



Address (Head Office)
427 Canterbury Road
SURREY HILLS VIC 3127

Office Locations
VIC NSW WA QLD

Postal Address
Unit 13, 9 Ambitious Link
BIBRA LAKE WA 6163

Freecall: 1300 364 005
www.ektimo.com.au
ABN: 86 600 381 413

Report Number R003551

**Emission Testing Report
Clingcast Metals, Kirrawee Plant**

Document Information

Client Name: Clingcast Metals
Report Number: R003551
Date of Issue: 1 December 2016
Attention: Chris Harden
Address: 98 Bath Rd
Kirrawee NSW 2232
Testing Laboratory: Ektimo (EML) ABN 98 006 878 342

Report Status

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Document Number	Initiator	Report Date	Section	Reason
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Report Authorisation



David Hill
Client Manager

NATA Accredited Laboratory
No. 2732

Heath Thatcher
Ektimo Signatory

Accredited for compliance with ISO/IEC 17025. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

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1 EXECUTIVE SUMMARY

Ektimo was engaged by Clingcast Metals to determine emissions to air as detailed below;

Location	Test Date	Test Parameters*
Baghouse Stack	9 November 2016	Total solid particles, type 1 & 2 substances (metals or metal compounds), nitrogen oxides, carbon dioxide, oxygen, carbon monoxide, volatile organic compounds (VOC's)

* Flow rate, velocity, temperature and moisture were determined unless otherwise stated

The sampling methodologies chosen by Ektimo are those recommended by the NSW Office of Environment and Heritage (as specified in the *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, January 2007*).

All results are reported on a dry basis at STP. Unless otherwise indicated, the methods cited in this report have been performed without deviation.

Plant operating conditions have been noted in the report.

2 STANDARDS COMPARISON TABLE

Pollutant	Units	POEO Reg Group C Limits ¹	POEO Reg Group 6 Limits ²	Detected Values 09/11/16
Total solid particles	mg/m ³	100	50	2
Type 1 & 2 substances in aggregate	mg/m ³	-	1	≤0.016
Nitrogen oxides	mg/m ³	-	350	<4
Volatile organic compounds	mg/m ³	-	40	4.7

1. The standards shown are derived from the Protection of the Environment Operations (Clean Air) Regulation NSW 2010 Schedule 6 "Standards of concentration for non-scheduled premises". It is considered that these standards apply to the Clingcast Baghouse Stack.
2. The standards shown are derived from the Protection of the Environment Operations (Clean Air) Regulation NSW 2010 Schedule 4 "Standards of concentration for scheduled premises: general activities and plant", Group 6. These represent the most stringent standards that are routinely applied in NSW for new plant. It is considered that these standards do not apply to the Clingcast Baghouse and have been displayed in this table for comparison purposes only.

3 RESULTS

3.1 Baghouse Stack

Date	9/11/2016	Client	Cling Cast Metals
Report	R003551	Stack ID	Baghouse Stack
Licence No.	-	Location	Kirrawee
Ektime Staff	David Hill / Steven Weekes	State	NSW
Process Conditions	Please refer to client records.		

Sampling Plane Details

Sampling plane dimensions	1355 mm
Sampling plane area	1.44 m ²
Sampling port size, number	4" Flange (x2)
Access & height of ports	Fixed ladder 12 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 1.5 D
Upstream disturbance	Centrifugal fan 8 D
No. traverses & points sampled	2 16
Compliance of sample plane to AS4323.1	Compliant but non-ideal

Comments

The sampling plane is deemed to be non-ideal or non-compliant due to the following reasons:

The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D

Stack Parameters

Moisture content, %v/v	2.4	
Gas molecular weight, g/g mole	28.7 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.28 (wet)	1.29 (dry)

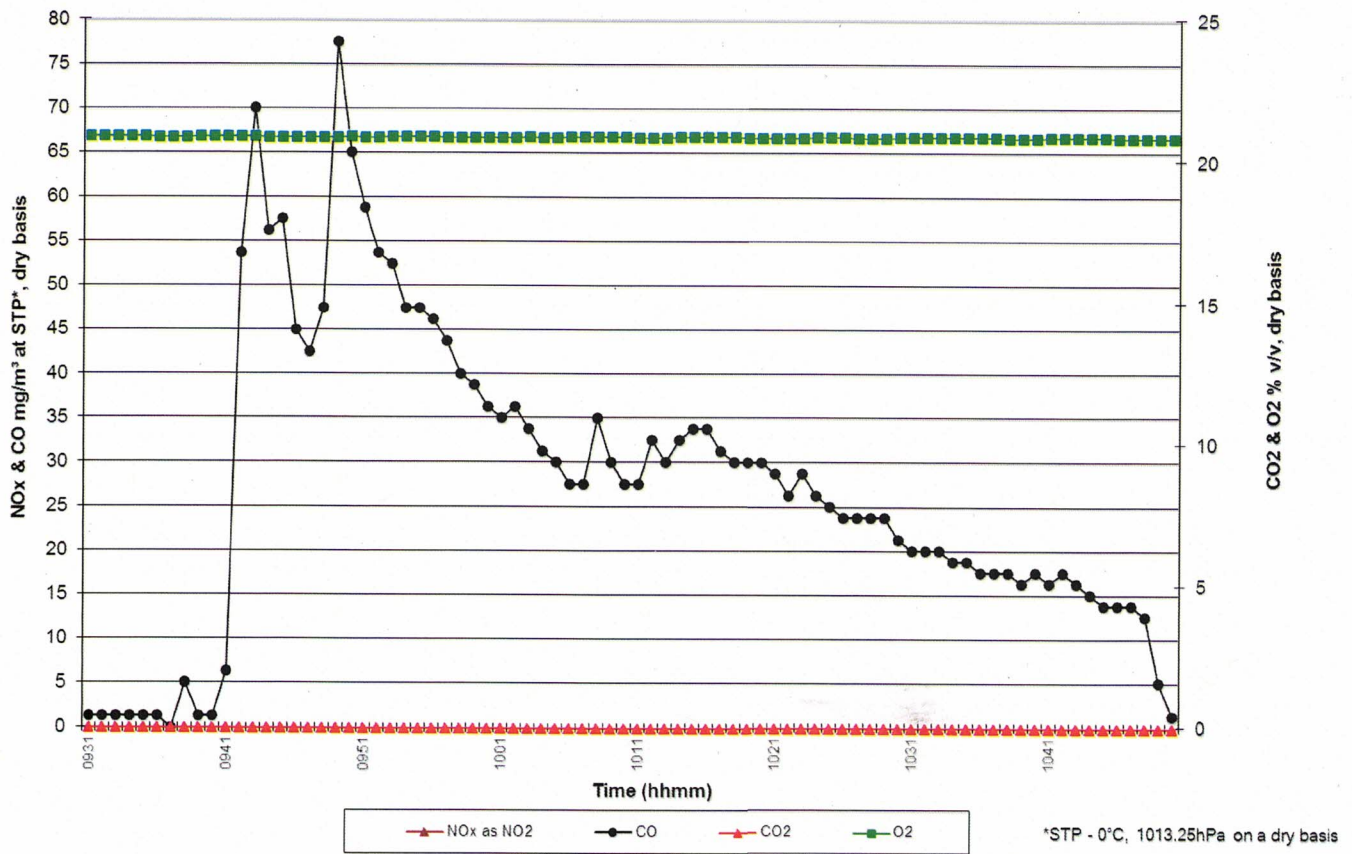
Gas Flow Parameters

Temperature, °C	31
Velocity at sampling plane, m/s	8
Volumetric flow rate, discharge, m ³ /s	11
Volumetric flow rate (wet STP), m ³ /s	10
Volumetric flow rate (dry STP), m ³ /s	10
Mass flow rate (wet basis), kg/hour	48000

Gas Analyser Results		Average 0931-1050		Minimum 0931-1050		Maximum 0931-1050	
	Sampling time	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases							
Nitrogen oxides (as NO ₂)		<4	<2	<4	<2	<4	<2
Carbon monoxide		27	17	<2	<1	77	47
		Concentration %		Concentration %		Concentration %	
Carbon dioxide		<0.3		<0.3		<0.3	
Oxygen		20.9		20.9		20.9	

Gases - Baghouse Stack

9 November 2016



Date	9/11/2016	Client	Cling Cast Metals
Report	R003551	Stack ID	Baghouse Stack
Licence No.	-	Location	Kirrawee
Ektimo Staff	David Hill / Steven Weekes		State NSW
Process Conditions	Please refer to client records.		

Isokinetic Results	Sampling time	Results	
		0930-1054	
		Concentration mg/m ³	Mass Rate g/min
Total Solid Particles		2	1.2
Antimony		<0.003	<0.002
Arsenic		<0.001	<0.0007
Cadmium		<0.0003	<0.0002
Lead		0.0041	0.0025
Mercury		<0.0002	<0.0001
Beryllium		<0.0005	<0.0003
Chromium		<0.0003	<0.0002
Cobalt		<0.0003	<0.0002
Manganese		0.0015	0.0009
Nickel		<0.0008	<0.0005
Selenium		<0.003	<0.002
Tin		<0.001	<0.0007
Vanadium		<0.0006	<0.0004
Total Type 1 Substances		≤0.0081	≤0.0049
Total Type 2 Substances		≤0.0077	≤0.0047
Total Type 1 & 2 Substances		≤0.016	≤0.0096
Isokinetic Sampling Parameters			
Sampling time, min		80	
Isokinetic rate, %		95	
Gas Flow Parameters			
Flow measurement time (h:mm)		842	
Temperature, °C		31	
Temperature, K		303	
Velocity at sampling plane, m/s		8	
Volumetric flow rate, discharge, m ³ /s		11	
Volumetric flow rate (wet STP), m ³ /s		10	
Volumetric flow rate (dry STP), m ³ /s		10	
Mass flow rate (wet basis), kg/hour		48000	
Velocity difference, %		1	

Total VOCs* (as n-Propane)	Sampling time	Results	
		0946-1046	
		Concentration mg/m ³	Mass Rate g/min
Total		4.7	2.9

*Total VOC's does not include methane

VOC (specified)	Sampling time	Results	
		0946-1046	
		Concentration mg/m ³	Mass Rate g/min
Detection limit ⁽¹⁾		<0.09	<0.05
Benzene		4.3	2.6
Toluene		2.4	1.4
m + p-Xylene		0.77	0.47
1,2,4-trimethylbenzene		0.21	0.13
Pentane		1.3	0.76

(1) Unless otherwise reported, the following target compounds were found to be below detection:

Ethanol, Isopropanol, Isobutanol, Butanol, 1-Methoxy-2-propanol, Cyclohexanol, 2-Butoxyethanol, Pentane, Hexane, Heptane, Octane, Nonane, Decane, Undecane, Dodecane, Tridecane, Tetradecane, Tetradecane, Cyclohexane, 2-Methylhexane, 2,3-Dimethylpentane, 3-Methylhexane, Isooctane, Methylcyclohexane, alpha-Pinene, beta-Pinene, d-Limonene, 3-Carene, 3-Carene, Acetone, Methyl ethyl ketone, Ethyl acetate, Isopropyl acetate, Propyl acetate, MIBK, 2-Hexanone, Butyl acetate, 1-Methoxy-2-propyl acetate, Cyclohexanone, Cyclohexanone, Cellosolve acetate, 2-Butoxyethyl acetate, Ethylidiglycol acetate, Diacetone alcohol, Isophorone, Benzene, Toluene, Ethylbenzene, m-p-Xylene, Styrene, o-Xylene, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, alpha-Methylstyrene, alpha-Methylstyrene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, 1,2,3-Trimethylbenzene, m-Diethylbenzene, o-Diethylbenzene, p-Diethylbenzene, Dichloromethane, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Carbon tetrachloride, 1,1-Dichloroethene, cis-1,2-Dichloroethene, trans-1,2-Dichloroethene, Trichloroethene, Tetrachloroethene, Tetrachloroethene, 1,1,2-Trichloroethane, 1,1,2,2-Tetrachloroethane, Chlorobenzene, Fluorobenzene

4 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Clingcast Metals' records for complete process conditions.

5 TEST METHODS

All sampling and analysis was performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling Method	Analysis Method	Method Detection Limit	Uncertainty*	NATA Accredited	
					Sampling	Analysis
Sample plane criteria	NSW TM-1	NA	NA	-	✓	NA
Moisture content	NSW TM-22	NSW TM-22	1.0%	19%	✓	✓
Molecular weight	NSW TM-23	NSW TM-23	-	not specified	✓	✓
Temperature	NSW TM-2	NA	0°C	2%	✓	NA
Flow rate	NSW TM-2	NA	Location specific	8%	✓	NA
Velocity	NSW TM-2	NA	2 m/s	7%	✓	NA
Particulate matter	NSW TM-15	NSW TM-15	0.001 g/m ³	5%	✓	✓
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse	Analyte specific	15%	✓	✓ ¹
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW TM-13	Envirolab inhouse	Analyte specific	15%	✓	✓ ¹
Speciated volatile organic compounds	NSW TM-34	USEPA SW-846 8260	0.3 mg/m ³	19%	✓	✓
Nitrogen oxides (NOx)	NSW TM-11	NSW TM-11	4 mg/m ³	12%	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	0.1%	13%	✓	✓
Carbon monoxide	NSW TM-32	NSW TM-32	0.003 g/m ³	12%	✓	✓
Oxygen	NSW TM-25	NSW TM-25	0.1%	13%	✓	✓

* Uncertainty values cited in this table are calculated at the 95% confidence level (coverage factor = 2)

1. Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 22 November 2016 in report number 157341

6 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION

Ektime (EML) and Ektime (ETC) are accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektime at NATA's website www.nata.com.au.

Ektime (EML) and Ektime (ETC) are accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025. – General Requirements for the Competence of Testing and Calibration Laboratories. ISO/IEC 17025 requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Compliance Manager.

NATA is a member of APLAC (Asia Pacific Laboratory Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through the mutual recognition arrangements with both of these organisations, NATA accreditation is recognised world –wide.

A formal Quality Control program is in place at Ektime to monitor analyses performed in the laboratory and sampling conducted in the field. The program is designed to check where appropriate; the sampling reproducibility, analytical method, accuracy, precision and the performance of the analyst. The Laboratory Manager is responsible for the administration and maintenance of this program.

7 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
VOC	Any chemical compound based on carbon with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the particular conditions of use. These compounds may contain oxygen, nitrogen and other elements, but specifically excluded are carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
TOC	The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
OU	The number of odour units per unit of volume. The numerical value of the odour concentration is equal to the number of dilutions to arrive at the odour threshold (50% panel response).
PM _{2.5}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PM ₁₀	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
BSP	British standard pipe
NT	Not tested or results not required
NA	Not applicable
D ₅₀	'Cut size' of a cyclone defined as the particle diameter at which the cyclone achieves a 50% collection efficiency ie. half of the particles are retained by the cyclone and half are not and pass through it to the next stage. The D ₅₀ method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D ₅₀ of that cyclone and less than the D ₅₀ of the preceding cyclone.
D	Duct diameter or equivalent duct diameter for rectangular ducts
<	Less than
>	Greater than
≥	Greater than or equal to
~	Approximately
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
DER	WA Department of Environment & Regulation
DECC	Department of Environment & Climate Change (NSW)
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
NATA	National Association of Testing Authorities
RATA	Relative Accuracy Test Audit
AS	Australian Standard
USEPA	United States Environmental Protection Agency
Vic EPA	Victorian Environment Protection Authority
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
CARB	Californian Air Resources Board
TM	Test Method
OM	Other approved method
CTM	Conditional test method
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
NIOSH	National Institute of Occupational Safety and Health
XRD	X-ray Diffractometry