Surface cleaning: Solvent update including the reclassification of trichloroethylene

Engineering Information Sheet No 34

Introduction

This information sheet gives basic advice to managers on proposed changes affecting health, safety and environmental controls on the use of solvents, and halogenated solvents in particular.

Halogenated organic solvents are hydrocarbons with one or more of the following halogens: fluorine, chlorine (eg trichloroethylene), bromine (eg n-propyl bromide) or iodine.

These changes take into account the reclassification of trichloroethylene to a category 2 carcinogen (Risk Phrase R45 - May cause cancer) and related restrictions arising from the Solvent Emissions Directive (SED).

This guidance has been written and agreed by a cross-industry working group involving the EEF (Engineering Employers' Federation), SEA (Surface Engineering Association), IMF (Institute of Metal Finishing) and BSTSA (British Surface Treatment Suppliers Association) in partnership with the Health and Safety Executive (HSE), the Department for Environment, Food and Rural Affairs (DEFRA) and Envirowise.

Background

The following points are relevant:

(a) Trichloroethylene, often known as 'trike', was reclassified as a category 2 carcinogen by the European Union (EU) in June 2001;

(b) The change in classification will be implemented into UK law by the Chemicals (Hazard Information and Packaging for Supply) Regulations (CHIP 3), in spring 2002. Once it becomes part of the Approved Supply List, under CHIP 3, trichloroethylene will then automatically be treated as a carcinogen under the Control of Substances Hazardous to Health Regulations (COSHH) and the SED;

(c) Trichloroethylene is used in a large number of workplaces, particularly as a powerful solvent for surface degreasing. It is often used in vapour degreasing tanks for the cleaning of metal parts. Many of the users are small businesses. Most of the tanks currently used are of the open-topped vapour type, and may be as much as 40 years old;

(d) The reclassification of trichloroethylene and consequent requirements under COSHH and SED have far-reaching implications for metal cleaning with trichloroethylene. This information sheet updates and addresses some of the relevant issues;

(e) There continue to be serious incidents, including fatalities, as a result of poor management of degreasing processes. The deaths have been associated with very bad practice, such as entry without breathing apparatus into degreasing tanks to clean them out;

(f) The reclassification of trichloroethylene provides an opportunity to review the use of solvents for metal cleaning and to consider the range of suitable alternatives (for example, see information under 'Free Envirowise solvents publications' on page 4).

The implications of the reclassification of trichloroethylene ('trike') under COSHH

What should users of trichloroethylene for vapour degreasing do now to comply with COSHH?

When considering your options you should read the implications under both COSHH and the SED. You need to ensure that your process satisfies the requirements for both.

Category 1 and 2 carcinogens are subject to specific requirements under COSHH. Employers must first consider whether it is reasonably practicable to prevent exposure to a carcinogen by using an alternative substance or process and, if not, whether it is reasonably practicable to enclose the process totally.

Trichloroethylene users need to consider:

(a) substitution, using an alternative solvent or cleaning process; or, if this is not reasonably practicable,

(b) enclosing the degreasing process as far as is reasonably practicable.

Substitution

Alternative solvents: The use of an alternative solvent should be properly assessed taking into consideration all information. The aim should be to reduce the overall risk to health, safety and the environment. It will not be sufficient for users to simply change the solvent if the degreasing tank is in a poor state and working practices are poor. Using a substitute in a badly maintained plant and/or continuing to follow poor working practices may even increase the risks by exposing workers to high levels of a different hazardous substance. It is important to remember that it will be necessary to make some

adjustments to the plant controls, such as thermostat settings etc, depending upon the substitute selected. Whatever solvent you use, it is fundamental to the protection of worker health that you maintain your plant in an efficient state, in efficient working order and in good repair, and follow good working practices.

Information on good practice for vapour degreasing and possible alternatives, is available in a free Envirowise (formerly the Environmental Technology Best Practice Programme) publication GG15 *Vapour degreasing* Tel: 0800 585794 or see the website at: www.envirowise.gov.uk. This publication is currently (01/2002) being revised by Envirowise.

It is important to note that trichloroethylene is **not** banned for degreasing operations - indeed there may be circumstances where it is the only option.

NB: HSE has recently undertaken a review of one possible substitute, n-propyl bromide, regarding its possible harmful effects. A Chemical Hazard Alert Notice (CHAN) for n-propyl bromide is available through HSE's Infoline. See also 'Useful reading' on page 4.

Alternative processes: The use of an alternative process that does not use organic solvent should also be considered. These alternatives will each have their own advantages and disadvantages. It is important to evaluate and control any risks which the new process may pose. Some wet processes such as plating and passivating can use wet detergent cleaning processes. Others may be able to use techniques such as water blasting or soft blasting with limestone.

Enclosure

If substitution is not feasible then the process should be totally enclosed if this is reasonably practicable. The capital expenditure of a fully enclosed degreasing bath can be recovered from reduced solvent usage, so you should be able to demonstrate that you have given this option due consideration. If you purchase a new plant, you should also ensure that it is able to meet any emission limits applicable under the SED.

If it is not reasonably practicable to enclose a tank, an open-topped tank for vapour degreasing can still be used, but care should be taken to operate the tank in accordance with current good working practices (see *Vapour degreasing* GG15). Also, you should ensure that the tank meets the environmental controls under the SED.

Flammable substances

Care is needed when switching to an alternative organic solvent which may be flammable or highly flammable. For solvents with a flash point of 32°C or less, the Highly Flammable Liquids and Petroleum Gases Regulations 1972 apply. These Regulations require controls on storage, on minimising spillage, on ignition sources and on preventing escape of vapours. For higher flashpoint solvents the Regulations do not apply but similar controls are still recommended, as set out in HSE guidance on the use of flammable liquids, ie *Safe use and handling of flammable liquids* HSG140 ISBN 0 7176 0967 7; *The storage of flammable liquids in containers* HSG51 ISBN 0 7176 1471 9; and *The storage of flammable liquids in tanks* HSG176 ISBN 0 7176 1470 0.

NB: The regulations controlling flammable substances are currently (01/2002) being reviewed to comply with the EU Chemical Agents Directive.

Existing Substances Regulation (ESR) review of trichloroethylene

ESR is a European risk assessment programme for those chemicals produced in high volumes. Member states review occupational, environmental and consumer exposure of high-volume chemicals taken from prepared priority lists. If the risk assessment identifies that risk reduction measures are required, an EU-agreed strategy is produced.

The UK's risk assessment of trichloroethylene under ESR has identified risks for manufacture and all occupational uses, and therefore the UK is developing a risk reduction strategy. For surface cleaning, HSE has proposed that the existing worker protection legislation in Europe (ie COSHH in the UK), provides an adequate framework for the control of risks to workers. Additionally, HSE is advising that the manufacturers and users work together to provide information on best practice for industry use. However, this risk reduction strategy has yet to be agreed by member states.

The strategy is also proposing that an EU harmonised occupational exposure limit is developed for trichloroethylene. In addition the strategy will include a proposal for promoting biological monitoring as an additional means of monitoring the effectiveness of worker health protection measures.

Solvent Emissions Directive (SED)

What are the current requirements for surface cleaning under the Pollution Prevention and Control Regulations?

Currently, surface degreasing requires authorisation under the Local Air Pollution Control (LAPC) system (and its successor the Local Air Pollution Prevention and Control system) if:

(a) it is associated with another activity that requires authorisation (usually coating processes), or

(b) it has a consumption capacity of more than 150 kg/hour or more than 200 tonnes per year.

Under the SED these thresholds are lower than those under LAPC and more activities will be required to obtain authorisations and meet specific conditions.

Which surface cleaning activities will the Solvent Emissions Directive affect?

The following surface cleaning activities fall within the SED:

(a) Any surface cleaning activity using **one tonne or more** per year of a volatile organic compound (VOC) classified as a carcinogen, mutagen or toxic to reproduction (with Risk Phrases R45, R46, R49, R60 or R61) and any halogenated VOCs with possible irreversible effects (Risk Phrase R40);

(b) Any surface cleaning activity using **two tonnes or more** per year of any other volatile organic compound.

VOCs include substances that are volatile at room temperature and substances that release VOCs under their conditions of use – this includes when heat is applied during a process.

What new requirements will these activities have to meet?

The specific requirements for these activities are listed in the SED. Guidance will be made available in the revised Process Guidance (PG) Notes for solvent activities published by DEFRA. In general, activities above the solvent consumption threshold will need to either:

(a) meet an emission limit value in waste gases (mg/Nm^3) and a fugitive emission limit value (percentage of solvent use); or

(b) implement a solvent reduction scheme to reduce emissions from the installation equal to those that would be achieved by meeting the emission limit value. (NB: The reduction scheme cannot be used for R-Phrase compounds.)

There are stricter requirements for those activities using potentially more harmful substances such as trike.

What if you are using trichloroethylene?

For the users of trichloroethylene or any other substances classified as carcinogenic, mutagenic or toxic to reproduction, the SED sets out further control measures. These users will also have to:

(a) meet strict emission limits;

(b) control emissions as far as technically and economically feasible, to safeguard public health and the environment; and

(c) work towards substituting the substance within the shortest possible time.

The strict emission limits are as follows:

(a) Where the mass flow of the substances classed as carcinogenic, mutagenic or toxic to reproduction is greater than or equal to 10g/hr, an emission value of 2 mg/Nm^3 applies;

(b) Where halogenated VOCs are assigned a Risk Phrase of R40 and the mass flow is greater than or equal to 100g/hr, an emission limit of 20 mg/Nm^3 applies.

Complying with the SED

For activities regulated under Part I of the Environmental Protection Act 1990 or the Pollution Prevention and Control Regulations 2000, conditions will be included in their permits to meet the additional SED requirements. The technical requirements will be outlined in the appropriate revised Process Guidance (PG) Note.

New activities, new abatement equipment and substantial changes to existing activities will have to meet the requirements straightaway, while unchanged existing authorised activities must comply with the SED from 31 October 2007.

Further guidance on transitional provisions is contained in the AQ1(01) note issued by DEFRA that can be downloaded from the Environment Agency's website http://www.environment-agency.gov.uk/business/lapc/. DEFRA will consult on proposals in 2002 on how to regulate those activities not currently subject to regulation under the existing pollution control regimes.

Envirowise is reviewing its Good Practice Guides relating to vapour cleaning (*Vapour degreasing* GG15) and surface preparation (*Cost-effective paint and powder coating* GG51) and will produce an updated guide by spring 2002. A web tutorial to help companies with solvent management should also be available from the Envirowise website (www.envirowise.gov.uk) by mid-2002.

Groundwater

Halogenated solvents are common pollutants in groundwater. This has resulted from inappropriate historical practices and poor storage arrangements over many years.

The majority of solvents are listed substances, which should not be discharged to groundwater, in order to comply with the Groundwater Directive. Pollution Prevention Control Regulations 2000 (PPC) authorisations are one means of implementing the Groundwater Directive. Non-PPC activities involving solvents come directly within the scope of the

Groundwater Regulations 1998. Further information is available from DEFRA and the Environment Agency.

Useful reading

General COSHH ACOP, Carcinogens ACOP and Biological Agents ACOP. Control of Substances Hazardous to Health Regulations 1999. Approved Codes of Practice L5 HSE Books ISBN 0 7176 1670 3

EH40/2002: Occupational exposure limits HSE Books ISBN 0 7176 2083 2 (updated annually)

Seven steps to successful substitution of hazardous substances HSG110 HSE Books ISBN 0 7176 0695 3

Health and safety at degreasing operations: Sources of guidance Engineering Information Sheet EIS22 HSE Books (single copy free)

Trichloroethylene: reclassification as category 2 carcinogen and the implications for its use in the workplace HSE Information Document 294/49 (available from HSE's Infoline)

Trichloroethylene users advised to plan ahead for revised hazard classification HSE press release at www.hse.gov.uk/press/e/0199.htm

n-Propyl bromide Hazard assessment document prepared for the Working Group on the Assessment of Toxic Chemicals 2001 (draft available through HSE's Infoline from March 2002)

n-Propyl bromide Chemical Hazard Alert Notice No 26 (available free through HSE's Infoline or at www.hse.gov.uk/pubns/chindex)

Solvent Emissions Directive (SED) (on the limitation of emissions of volatile organic solvents in certain activities and installations - 1999/13/EC)

Free Envirowise solvents publications

These are available on Tel: 0800 585794 or the Envirowise website www.envirowise.gov.uk

Cost-effective solvent management GG13

Solvent management in practice: industry examples GG124

Good housekeeping measures for solvents GG28

Reduce costs by tracking solvents (includes spreadsheets on disk) GG114

Vapour degreasing GG15 (being updated along with GG51 *Cost-effective paint and powder coating: Surface preparation* 01/2002)

Monitoring VOC emissions: Choosing the best option GG203

Free help to stop your profits evaporating leaflet about solvent publications ET209

Other publications

Guidance on the Groundwater Regulations 1998 DEFRA 2001 OOEP1318 (Tel: 08459 556000 or www.defra.gov.uk/environment/water/ground/)

Solvent pollution and how to avoid it Joint EA/ SEPA leaflet (Tel: 0845 933311)

EEF has drafted a list of suppliers of alternative degreasing products, technologies and substances, taking account of the Montreal Protocol which bans certain ozone-depleting substances.

Current key risk phrases

R40 Possible risk of irreversible effects
R45 May cause cancer
R46 May cause heritable genetic damage
R49 May cause cancer by inhalation
R60 May impair fertility
R61 May cause harm to the unborn child

Related websites

HSE: www.hse.gov.uk
Environment Agency: www.environment-agency.gov.uk
DEFRA: www.defra.gov.uk
Envirowise: www.envirowise.gov.uk
BIO-WISE: www.dti.gov.uk/biowise
EEF: www.eef.org.uk
SEA: www.sea.org.uk
IMF: http://www.uk-finishing.org.uk
BSTSA: www.bstsa.org.uk

While every effort has been made to ensure the accuracy of the references and web addresses in this publication, their future availability cannot be guaranteed.

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops.)

For information about health and safety ring HSE's InfoLine Tel: 08701 545500 Fax: 02920 859260 e-mail: hseinformationservices@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG. You can also visit HSE's website: www.hse.gov.uk

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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