FINAL

Emissions Testing Report Stack 1 August 2010

Weston Aluminium

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Weston Aluminium

Prepared for

Weston Aluminium

Prepared by

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Contents

List of Tables

List of Appendices

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1.0 Introduction

AECOM was appointed by Weston Aluminium Pty Ltd to conduct a series of measurements to determine air emissions from one stack 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 on 14th August 2010 to determine emission concentrations for EPL Point 1 for the following parameters:

- Total Particulate (TP);
- Fine Particulate (PM_{10});
- Particulate Fluoride;
- Gaseous Fluoride;
- Sulfuric Acid Mist;
- Sulfur Dioxide;
- Hazardous Substances (Metals);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Volatile Organic Compounds (VOC);
- Oxides of Nitrogen (NO_x as Equivalent NO_2);
- Cyanide;
- Hydrogen Chloride (HCl);and
- Chlorine (Cl).

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

- Australian Laboratory Services, NATA Accreditation No. 825, laboratory report number EN1002012, for analysis of:
  - Sulfuric Acid Mist
  - Sulfur Dioxide;
  - Cyanide;
  - Hydrogen Chloride
  - Chlorine;
  - Total Particulate
  - Fine Particulate;
  - Particulate and Gaseous Fluoride; and
  - Volatile Organic Compounds (VOCs);

- National Measurement Institute (NMI), NATA Accreditation No. 198, laboratory report number ORG10_081 for analysis of:
  - Polycyclic Aromatic Hydrocarbons

- SGS Environmental, NATA Accreditation No. 2562, performed the following analysis detailed in report number SE780789:
  - Hazardous Substances (Metals).

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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.*

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.

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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 DECC Approved Methods	USEPA Methods	Parameter measured
NSW DECC TM-1 (AS 4323.1-1995)	USEPA (2000) Method 1 under approved circumstances	Selection of sampling positions
NSW DECC 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 DECC 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 DECC 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 DECC TM-7	USEPA (2000) 26A	Chlorine (Cl_2)
NSW DECC TM-8	USEPA (2000) 26A	Hydrogen chloride (HCl)
NSW DECC 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 DECC 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)

Table 2 Continued

NSW DECC Approved Methods	USEPA Methods	Parameter measured
NSW DECC 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 DECC 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 DECC TM-15 (AS 4323.2-1995)	USEPA (2000) Method 5 under approved circumstances	Solid particles (Total)
NSW DECC TM-22	USEPA (2000) Method 4	Moisture content in stack gases
NSW DECC TM-23	USEPA (2000) Method 3	Dry gas density or molecular weight of stack gases
NSW DECC 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 DECC OM-5	USEPA (1997) Method 201 or 201A (as appropriate)	'Fine' particulates (PM_{10})
NSW DECC OM-6	California EPA Air Resources Board (1997) Method 429	Polycyclic aromatic hydrocarbons (PAHs)
NSW DECC TM-32	USEPA Method 10	Determination of Carbon Monoxide emissions from stationary sources
NSW DECC TM-25	USEPA Method 3A	Determination of Oxygen concentrations from stationary sources
NSW DECC TM-11	USEPA(2000) Method 7C	Determination of Nitrogen dioxide or nitric oxide emissions from stationary sources

All parameters are reported adjusted to 0^{o}C at 1 atmosphere and dry gas.

4.0 Sampling Location

4.1 Sampling Location Summary

Table 3 provides a summary of the location sampled by AECOM during August 2010 at the Weston Aluminium plant in Kurri Kurri, NSW.

Table 3: Sampling Location Summary

Discharge Description	Stack 1 (EPA Identification No. 1)
Duct Shape	Circular
Construction Material	Metal
Duct Diameter (mm)	1650
Minimum No. Sampling Points	16
Sampling Ports	2
Min. Points/Traverse	8
Disturbance	Yes
Distance from Upstream Disturbance	2D
Type of Disturbance	Fan entry
Distance from Downstream Disturbance	4D
Type of Disturbance	Stack exit
Ideal Sampling Location	No
Correction Factors Applied	Yes
Total No. Points Sampled	20
Points/Traverse	10
Sampling Performed to Standard*	Yes[1]

*AS 4323.1 Stationary source emissions Method 1 – Selection of sampling positions
[1] AS 4323.1 Section 4.2

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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.

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6.0 Results

A summary of test results for the Stack 1 Additional testing is presented in **Tables 4**. Detailed results along with gas stream properties during the testing periods can be found in **Tables 5** to **7**. **Tables 8** to **10** provide speciated results for Polycyclic Aromatic Hydrocarbons, Volatile Organic Compounds and Hazardous Substances (Metals).

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 revised Weston Aluminium licence (variation dated 25 September 2009).

Field notes recorded during the project are attached as **Appendix A**. Raw and calculated gas data can be viewed in **Appendix B**, with Laboratory Analysis Reports attached as **Appendix C**.

Table 4: Air Emission Results Summary, Stack 1 – 14 August 2010

Parameter	Stack 1 (EPA point 1)	Regulatory Limit (mg/m^3)
Total Particulate (mg/m^3)	8.9	25
Fine Particulate (PM_{10}) (mg/m^3)	0.24	Not Listed
Hydrogen Chloride (mg/m^3)	0.95	400
Chlorine (mg/m^3)	0.42	Not Listed
Particulate Fluoride (mg/m^3)	0.027	Not Listed
Gaseous Fluoride (mg/m^3)	0.38	2
Sulfuric Acid Mist (H_2SO_4 as SO_3) (mg/m^3)	<1.6	100
Sulfur Dioxide (SO_2 as SO_3) (mg/m^3)	<7.8	Not Listed
Total Hazardous Substances (Metals) (mg/m^3)	0.017	10
Total Polycyclic Aromatic Hydrocarbons (mg/m^3)	0.74	Not Listed
Volatile Organic Compounds (VOC) (mg/m^3)	<0.17	Not Listed
Total Oxides of Nitrogen (as Equivalent NO_2) (mg/m^3)	4	2500
Carbon Monoxide (CO) (mg/m^3)	5	100
Cyanide (mg/m^3)	<0.0061	Not Listed

Table 5: Stack 1 Fine Particulate (PM_{10}), Total Particulate, Sulfuric Acid Mist (H2SO4 as SO3) and Sulfur Dioxide (SO2 as SO3) Results, 14 August 2010

Sampling Conditions:				
Stack internal diameter at test location	1650	mm		
Stack gas temperature (average)	50.1	^{o}C	323.3	K
Stack pressure (average)	1031	hPa		
Stack gas velocity (average, stack conditions)	14	m/s		
Stack gas flowrate (stack conditions)	30	m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s		
Fine Particulate (PM10) Testing				
Test Period	10:30	-	10:31	
Fine Particulate (PM10) Mass	0.2	mg		
Gas Volume Sampled	0.827	m^3		
Fine Particulate (PM10) Emission*1	0.24	mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	6.1	mg/s		
Regulatory Limit	NA	mg/m^3		
Total Particulate Testing				
Test Period	10:40	-	12:40	
Total Particulate Mass	1.5	mg		
Gas Volume Sampled	0.168	m^3		
Total Particulate Emission*1	8.9	mg/m^3		
Total Particulate Mass Emission Rate*2	220	mg/s		
Regulatory Limit	25	mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Testing				
Test Period	10:40	-	12:40	
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2	mg		
Gas Volume Sampled	1.27	m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<1.6	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	10:40	-	12:40	
Sulfur Dioxide (SO2 as SO3) Mass	<10	mg		
Gas Volume Sampled	1.27	m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	<7.8	mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<200	mg/s		
Regulatory Limit	100	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.

Table 6: Stack 1 Cyanide, Chlorine and Hydrogen Chloride Results, 14 August 2010.

Sampling Conditions:				
Stack internal diameter at test location	1650	mm		
Stack gas temperature (average)	52.2	^{o}C	325.4	K
Stack pressure (average)	1030	hPa		
Stack gas velocity (average, stack conditions)	14	m/s		
Stack gas flowrate (stack conditions)	30	m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25	m^3/s		
Cyanide Testing				
Test Period	12:50	-	14:35	
Cyanide Mass	<0.006	mg		
Gas Volume Sampled	0.98	m^3		
Cyanide Emission*1	<0.0061	mg/m^3		
Cyanide Mass Emission Rate*2	<0.15	mg/s		
Regulatory Limit	NA	mg/m^3		
Chlorine Testing				
Test Period	12:50	-	14:35	
Chlorine Mass	0.545	mg		
Gas Volume Sampled	1.31	m^3		
Chlorine Emission*1	0.42	mg/m^3		
Chlorine Mass Emission Rate*2	10	mg/s		
Regulatory Limit	NA	mg/m^3		
Hydrogen Chloride Testing				
Test Period	12:50	-	14:35	
Hydrogen Chloride Mass	1.24	mg		
Gas Volume Sampled	1.31	m^3		
Hydrogen Chloride Emission*1	0.95	mg/m^3		
Hydrogen Chloride Mass Emission Rate*2	24	mg/s		
Regulatory Limit	400	mg/m^3		
Moisture Content (%)	**2.0**			
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.

Table 7: Stack 1 Hazardous substances (Metals), PAH, Particulate Fluoride and Gaseous Fluoride Results, 14 August 2010.

Sampling Conditions:				
Stack internal diameter at test location	1650	mm		
Stack gas temperature (average)	54.8	^{o}C	328.0	K
Stack pressure (average)	1036	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)	26	m^3/s		
Hazardous Substances (Metals) Testing				
Test Period	8:17	-	10:05	
Hazardous Substances (Metals) Mass	0.024	mg		
Gas Volume Sampled	1.38	m^3		
Hazardous Substances (Metals) Emission*1	0.017	mg/m^3		
Hazardous Substances (Metals) Mass Emission Rate*2	0.44	mg/s		
Regulatory Limit	10	mg/m^3		
Polycyclic Aromatic Hydrocarbons Testing				
Test Period	8:17	-	10:05	
Polycyclic Aromatic Hydrocarbons Mass	0.72	mg		
Gas Volume Sampled	0.971	m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.74	mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	19	mg/s		
Regulatory Limit	N/A	mg/m^3		
Particulate Fluoride Testing				
Test Period	8:17	-	10:05	
Particulate Fluoride Mass	0.043	mg		
Gas Volume Sampled	1.57	m^3		
Particulate Fluoride Emission*1	0.027	mg/m^3		
Particulate Fluoride Mass Emission Rate*2	0.7	mg/s		
Regulatory Limit	2	mg/m^3		
Gaseous Fluoride Testing				
Test Period	8:17	-	10:05	
Gaseous Fluoride Mass	0.6	mg		
Gas Volume Sampled	1.57	m^3		
Gaseous Fluoride Emission*1	0.38	mg/m^3		
Gaseous Fluoride Mass Emission Rate*2	9.8	mg/s		
Regulatory Limit	2	mg/m^3		
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.

Table 8: Stack 1 Speciated Volatile Organic Compounds (VOC) Results,14 August 2010.

Analyte	Sample µg	Blank µg	Sample Blank Corrected µg	(mg/m^3)	mg/s
Acetone	<0.5	<0.5	<0.5	<0.087	<2.3
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.087	<2.3
2-Butanone	<0.5	<0.5	<0.5	<0.087	<2.3
Chloroform	<0.5	<0.5	<0.5	<0.087	<2.3
Benzene	<0.5	<0.5	<0.5	<0.087	<2.3
1-heptene	<0.5	<0.5	<0.5	<0.087	<2.3
n-heptane	<0.5	<0.5	<0.5	<0.087	<2.3
Trichloroethene	<0.5	<0.5	<0.5	<0.087	<2.3
MIBK	<0.5	<0.5	<0.5	<0.087	<2.3
Toluene	<0.5	<0.5	<0.5	<0.087	<2.3
2-hexanone	<0.5	<0.5	<0.5	<0.087	<2.3
Chlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
Ethyl Benzene	<0.5	<0.5	<0.5	<0.087	<2.3
m- & p-xylene	<1	<1	<1	<0.17	<4.6
o-xylene	<0.5	<0.5	<0.5	<0.087	<2.3
Styrene	<0.5	<0.5	<0.5	<0.087	<2.3
Cyclohexanone	<0.5	<0.5	<0.5	<0.087	<2.3
Isopropylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
2-chlorotoluene	<0.5	<0.5	<0.5	<0.087	<2.3
4-chlorotoluene	<0.5	<0.5	<0.5	<0.087	<2.3
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
n-decane	<0.5	<0.5	<0.5	<0.087	<2.3
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.087	<2.3
n-butylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.087	<2.3
Total	<1		<1	<0.17	<4.6

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.

Table 9: Stack 1 Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results, 14 August 10.

	Sample Result			Emission		Mass Emission Rate	
	(ng)	(μg)	(mg)	(μg/m^3)	(mg/m^3)	(μg/s)	(mg/s)
Naphthalene	360000	360	0.36	370	0.37	9700	9.7
2 - Methylnapthalene	330000	330	0.33	340	0.34	8900	8.9
Acenaphthylene	580	0.58	0.00058	0.6	0.0006	16	0.016
Acenaphthene	1100	1.1	0.0011	1.1	0.0011	30	0.03
Fluorene	1800	1.8	0.0018	1.9	0.0019	49	0.049
Phenanthrene	2800	2.8	0.0028	2.9	0.0029	76	0.076
Anthracene	170	0.17	0.00017	0.17	0.00017	4.6	0.0046
Fluoranthene	1700	1.7	0.0017	1.7	0.0017	46	0.046
Pyrene	960	0.96	0.00096	0.99	0.00099	26	0.026
Benz(a)anthracene	240	0.24	0.00024	0.25	0.00025	6.5	0.0065
Chrysene	630	0.63	0.00063	0.65	0.00065	17	0.017
Benzo(b)fluoranthene	260	0.26	0.00026	0.27	0.00027	7	0.007
Benzo(k)fluoranthene	150	0.15	0.00015	0.15	0.00015	4.1	0.0041
Benzo(e)pyrene	180	0.18	0.00018	0.19	0.00019	4.9	0.0049
Benzo(a)pyrene	110	0.11	0.00011	0.11	0.00011	3	0.003
Perylene	100	0.1	0.0001	0.1	0.0001	2.7	0.0027
Indeno(123:cd)pyrene	68	0.068	0.000068	0.07	0.00007	1.8	0.0018
Dibenzo(ah)anthracene	<50	<0.05	<0.00005	0.051	<0.000051	<1.4	<0.0014
Benzo(ghi)perylene	<70	<0.07	<0.00007	0.072	<0.000072	<1.9	<0.0019
Sum of reported PAH's	**700000**	**700**	**0.7**	**720**	**0.72**	**19000**	**19**

Table 10: Stack 1 Speciated Hazardous Substances (Metals) Results, 14 August 2010.

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	<0.0051	<0.0037	<0.004	<0.0029			<0.02	<0.0037	<0.096
Arsenic	0.0024	0.0017	<0.003	<0.0022			0.0024	0.0017	0.044
Beryllium	<0.000096	<0.00007	<0.00003	<0.000022			<0.00012	<0.00007	<0.0018
Cadmium	0.0016	0.0012	0.0007	0.00051			0.002	0.0017	0.044
Chromium	<0.012	<0.0087	0.0061	0.0044			0.0061	0.0044	0.11
Cobalt	<0.0003	<0.00022	<0.0003	<0.00022			<0.0015	<0.00022	<0.0057
Copper	<0.002	<0.0015	0.00041	0.0003			0.00041	0.0003	0.0078
Lead	0.0095	0.0069	<0.003	<0.0022			0.0095	0.0069	0.18
Magnesium	0.31	0.23	0.012	0.0087			0.3	0.24	6.3
Manganese	<0.0068	<0.0049	<0.0032	<0.0023			<0.0004	<0.0049	<0.13
Mercury	<0.00005	<0.000036	<0.00024	<0.00017	0.00023	0.00017	<0.00005	0.00017	0.0044
Nickel	<0.0013	<0.00094	0.0006	0.00044			0.0006	0.00044	0.011
Selenium	<0.0079	<0.0057	0.0037	0.0027			0.0037	0.0027	0.07
Thallium	<0.008	<0.0058	<0.008	<0.0058			<0.04	<0.0058	<0.15
Tin	<0.002	<0.0015	<0.002	<0.0015			<0.01	<0.0015	<0.039
Vanadium	<0.0004	<0.00029	<0.0004	<0.00029			<0.02	<0.00029	<0.0076
Zinc	<15	<11	<0.0074	<0.0054			0	<11	<290
Total Hazardous Metals*	**0.014**	**0.0098**	**0.011**	**0.0081**	**0.00023**	**0.00017**	**0.024**	**0.017**	**0.46**
Total Metals	**0.32**	**0.24**	**0.024**	**0.017**			**0.32**	**0.24**	**6.1**

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

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7.0 References

NSW DECC "Section 55 protection of the Environment Operations Act 1997, Environmental Protection Licence 6423".

NSW State Government "Protection of the Environment Operations (Clean Air) Regulation 2002, Schedule 3 Standards of concentration for scheduled premises: general activities and plant".

NSW DECC, 2007, Approved methods for the sampling and analysis of air pollutants in New South Wales, January 2007

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Appendix A

Field Sheets

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STACK ANALYSIS - SAMPLING OF VOLATILE ORGANIC COMPOUNDS

AECOM

Client:	Weston Aluminium	
Project Number:	60162060	
Stack Description:	Stack 1	
Date:	14-Aug-10	
Rotameter Correction Factor:	1	
Time Start:	8:43	
Time Finish:	9:13	
Sample Flow Rate:	0.2	L/min
Sample Time:	30	min
Sampled Volume:	6	litres
	0.006	m^3
Ambient Temperature:	15	°C
Barometric Pressure:	1030	hPa
Stack Gas Moisture:	0.5	%
Corrected Volume:	0.00575	m^3 (0°C, dry gas, 1 atmosphere pressure)
Stack Flow Rate	27	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	<0.087	<2.3
1,1-dichloroethane	<0.5	<0.5	<0.5	<0.087	<2.3
2-Butanone	<0.5	<0.5	<0.5	<0.087	<2.3
Chloroform	<0.5	<0.5	<0.5	<0.087	<2.3
Benzene	<0.5	<0.5	<0.5	<0.087	<2.3
1-heptene	<0.5	<0.5	<0.5	<0.087	<2.3
n-heptane	<0.5	<0.5	<0.5	<0.087	<2.3
Trichloroethene	<0.5	<0.5	<0.5	<0.087	<2.3
MIBK	<0.5	<0.5	<0.5	<0.087	<2.3
Toluene	<0.5	<0.5	<0.5	<0.087	<2.3
2-hexanone	<0.5	<0.5	<0.5	<0.087	<2.3
Chlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
Ethyl Benzene	<0.5	<0.5	<0.5	<0.087	<2.3
m- & p-xylene	<1	<1	<1	<0.17	<4.6
o-xylene	<0.5	<0.5	<0.5	<0.087	<2.3
Styrene	<0.5	<0.5	<0.5	<0.087	<2.3
Cyclohexanone	<0.5	<0.5	<0.5	<0.087	<2.3
Isopropylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
2-chlorotoluene	<0.5	<0.5	<0.5	<0.087	<2.3
4-chlorotoluene	<0.5	<0.5	<0.5	<0.087	<2.3
1,3,5-trimethylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
n-decane	<0.5	<0.5	<0.5	<0.087	<2.3
1,2,4-trimethylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,3-dichlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,4-dichlorobenzene	<0.5	<0.5	<0.5	<0.087	<2.3
1,2-dichlorobenzne	<0.5	<0.5	<0.5	<0.087	<2.3
n-butylbenzene	<0.5	<0.5	<0.5	<0.087	<2.3
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.087	<2.3
Total	<1		<1	<0.17	<4.6

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.

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Weston Aluminium

AECOM's Project Number: 60162060

Emission Source: Stack 1

Date Sampled: 14-Aug-10

ANALYTE(S)	**METHOD**
Hazardous Substances (Metals)	NSW DECC TM - 12, 13 & 14
Polycyclic Aromatic Hydrocarbons	NSW DECC OM - 6
Particulate Fluoride	NSW DECC TM - 9
Gaseous Fluoride	NSW DECC TM - 9

Observations made during testing period:

Sampling Performed By:

Chris Burns

James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Particulate Fluoride
Test 4: Gaseous Fluoride

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: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Particulate Fluoride
Test 4: Gaseous Fluoride

Sampling time start: 7:50		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	7:50	1	20.8	0.1
2	7:51	2	20.8	0.1
3	7:52	2	20.8	0.1
4	7:53	1	20.8	0.1
5	7:54	1	20.8	0.1
6	7:55	2	20.7	0.1
7	7:56	1	20.7	0.1
8	7:57	2	20.7	0.1
	Averages:	1.5 ppm	20.8 %	0.1 %

Moisture content (M3): 0.99
Moisture percentage (M2): 1.20 %

Measurements

CO:	0.0002 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.1 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0001 %,(wet)	N_2:	78.2 %,(wet)
CO_2:	0.1 %,(wet)	O_2:	20.5 %,(wet)
H_2O:	1.20 %(=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-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Hazardous Substances (Metals)
Test 2: Polycyclic Aromatic Hydrocarbons
Test 3: Particulate Fluoride
Test 4: Gaseous Fluoride

Sampling time start: 7:50		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	7:50	3	20.5	0.2
2	7:51	3	20.5	0.2
3	7:52	2	20.5	0.2
4	7:53	2	20.6	0.2
5	7:54	2	20.6	0.2
6	7:55	2	20.6	0.2
7	7:56	3	20.5	0.2
8	7:57	2	20.5	0.2
	Averages:	2.4 ppm	20.5 %	0.2 %

Moisture content (M3): 0.99
Moisture percentage (M2): 0.96 %

Measurements

CO:	0.0002 %,(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:	0.96 %(=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-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1:Hazardous Substances (Metals)
Test 2:Polycyclic Aromatic Hydrocarbons
Test 3:Particulate Fluoride
Test 4:Gaseous Fluoride

Time :	7:45	Barometric Pressure :	1035	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	0.226	46.8	320.0	16.9
1/2	165	0.235	47.0	320.2	17.2
1/3	262	0.235	47.0	320.2	17.2
1/4	383	0.226	47.1	320.3	16.9
1/5	554	0.216	47.2	320.4	16.5
1/6	1036	0.147	47.3	320.5	13.6
1/7	1208	0.128	47.3	320.5	12.7
1/8	1328	0.113	47.3	320.5	11.9
1/9	1425	0.108	47.2	320.4	11.7
1/10	1509	0.098	47.1	320.3	11.1
2/1	81	0.240	46.8	320.0	17.4
2/2	165	0.226	46.8	320.0	16.9
2/3	262	0.221	46.9	320.1	16.7
2/4	383	0.206	46.9	320.1	16.1
2/5	554	0.196	47.0	320.2	15.7
2/6	1036	0.132	47.0	320.2	12.9
2/7	1208	0.128	47.0	320.2	12.7
2/8	1328	0.132	47.0	320.2	12.9
2/9	1425	0.142	46.9	320.1	13.4
2/10	1509	0.157	46.9	320.1	14.1
Average			47.0	320.2	14.7

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 7.5 mm
Absolute pressure in stack (hPa) : 1035.74 hPa

AECOM

STACK ANALYSIS

SAMPLING OF HAZARDOUS SUBSTANCES (METALS)

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: G55
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.68 x $10^{-5}m^2$
Thimble No: NA
Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 236.5688 Meter finish: 236.8688
Time start: 8:10 Time finish: 8:11

Therefore, leakage rate = 300 L/min

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

Leak Check (Post Sampling)
Meter start: 237.9916 Meter finish: 237.9916
Time start: 10:10 Time finish: 10:11

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1035 hPa (start); 1035 hPa (finish)
Meter start: 236.5710 Time start: 8:17
Meter correction factor (GMf) : 1.0094

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	15.7	30.0	12.0		Yes
1/2	0:10:00	195	16.0	30.0	12.0		Yes
1/3	0:15:00	292	16.0	30.0	11.0		Yes
1/4	0:20:00	413	15.7	30.0	11.0		Yes
1/5	0:25:00	584	15.3	30.0	11.0		Yes
1/6	0:30:00	1066	12.6	30.0	11.0		Yes
1/7	0:35:00	1238	11.8	30.0	10.0		Yes
1/8	0:40:00	1358	11.0	30.0	10.0		Yes
1/9	0:45:00	1455	10.9	29.0	9.0		Yes
1/10	0:50:00	1539	10.3	28.0	9.0		Yes
2/1	0:55:00	111	16.2	30.0	10.0		Yes
2/2	1:00:00	195	15.7	28.0	9.0		Yes
2/3	1:05:00	292	15.5	27.0	9.0		Yes
2/4	1:10:00	413	15.0	25.0	8.0		Yes
2/5	1:15:00	584	14.6	23.0	6.0		Yes
2/6	1:20:00	1066	12.0	22.0	6.0		Yes
2/7	1:25:00	1238	11.8	20.0	5.0		Yes
2/8	1:30:00	1358	12.0	19.0	5.0		Yes
2/9	1:35:00	1455	12.5	18.0	5.0		Yes
2/10	1:40:00	1539	13.1	17.0	5.0		Yes
Averages				26.3	8.7	no result	

Meter Finish: 237.9908 Time Finish: 10:05
Total Condensate collected: 10 ml Silica gel No(s) used: G017

AECOM

STACK ANALYSIS

SAMPLING OF POLYCYCLIC AROMATIC HYDROCARBONS

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
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: NA
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 4607.5752 Meter finish: 4607.5752
Time start: 8:12 Time finish: 8:13

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 4608.8905 Meter finish: 4608.5965
Time start: 10:15 Time finish: 10:16

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1035 hPa (start); 1035 hPa (finish)
Meter start: 4607.5766 Time start: 8:17
Meter correction factor (GMf) : 0.9918

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	11.8	14.0	9.0		Yes
1/2	0:10:00	195	12.0	14.0	9.0		Yes
1/3	0:15:00	292	12.0	16.0	9.0		Yes
1/4	0:20:00	413	11.7	18.0	9.0		Yes
1/5	0:25:00	584	11.5	20.0	9.0		Yes
1/6	0:30:00	1066	9.4	20.0	10.0		Yes
1/7	0:35:00	1238	8.8	21.0	10.0		Yes
1/8	0:40:00	1358	8.3	23.0	11.0		Yes
1/9	0:45:00	1455	8.1	24.0	11.0		Yes
1/10	0:50:00	1539	7.7	25.0	12.0		Yes
2/1	0:55:00	111	12.1	24.0	11.0		Yes
2/2	1:00:00	195	11.8	25.0	11.0		Yes
2/3	1:05:00	292	11.6	25.0	12.0		Yes
2/4	1:10:00	413	11.2	25.0	12.0		Yes
2/5	1:15:00	584	10.9	26.0	12.0		Yes
2/6	1:20:00	1066	9.0	26.0	13.0		Yes
2/7	1:25:00	1238	8.8	26.0	14.0		Yes
2/8	1:30:00	1358	9.0	27.0	14.0		Yes
2/9	1:35:00	1455	9.3	27.0	15.0		Yes
2/10	1:40:00	1539	9.8	27.0	16.0		Yes
Averages				22.7	11.5	no result	

Meter Finish: 4608.5956 Time Finish: 10:05
Total Condensate collected: 0 ml Silica gel No(s) used: G046

AECOM

STACK ANALYSIS

SAMPLING OF PARTICULATE FLUORIDE AND GASEOUS FLUORIDE

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: old30
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 2.03 x $10^{-5}m^2$
Thimble No: NA
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 12664.3626 Meter finish: 12664.3626
Time start: 8:13 Time finish: 8:14

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 12665.9859 Meter finish: 12665.9859
Time start: 10:13 Time finish: 10:14

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1035 hPa (start); 1035 hPa (finish)
Meter start: 12664.3668 Time start: 8:17
Meter correction factor (GMf) : 1.0155

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	19.1	29.0	18.0		Yes
1/2	0:10:00	195	19.4	29.0	17.0		Yes
1/3	0:15:00	292	19.4	29.0	17.0		Yes
1/4	0:20:00	413	19.1	29.0	17.0		Yes
1/5	0:25:00	584	18.6	29.0	15.0		Yes
1/6	0:30:00	1066	15.3	29.0	15.0		Yes
1/7	0:35:00	1238	14.3	29.0	15.0		Yes
1/8	0:40:00	1358	13.4	30.0	14.0		Yes
1/9	0:45:00	1455	13.2	29.0	14.0		Yes
1/10	0:50:00	1539	12.5	28.0	13.0		Yes
2/1	0:55:00	111	19.7	30.0	15.0		Yes
2/2	1:00:00	195	19.1	27.0	14.0		Yes
2/3	1:05:00	292	18.9	26.0	13.0		Yes
2/4	1:10:00	413	18.2	24.0	12.0		Yes
2/5	1:15:00	584	17.7	23.0	12.0		Yes
2/6	1:20:00	1066	14.6	22.0	11.0		Yes
2/7	1:25:00	1238	14.3	21.0	10.0		Yes
2/8	1:30:00	1358	14.6	19.0	9.0		Yes
2/9	1:35:00	1455	15.1	18.0	8.0		Yes
2/10	1:40:00	1539	15.9	15.0	7.0		Yes
Averages				25.8	13.3	no result	

Meter Finish: 12665.9850 Time Finish: 10:05
Total Condensate collected: 12 ml Silica gel No(s) used: 205A

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1:Hazardous Substances (Metals)
Test 2:Polycyclic Aromatic Hydrocarbons
Test 3:Particulate Fluoride
Test 4:Gaseous Fluoride

Time :	0:00	Barometric Pressure :		1035	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	62.9	336.1	16.9
1/2	165	0.216	63.6	336.8	16.9
1/3	262	0.206	64.2	337.4	16.5
1/4	383	0.206	64.3	337.5	16.5
1/5	554	0.206	64.1	337.3	16.5
1/6	1036	0.147	63.8	337.0	14.0
1/7	1208	0.118	63.1	336.3	12.5
1/8	1328	0.108	63.6	336.8	12.0
1/9	1425	0.088	62.0	335.2	10.8
1/10	1509	0.093	61.3	334.5	11.1
2/1	81	0.206	60.5	333.7	16.5
2/2	165	0.186	60.7	333.9	15.7
2/3	262	0.172	61.1	334.3	15.0
2/4	383	0.167	61.5	334.7	14.8
2/5	554	0.177	62.0	335.2	15.3
2/6	1036	0.128	62.1	335.3	13.0
2/7	1208	0.118	62.4	335.6	12.5
2/8	1328	0.113	62.5	335.7	12.2
2/9	1425	0.113	62.8	336.0	12.2
2/10	1509	0.118	62.8	336.0	12.5
Average			62.6	335.8	14.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 5 mm
Absolute pressure in stack (hPa) : 1035.49 hPa

AECOM

Stack Analysis - Speciated Polycyclic Aromatic Hydrocarbons (PAH) Results

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
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	360000	360	0.36	370	0.37	9700	9.7
2 - Methylnapthalene	330000	330	0.33	340	0.34	8900	8.9
Acenaphthylene	580	0.58	0.00058	0.6	0.0006	16	0.016
Acenaphthene	1100	1.1	0.0011	1.1	0.0011	30	0.03
Fluorene	1800	1.8	0.0018	1.9	0.0019	49	0.049
Phenanthrene	2800	2.8	0.0028	2.9	0.0029	76	0.076
Anthracene	170	0.17	0.00017	0.17	0.00017	4.6	0.0046
Fluoranthene	1700	1.7	0.0017	1.7	0.0017	46	0.046
Pyrene	960	0.96	0.00096	0.99	0.00099	26	0.026
Benz(a)anthracene	240	0.24	0.00024	0.25	0.00025	6.5	0.0065
Chrysene	630	0.63	0.00063	0.65	0.00065	17	0.017
Benzo(b)fluoranthene	260	0.26	0.00026	0.27	0.00027	7	0.007
Benzo(k)fluoranthene	150	0.15	0.00015	0.15	0.00015	4.1	0.0041
Benzo(e)pyrene	180	0.18	0.00018	0.19	0.00019	4.9	0.0049
Benzo(a)pyrene	110	0.11	0.00011	0.11	0.00011	3	0.003
Perylene	100	0.1	0.0001	0.1	0.0001	2.7	0.0027
Indeno(123:cd)pyrene	68	0.068	0.000068	0.07	0.00007	1.8	0.0018
Dibenzo(ah)anthracene	<50	<0.05	<0.00005	0.051	<0.000051	<1.4	<0.0014
Benzo(ghi)perylene	<70	<0.07	<0.00007	0.072	<0.000072	<1.9	<0.0019
Sum of reported PAH's	700000	700	0.7	720	0.72	19000	19

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Stack Analysis - Hazardous Substances Elemental Analysis Results

Date: 14-Aug-10 Client: Weston Aluminium
AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

	Particulate Metals Results	Gaseous Metals Results	Oixdisable Mercury Results		
Metal	Front Half, Filter, Acetone Rinses and Acid Rinses. **Containers 1, 2 and 3**	Back Half, Impingers + Acid Rines **Container 4**	KO Impinger + Acid Rinses **(5A)**	$KMnO_4$/ H_2SO_4 + Rinses (mg) **(5B)**	Residue Rinse 8N HCl (mg) (If Required) (5C)
Antimony	<0.0051	<0.004			
Arsenic	0.0024	<0.003			
Beryllium	<0.000096	<0.00003			
Cadmium	0.0016	0.0007			
Chromium	<0.012	0.0061			
Cobalt	<0.0003	<0.0003			
Copper	<0.002	0.00041			
Lead	0.0095	<0.003			
Magnesium	0.31	0.012			
Manganese	<0.0068	<0.0032			
Mercury	<0.00005	<0.00024	<0.00014	<0.0002	0.00023
Nickel	<0.0013	0.0006			
Selenium	<0.0079	0.0037			
Thallium	<0.008	<0.008			
Tin	<0.002	<0.002			
Vanadium	<0.0004	<0.0004			
Zinc	<15	<0.0074			

Note: Where the blank has returned a less than value, the analysed value has been corrected for half the of that blank value.
ie a blank value of <0.0005 has had 0.00025 subtracted from the analysed value.
* Total does not include Copper, Magnesium and Zinc as they are classed non-hazardous

Stack Analysis - Hazardous Substances Elemental Analysis Results Continued

Date: 14-Aug-10 Client: Weston Aluminium
AECOM's Project No: 60162060 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	<0.0051	<0.0037	<0.004	<0.0029			<0.02	<0.0037	<0.096
Arsenic	0.0024	0.0017	<0.003	<0.0022			0.0024	0.0017	0.044
Beryllium	<0.000096	<0.00007	<0.00003	<0.000022			<0.00012	<0.00007	<0.0018
Cadmium	0.0016	0.0012	0.0007	0.00051			0.002	0.0017	0.044
Chromium	<0.012	<0.0087	0.0061	0.0044			0.0061	0.0044	0.11
Cobalt	<0.0003	<0.00022	<0.0003	<0.00022			<0.0015	<0.00022	<0.0057
Copper	<0.002	<0.0015	0.00041	0.0003			0.00041	0.0003	0.0078
Lead	0.0095	0.0069	<0.003	<0.0022			0.0095	0.0069	0.18
Magnesium	0.31	0.23	0.012	0.0087			0.3	0.24	6.3
Manganese	<0.0068	<0.0049	<0.0032	<0.0023			<0.0004	<0.0049	<0.13
Mercury	<0.00005	<0.000036	<0.00024	<0.00017	0.00023	0.00017	<0.00005	0.00017	0.0044
Nickel	<0.0013	<0.00094	0.0006	0.00044			0.0006	0.00044	0.011
Selenium	<0.0079	<0.0057	0.0037	0.0027			0.0037	0.0027	0.07
Thallium	<0.008	<0.0058	<0.008	<0.0058			<0.04	<0.0058	<0.15
Tin	<0.002	<0.0015	<0.002	<0.0015			<0.01	<0.0015	<0.039
Vanadium	<0.0004	<0.00029	<0.0004	<0.00029			<0.02	<0.00029	<0.0076
Zinc	<15	<11	<0.0074	<0.0054			0	<11	<290
Total Hazardous Metals*	0.014	0.0098	0.011	0.0081	0.00023	0.00017	0.024	0.017	0.46
Total Metals	0.32	0.24	0.024	0.017			0.32	0.24	6.1

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

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Hazardous Substances (Metals)

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3): 1.4331 m^3

Average gas meter temp. ($T_{M,2}$): 17.5 °C

290.7 K

Average barometric pressure (P_{BARO}) 1035 hPa

Average pressure at meter ($P_{M,2}$) 1035.00 hPa

Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure): 1.3757 m^3

(B) Metals concentration at standard conditions

Blank thimble No.: 0

Thimble No. used: NA

Blank weight: g

Metals Weight 0.000024 g

Final Metals Weight (Mp1): 0.00002 g

Metals Concentration (C1): $=M_{p1}/MV_4=$ 0.000017 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.017 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.0014 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 1.4 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.00068 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 0.68 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G017

V_v = 0 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 ($V_{wsg(std)}$) = 0.0000

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

B_{ws} = 0.96 %

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): 1.28 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 $\frac{(Ps)}{(1013.25)}$

= 1.090 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.73 m/s

(ii) Average of post-sampling velocities: 14.17 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.45 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 = 30.90 m^3/s (stack conditions)

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

Qstd = 26.1 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.00044	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.44	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.035	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	35	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.018	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	18	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Polycyclic Aromatic Hydrocarbons

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.0106 m^3	Average barometric pressure (P_{BARO})	1035 hPa
Average gas meter temp. ($T_{M,2}$):	17.1 °C		
	290.3 K	Average pressure at meter ($P_{M,2}$)	1035.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9715 m^3		

(B) PAH concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: NA PAH Weight 0.00072 g

Final PAH Weight (Mp1): 0.00072 g

PAH Concentration (C1): $=M_{p1}/MV_4=$ 0.00074 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.74 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.059 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 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: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.03 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: G046

V_v = 0 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 ($V_{wsg(std)}$) = 0.0000

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

B_{ws} = 0.00 %

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): 1.27 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 $\frac{(Ps)}{(1013.25)}$

= 1.081 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.73 m/s

(ii) Average of post-sampling velocities: 14.17 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.45 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 = 30.90 m^3/s (stack conditions)

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

Qstd = 26.3 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.019	g/s (0°C, dry gas, 1 atm pressure)		
	=	19	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	1.6	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	1600	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.78	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	780	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Particulate Fluoride

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.6433 m^3	Average barometric pressure (P_{BARO})	1035 hPa
Average gas meter temp. ($T_{M,2}$):	19.5 °C		
	292.7 K	Average pressure at meter ($P_{M,2}$)	1035.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.5667 m^3		

(B) Particulate Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: NA Particulate Fluoride Weight 0.000043 g

Final Particulate Fluoride Weight (Mp1): 0.00004 g

Particulate Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.000027 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.027 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.0022 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 2.2 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.0011 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 1.1 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 205A

V_v = 10.9 g (from laboratory report) V_w = 12 mL (=grams) (recorded on Laboratory Form 108)

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

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0146

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

B_{ws} = 1.91 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Particulate 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): 1.29 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 $\frac{(Ps)}{(1013.25)}$

= 1.098 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.73 m/s

(ii) Average of post-sampling velocities: 14.17 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.45 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 = 30.90 m^3/s (stack conditions)

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

Qstd = 25.8 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 =	0.056	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	56	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.028	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	28	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Gaseous Fluoride

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.6433 m^3	Average barometric pressure (P_{BARO})	1035 hPa
Average gas meter temp. ($T_{M,2}$):	19.5 °C		
	292.7 K	Average pressure at meter ($P_{M,2}$)	1035.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.5667 m^3		

(B) Gaseous Fluoride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: NA Gaseous Fluoride Weight 0.0006 g

Final Gaseous Fluoride Weight (Mp1): 0.00060 g

Gaseous Fluoride Concentration (C1): $=M_{p1}/MV_4=$ 0.00038 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.38 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.03 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 30 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.015 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 15 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 205A

V_v = 10.9 g (from laboratory report) V_w = 12 mL (=grams) (recorded on Laboratory Form 108)

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

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0146

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

B_{ws} = 1.91 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Gaseous 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 $\frac{(Ps)}{(1013.25)}$

= 1.098 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.73 m/s

(ii) Average of post-sampling velocities: 14.17 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.45 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 = 30.90 m^3/s (stack conditions)

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

Qstd = 25.8 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0098	g/s (0°C, dry gas, 1 atm pressure	)		
	=	9.8	mg/s (0°C, dry gas, 1 atm pressure	)		
	C_{1a} x Qstd =	0.78	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2	)
	=	780	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2	)
	C_{1a} x Qstd =	0.39	g/s (0°C, dry gas, 1 atm pressure	7%	O_2	)
	=	390	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2	)

EMISSION MONITORING RESULTS, STACK 1
WESTON ALUMINIUM
14-Aug-10
HAZARDOUS SUBSTANCES (METALS)
POLYCYCLIC AROMATIC HYDROCARBONS
PARTICULATE FLUORIDE
GASEOUS FLUORIDE

Sampling Conditions:			
Stack internal diameter at test location	1650 mm		
Stack gas temperature (average)	54.8 °C		328.0 K
Stack pressure (average)	1036 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)	26 m^3/s		
Hazardous Substances (Metals) Testing			
Test Period	8:17	-	10:05
Hazardous Substances (Metals) Mass	0.024 mg		
Gas Volume Sampled	1.38 m^3		
Hazardous Substances (Metals) Emission*1	0.017 mg/m^3		
Hazardous Substances (Metals) Mass Emission Rate*2	0.44 mg/s		
Regulatory Limit	10 mg/m^3		
Polycyclic Aromatic Hydrocarbons Testing			
Test Period	8:17	-	10:05
Polycyclic Aromatic Hydrocarbons Mass	0.72 mg		
Gas Volume Sampled	0.971 m^3		
Polycyclic Aromatic Hydrocarbons Emission*1	0.74 mg/m^3		
Polycyclic Aromatic Hydrocarbons Mass Emission Rate*2	19 mg/s		
Regulatory Limit	N/A mg/m^3		
Particulate Fluoride Testing			
Test Period	8:17	-	10:05
Particulate Fluoride Mass	0.043 mg		
Gas Volume Sampled	1.57 m^3		
Particulate Fluoride Emission*1	0.027 mg/m^3		
Particulate Fluoride Mass Emission Rate*2	0.7 mg/s		
Regulatory Limit	2 mg/m^3		
Gaseous Fluoride Testing			
Test Period	8:17	-	10:05
Gaseous Fluoride Mass	0.6 mg		
Gas Volume Sampled	1.57 m^3		
Gaseous Fluoride Emission*1	0.38 mg/m^3		
Gaseous Fluoride Mass Emission Rate*2	9.8 mg/s		
Regulatory Limit	2 mg/m^3		
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.

AECOM

Weston Aluminium

AECOM's Project Number: 60162060

Emission Source: Stack 1

Date Sampled: 14-Aug-10

ANALYTE(S)	**METHOD**
Cyanide	USEPA CTM 033
Chlorine	NSW DECC TM - 7 & 8
Hydrogen Chloride	NSW DECC TM - 7 & 8

Observations made during testing period:

Sampling Performed By:

Chris Burns

James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Cyanide
Test 2: Chlorine
Test 3: Hydrogen Chloride

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: .....

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STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Cyanide
Test 2: Chlorine
Test 3: Hydrogen Chloride

Sampling time start: 12:40		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:40	3	20.8	0.1
2	12:41	3	20.8	0.1
3	12:42	3	20.8	0.1
4	12:43	3	20.8	0.1
5	12:44	3	20.8	0.1
6	12:45	3	20.8	0.1
7	12:46	3	20.8	0.1
8	12:47	3	20.8	0.1
	Averages:	3.0 ppm	20.8 %	0.1 %

Moisture content (M3): 0.99
Moisture percentage (M2): 1.20 %

Measurements

CO:	0.0003 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.1 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0003 %,(wet)	N_2:	78.2 %,(wet)
CO_2:	0.1 %,(wet)	O_2:	20.6 %,(wet)
H_2O:	1.20 %(=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-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Cyanide
Test 2: Chlorine
Test 3: Hydrogen Chloride

Sampling time start: 14:27		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	14:27	3	20.9	0.0
2	14:28	3	20.9	0.0
3	14:29	3	20.9	0.0
4	14:30	3	20.9	0.0
5	14:31	3	20.9	0.0
6	14:32	3	20.9	0.0
7	14:33	3	20.9	0.0
8	14:34	3	20.9	0.0
	Averages:	3.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
Moisture percentage (M2): 2.01 %

Measurements

CO:	0.0003 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.0 %,(dry)	O_2:	20.9 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0003 %,(wet)	N_2:	77.5 %,(wet)
CO_2:	0.0 %,(wet)	O_2:	20.5 %,(wet)
H_2O:	2.01 %(=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)

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Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1:Cyanide
Test 2:Chlorine
Test 3:Hydrogen Chloride

Time :	12:35	Barometric Pressure :		1030	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	0.226	37.5	310.7	16.7
1/2	165	0.226	37.6	310.8	16.7
1/3	262	0.216	37.7	310.9	16.3
1/4	383	0.206	37.7	310.9	15.9
1/5	554	0.196	37.8	311.0	15.5
1/6	1036	0.147	37.7	310.9	13.5
1/7	1208	0.128	37.9	311.1	12.5
1/8	1328	0.098	37.9	311.1	11.0
1/9	1425	0.098	37.8	311.0	11.0
1/10	1509	0.108	37.8	311.0	11.5
2/1	81	0.226	37.3	310.5	16.7
2/2	165	0.206	37.5	310.7	15.9
2/3	262	0.196	37.7	310.9	15.5
2/4	383	0.186	37.8	311.0	15.1
2/5	554	0.186	38.0	311.2	15.2
2/6	1036	0.147	37.9	311.1	13.5
2/7	1208	0.128	37.9	311.1	12.5
2/8	1328	0.137	37.9	311.1	13.0
2/9	1425	0.137	37.8	311.0	13.0
2/10	1509	0.152	37.7	310.9	13.7
Average			37.7	310.9	14.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 10 mm
Absolute pressure in stack (hPa) : 1030.98 hPa

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STACK ANALYSIS
SAMPLING OF CYANIDE

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: G54
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: 0

Leak Check (Pre-Sampling)
Meter start: 12667.1772 Meter finish: 12667.1772
Time start: 12:47 Time finish: 12:48

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 12668.2354 Meter finish: 12668.2354
Time start: 14:42 Time finish: 14:43

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 12667.1780 Time start: 12:50
Meter correction factor (GMf) : 1.0155

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	30.0	20.0		Yes
1/2	0:10:00	195	12.4	32.0	23.0		Yes
1/3	0:15:00	292	12.1	32.0	23.0		Yes
1/4	0:20:00	413	11.8	32.0	23.0		Yes
1/5	0:25:00	584	11.5	33.0	23.0		Yes
1/6	0:30:00	1066	10.0	33.0	23.0		Yes
1/7	0:35:00	1238	9.2	35.0	24.0		Yes
1/8	0:40:00	1358	8.1	35.0	25.0		Yes
1/9	0:45:00	1455	8.1	35.0	25.0		Yes
1/10	0:50:00	1539	8.5	35.0	26.0		Yes
2/1	0:55:00	111	12.4	37.0	30.0		Yes
2/2	1:00:00	195	11.8	37.0	29.0		Yes
2/3	1:05:00	292	11.5	37.0	29.0		Yes
2/4	1:10:00	413	11.2	37.0	29.0		Yes
2/5	1:15:00	584	11.2	37.0	30.0		Yes
2/6	1:20:00	1066	10.0	37.0	30.0		Yes
2/7	1:25:00	1238	9.2	37.0	30.0		Yes
2/8	1:30:00	1358	9.6	37.0	30.0		Yes
2/9	1:35:00	1455	9.6	37.0	30.0		Yes
2/10	1:40:00	1539	10.1	37.0	30.0		Yes
Averages				35.1	26.6	no result	

Meter Finish: 12668.2342 Time Finish: 14:35
Total Condensate collected: 10 ml Silica gel No(s) used: G049

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STACK ANALYSIS
SAMPLING OF CHLORINE

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: G55
Sampling Port No.: 1 to 2
Page No: 1 of 1
Sample Nozzle Area (An): 1.68 x $10^{-5}m^2$
Thimble No: NA
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 239.5020 Meter finish: 239.5020
Time start: 12:45 Time finish: 12:46

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 240.9213 Meter finish: 240.9213
Time start: 14:41 Time finish: 14:42

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 239.5029 Time start: 12:50
Meter correction factor (GMf) : 1.0094

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	16.1	40.0	24.0		Yes
1/2	0:10:00	195	16.1	40.0	24.0		Yes
1/3	0:15:00	292	15.7	40.0	24.0		Yes
1/4	0:20:00	413	15.3	40.0	24.0		Yes
1/5	0:25:00	584	15.0	40.0	23.0		Yes
1/6	0:30:00	1066	13.0	40.0	23.0		Yes
1/7	0:35:00	1238	12.1	40.0	23.0		Yes
1/8	0:40:00	1358	10.6	40.0	23.0		Yes
1/9	0:45:00	1455	10.6	40.0	23.0		Yes
1/10	0:50:00	1539	11.1	40.0	23.0		Yes
2/1	0:55:00	111	16.1	38.0	21.0		Yes
2/2	1:00:00	195	15.4	38.0	21.0		Yes
2/3	1:05:00	292	15.0	38.0	21.0		Yes
2/4	1:10:00	413	14.6	37.0	20.0		Yes
2/5	1:15:00	584	14.7	37.0	20.0		Yes
2/6	1:20:00	1066	13.0	37.0	19.0		Yes
2/7	1:25:00	1238	12.1	36.0	19.0		Yes
2/8	1:30:00	1358	12.5	36.0	19.0		Yes
2/9	1:35:00	1455	12.5	35.0	18.0		Yes
2/10	1:40:00	1539	13.2	33.0	17.0		Yes
Averages				38.3	21.5	no result	

Meter Finish: 240.9208 Time Finish: 14:35
Total Condensate collected: 15 ml Silica gel No(s) used: G653

AECOM

STACK ANALYSIS

#N/A

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: G55 Sample Nozzle Area (An): 1.68 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: NA
Page No: 1 of 1 Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 239.5020 Meter finish: 239.5020
Time start: 12:45 Time finish: 12:46

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 240.9213 Meter finish: 240.9213
Time start: 14:41 Time finish: 14:42

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 239.5029 Time start: 12:50
Meter correction factor (GMf) : 1.0094

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	16.1	40.0	24.0		Yes
1/2	0:10:00	195	16.1	40.0	24.0		Yes
1/3	0:15:00	292	15.7	40.0	24.0		Yes
1/4	0:20:00	413	15.3	40.0	24.0		Yes
1/5	0:25:00	584	15.0	40.0	23.0		Yes
1/6	0:30:00	1066	13.0	40.0	23.0		Yes
1/7	0:35:00	1238	12.1	40.0	23.0		Yes
1/8	0:40:00	1358	10.6	40.0	23.0		Yes
1/9	0:45:00	1455	10.6	40.0	23.0		Yes
1/10	0:50:00	1539	11.1	40.0	23.0		Yes
2/1	0:55:00	111	16.1	38.0	21.0		Yes
2/2	1:00:00	195	15.4	38.0	21.0		Yes
2/3	1:05:00	292	15.0	38.0	21.0		Yes
2/4	1:10:00	413	14.6	37.0	20.0		Yes
2/5	1:15:00	584	14.7	37.0	20.0		Yes
2/6	1:20:00	1066	13.0	37.0	19.0		Yes
2/7	1:25:00	1238	12.1	36.0	19.0		Yes
2/8	1:30:00	1358	12.5	36.0	19.0		Yes
2/9	1:35:00	1455	12.5	35.0	18.0		Yes
2/10	1:40:00	1539	13.2	33.0	17.0		Yes
Averages				38.3	21.5	no result	

Meter Finish: 240.9208 Time Finish: 14:35
Total Condensate collected: 15 ml Silica gel No(s) used: G653

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1:Cyanide
Test 2:Chlorine
Test 3:Hydrogen Chloride

Time :	0:00	Barometric Pressure :		1030	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	0.206	65.5	338.7	16.7
1/2	165	0.216	65.7	338.9	17.1
1/3	262	0.201	65.9	339.1	16.5
1/4	383	0.186	66.3	339.5	15.9
1/5	554	0.167	66.7	339.9	15.0
1/6	1036	0.128	66.8	340.0	13.1
1/7	1208	0.098	66.9	340.1	11.5
1/8	1328	0.078	67.0	340.2	10.3
1/9	1425	0.069	66.6	339.8	9.6
1/10	1509	0.098	66.4	339.6	11.5
2/1	81	0.172	66.6	339.8	15.2
2/2	165	0.172	67.1	340.3	15.2
2/3	262	0.177	67.4	340.6	15.5
2/4	383	0.167	67.6	340.8	15.0
2/5	554	0.181	67.5	340.7	15.7
2/6	1036	0.118	67.2	340.4	12.6
2/7	1208	0.103	67.1	340.3	11.8
2/8	1328	0.108	67.0	340.2	12.1
2/9	1425	0.118	66.9	340.1	12.6
2/10	1509	0.128	66.8	340.0	13.1
Average			66.8	340.0	13.8

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -9.5 mm
Absolute pressure in stack (hPa) : 1029.07 hPa

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STACK ANALYSIS - FINAL CALCULATIONS

Cyanide

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.0726 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	30.9 °C		
	304.1 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.9795 m^3		

(B) Cyanide concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: NA Cyanide Weight <0.000006 g

Final Cyanide Weight (Mp1): <0.000006 g

Cyanide 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: $= C_a \times 12/CO_2\% =$ <0.0015 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <1.5 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.00057 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <0.57 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G049

V_v = 0 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 ($V_{wsg(std)}$) = 0.0000

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

B_{ws} = 1.34 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

AECOM

Cyanide

(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 $\frac{(Ps)}{(1013.25)}$

= 1.092 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.24 m/s

(ii) Average of post-sampling velocities: 13.80 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.02 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 = 29.98 m^3/s (stack conditions)

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

Qstd = 25.2 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 =	<0.037	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
=	<37	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
C_{1a} x Qstd =	<0.014	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
=	<14	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

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STACK ANALYSIS - FINAL CALCULATIONS

Chlorine

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.4312 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	29.9 °C		
	303.1 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.3113 m^3		

(B) Chlorine concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: NA Chlorine Weight 0.000545 g

Final Chlorine Weight (Mp1): 0.00055 g

Chlorine 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%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.1 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 100 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.039 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 39 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G653

V_v = 8.61 g (from laboratory report) V_w = 15 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0200

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0115

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

B_{ws} = 2.34 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Chlorine

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(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 $\frac{(Ps)}{(1013.25)}$

= 1.101 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.24 m/s

(ii) Average of post-sampling velocities: 13.80 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.02 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 = 29.98 m^3/s (stack conditions)

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

Qstd = 25.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.01	g/s (0°C, dry gas, 1 atm pressure)		
	=	10	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	2.5	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	2500	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.98	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	980	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

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STACK ANALYSIS - FINAL CALCULATIONS

Hydrogen Chloride

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.4312 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	29.9 °C		
	303.1 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.3113 m^3		

(B) Hydrogen Chloride concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: NA Hydrogen Chloride Weight 0.00124 g

Final Hydrogen Chloride Weight (Mp1): 0.00124 g

Hydrogen Chloride Concentration (C1): $=M_{p1}/MV_4=$ 0.00095 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.95 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.1 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.23 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 230 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.9 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.089 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 89 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G653

V_v = 8.61 g (from laboratory report) V_w = 15 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0200

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0115

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

B_{ws} = 2.34 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Hydrogen Chloride

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(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 $\frac{(Ps)}{(1013.25)}$

= 1.101 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.24 m/s

(ii) Average of post-sampling velocities: 13.80 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.02 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 = 29.98 m^3/s (stack conditions)

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

Qstd = 25.0 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm = C_{1a} x Qstd =	0.024	g/s (0°C, dry gas, 1 atm pressure)		
=	24	mg/s (0°C, dry gas, 1 atm pressure)		
C_{1a} x Qstd =	5.7	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
=	5700	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
C_{1a} x Qstd =	2.2	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
=	2200	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 1
WESTON ALUMINIUM
14-Aug-10
CYANIDE
CHLORINE
HYDROGEN CHLORIDE

Sampling Conditions:			
Stack internal diameter at test location	1650 mm		
Stack gas temperature (average)	52.2 °C		325.4 K
Stack pressure (average)	1030 hPa		
Stack gas velocity (average, stack conditions)	14 m/s		
Stack gas flowrate (stack conditions)	30 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25 m^3/s		
Cyanide Testing			
Test Period	12:50	-	14:35
Cyanide Mass	<0.006 mg		
Gas Volume Sampled	0.98 m^3		
Cyanide Emission*1	<0.0061 mg/m^3		
Cyanide Mass Emission Rate*2	<0.15 mg/s		
Regulatory Limit	NA mg/m^3		
Chlorine Testing			
Test Period	12:50	-	14:35
Chlorine Mass	0.545 mg		
Gas Volume Sampled	1.31 m^3		
Chlorine Emission*1	0.42 mg/m^3		
Chlorine Mass Emission Rate*2	10 mg/s		
Regulatory Limit	NA mg/m^3		
Hydrogen Chloride Testing			
Test Period	12:50	-	14:35
Hydrogen Chloride Mass	1.24 mg		
Gas Volume Sampled	1.31 m^3		
Hydrogen Chloride Emission*1	0.95 mg/m^3		
Hydrogen Chloride Mass Emission Rate*2	24 mg/s		
Regulatory Limit	400 mg/m^3		
Moisture Content (%)	2.0		
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.

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Weston Aluminium

AECOM's Project Number: 60162060

Emission Source: Stack 1

Date Sampled: 14-Aug-10

ANALYTE(S)	**METHOD**
Fine Particulate (PM10)	NSW DECC OM - 5
Total Particulate	NSW DECC TM - 15
Sulfuric Acid Mist	NSW DECC TM - 3
Sulfur Dioxide	NSW DECC TM - 4

Observations made during testing period:

Sampling Performed By:

Chris Burns

James Lang

AECOM

STACK ANALYSIS - PRE-SAMPLING

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
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= 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		
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

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

General Comments:

Signed: .....

Checked: .....

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STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Sulfuric Acid Mist (H2SO4 as SO3)
Test 4: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 10:18		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	10:18	3	20.5	0.2
2	10:19	3	20.5	0.2
3	10:20	2	20.5	0.2
4	10:21	2	20.6	0.2
5	10:22	2	20.6	0.2
6	10:23	2	20.6	0.2
7	10:24	3	20.5	0.2
8	10:25	2	20.5	0.2
	Averages:	2.4 ppm	20.5 %	0.2 %

Moisture content (M3): 0.99
Moisture percentage (M2): 1.20 %

Measurements

CO:	0.0002 %,(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:	78.3 %,(wet)
CO_2:	0.2 %,(wet)	O_2:	20.3 %,(wet)
H_2O:	1.20 %(=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-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Sulfuric Acid Mist (H2SO4 as SO3)
Test 4: Sulfur Dioxide (SO2 as SO3)

Sampling time start: 12:40		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm). (dry)	O_2 (%), (dry)	CO_2 (%), (dry)
1	12:40	3	20.8	0.1
2	12:41	3	20.8	0.1
3	12:42	3	20.8	0.1
4	12:43	3	20.8	0.1
5	12:44	3	20.8	0.1
6	12:45	3	20.8	0.1
7	12:46	3	20.8	0.1
8	12:47	3	20.8	0.1
	Averages:	3.0 ppm	20.8 %	0.1 %

Moisture content (M3): 0.96
Moisture percentage (M2): 3.94 %

Measurements

CO:	0.0003 %,(dry)	N_2:	79.1 %,(dry)
CO_2:	0.1 %,(dry)	O_2:	20.8 %,(dry)
Gas Compositions converted to wet basis:			
CO:	0.0003 %,(wet)	N_2:	76.0 %,(wet)
CO_2:	0.1 %,(wet)	O_2:	20.0 %,(wet)
H_2O:	3.94 %(=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)	

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Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1

Test 2:Total Particulate
Test 3:Sulfuric Acid Mist (H2SO4 as SO3)
Test 4:Sulfur Dioxide (SO2 as SO3)

Time :	10:20	Barometric Pressure :		1030	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	62.9	336.1	16.9
1/2	165	0.216	63.6	336.8	17.0
1/3	262	0.206	64.2	337.4	16.6
1/4	383	0.206	64.3	337.5	16.6
1/5	554	0.206	64.1	337.3	16.6
1/6	1036	0.147	63.8	337.0	14.0
1/7	1208	0.118	63.1	336.3	12.5
1/8	1328	0.108	63.6	336.8	12.0
1/9	1425	0.088	62.0	335.2	10.8
1/10	1509	0.093	61.3	334.5	11.1
2/1	81	0.206	60.5	333.7	16.5
2/2	165	0.186	60.7	333.9	15.7
2/3	262	0.172	61.1	334.3	15.1
2/4	383	0.167	61.5	334.7	14.9
2/5	554	0.177	62.0	335.2	15.3
2/6	1036	0.128	62.1	335.3	13.0
2/7	1208	0.118	62.4	335.6	12.5
2/8	1328	0.113	62.5	335.7	12.2
2/9	1425	0.113	62.8	336.0	12.3
2/10	1509	0.118	62.8	336.0	12.5
Average			62.6	335.8	14.2

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 5 mm
Absolute pressure in stack (hPa) : 1030.49 hPa

AECOM

STACK ANALYSIS

SAMPLING OF FINE PARTICULATE (PM10)

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: Fine5 Sample Nozzle Area (An): 1.89 x $10^{-5}m^2$
Sampling Port No.: 1 to 2 Thimble No: S59
Page No: 1 of 1 Blank thimble No: 0

Leak Check (Pre-Sampling)
Meter start: 238.0240 Meter finish: 238.0240
Time start: 10:30 Time finish: 10:31

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 239.4965 Meter finish: 239.4965
Time start: 12:45 Time finish: 12:46

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 238.6260 Time start: 10:30
Meter correction factor (GMf) : 1.0094

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	0:09:45	73	13.5	25.0	11.0		Yes
1/2	0:09:45	241	13.5	26.0	11.0		Yes
1/3	0:09:45	488	13.5	27.0	12.0		Yes
1/4	0:07:45	1162	13.5	28.0	12.0		Yes
1/5	0:06:30	1409	13.5	30.0	13.0		Yes
1/6	0:06:45	1577	13.5	30.0	14.0		Yes
2/1	0:09:45	73	13.5	31.0	14.0		Yes
2/2	0:09:15	241	13.5	31.0	14.0		Yes
2/3	0:08:45	488	13.5	32.0	14.0		Yes
2/4	0:07:15	1162	13.5	32.0	15.0		Yes
2/5	0:07:15	1409	13.5	33.0	17.0		Yes
2/6	0:07:30	1577	13.5	33.0	18.0		Yes
Averages				29.8	13.8	no result	

Meter Finish: 239.4962 Time Finish: 10:31
Total Condensate collected: 9 ml Silica gel No(s) used: G027

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STACK ANALYSIS

SAMPLING OF TOTAL PARTICULATE

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: S9
Sampling Port No.: 1 to 2
Page No: 1 of 1

Sample Nozzle Area (An): 1.43 x $10^{-5}m^2$
Thimble No: S46
Blank thimble No:

Leak Check (Pre-Sampling)
Meter start: 12665.9982 Meter finish: 12665.9982
Time start: 10:32 Time finish: 10:33

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 12667.1730 Meter finish: 12667.1730
Time start: 12:48 Time finish: 12:49

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 12666.9901 Time start: 10:40
Meter correction factor (GMf) : 0.9918

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	12.6	34.0	24.0		Yes
1/2	0:10:00	195	12.7	34.0	24.0		Yes
1/3	0:15:00	292	12.3	33.0	23.0		Yes
1/4	0:20:00	413	12.3	33.0	22.0		Yes
1/5	0:25:00	584	12.3	33.0	22.0		Yes
1/6	0:30:00	1066	10.4	33.0	22.0		Yes
1/7	0:35:00	1238	9.3	32.0	22.0		Yes
1/8	0:40:00	1358	8.9	32.0	21.0		Yes
1/9	0:45:00	1455	8.1	32.0	20.0		Yes
1/10	0:50:00	1539	8.3	32.0	20.0		Yes
2/1	0:55:00	111	12.4	32.0	20.0		Yes
2/2	1:00:00	195	11.8	32.0	20.0		Yes
2/3	1:05:00	292	11.3	31.0	20.0		Yes
2/4	1:10:00	413	11.2	30.0	20.0		Yes
2/5	1:15:00	584	11.4	28.0	19.0		Yes
2/6	1:20:00	1066	9.7	27.0	18.0		Yes
2/7	1:25:00	1238	9.3	27.0	18.0		Yes
2/8	1:30:00	1358	9.1	26.0	18.0		Yes
2/9	1:35:00	1455	9.2	26.0	18.0		Yes
2/10	1:40:00	1539	9.3	25.0	17.0		Yes
Averages				30.6	20.4	no result	

Meter Finish: 12667.1726 Time Finish: 12:40
Total Condensate collected: 3 ml Silica gel No(s) used: G100

AECOM

STACK ANALYSIS

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

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack Description No.: Stack 1
Sample Nozzle No.: G55 Sample Nozzle Area (An): 1.68 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: 4608.5962 Meter finish: 4608.5962
Time start: 10:35 Time finish: 10:36

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:
Comments:

Leak Check (Post Sampling)
Meter start: 4608.9434 Meter finish: 4609.9434
Time start: 12:50 Time finish: 12:51

Therefore, leakage rate = 1000 L/min

(>0.1 l/min. is unacceptable)
Unacceptable

Repeat:
Comments:

Sampling Record Table

Barometric Pressure: 1030 hPa (start); 1030 hPa (finish)
Meter start: 4608.5990 Time start: 10:40
Meter correction factor (GMf) : 1.0155

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	15.2	30.0	24.0		Yes
1/2	0:10:00	195	15.2	30.0	24.0		Yes
1/3	0:15:00	292	14.8	30.0	24.0		Yes
1/4	0:20:00	413	14.8	30.0	23.0		Yes
1/5	0:25:00	584	14.8	30.0	23.0		Yes
1/6	0:30:00	1066	12.5	30.0	23.0		Yes
1/7	0:35:00	1238	11.2	30.0	22.0		Yes
1/8	0:40:00	1358	10.8	30.0	22.0		Yes
1/9	0:45:00	1455	9.7	30.0	21.0		Yes
1/10	0:50:00	1539	10.0	30.0	21.0		Yes
2/1	0:55:00	111	14.9	29.0	20.0		Yes
2/2	1:00:00	195	14.2	29.0	19.0		Yes
2/3	1:05:00	292	13.6	28.0	19.0		Yes
2/4	1:10:00	413	13.4	28.0	19.0		Yes
2/5	1:15:00	584	13.8	27.0	18.0		Yes
2/6	1:20:00	1066	11.7	26.0	18.0		Yes
2/7	1:25:00	1238	11.2	26.0	17.0		Yes
2/8	1:30:00	1358	11.0	25.0	17.0		Yes
2/9	1:35:00	1455	11.0	25.0	16.0		Yes
2/10	1:40:00	1539	11.2	24.0	15.0		Yes
Averages				28.4	20.3	no result	

Meter Finish: 4609.9432 Time Finish: 12:40
Total Condensate collected: 5 ml Silica gel No(s) used: 64K

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

AECOM

Date: 14-Aug-10
Client: Weston Aluminium
AECOM's Project No: 60162060
Stack/Duct Description: Stack 1

Test 2:Total Particulate
Test 3:Sulfuric Acid Mist (H2SO4 as SO3)
Test 4:Sulfur Dioxide (SO2 as SO3)

Time :	0:00	Barometric Pressure :		1030	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	0.226	37.5	310.7	16.7
1/2	165	0.226	37.6	310.8	16.7
1/3	262	0.216	37.7	310.9	16.4
1/4	383	0.206	37.7	310.9	16.0
1/5	554	0.196	37.8	311.0	15.6
1/6	1036	0.147	37.7	310.9	13.5
1/7	1208	0.128	37.9	311.1	12.6
1/8	1328	0.098	37.9	311.1	11.0
1/9	1425	0.098	37.8	311.0	11.0
1/10	1509	0.108	37.8	311.0	11.6
2/1	81	0.226	37.3	310.5	16.7
2/2	165	0.206	37.5	310.7	16.0
2/3	262	0.196	37.7	310.9	15.6
2/4	383	0.186	37.8	311.0	15.2
2/5	554	0.186	38.0	311.2	15.2
2/6	1036	0.147	37.9	311.1	13.5
2/7	1208	0.128	37.9	311.1	12.6
2/8	1328	0.137	37.9	311.1	13.1
2/9	1425	0.137	37.8	311.0	13.1
2/10	1509	0.152	37.7	310.9	13.8
Average			37.7	310.9	14.3

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : 10 mm
Absolute pressure in stack (hPa) : 1030.98 hPa

STACK ANALYSIS - PM10 CALCULATIONS

AECOM

Date:	14-Aug-10	Client:	Weston Aluminium
AECOM's Project No:	60162060	Stack/Duct Description:	Stack 1

1. Gas Analysis

	%		
$\%CO_2$	0.1		
$\%O_2$	20.8		
$\%N_2+\%CO$	79.3		
Fraction Moisture Content, Bws	0.03	M_d=	0.97

2. Molecular Weight of Stack Gas (Dry Basis)

Mol. Wt. of Stack Gas (dry)	28.85
Mol. Wt. of Stack Gas (wet)	28.72

3. Absolute Stack Pressure

	Pascals	in. Hg
Barometric Pressure (Pbar)	103000	30.41
Stack Static Pressure (Pg)	103098	30.44
Absolute Stack Pressure		30.44

4. Viscosity of Stack Gas

	°C	°F
Average Stack Temp.	37.7	99.8
Average Meter Temperature:	21.8	
Stack Gas Viscosity		187.3

5. Cyclone Flow Rate

	ft^3/min	m^3/min	L/min	L/s
Cyclone Flow Rate	0.47	0.0165	16.45	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
1	0.130	84.34	27.76	0.760	1.228	64.08	21.02	103.57	33.98
2	0.159	55.99	18.43	0.723	1.251	40.48	13.28	70.04	22.98
3	0.000	##########	##########	0.800	1.200	##########	########	########	########
4	0.000	##########	##########	0.800	1.200	##########	########	########	########
5	0.193	38.25	12.59	0.654	1.288	25.01	8.21	49.27	16.17
6	0.225	28.07	9.24	0.535	1.336	15.01	4.92	37.50	12.30
7	0.239	25.01	8.23	0.449	1.359	12.50	4.10	34.00	11.15
8	0.265	20.34	6.69	#NUM!	1.411	10.17	3.34	28.70	9.41
9	0.296	16.24	5.35	#NUM!	1.484	8.12	2.66	24.10	7.91
10	0.343	12.13	3.99	#NUM!	1.610	6.07	1.99	18.20	5.97
11	0.388	9.45	3.11	#NUM!	1.755	4.72	1.55	14.17	4.65

	Nozzle Diameter	Nozzle Diameter	Nozzle Area	Sample Rate
Selected Nozzle	(inches)	(m)	(m^2)	(L/min)
5	0.193	0.005	0.000019	13

AECOM

STACK ANALYSIS - PM10 CALCULATIONS CONTINUED

Date: 14-Aug-10 Client: Weston Aluminium
AECOM's Project No: 60162060 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
215.82	0.87	0.93	9.6
225.63	0.91	0.95	9.8
196.20	0.79	0.89	9.1
137.34	0.55	0.74	7.6
103.01	0.41	0.64	6.6
107.91	0.43	0.66	6.8
215.82	0.87	0.93	9.6
196.20	0.79	0.89	9.1
186.39	0.75	0.86	8.9
127.53	0.51	0.72	7.4
137.34	0.55	0.74	7.6
147.15	0.59	0.77	7.9
	Average	0.81	100.00
	Square	0.66	

Total time min	Full hours	Full minutes	Seconds
9.8	0	9	45
19.5	0	19	30
29.3	0	29	15
37.0	0	37	0
43.5	0	43	30
50.3	0	50	15
60.0	1	0	0
69.3	1	9	15
78.0	1	18	0
85.3	1	25	15
92.5	1	32	30
100.0	1	40	0

Aerodynamic Cut Size (u_{cyc})
190.0

PM_{10} Flow rate at actual cyclone conditions (Q_a)
0.0092

Actual D_{50}
13.0

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.8784 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	21.8 °C		
	295.0 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.8269 m^3		

(B) PM10 concentration at standard conditions

Blank thimble No.: 0 Blank weight: g

Thimble No. used: S59 PM10 Weight 0.0002 g

Final PM10 Weight (Mp1): 0.00020 g

PM10 Concentration (C1): $=M_{p1}/MV_4=$ 0.00024 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = 0.24 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.019 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 19 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.01 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 10 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G027

V_v = 8.3 g (from laboratory report) V_w = 9 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0120

Volume of Water Vapour Condensed ($V_{wsg(std)}$) = 0.0111

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

B_{ws} = 2.71 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Fine Particulate (PM10)

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 $\frac{(Ps)}{(1013.25)}$

= 1.118 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: 14.26 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.28 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 = 30.53 m^3/s (stack conditions)

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

Qstd = 25.6 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.0061	g/s (0°C, dry gas, 1 atm pressure)		
	=	6.1	mg/s (0°C, dry gas, 1 atm pressure)		
	C_{1a} x Qstd =	0.49	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	490	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	0.26	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	260	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	0.1810 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	25.5 °C		
	298.7 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	0.1683 m^3		

(B) Total Particulate concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: S46 Total Particulate Weight 0.0015 g

Final Total Particulate Weight (Mp1): 0.00150 g

Total Particulate 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%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ 0.71 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = 710 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ 0.38 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = 380 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: G100

V_v = 7.09 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 ($V_{wsg(std)}$) = 0.0095

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

B_{ws} = 7.41 %

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 $\frac{(Ps)}{(1013.25)}$

= 1.143 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.21 m/s

(ii) Average of post-sampling velocities: 14.30 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.25 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 = 30.47 m^3/s (stack conditions)

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

Qstd = 24.2 m^3/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C_{1a} x Qstd =	0.22	g/s (0°C, dry gas, 1 atm pressure)		
	=	220	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 =	9.1	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	9100	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfuric Acid Mist (H2SO4 as SO3)

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.3650 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	24.3 °C		
	297.5 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.2742 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): $=M_{p1}/MV_4=$ <0.0016 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <1.6 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.13 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%: 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: 64K

V_v = 11.4 g (from laboratory report) V_w = 5 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0067

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} = 1.69 %

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): 1.29 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 $\frac{(Ps)}{(1013.25)}$

= 1.109 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.21 m/s

(ii) Average of post-sampling velocities: 14.30 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.25 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 = 30.47 m^3/s (stack conditions)

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

Qstd = 25.7 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 =	<3.3	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<3300	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<1.7	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<1700	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

AECOM

STACK ANALYSIS - FINAL CALCULATIONS

Sulfur Dioxide (SO2 as SO3)

(Calculations perform in accordance with relevant NSW-DECC test method as defined by on cover page)

Date: 14-Aug-10 Client: Weston Aluminium

AECOM's Project No: 60162060 Stack/Duct Description: Stack 1

(A) Sample gas volume at standard conditions

Metered volume (MV_3):	1.3650 m^3	Average barometric pressure (P_{BARO})	1030 hPa
Average gas meter temp. ($T_{M,2}$):	24.3 °C		
	297.5 K	Average pressure at meter ($P_{M,2}$)	1030.00 hPa
Sample gas volume (MV_4); (0°C, dry gas, 1 atm pressure):	1.2742 m^3		

(B) SO2 as SO3 concentration at standard conditions

Blank thimble No.: Blank weight: g

Thimble No. used: 0 SO2 as SO3 Weight <.01 g

Final SO2 as SO3 Weight (Mp1): <.01 g

SO2 as SO3 Concentration (C1): $=M_{p1}/MV_4=$ <0.0078 g/m^3 (0°C, dry gas, 1atm pressure)

;and C_2 = <7.8 mg/m^3 (0°C, dry gas, 1atm pressure)

CO_2 Basis 12 %

Average CO_2%: 0.2 %

Therefore, C_c: $= C_a \times 12/CO_2\% =$ <0.62 g/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

;and C_{c1} = <620 mg/m^3 (0°C, dry gas, 1atm pressure, 12% CO_2)

O_2 Basis 7 %

Average O_2%: 20.7 %

Therefore, C_b: $=C_a \times (21 - O_{2ref}\%)/(21 - O_{2mea}\%)$ <0.33 g/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

;and C_{b1} = <330 mg/m^3 (0°C, dry gas, 1atm pressure, 7% O_2)

(C) Moisture content

Silica Gel Number: 64K

V_v = 11.4 g (from laboratory report) V_w = 5 mL (=grams) (recorded on Laboratory Form 108)

Volume of Water Vapour Condensed ($V_{wc(std)}$) = 0.0067

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} = 1.69 %

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): 1.29 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 $\frac{(Ps)}{(1013.25)}$

= 1.109 kg/m^3 (stack conditions, wet)

(E) Gas Velocities

(i) Average of pre-sampling velocities: 14.21 m/s

(ii) Average of post-sampling velocities: 14.30 m/s

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

(iv) Overall average of pre-sampling and post-sampling velocities (Vs): 14.25 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 = 30.47 m^3/s (stack conditions)

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

Qstd = 25.7 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 =	<16	g/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	=	<16000	mg/s (0°C, dry gas, 1 atm pressure	12%	CO_2)
	C_{1a} x Qstd =	<8.5	g/s (0°C, dry gas, 1 atm pressure	7%	O_2)
	=	<8500	mg/s (0°C, dry gas, 1 atm pressure	7%	O_2)

EMISSION MONITORING RESULTS, STACK 1
WESTON ALUMINIUM
14-Aug-10
FINE PARTICULATE (PM10)
TOTAL PARTICULATE
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)	50.1 °C		323.3 K
Stack pressure (average)	1031 hPa		
Stack gas velocity (average, stack conditions)	14 m/s		
Stack gas flowrate (stack conditions)	30 m^3/s		
Stack gas flowrate (0^0C, dry gas, 1 atm pressure)	25 m^3/s		
Fine Particulate (PM10) Testing			
Test Period	10:30	-	10:31
Fine Particulate (PM10) Mass	0.2 mg		
Gas Volume Sampled	0.827 m^3		
Fine Particulate (PM10) Emission*1	0.24 mg/m^3		
Fine Particulate (PM10) Mass Emission Rate*2	6.1 mg/s		
Regulatory Limit	NA mg/m^3		
Total Particulate Testing			
Test Period	10:40	-	12:40
Total Particulate Mass	1.5 mg		
Gas Volume Sampled	0.168 m^3		
Total Particulate Emission*1	8.9 mg/m^3		
Total Particulate Mass Emission Rate*2	220 mg/s		
Regulatory Limit	25 mg/m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Testing			
Test Period	10:40	-	12:40
Sulfuric Acid Mist (H2SO4 as SO3) Mass	<2 mg		
Gas Volume Sampled	1.27 m^3		
Sulfuric Acid Mist (H2SO4 as SO3) Emission*1	<1.6 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	10:40	-	12:40
Sulfur Dioxide (SO2 as SO3) Mass	<10 mg		
Gas Volume Sampled	1.27 m^3		
Sulfur Dioxide (SO2 as SO3) Emission*1	<7.8 mg/m^3		
Sulfur Dioxide (SO2 as SO3) Mass Emission Rate*2	<200 mg/s		
Regulatory Limit	100 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.

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Appendix B

Raw and Calculated Gas Data

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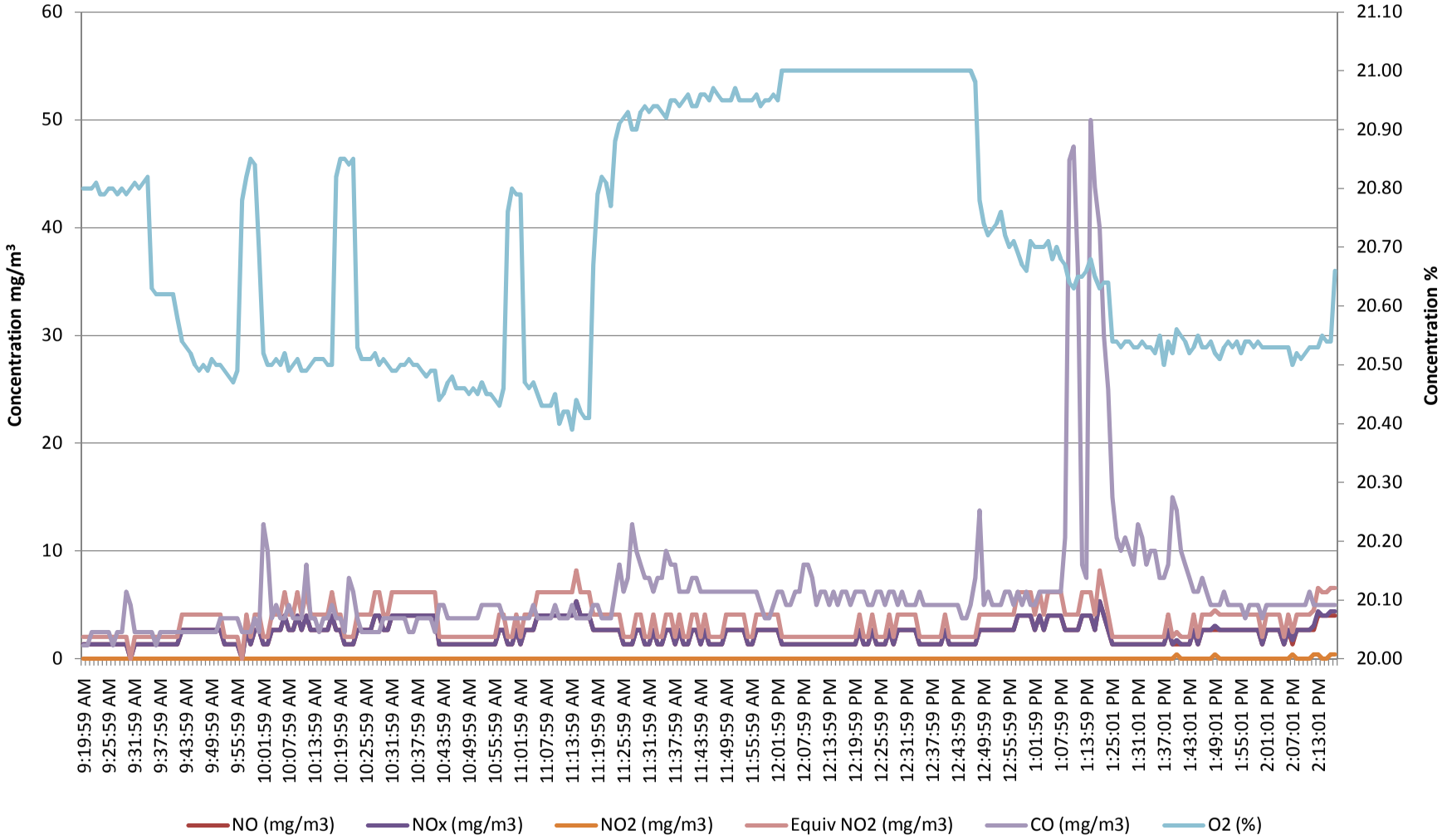
60162060 Stack 1 Oxides of Nitrogen, Carbon monoxide and Oxygen Plot, 14 August 2010



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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)
14/08/10	9:19:59 AM	1	1	1	1	0.0	0	2	2	1	1
14/08/10	9:20:59 AM	1	1	1	1	0.0	0	2	2	1	1
14/08/10	9:21:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:22:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:23:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:24:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:25:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:26:59 AM	1	1	1	1	0.0	0	2	2	1	1
14/08/10	9:27:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:28:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:29:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	9:30:59 AM	0	0	0	0	0.0	0	0	0	4	5
14/08/10	9:31:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:32:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:33:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:34:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:35:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:36:59 AM	1	1	1	1	0.0	0	2	2	1	1
14/08/10	9:37:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:38:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:39:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:40:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:41:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:42:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:43:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:44:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:45:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:46:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:47:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:48:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:49:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:50:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:51:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	9:52:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	9:53:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	9:54:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	9:55:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	9:56:59 AM	0	0	0	0	0.0	0	0	0	2	3
14/08/10	9:57:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	9:58:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	9:59:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:00:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	10:01:59 AM	1	1	1	1	0.0	0	2	2	10	13
14/08/10	10:02:59 AM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	10:03:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:04:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	10:05:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:06:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:07:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	10:08:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:09:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:10:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:11:59 AM	3	4	3	4	0.0	0	5	6	7	9
14/08/10	10:12:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:13:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:14:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	10:15:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:16:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:17:59 AM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	10:18:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:19:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:20:59 AM	1	1	1	1	0.0	0	2	2	2	3
14/08/10	10:21:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	10:22:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	10:23:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:24:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	10:25:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	10:26:59 AM	2	3	2	3	0.0	0	3	4	2	3
14/08/10	10:27:59 AM	3	4	3	4	0.0	0	5	6	2	3
14/08/10	10:28:59 AM	3	4	3	4	0.0	0	5	6	2	3
14/08/10	10:29:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:30:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:31:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:32:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:33:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:34:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:35:59 AM	3	4	3	4	0.0	0	5	6	2	3
14/08/10	10:36:59 AM	3	4	3	4	0.0	0	5	6	2	3
14/08/10	10:37:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:38:59 AM	3	4	3	4	0.0	0	5	6	3	4

14/08/10	10:39:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:40:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	10:41:59 AM	3	4	3	4	0.0	0	5	6	2	3
14/08/10	10:42:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:43:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:44:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:45:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:46:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:47:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:48:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:49:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:50:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:51:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:52:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:53:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:54:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:55:59 AM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	10:56:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	10:57:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	10:58:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	10:59:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	11:00:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:01:59 AM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	11:02:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:03:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:04:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	11:05:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:06:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:07:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:08:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:09:59 AM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	11:10:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:11:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:12:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:13:59 AM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	11:14:59 AM	4	5	4	5	0.0	0	6	8	3	4
14/08/10	11:15:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:16:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:17:59 AM	3	4	3	4	0.0	0	5	6	3	4
14/08/10	11:18:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	11:19:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	11:20:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:21:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:22:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:23:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:24:59 AM	2	3	2	3	0.0	0	3	4	7	9
14/08/10	11:25:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:26:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	11:27:59 AM	1	1	1	1	0.0	0	2	2	10	13
14/08/10	11:28:59 AM	2	3	2	3	0.0	0	3	4	8	10
14/08/10	11:29:59 AM	2	3	2	3	0.0	0	3	4	7	9
14/08/10	11:30:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	11:31:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	11:32:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:33:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	11:34:59 AM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	11:35:59 AM	2	3	2	3	0.0	0	3	4	8	10
14/08/10	11:36:59 AM	2	3	2	3	0.0	0	3	4	7	9
14/08/10	11:37:59 AM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	11:38:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:39:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:40:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:41:59 AM	2	3	2	3	0.0	0	3	4	6	8
14/08/10	11:42:59 AM	2	3	2	3	0.0	0	3	4	6	8
14/08/10	11:43:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:44:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:45:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:46:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:47:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:48:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:49:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:50:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:51:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:52:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:53:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:54:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:55:59 AM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	11:56:59 AM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	11:57:59 AM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	11:58:59 AM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	11:59:59 AM	2	3	2	3	0.0	0	3	4	3	4

14/08/10	12:00:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:01:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:02:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:03:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:04:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:05:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:06:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:07:59 PM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	12:08:59 PM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	12:09:59 PM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	12:10:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:11:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:12:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:13:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:14:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:15:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:16:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:17:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:18:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:19:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:20:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:21:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:22:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:23:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:24:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:25:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:26:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:27:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:28:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:29:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:30:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:31:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:32:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:33:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:34:59 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	12:35:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:36:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:37:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:38:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:39:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:40:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:41:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:42:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:43:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:44:59 PM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	12:45:59 PM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	12:46:59 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	12:47:59 PM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	12:48:59 PM	2	3	2	3	0.0	0	3	4	11	14
14/08/10	12:49:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:50:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:51:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:52:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:53:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:54:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:55:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	12:56:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	12:57:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	12:58:59 PM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	12:59:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:00:59 PM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	1:01:59 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:02:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:03:59 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	1:04:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:05:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:06:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:07:59 PM	3	4	3	4	0.0	0	5	6	5	6
14/08/10	1:08:59 PM	2	3	2	3	0.0	0	3	4	9	11
14/08/10	1:09:59 PM	2	3	2	3	0.0	0	3	4	37	46
14/08/10	1:10:59 PM	2	3	2	3	0.0	0	3	4	38	48
14/08/10	1:11:59 PM	2	3	2	3	0.0	0	3	4	29	36
14/08/10	1:12:59 PM	3	4	3	4	0.0	0	5	6	7	9
14/08/10	1:13:59 PM	3	4	3	4	0.0	0	5	6	6	8
14/08/10	1:14:59 PM	3	4	3	4	0.0	0	5	6	40	50
14/08/10	1:15:59 PM	2	3	2	3	0.0	0	3	4	35	44
14/08/10	1:16:59 PM	4	5	4	5	0.0	0	6	8	32	40
14/08/10	1:17:59 PM	3	4	3	4	0.0	0	5	6	24	30
14/08/10	1:18:59 PM	2	3	2	3	0.0	0	3	4	20	25
14/08/10	1:25:01 PM	1	1	1	1	0.0	0	2	2	12	15
14/08/10	1:26:01 PM	1	1	1	1	0.0	0	2	2	9	11

14/08/10	1:27:01 PM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	1:28:01 PM	1	1	1	1	0.0	0	2	2	9	11
14/08/10	1:29:01 PM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	1:30:01 PM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	1:31:01 PM	1	1	1	1	0.0	0	2	2	10	13
14/08/10	1:32:01 PM	1	1	1	1	0.0	0	2	2	9	11
14/08/10	1:33:01 PM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	1:34:01 PM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	1:35:01 PM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	1:36:01 PM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	1:37:01 PM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	1:38:01 PM	2	3	2	3	0.0	0	3	4	7	9
14/08/10	1:39:01 PM	1	1	1	1	0.0	0	2	2	12	15
14/08/10	1:40:01 PM	1	1	1	2	0.2	0	2	2	11	14
14/08/10	1:41:01 PM	1	1	1	1	0.0	0	2	2	8	10
14/08/10	1:42:01 PM	1	1	1	1	0.0	0	2	2	7	9
14/08/10	1:43:01 PM	1	1	1	1	0.0	0	2	2	6	8
14/08/10	1:44:01 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	1:45:01 PM	1	1	1	1	0.0	0	2	2	5	6
14/08/10	1:46:01 PM	2	3	2	3	0.0	0	3	4	6	8
14/08/10	1:47:01 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	1:48:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:49:01 PM	2	3	2	3	0.2	0	3	5	4	5
14/08/10	1:50:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:51:01 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	1:52:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:53:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:54:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:55:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:56:01 PM	2	3	2	3	0.0	0	3	4	3	4
14/08/10	1:57:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:58:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	1:59:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:00:01 PM	1	1	1	1	0.0	0	2	2	3	4
14/08/10	2:01:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:02:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:03:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:04:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:05:01 PM	1	1	1	1	0.0	0	2	2	4	5
14/08/10	2:06:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:07:01 PM	1	1	2	2	0.2	0	2	2	4	5
14/08/10	2:08:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:09:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:10:01 PM	2	3	2	3	0.0	0	3	4	4	5
14/08/10	2:11:01 PM	2	3	2	3	0.0	0	3	4	5	6
14/08/10	2:12:01 PM	2	3	2	3	0.2	0	3	5	4	5
14/08/10	2:13:01 PM	3	4	3	4	0.2	0	5	7	4	5
14/08/10	2:14:01 PM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	2:15:01 PM	3	4	3	4	0.0	0	5	6	4	5
14/08/10	2:16:01 PM	3	4	3	4	0.2	0	5	7	4	5
14/08/10	2:17:01 PM	3	4	3	4	0.2	0	5	7	4	5
	Average	2	2	2	2	0.0	0	3	4	5	6
	Maximum	4	5	4	5	0.2	0	6	8	40	50
	Minimum	0	0	0	0	0.0	0	0	0	1	1

Appendix C

Laboratory Analysis Reports

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ANALYTICAL REPORT

1 September 2010

AECOM Australia Pty Ltd
17 Warabrook Boulevarde
WARABROOK
NSW 2304

Attention: **James Lang**

Your Reference: 60153017

Our Reference: SE80789

Samples: 2 Filters, 10 Various Impinger Solutions
Received: 20/08/2010

Preliminary Report Sent: Not Issued

These samples were analysed in accordance with your written instructions.

For and on Behalf of:
SGS ENVIRONMENTAL SERVICES

Sample Receipt:	Angela Mamalicos	AU.SampleReceipt.Sydney@sgs.com
Production Manager:	Huong Crawford	Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Huong Crawford
Metals Signatory

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Metals by Method 29 Our Reference: Your Reference Sample Matrix	UNITS --- ---	SE80789-2 Metals 3 Impinger Solution	SE80789-3 Metals 4 Impinger Solution	SE80789-4 Metals 5A Impinger Solution	SE80789-5 Metals 5B Impinger Solution	SE80789-6 Metals 5C Impinger Solution
Volume	mL	98	295	100	385	240
Date Extracted (Metals)		[NA]	1/09/2010	[NA]	[NA]	[NA]
Date Analysed (Metals)		[NA]	1/09/2010	[NA]	[NA]	[NA]
Date Extracted (Mercury)		[NA]	27/08/2010	27/08/2010	27/08/2010	[NA]
Date Analysed (Mercury)		[NA]	27/08/2010	27/08/2010	27/08/2010	[NA]
Antimony	µg	[NA]	<4.0	[NA]	[NA]	[NA]
Aluminium*	µg	[NA]	26	[NA]	[NA]	[NA]
Arsenic	µg	[NA]	<3.0	[NA]	[NA]	[NA]
Barium	µg	[NA]	2.8	[NA]	[NA]	[NA]
Beryllium	µg	[NA]	<0.03	[NA]	[NA]	[NA]
Cadmium	µg	[NA]	0.8	[NA]	[NA]	[NA]
Chromium	µg	[NA]	6.4	[NA]	[NA]	[NA]
Cobalt	µg	[NA]	<0.3	[NA]	[NA]	[NA]
Copper	µg	[NA]	0.8	[NA]	[NA]	[NA]
Iron*	µg	[NA]	63	[NA]	[NA]	[NA]
Lead	µg	[NA]	<3.0	[NA]	[NA]	[NA]
Magnesium*	µg	[NA]	13	[NA]	[NA]	[NA]
Manganese	µg	[NA]	2.7	[NA]	[NA]	[NA]
Mercury	µg	[NA]	<0.15	<0.05	<0.25	[NA]
Nickel	µg	[NA]	0.8	[NA]	[NA]	[NA]
Phosphorus	µg	[NA]	<8.0	[NA]	[NA]	[NA]
Selenium	µg	[NA]	5.7	[NA]	[NA]	[NA]
Silver	µg	[NA]	7.7	[NA]	[NA]	[NA]
Thallium	µg	[NA]	<8.0	[NA]	[NA]	[NA]
Zinc	µg	[NA]	<1.0	[NA]	[NA]	[NA]
Tin*	µg	[NA]	<2.0	[NA]	[NA]	[NA]
Vanadium*	µg	[NA]	<0.40	[NA]	[NA]	[NA]

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Metals by Method 29 Our Reference: Your Reference Sample Matrix	UNITS ---------- ----------	SE80789-7 Metals 8A Impinger Solution	SE80789-8 Metals 8B Impinger Solution	SE80789-9 Metals 9 Impinger Solution	SE80789-10 Metals 10 Impinger Solution	SE80789-11 Metals 11 Impinger Solution
Volume	mL	285	95	195	100	240
Date Extracted (Mercury)		27/08/2010	[NA]	[NA]	[NA]	[NA]
Date Analysed (Mercury)		27/08/2010	[NA]	[NA]	[NA]	[NA]
Mercury	µg	<0.14	[NA]	[NA]	[NA]	[NA]

Metals by Method 29 Our Reference: Your Reference Sample Matrix	UNITS ---------- ----------	SE80789-13 Metals 1+3 COMPOSITE	SE80789-14 Metals 8A+12 COMPOSITE	SE80789-15 Metals 8A+9 COMPOSITE	SE80789-16 3C OF 5B+5C COMPOSITE	SE80789-17 Metals 8B+10 COMPOSITE
Date Extracted (Metals)		1/09/2010	1/09/2010	1/09/2010	[NA]	[NA]
Date Analysed (Metals)		1/09/2010	1/09/2010	1/09/2010	[NA]	[NA]
Date Extracted (Mercury)		27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010
Date Analysed (Mercury)		27/08/2010	27/08/2010	27/08/2010	27/08/2010	27/08/2010
Antimony	µg	<4.0	5.1	<4.0	[NA]	[NA]
Aluminium*	µg	7,700	11,000	4.7	[NA]	[NA]
Arsenic	µg	3.9	<3.0	<3.0	[NA]	[NA]
Barium	µg	3,500	2,600	2.4	[NA]	[NA]
Beryllium	µg	0.06	0.096	<0.03	[NA]	[NA]
Cadmium	µg	2.5	0.90	<0.2	[NA]	[NA]
Chromium	µg	8.2	12	0.3	[NA]	[NA]
Cobalt	µg	<0.3	<0.3	<0.3	[NA]	[NA]
Copper	µg	2	2	0.4	[NA]	[NA]
Iron*	µg	190	210	<0.60	[NA]	[NA]
Lead	µg	11	<3.0	<3.0	[NA]	[NA]
Magnesium*	µg	680	370	<2.0	[NA]	[NA]
Manganese	µg	6.0	6.8	3.2	[NA]	[NA]
Mercury	µg	<0.05	<0.05	<0.24	0.36	<0.20
Nickel	µg	1.3	1.3	<0.4	[NA]	[NA]
Phosphorus	µg	12	9.3	<8.0	[NA]	[NA]
Selenium	µg	7.9	6.1	<4.0	[NA]	[NA]
Silver	µg	1.5	0.44	<0.16	[NA]	[NA]
Thallium	µg	<8.0	<8.0	<8.0	[NA]	[NA]
Zinc	µg	9,800	15,000	7.4	[NA]	[NA]
Tin*	µg	<2.0	<2.0	<2.0	[NA]	[NA]
Vanadium*	µg	<0.40	<0.40	<0.40	[NA]	[NA]

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Metals by Method 29 Our Reference:	UNITS	SE80789-18
Your Reference	----------	3C OF (8B+10)+11
Sample Matrix	----------	COMPOSITE
Date Extracted (Mercury)		27/08/2010
Date Analysed (Mercury)		27/08/2010
Mercury	µg	<0.25

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Method ID	Methodology Summary
USEPA Method 29	Metals emissions from stationary sources are determined by ICPOES (Hg by CVAAS) following microwave digestion with nitric acid and hydrofluoric acid, in accordance with USEPA Method 29. Detection Limits for this method are based on MDL.

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QUALITY CONTROL Metals by Method 29	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Volume	mL	1		<1	[NT]	[NT]	[NR]	[NR]
Date Extracted (Metals)				1/09/2010	[NT]	[NT]	LCS	1/09/2010
Date Analysed (Metals)				1/09/2010	[NT]	[NT]	LCS	1/09/2010
Date Extracted (Mercury)				27/08/2010	[NT]	[NT]	LCS	27/08/2010
Date Analysed (Mercury)				27/08/2010	[NT]	[NT]	LCS	27/08/2010
Antimony	µg	4	USEPA Method 29	<4.0	[NT]	[NT]	LCS	88%
Aluminium*	µg	0.6	USEPA Method 29	<0.60	[NT]	[NT]	LCS	92%
Arsenic	µg	3	USEPA Method 29	<3.0	[NT]	[NT]	LCS	90%
Barium	µg	0.1	USEPA Method 29	<0.1	[NT]	[NT]	LCS	82%
Beryllium	µg	0.03	USEPA Method 29	<0.03	[NT]	[NT]	LCS	86%
Cadmium	µg	0.16	USEPA Method 29	<0.2	[NT]	[NT]	LCS	88%
Chromium	µg	0.12	USEPA Method 29	<0.1	[NT]	[NT]	LCS	87%
Cobalt	µg	0.3	USEPA Method 29	<0.3	[NT]	[NT]	LCS	87%
Copper	µg	0.12	USEPA Method 29	<0.1	[NT]	[NT]	LCS	89%
Iron*	µg	0.6	USEPA Method 29	<0.60	[NT]	[NT]	LCS	93%
Lead	µg	3	USEPA Method 29	<3.0	[NT]	[NT]	LCS	87%
Magnesium*	µg	2	USEPA Method 29	<2.0	[NT]	[NT]	LCS	88%
Manganese	µg	0.08	USEPA Method 29	<0.08	[NT]	[NT]	LCS	86%
Mercury	µg	0.05	USEPA Method 29	<0.05	[NT]	[NT]	LCS	106%
Nickel	µg	0.4	USEPA Method 29	<0.4	[NT]	[NT]	LCS	88%
Phosphorus	µg	8	USEPA Method 29	<8.0	[NT]	[NT]	LCS	93%
Selenium	µg	4	USEPA Method 29	<4.0	[NT]	[NT]	LCS	82%
Silver	µg	0.16	USEPA Method 29	<0.16	[NT]	[NT]	LCS	89%

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QUALITY CONTROL Metals by Method 29	UNITS	LOR	METHOD	Blank	Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD
Thallium	µg	8	USEPA Method 29	<8.0	[NT]	[NT]	LCS	93%
Zinc	µg	1	USEPA Method 29	<1.0	[NT]	[NT]	LCS	92%
Tin*	µg	2	USEPA Method 29	<2.0	[NT]	[NT]	LCS	89%
Vanadium*	µg	0.4	USEPA Method 29	<0.40	[NT]	[NT]	LCS	88%

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Result Codes

[INS] : Insufficient Sample for this test
[NR] : Not Requested
[NT] : Not tested
[LOR] : Limit of reporting
[RPD] : Relative Percentage Difference
* : Not part of NATA Accreditation
[N/A] : Not Applicable

Report Comments

Samples analysed as received. Solid samples expressed on a dry weight basis.
Date Organics extraction commenced:
NATA Corporate Accreditation No. 2562, Site No 4354
Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*)
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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.
Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.
Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.
Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.
Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **EN1002012**	Page	: 1 of 13
Amendment	: **1**		
Client	: **AECOM Australia Pty Ltd**	Laboratory	: Environmental Division Newcastle
Contact	: MR CHRIS BURNS	Contact	: Peter Keyte
Address	: 17 WARABROOK BOULEVARDE PO BOX 73, HUNTER REGION MC NSW 2310 WARABROOK NSW, AUSTRALIA 2304	Address	: 5 Rosegum Road Warabrook NSW Australia 2304
E-mail	: christopher.burns@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	: 60162060	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: ----		
C-O-C number	: 159556-558	Date Samples Received	: 20-AUG-2010
Sampler	: CB, JL	Issue Date	: 10-SEP-2010
Site	: ----		
		No. of samples received	: 28
Quote number	: EN/004/10	No. of samples analysed	: 24

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

This document is issued in accordance with NATA accreditation requirements.

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	Inorganics
Peter Keyte	Newcastle Manager	Newcastle

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 insuffient 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 date(s) and/or time(s) are shown bracketed, these have been assumed by the laboratory for processing purposes. If the sampling time is displayed as 0:00 the information was not provided by client.

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

- **Filters were supplied by the client. Filter preparation may not meet ALS method requirements for EA144C-F.**
- **This report has been amended and re-released to allow the reporting of additional analytical data.**

Analytical Results

Sub-Matrix: AIR				Client sample ID	GEL G027	GEL G653	GEL G049	GEL 205A	GEL 64K
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00
Compound	CAS Number	LOR	Unit		EN1002012-001	EN1002012-002	EN1002012-003	EN1002012-004	EN1002012-005
EA143B: Total Particulate Matter - Stack Tests									
^ Moisture @ 105°C	----	0.01	g		**8.30**	**8.61**	**6.18**	**10.9**	**11.4**

Analytical Results

Sub-Matrix: **AIR**

Compound	CAS Number	LOR	Unit	Client sample ID	GEL G046	GEL G100	GEL G017	STACK 1 PARTICULATE FLUORIDE	STACK 1 PARTICULATE FLUORIDE BLANK
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00
					EN1002012-006	EN1002012-007	EN1002012-008	EN1002012-011	EN1002012-012
EA143B: Total Particulate Matter - Stack Tests									
^ Moisture @ 105°C	----	0.01	g		**6.68**	**7.09**	**8.83**	----	----
EA144C: Gaseous and Particulate Fluorides									
Fluoride (Particulate) as HF	----	1	µg/filter		----	----	----	**43**	**3**

Analytical Results

Sub-Matrix: AIR	Client sample ID	THIMBLE S59	THIMBLE S46	----	----	----
	Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	----	----	----
Compound / CAS Number	LOR / Unit	EN1002012-027	EN1002012-028	----	----	----
EA143B: Total Particulate Matter - Stack Tests						
^ Particulate Matter ----	0.0001 g	**0.0002**	**0.0015**	----	----	----

Analytical Results

Sub-Matrix: **EMISSION**

Compound	CAS Number	LOR	Unit	Client sample ID	STACK 1 GASEOUS FLUORIDE	STACK 1 GASEOUS FLUORIDE BLANK	SOX TEST (IPA)	SOX TEST IPA (BLANK)	SOX TEST (H2O2)
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00
					EN1002012-009	EN1002012-010	EN1002012-013	EN1002012-014	EN1002012-015
EA143C: Sulfuric Acid and Sulfur Dioxide (as SO3)									
Volume - Impinger	----	1	mL		----	----	**270**	**608**	----
Sulfuric Acid as SO3	----	2	mg/sample		----	----	<2	<2	----
EA143C: Sulphuric Acid and Sulphur Dioxide (as SO3)									
Volume - Impinger	----	1	mL		----	----	----	----	**330**
Sulfur Dioxide as SO3	----	10	mg/sample		----	----	----	----	<10
EA144C: Gaseous and Particulate Fluorides									
Fluoride (as HF)	----	0.1	mg/sample		**0.6**	**0.5**	----	----	----
Volume - Impinger	----	1	mL		**325**	**268**	----	----	----

Analytical Results

Sub-Matrix: **EMISSION**

Compound	CAS Number	LOR	Unit	Client sample ID	SOX TEST H2O2 (BLANK)	HCL TEST (H2SO4)	HCL TEST H2SO4 (BLANK)	CL2 TEST (NAOH)	CL2 TEST NAOH (BLANK)
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00	20-AUG-2010 12:00
					EN1002012-016	EN1002012-017	EN1002012-018	EN1002012-019	EN1002012-020
EA143C: Sulphuric Acid and Sulphur Dioxide (as SO3)									
Volume - Impinger	----	1	mL		**536**	----	----	----	----
Sulfur Dioxide as SO3	----	10	mg/sample		<10	----	----	----	----
EA147: Acid Gases									
^ Hydrogen Chloride	7647-01-0	0.100	mg		----	**1.24**	<0.100	----	----
EA147: Halogens									
^ Chlorine	7782-50-5	0.100	mg		----	----	----	**0.545**	<0.100
ED009: Anions									
Chloride	16887-00-6	0.100	mg/L		----	**3.96**	<0.100	**1.86**	<0.100
Sampling Method									
Volume - Impinger	----	-	mL		----	**304**	**335**	----	----

Analytical Results

Sub-Matrix: **SORBENT TUBE**

Compound	CAS Number	LOR	Unit	Client sample ID: VOC TEST	VOC TEST BLANK	----	----	----
				Client sampling date / time: 20-AUG-2010 12:00	20-AUG-2010 12:00	----	----	----
				EN1002012-025	EN1002012-026	----	----	----
EP091A: Aliphatic Hydrocarbons - Total								
^ 1-heptene	592-76-7	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Decane	124-18-5	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Heptane	142-82-5	0.5	µg/sample	<0.5	<0.5	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons - Total								
^ Benzene	71-43-2	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Toluene	108-88-3	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Ethylbenzene	100-41-4	0.5	µg/sample	<0.5	<0.5	----	----	----
^ meta- & para-Xylene	108-38-3 106-42-3	1	µg/sample	<1	<1	----	----	----
^ Styrene	100-42-5	0.5	µg/sample	<0.5	<0.5	----	----	----
^ ortho-Xylene	95-47-6	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 1.3.5-Trimethylbenzene	108-67-8	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 1.2.4-Trimethylbenzene	95-63-6	0.5	µg/sample	<0.5	<0.5	----	----	----
^ n-Butylbenzene	104-51-8	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Isopropylbenzene	98-82-8	0.5	µg/sample	<0.5	<0.5	----	----	----
EP091C: Oxygenated Compounds - Total								
^ 2-Propanone (Acetone)	67-64-1	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 2-Butanone (MEK)	78-93-3	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 2-Hexanone (MBK)	591-78-6	0.5	µg/sample	<0.5	<0.5	----	----	----
EP091D: Halogenated Compounds - Total								
^ 1.1-Dichloroethane	75-34-3	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Chloroform	67-66-3	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Trichloroethene	79-01-6	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Chlorobenzene	108-90-7	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 2-Chlorotoluene	95-49-8	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 4-Chlorotoluene	106-43-4	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 1.3-Dichlorobenzene	541-73-1	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 1.4-Dichlorobenzene	106-46-7	0.5	µg/sample	<0.5	<0.5	----	----	----
^ 1.2-Dichlorobenzene	95-50-1	0.5	µg/sample	<0.5	<0.5	----	----	----
^ Hexachlorobutadiene	87-68-3	0.5	µg/sample	<0.5	<0.5	----	----	----
EP091A: Aliphatic Hydrocarbons (Section 1)								
1-heptene	592-76-7	0.5	µg	<0.5	<0.5	----	----	----
Heptane	142-82-5	0.5	µg	<0.5	<0.5	----	----	----
Decane	124-18-5	0.5	µg	<0.5	<0.5	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 1)								
Benzene	71-43-2	0.5	µg	<0.5	<0.5	----	----	----
Toluene	108-88-3	0.5	µg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: **SORBENT TUBE**

Compound	CAS Number	LOR	Unit	Client sample ID: VOC TEST	VOC TEST BLANK	----	----	----
				Client sampling date / time: 20-AUG-2010 12:00	20-AUG-2010 12:00	----	----	----
				EN1002012-025	EN1002012-026	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 1) - Continued								
Ethylbenzene	100-41-4	0.5	µg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg	<1	<1	----	----	----
Styrene	100-42-5	0.5	µg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	µg	<0.5	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg	<0.5	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg	<0.5	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	µg	<0.5	<0.5	----	----	----
Isopropylbenzene	98-82-8	0.5	µg	<0.5	<0.5	----	----	----
EP091C: Oxygenated Compounds (Section 1)								
2-Propanone (Acetone)	67-64-1	0.5	µg	<0.5	<0.5	----	----	----
2-Butanone (MEK)	78-93-3	0.5	µg	<0.5	<0.5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg	<0.5	<0.5	----	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg	<0.5	<0.5	----	----	----
EP091D: Halogenated Compounds (Section 1)								
1.1-Dichloroethane	75-34-3	0.5	µg	<0.5	<0.5	----	----	----
Chloroform	67-66-3	0.5	µg	<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	µg	<0.5	<0.5	----	----	----
Chlorobenzene	108-90-7	0.5	µg	<0.5	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	µg	<0.5	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	µg	<0.5	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg	<0.5	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg	<0.5	<0.5	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg	<0.5	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	µg	<0.5	<0.5	----	----	----
EP091A: Aliphatic Hydrocarbons (Section 2)								
1-heptene	592-76-7	0.5	µg	<0.5	<0.5	----	----	----
Heptane	142-82-5	0.5	µg	<0.5	<0.5	----	----	----
Decane	124-18-5	0.5	µg	<0.5	<0.5	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2)								
Benzene	71-43-2	0.5	µg	<0.5	<0.5	----	----	----
Toluene	108-88-3	0.5	µg	<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	µg	<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg	<1	<1	----	----	----
Styrene	100-42-5	0.5	µg	<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	µg	<0.5	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg	<0.5	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg	<0.5	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	µg	<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: **SORBENT TUBE**

Compound	CAS Number	LOR	Unit	Client sample ID	VOC TEST	VOC TEST BLANK	----	----	----
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	----	----	----
					EN1002012-025	EN1002012-026	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 2) - Continued									
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	----	----	----
EP091C: Oxygenated Compounds (Section 2)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	----	----	----
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	----	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	----	----	----
EP091D: Halogenated Compounds (Section 2)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	----	----	----
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	----	----	----
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	----	----	----
EP091A: Aliphatic Hydrocarbons (Section 3)									
1-heptene	592-76-7	0.5	µg		<0.5	<0.5	----	----	----
Heptane	142-82-5	0.5	µg		<0.5	<0.5	----	----	----
Decane	124-18-5	0.5	µg		<0.5	<0.5	----	----	----
EP091B: Monocyclic Aromatic Hydrocarbons (Section 3)									
Benzene	71-43-2	0.5	µg		<0.5	<0.5	----	----	----
Toluene	108-88-3	0.5	µg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	µg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	1	µg		<1	<1	----	----	----
Styrene	100-42-5	0.5	µg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	µg		<0.5	<0.5	----	----	----
1.3.5-Trimethylbenzene	108-67-8	0.5	µg		<0.5	<0.5	----	----	----
1.2.4-Trimethylbenzene	95-63-6	0.5	µg		<0.5	<0.5	----	----	----
n-Butylbenzene	104-51-8	0.5	µg		<0.5	<0.5	----	----	----
Isopropylbenzene	98-82-8	0.5	µg		<0.5	<0.5	----	----	----
EP091C: Oxygenated Compounds (Section 3)									
2-Propanone (Acetone)	67-64-1	0.5	µg		<0.5	<0.5	----	----	----
2-Butanone (MEK)	78-93-3	0.5	µg		<0.5	<0.5	----	----	----
4-Methyl-2-pentanone (MIBK)	108-10-1	0.5	µg		<0.5	<0.5	----	----	----
2-Hexanone (MBK)	591-78-6	0.5	µg		<0.5	<0.5	----	----	----

Analytical Results

Sub-Matrix: **SORBENT TUBE**

Compound	CAS Number	LOR	Unit	Client sample ID	VOC TEST	VOC TEST BLANK	----	----	----
				Client sampling date / time	20-AUG-2010 12:00	20-AUG-2010 12:00	----	----	----
					EN1002012-025	EN1002012-026	----	----	----
EP091D: Halogenated Compounds (Section 3)									
1.1-Dichloroethane	75-34-3	0.5	µg		<0.5	<0.5	----	----	----
Chloroform	67-66-3	0.5	µg		<0.5	<0.5	----	----	----
Trichloroethene	79-01-6	0.5	µg		<0.5	<0.5	----	----	----
Chlorobenzene	108-90-7	0.5	µg		<0.5	<0.5	----	----	----
2-Chlorotoluene	95-49-8	0.5	µg		<0.5	<0.5	----	----	----
4-Chlorotoluene	106-43-4	0.5	µg		<0.5	<0.5	----	----	----
1.3-Dichlorobenzene	541-73-1	0.5	µg		<0.5	<0.5	----	----	----
1.4-Dichlorobenzene	106-46-7	0.5	µg		<0.5	<0.5	----	----	----
1.2-Dichlorobenzene	95-50-1	0.5	µg		<0.5	<0.5	----	----	----
Hexachlorobutadiene	87-68-3	0.5	µg		<0.5	<0.5	----	----	----
EP091: Chlorinated Organic Surrogates (Section 1)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**102**	**102**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**70.0**	**71.8**	----	----	----
EP091: Chlorinated Organic Surrogates (Section 2)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**104**	**103**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**72.4**	**73.0**	----	----	----
EP091: Chlorinated Organic Surrogates (Section 3)									
1.2-Dichloroethane-D4	17060-07-0	0.1	%		**110**	**105**	----	----	----
4-Bromofluorobenzene	460-00-4	0.1	%		**76.8**	**70.6**	----	----	----
EP091: MAH Surrogates (Section 1)									
Toluene-D8	2037-26-5	0.1	%		**118**	**118**	----	----	----
EP091: MAH Surrogates (Section 2)									
Toluene-D8	2037-26-5	0.1	%		**122**	**124**	----	----	----
EP091: MAH Surrogates (Section 3)									
Toluene-D8	2037-26-5	0.1	%		**120**	**122**	----	----	----

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	60	140
4-Bromofluorobenzene	460-00-4	60	140
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	60	140
EP091: MAH Surrogates (Section 2)			
Toluene-D8	2037-26-5	60	140
EP091: MAH Surrogates (Section 3)			
Toluene-D8	2037-26-5	60	140

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ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Certificate of Analysis

LABORATORY REPORT NO: EN1002012

CLIENT REFERENCE: 60160260

CLIENT: AECOM
PO Box 73
HUNTER REGION MAIL CENTRE NSW 2310

ATTENTION: Mr James Lang

DATE REPORTED: 9/09/2010

DATE RECEIVED: 20/08/2010

TITLE: Air analysis

SAMPLES: 2 filters and 2 impingers

Please find results for the above samples.

Cyanide analysed by ALS Sydney, NATA site number 10911.

Sampled by AECOM, analysed as received.

Please do not hesitate to contact us if we can be of assistance.

Yours faithfully

Australian Laboratory Services Pty Ltd

Authorising Chemist
Dianne Blane

INORGANIC ANALYSIS

Report No: EN1002012

Client Reference: 60160260

		Sample	EN1002012/21	EN1002012/22	EN1002012/23	EN1002012/24				QA/QC	
		Client ID	Gaseous Cyanide	Gaseous Cyanide Blank	Particulate Cyanide	Particulate Cyanide Blank				Blank	Spike/Control % Recovery
		Date Sampled	-	-	-	-					
		Date Received	20/08/10	20/08/10	20/08/10	20/08/10					
METHOD	ANALYSIS DESCRIPTION	UNITS	LOR	NaOH	NaOH	filter	filter					
EK026G	Cyanide	µg/impinger	2	5	<2	-	-				<2	97%
EK026G	Cyanide	µg/filter	1	-	-	<1	<1				<1	97%
-	Impinger Volume	mL	1	302	706	-	-				-	-

Authorising Chemist: _____

Dianne Blane

Date: 09-Sep-10

Australian Government
National Measurement Institute

ANALYSIS REPORT # ORG10_081

Client	AECOM AUSTRALIA P/L 17 WARABROOK BOULEVARDE WARABROOK NSW 2304	**Job No.**	AECO01/100820
		Sampled by	Client
		Date Sampled	14-Aug-2010
Contact	JAMES LANG	**Date Received**	20-Aug-2010

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- Enviro
September 13, 2010

Accreditation

NATA Accredited Laboratory Number : 198
This report is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.

Sample Details : Job No. AECO01/100820

Laboratory Reg. No.	Client Sample Ref.	Matrix	Description
N10/021891	DAU120810N	Emission	Canister, Filter, Rinses

Project Details

Project Name	*Not specified*
Project Number	*60153017*

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/sample	nanograms per sample
<	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:

$$BaP\text{–}TEQ_{PAH} = \sum_{i=1}^{n} \left[PAH_i \times BaP - PEF_i \right]$$

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. AECO01/100820

Laboratory Reg. No.	N10/021891	**Date Reported**	13-Sep-2010
Client Sample Ref.	DAU120810N	**Date Extracted**	26-Aug-2010
Matrix	Emission		
Description	Canister, Filter, Rinses		

PAH	Conc. ng	Reporting Level (LOR, ng)	BaP-PEF Value	BaP-TEQ Contribution	Labelled Internal recovery (%)	Flags
Naphthalene	360000	990	-	-	24	*
2-Methylnaphthalene	330000	2500	-	-		
Acenaphthylene	580	55	-	-	34	*
Acenaphthene	1100	30	-	-	44	*
Fluorene	1800	65	-	-	54	
Phenanthrene	2800	200	-	-	70	
Anthracene	170	40	-	-		
Fluoranthene	1700	180	-	-	74	
Pyrene	960	160	-	-		
Benz(a)anthracene	240	55	0.1	24	71	
Chrysene	630	85	0.01	6.3	63	
Benzo(b)fluoranthene	260	55	0.1	26	64	
Benzo(k)fluoranthene	150	35	0.1	15	55	
Benzo(e)pyrene	180	55	-	-		
Benzo(a)pyrene	110	35	1.0	110	57	
Perylene	100	20	-	-		
Indeno(1,2,3-cd)pyrene	68	55	0.1	6.8	55	
Dibenz(ah)anthracene	<50	50	0.4	10	57	
Benzo(ghi)perylene	<70	70	-	-	56	

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	128

Summary Results		
BaP -TEQ$_{PAH}$		
Lower Bound [excluding LOD values]	**190**	ng
Middle Bound [including half LOD values]	**200**	ng
Upper Bound [including LOD values]	**210**	ng

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Worldwide Locations

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