STADCO Coventry

Determination of Gaseous Species
Contrapol Incinerator
Holbrook Lane, Coventry
CV6 4AW

29 November 2005

Prepared by: **CES Environmental Instruments Ltd**
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Report prepared by .....

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Contents

Executive Summary

Operator Company: - STADCO Coventry

Address: - Holbrook Lane, Coventry, CV6 4AW

Monitoring Company: - CES Environmental Instruments Ltd

Address: - Bretby Business Park, Ashby Road, Stanhope, Bretby
Burton on Trent, DE15 0YZ

Analytical Company: - CES Environmental Instruments Ltd

Address: - Bretby Business Park, Ashby Road, Stanhope, Bretby
Burton on Trent, DE15 0YZ

Monitoring Objective
To monitor and quantify gaseous emissions and volatile organic compounds to atmosphere from the Contrapol Incinerator located at Mayflower Vehicle Systems, Holbrook Lane, Coventry

Test Team
R. Allen (Team Leader), R. Ward, S. Elton, A. Orme

Deviations from Sampling Method
None

Results
Date of Sampling: 29 November 2005

Location	Pollutant	Test No.	Concentration mg/Nm³	Mean Concentration mg/Nm³	Emission Rate kg/hr	Mean Emission Rate kg/hr
Contrapol Incinerator	Oxygen	1	20.7%	20.7%		
Contrapol Incinerator	Carbon Monoxide	1	31.6	31.6		
Contrapol Incinerator	Oxides of Nitrogen	1	32.7	32.7		

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

1. Introduction

STADCO Coventry placed an order with CES Environmental Instruments Ltd, to monitor and quantify gaseous emissions and volatile organic compounds to atmosphere from the Contrapol Incinerator located at STADCO Coventry, Holbrook Lane, Coventry. Test work was carried out 29 November 2005, and was undertaken by R. Allen (Team Leader), R. Ward, S. Elton, A. Orme.

2. Plant Details

Contrapol Incinerator is a gas fired unit installed at Mayflower Vehicle Systems, Holbrook Lane Coventry. The incinerator is utilised to dispose of relic ED paint. The incinerator output is estimated to be in the region of 2,000,000 kcal/hr. For the duration of the test the incinerator was operating under normal operating conditions, the normal cycle is one item being dipped every 8 minutes.

Electro Dip Particulates & VOC Monitoring 29/11/05														
Materials Used During Monitoring Exercise														
Manufacturer				**Parts Dipped**				**Description**			**Type/ Identity number**			
PPG				As per log sheet				Powercron 648			ED 5			
Time	Product	Time	Product	Time	Product	Time	Product	Time	Product	Time	Product	Time	Product	
7.11	305 bodyside l/h (5 off)	9.21	Roofs 4 x 110 sw	11.31	MBF Bulkhead x 6	13.41	Roofs 3 x 110 sr 1 x	15.51	End Of Shift	18.01				
7.20	305 bodyside r/h (5 off)	9.30	Doors 12 x 803 r/h	11.40	305 bodyside r/h x 5	13.50	Roofs 4 x 110 sr	15.59	End Of Shift	18.09				
7.29	305 bodyside con. l/h (5 off)	9.38	Empty	11.48	Roofs 4 x 110 ht	13.58	Empty	16.06	End Of Shift	18.18				
7.37	Doors 8 x 803 l/h 4 x 305 l/h	9.47	Roofs 4 x 110 sw	11.57	MGF Bulkhead x 6	14.07	Roofs 2 x crew 1 x 110 sr	16.17	305 bodyside x 5 l/h	18.27				
7.46	Jig Remplates + 4 x 110 roofs	9.56	Roofs 4 x 110 sw	12.05	305 Bodyside l/h x 5	14.16	Empty	16.25	Door 305 x 12 l/h	18.35				
7.54	Doors 12 x 803 l/h	10.04	Doors 8 x 803 l/h 4 x 803 r/h	12.14	Roofs 3 x 110 ht 1 x 110 sw	14.24	Empty	16.34	Jig Remplate	18.44				
8.03	Jig Remplates + 4 x 110 roofs + 1 crew cab	10.13	10 x 305 bodyside r/h	12.23	803 x l/h bodyside x 5	14.33	Roofs 2 x crew 2 x 90 ht	16.43	Jig Remplate	18.53				
8.12	Roofs 3 x 110 sw	10.22	5 x 305 bodyside l/h	12.32	Roofs 4 x 110 ht	14.42	Door inners x 6	16.51		19.01				
8.20	24 x MGF fenders	10.30	5 x 305 bodyside r/h	12.40	Roofs 3 x 110 ht	14.50	305 bodyside x 3 l/h	17.00						
8.29	24 x MGF fenders	10.39	Roofs 2 x 110 sw 2 x crew	12.49	Jig Remplates	14.59	Empty	17.09						
8.38	Empty	10.48	Doors 12 x 803 r/h	12.58	Jig Remplates	15.07	Empty	17.17						
8.46	23 x MGF fenders	10.56	Roofs 1 x 110 sw 2 x crew	12.05	Empty	15.15	305 bodyside x 5 l/h	17.26						
8.55	Roofs 2 x 110 sw 2 x crew	11.05	10 x 803 bodyside l/h	13.15	Doors 305 x 12 l/h	15.25	Roofs 1 x 110 sr 3 x 90 ht	17.35						
9.04	Empty	11.14	6 x 803 bonnets	13.24	Roofs 4 x 110 sr	15.33	305 bodyside x 5 r/h	17.43						
9.12	803 window screen x 4	11.22	6 x 803 bonnets	13.32	Tonneau x 15	15.42	Empty	17.52						

3. Sampling Location

Sample ports were located on the exit flue of the Contrapol Incinerator.

4. Test Programme

Emissions of gaseous species were monitored from the exit of the Contrapol Incinerator on 26 August 2004. The boiler was monitored for a period of 5 hours. Gaseous samples were taken at points indicated by Mayflower Vehicle Systems personnel. Gas samples were taken using a "Testoterm" combustion efficiency analyser and gas conditioning unit.

The gaseous constituents for which the flue gases were analysed.

Oxides of Nitrogen	(combined NO & NO_2)
Oxygen	(O_2)
Carbon Monoxide	(CO)

Sampling equipment reference C022 – Testoterm

5. Plant Emissions

All results are corrected to 0°C (273K) and 1013mbar (101.3 kPa)

6. Results

Date of Sampling: 29 November 2005

Location	Pollutant	Test No.	Concentration mg/Nm³	Mean Concentration mg/Nm³	Emission Rate kg/hr	Mean Emission Rate kg/hr
Contrapol Incinerator	Oxygen	1	20.7%	20.7%		
Contrapol Incinerator	Carbon Monoxide	1	31.6	31.6		
Contrapol Incinerator	Oxides of Nitrogen	1	32.7	32.7		

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

7. Appendix 1
(Logged Values)

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon	Carbon	Nitric	Nitrogen	Oxides of
29/11/05			Monoxide	Monoxide	Oxide	Dioxide	Nitrogen (NO2)
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
Mean Value (10:00-10:59)	158.1	20.7	26	33	7	3	20
Mean Value (11:00-11:59)	160.8	20.7	29	36	13	2	30
Mean Value (12:00-12:59)	162.8	20.7	31	39	16	2	37
Mean Value (13:00-13:59)	149.5	20.7	22	28	16	2	38
Mean Value (14:00-14:59)	146.1	20.7	18	22	17	2	39
Max Test Result	162.8	20.7	31.0	38.8	16.7	2.5	38.7
Min Test Result	146.1	20.7	17.7	22.2	7.3	2.0	20.0
Mean Test Result	155.5	20.7	25.2	31.6	13.8	2.1	32.7

Results correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Dry	Dry

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon	Carbon	Nitric	Nitrogen	Oxides of
29/11/2005			Monoxide	Monoxide	Oxide	Dioxide	Nitrogen (NO2)
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
10:00:32	155.6	20.6	20	25	5	2	14
10:01:32	154.9	20.7	19	24	5	2	14
10:02:32	153.7	20.7	19	24	5	2	14
10:03:32	153.2	20.7	19	24	5	2	14
10:04:32	153.7	20.7	21	26	5	2	14
10:05:32	154.1	20.7	22	28	5	2	14
10:06:32	154.4	20.7	22	28	5	2	14
10:07:32	155.1	20.7	24	30	5	2	14
10:08:32	156.2	20.7	24	30	5	2	14
10:09:32	156.3	20.7	24	30	5	2	14
10:10:32	156.2	20.7	24	30	6	2	16
10:11:32	155.8	20.7	22	28	6	2	16
10:12:32	156.0	20.7	21	26	6	2	16
10:13:32	156.0	20.7	20	25	6	2	16
10:14:32	156.8	20.7	19	24	6	3	18
10:15:32	157.3	20.7	18	23	6	3	18
10:16:32	157.9	20.7	18	23	6	2	16
10:17:32	158.4	20.7	18	23	6	3	18
10:18:32	157.4	20.7	18	23	6	3	18
10:19:32	157.1	20.7	19	24	6	3	18
10:20:32	156.7	20.7	20	25	6	3	18
10:21:32	157.4	20.7	22	28	6	3	18
10:22:32	158.4	20.7	23	29	6	3	18
10:23:32	159.3	20.7	25	31	6	3	18
10:24:32	159.8	20.7	24	30	7	3	21
10:25:32	159.1	20.7	23	29	7	3	21
10:26:32	159.0	20.7	23	29	7	3	21
10:27:32	159.4	20.7	24	30	7	2	18
10:28:32	159.0	20.7	24	30	7	3	21
10:29:32	158.7	20.7	27	34	7	3	21
10:30:32	159.4	20.7	29	36	8	3	23
10:31:32	160.1	20.7	31	39	7	3	21
10:32:32	160.3	20.7	34	43	8	3	23
10:33:32	160.8	20.7	35	44	8	3	23
10:34:32	161.3	20.7	34	43	8	3	23
10:35:32	161.7	20.7	32	40	8	3	23
10:36:32	160.5	20.7	30	38	8	3	23
10:37:32	158.7	20.7	29	36	8	3	23
10:38:32	159.1	20.7	29	36	8	2	21
10:39:32	159.2	20.7	29	36	8	2	21
10:40:32	159.4	20.7	29	36	8	3	23
10:41:32	158.8	20.7	28	35	8	3	23
10:42:32	159.5	20.7	27	34	8	2	21
10:43:32	158.9	20.7	27	34	8	3	23
10:44:32	158.6	20.7	28	35	9	2	23
10:45:32	159.6	20.7	28	35	9	2	23
10:46:32	160.0	20.7	27	34	9	2	23
10:47:32	159.3	20.7	27	34	9	2	23
10:48:32	160.3	20.7	27	34	9	2	23
10:49:32	158.7	20.7	28	35	9	3	25
10:50:32	157.8	20.7	31	39	9	3	25
10:51:32	157.0	20.7	32	40	9	2	23
10:52:32	157.0	20.7	34	43	9	3	25
10:53:32	157.9	20.7	36	45	9	3	25
10:54:32	159.4	20.7	37	46	9	3	25
10:55:32	160.0	20.7	36	45	9	2	23
10:56:32	159.6	20.7	36	45	10	3	27
10:57:32	159.8	20.7	34	43	10	2	25
10:58:32	159.8	20.7	32	40	10	2	25
10:59:32	159.0	20.7	33	41	10	2	25
Max Test Result	**161.7**	**20.7**	**37.0**	**46.3**	**10.0**	**3.0**	**26.7**
Min Test Result	**153.2**	**20.6**	**18.0**	**22.5**	**5.0**	**2.0**	**14.4**
Mean Test Result	**158.1**	**20.7**	**26.3**	**32.8**	**7.3**	**2.5**	**20.0**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon	Carbon	Nitric	Nitrogen	Oxides of
29/11/2005			Monoxide	Monoxide	Oxide	Dioxide	Nitrogen (NO2)
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
11:00:32	158.5	20.7	33	41	10	2	25
11:01:32	157.7	20.7	35	44	10	3	27
11:02:31	157.4	20.7	37	46	10	3	27
11:03:32	158.2	20.7	38	48	10	2	25
11:04:32	157.9	20.7	39	49	10	2	25
11:05:31	157.6	20.7	39	49	11	3	29
11:06:32	158.2	20.7	37	46	11	2	27
11:07:31	158.3	20.7	34	43	11	2	27
11:08:31	157.9	20.7	34	43	11	2	27
11:09:32	158.3	20.7	33	41	11	2	27
11:10:31	157.8	20.7	34	43	11	2	27
11:11:31	158.1	20.7	34	43	11	2	27
11:12:31	158.7	20.7	33	41	11	2	27
11:13:31	159.6	20.7	31	39	11	2	27
11:14:31	160.4	20.7	30	38	12	2	29
11:15:31	159.9	20.7	27	34	12	2	29
11:16:31	159.1	20.7	27	34	12	2	29
11:17:31	159.6	20.7	27	34	12	2	29
11:18:31	158.9	20.7	27	34	12	2	29
11:19:31	158.8	20.7	28	35	12	2	29
11:20:31	159.4	20.7	30	38	12	2	29
11:21:31	160.5	20.7	32	40	12	2	29
11:22:31	160.9	20.7	33	41	12	2	29
11:23:31	160.4	20.7	34	43	12	2	29
11:24:31	160.8	20.7	33	41	13	2	31
11:25:31	162.6	20.7	32	40	13	2	31
11:26:31	164.0	20.7	30	38	13	2	31
11:27:31	165.0	20.7	29	36	13	2	31
11:28:31	166.2	20.7	27	34	13	2	31
11:29:31	166.7	20.7	26	33	13	2	31
11:30:31	167.4	20.7	25	31	13	2	31
11:31:31	167.0	20.7	24	30	13	2	31
11:32:31	168.0	20.7	23	29	13	2	31
11:33:31	168.9	20.7	22	28	13	2	31
11:34:31	167.9	20.7	23	29	13	2	31
11:35:31	164.8	20.7	23	29	13	2	31
11:36:31	162.5	20.7	25	31	13	2	31
11:37:31	161.4	20.7	27	34	12	2	29
11:38:31	159.8	20.7	27	34	13	2	31
11:39:31	160.0	20.7	27	34	12	2	29
11:40:31	159.5	20.7	26	33	13	2	31
11:41:31	161.6	20.7	25	31	13	2	31
11:42:31	163.9	20.7	24	30	13	2	31
11:43:31	163.5	20.7	23	29	13	2	31
11:44:31	162.2	20.7	23	29	14	2	33
11:45:31	160.6	20.7	23	29	14	2	33
11:46:31	159.8	20.7	24	30	14	2	33
11:47:31	158.6	20.7	24	30	14	2	33
11:48:31	159.8	20.7	24	30	14	2	33
11:49:31	160.2	20.7	24	30	14	2	33
11:50:31	160.3	20.7	24	30	14	2	33
11:51:31	159.3	20.7	23	29	14	2	33
11:52:31	159.7	20.7	23	29	14	2	33
11:53:31	158.0	20.7	23	29	14	2	33
11:54:31	158.0	20.7	26	33	14	2	33
11:55:31	158.3	20.7	28	35	15	2	35
11:56:31	159.2	20.7	32	40	15	2	35
11:57:31	159.0	20.7	34	43	15	2	35
11:58:31	160.4	20.7	36	45	15	2	35
11:59:31	160.9	20.7	36	45	15	2	35

Max Test Result	**168.9**	**20.7**	**39.0**	**48.8**	**15.0**	**3.0**	**34.9**
Min Test Result	**157.4**	**20.7**	**22.0**	**27.5**	**10.0**	**2.0**	**24.6**
Mean Test Result	**160.8**	**20.7**	**28.9**	**36.1**	**12.6**	**2.1**	**30.0**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon Monoxide	Carbon Monoxide	Nitric Oxide	Nitrogen Dioxide	Oxides of Nitrogen (NO2)
29/11/2005							
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
12:00:31	161.3	20.7	36	45	15	2	35
12:01:31	162.3	20.7	33	41	15	2	35
12:02:31	160.5	20.7	33	41	15	2	35
12:03:31	158.7	20.7	32	40	15	2	35
12:04:31	158.0	20.7	33	41	15	2	35
12:05:31	158.8	20.7	33	41	15	2	35
12:06:31	159.8	20.7	35	44	15	2	35
12:07:31	160.7	20.7	36	45	15	2	35
12:08:31	163.2	20.7	36	45	15	2	35
12:09:31	163.6	20.7	36	45	15	2	35
12:10:31	163.8	20.7	37	46	15	2	35
12:11:31	163.2	20.7	36	45	15	2	35
12:12:31	162.5	20.7	34	43	15	2	35
12:13:31	160.6	20.7	34	43	15	2	35
12:14:31	161.3	20.7	36	45	15	2	35
12:15:31	163.6	20.7	36	45	15	2	35
12:16:31	164.4	20.7	35	44	15	2	35
12:17:31	163.5	20.7	35	44	15	2	35
12:18:31	162.5	20.7	33	41	15	2	35
12:19:31	162.2	20.7	32	40	16	2	37
12:20:31	163.1	20.7	30	38	15	2	35
12:21:31	161.2	20.7	31	39	15	2	35
12:22:31	159.8	20.7	32	40	15	2	35
12:23:31	160.1	20.7	33	41	15	2	35
12:24:31	159.6	20.7	32	40	15	2	35
12:25:31	159.4	20.7	32	40	16	2	37
12:26:31	162.3	20.7	29	36	16	2	37
12:27:31	163.9	20.7	28	35	16	2	37
12:28:31	163.6	20.7	29	36	16	2	37
12:29:31	161.4	20.7	28	35	16	2	37
12:30:31	159.6	20.7	30	38	17	2	39
12:31:31	160.2	20.7	32	40	16	2	37
12:32:31	162.9	20.7	31	39	17	2	39
12:33:31	163.1	20.7	31	39	17	2	39
12:34:31	163.7	20.7	29	36	17	2	39
12:35:31	164.9	20.7	27	34	17	2	39
12:36:31	166.6	20.7	26	33	17	2	39
12:37:31	166.5	20.7	24	30	17	2	39
12:38:31	164.5	20.7	24	30	17	2	39
12:39:31	162.8	20.7	25	31	16	2	37
12:40:31	162.0	20.7	26	33	16	2	37
12:41:31	163.6	20.7	29	36	17	2	39
12:42:31	165.1	20.7	32	40	17	2	39
12:43:31	164.5	20.7	34	43	16	2	37
12:44:31	165.7	20.7	36	45	17	2	39
12:45:31	167.3	20.7	33	41	16	2	37
12:46:31	166.8	20.7	33	41	17	2	39
12:47:31	167.1	20.7	31	39	17	2	39
12:48:31	167.3	20.7	30	38	17	2	39
12:49:31	167.1	20.7	30	38	17	2	39
12:50:31	165.1	20.7	31	39	17	2	39
12:51:31	165.9	20.7	32	40	17	2	39
12:52:31	165.6	20.7	31	39	17	2	39
12:53:31	167.3	20.7	31	39	17	2	39
12:54:31	166.2	20.7	28	35	17	2	39
12:55:31	162.7	20.7	26	33	16	2	37
12:56:31	159.9	20.7	24	30	16	2	37
12:57:31	158.0	20.7	24	30	16	2	37
12:58:31	158.1	20.7	24	30	16	2	37
12:59:31	158.1	20.7	23	29	15	2	35

Max Test Result	**167.3**	**20.7**	**37.0**	**46.3**	**17.0**	**2.0**	**39.0**
Min Test Result	**158.0**	**20.7**	**23.0**	**28.8**	**15.0**	**2.0**	**34.9**
Mean Test Result	**162.8**	**20.7**	**31.0**	**38.8**	**15.9**	**2.0**	**36.7**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon Monoxide	Carbon Monoxide	Nitric Oxide	Nitrogen Dioxide	Oxides of Nitrogen (NO2)
29/11/2005							
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
13:00:31	157.3	20.7	22	28	16	2	37
13:01:31	156.1	20.7	21	26	15	2	35
13:02:31	156.1	20.7	19	24	15	2	35
13:03:31	155.8	20.7	18	23	16	2	37
13:04:31	156.1	20.7	17	21	16	2	37
13:05:31	155.6	20.7	17	21	16	2	37
13:06:31	154.5	20.7	18	23	16	2	37
13:07:31	154.7	20.7	19	24	16	2	37
13:08:31	154.8	20.7	19	24	16	2	37
13:09:31	155.4	20.7	19	24	16	2	37
13:10:31	155.0	20.7	19	24	16	2	37
13:11:31	155.2	20.7	19	24	16	2	37
13:12:31	153.3	20.7	20	25	16	2	37
13:13:31	152.6	20.7	21	26	16	2	37
13:14:31	152.5	20.7	22	28	16	2	37
13:15:31	151.1	20.7	22	28	16	2	37
13:16:31	150.7	20.7	24	30	16	2	37
13:17:31	150.9	20.7	26	33	16	2	37
13:18:31	152.6	20.7	27	34	16	2	37
13:19:31	154.8	20.7	27	34	16	2	37
13:20:31	153.3	20.7	28	35	16	2	37
13:21:31	151.4	20.7	28	35	17	2	39
13:22:31	151.3	20.7	29	36	17	2	39
13:23:31	150.2	20.7	29	36	17	2	39
13:24:31	150.8	20.7	28	35	16	2	37
13:25:31	151.6	20.7	27	34	16	2	37
13:26:31	151.3	20.7	25	31	16	2	37
13:27:31	151.3	20.7	24	30	17	2	39
13:28:31	151.6	20.7	24	30	16	2	37
13:29:31	150.2	20.7	22	28	16	2	37
13:30:31	149.7	20.7	23	29	17	2	39
13:31:31	149.2	20.7	23	29	17	2	39
13:32:31	149.3	20.7	23	29	17	2	39
13:33:31	148.5	20.7	23	29	16	2	37
13:34:31	148.1	20.7	23	29	17	2	39
13:35:31	147.8	20.7	24	30	17	2	39
13:36:31	148.0	20.7	24	30	17	2	39
13:37:31	147.5	20.7	23	29	17	2	39
13:38:31	146.6	20.7	23	29	17	2	39
13:39:31	146.2	20.7	22	28	17	2	39
13:40:31	145.9	20.7	22	28	17	2	39
13:41:31	146.3	20.7	20	25	17	2	39
13:42:31	146.0	20.7	20	25	17	2	39
13:43:31	145.5	20.7	19	24	17	2	39
13:44:31	145.6	20.7	20	25	17	2	39
13:45:31	146.8	20.7	20	25	17	2	39
13:46:31	147.0	20.7	21	26	17	2	39
13:47:31	146.0	20.7	22	28	17	2	39
13:48:31	145.7	20.7	22	28	16	2	37
13:49:31	145.0	20.7	21	26	16	2	37
13:50:31	144.8	20.7	23	29	16	2	37
13:51:31	143.9	20.7	23	29	17	2	39
13:52:31	144.4	20.7	23	29	17	2	39
13:53:31	143.3	20.7	22	28	17	2	39
13:54:31	143.4	20.7	22	28	17	2	39
13:55:31	141.3	20.7	23	29	17	2	39
13:56:31	142.0	20.7	22	28	17	2	39
13:57:31	143.2	20.7	21	26	17	2	39
13:58:31	143.6	20.7	21	26	17	2	39
13:59:31	143.8	20.7	21	26	17	2	39

Max Test Result	**157.3**	**20.7**	**29.0**	**36.3**	**17.0**	**2.0**	**39.0**
Min Test Result	**141.3**	**20.7**	**17.0**	**21.3**	**15.0**	**2.0**	**34.9**
Mean Test Result	**149.5**	**20.7**	**22.3**	**27.9**	**16.5**	**2.0**	**37.9**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

Site : STADCO Coventry
Date : 29 November 2005
Plant : Contrapol Incinerator
File Ref. 3901

Date	Temp	Oxygen	Carbon	Carbon	Nitric	Nitrogen	Oxides of
29/11/2005			Monoxide	Monoxide	Oxide	Dioxide	Nitrogen (NO2)
Time	°C	%	ppm	mg/m³	ppm	ppm	mg/m³
14:00:31	143.9	20.7	21	26	17	2	39
14:01:31	145.0	20.7	19	24	17	2	39
14:02:31	145.2	20.7	20	25	17	2	39
14:03:31	145.1	20.7	19	24	17	2	39
14:04:31	144.7	20.7	18	23	17	2	39
14:05:31	144.7	20.7	21	26	17	2	39
14:06:31	143.6	20.7	22	28	17	2	39
14:07:31	143.7	20.7	21	26	17	2	39
14:08:31	144.8	20.7	22	28	17	2	39
14:09:31	145.6	20.7	21	26	17	2	39
14:10:31	145.6	20.7	20	25	17	2	39
14:11:31	146.7	20.7	19	24	17	2	39
14:12:31	146.6	20.7	19	24	17	2	39
14:13:31	145.6	20.7	18	23	17	2	39
14:14:31	145.6	20.7	17	21	17	2	39
14:15:31	145.7	20.7	16	20	17	2	39
14:16:31	146.0	20.7	17	21	16	2	37
14:17:31	146.6	20.7	18	23	16	2	37
14:18:31	147.3	20.7	18	23	16	2	37
14:19:31	146.4	20.7	18	23	17	2	39
14:20:31	147.6	20.7	19	24	16	2	37
14:22:31	148.3	20.7	19	24	17	2	39
14:23:31	147.5	20.7	20	25	16	2	37
14:24:31	145.3	20.7	19	24	16	2	37
14:25:31	145.6	20.7	19	24	17	2	39
14:26:31	145.2	20.7	18	23	16	2	37
14:27:31	146.1	20.7	18	23	16	2	37
14:28:31	146.5	20.7	17	21	16	2	37
14:29:31	146.7	20.7	17	21	16	2	37
14:30:31	147.3	20.7	16	20	16	2	37
14:31:31	147.5	20.7	16	20	16	2	37
14:32:31	147.5	20.7	16	20	17	2	39
14:33:31	146.5	20.7	16	20	16	2	37
14:34:31	145.1	20.7	14	18	17	2	39
14:35:31	144.3	20.7	14	18	17	2	39
14:36:31	144.3	20.7	15	19	17	2	39
14:37:31	145.7	20.7	16	20	16	2	37
14:38:31	145.8	20.7	16	20	17	2	39
14:39:31	145.7	20.7	16	20	17	2	39
14:40:31	146.2	20.7	16	20	17	2	39
14:41:31	146.8	20.7	15	19	17	2	39
14:42:31	146.6	20.7	14	18	17	2	39
14:43:31	146.1	20.7	14	18	18	2	41
14:44:31	146.0	20.7	13	16	18	2	41
14:45:31	145.8	20.7	13	16	17	2	39
14:46:31	146.3	20.7	14	18	17	3	41
14:47:31	146.9	20.7	16	20	17	3	41
14:48:31	147.5	20.7	17	21	17	2	39
14:49:31	147.7	20.7	18	23	17	3	41
14:50:31	148.5	20.7	19	24	17	3	41
14:51:31	147.8	20.7	19	24	17	3	41
14:52:31	146.8	20.7	21	26	17	3	41
14:53:31	146.6	20.7	21	26	16	2	37
14:54:31	146.5	20.7	20	25	17	2	39
14:55:31	146.3	20.7	19	24	16	3	39
14:56:31	145.6	20.7	18	23	17	3	41
14:57:31	146.9	20.7	18	23	16	2	37
14:58:31	146.9	20.7	18	23	16	3	39
14:59:31	147.5	20.7	18	23	17	3	41

Max Test Result	**148.5**	**20.7**	**22.0**	**27.5**	**18.0**	**3.0**	**41.0**
Min Test Result	**143.6**	**20.7**	**13.0**	**16.3**	**16.0**	**2.0**	**36.9**
Mean Test Result	**146.1**	**20.7**	**17.7**	**22.2**	**16.7**	**2.2**	**38.7**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

8. Appendix 2
(Sampling Methods)

Gaseous Species Determination

The Testo 33 combustion efficiency analyser is a portable self-contained measuring system for flue gas analysis. The analyser contains an integral pumping system, temperature sensor and electro-chemical cells. A gas preparation unit is used for sample gas conditioning.

Long term analysis of flue gases on heating plants generally leads to inaccurate measurement of NO_x and SO_2 due to the formation of condensate below the dew point temperature. Condensate forms in the tubes or filter and absorbs some NO_x and SO_2, hence the values measured are inaccurate. The gas preparation unit employed reduces this absorption to a minimum. The gas path and filters are maintained at a temperature of 150°C until the measuring gas in the gas cooler has been cooled down to the dew point of 3°C to 6°C via a Peitler element. The measuring medium already cleaned and dried, is then analysed in the combustion efficiency analyser.

TESTO 33

Temperature Measurement	
Temperature Range	-40 to + 1200 deg C
Maximum Tolerance	± 0.5 deg C (-40 to +100 deg C)
Draught	
Measuring Range	± 50 mBar
Resolution	0.01 mBar
Oxygen Measurement	
Measuring Range	0 - 21% vol. %
Maximum Tolerance	± 0.2 vol.% of m.v.
Carbon Dioxide Calculation	
Indication Range	0 - CO_2 maximum
Maximum Tolerance	± 0.2 vol. %
Carbon Monoxide Measurement	
Measuring Range	0 to 8000 ppm
Tolerance	± 20 ppm (up to 400 ppm) ± 5% of m.v. (up to 2000 ppm) ± 10% of m.v. (>2000 ppm)
NO Measurement	
Measuring Range	0 to 2000 ppm
Tolerance	± 20 ppm (up to 400 ppm) ±5% of m.v. (>400 ppm)
NO_2 Measurement	
Measuring Range	0 - 100 ppm
Tolerance	± 10 ppm
$S0_2$ Measurement	
Measuring Range	0 - 2000 ppm
Maximum Tolerance	± 20 ppm (up to 400 ppm) ± 5% of m.v. (>400 ppm)

9. Appendix 3
(Calibration Certificates)

CES Environmental Instruments Ltd

GAS ANALYSER CALIBRATION SHEET

Gas Analyser Calibration		Client	STADCO	Date	29/11/2005
Instrument Type	Testo	Job Number	3901	Test	1
Quality No.	C022	Site	Contrapol Incinerator	Test Period	10:00-14:29

Range - Nitrogen (N2)	
Range - Carbon Dioxide (CO2)	
Range - Oxygen (O2)	0-25%
Range - Carbon Monoxide (CO)	2000ppm
Range - Nitric Oxide (NO)	2000ppm
Range - Nitrogen Dioxide (NO2)	
Range - Sulphur Dioxide (SO2)	

Zero Gas - Nitrogen (N_2)	99.990%	Certificate Number:	11431-2
Span Gas 1 - Carbon Dioxide (CO_2)		Certificate Number:	
Span Gas 1 - Oxygen (O_2)		Certificate Number:	
Span Gas 1 - Carbon Monoxide (CO)	248ppm	Certificate Number:	12901-1-1
Span Gas 1 - Nitric Oxide (NO)	350ppm	Certificate Number:	12901-1-1
Span Gas 1 - Nitrogen Dioxide (NO_2)		Certificate Number:	
Span Gas 1 - Sulphur Dioxide (SO_2)		Certificate Number:	

Span Gas 2 - Carbon Dioxide (CO_2)		Certificate Number:	
Span Gas 2 - Oxygen (O_2)		Certificate Number:	
Span Gas 2 - Carbon Monoxide (CO)		Certificate Number:	
Span Gas 2 - Nitric Oxide (NO)	100ppm	Certificate Number:	12901-3-1
Span Gas 2 - Nitrogen Dioxide (NO_2)		Certificate Number:	
Span Gas 2 - Sulphur Dioxide (SO_2)		Certificate Number:	

Pre-Sampling (Test Gas Entered Via Probe)

	CO_2	O_2	CO	NO	NO_2	SO_2
Zero Reading		0	0	0		
Span Gas 1 Reading			249	351		
Span Gas 2 Reading				98		
Ambient Air		20.9	0	0		

Post-Sampling (Test Gas Entered Via Probe)

	CO_2	O_2	CO	NO	NO_2	SO_2
Zero Reading		0	0	1		
Span Gas 1 Reading			247	352		
Span Gas 2 Reading				99		
Ambient Air		20.9	0	1		

STADCO Coventry

Determination of Particulates &
Volatile Organic Compounds
Prototype Plant
Holbrook Lane, Coventry
CV6 4AW

29 November 2005

Prepared by: **CES Environmental Instruments Ltd**
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Report prepared by .....
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Isokinetic Sampling Engineer AEATE 990018
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Report authorised by .....
D.J. Slack
Isokinetic Sampling Engineer AEATE 990019
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Contents

Executive Summary

Operator Company: - STADCO Coventry

Address: - Holbrook Lane, Coventry, CV6 4AW

Monitoring Company: - CES Environmental Instruments Ltd

Address: - Bretby Business Park, Ashby Road, Stanhope, Bretby
Burton on Trent, DE15 0YZ

Analytical Company: - CES Environmental Instruments Ltd

Address: - Bretby Business Park, Ashby Road, Stanhope, Bretby
Burton on Trent, DE15 0YZ

Monitoring Objective
To monitor and quantify particulate emissions and volatile organic compounds to atmosphere from the Prototype Spray Booth Plant located at Mayflower Vehicle Systems, Holbrook Lane, Coventry

Test Team
R. Allen (Team Leader), R. Ward, S. Elton, A. Orme

Deviations from Sampling Method
None

Results
Date of Sampling: 29 November 2005

Location	Pollutant	Test No.	Concentration Mg/Nm³	Mean Concentration mg/Nm³	Emission Rate kg/hr	Mean Emission Rate kg/hr
Prototype Plant	Particulate	1	0.0	0.0	0.000	0.000
Prototype Plant	Particulate	2	0.0		0.000	
Prototype Plant	Particulate	Blank	0.0	0.0		
Prototype Plant	Volatile Organic Compounds	1	12.0	12.0		

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Wet

1. Introduction

STADCO Coventry placed an order with CES Environmental Instruments Ltd, to monitor and quantify particulate emissions and volatile organic compounds to atmosphere from the Prototype Plant located at STADCO Coventry, Holbrook Lane, Coventry. Test work was carried out 29 November 2005, and was undertaken by R. Allen (Team Leader), R. Ward, S. Elton, A. Orme.

2. Plant and Conditions

The Prototype Spray Booth Plant is approximately 10m x 5m x 3m height, and is served by a dry filter system. Air is ducted into the booth and extracted out to atmosphere passing through a charcoal filter unit. Spraying activities are intermittent and are undertaken manually.

On the day spraying consisted of 1off Benjs Van Conversion. The materials used consisted of Primer, Etch Primer and Top Coat. All spraying activities were undertaken within a 45 minute period.

2.1 Materials Used

Prototype Particulates & VOC Monitoring 29/11/05		
Materials Used During Monitoring Exercise		
Manufacturer	**Description**	**Type/ identity number**
Tetrsyl	Etch Primer	GET 005
Tetrsyl	Activator Thinners	GET 006
Debeer	2 pack solid colour	2K Berocryl 400
Debeer	High Solids Hardner	MS 47 - 55
Debeer	High Solids Primer	8.145

Notes
Parts Sprayed - 1 off Benj's Van Conversion

Spraying consisted of :-
One coat of etch primer applied to bare metal
Second coat of high solid primer applied
3rd & 4 th coats of high solid top coat applied

3. Sampling Location

Sampling was undertaken in the vertical duct. The duct was measured to be 600mm x 600mm, giving a cross sectional area of 0.36m^2. There are two 4"BSP sample points. Samples were taken from 4 points on each axis, 8 in total. The sample location is compliant with BS EN 13284-1.

4. Test Programme

Two particulate emissions tests were carried out on each stack. Particulate emission measurements were made using the Erwin Sick "Gravimat SHC5" isokinetic dust sampling system. The method complies with the requirements of BS EN 13284-1 (Determination of low range mass concentration of dust). A detailed description of this method is given in Appendix 3.

Sampling equipment reference C005 – Gravimat SHC-5

Emissions of volatile organic compounds were extracted from the exit of the Prototype Plant and analysed using a FID Analyser. The Prototype Plant was monitored for a period of 60 minutes. Monitoring was undertaken in accordance with the requirements of US EPA Method 25A.

Sampling equipment reference C124 – FID Analyser

The instrument was calibrated at two reference points. Calibration gas was introduced via the probe.

Zero Reference = Ambient Air

Span Reference = 50ppm CH_4

Full sampling methods are given in Appendix 3.

5. Plant Emissions

No emission limits have yet been specified for the Prototype Spray Booth Plant.

All results are corrected to 0°C (273K) and 1013mbar (101.3 kPa)

6. Results

Date of Sampling: 29 November 2005

Location	Pollutant	Test No.	Concentration Mg/Nm³	Mean Concentration mg/Nm³	Emission Rate kg/hr	Mean Emission Rate kg/hr
Prototype Plant	Particulate	1	0.0	0.0	0.000	0.000
Prototype Plant	Particulate	2	0.0		0.000	
Prototype Plant	Particulate	Blank	0.0	0.0		
Prototype Plant	Volatile Organic Compounds	1	12.0	12.0		

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Wet

7. Appendix 1
(Extraction Protocol)

Site : STADCO Coventry
Date : 29 November 2005
Plant : Prototype Plant
File Ref. 3901

Mean Particulate Results

Filter	mg/m³	kg/hr
64131	0.0	0.000
64398	0.0	0.000
Mean	**0.0**	**0.000**

Control Blank Filter

Filter	Volume (m³)
80339	0.330
80336	0.327
Mean	**0.329**

(Reference Conditions with no correction for Oxygen)

Filter 64133

Tare Weight	**18.0675 mg**
Gross Weight	**18.0675 mg**
Gain	**0.0 mg**
Measured Oxygen	**0.0 %**
Concentration	**0.0 mg/Nm³**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Wet

file : 3901PRT1.SMP

29.11.05
12:09-12:33

plant : Prototype
measuring place: Stadco,Coventry
engineer : SE RW AO

remarks :
Normal Operation
Dim = 600*600

constants and parameters :

dyn.pressure	[mbar]	: 994
normal density	[kg/m3]	: 1.3
water vapour	[%Vol]	: 15.0
cross section of the duct	[m2]	: 0.36

results

density	[kg/m3]	: 1.200
volume flow act.	[m3/h]	: 9866
volume flow norm wet	[m3/h]	: 9104
volume flow norm dry	[m3/h]	: 7739

file : 3901PRT1.SMP dust probe : 64131 29.11.05
12:09-12:33

measured values and calculations

axis	depth	p_duct [mbar]	p_dyn [mbar]	T [°C]	v_duct [m/s]	angle [°]
1	1	2.5	0.44	18.0	8.5	-1.3
1	2	2.4	0.36	17.9	7.8	0.9
1	3	2.5	0.39	17.8	8.0	0.0
1	4	2.4	0.32	17.7	7.3	0.9
1	5	2.4	0.36	17.6	7.7	-1.7
1	6	2.4	0.35	17.5	7.6	0.4
1	7	2.4	0.36	17.4	7.7	-0.0
1	8	2.4	0.35	17.3	7.6	-1.1
1	9	2.4	0.37	17.2	7.8	0.6
1	10	2.4	0.35	17.1	7.6	0.4
2	1	2.4	0.33	17.0	7.4	1.2
2	2	2.4	0.35	17.1	7.6	0.1
2	3	2.4	0.33	17.4	7.3	-0.3
2	4	2.4	0.33	18.0	7.4	1.7
2	5	2.4	0.34	18.5	7.5	0.0
2	6	2.4	0.33	18.8	7.4	1.0
2	7	2.4	0.36	19.0	7.7	-0.5
2	8	2.4	0.34	19.2	7.5	-0.8
2	9	2.4	0.33	19.2	7.4	-0.0
2	10	2.4	0.34	19.1	7.5	0.2
mean :		2.4		17.9	7.6	

dust concentration measurement **ERWIN SICK Optic Electronic**
protocol of isokinetic extraction measurement

---

file : 3901PRT1.SMP dust probe : 64131 29.11.05
12:09-12:33

plant : Prototype
measuring place: Stadco,Coventry
engineer : SE RW AO

remarks :
Normal Operation
Dim = 600*600

constants and parameters :

dyn.pressure	[mbar]	: 994
normal density	[kg/m3]	: 1.3
water vapour	[%Vol]	: 15.0
cross section of the duct	[m2]	: 0.36
diameter of nozzle	[mm]	: 6.4
extraction/point	[h:m:s]	: 00:03:00
tare weight of probe	[mg]	: 18722.1
gross weight of probe	[mg]	: 18722.1

results

volume flow	[m3/h]	: 0.896
extracted vol. act.	[m3]	: 0.359
extracted vol. norm. hum.	[m3]	: 0.330
extracted vol. norm. dry	[m3]	: 0.281
volume flow act.	[m3/h]	: 9989.1
volume flow norm wet	[m3/h]	: 9199.5
volume flow norm dry	[m3/h]	: 7819.6
total extraction time	[h:m:s]	: 00:24:00
dust weight	[mg]	: 0.0
dust conc. act.	[mg/m3]	: 0.0
dust conc. norm. wet	[mg/m3]	: 0.0
dust conc. norm dry	[mg/m3]	: 0.0
particulate flow rate	[kg/h]	: 0.000
extinction	[mA]	: 0.00

dust concentration measurement **ERWIN SICK Optic Electronic**
protocol of isokinetic extraction measurement

file : 3901PRT1.SMP dust probe : 64131 29.11.05
12:09-12:33

a	d	p_duct [mbar]	p_dyn [mbar]	T [°C]	v_duct [m/s]	p_orif [mbar]	p_prob [mbar]	I_cal [mA]	q [m3/h]	angle [°]
1	1	2.4	0.36	17.3	7.7	1.83	-40	0.00	0.89	0.4
1	2	2.4	0.35	18.7	7.7	1.80	-39	0.00	0.89	0.9
1	3	2.4	0.36	18.3	7.8	1.90	-41	0.00	0.91	0.8
1	4	2.4	0.36	18.3	7.7	1.85	-40	0.00	0.90	0.8
2	1	2.4	0.36	19.2	7.8	1.80	-39	0.00	0.89	0.5
2	2	2.4	0.35	18.3	7.7	1.84	-39	0.00	0.90	0.1
2	3	2.4	0.35	19.7	7.6	1.80	-39	0.00	0.89	1.0
2	4	2.5	0.36	18.5	7.7	1.87	-39	0.00	0.90	0.3
mean :		2.4		18.5	7.7			0.00	0.90	

file : 3901PRT2.SMP dust probe : 64398 29.11.05
12:36-13:00

plant : Prototype
measuring place: Stadco,Coventry
engineer : SE RW AO

remarks :
Normal Operation
Dim = 600*600

constants and parameters :

dyn.pressure	[mbar]	: 994
normal density	[kg/m3]	: 1.3
water vapour	[%Vol]	: 15.0
cross section of the duct	[m2]	: 0.36
diameter of nozzle	[mm]	: 6.4
extraction/point	[h:m:s]	: 00:03:00
tare weight of probe	[mg]	: 17075.1
gross weight of probe	[mg]	: 17075.1

results

volume flow	[m3/h]	: 0.891
extracted vol. act.	[m3]	: 0.356
extracted vol. norm. hum.	[m3]	: 0.327
extracted vol. norm. dry	[m3]	: 0.278
volume flow act.	[m3/h]	: 9940.4
volume flow norm wet	[m3/h]	: 9127.0
volume flow norm dry	[m3/h]	: 7757.9
total extraction time	[h:m:s]	: 00:24:00
dust weight	[mg]	: 0.0
dust conc. act.	[mg/m3]	: 0.0
dust conc. norm. wet	[mg/m3]	: 0.0
dust conc. norm dry	[mg/m3]	: 0.0
particulate flow rate	[kg/h]	: 0.000
extinction	[mA]	: 0.00

file : 3901PRT2.SMP dust probe : 64398 29.11.05
12:36-13:00

a	d	p_duct [mbar]	p_dyn [mbar]	T [°C]	v_duct [m/s]	p_orif [mbar]	p_prob [mbar]	I_cal [mA]	q [m3/h]	angle [°]
1	1	2.4	0.35	18.4	7.6	1.77	-34	0.00	0.88	2.2
1	2	2.4	0.35	19.8	7.6	1.77	-34	0.00	0.89	2.5
1	3	2.4	0.36	19.1	7.7	1.82	-34	0.00	0.89	2.2
1	4	2.4	0.36	19.7	7.7	1.80	-34	0.00	0.89	2.2
2	1	2.4	0.36	19.3	7.7	1.77	-33	0.00	0.88	2.1
2	2	2.4	0.35	19.7	7.6	1.81	-34	0.00	0.90	2.3
2	3	2.4	0.35	19.3	7.6	1.80	-34	0.00	0.89	2.5
2	4	2.4	0.35	20.0	7.7	1.82	-34	0.00	0.90	2.0
mean :		2.4		19.4	7.7			0.00	0.89	

8. Appendix 2
(Logged Values)

Site: STADCO Coventry
Date : 29 November 2005
Plant : Prototype Spray Booth
File Ref. 3901

Date	Time	Total VOC"s ppm	VOC's Expressed as Carbon mg/m³
29/11/2005	13:35:00	0.00	0.00
29/11/2005	13:36:00	0.00	0.00
29/11/2005	13:37:00	0.00	0.00
29/11/2005	13:38:00	23.63	12.66
29/11/2005	13:39:00	18.19	9.74
29/11/2005	13:40:00	20.88	11.18
29/11/2005	13:41:00	28.63	15.33
29/11/2005	13:42:00	30.69	16.44
29/11/2005	13:43:00	26.56	14.23
29/11/2005	13:44:00	31.69	16.98
29/11/2005	13:45:00	21.25	11.38
29/11/2005	13:46:00	17.81	9.54
29/11/2005	13:47:00	17.88	9.58
29/11/2005	13:48:00	16.56	8.87
29/11/2005	13:49:00	18.94	10.15
29/11/2005	13:50:00	15.75	8.44
29/11/2005	13:51:00	14.06	7.53
29/11/2005	13:52:00	12.81	6.86
29/11/2005	13:53:00	33.31	17.85
29/11/2005	13:54:00	32.38	17.34
29/11/2005	13:55:00	31.50	16.88
29/11/2005	13:56:00	29.00	15.54
29/11/2005	13:57:00	28.06	15.03
29/11/2005	13:58:00	28.75	15.40
29/11/2005	13:59:00	21.88	11.72
29/11/2005	14:00:00	22.75	12.19
29/11/2005	14:01:00	30.38	16.27
29/11/2005	14:02:00	27.25	14.60
29/11/2005	14:03:00	20.19	10.81
29/11/2005	14:04:00	20.25	10.85
29/11/2005	14:05:00	15.63	8.4
29/11/2005	14:06:00	11.81	6.3
29/11/2005	14:07:00	28.38	15.2
29/11/2005	14:08:00	38.44	20.6
29/11/2005	14:09:00	34.31	18.4
29/11/2005	14:10:00	35.88	19.2
29/11/2005	14:11:00	36.13	19.4
29/11/2005	14:12:00	32.56	17.4
29/11/2005	14:13:00	19.75	10.6
29/11/2005	14:14:00	25.50	13.7
29/11/2005	14:15:00	31.38	16.8
29/11/2005	14:16:00	28.38	15.2
29/11/2005	14:17:00	26.44	14.2
29/11/2005	14:18:00	15.88	8.5
29/11/2005	14:19:00	12.19	6.5
29/11/2005	14:20:00	12.06	6.5
29/11/2005	14:21:00	12.31	6.6
29/11/2005	14:22:00	12.44	6.7
29/11/2005	14:23:00	13.50	7.2
29/11/2005	14:24:00	12.19	6.5
29/11/2005	14:25:00	30.25	16.2
29/11/2005	14:26:00	34.19	18.3
29/11/2005	14:27:00	31.13	16.7
29/11/2005	14:28:00	29.38	15.7
29/11/2005	14:29:00	29.88	16.0
29/11/2005	14:30:00	29.19	15.6
29/11/2005	14:31:00	22.94	12.3
29/11/2005	14:32:00	20.00	10.7
29/11/2005	14:33:00	17.69	9.5
29/11/2005	14:34:00	0.00	0.0

	Total VOC's	VOC's Expressed as Carbon
	22.3 ppm	**12.0 mg/m³**
Oxygen Value	**%**	
Normalised Result Expressed as Carbon		**12.0 mg/m³**

Results Correct to

Temperature		Pressure		Oxygen		Gas	
°C/K	0/273	mbar/kPa	1013/101.3	%		Wet/Dry	Dry

9. Appendix 3
(Sampling Methods)

Erwin Sick Sampling Train

Extractive dust measurements were made using the Erwin Sick "Gravimat SHC-5" isokinetic dust sampling system. The equipment uses a stainless steel probe which combines a sampling nozzle and filter, 3 pitot pressure inlets and a thermocouple. Real time velocity, turbidity and temperature measurements are provided for the control processor to modulate the pump speed and continuously ensure isokinetic conditions are maintained.

The Gravimat SHC-5 portable dust concentration measuring system operates on the gravimetric measuring principle as required by BS 3405 and BS 6069. The dust-laden gas is isokinetically extracted by a scavenging probe. A special filter retains the dust. The dust content is determined by differential weighing of the dust collectors together with the filters. This avoids the dust losses which are inevitable when the filters are removed. The dust concentration in mg/m^3 can then be calculated from the relationship between the dust weight and the volume of gas extracted.

The Gravimat SHC-5 gravimetric dust concentration measuring system comprises the following components:

* GS 5 filter head probe with accessories
* SHC-AE control unit
* Evaluation computer (laptop) with SMP5 measuring and evaluation software
* SHC-PS power supply unit
* SHC-TU transport unit, optional.

The SHC-AE control unit performs the isokinetic control that is necessary for precise measurements. It is connected to the multi-chamber hose and the thermocouple of the GS 5 probe as well as to the evaluation computer. All the measured data is automatically collected and recorded together with the extraction measurements time, relieving the operator of control and recording duties during the monitoring process. The operator is simply required to move the probe to the next measurement point at a signal from the control unit.

Before testing all recommended system checks and leak tests were carried out. The filters were assembled and then dried in an oven at 180°C, cooled in a desiccator and then weighed on a 0.1mg resolution balance. After testing the filters were weighed in a similar fashion with the oven set at a temperature of 160°C.

Features:

* Considerably improved measuring accuracy through the newly developed GS 5 filter head probe.
* The probe can be used for both high (several g/m^3) and very low dust concentrations (less than 1 mg/m^3)
* Fully automatic detection and storage of all relevant measured values during extraction of the sample.
* Fully automatic isokinetic control precludes operator error and increases the accuracy of the measurement.
* Automatic logging of all measurements - only the weight of the dust collector and plant-specific comments have to be entered manually.

Volatile Organic Compounds

The Signal Mode 3030PM Portable Heated Hydrocarbon Analyser is based on the Flame Ionisation Detector (FID). The flame ionisation detector works by ionising the sample gas using combustion in a hydrogen flame. Ions produced in this process are collected at a polarized electrode outside the combustion zone. The polarizing voltage across the detector must be high enough to stop any recombination of the electrons and positive ions produced in the flame.

When the sample gas is composed of gases of different carbon number, the detector will respond to the number of carbon atoms present.

An important characteristic of the flame ionisation detector is the variation in detector response with changes in oxygen concentration in the sample gas. This effect is normally only found in the analysis of combustion gases. It requires a special fuel consisting of 40% hydrogen and 60% helium mix. To compensate for the lower concentration of hydrogen, an analyser using a hydrogen/helium mix requires a greater (x3) fuel flow. Each analyser is built to be used with a specific fuel option. A 100% hydrogen fuel is used for applications rich in oxygen.

In order to give a stable signal, the FID requires a supply of clean, hydrocarbon-free air. As an aid to portability, the analyser air is supplied from a built-in pump. As there is a possibility of the ambient air being contaminated with hydrocarbons, it is passed over an internal platinum catalyst on an alumina substrate at high temperature. Air passed through the catalytic air purifier is also used as zero gas during calibration.

10. Appendix 4
(Calibration Certificates)

Certificate of Calibration

Date of Issue: 27 June 2005

CES Environmental Instruments Ltd
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel: 01283 216334 Fax: 01283 550939

[redacted]
Certified By

Instrument Details

Instrument Type	Gravimat SHC-5
Instrument Make	Erwin Sick
Instrument Serial No.	94015142
Quality No.	C005
Calibration Date	20/06/2005
Calibrated By Name	R. Allen

Ambient Conditions

Air Temperature (°C)	25	**
Barometric Pressure (mbar)	1008	
Relative Humidity (%)	57	**

Instruments used to undertake calibration

E Type Pitot	UKAS Certificate No. N8731/05	(Qu. No. C136)
Manometer Type FC012	UKAS Certificate No. 01799	(Qu. No. C082)
Manometer Type FC012	UKAS Certificate No. 01798	(Qu. No. C081)
Barometer Type 104	UKAS Certificate No. N1136252V	(Qu. No. C138)
Gallus Dry Gas Meter	UKAS Certificate No. N2054787F	(Qu. No. C125)
RIS Supersal XT	UKAS Certificate No. N2054798E	(Qu. No. C014)

* Not UKAS traceable ** Indication only

Flow and Extraction

The reference pitot was placed in a wind tunnel located at Bretby Business Park. The Gravimat SHC-5 Sampling Probe under test was mounted within the same wind tunnel in close proximity to the reference pitot. The wind tunnel was operated to generate a differential pressure across each pitot, a direct comparison was made. The differential pressures measured were in the region of the calibration points of the reference pitot. Correction factors were applied to the reference pitot and compared to the differential pressure shown for the pitot under test. The extraction system of the unit was operated for a period of one minute.

Volume Flow

A calibrated dry gas meter was connected to the sampling nozzel ot the Gravimat SCH-5. A volume of air is pulled through the sampling system. The measured value shown on the calibrated dry gas meter is then compared to the indicated value on the Gravimat SCH-5 display.

Barometric Pressure

The barometric pressure was measured using a calibrated barometer. The indicated pressure was compared to the Gravimat SHC-5 display.

Temperature

The probe thermocouple was placed in a thermpcouple oven and heated. The temperature was measured using a calibrated thermocouple and temperature indicator. The resultant temperature was compared to the Gravimat SCH-5 display.

Current

A mA current source was injected into the Gravimat SCH-5 using a mA current generator. The injected current was compared to the Gravimat SCH-5 display.

Certificate of Calibration

Date of Issue: 27 June 2005

CES Environmental Instruments Ltd
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel: 01283 216334 Fax: 01283 550939

[redacted]
Certified By

Instrument Details

Instrument Type	Gravimat SHC-5
Instrument Make	Erwin Sick
Instrument Serial No.	94015142
Quality No.	C005
Calibration Date	20/06/2005

Ambient Conditions

Air Temperature (°C)	25	**
Barometric Pressure (mbar)	1008	
Relative Humidity (%)	57	**
Air Density @ 0°C (kg/m³)	1.2770	
Corrected Air Density (kg/m³)	1.1641	

Calibration Details

Flow and Extraction

Applied Pressure (Pa)	Pitot Correction	Applied Pressure Corrected (Pa)	SHC5 p-dyn (Pa)	Pressure Factor	Calculated Velocity (m/s)	SHC5 Velocity (m/s)	Velocity Factor	Nozzel Diameter (mm)	Calculated Extraction (m³/hr)	SHC5 Extraction (m³/hr)	Extraction Factor
3.4	0.985	3.3	3.7	0.91	2.399	2.458	0.98	10.0	0.678	0.684	0.99
44.2	0.998	44.1	43.1	1.02	8.706	8.699	1.00	8.0	1.576	1.556	1.01
96.4	1.000	96.4	95.3	1.01	12.869	12.678	1.02	6.4	1.491	1.504	0.99
164.0	1.001	164.2	163.4	1.00	16.794	16.756	1.00	6.4	1.946	1.902	1.02
217.0	0.999	216.8	214.8	1.01	19.299	19.324	1.00	5.2	1.476	1.487	0.99
Mean (excluding 3.5Pa)				1.01			1.00				1.00

Volume Flow

Nominal Flow Rate	Actual Flow Rate	Actual Flow Rate	Orifice Constant
l/min	l/min	m³/hr	
15.00	15.167	0.910	14.14
20.00	20.867	1.252	14.40
25.00	25.517	1.531	14.55
30.00	29.950	1.797	14.60
		Instrument Orifice Constant(@1.5m³/hr) =	14.55

Barometric Pressure

Pressure	
Required Value (mbar)	Indicated Value (mbar)
1010.0	1010.0
1008.0	1009.0
1004.0	1005.0

Temperature

Temperature Input	
Required Value (°C)	Indicated Value (°C)
25.0	25.0
50.0	50.0
100.0	100.0
150.0	150.3
250.0	250.1
300.0	299.8

Current

Current Value	
Required Value (mA)	Indicated Value (mA)
0.0	0.0
5.0	5.0
10.0	10.0
15.0	15.0
20.0	20.0

Time

Time Period mins	Required Value mins	Within Limit
3:00	2:59 → 3:01	Yes
5:00	4:59 → 5:01	Yes
10:00	9:59 → 10:01	Yes