



Tacoma Smelter Plume Annual Report

Fiscal Year 2021

By

Pallavi Mukerjee

For the

Toxics Cleanup Program

Washington State Department of Ecology

Southwest Regional office

Olympia, Washington

December 2021, Publication 21-09-082

Publication Information

This document is available on the Department of Ecology's website at:

<https://apps.ecology.wa.gov/publications/SummaryPages/2109082.html>

Cross-referenced and related Information

- [Yard Program action levels Publication 13-09-086](#)
- [TSP 2019 Publication 19-09-082](#)
- [TSP Publication 2020](#)
- [CSA Publication 2021](#)
- [CSA Publication 2022](#)
- [Tacoma Smelter Plume](#)
- [Dirt Alert Map](#)

Contact Information

Toxics Cleanup Program

P.O. Box 47600

Olympia, WA 98504-7600

Phone: 360-407-7170

Website: [Washington State Department of Ecology](#)

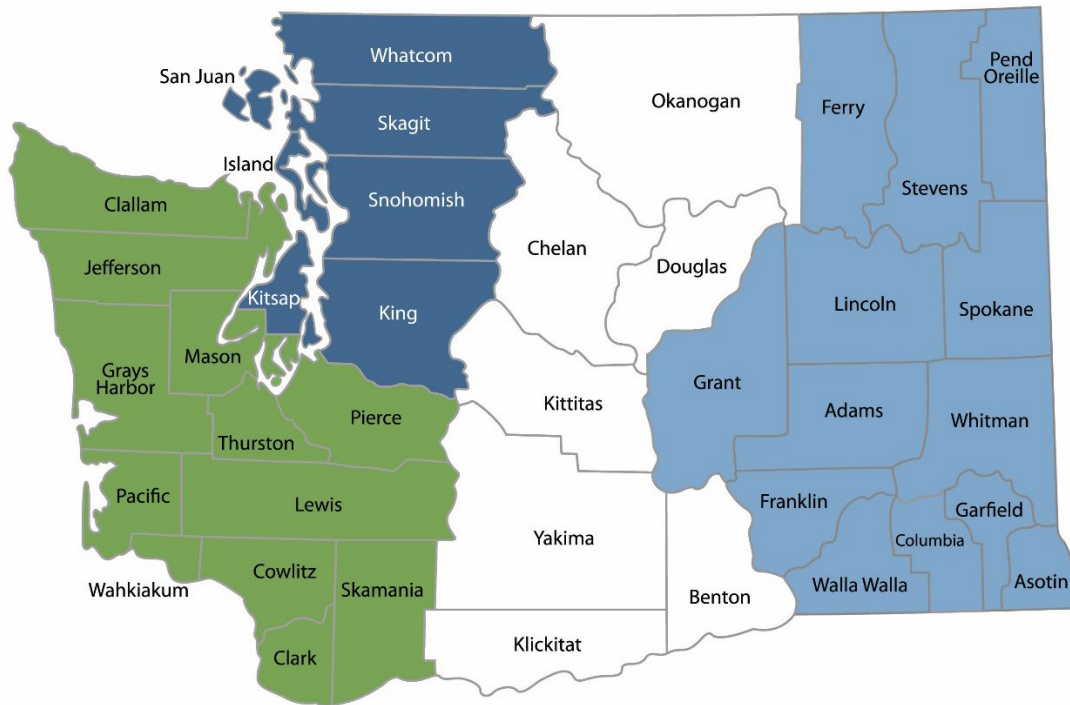
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Department of Ecology's Regional Offices

Map of Counties Served



Southwest Region 360-407-6300	Northwest Region 206-594-0000	Central Region 509-575-2490	Eastern Region 509-329-3400
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Region	Counties served	Mailing Address	Phone
Southwest	Clallam, Clark, Cowlitz, Grays Harbor, Jefferson, Mason, Lewis, Pacific, Pierce, Skamania, Thurston, Wahkiakum	PO Box 47775 Olympia, WA 98504	360-407-6300
Northwest	Island, King, Kitsap, San Juan, Skagit, Snohomish, Whatcom	PO Box 330316 Shoreline, WA 98133	206-594-0000
Central	Benton, Chelan, Douglas, Kittitas, Klickitat, Okanogan, Yakima	1250 W Alder St Union Gap, WA 98903	509-575-2490
Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 N Monroe Spokane, WA 99205	509-329-3400
Headquarters	Across Washington	PO Box 46700 Olympia, WA 98504	360-407-6000

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DEPARTMENT OF
ECOLOGY
State of Washington

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Acknowledgements

The lead author and editor of this report would like to thank the following people for their contribution to this report:

Ecology Project Staff

- Eva Barber, *Technical Assistance Coordinator*
- Amy Hargrove, *Remediation Manager*
- Heather May, *Section Planner*
- Justin Zakoren, *Yard Program Outreach Coordinator*

Toxics Cleanup Project Management

- Rebecca Lawson, *Section Manager*
- Marian Abbett, *Unit Supervisor*

Local Health Department Partners

- Tacoma-Pierce County Health Department
- Public Health-Seattle & King County

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

Abstract or Executive Summary

Purpose of the 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 (plume). It provides an update on the cleanup progress and efforts to manage human health risks.

Contents and time period covered in this report

The report covers the following:

- The plan for managing the Asarco Settlement.
- Cleanup strategies and priorities.
- Accomplishments and challenges in 2020 and 2021.

Most of the data are from the period October 1, 2020, through September 30, 2021.

Asarco settlement funds assist in cleanup and outreach

We received \$94.6 million from the Asarco bankruptcy settlement. The settlement funds were placed in the Cleanup Settlement Account (CSA), an interest-bearing account. We have managed the money resourcefully over the past eleven years. 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 actions. Outreach aims to reduce people's contact with contaminated soil.
- Provide free soil sampling and soil replacement to residential yards in areas of highest contamination through the Yard Program.
- Sample and replace contaminated soil in areas where children play.
- Assist developers, local governments, and landowners in cleaning up contamination during property development.

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, 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. The area with contaminated soil is called the Tacoma Smelter Plume (see Figures 2 and 3).



Figure 1: Asarco 50th Anniversary

The 2009 Asarco bankruptcy settlement

Washington became a 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 lawsuit against Asarco that spanned four years.

In November 2009, Asarco paid out a \$1.79 billion settlement nationwide. The settlement covered past and future cleanup costs, as well as interest earned over the four years it took to settle the lawsuit. Washington's share (\$188.5 million), which covers liabilities associated with the Tacoma Smelter, Everett Smelter, and several mines, was deposited into the CSA in December of 2009.

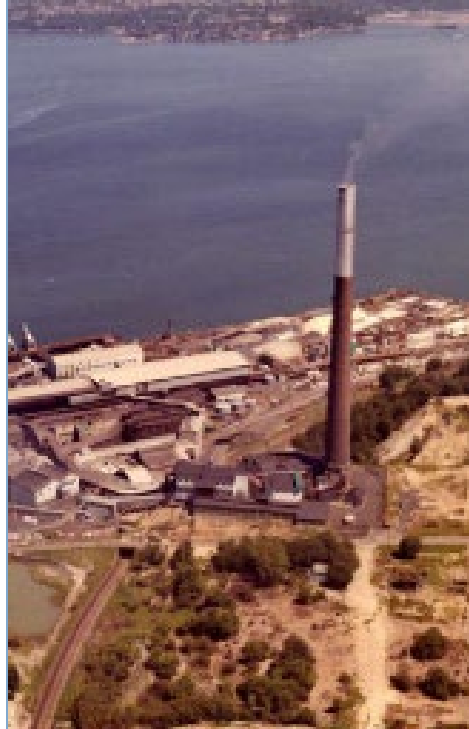


Figure 2: Asarco Smelter Plume

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 exposure to contaminated soil from the plume. This money 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 14-15 for categories of expenditure and planned settlement spending.

Work moves forward but future funds needed

We have managed the money received from the settlement resourcefully over the last eleven years. As of Fiscal Year 2021, we have spent \$57,119,000. The CSA funds for the plume will be spent by Fiscal Year 2026 or 2027. By then, we estimate that 200 of the nearly 1,200 yards qualifying for soil replacement will still need cleanup. With an additional \$15 million in other funds, we will be able to complete the remaining yard cleanups and continue outreach in affected communities. More information on settlement spending is discussed in the Cleanup Settlement Fiscal year 2021 Annual Report ([CSA Publication 2021](#)).

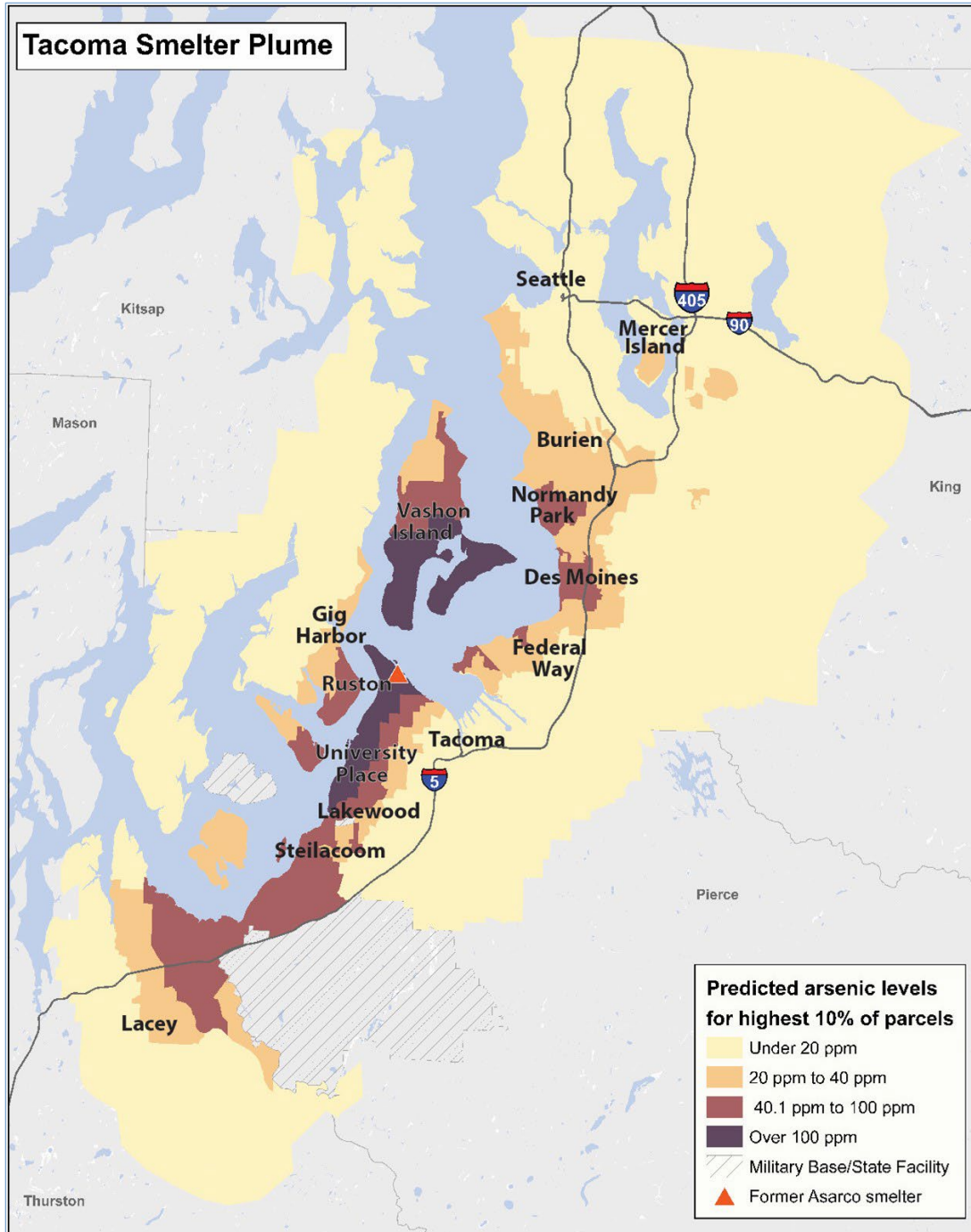


Figure 3: Tacoma Smelter Plume Map

There is 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, sampling data from forested soils, 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: 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 spread arsenic, lead, and other heavy metals across a 1,000 square mile area—the plume.

Arsenic and lead pose a potential long-term health risk. Within the plume, people may be exposed by accidentally consuming or inhaling contaminated soil. Children are at highest risk because they put dirty hands and toys in their mouths and their bodies are still growing and developing.



Figure 4: Children playing near the stack

Photo credit: (National Archives, Ruston, 1972)

Understanding patterns of contamination helps to prioritize the work

The Tacoma smelter used ore that was rich in arsenic. When it was built, the smelter's 571-foot smokestack was thought to be the tallest in the world. These factors, along with wind patterns and topography, created the broad pattern of contamination (see Figure 3).

Arsenic levels are higher closer to the former smelter and lower farther away from the smelter. Areas of higher contamination pose a greater risk to residents. The majority of the \$94.6 million settlement is going towards sampling and soil replacement in neighborhoods with higher concentrations.

Early health risk management focused on community outreach and healthy actions

Starting in 2000, Ecology funded the health departments in King and Pierce counties for work related to the plume. The funding covered education and outreach programs, as well as soil sampling to better understand the extent of the plume.

The main goals of outreach were to raise awareness and promote "healthy actions"—behaviors that reduce soil exposure, such as hand washing, vacuuming, taking shoes off at the door, etc. The health departments used surveys, focus groups, and other methods to develop outreach materials and strategies..

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 soil safety actions, such as replacing soil or covering with play chips, for play areas at schools and childcares. In 2010, using funding from the Asarco settlement, we expanded free soil sampling and safety actions to 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 soil safety actions, Ecology developed a plan in 2012 focusing work in four main areas. The two programs (Yard Program and Soil Safety Program) are combined under Cleanup in Figure 5:

- Yard Program—sample and replace soil from existing residential yards in areas of the highest contamination (defined on page 17).
- Soil Safety Program—sample soil and take soil safety actions at child play areas at schools, childcares, parks, camps, and multi-family housing.
- Outreach and Education—raise awareness about the contamination and healthy actions through health departments in King and Pierce counties.
- Technical Assistance—work with local governments and developers to encourage voluntary cleanup. Assist developers with soil cleanup.

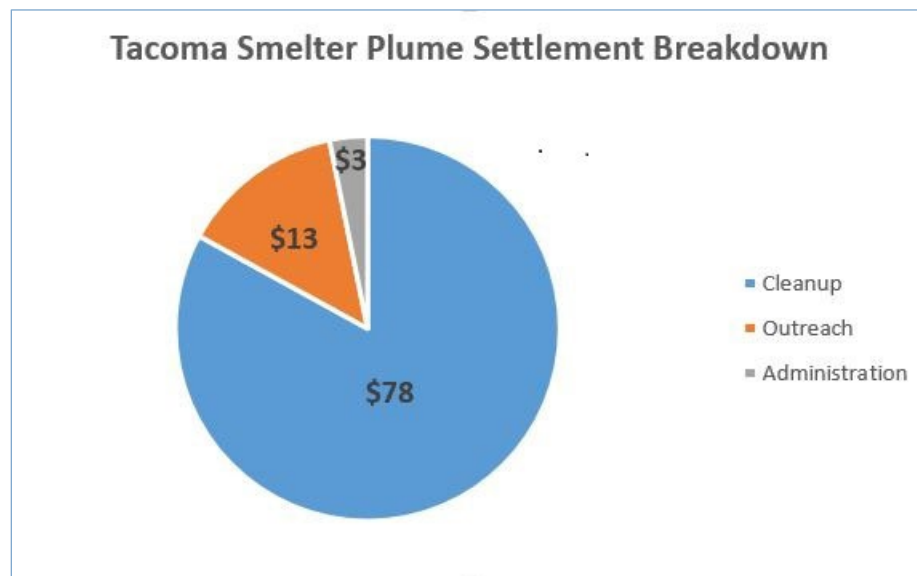


Figure 5: Categories of expenditures

(Categories of expenditures where the \$94.6 million in CSA are spent in millions of dollars).

Tacoma Smelter Plume Spending

As of Fiscal Year 2021, we have spent \$57,119,000 from the Tacoma Smelter Plume funds in the CSA. Funds in the CSA accrue interest. The actual fund balance is \$45,379,000, which reflects interest accrued. These remaining funds will not be enough to cover the entire cost of estimated cleanup activities. The CSA funds will be spent by Fiscal Year 2026 or 2027. By then, we estimate that 200 of the nearly 1,200 yards qualifying for soil replacement will still need cleanup.

With an additional \$15 million from other funds, we will be able to complete the remaining soil replacement and continue outreach in the affected communities. As we expect the appropriation from other funds to be for smaller amounts, we plan to reduce staffing and the number of yard soil replacements completed each fiscal year. The work will be spread over the next four biennia (Fiscal Years 2028 through 2033). Ongoing education and outreach will be necessary for the foreseeable future (see Figure 6).

We have been working since 2013 to remove and replace soil for qualifying residential properties. A few challenges have impacted our progress. In 2017, the capital budget was delayed and thus, construction was delayed. In 2018, we put two projects to bid, but the bidding process did not result in executed contracts. We bid those projects in 2019. Over the last couple of years, Ecology has improved its contracting processes. This transition delayed yard replacement designs. And in 2020, the state implemented a contract and hiring freeze due to economic impacts from the COVID pandemic, which further delayed our work.

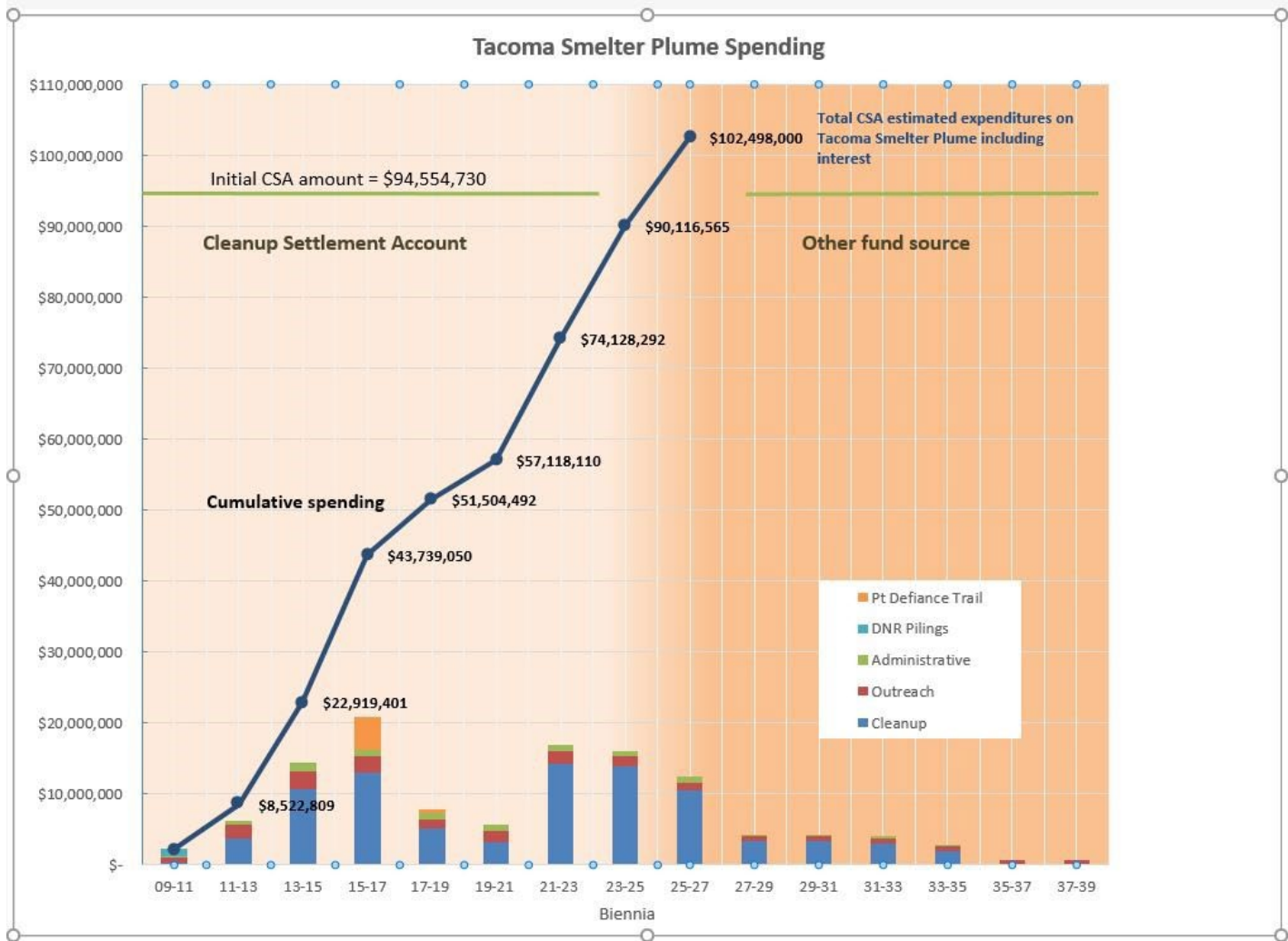


Figure 6: Tacoma Smelter Plume Spending

Sampling and Cleanup Programs

Yard Program

The Yard Program offers free soil sampling to all residential properties in our Yard Program Service Area (see Figure 7). Ecology is offering free cleanup (also known as soil replacement) for portions of yards above the action levels over 100 parts per million (ppm) for arsenic or 500 ppm for lead. Our program is voluntary, where property owners opt-in for soil sampling and soil replacement.

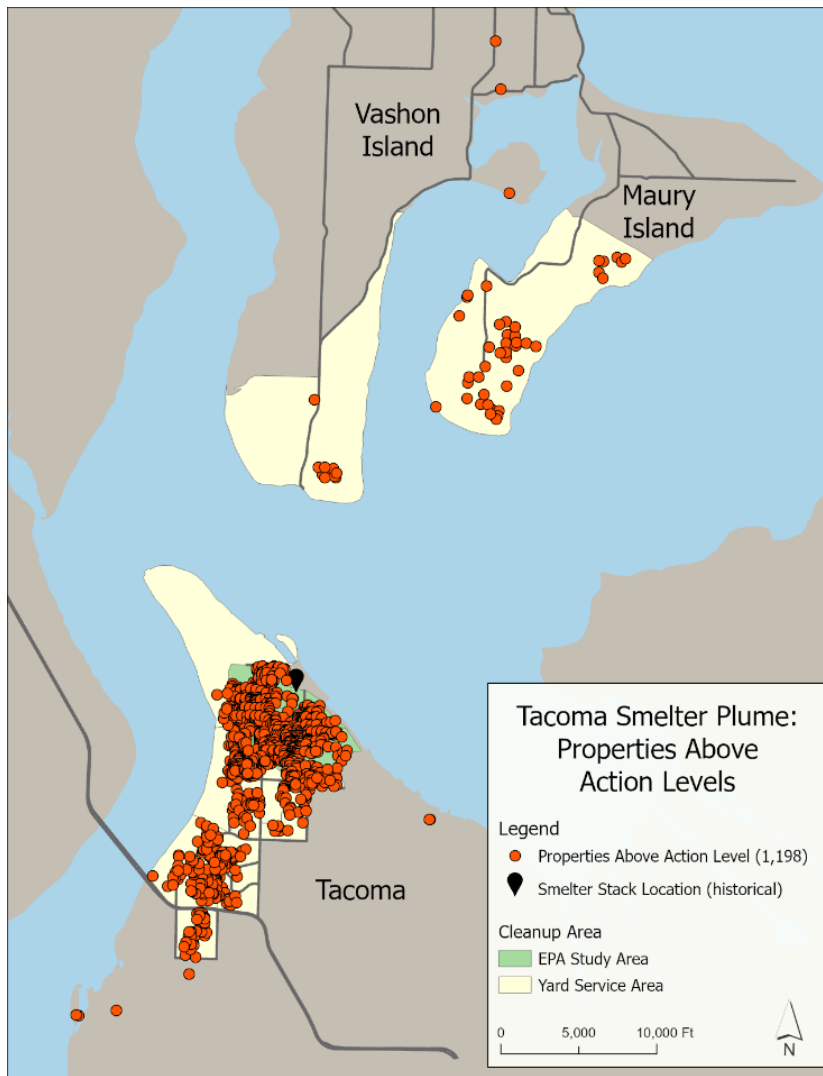


Figure 7: Yard Program Service Area showing all properties above the action levels

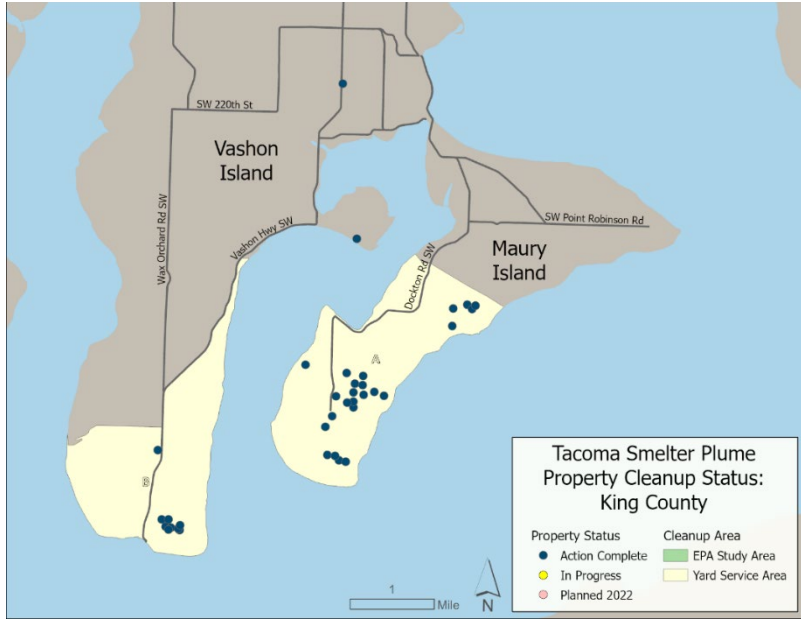


Figure 8: King County cleanup status

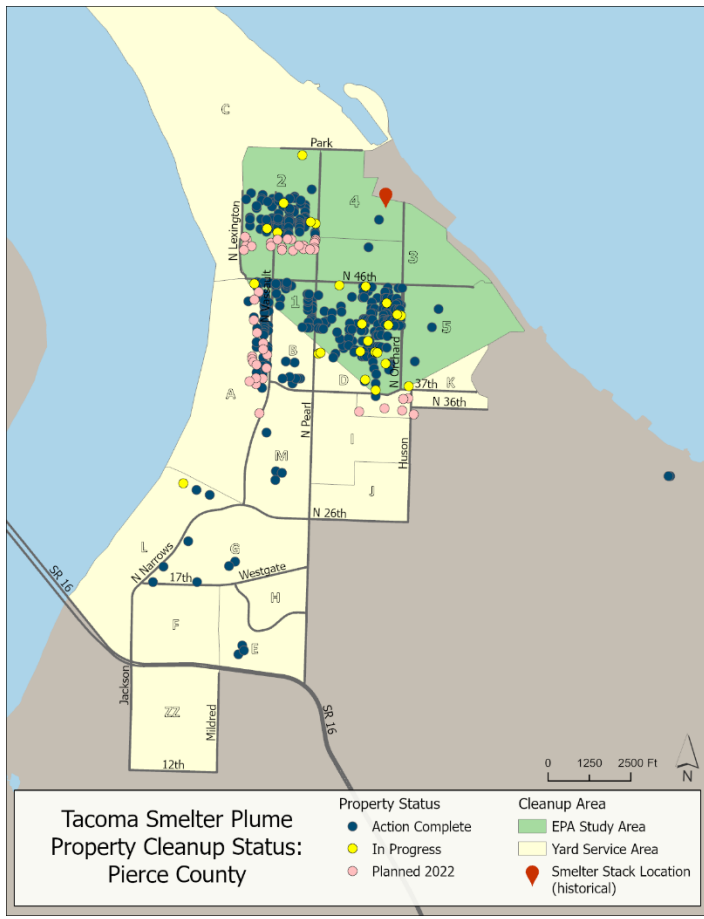


Figure 9: Pierce County cleanup status

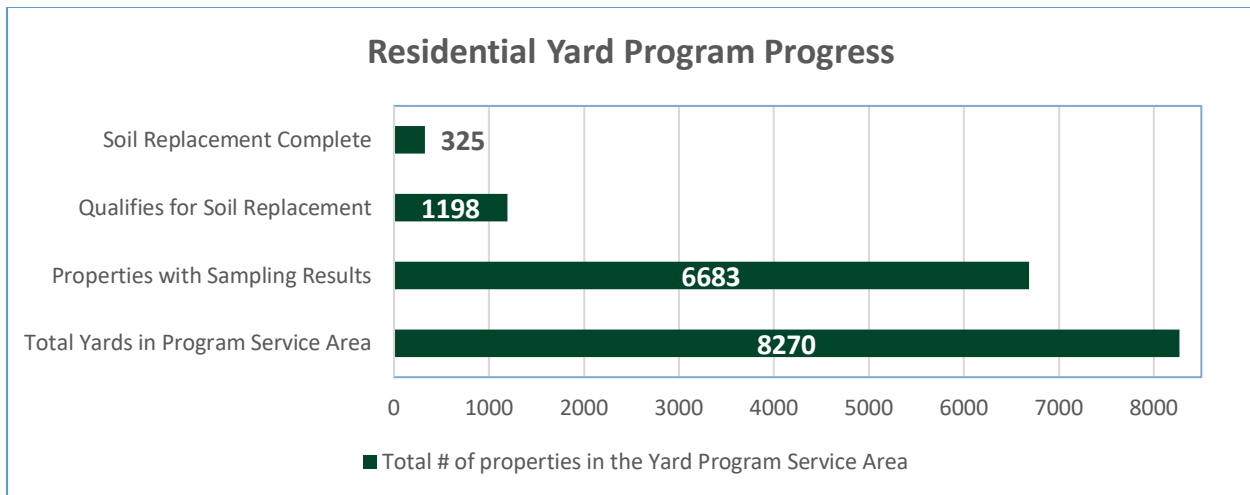


Figure 10: Progress in soil sampling and soil replacement

Through sampling, we found 1,198 properties that qualify for soil replacement (see Figures 7 and 10). To date, we removed and replaced soil on 325 properties (see blue dots on Figures 8 and 9). We will continue to offer soil sampling to new homeowners.

Soil Safety Program

The Soil Safety Program provides free sampling and soil safety actions for child play areas. Created in 2005, the program has sampled more than 1000 play areas at schools, parks, childcares, camps, and multi-family housing. The program has taken soil safety actions by removing soil, covering soil with fabric and play chips, or placing signage at 142 play areas. We continue to sample new licensed childcare play areas as they open and replace soil. We also complete other actions in play areas that have average arsenic or lead levels above the state cleanup level. As a reference point-the state cleanup level is 20 ppm for arsenic and 250 ppm for lead.

Restart of Planning and Cleanup Projects

The Yard Program and the Soil Safety Program restarted planning, design, and cleanup projects that were delayed in 2020.

Our cleanup programs engage property owners who qualify and are next in the sequence for soil replacement. In 2021, we contacted 83 properties including three childcares that were paused, in part due to the COVID pandemic, during their planning process. We signed up 43 properties for soil replacement, including two childcares. We plan to complete the work on these properties and others in 2022 (see pink dots on Figure 9). We continue to meet, design, and sign-up additional properties for soil replacement work in the future.

In May 2021, we put two groups of properties out to bid (see yellow dots on Figure 9). One is a group of four properties that are partially funded by the US Environmental Protection Agency,

and the other is a group of 21 properties and one childcare. In October 2021, work started on these properties, and will continue into early 2022.

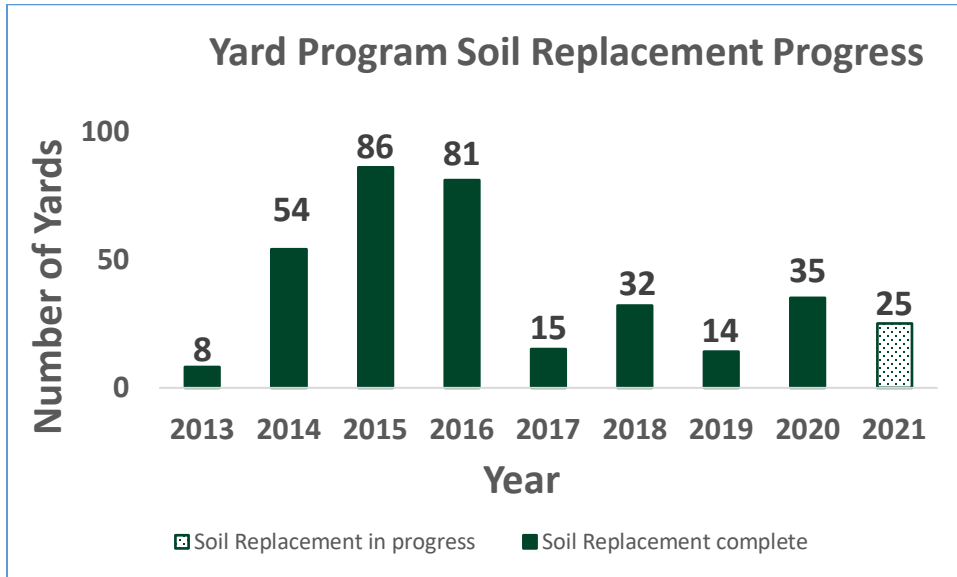


Figure 11: Yard Program soil replacement

Figures 8, 9, 10, and 11 show the soil replacement progress since it started in 2013 to the present. In June 2021, we completed work on 28 properties in north Tacoma that we started in 2020.

Figures 12 and 14 show one of the properties from this group before and after soil replacement. Figure 13 shows contractors replacing soil in the backyard.



Figure 12: Property before soil replacement



Figure 13: Contractors replacing soil in the backyard



Figure 14: Property after soil replacement

New Staffing

In 2020, the state implemented a hiring freeze due to economic impacts from the COVID pandemic. In 2021, the hiring freeze lifted, and we advertised four project positions that had been vacant during the 2020 hiring freeze. We look forward to the increased productivity of a fully staffed project.

Education and Outreach Programs

Dirt Alert and partnerships with the health departments

Ecology funds the [Tacoma-Pierce County Health Department \(TPCHD\)](#) and [Public Health-Seattle & King County \(PHSKC\)](#) for public outreach and education about reducing contact with contaminated soil and encouraging healthy actions.

Examples of healthy actions include:

- Washing hands after playing or working outside.
- Taking off shoes at the door.
- Vacuuming and damp dusting regularly.
- Covering bare patches of soil where children play.

Impacts of COVID-19

For most of 2021, since the outbreak of COVID-19, the health departments worked remotely. They responded to phone calls and emails and found ways to provide effective outreach to the affected communities in innovative ways virtually. They are now beginning to provide more in-person outreach.

Tacoma-Pierce County Health Department

Tacoma–Pierce County Health Department’s outreach includes handwashing demonstrations in schools and childcares, materials distributed at community events, and one-on-one conversations during soil testing and new homeowner meetings. This year, the Health Department continued the behavior change program called the Get Covered toolkit and the Community Garden Sign Project.

Get Covered toolkit:

Tacoma–Pierce County Health Department’s outreach included a program called the Get Covered toolkit. This program encourages residents to cover bare soil with clean wood chips where children and pets may be exposed. The toolkit included a coupon for free play chips and how-to instructions for mulching to reduce potential contact with contaminated soil (see Figure 15). In 2020, the health department reached out to nearly 2000 residents in the Yard Program Service Area (see Figure 7). The health department offered Get Covered toolkits and free soil testing. In total, 97 Get Covered toolkits were requested and sent out.



Figure 15: Contents of Get Covered toolkit

The ZZ area in the Yard Program Service Area (see Figure 9) is a diverse and disadvantaged community. In spring of 2021, the health department focused on the ZZ area with their Get Covered program. To reach all residents, they mailed 558 postcards offering Get Covered toolkits. Based on requests, they mailed out 25 kits in total.

Community Garden Sign Project:

Gardeners are curious about whether it is safe to grow vegetables within the plume. The Community Garden Sign project offers signs to community gardens within the plume. These signs direct the public to the Tacoma-Pierce County Health Department website where they can access information on safe gardening—such as using raised garden beds with soil brought in from a soil vendor. The website also lists the healthy actions to protect children and pets from coming into contact with arsenic and lead in soil (see Figure 16).



Figure 16: Community Garden Sign

Public Health-Seattle & King County

Public Health-Seattle & King County does outreach at community events and partners with community grantees. The grantees help raise awareness about the plume and promote healthy actions to residents that might otherwise be hard to reach.

- PHSKC continued to successfully partner with several organizations to raise awareness about contaminated soil and promote healthy actions. One of them, Tilth Alliance, works with gardeners in the community to build a sustainable, healthy, and equitable food future. When working with community gardeners, Tilth Alliance includes Dirt Alert information on safe gardening, such as gardening in raised beds. Tilth Alliance has developed demonstration garden sites in South King County (see Figure 17).
- PHSKC is partnering with new organizations to deliver messages to communities that have not been reached in the past including Native American tribes, advocacy groups and some community organizations. Some of the organizations they are networking with include King County Farmer's Program, Seattle Indian Health Board, King County Lead and Toxics, and Somali Health Board and Family Ways.



Figure 17: Vegetables and herbs grown in raised garden beds

Priorities and Dirt Alert outreach statistics

Arsenic and lead are toxic and can be harmful to human health. Children are especially vulnerable. Therefore, children and the adults that care for them are a priority for outreach.

Several Dirt Alert outreach methods are used to increase awareness about contaminated soil and healthy actions. Ecology tracks outreach methods of the health departments by estimating how many people are reached through their efforts.

Figure X shows trends of different outreach methods between October 2013 and September 2021. The methods include TV and online impressions, one-on-one outreach, broad based outreach, and community organizations.

- Impressions - the number of times a television or online ad runs multiplied by viewership.
- Broad-based outreach - mailers and events (such as fairs, school hand-washing presentations, and soilSHOP).
- One-on-one outreach - home visits, soil testing, email, and phone inquiries.
- Partnerships work with community organizations and the health departments to educate the public about Tacoma Smelter Plume and healthy actions.

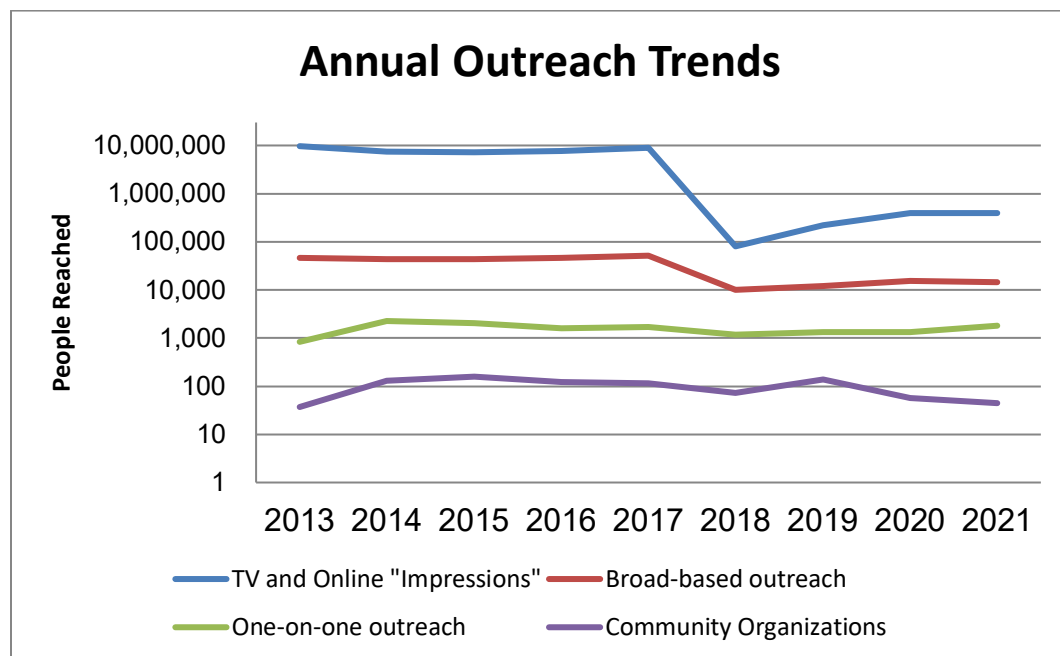


Figure 18: Dirt Alert Statistics

The trends are consistent with last year. We continue to see a decrease in people reached by Community Organizations and Broad-based outreach. Due to restrictions in place for controlling COVID-19, the health departments were unable to meet with key messengers in organizations or attend fairs and events.

Technical Assistance

Encouraging cleanup during development

Property development requires soil disturbance during land clearing and grading. This is an opportunity to test for contamination and to clean it up. It is more cost effective and straightforward to clean up the soil before constructing buildings, roads, and utilities. Our Technical Assistance Coordinator works with local and state governments, developers, and landowners to streamline the cleanup of contaminated soil. We collaborate with 18 local permitting offices in King, Pierce, and Thurston counties to encourage people to sample and cleanup before developing their properties.

Free Technical advice

Ecology provides free technical advice on planned and completed cleanup of Tacoma Smelter Plume-related contamination. Landowners, developers, and public agencies doing projects within the plume test the soil after Ecology comments on the environmental permit review. If sampling shows contamination, property owners enter Ecology's Voluntary Cleanup Program (VCP). In the program, owners receive opinions on proposed cleanups and get No Further Action (NFA) determinations when the cleanups meet state requirements. The opinion letters and NFA determinations help developers obtain necessary permits, loans, or sell the property in the future. To date, Ecology has issued 74 NFA determinations for properties within the plume.

Since 2006, landowners and developers sampled 2,186 acres of land in the plume. Over a thousand acres tested below the cleanup level and did not need to enroll in the VCP. To date, property owners cleaned 1,154 acres of contaminated soil within the plume and obtained NFA determinations. In the past year, five property owners cleaned 35 acres of contaminated soil through the VCP (see Figure 19).

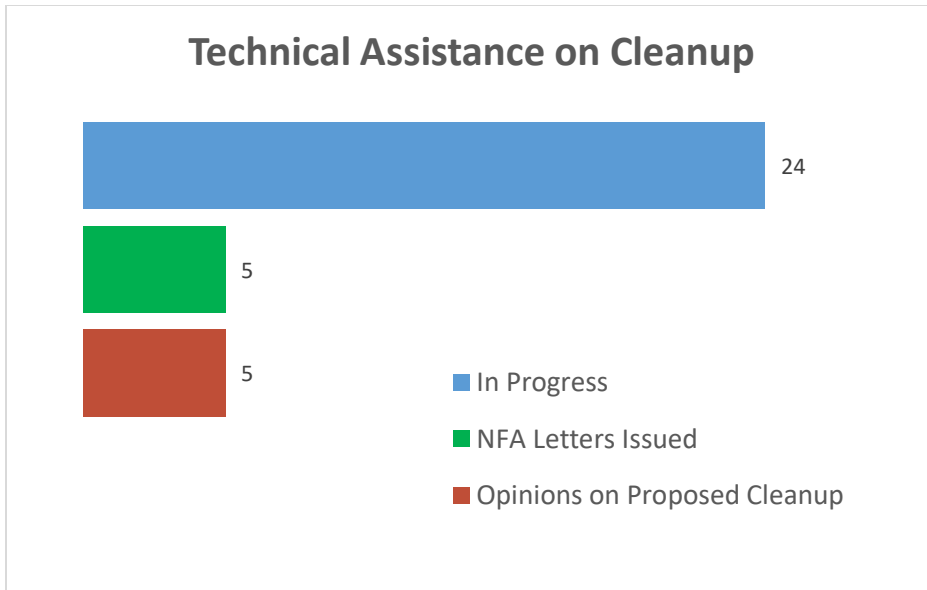


Figure 19: Progress with VCP Projects in 2021

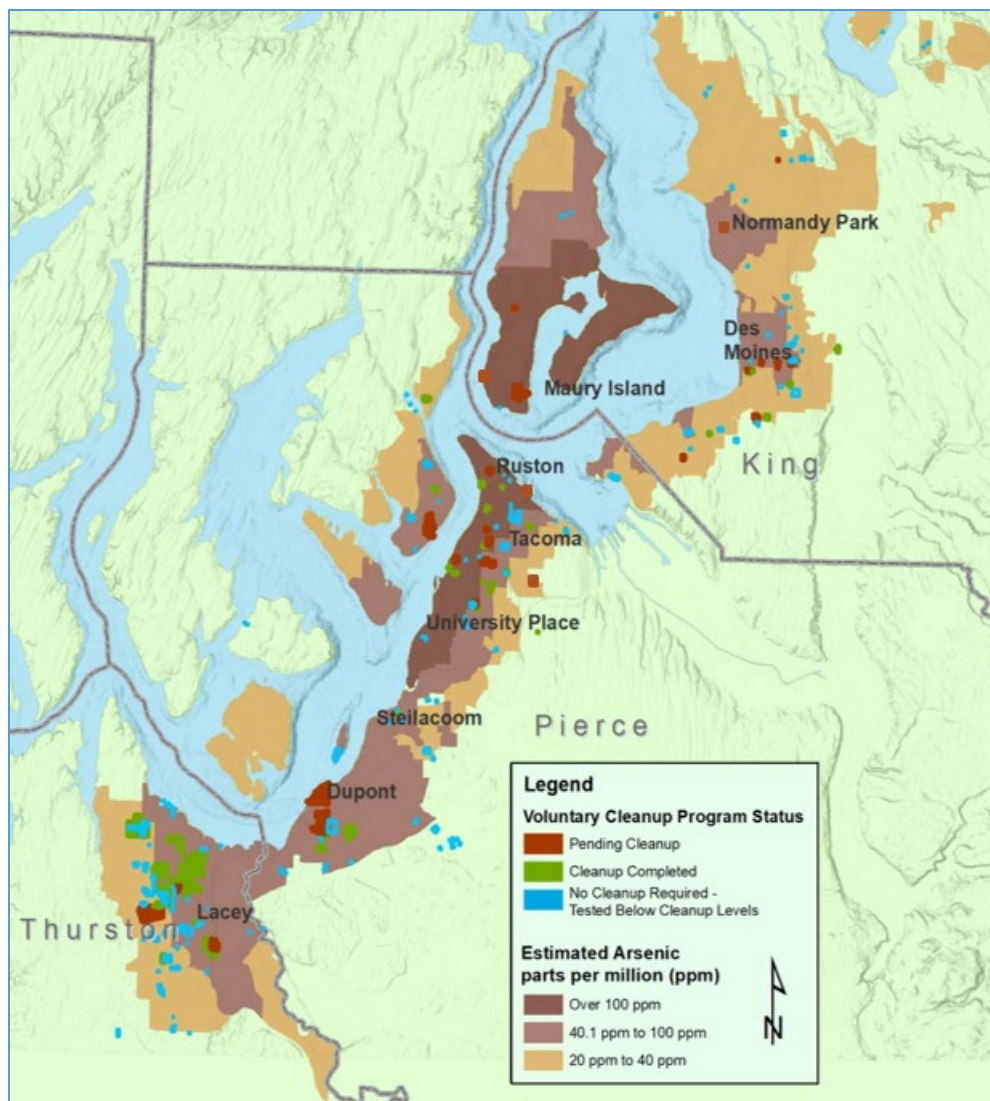


Figure 20: Voluntary Cleanup Program Status

Example: Integrating cleanup in development

Norberg Estates is a single-family residential development in Steilacoom, Pierce County. In June 2020, the developer incorporated soil cleanup into the property development by excavating the upper contaminated soil and mixing it into stockpiles. This dilutes arsenic and lead concentrations to below state cleanup levels. Mixing works well when there are lower levels of arsenic and lead. The contamination within the Norberg Estates development was low enough to qualify for mixing (see Figures 21 and 22).

The developer submitted a cleanup report to Ecology with the results of the soil sampling after the cleanup. Ecology reviewed the cleanup report and determined that the cleanup met state cleanup requirements. Ecology issued an NFA determination in January 2021.



Figure 21: Norberg Estate before cleanup and development



Figure 22: Norberg Estate after cleanup and development

Interim Action Plan

The 2012 Interim Action Plan describes how Ecology will use the \$94 million settlement to address the contamination and manage risk from the plume. Interim actions will lower risks to human health and the environment by addressing pathways that expose children, residents, gardeners, construction workers, and other groups. Ecology proposed a mix of physical cleanup — digging, mixing, or capping — and institutional controls that restrict access to contaminated soil. Ecology proposed two phases of interim actions:

Phase One

Phase One focuses on areas of highest contamination within the plume where children play and people live. Ecology developed a plan in 2012 that focused work in four main areas. These areas are:

- Yard Program—sample and replace soil from existing residential yards in areas of the highest contamination. (defined on page 17).
- Soil Safety Program—sample and take soil safety action at child play areas at schools, childcares, parks, camps, and multi-family housing.
- Outreach and Education—raise awareness about the contamination and healthy actions through health departments in King and Pierce counties.
- Technical Assistance—work with local governments and developers to encourage voluntary cleanup and assist developers with soil cleanup.

Phase Two

Phase Two looks at areas that are likely to have moderate contamination (average arsenic 20-100 ppm). We will continue outreach efforts to increase people’s awareness of the contamination and to perform healthy actions. Our goal is to find sustainable solutions that can be incorporated into the day-to-day business of local government, development, and real estate.

We are focused on informing buyers that there is potential soil contamination before they purchase a home. Some options we are reviewing include:

- Raising awareness about the plume in continuing education courses for real estate agents.
- Creating a handout similar to the one for lead-based paint that is given to buyers at the time of sale.
- Using deed notices for soil contamination remaining on a property.

Soil sampling before development

It is vital to our long-term strategy to integrate soil contamination issues into the work of other agencies that manage or regulate land. Our proposed actions include:

- Requiring soil sampling and cleanup for projects managed by state agencies and local governments where soil will be moved at the site.
- Providing agencies with outreach tools.
- Helping agencies address soil contamination using best management practices.
- Working with agencies to address contamination during construction of new parks and schools.

Key agencies we partner with include:

- Department of Children, Youth, and Families (DCYF)
- State Board of Health (SBOH)
- Office of the Superintendent of Public Instruction (OSPI)
- Department of Labor and Industries (L &I)
- Department of Licensing (DOL)
- Washington Department of Transportation (WSDOT)

In 2021, we researched options to address soil contamination through real estate transactions and during development. In 2022, we will evaluate certain strategies to see if they are sustainable, cost effective and implementable. Some strategies we are reviewing include a MTCA rule amendment, adding language to Form 17, addition of information to Notice of Title, and inclusion of language about area wide contamination in core curriculum taught to real estate agents.

Our expectation is to write the supplemental interim action plan and make it available for public comment in spring 2023.

Conclusion

Services to residents within the plume area

With the funding from the Asarco settlement, we provide free soil sampling and replacement through the Yard Program, and in areas where children play. We assist landowners in cleaning up contamination during property development, work to increase awareness about the plume, and promote healthy actions.

2020-2021 Accomplishments

Cleanup Work

- We signed up 43 properties for soil replacement, including two childcares.
- In October 2021, we started work on 25 properties and one childcare. We plan to complete the work on these properties and others in 2022.

Outreach and Education

- Since the outbreak of COVID-19 in 2020, the health departments have been working remotely to continue their effective outreach.
- Tacoma-Pierce County Health Department worked to promote awareness of contaminated soil with their Get Covered campaign to cover soil on residential properties. They also contacted community garden organizations to increase awareness about potential soil contamination in community gardens and how to practice healthy actions while gardening.
- Public Health Seattle & King County partnered with new organizations and gave presentations to deliver messages to communities that have not been reached in the past.

Technical Assistance

- Twenty-four VCP projects in the plume are pending cleanup actions. Five projects completed cleanup, and five projects received Ecology's opinions on the proposed cleanup.

Interim Action Plan and Phase Two

- In 2021, we researched options to address soil contamination through real estate transactions and during development.