

**ENVIRONMENT AND HERITAGE SERVICE**

**GUIDANCE FOR PROCESSES PRESCRIBED FOR  
AIR POLLUTION CONTROL  
BY THE CHIEF INDUSTRIAL POLLUTION INSPECTOR**

**CHIEF INSPECTOR'S GUIDANCE  
TO INSPECTORS  
(PART B PROCESSES)**

**BITUMEN AND TAR PROCESSES**

**B PROCESS GUIDANCE NOTE GNB 6/1 VERSION 1**

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## **CONTENTS**

1. INTRODUCTION
2. PROCESS DEFINITION
3. GENERAL REQUIREMENTS
4. RELEASES INTO AIR
5. RELEASE ROUTES
6. TECHNIQUES FOR RELEASE MINIMISATION
7. COMPLIANCE MONITORING PROGRAMME

## 1. INTRODUCTION

This Note is issued by the Chief Industrial Pollution Inspector as one of a series providing guidance for processes prescribed for Air Pollution Control (APC) by the Chief Inspector in Regulations made under the Industrial Pollution Control (Northern Ireland) Order 1997.

A further series of Notes is produced by the Department of the Environment (NI) for those processes prescribed for air pollution control and subject to regulation by the District Councils.

This Note provides a guide on standards and techniques to Inspectors in their assessment of an application for, or variation of, an APC authorisation under the Order.

This Note will also be of interest to operators of such processes, however it should be understood that whether an authorisation is granted, and on what conditions, will depend on the particular circumstances of each application. Parameters such as individual process characteristics and site location may influence the nature of the conditions that are included in an authorisation.

A key objective of the legislation is to ensure that, in carrying on a prescribed process, the best available techniques not entailing excessive cost (BATNEEC) will be used -

- (i) for preventing the release of prescribed substances into the air or, where that is not practicable by such means, for reducing the release of such substances to a minimum and for rendering harmless any such substances which are so released; and
- (ii) for rendering harmless any other substances which might cause harm if released into the air.

This Note comprises guidance in relation to new and existing processes and is based on an assessment of best available techniques as qualified by the requirement not to entail excessive cost. (The definition and meaning of BATNEEC is contained in the Industrial Pollution Control Part A and B processes “A Practical Guide”.)

The guidance contained in this Note is based on the current state of knowledge and understanding of these processes, their potential impact on the environment, and the available control techniques at the time of publication. The guidance will be updated regularly, (as a minimum the Note will be reviewed at not more than four yearly intervals from the date of publication), to reflect changes in knowledge and understanding. It will not always be possible to revise the Notes quickly enough to keep in absolute step with rapid changes. It is therefore recommended that operators and their advisors check with the Inspectorate as to whether there have been any changes before relying on this Note for the purpose of making an application or taking other significant action under the Order.

## 2. **PROCESS DEFINITION**

- 2.1 This Note applies to processes where tar or bitumen is heated in connection with a manufacturing process or where bitumen is oxidised by blowing air through it involving the use in any 12-month period of 5 tonnes or more of tar or of bitumen or, in aggregate, of both, (for example, cut back bitumens, bitumen emulsions, oxidised bitumens, mastic asphalt, roofing felt, bitumen containing paints, bitumen containing flooring materials, etc.), but not to processes in which tar or bitumen is distilled, as described in Schedule 1 - Section 6.3, Part B of the Industrial Pollution Control (Prescribed Processes & Substances) Regulations (Northern Ireland) 1998. Roadstone coating plants are covered by another Note GNB 6/2.

2.2 In the context of this note “process” comprises the whole process including the treatment, handling and storage of any materials used in the process as well as products and wastes produced by the process.

### 3.0 **GENERAL REQUIREMENTS**

3.1 New processes must comply with the standards contained in this Note immediately.

3.2 It should be the aim to bring processes up to current standards whenever the opportunity arises. Account should be taken of the plant’s technical characteristics; it’s rate of utilisation and the length of its remaining life; the nature and amount of polluting emissions from it and the desirability of not entailing excessive costs for the plant concerned.

3.3 As part of first application for authorisation of existing processes, those areas of the process that require upgrading to achieve the standards of this Note should be identified and the possible techniques which are to be employed indicated. Under normal circumstances, a detailed programme for upgrading, including timetable, should be submitted with the application.

## 4. **RELEASES INTO AIR**

### 4.1 **Reference Conditions**

All pollutant concentrations from contained releases should be expressed at standard conditions of temperature 273K (0°C) and pressure 101.3 kPa (1 atmosphere) without correction for water vapour content.

## 4.2 Emission Targets

4.2.1 The following emission standards should apply to contained releases:-

<u>Pollutant</u>	<u>Concentration (mg/m<sup>3</sup>)</u>
Tar fume	10
Bitumen fume	50
Volatile Organic Compounds as total carbon (excluding particulate matter)	50*
Total Particulate	50
Hydrogen Sulphide	5

**Note** Where non-continuous monitoring is undertaken no 30-minute mean emission concentration should exceed the specified emission standard.

\* Does not apply to processes involving the handling of bitumen or tar where the temperature of the exhaust gases is less than 42°C, unless these handling operations are carried out in connection with, or as part of, a process for the manufacture of cutback bitumen or solvent-based coatings.

4.2.2 All releases, other than steam or water vapour, should be colourless, free from persistent mist and fume and free from droplets.

4.2.3 The aim should be that all releases will be free from offensive odour outside the site process boundary, as perceived by the Inspectorate.

4.2.4 Where arrestment plant includes incineration, emissions in normal operation should be free from visible smoke and in no circumstances should exceed the equivalent of Ringelmann Shade 1, as described in BS 2742:1969.

- 4.2.5 The above emission standards should not be applied to vents serving tanks used solely for storage of raw materials. The emission standard for particulate matter should not be applied to arrestment plant serving storage silos.
- 4.2.6 The introduction of dilution air to achieve emission concentration limits in this Note should not be permitted. Exhaust flow rates should be minimised and consistent with efficient capture of emissions, good operating practice and meeting the requirements of the legislation relating to the workplace environment.

5. **RELEASE ROUTES**

The principal release routes are as detailed below:-

<b><u>Pollutant</u></b>	<b><u>Source</u></b>
Tar fume	The heating of tar or pitch
Bitumen fume	The heating of bitumen or petroleum pitch
VOCs	The manufacture of cut back bitumen and solvent based coatings
Particulate	Handling of dusty materials
Hydrogen Sulphide	The oxidation of bitumen

## **6. TECHNIQUES FOR RELEASE MINIMISATION**

### **6.1 Introduction**

The techniques selected need to cover releases from raw materials reception/storage, internal transportation, and from processing.

The process should be designed and operated in such a way that the substances released have the minimum impact on the environment. As a general principle the Inspectorate should be looking for evidence of the prevention, minimisation and rendering harmless of all releases of prescribed substances, and the rendering harmless of all other releases in the application, and requiring this in the authorisation.

Releases from the process may require a combination of several abatement techniques and the careful control of the process route taken in order to deal with the releases. The applicant should review all the options that are available and demonstrate that the combination of primary process and selected abatement equipment represents BATNEEC.

### **6.2 Techniques**

#### **6.2.1 Handling of Tar and Bitumen**

6.2.1.1 Deliveries of bitumen and tar from road and rail vehicles should, wherever practicable having regard to the availability of suitably equipped vehicles, be pumped into storage tanks, rather than blown using compressed air. Where compressed air delivery is utilised, a procedure designed to minimise fume emissions should be agreed with the Inspectorate. One such procedure involves the use of two short bursts of compressed air to clear hoses and lines rather than the traditional single, longer burst.

- 6.2.1.2 Where filling of road tankers with hot bitumen gives rise to off site odours, emissions should be adequately contained by local exhaust ventilation and exhausted to suitable arrestment equipment, or returned to the storage tank.
- 6.2.1.3 All bitumen and tar should be stored and processed within the appropriate temperature range for its grade. Details of suitable storage temperatures are given in Table 1.
- 6.2.1.4 Where practicable in relation to the viscosity and temperature of material being handled, bulk bitumen and tar storage tanks should be fitted with a high-level alarm or volume indicator to warn of overfilling. Where the fitting of such devices is not practicable, procedures to prevent overfilling should be agreed with the Inspectorate. Suitable means of containing spillage, (for example, bunding) should be provided.
- 6.2.1.5 Mixing tanks in which bitumen is blended with other materials such as organic solvents, polymers of water should be covered.
- 6.2.2 **Handling of Kerosene and other Solvents**
- 6.2.2.1 Emissions from mixing tanks and other processing equipment should be adequately contained by local exhaust ventilation and where necessary to meet the emission standard requirements in par. 4.2.1 exhausted to suitable arrestment equipment.
- 6.2.2.2 The receipt, handling and storage of organic solvents and other volatile organic compounds should be carried out in such a way that emissions are prevented, or where not practicable due to process characteristics, minimised and rendered harmless.
- 6.2.2.3 Emissions from bulk storage vessels during filling should either be vented to suitable arrestment plant or where practicable in relation to tanker off-loading arrangements, backvented to the delivery tanker.

6.2.2.4 Bulk storage should be fitted with a high level alarm or volume indicator to warn of overfilling. Where practicable in relation to the viscosity of material being handled or the pumping system used, the filling system should be interlocked to the alarm to interrupt the infilling operation at a predetermined level to prevent overfilling. Suitable means of containing spillage, (for example, bunding), should be provided.

### 6.2.3 **Handling of Dusty Material**

6.2.3.1 When limestone and other dusty materials are delivered in bulk, they should be stored in silos. Silos should be vented to suitable arrestment plant.

6.2.3.2 Charging and transfer of dusty material should be carried out by techniques which minimise emission (for example, by enclosed systems or use of extraction and collection).

### 6.2.4 **Arrestment Plant**

6.2.4.1 Where arrestment plant includes wet scrubbers, suitable indicative monitors should be provided to demonstrate liquor circulation, (for example, variable orifice meters).

6.2.4.2 Where arrestment plant includes incinerators they should operate at a minimum temperature of 800°C with a residence time of at least 0.5 seconds.

### 6.2.5 **General Operations**

6.2.5.1 Effective control of emissions requires the maintenance and proper use of equipment, and the proper supervision of process operations. Effective preventive maintenance should be employed on all plant and the equipment concerned with the control of emissions to the air. Essential spares and consumables should be held.

6.2.5.2 Any malfunction or breakdown leading to abnormal emissions should be dealt with promptly and process operations adjusted until normal operations can be restored. The inspector should be informed without delay. All such malfunctions should be recorded in a log book retained by the operator for a minimum of 4 years and available for examination by the Inspectorate.

6.2.5.3 Staff at all levels should receive the necessary formal training and instruction in their duties relating to control of the process and emissions to air. Particular emphasis should be given to training for start-up, shut down and abnormal conditions.

6.2.5.4 A high standard of housekeeping should be maintained.

6.2.6 **Dispersion**

6.2.6.1 The applicants will need to satisfy the Inspectorate that an appropriate assessment of vent and chimney heights has been made to provide adequate dispersion of odorous or prescribed substances, and other substances that might cause harm, which cannot be prevented and may be released. Some guidance is given in Technical Guidance Note D1 (ISBN 0-11-752794-7).

6.2.6.2 It may be necessary for dispersion modelling to be carried out which takes into account local meteorological data, local structures and topography, as well as other local releases, (for example, for sites with any large volume emission, significant non-combustion sources or multiple release points and sites where there are sensitive receptors nearby).

- 6.2.6.3 Applicants should provide clear information on the parameters used and the assumptions made in their assessments especially when using dispersion models. The assessment of background concentrations of pollutants will be particularly relevant. Statutory air quality standards and other recognised criteria should be taken into account.
- 6.2.6.4 Process upsets or equipment failure giving rise to abnormally high release levels over short periods should be assessed. Even if a very low probability of occurrence can be demonstrated by the applicant, a value for the chimney or vent height should nevertheless be set to avoid any serious damage to health in such circumstances.
- 6.2.6.5 The Operator should have procedures to reduce load or shut-down plant in the event of inadequate dispersion conditions.
- 6.2.6.6 Chimneys or process vents should be designed to provide efflux velocities that meet the requirements for stack aerodynamic downwash as described in Technical Guidance Note D1. Care should be taken to avoid generating positive pressure zones within the chimney unless the chimney wall is impervious or lined. Where a wet method of arrestment is used, the linear velocity within the arrestment equipment should not exceed 9 m/sec, to avoid entrainment of droplets.
- 6.2.6.7 Chimney flues, process vents and all ductwork should be leakproof. Chimney flues and ductwork leading to the chimney should be adequately insulated to minimise the cooling of waste gases and prevent liquid condensation on internal surfaces. Chimney flues and ductwork should be regularly cleaned to prevent accumulation of material.
- 6.2.6.8 Chimney or process vents should not be fitted with any restriction at the final opening, for example, a plate, cap or cowl where it is necessary to achieve dispersion of the residual pollutants, except for a cone to meet the efflux velocity requirements of par. 6.2.6.6. The discharge should be vertically upwards.

## 7. COMPLIANCE MONITORING PROGRAMME

### 7.1 General

Conditions in the authorisation should require the results of all monitoring to be recorded. It should further distinguish between:

- compliance records;
- measurement or records for which regular formal returns to the Inspectorate are not normally required; and
- operational records made by the operator during the normal course of operating the process.

### 7.2 Monitoring Requirements

7.2.1 Continuous monitoring for particulate may be required at the exhaust of abatement plant.

7.2.2 Where appropriate, particulate emissions should be tested at least annually. The reference test method for particulate emissions is by the procedure of British Standard BS 3405:1983. An alternative method of testing is acceptable by agreement with the Inspectorate, provided that it can be shown that results comparable with this method are obtained.

7.2.3 The Inspectorate should be advised at least 7 days in advance of any periodic monitoring exercise to determine compliance with emission limits, as well as the provisional time and date of monitoring, pollutants to be tested and the methods to be used.

- 7.2.4 Contained releases from sources other than vents serving storage tanks used solely for the storage of raw materials should be tested at least annually for tar or bitumen fume, as appropriate. Contained releases from sources, other than vents serving storage tanks, should also be tested at least annually for volatile organic compounds. This requirement does not apply to processes involving the handling of bitumen or tar where the temperature of the exhaust gases is less than 42°C, unless these handling operations are carried out in connection with, or as part of, a process for the manufacture of cutback bitumen or solvent-based coatings.
- 7.2.5 The temperature of emissions from incinerators should be continuously monitored and the results continuously recorded. The instrument should be checked daily and it should be calibrated in accordance with the manufacturers instructions and at least once a year to ensure reliability of data collected.
- 7.2.6 Emissions from bitumen blowing processes should be tested at least twice per year for hydrogen sulphide.
- 7.2.7 The frequency of testing should be increased as part of the commissioning of new or substantially changed processes, where there is a justifiable complaint situation or where the emission levels are near to or approach the emission standards in par. 4.2.1.
- 7.2.8 Visual and olfactory assessments of emissions should be made frequently, and at least once a day. Remedial action should be taken immediately in the case of abnormal emissions.
- 7.2.9 The results of all monitoring and inspections should be recorded in a log book, retained by the operator for a minimum of 4 years and available for examination by the Inspectorate. Adverse results should be investigated immediately and in all cases should be recorded in the log book. The operator should ensure that the cause has been identified and corrective action taken and this action recorded in the log book.

7.2.10 The sampling positions for all monitoring instruments should be agreed with the Inspectorate. Care is needed in the design and location of sampling systems to obtain representative samples.

7.2.11 The onus is on the operator, that the appropriate equipment, laboratory facilities, expertise and quality control procedures are provided to ensure accurate results.

7.2.12 **Environmental Monitoring**

The impact of the process on the environment will be affected by the size of the releases and the site's location. The need for environmental monitoring should be addressed in the application, where necessary, to demonstrate that the releases have been adequately rendered harmless by the application of BATNEEC.

**TABLE 1**  
**RECOMMENDED BITUMEN HANDLING AND STORAGE TEMPERATURES**

<b>GRADE</b>	<b>MINIMUM PUMPING TEMPERATURE (°C)</b>	<b>MAXIMUM HANDLING AND STORAGE TEMPERATURE (°C)</b>
<b>Penetration Grades</b>		
450 pen	90	190
350 pen	95	190
200 pen	100	190
100 pen	105	200
70 pen	110	200
50 pen	115	200
40 pen HD	125	200
35 pen	125	220
25 pen	135	220
15 pen	140	220
<b>Hard Grades</b>		
H80/90	160	230
H100/120	190	230
<b>Oxidised Grades</b>		
75/30	150	230
85/25	165	230
85/40	165	230
95/25	175	230
105/35	190	230
115/15	205	230
<b>Cutback Grades</b>		
50 secs	65	160
100 secs	70	170
200 secs	80	180