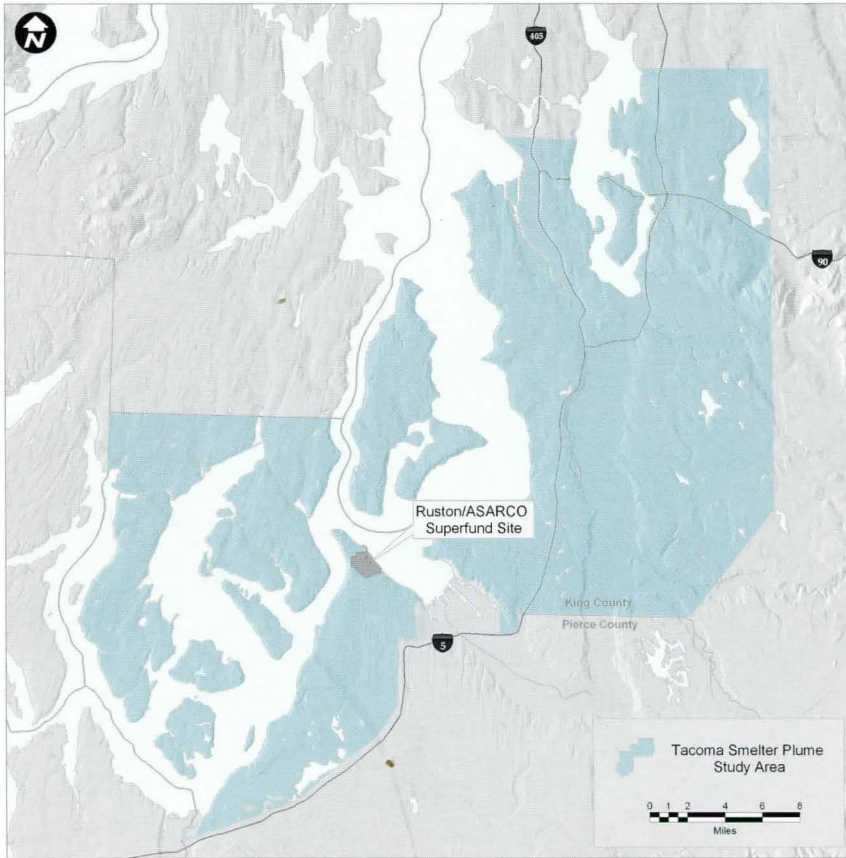


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# Alert

## Arsenic and Lead in Soils



WASHINGTON STATE  
DEPARTMENT OF  
E C O L O G Y

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2003

Ecology publication #03-09-036

Dirt alert : arsenic and lead soils

# Introduction

## Purpose of this Booklet

The Department of Ecology assembled this information to assist Schools, Childcare Operators, Residents and Local Governments to make decisions about how to manage possible soil contamination on their properties. This is in response to data we have collected identifying areas likely to have arsenic and lead in surface soils from the old Asarco smelter in north Tacoma. Our intention is to answer the most commonly asked questions about this project, and to assist you with soil protection steps you may choose to take.

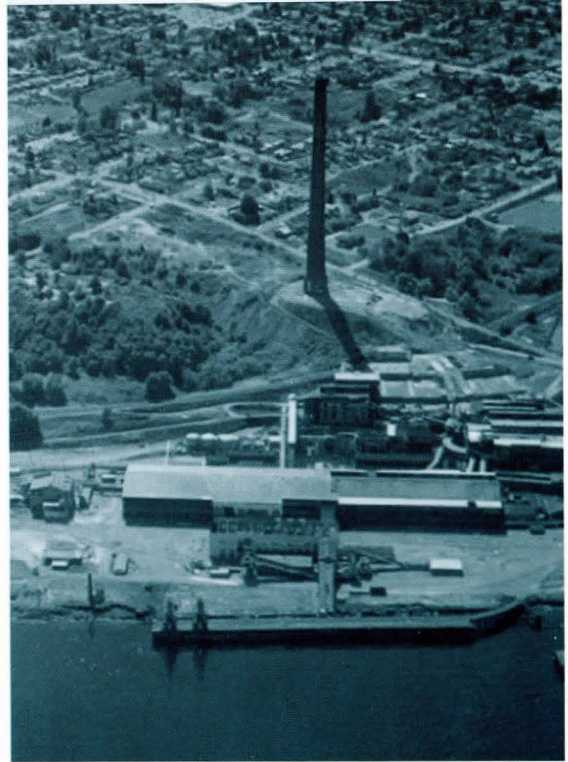
## What You Can Do Now in Response to Possible Soil Contamination

- Follow the recommended Soil Safety Guidelines (in King County; Healthy Actions in Pierce County.)
- Contact your local Public Health Department, or the Ecology site manager for your county, for
  - assistance with soil sampling, or
  - questions about soil management practices you can implement in areas where children play.

## What's in this Booklet

This booklet contains:

- Smelter History page 2
- Health Effects of Arsenic and Lead page 4
- Soil Safety Guidelines page 7
- Soil Management Practices page 8
- Cleanup Requirements page 12
- Contact List page 14



Contact the *Department of Ecology's Public Involvement Coordinator* to obtain a *Soil Sampling Guidance* booklet, which details steps of how to sample, and lists local certified laboratories.

Contact the *Health Promotion and Public Participation Coordinator* at your local Health Department to receive a number of educational posters and brochures. Examples include posters encouraging shoe removal when going indoors; soil safety guideline posters and brochures, gardening in soils that may be contaminated, and other healthy actions to reduce exposure to dust or dirt.

See *Contacts* in the back of this booklet.

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Page 1

# Health effects

## Arsenic and Lead Are Natural

Arsenic and lead occur naturally in the environment. The upper end of natural background levels for arsenic is 20 parts per million (ppm). The natural background level for lead is around 24 ppm.

## Smelter Emissions Increase Amounts of Arsenic and Lead

In western Washington, we find higher than normal amounts of arsenic and lead in surface soil. The likely source was air emissions from the Asarco smelter that operated north of Tacoma.

## Other Sources of Arsenic and Lead in Soil

There are other sources of arsenic and lead that could affect individual properties, such as:

- fertilizers and pesticides
- CCA (Chromated Copper Arsenate) wood
- Leaded gasoline
- Lead based paint



## How You Can Be Exposed

You can be exposed to arsenic and lead in the soil by swallowing small amounts of soil and dust. Arsenic and lead are not well absorbed through the skin. People at greatest risk are those exposed to soil on a regular basis - children, gardeners, construction workers, and landscapers.

Exposure to arsenic or lead over time can cause a variety of health problems

**Arsenic** exposure is linked to:

- cardiovascular and vascular disease
- diabetes

and a variety of cancers:

- skin (non-melanoma type)
- kidney
- prostate
- lung
- bladder and
- liver cancer

**Lead** exposure affect:

- the blood and central nervous systems
- blood pressure
- kidneys
- the body's ability to metabolize vitamin D

Children are particularly vulnerable to the effects of chronic lead poisoning. Effects range from lowered IQ and reduced growth, to balance, memory, and hearing problems. Pregnant women exposed to lead may have babies born prematurely and at lowered birth weights. Newborns may have the neurological effects described above.

For Further information on arsenic health risk, please contact Dr. Jim White, Washington State Department of Health, at (360) 236-3192, or at [jim.w.white@doh.wa.gov](mailto:jim.w.white@doh.wa.gov).

## Risk of harm

A person's risk of ill effects depends on:

- How sensitive the person is to arsenic and lead
- How much exposure the person has to the contaminated soil
- How much arsenic and lead are in the soil to which the person is exposed

Some of these health problems (cardiovascular disease, diabetes and cancer) have many causes and are common illnesses that affect many people. Even in areas with high levels of arsenic in the soil, we expect that in most cases, these health problems will not be caused by arsenic, but by other factors such as diet, genes, lifestyle, pre-existing illness, and other chemicals. At the same time, arsenic is expected to contribute to some of the cases.

A ballpark estimate of risk is calculated by multiplying the toxicity of a chemical (how dangerous is the chemical) by the exposure to the chemical (how much soil is swallowed over time).

*Risk = Toxicity x Exposure*

Risk assessment calculations used by the Department of Ecology are population based; we look at the risk faced by a whole community of people and are not able to predict individual risk. There are too many unknown factors with an individual's health to predict specific risks.

- If a million people are exposed to soils containing 20 ppm arsenic (natural background levels), we would expect around 30 extra cancers.
- At 200 ppm arsenic (concentrations seen in the Tacoma Smelter Plume area), the risk would increase tenfold to an extra 300 cancers per million people.

## How this risk compares to other risks we face in our lives:

| Events                              | Risk per million people |
|-------------------------------------|-------------------------|
| Bee sting                           | 12 deaths               |
| Commercial airline                  | 25 deaths               |
| Exposure to 200 ppm arsenic in soil | 300 cancer cases        |
| Job-related                         | 1600 deaths             |
| Homicide by gun                     | 2800 deaths             |

A word of caution about comparing risks based on numbers alone. A level of concern can be influenced by many other factors besides the calculated risk. For example, people are usually less concerned about risks that they control (driving a car), that provide a benefit (eating potentially contaminated fish), or that they have chosen (smoking); and more concerned about risks that they don't control (flying in an airplane), that don't provide a benefit (contaminated soil), or that they haven't chosen (second-hand smoke).



## Medical Testing

Some medical tests can help you tell if you have been exposed to arsenic or lead.

### Arsenic

Most arsenic stays in the body only a short time. Measuring the amount of arsenic in urine is the best way to see if you have been exposed to arsenic within the last 1 - 2 days.

*Note:* Less toxic forms of arsenic are present in some of the foods we eat, including seafood. A meal with seafood the day before a urine test could lead to high amounts of arsenic tested in the urine.

Arsenic can be measured in hair or fingernails, and may help in looking at your exposure to arsenic over time. However, scientists have not agreed on standards for running the tests, or what the results really mean.

### Lead

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your exposure to lead. Blood tests are commonly used to screen children for potential chronic lead poisoning.

If you are concerned about arsenic or lead exposure, contact your doctor or pediatrician for an arsenic urine test, or a blood lead test.

# Soil Safety Guidelines

Following these guidelines will help keep your house healthier and cleaner. Dirt has germs, bacteria, chemicals, and other unhealthy things in it. Dirt and dust can be breathed in or eaten, which can be harmful to your health. So encourage your family to follow the soil safety guidelines to reduce the amount of dirt and dust you inhale and ingest!

## Inside your home:

- Take off your shoes before entering your home.
- Wash hands and face thoroughly after working or playing in the soil, especially before eating.
- Damp mop and wipe surfaces often to control dust.
- Wash toddler toys and pacifiers often.
- Scrub vegetables and fruits with soap and water.
- Wash clothes dirtied by contaminated soil separately from other clothes.
- Repair painted surfaces in homes. Homes built before 1980 may contain lead-based paint. Older paint flakes may be a source of lead.
- Eat a balanced diet. Iron and calcium help keep lead from becoming a problem in the body.
- Use water and soap to wash – avoid “waterless” soaps.

## Outside your home:

- Keep children from playing in contaminated dirt.
- Cover bare patches of dirt with bark, sod or other material, or fence off area.
- Dampen dusty soils before gardening.
- Wear gardening gloves.
- Do not eat or drink in contaminated areas.

- Keep vegetable gardens away from old painted structures and treated wood.
- Do not plant food crops under the roof overhang of your home.
- Keep pets off of exposed dirt so they don't track it into the house.

## Special Considerations for Adults Doing Construction or Yardwork:

- Avoid all unnecessary exposure to soil or dust.
- Dampen dusty soils before and during the work project.
- Wear full body protective clothing (coveralls, or long sleeve shirt and pants,) shoes, and gloves. For maximum protection wear a dust mask or respiratory protection.
- Avoid eating, drinking or smoking while working in dirt.

## For More Health information:

*(You may find specific Soil Safety Guidelines vary slightly in different counties throughout the State).*

- King County:  
<http://www.metrokc.gov/health/tsp/arseniclead.htm>  
or contact *Bonnie Meyer* at 206-205-1150
- Pierce County:  
<http://www.tpchd.org/eh/Arsenic.htm>  
or contact *Janet Lindberg* at 253-798-6492.

## Additional Resource:

- Snohomish County:  
[http://www.ecy.wa.gov/programs/tcp/sites/asarco/es\\_main.html](http://www.ecy.wa.gov/programs/tcp/sites/asarco/es_main.html)  
or contact *Dave South* at 425-649-7200.

Information on this page courtesy of  
*Public Health - Seattle & King County*

# Soil Management Practices: Creating Safety within a Contaminated Soil Area

This section provides information about different actions you can take to manage contaminated soil on your property -- to reduce your exposure to the contaminants in the soil. There are two basic techniques: 1) put a barrier between you and the contaminated soil; and 2) reduce the amount of the contaminants in the soil. Your choice of actions is site specific and will depend on site conditions, the amount of contamination present, future use of the property, and cost.

Below are a number of actions to consider for managing soil contamination. These are general actions and are not intended to meet Model Toxics Control Act (MTCA) compliance for a formal cleanup. If you would like more detailed information about any of these practices, please contact the Ecology Site Manager in your county, listed at the back of this booklet.

## Fencing

The range of temporary actions begins at simply stopping access to a contaminated area by some physical barrier, such as a fence. This reduces your risk from exposure by stopping physical contact with the contaminated soil.

## Capping

Temporary capping or covering is another option. Materials such as gravel, bark chips, or rubber mats may be placed over the contaminated soil. We recommend at least one foot of bark or gravel cover material. You may need more if activities in the area will significantly disturb the cover material, such as under a swing set. Be careful to avoid digging through these temporary barriers, which could re-expose contaminated soils. You can visually

mark the contaminated soil by placing a heavy duty landscape fabric\* between the contaminated soil and cover material.

A more permanent capping option is to cover the contaminated area with the landscape fabric, and at least one foot of clean topsoil covered with sod. If larger plants will be used in the area, at least two feet of soil should be added. More durable coverings such as asphalt or concrete can also be used for capping.

*\*These fabrics are commonly found at home maintenance stores. Permeable fabrics create a barrier to contact and show where the contaminated soil begins, while allowing water drainage. The more durable the fabric, the lower the maintenance will be over time.*

## Raised Beds

For gardening, consider using raised beds with at least one foot of clean soil on top of a durable weed barrier or landscape fabric. This keeps contaminated dirt off of vegetables, and off your hands. Avoid using Chromated Copper Arsenate (CCA) treated wood for the raised beds, as the treated wood has very high concentrations of arsenic.

## Mixing

Mixing is a way of reducing (or diluting) the amount of contamination in the soil. The contaminated surface soil is rototilled to a depth of two feet - mixing the surface soil with deeper non-contaminated soil. Another option is to add clean soil and/or compost to get more dilution. This option may only work well where arsenic concentrations are generally less than 50 parts per million, the contamination is in the upper 12 inches, and aggressive mixing is used.

## Excavation and Disposal

This is “dig-and-haul.” The contaminated soil is excavated, hauled to an approved landfill (as approved by the local Health authority based on sample results), and replaced with clean soil.

## Containment

Containment means that contaminated soil is excavated, and placed back on the property in a completely enclosed location, isolating contaminants from the environment. Such containment structures have been used for basketball and tennis courts, concrete slab foundations, driveways and parking lots. If you have a construction project underway, you might want to consider containing the contaminated soil.

## Steps to Action

1. Sample areas of concern (child play area, garden, etc.)

2. Evaluate and select soil management options from the table at right. Contact Ecology if you need assistance.

3. Take selected action.

4. Consider testing soil again to see if the action worked.

## Soil Management Table

The purpose of the table on the next page is to allow a property owner to compare and contrast different methods of reducing contact with soil contamination. We’ve indicated generalized prices, which include all costs involved, unless otherwise stated. The measurements used are thought to be most applicable to property sizes involved in most residential areas. Where property owners collectively approach a contractor to make one large product order, costs can be reduced.





## Soil Management Table

| Method   | What's Involved  | Costs [generalized]   | Considerations   | Who to call*  |
|--|--|---|--|---|
| <b>Fencing and Signs</b>   | Block access to contaminated area with fences and warning signs.   | Fence: \$2-4/linear ft**  | <ul style="list-style-type: none"> <li>• Stop-gap measure only.</li> <li>• May prevent use of property.</li> </ul>   | Fencing   |
| <b>Cap (cover) with:</b><br>• Bark<br>• Wood chips<br>• Gravel<br>• Rubber mat | Place a physical barrier between you and the contaminated soil. Place heavy duty landscape fabric over contaminated soil and cover with 1-2 feet of gravel, wood chips, or bark. Or, place heavy duty rubber mats over contaminated soils in specific areas, such as a playground. | Permeable landscape fabric \$0.60/sq ft<br>Wood chips, bark**: \$0.25/sq ft (or \$6.75/cu yd)<br>Gravel**: \$0.50-0.60/sq ft (or \$15/cu yd)<br>Rubber Mat (recycled): 4' by 4' = \$26-\$44, varies with thickness**                          | <ul style="list-style-type: none"> <li>• Contaminants are isolated, but still present.</li> <li>• Avoid digging through cover.</li> <li>• Requires maintenance over time. Heavier landscape fabric will last years longer, resulting in less maintenance.</li> <li>• Must notify future property owners or tenants of need to maintain cover.</li> </ul>   | For cover material:<br>• Landscape Equipment & Supplies;<br>• Nurseries;<br>• Rock.<br>For rubber mats:<br>• Playground Equipment |
| <b>Cap (cover) with clean soil and sod</b>                                     | Place a physical barrier between you and the contaminated soil. Place heavy duty landscape fabric over contaminated soil and cover with 1-2 feet of clean soil. Place layer of sod from turf farms over clean cover soil.  | Permeable landscape fabric \$0.60/sq ft<br>Top Soil: \$11-13/cu yd**<br>Sod: \$0.30/sq ft (plus &70 delivery charge if >1000 sq ft)<br>Laboratory Analysis Fee: \$35-50/soil sample for arsenic and lead.                                     | <ul style="list-style-type: none"> <li>• Contaminants are isolated, but still present.</li> <li>• Avoid digging through cover.</li> <li>• Requires maintenance over time. Heavier landscape fabric will last years longer, resulting in less maintenance.</li> <li>• Recommend testing "clean" soil first.</li> <li>• Must notify future property owners or tenants of need to maintain cover.</li> </ul>  | Topsoil Suppliers;<br>Landscape;<br>Sod Farms & Sales   |
| <b>Cap (cover) with asphalt or concrete</b>                                    | Place a physical barrier between you and the contaminated soil. Pave areas of contaminated soil with asphalt or concrete.  | Concrete slab \$5 per sq. ft. For 20'x 20'x4": 5 yards of concrete = \$375 plus \$740 for all labor; total \$1115.<br>Asphalt For 20'x20'x4": \$3200 includes four man crew; estimates distance from asphalt plant. Expensive for small jobs. | <ul style="list-style-type: none"> <li>• Contaminants are isolated, but still present.</li> <li>• May be desirable to pave for other reasons: basketball or tennis court; driveway.</li> <li>• Must notify future property owners or tenants of need to maintain cover.</li> </ul>   | Concrete Contractors<br>Asphalt Contractors   |
| <b>Raised garden beds</b>  | Garden in clean soil. Place heavy duty landscape fabric over contaminated soil. On top of landscape fabric, build raised garden beds with untreated lumber. Fill with 1-2 feet of clean soil for gardening.  | Permeable landscape fabric \$0.60/sq ft<br>Composite wood: \$11 per 8 ft length; \$17 per 12 ft length; \$23 per 16 ft length<br>Topsoil**: \$11-13/cu yd<br>Laboratory Analysis Fee: \$35-50/soil sample for arsenic and lead.               | <ul style="list-style-type: none"> <li>• Allows gardening, landscaping.</li> <li>• Contaminants are isolated, but still present.</li> <li>• Avoid digging through fabric.</li> <li>• Requires maintenance over time.</li> <li>• Avoid Chromated Copper Arsenic [treated] wood.</li> <li>• Recommend composite wood. Untreated wood decomposes quickly.</li> <li>• Recommend testing "clean" soil first.</li> <li>• Must notify future property owners or tenants of need to maintain raised beds.</li> </ul> | Rock & Landscape Supply;<br>Topsoil suppliers;<br>Lumber, Building Materials  |

| Method   | What's Involved  | Costs [generalized]   | Considerations   | Who to call*  |
|--|--|---|--|---|
| <b>Mixing:</b><br>till contaminated surface soil with clean soil | Reduce arsenic/lead levels by tilling contaminated surface soil with clean soil. Till surface soil with cleaner soils below; or, till new clean soil into contaminated surface soil. | Rototiller (rental):<br>\$26 for two hours;<br>\$47 for four hours;<br>\$66 for one day<br>Topsoil**: \$11-13/cu yd<br>Soil testing: \$35-50/soil sample for arsenic and lead.<br>Confirmational Soil Testing: \$35-50/soil sample for arsenic and lead.  | <ul style="list-style-type: none"> <li>• If mixing of contaminated soil is thorough, arsenic/lead levels may be reduced to below levels of health concern.</li> <li>• May not be effective if arsenic levels are &gt; 50 ppm.</li> <li>• May require tilling to at least 2 feet depth to provide for adequate mixing.</li> <li>• Can bring in clean soil to reduce depth of tilling.</li> <li>• May increase your exposure to contaminants during action – precautions should be taken.</li> <li>• Recommend testing before and after mixing.</li> <li>• Small home-size rototillers may not be large enough.</li> </ul> | Rental Service Stores   |
| <b>Dig &amp; Haul</b>  | Remove all contaminated soil and transport to approved landfill. Replace with clean soil.  | Backhoe (rental): \$200-300 for one day (includes delivery of backhoe)<br>Container fee: May or may not be required<br>Disposal fee: \$14-20 cu yd<br>Transport fee: \$5-6 per ton locally<br>Topsoil: \$11-13/cu yd<br>Laboratory Analysis Fee: \$35-50/soil sample for arsenic and lead.<br>Landfill Fee Requirements. Landfill may require sampling prior to dumping, \$115-145. | <ul style="list-style-type: none"> <li>• Contamination is removed for good.</li> <li>• Very expensive.</li> <li>• May increase your exposure to contaminants during action – precautions should be taken.</li> <li>• Recommend testing after excavation to ensure all contamination has been removed.</li> <li>• Recommend testing "clean" soil first.</li> </ul>  | Contact local Ecology site manager for technical assistance. This is a complicated undertaking and requires environmental consultation. |
| <b>Containment</b>   | Remove contaminated soil and put in one place on the property. Cover with a permanent structure, such as a paved surface.  | Backhoe (rental): \$200-300 for one day (includes delivery of backhoe)<br>Concrete slab: \$25/ per 5' by 5' ft and 4" thick (includes cost of contractor to prepare forms)<br>Laboratory Analysis Fee: \$35-50/soil sample for arsenic and lead.  | <ul style="list-style-type: none"> <li>• Contaminants are isolated, but present in one area of property.</li> <li>• May want to pave for other reasons: basketball or tennis court; driveway.</li> <li>• May increase your exposure to contaminants during action – precautions should be taken.</li> <li>• Recommend testing after excavation to ensure all contamination has been removed.</li> <li>• Must notify future property owners or tenants of need to maintain cover.</li> </ul>  | Contact local Ecology site manager for technical assistance if needed.  |

\* See Yellow Pages under listed Heading

\*\* Cost Estimates include delivery of the product

Key: ppm = parts per million; < = less than; > = greater than; sq ft = square foot; cu yd = cubic yard (One cubic yard of material covers roughly an area 5' by 5' to 1' deep.)

Conversions: 1 Cubic Yard = 27 cubic feet; One acre-foot = 1613 cubic yards; 1 acre = 4840 square yards; 43,560 square feet; 740 linear feet circumference

# Cleanup Requirements: Real Estate Transactions

This section provides information to help answer the tough questions about cleanup of soil contamination on your property, and real estate disclosure requirements.

## Model Toxics Control Act

The Model Toxics Control Act (MTCA) is the state law governing cleanup of contaminated soil, water, and air in Washington. MTCA provides the process and standards for studying and cleaning up contamination in our environment.

## Am I required to cleanup my property?

Ecology is not requiring property owners to clean up their Tacoma Smelter Plume contaminated properties, unless a situation arises which could pose immediate and serious impacts to health. However, Ecology and local health districts are recommending property owners clean up contaminated soils whenever possible to reduce long term health risks:

### Schools, parks, camps, childcare facilities

Ecology is encouraging schools, parks, camps, and childcare facilities to provide clean play areas for children. Please see the section on Soil Management Practices for actions you might take in children's play areas. Ecology can provide technical assistance, for a fee through the *Voluntary Cleanup Program* (described below).

### Residential properties

Ecology is encouraging homeowners to manage their contaminated soil as opportunities arise, through landscaping or property additions/renovations.

- *Putting in a garden?* – install raised beds.
- *Making an area for the kids to play?* – install a sand box, or play area covered with wood chips, bark, or rubber mats.
- *Landscaping?* – place clean dirt on top of a fabric barrier for new plantings.

Please see the section on *Soil Management Practices* for other actions you might take on your property. Also see Voluntary Cleanup Program below, and contact your Ecology Site Manager for more information.

### Undeveloped properties

If you are considering developing an undeveloped property for housing, schools or childcare, where children will be playing, we encourage you to sample for contamination. Many of the Soil Management Practices can easily be incorporated into the development of the property.

## Voluntary Cleanup Program

If you want a formal buyoff by Ecology, we recommend going through our *Voluntary Cleanup Program*. Through the Voluntary Cleanup Program, Ecology provides services to individuals cleaning up contaminated sites. For a fee, Ecology staff will review a cleanup report and provide a written decision about the adequacy of the cleanup actions described in the report. Upon a satisfactory review, a property may receive a "No Further Action" decision from Ecology.

Reports received by the program are reviewed on a first-come, first-served basis. On average, the review process takes about six months to complete, and the initial fee to enter the program is \$500.

## Funding Options

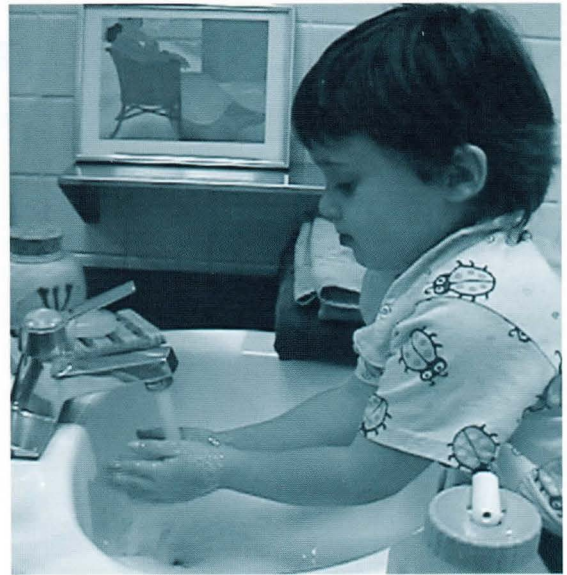
Currently, public funding is not available for cleanup of private properties within the Tacoma Smelter Plume area. Cleanup will have to be funded through private means.

### Brownfields Loan Fund

Private property owners may be eligible for a low-interest rate loan for cleanup of contamination through the brownfields loan program. Loans carry a low transaction cost with up to five years repayment terms. The brownfields program is managed by the Department of Community, Trade and Economic Development (CTED). For more information contact *Sharon Kophs* at 360-725-4032, or email [sharonk@cted.wa.gov](mailto:sharonk@cted.wa.gov).

### There are a few funding sources for cleanup of public properties:

- *Remedial Action Grants* Remedial Action Grants offer funding for the cleanup of public properties at 50% (75% if in an economically disadvantaged area) of total project costs. . The local government must enter the voluntary cleanup program and achieve a No Further Action status to be eligible for reimbursement of cleanup costs up to \$100,000. Alternatively, the local government entity may enter into an Agreed Order with Ecology and obtain up-front matching funds for conducting the cleanup. These grants may be for greater than \$100,000.
- *Brownfields Redevelopment Loan* – Public entities are also eligible for brownfields loan funds the same as private property owners. Loan funds may be used as match to the state’s Remedial Action grants.



## Requirements under Real Estate Disclosure Laws

Real estate law requires disclosure of known contamination on Form 17 (Chapter 64 RCW 64.06.020). As a buyer or seller within the Tacoma Smelter Plume area, you may want to consult with a real estate attorney.

- Buyers should look into the history of activities and environmental risks of a property.
- Sellers should provide any sampling results.
- Sellers should provide information about any soil management actions taken.
- Sellers should provide information regarding any deed notice, or maintenance requirements applicable to the property.

# Contact List for Tacoma Smelter Plume and Related Issues

## Washington State Department of Ecology

### Project Manager

*Marian Abbett*

(360) 407-6257

MABB461@ecy.wa.gov

### Public Involvement Coordinator

*Molly Gibbs*

(360) 407-6179

MGIB461@ecy.wa.gov

### King County Site Managers

*Guy Barrett*

(360) 407-7115

GBAR@461@ecy.wa.gov

*Norm Peck*

(425) 649-7047

NOPE@ecy.wa.gov

### Pierce County Site Manager

*Joyce Mercuri*

(360) 407-6260

JMER461@ecy.wa.gov

### Voluntary Cleanup Program

*Chuck Cline*

(360) 407-6267

CCLI461@ecy.wa.gov

## Asarco Tacoma Smelter

*Karen Pickett*, Public Relations Coordinator

(253) 756-0203

kpickett@asarco.com

## Washington State Department of Health

### Health Effects

*Jim White*, Toxicologist

Office of Environmental Health

(360) 236-3192

Jim.W.White@doh.wa.gov

### Arsenic in Drinking Water

(general questions)

*Denise Clifford*, Constituent Relations

Division of Drinking Water

Denise.Clifford@doh.wa.gov

(360) 236-3098

### Childhood Lead Poisoning Prevention Program

1-800-909-9898

## Public Health - Seattle & King County

### Project Lead

*Nicole Fus*

(206) 296-3916

nicole.fus@metrokc.gov

### Public Participation Coordinator

*Bonnie Meyer*

(206) 205-1150

bonnie.meyer@metrokc.gov

## Tacoma-Pierce County Health Department

### Project Coordinator

*Glenn Rollins*

(253) 798-3503

Grollins@tpchd.org

### Public Participation Coordinator

*Frank DiBiase*

(253) 798-7674

Fdibiase@tpchd.org

### Health Promotion Specialist

*Janet Lindberg*

(253) 798-6498

Jlindberg@tpchd.org

## Office of Trade and Economic Development

### Program Manager

#### Brownfields Redevelopment

*Sharon Kophs*

(360)725-4032

sharonk@cted.wa.gov

## Environmental Coalition of South Seattle

### Brownfields Assessment Funds

*Emery Bailey, Technical Svcs Mgr.*

(206)767-0432

## Washington State Department of Labor and Industries

### Worker Safety, King County:

*Mark Soltow*

(206) 281-5533

SOLT235@LNI.WA.GOV

### Pierce County

*Pat Mahaney*

(253) 596-3918

MAHA235@LNI.WA.GOV

## Websites

- Ecology Tacoma Smelter Plume Website  
[http://www.ecy.wa.gov/programs/tcp/sites/tacoma\\_smelter/ts\\_hp.htm](http://www.ecy.wa.gov/programs/tcp/sites/tacoma_smelter/ts_hp.htm)
- Public Health Seattle and King County  
<http://www.metrokc.gov/health/tsp/arsenic.htm>
- Pierce County Health Department, Arsenic Project  
<http://www.tpchd.org/eh/arsenic.htm>
- Environmental Protection Agency, Asarco Smelter Cleanup  
<http://www.epa.gov/region10/sustainability/pp03.htm>
- Agency for Toxic Substances and Disease Registry, Facts on Arsenic  
<http://www.atsdr.cdc.gov/tfacts2.html>
- Centers for Disease Control, Facts on Lead  
<http://www.cdc.gov/nceh/lead/guide/1997/docs/factlead.htm>
- Department of Health, Drinking Water  
<http://www.doh.wa.gov/ehp/dw>

If you require this document in an alternative format, please call (360) 407-6300 or (TTY) at 1-800-833-6388.

**Department of Ecology**

Southwest Regional Office

P.O. Box 47775

Olympia, WA 98504-7775