MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

January 23, 2014

TO: File for Naphthalene (CAS No. 91-20-3)

FROM: Michael Depa, Air Quality Division

SUBJECT: Screening Levels for Naphthalene

A new acute initial threshold screening level (ITSL) for naphthalene is being established at 520 µg/m³ with an 8-hr averaging time. Additionally, the chronic ITSL for naphthalene is remaining at 3 µg/m³, but the averaging time is being changed from 24-hrs to annual.

A review of available acute benchmarks of some other agencies was conducted to determine an appropriate basis for an acute ITSL. Acute inhalation benchmarks for naphthalene are not available from U.S. Environmental Protection Agency (USEPA), California EPA, or the Agency for Toxic Substances and Disease Registry (ATSDR). Also there is no Acute Exposure Guidance Level (AEGL) for naphthalene. Texas (TCEQ) has an acute benchmark of 200 µg/m³ (1 hour averaging time), however, that is based on odor rather than toxicity.

The new short term ITSL is based on the Threshold Limit Value (TLV) of 10 ppm (52 mg/m³) (ACGIH, 2001). The TLV was established to protect against ocular irritation observed at 15 ppm. Pursuant to Rule 232(1)(c), the ITSL was derived from the TLV (an occupational exposure limit or OEL) as follows:

ITSL = OEL/100
ITSL = (52 mg/m³)/100
ITSL = 0.52 mg/m³ x 1000 µg/mg
ITSL = 520 µg/m³

Regarding the chronic ITSL, in 1998, the ITSL for naphthalene was derived from a USEPA reference dose (RfC) of 3 µg/m³. The USEPA selected a two-year mouse study (NTP, 1992) as the critical study, and agreed that the lowest exposure level of 10 ppm (52 mg/m³), 6 hours per day, 5 days per week, was a lowest-observed-adverse-effect-level (LOAEL). After adjustment to an equivalent continuous exposure concentration (9.3 mg/m³), a total uncertainty factor (UF) of 3000 was applied to generate a RfC of 3 µg/m³. Three UFs of 10 each for: LOAEL to no-observed-adverse-effect-level (NOAEL), animal to human, and sensitive individuals were applied. An additional UF of 3 for inadequacy of the database was used. Considering the insensitivity of rodents to hemolytic anemia, a key characteristic of naphthalene's hazard profile in humans, this extra conservatism was deemed appropriate. Rule 229(2)(b) was used to derive the ITSL instead of Rule 232(2)(b). Since Rule 229 does not have a subrule similar to Rule 232(2)(b) that specifies an averaging time, annual averaging time was applied. It was reasoned that because the screening level is specifically derived to be protective of chronic effects an annual averaging time is most appropriate.

References

ACGIH. 2001. Naphthalene. Documentation of the Threshold Limit Values and Biological Exposure Indices for Chemical Substances. 7th Edition. American Conference of Governmental Industrial Hygienists. Cincinnati, OH.

National Toxicology Program (NTP). (1992). Toxicology and carcinogenesis studies of naphthalene in B6C3F1 mice (inhalation studies). Technical Report Series No. 410. NIH Publication No. 92-3141.