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2003

REPORT OF MONITORING OF ATMOSPHERIC EMISSIONS FROM SPECIFIED STACKS AT JAGUAR CARS LIMITED BROWNS LANE, COVENTRY

A Report For

Jaguar Cars Limited
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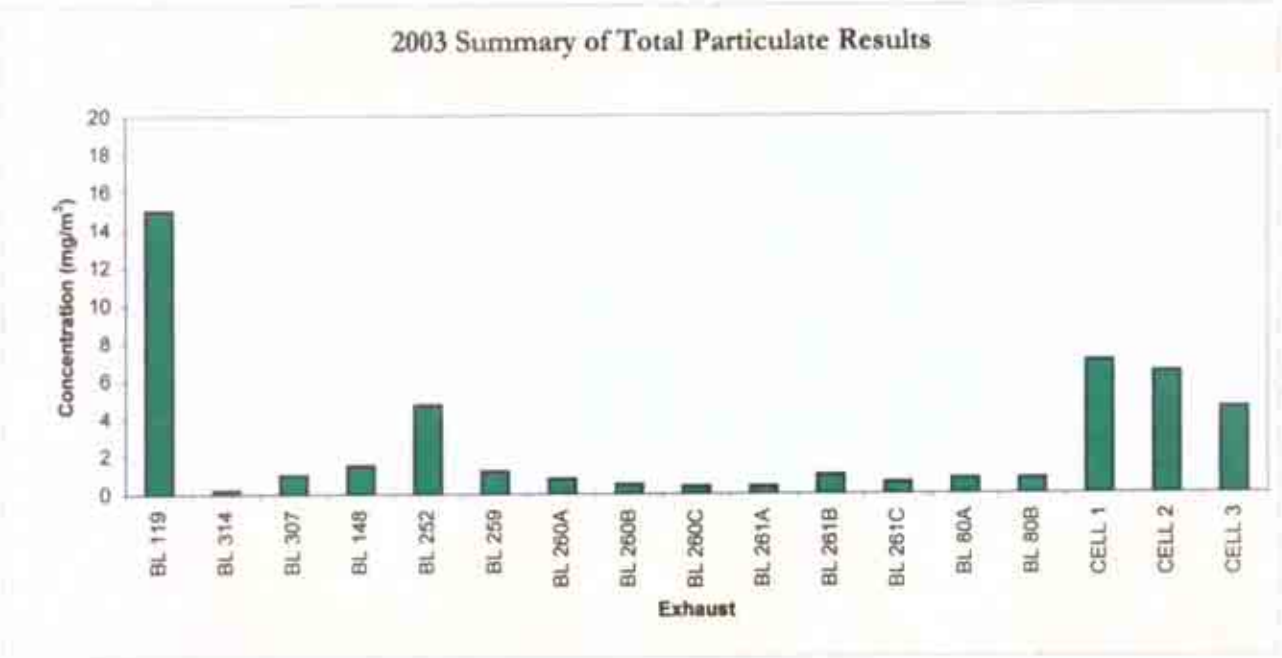
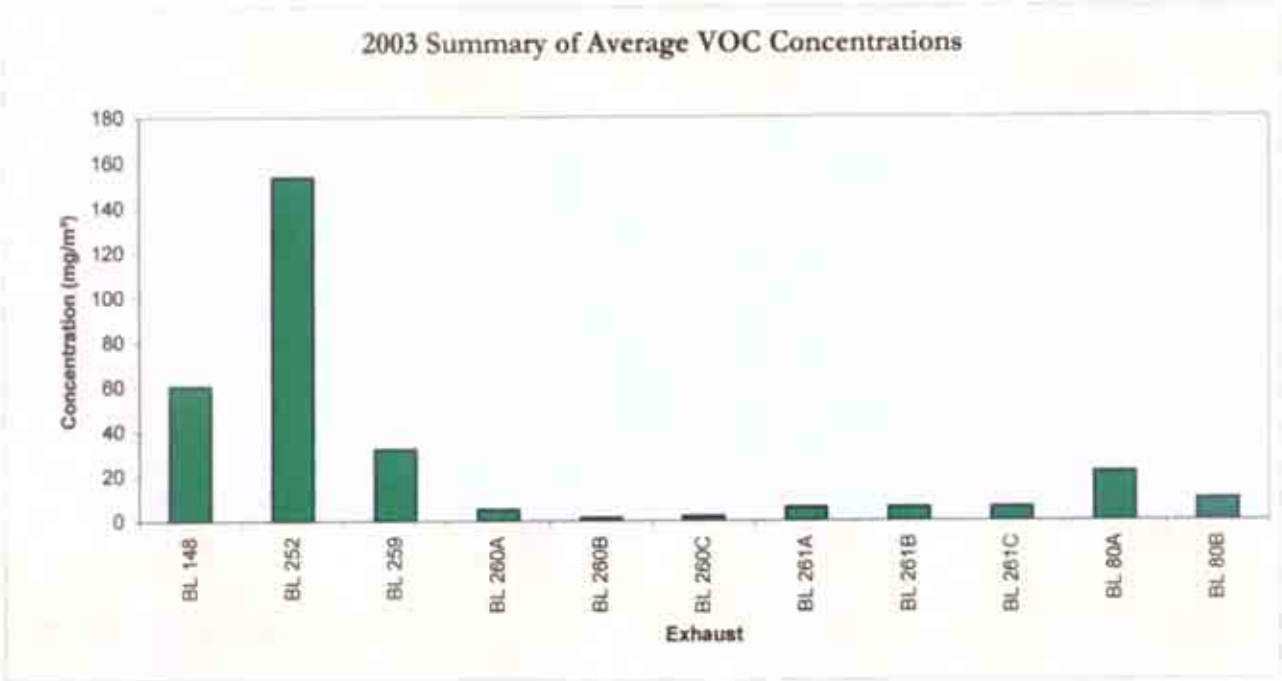
Executive Summary

Casella Stanger Ltd carried out a sitewide emissions monitoring programme from various processes at Jaguar Cars, Browns Lane from 17th September to 2nd October 2003. The graphs below give a brief summary of our findings which are reported in detail further into this report.





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PROJECT TEAM

Project work carried out by:	Mr. P. D. Butler Mr. H. Saeed
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1.0 INTRODUCTION

Jaguar Cars Limited commissioned Casella Stanger to conduct monitoring of atmospheric emissions from selected process stacks at the Browns Lane Site.

The scope of services provided by Casella Stanger is described in the proposal (Ref: T4192/93/94/CMB/IEM/v2 dated 6th May 2003) which includes details of the terms and conditions under which the work was performed. The specification was slightly reduced from the previous year with the removal of the Sawmill annexe Blackout Booth.

1.1 Objective

The objective of the survey was to provide information to support authorisation under the Environmental Protection Act 1990.

1.2 Scope of Survey

The emissions from the exhausts were monitored under normal operating conditions for the following parameters as specified by Jaguar Cars.

1.2.1 Old Sawmill

Reference	Location	No. of Exhausts	Parameters
BL 119	Acrylic Spray Booth	1	Particulate
BL 314	Spray Booth No. 1	1	Particulate, Isocyanate
BL 301	Spray Booth No. 2	1	Particulate, Isocyanate
BL 298	Spray Booth No. 3	1	Particulate, Isocyanate
BL 370	Spray Booth No. 4	1	Particulate, Isocyanate

Note : BL 301, BL 298 and BL 370 exhausts were found to be no longer in use which was confirmed between Casella Stanger and Jaguar Cars Ltd.

1.2.2 Trim Shop

Reference	Location	No. of Exhausts	Parameters
BL 307	Spray Booth	1	Particulate

1.2.3 Service Paint Shop

Reference	Location	No. of Exhausts	Parameters
BL 148	Spray Bake	1	Particulate, VOC, Isocyanate

1.2.3 Paint Repair Shop

Reference	Location	No. of Exhausts	Parameters
BL 001	Incinerator	1	VOC, CO, NO_x
BL 252	Spray Bake	1	Particulate, VOC, Isocyanate
BL 258	Blow Off Booth	1	VOC
BL 259	Tac Rag Booth	1	Particulate, VOC
BL 260	Colour Booths	3	Particulate, VOC
BL 261	Lacquer Booths	3	Particulate, VOC, Isocyanate

Note : BL 258 exhaust was found to be no longer in use which was confirmed by Casella Stanger and Jaguar Cars Ltd. BL 259 is now referred to as the Tack Off & Clean Booth.

1.2.4 Spot Repair Shop

Reference	Location	No. of Exhausts	Parameters
BL 80	Spray Booth	2	Particulate, VOC

1.2.5 New Sawmill

Reference	Location	No. of Exhausts	Parameters
Cell 1	Spray Booth	1	Particulate, Isocyanate
Cell 2	Spray Booth	1	Particulate, Isocyanate
Cell 3	Spray Booth	1	Particulate, Isocyanate

The site work was conducted between the 17th September and 2nd October 2003 by Mr. Philip Butler and Mr. Hamad Saeed under the overall supervision of Mr. P. Hutchings of Jaguar Cars Limited.

2.0 PLANT OPERATION

During the survey, Casella Stanger checked that each process was operating under normal conditions whilst it was monitored.

When monitoring for VOCs the processes were observed and a time log of spraying and other activity within the area was made. This data was used to annotate the presentation graphs displayed in Appendix 1 of this report.

Sampling was scheduled to avoid relief breaks on the production lines.

2.1 Operating Conditions

2.1.1 Old Sawmill

Spraying was constant during the sampling of Spray Booth 1 (BL 314), typically 45 minutes in every hour.

The UV Acrylic Lacquer Booth (BL 119) was used less frequently with the machine running for approximately 30 minutes per run. Monitoring was scheduled to coincide with these runs.

2.1.2 Trim Shop

The Trim Shop Spray Booth (BL 307) was used infrequently during the survey. A typical run consisted of a 30 minute spray cycle of adhesive (Evostick 6523 Clear).

2.1.3 Service Paint Shop

During Run 1 of the Spray Bake (BL 148), two representative panels were sprayed for approximately 15 minutes with Cromax Platinum and Quartz Basecoat. After spraying, the booth was set to bake for 30 minutes at 50°C. During Run 2, the same two panels were then sprayed for 10 minutes with Chromaclear 3800S Lacquer before being left to bake for 30 minutes at 90°C.

2.1.4 Paint Repair Shop

Production details from the Paint Repair Shop Colour Booths, Lacquer Booths, Spray Bake and Tack Off and Clean Booth were recorded during monitoring and used to annotate the presentation graphs displayed in Appendix 1 of this report. The spraying times, number of panels, paint type and colour were noted to give a more detailed account of production during monitoring periods.

2.1.5 Spot Repair Shop

A constant number of cars were worked on (typically 3 or 4 panels per hour) during the monitoring of the Spot Repair exhausts BL 80A and BL 80B without any breaks.

2.1.6 New Sawmill

During the monitoring of Cell 1, 350 panels (Walnut) were sprayed from 13:40 to 14:40 on 17th September with a further 350 panels (Walnut) sprayed from 08:48 to 10:30 on 19th September to coincide with the monitoring periods.

Cell 2 was monitored on 17th September between 13:16 and 14:59 and during this period 400 panels (Pommelle) were sprayed.

Cell 3 was also monitored on 17th September, from 10:02 to 12:09, and during this time 400 cappings (Pommelle) were sprayed.

3.0 SUMMARY OF RESULTS

Detailed results are divided into the following sections:

Appendix 1A	Old Sawmill
Appendix 1B	Trim Shop
Appendix 1C	Service Paint Shop
Appendix 1D	Paint Repair Shop
Appendix 1E	Spot Repair
Appendix 1F	New Sawmill

3.1 Summary of Results

Results are expressed to reference conditions of Temperature 273K, Pressure 101kPa.

The VOC results given are the highest recorded averages over a two minute period.

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3.1.1 Old Sawmill – PG6/33(97) Wood Coating Processes

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	Particulate Concentration (mg/m^3)	Isocyanates Concentration as NCO (mg/m^3)	Particulate Emission Limit (mg/m^3)
Acrylic Spray	1	2.3	16	12.7	-	
Booth	2	-	-	17.3	-	50.0
(BL 119)	Mean	**2.3**	**16**	**15.0**	-	
Spray Booth 1	1	8.8	20	<0.1	<0.01	
(BL 314)	2	-	-	0.3	-	50.0
	Mean	**8.8**	**20**	**0.2**	**<0.01**	

3.1.2 Trim Shop – PG6/32(97) Adhesive Coating Processes

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	Particulate Concentration (mg/m^3)	Particulate Emission Limit (mg/m^3)
Spray Booth	1	5.2	19	1.2	
(BL 307)	2	-	-	0.7	50.0
	Mean	**5.2**	**19**	**1.0**	

3.1.3 Service Paint Shop – PG6/34(97) Respraying of Road Vehicles

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	VOC as C Highest 2 Minute Mean concentration (mg/m^3)	Particulate Concentration (mg/m^3)	Isocyanates Concentration as NCO (mg/m^3)
Spraybake	1	7.0	17	-	0.8	<0.01
(BL 148)	2	-	-	-	2.1	-
	Mean	**7.0**	**17**	**60.3**	**1.5**	**<0.01**

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3.1.4 Paint Repair Shop – PG6/34(97) Respraying of Road Vehicles

Location	VOC as C Highest 2 Minute Mean Concentration (mg/m^3)	CO Highest 15 Minute Mean Concentration (mg/m^3)	NOx as NO_2 Highest 15 Minute Mean Concentration (mg/m^3)	VOC Emission Limit (mg/m^3)
Incinerator (BL 001)	2	122	77	50

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	VOC as C Highest 2 Minute Mean Concentration (mg/m^3)	Particulate Concentration (mg/m^3)	Isocyanates Concentration as NCO (mg/m^3)
Spraybake (BL 252)	1	2.4	22	153.3	4.8	<0.01
	2	-	-		4.5	-
	Mean	**2.4**	**22**		**4.7**	**<0.01**
Tack Off & Clean (BL 259)	1	2.9	23	32.0	1.8	-
	2	-	-		0.6	-
	Mean	**2.9**	**23**		**1.2**	-
Colour Booth (BL 260A)	1	13.9	18	5.0	0.4	-
	2	-	-		1.2	-
	Mean	**13.9**	**18**		**0.8**	-
Colour Booth (BL 260B)	1	13.2	19	1.3	1.0	-
	2	-	-		<0.1	-
	Mean	**13.2**	**19**		**0.5**	-
Colour Booth (BL 260C)	1	12.3	20	1.9	0.7	-
	2	-	-		<0.1	-
	Mean	**12.3**	**20**		**0.4**	-
Lacquer Booth (BL 261A)	1	6.2	20	5.9	0.5	<0.01
	2	-	-		0.3	-
	Mean	**6.2**	**20**		**0.4**	**<0.01**
Lacquer Booth (BL 261B)	1	4.0	23	5.9	1.4	<0.01
	2	-	-		0.6	-
	Mean	**4.0**	**23**		**1.0**	**<0.01**
Lacquer Booth (BL 261C)	1	14.6	22	6.0	0.2	<0.01
	2	-	-		1.0	-
	Mean	**14.6**	**22**		**0.6**	**<0.01**

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3.1.5 Spot Repair Shop – PG6/34(97) Respraying of Road Vehicles

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	Particulate Concentration (mg/m^3)	VOC as C Highest 2 Minute Mean Concentration (mg/m^3)	Particulate Emission Limit (mg/m^3)
Spray Booth	1	3.2	22	1.2		
Track 5	2	-	-	0.3	**21.7**	10.0
(BL 80A)	Mean	**3.2**	**22**	**0.8**		
Spray Booth	1	2.9	21	1.1		
Track 5	2	-	-	0.4	**9.6**	10.0
(BL 80B)	Mean	**2.9**	**21**	**0.8**		

3.1.6 New Sawmill – PG6/33(97) Wood Coating Processes

Location	Run	Flow at 273k (m^3/s)	Temp. (°C)	Particulate Concentration (mg/m^3)	Isocyanates Concentration as NCO (mg/m^3)	Particulate Emission Limit (mg/m^3)
Spray Booth	1	2.1	21	8.5	<0.01	
Cell 1	2	-	-	5.4	-	50.0
	Mean	**2.1**	**21**	**7.0**	**<0.01**	
Spray Booth	1	2.1	20	8.3	<0.01	
Cell 2	2	-	-	4.5	-	50.0
	Mean	**2.1**	**20**	**6.4**	**<0.01**	
Spray Booth	1	2.2	20	5.2	<0.01	
Cell 3	2	-	-	3.7	-	50.0
	Mean	**2.2**	**20**	**4.5**	**<0.01**	

APPENDIX 1

DETAILED RESULTS OF SAMPLING AND ANALYSIS

APPENDIX 1A

OLD SAWMILL

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Table 1

Preliminary Gas Velocity and Temperature Measurement
Rectangular Duct

Location:	**Old Sawmill Acrylic (UV Lacquer) Booth**
Test Position:	**Exhaust BL 119**
Date of Measurement:	**23rd September 2003**
Instrument:	**CAE Console**
Serial Number:	**SSE 33446**

Velocity Pressure Scale Factor: 0.20

Meas. pt. (m)	Line A Reading	Pv (Pa)	Temp. (°C)	Line B Reading	Pv (Pa)	Temp. (°C)
0.068	0.28	56		0.34	68	
0.135	0.24	48		0.24	48	
0.203	0.24	48		0.23	46	
0.270	0.23	46	16	0.19	38	16
0.338	0.18	36		0.17	34	
0.405	0.15	30		0.17	34	
0.473	0.13	26		0.16	32	

Note: Sampling points <2 duct diameters from bend, sampling not to BS3405

Mean Pv=	41.5			
Highest pitot-static reading (Pa)	68.0			
Lowest pitot-static reading (Pa)	26.0			
Ratio highest/lowest=	2.6	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	289.0			
Permitted range of Gas Temperature (°C)=		-12.9	to	44.9
Duct Dimension (m)	0.54	Duct Area (m^2)		0.29
Duct Dimension (m)	0.54			

Velocity (m/s) at Gas Temperature 8.2

Flowrate (m^3/s) at Gas Temperature 2.4

Flowrate (m^3/s) at Temperature 273K 2.3

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Table 2

Atmospheric Emission of Total Particulate Matter from the Old Sawmill Acrylic UV Lacquer Booth Exhaust (BL 119) on the 23rd September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/17	1	10:30 to 11:00	199	1.9	10.1
19266/19	2	11:10 to 11:40	208	2.4	12.1

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/18	1	10:30 to 11:00	0.5
19266/20	2	11:10 to 11:40	1.0

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/17 19266/18	1	10:30 to 11:00	199	2.4	12.7
19266/19 19266/20	2	11:10 to 11:40	208	3.4	17.3

Mean temperature in duct at sampling point (°C)	16

Sample volume measurement temperature (°C)	
Run 1	14
Run 2	17

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Table 3

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Old Sawmill Spray Booth No.1**
Test Position	**Exhaust BL 314**
Date of Measurement	**22nd September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.20

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.066	0.09	18		2.24	448	
0.198	negative	0		2.10	420	
0.330	negative	0		0.05	10	
0.462	negative	0		negative	0	
0.594	negative	0	20	negative	0	20
0.726	negative	0		negative	0	
0.858	negative	0		negative	0	
0.990	1.42	284		negative	0	
1.122	2.28	456		negative	0	
1.254	2.14	428		negative	0	

Note: Sampling points <4 duct diameters from fan, sampling not to BS3405

Mean Pv=	29.1			
Highest pitot-static reading (Pa)	456.0			
Lowest pitot-static reading (Pa)	1.0			
Ratio highest/lowest=	456.0	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	293.0			
Permitted range of Gas Temperature (°C)=		-9.3	to	49.3
Duct Diameter (m)	1.32	Duct Area (m^2)		1.37

Velocity (m/s) at Gas Temperature **6.9**

Flowrate (m^3/s) at Gas Temperature **9.5**

Flowrate (m^3/s) at Temperature 273K 8.8

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Table 4

Atmospheric Emission of Total Particulate Matter from the Old Sawmill Spray Booth 1 Exhaust (BL 314) on the 22nd September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/41	1	10:36 to 11:21	389	<0.1*	<0.1*
19266/43	2	11:27 to 12:12	399	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/42	1	10:36 to 11:21	<0.1*
19266/44	2	11:27 to 12:12	0.1

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/41 19266/42	1	10:36 to 11:21	389	<0.1	<0.1*
19266/43 19266/44	2	11:27 to 12:12	399	0.1	0.3

Mean temperature in duct at sampling point (°C)	20

Sample volume measurement temperature (°C)	
Run 1	20
Run 2	20

* Below Detection Limit

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Table 5

Atmospheric Emission of Total Isocyanates (as NCO)
from BL 314 Old Sawmill Booth No.1 Exhaust
on the 22nd September 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
BL314	1	10:40 to 11:40	60	0.03	<0.01

Detection Limit = 0.02 µg

Mean temperature in duct at sampling point (°C) = 20

Sample volume measurement temperature (°C) = 20

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

APPENDIX 1B

TRIM SHOP

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Table 6

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Trim Shop Spray Booth**
Test Position	**Exhaust BL 307**
Date of Measurement	**23rd September 2003**
Instrument:	**CAE Console**
Serial Number:	**SSE 33446**

Velocity Pressure Scale Factor: 0.20

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.031	2.15	430		2.30	460	
0.093	2.09	418		2.18	436	
0.155	1.90	380		2.17	434	
0.217	1.38	276		1.10	220	
0.279	1.05	210	19	0.64	128	19
0.341	0.82	164		0.55	110	
0.403	0.75	150		0.43	86	
0.465	0.67	134		0.42	84	
0.527	0.78	156		0.38	76	
0.589	0.85	170		0.36	72	

Mean Pv=	209.3			
Highest pitot-static reading (Pa)	460.0			
Lowest pitot-static reading (Pa)	72.0			
Ratio highest/lowest=	6.4	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	292.0			
Permitted range of Gas Temperature (°C)=		-10.2	to	48.2
Duct Diameter (m)	0.62	Duct Area (m^2)		0.30

Velocity (m/s) at Gas Temperature **18.5**

Flowrate (m^3/s) at Gas Temperature **5.6**

Flowrate (m^3/s) at Temperature 273K **5.2**

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Table 7

Atmospheric Emission of Total Particulate Matter from the Trim Shop Spray Booth Exhaust (BL 307) on the 23rd September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/13	1	07:50 to 08:20	585	0.4	0.7
19266/15	2	09:18 to 09:43	310	0.1	0.3

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/14	1	07:50 to 08:20	0.3
19266/16	2	09:18 to 09:43	0.1

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/13 19266/14	1	07:50 to 08:20	585	0.7	1.2
19266/15 19266/16	2	09:18 to 09:43	310	0.2	0.7

Mean temperature in duct at sampling point (°C)	19

Sample volume measurement temperature (°C)

Run 1	08
Run 2	09

APPENDIX 1C

SERVICE PAINT SHOP

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Table 8

Preliminary Gas Velocity and Temperature Measurement
Rectangular Duct

Location:	**Service Paint Shop Spray Bake**
Test Position:	**Exhaust BL 148**
Date of Measurement:	**2nd October 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	Line A Reading	Pv (Pa)	Temp. (°C)	Meas. pt. (m)	Line B Reading	Pv (Pa)	Temp. (°C)
0.150	0.30	30		0.150	0.33	33	
0.300	0.33	33		0.300	0.29	29	
0.450	0.28	28		0.450	0.27	27	
0.600	0.25	25	17	0.600	0.24	24	17
0.750	0.26	26		0.750	0.24	24	
0.900	0.23	23		0.900	0.21	21	
1.050	0.12	12		1.050	0.16	16	

Mean Pv=	24.7		
Highest pitot-static reading (Pa)	33.0		
Lowest pitot-static reading (Pa)	12.0		
Ratio highest/lowest=	2.8	(Maximum permitted ratio= 8:1)	
Mean Gas Temperature (K)	293.5		
Permitted range of Gas Temperature (°C)=		-8.8 to	49.9
Duct Dimension (m)	1.2	Duct Area (m^2)	1.18
Duct Dimension (m)	0.98		

Velocity (m/s) at Gas Temperature **6.4**

Flowrate (m^3/s) at Gas Temperature **7.5**

Flowrate (m^3/s) at Temperature 273K **7.0**

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Table 9

Atmospheric Emission of Total Particulate Matter from the Service Paint Shop Spray Bake Booth Exhaust (BL 148) on the 2nd October 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/72	1	09:40 to 09:56	263	0.1	0.4
19266/74	2	10:35 to 10:45	200	0.4	2.1

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/73	1	09:40 to 09:56	0.1
19266/75	2	10:35 to 10:45	<0.1*

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/72 19266/73	1	09:40 to 09:56	263	0.2	0.8
19266/74 19266/75	2	10:35 to 10:45	200	0.4	2.1

Mean temperature in duct at sampling point (°C)	17

Sample volume measurement temperature (°C)

Run 1	11
Run 2	14

*Below Detection Limit

Table 10

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Service Paint Shop		
Test Position	Spray Bake BL 148		
Run Number	1		
Date of Sampling	2nd October 2003		
Sample Reference	19266/81		
Sample Period	09:40	to	10:55
Ambient Temp. (°C)	11		
Sample Volume (l)	7.50		
Weight Recovered as Carbon (µg)	**170**		
Total VOC as Carbon* (mg/m^3)	**9.2**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 11

Atmospheric Emission of Total Isocyanates (as NCO) from BL 148 Service Paint Shop Spray Bake Exhaust on the 2nd October 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
19266/81	1	09:40 to 10:55	75	<dl	<0.01

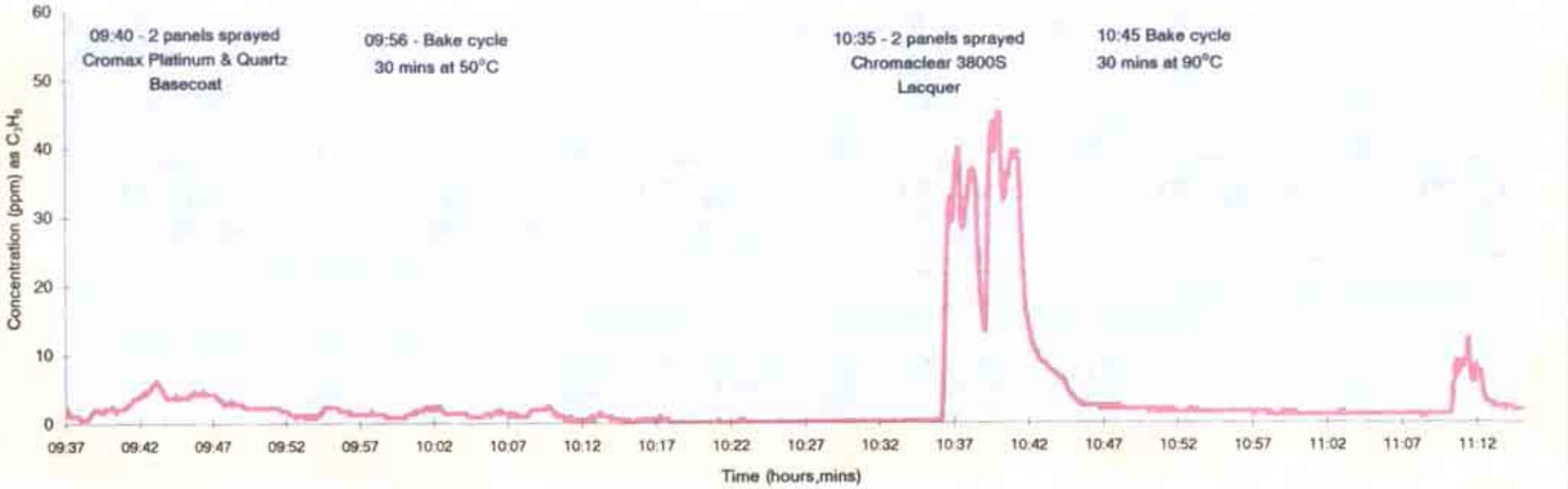
Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 17

Sample volume measurement temperature (°C) = 11

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

Figure 1. Emissions of Volatile Organic Compounds (as propane) from the Service Paint Shop Spray Bake Booth BL 148 Exhaust on the 2nd October 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	10:36 to 10:38	12.7	20.5
2	10:38 to 10:40	29.2	46.9

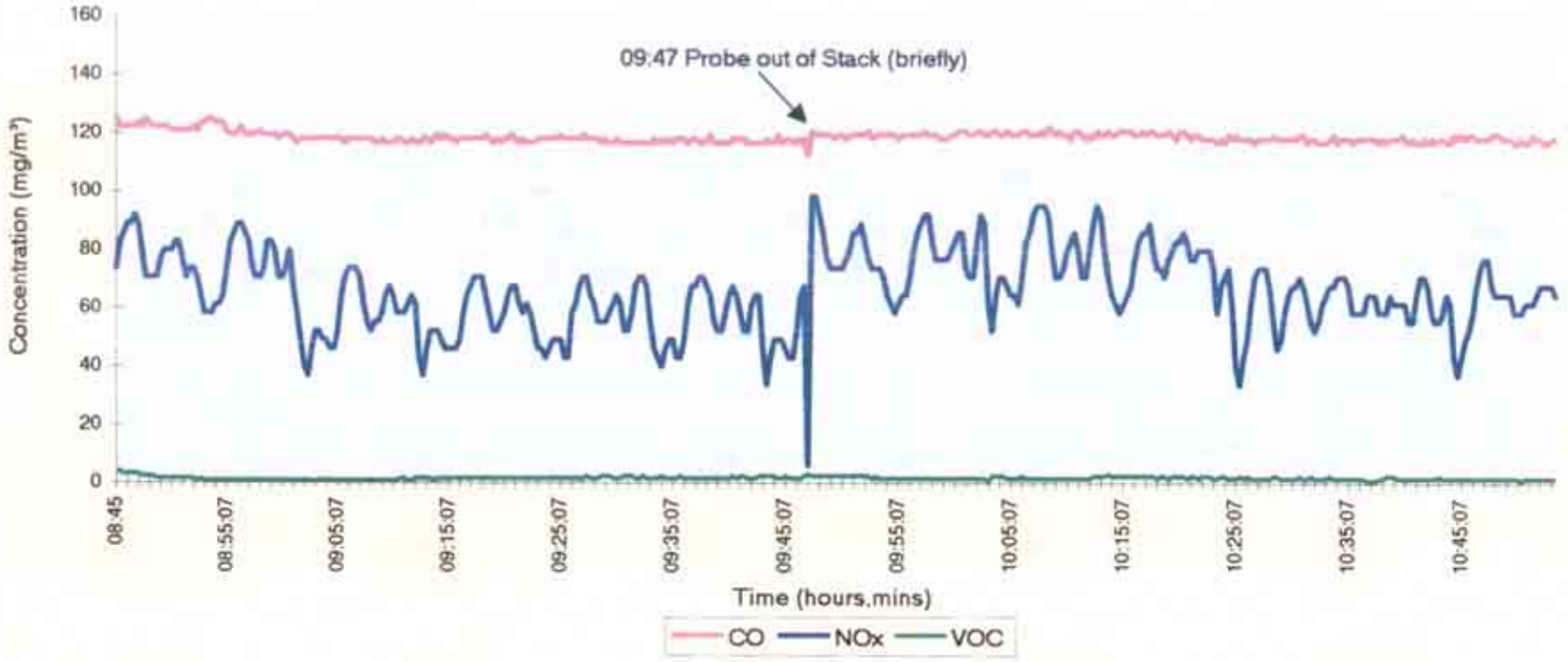
Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	10:40 to 10:42	37.5	60.3
4	10:42 to 10:44	17.3	27.8

Reference Conditions: Temperature 273K, Pressure 101.3kPa

APPENDIX 1D

PAINT REPAIR SHOP

Figure 2: Emissions of Carbon Monoxide, Oxides of Nitrogen and Volatile Organic Compounds from the Paint Repair Shop Incinerator BL 001 on 18th September 2003



Averaging time			Mean Concentration (mg/m³)			Max Concentration (mg/m³)			Min Concentration (mg/m³)		
			CO	NOx	VOC	CO	NOx	VOC	CO	NOx	VOC
08:45	to	09:00	122	76	2	125	92	4	118	58	1
09:00	to	09:15	118	57	1	119	80	2	117	37	0
09:15	to	09:30	118	57	2	119	71	2	117	43	2
09:30	to	09:45	117	56	2	119	71	2	117	34	2
09:45	to	10:00	119	73	2	121	98	3	113	6	2
10:00	to	10:15	120	77	2	122	95	3	118	52	1
10:15	to	10:30	119	70	2	121	89	2	117	34	2

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Table 12

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Spray Bake**
Test Position	**Exhaust BL 252**
Date of Measurement	**26th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.05

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.035	0.38	19.0		0.48	24.0	
0.105	0.37	18.5		0.53	26.5	
0.175	0.41	20.5		0.58	29.0	
0.245	0.49	24.5		0.60	30.0	
0.315	0.55	27.5	22	0.62	31.0	22
0.385	0.57	28.5		0.62	31.0	
0.455	0.58	29.0		0.61	30.5	
0.525	0.57	28.5		0.55	27.5	
0.595	0.55	27.5		0.53	26.5	
0.665	0.55	27.5		0.52	26.0	

Mean Pv=	26.5		
Highest pitot-static reading (Pa)	31.0		
Lowest pitot-static reading (Pa)	18.5		
Ratio highest/lowest=	1.7	(Maximum permitted ratio= 9:1)	
Mean Gas Temperature (K)	295.0		
Permitted range of Gas Temperature (°C)=		-7.5 to	51.5
Duct Diameter (m)	0.7	Duct Area (m^2)	0.38

Velocity (m/s) at Gas Temperature **6.6**

Flowrate (m^3/s) at Gas Temperature **2.6**

Flowrate (m^3/s) at Temperature 273K **2.4**

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Table 13

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Spray Bake Booth Exhaust (BL 252) on the 26th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/21	1	09:43 to 09:48	87	<0.1*	<0.1*
19266/23	2	11:14 to 11:19	94	0.3	3.4

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/22	1	09:43 to 09:48	0.4
19266/24	2	11:14 to 11:19	0.1

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/21 19266/22	1	09:43 to 09:48	87	0.4	4.8
19266/23 19266/24	2	11:14 to 11:19	94	0.4	4.5

Mean temperature in duct at sampling point (°C)	22

Sample volume measurement temperature (°C)

Run 1	15
Run 2	15

*Below Detection Limit

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Table 14

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop
Test Position	Spray Bake BL 252
Run Number	1
Date of Sampling	26th September 2003
Sample Reference	LD319266/45
Sample Period	09:40 to 10:40
Ambient Temp. (°C)	15
Sample Volume (l)	6.00
Weight Recovered as Carbon (µg)	**180**
Total VOC as Carbon* (mg/m^3)	**8.6**

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 15

**Atmospheric Emission of Total Isocyanates (as NCO)
from BL 252 Paint Repair Shop Spray Bake Exhaust
on the 26th September 2003**

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m^3)
19266/50	1	10:50 to 12:10	80	<dl	<0.01

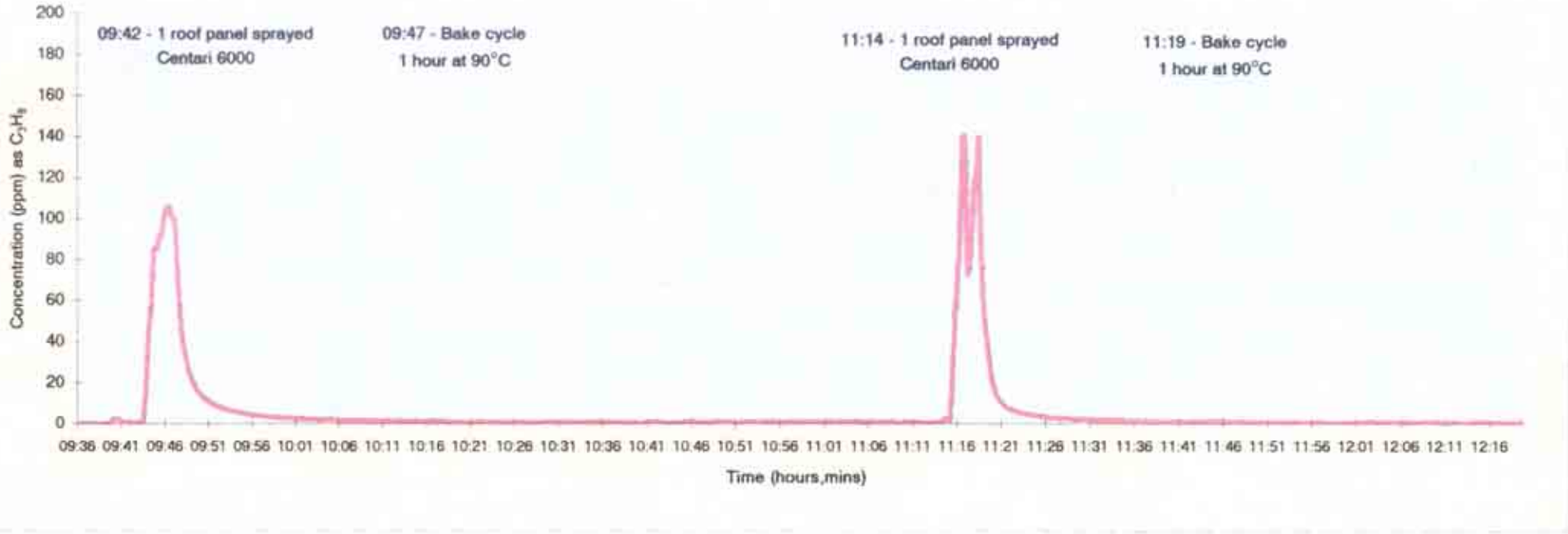
Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 22

Sample volume measurement temperature (°C) = 15

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

Figure 3. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Spray Bake Booth BL 252 Exhaust on the 26th September 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane / molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	09:45 to 09:47	95.4	153.3
2	09:47 to 09:49	61.4	98.7

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	11:16 to 11:18	93.6	150.4
4	11:18 to 11:20	83.1	133.5

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 16

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Tack Off & Clean Booth**
Test Position	**Exhaust BL 259**
Date of Measurement	**25th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.05

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.053	0.11	5.5		0.14	7.0	
0.158	0.13	6.5		0.14	7.0	
0.263	0.15	7.5		0.15	7.5	
0.368	0.16	8.0		0.15	7.5	
0.473	0.16	8.0	23	0.15	7.5	23
0.578	0.15	7.5		0.15	7.5	
0.683	0.15	7.5		0.16	8.0	
0.788	0.17	8.5		0.16	8.0	
0.893	0.18	9.0		0.19	9.5	
0.998	0.23	11.5		0.20	10.0	

Mean Pv=	7.9		
Highest pitot-static reading (Pa)	11.5		
Lowest pitot-static reading (Pa)	5.5		
Ratio highest/lowest=	2.1	(Maximum permitted ratio= 9:1)	
Mean Gas Temperature (K)	296.0		
Permitted range of Gas Temperature (°C)=		-6.6 to	52.6
Duct Diameter (m)	1.05	Duct Area (m^2)	0.87

Velocity (m/s) at Gas Temperature **3.6**

Flowrate (m^3/s) at Gas Temperature **3.1**

Flowrate (m^3/s) at Temperature 273K **2.9**

Table 17

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Tack Off and Clean Booth Exhaust (BL 259) on the 25th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/25	1	10:40 to 11:20	342	0.1	0.3
19266/27	2	11:26 to 12:06	363	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/26	1	10:40 to 11:20	0.5
19266/28	2	11:26 to 12:06	0.2

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/25 19266/26	1	10:40 to 11:20	342	0.6	1.8
19266/27 19266/28	2	11:26 to 12:06	363	0.2	0.6

Mean temperature in duct at sampling point (°C)	16

Sample volume measurement temperature (°C)		
	Run 1	14
	Run 2	17

*Below Detection Limit

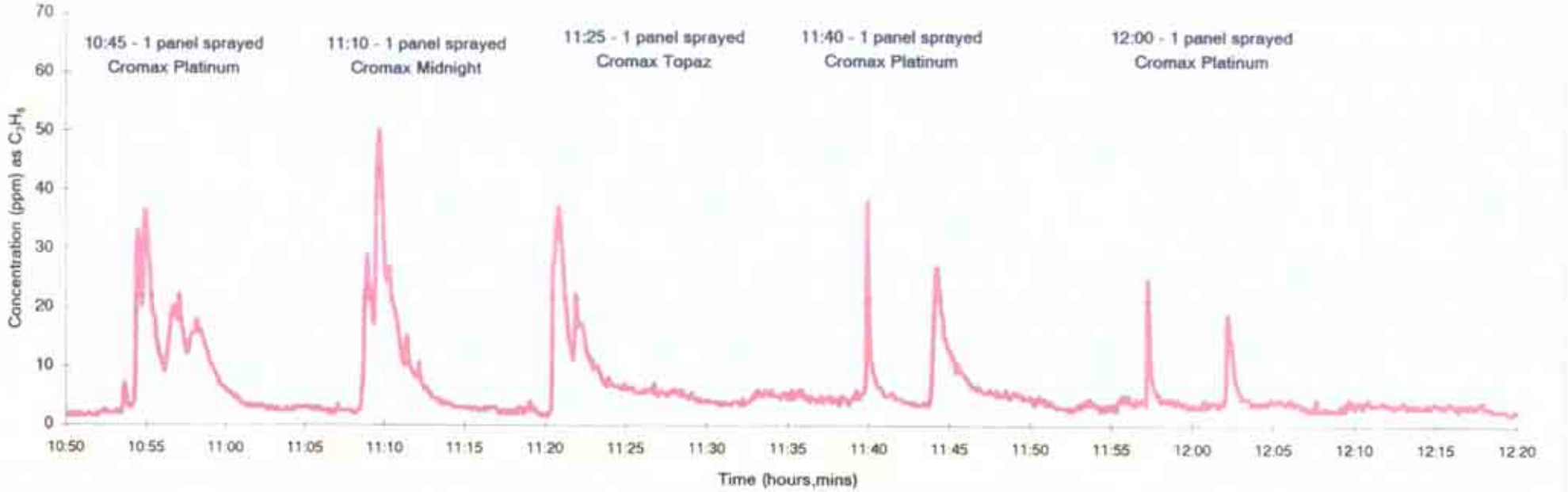
Table 18

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop
Test Position	Tack Off & Clean Booth BL 259
Run Number	1
Date of Sampling	25th September 2003
Sample Reference	LD319266/46
Sample Period	10:40 to 11:40
Ambient Temp. (°C)	12
Sample Volume (l)	6.60
Weight Recovered as Carbon (µg)	180
Total VOC as Carbon* (mg/m^3)	9.7

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 4. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Tack Off and Clean Booth BL 259 Exhaust on the 25th September 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	10:54 to 10:56	18.5	29.8
2	11:08 to 11:10	17.3	27.8

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	11:10 to 11:12	19.9	32.0
4	11:20 to 11:22	16.4	26.4

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 19

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Colour Booth**
Test Position	**Exhaust BL 260A**
Date of Measurement	**24th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.68	68		0.66	66	
0.203	0.84	84		0.83	83	
0.338	0.79	79		0.65	65	
0.473	0.35	35		0.32	32	
0.608	0.23	23	18	0.20	20	18
0.743	0.24	24		0.34	34	
0.878	0.41	41		0.91	91	
1.013	0.84	84		0.94	94	
1.148	1.30	130		1.12	112	
1.283	1.51	151		0.94	94	

Mean Pv=	65.6		
Highest pitot-static reading (Pa)	151.0		
Lowest pitot-static reading (Pa)	20.0		
Ratio highest/lowest=	7.6	(Maximum permitted ratio= 9:1)	
Mean Gas Temperature (K)	291.0		
Permitted range of Gas Temperature (°C)=		-11.1 to	47.1
Duct Diameter (m)	1.35	Duct Area (m^2)	1.43

Velocity (m/s) at Gas Temperature **10.4**

Flowrate (m^3/s) at Gas Temperature **14.8**

Flowrate (m^3/s) at Temperature 273K **13.9**

Table 20

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Colour Booth Exhaust (BL 260A) on the 24th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/29	1	11:02 to 11:42	539	0.1	0.2
19266/31	2	11:47 to 12:27	543	0.1	0.2

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/30	1	11:02 to 11:42	<0.1
19266/32	2	11:47 to 12:27	0.5

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/29 19266/30	1	11:02 to 11:42	539	0.2	0.4
19266/31 19266/32	2	11:47 to 12:27	543	0.6	1.2

Mean temperature in duct at sampling point (°C)	18

Sample volume measurement temperature (°C)	Run 1	20
	Run 2	23

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Table 21

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop		
Test Position	Colour Booth BL 260A		
Run Number	1		
Date of Sampling	24th September 2003		
Sample Reference	LD319266/47		
Sample Period	11:15	to	12:15
Ambient Temp. (°C)	16		
Sample Volume (l)	6.90		
Weight Recovered as Carbon (µg)	**520**		
Total VOC as Carbon* (mg/m^3)	**22.7**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 5. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Colour Booth BL 260A Exhaust on the 24th September 2003

Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	11:24 to 11:26	2.4	3.8
2	11:26 to 11:28	2.5	4.1

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	11:28 to 11:30	3.1	5.0
4	12:13 to 12:15	1.9	3.1

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 22

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Colour Booth**
Test Position	**Exhaust BL 260B**
Date of Measurement	**24th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.62	62		0.48	48	
0.203	0.73	73		0.59	59	
0.338	0.68	68		0.94	94	
0.473	0.60	60		0.86	86	
0.608	0.45	45	19	0.39	39	19
0.743	0.29	29		0.27	27	
0.878	0.47	47		0.33	33	
1.013	0.79	79		0.43	43	
1.148	0.94	94		0.56	56	
1.283	1.39	139		0.52	52	

Mean Pv=	59.1	
Highest pitot-static reading (Pa)	139.0	
Lowest pitot-static reading (Pa)	27.0	
Ratio highest/lowest=	5.1	(Maximum permitted ratio= 9:1)

Mean Gas Temperature (K)	292.0		
Permitted range of Gas Temperature (°C)=	-10.2	to	48.2

Duct Diameter (m)	1.35	Duct Area (m^2)	1.43

Velocity (m/s) at Gas Temperature **9.9**

Flowrate (m^3/s) at Gas Temperature **14.1**

Flowrate (m^3/s) at Temperature 273K **13.2**

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Table 23

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Colour Booth Exhaust (BL 260B) on the 24th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/33	1	13:08 to 13:48	630	0.2	0.3
19266/35	2	13:52 to 14:32	647	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/34	1	13:08 to 13:48	0.4
19266/36	2	13:52 to 14:32	<0.1*

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/33 19266/34	1	13:08 to 13:48	630	0.6	1.0
19266/35 19266/36	2	13:52 to 14:32	647	<0.1*	<0.1*

Mean temperature in duct at sampling point (°C)	19

Sample volume measurement temperature (°C)	
Run 1	26
Run 2	28

* Below Detection Limit

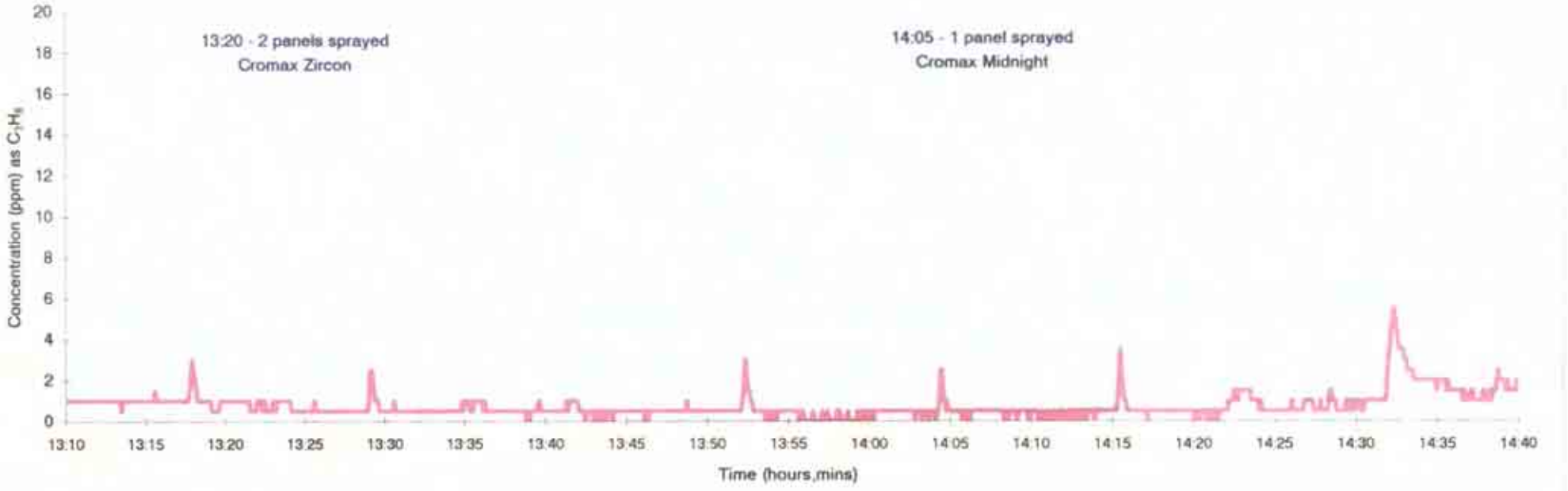
Table 24

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop		
Test Position	Colour Booth BL 260B		
Run Number	1		
Date of Sampling	24th September 2003		
Sample Reference	LD319266/48		
Sample Period	13:10	to	14:10
Ambient Temp. (°C)	16		
Sample Volume (l)	6.60		
Weight Recovered as Carbon (µg)	**300**		
Total VOC as Carbon* (mg/m^3)	**13.3**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 6. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Colour Booth BL 260B Exhaust on the 24th September 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane / molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	14:10 to 14:12	0.2	0.4
2	14:12 to 14:14	0.3	0.5

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	14:14 to 14:16	0.8	1.3
4	14:16 to 14:18	0.6	1.0

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 25

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Colour Booth**
Test Position	**Exhaust BL 260C**
Date of Measurement	**24th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.40	40		0.34	34	
0.203	0.53	53		0.49	49	
0.338	0.60	60		0.61	61	
0.473	0.63	63		0.42	42	
0.608	0.39	39	20	0.30	30	20
0.743	0.28	28		0.30	30	
0.878	0.40	40		0.67	67	
1.013	0.71	71		0.68	68	
1.148	0.89	89		0.64	64	
1.283	0.91	91		0.48	48	

Mean Pv=	51.8			
Highest pitot-static reading (Pa)	91.0			
Lowest pitot-static reading (Pa)	28.0			
Ratio highest/lowest=	3.3	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	293.0			
Permitted range of Gas Temperature (°C)=		-9.3	to	49.3
Duct Diameter (m)	1.35	Duct Area (m^2)		1.43

Velocity (m/s) at Gas Temperature **9.2**

Flowrate (m^3/s) at Gas Temperature **13.2**

Flowrate (m^3/s) at Temperature 273K **12.3**

Table 26

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Colour Booth Exhaust (BL 260C) on the 24th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/37	1	08:30 to 09:10	581	0.3	0.5
19266/39	2	09:15 to 09:55	581	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/38	1	08:30 to 09:10	0.1
19266/40	2	09:15 to 09:55	<0.1*

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/37 19266/38 19266/39 19266/40	1 2	08:30 to 09:10 09:15 to 09:55	581 581	0.4 <0.1*	0.7 <0.1*

Mean temperature in duct at sampling point (°C)	16

Sample volume measurement temperature (°C)	
Run 1	14
Run 2	17

*Below Detection Limit

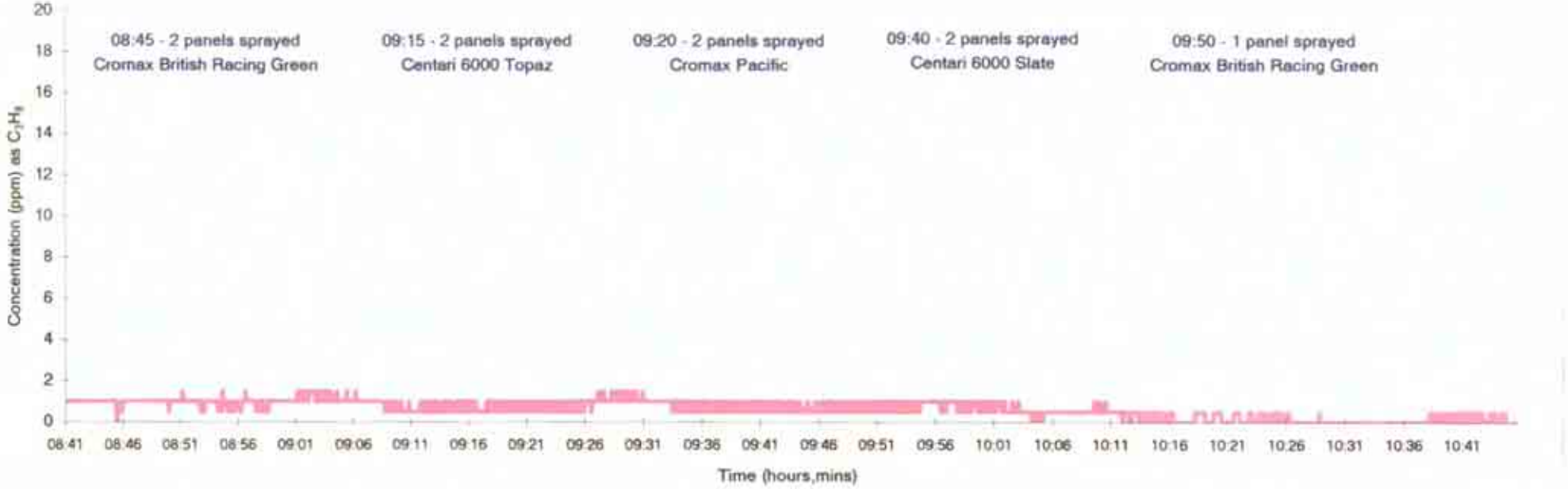
Table 27

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop		
Test Position	Colour Booth BL 260C		
Run Number	1		
Date of Sampling	25th September 2003		
Sample Reference	LD319266/49		
Sample Period	08:40	to	09:40
Ambient Temp. (°C)	07		
Sample Volume (l)	6.60		
Weight Recovered as Carbon (µg)	**200**		
Total VOC as Carbon* (mg/m^3)	**14.7**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 7. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Colour Booth BL 260C Exhaust on the 25th September 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane / molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	09:01 to 09:03	1.1	1.8
2	09:03 to 09:05	1.2	1.9

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	09:05 to 09:07	1.1	1.7
4	09:28 to 09:30	1.1	1.8

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 28

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Lacquer Booth**
Test Position	**Exhaust BL 261A**
Date of Measurement	**29th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.05

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.04	2		0.30	15	
0.203	0.01	1		0.33	17	
0.338	0.06	3		0.16	8	
0.473	0.04	2		0.07	4	
0.608	0.05	3	20	0.06	3	20
0.743	0.05	3		0.14	7	
0.878	0.26	13		0.24	12	
1.013	0.84	42		0.45	23	
1.148	1.21	61		0.63	32	
1.283	1.47	74		0.77	39	

Mean Pv=	12.9			
Highest pitot-static reading (Pa)	73.5			
Lowest pitot-static reading (Pa)	0.5			
Ratio highest/lowest=	147.0	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	293.0			
Permitted range of Gas Temperature (°C)=		-9.3	to	49.3
Duct Diameter (m)	1.35	Duct Area (m^2)		1.43

Velocity (m/s) at Gas Temperature **4.6**

Flowrate (m^3/s) at Gas Temperature **6.6**

Flowrate (m^3/s) at Temperature 273K **6.2**

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Table 29

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Lacquer Booth Exhaust (BL 261A) on the 29rd September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/52	1	09:39 to 10:40	392	<0.1*	<0.1*
19266/54	2	10:44 to 11:24	407	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/53	1	09:39 to 10:40	0.2
19266/55	2	10:44 to 11:24	0.1

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/52 19266/53 19266/54 19266/55	1 2	09:39 to 10:40 10:44 to 11:24	392 407	0.2 0.1	0.5 0.3

Mean temperature in duct at sampling point (°C)	20

Sample volume measurement temperature (°C)	
Run 1	14
Run 2	20

*Below Detection Limit

Table 30

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop
Test Position	Lacquer Booth BL 261A
Run Number	1
Date of Sampling	29th September 2003
Sample Reference	19266/76
Sample Period	10:20 to 11:20
Ambient Temp. (°C)	09
Sample Volume (l)	6.00
Weight Recovered as Carbon (µg)	85
Total VOC as Carbon* (mg/m^3)	5.7

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 31

Atmospheric Emission of Total Isocyanates (as NCO) from BL 261A Paint Repair Shop Lacquer Booth Exhaust on the 29th September 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
19266/82	1	10:20 to 11:20	60	<dl	<0.01

Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 20

Sample volume measurement temperature (°C) = 09

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

Figure 8. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Lacquer Booth BL 261A Exhaust on the 29th September 2003

Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	10:50 to 10:52	1.5	2.5
2	10:52 to 10:54	3.7	5.9

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	11:05 to 11:07	2.6	4.2
4	11:20 to 11:22	3.2	5.2

Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 32

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Lacquer Booth**
Test Position	**Exhaust BL 261B**
Date of Measurement	**29th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.05

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.01	1		0.28	14	
0.203	0.01	1		0.30	15	
0.338	0.01	1		0.21	11	
0.473	0.01	1		0.16	8	
0.608	0.12	6	23	0.07	4	23
0.743	0.17	9		0.05	3	
0.878	0.33	17		0.02	1	
1.013	0.34	17		0.02	1	
1.148	0.31	16		0.04	2	
1.283	0.32	16		0.05	3	

Mean Pv=	5.4			
Highest pitot-static reading (Pa)	17.0			
Lowest pitot-static reading (Pa)	0.5			
Ratio highest/lowest=	34.0	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	296.0			
Permitted range of Gas Temperature (°C)=		-6.6	to	52.6
Duct Diameter (m)	1.35	Duct Area (m^2)		1.43

Velocity (m/s) at Gas Temperature **3.0**

Flowrate (m^3/s) at Gas Temperature **4.3**

Flowrate (m^3/s) at Temperature 273K **4.0**

Table 33

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Lacquer Booth Exhaust (BL 261B) on the 29rd September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/56	1	11:31 to 12:11	384	<0.1*	<0.1*
19266/58	2	10:44 to 11:24	387	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/57	1	11:31 to 12:11	0.5
19266/59	2	10:44 to 11:24	0.2

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/56 19266/57	1	11:31 to 12:11	384	0.5	1.4
19266/58 19266/59	2	10:44 to 11:24	387	0.2	0.6

Mean temperature in duct at sampling point (°C)	23

Sample volume measurement temperature (°C)

Run 1	24
Run 2	21

*Below Detection Limit

Table 34

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Paint Repair Shop		
Test Position	Lacquer Booth BL 261B		
Run Number	1		
Date of Sampling	29th September 2003		
Sample Reference	19266/77		
Sample Period	11:25	to	12:25
Ambient Temp. (°C)	15		
Sample Volume (l)	6.00		
Weight Recovered as Carbon (µg)	**35**		
Total VOC as Carbon* (mg/m^3)	**1.7**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 35

**Atmospheric Emission of Total Isocyanates (as NCO)
from BL 261B Paint Repair Shop Lacquer Booth Exhaust
on the 29th September 2003**

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
19266/83	1	11:25 to 12:25	60	<dl	<0.01

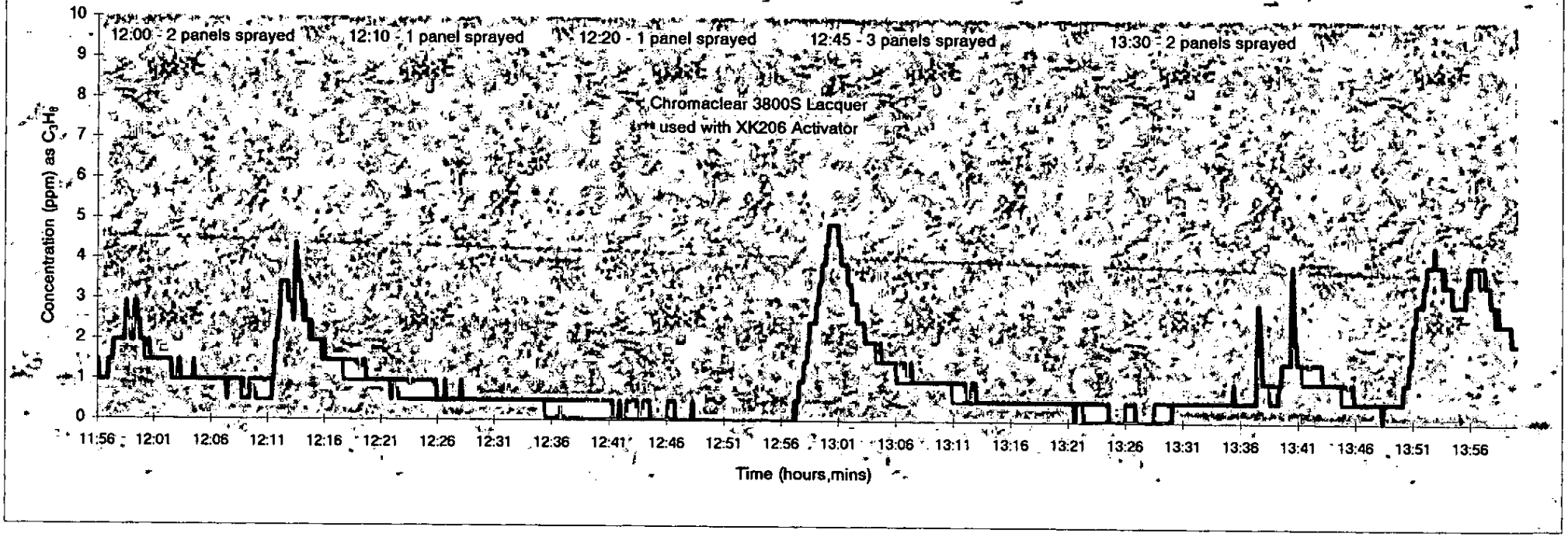
Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 23

Sample volume measurement temperature (°C) = 15

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

Figure 9. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Lacquer Booth BL 261B Exhaust on the 29th September 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)

Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	12:12 to 12:14	3.0	4.8
2	12:14 to 12:16	2.5	4.1

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	12:57 to 12:59	0.9	1.4
4	12:59 to 13:01	3.7	5.9

Reference Conditions: Temperature 273K, Pressure 101.3kPa

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Table 36

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Paint Repair Shop Lacquer Booth**
Test Position	**Exhaust BL 261C**
Date of Measurement	**29th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.068	0.91	91		0.85	85	
0.203	1.13	113		0.93	93	
0.338	0.93	93		0.70	70	
0.473	0.66	66		0.15	15	
0.608	0.07	7	22	0.18	18	22
0.743	0.04	4		0.76	76	
0.878	1.04	104		0.93	93	
1.013	1.21	121		1.09	109	
1.148	1.57	157		0.97	97	
1.283	1.44	144		0.82	82	

Mean Pv=	73.4			
Highest pitot-static reading (Pa)	157.0			
Lowest pitot-static reading (Pa)	4.0			
Ratio highest/lowest=	39.3	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	295.0			
Permitted range of Gas Temperature (°C)=		-7.5	to	51.5
Duct Diameter (m)	1.35	Duct Area (m^2)		1.43

Velocity (m/s) at Gas Temperature **11.0**

Flowrate (m^3/s) at Gas Temperature **15.8**

Flowrate (m^3/s) at Temperature 273K **14.6**

Table 37

Atmospheric Emission of Total Particulate Matter from the Paint Repair Shop Lacquer Booth Exhaust (BL 261C) on the 30th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/60	1	08:39 to 09:19	514	<0.1*	<0.1*
19266/62	2	09:20 to 10:00	551	0.3	0.6

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/61	1	08:39 to 09:19	0.1
19266/63	2	09:20 to 10:00	0.2

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/60 19266/61	1	08:39 to 09:19	514	0.1	0.2
19266/62 19266/63	2	09:20 to 10:00	551	0.5	1.0

Mean temperature in duct at sampling point (°C)	22

Sample volume measurement temperature (°C)

Run 1	12
Run 2	14

*Below Detection Limit

Table 38

Total VOC Emission Concentration by Charcoal Tube Sampling

Location Test Position	Paint Repair Shop Lacquer Booth BL 261C		
Run Number Date of Sampling Sample Reference Sample Period Ambient Temp. (°C) Sample Volume (l)	1 30th September 2003 19266/78 08:49	to	09:49 11 6.00
Weight Recovered as Carbon (µg)	**17**		
Total VOC as Carbon* (mg/m^3)	**1.0**		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 39

**Atmospheric Emission of Total Isocyanates (as NCO)
from BL 261C Paint Repair Shop Lacquer Booth Exhaust
on the 30th September 2003**

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m^3)
19266/84	1	08:55 to 09:55	60	<dl	<0.01

Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 22

Sample volume measurement temperature (°C) = 11

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

Figure 10. Emissions of Volatile Organic Compounds (as propane) from the Paint Repair Shop Lacquer Booth BL 261C Exhaust on the 30th September 2003

Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane / molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	09:56 to 09:58	2.2	3.5
2	09:58 to 10:00	2.7	4.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	10:00 to 10:02	3.7	6.0
4	10:02 to 10:04	2.6	4.3

Reference Conditions: Temperature 273K, Pressure 101.3kPa

APPENDIX 1E

SPOT REPAIR

Table 40

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Spot Repair No.1 Shop Spray Booth**
Test Position	**Exhaust BL 80A**
Date of Measurement	**1st October 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.05

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.038	1.70	85		0.30	15	
0.114	1.80	90		0.40	20	
0.190	1.31	66		0.19	10	
0.266	0.60	30		0.12	6	
0.342	0.33	17	22	0.65	33	22
0.418	0.13	7		1.06	53	
0.494	0.22	11		1.28	64	
0.570	0.43	22		1.35	68	
0.646	1.03	52		1.40	70	
0.722	0.34	17		1.50	75	

Mean Pv=	35.0		
Highest pitot-static reading (Pa)	90.0		
Lowest pitot-static reading (Pa)	6.0		
Ratio highest/lowest=	15.0	(Maximum permitted ratio= 8:1)	
Mean Gas Temperature (K)	295.0		
Permitted range of Gas Temperature (°C)=		-7.5 to	51.5
Duct Diameter (m)	0.76	Duct Area (m^2)	0.45

Velocity (m/s) at Gas Temperature **7.6**

Flowrate (m^3/s) at Gas Temperature **3.5**

Flowrate (m^3/s) at Temperature 273K **3.2**

Table 41

Atmospheric Emission of Total Particulate Matter from the Spot Repair Shop Spray Booth Exhaust (BL 80A) on the 1st October 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/64	1	09:20 to 10:00	427	0.1	0.2
19266/66	2	10:20 to 11:00	376	0.1	0.3

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/65	1	09:20 to 10:00	0.4
19266/67	2	10:20 to 11:00	<0.1*

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/64 19266/65	1	09:20 to 10:00	427	0.5	1.2
19266/66 19266/67	2	10:20 to 11:00	376	0.1	0.3

Mean temperature in duct at sampling point (°C)	22

Sample volume measurement temperature (°C)	
Run 1	15
Run 2	21

*Below Detection Limit

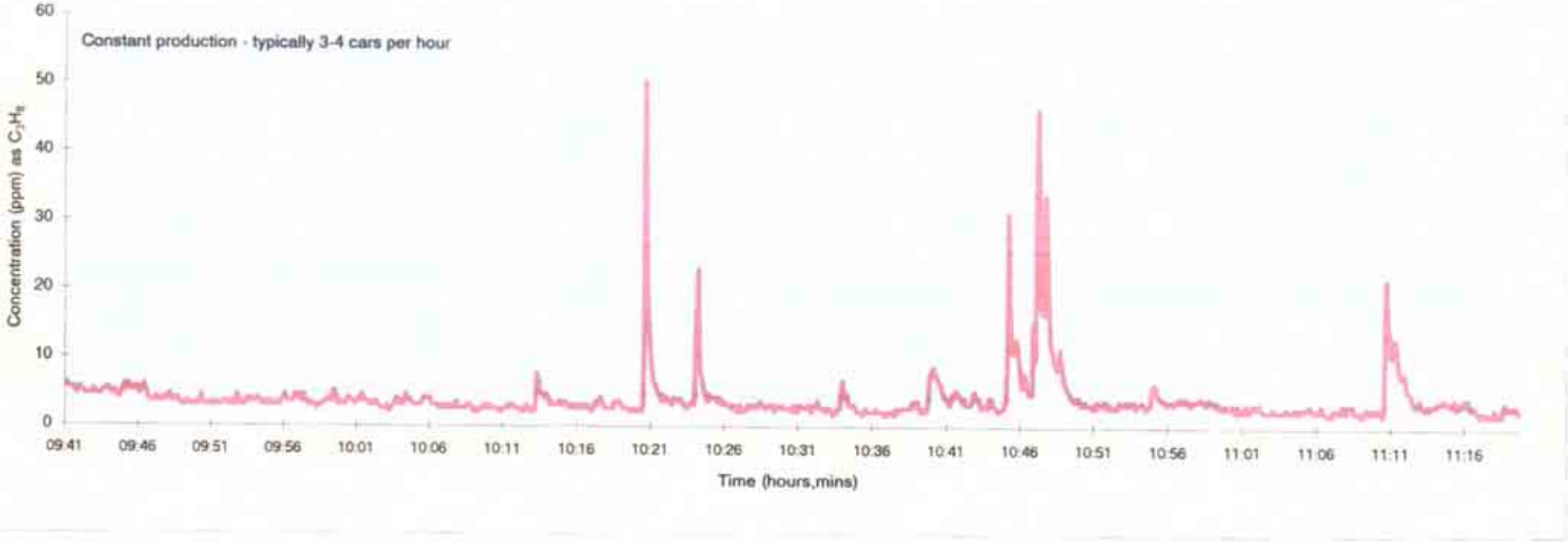
Table 42

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Spot Repair Shop	
Test Position	Spray Booth BL80A	
Run Number	1	
Date of Sampling	1st October 2003	
Sample Reference	19266/79	
Sample Period	09:30 to	11:00
Ambient Temp. (°C)	12	
Sample Volume (l)	9.00	
Weight Recovered as Carbon (µg)	**157**	
Total VOC as Carbon* (mg/m^3)	**7.5**	

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 11. Emissions of Volatile Organic Compounds (as propane) from the Spot Repair Shop Spray Booth BL 80A Exhaust on the 1st October 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	10:20 to 10:22	8.7	14.1
2	10:44 to 10:46	6.5	10.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	10:46 to 10:48	13.5	21.7
4	11:10 to 11:12	7.7	12.3

Reference Conditions: Temperature 273K, Pressure 101.3kPa

Table 43

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**Spot Repair No.1 Shop Spray Booth**
Test Position	**Exhaust BL 80B**
Date of Measurement	**1st October 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.038	0.96	96		negative	0	
0.114	0.51	51		negative	0	
0.190	0.18	18		negative	0	
0.266	0.10	10		0.15	15	
0.342	0.17	17	21	0.26	26	21
0.418	0.46	46		0.18	18	
0.494	0.44	44		0.47	47	
0.570	0.14	14		0.29	29	
0.646	0.07	7		0.88	88	
0.722	0.05	5		0.30	30	

Mean sqrt Pv=	5.34		
Mean Pv=		28.5	
Highest pitot-static reading (Pa)		96.0	
Lowest pitot-static reading (Pa)		5.0	
Ratio highest/lowest=		19.2	(Maximum permitted ratio= 8:1)

Mean Gas Temperature (K)	294.0			
Permitted range of Gas Temperature (°C)=		-8.4	to	50.4

Duct Diameter (m)	0.76	Duct Area (m^2)	0.45

Velocity (m/s) at Gas Temperature **6.9**

Flowrate (m^3/s) at Gas Temperature **3.1**

Flowrate (m^3/s) at Temperature 273K **2.9**

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Table 44

Atmospheric Emission of Total Particulate Matter from the Spot Repair Shop Spray Booth Exhaust (BL 80B) on the 1st October 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/68	1	11:08 to 11:48	496	0.1	0.2
19266/70	2	11:50 to 12:30	488	<0.1*	<0.1*

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/69	1	11:08 to 11:48	0.4
19266/71	2	11:50 to 12:30	0.2

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/68 19266/69	1	11:08 to 11:48	496	0.5	1.1
19266/70 19266/71	2	11:50 to 12:30	488	0.2	0.4

Mean temperature in duct at sampling point (°C)	21

Sample volume measurement temperature (°C)	
Run 1	24
Run 2	25

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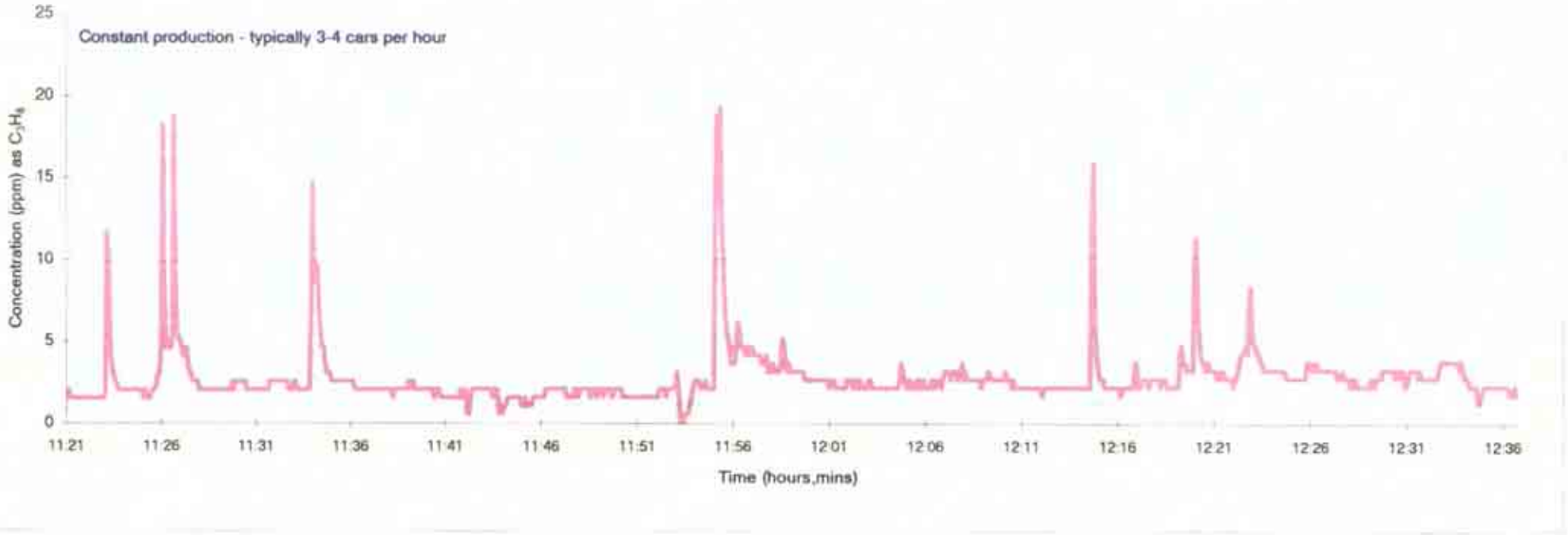
Table 45

Total VOC Emission Concentration by Charcoal Tube Sampling

Location	Spot Repair Shop		
Test Position	Spray Booth BL80B		
Run Number	1		
Date of Sampling	1st October 2003		
Sample Reference	19266/80		
Sample Period	11:10	to	12:10
Ambient Temp. (°C)	15		
Sample Volume (l)	6.00		
Weight Recovered as Carbon (µg)	72		
Total VOC as Carbon* (mg/m^3)	3.4		

*Concentration expressed to Reference Conditions: Temperature 273K, Pressure 101.3kPa

Figure 12. Emissions of Volatile Organic Compounds (as propane) from the Spot Repair Shop Spray Booth BL 80B Exhaust on the 1st October 2003



Conversion factor = 1.61 (ppm x factor = mg/m³ as C to reference conditions)
Based on molecular weight of propane/ molar volume at 273K = 36/22.4

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
1	11:25 to 11:27	2.8	4.5
2	11:33 to 11:35	3.2	5.2

Run	2 Minute Mean Time Period	Concentration (ppm)	Concentration (mg/m³ as C)
3	11:55 to 11:57	6.0	9.6
4	12:14 to 12:16	3.5	5.6

Reference Conditions Temperature 273K, Pressure 101.3kPa

APPENDIX 1F

NEW SAWMILL

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Table 46

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**New Sawmill Cell 1**
Test Position	**Exhaust**
Date of Measurement	**17th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.031	0.43	43		0.39	39	
0.093	0.44	44		0.39	39	
0.155	0.41	41		0.37	37	
0.217	0.36	36		0.36	36	
0.279	0.35	35	21	0.39	39	21
0.341	0.35	35		0.45	45	
0.403	0.30	30		0.41	41	
0.465	0.23	23		0.48	48	
0.527	0.16	16		0.49	49	
0.589	0.14	14		0.27	27	

Mean Pv=	35.1			
Highest pitot-static reading (Pa)	49.0			
Lowest pitot-static reading (Pa)	14.0			
Ratio highest/lowest=	3.5	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	294.0			
Permitted range of Gas Temperature (°C)=		-8.4	to	50.4
Duct Diameter (m)	0.62	Duct Area (m^2)		0.30

Velocity (m/s) at Gas Temperature 7.6

Flowrate (m^3/s) at Gas Temperature 2.3

Flowrate (m^3/s) at Temperature 273K 2.1

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Table 47

Atmospheric Emission of Total Particulate Matter from the New Sawmill Cell 1 Exhaust on the 19th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/01	1	08:48 to 09:37	545	2.9	5.7
19266/03	2	09:40 to 10:30	600	1.8	3.2

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/02	1	08:48 to 09:37	1.4
19266/04	2	09:40 to 10:30	1.2

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/01 19266/02	1	08:48 to 09:37	545	4.3	8.5
19266/03 19266/04	2	09:40 to 10:30	600	3.0	5.4

Mean temperature in duct at sampling point (°C)	21

Sample volume measurement temperature (°C)	
Run 1	21
Run 2	24

Table 48

Atmospheric Emission of Total Isocyanates (as NCO)
from Cell 1 New Sawmill Exhaust
on the 2nd October 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m^3)
19266/86	1	11:15 to 12:15	60	<dl	<0.01

Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 21

Sample volume measurement temperature (°C) = 12

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

CASELLA STANGER

Table 49

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**New Sawmill Cell 2**
Test Position	**Exhaust**
Date of Measurement	**17th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.031	0.36	36		0.38	38	
0.093	0.44	44		0.39	39	
0.155	0.43	43		0.43	43	
0.217	0.41	41		0.47	47	
0.279	0.35	35	20	0.44	44	20
0.341	0.27	27		0.34	34	
0.403	0.24	24		0.25	25	
0.465	0.26	26		0.44	44	
0.527	0.17	17		0.46	46	
0.589	0.16	16		0.36	36	

Mean Pv=	34.5			
Highest pitot-static reading (Pa)	47.0			
Lowest pitot-static reading (Pa)	16.0			
Ratio highest/lowest=	2.9	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	293.0			
Permitted range of Gas Temperature (°C)=		-9.3	to	49.3
Duct Diameter (m)	0.62	Duct Area (m^2)		0.30

Velocity (m/s) at Gas Temperature 7.5

Flowrate (m^3/s) at Gas Temperature 2.3

Flowrate (m^3/s) at Temperature 273K 2.1

CASELLA STANGER

Table 50

Atmospheric Emission of Total Particulate Matter from the New Sawmill Cell 2 Exhaust on the 17th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/05	1	13:16 to 14:05	585	3.1	6.0
19266/07	2	14:10 to 14:59	588	1.5	2.9

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/06	1	13:16 to 14:05	1.2
19266/08	2	14:10 to 14:59	0.8

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m³)
19266/05 19266/06	1	13:16 to 14:05	585	4.3	8.3
19266/07 19266/08	2	14:10 to 14:59	588	2.3	4.5

Mean temperature in duct at sampling point (°C)	20

Sample volume measurement temperature (°C)	
Run 1	35
Run 2	38

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Table 51

Atmospheric Emission of Total Isocyanates (as NCO) from Cell 2 New Sawmill Exhaust on the 1st October 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
19266/87	1	11:30 to 13:20	110	<dl	<0.01

Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 20

Sample volume measurement temperature (°C) = 15

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

CASELLA STANGER

Table 52

Preliminary Gas Velocity and Temperature Measurement
Circular Duct

Location	**New Sawmill Cell 3**
Test Position	**Exhaust**
Date of Measurement	**17th September 2003**
Instrument:	**Air Flow Developments Type 5 Manometer**
Serial Number:	**SSE 33449**

Velocity Pressure Scale Factor: 0.10

Meas. pt. (m)	A-axis Reading	Pv (Pa)	Temp. (°C)	B-axis Reading	Pv (Pa)	Temp. (°C)
0.031	0.49	49		0.43	43	
0.093	0.45	45		0.48	48	
0.155	0.41	41		0.53	53	
0.217	0.38	38		0.49	49	
0.279	0.37	37	20	0.46	46	20
0.341	0.34	34		0.44	44	
0.403	0.30	30		0.38	38	
0.465	0.29	29		0.33	33	
0.527	0.27	27		0.25	25	
0.589	0.26	26		0.21	21	

Mean Pv=	37.2			
Highest pitot-static reading (Pa)	53.0			
Lowest pitot-static reading (Pa)	21.0			
Ratio highest/lowest=	2.5	(Maximum permitted ratio= 9:1)		
Mean Gas Temperature (K)	293.0			
Permitted range of Gas Temperature (°C)=		-9.3	to	49.3
Duct Diameter (m)	0.62	Duct Area (m^2)		0.30

Velocity (m/s) at Gas Temperature 7.8

Flowrate (m^3/s) at Gas Temperature 2.4

Flowrate (m^3/s) at Temperature 273K 2.2

CASELLA STANGER

Table 53

Atmospheric Emission of Total Particulate Matter from the New Sawmill Cell 3 Exhaust on the 17th September 2003

Filter Only

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/09	1	10:02 to 10:52	572	2.0	3.8
19266/11	2	11:20 to 12:09	541	1.4	2.8

Probe Washings

Sample Reference	Run	Sample Period	Residue after oven drying at 105°C for 2 hrs (mg)
19266/10	1	10:02 to 10:52	0.7
19266/12	2	11:20 to 12:09	0.4

Probe Washing and Filter Combined

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (mg)	Concentration to Reference Conditions* (mg/m^3)
19266/09 19266/10	1	10:02 to 10:52	572	2.7	5.2
19266/11 19266/12	2	11:20 to 12:09	541	1.8	3.7

Mean temperature in duct at sampling point (°C)	20

Sample volume measurement temperature (°C)		
	Run 1	26
	Run 2	31

Table 54

Atmospheric Emission of Total Isocyanates (as NCO) from Cell 3 New Sawmill Exhaust on the 1st October 2003

Sample Reference	Run	Sample Period	Sample Volume (litre)	Weight Recovered (µg)	Concentration to Reference Conditions* (mg/m³)
19266/88	1	10:25 to 11:25	60	<dl	<0.01

Detection Limit (dl) = 0.02 µg

Mean temperature in duct at sampling point (°C) = 20

Sample volume measurement temperature (°C) = 15

*Reference Conditions: Temperature 273K, Pressure 101.3kPa, with no correction for water vapour

APPENDIX 2

METHODS OF MEASUREMENT, SAMPLING & ANALYSIS

PROJECT METHODS

Test Equipment and Procedures

i) Particulate Matter

The collection of particulate samples was carried out isokinetically. In accordance with BS3405 an in-stack sampler without heated sampling lines (US EPA Method 17) was used. Probe linings were washed with dry acetone and deposits collected to provide an estimate taking into account the sticky nature of emissions from paint process exhausts.

The detection limit for particulate matter collected on the sampler filter is 0.1 mg/m^3 (for sample volume of 0.5 m^3).

Two sampling runs were carried out at each location. The duration of each sampling run was approximately 40 minutes.

Filters were oven dried and weighed before and after sampling in our Monitor EC Group laboratory in accordance with UKAS accredited documented procedures.

Four or eight point sampling was carried out along two sampling planes according to BS3405.

Gas Velocities

Velocity pressures were measured using an Airflow Developments Type 5 manometer and Pitot tube. A copy of the Calibration Certificate is enclosed.

Temperature

Temperatures were measured using a digital thermometer.

ii) **Volatile Organic Compounds (VOC) –Stacks at or near ambient temperature and Incinerator Stacks**

The VOC sampling in this survey was measured using a heated zone flame ionisation detector (Type Bernath Atomic model 3006) with external air supply. The instrument will be calibrated at regular intervals throughout the survey against a propane standard. The concentrations will be expressed as mg/m^3 as carbon based on propane, as required by the process guidance note.

The concentration of VOCs will be logged every 20 seconds to provide a time history of emissions. A total of two hours monitoring per process exhaust will be undertaken.

This method is based on USEPA Method 25A, and is described in our Technical Procedure, TP8-IEM, which is UKAS accredited.

Uncertainty: ± 5.8%
Detection Limit: $1mg/Nm^3$

iii) **Oxides of Nitrogen and Carbon Monoxide**

Concentrations of these gases were measured using a direct reading instrument, i.e., a Horiba PG250, utilising non-dispersive infrared analyser for CO and Chemiluminescence for NO_x. The analyser was calibrated before and after monitoring against certified test gases.

The concentrations were logged every five seconds to provide a time history of emissions.

Copies of the calibration certificates are enclosed.
This measurement method is described in our in-house Technical Procedure TP24-IEM, which is UKAS accredited.

	Uncertainty	Detection Limit
NO_x	± 3.8%	$1mg/Nm^3$
CO_2	± 2.7%	0.01%
CO	± 3.8%	$1mg/Nm^3$
O_2	± 6.7%	0.1%

iv) **Isocyanate**

A stainless steel probe was inserted into the exhaust gas stream. A sample of the exhaust gas was removed non-isokinetically and the gas bubbled through impingers containing piperazine solution (the trapping reagent) using a portable sampling pump.

Upon completion of sampling, all samples were placed in clean containers sealed, labelled and returned to our Wolverhampton laboratory for analysis.

This method is based in the HSE method MDHS 25/2 Organic Isocyanates.

v) **VOC Speciation**

A measured volume of air was drawn non-isokinetically through a charcoal sorbent tube via a personal sampling pump. Any Volatile Organic Compounds present were absorbed on the activated charcoal, which was then sealed and passed on to an approved laboratory for analysis.

METHODS OF ANALYSIS

Total Particulate Matter (Filter)

Pre-weighed filters were returned to the laboratory where they were dried and re-weighed. Concentrations were then calculated from the known weights of deposit collected and known volume of exhaust air sampled.

Total Particulate Matter (Probe Washing)

The solvent used, acetone, was transferred to a pre-weighed container. It was evaporated to dryness and the container re-weighed using an analytical balance. Concentrations were then calculated from the known weights of residue and known volume of exhaust air sampled.

Isocyanates

Analysis of the samples collected was based on the MDHS Method 25 – Organic Isocyanates in Air, published by the HSE. The samples collected were analysed by HPLC using UV and EC detectors.

VOC Speciation (Carbon Tubes)

The sealed carbon tubes were then desorbed and analysed by gas chromatography with a flame ionisation detector (GC-FID). This method is based on BS EN 13649:2002.

APPENDIX 3

CERTIFICATES OF ANALYSIS

RPS Laboratories

RPS Laboratories . Unit 12 . Waters Edge Business Park . Modwen Road . Salford . M5 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3959

Test Certificate

CASELLA STANGER
WARD STREET
ETTINGSHELL
WOLVERHAMPTON

WV2 2PJ

Attn: SURJIT CHOPRA

CRT No 024608 : Issue 1
Ord No 6000376

Date Tested 17/10/03
Date Reported 17/10/03

Item - P CHARCOAL TUBES FOR GCMS TOP TEN SCAN

Specification- Not Applicable

Semi-quantitative GCMS SCREEN - In-House Method

Sample	Description	Result	Comments
01:233110	19266/76	650 ug toluene	Nil
02:233111	19266/77	270 ug toluene	Nil
03:233112	19266/78	130 ug toluene	Nil
04:233113	19266/79	1200 ug toluene	Nil
05:233114	19266/80	550 ug toluene	Nil
06:233115	19266/81	1300 ug toluene	Nil

Certificate Comments

Date of sample receipt: 08/10/2003

If you have any queries regarding this analysis please do not hesitate to contact the Laboratory Manager, Joanne Dewhurst.

Analysis was carried out on the samples 'as received'.

Standard terms and conditions are applicable, a copy is available on request.

Identification is based on best library fit calulated from purity, fit and reverse fit. In some cases due to the ion ratio similarities within various groups of compounds, it is not always possible to give an unequivical identification.
Results are semi-quantitative and are calculated on the response factor of the internal standard.

Tested by Jon Ashcroft [redacted] J. Ashcroft

For and on authority of RPS Laboratories
Senior Chemist

RPS Laboratories

RPS Laboratories . Unit 12 . Waters Edge Business Park . Modwen Road . Salford . M5 3EZ
Tel: (0161) 872 2443 . Fax: (0161) 877 3959

Test Certificate

CASELLA STANGER
WARD STREET
ETTINGSHELL
WOLVERHAMPTON

WV2 2PJ

Attn: -

CRT No 024522 : Issue 1
Ord No 630002800

Date Tested 09/10/03
Date Reported 09/10/03

Item - 5 CHARCOAL TUBES FOR VOC

Specification- Not Applicable

Volatile organic compounds - In-House Method

Sample	Description	Result	Comments
01:232703	LD319266/45	210 ug	See Below
02:232704	LD319266/46	210 ug	See Below
03:232705	LD319266/47	620 ug	See Below
04:232706	LD319266/48	350 ug	See Below
05:232707	LD319266/49	230 ug	See Below

Item 01: as undecane 180 ug as carbon
Item 02: as undecane 180 ug as carbon
Item 03: as undecane 520 ug as carbon
Item 04: as undecane 300 ug as carbon
Item 05: as undecane 200 ug as carbon

Certificate Comments

Date of sample receipt: 03/10/2003

If you have any queries regarding this analysis please do not hesitate to contact the Laboratory Manager, Joanne Dewhurst.

Analysis was carried out on the samples 'as received'.

Standard terms and conditions are applicable, a copy is available on request.

Tested by Gillian Fletcher
Jon Ashcroft

[redacted]

For and on authority of
RPS Laboratories

OEH
GROUP LTD
253-255 Great Lister Street
Birmingham B7 4BS

CONTACT:	Ms L. Clarke	**ANALYSIS REPORT NO:**	OEH/OEH31597/SC214
CLIENT:	Casella Stanger Ward Street Ettingshall Wolverhampton WV2 2PJ	**CLIENT REFERENCE:**	63000283
		DATE RECEIVED:	01/10/03
		DATE OF ANALYSIS:	14-15/10/03
		DATE OF REPORT:	17/10/03
		DISK REFERENCE:	N:\GenAdmin$\CT\Lab Reports\OEH31597.doc

TEST REPORT

INTRODUCTION

Two samples submitted by the client were received for the analysis of [isocyanate. The samples were labelled as indicated in the results table below:

TECHNICAL DETAILS

ANALYTE	UKAS STATUS	METHOD REFERENCE	TECHNIQUE	DETECTION LIMIT (µg)	PRECISION (%)	CALIBRATION LOG NUMBER
Isocyanate	✓	LSOP 502	HPLC	0.02	10	NCO/780
(MDI, HDI, TDI monomers and polymers)						

✓ UKAS Accredited
× Not UKAS Accredited

RESULTS

SAMPLE NUMBER	AMOUNT (µg)
BL252	<dl
BL314	0.03

Sample collection, opinions and interpretations expressed in this report are outside the scope of UKAS Accreditation.

Authorised Signature:	[redacted]	**D. A. Green CChem MRSC** **Senior Analytical Chemist**
Checked By:	[redacted]	**D. Fitzgerald BSc** **Laboratory Manager**

Tel: 0121 359 5361
Fax: 0121 359 2330
E-mail: enquiries@oehgroup.com
Website: www.oehgroup.com

OEH
GROUP LTD
253-255 Great Lister Street
Birmingham B7 4BS

CONTACT:	Mr Surjit Chopra	**ANALYSIS REPORT NO:**	OEH/31625/SC220
CLIENT:	Casella STanger Ward Street Ettingshall Wolverhampton WV2 2RJ	**CLIENT REFERENCE:**	63000378
		DATE RECEIVED:	08/10/03
		DATE OF ANALYSIS:	16/10/03
		DATE OF REPORT:	20/10/03
		DISK REFERENCE:	N:\GenAdmin$\CT\Lab Reports\OEH31625.doc

TEST REPORT

INTRODUCTION

Seven samples submitted by the client were received for the analysis of isocyanate (TDI monomer and polymers). The samples were labelled as indicated in the results table below:

TECHNICAL DETAILS

ANALYTE	UKAS STATUS	METHOD REFERENCE	TECHNIQUE	DETECTION LIMIT (µg)	PRECISION (%)	CALIBRATION LOG NUMBER
Isocyanate	✓	LSOP 502	High performance liquid chromatography	0.02	10	NCO/781

✓ UKAS Accredited
× Not UKAS Accredited

Authorised Signature:	[redacted]	**D. Fitzgerald BSc** **Laboratory Manager**
Checked By:	[redacted]	**S. Morris BSc** **Analytical Chemist**

Tel: 0121 359 5361
Fax: 0121 359 2330
E-mail: enquiries@oehgroup.com
Website: www.oehgroup.com

RESULTS

SAMPLE NUMBER	AMOUNT (µg)
19266/82	<dl
19266/83	<dl
19266/84	<dl
19266/85	<dl
19266/86	<dl
19266/87	<dl
19266/88	<dl

Sample collection, opinions and interpretations expressed in this report are outside the scope of UKAS Accreditation.

APPENDIX 4

CALIBRATION CERTIFICATES

AIRFLOW

SPECIALISTS IN AIR MOVEMENT TECHNOLOGY

CERTIFICATE OF CALIBRATION

AIRFLOW DEVELOPMENTS LIMITED
Lancaster Road, Cressex Business Park,
High Wycombe, Buckinghamshire
HP12 3QP, England.
Telephone: (Int + 44) (UK 0) 1494 525252
Facsimile: (Int + 44) (UK 0) 1494 461073
e.mail: info@airflow.co.uk
http://www.airflow.co.uk

COMPANY CASELLA STANGER LTD
WARD STREET
WOLVERHAMPTON
WV2-2PJ

INSTRUMENT Mk5 Man.Port. Pa.
SERIAL No. 37005
SPECIFICATION TP001-4

CERTIFICATE NUMBER 1BA07611/6P
DATE CERTIFIED 11/2/03
PART NUMBER H71519801

SERVICE No. A07611/6

CUST. REF.

This Certificate is issued in accordance with QCS 023 "Standard Conditions of Acceptance for Calibration" as currently published by Airflow Developments Ltd.

The measurements were correct at the time of calibration.

Limb Position	Range	Multi-plier	Inst.Rdg kPa.	True Rdg Pa.
Bottom	0 to 125 Pa.	0.05	2.0	100.4
Mid	0 to 250 Pa.	0.10	2.0	199.8
Top	0 to 500 Pa.	0.20	2.0	397.8
Vertical	0 to 2500 Pa.	1.00	2.0	2013.0

Calibration temperature 20.0°C Barometric pressure 1004.5mb.

This is to certify that the above item has been calibrated in accordance with our Specification and conforms to our published accuracy.

All measured parameters are traceable to BMT Fluid Mechanics Ltd or to National Standards where applicable - see overleaf for reference standards traceability.

It is recommended that this instrument should be re-calibrated annually.

CALIBRATED BY J.S

[redacted]

The uncertainty of the applied pressure is estimated not to exceed ± (0.028% of reading + 0.04Pa. + Instrument resolution). The uncertainties are for a confidence probability of not less than 95%.

Dry Gas Meter Calibration (using dgm)

Instrument: Clean Air Engineering (CAE)

Serial Number: SSE 33446

Meter Ref No: CAE 951

Date of Calibration: 18/10/02

Leak Check: Satisfactory

Test Number	1	2	3	4	5	6	7	8	9	10	11	12
	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres
Initial DGM	2708.74	2784.91	2859.77	2970.74	3089.76	3227.9	3375.66	3537.99	3704.37	3884.61	4072.35	4264.54
Final DGM	2784.91	2859.77	2970.74	3082.46	3227.9	3356.41	3537.99	3698.35	3884.61	4065.17	4264.54	4457.07
Volume	76.17	74.86	110.97	111.72	138.14	128.51	162.33	160.36	180.24	180.56	192.19	192.53
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Initial DGM temp (in/Out	16.75	17.5	19	20.25	22	23	24.75	25.5	26.5	27	27.5	28
Final DGM temp (in/out)	17.5	19	20.25	22	23	25	25.5	26.75	27.5	27.5	28.5	28.5
Mean DGM temp	17.125	18.25	19.625	21.125	22.5	24	25.125	26.125	27	27.25	28	28.25
Time (mins)	10	10	10	10	10	10	10	10	10	10	10	10
	mm H2O	mm H2O	mm H2O	mm H2O	mm H2O	mm H2O	mm H2O	mm H2O		mm H2O	mm H2O	mm H2O
Orifice H	5	5	10	10	15	15	20	20	25	25	30	30
	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft	cu ft
Initial DGM	363.04	365.455	367.822	371.352	375.101	379.456	384.082	389.125	394.332	399.945	405.771	411.725
Final DGM	365.455	367.822	371.352	374.875	379.456	383.894	389.126	394.148	399.945	405.551	411.725	417.679
Volume	2.415	2.367	3.53	3.523	4.355	4.438	5.043	5.022	5.613	5.606	5.954	5.954
	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres	litres
Volume	68.3851927	67.025984	99.9584805	99.7602626	123.319882	125.67018	142.801875	142.235538	158.942479	158.744261	168.598525	168.598525
	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Initial DGM temp (in/Out	17.5	17.5	17.5	18	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.75
Final DGM temp (in/out)	17.5	17.5	17.75	18	18.5	18.25	18.5	18.5	18.5	18.5	18.75	19
Mean DGM temp	17.5	17.5	17.625	18	18.5	18.375	18.5	18.5	18.5	18.5	18.625	18.875
Ambient Temp	18	18	18	18	18	18	18	18	18	18	18	19.5
Pressure (in/bar)	997	997	997	997	997	997	997	997	997	997	998	998
Pressure (mm/Hg)	747.811498	747.811498	747.811498	747.811498	747.811498	747.811498	747.811498	747.811498	747.811498	747.811498	748.561559	748.561559
Vm(std)	75.7820979	74.1910829	109.515436	109.693316	135.06922	134.747001	157.401173	154.971169	173.760292	173.923851	184.940465	185.113891
Vcr(std)	63.234943	62.9882741	93.8964823	93.5305247	115.493406	117.745034	133.738977	133.208582	148.855221	148.669582	157.830767	157.69558
Yd	0.83443115	0.8490005	0.85738126	0.8531926	0.85506828	0.8738304	0.8496695	0.85957009	0.85666995	0.85479698	0.85341392	0.8518841

#REF!

At least 2 test results must be within permitted range

Delta H @ (mm)	56.8453491	57.5133467	52.0070916	52.6168352	52.0690132	50.3506426	52.033974	52.8271695	53.0359997	53.2127885	56.7420565	56.8865407
Mean Delta H @(mm)	53.8617339											
Mean Delta H @(mm)	2.12054071											
Run difference %	-4.6122279											

Mean Yd(within Range) 0.85407512

Calibration Within Specification of 5%

Signature [redacted]

CASELLA STANGER

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CALIBRATION DETAILS

Instrument Type (e.g. Gas Analyser): Analyser

Instrument Make/Model Number : **Horiba PG250**

Type of Determination : **CO** concentration

Relevant TP Note: TP-24 - IEM

Type of Calibration (e.g. Linearity Check, Single Point Check): MULTIPOINT

Date of Calibration: 15/09/03

SSE Serial Numbers: Instrument SSE 33442
References

Cylinders	Gas	Concentration (ppm)
AA867314	Oxygen	20.95%
5800424	CO	60.2
P2851Z0509	CO	79.4
5800406	CO	497

Range for Linearity Check : **500**

Reference Instrument Reading (Unit ppm)			Candidate Instrument Reading (Unit ppm)			Variance From Full Scale Deflection (+/- %)	Within Permissible Limits? (Y/N)
	60.2		60	60	60	0.04	Y
	79.4		79	79	79	0.08	Y
	497		499	500	500	-0.53	Y
							Y

If multipoint linearity check

Linearity Variance (%): -0.1
Linearity in Tolerance Y

Lab ambient Temperature (°C) : 23
Thermocouple No SSE 33319
Temperature Indicator No SSE 33316

Carried Out By H. Saeed

Signature [redacted] .. (Authorised Operative)

CASELLA STANGER

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CALIBRATION DETAILS

Instrument Type (e.g. Gas Analyser): Analyser

Instrument Make/Model Number: **Horiba PG250**

Type of Determination: **NO** Concentration

Relevant TP Note: TP-24 - IEM

Range for Linearity Check: **2500**

Type of Calibration (e.g. Linearity Check, Single Point Check): MULTIPOINT

Date of Calibration: 15/09/03

SSE Serial Numbers: Instrument References: SSE 33442

Cylinders	Gas	Concentration (ppm)
AA867314	Oxygen	20.95%
5800322	NO	29.2
P2602L2603A	NO	76.8
5800259	NO	939
P2602L1549A	NO	2401

Reference Instrument Reading (Unit ppm)			Candidate Instrument Reading (Unit ppm)			Variance From Full Scale Deflection (+/- %)	Within Permissible Limits? (Y/N)
	29.2		29.2	29	29	0.01	Y
	76.8		77	77	77	-0.01	Y
	939		939	939	940	-0.01	Y
	2401		2400	2399	2399	0.07	Y

If multipoint linearity check

Linearity Variance (%) 0.0

Linearity in Tolerance Y

Lab ambient Temperature (°C) 23

Thermocouple No SSE 33319

Temperature Indicator No SSE 33316

Carried Out By H. Saeed Signature .... [redacted] ... (Authorised Operative)

CASELLA STANGER

CASELLA STANGER

CALIBRATION DETAILS

Instrument Type (e.g. Gas Analyser): Analyser

Type of Calibration (e.g. Linearity Check, Single Point Check): MULTIPOINT

Instrument Make/Model Number: **Horiba PG250**

Date of Calibration: 15/09/03

Type of Determination : **NO_x** Concentration

SSE Serial Numbers: Instrument SSE 33442

References

Relevant TP Note: TP24 - IEM

Range for Linearity Check : **2500**

Cylinders	Gas	Concentration (ppm)
AA867314	Oxygen	20.95%
5800322	NO_x	30.9
P2602L2549A	NO_x	2401

Reference Instrument Reading (Unit ppm)	Candidate Instrument Reading (Unit ppm)			Variance From Full Scale Deflection (+/- %)	Within Permissible Limits? (Y/N)
30.9	31	33	33	-0.06	Y
2401	2400	2399	2399	0.07	Y

If multipoint linearity check

Linearity Variance (%) 0.005

Linearity in Tolerance Y

Lab ambient Temperature (°C) : 23

Thermocouple No SSE 33319

Temperature Indicator No SSE 33316

Carried Out By H. Saeed

Signature ... [redacted] .... (Authorised Operative)

CASELLA STANGER

CASELLA STANGER

CALIBRATION DETAILS

Instrument Type (e.g. Gas Analyser): Heated FID

Type of Calibration (e.g. Linearity Check, Single Point Check): MULTIPOINT

Instrument Make/Model Number: Bernath 3005

Date of Calibration: 15/09/03

Type of Determination: Propane (Range 3)

SSE Serial Numbers: Instrument SSE 33440

References

Relevant TP Note: TP8 - IEM & TP13 - IEM

Range for Linearity Check: 1000

Reference Instrument Reading (Unit ppm)			Candidate Instrument Reading (Unit ppm)			Variance From Full Scale Deflection (+/- %)	Within Permissible Limits? (Y/N)
	79.3		79	79.5	79	0.01	Y
	79.8		80	79.5	79.5	0.01	Y
	90		90	89.5	89.5	0.03	Y
	842		84.25	84.7	84.2	0.00	Y

If multipoint linearity check

Linearity Variance (%): 0.020

Linearity in Tolerance: Y

Lab ambient Temperature (°C): 24

Thermocouple No: SSE 33319

Temperature Indicator No: SSE 33316

Carried Out By: HS

Signature: [redacted] .... (Authorised Operative)