MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

October 5, 1993

To: File for Sodium Sulfite (CAS # 7757-83-7)

FROM: Robert Sills, Surface Water Quality Division

SUBJECT: Screening Level Derivation

There is no occupational exposure guideline, or EPA RfC or RfD, for sodium sulfite. A review of standard references and via computerized literature searches (CAS, NTIS and NLM-Toxline). This review did not reveal useful human inhalation data for quantitative risk analysis, but some other useful studies were found.

Sodium sulfite is reported in a secondary reference (the primary reference is unavailable) to have an oral LD to rats of 4.76 - 6.78 g/kg. (Itami et al., 1989). Ingestion of sulfites has been linked to rapid, acute allergic reactions, including anaphylactic-like responses. A sulfite-sensitive subpopulation of asthmatics has been postulated to exist who have a relative deficiency of sulfite oxidase. The possibility that sulfur dioxide may be generated from sulfite in the low pH of the stomach has been considered as a mechanism of oral sulfite sensitivity (IARC, 1992). Nevertheless, the FDA has established that sodium sulfite is Generally Recognized as Safe (GRAS) as a chemical preservative for foods, with some restrictions (IARC, 1992).

Itami et al. (1989) administered sodium sulfite via the diet to groups of 10-12 female Wistar rats during days 8-20 of gestation. Dietary levels were 0%, 0.32%, 0.63%, 1.25%, 2.5% and 5%, which resulted in exposures of 0, 0.3, 0.49, 1.1, 2.1 and 3.3 g/kg/d, respectively, based on measured body weights and food intake. The high dose of 3.3 g/kg/d was a LOAEL for maternal toxicity based on suppressed body weight gain, however the food intake was also significantly depressed. Fetal body weights among male offspring on gestation day 20 were significantly depressed in all exposure groups. Among female fetuses, all groups except 2.5% (2.1 g/kg/d) had depressed fetal weights. Delayed ossification was slightly, but not significantly, increased by high doses (1.25-5%) of sodium sulfite. The LOAEL for fetal body weight depression was 0.3 g/kg/d, which may be converted to 309 mg/m^3 via the inhalation route by assuming that female Wistar rats breathe 0.969 m^3/kg-d (EPA, 1988).

Last et al. (1980) exposed groups of six male Sprague-Dawley rats to dry particle aerosols of sodium sulfite (approximately 1 µg size) to 0, 0.1, 1, 5 or 15 mg/m^3 for 23.5 hours/day over three days. Increased rates of glycoprotein secretion was observed for tracheae from rats exposed to 5 or 15 mg/m^3. The results from this tracheal explant assay indicate the functional capacity of the rat tracheae in vitro, which the authors stated may be a nonspecific response of airway tissue to irritant stimuli. Measurement of the wet to dry weight ratios of treated rats found significant elevations in the 1, 5 and 10 mg/m^3 groups. These levels were concluded to be eliciting mild pulmonary edema. Systemic effects were not evaluated. The induction of pulmonary edema, but not the increased glycoprotein secretion of

tracheal explants, is considered to be an adverse effect for the purposes of screening level development. The LOAEL for this effect is 1 mg/m^3, and the NOAEL is 0.1 mg/m^3, for 23.5 hours/day over 3 days.

The 3-day inhalation NOAEL (Last et al., 1980) is determined to be the best available data for the inhalation risk assessment of sodium sulfite. This study may be considered of minimal quality for ITSL development due to the short duration and the focus on only local effects.

Sodium sulfite 3-day inhalation NOAEL = 0.1 mg/m^3 (Last et al., 1980).

$$ITSL = \frac{100\,\frac{\mu g}{m^3}}{35\ x\ 100}\, x\, \frac{23.5\,\frac{hours}{day}}{24\,\frac{hours}{day}} = 0.028\,\frac{\mu g}{m^3}, annual\ averaging$$

REFERENCES

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