# PERMIT REFERENCE: PPC 053 Jaguar Cars Ltd

Pollution Prevention and Control Act 1999
Pollution Prevention and Control (England and Wales)
Regulations 2000 as amended

Process Address	Browns Lane
	Coventry
	CV5 9DR
Process Type	Coating Activity
Current Operator	Jaguar Cars Ltd
	Browns Lane
	Coventry
	CV5 9DR
Previous Operator	N/a
Date of Application	1 <sup>st</sup> April 2004
Date Permit Issued	1 <sup>st</sup> November 2004

# POLLUTION PREVENTION & CONTROL ACT 1999 POLLUTION PREVENTION & CONTROL (ENGLAND AND WALES) REGULATIONS 2000

**DOCUMENT A: PERMIT** 

**Jaguar Cars Ltd** 

Reference Number PPC/053

Coventry City Council ("the Council") in accordance with Section 10(2) of the Pollution Prevention & Control (England and Wales) Regulations 2000 ("The Regulations"), hereby permits:

**Jaguar Cars Ltd** 

Whose registered office is:

Browns Lane Coventry CV5 9DR

to operate a Part B installation involving a coating activity, as prescribed in Section 6.4 Part B of Schedule 1 to The Regulations, at:

Jaguar Cars Browns Lane Coventry CV5 9DR

The permit is subject to the conditions specified in this document consisting of 15 pages and comprising documents A, B and C, plans PPC/053/A, PPC/053/B and PPC/053/C and Appendix 1.

Signed	1
Ū	Alan Bennett, Head of Environmental Health
	A person authorised to sign on behalf of the Council
<b>5</b>	
Dated	

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## **SCOPE**

The installation comprises not just any relevant unit carrying out a Part B activity listed in Schedule 1 to the Regulations, but also directly associated activities which have a technical connection with that activity and which could have an effect on pollution.

All pollutant concentrations shall be expressed at reference conditions of 273K and 101.3kPa, without correction for water vapour content.

Technical Guidance documents used in the preparation of this document:

- Secretary of States Guidance Note PG6/33(04) Wood Coating Processes
- Secretary of State's Guidance General Guidance Manual on Policy and Procedures for A2 and B installations. ISBN 0-85521-028-1

Date Annual Fee Required: 1st April of each financial year

Date For Full Compliance: Date permit issued

Permit Prepared By: Rachel King
Permit Checked By: Susan Simmons

#### **LEGISLATION**

1. Pollution Prevention and Control Act 1999.

2. Pollution Prevention and Control Regulations 2000 as amended, schedule 1 as amended

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## BRIEF DESCRIPTION OF THE INSTALLATION REGULATED BY THIS PERMIT

Definitions referred to in this permit

- An Activity is an industrial activity forming part of an installation. Different types of activity are listed within Schedule 1 of the PPC Regulations and are broadly broken down into industrial sectors. Other "associated" activities may also form part of an installation.
- An Installation comprises not just any relevant unit carrying out a B activity listed within Schedule 1 to the PPC Regulations, but also directly associated activities which have a technical connection with a schedule 1 activity and which could have an effect on pollution.
- An **Operator** is the person (eg a company or individual) who has control over the operation of an installation.
- Volatile organic compound (VOC) shall mean any organic compound having at 293K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use.
- Organic solvent shall mean any VOC which is used alone or in combination with other agents, and without undergoing a chemical change, to dissolve raw materials, products or waste materials, or is used as a cleaning agent to dissolve contaminants, or as a dissolver, or as a dispersion medium, or as a viscosity adjuster, or as a surface tension adjuster, or a plasticiser, or as a preservative.
- Stack includes structures and openings of any kind from or through which substances may be emitted to air.
- Duct includes enclosed structures through which gaseous substances may be conveyed.
- Process vent includes open terminations of ducts.
- Authorised Officer shall mean an officer authorised to carry out duties under the Pollution Prevention and Control Act 1999 and subordinate regulations
- Logbook shall mean any electronic or paper means of storage of the required information as agreed by the regulator
- Local Authority shall mean Coventry City Council
- "m" means metre
- "m/s" means metres per second

The general location of the Authorised Process is shown on the attached plan PPC/053/A. The Installation boundary is marked in red on the attached plan PPC/053/B.

# **Description of Installation**

The installation consists of the following areas:

# **Veneer Preparation (carried out in VMC2)**

Sheets of wood veneer are delivered to the area in bundles where they are separated, inspected and then "conditioned" by spraying with de-mineralised water in order to increase the moisture content of the material so that it can be shaped.

Sheets of veneer are then cut using a variety of methods from hand cutting to laser, to the required shape and together with adhesive sheets and more thin wood veneer sheets are formed onto a metal or Grivory substrate in heated presses.

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These parts are then filled and sanded where splits or cracks ahev been found in preparation for coating.

# Polyester Lacquer Coating (carried out in VMC3)

Lacquers, diluents and cleaning solvents are delivered to and stored in the central paint store, solvent barrel store and mix room in the finishing building on site.

Materials are transferred in sealed containers to their point of use by hand or by fork lift truck and mixed to known specifications in the mix room in the finishing building. The mixed product is then transferred to the High Volume Low Pressure (HVLP) spray guns into one of four spray cells by a sealed pumped delivery system.

The wood veneer components are prepared for lacquering by the hand application of a sealing agent that aids the adhesion of the lacquer coats and the lacquer is applied in one of the three automatic polyester spray cells.

The mixed lacquer product is sprayed onto the wood veneer components using robotic spraying arms in the remaining three spray cells. Each component will receive a set number of lacquer coats as it passes through the lacquer spray on a number of occasions.

The lacquered components are manually removed from the automatic line and stored in the curing area, where the lacquer is air dried to form a finished product.

The facility also has 2 manual spay booths located in the "Seal and Touch" Area – these are used for occasional trials and minor specialist repairs

#### **Veneered Component Finishing (carried out in VMC3)**

The lacquered components are then taken through the finishing process where they are qualified by hand routers to remove excess lacquer around the periphery and aperture areas. The surfaces are then flatted using abrasive sheets to provide a smooth and flat surface.

They are then polished to remove any flatting lines and to give a high gloss finish by the use of either hand or automated polishers.

At certain points within this process some components are also machined by the use of automated CNC machines to remove "cut outs" etc dependent on the product requirement.

Some components for specific models do not go through the polishing operation but are given an additional sprayed final coat of PU lacquer in order to produce a satin finish (see PU coating below).

# PU Lacquer Coating (carried out in VMC3)

This fourth automatic spray cell is used for the application of UV material to attain a Satin finish post flatting and polishing operations.

# **UV Coating Facility (carried out in VMC1)**

A small-automated machine is used to do minor repair work – this facility allows for the application of lacquer, which is UV cured on minor defect repairs.

Other Coating Facilities (carried out in VMC3)

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In addition to the 3 automatic cells used for production the facility also has 2 small manual spray booths located in the "Seal and Touch" Area – these are intended to be used for occasional trials and minor specialist repairs.

<u>Table 1</u>
List of Process Areas within the Installation and Associated Emission Points,
Pollutants of Concern and Abatement Plant Required

Row Number	Area/Machinery Identification	Pollutants Emitted	Emission Limit in Permit	Abatement Plant Required
1	2 Manual Spray booths in the Touch and Seal Area in VMC3 on plan PPC/053/X	Particulates VOC's Isocyanates	1.1 to 1.5 inclusive	Dry filtration System
2	4 Automatic Spray booths located in Spraycells in VMC3 on plan PPC/053/X	Particulates VOC's Isocyanates	1.1 to 1.5 inclusive	Cascading water filtration system
3	1 Automatic Spray booth in UV coating facility in VMC1 on plan PPC/053/X	Particulates VOC's Isocyanates	1.1 to 1.5 inclusive	Dry filtration System

It should be noted that whilst that the veneer preparation and finishing areas have been described for completeness they are not considered to be part of the installation that requires to be regulated under the permit. This is because whilst they are a related activity, the operator has demonstrated that the potential to release emissions to atmosphere from these activities is minimal.

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# **DOCUMENT B**

# **CONDITIONS**

All conditions shall have immediate effect unless stated otherwise.

# 1.0 EMISSION LIMITS AND CONTROLS

- 1.1 All emissions to air shall be free from offensive odour outside the site boundary, as perceived by the local Authority Inspector.
- 1.2 All emissions to air, other than steam or condensed water vapour, shall be free from droplets, persistent mist and persistent fume.
- 1.3 There shall be no visible emissions of particulate matter noticeable beyond the site boundary.
- 1.4 The following concentrations of emissions to atmosphere shall not be exceeded
  - (a) total particulate matter from the stacks 50mg/m³ serving the 4 spray cells in VMC3, the 2 manual spray booths in the seal and touch area in VMC3 and the 1 automatic spraybooth in VMC1.
  - (b) isocyanates from the stacks serving the 0.1mg/m³ 4 spray cells in VMC3, the 2 manual spray booths in the seal and touch area in VMC3 and the 1 automatic spraybooth in VMC1.
  - (c) volatile organic compounds from the stacks serving the 4 spray cells in VMC3, the 2 manual spray booths in the seal and touch area in VMC3 and the 1 automatic spraybooth in VMC1.
- 1.5 The introduction of dilution air to achieve the emission concentration limits in condition 1.4 above is not permitted. Exhaust flow rates should be consistent with the efficient capture of emissions.

# 2.0 MONITORING, SAMPLING AND MEASUREMENT OF EMISSIONS

- 2.1 A calculation shall be submitted to this Authority annually, in order to demonstrate compliance with table 12 of The Secretary of States Process Guidance Note PG 6/33(04), relating to non-arrestment VOC reduction strategies. If compliance with table 12 can not be demonstrated the operator shall comply with the VOC emission limit outlined in condition 1.4 (c) above.
- 2.2 A visual assessment of particulate emissions from the 4 spray cells in VMC3, the 2 manual spray booths in VMC3, and the automatic spraybooth in VMC1 shall be carried out at least once a day while spraying operations are in progress. This shall be carried out by making an assessment of lacquer deposits around the installation boundary.
- 2.3 An olfactory assessment of emissions of volatile organic compounds from the 4 spray cells in VMC3, the 2 manual spray booths in VMC3, and the automatic spraybooth in VMC1 shall be carried out at least once a day whilst spraying operations are in progress around the installation boundary.

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- 2.4 Emissions from the 4 spray cells in VMC3, the 2 manual spray booths in VMC3, and the automatic spraybooth in VMC1 shall be tested for total particulate matter at least once every 12 months to demonstrate compliance with condition 1.4 above.
- 2.5 Emissions from the 4 spray cells in VMC3, the 2 manual spray booths in VMC3 and the automatic spraybooth in VMC1 shall be tested for isocyanates at least once every 12 months to demonstrate compliance with condition 1.4 above.
- 2.6 Emissions from the 4 spray cells in VMC3, the 2 manual spray booths in VMC3 and the automatic spraybooth in VMC1 shall be tested for volatile organic compounds at least once every 12 months to demonstrate compliance with condition 1.4 above unless compliance with condition 2.1 can be demonstrated..
- 2.7 At least 14 days prior to the monitoring required by condition 2.4 and 2.5 above the operator shall notify the Local Authority of the provisional date and time of monitoring, the methods to be used and the pollutants to be tested for. This is known as a monitoring protocol and further guidance on this is in appendix 1 of this permit. Monitoring shall only take place following the submission and approval of a monitoring protocol by the Local Authority.
- 2.8 A report on the monitoring required by condition 2.4 and 2.5 shall be submitted to the Local Authority within 8 weeks of the completion of monitoring. This report shall include the methods used and the results of the monitoring.
- 2.9 The results of monitoring to comply with 2.4 and 2.5 shall be recorded in a logbook. This shall include the date, time, and the name of the observer and an assessment of the emissions. This logbook shall be retained, on site, for a minimum of two years.
- 2.10 Any adverse results from the monitoring required in 2.4 and 2.5 shall be followed up immediately by the investigation of the cause of the emission and any corrective action taken, with this also being recorded in the logbook.
- 2.11 A detailed record shall be kept of all organic solvents used in the prescribed processes. This shall include cleaning solvent usage, diluent solvent usage and solvents contained within coatings used. This inventory shall be forwarded to the local Authority at least once every six months and shall include a determination for the total organic solvent usage for that period.

# 3.0 OPERATIONAL CONTROLS

- 3.1 The spray application of coatings shall only be carried out in an enclosed booth either by automatic robotic equipment or by manual operators, using High Volume Low Pressure (HVLP) spray guns, or other equipment as approved by the Local Authority.
- 3.2 The 4 spray cells in VMC3 and the auto spraybooth in VMC1 shall be fitted with cascading water curtain filtration systems. The 2 manual spray booths in VMC3 shall be fitted with a dry filtration media.
- 3.3 The pressure either side of the filters outlined in condition 3.2 above shall be continually monitored. Should the pressure differential indicate that a fault has occurred an interlock system shall automatically stop the application of coatings. The application of coatings shall not re-start until the cause of the fault has been identified and resolved.

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- 3.4 The interlock system outlined in condition 3.3 above shall be tested to ensure proper working order on a weekly basis. Any faults identified shall be rectified as soon as possible and no spraying shall take place until the interlock system is in full working order. Records of such tests shall be kept on site to include any faults noted and repairs undertaken, for a minimum of 2 years.
- 3.5 Materials containing volatile organic solvents shall be transferred in sealed containers to their point of use by hand or by forklift truck and mixed by hand and automated systems to known specifications in the mix room in the finishing building.
- 3.6 The mixed product shall be transferred to the High Volume Low Pressure (HVLP) spray guns into the spray cells by a sealed pumped delivery system, except in the case of the spray cell where the sealing agent is applied where the equipment shall have purpose made pressure pots. These shall be disconnected from the system when they need to be refilled and wheeled to the lacquer mix room or sealer storage area where they will be filled using a dedicated pumping system, before being reconnected to the spraying system.
- 3.7 The cleaning of spray guns shall only be carried out by the use of a closed loop cleaning system. This shall only be carried out in the spray booths/cells. Where the cleaning takes place in the spray booth the cleaning/flushing solvent shall be collected into a separate receptacle for disposal, and not sprayed directly into the booth or cell.
- 3.8 All full, partially full and nominally empty containers that hold or have held materials, which contain organic solvents shall be lidded or sealed to prevent fugitive emissions of solvents.
- 3.9 Odour neutralising equipment shall be fitted to the process exhaust vents serving the 3 spray cells in VMC3. The fourth cell shall not be used for the application of styrene lacquer and so shall not be fitted with the odour neutralising equipment. The equipment shall be operated in accordance with the manufacturer's instructions and shall utilise a weather station

# 4.0 STACKS, DUCTS AND PROCESS VENTS

- 4.1 The final discharge point above ground level of the stacks shown on shall be as follows with reference to plan PPC/053/C:
  - (a) The stack serving the automatic booth in VMC1 (not shown on plan)

3.4 metres

(b) Stacks A, B, C, F, G, H, I, J, K, L, M, N, O P, Q, R, S, T, U

9.1 metres

(c) Stacks D and E

3.4 metres

#### 5.0 **GENERAL OPERATIONS**

5.1 The operator shall undertake regular cleaning and preventative maintenance including inspection and repair/replacement on all plant and equipment

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- concerned with the emission, capture, transport and control of emissions to atmosphere. Where necessary manufacturers guidelines shall be used to determine the regularity of maintenance. Records of preventative maintenance including inspections and any works undertaken shall be kept on site and made available to the local authority inspector on request.
- 5.2 Spares and consumables for plant and equipment used in the installation in particular that subject to continual use or wear shall be held on site or shall be available at short notice. Such plant or equipment shall not be used unless that plant or equipment is capable of working in accordance with the conditions of this permit.
- 5.3 Staff at all levels shall receive the necessary training and instruction in their duties relating to control of the activities and emissions to air. Records shall be kept which details all relevant training provided to staff, and these records shall be kept for a minimum of 2 years.
- 5.4 Any malfunction of plant or spillage of solvent based materials shall be remedied as soon as possible and process operations altered whilst the necessary work is undertaken.
- 5.5 Any incident likely to give rise to adverse atmospheric emissions or emissions that may have an impact on the local community shall be notified to the local authority immediately, and the details of incident including remedial action taken recorded in the process log book.
- 5.6 The operator shall make available on demand and without charge any of the records required to be kept by this permit.
- 5.7 If there is any intention to change any aspect of the prescribed installation from the description contained in the beginning of this permit including table 1, or any other aspect which may affect the substances or concentration or amount of substances being emitted to atmosphere, the operator shall notify the regulator of the proposed changes at least 4 weeks in advance before the changes take place.

## 6.0 COMPLIANCE WITH SOLVENT EMISSIONS REGUALTIONS 2004

- 6.1 Compliance with the Solvent Emissions (England & Wales) Regulations 2004 shall be demonstrated by one of the following methods:
- 1) Achieving the following VOC emission limits expressed as total excluding particulate matter over a 30 minute mean:

Release Point	<b>Emission Limit</b>
Waste gases from oxidation plant	50 mg/Nm3
Waste gases from turbines reciprocating	150 mg/Nm3 till 2013
engines or boilers used as abatement plant	50 mg/Nm3 after 2013 for drying
	processes
	50 mg/Nm3 after 2013 for other processes
Any other waste gases	75 mg/Nm3

Fugitive Emission Limit Value = 20% of solvent input

Compliance date 31<sup>st</sup> of October 2007

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Note this does not apply to VOC emissions from coating operations where the operator can demonstrate compliance with the solvent specifications outlined in table 12 of PG6/33(04)

Or

2) The use of a Solvent Reduction Scheme to demonstrate the achievement of a Target Emission which is calculated by identifying the total amount of solids used in coating material in a 12 month period (all ingredients other than water and organic solvents should be assumed to form part of the solid coating. The Target Emission is as follows:

# **Total Mass of Solids X 1**

# Compliance date 31<sup>st</sup> October 2005

6.2 The operator shall identify products or materials that are/contain risk phrased substances/materials R45, R46, R49, R60 and R61 and formulate and implement a timetable to replace, control and limit designated risk phrase materials as soon as possible, as defined and agreed by the Local Authority.

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#### **DOCUMENT C**

### **RESIDUAL DUTY**

In relation to any aspect of the process not regulated by specific conditions in this permit, then Best Available Techniques shall be used:

For the purposes of the Pollution Prevention and Control (England and Wales) Regulations 2000, "best available techniques" means the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limit values designed to prevent and, where practicable, generally to reduce emissions and the impact on the environment as a whole; and for the purpose of this definition –

- a) "available techniques" means those techniques which have been developed on a scale which allows implementation in the relevant industrial sector, in the economically and technically viable conditions, taking into consideration the cost and advantages, whether or not the techniques are used or produced inside the United Kingdom, as long as they are reasonably accessible to the operator;
- b) "best" means, in relation to techniques, the most effective in achieving a high general level of protection of the environment as a whole;
- c) "techniques" includes both the technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

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### **SUPPLEMENTARY NOTES**

These notes do not comprise part of the Permit PPC/ 053 but contain guidance relevant to the Permit.

#### **Inspections and Powers of Entry**

Regular inspections will be carried out by officers of the Council (the Local Authority Inspectors) to check and ensure full compliance with the Permit conditions and residual duties. These inspections may be carried out without prior notice.

Under section 108(6) of the Environment Act 1995 authorised Local Authority Inspectors have been granted powers of entry into any premises for the purposes of discharging relevant duties.

#### Reviews

The Local Authority has a statutory duty to review the permit at least once every 6 years or in the following circumstances set out in regulation 15 of the Pollution Prevention and Control regulations 2000:

- a) The pollution from the installation is of such significance that the existing emission limit values for the permit need to be revised or new emission limit values need to be included in the permit
- b) Substantial changes in BAT make it possible to reduce emissions from he installation or mobile plant significantly without imposing excessive costs; or
- c) Operational safety of the activities carried out in the installation or mobile plant requires other techniques to be used

#### **Health and Safety**

This Permit is given in relation to the requirements of the Pollution Prevention and Control (England and Wales) Regulations 2000. It must not be taken to replace any workplace responsibilities the operator has under Health & Safety legislation. Whenever emission limits quoted in this Permit conflict with occupational exposure limits set under the Health and Safety at Work Act 1974 to secure the health, safety or welfare of persons at work, the tighter limit should prevail.

Installation must be operated in order to protect persons at work as well as the environment. In achieving conditions in this Permit the operator must not adopt any course of action that would put at risk the health, safety or welfare of persons at work.

#### **Other Statutory Requirements**

This Permit does not detract from any other statutory requirement, such as the need to obtain planning permission, hazardous substances consent, discharge consent from the Environment Agency, building regulations approval, or a waste disposal licence.

This Permit does not authorise a contravention of any other enactment or any order made, granted or issued under any enactment, nor does it authorise a contravention of any rule or breach of any agreement.

The Operator is advised to consult the relevant Planning Department regarding changes that may be required as a result of this Permit (e.g. stack heights) as they may require planning permission.

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#### **Transfer of Permits**

Where the operator of an installation wishes to transfer, in whole or in part, his permit to another person, the operator and the proposed transferee shall jointly make an application to the regulator to effect the transfer. Such an application shall be accompanied by the permit and any fee prescribed in respect of the transfer.

In the case of partial transfer, where the original operator retains part of the permit, the application must make clear who will retain control over the various parts of the installation. The application must include a plan identifying which parts of the site and which activities the operator proposes transferring.

The local authority will then determine whether to allow the transfer within a twomonth period, unless the local authority and the applicants agree a longer period. Where the local authority approves the transfer, the transfer will take effect from the date requested by the operator or a date that may be agreed by the local authority and the applicants.

### **Variation to Permits**

Variation to permits may be initiated either by the local authority or the operator, either in response to changes in the operation of an installation or if new conditions are needed to deal with new matters. Variations may be required in response to the following.

- Change of operation of the installation. (The operator shall notify the local authority under Section 16(1) of the Regulations.)
- In response to the findings of a periodic review of conditions.
- In response to the findings of an inspection.
- New or revised sector guidance notes

The operator should apply to the Local Authority in order to vary a permit under regulation 17 of the Regulations. The application must be in writing and, in accordance with Part 1 of Schedule 7 to the Regulations contain:

- The name, address and telephone number of the operator.
- The address of the installation.
- A correspondence address.
- A description of the proposed changes.
- An indication of the variations the operator would like to make.
- Any other information the operator wants the authority take account of.

# Substantial Change

A substantial change means, in relation to an installation, a change in operation, which in the opinion of the local authority may have significant negative effects on human beings or the environment.

Where the local authority deems that a proposed variation constitutes a substantial change, the operator will be informed of the process to follow.

#### <u>Noise</u>

This Permit does not include reference to noise. Statutory noise nuisance is regulated separately under the provisions of Part III of the 1990 Act.

# **Appeals**

An Appeal can be made against the conditions in, or variations to this Permit as per Part IV of the Regulations. Appeals are made to the Planning Inspectorate who acts on behalf of the Secretary of State. Appeals against conditions within a Permit must

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be submitted within 6 months of the date of issue of the permit. Appeals against variation notices must be submitted within 2 months of the date of issue of the notice. Appeals should be despatched on the day they are dated and sent to:

The Planning Inspectorate
Environmental Appeals Administration
Room 4/19 – Eagle Wing
Temple Quay House
2 The Square
Temple Quay
BRISTOL
BS1 6PN

## **HMSO Publications**

**Emission Monitoring Protocol** 

All HMSO publications can be ordered by telephone on Tel: 0870 600 5522, Fax: 0870 600 5533 or e-mail: book.orders@tso.co.uk

#### i ax. 0070 000 5555 of e-mail. book.orders@tso.co

The documented procedure by which reliable and comparable results are obtained from measurements at source is known as a Protocol.

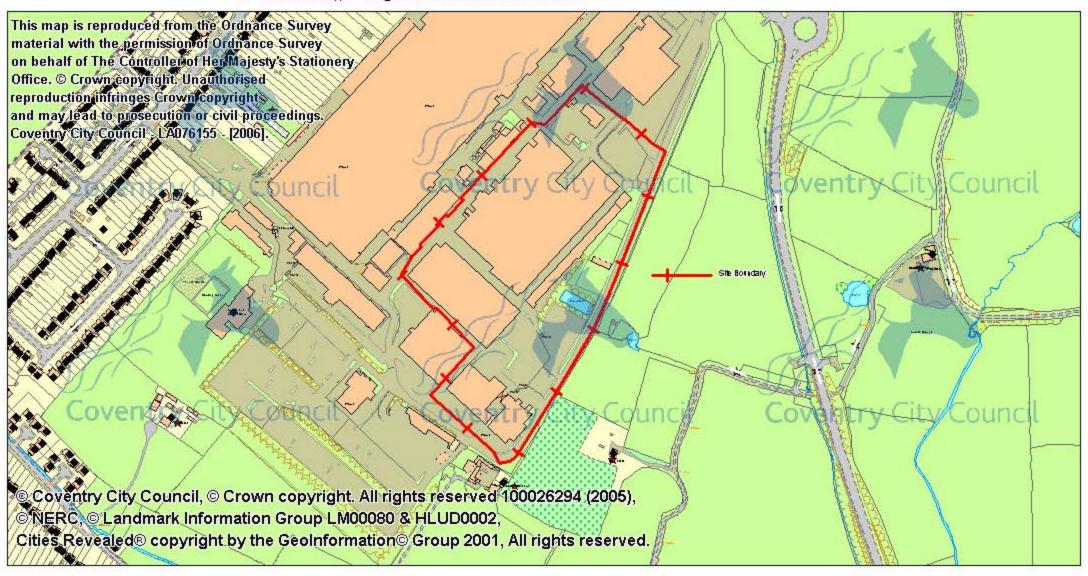
Protocols ensure that the sampling procedures are carried out correctly and that the results obtained accurately characterise the process.

The main components of a Protocol are as follows:-

- 1. Calibre and quality of the sampling team.
- 2. A reference measurement method (standard methods may not always be available)
- 3. A standard methodology setting out:
- health and safety considerations
- pollutants of interest
- · plant operating conditions required
- selection and location of sampling position
- sampling characteristics (e.g. isokinetic etc) and techniques
- sampling frequency
- sampling duration
- number of samples
- type (including make and model), condition and suitability of sampling equipment
- required accuracy
- variability of emissions
- analytical methods including laboratory competence and NAMAS accreditation certificate copy for each pollutant of interest
- analytical precision
- procedures to be adopted if standard methods unavailable
- calibration certificate(s) for sampling equipment
- Quality Control and Quality Assurance procedures
- Presentation of results and associated information.

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# PPC/053/A(i) - Jaguar Browns Lane Plant





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