



Address (Head Office)
7 Redland Drive
MITCHAM VIC 3132

Office Locations
VIC NSW WA QLD

Postal Address
52 Cooper Road
COCKBURN CENTRAL WA 6164

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

Report Number R007620

Emission Testing Report

Clingcast Metals, Kirrawee



Document Information

Client Name: Clingcast Metals
 Report Number: R007620
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 Attention: Paul Clingan
 Address: 98 Bath Rd
 KIRRAWEE NSW 2232
 Testing Laboratory: Ektimo Pty Ltd, ABN 86 600 381 413

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Report Authorisation



Aaron Davis
Client Manager

NATA Accredited Laboratory
No. 14601

Accredited for compliance with ISO/IEC 17025 - Testing. 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 perform emission testing as requested.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
Baghouse Stack	22 May 2019	Particulate matter, particulate matter <10µm (PM ₁₀) Nitrogen oxides (as NO ₂) Carbon monoxide Carbon dioxide Metals (type 1 & 2 + iron) Speciated volatile organic compounds (VOCs) Formaldehyde Phenols Odour and character

* Flow rate, velocity, temperature and moisture were also determined.

All results are reported on a dry basis at STP (except odour wet – STP).

Plant operating conditions have been noted in the report.

2 RESULTS SUMMARY TABLE

The table below outlines the proposed licence limits and the detected results for testing on the 22 May 2019.

Results from this stack emission monitoring program indicate that Clingcast Metals Pty Ltd are compliant with the proposed baghouse stack emission limits during the sampling period.

Location Description	Pollutant	Units	POEO Reg Group C Limits ¹	POEO Reg Group 6 Limits ²	Detected values 22/05/19
Baghouse Stack	Total solid particles	mg/m ³	100	50	4.9
	Smoke	Ringelmann	1	1	0
	Type 1 & 2 substances in aggregate	mg/m ³	-	1	≤0.019
	Cadmium	mg/m ³	-	0.2	<0.0005
	Mercury	mg/m ³	-	0.2	<0.0003
	Nitrogen oxides	mg/m ³	-	350	<4
	Volatile organic compounds	mg/m ³	-	40	0.68

- 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 Clingcast Metals Baghouse Stack.
- 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	22/05/2019	Client	Cling Cast Metals
Report	R007620	Stack ID	Baghouse Stack
Licence No.	-	Location	Kirrawee
Ektimo Staff	Aaron Davis / Hamish Proust	State	NSW
Process Conditions	Please refer to client records.		190520

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
Sample plane compliance to AS4323.1	Compliant but non-ideal

Comments
The sampling plane is deemed to be non-ideal 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	1.4	
Gas molecular weight, g/g mole	28.9 (wet)	29.0 (dry)
Gas density at STP, kg/m ³	1.29 (wet)	1.30 (dry)
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0930 & 1240	
Temperature, °C	38	
Velocity at sampling plane, m/s	12	
Volumetric flow rate, actual, m ³ /s	18	
Volumetric flow rate (wet STP), m ³ /s	16	
Volumetric flow rate (dry STP), m ³ /s	16	
Mass flow rate (wet basis), kg/hour	73000	

Gas Analyser Results	Sampling time	Average		Minimum		Maximum	
		1133 - 1232		1133 - 1232		1133 - 1232	
		Concentration	Mass Rate	Concentration	Mass Rate	Concentration	Mass Rate
Combustion Gases		mg/m ³	g/min	mg/m ³	g/min	mg/m ³	g/min
Nitrogen oxides (as NO ₂)		<4	<4	<4	<4	<4	<4
Carbon monoxide		5.4	5.1	<2	<2	19	17
		Concentration		Concentration		Concentration	
		%		%		%	
Carbon dioxide		<0.5		<0.5		<0.5	
Oxygen		20.9		20.9		20.9	

Formaldehyde	Sampling time	Results	
		1005-1105	
		Concentration	Mass Rate
		mg/m ³	g/min
Formaldehyde		0.083	0.078

Phenol	Sampling time	Results	
		1010-1110	
		Concentration	Mass Rate
		mg/m ³	g/min
Phenol		<0.05	<0.05

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Process Conditions	Please refer to client records.		

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Odour	Sampling time	Results	
		1030 - 1050	
		Concentration ou	Mass Rate oum ³ /min
Results		<30	<30000
Lower uncertainty limit		15	
Upper uncertainty limit		70	
Analysis date & time		23/05/19, 1452	
Holding time		28 hours	
Dilution factor		1	
Bag material		Nalophan	
Butanol threshold (ppb)		48.8	
Laboratory temp (°C)		23.5	
Last calibration date		July 2018	

Isokinetic Results	Sampling time	Results	
		0945-1110 0945-1110 (PM10&2.5)	
		Concentration mg/m ³	Mass Rate g/min
Solid Particles		4.9	4.6
Fine particulates (PM10)		<4	<4
Fine particulates (PM2.5)		<3	<2
D50 cut size, 10µm			10.6
D50 cut size, 2.5µm			2.26
Antimony		<0.004	<0.004
Arsenic		<0.002	<0.001
Beryllium		<0.0004	<0.0004
Cadmium		<0.0005	<0.0004
Chromium		<0.0005	<0.0005
Cobalt		<0.0005	<0.0005
Iron		0.0031	0.0029
Lead		0.0017	0.0016
Manganese		0.0026	0.0024
Mercury		<0.0003	<0.0003
Nickel		<0.0009	<0.0008
Selenium		<0.004	<0.004
Tin		<0.002	<0.001
Vanadium		<0.0009	<0.0008
Type 1 & 2 Substances			
Upper Bound			
Total Type 1 Substances		≤0.0079	≤0.0074
Total Type 2 Substances		≤0.011	≤0.01
Total Type 1 & 2 Substances		≤0.019	≤0.018
Isokinetic Sampling Parameters		Isokinetic	PM10&2.5
Sampling time, min		80	80
Isokinetic rate, %		97	108
Gas Flow Parameters			
Initial flow measurement time (hhmm)		0930	930
Final flow measurement time (hhmm)		1115	1115
Temperature, °C		38	38
Temperature, K		311	311
Velocity at sampling plane, m/s		12	12
Velocity at exit plane, m/s		12	12
Volumetric flow rate, actual, m ³ /s		18	18
Volumetric flow rate (wet STP), m ³ /s		16	16
Volumetric flow rate (dry STP), m ³ /s		16	16
Mass flow rate (wet basis), kg/hour		73000	73000
Velocity difference, %		<1	<1

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Process Conditions	Please refer to client records.		

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Smoke Obscuration	Time of assessment	Result
Smoke Obscuration		1000 - 1015 0

Total VOCs (as n-Propane)	Sampling time	Results	
Lower Bound		Concentration mg/m ³	Mass Rate g/min
Total		0.68	0.63

VOC (speciated)	Sampling time	Results 1000-1100	
		Concentration mg/m ³	Mass Rate g/min
Detection limit ⁽¹⁾		<0.04	<0.04
Ethanol		0.64	0.6
Toluene		0.14	0.13

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

Isopropanol, 1,1-Dichloroethene, Dichloromethane, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, 1,1,2-Trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, 1,2,4-Trimethylbenzene, tert-Butylbenzene, 1,2,3-Trimethylbenzene, Acetone, Pentane, Acrylonitrile, Methyl ethyl ketone, n-Hexane, Ethyl acetate, Cyclohexane, Isopropyl acetate, 2-Methylhexane, 2,3-Dimethylpentane, 3-Methylhexane, Heptane, Ethyl acrylate, Methyl methacrylate, Propyl acetate, Methylcyclohexane, Methyl Isobutyl Ketone, 2-Hexanone, Octane, Butyl acetate, 1-Methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, α -Pinene, β -Pinene, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

4 PLANT OPERATING CONDITIONS

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

22 May 2019

Cast Iron Furnace operating normally (charging)

Copper Furnace operating normally (charging)

5 TEST METHODS

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*); which are prescribed within the *POEO Clean Air Regulation 2002: Part 4 – Emission of air impurities from activities and plant*. 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	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Sample plane criteria	NSW TM-1	NA	NA	✓	NA
Flow rate, temperature and velocity	NA	NSW TM-2	8%, 2%, 7%	NA	✓
Moisture content	NSW TM-22	NSW TM-22	8%	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	13%	✓	✓
Carbon monoxide	NSW TM-32	NSW TM-32	12%	✓	✓
Nitrogen oxides	NSW TM-11	NSW TM-11	12%	✓	✓
Aldehydes and ketones	NSW TM-34	Ektimo 330	16%	✓	✓ [†]
Phenol and phenolic compounds	Ektimo 320	Ektimo 320	17%	✓	✓ [†]
Speciated volatile organic compounds (VOC's)	NSW TM-34 ^d	Ektimo 344	19%	✓	✓ [†]
Solid particles (total)	NSW TM-15	NSW TM-15	5%	✓	✓
Particulate matter (PM ₁₀)	NSW OM-5	NSW OM-5	6%	✓	✓
Particulate matter (PM _{2.5})	USEPA 201A	USEPA 201A	9%	✓	✓
Total (gaseous and particulate) metals and metallic compounds	NSW TM-12, NSW TM-13, NSW TM-14	Envirolab inhouse Metals-006, Metals-022, Metals-021	15%	✓	✓ [‡]
Type 1 substances (Sb, As, Cd, Pb, Hg)	NSW TM-12	Envirolab inhouse Metals-006, Metals-022, Metals-021	15%	✓	✓ [‡]
Type 2 substances (Be, Cr, Co, Mn, Ni, Se, Sn, V)	NSW TM-13	Envirolab inhouse Metals-006, Metals-022	15%	✓	✓ [‡]
Odour	NSW OM-7	NSW OM-7 [¥]	Refer to results	✓	✓
Odour Characterisation	NA	direct observation	NA	NA	✘

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

^d Excludes recovery study as specified in section 8.4.3 of USEPA Test Method 18

[†] Analysis performed by Ektimo, NATA accreditation number 14601. Laboratory analytical results were reported on
3 June 2019 in report number R007620-Aldehydes.
4 June 2019 in report number R007620-Phenolics.
7 June 2019 in report number R007620_SVOCs.

[‡] Analysis performed by Envirolab, NATA accreditation number 2901. Results were reported to Ektimo on 4 June 2019 in report number 218382.

[¥] Odour analysis conducted at the Ektimo NSW laboratory by forced choice olfactometry.

6 QUALITY ASSURANCE/QUALITY CONTROL INFORMATION

Ektimo is 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 Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing 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 Quality Director.

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 worldwide.

7 DEFINITIONS

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

% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American public health association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BSP	British standard pipe
CARB	Californian Air Resources Board
CEM	Continuous Emission Monitoring
CEMS	Continuous Emission Monitoring System
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
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.
DECC	Department of Environment & Climate Change (NSW)
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.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra-red
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
Lower Bound	Defines values reported below detection as equal to zero.
Medium Bound	Defines values reported below detection are equal to half the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
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 ₁₀	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
PM _{2.5}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA	Particle size analysis
RATA	Relative Accuracy Test Audit
Semi-quantified VOCs	Unknown VOCs (those not matching a standard compound), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration will be determined by matching the integrated area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
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.
TM	Test Method
TOC	The sum of all compounds of carbon which contain at least one carbon to carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Vic EPA	Victorian Environment Protection Authority
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.
XRD	X-ray Diffractometry
Upper Bound	Defines values reported below detection are equal to the detection limit.