

Metalworking Fluids

Introduction

Metalworking fluids (MWFs) are used to lubricate, cool, and remove debris from metal part surfaces during drilling, milling or turning in a variety of metalworking operations, e.g. cutting, grinding, and metal forming.

MWFs are classified according to the amount and type of mineral oil and water they contain and include: straight, soluble, and semi-synthetic oils which contain natural mineral oil; synthetic oils containing man-made oils; soluble, synthetic, and semi-synthetic containing water.

Who is Impacted?

Workers in the automotive industry, auto parts manufacturing, machine shops, die casting, steel manufacturing, heavy industry manufacturing, metalworking operations, or any industry where MWFs are used, are potentially exposed to the components of the Metalworking fluids.

Health Effects

Health Effects associated with Metalworking fluids include:

- Primary routes of exposure are inhalation and skin contact.
 - Average particle size between 2 μm and 6 μm which means that the particle is capable of both thoracic and respirable deposition.
 - Various chemical additives are used in order to provide specific performance requirements.
 - Diluted MWF solutions are prone to microbial contamination by various species of bacteria and fungi.
 - Respiratory symptoms, including asthma and hypersensitivity pneumonitis, are associated exposure to MWFs.
 - Skin dermatitis associated from contact with MWFs.
 - International Agency for Research on Cancer (IARC) has classified untreated and mildly treated mineral oil as a Group 1 carcinogen meaning carcinogenic to humans.
 - The National Institute for Occupational Safety and Health (NIOSH) has concluded that evidence exists for an increased cancer risk at several sites, e.g.skin,
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Regulatory Concerns

Due to the complex nature of MWFs, assessment of exposure is complicated by:

- Regulatory exposure limits are available for mineral oil mists but not applicable to water-based MWFs.
- Exposure limits are available for some of the additives used in the MWFs packages but not all.
- Microbial contaminants for liquid or aerosol MWFs **do not have exposure limits**
- NIOSH recommended exposure limit (REL) of 0.4 mg/m³ for thoracic particulate applies to all MWFs.

Sampling Issues

Problems associated with sampling for MWFs include:

- Particle size plays a role in where health impacts are experienced, e.g. inhalable, thoracic and respirable, in the respiratory system.
- Sampling methods for inhalable and respirable particles are standardized; however thoracic particulate sampling is not.

How can LEHDER Assist?

LEHDER uses a team-based approach to address metalworking fluids concerns and issues. Our team is composed of personnel with over twenty years of experience in the industrial hygiene field. LEHDER's totally integrated approach is suitable for clients in both the large facility and the small machine shop.

LEHDER capabilities include:

- Monitoring for MWFs including additives and base oils
- Monitoring for microbial agents
- Develop and/or review of work practices and procedures for the safe handling of MWFs
- Develop of specific training programs for MWFs
- Local Exhaust Ventilation (LEV) assessment
- Odour characterization by Thermal desorption Gas Chromatography Mass Spectrometry

Please visit the Occupational Hygiene area of the LEHDER web site for services provided by LEHDER www.lehder.com/occupationalhygiene

For further information

Questions?

For further information or questions concerning indoor air quality, please contact:

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**About
LEHDER**

LEHDER is one of the largest Air Quality Management consulting companies in Canada. Our team of consulting professionals is built around our core strength in industrial environmental, health and safety management. LEHDER recognizes our client's need to make decisions that provide for operational flexibility while meeting regulatory, economic and social requirements.

Visit our web pages at www.lehder.com

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Factsheet: 0041

