



DEPARTMENT OF
ECOLOGY
State of Washington

Tacoma Smelter Plume Annual Report

Toxics Cleanup Program

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Tacoma Smelter Plume Annual Report

Accomplishments in 2018

Toxics Cleanup Program
Washington State Department of Ecology
Olympia, Washington

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Purpose of Report

The purpose of this report is to describe how the Department of Ecology (Ecology) is using the Asarco settlement to manage the risk from the Tacoma Smelter Plume. It provides an update on the cleanup progress and efforts to manage human health risks.

The report covers the following:

- The plan for managing the Asarco Settlement.
- Cleanup strategies and priorities
- Accomplishments and 2018 performance measures

Most of the report data are from October 1, 2017 through September 30, 2018.

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, and 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).



Photo 1: Asarco 50th Anniversary

The 2009 Asarco bankruptcy settlement

Washington becomes part of the nation's largest environmental settlement in history

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 paid out a \$1.79 billion settlement. The settlement covered past and future cleanup costs, as well as interest earned over the four years. Washington's share, deposited into the Cleanup Settlement Account in December of 2009, was \$188.5 million.

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

Asarco settled for \$94.6 million for the future costs of managing the risks of the Tacoma Smelter Plume. It covers soil replacement for play areas and residential yards, ongoing education and outreach, and technical assistance for those voluntarily cleaning up their own properties. See pages 4-5 for planned settlement spending.

Work moves forward but future funds needed

The State made a bankruptcy claim for future environmental remediation costs for \$112.7M. We received only \$94.6 M. We have managed the money resourcefully over the last 8 years. However the remaining funds will not be enough to cover the cost of cleanup activities. We are beginning to plan and look ahead to other possible funds like Model Toxics Control Act. Further information on settlement spending is discussed in the [Cleanup Settlement Account Fiscal Year 2018 Annual Report](#).

<https://fortress.wa.gov/ecy/publications/SummaryPages/1809102.html>

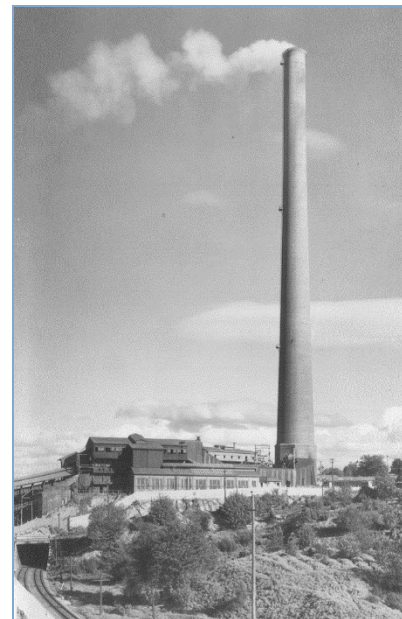


Photo 2: Former Asarco Smelter

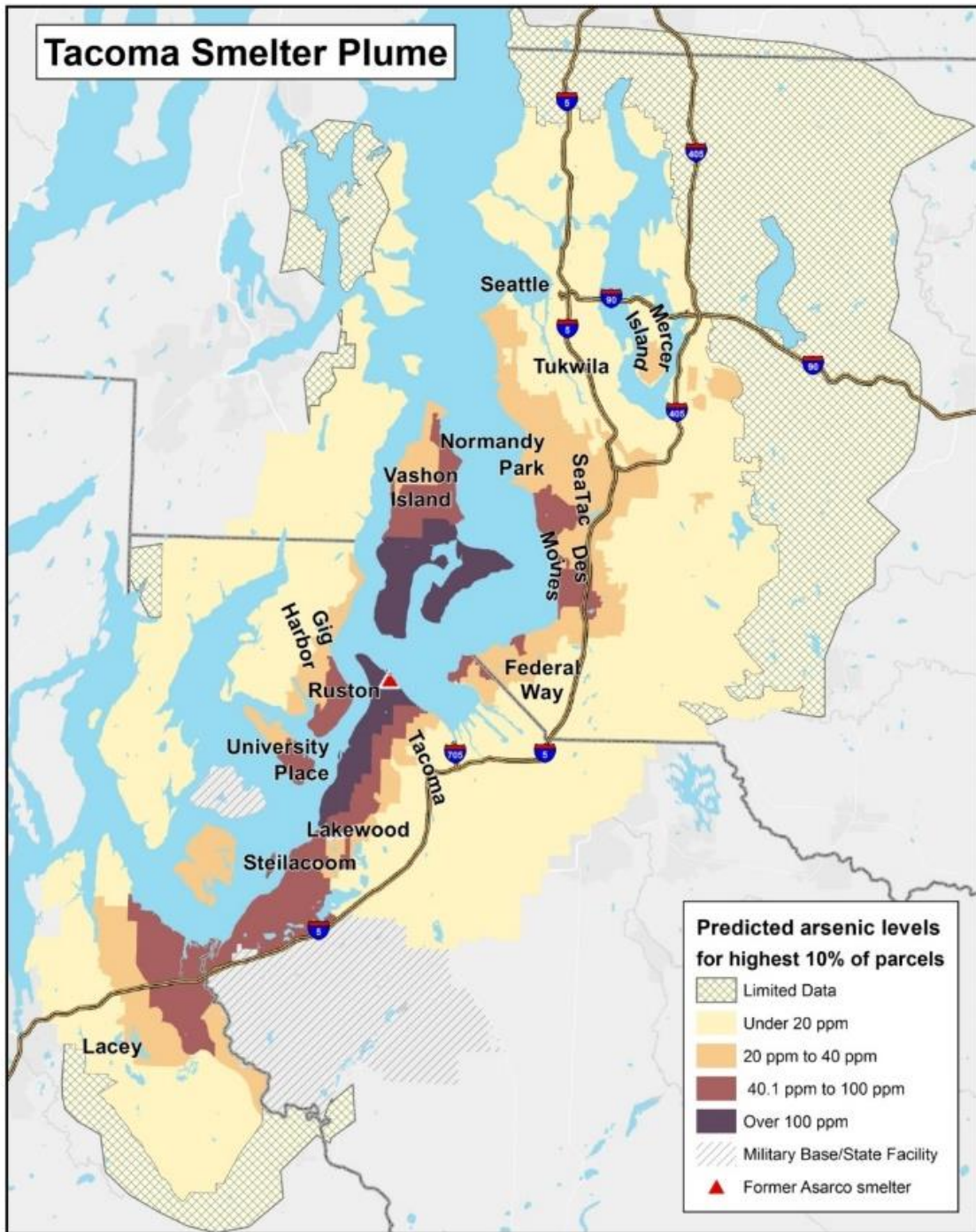


Figure 1: With 90 percent certainty, at least 1 in 10 parcels will have arsenic in soil at or above levels shown. Predictions are based on distance and direction from the former Asarco smelter, and on sampling data from forested and other soils undisturbed by development. Actual arsenic levels may vary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

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 pose a potential, long-term health risk. Within the plume, 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.



Photo 3: Former Asarco Smelter with its 571 feet smokestack

Understanding patterns of contamination helps to prioritize the 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.(see page 3).

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 is going to sampling and replacing soil in neighborhoods with higher concentrations.

Early health risk management focused on community outreach and safety actions

Starting in 2000, Ecology funded the health departments in King and Pierce counties for work related to the Tacoma Smelter Plume. 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 people.

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 parks, camps, and multi-family housing play areas.

Multi year plan for managing the Tacoma Smelter Plume

Using lessons learned from earlier outreach and play area safety actions (see Page 4), Ecology developed a plan in 2012 that focuses work in four main areas:

- **Yard Program**-Continue to 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. Assist developers with soil cleanup.

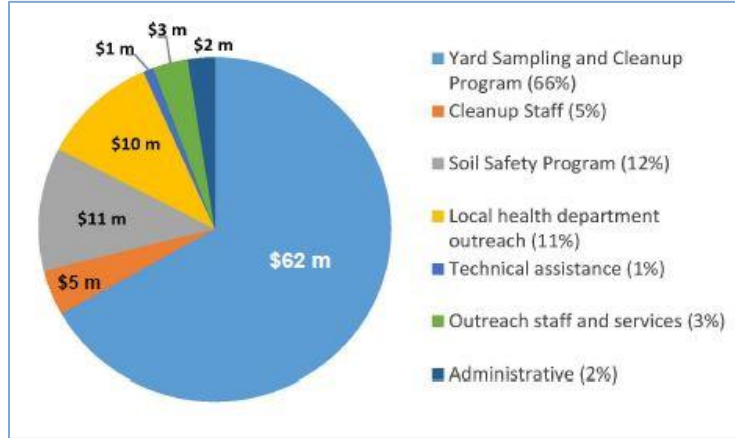


Figure 2: Breakdown of the \$94.6 million (m) Asarco settlement for the projected cost of managing the risk from the Tacoma Smelter Plume.

Tacoma Smelter Plume planned budget and activities- (multi year)

	Budget	Category	Activities and staffing
66%	\$62m	Yard Program	Contracts to sample yards and replace soil more than 100 ppm arsenic
12%	\$11m	Soil Safety Program	Contracts to sample play areas and replace soil more than 20 ppm arsenic
5%	\$5m	Cleanup staff	Six Ecology staff to manage contracts, field work, and 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 one staff person
1%	\$1m	Technical assistance	One Ecology staff technical assistance coordinator
2%	\$2m	Administrative	Equipment, staff training, and one staff person

Risk Management Priorities: Settlement funds help protect human health

Ecology continues to sample and replace soil on residential yards

There are 1,186 yards which qualify for soil replacement. By the end of 2018, we will complete 276 of those yards. We completed sampling offers to all residential yards and sampled 3,785 yards outside of the EPA Study Area (see page 7) to determine if they qualify for free soil replacement.

Soil Safety Program continues to sample schools, parks, childcares and camps

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 87 childcares, 25 schools, and 25 parks, and one camp. Over the past year, we continued these efforts and replaced soil at one childcare. In 2019, we will complete work on four more childcares and one community park.

Dirt Alert outreach efforts promote healthy actions

Dirt Alert programs in Pierce and King County health departments raise awareness about arsenic and lead. Program goals include educating the public about reducing soil exposure and encouraging healthy actions to manage risk. Some healthy actions to reduce dirt and dust inside the home include washing hands and taking off shoes at the door. Over the past two years, across the two programs, outreach staff tested soil at 177 homes through the Home Soil Testing program (see page 9), talked to more than 7,800 people at events, and reached more than 6,700 families through mailings.

Technical Assistance

Ecology provides free technical advice on planned and completed cleanup of contaminated soil within the Tacoma Smelter Plume (see page 12). We partner with local permitting offices in King, Pierce, and Thurston counties to encourage landowners and developers to clean up soil during grading. Through the program, landowners and developers have cleaned up 689 acres of contaminated soil within the plume.



Photo 4: A contractor excavates contaminated soil from a yard in Tacoma



Photo 5: Through the Soil Safety Program, Ecology has replaced soil or posted signage at 86 childcares, 25 schools, and 25 parks.



Photo 6: A cleaned residential lot is ready for development in Narrows Ridge

Yard Sampling and 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 provides free soil sampling for residential yards in the service areas shown in green and yellow (see figure 3). 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 716 residential yards for soil replacement in the EPA Study Area

In the 1990's and 2000's, Asarco under the direction of the Environmental Protection Agency (EPA) sampled soil in over 2,800 residential yards and replaced the soil of more than 1,600 yards in the EPA Study Area (see Study Area on map). The EPA's action level for arsenic is 230 ppm (see page 13).

With the help of the Tacoma-Pierce County Health Department (TPCHD), we reviewed the sampling results and cleanup records to identify yards with areas still above Ecology's action level of 100 ppm for arsenic. We found soil in 716 yards that qualifies for soil replacement within the EPA Study Area.

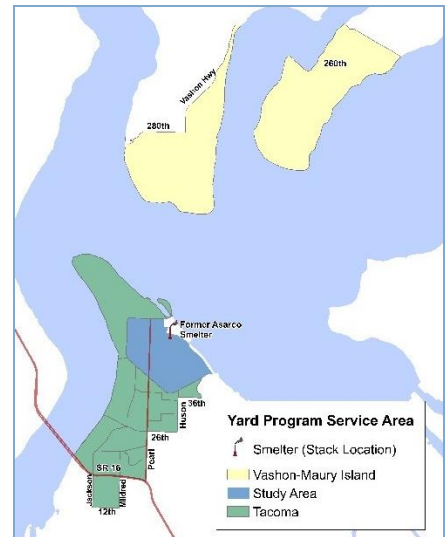


Figure 3: Yard Sampling and Cleanup program Service Area. Soil replacement is in its sixth year in the EPA Study Area.

Soil sampling identified 470 qualifying residential yards outside the Study Area

Since 2013, TPCHD and contractors sampled soil in 3,785 yards throughout the service area (outside the EPA Study Area). Of those, we identified 470 yards for soil replacement. Overall, we have data for more than 6,500 yards, and there are 1,186 yards that qualify for soil replacement in the program (see figure 4).

Residential Yard Program Progress

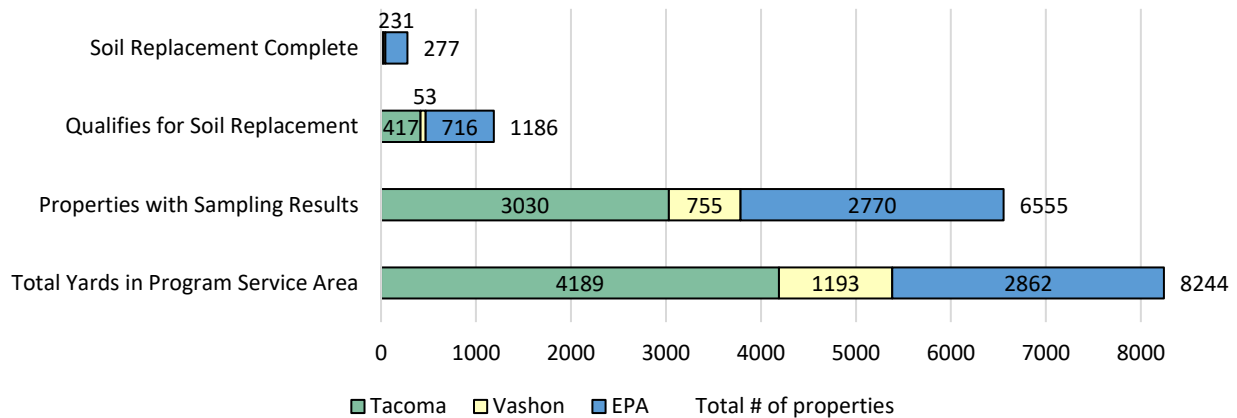


Figure 4: TPCHD, Ecology and contractors sampled a total of 3,785 yards outside of the EPA Study Area. A total of 1,186 yards qualify for soil replacement inside and outside of the EPA Study Area.

Yard program construction delayed

The funding for the Yard Program is from a bankruptcy settlement with Asarco. The State holds this funding in the Cleanup Settlement Account, which is a capital budget item. Every two years, the legislature must approve Ecology’s request to spend the funds.

In 2017, the capital budget was delayed and thus, construction was delayed.

Funding for the 2017-2019 biennium became available in January 2018. With funding, construction work moved slowly ahead. In 2017 and 2018 we weren’t able to work on as many yards as planned, but we do continue to make steady progress.

Construction underway on 32 residential yards

In 2017, we completed 15 yards. By the end of 2018, we will complete soil replacement in 32 yards. In 2019, we plan to complete 20 to 75 yards. (see figure 5).

Planning for soil replacement

In 2016 and 2017 we met with nearly 100 homeowners to plan for soil replacement work through the Yard Program. Some yards that we planned in 2016 and 2017 are still waiting for soil replacement. These are the yards that we will work on in 2019.

In 2019, we will continue planning and meeting with property owners about soil replacement that will take place in 2020.

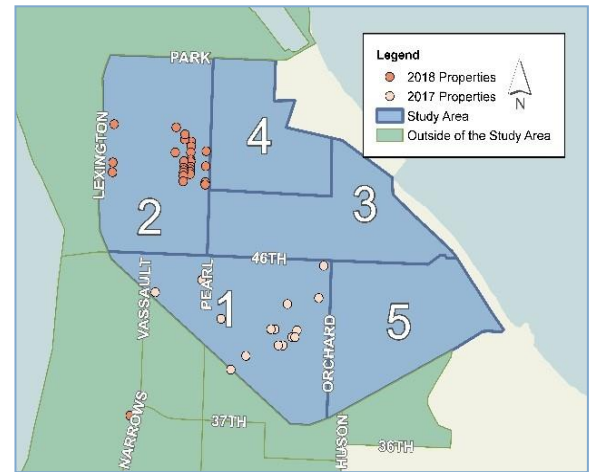


Figure 5: Yards receiving soil replacement in 2017 and 2018.

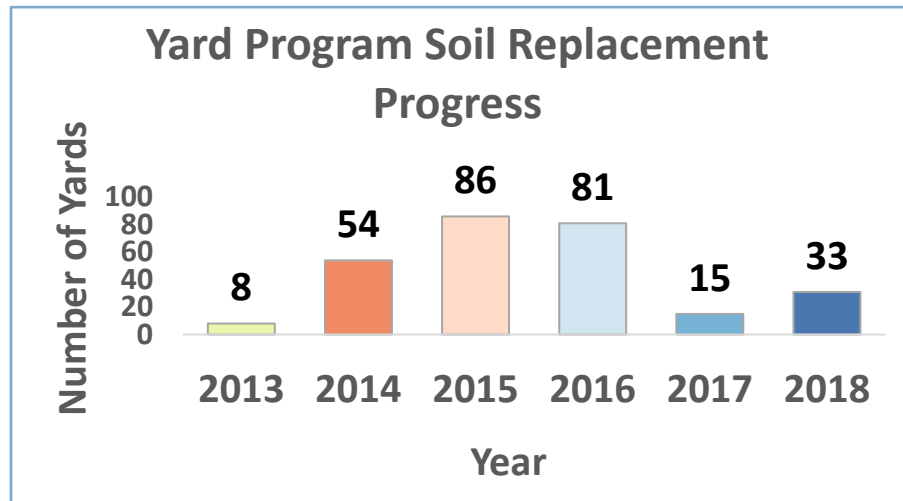


Figure 6: Bar graph of our soil replacement program since it started in 2013. Our goal is to complete soil replacement in 80-100 yards in each year.

Education and Outreach Programs

Dirt alert programs raise awareness and promote behavior change

Dirt Alert programs in the health departments of King and Pierce counties work 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.

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

Arsenic and lead exposure pose a larger risk for young children than for adults. Local health departments developed a wide range of outreach tools to target people.

These include:

- Training childcare providers, who then receive continuing education credits towards relicensing.
- Classroom and library presentations.
- Home visits to do soil testing and education.
- One-on-one conversations to help people work with their families to take healthy actions.
- Encouraging healthy actions through brochures, nail brushes, damp dust clothes, and door hangers.



Photo 7: Activities showing healthy actions



Photo 8: Cover Bare Patches of Dirt

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 7).

Health departments use this as a chance to teach folks about healthy actions. So far, we have successfully reached a total of 1,948 residents through home soil testing.

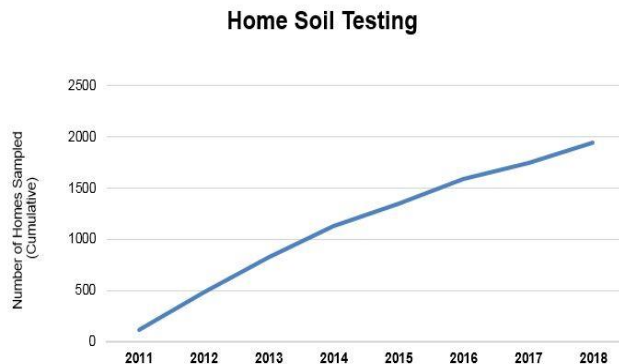


Figure 7: Home soil testing program
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Local Health Department Partners

Ecology provides outreach and education funding to:

- Tacoma-Pierce County Health Department (TPCHD)
- Public Health—Seattle & King County (PHSKC)

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

Dirt Alert outreach continues to increase awareness throughout the Plume

We track how many people we reach with Dirt Alert messages. Our different outreach methods increase awareness about soil contaminants and promote healthy actions. (see figure 8) :

- “Impressions” are the number of times an ad runs, multiplied by viewership. Comcast was dropped in 2018.
- “Broad-based outreach” includes mailers and events.
- “One-on-one outreach” includes home visits, soil testing, and phone calls.
- “Community Organizations” includes work with community groups, trainings, and community grants.

soilSHOP: A new opportunity for outreach and education

soilSHOP is an outreach event to help people find out if their soil is contaminated and learn healthy actions to reduce exposure. It is a unique opportunity for free, anonymous soil screening and education at one event.

PHSKC partnered with the Agency for Toxic Substances and Disease Registry (ATSDR), Pediatric Environmental Health Specialty Units (PEHSU), and Ecology, to bring soilSHOP to Vashon-Maury Island in August of 2018.

The event screened 66 soil samples for arsenic and lead from 29 participants. Event staff provided health messages on the risks of arsenic and lead, information on safe gardening practices, and healthy actions to reduce contact with contaminated soil.

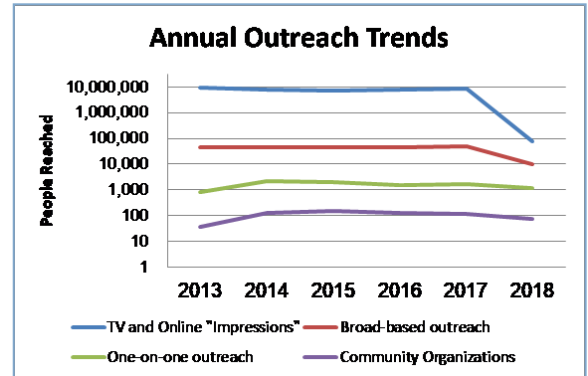


Figure 8: Annual Outreach Trends



Photo 9: At the soilSHOP on Vashon Island soil is screened for lead and arsenic contamination by staff using an X-ray fluorescence (XRF).



Photo 10: soilSHOP participants talk to outreach staff and register for soil screening.

Soil Safety Program

Over 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.

New data sharing agreement in place

Initiative 1501 passed in 2016. This led to new laws which affected the business practices of the Soil Safety Program in 2017. RCW 42.56.640 and 43.17.410 prevent state agencies from releasing family home childcare provider’s sensitive information, such as addresses. Ecology and the Department of Children, Youth and Family in August 2018 worked out a data sharing agreement. Ecology will now be able to have access to a list of newly licensed childcare providers. We will start sampling new childcares by the end of 2018.

Sandy Shores on Vashon-Maury Island

Ecology has worked with the Sandy Shores Homeowner’s Association to plan for soil replacement work at their neighborhood park. This park offers the neighborhood a grassy picnic area where families can play and access the Puget Sound. In 2019, we will remove the top six inches of soil and replace it with clean soil and sod.

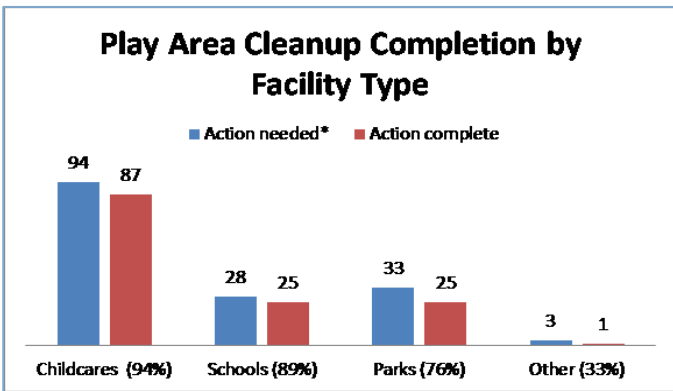


Figure 9: Play Area Cleanup Completion by Facility Type



Photo 11: Sandy Shores Community Park – This is a private park that serves the surrounding community. Ecology will remove six inches of soil and replace it with clean soil and sod.

Technical Assistance Program

Encouraging soil cleanup during development

Land development is a good opportunity to test soil for contamination and complete soil cleanup. During most grading activities, soil is moved before development. It is easier and more 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 the cleanup of contaminated soil.

We partner with 18 local permitting offices in King, Pierce, and Thurston counties to encourage landowners and developers to clean up soil during grading prior to developing their properties.

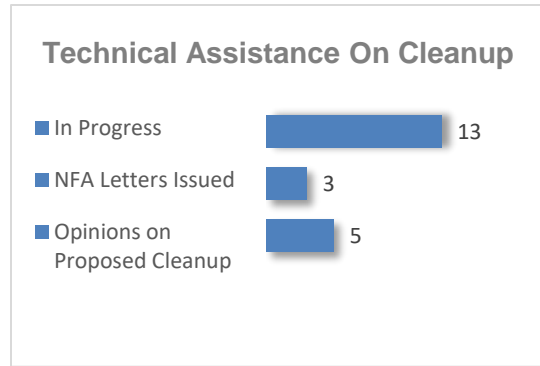


Figure 10: Technical Assistance on cleanup in 2017-2018.

Free technical advice for planned and completed cleanup projects

Through the Voluntary Cleanup Program (VCP), Ecology provides free technical advice on planned and completed cleanup of contamination within the Tacoma Smelter Plume. We issue opinion letters on proposed cleanup plans and No Further Action (NFA) determinations when cleanups meet Ecology’s requirements. The opinion letters and NFAs can help developers obtain necessary permits and loans, and help facilitate selling the property in the future.

Since 2006, landowners and developers cleaned up 689 acres of contaminated soil within the plume. In the past year, they cleaned up over 13 acres of contaminated soil through the VCP. Ecology issued three (NFA) determinations and five opinions on proposed cleanup. Overall, Ecology issued 53 NFA determinations for properties within the Tacoma Smelter Plume.

Narrows Ridge: Integrating cleanup into development

Narrows Ridge is a single-family development in Tacoma, Pierce County. The contamination level across the Narrows Ridge development was high and extended into deeper soil layers. Because of this the developer could not mix the upper contaminated soil layer with the cleaner soil below, a common remedy. Instead the developer used several remedies to clean their property. Some of the remedies included soil excavation and placement in a containment area that was capped with clean soil. This remedy required filing an environmental covenant with the City of Tacoma. The covenant informs future property owners of the contamination left on the property and the need to inspect and maintain the cap to keep the contaminated soil within the containment area.



Photo 12: Narrows Ridge development. Cleaned residential lots are ready for development.

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 (see figure 11), managed by the US Environmental Protection Agency (EPA).

Work completed by EPA: From 1993 to 2012, the EPA oversaw Asarco’s work to sample approximately 2,800 properties and clean up 1,600 properties.

EPA action level: Asarco only cleaned up areas that had arsenic levels over 230 parts per million (ppm).

Remaining contamination: Ecology is using Asarco settlement funds to clean up the 716 next contaminated yards in the EPA Study Areas. Many more are above the state cleanup level of 20 ppm.

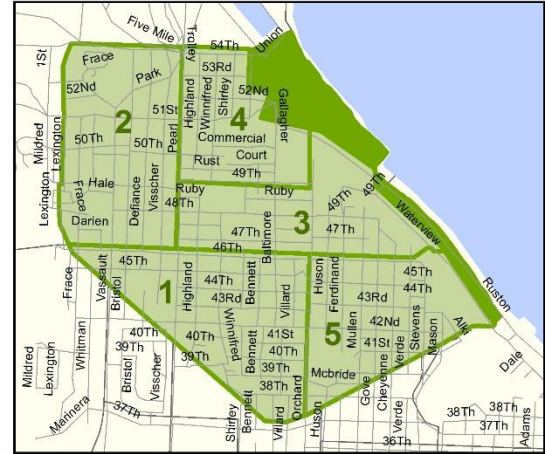


Figure 11: Map of EPA Study Area

Ecology continues to find soil above the EPA action level

Ecology identified 52 properties within the Yard Program service area with arsenic over the EPA action level. We have an agreement with the EPA that they will fund the soil replacement for yards that qualify over the EPA action level of 230 ppm or had previously refused sampling. Since 2013, we have completed soil replacement on 36 properties and plan to work on four additional properties in 2019.

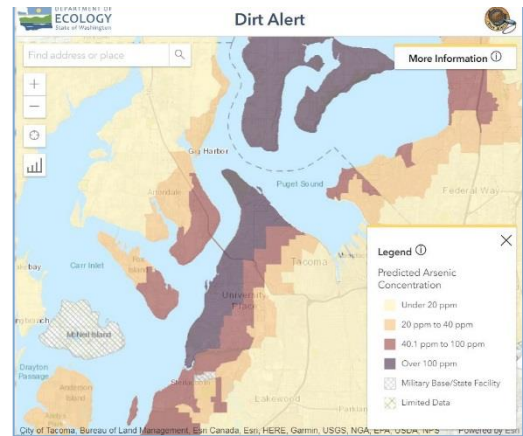


Photo 13: Home page of Ecology’s new web application.

Web Application: Transforming and consolidating our data:

Ecology is working on a new web application. EPA has funded the digitization of the study area sampling data. This map will show the general pattern of arsenic contamination from the Asarco Tacoma Smelter. It will also show property specific soil sampling and soil replacement information when available.

By placing both our programmatic information and data in one place, our goal is to make it easier for residents, community members, and interested parties to find Tacoma Smelter Plume related information for their property. We started user testing and plan on launching to the public by the end of 2018.

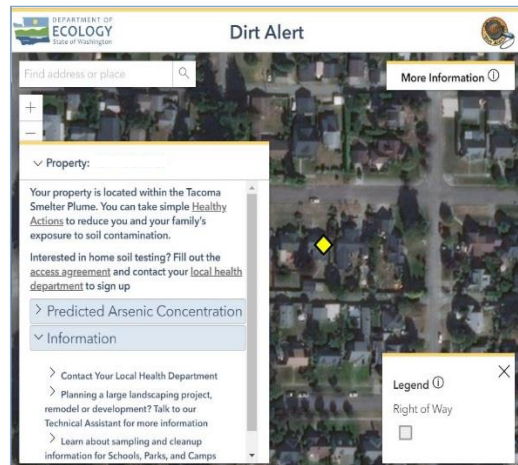


Photo 14: A screen shot of a property in Tacoma. The predicted levels for arsenic for the property will be shown in the pop-up box on the left.

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. The tunnel connected Ruston Way to Tacoma, under the former Asarco plant (see photo 15). In April 2017, Ecology and the City of Ruston entered into an interagency agreement to complete this project.

In 2018, the City of Ruston notified Ecology that it will not be incurring costs associated with the filling of the Ruston tunnel. Ecology let these funds lapse, and they have been returned to the Cleanup Settlement Account.

Per a legal agreement between Point Ruston, LLC and the EPA, Point Ruston, LLC is responsible for filling the Ruston Car Tunnel. Today, a new road goes around the tunnel and the old tunnel is being filled with soil. It is expected to be complete by December 2019.

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. It will be completed and open to the public by the end of 2018. Tacoma Metro Parks spent \$5 million for soil management, bridge work, concrete flatwork, and site cleanup and remediation.



Photo 15:- Ruston Tunnel under the former Asarco plant. Photo courtesy of Sherri Forch.



Photo 16: Point Defiance Trails project during construction. Photo courtesy of Atkinson Construction.

Conclusion

Conclusion

Our work funded by the Asarco settlement provides important services to residents that live within the plume. With these funds, we are able to:

- Provide outreach to increase awareness and promote healthy behaviors
- Provide free soil sampling and soil replacement through the Yard Program
- Sample and replace contaminated soil in areas where children play
- Assist landowners in cleaning up contamination during property development

2018 Accomplishments and highlights

Outreach and Education

Outreach staff engaged more than 7,800 people at events and reached more than 6,700 families through mailings. We launched a new way to reach out to property owners and sample soil through soilSHOP.

Yard Program and Soil Safety Program

By the end of 2018, we will complete soil replacement in 32 residential yards and one childcare.

Technical Assistance

Ecology's Voluntary Cleanup Program assisted landowners and developers to clean up 13 acres of contaminated soil during development.

Acknowledgements

The author of this report thanks the following people for their contribution to this project:

Tacoma Smelter Plume Team Members

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Jim Pendowski, Program Manager

Rebecca Lawson, Southwest Region Section Manager

Tacoma Smelter Plume Information

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Local Health Department Partners

Tacoma-Pierce County Health Department

Public Health-Seattle & King County

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Thanks to the Tacoma Public Library Northwest Room Digital Collections for historical photos.