

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for White Mineral Oil (CAS No. 8042-47-5)

FROM: Keisha Williams, Air Quality Division (AQD)

DATE: August 12, 2015

SUBJECT: Screening Level for White Mineral Oil

The initial threshold screening level (ITSL) for white mineral oil (CAS No. 8042-47-5) is 50 µg/m³ on an 8-hour averaging time based on an occupational exposure limit (OEL) of 5 mg/m³ pursuant to Rule 232 (1) (c). This ITSL was established by AQD on July 19, 1993. Although there have been reassessments of the OEL, the value used for ITSL derivation in 1993 has been retained.

White mineral oil is a mixture defined in the Toxic Substances Control Act inventory as being “a highly refined petroleum mineral oil consisting of a complex combination of hydrocarbons obtained from the intensive treatment of a petroleum fraction with sulfuric acid and oleum, or by hydrogenation, or by a combination of hydrogenation and acid treatment. Additional washing and treating steps may be included in the processing operation. It consists of saturated hydrocarbons having carbon numbers predominantly in the range of C15 through C50”(EPA, 2008; NIH, 2014).

Mixtures that are comparable to white mineral oil have been given different CAS numbers, but are still categorized under the term “mineral oil” or “oil mist, mineral” for health benchmark derivation (ACGIH, 2001; ACGIH, 2010). 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. 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. As shown in Table 1, the ACGIH gives examples of mixtures that are more likely to be in each group. Even in light of these examples, 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. Note that the examples included under the classification “Mineral oils-often severely refined” are mixtures with ITSLs set at 50 µg/m³ (8-hr averaging time) with a footnote indicating that the combined ambient air impacts should be compared to this ITSL. Mineral oil (CAS No. 8012-95-1) could be included under this same classification, and it also has an ITSL set at 50 µg/m³ (8-hr averaging time).

Table 1. Examples of Mineral Oils Classified by Refinement Level

Refinement Classification	Examples (CAS No./TSCA Inventory Name)
Mineral Oils-always severely refined	8042-47-5/White mineral oil
Mineral Oils-often severely refined	64741-88-4/Distillates (petroleum), solvent-refined heavy paraffinic; 64741-89-5/Distillates (petroleum), solvent-refined light paraffinic; 64742-52-5/Distillates (petroleum), hydrotreated heavy naphthenic; 64742-53-6/Distillates (petroleum) hydrotreated light naphthenic; 64742-54-7/Distillates (petroleum), hydrotreated heavy paraffinic; 64742-55-8/Distillates (petroleum), hydrotreated light paraffinic; 64742-62-7/Residual oils, petroleum, solvent-dewaxed; 64742-65-0/Distillates (petroleum), solvent-dewaxed heavy paraffinic
Mineral Oils-poorly and mildly refined	64741-50-0/Distillates (petroleum), light paraffinic; 64741-51-1/Distillates (petroleum), heavy paraffinic; 64741-52-2/Distillates (petroleum), light naphthenic; 64741-53-3/Distillates (petroleum), heavy naphthenic; 64741-76-0/Distillates (petroleum), heavy hydrocracked

(Modified from ACGIH, 2010)

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. Oil Mist, Mineral. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

ACGIH. 2010. Documentation of the Threshold Limit Values and Biological Exposure Indices. Mineral Oil, Excluding Metal Working Fluids. American Conference of Governmental Industrial Hygienists, Cincinnati, OH.

EPA. 2008. Substance Details-White mineral oil (petroleum). Accessed July 23, 2015. http://iaspub.epa.gov/sor_internet/registry/substreg/searchandretrieve/advancedsearch/externalSearch.do?p_type=CASNO&p_value=8042-47-5

NIH. 2014. ChemIDplus: Mineral oil. Accessed July 23, 2015. <http://chem.sis.nlm.nih.gov/chemidplus/rn/8042-47-5>

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