

| Health and Safety Executive Board |                               | HSE/11/05   |      |
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### **3<sup>rd</sup> European Commission Directive on Indicative Occupational Exposure Limit Values (IOELVs) – draft consultative document**

#### **Purpose of this paper**

1. To seek Board agreement for HSE to publish a Consultative Document (CD) setting out proposals to implement the EU Directive establishing a third list of Indicative Occupational Exposure Limit Values (Commission Directive 2009/161/EU, the 3<sup>rd</sup> IOELV Directive).

#### **Background**

2. The 3<sup>rd</sup> IOELV Directive lists 19 chemical substances with an indicative occupational exposure limit (IOELV) for each. This is the third list of IOELVs established under the Chemical Agents Directive (CAD) (98/24/EC) - two previous IOELV Directives were implemented in 2001 and 2007.
3. The 3<sup>rd</sup> IOELV Directive was adopted by the Commission on 17 December 2009, and Member States have until 18 December 2011 to introduce national implementing measures. Member States are required to introduce national limits for these substances, taking into account the EU limit. Failure to implement the Directive fully by the required date will result in infraction proceedings against the UK.
4. In Great Britain, these EU limits are implemented as Workplace Exposure Limits (WELs), approved by the HSE Board and subsequently published in the HSE publication "EH40 Workplace Exposure Limits". This proposed consultation is to seek views on the new national limits before formal approval by the Board.
5. The draft CD is attached as Annex B. Appendix 1 of the draft CD contains the text of the 3<sup>rd</sup> IOELV Directive, and Appendix 2 is an Impact Assessment, completed according to Cabinet Office guidelines, which sets out the likely costs and benefits of establishing Workplace Exposure Limits (WELs) for the relevant substances in line with the IOELVs in the Directive. Costs are estimated to be minimal.
6. Attached to this paper is a brief explanatory Annex (Annex A) which provides some additional information on IOELVs and WELs.
7. The concept of "one in – one out" regarding new legislation is not applicable in this case. No legislative change is required in order to implement the Directive, and moreover the concept does not apply to EU initiatives.

#### **Argument**

8. EU exposure limits are recommended by the European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL). Their inclusion in a Directive is considered by the tripartite Working Party on Chemicals, which advises the Advisory Committee on Safety and Health at Work.
9. HSE's usual policy has been to implement health-based IOELVs as WELs unless:

- a. there are very strong reasons for adapting or maintaining a WEL at a higher level than the health-based IOELV. No such reasons arise in implementing the 3rd IOELV Directive; or
  - b. there is an existing WEL in GB which is numerically lower than the IOELV (as is the case for tertiary-butyl-methyl ether).
10. Of the 19 substances listed in the Annex to the Directive:
- a. There are currently no WELs for five of the substances listed. In order to implement the Directive, HSE proposes to establish a WEL for each of these substances, in line with the IOELV. The substances are: bisphenol A, mercury and divalent inorganic mercury compounds, methyl acrylate, sulphuric acid (mist), and vinyl acetate.
  - b. For one further substance, phenol, the Directive requires the establishment of a Short-Term Exposure Limit (STEL), where currently there is only an 8-hour time-weighted average (TWA) WEL. HSE therefore proposes to establish a STEL for this substance in line with the IOELV.
  - c. A reduction in the current WEL is required for ten substances, to comply with the Directive. These are: carbon disulphide, N,N-dimethylformamide, 1,4-dioxane, 2-ethoxyethanol, 2-ethoxyethyl acetate, ethyl acrylate, 2-methoxyethanol, 2-methoxyethyl acetate, methyl isocyanate (see paragraphs 16 to 18 below) and n-methyl-2-pyrrolidone.
  - d. No change to the WEL is proposed for two of the substances, because the new recommended limit values are identical to the current WEL. These substances are hydrogen sulphide and methyl methacrylate.
  - e. For one further substance, tertiary-butyl methyl ether, the IOELV is higher than the existing WEL. It is proposed to align the WEL with the less-stringent IOELV (see paragraphs 12 to 15 below).
  - f. For 1,4-dioxane it is additionally proposed to remove the existing short-term WEL because no short-term limit is required by the Directive (see paragraph 16 below).
11. As regards the five proposed new WELs, occupational exposure standards (OESs) existed until 2003 for sulphuric acid and until 2005 for mercury and divalent inorganic compounds, for methyl acrylate and for vinyl acetate, but these limits were withdrawn because HSE was not confident at the time that the level of the OES was fully protective of health. To date, bisphenol A has never been subject to a GB occupational exposure limit. Although unrelated, recent media interest in bisphenol A is noted below for information.

*Tertiary-butyl-methyl ether*

12. The current WEL for this substance, established as an OES in 1998, following consideration by the Advisory Committee on Toxic Substances (ACTS) Working Group for the Assessment of Toxic Chemicals (WATCH) is:
- 25 parts per million (ppm) (8-hour time-weighted average); and
  - 75 ppm (short-term exposure limit).
13. The IOELV proposed by the European Commission is:
- 50 ppm (8-hour time-weighted average); and
  - 100 ppm (short-term exposure limit).

14. The Board is asked to agree that HSE should consult on a proposal to increase the existing WEL to bring it in line with the IOELV.
15. Tertiary-butyl-methyl ether, alternatively known as MTBE, is used primarily in the manufacture of petrol. Enquiries with major petrol manufacturers have shown that protective measures for gasoline blends are primarily aimed at benzene exposure rather than any MTBE that may be present, and consequently a relaxation of the WEL is not likely to have any direct impact in the UK.

#### *1,4-Dioxane*

16. The 3<sup>rd</sup> IOELV Directive contains an 8-hour TWA limit for 1,4-dioxane which is slightly lower than the GB WEL. It is therefore proposed to reduce the WEL to align it with the IOELV. There is currently also a GB STEL. SCOEL determined, however, that there was no evidence to require the establishment of a STEL, and consequently there is no STEL in the 3<sup>rd</sup> IOELV Directive. The Board is asked to agree that HSE should consult on the removal of the existing GB STEL to align the limit with that in the Directive.

#### *Methyl isocyanate*

17. The 3<sup>rd</sup> IOELV Directive contains a short-term IOELV for methyl isocyanate of 0.02 ppm, which is the equivalent of 0.035 mg.m<sup>-3</sup>. There is currently a WEL for all isocyanates of 0.02 mg.m<sup>-3</sup> (8-hour time-weighted average) and 0.07 mg.m<sup>-3</sup> (STEL). It is therefore necessary to reduce the current STEL for this substance from 0.07 mg.m<sup>-3</sup> to 0.035 mg.m<sup>-3</sup>, in order to comply with the Directive.
18. Occupational exposure limits in Great Britain consider isocyanates as a group, as there is no clear scientific justification for differentiating between them. All isocyanates are presumed to have the potential to cause respiratory sensitisation and are potent respiratory tract irritants.
19. The Board is asked to agree that HSE should consult on a reduction of the STEL for methyl isocyanate alone to 0.02 ppm (0.035 mg.m<sup>-3</sup>) and that the STEL for other isocyanates remain unchanged.

#### *Bisphenol A*

20. The Board will be aware that bisphenol A (BPA) has recently been linked in the media to ill-health effects in humans arising from the presence of the substance in some food-contact plastics. The IOELV and the proposed WEL relate, however, to workplace exposures to the inhalable dust, and the proposed limit is considered to be fully protective of health in these circumstances.
21. The Food Standards Agency (FSA) leads UK policy on food-contact materials. The FSA is aware of precautionary regulatory action on BPA being taken by Denmark and France, but considers it important that there is an agreed position across the EU. The European Food Safety Authority (EFSA) issued its latest opinion on the safety of BPA on 30 September 2010, concluding that no new study could be identified that warranted a revision of the current Tolerable Daily Intake level. There are, nevertheless, some uncertainties concerning other harmful effects on animals related to BPA, although the relevance of these findings for human health cannot be assessed due to shortcomings in the identified studies. The view of the FSA is that, on this occasion, a precautionary approach should be adopted. It proposes supporting the European Commission's plan to impose restrictions on babies' bottles or plastic materials and articles that contain BPA, intended to come into contact with infant formula.

### **Consultation**

22. HSE has consulted a number of interested organisations and companies in order to obtain information for the Impact Assessment. The list of these organisations is included in the draft CD.
23. Reflecting the EU-wide nature of the new IOELVs, ACTS and WATCH have not been directly involved in the determination of the limits on which HSE is consulting. ACTS members have, however, been made aware of the planned consultation exercise and invited to submit their views on the proposals to inform the Board's consideration of the issue.

### **Presentation**

24. Publication of the CD will be announced by means of a press release and a letter to known interested bodies inviting comments. The CD will be published on the HSE website. If, following consultation, the new and revised WELs are agreed by the HSE Board, they will be included on the HSE website for information, and the Minister advised accordingly, although they will not take effect until the last date for implementation which is 18 December 2011.
25. Appendix 3 of the CD lists the Government departments, public bodies, trade associations, other organisations and individual companies who will receive the consultation letter referred to above.
26. Separate arrangements exist for the implementation of the 3rd IOELV Directive in Northern Ireland and in Gibraltar. The Health and Safety Executive Northern Ireland intends to hold a similar consultation exercise.

### **Costs and benefits**

27. The Impact Assessment at Appendix 2 of the draft CD gives details of the estimated costs and benefits involved in implementing the 3rd IOELV Directive. For the 19 substances in the Directive, costs of meeting the new and revised limits are expected to be minimal. There are potential additional costs associated with the development of validated measurement methods for sulphuric acid. Benefits arising from the implementation of the Directive cannot be quantified, but the new and revised limits will remind employers of the need to keep exposures to these substances properly controlled.

### **Financial/ Resource implications for HSE**

28. Estimated costs of negotiating the Directive, preparing the Consultative Document and undertaking the subsequent steps to implement the Directive are £290,000. This includes the estimated staff time over 4 years of a Band 2 (Policy), a Band 3 (Scientist) and a Band 4 (Policy) based on Annual Full Cost, and the cost of work contracted to HSL. The bulk of this cost represents work already completed. In the financial year 2011/2012 the estimated cost in staff time, based on Annual Full Cost is £25,800.

### **Action**

29. The Board is invited to agree:
  - (a) the proposal to increase the level of the WEL for tertiary-butyl-methyl ether to be in line with the IOELV in the Directive (paragraphs 12 to 15 above);

- (b) the proposal to remove the short-term WEL for 1,4-dioxane (paragraph 16 above);
  - (c) the proposal to reduce the short-term WEL for methyl isocyanate alone, in line with the IOELV in the Directive (paragraphs 17 to 19 above).
30. Subject to paragraph 29 above, the Board is invited to agree to consult on implementation of the 3<sup>rd</sup> European Commission Directive on IOELVs, as per the draft CD at Annex B, with a 3-month consultation period.

**Paper Clearance**

31. This paper was cleared by the SMT on 1 December 2010.

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## EXPLANATORY ANNEX TO BOARD PAPER

### Indicative Occupational Exposure Limit Values

1. Indicative Occupational Exposure Limit Values (IOELVs) are European health-based limits of exposure to hazardous substances, set to protect the health of EU workers from the potential ill-health effects of these substances at work. Their legal status derives from Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work (the Chemical Agents Directive or CAD).

2. IOELVs are recommended by the European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL). SCOEL was established in 1995 with the mandate to advise the Commission on occupational exposure limits for chemicals in the workplace. It does this through the preparation of scientific recommendations for the Commission, which are used to underpin IOELVs. Draft recommendations from SCOEL undergo a six-month stakeholder consultation to allow interested parties to submit health-based scientific comments and further data.

3. SCOEL is composed of a maximum of 21 members, selected from candidates proposed by EU Member States and appointed by the Commission. They are scientists who are experts in chemistry, toxicology, epidemiology, occupational medicine or occupational hygiene, and who are able to review available information and recommend, where possible, exposure limits. There are currently two UK-nominated members of SCOEL, but all SCOEL members act as independent experts and not as representatives of their national governments.

4. Based on SCOEL recommendations, the Commission puts forward proposals for IOELVs, consulting both the tripartite Advisory Committee on Safety and Health at Work and its tripartite Working Party on Chemicals. The Directive in question is the 3<sup>rd</sup> list of IOELVs that has been through this process; previous lists were presented in Directives in 2000 and in 2006 and implemented in Great Britain in 2001 and 2007 respectively.

5. IOELV Directives require Member States to establish national occupational exposure limits for the chemical agents in question, taking into account the European value. In most cases this implies that the eventual British limit will be identical or very close to the IOELV. Nevertheless, in cases where the existing national limit is lower, and therefore more stringent than the IOELV, HSE practice to date has been to retain the existing limit.

### The British Occupational Exposure Limit System

6. The British occupational exposure limit is the Workplace Exposure Limit (WEL), as defined in the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (as amended). WELs were introduced in 2005, following widespread public consultation, to replace the earlier dual system of Maximum Exposure Limits (MELs) and Occupational Exposure Standards (OESs). MELs replaced what, before the coming into force of the original COSHH Regulations in 1989, were known as Control Limits. OESs replaced what were previously known as Recommended Limits and prior to that, Adopted Limits.

7. A WEL is the concentration of a hazardous substance in the air that people breathe, averaged over a specified reference period, referred to as a time-weighted

average (TWA). Two such periods are used; the long-term exposure limit (8 hours) and the short-term exposure limit or STEL (15 minutes).

8. WELs are published in the HSE publication “EH40 Workplace Exposure Limits” as well on the HSE website. The requirement for compliance with them is set out in regulation 7(7) of the COSHH Regulations 2002 (as amended).

**ANNEX B**

**PROPOSALS TO IMPLEMENT THE THIRD LIST OF INDICATIVE  
OCCUPATIONAL EXPOSURE LIMIT VALUES (COMMISSION DIRECTIVE  
2009/161/EU)**

**CONSULTATIVE DOCUMENT**

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## SUMMARY

The European Commission's 3rd list of health-based Indicative Occupational Exposure Limit Values (the 3rd IOELV Directive) (2009/161/EU) was adopted by the Commission on 17 December 2009. This Consultative Document sets out the Health and Safety Executive's (HSE's) proposals for establishing Workplace Exposure Limits (WELs) for the nineteen substances listed in the Directive, in order to implement it in Great Britain. The 19 substances are:

Bisphenol A (inhalable dust)  
Carbon disulphide  
N,N-Dimethylformamide  
1,4-Dioxane  
2-Ethoxyethanol  
2-Ethoxyethyl acetate  
Ethyl acrylate  
Hydrogen sulphide  
Mercury and divalent inorganic mercury compounds including mercuric oxide and mercuric chloride (measured as mercury)  
2-Methoxyethanol  
2-Methoxyethyl acetate  
Methyl acrylate  
Methyl isocyanate  
Methyl methacrylate  
n-Methyl-2-pyrrolidone  
Phenol  
Sulphuric acid (mist)  
Tertiary-butyl-methyl ether  
Vinyl acetate

The Health and Safety Executive seeks to inform its decision-making by consulting a wide range of interested bodies and, although these health-based limits have already been discussed by a European panel of experts, and been subject to consultation at EU level, you may have views or further information of which it is not aware. For example, you may have data relating to whether a particular limit can reasonably be achieved in the workplace. Your comments are important and a form is included at the back of this document to help you in providing them. This form summarises the questions set out in the main text.

The Health and Safety Executive has a statutory duty to consult to elicit stakeholders' views on proposals. HSE believes that this enables an open and transparent approach to decision-making, which is essential if policies and decisions are to have widespread ownership and reflect the needs and aspirations of the people they will affect. The Executive then decides on the best way forward based on an interpretation and analysis of the results of the exercise.

The Executive tries to make its consultation procedure as thorough and open as possible. Responses to this Consultation Document will be lodged in the

Health and Safety Executive's Knowledge Centre after the close of the consultation period where they can be inspected by members of the public or be copied to them on payment of the appropriate fee to cover costs.

Responses to this Consultation Document are invited on the basis that anyone submitting them agrees to this approach. Responses, or part of them, will be withheld from the Knowledge Centre only at the express request of the person making them. In such cases, a note will be put in the index to the responses identifying those who have commented and have asked that their views, or part of them, be treated as confidential.

Many business e-mail systems now automatically append a paragraph stating the message is confidential. If you are responding to this Consultation Document by e-mail and you are content for your responses to be made publicly available, please make clear in the body of your response that you do not wish any standard confidentiality statement to apply.

If you reply to this Consultation Document in a personal capacity, rather than as a post holder of an organisation, you should be aware that information you provide may constitute "personal data" in the terms of the Data Protection Act 1998. For the purposes of this Act, HSE is the "data controller" and will process the data for health, safety and environmental purposes. HSE may disclose this data to any person or organisation for the purposes for which it was collected, or where the Act allows disclosure. You have the right to ask for a copy of the data and to ask for inaccurate data to be corrected. Please note that all replies will be made public unless you specifically state that you wish yours to remain confidential.

We will acknowledge receipt of all comments sent to us and will give careful consideration to them. We may also contact you again if, for example, we have a query. The Health and Safety Executive would also like to know what you think about this consultation, both in the content and the layout. Your views will help to improve future consultations.

Please feel free to copy this Consultative Document more widely; hard copies are available from the address on the back cover, and are also available via the HSE's website ([www.hse.gov.uk/aboutus/consult/condocs/cdxxx.pdf](http://www.hse.gov.uk/aboutus/consult/condocs/cdxxx.pdf)).

If you are not satisfied with the way in which this consultation exercise has been conducted we want to know and we want to put things right. Please phone or write to the contact on the Consultation Document. We aim to reply to all complaints within 10 working days. If you are not satisfied with the response, you may ask for your complaint to be passed to a more senior member of staff. Following our second response, if you are still not satisfied, you can ask for your complaint to be referred to the Chief Executive.

## THE BRITISH OCCUPATIONAL EXPOSURE LIMIT SYSTEM

1. In 2005, the then Health and Safety Commission introduced a new framework for setting occupational exposure limits (OELs) following an amendment to the Control of Substances Hazardous to Health (COSHH) Regulations 2002 (S.I. 2004 No. 3386). The new system dispensed with the previous system of Maximum Exposure Limits (MELs) and Occupational Exposure Standards (OESs) and replaced both with a single type of limit, the Workplace Exposure Limit or WEL.

2. The requirements for compliance with WELs are set out in regulation 7(7) of the COSHH Regulations 2002 (as amended). In essence, the emphasis in the new WEL system is on the need to control exposure to substances according to the principles of good practice. In addition to these general principles of good practice, control advice sheets laying out step-by-step instructions for specific tasks and processes, are available via the electronic system of COSHH Essentials ([www.coshh-essentials.org.uk](http://www.coshh-essentials.org.uk)). These control guidance sheets represent good practice for the control of hazardous substances. COSHH Essentials is available as guidance only, and employers are free to use other sources of advice on good practice, if they wish.

3. In addition to the need to control substances according to good practice, it is a legal requirement that the WEL should not be exceeded. A WEL is defined as the concentration of a hazardous substance in the air that people breathe, averaged over a specified reference period referred to as a time-weighted average (TWA). Two periods are used: long-term exposure limit (8 hours) and short-term exposure limit (STEL) (15 minutes).

4. WELs are published in the HSE publication ***EH40 Workplace Exposure Limits***, the current paper edition of which was published in April 2005. The full text of ***EH40 Workplace Exposure Limits*** is available on the HSE website ([www.hse.gov.uk/pubns/priced/eh40.pdf](http://www.hse.gov.uk/pubns/priced/eh40.pdf)) and the table of WELs (Table 1) incorporates the changes that were made following the implementation of the 2nd IOELV Directive in October 2007. In addition to the requirement to control exposure to the level of the WEL, employers must, if the substance is a carcinogen or a respiratory sensitiser, reduce exposure still further to a level which is as low as is reasonably practicable.

5. For more information on employers' duties under COSHH, you should refer to HSE's booklet "***Working with Substances Hazardous to Health***" - INDG136 (rev4), which is available from HSE Books and is also on the HSE website. ([www.hse.gov.uk/pubns/indg136.pdf](http://www.hse.gov.uk/pubns/indg136.pdf)).

## INDICATIVE OCCUPATIONAL EXPOSURE LIMIT VALUES (IOELVs)

6. Indicative Occupational Exposure Limit Values (IOELVs) are European health-based limits that are set to protect the health of workers in the European Union from the ill-health effects of hazardous substances in the workplace. Their legal status derives from Council Directive 98/24/EC on the

protection of the health and safety of workers from the risks related to chemical agents at work (the Chemical Agents Directive or CAD). The first European Commission Directive on Indicative Occupational Exposure Limit Values (1st IOELV Directive) (2000/39/EC), containing limits for 63 substances was implemented in Great Britain in December 2001. The 2<sup>nd</sup> IOELV Directive (2006/15/EC), with limits for a further 33 substances was implemented in October 2007.

7. IOELV Directives require Member States to establish national occupational exposure limits for the chemical agents in question, **taking into account** the European values. In most cases this will mean that the British limit will be identical or very close to the IOELV. In a number of cases, where an existing national limit is lower than the IOELV, this existing national limit has been retained. Only in very rare circumstances would HSE consider establishing a WEL at a level substantially higher than the IOELV.

### **THE 3rd IOELV DIRECTIVE**

8. The European Commission has now set IOELVs for a further 19 substances. A copy of Commission Directive 2009/161/EU is at Appendix 1. In the Directive, substances are listed in Chemical Abstract Service (CAS) Number order. However, in this Consultative Document, for convenience, we consider each substance alphabetically. The limits for these substances are based on recommendations by the European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL), which has considered the scientific information available on each substance. The limits proposed by SCOEL have all been subject to six-month public consultation.

9. The supporting documentation prepared by SCOEL, is available for each substance covered by this Directive by accessing the website: <http://ec.europa.eu/social/main.jsp?catId=153&langId=en>, and clicking through, first on **Scientific Committee on Occupational Exposure Limits (SCOEL)**, and then on **documents database**. Those who do not have internet access or who need paper copies, may contact Richard Pedersen, International Chemicals Unit, Health and Safety Executive (see paragraph 26).

### **PROPOSAL FOR IMPLEMENTING THE 3rd IOELV DIRECTIVE IN THE NATIONAL LIMIT SETTING SYSTEM**

10. HSE proposes to implement the IOELVs in this Commission Directive through the domestic system of WELs. HSE proposes to harmonise specific WELs with the relevant IOELVs as set out in the Directive. The specific proposals are summarised in Table A and set out in detail on pages 10-12.

**TABLE A: SUMMARY OF THE PROPOSAL**

| <b>SUBSTANCE NAME</b><br><b>CAS Number</b> | <b>IOELV</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin notation</b>  | <b>Existing GB WEL and notations</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin notation</b> | <b>HSE Proposal</b>  |
|--|--|---|--|
| Bisphenol A<br>(inhalable dust)<br>80-05-7 | A) 10 mg.m <sup>-3</sup><br>B) None<br>C) None                                     | A) None<br>B) None<br>C) None   | Adopt IOELV 8-hour TWA limit and establish new GB WEL  |
| Carbon disulphide<br>75-15-0               | A) 15 mg.m <sup>-3</sup><br>5 ppm<br>B) None<br>C) Skin                            | A) 32 mg.m <sup>-3</sup><br>10 ppm<br>B) None<br>C) Skin  | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Retain Skin notation                |
| N,N-Dimethylformamide<br>68-12-2           | A) 15 mg.m <sup>-3</sup><br>5 ppm<br>B) 30 mg.m <sup>-3</sup><br>10 ppm<br>C) Skin | A) 30 mg.m <sup>-3</sup><br>10 ppm<br>B) 61 mg.m <sup>-3</sup><br>20 ppm<br>C) Skin                       | Adopt IOELV 8-hour TWA limit and IOELV STEL and reduce existing GB WEL<br>Retain Skin notation |
| 1,4-Dioxane<br>123-91-1                    | A) 73 mg.m <sup>-3</sup><br>20 ppm<br>B) None<br>C) None                           | A) 91 mg.m <sup>-3</sup><br>25 ppm<br>B) 366 mg.m <sup>-3</sup><br>100 ppm<br>C) None                     | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Remove existing STEL                |
| 2-Ethoxyethanol<br>110-80-5                | A) 8 mg.m <sup>-3</sup><br>2 ppm<br>B) None<br>C) Skin                             | A) 37 mg.m <sup>-3</sup><br>10 ppm<br>B) None<br>C) Skin  | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Retain Skin notation                |
| 2-Ethoxyethyl acetate<br>11115-9           | A) 11 mg.m <sup>-3</sup><br>2 ppm<br>B) None<br>C) Skin                            | A) 55 mg.m <sup>-3</sup><br>10 ppm<br>B) None<br>C) Skin  | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Retain Skin notation                |

| <b>SUBSTANCE NAME</b><br><b>CAS Number</b>  | <b>IOELV</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin Notation</b>  | <b>Existing GB WEL and notations</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin Notation</b> | <b>HSE Proposal</b>   |
|---|--|---|---|
| Ethyl acrylate<br>140-88-5  | A) 21 mg.m <sup>-3</sup><br>5 ppm<br>B) 42 mg.m <sup>-3</sup><br>10 ppm<br>C) None | A) 21 mg.m <sup>-3</sup><br>5 ppm<br>B) 62 mg.m <sup>-3</sup><br>15 ppm<br>C) None                        | Retain existing 8-hour TWA WEL<br>Adopt IOELV STEL and reduce existing GB WEL                                     |
| Hydrogen sulphide<br>7783-06-4  | A) 7 mg.m <sup>-3</sup><br>5 ppm<br>B) 14 mg.m <sup>-3</sup><br>10 ppm<br>C) None  | A) 7 mg.m <sup>-3</sup><br>5 ppm<br>B) 14 mg.m <sup>-3</sup><br>10 ppm<br>C) None                         | Retain existing 8-hour TWA WEL and STEL   |
| Mercury and divalent inorganic mercury compounds including mercuric oxide and mercuric chloride (measured as mercury) | A) 0.02 mg.m <sup>-3</sup><br>B) None<br>C) None                                   | A) None<br>B) None<br>C) None   | Adopt IOELV 8-hour TWA limit and establish new GB WEL   |
| 2-Methoxyethanol<br>109-86-4  | A) 3 mg.m <sup>-3</sup><br>1 ppm<br>B) None<br>C) Skin                             | A) 16 mg.m <sup>-3</sup><br>5 ppm<br>B) None<br>C) Skin   | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Retain Skin notation                                   |
| 2-Methoxyethyl acetate<br>110-49-6  | A) 5 mg.m <sup>-3</sup><br>1 ppm<br>B) None<br>C) Skin                             | A) 25 mg.m <sup>-3</sup><br>5 ppm<br>B) None<br>C) Skin   | Adopt IOELV 8-hour TWA limit and reduce existing GB WEL<br>Retain Skin notation                                   |
| Methyl acrylate<br>96-33-3  | A) 18 mg.m <sup>-3</sup><br>5 ppm<br>B) 36 mg.m <sup>-3</sup><br>10 ppm<br>C) None | A) None<br>B) None<br>C) None   | Adopt IOELV 8-hour TWA limit and IOELV STEL and establish new GB WEL  |
| Methyl isocyanate<br>624-83-9   | A) None<br>B) 0.02 ppm<br>C) None  | A) 0.02 mg.m <sup>-3</sup> (as -NCO)<br>B) 0.07 mg.m <sup>-3</sup> (as -NCO)<br>C) None                   | Adopt IOELV STEL for methyl isocyanate and reduce existing GB WEL. Retain existing WEL for all other isocyanates. |

| <b>SUBSTANCE NAME</b><br><b>CAS Number</b> | <b>IOELV</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin Notation</b>        | <b>Existing GB WEL and notations</b><br><b>A) 8-hour TWA</b><br><b>B) STEL</b><br><b>C) Skin Notation</b> | <b>HSE Proposal</b>  |
|--|--|---|--|
| Methyl methacrylate<br>80-62-6             | A) 50 ppm<br>B) 100 ppm<br>C) None   | A) 208 mg.m <sup>-3</sup><br>50 ppm<br>B) 416 mg.m <sup>-3</sup><br>100 ppm<br>C) None                    | Retain existing 8-hour TWA WEL and STEL  |
| n-Methyl-2-pyrrolidone<br>872-50-4         | A) 40 mg.m <sup>-3</sup><br>10 ppm<br>B) 80 mg.m <sup>-3</sup><br>20 ppm<br>C) Skin      | A) 103 mg.m <sup>-3</sup><br>25 ppm<br>B) 309 mg.m <sup>-3</sup><br>75 ppm<br>C) Skin                     | Adopt IOELV 8-hour TWA limit and IOELV STEL and reduce existing GB WEL<br>Retain Skin notation         |
| Phenol<br>108-95-2                         | A) 8 mg.m <sup>-3</sup><br>2 ppm<br>B) 16 mg.m <sup>-3</sup><br>4 ppm<br>C) Skin         | A) 2 ppm<br>B) None<br>C) Skin  | Retain existing 8-hour TWA WEL<br>Adopt IOELV STEL<br>Retain Skin notation                             |
| Sulphuric acid (mist)<br>7664-93-9         | A) 0.05 mg.m <sup>-3</sup><br>B) None<br>C) None   | A) None<br>B) None<br>C) None   | Adopt IOELV 8-hour TWA limit and establish new GB WEL  |
| Tertiary-butyl-methyl ether<br>1634-04-4   | A) 183.5 mg.m <sup>-3</sup><br>50 ppm<br>B) 367 mg.m <sup>-3</sup><br>100 ppm<br>C) None | A) 92 mg.m <sup>-3</sup><br>25 ppm<br>B) 275 mg.m <sup>-3</sup><br>75 ppm<br>C) None                      | Adopt IOELV 8-hour limit and increase existing GB WEL<br>Adopt IOELV STEL and increase existing GB WEL |
| Vinyl acetate<br>108-05-4                  | A) 17.6 mg.m <sup>-3</sup><br>5 ppm<br>B) 35.2 mg.m <sup>-3</sup><br>10 ppm<br>C) None   | A) None<br>B) None<br>C) None   | Adopt IOELV 8-hour TWA limit and IOELV STEL and establish new GB WEL                                   |

## DESCRIPTION OF THE PROPOSALS

### ***Substances for which no limit change is necessary***

11. Of the nineteen substances or groups of substances in the 3<sup>rd</sup> IOELV Directive, two have recommended IOELVs that are identical to the existing WELs, and consequently HSE is not proposing any change to the current WELs. These substances are:

Hydrogen sulphide  
Methyl methacrylate

12. Additionally, for a further three substances no change is proposed to the 8-hour TWA WEL as they are identical to the IOELVs but a change is proposed to the short-term exposure limit. These substances are:

Ethyl acrylate  
Methyl isocyanate (see paragraphs 18 and 19)  
Phenol (see paragraph 17)

In the case of ethyl acrylate, the proposed STEL is reduced from 15 to 10 ppm in line with the IOELV STEL. For methyl isocyanate the proposed STEL is 0.02 ppm, which equates to 0.035 mg.m<sup>-3</sup>, whereas the current STEL is 0.07 mg.m<sup>-3</sup>. In the case of phenol there is no existing STEL in Great Britain and adoption of the IOELV STEL of 4 ppm is proposed.

### ***Substance for which the existing WEL is increased***

13. In the case of tertiary-butyl-methyl ether (also known as methyl-*tert*-butyl ether), the IOELV is higher than the existing GB WEL. This WEL was established as an Occupational Exposure Standard (OES) in 1998, following consideration by social partners in the Advisory Committee on Toxic Substances. In order to comply with the Directive, HSE is proposing to increase the level of the 8-hour TWA WEL from 25 ppm (99 mg.m<sup>-3</sup>) to 50 ppm (183.5 mg.m<sup>-3</sup>), and to increase the level of the STEL from 75 ppm (275 mg.m<sup>-3</sup>) to 100 ppm (367 mg.m<sup>-3</sup>), which reflects the IOELV.

### ***Substance for which the existing WEL is removed***

14. For the substance 1,4-dioxane, there is an existing GB STEL, but no IOELV STEL is recommended in the Directive. In order to align with the Directive HSE proposes to remove the GB STEL, while reducing the 8-hour TWA limit.

### **Substances for which the existing WEL is reduced**

15. The following nine substances require reductions to be made to existing WELs in order to reflect the IOELV.

|                        |                            |
|------------------------|----------------------------|
| Carbon disulphide      | Ethyl acrylate (STEL only) |
| N,N-Dimethylformamide  | 2-Methoxyethanol           |
| 1,4-Dioxane            | 2-Methoxy ethyl acetate    |
| 2-Ethoxyethanol        | n-Methyl-2-pyrrolidone     |
| 2-Ethoxy ethyl acetate |                            |

### **Substances for which a new WEL is required**

16. To comply with the Directive, new 8-hour TWA and short-term limits are required for five substances where no WEL currently exists. The HSE therefore proposes the establishment of new WELs for the following substances:

Bisphenol A  
Mercury and divalent inorganic mercury compounds including mercuric oxide and mercuric chloride (measured as mercury)  
Methyl acrylate  
Sulphuric acid (mist)  
Vinyl acetate

### **Phenol**

17. The Directive requires the establishment of a short-term exposure limit (STEL) for phenol, where currently there is only an 8-hour TWA WEL. It is proposed to establish a STEL for phenol at the level of the IOELV STEL.

### **Methyl isocyanate**

18. The Directive contains a short-term (STEL) IOELV for methyl isocyanate of 0.02 ppm. There is currently a GB WEL listed in **EH40 Workplace Exposure Limits** for all isocyanates, both mono- and multifunctional monomers and oligomers, which is set at 0.02 mg.m<sup>-3</sup> (8-hour TWA) and 0.07 mg.m<sup>-3</sup> (STEL), measured as isocyanate (-NCO). The IOELV of 0.02 ppm converts to 0.035 mg.m<sup>-3</sup>, and it is therefore necessary to have a reduced STEL for this individual substance.

19. Although it might be considered more appropriate to apply a more stringent STEL to all isocyanates (including both monoisocyanates and diisocyanates) rather than to methyl isocyanate alone, on the presumption that all isocyanates have the potential to cause respiratory sensitisation and are potent respiratory tract irritants, such an action would exceed the minimum requirements of the Directive. Consequently it is proposed that the STEL for all other isocyanates, as well as the 8-hour TWA WEL, remains unchanged.

### ***Skin notations***

20. Eight of the substances listed in the Directive carry additional “skin” (Sk) notations signifying the possibility of significant uptake of the substance through the skin, leading to the potential for toxicity over and above that due to inhalation exposure alone. All of these substances already carry an Sk notation in ***EH40 Workplace Exposure Limits***, and no further change is therefore required. The substances in question are:

|                       |                        |
|-----------------------|------------------------|
| Carbon disulphide     | 2-Methoxyethanol       |
| N,N-Dimethylformamide | 2-Methoxyethyl acetate |
| 2-Ethoxy ethanol      | N-Methyl-2-pyrrolidone |
| 2-Ethoxyethyl acetate | Phenol                 |

### **IMPACT ASSESSMENT**

21. Before introducing new legislative requirements, HSE carries out an impact assessment of the costs this legislation would impose on industry and on other stakeholders, and of the benefits it is expected to bring. An Impact Assessment is not carried out, however, when the legislation does not impose additional costs to industry.

22. In relation to the IOELV proposals for the substances set out in this Consultative Document, HSE has examined what costs and benefits would result from their implementation, as proposed, into the national limit-setting system. This Impact Assessment is at Appendix 2. HSE estimates that, for most of the substances, no additional costs will arise, and that implementation of the Directive will not have adverse effects on British industry. Relevant British industry has been consulted on the proposed changes and no issues of contention were raised.

### **IMPLEMENTATION DATE**

23. Subject to the outcome of consultation, HSE proposes to apply the new limits on 18 December 2011, the final implementation date required by the Directive.

### **INVITATION TO COMMENT**

24. The HSE invites comments on these proposals. We are happy, nevertheless, to receive your written comments in any form convenient to you. We will acknowledge receipt of all comments sent to us and will give them careful consideration. The HSE would also like to know what you think about this consultation, both in terms of content and layout. Your views will help us to improve future consultations.

25. Taking into account the health-based limits as proposed by SCOEL (paragraph 9), as reflected in the IOELVs, and the information about each substance in the Impact Assessment at Appendix 2, consultees are invited to address the following question.

**Do you agree that new and revised Workplace Exposure Limits should be established for the substances listed in the European Commission's 3<sup>rd</sup> List of Indicative Occupational Exposure Limit Values to align them with the IOELVs ? If you disagree please explain why.**

**Please also provide any additional information to supplement or correct that given in Appendix 2.**

## **Appendix 1**

**Text of Commission Directive 2009/161/EU of 17 December 2009  
establishing a third list of indicative occupational exposure limit values  
in implementation of Council Directive 98/24/EC and amending Directive  
2000/39/EC**

## COMMISSION DIRECTIVE 2009/161/EU

of 17 December 2009

### establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on European Union and to the Treaty on the Functioning of the European Union,

Having regard to Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work<sup>1</sup>, and in particular Article 3(2) thereof,

Having regard to the opinion of the Advisory Committee on Safety and Health at Work,

Whereas:

- (1) Pursuant to Directive 98/24/EC, the Commission is to propose European objectives in the form of indicative occupational exposure limit values (IOELVs) for the protection of workers from chemical risks, to be set at Community level.
- (2) In carrying out this task, the Commission is assisted by the Scientific Committee for Occupational Exposure Limits to Chemical Agents (SCOEL) set up by Commission Decision 95/320/EC<sup>2</sup>.
- (3) IOELVs are health-based, non-binding values, derived from the most recent scientific data available and taking into account the availability of measurement techniques. They set threshold levels of exposure below which, in general, no detrimental effects are expected for any given substance after short-term or daily exposure over a working life time. They constitute European objectives to assist employers in determining and assessing risks, in accordance with Article 4 of Directive 98/24/EC.
- (4) For any chemical agent for which an IOELV is established at Community level, Member

States are required to establish a national occupational exposure limit value taking into account the Community limit value, but may determine its nature in accordance with national legislation and practice.

- (5) IOELVs should be regarded as an important part of the overall approach to ensuring that the health of workers is protected against the risks arising from hazardous chemicals.
- (6) Results of the risk assessments and risk reduction strategies developed in the framework of Council Regulation (EEC) No 793/93 of 23 March 1993 on the evaluation and control of the risks of existing substances<sup>3</sup> show the need for the establishment or revision of occupational exposure limit for a number of substances.
- (7) Commission Directive 91/322/EEC<sup>4</sup> as amended by Directive 2006/15/EC<sup>5</sup>, contains occupational exposure limits for 10 substances and remains in force.
- (8) A first and a second list of IOELVs were established by Commission Directives 2000/39/EC<sup>6</sup> and 2006/15/EC under Directive 98/24/EC. This Directive establishes a third list of IOELVs under Directive 98/24/EC.
- (9) In accordance with Article 3 of Directive 98/24/EC, SCOEL has assessed 19 substances, which are listed in the Annex to this Directive. One of these substances, phenol, was previously listed in the Annex to Directive 2000/39/EC. SCOEL has reviewed the IOELV for this substance in the light of recent scientific data and recommended the establishment of a short-term exposure limit (STEL) to complement the existing time-weighted average (TWA) IOELV. Therefore, this substance, now listed in the Annex to this Directive, should be deleted from the Annex to Directive 2000/39/EC.

<sup>1</sup> OJ L 131, 5.5.1998, p. 11.

<sup>2</sup> OJ L 188, 9.8.1995, p. 14.

<sup>3</sup> OJ L 84, 5.4.1993, p. 1.

<sup>4</sup> OJ L 177, 5.7.1991, p. 22.

<sup>5</sup> OJ L 38, 9.2.2006, p. 36.

<sup>6</sup> OJ L 142, 16.6.2000, p. 47.

- (10) Mercury is a substance with potentially serious cumulative health effects. Therefore health surveillance including biological monitoring in accordance with Article 10 of Directive 98/24/EC should complement the IOELV.
- (11) It is also necessary to establish short-term exposure limit values for certain substances to take account of effects arising from short-term exposure.
- (12) For some substances, it is necessary to take into account the possibility of penetration through the skin in order to ensure the best possible level of protection.
- (13) This Directive should constitute a practical step towards consolidating the social dimension of the internal market.
- (14) The measures provided for in this Directive are in accordance with the opinion of the Committee established by Article 17 of Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work<sup>7</sup>,

HAS ADOPTED THIS DIRECTIVE:

*Article 1*

In implementation of Directive 98/24/EC, a third list of Community indicative occupational exposure limit values is hereby established for the chemical agents listed in the Annex.

*Article 2*

Member States shall establish national occupational exposure limit values for the chemical agents listed in the Annex, taking into account the Community values.

*Article 3*

In the Annex to Directive 2000/39/EC the reference to phenol is deleted.

*Article 4*

1. Member States shall bring into force the necessary laws, regulations and administrative provisions to comply with this Directive by 18 December 2011 at the latest. They shall forthwith communicate to the Commission the text of those provisions and a correlation table between the provisions and this Directive.

When Member States adopt those provisions, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the text of the provisions of national law which they adopt in the field covered by this Directive.

*Article 5*

This Directive shall enter into force on the 20th day following its publication in the *Official Journal of the European Union*.

*Article 6*

This Directive is addressed to the Member States.

Done at Brussels, 17 December 2009.

*For the Commission*

*The President*

José Manuel BARROSO

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<sup>7</sup> OJ L 183, 29.6.1989, p.1.

ANNEX

| CAS <sup>8</sup> | NAME OF AGENT   | LIMIT VALUES                    |                   |                          |      | Notation <sup>9</sup> |
|------------------|---|---------------------------------|-------------------|--------------------------|------|-----------------------|
|                  |   | 8 hours <sup>10</sup>           |                   | Short term <sup>11</sup> |      |                       |
|                  |   | mg/m <sup>3</sup> <sup>12</sup> | ppm <sup>13</sup> | mg/m <sup>3</sup>        | ppm  |                       |
| 68-12-2          | N,N Dimethylformamide   | 15                              | 5                 | 30                       | 10   | skin                  |
| 75-15-0          | Carbon disulphide   | 15                              | 5                 | -                        | -    | skin                  |
| 80-05-7          | Bisphenol A (inhalable dust)  | 10                              | -                 | -                        | -    | -                     |
| 80-62-6          | Methyl methacrylate   | -                               | 50                | -                        | 100  | -                     |
| 96-33-3          | Methylacrylate  | 18                              | 5                 | 36                       | 10   | -                     |
| 108-05-4         | Vinyl acetate   | 17.6                            | 5                 | 35.2                     | 10   | -                     |
| 108-95-2         | Phenol  | 8                               | 2                 | 16                       | 4    | skin                  |
| 109-86-4         | 2-Methoxyethanol  | -                               | 1                 | -                        | -    | skin                  |
| 110-49-6         | 2-Methoxyethyl acetate  | -                               | 1                 | -                        | -    | skin                  |
| 110-80-5         | 2-Ethoxy ethanol  | 8                               | 2                 | -                        | 0    | skin                  |
| 111-15-9         | 2-Ethoxyethyl acetate   | 11                              | 2                 | -                        | -    | skin                  |
| 123-91-1         | 1,4 Dioxane   | 73                              | 20                | -                        | -    | -                     |
| 140-88-5         | Ethylacrylate   | 21                              | 5                 | 42                       | 10   | -                     |
| 624-83-9         | Methylisocyanate  | -                               | -                 | -                        | 0.02 | -                     |
| 872-50-4         | n-Methyl-2-pyrrolidone  | 40                              | 10                | 80                       | 20   | skin                  |
| 1634-04-4        | Tertiary-butyl-methyl ether   | 183.5                           | 50                | 367                      | 100  | -                     |
|                  | Mercury and divalent inorganic mercury compounds including mercuric oxide and mercuric chloride (measured as mercury) <sup>14</sup> | 0.02                            | -                 | -                        | -    | -                     |
| 7664-93-9        | Sulphuric acid (mist) <sup>15 16</sup>  | 0.05                            | -                 | -                        | -    | -                     |
| 7783-06-4        | Hydrogen sulphide   | 7                               | 5                 | 14                       | 10   | -                     |

8

CAS: Chemical Abstract Service Registry Number.

A skin notation assigned to the occupational exposure limit value indicates the possibility of significant uptake through the skin.

10

Measured or calculated in relation to a reference period of 8 hours time-weighted average (TWA)

11

Short-term exposure limit (STEL). A limit value above which exposure should not occur and which is related to a 15-minute period unless otherwise specified

12

mg/m<sup>3</sup> : milligrams per cubic metre of air at 20 °C and 101,3 KPa

13

ppm: parts per million by volume in air (ml/m<sup>3</sup>).

14

During exposure monitoring for mercury and its divalent inorganic compounds, account should be taken of relevant biological monitoring techniques that complement the IOELV.

15

When selecting an appropriate exposure monitoring method, account should be taken of potential limitations and interferences that may arise in the presence of other sulphur compounds

16

The mist is defined as the thoracic fraction.

**IMPACT ASSESSMENT FOR THE IMPLEMENTATION OF COMMISSION DIRECTIVE 2009/161/EU ESTABLISHING A THIRD LIST OF INDICATIVE OCCUPATIONAL EXPOSURE LIMIT VALUES (IOELVs) - PARTIAL**

**Background, Rationale and Objectives of Intervention**

1. The European Commission's 3<sup>rd</sup> Directive on Indicative Occupational Exposure Limit Values (IOELVs) sets standards to protect the health of workers by placing limits on the concentrations of certain hazardous substances in the air that workers inhale. The legal basis for IOELV directives is the Chemical Agents Directive (98/24/EC). IOELV directives require member states to introduce national occupational exposure limits for the substances listed in the directive, and in setting their national limits, to take account of the level of the IOELV.

2. In Great Britain, this normally entails establishing a Workplace Exposure Limit (WEL) at the same value as the IOELV, unless a more stringent limit has already been agreed by the social partners. There is the option, in particular circumstances, to establish a GB limit that is numerically higher than the IOELV, although this would require robust justification.

3. This impact assessment seeks to quantify the health benefits and any associated extra costs to British industry of introducing new or reduced WELs in order to implement the 3<sup>rd</sup> IOELV Directive and considers the associated social aspects of the change.

4. The hazards to human health of each substance in the Directive, and the level of exposure at which each could cause harm to health, have been examined by the European Commission's Scientific Committee on Occupational Exposure Limits (SCOEL), a body of experts drawn from throughout the European Union, including from the UK. The IOELVs proposed by SCOEL are health-based, and are set at a level at which no harmful effects would be predicted to occur to workers or to their progeny as a result of repeated exposure throughout their working lifetime. On this basis, implementation of the limits can be deemed to have an advantageous effect on health.

**Options**

5. HSE can:

(a) Do nothing.

(b) Ask industry to write its own standards and guidance in order to reduce exposure to the hazardous substances to an acceptable degree.

(c) Implement the 3<sup>rd</sup> IOELV Directive in its entirety by adding and revising WELs in line with the Directive, exceptionally where existing agreed national standards are higher, by retaining those standards.

(d) Implement the 3<sup>rd</sup> IOELV Directive by adding and revising WELs in line with the IOELV, except where, for a particular substance, a WEL numerically higher than the IOELV is robustly justified.

6. Option (a) would result in infraction proceedings from the European Union leading to a potential fine. This is something that the Government would not want to occur, other than in extreme cases of national interest. Non-implementation could additionally mean that the health of British workers would be adversely affected.

7. Option (b) would require industry to write its own standards and guidance, and would be time-consuming and costly. Furthermore, there is no evidence that industry guidance and standards would be accepted by all manufacturers and users, leading to fragmentation and different standards across Great Britain (and also across the EU). This would run counter to the concepts of national WELs and European IOELVs.

8. The choice between options (c) and (d) is dependent on the outcome of the consultation exercise.

### **Details of the substances in the 3<sup>rd</sup> IOELV Directive**

9. There are nineteen substances listed in the Annex to the 3<sup>rd</sup> IOELV Directive. For two of these substances, **hydrogen sulphide and methyl methacrylate**, the existing WEL published in *EH40 Workplace Exposure Limits* is equal to the IOELV and no further action is therefore required to comply with the IOELV. In the case of **tertiary-butyl-methyl ether**, the IOELV is higher than the existing WEL and it is proposed to align the WEL with the IOELV.

For five of the substances no current GB WEL exists and new EH40 entries will therefore be required to comply with the Directive. These substances are:

**Bisphenol A, Mercury and divalent inorganic mercury compounds including mercuric oxide and mercuric chloride (measured as mercury), Methyl acrylate, Sulphuric acid (mist), Vinyl acetate**

For one additional substance, **phenol**, a short-term exposure limit (STEL) is needed as one does not currently exist.

For the remaining ten substances, HSE is planning to revise the existing WEL in line with the IOELV. The intention is to safeguard the health of British workers by reducing exposures to these hazardous substances. These substances are:

**Carbon disulphide, N,N-Dimethylformamide, 1,4-Dioxane, 2-Ethoxyethanol, 2-Ethoxyethylacetate, Ethyl acrylate, 2-Methoxyethanol, 2-Methoxyethyl acetate, Methyl isocyanate, N-Methyl-2-pyrrolidone**

### **Costs and Benefits**

10. When compiling the information used in this Impact Assessment, details of manufacturers, importers, formulators and users, for all the substances in question,

were obtained from literature and internet sources, and from relevant trade associations. Annex 1 contains details of the trade organisations contacted by HSE. Additionally, for methyl isocyanate and sulphuric acid, exposure data were available from the Health and Safety Executive's National Exposure Database (NEDB) and were also obtained from companies manufacturing, formulating and using these substances.

11. The substances listed in the 3<sup>rd</sup> IOELV Directive, other than those where no change to the GB WEL are envisaged are set out in alphabetical order below, with details of usage and any potential costs and benefits arising from the new or amended WEL, as presently estimated by HSE.

#### **(i) Bisphenol A (inhalable dust)**

Limit proposed in the 10 mg.m<sup>-3</sup> (8-hour TWA)

Current GB limit None

#### ***IDENTITY AND PROPERTIES***

CAS No: 80-05-7

EU No: 201-245-8

Empirical formula: C<sub>15</sub>H<sub>16</sub>O<sub>2</sub>

Synonyms: 2,2-bis(4-hydroxyphenyl)propane

Molecular Weight: 228.29

Bisphenol A is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 3** and as **Irritant**. It is assigned the following risk (R) phrases:

**R62 - Possible risk of impaired fertility**

**R37 - Irritating to respiratory system**

**R41 - Risk of serious damage to eyes**

**R43 - May cause sensitisation by skin contact**

Bisphenol A is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Repr. 2, STOT SE 3, Eye Dam. 1, Skin Sens. 1**. It is assigned the following Hazard Statements:

**H361f\*\*\* - Suspected of damaging fertility**

**H335 - May cause respiratory irritation,**

**H318 - Causes serious eye damage,**

**H317 - May cause an allergic skin reaction**

A key to the meaning of asterisks in classifications and Hazard Statement Codes can be found on page 54.

#### ***OCCURRENCE AND USE***

Bisphenol-A is manufactured from phenol and acetone by an acid or alkaline catalysed condensation reaction and is used predominantly as a chemical intermediate in the manufacture of resins (e.g. epoxy, phenoxy and polycarbonate

resins), flame- retardants and rubber chemicals. Four companies within the EU manufacture bisphenol-A. There are a total of six production sites based in Germany, the Netherlands, Belgium and Spain. The total amount of bisphenol-A manufactured within the EU, based upon submissions to CEFIC by the manufacturers, is estimated to be around 700,000 tonnes/year). According to EU statistics in 1997 the total imports of bisphenol-A into the EU were 8,010 tonnes/year.

Its uses in the EU are shown below:

| Use Pattern Data                       | Tonnes/year | Percentage of EU consumption |
|--|-------------|------------------------------|
| Polycarbonate production               | 486,880     | 71.1                         |
| Epoxy resin production                 | 171,095     | 25.0                         |
| Phenoplast resins                      | 8,800       | 1.3                          |
| Unsaturated polyester resin production | 3,000       | 0.4                          |
| Can coating manufacture                | 2,460       | 0.4                          |
| Use PVC production and processing      | 2,250       | 0.3                          |
| Alkyoxylated bisphenol-A manufacture   | 2,020       | 0.3                          |
| Thermal paper manufacture              | 1,400       | 0.2                          |
| Polyols/Polyurethane manufacture       | 950         | 0.1                          |
| Modified polyamide production          | 150         | <0.1                         |
| Tyre manufacture                       | 110         | <0.1                         |
| Brake fluid                            | 45          | <0.1                         |
| Minor uses                             | 5,990       | 0.9                          |
| EU Consumption                         | 684,650     |                              |

### Costs

As the proposed new 8-hour TWA WEL is to be set at  $10 \text{ mg.m}^{-3}$ , which is the same level at which dust of any kind is regarded as a substance hazardous to health, it is believed that no new compliance costs will be incurred by British industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of bisphenol A, and the need to control exposure.

## **(ii) Carbon disulphide**

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 15 mg.m <sup>-3</sup> /5 ppm (8-hour TWA)<br>Skin notation   |
| Current GB limit                | 32 mg.m <sup>-3</sup> / 10 ppm (8-hour TWA)<br>Skin notation |

### ***IDENTITY AND PROPERTIES***

CAS No: 75-15-0

EU No: 200-843-6

Empirical formula: CS<sub>2</sub>

Synonyms: carbon bisulphide, carbon bisulfide, carbon sulphide, dithiocarbonic anhydride, sulphocarbonic anhydride

Molecular Weight: 76.14g/mol

Conversion factor: (25°C, 1 bar): 1mg/m<sup>3</sup> = 0.317 ppm;  
1 ppm = 3.11 mg.m<sup>-3</sup>

Carbon disulphide is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as ***Flammable, Toxic for Reproduction Category 3, Toxic and Irritant***. It is assigned the following Risk (R) phrases:

**R11- Highly flammable**

**R62 – Possible risk of impaired fertility**

**R63 – Possible risk of harm to the unborn child**

**R48/23 – Toxic: danger of serious damage to health by prolonged exposure through inhalation**

**R36/38 – Irritating to eyes and skin**

Carbon disulphide is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as ***Flam. Liq. 2, Repr. 2, STOT RE 1, Eye Irrit. 2 and Skin Irrit. 2***. It is assigned the following Hazard Statements:

**H225 - Highly flammable liquid**

**H361fd - Suspected of damaging fertility. Suspected of damaging the unborn child**

**H372\*\*\* - Causes damage to organs through prolonged or repeated exposure**

**H319 - Causes serious eye irritation**

**H315 - Causes skin irritation**

### ***OCCURRENCE AND USE***

Carbon disulphide (CS<sub>2</sub>) is a dense, highly volatile and refractive clear liquid, which yellows on exposure to air and light and usually has an offensive odour due to minor impurities such as mercaptans. CS<sub>2</sub> is highly flammable, and its vapours can auto-ignite at temperatures above 102°C. It is slightly soluble in water, miscible in many organic solvents and is a good solvent for a wide range of organic substances, sulphur and phosphorus. CS<sub>2</sub> can be found in natural sources such as salt marshes and volcanic plume and ash. Traces also occur in crude oil and coal tars. Until the 1950s, it was manufactured from charcoal and sulphur vapour by the retort process and the electro-thermal process, but it is now mostly manufactured by the catalytic reaction of sulphur vapour and methane (in natural gas). It is principally used in making viscose rayon fibre, cellulose film and other viscose products. It is also used

in the production of carbon tetrachloride and for the manufacture of other chemicals, pesticides, dyes, drugs, and in rubber curing. Its use as a laboratory agent is becoming more restricted due to its high reactivity, flammability and toxicity.

There is no known UK manufacturer of carbon disulphide. The one identified British manufacturer of viscose fibre/cellulose film believes that the change to the WEL will have no cost implications for them. Personal exposure data from 2008 (62 samples) ranged between 0.02 and 0.86 ppm, and static data (from tube readings) taken in 2009 showed a maximum value of 4 ppm.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of carbon disulphide, and of the need to control exposure.

### (iii) N,N-Dimethylformamide

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 15 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>30 mg.m <sup>-3</sup> / 10 ppm (STEL)<br>Skin notation |
| Current GB limit                | 30 mg.m <sup>-3</sup> /10 ppm (8-hour TWA)<br>61 mg.m <sup>-3</sup> / 20 ppm (STEL)<br>Skin notation |

## **IDENTITY AND PROPERTIES**

CAS No: 68-12-2

EU No: 200-679-5

Empirical formula: OHC–N(CH<sub>3</sub>)<sub>2</sub>

Synonyms: DMF, Formic acid dimethyl amide, Formyl dimethylamide,  
N,N-Dimethyl formic acid amide

Molecular Weight: 73.09

Conversion factor (20°C, 101kPa): 3.038 mg.m<sup>-3</sup> = 1 ppm

N,N-Dimethylformamide is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 2**, **Harmful** and **Irritant**. It is assigned the following Risk (R) phrases:

**R61 – May cause harm to the unborn child**

**R20/21 – Harmful by inhalation and in contact with skin**

**R36 – Irritating to eyes**

N,N-Dimethylformamide is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Repr. 1B**, **Acute Tox. 4\*** and **Eye Irrit. 2**. It is assigned the following Hazard Statements:

**H360D\*\*\* - May damage the unborn child**  
**H332 - Harmful if inhaled**  
**H312 - Harmful in contact with skin**  
**H315 - Causes serious eye irritation**

### ***OCCURRENCE AND USE***

Dimethylformamide is a colourless, high-boiling, strongly polar, hygroscopic liquid with a faint amine odour. It is a flammable liquid with an acrid odour and infinitely miscible with water and with many lipophilic solvents.

It has a MPt of -60.5°C, a BPt of 153°C and a flash point of 58°C. It has a vapour pressure of about 3.53 hPa at 20°C, and it is explosive in the range 2.2-16 % in air (BUA, 1994).

Dimethylformamide is predominately used as a solvent in the synthesis of fine chemicals, in polyacrylonitrile fibre production, polyurethane coating and in the electronics industry. The remaining use is split into various applications such as varnishing, surface coating, polyamide coating, absorbents, cleaners, and extractants. In addition, dimethylformamide is used as a solvent in crop protection agents. In the year 2000 the total production volume in the EU was in the range of 50,000 to 100, 000 tonnes/year.

No comments were received from British industry about the proposed change to the WEL.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of dimethylformamide, and of the need to control exposure.

#### (iv) 1,4-Dioxane

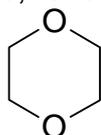
|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 73 mg.m <sup>-3</sup> / 20 ppm (8-hour TWA)  |
| Current GB limit                | 91 mg.m <sup>-3</sup> / 25 ppm (8-hour TWA)<br>366 mg.m <sup>-3</sup> / 100 ppm (STEL) |

#### **IDENTITY AND PROPERTIES**

CAS No: 123-91-1

EU No: 204-661-8

Synonyms: 1,4-dioxacyclohexane, diethylene dioxide, diethylene ether, diethylene-1,4- dioxide, dioxane, dioxyethylene ether, glycolethylene ether, NE 220, p-dioxane, tetrahydro-1,4-dioxane, tetrahydro-p-dioxane



Empirical formula:

Molecular weight: 88 g/mol

Conversion factor: (20 °C): 1 ppm = 3.6 mg.m<sup>-3</sup>; 1 mg.m<sup>-3</sup> = 0.28 ppm

1,4-Dioxane is a highly flammable liquid with a melting point of 12°C and a boiling point of 101°C. Its odour is etheric. The substance is miscible in water and in the most organic solvents. The flash point of 1,4-dioxane is 11°C and the vapour pressure is 40 hPa at 20°C.

1,4-Dioxane is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Flammable, Carcinogenic Category 3** and as **Irritant**. It is assigned the following Risk (R) phrases:

**R11 – Highly flammable**

**R19 – May form explosive peroxides**

**R36/37 – Irritating to eyes and respiratory system**

**R40 – Limited evidence of carcinogenic effect**

**R66 – Repeated exposure may cause skin dryness or cracking**

1,4-Dioxane is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Flam. Liq. 2, Carc. 2, Eye Irrit. 2** and **STOT SE 3**. It is assigned the following Hazard Statements:

**H225 - Highly flammable liquid and vapour**

**H351 - Suspected of causing cancer**

**H319 - Causes serious eye irritation**

**H335 - May cause respiratory irritation**

#### **OCCURENCE AND USE**

1,4-Dioxane is typically manufactured by acid-catalysed conversion of diethylene glycol by ring closure in a closed system. It is used as a solvent in the production of lacquers, varnishes, cleaning and detergent preparations, adhesives, cosmetics, deodorant fumigants, emulsions and polishing compositions, pulping of wood,

extraction medium for animal and vegetable oils, laboratory chemical (eluent in chromatography), cassettes, plastic and rubber, and insecticides and herbicides. It is used as a stabiliser in 1,1,1-trichloroethane; this use is diminished considerably as a result of the restriction of the use of substances depleting the ozone layer. 1,4-Dioxane is used as a catalyst, for example in vinyl chloride polymerisation of polyvinyl chloride.

In Europe, 1,4-dioxane is currently only produced at one production site. The production volume in 1997 was estimated to be 2,000-2,500 tonnes, with an export outside the European Union of 575 tonnes.

In 1995 the production capacity of known producers, and the worldwide production volume, was estimated at 8,000 tonnes/year and 10,000 tonnes/year, respectively. In general the world-wide production of 1,4-dioxane is decreasing because of changing use patterns.

1,4-Dioxane is not manufactured in the UK. In this country it is used primarily as a solvent in the manufacture of chemicals and as a laboratory reagent. Exposure is likely to be highest during drumming of the formulated product.

1,4-Dioxane was a trace contaminant of some chemicals used in cosmetics, detergents, and shampoos. However, manufacturers now reduce 1,4-dioxane from these chemicals to low levels before these chemicals are made into products.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of hazardous nature of 1,4-dioxane and of the need to control exposure.

### **(v) 2-Ethoxyethanol**

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 8 mg.m <sup>-3</sup> / 2 ppm (8-hour TWA)<br>Skin notation   |
| Current GB limit                | 37 mg.m <sup>-3</sup> / 10 ppm (8-hour TWA)<br>Skin notation |

### ***IDENTITY AND PROPERTIES***

CAS No: 110-80-5

EU No: 203-804-1

Empirical formula: C<sub>2</sub>H<sub>5</sub>OCH<sub>2</sub>CH<sub>2</sub>OH

Synonyms: Ethyl glycol, Ethylene glycol monoethyl ether, Cellusolve, Oxitol

Molecular Weight: 90.1

Conversion factors: (20°C, 101 kPa): 1 ppm = 3.69 mg.m<sup>-3</sup>; 1 mg.m<sup>-3</sup> = 0.272 ppm

2-Ethoxyethanol is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 2** and as **Harmful**. It is assigned the following Risk (R) phrases:

**R10 – Flammable**

**R60 – May impair fertility**

**R61 – May cause harm to the unborn child**

**R20/21/22 – Harmful by inhalation, in contact with skin and if swallowed**

2-Ethoxyethanol is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Flam. Liq. 3, Repr. 1B** and **Acute Tox. 4\***. It is assigned the following Hazard Statements:

**H226 - Flammable liquid and vapour**

**H360FD - May damage fertility. May damage the unborn child**

**H332 - Harmful if inhaled**

**H312 - Harmful in contact with skin**

**H302 - Harmful if swallowed**

## ***OCCURRENCE AND USE***

2-Ethoxyethanol is produced by reaction of ethylene oxide with ethanol under increased pressure and increased temperature in the presence of an alkaline catalyst and subsequent purification by distillation.

2-Ethoxyethanol was used as a chemical intermediate for ethoxyethyl acetate and as a solvent, particularly for epoxy coatings, nitrocellulose, natural and synthetic resins, lacquers, dopes, printing inks, and adhesives.

However, along with the other three glycol ethers (ethoxyethyl acetate, methoxyethanol and methoxyethyl acetate), it has been largely superseded and, as far as HSE is aware, ethoxyethanol is not present in any current coating products. In the USA, OSHA stated, in 2003, that there were few, if any, remaining opportunities for workplace exposure to any of the four glycol ethers.

## Costs

There are unlikely to be any additional costs to industry.

## Benefits

Likely to be few, but the publication of the new limit will remind employers of hazardous nature of 2-ethoxyethanol and of the need to control exposure.

## **(vi) 2-Ethoxyethyl acetate**

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 11 mg.m <sup>-3</sup> / 2 ppm (8-hour TWA)<br>Skin notation  |
| Current GB limit                | 55 mg.m <sup>-3</sup> / 10 ppm (8-hour TWA)<br>Skin notation |

### **IDENTITY AND PROPERTIES**

CAS No: 111-15-9

EU No: 203-839-2

Empirical formula: C<sub>2</sub>H<sub>5</sub>OCH<sub>2</sub>CH<sub>2</sub>OOCCH<sub>3</sub>

Synonyms: Ethylene glycol ethyl ether acetate, Cellusolve acetate

Molecular weight: 132.2

Conversion factors (20°C, 101 kPa): 1 ppm = 5.41 mg.m<sup>-3</sup>; 1 mg.m<sup>-3</sup> = 0.182 ppm

It is known from in vitro experiments and from human data that 2-ethoxyethyl acetate is rapidly deacetylated by esterases to 2-ethoxyethanol. The two substances have been found to be of similar toxicity in animal experiments. Numerous in vitro and in vivo studies have shown the toxicity of the two substances to be caused by the same metabolite, 2-ethoxyacetic acid.

2-Ethoxyethyl acetate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 2** and as **Irritant**. It is assigned the following Risk (R) phrases:

**R10 - Flammable**

**R60 – May impair fertility**

**R61 – May cause harm to the unborn child**

**R20/21/22 – Harmful by inhalation, in contact with the skin and if swallowed**

2-Ethoxyethyl acetate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Repr. 1B** and **Acute Tox. 4\***. It is assigned the following Hazard Statements:

**H360FD - May damage fertility. May damage the unborn child**

**H322 - Harmful if inhaled**

**H312 - Harmful in contact with skin**

**H302 - Harmful if swallowed**

### **OCCURRENCE AND USE**

As with all four glycol ethers (ethoxyethanol, ethoxyethyl acetate, methoxyethyl acetate and methoxyethanol), it has been largely superseded and, as far as HSE is aware, ethoxyethyl acetate is not present in any current coating products. In the USA, OSHA stated in 2003, that there were few, if any, remaining opportunities for workplace exposure to any of the four glycol ethers.

### **Costs**

There are unlikely to be any additional costs to industry.

## Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of 2-ethoxyethyl acetate and of the need to control exposure.

### **(vii) Ethyl acrylate**

|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 21 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>42 mg.m <sup>-3</sup> / 10 ppm (STEL) |
| Current GB limit                | 21 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>62 mg.m <sup>-3</sup> / 15 ppm (STEL) |

## **IDENTITY AND PROPERTIES**

CAS No: 140-88-5

EU No: 205-438-8

Empirical formula: H<sub>2</sub>C=CH-COOCH<sub>2</sub>CH<sub>3</sub>

Synonyms: Acrylic acid, ethyl ester; ethyl propenoate, 2-propenoic acid, ethyl ester; ethoxycarbonylethylene

Molecular Weight: 100.13

Conversion factor: (20°C, 101kPa): 4.17 mg.m<sup>-3</sup> = 1 ppm

Ethyl acrylate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Flammable**, **Harmful** and **Irritant**. It is assigned the following Risk (R) phrases:

**R11 – Highly flammable**

**R20/21/22 – Harmful by inhalation, in contact with the skin and if swallowed**

**R36/37/38 – Irritating to eyes, respiratory system and skin**

**R43 – May cause sensitisation by skin contact**

Ethyl acrylate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures as **Flam. Liq. 2**, **Acute Tox. 4\***, **Eye Irrit. 2**, **STOT SE 3**, **Skin Irrit. 2** and **Skin Sens. 1**. It is assigned the following Hazard Statements:

**H225 - Highly flammable liquid**

**H332 - Harmful if inhaled**

**H312 - Harmful in contact with skin**

**H302 - Harmful if swallowed**

**H319 - Causes serious eye irritation**

**H335 - May cause respiratory irritation**

**H315 - Causes skin irritation**

**H317 - May cause an allergic skin reaction**

## **OCCURRENCE AND USE**

Ethyl acrylate is a colourless, flammable liquid with an acrid penetrating odour. It has a MPt of -71.2°C, a BPt of 99.8°C, a vapour pressure of 3.9 kPa at 20°C, a vapour

density of 3.5 times that of air and has a lower explosive limit of 1.8% in air. The odour threshold is about 0.4 ppb (0.001 mg.m<sup>-3</sup>).

Ethyl acrylate is used in various industries as an intermediate in the production of emulsion-based polymers, which are then used in paint formulations, industrial coatings and latex products. Due to the low odour threshold and disagreeable odour, exposure is already well controlled. The production volume of ethyl acrylate is estimated to be 50-100,000 tonnes per year in Europe. It is manufactured and used mainly in closed systems.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of ethyl acrylate, and of the need to control exposure.

### **(viii) Mercury and divalent inorganic mercury compounds, including mercuric oxide and mercuric chloride (measured as mercury)**

|                                 |                                      |
|---------------------------------|--------------------------------------|
| Limit proposed in the Directive | 0.02 mg.m <sup>-3</sup> (8-hour TWA) |
| Current GB limit                | None                                 |

### ***IDENTITY AND PROPERTIES***

CAS Nos: Mercury: 7439-97-6  
Mercuric chloride: 7487-94-7  
Mercuric oxide: 21908-53-2

EU Nos: Mercury: 231-106-7  
Mercuric chloride: 231-299-8  
Mercuric oxide: 231-654-7

Empirical formulae: Mercury: Hg  
Mercuric chloride: HgCl<sub>2</sub>  
Mercuric oxide: HgO

Elemental mercury is a heavy, silvery white liquid (SG 13.59 at 20°C), melting point -39°C and boiling point 356°C. It has a uniform volume of expansion over its entire liquid range and low electrical resistivity. Mercury has a high vapour pressure: saturated air at 20°C contains 14 mg.m<sup>-3</sup> which increases to 2400 mg.m<sup>-3</sup> at 100°C. It readily forms amalgams with most metals.

Inorganic mercury compounds exist in two oxidation states, +1 mercurous and +2 mercuric; mercurous ions usually occur as dimers (Hg<sub>2</sub><sup>2+</sup>). Only the divalent mercuric form is considered in this assessment. Mercuric chloride is readily soluble in water.

Mercury is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic** and **Dangerous for the Environment**. It is assigned the following Risk (R) phrases:

**R23 – Toxic by inhalation**

**R33 – Danger of cumulative effects**

**R50 – Very toxic to aquatic organisms**

**R53 – May cause long-term adverse effects in the aquatic environment**

Mercury is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Acute Tox. 3\***, **STOT RE 2\***, **Aquatic Acute 1** and **Aquatic Chronic 1**. It is assigned the following Hazard Statements:

**H300 - Toxic if inhaled**

**H372\*\*\* - May cause damage to organs through prolonged or repeated exposure**

**H400 - Very toxic to aquatic life**

**H410 – Very toxic to aquatic life with long-lasting effects**

Mercuric chloride is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Very Toxic**, **Toxic**, **Corrosive** and **Dangerous for the Environment**. It is assigned the following Risk (R) phrases:

**R28 – Very toxic if swallowed**

**R48/24/25 – Toxic: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed**

**R34 – Causes burns**

**R50 – Very toxic to aquatic organisms**

**R53 – May cause long term adverse effects in the aquatic environment**

Mercuric chloride is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Acute Tox. 2\***, **STOT RE 1**, **Skin Corr. 1B**, **Aquatic Acute 1** and **Aquatic Chronic 1**. It is assigned the following Hazard Statement Codes:

**H300 - Fatal if swallowed**

**H372\*\* - Causes damage to organs through prolonged or repeated exposure**

**H314 - Causes severe skin burns and eye damage**

**H400 –Very toxic to aquatic life**

**H410 - Very toxic to aquatic life with long-lasting effects**

## **OCCURRENCE AND USE**

Mercury occurs naturally as sulphide. It is produced from the roasting of Cinnabar ore, which contains about 0.5% mercury. The only EU producer is the Almadén mercury mine in Spain. Other sources of mercury include Russia and China. The largest-scale use of mercury is in the chlor-alkali industry; elemental mercury forms a flowing cathode in cells used for the electrolysis of brine. Chlorine is formed at the anode and alkali metal amalgam at the cathode. The amalgam is hydrolysed to produce hydroxide and the mercury recycled to the electrolysis cells.

Metallic mercury is used for a small number of purposes, including electrical equipment such as batteries and semi-conductors, dentistry amalgams, barometers and paper manufacturing. However, a recent European directive has prohibited the sale to the general public of clinical thermometers and new mercury measuring devices (such as barometers), and this ban has been transposed into UK law via REACH.

In the EU, only the chlor-alkali industry remains a significant industrial user of mercury, and it is progressively phasing out the use of mercury-containing cells for production of chlorine. At the moment, this mercury is being returned to the world market but this will end with the phasing out of exports from the EU under new legislation from 2011. There is only one British site still using mercury technology to produce chlorine but the company anticipates no cost implications in complying.

Recycling of mercury-containing fluorescent lamps is increasing; a typical 1.2 metre fluorescent tube will contain between 15 and 20 mg of mercury. Between 20% and 40% of the mercury in broken bulbs is released into the air during the two-week period following breakage. The phosphor powder released is heated in oven at 425°C to release the mercury. Suitable extraction and filtration should, prevent any mercury vapour returning to the workplace.

#### Costs

The previous British limit for mercury and its inorganic divalent compounds was set at 0.025 mg.m<sup>-3</sup>. This limit was withdrawn prior to the 2005 edition of EH40, and there is currently no GB limit. There are unlikely to be additional costs to industry in implementing the new limit.

#### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of mercury and its divalent inorganic compounds and of the need to control exposure.

### **(ix) 2-Methoxyethanol**

|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 1 ppm (8-hour TWA)<br>Skin notation                         |
| Current GB limit                | 16 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>Skin notation |

### ***IDENTITY AND PROPERTIES***

CAS No: 109-86-4

EU No: 203-713-7

Empirical formula: CH<sub>3</sub>-O-CH<sub>2</sub>-CH<sub>2</sub>-OH

Synonyms: ethylene glycol monomethyl ether (EGME), methyl glycol, methyl cellosolve

Molecular Weight: 76.09

Conversion factors: 1 ppm = 3.11 mg.m<sup>-3</sup> (20°C)

1 mg.m<sup>-3</sup> = 0.322 ppm (20°C)

2-Methoxyethanol at room temperature is a flammable, volatile, clear liquid with a weak, sweetish odour and bitter taste. It dissolves readily and completely in water as well as in polar and non-polar solvents.

2-Methoxyethanol is produced by a reaction between methanol and ethylene oxide. Known impurities in 2-Methoxyethanol are reported to be < 0.1% methanol, <0.1% diethylene glycol methyl ether and <0.02% ethylene glycol.

2-Methoxyethanol is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 2** and as **Harmful**. It is assigned the following Risk (R) phrases:

**R10 – Flammable**

**R60 – May impair fertility**

**R61 – May cause harm to the unborn child**

**R20/21/22 – Harmful by inhalation, in contact with the skin and if swallowed**

2-Methoxyethanol is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Flam. Liq. 3**, **Repr. 1B** and **Acute Tox. 4\***. It is assigned the following Hazard Statements:

**H226 - Flammable liquid and vapour**

**H360FD - May damage fertility. May damage the unborn child**

**H332 - Harmful if inhaled**

**H312 - Harmful in contact with skin**

**H302 - Harmful if swallowed**

## **OCCURRENCE AND USE**

2-Methoxyethanol does not occur in nature. World-wide reported uses for the glycol ether are in paints and enamels; printer's ink; plastic packaging for foodstuffs; pigments for silk-screen printing; photographic and photolithographic processes (including the production of offset plates); CDs, circuit boards and integrated circuits; cleaners for household and industrial use; and antifreeze in hydraulic fluids and airplane fuel. In 1994 2-methoxyethanol was classified by the EU as toxic to reproduction and its use in consumer products was prohibited. The usage has declined significantly. For example, according to the Swedish Chemical Products Register, the annual use of 2-methoxyethanol dropped from 260 tons in 1993 to 19 tons in 1997.

Reported average exposure levels are in the range <0.1 to 23 mg.m<sup>-3</sup> (<0.3 to 7.4 ppm). Exposure has been reported from semiconductor and circuit board manufacture, printing, painting (especially automobile and ship painting), furniture finishing, paint production and automobile repair.

As with all four glycol ethers (ethoxyethanol, ethoxyethyl acetate, methoxyethanol and methoxyethyl acetate), it has been largely superseded and, as far as HSE is

aware, methoxyethanol is not present in any current coating products. In the USA, OSHA stated in 2003 that there were few, if any, remaining opportunities for workplace exposure to any of the four glycol ethers.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of 2-methoxyethanol and of the need to control exposure.

### **(x) 2-Methoxyethyl acetate**

|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 1 ppm (8-hour TWA)<br>Skin notation                         |
| Current GB limit                | 25 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>Skin notation |

### ***IDENTITY AND PROPERTIES***

CAS No: 110-49-6

EU No: 203-772-7

Synonyms: ethylene glycol monomethyl ether acetate (EGMEA), methyl glycol acetate, methyl cellosolve acetate

Empirical formula: CH<sub>3</sub>-O-CH<sub>2</sub>-CH<sub>2</sub>-O-CO-CH<sub>3</sub>

Molecular Weight: 118.13

Conversion factors: 1 ppm = 4.90 mg.m<sup>-3</sup> (20°C)

1 mg.m<sup>-3</sup> = 0.200 ppm (20°C)

2-Methoxyethyl acetate at room temperature is a flammable, volatile, clear liquid with a weak, sweetish odour and bitter taste. It dissolves readily and completely in water as well as polar and non-polar solvents. 2-Methoxyethyl acetate is produced from 2-methoxy ethanol by conventional esterification.

2-Methoxyethyl acetate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as ***Toxic for Reproduction Category 2*** and as ***Harmful***. It is assigned the following Risk (R) phrases:

**R60 – May impair fertility**

**R61 – May cause harm to the unborn child**

**R20/21/22 – Harmful by inhalation, in contact with the skin and if swallowed**

2-Methoxyethyl acetate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as ***Repr. 1B*** and ***Acute Tox. 4\****. It is assigned the following Hazard Statements:

**H360D - May damage the unborn child**

**H332 - Harmful if inhaled**

H312 - Harmful in contact with skin  
H302 - Harmful if swallowed

### ***OCCURRENCE AND USE***

2-Methoxyethyl acetate does not occur in nature. World-wide reported uses for the glycol ether are in paints and enamels, printer's ink, plastic packaging for foodstuffs, pigments for silk-screen printing, photographic and photolithographic processes (including the production of offset plates), CDs, circuit boards and integrated circuits, cleaners for household and industrial use, and antifreeze in hydraulic fluids and airplane fuel. In 1994, 2-methoxyethyl acetate was classified by the EU as toxic to reproduction and its use in consumer products was prohibited. The usage has declined significantly. For example, according to the Swedish Chemical Products Register, the annual use of 2-methoxyethyl acetate in Sweden was reportedly less than 0.1 tonne/year in 1997.

Reported average exposure levels are in the range <0.1 to 143 mg.m<sup>-3</sup> (<0.2 to 29 ppm). Exposure has been reported from semiconductor and circuit board manufacture, printing, painting (especially automobile and ship painting), furniture finishing, paint production and automobile repair.

As with all four glycol ethers (ethoxyethanol, ethoxyethyl acetate, methoxyethyl acetate and methoxyethanol), it has been largely superseded and, as far as HSE is aware, methoxyethyl acetate is not present in any current coating products. In the USA, OSHA stated in 2003 that there were few, if any, remaining opportunities for workplace exposure to any of the four glycol ethers.

#### Costs

There are unlikely to be any additional costs to industry.

#### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of 2-methoxyethyl acetate and of the need to control exposure.

#### **(xi) Methyl acrylate**

|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 18 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>36 mg.m <sup>-3</sup> / 10 ppm (STEL) |
|---------------------------------|---|

|                  |      |
|------------------|------|
| Current GB limit | None |
|------------------|------|

### ***IDENTITY AND PROPERTIES***

CAS No: 96-33-3

EU No: 202-500-6

Empirical formula: H<sub>2</sub>C=CH-COOCH<sub>3</sub>

Synonyms: Acrylic acid, methyl ester; methyl propenoate, 2-propenoic acid, methyl ester; Curithane 103; methoxycarbonylethylene

Molecular Weight: 86.10

Conversion factor: (20°, 101kPa) : 3.58 mg.m<sup>-3</sup> = 1 ppm

Methyl acrylate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Flammable**, **Harmful** and **Irritant**. It is assigned the following Risk (R) phrases:

**R11 – Highly flammable**

**R20/21/22 – Harmful by inhalation, in contact with the skin and if swallowed**

**R36/37/38 – Irritating to eyes, respiratory system and skin**

**R43 – May cause sensitisation by skin contact**

Methyl acrylate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Flam. Liq. 2**, **Acute Tox. 4\***, **Eye Irrit. 2**, **STOT SE 3**, **Skin Irrit. 2** and **Skin Sens. 1**. It is assigned the following Hazard Statements:

**H225 - Highly flammable liquid and vapour**

**H332 - Harmful if inhaled**

**H312 - Harmful in contact with skin**

**H302 - Harmful if swallowed**

**H319 - Causes serious eye irritation**

**H335 - May cause respiratory irritation**

**H315 - Causes skin irritation**

**H317 - May cause an allergic skin reaction**

## **OCCURRENCE AND USE**

Methyl acrylate is a colourless volatile, flammable liquid with an acrid odour. It has a MPt of -75°C, a BPt of 80.5°C and a flash point of -3°C. It has a vapour pressure of about 9 kPa at 20°C, a vapour density of 3 times that of air and it is explosive in the range 2.8 - 25 % in air. The odour threshold is about 0.005 - 0.01 ppm (0.02 - 0.05 mg.m<sup>-3</sup>). It polymerises easily on standing, accelerated by heat, light and peroxides, and can react vigorously with oxidising material.

Methyl acrylate is used primarily as a co-monomer with acrylonitrile in the preparation of acrylic and methacrylic fibres, which are used in clothing and furnishings. It is also used in the production of coatings, adhesives, elastomers, super absorbent polymers, flocculants, as well as fibres and plastics when other co-monomers are used. The production rate in the EU is in excess of 10,000 tonnes per year.

No comments were received from British industry in preliminary consultations.

## Costs

There are unlikely to be any additional costs to industry.

## Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of methyl acrylate, and of the need to control exposure.

### **(xii) Methyl isocyanate**

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 0.02 ppm (STEL)  |
| Current GB limit                | 0.02 mg.m <sup>-3</sup> (8-hour TWA)<br>0.07 mg.m <sup>-3</sup> (STEL) (all isocyanates) |

The current generic GB WEL takes into account both mono- and multifunctional monomers and oligomers.

## **IDENTITY AND PROPERTIES**

CAS No: 624-83-9

EU No: 210-866-3

Empirical formula: H<sub>3</sub>C-N=C=O

Synonyms: isocyanic acid methylester

Molecular Weight: 57.06

Conversion factors: 1 ppm = 2.4 mg.m<sup>-3</sup>  
1 mg.m<sup>-3</sup> = 0.4 ppm

Methyl isocyanate (MIC) is a monoisocyanate and should be distinguished from the diisocyanates. At room temperature, MIC is a clear liquid. It is sparingly soluble in water, although on contact with water it reacts violently, producing a large amount of heat. MIC has a sharp odour with an odour threshold above 2 ppm.

Methyl isocyanate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Highly Flammable, Toxic for Reproduction Category 3, Very Toxic, Toxic** and **Irritant**. It is assigned the following Risk (R) phrases:

**R12 – Extremely flammable**

**R63 – Possible risk of harm to the unborn child**

**R26 – Very toxic by inhalation**

**R24/25 – Toxic in contact with skin and if swallowed**

**R42/43 – May cause sensitisation by inhalation and skin contact**

**R37/38 – Irritating to respiratory system and skin**

**R41 – Risk of serious damage to eyes**

Methyl isocyanate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures as **Flam. Liq. 2, Repr. 2, Acute Tox. 2\*, Acute Tox. 3\*, STOT SE 3, Skin Irrit. 2, Eye Dam. 1, Resp. Sens. 1** and **Skin Sens. 1**. It is assigned the following Hazard Statements:

**H225 - Highly flammable liquid and vapour**

**H361d\*\*\* - Suspected of damaging the unborn child**

**H330 - Fatal if inhaled**

H311 - Toxic in contact with skin  
H301 - Toxic if swallowed  
H335 – May cause respiratory irritation  
H315 - Causes skin irritation,  
H318 - Causes serious eye damage  
H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled  
H317 - May cause an allergic skin reaction

### ***OCCURRENCE AND USE***

Methyl isocyanate (MIC) occurs primarily as an intermediate in the production of carbamate pesticides. It has also been used in the production of polymers. Photolytic breakdown of N-methyldithiocarbamate releases some MIC, and it can therefore occur in the air around application of carbamate pesticides. MIC is found in tobacco smoke: the measured content in the main stream ranges from 1.5 to 5 µg per cigarette.

MIC has also been identified in emissions from heating of core sand and mineral wool, where it results from breakdown or chemical transformation of the carbamide resin binder. Exposure measurements made in foundries indicate that MIC occurs primarily where “hot box” cores are used in chill casting. MIC occurs in the isocyanate mixture created by thermal breakdown of TDI- or HDI-based polyurethane lacquers during welding, cutting and grinding operations in automobile repair shops. In a survey of isocyanates in Swedish polyurethane industries, MIC levels of about 3 ppb (moulding), 0.2 ppb (flame lamination) and 0.04 ppb (UV lamination) have been reported. Relatively high airborne concentrations of MIC and ICA have been reported in a study of emissions from a chemical core binder system (Hot Box) based on formaldehyde-carbamide resin used in Swedish die-casting foundries. Air concentrations of MIC in short-term samples (n=298) ranged from <0.004 to 0.0068 mg.m<sup>-3</sup>.

Heating of materials containing polyurethane (PUR) or phenol-formaldehyde-urea (PFU) has been found to give rise to monomeric diisocyanates and a number of other monoisocyanates, including isocyanic acid (ICA), MIC, and ethyl, propyl or butyl isocyanates in air. HSE enforcement action was recently carried out on a company manufacturing mineral wool using a phenol-formaldehyde-urea binder which released MIC and isocyanic acid on heating.

PUR and PFU are widely used in industry. Insulation materials (e.g. mineral wool) containing PFU as a binder are used for insulation of ovens and pipes, and thermal degradation of PUR lacquers can be seen in car repair shops during finishing and machining processes that generate heat. Thermal degradation of PUR foams also occurs during flame bonding in the lamination and other industries. A number of factors affect the emission of isocyanates to air during the thermal degradation of PFU and PUR-coatings, and these factors include the applied temperature, the duration of heating and the type and quality of coatings used.

A study in body repair training schools and a body repair shop showed the generation of aliphatic, alkenyl and aromatic di- and mono- isocyanates during the thermal degradation of polyurethane-based car paints – the most abundant isocyanates being monomeric diisocyanates and MIC. During cutting and grinding, the airborne concentration of MIC ranged from 0.00064 mg.m<sup>-3</sup> to 0.0768 mg.m<sup>-3</sup>

close to the source of emission, and from 0.00061 mg.m<sup>-3</sup> to 0.00283 mg.m<sup>-3</sup> in the workers' breathing zone.

No comments on the proposed new WEL were received from British industry in preliminary consultation.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of methyl isocyanate and of the need to control exposure.

### **(xiii) N-Methyl-2-Pyrrolidone**

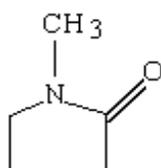
|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 40 mg.m <sup>-3</sup> / 10 ppm (8-hour TWA)<br>80 mg.m <sup>-3</sup> / 20 ppm (STEL)<br>Skin notation |
|---------------------------------|---|

|                  |   |
|------------------|---|
| Current GB limit | 103 mg.m <sup>-3</sup> / 25 ppm (8-hour TWA)<br>mg.m <sup>-3</sup> / 75 ppm (STEL)<br>Skin notation |
|------------------|---|

### ***IDENTITY AND PROPERTIES***

CAS No: 872-50-4

EU No: 212-828-1



Empirical formula:

Synonyms: NMP, N-methylpyrrolidone, 1-methyl-2-pyrrolidone, 1-methyl-2-pyrrolidinone

Molecular Weight: 99.13

Conversion factor (20°C, 101 kPa): 4.12 mg.m<sup>-3</sup> = 1 ppm

N-Methyl-2-Pyrrolidone (NMP) is a water-miscible colourless liquid with a characteristic amine odour. The boiling point of NMP is 202°C at 101.3 Pa and its vapour pressure is 0.39 hPa at 20 °C and 0.45 hPa at 25 °C (IPCS, 2001). Log Kow is – 0.38 and the density is 1,028 g/cm<sup>3</sup>. NMP is not flammable (flash point, closed cup, 90°C, open cup 95°C).

NMP in air is adsorbed onto solid sorbent or into absorption solution, followed by extraction of the NMP with an organic solvent. The NMP-containing extract can be analysed by gas chromatography (GC), using flame ionisation (FID) or nitrogen-phosphorus detection (NPD), with a detection limit corresponding to 0.1 mg/m<sup>3</sup> NMP

in air using FID detection and 0.01 mg/m<sup>3</sup> using NPD. Alternatively, airborne NMP can be analysed on a continuous basis by photoacoustic IR spectrometry (INNOVA, 1412 Photo Acoustic Field Gas-Monitor). Analysis of NMP in biological matrices such as blood and urine may be determined by HPLC methods (e.g. Wells *et al*, 1992) or alternatively may be extracted from the matrix by solvent extraction followed by GC using NPD or mass spectrometry detection. A detection limit for NMP in blood of 0.004 mg/l and in urine of 0.01 mg/l has been reported in one study, while another study reported a limit of quantification of 0.01 mg/l for NMP in urine.

N-Methyl-2-pyrrolidone is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Toxic for Reproduction Category 2** and as **Irritant**. It is assigned the following Risk (R) phrases:

**R61 – May cause harm to the unborn child**

**R36/37/38 – Irritating to eyes, respiratory system and skin**

N-Methyl-2-pyrrolidone is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Repr 1B, Eye Irrit. 2, STOT SE 3 and Skin Irrit. 2**. It is assigned the following Hazard Statements:

**H360D\*\*\* - May damage the unborn child,**

**H319 - Causes serious eye irritation,**

**H335 - May cause respiratory irritation**

**H315 - Causes skin irritation.**

## **OCCURRENCE AND USE**

The primary use of NMP is as a solvent in a wide range of applications including the paints and petrochemical industries, for stripping and cleaning applications in the microelectronics industry, for the removal of graffiti, as a paint stripper and as a substitute for chlorinated solvents. It is also used as an intermediate in the pharmaceutical, polymer and other chemical industries and as a formulating agent for plant protection and biocidal actives, and as a solvent for pigments, dyes and inks. Further uses include as a penetration enhancer for topically applied pharmaceuticals and as a vehicle in the cosmetics industry. It is increasingly used as a replacement for chlorinated solvents because of concern about the toxicological profile of some of the latter, e.g. it has been used to replace dichloromethane as a solvent in paint strippers.

Although NMP does not have a high vapour pressure, the pattern and wide range of uses results in some potential for occupational exposure by inhalation. Exposure may be to NMP as a vapour, as an aerosol or as a mixture of both, the relative proportions being dependent on temperature and relative humidity. Aerosol formation is unlikely at normal room temperature and humidity (60% relative humidity) and with concentrations of NMP below 80 mg.m<sup>-3</sup>. However, aerosol formation is potentiated at higher humidities and with increasing concentrations of NMP. Levels of up to 10 mg.m<sup>-3</sup> NMP have been measured in the breathing zone of workers involved in the removal of graffiti, while workers in the microelectronics industry have been exposed to up to 6 mg.m<sup>-3</sup>. Much higher exposures (up to 280 mg.m<sup>-3</sup>) were reported in the microelectronics industry when NMP was used at a

temperature of 80°C. Exposures of up to 64 mg.m<sup>-3</sup> have been measured in the breathing zone of paint-strippers, with peak exposures of up to 280 mg.m<sup>-3</sup>. Dermal exposure to NMP in the occupational setting is also likely, given the pattern and wide range of uses. NMP is readily absorbed through the skin, and dermal exposure is thus considered to contribute significantly to the internal NMP dose. There are several older reports in the literature of toxic effects resulting from skin contamination through spills, but inhalation of fumes may have contributed to the toxicity seen. Additionally, one experimental study in human volunteers reported dermal absorption of NMP from the vapour phase, equivalent to approximately ~ 30 % of the total inhalation dose. The design included a phase in which inhalational uptake was prevented by face shields.

No comments were received from British industry in preliminary consultations.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of NMP and of the need to control exposure.

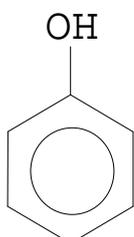
### **(xiv) Phenol**

|                                 |  |
|---------------------------------|--|
| Limit proposed in the Directive | 8 mg.m <sup>-3</sup> / 2 ppm (8-hour TWA)<br>16 mg.m <sup>-3</sup> / 4 ppm (STEL)<br>Skin notation |
| Current GB limit                | 8 mg.m <sup>-3</sup> / 2 ppm (8-hour TWA)<br>No STEL<br>Skin notation                              |

### ***IDENTITY AND PROPERTIES***

CAS No: 108-95-2

EU No: 203-632-7



Empirical formula:

Synonyms: Benzenol, carboic acid, hydroxybenzene

Molecular Weight: 94.11

Conversion factor (20°C, 101 kPa): 3.91 mg/m<sup>3</sup> = 1 ppm

Phenol is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Mutagenic Category 3, Toxic, Harmful** and **Corrosive**. It is assigned the following Risk (R) phrases:

**R68 – Possible risk of irreversible effects**

**R23/24/25 – Toxic by inhalation, in contact with the skin and if swallowed**

**R48/20/21/22 – Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed**

**R34 – Causes burns**

Phenol is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Muta. 2, Acute Tox. 3\*, STOT RE 2\*** and **Skin Corr. 1B**. It is assigned the following Hazard Statements:

**H341 - Suspected of causing genetic effects**

**H331 - Toxic if inhaled**

**H311 - Toxic in contact with skin**

**H301 - Toxic if swallowed**

**H373\*\*\* - May cause damage to organs through prolonged or repeated exposure**

**H314 - Causes severe skin burns and eye damage**

## ***OCCURRENCE AND USE***

Phenol is a white crystalline mass with a MPt of 40.6°C, BPt of 181.8°C and vapour pressure of 0.027 kPa at 20°C. The odour threshold is 0.05 ppm (0.2 mg.m<sup>-3</sup>). Phenol occurs naturally in coal tar and is produced synthetically from benzene with production levels in the EU in excess of 1,000,000 tonnes per annum. It is used primarily in the production of phenolic resins, with lesser amounts used for manufacture of caprolactam, alkyl phenol and as a disinfectant and antiseptic.

Occupational exposure levels are generally reported to be less than 1 ppm (4 mg.m<sup>-3</sup>), although levels up to 4.4 ppm (17 mg.m<sup>-3</sup>) have been reported in a plant manufacturing synthetic fibres.

Phenol is not manufactured in Great Britain but it is imported into the country and used as an intermediate in the chemical industry for the production of phenolic resins (the main use), bisphenol-A, salicylic acid and pentachlorophenol. Up to 25,000 people may be exposed to phenol from the use of resins as sand binders in foundries.

### Costs

There are unlikely to be any additional costs to industry.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of phenol and of the need to control exposure.

### **(xv) Sulphuric acid (mist)**

|                                 |                                      |
|---------------------------------|--------------------------------------|
| Limit proposed in the Directive | 0.05 mg.m <sup>-3</sup> (8-hour TWA) |
| Current GB limit                | None                                 |

### ***IDENTITY AND PROPERTIES***

CAS No: 7664-93-9

EU No: 231-639-5

Empirical formula: H<sub>2</sub>SO<sub>4</sub>

Synonyms: Battery acid, hydrogen sulphate, oil of vitriol

Conversion factor: 1 ppm = 4.07 mg.m<sup>-3</sup> at 20C

Sulphuric acid is a dense, oily, colourless and odourless liquid with low vapour pressure. Impurities tend to produce a brown discolouration. It is hygroscopic and soluble in water although the addition of water can produce a violent, exothermic reaction. Because of its hygroscopic nature, particle size of aerosols is influenced by humidity. Concentrated sulphuric acid is corrosive to metals but non-flammable.

Sulphuric acid is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Corrosive**. It is assigned the following Risk (R) phrase:

#### **R35 – Causes severe burns**

Sulphuric acid is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures (CLP Regulation) as **Skin Corr. 1A**. It is assigned the following Hazard Statement:

**H314 - Causes severe skin burns and eye damage.**

### ***OCCURRENCE AND USE***

Sulphuric acid is mainly produced via the catalytic reaction of sulphur dioxide with oxygen to produce sulphur trioxide. This is subsequently dissolved in water to produce concentrated sulphuric acid (over 99% pure).

There is currently only one manufacturer of sulphuric acid in Great Britain. 96% and 98% sulphuric acid is made by burning sulphur and then passing the resulting sulphur dioxide and air through towers containing oleum. Some of the concentrated acid is diluted down to 50% before being distributed. Potential exposure in the manufacturing plant is likely to be low, owing to the enclosed production process. RPE is used during maintenance, and sampling operations take place inside ventilated booths.

During manufacture, historical personal and static air monitoring data were available where exposure occurred. Twenty-five personal sampling measurements taken between 2003 and 2005 showed total-inhalable exposures of up to 0.3 mg.m<sup>-3</sup>. Forty

personal sampling measurements, taken between 2005 and 2008, showed total-inhalable exposures of up to  $0.2 \text{ mg.m}^{-3}$ .

From the silos, distributors fill road tankers by pumping the acid through 3 or 4 inch piping using open-lid/splash-fill methods. Older data suggested very high, localised exposures around the tanker lids, but slower, more controlled pumping reduces this considerably. Twenty-one static samples taken within 2 metres of the tanker lid showed total-inhalable exposures of up to  $0.57 \text{ mg.m}^{-3}$ . However, once the arm (usually articulated) is positioned in the tanker, there should be no need for operators to be exposed.

From tankers, the acid may be transported and dispensed into storage tanks where venting may be an issue because air discharge is often used and the storage tanks may be indoors. From storage, containers from 1000 litres down to 1 litre may be filled (concentrated sulphuric acid is still used for drain cleaning).

About 75% of the downstream uses of sulphuric acid, in a wide range of major chemical manufacturing companies, are in enclosed processes (such as in pH adjustment) and exposures are likely to be relatively low due to the enclosed manufacturing process employed. However, the other 25% of uses have the potential for higher exposures.

The largest single use of sulphuric acid is as a reagent with phosphate rock in the production of phosphate fertilisers, with lesser uses in the production of ammonium and potassium sulphate.

Sulphuric acid is used as an acidic dehydrating agent in organic chemical and petrochemical processes, as well as in oil refining. In the inorganic chemical industry, it is used most notably in the production of titanium dioxide and to make hydrochloric and hydrofluoric acids, aluminium and copper sulphate and chromium compounds.

Sulphuric acid is widely used to chemically remove oxides and scale from the surface of steel and iron (acid-pickling) before further processing, for the extraction of metals such as copper, uranium and vanadium from ores, and in non-ferrous metal purification and plating. A minor use in agriculture is as an application to growing potato plants to desiccate the shoots (haulms), effectively stopping any further growth. This process makes mechanical lifting of the tubers easier and also makes the plant move resources to the tubers, therefore providing an additional growth surge before harvesting.

Other uses include the manufacture of plasticisers, dyestuffs, explosives, silicate for toothpaste, adhesives, rubbers, edible oils, lubricants, the production of food acids such as citric or lactic acid and to directly control pH during the processing of some foods and beverages.

The main uses are examined in more detail below.

## *Battery manufacture*

Sulphuric acid is used as an electrolyte in lead acid batteries manufactured for automotive, aerospace and some industrial applications. There are four major lead acid battery manufacturers/suppliers where exposure is known to occur and all the companies responded to requests for information.

Following an HSE visit in 2006, one company carried out a full acid mist survey of all acid-using processes throughout the site. About 2,000 tonnes of sulphuric acid were used annually on this site, and around 15 employees were exposed. Principal exposure-generating activities included acid-filling, initial charging of battery plates, and battery cutting.

High acid-mist exposures were found initially during the automotive acid fill and charge process, but with improved controls the exposures were reduced. Of the 27 static and 19 personal total inhalable-fraction samples taken between 2006 and 2008, only one (static) sample was above the proposed new WEL of  $0.05 \text{ mg.m}^{-3}$ . These controls involved a capital cost of between £1,000 and £1,500 (a wet scrubber extraction system was already in place). However, the most cost-effective measures were fairly cheap – the installation of continuous rubber strip along the tops of the charging bath doors which effectively sealed gaps and contained the mist.

A second company operates sites with procedures similar to the first company above. On one of their sites, data from 2003 showed that of the 9 personal and 8 static total-inhalable samples measured, none were above the new proposed WEL of  $0.05 \text{ mg.m}^{-3}$ . However, total-inhalable samples taken during submarine battery charging showed the highest potential for non-compliance. Nevertheless submarine battery charging is no longer undertaken by this company and has been transferred to a separate company who believes there will be no problem complying with the proposed new WEL.

On the second company's other site the battery plates are assembled into battery containers in an electrically uniform condition. Containers are filled with sulphuric acid electrolyte, and the batteries are formed by passing an electric current through the battery. Gassing occurs during the process, producing acid mist. This is controlled by allowing only a small vent hole in the battery lid, and mist condenses back in the battery. Occupational exposure to acid mist is expected to be below the proposed IOELV of  $0.05 \text{ mg.m}^{-3}$ .

This company believes that processes in battery plants which generate acid mist already have ventilation in place (either general dilution ventilation or local exhaust ventilation) as it is usually necessary for employees to work in the area (for example, by taking voltage readings, SG readings, and to move batteries around). Exposures could only be reduced below existing levels by significant investment in sophisticated (and presumably high energy consuming) ventilation systems.

At the third company consulted, about 4,000 tonnes of sulphuric acid are used annually, and about 40 workers could be exposed to acid-mist throughout the 8-hour shift. Principal activities generating exposure are in the 'formation process' - involving either an initial charge of the battery plates in sulphuric acid tanks before assembly of the battery (tank formation), or following assembly of the battery cells (jar

formation), where an initial charge of three periods of 15 hours is carried out. Charging causes the evolution of hydrogen gas and potential formation of mist, which, in the tank formation, is controlled by LEV, each acid tank being fitted a hinged extraction lid. No LEV is used in the jar formation, where batteries are charged in a large segregated room. Here, recent typical background total inhalable levels in the formation area can be around  $0.2 \text{ mg.m}^{-3}$ , and personal monitoring data of between  $0.14 \text{ mg.m}^{-3}$  and  $0.22 \text{ mg.m}^{-3}$  have been measured. This company has also supplied recent monitoring data that showed that of the seven personal and five static total-inhalable samples, all were below the proposed new WEL of  $0.05 \text{ mg.m}^{-3}$ .

Despite this, the company believes that if the limit were set on the basis of total inhalable samples, 'significant' capital expenditure on LEV and PPE would be necessary to consistently achieve the proposed IOELV of  $0.05 \text{ mg.m}^{-3}$ .

A fourth company was approached, but had no exposure data. However, they suggested, in line with the concerns expressed by others, that processes of concern were the topping-up of dry-charged batteries. As only small numbers of people would be exposed for only brief periods of time, HSE believes that it might be possible, if further control were needed at some sites, to instigate RPE usage for the short periods of time spent in the charging areas. This cost would only be necessary if the limit was set on the basis of total-inhalable samples.

All companies expressed concern about the feasibility of measuring low levels of acid-mist over relatively short periods and HSE is aware of this issue. Nevertheless, Health and Safety Laboratory (HSL) scientists believe that the ISO method is capable, under ideal conditions, of sufficient sensitivity to measure at the proposed 8-hr TWA IOELV of  $0.05 \text{ mg.m}^{-3}$ . However, during field use, confounding issues such as interference from other sources of sulphate, or reaction of the sulphuric acid with species on the filter, or entrapment of sulphate precursors, is possible. It is therefore important to understand the environment in which the sample is taken so that confounders can be taken into consideration.

### *Crop spraying*

An estimated 50 -100 contractors apply about 12,500 tonnes of sulphuric acid (77%) to around 80,000 hectares of land as an agricultural desiccant to potatoes (mainly) by spraying. Potentially this could expose between 200 and 400 workers. Spraying sulphuric acid as a desiccant is only approved for use between 1 May and 15 November. Peak use is late summer, when spraying extends typically over a six-week period. During this time, operators may work 10 to 12-hour shifts for 6-7 days per week.

In 2002, an exposure survey of ten sites was carried out by HSE, and this remains the most recent data available.

All the data were for task-specific, short-term, total-inhalable samples and, of the 40 samples, only a few were above the proposed new WEL.

The National Sulphuric Acid Association has confirmed that the use of sulphuric acid as an agricultural desiccant has been revoked from 5 June 2010.

## *Surface engineering*

Sulphuric acid is used in a variety of processes in the metal finishing industry. Tasks include anodizing, copper micro-etching, electrolytic nickel-plating, electroless nickel-plating, jig-tin plating, barrel-tin plating, stainless steel electropolishing and stainless steel etching.

The Institute of Metal Finishing (IMF) and the Surface Engineering Association (SEA), who provide a focus for all aspects of the surface engineering industry and related trade associations, have provided valuable, up-to-date information on the current (circa 2005) industry. IMF estimates that between 300 and 400 premises use electroplating, about 200 premises use anodisers and about 100 other premises are engaged in what is described as in-house operations - a total of between 600 and 700 premises engaged in metal-finishing operations.

It is assumed that a quarter of the average workforce of 18 employees per site will be potentially exposed to sulphuric acid mist. This equates to a maximum of 3150 potentially exposed workers.

The limited exposure data held by HSE suggests that anodizing has the greatest potential to generate exposure. A survey of seven premises, carried out by HSE in 2004, collected 27 personal (total inhalable) samples. The nine samples collected from anodising operations showed exposure in a range from less than  $0.05 \text{ mg.m}^{-3}$  to  $0.6 \text{ mg.m}^{-3}$  (as an 8-hour TWA), although the higher samples (above  $0.05 \text{ mg.m}^{-3}$ ) came from just one of the four companies sampled. None of the other samples from the other processes checked (copper micro-etching, electrolytic and electroless nickel-plating, jig-tin plating, barrel-tin plating, stainless steel electropolishing and stainless steel etching) showed any exposures above the proposed new WEL of  $0.05 \text{ mg.mg}^{-3}$ .

Data on sulphuric acid supplied to this sector are limited. The SEA has been working with HSE to reduce the use of air agitation, and to promote the eductor technology use (particularly with soluble nickel compounds).

The SEA believes that spot readings could be greater than  $0.05 \text{ mg.m}^{-3}$  in areas close to the operating processes, but it is unlikely that many employees would actually be working in these areas. An exception would probably be in manually-operated plants where components are placed into and removed from operating tanks / vats by hand. They believe that fume extraction systems would need to be installed (if not already fitted), and the capital cost would range from £20,000 to £100,000 although this is based on the limit being set on the basis of total inhalable samples.

## Costs

Because the proposed new WEL will be based on the thoracic fraction only, HSE believes that any increased costs for compliance will be minimal. However to measure the thoracic fraction for enforcement purposes will require a validated method. There is currently no such validated method available. There are a limited number of useable methods, but insufficient performance data are available. Before

being used for enforcement purposes, the methods will need to be assessed, and possibly new methods will need to be developed. HSE believes that the only costs associated with the implementation of the new limit will be the costs of developing and/or validating these new methods.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of sulphuric acid and of the need to control exposure.

### (xvi) Vinyl acetate

|                                 |   |
|---------------------------------|---|
| Limit proposed in the Directive | 17.6 mg.m <sup>-3</sup> / 5 ppm (8-hour TWA)<br>35.2 mg.m <sup>-3</sup> / 10 ppm (STEL) |
| Current GB limit                | None  |

### **IDENTITY AND PROPERTIES**

CAS No: 108-05-4

EU No: 203-545-4

Empirical formula: CH<sub>3</sub>CO-O-CH=CH<sub>2</sub>

Synonyms: acetic acid vinyl ester, acetic acid ethenyl ester

Molecular Weight: 86.09

Conversion factors at 25°C: 1 ppm = 3.52 mg.m<sup>-3</sup>  
1 mg.m<sup>-3</sup> = 0.28 ppm

Vinyl acetate is classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009 as **Flammable**. It is assigned the following Risk (R) phrase:

#### **R11 – Highly flammable**

Vinyl acetate is classified under Regulation (EC) No. 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures as **Flam. Liq. 2**. It is assigned the following Hazard Statement:

#### **H225 - Highly flammable liquid and vapour**

### **OCCURRENCE AND USE**

Vinyl acetate is a colourless, volatile and flammable liquid with an odour described as either sweet and “ether-like”, or sharp and sour. It usually contains an inhibitor, hydroquinone, for storage of the chemical. Odour thresholds are reported between 0.36 and 0.5 ppm. Vinyl acetate polymerises when exposed to light.

Vinyl acetate is not known to occur naturally. It is a key intermediate in the production of a number of polymers and resins for adhesives, coatings, paints, films, textiles,

and other end products. The largest derivative is polyvinyl acetate (PVA), mainly used for adhesives, but also paper coatings and paints and industrial coatings. PVA is also used to make polyvinyl alcohol (PVOH), used for textiles, adhesives, packaging, films, thickeners and photosensitive coatings, and also for the production of polyvinyl butyral (PVB) – a resin with strong adhesion, used in laminated glass and commercial buildings.

Europe is a net importer of around 150,000 tonnes annually, mostly sourced from the USA.

The main British manufacturer believes that the new proposed WEL will not cause any extra costs for their operations, and the British Coatings Federation believes that its members could comply with the proposed new limit without significant cost.

### Costs

Likely to be few.

### Benefits

Likely to be few, but the publication of the new limit will remind employers of the hazardous nature of vinyl acetate and of the need to control exposure.

## **Key to Hazard Classes and Hazard Statement Codes**

### **\* Minimum classification**

For certain hazard classes, including acute toxicity and Single Target Organ Toxicity (STOT) Repeated Exposure (RE), the classification according to the criteria in Directive 67/548/EEC, and subsequently according to the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009, does not correspond directly to the classification in a hazard class and category under the CLP Regulation. In these cases, the classification listed is to be considered as a minimum classification.

Minimum classification is indicated by the reference \*.

### **\*\* Route of exposure cannot be excluded**

For certain hazard classes, e.g. Single Target Organ Toxicity (STOT), the route of exposure is indicated in the hazard statement only if it is conclusively proven that no other route of exposure can cause the hazard. The classification under 67/548/EEC, and subsequently under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009, has been translated into the corresponding class and category according to the CLP Regulation, but with a general statement not specifying the route of exposure as the necessary information is not available.

These hazard statements are indicated by the reference \*\*.

### **\*\*\* Hazard Statements for reproductive toxicity**

Hazard Statements H360 and H361 indicate a general concern for effects on both fertility and development. According to the criteria in the CLP Regulation, the general hazard statement "May damage/ suspected of damaging fertility or the unborn child", can be replaced by the hazard statement indicating only the property of concern, whether either fertility or developmental effects are proven to be not relevant.

In order not to lose information from the harmonised classifications for fertility and developmental effects under Directive 67/548/EEC, and subsequently under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2009, the classifications have been translated only for those effects classified under that Directive.

These hazard statements are indicated by the reference \*\*\*.

### **Effects on the Administrative Burden**

12. It is assumed that the costs of enforcement will be assimilated into HSE's routine operational costs.

### **Effects on small firms**

13. HSE does not believe that there will be any disproportionate adverse effects on small firms arising out of compliance with the new and revised WELs.

### **Competition Assessment**

14. There will be no competition implications.

### **Enforcement and sanctions**

15. Compliance with the Directive will be through the enforcing authorities of the Health and Safety at Work etc Act 1974. The enforcement of health and safety law is informed by principles of:

- proportionality in applying the law and securing compliance;
- consistency of approach;
- targeting of enforcement action; and
- transparency about how a regulator operates and what those regulated may expect.

### **Monitoring and Review**

16. No specific formal evaluation of the effects of the imposition of the new limits is planned. However, the new limits will be implemented through HSE's OEL framework. This forms part of HSE's Disease Reduction Programme, which places more emphasis on activities that will have a direct impact on the workplace. The evaluation of some new limits will form part of the evaluation of the impact of key projects on skin and respiratory disease under this Programme.

### **Other Specific Impact Tests**

17. There will be no discriminatory adverse effects as regards race, disability or gender arising out of the implementation of the 3<sup>rd</sup> IOELV Directive.

### **Implementation and Delivery Plan**

To be included in the full RIA.

### **Summary and Recommendations**

18. Exposure to the chemical substances, for which the Directive sets IOELVs, can result in adverse health effects. Limiting exposure to the substances is therefore necessary to protect human health. However, Great Britain currently has regulations that place a limit on the level of permitted exposure, and HSE considers that the lower limits set by the Directive are not expected to offer any quantifiable benefits. At the same time, implementation of the Directive is not expected to have adverse effects on British industry.

**Trade Associations, organisations and consultants contacted for information on the use and exposure to substances on the 3<sup>rd</sup> IOELV Directive list:**

Aluminium Federation Ltd  
British Adhesives and Sealants Association  
British Association of Chemical Specialities  
British Coatings Federation (BCF)  
British Occupational Hygiene Society (Global Occupational Hygienist List)  
British Plastics Federation  
Cast Metal Federation  
Chemical Industries Association  
CJH Consult Associates  
Confederation of British Metalforming  
Construction Products Association (CPA)  
Cristal Global  
Crop Protection Association  
European Sulphuric Acid Association  
Eurisol (UK Mineral Wool Insulation Association).  
Food and Drink Federation.  
Ineos Enterprises Ltd  
Institution of Cast Metals Engineers  
Institute of Materials, Metals and Mining  
Institute of Metal Finishing.  
National Association of Agricultural Contractors  
National Sulphuric Acid Association  
Paint Research Association  
Surface Engineering Association  
UK Petroleum Industry Association

Additional contributions were obtained from HSE/HSL inspectors and occupational hygienists.

In addition, a wide range of British companies were contacted by HSE for information, with seven companies and two trade associations being visited by HSE's occupational hygienists.

## List of Organisations and Individuals Consulted

### Government Departments

Attorney General's Office  
Cabinet Office – European Secretariat  
Cabinet Office – Office of Public Service  
Central Office of Information  
Department for Business, Innovation and Skills  
Department for Business, Innovation and Skills – Better Regulation Executive  
Department for Business, Innovation and Skills – Enterprise and Business Support  
Department for Communities and Local Government  
Department for Education  
Department for Energy and Climate Change  
Department for Environment, Food and Rural Affairs  
Chemicals and Nanotechnologies Division  
Global Atmosphere Division  
Waste Management Division  
Water Quality Division  
Department of Health  
Department for Transport  
Department for Work and Pensions – Workplace Health Division  
Foreign and Commonwealth Office  
Health and Safety Executive for Northern Ireland  
HM Prison Service  
HM Revenue and Customs  
HM Treasury  
Home Office  
Ministry of Defence  
Ministry of Justice  
National Assembly for Wales  
Scottish Executive Environment and Rural Affairs Department  
Scottish Executive Health Department

### Public Bodies

British Broadcasting Corporation  
Civil Aviation Authority  
Consumer Focus  
Crown Estate  
Environment Agency  
Food Standards Agency  
Forestry Commission  
Health Protection Agency  
Historic Royal Palaces Agency  
House of Commons Library  
House of Lords Library  
Joint Nature Conservation Committee  
Law Commission  
LGC  
Maritime and Coastguard Agency

Medicines and Healthcare Products Regulatory Agency  
Natural England  
Office for National Statistics  
Office of Rail Regulation  
Scottish Environment Protection Agency  
Scottish Law Commission  
Veterinary Laboratories Agency

## **European Union, Crown Dependencies and Overseas Territories**

Government of Gibraltar – Ministry of Employment  
Health and Safety Authority, Republic of Ireland  
Health and Safety Executive, Guernsey  
Department of Infrastructure, Isle of Man  
Department of Employment and Social Security, Jersey  
UK Permanent Representation to the European Union

## **Local Government Organisations**

Convention of Scottish Local Authorities  
Local Government Association  
London Councils  
National Association of Local Councils

## **Employers' Organisations and Small Firms' Representatives**

British Chambers of Commerce  
Confederation of British Industry  
EEF  
European Association of Craft, Small and Medium-Sized Enterprises (UEAPME)  
Federation of Small Businesses  
Independent Retailers Association  
Institute of Directors  
Small Business Trade Association Forum  
Universities and Colleges Employers' Association

## **Trade Unions and Employee Organisations**

Association of Teachers and Lecturers  
Bakers, Food and Allied Workers Union  
BALPA  
British Dental Association  
British Medical Association  
Communications Workers Union  
Community  
Fire Brigades Union  
Fire Officers Association  
General Federation of Trade Unions  
GMB  
Police Federation of England and Wales  
Prospect  
Royal College of Nursing  
Scottish Police Federation  
Scottish Trades Union Congress

Society of Radiographers  
Trades Union Congress  
UCATT  
Unison  
Unite  
Unity  
University and College Union  
USDAW

## **Trade Associations and Learned Bodies**

Adhesive Tape Manufacturers Association  
Aerospace Defence Security  
Agricultural Engineers Association  
Agricultural Industries Confederation  
Aluminium Federation Ltd  
Association of the British Pharmaceutical Industry  
Brick Development Association  
British Adhesives and Sealants Association  
British Aerosol Manufacturers Association  
British Association for Chemical Specialties  
British Battery Manufacturers Association  
British Ceramic Confederation  
British Coatings Federation  
British Colour Makers Association  
British Contract Furnishing Association  
British Electrotechnical and Allied Manufacturers Association  
British Fluid Power Association  
British Footwear Association  
British Fragrance Association  
British Furniture Manufacturers Association  
British Glass  
British Institute of Embalmers  
British Institute of Funeral Directors  
British Institute of Professional Photography  
British Jewellers' Association  
British Metals Recycling Association  
British Non-Ferrous Metals Federation  
British Pest Control Association  
British Plastics Federation  
British Printing Industries Federation  
British Pump Manufacturers Association  
British Pyrotechnists Association  
British Rigid Urethane Foam Manufacturers Association  
British Rubber and Polyurethane Products Association  
British Stainless Steel Association  
British Textile Machinery Association  
British Tyre Manufacturers Association  
British Veterinary Association  
Castings Technology International  
Cast Metals Federation  
Chemical Business Association  
Chemical Industries Association  
Composites UK

Confederation of British Metalforming  
Confederation of Paper Industries  
Construction Industry Research and Information Association  
Construction Products Association  
Contract Flooring Association  
Cosmetics, Toiletries and Perfumeries Association  
Crop Protection Association  
Dairy Industry Federation  
Electrical Contractors' Association  
Energy Institute  
Engineering Industries Association  
Environmental Services Association  
Eurisol (UK Mineral Wool Insulation Association)  
European Process Safety Centre  
Farmers Union of Wales  
FeRFA (Resin Flooring Association)  
Food and Drink Federation  
Freight Transport Association  
Glass and Glazing Federation  
Grain and Feed Trade Association  
The Horticultural Trades Association  
Institute of Materials, Metals and Mining  
Institute of Metal Finishing  
Institution of Cast Metals Engineers  
Institution of Chemical Engineers  
Institution of Engineering and Technology  
Intellect  
Law Society of England and Wales  
Law Society of Scotland  
Mineral Products Association  
Motor Vehicle Repairers Association  
National Association of Agricultural Contractors  
National Farmers Union  
National Farmers Union of Scotland  
National Federation of Builders  
National Federation of Demolition Contractors  
National Metals Technology Centre  
National Specialist Contractors Council  
Offshore Contractors Association  
Oil and Colour Chemists' Association  
Paint Research Association  
Painting and Decorating Association  
Paper Industry Technical Association  
Plastics and Board Industries Federation  
Property Care Association  
Retail Motor Industry Federation  
Road Haulage Association  
Royal Agricultural Society of England  
Royal Highland and Agricultural Society of Scotland  
Royal Pharmaceutical Society of Great Britain  
The Royal Society  
Royal Society of Chemistry  
Scotch Whisky Association  
Scottish Food and Drink Federation  
Scottish Motor Trade Association

Scottish Pharmaceutical Federation  
Screen Printing Association (UK) Ltd  
Shipbuilders and Shiprepairers Association  
Society of British Gas Industries  
Society of Chemical Industry  
Society of Dyers and Colourists  
Society of Motor Manufacturers and Traders  
Solvents Industry Association  
Surface Engineering Association  
Tank Storage Association  
Textile Services Association  
Tile Association  
Timber Trade Federation  
UK Contractors Group  
UK Fashion and Textile Association  
UK Leather  
UK Petroleum Industry Association  
United Kingdom Cleaning Products Industry Association  
United Kingdom Lubricants Association  
Water UK  
Welding Manufacturers Association  
Wood Panel Industries Federation

### **Police and Emergency Services Bodies**

Association of Chief Police Officers of England, Wales and Northern Ireland  
Association of Chief Police Officers in Scotland  
Chief Fire Officers' Association

### **Health and Safety Specialists/ Academic Institutions**

Association of Port Health Authorities  
BIBRA  
British Occupational Hygiene Society  
British Safety Council  
Cancer Research UK  
Chartered Institute of Environmental Health  
CJH Consult Associates  
The Environment Council  
Institute of Occupational and Environmental Medicine – University of Birmingham  
Institute of Occupational Medicine  
Institution of Occupational Safety and Health  
Natural Environment Research Council  
Newcastle Occupational Health  
Royal Environmental Health Institute of Scotland  
Royal Society for the Prevention of Accidents  
Society/Faculty of Occupational Medicine  
University of Manchester – Centre for Occupational and Environmental Health  
Which ?

### **Individual Companies**

Adshead Ratcliffe and Company Ltd  
Agropharm Ltd

Airbus UK Ltd  
Akcros Chemicals  
Alcohols Ltd  
Allied Glass Containers  
Arkema Ltd  
Avon Rubber plc  
BAE Systems  
BASF plc Industrial Chemicals  
Bayer UK Ltd  
Becker Acroma Ltd  
Britannia Refined Metals Ltd  
Caswell Adhesives  
Chemtek Ltd  
Ciba Specialty Chemicals  
Clariant UK Ltd  
Contract Chemicals Ltd  
Cristal Global  
Domino UK Ltd  
Dunlop Aircraft Tyres Ltd  
DuPont (UK) Ltd  
Dynea UK Ltd  
Egger UK Ltd  
Elementis plc  
Ellis and Everard UK Ltd  
Energys UK Ltd  
Fenner Dunlop Conveyor Belting  
Feralco (UK) Ltd  
Four D Rubber Co Ltd  
Grosvenor Chemicals Ltd  
Hexion Specialty Chemicals Ltd  
Hickson and Welch Ltd  
Hornett Bros and Co Ltd  
Huntsman Corporation (UK) plc  
IMCD Ltd  
Ineos ChlorVinyls Ltd  
International Paint Ltd  
Kingspan Group plc  
Kronospan Ltd  
Mallinckrodt Chemical Holdings UK Ltd  
Morris Lubricants  
Nalco Ltd  
NE Die Casting Ltd  
Norbord Ltd  
L'Oréal Manufacturing (UK) Ltd  
PDM Neptec Ltd  
Perstorp Ltd  
Petrochem Carless  
Pirelli UK Tyres Ltd  
Polyflor Ltd  
Rhodia UK Ltd  
SABIC UK Petrochemicals  
Safic-Alcan UK Ltd  
SGS Vernolab Ltd  
Sigma Aldrich Co Ltd  
Solutia UK Ltd

Sonae UK Ltd  
Special Metals Wiggin Ltd  
Spray Nine Europe Ltd  
Sun Chemical Ltd  
Tennants Distribution Ltd  
Witham Oil and Paint Ltd  
Whyte Chemicals Group

## RESPONSE FORM

### Control of Substances Hazardous to Health Regulations 2002

#### Proposals for Workplace Exposure Limits to implement Commission Directive 2009/161/EU establishing a 3rd list of indicative occupational exposure limit values and for a reduced Workplace Exposure Limit for formaldehyde

We would like you to tell us what you think about the proposals set out in this consultative document. The questions are in this reply form which you may wish to copy or tear out and use. Please add extra sheets if you wish.

|   |   |
|---|---|
| <b>Name of organisation or company</b>  |   |
| <b>Name of individual</b>   |   |
| <b>Address</b>  |   |
| <b>Email address</b>  |   |
| <b>Telephone number</b>   |   |
|   |   |
| <b>Question</b>   | <b>Comment</b>  |
| <p><b>Question 1:</b> Do you agree that new and revised Workplace Exposure Limits should be established for the substances listed in the European Commission's 3<sup>rd</sup> List of Indicative Occupational Exposure Limit Values to align them with the IOELVs? If you disagree please explain why.</p> <p>Please also provide any additional information to supplement or correct that given in Appendix 2.</p> |   |
| <p><b>Question 2:</b> In your view, how well does this consultation document present the different policy issues involved in this matter? Please tick one box.</p>  | <input type="checkbox"/> Very Well<br><input type="checkbox"/> Well<br><input type="checkbox"/> Not Well<br><input type="checkbox"/> Poorly |

|   |  |
|---|--|
| <p><b>Question 3:</b> Is there anything you particularly liked or disliked about this consultation?<br/>(Please add extra sheets if you wish)</p> |  |
|---|--|