

# MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

## INTEROFFICE COMMUNICATION

November 8, 1996

TO: File for Tin (CAS# 7440-31-5)

FROM: Michael Depa, Toxics Unit, Air Quality Division

SUBJECT: Screening Level Determination

The initial threshold screening level (ITSL) for tin (and inorganic salts as tin) is 20  $\mu\text{g}/\text{m}^3$  based on an 8 hour averaging time. This screening level does not pertain to organotin compounds.

The following references or databases were searched to identify data to determine the IRSL: IRIS, RTECS, ACGIH Threshold Limit Values, NIOSH Pocket Guide to Hazardous Chemicals, Environmental Protection Bureau Library, IARC Monographs, CAS Online (1967 - May 8, 1996), National Library of Medicine, Health Effects Assessment Summary Tables (HEAST), and NTP Status Report. Review of these sources found that EPA has not established an RfC or RID for tin in IRIS. An RfD of 0.6 mg/kg was calculated in HEAST. ACGIH and NIOSH established occupational exposure limits (OELs) for tin at 2 mg/m<sup>3</sup>. The U.S. Agency of Toxic Substances and Disease Registry (ATSDR) published a toxicological profile for tin in 1992. In 1982 the NTP performed a feed study bioassay using stannous chloride. This bioassay is summarized below.

Groups of 50 male and female F344/N rats were dosed in their feed with approximately 0, 40 or 79 mg/kg/day for 105 weeks (NTP, 1982). Also, groups of 50 male and female B6C3F1 mice were dosed in their feed with approximately 0, 170 or 350 mg/kg/day for 105 weeks. No compound related clinical signs were observed for male or female rats. No statistically significant differences in survival were observed between any group of either sex of rats. Decreased survival of the female mouse groups appeared to be dose related. Myocardial inflammation occurred in female rats in 10/50 (20%) in controls, 13/50 (26%) in the low dose and 16/50 (32%) in the high dose group. No other nonneoplastic lesions were dose related. With regard to the neoplastic lesions, the NTP concluded that

Under the conditions of this bioassay, stannous chloride was judged not to be carcinogenic for male or female F344/N rats or B6C3F1 mice, although C-cell tumors of the thyroid gland in male rats may have been associated with the administration of the test material.

Exposure to dust and flame of tin is recognized to result in stannosis, a mild pneumoconiosis of which more than 150 cases have been reported in the world literature (ACGIH, 1992). After an extensive review of the literature up to 1991, the ATSDR (1992) stated,

No target organs have been identified in humans or animals after chronic inhalation exposure to inorganic tin or organotin compounds. One possible target organ is the lung. Tin deposits were observed in chest x-rays of workers exposed to stannic oxide fumes for 15-20 years. However, there was no impairment of pulmonary function or systemic disease.

Since data was not found to indicate that inorganic tin causes any systemic effects via the inhalation pathway, it was deemed inappropriate to use oral toxicity data (i.e. the NTP oral bioassay) to derive an inhalation screening level. The OEL was designed to prevent stannosis, an endpoint not seen in oral dosing. Reports of health effects above the OEL of 2 mg/m<sup>3</sup> are not noted in the literature; therefore, it was decided that the OEL was adequate to use to develop the ITSL. Pursuant to Rule 232(1)(c) the ITSL was developed as follows:

$$\text{ITSL} = \text{OEL} \div 100$$

$$\text{ITSL} = 2 \text{ mg/m}^3 \div 100$$

$$\text{ITSL} = 0.02 \text{ mg/ m}^3$$

$$\text{ITSL } 20 \text{ } \mu\text{g/ m}^3 \text{ (based on an 8 hour averaging time)}$$

The ITSL for tin is 20  $\mu\text{g/m}^3$  based on an 8 hour averaging time.

#### REFERENCES

ACGIH. 1993. Documentation of threshold limit values and biological exposure indices. Cincinnati, OH. Pages 1550-1551.

ATSDR. 1992. Toxicological Profile for Tin. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry. TP-91/27. Page 86.

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