

Aspen Environmental Ltd
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www.aspenenvironmental.co.uk

Mr Sandy Stewart,
Steel Construction Ltd,
Bodmin Road,
Coventry,
CV2 5DB.

Date: 01/03/2018

Ref: L.2390

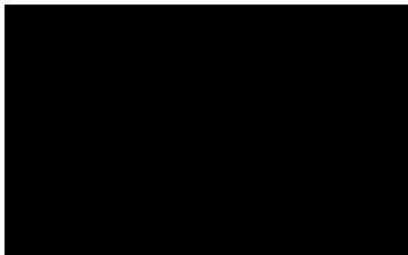
Dear Sandy,

Testing at Coventry February 2018:

I am pleased to present my report on the emissions testing undertaken on your site on the 8th March 2018.

If you have any queries on this report please do not hesitate to contact me

Yours sincerely,
For Aspen Environmental Ltd,



Dr Geoff Buck.
Director

**Emissions Testing Report:
Part 1, Executive Summary:**



UKAS Report

Emissions Testing from two Spray booth Stacks

Permit Number: Coventry CC
Steel Construction Ltd
Monitoring Date: 08/02/2018
Aspen Reference Number: J.1365

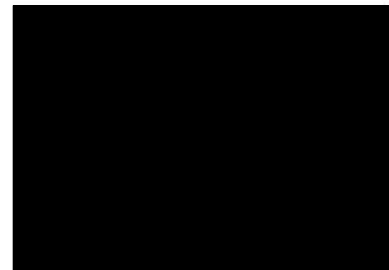
**Monitoring of:
Spraybooth Stacks at
Steel Construction Ltd, Bodmin Road, Coventry, CV2 5DB.**

**For:
SGM Associates Ltd, 8 Woodland Way, Woburn Sands,
Buckinghamshire, MK17 8QL.**

**by:
Aspen Environmental Ltd,
25A Church St, Uttoxeter, Staffordshire, ST14 8AG.**

Report Date: 1st March 2018

Prepared for Aspen Environmental Ltd by
Dr G.W.Buck (Director)
MCerts Registered MM 02 001 Level 2, TE1, TE3, TE4.



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Introduction

Steel Construction Ltd operate a factory manufacturing steel parts for the construction industry at their Coventry site.

Aspen Environmental Ltd (Dr G Buck & Mr J Buck) attended the site on the 8th February 2018, with Mr S Martin of SGM Associates to undertake emissions testing from two spray bays. Aspen Environmental Ltd are UKAS/MCerts accredited to perform tests to EN 13284-1 and EN 16911-1, which are the current particulate sampling, and flow rate measuring standards.

Emissions Monitoring

Aspen monitored the particulate emissions from two exhausts, one from each spraybooth in the construction shop. These two exhausts were accessed from a permanent platform erected outside the factory. For the purposes of testing, the stacks were labelled as Right Hand Side (Front Stack) & Left Hand Side (Rear Stack), as viewed from inside (& outside) the factory. At the time spray painting was being carried out on a series of steel parts, and each exhaust was sampled isokinetically for about a fifty minute period following Aspen's UKAS/MCerts accredited methodologies (Methods A1 & A5).

Results

The results are presented as a summary table overleaf:

Details of sampling, pitot flow measurements and two sheets of site data for both stacks are included in Appendix 2.

UKAS accredited filter & rinse weights are also included in Appendix 2

Uncertainty calculations for the testing are included as Appendix 3

Monitoring Deviations

Both exhausts were sampled using centre point sampling methodology.

Deviations from the method are highlighted in red in the appendices. There are no other deviations.

Steel Construction Ltd, Coventry				Aspen Environmental Ltd							
Emissions Testing 2018											
Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Uncertainty	Units	Reference Conditions	Date of Sampling	Start & End Times	Monitoring Method Reference	Accreditation for use of Method	Operating Status
Spray Painting Area RHS	Particulates	50	0.77	± 6.1 %	mg/Nm ³	Wet Gas	08/02/2018	11:21 - 12:11	EN 13284-1	MCerts	Normal Running
Spray Painting Area LHS	Particulates	50	0.86	± 6.1 %	mg/Nm ³	Wet Gas	08/02/2018	12:32 - 13:18	EN 13284-1	MCerts	Normal Running
Notes											
Dr G.W.Buck is personally MCerted to Level 2 with Technical Endorsements TE1 (Isokinetic Sampling), TE3 (Gases by manual techniques), & TE4 (Gases by Instrumental Methods)											
Aspen Environmental Ltd is a UKAS accredited Testing Laboratory No. 2395											

Appendix 1: Personnel, Methodologies & Equipment

Part 2 Supporting Information

Aspen Personnel

Dr G.W.Buck	MCerts Reg. MM 02 001	Level 2	TE1, TE3, TE4 Team Leader (to Nov 2020)
Mr J Buck	MCerts Reg. MM 06 783	Level 1	(to June 2022)

Relevant Tests for which Aspen is MCerts & UKAS accredited

- (A1) Flow in Ducts to EN 19611-1. 2014
- (A5) Particulates in Stacks to EN 13284-1. 2002

General Description of Aspen Sampling Equipment:

Accredited Methods used by Aspen Environmental Ltd		 
Method Number	Analyte & Procedure	Status
A1	Pressure, Temperature & Velocity to EN 16911-1.2013 & MID (Range 4 - 18 m/s)	MCerts
A2	Total Organics to EN 12619. 2013 (FID)	MCerts
A3	Speciated Organics to PD CEN/TS 13649. 2014 (Charcoal Tubes) 226-09	MCerts
A4.2	Oxygen to AM for EN 14789. 2005 (Zr cell) (EN 14789.2017)	MCerts
A4.2	Carbon monoxide to EN 15058. 2006 (NDIR) (EN15058.2017)	MCerts
A4.2	Carbon dioxide to ISO 12039. 2001 (NDIR)	MCerts
A4.2	Nitrogen oxides (as NOx) to EN 14792. 2005 & MID (Chemiluminescence) (EN14792.2017)	MCerts
A5	Particulates to EN 13284-1. 2002 (Range 0 - 50 mg/m ³)	MCerts
A5	Oil Mist, Tar & Bitumen fume (EN 13284-1. 2002 & MDHS 68 & 84)	MCerts
A6	Aliphatic Amines to PD CEN/TS 13649. 2014 (NIOSH Method 2010 Silica Gel Tube) 226-15	MCerts
A6	Aromatic Amines to PD CEN/TS 13649. 2014 (NIOSH Method 2002 Silica Gel Tube) 226-15	MCerts
A6	Aldehydes to PD CEN/TS 13649. 2014 (NIOSH Method 2539 XAD-2 Piperidine Tube) 226-117	MCerts
A6	Alcohols to PD CEN/TS 13649. 2014 (NIOSH 1400 & 2000 Charcoal & Silica Gel Tubes) 226-09 & 226-15	MCerts
A6	Phenols & Cresols to PD CEN/TS 13649. 2014 (NIOSH 2546 XAD-7 Tube) 226-95	MCerts
A6	Carboxylic Acids to PD CEN/TS 13649. 2014 (NIOSH 1603 Charcoal Tube) 226-09	MCerts
A6	Hydrogen sulphide (PD CEN/TS 13649. 2014 & NIOSH 6013 Charcoal tube) 226-09 & Zefluor prefilter	MCerts
A8	Water vapour to EN 14790. 2005 (EN 14790.2017)	MCerts
A9	Hydrogen chloride to EN 1911. 2010	MCerts
A9	Ammonia to EN 14791. 2005	MCerts
A9	Sulphur dioxide to EN 14791. 2005 (EN 14791.2017)	MCerts
A3	Organic sulphides & thiols PD CEN/TS 13649. 2014 (Tenax ATD Tube & GCMS)	UKAS
A6	Ammonia to PD CEN/TS 13649. 2014 (NIOSH 6016 Sulphuric Acid Coated Silica Gel Tube) 226-10-06	UKAS
A6	Hydrogen cyanide to PD CEN/TS 13649. 2014 (NIOSH 6010 Soda Lime Tube) 226-28	UKAS
A6.2	Impregnated Filter Method PD CEN/TS 13649. 2014 H ₂ SO ₄ & H ₃ PO ₄ (NIOSH 7908)	UKAS
A6.2	Impregnated Filter Method PD CEN/TS 13649. 2014 HCl, HBr, & HNO ₃ (NIOSH 7907)	UKAS
A6.2	Impregnated Filter Method PD CEN/TS 13649. 2014 Particulate Fluoride & HF (NIOSH 7906)	UKAS
A10	Speciated Organics using a Modified Water Trap to EA LFTGN08. 2011	UKAS

Aspen accredited methodology complies with the requirements of the Environment Agency performance standard (MCerts) & DD CEN/TS 15675. 2007 & EN 15259. 2007, under EN 17025. 2005

Method A1 Flow Measurement in Ducts to EN 16911-1:2013

A US "S" type pitot tube, or UK "L" type pitot tube, each individually UKAS calibrated is used to measure Velocity Pressure (Pv) at a specified number of points across each traverse of the stack (usually 2), as set out in EN 13284-1 & EN 15259. Similarly the pitot is used to measure Static Pressure (Ps), and angle of flow at each of the points. Stack internal diameter is also measured.

A UKAS calibrated "K" type thermocouple system is used to measure temperature at each point above. Where isokinetic sampling is required water vapour content is also assessed. Exhaust velocity and volume flows are calculated according to the standard.

Velocity & Static Pressure measuring equipment.

A UKAS calibrated UK (BS 1042) type pitot tube (Aspen Ref. 445), is used to calibrate other UK & US type pitot tubes (Aspen Refs. 200, 331, 472).

A UKAS calibrated Airflow PVM 620 electronic micromanometer (Aspen Ref 501).

All pitot tubes are vacuum checked before usage.

Temperature measuring equipment.

A UKAS calibrated thermocouple (Annually changed).

A UKAS calibrated Digitron 3208 IS thermocouple reader (Aspen Ref 328).

Method A5 Particulate Testing to EN 13284-1:2002.

Testing is isokinetic to collect particulates onto 47mm glass fibre filter papers.

The filter papers are pre conditioned at 180 ° C and uniquely numbered.

The first requirement is to measure the exhaust velocity, stack size & geometry to determine the suitability of the location for sampling.

The sampling line is a modified Italian system, using numbered 4, 6 & 8 mm diameter tips, a 47 mm in line filter holder, and a supported probe to allow correct positioning. A pitot tube and thermocouple can be attached to the probe tip to allow continuous monitoring of the stack conditions.

A hose connects the high level probe to the low level equipment, which consists of a large in line silica gel trap, containing dry silica gel with a colour indicator. From here the line passes through an in line stainless steel mesh filter, (to prevent silica gel granules migrating into the sampling pump), to a sealed 110 (or 240V) diaphragm pump. The exhaust from the pump passes through a rotameter flow meter, to a calibrated dry gas meter (DGM), with an attached thermocouple, the final exhaust from the DGM is to atmosphere, so that the DGM reads at atmospheric pressure.

Sampling time is a minimum of 30 minutes per sample, and the system is arranged such that the maximum volume of sample air is collected.

Post sampling the filter paper is carefully extracted from the filter holder and returned to its uniquely labelled sample pot. Any residual filter fibres and pre filter probe contamination are rinsed out of the filter holder & probe into a clean bottle, using deionised water & an acetone final rinse.

The filter is reconditioned and reweighed by a UKAS accredited laboratory, and the retained rinse solution is evaporated and the residue weighed.

Results are presented as milligrams of particulates per cubic metre of sample air.

The whole line is constructed to EN 13284-1.

The line is flexible such that it can be reconfigured to allow the filter unit to be heated inside the flue, or located outside the flue with the line to the filter unit being heated also.

110 V Diaphragm Pump Aspen Ref No.129

Rotameter Flowmeters 0 – 10 l/m Aspen Ref No. 80

0 – 50 l/m Aspen Ref No. 82


Dry Gas Meters Aspen Ref No. 97 & 102


Gas Meter Temperature Aspen Ref No. 83

Appendix 2

Stack Results Calculations & Data

Steel Construction Ltd, Coventry												
Particulate Emissions (08/02/2018)												
References:		Dry Gas Meter:			Temperature °C		Time		Particulate			
Filter Number	Rinse Number	DGM Correction Factor =		Stack	Gas Meter	Normal Sample Volume Litres	Initial	Final	Elapsed minutes	Filter	Acetone	Concentration
		Initial	Final									
Spray Painting Area RHS (Front Stack) Sheets 1 & 2												
Barometric Pressure = 1010 mb												
152558	G11896	649469.6	650198.5	8	5	692.9	11:21	12:11	50	<0.04	<0.5	0.779
Spray Painting Area LHS (Rear Stack) Sheets 3 & 4												
152555	G11895	650205.0	650889.2	8	5	650.4	12:32	13:18	46	0.060	<0.5	0.861
						Total Dry Gas	1343.3				Mean Dry Gas	0.820
						Total Wet Gas	1351.4				Mean Wet Gas	0.815
152554	G11894	Control										
Percentage Isokinetic Sampling Efficiency												
Spray Painting Area RHS (Front Stack) Sheets 1 & 2												
Normal Duct Velocity		7.86 Nm / s		Sample Volume in Litres		Theoretical		666.5		Silica Gel Pre Weight in g		925.8
Sampling Tip Diameter		6 mm		Actual		692.9		Silica Gel Post Weight in g		Water Weight in g		932.3
Sampling Time		50 minutes		% Isokinetic		104.0		Water Vapour Volume in l				6.5
Spray Painting Area LHS (Rear Stack) Sheets 3 & 4												
Normal Duct Velocity		7.86 Nm / s		Sample Volume in Litres		Theoretical		613.1				
Sampling Tip Diameter		6 mm		Actual		650.4						
Sampling Time		46 minutes		% Isokinetic		106.1						

Pitot Flow Measurements			Aspen Environmental Ltd					
Client: Steel Construction Ltd Address: Coventry			Date: 08/02/2018 Operator: GB, JB & SM Job Number: 1365 Location: Spray Painting Area RHS (Front Stack) Sheets 1 & 2					
Details of Duct			Atmospheric Pressure (Pa) millibars					
					Instrument Correction Corrected			
Duct Shape: Dimension / Diameter: (cm) Area: sq metres	Vertical 77 0.47	Circular 77 0.47	Initial: Final: Mean:	1015 1015 1010	-5 -5 -5	1010 1010 1010		
Pitot Tube Distance into Duct Position: % Diameter cm			Axis 1: Velocity Pressure Pv Pascals	Static Pressure Ps Pascals	Duct Temp ° Celsius	Axis 2: Velocity Pressure Pv Pascals	Static Pressure Ps Pascals	Duct Temp ° Celsius
3 Centre 8	15.3 50 84.7	11.8 38.5 65.2	19.7 41.3 32.9	145	8			
RMS & Means:			32.54	145.00	8.00	32.54	145.00	8.00
Mean Pv (Pascals)			32.54	Thermo & Reader 562 & 328		Mean T in K (°C + 273)		281
Static Pressure (Pa)			145	Pitot Tube & Manometer		472 & 501 K Factor		1
Duct Velocity (V) @ Temperature (T) in metres per second								7.20
Duct Velocity (V) @ 273K, 1013mb, in metres per second								6.98
Duct Volume Flow @ T in cubic metres per second								3.36
Duct Volume Flow @ 273K, 1013mb, in cubic metres per second								3.25
Duct Volume Flow @ 273K, 1013mb, in cubic feet per minute								6886
Duct Volume Flow @ Temperature (T) in cubic feet per minute								7109
© Aspen Environmental Form 20 Version 7 (May 2013)								

Pitot Flow Measurements			Aspen Environmental Ltd																				
Client: Steel Construction Ltd Address: Coventry			Date: 08/02/2018 Operator: GB, JB & SM Job Number: 1365 Location: Spray Painting Area LHS (Front Stack) Sheets 3 & 4																				
Details of Duct Duct Shape: Vertical Circular Dimension / Diameter: (cm) 77 Area: sq metres 0.47			Atmospheric Pressure (Pa) millibars <table border="1"> <thead> <tr> <th></th> <th>Instrument</th> <th>Correction</th> <th>Corrected</th> </tr> </thead> <tbody> <tr> <td>Initial:</td> <td>1015</td> <td>-5</td> <td>1010</td> </tr> <tr> <td>Final:</td> <td>1015</td> <td>-5</td> <td>1010</td> </tr> <tr> <td>Mean:</td> <td></td> <td></td> <td>1010</td> </tr> </tbody> </table>						Instrument	Correction	Corrected	Initial:	1015	-5	1010	Final:	1015	-5	1010	Mean:			1010
	Instrument	Correction	Corrected																				
Initial:	1015	-5	1010																				
Final:	1015	-5	1010																				
Mean:			1010																				
Pitot Tube Position:	Distance into Duct % Diameter	cm	Axis 1: Velocity Pressure Pv Pascals	Static Pressure Ps Pascals	Duct Temp ° Celsius	Axis 2: Velocity Pressure Pv Pascals	Static Pressure Ps Pascals	Duct Temp ° Celsius															
3	15.3	11.8	27.9																				
Centre	50	38.5	42.3	160	8																		
8	84.7	65.2	36.7																				
RMS & Means:			36.12	160.00	8.00	36.12	160.00	8.00															
Mean Pv (Pascals)		36.12	Thermo & Reader		562 & 328	Mean T in K (°C + 273)		281															
Static Pressure (Pa)		160	Pitot Tube & Manometer		472 & 501	K Factor		1															
Duct Velocity (V) @ Temperature (T) in metres per second								7.59															
Duct Velocity (V) @ 273K, 1013mb, in metres per second								7.35															
Duct Volume Flow @ T in cubic metres per second								3.53															
Duct Volume Flow @ 273K, 1013mb, in cubic metres per second								3.42															
Duct Volume Flow @ 273K, 1013mb, in cubic feet per minute								7255															
Duct Volume Flow @ Temperature (T) in cubic feet per minute								7490															



Test Certificate

Date: 28/02/2018

Client	Aspen Environmental Ltd 25A Church Street Uttoxeter Staffordshire ST14 8AG	Order No.	1353
		Certificate No.	WK18-0595
		Issue No.	1
Contact	Dr Geoff Buck	Date Received	13/02/2018
Description	3 filters & 3 washes for TPM	Technique	Gravimetric Stack

Sample No.	978882	182564	Method
Total particulate matter	<0.04 mg		D9(U)
Sample No.	978883	182566	Method
Total particulate matter	0.06 mg		D9(U)
Sample No.	978884	182568	Method
Total particulate matter	<0.04 mg		D9(U)
Sample No.	978885	G11894	Method
Total particulate matter	<0.5 mg		D9(U)
Sample No.	978888	G11895	Method
Total particulate matter	<0.5 mg		D9(U)
Sample No.	978887	G11898	Method
Total particulate matter	<0.5 mg		D9(U)



Date 26/02/2018

Test Certificate

Client	Aspen Environmental Ltd		Certificate No.	WC18-0888
			Issue No.	1
Tested By	Alex McKerracher Kirstie Davenport	Date	26/02/2018	
Approved By	[Redacted]	Date	26/02/2018	
	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 (ng/m³ and ppm) are calculated on the basis of information provided by the customer.
Results listed as ml air relating to the sample volume.


RPS Laboratories terms and conditions apply - a copy is available on request.

A analysis carried out on samples 'as received'

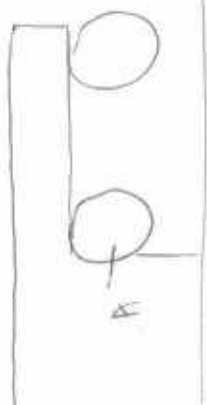
This document may not be reproduced other than in full, except with the written approval of the issuing laboratory.

Aspen Environmental Ltd		Sheet No: 1 of 4		Sampling Data Form			
Location & Drawing: SCL Coventry		Date: 8/2/18		Location:			
		Time: mb		Time:			
		Barometric Pressure:		Barometric Pressure:			
		Temperature °C:		Exhaust:			
				Ambient:			
				Gas Meter:			
Stack Dimensions (cm) & Aspect		Aspen Job Number		cm		Notes	
Sample Reference	Position	Time Initial	Time Final	Gas Meter Initial	Gas Meter Final	Vacuum % < 2	Sampling Points Comments
152556	VAC	10:49	+1	696	696	✓	SiGel: 9258 50ML, WITH SiGel 2.
		11:21	+50	6494696	6501955		
	VAC	17:14	+1	7020	7020	✓	Is the SiGel > 50 % Fresh Stack Gas Homogeneity
Equipment & Blank							
Pump							
Flowmeter							
Gasmeter							
Gas Temp							
Silica Gel							
Thermocouple							
Field Blank							
Operator: G B + JB							
Normal Flow							
152554	FB						

Aspen Environmental Ltd Form 1C Sampling Data Form v1 (Dec 2014)

Pitot & Isokinetic Sampling Data Form		Aspen Environmental Ltd							
Site & Stack Location <u>SCC CONCRETE</u>		<u>Sheet 1 of 4</u>		Sheet Number		Job Ref			
Date <u>5/1/18</u>		Pitot Tube & Micromanometer		Clean?		Straight?			
Thermocouple & Reader		Blocked?							
Pitot Checks:		Deformed?		Barometric Pressure mb					
Leak Check: Vacuum leak check: (GB)		Vacuum leak check: (GB)		Ambient Temperature °C					
S type pitot: Static Pressure must be < 10 Pa on each side									
1st Traverse		2		3		4		5	
Velocity pressure Pv		413		329					
Static Pressure Ps				+145					
Temp °C		8							
Swirl Angle °		A							
Velocity m/s		3.0							
Sampling l/min		13.6							
Tip Diam mm		6							
Uncertainty Pv:									
2nd Traverse		1		2		3		4	
Velocity pressure Pv									
Static Pressure Ps									
Temp °C									
Swirl Angle °									
Velocity m/s									
Sampling l/min									
Tip Diam mm									
Site Diagram, Sampling Details & Comments									
									
								Operator <u>GR JB</u>	

Aspen Environmental Ltd			Sheet No: 3		Sampling Data Form							
Location & Drawing			Location									
			Time									
			mb									
			Exhaust									
			Ambient									
			Gas Meter									
			Aspen Job Number									
Stack Dimensions (cm) & Aspect			Time		Gas Meter / Counter		Vacuum %		Sampling Points		Notes	
Sample Reference	Position	Initial	Final	Initial	Final							
VK		12.19	+1	705.0	205.0			Comments ✓ 174 SHEET 4		932-3		
15755		12.32	+46	680205.0	650889.2					Is the SiGel >50 % Fresh		
VK		13.21	+1	97.6	97.6					Stack Gas Homogeneity		
Equipment & Blank												
											Operator	
											6 BT JB	
											Normal Flow	

Pitot & Isokinetic Sampling Data Form				Aspen Environmental Ltd					
Site & Stack Location <i>522 Coventry</i>		Sheet Number		Clean?		Straight?			
Date <i>8/1/18</i>		Pitot Tube & Micromanometer		Barometric Pressure mb <i>1015</i>		Ambient Temperature °C <i>5/6</i>			
Thermocouple & Reader		Blocked?		Clean? <input checked="" type="checkbox"/>		Straight? <input checked="" type="checkbox"/>			
Pitot Checks:		Deformed? <input checked="" type="checkbox"/>		Barometric Pressure mb		Ambient Temperature °C			
Leak Check:		Vacuum leak check: (GIB) - <i>850 mb</i>		Barometric Pressure mb		Ambient Temperature °C			
S type pitot: Static Pressure must be < 10 Pa on each side		Blocked? <input checked="" type="checkbox"/>		Barometric Pressure mb		Ambient Temperature °C			
1st Traverse		1	2	3	4	5	6	7	8
Velocity pressure Pv		<i>27.7</i>	<i>42.3</i>	<i>36.7</i>					
Static Pressure Ps		<i>416.0</i>							
Temp °C		<i>8</i>							
Swirl Angle ° A									
Velocity m/s		<i>8.0</i>							
Sampling l/min		<i>13.6</i>							
Tip Diam mm		<i>6</i>							
Uncertainty Pv:									
2nd Traverse		1	2	3	4	5	6	7	8
Velocity pressure Pv									
Static Pressure Ps									
Temp °C									
Swirl Angle °									
Velocity m/s									
Sampling l/min									
Tip Diam mm									
Site Diagram, Sampling Details & Comments									
									
								Operator <i>GB + JB</i>	

Appendix 3

Uncertainty Calculations

Uncertainty for Particulate Sampling to EN 13284: 2002				Aspen Environmental Ltd	
Principal Uncertainties for Particulate Sample of 10 mg					
Cahn Balance (PBS) at 100 mg	± 0.022mg	95 %		0.0220	0.0005
Volume Measurement (Schlumberger)(Labcal) 400 L	± 0.5 % of volume	2 litres	4	4.0000	16.0000
	+ resolution	0.2 litres	0.025	0.1200	0.0144
DGM Aspen 97	± 2.3 %			4.6000	21.1600
Change in DGM temperature	± 10/293			0.0341	0.0012
Change in atmospheric pressure	± 2/1013			0.0020	0.0000
No change in humidity (dry gas)					
No change in oxygen (LEV system)					
				Sum Sq	37.1761
				sq rt	6.0972
				Expanded Result	6.1 %