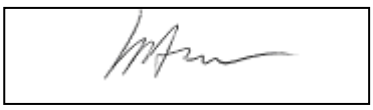
Report for Periodic Monitoring of Emissions to Atmosphere

Part 1:	**Executive Summary**
Permit Number:	**N/A**
Operator:	**Glynwed Pipe Systems**
Installation:	**Cambridgeshire**
Emission Point(s):	**1**
Monitoring Date(s):	**30th March 2012**

Contract Reference:	FTBS 20460
Operator:	Glynwed Pipe Systems
Address:	Cambridgeshire
Monitoring Organisation:	RPS Consultants
Address:	Noble House, Capital Drive, Linford Wood, Milton Keynes, Buckinghamshire MK14 6QP
Report Date:	3rd May 2012
Report Approved By:	Glyn Harrison
Position:	Operations Manager
MCERTS Registration Number:	MM 03 228
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, RPS Consultants conducted stack emission monitoring at the Cambridgeshire site in March 2012.

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**
	1
	Fluidised Bed Exhaust
Volatile Organic Compounds	✓
Total Particulate Matter	✓
Specific Requirements	Normal

Notes:
✓ *Represents pollutants sampled*

Monitoring Results

Table 2.1 Monitoring results for emission point 1, Carried out on 30/03/2012

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	4.4	mg/m^3	+/- 0.24	273K, 101.3kPa, Wet	30/03/2012	13:19 - 14:20	BS EN 13284-1:2002	MCERTS	Normal
Volatile Organic Compounds (as Carbon)	20	3.0	mg/m^3	+/- 1.6	273K, 101.3kPa, Wet	30/03/2012	13:19 - 14:19	BS EN 13526	MCERTS	Normal

Operating Information

Table 3.1 Operating conditions during the monitoring of emission point 1 carried out on 30/03/2012

Parameter	Result
Sample Date	30/03/2012
Process Type	Batch
Process Duration	4 Hour
If 'Batch', was monitoring carried out over the whole batch?	No – 1hr sample required
Abatement/Operational?	Not Installed

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 1

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**
Installation:	**Cambridgeshire**
Emission Point(s):	**1**
Monitoring Date(s):	**30th March 2012**

Contract Reference:	FTBS 20460
Operator:	Glynwed Pipe Systems
Address:	Cambridgeshire
Monitoring Organisation:	RPS Consultants
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MCERTS Certification Level:	2
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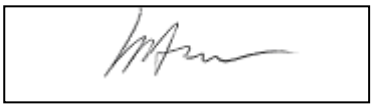
Signature:	

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APPENDIX 1: General Information

Monitoring Organisation Staff Details

Table 5.1 Sampling Personnel

Sampling Personnel	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Richard Harvey	Principal Consultant	Level 2	TE1, TE2, TE3, TE4	MM 02 020
Luke Prowse	Trainee	Trainee	-	MM 11 1145

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Carl Redgrove	Senior Consultant	Level 2	TE1, TE2, TE3, TE4	MM 03 173

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Glyn Harrison	Operations Manager	Level 2	TE1, TE2, TE3, TE4	MM 03 228

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
FTBS20460 Checklist	FTBS20460 Electronic & Work File

APPENDIX 2:
Sampling, Analysis & Uncertainty Data

Company Name: Glynwed Pipe Systems
Site Ref: Huntingdon
Sampling Point Ref: 1
Project Ref: FTBS20460

Date: 30/03/12
Run: TPM

Stack Width (m)	0.60
Stack Depth (m)	0.55
Stack Area (m2)	0.330

Stack Static press.mm H_2O: 760

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	17	4.123	75	16	4.000	82
2	21	4.583	87	15	3.873	87
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	17.0	4.123	75	15.0	3.873	82
Maximum	21.0	4.583	87	16.0	4.000	87
Mean	**19.0**	**4.353**	**81.0**	**15.5**	**3.936**	**84.5**
Sum	38	8.706	162	31	7.873	169
Total Sum						

Max. pitot press. =	21.0
Min. pitot press. =	15.0
Ratio Max:Min =	1.4 :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°?	
Duct Gas Flow Negative Velocity: Not Permitted	
Duct Gas Flow: Ratio of max to min velocity <3:1?	
Working Area > 5m²?	
Handrails with removable chains / self closing gates across the top of the ladder?	
Handrails (approx 0.5 and 1.0 m high) and vertical baseboards (approx 0.25m high)?	
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	
Handrails not restricting access to ports?	
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	

Company Name: Glynwed Pipe Systems	In-stack Filter?	Y	Bar. Press mm Hg	760	K Factor	4.329	Ambient Temp		Leak Rate (fin / %)	0
Site Ref: Huntingdon										
Sampling Point Ref: 1	Outstack Filter?		Cp	0.848	Dn used	6.933	Start Time	13:19	Leak Rate (start / %)	0
Date: 30/03/12										
Run: TPM	Operators	LP; RH	Bws%		Nozzle No		Stop Time	14:20	Box/Probe setting	160 +/- 5 oC
Project Ref: FTBS20460										
					Meter Correction Yd	0.98				

Sample Filter Weights

	Reference	Laboratory	Increase, mg
Filter	84433	RPS	6.11
Probe Washings	T20001250	RPS	0.5

Sample Filter Blank Weighings

	Reference	Laboratory	Increase, mg
Filter	84432	RPS	0.04
Probe Wash	T20001251	RPS	0.5

Impinger Weights

Weights	Initial	Final	Increase, g
Impinger 1	700.6	703.9	3.3
Impinger 2	794.2	793.4	-0.8
Impinger 3	601.4	600.6	-0.8
Impinger 4	815.4	828.2	12.8
Impinger 5			0.0
Silica Gel			0.0
		Total	14.5

Sample Point	Clock Time min	Pitot Δ p, mm H_2O	Stack Temp, °C	Orifice Δ H, mm H_2O		Gas Meter Reading	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	m^3							
	0	19.0	80	82.3	82.3	869448.2	20					10	4.359
	5	19.0	82	82.3	82.3	"	19					12	4.359
	10	19.0	82	82.3	82.3	"	19					12	4.359
	15	18.4	91	79.7	79.7	"	19					13	4.290
	20	18.4	91	79.7	79.7	"	20					14	4.290
	25	18.4	93	79.7	79.7	"	20					15	4.290
Endpoint	30					"							0.000
	0	16.0	83	69.3	69.3	"	21					15	4.000
	5	16.0	83	69.3	69.3	"	21					16	4.000
	10	14.4	83	62.3	62.3	"	21					16	3.795
	15	14.4	92	62.3	62.3	"	22					16	3.795
	20	14.4	93	62.3	62.3	"	22					16	3.795
	25	14.4	93	62.3	62.3	"	22					16	3.795
Endpoint	30					871082.4							
	60.00	**16.8**	**87.2**	**72.8**	**72.8**	**1.634**	**20.5**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**14.3**	**3.8**

Company Name: Glynwed Pipe Systems
Site Ref: Huntingdon
Project Ref: FTBS20460

Date: 30/03/12

Sampling Point Ref: 1		Run: TPM
Pitot Tube Constant		0.85
Impinger Solution Volume Gain, ml		14.5
BLANK CELL		BLANK CELL
Total Volume H_2O Collected, ml		14.5
Average Gas Meter Temp, °C		20.5
Meter Volume Sampled, acm		1.634
Sample Run Start Time		13:19
Sample Run End Time		14:20
Total Actual Sampling Time, min		60.0
Barometric Pressure, mm Hg		760.00
Stack Pressure, mm Hg		815.92
Average Stack Temp, °C		87.2
Av. Orifice Meter Press. Drop, mm H_2O		72.799
Av. Pitot tube Press. Drop, mm H_2O		16.817
Square Root Av. Pitot Tube Press. Drop, /mm H_2O		3.779
Volume of Water as gas at STP, scm		0.018
Meter Volume at STP, scm		1.499
Meter Volume at Wet STP, scm		1.517
Stack Moisture Content, %		1.2
Oxygen Reference Value		0.0
Oxygen Correction Factor		1.0
Stack Gas Analysis	$\%CO_2$	0.04
	$\%O_2$	21.00
	%CO	0.00
	Total %	21.04
	%N2	78.96
Dry Molecular Weight, g/gmole		28.846
Stack Molecular Weight, g/gmole		28.717
Average Stack Velocity, m/sec		13.889
Duct Diameter, m		0.55
Stack Area, m^2		0.33
Stack Flow Rate, acms		4.583
Stack Flow Rate, scms wet, STP		3.728
Stack Flow Rate, scms dry,STP		3.683
Nozzle Diameter, mm		6.93
% Isokinetic Variation		**98.6**
Mass of Particulate Collected on Filter, mg		6.1
Mass of Particulate collected in Probe, mg		0.5
Total Mass of Particulate, mg		6.6
Percentage of Total Particulate Collected on Filter		92.4
Stack Particulate Concentration, mg/m^3		**4.4**
Particulate Mass rate, kg/hour		0.058
Emission Limit value		**20**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.4
Total Weight Gain, mg (Sample Train Blank)	0.5
Blank Result Less than 10% of Limit Value	Y

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

Determined Concentration	4.4	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	1.8342	m^3
Sampled gas Temperature	293.5	k
Sampled gas Pressure	109.79	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	21	% by volume
Mass	8.61	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	0.14152395	mg

Uncertainty Calculation for Volume Correction

Volume Correction Factor	0.999		
	Sensitivity Coefficient		Uncertainty, Uv
Sampled gas Temperature	0.0034		0.0068
Sampled gas Pressure	0.0092		0.0092
Sampled gas Humidity	0.0100		0.0100
		Sqrt (Uv)^2	0.0152
		Total Uv	0.025

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	1.499	m3	2.94	0.07	$mg.m^{-3}$	1.66	%
Mass (weighing)	8.61	mg	0.67	0.09	$mg.m^{-3}$	2.14	%
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	0.67	0.00	$mg.m^{-3}$	0.00	%
			Total Uncertainty	0.12	$mg.m^{-3}$		

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

Expanded Uncertainty =	0.24	$mg.m^{-3}$
=>	5.41	% of Result
=>	0.00	% of ELV

Company Name: Glynwed
Site Ref: Huntingdon
Stack Ref: 1

Date: 30/03/12
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	1.86	3.02	0.04	3.31	0.05	20.90
Max	2.26	3.68	0.05	4.03	0.06	0.00
Min	1.31	2.12	0.03	2.32	0.03	0.00
Emission Limit						
Moisture, %	1.2					
Oxygen Reference, %	0.0					

Stack Gas Volume Flow Rate, m3/s (scms Dry) O2 Corrected	3.937183781

ISO 14956 Calculation Sheet - TOC (BS EN 13526)

Studied Concentration (mg/m^3 as C)	3.020685953
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	1.61	2.592
Repeatability Standard Deviation	U_R		% FS	0.017	0.000	% FS	0.017	0.000
8 Hour Drift	U_{drift}		%	0.0349	0.001	%	0.035	0.001
Atmospheric Pressure Dependence	U_{atmos}		% / kPa	0.002	0.000	% / kPa	0.002	0.000
Temperature Dependence	U_{temp}		% / K	0.003	0.000	% / K	0.003	0.000
Sum Interference	$U_{interference}$		%	0.035	0.001	%	0.002	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.002	0.000	% / V	0.002	0.000
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.035	0.001	%	0.035	0.001
Loss in sample line (Leaks)	$U_{Losses,\ leak}$		%	0.035	0.001	%	0.070	0.005
			Sum	1.774	2.597	Sum	1.776	2.600

Measurement Uncertainty at	3.020685953	mg/m^3 C			
U_{tot}	1.612	mg/m^3 C			
U_{tot} %	53.377	%	U_{limit}	30	%
Pass	No				

BS EN 13526:2001 Performance Requirements

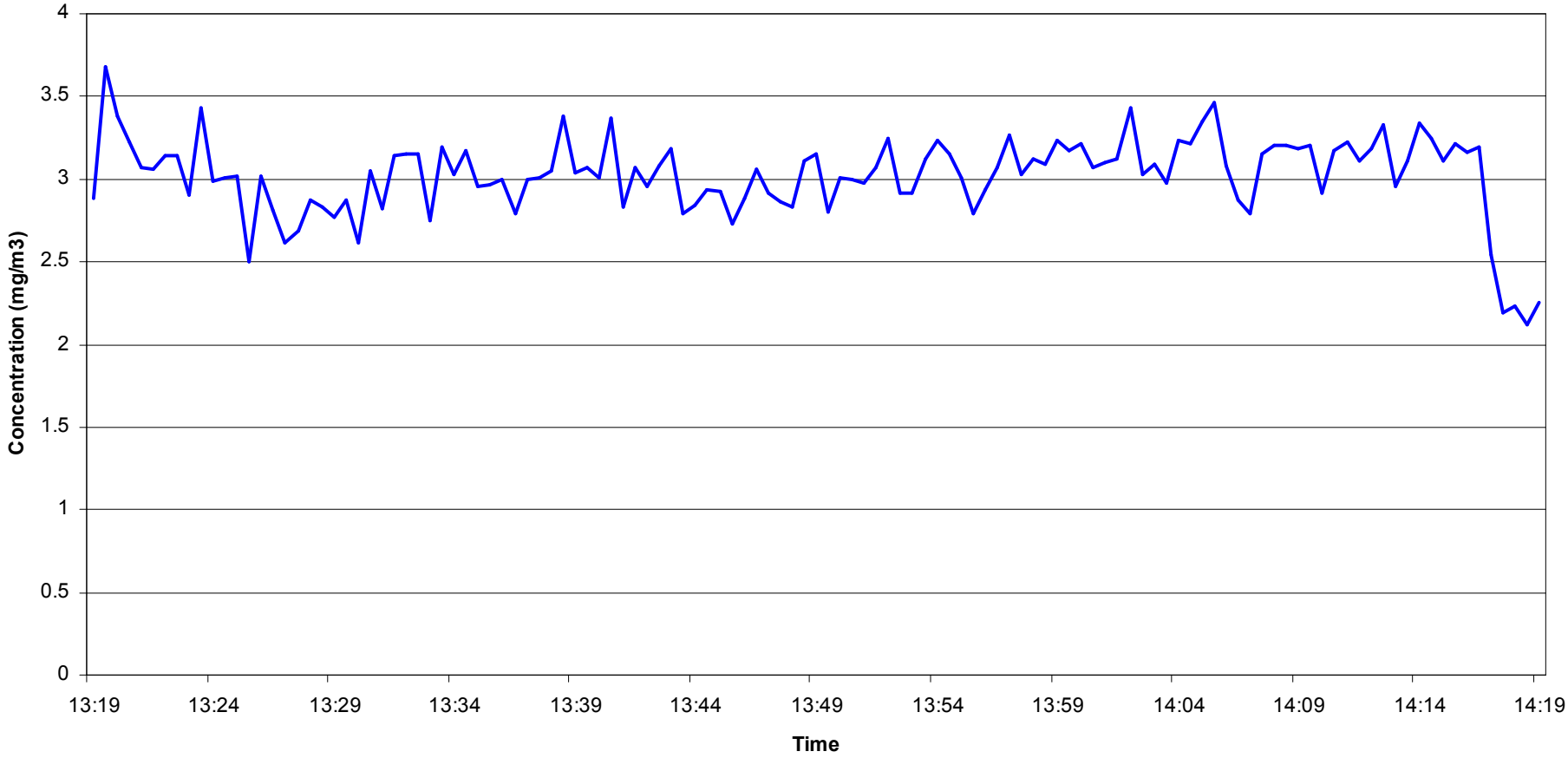
Performance Characteristic	Minimum Performance Requirement
Detection Limit	5% of the emission limit value
Response Time	less than 1 minute
Linearity Deviation	permissible deviation 5% of emission limit
Response Factors	Permissible range
Methane	0.9 to 1.2
Aliphatic Hydrocarbons	0.9 to 1.1
Aromatic Hydrocarbons	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.

Note: U_{limit} is the percentage of the ELV value allowed for the uncertainty. In other words, if the ELV is 50 mg/m3, the U_{limit} allowed is 15 mg/m3

TOC Emissions Profile from the Fluidised Bed Exhaust on 30/3/12 at Glynwed Pipe Systems

reference conditions expressed as 273K, 101.3 kPa, without correction for oxygen and wet gas



RPS Laboratories

UKAS TESTING 0605

Test Certificate

Date 16/04/2012

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 20460
		Certificate No.	WK12-2027
		Issue No.	1
Contact	Luke Prowse	**Date Received**	04/04/2012
Description	2 filters and 2 washes for TPM	**Technique**	Gravimetric

Sample No.	**690386**	**084433**	**Method**
Total particulate matter	8.11 mg		D9(U)
Sample No.	**690387**	**T20001250**	**Method**
Total particulate matter	<0.5 mg		D9(U)
Sample No.	**690388**	**084432**	**Method**
Total particulate matter	<0.04 mg		D9(U)
Sample No.	**690389**	**T20001251**	**Method**
Total particulate matter	<0.5 mg		D9(U)

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

UKAS TESTING 0605

Date 16/04/2012

Test Certificate

Client	RPS Milton Keynes HSED	**Certificate No.**	**WK12-2027**
		Issue No.	1

Tested By John McKeown Date 16/04/2012

Approved By Date 16/04/2012

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 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'

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