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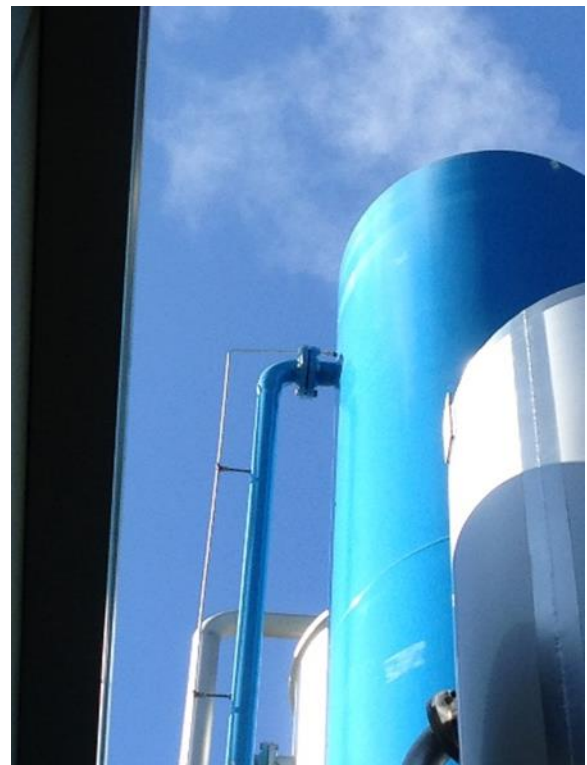
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Report Number R002391

Emission Testing Report Supagas, Ingleburn



Document Information

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 Attention: Andrew Walker
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 Testing Laboratory: Ektimo (ETC) ABN 74 474 273 172

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Report Authorisation



Steven Cooper
Client Manager

NATA Accredited Laboratory
No. 14601

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1 EXECUTIVE SUMMARY

Ektimo was engaged by Supagas to perform annual emission testing pursuant to their Environment Protection Licence 20022

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
CO ₂ Production Plant Absorber Tower Stack	1 March 2016	Nitrogen oxides, carbon monoxide, carbon dioxide, oxygen

* 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 LICENCE COMPARISON

The following licence comparison table shows that all analytes highlighted in green are below the licence limit set by the NSW EPA as per licence 20022 (last amended on 10/07/14).

EPA No.	Location Description	Pollutant	Units	Licence limit	Detected values 1/03/2016	Detected values (corrected to 3% O ₂)
1	CO ₂ Production Plant Absorber Tower Stack	Nitrogen Oxides	mg/m ³	230	110	110

3 RESULTS

3.1 CO₂ Production Plant Absorber Tower Stack

Date	1-03-2016	Client	Supagas		
Report	R002391	Stack ID	CO2 Production Plant Absorber Tower Stack		
Licence No.	20022	Location	Ingleburn	State	NSW
Ektimo Staff	Sc0/Swe				
Process Conditions	Please refer to client records.				

Sampling Plane Details

Sampling plane dimensions	1140 mm
Sampling plane area	1.02 m ²
Access & height of ports	Elevated work platform 10 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0.3 D
Upstream disturbance	Junction 0 D
No. traverses & points sampled	1 10
Compliance of sample plane to AS4323.1	Non-compliant ⁽¹⁾

Comments

Sampling was conducted via a ½ inch stainless steel duct secured permanently at the sampling plane. Flow rate, velocity, temperature and moisture measurements were taken from the exit of this discharge point as no removable ports at the sample plane are evident.

Non-compliant sampling plane; the testing precision will be reduced

The number of traverses sampled is less than the requirement

The number of points sampled is less than the requirement

Stack Parameters

Moisture content, %v/v	12 (saturated)	
Gas molecular weight, g/g mole	27.1 (wet)	28.3 (dry)
Gas density at STP, kg/m ³	1.21 (wet)	1.26 (dry)
% Oxygen correction & Factor	3 %	0.94

Gas Flow Parameters

Measurement time (hhmm)	830
Temperature, K	323
Velocity at sampling plane, m/s	<2
Volumetric flow rate, discharge, m ³ /s	<2
Volumetric flow rate (wet STP), m ³ /s	<1
Volumetric flow rate (dry STP), m ³ /s	<1
Mass flow rate (wet basis), kg/hour	< 6000
Velocity difference, %	<1

Gases	Sampling time	Average			Minimum			Maximum		
		838-937 Corrected to 3%			838-937 Corrected to 3%			838-937 Corrected to 3%		
		Concentration mg/m ³	O ₂ mg/m ³	Mass Rate g/s	Concentration mg/m ³	O ₂ mg/m ³	Mass Rate g/s	Concentration mg/m ³	O ₂ mg/m ³	Mass Rate g/s
Nitrogen oxides (as NO ₂)		110	110	<0.1	110	100	<0.1	120	110	<0.1
Carbon monoxide		65	61	<0.08	47	45	<0.06	91	86	<0.1
Carbon dioxide		Concentration %			Concentration %			Concentration %		
Oxygen		0.5			0.4			0.5		
		1.8			1.7			2		

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

The gas velocity at some or all sampling points is less than 3 m/s

The downstream disturbance is <1D from the sampling plane

The upstream disturbance is <2D from the sampling plane

The stack or duct does not have the required number of access holes (ports)

4 PLANT OPERATING CONDITIONS

Unless otherwise stated, the plant operating conditions were normal at the time of testing. See Supagas's 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	Test Method	Method Detection Limit	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Moisture content	NSW TM-22	0.4%	19%	✓	✓
Oxygen	USEPA 3A	0.1%	13%	✓	✓
Carbon dioxide	USEPA 3A	0.1%	13%	✓	✓
Nitrogen oxides	USEPA 7E	4mg/m ³	12%	✓	✓
Carbon monoxide	USEPA 10	2.5mg/m ³	12%	✓	✓
Sample plane criteria	NSW TM-1	NA	-	✓	NA
Velocity	NSW TM-2	2ms ⁻¹	7%	✓	NA
Temperature	NSW TM-2	0°C	2%	✓	NA
Flow rate	NSW TM-2	Location	8%	✓	NA

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

6 QUALITY ASSURANCE/ QUALITY CONTROL INFORMATION

Ektimo (EML) and Ektimo (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 Ektimo at NATA's website www.nata.com.au.

Ektimo (EML) and Ektimo (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 Ektimo 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