

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

March 18, 1994

TO: File for Sodium Silicofluoride (CAS# 16893-85-9)
FROM: Michael Depa, Toxics Unit
SUBJECT: Initial Threshold Screening Level

The initial threshold screening level (ITSL) for sodium silicofluoride (Na_2SiF_6) is $250 \mu\text{g}/\text{m}^3$ based on a 8 hour averaging time.

The following references or databases were searched to identify data to determine the ITSL: IRIS, RTECS, ACGIH Threshold Limit Values, NIOSH Pocket Guide to Hazardous Chemicals, Environmental Protection Bureau Library, IARC Monographs, CAS Online (1967 - March 4, 1994), NLM, and NTP Management Status Report. Review of these sources found that EPA has not established a RfC or RfD for sodium silicofluoride. There is no data available which meets the minimum requirements for establishing a RfC or RfD. RTECS indicated there is no evidence of carcinogenicity for sodium silicofluoride. The ACGIH TLV and the NIOSH REL for fluorides are both $2.5 \text{ mg}/\text{m}^3$. The ACGIH TLV Documentation (ACGIH, 1991) specifically listed sodium silicofluoride under "fluorides", therefore, it is deemed appropriate to use the TLV for "fluorides" to develop an ITSL for sodium silicofluoride.

ACGIH based the TLV on a human inhalation study done by Derryberry (1963) who found no bone changes in a group of workers exposed at a concentration of fluoride averaging $2.65 \text{ mg}/\text{m}^3$, while such changes were detected in 17 workers with exposures averaging $3.38 \text{ mg}/\text{m}^3$. In order to develop an ITSL for sodium silicofluoride, the TLV for "fluorides" must be converted to one specific for sodium aluminum fluoride. This is done in the following way:

$$\begin{aligned} & (\text{TLV: fluorides}) / (\text{mol wt fluoride}) \\ & = (\text{TLV: Na}_2\text{SiF}_6) / (\text{mol wt Na}_2\text{SiF}_6) \end{aligned}$$

or

$$\begin{aligned} \text{TLV: Na}_2\text{SiF}_6 \\ = [(\text{TLV: fluorides}) \times (\text{mol. wt. Na}_2\text{SiF}_6)] / (\text{mol. wt. fluoride}) \end{aligned}$$

where, the TLV for fluorides is 2.5 mg/m^3 ,
the molecular weight of fluoride is 19 g,
the TLV for Na_2SiF_6 is the unknown, and
the molecular weight for Na_2SiF_6 is 188.07 g.

Using this equation the TLV for sodium aluminum fluoride is 24.75 mg/m^3 . Based on Rule 232(1)(c) the ITSL is determined as follows:

$$\text{ITSL} = \text{OEL divided by } 100$$

Where the occupational exposure level (OEL) is the lowest value of the NIOSH REL or the ACGIH TLV. The ITSL is calculated in the following manner:

$$\text{ITSL} = (24.75 \text{ mg/m}^3) / 100$$

$$\text{ITSL} = 0.2475 \text{ mg/m}^3$$

$$\text{ITSL} = 250 \text{ } \mu\text{g/m}^3$$

The ITSL for sodium silicofluoride is $250 \text{ } \mu\text{g/m}^3$ based on an 8 hour averaging time.

ACGIH. 1991. Documentation of Threshold Limit Values and Biological Exposure Indices. Cincinnati, OH. 657-659.

Derrybery, O.M., Bartholomew, M.D., and Flemming, R.L. 1963. Fluoride exposure and worker health. Archives of Environmental Health. 6:503-514.