Report for Periodic Monitoring of Emissions to Atmosphere

Part 1:	**Executive Summary**
Permit Number:	**PPC/193**
Operator:	**Covpress Ltd**
Installation:	**Coventry**
Emission Point:	**Burn Off Oven Exhaust**
Monitoring Date:	**22nd October 2014**

UKAS TESTING
1709

mCERTS

Contract Reference:	FTBS 33285
Operator:	Covpress Ltd
Address:	Burnsall Road Canley Coventry CV5 6RT
Monitoring Organisation:	RPS Consultants
Address:	Old Power Way, Elland, West Yorkshire HX5 9DE
Report Date:	14th November 2014
Report Approved By:	Glyn Harrison
Position:	Operational Manager (Stack Emissions)
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 Steve Cottom of Covpress Ltd, RPS Consultants conducted stack emission monitoring at the Coventry site in October 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
	Burn Off Oven Exhaust
Total Particulate Matter	✓
Volatile Organic Compounds	✓
Oxides of Nitrogen	✓
Carbon Monoxide	✓
Specific Requirements	Normal

Notes:
✓ *Represents pollutants sampled*

Monitoring Results

Table 2.1 Monitoring results for the Burn Off Oven Exhaust, Carried out on 22nd October 2014

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Carbon Monoxide	No Limit	253	mg/m^3	+/- 14	273K, 101.3kPa, Dry, 11% Oxygen	22/10/14	10:15 – 14:35	EN 15058:2006	MCERTS	Normal
	No Limit	0.135	kg/hr	-						
Oxides of Nitrogen	No Limit	108	mg/m^3	+/- 5.1	273K, 101.3kPa, Dry, 11% Oxygen	22/10/14	10:15 – 14:35	BS EN 14792:2005	MCERTS	Normal
	No Limit	0.057	kg/hr	-						
Total Particulate Matter	20	1.6	mg/m^3	+/- 0.18	273K, 101.3kPa, Dry, 11% Oxygen	22/10/14	10:15 – 14:35	BS EN 13284-1:2002	MCERTS	Normal
	No Limit	0.00091	kg/hr	-						
Volatile Organic Compounds (as Carbon)	20	13	mg/m^3	+/- 0.40	273K, 101.3kPa, Dry, 11% Oxygen	22/10/14	10:15 – 14:35	BS EN 13526	MCERTS	Normal
	No Limit	0.0098	kg/hr	-						

Note : Tests were undertaken during a ‘long cycle’ burn off.

Operating Information

Table 3.1 Operating conditions during the monitoring of the Burn Off Oven Exhaust, carried out on 22nd October 2014

Parameter	Result
Sample Date	22/10/2014
Process Type	Batch
Process Duration	'Long Cycle' 270 Minutes
If 'Batch', was monitoring carried out over the whole batch?	Yes
Abatement/Operational?	Not Installed
Load	Oven loaded with "UK" bars.

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 Burn Off Oven Exhaust Emission Point

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Carbon Monoxide, Oxides of Nitrogen & Volatile Organic Compounds	None	None	None
Total Particulate Matter	None	Monitoring conducted from a single traverse line.	None

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Part 2:	**Supporting Information**
Permit Number:	**PPC/193**
Operator:	**Covpress Ltd**
Installation:	**Coventry**
Emission Point:	**Burn Off Oven Exhaust**
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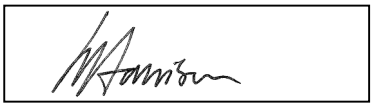
Signature:



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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
Chris Davies	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 03 252
Ian Baggley	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 05 653
Michael Duncan	Technician	Trainee	None	MM 13 1249

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Ian Baggley	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 05 653

Table 5.3 Report Reviewer

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

Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

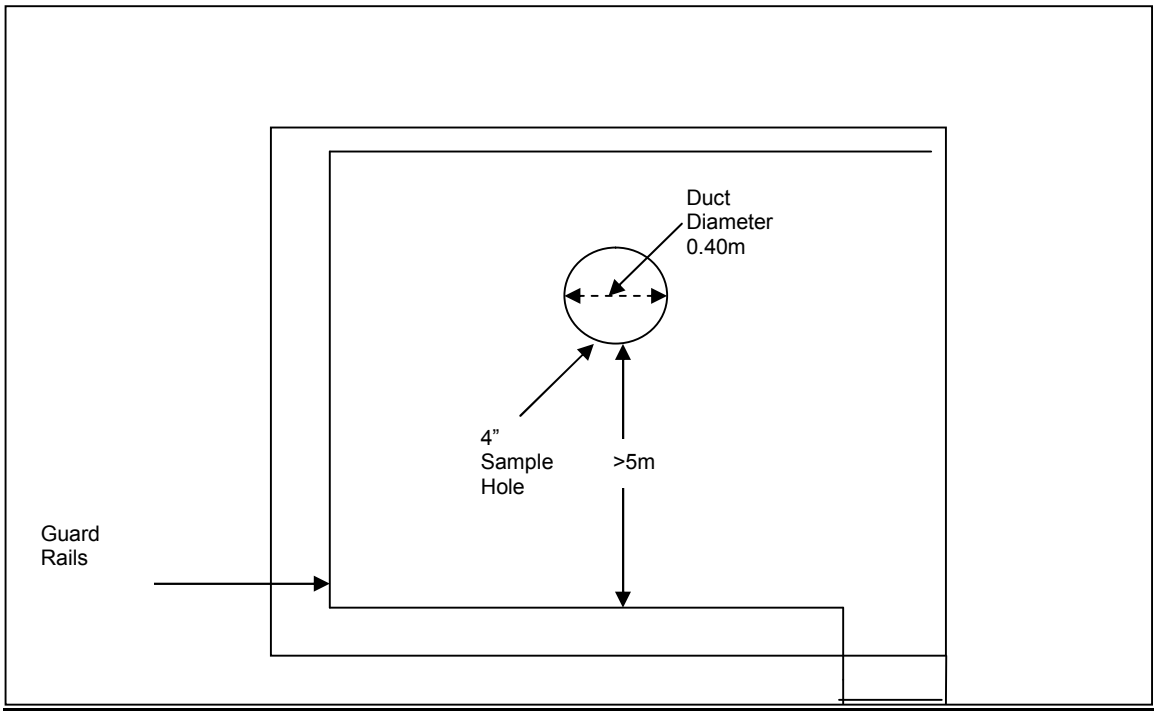
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditation
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Gas Temperatures	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Carbon Monoxide	EN 15058:2006	RPSCE/1/21h	MCERTS	NDIR	N/A	N/A	N/A
Oxides of Nitrogen	EN 14792:2005	RPSCE/1/21f	MCERTS	Chemiluminescence	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
FTBS33285 Checklist	FTBS33285 Electronic & Work File

APPENDIX 2:
Burn Off Oven Exhaust Sampling, Analysis & Uncertainty Data

Burn Off Oven Exhaust – Stack Diagram



Company Name: Covpress
Site Ref: Coventry
Stack Ref: Burn Off Oven

Date: 22/10/13
Run: Gases

Static Press, mm H_2O:	1.2	Stack Diamter (m)	0.40
Barometric press, mm Hg:	748.6	Pitot Tube Constant:	0.834

Traverse Point No.	Port A				Port B			
	Δ p, mmH2O	Conversion for pitot coefficient and to Pa	Root Δ p,	Stack Temp °C	Δ p, mmH2O	Conversion for pitot coefficient and to Pa	Root Δ p,	Stack Temp °C
1	1.4	9.7	3.121	650				
2	1.4	9.7	3.121	650				
3	1.4	9.7	3.121	650				
4	1.4	9.7	3.121	650				
5								
6								
7								
8								
9								
10								
Minimum	1.4	9.7	3.121	650.0	0.0	0.0	0.000	0.0
Maximum	1.4	9.7	3.121	650.0	0.0	0.0	0.000	0.0
Average	1.4	9.7	3.121	650.0				
Sum	5.6	39.0	12.483	2600.0	0.0	0.0	0.000	0.0
Total Sum								

Max. pitot press. =	9.7	Max. Temp.=	650.0
Min. pitot press. =	9.7	Min. Temp.=	650.0
Ratio Max:Min =	1.0 :1	Mean Temp.=	650.0

Mean Root D p	3.121
Mean Stack Temperature, °C	650.00
Traverse Stack Velocity, m/s	7.111
Stack Area, m^2	0.126
Stack Gas Volume Flow Rate, m^3/s (acms)	0.894
Stack Gas Volume Flow Rate, m^3/s (scms wet)	0.260
Stack Gas Volume Flow Rate, m3/s (scms DRY) O2 Corrected	0.148
Moisture	8.7
Stack Pressure, mm Hg	748.69

Gas Data

Oxygen %	14.72836589
CO_2 %	3.53

Oxygen Correction

Required Correction Value (%)	11
Oxygen Factor	1.604
Enter 0 if correction is not required	

Barometric Pressure (mmHg)	
Min	748.6
Max	748.6

Ambient Temperature (C)	
Min	9
Max	11

Company Name: Covpress
Site Ref: Coventry
Stack Ref: Burn Off Oven

Date: 22/10/13
Run: Gases

	O_2 %	CO_2 %	CO mg/m^3	CO kg/hr	NO_x mg/m^3	NO_x kg/hr		
Average	**14.73**	**3.53**	**252.69**	0.135	**107.78**	0.057		
Max	**20.72**	**5.51**	**3599.16**	1.919	**604.21**	0.32		
Min	**11.23**	**0.19**	**48.04**	0.026	**43.13**	0.02		
Emission Limit			**N/A**		**N/A**			
Moisture, %	**8.7**		**Baromteric (mmHg) Start**			735		
Oxygen Reference, %	**11.0**		**Baromteric (mmHg) End**			735		

Stack Gas Volume Flow Rate, m3/s (scms DRY) O2 Corrected	0.148107

Calibrations	O_2 %	CO_2 %	CO ppm	NO ppm	
Analyser - Start Zero	0.00	0.00	0.4	0.0	
Analyser - Start Span	15.05	7.80	116.7	190.9	
Analyser - Zero Check	0	0	0.3	0.2	
System - Zero Check	0.02	0.05	0.6	-0.1	
System - Span Check	15.05	7.76	116.2	190.6	
System - End Zero Check	0.04	0.01	0.6	0.6	
System - End Span Check	15.01	7.77	116.4	190.7	
Cylinder Number	221743	221743.00	221743	122902	
Span Value	15.04	7.8	116.7	190.9	
Analyser Range (0 - X)	25	20	5000	250	Not in Use

Equipment ID Nos	
Analyser	**278**
Heated Line	**370**
H/Line Controller	**378**
Logger	**pc**
Pitot	**435**
Manometer	**183**
T/couple	**390**
T/couple Readout	**185**
Barometer	**375**

Uncertainty calculation for Gaseous Measurement of Oxygen EN14789

Measured concentration	14.73	%vol
Range (Max Value)	25	%vol

Analyser Make/Model	Horiba PG250
ID Number	278

Performance Characteristics		**Value**			**specification**
Response time		12	seconds		< 200 s
Logger sampling interval		30	seconds		
Measurement period		145	minutes		
Number of readings in measurement		290	Assuming 30 Second Readings over 2.41666666666667 hour period		
Repeatability at zero		0.02	% by volume	stdev	<0.2 % range
Repeatability at span level		0.02	% by volume	stdev	<0.4 % range
Deviation from linearity		0.14	% vol	+/-	<0.3 % volume
Zero drift (during measurement period)		0.1329787	% vol at zero level	+/-	<2% of volume / 24hr
Span drift (during measurement period)		-0.265957	% vol at span level	+/-	<2% volume/24hr
volume or pressure flow dependence		0	% of fs / 10l/h	+- 5 l/h	<1% range
atmospheric pressure dependence		0	% of fs/kPa	+- 2kPa	< 1.5 % range
ambient temperature dependence		-0.07	% by volume /10K	+- 15K	<0.3% volume 10 K
CO_2 (% vol)	10	0.1	% by volume per	10	
NO (mg/m3)	300	0	% by volume per	300	
NO_2 (mg/m3)	30	0	% by volume per	30	
Combined interference			% range		<2% range
Dependence on voltage		0.1	% by volume /10V	+- 5%	< 0.1%vol /10 volt
Losses in the line (leak)		2	% of value		< 2% of value
Uncertainty of calibration gas		2	% of value		

Performance characteristic			**Uncertainty**	**Value of uncertainty quantity**			**% vol**
Standard deviation of repeatability at zero			u_{r0}		for mean		Only use rep at span
Standard deviation of repeatability at span level			u_{rs}		for mean		0.001
Lack of fit			u_{fit}				0.081
Drift			u_{0dr}				-0.074
volume or pressure flow dependence			u_{spres}				0.000
atmospheric pressure dependence			u_{apres}				0.000
ambient temperature dependence			u_{temp}				-0.008
CO_2							0.032
NO							0.000
NO_2							0.000
dependence on voltage			u_{volt}				0.000
losses in the line (leak)			u_{leak}				0.17
Uncertainty of calibration gas			u_{calib}				0.17

Measurement Concentration		**14.73**	**%vol**
Combined uncertainty		0.27	%vol
% of value		1.81	%
Coverage factor k =	2		
Expanded uncertainty		3.62	% of value
Expanded uncertainty		**0.53 % vol**	**(expressed with a level of confidence of 95%)**

Uncertainty calculation for Gaseous Measurement of Carbon Monoxide EN 15058

Measured concentration - CO	269.9	**mg/m^3 (O_2 & H_2O uncorrected)**	**Analyser Make/Model**	Horiba PG250
Range (Max Value)	6250.0	**mg/m^3**	**ID Number**	278

Performance Characteristics		**Value**			**specification**
Response time			seconds		< 200 s
Logger sampling interval		30	seconds		
Measurement period		145	minutes		
Number of readings in measurement		290	Assuming 30 Second Readings over 2.41666666666667 hour period		
Repeatability at zero		0	% of Range		< 1% Range
Repeatability at span level		0	% of Range		< 2% of Range
Deviation from linearity		0	% of Range		< 2% of Range
Zero drift (during measurement period)		0	% of Range		< 2% of Range
Span drift (during measurement period)		0.1713796	% of Range		< 2% of Range
volume or pressure flow dependence		0	% of fs / 10l/h		< 1% range
atmospheric pressure dependence		0	% of Range/kPa		< 1.5 % range
ambient temperature dependence		-0.07	% of Range /K		<0.3 % range /K
CO_2 (% vol)	15		% by volume per		
CH4 (mg/m^3)	57		mg/m^3		
N_2O (mg/m^3)	42		mg/m^3		
	Total	0	% of Range		< 4% of Range (Total)
Dependence on voltage		0.1	% by volume /10V	+- 5%	< 2% of Range/10 volt
Losses in the line (leak)		2	% of value		< 2% of value
Uncertainty of calibration gas		2	% of value		

Performance characteristic			**Uncertainty**	**Value of uncertainty quantity**			**% vol**
Standard deviation of repeatability at zero			u_{r0}		for mean		Only use rep at span
Standard deviation of repeatability at span level			u_{rs}		for mean		0.000
Lack of fit			u_{fit}				0.000
Drift			u_{0dr}				0.267
volume or pressure flow dependence			u_{spres}				0.000
atmospheric pressure dependence			u_{apres}				0.000
ambient temperature dependence			u_{temp}				-0.008
CO_2							0.000
NO							0.000
NO_2							0.000
dependence on voltage			u_{volt}				0.000
losses in the line (leak)			u_{leak}				3.12
Uncertainty of calibration gas			u_{calib}				3.12

Measurement Concentration	**269.85**	**mg/m^3**	
Combined uncertainty Coverage factor k = 2	4.41	**mg/m^3**	
Expanded uncertainty (as measured)	8.83	mg/m^3	**(expressed with a level of confidence of 95%)**
Expanded uncertainty (Corrected to Ref Conditions)	**14.16**	mg/m^3	

Uncertainty calculation for Gaseous Measurement of Oxides of Nitrogen BS EN 14792

Measured concentration - NOx	92.1	**mg/m³ (O_2 & H_2O uncorrected)**	**Analyser Make/Model**	Horiba PG250
Range (Max Value)	513.4	**mg/m³**	**ID Number**	278

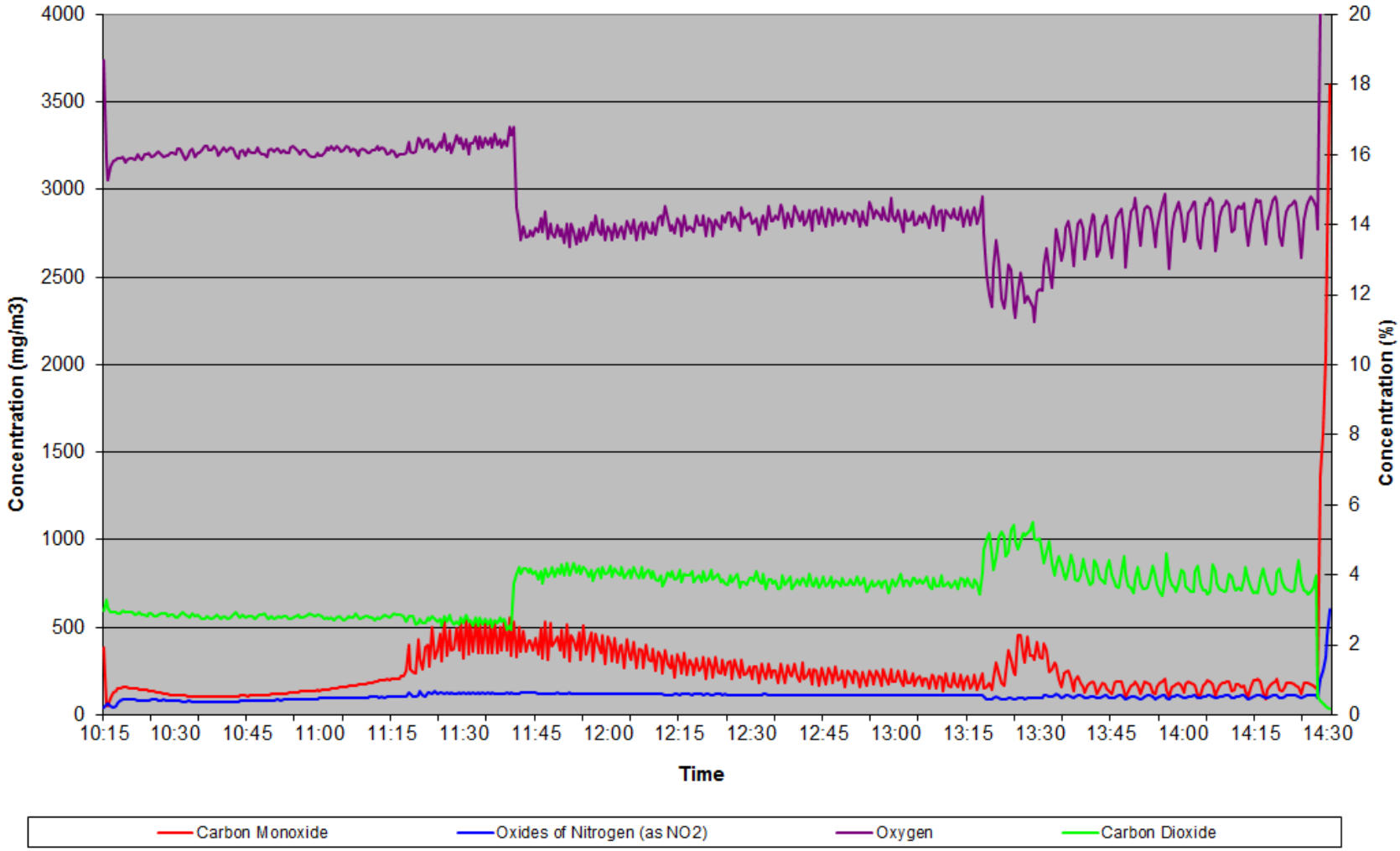
Performance Characteristics		**Value**			**specification**
Response time		13	seconds		< 180 s
Logger sampling interval		30	seconds		
Measurement period		145	minutes		
Number of readings in measurement		290	Assuming 30 Second Readings over 2.41666666666667 hour period		
Repeatability at zero		0.02	% full range		0.2
Repeatability at span level		0.02	% full range		2.0
Deviation from linearity		0.14	% of Value		2
Zero drift (during measurement period)		0.3666841	% full range		2
Span drift (during measurement period)		0.0523834	% full range		2
volume or pressure flow dependence		0	% of fs / kPa		0.033
atmospheric pressure dependence		0	% of fs/kPa		0.75
ambient temperature dependence		-0.07	% by volume /10K		0.3
CO_2 (% vol)	15		% by volume per		
CH_4 (mg/m³)	57		mg/m³		
NH_3 (mg/m³)	20		mg/m³		
Converter Efficiency		98.78	%		95%
Dependence on voltage		0.1	% by volume /10V		2% Full Scale /10 volt
Losses in the line (leak)		2	% of value		2% of value
Uncertainty of calibration gas		2	% of value		2% of value

Performance characteristic			**Uncertainty**	**Value of uncertainty quantity**			**% vol**
Standard deviation of repeatability at zero			u_{r0}		for mean		Only use rep at span
Standard deviation of repeatability at span level			u_{rs}		for mean		0.001
Lack of fit			u_{fit}				0.415
Drift			u_{0dr}				0.223
volume or pressure flow dependence			u_{spres}				0.000
atmospheric pressure dependence			u_{apres}				0.000
ambient temperature dependence			u_{temp}				-0.008
CO_2							0.000
NO							0.000
NO_2							0.000
Converter Efficiency			u_{ceff}				0.01
dependence on voltage			u_{volt}				0.000
losses in the line (leak)			u_{leak}				1.06
Uncertainty of calibration gas			u_{calib}				1.06

Measurement Concentration (as measured)	**92.06**	**mg/m³**	
Combined uncertainty	1.58	mg/m³	
Coverage factor k = 2			
Expanded uncertainty (as measured)	3.15	mg/m³	**(expressed with a level of confidence of 95%)**
Expanded uncertainty (Corrected to Ref Conditions)	**5.05**	**mg/m³**	

Combustion Gas Emissions from the Burn Off Oven Exhaust at Covpress, Coventry on 22nd October 2014

reference conditions expressed as 273K, 101.3 kPa, 11% O2 and dry gas



Company Name: Covpress	In-stack Filter?	No	Bar. Press.mm Hg	748.6	K Factor	8.75	Ambient Temp.	9	Leak Rate (fin	0
Site Name: Coventry										
Project Reference:FTBS33285	Outstack Filter?	Yes	Cp	0.823	Dn used	10.75	Start Time	10:15	Leak Rate (sta	0
Date: 22/10/14										
Run: TPM	Operators	CD IB MD	Bws%	10.6	Nozzle No.	367-11	Stop Time	14:35	Box/Probe set	160 +/- 5 °C
Sampling Point Ref: Burn Off Oven										
					Meter Correction Yd	0.963				

Sample Filter Weights

	Sample ID	Laboratory	Increase, mg
Filter	115129	RPS	0.1
Probe Washings	20008021	RPS	2.7

Sample Filter Blank Weighings

	Sample ID	Laboratory	Increase, mg
Filter	115125	RPS	**0.1**
Probe Wash	20008020	RPS	**0.5**

note : results in bold indicate at or below LOD

Impinger Weights

Weights	Initial	Final	Increase, g
Impinger 1	678.8	823	144.2
Impinger 2	630.8	661.5	30.7
Impinger 3	526.9	532.5	5.6
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	863.7	899.4	35.7
		Total	216.2

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	1.4	192	12.25	12.25	46176.8	9		160		1	9	1.183
	10	1.6	360	14	14		9		161		1	8	1.265
	20	1.4	466	12.25	12.25		9		160		1	7	1.183
	30	1.6	557	14	14		10		160		1	7	1.265
	40	1.6	595	14	14		10		161		1	8	1.265
	50	1.6	619	14	14		11		160		1	8	1.265
	60	1.6	636	14	14		11		160		1	9	1.265
	70	1.6	641	14	14		12		160		1	9	1.265
	80	1.6	650	14	14		13		160		1	9	1.265
	90	1.6	647	14	14		14		160		1	9	1.265
	100	1.6	637	14	14		15		160		1	9	1.265
	110	1.6	643	14	14		15		160		1	8	1.265
	120	1.4	646	12.25	12.25		15		160		1	7	1.183
	130	1.4	647	12.25	12.25		15		160		1	8	1.183
	140	1.6	636	14	14		16		160		1	8	1.265
	150	1.4	648	12.25	12.25		16		160		1	8	1.183
	160	1.6	647	14	14		16		160		1	8	1.265
	170	1.6	639	14	14		16		160		1	8	1.265
	180	1.6	642	14	14		16		160		1	8	1.265
	190	1.6	650	14	14		16		160		1	7	1.265
	200	1.6	647	14	14		16		160		1	6	1.265
	210	1.6	639	14	14		16		160		1	6	1.265
	220	1.6	649	14	14		17		161		1	3	1.265
	230	1.7	624	14.875	14.875		17		158		1	3	1.304
	240	1.6	649	14	14		17		161		1	4	1.265
	250	1.6	631	14	14		17		160		1	4	1.265
	260	0.8	555	7	7		17		160		1	4	0.894
Endpoint						49327.4							
	260	**1.537**	**599.7**	**13.4**	**13.4**	**3.151**	**14.1**	**n/a**	**160.1**	**n/a**	**1.0**	**7.1**	**1.2**

Company Name: Covpress
Site Name: Coventry
Project Reference: FTBS33285
Date: 22/10/14

Sampling Point Ref: Burn Off Oven	**Run: TPM**
Meter Volume Sampled, acm	3.151
Sample Run Start Time	10:15
Sample Run End Time	14:35
Total Actual Sampling Time, min	260.0
Barometric Pressure, mm Hg	748.60
Stack Pressure, mm Hg	748.69
Average Stack Temp, ^{o}C	599.7
Meter Volume at STP, scm	2.844
Stack Moisture Content, %	8.7
Average Stack Velocity, m/sec	7.240
Stack Flow Rate, scms dry,STP	0.160
Nozzle Diameter, mm	10.75
% Isokinetic Variation	**98.4**
Total Mass of Particulate, mg	2.8
Percentage of Total Particulate Collected on Filter	3.6
Stack Particulate Concentration, mg/m^3	**1.58**
Particulate Mass rate, kg/hour	0.00091
Emission Limit value	**20**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.31
Total Weight Gain, mg (Sample Train Blank)	0.60
Blank Result Less than 10% of Limit Value	Y

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

Determined Concentration	1.579	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	3.1506	m^3
Sampled gas Temperature	287.1111111	k
Sampled gas Pressure	99.82	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	14.72836589	% by volume
Mass	2.8	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	0.937		
	Sensitivity Coefficient		**Uncertainty, Uv**
Sampled gas Temperature	0.0033		0.0065
Sampled gas Pressure	0.0094		0.0094
Sampled gas Humidity	0.0094		0.0094
		Sqrt (Uv)^2	0.0148
		Total Uv	**0.047**

Uncertainty Calculation for Oxygen Correction

Oxygen Correction Factor	1.6041		
	Sensitivity Coefficient		**Uncertainty, Uo**
Oxygen Measurement	0.2574		0.0257
		Total Uo	**0.0257**

Uncertainty Contributions (Itemised)

	Value		Sensitivity coefficient	Uncertainty Contribution Concentration		Uncertainty Contribution %	
Volume Correction	2.844	m3	0.56	0.03	$mg.m^{-3}$	1.64	%
Mass (weighing)	2.80	mg	0.56	0.08	$mg.m^{-3}$	5.05	%
Oxygen Correction	1.6041		0.98	0.03	$mg.m^{-3}$	1.60	%
System Leak	0.00	$mg.m^{-3}$	1.00	0.00	$mg.m^{-3}$	0.00	%
Uncollected Mass	0.00	mg	0.56	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 =	**0.1753**	$mg.m^{-3}$
=>	**11.10**	**% of Result**
=>	**0.88**	**% of ELV**

Company Name: Covpress
Site Name: Coventry
Sampling Point Ref:Burn Off Oven

Date: 22/10/14
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	Oxygen %
Average	6.48	13.19	0.0098	14.45	0.01069	12.15
Max	98.15	199.63	0.1478	218.65	0.16182	12.15
Min	0.00	0.00	0.0000	0.00	0.00000	12.15
Emission Limit		20.00				
Moisture, %	10.6					
Oxygen Reference, %	11.0					

Stack Gas Volume Flow Rate, m3/s (scms Dry) O2 Corrected	0.205588035

Calibrations	ppm
Analyser - Start Zero	0.00
Analyser - Start Span	81.60
Analyser - Zero Check	0.00
System - Zero Check	0.20
System - Span Check	81.65
System - End Zero Check	0.26
System - End Span Check	81.70
Span Value	81.60
Analyser Range (0 - X)	100

Equipment ID	
FID	267
Heated Line	370
H/Line Controller (if req'd)	378
Logger	1007834
Pitot	1505
Manometer	183
T/couple	390
Barometer	340

ISO 14956 Calculation Sheet - TOC (BS EN 13526)

Studied Concentration (mg/m^3 as C)	13.18968804
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

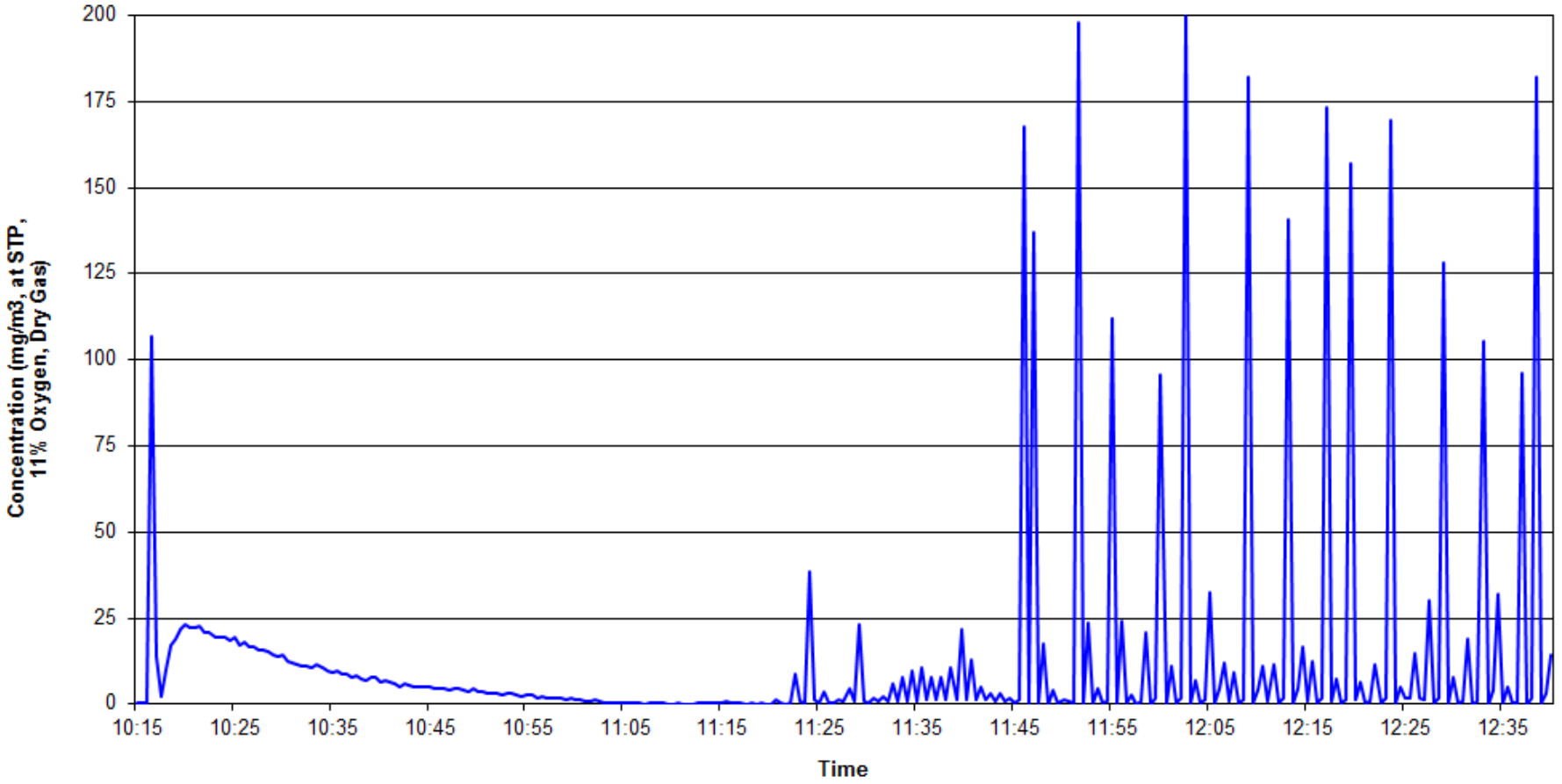
Selected Performance Characteristic	Value of Performance Characteristic			Operating Conditions compared to calibration condition		
	%	Numerical	Units	Required	Variable due to sampling conditions	Units
Deviation from Linearity	1	0.01	% FS	0.01	1	% FS
Repeatability Standard Deviation	1	0.01	% FS	0.01	1	% 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	0.1318969	0.017
Repeatability Standard Deviation	U_R		% FS	0.076	0.006	% FS	0.076	0.006
8 Hour Drift	U_{drift}		%	0.1523	0.023	%	0.152	0.023
Atmospheric Pressure Dependence	U_{Atmos}		% / kPa	0.008	0.000	% / kPa	0.008	0.000
Temperature Dependence	U_{Temp}		% / K	0.015	0.000	% / K	0.015	0.000
Sum Interference	$U_{Interference}$		%	0.152	0.023	%	0.008	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.008	0.000	% / V	0.008	0.000
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.152	0.023	%	0.152	0.023
Loss in sample line (Leaks)	$U_{Losses,\ leak}$		%	0.152	0.023	%	0.305	0.093
			Sum	2.326	2.691	Sum	0.855	0.163

Measurement Uncertainty at	13.18968804	mg/m^3 C			
U_{tot}	0.403	mg/m^3 C			
$U_{tot}{}^{/c}$	3.059	%	U_{limit}	30	%
Pass	Yes				

TOC Emissions Profile from the Burn off Oven Exhaust on 22nd October 2014 at Covpress, Coventry

reference conditions expressed as 273K, 101.3 kPa,11 % O2 and dry gas



APPENDIX 3:
Laboratory Data

RPS

UKAS TESTING 0605

Test Certificate

Date 03/11/2014

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 33285
		Certificate No.	**WK14-6935**
		Issue No.	1
Contact	Mr Ian Baggley	**Date Received**	27/10/2014
Description	2 filters & 2 washes for TPM	**Technique**	Gravimetric Stack

Sample No.	**813528**	**115125**	**Method**
Total particulate matter	<0.1 mg		D9(U)
Sample No.	**813529**	**20008020**	**Method**
Total particulate matter	<0.5 mg		D9(U)
Sample No.	**813530**	**115129**	**Method**
Total particulate matter	<0.1 mg		D9(U)
Sample No.	**813531**	**20008021**	**Method**
Total particulate matter	2.7 mg		D9(U)

Page 1 of 2

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 03/11/2014

Test Certificate

Client	RPS Milton Keynes HSED	**Certificate No.**	**WK14-6935**
		Issue No.	1

Tested By	Kirstie Davenport	Date	31/10/2014 03/11/2014
Approved By		Date	03/11/2014

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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