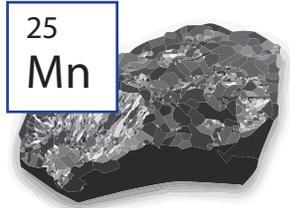


# MANGANESE

Manganese is a metal naturally occurring in the earth. It is generally used in the production of steel and other metal manufacturing due to its durability properties. Industrial use of manganese sometimes releases high concentrations of it in the air via dust or fumes, making workers in these industries and residents of these areas especially susceptible to manganese-related health conditions.



## Occupations at risk include:

battery production  
ferroalloy production  
mining  
ore processing  
steel repair and finishing  
welding and soldering

## KNOWN HEALTH EFFECTS

Small amounts of dietary manganese intake is essential for healthy metabolism, bone development, nerve function. However, deficiency or excessive absorption of manganese is harmful. When manganese is inhaled instead of ingested, it is not metabolized in the liver and goes straight into the blood stream and brain, where it can accumulate over time and create lasting damage.

## THRESHOLDS

The Occupational Safety and Health Administration (OSHA) permissible exposure limit is  $5 \text{ mg/m}^3$  for the general industry, construction, and shipyard industries.

However, these other limits over an 8 hour work shift have been deemed to better protect worker health:

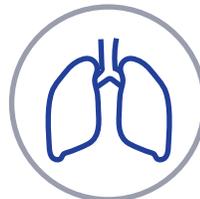
National Institute for Occupational Safety and Health (NIOSH):  $1 \text{ mg/m}^3$

American Conference of Government Industrial Hygienists (ACGIH):  $0.02 \text{ mg/m}^3$  (respirable fraction),  $0.1 \text{ mg/m}^3$  (inhalable fraction)

CAL/OSHA:  $0.02 \text{ mg/m}^3$  (respirable fraction)



- Irritation of the eyes, nose, and throat, which can develop into more serious conditions.



- Increased risk of pneumonia and other respiratory diseases.



- Long lasting or permanent neurobehavioral and neuropsychological problems, including changes in attention, memory, mood, and fine motor control.
- Increased risk of Parkinson's disease-like symptoms that can have a younger age of onset than usual Parkinson's disease.

## PROTECTION FROM EXPOSURE

The employer must have workplace controls and provide workers personal protective equipment and training on preventive measures. Workers should change out of clothing that may be contaminated with manganese dust before going home. Regular health monitoring for workers and residents of high risk areas can detect manganese-related conditions early.



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