

**LEAD**  
**(Pb) CAS # 7439-92-1 (Metal)**

**SOURCE/USE**

Lead may be used as pure or alloyed metal or as chemical compounds. Current commercial uses of lead include ammunition in the form of shot and bullets, bearing metals for machinery, electrical and electronic equipment, building construction process vessels, storage tanks, metal cans, and shipping containers. Sources include lead in air from combustion of lead-containing auto exhausts or industrial emissions, lead-based paint, hand-to-mouth activities of young children living in polluted environments, and lead-glazed earthen ware. Lead is expected to be one of the more toxicologically important air contaminants found during remediation projects.

**ROUTES OF EXPOSURE**

For the general population, exposure to lead occurs from inhalation of dusts and ingestion of food and water, with an approximate 50/50 division between inhalation and ingestion routes. Adults absorb about 5 to 15% of ingested lead and retain less than 5%. Children absorb about 50% and retain about 30%. Although the risk of off-post exposure to lead as a result of remediation at the Rocky Mountain Arsenal is small, any such exposure would likely be by inhalation. The concentrations resulting in acute clinical effects discussed in this document reflect occupational exposures or animal studies and are much higher than those likely to be encountered at the fence line during remediation at the Rocky Mountain Arsenal.

<b>APPLICABLE STANDARDS AND LIMITS</b>	
ATSDR MRL	Not Available
OSHA PEL	0.05 mg/m <sup>3</sup> (inorganic compounds)
ACGIH TLV	0.05 mg/m <sup>3</sup>
NIOSH REL	< 0.1 mg/m <sup>3</sup>
Odor threshold	Odorless
RMA acute fence line criteria	ARC – 1.5 µg/m <sup>3</sup> MARC - 4.0 µg/m <sup>3</sup>
RMA chronic fence line criteria	Cancer - NA Noncancer - 1.5 µg/m <sup>3</sup>

NA - Not applicable. Cancer criteria were not derived for this chemical because it is not considered a carcinogen or because a cancer slope factor is not available.

The goal of the remediation is exposure prevention through remedial design, environmental monitoring, and modeling. Failure of prevention could result in acute and/or chronic exposures. Following is an overview of the types of health effects associated with lead exposure.

### **ACUTE HEALTH EFFECTS**

Effects include learning disabilities, lowered IQ, and behavioral abnormalities (blood levels greater than 10 µg/dL). Headache, fatigue, irritability, and malaise may occur at higher exposures (blood levels greater than 25 µg/dL). Encephalopathy, seizures, and focal neurologic findings with imminent risk of death, permanent mental retardation, and motor deficits may occur at high (blood levels greater than 90 µg/dL) exposures.

No studies were located regarding respiratory effects in humans after inhalation exposure. Irritative response are noted in rats exposed via inhalation.

Hypertension and cardiographic abnormalities are observed in occupationally exposed workers who remove lead-based paint.

No studies were located on dermal effects to lead exposure.

No studies were located on ocular effects to lead exposure.

Lead can inhibit the activity of enzymes involved in biosynthesis of hemoglobin (i.e., ALAD and ferrochelatase) which can produce anemia.

Reversible renal and hepatic injury occur after acute pica ingestion of lead.

### **CHRONIC HEALTH EFFECTS**

EPA has classified lead as a probable carcinogen. However, no numerical estimate has been determined.

Muscle weakness, cramps, and joint pain are common complaints with chronic lead poisoning. Occurrence of a bluish tinged line in gums may occur in workers. Irreversible vascular sclerosis, tubular cell atrophy, interstitial fibrosis, and glomerular sclerosis of the kidney can occur. Metallic taste in mouth is common. Fetal exposure can cause growth retardation and neurological deficits. Men and women can experience fertility problems. Lead exposure is also associated with sperm abnormalities and miscarriages.