
WESTON
30-Apr-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE

Sampling Conditions:			
Stack internal diameter at test location	1650 mm		
Stack gas temperature (average)	67.0 °C		340.2 K
Stack pressure (average)	1020 hPa		
Stack gas velocity (average, stack conditions)	15 m/s		
Stack gas flowrate (stack conditions)	31 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	10:20	-	12:06
Fine Particulate (PM10) Mass	<0.2 mg		
Gas Volume Sampled	1.19 m^3		
Fine Particulate (PM10) Emission*1	<0.17 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	<4.2 mg/s		
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	10:20	-	12:06
Total Particulate Mass	0.8 mg		
Gas Volume Sampled	0.956 m^3		
Total Particulate Emission*1	0.84 mg/m^3		
Total Particulate Mass Emission Rate*2	21 mg/s		
Regulatory Limit	25 mg/m^3		
Moisture Content (%)	2.7		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.9 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 1

Date Sampled: 1-May-13

ANALYTE(S)	**METHOD**
Hazardous Substances (Metals)	NSW EPA TM - 12, 13 & 14
Polycyclic Aromatic Hydrocarbons	NSW EPA OM - 6
Hydrogen Chloride	NSW EPA TM - 7 & 8
Chlorine	NSW EPA TM - 7 & 8

Observations made during testing period:

Sampling Performed By:

James Lang

for Peter Waddingham

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Hydrogen Chloride
Test 4: Chlorine

Measurement/Observations	
Stack Internal Dimensions: Diameter 1650 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm	Cross Sectional Area 2.14 m^2 Minimum No. of sampling points= 16
Distance from sampling plane to nearest disturbances: Upstream (m) = 4 No. Diameters = 2.4 Type of Upstream Disturbance: Fan Downstream (m) = 6 No. Diameters = 3.6 Type of Down Stream Disturbance: Stack Exit	Total No. of sampling points = 20 PM2.5/10= NA No. of sampling traverses/ports sampled = 2 PM2.5/10= NA No. of sampling points on each traverse/port = 10 PM2.5/10= NA
Position of each sampling point, for each traverse:	Exclusion of any sample point numbers - comments:

No.	A Distance from wall	B S-type Pitot distances	PM10/2.5 A Distance from wall	PM2.5/10 B S-Type Pitot distances
1	111	81		
2	195	165		
3	292	262		
4	413	383		
5	584	554		
6	1066	1036		
7	1238	1208		
8	1358	1328		
9	1455	1425		
10	1539	1509		
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Hydrogen Chloride
Test 4: Chlorine

Sampling time start: 8:55		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	8:55	34	20.4	0.0
2	8:56	34	20.4	0.3
3	8:57	34	20.4	0.3
4	8:58	34	20.4	0.3
5	8:59	34	20.4	0.3
6	9:00	34	20.4	0.3
7	9:01	34	20.4	0.3
8	9:02	34	20.4	0.3
	Averages:	34.0 ppm	20.4 %	0.3 %

Moisture content (M3): 0.97
Moisture percentage (M2): 3.30 %

Measurements

CO:	0.0034 %,(dry)	N_2:	79.3 %,(dry)
CO_2:	0.3 %,(dry)	O_2:	20.4 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0033 %,(wet)	N_2:	76.7 %,(wet)
CO_2:	0.3 %,(wet)	O_2:	19.7 %,(wet)
H_2O:	3.30 %(=M2)		
Therefore, stack gas density (GD) =	1.27 kg/m^3	($0^{\circ}C$, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	($0^{\circ}C$, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Hydrogen Chloride
Test 4: Chlorine

Sampling time start: 12:04		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:04	14	20.9	0.0
2	12:05	14	20.9	0.0
3	12:06	14	20.9	0.0
4	12:07	14	20.9	0.0
5	12:08	14	20.9	0.0
6	12:09	14	20.9	0.0
7	12:10	14	20.9	0.0
8	12:11	14	20.9	0.0
	Averages:	14.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.18 %

Measurements

CO:	0.0014 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0014 %,(wet)	N_2:	77.4 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	2.18 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Hazardous Substances (Metals)
Test 2:Polycyclic Aromatic Hydrocarbons
Test 3:Hydrogen Chloride
Test 4:Chlorine

Time :	8:43	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.198	55.0	328.2	16.2
1/2	165	0.201	55.0	328.2	16.3
1/3	262	0.176	55.0	328.2	15.3
1/4	383	0.130	56.0	329.2	13.2
1/5	554	0.144	56.0	329.2	13.9
1/6	1036	0.104	56.0	329.2	11.8
1/7	1208	0.111	56.0	329.2	12.1
1/8	1328	0.131	56.0	329.2	13.2
1/9	1425	0.099	56.0	329.2	11.5
1/10	1509	0.141	55.0	328.2	13.7
2/1	81	0.190	55.0	328.2	15.9
2/2	165	0.239	57.0	330.2	17.9
2/3	262	0.186	58.0	331.2	15.8
2/4	383	0.164	59.0	332.2	14.8
2/5	554	0.181	59.0	332.2	15.6
2/6	1036	0.135	59.0	332.2	13.5
2/7	1208	0.142	59.0	332.2	13.8
2/8	1328	0.148	59.0	332.2	14.1
2/9	1425	0.143	59.0	332.2	13.9
2/10	1509	0.137	59.0	332.2	13.6
Average			57.0	330.2	14.3

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 7 mm
Absolute pressure in stack (hPa) : 1016.69 hPa

AECOM

STACK ANALYSIS

SAMPLING OF HAZARDDUS SUBSTANCES (METALS)

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: G4.5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 21.8419 Meter finish: 24.8419
Time start: 9:30 Time finish: 9:31

Therefore, leakage rate = 3000 L/min

(>0.1 l/min. is unacceptable)
Unacceptable
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 23.0653 Meter finish: 23.0653
Time start: 11:42 Time finish: 11:43

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 21.8462 Time start: 9:50
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	14.3	30.0	20.0		Yes
1/2	0:10:00	195	14.4	31.0	21.0		Yes
1/3	0:15:00	292	13.5	31.0	21.0		Yes
1/4	0:20:00	413	11.6	31.0	22.0		Yes
1/5	0:25:00	584	12.3	32.0	22.0		Yes
1/6	0:30:00	1066	10.4	33.0	23.0		Yes
1/7	0:35:00	1238	10.7	34.0	23.0		Yes
1/8	0:40:00	1358	11.6	34.0	23.0		Yes
1/9	0:45:00	1455	10.1	35.0	23.0		Yes
1/10	0:50:00	1539	12.1	35.0	23.0		Yes
2/1	0:55:00	111	14.1	35.0			Yes
2/2	1:00:00	195	15.7	35.0	24.0		Yes
2/3	1:05:00	292	13.9	35.0	24.0		Yes
2/4	1:10:00	413	12.9	36.0	24.0		Yes
2/5	1:15:00	584	13.6	36.0	25.0		Yes
2/6	1:20:00	1066	11.8	37.0	25.0		Yes
2/7	1:25:00	1238	12.1	37.0	25.0		Yes
2/8	1:30:00	1358	12.3	37.0	25.0		Yes
2/9	1:35:00	1455	12.2	37.0	25.0		Yes
2/10	1:40:00	1539	11.9	37.0	25.0		Yes
Averages				34.4	23.3	no result	

Meter Finish: 23.0648 Time Finish: 11:35
Total Condensate collected: 7 ml Silica gel No(s) used: P1

AECOM

STACK ANALYSIS

SAMPLING OF POLYCYCLIC AROMATIC HYDROCARBONS

Date: 1-May-13
Client: Weston
AECDM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: G56
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 2.03 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 16.6001 Meter finish: 16.6001
Time start: 9:34 Time finish: 9:35

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 18.1104 Meter finish: 18.1104
Time start: 11:44 Time finish: 11:45

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 16.6128 Time start: 9:50
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	17.7	24.0	20.0		Yes
1/2	0:10:00	195	17.8	24.0	20.0		Yes
1/3	0:15:00	292	16.7	24.0	20.0		Yes
1/4	0:20:00	413	14.4	24.0	20.0		Yes
1/5	0:25:00	584	15.2	24.0	20.0		Yes
1/6	0:30:00	1066	12.9	25.0	21.0		Yes
1/7	0:35:00	1238	13.2	25.0	21.0		Yes
1/8	0:40:00	1358	14.4	26.0	21.0		Yes
1/9	0:45:00	1455	12.5	26.0	21.0		Yes
1/10	0:50:00	1539	15.0	26.0	21.0		Yes
2/1	0:55:00	111	17.4	27.0	22.0		Yes
2/2	1:00:00	195	19.5	27.0	22.0		Yes
2/3	1:05:00	292	17.1	27.0	22.0		Yes
2/4	1:10:00	413	16.0	27.0	22.0		Yes
2/5	1:15:00	584	16.9	27.0	23.0		Yes
2/6	1:20:00	1066	14.6	27.0	23.0		Yes
2/7	1:25:00	1238	14.9	28.0	24.0		Yes
2/8	1:30:00	1358	15.2	28.0	24.0		Yes
2/9	1:35:00	1455	15.0	28.0	24.0		Yes
2/10	1:40:00	1539	14.7	28.0	24.0		Yes
Averages				26.1	21.8	no result	

Meter Finish: 18.1100 Time Finish: 11:35
Total Condensate collected: 6 ml Silica gel No(s) used: P26

AECOM

STACK ANALYSIS

SAMPLING OF HYDROGEN CHLORIDE AND CHLORINE

Date: 1-May-13
Client: Weston
AECDM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: G54 Sample Nozzle Area (An): 1.28 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: 0
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 15.8422 Meter finish: 15.8422
Time start: 9:37 Time finish: 9:38

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 16.8822 Meter finish: 16.8822
Time start: 11:46 Time finish: 11:47

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 15.8437 Time start: 9:50
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	11.2	27.0	24.0		Yes
1/2	0:10:00	195	11.3	27.0	24.0		Yes
1/3	0:15:00	292	10.6	27.0	24.0		Yes
1/4	0:20:00	413	9.1	27.0	23.0		Yes
1/5	0:25:00	584	9.6	26.0	23.0		Yes
1/6	0:30:00	1066	8.1	26.0	22.0		Yes
1/7	0:35:00	1238	8.3	26.0	22.0		Yes
1/8	0:40:00	1358	9.1	25.0	22.0		Yes
1/9	0:45:00	1455	7.9	25.0	21.0		Yes
1/10	0:50:00	1539	9.5				Yes
				25.0	20.0		
2/1	0:55:00	111	11.0	25.0	20.0		Yes
2/2	1:00:00	195	12.3	25.0	20.0		Yes
2/3	1:05:00	292	10.8	24.0	20.0		Yes
2/4	1:10:00	413	10.1	24.0	20.0		Yes
2/5	1:15:00	584	10.7	23.0	20.0		Yes
2/6	1:20:00	1066	9.2	22.0	20.0		Yes
2/7	1:25:00	1238	9.4	22.0	20.0		Yes
2/8	1:30:00	1358	9.6	22.0	20.0		Yes
2/9	1:35:00	1455	9.5	22.0	20.0		Yes
2/10	1:40:00	1539	9.3	21.0	20.0		Yes
Averages				24.6	21.3	no result	

Meter Finish: 16.8818 Time Finish: 11:35
Total Condensate collected: 8 ml Silica gel No(s) used: Z19

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Hazardous Substances (Metals)
Test 2:Polycyclic Aromatic Hydrocarbons
Test 3:Hydrogen Chloride
Test 4:Chlorine

Time :	12:05	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.177	67.0	340.2	15.6
1/2	165	0.167	68.0	341.2	15.1
1/3	262	0.175	68.0	341.2	15.5
1/4	383	0.133	68.0	341.2	13.5
1/5	554	0.135	68.0	341.2	13.6
1/6	1036	0.152	68.0	341.2	14.5
1/7	1208	0.126	68.0	341.2	13.1
1/8	1328	0.143	68.0	341.2	14.0
1/9	1425	0.128	68.0	341.2	13.2
1/10	1509	0.131	67.0	340.2	13.4
2/1	81	0.208	66.0	339.2	16.9
2/2	165	0.202	67.0	340.2	16.6
2/3	262	0.223	67.0	340.2	17.5
2/4	383	0.195	68.0	341.2	16.4
2/5	554	0.175	68.0	341.2	15.5
2/6	1036	0.169	68.0	341.2	15.2
2/7	1208	0.140	68.0	341.2	13.9
2/8	1328	0.121	68.0	341.2	12.9
2/9	1425	0.122	68.0	341.2	12.9
2/10	1509	0.137	67.0	340.2	13.7
Average			67.7	340.9	14.7

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 10 mm
Absolute pressure in stack (hPa) : 1016.98 hPa

AECOM

Stack Analysis - Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results

Date: 1-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	3900	3.9	0.0039	2.8	0.0028	70	0.07
2 - Methylnapthalene	870	0.87	0.00087	0.63	0.00063	16	0.016
Acenaphthylene	99	0.099	0.000099	0.072	0.000072	1.8	0.0018
Acenaphthene	870	0.87	0.00087	0.63	0.00063	16	0.016
Fluorene	1300	1.3	0.0013	0.94	0.00094	23	0.023
Phenanthrene	1100	1.1	0.0011	0.8	0.0008	20	0.02
Anthracene	<20	<0.02	<0.00002	0.015	<0.000015	<0.36	<0.00036
Fluoranthene	65	0.065	0.000065	0.047	0.000047	1.2	0.0012
Pyrene	25	0.025	0.000025	0.018	0.000018	0.45	0.00045
Benz(a)anthracene	<40	<0.04	<0.00004	0.029	<0.000029	<0.72	<0.00072
Chrysene	33	0.033	0.000033	0.024	0.000024	0.59	0.00059
Benzo(b)fluoranthene	28	0.028	0.000028	0.02	0.00002	0.5	0.0005
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.015	<0.000015	<0.36	<0.00036
Benzo(e)pyrene	<260	<0.26	<0.00026	0.19	<0.00019	<4.7	<0.0047
Benzo(a)pyrene	<300	<0.3	<0.0003	0.22	<0.00022	<5.4	<0.0054
Perylene	<340	<0.34	<0.00034	0.25	<0.00025	<6.1	<0.0061
Indeno(123:cd)pyrene	32	0.032	0.000032	0.023	0.000023	0.58	0.00058
Dibenzo(ah)anthracene	50	0.05	0.00005	0.036	0.000036	0.9	0.0009
Benzo(ghi)perylene	<25	<0.025	<0.000025	0.018	<0.000018	<0.45	<0.00045
Sum of reported PAH's	8400	8.4	0.0084	6.8	0.006	150	0.15

AECOM

Stack Analysis - Hazardous Substances Elemental Analysis Results

Date: 1-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

	Particulate Metals Results	Gaseous Metals Results	Oixdisable Mercury Results		
Metal	Front Half, Filter, Acetone Rinses and Acid Rinses (mg). **Containers 1, 2 and 3**	Back Half, Impingers + Acid Rinses (mg) **Container 4**	KO Impinger + Acid Rinses (mg) **(5A)**	$KMnO_4$/ H_2SO_4 + Rinses (mg) **(5B)**	Residue Rinse 8N HCl (mg) (If Required) **(5C)**
Antimony	<0.0005	<0.0005			
Arsenic	<0.00009	<0.0005			
Beryllium	<0.0005	<0.0005			
Cadmium	0.0014	0.0022			
Chromium	0.0014	0.0029			
Cobalt	<0.0001	<0.0005			
Copper	0.0035	0.0021			
Lead	0.034	0.0027			
Magnesium	0.056	0.019			
Manganese	0.021	0.017			
Mercury	0.00002	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	0.002	0.0026			
Selenium	0.0013	0.00054			
Thallium	<0.0005	<0.0005			
Tin	<0.00023	<0.0005			
Vanadium	<0.0003	<0.0005			
Zinc	0.64	0.017			

Note: Where the blank has returned a less than value, half of this value was subtracted from the sample result as a blank correction ie for a blank value of <0.0005, 0.00025 was subtracted from the sample result.

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

Stack Analysis - Hazardous Substances Elemental Analysis Results Continued

Date: 1-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

Sample	Total Particulate Metals (mg)	Total Particulate Metals (mg/m^3)	Total Gaseous Metals (mg)	Total Gaseous Metals (mg/m^3)	Total Oxidisable Mercury (mg)	Total Oxidisable Mercury (mg/m^3)	Total (mg)	Total (mg/m^3)	Mass Emission Rate (mg/s)
Antimony	<0.0005	<0.00045	<0.0005	<0.00045			<0.002	<0.0018	<0.044
Arsenic	<0.00009	<0.000081	<0.0005	<0.00045			<0.0015	<0.0014	<0.035
Beryllium	<0.0005	<0.00045	<0.0005	<0.00045			<0.000015	<0.000014	<0.00035
Cadmium	0.0014	0.0013	0.0022	0.002			0.004	0.0036	0.089
Chromium	0.0014	0.0013	0.0029	0.0026			0.004	0.0036	0.089
Cobalt	<0.0001	<0.00009	<0.0005	<0.00045			<0.00015	<0.00014	<0.0035
Copper	0.0035	0.0032	0.0021	0.0019			0.006	0.0054	0.13
Lead	0.034	0.031	0.0027	0.0024			0.04	0.036	0.89
Magnesium	0.056	0.05	0.019	0.017			0.08	0.072	1.8
Manganese	0.021	0.019	0.017	0.015			0.04	0.036	0.89
Mercury	0.00002	0.000018	<0.0005	<0.00045	<0.0005	<0.00045	0.00002	0.000018	0.00044
Nickel	0.002	0.0018	0.0026	0.0023			0.005	0.0045	0.11
Selenium	0.0013	0.0012	0.00054	0.00049			0.002	0.0018	0.044
Thallium	<0.0005	<0.00045	<0.0005	<0.00045			<0.004	<0.0036	<0.089
Tin	<0.00023	<0.00021	<0.0005	<0.00045			<0.001	<0.0009	<0.022
Vanadium	<0.0003	<0.00027	<0.0005	<0.00045			<0.0002	<0.00018	<0.0044
Zinc	0.64	0.58	0.017	0.015			0.7	0.63	16
Total Hazardous Metals*	0.061	0.056	0.028	0.025	<0.00025	<0.00045	0.095	0.086	2.1
Total Metals	0.76	0.69	0.066	0.059			0.88	0.79	20

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Hazardous Substances (Metals)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 1-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.2252 m^3

Average gas meter temp. ($T_{M,2}$): 28.9 °C

302.1 K

Average barometric pressure (P_{BARO}) 1016 hPa

Average pressure at meter ($P_{M,2}$) 1016.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1110 m^3

(B) Metals concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: 0

Blank weight: g

Metals Weight 0.000095 g

Final Metals Weight (Mp1): 0.00010 g

Metals Concentration (C1): $=M_{p1}/MV_4=$ 0.000086 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.086 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.0079 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 7.9 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0034 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 3.4 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P1

V_v = 13.9 g (from laboratory report) V_w = 7 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0093

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0186

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.45 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Hazardous Substances (Metals)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.27 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.038 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.31 m/s

(ii) Average of post-sampling velocities: 14.65 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.48 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.96 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0021	g/s (0°C, dry gas, 1 atm pressure)		
	=	2.1	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.19	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	190	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.085	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	85	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Polycyclic Aromatic Hydrocarbons

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 1-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.4947	m^3	Average barometric pressure (P_{BARO})	1016 hPa
Average gas meter temp. ($T_{M,2}$):	23.9	°C		
	297.1	K	Average pressure at meter ($P_{M,2}$)	1016.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.3782	m^3		

(B) PAH concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 PAH Weight 0.0000084 g

Final PAH Weight (Mp1): 0.00001 g

PAH Concentration (C1): $=M_{p1}/MV_4=$ 0.0000061 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.0061 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00056 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.56 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.00024 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.24 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P26

V_v = 12.9 g (from laboratory report) V_w = 6 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0080

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0172

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.80 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Polycyclic Aromatic Hydrocarbons

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.27 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.030 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.31 m/s

(ii) Average of post-sampling velocities: 14.65 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.48 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.96 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.00015	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.15	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.014	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	14	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.0061	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	6.1	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Hydrogen Chloride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 1-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.0397 m^3	Average barometric pressure (P_{BARO})	1016 hPa	
Average gas meter temp. ($T_{M,2}$):	22.9 °C			
	296.1 K	Average pressure at meter ($P_{M,2}$)	1016.00 hPa	
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9619 m^3			

(B) Hydrogen Chloride concentration at standard conditions

Blank thimble No.:		Blank weight:	g
Thimble No. used:	0	Hydrogen Chloride Weight	<0.002 g
Final Hydrogen Chloride Weight (Mp1):	<0.002 g		
Hydrogen Chloride Concentration (C1):	$=M_{p1}/MV_4=$	<0.0021	g/m^3 (0°C, dry gas, 1atm pressure)
	;and C_2 =	<2.1	mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.19 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <190 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.084 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <84 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z19

V_v = 8.9 g (from laboratory report) V_w = 8 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0107

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0119

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.29 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Hydrogen Chloride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.27 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.030 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.31 m/s

(ii) Average of post-sampling velocities: 14.65 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.48 m/s (stack conditions, wet)
(**Note:** (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.96 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.052	g/s (0°C, dry gas, 1 atm pressure)		
	=	<52	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<4.7	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<4700	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<2.1	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<2100	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Chlorine

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 1-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.0397	m^3	Average barometric pressure (P_{BARO})	1016 hPa
Average gas meter temp. ($T_{M,2}$):	22.9	°C		
	296.1	K	Average pressure at meter ($P_{M,2}$)	1016.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9619	m^3		

(B) Chlorine concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Chlorine Weight <0.002 g

Final Chlorine Weight (Mp1): <0.002 g

Chlorine Concentration (C1): $=M_{p1}/MV_4=$ <0.0021 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <2.1 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.19 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <190 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.084 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <84 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z19

V_v = 8.9 g (from laboratory report) V_w = 8 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0107

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0119

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.29 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Chlorine

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.27 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.030 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.31 m/s

(ii) Average of post-sampling velocities: 14.65 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.48 m/s (stack conditions, wet)
(**Note:** (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.96 m^3/s (stack conditions)

Qstd = Qstack x $\frac{Ps}{(Pstd)}$ x $\frac{(Tstd)}{(Ts)}$ x $\frac{(100 - B_w)}{100}$

Qstd = 24.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.052	g/s (0°C, dry gas, 1 atm pressure)		
	=	<52	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<4.7	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<4700	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<2.1	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<2100	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 1
WESTON
1-May-13
HAZARDOUS SUBSTANCES (METALS)
POLYCYCLIC AROMATIC HYDROCARBONS
HYDROGEN CHLORIDE
CHLORINE

Sampling Conditions:			
Stack internal diameter at test location	1650 mm		
Stack gas temperature (average)	62.3 °C		335.5 K
Stack pressure (average)	1017 hPa		
Stack gas velocity (average, stack conditions)	14 m/s		
Stack gas flowrate (stack conditions)	31 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25 m^3/s		
Hazardous Substances (Metals) Testing			
Test Period	9:50	-	11:35
Hazardous Substances (Metals) Mass	0.095 mg		
Gas Volume Sampled	1.11 m^3		
Hazardous Substances (Metals) Emission*1	0.086 mg/m^3		
Hazardous Substances (Metals) Mass Emission Rate*2	2.1 mg/s		
Regulatory Limit	10 mg/m^3		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	9:50	-	11:35
Polycyclic Aromatic Hydrocarbons Mass	0.0084 mg		
Gas Volume Sampled	1.38 m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.0061 mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	0.15 mg/s		
Regulatory Limit	NA		
Hydrogen Chloride Testing			
Test Period	9:50	-	11:35
Hydrogen Chloride Mass	<2 mg		
Gas Volume Sampled	0.962 m^3		
Hydrogen Chloride Emission*1	<2.1 mg/m^3		
Hydrogen Chloride Mass Emission Rate*2	<52 mg/s		
Regulatory Limit	400 mg/m^3		
Chlorine Testing			
Test Period	9:50	-	11:35
Chlorine Mass	<2 mg		
Gas Volume Sampled	0.962 m^3		
Chlorine Emission*1	<2.1 mg/m^3		
Chlorine Mass Emission Rate*2	<52 mg/s		
Regulatory Limit	NA		
Moisture Content (%)	2.2		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.9 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 1

Date Sampled: 30-Apr-13

ANALYTE(S)	METHOD
Particulate Fluoride	NSW EPA TM - 9
Gaseous Fluoride	NSW EPA TM - 9
Sulfuric Acid Mist	NSW EPA TM - 3
Sulfur Dioxide	NSW EPA TM - 4

Observations made during testing period:

Sampling Performed By:

Nic Baldwin

Colin Clarke

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Particulate Fluoride
Test 2: Gaseous Fluoride
Test 3: Sulfuric Acid Mist (H2SO4 as SO3)
Test 4: Sulfur Dioxide (SO2 as SO3)

Measurement/Observations

Stack Internal Dimensions:

Diameter 1650 mm
OR Length Width
Length/Width (mm)
Equivalent Diameter N/A mm

Cross Sectional Area 2.14 m^2

Minimum No. of sampling points= 16

Distance from sampling plane to nearest disturbances:

Upstream (m) = 4
No. Diameters = 2.4
Type of Upstream Disturbance: Fan
Downstream (m) = 6
No. Diameters = 3.6
Type of Down Stream Disturbance: Stack Exit

Total No. of sampling points = 20
PM2.5/10= NA
No. of sampling traverses/ports sampled = 2
PM2.5/10= NA
No. of sampling points on each traverse/port = 10
PM2.5/10= NA

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	111	81		
2	195	165		
3	292	262		
4	413	383		
5	584	554		
6	1066	1036		
7	1238	1208		
8	1358	1328		
9	1455	1425		
10	1539	1509		
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Particulate Fluoride
Test 2: Gaseous Fluoride
Test 3: Sulfuric Acid Mist (H2SO4 as SO3)
Test 4: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 9:28		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	9:28	9	19.5	0.8
2	9:29	9	19.5	0.8
3	9:30	9	19.5	0.8
4	9:31	9	19.5	0.8
5	9:32	9	19.5	0.8
6	9:33	9	19.5	0.8
7	9:34	9	19.5	0.8
8	9:35	9	19.5	0.8
	Averages:	9.0 ppm	19.5 %	0.8 %

Moisture content (M3): 0.97
Moisture percentage (M2): 3.30 %

Measurements

CO:	0.0009 %,(dry)	N_2:	79.7 %,(dry)
CO_2:	0.8 %,(dry)	O_2:	19.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0009 %,(wet)	N_2:	77.1 %,(wet)
CO_2:	0.8 %,(wet)	O_2:	18.9 %,(wet)
H_2O:	3.30 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1: Particulate Fluoride
Test 2: Gaseous Fluoride
Test 3: Sulfuric Acid Mist (H2SO4 as SO3)
Test 4: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 12:08		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:08	2	20.7	0.1
2	12:09	2	20.7	0.1
3	12:10	2	20.7	0.1
4	12:11	2	20.7	0.1
5	12:12	2	20.7	0.1
6	12:13	2	20.7	0.1
7	12:14	2	20.7	0.1
8	12:15	2	20.7	0.1
	Averages:	2.0 ppm	20.7 %	0.1 %

Moisture content (M3): 0.96
Moisture percentage (M2): 4.03 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.2 %,(dry)
CO_2:	0.1 %,(dry)	O_2:	20.7 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	76.0 %,(wet)
CO_2:	0.1 %,(wet)	O_2:	19.9 %,(wet)
H_2O:	4.03 %(=M2)		

Therefore, stack gas density (GD) =	1.27 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Particulate Fluoride
Test 2:Gaseous Fluoride
Test 3:Sulfuric Acid Mist (H2SO4 as SO3)
Test 4:Sulfur Dioxide (SO2 as SO3)

Time :	9:15	Barometric Pressure :		1022	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.169	72.0	345.2	15.3
1/2	165	0.174	72.0	345.2	15.5
1/3	262	0.174	72.0	345.2	15.5
1/4	383	0.142	72.0	345.2	14.1
1/5	554	0.162	72.0	345.2	15.0
1/6	1036	0.121	72.0	345.2	12.9
1/7	1208	0.129	72.0	345.2	13.4
1/8	1328	0.135	71.0	344.2	13.7
1/9	1425	0.131	71.0	344.2	13.5
1/10	1509	0.127	71.0	344.2	13.2
2/1	81	0.137	69.0	342.2	13.7
2/2	165	0.196	69.0	342.2	16.4
2/3	262	0.169	69.0	342.2	15.2
2/4	383	0.146	69.0	342.2	14.2
2/5	554	0.157	69.0	342.2	14.7
2/6	1036	0.131	69.0	342.2	13.4
2/7	1208	0.138	69.0	342.2	13.8
2/8	1328	0.143	68.0	341.2	14.0
2/9	1425	0.169	68.0	341.2	15.2
2/10	1509	0.177	68.0	341.2	15.6
Average			70.2	343.4	14.4

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9.8 mm
Absolute pressure in stack (hPa) : 1021.04 hPa

AECOM

STACK ANALYSIS

SAMPLING OF PARTICULATE FLUORIDE

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: Old26
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.58 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 15.3978 Meter finish: 15.3978
Time start: 10:11 Time finish: 10:12

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 16.5974 Meter finish: 16.5974
Time start: 12:12 Time finish: 12:13

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1022 hPa (start); 1020 hPa (finish)
Meter start: 15.3984 Time start: 10:20
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	12.4	24.0	20.0		Yes
1/2	0:10:00	195	12.5	24.0	20.0		Yes
1/3	0:15:00	292	12.5	25.0	20.0		Yes
1/4	0:20:00	413	11.4	26.0	20.0		Yes
1/5	0:25:00	584	12.1	26.0	20.0		Yes
1/6	0:30:00	1066	10.4	27.0	21.0		Yes
1/7	0:35:00	1238	10.8	28.0	23.0		Yes
1/8	0:40:00	1358	11.1	29.0	23.0		Yes
1/9	0:45:00	1455	10.9	29.0	23.0		Yes
1/10	0:50:00	1539	10.7	29.0	23.0		Yes
2/1	0:55:00	111	11.2	29.0	24.0		Yes
2/2	1:00:00	195	13.4	29.0	24.0		Yes
2/3	1:05:00	292	12.4	30.0	24.0		Yes
2/4	1:10:00	413	11.6	30.0	24.0		Yes
2/5	1:15:00	584	12.0	30.0	24.0		Yes
2/6	1:20:00	1066	10.9	30.0	24.0		Yes
2/7	1:25:00	1238	11.3	30.0	24.0		Yes
2/8	1:30:00	1358	11.4	30.0	25.0		Yes
2/9	1:35:00	1455	12.4	31.0	25.0		Yes
2/10	1:40:00	1539	12.8	31.0	25.0		Yes
Averages				28.4	22.8	no result	

Meter Finish: 16.5966 Time Finish: 12:06
Total Condensate collected: 0 ml Silica gel No(s) used: 192

AECOM

STACK ANALYSIS

SAMPLING OF GASEOUS FLUORIDE

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: old26
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.58 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 15.3978 Meter finish: 15.3978
Time start: 10:11 Time finish: 10:12

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 16.5974 Meter finish: 16.5974
Time start: 12:12 Time finish: 12:13

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1022 hPa (start); 1020 hPa (finish)
Meter start: 15.3984 Time start: 10:20
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	12.4	24.0	20.0		Yes
1/2	0:10:00	195	12.5	24.0	20.0		Yes
1/3	0:15:00	292	12.5	25.0	20.0		Yes
1/4	0:20:00	413	11.4	26.0	20.0		Yes
1/5	0:25:00	584	12.1	26.0	20.0		Yes
1/6	0:30:00	1066	10.4	27.0	21.0		Yes
1/7	0:35:00	1238	10.8	28.0	23.0		Yes
1/8	0:40:00	1358	11.1	29.0	23.0		Yes
1/9	0:45:00	1455	10.9	29.0	23.0		Yes
1/10	0:50:00	1539	10.7	29.0	23.0		Yes
2/1	0:55:00	111	11.2	29.0	24.0		Yes
2/2	1:00:00	195	13.4	29.0	24.0		Yes
2/3	1:05:00	292	12.4	30.0	24.0		Yes
2/4	1:10:00	413	11.6	30.0	24.0		Yes
2/5	1:15:00	584	12.0	30.0	24.0		Yes
2/6	1:20:00	1066	10.9	30.0	24.0		Yes
2/7	1:25:00	1238	11.3	30.0	24.0		Yes
2/8	1:30:00	1358	11.4	30.0	25.0		Yes
2/9	1:35:00	1455	12.4	31.0	25.0		Yes
2/10	1:40:00	1539	12.8	31.0	25.0		Yes
Averages				28.4	22.8	no result	

Meter Finish: 16.5966 Time Finish: 12:06
Total Condensate collected: 0 ml Silica gel No(s) used: 192

AECOM

STACK ANALYSIS

SAMPLING OF SULFURIC ACID MIST (H2SO4 AS SO3) AND SULFUR DIOXIDE (SO2 AS SO3)

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 1
Sample Nozzle No.: old25
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 14.6124 Meter finish: 14.6124
Time start: 10:12 Time finish: 10:13

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 15.8399 Meter finish: 15.8399
Time start: 12:13 Time finish: 12:14

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1022 hPa (start); 1020 hPa (finish)
Meter start: 14.6250 Time start: 10:20
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	111	12.8	24.0	21.0		Yes
1/2	0:10:00	195	13.0	25.0	22.0		Yes
1/3	0:15:00	292	13.0	26.0	23.0		Yes
1/4	0:20:00	413	11.8	26.0	23.0		Yes
1/5	0:25:00	584	12.5	26.0	24.0		Yes
1/6	0:30:00	1066	10.8	26.0	24.0		Yes
1/7	0:35:00	1238	11.2	26.0	24.0		Yes
1/8	0:40:00	1358	11.5	26.0	25.0		Yes
1/9	0:45:00	1455	11.3	26.0	25.0		Yes
1/10	0:50:00	1539	11.1	28.0	25.0		Yes
2/1	0:55:00	111	11.6	28.0	26.0		Yes
2/2	1:00:00	195	13.8	28.0	26.0		Yes
2/3	1:05:00	292	12.8	28.0	26.0		Yes
2/4	1:10:00	413	12.0	28.0	26.0		Yes
2/5	1:15:00	584	12.4	28.0	26.0		Yes
2/6	1:20:00	1066	11.3	26.0	26.0		Yes
2/7	1:25:00	1238	11.6	29.0	26.0		Yes
2/8	1:30:00	1358	11.8	29.0	26.0		Yes
2/9	1:35:00	1455	12.9	29.0	27.0		Yes
2/10	1:40:00	1539	13.2	30.0	27.0		Yes
Averages				27.1	24.9	no result	

Meter Finish: 15.8380 Time Finish: 12:06
Total Condensate collected: 62 ml Silica gel No(s) used: 134

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 30-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 1
Test 1:Particulate Fluoride
Test 2:Gaseous Fluoride
Test 3:Sulfuric Acid Mist (H2SO4 as SO3)
Test 4:Sulfur Dioxide (SO2 as SO3)

Time :	12:26	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	81	0.216	64.0	337.2	17.2
1/2	165	0.197	64.0	337.2	16.4
1/3	262	0.181	64.0	337.2	15.7
1/4	383	0.149	64.0	337.2	14.3
1/5	554	0.137	64.0	337.2	13.7
1/6	1036	0.152	64.0	337.2	14.4
1/7	1208	0.109	64.0	337.2	12.2
1/8	1328	0.142	64.0	337.2	13.9
1/9	1425	0.158	63.0	336.2	14.7
1/10	1509	0.136	63.0	336.2	13.6
2/1	81	0.127	64.0	337.2	13.1
2/2	165	0.181	64.0	337.2	15.7
2/3	262	0.196	64.0	337.2	16.4
2/4	383	0.191	64.0	337.2	16.2
2/5	554	0.179	64.0	337.2	15.6
2/6	1036	0.177	64.0	337.2	15.5
2/7	1208	0.141	64.0	337.2	13.9
2/8	1328	0.164	64.0	337.2	15.0
2/9	1425	0.123	62.0	335.2	12.9
2/10	1509	0.183	62.0	335.2	15.8
Average			63.7	336.9	14.8

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9 mm
Absolute pressure in stack (hPa) : 1019.12 hPa

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Particulate Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.1962 m^3

Average gas meter temp. ($T_{M,2}$): 25.6 °C

298.8 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1021 m^3

(B) Particulate Fluoride concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: 0 Particulate Fluoride Weight 0.000024 g

Final Particulate Fluoride Weight (Mp1): 0.00002 g

Particulate Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.000022 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.022 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00059 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.59 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.00034 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.34 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 192

V_v = 11.3 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0151

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.35 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Particulate Fluoride

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.42 m/s

(ii) Average of post-sampling velocities: 14.81 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.61 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.24 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.9 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.00055	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.55	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.015	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	15	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.0085	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	8.5	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Gaseous Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.1962 m^3

Average gas meter temp. ($T_{M,2}$): 25.6 °C

298.8 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1021 m^3

(B) Gaseous Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Gaseous Fluoride Weight <0.0001 g

Final Gaseous Fluoride Weight (Mp1): <0.0001 g

Gaseous Fluoride Concentration (C1): $=M_{p1}/MV_4=$ <0.000091 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.091 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.0024 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <2.4 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.0014 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <1.4 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 192

V_v = 11.3 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0151

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.35 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Gaseous Fluoride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.42 m/s

(ii) Average of post-sampling velocities: 14.81 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.61 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.24 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 24.9 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0023	g/s (0°C, dry gas, 1 atm pressure)		
	=	<2.3	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.06	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<60	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.035	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<35	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfuric Acid Mist (H2SO4 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.2148 m^3

Average gas meter temp. ($T_{M,2}$): 26.0 °C

299.2 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1177 m^3

(B) H2SO4 as SO3 concentration at standard conditions

Blank thimble No.:

Thimble No. used: 0

Blank weight: g

H2SO4 as SO3 Weight <0.002 g

Final H2SO4 as SO3 Weight (Mp1): <0.002 g

H2SO4 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0018 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <1.8 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.048 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <48 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.028 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <28 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 134

V_v = 24.7 g (from laboratory report) V_w = 62 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0826

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0330

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 9.37 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfuric Acid Mist (H2SO4 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.32 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.067 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.42 m/s

(ii) Average of post-sampling velocities: 14.81 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.61 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.24 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 22.9 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.041	g/s (0°C, dry gas, 1 atm pressure)		
	=	<41	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<1.1	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<1100	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.64	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<640	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfur Dioxide (SO2 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 30-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.2148 m^3	Average barometric pressure (P_{BARO})	1021 hPa	
Average gas meter temp. ($T_{M,2}$):	26.0 °C			
	299.2 K	Average pressure at meter ($P_{M,2}$)	1021.00 hPa	
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.1177 m^3			

(B) SO2 as SO3 concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 SO2 as SO3 Weight <0.010 g

Final SO2 as SO3 Weight (Mp1): <0.010 g

SO2 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0089 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <8.9 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.24 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <240 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.1 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.14 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <140 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 134

V_v = 24.7 g (from laboratory report) V_w = 62 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0826

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0330

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 9.37 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Sulfur Dioxide (SO2 as SO3)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.32 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.067 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.42 m/s

(ii) Average of post-sampling velocities: 14.81 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.61 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 31.24 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 22.9 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm = C_{1a} x Qstd =	<0.2	g/s (0°C, dry gas, 1 atm pressure	)		
=	<200	mg/s (0°C, dry gas, 1 atm pressure	)		
C_{1a} x Qstd =	<5.4	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)	
=	<5400	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)	
C_{1a} x Qstd =	<3.2	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)	
=	<3200	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)	

EMISSION MONITORING RESULTS, STACK 1
WESTON
30-Apr-13
PARTICULATE FLUORIDE
GASEOUS FLUORIDE
SULFURIC ACID MIST (H2SO4 AS SO3)
SULFUR DIOXIDE (SO2 AS SO3)

Sampling Conditions:			
Stack internal diameter at test location	1650 mm		
Stack gas temperature (average)	67.0 °C		340.2 K
Stack pressure (average)	1020 hPa		
Stack gas velocity (average, stack conditions)	15 m/s		
Stack gas flowrate (stack conditions)	31 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	24 m^3/s		
Particulate Fluoride Testing			
Test Period	10:20	-	12:06
Particulate Fluoride Mass	0.024 mg		
Gas Volume Sampled	1.1 m^3		
Particulate Fluoride Emission*1	0.022 mg/m^3		
Particulate Fluoride Mass Emission Rate*2	0.55 mg/s		
Regulatory Limit	N/A		
Gaseous Fluoride Testing			
Test Period	10:20	-	12:06
Gaseous Fluoride Mass	<0.1 mg		
Gas Volume Sampled	1.1 m^3		
Gaseous Fluoride Emission*1	<0.091 mg/m^3		
Gaseous Fluoride Mass Emission Rate*2	<2.3 mg/s		
Regulatory Limit	2 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	10:20	-	12:06
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg		
Gas Volume Sampled	1.12 m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<1.8 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<41 mg/s		
Regulatory Limit	100 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Testing			
Test Period	10:20	-	12:06
Sulfur Dioxide (SO2 as SO3) Mass	<10 mg		
Gas Volume Sampled	1.12 m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	<8.9 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<200 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	4.0		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.9 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 2

Date Sampled: 29-Apr-13

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Total Fluoride	NSW EPA TM - 9

Observations made during testing period:

Sampling Performed By:

Nic Baldwin

for Peter Waddingham

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 2
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Measurement/Observations				
Stack Internal Dimensions:			Cross Sectional Area 1.26 m^2	
Diameter 1265 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Minimum No. of sampling points= 12	
Distance from sampling plane to nearest disturbances: Upstream (m) = 7 No. Diameters = 5.5 Type of Upstream Disturbance: Centrifugal Fan Downstream (m) = 7 No. Diameters = 5.5 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 12 PM2.5/10= 12 No. of sampling traverses/ports sampled = 2 PM2.5/10= 2 No. of sampling points on each traverse/port = 6 PM2.5/10= 6	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	56	26	56	26
2	185	155	185	155
3	374	344	374	344
4	891	861	891	861
5	1080	1050	1080	1050
6	1209	1179	1209	1179
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 2
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 12:10		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm), (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:10	0	20.9	0.0
2	12:11	0	20.9	0.0
3	12:12	0	20.9	0.0
4	12:13	0	20.9	0.0
5	12:14	0	20.9	0.0
6	12:15	0	20.9	0.0
7	12:16	0	20.9	0.0
8	12:17	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.30 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	77.3 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	2.30 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 2
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 13:25		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm), (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	13:25	0	20.9	0.0
2	13:26	0	20.9	0.0
3	13:27	0	20.9	0.0
4	13:28	0	20.9	0.0
5	13:29	0	20.9	0.0
6	13:30	0	20.9	0.0
7	13:31	0	20.9	0.0
8	13:32	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 1.00
Moisture percentage (M2): 0.24 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	78.9 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.9 %,(wet)
H_2O:	0.24 %(=M2)		
Therefore, stack gas density (GD) =		1.29 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =		1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 2
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	11:43	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	26	0.119	27.0	300.2	12.0
1/2	155	0.153	28.0	301.2	13.6
1/3	344	0.157	28.0	301.2	13.8
1/4	861	0.151	28.0	301.2	13.5
1/5	1050	0.148	28.0	301.2	13.4
1/6	1179	0.137	28.0	301.2	12.9
2/1	26	0.113	28.0	301.2	11.7
2/2	155	0.138	28.0	301.2	12.9
2/3	344	0.155	28.0	301.2	13.7
2/4	861	0.156	28.0	301.2	13.7
2/5	1050	0.137	28.0	301.2	12.9
2/6	1179	0.135	28.0	301.2	12.8
Average			27.9	301.1	13.1

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -4 mm
Absolute pressure in stack (hPa) : 1019.61 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 2
Sample Nozzle No.: Fine5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.9 x $10^{-5}m^2$
Thimble No: T4
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 14.6252 Meter finish: 14.6252
Time start: 12:15 Time finish: 12:16
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 15.3958 Meter finish: 13.3958
Time start: 13:40 Time finish: 13:41
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 14.6258 Time start: 12:29
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:04:30	56	13.2	40.0	40.0		Yes
1/2	0:05:15	185	13.2	42.0	40.0		Yes
1/3	0:05:15	374	13.2	43.0	41.0		Yes
1/4	0:05:15	891	13.2	42.0	41.0		Yes
1/5	0:05:00	1080	13.2	40.0	40.0		Yes
1/6	0:05:00	1209	13.2	38.0	40.0		Yes
2/1	0:04:30	56	13.2	37.0	39.0		Yes
2/2	0:05:00	185	13.2	35.0	38.0		Yes
2/3	0:05:15	374	13.2	34.0	36.0		Yes
2/4	0:05:15	891	13.2	34.0	34.0		Yes
2/5	0:05:00	1080	13.2	34.0	33.0		Yes
2/6	0:05:00	1209	13.2	34.0	33.0		Yes
Averages				37.8	37.9	no result	

Meter Finish: 15.3952 Time Finish: 13:32
Total Condensate collected: -17 ml Silica gel No(s) used: G100

AECOM

STACK ANALYSIS

SAMPLING OF TOTAL PARTICULATE

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 2
Sample Nozzle No.: S16 Sample Nozzle Area (An): 1.41 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: T29
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 32.5824 Meter finish: 32.5824
Time start: 12:16 Time finish: 12:17

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 33.3360 Meter finish: 33.3360
Time start: 13:41 Time finish: 13:42

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 32.5830 Time start: 12:29
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	56	10.1	46.0	43.0		Yes
1/2	0:10:00	185	11.4	48.0	44.0		Yes
1/3	0:15:00	374	11.6	49.0	46.0		Yes
1/4	0:20:00	891	11.3	47.0	45.0		Yes
1/5	0:25:00	1080	11.3	47.0	44.0		Yes
1/6	0:30:00	1209	10.8	47.0	42.0		Yes
2/1	0:35:00	56	9.8	47.0	41.0		Yes
2/2	0:40:00	185	10.8	47.0	41.0		Yes
2/3	0:45:00	374	11.5	47.0	40.0		Yes
2/4	0:50:00	891	11.5	47.0	40.0		Yes
2/5	0:55:00	1080	10.8	47.0	40.0		Yes
2/6	1:00:00	1209	10.7	47.0	40.0		Yes
Averages				47.2	42.2	no result	

Meter Finish: 33.3348 Time Finish: 13:32
Total Condensate collected: -11 ml Silica gel No(s) used: Z2

AECOM

STACK ANALYSIS

SAMPLING OF TOTAL FLUORIDE

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 2
Sample Nozzle No.: Old26
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.58 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 19.6995 Meter finish: 19.6995
Time start: 12:17 Time finish: 12:18

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 20.3510 Meter finish: 20.3510
Time start: 13:42 Time finish: 13:43

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 19.7000 Time start: 12:29
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	56	11.4	40.0	30.0		Yes
1/2	0:10:00	185	12.8	41.0	30.0		Yes
1/3	0:15:00	374	13.0	42.0	31.0		Yes
1/4	0:20:00	891	12.7	42.0	31.0		Yes
1/5	0:25:00	1080	12.6	43.0	31.0		Yes
1/6	0:30:00	1209	12.2	44.0	30.0		Yes
2/1	0:35:00	56	11.0	44.0	30.0		Yes
2/2	0:40:00	185	12.2	44.0	30.0		Yes
2/3	0:45:00	374	12.9	44.0	30.0		Yes
2/4	0:50:00	891	12.9	44.0	30.0		Yes
2/5	0:55:00	1080	12.2	44.0	30.0		Yes
2/6	1:00:00	1209	12.1	44.0	30.0		Yes
Averages				43.0	30.3	no result	

Meter Finish: 20.3499 Time Finish: 13:32
Total Condensate collected: 0 ml Silica gel No(s) used: FA8

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 2
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	13:49	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.29	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	26	0.129	26.0	299.2	12.4
1/2	155	0.148	27.0	300.2	13.3
1/3	344	0.154	28.0	301.2	13.6
1/4	861	0.160	28.0	301.2	13.9
1/5	1050	0.146	28.0	301.2	13.3
1/6	1179	0.140	28.0	301.2	13.0
2/1	26	0.137	28.0	301.2	12.8
2/2	155	0.145	28.0	301.2	13.2
2/3	344	0.152	28.0	301.2	13.5
2/4	861	0.157	28.0	301.2	13.7
2/5	1050	0.148	28.0	301.2	13.3
2/6	1179	0.130	28.0	301.2	12.5
Average			27.8	301.0	13.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -4.5 mm
Absolute pressure in stack (hPa) : 1019.56 hPa

STACK ANALYSIS - PM10 CALCULATIONS

AECOM

Date:	29-Apr-13	Client:	Weston
AECOM's Project No:	60287751	Stack/Duct Description:	Stack 2

1. Gas Analysis

	%		
$\%CO_2$	0.0		
$\%O_2$	20.9		
$\%N_2+\%CO$	79.1		
Fraction Moisture Content, Bws	-0.01	M_s=	1.01

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.84
Mol. Wt. of Stack Gas (wet)	28.59

3. Absolute Stack Pressure

	Pascals	in. Hg
Barometric Pressure (Pbar)	102000	30.11
Stack Static Pressure (Pg)	101956	30.10
Absolute Stack Pressure		30.10

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	27.8	82.0
Average Meter Temperature:	37.8	
Stack Gas Viscosity		185.4

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.46	0.0162	16.21	0.27

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.138	73.86	24.31	0.751	1.233	55.50	18.21	91.10	29.89
2	0.161	54.09	17.80	0.720	1.253	38.95	12.78	67.76	22.23
3	0.164	52.28	17.21	0.716	1.255	37.41	12.27	65.63	21.53
4	0.200	34.92	11.50	0.631	1.299	22.05	7.24	45.35	14.88
5	0.194	37.38	12.30	0.651	1.290	24.33	7.98	48.20	15.81
6	0.220	29.06	9.57	0.560	1.328	16.26	5.33	38.58	12.66
7	0.239	24.56	8.08	0.442	1.361	12.28	4.03	33.42	10.96
8	0.264	20.16	6.63	#NUM!	1.410	10.08	3.31	28.42	9.33
9	0.292	16.48	5.42	#NUM!	1.474	8.24	2.70	24.29	7.97
10	0.341	12.09	3.98	#NUM!	1.606	6.05	1.98	18.14	5.95
11	0.389	9.27	3.05	#NUM!	1.760	4.63	1.52	13.90	4.56

Selected Nozzle	Nozzle Diameter (inches)	Nozzle Diameter (m)	Nozzle Area (m^2)	Sample Rate (L/min)
5	0.194	0.005	0.000019	14.9

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 29-Apr-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 2

7.Sampling Time Total Run Time 60 Number of points 12

Velocity Head (pitot) Pa	Vel Head in H20	Sqr Root	Dwell time mins
129.49	0.52	0.72	4.7
148.13	0.59	0.77	5.0
154.02	0.62	0.79	5.1
159.90	0.64	0.80	5.2
146.17	0.59	0.77	5.0
140.28	0.56	0.75	4.9
137.34	0.55	0.74	4.9
145.19	0.58	0.76	5.0
152.06	0.61	0.78	5.1
156.96	0.63	0.79	5.2
148.13	0.59	0.77	5.0
130.47	0.52	0.72	4.7
	Average	0.76	60.00
	Square	0.58	

Total time min	Full hours	Full minutes	Seconds
4.5	0	4	30
9.8	0	9	45
15.0	0	15	0
20.3	0	20	15
25.3	0	25	15
30.3	0	30	15
34.8	0	34	45
39.8	0	39	45
45.0	0	45	0
50.3	0	50	15
55.3	0	55	15
60.3	1	0	15

Aerodynamic Cut Size (u_{cyc})
183.0

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0114

Actual D_{50}
11.0

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 2

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.7681 m^3

Average gas meter temp. ($T_{M,2}$): 37.8 °C

311.0 K

Average barometric pressure (P_{BARO}) 1020 hPa

Average pressure at meter ($P_{M,2}$) 1020.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.6792 m^3

(B) PM10 concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: T4

Blank weight: g

PM10 Weight <0.0002 g

Final PM10 Weight (Mp1): <0.0002 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ <0.00029 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.29 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.00029 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <0.29 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.041 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <41 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G100

V_v = 12 g (from laboratory report) V_w = -17 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = -0.0227

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0160

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = -0.99 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.25 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.142 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 13.08 m/s

(ii) Average of post-sampling velocities: 13.21 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.14 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 16.51 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 15.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0044	g/s (0°C, dry gas, 1 atm pressure)		
	=	<4.4	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.0044	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<4.4	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.62	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<620	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 2

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.7540 m^3

Average gas meter temp. ($T_{M,2}$): 44.7 °C

317.9 K

Average barometric pressure (P_{BARO}) 1020 hPa

Average pressure at meter ($P_{M,2}$) 1020.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.6523 m^3

(B) Total Particulate concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: T29 Total Particulate Weight 0.0002 g

Final Total Particulate Weight (Mp1): 0.00020 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.00031 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.31 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00031 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.31 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.043 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 43 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z2

V_v = 10.8 g (from laboratory report) V_w = -11 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = -0.0147

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0144

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = -0.04 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.151 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 13.08 m/s

(ii) Average of post-sampling velocities: 13.21 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.14 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumelric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 16.51 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 15.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0047	g/s (0°C, dry gas, 1 atm pressure)		
	=	4.7	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0047	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	4.7	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.65	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	650	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 2

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.6534	m^3	Average barometric pressure (P_{BARO})	1020 hPa
Average gas meter temp. ($T_{M,2}$):	36.6	°C		
	309.8	K	Average pressure at meter ($P_{M,2}$)	1020.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.5800	m^3		

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Total Fluoride Weight <0.0001 g

Final Total Fluoride Weight (Mp1): <0.0001 g

Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ <0.00017 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.17 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.00017 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <0.17 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ #VALUE! g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = #VALUE! mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: FA8

V_v = 7.7 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0103

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.74 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Fluoride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.160 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 13.08 m/s

(ii) Average of post-sampling velocities: 13.21 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.14 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note:** (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 16.51 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 14.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0025	g/s (0°C, dry gas, 1 atm pressure	)		
	=	<2.5	mg/s (0°C, dry gas, 1 atm pressure	)		
	C_{1a} x Qstd =	<0.0025	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<2.5	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.35	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<350	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 2
WESTON
29-Apr-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
TOTAL FLUORIDE

Sampling Conditions:			
Stack internal diameter at test location	1265 mm		
Stack gas temperature (average)	27.8 °C		301.0 K
Stack pressure (average)	1020 hPa		
Stack gas velocity (average, stack conditions)	13 m/s		
Stack gas flowrate (stack conditions)	17 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	15 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	12:29	-	13:32
Fine Particulate (PM10) Mass	<0.2 mg		
Gas Volume Sampled	0.679 m^3		
Fine Particulate (PM10) Emission*1	<0.29 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	<4.4 mg/s		
Regulatory Limit	NA		
Total Particulate Testing			
Test Period	12:29	-	13:32
Total Particulate Mass	0.2 mg		
Gas Volume Sampled	0.652 m^3		
Total Particulate Emission*1	0.31 mg/m^3		
Total Particulate Mass Emission Rate*2	4.7 mg/s		
Regulatory Limit	35 mg/m^3		
Total Fluoride Testing			
Test Period	12:29	-	13:32
Total Fluoride Mass	<0.1 mg		
Gas Volume Sampled	0.58 m^3		
Total Fluoride Emission*1	<0.17 mg/m^3		
Total Fluoride Mass Emission Rate*2	<2.5 mg/s		
Regulatory Limit	NA		
Moisture Content (%)	0.9		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 3

Date Sampled: 29-Apr-13

ANALYTE(S)	**METHOD**
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Total Fluoride	NSW EPA TM - 9

Observations made during testing period:

Sampling Performed By:

Nic Baldwin

for Peter Waddingham

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 3
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Measurement/Observations

Stack Internal Dimensions:

Diameter 1000 mm
OR Length Width
Length/Width (mm)
Equivalent Diameter N/A mm

Cross Sectional Area 0.79 m^2

Minimum No. of sampling points= 12

Distance from sampling plane to nearest disturbances:

Upstream (m) = 6
No. Diameters = 6.0
Type of Upstream Disturbance: Fan
Downstream (m) = 3
No. Diameters = 3.0
Type of Down Stream Disturbance: Stack Exit

Total No. of sampling points = 12
PM2.5/10= 12
No. of sampling traverses/ports sampled = 2
PM2.5/10= 2
No. of sampling points on each traverse/port = 6
PM2.5/10= 6

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	44	14	44	14
2	146	116	146	116
3	296	266	296	266
4	704	674	704	674
5	854	824	854	824
6	956	926	956	926
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 3
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 9:27		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	9:27	0	20.9	0.0
2	9:28	0	20.9	0.0
3	9:29	0	20.9	0.0
4	9:30	0	20.9	0.0
5	9:31	0	20.9	0.0
6	9:32	0	20.9	0.0
7	9:33	0	20.9	0.0
8	9:34	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.20 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	77.4 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	2.20 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 3
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 11:50		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	11:50	0	20.9	0.0
2	11:51	0	20.9	0.0
3	11:52	0	20.9	0.0
4	11:53	0	20.9	0.0
5	11:54	0	20.9	0.0
6	11:55	0	20.9	0.0
7	11:56	0	20.9	0.0
8	11:57	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.14 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	77.4 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.5 %,(wet)
H_2O:	2.14 %(=M2)		
Therefore, stack gas density (GD) =		1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =		1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 3
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	9:40	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	14	0.125	29.0	302.2	12.3
1/2	116	0.127	29.0	302.2	12.4
1/3	266	0.118	30.0	303.2	12.0
1/4	674	0.142	30.0	303.2	13.2
1/5	824	0.166	30.0	303.2	14.2
1/6	926	0.130	30.0	303.2	12.6
2/1	14	0.112	30.0	303.2	11.7
2/2	116	0.115	30.0	303.2	11.8
2/3	266	0.118	31.0	304.2	12.0
2/4	674	0.133	31.0	304.2	12.8
2/5	824	0.154	31.0	304.2	13.7
2/6	926	0.146	31.0	304.2	13.4
Average			30.2	303.4	12.7

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 6.7 mm
Absolute pressure in stack (hPa) : 1020.66 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 3

Sample Nozzle No.: Fine5
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.9 x $10^{-5}m^2$
Thimble No: N12
Blank thimble No: 34

Leak Check (Pre-Sampling)
Meter start: 13.8114 Meter finish: 13.8114
Time start: 10:20 Time finish: 10:21

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 14.6243 Meter finish: 14.6243
Time start: 10:20 Time finish: 10:21

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 13.8123 Time start: 10:32
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:04:45	44	13.3	34.0	31.0		Yes
1/2	0:05:00	146	13.3	36.0	31.0		Yes
1/3	0:04:45	296	13.3	38.0	33.0		Yes
1/4	0:05:15	704	13.3	39.0	33.0		Yes
1/5	0:05:30	854	13.3	39.0	34.0		Yes
1/6	0:05:00	956	13.3	41.0	35.0		Yes
2/1	0:04:30	44	13.3	42.0	37.0		Yes
2/2	0:04:45	146	13.3	42.0	37.0		Yes
2/3	0:04:45	296	13.3	44.0	38.0		Yes
2/4	0:05:00	704	13.3	44.0	38.0		Yes
2/5	0:05:30	854	13.3	45.0	40.0		Yes
2/6	0:05:15	956	13.3	45.0	40.0		Yes
Averages				40.8	35.6	no result	

Meter Finish: 14.6234 Time Finish: 11:35
Total Condensate collected: 0 ml Silica gel No(s) used: Z17

AECOM

STACK ANALYSIS

SAMPLING OF TOTAL PARTICULATE

Date: 29-Apr-13
Client: Weston
AECDM's Project No: 60287751
Stack Description No.: Stack 3
Sample Nozzle No.: S16 Sample Nozzle Area (An): 1.41 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: T18
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 31.8036 Meter finish: 31.8036
Time start: 10:21 Time finish: 10:22

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 32.5811 Meter finish: 32.5811
Time start: 11:39 Time finish: 11:40

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 31.8052 Time start: 10:32
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	44	10.3	41.0	38.0		Yes
1/2	0:10:00	146	10.4	44.0	38.0		Yes
1/3	0:15:00	296	10.0	45.0	39.0		Yes
1/4	0:20:00	704	11.0	47.0	40.0		Yes
1/5	0:25:00	854	11.9	48.0	40.0		Yes
1/6	0:30:00	956	10.5	50.0	41.0		Yes
2/1	0:35:00	44	9.8	51.0	42.0		Yes
2/2	0:40:00	146	9.9	51.0	42.0		Yes
2/3	0:45:00	296	10.0	53.0	43.0		Yes
2/4	0:50:00	704	10.7	54.0	44.0		Yes
2/5	0:55:00	854	11.4	55.0	46.0		Yes
2/6	1:00:00	956	11.2	55.0	46.0		Yes
Averages				49.5	41.6	no result	

Meter Finish: 32.5800 Time Finish: 11:35
Total Condensate collected: 0 ml Silica gel No(s) used: F25

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL FLUORIDE

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 3
Sample Nozzle No.: Old26
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.58 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 18.9062 Meter finish: 18.9062
Time start: 10:22 Time finish: 10:23
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 19.6984 Meter finish: 19.6984
Time start: 11:40 Time finish: 11:41
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1020 hPa (start); 1020 hPa (finish)
Meter start: 18.9070 Time start: 10:32
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	44	11.6	44.0	36.0		Yes
1/2	0:10:00	146	11.7	44.0	36.0		Yes
1/3	0:15:00	296	11.3	45.0	36.0		Yes
1/4	0:20:00	704	12.4	47.0	38.0		Yes
1/5	0:25:00	854	13.3	50.0	38.0		Yes
1/6	0:30:00	956	11.8	50.0	38.0		Yes
2/1	0:35:00	44	11.0	51.0	38.0		Yes
2/2	0:40:00	146	11.1	52.0	38.0		Yes
2/3	0:45:00	296	11.2	53.0	38.0		Yes
2/4	0:50:00	704	12.0	53.0	38.0		Yes
2/5	0:55:00	854	12.8	53.0	38.0		Yes
2/6	1:00:00	956	12.5	53.0	38.0		Yes
Averages				49.6	37.5	no result	

Meter Finish: 19.6976 Time Finish: 11:35
Total Condensate collected: 3 ml Silica gel No(s) used: P29

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 29-Apr-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 3
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	11:55	Barometric Pressure :		1020	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	14	0.148	37.0	310.2	13.6
1/2	116	0.160	38.0	311.2	14.1
1/3	266	0.135	38.0	311.2	13.0
1/4	674	0.168	38.0	311.2	14.5
1/5	824	0.167	39.0	312.2	14.5
1/6	926	0.153	39.0	312.2	13.8
2/1	14	0.128	39.0	312.2	12.6
2/2	116	0.132	39.0	312.2	12.9
2/3	266	0.125	39.0	312.2	12.5
2/4	674	0.168	40.0	313.2	14.5
2/5	824	0.152	40.0	313.2	13.8
2/6	926	0.158	40.0	313.2	14.1
Average			38.8	312.0	13.7

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 7 mm
Absolute pressure in stack (hPa) : 1020.69 hPa

AECOM

STACK ANALYSIS - PM10 CALCULATIONS

Date:	29-Apr-13	Client:	Weston
AECOM's Project No:	60287751	Stack/Duct Description:	Stack 3

1. Gas Analysis

	%		
$\%CO_2$	0.0		
$\%O_2$	20.9		
$\%N_2+\%CO$	79.1		
Fraction Moisture Content, Bws	0.02	M_s=	0.98

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.84
Mol. Wt. of Stack Gas (wet)	28.60

3. Absolute Stack Pressure

	Pascals	in. Hg
Barometric Pressure (Pbar)	102000	30.11
Stack Static Pressure (Pg)	102069	30.13
Absolute Stack Pressure		30.13

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	38.8	101.9
Average Meter Temperature:	38.2	
Stack Gas Viscosity		188.6

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.47	0.0167	16.65	0.28

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.138	75.90	24.98	0.752	1.233	57.07	18.72	93.59	30.71
2	0.161	55.58	18.30	0.721	1.252	40.07	13.15	69.59	22.83
3	0.164	53.73	17.68	0.716	1.255	38.49	12.63	67.41	22.12
4	0.200	35.89	11.81	0.634	1.298	22.74	7.46	46.57	15.28
5	0.194	38.41	12.64	0.653	1.289	25.07	8.22	49.50	16.24
6	0.220	29.86	9.83	0.563	1.326	16.81	5.51	39.61	12.99
7	0.239	25.23	8.31	0.449	1.359	12.62	4.14	34.30	11.25
8	0.264	20.71	6.82	#NUM!	1.408	10.36	3.40	29.17	9.57
9	0.292	16.93	5.57	#NUM!	1.472	8.47	2.78	24.92	8.18
10	0.341	12.43	4.09	#NUM!	1.603	6.21	2.04	18.64	6.12
11	0.389	9.52	3.14	#NUM!	1.756	4.76	1.56	14.29	4.69

Selected Nozzle	Nozzle Diameter (inches)	Nozzle Diameter (m)	Nozzle Area (m^2)	Sample Rate (L/min)
5	0.194	0.005	0.000019	14

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 29-Apr-13 Client: Weston
AECOM's Project No: 60287751 Stack/Ouct Description: Stack 3

7.Sampling Time Total Run Time 60 Number of points 12

Velocity Head (pitot) Pa	Vel Head in H20	Sqr Root	Dwell time mins
148.13	0.59	0.77	5.0
159.90	0.64	0.80	5.2
135.38	0.54	0.74	4.8
167.75	0.67	0.82	5.3
166.77	0.67	0.82	5.3
153.04	0.61	0.78	5.1
127.53	0.51	0.72	4.6
132.44	0.53	0.73	4.7
124.59	0.50	0.71	4.6
167.75	0.67	0.82	5.3
152.06	0.61	0.78	5.1
157.94	0.63	0.80	5.1
	Average	0.77	60.00
	Square	0.60	

Total time min	Full hours	Full minutes	Seconds
4.8	0	4	45
9.8	0	9	45
14.5	0	14	30
19.8	0	19	45
25.3	0	25	15
30.3	0	30	15
34.8	0	34	45
39.5	0	39	30
44.3	0	44	15
49.3	0	49	15
54.8	0	54	45
60.0	1	0	0

Aerodynamic Cut Size (u_{cyc})
189.8

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0126

Actual D_{50}
10.4

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 3

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.8097 m^3

Average gas meter temp. ($T_{M,2}$): 38.2 °C / 311.4 K

Average barometric pressure (P_{BARO}) 1020 hPa

Average pressure at meter ($P_{M,2}$) 1020.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.7151 m^3

(B) PM10 concentration at standard conditions

Blank thimble No.: 34

Blank weight: g

Thimble No. used: N12

PM10 Weight 0.0003 g

Final PM10 Weight (Mp1): 0.00030 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ 0.00042 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.42 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00042 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.42 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.059 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 59 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z17

V_v = 9.6 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0128

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.76 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.136 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 12.68 m/s

(ii) Average of post-sampling velocities: 13.66 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.17 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note:** (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 10.34 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_{ws})}{100}$$

Qstd = 9.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0038	g/s (0°C, dry gas, 1 atm pressure)		
	=	3.8	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0038	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	3.8	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.53	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	530	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 3

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.7770 m^3
Average gas meter temp. ($T_{M,2}$): 45.5 °C
318.7 K

Average barometric pressure (P_{BARO}) 1020 hPa

Average pressure at meter ($P_{M,2}$) 1020.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.6705 m^3

(B) Total Particulate concentration at standard conditions
Blank thimble No.: Blank weight: g
Thimble No. used: T18 Total Particulate Weight 0.0007 g
Final Total Particulate Weight (Mp1): 0.00070 g
Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.001 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 1 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %
Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.001 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 1 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %
Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.14 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 140 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content
Silica Gel Number: F25
V_v = 11 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)
Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000
Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0147
Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.14 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Total Particulate

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.28 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.145 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 12.68 m/s

(ii) Average of post-sampling velocities: 13.66 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.17 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 10.34 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 9.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0091	g/s (0°C, dry gas, 1 atm pressure)		
	=	9.1	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0091	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	9.1	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	1.3	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	1300	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 29-Apr-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 3

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.7949	m^3	Average barometric pressure (P_{BARO})	1020 hPa
Average gas meter temp. ($T_{M,2}$):	43.5	°C		
	316.7	K	Average pressure at meter ($P_{M,2}$)	1020.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.6903	m^3		

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Total Fluoride Weight <0.0001 g

Final Total Fluoride Weight (Mp1): <0.0001 g

Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ <0.00014 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.14 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.00014 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <0.14 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.02 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <20 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P29

V_v = 10.3 g (from laboratory report) V_w = 3 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0040

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0138

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.51 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Fluoride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.28 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.145 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 12.68 m/s

(ii) Average of post-sampling velocities: 13.66 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 13.17 m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 10.34 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 9.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0013	g/s (0°C, dry gas, 1 atm pressure)		
	=	<1.3	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.0013	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<1.3	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.18	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<180	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 3
WESTON
29-Apr-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
TOTAL FLUORIDE

Sampling Conditions:			
Stack internal diameter at test location	1000 mm		
Stack gas temperature (average)	34.5 °C		307.7 K
Stack pressure (average)	1021 hPa		
Stack gas velocity (average, stack conditions)	13 m/s		
Stack gas flowrate (stack conditions)	10 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	9.1 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	10:32	-	11:35
Fine Particulate (PM10) Mass	0.3 mg		
Gas Volume Sampled	0.715 m^3		
Fine Particulate (PM10) Emission*1	0.42 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	3.8 mg/s		
Regulatory Limit	NA		
Total Particulate Testing			
Test Period	10:32	-	11:35
Total Particulate Mass	0.7 mg		
Gas Volume Sampled	0.671 m^3		
Total Particulate Emission*1	1 mg/m^3		
Total Particulate Mass Emission Rate*2	9.1 mg/s		
Regulatory Limit	50 mg/m^3		
Total Fluoride Testing			
Test Period	10:32	-	11:35
Total Fluoride Mass	<0.1 mg		
Gas Volume Sampled	0.69 m^3		
Total Fluoride Emission*1	<0.14 mg/m^3		
Total Fluoride Mass Emission Rate*2	<1.3 mg/s		
Regulatory Limit	NA		
Moisture Content (%)	2.3		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston Aluminium

AECOM's Project Number: 60287751

Emission Source: Stack 4

Date Sampled: 14-May-13

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Total Fluoride	NSW EPA TM - 9

Observations made during testing period:

Sampling Performed By:

Chris Burns

James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 4
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Measurement/Observations				
Stack Internal Dimensions: Diameter 1395 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 1.53 m^2 Minimum No. of sampling points= 12	
Distance from sampling plane to nearest disturbances: Upstream (m) = 8 No. Diameters = 5.7 Type of Upstream Disturbance: centrifugal Fan Downstream (m) = 5 No. Diameters = 3.6 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 12 PM2.5/10= 12 No. of sampling traverses/ports sampled = 2 PM2.5/10= 2 No. of sampling points on each traverse/port = 6 PM2.5/10= 6	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	61	31	61	31
2	204	174	204	174
3	413	383	413	383
4	982	952	982	952
5	1191	1161	1191	1161
6	1334	1304	1334	1304
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 4
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 9:45		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	9:45	0	20.9	0.0
2	9:46	0	20.9	0.0
3	9:47	0	20.9	0.0
4	9:48	0	20.9	0.0
5	9:49	0	20.9	0.0
6	9:50	0	20.9	0.0
7	9:51	0	20.9	0.0
8	9:52	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.20 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	77.4 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	2.20 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 4
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 11:30		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	11:30	0	20.9	0.0
2	11:31	0	20.9	0.0
3	11:32	0	20.9	0.0
4	11:33	0	20.9	0.0
5	11:34	0	20.9	0.0
6	11:35	0	20.9	0.0
7	11:36	0	20.9	0.0
8	11:37	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.99
Moisture percentage (M2): 1.38 %

Measurements

CO:	0.0000 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	78.0 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.6 %,(wet)
H_2O:	1.38 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 4
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	9:45	Barometric Pressure :		1010	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	31	0.226	34.0	307.2	16.8
1/2	174	0.235	34.0	307.2	17.1
1/3	383	0.245	34.0	307.2	17.5
1/4	952	0.294	34.0	307.2	19.2
1/5	1161	0.363	34.0	307.2	21.3
1/6	1304	0.334	34.0	307.2	20.4
2/1	31	0.294	34.0	307.2	19.2
2/2	174	0.294	34.0	307.2	19.2
2/3	383	0.373	34.0	307.2	21.6
2/4	952	0.412	34.0	307.2	22.7
2/5	1161	0.422	35.0	308.2	23.0
2/6	1304	0.402	35.0	308.2	22.5
Average			34.2	307.4	20.0

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -23 mm
Absolute pressure in stack (hPa) : 1007.74 hPa

AECOM

STACK ANALYSIS
SAMPLING OF FINE PARTICULATE (PM10)

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack Description No.: Stack 4
Sample Nozzle No.: fine2
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.3 x $10^{-5}m^2$
Thimble No: T2
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 22.9060 Meter finish: 22.9060
Time start: 10:31 Time finish: 10:32

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 23.7134 Meter finish: 23.7134
Time start: 11:39 Time finish: 11:40

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1010 hPa (start); 1010 hPa (finish)
Meter start: 22.9084 Time start: 10:36
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:04:15	61	12.9	16.0	14.0		Yes
1/2	0:04:15	204	12.9	16.0	15.0		Yes
1/3	0:04:15	413	12.9	16.0	15.0		Yes
1/4	0:04:45	982	12.9	16.0	15.0		Yes
1/5	0:05:15	1191	12.9	17.0	16.0		Yes
1/6	0:05:15	1334	12.9	17.0	16.0		Yes
2/1	0:04:45	61	12.9	17.0	16.0		Yes
2/2	0:04:45	204	12.9	17.0	16.0		Yes
2/3	0:05:30	413	12.9	17.0	16.0		Yes
2/4	0:05:45	982	12.9	18.0	16.0		Yes
2/5	0:05:45	1191	12.9	18.0	16.0		Yes
2/6	0:05:30	1334	12.9	19.0	16.0		Yes
Averages				17.0	15.6	no result	

Meter Finish: 23.7126 Time Finish: 11:38
Total Condensate collected: 0 ml Silica gel No(s) used: P31

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL PARTICULATE

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack Description No.: Stack 4
Sample Nozzle No.: old2
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.39 x $10^{-5}m^2$
Thimble No: T19
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 23.0410 Meter finish: 23.0410
Time start: 10:33 Time finish: 10:34

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 24.0204 Meter finish: 24.0204
Time start: 11:40 Time finish: 11:41

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1010 hPa (start); 1010 hPa (finish)
Meter start: 23.0424 Time start: 10:36
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	61	13.2	16.0	15.0		Yes
1/2	0:10:00	204	13.4	17.0	15.0		Yes
1/3	0:15:00	413	13.7	18.0	16.0		Yes
1/4	0:20:00	982	15.1	18.0	16.0		Yes
1/5	0:25:00	1191	16.7	18.0	16.0		Yes
1/6	0:30:00	1334	16.0	18.0	16.0		Yes
2/1	0:35:00	61	15.1	18.0	16.0		Yes
2/2	0:40:00	204	15.1	18.0	16.0		Yes
2/3	0:45:00	413	16.9	19.0	16.0		Yes
2/4	0:50:00	982	17.8	19.0	16.0		Yes
2/5	0:55:00	1191	18.0	19.0	16.0		Yes
2/6	1:00:00	1334	17.6	19.0	16.0		Yes
Averages				18.1	15.8	no result	

Meter Finish: 24.0192 Time Finish: 11:38
Total Condensate collected: 2 ml Silica gel No(s) used: 21

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL FLUORIDE

Date: 14-May-13
Client: Weston Aluminium
AECDM's Project No: 60287751
Stack Description No.: Stack 4
Sample Nozzle No.: old1
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.33 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 54.6980 Meter finish: 54.6980
Time start: 10:34 Time finish: 10:35

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 55.7252 Meter finish: 55.7252
Time start: 11:41 Time finish: 11:42

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1010 hPa (start); 1010 hPa (finish)
Meter start: 54.7026 Time start: 10:36
Meter correction factor (GMf) : 1.0003

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	61	12.6	16.0	14.0		Yes
1/2	0:10:00	204	12.8	18.0	15.0		Yes
1/3	0:15:00	413	13.1	18.0	15.0		Yes
1/4	0:20:00	982	14.4	18.0	16.0		Yes
1/5	0:25:00	1191	16.0	18.0	16.0		Yes
1/6	0:30:00	1334	15.3	18.0	16.0		Yes
2/1	0:35:00	61	14.4	18.0	16.0		Yes
2/2	0:40:00	204	14.4	19.0	17.0		Yes
2/3	0:45:00	413	16.2	19.0	17.0		Yes
2/4	0:50:00	982	17.0	19.0	17.0		Yes
2/5	0:55:00	1191	17.2	19.0	17.0		Yes
2/6	1:00:00	1334	16.8	19.0	17.0		Yes
Averages				18.3	16.1	no result	

Meter Finish: 55.7244 Time Finish: 11:38
Total Condensate collected: 0 ml Silica gel No(s) used: P2

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 4
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	11:45	Barometric Pressure :		1010	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	31	0.231	35.0	308.2	17.0
1/2	174	0.231	35.0	308.2	17.0
1/3	383	0.226	35.0	308.2	16.8
1/4	952	0.299	35.0	308.2	19.3
1/5	1161	0.343	35.0	308.2	20.7
1/6	1304	0.343	35.0	308.2	20.7
2/1	31	0.309	35.0	308.2	19.6
2/2	174	0.304	35.0	308.2	19.5
2/3	383	0.378	35.0	308.2	21.7
2/4	952	0.417	35.0	308.2	22.8
2/5	1161	0.402	35.0	308.2	22.4
2/6	1304	0.402	35.0	308.2	22.4
Average			35.0	308.2	20.0

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -20 mm
Absolute pressure in stack (hPa) : 1008.04 hPa

STACK ANALYSIS - PM10 CALCULATIONS

AECOM

Date:	14-May-13	Client:	Weston Aluminium
AECDM's Project No:	60287751	Stack/Duct Description:	Stack 4

1. Gas Analysis

	%		
$\%CO_2$	0.0		
$\%O_2$	20.9		
$\%N_2+\%CO$	79.1		
Fraction Moisture Content, Bws	0.01	M_d=	0.99

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.84
Mol. Wt. of Stack Gas (wet)	28.60

3. Absolute Stack Pressure

	Pascals	in. Hg
Barometric Pressure (Pbar)	101000	29.82
Stack Static Pressure (Pg)	100804	29.76
Absolute Stack Pressure		29.76

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	35.0	95.0
Average Meter Temperature:	16.3	
Stack Gas Viscosity		187.0

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.47	0.0165	16.52	0.28

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.131	83.67	27.54	0.759	1.228	63.53	20.84	102.78	33.72
2	0.160	55.68	18.33	0.722	1.251	40.21	13.19	69.67	22.86
3	0.165	52.53	17.29	0.714	1.256	37.53	12.31	65.98	21.65
4	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
5	0.188	40.54	13.34	0.668	1.281	27.07	8.88	51.93	17.04
6	0.217	30.38	10.00	0.575	1.322	17.46	5.73	40.16	13.18
7	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
8	0.274	19.09	6.29	#NUM!	1.430	9.55	3.13	27.30	8.96
9	0.309	14.97	4.93	#NUM!	1.515	7.48	2.46	22.45	7.37
10	0.338	12.53	4.12	#NUM!	1.595	6.26	2.06	18.79	6.17
11	0.409	8.53	2.81	#NUM!	1.826	4.26	1.40	12.79	4.20

	Nozzle Diameter	Nozzle Diameter	Nozzle Area	Sample Rate
Selected Nozzle	(inches)	(m)	(m^2)	(L/min)
2	0.160	0.004	0.000013	13.1

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 14-May-13 Client: Weston Aluminium
AECOM's Project No: 60287751 Stack/Duct Description: Stack 4

7.Sampling Time Total Run Time 60 Number of points 12

Velocity Head (pitot) Pa	Vel Head in H20	Sqr Root	Dwell time mins
230.54	0.93	0.96	4.2
230.54	0.93	0.96	4.2
225.63	0.91	0.95	4.2
299.21	1.20	1.10	4.8
343.35	1.38	1.17	5.2
343.35	1.38	1.17	5.2
309.02	1.24	1.11	4.9
304.11	1.22	1.10	4.9
377.69	1.52	1.23	5.4
416.93	1.67	1.29	5.7
402.21	1.61	1.27	5.6
402.21	1.61	1.27	5.6
	Average	1.13	60.00
	Square	1.28	

Total time min	Full hours	Full minutes	Seconds
4.3	0	4	15
8.5	0	8	30
12.8	0	12	45
17.5	0	17	30
22.8	0	22	45
28.0	0	28	0
32.8	0	32	45
37.5	0	37	30
43.0	0	43	0
48.8	0	48	45
54.5	0	54	30
60.0	1	0	0

Aerodynamic Cut Size (u_{cyc})
187.9

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0135

Actual D_{50}
9.9

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 4

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.8028 m^3

Average gas meter temp. ($T_{M,2}$): 16.3 °C

289.5 K

Average barometric pressure (P_{BARO}) 1010 hPa

Average pressure at meter ($P_{M,2}$) 1010.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.7552 m^3

(B) PM10 concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: T2 PM10 Weight 0.0006 g

Final PM10 Weight (Mp1): 0.00060 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ 0.00079 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.79 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00079 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.79 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.11 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 110 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P31

V_v = 7.9 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0105

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.38 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.121 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.04 m/s

(ii) Average of post-sampling velocities: 19.99 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.02 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.60 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_{ws})}{100}$$

Qstd = 26.6 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.021	g/s (0°C, dry gas, 1 atm pressure)		
	=	21	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.021	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	21	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	2.9	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	2900	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 4

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.9783	m^3	Average barometric pressure (P_{BARO})	1010 hPa
Average gas meter temp. ($T_{M,2}$):	17.0	°C		
	290.2	K	Average pressure at meter ($P_{M,2}$)	1010.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9180	m^3		

(B) Total Particulate concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: T19 Total Particulate Weight 0.0009 g

Final Total Particulate Weight (Mp1): 0.00090 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.00098 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.98 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00098 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.98 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.14 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 140 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 21

V_v = 10.2 g (from laboratory report) V_w = 2 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0027

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0136

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.74 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.121 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.04 m/s

(ii) Average of post-sampling velocities: 19.99 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.02 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.60 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 26.5 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.026	g/s (0°C, dry gas, 1 atm pressure)		
	=	26	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.026	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	26	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	3.6	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	3600	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 4

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.0221	m^3	Average barometric pressure (P_{BARO})	1010 hPa
Average gas meter temp. ($T_{M,2}$):	17.2	°C		
	290.4	K	Average pressure at meter ($P_{M,2}$)	1010.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9585	m^3		

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Total Fluoride Weight 0.000211 g

Final Total Fluoride Weight (Mp1): 0.00021 g

Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.00022 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.22 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00022 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.22 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.031 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 31 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P2

V_v = 7.4 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0099

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.02 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Fluoride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.121 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.04 m/s

(ii) Average of post-sampling velocities: 19.99 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.02 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 30.60 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 26.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0059	g/s (0°C, dry gas, 1 atm pressure)		
	=	5.9	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0059	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	5.9	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.82	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	820	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 4
WESTON ALUMINIUM
14-May-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
TOTAL FLUORIDE

Sampling Conditions:			
Stack internal diameter at test location	1395 mm		
Stack gas temperature (average)	34.6 °C		307.8 K
Stack pressure (average)	1008 hPa		
Stack gas velocity (average, stack conditions)	20 m/s		
Stack gas flowrate (stack conditions)	31 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	27 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	10:36	-	11:38
Fine Particulate (PM10) Mass	0.6 mg		
Gas Volume Sampled	0.755 m^3		
Fine Particulate (PM10) Emission*1	0.79 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	21 mg/s		
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	10:36	-	11:38
Total Particulate Mass	0.9 mg		
Gas Volume Sampled	0.918 m^3		
Total Particulate Emission*1	0.98 mg/m^3		
Total Particulate Mass Emission Rate*2	26 mg/s		
Regulatory Limit	50 mg/m^3		
Total Fluoride Testing			
Test Period	10:36	-	11:38
Total Fluoride Mass	0.211 mg		
Gas Volume Sampled	0.958 m^3		
Total Fluoride Emission*1	0.22 mg/m^3		
Total Fluoride Mass Emission Rate*2	5.9 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	1.4		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 5

Date Sampled: 13-May-13

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Hazardous Substances (Metals)	NSW EPA TM - 12, 13 & 14

Observations made during testing period:

Sampling Performed By:

Peter Waddingham

Colin Clark

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Hazardous Substances (Metals)

Measurement/Observations				
Stack Internal Dimensions: Diameter 1490 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 1.74 m^2 Minimum No. of sampling points= 12	
Distance from sampling plane to nearest disturbances: Upstream (m) = 10 No. Diameters = 6.7 Type of Upstream Disturbance: Fan Junction Downstream (m) = 10 No. Diameters = 6.7 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 12 PM2.5/10= 12 No. of sampling traverses/ports sampled = 2 PM2.5/10= 2 No. of sampling points on each traverse/port = 6 PM2.5/10= 6	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36	66	36
2	218	188	218	188
3	441	411	441	411
4	1049	1019	1049	1019
5	1272	1242	1272	1242
6	1424	1394	1424	1394
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Hazardous Substances (Metals)

Sampling time start: 10:10		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:10	2	20.5	0.0
2	10:11	2	20.5	0.0
3	10:12	2	20.5	0.0
4	10:13	2	20.5	0.0
5	10:14	2	20.5	0.0
6	10:15	2	20.5	0.0
7	10:16	2	20.5	0.0
8	10:17	2	20.5	0.0
	Averages:	2.0 ppm	20.5 %	0.0 %

Moisture content (M3): 1.00
Moisture percentage (M2): 0.50 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.5 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	79.1 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	0.50 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Hazardous Substances (Metals)

Sampling time start: 12:33		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:33	2	20.8	0.0
2	12:34	2	20.8	0.0
3	12:35	2	20.8	0.0
4	12:36	2	20.8	0.0
5	12:37	2	20.8	0.0
6	12:38	2	20.8	0.0
7	12:39	2	20.8	0.0
8	12:40	2	20.8	0.0
	Averages:	2.0 ppm	20.8 %	0.0 %

Moisture content (M3): 0.96
Moisture percentage (M2): 4.27 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.2 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	75.8 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	19.9 %,(wet)
H_2O:	4.27 %(=M2)		

Therefore, stack gas density (GD) =	1.27 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Hazardous Substances (Metals)

Time :	10:15	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.235	74.0	347.2	18.1
1/2	188	0.208	74.0	347.2	17.0
1/3	411	0.118	74.0	347.2	12.8
1/4	1019	0.173	73.0	346.2	15.5
1/5	1242	0.163	73.0	346.2	15.0
1/6	1394	0.102	72.0	345.2	11.9
2/1	36	0.199	72.0	345.2	16.6
2/2	188	0.221	73.0	346.2	17.5
2/3	411	0.217	74.0	347.2	17.4
2/4	1019	0.169	74.0	347.2	15.3
2/5	1242	0.232	74.0	347.2	18.0
2/6	1394	0.143	73.0	346.2	14.1
Average			73.3	346.5	15.8

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -6.9 mm
Absolute pressure in stack (hPa) : 1015.32 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: fine5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.9 x $10^{-5}m^2$
Thimble No: T13
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 37.9175 Meter finish: 37.9175
Time start: 11:02 Time finish: 11:03

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 39.2123 Meter finish: 39.2123
Time start: 12:41 Time finish: 12:42

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 37.9224 Time start: 11:09
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:08:00	66	13.7	25.0	17.0		Yes
1/2	0:07:30	218	13.7	28.0	18.0		Yes
1/3	0:05:45	441	13.7	28.0	18.0		Yes
1/4	0:07:00	1049	13.7	29.0	19.0		Yes
1/5	0:06:45	1272	13.7	30.0	20.0		Yes
1/6	0:05:15	1424	13.7	32.0	20.0		Yes
2/1	0:07:30	66	13.7	32.0	22.0		Yes
2/2	0:07:45	218	13.7	33.0	22.0		Yes
2/3	0:07:45	441	13.7	34.0	23.0		Yes
2/4	0:06:45	1049	13.7	35.0	24.0		Yes
2/5	0:08:00	1272	13.7	35.0	24.0		Yes
2/6	0:06:15	1424	13.7	35.0	24.0		Yes
Averages				31.3	20.9	no result	

Meter Finish: 39.2078 Time Finish: 12:40
Total Condensate collected: 36 ml Silica gel No(s) used: P6

AECOM

STACK ANALYSIS

SAMPLING OF TOTAL PARTICULATE

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: s2 Sample Nozzle Area (An): 1.27 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: T15
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 134.5568 Meter finish: 134.5568
Time start: 11:03 Time finish: 11:04

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 135.6544 Meter finish: 135.6544
Time start: 12:42 Time finish: 12:43

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 134.5584 Time start: 11:09
Meter correction factor (GMf) : 1.0022

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:00	66	11.7	20.0	19.0		Yes
1/2	0:14:00	218	11.0	22.0	18.0		Yes
1/3	0:21:00	441	8.3	23.0	18.0		Yes
1/4	0:28:00	1049	10.1	23.0	18.0		Yes
1/5	0:35:00	1272	9.7	24.0	19.0		Yes
1/6	0:42:00	1424	7.7	25.0	19.0		Yes
2/1	0:49:00	66	10.8	25.0	20.0		Yes
2/2	0:56:00	218	11.4	26.0	20.0		Yes
2/3	1:03:00	441	11.3	27.0	22.0		Yes
2/4	1:10:00	1049	9.9	27.0	22.0		Yes
2/5	1:17:00	1272	11.6	27.0	22.0		Yes
2/6	1:24:00	1424	9.1	27.0	22.0		Yes
Averages				24.7	19.9	no result	

Meter Finish: 135.6518 Time Finish: 12:40
Total Condensate collected: 34 ml Silica gel No(s) used: P5

AECOM

STACK ANALYSIS

SAMPLING OF HAZARDOUS SUBSTANCES (METALS)

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: g5
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.89 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 24.1220 Meter finish: 24.1220
Time start: 11:04 Time finish: 11:05

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 25.5650 Meter finish: 25.5650
Time start: 12:43 Time finish: 12:24

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1016 hPa (start); 1016 hPa (finish)
Meter start: 24.1253 Time start: 11:09
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:00	66	17.5	26.0	18.0		Yes
1/2	0:14:00	218	16.4	27.0	18.0		Yes
1/3	0:21:00	441	12.4	28.0	18.0		Yes
1/4	0:28:00	1049	15.0	29.0	18.0		Yes
1/5	0:35:00	1272	14.5	30.0	19.0		Yes
1/6	0:42:00	1424	11.6	30.0	19.0		Yes
2/1	0:49:00	66	16.1	30.0	19.0		Yes
2/2	0:56:00	218	16.9	31.0	20.0		Yes
2/3	1:03:00	441	16.8	32.0	21.0		Yes
2/4	1:10:00	1049	14.8	32.0	21.0		Yes
2/5	1:17:00	1272	17.4	32.0	21.0		Yes
2/6	1:24:00	1424	13.7	32.0	21.0		Yes
Averages				29.9	19.4	no result	

Meter Finish: 25.5606 Time Finish: 12:40
Total Condensate collected: 10 ml Silica gel No(s) used: 5A9

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 13-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Hazardous Substances (Metals)

Time :	12:33	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.274	66.0	339.2	19.4
1/2	188	0.260	67.0	340.2	19.0
1/3	411	0.243	67.0	340.2	18.3
1/4	1019	0.219	67.0	340.2	17.4
1/5	1242	0.166	65.0	338.2	15.1
1/6	1394	0.140	64.0	337.2	13.9
2/1	36	0.277	67.0	340.2	19.6
2/2	188	0.292	67.0	340.2	20.1
2/3	411	0.269	68.0	341.2	19.3
2/4	1019	0.229	68.0	341.2	17.8
2/5	1242	0.232	67.0	340.2	17.9
2/6	1394	0.225	67.0	340.2	17.6
Average			66.7	339.9	18.0

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -4.1 mm
Absolute pressure in stack (hPa) : 1015.60 hPa

AECOM

Stack Analysis - Hazardous Substances Elemental Analysis Results

Date: 13-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

	Particulate Metals Results	Gaseous Metals Results	Oixdisable Mercury Results		
Metal	Front Half, Filter, Acetone Rinses and Acid Rinses (mg). Containers 1, 2 and 3	Back Half, Impingers + Acid Rinses (mg) Container 4	KD Impinger + Acid Rinses (mg) (5A)	$KMnD_4$/ H_2SO_4 + Rinses (mg) (5B)	Residue Rinse 8N HCl (mg) (If Required) (5C)
Antimony	<0.0005	<0.0005			
Arsenic	0.00004	<0.0005			
Beryllium	<0.0005	<0.0005			
Cadmium	0.051	0.002			
Chromium	0.0033	0.0036			
Cobalt	<0.0005	<0.0005			
Copper	0.0028	0.0023			
Lead	0.01	0.0042			
Magnesium	0.12	0.014			
Manganese	0.035	0.018			
Mercury	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	0.0037	0.0029			
Selenium	0.0017	<0.0005			
Thallium	<0.0005	<0.0005			
Tin	0.00045	0.0015			
Vanadium	0.0006	<0.0005			
Zinc	0.72	0.017			

Note: Where the blank has returned a less than value, half of this value was subtracted from the sample result as a blank correction ie for a blank value of <0.0005, 0.00025 was subtracted from the sample result.

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

Stack Analysis - Hazardous Substances Elemental Analysis Results Continued

Date: 13-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

Sample	Total Particulate Metals (mg)	Total Particulate Metals (mg/m^3)	Total Gaseous Metals (mg)	Total Gaseous Metals (mg/m^3)	Total Oxidisable Mercury (mg)	Total Oxidisable Mercury (mg/m^3)	Total (mg)	Total (mg/m^3)	Mass Emission Rate (mg/s)
Antimony	<0.0005	<0.00038	<0.0005	<0.00038			<0.002	<0.0015	<0.034
Arsenic	0.00004	0.00003	<0.0005	<0.00038			0.00004	0.00003	0.00069
Beryllium	<0.0005	<0.00038	<0.0005	<0.00038			<0.000015	<0.000011	<0.00025
Cadmium	0.051	0.038	0.002	0.0015			0.05	0.038	0.87
Chromium	0.0033	0.0025	0.0036	0.0027			0.007	0.0053	0.12
Cobalt	<0.0005	<0.00038	<0.0005	<0.00038			<0.00015	<0.00011	<0.0025
Copper	0.0028	0.0021	0.0023	0.0017			0.005	0.0038	0.087
Lead	0.01	0.0075	0.0042	0.0032			0.01	0.0075	0.17
Magnesium	0.12	0.09	0.014	0.011			0.1	0.075	1.7
Manganese	0.035	0.026	0.018	0.014			0.05	0.038	0.87
Mercury	<0.0005	<0.00038	<0.0005	<0.00038	<0.0005	<0.00038	<0.000025	<0.000019	<0.00044
Nickel	0.0037	0.0028	0.0029	0.0022			0.007	0.0053	0.12
Selenium	0.0017	0.0013	<0.0005	<0.00038			0.0017	0.0013	0.03
Thallium	<0.0005	<0.00038	<0.0005	<0.00038			<0.004	<0.003	<0.069
Tin	0.00045	0.00034	0.0015	0.0011			0.002	0.0015	0.034
Vanadium	0.0006	0.00045	<0.0005	<0.00038			0.0006	0.00045	0.01
Zinc	0.72	0.54	0.017	0.013			0.7	0.53	12
Total Hazardous Metals*	0.11	0.079	0.031	0.024	<0.00025	<0.00038	0.13	0.097	2.2
Total Metals	0.95	0.71	0.066	0.05			0.93	0.7	16

* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

STACK ANALYSIS - PM10 CALCULATIONS

AECOM

Date:	13-May-13	Client:	Weston
AECOM's Project No:	60287751	Stack/Duct Description:	Stack 5

1. Gas Analysis

	%		
$\%CO_2$	0.0		
$\%O_2$	20.8		
$\%N_2+\%CO$	79.5		
Fraction Moisture Content, 8ws	0.05	M_s=	0.95

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.82
Mol. Wt. of Stack Gas (wet)	28.77

3. Absolute Stack Pressure

	Pascals	In. Hg
Barometric Pressure (Pbar)	101600	29.99
Stack Static Pressure (Pg)	101560	29.98
Absolute Stack Pressure		29.98

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	66.7	152.0
Average Meter Temperature:	26.1	
Stack Gas Viscosity		199.2

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.51	0.0180	18.04	0.30

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.138	82.22	27.06	0.753	1.232	61.92	20.31	101.31	33.24
2	0.161	60.21	19.82	0.723	1.251	43.53	14.28	75.31	24.71
3	0.164	58.20	19.16	0.719	1.253	41.83	13.72	72.95	23.93
4	0.200	38.67	12.80	0.638	1.295	24.82	8.14	50.36	16.52
5	0.194	41.61	13.70	0.657	1.287	27.33	8.97	53.53	17.56
6	0.220	32.35	10.65	0.571	1.323	18.46	6.06	42.81	14.04
7	0.239	27.33	9.00	0.464	1.356	13.67	4.48	37.06	12.16
8	0.264	22.44	7.39	#NUM!	1.404	11.22	3.68	31.49	10.33
9	0.292	18.34	6.04	#NUM!	1.466	9.17	3.01	26.89	8.82
10	0.341	13.46	4.43	#NUM!	1.594	6.73	2.21	20.19	6.62
11	0.389	10.32	3.40	#NUM!	1.745	5.16	1.69	15.48	5.08

	Nozzle Diameter	Nozzle Diameter	Nozzle Area	Sample Rate
Selected Nozzle	(inches)	(m)	(m^2)	(L/min)
5	0.194	0.005	0.000019	12.4

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 13-May-13 Client: Weston
AECDM's Project No: 60287751 Stack/Duct Description: Stack 5

7.Sampling Time Total Run Time 84 Number of points 12

Velocity Head (pitot) P_g	Vel Head in H20	Sqr Root	Dwell time mins
273.70	1.10	1.05	7.6
259.97	1.04	1.02	7.4
243.29	0.98	0.99	7.1
218.76	0.88	0.94	6.8
165.79	0.67	0.82	5.9
140.28	0.56	0.75	5.4
276.64	1.11	1.05	7.6
292.34	1.17	1.08	7.8
268.79	1.08	1.04	7.5
228.57	0.92	0.96	6.9
232.50	0.93	0.97	7.0
224.65	0.90	0.95	6.9
	Average	0.97	84.00
	Square	0.94	

Tetal time min	Full hours	Full minutes	Seconds
8.0	0	8	0
15.5	0	15	30
21.3	0	21	15
28.3	0	28	15
35.0	0	35	0
40.3	0	40	15
47.8	0	47	45
55.5	0	55	30
63.3	1	3	15
70.0	1	10	0
78.0	1	18	0
84.3	1	24	15

Aeredynamic Cut Size (u_{cyc})
204.5

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0172

Actual D_{50}
8.9

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.2891 m^3

Average gas meter temp. ($T_{M,2}$): 26.1 °C

299.3 K

Average barometric pressure (P_{BARO}) 1016 hPa

Average pressure at meter ($P_{M,2}$) 1016.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1799 m^3

(B) PM10 concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: T13

Blank weight: g

PM10 Weight 0.0004 g

Final PM10 Weight (Mp1): 0.00040 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ 0.00034 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.34 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00034 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.34 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.014 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 14 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P6

V_v = 11.6 g (from laboratory report) V_w = 36 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0480

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0155

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 5.11 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.32 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.053 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 15.77 m/s

(ii) Average of post-sampling velocities: 17.95 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.86 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.40 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 22.3 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0076	g/s (0°C, dry gas, 1 atm pressure)		
	=	7.6	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0076	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	7.6	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.3	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	300	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.0958 m^3

Average gas meter temp. ($T_{M,2}$): 22.3 °C

295.5 K

Average barometric pressure (P_{BARO}) 1016 hPa

Average pressure at meter ($P_{M,2}$) 1016.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.0159 m^3

(B) Total Particulate concentration at standard conditions

Blank thimble No.:

Blank weight: g

Thimble No. used: T15

Total Particulate Weight 0.0006 g

Final Total Particulate Weight (Mp1): 0.00060 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.00059 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.59 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00059 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.59 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.024 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 24 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P5

V_v = 10.4 g (from laboratory report) V_w = 34 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0453

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0139

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 5.51 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.33 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.061 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 15.77 m/s

(ii) Average of post-sampling velocities: 17.95 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.86 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.40 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 22.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.013	g/s (0°C, dry gas, 1 atm pressure)		
	=	13	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.013	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	13	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.52	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	520	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Hazardous Substances (Metals)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.4431	m^3	Average barometric pressure (P_{BARO})	1016 hPa
Average gas meter temp. ($T_{M,2}$):	24.7	°C		
	297.9	K	Average pressure at meter ($P_{M,2}$)	1016.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.3270	m^3		

(B) Metals concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Metals Weight 0.00013 g

Final Metals Weight (Mp1): 0.00013 g

Metals Concentration (C1): $=M_{p1}/MV_4=$ 0.000098 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.098 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.000098 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.098 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0039 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 3.9 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 5A9

V_v = 12.2 g (from laboratory report) V_w = 10 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0133

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0163

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.18 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Hazardous Substances (Metals)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.30 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.037 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 15.77 m/s

(ii) Average of post-sampling velocities: 17.95 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.86 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.40 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 22.9 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0022	g/s (0°C, dry gas, 1 atm pressure)		
	=	2.2	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0022	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	2.2	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.09	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	90	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 5
WESTON
13-May-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
HAZARDOUS SUBSTANCES (METALS)

Sampling Conditions:			
Stack internal diameter at test location	1490 mm		
Stack gas temperature (average)	70.0 °C		343.2 K
Stack pressure (average)	1015 hPa		
Stack gas velocity (average, stack conditions)	17 m/s		
Stack gas flowrate (stack conditions)	29 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	22 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	11:09	-	12:40
Fine Particulate (PM10) Mass	0.4 mg		
Gas Volume Sampled	1.18 m^3		
Fine Particulate (PM10) Emission*1	0.34 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	7.6 mg/s		
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	11:09	-	12:40
Total Particulate Mass	0.6 mg		
Gas Volume Sampled	1.02 m^3		
Total Particulate Emission*1	0.59 mg/m^3		
Total Particulate Mass Emission Rate*2	13 mg/s		
Regulatory Limit	10 mg/m^3		
Hazardous Substances (Metals) Testing			
Test Period	11:09	-	12:40
Hazardous Substances (Metals) Mass	0.13 mg		
Gas Volume Sampled	1.33 m^3		
Hazardous Substances (Metals) Emission*1	0.098 mg/m^3		
Hazardous Substances (Metals) Mass Emission Rate*2	2.2 mg/s		
Regulatory Limit	5 mg/m^3		
Moisture Content (%)	3.8		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 5

Date Sampled: 14-May-13

ANALYTE(S)	**METHOD**
Hydrogen Chloride	NSW EPA TM - 7 & 8
Chlorine	NSW EPA TM - 7 & 8

Observations made during testing period:

Sampling Performed By:

Peter Waddingham

Colin Clark

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Hydrogen Chloride
Test 2: Chlorine

Measurement/Observations				
Stack Internal Dimensions:				
Diameter	1490 mm		Cross Sectional Area	1.74 m^2
OR	Length	Width		
Length/Width (mm)			Minimum No. of	
Equivalent Diameter	N/A mm		sampling points=	12
Distance from sampling plane to nearest disturbances:			Total No. of sampling points =	12
			PM2.5/10=	NA
Upstream (m) =	10		No. of sampling traverses/ports sampled =	2
No. Diameters =	6.7		PM2.5/10=	NA
Type of Upstream Disturbance:	Fan Junction		No. of sampling points on each traverse/port =	6
Downstream (m) =	10		PM2.5/10=	NA
No. Diameters =	6.7			
Type of Down Stream Disturbance:	Stack Exit			

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36		
2	218	188		
3	441	411		
4	1049	1019		
5	1272	1242		
6	1424	1394		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Hydrogen Chloride
Test 2: Chlorine

Sampling time start: 10:15		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:15	8	20.8	0.0
2	10:16	8	20.8	0.0
3	10:17	8	20.8	0.0
4	10:18	8	20.8	0.0
5	10:19	8	20.8	0.0
6	10:20	8	20.8	0.0
7	10:21	8	20.8	0.0
8	10:22	8	20.8	0.0
	Averages:	8.0 ppm	20.8 %	0.0 %

Moisture content (M3): 1.00
Moisture percentage (M2): 0.50 %

Measurements

CO:	0.0008 %,(dry)	N_2:	79.2 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0008 %,(wet)	N_2:	78.8 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.7 %,(wet)
H_2O:	0.50 %(=M2)		

Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Hydrogen Chloride
Test 2: Chlorine

Sampling time start: 14:20		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	14:20	2	20.6	0.0
2	14:21	3	20.6	0.0
3	14:22	3	20.6	0.0
4	14:23	2	20.6	0.0
5	14:24	2	20.6	0.0
6	14:25	2	20.6	0.0
7	14:26	1	20.6	0.0
8	14:27	1	20.6	0.0
	Averages:	2.0 ppm	20.6 %	0.0 %

Moisture content (M3): 0.97
Moisture percentage (M2): 3.00 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.4 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.6 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	77.0 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.0 %,(wet)
H_2O:	3.00 %(=M2)		
Therefore, stack gas density (GD) =		1.27 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =		1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Hydrogen Chloride
Test 2:Chlorine

Time :	10:30	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.29	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.215	47.0	320.2	16.6
1/2	188	0.218	48.0	321.2	16.8
1/3	411	0.206	49.0	322.2	16.3
1/4	1019	0.228	49.0	322.2	17.2
1/5	1242	0.163	49.0	322.2	14.5
1/6	1394	0.172	50.0	323.2	14.9
2/1	36	0.181	50.0	323.2	15.3
2/2	188	0.195	50.0	323.2	15.9
2/3	411	0.230	50.0	323.2	17.3
2/4	1019	0.265	50.0	323.2	18.5
2/5	1242	0.197	50.0	323.2	16.0
2/6	1394	0.165	50.0	323.2	14.6
Average			49.3	322.5	16.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -10 mm
Absolute pressure in stack (hPa) : 1015.02 hPa

AECOM

STACK ANALYSIS
SAMPLING OF HYDROGEN CHLORIDE

Date: 14-May-13
Client: Weston
AECDM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: g4
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.28 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 136.5401 Meter finish: 136.5401
Time start: 11:06 Time finish: 12:07

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 137.2514 Meter finish: 137.2514
Time start: 12:10 Time finish: 12:11

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 136.5426 Time start: 11:06
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	11.8	16.0	15.0		Yes
1/2	0:10:00	218	11.9	16.0	15.0		Yes
1/3	0:15:00	441	11.5	18.0	16.0		Yes
1/4	0:20:00	1049	12.1	18.0	16.0		Yes
1/5	0:25:00	1272	10.2	19.0	16.0		Yes
1/6	0:30:00	1424	10.5	21.0	16.0		Yes
2/1	0:35:00	66	10.7	21.0	16.0		Yes
2/2	0:40:00	218	11.2	21.0	16.0		Yes
2/3	0:45:00	441	12.1	22.0	17.0		Yes
2/4	0:50:00	1049	13.0	22.0	17.0		Yes
2/5	0:55:00	1272	11.2	22.0	17.0		Yes
2/6	1:00:00	1424	10.3	22.0	17.0		Yes
Averages				19.8	16.2	no result	

Meter Finish: 137.2500 Time Finish: 12:07
Total Condensate collected: 4 ml Silica gel No(s) used: F97

AECOM

STACK ANALYSIS
SAMPLING OF CHLORINE

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: g4
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.28 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 136.5401 Meter finish: 136.5401
Time start: 11:06 Time finish: 12:07

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 137.2514 Meter finish: 137.2514
Time start: 12:10 Time finish: 12:11

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 136.5426 Time start: 11:06
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	11.8	16.0	15.0		Yes
1/2	0:10:00	218	11.9	16.0	15.0		Yes
1/3	0:15:00	441	11.5	18.0	16.0		Yes
1/4	0:20:00	1049	12.1	18.0	16.0		Yes
1/5	0:25:00	1272	10.2	19.0	16.0		Yes
1/6	0:30:00	1424	10.5	21.0	16.0		Yes
2/1	0:35:00	66	10.7	21.0	16.0		Yes
2/2	0:40:00	218	11.2	21.0	16.0		Yes
2/3	0:45:00	441	12.1	22.0	17.0		Yes
2/4	0:50:00	1049	13.0	22.0	17.0		Yes
2/5	0:55:00	1272	11.2	22.0	17.0		Yes
2/6	1:00:00	1424	10.3	22.0	17.0		Yes
Averages				19.8	16.2	no result	

Meter Finish: 137.2500 Time Finish: 12:07
Total Condensate collected: 4 ml Silica gel No(s) used: F97

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Hydrogen Chloride
Test 2:Chlorine

Time :	14:20	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.263	73.0	346.2	19.2
1/2	188	0.248	73.0	346.2	18.7
1/3	411	0.221	74.0	347.2	17.6
1/4	1019	0.218	74.0	347.2	17.5
1/5	1242	0.181	74.0	347.2	16.0
1/6	1394	0.186	74.0	347.2	16.2
2/1	36	0.192	74.0	347.2	16.4
2/2	188	0.206	74.0	347.2	17.0
2/3	411	0.220	74.0	347.2	17.6
2/4	1019	0.258	74.0	347.2	19.1
2/5	1242	0.194	74.0	347.2	16.5
2/6	1394	0.179	74.0	347.2	15.8
Average			73.8	347.0	17.3

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -11 mm
Absolute pressure in stack (hPa) : 1014.92 hPa

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Hydrogen Chloride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.7112 m^3

Average gas meter temp. ($T_{M,2}$): 18.0 °C

291.2 K

Average barometric pressure (P_{BARO}) 1008 hPa

Average pressure at meter ($P_{M,2}$) 1008.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.6638 m^3

(B) Hydrogen Chloride concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: 0 Hydrogen Chloride Weight <0.002 g

Final Hydrogen Chloride Weight (Mp1): <0.002 g

Hydrogen Chloride Concentration (C1): $=M_{p1}/MV_4=$ <0.003 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <3 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.003 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <3 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.14 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <140 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: F97

V_v = 11.4 g (from laboratory report) V_w = 4 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0053

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0152

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 3.00 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Hydrogen Chloride

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.29 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.31 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.071 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.16 m/s

(ii) Average of post-sampling velocities: 17.30 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.73 m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.17 m^3/s (stack conditions)

Qstd = Qstack x $\frac{Ps}{(Pstd)}$ x $\frac{(Tstd)}{(Ts)}$ x $\frac{(100 - B_w)}{100}$

Qstd = 23.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.069	g/s (0°C, dry gas, 1 atm pressure	)		
	=	<69	mg/s (0°C, dry gas, 1 atm pressure	)		
	C_{1a} x Qstd =	<0.069	g/s (0°C, dry gas, 1 atm pressure		12%	CO_2)
	=	<69	mg/s (0°C, dry gas, 1 atm pressure		12%	CO_2)
	C_{1a} x Qstd =	<3.2	g/s (0°C, dry gas, 1 atm pressure		7%	O_2)
	=	<3200	mg/s (0°C, dry gas, 1 atm pressure		7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Chlorine

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.7112 m^3
Average gas meter temp. ($T_{M,2}$): 18.0 °C
291.2 K

Average barometric pressure (P_{BARO}) 1008 hPa

Average pressure at meter ($P_{M,2}$) 1008.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.6638 m^3

(B) Chlorine concentration at standard conditions

Blank thimble No.:
Thimble No. used: 0
Final Chlorine Weight (Mp1): <0.002 g

Blank weight: g
Chlorine Weight <0.002 g

Chlorine Concentration (C1): $=M_{p1}/MV_4=$ <0.003 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <3 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %
Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.003 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <3 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %
Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.14 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <140 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: F97

V_v = 11.4 g (from laboratory report) V_w = 4 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0053
Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0152

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 3.00 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Chlorine

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.29 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.31 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.071 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.16 m/s

(ii) Average of post-sampling velocities: 17.30 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.73 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.17 m^3/s (stack conditions)

Qstd = Qstack x $\frac{Ps}{(Pstd)}$ x $\frac{(Tstd)}{(Ts)}$ x $\frac{(100 - B_w)}{100}$

Qstd = 23.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.069	g/s (0°C, dry gas, 1 atm pressure)		
	=	<69	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.069	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<69	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<3.2	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<3200	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 5
WESTON
14-May-13
HYDROGEN CHLORIDE
CHLORINE

Sampling Conditions:			
Stack internal diameter at test location	1490	mm	
Stack gas temperature (average)	61.6	°C	334.8 K
Stack pressure (average)	1015	hPa	
Stack gas velocity (average, stack conditions)	17	m/s	
Stack gas flowrate (stack conditions)	29	m^3/s	
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23	m^3/s	
Hydrogen Chloride Testing			
Test Period	11:06	-	12:07
Hydrogen Chloride Mass	<2	mg	
Gas Volume Sampled	0.664	m^3	
Hydrogen Chloride Emission*1	<3	mg/m^3	
Hydrogen Chloride Mass Emission Rate*2	<69	mg/s	
Regulatory Limit	10	mg/m^3	
Chlorine Testing			
Test Period	11:06	-	12:07
Chlorine Mass	<2	mg	
Gas Volume Sampled	0.664	m^3	
Chlorine Emission*1	<3	mg/m^3	
Chlorine Mass Emission Rate*2	<69	mg/s	
Regulatory Limit	N/A		
Moisture Content (%)	3.0		
Gas Density (dry at 1 atmosphere)	1.29	kg/m^3	
Dry Molecular Weight	28.8	g/g-mole	

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 5

Date Sampled: 14-May-13

ANALYTE(S)	**METHOD**
Total Fluoride	NSW EPA TM - 9
Sulfuric Acid Mist	NSW EPA TM - 3
Sulfur Dioxide	NSW EPA TM - 4

Observations made during testing period:

Sampling Performed By:

Peter Waddingham

Colin Clark

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Total Fluoride
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Measurement/Observations

Stack Internal Dimensions:

Diameter 1490 mm
OR Length Width
Length/Width (mm)
Equivalent Diameter N/A mm

Cross Sectional Area 1.74 m^2

Minimum No. of sampling points= 12

Distance from sampling plane to nearest disturbances:

Upstream (m) = 10
No. Diameters = 6.7
Type of Upstream Disturbance: Fan Junction
Downstream (m) = 10
No. Diameters = 6.7
Type of Down Stream Disturbance: Stack Exit

Total No. of sampling points = 12
PM2.5/10= NA
No. of sampling traverses/ports sampled = 2
PM2.5/10= NA
No. of sampling points on each traverse/port = 6
PM2.5/10= NA

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36		
2	218	188		
3	441	411		
4	1049	1019		
5	1272	1242		
6	1424	1394		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Total Fluoride
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 8:10		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	8:10	2	20.5	0.0
2	8:11	2	20.5	0.0
3	8:12	2	20.5	0.0
4	8:13	2	20.5	0.0
5	8:14	2	20.5	0.0
6	8:15	2	20.5	0.0
7	8:16	2	20.5	0.0
8	8:17	2	20.5	0.0
	Averages:	2.0 ppm	20.5 %	0.0 %

Moisture content (M3): 1.00
Moisture percentage (M2): 0.50 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.5 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	79.1 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	0.50 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1: Total Fluoride
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 10:15		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:15	8	20.8	0.0
2	10:16	8	20.8	0.0
3	10:17	8	20.8	0.0
4	10:18	8	20.8	0.0
5	10:19	8	20.8	0.0
6	10:20	8	20.8	0.0
7	10:21	8	20.8	0.0
8	10:22	8	20.8	0.0
	Averages:	8.0 ppm	20.8 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 1.82 %

Measurements

CO:	0.0008 %,(dry)	N_2:	79.2 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0008 %,(wet)	N_2:	77.8 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	1.82 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Total Fluoride
Test 2:Sulfuric Acid Mist (H2SO4 as SO3)
Test 3:Sulfur Dioxide (SO2 as SO3)

Time :	8:10	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.298	74.0	347.2	20.4
1/2	188	0.237	74.0	347.2	18.2
1/3	411	0.181	74.0	347.2	15.9
1/4	1019	0.200	73.0	346.2	16.7
1/5	1242	0.175	73.0	346.2	15.6
1/6	1394	0.154	72.0	345.2	14.6
2/1	36	0.248	72.0	345.2	18.5
2/2	188	0.266	73.0	346.2	19.2
2/3	411	0.197	74.0	347.2	16.6
2/4	1019	0.205	74.0	347.2	16.9
2/5	1242	0.180	74.0	347.2	15.8
2/6	1394	0.168	73.0	346.2	15.3
Average			73.3	346.5	17.0

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9.1 mm
Absolute pressure in stack (hPa) : 1015.11 hPa

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL FLUORIDE

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: old26
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.58 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 135.7030 Meter finish: 135.7030
Time start: 9:04 Time finish: 9:05
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 136.5289 Meter finish: 136.5289
Time start: 10:16 Time finish: 10:17
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 135.7052 Time start: 9:12
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	16.5	18.0	15.0		Yes
1/2	0:10:00	218	14.7	18.0	15.0		Yes
1/3	0:15:00	441	12.8	18.0	15.0		Yes
1/4	0:20:00	1049	13.5	19.0	15.0		Yes
1/5	0:25:00	1272	12.6	20.0	15.0		Yes
1/6	0:30:00	1424	11.9	21.0	16.0		Yes
2/1	0:35:00	66	15.0	22.0	16.0		Yes
2/2	0:40:00	218	15.5	22.0	16.0		Yes
2/3	0:45:00	441	13.4	22.0	16.0		Yes
2/4	0:50:00	1049	13.6	22.0	16.0		Yes
2/5	0:55:00	1272	12.8	22.0	16.0		Yes
2/6	1:00:00	1424	12.4	22.0	16.0		Yes
Averages				20.5	15.6	no result	

Meter Finish: 136.5278 Time Finish: 10:13
Total Condensate collected: 2 ml Silica gel No(s) used: 140

AECOM

STACK ANALYSIS

SAMPLING OF SULFURIC ACID MIST (H2SO4 AS SO3)

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: old22
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.81 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 25.5980 Meter finish: 25.5980
Time start: 9:05 Time finish: 9:06

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 26.5378 Meter finish: 26.5378
Time start: 10:17 Time finish: 10:18

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 25.6022 Time start: 9:12
Meter correction factor (GMf) : 1.0022

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	18.8	22.0	15.0		Yes
1/2	0:10:00	218	16.8	22.0	15.0		Yes
1/3	0:15:00	441	14.7	23.0	15.0		Yes
1/4	0:20:00	1049	15.4	24.0	15.0		Yes
1/5	0:25:00	1272	14.4	24.0	16.0		Yes
1/6	0:30:00	1424	13.5	25.0	16.0		Yes
2/1	0:35:00	66	17.1	25.0	16.0		Yes
2/2	0:40:00	218	17.7	26.0	17.0		Yes
2/3	0:45:00	441	15.3	26.0	17.0		Yes
2/4	0:50:00	1049	15.6	27.0	17.0		Yes
2/5	0:55:00	1272	14.6	28.0	17.0		Yes
2/6	1:00:00	1424	14.1	28.0	17.0		Yes
Averages				25.0	16.1	no result	

Meter Finish: 26.5348 Time Finish: 10:12
Total Condensate collected: 1 ml Silica gel No(s) used: G032

AECOM

STACK ANALYSIS

#N/A

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 5
Sample Nozzle No.: old22
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.81 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 25.5980 Meter finish: 25.5980
Time start: 9:05 Time finish: 9:06

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 26.5378 Meter finish: 26.5378
Time start: 10:17 Time finish: 10:18

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 25.6022 Time start: 9:12
Meter correction factor (GMf) : 1.0022

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	18.8	22.0	15.0		Yes
1/2	0:10:00	218	16.8	22.0	15.0		Yes
1/3	0:15:00	441	14.7	23.0	15.0		Yes
1/4	0:20:00	1049	15.4	24.0	15.0		Yes
1/5	0:25:00	1272	14.4	24.0	16.0		Yes
1/6	0:30:00	1424	13.5	25.0	16.0		Yes
2/1	0:35:00	66	17.1	25.0	16.0		Yes
2/2	0:40:00	218	17.7	26.0	17.0		Yes
2/3	0:45:00	441	15.3	26.0	17.0		Yes
2/4	0:50:00	1049	15.6	27.0	17.0		Yes
2/5	0:55:00	1272	14.6	28.0	17.0		Yes
2/6	1:00:00	1424	14.1	28.0	17.0		Yes
Averages				25.0	16.1	no result	

Meter Finish: 26.5348 Time Finish: 10:12
Total Condensate collected: 1 ml Silica gel No(s) used: G032

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 5
Test 1:Total Fluoride
Test 2:Sulfuric Acid Mist (H2SO4 as SO3)
Test 3:Sulfur Dioxide (SO2 as SO3)

Time :	10:30	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.215	47.0	320.2	16.7
1/2	188	0.218	48.0	321.2	16.8
1/3	411	0.206	49.0	322.2	16.4
1/4	1019	0.228	49.0	322.2	17.2
1/5	1242	0.163	49.0	322.2	14.5
1/6	1394	0.172	50.0	323.2	15.0
2/1	36	0.181	50.0	323.2	15.3
2/2	188	0.195	50.0	323.2	15.9
2/3	411	0.230	50.0	323.2	17.3
2/4	1019	0.265	50.0	323.2	18.6
2/5	1242	0.197	50.0	323.2	16.0
2/6	1394	0.165	50.0	323.2	14.7
Average			49.3	322.5	16.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -10 mm
Absolute pressure in stack (hPa) : 1015.02 hPa

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.8270 m^3

Average gas meter temp. ($T_{M,2}$): 18.0 °C

291.2 K

Average barometric pressure (P_{BARO}) 1008 hPa

Average pressure at meter ($P_{M,2}$) 1008.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.7719 m^3

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: 0

Blank weight: g

Total Fluoride Weight 0.000024 g

Final Total Fluoride Weight (Mp1): 0.00002 g

Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.000031 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.031 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.000031 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.031 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0012 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 1.2 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 140

V_v = 5.3 g (from laboratory report) V_w = 2 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0027

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0071

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.25 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Total Fluoride

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.29 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.055 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 16.20 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.59 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 28.93 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.4 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.00072	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.72	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.00072	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	0.72	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.029	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	29	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfuric Acid Mist (H2SO4 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.9347 m^3

Average gas meter temp. ($T_{M,2}$): 20.5 °C

293.7 K

Average barometric pressure (P_{BARO}) 1008 hPa

Average pressure at meter ($P_{M,2}$) 1008.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.8650 m^3

(B) H2SO4 as SO3 concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 H2SO4 as SO3 Weight <0.002 g

Final H2SO4 as SO3 Weight (Mp1): <0.002 g

H2SO4 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0023 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <2.3 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.0023 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <2.3 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.092 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <92 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G032

V_v = 12.9 g (from laboratory report) V_w = 1 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0013

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0172

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.10 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfuric Acid Mist (H2SO4 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.30 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.064 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 16.20 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.59 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 28.93 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.053	g/s (0°C, dry gas, 1 atm pressure)		
	=	<53	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.053	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<53	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<2.1	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<2100	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfur Dioxide (SO2 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.9347 m^3

Average gas meter temp. ($T_{M,2}$): 20.5 °C

293.7 K

Average barometric pressure (P_{BARO}) 1008 hPa

Average pressure at meter ($P_{M,2}$) 1008.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.8650 m^3

(B) SO2 as SO3 concentration at standard conditions

Blank thimble No.:

Thimble No. used: 0

Blank weight: g

SO2 as SO3 Weight <0.01 g

Final SO2 as SO3 Weight (Mp1): <0.01 g

SO2 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.012 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <12 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.012 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <12 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ #VALUE! g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = #VALUE! mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G032

V_v = 12.9 g (from laboratory report) V_w = 1 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0013

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0172

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 2.10 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfur Dioxide (SO2 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.30 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.064 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 16.20 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 16.59 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 28.93 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.28	g/s (0°C, dry gas, 1 atm pressure)		
	=	<280	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.28	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<280	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<11	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<11000	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 5
WESTON
14-May-13
TOTAL FLUORIDE
SULFURIC ACID MIST (H2SO4 AS SO3)
SULFUR DIOXIDE (SO2 AS SO3)

Sampling Conditions:			
Stack internal diameter at test location	1490 mm		
Stack gas temperature (average)	61.3 °C		334.5 K
Stack pressure (average)	1015 hPa		
Stack gas velocity (average, stack conditions)	17 m/s		
Stack gas flowrate (stack conditions)	29 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23 m^3/s		
Total Fluoride Testing			
Test Period	9:12	-	10:13
Total Fluoride Mass	0.024 mg		
Gas Volume Sampled	0.772 m^3		
Total Fluoride Emission*1	0.031 mg/m^3		
Total Fluoride Mass Emission Rate*2	0.72 mg/s		
Regulatory Limit	N/A		
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	9:12	-	10:12
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg		
Gas Volume Sampled	0.865 m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<2.3 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<53 mg/s		
Regulatory Limit	100 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Testing			
Test Period	9:12	-	10:12
Sulfur Dioxide (SO2 as SO3) Mass	<10 mg		
Gas Volume Sampled	0.865 m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	<12 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<280 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	1.2		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60246634

Emission Source: Stack 5

Date Sampled: 14-May-13

ANALYTE(S)	**METHOD**
Dioxins and Furans	NSW EPA TM - 18
Polycyclic Aromatic Hydrocarbons	NSW EPA OM - 6

Observations made during testing period:

Sampling Performed By:

Peter Waddingham

Colin Clark

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5
Test 1: Dioxins and Furans Lower Bound
Test 2: Dioxins and Furans Middle Bound
Test 3: Polycyclic Aromatic Hydrocarbons

Measurement/Observations				
Stack Internal Dimensions: Diameter 1490 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 1.74 m^2 Minimum No. of sampling points= 12	
Distance from sampling plane to nearest disturbances: Upstream (m) = 10 No. Diameters = 6.7 Type of Upstream Disturbance: Fan Junction Downstream (m) = 10 No. Diameters = 6.7 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 12 PM2.5/10= NA No. of sampling traverses/ports sampled = 2 PM2.5/10= NA No. of sampling points on each traverse/port = 6 PM2.5/10= NA	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36		
2	218	188		
3	441	411		
4	1049	1019		
5	1272	1242		
6	1424	1394		
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5
Test 1: Dioxins and Furans Lower Bound
Test 2: Dioxins and Furans Middle Bound
Test 3: Polycyclic Aromatic Hydrocarbons

Sampling time start: 8:10		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	8:10	2	20.5	0.0
2	8:11	2	20.5	0.0
3	8:12	2	20.5	0.0
4	8:13	2	20.5	0.0
5	8:14	2	20.5	0.0
6	8:15	2	20.5	0.0
7	8:16	2	20.5	0.0
8	8:17	2	20.5	0.0
	Averages:	2.0 ppm	20.5 %	0.0 %

Moisture content (M3): 1.00
Moisture percentage (M2): 0.50 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.5 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	79.1 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	0.50 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5
Test 1: Dioxins and Furans Lower Bound
Test 2: Dioxins and Furans Middle Bound
Test 3: Polycyclic Aromatic Hydrocarbons

Sampling time start: 14:20		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	14:20	2	20.6	0.0
2	14:21	3	20.6	0.0
3	14:22	3	20.6	0.0
4	14:23	2	20.6	0.0
5	14:24	2	20.6	0.0
6	14:25	2	20.6	0.0
7	14:26	1	20.6	0.0
8	14:27	1	20.6	0.0
	Averages:	2.0 ppm	20.6 %	0.0 %

Moisture content (M3): 0.99
Moisture percentage (M2): 0.91 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.4 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.6 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	78.7 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.4 %,(wet)
H_2O:	0.91 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5
Test 1:Dioxins and Furans Lower Bound
Test 2:Dioxins and Furans Middle Bound
Test 3:Polycyclic Aromatic Hydrocarbons

Time :	8:10	Barometric Pressure :	1016	hPa	
Page No. :	1 of 1	Pitot Correction Factor :	0.84		
Sampling Port No:	1 to 2	Stack Gas Density:	1.28	kg/m^3	
Pitot Tube Type :	S			(0 °C, Wet, 1 Atm)	

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.298	74.0	347.2	20.4
1/2	188	0.237	74.0	347.2	18.2
1/3	411	0.181	74.0	347.2	15.9
1/4	1019	0.200	73.0	346.2	16.7
1/5	1242	0.175	73.0	346.2	15.6
1/6	1394	0.154	72.0	345.2	14.6
2/1	36	0.248	72.0	345.2	18.5
2/2	188	0.266	73.0	346.2	19.2
2/3	411	0.197	74.0	347.2	16.6
2/4	1019	0.205	74.0	347.2	16.9
2/5	1242	0.180	74.0	347.2	15.8
2/6	1394	0.168	73.0	346.2	15.3
Average			73.3	346.5	17.0

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9.1 mm
Absolute pressure in stack (hPa) : 1015.11 hPa

AECOM

STACK ANALYSIS

SAMPLING OF DIOXINS AND FURANS

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack Description No.: Stack 5
Sample Nozzle No.: g4.5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: DAU080513A
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 39.2396 Meter finish: 39.2396
Time start: 8:28 Time finish: 8:29

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 44.3303 Meter finish: 44.3304
Time start: 14:35 Time finish: 14:36

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 39.2434 Time start: 8:32
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:30:00	66	16.9	30.0	18.0		Yes
1/2	1:00:00	218	15.1	32.0	19.0		Yes
1/3	1:30:00	441	13.2	34.0	20.0		Yes
1/4	2:00:00	1049	13.9	30.0	20.0		Yes
1/5	2:30:00	1272	13.0	30.0	20.0		Yes
1/6	3:00:00	1424	12.2	32.0	20.0		Yes
2/1	3:30:00	66	15.5	32.0	20.0		Yes
2/2	4:00:00	218	16.0	32.0	20.0		Yes
2/3	4:30:00	441	13.8	33.0	22.0		Yes
2/4	5:00:00	1049	14.0	35.0	24.0		Yes
2/5	5:30:00	1272	13.1	35.0	24.0		Yes
2/6	6:00:00	1424	12.7	35.0	24.0		Yes
Averages				32.5	20.9	no result	

Meter Finish: 44.3296 Time Finish: 14:33
Total Condensate collected: 23 ml Silica gel No(s) used: P1

AECOM

STACK ANALYSIS
SAMPLING OF

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack Description No.: Stack 5
Sample Nozzle No.: g4.5
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: DAU080513A
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 39.2396 Meter finish: 39.2396
Time start: 8:28 Time finish: 8:29

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 44.3303 Meter finish: 44.3304
Time start: 14:35 Time finish: 14:36

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 39.2434 Time start: 8:32
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:30:00	66	16.9	30.0	18.0		Yes
1/2	1:00:00	218	15.1	32.0	19.0		Yes
1/3	1:30:00	441	13.2	34.0	20.0		Yes
1/4	2:00:00	1049	13.9	30.0	20.0		Yes
1/5	2:30:00	1272	13.0	30.0	20.0		Yes
1/6	3:00:00	1424	12.2	32.0	20.0		Yes
2/1	3:30:00	66	15.5	32.0	20.0		Yes
2/2	4:00:00	218	16.0	32.0	20.0		Yes
2/3	4:30:00	441	13.8	33.0	22.0		Yes
2/4	5:00:00	1049	14.0	35.0	24.0		Yes
2/5	5:30:00	1272	13.1	35.0	24.0		Yes
2/6	6:00:00	1424	12.7	35.0	24.0		Yes
Averages				32.5	20.9	no result	

Meter Finish: 44.3296 Time Finish: 14:33
Total Condensate collected: 23 ml Silica gel No(s) used: P1

AECOM

STACK ANALYSIS

#N/A

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack Description No.: Stack 5
Sample Nozzle No.: g4.5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 39.2396 Meter finish: 39.2396
Time start: 8:28 Time finish: 8:29

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 44.3303 Meter finish: 44.3304
Time start: 14:35 Time finish: 14:36

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1008 hPa (start); 1008 hPa (finish)
Meter start: 39.2434 Time start: 8:32
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:30:00	66	16.9	30.0	18.0		Yes
1/2	1:00:00	218	15.1	32.0	19.0		Yes
1/3	1:30:00	441	13.2	34.0	20.0		Yes
1/4	2:00:00	1049	13.9	30.0	20.0		Yes
1/5	2:30:00	1272	13.0	30.0	20.0		Yes
1/6	3:00:00	1424	12.2	32.0	20.0		Yes
2/1	3:30:00	66	15.5	32.0	20.0		Yes
2/2	4:00:00	218	16.0	32.0	20.0		Yes
2/3	4:30:00	441	13.8	33.0	22.0		Yes
2/4	5:00:00	1049	14.0	35.0	24.0		Yes
2/5	5:30:00	1272	13.1	35.0	24.0		Yes
2/6	6:00:00	1424	12.7	35.0	24.0		Yes
Averages				32.5	20.9	no result	

Meter Finish: 44.3296 Time Finish: 14:33
Total Condensate collected: 23 ml Silica gel No(s) used: P1

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5
Test 1:Dioxins and Furans Lower Bound
Test 2:Dioxins and Furans Middle Bound
Test 3:Polycyclic Aromatic Hydrocarbons

Time :	14:20	Barometric Pressure :		1016	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.263	73.0	346.2	19.1
1/2	188	0.248	73.0	346.2	18.6
1/3	411	0.221	74.0	347.2	17.5
1/4	1019	0.218	74.0	347.2	17.4
1/5	1242	0.181	74.0	347.2	15.9
1/6	1394	0.186	74.0	347.2	16.1
2/1	36	0.192	74.0	347.2	16.4
2/2	188	0.206	74.0	347.2	16.9
2/3	411	0.220	74.0	347.2	17.5
2/4	1019	0.258	74.0	347.2	19.0
2/5	1242	0.194	74.0	347.2	16.5
2/6	1394	0.179	74.0	347.2	15.8

AECOM

Stack Analysis - Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results

Date: 14-May-13
Client: Weston
AECOM's Project No: 60246634
Stack/Duct Description: Stack 5

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	73000	73	0.073	16	0.016	370	0.37
2 - Methylnapthalene	14000	14	0.014	3	0.003	71	0.071
Acenaphthylene	26000	26	0.026	5.6	0.0056	130	0.13
Acenaphthene	1000	1	0.001	0.22	0.00022	5.1	0.0051
Fluorene	6400	6.4	0.0064	1.4	0.0014	32	0.032
Phenanthrene	16000	16	0.016	3.5	0.0035	81	0.081
Anthracene	990	0.99	0.00099	0.21	0.00021	5	0.005
Fluoranthene	1700	1.7	0.0017	0.37	0.00037	8.6	0.0086
Pyrene	990	0.99	0.00099	0.21	0.00021	5	0.005
Benz(a)anthracene	60	0.06	0.00006	0.013	0.000013	0.3	0.0003
Chrysene	140	0.14	0.00014	0.03	0.00003	0.71	0.00071
Benzo(b)fluoranthene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(e)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(a)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Perylene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Dibenzo(ah)anthracene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Benzo(ghi)perylene	<20	<0.02	<0.00002	0.0043	<0.0000043	<0.1	<0.0001
Sum of reported PAH's	140000	140	0.14	31	0.031	710	0.71

AECOM

60246634 Weston Stack 5 Speciated Dioxins and Furans Results					
Analyte	**Mass ng**	**Toxic Equivalency Factor (1 - TEFs)**	**Total Toxic Equivalence (1 - TEQs) ng**	**Concentration ng/m^3**	**Total Toxic Equivalence (1-TEQs) ng/m^3**
2,3,7,8-TCDF	0.0048	0.1	0.00048	0.001	0.0001
Total TCDF isomers	0.14				
2,3,7,8-TCDD	<0.0008	1	0.0004	<0.00017	0.000087
Total TCDD isomers	0.014				
1,2,3,7,8-PeCDF	0.0015	0.05	0.000075	0.00032	0.000016
2,3,4,7,8-PeCDF	0.0019	0.5	0.00095	0.00041	0.00021
Total PeCDF isomers	0.023				
1,2,3,7,8-PeCDD	<0.001	1	0.0005	<0.00022	0.00011
Total PeCDD isomers	<0.01				
1,2,3,4,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,6,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
2,3,4,6,7,8-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,7,8,9-HxCDF	<0.002	0.1	0.0001	<0.00043	0.000022
Total HxCDF isomers	<0.01				
1,2,3,4,7,8-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,6,7,8-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
1,2,3,7,8,9-HxCDD	<0.002	0.1	0.0001	<0.00043	0.000022
Total HxCDD isomers	0.011				
1,2,3,4,6,7,8-HpCDF	<0.001	0.01	0.000005	<0.00022	0.0000011
1,2,3,4,7,8,9-Hp CDF	<0.002	0.01	0.00001	<0.00043	0.0000022
Total HpCDF isomers	<0.003				
1,2,3,4,6,7,8-HpCDD	<0.004	0.01	0.00002	<0.00087	0.0000043
Total HpCDD isomers	<0.01				
DCDF	<0.003	0.0001	0.00000015	<0.00065	0.000000032
OCDD	0.024	0.0001	0.0000024	0.0052	0.00000052

I-TEQ$_{DF}$

Lower Bound (excluding LOD Values)	0.0015 ng
Middle Bound (including half LOD Values)	0.0031 ng
Date Tested **14-May-13**	

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Dioxins and Furans Lower Bound

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60246634 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	5.1009	m^3	Average barometric pressure (P_{BARO})	1008 hPa
Average gas meter temp. ($T_{M,2}$):	26.7	°C		
	299.9	K	Average pressure at meter ($P_{M,2}$)	1008.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	4.6227	m^3		

(B) Lower Bound concentration at standard conditions

Blank thimble No.: 0 Blank weight: µg

Thimble No. used: DAU080513A Lower Bound Weight 0.0000015 µg

Final Lower Bound Weight (Mp1): 0.00000 µg

Lower Bound Concentration (C1): $=M_{p1}/MV_4=$ 3.2E-07 µg/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.00032 ng/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00000032 µg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.00032 ng/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.6 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.00001 µg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.01 ng/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P1

V_v = 10.4 g (from laboratory report) V_w = 23 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0307

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0139

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 0.95 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Dioxins and Furans Lower Bound

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.29 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 17.23 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 17.10 m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.3 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0000075	µg/s (0°C, dry gas, 1 atm pressure)		
	=	0.0075	ng/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.0000075	µg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	0.0075	ng/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.00023	µg/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	0.23	ng/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Dioxins and Furans Middle Bound

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60246634 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	5.1009	m^3	Average barometric pressure (P_{BARO})	1008 hPa
Average gas meter temp. ($T_{M,2}$):	26.7	°C		
	299.9	K	Average pressure at meter ($P_{M,2}$)	1008.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	4.6227	m^3		

(B) Middle Bound concentration at standard conditions

Blank thimble No.: 0 Blank weight: µg

Thimble No. used: DAU080513A Middle Bound Weight 0.0000031 µg

Final Middle Bound Weight (Mp1): 0.00000 µg

Middle Bound Concentration (C1): $=M_{p1}/MV_4=$ 6.7E-07 µg/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.00067 ng/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00000067 µg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.00067 ng/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.6 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.000021 µg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.021 ng/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P1

V_v = 10.4 g (from laboratory report) V_w = 23 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0307

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0139

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 0.95 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Dioxins and Furans Middle Bound

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.29 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 17.23 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 17.10 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.3 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.000016	µg/s (0°C, dry gas, 1 atm pressure)		
	=	0.016	ng/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.000016	µg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	0.016	ng/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.00049	µg/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	0.49	ng/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Polycyclic Aromatic Hydrocarbons

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 14-May-13 Client: Weston

AECOM's Project No: 60246634 Stack/Duct Description: Stack 5

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	5.1009	m^3	Average barometric pressure (P_{BARO})	1008 hPa
Average gas meter temp. ($T_{M,2}$):	26.7	°C		
	299.9	K	Average pressure at meter ($P_{M,2}$)	1008.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	4.6227	m^3		

(B) PAH concentration at standard conditions

Blank thimble No.:	0		Blank weight:	g
Thimble No. used:	0		PAH Weight	0.00014 g
Final PAH Weight (Mp1):	0.00014 g			

PAH Concentration (C1): $=M_{p1}/MV_4=$ 0.00003 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.03 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.0 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.00003 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.03 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.6 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.00093 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.93 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P1

V_v = 6 g (from laboratory report) V_w = 23 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0307

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0080

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 0.83 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Polycyclic Aromatic Hydrocarbons

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.29 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.019 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 16.98 m/s

(ii) Average of post-sampling velocities: 17.23 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 17.10 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 29.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 23.3 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm = C_{1a} x Qstd =	0.0007	g/s (0°C, dry gas, 1 atm pressure)		
=	0.7	mg/s (0°C, dry gas, 1 atm pressure)		
C_{1a} x Qstd =	0.0007	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
=	0.7	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
C_{1a} x Qstd =	0.022	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
=	22	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 5
WESTON
14-May-13
DIOXINS AND FURANS

POLYCYCLIC AROMATIC HYDROCARBONS

Sampling Conditions:			
Stack internal diameter at test location	1490 mm		
Stack gas temperature (average)	73.6 °C		346.8 K
Stack pressure (average)	1016 hPa		
Stack gas velocity (average, stack conditions)	17 m/s		
Stack gas flowrate (stack conditions)	30 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	23 m^3/s		
Dioxins and Furans Lower Bound Testing			
Test Period	8:32	-	14:33
Dioxins and Furans Lower Bound Mass	0.0015 ng		
Gas Volume Sampled	4.62 m^3		
Dioxins and Furans Lower Bound Emission*1	0.00032 ng/m^3		
Dioxins and Furans Lower Bound Mass Emission Rate*2	0.0075 ng/s		
Regulatory Limit	0.1 ng/m^3		
Dioxins and Furans Middle Bound Testing			
Test Period	8:32	-	14:33
Dioxins and Furans Middle Bound Mass	0.0031 ng		
Gas Volume Sampled	4.62 m^3		
Dioxins and Furans Middle Bound Emission*1	0.00067 ng/m^3		
Dioxins and Furans Middle Bound Mass Emission Rate*2	0.016 ng/s		
Regulatory Limit	0.1 ng/m^3		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	8:32	-	14:33
Polycyclic Aromatic Hydrocarbons Mass	0.14 mg		
Gas Volume Sampled	4.62 m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.03 mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	0.7 mg/s		
Regulatory Limit	NA mg/m^3		
Moisture Content (%)	0.9		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.8 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston Aluminium

AECOM's Project Number: 60287751

Emission Source: Stack 6

Date Sampled: 13-May-13

ANALYTE(S)	**METHOD**
Total Particulate	NSW EPA TM - 15
Sulfuric Acid Mist	NSW EPA TM - 3
Sulfur Dioxide	NSW EPA TM - 4

Observations made during testing period:

Sampling Performed By: James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Particulate
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Measurement/Observations

Stack Internal Dimensions:

Diameter 580 mm
OR Length Width
Length/Width (mm)
Equivalent Diameter N/A mm

Cross Sectional Area 0.26 m^2

Minimum No. of sampling points= 8

Distance from sampling plane to nearest disturbances:

Upstream (m) = 5
No. Diameters = 8.6
Type of Upstream Disturbance: Bend
Downstream (m) = 3
No. Diameters = 5.2
Type of Down Stream Disturbance: Stack Exit

Total No. of sampling points = 8
PM2.5/10= NA
No. of sampling traverses/ports sampled = 2
PM2.5/10= NA
No. of sampling points on each traverse/port = 4
PM2.5/10= NA

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	39	9		
2	145	115		
3	435	405		
4	541	511		
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Particulate
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 11:25		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	11:25	16	11.8	5.1
2	11:26	15	11.8	5.1
3	11:27	14	11.8	5.1
4	11:28	14	11.8	5.1
5	11:29	13	11.8	5.1
6	11:30	15	11.8	5.1
7	11:31	15	11.9	5.1
8	11:32	16	11.9	5.1
	Averages:	14.8 ppm	11.8 %	5.1 %

Moisture content (M3): 0.95
Moisture percentage (M2): 5.00 %

Measurements

CO:	0.0015 %,(dry)	N_2:	83.1 %,(dry)
CO_2:	5.1 %,(dry)	O_2:	11.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0014 %,(wet)	N_2:	78.9 %,(wet)
CO_2:	4.8 %,(wet)	O_2:	11.2 %,(wet)
H_2O:	5.00 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.31 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Particulate
Test 2: Sulfuric Acid Mist (H2SO4 as SO3)
Test 3: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 13:05		Sampling port No.: 0		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	13:05	0	12.8	4.6
2	13:06	0	12.8	4.6
3	13:07	0	12.8	4.6
4	13:08	0	12.7	4.6
5	13:09	0	12.7	4.6
6	13:10	0	12.7	4.6
7	13:11	0	12.7	4.6
8	13:12	0	12.7	4.6
	Averages:	0.0 ppm	12.7 %	4.6 %

Moisture content (M3): 0.92
Moisture percentage (M2): 8.47 %

Measurements

CO:	0.0000 %,(dry)	N_2:	82.7 %,(dry)
CO_2:	4.6 %,(dry)	O_2:	12.7 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	75.7 %,(wet)
CO_2:	4.2 %,(wet)	O_2:	11.7 %,(wet)
H_2O:	8.47 %(=M2)		
Therefore, stack gas density (GD) =		1.26 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =		1.31 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1:Total Particulate
Test 2:Sulfuric Acid Mist (H2SO4 as SO3)
Test 3:Sulfur Dioxide (SO2 as SO3)

Time :	11:15	Barometric Pressure :		1014	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	9	0.167	574.0	847.2	23.9
1/2	115	0.163	575.0	848.2	23.6
1/3	405	0.164	580.0	853.2	23.7
1/4	511	0.152	574.0	847.2	22.8
2/1	9	0.171	578.0	851.2	24.2
2/2	115	0.168	576.0	849.2	24.0
2/3	405	0.148	584.0	857.2	22.6
2/4	511	0.100	574.0	847.2	18.5
Average			576.9	850.1	22.9

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -11 mm
Absolute pressure in stack (hPa) : 1012.92 hPa

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL PARTICULATE

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack Description No.: Stack 6
Sample Nozzle No.: old41
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 3.78 x $10^{-5}m^2$
Thimble No: T1
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 20.4582 Meter finish: 20.4582
Time start: 11:47 Time finish: 11:48

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 21.5031 Meter finish: 21.5031
Time start: 13:01 Time finish: 13:02

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1014 hPa (start); 1014 hPa (finish)
Meter start: 20.4606 Time start: 11:54
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:30	39	18.5	28.0	26.0		Yes
1/2	0:15:00	145	18.3	30.0	27.0		Yes
1/3	0:22:30	435	18.2	30.0	27.0		Yes
1/4	0:30:00	541	17.7	30.0	27.0		Yes
2/1	0:37:30	39	18.7	30.0	27.0		Yes
2/2	0:45:00	145	18.6	30.0	27.0		Yes
2/3	0:52:30	435	17.3	30.0	27.0		Yes
2/4	1:00:00	541	14.3	30.0	27.0		Yes
Averages				29.8	26.9	no result	

Meter Finish: 21.5025 Time Finish: 12:56
Total Condensate collected: 46 ml Silica gel No(s) used: F98

AECOM

STACK ANALYSIS

SAMPLING OF SULFURIC ACID MIST (H2SO4 AS SO3)

Date: 13-May-13
Client: Weston Aluminium
AECDM's Project No: 60287751
Stack Description No.: Stack 6

Sample Nozzle No.: Q6
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 2.84 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 21.2680 Meter finish: 21.2680
Time start: 11:49 Time finish: 11:50

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 22.0850 Meter finish: 22.0850
Time start: 13:02 Time finish: 13:03

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1014 hPa (start); 1014 hPa (finish)
Meter start: 21.2695 Time start: 11:54
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:30	39	14.0	29.0	28.0		Yes
1/2	0:15:00	145	13.8	29.0	28.0		Yes
1/3	0:22:30	435	13.8	29.0	28.0		Yes
1/4	0:30:00	541	13.3	29.0	28.0		Yes
2/1	0:37:30	39	14.1	30.0	28.0		Yes
2/2	0:45:00	145	14.0	30.0	29.0		Yes
2/3	0:52:30	435	13.1	29.0	28.0		Yes
2/4	1:00:00	541	10.8	29.0	28.0		Yes
Averages				29.3	28.1	no result	

Meter Finish: 22.0841 Time Finish: 12:56
Total Condensate collected: 35 ml Silica gel No(s) used: P30

AECOM

STACK ANALYSIS

SAMPLING OF SULFUR DIOXIDE (SO2 AS SO3)

Date: 13-May-13
Client: Weston Aluminium
AECDM's Project No: 60287751
Stack Description No.: Stack 6
Sample Nozzle No.: Q6
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 2.84 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 21.2680 Meter finish: 21.2680
Time start: 11:49 Time finish: 11:50
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 22.0850 Meter finish: 22.0850
Time start: 13:02 Time finish: 13:03
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1014 hPa (start); 1014 hPa (finish)
Meter start: 21.2695 Time start: 11:54
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:30	39	14.0	29.0	28.0		Yes
1/2	0:15:00	145	13.8	29.0	28.0		Yes
1/3	0:22:30	435	13.8	29.0	28.0		Yes
1/4	0:30:00	541	13.3	29.0	28.0		Yes
2/1	0:37:30	39	14.1	30.0	28.0		Yes
2/2	0:45:00	145	14.0	30.0	29.0		Yes
2/3	0:52:30	435	13.1	29.0	28.0		Yes
2/4	1:00:00	541	10.8	29.0	28.0		Yes
Averages				29.3	28.1	no result	

Meter Finish: 22.0841 Time Finish: 12:56
Total Condensate collected: 35 ml Silica gel No(s) used: P30

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1:Total Particulate
Test 2:Sulfuric Acid Mist (H2SO4 as SO3)
Test 3:Sulfur Dioxide (SO2 as SO3)

Time :	13:05	Barometric Pressure :		1014	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.26	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	9	0.146	525.0	798.2	21.8
1/2	115	0.137	526.0	799.2	21.2
1/3	405	0.138	529.0	802.2	21.3
1/4	511	0.135	528.0	801.2	21.1
2/1	9	0.145	527.0	800.2	21.8
2/2	115	0.137	528.0	801.2	21.2
2/3	405	0.127	530.0	803.2	20.4
2/4	511	0.129	526.0	799.2	20.6
Average			527.4	800.6	21.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -7 mm
Absolute pressure in stack (hPa) : 1013.31 hPa

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 6

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.0401 m^3

Average gas meter temp. ($T_{M,2}$): 28.3 °C

301.5 K

Average barometric pressure (P_{BARO}) 1014 hPa

Average pressure at meter ($P_{M,2}$) 1014.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.9432 m^3

(B) Total Particulate concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: T1

Blank weight: g

Total Particulate Weight 0.0043 g

Final Total Particulate Weight (Mp1): 0.00430 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.0046 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 4.6 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 4.9 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.011 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 11 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 3 %

Average O_2%: 12.3 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0095 g/m^3 (0°C, dry gas, 1atm pressure, 3% O_2)

;and C_{b1} = 9.5 mg/m^3 (0°C, dry gas, 1atm pressure, 3% O_2)

(C) Moisture content

Silica Gel Number: F98

V_v = 14.1 g (from laboratory report) V_w = 46 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0613

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0188

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 7.83 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Total Particulate

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.31 kg/m^3 (0°C, wet, 1 atm pressure)
1.31 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 0.434 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 22.91 m/s

(ii) Average of post-sampling velocities: 21.18 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 22.04 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 5.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 1.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0082	g/s (0°C, dry gas, 1 atm pressure)		
	=	8.2	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.02	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	20	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.017	g/s (0°C, dry gas, 1 atm pressure	3%	O_2)
	=	17	mg/s (0°C, dry gas, 1 atm pressure	3%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfuric Acid Mist (H2SO4 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 6

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.8158 m^3

Average gas meter temp. ($T_{M,2}$): 28.7 °C

301.9 K

Average barometric pressure (P_{BARO}) 1014 hPa

Average pressure at meter ($P_{M,2}$) 1014.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.7388 m^3

(B) H2SO4 as SO3 concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 H2SO4 as SO3 Weight <0.002 g

Final H2SO4 as SO3 Weight (Mp1): <0.002 g

H2SO4 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0027 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <2.7 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 4.9 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.0067 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <6.7 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 12.3 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.0043 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <4.3 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P30

V_v = 18.4 g (from laboratory report) V_w = 35 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0467

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0246

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 8.79 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfuric Acid Mist (H2SO4 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.31 kg/m^3 (0°C, wet, 1 atm pressure)
1.31 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 0.434 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 22.91 m/s

(ii) Average of post-sampling velocities: 21.18 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 22.04 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 5.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 1.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0047	g/s (0°C, dry gas, 1 atm pressure)		
	=	<4.7	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.012	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<12	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.0076	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<7.6	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfur Dioxide (SO2 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 6

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.8158 m^3

Average gas meter temp. ($T_{M,2}$): 28.7 °C

301.9 K

Average barometric pressure (P_{BARO}) 1014 hPa

Average pressure at meter ($P_{M,2}$) 1014.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.7388 m^3

(B) SO2 as SO3 concentration at standard conditions

Blank thimble No.:

Thimble No. used: 0

Blank weight: g

SO2 as SO3 Weight 0.04 g

Final SO2 as SO3 Weight (Mp1): 0.04000 g

SO2 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ 0.054 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 54 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 4.9 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.13 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 130 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 12.3 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.087 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 87 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P30

V_v = 18.4 g (from laboratory report) V_w = 35 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0467

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0246

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 8.79 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfur Dioxide (SO2 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.31 kg/m^3 (0°C, wet, 1 atm pressure)
1.31 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 0.434 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 22.91 m/s

(ii) Average of post-sampling velocities: 21.18 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 22.04 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 5.82 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 1.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.095	g/s (0°C, dry gas, 1 atm pressure)		
	=	95	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.23	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	230	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.15	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	150	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 6
WESTON ALUMINIUM
13-May-13
TOTAL PARTICULATE
SULFURIC ACID MIST (H2SO4 AS SO3)
SULFUR DIOXIDE (SO2 AS SO3)

Sampling Conditions:			
Stack internal diameter at test location	580 mm		
Stack gas temperature (average)	552.1 °C		825.3 K
Stack pressure (average)	1013 hPa		
Stack gas velocity (average, stack conditions)	22 m/s		
Stack gas flowrate (stack conditions)	5.8 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	1.8 m^3/s		
Total Particulate Testing			
Test Period	11:54	-	12:56
Total Particulate Mass	4.3 mg		
Gas Volume Sampled	0.943 m^3		
Total Particulate Emission*1 at 3% O2	9.5 mg/m^3		
Total Particulate Mass Emission Rate*2 at 3% O2	17 mg/s		
Regulatory Limit at 3% O2	10 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	11:54	-	12:56
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg		
Gas Volume Sampled	0.739 m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<2.7 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<4.7 mg/s		
Regulatory Limit	N/A		
Sulfur Dioxide (SO2 as SO3) Testing			
Test Period	11:54	-	12:56
Sulfur Dioxide (SO2 as SO3) Mass	40 mg		
Gas Volume Sampled	0.739 m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	54 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	95 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	7.8		
Gas Density (dry at 1 atmosphere)	1.31 kg/m^3		
Dry Molecular Weight	29.3 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Weston Aluminium

AECOM's Project Number: 60287751

Emission Source: Stack 6

Date Sampled: 13-May-13

ANALYTE(S)	METHOD
Total Fluoride	NSW EPA TM - 9
Polycyclic Aromatic Hydrocarbons	NSW EPA OM - 6

Observations made during testing period:

Sampling Performed By:

James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Fluoride
Test 2: Polycyclic Aromatic Hydrocarbons

Measurement/Observations				
Stack Internal Dimensions: Diameter 580 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 0.26 m^2 Minimum No. of sampling points= 8	
Distance from sampling plane to nearest disturbances: Upstream (m) = 5 No. Diameters = 8.6 Type of Upstream Disturbance: Bend Downstream (m) = 3 No. Diameters = 5.2 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 8 PM2.5/10= NA No. of sampling traverses/ports sampled = 2 PM2.5/10= NA No. of sampling points on each traverse/port = 4 PM2.5/10= NA	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	39	9		
2	145	115		
3	435	405		
4	541	511		
5				
6				
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Fluoride
Test 2: Polycyclic Aromatic Hydrocarbons

Sampling time start: 13:05		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	13:05	0	12.8	4.6
2	13:06	0	12.8	4.6
3	13:07	0	12.8	4.6
4	13:08	0	12.7	4.6
5	13:09	0	12.7	4.6
6	13:10	0	12.7	4.6
7	13:11	0	12.7	4.6
8	13:12	0	12.7	4.6
	Averages:	0.0 ppm	12.7 %	4.6 %

Moisture content (M3): 0.95
Moisture percentage (M2): 5.00 %

Measurements

CO:	0.0000 %,(dry)	N_2:	82.7 %,(dry)
CO_2:	4.6 %,(dry)	O_2:	12.7 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	78.5 %,(wet)
CO_2:	4.4 %,(wet)	O_2:	12.1 %,(wet)
H_2O:	5.00 %(=M2)		

Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.31 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1: Total Fluoride
Test 2: Polycyclic Aromatic Hydrocarbons

Sampling time start: 14:30		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	14:30	0	13.1	4.4
2	14:31	0	13.1	4.4
3	14:32	0	13.1	4.4
4	14:33	0	13.1	4.4
5	14:34	0	13.1	4.4
6	14:35	0	13.1	4.4
7	14:36	0	13.1	4.4
8	14:37	0	13.1	4.4
	Averages:	0.0 ppm	13.1 %	4.4 %

Moisture content (M3): 0.93
Moisture percentage (M2): 7.11 %

Measurements

CO:	0.0000 %,(dry)	N_2:	82.5 %,(dry)
CO_2:	4.4 %,(dry)	O_2:	13.1 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0000 %,(wet)	N_2:	76.6 %,(wet)
CO_2:	4.1 %,(wet)	O_2:	12.2 %,(wet)
H_2O:	7.11 %(=M2)		
Therefore, stack gas density (GD) =	1.27 kg/m^3	(0°C, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.31 kg/m^3	(0°C, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1:Total Fluoride
Test 2:Polycyclic Aromatic Hydrocarbons

Time :	13:05	Barometric Pressure :		1014	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	9	0.146	525.0	798.2	21.7
1/2	115	0.137	526.0	799.2	21.0
1/3	405	0.138	529.0	802.2	21.1
1/4	511	0.135	528.0	801.2	20.9
2/1	9	0.145	527.0	800.2	21.6
2/2	115	0.137	528.0	801.2	21.0
2/3	405	0.122	530.0	803.2	19.8
2/4	511	0.129	526.0	799.2	20.4
Average			527.4	800.6	20.9

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 7 mm
Absolute pressure in stack (hPa) : 1014.69 hPa

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL FLUORIDE

Date: 13-May-13
Client: Weston Aluminium
AECDM's Project No: 60287751
Stack Description No.: Stack 6
Sample Nozzle No.: old41
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 3.78 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 21.5040 Meter finish: 21.5040
Time start: 13:15 Time finish: 13:16

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 22.8817 Meter finish: 22.8817
Time start: 14:54 Time finish: 14:55

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1014 hPa (start); 1014 hPa (finish)
Meter start: 21.5050 Time start: 13:20
Meter correction factor (GMf) : 0.9983

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:10:00	39	17.9	27.0	25.0		Yes
1/2	0:20:00	145	17.3	28.0	25.0		Yes
1/3	0:30:00	435	17.3	28.0	25.0		Yes
1/4	0:40:00	541	17.2	28.0	25.0		Yes
2/1	0:50:00	39	17.8	28.0	25.0		Yes
2/2	1:00:00	145	17.2	28.0	25.0		Yes
2/3	1:10:00	435	16.2	28.0	25.0		Yes
2/4	1:20:00	541	16.8	28.0	25.0		Yes
Averages				27.9	25.0	no result	

Meter Finish: 22.8810 Time Finish: 14:45
Total Condensate collected: 56 ml Silica gel No(s) used: G046

AECOM

STACK ANALYSIS

SAMPLING OF POLYCYCLIC AROMATIC HYDROCARBONS

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack Description No.: Stack 6
Sample Nozzle No.: Q6
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 2.84 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 22.0860 Meter finish: 22.0860
Time start: 13:17 Time finish: 13:18

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 23.0156 Meter finish: 23.0156
Time start: 14:55 Time finish: 14:56

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1014 hPa (start); 1014 hPa (finish)
Meter start: 22.0866 Time start: 13:20
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Dutlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:10:00	39	13.5	27.0	26.0		Yes
1/2	0:20:00	145	13.0	27.0	26.0		Yes
1/3	0:30:00	435	13.0	27.0	26.0		Yes
1/4	0:40:00	541	12.9	28.0	26.0		Yes
2/1	0:50:00	39	13.4	27.0	26.0		Yes
2/2	1:00:00	145	13.0	27.0	26.0		Yes
2/3	1:10:00	435	12.2	26.0	26.0		Yes
2/4	1:20:00	541	12.7	25.0	24.0		Yes
Averages				26.8	25.8	no result	

Meter Finish: 23.0150 Time Finish: 14:45
Total Condensate collected: 40 ml Silica gel No(s) used: P1

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6
Test 1:Total Fluoride
Test 2:Polycyclic Aromatic Hydrocarbons

Time :	14:55	Barometric Pressure :		1014	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.27	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	9	0.147	524.0	797.2	21.8
1/2	115	0.151	528.0	801.2	22.2
1/3	405	0.146	530.0	803.2	21.9
1/4	511	0.143	530.0	803.2	21.6
2/1	9	0.147	527.0	800.2	21.9
2/2	115	0.153	528.0	801.2	22.3
2/3	405	0.125	536.0	809.2	20.3
2/4	511	0.110	530.0	803.2	18.9
Average			529.1	802.3	21.4

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -10 mm
Absolute pressure in stack (hPa) : 1013.02 hPa

AECOM

Stack Analysis - Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results

Date: 13-May-13
Client: Weston Aluminium
AECOM's Project No: 60287751
Stack/Duct Description: Stack 6

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	1600	1.6	0.0016	1.9	0.0019	3.3	0.0033
2 - Methylnapthalene	150	0.15	0.00015	0.18	0.00018	0.31	0.00031
Acenaphthylene	58	0.058	0.000058	0.068	0.000068	0.12	0.00012
Acenaphthene	69	0.069	0.000069	0.081	0.000081	0.14	0.00014
Fluorene	120	0.12	0.00012	0.14	0.00014	0.25	0.00025
Phenanthrene	620	0.62	0.00062	0.73	0.00073	1.3	0.0013
Anthracene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Fluoranthene	430	0.43	0.00043	0.51	0.00051	0.89	0.00089
Pyrene	130	0.13	0.00013	0.15	0.00015	0.27	0.00027
Benz(a)anthracene	32	0.032	0.000032	0.038	0.000038	0.067	0.000067
Chrysene	130	0.13	0.00013	0.15	0.00015	0.27	0.00027
Benzo(b)fluoranthene	58	0.058	0.000058	0.068	0.000068	0.12	0.00012
Benzo(k)fluoranthene	35	0.035	0.000035	0.041	0.000041	0.073	0.000073
Benzo(e)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Benzo(a)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Perylene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Dibenzo(ah)anthracene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Benzo(ghi)perylene	<20	<0.02	<0.00002	0.024	<0.000024	<0.042	<0.000042
Sum of reported PAH's	3400	3.4	0.0034	4.2	0.0041	7.1	0.0071

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston Aluminium
AECOM's Project No: 60287751 Stack/Duct Description: Stack 6

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.3737 m^3
Average gas meter temp. ($T_{M,2}$): 26.4 °C
299.6 K
Average barometric pressure (P_{BARO}) 1014 hPa
Average pressure at meter ($P_{M,2}$) 1014.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.2536 m^3

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: 0
Thimble No. used: 0
Blank weight: g
Total Fluoride Weight 0.016066 g
Final Total Fluoride Weight (Mp1): 0.01607 g
Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.013 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 13 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %
Average CO_2%: 4.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.035 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 35 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %
Average O_2%: 12.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.023 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 23 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G046
V_v = 13.6 g (from laboratory report) V_w = 56 mL (=grams) (recorded on Laboratory Form 108)
Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0746
Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0182
Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 6.89 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Total Fluoride

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.30 kg/m^3 (0^oC, wet, 1 atm pressure)
1.31 kg/m^3 (0^oC, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 0.443 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.94 m/s

(ii) Average of post-sampling velocities: 21.36 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 21.15 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 5.59 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 1.8 m^3/s (0^oC, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.023	g/s (0^oC, dry gas, 1 atm pressure)		
	=	23	mg/s (0^oC, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.062	g/s (0^oC, dry gas, 1 atm pressure	12%	CO_2)
	=	62	mg/s (0^oC, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.04	g/s (0^oC, dry gas, 1 atm pressure	7%	O_2)
	=	40	mg/s (0^oC, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Polycyclic Aromatic Hydrocarbons

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 13-May-13 Client: Weston Aluminium

AECOM's Project No: 60287751 Stack/Duct Description: Stack 6

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.9298	m^3	Average barometric pressure (P_{BARO})	1014 hPa
Average gas meter temp. ($T_{M,2}$):	26.3	°C		
	299.5	K	Average pressure at meter ($P_{M,2}$)	1014.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.8488	m^3		

(B) PAH concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 PAH Weight 0.0000034 g

Final PAH Weight (Mp1): 0.00000 g

PAH Concentration (C1): $=M_{p1}/MV_4=$ 0.000004 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.004 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 4.5 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.000011 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.011 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 12.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0000069 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.0069 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: P1

V_v = 10.4 g (from laboratory report) V_w = 40 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0533

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0139

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 7.34 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Polycyclic Aromatic Hydrocarbons

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.30 kg/m^3 (0°C, wet, 1 atm pressure)
1.31 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 0.443 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.94 m/s

(ii) Average of post-sampling velocities: 21.36 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 21.15 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 5.59 m^3/s (stack conditions)

Qstd = Qstack x $\frac{Ps}{(Pstd)}$ x $\frac{(Tstd)}{(Ts)}$ x $\frac{(100 - B_w)}{100}$

Qstd = 1.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0000071	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.0071	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.000019	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	0.019	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.000012	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	0.012	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 6
WESTON ALUMINIUM
13-May-13
TOTAL FLUORIDE
POLYCYCLIC AROMATIC HYDROCARBONS

Sampling Conditions:			
Stack internal diameter at test location	580 mm		
Stack gas temperature (average)	528.3 °C		801.5 K
Stack pressure (average)	1014 hPa		
Stack gas velocity (average, stack conditions)	21 m/s		
Stack gas flowrate (stack conditions)	5.6 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	1.8 m^3/s		
Total Fluoride Testing			
Test Period	13:20	-	14:45
Total Fluoride Mass	16.066 mg		
Gas Volume Sampled	1.25 m^3		
Total Fluoride Emission*1	13 mg/m^3		
Total Fluoride Mass Emission Rate*2	23 mg/s		
Regulatory Limit	N/A mg/m^3		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	13:20	-	14:45
Polycyclic Aromatic Hydrocarbons Mass	0.0034 mg		
Gas Volume Sampled	0.849 m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.004 mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	0.0071 mg/s		
Regulatory Limit	N/A mg/m^3		
Moisture Content (%)	7.1		
Gas Density (dry at 1 atmosphere)	1.31 kg/m^3		
Dry Molecular Weight	29.2 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 7

Date Sampled: 2-May-13

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Total Fluoride	NSW EPA TM - 9

Observations made during testing period:

Sampling Performed By:

Chris Burns

Nic Baldwin

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Measurement/Observations				
Stack Internal Dimensions: Diameter 1500 mm OR Length Width Length/Width (mm) Equivalent Diameter N/A mm			Cross Sectional Area 1.77 m^2 Minimum No. of sampling points= 12	
Distance from sampling plane to nearest disturbances: Upstream (m) = 10 No. Diameters = 6.7 Type of Upstream Disturbance: Fans Downstream (m) = 3.1 No. Diameters = 2.1 Type of Down Stream Disturbance: Stack Exit			Total No. of sampling points = 12 PM2.5/10= 12 No. of sampling traverses/ports sampled = 2 PM2.5/10= 2 No. of sampling points on each traverse/port = 6 PM2.5/10= 6	
Position of each sampling point, for each traverse:			Exclusion of any sample point numbers - comments:	
	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36	66	36
2	219	189	219	189
3	444	414	444	414
4	1056	1026	1056	1026
5	1281	1251	1281	1251
6	1434	1404	1434	1404
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19			General Comments:	
20				
Signed:			Checked:	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 9:20		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	9:20	3	20.4	0.3
2	9:21	3	20.4	0.3
3	9:22	3	20.4	0.3
4	9:23	3	20.4	0.3
5	9:24	3	20.4	0.3
6	9:25	3	20.4	0.3
7	9:26	3	20.4	0.3
8	9:27	3	20.4	0.3
	Averages:	3.0 ppm	20.4 %	0.3 %

Moisture content (M3): 0.97
Moisture percentage (M2): 2.90 %

Measurements

CO:	0.0003 %,(dry)	N_2:	79.3 %,(dry)
CO_2:	0.3 %,(dry)	O_2:	20.4 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0003 %,(wet)	N_2:	77.0 %,(wet)
CO_2:	0.3 %,(wet)	O_2:	19.8 %,(wet)
H_2O:	2.90 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Total Fluoride

Sampling time start: 10:45		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:45	2	20.3	0.3
2	10:46	2	20.3	0.3
3	10:47	2	20.3	0.3
4	10:48	2	20.3	0.3
5	10:49	2	20.3	0.3
6	10:50	2	20.3	0.3
7	10:51	2	20.3	0.3
8	10:52	2	20.3	0.3
	Averages:	2.0 ppm	20.3 %	0.3 %

Moisture content (M3): 0.99
Moisture percentage (M2): 0.76 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.4 %,(dry)
CO_2:	0.3 %,(dry)	O_2:	20.3 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	78.8 %,(wet)
CO_2:	0.3 %,(wet)	O_2:	20.1 %,(wet)
H_2O:	0.76 %(=M2)		
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	9:10	Barometric Pressure :		1021	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.343	22.0	295.2	20.2
1/2	189	0.334	22.0	295.2	19.9
1/3	414	0.373	22.0	295.2	21.1
1/4	1026	0.402	22.0	295.2	21.9
1/5	1251	0.412	22.0	295.2	22.1
1/6	1404	0.363	23.0	296.2	20.8
2/1	36	0.314	23.0	296.2	19.4
2/2	189	0.373	23.0	296.2	21.1
2/3	414	0.373	23.0	296.2	21.1
2/4	1026	0.373	23.0	296.2	21.1
2/5	1251	0.353	23.0	296.2	20.5
2/6	1404	0.334	23.0	296.2	19.9
Average			22.6	295.8	20.8

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -19 mm
Absolute pressure in stack (hPa) : 1019.14 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: fine5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.9 x $10^{-5}m^2$
Thimble No: N8
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 16.9285 Meter finish: 16.9285
Time start: 9:30 Time finish: 9:31
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 17.7750 Meter finish: 17.7750
Time start: 10:47 Time finish: 10:48
Therefore, leakage rate = no leak L/min
(>0.1 l/min. is unacceptable)
Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 16.9315 Time start: 9:40
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:04:45	66	13.0	18.0	16.0		Yes
1/2	0:04:45	219	13.0	19.0	16.0		Yes
1/3	0:05:15	444	13.0	20.0	16.0		Yes
1/4	0:05:15	1056	13.0	20.0	17.0		Yes
1/5	0:05:15	1281	13.0	21.0	17.0		Yes
1/6	0:05:00	1434	13.0	21.0	17.0		Yes
2/1	0:04:45	66	13.0	21.0	17.0		Yes
2/2	0:05:00	219	13.0	21.0	17.0		Yes
2/3	0:05:00	444	13.0	22.0	18.0		Yes
2/4	0:05:15	1056	13.0	22.0	18.0		Yes
2/5	0:05:00	1281	13.0	24.0	18.0		Yes
2/6	0:04:45	1434	13.0	24.0	18.0		Yes
Averages				21.1	17.1	no result	

Meter Finish: 17.7732 Time Finish: 10:42
Total Condensate collected: 0 ml Silica gel No(s) used: F24

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL PARTICULATE

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: s16 Sample Nozzle Area (An): 1.41 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: T24
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 35.3890 Meter finish: 35.3890
Time start: 9:31 Time finish: 9:32

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 36.4750 Meter finish: 36.4750
Time start: 10:48 Time finish: 10:49

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 35.3917 Time start: 9:40
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	17.2	22.0	17.0		Yes
1/2	0:10:00	219	16.9	28.0	18.0		Yes
1/3	0:15:00	444	17.9	30.0	18.0		Yes
1/4	0:20:00	1056	18.6	32.0	19.0		Yes
1/5	0:25:00	1281	18.8	34.0	20.0		Yes
1/6	0:30:00	1434	17.6	34.0	20.0		Yes
2/1	0:35:00	66	16.4	34.0	20.0		Yes
2/2	0:40:00	219	17.9	35.0	21.0		Yes
2/3	0:45:00	444	17.9	36.0	21.0		Yes
2/4	0:50:00	1056	17.9	38.0	22.0		Yes
2/5	0:55:00	1281	17.4	38.0	22.0		Yes
2/6	1:00:00	1434	16.9	39.0	23.0		Yes
Averages				33.3	20.1	no result	

Meter Finish: 36.4728 Time Finish: 10:42
Total Condensate collected: 0 ml Silica gel No(s) used: GS012

AECOM

STACK ANALYSIS
SAMPLING OF TOTAL FLUORIDE

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: old1
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.33 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 23.0662 Meter finish: 23.0662
Time start: 9:32 Time finish: 9:33

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 24.0047 Meter finish: 24.0047
Time start: 10:49 Time finish: 10:50

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 23.0696 Time start: 9:40
Meter correction factor (GMf) : 1.0054

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	16.2	22.0	16.0		Yes
1/2	0:10:00	219	16.0	25.0	16.0		Yes
1/3	0:15:00	444	17.0	26.0	17.0		Yes
1/4	0:20:00	1056	17.6	27.0	17.0		Yes
1/5	0:25:00	1281	17.8	28.0	18.0		Yes
1/6	0:30:00	1434	16.7	28.0	18.0		Yes
2/1	0:35:00	66	15.5	28.0	19.0		Yes
2/2	0:40:00	219	16.9	30.0	19.0		Yes
2/3	0:45:00	444	16.9	30.0	20.0		Yes
2/4	0:50:00	1056	16.9	32.0	20.0		Yes
2/5	0:55:00	1281	16.4	33.0	20.0		Yes
2/6	1:00:00	1434	15.9	33.0	20.0		Yes
Averages				28.5	18.3	no result	

Meter Finish: 24.0018 Time Finish: 10:42
Total Condensate collected: -10 ml Silica gel No(s) used: Z12

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1:Fine Particulate (PM10)
Test 2:Total Particulate
Test 3:Total Fluoride

Time :	10:50	Barometric Pressure :		1021	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.29	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)
Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.324	23.0	296.2	19.6
1/2	189	0.319	23.0	296.2	19.4
1/3	414	0.353	23.0	296.2	20.4
1/4	1026	0.368	24.0	297.2	20.9
1/5	1251	0.392	24.0	297.2	21.6
1/6	1404	0.358	24.0	297.2	20.6
2/1	36	0.294	24.0	297.2	18.7
2/2	189	0.348	24.0	297.2	20.3
2/3	414	0.363	24.0	297.2	20.8
2/4	1026	0.353	25.0	298.2	20.5
2/5	1251	0.353	25.0	298.2	20.5
2/6	1404	0.324	25.0	298.2	19.6
Average			24.0	297.2	20.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -17 mm
Absolute pressure in stack (hPa) : 1019.33 hPa

AECOM

STACK ANALYSIS - PM10 CALCULATIONS

Date:	2-May-13	Client:	Weston
AECOM's Project No:	60287751	Stack/Ouct Description:	Stack 7

1. Gas Analysis

	%		
$\%CO_2$	0.3		
$\%O_2$	20.3		
$\%N_2+\%CO$	79.3		
Fraction Moisture Content, Bws	0.01	M_s=	0.99

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.86
Mol. Wt. of Stack Gas (wet)	28.55

3. Absolute Stack Pressure

	Pascals	in. Hg
Barometric Pressure (Pbar)	102100	30.14
Stack Static Pressure (Pg)	101933	30.09
Absolute Stack Pressure		30.09

4. Viscosity of Stack Gas

	°C	°F
Average Steck Temp.	24.0	75.2
Average Meter Temperature:	19.1	
Stack Gas Viscosity		181.8

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.45	0.0158	15.84	0.26

6. Nozzle Velocity, Rmin and Rmax

Nozzle Number	Nozzle Diameter	Nozzle Velocity		Rmin	Rmax	Vmin	Vmin	Vmax	Vmax
	(inches)	ft/sec	m/s	[-]	[-]	ft/sec	m/s	ft/sec	m/s
0	0.000	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
1	0.138	72.20	23.77	0.751	1.234	54.24	17.79	89.06	29.22
2	0.161	52.87	17.40	0.720	1.253	38.06	12.49	66.24	21.73
3	0.164	51.11	16.82	0.715	1.255	36.55	11.99	64.16	21.05
4	0.200	34.14	11.24	0.631	1.299	21.53	7.06	44.34	14.55
5	0.194	36.54	12.03	0.650	1.290	23.76	7.80	47.13	15.46
6	0.220	28.41	9.35	0.558	1.328	15.86	5.20	37.72	12.36
7	0.239	24.00	7.90	0.440	1.361	12.00	3.94	32.68	10.72
8	0.264	19.70	6.49	#NUM!	1.411	9.85	3.23	27.80	9.12
9	0.292	16.11	5.30	#NUM!	1.475	8.05	2.64	23.76	7.79
10	0.341	11.82	3.89	#NUM!	1.607	5.91	1.94	17.73	5.82
11	0.389	9.06	2.98	#NUM!	1.761	4.53	1.49	13.59	4.46

	Nozzle Diameter	Nozzle Diameter	Nozzle Area	Sample Rate
Selected Nozzle	(inches)	(m)	(m^2)	(L/min)
5	0.194	0.005	0.000019	13.4

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 2-May-13 Client: Weston
AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

7.Sampling Time Total Run Time 60 Number of points 12

Velocity Head (pitot) Pa	Vel Head in H20	Sqr Root	Dwell time mins
323.73	1.30	1.14	4.8
318.83	1.28	1.13	4.8
353.16	1.42	1.19	5.1
367.88	1.48	1.22	5.2
392.40	1.57	1.25	5.3
358.07	1.44	1.20	5.1
294.30	1.18	1.09	4.6
348.26	1.40	1.18	5.0
362.97	1.46	1.21	5.1
353.16	1.42	1.19	5.1
353.16	1.42	1.19	5.1
323.73	1.30	1.14	4.8
	Average	1.18	60.00
	Square	1.39	

Total time min	Full hours	Full minutes	Seconds
4.8	0	4	45
9.5	0	9	30
14.8	0	14	45
20.0	0	20	0
25.3	0	25	15
30.3	0	30	15
35.0	0	35	0
40.0	0	40	0
45.0	0	45	0
50.3	0	50	15
55.3	0	55	15
60.0	1	0	0

Aerodynamic Cut Size (u_{cyc})
182.5

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0134

Actual D_{50}
9.6

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.8430	m^3	Average barometric pressure (P_{BARO})	1021 hPa
Average gas meter temp. ($T_{M,2}$):	19.1	°C		
	292.3	K	Average pressure at meter ($P_{M,2}$)	1021.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.7939	m^3		

(B) PM10 concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: N8 PM10 Weight <0.0002 g

Final PM10 Weight (Mp1): <0.0002 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ <0.00025 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.25 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.01 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <10 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.4 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.0054 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <5.4 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: F24

V_v = 6.3 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0084

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.05 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Fine Particulate (PM10)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.168 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.76 m/s

(ii) Average of post-sampling velocities: 20.24 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.50 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 36.23 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 33.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0083	g/s (0°C, dry gas, 1 atm pressure)		
	=	<8.3	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.33	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<330	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.18	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<180	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.0842 m^3

Average gas meter temp. ($T_{M,2}$): 26.7 °C

299.9 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.9952 m^3

(B) Total Particulate concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: T24 Total Particulate Weight 0.0014 g

Final Total Particulate Weight (Mp1): 0.00140 g

Total Particulate Concentration (C1): $=M_{p1}/MV_4=$ 0.0014 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 1.4 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.056 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 56 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.4 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.03 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 30 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: GS012

V_v = 12.6 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0168

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.66 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.27 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.177 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.76 m/s

(ii) Average of post-sampling velocities: 20.24 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.50 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 36.23 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 33.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.046	g/s (0°C, dry gas, 1 atm pressure)		
	=	46	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	1.8	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	1800	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	1	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	1000	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Fluoride

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.9372	m^3	Average barometric pressure (P_{BARO})	1021 hPa
Average gas meter temp. ($T_{M,2}$):	23.4	°C		
	296.6	K	Average pressure at meter ($P_{M,2}$)	1021.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.8699	m^3		

(B) Total Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 Total Fluoride Weight <0.0001 g

Final Total Fluoride Weight (Mp1): <0.0001 g

Total Fluoride Concentration (C1): $=M_{p1}/MV_4=$ <0.00011 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <0.11 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.0044 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <4.4 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.4 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.0024 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <2.4 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: Z12

V_v = 7.2 g (from laboratory report) V_w = -10 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = -0.0133

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0096

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = -0.43 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Fluoride

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.25 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.159 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.76 m/s

(ii) Average of post-sampling velocities: 20.24 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.50 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 36.23 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 33.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.0037	g/s (0°C, dry gas, 1 atm pressure)		
	=	<3.7	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<0.15	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<150	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<0.08	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<80	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 7
WESTON
2-May-13
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
TOTAL FLUORIDE

Sampling Conditions:			
Stack internal diameter at test location	1500 mm		
Stack gas temperature (average)	23.3 °C		296.5 K
Stack pressure (average)	1019 hPa		
Stack gas velocity (average, stack conditions)	21 m/s		
Stack gas flowrate (stack conditions)	36 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	33 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	9:40	-	10:42
Fine Particulate (PM10) Mass	<0.2 mg		
Gas Volume Sampled	0.794 m^3		
Fine Particulate (PM10) Emission*1	<0.25 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	<8.3 mg/s		
Regulatory Limit	N/A		
Total Particulate Testing			
Test Period	9:40	-	10:42
Total Particulate Mass	1.4 mg		
Gas Volume Sampled	0.995 m^3		
Total Particulate Emission*1	1.4 mg/m^3		
Total Particulate Mass Emission Rate*2	46 mg/s		
Regulatory Limit	15 mg/m^3		
Total Fluoride Testing			
Test Period	9:40	-	10:42
Total Fluoride Mass	<0.1 mg		
Gas Volume Sampled	0.87 m^3		
Total Fluoride Emission*1	<0.11 mg/m^3		
Total Fluoride Mass Emission Rate*2	<3.7 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	0.6		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.9 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

AECOM

Weston

AECOM's Project Number: 60287751

Emission Source: Stack 7

Date Sampled: 2-May-13

ANALYTE(S)	**METHOD**
Sulfuric Acid Mist	NSW EPA TM - 3
Sulfur Dioxide	NSW EPA TM - 4
Polycyclic Aromatic Hydrocarbons	NSW EPA OM - 6

Observations made during testing period:

Sampling Performed By:

Chris Burns

Nic Baldwin

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Sulfuric Acid Mist (H2SO4 as SO3)
Test 2: Sulfur Dioxide (SO2 as SO3)
Test 3: Polycyclic Aromatic Hydrocarbons

Measurement/Observations

Stack Internal Dimensions:

Diameter 1500 mm
OR Length Width
Length/Width (mm)
Equivalent Diameter N/A mm

Cross Sectional Area 1.77 m^2

Minimum No. of sampling points= 12

Distance from sampling plane to nearest disturbances:

Upstream (m) = 10
No. Diameters = 6.7
Type of Upstream Disturbance: Fans
Downstream (m) = 3.1
No. Diameters = 2.1
Type of Down Stream Disturbance: Stack Exit

Total No. of sampling points = 12
PM2.5/10= NA
No. of sampling traverses/ports sampled = 2
PM2.5/10= NA
No. of sampling points on each traverse/port = 6
PM2.5/10= NA

Position of each sampling point, for each traverse:

Exclusion of any sample point numbers - comments:

	A	B	PM10/2.5 A	PM2.5/10 B
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot distances
1	66	36		
2	219	189		
3	444	414		
4	1056	1026		
5	1281	1251		
6	1434	1404		
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Check of total points against minimum, (yes/no) - comments:

General Comments:

Signed: .....

Checked: .....

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Sulfuric Acid Mist (H2SO4 as SO3)
Test 2: Sulfur Dioxide (SO2 as SO3)
Test 3: Polycyclic Aromatic Hydrocarbons

Sampling time start: 10:45		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:45	2	20.3	0.3
2	10:46	2	20.3	0.3
3	10:47	2	20.3	0.3
4	10:48	2	20.3	0.3
5	10:49	2	20.3	0.3
6	10:50	2	20.3	0.3
7	10:51	2	20.3	0.3
8	10:52	2	20.3	0.3
	Averages:	2.0 ppm	20.3 %	0.3 %

Moisture content (M3): 0.97
Moisture percentage (M2): 2.90 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.4 %,(dry)
CO_2:	0.3 %,(dry)	O_2:	20.3 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	77.1 %,(wet)
CO_2:	0.3 %,(wet)	O_2:	19.7 %,(wet)
H_2O:	2.90 %(=M2)		

Therefore, stack gas density (GD) =	1.27 kg/m^3	(0^oC, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)

AECOM

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1: Sulfuric Acid Mist (H2SO4 as SO3)
Test 2: Sulfur Dioxide (SO2 as SO3)
Test 3: Polycyclic Aromatic Hydrocarbons

Sampling time start: 12:15		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:15	2	20.5	0.2
2	12:16	2	20.5	0.2
3	12:17	2	20.5	0.2
4	12:18	2	20.5	0.2
5	12:19	3	20.5	0.2
6	12:20	3	20.5	0.2
7	12:21	3	20.5	0.2
8	12:22	3	20.5	0.2
	Averages:	2.5 ppm	20.5 %	0.2 %

Moisture content (M3): 0.99
Moisture percentage (M2): 1.05 %

Measurements

CO:	0.0003 %,(dry)	N_2:	79.3 %,(dry)
CO_2:	0.2 %,(dry)	O_2:	20.5 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0002 %,(wet)	N_2:	78.5 %,(wet)
CO_2:	0.2 %,(wet)	O_2:	20.3 %,(wet)
H_2O:	1.05 %(=M2)		
Therefore, stack gas density (GD) =	1.28 kg/m^3	(0^oC, wet, 1 atm pressure)	
Therefore, stack gas density (GD) =	1.29 kg/m^3	(0^oC, dry, 1 atm pressure)	

AECOM

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1:Sulfuric Acid Mist (H2SO4 as SO3)
Test 2:Sulfur Dioxide (SO2 as SO3)
Test 3:Polycyclic Aromatic Hydrocarbons

Time :	10:48	Barometric Pressure :		1021	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.324	23.0	296.2	19.7
1/2	189	0.319	23.0	296.2	19.5
1/3	414	0.353	23.0	296.2	20.5
1/4	1026	0.368	24.0	297.2	21.0
1/5	1251	0.392	24.0	297.2	21.7
1/6	1404	0.358	24.0	297.2	20.7
2/1	36	0.294	24.0	297.2	18.8
2/2	189	0.348	24.0	297.2	20.4
2/3	414	0.363	24.0	297.2	20.8
2/4	1026	0.353	25.0	298.2	20.6
2/5	1251	0.353	25.0	298.2	20.6
2/6	1404	0.324	25.0	298.2	19.7
Average			24.0	297.2	20.3

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -17 mm
Absolute pressure in stack (hPa) : 1019.33 hPa

AECOM

STACK ANALYSIS

SAMPLING OF SULFURIC ACID MIST (H2SO4 AS SO3)

Date: 2-May-13
Client: Weston
AECDM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: old1
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.33 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 17.7752 Meter finish: 17.7752
Time start: 10:51 Time finish: 10:52

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 18.7608 Meter finish: 18.7608
Time start: 12:06 Time finish: 12:07

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 17.7755 Time start: 10:55
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	15.7	20.0	18.0		Yes
1/2	0:10:00	219	15.6	20.0	18.0		Yes
1/3	0:15:00	444	16.4	20.0	18.0		Yes
1/4	0:20:00	1056	16.7	21.0	18.0		Yes
1/5	0:25:00	1281	17.3	21.0	18.0		Yes
1/6	0:30:00	1434	16.5	21.0	19.0		Yes
2/1	0:35:00	66	15.0	22.0	19.0		Yes
2/2	0:40:00	219	16.2	22.0	19.0		Yes
2/3	0:45:00	444	16.5	22.0	20.0		Yes
2/4	0:50:00	1056	16.3	22.0	20.0		Yes
2/5	0:55:00	1281	16.3	22.0	20.0		Yes
2/6	1:00:00	1434	15.6	22.0	20.0		Yes
Averages				21.3	18.9	no result	

Meter Finish: 18.7600 Time Finish: 11:58
Total Condensate collected: -80 ml Silica gel No(s) used: G060

AECOM

STACK ANALYSIS

SAMPLING OF SULFUR DIOXIDE (SO2 AS SO3)

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: old1 Sample Nozzle Area (An): 1.33 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: 0
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 17.7752 Meter finish: 17.7752
Time start: 10:51 Time finish: 10:52

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 18.7608 Meter finish: 18.7608
Time start: 12:06 Time finish: 12:07

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 17.7755 Time start: 10:55
Meter correction factor (GMf) : 1.0015

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	15.7	20.0	18.0		Yes
1/2	0:10:00	219	15.6	20.0	18.0		Yes
1/3	0:15:00	444	16.4	20.0	18.0		Yes
1/4	0:20:00	1056	16.7	21.0	18.0		Yes
1/5	0:25:00	1281	17.3	21.0	18.0		Yes
1/6	0:30:00	1434	16.5	21.0	19.0		Yes
2/1	0:35:00	66	15.0	22.0	19.0		Yes
2/2	0:40:00	219	16.2	22.0	19.0		Yes
2/3	0:45:00	444	16.5	22.0	20.0		Yes
2/4	0:50:00	1056	16.3	22.0	20.0		Yes
2/5	0:55:00	1281	16.3	22.0	20.0		Yes
2/6	1:00:00	1434	15.6	22.0	20.0		Yes
Averages				21.3	18.9	no result	

Meter Finish: 18.7600 Time Finish: 11:58
Total Condensate collected: -80 ml Silica gel No(s) used: G060

AECOM

STACK ANALYSIS

SAMPLING OF POLYCYCLIC AROMATIC HYDROCARBONS

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack Description No.: Stack 7
Sample Nozzle No.: g4.5
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.63 x $10^{-5}m^2$
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 36.4758 Meter finish: 36.4758
Time start: 10:52 Time finish: 10:53

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 37.6704 Meter finish: 37.6704
Time start: 12:07 Time finish: 12:08

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1021 hPa (start); 1021 hPa (finish)
Meter start: 36.4760 Time start: 10:55
Meter correction factor (GMf) : 1.0029

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Dutlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:05:00	66	19.3	26.0	20.0		Yes
1/2	0:10:00	219	19.1	26.0	20.0		Yes
1/3	0:15:00	444	20.1	27.0	20.0		Yes
1/4	0:20:00	1056	20.5	27.0	21.0		Yes
1/5	0:25:00	1281	21.2	28.0	22.0		Yes
1/6	0:30:00	1434	20.2	28.0	22.0		Yes
2/1	0:35:00	66	18.4	28.0	23.0		Yes
2/2	0:40:00	219	19.9	29.0	23.0		Yes
2/3	0:45:00	444	20.3	29.0	24.0		Yes
2/4	0:50:00	1056	20.0	30.0	24.0		Yes
2/5	0:55:00	1281	20.0	30.0	24.0		Yes
2/6	1:00:00	1434	19.2	30.0	24.0		Yes
Averages				28.2	22.3	no result	

Meter Finish: 37.6691 Time Finish: 11:58
Total Condensate collected: 0 ml Silica gel No(s) used: F23

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7
Test 1:Sulfuric Acid Mist (H2SO4 as SO3)
Test 2:Sulfur Dioxide (SO2 as SO3)
Test 3:Polycyclic Aromatic Hydrocarbons

Time :	12:35	Barometric Pressure :		1021	hPa
Page No. :	1 of 1	Pitot Correction Factor :		0.84	
Sampling Port No:	1 to 2	Stack Gas Density:		1.28	kg/m^3
Pitot Tube Type :	S				(0 °C, Wet, 1 Atm)

Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ΔP, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s
1/1	36	0.334	24.0	297.2	19.9
1/2	189	0.334	24.0	297.2	19.9
1/3	414	0.353	24.0	297.2	20.5
1/4	1026	0.392	24.0	297.2	21.6
1/5	1251	0.392	25.0	298.2	21.6
1/6	1404	0.373	25.0	298.2	21.1
2/1	36	0.294	25.0	298.2	18.7
2/2	189	0.353	25.0	298.2	20.5
2/3	414	0.363	25.0	298.2	20.8
2/4	1026	0.363	25.0	298.2	20.8
2/5	1251	0.334	25.0	298.2	19.9
2/6	1404	0.314	25.0	298.2	19.4
Average			24.7	297.9	20.4

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -17.5 mm
Absolute pressure in stack (hPa) : 1019.28 hPa

AECOM

Stack Analysis - Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results

Date: 2-May-13
Client: Weston
AECOM's Project No: 60287751
Stack/Duct Description: Stack 7

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(µg)	(mg)	(µg/m^3)	(mg/m^3)	(µg/s)	(mg/s)
Naphthalene	1900	1.9	0.0019	1.7	0.0017	56	0.056
2 - Methylnapthalene	<230	<0.23	<0.00023	0.21	<0.00021	<6.8	<0.0068
Acenaphthylene	<40	<0.04	<0.00004	0.036	<0.000036	<1.2	<0.0012
Acenaphthene	39	0.039	0.000039	0.035	0.000035	1.2	0.0012
Fluorene	85	0.085	0.000085	0.077	0.000077	2.5	0.0025
Phenanthrene	99	0.099	0.000099	0.09	0.00009	2.9	0.0029
Anthracene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Pyrene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benz(a)anthracene	<40	<0.04	<0.00004	0.036	<0.000036	<1.2	<0.0012
Chrysene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(b)fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(k)fluoranthene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Benzo(e)pyrene	<260	<0.26	<0.00026	0.24	<0.00024	<7.7	<0.0077
Benzo(a)pyrene	<300	<0.3	<0.0003	0.27	<0.00027	<8.9	<0.0089
Perylene	<340	<0.34	<0.00034	0.31	<0.00031	<10	<0.01
Indeno(123:cd)pyrene	<20	<0.02	<0.00002	0.018	<0.000018	<0.59	<0.00059
Dibenzo(ah)anthracene	<25	<0.025	<0.000025	0.023	<0.000023	<0.74	<0.00074
Benzo(ghi)perylene	<25	<0.025	<0.000025	0.023	<0.000023	<0.74	<0.00074
Sum of reported PAH's	2100	2.1	0.0021	3.2	0.0019	63	0.063

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfuric Acid Mist (H2SO4 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 0.9860 m^3

Average gas meter temp. ($T_{M,2}$): 20.1 °C

293.3 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 0.9255 m^3

(B) H2SO4 as SO3 concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: 0

Blank weight: g

H2SO4 as SO3 Weight <0.002 g

Final H2SO4 as SO3 Weight (Mp1): <0.002 g

H2SO4 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0022 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <2.2 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.11 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <110 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.5 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.056 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <56 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G060

V_v = 85.7 g (from laboratory report) V_w = -80 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = -0.1066

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.1144

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 0.83 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Sulfuric Acid Mist (H2SO4 as SO3)

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.164 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.33 m/s

(ii) Average of post-sampling velocities: 20.39 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.36 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 35.98 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 33.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.073	g/s (0°C, dry gas, 1 atm pressure)		
	=	<73	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<3.5	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<3500	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<1.8	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<1800	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfur Dioxide (SO2 as SO3)

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.9860	m^3	Average barometric pressure (P_{BARO})	1021 hPa
Average gas meter temp. ($T_{M,2}$):	20.1	°C		
	293.3	K	Average pressure at meter ($P_{M,2}$)	1021.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9255	m^3		

(B) SO2 as SO3 concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 SO2 as SO3 Weight <0.010 g

Final SO2 as SO3 Weight (Mp1): <0.010 g

SO2 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.011 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <11 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.53 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <530 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.5 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.28 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <280 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G060

V_v = 85.7 g (from laboratory report) V_w = -80 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = -0.1066

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.1144

Therefore, $B_{ws} = \dfrac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 0.83 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Sulfur Dioxide (SO2 as SO3)

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.164 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.33 m/s

(ii) Average of post-sampling velocities: 20.39 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.36 m/s (stack conditions, wet)
N/A m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, not from (i) and (ii) alone.)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 35.98 m^3/s (stack conditions)

$$Qstd = Qstack \times \frac{Ps}{(Pstd)} \times \frac{(Tstd)}{(Ts)} \times \frac{(100 - B_w)}{100}$$

Qstd = 33.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	<0.36	g/s (0°C, dry gas, 1 atm pressure)		
	=	<360	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	<17	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<17000	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<9.2	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<9200	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Polycyclic Aromatic Hydrocarbons

(Calculations performed in accordance with relevant test method as defined on cover page)

Date: 2-May-13 Client: Weston

AECOM's Project No: 60287751 Stack/Duct Description: Stack 7

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.1966 m^3

Average gas meter temp. ($T_{M,2}$): 25.2 °C

298.4 K

Average barometric pressure (P_{BARO}) 1021 hPa

Average pressure at meter ($P_{M,2}$) 1021.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.1039 m^3

(B) PAH concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 PAH Weight 0.0000021 g

Final PAH Weight (Mp1): 0.00000 g

PAH Concentration (C1): $=M_{p1}/MV_4=$ 0.0000019 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.0019 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.3 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.000091 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 0.091 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.5 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.000048 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.048 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: F23

V_v = 12.4 g (from laboratory report) V_w = 0 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0000

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0166

Therefore, $B_{ws} = \frac{(V_{wc(std)}+V_{wsg(std)})}{(V_{wc(std)}+V_{wsg(std)}+V_{m(std)})}$

B_{ws} = 1.48 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Polycyclic Aromatic Hydrocarbons

AECOM

(D) Gas Composition and Density (Re-calculation)

(i) Initial gas density for sampling: 1.28 kg/m^3 (from Laboratory Form 107)

(ii) Re-calculated gas density based on moisture content in (c): 1.26 kg/m^3 (0°C, wet, 1 atm pressure)
1.29 kg/m^3 (0°C, dry, 1 atm pressure)

(iii) Gas density at stack conditions = (ii) x $\frac{(273.2)}{(273.2+Ts)}$ x $\frac{(Ps)}{(1013.25)}$

= 1.164 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 20.33 m/s

(ii) Average of post-sampling velocities: 20.39 m/s

(iii) Average of while-sampling velocities: N/A m/s

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 20.36 m/s (stack conditions, wet)
(**Note**: (Vs) is from all individual data, **not** from (i) and (ii) alone.) N/A m/s (stack conditions, wet)

(F) Volumetric Flowrates (Reference Method US-EPA Method 2, NSW-EPA TM-2)

Qstack = Vs x A = 35.98 m^3/s (stack conditions)

Qstd = Qstack x $\frac{Ps}{(Pstd)}$ x $\frac{(Tstd)}{(Ts)}$ x $\frac{(100 - B_w)}{100}$

Qstd = 32.7 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.000062	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.062	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.003	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	3	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.0016	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	1.6	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 7
WESTON
2-May-13
SULFURIC ACID MIST (H2SO4 AS SO3)
SULFUR DIOXIDE (SO2 AS SO3)
POLYCYCLIC AROMATIC HYDROCARBONS

Sampling Conditions:			
Stack internal diameter at test location	1500 mm		
Stack gas temperature (average)	24.3 °C		297.5 K
Stack pressure (average)	1019 hPa		
Stack gas velocity (average, stack conditions)	20 m/s		
Stack gas flowrate (stack conditions)	36 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	33 m^3/s		
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	10:55	-	11:58
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg		
Gas Volume Sampled	0.925 m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<2.2 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Mass Emission Rate*2	<73 mg/s		
Regulatory Limit	N/A		
Sulfur Dioxide (SO2 as SO3) Testing			
Test Period	10:55	-	11:58
Sulfur Dioxide (SO2 as SO3) Mass	<10 mg		
Gas Volume Sampled	0.925 m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	<11 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<360 mg/s		
Regulatory Limit	N/A		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	10:55	-	11:58
Polycyclic Aromatic Hydrocarbons Mass	0.0021 mg		
Gas Volume Sampled	1.1 m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.0019 mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	0.062 mg/s		
Regulatory Limit	N/A		
Moisture Content (%)	1.0		
Gas Density (dry at 1 atmosphere)	1.29 kg/m^3		
Dry Molecular Weight	28.9 g/g-mole		

Notes *1 Emission concentration at Standard conditions of 0^0C, 1 atm, dry gas

*2 Mass emission rate determined from pre and post test sampling flow measurements and the respective test moisture content. See Q_{std} in field sheets and final calculations "Stack Analysis - Final Calculations" for each test.

STACK ANALYSIS - SAMPLING OF VOLATILE ORGANIC COMPOUNDS

AECOM

Client:	Weston Aluminium	
Project Number:	60287751	
Stack Description:	Stack 1	
Date:	01-May-13	
Rotameter Correction Factor:	0.93	
Time Start:	9:20	
Time Finish:	9:50	
Sample Flow Rate:	0.2	L/min
Sample Time:	30	min
Sampled Volume:	5.58	litres
	0.00558	m^3
Ambient Temperature:	23	°C
Barometric Pressure:	1016	hPa
Stack Gas Moisture:	2.2	%
Corrected Volume:	0.00505	m^3 (0°C, dry gas, 1 atmosphere pressure)
Stack Flow Rate	25	m^3/s (0°C, dry gas, 1 atmosphere pressure)

VOC AIR EMISSION TEST RESULTS					
Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.099	<2.5
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.099	<2.5
2-Butanone	<0.5	<0.5	<0.5	<0.099	<2.5
Chloroform	<0.5	<0.5	<0.5	<0.099	<2.5
Benzene	<0.5	<0.5	<0.5	<0.099	<2.5
1-heptene	<0.5	<0.5	<0.5	<0.099	<2.5
n-heptane	<0.5	<0.5	<0.5	<0.099	<2.5
Trichloroethene	<0.5	<0.5	<0.5	<0.099	<2.5
MIBK	<0.5	<0.5	<0.5	<0.099	<2.5
Toluene	<0.5	<0.5	<0.5	<0.099	<2.5
2-hexanone	<0.5	<0.5	<0.5	<0.099	<2.5
Chlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
Ethyl Benzene	<0.5	<0.5	<0.5	<0.099	<2.5
m- & p-xylene	<1	<1	<1	<0.2	<5
o-xylene	<0.5	<0.5	<0.5	<0.099	<2.5
Styrene	<0.5	<0.5	<0.5	<0.099	<2.5
Cyclohexanone	<0.5	<0.5	<0.5	<0.099	<2.5
Isopropylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
2-chlorotoluene	<0.5	<0.5	<0.5	<0.099	<2.5
4-chlorotoluene	<0.5	<0.5	<0.5	<0.099	<2.5
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
n-decane	<0.5	<0.5	<0.5	<0.099	<2.5
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.099	<2.5
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.099	<2.5
n-butylbenzene	<0.5	<0.5	<0.5	<0.099	<2.5
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.099	<2.5
Total	<1		<1	<0.2	<5

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. ie a blank value of <0.5 has had 0.25 subtracted from the analysed value.

STACK ANALYSIS - SAMPLING OF VOLATILE ORGANIC COMPOUNDS

AECOM

Client:	Weston Aluminium	
Project Number:	60287751	
Stack Description:	Stack 5	
Date:	13-May-13	
Rotameter Correction Factor:	0.93	
Time Start:	11:11	
Time Finish:	11:41	
Sample Flow Rate:	0.2	L/min
Sample Time:	30	min
Sampled Volume:	5.58	litres
	0.00558	m^3
Ambient Temperature:	20	°C
Barometric Pressure:	1016	hPa
Stack Gas Moisture:	3.8	%
Corrected Volume:	0.00502	m^3 (0°C, dry gas, 1 atmosphere pressure)
Stack Flow Rate	22	m^3/s (0°C, dry gas, 1 atmosphere pressure)

VOC AIR EMISSION TEST RESULTS

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.1	<2.2
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.1	<2.2
2-Butanone	<0.5	<0.5	<0.5	<0.1	<2.2
Chloroform	<0.5	<0.5	<0.5	<0.1	<2.2
Benzene	<0.5	<0.5	<0.5	<0.1	<2.2
1-heptene	<0.5	<0.5	<0.5	<0.1	<2.2
n-heptane	<0.5	<0.5	<0.5	<0.1	<2.2
Trichloroethene	<0.5	<0.5	<0.5	<0.1	<2.2
MIBK	<0.5	<0.5	<0.5	<0.1	<2.2
Toluene	<0.5	<0.5	<0.5	<0.1	<2.2
2-hexanone	<0.5	<0.5	<0.5	<0.1	<2.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.1	<2.2
m- & p-xylene	<1	<1	<1	<0.2	<4.4
o-xylene	<0.5	<0.5	<0.5	<0.1	<2.2
Styrene	<0.5	<0.5	<0.5	<0.1	<2.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.1	<2.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.1	<2.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.1	<2.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
n-decane	<0.5	<0.5	<0.5	<0.1	<2.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.1	<2.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.1	<2.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.1	<2.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.1	<2.2
Total	<1		<1	<0.2	<4.4

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. ie a blank value of <0.5 has had 0.25 subtracted from the analysed value.

STACK ANALYSIS - SAMPLING OF VOLATILE ORGANIC COMPOUNDS

AECOM

Client:	Weston Aluminium	
Project Number:	60287751	
Stack Description:	Stack 6	
Date:	13-May-13	
Rotameter Correction Factor:	0.93	
Time Start:	14:30	
Time Finish:	15:00	
Sample Flow Rate:	0.2	L/min
Sample Time:	30	min
Sampled Volume:	5.58	litres
	0.00558	m^3
Ambient Temperature:	28	°C
Barometric Pressure:	1014	hPa
Stack Gas Moisture:	7.8	%
Corrected Volume:	0.00467	m^3 (0°C, dry gas, 1 atmosphere pressure)
Stack Flow Rate	1.8	m^3/s (0°C, dry gas, 1 atmosphere pressure)

VOC AIR EMISSION TEST RESULTS					
Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.11	<0.2
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.11	<0.2
2-Butanone	<0.5	<0.5	<0.5	<0.11	<0.2
Chloroform	<0.5	<0.5	<0.5	<0.11	<0.2
Benzene	<0.5	<0.5	<0.5	<0.11	<0.2
1-heptene	<0.5	<0.5	<0.5	<0.11	<0.2
n-heptane	<0.5	<0.5	<0.5	<0.11	<0.2
Trichloroethene	<0.5	<0.5	<0.5	<0.11	<0.2
MIBK	<0.5	<0.5	<0.5	<0.11	<0.2
Toluene	<0.5	<0.5	<0.5	<0.11	<0.2
2-hexanone	<0.5	<0.5	<0.5	<0.11	<0.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.11	<0.2
m- & p-xylene	<1	<1	<1	<0.21	<0.38
o-xylene	<0.5	<0.5	<0.5	<0.11	<0.2
Styrene	<0.5	<0.5	<0.5	<0.11	<0.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.11	<0.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.11	<0.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.11	<0.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
n-decane	<0.5	<0.5	<0.5	<0.11	<0.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.11	<0.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.11	<0.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.11	<0.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.11	<0.2
Total	<1		<1	<0.21	<0.38

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. ie a blank value of <0.5 has had 0.25 subtracted from the analysed value.

STACK ANALYSIS - SAMPLING OF VOLATILE ORGANIC COMPOUNDS

AECOM

Client:	Weston Aluminium	
Project Number:	60287751	
Stack Description:	Stack 7	
Date:	02-May-13	
Rotameter Correction Factor:	0.93	
Time Start:	9:50	
Time Finish:	10:20	
Sample Flow Rate:	0.2	L/min
Sample Time:	30	min
Sampled Volume:	5.58	litres
	0.00558	m^3
Ambient Temperature:	22	°C
Barometric Pressure:	1016	hPa
Stack Gas Moisture:		%
Corrected Volume:	0.00518	m^3 (0°C, dry gas, 1 atmosphere pressure)
Stack Flow Rate	33	m^3/s (0°C, dry gas, 1 atmosphere pressure)

VOC AIR EMISSION TEST RESULTS

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	4.3	<0.5	4.1	0.79	26
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.097	<3.2
2-Butanone	<0.5	<0.5	<0.5	<0.097	<3.2
Chloroform	<0.5	<0.5	<0.5	<0.097	<3.2
Benzene	<0.5	<0.5	<0.5	<0.097	<3.2
1-heptene	<0.5	<0.5	<0.5	<0.097	<3.2
n-heptane	<0.5	<0.5	<0.5	<0.097	<3.2
Trichloroethene	<0.5	<0.5	<0.5	<0.097	<3.2
MIBK	<0.5	<0.5	<0.5	<0.097	<3.2
Toluene	0.5	<0.5	0.3	0.058	1.9
2-hexanone	<0.5	<0.5	<0.5	<0.097	<3.2
Chlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
Ethyl Benzene	<0.5	<0.5	<0.5	<0.097	<3.2
m- & p-xylene	<1	<1	<1	<0.19	<6.3
o-xylene	<0.5	<0.5	<0.5	<0.097	<3.2
Styrene	<0.5	<0.5	<0.5	<0.097	<3.2
Cyclohexanone	<0.5	<0.5	<0.5	<0.097	<3.2
Isopropylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
2-chlorotoluene	<0.5	<0.5	<0.5	<0.097	<3.2
4-chlorotoluene	<0.5	<0.5	<0.5	<0.097	<3.2
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
n-decane	<0.5	<0.5	<0.5	<0.097	<3.2
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.097	<3.2
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.097	<3.2
n-butylbenzene	<0.5	<0.5	<0.5	<0.097	<3.2
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.097	<3.2
Total	4.8		4.4	0.8	27.9

Note: Where the blank has returned a less than value, the analysed value has been corrected for half of that blank value. ie a blank value of <0.5 has had 0.25 subtracted from the analysed value.

This page has been left blank intentionally.

Appendix B

Laboratory Analytical Reports (64 Pages)

Appendix B Laboratory Analytical Reports

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - MOISTURE REPORT

Origin: AECOM - Newcastle
Project: **60287751**

Report : 4514-0-M

Description : Stack Emission Samples
Received: 03-May-13

Date : 08-May-13

Report To : Peter Waddingham
17 Warabrook Blvd, Warabrook NSW 2304

Copy to: FILE

Jar ID	Moisture (g)
134	24.7
192	11.3
F23	12.4
F24	6.3
F25	11.0
F28	12.6
FA8	7.7
G060	85.7
G100	12.0
GS012	12.6
P1	13.9
P26	12.9
P29	10.3
Z11	16.1
Z12	7.2
Z17	9.6

NATA Accredited Laboratory 18079
Accredited for compliance with
ISO/IEC 17025

ACCREDITED FOR TECHNICAL COMPETENCE

Reported By: M. Campbell
Michael Campbell

Determined in Accordance With:
Moisture content in stack gases by gravimetric using in-house M301

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - MOISTURE REPORT

Origin:	AECOM - Newcastle	**Report :**	4514-0-M
Project:	**60287751**		
Description :	Stack Emission Samples Received: 03-May-13	**Date :**	08-May-13
Report To :	Peter Waddingham 17 Warabrook Blvd, Warabrook NSW 2304	**Copy to:**	FILE

Jar ID	Moisture (g)
Z19	8.9
Z2	10.8
Z8	6.7

NATA Accredited Laboratory 18079
Accredited for compliance with ISO/IEC 17025

ACCREDITED FOR TECHNICAL COMPETENCE

Reported By: M. Campbell

Michael Campbell

Determined in Accordance With:
Moisture content in stack gases by gravimetric using in-house M301

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - PARTICULATES REPORT

Origin: AECOM - Newcastle
Project: **60287751**

Report : 4514-0-P

Description : Stack Emission Samples
Received: 03-May-13

Date : 08-May-13

Report To : Peter Waddingham
17 Warabrook Blvd, Warabrook NSW 2304

Copy to: FILE

Thimble ID		Volume (mL)	Total Particulate Matter (g)
N12	Thimble	-	0.0003
N2	Thimble	-	<0.0002
N8	Thimble	-	<0.0002
T17	Thimble	-	0.0008
T18	Thimble	-	0.0007
T24	Thimble	-	0.0014
T29	Thimble	-	0.0002
T4	Thimble	-	<0.0002

NATA Accredited Laboratory 18079
Accredited for compliance with ISO/IEC 17025

Note : 1. Sampled by Client

Reported By: M Campbell
Michael Campbell

Determined in Accordance With:
Particulate matter - total in stack gases by gravimetric using in-house M300

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - MOISTURE REPORT

Origin: AECOM - Newcastle
Project: **60287751**

Report : 4560-0-M

Description : Stack Emission Samples
Received: 15-May-13

Date : 21-May-13

Report To : Peter Waddingham
17 Warabrook Blvd, Warabrook NSW 2304

Copy to: FILE

Jar ID	Moisture (g)
140	5.3
F97	11.4
F98	14.1
FA9	12.2
G032	12.9
G046	13.6
P1	10.4
P2	7.4
P30	18.4
P31	7.9
P5	10.4
P6	11.6
Z1	10.2

NATA Accredited Laboratory 18079
Accredited for compliance with
ISO/IEC 17025

NATA
ACCREDITED FOR
TECHNICAL
COMPETENCE

Reported By: Belinda Evans

Determined in Accordance With:
Moisture content in stack gases by gravimetric using in-house M301

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - PARTICULATES REPORT

Origin: AECOM - Newcastle
Project: **60287751**

Report : 4560-0-P

Description : Stack Emission Samples
Received: 15-May-13

Date : 21-May-13

Report To : Peter Waddingham
17 Warabrook Blvd, Warabrook NSW 2304

Copy to: FILE

Thimble ID		Volume (mL)	Total Particulate Matter (g)
T-13	Teflon Filter	-	0.0004
T-15	Teflon Filter	-	0.0006

NATA Accredited Laboratory 18079
Accredited for compliance with ISO/IEC 17025

ACCREDITED FOR TECHNICAL COMPETENCE

Note : 1. Sampled by Client

Reported By: _____
Belinda Evans

Determined in Accordance With:
Particulate matter - total in stack gases by gravimetric using in-house M300

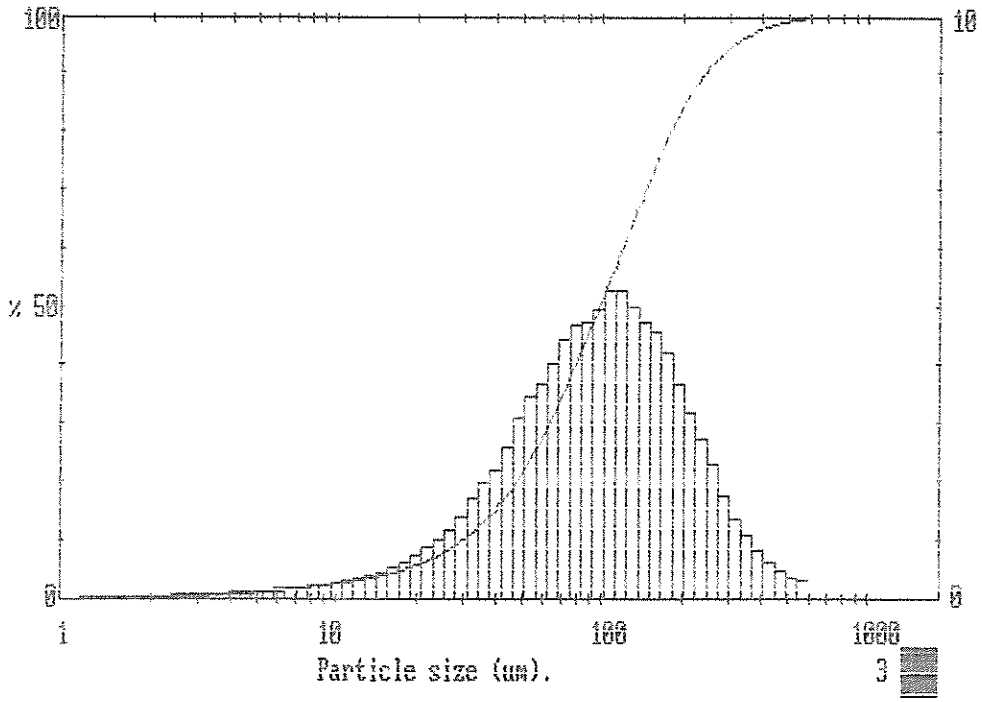
MALVERN Instruments S8.0D 8:21 am

STEEL RIVER TESTING SAMPLE NO : THIMBLE T1 # 4577

DATE:23/5/2013. 000004732

A

7160 stnd 11m652s



Upper	in	Lower	Under	Upper	in	Lower	Under	Upper	in	Lower	Under	Span 2.15
				124	10.5	101	52.1	11.6	0.6	9.48	2.3	
				101	9.7	83.3	42.4	9.48	0.4	7.78	1.9	D[4,3] 120.49µm
				83.3	9.1	68.3	33.2	7.78	0.4	6.39	1.5	
				68.3	7.7	56.1	25.5	6.39	0.3	5.24	1.2	
600	0.7	492	99.3	56.1	6.5	46.0	19.0	5.24	0.3	4.30	0.9	D[3,2] 47.77µm
492	1.1	404	98.2	46.0	4.8	37.8	14.2	4.30	0.2	3.53	0.7	
404	1.9	332	96.3	37.8	3.7	31.0	10.5	3.53	0.2	2.90	0.5	
332	2.2	272	93.1	31.0	2.6	25.5	7.9	2.90	0.1	2.38	0.4	D[v,0.9] 239.57µm
272	5.1	224	88.0	25.5	1.9	20.9	6.0	2.38	0.1	1.95	0.3	
224	6.9	183	81.3	20.9	1.4	17.1	4.6	1.95	0.1	1.60	0.2	
183	8.8	151	72.4	17.1	1.0	14.1	3.6	1.60	0.1	1.32	0.1	D[v,0.1] 29.97µm
151	9.7	124	62.6	14.1	0.7	11.6	2.9	1.32	0.1	0.50	0.0	

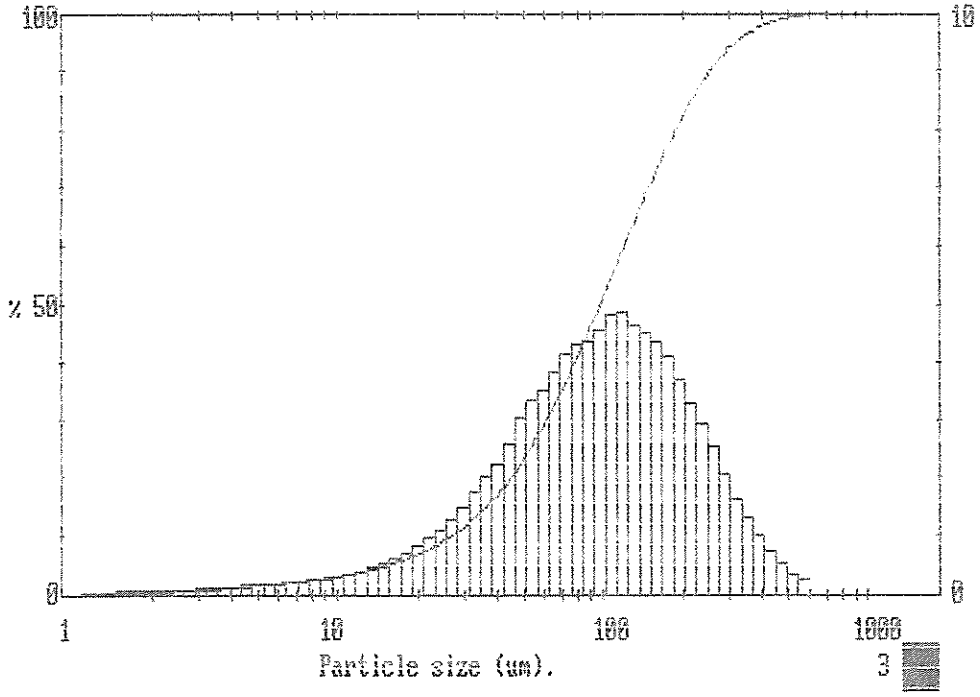
Source = :Sample	Beam length = 2.4 mm	Model indp	D[v,0.5] 97.40µm
Focal length = 300 mm	Residual = 1.191 %		
Presentation = stnd	Obscuration = 0.0450	Volume Conc. = 0.0896%	Shape OFF
	Volume distribution	Sp.S.A 0.1256 m²/cc.	

MALVERN Instruments SB.0D 8:22 am

STEEL RIVER TESTING SAMPLE NO : THIMBLE T1 # 4577
repeat
DATE:23/5/2013. 000004733

A

7160 stnd 11w652s



Upper	in	Lower	Under
600	0.6	492	99.4
492	1.2	404	98.1
404	2.3	332	95.8
332	3.7	272	92.1
272	5.5	224	86.5
224	7.0	183	79.5
183	8.6	151	70.9
151	9.2	124	61.8
124	9.7	101	52.1
101	8.9	83.3	43.1
83.2	8.5	68.3	34.6
68.3	7.4	56.1	27.2
56.1	6.4	46.0	20.8
46.0	4.9	37.8	15.9
37.8	3.8	31.0	12.1
31.0	2.8	25.5	8.3
25.5	2.1	20.9	7.2
20.9	1.5	17.1	5.7
17.1	1.1	14.1	4.6
14.1	0.9	11.6	3.7
11.6	0.7	9.48	3.0
9.48	0.5	7.78	2.5
7.78	0.4	6.39	2.1
6.39	0.4	5.24	1.7
5.24	0.3	4.30	1.4
4.30	0.3	3.53	1.1
3.53	0.2	2.90	0.8
2.90	0.2	2.38	0.6
2.38	0.2	1.95	0.4
1.95	0.1	1.60	0.3
1.60	0.1	1.32	0.2
1.32	0.2	0.50	0.0

Span 2.31

D[4,3] 122.12µm

D[3,2] 41.75µm

D[v,0.9] 251.07µm

D[v,0.1] 26.88µm

D[v,0.5] 97.04µm

Shape OFF

Source = :Sample
Focal length = 300 mm
Presentation = stnd

Beam length = 2.4 mm
Residual = 1.065 %
Obscuration = 0.0354
Volume distribution

Model indp
Volume Conc. = 0.0208%
Sp.S.A 0.1437 m²/cc.

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - PARTICULATES REPORT

Origin: AECOM - Newcastle
Project: **60287751**

Report : 4577-0-P

Description : Stack Emission Samples
Received: 20-May-13

Date : 24-May-13

Report To : Peter Waddingham
17 Warabrook Blvd, Warabrook NSW 2304

Copy to: FILE

Thimble ID		Volume (mL)	Total Particulate Matter (g)
T1	Thimble	-	0.0043
T19	Thimble	-	0.0009
T2	Thimble	-	0.0006

NATA Accredited Laboratory 18079
Accredited for compliance with ISO/IEC 17025

Note : 1. Sampled by Client

Reported By: M. Campbell
Michael Campbell

Determined in Accordance With:
Particulate matter - total in stack gases by gravimetric using in-house M300

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1301658**	Page	: 1 of 13
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Newcastle
Contact	: MR JAMES LANG	Contact	: Peter Keyte
Address	: 17 WARABROOK BOULEVARDE WARABROOK NSW, AUSTRALIA 2304	Address	: 5 Rosegum Road Warabrook NSW Australia 2304
E-mail	: james.lang@aecom.com	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 4911 4900	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 4911 4999	Facsimile	: +61-2-4968 0349
Project	: 60287751	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: ----	Date Samples Received	: 03-MAY-2013
Sampler	: ----	Issue Date	: 14-MAY-2013
Site	: ----		
		No. of samples received	: 26
Quote number	: EN/004/12	No. of samples analysed	: 26

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics
Merrin Avery	Laboratory Technician	Newcastle - Inorganics
Peter Keyte	Newcastle Manager	Newcastle - Organics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time componert. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **ED009X: LOR raised for Chloride on various samples due to samples' matrix.**
- **EK026-I: Cyanide was analysed as a preserved water sample by ALS Environmental, Sydney under NATA accreditation no. 825, site no 10911**
- **EP091-S3: Sample EN1301658-11 was received with the cap detached from the Section 3 end of the charcoal sorbent tube.**
- **Filters were supplied by the client. Filter preparation may not meet ALS method requirements.**

Analytical Results

Sub-Matrix: **FILTER** (Matrix: **AIR**)

	Client sample ID	Stack 1 Particulate Fluoride	Stack 2 Particulate Fluoride	Stack 3 Particulate Fluoride	Stack 7 Particulate Fluoride	Blank Particulate Fluoride
	Client sampling date / time	30-APR-2013 14:00	29-APR-2013 14:00	29-APR-2013 14:00	02-MAY-2013 14:00	03-MAY-2013 08:00
Compound / CAS Number / LOR / Unit		EN1301658-002	EN1301658-004	EN1301658-006	EN1301658-008	EN1301658-010
EA144C: Gaseous and Particulate Fluorides						
Fluoride (Particulate) as HF --- 1 µg/filter		24	2	8	11	51

Analytical Results

Sub-Matrix: **IMPINGER SOLUTION** (Matrix: **AIR**)

Compound	CAS Number	LOR	Unit	Client sample ID: Stack 1 Gaseous Fluroride	Stack 2 Gaseous Fluoride	Stack 3 Gaseous Fluoride	Stack 7 Gaseous Fluoride	Blank Gaseous Fluoride
				Client sampling date / time: 30-APR-2013 14:00	29-APR-2013 14:00	29-APR-2013 14:00	02-MAY-2013 14:00	03-MAY-2013 08:00
				EN1301658-001	EN1301658-003	EN1301658-005	EN1301658-007	EN1301658-009
EA144C: Gaseous and Particulate Fluorides								
Fluoride (as HF)	---	0.1	mg/sample	<0.1	<0.1	<0.1	<0.1	<0.1
Volume - Impinger	---	1	mL	**290**	**310**	**290**	**285**	**200**

Analytical Results

Sub-Matrix: IMPINGER SOLUTION (Matrix: AIR)				Client sample ID	Stack 1 SOx IPA	Stack 1 SOx H2O2	Stack 7 SOx IPA	Stack 7 SOx H2O2	SOx Blank IPA
				Client sampling date / time	30-APR-2013 14:00	30-APR-2013 14:00	02-MAY-2013 14:00	02-MAY-2013 14:00	03-MAY-2013 14:00
Compound	CAS Number	LOR	Unit		EN1301658-014	EN1301658-015	EN1301658-016	EN1301658-017	EN1301658-018
EA143C: Sulfuric Acid and Sulfur Dioxide (as SO3)									
Volume - Impinger	---	1	mL		**320**	---	**212**	---	**196**
Sulfuric Acid as SO3	---	2	mg/sample		<2	---	<2	---	<2
Volume - Impinger	---	1	mL		---	**332**	---	**167**	---
Sulfur Dioxide as SO3	---	10	mg/sample		---	<10	---	<10	---

Analytical Results

Sub-Matrix: IMPINGER SOLUTION (Matrix: AIR)				Client sample ID	SOx Blank H2O2	Stack 1 Cyanide Front 2	Stack 1 Cyanide Back 1	Cyanide Blank	Stack 1 HCL (H2SO4)
				Client sampling date / time	03-MAY-2013 14:00	01-MAY-2013 14:00	01-MAY-2013 14:00	03-MAY-2013 14:00	01-MAY-2013 14:00
Compound	CAS Number	LOR	Unit		EN1301658-019	EN1301658-020	EN1301658-021	EN1301658-022	EN1301658-023
EA143C: Sulfuric Acid and Sulfur Dioxide (as SO3)									
Volume - Impinger	----	1	mL		184	----	----	----	----
Sulfur Dioxide as SO3	----	10	mg/sample		<10	----	----	----	----
EA147: Acid Gases									
Hydrogen Chloride	7647-01-0	0.100	mg		----	----	----	----	<2.00
ED009: Anions									
Chloride	16887-00-6	0.100	mg		----	----	----	----	<2.00
EK026-I: Cyanide in Air Impinger Solutions									
Cyanide	57-12-5	0.01	mg		----	0.27	<0.01	<0.01	----
Volume - Impinger	----	1	mL		----	310	66	226	----
Sampling Method									
Volume - Impinger	----	-	mL		----	----	----	----	210

Analytical Results

Sub-Matrix: IMPINGER SOLUTION (Matrix: AIR)				Client sample ID	Stack 1 HCL (NaOH)	HCL H2SO4 Blank	HCL NaOH Blank	----	----
				Client sampling date / time	01-MAY-2013 14:00	03-MAY-2013 14:00	03-MAY-2013 14:00	----	----
Compound	CAS Number	LOR	Unit		EN1301658-024	EN1301658-025	EN1301658-026	----	----
EA147: Acid Gases									
Hydrogen Chloride	7647-01-0	0.100	mg		----	<2.00	----	----	----
EA147: Halogens									
Chlorine	7782-50-5	0.100	mg		<2.00	----	<2.00	----	----
ED009: Anions									
Chloride	16887-00-6	0.100	mg		<2.00	<2.00	<2.00	----	----
Sampling Method									
Volume - Impinger	----	-	mL		197	196	98.5	----	----

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)				Client sample ID	VOC Blank	Stack Seven VOC	Stack 1 VOC	----	----
				Client sampling date / time	03-MAY-2013 09:00	02-MAY-2013 14:00	01-MAY-2013 14:00	----	----
Compound	CAS Number	LOR	Unit		EN1301658-011	EN1301658-012	EN1301658-013	----	----
EP091A: Aliphatic Hydrocarbons - Total									
1-heptene	592-76-7	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Decane	124-18-5	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Heptane	142-82-5	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons - Total									
Benzene	71-43-2	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Toluene	108-88-3	0.5	µg/sample		<0.5	**0.5**	<0.5	----	----
Ethylbenzene	100-41-4	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg/sample		<1	<1	<1	----	----
Styrene	100-42-5	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
n-Butylbenzene	104-51-8	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Isopropylbenzene	98-82-8	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
EP091C: Oxygenated Compounds - Total									
2-Propanone (Acetone)	67-64-1	0.5	µg/sample		<0.5	**4.3**	**0.5**	----	----
2-Butanone (MEK)	78-93-3	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
EP091D: Halogenated Compounds - Total									
1.1-Dichloroethane	75-34-3	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Chloroform	67-66-3	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Chlorobenzene	108-90-7	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
2-Chlorotoluene	95-49-8	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
4-Chlorotoluene	106-43-4	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	µg/sample		<0.5	<0.5	<0.5	----	----
EP091A: Aliphatic Hydrocarbons (Section 1)									
1-heptene	592-76-7	0.5	µg		<0.5	<0.5	<0.5	----	----
Heptane	142-82-5	0.5	µg		<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)				Client sample ID	VOC Blank	Stack Seven VOC	Stack 1 VOC	----	----
				Client sampling date / time	03-MAY-2013 09:00	02-MAY-2013 14:00	01-MAY-2013 14:00	----	----
Compound	CAS Number	LOR	Unit		EN1301658-011	EN1301658-012	EN1301658-013	----	----
EP091A: Aliphatic Hydrocarbons (Section 1) - Continued									
Decane	124-18-5	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 1)									
Benzene	71-43-2	0.5	µg		<0.5	<0.5	<0.5	----	----
Toluene	108-88-3	0.5	µg		<0.5	**0.5**	<0.5	----	----
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	<1	----	----
Styrene	100-42-5	0.5	µg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	<0.5	----	----
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	<0.5	----	----
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091C: Oxygenated Compounds (Section 1)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	**4.3**	**0.5**	----	----
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091D: Halogenated Compounds (Section 1)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	<0.5	----	----
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091A: Aliphatic Hydrocarbons (Section 2)									
1-heptene	592-76-7	0.5	µg		<0.5	<0.5	<0.5	----	----
Heptane	142-82-5	0.5	µg		<0.5	<0.5	<0.5	----	----
Decane	124-18-5	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2)									

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)				Client sample ID	VOC Blank	Stack Seven VOC	Stack 1 VOC	---	---
				Client sampling date / time	03-MAY-2013 09:00	02-MAY-2013 14:00	01-MAY-2013 14:00	---	---
Compound	CAS Number	LOR	Unit		EN1301658-011	EN1301658-012	EN1301658-013	---	---
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2) - Continued									
Benzene	71-43-2	0.5	µg		<0.5	<0.5	<0.5	---	---
Toluene	108-88-3	0.5	µg		<0.5	<0.5	<0.5	---	---
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	<0.5	---	---
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	<1	---	---
Styrene	100-42-5	0.5	µg		<0.5	<0.5	<0.5	---	---
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	<0.5	---	---
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	<0.5	---	---
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	<0.5	---	---
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	<0.5	---	---
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091C: Oxygenated Compounds (Section 2)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	<0.5	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091D: Halogenated Compounds (Section 2)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	<0.5	---	---
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	<0.5	---	---
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	<0.5	---	---
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	<0.5	---	---
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	<0.5	---	---
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	<0.5	---	---
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	<0.5	---	---
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	<0.5	---	---
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091A: Aliphatic Hydrocarbons (Section 3)									
1-heptene	592-76-7	0.5	µg		<0.5	<0.5	<0.5	---	---
Heptane	142-82-5	0.5	µg		<0.5	<0.5	<0.5	---	---
Decane	124-18-5	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091B: Monocyclic Aromatic Hydrocarbons (Section 3)									
Benzene	71-43-2	0.5	µg		<0.5	<0.5	<0.5	---	---
Toluene	108-88-3	0.5	µg		<0.5	<0.5	<0.5	---	---

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)				Client sample ID	VOC Blank	Stack Seven VOC	Stack 1 VOC	---	---
				Client sampling date / time	03-MAY-2013 09:00	02-MAY-2013 14:00	01-MAY-2013 14:00	---	---
Compound	CAS Number	LOR	Unit		EN1301658-011	EN1301658-012	EN1301658-013	---	---
EP091B: Monocyclic Aromatic Hydrocarbons (Section 3) - Continued									
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	<0.5	---	---
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	<1	---	---
Styrene	100-42-5	0.5	µg		<0.5	<0.5	<0.5	---	---
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	<0.5	---	---
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	<0.5	---	---
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	<0.5	---	---
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	<0.5	---	---
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091C: Oxygenated Compounds (Section 3)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	<0.5	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091D: Halogenated Compounds (Section 3)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	<0.5	---	---
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	<0.5	---	---
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	<0.5	---	---
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	<0.5	---	---
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	<0.5	---	---
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	<0.5	---	---
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	<0.5	---	---
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	<0.5	---	---
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	<0.5	---	---
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	<0.5	---	---
EP091: Chlorinated Organic Surrogates (Section 1)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**90.0**	**95.2**	**96.0**	---	---
4-Bromofluorobenzene	460-00-4	0.1	%		**75.9**	**75.2**	**78.9**	---	---
EP091: Chlorinated Organic Surrogates (Section 2)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**94.3**	**97.5**	**95.8**	---	---
4-Bromofluorobenzene	460-00-4	0.1	%		**76.2**	**77.5**	**75.5**	---	---
EP091: Chlorinated Organic Surrogates (Section 3)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**93.3**	**93.5**	**94.8**	---	---
4-Bromofluorobenzene	460-00-4	0.1	%		**75.0**	**79.0**	**76.4**	---	---

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)				Client sample ID	VOC Blank	Stack Seven VOC	Stack 1 VOC	---	---
				Client sampling date / time	03-MAY-2013 09:00	02-MAY-2013 14:00	01-MAY-2013 14:00	---	---
Compound	CAS Number	LOR	Unit		EN1301658-011	EN1301658-012	EN1301658-013	---	---
EP091: MAH Surrogates (Section 1)									
Toluene-D8	2037-26-5	0.1	%		87.7	92.9	94.4	---	---
EP091: MAH Surrogates (Section 2)									
Toluene-D8	2037-26-5	0.1	%		92.2	95.6	92.2	---	---
EP091: MAH Surrogates (Section 3)									
Toluene-D8	2037-26-5	0.1	%		91.0	93.2	91.6	---	---

Surrogate Control Limits

Sub-Matrix: SORBENT TUBE		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP091: Chlorinated Organic Surrogates (Section 1)			
1.2-Dichloroethane-D4	17060-07-0	70	130
4-Bromofluorobenzene	460-00-4	70	130
EP091: Chlorinated Organic Surrogates (Section 2)			
1.2-Dichloroethane-D4	17060-07-0	60	140
4-Bromofluorobenzene	460-00-4	60	140
EP091: Chlorinated Organic Surrogates (Section 3)			
1.2-Dichloroethane-D4	17060-07-0	60	140
4-Bromofluorobenzene	460-00-4	60	140
EP091: MAH Surrogates (Section 1)			
Toluene-D8	2037-26-5	70	130
EP091: MAH Surrogates (Section 2)			
Toluene-D8	2037-26-5	60	140
EP091: MAH Surrogates (Section 3)			
Toluene-D8	2037-26-5	60	140

ALS Group

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1301825**	Page	: 1 of 12
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Newcastle
Contact	: MR JAMES LANG	Contact	: Peter Keyte
Address	: 17 WARABROOK BOULEVARDE WARABROOK NSW, AUSTRALIA 2304	Address	: 5 Rosegum Road Warabrook NSW Australia 2304
E-mail	: james.lang@aecom.com	E-mail	: peter.keyte@als.com.au
Telephone	: +61 02 4911 4900	Telephone	: 61-2-4968-9433
Facsimile	: +61 02 4911 4999	Facsimile	: +61-2-4968 0349
Project	: 60287751	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: 160961-962	Date Samples Received	: 17-MAY-2013
Sampler	: ----	Issue Date	: 23-MAY-2013
Site	: ----		
		No. of samples received	: 21
Qucte number	: ----	No. of samples analysed	: 21

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA

WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ashesh Patel	Inorganic Chemist	Sydney Inorganics
Dianne Blane	Laboratory Coordinator (2IC)	Newcastle - Inorganics
Karinne Gelderman	Analyst	Newcastle - Organics
Merrin Avery	Laboratory Technician	Newcastle - Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

- **ED009: LOR raised for Chloride due to sample matrix.**
- **Filters were supplied by the client. Filter preparation may not meet ALS method requirements.**
- **Particular samples required dilution prior to analysis due to matrix interferences. LOR values have been adjusted accordingly.**

Analytical Results

Sub-Matrix: **FILTER** (Matrix: **AIR**)

			Client sample ID	STACK 4 PARTICULATE FLUORIDE	STACK 5 PARTICULATE FLUORIDE	STACK 6 PARTICULATE FLUORIDE	PARTICULATE FLUORIDE BLANK	---
			Client sampling date / time	14-MAY-2013 15:00	14-MAY-2013 15:00	13-MAY-2013 15:00	14-MAY-2013 15:00	---
Compound	*CAS Number*	*LOR*	*Unit*	**EN1301825-005**	**EN1301825-007**	**EN1301825-009**	**EN1301825-011**	---
EA144C: Gaseous and Particulate Fluorides								
Fluoride (Particulate) as HF	**---**	1	µg/filter	**211**	**24**	**666**	**3**	**---**

Analytical Results

Sub-Matrix: **IMPINGER SOLUTION** (Matrix: **AIR**)

Compound	CAS Number	LOR	Unit	Client sample ID	STACK 5 HCl H2SO4	STACK 5 HCl NAOH	HCl BLANK H2SO4	HCl BLANK NAOH	STACK 4 GASEOUS FLUORIDE
				Client sampling date / time	14-MAY-2013 15:00	14-MAY-2013 15:00	14-MAY-2013 15:00	14-MAY-2013 15:00	14-MAY-2013 15:00
					EN1301825-001	EN1301825-002	EN1301825-003	EN1301825-004	EN1301825-006
EA144C: Gaseous and Particulate Fluorides									
Fluoride (as HF)	----	0.1	mg/sample		----	----	----	----	<0.1
Volume - Impinger	----	1	mL		----	----	----	----	**206**
EA147: Acid Gases									
Hydrogen Chloride	7647-01-0	0.100	mg		<2.00	----	<2.00	----	----
EA147: Halogens									
Chlorine	7782-50-5	0.100	mg		----	<2.00	----	<2.00	----
ED009: Anions									
Chloride	16887-00-6	0.100	mg/L		<2.00	<2.00	<2.00	<2.00	----
Sampling Method									
Volume - Impinger	----	-	mL		**238**	**222**	**151**	**183**	----

Analytical Results

Sub-Matrix: **IMPINGER SOLUTION** (Matrix: **AIR**)

Compound	CAS Number	LOR	Unit	Client sample ID	STACK 5 GASEOUS FLUORIDE	STACK 6 GASEOUS FLUORIDE	GASEOUS FLUORIDE BLANK	STACK 5 SOX IPA	STACK 5 SOX H2O2
				Client sampling date / time	14-MAY-2013 15:00	13-MAY-2013 15:00	14-MAY-2013 15:00	14-MAY-2013 15:00	14-MAY-2013 15:00
					EN1301825-008	EN1301825-010	EN1301825-012	EN1301825-016	EN1301825-017
EA143C: Sulfuric Acid and Sulfur Dioxide (as SO3)									
Volume - Impinger	---	1	mL		---	---	---	**215**	---
Sulfuric Acid as SO3	---	2	mg/sample		---	---	---	<2	---
Volume - Impinger	---	1	mL		---	---	---	---	**230**
Sulfur Dioxide as SO3	---	10	mg/sample		---	---	---	---	<10
EA144C: Gaseous and Particulate Fluorides									
Fluoride (as HF)	---	0.1	mg/sample		<0.1	**15.4**	<0.1	---	---
Volume - Impinger	---	1	mL		**265**	**300**	**200**	---	---

Analytical Results

Sub-Matrix: **IMPINGER SOLUTION** (Matrix: **AIR**)			Client sample ID	STACK 6 SOX IPA	STACK 6 SOX H2O2	SOX BLANK IPA	SOX BLANK H2O2	----
			Client sampling date / time	13-MAY-2013 15:00	13-MAY-2013 15:00	15-MAY-2013 15:00	15-MAY-2013 15:00	----
Compound	*CAS Number*	*LOR*	*Unit*	**EN1301825-018**	**EN1301825-019**	**EN1301825-020**	**EN1301825-021**	**----**
EA143C: Sulfuric Acid and Sulfur Dioxide (as SO3)								
Volume - Impinger	**----**	1	mL	**270**	**----**	**275**	**----**	**----**
Sulfuric Acid as SO3	**----**	2	mg/sample	<2	**----**	<2	**----**	**----**
Volume - Impinger	**----**	1	mL	**----**	**335**	**----**	**250**	**----**
Sulfur Dioxide as SO3	**----**	10	mg/sample	**----**	**40**	**----**	<10	**----**

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)			Client sample ID	STACK 5 VOC	STACK 6 VOC	VOC BLANK	---	---
			Client sampling date / time	13-MAY-2013 15:00	13-MAY-2013 15:00	13-MAY-2013 15:00	---	---
Compound	CAS Number	LOR	Unit	EN1301825-013	EN1301825-014	EN1301825-015	---	---
EP091A: Aliphatic Hydrocarbons - Total								
1-heptene	592-76-7	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Decane	124-18-5	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Heptane	142-82-5	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
EP091B: Monocyclic Aromatic Hydrocarbons - Total								
Benzene	71-43-2	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Toluene	108-88-3	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Ethylbenzene	100-41-4	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
meta- & para-Xylene	108-38-3 106-42-3	1	µg/sample	<1	<1	<1	---	---
Styrene	100-42-5	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
ortho-Xylene	95-47-6	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
1.3.5-Trimethylbenzene	108-67-8	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
1.2.4-Trimethylbenzene	95-63-6	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
n-Butylbenzene	104-51-8	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Isopropylbenzene	98-82-8	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
EP091C: Oxygenated Compounds - Total								
2-Propanone (Acetone)	67-64-1	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
2-Butanone (MEK)	78-93-3	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
2-Hexanone (MBK)	591-78-6	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
EP091D: Halogenated Compounds - Total								
1.1-Dichloroethane	75-34-3	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Chloroform	67-66-3	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Trichloroethene	79-01-6	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Chlorobenzene	108-90-7	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
2-Chlorotoluene	95-49-8	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
4-Chlorotoluene	106-43-4	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
1.3-Dichlorobenzene	541-73-1	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
1.4-Dichlorobenzene	106-46-7	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
1.2-Dichlorobenzene	95-50-1	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
Hexachlorobutadiene	87-68-3	0.5	µg/sample	<0.5	<0.5	<0.5	---	---
EP091A: Aliphatic Hydrocarbons (Section 1)								
1-heptene	592-76-7	0.5	µg	<0.5	<0.5	<0.5	---	---
Heptane	142-82-5	0.5	µg	<0.5	<0.5	<0.5	---	---

Analytical Results

Sub-Matrix: **SORBENT TUBE** (Matrix: **AIR**)

Compound	CAS Number	LOR	Unit	Client sample ID	STACK 5 VOC	STACK 6 VOC	VOC BLANK	----	----
				Client sampling date / time	13-MAY-2013 15:00	13-MAY-2013 15:00	13-MAY-2013 15:00	----	----
					EN1301825-013	EN1301825-014	EN1301825-015	----	----
EP091A: Aliphatic Hydrocarbons (Section 1) - Continued									
Decane	124-18-5	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 1)									
Benzene	71-43-2	0.5	µg		<0.5	<0.5	<0.5	----	----
Toluene	108-88-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	<1	----	----
Styrene	100-42-5	0.5	µg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	<0.5	----	----
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	<0.5	----	----
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091C: Oxygenated Compounds (Section 1)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091D: Halogenated Compounds (Section 1)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	<0.5	----	----
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091A: Aliphatic Hydrocarbons (Section 2)									
1-heptene	592-76-7	0.5	µg		<0.5	<0.5	<0.5	----	----
Heptane	142-82-5	0.5	µg		<0.5	<0.5	<0.5	----	----
Decane	124-18-5	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2)									

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)

Compound	CAS Number	LOR	Unit	Client sample ID: STACK 5 VOC	STACK 6 VOC	VOC BLANK	----	----
				Client sampling date / time: 13-MAY-2013 15:00	13-MAY-2013 15:00	13-MAY-2013 15:00	----	----
				EN1301825-013	EN1301825-014	EN1301825-015	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2) - Continued								
Benzene	71-43-2	0.5	µg	<0.5	<0.5	<0.5	----	----
Toluene	108-88-3	0.5	µg	<0.5	<0.5	<0.5	----	----
Ethylbenzene	100-41-4	0.5	µg	<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg	<1	<1	<1	----	----
Styrene	100-42-5	0.5	µg	<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	µg	<0.5	<0.5	<0.5	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg	<0.5	<0.5	<0.5	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg	<0.5	<0.5	<0.5	----	----
n-Butylbenzene	104-51-8	0.5	µg	<0.5	<0.5	<0.5	----	----
Isopropylbenzene	98-82-8	0.5	µg	<0.5	<0.5	<0.5	----	----
EP091C: Oxygenated Compounds (Section 2)								
2-Propanone (Acetone)	67-64-1	0.5	µg	<0.5	<0.5	<0.5	----	----
2-Butanone (MEK)	78-93-3	0.5	µg	<0.5	<0.5	<0.5	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg	<0.5	<0.5	<0.5	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg	<0.5	<0.5	<0.5	----	----
EP091D: Halogenated Compounds (Section 2)								
1.1-Dichloroethane	75-34-3	0.5	µg	<0.5	<0.5	<0.5	----	----
Chloroform	67-66-3	0.5	µg	<0.5	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	µg	<0.5	<0.5	<0.5	----	----
Chlorobenzene	108-90-7	0.5	µg	<0.5	<0.5	<0.5	----	----
2-Chlorotoluene	95-49-8	0.5	µg	<0.5	<0.5	<0.5	----	----
4-Chlorotoluene	106-43-4	0.5	µg	<0.5	<0.5	<0.5	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg	<0.5	<0.5	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg	<0.5	<0.5	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg	<0.5	<0.5	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	µg	<0.5	<0.5	<0.5	----	----
EP091A: Aliphatic Hydrocarbons (Section 3)								
1-heptene	592-76-7	0.5	µg	<0.5	<0.5	<0.5	----	----
Heptane	142-82-5	0.5	µg	<0.5	<0.5	<0.5	----	----
Decane	124-18-5	0.5	µg	<0.5	<0.5	<0.5	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 3)								
Benzene	71-43-2	0.5	µg	<0.5	<0.5	<0.5	----	----
Toluene	108-88-3	0.5	µg	<0.5	<0.5	<0.5	----	----

Analytical Results

Sub-Matrix: **SORBENT TUBE** (Matrix: **AIR**)

				Client sample ID	STACK 5 VOC	STACK 6 VOC	VOC BLANK	----	----
				Client sampling date / time	13-MAY-2013 15:00	13-MAY-2013 15:00	13-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit		EN1301825-013	EN1301825-014	EN1301825-015	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 3) - Continued									
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	<0.5	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	<1	----	----
Styrene	100-42-5	0.5	µg		<0.5	<0.5	<0.5	----	----
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	<0.5	----	----
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	<0.5	----	----
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091C: Oxygenated Compounds (Section 3)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091D: Halogenated Compounds (Section 3)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	<0.5	----	----
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	<0.5	----	----
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	<0.5	----	----
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	<0.5	----	----
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	<0.5	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	<0.5	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	<0.5	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	<0.5	----	----
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	<0.5	----	----
EP091: Chlorinated Organic Surrogates (Section 1)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		96.8	95.5	97.5	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		77.9	79.8	81.5	----	----
EP091: Chlorinated Organic Surrogates (Section 2)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		95.5	94.6	100	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		81.1	81.6	82.4	----	----
EP091: Chlorinated Organic Surrogates (Section 3)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		95.7	94.6	99.4	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		83.8	81.6	80.4	----	----

Analytical Results

Sub-Matrix: SORBENT TUBE (Matrix: AIR)			Client sample ID	STACK 5 VOC	STACK 6 VOC	VOC BLANK	----	----
			Client sampling date / time	13-MAY-2013 15:00	13-MAY-2013 15:00	13-MAY-2013 15:00	----	----
Compound	CAS Number	LOR	Unit	EN1301825-013	EN1301825-014	EN1301825-015	----	----
EP091: MAH Surrogates (Section 1)								
Toluene-D8	2037-26-5	0.1	%	92.1	94.3	96.0	----	----
EP091: MAH Surrogates (Section 2)								
Toluene-D8	2037-26-5	0.1	%	94.8	95.1	98.4	----	----
EP091: MAH Surrogates (Section 3)								
Toluene-D8	2037-26-5	0.1	%	96.7	95.1	98.0	----	----

Surrogate Control Limits

Sub-Matrix: **SORBENT TUBE**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP091: Chlorinated Organic Surrogates (Section 1)			
1.2-Dichloroethane-D4	17060-07-0	70	130
4-Bromofluorobenzene	460-00-4	70	130
EP091: Chlorinated Organic Surrogates (Section 2)			
1.2-Dichloroethane-D4	17060-07-0	60	140
4-Bromofluorobenzene	460-00-4	60	140
EP091: Chlorinated Organic Surrogates (Section 3)			
1.2-Dichloroethane-D4	17060-07-0	60	140
4-Bromofluorobenzene	460-00-4	60	140
EP091: MAH Surrogates (Section 1)			
Toluene-D8	2037-26-5	70	130
EP091: MAH Surrogates (Section 2)			
Toluene-D8	2037-26-5	60	140
EP091: MAH Surrogates (Section 3)			
Toluene-D8	2037-26-5	60	140

A.B.N. 44 000 964 278
3 - 5, 18 Redland Drive
Mitcham, Vic, 3132
Telephone: (03) 9874 1988
Fax: (03) 9874 1933

Chartered Chemists

15-May-2013

REPORT NUMBER: M130951
Site/Client Ref: 60287751
Order No: 68887AUS

AECOM
17 Warabrook Bvde
Warabrook

NSW 2304
Attention: Peter Waddingham

CERTIFICATE OF ANALYSIS

SAMPLES:	Twelve samples were received for analysis
DATE RECEIVED:	**6-May-2013**
DATE COMMENCED:	**6-May-2013**
METHODS:	See Attached Results
RESULTS:	Please refer to attached pages for results.

Note: Results are based on samples as received at SGS Leeder Consulting's laboratories

REPORTED BY:

Ming

Ming Dai
Chemist

NATA
WORLD RECOGNISED ACCREDITATION

NATA Accredited Laboratory Number: 2562

Accredited for compliance with ISO/IEC 17025.

(I) RESULTS

Report N°: M130951

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Sample units are expressed in µg total

	Leeder ID	2013011468	2013011469	2013011470
	Client ID	No.1	No.12	Method
Analyte Name	PQL			Blank
Sb	0.05	0.05	nd	nd
As	0.05	0.06	0.09	nd
Be	0.05	nd	nd	nd
Cd	0.05	0.74	nd	nd
Cr	0.05	0.52	0.80	nd
Co	0.05	nd	nd	nd
Cu	0.05	1.1	0.10	nd
Pb	0.05	0.37	nd	nd
Mg	0.05	2.2	0.39	nd
Mn	0.05	3.3	0.13	nd
Hg	0.05	0.07	0.05	nd
Ni	0.05	1.4	0.06	nd
Se	0.05	nd	nd	nd
Tl	0.05	nd	nd	nd
Sn	0.05	0.13	0.23	nd
V	0.25	nd	0.3	nd
Zn	0.05	15	2.1	nd

(I) RESULTS

Report N°: M130951

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013011471	2013011472	2013011473
	Client ID	No.3	No.4	No.8A
Analyte Name	PQL			
Sb	0.5	nd	nd	nd
As	0.5	nd	nd	nd
Be	0.5	nd	nd	nd
Cd	0.5	1.5	2.5	nd
Cr	0.5	1.1	3.2	nd
Co	0.5	nd	nd	nd
Cu	0.5	2.6	2.4	nd
Pb	0.5	34	3.0	nd
Mg	0.5	54	19	nd
Mn	0.5	18	18	nd
Hg	0.5	nd	nd	nd
Ni	0.5	0.7	2.9	nd
Se	0.5	1.5	0.8	nd
Tl	0.5	nd	nd	nd
Sn	0.5	nd	nd	nd
V	0.5	nd	nd	nd
Zn	0.5	630	17	nd
Sample Volume (ml)	0.5	100	310	300

(I) RESULTS

Report N°: M130951

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013011474	2013011475	2013011476	2013011477	2013011478	2013011479
	Client ID	No.9	No.5A	No.5C	No.8B	No.11	Method
Analyte Name	PQL						Blank
Sb	0.5	nd					nd
As	0.5	nd					nd
Be	0.5	nd					nd
Cd	0.5	nd					nd
Cr	0.5	nd					nd
Co	0.5	nd					nd
Cu	0.5	nd					nd
Pb	0.5	nd					nd
Mg	0.5	nd					nd
Mn	0.5	0.5					nd
Hg	0.5	nd	nd	nd	nd	nd	nd
Ni	0.5	nd					nd
Se	0.5	nd					nd
Tl	0.5	nd					nd
Sn	0.5	nd					nd
V	0.5	nd					nd
Zn	0.5	nd					nd
Sample Volume (ml)	0.5	200	100	250	100	250	

(I) RESULTS

Report N°: M130951

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013011480	2013011481	2013011482
	Client ID	No.5B	No.10	Method
Analyte Name	PQL			Blank
Hg	0.5	nd	nd	nd
Sample Volume (ml)		380	100	

(II) QUALITY CONTROL

Report N°: M130951

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013011483	2013011484
	Client ID	Matrix	Matrix
Analyte Name	PQL	Spike	Spike Dup
Sb		105	105
As		105	104
Be		111	99
Cd		106	104
Cr		105	102
Co		104	102
Cu		104	102
Pb		105	103
Mg		105	103
Mn		107	104
Hg		98	95
Ni		104	101
Se		108	106
Tl		100	99
Sn		108	107
V		106	105
Zn		115	113

(II) QUALITY CONTROL

Report N°: M130951

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013011485	2013011486
	Client ID	Matrix	Matrix
Analyte Name	PQL	Spike	Spike Dup
Sb		106	105
As		104	104
Be		100	104
Cd		106	104
Cr		104	103
Co		103	103
Cu		104	103
Pb		121	121
Mg		103	102
Mn		116	115
Hg		100	102
Ni		104	103
Se		106	107
Tl		101	101
Sn		110	105
V		105	104
Zn		U	U

(II) QUALITY CONTROL

Report N°: M130951

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013011487	2013011488
	Client ID	Matrix	Matrix
Analyte Name	PQL	Spike	Spike Dup
Hg		88	84

QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
ND	Not Detected – The analyte was not detected above the reported PQL.
NC	Not calculated, Results below PQL
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QCchecks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
C2	These compounds co-elute.
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

APPENDIX ONE.

CHAIN OF CUSTODY DOCUMENT

A.B.N. 44 000 964 278
3 - 5, 18 Redland Drive
Mitcham, Vic, 3132
Telephone: (03) 9874 1988
Fax: (03) 9874 1933

Chartered Chemists

30-May-2013

REPORT NUMBER: M131108
Site/Client Ref: 60287751
Order No: 60287751

AECOM
17 Warabrook Bvde
Warabrook

NSW 2304
Attention: James Lang

CERTIFICATE OF ANALYSIS

SAMPLES:	Twelve samples were received for analysis
DATE RECEIVED:	**22-May-2013**
DATE COMMENCED:	**22-May-2013**
METHODS:	See Attached Results
RESULTS:	Please refer to attached pages for results.

Note: Results are based on samples as received at SGS Leeder Consulting's laboratories

REPORTED BY:

Ming

Ming Dai
Chemist

NATA Accredited Laboratory Number: 2562

Accredited for compliance with ISO/IEC 17025.

(I) RESULTS

Report N°: M131108

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Sample units are expressed in µg total

	Leeder ID	2013012797	2013012798	2013012799
	Client ID	Metals No. 1	Metals No. 12	Method
Analyte Name	PQL			Blank
Sb	0.05	nd	nd	nd
As	0.05	0.58	0.54	nd
Be	0.05	nd	nd	nd
Cd	0.05	51	nd	nd
Cr	0.05	4.1	1.5	nd
Co	0.05	0.16	nd	nd
Cu	0.05	2.0	0.33	nd
Pb	0.05	4.2	0.36	nd
Mg	0.05	250	130	nd
Mn	0.05	22	1.3	nd
Hg	0.05	nd	nd	nd
Ni	0.05	1.9	nd	nd
Se	0.05	0.10	nd	nd
Tl	0.05	nd	nd	nd
Sn	0.05	0.65	0.20	nd
V	0.25	1.6	1.0	nd
Zn	0.05	3400	2700	nd

(I) RESULTS

Report N°: M131108

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013012800	2013012801	2013012802
	Client ID	Metals No. 3	Metals No. 4	Metals No. 8A
Analyte Name	PQL			
Sb	0.5	nd	nd	nd
As	0.5	nd	nd	nd
Be	0.5	nd	nd	nd
Cd	0.5	0.7	2.2	nd
Cr	0.5	0.7	3.8	nd
Co	0.5	nd	nd	nd
Cu	0.5	1.6	2.8	0.5
Pb	0.5	6.4	4.4	nd
Mg	0.5	9.3	24	7.6
Mn	0.5	14	18	nd
Hg	0.5	nd	nd	nd
Ni	0.5	2.0	3.6	nd
Se	0.5	1.8	nd	nd
Tl	0.5	nd	nd	nd
Sn	0.5	nd	1.7	nd
V	0.5	nd	nd	nd
Zn	0.5	18	17	nd
Sample Volume (ML)	0.5	92	300	300

(I) RESULTS

Report N°: M131108

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013012803	2013012804	2013012805	2013012806	2013012807	2013012808
	Client ID	Metals No. 9	Metals No. 5A	Metals No. 5C	Metals No. 8B	Metals No. 11	Method
Analyte Name	PQL						Blank
Sb	0.5	nd					nd
As	0.5	nd					nd
Be	0.5	nd					nd
Cd	0.5	nd					nd
Cr	0.5	nd					nd
Co	0.5	nd					nd
Cu	0.5	nd					nd
Pb	0.5	nd					nd
Mg	0.5	2.7					nd
Mn	0.5	nd					nd
Hg	0.5	nd	nd	nd	nd	nd	nd
Ni	0.5	0.7					nd
Se	0.5	nd					nd
Tl	0.5	nd					nd
Sn	0.5	nd					nd
V	0.5	nd					nd
Zn	0.5	nd					nd
Sample Volume (ML)	0.5	200					

(I) RESULTS

Report N°: M131108

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Sample units are expressed in µg total

	Leeder ID	2013012809	2013012810	2013012811
	Client ID	Metals No. 5B	Metals No. 10	Method
Analyte Name	PQL			Blank
Hg	0.5	nd	nd	nd
Sample Volume (ML)		400	100	

(II) QUALITY CONTROL

Report N°: M131108

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013012812	2013012813
	Client ID	Matrix	Matrix
Analyte Name	PQL	Spike	Spike Dup
Sb		108	110
As		105	107
Be		107	109
Cd		104	106
Cr		103	105
Co		99	100
Cu		103	103
Pb		100	104
Mg		U	U
Mn		105	107
Hg		103	106
Ni		103	106
Se		108	110
Tl		99	103
Sn		108	108
V		102	104
Zn		U	U

(II) QUALITY CONTROL

Report N°: M131108

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013012814	2013012815
	Client ID	Method	Method
Analyte Name	PQL	Spike	Spike Dup
Sb		117	119
As		109	111
Be		105	100
Cd		106	107
Cr		104	106
Co		98	100
Cu		101	102
Pb		101	101
Mg		107	106
Mn		106	109
Hg		104	105
Ni		103	104
Se		114	113
Tl		98	99
Sn		111	112
V		101	102
Zn		U	U

(II) QUALITY CONTROL

Report N°: M131108

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID	2013012816	2013012817
	Client ID	Method	Method
Analyte Name	PQL	Spike	Spike Dup
Hg		98	95

QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
ND	Not Detected – The analyte was not detected above the reported PQL.
NC	Not calculated, Results below PQL
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QCchecks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
C2	These compounds co-elute.
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

APPENDIX ONE.

CHAIN OF CUSTODY DOCUMENT

Australian Government
National Measurement Institute

CERTIFICATE OF ANALYSIS # DAU13_112

Client	AECOM 17 Warabrook Boulevarde Warabrook NSW 2304	**Job No.**	AECO01/130522
		Sampled by	Client
		Date Sampled	14-May-13
Contact	Peter Waddingham	**Date Received**	22-May-13

The results relate only to the sample(s) tested.

Method AUTL_02 **Date Reported** 19-Jun-13

Details

The method is for determination of tetra- through octa-chlorinated dibenzo-p-dioxins (PCDDs) & dibenzofurans (PCDFs) in emission samples by high resolution gas chromatography/high resolution mass spectrometry (HRGC/HRMS). This method provides data on all toxic 2,3,7,8-PCDD (seven) and PCDF (ten) isomers. PCDD and PCDF totals for each homologue group (tetra to octa) are also reported. The dioxin toxicity equivalent (I-TEQ) in each sample is calculated using International toxic equivalency factors (I-TEFs).
All results are corrected for labelled surrogate recoveries.

After sampling the filter & resin are spiked with a range of isotopically labelled surrogate standards and exhaustively extracted. Clean up is effected by partitioning with sulphuric acid then distilled water. Further purification is performed using column chromatography on acid and base modified silica gels, basic alumina and carbon dispersed on celite.

Immediately prior to injection, internal standards are added to each extract, and an aliquot of the extract is injected into the GC. The analytes are separated by the GC and detected by a high-resolution (>10,000) mass spectrometer.

Authorisation

Nino Piro
Senior Chemist
Dioxin Analysis Unit

Dr Alan Yates
Senior Analyst
Dioxin Analysis Unit

Accreditation

NATA Accredited Laboratory Number : 198

Accredited for compliance with ISO/IEC 17025.

This report shall not be reproduced, except in full.

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Sample Details : Job No. AECO01/130522

Laboratory Reg. No.	Client Sample Ref.	Matrix	Description
N13/013515X	Stack 5	Emission	Resin DAU080513A, Filter, Rinses

Project Details

Project Name	*Not Specified*
Project Number	*60287751*

Key

Analytes

TCDD	Tetrachlorodibenzo-p-dioxin	TCDF	Tetrachlorodibenzofuran
PeCDD	Pentachlorodibenzo-p-dioxin	PeCDF	Pentachlorodibenzofuran
HxCDD	Hexachlorodibenzo-p-dioxin	HxCDF	Hexachlorodibenzofuran
HpCDD	Heptachlorodibenzo-p-dioxin	HpCDF	Heptachlorodibenzofuran
OCDD	Octachlorodibenzo-p-dioxin	OCDF	Octachlorodibenzofuran

Units & Abbreviations

pg	picograms
<	level less than limit of detection (LOD)
I-TEF‡	International toxic equivalency factor
I-TEQ‡	International toxic equivalents - dioxins & furans

TEQs are calculated by multiplying the quantified level for each individual dioxin and furan congener reported by the corresponding TEF value and summing the result:

$$\text{I-TEQ} = \sum_{i=1}^{7}[\text{PCDD}_i \times \text{TEF}_i] + \sum_{j=1}^{10}[\text{PCDF}_j \times \text{TEF}_j]$$

i = PCDD congener index (1 - 7)
j = PCDF congener index (1 - 10)

Lower Bound TEQ	defines all congener values reported below the LOD as equal to zero.
Middle Bound TEQ	defines all congener values reported below the LOD as equal to half the LOD.
Upper Bound TEQ	defines all congener values reported below the LOD as equal to the LOD.

Surrogate Recovery	percentage recovery for $^{13}C_{12}$ labelled surrogate standard
⚐	Laboratory surrogate recovery outside normal acceptance criteria: **40-130%** for Tetra/Penta/Hexa congeners - **25-130%** for Hepta/Octa congeners
⚑	Field surrogate recovery outside normal acceptance criteria (**70-130%**)

‡ as defined in USEPA publication **EPA/625/3-89/016** (1989)

USEPA US Environmental Protection Agency

Results : Job No. AECO01/130522

Laboratory Reg. No.	N13/013515X	**Date Extracted**	11-Jun-13
Client Sample Ref.	Stack 5	**DB5 Analysis**	17-Jun-13
Matrix	Emission	**DB-Dioxin Analysis**	18-Jun-13
Description	Resin DAU080513A, Filter, Rinses		

PCDD/F Congeners	Level pg	I-TEF	I-TEQ contribution	Labelled Surrogate recovery
2,3,7,8-TCDF	4.8	0.1	0.48	105
2,3,7,8-TCDD	<0.8	1	0.4	84
1,2,3,7,8-PeCDF	1.5	0.05	0.076	71
2,3,4,7,8-PeCDF	1.9	0.5	0.93	**86**
1,2,3,7,8-PeCDD	<1	0.5	0.25	61
1,2,3,4,7,8-HxCDF	<2	0.1	0.1	**112**
1,2,3,6,7,8-HxCDF	<2	0.1	0.1	78
2,3,4,6,7,8-HxCDF	<2	0.1	0.1	
1,2,3,7,8,9-HxCDF	<2	0.1	0.1	
1,2,3,4,7,8-HxCDD	<2	0.1	0.1	**114**
1,2,3,6,7,8-HxCDD	<2	0.1	0.1	79
1,2,3,7,8,9-HxCDD	<2	0.1	0.1	
1,2,3,4,6,7,8-HpCDF	<1	0.01	0.005	79
1,2,3,4,7,8,9-HpCDF	<2	0.01	0.01	**104**
1,2,3,4,6,7,8-HpCDD	<4	0.01	0.02	80
OCDF	<3	0.001	0.002	
OCDD	24	0.001	0.024	86

PCDD/F Homologue Groups	Level pg
Total TCDF isomers	140
Total TCDD isomers	14
Total PeCDF isomers	23
Total PeCDD isomers	<10
Total HxCDF isomers	<10
Total HxCDD isomers	11
Total HpCDF isomers	<3
Total HpCDD isomers	<10

Summary Results		
Sum of PCDD and PCDF congeners		
Excluding LOD values	210	pg
I-TEQ		
Lower Bound [excluding LOD values]	**1.5**	pg
Middle Bound [including half LOD values]	**2.9**	pg
Upper Bound [including LOD values]	**4.3**	pg

Australian Government
National Measurement Institute

ANALYSIS REPORT # ORG13_023

Client	AECOM AUSTRALIA 17 WARABROOK BOULEVARDE WARABROOK NSW 2304	**Job No.**	AECO01/130506
		Sampled by	Client
		Date Sampled	1 & 2-May-2013
Contact	PETER WADDINGHAM	**Date Received**	6-May-2013

The results relate only to the sample(s) tested.

Method NGCMS 11.27

Details The samples are spiked with a range of isotopically labelled PAHs then extracted with organic solvent. The extracts were purified by chemical treatment and column chromatography. Analysis was performed using high resolution gas chromatography with low resolution mass spectrometry. Results have been corrected for recoveries of the internal standard.

Instrument: HP 5975 GCMS run in SIM mode. Column is a DB5-ms (30m×0.25mm×0.25µm). Method based on CARB429, July 1997 Revision.

Authorisation

Danny Slee
Senior Chemist- Environment
June 4, 2013

Accreditation NATA Accreditation Number : 198

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025.

This report shall not be reproduced, except in full.

Sample Details : Job No. AECO01/130506

Laboratory Reg. No.	Client Sample Ref.	Matrix	Description
N13/011926	DAU220413F	Emission	Cartridge, Filter, Rinses, 01/05/13, Stack 1
N13/011927	DAU020413A	Emission	Cartridge, Filter, Rinses, 02/05/13, Stack 7

Project Details

Project Name	*Main Stack PAH*
Project Number	*60287751 (PO No: 68888AUS)*

Key

Analytes	Labelled internal std.	Analytes	Labelled internal std.
Naphthalene	d8-Naphthalene	Chrysene	d12-Chrysene
2-Methylnaphthalene		Benzo(b)fluoranthene	d12-Benzo(b)fluoranthene
Acenaphthylene	d8-Acenaphthylene	Benzo(k)fluoranthene	d12-Benzo(k)fluoranthene
Acenaphthene	d10-Acenaphthene	Benzo(e)pyrene	
Fluorene	d10-Fluorene	Benzo(a)pyrene	d12-Benzo(a)pyrene
Phenanthrene	d10-Phenanthrene	Perylene	
Anthracene		Indeno(1,2,3-cd)pyrene	d12-Indeno(1,2,3-c,d)pyrene
Fluoranthene	d10-Fluoranthene	Dibenz(ah)anthracene	d14-Dibenz(ah)anthracene
Pyrene		Benzo(ghi)perylene	d12-Benzo(ghi)perylene
Benz(a)anthracene	d12-Benz(a)anthracene		

Abbreviations & Definitions

ng	nanograms per sample train
<	level less than limit of reporting (LOR)
BaP-PEF†	Benzo(a)pyrene Potency Equivalent Factor
$BaP\text{-}TEQ_{PAH}$	Benzo(a)pyrene Toxic Equivalents

† as defined in "Benzo(a)pyrene as a Toxic Air Contaminant", CARB/OEHHA Executive Summary, July 1994

TEQs are calculated by multiplying the quantified level for each toxic PAH by corresponding PEF and summing the result:

$$BaP\text{-}TEQ_{PAH} = \sum_{i=1}^{n}[PAH_i \times BaP\text{-}PEF_i] \qquad i = \text{toxic PAH analyte index (1 to n=7)}$$

CARB	California Air Resources Board
OEHHA	Office of Environmental Health Hazard Assessment (US)
Surrogate Standard	Known amount of deuterated standard added to the XAD resin prior to sampling. Surrogates are 'field spikes'. The surrogate recovery indicates how effectively the sample train retains PAHs collected on the resin. It is also a guide to matrix effects caused by time of storage and transportation.
Internal Standard	Known amount of deuterated PAHs added to field samples, blanks and QC samples prior to laboratory analysis. The internal standard is used to measure the concentration of native PAHs and surrogates. The internal standard recovery will determine the performance of the laboratory method. Usual recoveries are 50 to 150%. Lower recoveries can be accepted as long as the signal/noise ratio of the internal standard is >10.

Results : Job No. AECO01/130506

Laboratory Reg. No.	N13/011926	**Date Reported**	04-Jun-2013
Client Sample Ref.	DAU220413F	**Date Extracted**	06-May-2013
Matrix	Emission		
Description	Cartridge, Filter, Rinses, 01/05/13, Stack 1		

PAH	Conc. ng	Reporting Level (LOR, ng)	BaP-PEF Value	BaP-TEQ Contribution	Labelled Internal recovery (%)	Flags
Naphthalene	3900	65	-	-	62	
2-Methylnaphthalene	870	230	-	-		
Acenaphthylene	99	40	-	-	69	
Acenaphthene	870	25	-	-	74	
Fluorene	1300	20	-	-	63	
Phenanthrene	1100	35	-	-	74	
Anthracene	<20	20	-	-		
Fluoranthene	65	20	-	-	74	
Pyrene	25	20	-	-		
Benz(a)anthracene	<40	40	0.1	2.0	74	
Chrysene	33	20	0.01	0.3	79	
Benzo(b)fluoranthene	28	20	0.1	2.8	77	
Benzo(k)fluoranthene	<20	20	0.1	1.0	81	
Benzo(e)pyrene	<260	260	-	-		
Benzo(a)pyrene	<300	300	1.0	150	51	
Perylene	<340	340	-	-		
Indeno(1,2,3-cd)pyrene	32	20	0.1	3.2	80	
Dibenz(ah)anthracene	50	25	0.4	20	80	
Benzo(ghi)perylene	<25	25	-	-	80	

Flags
" * " : indicates the recovery is outside range but signal to noise is >10.
Acceptable recovery range set at 50 to 150%.

Surrogate Recovery	%
d14-Terphenyl	132

Summary Results		
BaP-TEQ$_{PAH}$		
Lower Bound [excluding LOD values]	**26**	ng
Middle Bound [including half LOD values]	**180**	ng
Upper Bound [including LOD values]	**330**	ng

Results : Job No. AECO01/130506

Laboratory Reg. No.	N13/011927	**Date Reported**	04-Jun-2013
Client Sample Ref.	DAU020413A	**Date Extracted**	06-May-2013
Matrix	Emission		
Description	Cartridge, Filter, Rinses, 02/05/13, Stack 7		

PAH	Conc. ng	Reporting Level (LOR, ng)	BaP-PEF Value	BaP-TEQ Contribution	Labelled Internal recovery (%)	Flags
Naphthalene	1900	65	-	-	61	
2-Methylnaphthalene	<230	230	-	-		
Acenaphthylene	<40	40	-	-	68	
Acenaphthene	39	25	-	-	73	
Fluorene	85	20	-	-	57	
Phenanthrene	99	35	-	-	57	
Anthracene	<20	20	-	-		
Fluoranthene	<20	20	-	-	56	
Pyrene	<20	20	-	-		
Benz(a)anthracene	<40	40	0.1	2.0	55	
Chrysene	<20	20	0.01	0.1	57	
Benzo(b)fluoranthene	<20	20	0.1	1.0	54	
Benzo(k)fluoranthene	<20	20	0.1	1.0	57	
Benzo(e)pyrene	<260	260	-	-		
Benzo(a)pyrene	<300	300	1.0	150	44	*
Perylene	<340	340	-	-		
Indeno(1,2,3-cd)pyrene	<20	20	0.1	1.0	61	
Dibenz(ah)anthracene	<25	25	0.4	5.0	61	
Benzo(ghi)perylene	<25	25	-	-	64	

Flags
" * " : indicates the recovery is outside range but signal to noise is >10.
Acceptable recovery range set at 50 to 150%.

Surrogate Recovery	%
d14-Terphenyl	86

Summary Results		
BaP-TEQ$_{PAH}$		
Lower Bound [excluding LOD values]	**0**	ng
Middle Bound [including half LOD values]	**160**	ng
Upper Bound [including LOD values]	**320**	ng

Australian Government
National Measurement Institute

ANALYSIS REPORT # ORG13_027

Client	AECOM AUSTRALIA 17 WARABROOK BOULEVARDE WARABROOK NSW 2304	**Job No.**	AECO01/130522
		Sampled by	Client
		Date Sampled	13/14-May-2013
Contact	PETER WADDINGHAM	**Date Received**	22-May-2013

The results relate only to the sample(s) tested.

Method NGCMS 11.27

Details The samples are spiked with a range of isotopically labelled PAHs then extracted with organic solvent. The extracts were purified by chemical treatment and column chromatography. Analysis was performed using high resolution gas chromatography with low resolution mass spectrometry. Results have been corrected for recoveries of the internal standard.

Instrument: HP 5975 GCMS run in SIM mode. Column is a DB5-ms (30m×0.25mm×0.25µm). Method based on CARB429, July 1997 Revision.

Authorisation

Danny Slee
Senior Chemist- Environment
June 26, 2013

Accreditation NATA Accreditation Number : 198

NATA
ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025.

This report shall not be reproduced, except in full.

Sample Details : Job No. AECO01/130522

Laboratory Reg. No.	Client Sample Ref.	Matrix	Description
N13/013515	DAU080513A	Emission	Cartridge, Filter, Rinses, Stack 5
N13/013516	DAU220413E	Emission	Cartridge, Filter, Rinses, Stack 6

Project Details

Project Name	*Not specified*
Project Number	*60287751*

Key

Analytes	Labelled internal std.	Analytes	Labelled internal std.
Naphthalene	d8-Naphthalene	Chrysene	d12-Chrysene
2-Methylnaphthalene		Benzo(b)fluoranthene	d12-Benzo(b)fluoranthene
Acenaphthylene	d8-Acenaphthylene	Benzo(k)fluoranthene	d12-Benzo(k)fluoranthene
Acenaphthene	d10-Acenaphthene	Benzo(e)pyrene	
Fluorene	d10-Fluorene	Benzo(a)pyrene	d12-Benzo(a)pyrene
Phenanthrene	d10-Phenanthrene	Perylene	
Anthracene		Indeno(1,2,3-cd)pyrene	d12-Indeno(1,2,3-c,d)pyrene
Fluoranthene	d10-Fluoranthene	Dibenz(ah)anthracene	d14-Dibenz(ah)anthracene
Pyrene		Benzo(ghi)perylene	d12-Benzo(ghi)perylene
Benz(a)anthracene	d12-Benz(a)anthracene		

Abbreviations & Definitions

ng	nanograms per sample train
<	level less than limit of reporting (LOR)
BaP-PEF[†]	Benzo(a)pyrene Potency Equivalent Factor
BaP-TEQ_{PAH}	Benzo(a)pyrene Toxic Equivalents

[†] as defined in "Benzo(a)pyrene as a Toxic Air Contaminant", CARB/OEHHA Executive Summary, July 1994

TEQs are calculated by multiplying the quantified level for each toxic PAH by corresponding PEF and summing the result:

$$BaP\text{-}TEQ_{PAH} = \sum_{i=1}^{n} [PAH_i \times BaP - PEF_i]$$ i = toxic PAH analyte index (1 to n=7)

CARB	California Air Resources Board
OEHHA	Office of Environmental Health Hazard Assessment (US)

Surrogate Standard	Known amount of deuterated standard added to the XAD resin prior to sampling. Surrogates are 'field spikes'. The surrogate recovery indicates how effectively the sample train retains PAHs collected on the resin. It is also a guide to matrix effects caused by time of storage and transportation.
Internal Standard	Known amount of deuterated PAHs added to field samples, blanks and QC samples prior to laboratory analysis. The internal standard is used to measure the concentration of native PAHs and surrogates. The internal standard recovery will determine the performance of the laboratory method. Usual recoveries are 50 to 150%. Lower recoveries can be accepted as long as the signal/noise ratio of the internal standard is >10.

Results : Job No. AECO01/130522

Laboratory Reg. No.	N13/013515	**Date Reported**	26-Jun-2013
Client Sample Ref.	DAU080513A	**Date Extracted**	12-Jun-2013
Matrix	Emission		
Description	Cartridge, Filter, Rinses, Stack 5		

PAH	Conc. ng	Reporting Level (LOR, ng)	BaP-PEF Value	BaP-TEQ Contribution	Labelled Internal recovery (%)	Flags
Naphthalene	73000	530	-	-	36	*
2-Methylnaphthalene	14000	65	-	-		
Acenaphthylene	26000	20	-	-	78	
Acenaphthene	1000	20	-	-	109	
Fluorene	6400	440	-	-	105	
Phenanthrene	16000	55	-	-	112	
Anthracene	990	20	-	-		
Fluoranthene	1700	20	-	-	108	
Pyrene	990	20	-	-		
Benz(a)anthracene	60	20	0.1	6.0	121	
Chrysene	140	20	0.01	1.4	120	
Benzo(b)fluoranthene	<20	20	0.1	1.0	111	
Benzo(k)fluoranthene	<20	20	0.1	1.0	106	
Benzo(e)pyrene	<20	20	-	-		
Benzo(a)pyrene	<20	20	1.0	10	101	
Perylene	<20	20	-	-		
Indeno(1,2,3-cd)pyrene	<20	20	0.1	1.0	106	
Dibenz(ah)anthracene	<20	20	0.4	4.0	109	
Benzo(ghi)perylene	<20	20	-	-	103	

Flags
" * " : indicates the recovery is outside range but signal to noise is >10.
Acceptable recovery range set at 50 to 150%.

Surrogate Recovery	%
d14-Terphenyl	105

Summary Results		
BaP-TEQ$_{PAH}$		
Lower Bound [excluding LOD values]	7.4	ng
Middle Bound [including half LOD values]	24	ng
Upper Bound [including LOD values]	41	ng

Results : Job No. AECO01/130522

Laboratory Reg. No.	N13/013516	**Date Reported**	26-Jun-2013
Client Sample Ref.	DAU220413E	**Date Extracted**	12-Jun-2013
Matrix	Emission		
Description	Cartridge, Filter, Rinses, Stack 6		

PAH	Conc. ng	Reporting Level (LOR, ng)	BaP-PEF Value	BaP-TEQ Contribution	Labelled Internal recovery (%)	Flags
Naphthalene	1600	20	-	-	76	
2-Methylnaphthalene	150	20	-	-		
Acenaphthylene	58	20	-	-	95	
Acenaphthene	69	20	-	-	94	
Fluorene	120	20	-	-	113	
Phenanthrene	620	20	-	-	113	
Anthracene	<20	20	-	-		
Fluoranthene	430	20	-	-	111	
Pyrene	130	20	-	-		
Benz(a)anthracene	32	20	0.1	3.2	114	
Chrysene	130	20	0.01	1.3	125	
Benzo(b)fluoranthene	58	20	0.1	5.8	127	
Benzo(k)fluoranthene	35	20	0.1	3.5	107	
Benzo(e)pyrene	<20	20	-	-		
Benzo(a)pyrene	<20	20	1.0	10	104	
Perylene	<20	20	-	-		
Indeno(1,2,3-cd)pyrene	<20	20	0.1	1.0	110	
Dibenz(ah)anthracene	<20	20	0.4	4.0	112	
Benzo(ghi)perylene	<20	20	-	-	104	

Flags
" * " : indicates the recovery is outside range but signal to noise is >10.
Acceptable recovery range set at 50 to 150%.

Surrogate Recovery	%
d14-Terphenyl	107

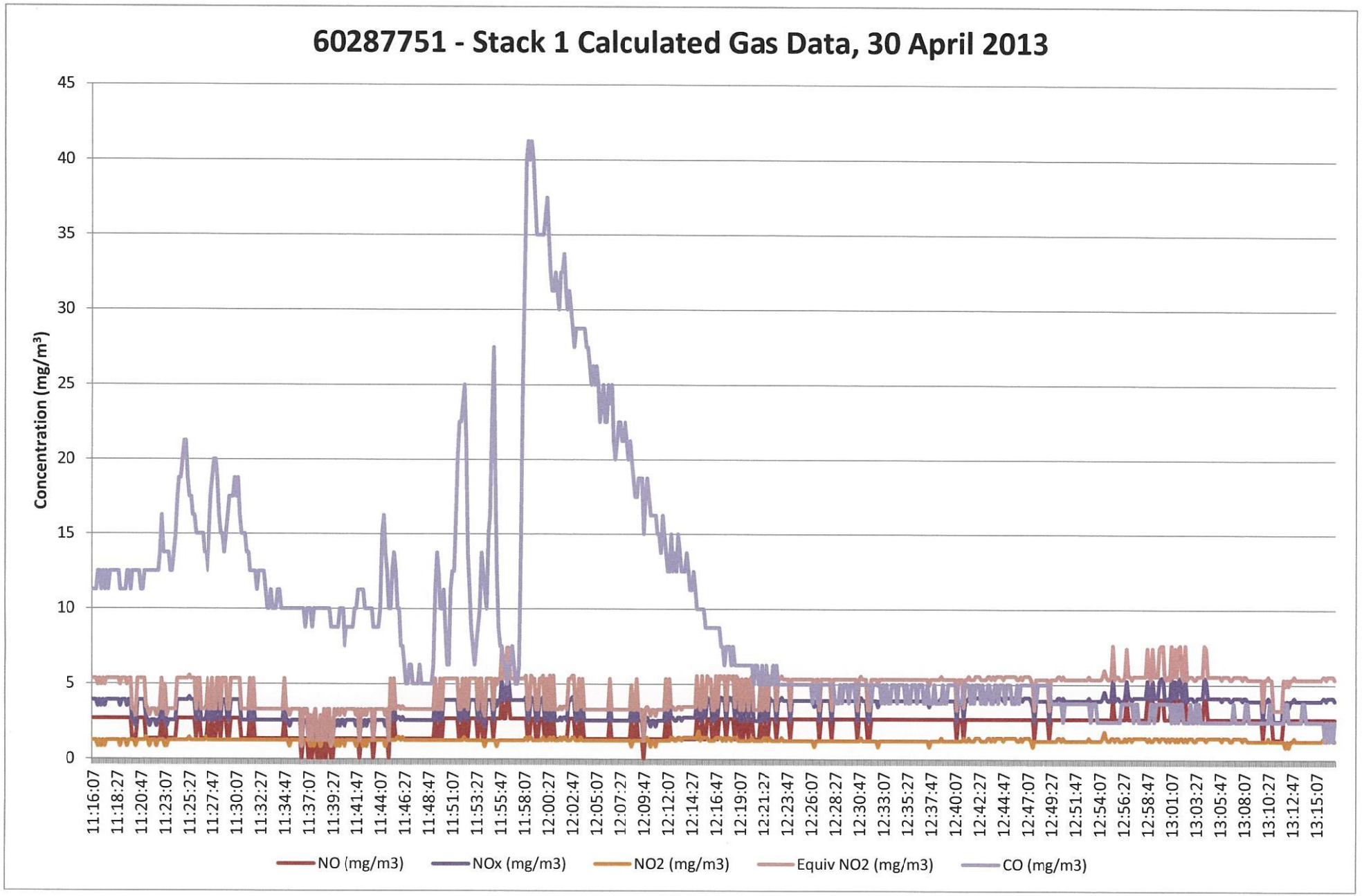
Summary Results		
$BaP\text{-}TEQ_{PAH}$		
Lower Bound [excluding LOD values]	**14**	ng
Middle Bound [including half LOD values]	**29**	ng
Upper Bound [including LOD values]	**44**	ng

This page has been left blank intentionally.

Appendix C

Raw & Calculated Gas Data (35 Pages)

Appendix C Raw & Calculated Gas Data


60287751 - Stack 1 Calculated Gas Data, 30 April 2013
Concentration (mg/m³)
45
40
35
30
25
20
15
10
5
0
11:16:07
11:18:27
11:20:47
11:23:07
11:25:27
11:27:47
11:30:07
11:32:27
11:34:47
11:37:07
11:39:27
11:41:47
11:44:07
11:46:27
11:48:47
11:51:07
11:53:27
11:55:47
11:58:07
12:00:27
12:02:47
12:05:07
12:07:27
12:09:47
12:12:07
12:14:27
12:16:47
12:19:07
12:21:27
12:23:47
12:26:07
12:28:27
12:30:47
12:33:07
12:35:27
12:37:47
12:40:07
12:42:27
12:44:47
12:47:07
12:49:27
12:51:47
12:54:07
12:56:27
12:58:47
13:01:07
13:03:27
13:05:47
13:08:07
13:10:27
13:12:47
13:15:07
NO (mg/m3)
NOx (mg/m3)
NO2 (mg/m3)
Equiv NO2 (mg/m3)
CO (mg/m3)

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	11:16:07	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:16:17	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:16:27	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:16:37	2	3	2	4	0.4	1	3	5	10	13
30/04/2013	11:16:47	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:16:57	2	3	2	4	0.4	1	3	5	9	11
30/04/2013	11:17:07	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:17:17	2	3	2	4	0.4	1	3	5	9	11
30/04/2013	11:17:27	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:17:37	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:17:47	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:17:57	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:18:07	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:18:17	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:18:27	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:18:37	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:18:47	2	3	2	4	0.4	1	3	5	9	11
30/04/2013	11:18:57	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:19:07	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:19:17	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:19:27	2	3	2	4	0.4	1	3	5	10	13
30/04/2013	11:19:37	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:19:47	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:19:57	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:20:07	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:20:17	1	1	1	2	0.4	1	2	3	10	13
30/04/2013	11:20:27	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:20:37	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:20:47	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:20:57	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:21:07	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:21:17	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	11:21:27	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:21:37	1	1	1	2	0.4	1	2	3	10	13
30/04/2013	11:21:47	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:21:57	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:22:07	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:22:17	1	1	1	2	0.4	1	2	3	10	13
30/04/2013	11:22:27	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:22:37	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:22:47	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:22:57	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:23:07	2	3	2	4	0.4	1	3	5	11	14
30/04/2013	11:23:17	1	1	1	2	0.4	1	2	3	11	14
30/04/2013	11:23:27	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:23:37	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:23:47	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:23:57	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:24:07	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:24:17	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	11:24:27	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:24:37	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:24:47	2	3	3	4	0.6	1	4	5	16	20
30/04/2013	11:24:57	2	3	3	4	0.6	1	4	5	17	21
30/04/2013	11:25:07	2	3	3	4	0.6	1	4	5	17	21
30/04/2013	11:25:17	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:25:27	2	3	3	4	0.7	1	4	6	14	18
30/04/2013	11:25:37	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	11:25:47	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:25:57	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:26:07	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:26:17	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:26:27	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:26:37	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:26:47	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:26:57	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:27:07	1	1	2	3	0.7	1	2	3	11	14
30/04/2013	11:27:17	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:27:27	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:27:37	1	1	2	3	0.6	1	2	3	14	18
30/04/2013	11:27:47	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:27:57	1	1	2	3	0.6	1	2	3	16	20
30/04/2013	11:28:07	1	1	2	3	0.6	1	2	3	16	20
30/04/2013	11:28:17	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:28:27	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:28:37	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:28:47	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:28:57	2	3	3	4	0.6	1	4	5	11	14
30/04/2013	11:29:07	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:29:17	1	1	2	3	0.6	1	2	3	13	16
30/04/2013	11:29:27	1	1	2	3	0.6	1	2	3	14	18
30/04/2013	11:29:37	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	11:29:47	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	11:29:57	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:30:07	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	11:30:17	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:30:27	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:30:37	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:30:47	1	1	2	3	0.6	1	2	3	12	15

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	11:30:57	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:31:07	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:31:17	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:31:27	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:31:37	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:31:47	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:31:57	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:32:07	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:32:17	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:32:27	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:32:37	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:32:47	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:32:57	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:33:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:33:17	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:33:27	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:33:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:33:47	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:33:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:34:07	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:34:17	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:34:27	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:34:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:34:47	2	3	3	4	0.6	1	4	5	8	10
30/04/2013	11:34:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:35:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:35:17	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:35:27	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:35:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:35:47	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:35:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:36:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:36:17	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:36:27	0	0	0	1	0.4	1	0	1	8	10
30/04/2013	11:36:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:36:47	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:36:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:37:07	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:37:17	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:37:27	0	0	1	1	0.6	1	1	1	7	9
30/04/2013	11:37:37	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:37:47	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:37:57	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:38:07	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:38:17	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:38:27	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:38:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:38:47	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:38:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:39:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:39:17	0	0	0	1	0.4	1	0	1	7	9
30/04/2013	11:39:27	0	0	1	1	0.6	1	1	1	7	9
30/04/2013	11:39:37	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:39:47	1	1	1	2	0.4	1	2	3	7	9
30/04/2013	11:39:57	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:40:07	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:40:17	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:40:27	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:40:37	1	1	1	2	0.4	1	2	3	6	8
30/04/2013	11:40:47	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:40:57	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:41:07	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:41:17	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:41:27	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:41:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:41:47	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:41:57	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:42:07	0	0	1	1	0.6	1	1	1	9	11
30/04/2013	11:42:17	1	1	2	3	0.6	1	2	3	9	11
30/04/2013	11:42:27	1	1	1	2	0.4	1	2	3	9	11
30/04/2013	11:42:37	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:42:47	1	1	1	2	0.4	1	2	3	8	10
30/04/2013	11:42:57	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:43:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:43:17	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:43:27	0	0	1	1	0.6	1	1	1	7	9
30/04/2013	11:43:37	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:43:47	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:43:57	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:44:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:44:17	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	11:44:27	1	1	2	3	0.6	1	2	3	13	16
30/04/2013	11:44:37	1	1	1	2	0.4	1	2	3	11	14
30/04/2013	11:44:47	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:44:57	0	0	1	1	0.6	1	1	1	8	10
30/04/2013	11:45:07	2	3	3	4	0.6	1	4	5	8	10
30/04/2013	11:45:17	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:45:27	2	3	3	4	0.6	1	4	5	11	14
30/04/2013	11:45:37	1	1	2	3	0.6	1	2	3	10	13

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	11:45:47	1	1	2	3	0.7	1	2	3	8	10
30/04/2013	11:45:57	1	1	2	3	0.7	1	2	3	8	10
30/04/2013	11:46:07	1	1	2	3	0.6	1	2	3	6	8
30/04/2013	11:46:17	1	1	2	3	0.7	1	2	3	6	8
30/04/2013	11:46:27	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	11:46:37	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:46:47	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:46:57	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	11:47:07	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	11:47:17	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:47:27	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:47:37	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:47:47	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:47:57	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	11:48:07	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:48:17	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:48:27	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:48:37	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:48:47	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:48:57	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:49:07	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	11:49:17	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	11:49:27	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:49:37	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:49:47	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:49:57	2	3	3	4	0.6	1	4	5	8	10
30/04/2013	11:50:07	1	1	2	3	0.6	1	2	3	8	10
30/04/2013	11:50:17	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:50:27	2	3	3	4	0.6	1	4	5	7	9
30/04/2013	11:50:37	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:50:47	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:50:57	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:51:07	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:51:17	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	11:51:27	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:51:37	2	3	3	4	0.6	1	4	5	16	20
30/04/2013	11:51:47	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	11:51:57	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	11:52:07	2	3	3	4	0.6	1	4	5	19	24
30/04/2013	11:52:17	1	1	2	3	0.7	1	2	3	20	25
30/04/2013	11:52:27	2	3	3	4	0.6	1	4	5	17	21
30/04/2013	11:52:37	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	11:52:47	2	3	3	4	0.6	1	4	5	9	11
30/04/2013	11:52:57	2	3	3	4	0.6	1	4	5	7	9
30/04/2013	11:53:07	2	3	3	4	0.6	1	4	5	6	8
30/04/2013	11:53:17	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:53:27	2	3	3	4	0.6	1	4	5	6	8
30/04/2013	11:53:37	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	11:53:47	2	3	3	4	0.6	1	4	5	8	10
30/04/2013	11:53:57	2	3	3	4	0.6	1	4	5	11	14
30/04/2013	11:54:07	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	11:54:17	1	1	1	2	0.4	1	2	3	9	11
30/04/2013	11:54:27	2	3	3	4	0.6	1	4	5	8	10
30/04/2013	11:54:37	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:54:47	2	3	3	4	0.6	1	4	5	13	16
30/04/2013	11:54:57	2	3	3	4	0.6	1	4	5	18	23
30/04/2013	11:55:07	1	1	2	3	0.6	1	2	3	22	28
30/04/2013	11:55:17	2	3	3	4	0.6	1	4	5	15	19
30/04/2013	11:55:27	2	3	2	4	0.4	1	3	5	10	13
30/04/2013	11:55:37	2	3	3	4	0.6	1	4	5	7	9
30/04/2013	11:55:47	2	3	3	4	0.6	1	4	5	6	8
30/04/2013	11:55:57	3	4	4	5	0.6	1	5	7	6	8
30/04/2013	11:56:07	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:56:17	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:56:27	3	4	4	5	0.6	1	5	7	4	5
30/04/2013	11:56:37	3	4	4	5	0.6	1	5	7	5	6
30/04/2013	11:56:47	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:56:57	2	3	3	4	0.6	1	4	5	6	8
30/04/2013	11:57:07	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:57:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	11:57:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	11:57:37	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	11:57:47	2	3	3	4	0.6	1	4	5	12	15
30/04/2013	11:57:57	2	3	3	4	0.6	1	4	5	20	25
30/04/2013	11:58:07	2	3	3	4	0.6	1	4	5	26	33
30/04/2013	11:58:17	2	3	3	4	0.7	1	4	6	32	40
30/04/2013	11:58:27	1	1	2	3	0.6	1	2	3	33	41
30/04/2013	11:58:37	1	1	2	3	0.7	1	2	3	32	40
30/04/2013	11:58:47	2	3	3	4	0.7	1	4	6	33	41
30/04/2013	11:58:57	2	3	3	4	0.6	1	4	5	32	40
30/04/2013	11:59:07	2	3	3	4	0.6	1	4	5	30	38
30/04/2013	11:59:17	1	1	2	3	0.6	1	2	3	28	35
30/04/2013	11:59:27	1	1	2	3	0.6	1	2	3	28	35
30/04/2013	11:59:37	2	3	3	4	0.6	1	4	5	28	35
30/04/2013	11:59:47	2	3	3	4	0.6	1	4	5	28	35
30/04/2013	11:59:57	2	3	3	4	0.7	1	4	6	28	35
30/04/2013	12:00:07	1	1	2	3	0.6	1	2	3	29	36
30/04/2013	12:00:17	2	3	3	4	0.6	1	4	5	30	38
30/04/2013	12:00:27	1	1	2	3	0.6	1	2	3	28	35

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	12:00:37	2	3	3	4	0.7	1	4	6	26	33
30/04/2013	12:00:47	1	1	2	3	0.6	1	2	3	25	31
30/04/2013	12:00:57	2	3	3	4	0.7	1	4	6	25	31
30/04/2013	12:01:07	1	1	2	3	0.6	1	2	3	26	33
30/04/2013	12:01:17	1	1	2	3	0.6	1	2	3	25	31
30/04/2013	12:01:27	1	1	2	3	0.6	1	2	3	24	30
30/04/2013	12:01:37	1	1	2	3	0.7	1	2	3	26	33
30/04/2013	12:01:47	1	1	2	3	0.6	1	2	3	26	33
30/04/2013	12:01:57	1	1	2	3	0.7	1	2	3	27	34
30/04/2013	12:02:07	1	1	2	3	0.7	1	2	3	25	31
30/04/2013	12:02:17	1	1	2	3	0.6	1	2	3	24	30
30/04/2013	12:02:27	2	3	3	4	0.6	1	4	5	25	31
30/04/2013	12:02:37	2	3	3	4	0.6	1	4	5	24	30
30/04/2013	12:02:47	2	3	3	4	0.7	1	4	6	23	29
30/04/2013	12:02:57	2	3	3	4	0.7	1	4	6	22	28
30/04/2013	12:03:07	1	1	2	3	0.6	1	2	3	23	29
30/04/2013	12:03:17	1	1	2	3	0.6	1	2	3	23	29
30/04/2013	12:03:27	2	3	3	4	0.6	1	4	5	23	29
30/04/2013	12:03:37	1	1	2	3	0.7	1	2	3	23	29
30/04/2013	12:03:47	2	3	3	4	0.6	1	4	5	23	29
30/04/2013	12:03:57	1	1	2	3	0.6	1	2	3	23	29
30/04/2013	12:04:07	1	1	2	3	0.6	1	2	3	22	28
30/04/2013	12:04:17	1	1	2	3	0.6	1	2	3	22	28
30/04/2013	12:04:27	1	1	2	3	0.6	1	2	3	21	26
30/04/2013	12:04:37	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:04:47	1	1	2	3	0.6	1	2	3	21	26
30/04/2013	12:04:57	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:05:07	1	1	2	3	0.6	1	2	3	21	26
30/04/2013	12:05:17	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:05:27	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:05:37	1	1	2	3	0.6	1	2	3	19	24
30/04/2013	12:05:47	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:05:57	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:06:07	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:06:17	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:06:27	2	3	3	4	0.6	1	4	5	19	24
30/04/2013	12:06:37	1	1	2	3	0.6	1	2	3	20	25
30/04/2013	12:06:47	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:06:57	1	1	2	3	0.6	1	2	3	16	20
30/04/2013	12:07:07	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:07:17	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:07:27	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:07:37	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:07:47	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:07:57	1	1	2	3	0.6	1	2	3	18	23
30/04/2013	12:08:07	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:08:17	1	1	2	3	0.6	1	2	3	16	20
30/04/2013	12:08:27	1	1	2	3	0.6	1	2	3	17	21
30/04/2013	12:08:37	2	3	2	4	0.4	1	3	5	16	20
30/04/2013	12:08:47	1	1	2	3	0.6	1	2	3	15	19
30/04/2013	12:08:57	1	1	2	3	0.6	1	2	3	14	18
30/04/2013	12:09:07	2	3	3	4	0.6	1	4	5	14	18
30/04/2013	12:09:17	1	1	2	3	0.6	1	2	3	15	19
30/04/2013	12:09:27	1	1	2	3	0.6	1	2	3	15	19
30/04/2013	12:09:37	1	1	2	3	0.6	1	2	3	15	19
30/04/2013	12:09:47	0	0	1	1	0.6	1	1	1	12	15
30/04/2013	12:09:57	1	1	2	3	0.6	1	2	3	14	18
30/04/2013	12:10:07	1	1	2	3	0.7	1	2	3	15	19
30/04/2013	12:10:17	1	1	2	3	0.6	1	2	3	14	18
30/04/2013	12:10:27	1	1	1	2	0.4	1	2	3	13	16
30/04/2013	12:10:37	1	1	2	3	0.6	1	2	3	13	16
30/04/2013	12:10:47	1	1	2	3	0.6	1	2	3	13	16
30/04/2013	12:10:57	1	1	1	2	0.4	1	2	3	13	16
30/04/2013	12:11:07	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	12:11:17	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	12:11:27	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	12:11:37	1	1	2	3	0.6	1	2	3	13	16
30/04/2013	12:11:47	1	1	2	3	0.6	1	2	3	12	15
30/04/2013	12:11:57	2	3	3	4	0.6	1	4	5	11	14
30/04/2013	12:12:07	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	12:12:17	2	3	3	4	0.6	1	4	5	10	13
30/04/2013	12:12:27	1	1	2	3	0.7	1	2	3	12	15
30/04/2013	12:12:37	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	12:12:47	1	1	2	3	0.6	1	2	3	11	14
30/04/2013	12:12:57	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	12:13:07	1	1	2	3	0.7	1	2	3	12	15
30/04/2013	12:13:17	1	1	2	3	0.7	1	2	3	11	14
30/04/2013	12:13:27	1	1	2	3	0.6	1	2	3	10	13
30/04/2013	12:13:37	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	12:13:47	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	12:13:57	1	1	2	3	0.7	1	2	3	11	14
30/04/2013	12:14:07	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	12:14:17	1	1	2	3	0.7	1	2	3	9	11
30/04/2013	12:14:27	1	1	2	3	0.7	1	2	3	9	11
30/04/2013	12:14:37	1	1	2	3	0.7	1	2	3	10	13
30/04/2013	12:14:47	1	1	2	3	0.7	1	2	3	9	11
30/04/2013	12:14:57	2	3	3	4	0.7	1	4	6	8	10
30/04/2013	12:15:07	1	1	2	3	0.9	2	2	4	8	10
30/04/2013	12:15:17	1	1	2	3	0.6	1	2	3	8	10

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	12:15:27	2	3	3	4	0.7	1	4	6	8	10
30/04/2013	12:15:37	1	1	2	3	0.7	1	2	3	8	10
30/04/2013	12:15:47	1	1	2	3	0.7	1	2	3	7	9
30/04/2013	12:15:57	2	3	3	4	0.7	1	4	6	7	9
30/04/2013	12:16:07	2	3	3	4	0.6	1	4	5	7	9
30/04/2013	12:16:17	2	3	3	4	0.6	1	4	5	7	9
30/04/2013	12:16:27	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	12:16:37	1	1	2	3	0.6	1	2	3	7	9
30/04/2013	12:16:47	2	3	3	4	0.7	1	4	6	7	9
30/04/2013	12:16:57	1	1	2	3	0.7	1	2	3	7	9
30/04/2013	12:17:07	2	3	3	4	0.7	1	4	6	7	9
30/04/2013	12:17:17	2	3	3	4	0.7	1	4	6	6	8
30/04/2013	12:17:27	2	3	3	4	0.6	1	4	5	6	8
30/04/2013	12:17:37	2	3	3	4	0.7	1	4	6	5	6
30/04/2013	12:17:47	1	1	2	3	0.6	1	2	3	6	8
30/04/2013	12:17:57	2	3	3	4	0.7	1	4	6	6	8
30/04/2013	12:18:07	2	3	3	4	0.7	1	4	6	6	8
30/04/2013	12:18:17	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:18:27	2	3	3	4	0.7	1	4	6	6	8
30/04/2013	12:18:37	1	1	2	3	0.7	1	2	3	5	6
30/04/2013	12:18:47	2	3	3	4	0.7	1	4	6	5	6
30/04/2013	12:18:57	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:19:07	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:19:17	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:19:27	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:19:37	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:19:47	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:19:57	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:20:07	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:20:17	2	3	3	4	0.7	1	4	6	5	6
30/04/2013	12:20:27	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:20:37	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:20:47	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:20:57	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:21:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:21:17	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:21:27	1	1	2	3	0.7	1	2	3	4	5
30/04/2013	12:21:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:21:47	1	1	2	3	0.7	1	2	3	5	6
30/04/2013	12:21:57	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:22:07	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:22:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:22:27	2	3	3	4	0.6	1	4	5	5	6
30/04/2013	12:22:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:22:47	1	1	2	3	0.6	1	2	3	5	6
30/04/2013	12:22:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:23:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:23:17	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:23:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:23:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:23:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:23:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:24:07	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:24:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:24:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:24:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:24:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:24:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:25:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:26:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:26:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:26:27	2	3	2	4	0.4	1	3	5	4	5
30/04/2013	12:26:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:26:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:26:57	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:27:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:27:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:27:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:27:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:27:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:27:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:28:07	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:28:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:28:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:28:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:28:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:28:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:29:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:29:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:29:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:29:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:29:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:29:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:30:07	2	3	3	4	0.6	1	4	5	4	5

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m³)	NOx (ppm)	NOx (mg/m³)	NO_2 (ppm)	NO_2 (mg/m³)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m³)	CO (ppm)	CO (mg/m³)
30/04/2013	12:30:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:30:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:30:37	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:30:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:30:57	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:31:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:31:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:31:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:31:37	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:31:47	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:31:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:32:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:32:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:32:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:32:37	2	3	2	4	0.4	1	3	5	4	5
30/04/2013	12:32:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:32:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:33:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:33:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:33:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:33:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:33:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:33:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:34:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:34:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:34:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:34:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:34:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:34:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:35:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:35:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:35:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:35:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:35:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:35:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:36:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:36:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:36:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:36:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:36:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:36:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:37:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:37:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:37:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:37:37	2	3	2	4	0.4	1	3	5	3	4
30/04/2013	12:37:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:37:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:38:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:38:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:38:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:38:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:38:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:38:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:39:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:39:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:39:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:39:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:39:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:39:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:40:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:40:17	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:40:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:40:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:40:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:40:57	1	1	2	3	0.7	1	2	3	4	5
30/04/2013	12:41:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:41:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:41:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:41:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:41:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:41:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:42:07	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:42:17	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:42:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:42:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:42:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:42:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:43:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:43:17	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:43:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:43:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:43:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:43:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:44:07	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:44:17	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:44:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:44:37	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:44:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:44:57	2	3	3	4	0.7	1	4	6	3	4

60287751
Stack 1 Calculated Gas Data
30 April 2013

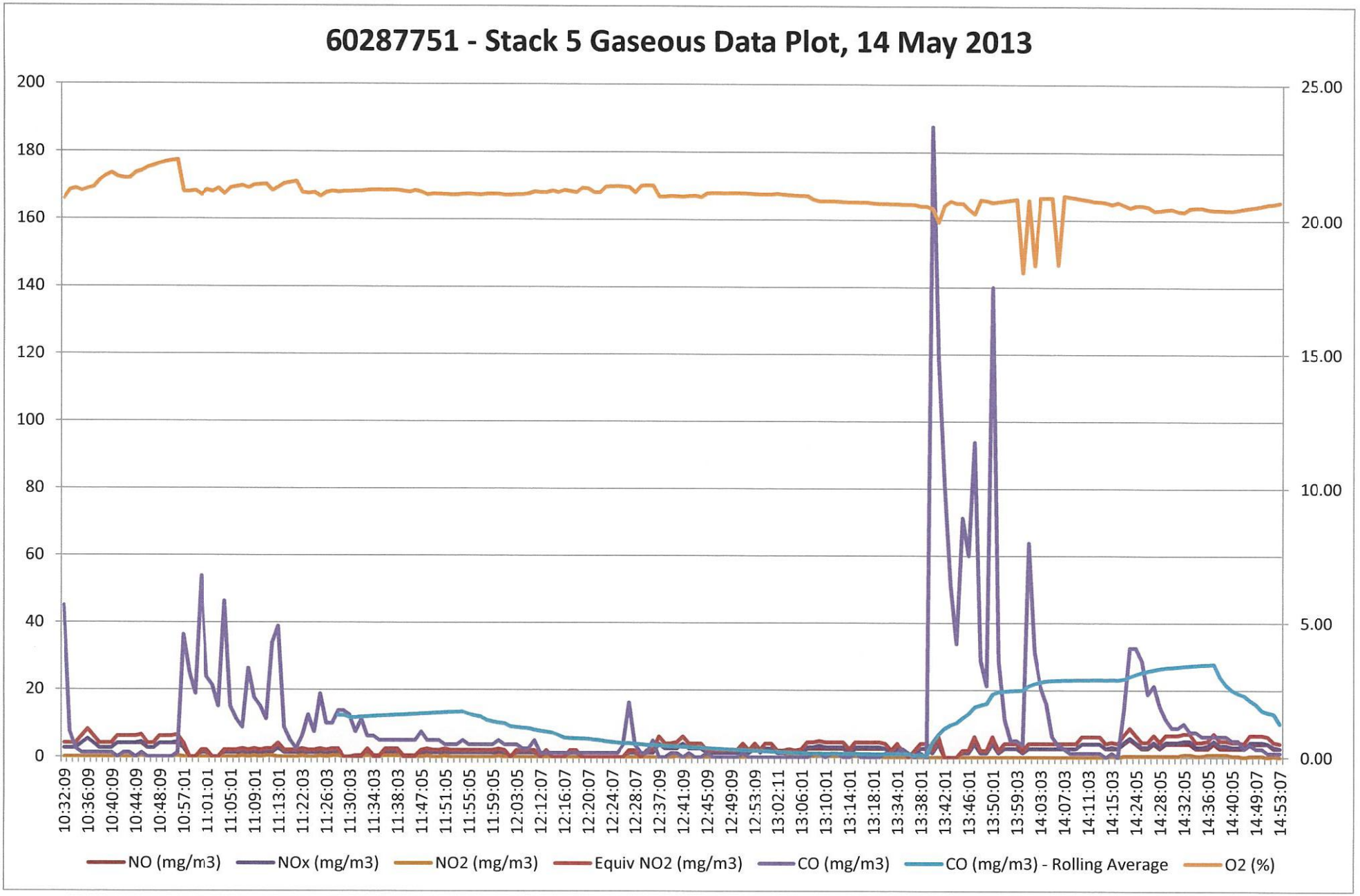
Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	12:45:07	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:45:17	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:45:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:45:37	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:45:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:45:57	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:46:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:46:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:46:27	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:46:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:46:47	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:46:57	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:47:07	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:47:17	2	3	3	4	0.7	1	4	6	4	5
30/04/2013	12:47:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:47:37	2	3	2	4	0.4	1	3	5	4	5
30/04/2013	12:47:47	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:47:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:48:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:48:17	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:48:27	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:48:37	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:48:47	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:48:57	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:49:07	2	3	3	4	0.6	1	4	5	4	5
30/04/2013	12:49:17	1	1	2	3	0.6	1	2	3	4	5
30/04/2013	12:49:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:49:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:49:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:49:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:50:07	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:50:17	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:50:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:50:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:50:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:50:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:51:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:52:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:53:07	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:53:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:53:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:53:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:53:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:53:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:54:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:54:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:54:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:54:37	2	3	3	5	0.9	2	4	6	2	3
30/04/2013	12:54:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:54:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:55:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:55:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:55:27	3	4	4	5	0.7	1	5	8	2	3
30/04/2013	12:55:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:55:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:55:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:56:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	12:56:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:56:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:56:37	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:56:47	3	4	4	5	0.6	1	5	7	3	4
30/04/2013	12:56:57	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:57:07	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:57:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:57:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:57:37	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:57:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:57:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:58:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:58:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:58:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:58:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:58:47	3	4	4	5	0.6	1	5	7	2	3
30/04/2013	12:58:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:59:07	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	12:59:17	3	4	4	5	0.6	1	5	7	3	4
30/04/2013	12:59:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	12:59:37	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	12:59:47	2	3	3	4	0.7	1	4	6	3	4

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	12:59:57	3	4	4	5	0.6	1	5	7	3	4
30/04/2013	13:00:07	3	4	4	5	0.7	1	5	8	3	4
30/04/2013	13:00:17	3	4	4	5	0.7	1	5	8	3	4
30/04/2013	13:00:27	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:00:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:00:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:00:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:01:07	3	4	4	5	0.7	1	5	8	2	3
30/04/2013	13:01:17	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:01:27	3	4	4	5	0.6	1	5	7	2	3
30/04/2013	13:01:37	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:01:47	3	4	4	5	0.6	1	5	7	2	3
30/04/2013	13:01:57	3	4	4	5	0.7	1	5	8	3	4
30/04/2013	13:02:07	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:02:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:02:27	3	4	4	5	0.7	1	5	8	2	3
30/04/2013	13:02:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:02:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:02:57	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:03:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:03:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:03:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:03:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:03:47	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:03:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:04:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:04:17	3	4	4	5	0.7	1	5	8	2	3
30/04/2013	13:04:27	3	4	4	5	0.6	1	5	7	2	3
30/04/2013	13:04:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:04:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:04:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:05:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:06:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:06:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:06:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:06:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:06:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:06:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:07:07	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:07:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:07:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:07:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:07:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:07:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:08:07	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:08:17	2	3	3	4	0.7	1	4	6	3	4
30/04/2013	13:08:27	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:08:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:08:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:08:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:27	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:09:57	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:10:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:10:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:10:27	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:10:37	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:10:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:10:57	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:07	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:17	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:27	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:37	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:47	1	1	2	3	0.6	1	2	3	2	3
30/04/2013	13:11:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:12:07	2	3	2	4	0.4	1	3	5	3	4
30/04/2013	13:12:17	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:12:27	2	3	2	4	0.4	1	3	5	2	3
30/04/2013	13:12:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:12:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:12:57	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:13:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:13:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:13:27	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:13:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:13:47	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:13:57	2	3	3	4	0.6	1	4	5	3	4
30/04/2013	13:14:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:14:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:14:27	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:14:37	2	3	3	4	0.6	1	4	5	2	3

60287751
Stack 1 Calculated Gas Data
30 April 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)
30/04/2013	13:14:47	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:14:57	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:15:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:15:17	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:15:27	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:15:37	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:15:47	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:15:57	2	3	3	4	0.7	1	4	6	1	1
30/04/2013	13:16:07	2	3	3	4	0.6	1	4	5	2	3
30/04/2013	13:16:17	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:16:27	2	3	3	4	0.7	1	4	6	1	1
30/04/2013	13:16:37	2	3	3	4	0.7	1	4	6	2	3
30/04/2013	13:16:47	2	3	3	4	0.7	1	4	6	1	1
30/04/2013	13:16:57	2	3	3	4	0.6	1	4	5	2	3
	Average	**2**	**2**	**2**	**3**	**0.6**	**1**	**3**	**5**	**8**	**10**

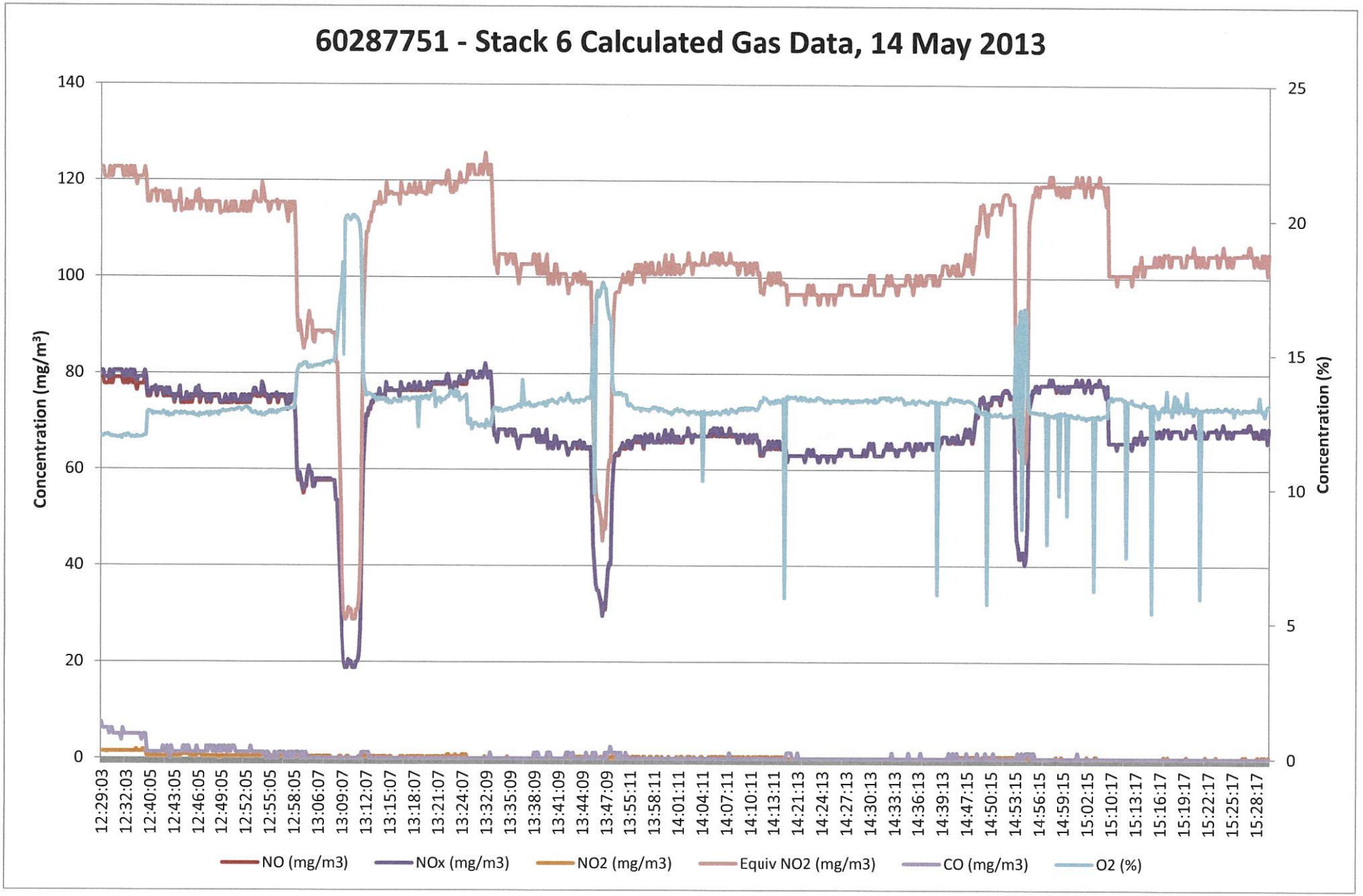

60287751 - Stack 5 Gaseous Data Plot, 14 May 2013
200
180
160
140
120
100
80
60
40
20
0
25.00
20.00
15.00
10.00
5.00
0.00
10:32:09
10:36:09
10:40:09
10:44:09
10:48:09
10:57:01
11:01:01
11:05:01
11:09:01
11:13:01
11:22:03
11:26:03
11:30:03
11:34:03
11:38:03
11:47:05
11:51:05
11:55:05
11:59:05
12:03:05
12:12:07
12:16:07
12:20:07
12:24:07
12:28:07
12:37:09
12:41:09
12:45:09
12:49:09
12:53:09
13:02:11
13:06:01
13:10:01
13:14:01
13:18:01
13:34:01
13:38:01
13:42:01
13:46:01
13:50:01
13:59:03
14:03:03
14:07:03
14:11:03
14:15:03
14:24:05
14:28:05
14:32:05
14:36:05
14:40:05
14:49:07
14:53:07
NO (mg/m3)
NOx (mg/m3)
NO2 (mg/m3)
Equiv NO2 (mg/m3)
CO (mg/m3)
CO (mg/m3) - Rolling Average
O2 (%)

60287751
Stack 5 Calculated Gas Data
14 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	CO (mg/m3) - Rolling Average	O2 (%)
14/05/13	10:32:09	2	3	2	3	0.0	0	3	4	36	45		20.73
14/05/13	10:33:09	2	3	2	3	0.0	0	3	4	6	8		21.05
14/05/13	10:34:09	2	3	2	3	0.0	0	3	4	2	3		21.11
14/05/13	10:35:09	3	4	3	4	0.0	0	5	6	1	1		21.02
14/05/13	10:36:09	4	5	4	5	0.0	0	6	8	1	1		21.10
14/05/13	10:37:09	3	4	3	4	0.0	0	5	6	1	1		21.17
14/05/13	10:38:09	2	3	2	3	0.0	0	3	4	1	1		21.42
14/05/13	10:39:09	2	3	2	3	0.0	0	3	4	1	1		21.58
14/05/13	10:40:09	2	3	2	3	0.0	0	3	4	1	1		21.69
14/05/13	10:41:09	3	4	3	4	0.0	0	5	6	0	0		21.55
14/05/13	10:42:09	3	4	3	4	0.0	0	5	6	1	1		21.50
14/05/13	10:43:09	3	4	3	4	0.0	0	5	6	1	1		21.50
14/05/13	10:44:09	3	4	3	4	0.0	0	5	6	0	0		21.70
14/05/13	10:45:09	3	4	3	4	0.2	0	5	7	1	1		21.77
14/05/13	10:46:09	2	3	2	3	0.0	0	3	4	0	0		21.89
14/05/13	10:47:09	2	3	2	3	0.0	0	3	4	0	0		21.96
14/05/13	10:48:09	3	4	3	4	0.0	0	5	6	0	0		22.04
14/05/13	10:49:09	3	4	3	4	0.0	0	5	6	0	0		22.10
14/05/13	10:50:09	3	4	3	4	0.0	0	5	6	0	0		22.14
14/05/13	10:51:09	3	4	3	4	0.2	0	5	7	1	1		22.17
14/05/13	10:57:01	2	3	2	3	0.0	0	3	4	29	36		21.00
14/05/13	10:58:01	0	0	0	0	0.0	0	0	0	20	25		21.00
14/05/13	10:59:01	0	0	0	0	0.0	0	0	0	15	19		21.03
14/05/13	11:00:01	1	1	1	1	0.0	0	2	2	43	54		20.87
14/05/13	11:01:01	1	1	1	1	0.0	0	2	2	19	24		21.06
14/05/13	11:02:01	0	0	0	0	0.0	0	0	0	17	21		21.00
14/05/13	11:03:01	0	0	0	0	0.0	0	0	0	12	15		21.12
14/05/13	11:04:01	1	1	1	1	0.0	0	2	2	37	46		20.91
14/05/13	11:05:01	1	1	1	1	0.0	0	2	2	12	15		21.14
14/05/13	11:06:01	1	1	1	1	0.0	0	2	2	9	11		21.18
14/05/13	11:07:01	1	1	1	2	0.2	0	2	2	7	9		21.22
14/05/13	11:08:01	1	1	1	1	0.0	0	2	2	21	26		21.14
14/05/13	11:09:01	1	1	1	2	0.2	0	2	2	14	18		21.24
14/05/13	11:10:01	1	1	1	1	0.0	0	2	2	12	15		21.26
14/05/13	11:11:01	1	1	1	2	0.2	0	2	2	9	11		21.28
14/05/13	11:12:01	1	1	1	2	0.2	0	2	2	27	34		21.04
14/05/13	11:13:01	2	3	2	3	0.0	0	3	4	31	39		21.16
14/05/13	11:14:01	1	1	1	1	0.0	0	2	2	7	9		21.30
14/05/13	11:15:01	1	1	1	1	0.0	0	2	2	4	5		21.34
14/05/13	11:16:01	1	1	1	1	0.0	0	2	2	2	3		21.38
14/05/13	11:22:03	1	1	1	2	0.2	0	2	2	5	6		20.97
14/05/13	11:23:03	1	1	1	1	0.0	0	2	2	10	13		20.94
14/05/13	11:24:03	1	1	1	1	0.0	0	2	2	6	8		20.97
14/05/13	11:25:03	1	1	1	2	0.2	0	2	2	15	19		20.83
14/05/13	11:26:03	1	1	1	1	0.0	0	2	2	8	10		20.97
14/05/13	11:27:03	1	1	1	2	0.2	0	2	2	8	10		21.02
14/05/13	11:28:03	1	1	1	2	0.2	0	2	2	11	14	12	20.99
14/05/13	11:29:03	0	0	0	0	0.0	0	0	0	11	14	12	21.01
14/05/13	11:30:03	0	0	0	0	0.0	0	0	0	10	13	12	21.01
14/05/13	11:31:03	0	0	0	0	0.2	0	0	0	6	8	12	21.03
14/05/13	11:32:03	0	0	0	0	0.2	0	0	0	9	11	12	21.03
14/05/13	11:33:03	1	1	1	2	0.2	0	2	2	5	6	12	21.06
14/05/13	11:34:03	0	0	0	0	0.2	0	0	0	5	6	12	21.07
14/05/13	11:35:03	0	0	0	0	0.2	0	0	0	4	5	12	21.07
14/05/13	11:36:03	1	1	1	2	0.2	0	2	2	4	5	12	21.06
14/05/13	11:37:03	1	1	1	2	0.2	0	2	2	4	5	12	21.07
14/05/13	11:38:03	1	1	1	2	0.2	0	2	2	4	5	12	21.06
14/05/13	11:39:03	0	0	0	0	0.2	0	0	0	4	5	13	21.03
14/05/13	11:40:03	0	0	0	0	0.2	0	0	0	4	5	13	21.00
14/05/13	11:41:03	0	0	0	0	0.2	0	0	0	4	5	13	21.05
14/05/13	11:47:05	1	1	1	1	0.0	0	2	2	6	8	13	21.00
14/05/13	11:48:05	1	1	1	2	0.2	0	2	2	4	5	13	20.90
14/05/13	11:49:05	1	1	1	1	0.0	0	2	2	4	5	13	20.93
14/05/13	11:50:05	1	1	1	1	0.0	0	2	2	4	5	13	20.92
14/05/13	11:51:05	1	1	1	2	0.2	0	2	2	3	4	13	20.91
14/05/13	11:52:05	1	1	1	1	0.0	0	2	2	3	4	13	20.90
14/05/13	11:53:05	1	1	1	1	0.0	0	2	2	3	4	13	20.90
14/05/13	11:54:05	1	1	1	1	0.0	0	2	2	4	5	13	20.92
14/05/13	11:55:05	1	1	1	1	0.0	0	2	2	3	4	13	20.93
14/05/13	11:56:05	1	1	1	1	0.0	0	2	2	3	4	12	20.91
14/05/13	11:57:05	1	1	1	1	0.0	0	2	2	3	4	12	20.90
14/05/13	11:58:05	1	1	1	1	0.0	0	2	2	3	4	11	20.93
14/05/13	11:59:05	1	1	1	1	0.0	0	2	2	3	4	11	20.93
14/05/13	12:00:05	1	1	1	2	0.2	0	2	2	4	5	10	20.93
14/05/13	12:01:05	1	1	1	1	0.0	0	2	2	3	4	10	20.90
14/05/13	12:02:05	0	0	0	0	0.0	0	0	0	3	4	9	20.90
14/05/13	12:03:05	1	1	1	1	0.0	0	2	2	3	4	9	20.91
14/05/13	12:04:05	1	1	1	1	0.0	0	2	2	2	3	9	20.91
14/05/13	12:05:05	1	1	1	1	0.0	0	2	2	2	3	9	20.95
14/05/13	12:06:05	1	1	1	1	0.0	0	2	2	4	5	8	21.02
14/05/13	12:12:07	0	0	0	0	0.0	0	0	0	1	1	8	21.00
14/05/13	12:13:07	1	1	1	1	0.0	0	2	2	1	1	7	21.00
14/05/13	12:14:07	0	0	0	0	0.0	0	0	0	1	1	7	21.05
14/05/13	12:15:07	0	0	0	0	0.0	0	0	0	1	1	7	21.00
14/05/13	12:16:07	0	0	0	0	0.0	0	0	0	1	1	6	21.08
14/05/13	12:17:07	1	1	1	1	0.0	0	2	2	1	1	6	21.04
14/05/13	12:18:07	1	1	1	1	0.0	0	2	2	1	1	6	21.00
14/05/13	12:19:07	0	0	0	0	0.0	0	0	0	1	1	6	21.16
14/05/13	12:20:07	0	0	0	0	0.0	0	0	0	1	1	5	21.14
14/05/13	12:21:07	0	0	0	0	0.0	0	0	0	1	1	5	21.00
14/05/13	12:22:07	0	0	0	0	0.0	0	0	0	1	1	5	21.00
14/05/13	12:23:07	0	0	0	0	0.0	0	0	0	1	1	5	21.21
14/05/13	12:24:07	0	0	0	0	0.0	0	0	0	1	1	5	21.22
14/05/13	12:25:07	0	0	0	0	0.0	0	0	0	1	1	4	21.23
14/05/13	12:26:07	0	0	0	0	0.0	0	0	0	3	4	4	21.21
14/05/13	12:27:07	1	1	1	1	0.0	0	2	2	13	16	4	21.19
14/05/13	12:28:07	1	1	1	1	0.0	0	2	2	3	4	4	21.00
14/05/13	12:29:07	0	0	0	0	0.0	0	0	0	1	1	4	21.24
14/05/13	12:30:07	1	1	1	1	0.0	0	2	2	1	1	4	21.26
14/05/13	12:31:07	1	1	1	1	0.0	0	2	2	4	5	4	21.25
14/05/13	12:37:09	3	4	3	4	0.0	0	5	6	0	0	3	20.85
14/05/13	12:38:09	2	3	2	3	0.0	0	3	4	0	0	3	20.85
14/05/13	12:39:09	2	3	2	3	0.0	0	3	4	1	1	3	20.87
14/05/13	12:40:09	2	3	2	3	0.2	0	3	5	1	1	3	20.86
14/05/13	12:41:09	3	4	3	4	0.0	0	5	6	0	0	3	20.85

60287751
Stack 5 Calculated Gas Data
14 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	CO (mg/m3) - Rolling Average	O2 (%)
14/05/13	12:42:09	2	3	2	3	0.0	0	3	4	1	1	3	20.87
14/05/13	12:43:09	2	3	2	3	0.0	0	3	4	0	0	3	20.88
14/05/13	12:44:09	2	3	2	3	0.0	0	3	4	0	0	3	20.83
14/05/13	12:45:09	1	1	1	1	0.0	0	2	2	1	1	3	20.97
14/05/13	12:46:09	1	1	1	1	0.0	0	2	2	0	0	3	20.98
14/05/13	12:47:09	1	1	1	1	0.0	0	2	2	0	0	3	20.98
14/05/13	12:48:09	1	1	1	1	0.0	0	2	2	0	0	2	20.97
14/05/13	12:49:09	1	1	1	1	0.0	0	2	2	0	0	2	20.98
14/05/13	12:50:09	1	1	1	1	0.0	0	2	2	0	0	2	20.98
14/05/13	12:51:09	2	3	2	3	0.0	0	3	4	1	1	2	20.97
14/05/13	12:52:09	1	1	1	1	0.0	0	2	2	0	0	2	20.96
14/05/13	12:53:09	2	3	2	3	0.0	0	3	4	0	0	2	20.95
14/05/13	12:54:09	1	1	1	1	0.0	0	2	2	0	0	2	20.94
14/05/13	12:55:09	2	3	2	3	0.0	0	3	4	0	0	2	20.94
14/05/13	12:56:09	2	3	2	3	0.0	0	3	4	0	0	2	20.94
14/05/13	13:02:11	1	1	1	1	0.0	0	2	2	0	0	2	20.96
14/05/13	13:03:01	1	1	1	1	0.0	0	2	2	0	0	2	20.93
14/05/13	13:04:01	1	1	1	2	0.2	0	2	2	0	0	2	20.91
14/05/13	13:05:01	1	1	1	1	0.0	0	2	2	0	0	1	20.90
14/05/13	13:06:01	1	1	1	2	0.2	0	2	2	0	0	1	20.89
14/05/13	13:07:01	2	3	2	3	0.2	0	3	5	0	0	1	20.88
14/05/13	13:08:01	2	3	2	3	0.2	0	3	5	1	1	1	20.75
14/05/13	13:09:01	2	3	3	4	0.4	1	3	5	1	1	1	20.69
14/05/13	13:10:01	2	3	2	3	0.2	0	3	5	0	0	1	20.69
14/05/13	13:11:01	2	3	2	3	0.2	0	3	5	1	1	1	20.69
14/05/13	13:12:01	2	3	2	3	0.2	0	3	5	1	1	1	20.68
14/05/13	13:13:01	2	3	2	3	0.2	0	3	5	0	0	1	20.67
14/05/13	13:14:01	1	1	1	2	0.2	0	2	2	0	0	1	20.66
14/05/13	13:15:01	2	3	2	3	0.2	0	3	5	1	1	1	20.66
14/05/13	13:16:01	2	3	2	3	0.2	0	3	5	0	0	1	20.65
14/05/13	13:17:01	2	3	2	3	0.2	0	3	5	0	0	1	20.65
14/05/13	13:18:01	2	3	2	3	0.2	0	3	5	0	0	1	20.62
14/05/13	13:19:01	2	3	2	3	0.2	0	3	5	0	0	1	20.60
14/05/13	13:32:01	2	3	2	3	0.0	0	3	4	1	1	1	20.60
14/05/13	13:33:01	1	1	1	1	0.0	0	2	2	1	1	1	20.59
14/05/13	13:34:01	2	3	2	3	0.0	0	3	4	1	1	1	20.59
14/05/13	13:35:01	1	1	1	1	0.0	0	2	2	2	3	1	20.58
14/05/13	13:36:01	0	0	0	0	0.0	0	0	0	1	1	1	20.58
14/05/13	13:37:01	1	1	1	1	0.0	0	2	2	0	0	1	20.57
14/05/13	13:38:01	2	3	2	3	0.0	0	3	4	1	1	1	20.51
14/05/13	13:39:01	2	3	2	3	0.0	0	3	4	0	0	1	20.51
14/05/13	13:40:01	1	1	1	1	0.0	0	2	2	150	188	4	20.41
14/05/13	13:41:01	3	4	3	4	0.0	0	5	6	95	119	7	19.92
14/05/13	13:42:01	0	0	0	0	0.0	0	0	0	65	81	9	20.54
14/05/13	13:43:01	0	0	0	0	0.0	0	0	0	41	51	10	20.70
14/05/13	13:44:01	0	0	0	0	0.0	0	0	0	27	34	10	20.62
14/05/13	13:45:01	1	1	1	1	0.0	0	2	2	57	71	12	20.62
14/05/13	13:46:01	1	1	1	1	0.0	0	2	2	48	60	13	20.40
14/05/13	13:47:01	3	4	3	4	0.0	0	5	6	75	94	15	20.23
14/05/13	13:48:01	1	1	1	1	0.0	0	2	2	23	29	15	20.75
14/05/13	13:49:01	1	1	1	1	0.0	0	2	2	17	21	16	20.72
14/05/13	13:50:01	3	4	3	4	0.0	0	5	6	112	140	19	20.65
14/05/13	13:51:01	1	1	1	1	0.0	0	2	2	23	29	19	20.68
14/05/13	13:57:03	2	3	2	3	0.0	0	3	4	9	11	20	20.71
14/05/13	13:58:03	2	3	2	3	0.0	0	3	4	4	5	20	20.74
14/05/13	13:59:03	2	3	2	3	0.0	0	3	4	4	5	20	20.77
14/05/13	14:00:03	1	1	1	1	0.0	0	2	2	3	4	20	18.04
14/05/13	14:01:03	2	3	2	3	0.0	0	3	4	51	64	21	20.73
14/05/13	14:02:03	2	3	2	3	0.0	0	3	4	25	31	22	18.31
14/05/13	14:03:03	2	3	2	3	0.0	0	3	4	17	21	22	20.82
14/05/13	14:04:03	2	3	2	3	0.0	0	3	4	13	16	23	20.82
14/05/13	14:05:03	2	3	2	3	0.0	0	3	4	5	6	23	20.82
14/05/13	14:06:03	2	3	2	3	0.0	0	3	4	3	4	23	18.34
14/05/13	14:07:03	2	3	2	3	0.0	0	3	4	2	3	23	20.89
14/05/13	14:08:03	2	3	2	3	0.0	0	3	4	1	1	23	20.86
14/05/13	14:09:03	2	3	2	3	0.0	0	3	4	1	1	23	20.82
14/05/13	14:10:03	3	4	3	4	0.0	0	5	6	1	1	23	20.79
14/05/13	14:11:03	3	4	3	4	0.0	0	5	6	1	1	23	20.75
14/05/13	14:12:03	3	4	3	4	0.0	0	5	6	1	1	23	20.70
14/05/13	14:13:03	3	4	3	4	0.0	0	5	6	1	1	23	20.69
14/05/13	14:14:03	2	3	2	3	0.0	0	3	4	0	0	23	20.66
14/05/13	14:15:03	2	3	3	3	0.2	0	3	5	1	1	23	20.59
14/05/13	14:16:03	2	3	2	3	0.0	0	3	4	0	0	23	20.66
14/05/13	14:22:05	3	4	3	4	0.2	0	5	7	11	14	23	20.57
14/05/13	14:23:05	4	5	5	6	0.2	0	6	9	26	33	24	20.47
14/05/13	14:24:05	3	4	3	4	0.2	0	5	7	26	33	25	20.54
14/05/13	14:25:05	2	3	2	3	0.2	0	3	5	23	29	25	20.54
14/05/13	14:26:05	2	3	2	3	0.2	0	3	5	15	19	26	20.50
14/05/13	14:27:05	3	4	3	4	0.2	0	5	7	17	21	26	20.35
14/05/13	14:28:05	2	3	2	3	0.2	0	3	5	12	15	26	20.37
14/05/13	14:29:05	3	4	3	4	0.2	0	5	7	9	11	27	20.40
14/05/13	14:30:05	3	4	4	4	0.2	0	5	7	7	9	27	20.42
14/05/13	14:31:05	3	4	3	4	0.2	0	5	7	7	9	27	20.34
14/05/13	14:32:05	3	4	3	5	0.4	1	5	7	8	10	27	20.31
14/05/13	14:33:05	3	4	3	5	0.4	1	5	7	6	8	27	20.45
14/05/13	14:34:05	2	3	2	3	0.2	0	3	5	6	8	27	20.47
14/05/13	14:35:05	2	3	2	3	0.2	0	3	5	5	6	27	20.47
14/05/13	14:36:05	2	3	2	4	0.4	1	3	5	5	6	28	20.41
14/05/13	14:37:05	3	4	3	5	0.4	1	5	7	5	6	28	20.39
14/05/13	14:38:05	2	3	3	4	0.4	1	3	5	5	6	24	20.39
14/05/13	14:39:05	2	3	3	4	0.4	1	3	5	5	6	22	20.37
14/05/13	14:40:05	2	3	2	3	0.2	0	3	5	4	5	20	20.37
14/05/13	14:41:05	2	3	2	3	0.2	0	3	5	4	5	19	20.40
14/05/13	14:47:07	2	3	2	3	0.0	0	3	4	2	3	18	20.44
14/05/13	14:48:07	3	4	3	4	0.2	0	5	7	3	4	17	20.48
14/05/13	14:49:07	3	4	3	4	0.2	0	5	7	2	3	16	20.51
14/05/13	14:50:07	3	4	3	4	0.2	0	5	7	2	3	14	20.55
14/05/13	14:51:07	3	4	3	4	0.0	0	5	6	1	1	13	20.60
14/05/13	14:52:07	2	3	3	3	0.2	0	3	5	1	1	13	20.62
14/05/13	14:53:07	2	3	2	3	0.0	0	3	4	1	1	10	20.66
	Average	2	2	2	2	0	0	2	3	9	11	11	20.9
	Maximum	4	5	5	6	0	1	6	9	150	188	28	22.2


60287751 - Stack 6 Calculated Gas Data, 14 May 2013
Concentration (mg/m³)
Concentration (%)
140
120
100
80
60
40
20
0
25
20
15
10
5
0
12:29:03
12:32:03
12:40:05
12:43:05
12:46:05
12:49:05
12:52:05
12:55:05
12:58:05
13:06:07
13:09:07
13:12:07
13:15:07
13:18:07
13:21:07
13:24:07
13:32:09
13:35:09
13:38:09
13:41:09
13:44:09
13:47:09
13:55:11
13:58:11
14:01:11
14:04:11
14:07:11
14:10:11
14:13:11
14:21:13
14:24:13
14:27:13
14:30:13
14:33:13
14:36:13
14:39:13
14:47:15
14:50:15
14:53:15
14:56:15
14:59:15
15:02:15
15:10:17
15:13:17
15:16:17
15:19:17
15:22:17
15:25:17
15:28:17
NO (mg/m3)
NOx (mg/m3)
NO2 (mg/m3)
Equiv NO2 (mg/m3)
CO (mg/m3)
O2 (%)

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	12:29:03	59	79	60	80	0.7	1.4	91	123	6	8	11.95
13/05/2013	12:29:13	59	79	60	80	0.7	1.4	91	123	5	6	11.91
13/05/2013	12:29:23	58	78	59	79	0.7	1.4	90	121	5	6	11.96
13/05/2013	12:29:33	58	78	59	79	0.7	1.4	90	121	5	6	11.99
13/05/2013	12:29:43	58	78	59	79	0.6	1.2	90	120	5	6	11.98
13/05/2013	12:29:53	58	78	59	79	0.7	1.4	90	121	5	6	12.01
13/05/2013	12:30:03	59	79	60	80	0.7	1.4	91	123	4	5	11.94
13/05/2013	12:30:13	58	78	59	79	0.7	1.4	90	121	5	6	11.91
13/05/2013	12:30:23	58	78	59	79	0.7	1.4	90	121	5	6	11.93
13/05/2013	12:30:33	59	79	60	80	0.7	1.4	91	123	4	5	11.90
13/05/2013	12:30:43	59	79	60	80	0.7	1.4	91	123	4	5	11.91
13/05/2013	12:30:53	59	79	60	80	0.7	1.4	91	123	4	5	11.90
13/05/2013	12:31:03	59	79	60	80	0.7	1.4	91	123	4	5	11.88
13/05/2013	12:31:13	59	79	60	80	0.7	1.4	91	123	4	5	11.88
13/05/2013	12:31:23	59	79	60	80	0.7	1.4	91	123	4	5	11.92
13/05/2013	12:31:33	59	79	60	80	0.7	1.4	91	123	3	4	11.84
13/05/2013	12:31:43	58	78	59	79	0.7	1.4	90	121	5	6	11.94
13/05/2013	12:31:53	58	78	59	79	0.7	1.4	90	121	4	5	11.96
13/05/2013	12:32:03	59	79	60	80	0.7	1.4	91	123	4	5	11.91
13/05/2013	12:32:13	58	78	59	79	0.7	1.4	90	121	4	5	11.99
13/05/2013	12:32:23	58	78	59	79	0.7	1.4	90	121	4	5	11.98
13/05/2013	12:32:33	59	79	60	80	0.7	1.4	91	123	4	5	11.91
13/05/2013	12:32:43	59	79	60	80	0.7	1.4	91	123	4	5	11.88
13/05/2013	12:32:53	58	78	59	79	0.7	1.4	90	121	4	5	11.92
13/05/2013	12:33:03	59	79	60	80	0.7	1.4	91	123	4	5	11.88
13/05/2013	12:33:13	58	78	59	79	0.7	1.4	90	121	4	5	11.88
13/05/2013	12:33:23	57	76	58	78	0.9	1.8	88	119	4	5	11.94
13/05/2013	12:33:33	58	78	59	79	0.7	1.4	90	121	4	5	11.89
13/05/2013	12:33:43	58	78	59	79	0.7	1.4	90	121	4	5	11.89
13/05/2013	12:33:53	58	78	59	79	0.7	1.4	90	121	4	5	11.90
13/05/2013	12:34:03	58	78	59	79	0.7	1.4	90	121	3	4	11.90
13/05/2013	12:34:13	58	78	59	80	0.9	1.8	90	121	4	5	11.94
13/05/2013	12:34:23	59	79	60	80	0.7	1.4	91	123	4	5	11.95
13/05/2013	12:34:33	58	78	59	79	0.7	1.4	90	121	4	5	11.97
13/05/2013	12:39:45	56	75	56	75	0.2	0.4	86	115	1	1	12.82
13/05/2013	12:39:55	56	75	56	75	0.2	0.4	86	115	1	1	12.87
13/05/2013	12:40:05	56	75	56	75	0.2	0.4	86	115	1	1	12.84
13/05/2013	12:40:15	57	76	57	77	0.2	0.4	88	117	1	1	12.84
13/05/2013	12:40:25	57	76	57	77	0.2	0.4	88	117	1	1	12.74
13/05/2013	12:40:35	57	76	57	77	0.2	0.4	88	117	1	1	12.80
13/05/2013	12:40:45	57	76	57	77	0.4	0.8	88	118	1	1	12.77
13/05/2013	12:40:55	56	75	56	75	0.2	0.4	86	115	1	1	12.78
13/05/2013	12:41:05	57	76	57	77	0.2	0.4	88	117	1	1	12.78
13/05/2013	12:41:15	57	76	57	77	0.2	0.4	88	117	1	1	12.78
13/05/2013	12:41:25	57	76	57	77	0.2	0.4	88	117	1	1	12.74
13/05/2013	12:41:35	57	76	57	77	0.2	0.4	88	117	1	1	12.77
13/05/2013	12:41:45	56	75	56	75	0.2	0.4	86	115	2	3	12.85
13/05/2013	12:41:55	56	75	56	75	0.2	0.4	86	115	1	1	12.79
13/05/2013	12:42:05	57	76	57	77	0.2	0.4	88	117	1	1	12.71
13/05/2013	12:42:15	56	75	56	75	0.2	0.4	86	115	2	3	12.79
13/05/2013	12:42:25	57	76	57	77	0.2	0.4	88	117	1	1	12.67
13/05/2013	12:42:35	56	75	56	75	0.2	0.4	86	115	0	0	12.74
13/05/2013	12:42:45	56	75	56	75	0.2	0.4	86	115	2	3	12.69
13/05/2013	12:42:55	56	75	56	75	0.2	0.4	86	115	1	1	12.70
13/05/2013	12:43:05	55	74	55	74	0.2	0.4	85	113	1	1	12.79
13/05/2013	12:43:15	56	75	56	75	0.2	0.4	86	115	1	1	12.81
13/05/2013	12:43:25	56	75	56	75	0.2	0.4	86	115	1	1	12.80
13/05/2013	12:43:35	56	75	56	75	0.2	0.4	86	115	1	1	12.79
13/05/2013	12:43:45	57	76	57	77	0.4	0.8	88	118	1	1	12.74
13/05/2013	12:43:55	55	74	55	74	0.2	0.4	85	113	1	1	12.82
13/05/2013	12:44:05	55	74	55	74	0.4	0.8	85	114	1	1	12.76
13/05/2013	12:44:15	55	74	55	74	0.4	0.8	85	114	2	3	12.79
13/05/2013	12:44:25	55	74	55	74	0.4	0.8	85	114	2	3	12.81
13/05/2013	12:44:35	56	75	56	76	0.4	0.8	86	116	1	1	12.76
13/05/2013	12:44:45	55	74	55	74	0.4	0.8	85	114	2	3	12.74
13/05/2013	12:44:55	55	74	55	74	0.4	0.8	85	114	2	3	12.77
13/05/2013	12:45:05	56	75	56	75	0.2	0.4	86	115	1	1	12.76
13/05/2013	12:45:15	55	74	55	74	0.4	0.8	85	114	1	1	12.75
13/05/2013	12:45:25	56	75	56	75	0.2	0.4	86	115	1	1	12.79
13/05/2013	12:45:35	56	75	56	75	0.2	0.4	86	115	1	1	12.71
13/05/2013	12:45:45	57	76	57	77	0.2	0.4	88	117	1	1	12.70
13/05/2013	12:45:55	56	75	56	75	0.2	0.4	86	115	2	3	12.72
13/05/2013	12:46:05	57	76	57	77	0.4	0.8	88	118	1	1	12.65
13/05/2013	12:46:15	55	74	55	74	0.4	0.8	85	114	1	1	12.78
13/05/2013	12:46:25	56	75	56	76	0.4	0.8	86	116	1	1	12.72
13/05/2013	12:46:35	56	75	56	75	0.2	0.4	86	115	1	1	12.73
13/05/2013	12:46:45	56	75	56	75	0.2	0.4	86	115	1	1	12.76
13/05/2013	12:46:55	56	75	56	75	0.2	0.4	86	115	1	1	12.73
13/05/2013	12:47:05	56	75	56	75	0.2	0.4	86	115	1	1	12.74
13/05/2013	12:47:15	55	74	55	74	0.2	0.4	85	113	2	3	12.80
13/05/2013	12:47:25	56	75	56	75	0.2	0.4	86	115	1	1	12.78
13/05/2013	12:47:35	56	75	56	75	0.2	0.4	86	115	2	3	12.68
13/05/2013	12:47:45	55	74	55	74	0.2	0.4	85	113	2	3	12.82
13/05/2013	12:47:55	56	75	56	75	0.2	0.4	86	115	2	3	12.74
13/05/2013	12:48:05	56	75	56	75	0.2	0.4	86	115	1	1	12.76
13/05/2013	12:48:15	56	75	56	75	0.2	0.4	86	115	2	3	12.82
13/05/2013	12:48:25	56	75	56	75	0.2	0.4	86	115	1	1	12.79
13/05/2013	12:48:35	56	75	56	75	0.2	0.4	86	115	1	1	12.82
13/05/2013	12:48:45	56	75	56	75	0.2	0.4	86	115	2	3	12.72
13/05/2013	12:48:55	55	74	55	74	0.0	0.0	84	113	1	1	12.84
13/05/2013	12:49:05	55	74	55	74	0.2	0.4	85	113	2	3	12.83
13/05/2013	12:49:15	55	74	55	74	0.2	0.4	85	113	1	1	12.90
13/05/2013	12:49:25	55	74	55	74	0.2	0.4	85	113	2	3	12.86
13/05/2013	12:49:35	56	75	56	75	0.2	0.4	86	115	2	3	12.85
13/05/2013	12:49:45	55	74	55	74	0.2	0.4	85	113	1	1	12.86

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	12:49:55	55	74	55	74	0.2	0.4	85	113	1	1	12.87
13/05/2013	12:50:05	55	74	55	74	0.2	0.4	85	113	2	3	12.87
13/05/2013	12:50:15	56	75	56	75	0.2	0.4	86	115	1	1	12.91
13/05/2013	12:50:25	55	74	55	74	0.2	0.4	85	113	2	3	12.91
13/05/2013	12:50:35	56	75	56	75	0.2	0.4	86	115	2	3	12.89
13/05/2013	12:50:45	56	75	56	75	0.2	0.4	86	115	2	3	12.91
13/05/2013	12:50:55	55	74	55	74	0.2	0.4	85	113	1	1	12.93
13/05/2013	12:51:05	55	74	55	74	0.2	0.4	85	113	1	1	12.95
13/05/2013	12:51:15	55	74	55	74	0.2	0.4	85	113	1	1	12.97
13/05/2013	12:51:25	55	74	55	74	0.4	0.8	85	114	1	1	12.96
13/05/2013	12:51:35	56	75	56	75	0.2	0.4	86	115	1	1	12.89
13/05/2013	12:51:45	55	74	55	74	0.2	0.4	85	113	1	1	12.93
13/05/2013	12:51:55	56	75	56	75	0.2	0.4	86	115	1	1	12.99
13/05/2013	12:52:05	55	74	55	74	0.2	0.4	85	113	1	1	13.02
13/05/2013	12:52:15	55	74	55	74	0.2	0.4	85	113	1	1	13.03
13/05/2013	12:52:25	56	75	56	75	0.2	0.4	86	115	1	1	12.93
13/05/2013	12:52:35	55	74	55	74	0.2	0.4	85	113	1	1	12.94
13/05/2013	12:52:45	56	75	56	75	0.2	0.4	86	115	2	3	12.83
13/05/2013	12:52:55	56	75	56	75	0.2	0.4	86	115	1	1	12.79
13/05/2013	12:53:05	57	76	57	77	0.2	0.4	88	117	1	1	12.79
13/05/2013	12:53:15	57	76	57	77	0.2	0.4	88	117	1	1	12.84
13/05/2013	12:53:25	56	75	56	76	0.4	0.8	86	116	1	1	12.78
13/05/2013	12:53:35	56	75	56	75	0.2	0.4	86	115	1	1	12.74
13/05/2013	12:53:45	56	75	56	75	0.2	0.4	86	115	1	1	12.76
13/05/2013	12:53:55	56	75	56	75	0.2	0.4	86	115	1	1	12.81
13/05/2013	12:54:05	58	78	58	78	0.2	0.4	89	120	1	1	12.70
13/05/2013	12:54:15	57	76	57	77	0.4	0.8	88	118	1	1	12.74
13/05/2013	12:54:25	56	75	56	76	0.4	0.8	86	116	1	1	12.70
13/05/2013	12:54:35	56	75	56	75	0.2	0.4	86	115	0	0	12.79
13/05/2013	12:54:45	56	75	56	75	0.2	0.4	86	115	1	1	12.77
13/05/2013	12:54:55	55	74	55	74	0.2	0.4	85	113	1	1	12.84
13/05/2013	12:55:05	55	74	55	74	0.4	0.8	85	114	0	0	12.88
13/05/2013	12:55:15	56	75	56	75	0.2	0.4	86	115	0	0	12.80
13/05/2013	12:55:25	56	75	56	75	0.2	0.4	86	115	0	0	12.89
13/05/2013	12:55:35	56	75	56	75	0.2	0.4	86	115	0	0	12.80
13/05/2013	12:55:45	56	75	56	75	0.2	0.4	86	115	1	1	12.83
13/05/2013	12:55:55	56	75	56	76	0.4	0.8	86	116	0	0	12.78
13/05/2013	12:56:05	55	74	55	74	0.4	0.8	85	114	0	0	12.87
13/05/2013	12:56:15	56	75	56	75	0.2	0.4	86	115	1	1	12.85
13/05/2013	12:56:25	56	75	56	75	0.2	0.4	86	115	1	1	12.90
13/05/2013	12:56:35	56	75	56	75	0.2	0.4	86	115	1	1	12.90
13/05/2013	12:56:45	56	75	56	75	0.2	0.4	86	115	1	1	12.93
13/05/2013	12:56:55	56	75	56	75	0.2	0.4	86	115	1	1	12.91
13/05/2013	12:57:05	55	74	55	74	0.2	0.4	85	113	0	0	12.97
13/05/2013	12:57:15	54	72	54	73	0.2	0.4	83	111	0	0	12.98
13/05/2013	12:57:25	56	75	56	75	0.2	0.4	86	115	1	1	12.95
13/05/2013	12:57:35	55	74	55	74	0.2	0.4	85	113	0	0	12.96
13/05/2013	12:57:45	56	75	56	75	0.2	0.4	86	115	1	1	12.98
13/05/2013	12:57:55	56	75	56	75	0.2	0.4	86	115	1	1	12.98
13/05/2013	12:58:05	56	75	56	75	0.2	0.4	86	115	0	0	12.98
13/05/2013	12:58:15	52	70	52	70	0.2	0.4	80	107	1	1	13.51
13/05/2013	12:58:25	45	60	45	61	0.2	0.4	69	93	1	1	14.31
13/05/2013	12:58:35	43	58	43	58	0.2	0.4	66	89	1	1	14.49
13/05/2013	12:58:45	44	59	44	59	0.2	0.4	68	91	1	1	14.58
13/05/2013	12:58:55	43	58	43	58	0.2	0.4	66	89	0	0	14.53
13/05/2013	12:59:05	42	56	42	57	0.2	0.4	65	87	1	1	14.57
13/05/2013	12:59:15	41	55	41	56	0.4	0.8	63	85	1	1	14.65
13/05/2013	12:59:25	42	56	42	57	0.2	0.4	65	87	0	0	14.67
13/05/2013	12:59:35	42	56	42	57	0.4	0.8	65	87	1	1	14.67
13/05/2013	13:04:47	44	59	44	59	0.2	0.4	68	91	0	0	14.49
13/05/2013	13:04:57	45	60	45	61	0.2	0.4	69	93	0	0	14.48
13/05/2013	13:05:07	44	59	44	59	0.0	0.0	67	90	0	0	14.55
13/05/2013	13:05:17	44	59	44	59	0.2	0.4	68	91	0	0	14.49
13/05/2013	13:05:27	42	56	42	57	0.2	0.4	65	87	0	0	14.51
13/05/2013	13:05:37	42	56	42	56	0.0	0.0	64	86	0	0	14.56
13/05/2013	13:05:47	43	58	43	58	0.2	0.4	66	89	0	0	14.54
13/05/2013	13:05:57	43	58	43	58	0.2	0.4	66	89	0	0	14.57
13/05/2013	13:06:07	43	58	43	58	0.2	0.4	66	89	0	0	14.57
13/05/2013	13:06:17	43	58	43	58	0.2	0.4	66	89	0	0	14.57
13/05/2013	13:06:27	43	58	43	58	0.2	0.4	66	89	0	0	14.59
13/05/2013	13:06:37	43	58	43	58	0.0	0.0	66	88	0	0	14.55
13/05/2013	13:06:47	43	58	43	58	0.2	0.4	66	89	0	0	14.65
13/05/2013	13:06:57	43	58	43	58	0.2	0.4	66	89	0	0	14.66
13/05/2013	13:07:07	43	58	43	58	0.2	0.4	66	89	0	0	14.67
13/05/2013	13:07:17	43	58	43	58	0.2	0.4	66	89	0	0	14.70
13/05/2013	13:07:27	43	58	43	58	0.2	0.4	66	89	0	0	14.64
13/05/2013	13:07:37	43	58	43	58	0.2	0.4	66	89	0	0	14.73
13/05/2013	13:07:47	43	58	43	58	0.0	0.0	66	88	0	0	14.72
13/05/2013	13:07:57	43	58	43	58	0.0	0.0	66	88	0	0	14.72
13/05/2013	13:08:07	43	58	43	58	0.0	0.0	66	88	0	0	14.85
13/05/2013	13:08:17	40	54	40	54	0.0	0.0	61	82	0	0	15.30
13/05/2013	13:08:27	40	54	40	54	0.0	0.0	61	82	0	0	15.78
13/05/2013	13:08:37	35	47	35	47	0.0	0.0	54	72	0	0	16.57
13/05/2013	13:08:47	30	40	30	41	0.2	0.4	46	62	0	0	17.07
13/05/2013	13:08:57	25	33	25	34	0.2	0.4	39	52	0	0	17.47
13/05/2013	13:09:07	19	25	19	25	0.0	0.0	29	39	0	0	18.38
13/05/2013	13:09:17	15	20	15	20	0.0	0.0	23	31	0	0	14.96
13/05/2013	13:09:27	14	19	14	19	0.0	0.0	21	29	0	0	19.96
13/05/2013	13:09:37	14	19	14	19	0.0	0.0	21	29	0	0	20.09
13/05/2013	13:09:47	14	19	14	19	0.2	0.4	22	29	0	0	20.11
13/05/2013	13:09:57	15	20	15	21	0.2	0.4	23	31	0	0	20.01
13/05/2013	13:10:07	15	20	15	20	0.0	0.0	23	31	0	0	19.95
13/05/2013	13:10:17	15	20	15	20	0.0	0.0	23	31	0	0	20.03
13/05/2013	13:10:27	14	19	14	19	0.0	0.0	21	29	0	0	20.13
13/05/2013	13:10:37	14	19	14	19	0.0	0.0	21	29	0	0	20.13

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	13:10:47	14	19	14	19	0.0	0.0	21	29	0	0	20.03
13/05/2013	13:10:57	15	20	15	20	0.0	0.0	23	31	0	0	20.05
13/05/2013	13:11:07	15	20	15	20	0.0	0.0	23	31	0	0	19.94
13/05/2013	13:11:17	16	21	16	22	0.2	0.4	25	33	0	0	19.79
13/05/2013	13:11:27	20	27	20	27	0.0	0.0	31	41	0	0	19.18
13/05/2013	13:11:37	34	46	34	46	0.2	0.4	52	70	1	1	16.59
13/05/2013	13:11:47	45	60	45	61	0.2	0.4	69	93	1	1	14.11
13/05/2013	13:11:57	50	67	50	67	0.2	0.4	77	103	1	1	13.71
13/05/2013	13:12:07	53	71	53	71	0.2	0.4	81	109	1	1	13.45
13/05/2013	13:12:17	53	71	53	71	0.2	0.4	81	109	1	1	13.48
13/05/2013	13:12:27	54	72	54	73	0.2	0.4	83	111	1	1	13.53
13/05/2013	13:12:37	54	72	54	73	0.2	0.4	83	111	0	0	13.50
13/05/2013	13:12:47	55	74	55	74	0.2	0.4	85	113	0	0	13.47
13/05/2013	13:12:57	55	74	55	74	0.2	0.4	85	113	0	0	13.40
13/05/2013	13:13:07	56	75	56	75	0.2	0.4	86	115	0	0	13.44
13/05/2013	13:13:17	56	75	56	75	0.2	0.4	86	115	0	0	13.34
13/05/2013	13:13:27	56	75	56	75	0.0	0.0	86	115	0	0	13.26
13/05/2013	13:13:37	56	75	56	75	0.2	0.4	86	115	0	0	13.36
13/05/2013	13:13:47	57	76	57	77	0.2	0.4	88	117	0	0	13.29
13/05/2013	13:13:57	56	75	56	75	0.0	0.0	86	115	0	0	13.35
13/05/2013	13:14:07	56	75	56	75	0.2	0.4	86	115	0	0	13.29
13/05/2013	13:14:17	56	75	56	75	0.2	0.4	86	115	0	0	13.35
13/05/2013	13:14:27	56	75	56	75	0.2	0.4	86	115	0	0	13.29
13/05/2013	13:14:37	58	78	58	78	0.2	0.4	89	120	0	0	13.22
13/05/2013	13:14:47	57	76	57	76	0.0	0.0	87	117	0	0	13.32
13/05/2013	13:14:57	57	76	57	76	0.0	0.0	87	117	0	0	13.17
13/05/2013	13:15:07	57	76	57	77	0.2	0.4	88	117	0	0	13.23
13/05/2013	13:15:17	57	76	57	77	0.2	0.4	88	117	0	0	13.16
13/05/2013	13:15:27	57	76	57	76	0.0	0.0	87	117	0	0	13.21
13/05/2013	13:15:37	57	76	57	76	0.0	0.0	87	117	0	0	13.33
13/05/2013	13:15:47	57	76	57	76	0.0	0.0	87	117	0	0	13.27
13/05/2013	13:15:57	57	76	57	76	0.0	0.0	87	117	0	0	13.25
13/05/2013	13:16:07	57	76	57	76	0.0	0.0	87	117	0	0	13.21
13/05/2013	13:16:17	56	75	56	75	0.0	0.0	86	115	0	0	13.29
13/05/2013	13:16:27	58	78	58	78	0.2	0.4	89	120	0	0	13.21
13/05/2013	13:16:37	57	76	57	77	0.2	0.4	88	117	0	0	13.33
13/05/2013	13:16:47	57	76	57	77	0.2	0.4	88	117	0	0	13.36
13/05/2013	13:16:57	57	76	57	76	0.0	0.0	87	117	0	0	13.31
13/05/2013	13:17:07	57	76	57	76	0.0	0.0	87	117	0	0	13.38
13/05/2013	13:17:17	57	76	57	77	0.2	0.4	88	117	0	0	13.35
13/05/2013	13:17:27	58	78	58	78	0.0	0.0	89	119	0	0	13.25
13/05/2013	13:17:37	57	76	57	77	0.2	0.4	88	117	0	0	13.30
13/05/2013	13:17:47	57	76	57	77	0.2	0.4	88	117	0	0	13.35
13/05/2013	13:17:57	57	76	57	77	0.2	0.4	88	117	0	0	13.36
13/05/2013	13:18:07	58	78	58	78	0.2	0.4	89	120	0	0	13.33
13/05/2013	13:18:17	57	76	57	76	0.0	0.0	87	117	0	0	13.38
13/05/2013	13:18:27	57	76	57	77	0.2	0.4	88	117	0	0	13.38
13/05/2013	13:18:37	57	76	57	77	0.2	0.4	88	117	0	0	12.28
13/05/2013	13:18:47	58	78	58	78	0.2	0.4	89	120	0	0	13.31
13/05/2013	13:18:57	57	76	57	77	0.2	0.4	88	117	0	0	13.41
13/05/2013	13:19:07	57	76	57	77	0.2	0.4	88	117	0	0	13.33
13/05/2013	13:19:17	57	76	57	77	0.2	0.4	88	117	0	0	13.34
13/05/2013	13:19:27	57	76	57	76	0.0	0.0	87	117	0	0	13.42
13/05/2013	13:19:37	57	76	57	76	0.0	0.0	87	117	0	0	13.44
13/05/2013	13:19:47	58	78	58	78	0.2	0.4	89	120	0	0	13.33
13/05/2013	13:19:57	58	78	58	78	0.0	0.0	89	119	0	0	13.31
13/05/2013	13:20:07	57	76	57	77	0.2	0.4	88	117	0	0	13.43
13/05/2013	13:20:17	58	78	58	78	0.2	0.4	89	120	0	0	13.48
13/05/2013	13:20:27	58	78	58	78	0.0	0.0	89	119	0	0	13.46
13/05/2013	13:20:37	58	78	58	78	0.2	0.4	89	120	0	0	13.63
13/05/2013	13:20:47	58	78	58	78	0.2	0.4	89	120	0	0	13.03
13/05/2013	13:20:57	58	78	58	78	0.2	0.4	89	120	0	0	13.34
13/05/2013	13:21:07	58	78	58	78	0.2	0.4	89	120	0	0	13.32
13/05/2013	13:21:17	58	78	58	78	0.2	0.4	89	120	0	0	13.38
13/05/2013	13:21:27	58	78	58	78	0.0	0.0	89	119	0	0	13.19
13/05/2013	13:21:37	58	78	58	78	0.2	0.4	89	120	0	0	13.32
13/05/2013	13:21:47	58	78	58	78	0.2	0.4	89	120	0	0	13.29
13/05/2013	13:21:57	58	78	58	78	0.0	0.0	89	119	0	0	13.32
13/05/2013	13:22:07	59	79	59	79	0.2	0.4	91	122	0	0	13.41
13/05/2013	13:22:17	59	79	59	80	0.4	0.8	91	122	0	0	13.41
13/05/2013	13:22:27	58	78	58	79	0.4	0.8	89	120	0	0	13.49
13/05/2013	13:22:37	57	76	57	77	0.2	0.4	88	117	0	0	13.63
13/05/2013	13:22:47	57	76	57	77	0.2	0.4	88	117	0	0	13.59
13/05/2013	13:22:57	57	76	57	77	0.2	0.4	88	117	0	0	13.52
13/05/2013	13:23:07	58	78	58	78	0.2	0.4	89	120	0	0	13.42
13/05/2013	13:23:17	57	76	57	77	0.4	0.8	88	118	0	0	13.68
13/05/2013	13:23:27	58	78	58	78	0.2	0.4	89	120	0	0	13.41
13/05/2013	13:23:37	58	78	58	78	0.2	0.4	89	120	0	0	13.57
13/05/2013	13:23:47	59	79	59	79	0.2	0.4	91	122	0	0	13.27
13/05/2013	13:23:57	58	78	58	78	0.2	0.4	89	120	0	0	13.32
13/05/2013	13:24:07	58	78	58	79	0.4	0.8	89	120	0	0	13.37
13/05/2013	13:24:17	58	78	58	79	0.4	0.8	89	120	0	0	13.39
13/05/2013	13:24:27	58	78	58	78	0.2	0.4	89	120	0	0	13.43
13/05/2013	13:24:37	58	78	58	79	0.4	0.8	89	120	0	0	13.49
13/05/2013	13:29:49	60	80	60	80	0.0	0.0	92	123	0	0	12.43
13/05/2013	13:29:59	59	79	59	79	0.0	0.0	90	121	0	0	12.40
13/05/2013	13:30:09	60	80	60	80	0.0	0.0	92	123	0	0	12.59
13/05/2013	13:30:19	60	80	60	80	0.0	0.0	92	123	0	0	12.21
13/05/2013	13:30:29	60	80	60	80	0.0	0.0	92	123	0	0	12.35
13/05/2013	13:30:39	59	79	59	79	0.0	0.0	90	121	0	0	12.44
13/05/2013	13:30:49	59	79	59	79	0.0	0.0	90	121	0	0	12.44
13/05/2013	13:30:59	59	79	59	79	0.0	0.0	90	121	0	0	12.40
13/05/2013	13:31:09	59	79	59	79	0.0	0.0	90	121	0	0	12.32
13/05/2013	13:31:19	60	80	60	80	0.0	0.0	92	123	0	0	12.30
13/05/2013	13:31:29	60	80	60	80	0.0	0.0	92	123	0	0	12.38

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	13:31:39	59	79	59	79	0.0	0.0	90	121	0	0	12.36
13/05/2013	13:31:49	60	80	60	80	0.0	0.0	92	123	0	0	12.35
13/05/2013	13:31:59	61	82	61	82	0.2	0.4	94	126	0	0	12.26
13/05/2013	13:32:09	60	80	60	80	0.0	0.0	92	123	0	0	12.56
13/05/2013	13:32:19	59	79	59	79	0.0	0.0	90	121	0	0	12.35
13/05/2013	13:32:29	60	80	60	80	0.0	0.0	92	123	0	0	12.34
13/05/2013	13:32:39	60	80	60	80	0.0	0.0	92	123	1	1	12.33
13/05/2013	13:32:49	57	76	57	76	0.0	0.0	87	117	0	0	12.58
13/05/2013	13:32:59	52	70	52	70	0.0	0.0	80	107	0	0	12.90
13/05/2013	13:33:09	50	67	50	67	0.0	0.0	77	103	0	0	13.02
13/05/2013	13:33:19	50	67	50	67	0.0	0.0	77	103	0	0	12.95
13/05/2013	13:33:29	49	66	49	66	0.0	0.0	75	101	0	0	12.99
13/05/2013	13:33:39	51	68	51	68	0.0	0.0	78	105	0	0	12.88
13/05/2013	13:33:49	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	13:33:59	51	68	51	68	0.0	0.0	78	105	0	0	12.93
13/05/2013	13:34:09	51	68	51	68	0.0	0.0	78	105	0	0	12.87
13/05/2013	13:34:19	51	68	51	68	0.0	0.0	78	105	0	0	12.92
13/05/2013	13:34:29	51	68	51	68	0.0	0.0	78	105	0	0	12.92
13/05/2013	13:34:39	50	67	50	67	0.0	0.0	77	103	0	0	12.93
13/05/2013	13:34:49	50	67	50	67	0.2	0.4	77	103	0	0	12.94
13/05/2013	13:34:59	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	13:35:09	51	68	51	68	0.0	0.0	78	105	0	0	13.00
13/05/2013	13:35:19	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	13:35:29	50	67	50	67	0.0	0.0	77	103	0	0	13.01
13/05/2013	13:35:39	51	68	51	68	0.0	0.0	78	105	0	0	13.03
13/05/2013	13:35:49	50	67	50	67	0.0	0.0	77	103	0	0	13.01
13/05/2013	13:35:59	49	66	49	66	0.0	0.0	75	101	0	0	13.09
13/05/2013	13:36:09	48	64	48	64	0.0	0.0	74	99	0	0	13.12
13/05/2013	13:36:19	49	66	49	66	0.0	0.0	75	101	0	0	13.06
13/05/2013	13:36:29	50	67	50	67	0.0	0.0	77	103	0	0	13.02
13/05/2013	13:36:39	50	67	50	67	0.0	0.0	77	103	0	0	14.04
13/05/2013	13:36:49	50	67	50	67	0.0	0.0	77	103	0	0	13.28
13/05/2013	13:36:59	50	67	50	67	0.0	0.0	77	103	0	0	13.10
13/05/2013	13:37:09	50	67	50	67	0.0	0.0	77	103	0	0	13.12
13/05/2013	13:37:19	50	67	50	67	0.0	0.0	77	103	0	0	13.17
13/05/2013	13:37:29	50	67	50	67	0.0	0.0	77	103	0	0	13.20
13/05/2013	13:37:39	50	67	50	67	0.0	0.0	77	103	0	0	13.06
13/05/2013	13:37:49	50	67	50	67	0.0	0.0	77	103	0	0	13.10
13/05/2013	13:37:59	51	68	51	68	0.0	0.0	78	105	0	0	13.05
13/05/2013	13:38:09	51	68	51	68	0.0	0.0	78	105	1	1	13.11
13/05/2013	13:38:19	50	67	50	67	0.0	0.0	77	103	0	0	13.07
13/05/2013	13:38:29	49	66	49	66	0.0	0.0	75	101	1	1	13.13
13/05/2013	13:38:39	51	68	51	68	0.0	0.0	78	105	1	1	13.17
13/05/2013	13:38:49	49	66	49	66	0.0	0.0	75	101	0	0	13.16
13/05/2013	13:38:59	49	66	49	66	0.0	0.0	75	101	0	0	13.15
13/05/2013	13:39:09	50	67	50	67	0.0	0.0	77	103	0	0	13.16
13/05/2013	13:39:19	49	66	49	66	0.0	0.0	75	101	0	0	13.22
13/05/2013	13:39:29	50	67	50	67	0.0	0.0	77	103	0	0	13.07
13/05/2013	13:39:39	51	68	51	68	0.0	0.0	78	105	0	0	13.07
13/05/2013	13:39:49	48	64	48	64	0.0	0.0	74	99	1	1	13.27
13/05/2013	13:39:59	49	66	49	66	0.0	0.0	75	101	1	1	13.24
13/05/2013	13:40:09	49	66	49	66	0.0	0.0	75	101	1	1	13.25
13/05/2013	13:40:19	48	64	48	64	0.0	0.0	74	99	0	0	13.32
13/05/2013	13:40:29	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	13:40:39	50	67	50	67	0.0	0.0	77	103	0	0	13.21
13/05/2013	13:40:49	50	67	50	67	0.0	0.0	77	103	0	0	13.21
13/05/2013	13:40:59	49	66	49	66	0.0	0.0	75	101	0	0	13.15
13/05/2013	13:41:09	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	13:41:19	49	66	49	66	0.0	0.0	75	101	0	0	13.34
13/05/2013	13:41:29	49	66	49	66	0.0	0.0	75	101	0	0	13.37
13/05/2013	13:41:39	49	66	49	66	0.0	0.0	75	101	0	0	13.28
13/05/2013	13:41:49	49	66	49	66	0.0	0.0	75	101	0	0	13.26
13/05/2013	13:41:59	49	66	49	66	0.0	0.0	75	101	0	0	13.32
13/05/2013	13:42:09	48	64	48	64	0.0	0.0	74	99	1	1	13.39
13/05/2013	13:42:19	47	63	47	63	0.0	0.0	72	97	1	1	13.54
13/05/2013	13:42:29	48	64	48	64	0.0	0.0	74	99	1	1	13.40
13/05/2013	13:42:39	48	64	48	64	0.0	0.0	74	99	0	0	13.27
13/05/2013	13:42:49	48	64	48	64	0.0	0.0	74	99	0	0	13.27
13/05/2013	13:42:59	49	66	49	66	0.0	0.0	75	101	1	1	13.19
13/05/2013	13:43:09	49	66	49	66	0.0	0.0	75	101	0	0	13.26
13/05/2013	13:43:19	49	66	49	66	0.0	0.0	75	101	0	0	13.28
13/05/2013	13:43:29	48	64	48	65	0.2	0.4	74	99	0	0	13.26
13/05/2013	13:43:39	49	66	49	66	0.0	0.0	75	101	0	0	13.20
13/05/2013	13:43:49	49	66	49	66	0.2	0.4	75	101	0	0	13.30
13/05/2013	13:43:59	48	64	48	64	0.0	0.0	74	99	0	0	13.30
13/05/2013	13:44:09	48	64	48	65	0.2	0.4	74	99	0	0	13.29
13/05/2013	13:44:19	49	66	49	66	0.0	0.0	75	101	0	0	13.27
13/05/2013	13:44:29	48	64	48	64	0.0	0.0	74	99	0	0	13.33
13/05/2013	13:44:39	48	64	48	64	0.0	0.0	74	99	1	1	13.39
13/05/2013	13:44:49	48	64	48	65	0.2	0.4	74	99	0	0	13.38
13/05/2013	13:44:59	48	64	48	64	0.0	0.0	74	99	0	0	13.37
13/05/2013	13:45:09	48	64	48	65	0.2	0.4	74	99	0	0	13.38
13/05/2013	13:45:19	41	55	41	55	0.0	0.0	63	84	0	0	14.63
13/05/2013	13:45:29	33	44	33	44	0.0	0.0	51	68	1	1	16.04
13/05/2013	13:45:39	30	40	30	40	0.0	0.0	46	62	0	0	9.84
13/05/2013	13:45:49	27	36	27	36	0.0	0.0	41	55	1	1	17.15
13/05/2013	13:45:59	26	35	26	35	0.0	0.0	40	53	0	0	17.36
13/05/2013	13:46:09	26	35	26	35	0.0	0.0	40	53	0	0	17.13
13/05/2013	13:46:19	25	33	25	33	0.0	0.0	38	51	0	0	17.24
13/05/2013	13:46:29	24	32	24	33	0.2	0.4	37	50	0	0	17.46
13/05/2013	13:46:39	22	29	22	29	0.0	0.0	34	45	0	0	17.67
13/05/2013	13:46:49	24	32	24	32	0.0	0.0	37	49	0	0	17.49
13/05/2013	13:46:59	23	31	23	31	0.2	0.4	35	48	1	1	17.44
13/05/2013	13:47:09	26	35	26	35	0.2	0.4	40	54	0	0	16.84
13/05/2013	13:47:19	29	39	29	39	0.2	0.4	45	60	1	1	16.51

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	13:47:29	30	40	30	41	0.2	0.4	46	62	1	1	16.30
13/05/2013	13:47:39	30	40	30	40	0.0	0.0	46	62	2	3	16.25
13/05/2013	13:47:49	41	55	41	55	0.2	0.4	63	85	1	1	14.01
13/05/2013	13:47:59	45	60	45	61	0.2	0.4	69	93	1	1	13.62
13/05/2013	13:48:09	47	63	47	63	0.0	0.0	72	97	1	1	13.52
13/05/2013	13:48:19	47	63	47	63	0.2	0.4	72	97	1	1	13.51
13/05/2013	13:48:29	47	63	47	63	0.2	0.4	72	97	0	0	13.57
13/05/2013	13:48:39	47	63	47	63	0.2	0.4	72	97	1	1	13.50
13/05/2013	13:48:49	48	64	48	64	0.0	0.0	74	99	0	0	13.57
13/05/2013	13:48:59	48	64	48	65	0.2	0.4	74	99	1	1	13.56
13/05/2013	13:49:09	49	66	49	66	0.0	0.0	75	101	0	0	13.47
13/05/2013	13:49:19	48	64	48	65	0.2	0.4	74	99	0	0	13.51
13/05/2013	13:49:29	48	64	48	65	0.2	0.4	74	99	0	0	13.49
13/05/2013	13:49:39	48	64	48	65	0.2	0.4	74	99	1	1	13.49
13/05/2013	13:54:51	49	66	49	66	0.2	0.4	75	101	0	0	13.13
13/05/2013	13:55:01	49	66	49	66	0.2	0.4	75	101	0	0	13.09
13/05/2013	13:55:11	48	64	48	64	0.0	0.0	74	99	0	0	13.16
13/05/2013	13:55:21	48	64	48	64	0.0	0.0	74	99	0	0	13.10
13/05/2013	13:55:31	49	66	49	66	0.2	0.4	75	101	0	0	13.05
13/05/2013	13:55:41	49	66	49	66	0.2	0.4	75	101	0	0	12.99
13/05/2013	13:55:51	50	67	50	67	0.0	0.0	77	103	0	0	12.98
13/05/2013	13:56:01	49	66	49	66	0.2	0.4	75	101	0	0	12.99
13/05/2013	13:56:11	50	67	50	67	0.0	0.0	77	103	0	0	13.00
13/05/2013	13:56:21	49	66	49	66	0.2	0.4	75	101	0	0	12.99
13/05/2013	13:56:31	50	67	50	67	0.0	0.0	77	103	0	0	12.89
13/05/2013	13:56:41	49	66	49	66	0.0	0.0	75	101	0	0	12.99
13/05/2013	13:56:51	48	64	48	65	0.2	0.4	74	99	0	0	12.95
13/05/2013	13:57:01	50	67	50	67	0.2	0.4	77	103	0	0	12.96
13/05/2013	13:57:11	49	66	49	66	0.0	0.0	75	101	0	0	12.92
13/05/2013	13:57:21	50	67	50	67	0.0	0.0	77	103	0	0	12.94
13/05/2013	13:57:31	49	66	49	66	0.0	0.0	75	101	0	0	12.89
13/05/2013	13:57:41	50	67	50	67	0.2	0.4	77	103	0	0	12.96
13/05/2013	13:57:51	50	67	50	67	0.2	0.4	77	103	0	0	12.98
13/05/2013	13:58:01	49	66	49	66	0.0	0.0	75	101	0	0	13.04
13/05/2013	13:58:11	49	66	49	66	0.0	0.0	75	101	0	0	13.00
13/05/2013	13:58:21	49	66	49	66	0.0	0.0	75	101	0	0	13.04
13/05/2013	13:58:31	49	66	49	66	0.2	0.4	75	101	0	0	12.98
13/05/2013	13:58:41	50	67	50	67	0.2	0.4	77	103	0	0	12.89
13/05/2013	13:58:51	49	66	49	66	0.0	0.0	75	101	0	0	13.00
13/05/2013	13:59:01	49	66	49	66	0.0	0.0	75	101	0	0	12.95
13/05/2013	13:59:11	49	66	49	66	0.2	0.4	75	101	0	0	12.97
13/05/2013	13:59:21	50	67	50	67	0.0	0.0	77	103	0	0	12.89
13/05/2013	13:59:31	51	68	51	68	0.0	0.0	78	105	0	0	12.90
13/05/2013	13:59:41	49	66	49	66	0.0	0.0	75	101	0	0	12.89
13/05/2013	13:59:51	50	67	50	67	0.0	0.0	77	103	0	0	12.85
13/05/2013	14:00:01	50	67	50	67	0.2	0.4	77	103	0	0	12.82
13/05/2013	14:00:11	49	66	49	66	0.0	0.0	75	101	0	0	12.85
13/05/2013	14:00:21	51	68	51	68	0.0	0.0	78	105	0	0	12.77
13/05/2013	14:00:31	50	67	50	67	0.0	0.0	77	103	0	0	12.83
13/05/2013	14:00:41	49	66	49	66	0.0	0.0	75	101	0	0	12.93
13/05/2013	14:00:51	50	67	50	67	0.0	0.0	77	103	0	0	12.94
13/05/2013	14:01:01	49	66	49	66	0.2	0.4	75	101	0	0	12.99
13/05/2013	14:01:11	50	67	50	67	0.0	0.0	77	103	0	0	12.89
13/05/2013	14:01:21	49	66	49	66	0.0	0.0	75	101	0	0	12.88
13/05/2013	14:01:31	49	66	49	66	0.2	0.4	75	101	0	0	12.94
13/05/2013	14:01:41	49	66	49	66	0.2	0.4	75	101	0	0	12.93
13/05/2013	14:01:51	50	67	50	67	0.0	0.0	77	103	0	0	12.90
13/05/2013	14:02:01	50	67	50	67	0.0	0.0	77	103	0	0	12.85
13/05/2013	14:02:11	50	67	50	67	0.0	0.0	77	103	0	0	12.85
13/05/2013	14:02:21	51	68	51	69	0.2	0.4	78	105	0	0	12.76
13/05/2013	14:02:31	50	67	50	67	0.2	0.4	77	103	0	0	12.87
13/05/2013	14:02:41	50	67	50	67	0.2	0.4	77	103	0	0	12.85
13/05/2013	14:02:51	49	66	49	66	0.0	0.0	75	101	0	0	12.86
13/05/2013	14:03:01	50	67	50	67	0.0	0.0	77	103	0	0	12.89
13/05/2013	14:03:11	50	67	50	67	0.2	0.4	77	103	0	0	12.86
13/05/2013	14:03:21	50	67	50	67	0.0	0.0	77	103	0	0	12.79
13/05/2013	14:03:31	50	67	50	67	0.0	0.0	77	103	0	0	12.85
13/05/2013	14:03:41	50	67	50	67	0.0	0.0	77	103	0	0	12.80
13/05/2013	14:03:51	50	67	50	67	0.0	0.0	77	103	0	0	12.84
13/05/2013	14:04:01	50	67	50	67	0.2	0.4	77	103	0	0	12.87
13/05/2013	14:04:11	51	68	51	69	0.2	0.4	78	105	0	0	10.29
13/05/2013	14:04:21	50	67	50	67	0.0	0.0	77	103	0	0	12.90
13/05/2013	14:04:31	50	67	50	67	0.0	0.0	77	103	0	0	12.83
13/05/2013	14:04:41	50	67	50	67	0.0	0.0	77	103	0	0	12.78
13/05/2013	14:04:51	50	67	50	67	0.0	0.0	77	103	0	0	12.83
13/05/2013	14:05:01	50	67	50	67	0.2	0.4	77	103	0	0	12.84
13/05/2013	14:05:11	51	68	51	68	0.0	0.0	78	105	0	0	12.77
13/05/2013	14:05:21	50	67	50	67	0.2	0.4	77	103	0	0	12.88
13/05/2013	14:05:31	51	68	51	69	0.2	0.4	78	105	0	0	12.82
13/05/2013	14:05:41	51	68	51	69	0.2	0.4	78	105	0	0	12.81
13/05/2013	14:05:51	50	67	50	67	0.2	0.4	77	103	0	0	12.87
13/05/2013	14:06:01	51	68	51	69	0.2	0.4	78	105	0	0	12.86
13/05/2013	14:06:11	50	67	50	67	0.0	0.0	77	103	0	0	12.81
13/05/2013	14:06:21	50	67	50	67	0.2	0.4	77	103	0	0	12.77
13/05/2013	14:06:31	51	68	51	69	0.2	0.4	78	105	0	0	12.83
13/05/2013	14:06:41	50	67	50	67	0.2	0.4	77	103	0	0	12.90
13/05/2013	14:06:51	50	67	50	67	0.2	0.4	77	103	0	0	12.86
13/05/2013	14:07:01	50	67	50	67	0.0	0.0	77	103	0	0	12.95
13/05/2013	14:07:11	50	67	50	67	0.2	0.4	77	103	0	0	12.85
13/05/2013	14:07:21	50	67	50	67	0.2	0.4	77	103	0	0	12.79
13/05/2013	14:07:31	51	68	51	69	0.2	0.4	78	105	1	1	12.86
13/05/2013	14:07:41	50	67	50	67	0.2	0.4	77	103	0	0	12.97
13/05/2013	14:07:51	50	67	50	67	0.2	0.4	77	103	0	0	12.94
13/05/2013	14:08:01	50	67	50	67	0.2	0.4	77	103	0	0	12.87
13/05/2013	14:08:11	50	67	50	67	0.0	0.0	77	103	0	0	12.89

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	14:08:21	50	67	50	67	0.2	0.4	77	103	0	0	12.84
13/05/2013	14:08:31	49	66	49	66	0.0	0.0	75	101	0	0	12.93
13/05/2013	14:08:41	49	66	49	66	0.2	0.4	75	101	0	0	13.00
13/05/2013	14:08:51	50	67	50	67	0.2	0.4	77	103	0	0	12.95
13/05/2013	14:09:01	50	67	50	67	0.0	0.0	77	103	0	0	13.01
13/05/2013	14:09:11	50	67	50	67	0.2	0.4	77	103	0	0	12.94
13/05/2013	14:09:21	50	67	50	67	0.2	0.4	77	103	0	0	13.01
13/05/2013	14:09:31	49	66	49	66	0.0	0.0	75	101	0	0	13.02
13/05/2013	14:09:41	50	67	50	67	0.0	0.0	77	103	0	0	12.94
13/05/2013	14:09:51	49	66	49	66	0.2	0.4	75	101	0	0	13.02
13/05/2013	14:10:01	50	67	50	67	0.2	0.4	77	103	0	0	12.96
13/05/2013	14:10:11	50	67	50	67	0.0	0.0	77	103	0	0	13.01
13/05/2013	14:10:21	49	66	49	66	0.0	0.0	75	101	0	0	13.01
13/05/2013	14:10:31	50	67	50	67	0.2	0.4	77	103	0	0	12.99
13/05/2013	14:10:41	50	67	50	67	0.0	0.0	77	103	0	0	12.96
13/05/2013	14:10:51	50	67	50	67	0.2	0.4	77	103	0	0	12.94
13/05/2013	14:11:01	49	66	49	66	0.0	0.0	75	101	0	0	12.98
13/05/2013	14:11:11	49	66	49	66	0.2	0.4	75	101	0	0	13.10
13/05/2013	14:11:21	47	63	47	63	0.2	0.4	72	97	0	0	13.26
13/05/2013	14:11:31	47	63	47	63	0.2	0.4	72	97	0	0	13.28
13/05/2013	14:11:41	47	63	47	63	0.2	0.4	72	97	0	0	13.23
13/05/2013	14:11:51	47	63	47	63	0.0	0.0	72	97	0	0	13.42
13/05/2013	14:12:01	48	64	48	65	0.2	0.4	74	99	0	0	13.37
13/05/2013	14:12:11	48	64	48	65	0.2	0.4	74	99	0	0	13.37
13/05/2013	14:12:21	48	64	48	65	0.2	0.4	74	99	0	0	13.30
13/05/2013	14:12:31	49	66	49	66	0.2	0.4	75	101	0	0	13.24
13/05/2013	14:12:41	48	64	48	64	0.0	0.0	74	99	0	0	13.17
13/05/2013	14:12:51	48	64	48	64	0.0	0.0	74	99	0	0	13.25
13/05/2013	14:13:01	49	66	49	66	0.2	0.4	75	101	0	0	13.23
13/05/2013	14:13:11	49	66	49	66	0.0	0.0	75	101	0	0	13.19
13/05/2013	14:13:21	48	64	48	65	0.2	0.4	74	99	0	0	13.30
13/05/2013	14:13:31	49	66	49	66	0.2	0.4	75	101	0	0	13.21
13/05/2013	14:13:41	48	64	48	65	0.2	0.4	74	99	0	0	13.31
13/05/2013	14:13:51	49	66	49	66	0.2	0.4	75	101	0	0	13.30
13/05/2013	14:14:01	48	64	48	64	0.0	0.0	74	99	0	0	13.22
13/05/2013	14:14:11	48	64	48	65	0.2	0.4	74	99	0	0	13.28
13/05/2013	14:14:21	48	64	48	65	0.2	0.4	74	99	0	0	13.36
13/05/2013	14:14:31	48	64	48	64	0.0	0.0	74	99	0	0	5.94
13/05/2013	14:14:41	48	64	48	64	0.0	0.0	74	99	0	0	13.37
13/05/2013	14:19:53	46	62	46	62	0.0	0.0	71	94	1	1	13.46
13/05/2013	14:20:03	47	63	47	63	0.0	0.0	72	97	1	1	13.36
13/05/2013	14:20:13	47	63	47	63	0.0	0.0	72	97	1	1	13.42
13/05/2013	14:20:23	47	63	47	63	0.0	0.0	72	97	1	1	13.41
13/05/2013	14:20:33	47	63	47	63	0.0	0.0	72	97	0	0	13.41
13/05/2013	14:20:43	47	63	47	63	0.0	0.0	72	97	0	0	13.39
13/05/2013	14:20:53	47	63	47	63	0.0	0.0	72	97	0	0	13.43
13/05/2013	14:21:03	47	63	47	63	0.0	0.0	72	97	0	0	13.37
13/05/2013	14:21:13	47	63	47	63	0.0	0.0	72	97	1	1	13.31
13/05/2013	14:21:23	47	63	47	63	0.0	0.0	72	97	0	0	13.35
13/05/2013	14:21:33	47	63	47	63	0.0	0.0	72	97	0	0	13.43
13/05/2013	14:21:43	47	63	47	63	0.0	0.0	72	97	0	0	13.31
13/05/2013	14:21:53	47	63	47	63	0.0	0.0	72	97	0	0	13.40
13/05/2013	14:22:03	46	62	46	62	0.0	0.0	71	94	0	0	13.39
13/05/2013	14:22:13	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:22:23	48	64	48	64	0.0	0.0	74	99	0	0	13.32
13/05/2013	14:22:33	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	14:22:43	47	63	47	63	0.0	0.0	72	97	0	0	13.36
13/05/2013	14:22:53	47	63	47	63	0.0	0.0	72	97	0	0	13.31
13/05/2013	14:23:03	48	64	48	64	0.0	0.0	74	99	0	0	13.30
13/05/2013	14:23:13	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:23:23	47	63	47	63	0.0	0.0	72	97	0	0	13.31
13/05/2013	14:23:33	47	63	47	63	0.0	0.0	72	97	0	0	13.39
13/05/2013	14:23:43	46	62	46	62	0.0	0.0	71	94	0	0	13.41
13/05/2013	14:23:53	46	62	46	62	0.0	0.0	71	94	0	0	13.38
13/05/2013	14:24:03	47	63	47	63	0.0	0.0	72	97	0	0	13.34
13/05/2013	14:24:13	47	63	47	63	0.0	0.0	72	97	0	0	13.34
13/05/2013	14:24:23	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:24:33	47	63	47	63	0.0	0.0	72	97	0	0	13.22
13/05/2013	14:24:43	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:24:53	46	62	46	62	0.0	0.0	71	94	0	0	13.29
13/05/2013	14:25:03	47	63	47	63	0.0	0.0	72	97	0	0	13.26
13/05/2013	14:25:13	47	63	47	63	0.0	0.0	72	97	0	0	13.20
13/05/2013	14:25:23	47	63	47	63	0.0	0.0	72	97	0	0	13.25
13/05/2013	14:25:33	47	63	47	63	0.0	0.0	72	97	0	0	13.32
13/05/2013	14:25:43	46	62	46	62	0.0	0.0	71	94	0	0	13.27
13/05/2013	14:25:53	47	63	47	63	0.0	0.0	72	97	0	0	13.28
13/05/2013	14:26:03	47	63	47	63	0.0	0.0	72	97	0	0	13.28
13/05/2013	14:26:13	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:26:23	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	14:26:33	47	63	47	63	0.0	0.0	72	97	0	0	13.28
13/05/2013	14:26:43	48	64	48	64	0.0	0.0	74	99	0	0	13.22
13/05/2013	14:26:53	48	64	48	64	0.0	0.0	74	99	0	0	13.32
13/05/2013	14:27:03	48	64	48	64	0.0	0.0	74	99	0	0	13.26
13/05/2013	14:27:13	48	64	48	64	0.0	0.0	74	99	0	0	13.33
13/05/2013	14:27:23	48	64	48	64	0.0	0.0	74	99	0	0	13.33
13/05/2013	14:27:33	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	14:27:43	48	64	48	64	0.0	0.0	74	99	0	0	13.22
13/05/2013	14:27:53	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:28:03	47	63	47	63	0.0	0.0	72	97	0	0	13.22
13/05/2013	14:28:13	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:28:23	47	63	47	63	0.0	0.0	72	97	0	0	13.30
13/05/2013	14:28:33	47	63	47	63	0.0	0.0	72	97	0	0	13.26
13/05/2013	14:28:43	47	63	47	63	0.0	0.0	72	97	0	0	13.31
13/05/2013	14:28:53	47	63	47	63	0.0	0.0	72	97	0	0	13.27
13/05/2013	14:29:03	47	63	47	63	0.0	0.0	72	97	0	0	13.28

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	14:29:13	47	63	47	63	0.0	0.0	72	97	0	0	13.27
13/05/2013	14:29:23	48	64	48	64	0.0	0.0	74	99	0	0	13.30
13/05/2013	14:29:33	47	63	47	63	0.0	0.0	72	97	0	0	13.33
13/05/2013	14:29:43	47	63	47	63	0.0	0.0	72	97	0	0	13.35
13/05/2013	14:29:53	48	64	48	64	0.0	0.0	74	99	0	0	13.24
13/05/2013	14:30:03	49	66	49	66	0.0	0.0	75	101	0	0	13.30
13/05/2013	14:30:13	49	66	49	66	0.0	0.0	75	101	0	0	13.30
13/05/2013	14:30:23	48	64	48	64	0.0	0.0	74	99	0	0	13.29
13/05/2013	14:30:33	49	66	49	66	0.0	0.0	75	101	0	0	13.23
13/05/2013	14:30:43	47	63	47	63	0.0	0.0	72	97	0	0	13.34
13/05/2013	14:30:53	47	63	47	63	0.0	0.0	72	97	0	0	13.23
13/05/2013	14:31:03	47	63	47	63	0.0	0.0	72	97	0	0	13.27
13/05/2013	14:31:13	47	63	47	63	0.0	0.0	72	97	0	0	13.29
13/05/2013	14:31:23	47	63	47	63	0.0	0.0	72	97	0	0	13.40
13/05/2013	14:31:33	47	63	47	63	0.0	0.0	72	97	0	0	13.39
13/05/2013	14:31:43	47	63	47	63	0.0	0.0	72	97	0	0	13.41
13/05/2013	14:31:53	48	64	48	64	0.0	0.0	74	99	0	0	13.41
13/05/2013	14:32:03	48	64	48	64	0.0	0.0	74	99	0	0	13.41
13/05/2013	14:32:13	49	66	49	66	0.0	0.0	75	101	0	0	13.33
13/05/2013	14:32:23	48	64	48	64	0.0	0.0	74	99	0	0	13.42
13/05/2013	14:32:33	48	64	48	64	0.0	0.0	74	99	0	0	13.41
13/05/2013	14:32:43	49	66	49	66	0.0	0.0	75	101	0	0	13.27
13/05/2013	14:32:53	48	64	48	64	0.0	0.0	74	99	1	1	13.35
13/05/2013	14:33:03	48	64	48	64	0.0	0.0	74	99	0	0	13.34
13/05/2013	14:33:13	48	64	48	64	0.0	0.0	74	99	0	0	13.37
13/05/2013	14:33:23	47	63	47	63	0.0	0.0	72	97	0	0	13.42
13/05/2013	14:33:33	47	63	47	63	0.0	0.0	72	97	0	0	13.37
13/05/2013	14:33:43	48	64	48	64	0.0	0.0	74	99	0	0	13.35
13/05/2013	14:33:53	48	64	48	64	0.0	0.0	74	99	0	0	13.40
13/05/2013	14:34:03	48	64	48	64	0.0	0.0	74	99	0	0	13.41
13/05/2013	14:34:13	48	64	48	64	0.0	0.0	74	99	0	0	13.36
13/05/2013	14:34:23	48	64	48	64	0.0	0.0	74	99	0	0	13.31
13/05/2013	14:34:33	48	64	48	64	0.0	0.0	74	99	0	0	13.15
13/05/2013	14:34:43	49	66	49	66	0.0	0.0	75	101	0	0	13.21
13/05/2013	14:34:53	49	66	49	66	0.0	0.0	75	101	0	0	13.23
13/05/2013	14:35:03	49	66	49	66	0.0	0.0	75	101	1	1	13.22
13/05/2013	14:35:13	48	64	48	64	0.0	0.0	74	99	0	0	13.21
13/05/2013	14:35:23	48	64	48	64	0.0	0.0	74	99	0	0	13.26
13/05/2013	14:35:33	47	63	47	63	0.0	0.0	72	97	0	0	13.32
13/05/2013	14:35:43	48	64	48	64	0.0	0.0	74	99	0	0	13.20
13/05/2013	14:35:53	49	66	49	66	0.0	0.0	75	101	0	0	13.17
13/05/2013	14:36:03	48	64	48	64	0.0	0.0	74	99	0	0	13.25
13/05/2013	14:36:13	48	64	48	64	0.0	0.0	74	99	0	0	13.28
13/05/2013	14:36:23	49	66	49	66	0.0	0.0	75	101	0	0	13.31
13/05/2013	14:36:33	49	66	49	66	0.0	0.0	75	101	1	1	13.26
13/05/2013	14:36:43	48	64	48	64	0.0	0.0	74	99	0	0	13.25
13/05/2013	14:36:53	48	64	48	64	0.0	0.0	74	99	0	0	13.24
13/05/2013	14:37:03	48	64	48	64	0.0	0.0	74	99	0	0	13.21
13/05/2013	14:37:13	49	66	49	66	0.0	0.0	75	101	0	0	13.17
13/05/2013	14:37:23	49	66	49	66	0.0	0.0	75	101	0	0	13.16
13/05/2013	14:37:33	49	66	49	66	0.0	0.0	75	101	0	0	13.25
13/05/2013	14:37:43	49	66	49	66	0.0	0.0	75	101	0	0	13.29
13/05/2013	14:37:53	49	66	49	66	0.0	0.0	75	101	0	0	13.28
13/05/2013	14:38:03	48	64	48	64	0.0	0.0	74	99	0	0	13.24
13/05/2013	14:38:13	49	66	49	66	0.0	0.0	75	101	0	0	13.26
13/05/2013	14:38:23	48	64	48	64	0.0	0.0	74	99	0	0	13.26
13/05/2013	14:38:33	48	64	48	64	0.0	0.0	74	99	0	0	6.07
13/05/2013	14:38:43	48	64	48	64	0.0	0.0	74	99	0	0	13.23
13/05/2013	14:38:53	49	66	49	66	0.0	0.0	75	101	0	0	13.20
13/05/2013	14:39:03	49	66	49	66	0.0	0.0	75	101	0	0	13.25
13/05/2013	14:39:13	50	67	50	67	0.0	0.0	77	103	0	0	13.22
13/05/2013	14:39:23	50	67	50	67	0.0	0.0	77	103	0	0	13.19
13/05/2013	14:39:33	50	67	50	67	0.0	0.0	77	103	0	0	13.22
13/05/2013	14:39:43	50	67	50	67	0.0	0.0	77	103	0	0	13.19
13/05/2013	14:44:55	49	66	49	66	0.2	0.4	75	101	0	0	13.29
13/05/2013	14:45:05	49	66	49	66	0.0	0.0	75	101	1	1	13.40
13/05/2013	14:45:15	49	66	49	66	0.2	0.4	75	101	0	0	13.39
13/05/2013	14:45:25	50	67	50	67	0.0	0.0	77	103	0	0	13.33
13/05/2013	14:45:35	50	67	50	67	0.0	0.0	77	103	1	1	13.28
13/05/2013	14:45:45	49	66	49	66	0.2	0.4	75	101	0	0	13.36
13/05/2013	14:45:55	49	66	49	66	0.0	0.0	75	101	0	0	13.33
13/05/2013	14:46:05	50	67	50	67	0.2	0.4	77	103	1	1	13.33
13/05/2013	14:46:15	49	66	49	66	0.0	0.0	75	101	0	0	13.34
13/05/2013	14:46:25	49	66	49	66	0.2	0.4	75	101	0	0	13.28
13/05/2013	14:46:35	49	66	49	66	0.0	0.0	75	101	0	0	13.33
13/05/2013	14:46:45	49	66	49	66	0.2	0.4	75	101	0	0	13.25
13/05/2013	14:46:55	50	67	50	67	0.2	0.4	77	103	0	0	13.24
13/05/2013	14:47:05	51	68	51	69	0.2	0.4	78	105	0	0	13.27
13/05/2013	14:47:15	50	67	50	67	0.0	0.0	77	103	1	1	13.29
13/05/2013	14:47:25	50	67	50	67	0.0	0.0	77	103	0	0	13.31
13/05/2013	14:47:35	51	68	51	69	0.2	0.4	78	105	0	0	13.27
13/05/2013	14:47:45	50	67	50	67	0.0	0.0	77	103	0	0	13.26
13/05/2013	14:47:55	49	66	49	66	0.2	0.4	75	101	0	0	13.23
13/05/2013	14:48:05	50	67	50	67	0.2	0.4	77	103	0	0	13.18
13/05/2013	14:48:15	52	70	52	70	0.2	0.4	80	107	0	0	13.13
13/05/2013	14:48:25	54	72	54	72	0.0	0.0	83	111	0	0	12.94
13/05/2013	14:48:35	53	71	53	71	0.2	0.4	81	109	1	1	13.01
13/05/2013	14:48:45	54	72	54	72	0.0	0.0	83	111	0	0	12.90
13/05/2013	14:48:55	56	75	56	75	0.0	0.0	86	115	0	0	12.84
13/05/2013	14:49:05	56	75	56	75	0.0	0.0	86	115	0	0	12.87
13/05/2013	14:49:15	56	75	56	75	0.2	0.4	86	115	0	0	12.83
13/05/2013	14:49:25	55	74	55	74	0.2	0.4	85	113	0	0	12.91
13/05/2013	14:49:35	54	72	54	72	0.0	0.0	83	111	1	1	12.91
13/05/2013	14:49:45	53	71	53	71	0.0	0.0	81	109	0	0	5.72
13/05/2013	14:49:55	55	74	55	74	0.2	0.4	85	113	0	0	12.83

60287751
Stack 6 Calculated Gas Data
13 May 2013

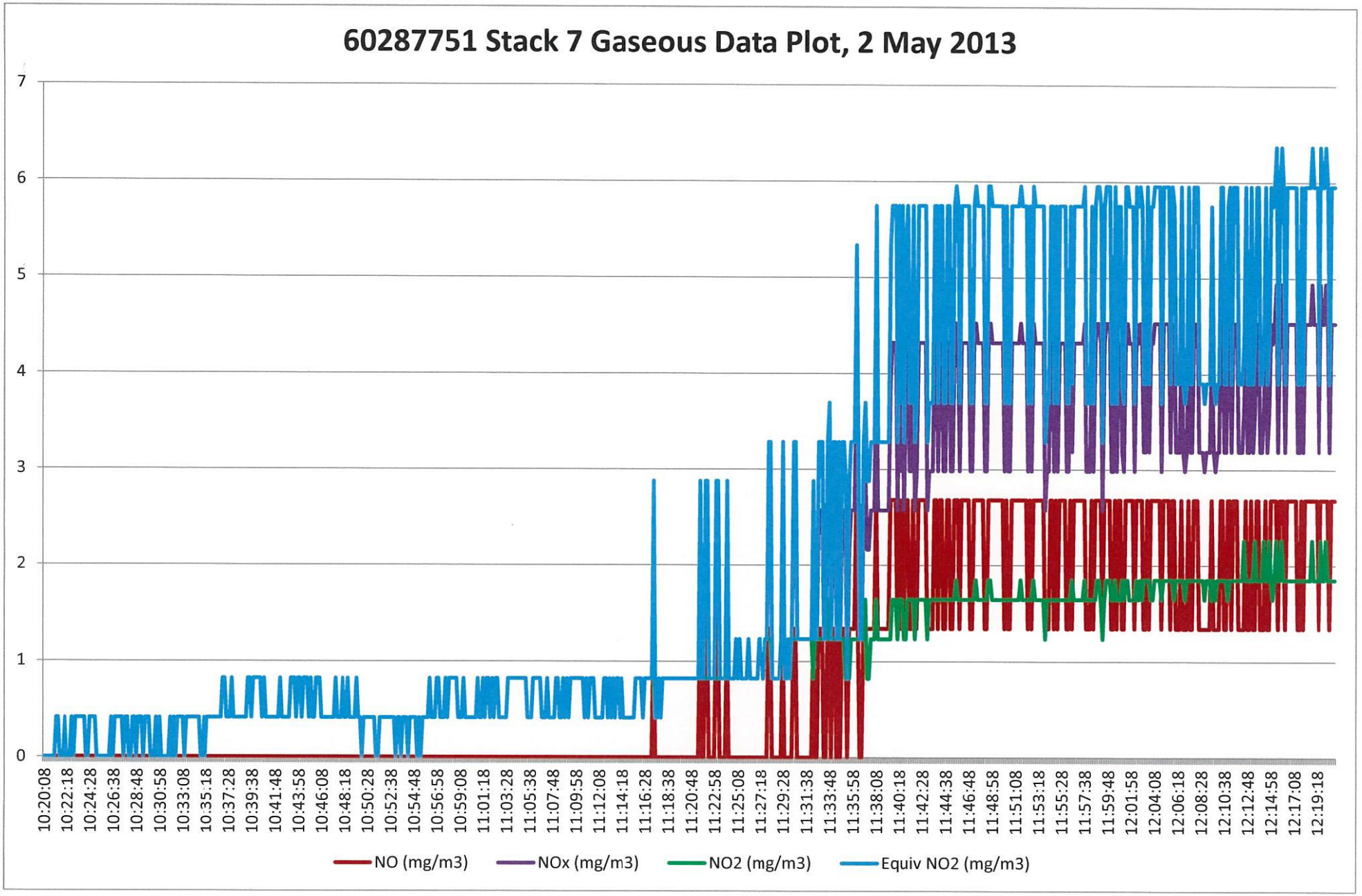
Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	14:50:05	55	74	55	74	0.2	0.4	85	113	0	0	12.82
13/05/2013	14:50:15	55	74	55	74	0.2	0.4	85	113	0	0	12.76
13/05/2013	14:50:25	56	75	56	75	0.2	0.4	86	115	0	0	12.75
13/05/2013	14:50:35	56	75	56	75	0.0	0.0	86	115	1	1	12.77
13/05/2013	14:50:45	56	75	56	75	0.2	0.4	86	115	0	0	12.82
13/05/2013	14:50:55	56	75	56	75	0.2	0.4	86	115	0	0	12.76
13/05/2013	14:51:05	56	75	56	75	0.2	0.4	86	115	0	0	12.75
13/05/2013	14:51:15	56	75	56	75	0.2	0.4	86	115	0	0	12.78
13/05/2013	14:51:25	55	74	55	74	0.2	0.4	85	113	0	0	12.84
13/05/2013	14:51:35	56	75	56	75	0.2	0.4	86	115	0	0	12.74
13/05/2013	14:51:45	57	76	57	76	0.0	0.0	87	117	0	0	12.70
13/05/2013	14:51:55	57	76	57	77	0.2	0.4	88	117	0	0	12.72
13/05/2013	14:52:05	57	76	57	77	0.2	0.4	88	117	0	0	12.74
13/05/2013	14:52:15	57	76	57	77	0.2	0.4	88	117	0	0	12.72
13/05/2013	14:52:25	57	76	57	76	0.0	0.0	87	117	0	0	12.74
13/05/2013	14:52:35	56	75	56	75	0.2	0.4	86	115	0	0	12.79
13/05/2013	14:52:45	56	75	56	75	0.2	0.4	86	115	0	0	12.76
13/05/2013	14:52:55	56	75	56	75	0.2	0.4	86	115	0	0	12.77
13/05/2013	14:53:05	56	75	56	75	0.2	0.4	86	115	0	0	12.81
13/05/2013	14:53:15	40	54	40	54	0.0	0.0	61	82	0	0	15.21
13/05/2013	14:53:25	34	46	34	46	0.0	0.0	52	70	0	0	16.08
13/05/2013	14:53:35	33	44	33	44	0.0	0.0	51	68	1	1	11.58
13/05/2013	14:53:45	31	42	31	42	0.2	0.4	48	64	0	0	16.60
13/05/2013	14:53:55	31	42	31	42	0.0	0.0	48	64	0	0	16.66
13/05/2013	14:54:05	32	43	32	43	0.0	0.0	49	66	1	1	8.52
13/05/2013	14:54:15	32	43	32	43	0.0	0.0	49	66	0	0	16.50
13/05/2013	14:54:25	30	40	30	40	0.0	0.0	46	62	0	0	16.72
13/05/2013	14:54:35	31	42	31	42	0.0	0.0	48	64	1	1	16.50
13/05/2013	14:54:45	36	48	36	48	0.0	0.0	55	74	1	1	13.70
13/05/2013	14:54:55	54	72	54	73	0.2	0.4	83	111	1	1	13.02
13/05/2013	14:55:05	55	74	55	74	0.2	0.4	85	113	1	1	12.86
13/05/2013	14:55:15	56	75	56	75	0.2	0.4	86	115	0	0	12.89
13/05/2013	14:55:25	57	76	57	77	0.2	0.4	88	117	1	1	12.87
13/05/2013	14:55:35	57	76	57	76	0.0	0.0	87	117	1	1	12.87
13/05/2013	14:55:45	58	78	58	78	0.0	0.0	89	119	0	0	12.86
13/05/2013	14:55:55	58	78	58	78	0.0	0.0	89	119	0	0	12.86
13/05/2013	14:56:05	57	76	57	76	0.0	0.0	87	117	0	0	12.84
13/05/2013	14:56:15	57	76	57	76	0.0	0.0	87	117	0	0	12.81
13/05/2013	14:56:25	58	78	58	78	0.0	0.0	89	119	0	0	12.85
13/05/2013	14:56:35	58	78	58	78	0.0	0.0	89	119	0	0	12.83
13/05/2013	14:56:45	58	78	58	78	0.0	0.0	89	119	0	0	12.83
13/05/2013	14:56:55	58	78	58	78	0.0	0.0	89	119	0	0	12.86
13/05/2013	14:57:05	58	78	58	78	0.0	0.0	89	119	0	0	12.71
13/05/2013	14:57:15	58	78	58	78	0.0	0.0	89	119	0	0	7.95
13/05/2013	14:57:25	58	78	58	78	0.0	0.0	89	119	0	0	12.79
13/05/2013	14:57:35	59	79	59	79	0.0	0.0	90	121	0	0	12.72
13/05/2013	14:57:45	58	78	58	78	0.0	0.0	89	119	0	0	12.75
13/05/2013	14:57:55	59	79	59	79	0.0	0.0	90	121	0	0	12.75
13/05/2013	14:58:05	58	78	58	78	0.0	0.0	89	119	0	0	12.70
13/05/2013	14:58:15	58	78	58	78	0.0	0.0	89	119	0	0	12.79
13/05/2013	14:58:25	57	76	57	77	0.2	0.4	88	117	0	0	12.78
13/05/2013	14:58:35	58	78	58	78	0.0	0.0	89	119	0	0	12.83
13/05/2013	14:58:45	58	78	58	78	0.0	0.0	89	119	0	0	9.77
13/05/2013	14:58:55	57	76	57	76	0.0	0.0	87	117	0	0	12.86
13/05/2013	14:59:05	57	76	57	77	0.2	0.4	88	117	0	0	12.80
13/05/2013	14:59:15	58	78	58	78	0.0	0.0	89	119	0	0	12.81
13/05/2013	14:59:25	57	76	57	76	0.0	0.0	87	117	0	0	12.86
13/05/2013	14:59:35	57	76	57	76	0.0	0.0	87	117	0	0	12.78
13/05/2013	14:59:45	58	78	58	78	0.0	0.0	89	119	0	0	9.02
13/05/2013	14:59:55	57	76	57	76	0.0	0.0	87	117	0	0	12.79
13/05/2013	15:00:05	58	78	58	78	0.0	0.0	89	119	0	0	12.74
13/05/2013	15:00:15	58	78	58	78	0.0	0.0	89	119	0	0	12.79
13/05/2013	15:00:25	58	78	58	78	0.0	0.0	89	119	0	0	12.72
13/05/2013	15:00:35	58	78	58	78	0.0	0.0	89	119	0	0	12.72
13/05/2013	15:00:45	58	78	58	78	0.0	0.0	89	119	0	0	12.70
13/05/2013	15:00:55	59	79	59	79	0.0	0.0	90	121	0	0	12.68
13/05/2013	15:01:05	58	78	58	78	0.2	0.4	89	120	1	1	12.78
13/05/2013	15:01:15	58	78	58	78	0.0	0.0	89	119	0	0	12.73
13/05/2013	15:01:25	58	78	58	78	0.0	0.0	89	119	0	0	12.69
13/05/2013	15:01:35	59	79	59	79	0.0	0.0	90	121	0	0	12.65
13/05/2013	15:01:45	58	78	58	78	0.0	0.0	89	119	0	0	12.70
13/05/2013	15:01:55	57	76	57	76	0.0	0.0	87	117	0	0	12.68
13/05/2013	15:02:05	58	78	58	78	0.0	0.0	89	119	0	0	12.59
13/05/2013	15:02:15	58	78	58	78	0.2	0.4	89	120	0	0	12.68
13/05/2013	15:02:25	59	79	59	79	0.0	0.0	90	121	0	0	12.65
13/05/2013	15:02:35	58	78	58	78	0.0	0.0	89	119	0	0	12.69
13/05/2013	15:02:45	57	76	57	76	0.0	0.0	87	117	0	0	12.69
13/05/2013	15:02:55	58	78	58	78	0.0	0.0	89	119	0	0	12.72
13/05/2013	15:03:05	58	78	58	78	0.0	0.0	89	119	0	0	6.22
13/05/2013	15:03:15	58	78	58	78	0.2	0.4	89	120	0	0	12.71
13/05/2013	15:03:25	58	78	58	78	0.2	0.4	89	120	0	0	12.69
13/05/2013	15:03:35	58	78	58	78	0.0	0.0	89	119	0	0	12.75
13/05/2013	15:03:45	59	79	59	79	0.0	0.0	90	121	0	0	12.64
13/05/2013	15:03:55	58	78	58	78	0.0	0.0	89	119	0	0	12.65
13/05/2013	15:04:05	58	78	58	78	0.0	0.0	89	119	0	0	12.70
13/05/2013	15:04:15	58	78	58	78	0.0	0.0	89	119	0	0	12.72
13/05/2013	15:04:25	57	76	57	76	0.0	0.0	87	117	0	0	12.76
13/05/2013	15:04:35	56	75	56	75	0.0	0.0	86	115	0	0	12.73
13/05/2013	15:04:45	58	78	58	78	0.0	0.0	89	119	0	0	12.69
13/05/2013	15:09:57	49	66	49	66	0.0	0.0	75	101	0	0	13.34
13/05/2013	15:10:07	49	66	49	66	0.0	0.0	75	101	0	0	13.33
13/05/2013	15:10:17	49	66	49	66	0.0	0.0	75	101	0	0	13.43
13/05/2013	15:10:27	49	66	49	66	0.0	0.0	75	101	0	0	13.32
13/05/2013	15:10:37	49	66	49	66	0.0	0.0	75	101	0	0	13.36
13/05/2013	15:10:47	49	66	49	66	0.0	0.0	75	101	0	0	13.40

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	15:10:57	48	64	48	64	0.0	0.0	74	99	0	0	13.40
13/05/2013	15:11:07	49	66	49	66	0.0	0.0	75	101	0	0	13.39
13/05/2013	15:11:17	49	66	49	66	0.0	0.0	75	101	0	0	13.41
13/05/2013	15:11:27	49	66	49	66	0.0	0.0	75	101	0	0	13.40
13/05/2013	15:11:37	49	66	49	66	0.0	0.0	75	101	0	0	13.39
13/05/2013	15:11:47	49	66	49	66	0.0	0.0	75	101	0	0	13.30
13/05/2013	15:11:57	49	66	49	66	0.0	0.0	75	101	0	0	13.34
13/05/2013	15:12:07	49	66	49	66	0.0	0.0	75	101	0	0	7.47
13/05/2013	15:12:17	49	66	49	66	0.0	0.0	75	101	0	0	13.27
13/05/2013	15:12:27	49	66	49	66	0.0	0.0	75	101	0	0	13.25
13/05/2013	15:12:37	49	66	49	66	0.0	0.0	75	101	0	0	13.26
13/05/2013	15:12:47	48	64	48	64	0.0	0.0	74	99	0	0	13.34
13/05/2013	15:12:57	49	66	49	66	0.0	0.0	75	101	0	0	13.21
13/05/2013	15:13:07	50	67	50	67	0.0	0.0	77	103	0	0	13.19
13/05/2013	15:13:17	50	67	50	67	0.0	0.0	77	103	0	0	13.17
13/05/2013	15:13:27	49	66	49	66	0.0	0.0	75	101	0	0	13.17
13/05/2013	15:13:37	50	67	50	67	0.0	0.0	77	103	0	0	13.16
13/05/2013	15:13:47	50	67	50	67	0.0	0.0	77	103	0	0	13.14
13/05/2013	15:13:57	51	68	51	68	0.0	0.0	78	105	0	0	13.10
13/05/2013	15:14:07	49	66	49	66	0.0	0.0	75	101	0	0	13.17
13/05/2013	15:14:17	49	66	49	66	0.0	0.0	75	101	0	0	13.25
13/05/2013	15:14:27	50	67	50	67	0.0	0.0	77	103	0	0	13.19
13/05/2013	15:14:37	50	67	50	67	0.0	0.0	77	103	0	0	13.13
13/05/2013	15:14:47	50	67	50	67	0.0	0.0	77	103	0	0	13.13
13/05/2013	15:14:57	50	67	50	67	0.0	0.0	77	103	0	0	13.10
13/05/2013	15:15:07	50	67	50	67	0.0	0.0	77	103	0	0	13.14
13/05/2013	15:15:17	50	67	50	67	0.0	0.0	77	103	0	0	5.39
13/05/2013	15:15:27	50	67	50	67	0.0	0.0	77	103	0	0	13.16
13/05/2013	15:15:37	51	68	51	68	0.0	0.0	78	105	0	0	13.05
13/05/2013	15:15:47	50	67	50	67	0.0	0.0	77	103	0	0	12.90
13/05/2013	15:15:57	50	67	50	67	0.0	0.0	77	103	0	0	12.94
13/05/2013	15:16:07	51	68	51	68	0.0	0.0	78	105	0	0	12.66
13/05/2013	15:16:17	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:16:27	50	67	50	67	0.0	0.0	77	103	0	0	12.99
13/05/2013	15:16:37	50	67	50	67	0.0	0.0	77	103	0	0	13.08
13/05/2013	15:16:47	51	68	51	69	0.2	0.4	78	105	0	0	12.92
13/05/2013	15:16:57	51	68	51	68	0.0	0.0	78	105	0	0	13.02
13/05/2013	15:17:07	51	68	51	68	0.0	0.0	78	105	0	0	13.67
13/05/2013	15:17:17	51	68	51	69	0.2	0.4	78	105	0	0	12.95
13/05/2013	15:17:27	50	67	50	67	0.0	0.0	77	103	0	0	12.99
13/05/2013	15:17:37	50	67	50	67	0.0	0.0	77	103	0	0	12.99
13/05/2013	15:17:47	51	68	51	68	0.0	0.0	78	105	0	0	12.74
13/05/2013	15:17:57	51	68	51	68	0.0	0.0	78	105	0	0	13.21
13/05/2013	15:18:07	51	68	51	68	0.0	0.0	78	105	0	0	13.51
13/05/2013	15:18:17	51	68	51	68	0.0	0.0	78	105	0	0	12.95
13/05/2013	15:18:27	51	68	51	68	0.0	0.0	78	105	0	0	13.41
13/05/2013	15:18:37	51	68	51	68	0.0	0.0	78	105	0	0	12.89
13/05/2013	15:18:47	51	68	51	68	0.0	0.0	78	105	0	0	13.23
13/05/2013	15:18:57	50	67	50	67	0.0	0.0	77	103	0	0	13.03
13/05/2013	15:19:07	50	67	50	67	0.0	0.0	77	103	0	0	13.07
13/05/2013	15:19:17	50	67	50	67	0.0	0.0	77	103	0	0	12.90
13/05/2013	15:19:27	50	67	50	67	0.0	0.0	77	103	0	0	13.08
13/05/2013	15:19:37	51	68	51	69	0.2	0.4	78	105	0	0	13.63
13/05/2013	15:19:47	51	68	51	68	0.0	0.0	78	105	0	0	12.93
13/05/2013	15:19:57	51	68	51	68	0.0	0.0	78	105	0	0	13.02
13/05/2013	15:20:07	51	68	51	68	0.0	0.0	78	105	0	0	12.93
13/05/2013	15:20:17	51	68	51	68	0.0	0.0	78	105	0	0	13.02
13/05/2013	15:20:27	52	70	52	70	0.0	0.0	80	107	0	0	12.79
13/05/2013	15:20:37	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:20:47	50	67	50	67	0.0	0.0	77	103	0	0	13.07
13/05/2013	15:20:57	51	68	51	68	0.0	0.0	78	105	0	0	12.97
13/05/2013	15:21:07	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	15:21:17	50	67	50	67	0.0	0.0	77	103	0	0	5.92
13/05/2013	15:21:27	51	68	51	68	0.0	0.0	78	105	0	0	12.97
13/05/2013	15:21:37	51	68	51	68	0.0	0.0	78	105	0	0	12.95
13/05/2013	15:21:47	50	67	50	67	0.0	0.0	77	103	0	0	12.98
13/05/2013	15:21:57	50	67	50	67	0.2	0.4	77	103	0	0	12.98
13/05/2013	15:22:07	50	67	50	67	0.0	0.0	77	103	0	0	13.02
13/05/2013	15:22:17	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:22:27	51	68	51	68	0.0	0.0	78	105	0	0	12.97
13/05/2013	15:22:37	51	68	51	68	0.0	0.0	78	105	0	0	13.01
13/05/2013	15:22:47	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	15:22:57	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:23:07	51	68	51	68	0.0	0.0	78	105	0	0	13.01
13/05/2013	15:23:17	51	68	51	69	0.2	0.4	78	105	0	0	12.96
13/05/2013	15:23:27	50	67	50	67	0.0	0.0	77	103	0	0	13.05
13/05/2013	15:23:37	50	67	50	67	0.0	0.0	77	103	0	0	12.99
13/05/2013	15:23:47	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	15:23:57	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:24:07	52	70	52	70	0.0	0.0	80	107	0	0	12.97
13/05/2013	15:24:17	51	68	51	68	0.0	0.0	78	105	0	0	13.02
13/05/2013	15:24:27	51	68	51	68	0.0	0.0	78	105	0	0	13.06
13/05/2013	15:24:37	50	67	50	67	0.0	0.0	77	103	0	0	13.01
13/05/2013	15:24:47	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	15:24:57	51	68	51	68	0.0	0.0	78	105	0	0	12.96
13/05/2013	15:25:07	50	67	50	67	0.0	0.0	77	103	0	0	12.96
13/05/2013	15:25:17	50	67	50	67	0.0	0.0	77	103	0	0	13.05
13/05/2013	15:25:27	51	68	51	68	0.0	0.0	78	105	0	0	12.73
13/05/2013	15:25:37	51	68	51	68	0.0	0.0	78	105	0	0	12.94
13/05/2013	15:25:47	51	68	51	68	0.0	0.0	78	105	0	0	12.98
13/05/2013	15:25:57	51	68	51	68	0.0	0.0	78	105	0	0	13.01
13/05/2013	15:26:07	51	68	51	68	0.0	0.0	78	105	0	0	12.92
13/05/2013	15:26:17	51	68	51	68	0.0	0.0	78	105	0	0	12.90
13/05/2013	15:26:27	51	68	51	68	0.0	0.0	78	105	0	0	12.89
13/05/2013	15:26:37	51	68	51	69	0.2	0.4	78	105	0	0	12.98

60287751
Stack 6 Calculated Gas Data
13 May 2013

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)	CO (ppm)	CO (mg/m^3)	O2 (%)
13/05/2013	15:26:47	51	68	51	68	0.0	0.0	78	105	0	0	12.99
13/05/2013	15:26:57	51	68	51	69	0.2	0.4	78	105	0	0	12.95
13/05/2013	15:27:07	51	68	51	68	0.0	0.0	78	105	0	0	12.97
13/05/2013	15:27:17	52	70	52	70	0.0	0.0	80	107	0	0	12.93
13/05/2013	15:27:27	52	70	52	70	0.0	0.0	80	107	0	0	12.97
13/05/2013	15:27:37	51	68	51	68	0.0	0.0	78	105	0	0	12.95
13/05/2013	15:27:47	51	68	51	68	0.0	0.0	78	105	0	0	13.01
13/05/2013	15:27:57	50	67	50	67	0.0	0.0	77	103	0	0	12.97
13/05/2013	15:28:07	51	68	51	68	0.0	0.0	78	105	0	0	12.96
13/05/2013	15:28:17	51	68	51	68	0.0	0.0	78	105	0	0	12.95
13/05/2013	15:28:27	50	67	50	67	0.2	0.4	77	103	0	0	12.96
13/05/2013	15:28:37	50	67	50	67	0.0	0.0	77	103	0	0	13.43
13/05/2013	15:28:47	50	67	50	67	0.0	0.0	77	103	0	0	13.02
13/05/2013	15:28:57	51	68	51	69	0.2	0.4	78	105	0	0	12.89
13/05/2013	15:29:07	50	67	50	67	0.0	0.0	77	103	0	0	12.94
13/05/2013	15:29:17	51	68	51	69	0.2	0.4	78	105	0	0	12.72
13/05/2013	15:29:27	51	68	51	68	0.0	0.0	78	105	0	0	12.97
13/05/2013	15:29:37	49	66	49	66	0.0	0.0	75	101	0	0	13.09
13/05/2013	15:29:47	51	68	51	69	0.2	0.4	78	105	0	0	13.12
	AVERAGE	**51**	**68**	**51**	**68**	**0.1**	**0.2**	**78**	**104**	**0.4**	**0.5**	**13.2**


60287751 Stack 7 Gaseous Data Plot, 2 May 2013
7
6
5
4
3
2
1
0
10:20:08
10:22:18
10:24:28
10:26:38
10:28:48
10:30:58
10:33:08
10:35:18
10:37:28
10:39:38
10:41:48
10:43:58
10:46:08
10:48:18
10:50:28
10:52:38
10:54:48
10:56:58
10:59:08
11:01:18
11:03:28
11:05:38
11:07:48
11:09:58
11:12:08
11:14:18
11:16:28
11:18:38
11:20:48
11:22:58
11:25:08
11:27:18
11:29:28
11:31:38
11:33:48
11:35:58
11:38:08
11:40:18
11:42:28
11:44:38
11:46:48
11:48:58
11:51:08
11:53:18
11:55:28
11:57:38
11:59:48
12:01:58
12:04:08
12:06:18
12:08:28
12:10:38
12:12:48
12:14:58
12:17:08
12:19:18
NO (mg/m3)
NOx (mg/m3)
NO2 (mg/m3)
Equiv NO2 (mg/m3)

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	10:20:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:20:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:20:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:20:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:20:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:20:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:21:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:21:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:21:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:21:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:21:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:21:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:22:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:22:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:22:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:22:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:22:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:22:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:23:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:23:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:23:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:23:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:23:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:23:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:24:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:24:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:24:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:24:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:24:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:24:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:25:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:25:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:25:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:25:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:25:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:25:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:26:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:26:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:26:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:26:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:26:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:26:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:27:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:27:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:27:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:27:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:27:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:27:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:28:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:28:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:28:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:28:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:28:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:28:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:29:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:29:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:29:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:29:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:29:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:29:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:30:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:30:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:30:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:30:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:30:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:30:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:31:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:31:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:31:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:31:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:31:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:31:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:32:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:32:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:32:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:32:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:32:48	0	0	0	0	0.2	0.4	0	0

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	10:32:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:33:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:33:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:33:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:33:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:33:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:33:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:34:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:34:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:34:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:34:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:34:48	0	0	0	0	0.0	0.0	0	0
02-May-13	10:34:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:35:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:35:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:35:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:35:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:35:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:35:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:36:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:36:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:36:28	0	0	1	0	0.2	0.4	0	0
02-May-13	10:36:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:36:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:36:58	0	0	0	1	0.4	0.8	0	1
02-May-13	10:37:08	0	0	1	1	0.4	0.8	0	1
02-May-13	10:37:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:37:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:37:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:37:48	0	0	0	1	0.4	0.8	0	1
02-May-13	10:37:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:38:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:38:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:38:28	0	0	1	0	0.2	0.4	0	0
02-May-13	10:38:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:38:48	0	0	1	0	0.2	0.4	0	0
02-May-13	10:38:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:39:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:39:18	0	0	1	1	0.4	0.8	0	1
02-May-13	10:39:28	0	0	1	1	0.4	0.8	0	1
02-May-13	10:39:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:39:48	0	0	1	1	0.4	0.8	0	1
02-May-13	10:39:58	0	0	1	1	0.4	0.8	0	1
02-May-13	10:40:08	0	0	1	1	0.4	0.8	0	1
02-May-13	10:40:18	0	0	1	1	0.4	0.8	0	1
02-May-13	10:40:28	0	0	0	1	0.4	0.8	0	1
02-May-13	10:40:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:40:48	0	0	1	1	0.4	0.8	0	1
02-May-13	10:40:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:28	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:48	0	0	1	0	0.2	0.4	0	0
02-May-13	10:41:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:42:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:42:18	0	0	1	1	0.4	0.8	0	1
02-May-13	10:42:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:42:38	0	0	1	0	0.2	0.4	0	0
02-May-13	10:42:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:42:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:43:08	0	0	1	0	0.2	0.4	0	0
02-May-13	10:43:18	0	0	0	1	0.4	0.8	0	1
02-May-13	10:43:28	0	0	0	1	0.4	0.8	0	1
02-May-13	10:43:38	0	0	0	1	0.4	0.8	0	1
02-May-13	10:43:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:43:58	0	0	1	1	0.4	0.8	0	1
02-May-13	10:44:08	0	0	0	1	0.4	0.8	0	1
02-May-13	10:44:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:44:28	0	0	1	1	0.4	0.8	0	1
02-May-13	10:44:38	0	0	1	1	0.4	0.8	0	1
02-May-13	10:44:48	0	0	1	1	0.4	0.8	0	1
02-May-13	10:44:58	0	0	1	0	0.2	0.4	0	0
02-May-13	10:45:08	0	0	1	1	0.4	0.8	0	1
02-May-13	10:45:18	0	0	1	0	0.2	0.4	0	0
02-May-13	10:45:28	0	0	1	0	0.2	0.4	0	0
02-May-13	10:45:38	0	0	1	1	0.4	0.8	0	1

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	10:45:48	0	0	0	1	0.4	0.8	0	1
02-May-13	10:45:58	0	0	1	1	0.4	0.8	0	1
02-May-13	10:46:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:46:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:46:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:46:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:46:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:46:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:47:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:47:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:47:28	0	0	1	1	0.4	0.8	0	1
02-May-13	10:47:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:47:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:47:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:48:08	0	0	1	1	0.4	0.8	0	1
02-May-13	10:48:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:48:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:48:38	0	0	1	1	0.4	0.8	0	1
02-May-13	10:48:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:48:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:49:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:49:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:49:28	0	0	1	1	0.4	0.8	0	1
02-May-13	10:49:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:49:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:49:58	0	0	0	0	0.0	0.0	0	0
02-May-13	10:50:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:50:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:50:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:50:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:50:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:50:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:51:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:51:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:51:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:51:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:51:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:51:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:52:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:53:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:53:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:53:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:53:38	0	0	0	0	0.0	0.0	0	0
02-May-13	10:53:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:53:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:54:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:54:18	0	0	0	0	0.0	0.0	0	0
02-May-13	10:54:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:54:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:54:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:54:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:55:08	0	0	0	0	0.0	0.0	0	0
02-May-13	10:55:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:55:28	0	0	0	0	0.0	0.0	0	0
02-May-13	10:55:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:55:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:55:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:56:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:56:18	0	0	0	1	0.4	0.8	0	1
02-May-13	10:56:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:56:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:56:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:56:58	0	0	0	1	0.4	0.8	0	1
02-May-13	10:57:08	0	0	0	1	0.4	0.8	0	1
02-May-13	10:57:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:57:28	0	0	0	0	0.2	0.4	0	0
02-May-13	10:57:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:57:48	0	0	0	1	0.4	0.8	0	1
02-May-13	10:57:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:58:08	0	0	0	1	0.4	0.8	0	1
02-May-13	10:58:18	0	0	0	1	0.4	0.8	0	1
02-May-13	10:58:28	0	0	0	1	0.4	0.8	0	1

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	10:58:38	0	0	0	1	0.4	0.8	0	1
02-May-13	10:58:48	0	0	0	1	0.4	0.8	0	1
02-May-13	10:58:58	0	0	0	0	0.2	0.4	0	0
02-May-13	10:59:08	0	0	0	0	0.2	0.4	0	0
02-May-13	10:59:18	0	0	0	0	0.2	0.4	0	0
02-May-13	10:59:28	0	0	0	1	0.4	0.8	0	1
02-May-13	10:59:38	0	0	0	0	0.2	0.4	0	0
02-May-13	10:59:48	0	0	0	0	0.2	0.4	0	0
02-May-13	10:59:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:00:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:00:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:00:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:00:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:00:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:00:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:01:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:01:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:01:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:01:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:01:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:01:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:02:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:02:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:02:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:02:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:02:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:02:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:03:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:03:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:03:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:03:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:03:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:03:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:04:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:05:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:05:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:05:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:05:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:05:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:05:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:06:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:06:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:06:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:06:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:06:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:06:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:07:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:07:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:07:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:07:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:07:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:07:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:08:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:08:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:08:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:08:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:08:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:08:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:09:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:09:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:09:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:09:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:09:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:09:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:10:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:10:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:10:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:10:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:10:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:10:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:11:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:11:18	0	0	0	1	0.4	0.8	0	1

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	11:11:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:11:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:11:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:11:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:12:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:12:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:12:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:12:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:12:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:12:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:13:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:13:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:13:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:13:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:13:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:13:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:14:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:14:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:14:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:14:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:14:48	0	0	0	0	0.2	0.4	0	0
02-May-13	11:14:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:15:08	0	0	0	0	0.2	0.4	0	0
02-May-13	11:15:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:15:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:15:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:15:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:15:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:16:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:16:18	0	0	0	0	0.2	0.4	0	0
02-May-13	11:16:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:16:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:16:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:16:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:17:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:17:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:17:28	0	0	0	0	0.2	0.4	0	0
02-May-13	11:17:38	0	0	0	0	0.2	0.4	0	0
02-May-13	11:17:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:17:58	0	0	0	0	0.2	0.4	0	0
02-May-13	11:18:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:18:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:18:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:18:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:18:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:18:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:19:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:20:58	0	0	0	1	0.4	0.8	0	1
02-May-13	11:21:08	0	0	0	1	0.4	0.8	0	1
02-May-13	11:21:18	0	0	0	1	0.4	0.8	0	1
02-May-13	11:21:28	0	0	0	1	0.4	0.8	0	1
02-May-13	11:21:38	1	1	1	2	0.4	0.8	2	3
02-May-13	11:21:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:21:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:22:08	1	1	1	2	0.4	0.8	2	3
02-May-13	11:22:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:22:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:22:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:22:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:22:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:23:08	1	1	1	2	0.4	0.8	2	3
02-May-13	11:23:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:23:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:23:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:23:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:23:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:24:08	1	1	1	2	0.4	0.8	2	3

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	11:24:18	0	0	1	1	0.4	0.8	0	1
02-May-13	11:24:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:24:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:24:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:24:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:25:08	0	0	1	1	0.4	0.8	0	1
02-May-13	11:25:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:25:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:25:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:25:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:25:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:26:08	0	0	1	1	0.6	1.2	1	1
02-May-13	11:26:18	0	0	1	1	0.4	0.8	0	1
02-May-13	11:26:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:26:38	0	0	0	1	0.4	0.8	0	1
02-May-13	11:26:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:26:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:27:08	0	0	1	1	0.6	1.2	1	1
02-May-13	11:27:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:27:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:27:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:27:48	0	0	1	1	0.6	1.2	1	1
02-May-13	11:27:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:28:08	1	1	1	3	0.6	1.2	2	3
02-May-13	11:28:18	1	1	1	3	0.6	1.2	2	3
02-May-13	11:28:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:28:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:28:48	0	0	0	1	0.4	0.8	0	1
02-May-13	11:28:58	0	0	1	1	0.4	0.8	0	1
02-May-13	11:29:08	0	0	1	1	0.4	0.8	0	1
02-May-13	11:29:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:29:28	1	1	1	3	0.6	1.2	2	3
02-May-13	11:29:38	0	0	1	1	0.4	0.8	0	1
02-May-13	11:29:48	0	0	1	1	0.4	0.8	0	1
02-May-13	11:29:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:30:08	0	0	1	1	0.4	0.8	0	1
02-May-13	11:30:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:30:28	1	1	1	3	0.6	1.2	2	3
02-May-13	11:30:38	1	1	1	3	0.6	1.2	2	3
02-May-13	11:30:48	0	0	1	1	0.6	1.2	1	1
02-May-13	11:30:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:08	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:28	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:38	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:48	0	0	1	1	0.6	1.2	1	1
02-May-13	11:31:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:32:08	0	0	1	1	0.6	1.2	1	1
02-May-13	11:32:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:32:28	0	0	1	1	0.6	1.2	1	1
02-May-13	11:32:38	0	0	1	1	0.6	1.2	1	1
02-May-13	11:32:48	1	1	1	3	0.6	1.2	2	3
02-May-13	11:32:58	1	1	1	3	0.6	1.2	2	3
02-May-13	11:33:08	1	1	1	3	0.6	1.2	2	3
02-May-13	11:33:18	0	0	1	1	0.6	1.2	1	1
02-May-13	11:33:28	0	0	1	1	0.6	1.2	1	1
02-May-13	11:33:38	1	1	1	3	0.6	1.2	2	3
02-May-13	11:33:48	1	1	2	3	0.8	1.6	2	4
02-May-13	11:33:58	0	0	1	1	0.6	1.2	1	1
02-May-13	11:34:08	1	1	2	3	0.6	1.2	2	3
02-May-13	11:34:18	1	1	2	3	0.6	1.2	2	3
02-May-13	11:34:28	0	0	1	1	0.6	1.2	1	1
02-May-13	11:34:38	1	1	2	3	0.6	1.2	2	3
02-May-13	11:34:48	0	0	1	1	0.6	1.2	1	1
02-May-13	11:34:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:35:08	1	1	2	3	0.6	1.2	2	3
02-May-13	11:35:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:35:28	0	0	1	1	0.4	0.8	0	1
02-May-13	11:35:38	1	1	1	2	0.4	0.8	2	3
02-May-13	11:35:48	1	1	2	3	0.6	1.2	2	3
02-May-13	11:35:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:36:08	1	1	2	3	0.6	1.2	2	3
02-May-13	11:36:18	2	3	2	4	0.6	1.2	4	5
02-May-13	11:36:28	1	1	2	3	0.6	1.2	2	3
02-May-13	11:36:38	0	0	1	1	0.6	1.2	1	1
02-May-13	11:36:48	0	0	1	1	0.6	1.2	1	1
02-May-13	11:36:58	1	1	2	3	0.6	1.2	2	3

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	11:37:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:37:18	1	1	1	2	0.4	0.8	2	3
02-May-13	11:37:28	1	1	1	2	0.4	0.8	2	3
02-May-13	11:37:38	1	1	2	3	0.6	1.2	2	3
02-May-13	11:37:48	1	1	2	3	0.6	1.2	2	3
02-May-13	11:37:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:38:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:38:18	1	1	2	3	0.6	1.2	2	3
02-May-13	11:38:28	1	1	2	3	0.6	1.2	2	3
02-May-13	11:38:38	1	1	2	3	0.6	1.2	2	3
02-May-13	11:38:48	1	1	2	3	0.6	1.2	2	3
02-May-13	11:38:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:39:08	1	1	2	3	0.6	1.2	2	3
02-May-13	11:39:18	1	1	2	3	0.6	1.2	2	3
02-May-13	11:39:28	2	3	2	4	0.6	1.2	4	5
02-May-13	11:39:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:39:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:39:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:40:08	1	1	2	3	0.6	1.2	2	3
02-May-13	11:40:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:40:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:40:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:40:48	1	1	2	3	0.6	1.2	2	3
02-May-13	11:40:58	2	3	2	4	0.6	1.2	4	5
02-May-13	11:41:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:41:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:41:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:41:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:41:48	1	1	2	3	0.6	1.2	2	3
02-May-13	11:41:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:42:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:42:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:42:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:42:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:42:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:42:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:43:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:43:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:43:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:43:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:43:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:43:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:44:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:44:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:44:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:44:38	1	1	2	3	0.8	1.6	2	4
02-May-13	11:44:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:44:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:45:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:45:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:45:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:45:38	2	3	3	5	0.9	1.8	4	6
02-May-13	11:45:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:45:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:46:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:46:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:46:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:46:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:46:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:46:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:47:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:47:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:47:28	2	3	3	5	0.9	1.8	4	6
02-May-13	11:47:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:47:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:47:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:48:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:48:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:48:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:48:38	2	3	3	5	0.9	1.8	4	6
02-May-13	11:48:48	2	3	3	5	0.9	1.8	4	6
02-May-13	11:48:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:49:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:49:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:49:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:49:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:49:48	2	3	2	4	0.8	1.6	4	6

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	11:49:58	2	3	3	4	0.8	1.6	4	6
02-May-13	11:50:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:50:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:50:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:50:38	1	1	2	3	0.8	1.6	2	4
02-May-13	11:50:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:50:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:51:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:51:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:51:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:51:38	2	3	3	5	0.9	1.8	4	6
02-May-13	11:51:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:51:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:52:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:52:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:52:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:52:38	1	1	2	3	0.8	1.6	2	4
02-May-13	11:52:48	2	3	3	5	0.9	1.8	4	6
02-May-13	11:52:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:53:58	1	1	2	3	0.6	1.2	2	3
02-May-13	11:54:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:54:18	1	1	2	3	0.8	1.6	2	4
02-May-13	11:54:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:54:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:54:48	1	1	2	3	0.8	1.6	2	4
02-May-13	11:54:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:55:08	1	1	1	3	0.8	1.6	2	4
02-May-13	11:55:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:55:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:55:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:55:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:55:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:56:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:56:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:56:28	1	1	2	3	0.9	1.8	2	4
02-May-13	11:56:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:56:48	2	3	2	4	0.8	1.6	4	6
02-May-13	11:56:58	2	3	2	4	0.8	1.6	4	6
02-May-13	11:57:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:57:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:57:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:57:38	2	3	3	5	0.9	1.8	4	6
02-May-13	11:57:48	1	1	2	3	0.8	1.6	2	4
02-May-13	11:57:58	1	1	2	3	0.8	1.6	2	4
02-May-13	11:58:08	1	1	2	3	0.8	1.6	2	4
02-May-13	11:58:18	2	3	2	4	0.8	1.6	4	6
02-May-13	11:58:28	1	1	2	3	0.8	1.6	2	4
02-May-13	11:58:38	2	3	2	4	0.8	1.6	4	6
02-May-13	11:58:48	2	3	3	5	0.9	1.8	4	6
02-May-13	11:58:58	2	3	3	5	0.9	1.8	4	6
02-May-13	11:59:08	2	3	2	4	0.8	1.6	4	6
02-May-13	11:59:18	1	1	2	3	0.6	1.2	2	3
02-May-13	11:59:28	2	3	2	4	0.8	1.6	4	6
02-May-13	11:59:38	2	3	3	5	0.9	1.8	4	6
02-May-13	11:59:48	2	3	3	5	0.9	1.8	4	6
02-May-13	11:59:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:00:08	1	1	2	3	0.8	1.6	2	4
02-May-13	12:00:18	1	1	2	3	0.8	1.6	2	4
02-May-13	12:00:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:00:38	1	1	2	3	0.8	1.6	2	4
02-May-13	12:00:48	2	3	2	4	0.8	1.6	4	6
02-May-13	12:00:58	2	3	2	4	0.8	1.6	4	6
02-May-13	12:01:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:01:18	1	1	2	3	0.8	1.6	2	4
02-May-13	12:01:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:01:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:01:48	2	3	2	4	0.8	1.6	4	6
02-May-13	12:01:58	2	3	2	4	0.8	1.6	4	6
02-May-13	12:02:08	2	3	2	4	0.8	1.6	4	6
02-May-13	12:02:18	1	1	2	3	0.8	1.6	2	4
02-May-13	12:02:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:02:38	2	3	2	4	0.8	1.6	4	6

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	12:02:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:02:58	2	3	2	4	0.8	1.6	4	6
02-May-13	12:03:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:03:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:03:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:03:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:03:48	2	3	2	4	0.8	1.6	4	6
02-May-13	12:03:58	2	3	2	4	0.8	1.6	4	6
02-May-13	12:04:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:04:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:04:28	2	3	2	5	0.9	1.8	4	6
02-May-13	12:04:38	2	3	2	5	0.9	1.8	4	6
02-May-13	12:04:48	1	1	2	3	0.8	1.6	2	4
02-May-13	12:04:58	2	3	2	5	0.9	1.8	4	6
02-May-13	12:05:08	2	3	2	5	0.9	1.8	4	6
02-May-13	12:05:18	2	3	2	5	0.9	1.8	4	6
02-May-13	12:05:28	2	3	2	5	0.9	1.8	4	6
02-May-13	12:05:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:05:48	2	3	2	5	0.9	1.8	4	6
02-May-13	12:05:58	2	3	2	4	0.8	1.6	4	6
02-May-13	12:06:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:06:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:06:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:06:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:06:48	1	1	2	3	0.9	1.8	2	4
02-May-13	12:06:58	1	1	2	3	0.8	1.6	2	4
02-May-13	12:07:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:07:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:07:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:07:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:07:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:07:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:08:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:08:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:08:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:08:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:08:48	1	1	2	3	0.8	1.6	2	4
02-May-13	12:08:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:09:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:09:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:09:28	2	3	3	4	0.8	1.6	4	6
02-May-13	12:09:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:09:48	1	1	2	3	0.8	1.6	2	4
02-May-13	12:09:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:10:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:10:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:10:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:10:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:10:48	1	1	2	3	0.9	1.8	2	4
02-May-13	12:10:58	2	3	3	4	0.8	1.6	4	6
02-May-13	12:11:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:11:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:11:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:11:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:11:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:11:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:12:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:12:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:12:28	1	1	3	4	1.1	2.3	3	4
02-May-13	12:12:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:12:48	1	1	2	3	0.9	1.8	2	4
02-May-13	12:12:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:13:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:13:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:13:28	1	1	2	4	1.1	2.3	3	4
02-May-13	12:13:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:13:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:13:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:14:08	1	1	2	3	0.9	1.8	2	4
02-May-13	12:14:18	1	1	2	4	1.1	2.3	3	4
02-May-13	12:14:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:14:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:14:48	1	1	2	4	1.1	2.3	3	4
02-May-13	12:14:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:15:08	2	3	3	4	0.8	1.6	4	6
02-May-13	12:15:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:15:28	2	3	3	5	1.1	2.3	4	6

Date	Time	NO (ppm)	NO (mg/m^3)	NOx (ppm)	NOx (mg/m^3)	NO_2 (ppm)	NO_2 (mg/m^3)	Equiv NO_2 (ppm)	Equiv NO_2 (mg/m^3)
02-May-13	12:15:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:15:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:15:58	2	3	3	5	1.1	2.3	4	6
02-May-13	12:16:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:16:18	1	1	2	3	0.9	1.8	2	4
02-May-13	12:16:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:16:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:16:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:16:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:17:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:17:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:17:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:17:38	1	1	2	3	0.9	1.8	2	4
02-May-13	12:17:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:17:58	1	1	2	3	0.9	1.8	2	4
02-May-13	12:18:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:18:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:18:28	2	3	3	5	0.9	1.8	4	6
02-May-13	12:18:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:18:48	2	3	3	5	1.1	2.3	4	6
02-May-13	12:18:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:19:08	2	3	3	5	0.9	1.8	4	6
02-May-13	12:19:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:19:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:19:38	2	3	3	5	1.1	2.3	4	6
02-May-13	12:19:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:19:58	2	3	3	5	0.9	1.8	4	6
02-May-13	12:20:08	2	3	3	5	1.1	2.3	4	6
02-May-13	12:20:18	2	3	3	5	0.9	1.8	4	6
02-May-13	12:20:28	1	1	2	3	0.9	1.8	2	4
02-May-13	12:20:38	2	3	3	5	0.9	1.8	4	6
02-May-13	12:20:48	2	3	3	5	0.9	1.8	4	6
02-May-13	12:20:58	2	3	3	5	0.9	1.8	4	6
	Average	**1**	1	**1**	**2**	**0.5**	**1.0**	**1**	**2**
	Maximum	**2**	**3**	**3**	**5**	**1.1**	**2.3**	**4**	**6**
	Minimum	**0**	**0**	**0**	**0**	**0.0**	**0.0**	**0**	**0**

This page has been left blank intentionally.

AECOM Australia Pty Ltd
17 Warabrook Boulevard
Warabrook NSW 2304
PO Box 73
Hunter Region MC NSW 2310
T +612 4911 4900
F + 612 4911 4999
www.aecom.com

ABN 20 093 846 925

This is the last page of the report