Photo Courtesy: USGS/Cascades Volcano Observatory

Proposed State Implementation Plan Revision

Tacoma-Pierce County $PM_{2.5}$ Redesignation Request and Maintenance Plan

DEPARTMENT OF ECOLOGY
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by

Washington State Department of Ecology
Air Quality Program
Olympia, Washington

with
Puget Sound Clean Air Agency

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Acknowledgements

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Executive Summary

Ecology proposes a revision to an air quality plan called a State Implementation Plan (SIP). The part of the plan being revised is for the Tacoma-Pierce County area to be reclassified to attainment (meeting federal air quality standards) for fine particles ($PM_{2.5}$). The proposed revision also includes a 10-year maintenance plan to keep air quality healthy in the Tacoma-Pierce County area.

In 2009, EPA declared the greater Tacoma area and surrounding communities in Pierce County a nonattainment area for not meeting the federal air quality standard for daily fine particles from 2006-2008.[1] Since then, Ecology and Puget Sound Clean Air Agency (the local clean air agency with authority in Pierce County) have been working to reduce fine particle pollution, focusing mainly on reducing wood smoke.

This SIP revision explains Washington's efforts to improve air quality in the proposed Maintenance Area. It was prepared by the Washington Department of Ecology (Ecology) with Puget Sound Clean Air Agency (PSCAA), the local clean air agency with jurisdiction in the area. The SIP revision documents:

- That the area meets the requirements under the federal Clean Air Act (CAA) to be reclassified to attainment;
- A 10-year maintenance plan to keep air quality healthy in the nonattainment area.
- Activities and projects conducted as part of the planning process for the SIP revision.

Why fine particle pollution is a problem

Dust, soot, and smoke are all "particulate matter." Particulate matter is one of the six criteria air pollutants monitored and regulated under the CAA. Fine particles are microscopic, a fraction of the diameter of a single human hair. The tiny size of fine particle pollution allows us to inhale it easily. The tiny particles travel deep into our lungs and circulatory system.

As a result, fine particles have both short- and long-term health effects including respiratory disease, decreased heart and lung function, asthma attacks, heart attacks, strokes, and premature death. These particles can also act as carriers for other toxic and cancer-causing materials. Fine particle pollution affects everyone, but has the most harmful effect on children, older adults, and people with respiratory and cardiac diseases.

Federal air quality standards

EPA set two National Ambient Air Quality Standards (NAAQS) for fine particle pollution to protect public health and the environment. These standards are:

- 24-hour (daily) standard.
- Annual standard.

In 2006, EPA strengthened the daily standard concentration for fine particles from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$.[2] The Tacoma-Pierce County area was designated nonattainment because the 2006-2008 design value of 44 $\mu g/m^3$ exceeded the 35 $\mu g/m^3$ standard. The design value is a measurement used to determine compliance with the standard, and is based on the annual 98th percentile value averaged over three years.

Where fine particles come from

The fine particle pollution in the Tacoma-Pierce County $PM_{2.5}$ Nonattainment Area comes mainly from smoke due to burning in wood stoves and fireplaces. Fine particle pollution is worse during the winter months when more households are burning wood for heat. In addition, stagnant weather conditions trap the smoke from these fires close to the ground and cause air pollution to build up rapidly. Other smaller sources of fine particle pollution include:

- exhaust from cars and trucks;
- dust;
- large industrial sources; and
- other nonroad engines, equipment, and vehicles, such as construction equipment, buses, ships, and trains.

Strategies to reduce fine particle pollution

Puget Sound Clean Air Agency (PSCAA) worked closely with the local community and convened a Task Force force in 2011 to develop and implement strategies to reduce fine particle pollution to healthier levels.[3] Under the Task Force's direction, PSCAA implemented three significant new programs in the Tacoma-Pierce County $PM_{2.5}$ Nonattainment Area starting in 2012:

- Enhanced enforcement of air quality burn bans and a lower burn ban trigger, with path to no penalty for first time violators and an exception for households with no alternative source of heat.
- Required removal at a future date certain of old, more polluting uncertified wood stoves, with the potential for a free replacement for low-income households.
- Public education and outreach to raise awareness about burn ban compliance and promote participation in the wood stove removal and replacement program.

The strategies were supported by legislation passed by the Washington State Legislature in 2012 (Substitute House Bill 2326 Chapter 219, Laws of 2012) and updated wood stove regulations incorporated in the Washington State Implementation Plan (SIP) that provide Ecology and PSCAA authority to implement the wood smoke rules and strategies for the Nonattainment Area. This SIP revision relies on rules that are currently approved in the Washington SIP. We do not propose to include any new rules as part of this SIP revision.

Progress in improving air quality

In 2012, EPA issued a clean data determination that the area met the daily fine particle standard based on monitoring data from 2009-2011.[4] Recent monitoring data show that air quality has improved and the area has continued to attain the standard since 2011.

What is in the SIP revision

This document was prepared by Department of Ecology with Puget Sound Clean Air Agency to demonstrate that the Nonattainment Area:

- meets CAA requirements for redesignation to attainment for the 2006 daily fine particle standard; and
- will maintain the fine particle air quality standard for the next 10 years.

This document includes additional federal planning requirements:

- inventories of air emissions infor 2011, 2017 and 2026 for fine particles and pollution that leads to fine particles;
- limits on onroad vehicle emissions to make sure the area continues to meet the standard;
- summary of fine particle reduction strategies and existing permanent and enforceable rules that provide Ecology and PSCAA authority to control fine particle pollution;
- summary of efforts to include everyone in the environmental decision-making process (regardless of race, color, national origin, or income);
- commitments Ecology and PSCAA make to continue monitoring, verify that the area continues to meet the standard, and implement a contingency plan if a future violation occurs.

Public Comment Period

Ecology accepted public comments on the proposed redesignation request and maintenance plan during a public comment period August 27 to October 3, 2014, and at a public hearing September 30, 2014. Ecology reviewed, responded to, and incorporated comments before finalizing the plan (See Appendix F).

Next Steps

Ecology will request EPA approve the proposed SIP revision. EPA must approve of Ecology's redesignation request and maintenance plan to remove the "nonattainment" designation and reclassify the area to attainment, making it a maintenance area. This would begin a 20-year planning cycle designed to make sure that the area remains below the federal standard. This maintenance plan covers the first 10 years of that planning cycle. Ecology will submit an updated maintenance plan for the second 10 year period, eight years after EPA approves this SIP revision.

Table 1: Timeline and summary of planning process

2006	• EPA revised the daily $PM_{2.5}$ NAAQS from 65 to 35 µg/m^3.[5]
2007	• PSCAA launches uncertified wood stove replacement program.
2009	• Parts of Tacoma-Pierce County designated nonattainment for the 2006 $PM_{2.5}$ NAAQS.[6]
2011	• PSCAA convenes a Tacoma-Pierce County Clean Air Task Force. The Task Force issues a set of recommendations in December 2011.[7] • PSCAA launches outreach effort to educate residents about fine particle pollution. • The three year average daily $PM_{2.5}$ level (the "design value") for 2009-2011 drops below the NAAQS and remains below the NAAQS in 2012 and 2013.
2012	• EPA issues a Clean Data Determination that the area meets the $PM_{2.5}$ NAAQS.[8] • Washington State Legislature passes legislation to advance the recommendations of the Task Force.[9] • PSCAA starts enhanced enforcement of burn bans. PSCAA continues to provide incentives for removal of older, more polluting uncertified wood stoves. • PSCAA adopts changes to PSCAA Regulation 1-13, Solid Fuel Burning Device Standards in October.[10] • Ecology submitted a SIP revision to EPA. The revision was approved by EPA, effective June 28, 2013.[11] The revision included: o PSCAA's Regulation 1-13 Solid Fuel Burning Device Standards, o 2008 emissions inventory for the Nonattainment Area, and o Motor Vehicle Emissions Budgets.[12]
2013	• Ecology amends Chapter 173-433 WAC Solid Fuel Burning Devices rule. The rule is adopted in January 2014 and approved by EPA for inclusion in the Washington SIP effective June 9, 2014.[13]
2014	• Ecology, PSCAA and Puget Sound Regional Council (PSRC) complete technical work for redesignation request and maintenance plan.

1. Introduction

The U.S. Environmental Protection Agency (EPA) sets air quality standards for fine particle pollution to protect public health and the environment. In December 2009 EPA classified parts of Tacoma-Pierce County as nonattainment for fine particle pollution under the federal Clean Air Act (CAA).[14] This designation is due to unhealthy levels of fine particle pollution from 2006-2008 and is a result of two factors:

- A stronger air pollution limit set by the EPA in 2006; and
- Spikes in fine particle pollution levels during the fall and winter that exceed the limit allowed in a 24-hour period.

Since 2010, fine particle pollution levels declined in the Tacoma-Pierce County $PM_{2.5}$ Nonattainment Area (Nonattainment Area). In 2012, EPA determined that the area met the standard based on monitoring data from 2009-2011.[15] Recent monitoring data show that the area has continued to attain the standard since then. This plan demonstrates how the area meets the federal CAA requirements to be redesignated to attainment for the daily fine particle standard and demonstrates how the area will continue to meet standard for the next 10 years.

This plan will be submitted to EPA to support the redesignation request and to request that EPA include the associated maintenance plan as a revision to the Washington State Implementation Plan (SIP). The SIP consists of plans and rules that demonstrate how Washington will meet National Ambient Air Quality Standards (NAAQS). Washington State Department of Ecology (Ecology) prepared this plan with Puget Sound Clean Air Agency (PSCAA). PSCAA is the local clean air agency with jurisdiction over the Tacoma-Pierce County area.

What is fine particle pollution?

Fine particle pollution refers to particulate matter 2.5 micrometers in size or smaller ($PM_{2.5}$). Fine particles are microscopic, a fraction (about $1/30^{th}$) of the diameter of a single human hair. Fine particles come from soot, dust, or unburned fuel suspended in the air, and can also be formed from chemical reactions involving gaseous precursors.

The fine particle pollution in the Nonattainment Area comes mainly from smoke due to burning in wood stoves and fireplaces, and exhaust from cars, trucks, and other sources such as buses, ships, and trains. Industries also contribute a small portion of fine particle pollution. Fine particle pollution is worse during the winter months when more households are burning wood for heat. In addition, stagnant weather conditions trap the smoke from these fires close to the ground and cause air pollution to build up rapidly.

Who is affected?

Fine particle pollution poses a serious health risk to residents of the Nonattainment Area. Small particles can penetrate deep into the lungs and travel in the circulatory system, affecting the heart and lungs. Exposure to fine particle pollution is associated with respiratory disease, decreased heart and lung function, asthma attacks, heart attacks, strokes, and premature death. Fine particles can also act as carriers for toxic and cancer-causing materials. Fine particle pollution

affects everyone, but has the most harmful effect on children, older adults, and people with respiratory and cardiac diseases.

Every year in Washington, fine particle pollution contributes to an estimated 1,100 deaths and $190 million in direct and indirect costs from treating illnesses and health conditions that stem from fine particle pollution.[16] Fine particle effects can result in increased hospital admissions, emergency room visits, absences from school or work, and restricted activity days.

In addition to the health risks, not attaining federal air quality standards has other consequences. Industries moving to or expanding in a Nonattainment Area are required to install the most costly pollution controls. This can be a disincentive for new businesses to relocate and bring new jobs to the region. Also, if the state doesn't submit this plan to show how the area will achieve cleaner air, the EPA could step in and develop and enforce its own plan in the area, and the community would have less influence in determining local solutions. Not acting could also endanger federal transportation funding for the region and grant funding for air quality.

What is in this plan?

This plan demonstrates how the Tacoma-Pierce County $PM_{2.5}$ Nonattainment Area currently meets and will continue to meet the 24-hour $PM_{2.5}$ NAAQS for the next 10 years. It fulfills the federal Clean Air Act requirements to redesignate the area to attainment. The plan is organized as follows:

- **Background** – describes the Nonattainment Area and the fine particle pollution problem.
- **Air Quality in the Nonattainment Area** – summarizes fine particle monitoring data.
- **Emissions Inventories** – summarizes the main sources and quantity of emissions for $PM_{2.5}$ and precursor emissions for 2011, 2017, and 2026.
- **Transportation Conformity Requirements** – summarizes the Motor Vehicle Emissions Budget set to limit onroad motor vehicle emissions from cars and trucks.
- **Strategies to Reduce Fine Particle Pollution** – describes critical control measures to reduce fine particle pollution, primarily wood smoke.
- **Environmental Justice** – describes how the agencies incorporated environmental justice concerns.
- **Redesignating the Area to Attainment**– demonstrates how this document fulfills federal requirements to redesignate the area to attainment.
- **Maintaining Healthy Air Quality–** describes the commitment to continue monitoring, verify continued attainment, and the contingency plan.
- **Next Steps** – describes the next steps in the process.

2. Background

Federal Air Quality Standards

EPA set two National Ambient Air Quality Standards for fine particle pollution to protect public health and the environment. These standards are:

- 24-hour (daily) standard.
- Annual standard.

EPA tightened the daily standard concentration for fine particulate matter in 2006 from 65 micrograms per cubic meter ($\mu g/m^3$) to 35 $\mu g/m^3$ after reviewing scientific evidence that short-term exposure to certain levels of fine particle pollution can cause premature death and harmful respiratory and cardiovascular effects. [17]

Table 2: $PM_{2.5}$ National Ambient Air Quality Standards

Averaging Time	Level	Method
24-hour (daily)	35 $\mu g/m^3$	Annual 98th percentile, averaged over 3 years
Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years

EPA uses the yearly 98th percentile from three years in a row to calculate an average. This average is called the design value. EPA compares the design value to the daily standard for fine particles, which is 35 $\mu g/m^3$. If the design value is above 35 $\mu g/m^3$, the area does not meet the standard. The Tacoma-Pierce County area was designated nonattainment because the 2006-2008 daily design value of 44 $\mu g/m^3$ exceeded the 35 $\mu g/m^3$ standard.

Area Description

The Nonattainment Area covers most of the greater Tacoma area and the surrounding communities within Pierce County's Urban Growth Area west of State Route 167 (see figure 1 below).

The topography surrounding the Nonattainment Area influences its meteorology. Important topographical features include:

- Puget Sound to the north and west,
- Cascade Mountains to the east and southeast, and
- Puyallup River Valley running through the area.

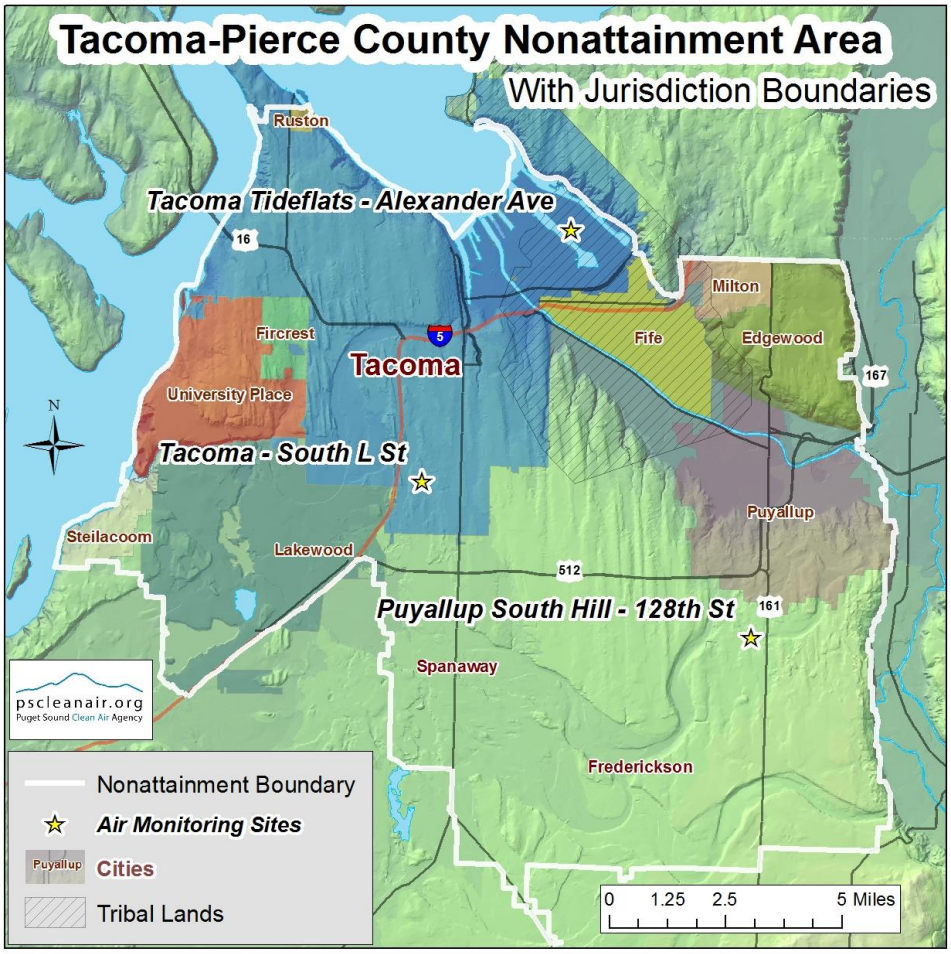

Figure 1: Map of Tacoma-Pierce County $PM_{2.5}$ Nonattainment Area and Monitoring Sites

Meteorology

In the Tacoma area, summers are relatively cool and comparatively dry while winters are mild, wet, and cloudy. In November and December, the wettest months, precipitation is frequently recorded on over 20 days each month. Usual wind flow is from west-southwest. However, high levels of fine particle pollution are associated with very light east-southeast surface winds, as well as calm conditions.

Elevated fine particle levels typically occur during the winter months between October and March when temperatures are low (less than 50 degree Fahrenheit) and winds are light (less than 1.5 miles per hour) (see figure 2 below). During the winter more households are burning wood for heat. Stagnant weather conditions trap the smoke from these fires close to the ground and cause air pollution to build up rapidly.

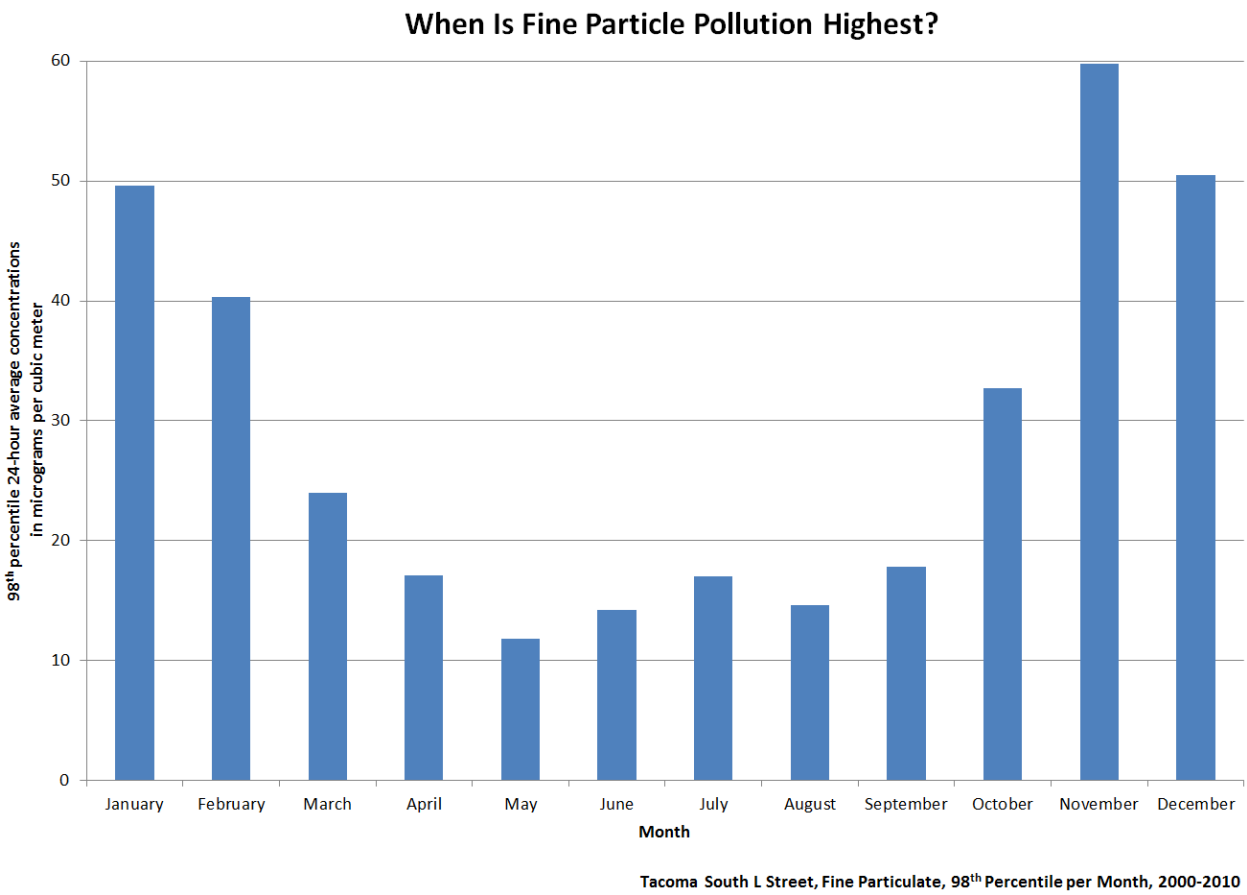

Figure 2: 98th Percentile 24-hour Fine Particle Pollution Levels by Month, Tacoma–South L Street Monitor from 2000–2010

On days with high levels of fine particle pollution, levels rise rapidly beginning about 3 to 4 pm and peak between 12 midnight and 1 a.m. A smaller increase is often observed between 6 a.m. and 8 a.m. Outside of the home heating season (non-winter months of April – September), there is little variation of the fine particle concentration throughout the day with the exception of July days with firework celebrations. Figure 3 shows the winter day pattern of fine particle levels.

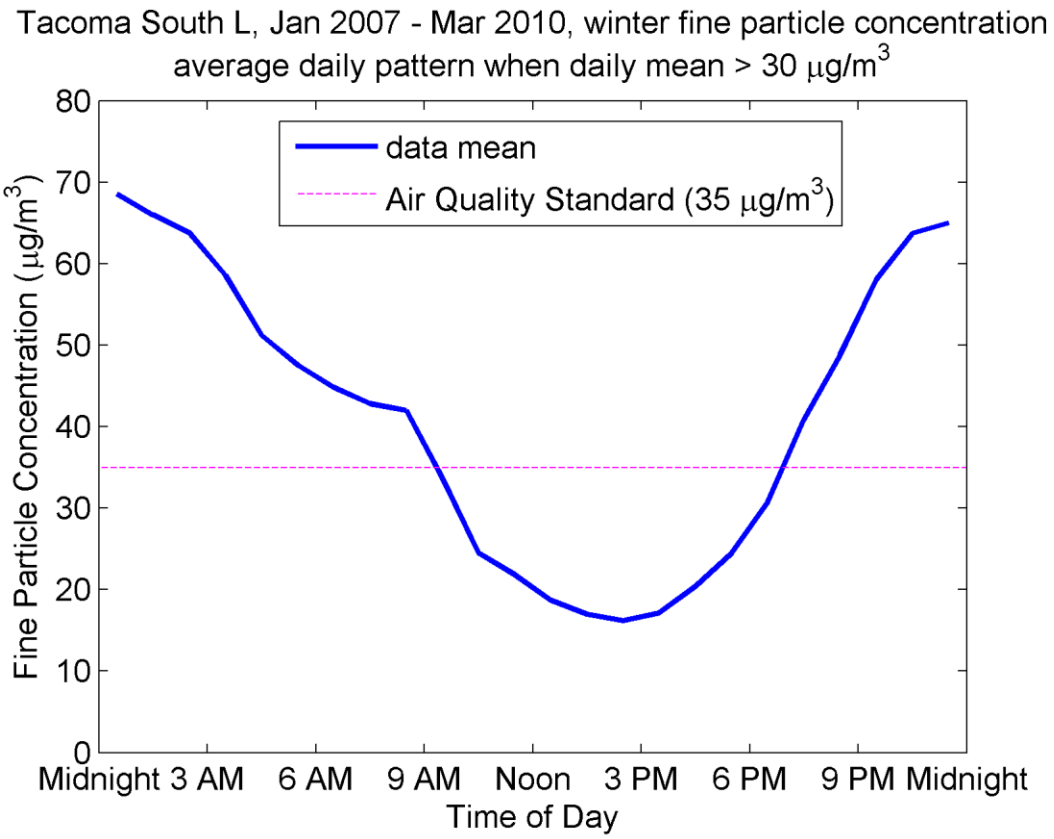

Figure 3: Average $PM_{2.5}$ concentration by hour for a winter day, Tacoma South L Street

3. Air Quality in the Nonattainment Area

Monitoring Locations

PSCAA operates three monitoring sites in the Nonattainment Area at the following locations (see figure 1 in Section 2):

- Tacoma–South L Street
- Puyallup–128th Street
- Tacoma Tideflats–Alexander Avenue

EPA uses the data from the Tacoma–South L Street monitor to determine compliance with federal health-based fine particle standards. Tacoma–South L Street is the only site of the three with a monitor that uses the Federal Reference Method (FRM). The FRM specifies the various federal requirements a compliance monitor and its site must meet before EPA can compare its data to the fine particle standard. The other two sites provide additional information that help PSCAA characterize fine particle levels throughout the Nonattainment Area.

PSCAA uses information from all three sites to evaluate pollution levels and determine whether actions, such as calling a burn ban, are necessary. PSCAA also used temporary and mobile monitors to help characterize the fine particle problem and determine the boundaries of the Nonattainment Area.

Progress in Improving Air Quality

In 2011, the area attained the federal standard based on monitoring data for 2009-2011. EPA issued a "clean data determination" (CDD) in 2012.[18] The CDD did not officially redesignate the area to attainment but it does relieve the state of certain planning requirements as long as the area continues to meet the standard.[19] Fine particle concentrations at the Tacoma South L Street monitor have remained below the 24-hour national ambient air quality standard since 2011, as shown below in figure 4.

Due to unusually favorable weather conditions, the annual 98th percentile 24-hour fine particle pollution level in the Nonattainment Area dropped significantly in 2010. Although average daily fine particle levels have increased since 2010, fine particle concentrations have remained below the standard. Figure 5 below indicates that the weather conditions in 2013 were not favorable for air quality and were the most conducive to high wood smoke concentrations since 2006. Despite the unfavorable weather conditions in 2013, the annual 98th percentile for $PM_{2.5}$ remained below the federal standard. This indicates that pollution levels are trending downward when corrected for meteorology.

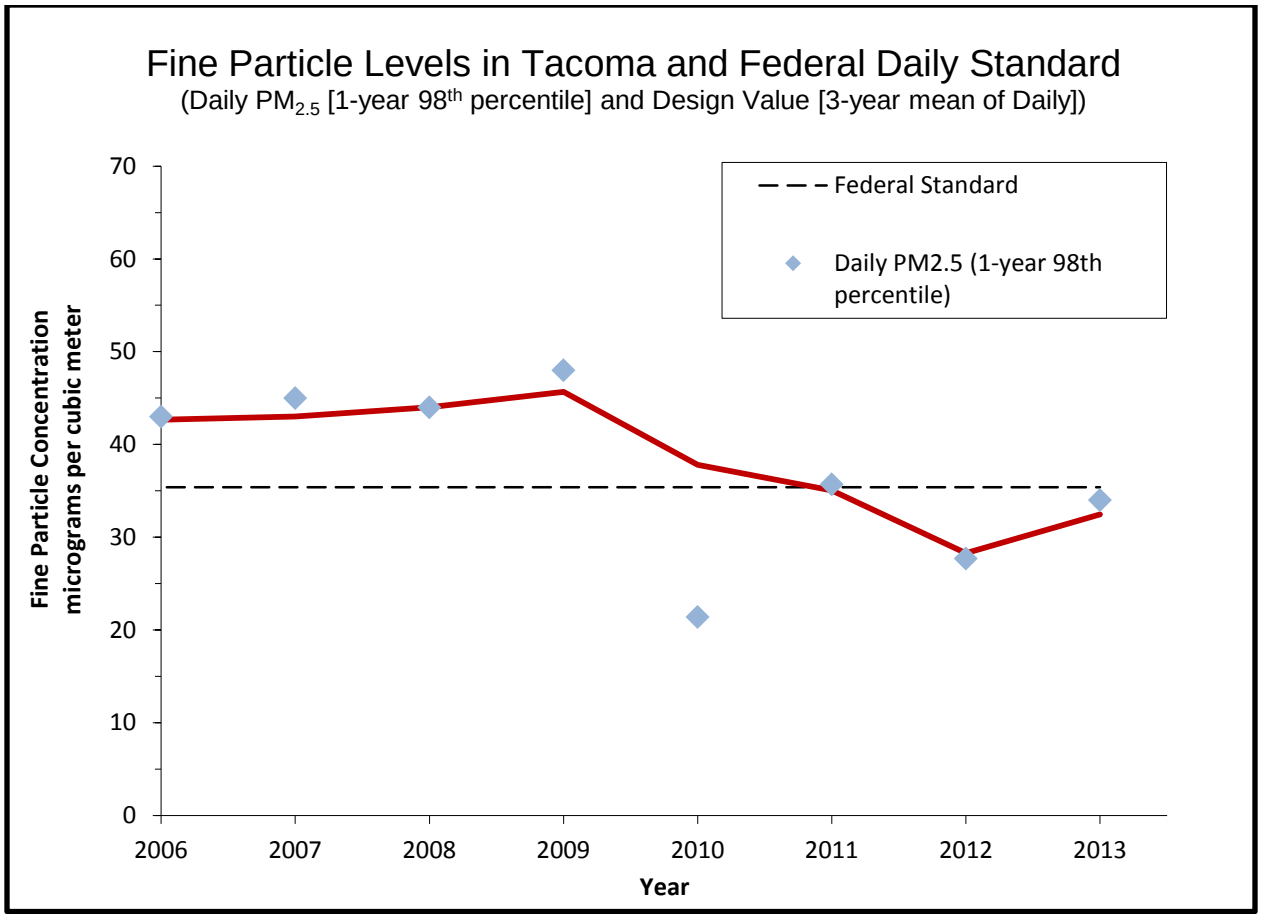

Figure 4: Fine Particle Levels at Tacoma South L Street and the Federal 24-Hour Standard

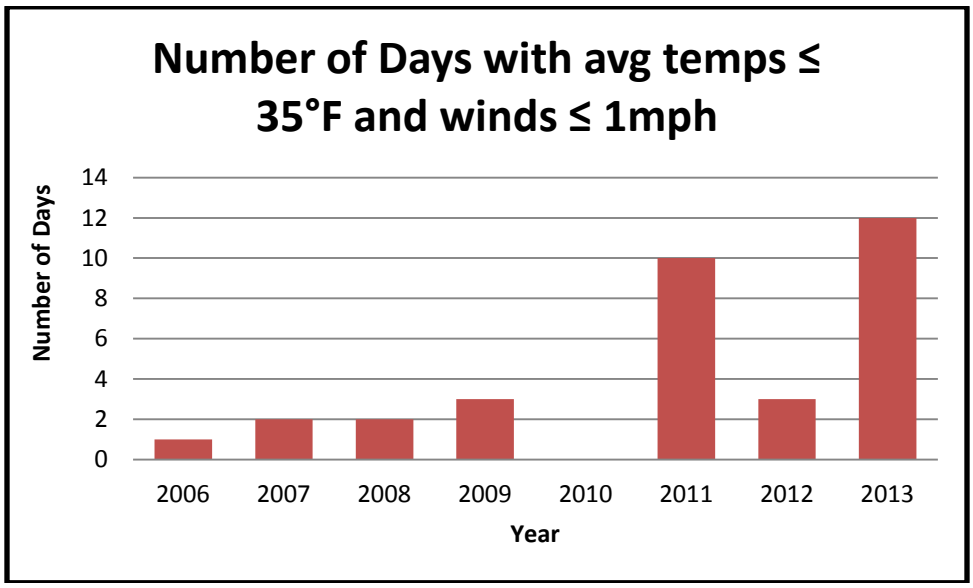

Figure 5: Number of days per year at the Tacoma South L Street monitor with average temperatures at or below 35 degrees F and average winds below 1 mile per hour.

Table 3 below shows the annual 98th percentile and three year design values. The design value is rounded to a whole number and must be below 35 µg/m^3 to comply with the federal standard.

Table 3: Tacoma-South L Street 98th Percentiles and 24-hour Design Values for 2007–2013.

Year	98th Percentile	Design Value					
		2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013
2006	42.7	44					
2007	45.3		46				
2008	44.2			38			
2009	47.6				35		
2010	21.4					28	
2011	35.7						32
2012	27.7						
2013	33.9						

Figure 6 below is the result of comparing a statistical model that predicts air pollution based on meteorology versus actual observed fine particle concentrations. The statistical model is based on 2007-2009 fine particle concentrations and meteorological conditions (winds and temperature). In effect, this comparison corrects for meteorology and shows emission trends versus the 2007-2009 baseline period. The figure shows that the model over predicts over time, indicating that emissions are dropping with meteorology held constant. Extrapolating from the figure, fine particle levels on the highest winter days have come down over 10 μg/m^3 since 2009.

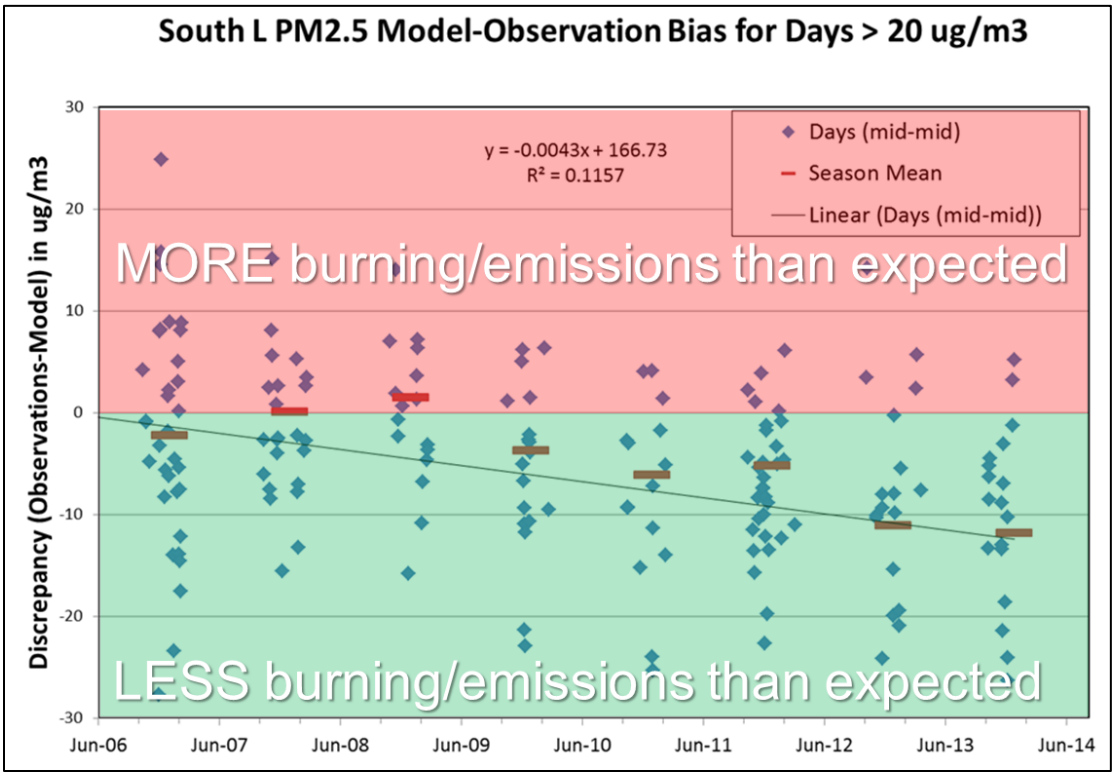

Figure 6: $PM_{2.5}$ Emissions Corrected for Meteorology.

Seasonal Air Quality Trends

Figure 7 below shows the mean 98th percentile $PM_{2.5}$ concentrations at the Tacoma South L Street monitor for the winter heating season (November through February) in red. The red circles indicate the 98th percentile $PM_{2.5}$ level for each month from November through February, beginning Nov. 2006 through Feb. 2014. The bold red line is a statistical fit to the monthly data. It indicates a trend of decreasing mean monthly 98th percentile levels of $PM_{2.5}$ from 2006 to February 2014 in the winter months when the levels are typically higher and more likely to exceed the federal standard. The red shaded area represents the 95 percent confidence level of the distribution, which indicates the uncertainty of the estimate.

The 98th percentile $PM_{2.5}$ levels of spring, summer, and early fall months (March through October, shown in blue) are consistently below the health-based standard. Its gradual increase seems to reflect the one to three percent annual population increase in Tacoma over the same period.

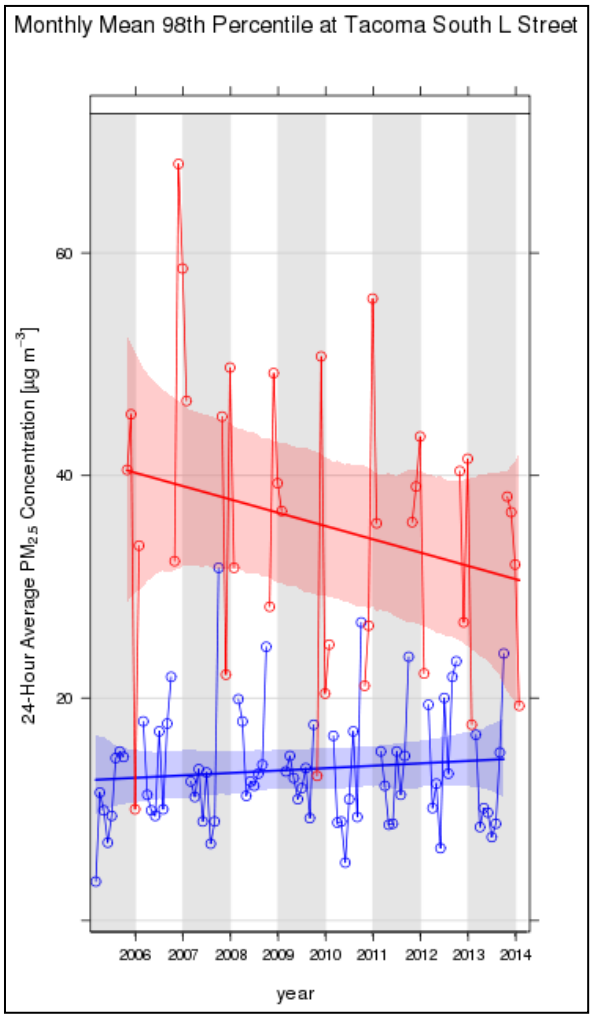

Figure 7: 2006-2014 Seasonal Monthly Mean 98th Percentile $PM_{2.5}$ Levels at the Tacoma South L Street Monitor for home heating months in red (Nov – Feb), and other months (Mar – Oct) in blue.

2013-2014 Fine Particle Levels

The highest daily concentrations at the Tacoma South L Street site in 2013 were fairly uniform, with less than a 2 $\mu g/m^3$ difference between the 4th highest (35.5) and 10th highest (33.7). Figure 8 below shows the highest daily concentrations at the Tacoma South L Street site. The figure illustrates a much smaller difference among the highest concentrations than seen in previous years, creating a "plateau" of concentrations near the daily standard.

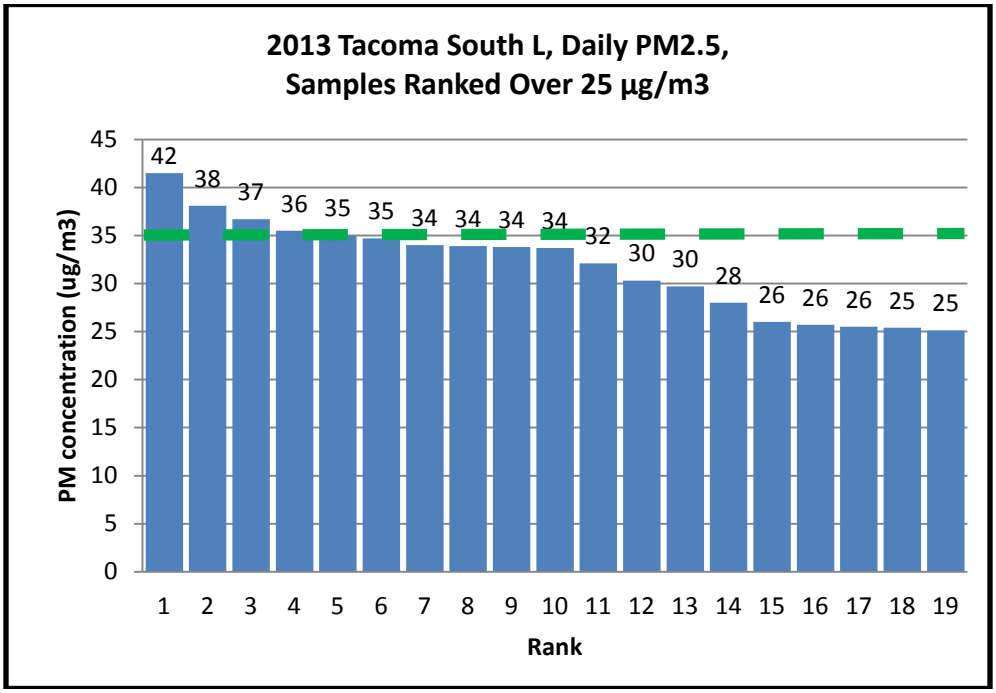

Figure 8: 2013 Fine Particle Daily Concentrations over 25 µg/m3, ordered by decreasing concentration at the Tacoma South L Street Monitor.

For the first part of 2014, $PM_{2.5}$ levels at the Tacoma south L monitor have remained below the federal standard. Figure 9 below shows the 10 highest $PM_{2.5}$ levels as recorded on the Tacoma L Street monitor through February 23, 2014.

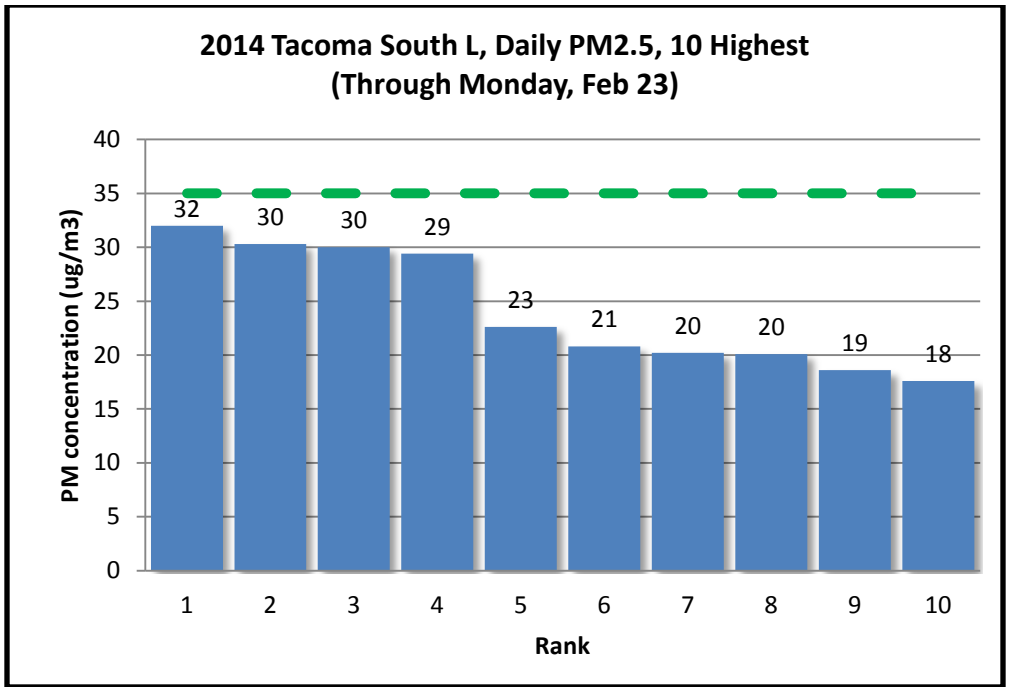

Figure 9: Top 10 Highest $PM_{2.5}$ Concentrations at Tacoma South L Street through February 23, 2014, ordered by decreasing concentration.

4. Emissions Inventories

Fine particles ($PM_{2.5}$) are emitted directly to the air and are also formed when gaseous precursors undergo chemical reactions in the atmosphere to form secondary fine particles. The main precursor gases associated with secondary fine particle formation are:

- Sulfur dioxide (SO_2),
- Nitrogen oxides (NOx),
- Volatile organic compounds (VOCs), and
- Ammonia (NH_3).

For the Nonattainment Area, federal regulations[20] require Ecology to prepare a comprehensive, accurate, current inventory of emissions from the Nonattainment Area for emissions fine particles ($PM_{2.5}$) and fine particle precursors. Ecology prepared Nonattainment Area winter day and annual inventories for:

- 2011, the attainment year;
- 2017, an interim year; and
- 2026, the final year of the maintenance plan.

We developed winter day inventories because the 24-hour standard focuses on emissions on a single day. Additionally, elevated concentrations of fine particles have typically occurred between October and March. The emissions inventories and a description of the methodology Ecology used for the calculations are included in Appendix A. A summary is included below.

Sources of Fine Particle Emissions

Figure 10 shows the percentage of fine particles from each source category in the winter day inventory for 2011, the attainment year. Seventy-six percent of emissions in the Nonattainment Area come from residential wood combustion emitted from wood stoves and fireplaces.

Figure 11 shows the winter day fine particle emissions sources and trends for 2011, 2017, and 2026. To demonstrate that the area will maintain the fine particle standard for the next ten years, total winter day fine particle emissions from all sources in 2026 must be below 2011 emissions. In 2026, fine particle emissions are projected to decline 1 percent from 2011 levels.

Ecology used a highly conservative approach to project the 2017 and 2026 emissions. The projections are higher than expected because they do not take into account expected emission reductions from permanent and enforceable wood smoke reduction controls described below and in section 6. Ecology's $PM_{2.5}$ emissions projections are also conservative because they include potential increases in dust due to increased locomotive traffic and coal dust if proposed coal terminals are built and operate at full capacity. Conservative projections were also used with point sources in the inventory. Unless there was specific information or engineering knowledge about a source that indicated projections should be calculated differently, the ten year maximum reported emission of $PM_{2.5}$ was used as the projection for 2017 and 2026. See appendix A for more details about the methodology and assumptions used in the emissions inventory.

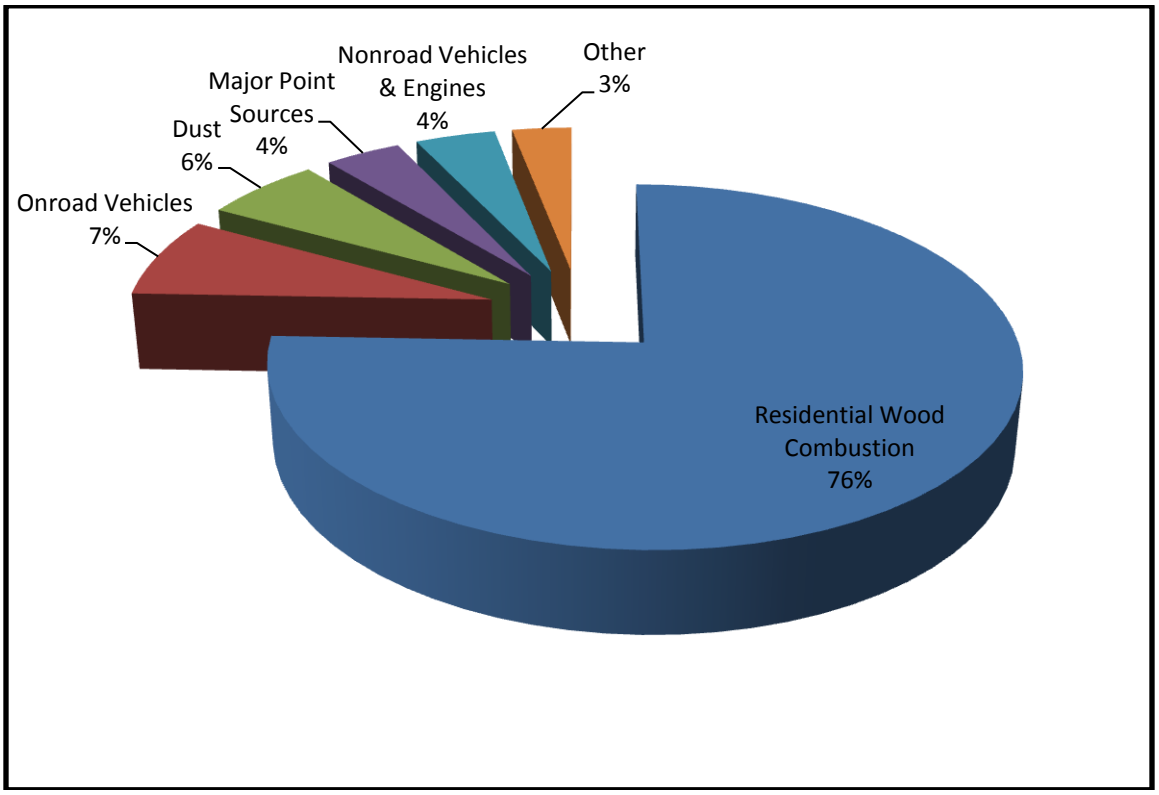

Figure 10: Tacoma-Pierce County Nonattainment Area Winter Day Fine Particle ($PM_{2.5}$) Emissions by Source Category, 2011

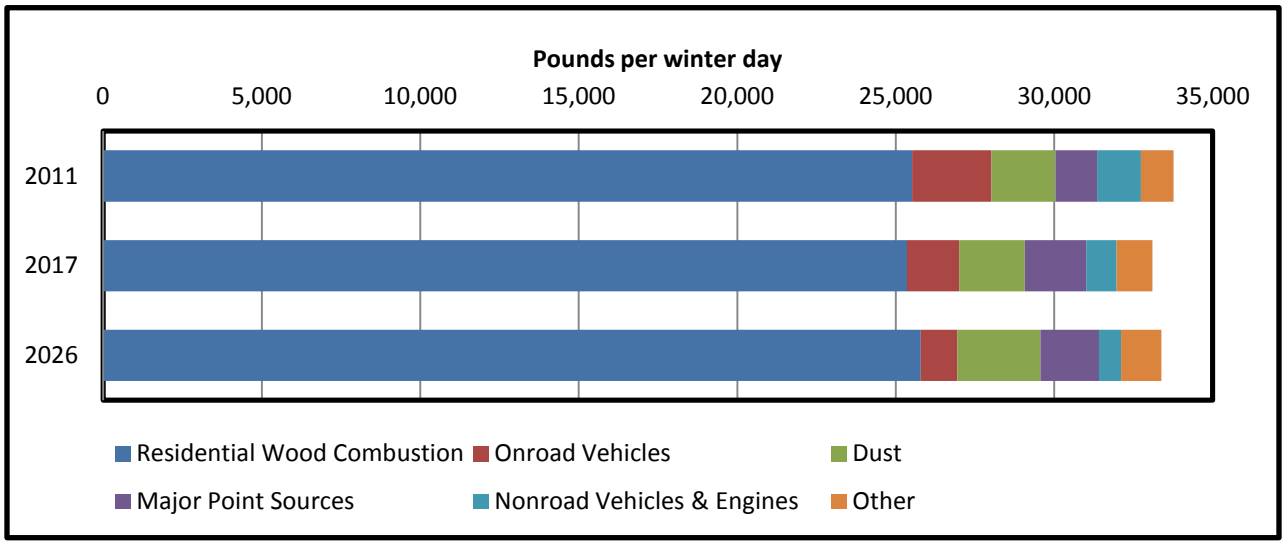

Figure 11: Tacoma-Pierce County Nonattainment Area Winter Day Fine Particle ($PM_{2.5}$) Emissions and Trends by Source Category for 2011, 2017, and 2026.

Table 4: Tacoma-Pierce County Nonattainment Area Winter Day Fine Particle Emissions in Pounds

Source Category	2011	2017	2026
Residential Wood Combustion	25,519	25,355	25,788
Onroad	2,497	1,642	1,149
Dust	2,023	2,069	2,631
Major Point Sources	1,313	1,940	1,848
Nonroad	1,384	957	697
Other	1,025	1,136	1,266
TOTAL	***33,761***	***33,099***	***33,379***

We expect emissions reductions from enhanced burn ban enforcement and removal of old, uncertified wood stoves that are not quantitatively reflected in figure 11. PSCAA enhanced its burn ban enforcement efforts in the last two heating seasons (fall and winter of 2012-2013 and 2013-2014) and called 7 burn bans spanning 27 days, based on lower burn ban triggers that were adopted into law in the 2012 Legislative session.[21] The stricter trigger level enabled PSCAA forecasting staff to call burn bans to more effectively avoid exceedances. In addition, PSCAA issued over 2,000 Notices of Violation to households that were burning during a burn ban. Through their enforcement process, PSCAA helped households mitigate penalties by providing incentives to remove uncertified stoves, having them sign up for burn ban email or text alerts, or having them pass a clean burn test. All of these actions are geared at changing behavior among violators.

Preliminary data indicate that this process is working – a survey of previous burn ban violators reveals low re-violation rates in subsequent burn bans. With outreach to each individual violator and a better notified and educated public overall, PSCAA expects the enhanced burn ban enforcement to continue to reduce emissions at the very times when it is most important. Awareness of burn ban enforcement is growing beyond the pace of Notices of Violation – for example, since PSCAA initiated burn ban text alert program in 2012, over 3,700 subscribers have signed up (almost twice as many as households that have received violations during burn bans).

We also expect fine particle emissions reductions from replacing older uncertified woodstoves with cleaner, more efficient wood or pellet stoves. The emissions projections in figure 11 incorporate fine particle reductions from historical turnover rates of older stoves and from replacement of uncertified stoves with non-wood burning devices through PSCAA's currently funded woodstove changeout program. The projections do not incorporate fine particle reductions from a possible increase in the stove turnover rate due to PSCAA's changeout program and the ban of uncertified stoves in the Nonattainment Area after September 2015. PSCAA anticipates that the ban will increase participation in the wood stove removal program as households seek to comply with the rule. The projections also do not incorporate future more stringent federal emissions standards in the proposed New Source Performance Standards for Residential Wood Heaters.[22]

5. Transportation Conformity Requirements

Transportation conformity addresses air pollution from onroad mobile sources, such as cars, trucks, and transit. Federal and state transportation conformity regulations[23] require the evaluation of onroad emissions from transportation plans, programs, and projects before their implementation. This is to ensure that federal funding and approval are given to onroad transportation activities that are consistent with air quality goals. Conforming to a SIP means that onroad transportation activities will not cause or contribute to a violation of federal air quality standards, worsen air quality, or prevent or delay the improvement of air quality.

Motor Vehicle Emissions Budgets

Ecology worked with Puget Sound Regional Council to develop motor vehicle emissions budgets (MVEBs) for the proposed Maintenance Area. Puget Sound Regional Council is the organization responsible for long-range transportation planning in the central Puget Sound region. MVEBs establish a limit on the total emissions allowed from onroad mobile sources, such as cars, trucks, and buses. The MVEBs are required for nonattainment and maintenance areas to make sure that future emissions from onroad mobile sources do not interfere with the continued attainment of the fine particle standard.

Once EPA approves the MVEBs, PSRC and the U.S. Department of Transportation will use the budgets to make transportation conformity determinations. In order to demonstrate transportation conformity, projected emissions from federally funded transportation plans and programs must be less than or equal to the budgets.

The MVEBs reflect the total on-road emissions projected for 2017 and 2026, plus a portion of the available $PM_{2.5}$ and NO_x safety margins. The onroad mobile emissions inventory was developed using EPA's MOVES2010b model and PSRC's current travel demand model.[24] A conservative margin of safety was added to the MVEB to accommodate uncertainty. A safety margin is the amount by which the total projected emissions from all sources of a given pollutant are less than the total emissions for the 2011 attainment year, the level required to demonstrate continued maintenance of the standard. [25]

A portion of the inventory safety margin was allotted to the onroad motor vehicle emissions inventory projections to accommodate the wide array of assumptions that are factored into the calculation process. Since assumptions and models change over time, it is necessary to have a margin of safety that will accommodate technical uncertainties due to future model updates and inputs to EPA's MOVES model and PSRC's travel demand model, as well as potential changes in regional transportation policies or funding priorities. Appendix C includes additional information on MVEB methodology and safety margin.

Table 5 below contains the MVEBs for the proposed Maintenance Area for the years 2017 and 2026 for $PM_{2.5}$ and NO_x. The values represent the maximum pounds per winter day of emissions that will be allowed from onroad mobile sources. Federal transportation conformity regulations require MVEBs for $PM_{2.5}$ and NO_x.[26]

Table 5: Onroad Motor Vehicle Emissions Budgets (Pounds per winter day)

Year	$PM_{2.5}$	NO_x
2017	**1,888**	**41,790**
2026	**1,321**	**22,880**

PSRC held a consultation on the MVEBs and the underlying methodology with the interagency air quality consultation partners in the Central Puget Sound region. The consultation partners include representatives from the following agencies:

- Puget Sound Clean Air Agency
- Puget Sound Regional Council
- Federal Highway Administration
- Federal Transit Administration
- U.S. Environmental Protection Agency
- Washington State Department of Ecology
- Washington State Department of Transportation.

The consultation partners reviewed and concurred on the MVEB and the methodology.

6. Strategies to Reduce Fine Particle Pollution

The Puget Sound Clean Air Agency worked closely with the local community to develop strategies to reduce fine particle pollution to healthier levels. In 2011, PSCAA established the Tacoma-Pierce County Clean Air Task Force (Task Force) made up of representatives from healthcare, community groups, industry associations, state and local agencies, wood-burners and non-burners alike.[27] The Task Force agreed that the focus for reductions should be residential wood combustion, and also concluded that the Nonattainment Area should implement a range of strategies for non-wood smoke sources.[28]

Following the Task Force recommendations, PSCAA and Ecology focused on residential wood smoke reduction strategies to bring the area into attainment for fine particulate matter. The control strategies rely on regulatory and enforcement provisions contained in PSCAA, Ecology, and federal rules, and education and outreach to communicate those provisions. In addition, reductions from vehicles, trucks, buses, and ships will also help control emissions.

Residential Wood Smoke

Based on the recommendations of the Task Force, PSCAA partnered with community groups to implement three main strategies, starting with the 2012-2013 home heating season:

- Increased enforcement during air quality burn bans;
- Removal of old, uncertified stoves; and
- Public education and outreach.

We expect substantial emissions reductions with these strategies. However, the emissions inventory projections do not include these reductions to allow for a wider margin of safety.[29] A description of these strategies is included below, along with a summary of state and local rules relied on to achieve fine particle reductions from residential wood smoke.

Enhanced enforcement of air quality burn bans

PSCAA enforces burn bans to prevent unhealthy levels of pollution (PSCAA Regulation 1-13.05). Burn bans are issued when scientific forecasts and real-time monitoring data indicate that pollution will rise to unhealthy levels. There are two stages of burn bans. During Stage 1 burn bans, use of fireplaces and uncertified wood stoves and inserts, as well as outdoor burning are prohibited, and use of pellet stoves and certified wood stoves and inserts are allowed. All wood burning is prohibited during a stage 2 burn ban.

Starting with the 2012-2013 home heating season and continued in 2013-2014, PSCAA implemented new burn ban triggers that allow them to call burn bans at lower levels. During this time period PSCAA called 7 burn bans spanning 27 days based on the lower burn ban triggers. PSCAA also established agreements with local agencies and trained over 60 staff to assist with enforcement. Patrol hours increased substantially and burn ban enforcement was extended to dusk and at night when more people are burning wood for heat. PSCAA issued over 2,000 Notices of Violation over the two winters. First time violators of burn bans could avoid paying a penalty but repeat violations could result in a fine of up to $1,000.

The process for recipients of Notices of Violation is designed to prevent future wood burning during stagnant (burn ban) conditions. The process includes potential to mitigate fines by taking a clean burn test, removing uncertified stoves, or signing up for notification through email alerts, text alerts, or social media. Over the last two winters, PSCAA received over 600 clean burn tests.

Removal and replacement of uncertified wood stoves

To improve air quality and protect public health, residents in the Nonattainment Area were offered incentives to recycle or replace an old wood stove with cleaner heat. Residents could receive up to $350 for the removal and recycling of eligible wood-burning devices, and a discount of up to $1,500 for replacing their wood-burning device with certain clean heating replacement equipment. Qualified low-income residents could apply to receive a free heating replacement.

Over the last two years, close to $2 million in incentives was provided for residents and about1,000 uncertified wood stoves were removed and recycled. Over three quarters of the funding has gone to provide low income households a new and cleaner source of heat at no cost. In total, over 2,100 uncertified wood stoves have been removed and recycled since PSCAA's first removal and replacement program started in 2007.

Recognizing the limitations of voluntary and incentive programs, the Task Force recommended a date certain removal requirement for old, uncertified wood stoves. PSCAA revised its wood stove regulation to require removal of uncertified wood stoves in the Nonattainment Area by September 30, 2015. PSCAA's current removal program runs through June 2015, and is designed to achieve as many removals as possible before the September 30, 2015 uncertified wood stove ban. PSCAA plans to enforce the ban under PSCAA Regulation 1-13.07.

Public education and outreach

PSCAA launched an outreach campaign, "Air. On the safe side." in November 2012 to raise awareness about burn bans, encourage participation in the wood stove changeout program, and engage people and provide them tools to make informed decisions about clean burning practices.

Key features of the campaign in the 2012-2013 and 2013-2014 heating seasons include:

- Text message alerts - Residents can sign up for free text alerts to notify them when a burn ban starts and ends. 3,700 subscribers have signed up so far. Residents can also be notified through an active e-mail distribution list.
- Creation of a new www.airsafepiercecounty.org website and outreach materials and visuals based on focus group testing.
- Media coverage – TV, print, and online coverage.
- Online and print advertisements – Tacoma News Tribune and Puyallup Herald.
- Extensive grassroots community outreach – 60 presentations delivered to local community groups, newsletter articles distributed through citizen and community groups and major employers, posters and flyers distributed.
- Direct mail - 80,000 postcards were sent to low-income households in the areas where wood burning is more frequent. An earlier mailing sent postcards to all 220,000 households in the area.

- Posted information on the PSCAA monthly electronic newsletter (16,000 subscribers), Facebook, and Twitter.

The outreach and education activities were completed in close coordination with and with input from local Pierce County agency partners.

State and Local Regulatory Framework for Wood Smoke

Washington's Clean Air Act and Ecology and PSCAA rules establish the regulatory framework for limiting unhealthy levels of wood smoke. The framework comprises:

- Emissions standards for new wood burning devices that are more stringent than the federal standards set by EPA;
- Opacity standards for smoke plumes;
- Prohibition to burn certain materials;
- Curtailment program (burn bans); and
- Special nonattainment area provisions.

Legislation passed by the Washington State Legislature in 2012 (Substitute House Bill 2326 Chapter 219, Laws of 2012)[30] authorized Ecology and PSCAA to take the following actions in the Nonattainment Area:

- Call stage 1 and 2 burn bans at lower thresholds;
- Work with the city, county, or local health department on enforcement assistance;
- Prohibit the use of uncertified wood stoves at a future date;
- Explore options to reduce pollution from fireplaces as a contingency measure if needed to meet federal requirements; and
- Provide assistance to households using a woodstove or fireplace to reduce emissions or change to cleaner device.

PSCAA and Ecology strengthened local and state rules to reflect the 2012 statutory changes and provide the regulatory framework to address fine particle pollution. These rules were submitted to EPA to include in the Washington State Implementation Plan to protect air quality.

- **PSCAA Regulation 1-13, *Solid Fuel Burning Device Standards*** – Revisions were adopted Oct. 25, 2012 and approved by EPA for inclusion in the Washington SIP effective June 28, 2013.[31]
- **Ch. 173-433 WAC, *Solid Fuel Burning Devices*** – Revisions were adopted January 23, 2014 and approved by EPA for inclusion in the Washington SIP effective June 9, 2014.[32]

This SIP revision relies on rules in table 7 below that are currently approved in the Washington SIP to attain the standard. We do not propose to include any new rules as part of this SIP revision.

Table 6: Residential Wood Smoke Control Measures in PSCAA Rules

Citation	Title	Effective Date
PSCAA Regulation I - Article 13: Solid Fuel Burning Device Standards		
13.01	Policy and Purpose	12/01/12
13.02	Definitions	12/01/12
13.03	Opacity Standards	12/01/12
13.04	Allowed and Prohibited Fuel Types	12/01/12
13.05	Restrictions on Operation of Solid Fuel Burning Devices	12/01/12
13.06	Emission Performance Standards	12/01/12
13.07	Prohibitions on Wood Stoves that are not Certified Wood Stoves	12/01/12

Table 7: Residential Wood Smoke Control Measures in Ecology's rules

Citation	Title	Effective Date
Washington Administrative Code, Chapter 173-433 Solid Fuel Burning Device Standards		
173-433-010	Purpose	02/23/14
173-433-020	Applicability	02/23/14
173-433-030	Definitions	02/23/14
173-433-100	Emission Performance Standards	02/23/14
173-433-110	Opacity Standards	02/23/14
173-433-120	Prohibited Fuel Types	02/23/14
173-433-140	Criteria for Impaired Air Quality Burn Bans	02/23/14
173-433-150	Restrictions on the Operation of Solid Fuel Burning Devices	02/23/14
173-433-155	Criteria for Prohibiting the Use of Solid Fuel Burning Devices that Are Not Certified	02/23/14

Motor Vehicles

We expect to see substantial reductions in $PM_{2.5}$ and $PM_{2.5}$ precursor emissions from cars, trucks, buses, equipment, and ships due to new engine and fuel standards.

Clean Cars and Passenger Trucks

In February 2000, EPA issued Tier II emissions standards for new gasoline and diesel light trucks and cars and fuel standards to reduce the sulfur content of gasoline.[33] The nationwide rules were phased in between 2004 and 2009 and resulted in significant reductions in NO_x, $PM_{2.5}$, and sulfur. The Washington State Legislature adopted the California Low Emission Vehicle (LEV II) standards in 2005 which set more stringent emissions standards for new light duty vehicles and trucks starting with the 2009 model year.

Following California, in 2012 Washington adopted increasingly more stringent Low Emission Vehicle (LEV III) standards to be phased in over the 2015-2025 model years. EPA later finalized tighter Tier III vehicle and fuel standards in March 2014 to reduce emissions from passenger cars and trucks. The nationwide tailpipe standards are similar in stringency to LEV III and will be phased in gradually between model years 2017 and 2025 and the timetable will vary

by vehicle class. The Tier III fuel standards will further reduce the sulfur content of gasoline beginning in 2017.

Clean Diesel Trucks, Buses, and Fuel

Standards to reduce NO_x and VOC emissions from heavy-duty diesel and gasoline highway vehicles took effect in 2004 and 2005. A second phase of standards began in 2007 and established stringent NO_x and $PM_{2.5}$ emissions standards and low sulfur diesel fuel standards were implemented for new buses and trucks.

Clean Non-road Diesel Rule

In 2004 EPA adopted a new rule to establish tighter emission limits for large non-road diesel engines, such as those used in construction, agricultural, and industrial equipment. New engine standards were phased in between 2008 and 2014. The rule also phased in reductions in the sulfur content of non-road diesel fuel.

Emission standards for Ocean-Going Vessels

In April 2010, EPA adopted standards that apply to Category 3 engines installed on U.S. vessels and to marine diesel fuels produced and distributed in the U.S. The emission standards are being phased in starting in 2011. The ultra-low sulfur diesel standard is being phased in by 2015.

The Emission Control Area (ECA) requirements took effect in 2012 to reduce sulfur levels to 1 percent in diesel fuel used in ocean going vessels within 200 nautical miles of coastal areas of North America. ECA will further require sulfur levels be reduced to 0.1 percent in 2015, resulting in a 74 percent reduction in $PM_{2.5}$ from ocean going vessels.

Voluntary Diesel Emission Reductions

Federal, state, and local funding and programs are providing assistance to help fleet managers reduce idling, use cleaner fuels, install exhaust retrofits and equipment to clean up diesel exhaust, and replace older engines with newer, cleaner ones. Projects have been implemented in the Tacoma-Pierce County area to:

- Retrofit school buses with cleaner technology, replace aging school buses with new clean running buses, and reduce engine idle time;
- Retrofit and reduce engine idle time for public and private fleet vehicles, including fire department vehicles, city and county vehicles, transit authority vehicles, waste haulers, and construction companies;
- Upgrade passenger and switch locomotive engines to bring them up to the cleanest emission standards;
- Reduce passenger and switch locomotive idling;
- Support implementation of the Northwest Ports Clean Air Strategy;
- Retrofit and replace cargo handling equipment and reduce idling at the Port of Tacoma;
- Replace reefer generators with grid electric infrastructure at the Port of Tacoma;
- Install optical character recognition and license plate readers at the Port of Tacoma to improve terminal efficiency and reduce gate wait times;
- Replace engines on harbor vessels with new cleaner burning engines;
- Retrofit or replace old, heavy-duty diesel trucks working in the Port of Tacoma; and
- Totem Ocean Trailer Express (TOTE) vessels to use shore power at berth, convert diesel vessels to LNG, and use cleaner burning fuels.

7. Environmental Justice

EPA defines environmental justice as *the fair treatment and meaningful involvement of all people…with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.*

Ecology organized an interagency work group focused on environmental justice which developed the following goals:

- Reduce health risks from fine particle pollution in priority communities. Priority communities are those the interagency work group identified as potentially having disproportionate effects from fine particle pollution or the strategies to reduce fine particle pollution.
- Consider social and environmental effects on priority communities when determining how to reduce fine particle pollution.
- Build meaningful public participation in the SIP development and decision making processes. Design a communication strategy that informs and engages priority communities.
- Direct resources and incentives to priority communities.
- Track our progress and lessons learned in the Nonattainment Area for future planning work throughout Washington.

PSCAA, the Tacoma-Pierce County Clean Air Task Force, and Ecology worked together to incorporate environmental justice concerns in the development and implementation of fine particle reduction strategies. Examples of actions taken to addfress environmental justice considerations include:

- Low-income residents and residents with no alternative source of heat were encouraged to participate in the woodstove changeout program to receive up to $350 for the removal and recycling of eligible wood-burning devices, and a discount of up to $1,500 for a free heating replacement. Close to $2 million in incentives was provided, with approximately ¾ of that going to low-income households.
- Residents with no other adequate source of heat could apply for an exemption to allow them to continue to use their wood stoves during burn bans.
- Translation and interpretation services were offered for limited English proficient communities.

Appendix D includes a questionnaire developed to help Ecology and PSCAA track the actions taken in the Nonattainment Area to integrate environmental justice. Ecology worked collaboratively with PSCAA to complete the questionnaire.

8. Redesignating the Area to Attainment

Redesignation Requirements

The federal Clean Air Act Section 107 (d) (3) outlines the requirements the state must meet to redesignate the Nonattainment Area to attainment.[34] A description of how the state has fulfilled these requirements is in Table 9 below.

Table 8: Redesignation Requirements Addressed in this Plan

Requirement for Redesignation	How Requirement is Met
1. The area has attained the 2006 24-hour $PM_{2.5}$ NAAQS.	In 2012 EPA made a clean data determination that the Tacoma-Pierce County Nonattainment Area met the 2006 24-hour $PM_{2.5}$ NAAQS based on complete, quality assured and certified ambient air monitoring data from 2009-2011.[35] The area has continued to attain the NAAQS since then. See section 3.
2. The improvement in air quality is due to permanent and enforceable reductions in emissions.	Sections 3 and 6 of this plan describe improvements in air quality resulting from implementation of permanent and enforceable control measures.
3. The area has a fully approved implementation plan under CAA section 110(k).	When EPA approves this plan, the area will have a fully approved implementation plan under CAA section 110(k).
4. The area has a fully approved maintenance plan which ensures attainment of the NAAQS for at least 10 years beyond redesignation.	When EPA approves this plan, the area will have a fully approved maintenance plan demonstrating continued attainment of the 2006 24-hour $PM_{2.5}$ NAAQS for 10 years. The maintenance plan requirements are addressed in the following sections: • Attainment inventory – section 4. • Maintenance demonstration showing maintenance for 10 years – section 4. • A commitment to maintain the existing monitoring network – section 9. • A commitment to verify continued attainment – section 9. • A contingency plan to prevent or correct future violations of the NAAQS – section 9.
5. The area has met the requirements of CAA section 110 and part D.	CAA Section 110: • Washington submitted an infrastructure SIP for the 2006 24-hour $PM_{2.5}$ NAAQS to the U.S. EPA in September 2014, demonstrating compliance with the CAA Section 110

	requirements. CAA Part D Subpart 1 Requirements: • The clean data determination issued by EPA[36] suspends the requirements for the state to meet certain planning requirements contained in CAA Subpart D for so long as the area continues to meet the 24-hour $PM_{2.5}$ NAAQS, including: o An attainment demonstration, o Reasonably available control measures, o Reasonable further progress plan, o Contingency Measures, and o Other SIP planning requirements related to attainment of the standard.[37] • An emissions inventory is included in section 4 of this document to address CAA Section 172(c)(3) requirements. • CAA Sections 172(c)(4) and (5) and Sec. 173 stipulate nonattainment New Source Review permitting requirements for nonattainment areas. EPA policy states that a fully-approved part D NSR program is not required for an area to be redesignated, provided that that the area can maintain the standard with a prevention of significant deterioration (PSD) program after redesignation.[38] The Nonattainment Area currently attains the standard with the existing PSD program. Therefore nonattainment NSR permitting rules are not required. • CAA Section 176(c) transportation conformity requirements are discussed in section 5. Washington will follow applicable state and federal conformity procedures. CAA Part D Subpart 4 Requirements: • EPA issued a rule that classifies the Tacoma-Pierce County PM2.5 Nonattainment Area as a moderate nonattainment area.[39] The rule does not impose any additional requirements for so long as the Nonattainment Area continues to attain the 2006 24-hour $PM_{2.5}$ NAAQS.

9. Maintaining Healthy Air Quality

Commitment to Continue Monitoring and Verify Continued Attainment

Ecology and PSCAA currently operate three $PM_{2.5}$ monitors in the Tacoma-Pierce County area. To demonstrate compliance with the fine particle NAAQS, Ecology and PSCAA commit to continue to operate the monitoring network. The air monitoring results will detect any changes in the ambient air quality and assist Ecology and PSCAA in verifying continued attainment and tracking the progress of the maintenance plan. Ecology and PSCAA will review the air monitoring results and design value each year to determine if any contingency measures need to be implemented.

Ecology will work with EPA each year through the air monitoring network review process, as required by 40 CFR Part 58, to determine:

- The adequacy of the $PM_{2.5}$ monitoring network;
- If additional monitoring is needed; and
- If/when sites can be discontinued or relocated.

Ecology will follow federal monitoring regulations and will consult with EPA before making any changes to the network. Ecology will include a description of any changes in its annual monitoring report, and will continue to quality assure the monitoring data to comply with the requirements of 40 CFR part 58.

Contingency Plan

Ecology and PSCAA developed a contingency plan that identifies actions Ecology and PSCAA will take to promptly prevent or correct a violation of the 2006 24-hour $PM_{2.5}$ NAAQS that occurs in the Tacoma-Pierce County $PM_{2.5}$ maintenance area after redesignation. The contingency plan identifies:

- The procedures that Ecology and PSCAA will follow to adopt and implement contingency measures;
- Specific indicators, or triggers, to determine when contingency measures will be adopted; and
- The measures to be considered.[40]

While these measures do not need to be fully adopted by Ecology or PSCAA prior to the occurrence of a NAAQS exceedance or violation, the contingency plan includes a schedule for adoption and implementation, and a specific time limit for action to ensure that the contingency measures are adopted expeditiously once they are triggered.

Ecology and PSCAA will use the following triggers and perform the following actions within the timeline described below as a contingency plan:

Warning level

If the 98^{th} percentile of the 24-hour average daily concentration of $PM_{2.5}$ reaches 35.5 $\mu g/m^3$ or greater in a single calendar year within the Tacoma-Pierce County $PM_{2.5}$ maintenance area, PSCAA will evaluate all appropriate data to determine the cause of the elevated levels, and

whether the elevated $PM_{2.5}$ levels are likely to continue. This will include air quality data, meteorological data, evaluation of wood smoke programs, information on unusual weather events (wildfires or winter power outages), and other data to try to determine the cause of the exceedance. This evaluation will be performed within 6 months of the end of the year in which the annual 98^{th} percentile average daily concentration of $PM_{2.5}$ reaches 35.5 $\mu g/m^3$ or greater.

Based on the evaluation, PSCAA will strengthen implementation of existing control measures in the following heating season and calendar year as appropriate to reduce emissions and $PM_{2.5}$ levels. If it is determined that additional emissions reductions are necessary, PSCAA will adopt and implement appropriate contingency measures as expeditiously as possible, no later than 18 months from the determination of a single year exceedance based on quality assured data. If a new measure or control is already promulgated and scheduled to be implemented at the federal or state level, and that measure or control is determined to be sufficient to prevent a violation of the 2006 daily $PM_{2.5}$ NAAQS, additional local measures may be unnecessary.

Action Level

If a two-year or three-year average of the 98^{th} percentile of the 24-hour average daily $PM_{2.5}$ concentration reaches 35.5 $\mu g/m^3$ or greater, PSCAA will evaluate all appropriate data to determine the cause of the elevated levels. A three-year average of the 98^{th} percentile of the 24-hour average daily concentration that reaches 35.5 $\mu g/m^3$ or greater constitutes a violation of the 2006 daily $PM_{2.5}$ NAAQS. The evaluation will include air quality data, meteorological data, evaluation of wood smoke and other $PM_{2.5}$ programs, information on unusual weather events (wildfires or winter power outages), and other data to try to determine the cause of the exceedance. This evaluation will occur within 6 months of the determination of a violation or two-year exceedance. Where appropriate, Ecology and PSCAA will follow the EPA exceptional events rules if it is determined that an exceptional event contributed to the violation or two-year exceedance, or pursue enforcement actions if the violation of a rule or permit contributed to the violation or two-year exceedance.

Based on the findings of the evaluation, PSCAA will identify the appropriate contingency measures necessary to correct the violation or two-year exceedance and assure future attainment of the 2006 daily $PM_{2.5}$ NAAQS. The contingency measures may include strengthening enforcement and implementation of existing controls and/or additional controls. Additional controls could primarily address emissions from residential wood combustion (e.g. emissions from fireplaces under the existing authority granted in RCW 70.94.477 (2)(a)) and/or other $PM_{2.5}$ sources identified in the emissions inventory: onroad and nonroad vehicles (diesel and gasoline), industrial sources, and dust. PSCAA commits to expeditiously adopt and implement the necessary contingency measures as expeditiously as possible, no later than 18 months from the determination of a two-year exceedance or violation based on quality assured data.

10. Next Steps

Redesignation to Attainment

EPA must approve Ecology's maintenance plan and request for redesignation to remove the "nonattainment" designation. This would begin a 20-year planning cycle designed to make sure that the area remains below the federal standards. This maintenance plan covers the first 10 years of that planning cycle. Ecology commits to submit an updated maintenance plan 8 years after redesignation of the Tacoma-Pierce County Area. This update will cover the second 10 year period.

Table 9: Summary of commitments in this maintenance plan

Commitment	Lead agency
1. Continue operation of $PM_{2.5}$ monitoring network.	PSCAA
2. Review monitoring data annually and verify continued attainment.	Ecology
3. Implement contingency plan if certain triggers are met.	PSCAA
4. Develop second 10 year maintenance plan, due 8 years after this maintenance plan is approved.	Ecology

Public Participation

Ecology accepted public comments on the proposed maintenance plan and redesignation request during a public comment period from August 27 to October 3 and at a public hearing on September 30. Ecology reviewed, responded to, and incorporated comments before finalizing the plan (See Appendix F).

List of Abbreviations and Other Terms

µg/m^3: Micrograms per cubic meter.

98th percentile: The calculation for the 24-hour $PM_{2.5}$ National Ambient Air Quality Standard design value uses the annual 98th percentile from the daily measurements. A percentile is a measure used to rank information. For air pollution, the 98th percentile measurement is the measurement for the day that has pollution levels higher than 98% of the other days in the year. To determine the 98th percentile for a full year of sampling where 365 measurements are taken, we ignore the highest 2% of measurements – which means the highest 7 measurements are ignored (2% of 365 is 7). The 8th highest daily measurement is the 98th percentile.

CDD: Clean Data Determination. EPA issued a CDD that the Nonattainment Area met the standard for daily fine particle pollution during the three-year period from 2009-2011.

Design Value: EPA uses the design value to determine an area's compliance with federal health based air quality standards known as NAAQS. The 24-hour $PM_{2.5}$ design value is 35 µg/m^3, calculated as a 3 year average of the annual 98th percentile.

Ecology: Washington State Department of Ecology

Emissions Inventory: Calculation of the amount of pollutants released into the air during a specific time span

EPA: United State Environmental Protection Agency

FRM: Federal Reference Method

LEP: Limited English Proficient

Maintenance Area: The Tacoma-Pierce County $PM_{2.5}$ Maintenance Area. When EPA approves this redesignation request, the "nonattainment" designation is removed and the area becomes a maintenance area for the next 20 years.

NAAQS: National Ambient Air Quality Standard

Nonattainment Area: The Tacoma-Pierce County Nonattainment Area. A Nonattainment Area is an area that does not meet one or more of the federal health based air quality standards known as the NAAQS.

NO_X: Nitrogen oxide

$PM_{2.5}$: Another term for fine particles. Particles that are less than 2.5 micrometers in diameter.

PSCAA: Puget Sound Clean Air Agency

RCW: Revised Code of Washington

SIP: State Implementation Plan

SIP revision for the Tacoma-Pierce County Nonattainment Area: Washington's plan to improve air quality in the Tacoma-Pierce County Nonattainment Area

SO_2: Sulfur dioxide

Tacoma-Pierce County Fine Particle Nonattainment Area: Most of the greater Tacoma area and the surrounding communities within Pierce County's urban growth area west of State Route 167. EPA designated this area nonattainment for the 2006 24-hour fine particle national ambient air quality standard in 2009

Tacoma–South L Street: The monitoring site in the Nonattainment Area with a monitor that uses the FRM. EPA uses data from the FRM monitor at Tacoma – South L Street to determine compliance with the federal health based fine particle standards

Task Force: The Tacoma-Pierce County Clean Air Task Force

UGA: Urban growth area

WAC: Washington Administrative Code

VOC: Volatile Organic Compounds

Appendices

Appendices are posted as separate documents on Ecology's website, http://www.ecy.wa.gov/programs/air/sips/designations/pm_tacoma.htm.

Appendix A. Emissions Inventories

Appendix B. MOVES Inputs

Appendix C. Motor Vehicle Emissions Budget Methodology

Appendix D. Environmental Justice Questionnaire

Appendix E. Additional Resources

Appendix F. Response to Comments

References

[1] Federal Register Vol. 74, No. 218, November 13, 2009, 58688, http://www.gpo.gov/fdsys/pkg/FR-2009-11-13/pdf/E9-25711.pdf

[2] Federal Register Vol. 71, No. 200, Oct. 17, 2006, 61144, http://www.gpo.gov/fdsys/pkg/FR-2006-10-17/pdf/06-8477.pdf#page=1

[3] Tacoma-Pierce County Clean Air Task Force, www.cleanairpiercecounty.org

[4] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[5] Federal Register Vol. 71, No. 200, Oct. 17, 2006, 61144, http://www.gpo.gov/fdsys/pkg/FR-2006-10-17/pdf/06-8477.pdf#page=1

[6] Federal Register Vol. 74, No. 218, Nov. 13, 2009, 58688, http://www.gpo.gov/fdsys/pkg/FR-2009-11-13/pdf/E9-25711.pdf

[7] Tacoma-Pierce County Clean Air Task Force, 2011, "Report and Recommendations to Puget Sound Clean Air Agency", http://www.cleanairpiercecounty.org/taskforce/CleanAirTaskForceReport_FullReport.pdf

[8] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[9] Substitute House Bill 2326, Chapter 219, Laws of 2012, http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session%20Laws/House/2326-S.SL.pdf

[10] Puget Sound Clean Air Agency, Regulation 1, Article 13, "Solid Fuel Burning Device Standards," http://www.pscleanair.org/regulated/reg1/1-13.pdf

[11] Federal Register Vol. 78, No. 103, May 29, 2013, 32131, http://www.gpo.gov/fdsys/pkg/FR-2013-05-29/pdf/2013-12514.pdf

[12] EPA approved the MVEBs, effective Oct. 21, 2013; Federal Register Vol. 78, No. 182, Sept. 19, 2013, 57503, http://www.gpo.gov/fdsys/pkg/FR-2013-09-19/pdf/2013-22738.pdf

[13] Federal Register Vol. 79, No. 90, May 9, 2014, 26628, http://www.gpo.gov/fdsys/pkg/FR-2014-05-09/pdf/2014-10581.pdf

[14] Federal Register Vol. 74, No. 218, Nov. 13, 2009, 58688, http://www.gpo.gov/fdsys/pkg/FR-2009-11-13/pdf/E9-25711.pdf

[15] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[16] Dept. of Ecology, 2009, "Health Effects and Economic Impacts of Fine Particle Pollution in Washington," Publication 09-02-021, https://fortress.wa.gov/ecy/publications/SummaryPages/0902021.html

[17] Federal Register Vol. 71, No. 200, Oct. 17, 2006, 61144, http://www.gpo.gov/fdsys/pkg/FR-2006-10-17/pdf/06-8477.pdf#page=1

[18] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[19] See Code of Federal Regulations 51.1004(c); US EPA, 2004, "Clean Data Policy for the Fine Particle National Ambient Air Quality Standards," Memo from Stephen D. Page, http://www.epa.gov/airquality/urbanair/sipstatus/docs/pm25_clean_data_policy_14dec2004.pdf

[20] See 40 CFR Part 51 Subpart Z—Provisions for Implementation of $PM_{2.5}$ National Ambient Air Quality Standard

[21] Substitute House Bill 2326 Chapter 219, Laws of 2012, http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session%20Laws/House/2326-S.SL.pdf

[22] Federal Register Vol. 79, No. 22, February 3, 2014, 6330, http://www.gpo.gov/fdsys/pkg/FR-2014-02-03/pdf/2014-00409.pdf .

[23] See 40 CFR Part 93 Subpart A; Chapter 173-420 Washington Administrative Code

[24] See Appendix A for the emissions inventory documentation and Appendix B for the MOVES documentation

[25] Safety margin is defined in 40 CFR 93.101

[26] See 40 CFR 93.102 (b)(1) and (2)(iv) and (v)

[27] Tacoma-Pierce County Clean Air Task Force, www.cleanairpiercecounty.org

[28] Tacoma-Pierce County Clean Air Task Force, 2011, "Report and Recommendations to Puget Sound Clean Air Agency"

[29] See section 4 and appendix A of this report for more detail

[30] Substitute House Bill 2326 Chapter 219, Laws of 2012, http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bills/Session%20Laws/House/2326-S.SL.pdf

[31] Federal Register Vol. 78, No. 103, May 29, 2013, 32131, http://www.gpo.gov/fsdsys/pkg/FR-2013-05-29/pdf/2013-12514.pdf

[32] Federal Register Vol. 79, No. 90, May 9, 2014, http://www.gpo.gov/fdsys/pkg/FR-2014-05-09/pdf/2014-10581.pdf

[33] Federal Register Vol. 65, No. 28, February 10, 2000, 6698, http://www.gpo.gov/fdsys/pkg/FR-2000-02-10/pdf/00-19.pdf

[34] See also US EPA, 1992, "Procedures for Processing Request to Redesignate Areas to Attainment," Memorandum from John Calcagni, http://www.epa.gov/glo/designations/1997standards/redesig/documents/Redesignation-Guidance-9-04-92.pdf

[35] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[36] Federal Register Vol. 77, No. 171, Sept. 4, 2012, 53772, http://www.gpo.gov/fdsys/pkg/FR-2012-09-04/pdf/2012-21560.pdf

[37] See 40 CFR 51.1004(c); US EPA, 2004, "Clean Data Policy for the Fine Particle National Ambient Air Quality Standards," Memo from Stephen D. Page, http://www.epa.gov/airquality/urbanair/sipstatus/docs/pm25_clean_data_policy_14dec2004.pdf ; Federal Register Vol. 72, No. 79, April 25, 2007, 20586, 72 FR 20586, http://www.gpo.gov/fdsys/pkg/FR-2007-04-25/pdf/E7-6347.pdf

[38] See US EPA, 1994, "Part D New Source Review (part D NSR) Requirements for Areas Requesting Redesignation to Attainment," Memo from Mary D. Nichols, http://www.epa.gov/region7/air/nsr/nsrmemos/101494m.pdf

[39] Federal Register Vol. 79, No. 105, June 2, 2014, 31566, http://www.gpo.gov/fdsys/pkg/FR-2014-06-02/pdf/2014-10395.pdf

[40] Because the area has a clean data determination, the requirement for the contingency plan to clearly identify the contingency measures that will be adopted is suspended for so long as the area continues to meet the 24-hour $PM_{2.5}$ NAAQS (See 77 FR 53772, Sept. 4, 2012; 40 CFR 51.1004(c))