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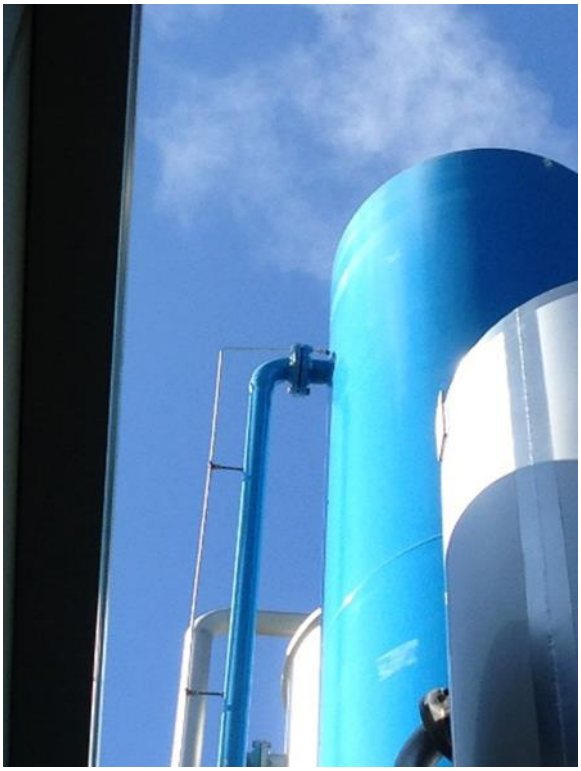
Report Number R004220

Emission Testing Report
Supagas, Ingleburn



Document Information

Client Name:	Supagas
Report Number:	R004220
Date of Issue:	5 February 2018
Attention:	Reza Pourdarvish
Address:	5 Benson Road Ingleburn NSW 2565
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Status

Format	Document Number	Report Date	Prepared By	Reviewed By (1)	Reviewed By (2)
Preliminary Report	-	-	-	-	-
Draft Report	-	-	-	-	-
Final Report	R004220	5/02/2018	JWe	SCo	SWe
Amend Report	-	-	-	-	-

Template Version: 081217

Amendment Record

Document Number	Initiator	Report Date	Section	Reason
Nil	-	-	-	-

Report Authorisation

Steven Cooper
Ektimo Signatory

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 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 February 2018	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 1/02/2018	Detected values (corrected to 3% O_2)
1	CO_2 Production Plant Absorber Tower Stack	Nitrogen Oxides	mg/m^3	230	130	120

3 RESULTS

3.1 CO_2 Production Plant Absorber Tower Stack

Date	1/02/2018	**Client**	Supagas
Report	R004220	**Stack ID**	CO2 Production Plant Absorber Tower Stack
Licence No.	20022	**Location**	Ingleburn
Ektimo Staff	David Hill & Steven Weekes	**State**	NSW
Process Conditions	Please refer to client records.		*180129*

Sampling Plane Details	
Sampling plane dimensions	1140 mm
Sampling plane area	1.02 m²
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	2 20
Sample plane compliance to AS4323.1	Non-compliant

Comments

Sampling was conducted via a 1/2 inch stainless steel duct secured permanantly 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 sampling plane are evident.

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

Stack Parameters		
Moisture content, %v/v	12 (saturated)	
Gas molecular weight, g/g mole	27.0 (wet)	28.3 (dry)
Gas density at STP, kg/m³	1.21 (wet)	1.26 (dry)
% Oxygen correction & Factor	3 %	0.93
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0955 & 1058	
Temperature, K	323	
Velocity at sampling plane, m/s	2.1	
Volumetric flow rate, discharge, m³/s	2.1	
Volumetric flow rate (wet STP), m³/s	1.8	
Volumetric flow rate (dry STP), m³/s	1.8	
Mass flow rate (wet basis), kg/hour	7700	
Velocity difference, %	<1	

Gas Analyser Results	Average			Minimum			Maximum		
Sampling time	0942 - 1041			0942 - 1041			0942 - 1041		
	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min	Concentration mg/m³	Corrected to 3% O2 mg/m³	Mass Rate g/min
Combustion Gases									
Nitrogen oxides (as NO_2)	130	120	14	120	110	12	140	130	15
Carbon monoxide	27	26	2.9	<2	<2	<0.2	110	100	12
	Concentration %			Concentration %			Concentration %		
Carbon dioxide	0.6			0.6			0.7		
Oxygen	1.7			1.5			1.9		

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	Sampling Method	Analysis Method	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Sample plane criteria	NSW TM-1	NA	-	✓	NA
Flow rate, temperature and velocity	NSW TM-2	NA	8%, 2%, 7%	✓	NA
Moisture content	NSW TM-22	NSW TM-22	19%	✓	✓
Molecular weight	NSW TM-23	USEPA 3A	not specified	✓	✓
Carbon dioxide	NSW TM-24	NSW TM-24	13%	✓	✓
Carbon monoxide	NSW TM-32	NSW TM-32	12%	✓	✓
Nitrogen oxides (NO_x)	NSW TM-11	NSW TM-11	12%	✓	✓
Oxygen	NSW TM-25	NSW TM-25	13%	✓	✓

180109

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

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 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:

~	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
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra Red
ISC	Intersociety committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
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
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