chem File

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

June 1, 1999

TO: File for Heavy alkylate naphtha (64741-65-7)

FROM: Dan O'Brien, Toxics Unit

SUBJECT: Initial Threshold Screening Level

The initial threshold screening level (ITSL) for heavy alkylate naphtha is 3500 µg/m^3 based on an 8-hour averaging time.

The following references or databases were searched to identify data to determine the ITSL: AQD chemical files; EPA's Integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tables (HEAST); American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) Booklet; National Institute for Occupational Safety and Health (NIOSH) Pocket Guide to Chemical Hazards and Registry of Toxic Effects of Chemical Substances (RTECS); National Toxicology Program (NTP) World Wide Website (WWW), MDEQ Library; International Agency for Research on Cancer (IARC) WWW; Chemical Abstract Service (CAS) On-line and National Library of Medicine (NLM) Toxline (1967 –April 14, 1999), Chemical Evaluation Search And Retrieval System (CESARS), Handbook of Environmental Data on Organic Chemicals, Patty's Industrial Hygiene and Toxicology, Merck Index and the Condensed Chemical Dictionary.

No adequate toxicological data specific to this chemical were found which could be used for the independent derivation of a screening level. However, search of the Toxic Substance Control Act (TSCA) Chemical Substance Inventory (EPA, 1979) yielded a specific chemical substance definition for this CAS number; it refers to this chemical as naphtha (petroleum), heavy alkylate. The definition goes on to characterize the compound as "consisting of predominantly branched chain saturated hydrocarbons having carbon numbers predominantly in the range of C_9 through C_{12} and boiling in the range of approximately 90°C to 220°C (194°F to 428°F)." With respect to number of carbons and boiling point range, this compound is similar to such compounds as stoddard solvent (8052-41-3) and medium aliphatic solvent naphtha (64742-88-7), both of which have been assigned a screening level of 3500 µg/m^3, 8 hour averaging. That ITSL is based on the NIOSH (1977) Recommended Exposure Level (REL) for refined petroleum solvents having hydrocarbon chain lengths from C_5 to C_{12}, a boiling point range from 30°C to 210°C, and composed of <20% aromatic hydrocarbons. NIOSH considered the toxicity of petroleum hydrocarbons falling within these ranges likely to be sufficiently similar to justify a health-based occupational standard applicable to all compounds in the group. Because the physical characteristics of heavy alkylate

naphtha also fall within these ranges, it is considered appropriate to base its ITSL on the same NIOSH standard.

In choosing data for screening level development, preference is generally given to human epidemiologic data or chronic laboratory animal inhalation studies which can be used to derive a Reference Concentration (RfC). Such data were not found in our searches. When adequate data for RfC calculation are not available, next preference is given to oral data for calculation of a Reference Dose (RfD) if available data do not indicate that extrapolation from the oral to the inhalation route of exposure is inappropriate. With respect to heavy alkylate naphtha, no chronic oral data are available. Next preference is given to occupational exposure limits (OELs), when available and sufficiently documented. Based on the considerations discussed above, it is considered appropriate here to use the NIOSH REL for refined petroleum solvents (350 mg/m^3) as the basis for the ITSL for heavy alkylate naphtha.

ITSL Derivation: Per section R 336.1232, rule 232(1)(c) of Act 451, as amended:

$$\textbf{ITSL} = \text{OEL} \times \frac{1}{100} = 350\ \text{mg/m}^3 \times \frac{1}{100}$$

$$= 3.5\ \text{mg/m}^3 \times \frac{1000\ \mu\text{g}}{1\ \text{mg}} = \textbf{3500 µg/m}^3$$

where the factor of 1/100 is a safety factor to account for: 1) differences in susceptibility between the healthy, adult worker population as compared to the general population which may include individuals or subpopulations more sensitive to the effects of exposure to heavy alkylate naphtha and 2) the difference in exposure duration for the worker population as opposed to the general population. The factor is derived as follows:

$$\text{Safety factor} = \frac{40\ \text{hours}}{168\ \text{hours}} \times \frac{30\ \text{years}}{70\ \text{years}} \times \frac{1}{10} = \frac{1}{100}$$

The first term adjusts for the difference between a 40-hour work week and the total hours in a week; the second factor adjusts for the difference between an assumed working life of 30 years and an assumed total lifespan of 70 years; and the third factor is a standard ten-fold uncertainty factor to extrapolate from the healthy worker to sensitive individuals in the general population.

Per 232(2)(a), since the screening level is based on an OEL with a time-weighted average (TWA) exposure, an **8-hour averaging** time applies to this ITSL.

Note that this chemical is one of a group of petroleum hydrocarbon materials the toxicity of which (generally respiratory irritation and central nervous system toxicity) is anticipated to be exerted *via* similar mechanisms. Consequently, the *combined* impact of this compound and all other petroleum hydrocarbons materials so designated in the Michigan Department of Environmental Quality's Chemical Criteria Database (EPBCCD) should be evaluated against the ITSL of 3500 $\mu g/m^3$, 8-hour averaging.

References

EPA (1979). Toxic Substances Control Act (TSCA) Chemical Substance Inventory. Volume I: Initial Inventory. Washington, DC: Office of Toxic Substances, U.S. Environmental Protection Agency. Appendix A: Chemical Substance Definitions, p. 9.

NIOSH (1977). Criteria For a Recommended Standard....Occupational Exposure to Refined Petroleum Solvents. Cincinnati OH: National Institute for Occupational Safety and Health, Center for Disease Control, Public Health Service, U.S. Department of Health , Education and Welfare. DHEW (NIOSH) Publication #77-192; 245 + 10 pp. (7/1977).

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