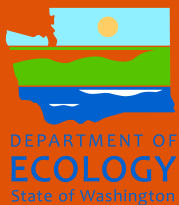


Tacoma Smelter Plume

2014 Annual Report



DEPARTMENT OF
ECOLOGY
State of Washington

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Purpose of the Report

This report describes how the Department of Ecology (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 2014 performance measures.

Most of the report data are from October 1, 2013, through September 30, 2014.

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

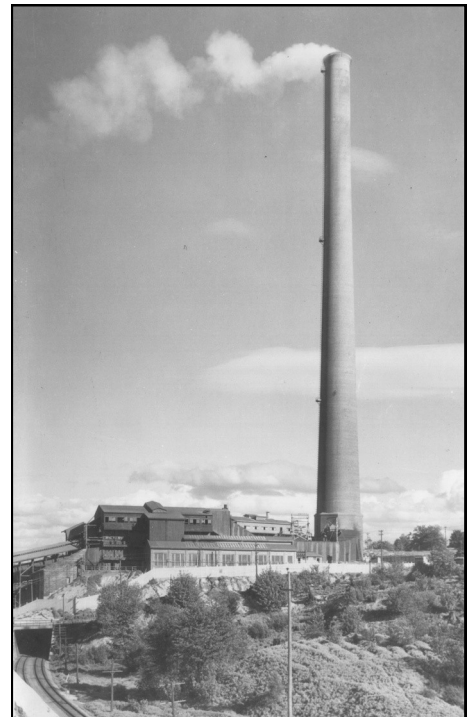
In 2005, Asarco declared bankruptcy, largely due to environmental liabilities from its nearly 100 cleanup sites across the country. The State of Washington joined the federal government and other states in a suit against Asarco that spanned four years.

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.

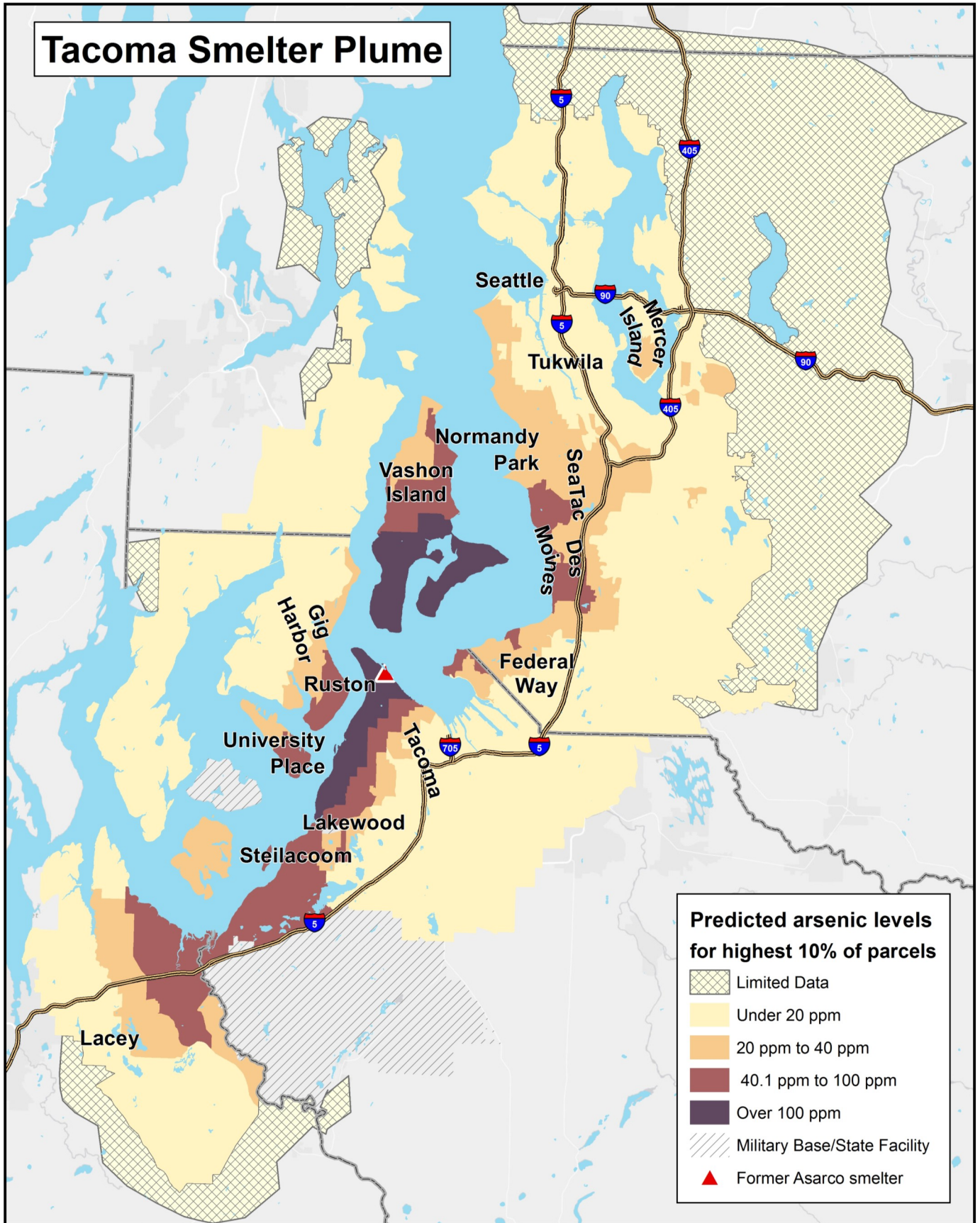
Tacoma Smelter Plume communities benefit from \$94.6 million for cleanup and reducing risk

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 education and 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 4-5 for more about planned settlement spending.



Historic photos courtesy of Tacoma Public Library Image Archives



With 90% certainty, at least 1 in 10 parcels will have arsenic in soil 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. Arsenic levels are shown in parts per million (ppm).

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



Former Asarco smelter and its 571-foot smokestack

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. Within the plume, hundreds of thousands of people may be exposed to contaminated soil. Children are at highest risk.

Understanding patterns of contamination helps to prioritize cleanup work

The Tacoma smelter used 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 education and 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. At first, the program 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.

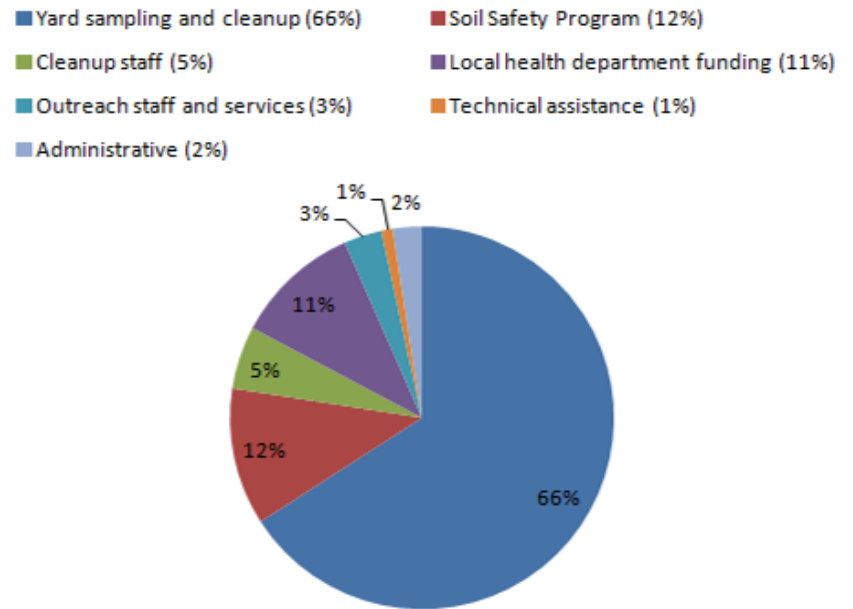
Ten-Year Plan for Managing the Tacoma Smelter Plume

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:** Sample soil and clean up existing residential yards in areas of highest contamination.
- **Soil Safety Program:** Continue sampling and cleaning up child play areas at school, childcare, park, and camps.
- **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 the Tacoma Smelter Plume settlement funds (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 over 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

Cleanup and Risk Management Priorities: Preserving Settlement Funds is Becoming More Vital

Ecology has already made large investments in soil cleanup

The \$62 million Yard Sampling and Cleanup Program is under way, with 920 yards already slated for cleanup. By January 2015, 61 of those yards will be complete.

Soil replacement on eight acres of Tacoma's Vassault Park is nearly complete. Plans are in progress for the cleanup of four other park play areas in Tacoma.

New data show cleanup predictions are on target for Tacoma

Soil sampling results from more than 1,000 Tacoma yards align with earlier estimates of arsenic levels. Up to 40% of homes in certain neighborhoods qualify for cleanup. The rate decreases farther away from the smelter.

The demand for education programs is increasing with public awareness

Yard cleanups are raising awareness and our soil sampling programs are identifying more homes with arsenic levels that don't qualify for cleanup. Healthy action planning, outreach, and education are key for helping residents manage their risk.

A new community grant program in King County has raised awareness among underserved ethnic groups. There is a growing need for translated materials and more culturally-appropriate messages.

Economic recovery means more development projects needing technical assistance

We expect to work with more and more land developers over the coming years. Development is a good time to test for and address soil contamination. Our free advice can help offset some of the cost.



The highly visible cleanup of homes and parks usually raises public interest in the risks of arsenic and lead.



Local health departments provide educational materials. To reach underserved populations, King County is working with community groups like the Korean Women's Association.

Yard Sampling & Cleanup Program

Removing contaminated soils protects people now and into the future

The Residential Yard Sampling and Cleanup Program (Yard Program) provides free soil sampling for the 4,653 yards in the service areas shown to the right.

Ecology is offering free soil cleanup for portions of yards with levels over:

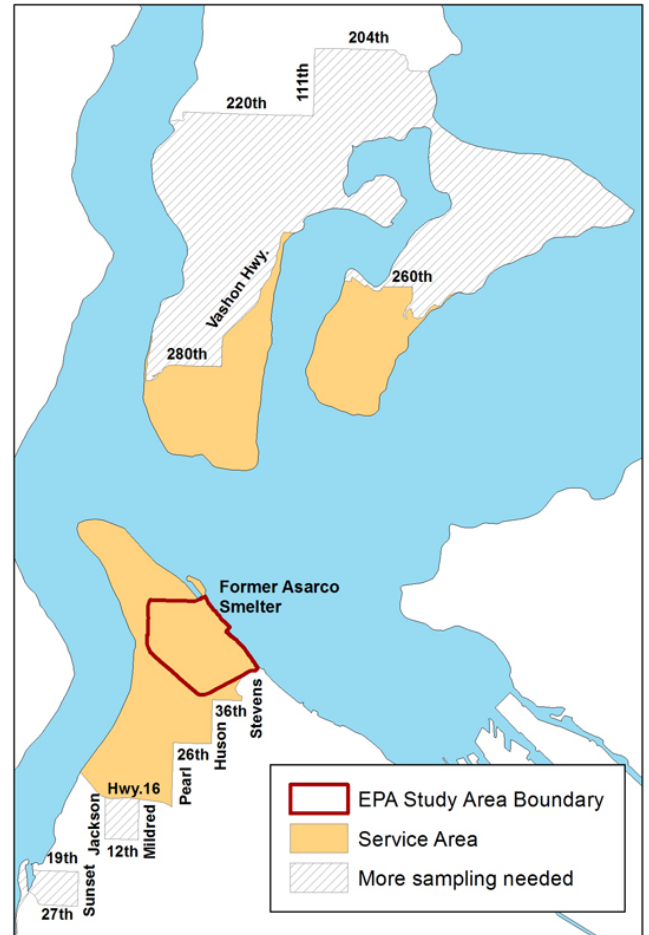
- 100 parts per million (ppm) for arsenic; or
- 500 ppm for lead.

Soil sampling continues in Tacoma, and finishes fall 2014 on Vashon Island

In Tacoma, the Tacoma-Pierce County Health Department (TPCHD) has offered sampling to 2,095 homeowners. Of those, 1,250 agreed to sampling and we completed sampling for 880 yards. Over the next two years, TPCHD will offer sampling to around 1,800 more homeowners.

On Vashon Island, we offered sampling to 807 yards in the service area. A total of 624 homeowners agreed to sampling and we completed sampling for 615. We will continue to accept sign ups for sampling on Vashon through 2015.

As of October 31, 2014, we signed up 1,874 homeowners and **sampled 1,495 yards** throughout the service area. 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 in the summer of 2013.

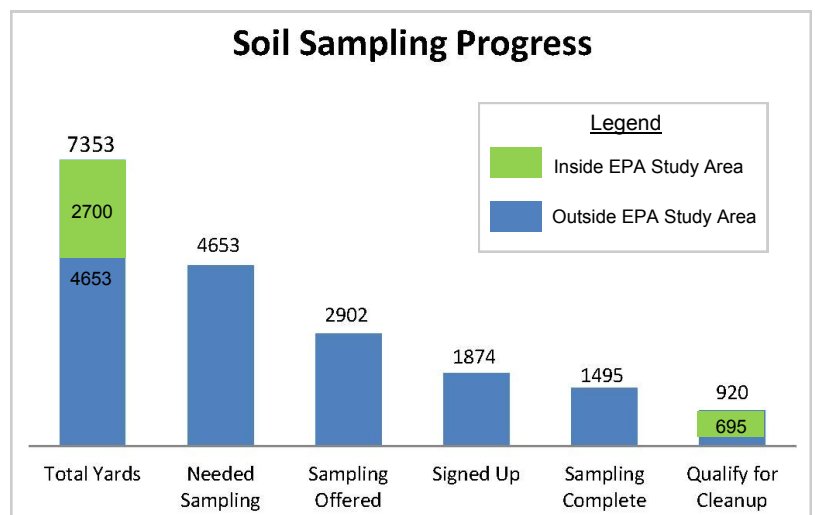
Soil sampling identified 225 more yards that qualify for cleanup

In Tacoma, we found 181 more yards that qualify for cleanup outside the EPA Study Area (see map above).

On Vashon Island, we found 44 yards that qualify for cleanup.

In EPA Study Area, around 695 yards qualify for cleanup. These yards were sampled during the EPA Superfund Cleanup in the 1990's and early 2000's.

Overall, there are **920** yards slated for soil cleanup in the program. We expect to find 275 more yards that qualify for cleanup.



Yard Program soil sampling progress as of Oct. 31, 2014.

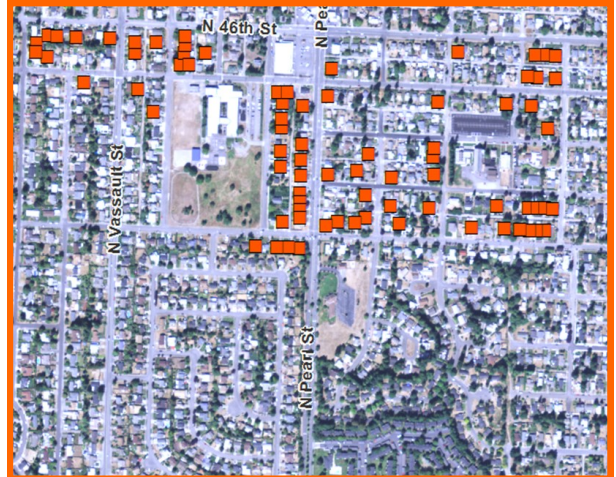
Total yards includes the 4,653 that needed sampling plus 2,700 EPA Study Area yards already sampled by the EPA. The 920 total yards that qualify for cleanup include 225 outside the EPA Study Area and 695 within the EPA Study Area.

Cleanup underway on 53 more yards in 2014.

Last fall, we completed cleanup on the first eight yards in the EPA Study Area. These yards were remaining from the EPA Superfund cleanup.

In summer 2014, we started cleanup on 53 more yards in the overall program. In the EPA Study Area, we began work on 47 yards (see map). On Vashon Island, we began work on the first 6 yards.

As of October 31st, over half of the 53 yards were close to completion, with the remaining ones underway.



2014 yard cleanups in Tacoma. In late July 2014, Ecology began work on 47 yards in Tacoma for the 2014 cleanup season. The 47 yards are all between 41st and 46th, near Pearl Ave.

More than 100 cleanups slated for 2015-2016 construction seasons

In 2014, we met with 119 homeowners to discuss cleanup and re-landscaping plans. We plan to clean up at least 100 of those yards in 2015.



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

EPA-funded cleanups outside Study Area

Outside the EPA Study Area in Tacoma, we found 11 yards with arsenic over 230 parts per million, the action level of the Environmental Protection Agency (EPA). We have an agreement with the EPA that they will fund the cleanup of these yards.

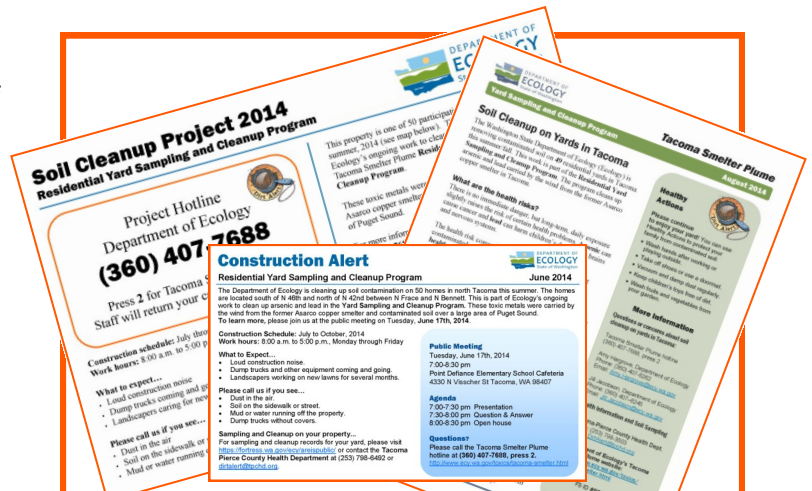
Increased outreach about yard cleanup work

Due to high public interest, we developed a wide range of outreach tools to inform the surrounding communities about the yard cleanup work.

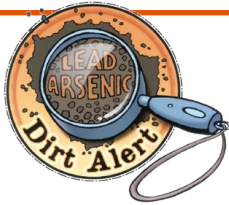
These included:

- Public meeting in Tacoma to present details of the cleanup work and answer questions.
- Project hotline to call for concerns about a cleanup site or to find more information.
- Signs and a fact sheet posted at each yard in the 2014 cleanup group.
- Social media including blog posts, emails to our Listserv and updates to our website.
- Postcards and newsletters sent to neighbors.

This fall, we began creating a short video to orient future participants to the cleanup process. The video will be complete by January 2015.



New materials inform residents about the cleanup work in their neighborhood.



Education and Outreach Programs

Dirt Alert! programs raise awareness and promote behavior change

The main goals of Dirt Alert programs are to:

- Raise awareness about arsenic and lead.
- Educate the public about reducing soil contact.
- Encourage taking healthy actions to manage risk.

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.

Dirt Alert encourages healthy actions through one-on-one planning conversations, nail brushes, posters, damp dust cloths, door hangers, and brochures.



Residents say placing a mat at the door can help you remember to take your shoes off and keep dirt out of the house.

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 childcare providers, who receive continuing education credits towards relicensing.
- Classroom and library presentations.
- Home visits to do soil testing and education about reducing exposure.
- One-on-one conversations to help people plan how to work with their families to take healthy actions.



Local health departments give hand washing demonstrations at libraries and childcares.

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 and education funding to:

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

Health departments do home soil testing, one-on-one outreach, give presentations to adults and children, outreach at events, work with community groups, help develop materials, and outreach to gardeners, landscapers, and non-English speakers.

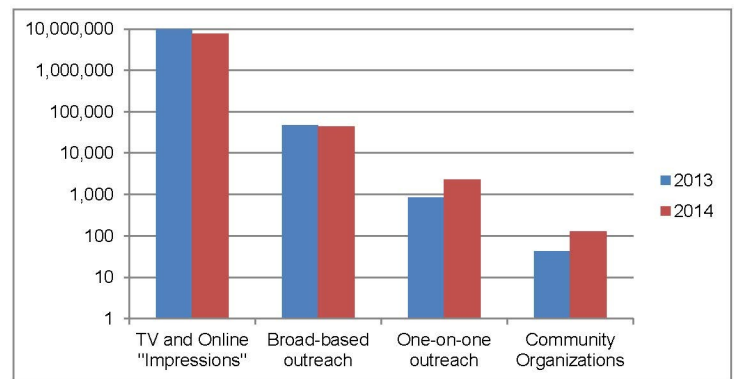


Local health departments provide educational materials at fairs and festivals.

Dirt Alert in-depth outreach increased from 2013 to 2014

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 and events.
- One-on-one outreach includes home visits, soil testing, and phone calls.
- Work with community groups includes trainings and community grants.



Dirt Alert outreach statistics for the 2013 and 2014 reporting periods (October—September).

In 2014, we increased work with community groups and one-on-one outreach. We also contacted thousands of households about the Yard Program (pages 6-7).

Increased work with community groups builds community knowledge and resources

In 2014, the Public Health—Seattle & King County gave grants to three community groups. Latino Community Fund and the Korean Women’s Association are increasing outreach to Spanish and Korean communities. Child Care Resources is training childcare providers and developing training and materials for Somali childcares.

Tacoma-Pierce County Health Department is increasing outreach to community groups in Ruston and North Tacoma, Realtors, and gardening groups. The EPA Study Area Advisory Committee also restarted this year (page 12).



New materials in English, Spanish, Korean, Slavic, and Somali encourage healthy actions

Soil Safety Program

Protecting children where they play

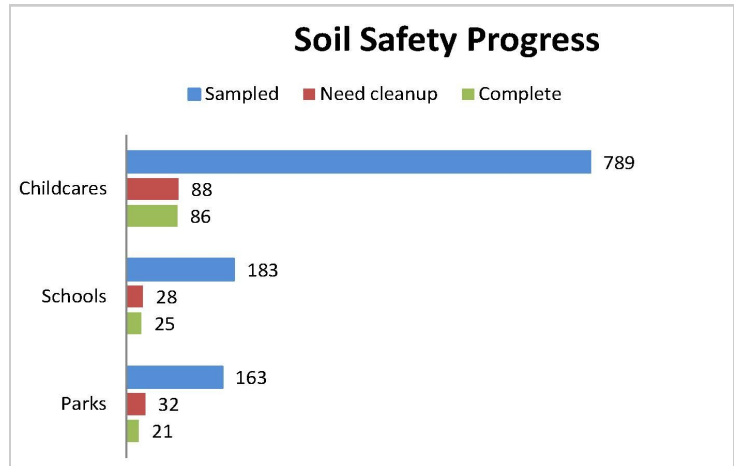
The Soil Safety Program provides free soil sampling and cleanup for child play areas. Created through 2005 legislation, the program has cleaned up over 100 play areas and sampled more than 1,000.

Four remaining Metro Park cleanups to finish by 2016

Of the 32 contaminated parks in the program, only 11 are left on our cleanup list. The rest have either had soil replacement or signage installed where risks are low.

By 2016, we plan to clean up the four remaining Metro Park play areas in Tacoma:

- 2015: Baltimore and Optimist.
- 2016: Fort Nisqually and a playground at Point Defiance Park.



Sampling and cleanup since 2006. Ecology assesses play areas for exposed soil to sample. If arsenic or lead are over the action levels (see page 12), we remove or cover the soil.

Vassault Park: Working with Metro Parks to combine cleanup with drainage fixes

Vassault Park on North 37th Street in Tacoma was the most highly-contaminated park in the plume. At eight acres, it is the largest park in the Soil Safety Program.

Over the years, Metro Parks Tacoma experienced drainage issues in the playfields at Vassault Park.

Both agencies were thrilled to break ground this summer on a \$2.1 million joint project to replace the soils and fix the drainage problems.

We paid for soil removal and replacement, and Metro Parks paid for the new drainage system.

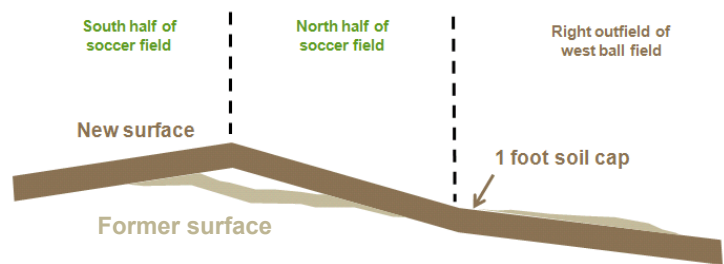
Vassault Park reopens next year after the new grass has grown in.

Upper: Removing soils from Vassault Park

Lower: New slopes will improve drainage



Field cross section (not to scale)



Technical Assistance Program

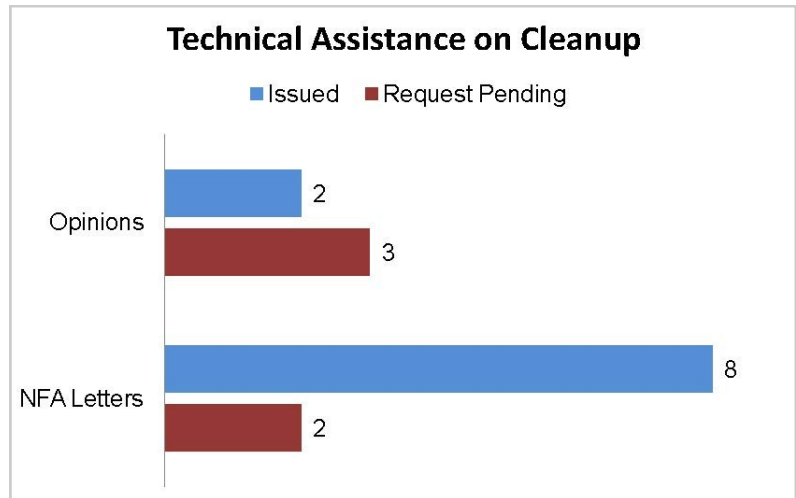
Encouraging soil cleanup during grading projects

Land development is a good time to test soil for contamination and complete cleanup. During most grading activities soil is moved before development. It is easier and cost-effective to clean up soil before constructing houses, buildings, and roads.

Our Technical Assistance Coordinator works with state and local governments, developers, and landowners to streamline cleanup of contaminated soil.

We partner with 15 local permitting offices in King, Pierce, and Thurston counties to encourage landowners and developers to clean up soils during grading.

Between October 2013 and September 2014, landowners and developers cleaned up over **54 acres** of soil contaminated with arsenic and lead. These properties were cleaned up through the Voluntary Cleanup Program (VCP).



Technical Assistance on Cleanup in 2013-2014. Ecology provides free technical advice on planned and completed cleanup. We issue a No Further Action (NFA) letter when the developer meets cleanup requirements. This opinion may help developers obtain loans or sell the property in the future.

Meridian Campus: Integrating Cleanup into Development

Meridian Campus is a 1,540-acre single and multi-family development complex in Lacey, Thurston County.

The contamination level across the Meridian Campus development was low enough to allow mixing of the upper contaminated soil layer with cleaner lower soil.

To date, the contractor cleaned almost 90 acres of soil contaminated with arsenic and lead in eight properties within the Meridian Campus development before building homes.

More properties within the Meridian Campus will be cleaned through the VCP process in the future.



Meridian Campus - Campus Willows

Ruston/North Tacoma Superfund Area

After Superfund cleanup, remaining contamination still poses a risk

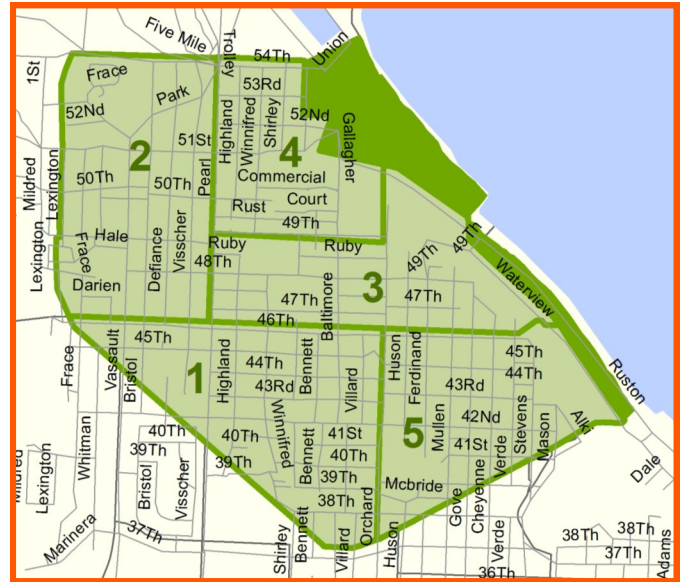
The one-mile radius around the former Asarco smelter is a federal Superfund site (map to right), managed by the US Environmental Protection Agency (EPA).

Work completed by EPA: 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 still have arsenic over 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 helped EPA finish Superfund yard cleanups

In 2013, Ecology cleaned up eight yards not completed under the Superfund cleanup. Under an agreement with Ecology, EPA will reimburse the state.

EPA Study Area outreach transitioned to local management

In 2014, the Tacoma-Pierce County Health Department and Ecology took over EPA's outreach work. In January, the health department began operating the Asarco Information Center, which includes yearly mailings, local events, and helping people look up their soil sampling results and cleanup paperwork.

The health department re-launched the EPA Study Area advisory committee. The advisory committee is composed of representatives from schools, community groups, and businesses. It is providing input on outreach strategies and materials for the Study Area, such as a mailer that went out this fall.



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.

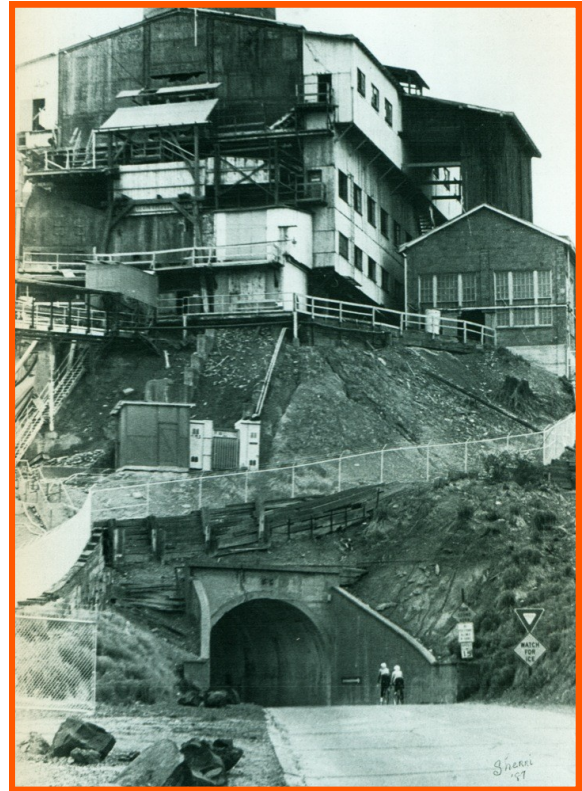
Ruston Tunnel

In the 2013-2015 biennium, the Legislature set aside \$400,000 of the Asarco settlement for the closure of the Ruston Tunnel. Ecology and the City of Ruston are negotiating an interagency agreement to complete this project.

The tunnel connected Ruston Way to Tacoma, under the former Asarco plant (photo to the right). Today, a new road goes around the tunnel. The old tunnel is now filled with contaminated soils. The next step is to fill the remaining space to make it stable. The final step is to seal the tunnel.

Point Defiance Trail

In 2013-2015, the Legislature also set aside \$5 million of the Asarco settlement for the Point Defiance Trails Project. The Trails Project completes a 7-mile destination waterfront trail connecting Ruston Way with Point Defiance Park. Ecology and Tacoma Metro Parks are negotiating an interagency agreement. Part of the funding will go toward soil management during trail building.



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



Point Defiance Trails Project

Tacoma Smelter Plume Team Members

Toxics Cleanup Program Management

Jim Pendowski, Program Manager
Rebecca S. Lawson, Southwest Region Section Manager

Ecology Project Staff

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Hannah Aoyagi, Project Planner
Diana Smith, Outreach Coordinator
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Jackson Barnes, Cleanup Coordinator
Jill Jacobson Reitz, Cleanup Outreach Coordinator
Steve Needles, Cleanup Field Coordinator
Lisa Kean, Cleanup Administration
John Zinza, Cleanup Field Coordinator

Local Health Department Partners

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

Tacoma Smelter Plume Information

Website: <http://www.ecy.wa.gov/toxics/tacoma-smelter.html>

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Editor and graphic design: Hannah Aoyagi and Jill Jacobson Reitz

Arsenic in Soils Database and Smelter Search Interactive Map

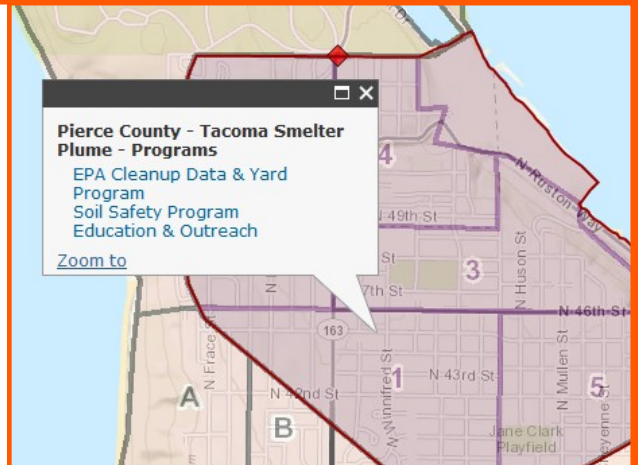
Arsenic in Soils Database: The public can find soil sampling and cleanup data through an online database. Data include past Superfund cleanups and sampling results from Ecology's new Yard Program (pages 6-7).

<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



Washington State Department of Ecology

Toxics Cleanup Program
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6300. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Tacoma Smelter Plume, Facility Site ID #89267963