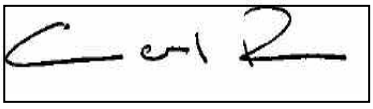
Report for Periodic Monitoring of Emissions to Atmosphere

Part 1:	**Executive Summary**
Permit Number:	**EPR07/09**
Operator:	**Todd Engineering**
Installation:	**Rugeley**
Emission Point:	**Spraybooth**
Monitoring Date:	**5th April 2013**

UKAS TESTING 1709

MCERTS

Contract Reference:	FTBS 25470
Operator:	Todd Engineering
Address:	Gregory Works Armitage Road Rugeley Staffs WS151PW
Monitoring Organisation:	RPS Consultants
Address:	Noble House, Capital Drive, Linford Wood, Milton Keynes, MK14 6QP
Report Date:	25th April 2013
Report Approved By:	Carl Redgrove
Position:	Senior Consultant
MCERTS Registration Number:	MM 03 173
MCERTS Certification Level:	2
Technical Endorsements:	TE1, TE2, TE3, TE4
Signature:	

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Monitoring Objectives

At the request of Adam Turner of Todd Engineering Ltd, RPS Consultants conducted stack emission monitoring at the Todd Engineering Ltd 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**
	Spraybooth
Volatile Organic Compounds	
Total Particulate Matter	
Specific Requirements	Normal

Notes:
✓ *Represents pollutants sampled*

Monitoring Results

Table 2.1 Monitoring results for the Spraybooth, Carried out on 5th April 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	10	0.71	mg/m^3	+/- 0.27	273K, 101.3kPa, Dry	05/04/2013	12:10 - 13:02	BS EN 13284-1:2002	MCERTS	Normal
Volatile Organic Compounds (as Carbon)	100	2.6	mg/m^3	+/- 1.6	273K, 101.3kPa, Dry	05/04/2013	12:10 - 13:04	BS EN 13526	MCERTS	Normal

Operating Information

Table 3.1 Operating conditions during the monitoring of the Spraybooth emission point, carried out on 5th April 2013

Parameter	Result
Sample Date	05/04/2013
Process Type	Batch
Process Duration	~ 1 Hour
If 'Batch', was monitoring carried out over the whole batch?	Yes
Abatement/Operational?	EU2/EU3 Glass Fibre-Synthetic/ Operational
Spraybooth Model	Spartan 2000 Series

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

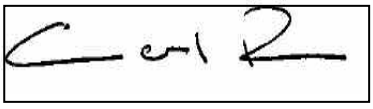
Table 4.1 Monitoring Deviations for Spraybooth Emission Point

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:	**EPR07/09**
Operator:	**Todd Engineering**
Installation:	**Rugeley**
Emission Point:	**Spraybooth**
Monitoring Date:	**5th April 2013**

1709

Contract Reference:	FTBS 25470
Operator:	Todd Engineering
Address:	Gregory Works Armitage Road Rugeley Staffs WS151PW
Monitoring Organisation:	RPS Consultants
Address:	Noble House, Capital Drive, Linford Wood, Milton Keynes, MK14 6QP
Report Date:	18th April 2013
Report Approved By:	Carl Redgrove
Position:	Senior Consultant
MCERTS Registration Number:	MM 03 173
MCERTS Certification Level:	2
Technical Endorsements:	TE1, TE2, TE3, TE4
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
James Beechey	Technician	Level 1	TE1 – 12/02/18	MM 11 1144

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
Carl Redgrove	Senior Consultant	Level 2	TE1 – 01/10/14 TE2 – 09/03/15 TE3 – 11/03/16 TE4 – 11/03/16	MM 07 861

Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

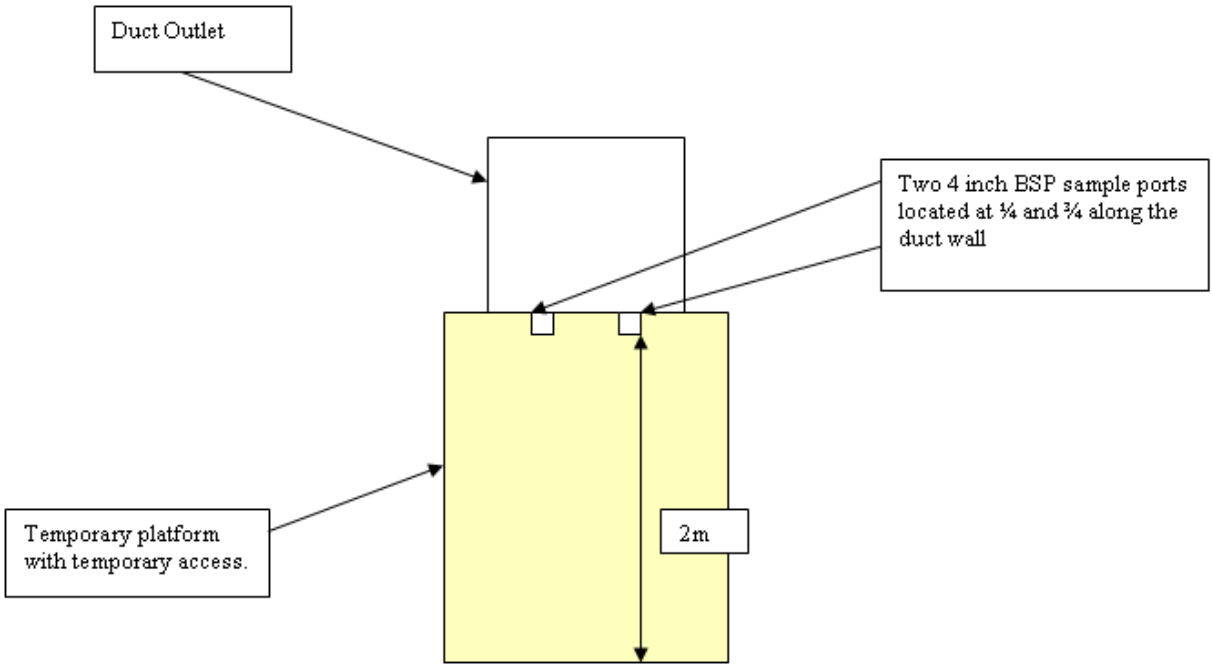
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditaton
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
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
FTBS25470 Checklist	FTBS25470 Electronic & Work File

APPENDIX 2:
Spraybooth Sampling, Analysis & Uncertainty Data

Sampling Point Diagram



Company Name: Todd Engineering
Site Ref: Rugeley
Sampling Point Ref: SB 1
Project Ref: FTBS25470

Date: 05/04/13
Run: TPM

Stack Width (m)	0.90
Stack Depth (m)	0.86
Stack Area (m2)	0.774

Stack Static press mm H_2O: 24.2

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	7.2	2.683	12	4.2	2.049	12
2	5.6	2.366	12	1.6	1.265	12
3						
4						
5						
6						
7						
8						
9						
10						
Minimum	5.6	2.366	12	1.6	1.265	12
Maximum	7.2	2.683	12	4.2	2.049	12
Mean	**6.4**	**2.525**	**12.0**	**2.9**	**1.657**	**12.0**
Sum	12.8	5.050	24	5.8	3.314	24
Total Sum						

Max. pitot press. =	7.2
Min. pitot press. =	1.6
Ratio Max:Min =	4.5 :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 > 5m²?	N
Handrails with removable chains / self closing gates across the top of the ladder?	N
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?	N
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	Y

Company Name: Todd Engineering		In-stack Filter?	Y	Bar. Press mm Hg	755	K Factor	9.636	Ambient Temp	14	Leak Rate (fin / %)	0
Site Ref: Rugeley											
Sampling Point Ref: SB 1		Outstack Filter?	N	Cp	0.824	Dn used	7.98	Start Time	12:10	Leak Rate (start / %)	0
Date:	05/04/13										
Run: TPM		Operators	rc jb	Bws%	2	Nozzle No		Stop Time	13:02	Box/Probe setting	160 +/- 5 oC
Project Ref: FTBS25470											
						Meter Correction Yd	0.98				

Sample Filter Weights

	Reference	Laboratory	Increase, mg
Filter	95549	RPS	0.24
Probe Washings	30002231	RPS	0.5

Sample Filter Blank Weighings

	Reference	Laboratory	Increase, mg
Filter	95548	RPS	0.04
Probe Wash	30002230	RPS	0.5

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								
	0	5.4	12	52.0	52.0	1168311	14	N/A	N/A	N/A	7	10	2.324
	6.25	4.8	12	46.3	46.3		15	N/A	N/A	N/A	7	11	2.191
	12.5	5.0	12	48.2	48.2		16	N/A	N/A	N/A	7	12	2.236
	18.75	5.0	12	48.2	48.2		17	N/A	N/A	N/A	7	14	2.236
Endpoint	25												
	0	5.0	12	48.2	48.2		19	N/A	N/A	N/A	7	16	2.236
	6.25	5.0	12	48.2	48.2		20	N/A	N/A	N/A	7	17	2.236
	12.5	5.0	12	48.2	48.2		21	N/A	N/A	N/A	7	17	2.236
	18.75	5.0	12	48.2	48.2		21	N/A	N/A	N/A	7	17	2.236
Endpoint	25					1169441.8							
	50.00	**5.0**	**12.0**	**48.4**	**48.4**	**1.131**	**17.9**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**7.0**	**14.3**	**2.2**

Company Name: Todd Engineering
Site Ref: Rugeley
Project Ref: FTBS25470

Date: 05/04/13

Sampling Point Ref: SB 1	Run: TPM
Meter Volume Sampled, acm	1.131
Sample Run Start Time	12:10
Sample Run End Time	13:02
Total Actual Sampling Time, min	50.0
Barometric Pressure, mm Hg	755.00
Stack Pressure, mm Hg	756.78
Average Stack Temp, °C	12.0
Meter Volume at STP, scm	1.038
Stack Moisture Content, %	0.0
Average Stack Velocity, m/sec	7.377
Stack Flow Rate, scms dry,STP	5.443
Nozzle Diameter, mm	7.98
% Isokinetic Variation	**98.1**
Total Mass of Particulate, mg	0.7
Percentage of Total Particulate Collected on Filter	32.4
Stack Particulate Concentration, mg/m^3	**0.7**
Particulate Mass rate, kg/hour	0.014
Emission Limit value	**10**

Sample Train Blank Results	
Sample Blank Particulate Concentration, mg/m^3	0.5
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	0.7	mg/m3 (at Reference Cond)

Measured Values

Sampled Volume	1.1308	m^3
Sampled gas Temperature	280.875	k
Sampled gas Pressure	100.90	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	21	% by volume
Mass	0.74	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	0.14152985	mg

Uncertainty Calculation for Volume Correction

Volume Correction Factor	0.995		
	Sensitivity Coefficient		Uncertainty, Uv
Sampled gas Temperature	0.0032		0.0064
Sampled gas Pressure	0.0093		0.0093
Sampled gas Humidity	0.0093		0.0093
		Sqrt (Uv)^2	0.0148
		Total Uv	0.017

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	1.038	m3	0.69	0.01	$mg.m^{-3}$	1.60 %
Mass (weighing)	0.74	mg	0.96	0.14	$mg.m^{-3}$	19.12 %
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	0.96	0.00	$mg.m^{-3}$	0.00 %
			Total Uncertainty	0.14	$mg.m^{-3}$	

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

Expanded Uncertainty =	0.27	$mg.m^{-3}$
=>	38.38	% of Result
=>	0.00	% of ELV

Company Name: Todd Eng
Site Ref: Rugeley
Stack Ref: SB 1

Date: 05/04/13
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	#DIV/0!	2.62	0.05	2.87	0.05	#DIV/0!
Max	0.00	21.69	0.39	23.75	0.43	0.00
Min	0.00	-0.16	0.00	-0.18	0.00	0.00
Emission Limit						
Moisture, %	2.0					
Oxygen Reference, %	0.0					

Stack Gas Volume Flow Rate, m3/s (scms Dry) O2 Corrected	4.988806023

ISO 14956 Calculation Sheet - TOC (BS EN 13526)

Studied Concentration (mg/m^3 as C)	2.617707975
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	0.015	0.000	% FS	0.015	0.000
8 Hour Drift	U_{drift}		%	0.0302	0.001	%	0.030	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	$U_{Interference}$		%	0.030	0.001	%	0.022	0.000
Voltage Supply	$U_{Voltage}$		% / V	0.002	0.000	% / V	0.002	0.000
Uncertainty of Calibration Gas	$U_{Calibration\ gas}$		%	0.030	0.001	%	0.030	0.001
Loss in sample line (Leaks)	$U_{Losses,\ leak}$		%	0.030	0.001	%	0.060	0.004
			Sum	1.752	2.596	Sum	1.754	2.598

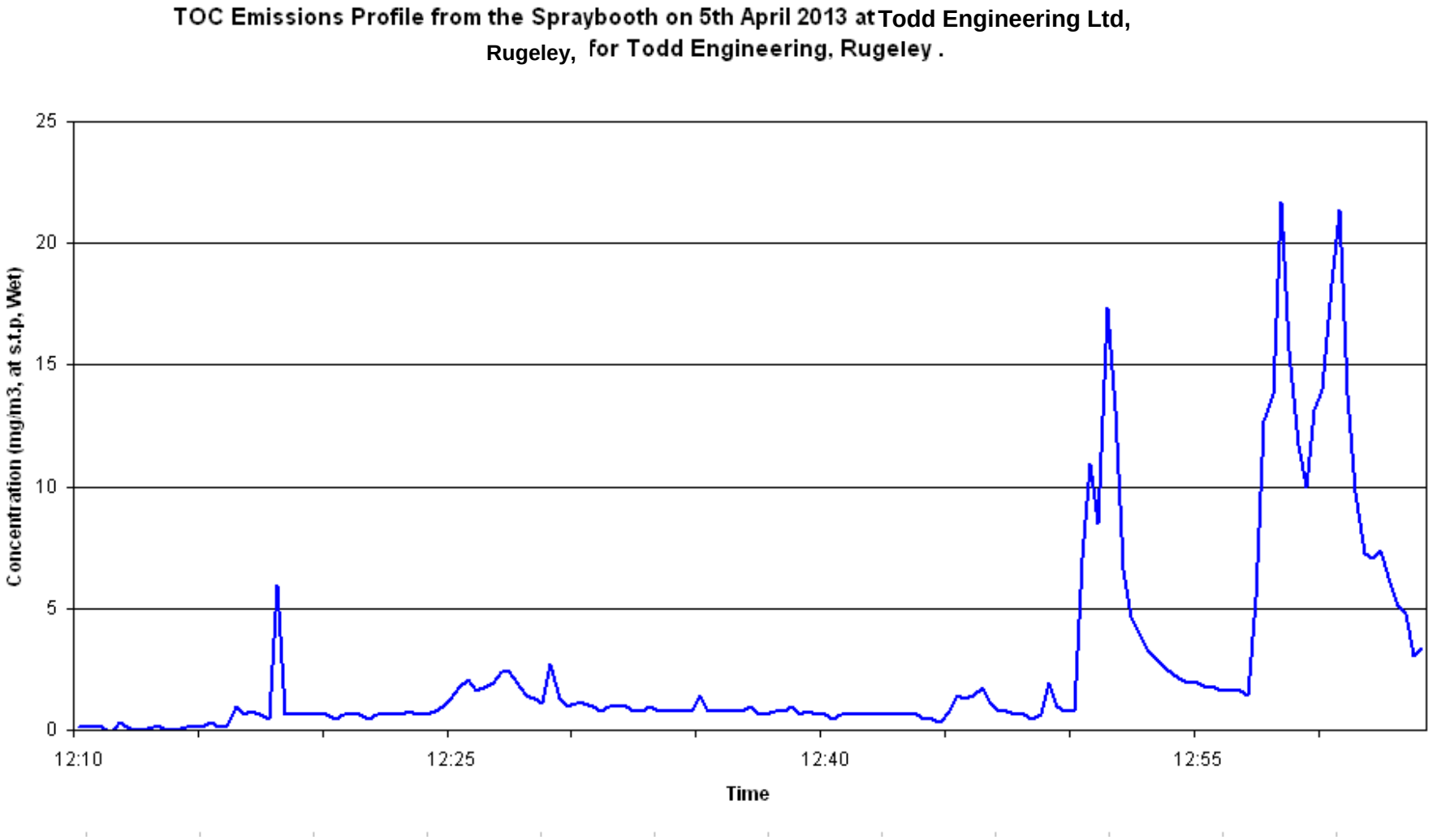
Measurement Uncertainty at	2.617707975	mg/m^3 C			
U_{tot}	1.612	mg/m^3 C			
U_{tot}/*	61.572	%	U_{limit}	30	%
Pass	No				

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 Spraybooth on 5th April 2013 at Todd Engineering Ltd, Rugeley, for Todd Engineering, Rugeley .
Concentration (mg/m3, at s.t.p, Wet)
25
20
15
10
5
0
12:10
12:25
12:40
12:55
Time

RPS Laboratories

UKAS TESTING 0605

Test Certificate

Date 17/04/2013

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	**Order No.**	FTBS 25470
		Certificate No.	**WK13-2190**
		Issue No.	1
Contact	James Beechey	**Date Received**	10/04/2013
Description	2 filters & 2 solutions for TPM	**Technique**	Gravimetric Stack

Sample No.	**740079**	**095548**	**Method**
Total particulate matter	<0.04 mg		D9(U)
Sample No.	**740080**	**30002230**	**Method**
Total particulate matter	<0.5 mg		D9(U)
Sample No.	**740081**	**095549**	**Method**
Total particulate matter	0.24 mg		D9(U)
Sample No.	**740082**	**30002231**	**Method**
Total particulate matter	<0.5 mg		D9(U)

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