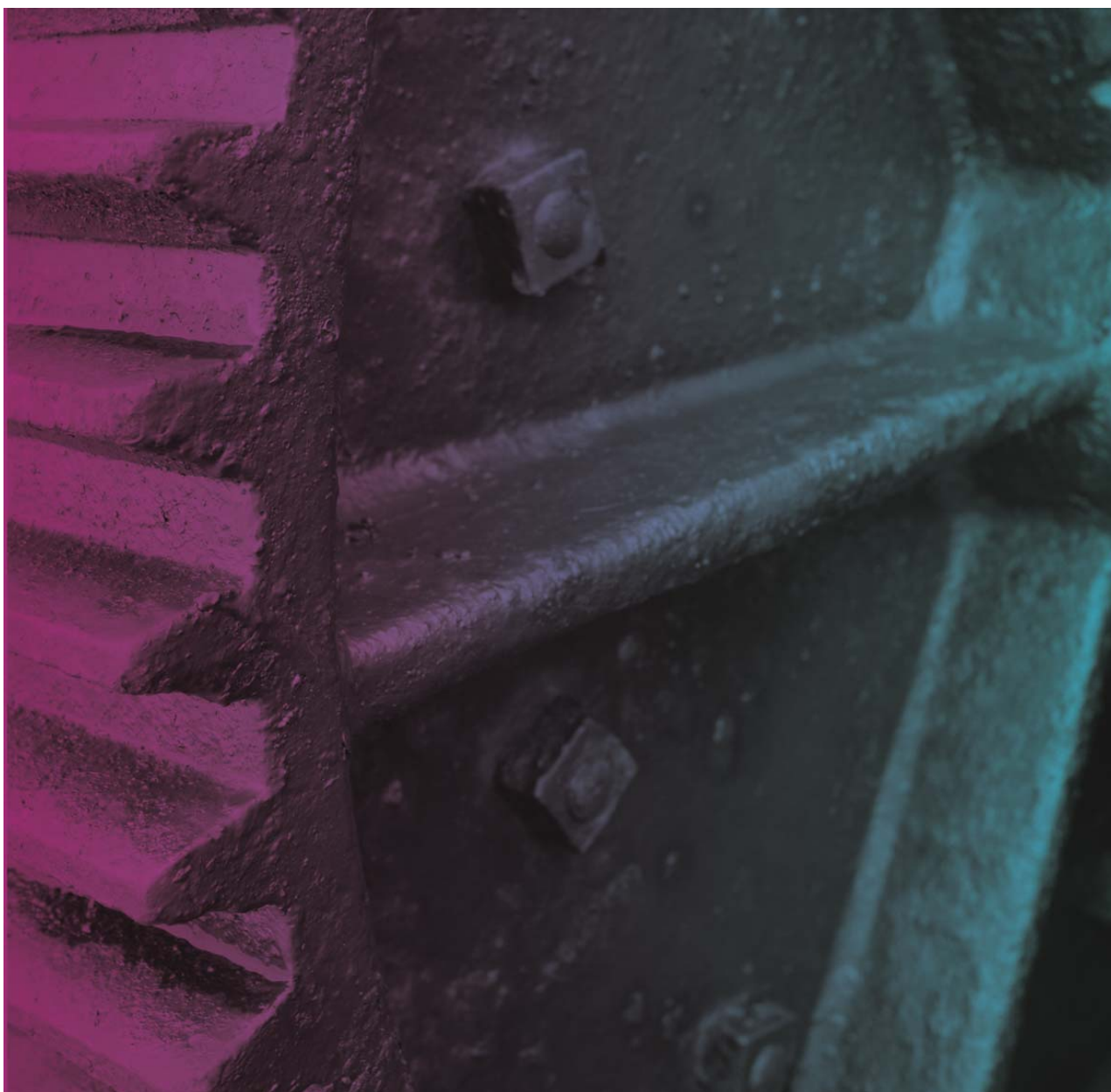


2nd Quarter Emissions Testing Report 2016

OneSteel Recycling Hexham



NATA ACCREDITATION No. 2778 (14391)

Accredited for compliance with ISO/IEC 17025

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

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2nd Quarter Emissions Testing Report 2016

OneSteel Recycling Hexham

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01-Aug-2016

Job No.: 60493017

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Quality Information


Document 2nd Quarter Emissions Testing Report 2016

Ref 60493017

Date 01-Aug-2016

Prepared by Vilai Kelemete-Manua

Reviewed by Chad Whitburn Approved Signatory



Revision History


Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
0	01-Aug-2016	Report for Issue	Chad Whitburn Associate Director - Compliance Services Team Leader	

Table of Contents

1.0	Introduction	1
2.0	Sampling Plane Requirements	3
3.0	Methodology	5
3.1	NATA Accredited Methods	5
4.0	Sampling Location	7
4.1	Sampling Location Summary	7
5.0	Equipment Calibration	9
6.0	Results	11
Appendix A		
	Field Sheets (17 pages)	A
Appendix B		
	Laboratory Results (11 pages)	B

List of Tables

Table 1	Criteria for Selection of Sampling Planes (AS 4323.1)	3
Table 2	AECOM NATA Endorsed Methods	5
Table 3	Sampling Location Summary	7
Table 4	Shredder Baghouse Emission Results Summary, 28 June 2016	11
Table 5	Fine Particulate (PM ₁₀), Total Particulate and Hazardous Substance (Metals) Results, 28 June 2016	12
Table 6	Hazardous Substances (Metals) Elemental Analysis Results, 28 June 2016	13

1.0 Introduction

AECOM was appointed by OneSteel Recycling Pty Ltd to conduct a series of measurements to determine air emissions from the Shredder Bag house Stack (EPL Point 1) at the Hexham facility. Measurements were required for NSW EPA licence compliance (EPL No. 5345).

Testing was undertaken on 28 June 2016 to investigate emission concentrations for the following parameters:

- Fine Particulates (PM₁₀);
- Total Particulate (TP); and
- Hazardous Substances (Metals) including Lead and Mercury.

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

- Steel River Testing, laboratory NATA accreditation number 18079, performed the following analysis detailed in report number 11570-0-M & 11570-0-P:
 - Total Particulate (TP);
 - Fine Particulates (PM₁₀); and
 - Moisture.
- SGS Leeder Consulting laboratory NATA accreditation number 14429, performed the following analysis detailed in report number M161422:
 - Hazardous Substances (Metals).

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2.0 Sampling Plane Requirements

The criteria for sampling planes are specified in AS 4323.1-1995 (R2014).

Table 1 Criteria for Selection of Sampling Planes (AS 4323.1)

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° 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; and*
- f. *The gas temperature at the sampling plane should preferably be above the dewpoint.*

With the exception of point 'b', the sampling plane was in accordance with AS4323.1. The gas stream velocities at each sampling point were found to be 2.4 m/s. Please note that the bag house was not running at full capacity at the time of testing.

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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 number 2778 (14391)) and are approved for the sampling and analysis of gases. Specific details of the methods are available on request.

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

Table 2 AECOM NATA Endorsed Methods

NSW EPA Approved Methods	USEPA Methods	Method Title
AS4323.1 (NSW EPA TM-1)	USEPA (2000) Method 1	Selection of sampling positions
AS4323.2 (NSW EPA TM-15)	USEPA (2000) Method 5 under approved circumstances	Determination of total particulate matter – isokinetic manual sampling – gravimetric method
NSW EPA TM-2	USEPA (2000) Method 2 or 2C or USEPA (1999) Method 2F or 2G or 2H (as appropriate)	Determination of stack gas velocity and volumetric flow rate (type s pitot tube)
NSW EPA TM-22	USEPA (2000) Method 4	Determination of moisture content in stack gases
NSW EPA TM-23	USEPA (2000) Method 3	Gas analysis for the determination of dry molecular weight
NSW EPA OM-5	USEPA (1997) Method 201 or 201A (as appropriate)	Determination of PM ₁₀ emissions
NSW EPA TM-12,13 and 14	USEPA Method 29	Determination of metal emissions from stationary sources

All parameters are reported adjusted to 0°C at 1 atmosphere and dry gas.

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4.0 Sampling Location

4.1 Sampling Location Summary

Table 3 provides a summary of the location sampled by AECOM on 28 June 2016.

Table 3 Sampling Location Summary

Discharge Description	Shredder Baghouse Stack (EPL Point 1)
Duct Shape	Circular
Construction Material	Metal
Duct Diameter (mm)	760
Minimum No. Sampling Points	12
Sampling Ports	2
Min. Points/Traverse	6
Disturbance	No
Distance from Upstream Disturbance	6.6D
Type of Disturbance	Bend
Distance from Downstream Disturbance	2.6D
Type of Disturbance	Stack Exit
Ideal Sampling Location	Yes ²
Correction Factors Applied	No
Total No. Points Sampled	12
Points/Traverse	6
Sampling Performed to Standard ¹	Yes ²

¹ AS 4323.1 Section 4.1

² The sampling location was ideal in terms of flow disturbances, but did not comply with AS 4323.1 point b) as the corrected velocity of the gas at all sampling points was found to be 2.4 m/s (minimum 3m/s).

D = Diameters

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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 air emission test results is shown in **Table 4**. Detailed results along with gas stream properties during the testing period can be found in **Table 5**. Speciated Hazardous Substances (Metals) results are presented in **Table 6**. Emission concentrations are converted to standard conditions of 0°C, dry gas and 1 atm pressure for comparison with regulatory limits.

Field sheets and final calculations recorded during the project are attached as **Appendix A**. Laboratory reports can be referred to in **Appendix B**.

AECOM has a calculated limit of uncertainty in regards to results. The estimation of measurement uncertainty in source testing is conducted to provide an indication of the precision of the measurement result and a degree of confidence in the range of values the reported result may represent. The measurement of uncertainty has been calculated at $\pm 13.6\%$.

Table 4 Shredder Baghouse Emission Results Summary, 28 June 2016

Parameter	Emission Concentration (EPL Point 1)	Emission Concentration Limit
Total Particulate (TP) (mg/m ³)	0.78	100
Fine Particulate (PM ₁₀) (mg/m ³)	0.5	NA
Lead (mg/m ³)	0.008	5.0
Mercury (mg/m ³)	<0.0004	1.0
Total Hazardous Substances (Metals) (mg/m ³)	0.017	NA

Results from testing conducted on EPL Point 1 on 28 June 2016 are below the regulatory limits listed in EPL 5345.

Table 5 Fine Particulate (PM₁₀), Total Particulate and Hazardous Substance (Metals) Results, 28 June 2016

Sampling Conditions:		
Stack internal diameter at test location	760 mm	
Stack gas temperature (average)	13.2 °C	286.4 K
Stack pressure (average)	1023 hPa	
Stack gas velocity (average, stack conditions)	2.4 m/s	
Stack gas flowrate (stack conditions)	1.1 m ³ /s	
Stack gas flowrate (0°C, dry gas, 1 atm pressure)	1 m ³ /s	
Fine Particulate (PM₁₀) Testing		
Test Period	10:38 -	12:42
Fine Particulate (PM ₁₀) Mass	0.5 mg	
Gas Volume Sampled	1.00 m ³	
Fine Particulate (PM ₁₀) Emission* ¹	0.5 mg/m ³	
Fine Particulate (PM ₁₀) Mass Emission Rate* ²	0.52 mg/s	
Regulatory Limit	NA	
Total Particulate Testing		
Test Period	10:38 -	12:42
Total Particulate Mass	0.8 mg	
Gas Volume Sampled	1.03 m ³	
Total Particulate Emission* ¹	0.78 mg/m ³	
Total Particulate Mass Emission Rate* ²	0.81 mg/s	
Regulatory Limit	100 mg/m ³	
Hazardous Substances (Metals) Testing		
Test Period	10:38 -	12:42
Hazardous Substances (Metals) Mass	0.021 mg	
Gas Volume Sampled	1.26 m ³	
Hazardous Substances (Metals) Emission* ¹	0.017 mg/m ³	
Hazardous Substances (Metals) Mass Emission Rate* ²	0.018 mg/s	
Regulatory Limit	NA	
Moisture Content (%)	1.3	
Gas Density (dry at 1 atmosphere)	1.29 kg/m³	
Dry Molecular Weight	28.8 g/g-mole	

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

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

Table 6 Hazardous Substances (Metals) Elemental Analysis Results, 28 June 2016

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	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Arsenic	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Beryllium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Cadmium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Chromium	0.0002	0.00016	0.013	0.01			0.01	0.008	0.0083
Cobalt	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Copper	0.0011	0.00088	0.0019	0.0015			0.003	0.0024	0.0025
Lead	0.011	0.0088	0.0026	0.0021			0.01	0.008	0.0083
Magnesium	<0.045	<0.036	<0.033	<0.026			<0.002	<0.0016	<0.0017
Manganese	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Mercury	<0.0002	<0.00016	<0.0001	<0.00008	<0.0001	<0.00008	<0.0005	<0.0004	<0.00041
Nickel	0.0003	0.00024	0.00035	0.00028			0.0007	0.00056	0.00058
Selenium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Thallium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Tin	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Vanadium	<0.0005	<0.0004	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Zinc	0.018	0.014	0.0014	0.0011			0.02	0.016	0.017
Total Hazardous Metals*	0.012	0.0092	0.016	0.012	<0.0001	<0.00008	0.021	0.017	0.017
Total Metals	0.031	0.024	0.019	0.015			0.044	0.035	0.036

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

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Appendix A

Field Sheets (17 pages)

Appendix A Field Sheets (17 pages)

Emission Measurement Calculations Spreadsheet**OneSteel Hexham**

AECOM's Project Number: 60493017

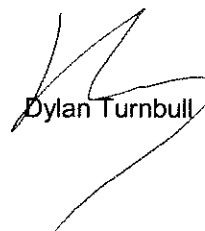
Emission Source: Shredder Stack

Date Sampled: 28-Jun-16

ANALYTE(S)	METHOD
Fine Particulate (PM10)	NSW EPA OM - 5
Total Particulate	NSW EPA TM - 15
Hazardous Substances (Metals)	NSW EPA TM - 12, 13 & 14

Observations made during testing period:

Test paused whilst the plant was shutdown for repair, and restarted again once the repairs had been made, and the plant was operational

Sampling Performed By:
for Vilai Kelemete-Manua
Dylan Turnbull

ANZ

Emission Measurement Calculations Spreadsheet

Q4AN(EV)-332-FM31

STACK ANALYSIS - PRE-SAMPLING

Date: 28-Jun-16
 Client: OneSteel Hexham
 AECOM's Project No: 60493017
 Stack/Duct Description: Shredder Stack
 Test 1: Fine Particulate (PM10)
 Test 2: Total Particulate
 Test 3: Hazardous Substances (Metals)

Measurement/Observations				
Stack Internal Dimensions:				
Diameter	760 mm	Cross Sectional Area :		0.45 m ²
OR	Length Width			
Length/Width (mm)		Minimum No. of		
Equivalent Diameter	N/A mm	sampling points=		12
Distance from sampling plane to nearest disturbances:		Total No. of sampling points = 12		
Upstream (m) =	5	PM2.5/10=		12
No. Diameters =	6.6	No. of sampling traverses/ports sampled =		2
Type of Upstream Disturbance:	Fan Entry	PM2.5/10=		2
Downstream (m) =	2	No. of sampling points on each traverse/port =		6
No. Diameters =	2.6	PM2.5/10=		6
Type of Down Stream Disturbance:	Stack Exit	Exclusion of any sample point numbers - comments:		
Position of each sampling point, for each traverse:				
	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	33	3	33	3
2	111	81	111	81
3	225	195	225	195
4	535	505	535	505
5	649	619	649	619
6	727	697	727	697
7				
8				
9				
10			Check of total points against minimum, (yes/no) - comments:	
11				
12				
13				
14				
15				
16				
17				
18				
19				
20			General Comments:	
Signed:		Checked:		

ANZ

Emission Measurement Calculations Spreadsheet

Q4AN(EV)-332-FM31

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date: 28-Jun-16
 Client: OneSteel Hexham
 AECOM's Project No: 60493017
 Stack/Duct Description: Shredder Stack
 Test 1: Fine Particulate (PM10)
 Test 2: Total Particulate
 Test 3: Hazardous Substances (Metals)

Sampling time start: 10:31		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm), (dry)	O ₂ (%), (dry)	CO ₂ (%), (dry)
1	10:31	0	20.9	0.0
2	10:32	0	20.9	0.0
3	10:33	0	20.9	0.0
4	10:34	0	20.9	0.0
5	10:35	0	20.9	0.0
6	10:36	0	20.9	0.0
7	10:37	0	20.9	0.0
8	10:38	0	20.9	0.0
Averages:		0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.98
 Moisture percentage (M2): 2.40 %

Measurements

CO: 0.0000 %,(dry)	N ₂ : 79.1 %,(dry)
CO ₂ : 0.0 %,(dry)	O ₂ : 20.9 %,(dry)
Gas Compositions converted to wet basis:	
CO: 0.0000 %,(wet)	N ₂ : 77.2 %,(wet)
CO ₂ : 0.0 %,(wet)	O ₂ : 20.4 %,(wet)
H ₂ O: 2.40 % (=M2)	
Therefore, stack gas density (GD) =	1.28 kg/m ³ (0°C, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m ³ (0°C, dry, 1 atm pressure)

ANZ

Emission Measurement Calculations Spreadsheet

Q4AN(EV)-332-FM31

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date: 28-Jun-16
 Client: OneSteel Hexham
 AECOM's Project No: 60493017
 Stack/Duct Description: Shredder Stack
 Test 1: Fine Particulate (PM10)
 Test 2: Total Particulate
 Test 3: Hazardous Substances (Metals)

Sampling time start: 12:35		Sampling port No.: 1		
Measurement No.	Time sampled	CO (ppm), (dry)	O ₂ (%), (dry)	CO ₂ (%), (dry)
1	12:35	0	20.9	0.0
2	12:36	0	20.9	0.0
3	12:37	0	20.9	0.0
4	12:38	0	20.9	0.0
5	12:39	0	20.9	0.0
6	12:40	0	20.9	0.0
7	12:41	0	20.9	0.0
8	12:42	0	20.9	0.0
Averages:		0.0 ppm	20.9 %	0.0 %

Moisture content (M3): 0.99
 Moisture percentage (M2): 1.21 %

Measurements

CO: 0.0000 %,(dry)	N ₂ : 79.1 %,(dry)
CO ₂ : 0.0 %,(dry)	O ₂ : 20.9 %,(dry)
Gas Compositions converted to wet basis:	
CO: 0.0000 %,(wet)	N ₂ : 78.1 %,(wet)
CO ₂ : 0.0 %,(wet)	O ₂ : 20.6 %,(wet)
H ₂ O: 1.21 % (=M2)	
Therefore, stack gas density (GD) =	1.28 kg/m ³ (0°C, wet, 1 atm pressure)
Therefore, stack gas density (GD) =	1.29 kg/m ³ (0°C, dry, 1 atm pressure)

Emission Measurement Calculations Spreadsheet

Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

Date: 28-Jun-16
Client: OneSteel Hexham
AECOM's Project No: 60493017
Stack/Duct Description: Shredder Stack
Test 1: Fine Particulate (PM10)
Test 2: Total Particulate
Test 3: Hazardous Substances (Metals)

Table with columns: 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. Includes an 'Average' row at the bottom.

Static Pressure (Dwyer) (Pa): kPa
Static Pressure (U-tube, if required) : -0.5 mm
Absolute pressure in stack (hPa) : 1022.95 hPa

Emission Measurement Calculations Spreadsheet

STACK ANALYSIS

SAMPLING OF HAZARDOUS SUBSTANCES (METALS)

Date: 28-Jun-16
Client: OneSteel Hexham
AECOM's Project No.: 60493017
Stack Description No.: Shredder Stack
Sample Nozzle No.: G12
Sampling Port No.: 1 to 2
Page No.: 1 of 1
Sample Nozzle Area (An): 11.31 x 10⁻⁶m²
Thimble No: 0
Blank thimble No:

Leak Check (Pre-Sampling)

Meter start: 188.0560 Meter finish: 188.0560
Time start: 10:19 Time finish: 10:20

Leak Check (Post Sampling)

Meter start: 189.3892 Meter finish: 189.3892
Time start: 12:47 Time finish: 12:48

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Therefore, leakage rate = no leak L/min

(>0.1 l/min. is unacceptable)

Repeat:

Comments:

Repeat:

Comments:

Sampling Record Table

Barometric Pressure: 1023 hPa (start); 1023 hPa (finish)
Meter start: 188.0578 Time start: 10:38
Meter correction factor (GMf) : 1.0100

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	0:06:30	33	16.8	18.0	12.0		Yes
1/2	0:13:00	111	16.8	21.0	13.0		Yes
1/3	0:19:30	225	16.8	24.0	14.0		Yes
1/4	0:26:00	535	16.8	27.0	15.0		Yes
1/5	0:32:30	649	16.8	28.0	16.0		Yes
1/6	0:39:00	727	16.8	29.0	16.0		Yes
2/1	0:45:30	33	16.9	30.0	17.0		Yes
2/2	0:52:00	111	16.8	24.0	18.0		Yes
2/3	0:58:30	225	16.8	27.0	18.0		Yes
2/4	1:05:00	535	16.8	30.0	19.0		Yes
2/5	1:11:30	649	16.8	30.0	19.0		Yes
2/6	1:18:00	727	16.8	31.0	19.0		Yes
Averages				26.6	16.3	no result	

Meter Finish: 189.3870 Time Finish: 12:42
Total Condensate collected: 2 ml Silica gel No(s) used: 99

Emission Measurement Calculations Spreadsheet

Stack Analysis - Hazardous Substances Elemental Analysis Results

Date: 28-Jun-16 Client: OneSteel Hexham
 AECOM's Project No: 60493017 Stack/Duct Description: Shredder Stack

Metal	Particulate Metals Results	Gaseous Metals Results	Oxidisable Mercury Results		
	Front Half, Filter, Acetone Rinses and Acid Rinses (mg). Containers 1, 2 and 3	Back Half, Impingers + Acid Rinses (mg) Container 4	KO Impinger + Acid Rinses (mg) (5A)	KMnO ₄ /H ₂ SO ₄ + Rinses (mg) (5B)	Residue Rinse 8N HCl (mg) (If Required) (5C)
Antimony	<0.0002	<0.0001			
Arsenic	<0.0002	<0.0001			
Beryllium	<0.0002	<0.0001			
Cadmium	<0.0002	<0.0001			
Chromium	0.0002	0.013			
Cobalt	<0.0002	<0.0001			
Copper	0.0011	0.0019			
Lead	0.011	0.0026			
Magnesium	<0.045	<0.033			
Manganese	<0.0002	<0.0001			
Mercury	<0.0002	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.0003	0.00035			
Selenium	<0.0002	<0.0001			
Thallium	<0.0002	<0.0001			
Tin	<0.0002	<0.0001			
Vanadium	<0.0005	<0.0001			
Zinc	0.018	0.0014			

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

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

Stack Analysis - Hazardous Substances Elemental Analysis Results Continued

Date: 28-Jun-16 Client: OneSteel Hexham
 AECOM's Project No: 60493017 Stack/Duct Description: Shredder Stack

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	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Arsenic	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Beryllium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Cadmium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Chromium	0.0002	0.00016	0.013	0.01			0.01	0.008	0.0083
Cobalt	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Copper	0.0011	0.00088	0.0019	0.0015			0.003	0.0024	0.0025
Lead	0.011	0.0088	0.0026	0.0021			0.01	0.008	0.0083
Magnesium	<0.045	<0.036	<0.033	<0.026			<0.002	<0.0016	<0.0017
Manganese	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Mercury	<0.0002	<0.00016	<0.0001	<0.00008	<0.0001	<0.00008	<0.0005	<0.0004	<0.00041
Nickel	0.0003	0.00024	0.00035	0.00028			0.0007	0.00056	0.00058
Selenium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Thallium	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Tin	<0.0002	<0.00016	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Vanadium	<0.0005	<0.0004	<0.0001	<0.00008			<0.0002	<0.00016	<0.00017
Zinc	0.018	0.014	0.0014	0.0011			0.02	0.016	0.017
Total Hazardous Metals*	0.012	0.0092	0.016	0.012	<0.0001	<0.00008	0.021	0.017	0.017
Total Metals	0.031	0.024	0.019	0.015			0.044	0.035	0.036

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

STACK ANALYSIS - FINAL CALCULATIONS

Fine Particulate (PM10)

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

Date: 28-Jun-16 Client: OneSteel Hexham
 AECOM's Project No: 60493017 Stack/Duct Description: Shredder Stack

(A) Sample gas volume at standard conditions

Metered volume (MV ₃):	1.0931 m ³	Average barometric pressure (P _{BARO}):	1023 hPa
Average gas meter temp. (T _{M,2}):	27.8 °C	Average pressure at meter (P _{M,2}):	1023.00 hPa
	301.0 K		
Sample gas volume (MV ₄); (0°C, dry gas, 1 atm pressure):	1.0017 m ³		

(B) PM10 concentration at standard conditions

Blank thimble No.:	0	Blank weight:	g
Thimble No. used:	T409	PM10 Weight:	0.0005 g
Final PM10 Weight (Mp1):	0.00050 g		
PM10 Concentration (C1):	=M _{p1} /MV ₄ =		0.0005 g/m ³ (0°C, dry gas, 1atm pressure)

		;and C ₂ =	0.5 mg/m ³ (0°C, dry gas, 1atm pressure)
CO ₂ Basis	12 %		
Average CO ₂ %:	0.0 %		

Therefore, C _c :	= C _a x 12/CO ₂ % =	0.0005 g/m ³ (0°C, dry gas, 1atm pressure, 12% CO ₂)
	;and C _{c1} =	0.5 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 x (21 - O _{2ref} %)/(21 - O _{2mea} %)	0.07 g/m ³ (0°C, dry gas, 1atm pressure, 7% O ₂)
	;and C _{b1} =	70 mg/m ³ (0°C, dry gas, 1atm pressure, 7% O ₂)

(C) Moisture content

Silica Gel Number:	L18		
V _v =	7.6 g (from laboratory report)	V _w =	0 mL (=grams) (recorded on Laboratory Form 108)
Volume of Water Vapour Condensed (V _{wc(std)}) =	0.0000		
Volume of Water Vapour Condensed (V _{wsg(std)}) =	0.0101		

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

B_{ws} = 1.00 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Fine Particulate (PM10)

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

- (i) Initial gas density for sampling: 1.28 kg/m³ (from Laboratory Form 107)
- (ii) Re-calculated gas density based on moisture content in (c):
 - 1.27 kg/m³ (0°C, wet, 1 atm pressure)
 - 1.29 kg/m³ (0°C, dry, 1 atm pressure)
- (iii) Gas density at stack conditions =

$$(ii) \times \frac{(273.2)}{(273.2+T_s)} \times \frac{(P_s)}{(1013.25)}$$

= 1.223 kg/m³ (stack conditions, wet)

(E) Gas Velocities

- (i) Average of pre-sampling velocities: 2.40 m/s
- (ii) Average of post-sampling velocities: 2.40 m/s
- (iii) Average of while-sampling velocities: N/A m/s
- (iv) Overall average of pre-sampling and post-sampling velocities (Vs):
 - 2.40 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 = 1.09 m³/s (stack conditions)

$$Q_{std} = Q_{stack} \times \frac{P_s}{(P_{std})} \times \frac{(T_{std})}{(T_s)} \times \frac{(100 - B_w)}{100}$$

Qstd = 1.0 m³/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C _{1a} x Qstd =	0.00052	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.52	mg/s (0°C, dry gas, 1 atm pressure)		
	C _{1a} x Qstd =	0.00052	g/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	=	0.52	mg/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	C _{1a} x Qstd =	0.073	g/s (0°C, dry gas, 1 atm pressure	7%	O ₂)
	=	73	mg/s (0°C, dry gas, 1 atm pressure	7%	O ₂)

STACK ANALYSIS - FINAL CALCULATIONS

Total Particulate

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

Date: 28-Jun-16 Client: OneSteel Hexham
 AECOM's Project No: 60493017 Stack/Duct Description: Shredder Stack

(A) Sample gas volume at standard conditions

Metered volume (MV ₃):	1.1039 m ³	Average barometric pressure (P _{BARO}):	1023 hPa
Average gas meter temp. (T _{M,2}):	23.7 °C	Average pressure at meter (P _{M,2}):	1023.00 hPa
	296.9 K		
Sample gas volume (MV ₄); (0°C, dry gas, 1 atm pressure):	1.0256 m ³		

(B) Total Particulate concentration at standard conditions

Blank thimble No.:		Blank weight:	g
Thimble No. used:	T433	Total Particulate Weight	0.0008 g
Final Total Particulate Weight (Mp1):	0.00080 g		
Total Particulate Concentration (C1):	=M _{p1} /MV ₄ =	0.00078 g/m ³ (0°C, dry gas, 1atm pressure)	
		and C ₂ =	0.78 mg/m ³ (0°C, dry gas, 1atm pressure)
CO ₂ Basis	12 %		
Average CO ₂ %:	0.0 %		
Therefore, C _c :	= C _a x 12/CO ₂ % =	0.00078 g/m ³ (0°C, dry gas, 1atm pressure, 12% CO ₂)	
		and C _{c1} =	0.78 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 x (21 - O _{2ref} %)/(21 - O _{2mea} %)	0.11 g/m ³ (0°C, dry gas, 1atm pressure, 7% O ₂)	
		and C _{b1} =	110 mg/m ³ (0°C, dry gas, 1atm pressure, 7% O ₂)

(C) Moisture content

Silica Gel Number:	DT351		
V _v =	6.9 g (from laboratory report)	V _w =	4 mL (=grams) (recorded on Laboratory Form 108)
Volume of Water Vapour Condensed (V _{wc(std)}) =	0.0053		
Volume of Water Vapour Condensed (V _{wsg(std)}) =	0.0092		
Therefore, B _{ws} =	$\frac{(V_{wc(std)} + V_{wsg(std)})}{(V_{wc(std)} + V_{wsg(std)} + V_{m(std)})}$		
B _{ws} =	1.40 %		

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

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

- (i) Initial gas density for sampling: 1.28 kg/m³ (from Laboratory Form 107)
- (ii) Re-calculated gas density based on moisture content in (c):
 - 1.27 kg/m³ (0°C, wet, 1 atm pressure)
 - 1.29 kg/m³ (0°C, dry, 1 atm pressure)
- (iii) Gas density at stack conditions =

$$(ii) \times \frac{(273.2)}{(273.2+T_s)} \times \frac{(P_s)}{(1013.25)}$$

= 1.223 kg/m³ (stack conditions, wet)

(E) Gas Velocities

- (i) Average of pre-sampling velocities: 2.40 m/s
- (ii) Average of post-sampling velocities: 2.40 m/s
- (iii) Average of while-sampling velocities: N/A m/s
- (iv) Overall average of pre-sampling and post-sampling velocities (Vs):
 - 2.40 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 = 1.09 m³/s (stack conditions)

Qstd = Qstack x $\frac{P_s}{(P_{std})} \times \frac{(T_{std})}{(T_s)} \times \frac{(100 - B_w)}{100}$

Qstd = 1.0 m³/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

Rm =	C _{1a} x Qstd =	0.00081	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.81	mg/s (0°C, dry gas, 1 atm pressure)		
	C _{1a} x Qstd =	0.00081	g/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	=	0.81	mg/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	C _{1a} x Qstd =	0.11	g/s (0°C, dry gas, 1 atm pressure	7%	O ₂)
	=	110	mg/s (0°C, dry gas, 1 atm pressure	7%	O ₂)

STACK ANALYSIS - FINAL CALCULATIONS

Hazardous Substances (Metals)

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

Date: 28-Jun-16 Client: OneSteel Hexham
 AECOM's Project No: 60493017 Stack/Duct Description: Shredder Stack

(A) Sample gas volume at standard conditions

Metered volume (MV₃): 1.3425 m³ Average barometric pressure (P_{BARO}) 1023 hPa
 Average gas meter temp. (T_{M,2}): 21.5 °C
 294.7 K Average pressure at meter (P_{M,2}) 1023.00 hPa
 Sample gas volume (MV₄); (0°C, dry gas, 1 atm pressure): 1.2565 m³

(B) Metals concentration at standard conditions

Blank thimble No.: Blank weight: g
 Thimble No. used: 0 Metals Weight: 0.000021 g
 Final Metals Weight (Mp1): 0.00002 g
 Metals Concentration (C1): =M_{p1}/MV₄= 0.000017 g/m³ (0°C, dry gas, 1atm pressure)
 ;and C₂ = 0.017 mg/m³ (0°C, dry gas, 1atm pressure)
 CO₂ Basis 12 %
 Average CO₂ %: 0.0 %
 Therefore, C_c: = C_a x 12/CO₂% = 0.000017 g/m³ (0°C, dry gas, 1atm pressure, 12% CO₂)
 ;and C_{c1} = 0.017 mg/m³ (0°C, dry gas, 1atm pressure, 12% CO₂)
 O₂ Basis 7 %
 Average O₂ %: 20.9 %
 Therefore, C_b: =C_a x (21 - O_{2ref}%)/(21 - O_{2mea}%) 0.0024 g/m³ (0°C, dry gas, 1atm pressure, 7% O₂)
 ;and C_{b1} = 2.4 mg/m³ (0°C, dry gas, 1atm pressure, 7% O₂)

(C) Moisture content

Silica Gel Number: 99
 V_v = 9.7 g (from laboratory report) V_w = 2 mL (=grams) (recorded on Laboratory Form 108)
 Volume of Water Vapour Condensed (V_{wc(std)}) = 0.0027
 Volume of Water Vapour Condensed (V_{wsg(std)}) = 0.0129
 Therefore, B_{ws} = $\frac{(V_{wc(std)} + V_{wsg(std)})}{(V_{wc(std)} + V_{wsg(std)} + V_{m(std)})}$
 B_{ws} = 1.23 %

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Hazardous Substances (Metals)

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

- (i) Initial gas density for sampling: 1.28 kg/m³ (from Laboratory Form 107)
- (ii) Re-calculated gas density based on moisture content in (c):
 - 1.27 kg/m³ (0°C, wet, 1 atm pressure)
 - 1.29 kg/m³ (0°C, dry, 1 atm pressure)
- (iii) Gas density at stack conditions =

$$(ii) \times \frac{(273.2)}{(273.2+T_s)} \times \frac{(P_s)}{(1013.25)}$$

= 1.223 kg/m³ (stack conditions, wet)

(E) Gas Velocities

- (i) Average of pre-sampling velocities: 2.40 m/s
- (ii) Average of post-sampling velocities: 2.40 m/s
- (iii) Average of while-sampling velocities: N/A m/s
- (iv) Overall average of pre-sampling and post-sampling velocities (Vs):
 - 2.40 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)

Q_{stack} = V_s x A = 1.09 m³/s (stack conditions)

$$Q_{std} = Q_{stack} \times \frac{P_s}{(P_{std})} \times \frac{(T_{std})}{(T_s)} \times \frac{(100 - B_w)}{100}$$

Q_{std} = 1.0 m³/s (0°C, dry gas, 1 atm pressure)

(G) Mass Emission Rate

R _m =	C _{1a} x Q _{std} =	0.000018	g/s (0°C, dry gas, 1 atm pressure)		
	=	0.018	mg/s (0°C, dry gas, 1 atm pressure)		
	C _{1a} x Q _{std} =	0.000018	g/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	=	0.018	mg/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	C _{1a} x Q _{std} =	0.0025	g/s (0°C, dry gas, 1 atm pressure	7%	O ₂)
	=	2.5	mg/s (0°C, dry gas, 1 atm pressure	7%	O ₂)

Emission Measurement Calculations Spreadsheet

EMISSION MONITORING RESULTS, SHREDDER STACK ONESTEEL HEXHAM 28-Jun-16 FINE PARTICULATE (PM10) TOTAL PARTICULATE HAZARDOUS SUBSTANCES (METALS)		
Sampling Conditions:		
Stack internal diameter at test location	760 mm	
Stack gas temperature (average)	13.2 °C	286.4 K
Stack pressure (average)	1023 hPa	
Stack gas velocity (average, stack conditions)	2.4 m/s	
Stack gas flowrate (stack conditions)	1.1 m ³ /s	
Stack gas flowrate (0°C, dry gas, 1 atm pressure)	1 m ³ /s	
Fine Particulate (PM10) Testing		
Test Period	10:38	- 12:42
Fine Particulate (PM10) Mass	0.5 mg	
Gas Volume Sampled	1.00 m ³	
Fine Particulate (PM10) Emission*1	0.5 mg/m ³	
Fine Particulate (PM10) Mass Emission Rate*2	0.52 mg/s	
Regulatory Limit	NA	
Total Particulate Testing		
Test Period	10:38	- 12:42
Total Particulate Mass	0.8 mg	
Gas Volume Sampled	1.03 m ³	
Total Particulate Emission*1	0.78 mg/m ³	
Total Particulate Mass Emission Rate*2	0.81 mg/s	
Regulatory Limit	100 mg/m ³	
Hazardous Substances (Metals) Testing		
Test Period	10:38	- 12:42
Hazardous Substances (Metals) Mass	0.021 mg	
Gas Volume Sampled	1.26 m ³	
Hazardous Substances (Metals) Emission*1	0.017 mg/m ³	
Hazardous Substances (Metals) Mass Emission Rate*2	0.018 mg/s	
Regulatory Limit	NA	
Moisture Content (%)	1.3	
Gas Density (dry at 1 atmosphere)	1.29 kg/m ³	
Dry Molecular Weight	28.8 g/g-mole	

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

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

Appendix B

Laboratory Results (11 pages)

Appendix B Laboratory Results (11 pages)

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304
Phone: 02 49677880

STACK EMISSION - PARTICULATES REPORT

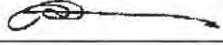
Origin: AECOM - Newcastle
Project: 60493017
Report : 11570-0-P Page 1 of 1
Description : Stack Emission Samples
Received: 30-Jun-16
Date : 04-Jul-16
Report To : Colin Clarke
17 Warabrook Blvd, Warabrook NSW 2304
Copy to: FILE

Thimble ID		Volume (mL)	Total Particulate Matter (g)
T409	Filter	-	0.0005
T433	Filter	-	0.0008



NATA Accredited Laboratory 18079
Accredited for compliance with
ISO/IEC 17025

Note : Sampled by Client

Reported By: 

Robert Dawson

Determined in Accordance With:
Particulate matter - total in stack gases by
gravimetric using in-house M300;
Acetone/Water Rinse using AS4323.2

Steel River Testing

5/11 McIntosh Drive, Mayfield West, NSW 2304

Phone: 02 49677880

STACK EMISSION - MOISTURE REPORT

Origin: AECOM - Newcastle

Report : 11570-0-M

Page 1 of 1

Project: 60493017

Description : Stack Emission Samples

Date : 04-Jul-16

Received: 30-Jun-16

Report To : Colin Clarke

Copy to: FILE

17 Warabrook Blvd, Warabrook NSW 2304

Jar ID	Moisture (g)
99	9.7
DT351	6.9
L18	7.6



NATA Accredited Laboratory 18079

Accredited for compliance with
ISO/IEC 17025

Reported By: 

Robert Dawson

Determined in Accordance With:
Moisture content in stack gases by gravimetric
using in-house M301



A.B.N. 44 000 964 278
10 / 585 Blackburn Road
Notting Hill, Vic, 3168
Telephone: (03) 9574 3200

Chartered Chemists

11-Jul-2016

AECOM

17 Warabrook Bvde
Warabrook

NSW 2304
Attention: James Lang

REPORT NUMBER: M161422

Site/Client Ref: 60493017/1.1

Order No: 60493017-1.1

CERTIFICATE OF ANALYSIS

SAMPLES: Twelve samples were received for analysis

DATE RECEIVED: 1-Jul-2016

DATE COMMENCED: 1-Jul-2016

METHODS: See Attached Results

RESULTS: Please refer to attached pages for results.

Note: Results are based on samples as received at SGS Leeder Consulting's laboratories

REPORTED BY:

Ming Dai
Senior Chemist



NATA Accredited Laboratory Number: 14429

Accredited for compliance
with ISO/IEC 17025.

ANALYTICAL RESULTS

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Sample units are expressed in µg total

Test Started: 7/07/2016

Analyte Name	Leeder ID Client ID	Sampled Date PQL	2016017893	2016017894	2016017895
			Metals 1	Metals 12	Method
			28/06/2016	28/06/2016	Blank
Sb	0.2	0.2	nd	nd	nd
As	0.2	0.2	nd	nd	nd
Be	0.2	0.2	nd	nd	nd
Cd	0.2	0.2	nd	nd	nd
Cr	0.2	0.2	0.8	0.9	nd
Co	0.2	0.2	nd	nd	nd
Cu	0.2	0.2	0.5	0.2	nd
Pb	0.2	0.2	0.3	0.3	nd
Mg	2	2	25	25	nd
Mn	0.2	0.2	nd	nd	nd
Hg	0.2	0.2	nd	nd	nd
Ni	0.2	0.2	nd	nd	nd
Se	0.2	0.2	nd	nd	nd
Tl	0.2	0.2	nd	nd	nd
Sn	0.2	0.2	nd	nd	nd
V	0.2	0.2	0.5	0.5	nd
Zn	0.2	0.2	290	300	nd



ANALYTICAL RESULTS

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

Test Started: 7/07/2016

Analyte Name	Leader ID Client ID	2016017896	2016017897	2016017898
		Metals 3	Metals 4	Metals 8A
Sampled Date	PQL	28/06/2016	28/06/2016	28/06/2016
Sb	0.1	nd	nd	nd
As	0.1	nd	nd	nd
Be	0.1	nd	nd	nd
Cd	0.1	nd	nd	nd
Cr	0.1	0.3	13	nd
Co	0.1	nd	nd	nd
Cu	0.1	0.8	1.9	nd
Pb	0.1	11	2.6	nd
Mg	0.1	10	20	20
Mn	0.1	nd	nd	nd
Hg	0.1	nd	nd	nd
Ni	0.1	0.4	0.4	nd
Se	0.1	nd	nd	nd
Tl	0.1	nd	nd	nd
Sn	0.1	nd	nd	nd
V	0.1	nd	nd	nd
Zn	0.1	28	1.7	nd
Sample Volume		95	300	300

ANALYTICAL RESULTS

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Sample units are expressed in µg total

Test Started: 7/07/2016

Analyte Name	Sampled Date PQL	Leader ID Client ID	2016017899 Metals 9	2016017900 Metals 5A	2016017901 Metals 5C	2016017902 Metals 8B	2016017903 Metals 11	2016017904 Method
			28/06/2016	28/06/2016	28/06/2016	28/06/2016	28/06/2016	Blank
Sb	0.1		nd					nd
As	0.1		nd					nd
Be	0.1		nd					nd
Cd	0.1		nd					nd
Cr	0.1		nd					nd
Co	0.1		nd					nd
Cu	0.1		nd					nd
Pb	0.1		nd					nd
Mg	0.1		13					nd
Mn	0.1		nd					nd
Hg	0.1		nd	nd	nd	nd	nd	nd
Ni	0.1		nd					nd
Se	0.1		nd					nd
Tl	0.1		nd					nd
Sn	0.1		nd					nd
V	0.1		nd					nd
Zn	0.1		0.3					nd
Sample Volume			210	100	260	100	260	

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Sample units are expressed in µg total

Test Started: 7/07/2016

Analyte Name	Sampled Date PQL	Leader ID Client ID	2016017905 Metals 5B	2016017906 Metals 10	2016017907 Method
			28/06/2016	28/06/2016	Blank
Hg	0.5		nd	nd	nd
Sample Volume			400	110	



Report N°: M161422

QA/QC RESULTS

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 7/07/2016

Analyte Name	Leader ID Client ID	Sampled Date PQL	2016017908	2016017909
			Matrix	Matrix
			Spike	Spike Dup
Sb			98	100
As			100	99
Be			99	100
Cd			98	99
Cr			102	100
Co			102	103
Cu			98	98
Pb			111	110
Mg			91	92
Mn			101	98
Hg			99	92
Ni			100	101
Se			93	92
Tl			117	117
Sn			104	105
V			108	110
Zn			97	97

QA/QC RESULTS

Matrix: Impinger Solution

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.06 Metals in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 7/07/2016

Analyte Name	Sampled Date PQL	Leeder ID Client ID	2016017910 Matrix	2016017911 Matrix
			Spike	Spike Dup
Sb			98	97
As			98	100
Be			105	99
Cd			100	99
Cr			101	100
Co			101	101
Cu			94	92
Pb			113	113
Mg			99	97
Mn			90	88
Hg			98	98
Ni			99	99
Se			92	87
Tl			117	117
Sn			100	101
V			105	105
Zn			115	118

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total)

Quality Control Results are expressed in Percent Recovery of expected result

Test Started: 7/07/2016

Analyte Name	Sampled Date PQL	Leeder ID Client ID	2016017912 Matrix	2016017913 Matrix
			Spike	Spike Dup
Hg			101	102

QUALIFIERS / NOTES FOR REPORTED RESULTS

PQL	Practical Quantitation Limit
nd	Not Detected – The analyte was not detected above the reported PQL.
is	Insufficient Sample to perform this analysis.
T	Tentative identification based on computer library search of mass spectra.
NC	Not calculated and/or Results below PQL
NV	No Vacuum, Canister received above standard atmospheric pressure
nr	Not Requested for analysis.
R	Rejected Result – results for this analysis failed QC checks.
SQ	Semi-Quantitative result – quantitation based on a generic response factor for this class of analyte.
IM	Inappropriate method of analysis for this compound
U	Unable to provide Quality Control data – high levels of compounds in sample interfered with analysis of QC results.
UF	Unable to provide Quality Control data- Surrogates failed QC checks due to sample matrix effects
L	Analyte detected at a level above the linear response of calibration curve.
E	Estimated result. NATA accreditation does not cover estimated results.
C1	These compounds co-elute.
--	Parameter Not Determined
CT	Elevated concentration. Results reported from carbon tube analysis
**	Sample shows non-petroleum hydrocarbon profile

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APPENDIX ONE.

CHAIN OF CUSTODY DOCUMENT

Chain of Custody Record - SGS Leeder Consulting

Dispatch samples to: Unit 10/585 Blackburn Road, Notting Hill VIC 3168

Sheet 1 of 1

Attn: Lyndall Stevens - Contact Ph: (03) 9574 3200 Email: au.samplerreceipt@sgs.com

CLIENT NAME: AECOM

CONTACT PHONE No: 02 4911 4900

Sample Disposal (Please X) After: 4 Weeks () 6 Weeks ()

CLIENT ADDRESS: 17 Warabrook I

CONTACT FAX No: 02 4911 4999

Warabrook NSW 2304

RESULTS REQUIRED BY:

CONTACT:

James Lang

EMAIL REPORT TO: james.lang@aecom.com

SAMPLED BY:

DT VK

LAB QUOTE NUMBER:

PROJECT REF. / ORDER No: 60493017-1.1

Containers/Preservation (please tick) (G=glass, P=plastic)

Client Sample ID	Date Sampled	Matrix			0.1-1L Jar(G) n.a.	0.1-1.0 litre(G) Nat.	0.1-1.0 litre(P) Nat.	40ml Vial(G) Nat.	40ml Vial(G) H2SO4	0.1-1L (P) H2SO4	125mL (P) HCl acid washed	125mL (P) Zn Acc. NaOH	125mL (P) Filtered Yes/No HNO3	125mL (P) NaOH	Analyses Required (Analyte + Method Code)														
		Filter	Impinger	KMnO4											Metals -USEPA Method 29*	Mercury													
Metals 1		x			x										x														
Metals 3			x				x								x														
Metals 4			x				x								x														
Metals 5A			x				x									x													
Metals 5B				x			x									x													
Metals 5C			x				x									x													
Metals 8A			x				x								x														
Metals 8B			x				x									x													
Metals 9			x				x								x														
Metals 10				x			x									x													
Metals 11			x				x									x													
Metals 12		x					x								x														
-----		Totals:	2	8	2	2	2	8							6	6													

CHAIN OF CUSTODY RECORD

RELEASED BY: (Name) (Signature) (Date / Time)

James Lang
(Signature) 7/03/16 2pm

RECEIVED BY: (Name) (Signature) (Date / Time)

Lyndall Stevens
(Signature) 1/7/16 9:30am

Custody Seals Intact?

Yes / No

Samples Received Chilled?

Yes / *No*

Please Note: Dissolved metals require filtering in the field.

Please indicate whether the HNO3 acidified sample has been filtered.

Comments: (eg. Highly contaminated samples, reporting requirements etc)

*Sb, As, Be, Cd, Cr, Co, Cu, Pb, Mg, Mn, Hg, Ni, Se, Tl, Sn, V, Zn

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