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DEPARTMENT OF MINERALS AND ENERGY

Minerals and Energy for Development and Prosperity

MINE HEALTH AND SAFETY INSPECTORATE

OCCUPATIONAL HEALTH GUIDELINE FOR MANGANESE

MINE HEALTH AND SAFETY INSPECTORATE

INTRODUCTION

This guideline is aimed as a source of information for employees, employers, physicians, industrial hygienists and other health professionals who may have the need for such information. It does not attempt to present all data but it presents permanent information and data in summary form.

SUBSTANCE IDENTIFICATION

- Formula: Mn
- Symptoms: None
- Appearance: Gray solid

OCCUPATIONAL EXPOSURE LIMIT $(OEL)_1$

The currant standard for manganese is a ceiling level of 5 milligrams per cubic meter of air (mg/m^3)

HEALTH RISK INFORMATION

- **Routes of exposure**

Manganese can affect the body if it is inhaled and/or if swallowed or trough skin absorption.

- **Effects of overexposure**

1. Short term Exposure: Inhalation of fumes with high concentration of manganese and its oxides may bring about "metal fume fever". Symptoms of metal fume fever are chills and fever, upset stomach, vomiting, dryness of the throat, cough, weakness and aching of the head and body. Symptoms often occur several hours after exposure to fumes and usually last for only a day.
2. Long term Exposure: Prolonged or repeated exposure to manganese may affect the nervous system with difficulty in walking and balancing, weakness or cramps of the extremities, hoarseness, trouble with memory and judgment, unstable emotions or unusual irritability. If high exposure continues, a person may have poor coordination, difficulty in speaking clearly or shaking or tremors of the limbs. A person may have hallucinations or uncontrollable laughter or crying. The respiratory system may be affected by a condition known as "manganese pneumonia" which may result in symptoms and signs of coughing, fever, chills, general aching of the body, chest pains and other common signs of pneumonia.

MEDICAL SURVEILLANCE

The employer must establish and maintain a system of medical surveillance as contemplated in section 13 of the Mine Health and safety Act, 1996 (Act 29 of 1996) for all employees who perform work in any working place where exposure to manganese occurs in excess of 10% of the OEL for manganese.

The following medical procedures should be made available to all employees who are exposed to manganese at potentially hazardous levels:

1. Initial Medical Examinations

A complete history and physical examination should be performed to detect pre-existing conditions that might place the exposed employee at increased risk and to establish a baseline for future health monitoring. Persons with a history of alcoholism, psychiatric, neurological or pulmonary diseases or liver dysfunction would be expected to be at increased risk from exposure.
Tests to be performed:

- Chest X-ray
- Lung function test$_2$
- Full blood count
- Urinalysis

2. Periodical Medical Examinations

The periodical medical examination should be conducted on all employees who, in terms of regulation 3, are exposed to manganese.
A chest X-ray is considered necessary only when indicated by the results of the lung function testing, or by signs and symptoms of respiratory disease.
Tests to be performed:

- Lung function test – annually.
- Full blood count – annually.
- Urinalysis – annually.

3. Exit Medical Examination

The employer must ensure that every employee who leaves his employment, and who was subjected to medical surveillance in terms of regulation 3, has an exit medical examination.
In addition to the medical examination for purposes of section 17 of the Mine Health and Safety Act, 1996 (Act 29 of 1996) the employee shall also have:

- A cardio-respiratory examination.
- A full size chest X-ray$_3$ unless a lung function test was done one year prior to the exit medical examination.

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>> **DEFINITIONS**
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"Occupational Exposure Limits (OEL)"[1] means the time weighted average concentration for 8 hours per day or 40 hours per week to which nearly all employees may repeatedly be exposed without adverse effects.

"Lung function test"[2] means spirometry, which measures the volume of air inspired or expired over a period of time.

"Full size chest X-ray"[3] means a chest X-ray using a photographic plate measuring 35cm X 35cm or 35cm X 42cm or the digital equivalent.