MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for High Benzene Naphtha, Hydrotreated C6-C8 Fraction [CAS # 68410-97-9]

FROM: Doreen Lehner

SUBJECT: Screening Level Determination for High Benzene Naphtha, Hydrotreated C6-C8 Fraction [CAS # 68410-97-9]

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The Initial Threshold Screening Level (ITSL) and The Initial Risk Screening Level (IRSL) for high benzene naphtha, hydrotreated C6-C8 fraction [CAS # 68410-97-9] will be set at the same ITSL and IRSL as benzene [CAS # 71-43-2].

High benzene naphtha, hydrotreated C6-C8 fraction [CAS# 68410-97-9] is a complex mixture of benzene, cyclohexane, isohexane, n-hexane, methyl cyclopentane, toluene, and xylenes (EPA, 2010). The reported composition for the hydrotreated C6-C8 streams indicates benzene content at 40-75%, toluene content at 3-15%, and 3-10% aromatics (EPA, 2010). The high benzene naphthas category (of which the hydrotreated C6-C8 fraction is a part) is composed of 10 ethylene-manufacturing streams that share a common origin in the ethylene process and share similar compositions (EPA, 2010). The hydrotreated C6-C8 fraction is used: as lantern fuel; camp fuel; lighter fluid; in industrial, professional, and consumer adhesives and coatings; and as a blowing agent for polystyrene foam.

A literature review was conducted to determine an initial threshold screening level (ITSL) for high benzene naphtha, hydrotreated C6-C8 fraction. The following references and databases were searched to derive the above screening level: EPBCCD, Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV)/ Biological Exposure Indices (BEI) 2012 guide, DEQ library, National Toxicology Program (NTP) Study Database, International Agency for Research on Cancer (IARC), Acute Database, CAS Online (searched 11/21/13), National Library of Medicine (NLM)-online, Environmental Protection Agency (EPA) Aggregated Computational Toxicology Resource (ACToR) Database, and the Agency for Toxic Substances and Disease Registry (ATSDR) database.

Fischer 344 rats (5 sex/dose) were administered hydrogenated pyrolysis gasoline via an unspecified oral route at doses of 4200, 4600, 5000, or 5400 mg/kg and observed for 14 days following dosing. Male and female mortalities were combined to calculate an LD_{50}. Mortality from a previously performed limit test conducted at 5000 mg/kg was combined with results from the 5000 mg/kg dose in this study. Mortalities occurred at the highest two dose levels (7/20 rats at 5000 mg/kg dose and 7/10 rats at 5400 mg/kg dose). Gross necropsies revealed red lungs, gas-filled stomach and intestine, mottled liver, discoloration of kidney, and opaque eyes in rats that died during the study. These observations, with the exception of opacity in the left eye of one 5400 mg/kg female, were absent in rats sacrificed at study termination (day 15). The acute median lethal

dose (LD_{50}) for hydrogenated pyrolysis gasoline in male and female rats was 5170 mg/kg (Rausina, 1984a).

Fischer 344 rats (5 sex/dose) were exposed whole-body to hydrogenated pyrolysis gasoline as an aerosol at measured concentrations ranging from 8642 to 17371 ppm (average 12,408 ppm) for 4 hours and observed for 14 days following dosing. No mortalities occurred (Rausina, 1984b). "Because test substance is a complex mixture for which *exact* component identity and concentration is not known, conversion from ppm to mg/L in air is not possible" (EPA 2010).

Fischer 344 rats (5 sex/dose) were exposed whole-body to hydrogenated pyrolysis gasoline as an aerosol at measured concentrations 0, 4869±470, and 9137±917 ppm for 6 hours/day for 5 days with a 2-day post-exposure period. One female rat died during exposure on day 1; one male and one female rat from the highest dose group died on day 2. Rats in the exposure groups showed ocular discharge throughout days 1 through 5. Rats in the low dose group showed increased respiratory rate and dry red material around nose and mouth. All rats in the low dose group were lethargic and showed labored respiration. Many rats (exact number not reported) in the high dose group were lethargic and exhibited twitching and harsh respiratory sounds throughout days 1 through 5. All rats in the low-dose group and all but one rat in the high-dose group appeared normal on day 8. Group mean body weight was significantly decreased in a dose related manner. No gross findings were found in rats that survived to necropsy on day 8. The male rat that died on day 2 of the experiment showed gas in the G.I. tract and red-tinged fluid in the stomach. Exposure to the compound caused a significant decrease in mean body weight of male and female rats at low- and high-dose groups that was correlated with exposure level. Three deaths occurred in the high dose group during exposure. Major clinical signs were lethargy, twitching, harsh respiratory sounds, and ocular discharge. No gross alterations were found in rats surviving to sacrifice (Rausina, 1984c).

The most appropriate approach to screening level development for this mixture is to base screening levels on the high benzene content of the mixture. Although the benzene component of the mixture may be 75% and the other components of the mixture could be somewhat less potent than benzene, screening levels are rounded off to one or two significant figures, therefore it is not considered necessary to determine an appropriate adjustment to the benzene screening levels in order to set screening levels for this mixture. Due to the high benzene content in the high benzene naphtha, hydrotreated C6-C8 fraction, this compound will have the same screening levels as the major component of the mixture, benzene. The screening levels for this mixture, identical to the screening levels for benzene, include: an ITSL of 30 µg/m^3 (annual averaging time); a second ITSL of 30 µg/m^3 (24-hour averaging time); an IRSL of 0.1 µg/m^3 (annual averaging time); and a SRSL at 1 µg/m^3 (annual averaging time).

References

EPA. 2010. Screening Level Hazard Characterization High Benzene Naphthas Category. Subcategory I: Pygas, Subcategory II: High Benzene Naphthas, Subcategory III: Quench/Compressor Oil with Supporting Chemicals. Available online at: http://www.epa.gov/chemrtk/hpvis/hazchar/Category_High%20Benzene%20Naphthas_December_2010.pdf

Rausina, G.A. 1984a. Acute oral toxicity study in rats of hydrogenated pyrolysis gasoline. Proj. #2091. Gulf Life Sciences Center, Pittsburgh, PA.

Rausina, G.A. 1984b. Acute inhalation toxicity study in rats of hydrogenated pyrolysis gasoline. Proj. #2092. Gulf Life Sciences Center, Pittsburgh, PA.

Rausina, G.A. 1984c. Five-day repeated dose inhalation toxicity study in rats of hydrogenated pyrolysis gasoline. Proj. #2099. Gulf Life Sciences Center, Pittsburgh, PA.

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