




Report Title	Air Emissions Compliance Monitoring Emissions Report
Company address	Air Scientific Ltd., 32 DeGranville Court, Dublin road, Trim, Co. Meath
Stack Emissions Testing Report Commissioned by	Red Mills
Facility Name	Goresbridge, Co Kilkenny
Contact Person	Mr John Rea
EPA Licence Number	-
Licence Holder	Red Mills, Boiler
Stack Reference Number	Boiler
Dates of the Monitoring Campaign	19/01/2017
Job Reference Number	REMITL1190117 / 2017521
Report Written By	Dr. John Casey
Report Approved by	Dr. Brian Sheridan
Stack Testing Team	Dr. Brian Sheridan, Dr. John Casey
Report Date	
Report Type	Test Report Compliance Monitoring
Version	1
Signature of Approver	 Brian Sheridan Technical Manager

For inspection purposes only.
 Consent of copyright owner required for any other use.

Contents

1. Executive Summary.....	4
I. Monitoring Objectives	4
Overall Aim of the monitoring Campaign	4
Special Requirements	4
Target Parameters	4
Emission Limit Values.....	4
Reference Conditions.....	4
Overall Results	5
Accreditation details	5
Monitoring Dates & Times	6
Process details	7
Monitoring, Equipment & Analytical Methods.....	8
Sampling Deviations.....	10
Reference Documents.....	10
Suitability of sampling location.....	11
Stack diagram.....	12
2. APPENDICES	13
II. Appendix I - Monitoring Personnel & Equipment.....	13
Stack Emissions Monitoring Personnel.....	13
III. Appendix II - Stack Details & flow characteristics.....	14
Preliminary stack survey calculations	14
IV. Appendix III - Individual parameter sampling details and results	21
Carbon Monoxide Quality Assurance	21
Carbon Monoxide Results & Sampling details.....	22
Carbon Monoxide Trend	23
Carbon Monoxide Measurement Uncertainty.....	24
Oxides of Nitrogen Quality Assurance	25
Oxides of Nitrogen Results & Sampling details.....	26
Oxides of Nitrogen Trend.....	27
Oxides of Nitrogen Measurement Uncertainty	28
Sulphur Dioxide Quality Assurance.....	29
Sulphur Dioxide Results & Sampling details	30
Sulphur Dioxide Trend	31
Sulphur Dioxide Measurement Uncertainty.....	32

Opinions and interpretations expressed herein are outside the scope of Air Scientific Limited INAB accreditation. This test report shall not be reproduced, without the written approval of Air Scientific Limited. All sampling and reporting is completed in accordance with Environmental Protection Agency Air Guidance Note 2 requirements.



*For inspection purposes only.
Consent of copyright owner required for any other use.*

1. Executive Summary

I. Monitoring Objectives

Overall Aim of the monitoring Campaign

The aim of the monitoring campaign was to demonstrate compliance with a set of emission limit values as specified in the site licence.

Special Requirements

There were no special requirements.

Target Parameters

Carbon Monoxide (CO)
Oxides of Nitrogen (NOx) as NO ₂
Sulphur Dioxide (SO ₂)
Stack Gas Temperature
Volume (m ³ .h ⁻¹)

Emission Limit Values

Emission Limit Values / Mass Emissions Limit Values	mg.m ⁻³	kg.h ⁻¹
CO	-	-
NOx as NO ₂	-	-
SO ₂	-	-
Stack Gas Temperature	-	-
Volume (m ³ .h ⁻¹)	-	-

Reference Conditions

Reference Conditions	Value
Oxygen Reference %	3
Temperature °C	273.15
Total Pressure kPa	101.3
Moisture %	Yes

Executive Summary

Overall Results

	Concentration				
Parameter	Units	Result	MU +/-	Limit	Compliant
Carbon Monoxide (CO)	mg.m ⁻³	2.12	2.18	-	N/A
Oxides of Nitrogen (NOx) as NO ₂	mg.m ⁻³	228.56	16.92	-	N/A
Sulphur Dioxide (SO ₂)	mg.m ⁻³	17.08	2.61	-	N/A
Oxygen (%)	% v/v	5.00	0.12	-	N/A
Stack Gas Temperature	K	-	-	-	N/A
Stack Gas Velocity	m.s ⁻¹	-	-	-	N/A
Volumetric Flow Rate	m ³ .h ⁻¹	-	-	-	N/A
Volumetric Flow Rate (Ref.)	m ³ .h ⁻¹	-	-	-	N/A

Accreditation details

Air Scientific Limited	INAB319T
External Analytical Laboratory	-
Other	-

Consent of copyright owner required for any other use.
 For inspection purposes only.

Executive Summary

Monitoring Dates & Times

Parameter	Run	Location ID	Sampling Dates	Sampling Time On	Sampling Time Off	Duration (mins.)
Carbon Monoxide (CO)	Run 1	Boiler	19/01/2017	11:03:00	11:38:00	00:35:00
	Run 2					
	Run 3					
Oxides of Nitrogen (NOx) as NO ₂	Run 1	Boiler	19/01/2017	11:03:00	11:38:00	00:35:00
	Run 2					
	Run 3					
Sulphur Dioxide (SO ₂)	Run 1	Boiler	19/01/2017	11:03:00	11:38:00	00:35:00
	Run 2					
	Run 3					
Oxygen (%)		Boiler	19/01/2017	11:03:00	11:38:00	00:35:00

*For inspection purposes only.
 Consent of copyright owner required for any other use.*

Executive Summary

Process details

Parameter	
Process status	Normal
Capacity (per/hour) (if applicable)	N/a
Continuous or Batch Process	Continuous
Feedstock	Process Air
Abatement System	Yes
Abatement Systems Running Status	Normal
Fuel	N/A
Plume Appearance	No
Other information	None

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Executive Summary

Monitoring, Equipment & Analytical Methods

	Monitoring				Analysis	
Parameter	Standard	Technical Procedure	Accredited Testing	Testing Lab	Analytical Technique	Analysis Lab
Carbon Monoxide (CO)	EN15058:2006	SOP 2004	Yes	AirSci	NCIR By Horiba PG-250	AirSci
Oxides of Nitrogen (NOx)	EN14792:2006	SOP 2002	Yes	AirSci	Chemiluminescence	AirSci
Sulphur Dioxide (SO ₂)	TGN 21	SOP 2012	Yes	AirSci	NDIR Absorption	AirSci
Oxygen (%)	EN14789:2005	SOP 2008	Yes	AirSci	Paramagnetic	AirSci

*For inspection purposes only.
 Consent of copyright owner required for any other use.*

List of Equipment

ID	Item of Equipment	Manufacturer	Serial No.
ASLTM12EQ520	Buhler Sample Gas Cooler	Buhler Technologies	100063602044367-001
ASLTM13EQ504	Horiba PG2500 Portable Flue Gas Analyzer	Horiba	41432840053
ASLTM13EQ509	10 metre industrial heated sample line (Temp controller box 1 & 2)	Neptech	13B088

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Sampling Deviations

Parameter	Deviation
Standard ID	-
Standard ID	-
Standard ID	-
Standard ID	-

Reference Documents

Risk Assessment (RA)	SOP1011
Site Review (SR)	SOP1015
Site Specific Protocol (SSP)	SOP1015

*For inspection purposes only.
Consent of copyright owner required for any other use.*

Executive Summary

Suitability of sampling location

General Information	Value
Permanent/Temporary	Permanent
Inside/ Outside	Inside

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

Sampling Location / Platform Improvement Recommendations
None

BSEN 15259 Homogeneity Test Requirements
1: There is no requirement to perform a BSEN15259 Homogeneity Test on this stack
E.g. Select Option
1: There is no requirement to perform a BSEN15259 Homogeneity Test on this stack
2: Test results were obtained from previous Homogeneity test carried out by ASL
3: Test results were obtained from previous Homogeneity test carried out by Alternative contractor
4: Other: Enter Description

Consent of copyright owner required for any other use.

Executive Summary

Stack diagram

Boiler 1



*For inspection purposes only.
Consent of copyright owner required for any other use.*

APPENDICES

II. Appendix I Monitoring Personnel & Equipment

Stack Emissions Monitoring Personnel

Team Leader	Name	John Casey
	Qualifications	PhD. (Eng.), MSc. (Agr.), B. Agr. Sc.
	System approval	Air Scientific Limited Approved
		-
Team Leader	Name	Brian Sheridan
	Qualifications	PhD. (Eng.), MSc. (Agr.), BSc. (Hons.)
	System approval	Air Scientific Limited Approved
		-

*For inspection purposes only.
Consent of copyright owner required for any other use.*

III. Appendix II Stack Details & flow characteristics

Preliminary stack survey calculations

General Stack Details		
Stack details	Units	Value
Date of survey		19/01/2017
Time of survey		-
Type		-
Stack Diameter / Depth, D	m	-
Stack Width, W	m	-
Average Stack Gas Temp., Ta	C	-
Average Static Pressure, P static	kPa	-
Average Barometric Pressure, Pb	kPa	-
Type of Pitot		-
Are Water Droplets Present ?		-
Average Pitot Tube Calibration Coeff, Cp		-
Negative flow		-
Highly homogeneous flow stream/gas velocity		Yes

Sample Port Size	mm	-
Initial Pitot Leak Check	Pa	-
Final Pitot Leak Check	Pa	-
Orientation of Duct		Vertical
Pitot Tube Cp		0.998
Number of Lines Available		-
Number of Lines Used		-

Document No.: REMITL1190117 / 2017521
 Visit No: 1
 Year: 2017
 Office: Trim

IPPC Licence No.: -
 Licence Holder: Red Mills, Boiler
 Facility Location: Goresbridge, Co Kilkenny
 Rev.No: 1

Sampling Line A						
Point	Distance to duct (m)	Pa	Temp °C	Velocity (m/s)	Oxygen (%)	Angle of Swirl
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
Average	-	-	-	-	-	-
Min	-	-	-	-	-	-
Max	-	-	-	-	-	-

For inspection purposes only.
 Consent of copyright owner required for any other use.

Sampling Line B						
Point	Distance to duct (m)	Pa	Temp °C	Velocity (m/s)	Oxygen (%)	Angle of Swirl
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	-	-	-	-	-	-
6	-	-	-	-	-	-
7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
Average	-	-	-	-	-	-
Min	-	-	-	-	-	-
Max	-	-	-	-	-	-

For inspection purposes only.
 Consent of copyright owner required for any other use.

Document No.: REMITL1190117 / 2017521
 Visit No: 1
 Year: 2017
 Office: Trim

IPPC Licence No.: -
 Licence Holder: Red Mills, Boiler
 Facility Location: Goresbridge, Co Kilkenny
 Rev.No: 1

Component	Conc. ppm	Conc. Dry % v/v	Conc. Wet % v/v	Molar Mass
Carbon Dioxide CO ₂	-	0	-	44.01
Oxygen O ₂	-	5	-	32
Nitrogen N ₂	-	95	-	28.1
Moisture (H ₂ O)	-	-	-	18.02
Reference Conditions				
	Units	Numbers		
Temperature	°C	273.15		
Total Pressure	kPa	101.3		
Moisture	%	-		
Oxygen (Dry)	%	No Oxygen Ref		

For inspection purposes only.
 Consent of copyright owner required for any other use.

Stack Gas Composition & Molecular Weights								
Component	Molar Mass M	Density Kg/m ³ p	Conc. Dry % v/v	Dry Volume Fraction r	Dry Conc. kg/m ³ pi	Conc. wet % v/v	Wet Volume Fraction r	Wet Conc. kg/m ³ pi
Carbon Dioxide CO ₂	44.01	1.96	0	0	0.00	0.00	0.00	0.00
Oxygen O ₂	32	1.43	5	0.05	0.07	5.00	0.05	0.07
Nitrogen N ₂	28.1	1.25	95	0.95	1.19	95.00	0.95	1.19
Moisture (H ₂ O)	18.02	0.80	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
where p=M/22.41	-	-	-	-	-	-	-	-
pi = r x p	-	-	-	-	-	-	-	-

For inspection purposes only.
 Consent of copyright owner required for any other use.

Calculation of Stack Gas Densities		
Determinand	Units	Result
Dry Density (STP), P STD	kg.m ⁻³	1.263
Wet Density (STP), P STW	kg.m ⁻³	1.263
Dry Density (Actual), P Actual	kg.m ⁻³	-
Average wet Density (Actual), P ActualW	kg.m ⁻³	-
Where		
P STD = sum of component concentrations, kg/m ³ (excluding water vapour)	-	-
$P_{STW} = (P_{STD} + p_{i \text{ of H}_2\text{O}}) / (1 + (p_{i \text{ of H}_2\text{O}} / 0.8036))$	-	-
$P_{actual} = P_{STD} \times (T_{STP} / (P_{STP})) \times (P_a / T_a)$	-	-
$P_{actual W} \text{ (at each sampling point)} = P_{STW} \times (T_s / P_s) \times (P_a / T_a)$	-	-

For inspection purposes only.
 Consent of copyright owner required for any other use.

Sampling Plane Validation Criteria	Value	Units	Requirement	Compliance	Method
Lowest Differential Pressure	-	Pa	>5 Pa	N/A	EN16911:2013
Lowest Gas Velocity	-	m/s	-	N/A	-
Highest Gas Velocity	-	m/s	-	N/A	-
Ratio of Above	-	:1	<3:1	Yes	EN16911:2013
Mean Velocity	-	m/s	-	N/A	-
Angle of flow with regard to duct axis	-	degrees	< 15	N/A	EN16911:2013
No local negative flow	-	-	-	N/A	-
Homogeneous flow stream/gas velocity	-	-	-	N/A	-

Calculation of stack Gas Velocity, V	
Velocity at Traverse Point, $V = K_{cp} \cdot \sqrt{(2 \cdot DP) / \text{Density}}$	-
Where	
K_{pt} = Pitot tube calibration coefficient	-
C = Compressibility correction factor, assumed at a constant 0.998	0.998

Gas Volumetric Flowrate	Units	Result
Gas Volumetric Flow Rate (Actual)	$m^3 \cdot h^{-1}$	-
Gas Volumetric Flow Rate (STP, Wet)	$m^3 \cdot h^{-1}$	-
Gas Volumetric Flowrate (STP, Dry)	$m^3 \cdot h^{-1}$	-
Gas Volumetric Flowrate REF to Oxygen	$m^3 \cdot h^{-1}$	-

IV. Appendix III Individual parameter sampling details and results

Carbon Monoxide Quality Assurance

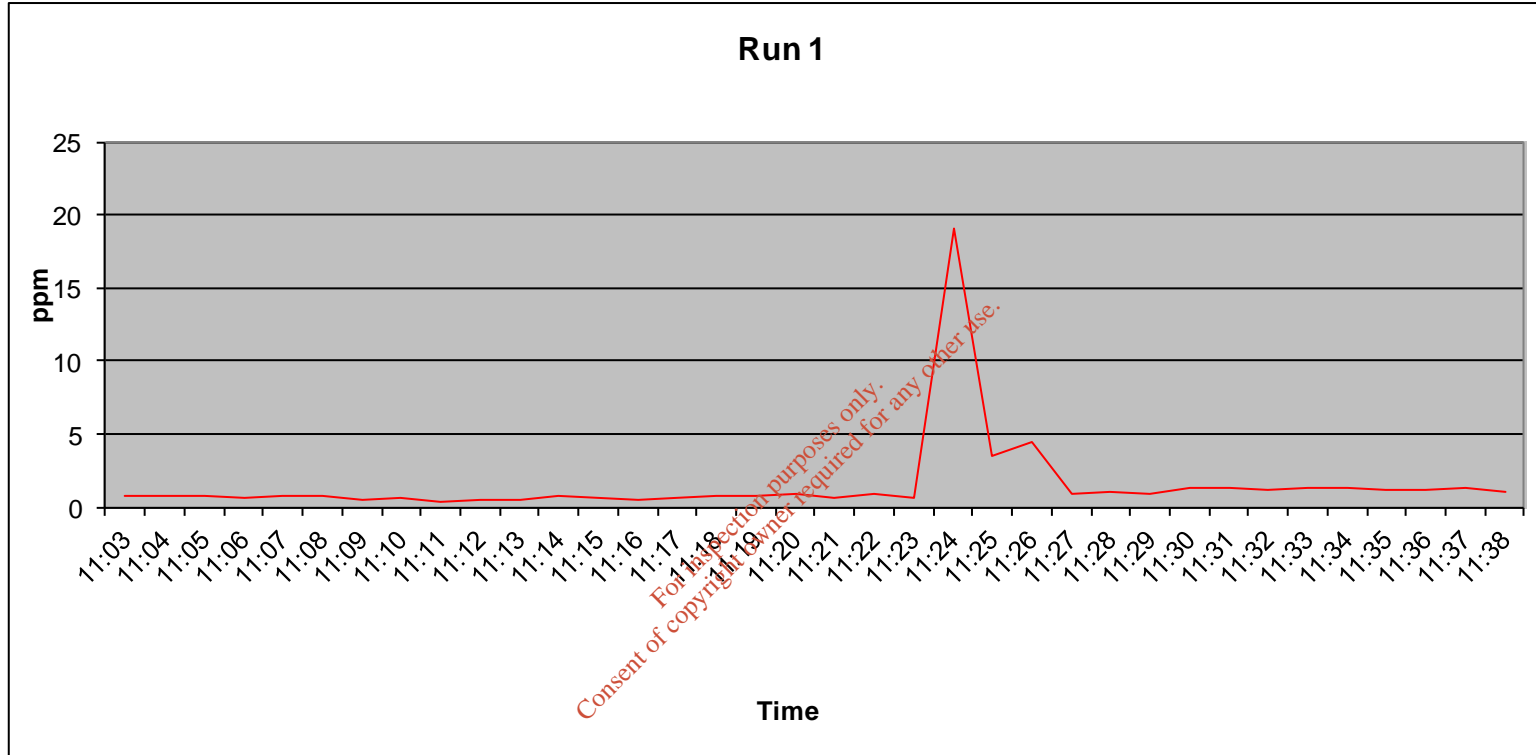
Sampling Details		
Stack ID	Boiler	-
	Units	Run 1
Parameter		
Sampling Times	-	11:03
Sampling Dates	-	19/01/2017
Instrument Range	ppm	200
Span Gas Value	ppm	161
Acceptable Gas Range	-	Yes
Quality Assurance		
	Units	Run 1
Conditioning Unit Temperature	C	2
Average Temperature	< C	2
Allowable Temperature	-	4
Temperature Acceptable	-	Yes
Pump flow rate	l/min.	0.6
Zero Drift		
	Units	Run 1
Zero Down Sampling Line (Pre)	ppm	0.1
Zero Down Sampling Line (Post)	ppm	0.3
Zero drift	ppm	0.2
Allowable Zero Drift	ppm	3.2
Zero Drift Acceptable	-	Yes
Span Drift		
	Units	Run 1
Span Down Sampling Line (Pre)	ppm	161
Span Down Sampling Line (Post)	ppm	160.4
Span Drift	ppm	0.4
Allowable Span Drift	ppm	3.2
Span Drift Acceptable (Y/N)	-	Yes
Leak Check		
Span Gas Conc.	ppm	161
Recorded Conc. down Line	ppm	161
Leak check acceptable (< 2%)	(Y/N)	Yes
Test Conditions		
	Units	Run 1
Run Ambient Temperature Range	C	9

Carbon Monoxide Results & Sampling details

Parameter	Units	Run 1
Concentration	mg.m ⁻³	1.88
Uncertainty	mg.m ⁻³	2.18
Mass Emission	kg.h	-

General Sampling Information	
Parameter	Value
Standard	EN15058
Technical Procedure	SOP2004
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	190
Span Gas Reference Number	ASLTM15ING534
Span Gas Expiry Date	Dec-18
Span Gas Start Pressure (bar)	40
Gas Cylinder Concentration (ppm)	161
Span Gas Uncertainty (%)	<2
Zero Gas Type	Nitrogen
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	Boiler
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	No Oxygen Ref

Carbon Monoxide Trend



Carbon Monoxide Measurement Uncertainty

	Units	Run 1
Measured Quantities		
Certified Range of Analyser	ppm	1.36 to 1000
Operational Range of Analyser	ppm	200
Measured Reading	ppm	1.51
Measured Quantities	Units	Run 1
Nonlinearity	%	0.9
Temperature Dependent Zero drift	%	0.14
Temperature Dependent Span drift	%	-0.12
Cross-sensitivity	%	0.08
Leak	%	0
Calibration Gas Uncertainty	%	<2
Parameter	Units	Run 1
Combined uncertainty	mg.m ⁻³	0.96
Expanded uncertainty	mg.m ⁻³	1.92
Uncertainty corrected to std conds.	mg.m ⁻³	2.18
Expanded uncertainty expressed with a level of confidence of 95%	% of ELV	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	2.18
Expanded uncertainty expressed with a level of confidence of 95%	% of value	115.60
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions		

For inspection purposes only.
 Consent of copyright owner required for any other use.

Oxides of Nitrogen Quality Assurance

Sampling Details		
Stack ID	Boiler	-
	Units	Run 1
Parameter		
Sampling Times	-	11:03
Sampling Dates	-	19/01/2017
Instrument Range	ppm	250
Span Gas Value	ppm	163
Acceptable Gas Range	-	Yes
Quality Assurance		
	Units	Run 1
Conditioning Unit Temperature	C	2
Average Temperature	< C	2
Allowable Temperature	-	4
Temperature Acceptable	-	Yes
Pump flow rate	l/min.	0.6
Zero Drift		
	Units	Run 1
Zero Down Sampling Line (Pre)	ppm	0.1
Zero Down Sampling Line (Post)	ppm	0.8
Zero drift	ppm	0.7
Allowable Zero Drift	ppm	3.2
Zero Drift Acceptable	-	Yes
Span Drift		
	Units	Run 1
Span Down Sampling Line (Pre)	ppm	163.1
Span Down Sampling Line (Post)	ppm	162
Span Drift	ppm	0.9
Allowable Span Drift	ppm	3.2
Span Drift Acceptable (Y/N)	-	Yes
Leak Check		
Span Gas Conc.	ppm	163
Recorded Conc. down Line	ppm	163.1
Leak check acceptable (< 2%)	(Y/N)	Yes
Test Conditions		
	Units	Run 1
Run Ambient Temperature Range	C	9
NOx Converter Efficiency	%	95.4

Oxides of Nitrogen Results & Sampling details

Parameter	Units	Run 1
Concentration	mg.m ⁻³	202.98
Uncertainty	mg.m ⁻³	16.92
Mass Emission	kg.h ⁻¹	-

General Sampling Information	
Parameter	Value
Standard	EN14792
Technical Procedure	SOP2002
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	190
Date & Result of last converter check	95.4 7/1/17
Span Gas Reference Number	ASLTM16ING517
Span Gas Expiry Date	Jul-17
Span Gas Start Pressure (bar)	20
Gas Cylinder Concentration (ppm)	163
Span Gas Uncertainty (%)	<2
Zero Gas Type	Nitrogen
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	Boiler
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	No Oxygen Ref

Oxides of Nitrogen Measurement Uncertainty

Measured Quantities	Units	Run 1
Nonlinearity	%	1.4
Temperature Dependent Zero drift	%	-0.04
Temperature Dependent Span drift	%	-0.25
Cross-sensitivity	%	0.5
Leak	%	0
Calibration Gas Uncertainty	%	<2
Mass Flow Controllers (Dilution) Uncertainty	%	<1
NOx Converter Efficiency	%	95.4
Parameter	Units	Run 1
Combined uncertainty	mg.m ⁻³	5.98
Expanded uncertainty	mg.m ⁻³	11.96
Uncertainty corrected to std conds.	mg.m ⁻³	16.92
Expanded uncertainty expressed with a level of confidence of 95%	% of ELV	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	16.92
Expanded uncertainty expressed with a level of confidence of 95%	% of value	8.33
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions		

For inspection purposes only. Consent of copyright owner required for any other use.

Sulphur Dioxide Quality Assurance

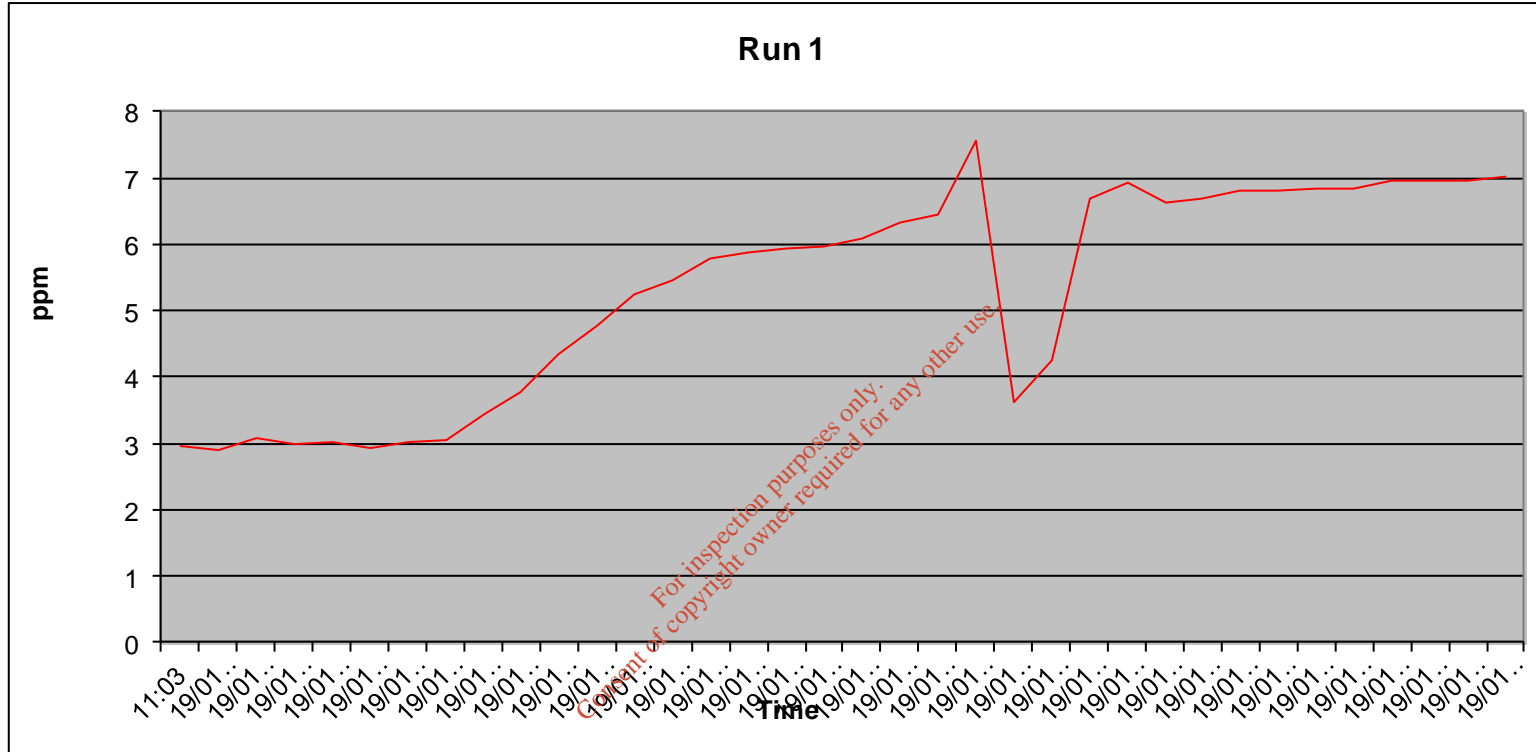
Sampling Details		
Stack ID	Boiler	-
	Units	Run 1
Parameter		
Sampling Times	-	11:03
Sampling Dates	-	19/01/2017
Instrument Range	ppm	200
Span Gas Value	ppm	164
Acceptable Gas Range	-	Yes
	-	-
Quality Assurance	Units	Run 1
Conditioning Unit Temperature	C	2
Average Temperature	< C	2
Allowable Temperature	-	4
Temperature Acceptable	-	Yes
Pump flow rate	l/min.	0.6
	-	-
Zero Drift	Units	Run 1
Zero Down Sampling Line (Pre)	ppm	0.1
Zero Down Sampling Line (Post)	ppm	2.8
Zero drift	ppm	2.7
Allowable Zero Drift	ppm	8.2
Zero Drift Acceptable	-	Yes
	-	-
Span Drift	Units	Run 1
Span Down Sampling Line (Pre)	ppm	164
Span Down Sampling Line (Post)	ppm	160
Span Drift	ppm	4
Allowable Span Drift	ppm	8.2
Span Drift Acceptable (Y/N)	-	Yes
	-	-
Leak Check		
Span Gas Conc.	ppm	164
Recorded Conc. down Line	ppm	164
Leak check acceptable (< 2%)	(Y/N)	Yes
	-	-
Test Conditions	Units	Run 1
Run Ambient Temperature Range	C	9

Sulphur Dioxide Results & Sampling details

Parameter	Units	Run 1
Concentration	mg.m ⁻³	15.17
Uncertainty	mg.m ⁻³	2.61
Mass Emission	kg.h	-

General Sampling Information	
Parameter	Value
Standard	TGN 21
Technical Procedure	2012
Probe material	SS
Filtration Type/Size	PTFE
Heated Head Filter Used	Yes
Heated Line Temperature	190
Date & Result of last converter check	-
Span Gas Reference Number	ASLTM14ING513
Span Gas Expiry Date	Jan-17
Span Gas Start Pressure (bar)	30
Gas Cylinder Concentration (ppm)	164
Span Gas Uncertainty (%)	<2
Zero Gas Type	N
Number of Sampling Lines Used	1
Number of Sampling Points Used	1
Sample Point I.D's	Boiler
Reference Conditions	
Temperature (K)	273.15
Pressure (kPa)	101.3
Gas (Wet or Dry)	Dry
Oxygen	No Oxygen Ref

Sulphur Dioxide Trend



For inspection purposes only.
Consent of copyright owner required for any other use.

Sulphur Dioxide Measurement Uncertainty

	Units	Run 1
Measured Quantities		
Certified Range of Analyser	ppm	2.14 to 1000
Operational Range of Analyser	ppm	200
Measured Reading	ppm	5.30
Measured Quantities	Units	Run 1
Nonlinearity	%	0.8
Temperature Dependent Zero drift	%	0.8
Temperature Dependent Span drift	%	2
Cross-sensitivity	%	1.5
Leak	%	0
Calibration Gas Uncertainty	%	<2 %
Parameter	Units	Run 1
Combined uncertainty	mg.m ⁻³	1.09
Expanded uncertainty	mg.m ⁻³	2.19
Uncertainty corrected to std conds.	mg.m ⁻³	2.61
Expanded uncertainty expressed with a level of confidence of 95%	% of ELV	-
Expanded uncertainty expressed with a level of confidence of 95%	mg.m ⁻³	2.61
Expanded uncertainty expressed with a level of confidence of 95%	% of value	17.23
Requirement in standard is for uncertainty to be < 10% at ELV at standard conditions		

For inspection purposes only.
 Consent of copyright owner required for any other use.