

LEAD FAQs

For the 2016 DTSC-Caltrans Soil Management Agreement for Aerially Deposited Lead-Contaminated Soils

July 2016

Why is lead a concern for highway improvement projects?

Lead is a heavy metal that was used in paints, gasoline, and industrial purposes. Intake of lead may be toxic to the nervous system, blood, heart, liver, and reproductive system. Children and pregnant women are particularly vulnerable. Lead exposure during pregnancy can cause premature births, smaller babies, decreased mental ability in the infant, learning difficulties, and reduced growth in children. Adults can suffer from reproductive problems (in both men and women), high blood pressure, digestive problems, nerve disorders, memory and concentration problems, muscle and joint pain. If not detected early, children with high levels of lead in their bodies can suffer from damage to the brain and nervous system, behavior and learning problems (such as hyperactivity), slowed growth, hearing problems, and headaches.

Refiners in the United States started adding lead compounds to gasoline in the 1920s in order to boost octane levels and improve engine performance by reducing engine 'knock' and allowing higher engine compression. Tailpipe emissions from automobiles that used leaded gasoline contained lead and resulted in aerially deposited lead (ADL) being deposited in and along roadways throughout the State. The phasedown of lead in gasoline began in 1974 when, under the authority of the Clean Air Act Amendments of 1970, the U.S. Environmental Protection Agency (USEPA) introduced rules requiring the use of unleaded gasoline in new cars equipped with catalytic converters. The introduction of catalytic converters for control of hydrocarbon (HC), nitrous oxide (NOx) and carbon monoxide (CO) emissions required that motorists use unleaded gasoline because lead destroys the emissions control capacity of catalytic converters. Beginning in 1992, lead was banned as a fuel additive in California. Lead-contaminated soil still exists along roadsides and medians and can also be found underneath some existing road surfaces due to past construction activities.

What are acceptable concentrations of lead in soil in California?

In 2007 the California Office of Environmental Health Hazard Assessment (OEHHA) developed a 1 microgram per deciliter ($\mu\text{g}/\text{dL}$) benchmark for source-specific incremental change in blood lead levels for protection of school children and fetuses. In 2009 OEHHA commenced an effort to estimate lead concentrations in soil that would lead to an incremental increase in blood lead (PbB) of up to 1 $\mu\text{g}/\text{dL}$, in people exposed to that soil (Revised California Human Health Screening Levels for Lead,

<http://oehha.ca.gov/media/downloads/crn/leadchhsl091709.pdf>). For the residential scenario for lead, OEHHA evaluated the exposure to a child resident. For the commercial/industrial scenario, OEHHA evaluated the exposure to a pregnant adult worker.

The Department of Toxic Substances Control's (DTSC) Leadsread model was used to estimate blood lead concentrations in children. The Leadsread model considers exposure to lead in soil by three pathways: ingestion, re-suspension and inhalation, and dermal contact. The Leadsread model was queried for the soil lead concentration that would give rise to a 90th percentile estimate of increase in blood lead of 1 µg/dL, which resulted in a soil lead concentration of 80 milligrams per kilogram (mg/kg). This value is currently used by DTSC as a screening level for residential, or unrestricted, land use. Soils with a total lead concentration of 80 mg/kg or less are usually considered acceptable for reuse without restriction.

U.S. EPA's Adult Lead Model (ALM) was used to estimate the blood lead concentration in a fetus of an adult worker exposed to lead-contaminated soil. The model was queried directly for the soil lead concentrations that would give rise to the 90th percentile estimate of change in blood lead of 1 µg/dL, which resulted in a soil lead concentration of 320 mg/kg. This value is currently used by DTSC as a screening level for commercial/industrial land use. Soils with a total lead concentration of 320 mg/kg or less are usually considered acceptable for use at commercial/industrial properties with prior written approval from DTSC, but land use restrictions are required to prevent unacceptable risk by limiting the use of the property.

The application of these screening levels in determining appropriate actions for soils containing lead is further discussed in Human Health Risk Assessment (HHRA) Note Number Three (<https://www.dtsc.ca.gov/assessingrisk/humanrisk2.cfm>) which is issued by the Human and Ecological Risk Office of DTSC.

What is DTSC's authority to regulate the reuse of soils containing lead?

The California Department of Transportation (Caltrans), its contractors or outside contractors may be liable under State and federal laws as an "owner or operator", "transporter" or "arranger" based on any excavation, grading or construction activities associated with the movement or placement of soils containing a hazardous substance that may pose an imminent and substantial danger to the public health or welfare. In addition, these parties may be a "generator" of ADL-contaminated soil in the course of future activities associated with Caltrans projects.

Using the risk based screening levels developed by OEHHA, excavated soils with a lead concentration less than or equal to 80 mg/kg total lead (analyzed by USEPA Method 6010 or 6020) would be acceptable for reuse without restrictions. Excavated soils that are considered a California hazardous waste (total lead concentration greater

than or equal to 1,000 mg/kg or a soluble lead concentration greater than or equal to 5 milligrams per liter [mg/L] as determined by the California Waste Extraction Test [CA-Wet]) or are a RCRA hazardous waste must be disposed of in a Class I hazardous waste landfill. Excavated soils whose soil lead concentration is below that considered to be a hazardous waste and above 80 mg/kg total lead may be eligible for reuse with specific restrictions to reduce or eliminate exposure, with prior written approval from DTSC, or may be disposed of at an appropriately permitted landfill.

Must soils with a lead concentration above the unrestricted use level be cleaned up if they are not excavated as part of the highway improvement project?

Soils within the roadway right of way with a lead concentration above the unrestricted use level (currently 80 mg/kg) that are not excavated do not need to be cleaned up. Health and Safety Code Section 25321(b) states that emissions from the engine exhaust of a motor vehicle are not included in the definition of "Release". Until these soils are excavated, graded or a part of construction activities associated with the movement or placement of contaminated soils, there has not been a release or a threatened release of a hazardous substance.