



SOURCE EMISSIONS MONITORING ROUND 2– CAPRAL SMITHFIELD

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Table 1: History of Revisions

Revisio	Date	Issued to	Changes
RO	4/10/2024	Alida Langlois & Matthew Prickett	Initial Release

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ACCREDITED FOR COMPLIANCE TO ISO/IEC 17025

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

Accreditation number: 19703



EXECUTIVE SUMMARY

Assured Environmental (AE) conducted emissions monitoring at the Capral Limited facility located at Capral Smithfield. Sampling was undertaken from 16 September 2024 during normal operating conditions. The monitoring was undertaken to facilitate the determination of compliance with the release limits specified in the site EA issued by the NSW Environmental Protection Authority (reference: 21542).

Table 2 provides a summary of the monitoring results for three Release Points, along with a comparison of measured emissions with the limits provided by the environmental authority.

Table 2: Executive Summary of Emissions

Analyte	SOURCE	License Limit	Units/Ref Condition	Sample Result	PASS/FAIL
Oxides of Nitrogen (NOx)	Oven 1	30	Dry mg/Nm3	27.4	PASS
Oxides of Nitrogen (NOx)	Oven 2	30	Dry mg/Nm3	24.1	PASS
Oxides of Nitrogen (NOx)	Oven 3 (Log Oven)	30	Dry mg/Nm3	7.5	PASS

*All testing is done during normal operations.

Based on the comparison, the monitoring results have demonstrated compliance with the release limits provided in the site EA for all parameters tested.

Decision rule: The decision rule is based on values obtained during testing without regard to uncertainty limits (listed in Table 7) as per state regulation.



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1 MONITORING PLAN

Assured Environmental Pty Ltd (AE) was appointed by Capral Limited to undertake monitoring of emissions to the atmosphere from their Capral Smithfield facility. All monitoring was undertaken from 16 September 2024.

AE was responsible for the collection and analysis of samples unless otherwise indicated. The samples were recovered and stored appropriately until their return to the laboratory, where they were prepared and analysed according to the methodologies listed in this report.

This test program was conducted to satisfy the conditions listed in the environmental authority issued to the facility by the NSW Environmental Protection Authority (reference: 21542). Table 3 provides a summary of the monitoring undertaken during the sampling program. All testing was conducted under normal operation.

Table 3: Summary of Sampling Undertaken

Pollutant	Units of Measure	NSW EPA Test Method	Reference Method
Travers points	na	TM-1	AS4323.1
Volumetric flowrate	m ³ /sec	TM-2	USEPA M 2
Temperature	Kelvin	TM-2	USEPA M 2
Velocity	m/s	TM-2	USEPA M 2
Stack gas density (O ₂ , CO ₂)	g/g-mol	TM-23, 24, 25	USEPA M 3A
Moisture	percent	TM-22	USEPA M 4
Oxygen	percent	TM-25	USEPA M 3A
Carbon Dioxide	percent	TM-24	USEPA M 3A
Carbon Monoxide	mg/m ³	TM-32	USEPA M 10
Nitrogen Oxides	mg/m ³	TM-11	USEPA M 7E

2 MONITORING METHODOLOGY

2.1 Overview

AE personnel contacted the nominated site representative and confirmed that the plant was operating normally. At this time, all site access permits were arranged, and the client agreed upon the previously prepared draft sampling plan for the day.

The following sections provide a summary of the specific locations utilised and methodologies used for the monitoring.

2.2 Sample Locations

Table 4 provides a description of each of the sampling points utilised for the sampling program. For each sampling point, an assessment of compliance against the requirements of AS4323.1:2021 was undertaken. Based on this analysis, and in accordance with the requirements of the standard, sampling locations are identified as either ideal, non-ideal or non-conforming. Where a sampling plane is identified as non-ideal or non-conforming, no alternative ideal sampling planes representative of the source were available at the facility.

Table 4: Assessment of Compliance with AS4323.1

AS4323.1	Sample location	Oven 1	Oven 2	Oven 3 (Log Oven)
	Description	Oven 1 Stack	Oven 2 Stack	Oven 3 Stack
	Stack coordinates	UTM 56s:	UTM 56s:	UTM 56s:
	Easting	0	0	0
	Southing	0	0	0
	Stack Exit point from ground (m)	6	6	8
	Stack Shape	CIRCULAR	CIRCULAR	CIRCULAR
Ideal Sampling Plane Assessment				
	Stack Diameter (m)	0.46	0.46	0.30
	Stack Cross Section Area (m2)	0.17	0.17	0.07
	Distance to upstream disturbance (m) (from disturbance)	1.20	1.10	1.30
	Upstream Diameters (D)	2.61	2.39	4.33
	Distance to downstream disturbance (m) (from disturbance)	0.73	1.00	6.00
	Downstream diameters (D)	1.59	2.17	20.00
4.2.2 Table 1	Meets Requirements AS4323.1 Table 1	No	No	Yes
Non- Ideal Sampling Plane Assessment				
	Assessment required?	No	No	Yes
	Total traverse point factors	1.2	1.2	1.0
Non-conforming Sampling Plane Assessment				
4.2.2(a)	Gas flow in same direction	Yes	Yes	Yes
4.2.2(b)	Gas flow steady & evenly distributed (cyclonic or swirl <15°)	Yes	Yes	Yes
4.2.2(c)	Temperature difference between points <10%, and each point <10% of average	Yes	Yes	Yes
4.2.2(d)	Ratio of highest to lowest differential pressure & ratio highest to lowest velocity	1.2	1.2	1.4
		1.1	1.1	1.2
4.2.2(e)	Minimum differential pressure	7.11	7.13	5.95
	Gas temperature above dewpoint	Yes	Yes	Yes
Sampling Plane Type				
4.2.2, 4.2.3, 4.2.4	Sampling plane type	Non-conforming	Non-ideal	Ideal
	Alternative sampling plane available?	No	No	-
Number of Sample Points Adopted				
	Port size (mm)	50	50	51
	Port Thread Type	Flange	Flange	Flange
	Number of traverses	1	1	2
	Number of points per traverse	1	6	2
	Total number of traverse points	1	6	4
	Flow & temperature compliance check	Yes	Yes	Yes



Figure 1 Oven 1



Figure 2 Oven 2



Figure 3 Oven 3 Log Oven

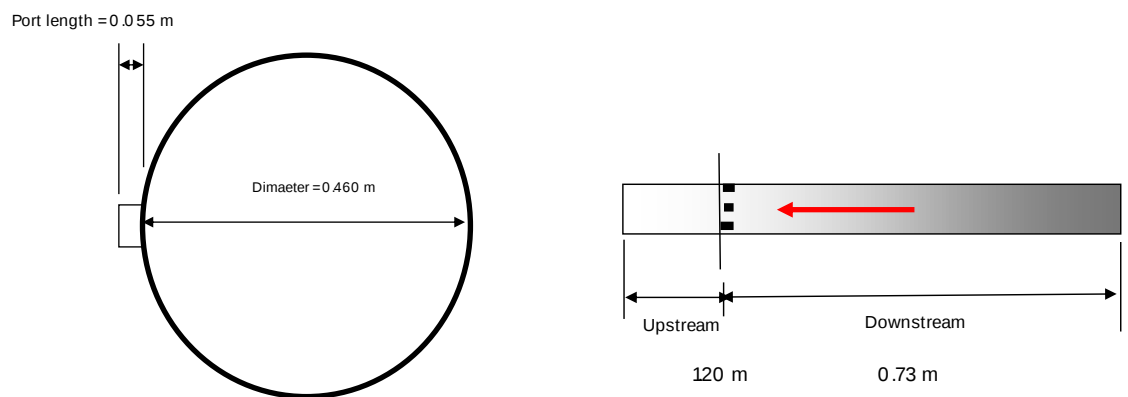


Figure 4 Oven 1 Sampling Schematic

Port length = 0.055 m

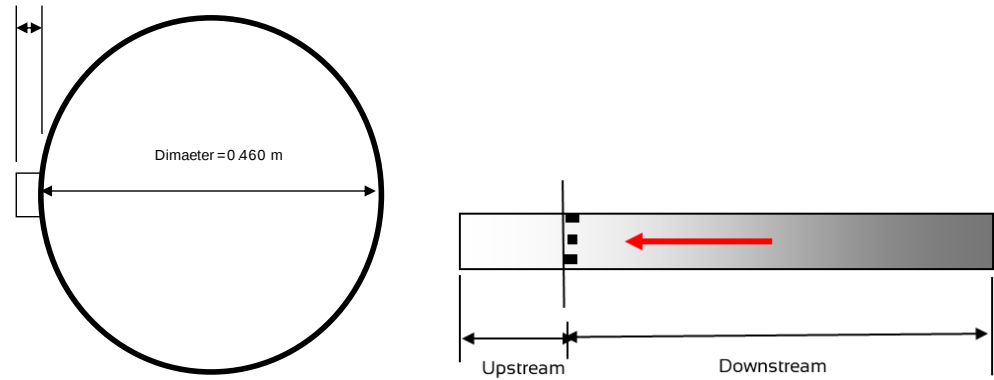


Figure 5 Oven 2 Sampling location Schematic

Port length = 0.055 m

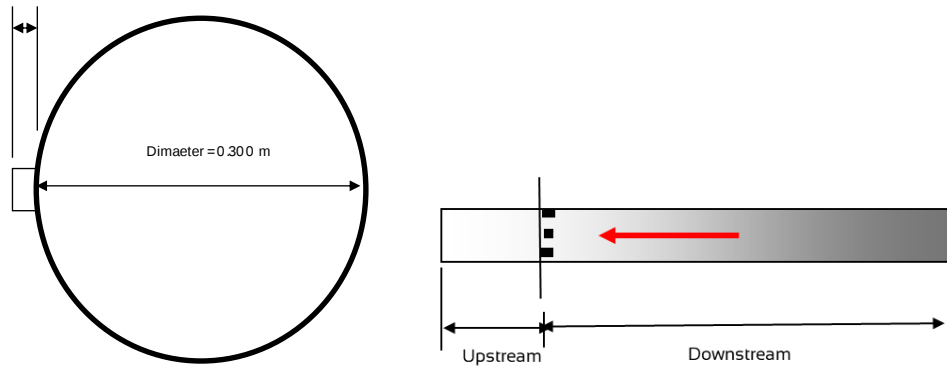


Figure 6 Oven 3 (Log Oven) Sampling location Schematic



2.3 Sampling Methodology

All sampling and analysis were carried out in accordance with the methods listed in Table 5. Any deviations to these approved methods have been documented where applicable. These notes also contain any known upset operational conditions of the plant during testing. Unless stated in the notes all samples taken were representative of the process.

Table 5: Test Methods

Parameter	Reference Sample method	NATA accreditation	Sampling Notes	Analysis By
Sample Plane Criteria	AS4323.1	yes	a	1
Gas Velocity & Temperature	USEPA Method 2	yes	nil	1
Stack Gas Density	USEPA Method 3	yes	nil	1
Oxygen & Carbon Dioxide	USEPA Method 3A	yes	nil	1
Stack Gas Water Vapour	USEPA Method 4	yes	nil	1
Oxides of Nitrogen	USEPA Method 7E	yes	nil	1

a) Sample locations compliant with AS4323.1. Location 1 was non-compliant, Location 2 was non-ideal, and there were no other suitable locations. The total sampling traverse points were increased in line with the method to satisfy the method's requirements.

Table 6: Analysis By

Note	Company	Work performed	NATA ID	Report Number
1	AE	Sampling & analysis	19703	15694

2.4 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 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 vapor content, and sample analysis.

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

Table 7: Sample uncertainty

Parameter	Reference method	Measurement Uncertainty	Coverage factor	Confidence coefficient
Gas velocity	USEPA Method 2	3	2	95
Gas temperature (°K)	USEPA Method 2	3	2	95
Gas water vapour content	USEPA Method 4	4	2	95
Oxygen	USEPA Method 3A	7	2	95
Carbon dioxide	USEPA Method 3A	7	2	95
Carbon monoxide	USEPA Method 10	7	2	95
Oxides of nitrogen	USEPA Method 7E	7	2	95

the % uncertainties are for results $\geq 10 \times$ the reporting limit given in the laboratory analysis; note, as you approach the reporting limit, statistically ("Horwitz trumpet") the estimated MU will increase.

2.5 Calibration Records

The sampling equipment was transported to the site using AE's mobile lab and freight contractors. Before the commencement of sampling, the mobile laboratory 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 umbilicals 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 8 presents a summary of the calibration status of each of the key equipment used in the sampling program.

Table 8: Calibration Records

Equipment	Equipment ID	Calibration Due date	Calibration information
Pitot	PN57	12/12/2025	
Gas Analyser	SN830	04/09/2025	
Thermocouple	TN110	27/07/2025	
Gas Cylinder	379921	19/05/2026	



3 MONITORING RESULTS

3.1 Results – RP1

Table 9: Results table

Release Point Parameter	Unit of Measure	Stack result	Stack result	Stack result
Site		Smithfield	Smithfield	Smithfield
Sample location		Oven 1	Oven 2	Oven 3 (Log Oven)
Run ID		4	5	6
Test parameter		Gases, flow, & Moisture	Gases, flow, & Moisture	Gases, flow, & Moisture
Date of testing	dd-mm-yyyy	16/09/2024	16/09/2024	16/09/2024
Start time	hh:mm	11:43	12:54	9:57
Finish Time	hh:mm	12:43	13:54	10:57
Average stack temperature	K	434	436	538
Average stack temperature	°C	161	163	265
Atmospheric Pressure	kPa	102	102	102
Absolute stack pressure	mbar	1022	1021	1024
Average stack gas water vapour content	%-vol	8.2	8.1	6.3
Average carbon dioxide content	%-vol	2.0	0.7	1.5
Average oxygen content	%-vol	17.2	19.8	18.0
Dry gas density	kg/Nm ³	1.3	1.3	1.3
Dry gas molecular weight	g/gmole	29.0	29.0	29.0
Exhaust Velocity	m/sec	11.8	11.9	12.1
Actual stack volume flow	m ³ /min	118	119	51
Dry standard stack flow rate	Nm ³ /min	69	69	25
Actual stack volume flow	m ³ /sec	2.0	2.0	0.9
Dry standard stack flow rate	Nm ³ /sec	1.1	1.1	0.4
Sulfur dioxide	mg/Nm ³	3.42	5.90	< 2.86
Emission rate	g/min	0.23	0.41	< 0.07
Oxides of nitrogen (NO ₂)	mg/Nm ³	27.3	24.1	7.5
Emission rate	g/min	1.88	1.66	0.18
Carbon monoxide	mg/Nm ³	21.1	22.6	162.4
Emission rate	g/min	1.45	1.56	4.01



4 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

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 has 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.

5 GLOSSARY OF TERMS

The following terms and abbreviations may be used in this report:

Table 10: Definitions

Symbol	Definition
<	The analytes tested for was not detected; the value stated is the reportable limit of detection
Am3	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)
oC	Degrees Celsius
CARB	California Air Resources Board methods
dscm	dry standard cubic meters
FH	Front half of sample train (probe and filter holder) (referred to during sample recovery)
f/ml	Fibres per millilitre
g	Grams
kg	Kilograms
m	Metres
m3	actual gas volume in cubic metres as measured
mbar	Millibars
mg	Milligrams (10 ⁻³ grams)
min	Minute
ml	Millilitres
mmH ₂ O	Millimetres of water
Mole	SI unit that measures the amount of substance
N/A	Not applicable
ng	Nanograms (10 ⁻⁹ grams)
NATO	North Atlantic Treaty Organisation
NIOSH	National institute for occupational safety and health (USA)
Nm3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa)
NMI	National Measurement Institute
NM VOC	Non methane volatile organic compound
NR	Not required on this occasion
OSHA	Occupational Safety and Health Act
OU	Odour unit (ou.m3)



PCDD	Polychlorinated dibenzo-p-dioxin
PCDF	Polychlorinated dibenzofuran
PM	Particulate matter
ppb	Parts per billion
ppm	Parts per million
sec	Second
Sm3	Gas volume in dry cubic metres at standard temperature and pressure (0°C and 101.3 kPa) and corrected to a standardised value (e.g. 15% O2)
STP	Standard temperature and pressure (0°C and 101.3 kPa)
TO	USEPA air toxics method
TWA	Time weighted average
USEPA	United States Environmental Protection Authority



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