

Occupational Exposures

Year 2006

Testing of Occupational Chemicals

The National Toxicology Program (NTP) is addressing potential safety issues associated with certain occupational exposures. Some of the agents for which toxicology studies are currently planned or ongoing are listed below.

Abrasive Blasting Materials – alternatives to silica sand for abrasive blasting are frequently recommended to reduce worker's risk for acquiring fibrotic lung disease and cancer. Coal slag, garnet, steel grit, crushed glass, and specular hematite are often recommended as safe alternatives to silica sand. These abrasive blasting materials are being assessed to determine their relative potential for inducing lung fibrosis in experimental animals. Results will aid risk assessment and provide guidance of recommended exposure limits,

1-Bromopropane (CAS No. 106-94-5) – an industrial chemical used in metal cleaning and degreasing that has been approved as a replacement for ozone-depleting chemicals such as hydrochlorofluorocarbons and chlorinated solvents.

Metalworking fluids – complex mixtures of varying composition that are also called cutting oils, machining fluids, and metal removal fluids. Millions of gallons of these fluids are used each year for cutting, milling, drilling, stamping, and grinding metal.

Methyl isobutyl ketone (also called MIBK; CAS No. 108-10-1) – primarily used as a solvent in protective coatings. Also used as a solvent in specialty adhesives and inks, as a process solvent in the extraction and production of pharmaceuticals, and in the manufacture of pesticides.

Propargyl alcohol (CAS No. 107-19-7) – used as a starting material or intermediate in the manufacture of pharmaceutical, electrical and agricultural chemicals, as a solvent in paint products, as a stabilizer in solvents, and as an inhibitor of corrosion.

Triethylamine (CAS No. 121-44-8) – used as an industrial catalyst in the manufacture of foundry mold resins and phenol-formaldehyde adhesives, and in the manufacture of quarternary ammonia compounds and antibiotics.

Initiatives in Occupational Health: Occupational Mixtures and Exposures

The National Institute of Environmental Health Sciences of the National Institutes of Health (NIEHS/NIH) and National Institute for Occupational Safety and Health (NIOSH) are coordinating an effort to better characterize worker exposures, educate workers, and identify occupational health research gaps. Current efforts are addressing worker exposure to welding fumes, abrasive blasting materials and metalworking fluids. Previously this effort addressed exposure to cellulose fiber insulation, paving asphalt fumes and 1-bromopropane.

In processing tungsten-containing ores to obtain useful chemical forms of tungsten, metallurgists create tungsten trioxide or suboxide (WO) species as products of reduction reactions. Recent studies in the Swedish hard-metal industry have shown that calcinations of WO, ammonium paratungstate and 'blue' oxide results in the formation of asbestos-like WO whiskers (i.e., fibers) that are thought to be more toxic than WO powder. Investigations into the existence of WO fibers in the US hard-metal industry have not been conducted previously. NIOSH is embarking on a field study in the hard metal industry to define the baseline exposure for WO fibers among a cohort of US hard-metal workers.

Epidemiology suggests that pulmonary exposure to welding fumes may cause adverse health effects, such as lung inflammation, cancer, and neurotoxicity. However, more information is required to determine causality, evaluate temporal and dose-response relationships, and elucidate mechanisms. NIOSH has designed and constructed a welding fume generation and inhalation exposure system that will be used to characterize the physical and chemical properties of generated welding fume. The system will be used to evaluate which exposure conditions, generator parameters, and welding processes and materials cause acute biological responses in an animal model.

Millions of gallons of metalworking fluids are used each day in industry for cutting, milling, drilling, stamping and grinding. NIOSH has estimated that over a million workers are engaged in these activities and are potentially exposed dermally and via inhalation to a wide variety of formulations. Potential hazards of product formulations are typically identified by testing of individual constituents. To determine if inhalation exposure to metalworking fluid formulations poses an unrecognized hazard, several commercial products will be tested in sub-chronic, and in some cases chronic, inhalation bioassays.

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