

# Stack Emissions Monitoring Report

Job Reference: JOB-1466

Commissioned by BAE Systems (Operations) Ltd

**Operator Name**

BAE Systems (Operations) Ltd | Warton

**Operator Address**

Warton Aerodrome, Warton  
Preston, Lancashire  
PR4 1AX  
EPR Permit

**Cura Terra Primary Contact**

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**Release Point**

Boiler 2


**Dates of the Monitoring Campaign**

03/04/2025

**Report Date | Version Number**

07/04/2025 | Version 1



Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terra OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Andrew Shipley Senior Team Leader MCERTS Level 2   Endorsements: TE1 TE2 TE3 TE4 MM 13 1243   expires on 30/11/2026	Chris Rhodes Senior Team Leader MCERTS Level 2   Endorsements: TE1 TE2 TE3 TE4 MM 02 117   expires on 18/05/2026	

# Report Contents and Monitoring Objectives

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## Report Contents

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## 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.

# Part 1: Executive Summary - Monitoring Results Summary

## Monitoring Results - Summary

test parameter	EXPRESSED AS A CONCENTRATION				EXPRESSED AS A MASS EMISSION				reference conditions	accreditation status
	result	uncertainty in result +/-	limit (ELV)	units	result	uncertainty in result +/-	limit (ELV)	units		
Oxides of Nitrogen (as NO <sub>2</sub> )	133	5.5	200	mg/m <sup>3</sup>	867	47.2		g/hr	STP, dry, 3% O <sub>2</sub>	MCERTS
Carbon Monoxide	2.5	0.11		mg/m <sup>3</sup>	16.4	0.94		g/hr	STP, dry, 3% O <sub>2</sub>	MCERTS
Oxygen	4.8	0.15		% v/v					dry	MCERTS
Stack Gas Temperature	204			°C					actual	MCERTS
Stack Gas Velocity	16.0	0.21		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	13168	621		m <sup>3</sup> /hr					actual	MCERTS
Stack Gas Flow Rate (REF)	6498	306		m <sup>3</sup> /hr					STP, dry, 3% O <sub>2</sub>	MCERTS

The stack 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

test parameter	run	EXPRESSED AS A CONCENTRATION				EXPRESSED AS A MASS EMISSION				sampling date   times	run time (mins)	H <sub>2</sub> O (% v/v)	reference conditions
		result	uncertainty in result +/-	limit (ELV)	units	result	uncertainty in result +/-	limit (ELV)	units				
Oxides of Nitrogen (as NO <sub>2</sub> )	R1	133	5.5	200	mg/m <sup>3</sup>	867	47.2		g/hr	03/04/2025   11:18 - 11:48	30		STP, dry, 3% O <sub>2</sub>
Carbon Monoxide	R1	2.5	0.11		mg/m <sup>3</sup>	16.4	0.94		g/hr	03/04/2025   11:18 - 11:48	30		STP, dry, 3% O <sub>2</sub>
Oxygen		4.8	0.15		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	16.0	0.21		m/s	13168	621		m <sup>3</sup> /hr	03/04/2025   11:45 - 11:47			actual
Stack Gas Temperature		204			°C								actual
Stack Gas Velocity		16.0	0.21		m/s								actual
Stack Gas Flow Rate (ACTUAL)		13168	621		m <sup>3</sup> /hr								actual
Stack Gas Flow Rate (REF)		6498	306		m <sup>3</sup> /hr								STP, dry, 3% O <sub>2</sub>

The stack 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 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 <sub>2</sub> )	CTA	2522	ETC-SE-10b	EN 14792	MCERTS	Chemiluminescence using Horiba PG-350E	MCERTS
Carbon Monoxide	CTA	2522	ETC-SE-10b	EN 15058	MCERTS	NDIR using Horiba PG-350E	MCERTS
Oxygen	CTA	2522	ETC-SE-10b	EN 14789	MCERTS	Paramagnetism using Horiba PG-350E	MCERTS
Velocity & Flow Rate Traverse	CTA	2522	ETC-SE-24	EN 16911-1   TR 17078	MCERTS	Pitot Tube, Thermocouple & Thermomanometer	MCERTS

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.

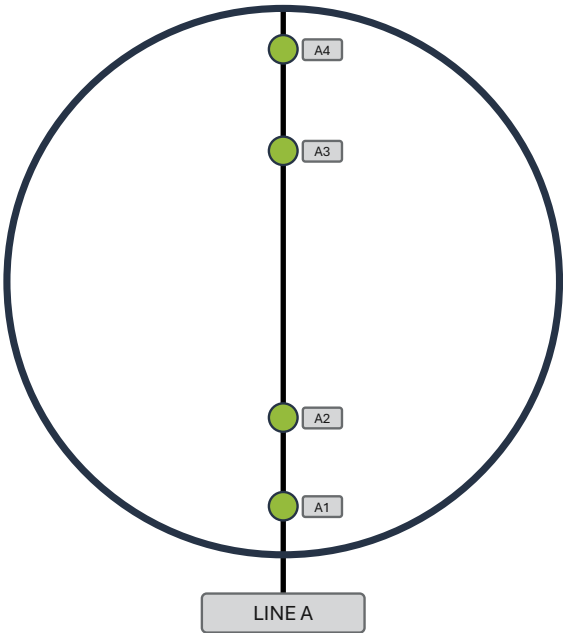
# Part 1: Executive Summary - Monitoring Location

## 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	parameter	value	summary of all sample ports available
shape	-	Circular	primary sample port size	0.5" BSP	0.5" BSP
dimensions	-	Diameter = 0.54 m	primary sample port depth   cm	10	
area	m <sup>2</sup>	0.23	primary sample ports number of sampling lines available	1	
orientation	-	Horizontal			

Sampling Location General Information

general information	details
type   location   access	On the Ground   Outside with shelter available in nearby building   On Ground Level

CEMS | Abatement Systems

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

Sampling Plane Validation Criteria Summary (EN 15259) from Stack Traverse/s

criteria in EN 15259	units	value	allowed	compliant
lowest differential pressure	Pa	137.0	> 5 Pa	Yes
lowest traverse velocity	m/s	15.8	-	-
highest traverse velocity	m/s	16.1	-	-
mean traverse velocity	m/s	16.0	-	-
ratio traverse velocities	: 1	1.02	< 3 : 1	Yes
angle of swirl compliance	°	< 15	< 15°	Yes
no local negative flow	-	Yes	-	Yes

# Part 1: Executive Summary - Sampling Location and Operating Information

## Process Details

process detail	details
plume appearance on day of monitoring	No Visible Plume
type of process	Combustion
batch or continuous process	On Demand
fuel type	Natural Gas
feedstock	N/A
typical load / throughput of plant	100% Capacity
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
Andrew Shipley	Senior Team Leader	MCERTS Level 2   MM 13 1243   30/11/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1   MM 23 1823   22/01/2029	-

### Analysis Laboratories

laboratory	ISO 17025 accreditation number	laboratory short name	laboratory phone number
Cura Terrae OH and Emissions Testing Limited   North West	2522	CTA	0800 970 8945

### Test Equipment Used

equipment type	A-EQ ID
Source sampling console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-350E multigas analyser	69
Gasmet DX4000 FTIR	
Gasmet PSS	
Protea AtmosFIR	
Protea PIB Pump	
Gasmet syringe calibrator	
M&C PSS5-C conditioning unit	61
Digital thermomanometer	116
Top pan balance kit	

equipment type	A-EQ ID
Pitot	153
Calipers	
Barometer	21
Timer	
Tape measure	480
Heated head filter	
Heated tee	
10m heated line	28   30
1.5m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	

equipment type	A-EQ ID
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	164
Exit thermocouple	
Condenser thermocouple	
Tubes kit thermocouple	
2-way heater controller	
Air sampling pump	
5-figure analytical balance	1

Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO<sub>2</sub>) | Run 1

Results reference conditions are: STP, dry, 3% O<sub>2</sub>

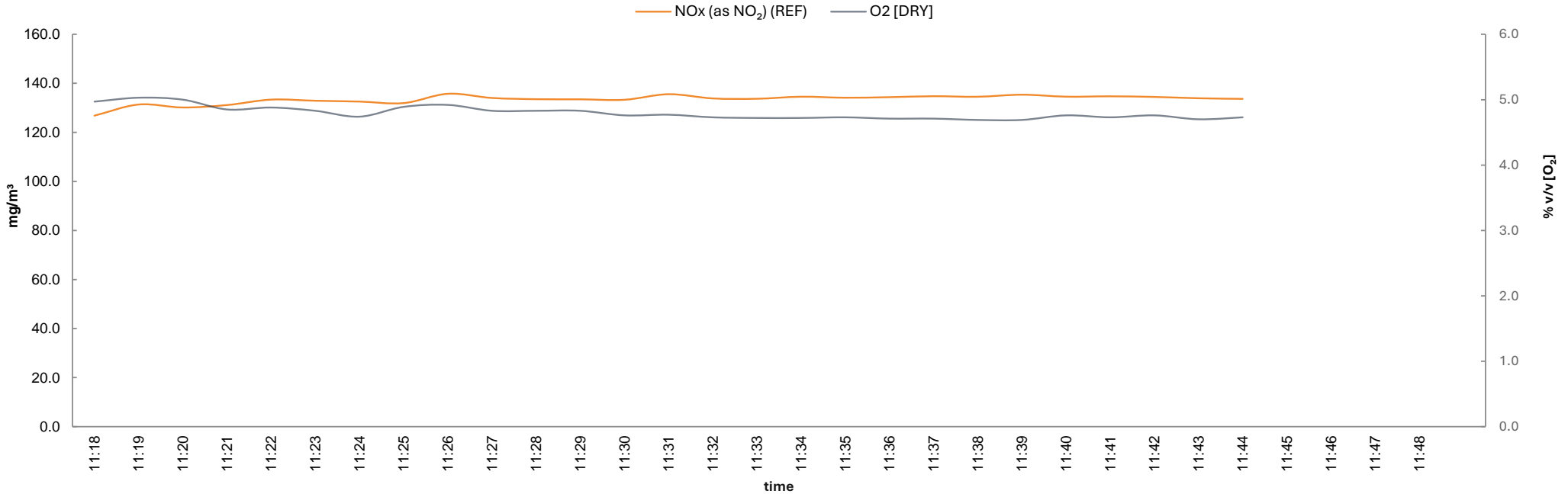
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO <sub>2</sub> )	mg/m <sup>3</sup>	133 ± 5.5	g/hr	867 ± 47.2

General Information

parameter	details
sampling start date & time	03/04/2025 11:18
sampling end date & time	03/04/2025 11:48
test time   mins	30
testing team	AS   MG
standard   technical procedure	EN 14792   ETC-SE-10b
analyser type	Horiba PG-350E
heated head & line temperature	180°C

parameter	details
probe material	Titanium
filter size, material & location	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	A1

Plot of Emissions Over Time



Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO<sub>2</sub>) | Run 1

Analyser Calibration Information with QA checks

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

CAL ID	pre-test calibration events							post-test calibration events			quality assurance			
	date & time	zero [A] [ppm]	span [A] [ppm]	zero [L] [ppm]	span [L] [ppm]	T <sub>90</sub> [s]	leak [%]	date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]	span drift [%]	allowable [%]	temp [°C]
1	03/04/25 10:16	0.00	206.27	0.00	206.27	63	0.0	03/04/25 12:05	0.00	212.90	0.0	3.2	±5	13.0

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	AS	Yes	60	A-CYL-141	206.27	21/08/2027	1.2	Nitrogen 5.2	5l 200ppm NO   160ppm CO   16% CO2 in Nitrogen	206.27	500	0.09

Part 2: Supporting Information - Appendix 2: Oxides of Nitrogen (as NO<sub>2</sub>) | Run 1

Measurement Uncertainty (MU) Calculations

general information			units	value
emission limit value (ELV) (REF)			mg/m <sup>3</sup>	200
measured concentration (REF)			mg/m <sup>3</sup>	133

MU budget			
parameter	units	min	max
ambient temp	°C	13.0	13.0
voltage	V	90.0	130.0

overall MU for O <sub>2</sub> correction	
3.1%	

MU factor O <sub>2</sub> correction	
0.03	

performance characteristics	MU budget input parameters				MU budget		
	symbol	units	value	source	symbol	units	value
repeatability at zero	rz	% of value	0	MCERTS certificate MC130223	U <sub>rz</sub>	mg/m <sup>3</sup>	0
repeatability at span	rs	% of value	0.1	MCERTS certificate MC130223	U <sub>rs</sub>	mg/m <sup>3</sup>	0.13
lack of fit	lof	% of value	2	maximum allowable	U <sub>lof</sub>	mg/m <sup>3</sup>	1.5
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0	day of testing	U <sub>dz</sub>	mg/m <sup>3</sup>	0
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0	day of testing	U <sub>ds</sub>	mg/m <sup>3</sup>	0
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U <sub>f</sub>	mg/m <sup>3</sup>	0.077
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U <sub>p</sub>	mg/m <sup>3</sup>	0
influence of ambient temperature zero point ( / 35k)	tz	% of value	0	MCERTS certificate MC130223	U <sub>tz</sub>	mg/m <sup>3</sup>	0
influence of ambient temperature span point ( / 35k)	ts	% of value	1.8	MCERTS certificate MC130223	U <sub>ts</sub>	mg/m <sup>3</sup>	0
influence of supply voltage ( / 60V)	v	% of value	0.4	MCERTS certificate MC130223	U <sub>v</sub>	mg/m <sup>3</sup>	0.21
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U <sub>iz</sub>	mg/m <sup>3</sup>	0.49
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U <sub>is</sub>	mg/m <sup>3</sup>	-0.4
maximum leak	L	% of value	0	day of testing	U <sub>L</sub>	mg/m <sup>3</sup>	0
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U <sub>adj</sub>	mg/m <sup>3</sup>	0.78
combined MU with O <sub>2</sub> correction						mg/m <sup>3</sup>	2.8
expanded MU with O <sub>2</sub> correction (k = 1.96)						mg/m <sup>3</sup>	5.5
expanded MU 95% CI with O <sub>2</sub> correction (k = 1.96) as percentage of measured value						%	4.1
expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission						%	5.4
expanded MU with O <sub>2</sub> correction (k = 1.96) as percentage of ELV [allowable 10.5%]						%	2.7
							result
							Pass

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<sub>2</sub>

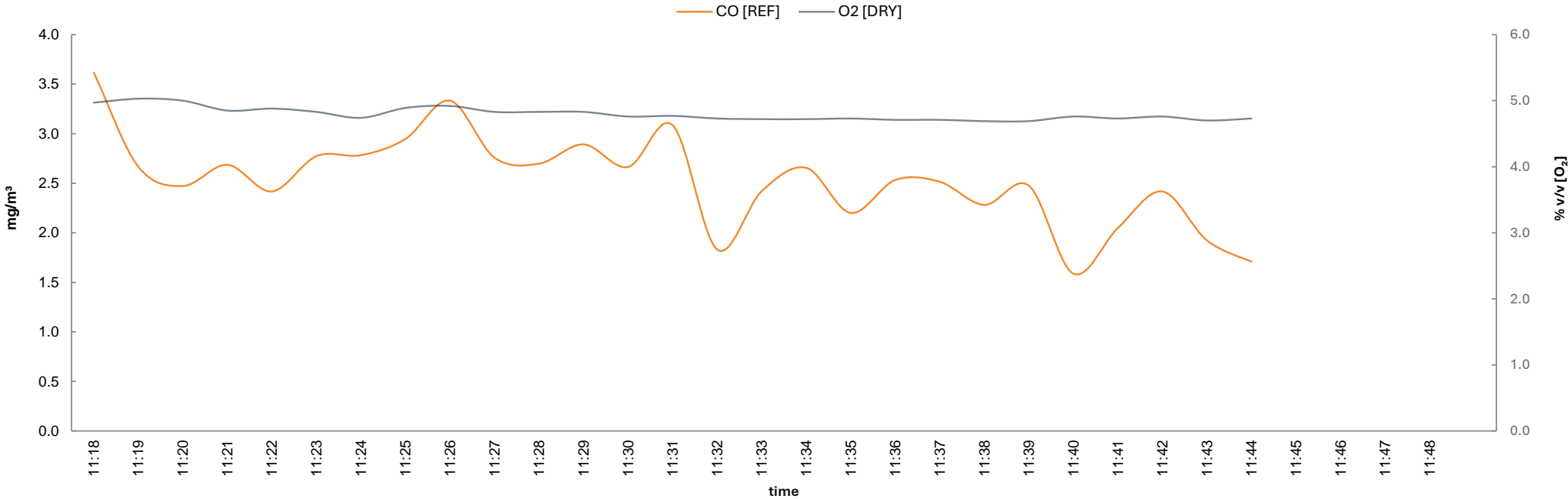
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m <sup>3</sup>	2.5 ± 0.11	g/hr	16.4 ± 0.94

General Information

parameter	details
sampling start date & time	03/04/2025 11:18
sampling end date & time	03/04/2025 11:48
test time   mins	30
testing team	AS   MG
standard   technical procedure	EN 15058   ETC-SE-10b
analyser type	Horiba PG-350E
heated head & line temperature	180°C

parameter	details
probe material	Titanium
filter size, material & location	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	A1

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 <sub>90</sub> [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	03/04/25 10:16	0.00	168.98	0.40	166.60	63	1.4	P	03/04/25 12:05	1.10	164.60	0.7	P	-3.2	P	±5	13.0

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	AS	Yes	60	A-CYL-141	168.98	21/08/2027	1.0	Nitrogen 5.2	5l 200ppm NO   160ppm CO   16% CO2 in Nitrogen	168.98	500	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 <sup>3</sup>	N/A
measured concentration (REF)			mg/m <sup>3</sup>	2.5

MU budget			
parameter	units	min	max
ambient temp	°C	13.0	13.0
voltage	V	90.0	130.0

overall MU for O <sub>2</sub> correction	
3.1%	

MU factor O <sub>2</sub> correction	
0.03	

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 <sub>rz</sub>	mg/m <sup>3</sup>	0.0025
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U <sub>rs</sub>	mg/m <sup>3</sup>	0.0051
lack of fit	lof	% of value	2	maximum allowable	U <sub>lof</sub>	mg/m <sup>3</sup>	0.029
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0	day of testing	U <sub>dz</sub>	mg/m <sup>3</sup>	0
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0	day of testing	U <sub>ds</sub>	mg/m <sup>3</sup>	0
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U <sub>f</sub>	mg/m <sup>3</sup>	0.0015
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U <sub>p</sub>	mg/m <sup>3</sup>	0
influence of ambient temperature zero point ( / 35k)	tz	% of value	-0.2	MCERTS certificate MC130223	U <sub>tz</sub>	mg/m <sup>3</sup>	0
influence of ambient temperature span point ( / 35k)	ts	% of value	2	MCERTS certificate MC130223	U <sub>ts</sub>	mg/m <sup>3</sup>	0
influence of supply voltage ( / 60V)	v	% of value	0.5	MCERTS certificate MC130223	U <sub>v</sub>	mg/m <sup>3</sup>	0.0049
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U <sub>iz</sub>	mg/m <sup>3</sup>	-0.007
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U <sub>is</sub>	mg/m <sup>3</sup>	-0.013
maximum leak	L	% of value	1.4	day of testing	U <sub>L</sub>	mg/m <sup>3</sup>	0.021
uncertainty associated with calibration gas	adj	% of value	0.97	span gas calibration certificate	U <sub>adj</sub>	mg/m <sup>3</sup>	0.012
combined MU with O <sub>2</sub> correction						mg/m <sup>3</sup>	0.057
expanded MU with O <sub>2</sub> correction (k = 1.96)						mg/m <sup>3</sup>	0.11
expanded MU 95% CI with O <sub>2</sub> correction (k = 1.96) as percentage of measured value						%	4.4
expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission						%	5.7

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	4.8 ± 0.15

General Information

parameter	details
sampling start date & time	N/A - Concurrent Testing
sampling end date & time	N/A - Concurrent Testing
testing team	AS   MG

parameter	details
standard   technical procedure	EN 14789   ETC-SE-10b
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 <sub>90</sub> [s]	leak [%]		date & time	zero [A] [% v/v]	span [A] [% v/v]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	03/04/25 10:16	0.00	21.14	0.28	20.86	83	1.3	P	03/04/25 12:05	0.11	21.09	0.3	P	-0.5	P	±5	13.0

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	AS	No	60	A-CYL-137	21.14	15/08/2029	1.2	Nitrogen 5.2	5l Synthetic Air	21.14	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	4.8

MU budget			
parameter	units	min	max
ambient temp	°C	13.0	13.0
voltage	V	90.0	130.0

performance characteristics	MU budget input parameters				MU budget		
	symbol	units	value	source	symbol	units	value
repeatability at zero	rz	% of value	0.02	MCERTS certificate MC130223	U <sub>rz</sub>	% v/v	0.00096
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U <sub>rs</sub>	% v/v	0.00096
lack of fit	lof	% of value	2	maximum allowable	U <sub>lof</sub>	% v/v	0.055
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.29	day of testing	U <sub>dz</sub>	% v/v	0.008
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.52	day of testing	U <sub>ds</sub>	% v/v	0.014
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U <sub>f</sub>	% v/v	-0.00028
influence of sample gas pressure	p	% of value	0	MCERTS certificate MC130223	U <sub>p</sub>	% v/v	0
influence of ambient temperature zero point ( / 35k)	tz	% of value	-0.4	MCERTS certificate MC130223	U <sub>tz</sub>	% v/v	0
influence of ambient temperature span point ( / 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U <sub>ts</sub>	% v/v	0
influence of supply voltage ( / 60V)	v	% of value	0.02	MCERTS certificate MC130223	U <sub>v</sub>	% v/v	0.00037
cross sensitivity at zero	iz	% of value	0	MCERTS certificate MC130223	U <sub>iz</sub>	% v/v	0
cross sensitivity at span	is	% of value	0	MCERTS certificate MC130223	U <sub>is</sub>	% v/v	0
maximum leak	L	% of value	1.3	day of testing	U <sub>L</sub>	% v/v	0.037
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U <sub>adj</sub>	% v/v	0.029
combined MU						% v/v	0.074
expanded MU 95% CI (k = 1.96)						% v/v	0.15
expanded MU 95% CI (k = 1.96) as percentage of measured value						%	3

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	102.3
average wet density	kg/m <sup>3</sup>	0.752
average stack static pressure	Pa	-128.0
pitot tube coefficient, C <sub>p</sub>	-	0.831

ND = Not Detected

NM = Not Measured

Line A

static pressure = -128 Pa

Pt	Depth   m	ΔP   Pa	Temp   °C	Vel   m/s	Swirl   °
1	0.05	143.0	204.9	16.1	< 15
2	0.14	142.0	204.3	16.1	< 15
3	0.41	139.0	204.1	15.9	< 15
4	0.49	137.0	204.1	15.8	< 15

General Information

parameter	details
traverse date	03/04/2025
traverse times   performed by	11:45 - 11:47   performed by: AS   MG
standard   technical procedure	EN 16911-1   TR 17078   ETC-SE-24
device used	S-type Pitot with Apex XD-502 (0 to 249Pa)

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	3.4
standard uncertainty associated with the molar mass of the gas	-	0.000036
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 <sup>3</sup>	0.0042
standard uncertainty associated with the local velocities	m/s	0.2
standard uncertainty associated with the mean velocity	m/s	0.11

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.21
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.3
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m <sup>3</sup> /hr	621
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.7
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m <sup>3</sup> /hr	306
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.7

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