

**Summary update for WATCH :  
HSE/HSL Research Project JN0004280:  
Respiratory ill health associated with Metalworking Fluids  
Sub-study 4: Constituents of Metalworking Fluid formulations**

**Summary by Brian Crook, HSL, January 2009**

**Background:** The objective for this phase of the study was to collate information so that HSE would have an inventory of the key chemical ingredients of metalworking fluids (MWF) and relevant human data about potentially hazardous chemicals (e.g., are they classified as sensitising agents, irritants etc). The intention was for this information to be systematically organised and stored in a form that could be annotated as new evidence becomes available. This work addresses concern expressed by members of WATCH that the potential chemical as well as biological hazards in used metal working fluids need to be considered as causative agents for respiratory disease.

The aims of this phase of the project were:

- a) To collate data about potential chemical hazards from material safety data sheets (MSDS), other sources of product information, and from relevant experts, and to organise this information using a suitable database.
- b) To maintain and update this database throughout the project.

At the HSE/HSL MWF Forum meeting in December 2008, Paul Whitehead, Chairman of the UK Lubricants Association Product Stewardship Group, gave a presentation on the subject of MWF formulations, based on his extensive knowledge of the industry in general. The following summarises the key points of this presentation and their relevance to the planned work.

**MWF formulation and additives:** MWF formulations are highly complex in order to address the required performance, (for example heat removal; viscosity, to protect and lubricate machine tools and workpieces; corrosion inhibitors, to prevent damage to workpieces; biocides, to prevent bacterial contamination, etc). Most MWF formulators and suppliers provide a range of formulations to match customer needs. To meet specific machining requirements, some formulations are modified on site by adding either additional substances, or extra concentration of one or more substances in the original formula.

Obtaining an inventory of the chemical ingredients of MWF poses distinct challenges:

- 1) For commercial reasons, MWF formulators are reticent to identify in detail all of the components. This is further complicated in the end product by the use of pre-formulated components early in the formulation chain.
- 2) A list of chemical ingredients will not necessarily usefully identify the risks. Water mix MWF formulations are a dynamic equilibrium of chemical constituents and the reaction between them, and their reaction with the components being machined, can lead to total, or partial, neutralisation of some components. The properties of the formulation will depend on both the chemical mix and their concentrations, both of which can be adjusted by on-site conditions and additions.
- 3) The MSDS data does not necessarily identify the most appropriate risk phrases. Although the risk phrase(s) should probably be based on the final residual products and their working concentrations, there is some uncertainty about this, and some MWF manufacturers list the initial constituents in the MSDS, while others list the residual constituents.

Compiling a database of individual ingredients based on MSDS data does not therefore necessarily address the state of the chemical as formulated, nor address the potential chemical / metal contaminants that can accumulate in used MWFs.

Consequently, before progressing further with this work, WATCH may wish to consider how 'potential' chemical respiratory hazards in used MWFs can be identified. To assist this discussion, UKLA is willing to nominate an expert to give a presentation and to address any questions should WATCH decide to explore this issue at a future meeting.

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