

# toxics release inventory

## Chemical Profile

*Environment Division*

## Manganese

### What is manganese?

Manganese (Mn) is a silver-colored metal that resembles iron but is not magnetic. In nature, it always combines with other elements to form manganese compounds. Small amounts of these manganese compounds are naturally present in soils, rocks, and water.

Manganese is used to harden and strengthen steel as it is being manufactured. It is also used in matches, fireworks, porcelain, dry-cell batteries, fertilizers, and animal feed.

### How is manganese released by electric utilities?

Trace amounts of manganese are present in coal and oil. When electric utilities burn these fuels at their power plants, manganese is released in very small amounts. This manganese is carried by particles of ash.

Coal-burning power plants are equipped with devices to capture ash particles before they reach the air. Particle control devices typically capture more than 99% of the ash, so very little ash enters the air. Manganese-carrying ash captured by these devices is usually sent to ash ponds or land disposal sites.

Manganese from power plants was about 10% of all the manganese from human activities released into the air in

the United States in 1994. EPRI estimates that U.S. power plants release about 200 tons of manganese into the air each year.

### Is manganese also released by other sources?

Manganese is released into water and soils by eroding rocks. It is released into the air by soils as they erode in wind and rain. Estimates are that 10 times as much manganese comes from airborne dust caused by erosion and traffic as from all other sources.

Manganese released into the air by human activities comes mainly from steel mills. Industries reporting to the U.S. Environmental Protection Agency (EPA) released 4567 tons of manganese into the environment in 1995. About 90% was released to the soil.

### What happens to manganese after it is released by electric utilities?

Ash particles carrying manganese eventually settle to the ground after they are released into the air from power plants. Manganese compounds that dissolve in water are carried to the ground by rain and snow. Other manganese compounds that don't dissolve reach the ground through gravity and air turbulence.

Ash pond wastewater discharged into public waterways may contain small amounts of manganese, but these amounts are regulated by local permits.

### How might people be exposed to manganese?

People are commonly exposed to manganese by breathing it in the air. They may drink water or eat food that contains very small amounts of manganese. However, some people may be exposed to larger amounts of manganese in well water. Industrial workers may breathe manganese dust.

### What are the potential effects of manganese on human health?

Very small amounts of manganese in people's diets are necessary for good health. But eating or drinking large amounts of manganese can injure the brain. Breathing large amounts of manganese dust can irritate the lungs and cause impotence. It can also injure the brain, causing mental confusion and slow, clumsy body movements that look like those of Parkinson's disease. Although research is ongoing, manganese has not been found to cause cancer in people.

## **How likely is it that utility releases pose a risk to human health?**

It is unlikely that manganese from power plants poses a significant risk to human health. EPA has evaluated the potential health risks of breathing manganese for people who live near power plants that burn coal and oil. EPA estimates that the highest manganese exposures for people living near power plants would never exceed one-twentieth of the safe exposure level for breathing manganese.

EPRI has found that ash from power plants typically has about half as much manganese as the soil. Furthermore—since airborne ash particles carrying manganese are widely scattered before they settle to the ground—it is unlikely that ash from power plants significantly increases the amount of manganese in soils, water, or food.

## **How is manganese regulated?**

EPA has established limits for manganese in food and drinking water. Under the National Pollutant Discharge Elimination System, federal and state regulators determine how much manganese each power plants may release in wastewater discharges. The Occupational Safety and Health Administration has set limits on the amount of manganese in workplace air.

## **Where can I get more information about manganese?**

EPA has a fact sheet that is available on the Internet at  
<http://www.epa.gov/ttnautw1/hlthef/manganes.html>