

OneSteel Recycling Pty Ltd Doc No. 60493017_1.1_Q4_2016

4th Quarter Emissions Testing Report 2016

OneSteel Recycling Hexham



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4th Quarter Emissions Testing Report 2016

OneSteel Recycling Hexham

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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
Appe	ndix A	
	Field Sheets (17 pages)	A
Appe	ndix B	
	Laboratory Results	
	(12 pages)	В

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, 2 December 2016	11
Table 5	Fine Particulate (PM ₁₀), Total Particulate and Hazardous Substance (Metals)	
	Results, 2 December 2016	12
Table 6	Hazardous Substances (Metals) Elemental Analysis Results, 2 December 2016	13

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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 2 December 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 12605-0-M & 12605-0-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 M162302:
 - 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 2.5 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 2 December 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 2.5 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 ±13.6%.

Table 4	Shredder Baghouse Emission Results Summary, 2 December 2016
---------	---

Parameter	Emission Concentration (EPL Point 1)	Emission Concentration Limit
Total Particulate (TP) (mg/m ³)	0.68	100
Fine Particulate (PM ₁₀) (mg/m ³)	0.37	NA
Lead (mg/m ³)	0.0033	5.0
Mercury (mg/m ³)	<0.00041	1.0
Total Hazardous Substances (Metals) (mg/m ³)	0.011	NA

Results from testing conducted on EPL Point 1 on 2 December 2016 are below the regulatory limits listed in EPL 5345.

		1000110, 2 20001	1001 2010	
Sampling Conditions:				
Stack internal diameter at test location	760	mm		
Stack gas temperature (average)	29.0	°C	302.2	Κ
Stack pressure (average)	1010	hPa		
Stack gas velocity (average, stack conditions)	2.5	m/s		
Stack gas flowrate (stack conditions)	1.1	m³/s		
Stack gas flowrate (0°C, dry gas, 1 atm pressure)	0.98	m³/s		
Fine Particulate (PM ₁₀) Testing				
Test Period	9:56	-	11:27	
Fine Particulate (PM ₁₀) Mass	0.4	mg		
Gas Volume Sampled	1.07	m ³		
Fine Particulate (PM ₁₀) Emission* ¹	0.37	mg/m ³		
Fine Particulate (PM ₁₀) Mass Emission Rate* ²	0.36	mg/s		
Regulatory Limit	NA			
Total Particulate Testing				
Test Period	9:56	-	11:27	
Total Particulate Mass	0.7	mg		
Gas Volume Sampled	1.02	m ³		
Total Particulate Emission*1	0.68	mg/m ³		
Total Particulate Mass Emission Rate* ²	0.67	mg/s		
Regulatory Limit	100	mg/m ³		
Hazardous Substances (Metals) Testing				
Test Period	9:56	-	11:27	
Hazardous Substances (Metals) Mass	0.013	mg		
Gas Volume Sampled	1.22	m ³		
Hazardous Substances (Metals) Emission*1	0.011	mg/m ³		
Hazardous Substances (Metals) Mass Emission Rate* ²	0.011	mg/s		
Regulatory Limit	NA			
Moisture Content (%)	1.9			
Gas Density (dry at 1 atmosphere)	1.29	kg/m ³		
Dry Molecular Weight	28.8	g/g-mole		

Table 5 Fine Particulate (PM₁₀). Total Particulate and Hazardous Substance (Metals) Results. 2 December 2016

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.

	1	3

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/m³)	Mass Emission Rate (mg/s)
Antimony	<0.0002	<0.00016	0.000097	0.00008			0.000097	0.00008	0.000078
Arsenic	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Beryllium	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Cadmium	0.0005	0.00041	0.000048	0.000039			0.0005	0.00041	0.0004
Chromium	0.0003	0.00025	0.00055	0.00045			0.0009	0.00074	0.00072
Cobalt	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Copper	0.012	0.0099	<0.0005	<0.00041			0.012	0.0099	0.0097
Lead	0.0036	0.003	0.00055	0.00045			0.004	0.0033	0.0032
Magnesium	<0.0812	<0.067	0.00034	0.00028			0.00034	0.00028	0.00027
Manganese	0.0048	0.0039	0.0011	0.0009			0.006	0.0049	0.0048
Mercury	<0.0002	<0.00016	<0.0001	<0.000082	<0.0005	<0.00041	<0.0005	<0.00041	<0.0004
Nickel	0.0017	0.0014	<0.0003	<0.00025			0.0017	0.0014	0.0014
Selenium	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Thallium	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Tin	<0.0002	<0.00016	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Vanadium	<0.0026	<0.0021	<0.0001	<0.000082			<0.0002	<0.00016	<0.00016
Zinc	<1.7	<1.4	0.0081	0.0067			0.0081	0.0067	0.0066
Total Hazardous Metals*	0.011	0.009	0.0023	0.0019	<0.0005	<0.00041	0.013	0.011	0.011
Total Metals	0.023	0.019	0.011	0.0089			0.034	0.028	0.027

Table 6 Hazardous Substances (Metals) Elemental Analysis Results, 2 December 2016

* 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)



Q4AN(EV)-332-FM31

OneSteel Hexham

AECOM's Project Number: 60493017

Emission Source: Shredder Stack

Date Sampled: 2-Dec-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:

James Lang

Sampling Performed By:

Dylan Turnbull

SampleID Emission Measurement Calculations Spreadsheet (Q4AN(EV)-332-FM31) Revision 2 May 28, 2015



Q4AN(EV)-332-FM31

STACK ANALYSIS - PRE-SAMPLING

Date:2-Dec-16Client:OneSteel HexhamAECOM's Project No:60493017Stack/Duct Description:Shredder StackTest 1:Fine Particulate (PM10)Test 2:Total ParticulateTest 3:Hazardous Substances (Metals)

1		Measurement/Obse	rvations		
Stack Inte	ernal Dimensions:				
Diameter OR Length/W Equivaler	760 Length /idth (mm) nt Diameter N/A) mm Width mm	Cross Sectional Area Minimum No. of sampling points=	• 0.45 m ² 12	2
Distance	from encoding place to		+		
Distance	irom sampling plane to		I otal No. of sampling	points =	12
nearest u	isturbances.		No. of compling trave	PIVI2.5/10=	12
Instroom	(m) = 5		no. of sampling trave	rses/pons	0
No Diam	otors = 66		sampled -	DM2 5/10-	2
Type of L	lostroom Disturbance:	Ean Entry	No. of compling point	PIVI2.5/10=	2
Downstre	am(m) = 2	Fan Entry	traverse/part =	s on each	0
No Diam	$a_{\text{n}}(n) = 2$		traverse/port -	DM0 5/10-	0
Type of D	lown Stream Disturbance:	Stack Exit	1 C C C C C	PIVI2.5/10=	6
			Exclusion of any sam	ple point	
Position o	of each sampling point, for	each traverse:	numbers - comments	i i i i i i i i i i i i i i i i i i i	
No.	Distance from wall	S-type Pitot distances	Distance from wall	S-Type Pitot di	stances
1	33	3	33	3	
2	111	81	111	81	
3	225	195	225	195	
4	535	505	535	505	-
o c	649	619	649	619	
0	121	697	121	697	_
0					-
0					_
10			Check of total points	aggingt	
11					
12				Jonnents.	
13		1			
14					
15	1				
16	·		1		
17	1		1		
18	1				
			General Comments:	/	_
19	P		Oeneral Comments.		
19 20			General Comments.	11	

SamplePts Emission Measurement Calculations Spreadsheet (Q4AN(EV)-332-FM31) Revision 2 May 28, 2015

Q4AN(EV)-332-FM31

STACK ANALYSIS - GAS COMPOSITION AND DENSITY PRE-SAMPLING

Date:2-Dec-16Client:OneSteel HexhamAECOM's Project No:60493017Stack/Duct Description:Shredder StackTest 1:Fine Particulate (PM10)Test 2:Total ParticulateTest 3:Hazardous Substances (Metals)

Sampling time start:	9:40	Sampling port No.:	1	
Measurement No.	Time sampled	CO (ppm). (dry)	O ₂ (%), (dry)	CO ₂ (%), (dry)
1	9:40	0	20.9	0.0
2	9:41	0	20.9	0.0
3	9:42	0	20.9	0.0
4	9:43	0	20.9	0.0
5	9:44	0	20.9	0.0
6	9:45	0	20.9	0.0
7	9:46	0	20.9	0.0
8	9:47	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %

Moisture percentage (M2):

1.70 %

Measurements

CO:	0.0000 %,(dry)	N ₂ :	79.1 %,(dry)	
CO ₂ :	0.0 %,(dry)	O ₂ :	20.9 %,(dry)	
Gas Com	positions converted to wet basis:			
CO:	0.0000 %,(wet)	N ₂ :	77.8 %,(wet)	
CO2:	0.0 %,(wet)	O ₂ :	20.5 %,(wet)	
H ₂ O:	1.70 %(=M2)	 A 1 		
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)	

ATCO

Q4AN(EV)-332-FM31

STACK ANALYSIS - GAS COMPOSITION AND DENSITY POST-SAMPLING

Date:	2-Dec-16	
Client:	OneSteel Hexham	1
AECOM	s Project No:	60493017
Stack/Du	ict Description:	Shredder Stack
Test 1:	Fine Particulate (F	PM10)
Test 2:	Total Particulate	
Test 3:	Hazardous Substa	ances (Metals)

Sampling time start:	11:20	Sampling port No.:	1	
Measurement No.	Time sampled	CO (ppm). (dry)	O ₂ (%), (dry)	CO ₂ (%), (dry)
1	11:20	0	20.9	0.0
2	11:21	0	20.9	0.0
3	11:22	0	20.9	0.0
4	11:23	0	20.9	0.0
5	11:24	0	20.9	0.0
6	11:25	0	20.9	0.0
7	11:26	0	20.9	0.0
8	11:27	0	20.9	0.0
	Averages:	0.0 ppm	20.9 %	0.0 %
Moisture content (M3)	0.98			

Moisture content (M3): Moisture percentage (M2):

2.08 %

Measurements

CO:	0.0000 %,(dry)	N ₂ :	79.1 %,(dry)	
CO ₂ :	0.0 %,(dry)	O ₂ :	20.9 %,(dry)	
Gas Com	positions converted to wet basis:			
CO:	0.0000 %,(wet)	N ₂ :	77.5 %,(wet)	
CO ₂ :	0.0 %,(wet)	O ₂ :	20.5 %,(wet)	
H ₂ O:	2.08 %(=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)	



Stack Analysis - Pre Sampling Pitot Tube and Temperature Traverses

 Date:
 2-Dec-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)
 Substances (Metals)

Time :	9:40	Barometric Pressure :		1010 hPa		
Page No. :	1 of 1	Pitot Correction Factor : Stack Gas Density:		0.84		
Sampling Port No:	1 to 2			1.28	ka/m ³	
Pitot Tube Type :	e 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	3	0.005	28.0	301.2	24	
1/2	81	0.005	28.0	301.2	2.4	
1/3	195	0.005	28.0	301.2	2.4	
1/4	505	0.005	28.0	301.2	24	
1/5	619	0.005	28.0	301.2	2.4	
1/6	697	0.005	28.0	301.2	2.4	
2/1	3	0.005	28.0	301.2	2.4	
2/2	81	0.005	28.0	301.2	2.4	
2/3	195	0.005	28.0	301.2	2.4	
2/4	505	0.005	28.0	301.2	2.4	
2/5	619	0.005	28.0	301.2	2.4	
2/6	697	0.005	28.0	301.2	2.4	
Average			28.0	301.2	2.4	

Static Pressure (Dwyer) (Pa): Static Pressure (U-tube, if required) : Absolute pressure in stack (hPa) : kPa 0.5 mm 1010.05 hPa



STACK ANALYSIS

SAMPLING	OF FIN	E PARTICULATE (PM10)	
Datas	2.0.	- 10	

Date.	2-Dec-10							
Client: On	eSteel Hext	ham						
AECOM's Proje	ct No:		60493017					
Stack Descriptio	on No.:	Shredder Stac	k					
Sample Nozzle	No.:	fine10		Sample Nozzle Ar	ea (An):	5.92	$\times 10^{-5} m^2$	
Sampling Port N	lo.:	1 to 2		Thimble No:		T398		
Page No:		1 of 1		Blank thimble No:		NA		
Leak Check (Pr	re-Sampling	g)		Leak Check (Pos	t Sampling	0		
Meter start:	187.0854	Meter finish:	187.0854	Meter start:	188.3206	Meter finish:	188.3206	
Time start:	9:52	Time finish:	9:53	Time start:	12:00	Time finish:	12:01	
Therefore, leaka	age rate =	no leak	L/min	Therefore, leakage	e rate =	no leak	L/min	
(>0.1 l/min. is ur	nacceptable)		(>0.1 l/min. is una	cceptable)			
Repeat:				Repeat:				
Comments:				Comments:				

Sampling Record Table

Barometric Pressure:	1010 hPa (start);		1010 hPa (finish)
Meter start:	187.0872	Time start:	9:56
Meter correction factor (GMf) :		1.0000	

Sampling	Stopwatch Time at Sampling	Distance from far wall	Isokinetic Flowrate	Meter Inlet	Meter Outlet	Impinger Train Outlet	Flowrate Attained
Position No.	Position	(mm)	(L/min)	Temp. (°C)	Temp. (°C)	Temp (°C)	(Y/N)
1/1	0:07:30	33	13.3	38.0	26.0	y	Yes
1/2	0:07:30	111	13.3	43.0	31.0	v	Yes
1/3	0:07:30	225	13.3	44.0	31.0	y	Yes
1/4	0:07:30	535	13.3	45.0	32.0	y	Yes
1/5	0:07:30	649	13.3	46.0	33.0	y	Yes
1/6	0:07:30	727	13.3	47.0	34.0	ý	Yes
2/1	0:07:30	33	13.3	47.0	35.0	У	Yes
2/2	0:07:30	111	13.3	48.0	35.0	У	Yes
2/3	0:07:30	225	13.3	49.0	36.0	У	Yes
2/4	0:07:30	535	13.3	49.0	37.0	y	Yes
2/5	0:07:30	649	13.3	50.0	38.0	y	Yes
2/6	0:07:30	727	13.3	51.0	39.0	у	Yes
Averages				46.4	33.9	no result	

Q4AN(EV)-332-FM31

STACK ANALYSIS

SAMPLING OF TOTAL PARTICULATE

Date: 2-Dec-	16					
Client: OneSteel He	exham					
AECOM's Project No:		60493017				
Stack Description No .:	Shredder Stac	k				
Sample Nozzle No .:	s6		Sample Nozzle Area (An):	9.16	x 10 ⁻⁵ m ²
Sampling Port No .:	1 to 2		Thimble No:		T399	
Page No:	1 of 1		Blank thimble No:		NA	
Leak Check (Pre-Sampl	ing)		Leak Check (Post Sa	mpling	1)	
Meter start: 5313.507	1 Meter finish:	5313.5071	Meter start: 531	4.6785	Meter finish:	5314.6785
Time start: 9:5	53 Time finish:	9:54	Time start:	12:02	Time finish:	12:03
Therefore, leakage rate =	no leak	L/min	Therefore, leakage rat	e =	no leak	L/min
(>0.1 l/min. is unacceptat	ble)		(>0.1 l/min. is unaccer	otable)		
Repeat:			Repeat:			
Comments:			Comments:			

Sampling Record Table

 Barometric Pressure:
 1010 hPa (start);
 1010 hPa (finish)

 Meter start:
 5313.5088
 Time start:
 9:56

 Meter correction factor (GMf) :
 1.0000
 1.0000

Sampling Position No	Stopwatch Time at Sampling Position	Distance from far wall	Isokinetic Flowrate (L/min)	Meter Inlet	Meter Outlet	Impinger Train Outlet	Flowrate Attained
1/1	0:07:30	33	12.9	36.0	26.0	Temp (C)	Vec
1/2	0:15:00	111	12.9	39.0	28.0	y	Yes
1/3	0:22:30	225	12.9	40.0	29.0	y v	Ves
1/4	0:30:00	535	12.9	42.0	30.0	y v	Yes
1/5	0:37:30	649	12.9	43.0	31.0	v	Yes
1/6	0:45:00	727	12.9	44.0	31.0	y	Yes
2/1	0:52:30	33	12.9	44.0	32.0	y	Yes
2/2	1:00:00	111	12.9	45.0	33.0	y	Yes
2/3	1:07:30	225	12.9	46.0	34.0	y	Yes
2/4	1:15:00	535	12.9	47.0	35.0	y	Yes
2/5	1:22:30	649	12.9	48.0	36.0	y	Yes
2/6	1:30:00	727	12.9	49.0	37.0	У	Yes
							-
			-				
Averages				43.6	31.8	no result	

Q4AN(EV)-332-FM31

STACK ANALYSIS

Hazardous Substances (Metals) 2-Dec-16 Date: OneSteel Hexham Client: AECOM's Project No: 60493017 Stack Description No .: Shredder Stack Sample Nozzle No .: G12 x 10⁻⁵m² Sample Nozzle Area (An): 11.31 Sampling Port No .: 1 to 2 Thimble No: NA Page No: 1 of 1 Blank thimble No: NA Leak Check (Pre-Sampling) Leak Check (Post Sampling) Meter start: 67.4843 Meter finish: 67.4843 Meter start: 68.8704 Meter finish: 68.8704 9:55 Time start: Time start: 9:54 Time finish: 12:04 Time finish: 12:05 Therefore, leakage rate = no leak L/min Therefore, leakage rate = no leak L/min (>0.1 l/min. is unacceptable) (>0.1 l/min. is unacceptable) Repeat: Repeat: Comments: Comments:

Sampling Record Table

Barometric Pressure:	1010 hPa (s	tart);	1010 hPa (finish)
Meter start:	67.4863	Time start:	9:56
Meter correction factor (GMf) :		0.9900	

Sampling Position No.	Stopwatch Time at Sampling Position	Distance from far wall (mm)	Isokinetic Flowrate (L/min)	Meter Inlet Temp. (°C)	Meter Outlet Temp. (°C)	Impinger Train Outlet Temp (°C)	Flowrate Attained (Y/N)
1/1	0:07:30	33	15.8	29.0	25.0	V	Yes
1/2	0:15:00	111	15.8	30.0	27.0	y	Yes
1/3	0:22:30	225	15.8	32.0	27.0	y	Yes
1/4	0:30:00	535	15.8	33.0	27.0	y	Yes
1/5	0:37:30	649	15.8	35.0	28.0	y	Yes
1/6	0:45:00	727	15.8	36.0	28.0	У	Yes
2/1	0:52:30	33	15.8	38.0	29.0	у	Yes
2/2	1:00:00	111	15.8	39.0	30.0	У	Yes
2/3	1:07:30	225	15.8	40.0	31.0	У	Yes
2/4	1:15:00	535	15.8	42.0	32.0	У	Yes
2/5	1:22:30	649	15.8	43.0	33.0	У	Yes
2/6	1:30:00	727	15.8	44.0	35.0	у	Yes
Averages				36.8	29.3	no result	

Q4AN(EV)-332-FM31

Stack Analysis - Post Sampling Pitot Tube and Temperature Traverses

 Date:
 2-Dec-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)
 Enterline

Time : Page No. : Sampling Port No: Pitot Tube Type :	11:35 1 of 1 1 to 2 S	Barometric Pressure : Pitot Correction Factor : Stack Gas Density:		1010 0.84 1.28	hPa kg/m ³ (0 °C, Wet, 1 Atm)	
Sampling Position No.	Distance from far wall (mm)	Max. Differential Pressure ∆P, kilo Pascals	Max Temp. °C	Max Temp. (Ts) K	Corrected Velocity (Vs) m/s	
1/1	3	0.005	30.0	303.2	2.5	
1/2	81	0.005	30.0	303.2	2.5	
1/3	195	0.005	30.0	303.2	2.5	
1/4	505	0.005	30.0	303.2	2.5	
1/5	619	0.005	30.0	303.2	2.5	
1/6	697	0.005	30.0	303.2	2.5	
2/1	3	0.005	30.0	303.2	2.5	
2/2	81	0.005	30.0	303.2	2.5	
2/3	195	0.005	30.0	303.2	2.5	
2/4	505	0.005	30.0	303.2	2.5	
2/5	619	0.005	30.0	303.2	2.5	
2/6	697	0.005	30.0	303.2	2.5	
Average			30.0	303.2	25	

Static Pressure (Dwyer) (Pa): Static Pressure (U-tube, if required) : Absolute pressure in stack (hPa) : kPa 0.5 mm 1010.05 hPa



Stack Analysis - Hazardous Substances Elemental Analysis Results

Date:	2-Dec-16		Client:	OneSteel H	exham
AECOM's Pr	oject No:	60493017	Stack/Duct	Description:	Shredder Stack

	Particulate Metals Results	Gaseous Metals Results	Oixdi	sable Mercury	Results
Metal	Front Half, Filter, Acetone Rinses and Acid Rinses (mg). Containers 1, 2 and 3	Back Half, Impingers + Acid Rinses (mg) Container 4	KO Impinger + Acid Rinses (mg) (5A)	KMnO ₄ / H ₂ SO ₄ + Rinses (mg) (5B)	Residue Rinse 8N HCI (mg) (If Required) (5C)
Antimony	<0.0002	0.000097			
Arsenic	<0.0002	<0.0001			Martin Constant
Beryllium	<0.0002	<0.0001			
Cadmium	0.0005	0.000048	0000000000000	1	
Chromium	0.0003	0.00055		10112020200	
Cobalt	<0.0002	<0.0001	1000323424724		
Copper	0.012	< 0.0005	0.00000000000	46429666666	
Lead	0.0036	0.00055	SCORES STATE		
Magnesium	<0.0812	0.00034	Stational states	Materic Constraints	
Manganese	0.0048	0.0011		41246986386	
Mercury	<0.0002	< 0.0001	< 0.0001	<0.0005	< 0.0005
Nickel	0.0017	< 0.0003	1666666666666	No. Contraction	Deletion of the
Selenium	<0.0002	< 0.0001	200001000000		
Thallium	<0.0002	< 0.0001	56606000000000	142233233333	12122300000000
Tin	<0.0002	< 0.0001	Sec	100000000000000000000000000000000000000	
Vanadium	<0.0026	< 0.0001			
Zinc	<1.7	0.0081	6000000000000		1.0000000000000

Client:

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.

2-Dec-16

Date:

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

AECOM's Proj	ect 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	0.000097	0.00008	ACCESSION OF THE		0.000097	0.00008	0.000078
Arsenic	< 0.0002	< 0.00016	< 0.0001	< 0.000082			< 0.0002	< 0.00016	< 0.00016
Beryllium	< 0.0002	< 0.00016	< 0.0001	< 0.000082			< 0.0002	< 0.00016	< 0.00016
Cadmium	0.0005	0.00041	0.000048	0.000039	Constant Constant		0.0005	0.00041	0.0004
Chromium	0.0003	0.00025	0.00055	0.00045			0.0009	0.00074	0.00072
Cobalt	< 0.0002	< 0.00016	< 0.0001	< 0.000082	1-1-1-1-1-1	MCCOPERSITER)	< 0.0002	< 0.00016	< 0.00016
Copper	0.012	0.0099	< 0.0005	< 0.00041	R. Colorador a da		0.012	0.0099	0.0097
Lead	0.0036	0.003	0.00055	0.00045	Ren researcher	enderste here	0.004	0.0033	0.0032
Magnesium	< 0.0812	< 0.067	0.00034	0.00028		NAMES OF THE OWNER	0.00034	0.00028	0.00027
Manganese	0.0048	0.0039	0.0011	0.0009		hananan sed	0.006	0.0049	0.0048
Mercury	< 0.0002	< 0.00016	< 0.0001	< 0.000082	< 0.0005	< 0.00041	< 0.0005	< 0.00041	< 0.0004
Nickel	0.0017	0.0014	< 0.0003	< 0.00025			0.0017	0.0014	0.0014
Selenium	< 0.0002	< 0.00016	< 0.0001	<0.000082	$ \begin{array}{c} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 &$	1	< 0.0002	< 0.00016	< 0.00016
Thallium	< 0.0002	< 0.00016	< 0.0001	< 0.000082			< 0.0002	< 0.00016	< 0.00016
Tin	< 0.0002	< 0.00016	< 0.0001	< 0.000082	1.0000000000000000000000000000000000000		< 0.0002	< 0.00016	< 0.00016
Vanadium	< 0.0026	< 0.0021	< 0.0001	< 0.000082			< 0.0002	< 0.00016	< 0.00016
Zinc	<1.7	<1.4	0.0081	0.0067			0.0081	0.0067	0.0066
Total Hazardous Metals*	0.011	0.009	0.0023	0.0019	<0.0005	<0.00041	0.013	0.011	0.011
Total Metals	0.023	0.019	0.011	0.0089			0.034	0.028	0.027

OneSteel Hexham

Stack Analysis - Hazardous Substances Elemental Analysis Results Continued

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

Q4AN(EV)-332-FM31

STACK	ANALYSIS -	FINAL	CALCULA	TIONS

Fine Particulate (PM10)

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

Date: 2-De AECOM's Project No	c-16 :	60493017	Client: Stack/Duc	OneSteel Hext Description:	nam Shredder S	Stack
(A) Sample gas volur	ne at standard o	conditions				
Metered volume (MV	3):	1.2323	m ³	Average baron	netric	
Average gas meter te	emp. (T _{M,2}):	40.2	°C	pressure (P _{BAR}	o)	1010 hPa
	7.01.044	313.4	к	Average press meter (P _{M,2})	ure at	1010.00 hPa
Sample gas volume (MV ₄); (0°C, dry					
gas, 1 atm pressure):		1.0708	m ³			
(B) PM10 concentrati	on at standard	conditions				
Blank thimble No .:	NA			Blank weight:		9
Thimble No. used:	T398			PM10 Weight		0.0004 g
Final PM10 Weight (N	Mp1):	0.00040	9			30. 2. Carlos
PM10 Concentration	(C1):		=M _{p1} /MV ₄ =		0.00037	g/m ^a (0°C, dry gas, 1atm pressure)
			;and C ₂ =		0.37	mg/m ³ (0°C, dry gas-
CO ₂ Basis	12 %					1atm pressure)
Average CO ₂ %:		0.0 %				
Therefore, C _c :		= C _a x 12/0	CO ₂ % =	0.00037	g/m ³ (0°C, pressure, 1	dry gas, 1atm 12% CO ₂)
			;and C _{c1} =	0.37	mg/m ³ (0°C	C, dry gas, 1atm 2% CO₃)
O ₂ Basis	7 %					27
Average O ₂ %:	13	20.9 %				
Therefore, C _b :	=C _a x (21	- O _{2ref} %)/(21 - C) _{2mea} %)	0.052	g/m ³ (0°C, 7%	dry gas, 1atm pressure, O ₂)
			;and C _{b1} =	52	mg/m ³ (0°C 7%	C, dry gas, 1atm pressure, O ₂)
(C) Moisture content Silica Gel Number:	P38					
V _v = Volume of Water Vap Volume of Water Vap Therefore, B _{ws} =	9.8 g (from lab our Condensed our Condensed (Vw	poratory report)	0.0133 0.0131) _{h(std)})	V _w =	10	mL (=grams) (recorded on Laboratory Form 108)
B _{ws} =		2.41 %				



Q4AN(EV)-332-FM31

ANZ Emission M	leasurement Calcul	ations Spreadsheet
STACK ANALY Fine Particulate (P	SIS - FINAL CALCULATIO M10)	NS CONTINUED
(D) Gas Composit	ion and Density (Re-calculation)
(i) Initial gas densi	ty for sampling:	1.28 kg/m ³ (from Laboratory Form 107)
(ii) Re-calculated content in (c):	gas density based on moisture	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 <u>(273.2) x (Ps)</u> (273.2+Ts) (1013.25)
	÷	1.163 kg/m ³ (stack conditions, wet)
(E) Gas Velocities		
(i) Average of pre-	sampling velocities:	2.40 m/s
(ii) Average of pos	st-sampling velocities:	2.50 m/s
(iii) Average of wh	ile-sampling velocities:	N/A m/s
(iv) Overall averages ampling velocitie (Note: (Vs) is from and (ii) alone.)	ge of pre-sampling and post- s (Vs): n all individual data, not from (i)	2.45 m/s (stack conditions, wet) N/A m/s (stack conditions, wet)
(F) Volumetric Flo	wrates (Reference Method US-	EPA Method 2, NSW-EPA TM-2)
Qstack =	Vs x A =	1.11 m ³ /s (stack conditions)
	Bo y (Tetd)	× (100 B)

Qstack =		Vs x A =		1.11 m ³ /s	s (stack conditi
Qstd =	Qstack x	<u>Ps</u> x (Pstd)	(<u>Tstd)</u> × (Ts)	<u>(100 - B_w)</u> 100	
Qstd =	1	.0 m ³ /s (0°C, d	ry gas, 1 atm	pressure)	

(G) Mass Emission Rate

Rm =	C _{1a} x Qstd =	0.00036	g/s (0°C, dry gas, 1 atm pressure)	
	C. x Ostd =	0.00	a/s (0°C dry gas, 1 atm pressure	12%	CO ₂)
	=	0.36	mg/s (0°C, dry gas, 1 atm pressure	12%	CO ₂)
	C _{1a} x Qstd =	0.051	g/s (0°C, dry gas, 1 atm pressure	7%	O ₂)
		51	mg/s (0°C, dry gas, 1 atm pressure	7%	$O_2)$





Q4AN(EV)-332-FM31

STACK ANALYSIS - FINAL CALCULATIONS Total Particulate

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

Date: 2-De AECOM's Project Ne	ec-16 o:	60493017	Client: Stack/Duc	OneSteel Hex Description:	ham Shredder S	tack
(A) Sample gas volu	me at standard cor	nditions				
Metered volume (M) Average gas meter	V₃); temp. (T _{M₂}):	1.1689 37.7	m³ ℃	Average baron pressure (P _{BAI}	metric _{RO})	1010 hPa
		310.9	к	Average press (P _{M.2})	sure at meter	1010.00 hPa
Sample gas volume gas, 1 atm pressure	(MV ₄); (0 ^o C, dry):	1.0239	m ³			
(B) Total Particulate Blank thimble No.: Thimble No. used: Final Total Particula Total Particulate Con	concentration at st NA T399 te Weight (Mp1): ncentration (C1):	andard condit 0.00070	g =M _{p1} /MV ₄ =	Blank weight: Total Particula	ate Weight 0.00068	g 0.0007 g g/m ³ (0°C, dry gas, 1atm pressure)
CO ₂ Basis Average CO ₂ %:	12 %	.0 %	;and C ₂ =		0.68	mg/m ³ (0°C, dry gas, 1atm pressure)
Therefore, C _c :		= C _a x 12/0	CO ₂ % =	0.0006	g g/m ³ (0°C, c pressure, 1	dry gas, 1atm 2% CO ₂)
			;and $C_{c1} =$	0.6	8 mg/m ³ (0°C pressure, 13	, dry gas, 1atm 2% CO ₂)
O ₂ Basis Average O ₂ %:	7 %	.9 %				
Therefore, C _b :	=C _a x (21 - C	D _{2ref} %)/(21 - C) _{2mea} %)	0.09	5 g/m ³ (0°C, c 7%	dry gas, 1atm pressure, O ₂)
			;and C _{b1} =	9	⁵ mg/m ³ (0°C 7%	, dry gas, 1atm pressure, O ₂)
(C) Moisture content Silica Gel Number:	M301					
$V_v =$ Volume of Water Va Volume of Water Va Therefore, $B_{ws} =$	11.6 g (from labor pour Condensed (\ pour Condensed (\ <u>(V</u> (V _{wc(st}	atory report) / _{wc(std)}) = / _{wsg(std)}) = 	0.0000 0.0155) _{h(std)})	V _w =	0	mL (=grams) (recorded on Laboratory Form 108)

B_{ws} = 1.49 %



Q4AN(EV)-332-FM31

STACK ANALYSIS - FINAL CALCULATIONS CONTINUED

Total Particulate

(D) Gas Compositi	ion and Density (Re-calculation)	
(i) Initial gas densi	ty for sampling:	1.28 kg/m ³ (from Laboratory Form 107)
(ii) Re-calculated g content in (c):	gas density based on moisture	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 <u>(273.2)</u> x <u>(Ps)</u> (273.2+Ts) (1013.25)
	÷	1.154 kg/m ³ (stack conditions, wet)
(E) Gas Velocities		
(i) Average of pre-	sampling velocities:	2.40 m/s
(ii) Average of pos	st-sampling velocities:	2.50 m/s
(iii) Average of wh	ile-sampling velocities:	N/A m/s
(iv) Overall averages ampling velocitie (Note: (Vs) is from and (ii) alone.)	ge of pre-sampling and post- s (Vs): n all individual data, not from (i)	2.45 m/s (stack conditions, wet) N/A m/s (stack conditions, wet)
(F) Volumetric Flo	wrates (Reference Method US-EP)	A Method 2, NSW-EPA TM-2)
Qstack =	Vs x A =	1.11 m ³ /s (stack conditions)

Qstd =	Qstack x	<u>Ps</u> x	(Tstd) x	(100 - B _w)
		(Pstd)	(Ts)	100

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

Qstd =

(G) Mass Emission Rate

Rm =	C _{1a} x Qstd = =	0.00067 0.67	g/s (0°C, dry gas, 1 atm pressure mg/s (0°C, dry gas, 1 atm pressure))	
	C _{1a} x Qstd = =	0.00067 0.67	g/s (0°C, dry gas, 1 atm pressure mg/s (0°C, dry gas, 1 atm pressure	12% 12%	$\begin{array}{c} \mathrm{CO}_2 \end{array} \\ \mathrm{CO}_2 \end{array} $
	C _{1a} x Qstd = =	0.094 94	g/s (0°C, dry gas, 1 atm pressure mg/s (0°C, dry gas, 1 atm pressure	7% 7%	O ₂) O ₂)

Q4AN(EV)-332-FM31

STACK ANA	ALYSIS - FI	NAL CALC	ULATIONS
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Hazardous Substances (Metals) (Calculations performed in accordance with relevant test method as defined on cover page)

Data: 2 Da	- 16		Olivet	0		
AECOM's Project No	0-10	60493017	Stack/Duc	t Description:	Shredder S	stack
(A) Sample gas volur	ne at standa	rd conditions				
Matarad upluma (M)	X		3	A		
Metered volume (MV	3);	1.3693	200	Average baron	netric	and a second
Average gas meter te	emp. (1 _{M,2}):	33.0		pressure (r BAR	(0)	1010 hPa
		306.2	ĸ	Average press (P _{M.2})	ure at meter	1010.00 hPa
Sample gas volume (MV ₄); (0°C, o	iry				
gas, 1 atm pressure)		1.2178	m ³			
(B) Metals concentra	tion at standa	ard conditions				
Blank thimble No.:	NA			Blank weight:		g
Thimble No. used:	NA			Metals Weight		0.000013 g
Final Metals Weight ((Mp1):	0.00001	g		1.	3
Metals Concentration	(C1):		=M _{p1} /MV ₄ =		0.000011	g/m° (0°C, dry gas, 1atm pressure)
			;and C ₂ =		0.011	mg/m ³ (0°C, dry gas,
CO ₂ Basis	12 %					1atm pressure)
Average CO ₂ %:		0.0 %				
Therefore, Cc.		= C _a x 12/0	CO ₂ % =	0.000011	g/m ³ (0°C, pressure, 1	dry gas, 1atm 2% CO ₂)
			;and C _{c1} =	0.011	mg/m ³ (0°C pressure, 1	; dry gas, 1atm 2% CO ₂)
O ₂ Basis	7 %				Part and a start of a	£1
Average O ₂ %:		20.9 %				
Therefore, C _b :	=C _a x (21 - O _{2ref} %)/(21 - C	D _{2mea} %)	0.0015	g/m ³ (0°C, - 7%	dry gas, 1atm pressure, O ₂)
			;and C _{b1} =	1.5	mg/m ³ (0°C 7%	, dry gas, 1atm pressure O ₂)
(C) Moisture content Silica Gel Number:	G058					
V., =	14 g (from	laboratory report)		V=	9	mL (=grams)
Volume of Water Var	our Condens	(V =) =	0.0107	•w	0	(recorded on
Volume of Water Var	our Conden	$rad (V_{wc(std)}) =$	0.0107			Laboratory Form
Therefore R =	our condens	(V _{wsg(std)}) -	0.0107			108)
meretore, D _{ws} -		(Vwc(std)+Vwsg(std	μ.,			
	(V _{wc(std)} +V _{wsg(std)} +V _r	n(std))			
B _{ws} =		2.35 %				



Q4AN(EV)-332-FM31

anz Emissi	on Measu	irement C	alculati	ions Spreadshe	et		
STACK ANALYSIS - FINAL CALCULATIONS CONTINUED Hazardous Substances (Metals)							
(D) Gas Co	omposition and	Density (Re-ca	alculation)				
(i) Initial ga	s density for sa	impling:		1.28 kg/m ³ (from	Laboratory Fo	orm 107)	
(ii) Re-calc content in	ulated gas den (c):	sity based on r	moisture	1.28 kg/m ³ (0°C, 1.29 kg/m ³ (0°C,	wet, 1 atm pre dry, 1 atm pre	essure) essure)	
(iii) Gas de	ensity at stack c	onditions =		(ii)) x <u>(273.2)</u> (273.2+T	(<u>(Ps</u>) s) (1013.25)	
			÷	1.154 kg/m ³ (stack	conditions, w	vet)	
(E) Gas Ve	elocities						
(i) Average	e of pre-samplir	ng velocities:		2.40 m/s			
(ii) Averag	e of post-sampl	ling velocities:		2.50 m/s			
(iii) Averag	e of while-sam	pling velocities	s:	N/A m/s			
(iv) Overall average of pre-sampling and post- sampling velocities (Vs): (Note: (Vs) is from all individual data, not from (i) and (ii) alone.)			t post- ot from (i)	2.45 m/s (stack conditions, wet) N/A m/s (stack conditions, wet)			
(F) Volume	etric Flowrates	(Reference Me	thod US-EP	A Method 2, NSW-EPA	TM-2)		
Qstack =		Vs x A =		1.11 m ³ /s (stack	conditions)		
Qstd =	Qstack x	<u>Ps</u> x (Pstd)	<u>(Tstd)</u> x (Ts)	<u>(100 - B_w)</u> 100			
Qstd =	1.0	m ³ /s (0°C, dry	/ gas, 1 atm	pressure)			
(G) Mass	Emission Rate						
Rm =	C _{1a} x Qstd = =	0.000011	g/s (0°C, 0 mg/s (0°C	dry gas, 1 atm pressure , dry gas, 1 atm pressure) a)		
	C _{1a} x Qstd =	0.000011	g/s (0°C, 0	dry gas, 1 atm pressure	12%	CO ₂)	
		0.011	mg/s (0°C	, dry gas, 1 atm pressure	12%	$CO_2)$	
	C _{1a} x Qstd =	0.0015	g/s (0°C, 0	dry gas, 1 atm pressure	7%	O_2)	
	-	1.5	ing/s (0 C	, ury gas, i aun pressure	/ 70	21	

AECOM

ANZ Emission Measurement Calculations Spreadsheet

Q4AN(EV)-332-FM31

EMISSION MONITORING RESULTS, SHREDDER STACK ONESTEEL HEXHAM 2-Dec-16 FINE PARTICULATE (PM10) TOTAL PARTICULATE HAZARDOUS SUBSTANCES (METALS)					
Sampling Conditions:	all fail and				
Stack internal diameter at test location	760 mm				
Stack gas temperature (average)	29.0 °C 302.2 K				
Stack pressure (average)	1010 hPa				
Stack gas velocity (average, stack conditions)	2.5 m/s				
Stack gas flowrate (stack conditions)	1.1 m ⁻ /s				
Stack gas flowrate (0°C, dry gas, 1 atm pressure)	0.98 m³/s				
Fine Particulate (PM10) Testing	0.50				
Fine Particulate (PM10) Mass	9:56 - 11:27				
Gas Volume Sampled	0.4 mg				
Sas Volume Sampled	0.27 mc/m ³				
Fine Particulate (PM10) Emission 1 Fine Particulate (PM10) Mass Emission Pate*2	0.37 mg/m				
Pogulaton Limit	0.36 mg/s				
Total Particulate Testing	NA mg/m				
Test Period	9.56 - 11.27				
Total Particulate Mass	0.7 mg				
Gas Volume Sampled	1.02 m ³				
Total Particulate Emission*1	0.68 mg/m^3				
Total Particulate Mass Emission Rate*2	0.67 mg/s				
Regulatory Limit	100 mg/m ³				
Hazardous Substances (Metals) Testing					
Test Period	9:56 - 11:27				
Hazardous Substances (Metals) Mass	0.013 mg				
Gas Volume Sampled	1.22 m ³				
Hazardous Substances (Metals) Emission*1	0.011 mg/m ³				
Hazardous Substances (Metals) Mass Emission Rate*2	0.011 mg/s				
Regulatory Limit	NA mg/m ³				
Moisture Content (%)	1.9				
Gas Density (dry at 1 atmosphere)	1.29 kg/m ³				
Dry Molecular Weight	28.8 g/g-mole				

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

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

Appendix B

Laboratory Results (12 pages)

Appendix B Laboratory Results (12 pages)



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

STACK EMISSION - PARTICULATES REPORT

<u>Origin:</u> Project:	AECOM - Newcastle 60493017	Report :	12605	-0-P	Page 1 of 1
Description :	Stack Emission Samples Received: 07-Dec-16	Date :	09-De	c-16	
<u>Report To :</u>	Colin Clarke 17 Warabrook Blvd, Warabrook NSW 2304	<u>Copy to:</u>	FILE		
Thimble ID		Volume	(mL)	T Particul	`otal ate Matter (g)
T398	Filter	4		0.	0004
T399	Filter	÷		0.	0007



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

Note : Sampled by Client

M Reported By:_ . Can

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

lell

Michael Campbell



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

STACK EMISSION - MOISTURE REPORT

<u>Origin:</u> Project:	AECOM - Newcastle 60493017	Report :	12605-0-M	Page 1 of 1
Description :	Stack Emission Samples Received: 07-Dec-16	<u>Date :</u>	09-Dec-16	
<u>Report To :</u>	Colin Clarke 17 Warabrook Blvd, Warabrook NSW 2304	<u>Copy to:</u>	FILE	
Jar ID	Μ	loisture (g)		
G058		14.0		
M301		11.6		
P38		9.8		



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

V Reported By:_

an Michael Campbell

lell

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



Chartered Chemists

22-Dec-2016

AECOM 17 Warabrook Bvde Warabrook

NSW 2304 Attention: Colin Clarke A.B.N. 44 000 964 278 10 / 585 Blackburn Road Notting Hill, Vic, 3168 Telephone: (03) 9574 3200

> REPORT NUMBER: M162302 Site/Client Ref: 60493017/1.1 Order No: 60493017/1.1

CERTIFICATE OF ANALYSIS

SAMPLES:

Twelve samples were received for analysis

DATE RECEIVED:

DATE COMMENCED:

6-Dec-2016

......

6-Dec-2016

METHODS:

See Attached Results

RESULTS:

Please refer to attached pages for results.

Note: Results are based on samples as received at SGS laboratories

REPORTED BY:

NG

Ming Dai Senior Chemist



NATA Accredited Laboratory Number: 14429

Accredited for compliance with ISO/IEC 17025.



Report N°: M162302

ANALYTICAL RESULTS

Matrix: Filter

Method: USEPA M29 (Analysis only) - MA-1400.FL.M29.02 Sample units are expressed in µg total

	Leeder ID Client ID	2016028745 Metals 1	2016028746 Metals 12	2016028747 Method
Analyte Name	Sampled Date PQL			Blank
Sb	0.2	nd	nd	nd
As	0.2	nd	0.2	nd
Ве	0.2	nd	nd	nd
Cd	0.2	0.2	nd	nd
Cr	0.2	0.7	0.8	nd
Со	0.2	nd	nd	nd
Cu	0.2	9.0	1.8	nd
Pb	0.2	1.1	0.5	nd
Mg	2	48	81	nd
Mn	0.2	1.2	0.8	nd
Hg	0.2	nd	nd	nd
Ni	0.2	1.4	0.5	nd
Se	0.2	nd	nd	nd
ті	0.2	nd	nd	nd
Sn	0.2	nd	nd	nd
v	0.2	2.1	2.6	nd
Zn	0.2	930	1700	nd



Report N°: M162302

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

	Leeder ID Client ID	2016028748 Metals 3	2016028749 Metals 4
Analyte Name	Sampled Date PQL		
Sb	0.1	nd	0.2
As	0.1	0.1	nd
Be	0.1	nd	nd
Cd	0.1	0.4	0.1
Cr	0.1	0.4	0.6
Со	0.1	nd	nd
Cu	0.1	4.6	0.5
Pb	0.1	3.0	0.6
Mg	0.1	5.2	2.3
Mn	0.1	4.7	1.7
Hg	0.1	nd	nd
Ni	0.1	0.8	0.3
Se	0.1	nd	nd
ті	0.1	nd	nd
Sn	0.1	0.1	0.1
v	0.1	nd	nd
Zn	0.1	28	8.2
Sample Volume (mL)		94	310



Report Nº: M162302

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

	Leeder ID Client ID	2016028750 Metals 8A	2016028751 Metals 9	2016028752 Metals 5A	2016028753 Metals 5C	2016028754 Metals 8B
analyte Name	Sampled Date PQL					
Sb	0.1	nd	0.1			
As	0.1	nd	nd			
Зе	0.1	nd	nd			
Cd	0.1	nd	nd			
Cr	0.1	nd	nd			
Co	0.1	nd	nd			
Cu	0.1	0.2	0.3			-
Pb	0.1	nd	nd			
Мg	0.1	0.2	1.7			
Мn	0.1	0.3	0.3	and a second second		
Hg	0.1	nd	nd	nd	nd	nd
Ni	0.1	nd	0.3			
Se	0.1	nd	nd			-
ті	0.1	nd	nd			
5n	0.1	nd	0.1			
v	0.1	nd	nd			1
Zn	0.1	nd	nd	1		1 1 10/12
Sample Volume (mL))	300	200	100	250	100



Report Nº: M162302

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: 16/12/2016

	Leeder ID Client ID	2016028755 Metals 11	2016028756 Method
Analyte Name	Sampled Date PQL		Blank
Sb	0.1		nd
As	0.1		nd
Ве	0.1		nd
Cd	0.1		nd
Cr	0.1		nd
Со	0.1		nd
Cu	0.1		nd
Pb	0.1		nd
Mg	0.1		nd
Mn	0.1		nd
Hg	0.1	nd	nd
Ni	0.1		nd
Se	0.1		nd
ті	0.1		nd
Sn	0.1		nd
v	0.1		nd
Zn	0.1		nd
Sample Volume (mL)		250	

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total) Sample units are expressed in µg total

Analyte Name	Leeder ID Client ID Sampled Date PQL	2016028757 Metals 5B	2016028758 Metals 10	2016028759 Method Blank
Hg Sample Volume (mL)	0.5	nd 390	nd 110	nd



Report N°: M162302

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

	Leeder ID Client ID	2016028760 Method	2016028761 Method
Analyte Name	Sampled Date PQL	Spike	Spike Dup
Sb		89	90
As		86	87
Ве		104	107
Cd		90	91
Cr		91	91
Со		91	92
Cu		92	92
Pb		76	76
Mg		98	101
Mn		95	96
Hg		83	82
Ni		99	100
Se		85	83
ті		76	76
Sn		98	100
v		101	100
Zn		112	112



Report N°: M162302

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: 16/12/2016

	Leeder ID Client ID	2016028762 Method	2016028763 Method
Analyte Name	Sampled Date PQL	Spike	Spike Dup
Sb		104	105
As		100	103
Be		111	106
Cd		106	106
Cr		101	102
Со		101	102
Cu		108	109
Pb		93	93
Mg		113	116
Mn		115	117
Hg		102	101
Ni		107	110
Se		99	105
ті		90	91
Sn		109	110
v		112	117
Zn		106	105

Matrix: KMnO4

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total) Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID Client ID	2016028764 Method	
Analyte Name	Sampled Date PQL	Spike	
Hg		101	

|--|

Method: USEPA M29 (Analysis only) - MA-1400.IMP.M29.04 Mercury in Impingers (ug total) Quality Control Results are expressed in Percent Recovery of expected result

	Leeder ID Client ID	2016028765 Method	
Analyte Name	Sampled Date PQL	Spike Dup	
Hg		100	

Test Started: 16/12/2016



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

SGS Leeder Cons.	ulting			Attm	Lyndal	i Steven	s - Con	11act Ph	ealani :: (03)	1 Drive,	88 Fax:	um, VIC, (03) 9874	5152 1933 E	mail:	u.sam	plereceipt	Sh mitcham	eet <u>1</u> @sgs.com	of	-	
CLIENT NAME: AECOM CLIENT ADDRESS: 17 Warabroo	¥I.			CONT	ACT PHO	DNE No: (No:	1		-	02 4911 02 4911	4900 4999			Samı	le Disp	osal (Please	X) After: 4	Weeks ()	6 Weeks	2	
Warabrook NSW 2304				RESU	LTS REQ	UIRED B	.X:			Stand	ard			R	alyses	Required	(Analyte -	+ Method C	(ode)		
CONTACT:	Colin	Clark	e	EMAI	L REPOR	T TO:			colin.c	larke@	aecom.c	티									
SAMPLED BY:	DT	II.		LABQ	UOTEN	UMBER:			-					67 po	1		_	_			
PROJECT REF. / ORDER No:	60493	017/1.	_	Contai	ners/Pres	crvation (please ti	ck)				(G=gla	ss, P=plastic	Weth	1		_			1	
Client Sample ID	Sampled	Impinger A	KMnO4	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) HCI acid washed	125mL (P) Zn Ace. NaOH	125mL (P) Filtered Yes/No HNO3	125mL (P) NaOH	Metals -USEPA	νιειεπιλ						
Metals 1	x			×										v ×	N					t	
Metals 3		×	_			×						U		×							
Metals 4		×				×								×							
Metals 5A		×				x			0.0						×						
Metals 5B			×		x										×						
Metals 5C		×	_			x									×						
Metals 8A		×	_			×								×							
Metals 8B		×				x									×						
Metals 9		×				x								×							
Metals 10			×		×										×						
Metals 11		×				×									×						
Metals 12	×	_		×										×							
	Totals:	5	~	2	2	80			(1-)						5	9					
CH	IAIN OF CUST	YOO'	REC	ORD										Please	Note:	Dissolved	metals requir	e filtering in th	he field.		
KELEASED BY: (Name)	(Signature)	-	Date /	Time)		Custody S	eals Intac	42				des DNo		Please	ndicate	whether the H	NO3 acidifie	d sample has b	seen filtere	-i	
Dylan Tumbull GECEIVED BY: (Name)	DT (Signature)	ŗ	Date /	5/12/16 Time)	11 202	Samples I	leceived (Chilled?				Yes / No		*Sb,	<u>mts:</u> (eg. Ås, Be	Highly contar , Cd, Cr, C	ninated samp	les, reporting .), Mg, Mn,	requiremer Hg, Ni,	tts etc)	Sn,
					~									1							٦

PF-AU-ENV-MIT-QU-007.xls / Ver 1 / 10.08.2012 / Page 1 of 1

End of Report

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