MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

March 31, 2004

TO: File for extracts (petroleum), middle distillate solvent (64742-06-9)

FROM: Marco Bianchi

SUBJECT: Initial Threshold Screening Level

The initial threshold screening level (ITSL) for *extracts (petroleum), middle distillate solvent* is 2 µg/m^3 based on an annual averaging time.

The following references or databases were searched to identify data to determine the ITSL: IRIS, HEAST, NTP Management Status Report on-line, RTECS, EPBCCD, EPB library, CAS-online, NLM-online, IARC on-line, NIOSH Pocket Guide, and ACGIH Guide.

A definition of this petroleum hydrocarbon distillate is provided by the Toxic Substance Control Act (TSCA) Chemical Substance Inventory (Initial Inventory; Volume 1; 1979):

"extracts (petroleum), middle distillate solvent, is a complex combination of hydrocarbons obtained as an extract from a solvent extraction process. It consists predominately of aromatic hydrocarbons having carbon numbers predominately in the range of C_9 through C_{20} and boiling in the range of approximately 150°C to 345°C (302°F to 653°F)."

A complete reference cheek was conducted for *extracts (petroleum), middle distillate solvent,* but no toxicity information was available to derive an ITSL. In the past, the Scientific Advisory Panel to the Air Quality Division (which met from 1993-1995) allowed petroleum distillate compounds having similar carbon chain lengths and boiling ranges with established ITSLs to be used as surrogate values for petroleum distillates with no toxicity information. The TSCA description for *extracts (petroleum), middle distillate solvent* shows that it is similar to *sweetened middle distillate* (64741-86-2). The *sweetened middle distillate* is described as being a complex combination of hydrocarbons subject to a sweetening process to convert mercaptans or remove acidic impurities. It consists of hydrocarbons with carbon number length predominately in the range of C_9 to C_{20}, and boiling in the range of approximately 150°C to 345°C.

Although the two TSCA descriptions are not identical, there is sufficient similarity in the listed properties to make it reasonable to assume toxicity information from *sweetened middle distillate* could be applicable to *extracts (petroleum), middle distillate solvent.*

Therefore, the ITSL for *extracts (petroleum), middle distillate solvent* will be established at 2 µg/m^3 annual averaging, as based on the ITSL for *sweetened middle distillate.* The ITSL derived by this method is relatively low when compared to ITSLs for other petroleum hydrocarbon fractions.

The ITSL for *extracts (petroleum), middle distillate solvent* = 2 µg/m^3 based on annual averaging.

References:

1. TSCA. 1979. Toxic Substance Control Act Chemical Substance Inventory (Initial Inventory; Volume 1. U.S. EPA, Office of Toxic Substances, Washington DC 20460, May 1979.

Recommendations of the Scientific Advisory Panel
SWEETENED MIDDLE DISTILLATE
CAS Number 64741-86-2
June 13, 1994

Sweetened middle distillate is described in the U.S. Environmental Protection Agency (EPA) Toxic Substance Control Act (ToSCA) inventory as being a complex combination of hydrocarbons subjected to a sweetening process to convert mercaptans or remove acidic impurities. It consists of hydrocarbons with carbon number length predominately in the range of C_9 to C_{20}, and boiling in the range of approximately 150°C to 345°C

No toxicity data was located for sweetened middle distillate.

The Panel's evaluation of data and recommendations provided by the American Petroleum Institute (API) indicated that toxicity data for hydrodesulfurized middle distillate (CAS # 64742-80-9) could be used as the basis for an initial threshold screening level (ITSL) for sweetened middle distillate. The ToSCA description for hydrodesulfurized middle distillate shows that it is relatively similar to sweetened middle distillate. Hydrodesulfurized middle distillate is described 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°C to 400°C.

Although the two ToSCA descriptions are not identical, there is sufficient similarity in the listed properties to make it reasonable to assume toxicity information from middle distillate could be applicable to sweetened middle distillate.

Therefore, the ITSL for sweetened middle distillate will be established at 2 $\mu g/m^3$ with annual averaging, as based on the ITSL for hydrodesulfurized middle distillate. The ITSL derived by this method is relatively low when compared to ITSLs for other petroleum hydrocarbon fractions.

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.