

MANGANESE FUME

CAS: 7439-96-5; Chemical Formula: MnO

Content source: National Institute for Occupational Safety and Health Education and Information Division, available at: <https://www.cdc.gov/niosh/pel88/7439-96.html>

“OSHA previously had a ceiling limit of 5 mg/m³ for manganese fume, measured as manganese. Because of this substance's potential for damage to the lungs and central nervous system, the ACGIH recommends an 8-hour TWA of 1 mg/m³ and a 3-mg/m³ STEL for manganese fume. These limits were proposed and are now established by the final rule. NIOSH (Ex. 8-47, Table N1) concurs that these limits are appropriate.

Symptoms of manganese poisoning range from sleepiness and weakness in the legs (Fairhall 1957a, as cited in ACGIH 1986/ Ex. 1-3, p. 354) to difficulty in walking and uncontrolled laughter (Fairhall and Neal 1943, as cited in ACGIH 1986/ Ex. 1-3, p. 354). Health surveys of employees exposed to manganese fume have demonstrated a high incidence of pneumonia in these workers (Davies 1946, as cited in ACGIH 1986/Ex. 1-3, p. 354). Tanaka and Lieben (1969/Ex. 1-388) found seven cases of pneumonia and 15 borderline cases of pneumonia among 144 workers exposed to manganese dust or fume concentrations greater than 5 mg/m³; three of these cases were associated with fume rather than dust exposure. Those workers exposed to fume levels below 5 mg/m³ exhibited no signs of pneumonia. In a separate study by Smyth, Ruhf, Whitman, and Dugan (1973/Ex. 1-990), three cases of manganese poisoning were detected among 71 employees exposed to levels of 13.3 mg/m³ manganese fume.

OSHA received several comments on manganese fume and dust (Exs. 3-189, 3-673, 3-675, 3-829, 8-22, and 129). Some commenters stated that reducing the PEL for manganese fume would have a large impact on their industries but did not provide any details (Exs. 3-673, 3-675, and 8-22). Chemetals, Inc., a manufacturer of manganese products, supports the reduction in the PEL for manganese fume from a ceiling of 5 mg/m³ to an 8-hour TWA of 1 mg/m³ and a STEL of 3 mg/m³. According to Chemetals:

- [We] agree that the fumes of metals and their compounds have higher toxicities than the dusts....and that a time-weighted average is more appropriate for manganese (Ex. 3-189, p. 2).

However, Chemetals urged OSHA to also revise the Agency's limit for manganese dust from a ceiling to an 8-hour TWA (Ex. 3-189). OSHA did not propose a change to its existing 5-mg/m³ ceiling limit for manganese dust. In response to this comment, OSHA notes that manganese dust is not a substance that is included in this rulemaking; the Agency did not propose to regulate manganese dust and is not revising its limits for this substance in the final rule (see the preamble section entitled "Boundaries to the Regulation").

One other commenter, the Specialty Steel Industry of the United States (Ex. 3-829), stated that, in its opinion, there was no basis for reducing OSHA's former PEL for manganese fumes or for supplementing this limit with a STEL. OSHA does not agree with the views of this commenter, because exposures to these fumes have been demonstrated to cause toxic effects in both humans and animals. Workers exposed to manganese fumes developed pneumonia (Tanaka and Lieben 1969/Ex. 1-388), and Stokinger (1981f, in Patty's Industrial Hygiene and Toxicology, 3rd rev. ed., Vol. 2A, p. 1767) reports that the 1-mg/m³ limit "is supported by the finding in animals that the higher oxides are more toxic, and the report of an occasional case of Mn poisoning in susceptible workers exposed to ferro Mn fumes around the 1-mg/m³ limit."

Based on a review of all of the record evidence, the final rule establishes a 1-mg/m³ TWA and a 3-mg/m³ STEL for manganese fume. The Agency concludes that both a TWA limit and a STEL are required to protect employees from the significant risks of manganese poisoning, lung damage, and pneumonia, all of which constitute material health impairments, associated with exposure to these fumes."

NOTE:

OSHA comments from the January 19, 1989 Final Rule on Air Contaminants Project extracted from 54 FR 2332 et. seq. **The 1988 Air Contaminants rule was remanded by the U.S. Circuit Court of Appeals and the limits are not currently in force.**