MSM MILLING – BIOMASS BOILER (Pt. 3) 6-MONTHLY COMPLIANCE EMISSIONS TESTING REPORT

Project ID: 17203

18/09/2025

Release: R0

Prepared For:

MSM MILLING - MANILDRA

Assured Environmental

DOCUMENT CONTROL PAGE

Project Title: MSM MILLING – BIOMASS BOILER (Pt. 3) 6-MONTHLY COMPLIANCE EMISSIONS TESTING REPORT

Project Reference ID: 17203

Report Prepared by:

Assured Environmental
Unit 7, 142 Tennyson Memorial Avenue
Tennyson, QLD, 4105
ABN: 87 604 851 078

Report Prepared for:

MSM Milling- Manildra
Dederang Street
Manildra NSW 2865

Author: David Arbuckle

Reviewer: Jay Weber

Table 1: History of Revisions

Revision	Date	Issued to	Changes
R0	18/09/2025	Kaushal Pathirana	Initial release

ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025 (TESTING)

The results of the tests, calibrations and/or measurements included in this document is traceable to Australian/national standards.

NATA
WORLD RECOGNISED ACCREDITATION
NATA ID: 19703

DISCLAIMER

Assured Environmental acts in all professional matters as a faithful advisor to the Client and exercises all reasonable skill and care in the provision of its professional services.

Reports are commissioned by and prepared for the exclusive use of the Client. They are subject to and issued in accordance with the agreement between the Client and Assured Environmental. Assured Environmental is not responsible for any liability and accepts no responsibility whatsoever arising from the misapplication or misinterpretation by third parties of the contents of its reports.

Except where expressly stated, Assured Environmental does not attempt to verify the accuracy, validity or comprehensiveness of any information supplied to Assured Environmental for its reports.

Reports cannot be copied or reproduced in whole or part for any purpose without the prior written agreement of Assured Environmental.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Assured Environmental is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

EXECUTIVE SUMMARY

The objective of this project was to measure stack emissions from the MSM Milling boiler located at the Manildra facility in New South Wales. Measurements were performed on the boiler stack release point, identified as EPA **Identification Number 3** (**Biomass Boiler Stack**) in EPL number 13228. The plant was operating under normal conditions at the time of sampling. Further operation details are shown in Section 2.3 of this report.

All results are presented at normalised conditions (dry, 273K and 101.325 kPa) with applicable corrections for oxygen reference conditions where stated.

Table 2: Summary of Emissions - Biomass Boiler Stack

Release Point Parameter	Unit of Measure		Average	License Limit	Compliance Status
Site	-		Manildra	-	-
Sample location	-		Boiler stack	-	-
Date of testing	dd-mm-yyyy		27/08/2025	-	-
Start time	hh:mm		12:05	-	-
Finish Time	hh:mm		16:27	-	-
Average stack temperature	°C		132	-	-
Average stack gas water vapour content	%-vol		11.8	-	-
Average carbon dioxide content	%-vol		10.1	-	-
Average oxygen content	%-vol		9.54	-	-
Dry gas density	kg/Nm^3		1.34	-	-
Dry gas molecular weight	g/g-mole		30.0	-	-
Sample volume (dry gas meter)	Nm^3		0.467	-	-
Exhaust Velocity	m/sec		9.67	-	-
Dry standard stack flow rate	Nm^3/min		77.2	-	-
Total Solid Particulate Concentration at 7 % O2	mg/Nm^3	<	2.35	50	PASS
SO2 Concentration at 7 % O2	mg/Nm^3	<	3.58	-	-
NOx Concentration at 7 % O2	mg/Nm^3		159	500	PASS
Cadmium (Cd) Concentration at 7 % O2	mg/Nm^3		0.00850	0.2	PASS
Mercury (Hg) Concentration at 7 % O2	mg/Nm^3		0.000118	0.2	PASS
Type 1 & 2 substances combined at 7 % O2	mg/Nm^3		0.0254	1	PASS
HF Concentration at 7 % O2	mg/Nm^3	<	0.23	-	-
HCl Concentration at 7 % O2	mg/Nm^3	<	2.30	100	PASS
F Concentration at 7 % O2	mg/Nm^3	<	1.18	50	PASS
Chlorine (Cl2) Concentration at 7 % O2	mg/Nm^3	<	2.30	200	PASS
Hydrogen Sulfide Concentration at 7 % O2	mg/Nm^3	<	2.27	5	PASS
Sulfuric Acid Mist (as 'H2SO4') Concentration at 7 % O2	mg/Nm^3	<	2.05	100	PASS
TVOC Concentration at 7 % O2	mg/Nm^3		0.95	40	PASS

Where more than one measurement is performed for the one parameter, the result presented is the average of all measurements. Individual sample results are presented in the calculation of results section at the end of this report.

Based on the comparison presented, the results of the monitoring undertaken has demonstrated compliance with the release limits provided in the site EA for all parameters tested. *The decision rule used is based on values obtained during testing without regard to uncertainty limits.*

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1.1 Scope of Assessment

Assured Environmental (AE) was appointed by MSM Milling Pty Ltd to sample and analyse source emissions from the licenced biomass boiler at their facility in Manildra, New South Wales. Sampling was conducted by AE on the 27th of August 2025.

AE was responsible for the collection and analysis of all samples unless otherwise indicated. All collected samples were recovered and stored in the appropriate manner until their return to the laboratory where the samples were prepared and analysed according to the appropriate methodology.

2 METHODOLOGY

2.1 Sampling Methodology

All sampling and analysis were carried out in accordance with the listed requirements in Table 3. Any sampling-specific comments have been documented where required.

Table 3: Test Methods

Parameter	Test Method	NSW Test Method	UOM	Reference Conditions	Oxygen correction
Selection of sample location	AS4323.1	TM-1	N/A	N/A	N/A
Temperature & velocity	USEPA Method 2	TM-2	°C & m/s	stack	N/A
Stack gas density (O_2 & CO_2)	USEPA Method 3A	TM-23	kg/m$_3$	dry, 273K, 1 atm	N/A
Stack gas moisture content	USEPA Method 4	TM-22	%v/v	dry, 273K, 1 atm	N/A
Solid particles (Total)	AS 4323.2	TM-15	mg/m^3	dry, 273K, 1 atm	7%
Nitrogen oxides (NOx)	USEPA Method 7E	TM-11	mg/m^3	dry, 273K, 1 atm	7%
Sulfuric acid mist & sulfur trioxide (as SO_3)	USEPA Method 8	TM-3	mg/m^3	dry, 273K, 1 atm	7%
Hydrogen sulfide (H_2S)	USEPA Method 11	TM-5	mg/m^3	dry, 273K, 1 atm	7%
Fluorine (F_2)	USEPA Method 13	TM-9	mg/m^3	dry, 273K, 1 atm	7%
Chlorine (Cl_2)	USEPA Method 26A	TM-7	mg/m^3	dry, 273K, 1 atm	7%
Hydrogen chloride (HCl)	USEPA Method 26A	TM-8	mg/m^3	dry, 273K, 1 atm	7%
Type 1 & Type 2 substances in aggregate	USEPA Method 29	TM-12, 13, 14	mg/m^3	dry, 273K, 1 atm	7%
Cadmium (Cd)	USEPA Method 29	TM-12, 13, 14	mg/m^3	dry, 273K, 1 atm	7%
Mercury (Hg)	USEPA Method 29	TM-12, 13, 14	mg/m^3	dry, 273K, 1 atm	7%
TVOCs [a)]	USEPA Method 18[b)]	TM-34	mg/m^3	dry, 273K, 1 atm	7%

a) Total volatile organic compounds (TVOCs), such as n-propane.
b) USEPA Method 18 tube method.

Table 4: Analysis Notes

Note	Company	Work performed	NATA ID	Report Number
1	Assured Environmental Pty Ltd	Sampling & analysis	19703	17203
2	Enviro Lab Services	Analysis	2901	389701-[R00]

Table 5: Method Specific Notes

Note	Comment
A	Total heavy metals are reported as sum of all metal's species (type 1 and type 2 substances) found above the limit of detection (positive result), otherwise referred to as the lower bound result. Those metals found below the detection limit are not included in the total figure. Individual metals are presented in the results summary section.

Table 6: Heavy Metals Classification (As Per NSW Air Sampling Manual)

Type 1 substances	Type 2 substances
Antimony, Arsenic, Cadmium, Lead & Mercury	Beryllium, Chromium, Cobalt, Manganese, Nickel, Selenium, Tin & Vanadium

2.2 Sampling Locations

Stack emissions monitoring was conducted from EPA Identification Point Number 3 in EPL Number 13228. This is a biomass boiler stack release point for the new boilers onsite. The table below provides a summary of compliance of the sampling location with the requirements of AS4323.1 and Figure 1 and Figure 2 provide photographs of the stack and sampling location respectively. A schematic of the release point and sampling location as required by AS4323.1 is provided as Figure 3.

Table 7: Stack Sample Location Summary

AS4323.1	Sample location	Boiler stack
	Description	Biomass Boiler Stack
	Stack coordinates	UTM 56s:
	Stack Coordinates (North/South) (DD)	-33.18766221098885
	Stack Coordinates (East/West) (DD)	148.69411047548365
	Stack Exit point from ground (m)	18
	Stack Shape	CIRCULAR
	Ideal Sampling Plane Assessment	
	Stack Diameter (m)	0.55
	Stack Cross Section Area (m^2)	0.238
	Distance Upstream - from disturbance (m)	15.00
	Upstream Diameters (D)	27.27
	Distance downstream - from disturbance (m)	3.50
	Downstream diameters (D)	6.36
4.2.2 Table 1	Meets Requirements AS4323.1 Table 1	Yes
	Non- Ideal Sampling Plane Assessment	
	Assessment required?	Yes
	Total traverse point factors	1.0
	Non-conforming Sampling Plane Assessment	
4.2.2(a)	Gas flow in same direction	Yes
4.2.2(b)	Gas flow steady & evenly distributed (cyclonic or swirl <15°)	Yes
4.2.2(c)	Temperature difference between points <10%, and each point <10% of average	Yes
4.2.2(d)	Ratio of highest to lowest differential pressure	1.3
	Ratio highest to lowest velocity	1.1
4.2.2(e)	Minimum differential pressure	5.20
	Gas temperature above dewpoint	Yes
	Sampling Plane Type	
4.2.2, 4.2.3, 4.2.4	Sampling plane type	Ideal
	Number of Sample Points Adopted	
	Port size (mm)	100
	Port Thread Type	Flange
	Number of traverses	2
	Number of points per traverse	4
	Total number of traverse points	8
	Flow & temperature compliance check	Yes

Figure 1: Boiler stack and sampling location

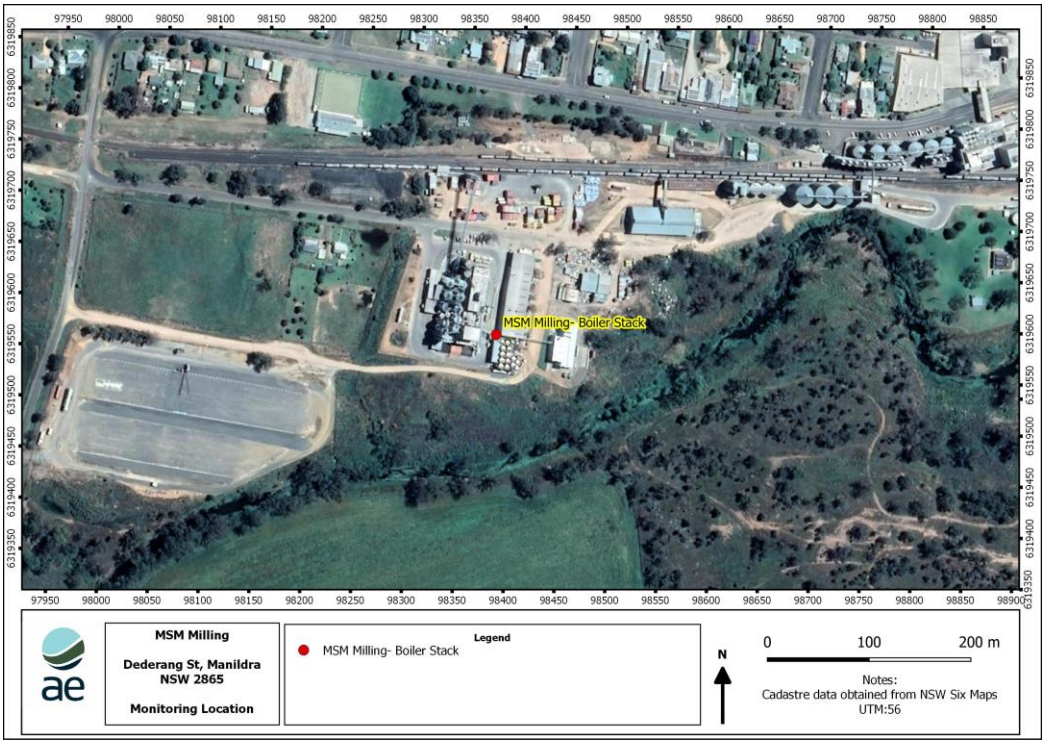

Figure 2: Boiler stack exhaust location

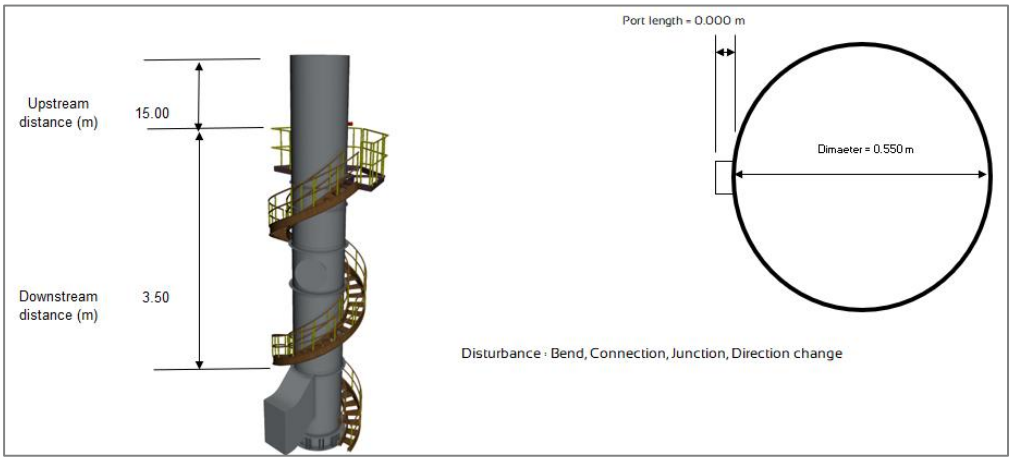

Figure 3: Sample location schematic

2.3 Test Equipment

All equipment used during the testing meets or exceeds all relevant performance standards as required by all jurisdictions. Our isokinetic equipment used for this project was from Apex Instruments. Combustion gases were monitored using an MRU Optima 7 flue gas analyser.

Table 8: Sample Uncertainty

Compound	Range	Lower Detection Limit	Linearity
O_2	1 to 25%	0.01%	+/- 0.8% selected range
SO_2	1 to 5000ppm	1 ppm	+/- 5% selected range
CO	1 to 10,000ppm	1 ppm	+/- 5% selected range
CO_2	1 to 50%	0.01%	+/- 1.3% selected range
NO	1 to 3,000ppm	1 ppm	+/- 5% selected range
NO_2	1 to 500ppm	1 ppm	+/- 5% selected range
Lower Detection Limit	2X Noise at 60sec averaging		
Precision (% of point)	+/- 0.1%, measured with single gases at the span concentration		
Flow Rate	~ 1 litre per minute		
Accuracy	5% of span		
Span Drift	Less than 2% per week (operation time)		
Zero Noise	0.5 ppm RMS (60sec averaging time)		
Response Time	~40 seconds		

The sampling equipment was transported to site by AE. Prior to commencement of sampling, the equipment was set up at the base of the stack and used as a temporary site office and laboratory whilst on site. Sampling consoles, analysers, calibration gases and sample recovery equipment were set up with umbilical's connecting these sampling consoles to the probes and impingers in accordance with the methods.

All equipment used in the sampling program was calibrated in accordance with AE's NATA accredited procedures. Table 9 presents a summary of the calibration status of each of the key equipment used in the sampling program.

Table 9: Calibration Records

Equipment	Description	Equipment ID	Calibration Due Date	Calibration Information
Console/ Gas meter	APEX Digital Console	SN937	17/01/2026	(Y)=1.004 (DH@)=46.98
Pitot	150cm Straight Pitot	SN745	6/02/2026	
Nozzle	Glass nozzle set	SN939	5/11/2025	
Gas Analyser	MRU Optima 7 O2, CO2, CO, NO, NO2, NOx, SO2 (SYD)	SN1056	12/01/2026	
Thermocouple	K type Thermocouple (PN109)	TN171	13/01/2027	
SKC Pump	SKC AirCheck Touch Pump	SN1075	15/05/2026	

3 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

3.1 Overview

Assured Environmental operates within a quality system based upon the requirements of ISO17025.Our quality system defines specific procedures and methodologies to ensure any project undertaken by Assured Environmental is conducted with the highest level of quality given the specific confines of each project. The overall objective of our QA/QC procedures is to representatively sample and accurately analyse components in the gas streams and therefore report valid measurements of emission concentrations.

To ensure representativeness of field work, our quality procedures target:

1. Correct sampling locations
2. Sample time
3. Frequency of samples and
4. Method selection & adherence

To ensure representativeness of lab work, our quality procedures target:

1. Sample preservation
2. Chain of custody (COC)
3. Sample preparation and
4. Analytical techniques

Assured Environmental maintains strict quality assurance throughout all its sampling programs, covering on-site 'field work' and the analytical phase of our projects. Our QA program covers the calibration of all sampling and analytical apparatus where applicable and the use of spikes, replicate sample and reference standards. The test methodologies used for this project are outlined in the methods section of this document. Field test data has been recorded and calculated using direct entry into Microsoft Excel spreadsheets following the procedures of the appropriate test methods. Determination of emission concentrations has been performed using the same Microsoft Excel spreadsheets which are partially supplied as an attachment to this report. More detailed information can be supplied upon request.

QA/QC checks for this project will use validation techniques and criteria appropriate to the type of data and the purpose of the measurement to approve the test report. Records of all data will be maintained. Complete chain of custody (COC) procedures have been followed to document the entire custodial history of each sample. The COC forms also served as a laboratory sheet detailing sample ID and analysis requirements.

Table 10: Sampling Data QA/QC Checklist

Sampling Data QA/QC Checklist	Comment
Use of appropriate test methods	Yes
'Normal' operation of the process being tested	Yes – as instructed by client
Use of properly operating and calibrated test equipment	Yes
Use of high purity reagents	Yes
Performance of leak checks post sample (at least)	Yes

Table 11: Laboratory Data QA/QC Checklist

Laboratory Data QA/QC Checklist	Comment
Use of appropriate analytical methods	Yes
Use of properly operating and calibrated analytical equipment	Yes
Precision and accuracy comparable to that achieved in similar projects	Yes
Accurate reporting	Yes

3.2 Measurement Uncertainty

There is an inherent uncertainty associated with any scientific measurement, including stack emissions monitoring. The measurement uncertainty can be controlled with strict adherence to the reference methodology along with utilising appropriate calibration standards with corresponding acceptable uncertainty reports.

Many source sampling methods do not outline exact procedures for establishing direct measurement uncertainty. In the absence of a defined procedure, the uncertainty budgets presented are based on estimations using ISO-GUM method.

Each individual source and test may have a unique associated uncertainty assigned, due to factors such as the stack sample location in relation to the positioning requirements of AS4323.1, stack temperature, water vapour content and sample analysis.

The table below outlines the estimated uncertainties associate with reports presented within this report

Table 12: Sample Uncertainty

Parameter	Reference method	Uncertainty ± %	Coverage factor	Confidence coefficient %
Velocity	USEPA Method 2	3	2	95
Temperature	USEPA Method 2	3	2	95
Moisture content	USEPA Method 4	4	2	95
Oxygen	USEPA Method 3A	7	2	95
Particulate matter	AS 4323.2	8	2	95
Combustion gases	USEPA Method 6C, 7E & 10	7	2	95
VOCs	USEPA Method 18	39	2	95
Metals	USEPA Method 29	26	2	95
Hydrogen Chloride	USEPA Method 26A	21	2	95
Fluorine	USEPA Method 13	20	2	95
Chlorine	USEPA Method 26A	20	2	95
SO_3 (as H_2SO_4 mist)	USEPA Method 8	31	2	95
H_2S	USEPA Method 11	30	2	95

4 RESULTS SUMMARY

The results of the measurements are presented below along with other pertinent data associated with the tests. Refer to the accompanying spreadsheet for more detail.

Table 13: Sample Data Summary

Source Data									
Client			MSM Milling	MSM Milling	MSM Milling	MSM Milling	MSM Milling	MSM Milling	MSM Milling
Site			Manildra	Manildra	Manildra	Manildra	Manildra	Manildra	Manildra
Sample Point			Boiler stack	Boiler stack	Boiler stack	Boiler stack	Boiler stack	Boiler stack	Boiler stack
Reference Method			USEPA M8 - ISOKINETIC	USEPA M11 - CONSTANT FLOW	USEPA M13B - ISOKINETIC	USEPA M18 - CONSTANT FLOW	USEPA M26 - CONSTANT FLOW	USEPA M29 - ISOKINETIC	USEPA M18 - CONSTANT FLOW
Test Parameters			SOx	H2S	Fl	VOCs	HCl,HF,HBr,(NH3)/Br2,Cl2	Metals	VOCs
Process conditions			See Process screen shot	See Process screen shot	See Process screen shot	See Process screen shot	See Process screen shot	See Process screen shot	See Process screen shot
Historical Data & Hardware Information - Manual Sample									
Run Start Date		dd-mm-yyyy	27/08/2025	27/08/2025	27/08/2025	27/08/2025	27/08/2025	27/08/2025	27/08/2025
Project ID			17203	17203	17203	17203	17203	17203	17203
Run ID			-1	-2	-3	-4	-5	-6	-11
Run Start Time	Ti	hh:mm	15:25	12:05	14:01	14:05	15:27	12:06	8:50
Run Stop Time	Tf	hh:mm	16:08	13:05	15:04	15:05	16:27	13:13	9:50
Positioning compliance check with AS4323.1			Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal
Flow & temperature compliance check with AS4323.1			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Traverse pt factors; up, down, total & trav pts			1 , 1 , 1 , 8	1 , 1 , 1 , 8	1 , 1 , 1 , 8	1 , 1 , 1 , 8	1 , 1 , 1 , 8	1 , 1 , 1 , 8	1 , 1 , 1 , 8
Console Serial Number			SN937	SN937	SN937	SN937	SN937	SN937	SN937
Meter Calibration Factor	(Y)		1.004	1.004	1.004	1.004	1.004	1.004	1.004
Orifice Coefficient		(DH@)	46.98	N/A	46.98	N/A	N/A	46.98	N/A
Pitot Tube Coefficient	(Cp)		0.84	0.84	0.84	0.84	0.84	0.84	0.84
Actual Nozzle Diameter	(Dna)	mm	7.81	N/A	7.81	N/A	N/A	7.81	N/A
Stack Test Data									
Initial Meter Volume	(Vm)i	m^3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Final Meter Volume	(Vm)f	m^3	0.6510	0.0612	1.1620	0.0307	0.0580	1.1980	0.0312
Actual Sampling Time	(Q)	minutes	40	64	64	64	40	64	56
Average Meter Temperature	(tm)avg	°C	18.50	9.92	22.40	11.70	11.90	17.50	9.33
Average Stack Temperature	(ts)avg	°C	128.00	132.00	135.00	135.00	130.00	132.00	211.00
Barometric Pressure	(Pb)	mb	957	953	957	957	957	953	961
Stack Static Pressure	(Pstatic)	mm H2O	-2.8	-3	-2.8	-2.8	-2.8	-3	-3.5
Absolute Stack Pressure	(Ps)	mb	956	952	956	956	956	952	960
Sample Volumes									
Actual Meter Volume	(Vm)	m^3	0.6536	0.0615	1.1667	0.0308	0.0582	1.2028	0.0313
Standard Meter Volume	(Vm)std	Nm^3	0.5795	0.0558	1.0217	0.0279	0.0527	1.0666	0.0287
Standard Meter Volume - referenced	at 7%O2	Nm^3	0.4800	0.0441	0.8460	0.0237	0.0436	0.8530	0.0186
Standard Meter Volume - referenced	at 10%O2	Nm^3	0.6120	0.0563	1.0800	0.0302	0.0556	1.0900	0.0237
Standard Meter Volume - referenced	at 12%CO2	Nm^3	0 0.4920	0 0.0462	0 0.8710	0 0.0237	0 0.0447	0 0.8910	0 0.0138
Moisture Content Data									
Impingers 1-3 Water Volume Gain	(Vn)	ml	56.0	4.0	111.0	3.0	4.0	78.0	1.0
Impinger 4 Silica Gel Weight Gain	(Wn)	g	1.10	2.00	4.60	#NUM!	1.00	10.40	0.50
Total Water Volume Collected	(Vlc)	ml	57.1	6.0	116.0	3.0	5.0	88.4	1.5
Water vapour concentration	(Bws(calc))	%	11.60	12.50	13.10	12.50	11.20	9.95	6.51
Stack Gas Density Analysis Data									
Carbon Dioxide Percentage	(%CO2)	%	10.2	9.95	10.2	10.2	10.2	10.0	5.75
Oxygen Percentage	(%O2)	%	9.39	9.90	9.39	9.40	9.40	9.78	11.9
Carbon Monoxide Percentage	(%CO)	%	0.000588	0.00428	0.00558	0.00526	0.000589	0.00449	0.000100
Nitrogen Percentage	(%N2)	%	80.4	80.1	80.4	80.7	80.4	80.2	82.3
Dry Gas Molecular Weight	(Md)	kg/Nm^3	1.34	1.34	1.34	1.34	1.34	1.34	1.31
Dry Gas Molecular Weight	(Md)	g/g-mole	30.0	30.0	30.0	30.0	30.0	30.0	29.4
Wet Stack Gas Molecular Weight	(Ms)	g/g-mole	28.6	28.5	28.4	28.5	28.7	28.8	28.7
Volumetric Flow Rate Data (at Sample Plane)									
Average Stack Gas Velocity	(vs)	m/sec	8.63	10.3	9.97	9.97	8.94	10.2	3.77
Stack Diameter	Ds	m	0.550	0.550	0.550	0.550	0.550	0.550	0.250
Stack Cross-Sectional Area	(As)	m^2	0.238	0.238	0.238	0.238	0.238	0.238	0.0491
Upstream distance (from disturbance)	B	m	15.0	15.0	15.0	15.0	15.0	15.0	6.00
Downstream distance (from disturbance)	A	m	3.50	3.50	3.50	3.50	3.50	3.50	6.00
Actual Stack Flow Rate	(Qaw)	m^3/min	123.	147.	142.	142.	127.	146.	11.1
Wet Standard Stack Flow Rate	(Qsw)	Nm^3/min-wet	79.0	92.8	89.9	89.8	81.5	92.3	5.93
Dry Standard Stack Flow Rate	(Qsd)	Nm^3/min-dry	69.8	81.2	78.1	78.5	72.3	83.1	5.55
Percent of Isokinetic Rate	(I)	%	103.		101.			99.4	
Particulate Matter (PM) Concentration									
Total Mass of Particulates	(mn)	g						< 0.00200	
Stack PM Concentration	(cs)	mg/Nm^3						< 1.88	
Stack PM Concentration at 7 % O2	(cs)	mg/Nm^3						< 2.34	
Particulate Emission Rate	(E)	g/min						< 0.156	
Instrumental Analyser - Historical Data & Hardware Information									
Analyser serial number, make & model		value	SN1056	SN1056	SN1056	SN1056	SN1056	SN1056	SN1056
Analyser Run Start Time	Ti	hh:mm	0.647	0.504	0.584	0.587	0.647	0.507	0.369
Analyser Run Stop Time	Tf	hh:mm	0.686	0.533	0.622	0.622	0.685	0.533	0.391
Analyser Total Sampling Time	(Q)	hh:min	0.0389	0.0299	0.0375	0.0354	0.0382	0.0257	0.0225
Instrumental Analyser Raw Data Averages									
Sulfur Dioxide	(SO2)	ppm						< 1.00	
Oxides of Nitrogen	(NOx)	ppm						61.7	
Carbon Monoxide	(CO)	ppm	5.88	42.8	55.8	52.6	5.89	44.9	< 1.00
Average Sulphur Dioxide (USEPA Method 6C - instrumental analyser)									
Sulfur Dioxide (SO2)	(Conc)	mg/Nm^3						< 2.86	
Sulfur Dioxide at 7 % O2	(Conc)	mg/Nm^3						< 3.57	
Sulfur Dioxide (SO2)	(E)	g/min						< 0.238	
Average Oxides of Nitrogen (USEPA Method 7E - instrumental analyser)									
Oxides of Nitrogen (NOx as NO2)	(Conc)	mg/Nm^3						127.	
Oxides of Nitrogen at 7 % O2	(Conc)	mg/Nm^3						158.	
Oxides of Nitrogen (NOx as NO2)	(E)	g/min						10.5	
Average Carbon Monoxide (USEPA Method 10 - instrumental analyser)									
Carbon Monoxide (CO)	(Conc)	mg/Nm^3	7.35	53.5	69.8	65.7	7.37	56.2	< 1.25
Carbon Monoxide at 7 % O2	(Conc)	mg/Nm^3	8.87	67.6	84.3	79.5	8.90	70.2	< 1.93
Carbon Monoxide (CO)	(E)	g/min	0.513	4.34	5.45	5.16	0.533	4.67	< 0.00694
Heavy Metals (USEPA Method 29)	**NSW Type #**								
Antimony (Sb)	1	$\mu g/Nm^3$						< 5.30	
Arsenic (As)	1	$\mu g/Nm^3$						< 5.30	
Barium (Ba)		$\mu g/Nm^3$						<	
Beryllium (Be)	2	$\mu g/Nm^3$						< 0.400	
Cadmium (Cd)	1	$\mu g/Nm^3$						6.80	
Chromium (Cr)	2	$\mu g/Nm^3$						5.70	
Cobalt (Co)	2	$\mu g/Nm^3$						< 0.470	
Copper (Cu)		$\mu g/Nm^3$							
Lead (Pb)	1	$\mu g/Nm^3$						94.0	
Manganese (Mn)	2	$\mu g/Nm^3$						8.80	
Nickel (Ni)	2	$\mu g/Nm^3$						7.00	
Phosphorus (P)		$\mu g/Nm^3$						<	
Selenium (Se)	2	$\mu g/Nm^3$						< 5.30	
Silver (Ag)		$\mu g/Nm^3$						<	
Thallium (Th)		$\mu g/Nm^3$						<	
Tin (Sn)	2	$\mu g/Nm^3$						< 13.0	
Vanadium (V)	2	$\mu g/Nm^3$						< 6.60	
Zinc (Zn)		$\mu g/Nm^3$							
Mercury (Hg)	1	$\mu g/Nm^3$						0.0940	
OTHER ANALYTES (PLEASE SPECIFIY)									
Hydrogen Fluoride (HF)	(Conc)	mg/Nm^3					< 0.190		
Hydrogen Fluoride (HF) emission rate	(E)	g/min					< 0.0140		
Hydrogen Chloride (HCl)	(Conc)	mg/Nm^3					< 1.90		
HydrogenChloride (HCl) emission rate	(E)	g/min					< 0.140		
Fluoride (F)	(Conc)	mg/Nm^3			< 0.980				
Fluoride (F) emission rate	(E)	g/min			< 0.0760				
Chlorine (Cl_2)	(Conc)	mg/Nm^3					< 1.90		
Chlorine (Cl_2) emission rate	(E)	g/min					< 0.140		
Hydrogen Sulfide	(Conc)	mg/Nm^3		< 1.80					
Hydrogen Sulfide emission rate	(E)	g/min		< 0.150					
Sulfuric Acid Mist (as 'H2SO4')	(Conc)	mg/Nm^3	< 1.70						
Sulfuric Acid Mist (as 'H2SO4') emission rate	(E)	g/min	< 0.120						
TVOC (as propane)	(Conc)	mg/Nm^3				0.790			
TVOC (as propane) emission rate	(E)	g/min				0.0620			
Benzene	(Conc)	mg/Nm^3				< 0.0720			
Benzene emission rate	(E)	g/min				< 0.00560			
Toluene	(Conc)	mg/Nm^3				< 0.180			
Toluene emission rate	(E)	g/min				< 0.0140			
Ethyl Benzene	(Conc)	mg/Nm^3				< 0.180			
Ethyl Benzene emission rate	(E)	g/min				< 0.0140			
m&p xylene	(Conc)	mg/Nm^3				< 0.360			
m&p xylene emission rate	(E)	g/min				< 0.0280			
o xylene	(Conc)	mg/Nm^3				< 0.180			
o xylene emission rate	(E)	g/min				< 0.0140			
Heavy Metals (USEPA Method 29) - TOTAL									
Type 1 Substances	(Conc)	$\mu g/Nm^3$						0 101.0	
Type 2 Substances	(Conc)	$\mu g/Nm^3$						0 21.6	
Type 1 & 2 substances combined	(Conc)	**$\mu g/Nm^3$**						0 **122.0**	

5 RELEVANT EXTRACT FROM NSW EPA LICENCE NO.13228

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Concentration limits

L2.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L2.2 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L2.3 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table\s.

L2.4 Air Concentration Limits

POINT 3

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Solid Particles	milligrams per cubic metre	50	dry, 273K, 101.3kPa	7%	1 hour
Nitrogen Oxides	milligrams per cubic metre	500	dry, 273K, 101.3kPa	7%	1 hour block
Sulfuric acid mist and sulfur trioxide (as SO3)	milligrams per cubic metre	100	dry, 273K, 101.3kPa	7%	1 hour

Section 55 Protection of the Environment Operations Act 1997

Environment Protection Licence

Licence - 13228

Hydrogen Sulfide	milligrams per cubic metre	5	dry, 273K, 101.3kPa	7%	1 hour block
Fluorine	milligrams per cubic metre	50	dry, 273K, 101.3kPa	7%	1 hour
Chlorine	milligrams per cubic metre	200	dry, 273K, 101.3kPa	7%	1 hour block
Hydrogen chloride	milligrams per cubic metre	100	dry, 273K, 101.3kPa	7%	1 hour
Type 1 and Type 2 substances in aggregate	milligrams per cubic metre	1	dry, 273K, 101.3kPa	7%	1 hour
Cadmium	milligrams per cubic metre	0.2	dry, 273K, 101.3kPa	7%	1 hour
Mercury	milligrams per cubic metre	0.2	dry, 273K, 101.3kPa	7%	1 hour
Volatile organic compounds	milligrams per cubic metre	40	dry, 273K, 101.3kPa	7%	1 hour rolling

POINT 10

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
Nitrogen Oxides	milligrams per cubic metre	350	dry, 273K, 101.3kPa	7%	1 hour block
Volatile organic compounds	milligrams per cubic metre	40	dry, 273K, 101.3kPa	7%	1 hour rolling

Note: All plant and equipment must comply with the relevant concentration standards listed in Schedule 2 of the Protection of the Environment Operations (Clean Air) Regulation 2022 if pollutant limits are not specified in the tables above.

Note: The air quality limits listed for point 3 under condition L2.4 will be reviewed following the completion of post-commissioning air monitoring associated with any upgrades to the premises. The review would be intended to ensure emission limits reflect the performance capability of the biomass boiler.

L2.5 Water and/or Land Concentration Limits

Figure 4: Permit extract

GLOSSARY OF TERMS

Abbreviation	Definition
%v/v	percent volume to volume ratio
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
AE	Assured Environmental
Am^3	Gas volume in cubic metres at measured conditions
AS	Australian Standard
BH	Back half of sample train (filter holder and impingers) (referred to during sample recovery)
CARB	California Air Resources Board methods
CEMS	Continuous Emission Monitoring System
CO	Carbon monoxide
CO_2	Carbon dioxide
COC	Chain of custody
CSA	Cross sectional area
dd/mm/yy	day / month / year
DECC	Department of Environment & Climate Change
DP	Discharge point
dscm	dry standard cubic meters
ELS	Envirolab Services
EPA	Environmental Protection Agency
EPL	Environmental Protection Licence
EWP	Elevated work platform
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
g	Grams
g/g mole	gram per gram - mole
H_2O	Water
H_2S	Hydrogen sulphide
H_2SO_4	Sulphuric acid
hh:mm	hours: minutes
ISO17025	ISO for the General requirements for the competence of testing and calibration laboratories
kg	Kilograms
m	Metres
m/sec	metres per second
m^3	actual gas volume in cubic metres as measured
mbar	Millibars
MDL	Method detection limit
mg	Milligrams (10^{-3} grams)
min	Minute
mL	Millilitres
mm	Millimetres
mmH_2O	Millimetres of water
Mole	SI unit that measures the amount of substance
MRU	Gas analyser brand
N/A	Not applicable
NATA	National Association of Testing Authorities
NATO	North Atlantic Treaty Organisation
ng	Nanograms (10^{-9} grams)
NH_3	Ammonia
NM	Non-methane
Nm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NO	Nitrogen monoxide
NO_2	Nitrogen dioxide
NR	Not required on this occasion
NSW	New South Wales
O_2	Oxygen
°C	Degrees Celsius
OH&S	Occupational Health & Safety
OM	Other Method
OSHA	Occupational Safety and Health Act
ou	Odour unit
PAH	Polycyclic Aromatic Hydrocarbon
PM	Particulate matter (total)
PM_{10}	Particles with a diameter of 10 micrometres or less
$PM_{2.5}$	Particles with a diameter of 2.5 micrometres or less
ppb	Parts per billion

Abbreviation	Definition
ppm	Parts per million
PQL	Practical quantitation limit
PSD	Particle size distribution
Q1	Quarter 1
Q2	Quarter 2
Q3	Quarter 3
Q4	Quarter 4
QA	Quality assurance
QC	Quality control
RMS	Root mean square
SCAQMD	South Coast Air Quality Management District
sec	Second
SI	Standards international
Sm^3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value.
SO_2	Sulphur dioxide
SO_3	Sulphur trioxide
SSI	State Significant Infrastructure
STP	Standard temperature and pressure (0°C and 101.3 kPa)
TM	Test Method
TO	USEPA air toxics method
TWA	Time weighted average
USEPA	United States Environmental Protection Authority
UOM	Unit of measurement
UTM	Universal Transverse Mercator
VOC	Volatile organic compound