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## Process Guidance Note 6/03 (11)

# Secretary of State's Guidance for Chemical Treatment of Timber and Wood Based Products

Secretary of State's Guidance for Local Air Pollution Control (LAPC) and Local Authority Pollution Prevention and Control (LAPPC)

February 2011



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## Secretary of State's Guidance for Chemical Treatment of Timber and Wood Based Products.

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# 1. Introduction

## Legal basis

- 1.1 This Note applies to the whole of the UK. It is issued by the Secretary of State, the Welsh Assembly Government, the Scottish Government and the Department of the Environment in Northern Ireland to give guidance on the conditions appropriate for the control of emissions into the air from the chemical treatment of wood. It is published only in electronic form and can be found on the [Defra website](#). It supersedes PG6/3(04).
- 1.2 This guidance document is compliant with the [Code of Practice on Guidance on Regulation](#) page 6 of which contains the "golden rules of good guidance". If you feel this guidance breaches the code, or notice any inaccuracies within the guidance, please contact us.
- 1.3 This is one of a series of statutory notes<sup>1</sup> giving guidance on the Best Available Techniques (BAT)<sup>2</sup>. The notes are all aimed at providing a strong framework for consistent and transparent regulation of installations regulated under the statutory Local Air Pollution Prevention and Control (LAPPC) regime in [England and Wales, Scotland and Northern Ireland](#). The note will be treated as one of the material considerations when determining any appeals against a decision made under this legislation.
- 1.4 In general terms, what is BAT for one installation in a sector is likely to be BAT for a comparable installation. Consistency is important where circumstances are the same. However, in each case it is, in practice, for regulators (subject to appeal) to decide what is BAT for each individual installation, taking into account variable factors such as the configuration, size and other individual characteristics of the installation, as well as the locality (eg proximity to particularly sensitive receptors).
- 1.5 The note also, where appropriate, gives details of any mandatory requirements affecting air emissions which are in force at the time of publication, such as those contained in Regulations or in Directions from the Government. In the case of this note, at the time of publication the mandatory requirements are those contained in the [EU Solvent Emissions Directive](#). The Regulations referenced in paragraph 1.3 put the Directive requirements into UK law.

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<sup>1</sup> this and other notes in the series are issued as statutory guidance in England and Wales under regulation 64(2) of the Environmental Permitting Regulations. The notes are also issued as statutory guidance in Northern Ireland and guidance in Scotland.

<sup>2</sup> further guidance on the meaning of BAT can be found for [England and Wales](#) (section 12 of the General Guidance Manual) , [Scotland](#), and [Northern Ireland](#).

## Who is the guidance for?

- This guidance is for:
  - Regulators
    - local authorities in England and Wales, who must have regard to the guidance when determining applications for permits and reviewing extant permits
    - the Scottish Environment Protection Agency in Scotland, and local authorities or the Northern Ireland Environment Agency in Northern Ireland.
  - Operators, who are best advised also to have regard to it when making applications and in the subsequent operation of their installation
  - Members of the public, who may be interested to know what the Government considers, in accordance with the legislation, amounts to appropriate conditions for controlling air emissions for the generality of installations in this particular industry sector.

## Updating the guidance

- 1.6 The guidance is based on the state of knowledge and understanding, at the time of writing, of what constitutes BAT for this sector. The note may be amended from time to time to keep up with developments in BAT, including improvements in techniques, changes to the economic parameters, and new understanding of environmental impacts and risks. The updated version will replace the previous version on the Defra website and will include an index to the amendments.
- 1.7 Reasonable steps will be taken to keep the guidance up-to-date and to ensure that those who need to know about changes to the guidance are informed of any published revisions. However, because there can be rapid change to matters referred to in the guidance - for example to legislation - it should not be assumed that the most recent version of this note reflects the very latest legal requirements; these requirements apply.

## Consultation

- 1.8 This note has been produced in consultation with relevant trade bodies, representatives of regulators including members of the Industrial Pollution Liaison Committee, and other potentially-interested organisations.

## Policy and procedures

- 1.9 General guidance explaining LAPPC and setting out the policy and procedures is contained in separate documents for [England and Wales](#), [Scotland](#) and [Northern Ireland](#).

## European Union Solvent Emissions Directive (SED).

- 1.10 The SED requires installations where wood products are chemically treated with solvent containing materials, and where the solvent consumption is more than 25 tonnes a year, to meet specified standards. It is important to read the SED chapters of the appropriate Guidance Manual referred to at paragraph 1.9 above in conjunction with this Note. These chapters summarise the SED requirements and gives advice on various issues.
- 1.11 In particular, the appropriate Guidance Manual contains a guide to using any PG note which implements the SED. It explains which parts of the note must be complied with by all SED installations. In this PG note the compulsory requirements are in boxes headed "SED Box".
- 1.12 The Guide also explains which parts of the note are subject to BAT decisions and what to do where a non-SED installation is covered by a note. A further paragraph describes when an SED installation can be excused from meeting all the requirements - so-called "derogations".
- 1.13 The SED offers three ways of compliance:
- complying with SED emission limits and fugitive emission limits,
  - complying with SED total emissions limits,
  - applying the SED reduction scheme.

Annex IIA of SED states which of the above options are available for the activity being regulated.

- 1.14 For wood treatment the first two options are available. The following table sets out which paragraphs of this Note are therefore relevant for this activity. However



option 1, (Emission & Fugitive Limits), is currently not used by the sector. The option has been left in the Note in case it is required at a future date.

**Table 1: Wood treatment, operating conditions and relevant paragraphs**

Installation	Paragraphs of Guidance Note which apply <sup>(1)</sup>		
	Activities Applying Emission and Fugitive Limits	Activities Applying Total Emission Limit	
		Without VOC Abatement	With VOC Abatement
Single SED Activity. Solvent consumption >25 tonnes/annum	All SED Boxes except 6 & 10. Table 3	All SED Boxes except 5 & 10. Table 3	All SED Boxes except 5 & 10.
More than one SED activity	All SED Boxes except 6. Table 3	All SED Boxes except 5. Table 3	All SED Boxes except 5
No SED activity, (as <25 tonnes used), but EPR activity as more than 1000m <sup>3</sup> of wood is treated.	See paragraph 4.3.		
<p>A SED activity is an activity falling within the scope of the Solvent Emission Directive (i.e. an activity as defined in Annex I, and which exceeds the thresholds in Annex IIA of the Directive). Consumption is the organic solvent consumption of the activity, (see Annex IIA of the Directive). Determination of consumption is described in paragraph 4.9 of this Note.</p> <p>Note 1 – The SED Box will indicate which of monitoring paragraphs apply.</p>			

- 1.15 The SED also requires replacement of certain solvents, as far as possible, in the shortest possible time. These are substances or preparations which are assigned or need to carry any of the following risk phrases: R45, R46, R49, R60, R61<sup>3</sup>. Additional requirements also apply to the use of halogenated VOCs assigned risk phrase R40.

<sup>3</sup> Risk phrases classifications in SED will be replaced in June 2015 by “hazard statements”. From December 2010 to June 2015 both classifications apply. (See section 7)

## 2. Timetable for compliance and reviews

### Existing processes or activities

- 2.1 This Note contains all the provisions from previous editions which have not been amended or removed. For installations in operation at the date this Note is published, the regulator should have already issued or varied the permit having regard to the previous editions. If they have not done so, this should now be done.
- 2.2 The new provisions of this note and the dates by which compliance with these provisions is expected are listed in the table below, together with the paragraph number where the provision is to be found. Compliance with the new provisions should normally be achieved by the dates shown. Permits should be varied as necessary, having regard to the changes and the timetable.

**Table 2 : Compliance timetable**

Guidance	Relevant Paragraph/Row in this Note	Compliance Date
There are no new or upgraded provisions in this Note.		

- 2.3 Replacement plant should normally be designed to meet the appropriate standards specified for new installations or activities.
- 2.4 Where provisions in the preceding guidance note have been deleted or relaxed, permits should be varied as necessary as soon as reasonably practicable. Section 6 provides a summary of all changes.
- 2.5 For new activities, the permit should have regard to the full standards of this guidance from the first day of operation.
- 2.6 For substantially changed activities, the permit should normally have regard to the full standards of this guidance with respect to the parts of the process that have been substantially changed and any part of the process affected by the change, from the first day of operation.

## Permit Reviews

- 2.7 Under LAPPC the legislation requires permits to be reviewed periodically but does not specify a frequency. It is considered for this sector that a frequency of once every six years ought normally to be sufficient for the purposes of the legislation. Further guidance on permit reviews is contained in the appropriate General Guidance Manual for England and Wales, Scotland and Northern Ireland. Regulators should use any opportunities to determine the variations to permits necessitated by paragraph 2.2 above in conjunction with these reviews. Conditions should also be reviewed where complaint is attributable to the operation of the process and is, in the opinion of the regulator, justified.

## Specific SED requirements

- 2.8 Since 31<sup>st</sup> October 2007 the full requirements of the Solvent Emissions Directive have applied. Table 1 above lists any new non SED requirements introduced into this Note. The SED compliance requirements are given in Section 4.

### SED Box 1 New VOC abatement plant

(article 5) All activities not using the Reduction Scheme

All installations with any VOC abatement equipment installed after 1 April 2001 must meet the emission limit requirements for New Installations of SED Box 5 (but not the fugitive limits) and SED Box 6

### SED Box 2 New Installations

(article 3) All Activities

For new installations the permit must have regard to the full standards of the Directive as from 1 April 2001.

### SED Box 3 Substantially changed installations

(articles 2,4 & 9) All Activities

For substantially changed (as defined in Article 2 of SED installations the permit must have regard to the full standards of the Directive as from the first day of April 2001.

Where an installation:

- undergoes a substantial change; or
- comes within the scope of this Directive for the first time following a substantial change that part of the installation which undergoes the substantial change shall be treated as new installation.

However, if the following condition is met, then the change should not be considered substantial and an application for a non-substantial variation should be made:-

The total mass emission of VOC from the SED installation after the substantial change is less than:

- the total mass emission of the installation prior to the change (which would have been described as substantial);
- PLUS
- the calculated additional mass emission of the changed part (which would have been described as substantial) of the installation if it had complied with the appropriate 31 October 2007 VOC requirements (i.e. those requirements being either emission and fugitive limits, or total emission limits, or the reduction scheme, as appropriate).

When determining a substantial change for SED installations, consideration must be given to the fact that:

- an increase in VOC emissions is required above the percentages set out below, and
- that increase in emissions must have resulted from a change in nominal capacity of the installation

Under the SED a substantial change means:

- For a small installation, a change of the nominal capacity leading to an increase of emissions of VOC of more than 25%. Any change that may have, in the opinion of the competent authority, significant negative effects on human health or the environment is also a substantial change.
- For all other installations a change of the nominal capacity leading to an increase of emissions of VOC of more than 10%. Any change that may have, in the opinion of the competent authority, significant negative effects on human health or the environment is also a substantial change.

Following a substantial change, compliance must be re-verified.

### 3. Activity description

#### Regulations

- 3.1 This Note applies to LAPPC activities for the chemical treatment of wood and wood products. The activities are listed for regulation as follows.

	Solvent Consumption of activity	England and Wales	Scotland	Northern Ireland
		EPR Schedule 1 reference		
A	> 150kg/hr or > 200te per year	6.4, Part A2		
B	> 25te per year but < row A	7, Part B		
C	Treatment of >1000m <sup>3</sup> of wood or wood products, but with a solvent consumption of < 25te per year	6.6, Part B		

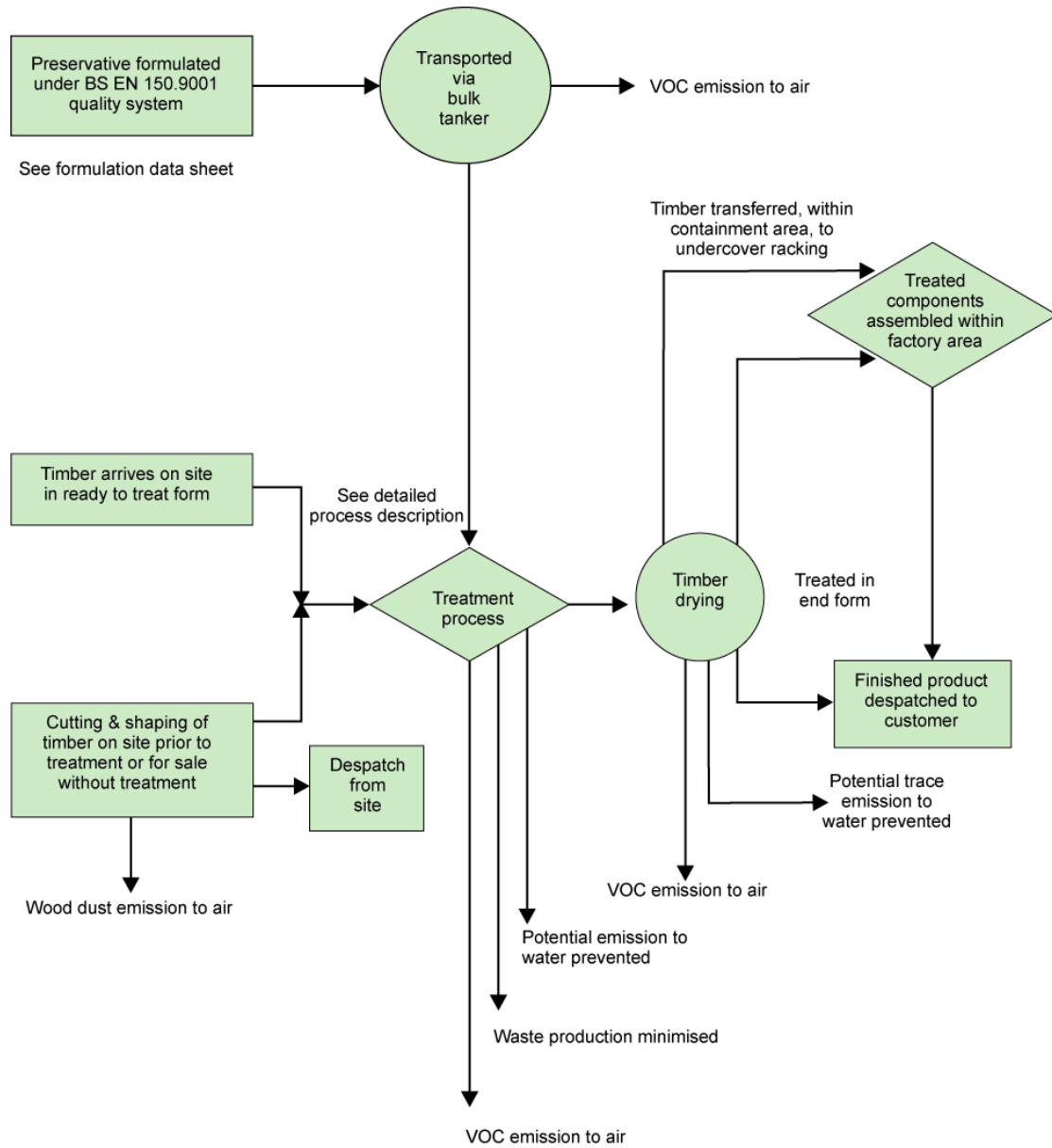
- 3.2 This note refers to processes for the impregnation with or immersion of timber in organic solvent-based preservatives. It also applies to the treatment of timber with creosote.

In the rest of **this section only** “process” should be understood to describe the various stages involved in the wood treatment operations. It does not necessarily have the same meaning as elsewhere in this note.

- 3.3 In the context of this note, “process” or “activity” comprises the whole process from receipt of raw materials via production of intermediates to dispatch of finished products, including the treating, handling and storage of all materials and wastes relating to the process.
- 3.4 Timber is pre-treated with preservative to prevent rot and/or insect attack when the timber is in service/use. The preservative contains biocides blended into a hydrocarbon solvent. Treatment plant in the UK industry are normally designed and operated in accordance with [Wood Protection Association](#) code of practice for the Safe Design and Operation of Timber Treatment Installations. Materials used in the treatment process must have a current authorisation to be placed on the market either under the Control of Pesticides Regulations or the Biocidal Products Regulations.
- 3.5 The process parameters vary depending on the level of treatment required to achieve the service life conditions as determined by National/European standards.
- 3.6 The treatment plant consists of three vessels. The treatment vessel incorporates a loading system to enable packs of timber to be moved in and out, either manually or automatically. The treatment vessel door incorporates safety devices to prevent the process starting until the door is fully closed and locked and to prevent it being opened until all preservative is removed. There are normally two storage vessels; one is the working vessel which holds the preservative to flood the treatment vessel and the other is the bulk vessel which is used to accept delivery of new preservative and to replenish the working vessel.

- 3.7 Once the timber is loaded into the vessel and the door is closed and safely locked, the process, which is generally referred to as a double vacuum or vacuum low pressure process, is carried out as follows:
- 3.8 There are six main stages, though Stage 1 may be omitted:
- (1) Initial vacuum - an initial vacuum is used to take air out of the timber. The length of this vacuum period and level used vary according to the specification being followed. The amount of air removed will affect the final uptake and penetration of preservative. To control retentions some processes run without applying an initial vacuum.
  - (2) Flooding - the preservative solution is transferred from the working vessel to the treatment vessel. If applied, the vacuum is maintained during transfer so that its effect is not wasted.
  - (3) Pressure Period - once the treatment vessel is full the vacuum is released and the vessel returned to atmospheric pressure. The timber is held in the preservative for a period of time or, where the specification requires, a low positive pressure is applied.
  - (4) Initial Drain - at the end of the pressure period the preservative is transferred back to the working vessel.
  - (5) Final Vacuum - a final vacuum is applied to the timber both to remove any excess preservative from the surface layer of the wood and to reduce dripping of the treated timber at the end of the process. As this vacuum is released, air moves back into the vessel and into the surface cells of the wood, carrying with it some of the residual preservative fluid on the wood surface.
  - (6) Final Drain - during the final vacuum, the preservative collected in the treatment vessel is pumped back into the working vessel. Before the timber is removed from the vessel fresh air is drawn through the vessel to remove solvent vapour from the working area around the door to minimise operator exposure.
- 3.9 Timber is loaded on a slope on trolleys to assist the wood to emerge as dry as possible from the treatment process and the plant is filled with timber to capacity whenever practical.
- 3.10 VOC releases occur when transferring preservative from the road delivery tanker to the bulk vessel, from one vessel to another, from the vacuum pump systems, and from the treated timber itself. When any droplets may be present in air such as from some vacuum systems the air is first passed through a coalescing filter system. All plant emissions are vented out of the process building. The liquid from the coalescing filter is removed from site approximately once per annum.
- 3.11 Other abatement systems have been considered, (or used) in the sector to reduce VOC losses to atmosphere. These include destruction in a thermal oxidiser, (or some other form of combustion process), or adsorption onto carbon. Neither is considered BAT for this activity due to both the high cost and the failure to recover/recycle the VOC entering the abatement system.

Figure 3.1: Potential VOC releases from a Typical Treatment Plant



## 4. Emission limits, monitoring and other Provisions

- 4.1 Emissions of the substances listed in SED box 5 below should be controlled.
- 4.2 The emission limit values and provisions described in this section are achievable using the best available techniques described in Section 5. Monitoring of emissions should be carried out according to the method specified in this section or by an equivalent method agreed by the regulator. Where reference is made to a British, European, or International standard (BS, CEN or ISO) in this Section, the standards referred to are correct at the date of publication. (Users of this Note should bear in mind that the standards are periodically amended, updated or replaced. The latest information regarding the monitoring standards applicable can be found at the [Source Testing Association](#) website. Further information on monitoring can be found in Environment Agency publications (M1) and (M2))
- 4.3 For VOC emissions from a non SED activity the regulator should consider whether emission limit values are required. Provided the installation has been installed to, and is subsequently operated to, the BAT requirements in Section 5, then the capacity of the installation to cause pollution is likely to be insignificant. (In making this judgement the regulator should consider, in particular, whether the application of these emission limit requirements to such processes may be appropriate in areas where it can be demonstrated that local emissions sources are contributing significantly to a breach, or serious risk of breach, of air quality standards currently in force).
- 4.4 For VOC from SED activities two compliance options are available:

### SED Box 4 VOC compliance

(article 5) All Activities

All installations must comply with

Either:

(a) The emission limit in waste gases and the fugitive emission values in SED Box 5 or

(b) The requirements of the total emission limit values in SED Box 6

Also, all installations must comply with the emission limits for designated risk phrase materials in SED Box 7

(The reduction scheme option is not available for demonstration of compliance for this activity).

However the first of these options is not used by the sector and therefore the requirements of SED Box 5 below are for information only.



SED Box 5 Contained and Fugitive Emission Limits and Requirements (articles 5,8,9 & Annex IIA)				
For all activities not using the Total Emission Limit Values				
Row	VOC in waste gases	Emission Limits / Requirement	Fugitive Emission Values	Monitoring
1	All installations  Organic solvent consumption of 25 tonnes or more.	VOC expressed as total mass of organic carbon, (Note 1)		
	Waste gases from oxidation plant used as abatement	150 mg Carbon/Nm <sup>3</sup> (Note 2) 50 mg Carbon/Nm <sup>3</sup>	25% of organic solvent input	Abated releases Continuous monitoring and recording See paragraphs 4.15 and 4.16 Plus  Unabated releases Annual manual extractive testing See 4.17  Fugitive Emissions See Solvent Management Plan
	Waste gases from other abatement plant	150 mg Carbon/Nm <sup>3</sup> (Note 2) 100 mg Carbon/Nm <sup>3</sup>		
	Any other waste gases	100 mg Carbon/Nm <sup>3</sup>		

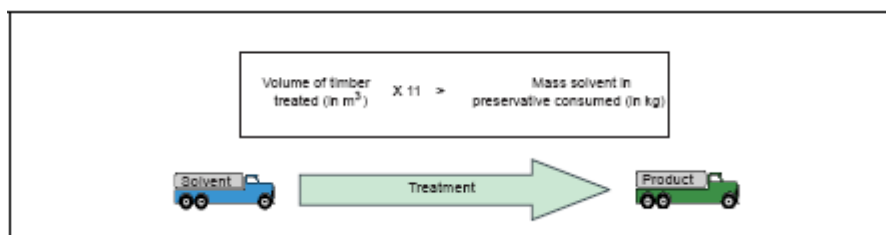
Note 1 The emission limit requirements should not apply to activities involving the use of creosote where no other organic solvent borne preservative is employed.  
Note 2 For abatement plant existing prior to 1 April 2001, the higher contained emission figure may be used until 1 April 2013 if the total emission from the whole installation (fugitive + contained emission) does not exceed after 1 April 2013 (fugitive + contained emission after 1 April 2013).

### Total Emission Limit Value

SED Box 6 (article 5, 8, 9) All activities using the Total Emission Limit Values			
Total Emission Limit Values SED activities			
All SED installations applying the Total Emission Limit Values			
Row	VOC in waste gases	Total Emission Limit Values / requirements	Compliance calculation
1	All installations  Organic solvent consumption of 25 tonnes or more.	11kg/m <sup>3</sup> (See Note 1)	Compliance with the total emission value per m <sup>3</sup> of timber treated is achieved if the total input of the solvent (C, in kgs), divided by the volume input of wood treated (in m <sup>3</sup> ) is less than or equal to the total emission limit value in the Table above. See Figure 4.1 also.

Note 1 – Solvent consumption is influenced by the surface area of the timber treated per batch. Where timber products with a low surface area/volume ratio are treated then less solvent should be required per batch, allowing tighter emission limits to be achieved.  
Note 2 – For initial calculation the wood surface area would be obtained by simple calculation, (ie Depth x Length + Height x Length), of each item, x no of items treated). Where the item treated is of irregular surface profile, eg moulded components, then the operator should provide a justification for the surface area figure used.

Figure 4.1- Compliance Calculation



### Determination of Solvent Consumption

- 4.5 Construction of inventories of materials consumed and disposed of may involve the identification of individual organic solvents, or solids. This may give rise to an issue of commercial confidentiality. Information supplied must be placed on the public register, unless exclusion has been granted on the grounds of commercial confidentiality or national security. (Further guidance can be found in the appropriate General Guidance Manual)
- 4.6 A determination of the organic solvent consumption, the total mass of organic solvent Inputs minus any solvents sent for reuse/recovery off-site, should be made and submitted to the regulator annually, preferably to coincide with the operators stocktaking requirements, in the form of a mass balance in order to determine the annual actual consumption of organic solvent (C):

Where:  $C = I1 - O8$

I1 Total quantity of organic solvents, or their quantity in preparations purchased which are used as input into the activity.

A calculation of the purchased organic solvent Input ( I1) to the activity, is carried out by recording:

- i. The mass of organic solvent contained in coatings, diluents and cleaners in the initial stock (IS) at the start of the accounting period; plus
- ii. The mass of organic solvent contained in coatings, diluents and cleaners in the purchased stock (PS) during the accounting period.
- iii. Minus the mass of organic solvent contained in coatings, diluents and cleaners in the final stock (FS) at the end of the accounting period.

$$\text{Total Organic Solvent Input (I1)} = \text{IS} + \text{PS} - \text{FS}$$

### Solvent Management Plan

- 4.7 The Solvent Management Plan provides definitions and calculations to demonstrate compliance with the VOC requirements of this note. The use of the standard definitions and calculations also ensures consistency of VOC compliance across installations with an industrial sector.
- 4.8 The definitions provided must be used in all calculations relating to the Solvent Management Plan (SMP) (**Figure 4.2**).
- for SED installations using the emission and fugitive limits, the SMP should be used for determining the fugitive emissions (SED Box 5). Once completed, it need not be done until the equipment is modified

## Definitions:

The following definitions provide a framework for the mass balance calculations used in determining compliance.

Inputs of Organic Solvent in the time frame over which the mass balance is being calculated ( I)

I1 The quantity of organic solvents, or their quantity in preparations purchased which are used as input into the process/activity (including organic solvents used in the cleaning of equipment, but not those used for the cleaning of the products).

I2 The quantity of organic solvents or their quantity in preparations recovered and reused as solvent input into the process/activity. (The recycled solvent is counted every time it is used to carry out the activity.)

Outputs of Organic Solvents in the time frame over which the mass balance is being calculated (O)

O1 Emissions in waste gases.

O2 Organic solvents lost in water, if appropriate taking into account waste water treatment when calculating O5.

O3 The quantity of organic solvents which remains as contamination or residue in products output from the process/activity.

O4 Uncaptured emissions of organic solvents to air. This includes the general ventilation of rooms, where air is released to the outside environment via windows, doors, vents and similar openings.

O5 Organic solvents and/or organic compounds lost due to chemical or physical reactions. (including for example those which are destroyed, e.g. by thermal oxidation or other waste gas or waste water treatments, or captured, e.g. by adsorption, as long as they are not counted under O6, O7 or O8).

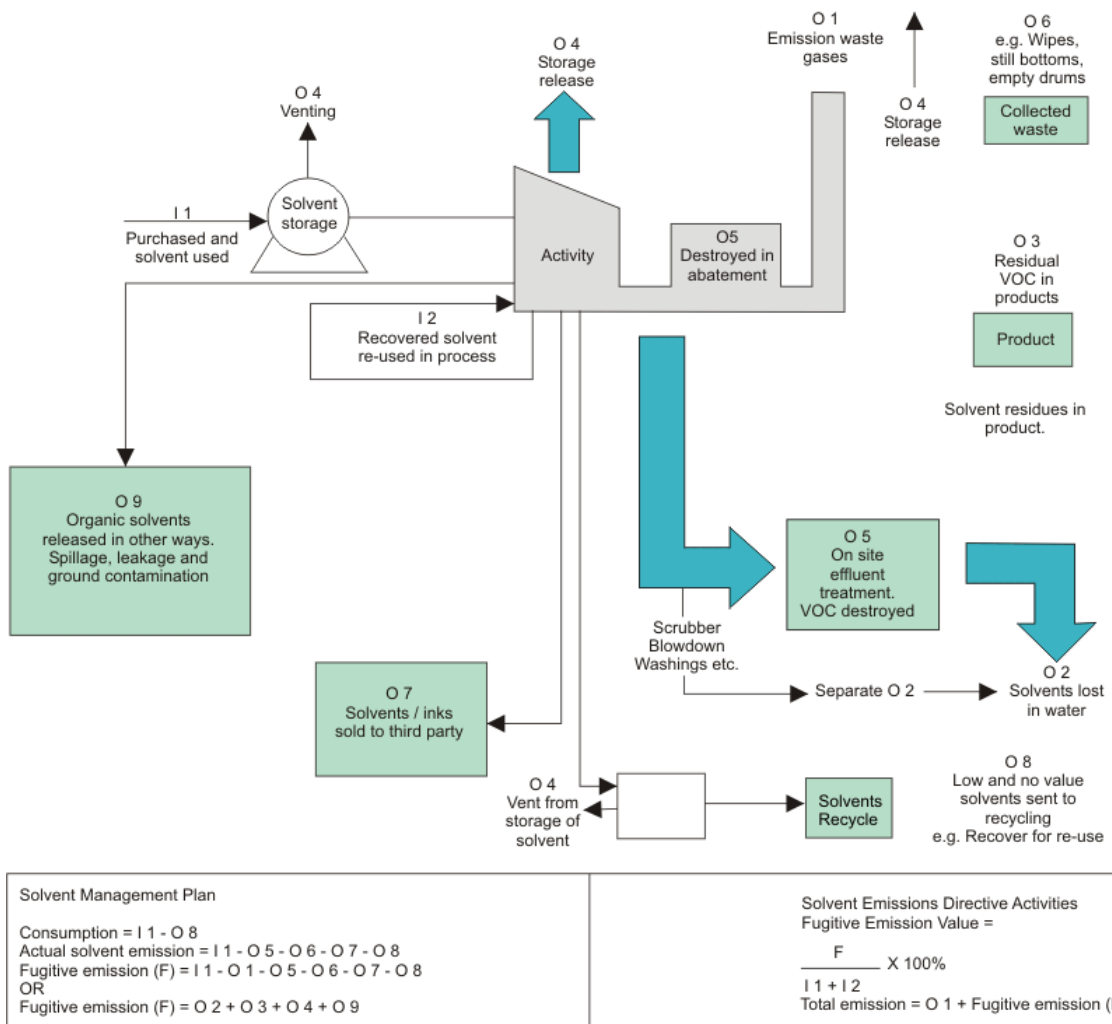
O6 Organic solvents contained in collected waste.

O7 Organic solvents, or organic solvents contained in preparations, which are sold or are intended to be sold as a commercially valuable product.

O8 Organic solvents contained in preparations recovered for reuse but not as input into the process/activity, as long as not counted under O7.

O9 Organic solvents released in other ways

Figure 4.2: Solvent Management Plan Inputs and Outputs



## Designated Materials, Emission Limits and Conditions

<b>SED Box 7 SED requirements for Designated Materials</b> (articles 5,7,8,9) <b>All Activities using Designated Materials</b> Designated Materials used in SED installations must be either replaced, controlled and or limited, as set out below.		
<b>All SED Installations.</b> i.e. existing, new and substantially changed		
Row	<b>Materials Designated :</b> Until 1 Jun 2015: risk phrase R45, R46, R49, R60, or R61 From 1 Dec 2010: hazard statement H340, H350, H350i, H360D, or H360F	
	1	Requirements <b>Replace</b> as far as possible, (taking into account guidance under article 7(1) of the SED), by less harmful substances or preparations <b>Control</b> under contained conditions as far as technically and economically feasible to safeguard public health and the environment. Normally, in accordance with the guidance provided within <b>Section 5</b> of the note <b>Limit</b> -where the sum of the mass flows of all the discharges of all the compounds causing the designated labelling is greater or equal to 10 g/h, a limit value of 2 mg/Nm <sup>3</sup> for the mass sum of the individual compounds must apply
	Timescale • installations must comply within the shortest possible time	
	Timescale Immediately (and see note below)	
	Monitoring Annual manual extractive testing (See monitoring section and SED Box 9)	
<b>Designated Materials: Halogenated VOC with designation:</b> Until 1 Jun 2015 : risk phrase R40, or from 1 Dec 2010 until 1 Jun 2015, risk phrase R68 From 1 Dec 2010: hazard statements H341 or H351		
2	Requirements <b>Control</b> under contained conditions as far as technically and economically feasible to safeguard public health and the environment. Normally, in accordance with the guidance provided within <b>Section 5</b> of the note <b>Limit</b> -where the sum of the mass flows of all the discharges of all the compounds causing the designated labelling is greater or equal to 100 g/ h, a limit value of 20 mg/Nm <sup>3</sup> for the mass sum of the individual compounds must apply	
	Timescale Immediately (and see note below)	
	Monitoring Annual manual extractive testing (See monitoring section and SED Box 9)	
N.B. Substances or mixtures or halogenated VOC which are classified as designated materials, after the date of publication of this note must apply the replace, control and limit requirements above within the shortest possible time from the date at which substances or mixtures or halogenated VOC became/become designated materials. In determining the Shortest Possible Time, the operator will need to justify their timetables taking account of the guidance in the relevant chapter of the appropriate Guidance Manual.		

### Monitoring, investigating and reporting

- 4.9 The operator will monitor emissions, make tests and inspections of the activity, though the need for and scope of testing, and the frequency and time of sampling depend on local circumstances. The operator should keep records of inspections,

tests and monitoring, including all non-continuous monitoring, inspections and visual assessments. The records should be:

- kept on site
- kept by the operator for at least two years; and
- made available for the regulator to examine

4.10 Any historical records kept off-site should be made available for inspection within one working week of any request by the regulator.

### Information required by the regulator

4.11 The regulator needs to be informed of monitoring to be carried out and the results; the results should include process conditions at the time of monitoring.

- The operator should notify the regulator at least 7 days before any periodic monitoring exercise to determine compliance with emission limit values. The operator should state the provisional time and date of monitoring, pollutants to be tested and the methods to be used.
- The results of non-continuous emission testing should be forwarded to the regulator within 8 weeks of the completion of the sampling.
- Adverse results from **any** monitoring activity (both continuous and non-continuous) should be investigated by the operator as soon as the monitoring data has been obtained/received. The operator should:
  - identify the cause and take corrective action
  - record as much detail as possible regarding the cause and extent of the problem, and the action taken by the operator to rectify the situation
  - re-test to demonstrate compliance as soon as possible; and
  - notify the regulator

### Visible Emissions

4.12 The aim should be to prevent any visible airborne emission from any part of the process. This aim includes all sites, regardless of location. Monitoring to identify the origin of a visible emission should be undertaken using BS 1747 Part 1, though more complex monitoring techniques might be required if this standard does not produce adequate results. Where combustion units are in use for dryers the combustion process should be controlled and equipment maintained as appropriate.

- Emissions from combustion processes should in normal operation be free from visible smoke. During start up and shut down the emissions should not exceed the equivalent of Ringelmann Shade 1 as described in British Standard BS 2742: 2009
- All other releases to air, other than condensed water vapour, should be free from persistent visible emissions.

- All emissions to air should be free from droplets.
- A visual check should be made once per day when an installation is being operated. The time, location and result of these checks, along with weather conditions such as indicative wind direction and strength, should be recorded.
- Where, in the opinion of the regulator, dust from the installation is being transported off the site, the operator should inspect in order to find out which operation(s) is the cause. If this inspection does not lead to correction of the problem then the operator should inform the regulator in order to determine whether ambient air monitoring is necessary. Ambient monitoring may either be by a British Standard method or by a method agreed with the regulator. Once the source of the emission is known, corrective action should be taken without delay

Where ambient monitoring is carried out it may also be appropriate for the regulator to specify recording of wind direction and strength.

## Emissions of Odour

The overall aim should be that all emissions are free from offensive odour outside the site boundary, as perceived by the regulator. However, the location of the installation will influence the assessment of the potential for odour impact for local meteorological conditions which may lead to poor dispersion conditions. Where the site has a low odour impact due to its remoteness from sensitive receptors, the escape of offensive odour beyond the installation would be unlikely to cause harm.

- A boundary check should be made once per day when an installation is being operated. The time, location and result of these checks, along with weather conditions such as indicative wind direction and strength, should be recorded.
- Where, in the opinion of the regulator, odour from the installation is being transported off the site, the operator should inspect in order to find out which operation(s) is the cause. This check should include inspections of the process, buildings and equipment to check that emissions are being contained and treated.

## Abnormal events

4.13 The operator should respond to problems which may have an adverse effect on emissions to air. In the case of abnormal emissions, malfunction or breakdown leading to abnormal emissions the operator should:

- investigate and undertake remedial action **immediately**
- adjust the process or activity to minimise those emissions; and
- promptly record the events and actions taken

The regulator should be informed without delay, whether or not there is related monitoring showing an adverse result:

- if there is an emission that is likely to have an effect on the local community; or
- in the event of the failure of key arrestment plant, for example, bag filtration plant or scrubber units

The operator should provide a list of key arrestment plant and should have a written procedure for dealing with its failure, in order to minimise any adverse effects.

**SED Box 8 Non compliance causing immediate danger**

(article 10) All Activities

In cases of non-compliance causing immediate danger to human health, operation of the activity must be suspended.

All of the following criteria should be taken into account:

- the toxicity of the substances being released
- the amount released
- the location of the installation; and
- the sensitivity of the receptors

- 4.14 Higher emissions may occur during start-up and shut-down of a process. These emissions can be reduced, by minimising, where possible, the number of start-ups and shut-downs and having adequate procedures in place for start-up, shut-down and emergency shut-downs.

All appropriate precautions must be taken to minimise emissions during start-up and shutdown.

**Continuous monitoring VOC abated releases**

- 4.15 This should not be required for this sector. In exceptional circumstances requiring a need for such monitoring, reference should be made to PG 6/23 which contains general information on this topic.

**SED Box 9 VOC Monitoring**

There are no monitoring requirements for releases to air from this sector. Records of solvent consumption and surface area of wood treated will need to be kept.

- 4.16 Exhaust flow rates from the treatment plant should be consistent with good operating practice and meet the requirements of the legislation relating to the workplace environment.

**Monitoring of unabated Releases**

- 4.17 Where emission limit values for VOC are consistently met without the use of abatement equipment, the monitoring requirement for those pollutants should be dispensed with subject to the paragraphs above.



## Two or more SED activities within the same installation

### SED Box 10 All Installations with Two or More Activities

(Article 5 and Annex III)

Installations with two or more activities

Installations where two or more of the activities in Annex I of the Solvents Emissions Directive are carried out, each of

which exceeds the threshold in Annex IIA of the Solvents Emissions Directive must:

(1) as regards to Designated Risk Phrase Materials, meet the requirements specified in SED Box 7, for each activity individually;

(2) as regards all other substances, either:

(i) meet the requirements for each activity individually; or

(ii) have total emissions not exceeding those that would have resulted had point (i) been applied.

When applying 2 (ii) above, the Solvent Management Plan should be done to determine total emissions from all activities concerned. That figure must then be compared with the total emissions from the installation that would have resulted had

the requirements of Annex II of the SED been met for each activity separately

## 5. Control techniques

### Summary of Best Available Techniques

- 5.1 The following table provides a summary of BAT that can be used to control the process in order to meet the emission limits and provisions in [Section 4](#). Provided that it is demonstrated to the satisfaction of the regulator that an equivalent level of control will be achieved, then other techniques may be used.

**Table 3: Summary of Control Techniques**

Release source	Substance	Control techniques
Storage and handling of organic solvents and materials containing organic solvents	VOC	Use of low organic solvent preservative materials
		Use of enclosed mixing and storage vessels
		Siting of storage tanks, Back venting deliveries if needed
		Capture, or capture and disposal, or capture and destruction

### Non VOC Releases Control Techniques

#### Sulphur dioxide

- 5.2 In combustion processes the most significant release of sulphur dioxide occurs as a result of the sulphur content of the fuel burnt and should be addressed by using low sulphur fuel

#### Nitrogen oxides

- 5.3 In combustion processes nitrogen oxides can be formed as a result of the combustion of nitrogen in the fuel or the formation of thermal nitrogen oxides from nitrogen in the air used for combustion.
- Where necessary, the nitrogen content of the fuel and other material being burnt should be controlled.
  - Where necessary, low NOx burners should be installed.

## VOC Control Techniques

### VOC Substitution

- 5.4 For many installations the substitution of a low VOC content treatment solution should represent BAT. This particularly applies to timber used for general construction where dimensional changes brought about by adsorption of water from the treatment solution can be tolerated. However, such dimensional changes may cause difficulty when the timber is used for joinery products such as door/window frames.
- 5.5 Substitution of creosote based solutions is not normally carried out. However, such solutions will need to comply with the current legislation relating to use of these materials. Guidance on this subject is available from the [Wood Protection Association](#).

### VOC odour control

- 5.6 Odour may arise from the receipt, handling and storage of organic solvents and organic solvent containing liquids. Careful siting of storage and mixing tanks, particularly in relation to new and replacement tanks, and controlled handling of odorous liquids may help prevent offensive emissions off-site. In addition:
- Bulk storage tanks for organic solvents and organic solvent-containing liquids should wherever practicable be back vented to the delivery tank during filling. Where this is impracticable, displaced air vents should be sited in such a way as to prevent the arising of offensive odour beyond the site boundary.
  - All potentially odorous waste materials should be stored in suitable closed containers or bulk storage vessels, where appropriate vented to suitable abatement plant.
  - Material removed from the treatment vessel should be dried in a location that minimises the potential for evaporative losses to exit the installation.
- 5.7 Breathing losses from bulk storage tanks can be minimised by fitting pressure vacuum relief valves. The vapour pressure within the bulk storage can also be minimised by reducing the solar absorbency of the storage tank.
- The exterior of bulk storage tanks for organic solvent storage should normally be light coloured.
  - If necessary, emissions from fixed organic solvent storage tanks should be vented to suitable arrestment equipment to meet the emission limits in [Section 4](#).
  - All new static bulk organic solvent storage tanks containing organic solvent with a composite vapour pressure that is likely to exceed 0.4kPa at 20oC (293K) should be fitted with pressure vacuum relief valves. Pressure vacuum relief valves should be examined at regular intervals for signs of contamination, incorrect seating and be cleaned and/or corrected as required. The normal minimum examination frequency should be once every

six months, but less frequent examination may be justified having regard for the tank contents and the potential emissions as a result of valve failure.

- 5.8 Both major and minor spillage of organic solvent from bulk storage tanks can arise as a result of a number of scenarios such as: overfilling of tanks, incorrect draining of filling lines, operator error or vandalism.
- Delivery connections to bulk storage tanks should be located within a bunded area.
  - Where the operator can not demonstrate to the satisfaction of the regulator that suitable management controls and training with regard to bulk storage deliveries of organic solvents and organic solvent containing materials are in place, along with adequate on-site security, then connections to bulk storage tanks should be fixed and locked when not in use.
  - All fixed storage tanks should be fitted with high-level alarms or volume indicators to warn of overfilling. Where practicable the filling systems should be interlocked to the alarm system to prevent overfilling.

Bunding should<sup>4</sup>

- completely surround the bulk liquid storage tanks
- be impervious and resistant to the liquids in storage; and
- be capable of holding 110% of the capacity of the largest storage tank.
- Clean surface water should not be allowed to mix with water from treatment areas unless a suitable water harvesting system is operational..

## VOC control handling

- 5.9 The receipt, handling, use and storage of organic solvents and organic solvent containing liquids will give rise to fugitive releases of VOC.
- Raw materials containing VOC should be stored in closed storage containers.
  - All measures should be taken to minimise VOC emissions during mixing, i.e. the use of covered or closed mixing vessels.
  - Emissions from the emptying of mixing vessels and transfer of materials should be adequately contained, preferably by the use of closed transfer systems. This may be achieved by the use of closed mobile containers, containers with close-fitting lids, or, preferably, closed containers with pipeline delivery.

## VOC control cleaning

- 5.10 Cleaning operations will give rise to fugitive releases of VOC.

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<sup>4</sup> In certain circumstances, the specification of bunds may be controlled by other regulations. Conditions in permits should not conflict with the requirements of those regulations. The Defra website has a code of practice on the use and [storage of solvents](#).

- Cleaning operations involving organic solvents should be periodically reviewed, normally at least once every two years, to identify opportunities for reducing VOC emissions (e.g. cleaning steps that can be eliminated or alternative cleaning methods). The regulator should be provided with a report on the conclusions of the review.
- Where practicable, fixed equipment should be cleaned in-situ, and such equipment should, where practicable, be kept enclosed whilst cleaning is carried out.

## VOC control operational

- 5.11 Organic solvent losses can be identified and minimised by operational controls and good operational practice.
- A programme to monitor and record the consumption of organic solvent preservatives product produced should be used to minimise the amount of excess organic solvent / coating used.
- 5.12 Fugitive releases of volatile organic compounds occur in the chemical treatment of timber and wood based products as follows;
- Storage of treated timber
  - The receipt, handling, usage and storage of preservatives containing solvents
  - End entry treatment vessels should be equipped with a means of checking that the treatment vessel is drained of liquid before the door is opened. An interlock mechanism should be fitted to prevent the door being opened until the vessel is drained, except in the case of bolted doors. Where bolted doors are fitted, all bolts should be fully tightened before commencement of the treatment process and should remain so until the completion of the process.
  - For pressure treatment vessels, an interlock should be fitted to prevent the door being opened until ambient pressure has been reached.
  - A hard surfaced, impervious area should be provided for the collection of preservative from freshly treated timber for reuse in the treatment plant, or for safe disposal, as appropriate.
  - Exhaust ventilation from treatment vessels should be vented to suitable abatement equipment plant (if necessary) to meet the requirements of [Section 4](#).
  - Fugitive emissions of volatile organic compounds should be minimised by the following methods:
    - rationalisation of the number of treatment cycles by avoiding wherever possible, the treatment of timber in partly filled vessels
    - using a design of trolley, which minimises the amount of solvent, retained on it when it is removed from the treatment vessel
    - stacking of loads of timber to avoid retention of excess solvent and subsequent dripping, for example by sloping the timber and using spacers
    - carrying out a purge cycle before discharging the timber from the vessel
    - Where possible release strapping around packs of smooth sawn timber after the dripping period to promote the run out and recovery of treating solution from any shaped profiles within the timber.

## VOC control waste

- 5.13 Waste contaminated with VOC may give rise to both odorous and fugitive emissions.
- All reasonably practicable efforts should be made to minimise the amount of residual organic solvent bearing material left in drums and other containers after use. All organic solvent contaminated waste should be stored in closed containers.
  - Prior to disposal, empty drums and containers contaminated with organic solvent should be closed to minimise emissions from residues during storage prior to disposal and labelled, so that all that handle them are aware of their contents and hazardous properties.
  - Nominally empty drums or drums containing waste contaminated with VOC awaiting disposal should be stored in accordance with the requirements for full or new containers.
  - All waste should be contained in such a way as to prevent odour reaching beyond the process boundary: For information, as regards the disposal of wastes, attention is drawn to the [Timber Treatment Installations 2009 Code of Practice for Safe Design and Operation](#), published by the Wood Protection Association.
  - Redundant treated wood produced by the activity should not be mixed with untreated wood. Further information on classification of untreated wood can be found on the Environment Agency website.

## Dust and spillage control

- 5.14 Adequate provision to contain liquid and solid spillage is needed:
- dusty wastes should be stored in closed containers and handled in a manner that avoids emissions
  - dry sweeping of dusty materials should not normally be permitted unless there are environmental or health and safety risks in using alternative techniques
  - suitable organic solvent containment and spillage equipment should be readily available in all organic solvent handling areas
  - a high standard of housekeeping should be maintained
  - adequate provision should be made for the containment and clearing up of any spillages which may occur during preservative handling. A contingency plan to be implemented when spillages occur should be agreed with the Regulator.
  - Operators should also note that the relevant water regulation authority may require contingency arrangements.

## Air Quality

### Dispersion & Dilution

- 5.15 Pollutants that are emitted via a stack require sufficient dispersion and dilution in the atmosphere to ensure that they ground at concentrations that are harmless. This is the basis upon which stack heights are calculated using HMIP Technical Guidance Note D1 (D1), (ref 1). The stack height so obtained is adjusted to take into account local meteorological data, local topography, nearby emissions and the influence of plant structure.

The calculation procedure of D1 is usually used to calculate the required stack height but alternative dispersion models may be used in agreement with the regulator. An operator may choose to meet tighter emission limits in order to reduce the required stack height.

Where an emission consists purely of air and particulate matter, (i.e. no products of combustion or any other gaseous pollutants are emitted) the above provisions relating to stack height calculation for the purpose of dispersion and dilution should not normally be applied.

### Ambient air quality management

- 5.16 In areas where air quality standards or objectives are being breached or are in serious risk of breach and it is clear from the detailed review and assessment work under Local Air Quality Management that the Part B process itself is a significant contributor to the problem, it may be necessary to recalculate the stack height or to impose tighter emission limits. If the standard that is in danger of being exceeded is not an EC Directive requirement, then industry is not expected to go beyond BAT to meet it. Decisions should be taken in the context of a local authority's Local Air Quality Management action plan. For example, where a Part B process is only responsible to a very small extent for an air quality problem, the authority should not unduly penalise the operator of the process by requiring disproportionate emissions reductions. Paragraph 59 of the Air Quality Strategy 2007 [Volume 1]<sup>5</sup> gives the following advice:

*“...In drawing up action plans, local authority environmental health/pollution teams are expected to engage local authority officers across different departments, particularly, land-use and transport planners to ensure the actions are supported by all parts of the authority. In addition, engagement with the wider panorama of relevant stakeholders, including the public, is required to ensure action plans are fit-for-purpose in addressing air quality issues. It is vital that all those organisations, groups and individuals that have an impact upon local air quality, buy-in and work towards objectives of an adopted action plan.”*

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<sup>5</sup> There is a link to the 2007 Air Quality Strategy on the [Defra Air Quality web page](#)  
Process Guidance Note 6/03 (11) Published Feb 2011

## Stacks, vents and process exhausts

- 5.17 Liquid condensation on internal surfaces of stacks and exhaust ducts might lead to corrosion and ductwork failure or to droplet emission. Adequate insulation will minimise the cooling of waste gases and prevent liquid condensation by keeping the temperature of the exhaust gases above the dewpoint. Stacks and ductwork should be leak proof.
- 5.18 The exit velocity from the stack (or vent) is normally required to be >15m/sec under normal operating conditions, (but see below regarding wet plumes). In order to ensure dispersion is not impaired by low exit velocity at the point of discharge, or deflection of the discharge, a cap or other restriction should not be used at the exit of the stack. However, a cone may sometimes be useful to increase the exit velocity and achieve greater dispersion.

Other factors that should be taken into consideration relating to the exhaust stack are:

- Flues and ductwork should be cleaned to prevent accumulation of materials, as part of the routine maintenance programme.
- A minimum discharge velocity should be required in order to prevent the discharged plume being affected by aerodynamic downwash.

An exception to the above is where wet arrestment is used as the abatement . Unacceptable emissions of droplets could occur from such plant where the linear velocity in the stack exceeds 9 m/sec. To reduce the potential of droplet emissions a mist eliminator should be used. Where a linear velocity of 9m/sec is exceeded in existing plant consideration should be given to reducing this velocity as far as practicable to ensure such droplet entrainment and fall out does not happen.

## Management

### Management techniques

- 5.19 Important elements for effective control of emissions include:
- proper management, supervision and training for process operations;
  - proper use of equipment;
  - effective preventative maintenance on all plant and equipment concerned with the control of emissions to the air; and
  - ensuring that spares and consumables - in particular, those subject to continual wear – are held on site, or available at short notice from guaranteed local suppliers, so that plant breakdowns can be rectified rapidly. This is important with respect to arrestment plant and other necessary environmental controls. It is useful to have an audited list of essential items.



## Appropriate management systems

- 5.20 Effective management is central to environmental performance; It is an important component of BAT and of achieving compliance with permit conditions. It requires a commitment to establishing objectives, setting targets, measuring progress and revising the objectives according to results. This includes managing risks under normal operating conditions and in accidents and emergencies. It is therefore desirable that installations put in place some form of structured environmental management approach, whether by adopting published standards (ISO 14001 or the EU Eco Management and Audit Scheme [EMAS]) or by setting up an environmental management system (EMS) tailored to the nature and size of the particular process. Operators may also find that an EMS will help identify cost savings.

Regulators should use their discretion, in consultation with individual operators, in agreeing the appropriate level of environmental management. Simple systems which ensure that LAPC considerations are taken account of in the day-to-day running of a process may well suffice, especially for small and medium-sized enterprises. For further information/advice on EMS refer to EMS Additional Information in the appropriate Guidance manual.

## Training

- 5.21 Staff at all levels need the necessary training and instruction in their duties relating to control of the process and emissions to air. In order to minimise risk of emissions, particular emphasis should be given to control procedures during start-up, shut down and abnormal conditions. Training may often sensibly be addressed in the EMS referred to above.

Training of all staff with responsibility for operating the process should include:

- awareness of their responsibilities under the permit; in particular how to deal with conditions likely to give rise to dust emissions, such as the event of spillage
- minimising emissions on start up and shut down
- action to minimise emissions during abnormal conditions.

The operator should maintain a statement of training requirements for each operational post and keep a record of the training received by each person whose actions may have an impact on the environment. These documents should be made available to the regulator on request.

## Maintenance

- 5.22 Effective preventative maintenance should be employed on all aspects of the process including all plant, buildings and the equipment concerned with the control of emissions to air. In particular:
- A written maintenance programme should be provided to the regulator with respect to pollution control equipment; and
  - A record of such maintenance should be made available for inspection.

## 6. Summary of changes

The main changes to this Note, with the reasons for the change, are summarised below in Table 4 . Minor changes that will not impact on the permit conditions, eg slight alterations to the Process Description, have not been recorded.

**Table 4: Summary of changes.**

Section / Paragraph / Row	Change	Reason	Comment
Introduction			
	Simplification of text	Make Note clearer	
	Addition of links	Change to electronic format	Removes need for extensive footnotes/references
Emission limits, monitoring and other provisions			
	Removal of redundant paragraphs	SED now fully in force	
	Removal of monitoring requirements	Not required when applying Total Emission Limit	See Figure 4.1
Control techniques			
Air Quality	Clarification of exhaust velocity requirements		

## 7. Further information

### Sustainable consumption and production (SCP)

7.1 Both business and the environment can benefit from adopting sustainable consumption and production practices.

Estimates of potential business savings include:

- £6.4 billion a year UK business savings from resource efficiency measures that cost little or nothing
- 2% of annual profit lost through inefficient management of energy, water and waste
- 4% of turnover is spent on waste.

7.2 When putting in place arrangements to comply with permit conditions, operators are strongly advised to use the opportunity to look into what other steps they may be able to take. Local authority regulators may be willing to provide assistance and ideas, although cannot be expected to act as unpaid consultants.

### Health and safety

Operators of processes and installations must protect people at work as well as the environment:

- requirements of a permit or authorisation should not put at risk the health, safety or welfare of people at work
- equally, the permit must not contain conditions whose only purpose is to secure the health of people at work. That is the job of the health and safety enforcing authorities

Where emission limits quoted in this guidance conflict with health and safety limits, the tighter limit should prevail because:

- emission limits under the Environment Protection Act 1990 or Pollution Prevention and Control Act 1999 relate to the concentration of pollutant released into the air from prescribed activities<sup>6</sup>
- exposure limits under health and safety legislation relate to the concentration of pollutant in the air breathed by workers
- these limits may differ since they are set according to different criteria. It will normally be quite appropriate to have different standards for the same pollutant, but in some cases they may be in conflict (for example, where air discharged from a process is breathed by workers). In such cases, the tighter limit should be applied to prevent a relaxation of control.

<sup>6</sup> In Northern Ireland, [The Environment \(Northern Ireland\) Order 2002](#)

## Further advice on responding to incidents

The UK Environment Agencies have published [guidance](#) on producing an incident response plan to deal with environmental incidents. Only those aspects relating to air emissions can be subject to regulation via a Part B permit, but regulators may nonetheless wish to informally draw the attention of all appropriate operators to the guidance.

It is not envisaged that regulators will often want to include conditions, in addition to those advised in this PG note, specifying particular incident response arrangements aimed at minimising air emissions. Regulators should decide this on a case-by-case basis. In accordance with BAT, any such conditions should be proportionate to the risk, including the potential for harm from air emissions if an incident were to occur. Account should therefore be taken of matters such as the amount and type of materials held on site which might be affected by an incident, the likelihood of an incident occurring, the sensitivity of the location of the installation, and the cost of producing any plans and taking any additional measures.

## Risk Phrase Classifications

As from 1<sup>st</sup> December 2010 “risk phrase” materials will also be known as “hazard statement” materials. Both terms will apply until 1<sup>st</sup> June 2015, when only the term “hazard statement” materials will apply. This change will not have an impact on the regulatory position under SED, all requirements regarding risk phrase materials still applying for hazard statement materials. However, as the identifier for the risk categories will change Table 6 below has been included to allow comparison between the two ways of labelling hazardous materials.

**Table 5: Classification of hazardous materials.**

			<b>SED only catches halogenated VOC with the phrases/statements in this column</b>
<b>Risk Phrases</b>	<b>class 1 'known to'</b>	<b>class 2 'treat as'</b>	<b>class 3 'cause concern'</b>
<b>Hazard statements categories</b> They are NOT exact equivalents to risk phrase classes	category 1a <b>known</b> from human evidence	category 1b <b>presumed</b> from animal evidence	category 2 <b>suspected</b> human carcinogens
	H340, H350, H350i, H360D or H360F		H341 H351
<b>Carcinogens</b>	R45 may cause cancer  H350 May cause cancer	R45 may cause cancer  H350 May cause cancer	R40 Limited evidence of a carcinogenic effect  H351 Suspected of causing cancer
<b>Mutagens</b>	R46 May cause heritable genetic damage  H340 May cause genetic defects	R46 May cause heritable genetic damage  H340 May cause genetic defects	<b>new to SED</b> R68 possible risk of irreversible effects  H341 Suspected of causing genetic defects
<b>Carcinogen by inhalation</b>	R49 may cause cancer by inhalation  H350i may cause cancer by inhalation	R49 may cause cancer by inhalation  H350i may cause cancer by inhalation	(Covered by R40 and H351 above)
<b>Toxic to reproduction,</b>	R60 may impair fertility - and R61 may cause harm to the unborn child H360D or H360F May damage fertility or the unborn child	R60 may impair fertility - and R61 may cause harm to the unborn child H360D or H360F May damage fertility or the unborn child	<b>Outside SED</b> - R62 and R63 for the suspected R phrases say possible risk to.

## References

- 1) HMIP Technical Guidance Note D1 “ Guidelines on Stack Heights for Polluting Emissions”
- 2) [The Chemical \(Hazard Information and Packaging of Supply\) Regulations 2002 SI 3247](#)
- 3) [Environment Agency – NetRegs Pages](#)