

TOPIC INSPECTION PACK

Metalworking fluids: Controlling inhalation exposure to metalworking fluids.

Disease Reduction Programme (DRP)

June 2006

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1. PURPOSE OF INTERVENTION

1.1 HSE has established a Disease Reduction Programme (DRP) as part of the FIT3 Strategic Programme. The aim of the Disease Reduction Programme is to achieve a reduction in the incidence of work-related ill health caused by exposure to hazardous agents. Respiratory disease accounts for a significant proportion of work-related ill health, and therefore a specific respiratory disease project has been set up to address this. The respiratory disease project aims to achieve a 10% reduction in new cases of occupational asthma by 2007/08 compared with 2003/04.

1.2 A growing concern is the risk of asthma, extrinsic allergic alveolitis (EAA) and other breathing problems from exposure to mist from metalworking. Work-related asthma is a significant and growing problem with an estimated 1,500 to 3,000 new cases each year. On average, up to 2003, at least 20 of these cases were associated with exposure to metalworking fluids (MWFs) but it is thought many more cases go unrecognised. There are also thought to be the same risks of respiratory disease arising from exposure to mist from water–mix wash fluids used to clean machined components.

There has been one large outbreak of respiratory illness in the UK at a single site, peaking in 2003, where over 100 workers have been diagnosed with respiratory illness (both occupational asthma and EAA) as a result of exposure to mist. At the site there was mist from both metalworking and washing machines. There are also a number of smaller outbreaks under investigation.

1.3 As a result, HSE began an initiative in 2005/6 to reduce the risk of respiratory (and skin disease – see separate Topic Pack) from metalworking fluids by targeting large users of metalworking fluids, to improve controls and management of fluids – see SIM 03/2005/03.

1.4 This project continues the initiative by targeting smaller users of MWFs to raise awareness of

- how MWFs affect health
- how exposures occur
- how control measures can minimise exposures
- how to check that controls are working
- the importance of health surveillance
- the need to ensure that key preventative measures are being followed.

See SIM 03/2006/6.

1.5 This inspection pack provides information to HSE inspectors who will be carrying out the visits to smaller users of MWFs.

2. KEY MESSAGES AND PREVENTATIVE MEASURES

- To increase awareness of the problem by completion of suitable and sufficient risk assessments
- To ensure metalworking fluids start clean and stay clean, by monitoring the condition of the fluid
- To reduce respiratory exposure by preventing and controlling mist from the machining and washing of components
- To check that controls are working by looking for symptoms through health surveillance

3. WHAT THE LAW REQUIRES

- 3.1 Metalworking fluids are hazardous substances under the Control of Substances Hazardous to Health Regulations 2002 (as amended). The guidance limits for metalworking fluids that were introduced in HSG 231 have recently been withdrawn as it became apparent that there could be respiratory effects at concentrations below the guidance limit for water-mix metalworking fluids in particular.
- 3.2 A suitable and sufficient assessment of the risk to health from exposure to MWF is required by Regulation 6 of COSHH.
- 3.3 In order to achieve adequate control an employer must apply the principles of good control practice in Schedule 2A of COSHH (Regulation 7.7(a)). See Appendix 1.
- 3.4 Exposure to substances that cause occupational asthma should be reduced to as low as reasonably practicable (COSHH Regulation 7.7 (c)(ii)). Currently there is no standard WEL for metalworking fluids (but individual workplace limits may be set).

4. ENFORCEMENT MANAGEMENT MODEL (EMM)

- 4.1 EMM was set up to help inspectors reach a proportionate enforcement decision. It is used to determine the risk gap, risk-based decisions and compliance issues. It also takes account of the Initial Enforcement Expectation, taking account of the different authority in law of the standards of control required.
- 4.2 In terms of the EMM, both occupational asthma and extrinsic allergic alveolitis are described as serious health effects. The benchmark standard is set as nil or negligible risk. For exposure to metalworking fluids this can be achieved by (1) where possible eliminating the need

to use metalworking fluids (this is unlikely to be possible in the majority of situations); OR (2) managing the quality of the metalworking fluid; (3) reducing the amount of mist generated at the machining/washing process; (4) providing extracted enclosures or installing LEV at machinery where emissions/exposure occur, (5) using suitable Respiratory Protective Equipment (RPE) in combination with other control measures where appropriate, and other Personal Protective Equipment (PPE) e.g. gloves; and (6) providing health surveillance.

- 4.3 Exposures above any WEL for MWF will result in an **extreme risk** gap. To accommodate ALARP; exposure at any WEL for MWF will produce a **substantial risk** gap. Both scenarios have initial enforcement expectation of an Improvement Notice.

5. INSPECTION GUIDELINES

5.1 General Information

Metalworking fluids (MWFs) are neat oils or water-based fluids used during the machining of metals to provide lubrication and cooling. They are sometimes referred to as suds, coolants, slurry or soap. The water-based fluids are a complex and variable mix of chemicals, mixed to a predetermined percentage with water. Some of the chemical constituents may individually be associated with the risk of respiratory disease.

Metalworking fluids, especially the water-based fluids, will support bacterial and fungal growth, and may also contain endotoxins (the dead cell walls of bacteria) all of which have been implicated as the cause of respiratory disease if inhaled.

Users of metal working fluids should

- carry out a suitable and sufficient risk assessment– HSE’s self-assessment questionnaire (see web site) will help them do this;
- maintain fluid quality and control bacterial contamination of fluids;
- minimise skin exposure to fluids;
- prevent or control airborne mists; and
- where there is exposure to fluid or mist, carry out health surveillance.


To achieve the necessary standard of control, and effective risk reduction, actions should include:

- checking and maintenance of exposure control measures, such as enclosures and local exhaust ventilation;
- checking of levels of bacterial contamination using dip slides, or other means of measuring the level of bacterial activity, in both metalworking and associated fluids e.g. in washing machines, and taking action on the readings obtained, in line with the risk assessment;
- ensuring that, as a minimum, a responsible person carries out the required health surveillance;

[Understanding health surveillance at work: An introduction for](#)

[employers](#) [65kb] 

- conducting asthma health checks
- referring anyone affected to a competent occupational health professional
- taking prompt action after any diagnosis of ill health to identify the likely cause and ensure it is prevented or adequately controlled; and
- keeping workers informed of all findings.

[Working safely with metalworking fluids: A guide for employees](#)
[354kb] 

6. INSPECTION TIPS

- What are your first impressions of the machining workshop, is it clean, light and well ventilated, or dirty, dark and misty with slippery floors? The latter suggests that there could be a problem.
- Is there evidence of oil or MWF on conduits or trunking (e.g. is it dripping off)? This would suggest that there is mist coming off the machines and it is not controlled.
- Can you see a haze in the workshop? Again suggesting uncontrolled release.
- Can you smell rotten eggs or do you get a taste in the back of your throat? Suggests high bacterial activity (smell) and possible uncontrolled release of mist (taste). Also that bacterial monitoring is not being carried out.
- Is the machinery new or old – possibly older machinery not enclosed or mist not so well controlled, although newer machines may have faster speeds and generate more mist.
- Are machines enclosed, with LEV, or are there splash guards?
- Are the sumps clean and free of debris; is there evidence of tramp oil?
- Are skimmers or absorbers being used?
- Are the machines cleaned thoroughly – is there a procedure for this?
- Speak to the employees to find out what information, training and instruction they have received on the health risks associated with exposure to MWFs, good control practice; and use of any extraction provided (ask employees if they experience any respiratory or skin problems that they associate with exposure to MWF mist).
- Speak to the supervisor/charge-hand to identify what their role is in checking compliance with good work practices and use of any extraction controls and what action is taken if employees don't comply.
- Speak to the employees to ascertain if they receive health surveillance and, if so, what it entails and the frequency.
- If a responsible person has been nominated to undertake low level health surveillance or to report ill health problems, speak to the individual to check their competence (Medical or Occupational Health Inspectors may advise).

Assessment of paperwork.

Ask to see copies of:

- The company's COSHH risk assessment (if the company employs more than five people);
- Summaries of the health surveillance records, to verify it is being conducted;
- Records of monitoring of the quality of the metalworking fluids e.g. refractometry, pH, dip slides
- Test records for thorough examination of any extraction equipment provided, as required by COSHH regulation 9 (this should be conducted at least every 14 months);
- Instructions provided to employees covering:
 - Health hazards (i.e. asthma and dermatitis);
 - Signs and symptoms relating to asthma and dermatitis;
 - Procedure for reporting signs and symptoms;
 - Good work methods;
 - How to use any extraction provided.

7. ENFORCEMENT GUIDANCE (EMM)

7.1 The level of enforcement taken for non-compliance will be in accordance with the EMM. Since MWFs are respiratory sensitisers and also cause dermatitis, failure to follow the Top Tips and implement controls etc. as detailed in the following table is likely to result in directing you to issue improvement notices.

Enforcement is likely to be taken using COSHH on the issues set out in Table 1:

Table 1

| Observation/Regulation | Initial Enforcement Expectation (IEE) / Action |
|--|---|
| COSHH assessment absent COSHH Regulation 6 (assessment) Factors to be considered: A suitable and sufficient assessment should include the following and deal not only with employees but others who may be exposed such as industrial cleaners: | IEE – compliance issue Action: >5 employees – IN written COSHH assessment required |

| Observation/Regulation | Initial Enforcement Expectation (IEE) / Action |
|--|--|
| <ul style="list-style-type: none"> • consideration of the health effects of the metalworking fluids (MWFs), including information contained in any safety data sheet and the health effects associated with inhalation, not only of the MWFs themselves but also of any material with which they may become contaminated in use, such as bacteria in water-mix MWFs or the metals being worked, • the level, type and duration of exposure, • the work circumstances including the amount of MWFs involved, • activities such as sump cleaning and maintenance where there is a potential for a high level of exposure, • the arrangements for any preventative or control measures provided, • the arrangements for monitoring MWF quality when in use, including: <ol style="list-style-type: none"> 1. the arrangements for monitoring microbial contamination of water-mix MWFs (eg weekly testing of sumps using dip slides), 2. the arrangements for monitoring MWF appearance, odour and colour, 3. the arrangements for monitoring water-mix MWF concentration, 4. the arrangements for monitoring water-mix MWF pH, 5. the arrangements for other monitoring including biocide levels, tramp oil, temperature etc, and 6. the results of any MWF quality monitoring, • the arrangements for maintaining, examining and testing control measures (eg the arrangements for thorough examination and test of local exhaust ventilation), • the arrangements for monitoring occupational exposure, • the results of occupational exposure monitoring; • the arrangements for health surveillance, • the results of the health surveillance (suitably anonymised), • the arrangements for providing information, instruction and training for persons who may be exposed to MWFs, and • any additional relevant information, • or you can take any other equally effective measures to achieve compliance with the notice. <p>Absence of any one of these factors may be used as the basis for issue of a notice and schedule. See http://www.hse.gov.uk/metalworking/experience/schedule0506.htm for details of a schedule issued during the 'large users' project.</p> | <p>< 5 employees Para 72 of COSHH ACOP – occupiers are strongly advised to record significant findings of assessment</p> <p>Action/IEE – IN/letter seeking evidence that company has systematically considered factors liable to produce exposure and to demonstrate that controls in place are effective</p> |
| <p>RIDDOR</p> <p>The law also requires employers to report cases of occupational asthma to a central point. This is under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995. The Incident Contact Centre is at Caerphilly Business Park, Caerphilly CF83 3GG</p> | |

| Observation/Regulation | Initial Enforcement Expectation (IEE) / Action |
|--|--|
| Tel: 0845 300 9923, Fax: 0845 300 9924, e-mail: riddor@natbrit.com . | |

For situations relating to control matters you should consult with the SG occupational hygienist, occupational health Inspector or the project coordinator.

8. RISK CONTROL INDICATORS

3 indicators have been selected against which performance will be measured. These are:-

(a) Management – there is evidence of effective organisation and arrangements including adequate COSHH assessments, provision of information, training and supervision and evidence of management commitment.

A score of 1 if all above are in place. A score of 4 where enforcement is required. Scores of 2 or 3 where enforcement may be appropriate

(b) Control Strategy – there is evidence that substitution has been considered and effected where possible, effective engineering controls have been provided and maintained, suitable RPE is provided, worn correctly (face fit test undertaken where appropriate). Appropriate training provided regarding use and maintenance of engineering controls/RPE.

A score of 1 where hierarchical approach to control has been taken, and exposure to MWFs has been either prevented or adequately controlled to a level as low as reasonably practicable.

A score of 4 where enforcement is required. Scores of 2 or 3 where enforcement may be appropriate

(c) Health Surveillance – a competent person provides high level of health surveillance. If there are any concerns regarding competency of a health provider you will need specialist advice and support.

A score of 1 should be allocated where health surveillance is provided by health provider. A score of 4 where enforcement is required. Scores of 2 or 3 where enforcement may be appropriate

9. FURTHER GUIDANCE

- HSE web site section on metalworking fluids
www.hse.gov.uk/metalworking
- COSHH Essentials control sheets-cover engineering controls and health surveillance (see Appendix 3).

- HSE Guidance HSG 231 “Working Safely with metalworking fluids – Good practice manual”, now withdrawn, but much of the information therein still very relevant and can be used as an adjunct to the latest guidance sheets on the web site.

APPENDICES

Appendix 1 - 1 Principles of good practice (COSHH Regulation 7.7(a) Schedule 2A)

Appendix 2 - 10 Top Tips

Appendix 3 - COSHH Essentials direct control sheets

Appendix 4 - Inspection Aide Memoire

APPENDIX 1

COSHH Regulations 2002 (as amended) - Principles of good practice for the control of exposure to substances hazardous to health

COSHH Regulation 7(7) – Schedule 2A

| | |
|----|---|
| a) | Design and operate processes and activities to minimise emission, release and spread of substances hazardous to health |
| b) | Take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures |
| c) | Control exposure by measures that are proportionate to the health risk |
| d) | Choose the most effective and reliable control options which minimise the escape and spread of substances hazardous to health |
| e) | Where adequate control of exposure cannot be achieved by other means, provide, in combination with other control measures, suitable personal protective equipment |
| f) | Check and review regularly all elements of control measures for their continuing effectiveness |
| g) | Inform and train all employees on the hazards and risks from the substances with which they work and the use of control measures |
| h) | Ensure that the introduction of control measures does not increase the overall risk to health and safety |

APPENDIX 2

TOP TIPS

- carry out a suitable and sufficient risk assessment – HSE’s self-assessment questionnaire will help with this;
- maintain fluid quality and control bacterial contamination of fluids;
- minimise skin exposure to fluids;
- prevent or control airborne mists; and
- where there is exposure to fluid or mist, carry out health surveillance.
- actions for effective risk reduction include:
 - checking and maintaining exposure control measures, such as enclosures and local exhaust ventilation;
 - checking levels of bacterial contamination using dip slides, or other means of measuring the level of bacterial activity, in both metalworking and associated fluids eg in washing machines, and acting on the readings obtained in line with the risk assessment;
 - ensuring that, as a minimum, a responsible person carries out the required health surveillance;
 - conducting asthma health checks;
 - referring anyone affected by exposure to a competent occupational health professional;
 - taking prompt action after any diagnosis of ill health to identify the likely cause and ensure it is prevented or adequately controlled;
 - and keeping workers informed of all findings.

APPENDIX 3

COSHH Essentials Direct Control Sheets for metalworking fluid users

- [Advice for managers MW0 \[40kb\]](#)
- [Mist control: Inhalation risks MW1 \[50kb\]](#)
- [Fluid control: Skin risks MW2 \[50kb\]](#)
- [Sump cleaning: Water-mix fluids MW3 \[50kb\]](#)
- [Sump cleaning: Neat oils MW4 \[50kb\]](#)
- [Managing sumps and bacterial contamination \[50kb\] MW5](#)

Additional information

- [Health surveillance for occupational asthma G402 \[20kb\]](#)
- [Health surveillance for occupational dermatitis G403 \[38kb\]](#)
- [New and existing engineering control systems G406 \[40kb\]](#)

They can be accessed at [COSHH essentials for machining with metalworking fluids](#).

APPENDIX 4

INSPECTION AIDE MEMOIRE

METALWORKING FLUIDS SMALL USER PROJECT

Metalworking fluid (MWF) users will significantly reduce the risk of respiratory ill health and skin problems by addressing four key requirements for successful MWF management. These are:

- having a suitable and sufficient risk assessment;
- preventing or controlling inhalation and skin exposure;
- maintaining MWF quality and minimising bacterial contamination of metalworking and associated washing fluids; and
- carrying out health surveillance.

This aide memoire is designed to help you assess the performance of the company in these areas.

The use of water - mix wash fluids to clean machined components in washing machines can give rise to hazards and health risks similar to those from MWFs, particularly from contaminated fluid and mist. The points below should also be considered in relation to water - mix wash fluids and washing machines to check that risks are being properly controlled.

| | |
|---------------------------------|--|
| Name of Company | |
| Address | |
| Number of employees | |
| COIN Number | |
| Process | |
| Machinery used | |
| Number exposed to MWFs (approx) | |

1. RISK ASSESSMENT – DOES IT:

| | |
|---|--|
| 1.1 Cover all groups of persons likely to be affected. Which groups? | |
| 1.2 Cover all health risks. Inhalation and skin. | |
| 1.3 Identify measures needed to achieve adequate control of exposure. | |
| What are the measures? | |

| | |
|--|--|
| 1.4 Outline how control measures are examined, tested and maintained. How? | |
| 1.5 Identify any monitoring required. What monitoring is specified? | |
| 1.6 Specify health surveillance required. What health surveillance? | |
| 1.7 Deal with information for employees. How are employees kept informed? | |

2. CONTROLLING EXPOSURE BY INHALATION

COSHH requires that exposure to MWFs by inhalation and skin contact is either prevented or adequately controlled.

What has been done to minimise MWF inhalation exposure?

| | |
|---|--|
| 2.1 Dry machining. | |
| 2.2 "Low misting" MWFs. | |
| 2.3 Totally enclosed processes. | |
| 2.4 Partially enclosed processes/installed splash guards. | |
| 2.5 Installed local exhaust ventilation. | |
| 2.6 Optimised MWF flow rate and delivery onto the workpiece. | |
| 2.7 Stopped MWF delivery when not machining. | |
| 2.8 Stopped using MWFs in pressure hoses to wash down machines. | |
| 2.9 Stopped using compressed air to remove MWFs from machined parts | |
| 2.10 Other measures - what? | |

3. MONITORING

| | |
|---|--|
| 3.1 Has monitoring been carried out? | |
| 3.2 When was the last time? | |
| 3.3 What method was used (eg HSE Method for Determining Hazardous Substances 95(2))? | |
| 3.4 How many personal samples were taken? | |
| 3.5 What was the range of results (ie the lowest and the highest results)? | |
| 3.6 What was the range of monitoring times (i.e. the shortest and the longest times)? | |
| 3.7 Has exposure to water-mix MWF | |

| | |
|---|--|
| been monitored? | |
| 3.8 What actions were taken as a result of monitoring? | |
| 3.9 When was the last monitoring? | |
| 3.10 Has exposure to neat oil been monitored? What method was used (e.g. HSE Method for Determining Hazardous Substances 84)? | |
| 3.11 How many personal samples were taken? | |
| 3.12 What was the range of results (i.e. the lowest and the highest results)? | |
| 3.13 What was the range of monitoring times (i.e. the shortest and the longest times)? | |
| 3.14 What actions have been taken as a result of monitoring? | |

4. TRAINING

| | |
|--|--|
| 4.1 What information, instruction and/or training have employees received about the risks associated with MWF exposure via inhalation? | |
|--|--|

5. LEV

| | |
|---|--|
| 5.1 Are the processes requiring MWF application enclosed | |
| 5.2 Is LEV fitted – to enclosures? To non-enclosed machines? | |
| 5.3 Is all LEV thoroughly examined and tested by a competent person (as described in the Approved Code of Practice accompanying the COSHH Regulations) at least once every 14 months? | |

6. RPE

| | |
|---|--|
| 6.1 Are exposed employees supplied with respiratory protective equipment (RPE) to protect against MWF mists? What type? | |
|---|--|

If RPE is supplied, is there an RPE programme that addresses the following elements?

| | |
|--|--|
| 6.2 Suitability of RPE. (type and fit) | |
| 6.3 Training. | |
| 6.4 Storage. | |
| 6.5 Cleaning. | |
| 6.6 Replacement. | |
| 6.7 Records of examination and tests. | |
| 6.8 Other elements of the programme. | |

7. CONTROLLING SKIN EXPOSURE

| | |
|--|--|
| 7.1 What information, instruction and/or training have employees received about the risks of dermatitis from MWF exposure? | |
| 7.2 What are the main features of the skin care programme? | |
| 7.3 What is the policy in relation to eating, drinking and smoking where metalworking fluids are used? | |
| 7.4 Are exposed employees supplied with chemical resistant gloves? Type of gloves supplied? | |

If gloves are supplied, is there a protective glove programme that adequately addresses the following elements?

| | |
|--|--|
| 7.5 Selection. | |
| 7.6 Issue policy. | |
| 7.7 Training. | |
| 7.8 Replacement. | |
| 7.9 Any other elements of the programme. | |

8. BACTERIOLOGICAL CONTAMINATION

MWF users must be able to demonstrate that bacteriological contamination of their systems is controlled to a level sufficient to ensure the health of their employees. There are very few examples where this is possible without using dip slides.

| | |
|---|--|
| 8.1 Are bacteriological levels monitored with dip slides? | |
| 8.2 How long are the dip slides incubated for? At what temperature? | |
| 8.3 At what level(s) of dip slide readings is action taken? What is done? | |
| 8.4 Are water-mix MWF sumps (and/or | |

| | |
|---|--|
| central tanks) emptied and cleaned periodically? What is the frequency of periodic cleaning? | |
| 8.5 Are neat oil sumps (and/or central tanks) emptied and cleaned periodically? What is the frequency of periodic cleaning? | |
| 8.6 Is MWF pH monitored? How often? | |
| 8.7 Is emulsion stability monitored? How often? | |
| 8.8 Is concentration monitored? How often? | |
| 8.9 Are visual/smell checks carried out? How often? | |
| 8.10 Are biocide levels monitored? How and how often? | |
| 8.11 Is MWF temperature monitored? How often? | |
| 8.12. Does the metalworking fluid supplier help with the above? What do they do? | |

9. HEALTH SURVEILLANCE

Health surveillance is required when:

- the work can cause an adverse health effect;
- there are valid ways to detect that effect;
- it is reasonably likely that damage to health may occur under the particular conditions at work; and
- the surveillance is likely to benefit the employee.

Health surveillance is almost always appropriate for employees exposed to MWFs.

| | |
|--|--|
| 9.1 Are all employees exposed to MWFs under health surveillance as required under the COSHH Regulations? | |
| 9.2 Who carries out the health surveillance? | |
| | |
| 9.2a Occupational health nurse employed by the company. | |
| 9.2b Occupational health nurse not employed by the company. | |
| 9.2c Occupational physician employed by the company. | |
| 9.2d Occupational physician not employed by the company. | |
| 9.2e A responsible person (eg a supervisor or manager). | |

| | |
|--|--|
| 9.2f Other (please summarise). | |
| On at least an annual basis: | |
| 9.3 Is spirometry used for lung function testing? | |
| 9.4 Is peak flow measurement used for lung function testing? | |
| 9.5 Is a questionnaire used for lung function testing? | |
| 9.6 Are skin checks carried out by responsible person reviews? | |
| 9.7 Are skin checks carried out using questionnaires? | |
| 9.8 Are skin checks carried out by clinical examinations? | |
| 9.9 Other comments on health surveillance | |