



Klamath Falls Redesignation Request and Maintenance Plan for PM_{2.5}

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Executive summary

The Oregon Department of Environmental Quality (DEQ) proposes a revision to the State of Oregon Clean Air Act Implementation Plan, referred to as the State implementation Plan (SIP). This proposed revision would:

- Redesignate the Klamath Falls airshed as attainment for the national air quality health standards for fine particles (PM_{2.5}); and
- Include a 10-year maintenance plan to keep PM_{2.5} concentrations in compliance with the 2024 24-hour national ambient air quality standards (40 CFR 50.7).

The U.S. Environmental Protection Agency (EPA) adopted more protective PM_{2.5} health standard in 2006 as part of its periodic review of National Ambient Air Quality Standards (NAAQS) to ensure protection of public health. The Klamath Falls airshed was identified as an area not meeting the PM_{2.5} health standard on worst winter days and was designated as a PM_{2.5} nonattainment area in 2009.

In collaboration with the City of Klamath Falls, the County and other stakeholders, DEQ submitted a [Klamath Falls 2012 PM_{2.5} Attainment Plan](#) (“2012 Attainment Plan”) for the Klamath Falls airshed in 2012 as a SIP revision. The 2012 Attainment Plan identified residential wood combustion (in certified and non-certified woodstoves, fireplaces and pellet stoves) as the major emission category causing violations of the PM_{2.5} health standards on stagnant winter days and outlined commitments for a number of strategies to curtail residential wood combustion during stagnant conditions, replace non-certified woodstoves with cleaner burning units, and improve firewood seasoning and woodstove operation to reduce PM_{2.5} emissions.

The 2012 Attainment Plan was successful in achieving the PM_{2.5} health standard on schedule, based on 2012-2014 monitoring data. EPA made a finding of attainment for Klamath Falls and approved the Attainment Plan in June 2016.

Major wildfires in 2012, 2013, 2015, 2017, 2018, 2020 and 2021 caused summertime violations of the PM_{2.5} health standard. These wildfires caused significant impacts on Klamath Falls residents, but those violations are being addressed separately by DEQ and EPA as part of the Exceptional Events review process. The Exceptional Events rule and guidance developed by EPA, in consultation with other agencies and the public, is intended to prevent penalizing communities for events outside their control.

This proposed redesignation request outlines the specific actions taken in the Klamath Falls area to successfully meet the federal Clean Air Act requirements and includes a maintenance plan to continue the critical air pollution control strategies. Ongoing and additional control strategies are:

- The Klamath County Clean Air Ordinance;
- Woodstove Change-Outs;
- Oregon and EPA Woodstove Certification Programs;
- Heat Smart: Statewide Stove Removal Upon Sale of Home;
- Public Education Efforts on Woodsmoke;
- ASTM Fireplace Standard for New Construction;
- Oregon Smoke Management Plan Restrictions on Prescribed Burning;
- Maximum Achievable Control Technology (MACT) Reductions;

- RACT for Industrial Sources of PM_{2.5};
- Road Paving and Winter Sanding Best Practices;
- Federal Transportation and Fuel-Related Emissions Reductions.

Introduction

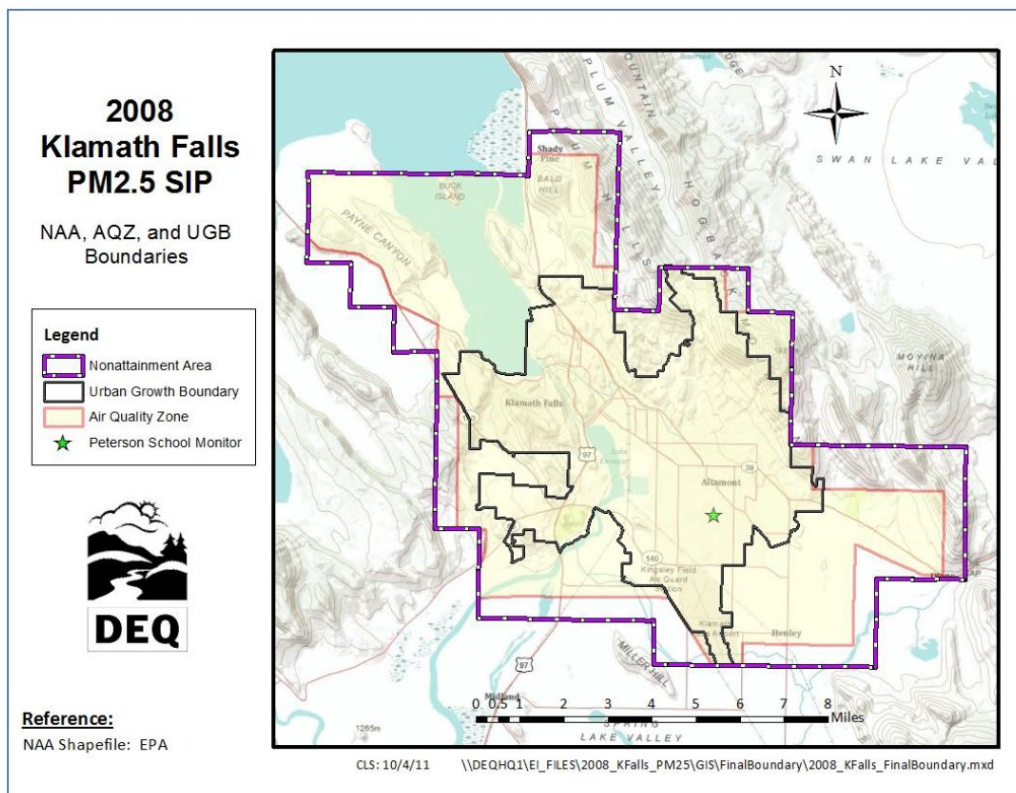
The federal Clean Air Act requires the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) and to periodically review and update these standards to protect public health. EPA adopts new standards after consultation with the Clean Air Scientific Advisory Committee (CASAC), a group of non-EPA scientists and medical professionals established by Congress.

In 1997, EPA adopted a daily (24-hr) $PM_{2.5}$ standard of 65 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and an annual $PM_{2.5}$ standard of 15 $\mu\text{g}/\text{m}^3$. However, subsequent national health studies supported more protective $PM_{2.5}$ health standards, and EPA adopted a 35 $\mu\text{g}/\text{m}^3$ 24-hour $PM_{2.5}$ standard in 2006 and a 12 $\mu\text{g}/\text{m}^3$ annual $PM_{2.5}$ standard in 2012. The annual $PM_{2.5}$ standard was lowered again in March of 2024 to 9 $\mu\text{g}/\text{m}^3$.

In general, areas in violation of the $PM_{2.5}$ standards (based on the most recent three years of regulatory monitoring data) are initially designated as a Moderate Nonattainment Area (NAA) by the EPA. DEQ has monitored at the Peterson School site, in Klamath Falls, Since 1999 for $PM_{2.5}$. Klamath Falls was designated as nonattainment for the 2006 daily $PM_{2.5}$ standard in 2009 based on a comparison of Klamath Falls nonattainment area data from 2006-2008 with the 2006 daily standard of 35 $\mu\text{g}/\text{m}^3$. Figure 1 illustrates the nonattainment area boundary.

The $PM_{2.5}$ NAA boundary was expanded from the Klamath Falls Woodstove and Open Burning Ordinance Boundary, also known as the air quality zone (AQZ) and finalized by the EPA after collaboration with Oregon Department of Environmental Quality (DEQ) for the 2008 inventory. The 2008 non-attainment boundary was also used for the 2017 base year and 2037 future year emissions inventories. The NAA and AQZ boundaries, along with the Klamath Falls Urban Growth Boundary (UGB) are shown in Figure 1 below.

Figure 1: 2008 and 2017 Klamath Falls PM2.5 NAA, AQZ, and UGB Boundaries



The legal description of the Klamath Falls NAA defines the nonattainment area boundary and can be found in Oregon Administrative Rules (OAR) Chapter 340, Division 204, and Section 0010(6).

“Klamath Falls nonattainment area” means the area of the state beginning at the northwest corner of Section 31, T37S, R9E; thence east approximately two miles to the northeast corner of Section 32; thence south approximately four miles to the southeast corner of Section 17, T38S, R9E; thence east approximately one mile to the southwest corner of Section 15; thence north approximately one mile to the northwest corner of Section 15; thence east approximately 2 miles to the northeast corner of Section 14; thence south approximately one mile to the northwest corner of section 24; thence east approximately one mile to the northeast corner of Section 24; thence south approximately three miles to the southeast corner of Section 36; thence east approximately four miles to the northeast corner of Section 3, T39S, R10E; thence south approximately three miles to the southeast corner of Section 15; thence west approximately two miles to the southwest corner of Section 16; thence south approximately two miles to the southeast corner of Section 29; thence west approximately five miles to the southwest corner of Section 27, T39S, R9E; thence north approximately one mile to the northeast corner of Section 27; thence west approximately four miles to the southwest corner of Section 24, T39S R8E; thence north approximately two miles to the northeast corner of Section 13; thence west approximately one mile to

the southwest corner of Section 11; thence north approximately four miles to the northwest corner of Section 26 T38S, R8E; thence west one mile to the southwest corner of Section 22; thence north approximately one mile to the northwest corner of Section 22; thence west approximately one mile to the southwest corner of Section 16; thence north approximately one mile to the northeast corner of Section 16; thence west approximately one mile to the southwest corner of Section 8; thence north approximately two miles to the northwest corner of Section 5; thence east to the northeast corner of Section 1; thence north approximately one mile to the point of beginning.

In addition to the NAA, there are other specified boundaries within the NAA including the Air Quality Zone (AQZ), the Urban Growth Boundary (UGB), the Open Burning Control Area, the Special Protection Zone (SPZ), and the Smoke Sensitive Receptor Area (SSRA).

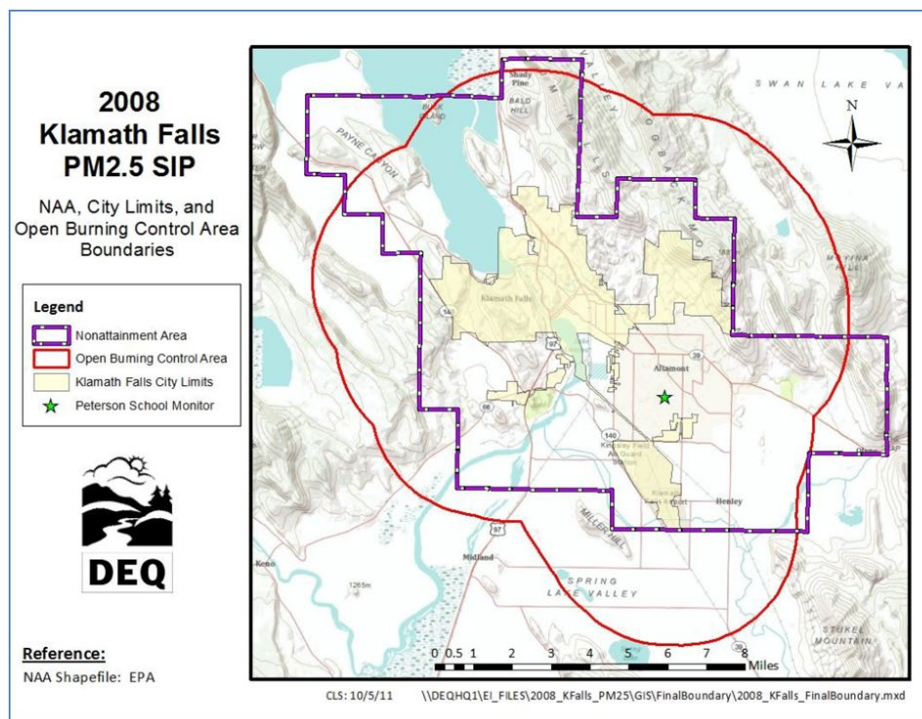
The AQZ is the area within Klamath County within which Air Quality Advisories and the burning restrictions of the Klamath Air Quality Ordinance apply in order to maintain attainment with the NAAQS.

The UGB is an area of the county surrounding the City of Klamath Falls designated by the Klamath County Board of Commissioners and the City of Klamath Falls as an area of potential growth to comply with Oregon land use law and control urban expansion onto farm and forest lands.

The purpose of the Open Burning Control Area is to restrict open burning in and around densely populated urban areas in order to reduce particulate matter in communities. These areas are regulated by DEQ and restrict commercial, construction and demolition open burning within three miles of the city limit. Slash burning on forest land within this area not controlled by the Department of Forestry is also prohibited in Open Burning Control Areas except as provided by OAR 340-264-0078(1). The Klamath Falls Open Burning Control Area is regulated by OAR 340-264-0175.

See Figure 2 for the 2008 Klamath Falls PM_{2.5} NAA and Open Burning Control Area boundaries.

Figure 2: 2008 Klamath Falls PM_{2.5} NAA, City Limits, and Open Burning Control Area Boundaries



In addition to the Open Burning Control Area, the Oregon Department of Forestry (ODF) has specified two additional zones. The SPZ is designated by ODF to provide additional protection from particulates. Any burning within the SPZ during the colder season when PM tends to be higher, from November 15-February 15, is restricted on red advisory days and requires approval of the meteorologist on green and yellow days. Additional restrictions that apply to the SPZ are set out in OAR 629-048-0135 and -0137. The SPZ boundaries are the same as the Klamath Falls NAA and apply until the area is designated in attainment with the PM_{2.5} NAAQS.

As per OAR 629-048-0140, an SSRA is designated by the State Board of Forestry in consultation with DEQ to provide the highest level of protection under the Oregon Smoke Management Plan (SMP). Factors considered in the designation of SSRAs include past history of smoke incidents; density of population or other special legal status related to visibility. The SSRA in Klamath Falls has the same boundary as the City of Klamath Falls' Urban Growth Boundary.

Oregon Department of Environmental Quality, Klamath County, and other stakeholders developed the [2012 Attainment Plan](#) to meet the daily PM_{2.5} standard by the Clean Air Act deadline of December 31, 2014. The 2012 Attainment Plan was approved by the Environmental Quality Commission on November 16, 2012 and incorporated into the State of Oregon Clean Air Act Implementation Plan, referred to as the State Implementation Plan (SIP). On December 30, 2014 ([79 FR 78372](#)) EPA proposed and on August 25, 2015 ([80 FR 51470](#)) EPA finalized approval of the emissions inventory and control measures for the Klamath Falls nonattainment area.

On April 13, 2016 ([81 FR 21814](#)) EPA proposed and on June 6, 2016 ([81 FR 36176](#)) EPA finalized the finding of attainment and the 2012 Attainment Plan approval for the Klamath Falls PM_{2.5} nonattainment area based on 2012-2014 air monitoring data. This approval was effective July 6, 2016.

The federal Clean Air Act [in CAA §107(d)(3)(E)] allows areas to request redesignation of a nonattainment area to attainment if certain criteria are met. This redesignation request and maintenance plan address the Clean Air Act requirements and outlines how the Klamath Falls airshed will continue to meet the PM_{2.5} NAAQS. The redesignation request and maintenance plan are organized as follows:

- **Background:** describing the airshed, and the historical PM_{2.5} air pollution problem.
- **Redesignation Requirements:** demonstrating how this document fulfills federal Clean Air Act requirements to redesignate the area to attainment.
- **Air Quality Monitoring:** summarizing the PM_{2.5} monitoring data and trends.
- **Emission Inventories:** summarizing major sources of PM_{2.5} emission from 2017 through 2037.
- **Air Pollution Control Strategies:** describing key control measures that continue to contribute to PM_{2.5} emission reductions in future years.
- **Transportation Conformity:** summarizing the motor vehicle emissions budget to limit on-road motor vehicle emissions from cars and trucks.
- **Maintenance of 2006 PM_{2.5} 24-hour NAAQS:** describing the commitment to continue monitoring, verify continued attainment, and the contingency plan.
- **Redesignation to Attainment:** describing the next steps in the process.

Background

Klamath Falls is a relatively small urban community located in a large rural county in south-central Oregon at an elevation of 4,105 feet. The Klamath Falls nonattainment area (see Figure 1) has a population of approximately 50,700 as of 2017. Based on Portland State University's Population Center's long-range forecast, the Klamath Falls nonattainment area population is expected to grow to approximately 52,125 by 2037 (0.14 percent per year linear non-compounding average annual growth).

The City of Klamath Falls serves as an important commercial center for south central Oregon. The Klamath Basin is a relatively flat area of an old high elevation lakebed that is drained by the Klamath River. Occasional hills and a system of elongated ridges confine the basin and the greater Klamath Falls area to the east and west. Most of the Klamath Falls residential area, especially the south suburban area, is located in the lower elevation portion of the basin. Because of these topographic features, Klamath Falls can experience very strong and shallow nighttime inversions that break up with daytime solar heating. In the wintertime, arctic air masses frequently move down Upper Klamath Lake and fill the Klamath Basin. Temperatures can remain well below freezing for several weeks at a time. Under these conditions, strong inversions occur over the Klamath Basin concentrating emissions in the south suburban area of Klamath Falls.

DEQ and the Klamath Falls community developed the 2012 Attainment Plan to bring air quality into compliance with the 24-hour PM_{2.5} NAAQS. DEQ and the Klamath Falls community have implemented and enforced all of the control strategies from the 2012 Attainment Plan that address various PM_{2.5} emission sources, including residential wood smoke, open burning, industrial sources, and area sources. In implementing these efforts, Klamath Falls successfully achieved the 2006 24-hour PM_{2.5} NAAQS on schedule in 2012-2014. EPA recognized compliance with the PM_{2.5} NAAQS and made a finding attainment for the Klamath Falls area and approved the 2012 Attainment Plan in June 2016 ([81 FR 36176](#)).

Fine particulate matter (PM_{2.5}) is a mixture of extremely small particles and droplets in the air and is known to cause or contribute to respiratory disease, asthma attacks, heart problems, and premature death. Fine particles are most closely associated with such health effects as increased hospital admissions and emergency room visits for heart and lung disease, increased respiratory symptoms and disease, decreased lung function and premature death. Sensitive groups that are at greatest risk include the elderly, pregnant women, individuals with cardiopulmonary disease such as asthma, and children. Fine particles (PM_{2.5}) generally result from fuel combustion from residential fireplaces and woodstoves, pile and forest burning, industrial facilities, and motor vehicles.

EPA has established NAAQS for PM_{2.5} at 35 µg/m³ for a daily (24-hour) standard and 9 µg/m³ as an annual standard. Any value monitored above these levels, as defined by federal rules and guidance, is considered an exceedance but not a violation of the NAAQS. A violation occurs when the design value is over the NAAQS. The design value for the daily standard is determined by taking the three-year average of the annual 98th percentile of the 24-hr average PM_{2.5} levels. For more information on how the design value is calculated refer to 40 CFR Part 50, Appendix N.

EPA announced its boundary determination of Klamath Falls, OR as a nonattainment area for the 24-hour PM_{2.5} standard in December 2008, and in December 2009 formally announced Klamath Falls as a nonattainment area ([74 FR 58688](#)). EPA subsequently made a finding of attainment and clean data determination (CDD), based on 2012-2014 air monitoring data, on June 6, 2016 ([81 FR 36176](#)), effective July 6, 2016. This Redesignation Request and Maintenance Plan includes a demonstration of continuing attainment with the 24-hr PM_{2.5} standard in Klamath Falls.

Klamath Falls achieved attainment of the 2006 PM_{2.5} NAAQS in 2014 and continues to attain that standard. Therefore, DEQ requests redesignation of the Klamath Falls Nonattainment Area (NAA) to attainment for the 24-hour PM_{2.5} NAAQS (state classification will be "maintenance"). With the redesignation request, DEQ submits a maintenance plan to ensure the Klamath Falls area maintains compliance with the 24-hour PM_{2.5} NAAQS. This redesignation request complies with the applicable 1990 federal Clean Air Act requirements and EPA rules, guidance, and policies. Redesignation requirements can be found in CAA §107(d)(3)(E), and maintenance plan requirements can be found in CAA §175(A).

The maintenance plan continues all permanent and enforceable strategies approved in the Klamath Falls attainment plan in order to continue to maintain the PM_{2.5} standards for two decades following redesignation by EPA also includes contingency provisions should Klamath Falls not continue to meet air quality standards. For analyses in this report, the year 2017 was chosen as the emissions inventory baseline year because it is a year that the Klamath Falls NAA data suggest compliance with the standard and was the latest national emissions inventory year with data available for all sources when these analyses were conducted, including for nonpoint sources.

Oregon DEQ also developed and submitted actual annual emissions for larger permitted point sources for the 2017 NEI, which are critical for the analyses here. The end year of 2037 was chosen because DEQ had the necessary 2037 VMT data from ODOT’s Travel Demand Model. Because Klamath Falls is an isolated rural area, it is not under the jurisdiction of a Metropolitan Planning Organization and thus reliant on ODOT to provide this data.

EPA must approve the Klamath Falls area maintenance plan under CAA Section 175(A) before the agency may redesignate the Klamath Falls area as attaining the PM_{2.5} NAAQS. In order for EPA to redesignate the Klamath Falls area to attainment, the agency must also verify that the PM_{2.5} design value meets the NAAQS, that the area has an attainment plan approved under CAA Section 110(k), that the state has met all applicable requirements for the area under CAA §110 Part D, and that air quality controls are permanent and enforceable.

Redesignation requirements

The federal Clean Air Act in Section 107 [CAA §107(d)(3)(E)] outlines the requirements the area must meet to redesignate the Klamath Falls PM_{2.5} NAA to attainment:

- a. The area has attained the 24-hour PM_{2.5} NAAQS.
- b. The improvement in air quality is due to permanent and enforceable reductions in emissions.
- c. The plan has a fully approved implementation plan under CAA §110(k).
- d. The area has met the requirements of CAA §110 and Part D.
- e. The area has a fully approved maintenance plan that ensures attainment of the NAAQS for at least ten years beyond redesignation.

With EPA approval of this maintenance plan and redesignation request, the Klamath Falls NAA will meet all the requirements for EPA to redesignate the area to attainment, as outlined below.

Table 1: Federal Clean Air Act Requirements for Redesignation

Clean Air Act Requirement	How Requirement is Met
a. The area has attained the 2006 24-hour PM _{2.5} NAAQS.	EPA certified and Quality-assured PM _{2.5} data for the NAA for the 3-year period of 2021-2023 indicated that the NAA has attained the PM _{2.5} NAAQS [(81 FR 36176)]. Data from 2014-2023 confirm the NAA continues to attain the standards, except for wildfire impacts addressed by Exceptional Events guidance. See Section IV for more details.
b. The improvement in air quality is due to permanent and enforceable reductions in emissions.	Enforceable local and state strategies implemented in the attainment plan—primarily to reduce residential woodsmoke—have achieved the intended emissions reductions. Federal measures continue to reduce mobile source emissions.

<p>c. The plan has a fully approved implementation plan under CAA §110(k).</p>	<p>DEQ, Klamath County and other stakeholders developed and implemented the Klamath Falls 2012 PM_{2.5} Attainment Plan to bring air quality in Klamath Falls into compliance with the standards by the Clean Air Act deadline of December 31, 2015. Residential Wood Combustion (RWC) emissions from certified and noncertified woodstoves, fireplaces and pellet stoves were identified as the major source of PM_{2.5} emissions on worst winter days contributing to violations of the 24-hour NAAQS for PM_{2.5}. The 2012 Attainment Plan was approved by the Environmental Quality Commission on November 16, 2012 and incorporated into the State of Oregon Clean Air SIP. The 2012 Attainment Plan was subsequently approved by EPA. In addition, the EPA made a finding of attainment and clean data determination (CDD), based on 2012-2014 air monitoring data, on June 6, 2016 (81 FR 36176), effective July 6, 2016.</p>
<p>d. The area has met the requirements of CAA §110 and Part D.</p>	<p>DEQ has met the requirements of CAA §110 and Part D. See https://www.epa.gov/sips-or. EPA has approved the 2012 Attainment Plan (April 13, 2016, 81 FR 21814), Oregon's Part D NA NSR and PSD Program (October 11, 2017, 82 FR 47122), the 24-hour PM_{2.5} NAAQS Interstate Transport SIP (December 27, 2011, 76 FR 80747) and the Infrastructure SIP (August 1, 2014, 78 FR 46514).</p>
<p>e. The area has a fully approved maintenance plan that ensures attainment of the NAAQS for at least ten years beyond redesignation.</p>	<p>With the EPA approval of this maintenance plan and redesignation request, the Klamath Falls NAA will have a fully approved maintenance plan ensuring continued attainment of the 2006 24-hour PM_{2.5} standard for at least ten years beyond redesignation. See Sections IV-IX for more details.</p>

Air quality monitoring

The Klamath Falls area has one particulate (PM_{2.5}) monitoring site located at 4856 Clinton Street, also known as Peterson School. The site's ID in EPA's Air Quality System (AQS) database is 41-035-0004. DEQ has monitored at the Peterson School site since 1999 for PM_{2.5}. DEQ chose this site because of its low point in the basin and hence higher PM concentrations, fulfilling the requirement to site the monitor in the area of expected maximum PM_{2.5} concentrations (40 CFR Part 58 Appendix D 4.7.1(b)(1)). DEQ quality assures and loads the

data to AQS quarterly and runs certification reports to verify that all data is complete and accurate annually. DEQ then submits a certification letter by May 1 annually. After this date, both parties certify the data. EPA certified the data from the Peterson School monitor as the basis for the nonattainment determination and for determining compliance with the PM_{2.5} NAAQS.

The purpose of a saturation survey is to verify that your monitoring station is in a representative area. A representative area measures the worst pollution concentrations of the local areas where people work, live and play. DEQ has conducted three saturation surveys to confirm Peterson School is still the appropriate location for the monitor. DEQ conducted saturation surveys in 1996-1997, 2000-2001, and most recently in 2010-2011. In the most recent survey, DEQ deployed six temporary PM_{2.5} monitors across the community, with the majority of monitors situated to the northwest of the Peterson School site. DEQ suspected sources from northwest Klamath Falls because on days with elevated levels of PM_{2.5}, the wind was light but was from the northwest. The survey results showed that the neighborhood in the southeast of Klamath Falls (referred to as the Valley) had higher levels than the northwest part of the Klamath Falls. Within the Valley the highest PM_{2.5} concentrations were at Peterson School, confirming that this site represents peak PM_{2.5} concentrations in the Klamath Falls area. Details of the 2010-2011 Saturation Survey are available in **Appendix 5**.

The sampling method for PM_{2.5} at Peterson School has historically been the filter-based Federal Reference Method (FRM) operating on an every-3rd-day schedule. In 2018, EPA requested ODEQ to increase the sampling frequency at Klamath Falls from every-3rd-day to daily in their response to ODEQ's 2017 Annual Network Plan. This was based on the 2015 Klamath DV, which was within 5% of the NAAQS. The letter stated that daily sampling was required, citing 40 CFR § 58.12(d)(1)(iii). In January 2019, a T640x Federal Equivalent Monitor (FEM) that runs every hour continuously was deployed to comply with EPA sampling frequency requirements. When the FEM was added, DEQ reduced the frequency of FRM sample collection to an every-6th-day schedule. DEQ found the FEM to be biased about 60% higher than the FRM and replaced the T640x with a BAM 1022 as the FEM in June 2021. The current parameters measured at the Peterson School station include:

- PM_{2.5} with Federal Equivalent Method (continuous beta attenuation method),
- PM_{2.5} with Federal Reference Method (FEM collocation requirement),
- Nephelometer (continuous optical backscatter),
- Wind Speed and Direction (continuous ultrasonic),
- Temperature (continuous platinum RTD at 2 meters and 10 meters height),
- Barometric Pressure (continuous electronic barometer), and
- Relative Humidity Sensor.

DEQ follows quality assurance procedures before submitting data quarterly to EPA within 90 days of the end of each calendar quarter. DEQ is committed to continue EPA-approved PM_{2.5} monitoring throughout the maintenance period as outlined in the Oregon Annual Network Plan, biennial CAA §105 grant workplan and semi-annual progress reports. Any modification to operation of the monitoring network will be done in consultation with EPA R10.

Exceptional events reporting

In recent years, increasing wildfires have complicated DEQ's reporting of Klamath Falls PM concentrations and NAAQS compliance. The Exceptional Events (EE) rule and guidance developed by EPA, in consultation with other agencies and the public, is intended to prevent

penalizing communities for events outside their control. State and local air agencies may flag days they believe have been influenced by exceptional events and submit a demonstration for EPA concurrence.

In 2012, wildfire smoke began to impact monitored PM_{2.5} values in Klamath Falls and other Oregon communities. DEQ compiled and submitted documentation to EPA requesting that EPA concur that these wildfires were Exceptional Events. With EPA concurrence regarding Exceptional Events in 2012 and 2013, Klamath Falls air quality in 2012-2014 met the 24-hour NAAQS for PM_{2.5}, as projected in the 2012 Attainment Plan.

Large wildfires in Oregon and nearby states in 2015, 2017, 2018, 2020 and 2021 also resulted in monitored PM_{2.5} values above the 24-hour PM_{2.5} standard in Klamath Falls. DEQ submitted Exceptional Event documentation for wildfires in 2017 and EPA issued concurrence such that the Klamath Falls NAA maintained compliance with the 24-hour PM_{2.5} standards.

While states may flag data they assert were influenced by wildfire, EPA can only approve wildfire smoke impacts (or other exceptional events) that have “regulatory significance.” This means that EPA may not be able to approve all the EE days that are flagged by local, or state agencies. EPA will concur that wildfires are Exceptional Events only if they have regulatory significance. Exceptional event concurrence happens only when the monitored values of PM_{2.5} contribute to violations of the NAAQS. While the Klamath Falls area had increased PM_{2.5} in 2018 due to wildfire events, the levels did not go above the NAAQS standard.

DEQ has also submitted Exceptional Events Documentation for wildfires in 2020 and 2021 but has yet to receive EPA concurrence. The [Oregon DEQ Air Quality 2022 Annual Report](#) also summarizes the 2000-2023 concentrations in Klamath with and without wildfire impacts and will be submitted to the EPA prior to the submission of this maintenance plan.

The following series of tables and graphs summarize the 2000-2023 data in the context of Exceptional Events demonstrations. The 3-year design values coded in red denote violation of the 24-hour PM_{2.5} standard (35 µg/m³) NAAQS; green indicates attainment with the 24-hr NAAQS. Table 2 displays Klamath Falls PM_{2.5} data with all DEQ-flagged wildfire smoke impact days removed; Table 3 displays Klamath Falls PM_{2.5} data with only Exceptional Events removed. For completeness, both data sets are included here for review. The data in Table 2 best describes the progress of the 2012 Attainment Plan. **Figure 3** shows the data in terms of AQI, EPA’s health index for reporting air quality. This figure shows a steady decrease in unhealthy winter days because of restrictions on wood burning, and an increase in unhealthy summer days due to wildfires. **Figure 3** illustrates that the problem in Klamath has largely shifted from a wintertime woodsmoke problem to a summertime wildfire problem. If EPA were to act on DEQ’s full set of wildfire-related exceptional events, the design value for Klamath Falls would not be within 5% of the NAAQS standard for requiring continuous monitoring.

Table 2: Klamath Falls data with all flagged wildfire smoke impact days removed.

PM2.5 Daily Design Values with Wildfire Data Removed

Year	98th %tile	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
1999	44.1																							
2000	37.3	39																						
2001	35.1		41																					
2002	51.1	WF		39																				
2003	30.6				41																			
2004	42.0					41																		
2005	49.2						46																	
2006	47.5							45																
2007	39.6								46															
2008	52.2									45														
2009	44.0										44													
2010	34.6											39												
2011	37.1												32											
2012	25.1	WF												36										
2013	46.2	WF													33									
2014	27.8	WF														33								
2015	25.2	WF															25							
2016	23.0																	27						
2017	31.6	WF																	28					
2018	27.9	WF																		31				
2019	32.3	WF																			37			
2020	49.3	WF																				39		
2021	36.4	WF																					37	
2022	26.0	WF																						29
2023	25.6	WF																						

Gray - Meets old NAAQS
 Green - Meets NAAQS
 Red - Does not meet NAAQS

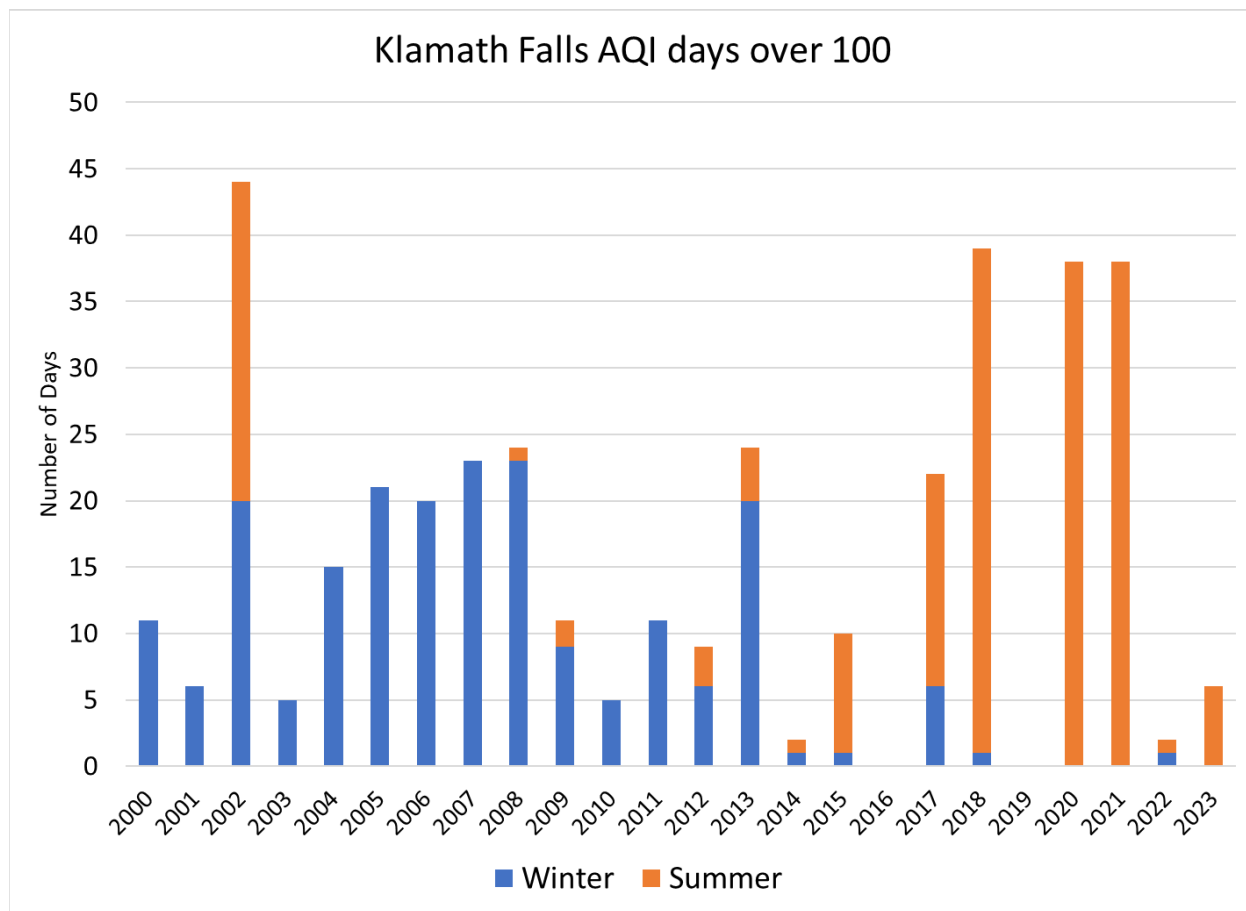
Table 3: Klamath Falls data with EE data of regulatory significance removed (current AQS).

PM2.5 Daily Design Values with Exceptional Events and Wildfire Data Removed

Year	98th %tile	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023
1999	44.1																							
2000	37.3	39																						
2001	35.1		41																					
2002	51.1	WF		39																				
2003	30.6				41																			
2004	42.0					41																		
2005	49.2						46																	
2006	47.5							45																
2007	39.6								46															
2008	52.2									45														
2009	44.0										44													
2010	34.6											39												
2011	37.1												33											
2012	25.9	EE												36										
2013	46.2	EE													34									
2014	29.6															35								
2015	29.5	EE															27							
2016	23.0																	32						
2017	44.7	EE																	28					
2018	27.9	WF																		35				
2019	32.3	WF																			37			
2020	49.3	WF																				39		
2021	36.4	EE																					37	
2022	26.0	WF																						29
2023	25.6	WF																						

Gray - Meets old NAAQS
 Green - Meets NAAQS
 Red - Does not meet NAAQS

Figure 3: Klamath Falls AQI days over the current Unhealthy for Sensitive Groups Level



Attainment inventory

In September 2019, DEQ and EPA established basic technical elements for developing the attainment and future year inventory. The discussion determined the following: 1) the use of 2017 and 2037 for the attainment and future year inventory, 2) which types of emissions, emission categories, and pollutants to inventory, 3) which EPA approved data models and resources to use, 4) which years of monitoring data to use, and 5) which years to use for the Motor Vehicle Emissions Budget (MVEB). These agreed upon elements were then included in a Technical Analysis Protocol (TAP) and submitted along with the Klamath Falls Inventory Preparation Plan to EPA in Spring 2020. The rest of this section summarizes the basic technical elements agreed upon by DEQ and EPA to develop the attainment and future year emissions inventory.

The emission inventory fulfills EPA requirements for preparing the 2017 Attainment and 2037 Future Year emissions inventory, as specified in the provisions of the 1990 CAAA, PM2.5 SIP Requirements Rule 40 CFR 51.1008, TAP, and other EPA guidance documents. The geographic boundary for the inventory continues to be the Klamath Falls NAA, as defined by the NAA boundary in the 2012 Attainment Plan and illustrated previously in **Figure 1**.

The purpose of the inventory was to establish attainment and projected emissions for the Klamath Falls NAA. DEQ chose 2017 as the attainment year because at the time of developing the inventory in 2020, it was the most current emissions data available from the National Emissions Inventory (NEI) for most emission categories. Both onroad and nonroad emissions were initially modeled using EPA's MOVES2014b because it was the latest model available when ran in 2020. However, due to delays in acquiring monitoring data, EPA and other transportation agencies requested Oregon DEQ update onroad and nonroad emission estimates using MOVES3.1 which was completed in the Spring of 2023. Although MOVES4 was released later that year in September of 2023 states are afforded a two-year grace period according to the new model's guidance before requiring its use beginning in 2025.

The reason for choosing 2037 as the future year was because the traffic activity data for running MOVES3.1 provided by Oregon Department of Transportation Traffic Demand Model (TDM) was already available without re-running the model due to resource constraints. Furthermore, the year 2037 as an end year for this maintenance plan also meets the requirement to demonstrate continued attainment for at least 10 years into the future. See **Appendix 3**, Motor Vehicles Emissions Inventory and Budget, for further explanation regarding the available traffic activity data to run the MOVES model.

The pollutants covered in the inventory are PM_{2.5} and precursors of secondary formation of PM within the Klamath Falls NAA. PM_{2.5} was further speciated to filterable and condensable forms for fuel combustion sources. The precursors included in this inventory are nitrogen oxides (NO_x), sulfur dioxide (SO₂), volatile organic compounds (VOC), and ammonia (NH₃).

To demonstrate maintenance of the 24-hour PM 2.5 NAAQS for at least ten years from redesignation, DEQ projected annual and winter PM season day (referred to hereafter as a typical season day) emissions for PM_{2.5} and precursor pollutants for the 2027 interim maintenance year, and the 2037 maintenance demonstration year. The winter PM season when typical season days occur is represented by the months of January, February, November, and December in the same calendar year. Because the 24-hour PM_{2.5} NAAQS is a daily standard, it is appropriate for the maintenance demonstration to be in the form of a daily emissions inventory comparison.

Emission categories inventoried include events and natural sources and mobile, nonpoint, and point sources of emissions. Both annual and typical season day emissions were estimated for this inventory. The emissions are reported in tons per year for annual and pounds per day for the typical season day. Temporal emissions are average daily emissions calculated over a four-month period identified as the PM winter season with typical season days. An exception to that are the mobile source emissions. DEQ selected the highest daily emissions estimated during that four-month period in MOVES3.1 for both 2017 attainment and 2037 future years.

DEQ used the ArcGIS Pro application for point source determination within the NAA and spatial allocation of nonpoint and event emissions, and mobile activity data to the NAA. DEQ developed all other actual emission estimates in-house for this project as specified in the EI report. Finally, DEQ developed and submitted actual annual emissions for larger permitted point sources for the 2017 NEI which are stored in the agency's permitting database Tracking, Reporting and Administration of Air Contaminant Sources (TRAACS). These 2017 permitted point source emissions were used to develop daily emissions for this inventory. Because smaller permitted point sources are not required reporting for 2017 NEI, DEQ developed actual annual and daily emission estimates in-house for this inventory as well.

The principal components for development and documentation of the PM_{2.5} Maintenance Plan emission inventories are addressed in **Appendix 2**.

Estimating future year emissions

The attainment demonstration must show that total emissions in the future will not exceed 2017 PM_{2.5} baseline emissions and the National Ambient Air Quality Standard (NAAQS). Section 175A(a) of the Clean Air Act indicates the maintenance plan must ensure attainment for a minimum of 10 years. 2037 is the future year agreed upon by DEQ and EPA to project emissions out for this plan in accordance with the requirements of the Clean Air Act.

EPA provides guidance, *Emission Projections (EIP Volume X, 1999)*, for state and local agencies to develop emission projections for point, nonpoint, onroad, and nonroad emissions categories. However, some emissions categories or sectors may be difficult to project emissions. Such categories found within Klamath Falls NAA are point sources and some nonpoint sectors (some agriculture sources) and events (wildfires/prescribed and structural fires) and natural emission sources (biogenic) identified in EPA's *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations (EPA, 2017)*. Such reasons for inability to project emissions include the following:

1. Events such as fires are highly variable from year to year,
2. Biogenic emissions that are dependent upon meteorology that is highly variable from year to year, and
3. State and federal permitted point sources with established emission limits that restrict emissions growth over the duration of the permit.

These categories and sectors considered difficult to project emissions were set at “no-growth”, essentially equal to 2017 attainment year emissions, for the 2037 future year inventory. See **Appendix 2, Section 3** of the EI report for further detail on developing the Future Year Emissions Inventory.

Growth within the Klamath Falls NAA

Emissions should reflect Klamath County and Klamath Falls NAA's growth in demographics and traffic patterns over the next 20-year period. Based on the 2018 through 2065 Coordinated Population Forecasts for Klamath County developed by Portland State University and Oregon Employment Department's data, county demographics are predicted to grow gradually from 2017 through 2037. The vehicle traffic growth patterns within the NAA were established by ODOT in their Traffic Demand Model (TDM) based on county demographics and roadwork network patterns used in the previous EI. See **Appendix 3** for further explanation on TDM traffic data development. DEQ used the ArcGIS Pro application to spatially allocate demographics and traffic data from county level to the Klamath Falls NAA.

The population for the Klamath Falls NAA is expected to increase from 48,496 to 49,840 people as well as housing from 24,493 to 25,172 units over the next 20 years. Likewise, employment will also steadily increase over the next 20 years from 19,124 to 24,024 employees as new people move into the area or young adults enter the workforce. Along with the increase in NAA population, household, and employment numbers, the TDM projected annual VMT will increase from 308,194,262 to approximately 369,833,114 vehicle miles traveled over the same period.

Growth factors

Since growth of PM_{2.5} and precursor emissions vary based on the types of emission sources inventoried, growth factors were developed using demographics data to estimate 2037 emissions. DEQ developed 2017-2037 Annual Average Growth Rates (AAGR) for employment, population, household, or combination of the data. (See **Table 4** below.)

Table 4: Klamath Falls Non-Attainment (NAA) Growth Factors

Growth Type ID	Growth Type Description	2017-2037 AAGR	Growth Parameter	Data Resource
1	Klamath Falls NAA Population	0.14%	Linear, noncompounding	PSU Population Research Center
2	Klamath Falls NAA Household	0.14%	Linear, noncompounding	PSU Population Research Center
3	Klamath Falls NAA Employment (EMP) - use for commercial, construction, and industrial NAICS.	1.15%	Linear, noncompounding	Oregon Employment Department
9	Average of Population, Commercial, Industrial EMP	0.64%	Average of EMP and Population.	Oregon Employment Department, PSU Population Research Center, and U.S. Census
10	Animal Husbandry, Biogenics, Point, Structural Fires, and Prescribed Fires and Wildfires.	0.00%	No growth	2008 Klamath Falls SIP EI (ref. 815) page 196. Emissions held constant for these subsectors in FY estimates.

The growth factors were applied to various data categories to project future year emissions. For example, population, household, and employment or a combination of this data was applied to certain nonpoint emissions sources such as stationary fuel combustion, residential woodstoves, and commercial cooking.

It was not necessary for DEQ to develop growth factors to estimate 2037 onroad and re-entrained road dust emissions. ODOT provided 2037 traffic activity data from their TDM, which already incorporated growth for the NAA; therefore, 2037 emissions were calculated directly in MOVES3.1 and not grown. Further, DEQ used the same 2037 traffic activity data provided by ODOT to calculate re-entrained road dust emissions outside of MOVES using EPA AP-42 emission factors (See **Appendix 3** for further explanation).

Growth factors were not developed nor applied to permitted point sources, wildfires and prescribed and structural fires, and some nonpoint sources such as some agriculture emissions sources for this inventory. These categories are considered difficult to project emissions for and were established as “no-growth”, so 2037 emissions were set equal to 2017 attainment year emissions.

Further, once emission estimates were made for 2017 and 2037 for the appropriate emissions sources, emissions were linearly interpolated between those years based on 5-year intervals.

Emission summaries

PM_{2.5} emissions inventories

The most significant categories for 2017 continue to be prescribed burning, permitted industries, and residential wood heating. **Figure 4** provides this visual representation of 2017 and 2037 Typical Season Day Emissions for the highest PM_{2.5} emitting sectors within the Klamath Falls NAA. **Table 5** compares 2017 attainment year, 2027 interim year, and 2037 future year typical season day emissions for those highest PM_{2.5} emitting sectors as well.

According to past and present data, some emission sources such as prescribed burning, wood stoves, open burning, and onroad mobile sources within the Klamath Falls NAA contribute to the violation of 24-hour NAAQS for PM_{2.5} typical season days. **Table 6** includes the emissions categories that are most significant for maintaining attainment for these days. The progression of emissions changes from 2017, 2027, 2037 shows that over time some categories may increase due to changes in demographics such as population and housing, vehicle miles traveled, and employment. While other emission sources are decreasing over time out to 2037 such as onroad and nonroad mobile sources, due to cleaner fuels and change out of older equipment to more fuel-efficient equipment. However, some categories—such as prescribed fires and agricultural field burning or tilling—stay the same, not because this is a physical change in emissions, but due to the difficulty in projecting emissions out to 2037. These are episodic emissions and cannot be projected with any certainty out to a future year. Or in the case of permitted sources, emissions stay the same because these industries are constrained by allowable emission limits in permits that restrict growth in emissions. Also, EPA has determined that demographic growth does not directly impact emissions growth from permitted point sources.

Figure 4: Klamath Falls Non-Attainment Area (NAA) 2017 and 2037 PM_{2.5} Typical Season Day (TSD) Emissions Comparison

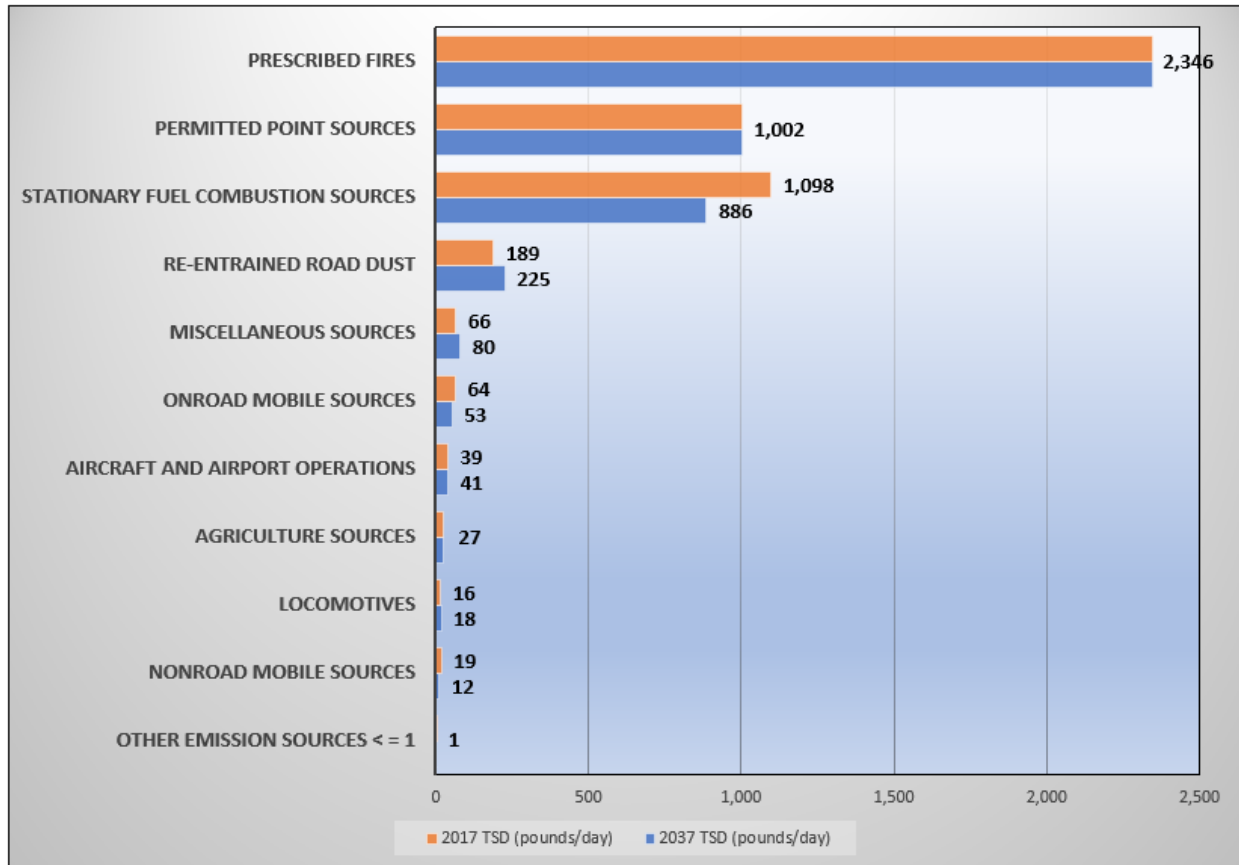


Table 5: Klamath Falls Non-Attainment Area (NAA) Comparison of Base Year and Future Years PM_{2.5} Typical Season Day Emissions.

PM _{2.5} Emitting Sources	Typical Season Day Emissions		
	PM _{2.5} -Primary (pounds/day)		
	2017	2027	2037
Prescribed Fires	2346	2346	2346
Stationary Fuel Combustion Sources	1098	1034	886
Permitted Point Sources	1002	1002	1002
Re-Entrained Road Dust	189	200	225
Miscellaneous Sources	66	70	80
Onroad Mobile Sources	64	61	53
Aircraft and Airport Operations	39	40	41
Agriculture Sources	27	27	27
Nonroad Mobile Sources	19	17	12
Locomotives	16	17	18
Structure Fires	1	1	1
Fugitive Sources	0	0	0
Waste Disposal Sources	0	0	0
Wildfires	0	0	0
Grand Total	4868	4815	4691

Although prescribed burning is the highest source of PM_{2.5} emissions on a typical season day, as summarized in **Table 5**, ground level impacts to the NAA from smoke are very rare. Within the EI, prescribed fire PM_{2.5} amounts are estimated mass emissions that do not equate to pollutant amounts that will impact the ambient air within the NAA. Oregon's Smoke Management Plan (SMP) regulates prescribed fire and uses smoke forecasting to prevent smoke intrusions. In the last decade, the Klamath Falls NAA has experienced a total of only two smoke intrusions from prescribed fires. Emissions from 2017 through to 2037 stay the same due to the difficult nature in predicting fires out to a future year. However, this is a very conservative estimate as research shows repeat entry burns have lower fuel composition equating to less smoke emissions ([Levine 2020](#)). This was not accounted for in this Emissions Inventory.

Regarding residential wood heating—which is a subset of stationary fuel combustion sources—although some emissions projections increased due to population and housing growth in future years, these emissions decreased overall. This is the result of the replacement of non-certified woodstoves with cleaner equipment after 2017 and improvements in public outreach regarding cleaner burning techniques and code enforcement programs for curtailment during stagnant air episodes. **Table 6** reflects the projected changes mentioned above between 2017 and 2037.

Table 6: Klamath Falls Non-Attainment Area (NAA) 2017 and 2037 PM_{2.5} Typical Season Day Emissions by Stationary Fuel Combustion Sources

Stationary Combustion Sources	Typical Season Day Emissions	
	PM _{2.5} (pounds/day)	
	2017	2037
Residential Woodstove	617	395
Residential Hydronic Heater	254	254
Residential Fireplace	140	144
Residential Furnace	56	58
All Other Fuel Combustion Sources	31	36
Residential Outdoor Wood Devices	0	0
Grand Total	1098	886

The primary focus of the 2012 Attainment Plan and this Maintenance Plan is to continue to reduce residential wood combustion (RWC) emissions. As described in detail in the 2012 Attainment Plan, RWC emissions from certified and non-certified woodstoves, fireplaces and pellet stoves have been identified as the major source of PM_{2.5} emissions during typical season days contributing to violation of the 24-hour PM_{2.5} NAAQS. The Klamath Clean Air Ordinance, outlined in detail in **Appendix 4**, continues to implement RWC strategies that have been effective over the past few decades along with some new strategies, fully described in Section VI.

Most of the funding for the RWC emissions reductions in Klamath is provided by EPA Targeted Airshed Grants, with some additional state funding, and several further stove removals due to DEQ’s Heat Smart Program requirements. **Table 7** is a breakdown of woodstoves to be replaced by 2028 and projected attendant PM_{2.5} emissions reductions.

Table 7: Klamath Falls Projected Wood Stove Removals by 2028

Funding/Program	Number Stoves Removed	PM _{2.5} Emissions Reduced (tons per year)
2019 TAG	144	6.81
2019 State Funding	50	2.36
Heat Smart Program	7	0.33
2022 TAG	210	9.93
Totals	411	19.43

Because of this funding the most significant of the RWC reductions in the Klamath Falls NAA will be achieved from 2021-2028. These reductions are a product of woodstove changeouts to non-wood burning devices such as heat pumps or gas furnaces. A total of 411 stoves are projected to be replaced by 2028, of which 180 stoves have already been replaced. In addition to changeouts funded by TAG, a total of 50 stoves were replaced with DEQ funding in 2019 and

an additional 7 uncertified stoves in Klamath Falls were removed to meet the requirements of the statewide Heat Smart program during the attainment planning period. Emissions reductions were estimated using a modified version of EPA’s woodstove calculator (incorporating Oregon inputs). These changeouts are covered in more detail in **Section VI**. See **Appendix 2, Sections 2.4.4.5.3** for more information on developing RWC emissions and 3.1.2.1 for developing RWC emission reduction estimates.

Table 8 summarizes permitted point sources that contribute to PM_{2.5} emissions by industry type using North American Industrial Classification System (NAICS) codes. The top industry types (NAICS) that contribute significantly to point source emissions are wood products manufacturing and electric power generation. DEQ attributes growth in industry emissions from the previous 2008 EI to the current EI (2017) to economic improvement after the 2009 recession. All permitted facilities are still emitting within permit limitations. Industrial emissions development is discussed in further detail in **Section 2.3.3 of Appendix 2**.

Table 8: Klamath Falls Non-Attainment Area (NAA) 2017 and 2037 PM_{2.5} Typical Season Day Emissions by Broken Down by North American Industrial Classification System (NAICS)

NAICS and NAICS Description	Typical Season Day Emissions PM _{2.5} Emissions	
	2017	2037
	(pounds/day)	
321219 - Reconstituted Wood Product Manufacturing	487	487
321212 - Softwood Veneer and Plywood Manufacturing	358	358
221112 - Fossil Fuel Electric Power Generation	107	107
327992 - Ground or Treated Mineral and Earth Manufacturing	16	16
212321 - Construction Sand and Gravel Mining	15	15
423930 - Recyclable Material Merchant Wholesalers	7	7
812220 - Cemeteries and Crematories	7	7
327320 - Ready-Mix Concrete Manufacturing	3	3
928110 - National Security	0	0
335999 - All Other Miscellaneous Electrical Equipment and Component Manufacturing	0	0
812210 - Funeral Homes and Funeral Services	0	0
221330 - Steam and Air-Conditioning Supply	0	0
321918 - Other Millwork (including Flooring)	0	0
812910 - Pet Care (except Veterinary) Services	0	0
Grand Total	1002	1002

Onroad mobile source emissions were calculated by DEQ for the 2017 attainment year and 2037 future years emissions using the latest MOVES model. When the EI was developed in 2020, onroad mobile source emissions were run in the latest available model, MOVES2014(b). In January 2021, a year after the mobile source estimates were completed, a new version of MOVES was released. Since the onroad emission estimates were already completed using MOVES2014(b), EPA agreed that the mobile emissions did not need to be remodeled using MOVES3 at that time. However, due to delays in acquiring monitoring data, EPA and other transportation agencies requested Oregon DEQ to update onroad emission estimates using

MOVES3.1. A significant amount of work was accomplished to update mobile emissions in Spring 2023 using MOVES3.1. Although MOVES4 was released in September 2023, EPA grants a 2-year grace period before requiring states to move permanently to MOVES4 for transportation conformity and SIP mobile work; therefore, Oregon DEQ elected to utilize emissions already ran using MOVES3.1.

Although MOVES provides onroad default inputs such as vehicle populations, travel activity, fuel content and supply information at a county level, DEQ used regionally specific activity and vehicle population types and distribution data to run emissions in MOVES for Klamath Falls NAA. ODOT provided 2008 and 2037 vehicle activity in the form of Daily Vehicle Miles Traveled (DVMT) by Traffic Analysis Zone (TAZ) for Klamath County from previous traffic demand modeling for 2008 Klamath Falls SIP EI. DEQ linearly interpolated 2017 traffic activity using the 2008 and 2037 DVMT provided by ODOT. The DVMT was clipped by EI staff to the NAA via GIS analysis to use in MOVES. In addition, Oregon Department of Motor Vehicle data was used to identify vehicle populations and GIS analysis was used to distribute that data to the Klamath Falls NAA to use in the MOVES model. See **Appendix 3, Section 2.7** for inventory development details such as run specifications and activity data used to run MOVES.

DEQ used MOVES3.1 in emissions inventory mode to estimate 2017 and 2037 annual and typical season day onroad emissions for Klamath Falls NAA. The runs included all vehicle and road types and PM_{2.5} and precursor pollutants. The model estimates onroad process emissions for exhaust, and brake and tire wear for all vehicle and road types. In addition, 2017 and 2037 re-entrained road dust emissions were estimated using the same vehicle activity (DVMT) data provided by ODOT’s Travel Demand Model (TDM) which was initially used in MOVES3.1 to estimate onroad mobile source emissions. This activity was applied to emission factors developed by DEQ using EPA AP-42 emission factor formulas to estimate re-entrained road dust emissions outside of MOVES3.1. These emissions were folded in with exhaust and brake and tire wear process emissions for total onroad mobile sources. The PM_{2.5} MOVES 3.1 emission modeling results and re-entrained road dust typical season day emissions for 2017 and 2037 are summarized in **Table 9** below. (See **Appendix 3, Section 2.7** and 3.2.4 for further details on developing motor vehicle emissions for this plan.)

Table 9: Klamath Falls Non-Attainment Area (NAA) Onroad and Re-Entrained Road Dust 2017 and 2037 PM_{2.5} Typical Season Day Emissions

PM2.5 by Process Type	Typical Season Day Emissions	
	2017	2037
	(pounds/day)	
Primary PM2.5 - Exhaust	55	37
Primary PM2.5 - Brakewear	7	12
Primary PM2.5 - Tirewear	2	4
Primary PM2.5 - RERD*	189	225
Grand Total	254	278

*Re-Entrained Road Dust

The differences between the 2017 attainment year and the 2037 future year emission inventory are the result of a combination of increases due to growth factors and decreases due to emission control strategies. For example, motor vehicle emissions continue to decrease overall

due to progressively cleaner gasoline and diesel fuels and motor vehicles and the transition to more zero-emission vehicles.

Please see the EI report in **Appendix 2** for further discussion on other PM_{2.5} emission sources within the Klamath Falls NAA that are not considered significant sources of emissions.

Precursor emission inventories (NO_x, VOC, SO₂ and NH₃)

In addition to direct PM_{2.5} emissions, particulate matter is formed in the atmosphere from precursors. Sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOC), and ammonia (NH₃) all contribute to the secondary formation of particulate matter. Secondary particulate formation is a minor contributor to the Klamath Falls PM_{2.5} air pollution concentrations on typical season days as summarized in the 2012 Attainment Plan. DEQ conducted an analysis of the PM_{2.5} precursors in Klamath Falls to determine their contribution to the PM_{2.5} nonattainment area and whether specific strategies needed to be developed to address precursor emissions. Although there is some contribution through secondary formation, analysis of filter samples and modeling shows on average that secondary formation is relatively small compared to the direct PM_{2.5} emissions. For more detail on this analysis, see pages 17-18 of the 2012 Attainment Plan.

In the preparation of the maintenance plan, DEQ staff performed a more definitive analysis of the 2017 attainment and 2037 future years precursor emissions (NO_x, VOC, SO₂, and NH₃). Annual and typical season day precursor emissions were calculated for this plan and are discussed further in **Appendix 2**. DEQ focused its strategy development on those controls that directly impact PM_{2.5} emission levels; however, many of these strategies simultaneously address precursor emissions. Annual PM_{2.5} and precursor emissions of NH₃, NO_x, SO₂, and VOC are compared between the previous plan's 2008 EI and 2017 and 2037 emissions for the current plan in **Table 10**. This comparison showed overall precursor emissions for the Klamath Falls NAA were trending downward except for NH₃ and VOC. The general decrease for NO_x and SO₂ emissions are largely due to motor vehicle emissions within the NAA and should be even less significant contributor to PM_{2.5} in the future. Motor vehicle emissions continue to decrease overall due to progressively cleaner gasoline and diesel fuels and motor vehicles and the transition to more zero-emission vehicles.

However, DEQ went a step further to compare county-level precursor trends using previous NEIs 2008, 2011, 2014, and 2017 triennial emissions to confirm a pattern of emission increases or decreases for certain pollutants. Overall county emissions over the different triennial years are decreasing as well for NO_x and SO₂, but NH₃ and VOCs are indeed increasing across the county. DEQ identified the causes for rising levels of NH₃ and VOC emissions within the county and NAA as increased prescribed fires, wildfires, and production activity by industrial sources. Increases in frequency and location of prescribed fires and wildfires have driven VOC emission levels up since the previous plan. In addition, economic improvement since the 2008 recession has provided an opportunity for industrial sources within the NAA to increase their annual production activity back to norm since the last plan but within current permit limits: thereby, may be the explanation for increasing NH₃ emission levels. While new control technologies installed by 2009 for some wood products manufacturing companies within the NAA might explain the emission reductions for the other pollutants not recognized until after the 2008 SIP EI was developed. (See **Section VI** below for more explanation). So overall, county and NAA emission trends corresponds with the emission estimates developed for the current plan.

Table 10: Klamath Falls Non-Attainment Area (NAA) Comparison of PM_{2.5} and Precursors Annual Emissions from 2008-2037

Pollutants and Emissions Category	Base and Future Year Annual Emissions (AE)					
	2008		2017		2037	
	AE (tpy)	AE Percent Distribution	AE (tpy)	AE Percent Distribution	AE (tpy)	AE Percent Distribution
PM2.5-Primary						
Nonpoint Sources	296.0	45%	232.5	38%	223.7	37%
Events and Natural Sources	107.0	16%	163.5	27%	163.5	27%
Point Sources	143.4	22%	158.5	26%	158.5	26%
Mobile Sources	108.3	17%	56.5	9%	59.6	10%
PM2.5-Primary Total	654.7		611.0		605.3	
NH3						
Point Sources	70.4	29%	111.7	44%	111.7	43%
Nonpoint Sources	141.1	58%	97.6	38%	103.6	40%
Events and Natural Sources	20.8	9%	32.2	13%	32.2	12%
Mobile Sources	11.4	5%	13.0	5%	10.1	4%
NH3 Total	243.7		254.4		257.6	
NOX						
Mobile Sources	1792.5	80%	650.4	61%	451.0	56%
Point Sources	329.3	15%	257.6	24%	208.5	26%
Nonpoint Sources	100.6	4%	77.1	7%	79.8	10%
Events and Natural Sources	13.7	1%	72.8	7%	72.8	9%
NOX Total	2236.1		1057.9		812.1	
SO2						
Point Sources	40.7	37%	14.8	31%	14.8	31%
Mobile Sources	47.8	43%	13.9	29%	14.1	29%
Events and Natural Sources	13.0	12%	12.1	25%	12.1	25%
Nonpoint Sources	8.4	8%	6.7	14%	6.9	14%
SO2 Total	109.9		47.6		47.9	
VOC						
Events and Natural Sources	299.3	10%	5613.1	77%	5613.1	79%
Nonpoint Sources	673.6	23%	724.2	10%	756.5	11%
Mobile Sources	940.2	32%	406.6	6%	224.1	3%
Point Sources	997.2	34%	555.5	8%	555.5	8%
VOC Total	2910.3		7299.4		7149.2	

Table 11: Klamath Falls Non-Attainment Area (NAA) Comparison of Baseline and Future Years Typical Season Day Emissions

Attainment and Future Year Typical Season Day (TSD) Emissions				
Pollutant Emissions by Emission Category	2017		2037	
	TSD (lbs/day)	TSD Percent Distribution	TSD (lbs/day)	TSD Percent Distribution
PM2.5-Primary				
Events and Natural Sources	2347	48%	2347	50%
Mobile Sources	328	7%	348	7%
Nonpoint Sources	1191	24%	994	21%
Point Sources	1002	21%	1002	21%
PM2.5-Primary Total	4868		4691	
NH3				
Events and Natural Sources	462	33%	462	33%
Mobile Sources	69	5%	56	4%
Nonpoint Sources	337	24%	347	25%
Point Sources	537	38%	537	38%
NH3 Total	1406		1403	
NOX				
Events and Natural Sources	559	9%	559	11%
Mobile Sources	3490	56%	2469	50%
Nonpoint Sources	656	10%	670	13%
Point Sources	1551	25%	1281	26%
NOX Total	6256		4980	
SO2				
Events and Natural Sources	174	47%	174	47%
Mobile Sources	70	19%	71	19%
Nonpoint Sources	40	11%	38	10%
Point Sources	84	23%	84	23%
SO2 Total	368		367	
VOC				
Events and Natural Sources	47209	83%	47209	84%
Mobile Sources	2256	4%	1231	2%
Nonpoint Sources	4308	8%	4334	8%
Point Sources	3124	5%	3124	6%
VOC Total	56897		55897	

Table 11 summarizes 2017 and 2037 precursor typical season day emissions and distribution of those emissions across various emission categories within the Klamath Falls NAA for this plan. As indicated above, all the precursor emission categories generally decreased from 2017 to 2037. The general decrease is as expected since most of the precursor emissions are related to such sectors as Residential Wood Combustion or Onroad Motor Vehicles, and the precursor emissions are reduced by the same control strategies that reduce Residential Wood Combustion PM_{2.5} emissions (e.g., progressively cleaner burning home heating units) and Onroad Motor Vehicle PM_{2.5} emissions (e.g., progressively cleaner vehicles and fuels). See **Appendix 2** for more details on developing precursor emission estimates.

Air pollution control strategies

The SIP-approved Control Measures for PM_{2.5} emissions in the Klamath Falls NAA from 2012 Attainment Plan that are currently in effect include the following:

- The Klamath County Clean Air Ordinance;
- Woodstove Change-Outs;
- Oregon and EPA Woodstove Certification Programs;
- Heat Smart: Statewide Stove Removal Upon Sale of Home;
- Maximum Achievable Control Technology (MACT) Reductions;
- RACT for Industrial Sources of PM_{2.5};
- Road Paving and Winter Sanding Best Practices;
- Transportation and Fuel-Related Emissions Reductions.

DEQ is requesting that the following new control strategies since 2012 be considered for SIP approval:

- Revised Klamath County Clean Air Ordinance
- Public Education Efforts on Woodsmoke;
- ASTM Fireplace Standard for New Construction;
- Oregon Smoke Management Plan Limitations on Prescribed Burning;

Residential wood combustion

Residential wood combustion (RWC) emissions have been the major contributor to the historical PM_{2.5} air pollution problems in the Klamath Falls NAA and are expected to continue to be one of the most significant sources of PM_{2.5} emissions in the future, as illustrated in the emission inventories summarized in the previous section.

The key RWC control strategies in the Klamath Falls NAA have been:

- woodstove change-out programs replacing uncertified woodstoves with cleaner and more efficient home heating equipment;
- the Oregon and EPA woodstove certification programs requiring any new woodstoves installed since 1986 to be certified woodstoves;
- the Klamath Clean Air Ordinance and Oregon Heat Smart law requiring removal of uncertified woodstoves upon home sale; and
- enforcement of Klamath County's Clean Air Ordinance, which included:
 - Mandatory woodburning curtailment program during air stagnation episodes;
 - Prohibition of open burning except during 14-day windows twice a year in spring and fall, and complete prohibition of agricultural burning in the NAA;
 - Opacity standards to ensure clean burning woodstoves with reduced woodsmoke;
 - Restriction on wood stoves as the sole source of heat in rental units.

Since the submission of the 2012 Attainment Plan, the Clean Air Ordinance has been revised to include:

- Expanded code enforcement, public outreach and education to improve woodstove operation and minimize emissions, and educational diversion program for first-time smoke violations.
- ASTM Fireplace Standard for New Construction.

All RWC control strategies from the 2012 Attainment Plan will be continued, along with those added since the submission of the Attainment Plan. More specifics regarding the prohibition of residential open burning outside of open burning windows, mandatory woodstove curtailment during air stagnation episodes and opacity standards can be found in the Klamath Clean Air Ordinance, Chapter 406, 63.06 of the County Code. The Ordinance is also included in **Appendix 4**.

Woodstove changeouts

DEQ and Klamath County have been conducting woodstove changeouts by replacing old uncertified stoves with cleaner burning units over the past three decades and this work is ongoing. In 2019, DEQ funded the changeout of 50 stoves in the Klamath NAA with one-time funding. Credit was taken in the EI for these changeouts. Woodstoves will continue to be replaced with cleaner heating systems such as electric heat pumps or natural gas furnaces through the Klamath Falls Targeted Airshed Grant (TAG). The first round of TAG funding provided \$1.8 million in EPA funding, which is projected to fund the changeout of 120 woodstoves and the weatherization of approximately 125 homes. This program will continue to be implemented from 2021-2025. DEQ also successfully applied for a second round of TAG funding and received a \$4.67 million award to be spent from 2024-2028. Between both rounds of TAG funding and additional DEQ stove removal projects as described above, a total of 411 woodstoves will be replaced by 2028 with a total of 19.43 tons per year of reduced PM2.5 emissions.

Additional woodstove changeouts may be funded by legislative funding. There has been an ongoing budget note in DEQ's biennial budget since 2009 that has been consistently renewed since that time, with funding ranging from \$77,000 to \$130,000 per year. Klamath typically has received approximately 26% of that funding annually. The funding isn't explicitly guaranteed to continue, so no emissions reductions credits were taken in the EI—but DEQ intends to continue to use those funds to reduce woodsmoke in the Klamath Falls NAA.

HeatSmart

In 2010, a statewide requirement mandating the removal of an uncertified stove at the time of home sale went into effect. This statewide rule closely mirrored the existing requirement in the Klamath County ordinance. Under the rule, all uncertified devices that are on the property being sold (including residences, shops, garages, and outbuildings) must be removed at the time of home sale. With the Heat Smart requirement and through the natural attrition of people wanting to upgrade or replace their old device on their own, there will continue to be old stoves replaced. Since 2017, Heat Smart records show that 7 additional uncertified stoves have been removed and destroyed in the Klamath Falls area. Emissions reductions credit was taken in the EI for this Control Measure.

Klamath Clean Air Ordinance

Much of the emissions reductions work in this sector is achieved through implementation of Klamath County's Clean Air Ordinance, found in Chapter 406, 63.06 of the County Code.

The ordinance includes provisions restricting open burning. Open burning in the Klamath Falls nonattainment area is now restricted to just 15 days in the fall and 15 days in the spring, outside of the typical season days during the PM season. The county also has the option to not open a fall window at all if conditions warrant it. In addition, the ordinance prohibits the use of burn barrels in the nonattainment area. In addition, the ordinance prohibits any agricultural burning

on red and yellow days. Klamath County's health and environment staff monitor and enforce the open burning regulations as necessary. The open burning program also includes an effort for public outreach and education. Program staff makes field visits to homeowners to provide educational materials, warnings, and citations, as needed. Emissions reductions credit was taken for this Control Measure because it completely restricts residential open burning in the NAA during typical days of the PM winter season.

Additions to the Ordinance since the 2012 Attainment Plan include public outreach and education to improve woodstove operation and minimize emissions, expanded code enforcement and educational diversion program for first-time smoke violations. These control strategies were memorialized in the 2012 Plan as "public awareness." Starting in 2014, Klamath County used DEQ funding to enhance existing educational strategies regarding reducing woodsmoke and the proper use of woodstoves. Klamath County provides programs such as hands-on demonstration of wood stove use, wood smoke health effects information dissemination, videos on public access and government websites, and outreach to teach homeowners about appropriate wood selection. All residents with an exemption allowing them to burn wood for heat during curtailment periods are required to review BurnWise materials and use a moisture meter. Klamath County also oversees the School Flag program, in which the County provides educational materials for use in schools and assists students with efforts to raise awareness about red advisory days. Lastly, Klamath County participates in an average of 6 community events a year to conduct outreach regarding wood burning. While there were some limitations in 2020-2021 due to COVID-19, these efforts are ongoing and were reinitiated starting in September 2022.

In addition to educational programming, funding from DEQ increased enforcement of woodstove curtailment considerably. Starting during 2012-2013, Klamath County initiated patrols on every red day and on all days during the established open burning window. Accordingly, the number of patrol days increased from 71 to 108. Since 2013, this practice has been continued and the number of patrol days continues to average 100 or more days per year during all red days and open burning windows. No emissions reduction credit was taken for this educational programming or expanded code enforcement in the Emissions Inventory.

Lastly, an ASTM Fireplace Standard for New Construction was listed as a future Control Measure in the 2012 Attainment Plan. This Measure would require that fireplaces in newly constructed homes be built using the most stringent ASTM standard for fireplaces. This requires that all fireplaces in new construction emit no more than 5.1 g/kg of PM_{2.5}, as confirmed by ASTM test method E2558. When amendments to the Klamath Clean Air Ordinance went into effect on December 31 2012, this Standard became enforceable and is carried out by the Klamath County building codes department in issuing permits for fireplace construction in new homes. This measure continues to apply to all new construction in Klamath County. No emissions reduction credit was taken for this Control Measure.

Prescribed fire

The combination of increasing global temperatures and more prolonged and severe droughts over the past decades are creating favorable wildfire conditions. Larger and more intense wildfires are producing a lot of smoke. This is a big problem in Oregon, and across the country, given that pollution from wildfire smoke makes up an increasing share of total air pollution. Prescribed burning is an important management tool used to improve forest health and reduce the size and impact of wildfires. Although prescribed burning is the highest source of PM_{2.5}

emissions on a typical season day, as summarized in Figure 4, ground level impacts to the NAA from smoke are rare. In the last decade, the Klamath Falls NAA has experienced a total of two smoke intrusions from prescribed fires.

Prescribed burning is managed through the Oregon SMP (detailed in OAR 629-048-0001 through 629-048-0500), which was approved into Oregon's State Implementation Plan by EPA on June 24, 2021 (86 FR 10220). DEQ collaborates with the Oregon Department of Forestry (ODF) to develop and implement the SMP. Klamath Falls is a Smoke Sensitive Receptor Area (SSRA), which receive the greatest level of protection under the SMP. Additionally, Klamath Falls is designated as a Special Protection Zone (SPZ), which further restricts prescribed burning to reduce the likelihood of smoke intrusions in the NAA during the winter.

Designation as an SPZ restricts prescribed burning in the Klamath Falls NAA from November 15-February 15. These restrictions include curtailed burning on red days, tailored forecasting practices and intermittent monitoring after ignition. These practices are known to substantially reduce the likelihood of smoke intrusions into nearby communities. More information about specific restrictions can be found in OAR 629-048-0135 and in the [Operational Guidance for the Oregon Smoke Management Program](#).

Permitted industrial emissions

Permitted stationary source emissions are another significant source of emissions on typical season days. The installation of Maximum Available Control Technology (MACT) for particleboard and hardboard facilities significantly reduced PM_{2.5} emissions. MACT compliance was required by 2007, although Collins Forest Products and Jeld-Wen applied for an extension and complied with the MACT by 2009. Although the control technology required under MACT was intended to address hazardous air pollutants, there were also reductions in PM_{2.5} emissions. The MACT requirements provide the reasonably available reductions for PM_{2.5} for these sources, so DEQ considers this to be RACT.

In addition to MACT compliance, DEQ has ensured that all permitted facilities emitting 10 or more tons per year of PM_{2.5} have implemented RACT measures, specifically: opacity limits, fugitive emissions plans and operations and maintenance best practices. These measures can be found in OAR 340-240-0510 through -0530. All industrial facilities meeting this description implemented RACT measures by July 1, 2013, as described in the 2012 Attainment Plan. All of these measures continue to apply to industrial sources of PM_{2.5}.

Mobile sources

Mobile source emissions are much less significant sources of emissions in the Klamath NAA than area industrial sources. Klamath Falls is still an isolated, rural area and thus not under the jurisdiction of a Metropolitan Planning Organization. No Transportation Control Measures (TCMs) are currently utilized in the Klamath Falls Nonattainment Area.

Federal regulations requiring increased fuel economy for new cars, trucks and locomotives will continue to reduce mobile source emissions in future years, as summarized in Table 7 of the previous section and described in more detail in **Appendix 3**. Other control measures have included restrictions on winter sanding and street paving in the Klamath Falls NAA to reduce re-

entrained road dust. While some street paving continued past the 2017 base year, no future street paving projects are planned and thus it is not a continuing Control Measure. Winter sanding continues to be a control measure; the winter sanding agreement remains in effect. DEQ has report data from 2012-2021 and will continue to receive reports. More information on winter sanding practices can be found in **Appendix 6**. No emissions reductions were taken for road paving and winter sanding.

Transportation conformity

Transportation Conformity ensures that air pollution from on-road mobile sources such as cars and trucks in the Klamath Falls NAA will not cause new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS. Federal transportation conformity rules and regulations 40 CFR Parts 51 and 93 require the evaluation of potential changes to on-road emissions within Klamath Falls NAA that may be caused by proposed federally funded highway and transit projects for a 20-year period, following approval by EPA of the Maintenance Plan. Under conformity, emissions resulting from highway and transportation projects cannot exceed the allowable emissions level established for transportation in the air quality plan known as the motor vehicle emissions budget (MVEB). The MVEB ensures that on-road transportation activities within Klamath Falls NAA will not violate overall air quality standards. DEQ's transportation conformity rules and process can be found in Oregon Administrative Rule 340, Division 252. For this current plan, DEQ is only required to provide MVEB based on typical season day emissions from onroad mobile sources. DEQ did not include re-entrained road dust for this plan due to its insignificant contribution to overall PM_{2.5} emissions within the NAA. The previous SIP Plan (2012) used the highest emissions, worst-case day (2014), to establish the MVEB for onroad emissions sources including re-entrained road dust.

A motor vehicle emissions inventory was developed for the Klamath Falls NAA maintenance plan for the 2017 attainment year and 2037 future year. Onroad mobile source emissions were estimated by DEQ using EPA's MOVES3.1 model. Re-entrained road dust emission estimates were developed using daily VMT from the model runs, and emission factors developed by DEQ using EPA AP-42 formulas. The 2037 typical season day emission estimates from the motor vehicle EI (MVEI) were used to create the 2037 MVEB. See **Appendix 3** for further MVEI development details.

The MVEB for this plan was established using 2037 onroad PM_{2.5} and NO_x emission estimates from the MVEI and safety margins developed by DEQ in consultation with EPA, FHWA and ODOT during the interagency consultation process, as required by OAR 340-252-0060. Based on interagency consultation in August 2022, the process for developing safety margins and application of a portion of woodstove emissions was agreed upon and applied to 2037 MVEI onroad mobile source emissions to set the budget. DEQ calculated these safety margins for onroad mobile sources only based on percent change from 2017-2037 for both PM_{2.5} and NO_x typical season day emissions and then divided it in half. The percent change provides a moderate cushion for PM_{2.5} and NO_x emissions within the NAA. The safety margin was applied to the 2037 MVEI onroad mobile emissions to calculate an increase that would cover any future transportation projects. DEQ did not include re-entrained road dust in the MVEB because overall mobile emissions are not a significant source of PM_{2.5} emissions within the NAA. See **Appendix 3, Section 2, Formulas 1 and 2** for details regarding the development of the safety margin and application to create MVEB estimates.

DEQ decided to go a step further by providing additional cushion using a portion of woodstove emission reductions projected between 2017 and 2037 for the MVEB. DEQ applied the onroad mobile source safety margins, 9% for PM_{2.5} and 23% for NO_x, to get a portion of woodstove emission reductions to allocate towards the MVEB. This re-assignment of a portion of PM_{2.5} and NO_x emissions to the MVEB is possible due to the removal of stoves from 2017 through 2037. These removals include 354 stoves via two rounds of EPA TAG funding and 57 stoves based on 2019 state funding and DEQ's Heat Smart program. DEQ applied the safety margins against the difference in PM_{2.5} and NO_x emissions between 2017 and 2037 for residential woodstoves and added that portion back to the MVEB. These additional emissions will help cover any uncertainty or other potential changes in modeled transportation network, regional policy, and economic conditions that might impact PM_{2.5} and NO_x emissions within the NAA. 2017 emissions and air monitoring indicate that Klamath Falls NAA is already in attainment; therefore, if we set MVEB at these levels then the NAAQS and 2017 attainment year emissions should not be violated if emissions from planned transportation projects or more extensive economic growth does not exceed this budgeted amount. See **Appendix 3, Section 2, Formula 3** for further details on how the portion of woodstove reductions were calculated.

Table 12 below reflects 2017 attainment year and 2037 future year emissions, and 2037 MVEB allocated emissions for onroad and woodstove sectors within the NAA. The 2037 MVEB column includes the adjusted 2037 onroad mobile source emissions based on safety margins and the portion of woodstove emissions reductions from 2017 to 2037.

Table 12: Klamath Falls Non-Attainment Area (NAA) 2037 PM_{2.5} and NO_x Motor Vehicle Budget (pounds/day)

Onroad Category and Woodstove Emissions Reductions	2017 and 2037 Typical Season Day Emissions (lbs/day)							
	2017		2037		2037 MVEB		Safety Margins (%)	
	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx	PM2.5	NOx
Onroad	64	2149	53	1181	58	1447	9%	23%
Woodstove Emissions Reductions	617	64	395	57	20	2	9%	23%
Total Emissions (lbs/day)	681	2214	448	1238	77	1448		

Table 13 below provides a comparison of all emission categories for 2017 attainment and 2037 future years and the established 2037 MVEB for PM_{2.5} and NO_x typical season day emissions. The 2037 MVEB column includes the adjusted 2037 onroad mobile source emissions and portion of woodstove emissions reductions allocated to the budget and all other emission categories set equal to 2037 emission amounts within the NAA. This table demonstrates that substitution of budgeted emissions in place of 2037 Future Year EI onroad mobile source emissions combined with other emission sources also emitting PM_{2.5} and NO_x within the NAA will not exceed the 2017 attainment year emissions.

Table 13: Klamath Falls Non-Attainment Area (NAA) 2017 and 2037 PM_{2.5} and NO_x Emissions by Category including Motor Vehicle Emissions Budget (MVEB)

Typical Season Day (TSD) Emissions			
Pollutants and Emissions Category	Attainment and Future Year EI		2037 MVEB
	2017	2037	
	(lbs/day)		
PM_{2.5}-Primary			
Nonpoint Sources	1191	994	994
Events and Natural Sources	2347	2347	2347
Point Sources	1002	1002	1002
Mobile Sources			
Woodstove Emissions Reductions	---	---	20
Onroad Mobile Sources	64	53	58
Subtotal	64	53	77
Re-Entrained Road Dust	189	225	225
Aircraft and Airport Operations	39	41	41
Nonroad Mobile Sources	19	12	12
Locomotives	16	18	18
Mobile Sources Subtotal	328	348	373
PM_{2.5}-Primary Total	4868	4691	4716
NO_x			
Mobile Sources			
Woodstove Emissions Reductions	---	---	2
Onroad	2149	1181	1447
Subtotal	2149	1181	1448
Re-Entrained Road Dust	---	---	---
Aircraft and Airport Operations	558	574	574
Locomotives	550	619	619
Nonroad Mobile Sources	232	95	244
Mobile Sources Subtotal	3490	2469	2885
Point Sources	1551	1281	1281
Nonpoint Sources	656	670	681
Events and Natural Sources	559	559	559
NO_x Total	6256	4980	5407

Maintenance demonstration

Section 175A(a) of the CAA requires that the maintenance plan “provide for the maintenance of the national primary ambient air quality standard for such air pollutant in the area concerned for at least 10 years after the redesignation.” According to EPA guidance in the Calcagni memo, a state may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by conducting modeling that shows that the future mix of sources and emissions rates will not cause a violation of the NAAQS.

To demonstrate maintenance of the 24-hour PM 2.5 NAAQS for ten years from redesignation, DEQ projected annual and typical season day emissions inventories for PM_{2.5}, NO_x, SO_x, VOC, and NH₃ for 2027, the interim maintenance year, and 2037, the ten-year maintenance demonstration year. The attainment inventory shows a reduction in emissions between 2017-2037, which demonstrates that the area will continue to maintain compliance with the 24-hour PM_{2.5} NAAQS. Because the 24-hour PM_{2.5} NAAQS is a daily standard, it is appropriate for the maintenance demonstration to be in the form of a daily emissions inventory comparison. For a more detailed description of the attainment inventory, see Section V.

There are three additional key commitments to ensure continued maintenance of air quality health standards through at least 2037:

- Continued operation of the PM_{2.5} monitoring network;
- Verification of continued maintenance of the 2006 24-hour PM_{2.5} air quality health standards; and
- Contingency plan to implement if necessary to ensure maintenance of PM_{2.5} standards.

Commitment to continue air monitoring network

DEQ will continue operation of the PM_{2.5} monitoring network as outlined in the Annual DEQ Ambient Air Monitoring Network Plan and summarized in Section IV of this document. Any modifications to the monitoring network will be done in consultation with EPA Region 10.

Verification of continued maintenance of standards

DEQ will continue to provide quality-assured air quality data from the previous calendar quarter and upload it to the EPA Air Quality System (AQS) within 90 days of the end of each quarter to verify continued compliance with the NAAQS. DEQ will provide informational flags (IT) for any days it considers to be influenced by Exceptional Events such as wildfire smoke impacts.

DEQ will review the air monitoring results and design value each year to verify continued attainment. DEQ will determine annually if Exceptional Events influenced the continued attainment of the 2006 24-hour PM_{2.5} NAAQS and need to be documented. If needed, Exceptional Events documentation will be submitted to EPA Region 10 for review.

Contingency plan

CAA section 175A(d) requires that a maintenance plan also include contingency provisions, as necessary, to promptly correct any violation of the NAAQS that occurs after redesignation of the area to attainment. For the purposes of CAA section 175A, a state is not required to have fully

adopted contingency provisions that will take effect without further action by the state in order for the maintenance plan to be approved. However, the contingency plan is an enforceable part of the SIP and should ensure that contingency provisions are adopted promptly once they are triggered. The state should also identify the specific indicators, or triggers, which will be used to determine when the contingency plan will be implemented.

If real time monitored PM_{2.5} levels exceed 35 µg/m³ (24-hr average), DEQ will assess the probable emissions and meteorological events contributing to elevated PM_{2.5} levels, including information on wildfires or winter power outages. The agency will work to determine the cause of the exceedance within 6 months after annual data certification.

DEQ and Klamath County will confer to discuss the exceedances and determine if:

(a) elevated PM_{2.5} levels were caused by an event that is unlikely to occur again within the maintenance planning timeframe, or (b) high PM_{2.5} levels were caused by an uncontrollable event such as a wildfire.

At this point, if prescribed burning were determined to be a contributor to the single exceedance of the 35 µg/m³ 24-hour PM_{2.5} standard, existing rules related to prescribed burning would be implemented by DEQ and ODF as contingency provisions. The prescribed burning restrictions for the SPZ described in Section VI would be extended for a longer season from November 1 – March 1, and would expand the SPZ boundaries to include additional areas where burning is determined to be a contributor to violations of the standard. ODF would also require landowners to meet more extensive burning reporting requirements, and ODF and DEQ would undertake adaptive management steps as described in OAR 629-048-0110. This process is fully described in OAR 629-048-0137.

DEQ commits to work with Klamath County to implement necessary contingency provisions no later than one year after data from a single year exceeds the 24-hour NAAQS standard based on confirmed quality assured data. Any contingency provisions adopted and implemented will become part of the next revised maintenance plan submitted to the EPA for approval.

DEQ has identified the following additional potential contingency provisions for the Klamath Falls maintenance plan:

- Development of Red Day Plans for industrial sources of PM_{2.5} with Title V permits to be implemented on non-wildfire related predicted red days when and if the Klamath Falls Contingency Plan goes into effect;
- Development of updated RACT measures for industrial sources with the capacity to emit more than 50 pounds per day of PM_{2.5};
- Continuing to fund wood stove changeouts within the Klamath Falls nonattainment area;
- Use of application process for debris burning or agricultural burning to spread out incidents of burning and limit exceedances;
- Development of a street sweeping plan with local highway districts and the Oregon Department of Transportation to prioritize the reduction of fugitive road dust, and
- Additional street paving projects.

Redesignation to attainment

As outlined in Section III of this document, the EPA approval of this maintenance plan and redesignation request will satisfy the requirements of the federal Clean Air Act in Section 107 [CAA §107(d)(3)(E)] and the Klamath Falls NAA will then have a fully approved maintenance plan ensuring continued attainment of the 2006 24-hour PM_{2.5} standard for at least ten years beyond redesignation. This would begin a 20-year planning cycle designed to ensure that the Klamath Falls airshed remains in continued attainment with the national 2006 24-hour PM_{2.5} air quality health standard. This maintenance plan covers the first ten years of that planning cycle. The Clean Air Act requires a second 10-year maintenance plan in the future to complete the 20-year planning cycle.