UKAS TESTING
2082N

EMISSION MONITORING OF THE 4 No. CREMATORS AT COVENTRY CREMATORIUM

AT COVENTRY CREMATORIUM

Prepared for:

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Issued : June 2004
Reference : r70389

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4. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.1, Test 1 between 12:35 & 13:30 on 27th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

5. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.1, Test 2 between 14:17 & 15:29 on 27th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

6. Flue gas parameters at Coventry Crematorium, Cremator No.2 on 27th & 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

7. Level of particulate at Coventry Crematorium, Cremator No.2 on 27th & 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

8. Levels of hydrogen chloride at Coventry Crematorium, Cremator No.2 on 27th & 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

9. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.2, Test 1 between 16:19 & 17:19 on 27th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

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11. Flue gas parameters at Coventry Crematorium, Cremator No.3 on 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

12. Level of particulate at Coventry Crematorium, Cremator No.3 on 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

13. Levels of hydrogen chloride at Coventry Crematorium, Cremator No.3 on 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

14. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.3, Test 1 between 12:08 & 13:28 on 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

15. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.3, Test 2 between 13:50 & 15:08 on 28th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

16. Flue gas parameters at Coventry Crematorium, Cremator No.4 on 29th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

17. Level of particulate at Coventry Crematorium, Cremator No.4 on 29th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

18. Levels of hydrogen chloride at Coventry Crematorium, Cremator No.4 on 29th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

19. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.4, Test 1 between 12:06 & 13:30 on 29th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

20. Minute averaged gaseous emissions data from Coventry Crematorium, Cremator No.4, Test 2 between 14:25 & 15:39 on 29th April 2004. Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas.

APPENDICES

1. US EPA Method 5 (Andersen) Test Sheets and Moisture Test Sheets

2. Data presented at 273K, 101.3kPa, without correction for oxygen or moisture.

3. Calculations

EXECUTIVE SUMMARY

Sampling for volatile organic compounds, carbon monoxide, oxygen, moisture, particulate and hydrogen chloride was undertaken at Coventry Crematorium on Cremator Nos. 1, 2, 3 and 4 between 27th and 29th April 2004. Monitoring was carried out on a continuous basis (volatile organic compounds, carbon monoxide, oxygen) or extractive basis (moisture, particulate and hydrogen chloride) during each cremation 'cycle'.

A summary of the concentrations recorded for the aforementioned determinands follows (data are presented at 273K, 101.3kPa, 11% oxygen and dry gas, in chronological order).

CREMATOR No.1

DETERMINAND	UNITS	AVERAGE CONCENTRATION	
		Test 1	Test 2
Particulate	mg/Nm^3	108	61
Hydrogen chloride	mg/Nm^3	146	47
Volatile organic compounds	mg/Nm^3	10	5
Carbon monoxide	mg/Nm^3	8	5
Moisture	%	12.7	12.9
Oxygen	%	11.5	11.9
Temperature	°C	761	760
Test duration	mins	95	92
Coffin size	n/a	medium	medium

CREMATOR No.2

DETERMINAND	UNITS	AVERAGE CONCENTRATION	
		Test 3	Test 4
Particulate	mg/Nm^3	188	116
Hydrogen chloride	mg/Nm^3	69	17
Volatile organic compounds	mg/Nm^3	3	3
Carbon monoxide	mg/Nm^3	3	4
Moisture	%	15.1	9.0
Oxygen	%	10.7	8.7
Temperature	°C	811	816
Test duration	mins	65	80
Coffin size	n/a	medium	medium

CREMATOR No.3

DETERMINAND	UNITS	AVERAGE CONCENTRATION	
		Test 5	Test 6
Particulate	mg/Nm^3	159	314
Hydrogen chloride	mg/Nm^3	38	59
Volatile organic compounds	mg/Nm^3	6	17
Carbon monoxide	mg/Nm^3	2	2
Moisture	%	9	9.5
Oxygen	%	11.1	15.0
Temperature	°C	801	809
Test duration	mins	80	83
Coffin size	n/a	medium	medium

CREMATOR No.4

DETERMINAND	UNITS	AVERAGE CONCENTRATION	
		Test 5	**Test 6**
Particulate	mg/Nm^3	406	432
Hydrogen chloride	mg/Nm^3	43	47
Volatile organic compounds	mg/Nm^3	8	9
Carbon monoxide	mg/Nm^3	3	<1
Moisture	%	9.8	12.1
Oxygen	%	10.0	9.5
Temperature	°C	907	944
Test duration	mins	89	75
Coffin size	n/a	large	large

1. INTRODUCTION

1.1 Purpose of Report

1.1.1 Coventry District Council commissioned REC Ltd to carry out continuous monitoring for volatile organic compounds, carbon monoxide and oxygen in the exhaust ducts from Cremator Nos. 1, 2, 3 and 4 at Coventry Crematorium. Additionally, REC Ltd were requested to monitor the same ducts for particulate and hydrogen chloride via an extractive technique. Monitoring for moisture was also conducted.

1.1.2 The monitoring work detailed herein was carried out during the period 27th-29th April 2004.

1.1.3 Sampling was conducted by L Swanson and R Jones, both being permanent employees of REC Ltd. M Smith, REC Ltd Operations Manager, assisted on 27th April 2004.

2. METHODOLOGY ADOPTED FOR MONITORING

2.1 On-line and extractive analyses techniques

SPECIES	TECHNIQUES	CONTINUOUS ANALYSIS	REFERENCE METHOD
VOCs	FID	Yes	US EPA Method 25
Carbon Monoxide	Electrochemical Cell	Yes	US EPA Method 10
Oxygen	Electrochemical Cell	Yes	US EPA Method 3A
Moisture	Gravimetric	No	US EPA Method 4
Hydrogen chloride	ISE	No	EN 1911
Particulate	Gravimetric	No	US EPA Method 5, BS6069:1992

2.2 Limits of detection and accreditation status:

Species	Ukas Accredited for:-		Limit of Detection
	Sampling	Analysis	mg/Nm^3
Moisture	✓	✓	0.1%
Particulates	✓	✓	2
Hydrogen Chloride	-	✓	0.05
Carbon Monoxide	✓	✓	1
Volatile Organics (VOCs)	✓	✓	1
Oxygen	✓	✓	0.1%

2.3 Particulate

2.3.1 Duplicate sampling for particulate was conducted with reference to BS6069:1992 and REC Ltd protocols. The accuracy of particulate measurement using these techniques is normally to ±10% - ±25%. Particulate sampling was conducted through one access port as permitted by PG5/2(95). Very flat flow profiles were obtained during initial velocity traversing on each duct therefore sampling through a single sampling port under these conditions is more likely to result in the accuracy being closer to ±10% and has been applied to particulate concentrations presented herein.

2.4 Hydrogen Chloride

2.4.1 Duplicate sampling for hydrogen chloride was conducted with reference to EN 1911 and REC Ltd protocols. The accuracy of hydrogen chloride measurement using these techniques is to ±20%. Hydrogen chloride sampling was conducted in parallel with the sampling for particulate.

2.5 Volatile organic compounds (VOCs)

2.5.1 Monitoring was carried out using a Signal 3030PM analyser. The Signal 3030PM analyser utilises a flame ionisation detection technique for the analysis of VOCs. The accuracy of measurement using this technique is ±10%.

2.6 Carbon Monoxide (CO)

2.6.1 Monitoring was carried out with the REC Ltd Testo Model 360 multigas analyser. The analyser utilises an electrochemical cell technique for the analysis of CO. The accuracy of measurement using this technique is ±10%.

2.7 Oxygen (O_2)

2.7.1 Monitoring was carried out with the REC Ltd Testo Model 360 multigas analyser. The analyser utilises an electrochemical cell technique for the analysis of O_2. The accuracy of measurement using this technique is ±10%.

2.8 Moisture (H_2O)

2.8.1 Monitoring was carried out in parallel with the particulate and hydrogen chloride sampling utilising a gravimetric technique based on US EPA Method 4 and REC Ltd protocols. The accuracy of measurement using this technique is ±20%.

3. RESULTS AND DISCUSSION

3.1 Between 27th and 29th April 2004, emissions data were collected from four exhaust ducts associated with cremator Nos. 1, 2, 3 and 4 at Coventry Crematorium. The data have been presented at 273K, 101.3kPa, 11% oxygen and dry gas and may be found in Tables 1 - 20 and Figures 1 to 8. Data presented at 273K, 101.3kPa without correction for oxygen or moisture may be found in Tables 1w - 20w and Figures 1w - 8w (Appendix 2).

3.2 Monitoring for all reported determinands was conducted during complete cremations or 'cycles' i.e. sampling commenced approximately two minutes after loading and concluded when the cremation was judged to be completed by the cremator operator but prior to raking out.

CREMATOR No. 1

3.3 Flow

3.3.1 Flow data are presented in Table 1. It can be seen from the data presented that the flue gas flow rates ranged between 899 m^3/hr and 1283 m^3/hr while flue gas temperatures ranged between 761°C and 760°C. It should be noted that the flow data presented in Table 1 are derived from dynamic pressure measurements made at the sampling positions during extractive monitoring.

3.4 Particulate

3.4.1 Particulate concentrations are presented in Table 2. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 108 . mg/Nm^3 and 61mg/Nm^3 respectively ±10%. average ?

3.5 Hydrogen Chloride

3.5.1 Hydrogen chloride concentrations are presented in Table 3. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 146.1 mg/Nm^3 and 47.2 mg/Nm^3 respectively.

3.6 Continuous Emissions Monitoring

3.6.1 Continuous emissions data were recorded using REC Ltd's Testo Model 360 Multigas Analyser and a Signal 3030PM FID analyser, for CO, O_2 and VOCs.

3.6.2 Continuous emissions data were collected during each of two cremation 'cycles' on 27th April 2004 under what were considered to be typical operating conditions. Continuous emissions data collected during each cycle are presented in Tables 4 & 5 and Figures 1 & 2.

3.6.3 Volatile Organic Compounds (VOCs)

3.6.3.1 The concentrations of VOC's during both tests ranged from 3.8 mg/Nm³ to 84 mg/Nm³ in Test 1 and 3 to 18 mg/Nm³ in Test 2. average ck .

3.6.3.2 The average concentrations determined for both tests were 10 mg/Nm³ and 5 mg/Nm³ for Tests 1 and 2 respectively.

3.6.4 Carbon Monoxide (CO)

3.6.4.1 The concentrations of CO were found to range between <1mg/Nm³ and 50 mg/Nm^3 with an overall average concentration of 8 mg/Nm^3 for Test 1. For Test 2 concentrations ranged between 1 mg/Nm³ and 17 mg/Nm^3 with an overall average concentration of 5 mg/Nm^3 .

CREMATOR No. 2

3.7 Flow

3.7.1 Flow data are presented in Table 6. It can be seen from the data presented that the flue gas flow rates ranged between 1204 m³/hr and 1571 Nm^3/hr while flue gas temperatures ranged between 811°C and 816°C. It should be noted that the flow data presented in Table 6 are derived from dynamic pressure measurements made at the sampling positions during extractive monitoring.

3.8 Particulate

3.8.1 Particulate concentrations are presented in Table 7. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 188mg/Nm³ and 116 mg/Nm^3 respectively ±10%.

3.9 Hydrogen Chloride

3.9.1 Hydrogen chloride concentrations are presented in Table 8. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 68.9 mg/Nm^3 and 17.0 mg/Nm^3 for Tests 1 and 2 respectively.

3.10 Continuous Emissions Monitoring

3.10.1 Continuous emissions data were collected during each of two cremation 'cycles' on 27th and 28th April 2004 under what were considered to be typical operating conditions. Continuous emissions data collected during each cycle are presented in Table 9 & 10 and Figures 3 & 4.

3.10.1.1 Volatile Organic Compounds (VOCs)

3.10.1.2 The concentrations of VOCs during Test 1 were found to range from 1 mg/Nm^3 to 11 mg/Nm^3 with an overall average concentration of 3 mg/Nm^3 . The concentrations of VOCs during Test 2 were found to range from 1 mg/Nm^3 to 10 mg/Nm^3 with an overall average concentration of 3 mg/Nm^3.

3.10.2 Carbon Monoxide (CO)

3.10.2.1 The concentrations of CO ranged between 1 mg/Nm^3 and 8 mg/Nm^3 with an overall average concentration of 3 mg/Nm^3 for Test 1. Test 2 levels ranged between <1 and 11 mg/Nm^3 giving an average concentration of 4 mg/Nm^3.

CREMATOR No. 3

3.11 Flow

3.11.1 Flow data are presented in Table 11. It can be seen from the data presented that the flue gas flow rates ranged between 1062 m^3/hr and 586 Nm^3/hr while flue gas temperatures ranged between 801°C and 809°C. It should be noted that the flow data presented in Table 11 are derived from dynamic pressure measurements made at the sampling positions during extractive monitoring.

3.12 Particulate

3.12.1 Particulate concentrations are presented in Table 12. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 159 mg/Nm^3 and 314 mg/Nm^3 for Tests 1 and 2 respectively.

3.13 Hydrogen Chloride

3.13.1 Hydrogen chloride concentrations are presented in Table 13. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 37.5 mg/Nm^3 and 59.2 mg/Nm^3 for Tests 1 and 2 respectively.

3.14 Continuous Emissions Monitoring

3.14.1 Continuous emissions data were collected during each of two cremation 'cycles' on 28th April 2004 under what were considered to be typical operating conditions. Continuous emissions data collected during each cycle are presented in Tables 14 & 15 and Figures 5 & 6.

3.14.2 Volatile Organic Compounds (VOCs)

3.14.2.1 The concentrations of VOCs during Test 1 were found to range from 3 mg/Nm^3 to 17 mg/Nm^3 with an overall average concentration of 6 mg/Nm^3 . The concentrations of VOCs during Test 2 were found to range from 4 mg/Nm^3 to 679 mg/Nm^3 with an overall average concentration of 17 mg/Nm^3 average ck

3.14.3 Carbon Monoxide (CO)

3.14.3.1 The concentrations of CO during Test 1 ranged between <1 mg/Nm^3 and 29 mg/Nm^3 with an overall average concentration of 2 mg/Nm^3 . The concentration during Test 2 ranged from <1 mg/Nm^3 to 22 mg/Nm^3 giving an average concentration of 2 mg/Nm^3.

CREMATOR No. 4

3.15 Flow

3.15.1 Flow data are presented in Table 16. It can be seen from the data presented that the flue gas flow rates ranged between 823 m^3/hr and 771 Nm^3/hr while flue gas temperatures ranged between 907°C and 944°C. It should be noted that the flow data presented in Table 16 are derived from dynamic pressure measurements made at the sampling positions during extractive monitoring.

3.16 Particulate

3.16.1 Particulate concentrations are presented in Table 17. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 406 mg/Nm^3 and 432 mg/Nm^3 for Tests 1 and 2 respectively.

3.17 Hydrogen Chloride

3.17.1 Hydrogen chloride concentrations are presented in Table 18. It can be seen from the data presented that the concentrations determined for the duplicate tests conducted were 43.1 mg/Nm³ and 47.3 mg/Nm^3 for Tests 1 and 2 respectively.

3.18 Continuous Emissions Monitoring

3.18.1 Continuous emissions data were collected during each of two cremation 'cycles' on 29th April 2004 under what were considered to be typical operating conditions. Continuous emissions data collected during each cycle are presented in Tables 19 & 20 and Figures 7 & 8.

3.18.2 Volatile Organic Compounds (VOCs)

3.18:2.1 The concentrations of VOCs during Test 1 were found to range from <1 mg/Nm³ to 240 mg/Nm³ with an overall average concentration of 8 mg/Nm^3 . The concentrations of VOCs during Test 2 were found to range from 1 mg/Nm³ to 39 mg/Nm³ with an overall average concentration of 9 mg/Nm^3 average OK.

3.18.3 Carbon Monoxide (CO)

3.18.3.1 The concentrations of CO during Test 1 ranged between <1 mg/Nm³ and 15 mg/Nm^3 with an overall average concentration of 3 mg/Nm^3 . The concentration during Test 2 ranged from <1 mg/Nm³ to 2 mg/Nm³ giving an average concentration of <1 mg/Nm³.

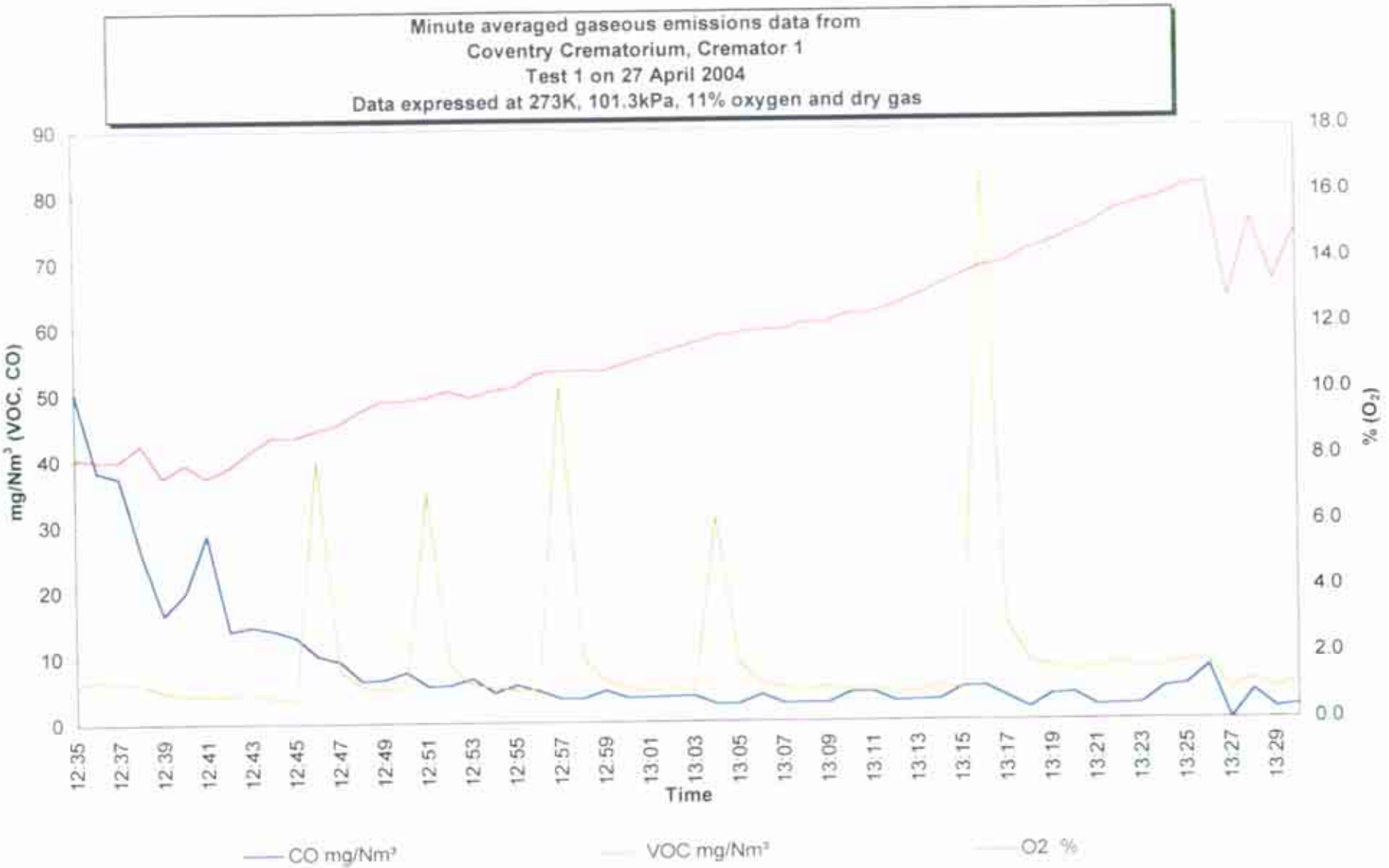
4. CONCLUSIONS AND RECOMMENDATIONS

4.1 From the monitoring work conducted on Cremators 1, 2, 3 and 4 at Coventry Crematorium from 27th to 29th April 2004, the following conclusions may be drawn:

4.1.1 Particulate concentrations were found to be significant throughout but were particularly elevated on Cremator No. 4. It is recommended that the combustion conditions be investigated by a service engineer with testing being repeated thereafter.

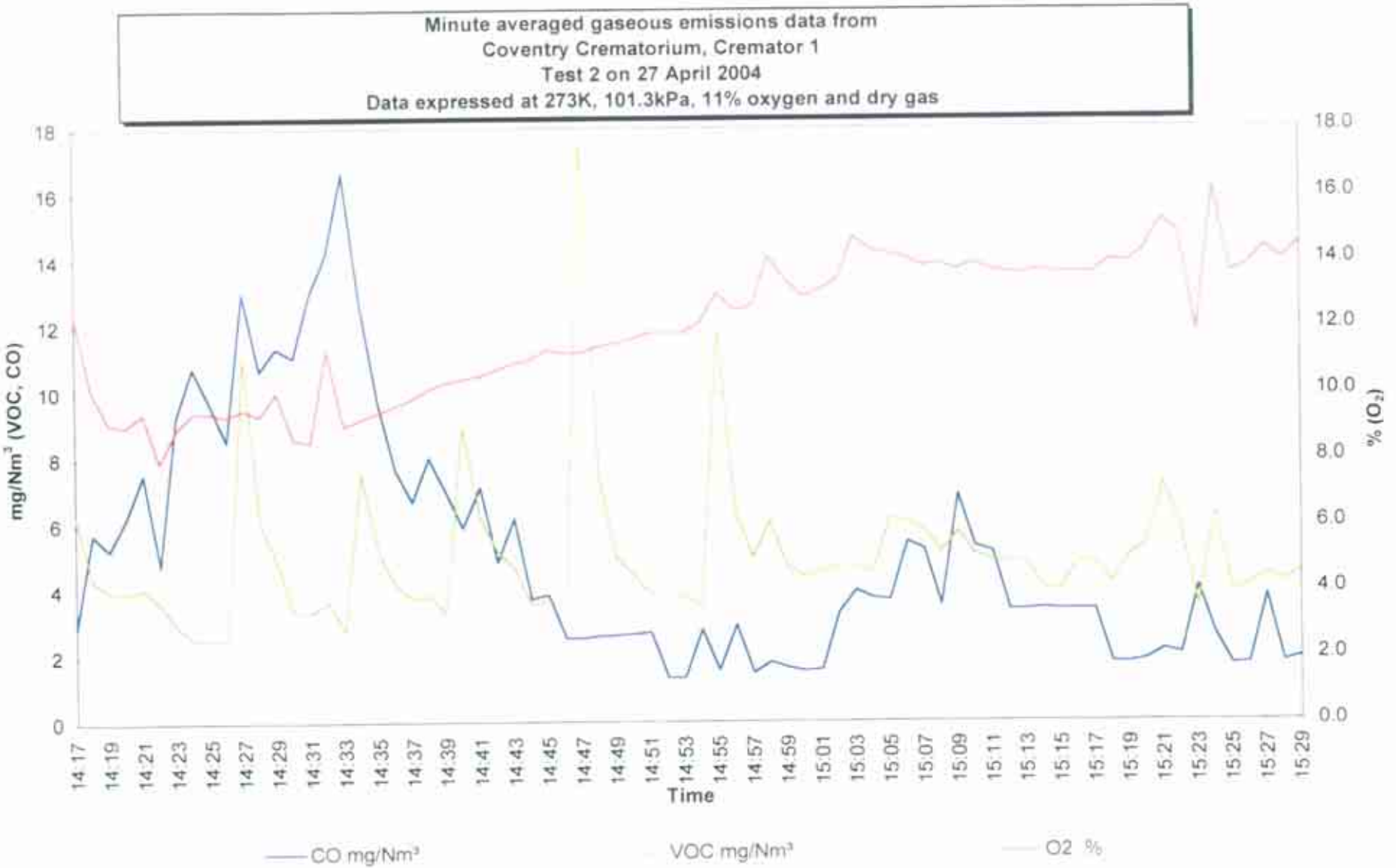
voc levels high on crem no. 1 84 mg
crem no 3 6-79 mg.
crem no 4 240 mg.
height diverger over cremation cycle ok.

FIGURES



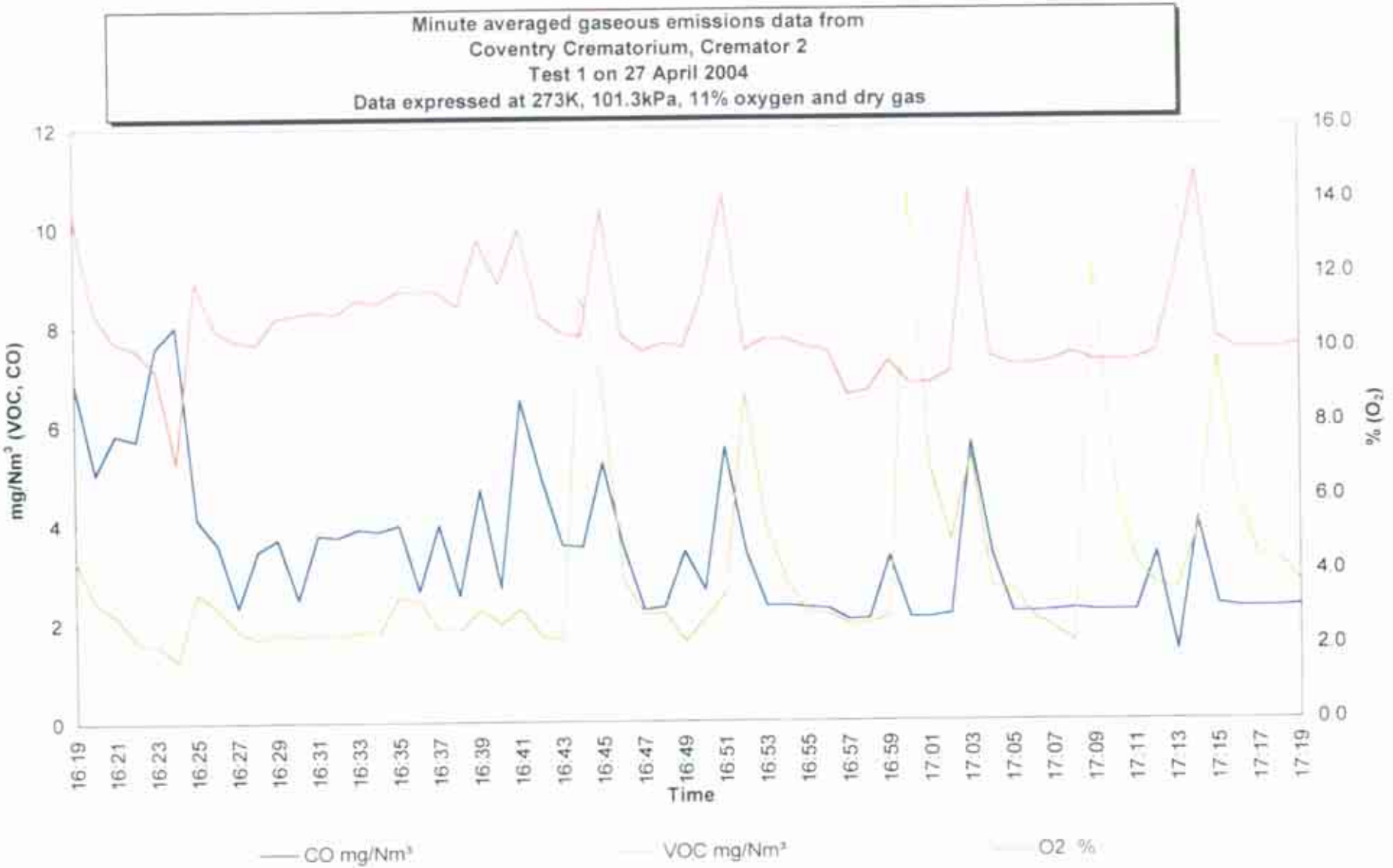
C1T1&T2.XLS CREM 1 TEST 1 PIC

Figure 1



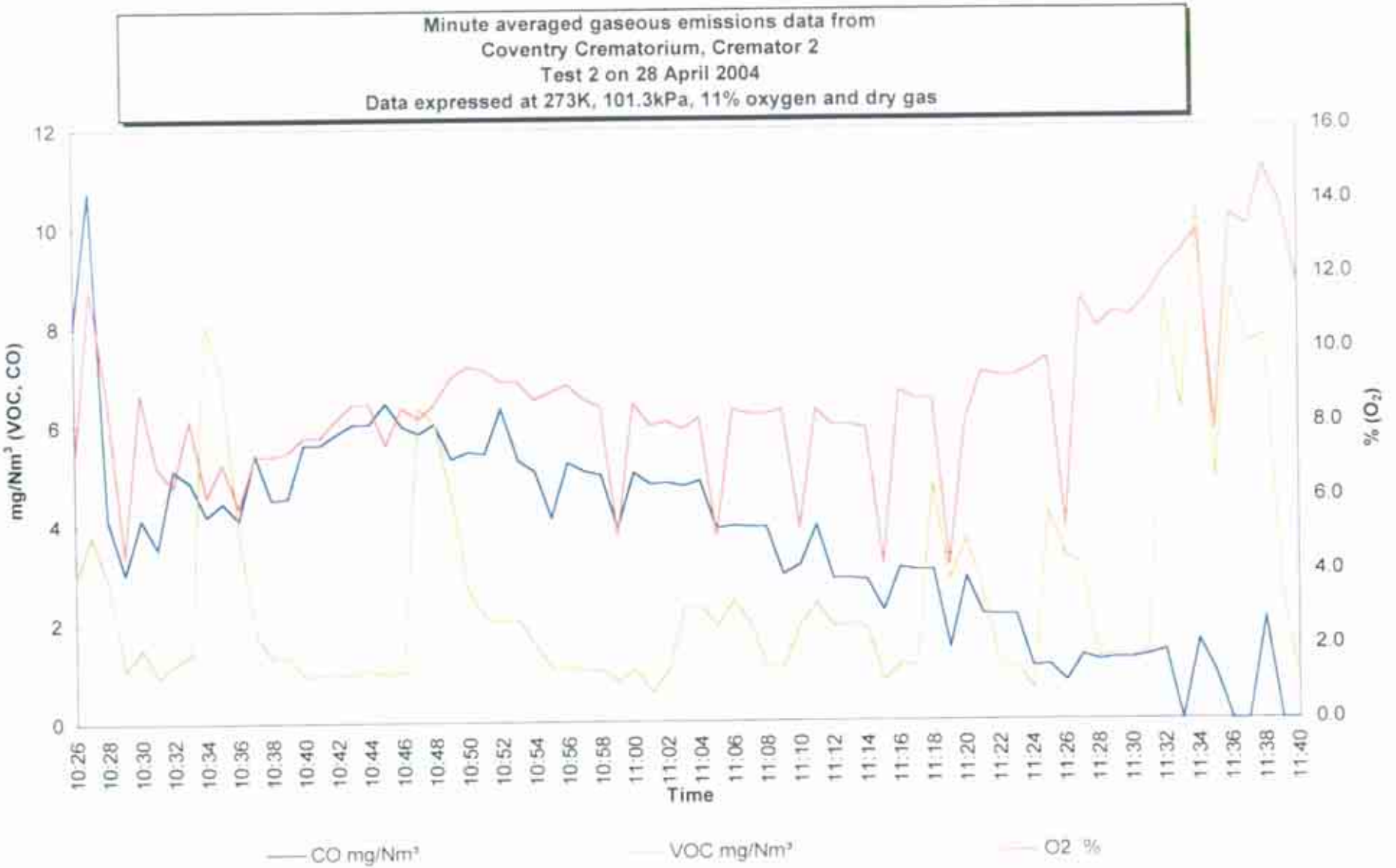
C1T1&T2.XLS CREM 1 TEST 2 PIC

Figure 2



C2T1&T2 XLS CREM 2 TEST 1 PIC

Figure 3



C2T1&T2.XLS CREM 2 TEST 2 PIC

Figure 4

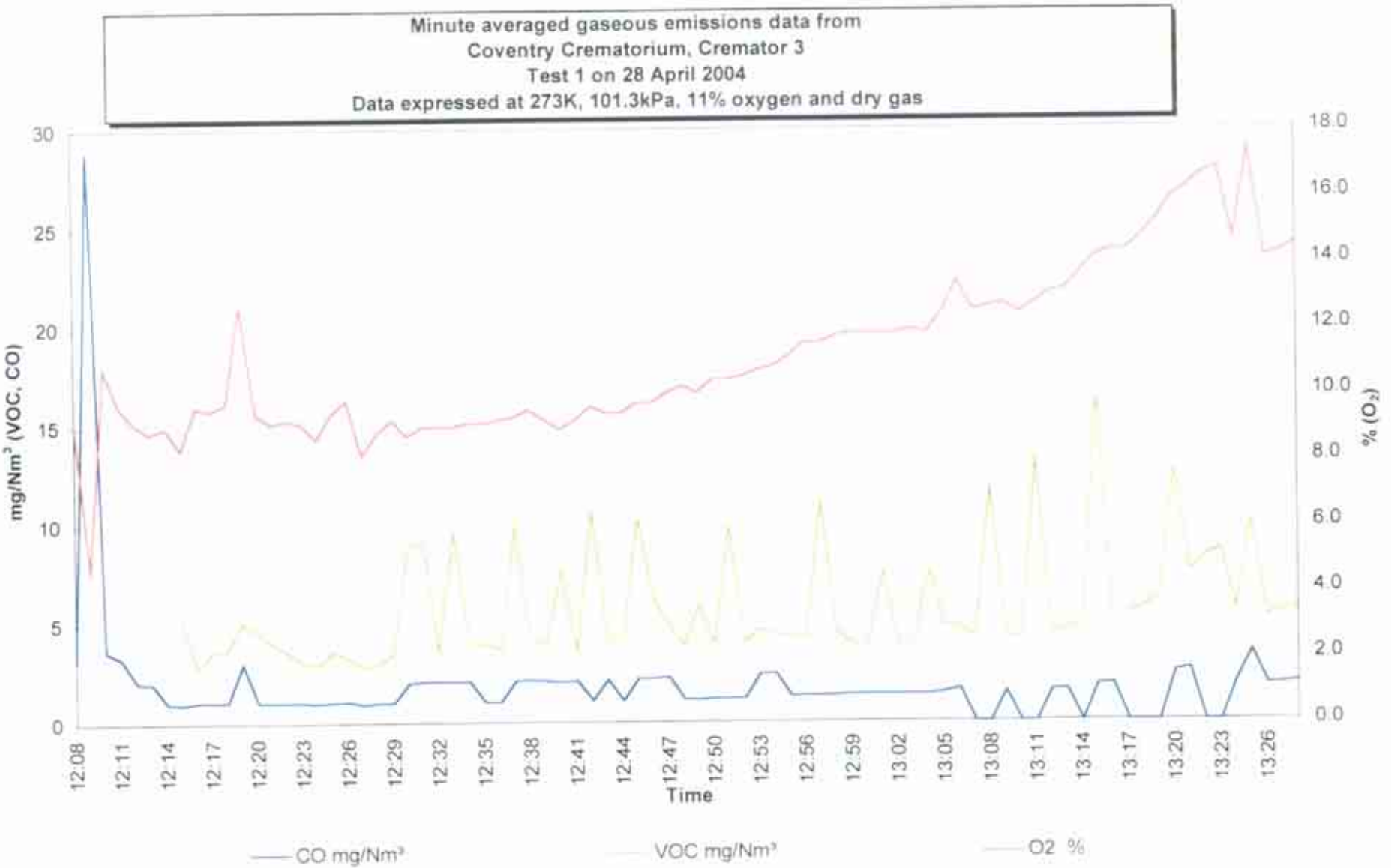
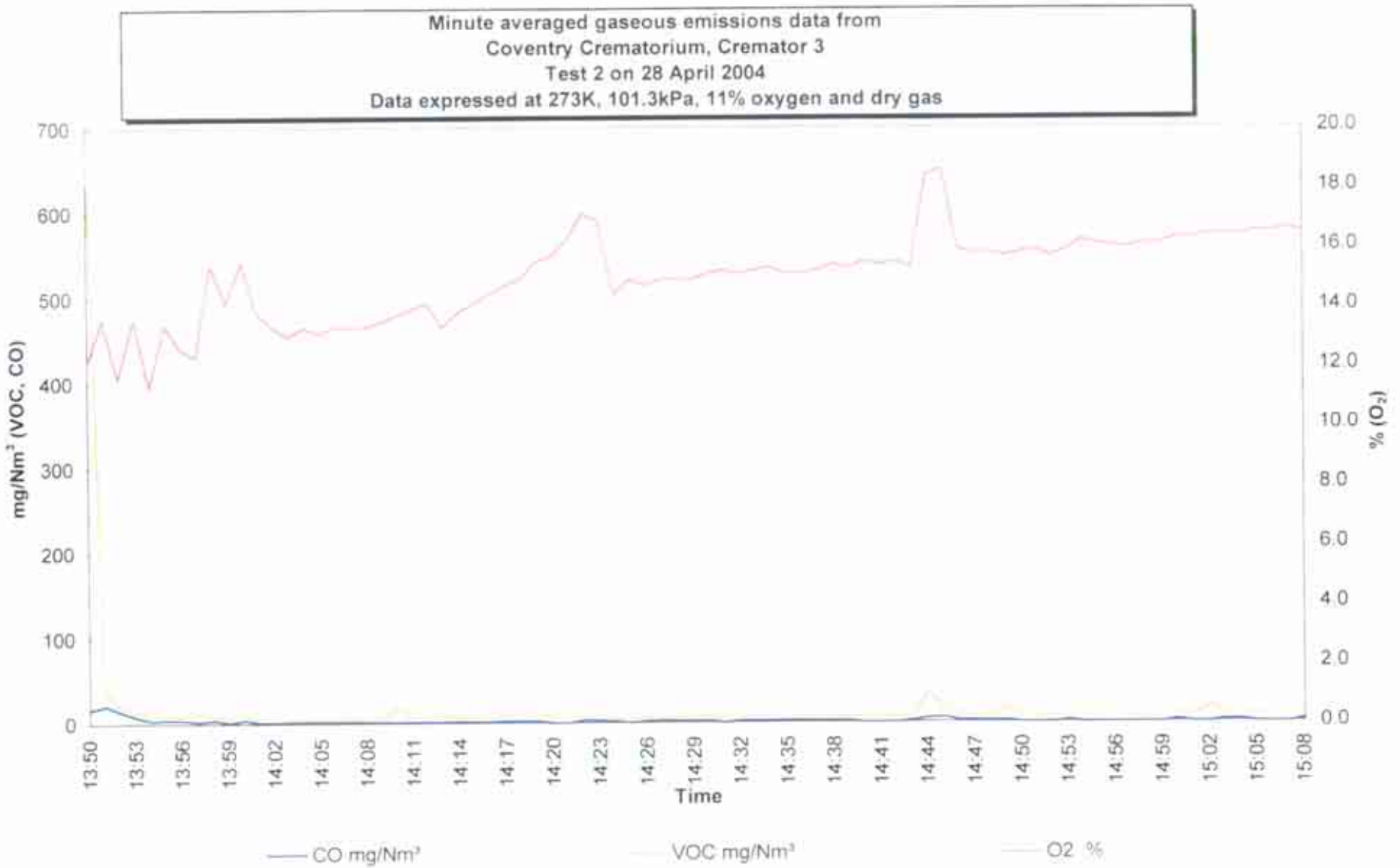
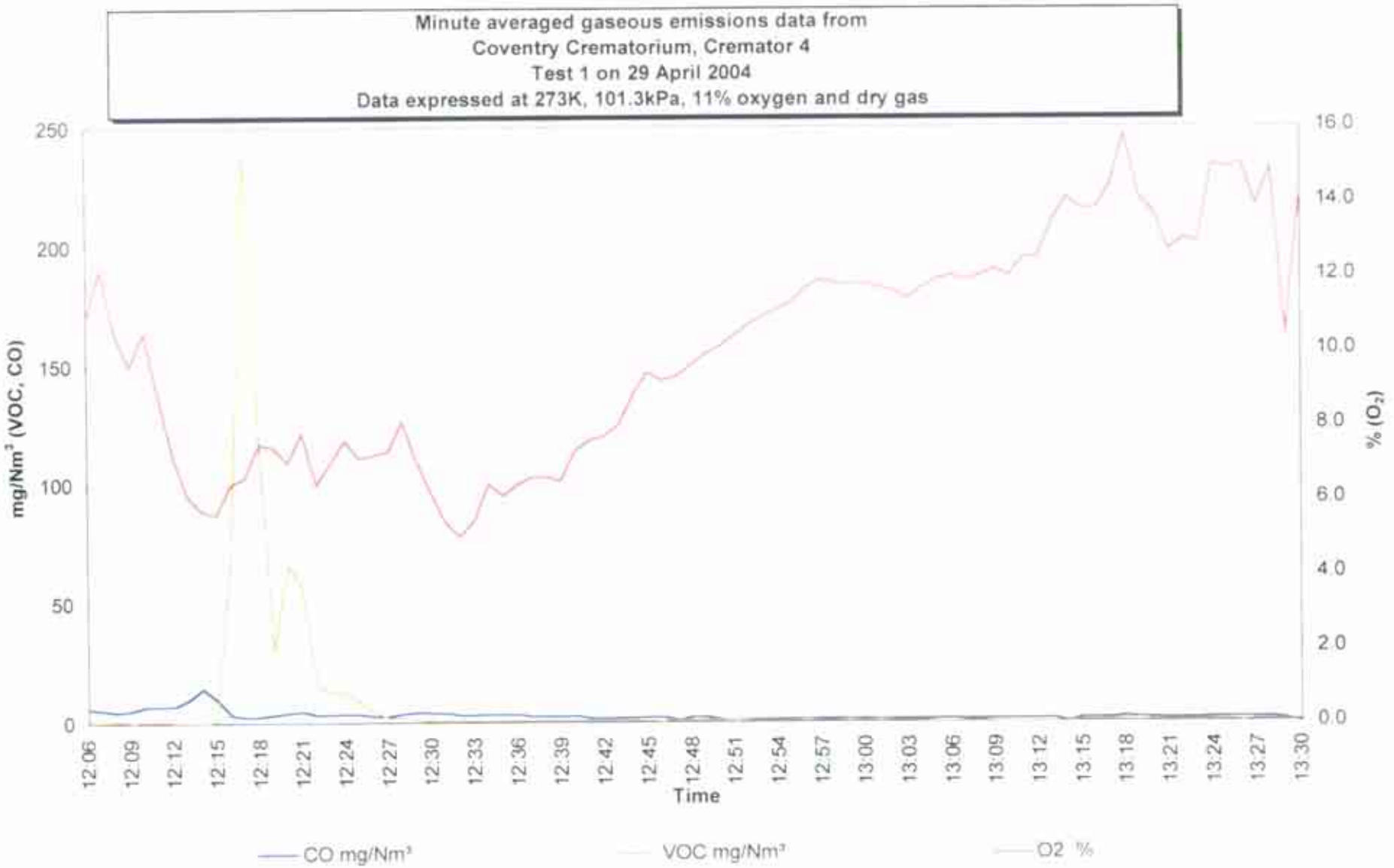

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 3
Test 1 on 28 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas
mg/Nm³ (VOC, CO)
% (O₂)
Time
CO mg/Nm³
VOC mg/Nm³
O2 %

Figure 5



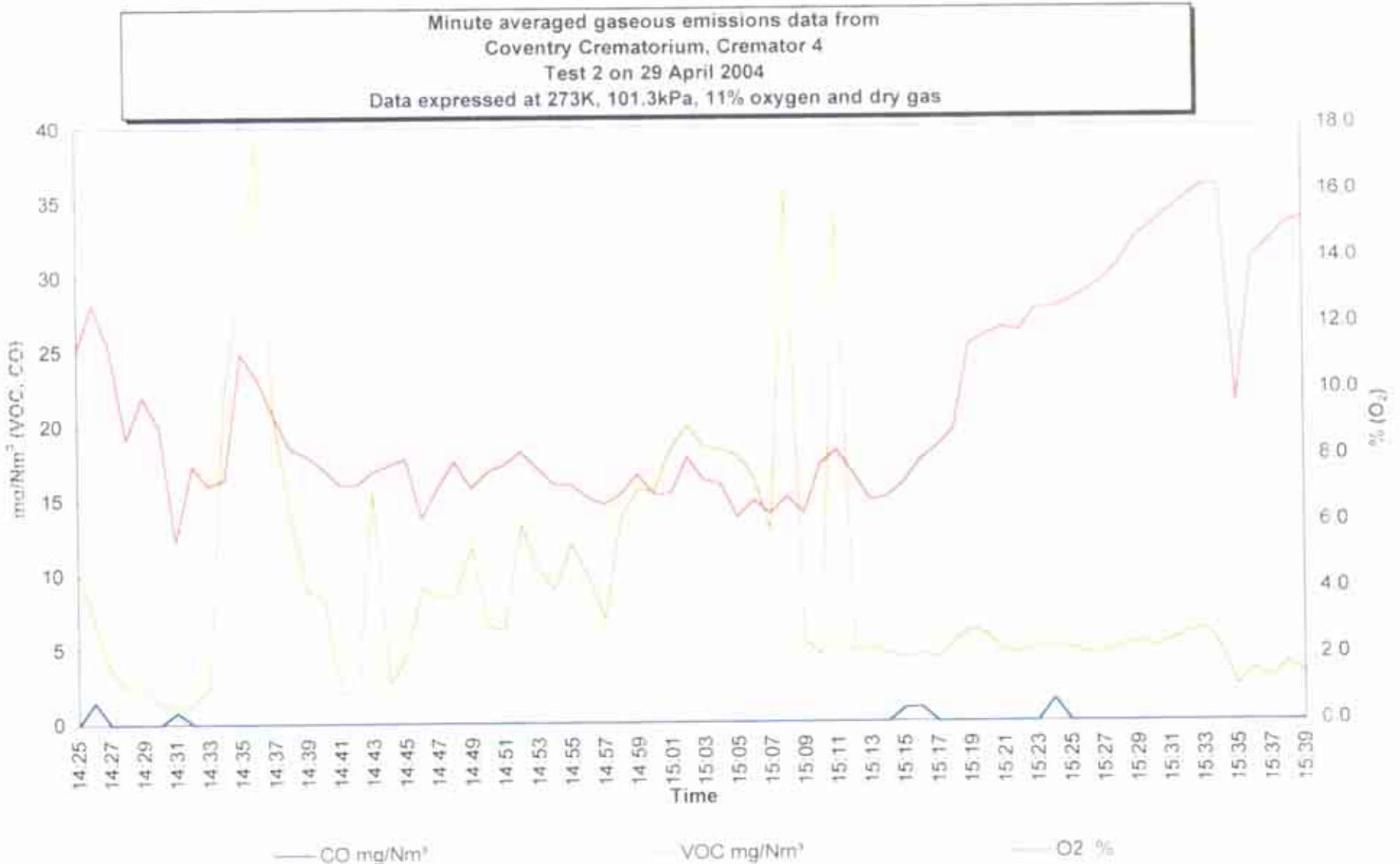
C3T1&T2 XLS CREM 3 TEST 2 PIC

Figure 6



C4T1&T2 XLS CREM 4 TEST 1 PIC

Figure 7



C4T &T2 XLS CREM 4 TEST 2 PIC

Figure 8

TABLES

Table 1

Flue Gas parameters at Coventry Crematorium, Cremator No. 1
(Data expressed at 273K, 101.3kPa , 11% O_2 and Dry Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
27-Apr-04	11:55	13:30	CC Parts 1	899	761
27-Apr-04	14:01	15:33	CC Parts 2	1283	760

Level of Particulates on Cremator 1 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 1	27-Apr-04	11:55	13:30	01:35	9.1	0.25	761	11.5	12.7	0.5900	14.9
CC Parts 2	27-Apr-04	14:01	15:33	01:32	9.0	0.36	760	7.4	12.9	0.8660	15.2

Test No	Dust Concentration		Accuracy of Results (± 10%)			Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm³		mg/Nm³			kg/hr	g	g	g	g		g
CC Parts 1	108		*97.5*	*to*	*119.2*	0.10	0.0639	0.5202	0.5551	0.0349		0.0291
CC Parts 2	61		*54.7*	*to*	*66.9*	0.08	0.0527	0.5164	0.5401	0.0236		0.0291

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 1
(Data expressed at 273K, 101.3kPa, 11% O_2 and Dry Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 1	CC Parts 2			CC Parts 1	CC Parts 2
Date	27-Apr-04	27-Apr-04				
Start Time	11:55	14:01		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	13:30	15:33				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	146.1	47.2		96	86.2	40.8

Gas Volume at Ref. Conditions (m³)	0.59	0.87
Average Gas Meter Temperature (°C)	14.9	15.2
Oxygen (%)	11.5	7.4
Moisture (%)	12.7	12.9

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1													
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2	
Chloride	36.5	1	35.5	85.32	0	237	0	300	60	360	0	0	0	41.18	0	116	0	300

Table 3

	est 2					Blank		
	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Sample	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1		Impinger 2					
Chloride	55	355	0	0	0	0.7134	4.1	174

Minute averaged gaseous emissions data from Coventry Crematorium, Cremator 1 Test 1 on 27 April 2004 Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
12:35	6	50	8.1
12:36	7	38	8.0
12:37	6	37	8.0
12:38	6	26	8.5
12:39	5	17	7.5
12:40	4	20	7.9
12:41	4	29	7.5
12:42	4	14	7.8
12:43	5	15	8.3
12:44	4	14	8.7
12:45	4	13	8.7
12:46	40	10	8.9
12:47	8	9	9.1
12:48	6	7	9.5
12:49	5	7	9.8
12:50	5	8	9.8
12:51	35	6	9.9
12:52	9	6	10.1
12:53	6	7	9.9
12:54	5	5	10.1
12:55	5	6	10.2
12:56	5	5	10.6
12:57	51	4	10.7
12:58	10	4	10.7
12:59	6	5	10.7
13:00	5	4	10.9
13:01	5	4	11.1
13:02	5	4	11.3
13:03	5	4	11.5
13:04	31	3	11.7
13:05	9	3	11.8
13:06	6	4	11.9
13:07	5	3	11.9
13:08	5	3	12.1
13:09	5	3	12.1
13:10	5	4	12.4
13:11	5	4	12.4
13:12	5	3	12.6
13:13	4	3	12.9
13:14	5	3	13.2
13:15	5	5	13.5
13:16	84	5	13.8
13:17	15	4	13.9
13:18	9	2	14.3
13:19	8	4	14.5
13:20	8	4	14.8
13:21	8	2	15.1
13:22	9	2	15.5
13:23	8	2	15.7
13:24	8	5	15.9
13:25	9	5	16.2
13:26	9	8	16.3
13:27	5	0	12.8
13:28	6	4	15.2
13:29	5	2	13.3
13:30	6	2	14.9
Maximum	84	50	16.3
Minimum	3.8	0.0	7.5
Average	10	8	11.5

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 1
Test 2 on 27 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
14:17	6	3	12.4
14:18	4	6	10.1
14:19	4	5	9.1
14:20	4	6	9.0
14:21	4	8	9.4
14:22	4	5	7.9
14:23	3	9	8.9
14:24	3	11	9.4
14:25	3	10	9.4
14:26	3	9	9.3
14:27	11	13	9.5
14:28	6	11	9.3
14:29	5	11	10.0
14:30	3	11	8.6
14:31	3	13	8.5
14:32	4	14	11.3
14:33	3	17	9.0
14:34	8	13	9.2
14:35	5	10	9.4
14:36	4	8	9.6
14:37	4	7	9.8
14:38	4	8	10.1
14:39	3	7	10.3
14:40	9	6	10.4
14:41	6	7	10.5
14:42	5	5	10.7
14:43	5	6	10.9
14:44	4	4	11.0
14:45	4	4	11.3
14:46	4	3	11.2
14:47	18	3	11.2
14:48	7	3	11.4
14:49	5	3	11.5
14:50	4	3	11.6
14:51	4	3	11.8
14:52	4	1	11.8
14:53	4	1	11.8
14:54	3	3	12.1
14:55	12	2	13.0
14:56	6	3	12.5
14:57	5	1	12.6
14:58	5	2	14.1
14:59	5	2	13.4
15:00	4	2	12.9
15:01	5	2	13.1
15:02	5	3	13.4
15:03	5	4	14.7
15:04	5	4	14.3
15:05	6	4	14,2
15:06	6	5	14,1
15:07	6	5	13,8
15:08	5	4	13,9
15:09	6	7	13,7
15:10	5	5	13.9
15:11	5	5	13,7
15:12	5	3	13.6
15:13	5	3	13.6
15:14	4	3	13.7
15:15	4	3	13.6
15:16	5	3	13.6
15:17	5	3	13.6
15:18	4	2	14.0
15:19	5	2	13.9
15:20	5	2	14.3
15:21	7	2	15.2
15:22	6	2	14.8
15:23	4	4	11.8
15:24	6	3	16.2
15:25	4	2	13.6
15:26	4	2	13.8
15:27	4	4	14.4
15:28	4	2	14.0
15:29	5	2	14.5
Maximum	18	17	16.2
Minimum	3	1	7.9
Average	5	5	11.9

Table 6

Flue Gas parameters at Coventry Crematorium, Cremator No. 2
(Data expressed at 273K, 101.3kPa , 11% O_2 and Dry Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
28-Apr-04	16:19	17:24	CC Parts 3	1204	811
28-Apr-04	10:26	11:46	CC Parts 4	1571	816

Level of Particulates on Cremator 2 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:mln		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 3	28-Apr-04	16:19	17:24	01:05	9.3	0.33	811	10.7	15.1	0.4839	14.2
CC Parts 4	28-Apr-04	10:26	11:46	01:20	9.5	0.44	816	8.7	9.0	0.7085	19.2

Test No	Dust Concentration		Accuracy of Results (± 10%)			Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm^3		mg/Nm^3			kg/hr	g	g	g	g		g
CC Parts 3	188		*169.0*	*to*	*206.5*	0.23	0.0909	0.5126	0.5325	0.0199		0.0710
CC Parts 4	116		*104.0*	*to*	*127.1*	0.18	0.0819	0.5181	0.5290	0.0109		0.0710

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 2
(Data expressed at 273K, 101.3kPa, 11% O_2 and Dry Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 3	CC Parts 4			CC Parts 3	CC Parts 4
Date	28-Apr-04	28-Apr-04				
Start Time	16:19	10:26		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	17:24	11:46				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	68.9	17.0		55	33.4	12.0

Gas Volume at Ref. Conditions (m³)	0.48	0.71
Average Gas Meter Temperature (°C)	14.2	19.2
Oxygen (%)	10.7	8.7
Moisture (%)	15.1	9.0

* Values Reported Represent the Lower Analytical Detection Limit.

Table 8

				Test 1														
	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample		Amount of Species in Solns		Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Amount of Species in Sample		Amount of Species in Solns		Initial Volume of Impinger Solns
Units				mg		$mg\ l^{-1}$		ml	ml	ml	ml	ml	ml	mg		$mg\ l^{-1}$		ml
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2	
Chloride	36.5	1	35.5	33.945	0	93	0	300	65	365	0	0	0	13.11	0	38	0	300

	est 2					Blank		
	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Sample	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1		Impinger 2					
Chloride	45	345	0	0	0	0.7134	4.1	174

Table 9

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 2
Test 1 on 27 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
16:19	3	7	13.7
16:20	2	5	11.1
16:21	2	6	10.3
16:22	2	6	10.1
16:23	2	8	9.5
16:24	1	8	7.0
16:25	3	4	11.9
16:26	2	4	10.6
16:27	2	2	10.3
16:28	2	3	10.2
16:29	2	4	10.9
16:30	2	3	11.0
16:31	2	4	11.1
16:32	2	4	11.0
16:33	2	4	11.4
16:34	2	4	11.3
16:35	3	4	11.6
16:36	2	3	11.6
16:37	2	4	11.6
16:38	2	3	11.2
16:39	2	5	13.0
16:40	2	3	11.8
16:41	2	7	13.3
16:42	2	5	10.9
16:43	2	4	10.5
16:44	9	4	10.4
16:45	7	5	13.8
16:46	3	4	10.4
16:47	2	2	10.0
16:48	2	2	10.2
16:49	2	3	10.1
16:50	2	3	11.6
16:51	3	6	14.2
16:52	7	3	10.0
16:53	4	2	10.3
16:54	3	2	10.3
16:55	2	2	10.1
16:56	2	2	10.0
16:57	2	2	8.8
16:58	2	2	8.9
16:59	2	3	9.7
17:00	11	2	9.1
17:01	5	2	9.1
17:02	4	2	9.4
17:03	5	6	14.3
17:04	3	3	9.8
17:05	3	2	9.6
17:06	2	2	9.6
17:07	2	2	9.7
17:08	2	2	9.9
17:09	9	2	9.7
17:10	5	2	9.7
17:11	3	2	9.7
17:12	3	3	9.9
17:13	3	1	12.1
17:14	4	4	14.8
17:15	7	2	10.3
17:16	4	2	10.0
17:17	3	2	10.0
17:18	3	2	10.0
17:19	3	2	10.1
Maximum	11	8	14.8
Minimum	1.3	1.4	7.0
Average	3	3	10.7

Table 10

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 2
Test 2 on 28th April 2004
Data expressed at 273K, 101.3kPa, 11%oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
10:26	3	8	7.1
10:27	4	11	11.7
10:28	3	4	8.9
10:29	1	3	4.5
10:30	2	4	8.9
10:31	1	4	6.9
10:32	1	5	6.4
10:33	1	5	8.2
10:34	8	4	6.1
10:35	7	4	7.0
10:36	4	4	5.8
10:37	2	5	7.2
10:38	1	5	7.2
10:39	1	5	7.3
10:40	1	6	7.7
10:41	1	6	7.7
10:42	1	6	8.2
10:43	1	6	8.6
10:44	1	6	8.6
10:45	1	6	7.5
10:46	1	6	8.5
10:47	6	6	8.2
10:48	6	6	8.6
10:49	5	5	9.3
10:50	3	5	9.6
10:51	2	5	9.5
10:52	2	6	9.2
10:53	2	5	9.2
10:54	2	5	8.7
10:55	1	4	8.9
10:56	1	5	9.1
10:57	1	5	8.7
10:58	1	5	8.5
10:59	1	4	5.0
11:00	1	5	8.6
11:01	1	5	8.0
11:02	1	5	8.1
11:03	2	5	7.9
11:04	2	5	8.2
11:05	2	4	5.0
11:06	2	4	8.4
11:07	2	4	8.3
11:08	1	4	8.3
11:09	1	3	8.4
11:10	2	3	5.2
11:11	2	4	8.4
11:12	2	3	8.0
11:13	2	3	8.0
11:14	2	3	7.9
11:15	1	2	4.2
11:16	1	3	8.9
11:17	1	3	8.7
11:18	5	3	8.7
11:19	3	1	4.2
11:20	4	3	8.1
11:21	3	2	9.4
11:22	1	2	9.3
11:23	1	2	9.3
11:24	1	1	9.5
11:25	4	1	9.8
11:26	3	1	5.2
11:27	3	1	11.4
11:28	1	1	10.6
11:29	1	1	11.0
11:30	1	1	10.9
11:31	1	1	11.4
11:32	8	1	12.1
11:33	6	0	12.6
11:34	10	2	13.2
11:35	5	1	7.8
11:36	9	0	13.6
11:37	8	0	13.3
11:38	8	2	14.9
11:39	3	0	13.9
11:40	1	0	11.7
Maximum	10	11	14.9
Minimum	1	0	4.2
Average	3	4	8.7

Flue Gas parameters at Coventry Crematorium, Cremator No. 3
(Data expressed at 273K, 101.3kPa , 11% O_2 and Dry Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
28-Apr-04	12:08	13:28	CC Parts 5	1062	801
28-Apr-04	13:50	15:13	CC Parts 6	586	809

Level of Particulates on Cremator 3 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 5	28-Apr-04	12:08	13:28	01:20	10.0	0.29	801	11.1	9.0	0.6518	22.3
CC Parts 6	28-Apr-04	13:50	15:13	01:23	9.3	0.16	809	15.0	9.6	0.3298	21.7

Test No	Dust Concentration		Accuracy of Results (± 10%)			Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm³		mg/Nm³			kg/hr	g	g	g	g		g
CC Parts 5	159		*142.7*	*to*	*174.4*	0.17	0.1033	0.5129	0.5311	0.0182		0.0852
CC Parts 6	314		*282.5*	*to*	*345.2*	0.18	0.1035	0.5180	0.5363	0.0184		0.0852

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 3
(Data expressed at 273K, 101.3kPa, 11% O_2 and Dry Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 5	CC Parts 6			CC Parts 5	CC Parts 6
Date	28-Apr-04	28-Apr-04				
Start Time	12:08	13:50		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	13:28	15:13				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	37.5	59.2		37	24.4	19.5

Gas Volume at Ref. Conditions (m³)	0.65	0.33
Average Gas Meter Temperature (°C)	22.3	21.7
Oxygen (%)	11.1	15.0
Moisture (%)	9.0	9.6

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1														
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2	
Chloride	36.5	1	35.5	25.185	0	73	0	300	45	345	0	0	0	20.4	0	60	0	300

Table 13

	est 2					Blank		
Units	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Total Amount of Species in Sample mg	Total Amount of Species in Blank mg l^{-1}	Total Volume of Blank ml
Analyte	Impinger 1		Impinger 2					
Chloride	40	340	0	0	0	0.7134	4.1	174

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 3
Test 1 on 28 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
12:08		3	9.1
12:09		29	4.6
12:10		4	10.8
12:11		3	9.6
12:12		2	9.1
12:13		2	8.8
12:14		1	9.0
12:15	5	1	8.3
12:16	3	1	9.6
12:17	4	1	9.5
12:18	4	1	9.7
12:19	5	3	12.7
12:20	5	1	9.4
12:21	4	1	9.1
12:22	4	1	9.2
12:23	3	1	9.1
12:24	3	1	8.6
12:25	4	1	9.4
12:26	3	1	9.8
12:27	3	1	8.1
12:28	3	1	8.8
12:29	4	1	9.2
12:30	9	2	8.7
12:31	9	2	9.0
12:32	4	2	9.0
12:33	10	2	9.0
12:34	4	2	9.1
12:35	4	1	9.1
12:36	4	1	9.2
12:37	10	2	9.3
12:38	4	2	9.5
12:39	4	2	9.2
12:40	8	2	8.9
12:41	4	2	9.2
12:42	11	1	9.6
12:43	4	2	9.4
12:44	4	1	9.4
12:45	10	2	9.7
12:46	6	2	9.7
12:47	5	2	10.0
12:48	4	1	10.2
12:49	6	1	10.0
12:50	4	1	10.4
12:51	10	1	10.4
12:52	4	1	10.5
12:53	5	2	10.7
12:54	5	2	10.8
12:55	4	1	11.1
12:56	4	1	11.5
12:57	11	1	11.5
12:58	5	1	11.7
12:59	4	1	11.8
13:00	4	1	11.8
13:01	8	1	11.8
13:02	4	1	11.8
13:03	4	1	11.9
13:04	8	1	11.8
13:05	5	1	12.4
13:06	5	2	13.4
13:07	4	0	12.5
13:08	12	0	12.6
13:09	4	2	12.7
13:10	4	0	12.4
13:11	13	0	12.7
13:12	5	2	13.0
13:13	5	2	13.1
13:14	5	0	13.6
13:15	17	2	14.1
13:16	5	2	14.3
13:17	5	0	14.3
13:18	6	0	14.7
13:19	6	0	15.2
13:20	13	2	15.9
13:21	8	3	16.2
13:22	8	0	16.6
13:23	9	0	16.8
13:24	6	2	14.6
13:25	10	4	17.4
13:26	5	2	14.1
13:27	6	2	14.2
13:28	6	2	14.5
Maximum	17	29	17.4
Minimum	2.8	0.0	4.6
Average	6	2	11.1

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 3
Test 2 on 28 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
13:50	679	17	12.1
13:51	42	22	13.6
13:52	19	15	11.6
13:53	16	8	13.6
13:54	10	4	11.3
13:55	11	5	13.4
13:56	8	4	12.6
13:57	11	3	12.3
13:58	9	4	15.4
13:59	7	2	14.1
14:00	8	5	15.5
14:01	6	2	13.8
14:02	5	2	13.3
14:03	4	2	13.0
14:04	5	2	13.3
14:05	4	2	13.1
14:06	5	2	13.3
14:07	5	2	13.3
14:08	5	2	13.3
14:09	5	2	13.5
14:10	20	2	13.7
14:11	7	2	13.9
14:12	6	2	14.1
14:13	10	2	13.3
14:14	6	2	13.8
14:15	6	2	14.1
14:16	6	2	14.4
14:17	9	2	14.7
14:18	9	2	14.9
14:19	12	2	15.5
14:20	8	0	15.7
14:21	7	0	16.2
14:22	9	3	17.1
14:23	9	3	16.9
14:24	5	2	14.4
14:25	6	0	14.9
14:26	6	2	14.7
14:27	5	2	14.9
14:28	6	2	14.9
14:29	9	2	14.9
14:30	7	2	15.1
14:31	7	0	15.2
14:32	7	2	15.1
14:33	6	2	15.2
14:34	7	2	15.3
14:35	6	2	15.1
14:36	6	2	15.1
14:37	6	2	15.2
14:38	7	2	15.4
14:39	7	2	15.3
14:40	7	0	15.5
14:41	7	0	15.4
14:42	7	0	15.5
14:43	7	2	15.3
14:44	35	5	18.4
14:45	16	5	18.6
14:46	8	2	15.9
14:47	8	2	15.8
14:48	8	2	15.8
14:49	16	2	15.7
14:50	8	0	15.8
14:51	8	0	15.9
14:52	7	0	15.7
14:53	8	2	15.9
14:54	9	0	16.2
14:55	7	0	16.1
14:56	7	0	16.0
14:57	7	0	16.0
14:58	7	0	16.1
14:59	8	0	16.1
15:00	9	3	16.3
15:01	8	0	16.3
15:02	19	0	16.4
15:03	9	3	16.4
15:04	9	3	16.4
15:05	8	0	16.5
15:06	8	0	16.5
15:07	8	0	16.6
15:08	8	3	16.5
Maximum	679	22	18.6
Minimum	4	0	11.3
Average	17	2	15.0

Flue Gas parameters at Coventry Crematorium, Cremator No. 4
(Data expressed at 273K, 101.3kPa , 11% O_2 and Dry Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
29-Apr-04	12:06	13:35	CC Parts 7	823	907
29-Apr-04	14:25	15:40	CC Parts 8	771	944

Level of Particulates on Cremator 4 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 7	29-Apr-04	12:06	13:35	01:29	8.3	0.23	907	10.0	9.8	0.6159	19.0
CC Parts 8	29-Apr-04	14:25	15:40	01:15	7.9	0.21	944	9.5	12.1	0.6095	20.4

Test No	Dust Concentration		Accuracy of Results (± 10%)			Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm³		mg/Nm³			kg/hr	g	g	g	g		g
CC Parts 7	**406**		*365.4*	*to*	*446.7*	0.33	0.2501	**0.5214**	**0.5533**	0.0319		0.2182
CC Parts 8	**432**		*389.1*	*to*	*475.5*	0.33	0.2635	**0.5198**	**0.5651**	0.0453		0.2182

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 4
(Data expressed at 273K, 101.3kPa, 11% O_2 and Dry Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 7	CC Parts 8			CC Parts 7	CC Parts 8
Date	29-Apr-04	29-Apr-04				
Start Time	12:06	14:25		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	13:35	15:40				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	43.1	47.3		36	26.6	28.8

Gas Volume at Ref. Conditions (m³)	0.62	0.61
Average Gas Meter Temperature (°C)	19.0	20.4
Oxygen (%)	10.0	9.5
Moisture (%)	9.8	12.1

* Values Reported Represent the Lower Analytical Detection Limit.

Table 18

				Test 1													
	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample		Amount of Species in Solns		Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Amount of Species in Sample		Amount of Species in Solns		Initial Volume of Impinger Solns
Units				mg		$mg\ l^{-1}$		ml	ml	ml	ml	ml	ml	mg		$mg\ l^{-1}$		ml
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2	
Chloride	36.5	1	35.5	27.255	0	79	0	300	45	345	0	0	0	29.465	0	83	0	300

	est 2					Blank		
	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Sample	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	impinger 1		impinger 2					
Chloride	55	355	0	0	0	0.7134	4.1	174

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 4
Test 1 on 29 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
12:05	2	6	10.9
12:07	1	6	12.2
12:08	1	5	10.5
12:09	0	5	9.6
12:10	1	7	10.5
12:11	1	7	8.8
12:12	0	7	7.2
12:13	0	10	6.1
12:14	0	15	5.7
12:15	1	10	5.6
12:16	71	3	6.4
12:17	240	3	6.6
12:18	116	3	7.5
12:19	31	4	7.4
12:20	66	4	7.0
12:21	57	5	7.8
12:22	16	3	6.4
12:23	13	4	7.0
12:24	13	4	7.6
12:25	9	4	7.1
12:26	4	3	7.2
12:27	2	3	7.3
12:28	2	4	8.1
12:29	1	4	7.0
12:30	1	4	6.2
12:31	1	4	5.4
12:32	1	3	5.0
12:33	1	3	5.4
12:34	1	3	6.4
12:35	1	3	6.1
12:36	1	3	6.4
12:37	1	3	6.6
12:38	1	3	6.6
12:39	1	3	6.5
12:40	1	3	7.3
12:41	1	2	7.6
12:42	1	2	7.7
12:43	1	2	8.0
12:44	1	2	8.8
12:45	1	2	9.4
12:46	0	2	9.2
12:47	1	1	9.3
12:48	1	2	9.6
12:49	1	2	9.9
12:50	1	1	10.1
12:51	1	1	10.4
12:52	1	1	10.7
12:53	1	1	10.9
12:54	1	1	11.1
12:55	1	1	11.3
12:56	1	1	11.7
12:57	1	1	11.9
12:58	1	1	11.8
12:59	1	1	11.8
13:00	1	1	11.8
13:01	1	1	11.7
13:02	1	1	11.6
13:03	1	1	11.4
13:04	1	1	11.7
13:05	0	1	11.9
13:06	0	1	12.0
13:07	1	1	11.9
13:08	1	1	12.0
13:09	0	1	12.2
13:10	0	1	12.0
13:11	0	1	12.5
13:12	0	1	12.5
13:13	0	2	13.5
13:14	0	0	14.1
13:15	1	2	13.8
13:16	1	2	13.5
13:17	1	2	14.4
13:18	1	2	15.8
13:19	2	2	14.1
13:20	1	2	13.7
13:21	1	2	12.7
13:22	1	2	13.0
13:23	1	2	12.9
13:24	1	2	15.0
13:25	1	2	14.9
13:26	0	2	15.0
13:27	1	2	13.9
13:28	1	2	14.9
13:29	1	1	10.4
13:30	1	0	14.3
Maximum	240	15	15.8
Minimum	0.0	0.0	5.0
Average	8	3	10.0

Minute averaged gaseous emissions data from
Coventry Crematorium, Cremator 4
Test 2 on 29 April 2004
Data expressed at 273K, 101.3kPa, 11% oxygen and dry gas

TIME	VOC mg/Nm³	CO mg/Nm³	O2 %
14:25	10	0	11.3
14:26	7	2	12.7
14:27	4	0	11.4
14:28	2	0	8.6
14:29	2	0	9.9
14:30	1	0	9.0
14:31	1	1	5.5
14:32	1	0	7.8
14:33	3	0	7.2
14:34	22	0	7.4
14:35	29	0	11.2
14:36	39	0	10.4
14:37	21	0	9.3
14:38	14	0	8.3
14:39	9	0	8.1
14:40	8	0	7.7
14:41	2	0	7.2
14:42	2	0	7.2
14:43	16	0	7.6
14:44	3	0	7.8
14:45	5	0	8.0
14:46	9	0	6.2
14:47	8	0	7.1
14:48	9	0	7.9
14:49	12	0	7.1
14:50	7	0	7.6
14:51	6	0	7.8
14:52	13	0	8.2
14:53	10	0	7.7
14:54	9	0	7.2
14:55	12	0	7.2
14:56	10	0	6.8
14:57	7	0	6.6
14:58	14	0	6.9
14:59	16	0	7.5
15:00	16	0	6.9
15:01	18	0	6.9
15:02	20	0	8.0
15:03	18	0	7.3
15:04	18	0	7.2
15:05	18	0	6.2
15:06	16	0	6.7
15:07	13	0	6.3
15:08	36	0	6.8
15:09	5	0	6.3
15:10	4	0	7.8
15:11	35	0	8.2
15:12	5	0	7.5
15:13	5	0	6.7
15:14	5	0	6.8
15:15	4	1	7.2
15:16	5	1	7.9
15:17	4	0	8.3
15:18	5	0	8.8
15:19	6	0	11.4
15:20	6	0	11.7
15:21	5	0	11.9
15:22	5	0	11.8
15:23	5	0	12.5
15:24	5	1	12.5
15:25	5	0	12.7
15:26	5	0	13.0
15:27	5	0	13.3
15:28	5	0	13.8
15:29	5	0	14.6
15:30	5	0	15.0
15:31	5	0	15.4
15:32	6	0	15.8
15:33	6	0	16.2
15:34	5	0	16.2
15:35	2	0	9.6
15:36	4	0	14.0
15:37	3	0	14.5
15:38	4	0	15.0
15:39	3	0	15.2
Maximum	39	2	16.2
Minimum	1	0	5.5
Average	9	0	9.5

APPENDIX 1

US EPA Method 5 (Andersen) Test Sheets

Moisture Test Sheets

Test no	CC Parts 1	
Date	27-4-04	
Nozzle diameter	8.00	mm
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20
End volume reading	167.16	m^3
Start volume reading	166.54	m^3
Volume sampled	0.62	m^3

Site: Coventry Crematorium **Stack Description:** Cremator 1

Filter No: 7971 **Absorber No(s):**

SITE TEAM: LS, RJ

COMMENTS:

Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)		Does test conform to standard (Y/N)	
Type of source			
Plant load			

end time	13:30	hr:min	**Control Box No:** AQ325
start time	11:55	hr:min	
total time	01:35	hr:min	

Conditions	Value	Units
Stack pressure	760.00	mm Hg
Gas Meter Calibration Factor Y	1.0530	
Ref oxygen Value	11	%
Moisture content	12.7	%
CO	8	ppm
CO_2	9.43	%
N_2	79.07	%
O_2	11.5	%
Dry molecular wt	29.97	
Stack molecular wt	28.44	
Orifice ΔH@ Factor	46.30	mm H_20
Area of stack	0.13	m^2
Pbar	1013	mbar
Pbar	760.0	mmHg
Pitot tube coeft	0.84	
Reference Temp	273	K
Reference Pressure	760	mmHg

Diagram of Sample Location (include dimensions):

LEAK CHECK

Pre Vac (" Hg): 15	**Post Vac (" Hg):** 2
Leak rate (m^3): <0.00057	**Leak rate (m^3):** <0.00057

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	11:55	1	15	2.0	5.50	797	n/a	14	13	121	28	1	1.41
2:	12:10	1	15	2.0	5.50	813	n/a	15	14	122	26	1	1.41
3:	12:25	1	15	2.0	5.50	752	n/a	16	14	132	29	1	1.41
4:	12:40	1	15	2.0	5.50	740	n/a	16	14	130	29	1	1.41
5:	12:55	1	15	2.0	5.50	732	n/a	16	15	130	29	1	1.41
6:	13:10	1	15	2.0	5.5	730	n/a	17	15	130	30	1	1.41
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		90		5.5	760.7			14.9	127.5	28.5	1.0	1.41

Operational Flow Characteristics at: Test No	Cremator 1 CC Parts 1	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.08	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.25	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.14	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	1.00	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.30	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.44	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.62	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.59	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.71	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.68	m^3
Percentage Isokinicity	109	%

Test no	CC Parts 2		Site: Coventry Crematorium				Stack Description: Cremator 1	
Date	27-4-04		Filter No: 7972				Absorber No(s):	
Nozzle diameter	8.00	mm	SITE TEAM: LS, RJ					
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20	COMMENTS:					
			Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)			Does test conform to standard (Y/N)		
			Type of source					
			Plant load					
End volume reading	167.80	m^3		end time	15:33	hr:min	Control Box No: AQ 325	
Start volume reading	167.16	m^3		start time	14:01	hr:min		
Volume sampled	0.63	m^3		total time	01:32	hr:min		
Conditions	Value	Units	Diagram of Sample Location (include dimensions):					
Stack pressure	760.00	mm Hg						
Gas Meter Calibration Factor Y	1.0530							
Ref oxygen Value	11	%						
Moisture content	12.9	%						
CO	4	ppm						
CO_2	13.56	%						
N_2	79.07	%						
O_2	7.37	%						
Dry molecular wt	30.46							
Stack molecular wt	28.86							
Orifice ΔH@ Factor	46.30	mm H_20						
Area of stack	0.13	m^2	LEAK CHECK					
Pbar	1013	mbar	Pre Vac (" Hg): 15				Post Vac (" Hg): 2	
Pbar	760.0	mmHg						
Pitot tube coeft	0.84		Leak rate (m^3): <0.00057				Leak rate (m^3): <0.00057	
Reference Temp	273	K						
Reference Pressure	760	mmHg						

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	14:01	1	15	2.0	5.5	851	n/a	15	15	130	29	1	1.41
2:	14:16	1	15	2.0	5.5	785	n/a	16	14	130	29	1	1.41
3:	14:31	1	15	2.0	5.5	753	n/a	16	14	130	31	1	1.41
4:	14:46	1	15	2.0	5.5	744	n/a	15	15	130	29	1	1.41
5:	15:01	1	15	2.0	5.5	737	n/a	16	15	130	28	2	1.41
6:	15:16	1	15	2.00	5.5	727	n/a	16	15	130	28	2.0	1.41
7:	15:31	1	15	2.00	5.5	726	n/a	16	15	130	28	2.0	1.41
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		105		5.5	760.4			15.2	130.0	28.9	1.4	1.41

Operational Flow Characteristics at: Test No	Cremator 1 CC Parts 2	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.02	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.36	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.13	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	0.99	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.30	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.62	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.63	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.87	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.73	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.99	m^3
Percentage Isokinicity	96	%

REC
Moisture Test Form

Test No	CC Parts 1
Date	27-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	15
delta H (mm of H_2O)	5.5
Filter No (if app)	7971

Site	Coventry Crematorium
Stack	Cremator 1
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	167.16	m^3
Start Volume reading	166.54	m^3
Volume Sampled	0.62	m^3

end time	13:30	hr:min
start time	11:55	hr:min
total time	01:35	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	629.1	652.1	748.6	421.1		
Start weight in impingers in (gms)	595.8	631.7	734	420.2		
Weight Gain (g)	33.3	20.4	14.6	0.9	0	0

Total Weight Gain (1+2+3+4) (g)	69.2

Gas Volume of water at 0 deg. celcius (l)	86.15
Gas Meter volume at 0 deg. celcius (l)	590.09

Moisture content of Gases (%)	12.7

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is; 1 m^3 of gas weighs aporox 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content approx} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

REC
Moisture Test Form

Test No	CC Parts 2
Date	27-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	15
delta H (mm of H_20)	5.5
Filter No (if app)	7972

Site	Coventry Crematorium
Stack	Cremator 1
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	167.80	m^3
Start Volume reading	167.16	m^3
Volume Sampled	0.63	m^3

end time	15:33	hr:min
start time	14:01	hr:min
total time	01:32	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	626.7	629.5	428.3	826.2		
Start weight in impingers in (gms)	575.4	618.1	425.8	820		
Weight Gain (g)	51.3	11.4	2.5	6.2	0	0

Total Weight Gain (1+2+3+4) (g)	71.4

Gas Volume of water at 0 deg. celcius (l)	88.89
Gas Meter volume at 0 deg. celcius (l)	601.80

Moisture content of Gases (%)	12.9

NOTES:

at 0 deg. centigrade
Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected
Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg
35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

Test no	CC Parts 3	
Date	28-4-04	
Nozzle diameter	8.00	mm
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20
End volume reading	168.26	m^3
Start volume reading	167.80	m^3
Volume sampled	0.47	m^3

Conditions	Value	Units
Stack pressure	760.00	mm Hg
Gas Meter Calibration Factor Y	1.0530	
Ref oxygen Value	11	%
Moisture content	15.1	%
CO	3	ppm
CO_2	10.23	%
N_2	79.07	%
O_2	10.7	%
Dry molecular wt	30.06	
Stack molecular wt	28.25	
Orifice $\Delta H@$ Factor	46.30	mm H_20
Area of stack	0.16	m^2
Pbar	1013	mbar
Pbar	760.0	mmHg
Pitot tube coeft	0.84	
Reference Temp	273	K
Reference Pressure	760	mmHg

Site: Coventry Crematorium Stack Description: Cremator 2

Filter No: 7973 Absorber No(s):

SITE TEAM: LS, RJ

COMMENTS:

Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)		Does test conform to standard (Y/N)	
Type of source			
Plant load			

end time	17:24	hr:min	Control Box No: AQ325
start time	16:19	hr:min	
total time	01:05	hr:min	

Diagram of Sample Location (include dimensions):

LEAK CHECK

Pre Vac (" Hg): 15	Post Vac (" Hg): 2
Leak rate (m^3): <0.00057	Leak rate (m^3): <0.00057

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	16:19	1	15	2.0	5.50	836	n/a	14	14	130	23	1	1.41
2:	16:34	1	15	2.0	5.50	821	n/a	14	14	130	23	1	1.41
3:	16:49	1	15	2.0	5.50	808	n/a	14	14	130	21	1	1.41
4:	17:04	1	15	2.0	5.50	793	n/a	15	14	130	21	1	1.41
5:	17:19	1	15	2.0	5.50	799	n/a	15	14	130	20	1	1.41
6:													
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		75		5.5	811.4			14.2	130.0	21.6	1.0	1.41

Operational Flow Characteristics at: Test No	Cremator 2 CC Parts 3	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.34	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.33	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.52	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	1.29	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.38	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.60	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.47	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.48	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.55	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.57	m^3
Percentage Isokinicity	104	%

Test no	CC Parts 4		Site: Coventry Crematorium				Stack Description: Cremator 2	
Date	28-4-04		Filter No: 7974				Absorber No(s):	
Nozzle diameter	8.00	mm	SITE TEAM: LS, RJ					
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20	COMMENTS:					
			Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)			Does test conform to standard (Y/N)		
			Type of source					
			Plant load					
End volume reading	168.85	m^3		end time	11:46	hr:min	Control Box No: AQ 325	
Start volume reading	168.27	m^3		start time	10:26	hr:min		
Volume sampled	0.58	m^3		total time	01:20	hr:min		

Conditions	Value	Units
Stack pressure	760.00	mm Hg
Gas Meter Calibration Factor Y	1.0530	
Ref oxygen Value	11	%
Moisture content	9.0	%
CO	4	ppm
CO_2	12.23	%
N_2	79.07	%
O_2	8.7	%
Dry molecular wt	30.30	
Stack molecular wt	29.19	
Orifice ΔH@ Factor	46.30	mm H_20
Area of stack	0.16	m^2
Pbar	1013	mbar
Pbar	760.0	mmHg
Pitot tube coeft	0.84	
Reference Temp	273	K
Reference Pressure	760	mmHg

Diagram of Sample Location (include dimensions):

LEAK CHECK			
Pre Vac (" Hg):	15	Post Vac (" Hg):	2
Leak rate (m^3):	<0.00057	Leak rate (m^3):	<0.00057

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	10:26	1	15	3.0	6.0	863	n/a	18	18	131	24	1	1.73
2:	10:41	1	15	2.0	5.5	828	n/a	20	18	131	25	1	1.41
3:	10:56	1	15	2.0	5.5	823	n/a	21	19	130	25	1	1.41
4:	11:11	1	15	2.0	5.5	804	n/a	22	20	130	26	1	1.41
5:	11:26	1	15	2.0	5.5	793	n/a	18	19	130	21	1	1.41
6:	11:41	1	15	2.00	5.5	784	n/a	18	19	130	21	1.0	1.41
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		90		5.6	815.8			19.2	130.3	23.7	1.0	1.47

Operational Flow Characteristics at: Test No	Cremator 2 CC Parts 4	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.55	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.44	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.55	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	1.41	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.39	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.74	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.57	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.71	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.63	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.78	m^3
Percentage Isokinicity	97	%

REC
Moisture Test Form

Test No	CC Parts 3
Date	28-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	14
delta H (mm of H_20)	5.5
Filter No (if app)	7973

Site	Coventry Crematorium
Stack	Cremator 2
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	168.26	m^3
Start Volume reading	167.80	m^3
Volume Sampled	0.47	m^3

end time	17:24	hr:min
start time	16:19	hr:min
total time	01:05	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	639	633.8	421.6	753.5		
Start weight in impingers in (gms)	586.5	627.8	421.6	748.5		
Weight Gain (g)	52.5	6	0	5	0	0

Total Weight Gain (1+2+3+4) (g)	63.5

Gas Volume of water at 0 deg. celcius (l)	79.06
Gas Meter volume at 0 deg. celcius (l)	446.05

Moisture content of Gases (%)	15.1

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

REC
Moisture Test Form

Test No	CC Parts 4
Date	28-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	19
delta H (mm of H_2O)	5.6
Filter No (if app)	7974

Site	Coventry Crematorium
Stack	Cremator 2
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	168.85	m^3
Start Volume reading	168.27	m^3
Volume Sampled	0.58	m^3

end time	11:46	hr:min
start time	10:26	hr:min
total time	01:20	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	626.6	637.2	421.8	758		
Start weight in impingers in (gms)	590.4	634.7	421.4	753.5		
Weight Gain (g)	36.2	2.5	0.4	4.5	0	0

Total Weight Gain (1+2+3+4) (g)	43.6

Gas Volume of water at 0 deg. celcius (l)	54.28
Gas Meter volume at 0 deg. celcius (l)	545.98

Moisture content of Gases (%)	9.0

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

Test no	CC Parts 5	
Date	28-4-04	
Nozzle diameter	8.00	mm
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20
End volume reading	169.53	m^3
Start volume reading	168.85	m^3
Volume sampled	0.68	m^3

Conditions	Value	Units
Stack pressure	760.00	mm Hg
Gas Meter Calibration Factor Y	1.0530	
Ref oxygen Value	11	%
Moisture content	9.0	%
CO	2	ppm
CO_2	9.83	%
N_2	79.07	%
O_2	11.1	%
Dry molecular wt	30.02	
Stack molecular wt	28.94	
Orifice ΔH@ Factor	46.30	mm H_20
Area of stack	0.13	m^2
Pbar	1013	mbar
Pbar	760.0	mmHg
Pitot tube coeft	0.84	
Reference Temp	273	K
Reference Pressure	760	mmHg

Site: Coventry Crematorium Stack Description: Cremator 3

Filter No: 7975 Absorber No(s):

SITE TEAM: LS, RJ

COMMENTS:

Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)		Does test conform to standard (Y/N)	
Type of source			
Plant load			

end time	13:28	hr:min	Control Box No: AQ325
start time	12:08	hr:min	
total time	01:20	hr:min	

Diagram of Sample Location (include dimensions):

LEAK CHECK

Pre Vac (" Hg):	15	Post Vac (" Hg):	2
Leak rate (m^3):	<0.00057	Leak rate (m^3):	<0.00057

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	12:08	1	15	2.5	6.00	785	n/a	20	19	131	31	1	1.58
2:	12:23	1	15	4.0	10.00	824	n/a	23	20	131	32	1	2.00
3:	12:38	1	15	2.0	5.50	812	n/a	24	21	130	32	1	1.41
4:	12:53	1	15	2.0	5.50	797	n/a	24	22	130	33	1	1.41
5:	13:08	1	15	2.0	5.50	791	n/a	24	23	129	34	1	1.41
6:	13:23	1	15	2.0	5.50	795	n/a	25	23	130	35	1	1.41
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		90		6.3	800.7			22.3	130.2	32.8	1.0	1.54

Operational Flow Characteristics at: Test No	Cremator 3 CC Parts 5	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.99	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.29	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.29	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	1.17	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.33	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.50	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.66	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.65	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.72	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.72	m^3
Percentage Isokinicity	105	%

Test no	CC Parts 6		Site: Coventry Crematorium				Stack Description: Cremator 3	
Date	28-4-04		Filter No: 7976				Absorber No(s):	
Nozzle diameter	8.00	mm	SITE TEAM: LS, RJ					
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20	COMMENTS:					
			Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)			Does test conform to standard (Y/N)		
			Type of source					
			Plant load					
End volume reading	170.10	m^3		end time	15:13	hr:min	Control Box No: AQ 325	
Start volume reading	169.53	m^3		start time	13:50	hr:min		
Volume sampled	0.57	m^3		total time	01:23	hr:min		
Conditions	**Value**	**Units**	Diagram of Sample Location (include dimensions):					
Stack pressure	760.00	mm Hg						
Gas Meter Calibration Factor Y	1.0530							
Ref oxygen Value	11	%						
Moisture content	9.6	%						
CO	1.5	ppm						
CO_2	5.93	%						
N_2	79.07	%						
O_2	15	%						
Dry molecular wt	29.55							
Stack molecular wt	28.44							
Orifice $\Delta H@$ Factor	46.30	mm H_20						
Area of stack	0.13	m^2	LEAK CHECK					
Pbar	1013	mbar	Pre Vac (" Hg): 15				Post Vac (" Hg): 2	
Pbar	760.0	mmHg						
Pitot tube coeft	0.84		Leak rate (m^3): <0.00057				Leak rate (m^3): <0.00057	
Reference Temp	273	K						
Reference Pressure	760	mmHg						

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(In) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	13:50	1	15	2.0	5.5	854	n/a	24	24	129	37	1	1.41
2:	14:05	1	15	2.0	5.5	790	n/a	24	24	130	36	1	1.41
3:	14:20	1	15	2.0	5.5	801	n/a	25	23	130	36	1	1.41
4:	14:35	1	15	2.0	5.5	808	n/a	20	22	130	29	3	1.41
5:	14:50	1	15	2.0	5.5	801	n/a	18	20	130	26	3	1.41
6:	15:05	1	15	2.0	5.5	801	n/a	17	19	130	25	3.0	1.41
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		90		5.5	809.2			21.7	129.8	31.5	2.0	1.41

Operational Flow Characteristics at: Test No	Cremator 3 CC Parts 6	Units
Stack Velocity at stack gas T & P and a wet gas basis	9.30	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.16	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	1.20	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	1.08	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.30	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.28	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.55	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.33	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.61	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.36	m^3
Percentage Isokinicity	96	%

REC
Moisture Test Form

Test No	CC Parts 5
Date	28-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	22
delta H (mm of H_20)	6.3
Filter No (if app)	7975

Site	Coventry Crematorium
Stack	Cremator 3
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	169.53	m^3
Start Volume reading	168.85	m^3
Volume Sampled	0.68	m^3

end time	13:28	**hr:min**
start time	12:08	**hr:min**
total time	**01:20**	**hr:min**

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	618.4	618.7	428.5	831.8		
Start weight in impingers in (gms)	577.8	616.2	428	826		
Weight Gain (g)	**40.6**	**2.5**	**0.5**	**5.8**	**0**	**0**

Total Weight Gain (1+2+3+4) (g)	49.4

Gas Volume of water at 0 deg. celcius (l)	61.50
Gas Meter volume at 0 deg. celcius (l)	625.26

Moisture content of Gases (%)	**9.0**

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (\text{m}^3 \text{ of gas on meter} \times 1200)}$$

REC
Moisture Test Form

Test No	CC Parts 6
Date	28-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	22
delta H (mm of H_20)	5.5
Filter No (if app)	7976

Site	Coventry Crematorium
Stack	Cremator 3
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	170.10	m^3
Start Volume reading	169.53	m^3
Volume Sampled	0.57	m^3

end time	15:13	hr:min
start time	13:50	hr:min
total time	01:23	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of Impingers in (gms)	621.3	639.1	422.4	750		
Start weight in impingers in (gms)	585.9	635.2	421.7	745		
Weight Gain (g)	35.4	3.9	0.7	5	0	0

Total Weight Gain (1+2+3+4) (g)	45

Gas Volume of water at 0 deg. celcius (l)	56.02
Gas Meter volume at 0 deg. celcius (l)	525.59

Moisture content of Gases (%)	9.6

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

Test no	CC Parts 7		Site: Coventry Crematorium				Stack Description: Cremator 4	
Date	29-4-04		Filter No: 7978				Absorber No(s):	
Nozzle diameter	8.00	mm	SITE TEAM: LS, RJ					
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20	COMMENTS:					
			Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)				Does test conform to standard (Y/N)	
			Type of source					
			Plant load					
End volume reading	171.43	m^3		end time	13:35	hr:min	Control Box No: AQ325	
Start volume reading	170.86	m^3		start time	12:06	hr:min		
Volume sampled	0.57	m^3		total time	01:29	hr:min		
Conditions	Value	Units	Diagram of Sample Location (include dimensions):					
Stack pressure	760.00	mm Hg						
Gas Meter Calibration Factor Y	1.0530							
Ref oxygen Value	11	%						
Moisture content	9.8	%						
CO	3	ppm						
CO_2	10.93	%						
N_2	79.07	%						
O_2	10	%						
Dry molecular wt	30.15							
Stack molecular wt	28.96							
Orifice ΔH@ Factor	46.30	mm H_20						
Area of stack	0.12	m^2	LEAK CHECK					
Pbar	1013	mbar	Pre Vac (" Hg): 15				Post Vac (" Hg): 2	
Pbar	760.0	mmHg						
Pitot tube coeft	0.84		Leak rate (m^3): <0.00057				Leak rate (m^3): <0.00057	
Reference Temp	273	K						
Reference Pressure	760	mmHg						

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
1:	12:06	1	15	1.5	5.00	927	n/a	18	18	129	17	1	1.22
2:	12:21	1	15	1.5	5.00	964	n/a	20	17	129	16	2	1.22
3:	12:36	1	15	1.5	4.00	916	n/a	21	18	129	16	2	1.22
4:	12:51	1	15	1.5	4.00	908	n/a	20	18	130	16	2	1.22
5:	13:06	1	15	1.5	4.00	870	n/a	20	18	130	17	2	1.22
6:	13:21	1	15	1.5	4.00	855	n/a	21	19	130	17	2	1.22
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		90		4.3	906.7			19.0	129.5	16.5	1.8	1.22

Operational Flow Characteristics at: Test No	Cremator 4 CC Parts 7	Units
Stack Velocity at stack gas T & P and a wet gas basis	8.33	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.23	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	0.99	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	0.90	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.23	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.39	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.56	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.62	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.62	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.68	m^3
Percentage Isokinicity	118	%

Test no	CC Parts 8		**Site:** Coventry Crematorium				**Stack Description:** Cremator 4	
Date	29-4-04		**Filter No:** 7979				**Absorber No(s):**	
Nozzle diameter	8.00	mm	**SITE TEAM:** LS, RJ					
Stack Pres (with +/- above barometric if unknown enter zero)	0.0	mm H20	**COMMENTS:**					
			Reference Standard (BS6069, BS3405, US EPA M5, Non Standard)				Does test conform to standard (Y/N)	
			Type of source					
			Plant load					
End volume reading	171.97	m^3		**end time**	15:40	hr:min	**Control Box No:** AQ 325	
Start volume reading	171.43	m^3		**start time**	14:25	hr:min		
Volume sampled	0.54	m^3		**total time**	01:15	hr:min		
Conditions	**Value**	**Units**	**Diagram of Sample Location (include dimensions):**					
Stack pressure	760.00	mm Hg						
Gas Meter Calibration Factor Y	1.0530							
Ref oxygen Value	11	%						
Moisture content	12.1	%						
CO	0	ppm						
CO_2	11.43	%						
N_2	79.07	%						
O_2	9.5	%						
Dry molecular wt	30.21							
Stack molecular wt	28.74							
Orifice ΔH@ Factor	46.30	mm H_2O						
Area of stack	0.12	m^2	**LEAK CHECK**					
Pbar	1013	mbar	**Pre Vac (" Hg):** 15				**Post Vac (" Hg):** 2	
Pbar	760.0	mmHg						
Pitot tube coeft	0.84		**Leak rate (m^3):** <0.00057				**Leak rate (m^3):** <0.00057	
Reference Temp	273	K						
Reference Pressure	760	mmHg						

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum In Hg	√Δp
1:	14:25	1	15	2.0	5.5	916	n/a	19	19	129	15	1	1.41
2:	14:40	1	15	1.0	4.0	954	n/a	21	19	130	31	1	1.00
3:	14:55	1	15	2.0	5.5	1016	n/a	21	19	130	53	1	1.41
4:	15:10	1	15	1.0	4.0	999	n/a	22	20	130	20	1	1.00
5:	15:25	1	15	1.0	4.0	927	n/a	22	20	131	21	1	1.00
6:	15:40	1	15	1.0	4.0	852	n/a	23	20	129	17	1.0	1.00
7:													
8:													
9:													
10:													

	Time Hr : Min	Probe position	Time at each position min	Δ p mm H_2O	Δ h mm H_2O	stack Temp Ts °C	probe Temp Tp °C	Meter in Tm(in) °C	Meter out Tm(out) °C	Oven Temp °C	Impinger Temp °C	Vacuum in Hg	√Δp
11:													
12:													
13:													
14:													
15:													
16													
17:													
18:													
19:													
20:													
21:													
	Average values		**90**		**4.5**	**944.0**			**20.4**	**129.8**	**26.2**	**0.8**	**1.14**

Operational Flow Characteristics at: Test No	Cremator 4 CC Parts 8	Units
Stack Velocity at stack gas T & P and a wet gas basis	7.89	ms^{-1}
Stack flow @ STP, O_2 (ref) and on a dry gas basis	0.21	m^3s^{-1}
Stack flow @ stack gas T & P and on a wet gas basis	0.94	m^3s^{-1}
Stack flow @ stack gas T & P and on a dry gas basis	0.83	m^3s^{-1}
Stack flow @ STP and on a wet gas basis	0.21	m^3s^{-1}
Stack flow @ STP, O_2 (ref) and on a wet gas basis	0.38	m^3s^{-1}
Gas vol. samp. @ STP and on a dry gas basis	0.53	m^3
Gas vol. samp. @ STP, O_2(ref), and on a dry gas basis	0.61	m^3
Gas vol. samp. @ STP and on a wet gas basis	0.60	m^3
Gas vol. samp. @ STP, O_2 (ref) and on a wet gas basis	0.69	m^3
Percentage Isokinicity	125	%

REC
Moisture Test Form

Test No	CC Parts 7
Date	29-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	19
delta H (mm of H_2O)	4.3
Filter No (if app)	7978

Site	Coventry Crematorium
Stack	Cremator 4
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	171.43	m^3
Start Volume reading	170.86	m^3
Volume Sampled	0.57	m^3

end time	13:35	**hr:min**
start time	12:06	**hr:min**
total time	**01:29**	**hr:min**

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	592.7	669.8	421.7	749.7		
Start weight in impingers in (gms)	585.9	630	422	749.8		
Weight Gain (g)	**6.8**	**39.8**	**-0.3**	**-0.1**	0	0

Total Weight Gain (1+2+3+4) (g)	**46.2**

Gas Volume of water at 0 deg. celcius (l)	57.52
Gas Meter volume at 0 deg. celcius (l)	531.26

Moisture content of Gases (%)	**9.8**

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (\text{m}^3 \text{ of gas on meter} \times 1200)}$$

REC
Moisture Test Form

Test No	CC Parts 8
Date	29-4-04
pbar (mbar)	1013
pbar (mm of Hg):	760
nozzle diameter (mm)	8.00
Temp of Meter (in)/(out) deg. C	20
delta H (mm of H_20)	4.5
Filter No (if app)	7979

Site	Coventry Crematorium
Stack	Cremator 4
Site Team:	LS, RJ
Data Entered By:	MS

End Volume Reading	171.97	m^3
Start Volume reading	171.43	m^3
Volume Sampled	0.54	m^3

end time	15:40	hr:min
start time	14:25	hr:min
total time	01:15	hr:min

IMPINGER	1	2	3	4	5	6
End Weight of impingers in (gms)	620.9	631.4	428.6	832.4		
Start weight in impingers in (gms)	576.8	625.6	428.4	827.1		
Weight Gain (g)	44.1	5.8	0.2	5.3	0	0

Total Weight Gain (1+2+3+4) (g)	55.4

Gas Volume of water at 0 deg. celcius (l)	68.97
Gas Meter volume at 0 deg. celcius (l)	502.64

Moisture content of Gases (%)	12.1

NOTES:

at 0 deg. centigrade

Volume (ltrs) of water in gas phase is Vwc= 1.2444 x wt of water collected

Volume of gas sampled by meter (ltrs) dry Vmc= 359.2 x gas meter reading(m^3) x (Pbar + delta H/13.6) / (meter temp +273)

moisture content = Vwc/(Vwc+Vmc)

an approximation is: 1 m^3 of gas weighs approx 1.2 Kg

35.3 cu ft of gas = 1 cu m

$$\text{moisture content aprrox} = \frac{\text{wt of water collected (g)} \times 100}{\text{wt of water collected (g)} + (m^3 \text{ of gas on meter} \times 1200)}$$

APPENDIX 2

Data Presented at 273K,
101.3kPa Without Correction
For Oxygen Or Moisture

Table 1w

Flue Gas parameters at Coventry Crematorium, Cremator No. 1
(Data expressed at 273K, 101.3kPa and Wet Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
27-Apr-04	11:55	13:30	CC Parts 1	1085	761
27-Apr-04	14:01	15:33	CC Parts 2	1078	760

Level of Particulates on Cremator 1 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, Wet Gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m³/s	(°C)	(%)	(%)	(m³)	(°C)
CC Parts 1	27-Apr-04	11:55	13:30	01:35	9.1	0.30	761	11.5	12.7	0.7121	14.9
CC Parts 2	27-Apr-04	14:01	15:33	01:32	9.0	0.30	760	7.4	12.9	0.7273	15.2

Test No	Dust Concentration		Accuracy of Results (± 10%)	Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm³		mg/Nm³	kg/hr	g	g	g	g		g
CC Parts 1	90		*80.8 to 98.7*	0.10	0.0639	0.5202	0.5551	0.0349		0.0291
CC Parts 2	72		*65.2 to 79.7*	0.08	0.0527	0.5164	0.5401	0.0236		0.0291

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 1
(Data expressed at 273K, 101.3kPa and Wet Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 1	CC Parts 2			CC Parts 1	CC Parts 2
Date	27-Apr-04	27-Apr-04				
Start Time	11:55	14:01		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	13:30	15:33				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	121.1	56.2		96	86.2	40.8

Gas Volume at Ref. Conditions (m³)	0.71	0.73
Average Gas Meter Temperature (°C)	14.9	15.2
Oxygen (%)	11.5	7.4
Moisture (%)	12.7	12.9

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1												
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}	
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2
Chloride	36.5	1	35.5	85.32		237		300	60	360				41.18		116	

Table 3w

	Test 2						Blank		
	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Blank	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1			Impinger 2					
Chloride	300	55	355				0.7134	4.1	174

Table 6w

Flue Gas parameters at Coventry Crematorium, Cremator No. 2
(Data expressed at 273K, 101.3kPa and Wet Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
28-Apr-04	16:19	17:24	CC Parts 3	1376	811
28-Apr-04	10:26	11:46	CC Parts 4	1401	816

Level of Particulates on Cremator 2 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, Wet Gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 3	28-Apr-04	16:19	17:24	01:05	9.3	0.38	811	10.7	15.1	0.5529	14.2
CC Parts 4	28-Apr-04	10:26	11:46	01:20	9.5	0.39	816	8.7	9.0	0.6321	19.2

Test No	Dust Concentration mg/Nm³		Accuracy of Results (± 10%) mg/Nm³			Mass Emission Rate kg/hr	Total Particulate Mass Collected g	Pre Filter Wt g	Post Filter Wt g	Particulate on Filter g	n.d (*)	Particulate in Acetone g
CC Parts 3	**164**		*147.9*	*to*	*180.7*	0.23	0.0909	0.5126	0.5325	0.0199		0.0710
CC Parts 4	**130**		*116.6*	*to*	*142.5*	0.18	0.0819	0.5181	0.5290	0.0109		0.0710

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 2
(Data expressed at 273K, 101.3kPa and Wet Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 3	CC Parts 4			CC Parts 3	CC Parts 4
Date	28-Apr-04	28-Apr-04				
Start Time	16:19	10:26		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	17:24	11:46				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	60.3	19.0		55	33.4	12.0

Gas Volume at Ref. Conditions (m³)	0.55	0.63
Average Gas Meter Temperature (°C)	14.2	19.2
Oxygen (%)	10.7	8.7
Moisture (%)	15.1	9.0

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1												
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}	
Analyte	(eg. HCl = 36.5)	l_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2
Chloride	36.5	1	35.5	33.945		93		300	65	365				13.11		38	

	Test 2						Blank		
	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Blank	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1			Impinger 2					
Chloride	300	45	345				0.7134	4.1	174

Table 11w

Flue Gas parameters at Coventry Crematorium, Cremator No. 3
(Data expressed at 273K, 101.3kPa and Wet Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
28-Apr-04	12:08	13:28	CC Parts 5	1178	801
28-Apr-04	13:50	15:13	CC Parts 6	1088	809

Level of Particulates on Cremator 3 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, Wet Gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m³/s	(°C)	(%)	(%)	(m³)	(°C)
CC Parts 5	28-Apr-04	12:08	13:28	01:20	10.0	0.33	801	11.1	9.0	0.7232	22.3
CC Parts 6	28-Apr-04	13:50	15:13	01:23	9.3	0.30	809	15.0	9.6	0.6124	21.7

Test No	Dust Concentration		Accuracy of Results (± 10%)			Mass Emission Rate	Total Particulate Mass Collected	Pre Filter Wt	Post Filter Wt	Particulate on Filter	n.d (*)	Particulate in Acetone
	mg/Nm³		mg/Nm³			kg/hr	g	g	g	g		g
CC Parts 5	143		*128.6*	*to*	*157.2*	0.17	0.1033	0.5129	0.5311	0.0182		0.0852
CC Parts 6	169		*152.1*	*to*	*185.9*	0.18	0.1035	0.5180	0.5363	0.0184		0.0852

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 3
(Data expressed at 273K, 101.3kPa and Wet Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 5	CC Parts 6			CC Parts 5	CC Parts 6
Date	28-Apr-04	28-Apr-04				
Start Time	12:08	13:50		Average Mass Emission	Amount of Species in Sample	Amount of Species in Sample
End Time	13:28	15:13				
Units	mg/Nm³	mg/Nm³		g/hr	mg	mg
Hydrogen Chloride	33.8	31.9		37	24.4	19.5

Gas Volume at Ref. Conditions (m³)	0.72	0.61
Average Gas Meter Temperature (°C)	22.3	21.7
Oxygen (%)	11.1	15.0
Moisture (%)	9.0	9.6

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1												
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Soins mg l^{-1}		Initial Volume of Impinger Soins ml	Absorber Soln added as Washings ml	Final Volume of Impinger Soins ml	Initial Volume of Impinger Soins ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Soins ml	Amount of Species in Sample mg		Amount of Species in Soins mg l^{-1}	
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2
Chloride	36.5	1	35.5	25.185		73		300	45	345				20.4		60	

	Test 2						Blank		
	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Blank	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1			Impinger 2					
Chloride	300	40	340				0.7134	4.1	174

Table 16w

Flue Gas parameters at Coventry Crematorium, Cremator No. 4
(Data expressed at 273K, 101.3kPa and Wet Gas)

Date	Start Time hr:min	End Time hr:min	Test No	Gas Flow rate m^3/hr	Average Temp °C
29-Apr-04	12:06	13:35	CC Parts 7	829	907
29-Apr-04	14:25	15:40	CC Parts 8	761	944

Level of Particulates on Cremator 4 at Coventry Crematorium
(Data expressed at 273K, 101.3kPa, Wet Gas)

Test No	Date	Test Start Time	Test End Time	Duration of Sampling	Stack Gas Velocity	Stack Gas Flow at Ref. Cond.	Average Stack Gas Temp.	Stack Gas Oxygen	Stack gas Moisture	Meter Gas Volume at Ref. Conditions	Average Gas Meter Temperature
		hr:min		hr:min	m/s	m^3/s	(°C)	(%)	(%)	(m^3)	(°C)
CC Parts 7	29-Apr-04	12:06	13:35	01:29	8.3	0.23	907	10.0	9.8	0.6200	19.0
CC Parts 8	29-Apr-04	14:25	15:40	01:15	7.9	0.21	944	9.5	12.1	0.6019	20.4

Test No	Dust Concentration mg/Nm³		Accuracy of Results (± 10%) mg/Nm³			Mass Emission Rate kg/hr	Total Particulate Mass Collected g	Pre Filter Wt g	Post Filter Wt g	Particulate on Filter g	n.d (*)	Particulate in Acetone g
CC Parts 7	403		*363.1*	*to*	*443.7*	0.33	0.2501	0.5214	0.5533	0.0319		0.2182
CC Parts 8	438		*393.9*	*to*	*481.5*	0.33	0.2635	0.5198	0.5651	0.0453		0.2182

Level of Chloride (expressed as HCl)
at Coventry Crematorium, Cremator 4
(Data expressed at 273K, 101.3kPa and Wet Gas)
Concentrations of acids in mg/Nm³

Test No	CC Parts 7	CC Parts 8				CC Parts 7	CC Parts 8
Date	29-Apr-04	29-Apr-04					
Start Time End Time	12:06 13:35	14:25 15:40		Average Mass Emission		Amount of Species in Sample	Amount of Species in Sample
Units	mg/Nm³	mg/Nm³		g/hr		mg	mg
Hydrogen Chloride	42.9	47.8		36		26.6	28.8

Gas Volume at Ref. Conditions (m³)	0.62	0.60
Average Gas Meter Temperature (°C)	19.0	20.4
Oxygen (%)	10.0	9.5
Moisture (%)	9.8	12.1

* Values Reported Represent the Lower Analytical Detection Limit.

				Test 1												
Units	Molecular Weight.	No of atoms of analyte in molecule	Molecular Weight of analyte	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}		Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Volume of Impinger Solns ml	Initial Volume of Impinger Solns ml	Absorber Soln added as Washings ml	Final Total Volume of Impinger Solns ml	Amount of Species in Sample mg		Amount of Species in Solns mg l^{-1}	
Analyte	(eg. HCl = 36.5)	I_2 = 2, HCl =	(eg. Cl = 35.5)	Imp 1	Imp 2	Imp 1	Imp 2	Impinger 1			Impinger 2			Imp 1	Imp 2	Imp 1	Imp 2
Chloride	36.5	1	35.5	27.255		79		300	45	345				29.465		83	

	Test 2						Blank		
	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Initial Volume of Impinger Solns	Absorber Soln added as Washings	Final Total Volume of Impinger Solns	Total Amount of Species in Blank	Total Amount of Species in Blank	Total Volume of Blank
Units	ml	ml	ml	ml	ml	ml	mg	mg l^{-1}	ml
Analyte	Impinger 1			Impinger 2					
Chloride	300	55	355				0.7134	4.1	174

APPENDIX 3

Calculations

Calculations

Conversion Factors

ppm ® mg/Nm³ (at 273K, 101.3kPa: STP)

CO	X	1.25	
SO_2	X	2.86	
VOC's	X	0.53	(as total Carbon)
NO_x	X	2.05	(as NO_2)

Oxygen Correction to Reference Value

Concentration at (STP) -> Concentration at 273K, 101.3kPa, reference O_2 and Dry Gas, i.e.

Concentration X ((20.9-O_2 ref)/(20.9-O_2 measured)) = Concentration at ref Oxygen state.

Example Calculation

SO_2 concentration at STP	=	170.7 mg/Nm³
Oxygen percentage in gas stream	=	13.8%
Reference Oxygen	=	11%

SO_2 concentration at reference O_2 conditions	=	170.7 ((20.9-11)/(20.9-13.8))
	=	238 mg/Nm³ at 273K, 101.3kPa, 11% O_2 and Dry Gas

Moisture Correction (Wet to Dry)

Concentration of Gas Dry = Concentration of x 100/100-Bws Gas Wet

Concentration of Gas Wet = Concentration of x 100-Bws/100 Gas Dry

Where Bws = moisture content of gas stream in percent (Vol/Vol).

Example

VOC concentration	=	25 mg/Nm³ (Wet)
Moisture Content	=	27.1%
Concentration of VOC Dry	=	25 (100/(100-27.1))
=		34.3 mg/Nm³ (Dry)

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To:	**John LeNepveu**	**Of:**	**Coventry Crematorium**
Fax No.:	**via email**	**cc.**	
From:	**Mike Smith**	**Date:**	**24 March 2004**
No. pages:	**na (incl. this sheet)**	**Ref.:**	**1f70389**

Subject: EMISSIONS MONITORING AT COVENTRY CREMATORIUM

Hi John,

Further to your request for a method statement on how we would conduct emissions monitoring at Coventry Crematorium, I am pleased to respond as follows:-

Scope of Works

Sampling would be undertaken in order to satisfy the monitoring requirements specified in *Local Authority* authorisation under Process Guidance Note PG 5/2 (95),. The survey would include measurements of total Particulate matter, Hydrogen chloride, Total Hydrocarbons (THC), Carbon Monoxide (CO), and Oxygen (O_2) moisture content would be calculated gravimetrically from the cremation.

The monitoring data would be reported either in terms of emission concentrations or emission rates of pollutants dependent upon the conditions of the individual Authorisation.

Sampling Methodology

The following sampling and analytical methodology would be adopted for the parameters above:

Particulates and Hydrogen Chloride (HCl)- sampled in accordance with the main procedural requirements of British Standard 3405 using isokinetic stack sampling equipment. Equipment based upon US EPA Method 5 would be used for the tests. Sampling would be undertaken under isokinetic conditions i.e. the flowrate through the sampling train is equal to that in the stack.

An initial temperature and velocity profile would be carried out to determine the variation and allow an appropriate sized nozzle to be selected to undertake the sampling.

The US EPA M5 equipment consists of a probe connected to a filter contained in an oven compartment to ensure emissions are kept above the dew point prior to filtration. The design of the probe would be dependent upon the temperature at the measurement point.The probe is fitted with a thermocouple to record the stack temperature and an S-type pitot to measure the flow in the stack.

The filter is connected to an impinger train containing de-ionised water. The first two impingers each contain 150ml of de-ionised water, the third is left empty and the fourth contains silica gel to dry the gas prior to recording the volume sampled on a dry gas meter (DGM).
On completion of sampling the filter is removed from its holder and transferred to its original container. The probe and glassware up to the filter are rinsed with acetone and these washings collected in a glass jar.

At the laboratory the filters are conditioned and re-weighed. The acetone wash is evaporated to dryness in a tared container and the amount of residue weighed to constant weight. A total mass of particulate matter collected from the run is then determined from the sum of the filter weight gain and acetone wash residue. From the known volume of emissions sampled at reference conditions an emission concentration could then be calculated.

Duplicate samples would be obtained from each release point to be monitored.

The volume in the impingers is noted. The silica gel is re-weighed to determine the amount of moisture absorbed. A moisture content of emissions can then be calculated form the total amount of water collected in the impinger train and dry gas volume sampled.

In order to also sample for chloride on the particulate sampling runs the impinger train on the Method 5 equipment would be used to absorb volatile chloride in accordance with the requirements of BS EN 1911 using deionised water as the absorbing media to capture volatile chloride.

Ambient temperature and pressure would be measured in order that the gas meter volumes can be corrected to 101.3 kPa and 273K. The stack oxygen and moisture content would also be measured in order that the results could be referenced to the appropriate standard conditions.

On completion of sampling the adsorbing solutions are collected and stored in sealed bottles.

All samples collected are uniquely labelled and details entered onto a Laboratory Submission Sheet to ensure a chain of custody from sample collection to laboratory receipt. All sample analysis is carried out by our sister company SAL Ltd a UKAS accredited contract laboratory.

Organic Compounds as C

Sampling would be undertaken using a Signal 3030-flame ionisation detector (FID) in accordance with the requirements of US EPA Method 25A. The unit is not intrinsically safe and a single 110V (16A) supply at the inlet sampling point at ground would be necessary. The instrument is fitted with a sintered filter to remove particulates and a heated sample line and FID block to minimise condensation problems or a non-reactive PTFE tube would be utilised to draw a sample of the gas into the FID. Concentration are logged using a data logger set to record minute averages expressed as parts per million as carbon. This data is then transferred to an Excel spreadsheet and converted to a concentration in mg/m^3 using the conversion factor

mg/m^3 as C = ppm as C x 12/22.4.

VOC concentrations would be monitored continuously. An average concentration over each trial is then calculated.

Combustion Gases

REC Ltd has various monitoring equipment available for this type of work from mobile laboratories fitted with continuous analysers to portable sampling equipment. For versatility of access at the Crematoria and the intrusive nature of the laboratories, REC Ltd would propose to use a Testo 33 (or a Testo 360) portable analyser fitted with electrochemical cells to measure concentrations of the combustion gases.

The analyser would be calibrated against traceable test gases prior to each survey. Measured data for O_2, and CO in parts per million (ppm) would then be converted and expressed in mg/m^3.

Additional Measurements

Temperature and flow measurement would also be undertaken and reported.

Sampling Procedure

An initial velocity and flow profile is established to ensure the temperature and flow variation are within the requirements of BS 3405.

Sampling for particulate matter is carried out via both of the access ports provided wherever access permits. Sampling is carried out over a reasonable period to try to ensure the minimum amount of material required by the standard (0.3% of the weight of the filter) is collected.

Sampling for particulates should be undertaken at four points across two sampling planes defined at 0.15D and 0.85D where D = stack diameter or 0.25W and 0.75W where W = width of a rectangular duct. Measurements of O_2 and CO concentrations are also made in order to determine the nozzle required to achieve isokinetic sampling for dioxin sampling.

The FID and combustion analyser are set up and checked for operation. The FID is span and zero checked. The probes are inserted into the sample ports provided as per BS 3405.

All analysers are zeroed and calibrated on site using certified standards. All systems are leak checked to ensure integrity prior to sampling.

Reporting Requirements

A detailed report would be prepared including:

- Details of the tests carried out - date, time,
- Details of the test methods and any variations
- Plant operational details (coffin size etc.)
- Results reported at the appropriate standard conditions of 273K, 101.3kPa at 11
- % O_2 on a dry gas basis.
- Results should be expressed as either a mass emission rate in gram per hour (g/hr) or concentration in milligram per cubic metre (mg/m^3) dependent upon the conditions of the authorisation.

I hope the above is useful to you and I look forward to your decision in due course.

Best Regards

Mike Smith
Operations Manager
for **REC (Birmingham) Ltd**