

Tacoma Smelter Plume

2016 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 plan for managing the Asarco settlement.
- Cleanup strategies and priorities.
- Accomplishments and 2016 performance measures.

Most of the report data are from October 1, 2015 through September 30, 2016.

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 soil in the Puget Sound region, called the Tacoma Smelter Plume (Plume).



The 2009 Asarco bankruptcy settlement

Washington becomes part of the nation's largest environmental settlement

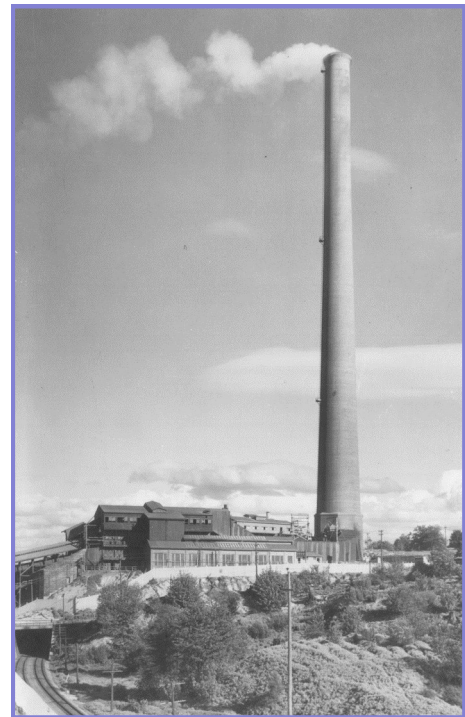
In 2005, Asarco declared bankruptcy, largely due to environmental liabilities from its nearly 100 cleanup sites across the country. The State of Washington joined the federal government and other states in a suit against Asarco that spanned four years.

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.

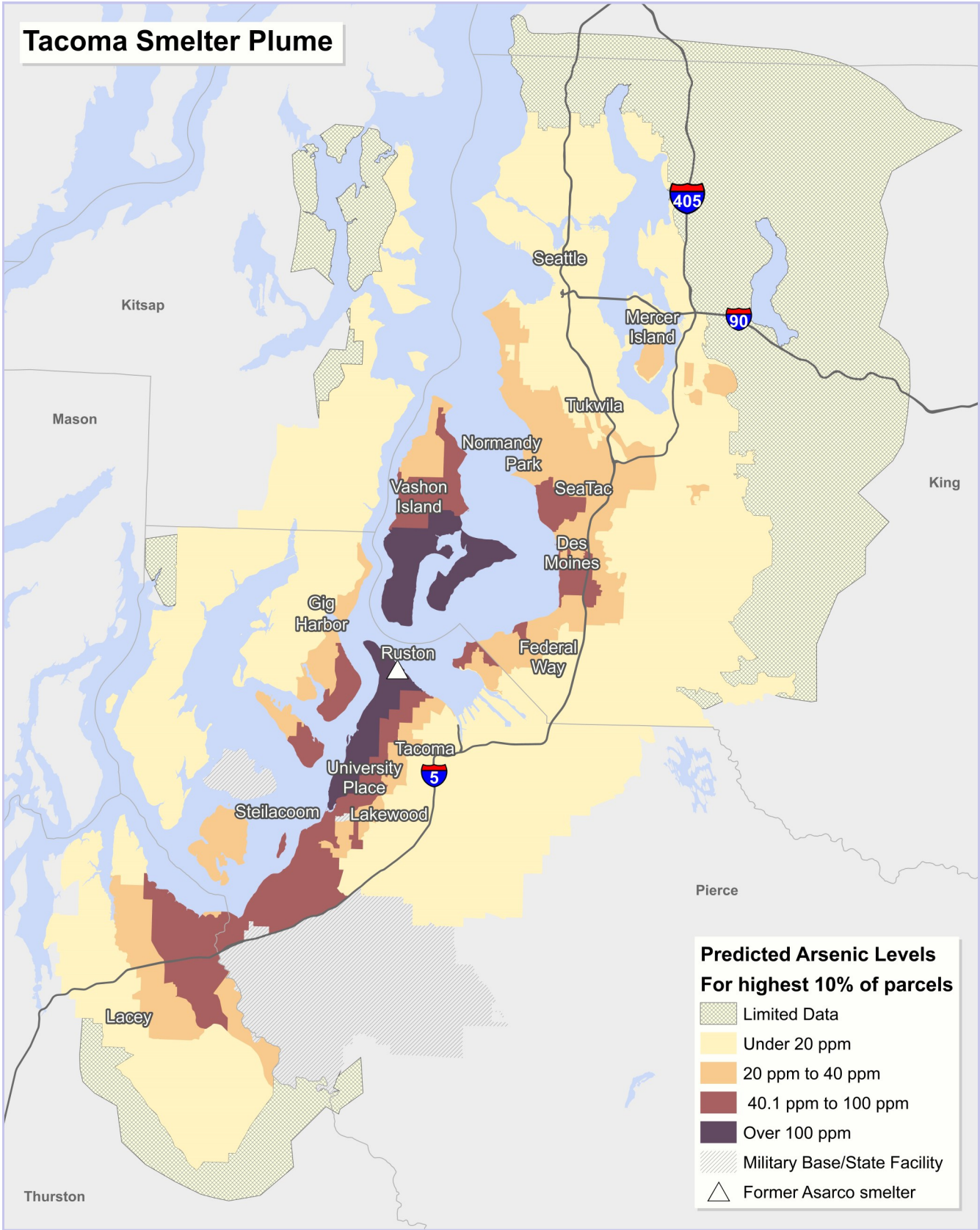
Tacoma Smelter Plume communities benefit from \$94.6 million for cleanup and reducing risk

Asarco settled for \$94.6 million for the future costs of cleaning up the Tacoma Smelter Plume. It covers 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 replacing soil in yards 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). The State Cleanup level for arsenic is 20 ppm. The Action Level for soil replacement is 100 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

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 (plume).

Arsenic and lead can harm your health. Within the plume, hundreds of thousands of people may be exposed by accidentally ingesting or inhaling contaminated soil. Children are at highest risk because they put dirty hands and toys in their mouths, and because their bodies are still growing and developing.



Former Asarco smelter and its 571-foot smokestack

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 to the former smelter and decrease with distance from it. Areas of higher contamination pose a larger risk to residents. The majority of the \$94.6 million settlement will go to sampling and replacing soil in neighborhoods with higher concentrations.

Early risk management focused on community outreach and play area cleanups

Starting in 2000, Ecology has given 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 that 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.

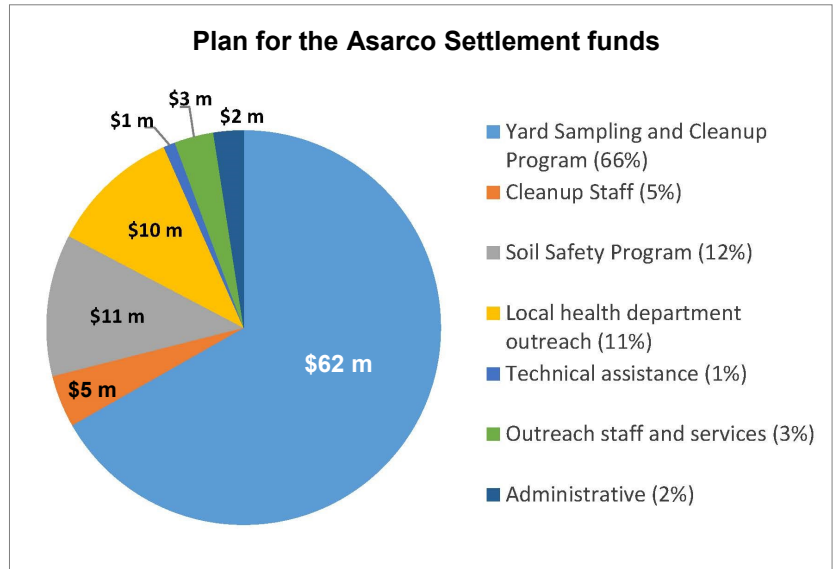
In 2005, the Area-Wide Soil Contamination law (Chapter 70.140 RCW) led Ecology to develop the Soil Safety Program. At first, the program provided free soil sampling and replacement for play areas at schools and childcares. In 2010, using funding from the Asarco settlement, we expanded it to include park,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

Plan for managing the Tacoma Smelter Plume

Using lessons learned from earlier outreach and play area cleanup work, Ecology developed a 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 and replace soil from existing residential yards in areas of highest contamination.
- **Soil Safety Program:** Continue sampling and replacing soil in child play areas at schools, childcares, parks, 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.

Tacoma Smelter Plume plan budget and activities

	Budget	Category	Activities and staffing
66%	\$62m *	Yard sampling and cleanup	Contracts to sample yards and replace soil over 100 ppm arsenic
12%	\$11m	Soil Safety Program	Contracts to sample play areas and replace soil over 20 ppm arsenic
5%	\$5m	Cleanup staff	Six 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

* This amount reflects the original estimate for the Yard Sampling and Cleanup Program.

Cleanup and risk management priorities: Settlement funds help to protect human health

Ecology continues to sample and replace soil on residential yards

The Yard Sampling and Cleanup Program (Yard Program) is under way, with over 1,100 yards already slated for soil replacement. By the end of 2016, over 229 of those yards will be complete. So far, we have offered sampling to 4,677 homeowners and sampled 3,180 yards to determine if they qualify for free soil replacement.

2016 marks the ten-year anniversary of the Soil Safety Program

Since 2006, we have sampled more than 1,000 child play areas including schools, parks, childcares, camps, and multi-family housing. We replaced soil or posted signage at 86 childcares, 25 schools and 24 parks.

Over the past year, we continued these efforts and replaced soil at three parks in Tacoma, including Baltimore, Optimist and Fort Nisqually in Point Defiance Park.

Outreach to multi-family properties

In 2016, we started outreach to owners of multi-family residential properties, such as apartments or condo complexes. We mailed letters to offer soil sampling to seven multi-family residential properties with child play areas. We also offered to sample the common areas on 50 multi-family properties in the Yard Program.

In addition, Tacoma-Pierce County Health Department (TPCHD) sent packets with information about healthy actions to over 3,000 residents living in multi-family housing units in the Yard Program.

Increased outreach to real estate community

Ecology and the local health departments in Pierce and King Counties increased outreach to real estate buyers, sellers and new residents.

In Tacoma, we piloted an effort to deliver packets to new residents. The packets included information on services available, healthy actions, and past sampling and soil replacement records. We also met with real estate associations in Pierce and King County to discuss new ways to inform buyers of potential soil contamination within the Plume.



Contractors excavate contaminated soil from a yard in Tacoma.



Ecology is conducting outreach to renters and property owners in multi-family private and public properties.



Ecology is developing strategies to ensure buyers receive information about Tacoma Smelter Plume before purchasing a home in the area.

Yard Sampling & Cleanup Program

Work is underway to sample and replace soil in yards in Tacoma and Vashon-Maury Island

The Residential Yard Sampling and Cleanup Program (Yard Program) provides free soil sampling for residential yards in the service areas shown in green and yellow (see map to the right).

Ecology is offering free cleanup, also known as soil replacement, for portions of yards with levels over:

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

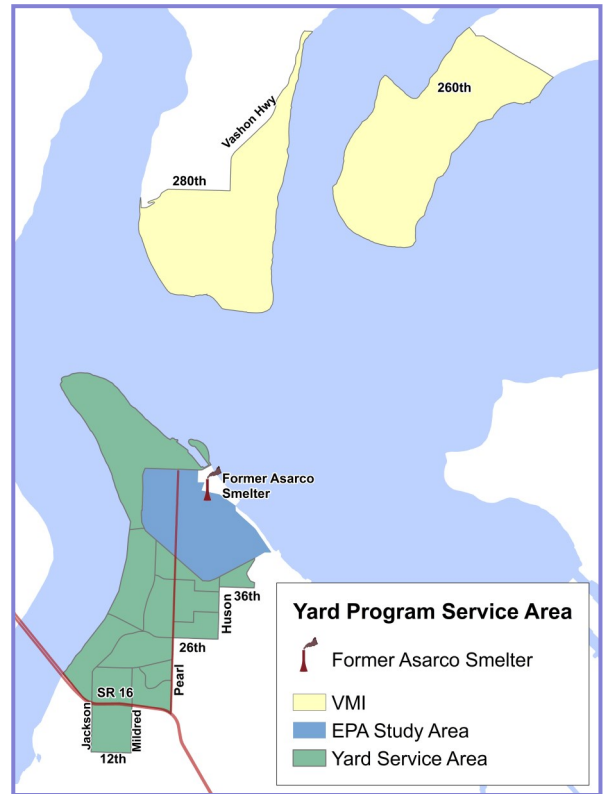
Ecology identified 712 yards for soil replacement in the Study Area

In the 1990's and 2000's, the Environmental Protection Agency (EPA) sampled over 2,900 residential yards and replaced soil on over 1,600 yards in the Study Area (see map right). The EPA's action level for arsenic is 230 ppm.

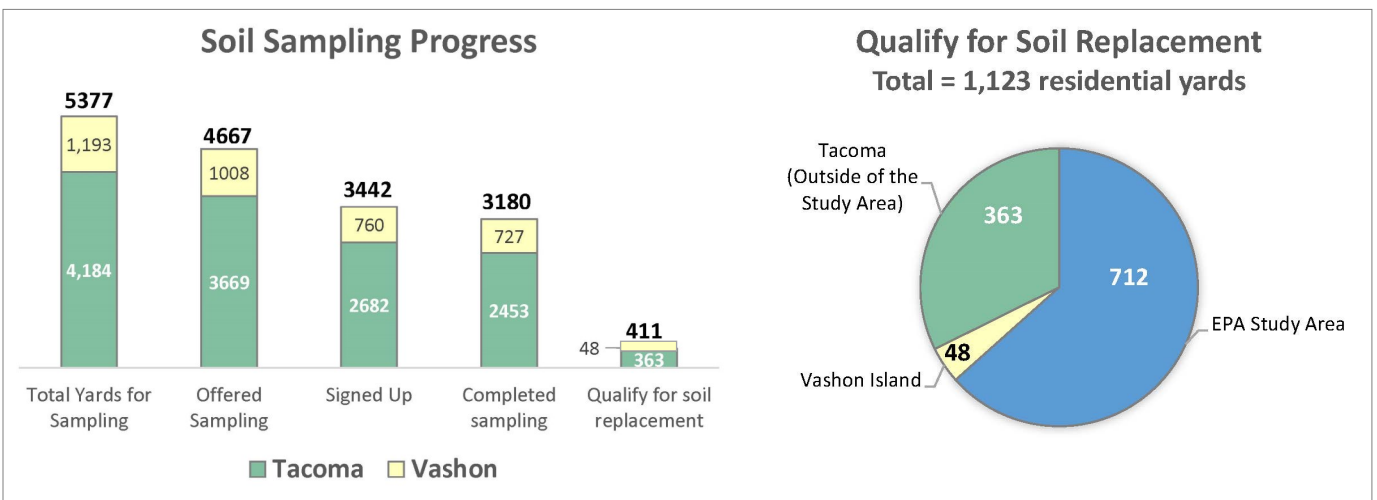
We reviewed their sampling results and cleanup records to identify yards with areas still above Ecology's action level of 100 ppm for arsenic. We found **712 yards** that qualify for soil replacement within the Study Area.

Soil sampling identified 411 more yards that qualify for soil replacement

As of September 30, 2016, Ecology sampled 3,180 yards throughout the service area (outside the Study Area). Of those, we identified 411 yards for soil replacement. Overall, there are 1,123 yards slated for soil replacement in the program (see pie chart below right). We estimate that we will find at least 75 more yards that qualify for soil replacement through additional soil sampling.



Yard Sampling and Cleanup Program Service Area Cleanup is in its third year in the EPA Study Area. The Yard Program service area was updated in 2016.



Yard Program progress measures as of Sept. 30, 2016. The chart on the left shows our soil sampling progress broken out by each area, Vashon-Maury Island and Tacoma (outside the Study Area). The pie chart on the right shows where the 1,123 yards that qualify for soil replacement are located within our service area.

Construction underway on 82 yards in 2016.

In May 2016, we started replacing soil on 82 yards. This work will continue through the late fall and early winter.

Since 2013, we have replaced soil on a total of 126 yards in Tacoma and 21 yards on Vashon Island. In 2016, we will continue to work primarily in the EPA Study Area (see map to the right). In 2017, we plan to expand our work outside of the EPA Study Area in Tacoma (see map to the left).

More than 90 yards slated for soil replacement in 2017 construction season

In 2016, we met with homeowners to discuss soil replacement and re-landscaping plans. We plan to replace soil for at least 90 of those yards in 2017.

EPA will fund soil replacement on 26 yards

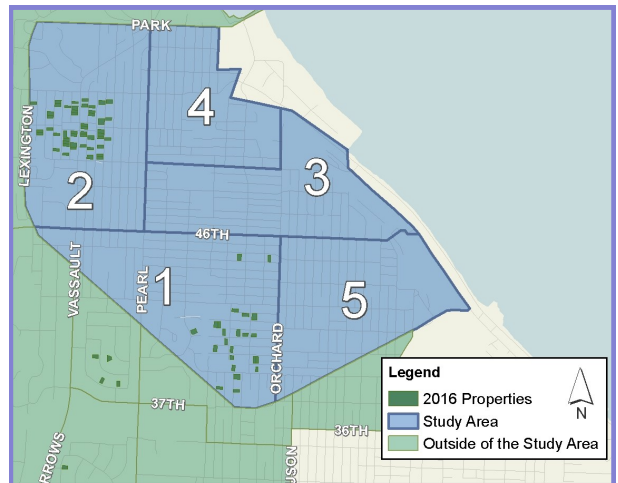
Sampling has identified 26 yards with arsenic over 230 parts per million, the action level of the Environmental Protection Agency (EPA). We have an agreement with the EPA that they will fund the soil replacement for these yards. In 2015, we completed the first 8 yards and will work on 11 yards in 2016. We plan to work on 7 more yards in 2017.

Lessons learned from first three years of the Yard Program

Each year, we work with the Tacoma-Pierce County Health Department to survey participants to get feedback on ways we can improve the process.

In 2015, we received feedback that homeowners would like more information about how to care for their new lawns. In response, we started offering a lawn care workshop, mailed lawn care reminders, and increased our one-on-one outreach with homeowners who just received soil replacement.

We are currently designing more strategies, which may include giveaways, such as supplies for watering. We also will check in with the homeowner more frequently on the condition of the new landscaping after soil replacement. We will pilot these new strategies in the Spring of 2017.



Some of the yards receiving soil replacement in 2016. In May 2016, Ecology began work on 82 yards in North Tacoma.



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



Landscape options include sod, mulch and gravel.

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 the risks from arsenic and lead soil contamination.
- 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 conversations, nail brushes, posters, damp dust cloths, door hangers, and brochures.



Healthy actions, such as taking shoes off after playing or working outside, can reduce exposure to contaminants in soil.

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.

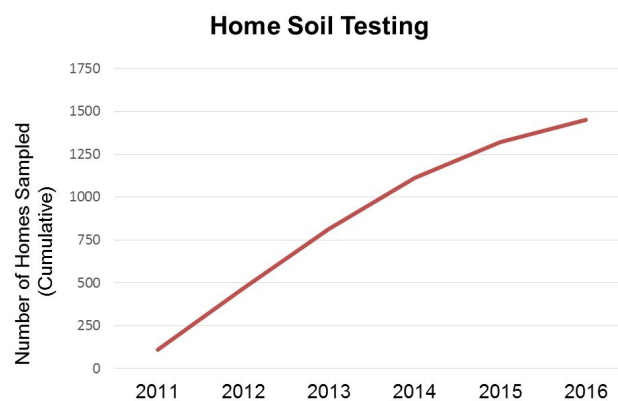


Shooting a new series of short videos focused on promoting Healthy Actions.

Home soil testing programs have educated thousands of families

Pierce and King county residents can sign up for free home soil testing in the areas of their yard that they use the most. This service is for properties outside of the Yard Program service area (see map on page 6).

Health departments use this as a chance to teach folks about healthy actions. So far, we have successfully reached a total of 1,452 residents through home soil testing.



Local health department partners

Ecology provides outreach and education funding to:

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

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

In 2016, PHSKC continued to partner with grantees to develop outreach strategies for non-English speaking communities, including Spanish, Somali and Korean. Grantees include the Latino Community Fund, Korean Women’s Association and Child Care Resources.



PHSKC and Latino Community Fund created Facebook advertisements in Spanish.

Dirt Alert outreach continues to increase awareness throughout the Plume

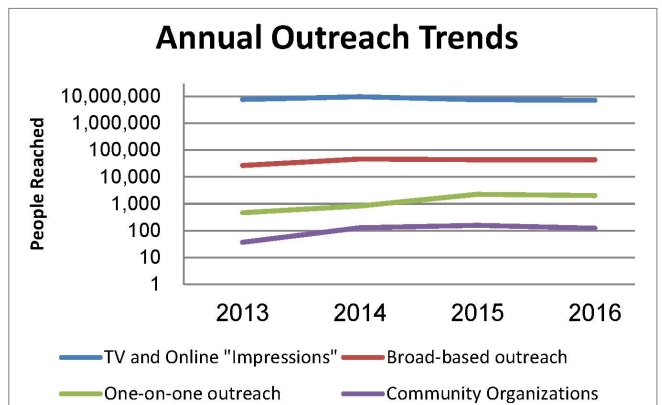
We track how many people we reached with Dirt Alert messages. It can take many contacts and different methods to increase awareness and lead to behavior change. In the chart:

- 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.

In 2016, we continued to work with community groups and conduct one-on-one outreach. We saw an increase in broad-based outreach in the Spanish community from two radio interviews and a Spanish Facebook Ad.

New ways to promote healthy actions

Our sampling efforts have identified thousands of yards with elevated levels of arsenic in the soil. Research shows that building awareness is not enough to create healthy communities. Therefore, Ecology and the local health departments are designing a social marketing program to promote healthy actions. We are focusing these new strategies on the highest risk populations, children and gardeners. We plan to pilot these new strategies in 2017.



Dirt Alert outreach statistics for October 1st, 2013 to September 30th, 2016.



PHSKC presenting to children at the “Storming the Sound with Salmon” event in Federal Way.

Soil Safety Program

10 years of protecting children where they play

The Soil Safety Program provides free soil sampling and replacement for child play areas. Created through 2005 legislation, the program has sampled more than 1,000 child play areas, including schools, parks, childcares, camps and multi-family housing. We replaced soil or posted signage at 86 childcares, 25 schools and 24 parks.

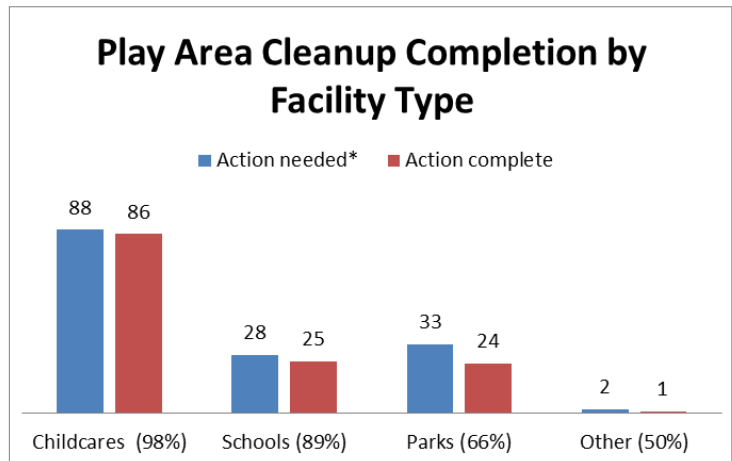
Ecology continues work to replace soil in play areas at parks

Over the past year, Ecology replaced soil at three parks in Tacoma:

- Baltimore Park
- Optimist Park
- Fort Nisqually at Point Defiance Park

Of the 33 contaminated parks in the program, only 9 are left on our cleanup list.

The rest have either had soil replacement or signage installed where risks are low.



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

Upcoming work planned for 2017

In 2017, we plan to complete soil replacement on two childcares. We are also working with the City of Des Moines to replace soil at Parkside Park. Construction will start in 2017.

Fort Nisqually in Point Defiance Park

In early 2016, Ecology replaced contaminated soil at Fort Nisqually at Point Defiance Park. Fort Nisqually is a Living History Museum within the park.

Overall, we removed 2,000 tons of soil inside the fort and in a nearby meadow. Then, we replaced the soil with clean soil and restored the grass with sod.

We also created new pathways for visitors inside the fort's palisades, which should help protect the new grass.

Upper: Contractors remove contaminated soil from Fort Nisqually Park.

Lower: The new grass growing in at Fort Nisqually after work is complete.



Technical Assistance Program

Encouraging soil replacement during grading projects

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

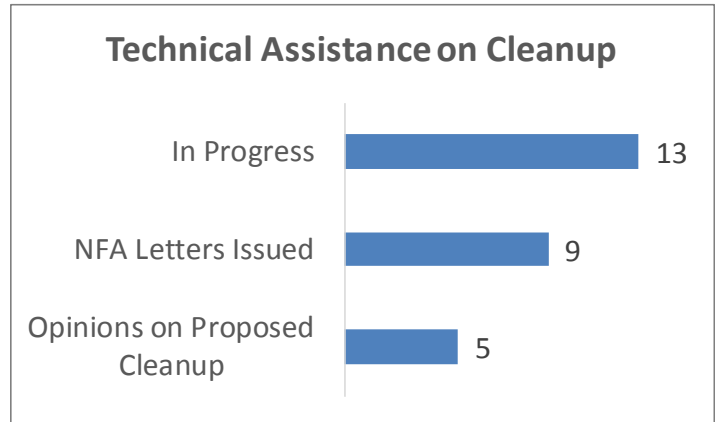
Our Technical Assistance Coordinator works with state and local governments, developers, and landowners to streamline the replacement of contaminated soil.

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

Free technical advice for planned and completed cleanup projects.

Ecology provides free technical advice on planned and completed cleanup of contamination within the Tacoma Smelter Plume. We issue Opinion Letters on Proposed Cleanup and No Further Action (NFA) letters when the cleanups meet standard requirements. The opinion letters and NFAs may help developers obtain necessary permits, loans or sell the property in the future.

In the past year, landowners and developers cleaned up over 276 acres of contaminated soil. These properties were cleaned up through the Voluntary Cleanup Program (VCP).



Technical Assistance on Cleanup in 2015-2016. Ecology issued 9 No Further Action (NFA) letters and 5 opinions on proposed cleanup. Overall, Ecology has issued 39 NFA letters.

Steilacoom Ridge integrating cleanup into development

Steilacoom Ridge is a 147-acre single and multi-family development complex in Olympia, Thurston County.

The contamination level across the Steilacoom Ridge development was low. This meant the developer could mix the upper contaminated soil layer with the cleaner soil below.

To date, the contractor has cleaned up contaminated soil on 62 acres of one parcel. In the future, this property will be subdivided and developed into 248 single-family homes.

Next, they plan to replace soil on additional parcels within the Steilacoom Ridge. One of the properties is enrolled in the VCP program and will be cleaned and developed in the near future.



Steilacoom Ridge - North Block received an NFA letter in the summer of 2016.

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 Asarco's work to sample 3,750 properties and cleanup 2,436.

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

Remaining contamination: Around 712 yards still have arsenic over Ecology's action level of 100 ppm. Many more are above the state cleanup level of 20 ppm.

Ecology is using Asarco settlement funds to clean up the 712 next most contaminated yards.

Ecology continues to find yards above the EPA action level

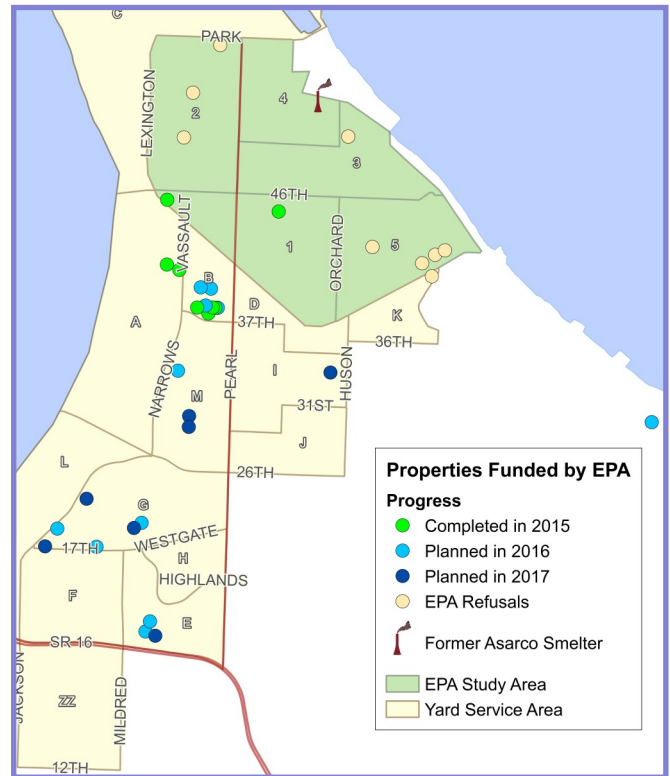
Sampling has identified 26 yards with arsenic over 230 ppm. We have an agreement with the EPA that they will fund the soil replacement for these yards. In 2014, we completed the first 8 yards and will work on 11 yards in 2016. We plan to work on 7 more yards in 2017 (see map to the right).

Outreach efforts for new residents in the Study Area

Over the past year, the health department piloted an effort to mail packets to new residents. These packets included information on the Tacoma Smelter Plume, past sampling and soil replacement records, and healthy actions. We also started work to develop an online map to display the status of soil sampling and replacement on individual properties.

New program to offer assistance for soil disposal in the Study Area

In late 2016, the Tacoma-Pierce County Health Department will begin to pilot a soil disposal voucher program in the EPA Study Area. This voucher covers the cost to dispose limited amounts of residential soil from the Tacoma Smelter Plume at the Tacoma Recovery & Transfer Center. The homeowner must transport the soil on their own to the facility. The health department will first conduct an assessment of the soil to determine if it meets the criteria for the program.



The EPA funds properties with arsenic above 230 ppm, the EPA action level. We have identified 26 yards above 230 ppm. We also have 9 yards that refused sampling or soil replacement from the EPA.



Ecology and TPCHD piloted an outreach strategy to provide information to new residents.

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 mostly 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.



The tunnel on the right is the Ruston Tunnel, which the City of Ruston has filled with contaminated soil.

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 waterfront trail connecting Ruston Way to Point Defiance Park.

In 2016, Tacoma Metro Parks started construction and spent \$3,319,657 out of the \$5 million set aside in the Cleanup Settlement Account.

Part of the funding was used for soil management during trail building, including soil excavation, testing, erosion and sediment control.



Point Defiance Trails Project: Tacoma Metro Parks is completing a 7-mile waterfront trail that connects Ruston Way and Point Defiance Park.

Tacoma Smelter Plume team members

Toxics Cleanup Program management

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

Ecology project staff

Marian Abbett, Project Manager
Jill Reitz, Project Planner
Stacy Galleher, Outreach Coordinator
Eva Barber, Technical Assistance Coordinator
Amy Hargrove, Cleanup Manager

Chris Huff, Construction Manager
Shelby Giltner, Construction Manager
Jackson Barnes, Field Oversight Coordinator
Matthew Kogle, Field Oversight Coordinator
Crescent Calimpong, Cleanup Outreach Coordinator
Sherryl Kennedy, Cleanup Administration

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

Websites: <http://www.ecy.wa.gov/toxics/tacoma-smelter.html> or www.dirtalert.info

Contact:

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Southwest Region, Toxics Cleanup Program
P.O. Box 47775
Olympia, WA 98504-7775
Marian.Abbett@ecy.wa.gov
360-407-6257

Lead author, editor and graphic designer: Jill Reitz

Arsenic in Soils Database and Smelter Search Interactive Map

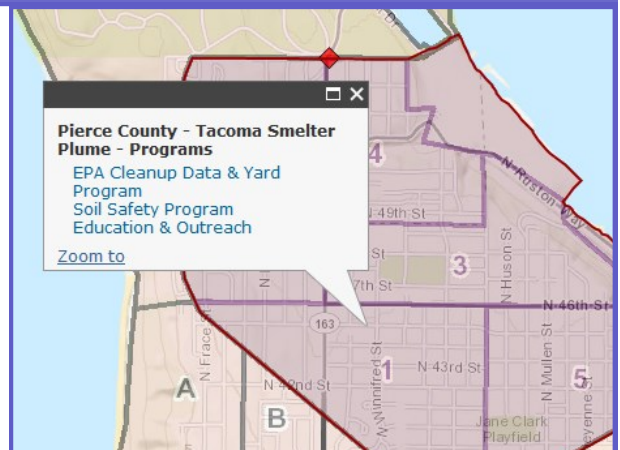
Arsenic in Soils Database: The public can find soil sampling and cleanup data through an online database.

Data include sampling results and soil replacement records from Ecology's Yard Program (pages 6-7) and the past Superfund cleanups.

<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 Jill Reitz at 360-407-6245. 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