Report for Periodic Monitoring of Emissions to Atmosphere

Part 1:	**Executive Summary**
Permit Number:	**N/A**
Operator:	**Glynwed Pipe Systems Ltd**
Installation:	**Cambridgeshire**
Emission Points:	**Fluidised Bed Exhaust**
Monitoring Dates:	**29th April 2014**

UKAS TESTING
1709

mCERTS

Contract Reference:	FTBS 30301
Operator:	Glynwed Pipe Systems Ltd
Address:	St Peters Road Huntington Cambridgeshire PE29 7DA
Monitoring Organisation:	RPS Consultants
Address:	Noble House, Capital Drive, Linford Wood, Milton Keynes, MK14 6QP
Report Date:	2nd June 2014
Report Approved By:	Ian Baggley
Position:	Consultant
MCERTS Registration No.:	MM 05 653
MCERTS Certification Level:	2
Technical Endorsements:	TE1, TE2, TE3, TE4

Signature:

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Monitoring Objectives

At the request of Eric Cross of Glynwed Pipe Systems Ltd, RPS Consultants conducted stack emission monitoring at the Cambridgeshire site in April 2014.

The monitoring programme at this installation was carried out to provide data on emissions to atmosphere for comparison with the limits specified in the air emission criteria for this site.

The following tables detail the parameters requested for monitoring at each emission point and the actual monitoring conducted.

Table 1.1

Parameters Requested to be Monitored	Emission Point
	Fluidised Bed Exhaust
Total Particulate Matter	✓
Volatile Organic Compounds	✓
Specific Requirements	Normal

Notes:
✓ *Represents pollutants sampled*

Monitoring Results

Table 2.1 Monitoring results for emission point Fluidised Bed Exhaust, Carried out on 29th April 2014

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Particulate Matter	20	< 0.44	mg/m^3	+/- 0.23	273K, 101.3kPa, Wet	29/04/14	12:43 – 13:43	BS EN 13284-1:2002	MCERTS	Normal
Volatile Organic Compounds (as Carbon)	20	< 1.0	mg/m^3	+/- 0.013	273K, 101.3kPa, Wet	29/04/14	12:43 – 13:43	BS EN 13526	MCERTS	Normal

Note : The Total Particulate Matter result is reported at the limit of detection.

Operating Information

Table 3.1 Operating conditions during the monitoring of emission point Fluidised Bed Exhaust carried out on 29th April 2014

Parameter	Result
Sample Date	29/04/14
Process Type	Batch
Process Duration	4 Hour
If 'Batch', was monitoring carried out over the whole batch?	No – 1hr sample required
Abatement/Operational?	Afterburner & Candle Filters

Comparison of Operator CEM and Periodic Monitoring Results		
Substance	**CEMs Results (mg/m^3)**	**Periodic Monitoring Results (mg/m^3)**
No CEMS Installed/Data Available		

Monitoring Deviations

Table 4.1 Monitoring Deviations for Emission Point Fluidised Bed Exhaust

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Particulate Matter & Volatile Organic Compounds	None	None	None

Report for Periodic Monitoring of Emissions to Atmosphere

Part 2:	**Supporting Information**
Permit Number:	**N/A**
Operator:	**Glynwed Pipe Systems Ltd**
Installation:	**Cambridgeshire**
Emission Points:	**Fluidised Bed Exhaust**
Monitoring Dates:	**29th April 2014**

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MCERTS

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Signature:	

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APPENDIX 1: General Information

Monitoring Organisation Staff Details

Table 5.1 Sampling Personnel

Sampling Personnel	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
Carl Redgrove	Senior Consultant	Level 2	01/10/14 09/03/15 11/03/16 11/03/16	MM 03 173
Alex Shepherd	Trainee	Trainee	-	MM 14 1270
Nick Mills	Trainee	Trainee	-	MM 14 TBC

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
Carl Redgrove	Senior Consultant	Level 2	TE1 Oct 14 TE2 Mar 15 TE3 Mar 16 TE4 Mar 16	MM 03 173

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
Ian Baggley	Consulatnt	Level 2	TE1 Jun 18 TE2 Mar 15 TE3 Dec 17 TE4 Mar 17	MM 05 653

Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

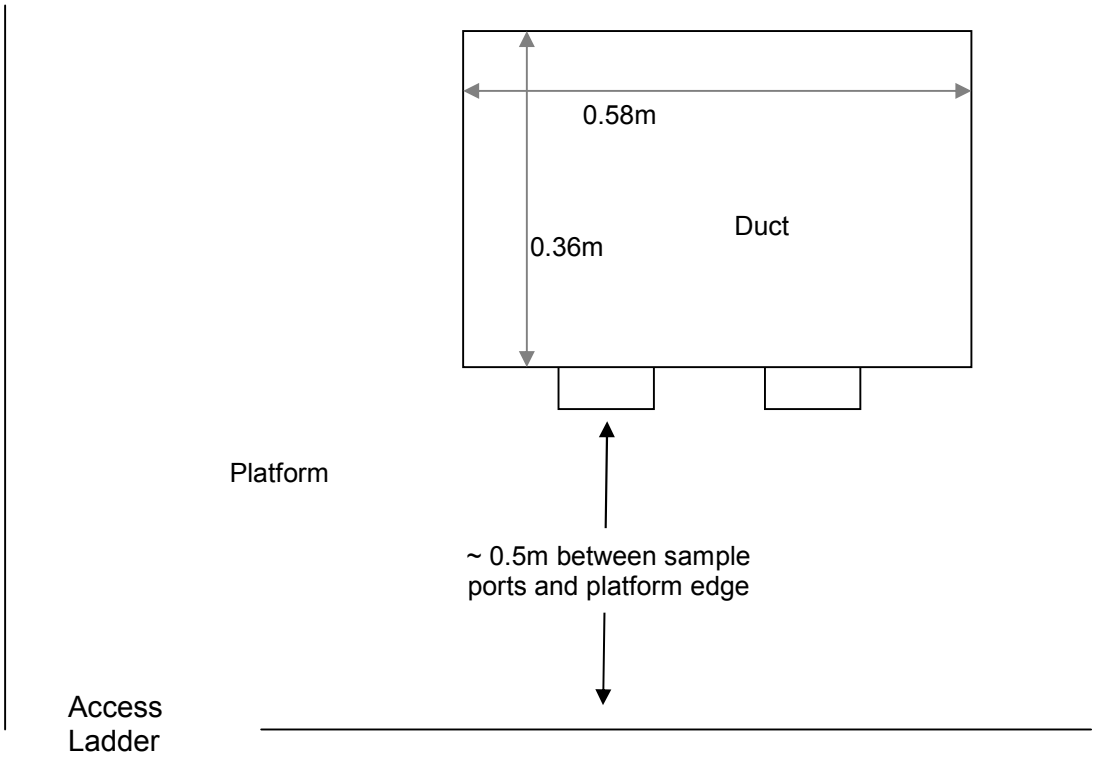
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditation
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Gas Temperatures	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Low Concentration Total Particulate Matter	BS EN 13284-1:2002	RPSCE/1/7c	MCERTS	Gravimetric	D9	RPS Laboratories	UKAS
TOCs at high concentrations	BS EN 13526	RPSCE/1/4c	MCERTS	Flame Ionisation Detector	N/A	N/A	N/A

Table 7.1 – Checklist Used

Equipment Checklist Used	File Location Address
FTBS 30301 Checklist	FTBS 30301 Electronic & Work File

APPENDIX 2:
Fluidised Bed Exhaust Sampling, Analysis & Uncertainty Data

Sample Point Diagram



Company Name: Glynwed Pipe Systems Ltd. | Date: 29/04/14
Site Name: Huntingdon | Run: TPM
Sampling Point Ref: Fluidised Bed Exhaust
Project Reference:FTBS 30301

Stack Width (m)	0.58
Stack Depth (m)	0.36
Stack Area (m2):	0.204

Stack Static press.mm H_2O: 20

Traverse Point No.	Port A			Port B		
	Δ p, mm H_2O	Root Δ p	Stack Temp °C	Δ p, mm H_2O	Root Δ p	Stack Temp °C
1	30	5.477	94	19	4.359	96
2	22	4.690	94	15	3.873	96
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	22.0	4.690	94	15.0	3.873	96
Maximum	30.0	5.477	94	19.0	4.359	96
Mean	**26.0**	**5.084**	**94.0**	**17.0**	**4.116**	**96.0**
Sum	52	10.168	188	34	8.232	192
Total Sum						

Max. pitot press. =	30.0
Min. pitot press. =	15.0
Ratio Max:Min =	2.0 :1

Gas Data

Oxygen %	21.0
CO_2 %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1.000
Enter 0 if correction is not required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow Negative Velocity: Not Permitted	Y
Duct Gas Flow: Ratio of max to min velocity <3:1?	Y
Working Area > 5m²?	N
Handrails with removable chains / self closing gates across the top of the ladder?	Y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	Y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	N/A
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	N
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

Company Name: Glynwed Pipe Systems L	In-stack Filter?	Y	Bar. Press.mm Hg	747	K Factor	2.31	Ambient Temp.		Leak Rate (fin / %)	0
Site Name: Huntingdon										
Project Reference:FTBS 30301	Outstack Filter?	N	Cp	0.839	Dn used	5.967	Start Time	12:43	Leak Rate (start / %)	0
Date: 29/04/14										
Run: TPM	Operators	CR AS NM	Bws%	2	Nozzle No.	1014	Stop Time	13:43	Box/Probe setting	160 +/- 5 °C
Sampling Point Ref: Fluidised Bed Exhaust										
					Meter Correction Yd	0.946				

Sample Filter Weights

	Sample ID	Laboratory	Increase, mg
Filter	109076	RPS	0.04
Probe Washings	30003797	RPS	0.5

Sample Filter Blank Weighings

	Sample ID	Laboratory	Increase, mg
Filter	109077	RPS	0.04
Probe Wash	30003796	RPS	0.5

Impinger Weights

Weights	Initial	Final	Increase, g
Impinger 1	724.5	724.5	0.0
Impinger 2	548.4	548.4	0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	907.1	928	20.9
		Total	20.9

Sample Point	Clock Time min	Pitot Δ p, mm H_2O	Stack Temp, °C	Orifice Δ H, mm H_2O		Gas Meter Reading m^3	Temp at Gas Meter Outlet °C	Condenser Temp, °C	Filter Box Temp °C	Probe Temp °C	Pump Vacuum Inches Hg	Impinger Stem Temp. °C	Root Δ p,
				Desired	Actual								
	0	30	98	69.3	69.3	43985.5	21				-6	20	5.477
	5	30	99	69.3	69.3		22				-6	21	5.477
	10	29	100	66.99	66.99		22				-6	22	5.385
	15	21.5	100	49.665	49.665		24				-6	24	4.637
	20	21	101	48.51	48.51		23				-5	26	4.583
	25	20	101	46.2	46.2		24				-5	26	4.472
Endpoint	30												
	0	19	100	43.89	43.89		24				-5	27	4.359
	5	19	100	43.89	43.89		25				-5	27	4.359
	10	18.2	100	42.042	42.042		26				-5	27	4.266
	15	17.6	100	40.656	40.656		27				-5	28	4.195
	20	11	93	25.41	25.41		28				-4	28	3.317
	25	11	92	25.41	25.41		28				-4	28	3.317
Endpoint	30					45430							
	60.00	**20.608**	**98.7**	**47.6**	**47.6**	**1.445**	**24.5**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**-5.2**	**25.3**	**4.5**

Company Name: Glynwed Pipe Systems Ltd.
Site Name: Huntingdon
Project Reference:FTBS 30301

Date: 29/04/14

Sampling Point Ref: Fluidised Bed Exhaust	Run: TPM
Meter Volume Sampled, acm	1.445
Sample Run Start Time	12:43
Sample Run End Time	13:43
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	747.00
Stack Pressure, mm Hg	748.47
Average Stack Temp, °C	98.7
Meter Volume at STP, scm	1.238
Stack Moisture Content, %	2.1
Average Stack Velocity, m/sec	17.335
Nozzle Diameter, mm	5.97
% Isokinetic Variation	**99.9**
Total Mass of Particulate, mg	0.5
Percentage of Total Particulate Collected on Filter	7.4
Stack Particulate Concentration, mg/m^3	**0.436**
Particulate Mass rate, kg/hour	0.004
Emission Limit value	**20**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.43
Total Weight Gain, mg (Sample Train Blank)	0.54
Blank Result Less than 10% of Limit Value	Y

Uncertainty Calculation for Total Particulate Matter to BS EN 13284-1

Determined Concentration	0.436	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	1.4445	m^3
Sampled gas Temperature	297.5	k
Sampled gas Pressure	99.79	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	21	% by volume
Mass	0.54	mg

Leak	0.00	%
Uncollected Mass	0	mg

Standard Uncertainties for Measured Values

Sampled Volume	0.001	m3
Sampled gas Temperature	2	k
Sampled gas Pressure	1	kPa
Sampled gas Humidity	1	% by volume
Oxygen content	0.1	% by volume
Mass	0.14152385	mg

Uncertainty Calculation for Volume Correction

Volume Correction Factor	0.904		
	Sensitivity Coefficient		**Uncertainty, Uv**
Sampled gas Temperature	0.0030		0.0061
Sampled gas Pressure	0.0091		0.0091
Sampled gas Humidity	0.0090		0.0090
		Sqrt (Uv)^2	0.0142
		Total Uv	**0.020**

Uncertainty Calculation for Oxygen Correction

Oxygen Correction Factor	1.0000		
	Sensitivity Coefficient		**Uncertainty, Uo**
Oxygen Measurement	N/A		N/A
		Total Uo	**N/A**

Uncertainty Contributions (Itemised)

	Value		Sensitivity coefficient	Uncertainty Contribution			
				Concentration		%	
Volume Correction	1.238	m3	0.35	0.01	$mg.m^{-3}$	1.66	%
Mass (weighing)	0.54	mg	0.81	0.11	$mg.m^{-3}$	26.21	%
Oxygen Correction	N/A		0.00	0.00	$mg.m^{-3}$	0.00	%
System Leak	0.00	$mg.m^{-3}$	1.00	0.00	$mg.m^{-3}$	0.00	%
Uncollected Mass	0.00	mg	0.81	0.00	$mg.m^{-3}$	0.00	%
			Total Uncertainty	**0.11**	$mg.m^{-3}$		

Uncertainty Result (Uncertainty has been expanded with a coveragefactor of 2 (K=2))

Expanded Uncertainty =	**0.2292**	$mg.m^{-3}$
=>	**52.52**	**% of Result**
=>	**1.15**	**% of ELV**

Company Name: Glynwed Pipe Systems
Site Ref: Huntingdon
Stack Ref: Fluidised Bed Exhaust

Date: 29/04/14
Run: VOC

	VOC (as Carbon) ppm	VOC (as Carbon) mg/m3	VOC (as Carbon) kg/h	VOC (as Toluene) mg/m3	VOC (as Toluene) kg/h
Average	0.2727	0.4383	0.0043	0.4801	0.0047
Max	1.6000	2.5714	0.0251	2.8163	0.0275
Min	0.0000	0.0000	0.0000	0.0000	0.0000
Emission Limit		20			
Moisture, %	#DIV/0!				
Oxygen Reference, %	0.0				

Stack Gas Volume Flow Rate, m3/s (scms WET) O2 Corrected	2.713029114

Calibrations	ppm
Analyser - Start Zero	0.00
Analyser - Start Span	81.40
Analyser - Zero Check	0.00
System - Zero Check	0.20
System - Span Check	81.30
System - End Zero Check	0.30
System - End Span Check	81.20
Span Value	81.40
Analyser Range (0 - X)	0-100

Equipment ID	
FID	1575

ISO 14956 Calculation Sheet - TOC (BS EN 13526)

Studied Concentration (mg/m^3 as C)	0.438311688
Range of Instrument (mg/m^3 as C)	161

Sampling Parameters to be met	Requirement Met?
Response Time < 60s	Yes
Operating temperature (5 - 45°C)	Yes
Atmospheric pressure (700 - 1240 mbar)	Yes
Relative Humidity (10 - 90%, non condensing)	Yes
Altitude (< 2000 m)	Yes
Zero Drift 2% of FS	Yes
Span Drift 4% of FS	Yes

Selected Performance Characteristic	Value of Performance Characteristic			Operating Conditions compared to calibration condition		
	%	Numerical	Units	Required	Variable due to sampling conditions	Units
Deviation from Linearity	1	0.01	% FS	0.01	1	% FS
Repeatability Standard Deviation	1	0.01	% FS	0.01	1	% FS
8 Hour Drift	2	0.02	%	0.02	1	%
Atmospheric Pressure Dependence	0.1	0.001	% kPa	0.001	1	% kPa
Temperature Dependence	0.2	0.002	%K	0.002	1	%K
Sum Interference	2	0.02	%	0.02	2	%
Voltage Supply	0.1	0.001	%V	0.001	1	%V
Uncertainty of Calibration Gas	2	0.02	%	0.02	1	%
Moisture Effect	1	0.01	%Vol H2O Error	0.01	2	%Vol H2O Error
Loss in sample line (Leaks)	2	0.02	%	0.02	2	%

Measurement Performance related to stationary conditions								
			Value of Uncertainty Quantity					
			At Calibration Conditions			At Sampling Conditions		
Performance Characteristic	Uncertainty Quantity		Units	U	U^2	Units	U	U^2
Deviation form Linearity	U_{Fit}		% FS	1.61	2.592	% FS	0.0043831	0.000
Repeatability Standard Deviation	U_R		% FS	0.003	0.000	% FS	0.003	0.000
8 Hour Drift	U_{drift}		%	0.0051	0.000	%	0.005	0.000
Atmospheric Pressure Dependence	U_{Atmos}		% / kPa	0.000	0.000	% / kPa	0.000	0.000
Temperature Dependence	U_{Temp}		% / K	0.001	0.000	% / K	0.001	0.000
Sum Interference	$U_{Interference}$		%	0.005	0.000	%	0.000	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.000	0.000	% / V	0.000	0.000
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.005	0.000	%	0.005	0.000
Loss in sample line (Leaks)	$U_{Losses,\ leak}$		%	0.005	0.000	%	0.010	0.000
			Sum	1.634	2.592	Sum	0.028	0.000

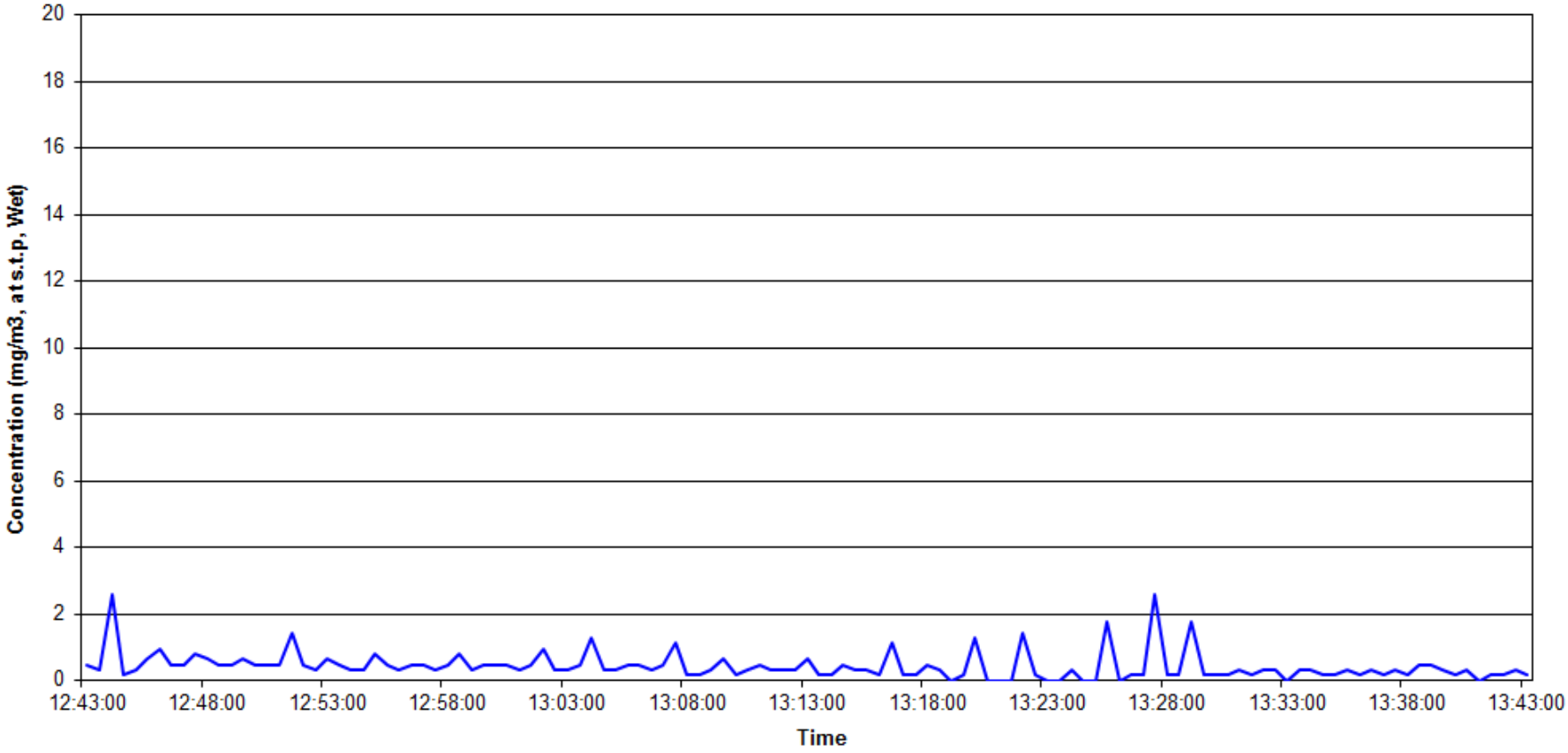
Measurement Uncertainty at	0.438311688	mg/m^3 C			
U_{tot}	0.013	mg/m^3 C			
$U_{tot}{}^{/c}$	3.059	%	U_{limit}	30	%
Pass	Yes				

BS EN 13526:2001 Performance Requirements

Performance Characteristic	Minimum Performance Requirement
Detection Limit	5% of the emission limit value
Response Time	less than 1 minute
Linearity Deviation	permissible deviation 5% of emission limit
Response Factors	Permissible range
Methane	0.9 to 1.2
Aliphatic Hydrocarbons	0.9 to 1.1
Aromatic Hydrocarbons	0.8 to 1.1
Aliphatic alchohols	0.7 to 1.0
Esters	0.7 to 1.0
Ketones	0.7 to 1.0
Organic Acids	0.5 to 1.0
Oxygen Effect	permissible deviation 5% of emission limit

For more details on the above figures see BS EN 13526:2001.

TOC Emissions Profile from the Fluidised Bed Exhaust on 29/4/14 at Glynwed Pipe Systems Ltd, Huntingdon.



Appendix 3 – Certificates of Analysis

RPS

UKAS TESTING 0605

Test Certificate

Date 09/05/2014

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 30301
		Certificate No.	WK14-2773
		Issue No.	1
Contact	Carl Redgrove	**Date Received**	01/05/2014
Description	2 filters & 2 washes for TPM	**Technique**	Gravimetric Stack

Sample No.	**789000**	**109076**	**Method**
Total particulate matter	<0.04 mg		DØ(U)
Sample No.	**789001**	**30003797**	**Method**
Total particulate matter	<0.5 mg		DØ(U)
Sample No.	**789002**	**109077**	**Method**
Total particulate matter	<0.04 mg		DØ(U)
Sample No.	**789003**	**30003796**	**Method**
Total particulate matter	<0.5 mg		DØ(U)

RPS Laboratories Ltd. Unit 12. Waters Edge Business Park. Modwen Road. Salford. M5 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3969

0505

Date 09/05/2014

Test Certificate

Client	RPS Milton Keynes HSED	Certificate No.	WK14-2773
		Issue No.	1

Tested By	Kirstie Davenport	Date	08/05/2014
Approved By		Date	09/05/2014

Joanne Dewhurst
Laboratory Manager

For and on authority of RPS Laboratories Ltd.

Method Symbols (U) Analysis is UKAS Accredited
(N) Analysis is not UKAS Accredited

Concentration values (mg/m3 and ppm) are calculated on the basis of information provided by the customer.
Results stated as ml are refering to the sample volume.

RPS Laboratories terms and conditions apply - a copy is available on request.
Analysis carried out on samples 'as received'

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