Stack Emissions Monitoring Report

Job Reference: JOB-2767

Commissioned by Greencore

Operator Name
Greencore | Old Leake

Operator Address
Old Leake
Boston, Lincolnshire
LN22 9PN

Cura Terrae Primary Contact
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Release Point
EP 3 - Boiler 3

Dates of the Monitoring Campaign
29/04/2026

Report Date | Version Number
15/07/2026 | Version 2

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited West Yorkshire Office Bradford Chamber Business Park, New Lane Bradford, West Yorkshire, BD4 8BX	Tom Arden Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 18 1478 | expires on 13/11/2028	Andy Dykes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 04 500 | expires on 28/08/2026	

Report Contents and Monitoring Objectives

Report Contents

TITLE PAGE

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PART 1: EXECUTIVE SUMMARY
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- Monitoring and Analytical Methods (incorporating Method Deviations if applicable)
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Record of Report Amendments

version	details of the amendment along with the reason for making the amendment
2	Revisited site to obtain velocity, temperature and flowrate measurements

Monitoring Objective

The monitoring objective was to conduct stack emissions monitoring to demonstrate compliance against a set of emission limit values (ELVs) as specified in the Site's Environmental Permit.

Special Requirements

There were no special requirements for this monitoring campaign.

Opinions and Interpretations

Any opinions or interpretations contained within this test report are outside the scope of Cura Terrae's MCERTS / ISO 17025 accreditation.

IMPORTANT NOTE: This version of the monitoring report supersedes any versions that were previously issued.

Part 1: Executive Summary - Monitoring Results Summary

Monitoring Results - Summary

	EXPRESSED AS A CONCENTRATION				EXPRESSED AS A MASS EMISSION					
test parameter	**result**	**uncertainty in result +/-**	**limit** (ELV)	**units**	**result**	**uncertainty in result +/-**	**limit** (ELV)	**units**	**reference conditions**	**accreditation status**
Oxides of Nitrogen (as NO_2)	270	11.5		mg/m^3	887	47.7		g/hr	STP, dry, 3% O_2	MCERTS
Carbon Monoxide	0.47	0.02		mg/m^3	1.5	0.084		g/hr	STP, dry, 3% O_2	MCERTS
Oxygen	5.7	0.19		% v/v					dry	MCERTS
Stack Gas Water Vapour	5.0	0.13		% v/v					actual	MCERTS
Stack Gas Temperature	188			°C					actual	MCERTS
Stack Gas Velocity	15.4	0.16		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	6970	324		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	3285	152.5		m^3/hr					STP, dry, 3% O_2	MCERTS

The stack gas water vapour, temperature, velocity and flow rates in the above table are calculated as an average of all of the results recorded during this monitoring campaign

The uncertainty in the result is reported at a 95% Confidence Interval in the same units as the monitoring result. In practice, this means that 95 times out of 100, the true result will lie within the stated range.

Part 1: Executive Summary - Monitoring Results Further Details

Monitoring Results - Further Details

		EXPRESSED AS A CONCENTRATION				EXPRESSED AS A MASS EMISSION							
test parameter	**run**	**result**	**uncertainty in result +/-**	**limit** (ELV)	**units**	**result**	**uncertainty in result +/-**	**limit** (ELV)	**units**	**sampling date | times**	**run time** (mins)	**H_2O** (% v/v)	**reference conditions**
Oxides of Nitrogen (as NO_2)	R1	270	11.5		mg/m^3	887	47.7		g/hr	29/04/2026 | 13:15 - 14:15	60		STP, dry, 3% O_2
Carbon Monoxide	R1	0.47	0.02		mg/m^3	1.5	0.084		g/hr	29/04/2026 | 13:15 - 14:15	60		STP, dry, 3% O_2
Oxygen		5.7	0.19		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	15.4	0.16		m/s	6970	324		m^3/hr	14/07/2026 | 12:09 - 12:15			actual

Part 1: Executive Summary - Monitoring and Analytical Methods

Monitoring and Analytical Methods

where analysis not required	MONITORING						
test parameter	**laboratory**	**accreditation number**	**technical procedure**	**reference method**	**monitoring status**	**measurement technique & equipment**	**accreditation status**
Oxides of Nitrogen (as NO_2)	CTA	2522	TP-22a	EN 14792	MCERTS	Chemiluminescence using Horiba PG-350E	MCERTS
Carbon Monoxide	CTA	2522	TP-22b	EN 15058	MCERTS	NDIR using Horiba PG-350E	MCERTS
Oxygen	CTA	2522	TP-22d	EN 14789	MCERTS	Paramagnetism using Horiba PG-350E	MCERTS
Velocity & Flow Rate Traverse	CTA	2522	TP-04a	EN 16911-1 | TR 17078	MCERTS	Pitot Tube, Thermocouple & Thermomanometer	MCERTS [D]

Summary of Monitoring Deviations (from Appendix 2)

test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

Part 1: Executive Summary - Monitoring Location

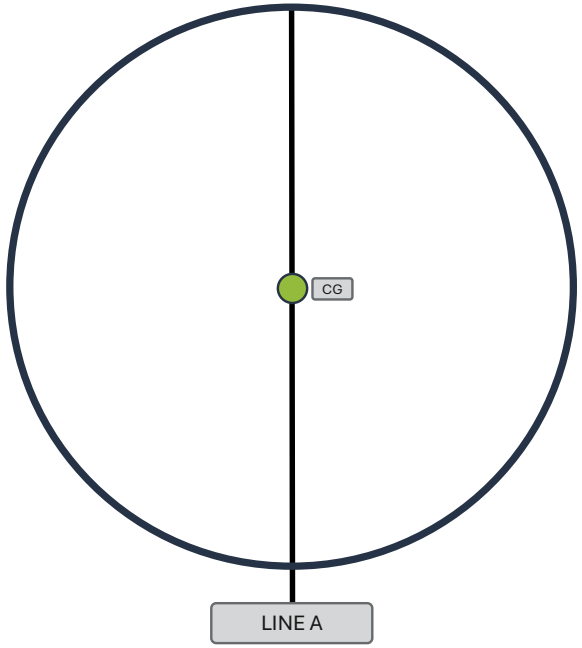
Monitoring Location Photos






Identification of Sampling Points on a Duct Diagram

refer to Appendix 2 - Raw Data to see how the points on this diagram relate to the points used for each test



Part 1: Executive Summary - Duct and Sampling Platform Information

Duct Characteristics | Sampling Ports

parameter	units	value
shape	-	Circular
dimensions	-	Diameter = 0.40 m
area	m^2	0.13
orientation	-	Vertical

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	2
primary sample ports number of sampling lines available	1

summary of all sample ports available
1" BSP

Sampling Location General Information

general information	details
type | location | access	Permanent | Inside | Ladder

CEMS | Abatement Systems

parameter	details
abatement system/s	N/A
CEMS installed on the stack	N/A

Part 1: Executive Summary - Sampling Location and Operating Information

Process Details

process detail	details
plume appearance on day of monitoring	White steam
type of process	Combustion
batch or continuous process	On Demand
fuel type	Natural Gas
feedstock	N/A
typical load / throughput of plant	100% Load Expected
details of any unusual process occurrences	None

Part 2: Supporting Information - Appendix 1: Monitoring Personnel, Analysis Laboratories and Test Equipment Used

Monitoring Personnel

name	position	MCERTS level | number | expiry	MCERTS technical endorsements
Tom Arden	Team Leader	MCERTS Level 2 | MM 18 1478 | 13/11/2028	TE1 TE2 TE3 TE4
Safeyan Siddique	Trainee	MCERTS Trainee | MM 24 1865 | 28/06/2029	-

Analysis Laboratories

laboratory	ISO 17025 accreditation number	laboratory short name	laboratory phone number
Cura Terrae OH and Emissions Testing Limited | West Yorkshire	2522	CTA	01274 738 668

Test Equipment Used

equipment type	A-EQ ID
Source sampling console	
Low flow sampling console	855
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	516
Gasmet DX4000 FTIR	
Gasmet PSS	
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	685
Digital thermomanometer	853
Top pan balance kit	1007

equipment type	A-EQ ID
S-Type pitot	605 | 857
S-Type pitot tip	
Mini S-Type pitot	
L-Type pitot	
Calipers	
Heated head filter	583
Heated tee	
1.5m heated line	
10m heated line	565
20m heated line	575
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	863

equipment type	A-EQ ID
Barometer	737
Timer	858
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	683
Ambient thermocouple	
Stack thermocouple	666
Exit thermocouple	
Condenser thermocouple	
Tubes kit thermocouple	
2-way heater controller	
Air sampling pump	
Analytical balance	1 | 492

Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO_2) | Run 1

Results

reference conditions are: STP, dry, 3% O_2

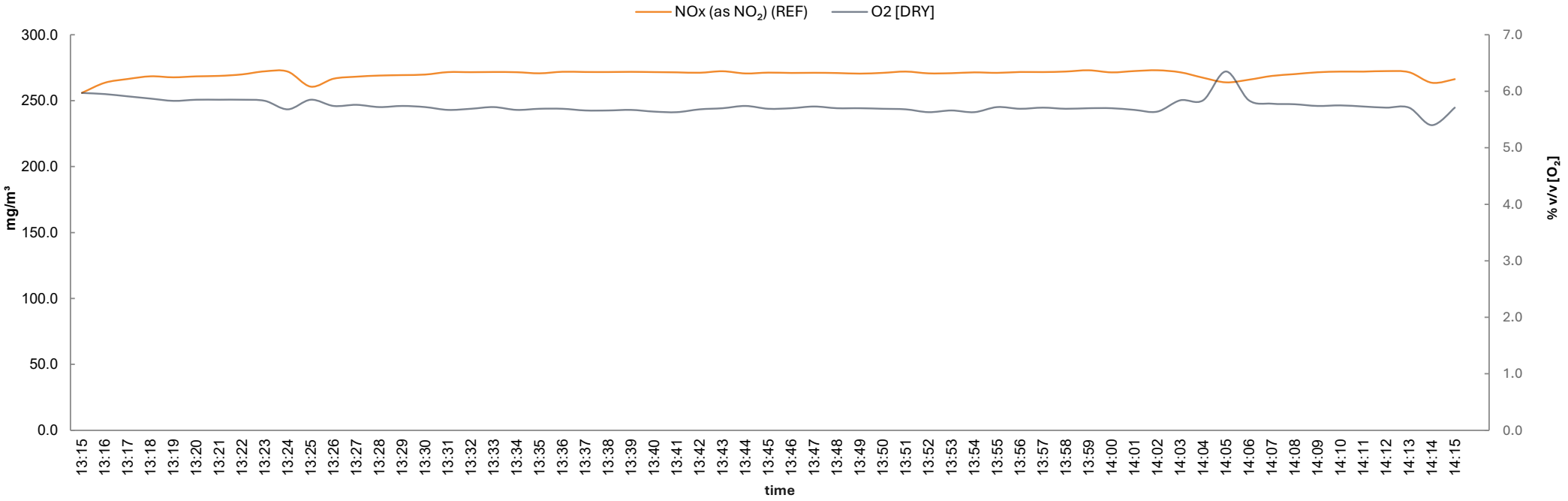
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	270 ± 11.5	g/hr	887 ± 47.7

General Information

parameter	details
sampling start date & time	29/04/2026 13:15
sampling end date & time	29/04/2026 14:15
test time | mins	60
testing team	TA | SS
standard | technical procedure	EN 14792 | TP-22a
analyser type	Horiba PG-350E
heated head & line temperature	180°C

parameter	details
probe material	Stainless Steel
filter size, material & location	Heated Head Filter Element GF | Within Heated Head
number sampling lines available	1
number sampling lines used	1
number sampling points ideal per line	1
number sampling points used per line	1
sampling point IDs	CG

Plot of Emissions Over Time



Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO_2) | Run 1

Analyser Calibration Information with QA checks

where [A] = at analyser, [L] = down sampling line

	pre-test calibration events								post-test calibration events			quality assurance					
CAL ID	date & time	zero [A] [ppm]	span [A] [ppm]	zero [L] [ppm]	span [L] [ppm]	T_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	29/04/26 10:50	0.00	198.50	0.00	199.00	55	0.0	P	29/04/26 14:24	0.00	203.40	0.0	P	2.5	P	±5	19.0

Analyser Calibration Extended Information

CAL ID	performed by	drift corr. applied	log period [s]	CYL ID	CYL conc. [ppm]	CYL expiry	CYL MU [%]	zero gas type	span [CYL] gas type	span target [ppm]	range [ppm]	LOD [ppm]
1	TA	Yes	60	A-CYL-279	198.53	24/03/2029	1.2	Nitrogen 5.2	10l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	198.53	250	0.09

Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO_2) | Run 1

Measurement Uncertainty (MU) Calculations

general information	units	value
emission limit value (ELV) (REF)	mg/m^3	N/A
measured concentration (REF)	mg/m^3	270

MU budget			
parameter	units	min	max
ambient temp	°C	18.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
3.3%

MU factor O_2 correction
0.04

	MU budget input parameters				MU budget		
performance characteristics	symbol	units	value	source	symbol	units	value
repeatability at zero	rz	% of value	0	MCERTS certificate MC130223	U_{rz}	mg/m^3	0
repeatability at span	rs	% of value	0.1	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.27
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	3.1
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0	day of testing	U_{dz}	mg/m^3	0
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0	day of testing	U_{ds}	mg/m^3	0
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.16
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U_p	mg/m^3	0
influence of ambient temperature zero point (/ 35k)	tz	% of value	0	MCERTS certificate MC130223	U_{tz}	mg/m^3	0
influence of ambient temperature span point (/ 35k)	ts	% of value	1.8	MCERTS certificate MC130223	U_{ts}	mg/m^3	0.093
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.42
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.98
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.81
maximum leak	L	% of value	0	day of testing	U_L	mg/m^3	0
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	mg/m^3	1.6
		combined MU with O_2 correction				mg/m^3	5.9
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	11.5
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	4.3
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.4

method and sampling deviations
Sampling was performed in full compliance with the Standard, technical procedure and regulatory requirements.

Part 2: Supporting Information - Appendix 2: Carbon Monoxide | Run 1

Results

reference conditions are: STP, dry, 3% O_2

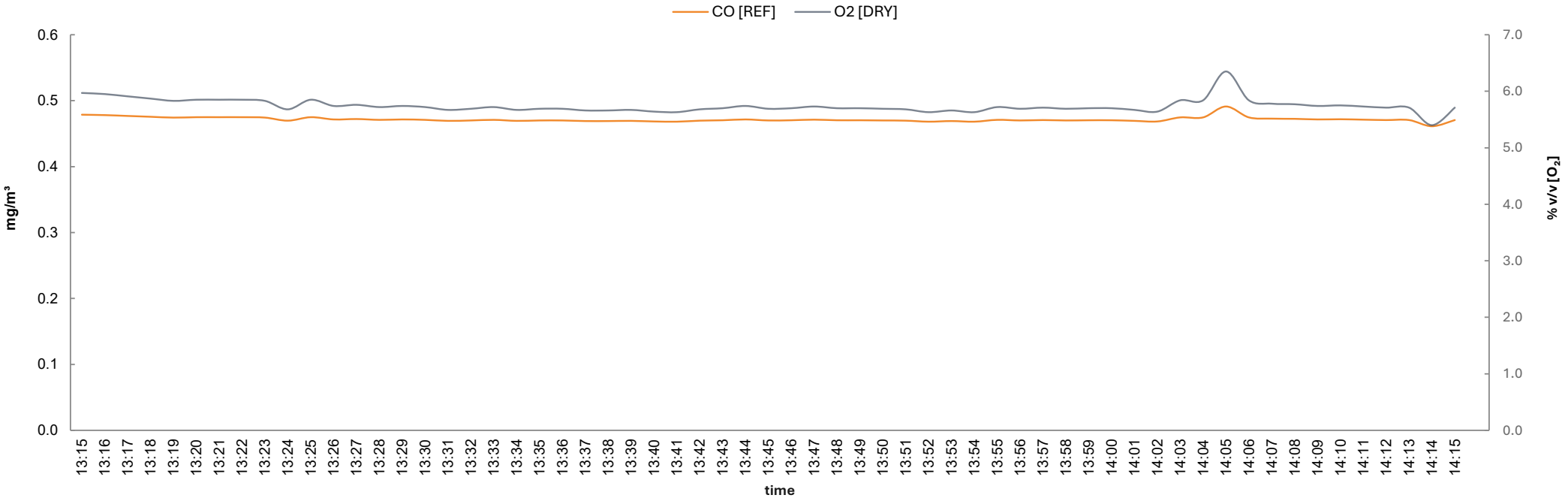
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	0.47 ± 0.02	g/hr	1.5 ± 0.084

General Information

parameter	details
sampling start date & time	29/04/2026 13:15
sampling end date & time	29/04/2026 14:15
test time | mins	60
testing team	TA | SS
standard | technical procedure	EN 15058 | TP-22b
analyser type	Horiba PG-350E
heated head & line temperature	180°C

parameter	details
probe material	Stainless Steel
filter size, material & location	Heated Head Filter Element GF | Within Heated Head
number sampling lines available	1
number sampling lines used	1
number sampling points ideal per line	1
number sampling points used per line	1
sampling point IDs	CG

Plot of Emissions Over Time



Part 2: Supporting Information - Appendix 2: Carbon Monoxide | Run 1

Analyser Calibration Information with QA checks

where [A] = at analyser, [L] = down sampling line

	pre-test calibration events								post-test calibration events			quality assurance					
CAL ID	date & time	zero [A] [ppm]	span [A] [ppm]	zero [L] [ppm]	span [L] [ppm]	T_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	29/04/26 10:50	0.00	165.80	-0.20	165.80	55	0.0	P	29/04/26 14:24	0.10	166.30	0.1	P	0.2	P	±5	19.0

Analyser Calibration Extended Information

CAL ID	performed by	drift corr. applied	log period [s]	CYL ID	CYL conc. [ppm]	CYL expiry	CYL MU [%]	zero gas type	span [CYL] gas type	span target [ppm]	range [ppm]	LOD [ppm]
1	TA	No	60	A-CYL-279	165.79	24/03/2029	1.0	Nitrogen 5.2	10l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	165.79	200	0.32

Part 2: Supporting Information - Appendix 2: Carbon Monoxide | Run 1

Measurement Uncertainty (MU) Calculations

general information	units	value
emission limit value (ELV) (REF)	mg/m^3	N/A
measured concentration (REF)	mg/m^3	0.47

MU budget			
parameter	units	min	max
ambient temp	°C	18.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
3.3%

MU factor O_2 correction
0.04

	MU budget input parameters				MU budget		
performance characteristics	symbol	units	value	source	symbol	units	value
repeatability at zero	rz	% of value	0.1	MCERTS certificate MC130223	U_{rz}	mg/m^3	0.00047
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.00094
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.0054
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.06	day of testing	U_{dz}	mg/m^3	0.00016
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.24	day of testing	U_{ds}	mg/m^3	0.00066
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.00027
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U_p	mg/m^3	0
influence of ambient temperature zero point (/ 35k)	tz	% of value	-0.2	MCERTS certificate MC130223	U_{tz}	mg/m^3	-0.000018
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0.00018
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.00091
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.0013
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.0024
maximum leak	L	% of value	0	day of testing	U_L	mg/m^3	0
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.0023
		combined MU with O_2 correction				mg/m^3	0.01
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.02
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	4.3
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.4

method and sampling deviations
Sampling was performed in full compliance with the Standard, technical procedure and regulatory requirements.

Part 2: Supporting Information - Appendix 2: Oxygen | QA Concurrent Testing

Results

parameter	units	result ± MU (95% CI)
Oxygen	% v/v	5.7 ± 0.19

General Information

parameter	details
sampling start date & time	N/A - Concurrent Testing
sampling end date & time	N/A - Concurrent Testing
testing team	TA | SS

parameter	details
standard | technical procedure	EN 14789 | TP-22d
analyser type	Horiba PG-350E

Analyser Calibration Information with QA checks

where [A] = at analyser, [L] = down sampling line

	pre-test calibration events								post-test calibration events			quality assurance						
CAL ID	date & time	zero [A] [% v/v]	span [A] [% v/v]	zero [L] [% v/v]	span [L] [% v/v]	T_{90} [s]	leak [%]		date & time	zero [A] [% v/v]	span [A] [% v/v]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	29/04/26 10:50	0.00	20.80	0.10	20.70	69	0.5	P	29/04/26 14:24	0.06	20.62	0.3	P	-1.2	P	±5	19.0

Analyser Calibration Extended Information

CAL ID	performed by	drift corr. applied	log period [s]	CYL ID	CYL conc. [% v/v]	CYL expiry	CYL MU [%]	zero gas type	span [CYL] gas type	span target [% v/v]	range [% v/v]	LOD [% v/v]
1	TA	No	60	#N/A	20.90	-	2.0	Nitrogen 5.2	Fresh Air	20.90	25	0.03

Part 2: Supporting Information - Appendix 2: Oxygen | QA Concurrent Testing

Measurement Uncertainty (MU) Calculations

general information	units	value
measured concentration (dry)	% v/v	5.7

MU budget			
parameter	units	min	max
ambient temp	°C	18.0	20.0
voltage	V	90.0	130.0

	MU budget input parameters				MU budget		
performance characteristics	symbol	units	value	source	symbol	units	value
repeatability at zero	rz	% of value	0.02	MCERTS certificate MC130223	U_{rz}	% v/v	0.0011
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0011
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.066
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.34	day of testing	U_{dz}	% v/v	0.011
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.2	day of testing	U_{ds}	% v/v	0.04
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00033
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U_{p}	% v/v	0
influence of ambient temperature zero point (/ 35k)	tz	% of value	-0.4	MCERTS certificate MC130223	U_{tz}	% v/v	-0.00044
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	-0.00016
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.00044
cross sensitivity at zero	iz	% of value	0	MCERTS certificate MC130223	U_{iz}	% v/v	0
cross sensitivity at span	is	% of value	0	MCERTS certificate MC130223	U_{is}	% v/v	0
maximum leak	L	% of value	0.48	day of testing	U_{L}	% v/v	0.016
uncertainty associated with calibration gas	adj	% of value	2	span gas calibration certificate	U_{adj}	% v/v	0.057
		combined MU				% v/v	0.098
		expanded MU 95% CI (k = 1.96)				% v/v	0.19
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.4

method and sampling deviations
Sampling was performed in full compliance with the Standard, technical procedure and regulatory requirements.

Part 2: Supporting Information - Appendix 2: Velocity & Flow Rate Traverse | Run 1

Supporting Information

parameter	units	value
barometric pressure	kPa	100.1
average wet density	kg/m^3	0.752
average stack static pressure	Pa	52.0
pitot tube coefficient, C_p	-	0.821

ND = Not Detected
NM = Not Measured

Line A

static pressure = 52 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.05	94.0	188.0	12.9	< 15
2	0.10	151.0	188.0	16.4	< 15
3	0.30	148.0	188.0	16.2	< 15
4	0.35	147.0	188.0	16.1	< 15

General Information

parameter	details
traverse date	14/07/2026
traverse times | performed by	12:09 - 12:15 | performed by: TA | SS
standard | technical procedure	EN 16911-1 | TR 17078 | TP-04a
device used	S-type Pitot with KIMO MP 210 (500Pa module)

Limit of Detection (LOD) is 1 m/s for this device combination

Quality Assurance

parameter	details
result of pitot stagnation test	Pass
result of pitot leak check (pre)	Pass
result of pitot leak check (post)	Pass
water droplets present	No

Part 2: Supporting Information - Appendix 2: Velocity & Flow Rate Traverse | Run 1

Measurement Uncertainty (MU) Calculations

ND = Not Detected

parameter	units	value
standard uncertainty on the coefficient of the pitot tube	-	0.0015
standard uncertainty associated with the mean local dynamic pressures	Pa	2.3
standard uncertainty associated with the molar mass of the gas	-	0.00003
standard uncertainty associated with the temperature	K	2.4
standard uncertainty associated with the absolute pressure in the duct	Pa	176
standard uncertainty associated with the density of the gas effluent	kg/m^3	0.0041
standard uncertainty associated with the local velocities	m/s	0.14
standard uncertainty associated with the mean velocity	m/s	0.081

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.16
standard uncertainty associated with the mean velocity (95% CI), relative	%	1
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	324
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.6
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	153
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.6

method and sampling deviations