



AGL UPSTREAM INVESTMENTS PTY LTD
Newcastle Gas Storage Facility
Air Monitoring Report

Reporting Period: June – July 2017

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Foreword

PREMISES	Newcastle Gas Storage Facility 5 Old Punt Road TOMAGO NSW 2322
LICENCE DETAILS	<u>Environment Protection Licence 20130</u>
LICENCEE	AGL Upstream Investments Pty Limited
LICENCEE'S ADDRESS	Locked Bag 1837, St Leonards, NSW 2065
MONITORING DATE	15, 16, 27, 28 June 2017
MONITORING BY	Ektimo
ANALYSIS BY	Ektimo (laboratory report number R003725)
OBTAINED DATA DATE	16 August 2017 (Ektimo Report R003725)
REPORT DATE	21 August 2017
REPORT PREPARED BY	Aaron Clifton Environment Business Partner

SUMMARY OF ACTIVITY

The Newcastle Gas Storage Facility (NGSF) is located in Tomago, New South Wales.

The NGSF includes:

- A processing plant that converts pipeline natural gas to liquefied natural gas (LNG) by cooling it to -162°C . It is capable of processing up to 66,500 tonnes of LNG per year.
- An insulated, non-pressurised LNG storage tank capable of containing 30,000 tonnes or $63,000\text{ m}^3$ of LNG, equivalent to 1.5 petajoules (PJ) of natural gas, and an associated containment area.
- A re-gasification unit to convert the LNG in the storage tank back into natural gas.
- A flare stack with a height of approximately 15m to combust hydrocarbons discharged from the process.

- A truck loading facility to allow the dispatch of up to 1,000 tankers of LNG per year.
- Infrastructure and utility connection and an emergency access road.

This Monitoring Report relates to those air monitoring activities specified in Part 5, Monitoring and Recording Conditions, of the Environment Protection Licence. The Licence conditions stipulate air monitoring is required to be carried out at the locations, at the frequency and using the test methods as set out in the tables below.

This report is prepared in accordance with the *Requirements for Publishing Pollution Monitoring Data* (EPA, October 2013) (**Publication Requirements**).

AIR MONITORING LOCATIONS

Point	Location	Monitoring Frequency
7	Stack associated with the Gas Liquefaction System (H101)	Twice per year
8	Stack associated with the LNG Vaporiser (H501A)	Twice per year
10	Stack associated with the LNG Vaporiser (H501B)	Twice per year
11	Stack associated with the LNG Vaporiser (H501C)	Twice per year

AIR MONITORING TEST METHODS

Parameter	NSW EPA Test Method (Sampling Method)
Carbon dioxide	TM-24
Carbon monoxide	TM-32
Dry gas density	TM-23
Moisture	TM-22
Molecular weight of stack gases	TM-23
Nitrogen Oxides	TM-11
Oxygen (O ₂)	TM-25
Solid Particles	TM-15
Sulfuric acid mist and sulphur trioxide (as SO ₃)	TM-3
Sulphur dioxide	TM-4
Temperature	TM-2



Parameter	NSW EPA Test Method (Sampling Method)
Velocity	TM-2
Volatile organic compounds	OM-2
Volumetric flowrate	TM-2

Air Monitoring Results

Monitoring Date: 16 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
7	Stack associated with Gas Liquefaction System (H101)	Carbon dioxide	Percent		TM-24	Twice per year	8.3	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	100
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.32	Not applicable
		Moisture	Percent		TM-22	Twice per year	13	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.7	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	75	250
		Oxygen (O ₂)	Percent		TM-25	Twice per year	6	Not applicable
		Solid Particles	Milligrams per cubic metre		TM-15	Twice per year	<2 (mg/m ³)	5
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.074	60
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	478	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.7	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.096	5
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	1.7	Not applicable		

Monitoring Date: 28 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
7	Stack associated with Gas Liquefaction System (H101)	Carbon dioxide	Percent		TM-24	Twice per year	8.5	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	100
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.33	Not applicable
		Moisture	Percent		TM-22	Twice per year	18	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.7	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	82	250
		Oxygen (O ₂)	Percent		TM-25	Twice per year	5.8	Not applicable
		Solid Particles	Milligrams per cubic metre		TM-15	Twice per year	<2 (mg/m ³)	5
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.1	60
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	488	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.1	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	<0.03	5
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	1.5	Not applicable		

Monitoring Date: 15 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
8	Stack associated with LNG Vaporiser (H-501a)	Carbon dioxide	Percent		TM-24	Twice per year	7.7	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<3	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.32	Not applicable
		Moisture	Percent		TM-22	Twice per year	16	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.6	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	110	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	7	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<1 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.013	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	359	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.2	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.12	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	3.1	Not applicable		

Monitoring Date: 27 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
8	Stack associated with LNG Vaporiser (H-501a)	Carbon dioxide	Percent		TM-24	Twice per year	8.4	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.33	Not applicable
		Moisture	Percent		TM-22	Twice per year	16	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.7	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	130	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	5.9	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<2 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.051	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	366	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	6.4	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.41	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	3.9	Not applicable		

Monitoring Date: 15 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
10	Stack associated with LNG Vaporiser (H-501b)	Carbon dioxide	Percent		TM-24	Twice per year	9.2	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.33	Not applicable
		Moisture	Percent		TM-22	Twice per year	18	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.8	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	130	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	4.4	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<1 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.81	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	358	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.1	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.052	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	3.1	Not applicable		

Monitoring Date: 27 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
10	Stack associated with LNG Vaporiser (H-501b)	Carbon dioxide	Percent		TM-24	Twice per year	9.5	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.33	Not applicable
		Moisture	Percent		TM-22	Twice per year	16	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.8	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	150	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	4	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<2 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.038	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	362	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	4.5	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.049	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	2.7	Not applicable		

Monitoring Date: 15 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
11	Stack associated with LNG Vaporiser (H-501c)	Carbon dioxide	Percent		TM-24	Twice per year	8.3	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.32	Not applicable
		Moisture	Percent		TM-22	Twice per year	19	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.7	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	130	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	6	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<2 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.053	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	359	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.1	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.023	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	3	Not applicable		

Monitoring Date: 28 June 2017

Monitoring Point	Description	Pollutant	Units of measure	Oxygen correction	Sampling method	Monitoring frequency required by licence	Average Concentration	Concentration limit
11	Stack associated with LNG Vaporiser (H-501c)	Carbon dioxide	Percent		TM-24	Twice per year	8.2	Not applicable
		Carbon monoxide	Milligrams per cubic metre	3%	TM-32	Twice per year	<2	125
		Dry gas density	Kilograms per cubic metre		TM-23	Twice per year	1.32	Not applicable
		Moisture	Percent		TM-22	Twice per year	16	Not applicable
		Molecular weight of stack gases	Grams per gram mole		TM-23	Twice per year	29.7	Not applicable
		Nitrogen Oxides (as NO ₂ equivalent)	Milligrams per cubic metre		TM-11	Twice per year	130	190
		Oxygen (O ₂)	Percent		TM-25	Twice per year	6.3	Not applicable
		Solid Particles	Micrograms per cubic metre		TM-15	Twice per year	<1 (mg/m ³)	40
		Sulfuric acid mist and sulphur trioxide (as SO ₃)	Milligrams per cubic metre		TM-3	Twice per year	0.032	5
		Sulphur dioxide	Milligrams per cubic metre		TM-4	Twice per year	<5	Not applicable
		Temperature	Kelvin		TM-2	Twice per year	360	Not applicable
		Velocity	Metres per second		TM-2	Twice per year	5.2	Not applicable
		Volatile organic compounds	Milligrams per cubic metre	3%	OM-2	Twice per year	0.39	20
Volumetric flowrate	Cubic metres per second		TM-2	Twice per year	3.1	Not applicable		