

**MICHIGAN DEPARTMENT OF NATURAL RESOURCES**

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**INTEROFFICE COMMUNICATION**

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September 7, 1994

TO: Magnesium file (CAS# 7439-95-4)

FROM: Gary Butterfield

SUBJECT: ITSL for magnesium

Magnesium is an essential element. The National Academy of Science (1989) Recommended Daily Allowance (RDA) for adults is 4.5 mg/kg, for children the RDA is 6 mg/kg. Due to the body's ability to regulate and control magnesium concentrations, it is difficult to produce adverse effects from overdosing oral magnesium in normal people. However, people with impaired renal function, the mechanism used to regulate and control internal magnesium levels, are at much greater risk of developing symptoms of hypermagnesemia, if high levels of magnesium are consumed orally.

Several authors have reported effects following inhalation of magnesium to include symptoms of metal fume fever. The reported symptoms have been observed in humans and animals exposed to magnesium. The metal fever response has not been observed following ingestion of magnesium. Metal fume fever also appears to occur with lower exposures than does symptoms of hypermagnesemia from oral exposure. Therefore, it is not considered appropriate to use data from the oral exposure route for development of the ITSL for magnesium.

There is no RfC for magnesium established by EPA. A CAS and NLM on-line literature search was not able to locate any inhalation toxicity studies of greater than acute duration. There are occupational exposure limits for magnesium oxide provided by AGIH and OSHA. The ACGIH TLV for magnesium oxide is set at 10 mg/m<sup>3</sup>. The TLV is comparable to the TLV for nuisance particles, and is also believed to be protective, with an unknown margin of safety for producing adverse health effects - irritation of eyes and nose, and the symptoms of metal fume fever.

From combustion and high temperature sources in an oxygen containing atmosphere, metallic magnesium would be expected to be emitted as magnesium oxide. The screening level developed for magnesium oxide could be applied to metallic magnesium under these conditions.

The ACGIH documentation discusses magnesium oxide as being readily hydrolyzed in the presence of water to form magnesium hydroxide. The lungs are a very moist environment, and would allow this hydrolysis to occur.

Therefore the ITSL for magnesium oxide should also apply to magnesium hydroxide.

The 1989 OSHA PEL for magnesium oxide is quoted as being 10 mg/m<sup>3</sup> total dust, and 5 mg/m<sup>3</sup> respirable dust. However, the 1989 PEL's were struck down by a 1992 court action, resulting in reversion to the former 1971 PEL of 15 mg/m<sup>3</sup>.

The ITSL for magnesium, magnesium oxide and magnesium hydroxide, either individually or in any combination, is being established at 100 µg/m<sup>3</sup> with an 8-hour average based on 1 percent of the ACGIH TLV for magnesium oxide.

### **References**

ACGIH. 1992. Documentation of the mv and BEI.

EPA. 1994. IRIS database.

National Academy of Science (NAS). 1989. Recommended Daily Allowance.

OSHA. 1989. Preamble to OSHA final rule revising workplace air contaminants limits. 54FR2332—2920.