HOCTIEF UK Construction Ltd

Snowdonia VIP

Emissions Testing

August 2025

Document Control Sheet

Identification	
Client	HOCTIEF UK
Document Title	Snowdonia VIP Emissions Testing
Bureau Veritas Ref No.	AIR25864554

Contact Details		
Company Name	Bureau Veritas UK Limited	HOCHTIEF (UK) Construction Ltd
Contact Name	Emma Haymer	David Grantham
Position	Associate Director	Environmental and Sustainability Manager

Configuration				
Version	**Date**	**Author**	**Reason for Issue/Summary of Changes**	**Status**
1.0	20/08/25	B Lloyd	First Issue – Report 1 of 2	Issued

	Name	Job Title	Signature
Prepared By	B Lloyd	Air Quality Consultant	
Approved By	E Haymer	Air Quality Associate Director	

Commercial In Confidence

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1 Introduction

HOCTIEF (UK) Construction Ltd ('the Client') has commissioned Bureau Veritas UK Ltd to provide emissions testing at the Garth site ("the Site") for the Snowdonia Visual Impact Project (VIP).

An Environmental Permit (EP) (ref: EPR/DB3399FA) was issued by Natural Resources Wales (NRW) for the operation of six identical generator units at the Site (known as Gensets 1-6). Each Genset consists of 2 internal combustion engines (Engines 1 and 2) that are powered by Hydrotreated Vegetable Oil (HVO) fuel.

In its decision document, NRW imposed monitoring requirements on the Operator to demonstrate compliance with the emission limits specified in the permit, as per the monitoring frequency requirements.

This report sets out the results of the stack emissions testing undertaken on the 30th and 31st July 2025 covering the following Gensets and Engines:

- Genset 1, Engines 1 and 2;
- Genset 2, Engines 1 and 2;
- Genset 3, Engine 1;
- Genset 4, Engines 1 and 2.

Additional testing will be undertaken when the remaining Gensets come into operation and are operating under normal load.

1.1 Site Location

The Site is located along ffordd Tan-y-Glannau in the village of Minffordd within the Welsh county of Gwynedd. The surrounding land use is predominantly residential to the south-east of the Site, with agricultural land to the north-east. To the north-west of the Site lies open countryside, some of which is protected.

The closest ecological receptors are Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites, a Special Area of Conservation (SAC) designated as bog woodland, and Glaslyn, a Site of Special Scientific Interest (SSSI) designated as semi-natural woodland. These ecological receptors cover the same land bordering the north-west corner of the Site, approximately 77 m away from the emissions points.

1.2 Scope of Work

Monitoring Certification Scheme (MCERTS) accredited emissions testing has been performed in line with all relevant Health and Safety legislation and Regulator guidance. The stack tests followed UK Accreditation Service (UKAS) and MCERTS accredited stack emissions testing procedures and methodologies as presented in Table 1.1.

Table 1.1 – Monitored Parameters and Pollutants

Parameter	Standard | Technical procedure	Duration	Accreditation	Number of release points tested
Oxides of Nitrogen (as NO_2)	BS EN 14792 | TP-22a	1 x 30 mins	MCERTS	7
Carbon Monoxide	BS EN 15058 | TP-22b	1 x 30 mins	MCERTS	7
Oxygen	BS EN 14789 | TP-22d	1 x 30 mins	MCERTS	7
Velocity & Flow Rate Traverse	BS EN 16911-1 | TR 17078 | TP-04a	Initial Survey	MCERTS	7

Reference conditions: 273K, 101.3kPa, 15% oxygen, dry gas

2 Results

Detailed results are presented in Tables 2.1-2.7 below.

The emission limit values (ELV) within the Sites EP were informed from the Air Quality Assessment (AQA) submitted with the EP application. The ELV for each engine is 36 mg/m^3. As presented below, all engines tested to date comply with the relevant ELV.

Table 2.1 – Genset 1 Engine 1 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	2.6	36	0.28	mg/m^3	STP, Dry, 15% O_2	30/07/25 | 12:10-12:40
Carbon Monoxide	9.5	-	1.0	mg/m^3	STP, Dry, 15% O_2	30/07/25 | 12:10-12:40
Oxygen	16.1	-	0.57	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	19.2	-	0.33	m/s	Actual	30/07/25 | 12:05-12:07

[a] ELV informed from the AQA.

Table 2.2 – Genset 1 Engine 2 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	15.1	36	1.2	mg/m^3	STP, Dry, 15% O_2	30/07/25 | 12:58-13:28
Carbon Monoxide	9.5	-	0.80	mg/m^3	STP, Dry, 15% O_2	30/07/25 | 12:58-13:28
Oxygen	14.5	-	0.51	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	17.2	-	0.30	m/s	Actual	30/07/25 | 11:23-11:26

[a] ELV informed from the AQA.

Table 2.3 – Genset 2 Engine 1 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	16.9	36	1.2	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 12:48 - 13:18
Carbon Monoxide	8.2	-	0.57	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 12:48 - 13:18
Oxygen	13.1	-	0.47	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	19.8	-	0.34	m/s	Actual	31/07/2025 | 12:35 - 12:37

[a] ELV informed from the AQA.

Table 2.4 – Genset 2 Engine 2 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	8.5	36	0.74	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 13:27 - 13:57
Carbon Monoxide	14.0	-	1.2	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 13:27 - 13:57
Oxygen	14.9	-	0.53	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	19.1	-	0.33	m/s	Actual	31/07/2025 | 14:21 - 14:23

[a] ELV informed from the AQA.

Table 2.5 – Genset 3 Engine 2 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	4.6	36	0.44	mg/m^3	STP, Dry, 15% O_2	30/07/2025 | 13:36 - 14:06
Carbon Monoxide	7.2	-	0.69	mg/m^3	STP, Dry, 15% O_2	30/07/2025 | 13:36 - 14:06
Oxygen	15.4	-	0.55	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	14.6	-	0.27	m/s	Actual	30/07/2025 | 13:30 - 13:32

[a] ELV informed from the AQA.

Table 2.6 – Genset 4 Engine 1 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	24.3	36	1.8	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 12:10 - 12:40
Carbon Monoxide	7.9	-	0.59	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 12:10 - 12:40
Oxygen	13.8	-	0.49	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	21.2	-	0.36	m/s	Actual	31/07/2025 | 12:43 - 12:45

[a] ELV informed from the AQA.

Table 2.7 – Genset 4 Engine 2 Sampling Results

Substance	Result	ELV[a]	Measurement uncertainty	Units	Reference conditions	Sampling date | Time
Oxides of Nitrogen (as NO_2)	13.9	36	1.1	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 11:12 - 11:42
Carbon Monoxide	8.9	-	0.69	mg/m^3	STP, Dry, 15% O_2	31/07/2025 | 11:12 - 11:42
Oxygen	14.0	-	0.50	% v/v	Dry	N/A - Concurrent Testing
Velocity and Flow Rate Traverse	28.9	-	0.47	m/s	Actual	31/07/2025 | 11:05 - 11:07

[a] ELV informed from the AQA

Appendix A: Stack Emissions Testing Reports

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A1 - Genset 1 - Engine 1 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	2.6	0.28	36	mg/m^3	3.3	0.19		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	9.5	1.0		mg/m^3	12.0	0.70		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	16.1	0.57		% v/v					dry	MCERTS
Stack Gas Temperature	298			°C					actual	MCERTS
Stack Gas Velocity	19.2	0.33		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	3394	164		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	1264	61.2		m^3/hr					STP, dry, 15% O_2	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

		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	2.6	0.28	36	mg/m^3	3.3	0.19		g/hr	30/07/2025 | 12:10 - 12:40	30		STP, dry, 15% O_2
Carbon Monoxide	R1	9.5	1.0		mg/m^3	12.0	0.70		g/hr	30/07/2025 | 12:10 - 12:40	30		STP, dry, 15% O_2
Oxygen		16.1	0.57		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	19.2	0.33		m/s	3394	164		m^3/hr	30/07/2025 | 12:05 - 12:07			actual
Stack Gas Temperature		298			°C								actual
Stack Gas Velocity		19.2	0.33		m/s								actual
Stack Gas Flow Rate (ACTUAL)		3394	164		m^3/hr								actual
Stack Gas Flow Rate (REF)		1264	61.2		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

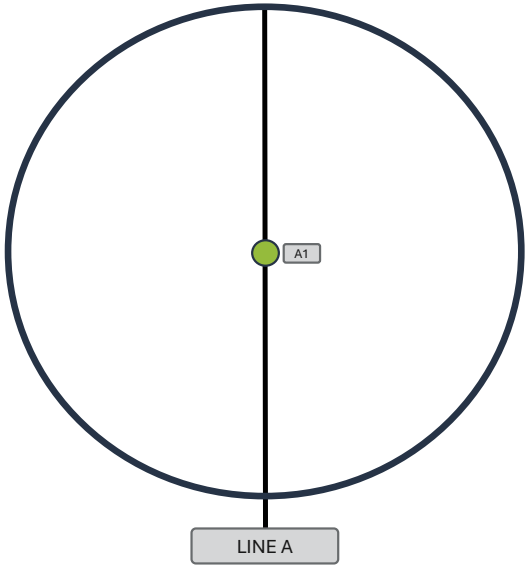
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	168.0	> 5 Pa	Yes
lowest traverse velocity	m/s	19.2	-	-
highest traverse velocity	m/s	19.2	-	-
mean traverse velocity	m/s	19.2	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

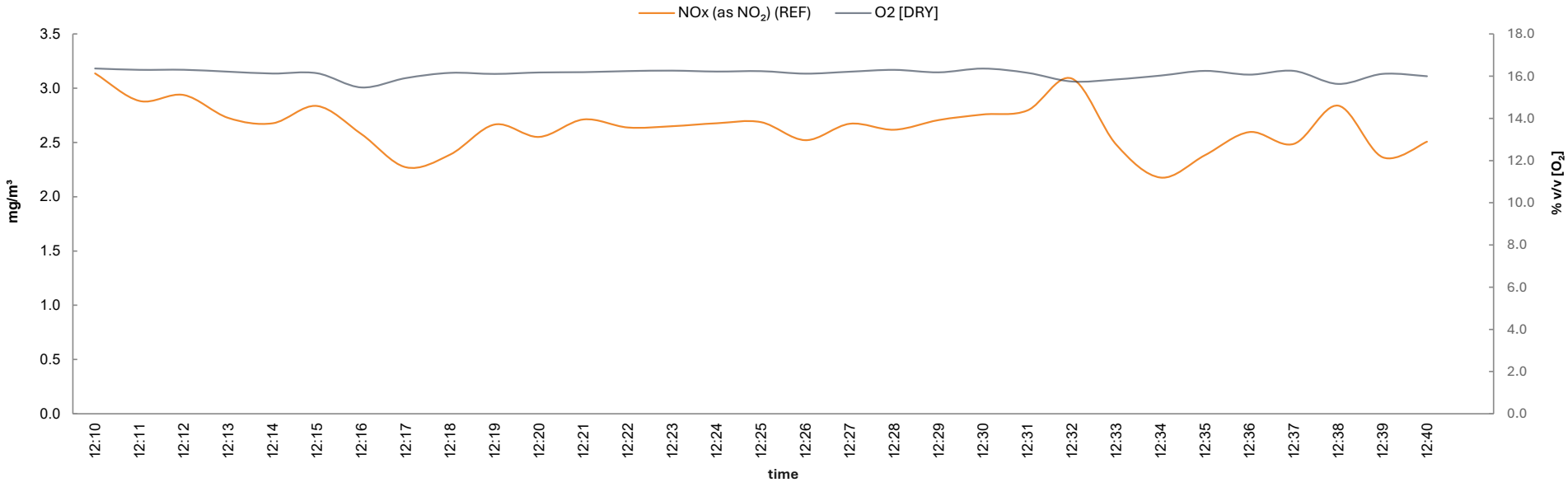
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	2.6 ± 0.28	g/hr	3.3 ± 0.19

General Information

parameter	details
sampling start date & time	30/07/2025 12:10
sampling end date & time	30/07/2025 12:40
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	30/07/25 11:36	0.00	202.84	0.60	206.04	39	0.0	P	30/07/25 14:14	0.00	204.40	-0.4	P	1.2	P	±5	19.5

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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	2.6

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
10.2%

MU factor O_2 correction
0.13

	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	0.0026
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.031
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.0068
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.2	day of testing	U_{ds}	mg/m^3	0.019
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0015
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	0.00045
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.0041
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.0096
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.0079
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	0.016
		combined MU with O_2 correction				mg/m^3	0.14
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.28
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	10.7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.8
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 14.3%]				%	0.79

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, 15% O_2

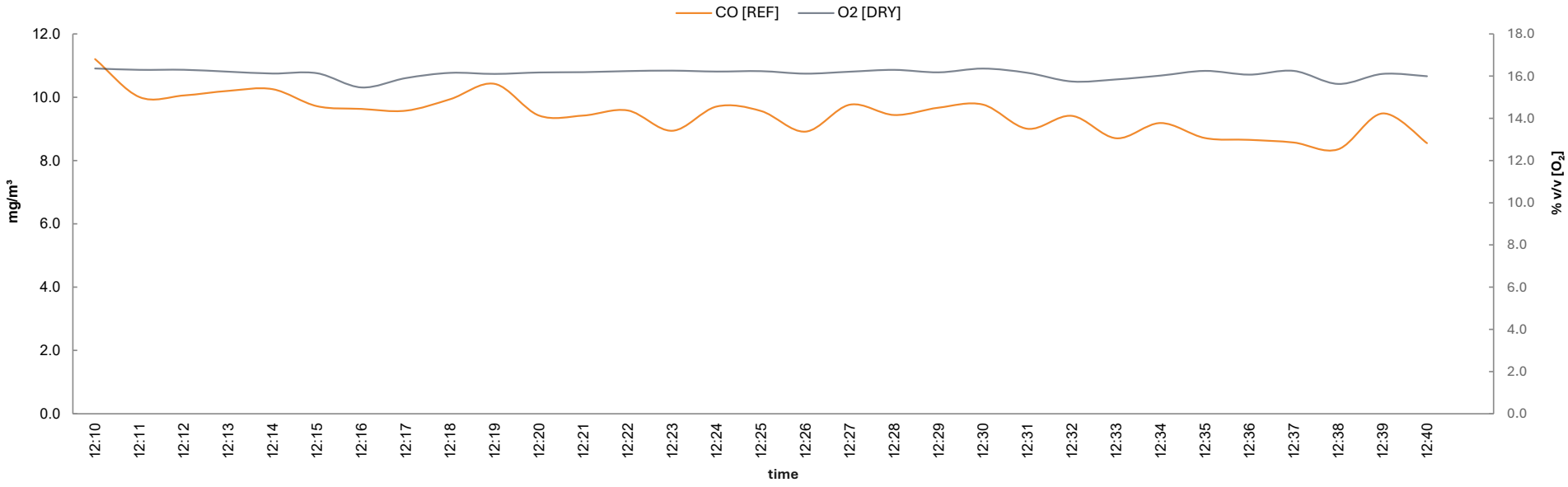
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	9.5 ± 1	g/hr	12 ± 0.7

General Information

parameter	details
sampling start date & time	30/07/2025 12:10
sampling end date & time	30/07/2025 12:40
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	30/07/25 11:36	0.00	168.10	0.60	167.10	32	0.6	P	30/07/25 14:14	-0.70	165.40	-0.1	P	-1.5	P	±5	19.5

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	ZH	No	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	9.5

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
10.2%

MU factor O_2 correction
0.13

	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	0.0095
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.019
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.11
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.066	day of testing	U_{dz}	mg/m^3	0.0036
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.5	day of testing	U_{ds}	mg/m^3	0.085
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0055
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	-0.00018
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0.0018
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.018
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.026
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.048
maximum leak	L	% of value	0.59	day of testing	U_L	mg/m^3	0.033
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.047
		combined MU with O_2 correction				mg/m^3	0.52
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	10.8
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.9

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	16.1 ± 0.57

General Information

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

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	30/07/25 11:36	0.00	21.18	0.19	20.91	24	1.3	P	30/07/25 14:14	0.19	20.88	0.3	P	-1.7	P	±5	19.5

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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	16.1

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	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	0.0032
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0032
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.19
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.35	day of testing	U_{dz}	% v/v	0.032
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.16
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00093
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	-0.00061
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	-0.00023
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0012
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	1.3	day of testing	U_{L}	% v/v	0.12
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.097
		combined MU				% v/v	0.29
		expanded MU 95% CI (k = 1.96)				% v/v	0.57
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	102.1
average wet density	kg/m^3	0.624
average stack static pressure	Pa	29.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

		Line A			
		static pressure = 29 Pa			
Pt	**Depth | m**	**ΔP | Pa**	**Temp | °C**	**Vel | m/s**	**Swirl | °**
1	0.13	168.0	298.0	19.2	< 15

General Information

parameter	details
traverse date	30/07/2025
traverse times | performed by	12:05 - 12:07 | performed by: ZH | MG
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	2.8
standard uncertainty associated with the molar mass of the gas	-	0.000033
standard uncertainty associated with the temperature	K	2.9
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	0.0034
standard uncertainty associated with the local velocities	m/s	0.17
standard uncertainty associated with the mean velocity	m/s	0.17

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.33
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.7
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	164
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.8
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	61.2
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.8

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A1 - Genset 1 - Engine 2 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	15.1	1.2	36	mg/m^3	27.0	1.6		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	9.5	0.80		mg/m^3	16.5	0.97		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	14.5	0.51		% v/v					dry	MCERTS
Stack Gas Temperature	226			°C					actual	MCERTS
Stack Gas Velocity	17.2	0.30		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	3031	147		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	1726	83.7		m^3/hr					STP, dry, 15% O_2	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

		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	15.1	1.2	36	mg/m^3	27.0	1.6		g/hr	30/07/2025 | 12:58 - 13:28	30		STP, dry, 15% O_2
Carbon Monoxide	R1	9.5	0.80		mg/m^3	16.5	0.97		g/hr	30/07/2025 | 12:58 - 13:28	30		STP, dry, 15% O_2
Oxygen		14.5	0.51		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	17.2	0.30		m/s	3031	147		m^3/hr	30/07/2025 | 11:23 - 11:26			actual
Stack Gas Temperature		226			°C								actual
Stack Gas Velocity		17.2	0.30		m/s								actual
Stack Gas Flow Rate (ACTUAL)		3031	147		m^3/hr								actual
Stack Gas Flow Rate (REF)		1726	83.7		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

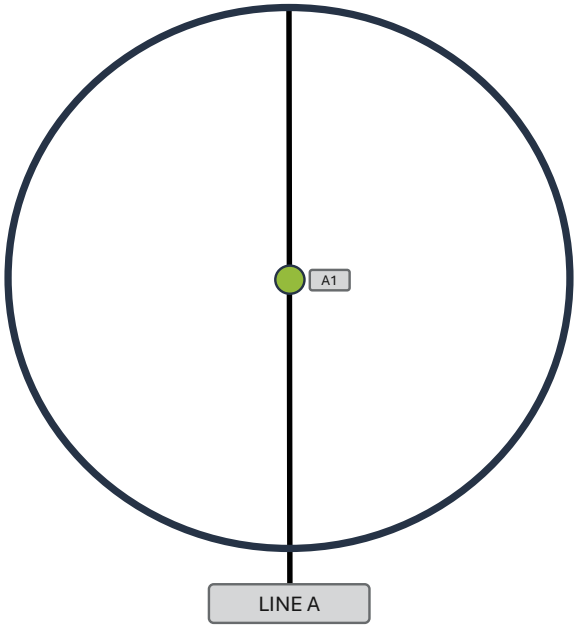
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	153.0	> 5 Pa	Yes
lowest traverse velocity	m/s	17.2	-	-
highest traverse velocity	m/s	17.2	-	-
mean traverse velocity	m/s	17.2	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

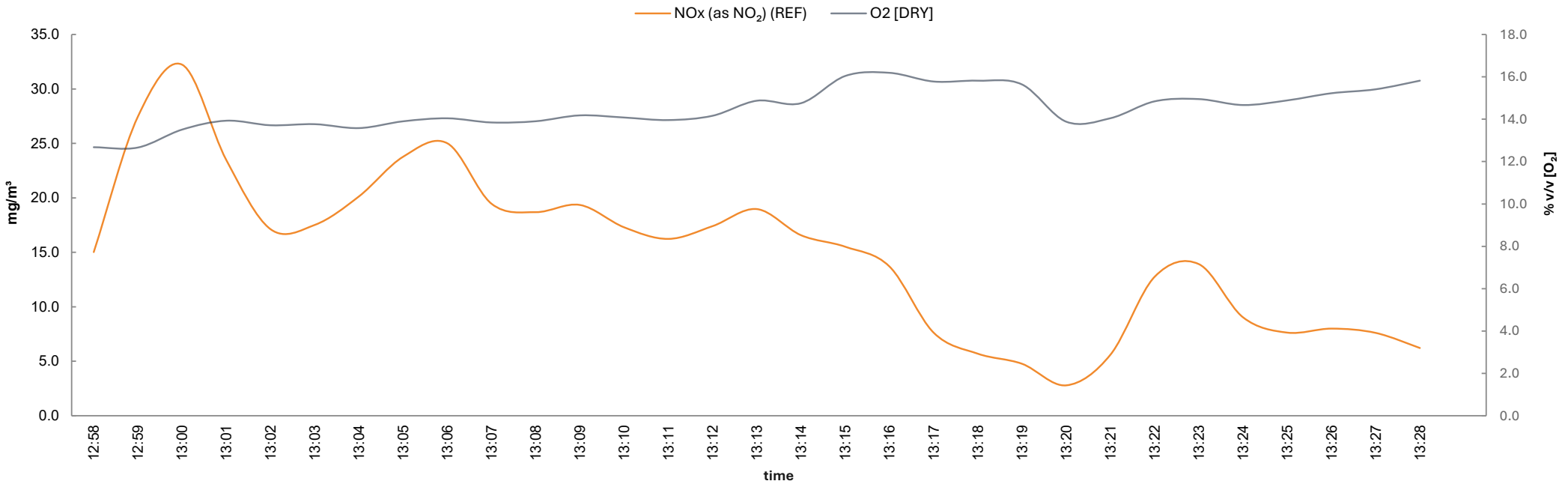
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	15.1 ± 1.2	g/hr	27 ± 1.6

General Information

parameter	details
sampling start date & time	30/07/2025 12:58
sampling end date & time	30/07/2025 13:28
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	30/07/25 11:36	0.00	202.84	0.60	206.04	39	0.0	P	30/07/25 14:14	0.00	204.40	-0.4	P	1.2	P	±5	19.5

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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	15.1

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
7.7%

MU factor O_2 correction
0.07

	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	0.015
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.17
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.039
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.2	day of testing	U_{ds}	mg/m^3	0.11
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0087
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	0.0026
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.023
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.055
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.045
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	0.09
		combined MU with O_2 correction				mg/m^3	0.64
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1.2
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	8.3
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.8
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 12.6%]				%	3.5

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, 15% O_2

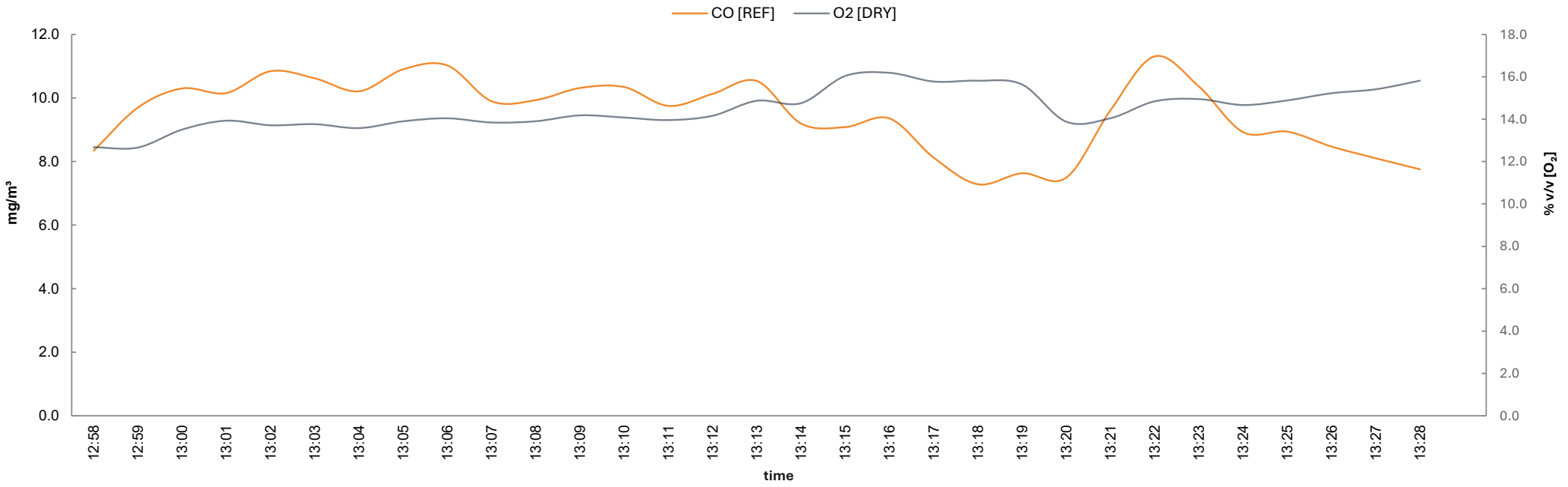
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	9.5 ± 0.8	g/hr	16.5 ± 0.97

General Information

parameter	details
sampling start date & time	30/07/2025 12:58
sampling end date & time	30/07/2025 13:28
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	30/07/25 11:36	0.00	168.10	0.60	167.10	32	0.6	P	30/07/25 14:14	-0.70	165.40	-0.1	P	-1.5	P	±5	19.5

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	ZH	No	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	9.5

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
7.7%

MU factor O_2 correction
0.07

	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	0.0095
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.019
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.11
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.066	day of testing	U_{dz}	mg/m^3	0.0036
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.5	day of testing	U_{ds}	mg/m^3	0.085
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0055
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	-0.00018
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0.0018
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.018
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.026
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.048
maximum leak	L	% of value	0.59	day of testing	U_L	mg/m^3	0.033
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.047
		combined MU with O_2 correction				mg/m^3	0.41
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.8
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	8.4
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.9

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	14.5 ± 0.51

General Information

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

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	30/07/25 11:36	0.00	21.18	0.19	20.91	24	1.3	P	30/07/25 14:14	0.19	20.88	0.3	P	-1.7	P	±5	19.5

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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	14.5

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	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	0.0029
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0029
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.17
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.35	day of testing	U_{dz}	% v/v	0.029
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.15
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00084
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	-0.00055
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	-0.00021
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0011
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	1.3	day of testing	U_{L}	% v/v	0.11
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.087
		combined MU				% v/v	0.26
		expanded MU 95% CI (k = 1.96)				% v/v	0.51
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	102.1
average wet density	kg/m^3	0.713
average stack static pressure	Pa	-15.3
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

Line A

static pressure = -15.3 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.13	153.0	226.0	17.2	< 15

General Information

parameter	details
traverse date	30/07/2025
traverse times | performed by	11:23 - 11:26 | performed by: ZH | MG
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	2.6
standard uncertainty associated with the molar mass of the gas	-	0.000032
standard uncertainty associated with the temperature	K	2.5
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	0.0039
standard uncertainty associated with the local velocities	m/s	0.16
standard uncertainty associated with the mean velocity	m/s	0.15

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.3
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.7
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	147
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.9
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	83.7
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.9

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A2 - Genset 2 - Engine 1 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	16.9	1.2	36	mg/m^3	35.4	2.0		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	8.2	0.57		mg/m^3	17.2	0.97		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	13.1	0.47		% v/v					dry	MCERTS
Stack Gas Temperature	298			°C					actual	MCERTS
Stack Gas Velocity	19.8	0.34		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	3498	169		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	2083	101		m^3/hr					STP, dry, 15% O_2	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

		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	16.9	1.2	36	mg/m^3	35.4	2.0		g/hr	31/07/2025 | 12:48 - 13:18	30		STP, dry, 15% O_2
Carbon Monoxide	R1	8.2	0.57		mg/m^3	17.2	0.97		g/hr	31/07/2025 | 12:48 - 13:18	30		STP, dry, 15% O_2
Oxygen		13.1	0.47		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	19.8	0.34		m/s	3498	169		m^3/hr	31/07/2025 | 12:35 - 12:37			actual
Stack Gas Temperature		298			°C								actual
Stack Gas Velocity		19.8	0.34		m/s								actual
Stack Gas Flow Rate (ACTUAL)		3498	169		m^3/hr								actual
Stack Gas Flow Rate (REF)		2083	101		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

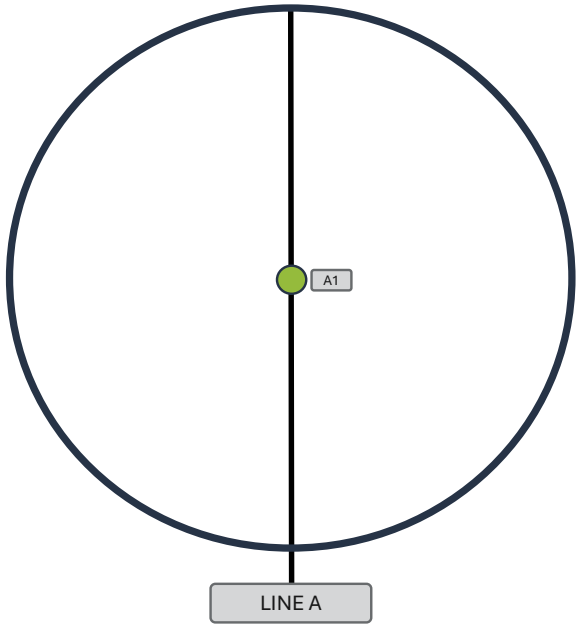
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	176.3	> 5 Pa	Yes
lowest traverse velocity	m/s	19.8	-	-
highest traverse velocity	m/s	19.8	-	-
mean traverse velocity	m/s	19.8	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

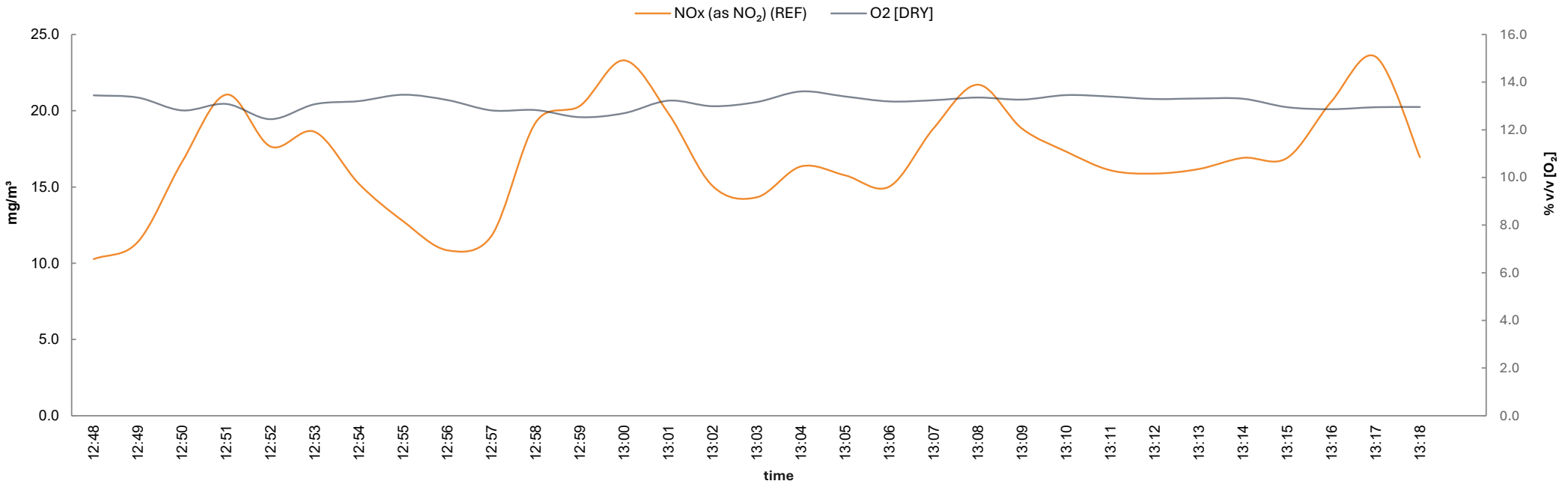
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	16.9 ± 1.2	g/hr	35.4 ± 2

General Information

parameter	details
sampling start date & time	31/07/2025 12:48
sampling end date & time	31/07/2025 13:18
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	31/07/25 10:44	0.00	202.84	0.80	202.70	45	0.1	P	31/07/25 14:23	0.00	201.40	-0.4	P	-0.3	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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	16.9

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
6.4%

MU factor O_2 correction
0.05

	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	0.017
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.2
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.044
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.27	day of testing	U_{ds}	mg/m^3	0.026
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0098
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
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.026
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.062
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.051
maximum leak	L	% of value	0.069	day of testing	U_L	mg/m^3	0.0068
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	mg/m^3	0.1
		combined MU with O_2 correction				mg/m^3	0.6
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1.2
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	6.9
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 11.8%]				%	3.3

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, 15% O_2

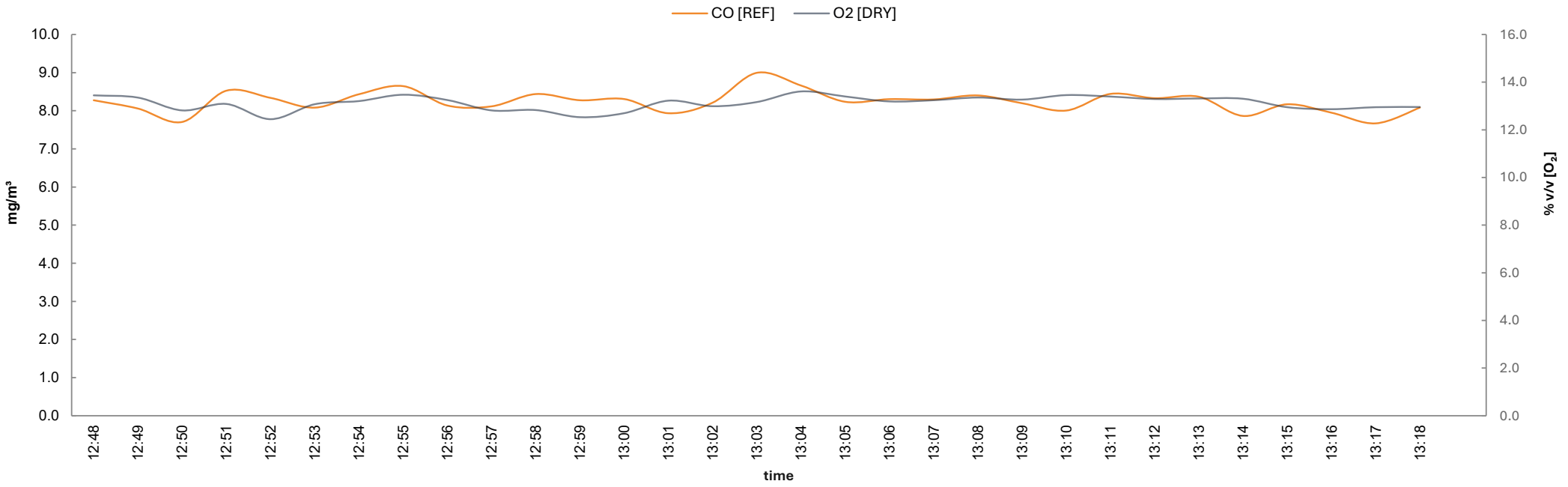
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	8.2 ± 0.57	g/hr	17.2 ± 0.97

General Information

parameter	details
sampling start date & time	31/07/2025 12:48
sampling end date & time	31/07/2025 13:18
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	31/07/25 10:44	0.00	168.10	0.20	167.00	34	0.7	P	31/07/25 14:23	0.30	164.50	0.2	P	-2.4	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	ZH	Yes	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	8.2

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
6.4%

MU factor O_2 correction
0.05

	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	0.0082
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.016
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.095
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	0.0048
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
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.016
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.023
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.041
maximum leak	L	% of value	0.65	day of testing	U_L	mg/m^3	0.031
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.041
		combined MU with O_2 correction				mg/m^3	0.29
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.57
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6

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	13.1 ± 0.47

General Information

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

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	31/07/25 10:44	0.00	21.18	0.07	20.93	18	1.2	P	31/07/25 14:23	0.20	21.00	0.8	P	-1.7	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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	13.1

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
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	0.0026
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0026
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.15
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.82	day of testing	U_{dz}	% v/v	0.062
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.13
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00076
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
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	0
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.001
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	1.2	day of testing	U_{L}	% v/v	0.089
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.079
		combined MU				% v/v	0.24
		expanded MU 95% CI (k = 1.96)				% v/v	0.47
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	101.2
average wet density	kg/m^3	0.617
average stack static pressure	Pa	39.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

Line A

static pressure = 39 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.13	176.3	298.0	19.8	< 15

General Information

parameter	details
traverse date	31/07/2025
traverse times | performed by	12:35 - 12:37 | performed by: ZH | MG
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	2.9
standard uncertainty associated with the molar mass of the gas	-	0.000031
standard uncertainty associated with the temperature	K	2.9
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	0.0034
standard uncertainty associated with the local velocities	m/s	0.18
standard uncertainty associated with the mean velocity	m/s	0.17

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.34
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.7
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	169
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.8
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	101
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.8

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A2 - Genset 2 - Engine 2 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	8.5	0.74	36	mg/m^3	15.1	0.85		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	14.0	1.2		mg/m^3	22.5	1.3		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	14.9	0.53		% v/v					dry	MCERTS
Stack Gas Temperature	275			°C					actual	MCERTS
Stack Gas Velocity	19.1	0.33		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	3383	164		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	1632	79.0		m^3/hr					STP, dry, 15% O_2	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

		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	8.5	0.74	36	mg/m^3	15.1	0.85		g/hr	31/07/2025 | 13:27 - 13:57	30		STP, dry, 15% O_2
Carbon Monoxide	R1	14.0	1.2		mg/m^3	22.5	1.3		g/hr	31/07/2025 | 13:27 - 13:57	30		STP, dry, 15% O_2
Oxygen		14.9	0.53		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	19.1	0.33		m/s	3383	164		m^3/hr	31/07/2025 | 14:21 - 14:23			actual
Stack Gas Temperature		275			°C								actual
Stack Gas Velocity		19.1	0.33		m/s								actual
Stack Gas Flow Rate (ACTUAL)		3383	164		m^3/hr								actual
Stack Gas Flow Rate (REF)		1632	79.0		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

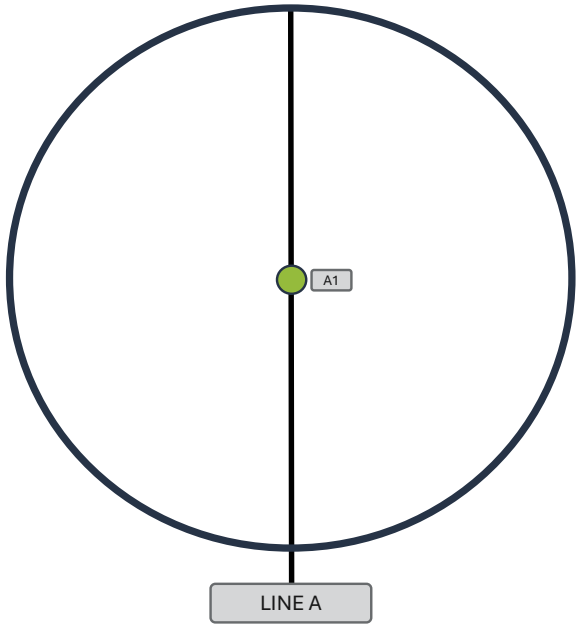
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	174	> 5 Pa	Yes
lowest traverse velocity	m/s	19.1	-	-
highest traverse velocity	m/s	19.1	-	-
mean traverse velocity	m/s	19.1	-	-
ratio traverse velocities	: 1	1.00	< 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	None visible
type of process	Combustion
batch or continuous process	On Demand
fuel type	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

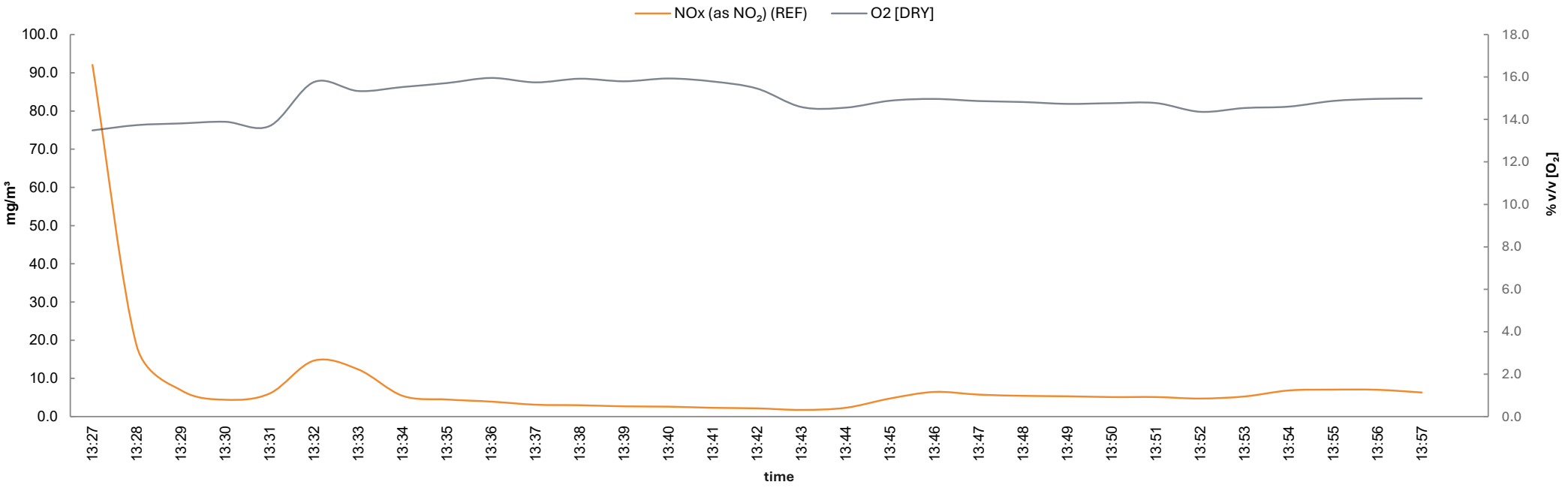
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	8.5 ± 0.74	g/hr	15.1 ± 0.85

General Information

parameter	details
sampling start date & time	31/07/2025 13:27
sampling end date & time	31/07/2025 13:57
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	31/07/25 10:44	0.00	202.84	0.80	202.70	45	0.1	P	31/07/25 14:23	0.00	201.40	-0.4	P	-0.3	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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	8.5

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
8.2%

MU factor O_2 correction
0.08

	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	0.0085
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.098
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.022
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.27	day of testing	U_{ds}	mg/m^3	0.013
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0049
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
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.013
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.031
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.026
maximum leak	L	% of value	0.069	day of testing	U_L	mg/m^3	0.0034
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	mg/m^3	0.051
		combined MU with O_2 correction				mg/m^3	0.38
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.74
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	8.7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 13%]				%	2.1

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, 15% O_2

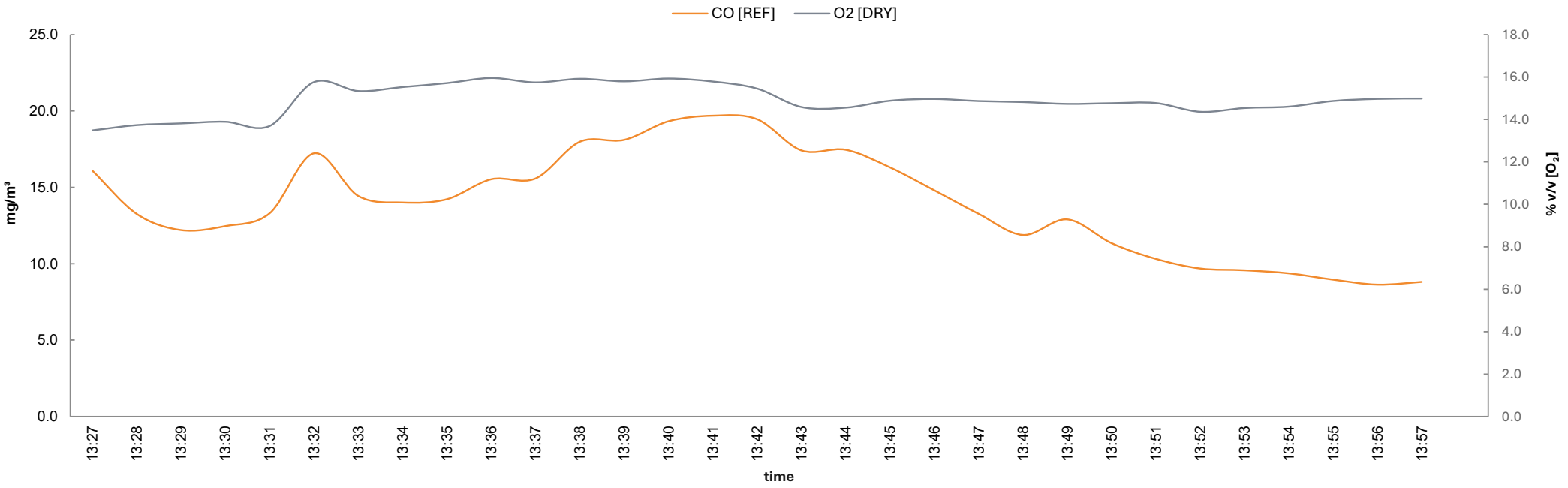
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	14 ± 1.2	g/hr	22.5 ± 1.3

General Information

parameter	details
sampling start date & time	31/07/2025 13:27
sampling end date & time	31/07/2025 13:57
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	31/07/25 10:44	0.00	168.10	0.20	167.00	34	0.7	P	31/07/25 14:23	0.30	164.50	0.2	P	-2.4	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	ZH	Yes	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	14

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
8.2%

MU factor O_2 correction
0.08

	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	0.014
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.028
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.16
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	0.0081
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
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.027
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.039
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.07
maximum leak	L	% of value	0.65	day of testing	U_L	mg/m^3	0.053
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.069
		combined MU with O_2 correction				mg/m^3	0.62
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1.2
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	8.7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6

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	14.9 ± 0.53

General Information

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

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	31/07/25 10:44	0.00	21.18	0.07	20.93	18	1.2	P	31/07/25 14:23	0.20	21.00	0.8	P	-1.7	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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	14.9

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
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	0.003
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.003
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.17
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.82	day of testing	U_{dz}	% v/v	0.071
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.14
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00086
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
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	0
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0011
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	1.2	day of testing	U_{L}	% v/v	0.1
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.09
		combined MU				% v/v	0.27
		expanded MU 95% CI (k = 1.96)				% v/v	0.53
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	102.1
average wet density	kg/m^3	0.650
average stack static pressure	Pa	37.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

Line A

static pressure = 37 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.13	173.7	275.0	19.1	< 15

General Information

parameter	details
traverse date	31/07/2025
traverse times | performed by	14:21 - 14:23 | performed by: ZH | MG
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	2.9
standard uncertainty associated with the molar mass of the gas	-	0.000032
standard uncertainty associated with the temperature	K	2.8
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	0.0036
standard uncertainty associated with the local velocities	m/s	0.17
standard uncertainty associated with the mean velocity	m/s	0.17

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.33
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.7
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	164
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.8
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	79
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.8

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Release Point
A3 - Genset 3 - Engine 2 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	4.6	0.44	36	mg/m^3	6.0	0.35		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	7.2	0.69		mg/m^3	9.3	0.55		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	15.4	0.55		% v/v					dry	MCERTS
Stack Gas Temperature	224			°C					actual	MCERTS
Stack Gas Velocity	14.6	0.27		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	2575	126		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	1266	61.9		m^3/hr					STP, dry, 15% O_2	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

		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	4.6	0.44	36	mg/m^3	6.0	0.35		g/hr	30/07/2025 | 13:36 - 14:06	30		STP, dry, 15% O_2
Carbon Monoxide	R1	7.2	0.69		mg/m^3	9.3	0.55		g/hr	30/07/2025 | 13:36 - 14:06	30		STP, dry, 15% O_2
Oxygen		15.4	0.55		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	14.6	0.27		m/s	2575	126		m^3/hr	30/07/2025 | 13:30 - 13:32			actual
Stack Gas Temperature		224			°C								actual
Stack Gas Velocity		14.6	0.27		m/s								actual
Stack Gas Flow Rate (ACTUAL)		2575	126		m^3/hr								actual
Stack Gas Flow Rate (REF)		1266	61.9		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

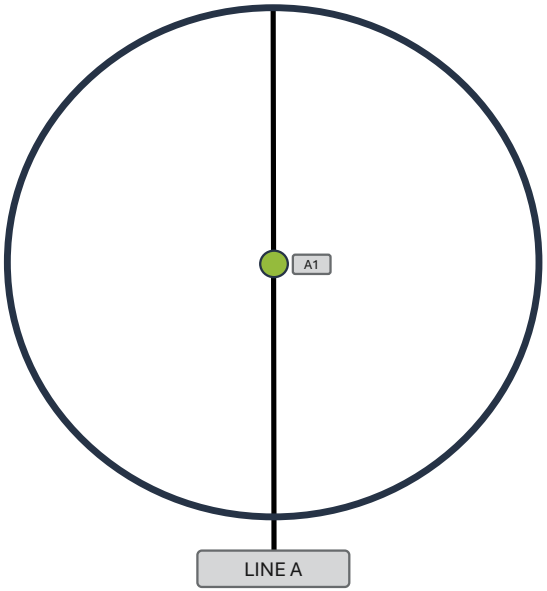
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	111.0	> 5 Pa	Yes
lowest traverse velocity	m/s	14.6	-	-
highest traverse velocity	m/s	14.6	-	-
mean traverse velocity	m/s	14.6	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

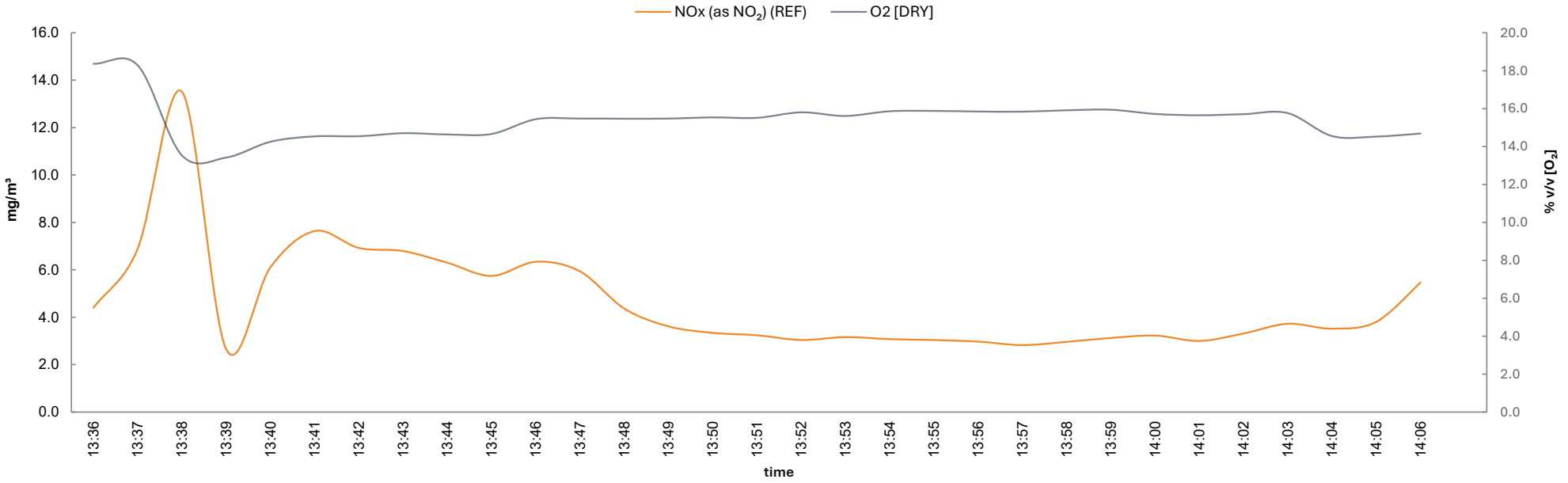
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	4.6 ± 0.44	g/hr	6 ± 0.35

General Information

parameter	details
sampling start date & time	30/07/2025 13:36
sampling end date & time	30/07/2025 14:06
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	30/07/25 11:36	0.00	202.84	0.60	206.04	39	0.0	P	30/07/25 14:14	0.00	204.40	-0.4	P	1.2	P	±5	19.5

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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	4.6

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
8.9%

MU factor O_2 correction
0.10

	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	0.0046
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.054
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.012
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.2	day of testing	U_{ds}	mg/m^3	0.033
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0027
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	0.0008
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.0072
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.017
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.014
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	0.028
		combined MU with O_2 correction				mg/m^3	0.22
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.44
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	9.4
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.8
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 13.4%]				%	1.2

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, 15% O_2

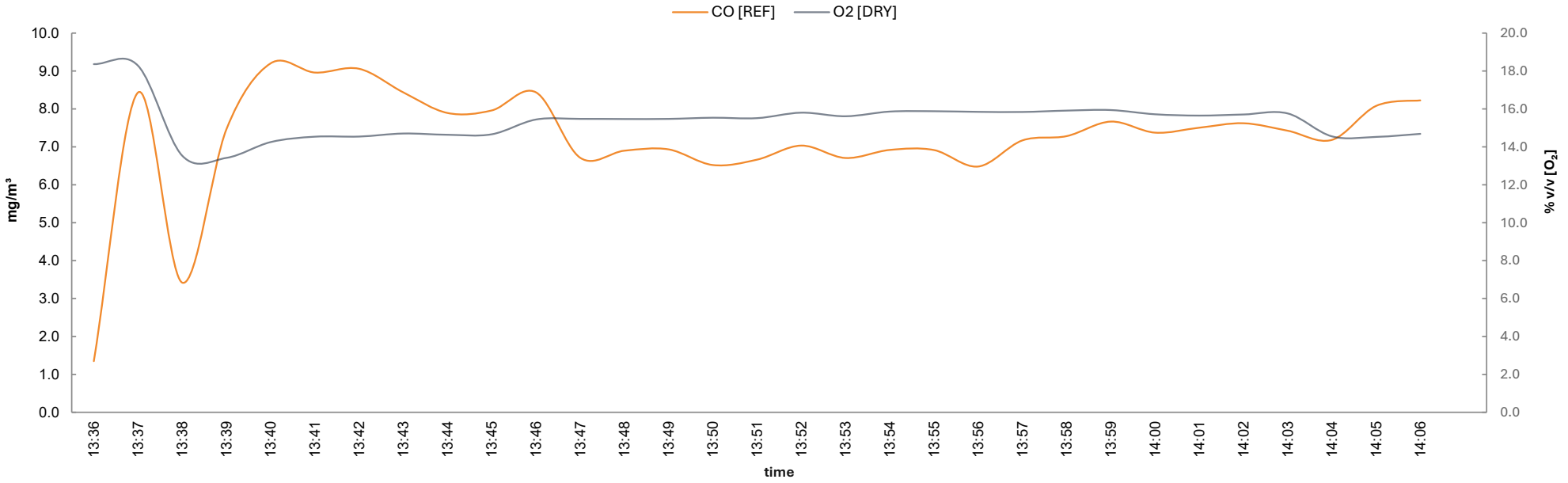
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	7.2 ± 0.69	g/hr	9.3 ± 0.55

General Information

parameter	details
sampling start date & time	30/07/2025 13:36
sampling end date & time	30/07/2025 14:06
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	30/07/25 11:36	0.00	168.10	0.60	167.10	32	0.6	P	30/07/25 14:14	-0.70	165.40	-0.1	P	-1.5	P	±5	19.5

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	ZH	No	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	7.2

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	20.0
voltage	V	90.0	130.0

overall MU for O_2 correction
8.9%

MU factor O_2 correction
0.10

	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	0.0072
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.014
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.083
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.066	day of testing	U_{dz}	mg/m^3	0.0027
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.5	day of testing	U_{ds}	mg/m^3	0.065
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.0042
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	-0.00014
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0.0014
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.014
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.02
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.036
maximum leak	L	% of value	0.59	day of testing	U_L	mg/m^3	0.025
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.036
		combined MU with O_2 correction				mg/m^3	0.35
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.69
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	9.5
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.9

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	15.4 ± 0.55

General Information

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

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	30/07/25 11:36	0.00	21.18	0.19	20.91	24	1.3	P	30/07/25 14:14	0.19	20.88	0.3	P	-1.7	P	±5	19.5

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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	15.4

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	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	0.0031
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0031
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.18
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.35	day of testing	U_{dz}	% v/v	0.031
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.16
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00089
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	-0.00059
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	-0.00022
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0012
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	1.3	day of testing	U_{L}	% v/v	0.11
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.092
		combined MU				% v/v	0.28
		expanded MU 95% CI (k = 1.96)				% v/v	0.55
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	102.1
average wet density	kg/m^3	0.717
average stack static pressure	Pa	28.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

	Line A				
	static pressure = 28 Pa				
Pt	**Depth | m**	**ΔP | Pa**	**Temp | °C**	**Vel | m/s**	**Swirl | °**
1	0.13	111.0	224.0	14.6	< 15

General Information

parameter	details
traverse date	30/07/2025
traverse times | performed by	13:30 - 13:32 | performed by: ZH | MG
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
standard uncertainty associated with the molar mass of the gas	-	0.000032
standard uncertainty associated with the temperature	K	2.5
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	0.0039
standard uncertainty associated with the local velocities	m/s	0.14
standard uncertainty associated with the mean velocity	m/s	0.14

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.27
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.9
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	126
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.9
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	61.9
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.9

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A4 - Genset 4 - Engine 1 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	24.3	1.8	36	mg/m^3	49.0	2.7		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	7.9	0.59		mg/m^3	15.6	0.88		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	13.8	0.49		% v/v					dry	MCERTS
Stack Gas Temperature	318			°C					actual	MCERTS
Stack Gas Velocity	21.2	0.36		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	3753	181		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	1983	95.9		m^3/hr					STP, dry, 15% O_2	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

		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	24.3	1.8	36	mg/m^3	49.0	2.7		g/hr	31/07/2025 | 12:10 - 12:40	30		STP, dry, 15% O_2
Carbon Monoxide	R1	7.9	0.59		mg/m^3	15.6	0.88		g/hr	31/07/2025 | 12:10 - 12:40	30		STP, dry, 15% O_2
Oxygen		13.8	0.49		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	21.2	0.36		m/s	3753	181		m^3/hr	31/07/2025 | 12:43 - 12:45			actual
Stack Gas Temperature		318			°C								actual
Stack Gas Velocity		21.2	0.36		m/s								actual
Stack Gas Flow Rate (ACTUAL)		3753	181		m^3/hr								actual
Stack Gas Flow Rate (REF)		1983	95.9		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

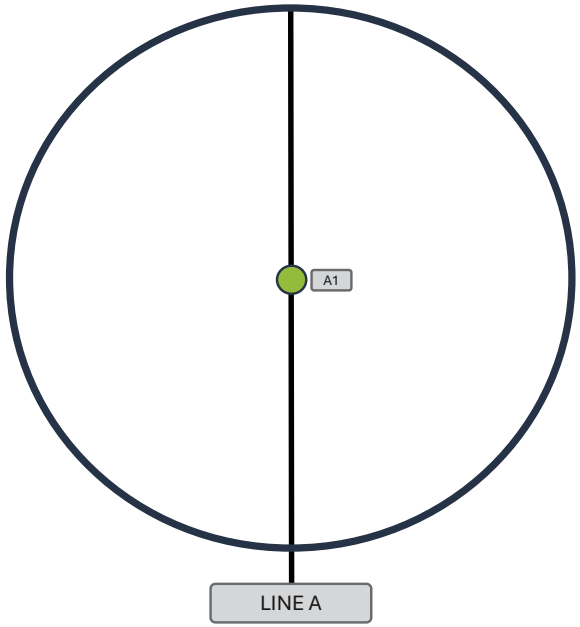
test parameter	run	details of monitoring deviation
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	196.3	> 5 Pa	Yes
lowest traverse velocity	m/s	21.2	-	-
highest traverse velocity	m/s	21.2	-	-
mean traverse velocity	m/s	21.2	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE3 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

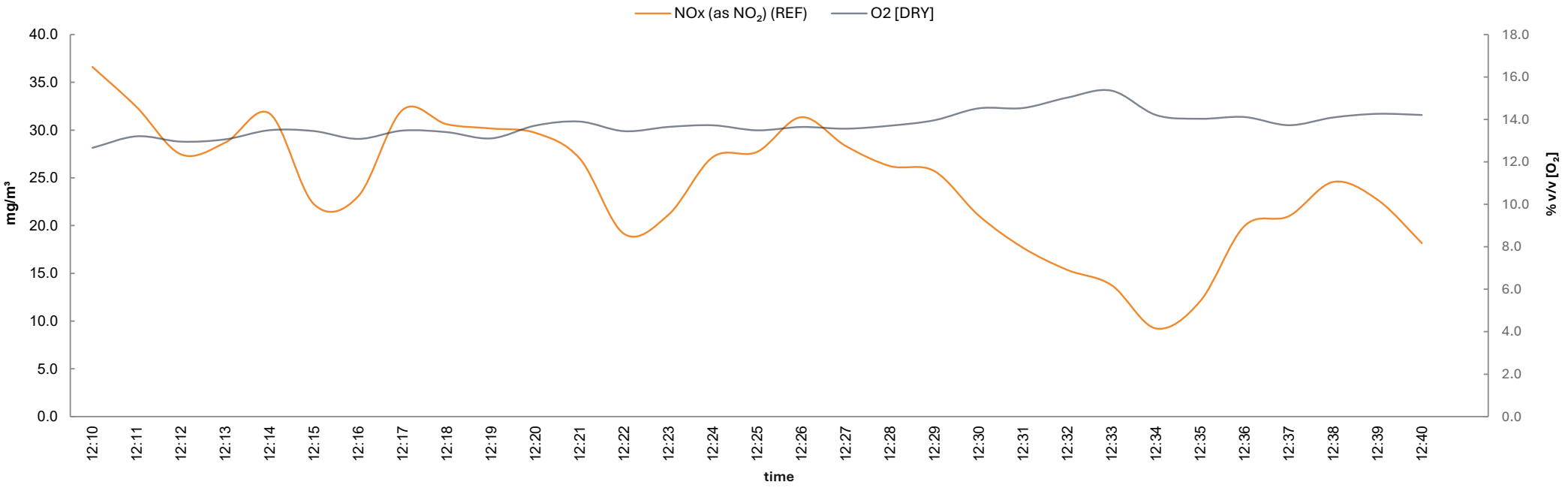
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	24.3 ± 1.8	g/hr	49 ± 2.7

General Information

parameter	details
sampling start date & time	31/07/2025 12:10
sampling end date & time	31/07/2025 12:40
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 14792 | TP-22a
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_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	00/01/00 10:44	0.00	202.84	0.80	202.70	45	0.1	P	31/07/25 14:23	0.00	201.40	-0.4	P	-0.3	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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	24.3

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
6.9%

MU factor O_2 correction
0.06

	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	0.024
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.28
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.063
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.27	day of testing	U_{ds}	mg/m^3	0.037
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.014
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
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.037
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.088
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.073
maximum leak	L	% of value	0.069	day of testing	U_L	mg/m^3	0.0097
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	mg/m^3	0.15
		combined MU with O_2 correction				mg/m^3	0.93
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1.8
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	7.5
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 12.2%]				%	5

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, 15% O_2

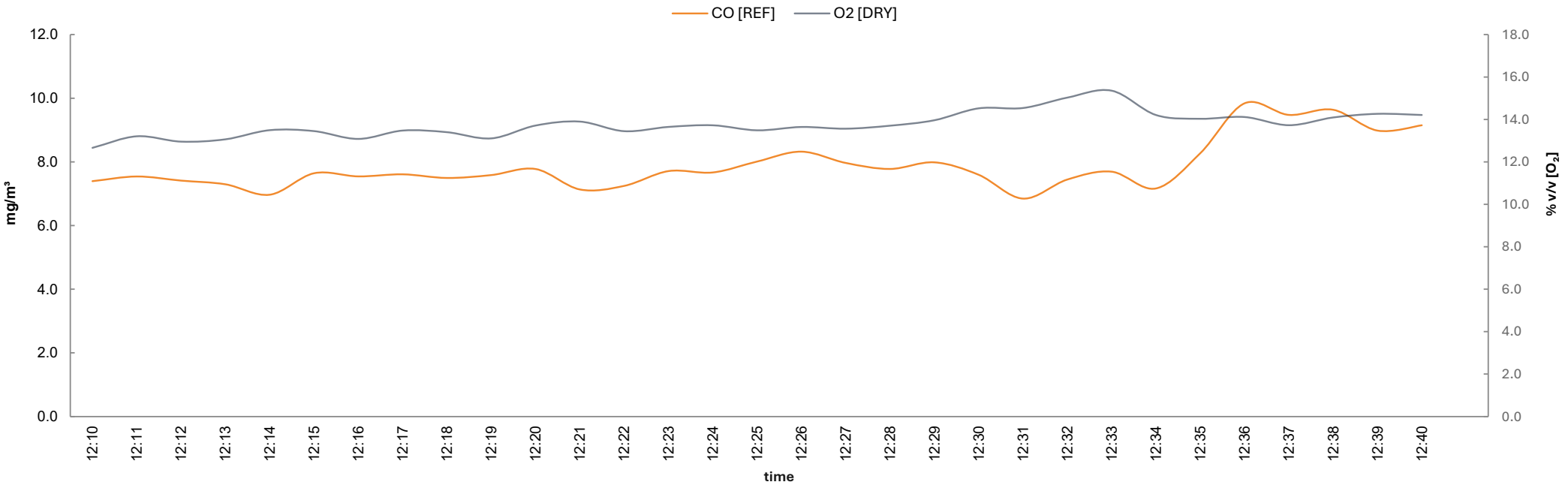
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	7.9 ± 0.59	g/hr	15.6 ± 0.88

General Information

parameter	details
sampling start date & time	31/07/2025 12:10
sampling end date & time	31/07/2025 12:40
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	00/01/00 10:44	0.00	168.10	0.20	167.00	34	0.7	P	31/07/25 14:23	0.30	164.50	0.2	P	-2.4	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	ZH	Yes	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	7.9

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
6.9%

MU factor O_2 correction
0.06

	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	0.0079
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.016
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.091
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	0.0045
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
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.015
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.022
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.04
maximum leak	L	% of value	0.65	day of testing	U_L	mg/m^3	0.03
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.039
		combined MU with O_2 correction				mg/m^3	0.3
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.59
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	7.5
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6

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	13.8 ± 0.49

General Information

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

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	00/01/00 10:44	0.00	21.18	0.07	20.93	18	1.2	P	31/07/25 14:23	0.20	21.00	0.8	P	-1.7	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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	13.8

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
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	0.0028
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0028
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.16
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.82	day of testing	U_{dz}	% v/v	0.065
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.13
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00079
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
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	0
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0011
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	1.2	day of testing	U_{L}	% v/v	0.094
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.083
		combined MU				% v/v	0.25
		expanded MU 95% CI (k = 1.96)				% v/v	0.49
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	101.2
average wet density	kg/m^3	0.597
average stack static pressure	Pa	94.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

Line A

static pressure = 94 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.13	196.3	318.0	21.2	< 15

General Information

parameter	details
traverse date	31/07/2025
traverse times | performed by	12:43 - 12:45 | performed by: ZH | MG
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	3.2
standard uncertainty associated with the molar mass of the gas	-	0.000031
standard uncertainty associated with the temperature	K	3
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	0.0033
standard uncertainty associated with the local velocities	m/s	0.19
standard uncertainty associated with the mean velocity	m/s	0.18

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.36
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.7
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	181
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.8
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	95.9
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.8

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

Stack Emissions Monitoring Report

Job Reference: JOB-1829

Commissioned by Bureau Veritas UK Ltd

Operator Name
Hochtief (UK) Construction Ltd | Minfordd Construction Compound

Operator Address
Site Office
Minfordd
LL48 6HP
EPR Permit EPR/DB3399FA

Cura Terrae Primary Contact
Alastair Wolff | m: 07506 729 226
e: alastair.wolff@cura-terrae.com

Release Point
A4 - Genset 4 - Engine 2 of 2

Dates of the Monitoring Campaign
30/07/2025 - 31/07/2025

Report Date | Version Number
01/08/2025 | Version 1

2522

Monitoring organisation name & address	Report written by	Report approved by	Report approved by signature
Cura Terrae OH and Emissions Testing Limited North West Office Unit 2, Asher Court, Lyncastle Way Appleton, Warrington, Cheshire, WA4 4ST	Zack Harrison Team Leader MCERTS Level 2 | Endorsements: TE1 TE2 TE4 MM 21 1627 | expires on 26/04/2026	Chris Rhodes Operations Manager MCERTS Level 2 | Endorsements: TE1 TE2 TE3 TE4 MM 02 117 | expires on 18/05/2026	

Report Contents and Monitoring Objectives

Report Contents

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

	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)	13.9	1.1	36	mg/m^3	33.5	1.9		g/hr	STP, dry, 15% O_2	MCERTS
Carbon Monoxide	8.9	0.69		mg/m^3	21.9	1.2		g/hr	STP, dry, 15% O_2	MCERTS
Oxygen	14.0	0.50		% v/v					dry	MCERTS
Stack Gas Temperature	368			°C					actual	MCERTS
Stack Gas Velocity	28.9	0.47		m/s					actual	MCERTS
Stack Gas Flow Rate (ACTUAL)	5099	246		m^3/hr					actual	MCERTS
Stack Gas Flow Rate (REF)	2403	116		m^3/hr					STP, dry, 15% O_2	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

		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	13.9	1.1	36	mg/m^3	33.5	1.9		g/hr	31/07/2025 | 11:12 - 11:42	30		STP, dry, 15% O_2
Carbon Monoxide	R1	8.9	0.69		mg/m^3	21.9	1.2		g/hr	31/07/2025 | 11:12 - 11:42	30		STP, dry, 15% O_2
Oxygen		14.0	0.50		% v/v					N/A - Concurrent Testing			dry
Velocity & Flow Rate Traverse	R1	28.9	0.47		m/s	5099	246		m^3/hr	31/07/2025 | 11:05 - 11:07			actual
Stack Gas Temperature		368			°C								actual
Stack Gas Velocity		28.9	0.47		m/s								actual
Stack Gas Flow Rate (ACTUAL)		5099	246		m^3/hr								actual
Stack Gas Flow Rate (REF)		2403	116		m^3/hr								STP, dry, 15% O_2

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_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

Summary of Monitoring Deviations (from Appendix 2)

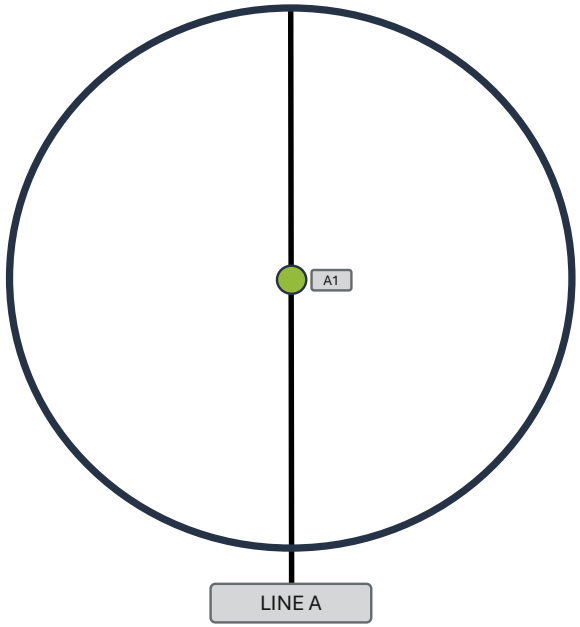
test parameter	**run**	**details of monitoring deviation**
All	1	There were no deviations associated with the monitoring employed.

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 = 0.25 m
area	m^2	0.05
orientation	-	Horizontal

parameter	value
primary sample port size	1" BSP
primary sample port depth | cm	10
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	On the Ground | Outside with no shelter available | On Ground Level

CEMS | Abatement Systems

parameter	details
abatement system/s	SCR
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	336.0	> 5 Pa	Yes
lowest traverse velocity	m/s	28.9	-	-
highest traverse velocity	m/s	28.9	-	-
mean traverse velocity	m/s	28.9	-	-
ratio traverse velocities	: 1	1.00	< 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	Gas Oil / HVO
feedstock	N/A
typical load / throughput of plant	1.305 MWth
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
Zack Harrison	Team Leader	MCERTS Level 2 | MM 21 1627 | 26/04/2026	TE1 TE2 TE4
Mike Gormley	Technician	MCERTS Level 1 | MM 23 1823 | 22/01/2029	TE1

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 console	
Low flow sampling MFCs	
ThermoFID / iFID mobile	
Horiba PG-250	
Horiba PG-350E	68
Gasmet DX4000 FTIR	
Gasmet PSS	66
Protea AtmosFIR	
Protea PIB 9ump	
Gasmet syringe calibrator	
M&C PSS5-C	
Digital thermomanometer	
Top pan balance kit	

equipment type	A-EQ ID
S-Type pitot	
S-Type pitot tip	
Mini S-Type pitot	193
L-Type pitot	
Calipers	
Heated head filter	227
Heated tee	
1.5m heated line	
10m heated line	463 | 464
20m heated line	
Odour barrel	
Vacuum chamber	
Dilution probe	
Tape measure	476

equipment type	A-EQ ID
Barometer	240
Timer	399
10m umbilical	
30m umbilical	
Heated probe	
Filter oven	
Ambient thermocouple	
Stack thermocouple	273
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, 15% O_2

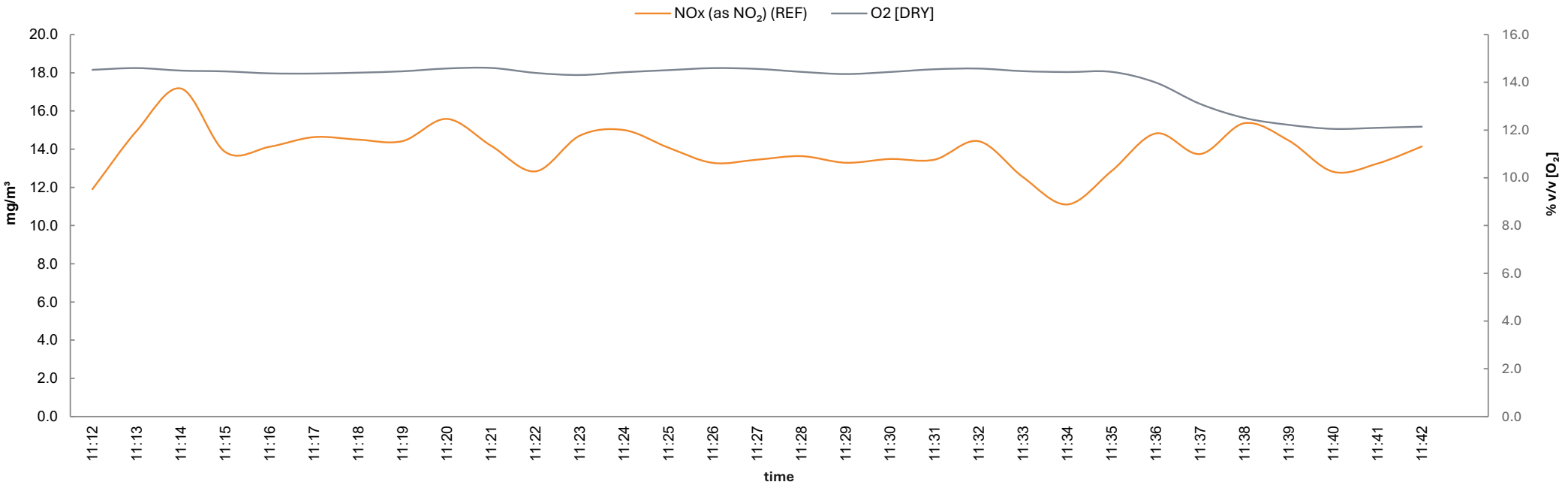
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Oxides of Nitrogen (as NO_2)	mg/m^3	13.9 ± 1.1	g/hr	33.5 ± 1.9

General Information

parameter	details
sampling start date & time	31/07/2025 11:12
sampling end date & time	31/07/2025 11:42
test time | mins	30
testing team	ZH | MG
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	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_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	31/07/25 10:44	0.00	202.84	0.80	202.70	45	0.1	P	31/07/25 14:23	0.00	201.40	-0.4	P	-0.3	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	ZH	No	60	A-CYL-165	202.84	05/06/2028	1.2	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	202.84	100	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	36
measured concentration (REF)	mg/m^3	13.9

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
7.2%

MU factor O_2 correction
0.06

	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	0.014
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.16
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.45	day of testing	U_{dz}	mg/m^3	0.036
maximum short term span drift (ABS) [after drift correction]	ds	% of value	0.27	day of testing	U_{ds}	mg/m^3	0.021
influence of sample gas flow	f	% of value	0.1	MCERTS certificate MC130223	U_f	mg/m^3	0.008
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
influence of supply voltage (/ 60V)	v	% of value	0.4	MCERTS certificate MC130223	U_v	mg/m^3	0.021
cross sensitivity at zero	iz	% of value	0.63	MCERTS certificate MC130223	U_{iz}	mg/m^3	0.051
cross sensitivity at span	is	% of value	-0.52	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.042
maximum leak	L	% of value	0.069	day of testing	U_L	mg/m^3	0.0056
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	mg/m^3	0.084
		combined MU with O_2 correction				mg/m^3	0.55
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	1.1
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	7.7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6
		expanded MU with O_2 correction (k = 1.96) as percentage of ELV [allowable 12.3%]				%	3

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, 15% O_2

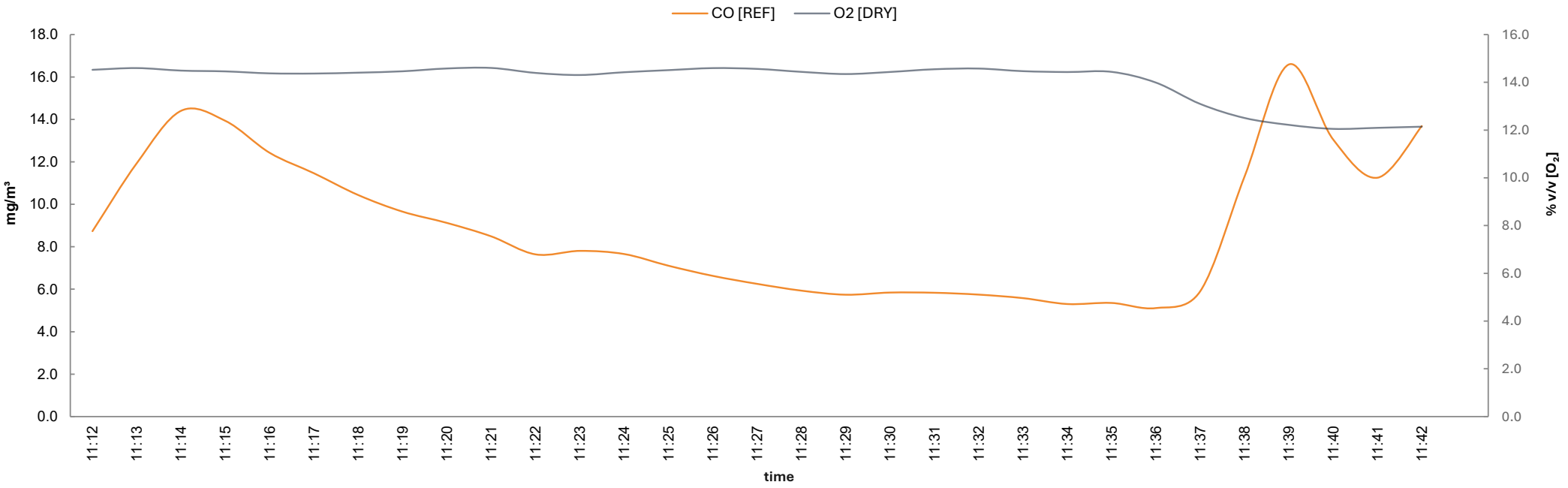
parameter	units	result ± MU (95% CI)	units	result ± MU (95% CI)
Carbon Monoxide	mg/m^3	8.9 ± 0.69	g/hr	21.9 ± 1.2

General Information

parameter	details
sampling start date & time	31/07/2025 11:12
sampling end date & time	31/07/2025 11:42
test time | mins	30
testing team	ZH | MG
standard | technical procedure	EN 15058 | TP-22b
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_{90} [s]	leak [%]		date & time	zero [A] [ppm]	span [A] [ppm]	zero drift [%]		span drift [%]		allowable [%]	temp [°C]
1	31/07/25 10:44	0.00	168.10	0.20	167.00	34	0.7	P	31/07/25 14:23	0.30	164.50	0.2	P	-2.4	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	ZH	Yes	60	A-CYL-165	168.10	05/06/2028	1.0	Nitrogen 5.2	5l 200ppm NO | 160ppm CO | 16% CO2 in Nitrogen	168.10	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	8.9

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
voltage	V	90.0	130.0

overall MU for O_2 correction
7.2%

MU factor O_2 correction
0.06

	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	0.0089
repeatability at span	rs	% of value	0.2	MCERTS certificate MC130223	U_{rs}	mg/m^3	0.018
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	mg/m^3	0.1
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	0.0051
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
influence of ambient temperature span point (/ 35k)	ts	% of value	2	MCERTS certificate MC130223	U_{ts}	mg/m^3	0
influence of supply voltage (/ 60V)	v	% of value	0.5	MCERTS certificate MC130223	U_v	mg/m^3	0.017
cross sensitivity at zero	iz	% of value	-0.48	MCERTS certificate MC130223	U_{iz}	mg/m^3	-0.025
cross sensitivity at span	is	% of value	-0.87	MCERTS certificate MC130223	U_{is}	mg/m^3	-0.045
maximum leak	L	% of value	0.65	day of testing	U_L	mg/m^3	0.034
uncertainty associated with calibration gas	adj	% of value	0.99	span gas calibration certificate	U_{adj}	mg/m^3	0.044
		combined MU with O_2 correction				mg/m^3	0.35
		expanded MU with O_2 correction (k = 1.96)				mg/m^3	0.69
		expanded MU 95% CI with O_2 correction (k = 1.96) as percentage of measured value				%	7.7
		expanded MU 95% CI (k = 1.96) as percentage of measured value for mass emission				%	5.6

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	14 ± 0.5

General Information

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

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	31/07/25 10:44	0.00	21.18	0.07	20.93	18	1.2	P	31/07/25 14:23	0.20	21.00	0.8	P	-1.7	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	ZH	No	60	A-CYL-135	21.18	15/08/2029	1.2	Nitrogen 5.2	10l Synthetic Air	21.18	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	14

MU budget			
parameter	units	min	max
ambient temp	°C	19.0	19.0
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	0.0028
repeatability at span	rs	% of value	0.02	MCERTS certificate MC130223	U_{rs}	% v/v	0.0028
lack of fit	lof	% of value	2	maximum allowable	U_{lof}	% v/v	0.16
maximum short term zero drift (ABS) [after drift correction]	dz	% of value	0.82	day of testing	U_{dz}	% v/v	0.066
maximum short term span drift (ABS) [after drift correction]	ds	% of value	1.7	day of testing	U_{ds}	% v/v	0.13
influence of sample gas flow	f	% of value	-0.01	MCERTS certificate MC130223	U_{f}	% v/v	-0.00081
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
influence of ambient temperature span point (/ 35k)	ts	% of value	-0.15	MCERTS certificate MC130223	U_{ts}	% v/v	0
influence of supply voltage (/ 60V)	v	% of value	0.02	MCERTS certificate MC130223	U_{v}	% v/v	0.0011
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	1.2	day of testing	U_{L}	% v/v	0.096
uncertainty associated with calibration gas	adj	% of value	1.2	span gas calibration certificate	U_{adj}	% v/v	0.084
		combined MU				% v/v	0.25
		expanded MU 95% CI (k = 1.96)				% v/v	0.5
		expanded MU 95% CI (k = 1.96) as percentage of measured value				%	3.6

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	101.8
average wet density	kg/m^3	0.553
average stack static pressure	Pa	45.0
pitot tube coefficient, C_p	-	0.832

ND = Not Detected
NM = Not Measured

Line A

static pressure = 45 Pa

Pt	Depth | m	ΔP | Pa	Temp | °C	Vel | m/s	Swirl | °
1	0.13	336.0	368.0	28.9	< 15

General Information

parameter	details
traverse date	31/07/2025
traverse times | performed by	11:05 - 11:07 | performed by: ZH | MG
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	5.3
standard uncertainty associated with the molar mass of the gas	-	0.000031
standard uncertainty associated with the temperature	K	3.3
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	0.003
standard uncertainty associated with the local velocities	m/s	0.25
standard uncertainty associated with the mean velocity	m/s	0.24

ND = Not Detected

parameter	units	value
standard uncertainty associated with the mean velocity (95% CI)	m/s	0.47
standard uncertainty associated with the mean velocity (95% CI), relative	%	1.6
standard uncertainty associated with the volume flow rate @ actual (95% CI)	m^3/hr	246
standard uncertainty associated with the volume flow rate @ actual (95% CI), relative	%	4.8
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI)	m^3/hr	116
standard uncertainty associated with the volume flow rate @ ref 1 (95% CI), relative	%	4.8

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