

**Date:** 4 July 2014

**Report No:** 140248r

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Ingal Civil Products  
57-65 Airs Rd  
MINTO NSW 2566

***Emission Testing – June 2014***  
*Ingal Civil Products – Minto Plant*

Dear Amit,

Tests were performed 17 June 2014 to determine emissions to air from 2 locations at the Minto plant of Ingal Civil Products.

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Yours faithfully  
Emission Testing Consultants



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## LICENCE COMPARISON

EPA No.	Location Description	Pollutant	Unit of measure	Licence limit	Detected values	Detected values (corrected to 3% O <sub>2</sub> )
1	Baghouse Stack	Type 1 and Type 2 substances in aggregate	milligrams per cubic meter (mg/m <sup>3</sup> )	0.08	<0.02	NA
		Ammonia and ammonium compounds	milligrams per cubic meter (mg/m <sup>3</sup> )	2	0.42	NA
		Odour	odour units (ou)	520	150	NA
		Zinc and zinc compounds	milligrams per cubic meter (mg/m <sup>3</sup> )	5	0.0089	NA
		Hydrogen chloride	milligrams per cubic meter (mg/m <sup>3</sup> )	5	<0.09	NA
		Cadmium	milligrams per cubic meter (mg/m <sup>3</sup> )	0.04	<0.001	NA
		Solid Particles	milligrams per cubic meter (mg/m <sup>3</sup> )	5	<2	NA
2	Galvanising Area Boiler	Solid Particles	milligrams per cubic meter (mg/m <sup>3</sup> )	11	<2	<2
		Nitrogen Oxides (as NO <sub>2</sub> )	milligrams per cubic meter (mg/m <sup>3</sup> )	170	110	160

All analytes are below the Licence Limit set by the NSW EPA licence 12593 (last amended on 5/12/2013). Results from location 2 have also been corrected to 3% Oxygen as stipulated in Part 3, Schedule 5 of the *Protection of the Environment Operations (Clean Air) Regulation, (NSW) 2010*.

## EXECUTIVE SUMMARY

Emission Testing Consultants (ETC) was engaged by Ingal Civil Products to perform emission monitoring as part of the yearly requirement stipulated in their NSW EPA Environment Protection Licence (12593). Monitoring was performed on the Baghouse Stack and the Galvanising Area Boiler (EPA Points 1 and 2 respectively) for the following parameters:

### EPA 1 – Baghouse Stack

- Odour
- Solid particles
- Hydrogen chloride (HCl)
- Ammonia and ammonium compounds
- Type 1 and Type 2 substances
- Cadmium and cadmium compounds
- Zinc and zinc compounds

### EPA 2 – Galvanising Area Boiler

- Solid particles
- Nitrogen oxides (NO<sub>x</sub>) as NO<sub>2</sub>

Flow rate, velocity, temperature and moisture measurements were also taken. These measurements enabled the calculation of emission rates.

This formed the yearly round of scheduled monitoring for 2014.

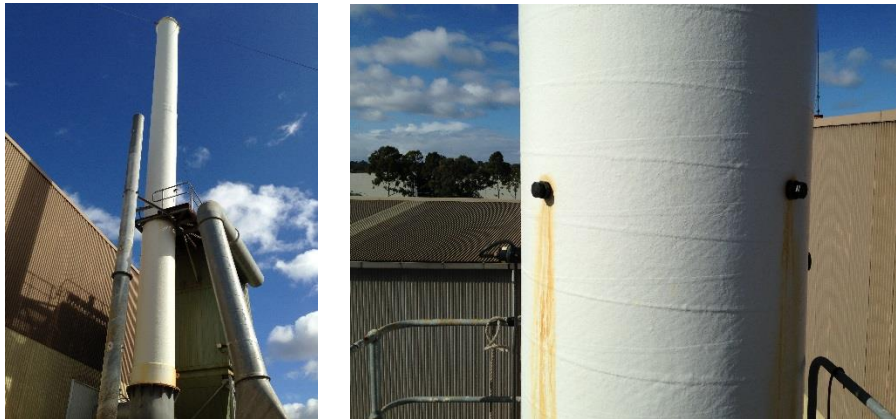
The methodologies chosen by ETC are those stipulated in Ingal Civil Products EPA Licence, and as prescribed in the NSW EPA publication, *Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales, 2007*. For measuring ammonia no method has been prescribed in either document. Thus internal method ETC 330 was selected as it has been validated by NATA.

There were no technical issues in terms of sampling on the days of testing.

**RESULTS**

**EPA 1 – Baghouse Stack**

17 June 2014



Flow Results		Ambient air MW	EPA 1 - Baghouse Stack 140248
Date and time of flow test		17/06/2014 9:10	
Date and time of flow test		17/06/2014 11:10	
Stack dimensions at sampling plane		1200	mm
Velocity at sampling plane		8.9	m/s
Average temperature		31	°C
Moisture content	Method 4	2.5	% v/v
Flow rate at discharge conditions		10	m <sup>3</sup> /sec
Flow rate at wet NTP conditions		9.0	m <sup>3</sup> /sec
Flow rate at dry NTP conditions		8.8	m <sup>3</sup> /sec

Manual Sampling Results	EPA 1 - Baghouse Stack 140248 530	Sampling Times	Concentration at NTP	Mass rate
Ammonia & ammonium compounds		1005-1105	0.42 mg/m <sup>3</sup>	0.22 g/min

Odour Results	EPA 1 - Baghouse Stack 140248 530	Sampling Times	Concentration at NTP Wet	Mass rate
Odour		935-955	150 ou	83,000 ouv/min

## EPA 1 – Baghouse Stack

### 17 June 2014

Isokinetic Sampling Results	EPA 1- Baghouse Stack 140248 530	Sampling Times	Concentration at NTP	Mass rate
Chloride (as HCl)		1030-1132	< 0.09 mg/m <sup>3</sup>	< 0.05 g/min
Solid particles		915-1017	< 2 mg/m <sup>3</sup>	< 1 g/min
Metals Sampling Results	EPA 1- Baghouse Stack 140248 530	Sampling Times	Concentration at NTP	Mass rate
Antimony (Sb)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Arsenic (As)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0007 g/min
Beryllium (Be)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Cadmium (Cd)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Chromium (Cr)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0007 g/min
Cobalt (Co)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Lead (Pb)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Manganese (Mn)		915-1017	< 0.002 mg/m <sup>3</sup>	< 0.001 g/min
Mercury (Hg)		915-1017	< 0.002 mg/m <sup>3</sup>	< 0.0010 g/min
Nickel (Ni)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Selenium (Se)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0007 g/min
Tin (Sn)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0006 g/min
Vanadium (V)		915-1017	< 0.001 mg/m <sup>3</sup>	< 0.0007 g/min
Type 1 & 2 substances in aggregate		915-1017	< 0.02 mg/m <sup>3</sup>	< 0.004 g/min
Zinc (Zn)		915-1017	0.0089 mg/m <sup>3</sup>	0.0047 g/min
No. of sampling points			12	
Length of sampling, min			60	
Stack gas molecular weight, g/g-mole (wet)			28.6	
Stack gas density, at wet NTP			1.28	

**Note:** Type 1 and Type 2 substances include Sb, As, Be, Cd, Cr, Co, Pb, Mn, Hg, Ni, Se, Sn and V. Zn is not classified as a Type 1 or Type 2 substance, and has thus not been included in the Type 1 and Type 2 aggregate.

Refer to “**SAMPLING PLANE OBSERVATIONS**” on page 6.

## EPA 2 – Galvanising Area Boiler

17 June 2014



Flow Results		Measured MW	EPA 2 - Galvanising Area Boiler 140248
Date and time of flow test		17/06/2014 11:50	
Date and time of flow test		17/06/2014 13:10	
Stack dimensions at sampling plane		260	mm
Velocity at sampling plane		7.3	m/s
Average temperature		148	°C
Moisture content	Method 4	7.9	% v/v
Flow rate at discharge conditions		0.39	m <sup>3</sup> /sec
Flow rate at wet NTP conditions		0.25	m <sup>3</sup> /sec
Flow rate at dry NTP conditions		0.23	m <sup>3</sup> /sec

Isokinetic Sampling Results	EPA 2 - Galvanising Area Boiler 140248 14	Sampling Times	Concentration at NTP	Concentration at 3% O2	Mass rate
<b>Solid particles</b>		1155-1255	< 2 mg/m3	< 2 mg/m3	< 0.02 g/min
<i>No. of sampling points</i>			4		
<i>Length of sampling, min</i>			60		
<i>Stack gas molecular weight, g/g-mole (wet)</i>			28.5		
<i>Stack gas density, at wet NTP</i>			1.27		

Continuous Analyser Results	EPA 2 - Galvanising Area Boiler 140248 14	Sampling Times	Concentration at NTP	Concentration at 3% O2	Mass rate
<b>Oxygen (dry basis)</b>		1200-1259	8.3 % v/v	-	-
<b>Carbon dioxide (dry basis)</b>		1200-1259	6.8 % v/v	-	-
<b>Dry gas density</b>		1200-1259	1.3 kg/m3	-	-
<b>Molecular weight of stack gas, dry basis</b>		1200-1259	29 g/g-mole	-	-
<b>Nitrogen oxides as NO<sub>2</sub></b>		1200-1259	110 mg/m3	160 mg/m3	1.6 g/min

Refer to “**SAMPLING PLANE OBSERVATIONS**” on page 6.

## SAMPLING PLANE OBSERVATIONS

### EPA 1 – Baghouse Stack

The sampling plane had 2 x 2 inch holes. The location was determined to be “ideal” as per AS4323.1. It was more than the required 2 duct diameters upstream from the exit. It was more than the required 6 duct diameters downstream from a junction. The sampling plane passed the flow assessment (items (a) to (f) of AS4323.1) and was therefore “compliant”.

### EPA 2 – Galvanising Area Boiler

The sampling plane had 2 x 4 inch BSP Ports. The location was determined to be “ideal” as per AS4323.1. It was more than the required 2 duct diameters upstream from the exit. It was more than the required 6 duct diameters downstream from a bend. The sampling plane passed the flow assessment (items (a) to (f) of AS4323.1) and was therefore “compliant”.

## PLANT OPERATING CONDITIONS

Plant operating conditions were supplied by Ingal Civil Products personnel.

Plant operating conditions were representative of typical operation for the duration of sampling.

## ODOUR SAMPLING AND ANALYSIS PARAMETERS

Technique: <small>140246</small>		AS4323.3 - Forced Choice	
Date and time of analysis:		18/06/2014 , 1500-1600	
Sample pre-dilution ratio:	DP1	Nil , <i>All sample gas</i>	
Quality Requirements		Acceptance	Current value
n-Butanol threshold value (ppb)		20-80	41
Repeatability “r”		≤0.477	0.289
Repeatability “10r”		≤3.00	1.94
Accuracy “A”		<0.217	0.125

## TEST METHODS

The following methods are accredited with the National Association of Testing Authorities (NATA) and are approved for the sampling and analysis of gases unless otherwise stated. Specific details of the methods are available on request.

All sampling and analysis conducted in accordance with test methods (TM) prescribed for the purposes of the New South Wales Protection of the Environment Operations (Clean Air) Regulation 2010, or other approved methods (OM) unless otherwise stated.

All parameters are reported adjusted to dry (**wet for odour only**) NTP conditions unless otherwise stated.

Parameter	NSW TM Method	Sampling Method	NATA	Analytical Laboratory	Analytical Method	NATA	Analytical Laboratory NATA accreditation number	Analytical Laboratory Report Number(s)
Selection of sampling positions	TM-1	AS4323.1	Yes	NA	NA	Yes	14601	N140248
Flow rate	TM-2	USEPA 2	Yes	NA	NA	Yes	14601	N140248
Velocity	TM-2	USEPA 2	Yes	NA	NA	Yes	14601	N140248
Temperature	TM-2	USEPA 2	Yes	NA	NA	Yes	14601	N140248
Moisture	TM-22	USEPA 4	Yes	NA	NA	Yes	14601	N140248
Odour	OM-7	AS4323.3	Yes	Emission Testing Consultants	AS4323.3	Yes	14601	N140248
Solid particles	TM-15	AS4323.2	Yes	Emission Testing Consultants	AS4323.2	Yes	14601	N140248
Dry gas Density	TM-23	USEPA 3	Yes	Emission Testing Consultants	USEPA 3	Yes	14601	N140248
Molecular weight	TM-23	USEPA 3	Yes	Emission Testing Consultants	USEPA 3	Yes	14601	N140248
Carbon dioxide (CO <sub>2</sub> )	TM-24	USEPA 3A	Yes	Emission Testing Consultants	USEPA 3A	Yes	14601	N140248
Oxygen (O <sub>2</sub> )	TM-25	USEPA 3A	Yes	Emission Testing Consultants	USEPA 3A	Yes	14601	N140248
Nitrogen oxides (NO <sub>x</sub> ) as NO <sub>2</sub>	TM-11	USEPA 7E	Yes	Emission Testing Consultants	USEPA 7E	Yes	14601	N140248
Hydrogen chloride (HCl)	TM-8	USEPA 26A	Yes	SGS Australia Pty Ltd	USEPA 26A	Yes	2562	85900
Ammonia (NH <sub>3</sub> )	n/a	ETC 330	Yes	MGT-LabMark Environmental Pty Ltd	APHA4500-NH3 H	Yes	1261	422393-A
Cadmium (Cd)	TM-12	USEPA 29	Yes	National Measurement Institute (NMI)	NT2_47 and NT2_52	Yes	198	RN1026223
Type 1 & 2 substances	TM-12,13,14	USEPA 29	Yes	National Measurement Institute (NMI)	NT2_47 and NT2_52	Yes	198	RN1026223
Zinc (Zn)	TM-14	USEPA 29	Yes	National Measurement Institute (NMI)	NT2_47 and NT2_52	Yes	198	RN1026223

## DEFINITIONS

The following symbols and abbreviations are used in test reports:

BSP	British standard pipe.
Concentration	Mass of analyte per cubic metre expressed at NTP dry conditions (ng, µg or mg/m <sup>3</sup> ).
Flow rate at discharge conditions	Volume of gas flow per unit time expressed at discharge temperature, pressure and moisture content (m <sup>3</sup> /min).
Flow rate at wet NTP conditions	Volume of gas flow per unit time expressed at 0°C, an absolute pressure of 101.325 kPa and discharge moisture content (m <sup>3</sup> /min).
Flow rate at dry NTP conditions	Volume of gas flow per unit time expressed at 0°C, an absolute pressure of 101.325 kPa and 0% moisture content (m <sup>3</sup> /min).
Mass rate	Mass of analyte per unit time (µg, mg or g/min).
Moisture content	Percentage of gaseous moisture in the gas expressed on a volume / volume percentage basis. This does not include moisture in the gas stream that is in the liquid phase (free moisture).
NTP	Normal temperature and pressure. Gas volumes and concentrations are expressed on a dry ( <b>wet in the case of odour only</b> ) basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
Odour concentration	Number of odour units (ou).
Odour flux rate	Odour emission rate per unit surface area per unit time (ou/m <sup>2</sup> /min).
Odour mass rate	Odour emission rate per unit time (ou/min).
Odour unit	One odour unit (ou) is that concentration of odorant(s) at standard concentrations that elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
Sampling plane	Location at which measurements were conducted.
Velocity	Gas velocity expressed at discharge temperature, pressure and moisture content (m/s)
>	Greater than.
<	Less than the minimum limit of detection using the specified method.
~	Approximately.

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