Solvents
Brian Andrews

Solvents are defined as substances capable of dissolving other substances to form uniformly dispersed mixtures and are present in many aspects of work - some not easily recognisable. There are many hazards presented by solvents, including dermatitis, narcosis and damage to the lungs and mucous membranes, as well as toxic problems caused if they are ingested. The risks are controlled by identifying the solvents present, classifying their hazards, assessing their risks and implementing proper control measures. It is essential that solvents are properly stored and disposed of and that instruction and training with health surveillance, where necessary, is provided for those exposed to them.

Latest Updates

02/ 04/ 2003
Guidance on the safe use and cleaning of solvent degreasing plants, particularly recommending Enclosure of a Process, has been published by the Health and Safety Executive.

25/ 02/ 2003
There are many hazards presented by solvents including dermatitis, narcosis and damage to the lungs and mucous membranes, as well as toxic problems caused if they are ingested. The risks of solvents are controlled by identifying the solvents present, classifying their hazards, assessing their risks and instigating proper control measures. It is essential that solvents are properly stored and disposed of and that proper instruction and training with health surveillance, where necessary, for those exposed to them.

Table of Contents

• Quick View ........................................................................................................ 3
• 1. Introduction to Solvents ................................................................................. 4
• 2. The Hazards Presented by Solvents ................................................................. 5
  • 2.1 Routes of Exposure ..................................................................................... 5
  • 2.2 Inhalation ..................................................................................................... 5
  • 2.3 Skin Contact ............................................................................................... 6
  • 2.4 Ingestion ...................................................................................................... 6
  • 2.5 Solvents That Cause Health Disorders ....................................................... 6
  • 2.6 Those Most at Risk .................................................................................... 7
    • 2.6.1 Groups Generally at Risk ........................................................................ 7
    • 2.6.2 High Risk Employees .......................................................................... 8
    • 2.6.3 Pregnant Women and New Mothers ..................................................... 8
    • 2.6.4 Workers with Higher Susceptibility ..................................................... 8
• 3. Controlling the Risks From Solvents ............................................................... 9
  • 3.1 Risk Assessment Checklist for Solvents ...................................................... 9
  • 3.2 Identifying Solvents .................................................................................... 10
    • 3.2.1 Drawing Up an Inventory .................................................................... 10
    • 3.2.2 Classification of Solvents ................................................................... 10
  • 3.3 Safety Data Sheets ..................................................................................... 11
  • 3.4 Undertaking COSHH Assessments ............................................................. 14
  • 3.5 Hierarchy of Means of Control .................................................................. 16
    • 3.5.1 Overview to the Hierarchy of Control .................................................. 16
    • 3.5.2 Elimination or Substitution of Solvents .............................................. 16
    • 3.5.3 Modification of Processes .................................................................... 17
    • 3.5.4 Enclosure of a Process ........................................................................ 17
  • 3.6 Ventilation .................................................................................................. 18
1. Solvents are defined as substances capable of dissolving other substances to form uniformly dispersed mixtures and are present in many aspects of work. Some are not easily recognisable. See Introduction to Solvents.

2. There are many hazards presented by solvents, including dermatitis, narcosis and damage to the lungs and mucous membranes, as well as toxic problems caused if they are swallowed. Some workers, particularly pregnant women, are much more susceptible to ill health from solvents than others. See The Hazards Presented by Solvents.

3. The risks are controlled by identifying the solvents present, classifying their hazards, assessing their risks and instigating proper control measures, selected in the correct order from a hierarchy of means of control, not just using personal protective equipment. See Controlling the Risks From Solvents.

4. It is essential that solvents are properly stored and disposed of, to avoid increasing the risk of injury or property damage, or damage to the environment. See Storage and Disposal of Solvents.

5. The provision of proper instruction and training with health surveillance, where necessary, for those exposed to solvents is particularly necessary. See Worker-specific Issues.
1. Introduction to Solvents

Solvents are defined as substances capable of dissolving other substances to form uniformly dispersed mixtures. Although water is the most common solvent, it is the organic solvents (e.g. hydrocarbons, ethers) that are the subject of this topic. Typical solvents such as acetone, methanol, toluene, trichloroethylene and white spirit, just to name a few, are used by an estimated two and a half million workers across the UK.

Solvents are used in a multiplicity of industries and will be present in the workplace anywhere that the following are used:

1. Adhesives
2. Cleaning and degreasing materials
3. Ink and ink removers
4. Paints
5. Lacquers and varnishes
6. Paint strippers

It is probably more difficult to find organisations that do not use solvents than those that do.

Without adequate control measures solvents can adversely affect health, with problems being particularly associated with the skin, lungs and the central nervous system (e.g. causing headaches and dizziness).
2. The Hazards Presented by Solvents

2.1 Routes of Exposure

Since there are a vast array of solvents with widely differing properties, it is only possible to generalise regarding the hazards associated with their use.

There are three main routes of exposure from solvents:

1. Inhalation
2. Skin contact
3. Ingestion

As well as having adverse direct effects on a worker's health, excessive uncontrolled exposure to solvents can impair co-ordination as a result of narcosis, with resultant poor performance and the likelihood of accidents.

2.2 Inhalation

Inhalation of solvent can result from breathing:

1. Solvent vapours (e.g. when filling a solvent reservoir from smaller containers)
2. Solvent fumes at high temperatures (e.g. released from a heated degreasing tank)
3. Solvent mists (small droplets of liquid) produced from excessive turbulence when using, for instance, speed mixers

The immediate symptoms of solvent inhalation are nausea, dizziness, mood swings and light-headedness. Although these are transitory, it is the possible effects on the respiratory system that can lead to long-term ill health.

Exposure to organic solvents by inhalation has also been reported to be associated with kidney disease. It has been concluded from a range of clinical, epidemiological and animal experimentation studies that exposure to organic solvents can lead to a range of renal disorders. Among these are different types of glomerulonephritis, a form of kidney disease. Furthermore, this research has indicated that continued high solvent exposure may exacerbate or increase the rate of progression of some kidney disease, this observation being particularly significant in those suffering from diabetes.

A paper published in the British Medical Journal, *Occupational Asthma and Other Respiratory Diseases* (BMJ Volume 313, pp 291-294, 3 August 1996), showed that a study of work-related respiratory disease in the UK in 1994 gave 28.8% of cases as being diagnosed as occupational asthma - the highest cause of work-related respiratory disease - with the greatest cause being from isocyanate paint spraying.

In the HSE publication *MS25 Medical Aspects of Occupational Asthma* (available from HSE Books, price £6.00, ISBN 0 7176 1547 2), it is suggested that 2-6% of cases of adult asthma result from workplace exposure. Except for a few specific examples (e.g. isocyanates), solvents have not been implicated as respiratory sensitisers, but it is quite possible that they will be in the future.

This supposition is derived from the fact that in 1995 the EH40 publication on *Occupational Exposure Limits* listed three volatile substances that were categorised as 'capable of causing respiratory sensitisation', while it has risen to more than ten by 2002. In addition, some chemicals (e.g. chlorine and sulphur dioxide), possibly generated through the reaction of solvents, can lead to asthma by non-allergic mechanisms.

The possibility of asthma occurring will depend on the individual exposed, the substance itself and the duration and the intensity of exposure. The clinical mechanism leading to these disorders is not completely understood but is likely to be similar to the way in which skin sensitisation manifests itself. While it should be emphasised that most common solvents are not at present classified as respiratory sensitisers, there should be a general awareness of the future possibility and that tobacco smoke and general air pollution can exacerbate the problem.

Since asthma is such a common industrial disease, it has now been acknowledged by having an Approved Code of
Practice - Control of Substances that Cause Occupational Asthma - included as Appendix 3 to the ACOP and Guidance L5 to the Control of Substances Hazardous to Health Regulations 2002 (fourth edn) (available from HSE Books, price £10.50, ISBN 0 7176 2534 6). Further information is also given in HSE publication Asthmagen: Critical assessments of the evidence for agents implicated in occupational asthma (available from HSE Books, price £25.00, ISBN 0 7176 1465 4).

2.3 Skin Contact

Skin contact with certain solvents (e.g. water-based metal working fluids) may result in dermatitis.

Although the outward symptoms for dermatitis are the same, the definition of which dermatitis has been contracted is dependent upon the cause:

1. Acute irritant contact dermatitis results from a single exposure to the solvent
2. Chronic irritant contact dermatitis occurs after periods of prolonged or frequent use

Although irritants (including solvents) can be very generally divided into weak and strong (the latter cause the immediate symptoms) there is, in reality, a continuous gradation in strength. For this reason it is not possible to categorise solvents into those that produce acute irritation and those that lead to chronic irritation.

In addition, there is a third type of dermatitis - allergic contact dermatitis. Solvents capable of producing this type of dermatitis are termed ‘skin sensitisers’. On initial skin contact, the solvent penetrates the barrier layer of the skin and causes contact sensitisation that takes about seven days to develop fully.

There is now some evidence, although not conclusive proof, that skin contact to some sensitisers may trigger respiratory sensitisation.

2.4 Ingestion

The third means of solvents entering the body is through swallowing, although this is not very likely to arise accidentally. The most likely cause is through ingestion during the in-take of food or drink where the food or drink - or, more likely, the cup or the hands of the person - is inadvertently contaminated with a solvent. This would, however, be unlikely to cause major problems.

2.5 Solvents That Cause Health Disorders

With the vast array of solvents, it is not possible to give a comprehensive list of those substances that cause respiratory or skin problems. Also, since new sensitisers are being reported continually, the list would be out-of-date very soon.

Instead, examples can be given of typical solvents (and possible solvent degradation products) that cause the problems. It should be understood that, in general, no particular solvent can be linked to a specific medical disorder. Furthermore, it should be emphasised that individuals may react differently to different solvents, and that solvents not on the list may cause skin or respiratory disorders or other symptoms. However, an indication of any likely symptoms can be determined by reading the associated safety data sheet.
<table>
<thead>
<tr>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethylene dichloride</td>
</tr>
<tr>
<td>Diethyl sulphate</td>
</tr>
<tr>
<td>Ethylene glycol</td>
</tr>
<tr>
<td>Monoethyl ether</td>
</tr>
<tr>
<td>Methanol</td>
</tr>
<tr>
<td>n-Propanol</td>
</tr>
<tr>
<td>Toluene</td>
</tr>
<tr>
<td>Trichloroethylene</td>
</tr>
<tr>
<td>Xylene, mixed isomers</td>
</tr>
</tbody>
</table>

**Skin contact irritants and separate sensitisers**

<table>
<thead>
<tr>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acrylates</td>
</tr>
<tr>
<td>Cresols</td>
</tr>
<tr>
<td>White spirit</td>
</tr>
</tbody>
</table>

It should not be overlooked that workers are often exposed to more than one solvent at the same time. This could result in additive effects or, in some cases, effects greater than the sum of the individual solvents.

### 2.6 Those Most at Risk

#### 2.6.1 Groups Generally at Risk

There are a wide range of workers exposed to solvents within the workplace. Some occupations together with typical solvent-containing materials that they might use are given below.

<table>
<thead>
<tr>
<th>Occupational grouping</th>
<th>Substances used that contain solvents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carpenters and joiners</td>
<td>Adhesives</td>
</tr>
<tr>
<td></td>
<td>Paint strippers</td>
</tr>
<tr>
<td></td>
<td>Paint thinners</td>
</tr>
<tr>
<td></td>
<td>Lacquers and varnishes</td>
</tr>
<tr>
<td>Paint sprayers</td>
<td>Paint</td>
</tr>
</tbody>
</table>
As well as those obviously exposed, others in the vicinity may also be at some risk. These include contractors, maintenance staff carrying out emergency or routine work and visitors.

It is also important to emphasise that, although a particular operator may not be affected by the use of specific solvents in the operation, there could be solvents used elsewhere that have a damaging effect. This situation could arise from recirculation of solvent-contaminated air.

### 2.6.2 High Risk Employees

As well as including non-operatives (e.g. maintenance staff) in the list of those to be considered at possible risk from exposure to solvents, the actual capabilities of those undertaking the work should be addressed. In addition to the typical worker in the engineering workshop environment, there could be those with impaired capabilities.

Particular consideration should be paid to staff who:

1. Are pregnant or new mothers
2. Have a medical history of skin or respiratory sensitisation

There are other possible high risk employees (e.g. young people on work experience) to be considered.

### 2.6.3 Pregnant Women and New Mothers

Some lesser used solvents (e.g. 2-ethoxyethyl acetate, \( \text{C}_2\text{H}_5\text{OCH}_2\text{CH}_2\text{OOCCH}_3 \); carbon disulphide, \( \text{CS}_2 \)) are suspected of causing harm to unborn children, and solvents in general (since they are fat soluble) have the potential for entering breast milk if the solvent is absorbed by the mother.

Under the *Management of Health and Safety at Work Regulations 1999* (S.I. 1999, No. 3242), special attention has to be paid to new and expectant mothers. This is of particular importance to solvent handling as new and expectant mothers are more susceptible to harm from exposure.

### 2.6.4 Workers with Higher Susceptibility

Any workers with a medical history of skin or respiratory sensitisation are particularly susceptible to harm if exposed to substances (e.g. solvents) that are known sensitisers.

It would be unwise, and negligent under the *Health and Safety at Work etc. Act 1974*, to allow these sensitised people to work where it is known that certain solvents were being used or generated in significant quantities.
3. Controlling the Risks From Solvents

3.1 Risk Assessment Checklist for Solvents

A checklist will assist in conducting a risk assessment of solvents and should cover, where appropriate:

1. Products
2. Place of work
3. Work equipment
4. People at risk
5. Procedures

It is likely that negative or unknown answers to the questions will mean a higher level of risk of harm to health. In these cases, more controls should be put in place that will be suitable and sufficient to prevent a risk to health.

Normally, the managing of solvent risks is relatively simple, and this can not only improve the health of the workforce but also reduce solvent usage and save money. It should be noted that the recommendations made in the checklist are intended to identify where attention should be directed, and are not exhaustive.

Checklist for Risk Assessment of Solvents

- Are you aware of any health-related problem in the workplace regarding solvents?
- Is up-to-date hazard information available from the supplier?
- Has a competent person carried out an assessment in accordance with the requirements of the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677) for solvents in the workplace?
- If solvent monitoring in the workplace was undertaken, were the values measured below the occupational exposure limit values?
- If solvent monitoring is required to be undertaken, is it carried out by a competent person on a predetermined basis according to a set procedure?
- Is the workplace well ventilated?
- Is there a general background odour of solvents in the atmosphere?
- Is work undertaken with solvents in confined spaces, especially cleaning operations?
- Is housekeeping carried out in the workplace on a planned, regular basis?
- Have the various capabilities of the operators been considered?
- Have all personnel received adequate information and training regarding use of the safe equipment?
- Have all personnel received adequate training in the handling of hazardous substances?
- Have all personnel received adequate training in the use of personal protective equipment?
- Is there a procedure for selecting solvents to be used?
- Are there written records of the examination of local exhaust ventilation?
• Are written records kept for training the operators?
• Are there any procedures for reporting by staff of solvent-related occurrences?
• Are there procedures for surveying incident and accident reports?
• Have all personnel been informed about accident reporting procedures and been trained in using them?
• Is health surveillance considered or carried out?

3.2 Identifying Solvents

3.2.1 Drawing Up an Inventory

The first exercise in identifying hazards is to find out the solvents used in the organisation and the processes in which they are used. The making of an inventory is one of the recommended first steps of a COSHH assessment. This list should include those solvents that are used for operations for which they were not originally intended - for instance the cleaning of paint brushes with spent organic solvent - and also products that contain at least one solvent as part of their formulation, such as a paint preparation.

Although there may be small operations where there is exposure to a solvent, for instance when using many adhesives, the major exposure will arise from the tasks given below.

<table>
<thead>
<tr>
<th>Task</th>
<th>Solvents in use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint spraying</td>
<td>White Spirit (mainly alkane hydrocarbons)</td>
</tr>
<tr>
<td>Paint formulation</td>
<td>n-Butyl acetate (CH₃COO(CH₂)₃CH₃)</td>
</tr>
<tr>
<td>Paint stripping</td>
<td>Dichloromethane (CH₂Cl₂)</td>
</tr>
<tr>
<td>Cleaning and degreasing</td>
<td>Trichloroethylene (CCl₂=CHCl)</td>
</tr>
</tbody>
</table>

3.2.2 Classification of Solvents

Having drawn up the inventory, the next task is to find out if the solvents pose any hazards to health; that is, if they are classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (S.I. 2002, No. 1689) (CHIP3) or possess an occupational exposure limit value. To determine the latter, reference should be made to the safety data sheet (SDS), or to the EH 40 publication in case the SDS fails to include this information. The product label and the SDS should indicate if the solvent is classified. Specific CHIP symbols and risk phrases that indicate a possible risk of handling solvents are given below.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Risk phrase</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmful</td>
<td>R20: Harmful by inhalation</td>
<td>n-Butanol</td>
</tr>
<tr>
<td>Category</td>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>Harmful</td>
<td>R21</td>
<td>Harmful in contact with skin</td>
</tr>
<tr>
<td>Harmful</td>
<td>R22</td>
<td>Harmful if swallowed</td>
</tr>
<tr>
<td>Corrosive</td>
<td>R34</td>
<td>Causes burns</td>
</tr>
<tr>
<td>Irritant</td>
<td>R36</td>
<td>Irritating to the eyes</td>
</tr>
<tr>
<td>Irritant</td>
<td>R37</td>
<td>Irritating to the respiratory system</td>
</tr>
<tr>
<td>Irritant</td>
<td>R38</td>
<td>Irritating to the skin</td>
</tr>
<tr>
<td>Irritant</td>
<td>R41</td>
<td>Risk of serious damage to eyes</td>
</tr>
<tr>
<td>Irritant</td>
<td>R43</td>
<td>May cause sensitisation by skin contact</td>
</tr>
<tr>
<td>Toxic</td>
<td>R23</td>
<td>Toxic by inhalation</td>
</tr>
<tr>
<td>Toxic</td>
<td>R24</td>
<td>Toxic in contact with skin</td>
</tr>
<tr>
<td>Toxic</td>
<td>R25</td>
<td>Toxic if swallowed</td>
</tr>
</tbody>
</table>

Safety phrases will also be included on both the label and SDS, but since these are mostly derived from risk phrases (R phrases) they have less significance.

If the solvent has either a maximum exposure limit (MEL) (e.g. diethyl sulphate, benzene, trichloroethylene) or, more likely, an occupational exposure standard (OES) (e.g. ethylacetate, cresols, turpentine), exposure should be reduced as far below the assigned MEL value as reasonably practicable, or should not exceed the quoted OES level.

### 3.3 Safety Data Sheets

Safety data sheets (SDS) are essential when carrying out an assessment in accordance with the requirements of the *Control of Substances Hazardous to Health Regulations 2002* (S.I. 2002, No. 2677) and should contain specific information.
Good safety data sheets will include the relevant label (e.g. irritant symbol) plus the associated risk phrases on the front page to immediately communicate the hazards to the user. This, however, is not always the case. Besides the classification it is important to look for other information on the SDS and since safety data sheets, if compliant with CHIP, are in a prescribed format, this should not be difficult. A section from the SDS for trichloroethylene (CCl$_2$=CHCl) will indicate the sections of the SDS relevant to evaluating the health risks, as given below.

<table>
<thead>
<tr>
<th>SDS section</th>
<th>Typical Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard identification</td>
<td>Harmful Symbol R-phrase:</td>
</tr>
<tr>
<td></td>
<td>• R45 May cause cancer (Carcinogen Category 2)</td>
</tr>
<tr>
<td></td>
<td>• R52 Harmful to Aquatic organisms</td>
</tr>
<tr>
<td></td>
<td>• R53 May cause long term adverse effects in the aquatic environment</td>
</tr>
<tr>
<td></td>
<td>Noting that the product has an occupational exposure limit (OES data given under Exposure controls)</td>
</tr>
<tr>
<td>First aid measures</td>
<td>First aid procedures to be adopted in the event of ingestion, inhalation and contact with skin or eyes</td>
</tr>
<tr>
<td>Exposure controls/personal protection</td>
<td>15-minute MEL 820 mg/m$^3$</td>
</tr>
<tr>
<td></td>
<td>8-hour MEL 550</td>
</tr>
<tr>
<td>mg/m³</td>
<td>Recommended engineering controls:</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td></td>
<td>• provide local exhaust ventilation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Personal protection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• avoid inhalation of vapour</td>
</tr>
<tr>
<td>• wash hands before and after work</td>
</tr>
</tbody>
</table>

| • wear personal protective equipment appropriate to the task, e.g. gloves, safety goggles, respirator (if ventilation is inadequate) |

<table>
<thead>
<tr>
<th>Stability and reactivity</th>
<th>Materials to avoid:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• the product can attack plastic</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hazardous decomposition products:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• hydrogen chloride, Carbon monoxide; Phosgene (above 110°C)</td>
</tr>
</tbody>
</table>

| Regulatory information | Repeat of information on the product label |
It should be appreciated that the classification and labelling of a product is based almost exclusively on the results from animal experiments; there is rarely any information derived from handling of the product in the workplace. Therefore, it is good practice to consult the accident book and absentee reports to find out if a particular process or product has apparently already been causing problems (e.g. skin irritation or nausea).

Obtaining SDS should be fairly straightforward, since under the *Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* (S.I. 2002, No. 1689) (CHIP3) there is an obligation for suppliers of hazardous substances to send a SDS to customers receiving the product. This SDS should be sent at the latest with the product, allowing the customer to undertake a risk assessment prior to use. If one is not issued, it should be requested from the supplier.

### 3.4 Undertaking COSHH Assessments

Only an overview of undertaking an assessment in accordance with the requirements of the *Control of Substances Hazardous to Health Regulations 2002* (S.I. 2002, No. 2677) of particular relevance to solvents is included here.

The safety data sheet (SDS) should have led to the identification of the hazards. The next exercise is to determine what, if any, significant exposure there is to the workforce as a result of the specific work activities.

In particular, these questions should be asked:

1. What are the processes where the solvent is used?
2. How much solvent is used?
3. For how long are the workers exposed?
4. What control measures (e.g. local ventilation) are in place?
5. How often are the operators exposed (e.g. continually, five minutes every hour, etc.)?

Some of these questions can be answered by reference to the SDS and others by a knowledge of the operation (if in doubt the operators should be consulted).

A typical form, which can be the basis of the COSHH assessment - in this case for trichloroethylene - is given here.

<table>
<thead>
<tr>
<th>Chemical/Product</th>
<th>Trichloroethylene - CCl₂ = CHCl₃</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Machine Shop 3</td>
</tr>
<tr>
<td>Supplier</td>
<td>XYZ Solvents Ltd</td>
</tr>
<tr>
<td>Hazard</td>
<td>Harmful Possible risk of irreversible effects</td>
</tr>
<tr>
<td>MEL/OES value</td>
<td>15 min 820 mg/m³ 8 hours: 550 mg/m³</td>
</tr>
<tr>
<td>Route(s) of</td>
<td>Inhalation</td>
</tr>
<tr>
<td>SDS No.</td>
<td>135</td>
</tr>
<tr>
<td>exposure</td>
<td>Skin contact</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Quantities used</td>
<td>5 litres per batch cleaning operation</td>
</tr>
<tr>
<td>Physical form</td>
<td>Vapour, liquid</td>
</tr>
<tr>
<td>Volatility</td>
<td>Boiling point (105ºC) near processing temperature (90ºC)</td>
</tr>
<tr>
<td>Current exposure controls</td>
<td>Exhaust ventilation used</td>
</tr>
<tr>
<td>PPE</td>
<td>Rubber gloves, safety goggles, respirator (for heated operations)</td>
</tr>
<tr>
<td>Has monitoring been undertaken?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are controls adequate?</td>
<td>Yes (If no, recommend additional control procedures)</td>
</tr>
<tr>
<td>Assessed by: A. Jones (Chief Technician)</td>
<td>Approved by: Dr P. Smith (Lab. Manager)</td>
</tr>
<tr>
<td>Date: 12/4/02</td>
<td>Date: 17/4/02</td>
</tr>
<tr>
<td>Additional Control Procedures: It is</td>
<td></td>
</tr>
</tbody>
</table>
recommended that Viton gloves are used and that they are inspected after use. (Trichloroethylene is absorbed through the skin.)

Date of Review: 12/4/2003

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3.5 Hierarchy of Means of Control

3.5.1 Overview to the Hierarchy of Control

If answers to questions in the checklist (see Risk Assessment Checklist for Solvents) indicate that exposure to the solvent may cause ill health, then the hazard must be adequately controlled. If there is any doubt, then the solvent level should be measured. In fact this is the only way to know the actual solvent level in the workplace.

Assuming that the exposure to solvents is not adequately controlled, there is a hierarchy of procedures to be taken:

1. Elimination or substitution of the hazardous solvent
2. Modification of the process
3. Provision of some form of engineering controls (e.g. ventilation)
4. Training
5. Wearing of personal protective equipment

3.5.2 Elimination or Substitution of Solvents

As part of the COSHH assessment, it is likely to be recommended that an initial control measure is to eliminate or substitute the hazardous substance. Although it is unlikely that a non solvent-based product could be used, it might be possible to substitute the currently used solvent with a less volatile alternative.

Another consideration might be to modify or purchase new equipment that requires less solvent usage. For new processes, careful consideration should be given to the choice of solvent and, in situations where new processes are frequently being introduced, it is recommended that a procedure should be in place.

This should not be over elaborate but merely pose the questions, for instance:

1. Is the solvent classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002 (S.I. 2002, No. 1689) (CHIP3)?
2. Does the solvent have a reported occupational exposure limit value?
3. Are there any staff members who could be sensitive to the solvent?

If the answer to any of the above questions is 'yes', you need to ask whether the specified solvent is really necessary or
whether it could be replaced with an alternative, less hazardous, solvent.

If the answer to this question is ‘no’, then ask whether the necessary control measures will be in place to minimise exposure.

3.5.3 Modification of Processes

As well as being specifically involved as part of a process (e.g. appliance degreasing or cleaning, paint spraying), solvents can be supplementary to a process, as with equipment cleaning with a proprietary product containing a solvent. The type and extent of solvent usage will largely depend on the particular equipment being used.

A number of processes can be modified to ensure the workers are less exposed to the risk of harm from solvents.

Examples of these include:

1. Investing in new containers with well fitting lids and with a water cooling system, plus the use of curtains or screens to reduce solvent vapours caused by draughts to avoid high solvent levels, resulting from mixing paint preparations in open containers at temperatures above ambient.

2. Replacing existing degreasing tanks with larger enclosed tanks, and a change in the process that uses tanks less frequently, is run at a lower temperature or the use of a blanket of floating polypropylene balls (ALLPLAS) to significantly reduce solvent evaporation that will cause high operator exposure to emissions of solvents from degreasing tanks.

3. Installation of a hoist with a basket attachment (to hold the parts) above the solvent baths to allow both better solvent removal and drainage and a process that enables higher quantities of parts to be stripped together after paint stripping instead of removal of parts by hand, which results in high short-term skin contact and spillage of large volumes of solvent.

4. Enclosure of the drying process and diversion of vapours (e.g. local exhaust ventilation) from the workplace to avoid solvent vapour (e.g. from trichloroethylene) evolved into the workplace from degreased components left to dry after cleaning.

5. Using more efficient spray guns (e.g. high volume low pressure spray guns) and other equipment (e.g. more up-to-date) where there is less solvent evaporation to avoid unacceptably high solvent levels during paint spraying; also consider paint that has improved adhesive properties onto items being sprayed.

6. Replacing manual cleaning with an automatic system including solvent removal extraction to avoid the handling of large solvent volumes with manual cleaning of mixing vessels.

As well as the obvious reduction in atmospheric solvent levels and the predicted improvement in the health of the workforce, measures to reduce the usage of solvents will decrease costs.

3.5.4 Enclosure of a Process

Total enclosure of a process, where there might be vessel lids that interlocked to the extraction system, should eliminate the release of solvent vapour completely. Although on the surface this might seem an expensive option, the subsequent saving in the purchase of solvents might overcome the cost when the area is viewed in the longer term.

Guidance on the safe use and cleaning of solvent degreasing plants has been published by the Health and Safety Executive (HSE). *EIS 40 Safe use of solvent degreasing plant* summarises the main precautions required when carrying out solvent degreasing, while the existing leaflet *EIS20 (rev 1) Maintenance and cleaning of solvent degreasing plant* has been revised and updated (both available free of charge from HSE Books).

Both guides, which are supported by a cross-industry surface cleaning working group, explain what constitutes good practice in the use of solvent degreasers and complement earlier HSE advice on surface cleaning of metal articles and components, *EIS34 Surface cleaning: Solvent update including the reclassification of trichloroethylene* (available free of charge from HSE Books).
If possible, solvent degreasing should be carried out in an enclosed system. Where open-topped degreasers are used, they should be enclosed as far as is reasonably practicable. Retrofitting of an enclosure on a conventional open-topped degreaser can significantly reduce both operator exposure and vapour emissions into the workplace if designed, installed and operated correctly.

Solvent degreasing plants require routine maintenance and cleaning if they are to perform and run effectively and safely. Maintenance and cleaning procedures should be designed to eliminate or minimise the need to enter the degreaser.

### 3.6 Ventilation

#### 3.6.1 Ventilation as a Risk Control

There are basically two forms of ventilation: general ventilation and local exhaust ventilation (LEV). When solvent levels in the workplace environment are judged (e.g. by specific measurement) to be low (that is, well below any quoted occupational exposure standard) and the solvents are not used frequently, then general ventilation may be sufficient. This decision could form part of your general risk assessment.

However, consideration should be given to likely temperatures in the workplace; high temperatures may increase solvent vapours, low temperatures could cause windows to be closed. LEV should be used if these minimal conditions are not met (e.g. the solvent has a maximum exposure limit and large volumes are used).

#### 3.6.2 General Ventilation

If a particular process cannot be enclosed, effectively eliminating exposure to solvents, some form of ventilation should be introduced. Although this will often be local exhaust ventilation (LEV), the opening of doors and windows or the suitable positioning of roof fans and wall fans may be sufficient to dilute the background levels of solvent.

It should be realised that such ventilation may cause uncontrolled draughts that could increase the overall exposure. If ventilation is required, the removal of solvent vapours at source (that is, LEV) will be the preferred option.

#### 3.6.3 Local Exhaust Ventilation

Although local exhaust ventilation (LEV) can take many forms, a preferred system is to have the process enclosed as much as possible with the ventilation hood positioned close to the opening. It is important to have the LEV system designed and installed professionally to ensure, for instance, that solvent vapours are being extracted efficiently and the removal of excessive amounts of solvent vapour does not involve the removal of too much air.

Ideally, the extraction should be placed as close as possible to the point where the solvent vapours are being released. This is particularly relevant when the vapours are heavier than air, as failure to do this could result in the operator being exposed to the dispersed vapours. Thought should also be given to switching off the LEV to reduce solvent loss, providing that solvent vapours have ceased being generated (e.g. not with a warm degreasing tank).

The actual flow rate of the extraction system will be governed by the specifications of the system (e.g. motor capacity, installed filters, size of ducting), and should be designed to remove adequately the solvents being generated.

### 3.7 Working in Confined Spaces

There are a number of points to consider when working with solvents in confined spaces, or even on vessels that are nominally empty of solvent. It is recommended that any work of this nature is subject to a 'permit-to-work' system. Monitoring the atmosphere for the presence of harmful or flammable vapours will also be required.

The welding or the cutting of tanks which had originally contained solvent is normally undertaken only after first purging the vessel with nitrogen and further with fresh air, as required. An alternative is to thoroughly wash the vessel with water.

Working in confined spaces at elevated temperatures should be avoided if possible since there is more risk of solvent vapour being released and the physical effects of distress and discomfort are exacerbated.
Unfortunately, many multiple fatalities have arisen when a person has entered a vessel, been overcome by solvent vapours and a rescuer (or rescuers) have gone into the vessel after them only to also be fatally overcome by the vapours. Initially, a measurement of the solvent level in the confined space may yield a satisfactory result but as work proceeds, for example the vessel is heated by the use of welding equipment, or sludge at the bottom of the tank is disturbed, more solvent is released. Continual monitoring and the wearing of rescue harnesses should be considered essential.

A cartridge or filter respirator can only remove contaminants; it cannot provide oxygen or breathable air. For this reason self-contained breathing apparatus or air-fed respirators would be safer for all but the simplest of vessel entry work. Removal of the lid of the vessel to provide unrestricted access is another option sometimes available to make the entry safer and remove the element of a confined space. All work undertaken must comply with the Confinement Spaces Regulations 1997 (S.I. 1997, No. 1713).

3.8 Personal Protective Equipment

3.8.1 The Requirement for Personal Protective Equipment

Although the requirement and type of personal protective equipment (PPE) to be worn should be stated on the safety data sheet, it should be realised that this information is normally fairly general, since the supplying company will often not know how and where the substance is to be used.

A general rule is that the wearing of PPE should be dependent on the hazard properties of the solvent. Therefore, a non-hazardous solvent without a recognised occupational exposure limit and of low volatility (e.g. methyl amyl acetate, a solvent for lacquers) could be handled without any PPE (although you must consider whether there may be other solvents used in the process that demand the wearing of PPE).

In contrast, a corrosive liquid with a listed maximum exposure limit value (e.g. dimethyl sulphate) would require full PPE. This full PPE could be comprised of thick solvent resistant gloves, safety goggles with side protection (or a full face visor), a respirator, a protective apron and rubber boots.

Between these two extremes (e.g. the handling of xylene, which is harmful by inhalation and in contact with skin, and has an occupational exposure standard) there could be the wearing of gloves and simple safety glasses for low volatility solvents, which are slightly irritant to skin and eyes and without an occupational exposure level.

By all means err on being 'over protective', but avoid the situation where full PPE is stipulated for non-hazardous solvents. In addition, the need to wear PPE could be influenced by the task being performed, for example working in confined spaces will demand a respirator.

The choice of PPE will have to be made from the information obtained as a part of the COSHH assessment and the way in which the solvent is being used. In certain operations, there will be the need for operators to wear respiratory protective equipment as, for example, in a paint spraying booth or when working with solvents in a confined space. Although appropriate safety goggles and overalls should be worn, the most relevant PPE to the handling of solvents are gloves and respiratory protective equipment.

3.8.2 Gloves

There are numerous types of solvent resistant gloves available, each with its own permeability property towards solvents and unique design (e.g. elbow-length). The latter is important when the actual solvent handling process is considered. For most solvents it is recommended that gloves should be worn to inhibit direct skin contact but, unfortunately, depending on the solvents handled, there are few gloves that offer the desired mechanical strength together with protection for the total working day.

The HSE have published guidance for dealing with solvent use, HSG188 Health risks management: A guide to working with solvents (available from HSE Books, price £5.75, ISBN 0 7176 1664 9), which gives a guide to the type of glove to be used for the solvent being used (reproduced below). It must be stressed that this is only a guide and further professional advice should be sought elsewhere.

<table>
<thead>
<tr>
<th>Solvent</th>
<th>First Choice*</th>
<th>Second Choice**</th>
</tr>
</thead>
</table>

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19

Controlling the Risks From Solvents
<table>
<thead>
<tr>
<th>Solvent</th>
<th>(Type of material)</th>
<th>(Type of material)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetone [CH_3COCH_3]</td>
<td>Butyl</td>
<td>No other material suitable</td>
</tr>
<tr>
<td>Butanol [CH_3(CH_2)_3OH]</td>
<td>Nitrile</td>
<td>Neoprene™</td>
</tr>
<tr>
<td>Ethyl Acetate [CH_3COOC_2H_5]</td>
<td>Butyl</td>
<td>Nitrile, only for short periods</td>
</tr>
<tr>
<td>Ethylene glycol [CH_2OHCH_2OH]</td>
<td>Butyl</td>
<td>Natural rubber/Neoprene™ for short periods only (degradation occurs)</td>
</tr>
<tr>
<td>n-Hexane [C_6H_{14}]</td>
<td>Viton™</td>
<td>Nitrile</td>
</tr>
<tr>
<td>Isopropyl acetate [CH_3COOCH(CH_3)_2]</td>
<td>Butyl</td>
<td>Nitrile</td>
</tr>
<tr>
<td>Methanol [CH_3OH]</td>
<td>Butyl</td>
<td>Nitrile</td>
</tr>
<tr>
<td>Methyl ethyl ketone [CH_3COC_2H_5]</td>
<td>Butyl</td>
<td>Nitrile</td>
</tr>
<tr>
<td>Methylene chloride [CH_2Cl_2]</td>
<td>Viton™</td>
<td>Nitrile only gives short-term protection. There is currently no suitable material available offering more.</td>
</tr>
<tr>
<td>Perchloroethylene [CCl_2=CCl_2]</td>
<td>Viton™</td>
<td>Nitrile</td>
</tr>
<tr>
<td>Styrene [C_6H_5CH=CH_2]</td>
<td>Viton™</td>
<td>Butyl</td>
</tr>
<tr>
<td>Toluene [C_6H_5CH_3]</td>
<td>Viton™</td>
<td>Nitrile, only for short periods</td>
</tr>
<tr>
<td>Trichloroethylene [CCl_2=CHCl]</td>
<td>Viton™</td>
<td>Nitrile, only for short periods</td>
</tr>
<tr>
<td>White Spirit (Stoddard solvent)</td>
<td>Nitrile</td>
<td>Neoprene™</td>
</tr>
<tr>
<td>Xylene (\text{C}_6\text{H}_4\text{(CH}_3\text{)}_2)</td>
<td>Viton™</td>
<td>Nitrile, only for short periods</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------</td>
<td>-------------------------------</td>
</tr>
</tbody>
</table>

* Used if operators are routinely putting their hands into the solvent.
** Used when there is occasional splashing of solvent onto the ground.

Reproduced by kind permission of HSE Books, from HSG188 Health risks management; A guide to working with solvents.
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In addition, the Marigold Industrial can be contacted for advice on proper glove selection:

Marigold Industrial LRC Products Ltd
London International House
Turnford Place
Broxbourne
Herts
EN10 6LN
Tel: 01992 456700
Fax: 01992 471536
www.marigoldindustrial.com/

Their website includes selection information covering chemical resistance, proper sizing, maintenance and use of gloves (e.g. examination, protecting against the hazard, etc.).

### 3.8.3 Respiratory Protective Equipment

The use of the correct respiratory protective equipment (RPE) is important. If in doubt, the RPE manufacturer should be consulted.
There are basically two forms of RPE:

1. Those containing cartridges that filter the solvent from the air (available as full and half masks with and without eye protection and can operate in positive pressure mode)

2. Air-fed respirators that provide fresh air

Although the former are cheaper, depending on their use the cartridges have to be specific for the solvent being used and have to be changed on a regular basis. The air-fed varieties have the advantage that they can be used for a variety of applications involving solvents. However, whatever RPE is employed to give protection, it must be used as stipulated by the manufacturer and continually maintained.
4. Storage and Disposal of Solvents

4.1 Storage of Solvents

The storage of solvents will largely depend on their properties and the quantities required in the workplace. Ideally, all solvent storage tanks and areas containing smaller volumes of stored solvents should be bunded (i.e. be surrounded by a low wall that will contain any spills, up to the total capacity of the full containers). However, sometimes this may not be practical or really essential. A decision as to whether bunding is required should have been determined as part of the general risk assessment exercise.

Without going into specific details, issues like flammability, toxicity and effects on the environment (i.e. aquatic and atmospheric) resulting from spilt product should have been considered. If possible, storage of solvent should be situated in a bunded area or dedicated solvent storage facility well away from the main workplace.

When not in use, open vessels containing solvents should be closed, covered with lids or filled with polypropylene balls to prevent solvent vapours being released into the working environment. Large volumes of solvents should be securely stored in a flammable solvent store and only those quantities being used on a daily basis should be kept in the general working area.

The actual vessels used for the latter should be made from either the same material as the original container from the supplier (e.g. thermosetting plastics) or as supplied for performing the designated task. If required, information on the compatibility of the solvent with the vessel should be obtained from the vessel manufacturer or the solvent supplier.

Where there is a possibility of leakage or spillage of a solvent, drip trays and/or bunding need to be provided. If a spillage does occur it should be cleaned up immediately using the materials, such as sand or sawdust, as prescribed by the safety data sheet. Adherence to any recommended personal protective equipment (e.g. solvent resistant gloves) is required during this operation. If the clean-up operation is not successful and spilled chemicals do enter a surface water drain, ditch, watercourse or soakaway, ring the Environment Agency pollution hotline for assistance immediately:

Environment Agency Pollution Hotline
Tel: 0800 807060

If spilled chemicals enter the foul sewer, notify the local Water Company (Water Authority in Scotland) immediately. This will help them prevent the spillage causing damage to the environment or their treatment works downstream.

4.2 Disposal of Solvents

Under the Environmental Protection (Duty of Care) Regulations 1991 (S.I. 1991, No. 2839), any producer of waste has a general duty of care for its disposal. The disposal of unused solvent and solvent waste should be in accordance with the relevant national and local legislation (e.g. the Trade Effluent (Prescribed Processes and Substances) Regulations 1992 (S.I. 1992, No. 339)).

It must not be tipped into the drainage system where it can adversely affect the integrity of the sewer and eventually reach a biological purification plant with possible harmful consequences to the biological treatment processes. If this does accidentally occur, the local water authority should be informed at once.

Where at all possible, the solvent should be recovered (e.g. by distillation) for reuse. Alternatively, it could be considered for use as a fuel. Since it will be categorised as special waste (in accordance with the Special Waste Regulations 1996 (S.I. 1996, No. 972)), a special waste contractor will be required to take responsibility for the disposal. This will involve the preparation of consignment notes and liaison with the local Environment Agency office.

For various reasons, including the prohibition of landfill for highly flammable liquids, solvent waste will be disposed of by high temperature incineration.
5. Worker-specific Issues

5.1 Training and Instruction

It is of the utmost importance that all staff involved with activities where solvents are used or produced have adequate training and are given sufficient information and instruction. If employees are fully aware of, and understand, the possible consequences of being exposed to solvent vapours and the systems of work employed to control them, they should readily adopt the prescribed procedures. This should result in reduced atmospheric solvent levels, lower solvent usage and, therefore, lower costs. As a minimum, the training and information supplied to staff should include the following.

Checklist of Training Information for Users of Solvents

- An overview of health and safety legislation, including the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677)
- The possible hazards associated with the solvents being used
- The possible symptoms and ill-health consequences of exposure to solvents
- Details concerning handling of solvents in the course of work
- General personal hygiene requirements (e.g. washing hands, not eating or drinking in working areas)
- The control measures adopted (e.g. local exhaust ventilation, personal protective equipment), their rationale and their operation
- A session on the recognition of hazard warning symbols on labels and safety data sheets
- The action to be taken in reporting symptoms (e.g. skin or respiratory problems) connected with handling solvents

5.2 Pregnant Women

In order to carry out valid COSHH assessments, management must be aware of any medical conditions, and this includes pregnancy. It should be made the responsibility of women employees to inform management if they are pregnant, and they should be aware of this responsibility (e.g. it should be included in their contract of employment).

Although evidence is generally lacking regarding the effect of solvents on pregnant women and breast-feeding mothers, as a precaution they should be removed from the process involving solvents where the COSHH assessment has identified any risk.

5.3 Health Surveillance

5.3.1 Pre-employment Procedures

As part of any pre-employment procedures, a question as to any medical history of sensitisation to solvents should be asked. Although this may seem a strict practice, it would be better not to employ such a person in the first instance, rather than to make someone redundant who later developed symptoms of solvent sensitisation.

However, any such decision must be taken in accordance with the Disability Discrimination Act 1995. A common practice within industry where the work involves the possibility of developing an allergic response is for potential employees to complete a medical questionnaire. The questionnaire is assessed by a medical practitioner and any employee with 'positive answers' is subject to examination by the medical practitioner.
5.3.2 Provision of Health Surveillance

Under the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677), reg. 11(2), health surveillance is only obligatory for those working with a small number of prescribed substances given in the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677), Sch. 6 (e.g. the manufacture, formation or use of ortho-toluidine, dianisidine or dichlorobenzidine or their salts) and if certain conditions apply.

These conditions are if:

1. An identifiable disease or adverse health effect may be related to the exposure
2. There is a reasonable likelihood that the disease or adverse health effect may occur under the particular conditions of the work
3. There are valid techniques for detecting indications of the disease or effect

Some solvents have certainly identified effects from exposure (e.g. asthma and dermatitis) and there are validated techniques for detecting occurrences of the disease or effects. Whether or not the levels of exposure are sufficient to trigger symptoms of an effect will depend on the solvent, the control measures, and therefore the degree of exposure, and the individual worker (e.g. is there a medical history of sensitisation?).

It is recommended that when working with solvents, particularly where a specific solvent is or is suspected of being a sensitiser (this information should be included in the safety data sheet) then some form of health surveillance is undertaken. This can be by the use of a suitable questionnaire, or some form of self assessment (e.g. the condition of the hands) or both. Medical advice should be obtained where there is a suspicion of sensitisation; such employees should be removed from their work with solvents at an early stage.

In the TUC survey 'Masking the Problem', it was found that the health of workers using solvents was not subjected to surveillance by most employers and, furthermore, even fewer employers actually monitored the solvent levels in the atmosphere. These are disappointing findings. Whereas it would be unnecessary and impractical to conduct strict health surveillance with regular medical examinations for the vast majority of those handling solvents on a regular basis, it would be useful, both to the worker and the employer, to carry out some form of health check. This should be undertaken as part of the pre-employment procedures, on a regular basis (e.g. annually) or following the report of a solvent-related accident or ill-health problem.
Key Questions

- We only do office work; do we need to worry about solvents?
  See Introduction to Solvents.

- Can people be made ill by solvents even though they are not actually using them?
  See High Risk Employees.

- Is it not sufficient to issue gloves and goggles to our operatives using solvents?
  See Hierarchy of Means of Control.

- Do we have to 'bund' all our solvent storage?
  See Storage of Solvents.

- What should be in a training course for users of solvents?
  See Training and Instruction.
Troubleshooter

Finding Our Solvents

Q. We are not sure what solvents we have on-site, and indeed if certain products are, or contain, solvents. What should we do?

A. The locating of the solvents can be undertaken in two ways. Firstly, products can be identified by the conduction an inventory during the general workplace inspections. Secondly, less obvious sources of solvents may be identified by analysing the invoices for products bought by the organisation.

In both cases products may be identified if you are not sure of their formulation, i.e. to see whether they contain solvents. The safety data sheet should help here, or contact the technical support department of the manufacturer. See Classification of Solvents.

Custom Designed LEV

Q. We have just had a quote for a custom designed LEV system which seems very high. Is it necessary to have it custom made?

A. The design of the LEV system and the components used in it - particularly the fan, or air-mover - need to be properly selected, designed and installed to ensure that the intended degree of protection is assured. In addition, improper selection of components could cause danger. Many of the solvents are flammable and the use of an incorrect fan could cause an explosion.

The long-term integrity of the system could also be degraded if the wrong materials are used, for example incorrect materials used for the ducting. As a result of all this, it is likely to be a false economy to attempt to 'cut corners' on the design, selection and installation of an important risk control measure that is provided by LEV. See Local Exhaust Ventilation.

Level of Surveillance

Q. Some of our operatives only have limited exposure to solvents. Do they still need health surveillance?

A. The level of provision of health surveillance is dependant on the risk. For many people the exposure to small amounts of solvents will not affect their health at all. However, for some - such as pregnant women and those that are more susceptible than normal - even small quantities of solvent can cause significant health risks. For this reason, all people exposed to solvents should be subject to a health inspection within a few months of commencing their exposure, possibly within the first three months, but no sooner than the first month (unless health effects are suspected).

The purpose of this is to establish each person's particular susceptibility initially as a benchmark. Thereafter - on medical advice - the inspections can be set at an appropriate interval. However, it is important that all people exposed to solvents are informed of the need to report skin problems or breathing difficulties either to their GP or the company's occupational health department, to ensure that any change in a person's sensitisation is noted and dealt with. See Provision of Health Surveillance.
Checklist for Risk Assessment of Solvents

- Are you aware of any health-related problem in the workplace regarding solvents?
- Is up-to-date hazard information available from the supplier?
- Has a competent person carried out an assessment in accordance with the requirements of the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677) for solvents in the workplace?
- If solvent monitoring in the workplace was undertaken, were the values measured below the occupational exposure limit values?
- If solvent monitoring is required to be undertaken, is it carried out by a competent person on a predetermined basis according to a set procedure?
- Is the workplace well ventilated?
- Is there a general background odour of solvents in the atmosphere?
- Is work undertaken with solvents in confined spaces, especially cleaning operations?
- Is housekeeping carried out in the workplace on a planned, regular basis?
- Have the various capabilities of the operators been considered?
- Have all personnel received adequate information and training regarding use of the safe equipment?
- Have all personnel received adequate training in the handling of hazardous substances?
- Have all personnel received adequate training in the use of personal protective equipment?
- Is there a procedure for selecting solvents to be used?
- Are there written records of the examination of local exhaust ventilation?
- Are written records kept for training the operators?
- Are there any procedures for reporting by staff of solvent-related occurrences?
- Are there procedures for surveying incident and accident reports?
- Have all personnel been informed about accident reporting procedures and been trained in using them?
- Is health surveillance considered or carried out?

For further information on using this checklist see 3. Controlling the Risks From Solvents

Checklist of Training Information for Users of Solvents

- An overview of health and safety legislation, including the Control of Substances Hazardous to Health Regulations 2002 (S.I. 2002, No. 2677)
- The possible hazards associated with the solvents being used
- The possible symptoms and ill-health consequences of exposure to solvents
• Details concerning handling of solvents in the course of work

• General personal hygiene requirements (e.g. washing hands, not eating or drinking in working areas)

• The control measures adopted (e.g. local exhaust ventilation, personal protective equipment), their rationale and their operation

• A session on the recognition of hazard warning symbols on labels and safety data sheets

• The action to be taken in reporting symptoms (e.g. skin or respiratory problems) connected with handling solvents

For further information on using this checklist see 5. Worker-specific Issues
# Model Documents

## COSHH Assessment for a Solvent - Trichloroethylene

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<thead>
<tr>
<th>Chemical/Product</th>
<th>Reference: ABC/123</th>
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<td>Trichloroethylene</td>
<td>- CCl₂ = CHCl₃</td>
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<table>
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<table>
<thead>
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<th>Quantities used</th>
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<table>
<thead>
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<td>Boiling point (105°C) near processing temperature (90°C)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current exposure controls</th>
<th>Date tested: 15.3.02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust ventilation used</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PPE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubber gloves, safety goggles, respirator (for heated operations)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Has monitoring been</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes Levels determined</td>
<td></td>
</tr>
<tr>
<td>Undertaken?</td>
<td>10-20 ppm (gas detection tube method)</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>COSHH Monitoring Report:</td>
<td>LMN 123</td>
</tr>
<tr>
<td>Are controls adequate?</td>
<td>Yes (If no, recommend additional control procedures)</td>
</tr>
</tbody>
</table>

**Assessed by:** A. Jones (Chief Technician)  
**Approved by:** Dr P. Smith (Lab. Manager) 

**Date:** 12/4/02  
**Date:** 17/4/02 

**Additional Control Procedures:**  
It is recommended that Viton gloves are used and that they are inspected after use. (Trichloroethylene is absorbed through the skin.) 
**Date of Review:** 12/4/2003 

[To download a rich text format (RTF) version of this document to your word processor click on the following link: www.gee.co.uk/downloads/factfind/0217.rtf.] 

For further information on using this model document see 3. Controlling the Risks From Solvents
Addresses

Marigold Industrial LRC Products Ltd
London International House
Turnford Place
Broxbourne
Herts
EN10 6LN
Tel: 01992 456700
Fax: 01992 471536

Environment Agency Pollution Hotline
Tel: 0800 807060