Report for Periodic Monitoring of Emissions to Atmosphere

Part 1:	**Executive Summary**
Permit Number:	**22/93**
Operator:	**GPS PE Pipe Systems Ltd**
Installation:	**Cambridgeshire**
Emission Points:	**Fluidised Bed Exhaust**
Monitoring Dates:	**7th May 2015**

UKAS TESTING
1709

mCERTS

Contract Reference:	FTBS 35310
Operator:	GPS PE 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:	19th June 2015
Report Approved By:	Glyn Harrison
Position:	Operations Manager
MCERTS Registration No.:	MM 03 228
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.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above. This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.

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Monitoring Objectives

At the request of Eric Cross of GPS PE Pipe Systems Ltd, RPS Consultants conducted stack emission monitoring at the Cambridgeshire site in May 2015.

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 7th May 2015

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	< 0.34	mg/m^3	+/- 0.18	273K, 101.3kPa, Wet	07/05/2015	13:51 – 14:51	BS EN 13284-1:2002	MCERTS	Normal
Volatile Organic Compounds (as Carbon)	20	0.072	mg/m^3	+/- 0.0022	273K, 101.3kPa, Wet	07/05/2015	13:51 – 14:51	BS EN 13526	MCERTS	Normal

Operating Information

Table 3.1 Operating conditions during the monitoring of emission point Fluidised Bed Exhaust carried out on 7th May 2015

Parameter	Result
Sample Date	07/05/2015
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:	**22/93**
Operator:	**GPS PE Pipe Systems Ltd**
Installation:	**Cambridgeshire**
Emission Points:	**Fluidised Bed Exhaust**
Monitoring Dates:	**7th May 2015**

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MCERTS Certification Level:	2
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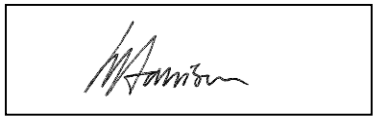
Signature:	

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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
Waheed Rasul	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 07 851

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements & Expiries	MCERTS Registration Number
Daniel Lewis	Technician	Level 1	-	MM 14 1291

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements & Expiries	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

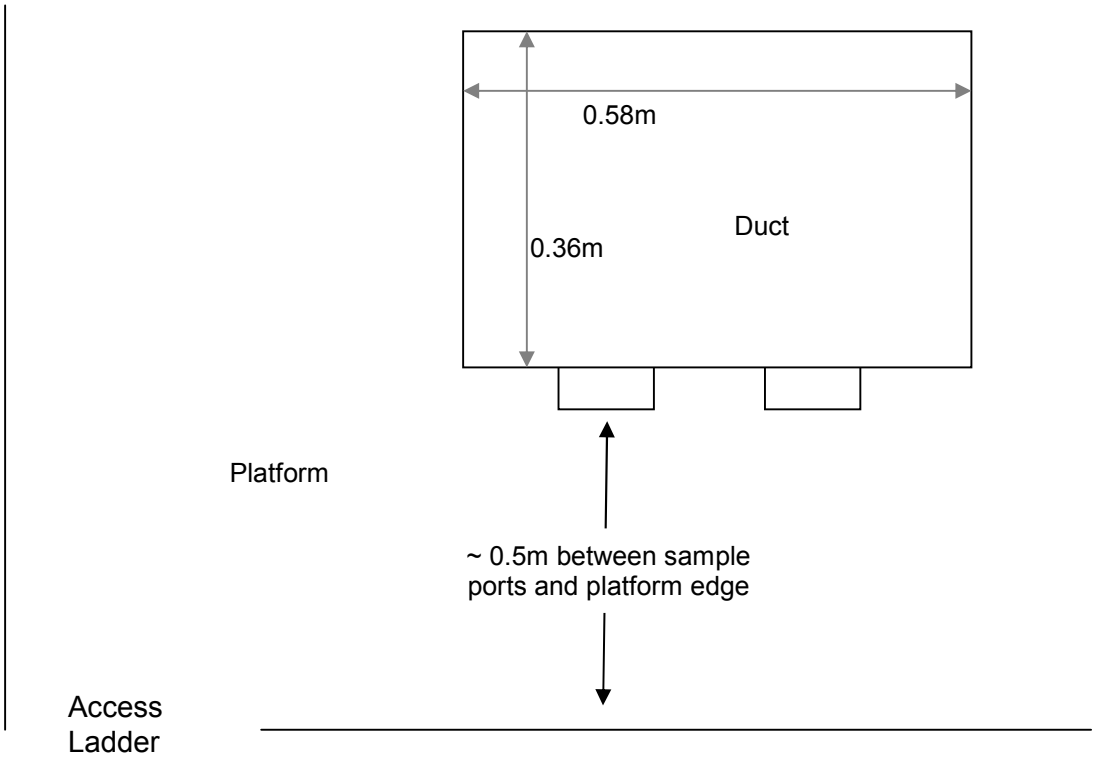
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditatlon
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
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	BS EN 12691	RPSCE/1/4b	MCERTS	Flame Ionisation Detector	N/A	N/A	N/A

Table 7.1 – Checklist Used

Equipment Checklist Used	File Location Address
FTBS 35310 Checklist	FTBS 35310 Electronic & Work File

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

Sample Point Diagram



Company Name: Glynwed Pipe Sysytems Ltd
Site Name: Huntingdon
Sampling Point Ref: Fluidised Bed Exhaust
Project Reference:FTBS 35310

Date: 07/05/15
Run: TPM

Stack Width (m)	0.58
Stack Depth (m)	0.36
Stack Area (m2):	0.209

Stack Static press.mm H_2O: 10

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	80	8.944	100	65	8.062	100
2	68	8.246	100	66	8.124	100
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	68.0	8.246	100	65.0	8.062	100
Maximum	80.0	8.944	100	66.0	8.124	100
Mean	**74.0**	**8.595**	**100.0**	**65.5**	**8.093**	**100.0**
Sum	148	17.190	200	131	16.186	200
Total Sum						

Max. pitot press. =	80.0
Min. pitot press. =	65.0
Ratio Max:Min =	1.2 :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?	Y
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?	Y
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

Company Name: Glynwed Pipe Sysytems	In-stack Filter?	y	Bar. Press.mm Hg	759	K Factor	1.166	Ambient Temp.	12	Leak Rate (fin / %)	1
Site Name: Huntingdon										
Project Reference:FTBS 35310	Outstack Filter?		Cp	0.83	Dn used	5	Start Time	13:51	Leak Rate (start / %)	1
Date: 07/05/15										
Run:	Operators	WR	Bws%	2.5	Nozzle No.		Stop Time	14:51	Box/Probe setting	160 +/- 5 °C
Sampling Point Ref: Fluidised Bed Exhaust										
					Meter Correction Yd	1.006				

Sample Filter Weights

	Sample ID	Laboratory	Increase, mg
Filter	121937	RPS	0.04
Probe Washings	30006811	RPS	0.5

Sample Filter Blank Weighings

	Sample ID	Laboratory	Increase, mg
Filter	121940	RPS	0.04
Probe Wash	30006810	RPS	0.5

Impinger Weights

Weights	Initial	Final	Increase, g
Impinger 1	736.8	736.8	0.0
Impinger 2	736.7	737.8	1.1
Impinger 3	594.5	595.6	1.1
Impinger 4	865	879.7	14.7
Impinger 5			0.0
Silica Gel			0.0
		Total	16.9

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								
a1	0	66	101	76.956	77	1058145.3	23			101	10	12	8.124
	5	66	102	76.956	77		24			102	10	12	8.124
	10	66	102	76.956	77		25			102	10	12	8.124
a2	15	52	103	60.632	61		26			103	9	12	7.211
	20	52	102	60.632	61		27			102	8	13	7.211
	25	52	102	60.632	61		27			102	8	13	7.211
Endpoint	30												
b1	0	62	103	72.292	72		27			103	9	14	7.874
	5	64	104	74.624	75		26			104	9	14	8.000
	10	64	104	74.624	75		26			104	9	15	8.000
b2	15	62	104	72.292	73		27			104	9	15	7.874
	20	62	104	72.292	73		27			104	9	16	7.874
	25	62	103	72.292	73		27			103	9	16	7.874
Endpoint	30					1059858.8							
	60.00	**60.833**	**102.8**	**70.9**	**71.3**	**1.714**	**26.0**			**102.8**	**9.1**	**13.7**	**7.8**

Company Name: Glynwed Pipe Sysytems Ltd
Site Name: Huntingdon
Date: 07/05/15
Project Reference:FTBS 35310

Sampling Point Ref: Fluidised Bed Exhaust	Run:
Meter Volume Sampled, acm	1.714
Sample Run Start Time	13:51
Sample Run End Time	14:51
Total Actual Sampling Time, min	60.0
Barometric Pressure, mm Hg	759.00
Stack Pressure, mm Hg	759.74
Average Stack Temp, ^{o}C	102.8
Meter Volume at Wet STP, scm	1.603
Stack Moisture Content, %	1.3
Average Stack Velocity, m/sec	29.681
Stack Flow Rate, scms wet, STP	4.498
Nozzle Diameter, mm	5.00
% Isokinetic Variation	**105.0**
Total Mass of Particulate, mg	0.5
Percentage of Total Particulate Collected on Filter	7.4
Stack Particulate Concentration, mg/m^3	**0.337**
Particulate Mass rate, kg/hour	0.0055
Emission Limit value	**20**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.34
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	0.337	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	1.7135	m^3
Sampled gas Temperature	299	k
Sampled gas Pressure	101.30	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	21	% by volume
Mass	0.54	mg

Leak	1.00	%
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		0.0061
Sampled gas Pressure	0.0090		0.0090
Sampled gas Humidity	0.0091		0.0091
		Sqrt (Uv)^2	0.0142
		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	1.582	m3	0.21	0.01	$mg.m^{-3}$	1.54	%
Mass (weighing)	0.54	mg	0.62	0.09	$mg.m^{-3}$	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	$mg.m^{-3}$	0.58	%
Uncollected Mass	0.00	mg	0.62	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 =	**0.1769**	**$mg.m^{-3}$**
=>	**52.52**	**% of Result**
=>	**0.88**	**% of ELV**

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

Date: 07/05/15
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	0.04	0.072	0.000252	0.08	0.00	#DIV/0!
Max	3.40	5.46	0.02	5.98	0.02	0.00
Min	0.00	0.00	0.00	0.00	0.00	0.00
Emission Limit		20.00				
Moisture, %	1.3					
Oxygen Reference, %	0.0					

Stack Gas Volume Flow Rate, m3/s (scms WET) O2 Corrected	0.968793468

Calibrations	ppm
Analyser - Start Zero	0.00
Analyser - Start Span	76.00
Analyser - Zero Check	0.10
System - Zero Check	0.30
System - Span Check	76.40
System - End Zero Check	0.03
System - End Span Check	75.90
Cylinder Number	161060.00
Span Value	76.00
Analyser Range (0 - X)	100.00

Equipment ID	
FID	FYS267
Heated Line	
H/Line Controller (if req'd)	
Logger	
Pitot	
Manometer	
T/couple	
T/couple Readout	
Barometer	

ISO 14956 Calculation Sheet - TOC (BS EN 12619)

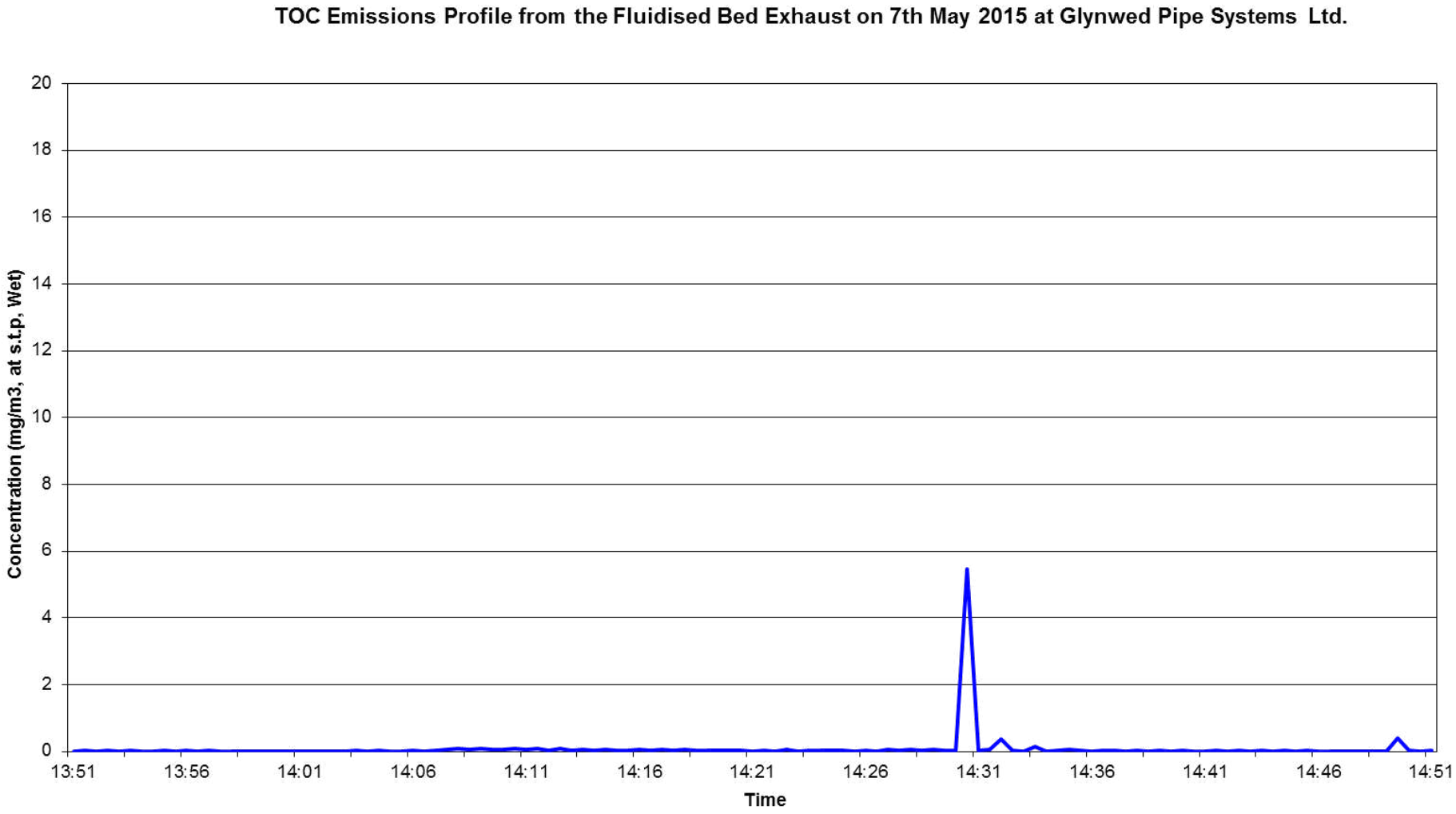
Studied Concentration (mg/m^3 As C)	0.072122196
Range of Instrument (mg/m^3 as C)	160.7142857

Sampling Parameters to be met	Requirement Met?
Response Time < 60s	Yes
Operating temperature (5 - 45ºC)	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
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	1.60714286	2.583	% FS	0.0007212	0.000
Repeatability Standard Deviation	U_R		% FS	0.000	0.000	% FS	0.000	0.000
8 Hour Drift	U_{drift}		%	0.0008	0.000	%	0.001	0.000
Atmospheric Pressure Dependence	U_{Atmos}		% / kPa	0.000	0.000	% / kPa	0.000	0.000
Temperature Dependence	U_{Temp}		% / K	0.000	0.000	% / K	0.000	0.000
Sum Interference	$U_{Interference}$		%	0.001	0.000	%	0.000	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.000	0.000	% / V	0.000	0.000
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.001	0.000	%	0.001	0.000
Loss in sample line (Leaks)	$U_{Losses,\ leak}$		%	0.001	0.000	%	0.002	0.000
			Sum	1.611	2.583	Sum	0.005	0.000

Measurement Uncertainty at	0.072122196	mg/m^3 C			
U_{tot}	0.0022	mg/m^3 C			
$U_{tot}{}^{/c}$	3.059	%	U_{limit}	30	%


TOC Emissions Profile from the Fluidised Bed Exhaust on 7th May 2015 at Glynwed Pipe Systems Ltd.
Concentration (mg/m3, at s.t.p, Wet)
20
18
16
14
12
10
8
6
4
2
0
13:51
13:56
14:01
14:06
14:11
14:16
14:21
14:26
14:31
14:36
14:41
14:46
14:51
Time

Appendix 3 – Certificates of Analysis

RPS

UKAS TESTING 0606

Test Certificate

Date 04/06/2015

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 36310
		Certificate No.	WK15-2574
		Issue No.	1
Contact	Waheed Rasul	**Date Received**	12/06/2015
Description	2 filters & 2 washes for TPM	**Technique**	Gravimetric Stack

Sample No.	836635	121940	Method
Total particulate matter		<0.04 mg	D9(U)
Sample No.	**836636**	**30006810**	**Method**
Total particulate matter		<0.5 mg	D9(U)
Sample No.	**836637**	**121937**	**Method**
Total particulate matter		<0.04 mg	D9(U)
Sample No.	**836638**	**30006811**	**Method**
Total particulate matter		<0.5 mg	D9(U)

Page 1 of 2

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Tel: (0161) 872 2443 Fax: (0161) 877 3959

0605

Date 04/06/2015

Test Certificate

Client	RPS Milton Keynes HSED	Certificate No.	WK15-2674
		Issue No.	1

Tested By	Kirstie Davenport	Date	20/05/2015
Approved By		Date	20/05/2015

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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