Site Visit Report

The site visit process is a sample on a particular day of an installation's compliance with some of its licence conditions. Where non-compliance against a particular condition has not been reported, this should not be construed to mean that there is full compliance with that condition of the licence.

Instructions and actions arising from the visit shall be addressed, or where applicable noted, by the licensee in order to ensure compliance, to improve the environmental performance of the installation and to provide clarification on certain issues.

The licensee shall take the actions specified to close out the non-compliances and observations raised in this Site Visit Report.

The licensee may also be requested to provide a response to the Environmental Protection Agency (hereafter referred to as the Agency) in relation to the site visit report findings.

Licensee

Name of Installation	Wellman International Limited
Licensee	Wellman International Limited
Licence Register No.	P0236-02
CRO Number	31341
Site Address	Mullagh, Kells, Meath
Site Visit Reference No.	SV33241

Report Detail

Issue Date	04/12/2025
Prepared By	Aimee Carroll

Site Visit Detail

Date Of Inspection	16/09/2025		
Time In	09:00	**Time Out**	17:00
EPA Inspector(s)			
Additional Visitors	Element		
Licensee Personnel and Role	N/A		

Summary

This site visit was conducted as part the Agency’s response to a complaint investigation. The monitoring report is attached.

Site Areas Inspected

See report.

Documents Inspected

See report.

EPA AIR EMISSIONS COMPLIANCE MONITORING EMISSIONS REPORT

(Prepared on behalf of the EPA by Element Ireland - EPA Contract No. OEE25-AEMP)

Element Ireland, Unit D8 North City Business Park, North Road, Finglas, Dublin 11
Your Element Ireland Contact: James Magann (+353 (0)877 566 106)
E: james.magann@element.com

Stack Emissions Testing Report Commissioned by
EPA Office of Environmental Enforcement

Installation Name & Address
Wellman International Limited
Mullagh
Kells
Co. Cavan

IPC Authorisation: P0236-02

Stack Reference
NGR Line

Dates of the Monitoring Campaign
16th September 2025

Job Reference Number
P0236-02CAR25-02

Report Written by
James O Connor Team Leader MCERTS Level 2 MM22 1720 TE1 TE2 TE3 TE4

Report Checked by	Report Approved by
Darragh Long Reporting Manager MCERTS Level 2 MM 18 1494 TE1 TE2 TE3 TE4	Donal O Faogain Technical Report Writer MCERTS Level 2 MM13 1259 TE1 TE2 TE3 TE4

Report Date
15th October 2025

Version
Version 1

Signature of Report Checker	Signature of Report Approver
	

CONTENTS

Opinions and interpretations expressed herein are outside the scope of Element Ireland's ISO 17025 accreditation.

The testing performed fully meets the technical requirements in Irish EPA Guidance Note, AG2.

MONITORING OBJECTIVES

Wellman International Limited, Kells
NGR Line
16th September 2025

Overall Aim of the Monitoring Campaign

Element Ireland were commissioned by the EPA Office of Environmental Enforcement to carry out stack emissions testing at Wellman International Limited on the NGR Line at Kells.

The aim of the monitoring campaign was to perform testing, as requested by the customer, for a number of prescribed pollutants. There are no emission limits set for any of the pollutants at this time.

Special Requirements

There were no special requirements.

Target Parameters

Heavy Metals, Tungsten, Total VOCs (as Carbon)

Executive Summary

MONITORING RESULTS

Wellman International Limited, Kells
NGR Line
16th September 2025

where MU = Measurement Uncertainty associated with the Result

		Concentration				Mass Emission			
Parameter		**Units**	**Result**	**MU +/-**	**Limit**	**Units**	**Result**	**MU +/-**	**Limit**
Heavy Metals	[1]	mg/m³	0.03	0.01	-	g/hr	0.001	0.0004	-
Tungsten	[1]	mg/m³	0.008	0.002	-	g/hr	0.0002	0.0001	-
Total VOCs (as Carbon)	[1]	mg/m³	5415	177	-	g/hr	107	57.3	-
Water Vapour		% v/v	3.8	0.20					
Stack Gas Temperature		°C	23.3						
Stack Gas Velocity		m/s	1.6	0.83					
Volumetric Flow Rate (ACTUAL)		m³/hr	22	11					
Volumetric Flow Rate (REF)	[1]	m³/hr	20	11					

NOTE: VOLUMETRIC FLOW RATE & VELOCITY DATA TAKEN FROM THE PRELIMINARY VELOCITY TRAVERSE.

[1] Reference Conditions (REF) are: 273K, 101.3kPa, without correction for water vapour content.

MONITORING DATE(S) & TIMES

Wellman International Limited, Kells
NGR Line
16th September 2025

Parameter		Units	Concentration	Units	Mass Emission	Sampling Date(s)	Sampling Times	Duration mins
Heavy Metals	R1	mg/m³	0.03	g/hr	0.001	16/09/2025	11:00 - 12:00	60
Tungsten	R1	mg/m³	0.008	g/hr	0.0002	16/09/2025	11:00 - 12:00	60
Total VOCs (as Carbon)	R1	mg/m³	5415	g/hr	107	16/09/2025	11:03 - 11:33	30
Velocity Traverse	R1					16/09/2025	10:40 - 10:45	

All results are expressed at the respective reference conditions.

PROCESS DETAILS

Wellman International Limited, Kells
NGR Line
16th September 2025

Standard Operating Conditions

Parameter	Value
Process Status	NGR Process
Capacity (of 100%) and Tonnes / Hour	100%
Continuous or Batch Process	Continous
Feedstock (if applicable)	Monomers
Abatement System	Dry Scrubbing
Abatement System Running Status	Yes
Fuel	N/A
Plume Appearance	None Visible

Executive Summary

(Page 5 of 7)

MONITORING & ANALYTICAL METHODS

Wellman International Limited, Kells
NGR Line
16th September 2025

	Monitoring				Analysis					
Parameter	**Standard**	**Technical Procedure**	**Sampling Status**	**Testing Lab**	**Analytical Procedure**	**Analytical Technique**	**Analysis Status**	**Analysis Lab**	**Overall Status**	**LOD (Average)**
Heavy Metals	EN 14385	MD 006	MCERTS	EDU	M31	ICP-MS	MCERTS	RPS	MCERTS	0.008 mg/m³
Tungsten	EN 14385	MD 006	MCERTS	EDU	M31	ICP-MS	MCERTS	RPS	MCERTS	0.004 mg/m³
Water Vapour	EN 14790	MD 005	MCERTS	EDU	MD 005	Gravimetric	MCERTS	EDU	MCERTS	0.10 % v/v
Total VOCs (as Carbon)	EN 12619:2013	MD 020	MCERTS	EDU	Flame Ionisation Detection by Sick 3006				MCERTS	0.32 mg/m³
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	MD 041	MCERTS	EDU	Pitot Tube and Thermocouple				MCERTS	1.2 m/s

ANALYSIS LABORATORIES

(with short name reference as appears in the table above)

Element (Dublin Lab - EDU)	ISO 17025 Accreditation Number: INAB 393T
RPS Laboratories Ltd (RPS)	ISO 17025 Accreditation Number: UKAS 0605

SUMMARY OF SAMPLING DEVIATIONS

Parameter	Run	Deviation
All	All	Lowest differential pressure < 5 Pa.
Heavy Metals	1	The absorption efficiency for all of the individual metals was not met, however it should be noted the results were of an extremely low order.

SUITABILITY OF SAMPLING LOCATION

Duct Characteristics

Parameter	Units	Value
Type	-	Circular
Depth	m	0.07
Width	m	-
Area	m²	0.00
Port Depth	cm	5
Orientation of Duct	-	Vertical
Number of Ports	-	1
Sample Port Size	-	2" BSP

Location of Sampling Platform

General Platform Information	Value
Permanent / Temporary Platform	Scissor Lift
Inside / Outside	Inside

Platform Details

Irish EPA Technical Guidance Note AG1 / EN 15259 Platform Requirements	Value
Sufficient working area to manipulate probe and operate the measuring instruments	N/A
Platform has 2 levels of handrails (approx. 0.5m & 1.0m high)	N/A
Platform has vertical base boards (approx. 0.25m high)	N/A
Platform has chains / self closing gates at top of ladders	N/A
There are no obstructions present which hamper insertion of sampling equipment	N/A
Safe Access Available	N/A
Easy Access Available	N/A

Sampling Location / Platform Improvement Recommendations

All platforms should be designed in accordance with the requirements in EPA Guidance Note AG1 and EN 15259.

EN 15259 Homogeneity Test Requirements

There is no requirement to perform a EN 15259 Homogeneity Test on this Stack.

Sampling Plane Validation Criteria (from EN 15259)

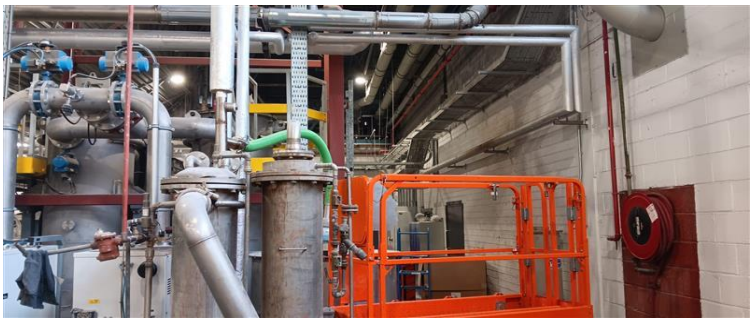
Criteria in EN 15259	Units	Traverse 1	Required	Compliant
Lowest Differential Pressure	Pa	2.0	> 5 Pa	No
Mean Velocity	m/s	1.55	-	-
Lowest Gas Velocity	m/s	1.55	-	-
Highest Gas Velocity	m/s	1.55	-	-
Ratio of Above	: 1	1.00	< 3 : 1	Yes
Maximum Angle of Swirl	°	3.00	< 15°	Yes
No Local Negative Flow	-	Yes	-	Yes

PLANT PHOTOS

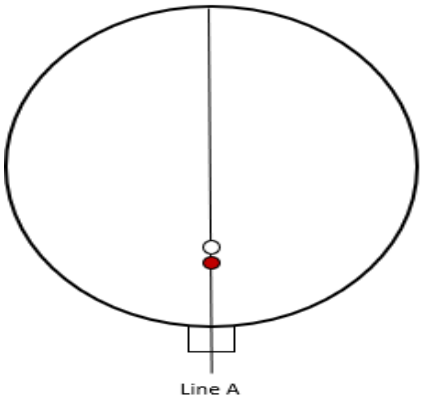
Photo 1

Photo 2

Photo 3



SAMPLE POINTS



where
= isokinetic point sampled at
= isokinetic point not sampled at
= combustion gases sample point
= non-isokinetic sample point

APPENDIX CONTENTS

APPENDIX 1

STACK EMISSIONS MONITORING PERSONNEL

Position	Name	MCERTS Accreditation	MCERTS Number	Technical Endorsements
Team Leader	James O Connor	MCERTS Level 2	MM22 1720	TE1 TE2 TE3 TE4
Trainee	Conor Fox	MCERTS Trainee	MM25 1888	None

LIST OF EQUIPMENT

Extractive Sampling	
Equipment Type	**Equipment I.D.**
Control Box DGM (1)	CAT 7.103
Control Box DGM (2)	-
Box Thermocouples (1)	CAT 3.208
Box Thermocouples (2)	-
Umbilical (1)	CAT 3.208
Umbilical (2)	-
Oven Box (1)	CAT 12.971
Oven Box (2)	-
Heated Probe (1)	CAT 5.52
Heated Probe (2)	-
Heated Probe (3)	-
S-Pitot (1)	CAT 21S.73
S-Pitot (2)	CAT 21P.104
L-Pitot	-
Site Balance	CAT 17.37
500g / 1Kg Check Weights	CAT 17.37
Last Impinger Arm	-
Callipers	CAT 23.58
Tubes Kit Thermocouple	-

Instrumental Analysers	
Equipment Type	**Equipment I.D.**
Horiba PG-250	-
Horiba PG-350E	-
Servomex 4900	-
Eco Physics CLD 822Mh	-
ABB AO2020-URAS26	-
Testo 350 XL	-
JCT JCC P1 Cooler	-
Gasmet DX4000	-
Gasmet Sampling System	-
Sick 3006	CAT 8.20
M&C PSS	CAT 12.83
Mass Flow Controller (1)	CAT 6.45
Mass Flow Controller (2)	CAT 6.85
Mass View (1)	-
Mass View (2)	-
Hioki 5043 (V)	CAT 11.76
Easylogger EN-EL-12 Bit	-
Bioaerosols Temperature Logger	-
Electronic Refrigerator	-

Miscellaneous Items	
Equipment Type	**Equipment I.D.**
Digital Manometer (1)	CAT 3.250
Digital Manometer (2)	CAT 3.261
Digital Temperature Meter	CAT 3.250
Stopwatch	CAT 14.53
Barometer	CAT 13.39
Stack Thermocouple (1)	CAT 4.00093
Stack Thermocouple (2)	CAT 4.2061
Stack Thermocouple (3)	-
1m Heated Line (1)	-
1m Heated Line (2)	-
1m Heated Line (3)	-
5m Heated Line (1)	-
15m Heated Line (1)	CAT 20.998
20m Heated Line (1)	-
20m Heated Line (2)	-
Dual Channel Heater Controller	-
Single Channel Heater Controller	CAT 20.998
Laboratory Balance	
Tape Measure	CAT 16.35

METHODS & TECHNICAL PROCEDURES USED

Parameter	Standard	Technical Procedure
Heavy Metals	EN 14385	MD 006
Tungsten	EN 14385	MD 006
Water Vapour	EN 14790	MD 005
Total VOCs (as Carbon)	EN 12619:2013	MD 020
Velocity & Vol. Flow Rate	EN 16911-1 (MID)	MD 041

PRELIMINARY STACK SURVEY: CALCULATIONS

General Stack Details

Stack Details (from Traverse)	Units	Value
Stack Diameter / Depth, D	m	0.07
Stack Width, W	m	-
Stack Area, A	m²	0.00
Average Stack Gas Temperature, T_a	°C	23.3
Average Stack Gas Pressure	Pa	2.0
Average Stack Static Pressure, P_{static}	kPa	-0.001
Average Barometric Pressure, P_b	kPa	101.0
Average Pitot Tube Calibration Coefficient, C_p	-	0.84

Stack Gas Composition & Molecular Weights

Component	Conc ppm	Conc Dry % v/v	Conc Wet % v/v	Volume Fraction r	Molar Mass M	Density kg/m³ p	Conc kg/m³ p_i
CO_2 (Estimated)	-	0.06	0.06	0.0006	44.01	1.9635	0.00118
O_2 (Estimated)	-	20.80	20.02	0.2080	32.00	1.4277	0.29696
N_2	-	79.14	76.17	0.7914	28.01	1.2498	0.98913
Moisture (H_2O)	-	-	3.76	0.0376	18.02	0.8037	0.03020

Where: $p = M / 22.41$

$p_i = r \times p$

Calculation of Stack Gas Densities

Determinand	Units	Result
Dry Density (STP), P_{STD}	kg/m³	1.287
Wet Density (STP), P_{STW}	kg/m³	1.269
Dry Density (Actual), P_{Actual}	kg/m³	1.183
Average Wet Density (Actual), $P_{ActualW}$	kg/m³	1.166

Where: P_{STD} = sum of component concentrations, kg/m³ (not including water vapour)

P_{STW} = sum of all wet concentrations / 100 x density, kg/m³ (including water vapour)

$P_{Actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times ((P_{static} + P_b) / T_a)$

$P_{ActualW}$ (at each sampling point) $= P_{STW} \times (T_s / P_s) \times (P_a / T_a)$

Calculation of Stack Gas Volumetric Flowrate, Q

Duct gas flow conditions	Units	Actual	REF [1]
Temperature	°C	23.3	0.0
Total Pressure	kPa	101.0	101.3
Moisture	%	3.76	3.76

Gas Volumetric Flowrate (from Traverse)	Units	Result
Gas Volumetric Flowrate (Actual)	m³/hr	22
Gas Volumetric Flowrate (STP, Wet)	m³/hr	20
Gas Volumetric Flowrate (STP, Dry)	m³/hr	19
Gas Volumetric Flowrate REF [1]	m³/hr	20

APPENDIX 2

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE TO EN 16911-1 (MID)

(1 of 1)

Parameter	Units	Value
Date of Survey	-	16/09/2025
Time of Survey	-	10:40 - 10:45
Atmospheric Pressure	kPa	101.0
Average Stack Static Pressure	Pa	-1
Result of Pitot Stagnation Test	-	Pass
Are Water Droplets Present?	-	No
Device Used	S-Type Pitot with KIMO MP 210 (500Pa)	

Parameter	Units	Value
Initial Pitot Leak Check	-	Pass
Final Pitot Leak Check	-	Pass
Orientation of Duct	-	Vertical
Pitot Tube, C_p	-	0.84
Number of Lines Available	-	1
Number of Lines Used	-	1

Sampling Line A

Traverse Point	Depth m	ΔP Pa	Temp °C	Wet Density kg/m³	Velocity m/s	Swirl °
STATIC (Units: Pa)		*-1.0*				
Mean		**2.0**	**23.3**	**1.166**	**1.55**	
1	0.04	2.0	23.3	1.166	1.55	3.0

PRELIMINARY STACK SURVEY: VELOCITY TRAVERSE TO EN 16911-1 (MID) - MEASUREMENT UNCERTAINTY

(1 of 1)

Performance characteristics (Uncertainty Components)	Uncertainty	Value	Units
Standard Uncertainty on the coefficient of the Pitot Tube	u(k)	0.005	-
Standard Uncertainty associated with the mean local dynamic pressures	u(Δpi)	1.045	Pa
- Resolution	u(res)	0.00087	
- Calibration	u(cal)	0.000	
- Drift	u(drift)	0.083	
- Lack of Fit	u(fit)	0.008	
- Overall corrections to dynamic measurements	u(Cf)	0.092	
Standard uncertainty associated with the molar mass of the gas	u(M)	0.00003	-
- $\varphi O_2,w$	-	20.018	
- $\varphi CO_2,w$	-	0.058	
- Oxygen, dry	u(ϕO_2,d)	0.637	
- Carbon Dioxide, dry	u(ϕCO_2,d)	0.002	
- Water Vapour	u(ϕH_2O)	0.192	
- Oxygen, wet	u(ϕO_2,w)	0.614	
- Carbon Dioxide, wet	u(ϕCO_2,w)	0.002	
Standard uncertainty associated with the stack temperature	u(Tc)	1.512	K
Standard uncertainty associated with the absolute pressure in the duct	u(pc)	175.695	Pa
- Atmospheric Pressure	u(patm)	175.692	
- Static Pressure	u(pstat)	1.045	
Standard uncertainty associated with the density in the duct	u(ρ)	0.00641	-
Standard uncertainty associated with the local velocities	u(vi)	0.422	Pa
Standard uncertainty associated with the mean velocity	u(v)	0.422	m/s
Standard uncertainty associated with the mean velocity (95% Confidence)	Uc(v)	0.827	m/s
Standard uncertainty associated with the mean velocity (95% Confidence), relative	Uc,rel(v)	53.17	%
Standard uncertainty associated with the volume flow rate (95% Confidence)	Uc(qV,w)	11.5	m^3/hr
- $u^2(a)/a^2$	-	0.00053	
- $u^2(qV,w)/q^2V,w$	-	0.07413	
- $u^2(qV,w)$	-	34	
- $u(qV,w)$	-	5.9	
Standard uncertainty associated with the volume flow rate (95% Confidence), relative	Uc,rel(qV,w)	53.36	%

APPENDIX 2

HEAVY METALS: RESULTS SUMMARY

Wellman International Limited, Kells
NGR Line

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	0.03		0.03
Uncertainty	±mg/m³	0.01		0.01
Mass Emission	g/hr	0.001		0.001
Uncertainty	±g/hr	0.0004		0.0004

Parameter	Units	Run 1		Mean
Water Vapour	% v/v	3.8		3.8
Uncertainty	±% v/v	0.20		0.20

Blank Runs

Parameter	Units	Blank 1		Maximum
Concentration	mg/m³	0.01		0.01

General Sampling Information

Parameter	Value	
Standard	EN 14385	
Technical Procedure	MD 006	
Name of Analytical Laboratory	RPS	
Analytical Laboratory's Procedure	M31	
ISO 17025 Accredited Analysis?	MCERTS	
Date of Sample Analysis	09/10/2025	
Probe Material	Titanium	
Filter Housing Material	Borosilicate Glass	
Impinger Material	Borosilicate Glass	
Absorption Solution	Nitric Peroxide	
Positioning of Filter	Out Stack	
Filter Size and Material	47mm Quartz Fibre	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

HEAVY METALS: ISOKINETIC SAMPLING CALCULATIONS

Test	Units	Run 1
Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	mmHg	757.6
Stack static pressure, P_{static}	mmH_2O	-0.1
$P_s = (P_b + (P_{static} / 13.6)$	mmHg	757.6
Volume of water vapour collected, V_{wstd}		
Total mass collected in impingers (liquid trap)	g	8.3
Total mass collected in impingers (silica trap)	g	26.3
Total mass of liquid collected, V_{lc}	g	34.6
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.0431
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m	m^3	1.1720
Gas meter correction factor, Y_d	-	1.0140
Average dry gas meter temperature, T_m	°C	20.8
Average pressure drop across orifice, ΔH	mmH_2O	31.7
$V_{mstd} = ((0.3592)(V_m)(P_b + (\Delta H/13.6))(Y_d)) / (T_m + 273)$	m^3	1.1041
Moisture content, B_{wo} & R_{wv}		
$B_{wo} = V_{wstd} / (V_{mstd} + V_{wstd})$	m^3	0.0376
B_{wo} as a percentage	% v/v	3.76
Reported Water Vapour, checked with Tables in EN 14790, Rwv	% v/v	3.76
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = (V_{mstd})(100/(100 - R_{wv}))$	m^3	1.1472
Volume of gas metered at Oxygen Reference Conditions, $V_{mstd@X\%O_2}$ & $V_{mstw@X\%O_2}$		
IED & Incinerates Hazardous Material? (Yes = no positive O_2 correction)	-	No
% wet oxygen measured in gas stream, $ACT\%O_{2w}$	% v/v	N/A
% dry oxygen measured in gas stream, $ACT\%O_{2d}$	% v/v	N/A
% oxygen reference condition, $REF\%O_2$	% v/v	N/A
O_2 Reference Factor wet $(O_{2REFw}) = (21 - REF\%O_2) / (21 - ACT\%O_{2w})$	-	N/A
O_2 Reference Factor dry $(O_{2REFd}) = (21 - REF\%O_2) / (21 - ACT\%O_{2d})$	-	N/A
$V_{mstw@X\%oxygen} = (V_{mstw}) / (O_{2REFw})$	m^3	N/A
$V_{mstd@X\%oxygen} = (V_{mstd}) / (O_{2REFd})$	m^3	N/A
Molecular weight of dry gas stream, M_d		
CO_2 (Estimated)	% v/v	0.06
O_2 (Estimated)	% v/v	20.80
Total	% v/v	20.86
N_2	% v/v	79.14
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$	g/gmol	28.84
Molecular weight of stack gas (wet), M_s		
$M_s = M_d(1 - (R_{wv}/100)) + 18(R_{wv}/100)$	g/gmol	28.43
Velocity of stack gas, V_s		
Pitot tube velocity constant, K_p	-	34.97
Velocity pressure coefficient, C_p	-	0.83
Average of velocity heads, ΔP_{avg}	mmH_2O	0.20
Average square root of velocity heads, √ΔP	$\sqrt{mmH_2O}$	0.45
Average stack gas temperature, T_s	°C	20.5
$V_s = ((K_p)(C_p)(\sqrt{\Delta P})(\sqrt{T_s} + 273)) / (\sqrt{(M_s)(P_s)})$	m/s	1.52
Total flow of stack gas: Actual (Q_a), Wet (Q_{stw}), Dry (Q_{std}), Wet@O_{2REF} (Q_{stwO_2}), Dry@O_{2REF} (Q_{stdO_2})		
Area of stack, A_s	m^2	0.00
$Q_a = (60)(A_s)(V_s)$	m^3/min	0.4
Conversion factor (K/mm.Hg), C_f	-	0.3592
$Q_{stw} = ((Q_a)(P_{sj})(C_f)) / ((T_s) + 273)$	m^3/min	0.3
$Q_{std} = ((Q_a)(P_s)(C_f)(1 - (R_{wv}/100))) / ((T_s) + 273)$	m^3/min	0.3
$Q_{stwO_2} = ((Q_a)(P_s)(C_f)) / ((T_s) + 273) / (O_{2REFw})$	m^3/min	N/A
$Q_{stdO_2} = ((Q_a)(P_s)(C_f)(1 - (R_{wv}/100))) / ((T_s) + 273) / (O_{2REFd})$	m^3/min	N/A
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	15.88
Nozzle area, A_n	mm^2	198.08
Total sampling time, q	min	60
$\%I = (4.6398E^6)(T_s+273)(V_{mstd}) / (P_s)(V_s)(A_n)(q)(1 - (R_{wv}/100))$	%	114.2

APPENDIX 2

HEAVY METALS: SAMPLING DETAILS

(PAGE 1 OF 5)

Sample Runs

Parameter	Units	Run 1
Sampling Times	-	11:00 - 12:00
Sampling Dates	-	16/09/2025
Sampling Device	-	ISO
Volume Sampled (REF)	m^3	1.1472
Arsenic		
Mass on Filter / in Rinse	µg	< 0.50
Mass in Front Impingers	µg	0.31
Mass in Back Impinger	µg	0.03
Total Mass Collected	µg	0.84
Calculated Concentration	mg/m^3	0.0007
Reported Concentration	mg/m^3	0.0007
Mass Emission	g/hr	0.00001
Cobalt		
Mass on Filter / in Rinse	µg	< 0.50
Mass in Front Impingers	µg	< 0.04
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	< 0.56
Calculated Concentration	mg/m^3	< 0.0005
Reported Concentration	mg/m^3	< 0.0005
Mass Emission	g/hr	< 0.00001
Chromium		
Mass on Filter / in Rinse	µg	2.60
Mass in Front Impingers	µg	0.96
Mass in Back Impinger	µg	1.15
Total Mass Collected	µg	4.71
Calculated Concentration	mg/m^3	0.0041
Reported Concentration	mg/m^3	0.0041
Mass Emission	g/hr	0.00008
Copper		
Mass on Filter / in Rinse	µg	3.20
Mass in Front Impingers	µg	0.84
Mass in Back Impinger	µg	1.03
Total Mass Collected	µg	5.07
Calculated Concentration	mg/m^3	0.0044
Reported Concentration	mg/m^3	0.0044
Mass Emission	g/hr	0.00009
Manganese		
Mass on Filter / in Rinse	µg	2.90
Mass in Front Impingers	µg	0.29
Mass in Back Impinger	µg	0.16
Total Mass Collected	µg	3.35
Calculated Concentration	mg/m^3	0.0029
Reported Concentration	mg/m^3	0.0029
Mass Emission	g/hr	0.00006

HEAVY METALS: SAMPLING DETAILS

Sample Runs (continued)

Parameter	Units	Run 1
Nickel		
Mass on Filter / in Rinse	µg	7.90
Mass in Front Impingers	µg	0.39
Mass in Back Impinger	µg	0.05
Total Mass Collected	µg	8.34
Calculated Concentration	mg/m³	0.0073
Reported Concentration	mg/m³	0.0073
Mass Emission	g/hr	0.00014
Lead		
Mass on Filter / in Rinse	µg	4.30
Mass in Front Impingers	µg	0.61
Mass in Back Impinger	µg	0.46
Total Mass Collected	µg	5.37
Calculated Concentration	mg/m³	0.0047
Reported Concentration	mg/m³	0.0047
Mass Emission	g/hr	0.00009
Antimony		
Mass on Filter / in Rinse	µg	< 0.60
Mass in Front Impingers	µg	0.10
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	0.72
Calculated Concentration	mg/m³	0.0006
Reported Concentration	mg/m³	0.0006
Mass Emission	g/hr	0.00001
Vanadium		
Mass on Filter / in Rinse	µg	< 0.40
Mass in Front Impingers	µg	0.04
Mass in Back Impinger	µg	0.02
Total Mass Collected	µg	0.46
Calculated Concentration	mg/m³	0.0004
Reported Concentration	mg/m³	0.0004
Mass Emission	g/hr	0.00001
Tungsten		
Mass on Filter / in Rinse	µg	6.60
Mass in Front Impingers	µg	< 2.05
Mass in Back Impinger	µg	< 1.02
Total Mass Collected	µg	9.67
Calculated Concentration	mg/m³	0.0084
Reported Concentration	mg/m³	0.0084
Mass Emission	g/hr	0.00017

HEAVY METALS: SAMPLING DETAILS

Sample Runs (continued)

Heavy Metals Combined			
Total Mass Collected	µg	39.10	
Calculated Concentration	mg/m³	0.0341	
Reported Concentration	mg/m³	0.0341	

Where: ISO stands for Manual Isokinetic Sampling Train

Blank Runs

Parameter	**Units**	**Blank 1**	
Blank Dates	-	16/09/2025	
Average Volume Sampled (REF)	m³	1.1472	
Arsenic			
Mass on Filter / in Rinse	µg	< 0.50	
Mass in Front Impingers	µg	< 0.06	
Mass in Back Impinger	µg	< 0.03	
Total Mass Collected	µg	< 0.59	
Calculated Concentration	mg/m³	< 0.0005	
Reported Concentration	mg/m³	< 0.0005	
Cobalt			
Mass on Filter / in Rinse	µg	< 0.50	
Mass in Front Impingers	µg	< 0.04	
Mass in Back Impinger	µg	< 0.02	
Total Mass Collected	µg	< 0.56	
Calculated Concentration	mg/m³	< 0.0005	
Reported Concentration	mg/m³	< 0.0005	

HEAVY METALS: SAMPLING DETAILS

(PAGE 4 OF 5)

Blank Runs (continued)

Parameter	Units	Blank 1
Chromium		
Mass on Filter / in Rinse	µg	0.80
Mass in Front Impingers	µg	< 0.04
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	0.86
Calculated Concentration	mg/m³	0.0007
Reported Concentration	mg/m³	0.0007
Copper		
Mass on Filter / in Rinse	µg	< 0.60
Mass in Front Impingers	µg	0.46
Mass in Back Impinger	µg	< 0.04
Total Mass Collected	µg	1.10
Calculated Concentration	mg/m³	0.0010
Reported Concentration	mg/m³	0.0010
Manganese		
Mass on Filter / in Rinse	µg	0.50
Mass in Front Impingers	µg	0.36
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	0.88
Calculated Concentration	mg/m³	0.0008
Reported Concentration	mg/m³	0.0008
Nickel		
Mass on Filter / in Rinse	µg	0.80
Mass in Front Impingers	µg	< 0.06
Mass in Back Impinger	µg	< 0.03
Total Mass Collected	µg	0.89
Calculated Concentration	mg/m³	0.0008
Reported Concentration	mg/m³	0.0008
Lead		
Mass on Filter / in Rinse	µg	< 0.50
Mass in Front Impingers	µg	0.84
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	1.36
Calculated Concentration	mg/m³	0.0012
Reported Concentration	mg/m³	0.0012
Antimony		
Mass on Filter / in Rinse	µg	< 0.60
Mass in Front Impingers	µg	0.12
Mass in Back Impinger	µg	< 0.02
Total Mass Collected	µg	0.74
Calculated Concentration	mg/m³	0.0006
Reported Concentration	mg/m³	0.0006
Vanadium		
Mass on Filter / in Rinse	µg	< 0.40
Mass in Front Impingers	µg	0.06
Mass in Back Impinger	µg	< 0.01
Total Mass Collected	µg	0.47
Calculated Concentration	mg/m³	0.0004
Reported Concentration	mg/m³	0.0004

HEAVY METALS: SAMPLING DETAILS

Blank Runs (continued)

Parameter	Units	Blank 1	
Tungsten			
Mass on Filter / in Rinse	µg	5.60	
Mass in Front Impingers	µg	< 2.00	
Mass in Back Impinger	µg	< 1.02	
Total Mass Collected	µg	8.62	
Calculated Concentration	mg/m³	0.0075	
Reported Concentration	mg/m³	0.0075	
Heavy Metals Combined			
Total Mass Collected	µg	16.07	
Calculated Concentration	mg/m³	0.0140	
Reported Concentration	mg/m³	0.0140	

APPENDIX 2

HEAVY METALS: QUALITY ASSURANCE

(PAGE 1 OF 2)

Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	19.8
Pre-Sampling Leak Rate	l/min	0.28
Post-Sampling Leak Rate	l/min	N/A
Allowable Leak Rate	l/min	0.40
Leak Test Acceptable	-	Yes

Absorption Efficiency	Units	Run 1
Arsenic	%	96.3
Cobalt	%	100.0
Chromium	%	75.7
Copper	%	79.6
Manganese	%	95.1
Nickel	%	99.4
Lead	%	91.4
Antimony	%	100.0
Vanadium	%	95.6
Tungsten	%	100.0
Allowable Absorption Efficiency	%	90
Absorption Efficiency Acceptable	-	No

Detection Limit	Units	Run 1
Arsenic	µg/m³	0.5
Cobalt	µg/m³	0.5
Chromium	µg/m³	0.5
Copper	µg/m³	0.6
Manganese	µg/m³	0.4
Nickel	µg/m³	0.6
Lead	µg/m³	0.5
Antimony	µg/m³	0.6
Vanadium	µg/m³	0.4
Tungsten	µg/m³	3.5
Allowable Detection Limit	µg/m³	5
Detection Limit Acceptable	-	Yes

Water Droplets	Units	Run 1
Are Water Droplets Present	-	No

MU (Concurrent Water Vapour)	Units	Run 1
Measurement Uncertainty (MU)	%	5.3
Allowable MU	%	20.0
MU Acceptable	%	Yes

HEAVY METALS: QUALITY ASSURANCE

(PAGE 2 OF 2)

Silica Gel (Concurrent Water Vapour)	Units	Run 1
Less than 50% Faded	%	Yes

Isokinetic Criterion Compliance	Units	Run 1
Isokinetic Variation	%	114.2
Allowable Isokinetic Range	%	95 - 115
Isokineticity Acceptable	-	Yes

Filter Temperatures	Units	Run 1
Maximum Filter Temperature	°C	180

Impingers Exit Temperature	Units	Run 1
Maximum Temperature Recorded	°C	7
Maximum Allowable Temperature	°C	30
Exit Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	Yes

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	20.0
Pre-Sampling Leak Rate	l/min	0.24
Post-Sampling Leak Rate	l/min	N/A
Allowable Leak Rate	l/min	0.40
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1
Allowable Blank	mg/m^3	N/A
Blank Acceptable	-	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run, wx = deviation also applies to the concurrent water vapour run)	Run Number 1	
Lowest differential pressure < 5 Pa.	x	
The absorption efficiency for all of the individual metals was not met, however it should be noted the results were of an extremely low order.	x	

HEAVY METALS: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value		Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**	**Symbol**	**Units**	**Run 1**
Sampled Volume (Actual)	V_m	1.1720	uV_m	m³	0.0234
Sampled Gas Temperature	T_m	293.8	uT_m	K	2.00
Sampled Gas Pressure	ρ_m	101.0	$u\rho_m$	kPa	0.50
Sampled Gas Humidity	H_m	0.00	uH_m	% v/v	1.00
Leak	L	1.41	uL	%	-
Laboratory Result	L_r	9.00	uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (Actual)	%	2.00	≤2%
Sampled Gas Temperature	%	0.68	≤1%
Sampled Gas Pressure	%	0.50	≤1%
Sampled Gas Humidity	%	1.00	≤1%
Leak	%	1.41	≤2%
Laboratory Result	%	9.00	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m³	1.1041	0.03
Leak	L	mg/m³	0.000	1.00
Laboratory Result	L_r	mg/m³	0.003	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m³	0.001
Leak	mg/m³	0.0003
Laboratory Result	mg/m³	0.0031

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	-	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m³	0.0032
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m³	0.01
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m³	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m³	0.01
Reported Uncertainty	mg/m³	0.01
Expanded uncertainty (95% confidence), without Oxygen Correction	%	18.4
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	26.5
Reported Uncertainty	%	26.5
Reported Uncertainty as % of ELV	%	N/A

APPENDIX 2

TUNGSTEN: RESULTS SUMMARY

Wellman International Limited, Kells
NGR Line

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	0.008		0.008
Uncertainty	±mg/m³	0.0019		0.0019
Mass Emission	g/hr	0.0002		0.0002
Uncertainty	±g/hr	0.0001		0.0001

Parameter	Units	Run 1		Mean
Water Vapour	% v/v	3.8		3.8
Uncertainty	±% v/v	0.20		0.20

Blank Runs

Parameter	Units	Blank 1		Maximum
Concentration	mg/m³	0.0075		0.0075

General Sampling Information

Parameter	Value	
Standard	EN 14385	
Technical Procedure	MD 006	
Name of Analytical Laboratory	RPS	
Analytical Laboratory's Procedure	M31	
ISO 17025 Accredited Analysis?	MCERTS	
Date of Sample Analysis	09/10/2025	
Probe Material	Titanium	
Filter Housing Material	Borosilicate Glass	
Impinger Material	Borosilicate Glass	
Absorption Solution	Nitric Peroxide	
Positioning of Filter	Out Stack	
Filter Size and Material	47mm Quartz Fibre	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

APPENDIX 2

TUNGSTEN: ISOKINETIC SAMPLING CALCULATIONS

Test	Units	Run 1
Absolute pressure of stack gas, P_s		
Barometric pressure, P_b	mmHg	757.6
Stack static pressure, P_{static}	mmH_2O	-0.1
$P_s = (P_b + (P_{static} / 13.6)$	mmHg	757.6
Volume of water vapour collected, V_{wstd}		
Total mass collected in impingers (liquid trap)	g	8.3
Total mass collected in impingers (silica trap)	g	26.3
Total mass of liquid collected, V_{lc}	g	34.6
$V_{wstd} = (0.001246)(V_{lc})$	m^3	0.0431
Volume of gas metered dry, V_{mstd}		
Volume of gas sample through gas meter, V_m	m^3	1.1720
Gas meter correction factor, Y_d	-	1.0140
Average dry gas meter temperature, T_m	°C	20.8
Average pressure drop across orifice, ΔH	mmH_2O	31.7
$V_{mstd} = ((0.3592)(V_m)(P_b + (\Delta H/13.6))(Y_d)) / (T_m + 273)$	m^3	1.1041
Moisture content, B_{wo} & R_{wv}		
$B_{wo} = V_{wstd} / (V_{mstd} + V_{wstd})$	m^3	0.0376
B_{wo} as a percentage	% v/v	3.76
Reported Water Vapour, checked with Tables in EN 14790, Rwv	% v/v	3.76
Volume of gas metered wet, V_{mstw}		
$V_{mstw} = (V_{mstd})(100/(100 - R_{wv}))$	m^3	1.1472
Volume of gas metered at Oxygen Reference Conditions, $V_{mstd@X\%O_2}$ & $V_{mstw@X\%O_2}$		
IED & Incinerates Hazardous Material? (Yes = no positive O_2 correction)	-	No
% wet oxygen measured in gas stream, $ACT\%O_{2w}$	% v/v	N/A
% dry oxygen measured in gas stream, $ACT\%O_{2d}$	% v/v	N/A
% oxygen reference condition, $REF\%O_2$	% v/v	N/A
O_2 Reference Factor wet $(O_{2REFw}) = (21 - REF\%O_2) / (21 - ACT\%O_{2w})$	-	N/A
O_2 Reference Factor dry $(O_{2REFd}) = (21 - REF\%O_2) / (21 - ACT\%O_{2d})$	-	N/A
$V_{mstw@X\%oxygen} = (V_{mstw}) / (O_{2REFw})$	m^3	N/A
$V_{mstd@X\%oxygen} = (V_{mstd}) / (O_{2REFd})$	m^3	N/A
Molecular weight of dry gas stream, M_d		
CO_2 (Estimated)	% v/v	0.06
O_2 (Estimated)	% v/v	20.80
Total	% v/v	20.86
N_2	% v/v	79.14
$M_d = 0.44(\%CO_2)+0.32(\%O_2)+0.28(\%N_2)$	g/gmol	28.84
Molecular weight of stack gas (wet), M_s		
$M_s = M_d(1 - (R_{wv}/100)) + 18(R_{wv}/100)$	g/gmol	28.43
Velocity of stack gas, V_s		
Pitot tube velocity constant, K_p	-	34.97
Velocity pressure coefficient, C_p	-	0.83
Average of velocity heads, ΔP_{avg}	mmH_2O	0.20
Average square root of velocity heads, √ΔP	$\sqrt{mmH_2O}$	0.45
Average stack gas temperature, T_s	°C	20.5
$V_s = ((K_p)(C_p)(\sqrt{\Delta P})(\sqrt{T_s} + 273)) / (\sqrt{(M_s)(P_s)})$	m/s	1.52
Total flow of stack gas: Actual (Q_a), Wet (Q_{stw}), Dry (Q_{std}), Wet@O_{2REF} (Q_{stwO_2}), Dry@O_{2REF} (Q_{stdO_2})		
Area of stack, A_s	m^2	0.00
$Q_a = (60)(A_s)(V_s)$	m^3/min	0.4
Conversion factor (K/mm.Hg), C_f	-	0.3592
$Q_{stw} = ((Q_a)(P_{sj})(C_f)) / ((T_s) + 273)$	m^3/min	0.3
$Q_{std} = ((Q_a)(P_s)(C_f)(1 - (R_{wv}/100))) / ((T_s) + 273)$	m^3/min	0.3
$Q_{stwO_2} = ((Q_a)(P_s)(C_f)) / ((T_s) + 273) / (O_{2REFw})$	m^3/min	N/A
$Q_{stdO_2} = ((Q_a)(P_s)(C_f)(1 - (R_{wv}/100))) / ((T_s) + 273) / (O_{2REFd})$	m^3/min	N/A
Percent isokinetic, %I		
Nozzle diameter, D_n	mm	15.88
Nozzle area, A_n	mm^2	198.08
Total sampling time, q	min	60
$\%I = (4.6398E^6)(T_s+273)(V_{mstd}) / (P_s)(V_s)(A_n)(q)(1 - (R_{wv}/100))$	%	114.2

TUNGSTEN: SAMPLING DETAILS

Sample Runs

Parameter	Units	Run 1
Sampling Times	-	11:00 - 12:00
Sampling Dates	-	16/09/2025
Sampling Device	-	ISO
Volume Sampled (REF)	m^3	1.1472
Mass on Filter / in Rinse	µg	6.60
Mass in Front Impingers	µg	< 2.05
Mass in Back Impinger	µg	< 1.02
Total Mass Collected	µg	9.67
Calculated Concentration	mg/m^3	0.0084
Reported Concentration	mg/m^3	0.0084

Where: ISO stands for Manual Isokinetic Sampling Train

Blank Runs

Parameter	Units	Blank 1
Blank Dates	-	16/09/2025
Average Volume Sampled (REF)	m^3	1.1472
Mass on Filter / in Rinse	µg	5.60
Mass in Front Impingers	µg	< 2.00
Mass in Back Impinger	µg	< 1.02
Total Mass Collected	µg	8.62
Calculated Concentration	mg/m^3	0.0075
Reported Concentration	mg/m^3	0.0075

TUNGSTEN: QUALITY ASSURANCE

Sample Runs

Leak Test Results	Units	Run 1
Mean Sampling Rate	l/min	19.8
Pre-Sampling Leak Rate	l/min	0.28
Post-Sampling Leak Rate	l/min	N/A
Allowable Leak Rate	l/min	0.40
Leak Test Acceptable	-	Yes

Absorption Efficiency	Units	Run 1
Absorption Efficiency	%	100.0
Allowable Absorption Efficiency	%	90
Absorption Efficiency Acceptable	-	Yes

Detection Limit	Units	Run 1
Detection Limit	µg/m³	3.5
Allowable Detection Limit	µg/m³	5
Detection Limit Acceptable	-	Yes

Water Droplets	Units	Run 1
Are Water Droplets Present	-	No

MU (Concurrent Water Vapour)	Units	Run 1
Measurement Uncertainty (MU)	%	5.3
Allowable MU	%	20.0
MU Acceptable	%	Yes

Silica Gel (Concurrent Water Vapour)	Units	Run 1
Less than 50% Faded	%	Yes

Isokinetic Criterion Compliance	Units	Run 1
Isokinetic Variation	%	114.2
Allowable Isokinetic Range	%	95 - 115
Isokineticity Acceptable	-	Yes

Filter Temperatures	Units	Run 1
Maximum Filter Temperature	°C	180

Impingers Exit Temperature	Units	Run 1
Maximum Temperature Recorded	°C	7
Maximum Allowable Temperature	°C	30
Exit Temperature Acceptable	-	Yes

Test Conditions	Units	Run 1
Ambient Temperature Recorded?	-	Yes

APPENDIX 2

TUNGSTEN: QUALITY ASSURANCE

(PAGE 2 OF 2)

Blank Runs

Leak Test Results	Units	Blank 1
Expected Sampling Rate	l/min	20.0
Pre-Sampling Leak Rate	l/min	0.24
Post-Sampling Leak Rate	l/min	N/A
Allowable Leak Rate	l/min	0.40
Leak Test Acceptable	-	Yes

Validity of Blank vs ELV	Units	Blank 1
Allowable Blank	mg/m³	N/A
Blank Acceptable	-	N/A

Method Deviations

Nature of Deviation (x = deviation applies to the associated run, wx = deviation also applies to the concurrent water vapour run)	Run Number 1	
Lowest differential pressure < 5 Pa.	x	

TUNGSTEN: MEASUREMENT UNCERTAINTY CALCULATIONS

	Value			Standard uncertainty		
Measured Quantities	**Symbol**	**Run 1**		**Symbol**	**Units**	**Run 1**
Sampled Volume (Actual)	V_m	1.1720		uV_m	m³	0.0234
Sampled Gas Temperature	T_m	293.8		uT_m	K	2.00
Sampled Gas Pressure	ρ_m	101.0		$u\rho_m$	kPa	0.50
Sampled Gas Humidity	H_m	0.0		uH_m	% v/v	1.00
Leak	L	1.41		uL	%	-
Laboratory Result	L_r	9.00		uL_r	%	-

	Uncertainty as a Percentage		
Measured Quantities	**Units**	**Run 1**	**Requirement of Standard**
Sampled Volume (Actual)	%	2.00	≤2%
Sampled Gas Temperature	%	0.68	≤1%
Sampled Gas Pressure	%	0.50	≤1%
Sampled Gas Humidity	%	1.00	≤1%
Leak	%	1.41	≤2%
Laboratory Result	%	9.00	No Requirement

	Uncertainty in Measurement Units			Sensitivity Coefficient
Measured Quantities	**Symbol**	**Units**	**Run 1**	**Run 1**
Sampled Volume (STP)	V_m	m³	1.1041	0.01
Leak	L	mg/m³	0.0001	1.00
Laboratory Result	L_r	mg/m³	0.0008	1.00

	Uncertainty in Result	
Measured Quantities	**Units**	**Run 1**
Sampled Volume (STP)	mg/m³	0.0002
Leak	mg/m³	0.0001
Laboratory Result	mg/m³	0.0008

	Oxygen Correction Part of MU Budget	
Measured Quantities	**Units**	**Run 1**
O_2 Correction Factor	-	N/A
Stack Gas O_2 Content	% v/v	N/A
MU for O_2 Correction	%	N/A
Overall MU For O_2 Measurement	%	N/A

Parameter	**Units**	**Run 1**
Combined uncertainty	mg/m³	0.0008
Expanded uncertainty (95% confidence), without Oxygen Correction	mg/m³	0.0015
Expanded uncertainty (95% confidence), with Oxygen Correction	mg/m³	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	mg/m³	0.0019
Reported Uncertainty	mg/m³	0.0019
Expanded uncertainty (95% confidence), without Oxygen Correction	%	18.4
Expanded uncertainty (95% confidence), with Oxygen Correction	%	N/A
Expanded uncertainty (95% confidence), estimated with Method Deviations	%	22.0
Reported Uncertainty	%	22.0
Reported Uncertainty as % of ELV	%	N/A

APPENDIX 2

TOTAL VOCs (as CARBON): RESULTS SUMMARY

Wellman International Limited, Kells
NGR Line

Sample Runs

Parameter	Units	Run 1		Mean
Concentration	mg/m³	5415		5415
Uncertainty	±mg/m³	177		177
Mass Emission	g/hr	107		107
Uncertainty	±g/hr	57.3		57.3

General Sampling Information

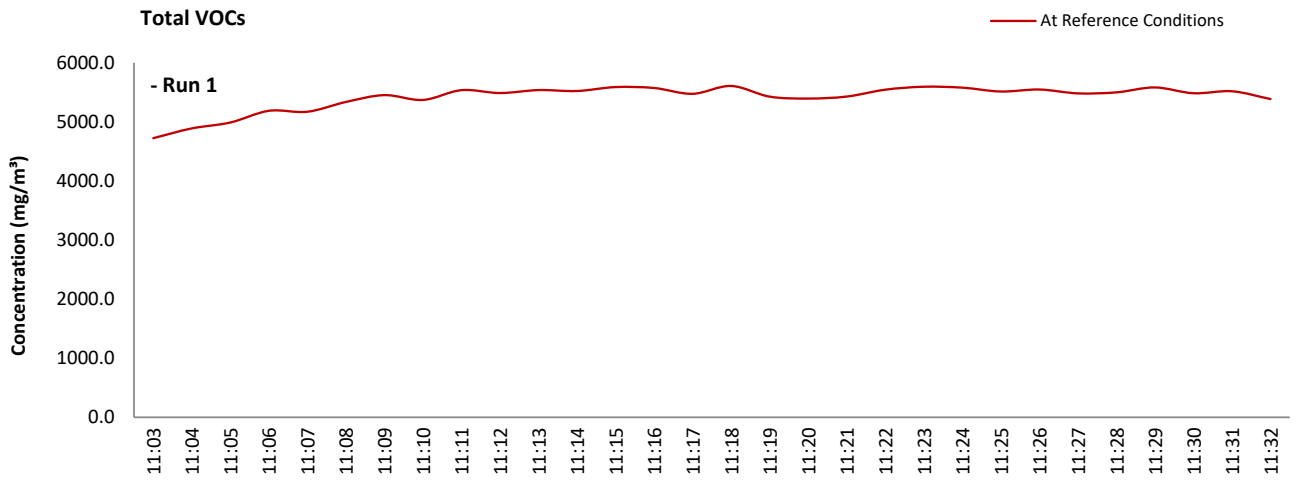
Parameter	Value	
Standard	EN 12619:2013	
Technical Procedure	MD 020	
Probe Material	Stainless Steel	
Filtration Type / Size	0.1µm Glass Fibre	
Heated Head Filter Used	Yes	
Heated Line Temperature	180°C	
Span Gas Type	Propane In Synthetic Air (5 Grade)	
Span Gas Reference Number	1.0572	
Span Gas Expiry Date	29/09/2028	
Span Gas Start Pressure (bar)	45	
Gas Cylinder Concentration (ppm)	78.94	
Span Gas Set Point (ppm)	78.94	
Span Gas Uncertainty (%)	2	
Zero Gas Type	Synthetic Air (5 Grade)	
Number of Sampling Lines Used	1 / 1	FORMAT: Number Used / Number Required
Number of Sampling Points Used	1 / 1	FORMAT: Number Used / Number Required
Sample Point I.D.'s	A1	

Reference Conditions

Reference Conditions are: 273K, 101.3kPa, without correction for water vapour content.

TOTAL VOCs (as CARBON): DATA TREND

Graphical Trend of Data



TOTAL VOCs (as CARBON): SAMPLING DETAILS & QUALITY ASSURANCE

Sampling Details

Parameter	Units	Run 1
Sampling Times	-	11:03 - 11:33
Sampling Dates	-	16/09/2025
Instrument Range	ppm	10000
Span Gas Value	ppm	78.9

Quality Assurance

	Zero Drift	Units	Run 1
CAL 1	Zero Down Sampling Line (Pre)	ppm	0.40
	Zero Down Sampling Line (Post)	ppm	0.00
	Zero Drift	ppm	-0.40
	Zero Drift	%	-0.51
	Drift Correction Applied	2-5%	No
	Allowable Zero Drift	± ppm	3.95
	Zero Drift Acceptable	-	Yes

	Span Drift	Units	Run 1
CAL 1	Span Down Sampling Line (Pre)	ppm	77.80
	Span Down Sampling Line (Post)	ppm	76.60
	Span Drift	ppm	-1.20
	Span Drift	%	-1.54
	Drift Correction Applied	2-5%	No
	Allowable Span Drift	± ppm	3.95
	Span Drift Acceptable	-	Yes

Test Conditions	Units	Run 1
Run Ambient Temperature Range	°C	10 - 15

Method Deviations

Nature of Deviation (x = deviation applies to the associated run)	Run Number 1	
Lowest differential pressure < 5 Pa.	x	

TOTAL VOCs (as CARBON): MEASUREMENT UNCERTAINTY CALCULATIONS

Performance characteristics	RUN 1		Units
Limit value	-		mg/m³ (REF)
Allowable MU	15.0		%
Measured concentration	5626.32		mg/m³ (STP, dry)
Range Used	10000.0		ppm
Range Used [A]	16061.4		mg/m³
Cal gas conc.	78.9		ppm
Conversion	1.61		ppm to mg/m³
MCERTS Range [B]	15.0		mg/m³
Lower of [A] or [B]	15.0		mg/m³
Cal gas conc.	126.8		mg/m³

Performance characteristics	RUN 1		Units
Response time	45		seconds
Number of readings in measurement	30		-
Repeatability at zero	2.00		% full scale
Repeatability at span level	0.00		% full scale
Deviation from linearity	0.18		% of value
Zero drift	-0.51		% full scale
Span drift	-1.54		% full scale
Volume or pressure flow dependence	1.60		% of full scale
Atmospheric pressure dependence	0.30		% of value/kPa
Ambient temperature dependence	1.40		% full scale/10K
Combined interference	0.45		% range
Dependence on voltage	0.50		% full scale/10V
Losses in the line (leak)	1.39		% of value
Uncertainty of calibration gas	2.00		% of value

Performance characteristic	RUN 1		Units
Standard deviation of repeatability at zero	use rep at span		mg/m³
Standard deviation of repeatability at span level	0.00		mg/m³
Lack of fit	0.02		mg/m³
Drift	-50.48		mg/m³
Volume or pressure flow dependence	0.00		mg/m³
Atmospheric pressure dependence	0.01		mg/m³
Ambient temperature dependence	0.20		mg/m³
Combined interference (from MCERTS Certificate)	0.04		mg/m³
Dependence on voltage	0.06		mg/m³
Losses in the line (leak)	45.26		mg/m³
Uncertainty of calibration gas	64.97		mg/m³

			RUN 1		Units
Measurement uncertainty		**Result**	5626.32		mg/m³
Combined uncertainty			93.90		mg/m³
Expanded uncertainty	k =	1.96	184.05		mg/m³
Uncertainty corrected to std conds. (O_2)			184.05		mg/m³ (REF)

	RUN 1		Units
Expanded uncertainty (no O_2) - at 95% Confidence	3.27		% of Value
Expanded uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (no O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

	RUN 1		Units
Expanded uncertainty (with O_2) - at 95% Confidence	N/A		% of Value
Expanded uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Overall Allowable uncertainty (with O_2) - at 95% Confidence	N/A		% at ELV
Result of Compliance with Uncertainty Requirement	**N/A**		-

Requirement for SRM is that Uncertainty should be <15% of the value at the ELV, on a dry gas basis, or if O_2 correction is applied less than 15% + the uncertainty associated with the O_2 correction (using sqrt of sum squares to add uncertainty components).

VERSION HISTORY

Version Number	Record of changes made within this version of the document
V1	The original document issued to the client

FOLLOW-UP ACTIONS

The licensee is required to complete the actions outlined in this site visit report within the specified timeframes. Where required, the licensee shall also respond to actions specified in Compliance Investigations and/or submit a response to this site visit report via the EDEN system. The licensee shall maintain a documentary evidence, for review by the Agency, that the prescribed actions were completed within the required timeframe.

(i) Compliance Investigations

The Agency may generate a Compliance Investigation through the EDEN system and issue instructions and actions to the licensee. The licensee will receive notification when an instruction or action is issued and the licensee must respond to the actions within the Compliance Investigation within the specified timeframe.

(ii) Response to Site Visit Report

Where the licensee is requested to (or wishes to) respond to the Agency in relation to this site visit report, the licensee may select the 'Make a Response' link on the Site Visits page in EDEN where a .pdf document containing the response can be attached and submitted. The response should include details of the actions taken by the licensee to address the issues raised in this site visit report and the target completion dates. This Licensee Public Response provides the licensee with an opportunity to inform both the Agency and the public about the implementing of actions set out in the Agency site visit report. The response must be submitted **within 21 calendar days** of the issue date of this site visit report.

(iii) Publication of Reports

This site visit report will be published on the EPA's website, www.epa.ie, 30 calendar days after the site visit report issue date.

Any licensee response to this site visit report will be published on the EPA's website simultaneously (i.e. 30 calendar days after the site visit report issue date).

Please note that licensees are required to comply with the conditions of the licence at all times, and where non-compliance occurs, compliance must be restored within the shortest possible time. These actions will be verified during subsequent Agency visits. Please quote the above Inspection Reference Number in any correspondence in relation this Report.