Report for Periodic Monitoring of Emissions to Atmosphere

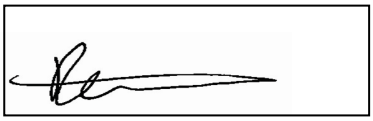
Part 1:	**Executive Summary**
Permit Number:	**N/A**
Operator:	**Glynwed Pipe Systems Ltd**
Installation:	**Cambridgeshire**
Emission Points:	**Fluidised Bed Exhaust**
Monitoring Dates:	**11th April 2013**

UKAS TESTING 1709

mCERTS

Contract Reference:	FTBS 25399
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:	8th May 2013
Report Approved By:	Richard Carter
Position:	Consultant
MCERTS Registration Number:	MM 07 861
MCERTS Certification Level:	2
Technical Endorsements:	TE1, TE2, TE3, TE4

Signature:



RPS Consultants has produced this report within the term of the contract with the client and taking account of the resources devoted to it by agreement with the client.

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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 2013.

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 11/04/2013

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	1.0	mg/m^3	+/- 0.19	273K, 101.3kPa, Wet	11/04/2013	12:15 - 13:15	BS EN 13284-1:2002	MCERTS	Normal
Volatile Organic Compounds (as Carbon)	20	1.9	mg/m^3	+/- 0.012	273K, 101.3kPa, Wet	11/04/2013	12:16 - 13:16	BS EN 13526	MCERTS	Normal

Operating Information

Table 3.1 Operating conditions during the monitoring of emission point Fluidised Bed Exhaust carried out on 11/04/2013

Parameter	Result
Sample Date	11/04/2013
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:	**11th April 2013**

UKAS TESTING 1709

MCERTS

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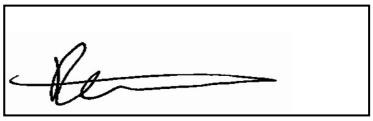
Signature:	

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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
Richard Carter	Consultant	Level 2	TE1 – 13/06/13 TE2 – 03/12/13 TE3 – 03/12/14 TE4 – 18/03/15	MM 07 861
Luke Prowse	Technician	Level 1	TE1 – 12/02/18	MM 11 1145

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
James Beechey	Technician	Level 1	TE1 – 12/02/18	MM 11 1144

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
Richard Carter	Consultant	Level 2	TE1 – 13/06/13 TE2 – 03/12/13 TE3 – 03/12/14 TE4 – 18/03/15	MM 07 861

Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

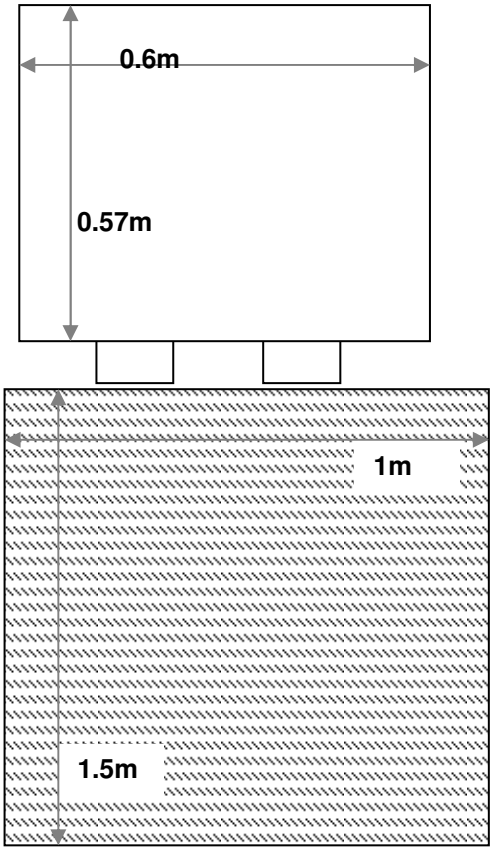
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditaton
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
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
FTBS25399 Checklist	FTBS25399 Electronic & Work File

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

Sample Point Diagram



Company Name: Glynwed Pipe Systems Ltd
Site Ref: Huntington
Sampling Point Ref: Fluidised Bed Exhaust
Project Ref: FTBS25399

Date: 11/04/13
Run: TPM

Stack Width (m)	0.60
Stack Depth (m)	0.57
Stack Area (m2):	0.342

Stack Static press.mm H_2O: 5

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	16	4.000	107	12.5	3.536	102
2	14	3.742	105	13	3.606	102
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	14.0	3.742	105	12.5	3.536	102
Maximum	16.0	4.000	107	13.0	3.606	102
Mean	**15.0**	**3.871**	**106.0**	**12.8**	**3.571**	**102.0**
Sum	30	7.742	212	25.5	7.141	204
Total Sum						

Max. pitot press. =	16.0
Min. pitot press. =	12.5
Ratio Max:Min =	1.3 :1

Gas Data

Oxygen %	21.0
CO_2 %	0.04
CO %	

Oxygen Correction

Required Correction Value	0
Actual Oxygen Factor	1
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 > 5m^2?	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	Y
Handrails not restricting access to ports?	Y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	Y
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

Company Name: Glynwed Pipe Systems L	In-stack Filter?	N	Bar. Press.mm Hg	750	K Factor	4.177	Ambient Temp.	15	Leak Rate (fin / %)	0
Site Ref: Huntington										
Sampling Point Ref: Fluidised Bed Exhaus	Outstack Filter?	Y	Cp	0.824	Dn used	7	Start Time	12:15	Leak Rate (start / %)	0
Date: 11/04/13										
Run: TPM	Operators	RC LP	Bws%	4	Nozzle No.		Stop Time	13:15	Box/Probe setting	160 +/- 5 oC
Project Ref: FTBS25399										
					Meter Correction Yd	0.98				

Sample Filter Weights

	Reference	Laboratory	Increase, mg
Filter	95617	RPS	0.53
Probe Washings	30002233	RPS	1

Sample Filter Blank Weighings

	Reference	Laboratory	Increase, mg
Filter	95629	RPS	0.22
Probe Wash	30002232	RPS	1.2

Impinger Weights

Weights	Initial	Final	Increase, g
Impinger 1			0.0
Impinger 2			0.0
Impinger 3			0.0
Impinger 4			0.0
Impinger 5			0.0
Silica Gel			0.0
		Total	0.0

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								
1	0	21.0	112	87.7	87.7	1169456.2	19	N/A	na	na	-12	7	4.583
	5	22.0	115	91.9	91.9		19	N/A			-15	7	4.690
	10	18.0	116	75.2	75.2		19	N/A			-12	8	4.243
	15	18.0	115	75.2	75.2		19	N/A			-10	8	4.243
	20	18.0	116	75.2	75.2		20	N/A			-11	8	4.243
	25	18.0	116	75.2	75.2		22	N/A			-11	9	4.243
Endpoint	30												
2	0	18.0	112	75.2	75.2		23	N/A			-11	9	4.243
	5	18.0	110	75.2	75.2		24	N/A			-11	10	4.243
	10	15.0	110	62.7	62.7		24	N/A			-10	11	3.873
	15	21.0	108	87.7	87.7		25	N/A			-12	11	4.583
	20	15.0	109	62.7	62.7		26	N/A			-19	11	3.873
	25	15.0	109	62.7	62.7		26	N/A			-19	11	3.873
Endpoint	30					1171142.5		N/A					
	60.00	**18.1**	**112.3**	**75.5**	**75.5**	**1.686**	**22.2**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**-12.8**	**9.2**	**4.2**

Company Name: Glynwed Pipe Systems Ltd
Site Ref: Huntington
Project Ref: FTBS25399

Date: 11/04/13

Sampling Point Ref: Fluidised Bed Exhaust	Run: TPM
Meter Volume Sampled, acm	1.686
Sample Run Start Time	12:15
Sample Run End Time	13:15
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	750.00
Stack Pressure, mm Hg	750.37
Average Stack Temp, °C	112.3
Meter Volume at Wet STP, scm	1.519
Stack Moisture Content, %	2.0
Average Stack Velocity, m/sec	16.375
Stack Flow Rate, scms wet, STP	3.915
Nozzle Diameter, mm	7.00
% Isokinetic Variation	**97.5**
Total Mass of Particulate, mg	1.5
Percentage of Total Particulate Collected on Filter	34.6
Stack Particulate Concentration, mg/m^3	**1.01**
Particulate Mass rate, kg/hour	0.014
Emission Limit value	**20**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.9
Total Weight Gain, mg (Sample Train Blank)	1.4
Blank Result Less than 10% of Limit Value	Y

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

Determined Concentration	1.0	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	1.6863	m^3
Sampled gas Temperature	295.1666667	k
Sampled gas Pressure	100.00	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	21	% by volume
Mass	1.53	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	0.913		
	Sensitivity Coefficient		Uncertainty, Uv
Sampled gas Temperature	0.0031		0.0062
Sampled gas Pressure	0.0091		0.0091
Sampled gas Humidity	0.0091		0.0091
		Sqrt (Uv)^2	0.0143
		Total Uv	0.024

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	1.519	m3	0.66	0.02	$mg.m^{-3}$	1.59	%
Mass (weighing)	1.53	mg	0.66	0.09	$mg.m^{-3}$	9.25	%
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	0.66	0.00	$mg.m^{-3}$	0.00	%
			Total Uncertainty	0.09	$mg.m^{-3}$		

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

Expanded Uncertainty =	0.19	$mg.m^{-3}$
=>	18.77	% of Result
=>	0.00	% of ELV

Company Name: Glynwed
Site Ref: Huntington
Stack Ref: Fluidised Bed E

Date: 11/04/13
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	Oxygen %
Average	1.21	1.94	0.01	2.13	0.01	#DIV/0!
Max	8.61	13.84	0.06	15.15	0.06	0.00
Min	0.14	0.23	0.00	0.25	0.00	0.00
Emission Limit						
Moisture, %	1.5					
Oxygen Reference, %	0.0					

Stack Gas Volume Flow Rate, m3/s (scms WET) O2 Corrected	1.115422033

ISO 14956 Calculation Sheet - TOC (BS EN 12619)

Studied Concentration (mg/m^3 As C)	1.944294775
Range of Instrument (mg/m^3 as C)	

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 < 0.4 mg/m^3	Yes
Span Drift <0.7 mg/m^3	Yes

Selected Performance Characteristic	Value of Performance Characteristic			Operating Conditions compared to calibration condition		
	%	Numerical	Units	Required	Variable due to sampling conditions	Units
Response Time	2	0.02	minutes	0.02	1	minutes
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
Losses in sample line	2	0.02	%	0.02	2	%
Uncertainty of Calibration Gas	2	0.02	%	0.02	1	%
Calibration Error (Gas Divider)	0.5	0.005	%	0.005	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
Response Time	$U_{response}$		minutes	0.000	0.000	minutes	0.000	0.000
Deviation form Linearity	U_{Fit}		% FS	0	0.000	% FS	0	0.000
Repeatability Standard Deviation	U_R		% FS	0.011	0.000	% FS	0.011	0.000
8 Hour Drift	U_{drift}		%	0.0225	0.001	%	0.022	0.001
Atmospheric Pressure Dependence	U_{Atmos}		% / kPa	0.001	0.000	% / kPa	0.001	0.000
Temperature Dependence	U_{Temp}		% / K	0.002	0.000	% / K	0.002	0.000
Sum Interference	$U_{Interference}$		%	0.022	0.001	%	0.001	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.001	0.000	% / V	0.001	0.000
Losses in sample line	$U_{Losses, TOC}$		%	0.022	0.001	%	0.045	0.002
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.022	0.001	%	0.022	0.001
Calibration Error (Gas Divider)	$U_{gas\ divider}$		%	0.006	0.000	%	0.006	0.000
Loss in sample line (Leaks)	$U_{Losses, leak}$		%	0.022	0.001	%	0.045	0.002
			Sum	0.134	0.003	Sum	0.157	0.005

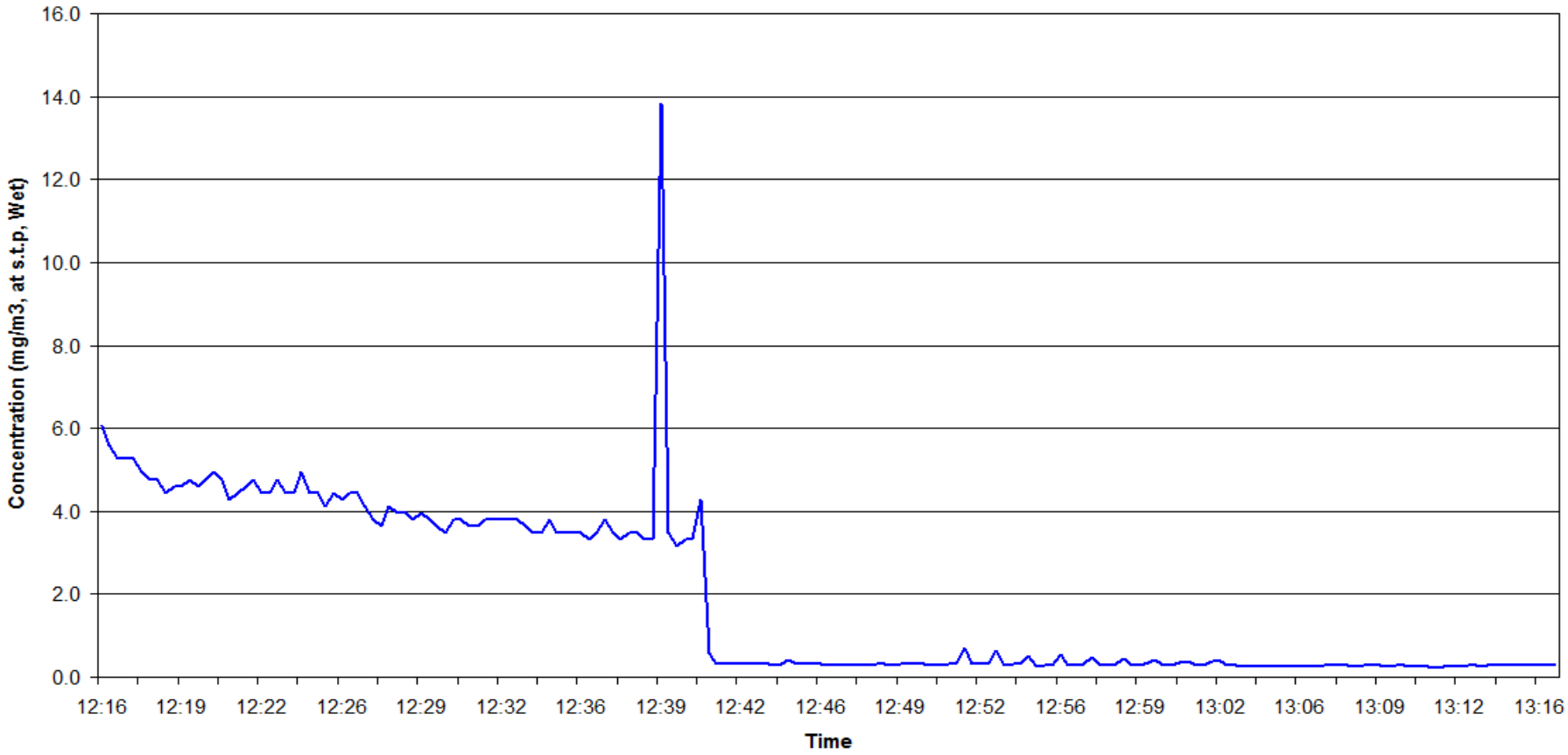
Measurement Uncertainty at	1.944294775	mg/m^3 C			
U_{tot}	0.072	mg/m^3 C			
$U_{tot}{}^{/c}$	3.711	%	U_{limit}	30	%
Pass	Yes				

BS EN 12619:1999 Performance Requirements

Performance Characteristic	Minimum Performance Requirement
Detection Threshold	0.4 mg/m3
Response Time	Less than 1 minute
Linearity Deviation	Permissible deviation 0.4 mg/m3
Range of Response Factors	Permissible Range
aliphatic hydrocarbons	0.90 to 1.10
aromatic hydrocarbons	0.85 to 1.10
methylene chloride	0.75 to 1.15
Oxygen Interference	Permissible interference 0.8 mg/m3
Gas Interference	Permissible interference 1 mg/m3
Zero Drift	0.4 mg/m3
Span Drift	0.7 mg/m3
Temperature responsive zero drift	0.4 mg/m3 (Based on a 10 C temperature change within allowed temperature range)
Temperature responsive span drift	0.5 mg/m3 (Based on a 10 C temperature change within allowed temperature range)
Allowable ambient temperature ranges	Between 0 - 40 °C
Zero Point Reading	About 10 - 20% of Full Scale

For more details on the above figures see BS EN 12619:1999

TOC Emissions Profile from the Fluidised Bed Exhaust on 11/4/13 at Glynwed Pipe Systems Ltd, Huntingdon.



Appendix 3 – Certificates of Analysis

RPS Laboratories

0605

Test Certificate

Date 08/05/2013

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 25399
		Certificate No.	WK13-2603
		Issue No.	1
Contact	James Beechey	**Date Received**	29/04/2013
Description	2 filters & 2 solutions for TPM	**Technique**	Gravimetric Stack

Sample No.	742587	095617	**Method**
Total particulate matter	0.53 mg		DΘ(U)
Sample No.	742588	30002233	**Method**
Total particulate matter	1.0 mg		DΘ(U)
Sample No.	742589	095629	**Method**
Total particulate matter	0.22 mg		DΘ(U)
Sample No.	742590	30002232	**Method**
Total particulate matter	1.2 mg		DΘ(U)

RPS Laboratories Ltd. Unit 12. Waters Edge Business Park. Modwen Road. Salford. M5 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3959

Date 08/05/2013

Test Certificate

Client	RPS Milton Keynes HSED	Certificate No.	WK13-2603
		Issue No.	1

Tested By	Kirstie Davenport	Date	03/05/2013 07/05/2013
Approved By		Date	08/05/2013

Lora McKerracher
Chemist

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 provided to assist with interpretation only, they are not covered by the scope of UKAS accreditation.
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'

RPS Laboratories Ltd. Unit 12, Waters Edge Business Park, Modwen Road, Salford, M5 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3959