



Tacoma Smelter Plume Safe Soil Program – Soil Testing

April 5, 2007

Information Provided By:
Dr. Diana T. Yu
Health Officer

Background

From the late 1890s until the 1980s, the Asarco copper smelter in Tacoma produced air emissions with lead and arsenic that settled on soils in the Puget Sound region, primarily in Pierce and King counties, but also in parts of Thurston County. The Department of Ecology, as required by state law (RCW 70.140.030), will be testing playground soils of schools and child care centers in northeast Thurston County for lead and arsenic in the spring and summer of 2007. If high levels of lead (over 250 parts per million or ppm) or arsenic (over 20 ppm) are found, Ecology will work on a soil safety action plan with the individual site, which could include covering or replacing soils.

Soil Safety Recommendations

The levels of arsenic and lead in most areas of Puget Sound do not pose an immediate health threat. Thurston County Public Health recommends that all families adhere to the following safe soil practices:

- **Wash hands and face** after playing outside and before eating.
- **Keep soil outside**—use doormats at every door or take off shoes when coming inside.
- **Mop, dust, and vacuum** regularly to remove soil tracked in from outside.
- **Keep rooms clean** so dust does not collect.
- **Wash and rinse toys often.**
- **Maintain your grounds** by using ground cover plants or mulch on bare patches of soil.

The risk that the Tacoma Smelter Plume has caused problems you see in children today is very low. The route of exposure is through inhalation or ingestion of soil and water contaminated with lead or arsenic. If a family is in constant contact with contaminated dirt over a long period of time, there is concern about possible health effects. It's important to remember, however, that these concerns can largely be addressed through proper hygiene and by following the Soil Safety Recommendations listed above.

Arsenic Information

- Everyone has daily exposure to arsenic because it is a naturally occurring chemical found in water, soil, dust, air, and food. Soil in our state typically contains less than 7 ppm of arsenic.
- Health effects of arsenic can be different in different people, depending on the amount of arsenic they are exposed to, the length of time exposure occurs, and an individual's sensitivity to the harmful effects of arsenic.



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- Short-term exposure to large amounts of arsenic can cause mild symptoms, serious illness, or death. Milder effects may include swelling of the face, nausea, vomiting, stomach pain, or diarrhea. Serious effects may include coma, internal bleeding, or nerve damage causing weakness or loss of sensation in the hands, arms, feet, or legs. **Levels of arsenic in the soil are too low to cause health effects from short-term exposure except under extremely unusual circumstances.**
- Long-term exposure (greater than 6 months) to small amounts of arsenic has been linked to many different potential health problems, such as bladder, lung, non-melanoma skin, liver, prostate, and kidney cancer; cardiovascular disease; diabetes mellitus; damage to peripheral nerves; and changes to the pattern of color or thickness of the skin.

These illnesses often have several possible contributory factors besides arsenic. Even in areas with high levels of arsenic in soil, most cases of these health problems are not the result of arsenic exposure, but due to other factors such as diet, genetic susceptibility, lifestyle, preexisting illness, and exposure to other chemicals. Arsenic can contribute to some of the cases.

- **Medical testing:** Most arsenic inhaled or ingested stays in the body only a short time and is excreted in the feces or urine. The standard method for measuring the level of arsenic in by collecting urine samples. Two types of urine tests are available.
 - The most common test measures the total amount of arsenic and does not distinguish between the toxic “inorganic” form and the less toxic “organic” forms that make up the majority of arsenic in fish, seafood and other foods. False positive high test results could occur if foods with high levels of the relatively nontoxic organic arsenic compounds are not removed from the diet 1-2 days before the test.
 - The second type of test, for “speciated” arsenic, measures exposure to just the toxic inorganic forms of arsenic and is better for evaluating exposure relevant to health.
- Measurements of arsenic levels in hair or fingernails are not standardized, and there are no widely accepted standard values to distinguish normal from elevated.
- Arsenic tests may indicate recent exposure to arsenic, but do not indicate possible health effects from exposure. Questions about biomonitoring tests for arsenic exposure may be directed to Dr. David Kalman, Chair, Department of Environmental Health, University of Washington: (206) 543-6991. Dr. Jim White, toxicologist at the Washington State Department of Health is also available for questions relating to arsenic exposure: (360) 236-3192.



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Lead Information

- Long-term exposure to even low levels of lead is linked to irreversible learning difficulties, mental retardation, and delayed neurological and physical development.
- In adults, exposure to lead affects primarily the peripheral nervous system and can cause impairment of hearing, vision, and muscle coordination. Lead also damages the blood, kidneys, heart and reproductive system.
- Early symptoms of poisoning may include loss of appetite, fatigue, irritability, anemia, and abdominal pain.
- The Thurston County Health Department recommends children six and under be tested for lead exposure only if:
 - tests in soils where the child plays is greater than 350 ppm; or if
 - there is another potential exposure source such as peeling paint; and if
 - the child has unusual habit of eating non-edible materials.
- Please refer to the lead screening guidelines for children developed by the Centers for Disease Control and Prevention in their publication titled "Screening Young Children for Lead Poisoning." It may be found in the publications section of the CDC lead poisoning prevention site:
www.cdc.gov/nceh/lead/lead.htm

If you do have high results for lead or arsenic, and parents want further consultation, contact the Pediatric Environmental Health Specialty Unit (PEHSU) at 1-877-KID-CHEM (1-877-543-2436); see <http://depts.washington.edu/pehsu/>

For more information, see

- Arsenic in the Environment, DOH fact sheet
http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/tsp_Reference%20Docs/EPH%20Arsenic%20Factsheet%206-10-03.pdf
- DOH Lead Poisoning fact sheet <http://www.doh.wa.gov/topics/lead.htm>
- Public Health Seattle-King County's Tacoma Smelter Plume Project homepage has links to reports on the studies, fact sheets on arsenic, lead and pica behavior: www.metrokc.gov/health/tsp/arseniclead.htm
- General Information on Arsenic and Lead in Soil brochure
<http://www.ecy.wa.gov/pubs/0609048.pdf>
- Medical Management Issues of Children with Elevated Blood Lead Levels
<http://www.metrokc.gov/HEALTH/tsp/medmgt.pdf>
- Parents' Guide to Getting Children Tested for Lead Exposure
<http://www.metrokc.gov/HEALTH/providers/epidemiology/dearparent.htm>