

Tacoma Smelter Plume

2013 Annual Report

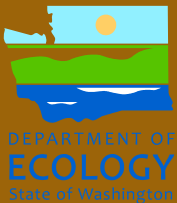


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Purpose of the Report

This report describes how the Department of Ecology is using the Asarco settlement to clean up the Tacoma Smelter Plume. It provides an update on cleanup progress and efforts to manage human health risks. The report covers:

- The ten-year plan for managing the Asarco settlement.
- Cleanup strategies and priorities.
- Accomplishments and 2013 performance measures.

Most of the report data are from October 1, 2012 through September 30, 2013. Soil sampling and cleanup data are current through October 31, 2013.

Asarco Settlement

Asarco's Legacy in Washington

Contamination from smelters and mines

The American Smelting and Refining Company (Asarco) was founded in 1899. Asarco operated two smelters and four mines in Washington, leaving a legacy of contamination.

The **Tacoma smelter** operated from 1890 to 1986. The Town of Ruston grew up around it. Air emissions from the smelter contaminated over 1,000 square miles of soils in the Puget Sound region.



The 2009 Asarco Bankruptcy Settlement

Washington becomes part of the nation's largest environmental settlement

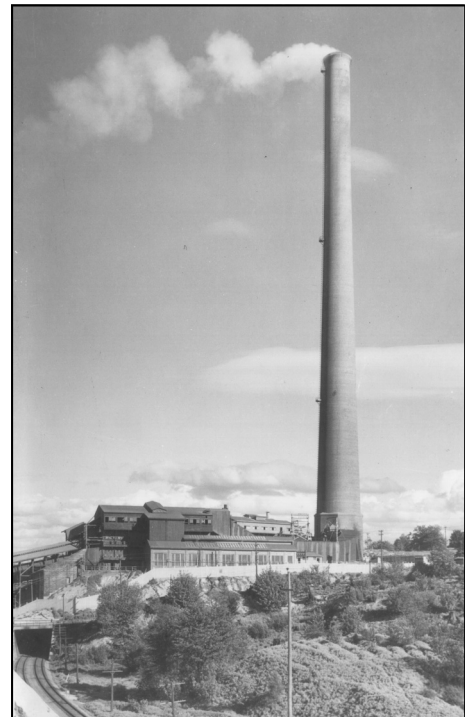
In 2005, Asarco declared bankruptcy, largely due to environmental liabilities from its nearly 100 cleanup sites across the country. The State of Washington joined the federal government and other states in a suit against Asarco that spanned four years.

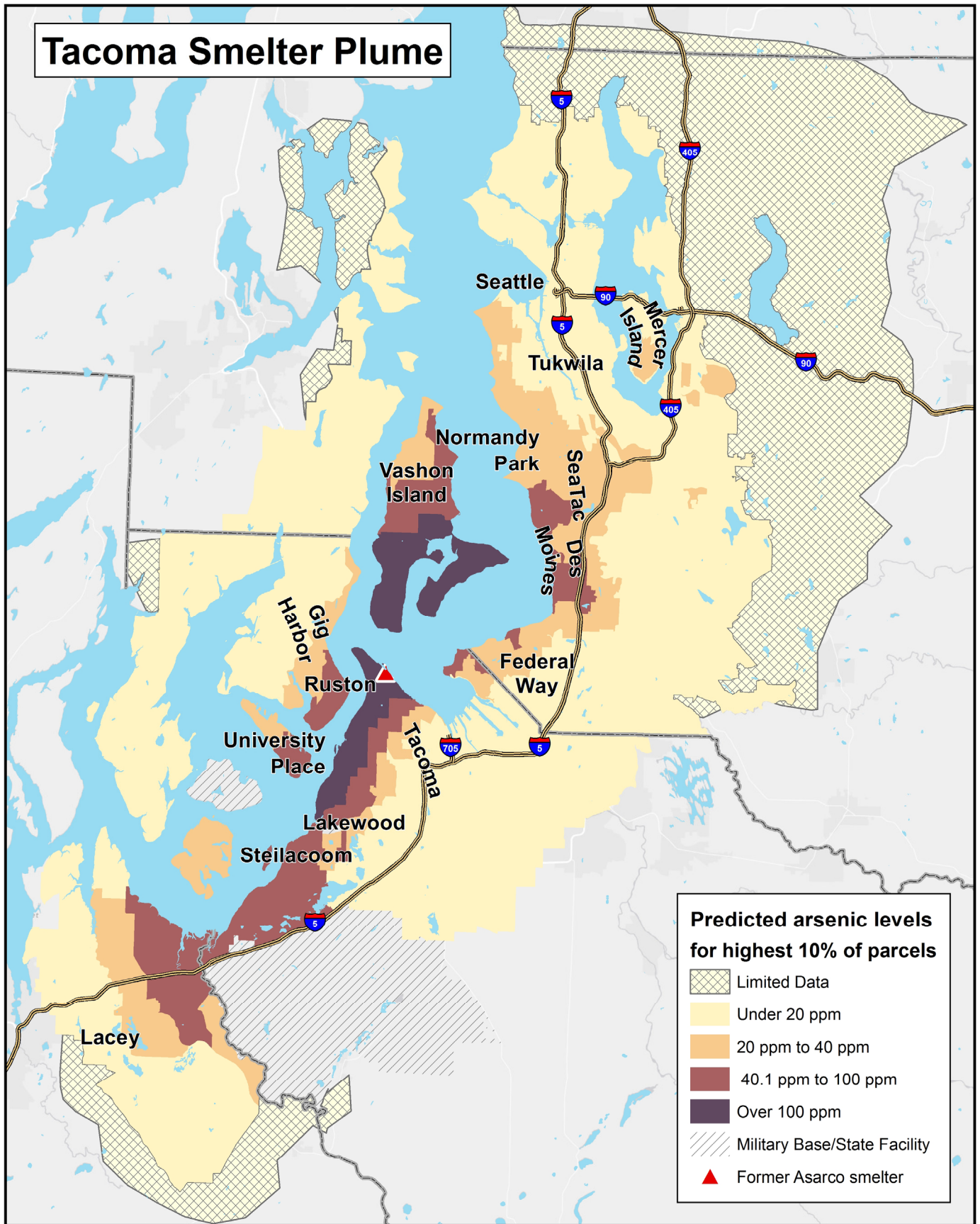
In November 2009, Asarco emerged from bankruptcy, having paid out the largest environmental settlement in U.S. history. The total settlement was \$1.79 billion for past and future cleanup costs, and interest earned over the four years. Washington's share was \$188.5 million—nearly 90 cents for every dollar claimed.

Tacoma Smelter Plume communities benefit from \$94.6 million for cleanup and reducing risk

Asarco settled for \$94.6 million for the future costs of cleaning up the Tacoma Smelter Plume. It covers soil cleanup for play areas and residential yards, ongoing outreach, and technical assistance for those voluntarily cleaning up their own properties.

Most funds will go to yard cleanup in Ruston, north and west Tacoma, and southern Vashon-Maury Island neighborhoods, which have the highest contamination. See pages 8-9 for more about planned settlement spending.





With 90% certainty, at least 1 in 10 parcels will have soil arsenic at or above levels shown. Predictions are based on distance and direction from the former Asarco smelter, and on sampling data from forested and other soils undisturbed by development. Actual arsenic levels may vary greatly from parcel to parcel.

Tacoma Smelter Plume

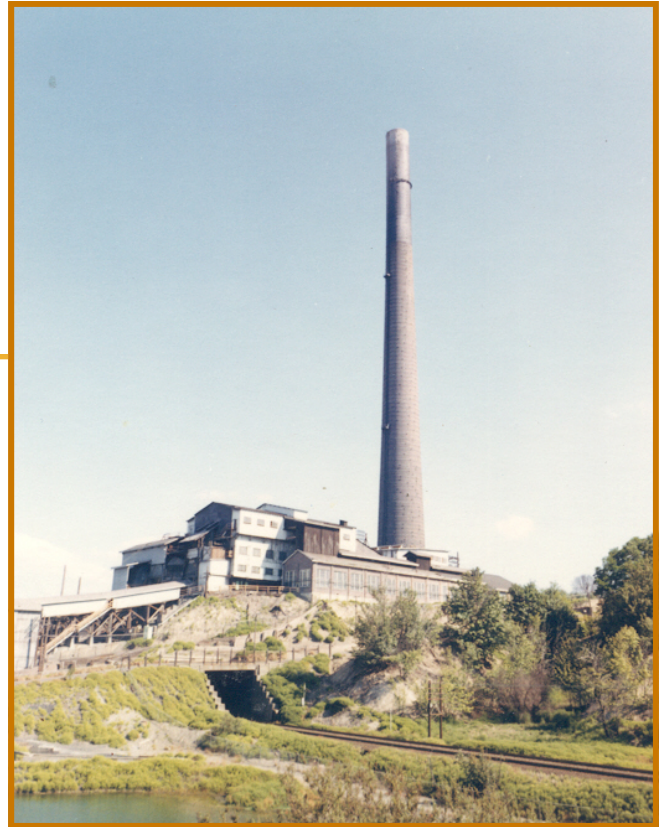
Tacoma Smelter Plume at a Glance

Total Settlement: \$94.6 million

Counties: Thurston, Pierce, King

Total size: Over 1,000 square miles

Cleanup focus: Surface soils



Tacoma Smelter Plume History

In 1890, a lead smelter began operating on the border of north Tacoma and Ruston. In 1905, Asarco purchased it and converted it to a copper smelter in 1912. Its smokestack emissions dispersed arsenic, lead, and other heavy metals across a 1,000 square mile area—the Tacoma Smelter Plume.

Arsenic and lead are toxic and children are at highest risk. Within the plume, hundreds of thousands of people may be exposed.

Understanding patterns of contamination helps to prioritize cleanup work

Former Asarco smelter and its 571 foot smokestack

The Tacoma smelter extracted copper and other products from high-arsenic ores. Its 571-foot smokestack was believed to be the tallest in the world when it was built. These factors, along with wind patterns and topography, created the broad pattern of contamination shown in the map on page 2.

Arsenic levels are higher closer in to the former smelter and decrease with distance. Areas of higher contamination pose a larger risk to residents. The majority of the \$94.6 million settlement will go to soil sampling and cleanup in these neighborhoods.

Early risk management focused on community outreach and play area cleanups

Starting in 2000, Ecology gave funding to health departments in King and Pierce counties. The funding covered outreach programs, as well as soil sampling to better understand the plume extent.

The main goals of outreach were to raise awareness and promote “healthy actions”—behaviors to reduce soil exposure, such as hand-washing. The health departments used surveys, focus groups, and other feedback to develop a suite of outreach materials and strategies for reaching children, parents, and caretakers, in particular.

In 2005, the Area-Wide Soil Contamination law (Chapter 70.140 RCW) led Ecology to develop the Soil Safety Program. The program at first provided free soil sampling and cleanup for play areas at schools and childcares. In 2010, using funding from the Asarco settlement, we expanded it to include park, camp, and public multifamily housing play areas.

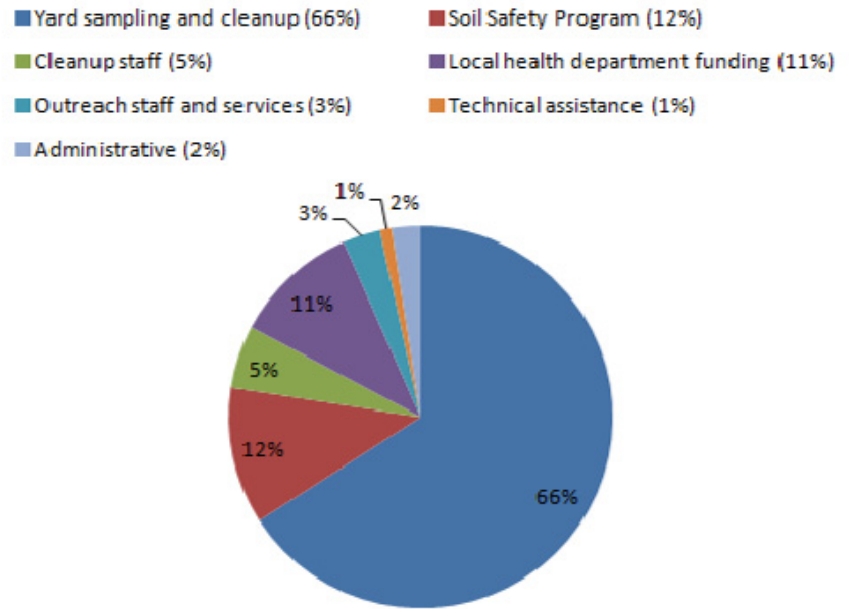
Ten-Year Plan for Managing the Tacoma Smelter Plume

Using lessons learned from earlier outreach and play area cleanup work, Ecology developed a 10-year plan for the Tacoma Smelter Plume Asarco settlement. The plan focuses on four main strategies, which are described in the 2012 Tacoma Smelter Plume Interim Action Plan:

- **Yard cleanups:** Soil sampling and cleanup for existing residential yards in areas of highest contamination.
- **Soil Safety Program:** Continue sampling and cleaning up school, childcare, park, and camp play areas.
- **Outreach and education:** Continue programs at health departments in King, Pierce, and Thurston counties.
- **Technical assistance:** Work with local governments and developers to encourage voluntary cleanup.

The yard cleanup program will use the majority of settlement funds meant for the future cost of cleaning up the Tacoma Smelter Plume (pie chart and table).

Breakdown of the \$94.6 million Asarco settlement for the future cost of cleaning up the Tacoma Smelter Plume, over 10 years



Tacoma Smelter Plume 10-year plan budget and activities

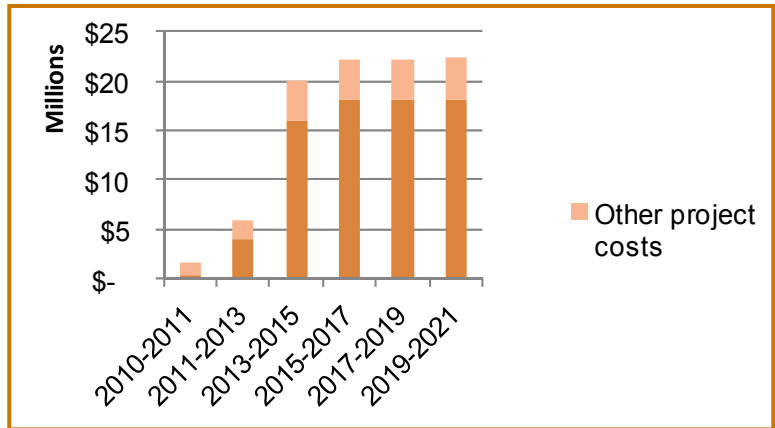
	Budget	Category	Activities and staffing
66%	\$62m	Yard sampling and cleanup	Contracts to sample yards and clean up soils >100 ppm arsenic
12%	\$11m	Soil Safety Program	Contracts to sample play areas and clean up soils over 20 ppm arsenic
5%	\$5m	Cleanup staff	Five Ecology staff to manage contracts, field work, and cleanup data
11%	\$10m	Local health department outreach	Interagency agreements fund outreach programs in King, Pierce, and Thurston counties
3%	\$3m	Outreach staff and services	Mass media advertising, surveys, home soil testing program, and 1 staff person
1%	\$1m	Technical assistance	1 Ecology staff technical assistance coordinator
2%	\$2m	Administrative	Equipment, staff training, and 1 staff person

Settlement Spending Priorities

Protection of public health depends on preserving the full settlement

Yard cleanups began this year, so spending will begin to ramp up toward a peak of around \$21 million in the 2015-2017 biennium (bar chart).

Ecology has already invested in designing the yard cleanup program, planning several large park cleanups, and building outreach programs.



Tacoma Smelter Plume 10-year projected costs (2010-2013 are actual expenditures)

The majority of funding goes directly to sampling and cleanup contracts

More than three-quarters of the settlement will go to soil sampling and remediation contracts.

We expect to sample over 4,600 yards and 1,200 could need cleanup. At the program’s peak, we will have at least three cleanup contracts, each with multiple work crews.

A focus on soil cleanup protects those at greatest risk

A two-pronged cleanup approach addresses both geographic areas and populations at greatest risk.

The **yard cleanup program** will begin in neighborhoods with the highest estimated arsenic levels. At the same time, the **Soil Safety Program** reduces the potential for exposure in the play areas where large numbers of children regularly spend time.



Children’s developing bodies are more susceptible to toxins, they spend time near the ground, and they often put dirty hands in their mouths

Partnering with local agencies stretches our dollars

We plan to provide \$10 million over 10 years to local health departments to run “Dirt Alert” outreach programs and to support the overall project. These programs help people understand and reduce their exposure to soils that may be contaminated.

Local agencies know their communities best and are a trusted resource. They have health education expertise and the tools to evaluate and improve outreach programs. They also partner with other environmental health programs to promote Dirt Alert messages.



Yard Sampling & Cleanup Program

Removing contaminated soils protects people now and into the future

Summer of 2013 marked the launch of the Residential Yard Sampling and Cleanup Program (Yard Program). This program provides free soil sampling for the 4,653 yards in the service area shown to the right.

Ecology will offer free soil cleanup for portions of yards with levels above:

- 100 parts per million (ppm) for arsenic; or
- 500 ppm for lead.

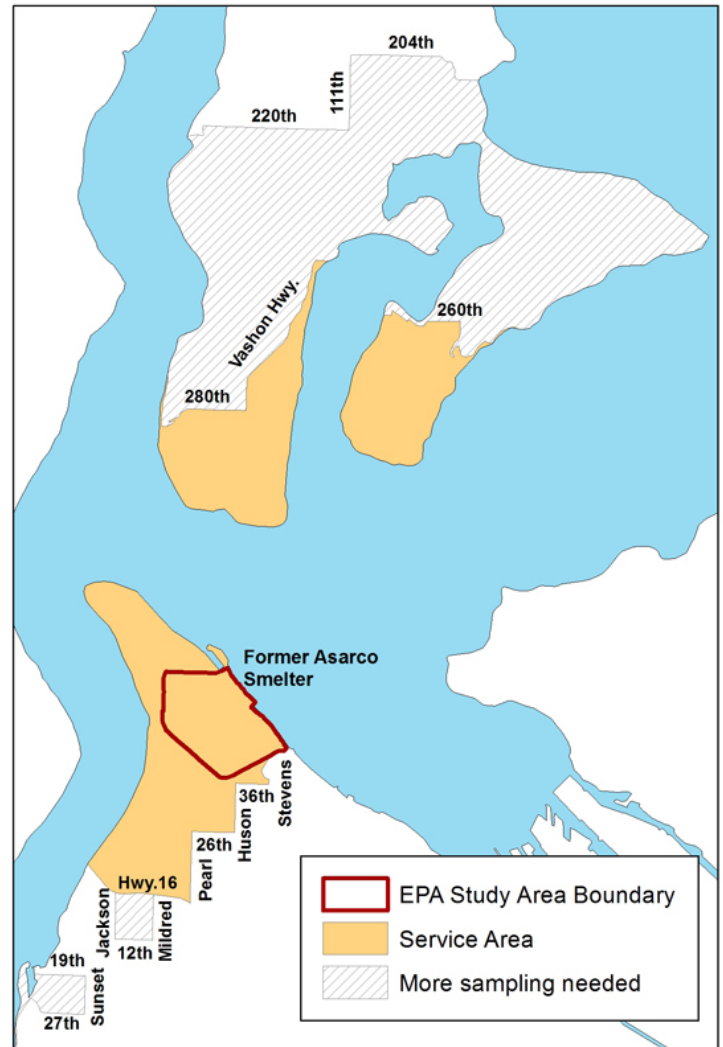
Soil sampling moving quickly in Tacoma and on Vashon-Maury Island

Due to high public interest, Ecology began signing homeowners up for sampling in the spring of 2013. This gave soil samplers a large group of homes to jump-start the sampling effort.

We are working in two main areas:

- **In Tacoma**, the Tacoma-Pierce County Health Department is doing sampling.
- **On Vashon**, Ecology hired the firm Kennedy Jenks to take samples.

As of October 31, 2013, we **signed up 383 homeowners** and **sampled 249 yards**. See table below for more progress measures.



Yard Sampling and Cleanup Program Service Area

Cleanup has started in the EPA Study Area. Soil sampling began on Vashon and just outside of the EPA Study Area.

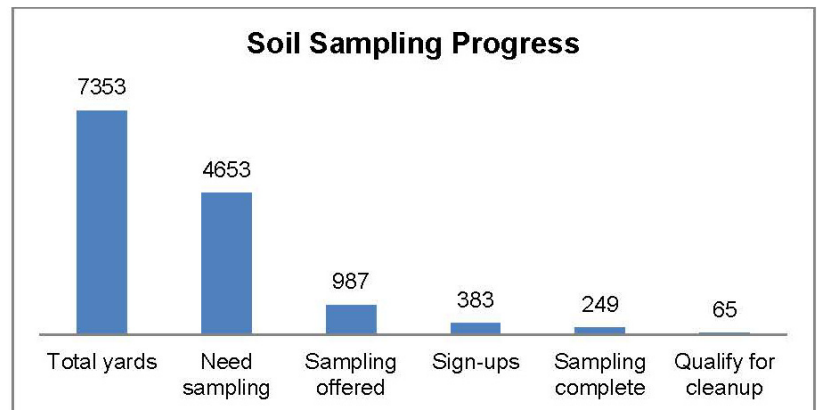
Cleanup halfway complete for first group of eight Tacoma homes

This fall, we started our first eight cleanups in the EPA Study Area (see map). Four yards are complete. A small first group allows us to pilot test the cleanup process and further improve the program design.

More than 100 cleanups slated for 2014-2015 construction seasons

We have contacted 43 more homeowners in the EPA Study Area to offer yard cleanup. Of those, 34 agreed to meet to discuss cleanup and re-landscaping plans.

We plan to clean up at least 34 yards in 2014 and around 100 by June 30, 2015.



Yard Program soil sampling progress as of Oct. 31, 2013.

Total yards includes the 4,653 needing sampling plus 2,700 EPA Study Area yards already sampled.

Early results show a high rate of yards qualifying for cleanup

So far, 26% of sampled yards qualify for cleanup. This is higher than the 11% we predicted for the overall program. However, we did start sampling in the most contaminated areas to address the highest risks first.

The first year of sampling and cleanup will inform the overall program budget.

We based the budget on data from other, similar projects. Data from this first year will show if our projections (table to the right) are on track.

- **Soil sampling costs around \$1,500 a yard.** Cost depends on yard size and how many homes sign up in a neighborhood.
- **Cleanup is around \$50,000 for a standard yard.** Larger lots, difficult access, and complex landscaping increase the cost.



In most cases, we remove the top 12-18 inches of soil, then backfill and re-landscape the yard.

Projected Yard Sampling and Cleanup Costs

Program area	Parcels to sample	Sampling cost	Parcels to clean up	Cleanup cost
Ruston/North Tacoma Study Area	Already sampled	\$0	695	\$34,750,000
Vashon-Maury Island	731	\$1,096,500	100	\$5,000,000
Tacoma (outside of Study Area)	3,922	\$5,883,300	400	\$20,000,000
Total	4,653	\$6,979,500	1,195	\$59,750,000

Comment Period and Changes to the Final Program Design

The public comment period for the Yard Program design ran March—April, 2013. The final design and response to comments are online.

A new map focuses sampling and cleanup efforts

The map on page 6 shows a smaller service area than we estimated in 2012. We used sampling data and a statistical model to predict areas most likely to have arsenic over 90 parts per million (ppm).

More sampling will help decide if the service area should grow

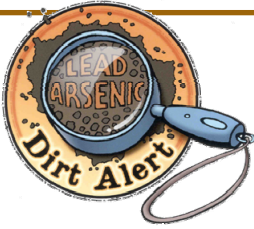
We did not have enough data to tell whether the grey hatched areas on the map should be in or out of the program. Over the next few years, we will collect more data and rerun the model.

A cleanup threshold of 90 ppm arsenic is more conservative

Ecology set a cleanup action level for arsenic at 100 ppm. Soil sampling can sometimes over- or under-estimate actual levels. By using 90 ppm as a threshold for cleanup, we have a better chance of catching all the yards truly over 100 ppm.



Cutting sod at the edge of a patio to finish re-landscaping a yard.



Outreach Programs

Dirt Alert! program raises awareness and promotes behavior change

The main goals of outreach are to raise awareness about arsenic and lead and educate the public about reducing soil contact.

The Dirt Alert program promotes “healthy actions” through nail brushes, posters, door hangers, and brochures. Healthy actions include:

- Washing hands after playing or working outside.
- Taking off shoes at the door or using a doormat.
- Vacuuming and damp-dusting regularly.
- Covering bare patches of dirt in the yard.

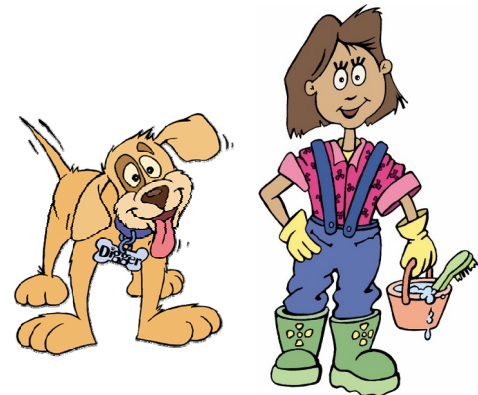


Parents and childcare providers say fish nail-brushes encourage children to wash their hands.

Children and the adults that care for them are priorities for outreach

Arsenic and lead pose a larger risk for young children than for adults. Local health departments developed a wide range of outreach tools to target children, parents, teachers, and childcare providers. These include:

- Training for childcare providers, for which they receive continuing education credits towards relicensing.
- Classroom presentations using the Dirt Alert curriculum.
- Home visits to do soil testing and outreach about reducing exposure.



Digger the Dog and Sudsy Sally are ambassadors of the Dirt Alert program.

Home soil testing programs have educated thousands of families

Pierce and King county residents can sign up for free home soil testing for areas of their yard they use the most. Health departments use this as a chance to teach them about simple ways to reduce contact with soil while still enjoying their yard.

“The information the testing provided enables us to make healthy decisions for our kids, especially considering lead and arsenic risks.” (Pierce County resident)

Testing takes less than an hour. Samplers dig small holes, remove the soil, and send it a lab.



Local health department partners

Ecology provides outreach funding to:

- Tacoma-Pierce County Health Department.
- Public Health—Seattle & King County.
- Thurston County Department of Health and Social Services.

In 2013, Public Health—Seattle & King County restarted its Dirt Alert program. This summer, Tacoma-Pierce County Health Department expanded its work to include outreach and soil sampling for the Yard Program (pages 6-7).

Mini-grant program targeting south King County community groups

This fall, Public Health—Seattle & King County asked community groups to apply for two \$25,000 grants. The grants are for Dirt Alert outreach to ethnic and non-English speaking groups.

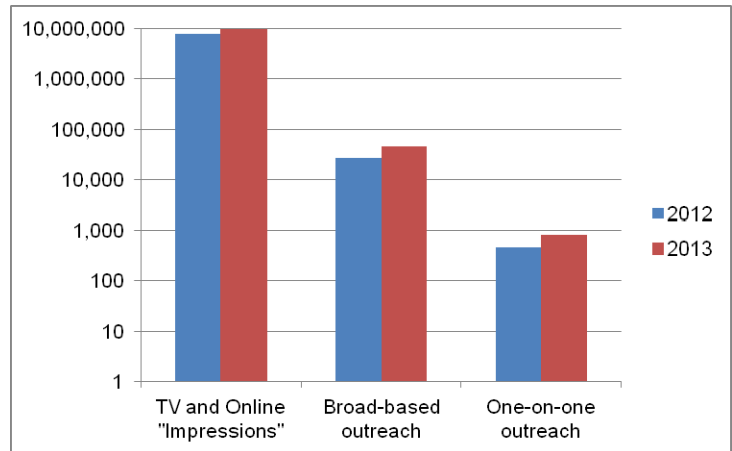
Grant recipients will help the county build better outreach programs that address the concerns of diverse communities.

Dirt Alert outreach increased from 2012 to 2013

We track how many times we reach a person with Dirt Alert messages. It can take many contacts and different methods to increase awareness and lead to behavior change. In the chart...

- Impressions are the number of times an ad runs, multiplied by viewership.
- Broad-based outreach includes mailers, trainings, and events.
- One-on-one outreach includes home visits, soil testing, and phone calls.

In 2013, we ran more ads and expanded outreach through local health departments. We also contacted thousands of households about the Yard Program (pages 6-7).

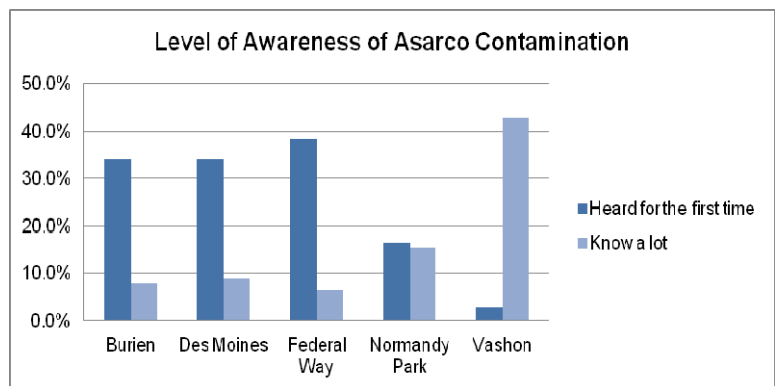


Dirt Alert outreach statistics for the 2012 and 2013 reporting periods (October—September)

Survey results show a need for more outreach in some areas of King County

In the spring of 2013, we surveyed five communities in King County and heard back from nearly 3,000 people. We asked about awareness of Dirt Alert and whether they take healthy actions (page 8).

Vashon Island, which has received the most outreach, has the highest awareness of soil contamination. Burien, Des Moines, and Federal Way are the focus of new outreach programs.



Soil Safety Program

Protecting children where they play

The Soil Safety Program provides free soil sampling and cleanup for child play areas. Created through 2005 legislation, the program has cleaned up over 100 play areas and sampled more than 1,000.

Park cleanups nearly halfway done

Most Soil Safety Program work this past year was park cleanups:

- **Cleanup completed** at parks in Burien, SeaTac, Federal Way, and Vashon-Maury Island.
- **Cleanup underway** at parks in Tacoma and Lakewood.

Fourteen of the 32 parks with contamination are cleaned up or have signage (see below).

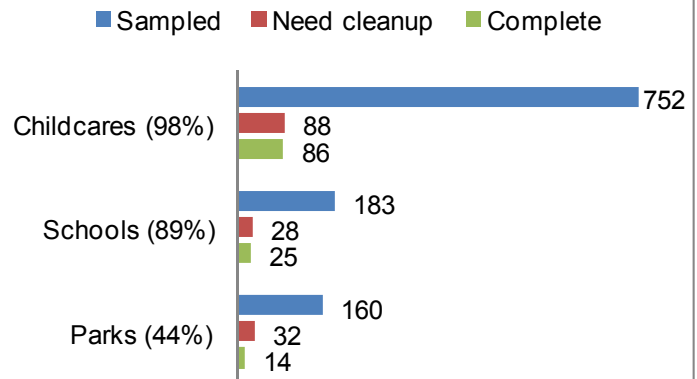


Park signs for wooded areas

In some cases, we cannot clean up a park play area because it is in the woods and cleanup would harm the trees. For those areas, we offer signage to warn users and give tips for reducing contact with soil.

Dottie Harper Park in Burien was one of the first to put up signs. Over the next year, we hope to get signs to all affected park districts.

Soil Safety Program Progress



Sampling and cleanup since 2006. Ecology assesses play areas for exposed soil to sample. If arsenic or lead are over the action levels (below), we remove or cover the soil. The chart also shows the percentage of cleanups completed.

Soil Safety Program Action Levels

- Average **arsenic** over 20 parts per million (ppm) or any single sample over 40 ppm; or
- Average **lead** over 250 ppm or any single sample over 500 ppm.

Working Around Summer Park Activities to Get Cleanup Done

Coordinating with Tacoma Metro Parks

Construction season overlaps with summer break programs at many parks. We worked with Tacoma Metropolitan Park District to schedule the last five Tacoma park cleanups over three summers.

Although we want to reduce the risk to kids as soon as possible, cleanup can be disruptive to the community. Spacing the cleanups out over three years makes it easier for everyone to plan ahead.

Removing soils from behind the baseball diamond at Jane Clark Park



Technical Assistance Program

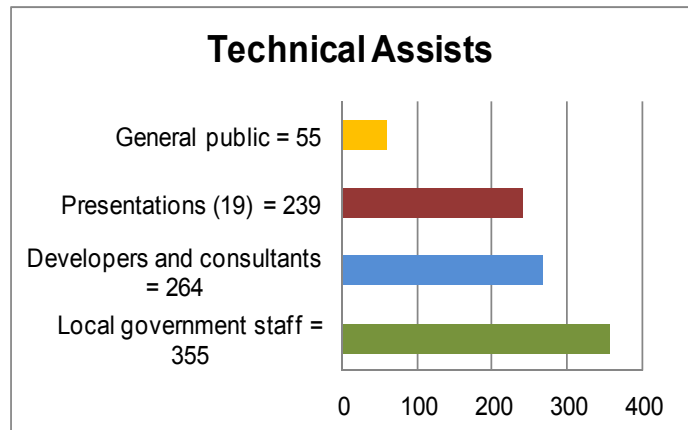
Encouraging soil cleanup during grading projects

Grading during land development is a good time to do cleanup because soils are already being moved. It is easier to remediate them before houses, buildings, and roads are constructed.

The Technical Assistance Coordinator works with local governments, developers, and landowners to clean up contaminated soil.

We partner with 18 local permitting offices in King, Pierce, and Thurston counties to encourage landowners to do soil cleanup during grading.

From October, 2012 through September, 2013, **21 acres** were cleaned up through the Voluntary Cleanup Program.



Tacoma Smelter Plume technical assistance provided October, 2012—September, 2013

Two Tacoma Developments Clean up Soils to Protect Future Residents

Sunset Estates in Tacoma

This new Quadrant development in Tacoma is near Titlow Park and includes **24 new single family lots**. The property is 5.8 acres.

Before building homes, Quadrant removed 15,774 cubic yards (over 20,000 tons) of contaminated soil. They then disposed of the soil at the Land Recycling Inc. (LRI) soil waste landfill in Graham, WA.

Removing contaminated soils at Sunset Estates →



Creekside Village development site

Creekside Village Apartments in DuPont

Creekside DuPont Partners LLC developed a **12.8 acre**, multi-building apartment community in DuPont. The complex includes **160 units**, community center, salt water pool, sports court, and several neighborhood and pocket parks.

Creekside DuPont Partners LLC removed around 130 tons of arsenic-laden soil and disposed of it at LRI. They then mixed the remaining contaminated soils with clean soils to reduce arsenic levels.

Ruston/North Tacoma Superfund After Superfund cleanup, remaining contamination still poses a risk

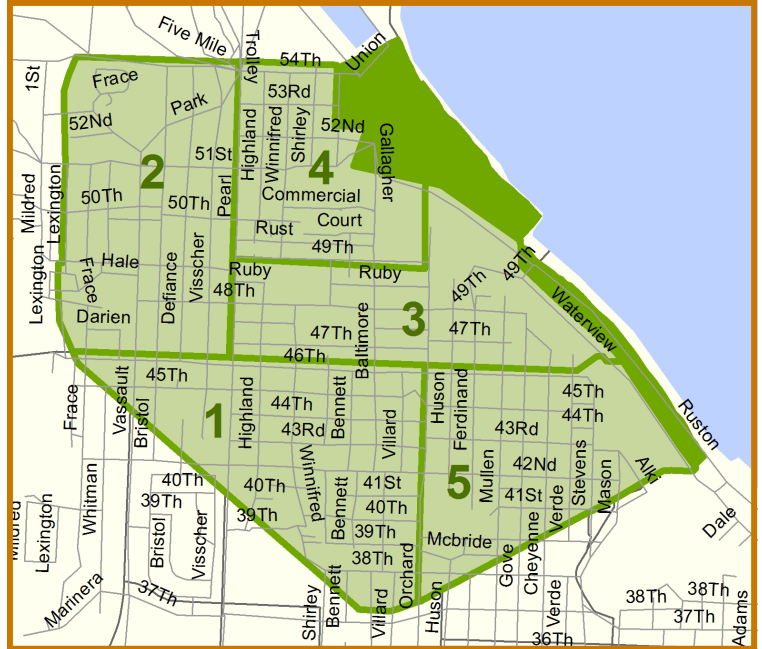
The one mile radius around the former Asarco smelter is a federal Superfund site (map to right), managed by the US Environmental Protection Agency (EPA).

Work completed: From 1993 to 2012, EPA oversaw sampling of 3,750 properties and cleanup of 2,436.

EPA action level: EPA only did cleanup where arsenic levels were over 230 parts per million (ppm).

Remaining contamination: Around 700 yards are still above Ecology's action level of 100 ppm. Many more are above the state cleanup level of 20 ppm (see chart below).

Ecology is using Asarco settlement funds to clean up the 700 next most contaminated yards.



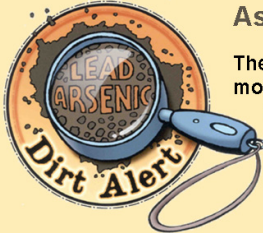
Ruston/North Tacoma Superfund area cleanup sequence: Ecology is cleaning up area 1 first because it has the highest percent of yards still needing cleanup

Ecology helping EPA to finish Superfund cleanup

This fall, Ecology began cleanup of eight yards not completed under the Superfund cleanup. Under an agreement with Ecology, EPA will reimburse the state. Ecology is also taking over some of EPA's local outreach tasks.

Asarco Information Center transitioning to local management

Under the same agreement, the Tacoma-Pierce County Health Department will soon take over EPA's outreach work. This includes yearly mailings, local events, and helping people look up their soil sampling results and cleanup paperwork.



Asarco Information Center

The EPA Asarco Information Center has moved to the Tacoma-Pierce County Health Department (TPCHD).

E-mail: DirtAlert@tpchd.org
Phone: 253-798-3503



Arsenic Cleanup Levels and Action Levels. An action level is the point where an agency will take action to clean up the soil. Action levels depend on the agency doing the work and the type of area being cleaned up. Once Ecology does a cleanup, the soils should have lower than the cleanup level of 20 parts per million (ppm) arsenic.

Other Work Supported by the Tacoma Smelter Plume Project

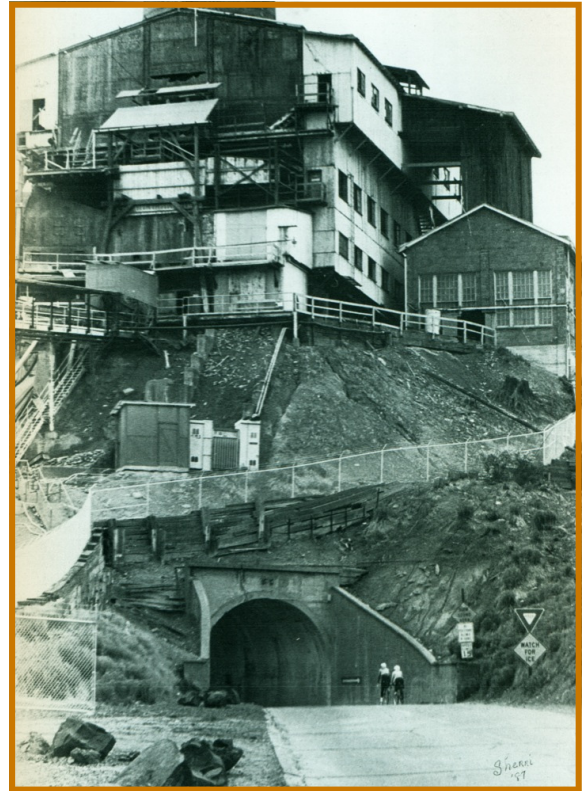
Ecology’s staff provides oversight and technical assistance for other projects funded by appropriations from the Asarco settlement. These projects deal with soils impacted by the former Tacoma smelter.

Our role is to ensure contaminated soils are properly managed.

Ruston Tunnel

In the 2013-2015 biennium, the Legislature set aside \$400,000 of the Asarco settlement for the closure of the Ruston Tunnel. Ecology is planning an inter-agency agreement with the City of Ruston to complete this project.

The tunnel used to run traffic from Ruston Way in Tacoma, under the former Asarco plant (photo to the right). A new road bypasses the tunnel, which is now filled with contaminated soils. Final steps include filling the remaining space to make it stable enough to seal up.



Ruston Tunnel under the former Asarco plant
Photo courtesy of Sherri Forch

Point Defiance Trail

In 2013-2015, \$5 million of the Asarco settlement will go to Tacoma Metro Parks for helping to finish a trail between Ruston Way and Point Defiance Park in Tacoma. Part of the funding will go towards soil management during trail building.

Funding will be taken from existing programs, likely the Yard Program (pages 6-7). Ecology will enter into an interagency agreement with Metro Parks to manage the funds.

Arsenic in Soils Database and Smelter Search Interactive Map

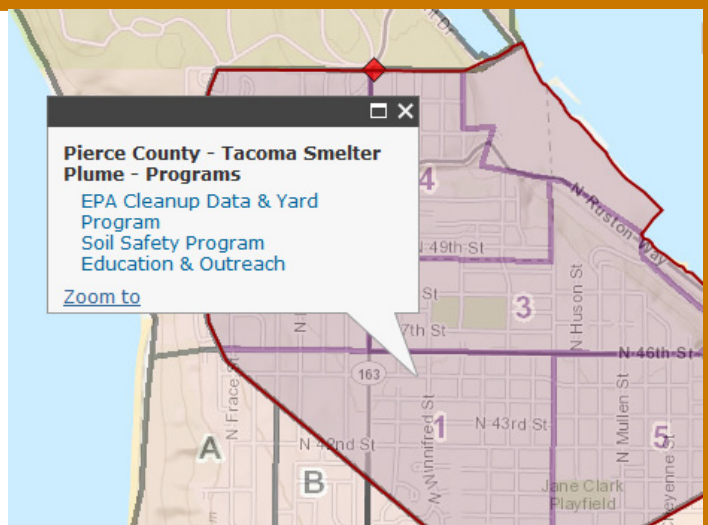
Arsenic in Soils Database: The public can find soil sampling and cleanup data through an online database. Data include past Superfund cleanups and sampling results from Ecology’s new Yard Program (pages 6-7).

<https://fortress.wa.gov/ecy/areispublic/>

Smelter Search: This interactive map links users to programs they qualify for, including soil sampling and outreach.

<https://fortress.wa.gov/ecy/smeltersearch/>

Smelter Search results for a north Tacoma address



Tacoma Smelter Plume Team Members

Toxics Cleanup Program Management

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Public Health—Seattle & King County

Thurston County Department of Health and Social Services

Tacoma Smelter Plume Information

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