



ALcontrol Laboratories

On-Site Services

REPORT NO. 12150C

EMISSION MONITORING TO COMPLY WITH
THE POLLUTION PREVENTION & CONTROL LEGISLATION

Premise: PPL Coventry Factories 1 & 2

Date: 9 November 2010

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CLIENT

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November 2010

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QUALITY CHECKED BY

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1 **INTRODUCTION**

On the 9 November 2010 ALcontrol Laboratories On-site Services carried out emissions monitoring for the release of prescribed substances, total particulate and VOC as Carbon into the air from various exhaust stacks. This was undertaken in order to assess the emissions for the preparation of a report to Coventry City Council and assessment under Pollution Prevention and Control Legislation

2 **PROCEDURES**

The full procedures for sampling are included in Appendix 1.

3 **OBSERVATIONS**

The degreasing unit in Factory 1 is used as and when required to prepare metal components for casting. It uses an acetone/dichloromethane solution as liquid and hot vapour. Lip extraction controls emission from the tank into the workplace, venting vapours directly to atmosphere.

The shot blast unit in factory 2 ran almost continuously blasting rail damper bars The unit exhausted to atmosphere after filtration, the work load was heavy but normal, Following blasting the bars were hung on a spray line which then passed the bars through a spray booth which sprayed a bonding agent onto them prior to their being bonded in a polyurethane case. This booth was controlled by local exhaust ventilation which vented direct to atmosphere with no filtration.

4 **RESULTS**

The full list of results and calculations are included in Appendix 2.

A brief table of the results of monitoring for Total Particulate and VOC as Carbon is shown below.

Particulate (Factory 2)

Stack	Test 1 (mg/m³)	Test 2 (mg/m³)	Average (mg/m³)	Predicted Limit (mg/m³)
Shot blast	0.19	0.65	N/A	50
Spray Booth	0.13	0.18	0.15	50

VOC as Carbon

Stack	Test 1 (mg/m³)	Test 2 (mg/m³)	Average (mg/m³)	Predicted Limit (mg/m³)
Degreaser Factory 1	272.4	228.8	250.6	20

5 **CONCLUSIONS**

Particulate emission levels for both tests on both stacks were low. PG2/09 decontamination of metal components.

The workload was reported as typical of current levels and it can be assumed that at no point will emissions approach any limits likely to be set.

Emissions of VOC as Carbon from the degreasing tank within factory 1 were high in comparison with limits likely to be set based on process guidance PG2/09

Further emission monitoring for potential air pollutants may be required as follows:

- At a time recommended by Coventry City Council.
- To check effectiveness of additional abatement technology.
- To check the emissions of new plant.
- When there are other changes which may have an effect on emissions to air.

APPENDIX 1
STANDARD PROCEDURES

APPENDIX 1 PROCEDURES

Emission Sampling Procedure

(Carried out to the In house method described below)

1. Two circular holes were drilled into the side of the stack so as to allow access along two sampling lines.

The holes were at 90° to each other in the circular stack side. Ideally 2" or 4" BSP fittings will be attached to hold sampling equipment in the stack.

2. Prior to sampling, the process activity and the cycle of operation of the plant were observed so that sampling could take place at a time which was representative of the normal working conditions of the process, or give information about a specific part of the cycle. Details of the process activities at the time of sampling are recorded along with any other relevant information (e.g. materials in use, delays etc.).

3. A velocity temperature survey of the stack was undertaken along the two sampling lines so as to determine the suitability of the sampling location and the number of sampling points required. At each of ten equally spaced intervals along each line (excluding the region within 5% of the effective stack diameter from the wall), the gas velocity and temperature was measured and recorded.

4. A nozzle of suitable size was used which, in conjunction with the adjusted flow rate of the pump (compensating for differences in temperature and pressure between the stack and the pump), enabled the flow at the entrance to the nozzle to match that in the stack.

The nozzle was connected to a filter holder (loaded with a pre-weighed filter*), and the filter holder connected to a suitably sized stainless steel probe tube which was inserted into the stack with the nozzle at 90°C to gas flow. When ready to start sampling the nozzle will be turned to face into the flow.

(*Note: Filters used were 25 mm GFA (Glass Fibre A) filters composed of 100% borosilicate glass with a pore size of 1 µm and a maximum operating temperature of 500°C).

5. The sampling probe was attached to a variable flow pump, flow meter. The start time, meter reading and required flow rate recorded before the sampling commences. Sampling was carried out at each of the four positions, adjusting the flow rate of the pump at each location so as to achieve continuous isokinetic sampling. The sampling took place for a sufficient duration so that the weight of sample obtained was greater than 0.3% of the filter weight.
6. Throughout the test the meter readings were monitored and timed to ensure the correct flow rate at each sampling position. On completion

APPENDIX 1 (continued)
PROCEDURES

of the test the final meter reading was used to calculate the total volume of stack gases sampled.

7. The probe was then removed from the stack and a repeat velocity temperature survey was undertaken at the same sampling positions.

(If the sum of the velocity readings at these sampling positions had differed by more than 5% compared to the original survey, the test results would not be regarded as having the required accuracy and the test repeated or sampling position re-assessed).

8. The filter was removed from the filter holder and stored in its original container, prior to being returned for tare weighing on an electronic balance capable of 0.000001 grams resolution.
9. A new filter was loaded into the filter holder and the procedure repeated immediately using the results from the repeat velocity temperature survey as the initial readings for the second sample.

Procedure VOC Emissions Monitoring

The sampling apparatus used for VOC analysis follows certain criteria:-

The adsorbent material selected has a high, but reversible retention for the VOCs expected in the emission at the selected flow rate.

The sample flow rate is calibrated such that, at the end of the sampling period, the concentration of the contaminant on the adsorbent medium is within the range required for the analytical procedure.

The adsorbent is capable of storing the bound VOC compounds in a stable form, without losses until the analysis is carried out in the laboratory.

On site a low flow pump was connected to two SKC activated carbon adsorbent tubes No. 226-01 in series. Flow rates were set using a Saga 5000 digital bubble flow calibrator. Duration of sampling, location and process in operation at time were recorded.

Static pressure, barometric pressure and temperature were also taken at every sample point.

All the carbon tubes were then capped to prevent any loss of sample during transport. The samples were then submitted for analysis via the appropriate Methods for the Determination of Hazardous Substances (MDHS) procedures and National Institute for Occupational Safety & Health (NIOSH) methods.

APPENDIX 2
RESULTS

**APPENDIX 2
RESULTS**

Particulate Emission Calculations

(Values taken from raw data sheets)

Location: Shot blast
Date of Sample: 09-Nov-10
Test No: 1
Filter No: GFA 6108

Absolute temperature at meter (Tm)		286	K
Absolute temperature in duct (Td)		307	K
Total pressure in duct (Pd)		100.0	kPa
Total pressure at meter (Pm)		92.1	kPa
Temperature/Pressure correction factor =	$\frac{Pd \times Tm}{Pm \times Td}$ (CF)	1.01	
Total volume sampled at meter (Vm)		0.911	m ³
Quantity of air at nozzle =	$\frac{Vm}{CF}$ (Qn)	0.90	m ³
Particulate weighed on filter (W)		0.151	mg
Particulate concentration (nominal) = W/Qn		0.17	mg/m ³
Correction to STP =	$\frac{W \times Td \times 101.3}{Qn \times 273 \times Pd}$	0.19	mg/m ³

Process at time of sampling

Shot blasting rail damper bars

Substances in use at time of sampling

Shot blast bead

Other information

Velocity Profile m/s 25.6, 25.7, 25.0, 24.6, 24.8, 25.2, 25.3, 25.1, 24.6, 24.2
Average 25.0m/s Volume 1018m³/hr
0.193grams/hour

APPENDIX 2 RESULTS

Particulate Emission Calculations

(Values taken from raw data sheets)

Location: Shot blast
Date of Sample: 09-Nov-10
Test No: 2
Filter No: GFA 6109

Absolute temperature at meter (Tm)	286	K
Absolute temperature in duct (Td)	307	K
Total pressure in duct (Pd)	100.0	kPa
Total pressure at meter (Pm)	92.1	kPa
Temperature/Pressure correction factor =	$\frac{Pd \times Tm}{Pm \times Td}$ (CF)	1.01
Total volume sampled at meter (Vm)	0.911	m ³
Quantity of air at nozzle =	$\frac{Vm}{CF}$ (Qn)	0.90
		m ³
Particulate weighed on filter (W)	0.515	mg
Particulate concentration (nominal) = W/Qn	0.57	mg/m ³
Correction to STP =	$\frac{W \times Td \times 101.3}{Qn \times 273 \times Pd}$	0.65
		mg/m ³

Process at time of
sampling
Shot blasting

Substances in use at time of sampling
Shot blast beads

Other information

Velocity Profile m/s 25.6, 25.7, 25.0, 24.6, 24.8, 25.2, 25.3, 25.1, 24.6, 24.2
Average 25.0m/s Volume 1018m³/hr
0.524grams/hour

APPENDIX 2 RESULTS

Particulate Emission Calculations

(Values taken from raw data sheets)

Location: Spray booth
Date of Sample: 09-Nov-10
Test No: 1
Filter No: GFA 7110

Absolute temperature at meter (Tm)	291	K
Absolute temperature in duct (Td)	295	K
Total pressure in duct (Pd)	99.9	kPa
Total pressure at meter (Pm)	92.1	kPa
Temperature/Pressure correction factor =	$\frac{Pd \times Tm}{Pm \times Td}$ (CF)	1.07
Total volume sampled at meter (Vm)	0.644	m ³
Quantity of air at nozzle =	$\frac{Vm}{CF}$ (Qn)	0.60
		m ³
Particulate weighed on filter (W)	0.070	mg
Particulate concentration (nominal) = W/Qn	0.12	mg/m ³
Correction to STP =	$\frac{W \times Td \times 101.3}{Qn \times 273 \times Pd}$	0.13
		mg/m ³

Process at time of sampling

Spray bonding agent to rail damper bars

Substances in use at time of sampling

Spraying

Other information

Velocity Profile m/s 5.3, 5.0, 4.9, 4.8, 5.0, 4.9, 4.7, 4.8, 4.8, 4.6
Average 4.9m/s Volume 4988m³/hr
0.65grams/hour

**APPENDIX 2
RESULTS**

Particulate Emission Calculations

(Values taken from raw data sheets)

Location: Spray booth
Date of Sample: 09-Nov-10
Test No: 2
Filter No: GFA 7112

Absolute temperature at meter (Tm)		291	K
Absolute temperature in duct (Td)		295	K
Total pressure in duct (Pd)		99.9	kPa
Total pressure at meter (Pm)		92.1	kPa
Temperature/Pressure correction factor =	$\frac{Pd \times Tm}{Pm \times Td}$ (CF)	1.07	
Total volume sampled at meter (Vm)		0.644	m ³
Quantity of air at nozzle =	$\frac{Vm}{CF}$ (Qn)	0.60	m ³
Particulate weighed on filter (W)		0.097	mg
Particulate concentration (nominal) = W/Qn		0.16	mg/m ³
Correction to STP =	$\frac{W \times Td \times 101.3}{Qn \times 273 \times Pd}$	0.18	mg/m ³

Process at time of sampling

Spray bonding agent rail damper bars

Substances in use at time of sampling

Spraying

Other information

Velocity Profile m/s 5.3, 5.0, 4.9, 4.8, 5.0, 4.9, 4.7, 4.8, 4.8, 4.6
Average 4.9m/s Volume 4988m³/hr
0.90grams/hour

APPENDIX 2 RESULTS

VOC Emission Calculations

Location: Degreaser Factory 1 Sample Start: 10:40
Date of Sample: 09-Nov-10 Sampling Stop: 11:10

Absolute temperature in duct (Td)	289	K
Total pressure in duct = barometric + static (Pd)	100	kPa
Flow rate for VOC sampling (f)	50	ml/min
Total period of sampling (t) = T1-T0	30	mins
Total quantity of air samples = f x t (Q voc)	0.002	m ³
Weight of VOC collected expressed as Carbon (Wc)	0.381	mg
Concentration VOC = $\frac{Wc}{Q \text{ voc}}$	254.0	mg/m ³
Correction to STP = $\frac{Wc \times Td \times 101.3}{Q \text{ voc} \times 273 \times Pd}$	272.4	mg/m ³

Code:- VOC = Volatile Organic Compound

Process at time of sampling

Degrease metal components

One basket dipped for test purposes

Substances in use at time of sampling

Acetone

Dichloromethane

Other information

Velocity Profile 19.5m/s Area 0.008m² volume 551.4m³/hr
Discharge 0.15g/hour carbon

APPENDIX 4
DETAILS OF EXHAUST SAMPLING POINT



Bonding Spray Booth



Shot Blast



Factory 1 Degreaser