

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for Mineral Oil (CAS# 8012-95-1)

FROM: Keisha Williams, Air Quality Division (AQD)

DATE: August 12, 2015

SUBJECT: Screening Level for Mineral Oil

The initial threshold screening level (ITSL) for mineral oil (CAS# 8012-95-1) is 50 µg/m³ on an 8-hour averaging time. This ITSL was established by AQD on July 19, 1993. Although there have been reassessments of the occupational exposure limit (OEL) on which this ITSL was based, the OEL value used in 1993 has been retained.

Mineral oil, also known as paraffin oils, liquid petroleum, white mineral oil, and USP mineral oil (ACGIH, 2010), is a mixture defined in the Toxic Substances Control Act inventory as “liquid hydrocarbons from petroleum” (EPA, 2008; NIH, 2014). Occupational health benchmark values for mineral oil and mineral oil mist are set at 5 mg/m³ where the shared critical effect is respiratory irritation (ACGIH, 2001; ACGIH, 2010; NIOSH, 2015).

The threshold limit value (TLV) for “oil mist, mineral” was used in 1993 to derive the ITSL for white mineral oil, where the TLV is founded on human studies which do not show evidence of respiratory tract irritation, fibrosis, lipoid pneumonia or carcinogenesis with exposures below 5 mg/m³ (ACGIH, 2001). Furthermore, it was noted that “available human studies on exposure to mineral oil mist alone have not demonstrated human health effects, except at levels above 5 ppm” (ACGIH, 2001).

While the TLV for “oil mist, mineral” was used for ITSL derivation, the comparable TLV for “mineral oil, excluding metal working fluids” shows that care must be taken to evaluate the composition of the mixtures. The American Conference of Governmental Industrial Hygienists (ACGIH) distinguishes between the health effects of “pure, highly and severely refined” mineral oil and “poorly and mildly refined” mineral oil, where a health benchmark or TLV of 5 mg/m³ has been given to protect against adverse health effects of “pure, highly and severely refined” mineral oil as described above. On the other hand, “poorly and mildly refined” mineral oils have not been studied as well, and a TLV has not been established for this group of mineral oils (ACGIH, 2010). However, ACGIH does note that the health effect associated with “poorly and mildly refined” mineral oil is carcinogenesis, where polycyclic aromatic hydrocarbons in these mixtures is likely to be the cause (ACGIH, 2010). As a result, it is important to evaluate the composition of mixtures defined as mineral oil. ACGIH has noted that “CAS numbers do not indicate the refining severity for a specific mineral oil”, and careful evaluation must be done to determine the level of refining a mixture has undergone.

Based on AQD Rule 336.1232 (1) (c), an ITSL can be derived as 1% of the OEL. The ITSL is then calculated thusly:

$$ITSL = \frac{OEL}{100}$$

$$ITSL = \frac{5 \frac{mg}{m^3}}{100} \times \frac{1000 \mu g}{mg} = 50 \frac{\mu g}{m^3}, 8 \text{ hour averaging time}$$

References:

ACGIH. 2001. Documentation of the Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

ACGIH. 2010. Documentation of the Threshold Limit Values and Biological Exposure Indices. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

EPA. 2008. Substance Details-Paraffin oils. Accessed July 23, 2015.

http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/advancedsearch/search.do?details=displayDetails&selectedSubstanceId=16051

NIH. 2014. ChemIDplus : Mineral oils. Accessed July 23, 2015.

<http://chem.sis.nlm.nih.gov/chemidplus/rn/8020-83-5>

NIOSH. 2015. NIOSH Pocket Guide to Chemical Hazards: Oil mist (mineral). Accessed July 23, 2015. <http://www.cdc.gov/niosh/npg/npgd0472.html>