Recommendations of the Scientific Advisory Panel
HYDRODESULFURIZED MIDDLE DISTILLATE
CAS Number 64742-80-9

June 13, 1994

Hydrodesulfurized middle distillate (CAS #64742-80-9) is described in the U.S. Environmental Protection Agency's (EPA) Toxic Substance Control Act (ToSCA) inventory as being a complex combination of hydrocarbons treated with hydrogen to convert organic sulfur to hydrogen sulfide for removal. It consists of hydrocarbons with carbon number length predominately in the range of C_{11} to C_{25}, and boiling in the range of approximately 205° to 400°C.

The only available toxicity data on hydrodesulfurized middle distillate were some unpublished studies identified by American Petroleum Institute (API), including a 4-week rat inhalation study, and acute oral and inhalation studies. Acute toxicity studies conducted with hydrodesulfurized middle distillate found the LC50 for API 81-09, a single batch of hydrodesulfurized middle distillate, to be 4.60 mg/L with a 95% confidence interval of 3.92 to 5.40 (IRDC 1983a), while the LC50 for API 81-10, another batch of hydrodesulfurized middle distillate, was 7.64 mg/L with a 95% confidence interval of 5.51 to 10.58 (IRDC 1983b). The acute oral LD50 for both API 81-09 and API 81-10 was found to be greater than 5 g/kg (Hazleton 1982a, b).

In the 4-week study (IRDC 1986), groups of 20 male and 20 female Sprague-Dawley rats were exposed for 6 hours a day, 5 days per week to 24 or 23 mg/m^3 of the two batches of hydrodesulfurized middle distillate, API 81-09 and API 81-10. The rats exposed to API 81-09 or API 81-10 had no deaths during the study, no clinical signs of toxicity, no changes in body weight different than controls, and no toxicologically significant changes in organ weight. There were sporadic changes in organ weights observed; however, there were no associated macroscopic or microscopic findings. The rats of both sexes exposed to API 81-09 were found to have rhinitis, which was described in more detail as nasal respiratory mucosa lining subacute inflammation, ranging in severity from trace to mild. The epithelium lining was intact, and there were no changes in the posterior nasal cavity. The rats of both sexes exposed to API 81-10 had moderately increased leukocyte counts. Although some slight changes were observed in this study, the observed changes are not considered to be biologically significant adverse effects. Thus, the from this study exposure to 23 or 24 mg/m^3 can be considered to be a no observed adverse effect level (NOAEL).

It is generally more preferable to use data from longer-term exposures in calculation of the initial threshold screening level (ITSL). Therefore, the NOAEL of 24 mg/m^3 from the 4-week study IRDC (1986) will be used to calculate the ITSL. The duration of this study is insufficient to meet the criteria for establishing a reference concentration or RfC (EPA 1990). The ITSL will be calculated using the equation from Rule 232(1)(d), where the 35 fold factor is reduced to 20 because the study duration is longer than 7 days. The ITSL derived from this method is 2 µg/m^3 (annual average), and was determined as follows:

$$\text{ITSL} = \frac{(\text{NOAEL } 24 \text{ mg/m}^3)}{20 \times 100} \times \frac{6}{24} \times \frac{5}{7} = 2 \text{ µg/m}^3$$

The ITSL derived by this method is relatively low when compared to ITSLs for other petroleum hydrocarbon fractions.

References:

EPA. 1990. Interim methods for development of inhalation reference concentrations. EPA/600/ 8-90/066A.

Hazleton. 1982a. Acute toxicity studies hydrodesulfurized middle distillate API 81-09. Study conducted for API, API report # 30-32347.

Hazleton. 1982b. Acute toxicity studies hydrodesulfurized middle distillate API 81—10. Study conducted for API, API report # 30-32348.

IRDC. 1986. Four week subchronic inhalation toxicity study in rats: API 81-07 hydrodesulfurized kerosene, API 81-09 hydrodesulfurized middle distillate, and API 81-10 hydrodesulfurized middle distillate. Study conducted for API, API Report # 33-32724.

IRDC. 1983a. LC50 acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rat, API 81-09. Study conducted for API, API report # 30-32856.

IRDC. 1983b. LC50 acute inhalation toxicity evaluation of a petroleum derived hydrocarbon in rat, API 81-10. Study conducted for API, API report # 30-32857.