

**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: **16<sup>th</sup> March 2016**



Contract Reference: FTBS 41062

Operator: Covpress Ltd

Address: Burnsall Road  
Canley  
Coventry  
CV5 6RT

Monitoring Organisation: RPS Consultants

Address: Noble House, Capital Drive, Linford  
Wood, MK14 6QP

Report Date: 31<sup>st</sup> March 2016

Report Approved By: Edwin Powell

Position: Consultant

MCERTS Registration No.: MM 05 621

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 March 2016.

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	✓
<b>Specific Requirements</b>	Short Cycle 'Burn Off' (150 minutes)

Notes:

✓ Represents pollutants sampled

## Monitoring Results

**Table 2.1 Monitoring results for the Burn Off Oven Exhaust, Carried out on 16<sup>th</sup> March 2016.**

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	213	mg/m <sup>3</sup>	+/- 14	273K, 101.3kPa, Dry, 11% Oxygen	16/03/16	11:45 – 14:15	EN 15058:2006	MCERTS	Normal
	No Limit	0.14	kg/hr	-						
Oxides of Nitrogen	No Limit	104	mg/m <sup>3</sup>	+/- 5.0	273K, 101.3kPa, Dry, 11% Oxygen	16/03/16	11:45 – 14:15	BS EN 14792:2005	MCERTS	Normal
	No Limit	0.068	kg/hr	-						
Total Particulate Matter	20	12	mg/m <sup>3</sup>	+/- 0.56	273K, 101.3kPa, Dry, 11% Oxygen	16/03/16	11:45 – 14:15	BS EN 13284-1:2002	MCERTS	Normal
	No Limit	0.0079	kg/hr	-						
Volatile Organic Compounds (as Carbon)	20	<b>37</b>	mg/m <sup>3</sup>	+/- 1.1	273K, 101.3kPa, Dry, 11% Oxygen	16/03/16	11:45 – 14:15	BS EN 12619	MCERTS	Normal
	No Limit	0.023	kg/hr	-						

Note :

- Result in **bold type** is over the Emission Limit Value
- Tests were undertaken during a 'short cycle' burn off.

## Operating Information

**Table 3.1 Operating conditions during the monitoring of the Burn Off Oven Exhaust, carried out on 16<sup>th</sup> March 2016**

Parameter	Result
Sample Date	16/03/16
Process Type	Batch
Process Duration	'Short Cycle' 150 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 <sup>3</sup> )	Periodic Monitoring Results (mg/m <sup>3</sup> )
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

## Report for Periodic Monitoring of Emissions to Atmosphere

Part 2: **Supporting Information**

Permit Number: **PPC/193**

Operator: **Covpress Ltd.**

Installation: **Coventry**

Emission Point: **Burn Off Oven Exhaust**

Monitoring Date: **18<sup>th</sup> February 2016**



Contract Reference: FTBS 41062

Operator: Covpress Ltd

Address: Burnsall Road  
Canley  
Coventry  
CV5 6RT

Monitoring Organisation: RPS Consultants

Address: Noble House, Capital Drive, Linford  
Wood, MK14 6QP

Report Date: 31<sup>st</sup> March 2016

Report Approved By: Edwin Powell

Position: Consultant

MCERTS Registration No.: MM 05 621

MCERTS Certification Level: 2

Technical Endorsements: TE1, TE2, TE3, TE4

Signature:



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**Appendix 3 – Laboratory Data**

## APPENDIX 1: General Information

## Monitoring Organisation Staff Details

**Table 5.1 Sampling Personnel**

Sampling Personnel	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Carl Redgrove	Senior Consultant	Level 2	TE1, TE2, TE3, TE4	MM 03 173
Jack Richmond	Trainee Technician	-	-	MM 15 1361

**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
Edwin Powell	Consultant	Level 2	TE1, TE2, TE3, TE4	MM 05 621

## Monitoring Organisation Method Details

**Table 6.1 Monitoring Methods**

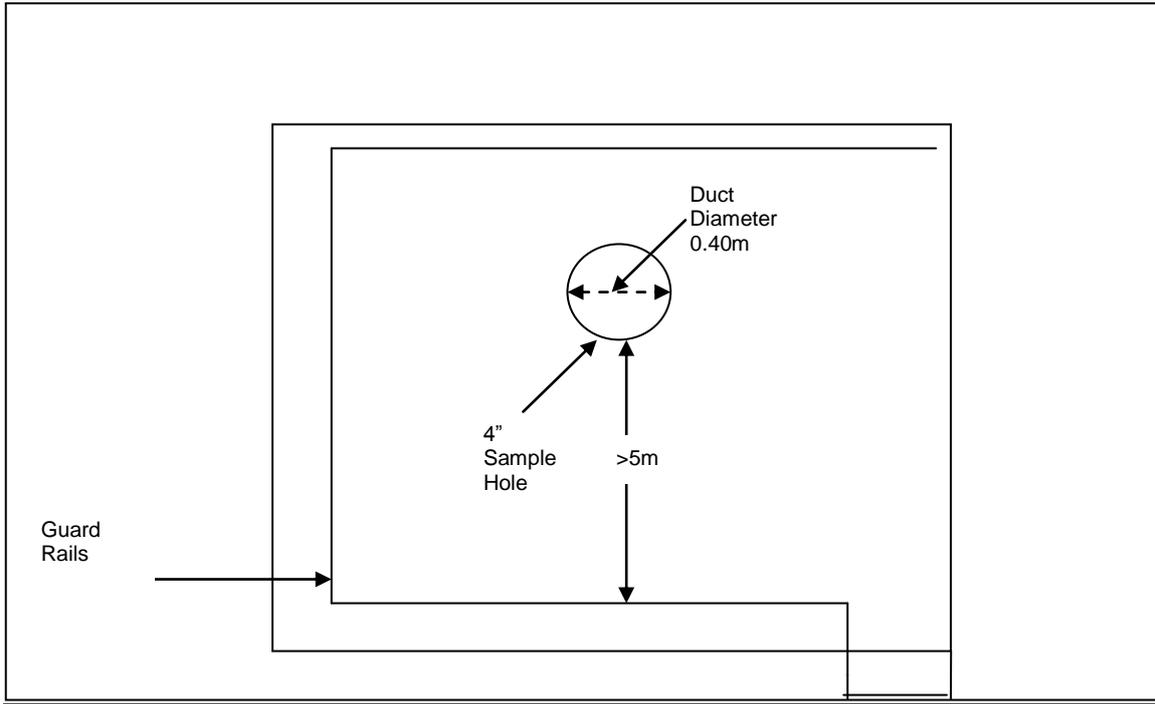
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditation
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
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	BS EN 12619:2013	RPSCE/1/4b	MCERTS	Flame Ionisation Detector	N/A	N/A	N/A

**Table 7.1 – Checklist Used**

Equipment Checklist Used	File Location Address
FTBS41062 Checklist	FTBS41062 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: 16/03/16  
Run: Gases

Static Press, mm H<sub>2</sub>O: 1.2  
Barometric press, mm Hg: 761  
Stack Diamter (m): 0.40  
Pitot Tube Constant: 0.847

Traverse Point No.	Port A				Port B			
	Δ p, mmH <sub>2</sub> O	Conversion for pitot coefficient and to Pa	Root Δ p,	Stack Temp °C	Δ p, mmH <sub>2</sub> O	Conversion for pitot coefficient and to Pa	Root Δ p,	Stack Temp °C
1	1.0	7.2	2.679	603.7				
2	1.0	7.2	2.679	603.7				
3	1.0	7.2	2.679	603.7				
4	1.0	7.2	2.679	603.7				
5								
6								
7								
8								
9								
10								
Minimum	1.0	7.2	2.679	603.7				
Maximum	1.0	7.2	2.679	603.7				
Average	1.0	7.2	2.679	603.7				
Sum	4.0	28.7	10.715	2414.8				
Total Sum								
Max. pitot press. =		7.2			Max. Temp. =		603.7	
Min. pitot press. =		7.2			Min. Temp. =		603.7	
Ratio Max:Min =		1.0 :1			Mean Temp. =		603.7	

Mean Root D p	2.679
Mean Stack Temperature, °C	603.70
Traverse Stack Velocity, m/s	5.949
Stack Area, m <sup>2</sup>	0.126
Stack Gas Volume Flow Rate, m <sup>3</sup> /s (acms)	0.748
Stack Gas Volume Flow Rate, m <sup>3</sup> /s (scms wet)	0.233
Stack Gas Volume Flow Rate, m <sup>3</sup> /s (scms DRY) O2 Corrected	0.181
Moisture	8.9
Stack Pressure, mm Hg	761.09

**Gas Data**

Oxygen %	12.46556134
CO <sub>2</sub> %	5.22

**Oxygen Correction**

Required Correction Value (%)	11
Oxygen Factor	1.174
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: 16/03/16  
Run: Gases

	O <sub>2</sub> %	CO <sub>2</sub> %	CO mg/m <sup>3</sup>	CO kg/hr	NO <sub>x</sub> mg/m <sup>3</sup>	NO <sub>x</sub> kg/hr		
<b>Average</b>	12.47	5.22	213.04	0.139	103.80	0.068		
<b>Max</b>	14.80	10.65	2597.15	1.691	182.61	0.12		
<b>Min</b>	6.39	1.33	34.37	0.022	22.80	0.01		
<b>Emission Limit</b>			N/A		N/A			
<b>Moisture, %</b>	8.9			<b>Baromteric (mmHg) Start</b>		761		
<b>Oxygen Reference, %</b>	11.0			<b>Baromteric (mmHg) End</b>		761		

Stack Gas Volume Flow Rate, m3/s (scms DRY) O2 Corrected	0.180818
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Calibrations	O <sub>2</sub> %	CO <sub>2</sub> %	CO ppm	NO ppm
<b>Analyser - Start Zero</b>	0.00	0.00	0.0	0.0
<b>Analyser - Start Span</b>	14.61	8.05	118.0	214.0
<b>Analyser - Zero Check</b>	0.02	0	0.6	0.0
<b>System - Zero Check</b>	0.12	-0.03	0.4	0.3
<b>System - Span Check</b>	14.53	8.02	118.2	214.2
<b>System - End Zero Check</b>	0.2	0.04	0.5	0.3
<b>System - End Span Check</b>	14.66	7.97	116.7	218.1
<b>Cylinder Number</b>	243111	243111.00	243111	163383
<b>Span Value</b>	14.6	8.05	118	214
<b>Analyser Range (0 - X)</b>	25	20	5000	250

Not in Use

Equipment ID Nos	
<b>Analyser</b>	928

**Uncertainty calculation for Gaseous Measurement of Carbon Monoxide EN 15058**

Measured concentration - CO	334.6	mg/m <sup>3</sup> (O <sub>2</sub> & H <sub>2</sub> O uncorrected)	Analyser Make/Model	Horiba PG250
Range (Max Value)	6250.0	mg/m <sup>3</sup>	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)	0.0847458	% of Range	< 2% of Range
Span drift (during measurement period)	-1.271186	% 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 <sub>2</sub> (% vol)	15	% by volume per	
CH <sub>4</sub> (mg/m <sup>3</sup> )	57	mg/m <sup>3</sup>	
N <sub>2</sub> O (mg/m <sup>3</sup> )	42	mg/m <sup>3</sup>	
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 <sub>0</sub>	for mean	Only use rep at span
Standard deviation of repeatability at span level	u <sub>rs</sub>	for mean	0.000
Lack of fit	u <sub>fit</sub>		0.000
Drift	u <sub>odr</sub>		-2.292
volume or pressure flow dependence	u <sub>spres</sub>		0.000
atmospheric pressure dependence	u <sub>apres</sub>		0.000
ambient temperature dependence	u <sub>temp</sub>		-0.008
CO <sub>2</sub>			0.000
NO			0.000
NO <sub>2</sub>			0.000
dependence on voltage	u <sub>volt</sub>		0.000
losses in the line (leak)	u <sub>leak</sub>		3.86
Uncertainty of calibration gas	u <sub>calib</sub>		3.86

<b>Measurement Concentration</b>	<b>334.63</b>	<b>mg/m<sup>3</sup></b>	
<b>Combined uncertainty</b>	<b>5.93</b>	<b>mg/m<sup>3</sup></b>	
Coverage factor k = 2			
Expanded uncertainty (as measured)	11.85	mg/m <sup>3</sup>	<b>(expressed with a level of confidence of 95%)</b>
<b>Expanded uncertainty (Corrected to Ref Conditions)</b>	<b>13.91</b>	<b>mg/m<sup>3</sup></b>	

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

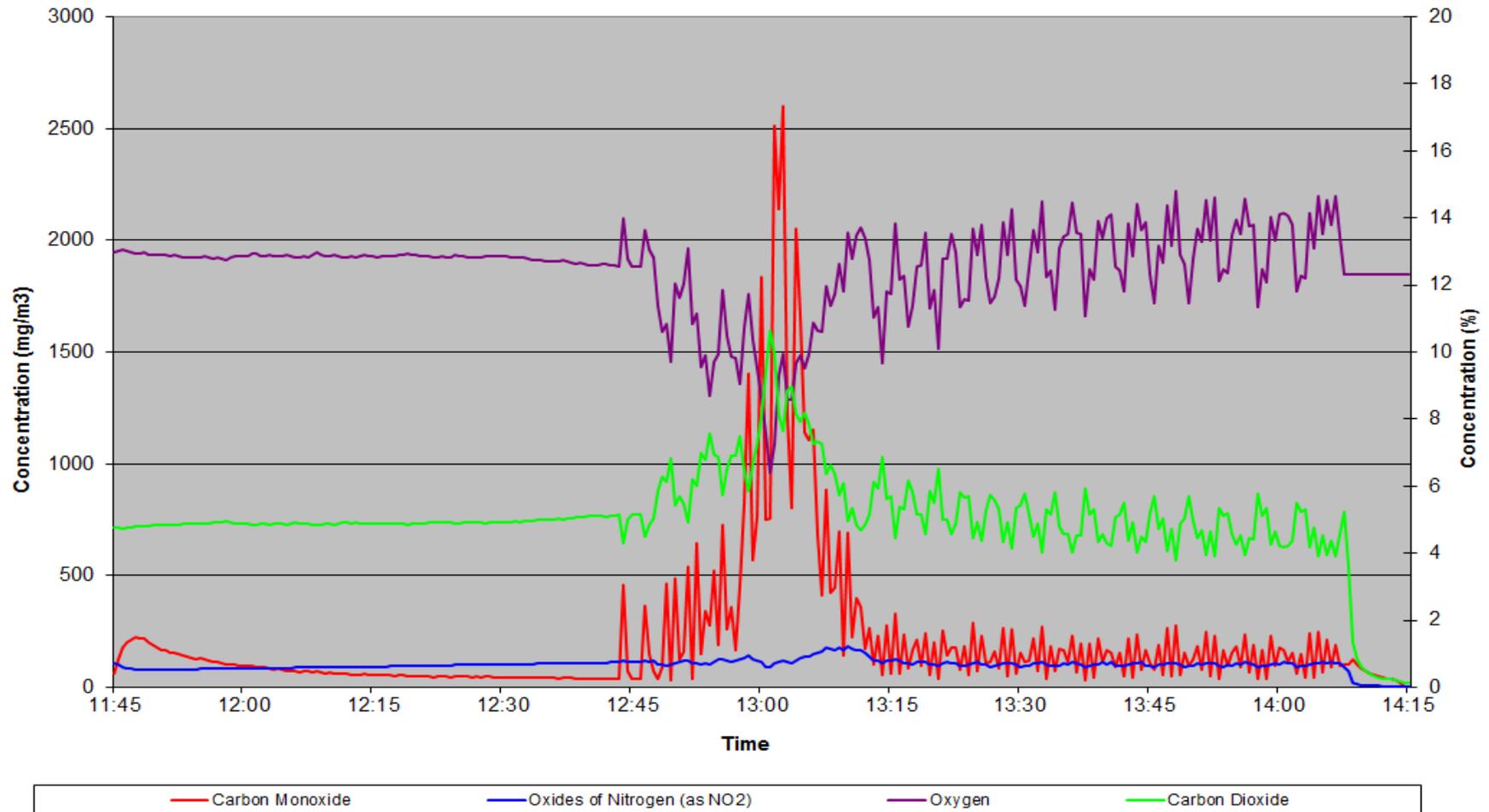
Measured concentration - NOx	107.7	mg/m <sup>3</sup> (O <sub>2</sub> & H <sub>2</sub> O uncorrected)	Analyser Make/Model	Horiba PG250
Range (Max Value)	513.4	mg/m <sup>3</sup>	ID Number	278

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	% full range	2
Span drift (during measurement period)	1.8224299	% 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 <sub>2</sub> (% vol)	15	% by volume per	
CH <sub>4</sub> (mg/m <sup>3</sup> )	57	mg/m <sup>3</sup>	
NH <sub>3</sub> (mg/m <sup>3</sup> )	20	mg/m <sup>3</sup>	
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 <sub>r0</sub>	for mean	Only use rep at span
Standard deviation of repeatability at span level	u <sub>rs</sub>	for mean	0.001
Lack of fit	u <sub>fit</sub>		0.415
Drift	u <sub>odr</sub>		1.134
volume or pressure flow dependence	u <sub>spres</sub>		0.000
atmospheric pressure dependence	u <sub>apres</sub>		0.000
ambient temperature dependence	u <sub>temp</sub>		-0.008
CO <sub>2</sub>			0.000
NO			0.000
NO <sub>2</sub>			0.000
Converter Efficiency	u <sub>ceff</sub>		0.01
dependence on voltage	u <sub>volt</sub>		0.000
losses in the line (leak)	u <sub>leak</sub>		1.24
Uncertainty of calibration gas	u <sub>calib</sub>		1.24

<b>Measurement Concentration (as measured)</b>	<b>107.73</b>	<b>mg/m<sup>3</sup></b>	
Combined uncertainty	2.13	mg/m <sup>3</sup>	
Coverage factor k = 2			
Expanded uncertainty (as measured)	4.27	mg/m <sup>3</sup>	
<b>Expanded uncertainty (Corrected to Ref Conditions)</b>	<b>5.01</b>	<b>mg/m<sup>3</sup></b>	<b>(expressed with a level of confidence of 95%)</b>

**Combustion Gas Emissions from the Burn Off Oven Exhaust at Covpress, Coventry on 16th March 2016**  
*reference conditions expressed as 273K, 101.3 kPa, 11% O<sub>2</sub> and dry gas*



Company Name: Covpress      In-stack Filter?  No      Bar. Press.mm Hg       K Factor       Ambient Temp.       Leak Rate (fin / %)

Site Name: Coventry      Outstack Filter?  Yes      Cp       Dn used       Start Time       Leak Rate (start / %)

Project Reference: FTBS33285      Date:       Operators       Bws%       Nozzle No.       Stop Time       Box/Probe setting

Run: TPM      Meter Correction Yd

Sampling Point Ref: Burn Off Oven

**Sample Filter Weights**

	Sample ID	Laboratory	Increase, mg
Filter	127454	RPS	5.88
Probe Washings	30009995	RPS	5.52

**Sample Filter Blank Weighings**

	Sample ID	Laboratory	Increase, mg
Filter	127453	RPS	<b>0.1</b>
Probe Wash	30009994	RPS	<b>0.5</b>

Note: Results in Bold are reported at the L.O.D.

**Impinger Weights**

Weights	Initial	Final	Increase, g
Impinger 1	684.6	745.1	60.5
Impinger 2	664.6	679.4	14.8
Impinger 3	601.5	604.1	2.6
Impinger 4			0.0
Impinger 5			0.0
Silica Gel	908.7	916.8	8.1
<b>Total</b>			<b>86.0</b>

Sample Point	Clock Time min	Pitot Δ p, mm H <sub>2</sub> O	Stack Temp, °C	Orifice Δ H, mm H <sub>2</sub> O		Gas Meter Reading  m <sup>3</sup>	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	311	5.538429509	5.538429509	<b>570784</b>	10		120		0	10	1.000
	10	1	507	5.538429509	5.538429509		10		120		0	7	1.000
	20	1	572	5.538429509	5.538429509		11		120		0	7	1.000
	30	1	608	5.538429509	5.538429509		12		120		0	7	1.000
	40	1	648	5.538429509	5.538429509		13		120		0	7	1.000
	50	1	663	5.538429509	5.538429509		14		120		0	7	1.000
	60	1	647	5.538429509	5.538429509		16		120		0	7	1.000
	70	1	661	5.538429509	5.538429509		16		120		0	8	1.000
	80	1	622	5.538429509	5.538429509		17		120		0	8	1.000
	90	1	636	5.538429509	5.538429509		17		120		0	8	1.000
	100	1	659	5.538429509	5.538429509		19		120		0	8	1.000
	110	1	608	5.538429509	5.538429509		19		120		0	8	1.000
	120	1	640	5.538429509	5.538429509		19		120		0	8	1.000
	130	1	612	5.538429509	5.538429509		19		120		0	8	1.000
	140	1	661	5.538429509	5.538429509		19		120		0	8	1.000
Endpoint						<b>571939</b>							
	<b>150.00</b>	<b>1.000</b>	<b>603.7</b>	<b>5.5</b>	<b>5.5</b>	<b>1.155</b>	<b>15.4</b>	<b>#DIV/0!</b>	<b>120.0</b>	<b>#DIV/0!</b>	<b>0.0</b>	<b>7.7</b>	<b>1.0</b>

Company Name: Covpress  
Site Name: Coventry  
Project Reference: FTBS33285

Date: 16/03/16

Sampling Point Ref: Burn Off Oven	Run: TPM
Meter Volume Sampled, acm	1.155
Sample Run Start Time	11:45
Sample Run End Time	14:15
Total Actual Sampling Time, min	150.0
Barometric Pressure, mm Hg	761.00
Stack Pressure, mm Hg	761.09
Average Stack Temp, °C	603.7
Meter Volume at STP, scm	1.090
Stack Moisture Content, %	8.9
Average Stack Velocity, m/sec	5.972
Nozzle Diameter, mm	9.28
<b>% Isokinetic Variation</b>	<b>105.4</b>
Total Mass of Particulate, mg	11.2
Percentage of Total Particulate Collected on Filter	50.7
<b>Stack Particulate Concentration, mg/m<sup>3</sup></b>	<b>12.063</b>
Particulate Mass rate, kg/hour	0.0079
Emission Limit value	<b>20</b>

<b>Sample Train Blank Results</b>	
Sample Blank Particulate Concentration, mg/m <sup>3</sup>	0.59
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	12.063	mg/m <sup>3</sup> (at Reference Cond)
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**Measured Values**

Sampled Volume	1.155	m <sup>3</sup>
Sampled gas Temperature	288.4	k
Sampled gas Pressure	101.48	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	12.47	% by volume
Mass	11.2	mg

Leak	0.00	%
Uncollected Mass	0	mg

**Standard Uncertainties for Measured Values**

Sampled Volume	0.001	m <sup>3</sup>
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				Uncertainty Calculation for Oxygen Correction			
Volume Correction Factor	0.948			Oxygen Correction Factor	1.1744		
	<b>Sensitivity Coefficient</b>		<b>Uncertainty, U<sub>v</sub></b>		<b>Sensitivity Coefficient</b>		<b>Uncertainty, U<sub>o</sub></b>
Sampled gas Temperature	0.0033		0.0066	Oxygen Measurement	0.1383		0.0138
Sampled gas Pressure	0.0093		0.0093				
Sampled gas Humidity	0.0095		0.0095				
	<b>Sqrt (U<sub>v</sub>)<sup>2</sup></b>		0.0148				
	<b>Total U<sub>v</sub></b>		<b>0.017</b>			<b>Total U<sub>o</sub></b>	<b>0.0138</b>

**Uncertainty Contributions (Itemised)**

	Value		Sensitivity coefficient	Uncertainty Contribution	
				Concentration	%
Volume Correction	1.090	m <sup>3</sup>	11.06	0.19 mg.m <sup>-3</sup>	1.58 %
Mass (weighing)	11.20	mg	1.08	0.15 mg.m <sup>-3</sup>	1.26 %
Oxygen Correction	1.1744		10.27	0.14 mg.m <sup>-3</sup>	1.18 %
System Leak	0.00	mg.m <sup>-3</sup>	1.00	0.00 mg.m <sup>-3</sup>	0.00 %
Uncollected Mass	0.00	mg	1.08	0.00 mg.m <sup>-3</sup>	0.00 %
			<b>Total Uncertainty</b>	<b>0.28 mg.m<sup>-3</sup></b>	

**Uncertainty Result**

(Uncertainty has been expanded with a coverage factor of 2 (K=2))

<b>Expanded Uncertainty =</b>	<b>0.5641</b>	<b>mg.m<sup>-3</sup></b>
<b>=&gt;</b>	<b>4.68</b>	<b>% of Result</b>
<b>=&gt;</b>	<b>2.82</b>	<b>% of ELV</b>

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

Date: 16/03/16  
Run: VOC

	VOC (as Carbon) ppm	VOC (as Carbon) mg/m3	VOC (as Carbon) kg/h			Oxygen %
<b>Average</b>	19.75	36.63	0.0233			12.46
<b>Max</b>	681.00	965.79	0.6142			14.80
<b>Min</b>	0.00	0.00	0.0000			6.39
<b>Emission Limit</b>		20.00				
<b>Moisture, %</b>	8.9					
<b>Oxygen Reference, %</b>	11.0					

Stack Gas Volume Flow Rate, m3/s (scms Dry) O2 Corrected	0.1766
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Calibrations	ppm
Analyser - Start Zero	0.00
Analyser - Start Span	874.00
Analyser - Zero Check	0.00
System - Zero Check	1.00
System - Span Check	872.00
System - End Zero Check	1.00
System - End Span Check	870.00
Cylinder Number	164056
Span Value	874.00
Analyser Range (0 - X)	1000

Equipment ID	
FID	278

**ISO 14956 Calculation Sheet - TOC (BS EN 12619)**

Studied Concentration (mg/m <sup>3</sup> as C)	36.63431974
Range of Instrument (mg/m <sup>3</sup> as C)	1607

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

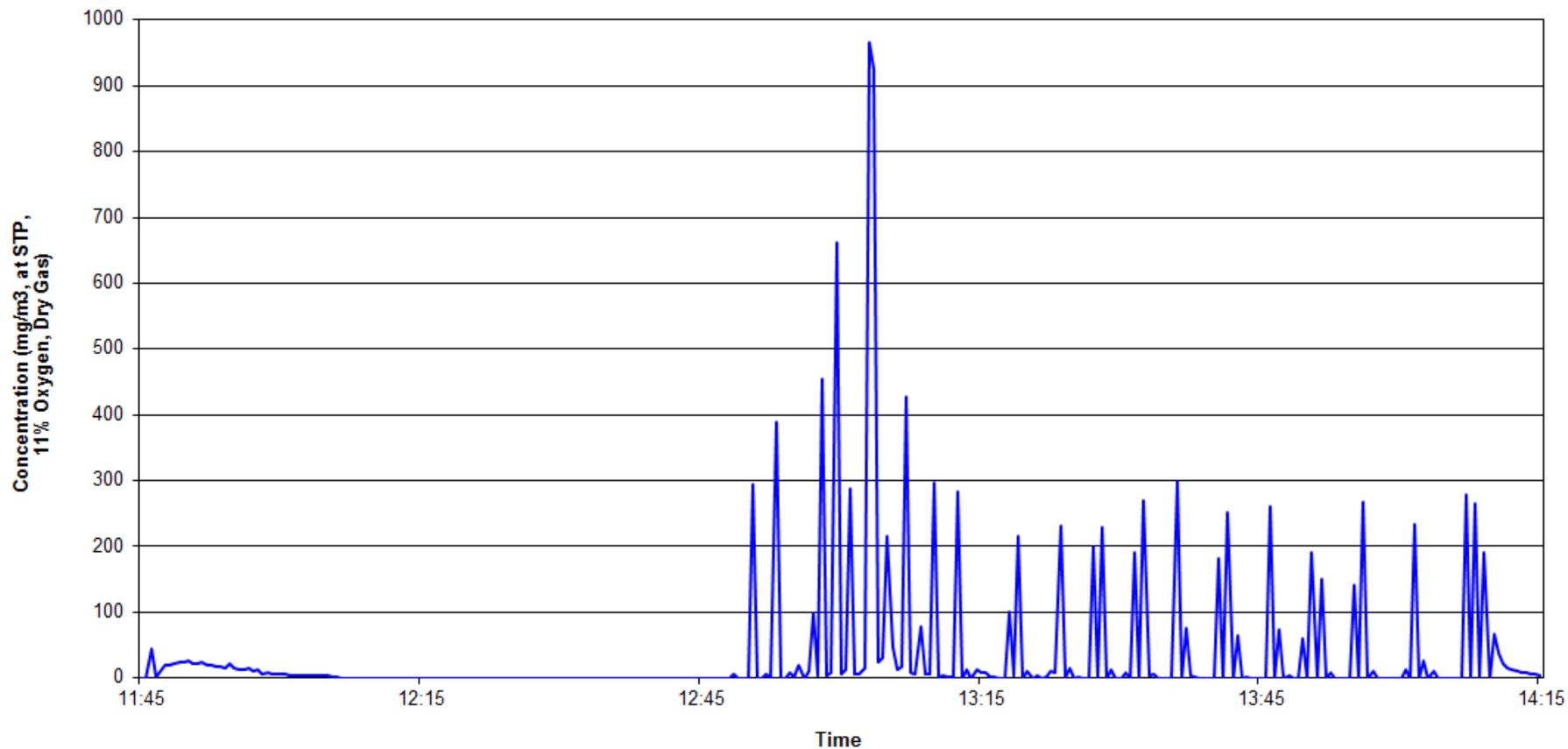
Selected Performance Characteristic	Value of Performance Characteristic			Operating Conditions compared to calibration condition		
	%	Numerical	Units	Required	Variable due to sampling conditions	Units
Deviation from Linearity	1	0.01	% FS	0.01	1	% FS
Repeatability Standard Deviation	1	0.01	% FS	0.01	1	% 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					
Performance Characteristic	Uncertainty Quantity	At Calibration Conditions			At Sampling Conditions		
		Units	U	U <sup>2</sup>	Units	U	U <sup>2</sup>
Deviation form Linearity	U <sub>Fit</sub>	% FS	16.07	258.245	% FS	0.3663432	0.134
Repeatability Standard Deviation	U <sub>R</sub>	% FS	0.212	0.045	% FS	0.212	0.045
8 Hour Drift	U <sub>drift</sub>	%	0.4230	0.179	%	0.423	0.179
Atmospheric Pressure Dependence	U <sub>Atmos</sub>	% / kPa	0.021	0.000	% / kPa	0.021	0.000
Temperature Dependence	U <sub>Temp</sub>	% / K	0.042	0.002	% / K	0.042	0.002
Sum Interference	U <sub>Interference</sub>	%	0.423	0.179	%	0.021	0.000
Voltage Supply	U <sub>Voltage</sub>	% / V	0.021	0.000	% / V	0.021	0.000
Uncertainty of Calibration Gas	U <sub>Calibration gas</sub>	%	0.423	0.179	%	0.423	0.179
Loss in sample line (Leaks)	U <sub>Losses, leak</sub>	%	0.423	0.179	%	0.846	0.716
Sum			18.058	259.008	Sum	2.376	1.256

Measurement Uncertainty at	36.63431974	mg/m <sup>3</sup> C		
U <sub>tot</sub>	1.121	mg/m <sup>3</sup> C		
U <sub>tot</sub> / <sup>c</sup>	3.059	%	U <sub>limit</sub>	30 %
Pass	Yes			

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 alcohols	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

**TOC Emissions Profile from the Burn off Oven Exhaust on 16th March 2016 at Covpress, Coventry**  
*reference conditions expressed as 273K, 101.3 kPa, 11 % O<sub>2</sub> and dry gas*



## **APPENDIX 3: Laboratory Data**



Test Certificate

Date 30/03/2016

<b>Client</b>	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	<b>Order No.</b>	FTBS 41602
		<b>Certificate No.</b>	WK16-1646
		<b>Issue No.</b>	1
<b>Contact</b>	Carl Redgrove	<b>Date Received</b>	18/03/2016
<b>Description</b>	2 filters & 2 washes for TPM	<b>Technique</b>	Gravimetric Stack
<b>Sample No.</b>	874192	127463	<b>Method</b>
Total particulate matter	<0.1 mg		D9(U)
<b>Sample No.</b>	874193	30009994	<b>Method</b>
Total particulate matter	<0.5 mg		D9(U)
<b>Sample No.</b>	874194	127464	<b>Method</b>
Total particulate matter	5.88 mg		D9(U)
<b>Sample No.</b>	874195	30009996	<b>Method</b>
Total particulate matter	5.52 mg		D9(U)



Test Certificate

Date 30/03/2016

Client	RPS Milton Keynes HSED	Certificate No.	WK16-1646
		Issue No.	1

Tested By Simon Doodson Date 30/03/2016

Approved By  Date 30/03/2016

Joanne Dewhurst  
Operational 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/l<sub>3</sub> and ppm) are calculated on the basis of information provided by the customer.  
Results stated as ml are referring 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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