

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

March 29, 2011

TO: File for Hydrodesulfurized Kerosene (CAS No. 64742-81-0)
FROM: Michael Depa, Toxics Unit, Air Quality Division
SUBJECT: Development of the Initial Threshold Screening Level

The initial threshold screening level (ITSL) for hydrodesulfurized kerosene is 4 µg/m³ (based on annual averaging time).

The following references or databases were searched to identify data to determine the screening level: Environmental Protection Agency's (EPA's) Integrated Risk Information System (IRIS), the Registry of Toxic Effects of Chemical Substances (RTECS), the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV), National Institute of Occupational Safety and Health (NIOSH) Pocket Guide to Hazardous Chemicals, Environmental Protection Bureau Library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1967- December 2002), National Library of Medicine (NLM), Health Effects Assessment Summary Tables (HEAST), and National Toxicology Program (NTP) Status Report. The EPA has not established a reference dose (RfD) or a reference concentration (RfC) for hydrodesulfurized kerosene. The ACGIH and NIOSH have not established Occupational Exposure Limits (OELs). An updated literature search March 28, 2011 did not produce additional toxicity studies not already obtained prior to December 2002.

Hydrodesulfurized kerosene is a complex combination of hydrocarbons obtained from a petroleum stock by treating with hydrogen to convert organic sulfur to hydrogen sulfide with is removed. It consists of hydrocarbons having carbon numbers predominantly in the range of C9 through C16 and boiling in the range of approximately 150°C to 290°C (302°F to 554°F). Other physical data include:

Sulfur, weight %	0.07
Nitrogen, ppm	--
Flash point °F	140
Paraffins, %	47
Olefins, %	1
Naphthenes, %	35
Aromatics, %	18

Animal Studies

In an acute oral toxicity study, 5 male and 5 female Sprague-Dawley rats were dosed with 5 g/kg hydrodesulfurized kerosene and observed for 14 days (Hazelton Ralteck, Inc., 1982). There were no deaths. Pharmacotoxic signs seen throughout the study included: hypoactivity, excess salivation, diarrhea, urine-stained abdomen, and hair loss around the anal area. The LD50 was estimated to be greater than 5.0 g/kg.

In an acute inhalation study, a group of 5 male and 5 female rats (strain not-specified) were dosed with hydrodesulfurized kerosene at a concentration of 5,200 mg/m³ for 4 hours (IRDC, 1983). A similar group served as an air-exposed control. The principal pharmacotoxic sign

observed during and after the exposure was dyspnea. There was no apparent effect of exposure on body weight gain. There were no test-article related macroscopic or microscopic changes observed in rats after 24 days of recovery from the single four-hour exposure.

Groups of 20 male and 20 female CD rats were exposed to 24 mg/m³ hydrodesulfurized kerosene 6 hours per day, 5 days per week for 4 weeks (IRDC, 1983). No animals died and there were no exposure-related clinical signs, body weight effects, serum biochemical changes or hematologic changes. There was trace inflammation observed in the lung tissue of 10 of 20 male rats exposed to hydrodesulfurized kerosene, compared to 6 of 20 in the control animals. No other noteworthy histopathological effects were observed. No statistical analysis was provided in this report; however, Fischer's Exact Test was performed by AQD personnel. Based on inflammation in the male rat lungs, the P value was determined to be 0.071. Because this P value was greater than 0.05, it was determined to be not significant; therefore, the dose level of 24 mg/m³ was determined to be a no-observable-adverse-effect-level (NOAEL).

Derivation of the Screening Level

The four week inhalation study by IRDC (1983) was well performed and was the longest duration study available. Since it was 4 weeks in duration, the 7 day inhalation equation from Rule 232(d) was modified to reflect the decrease in uncertainty when extrapolating from a subacute duration to chronic (i.e., from 35 to 10). The uncertainty factors used to derive the ITSL are as follows:

- 10 for subchronic to chronic duration
- 10 for interspecies (animal to human)
- 10 for intraspecies (sensitive individuals)

The derivation of the ITSL from the 4 week study also takes into account the hours exposed per day and days per week in order to convert to continuous exposure.

The ITSL was derived as follows:

$$\text{ITSL} = \text{NOAEL}/(10 \times 10 \times 10) \times \text{hours exposed per day} \times \text{days exposed per week}$$

$$\text{ITSL} = (24 \text{ mg/m}^3)/(1000) \times 6/24 \times 5/7$$

$$\text{ITSL} = 0.0043 \text{ mg/m}^3$$

$$\text{ITSL} = 4 \text{ }\mu\text{g/m}^3$$

The ITSL for hydrodesulfurized kerosene is 4 $\mu\text{g/m}^3$ based on an annual averaging time.

References

Hazleton Raltech, Inc. 1982. Acute oral toxicity in albino rats of API-81-07 (hydrodesulfurized kerosene). Obtained from EPA Office of Toxic Substances, FYI-AX-0382-0171 initial submission.

IRDC. 1983. International Research and Development Corporation. LC50 acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rats with cover letter. Obtained from EPA Office of Toxic Substances, FYI-AX-0683-018 supplemental.

IRDC. 1986. Four-week subchronic inhalation toxicity study in rats on 81-07 (hydrodesulfurized kerosene; CAS #64742-81-0); *etc.* Final report from IRDC. Supplemental submission from American Petroleum Institute. With cover letter dated October 15, 1986. Obtained from Toxic Substances Control Act (TSCA) §8(e) Public Docket. Document numbers FYI-AX-1086-0474 supplement and/or OTS0000474-2. IRDC Study number 418-027.

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