



Oregon Department of Environmental Quality

Demonstration of Noninterference PM NAAQS Under Section 110(I) of the Clean Air Act for Proposed Revision to Allow Outdoor Burning of Woody Yard Trimmings in Lowell, Oregon During Winter Months

LRAPA Title 47 Open Burning Rulemaking

May 2024

Introduction

The City of Lowell and the Lane Regional Air Protection Agency (LRAPA) are proposing a revision to LRAPA's rules in Title 47 - Outdoor Burning, to allow outdoor burning of woody yard trimmings in Lowell during the winter months of November through February, and to extend the spring burning season through June 15th.

**The request for the extension of the spring burn season for an extra 15 days is a housekeeping measure to align the Lowell spring burn season with the rest of Lane County. All other areas in Lane County that allow spring burning end the spring burn season on June 15th, or sooner, depending on the wildfire danger. The summer season is closed to outdoor burning for fire danger reasons and not for air quality related issues.*

Currently, outdoor burning is prohibited in Lowell from November through February. This prohibition was initially put in place to meet the desire of the City of Lowell. However, this has created confusion and tension due to adjacent properties outside Lowell where wintertime outdoor burning is permitted on LRAPA approved burning days. LRAPA believes this proposed revision will not interfere with attainment or maintenance of the National Ambient Air Quality Standards (NAAQS) or with other applicable CAA requirements. Trend analyses, presented below, demonstrate stable or improving PM levels in recent years, indicating capacity exists to accommodate the small increases in emissions expected from the additional outdoor burning.

Proposed Title 47 rule change

LRAPA is proposing revisions to two sections under Title 47 - Outdoor Burning, specifically Section 47-015(2) Residential Outdoor Burning Requirements, which currently prohibit outdoor burning of woody yard trimmings within Lowell city limits during winter months.

~~(g) — (g) — Outdoor burning within Lowell city limits and surrounding Lowell urban growth boundary is prohibited November through February except that burning of woody yard trimmings is allowed on approved burn days from March 1 through May 31 and October 1 through October 31.~~

~~(h)(g) Outdoor burning is prohibited within the Coburg, Cottage Grove, Creswell, Dunes City, Junction City, Lowell, Veneta, and Westfir city limits except for the outdoor burning of woody yard trimmings on approved burn days from October 1 through June 15.~~

Figure 1: Proposed Amendments to LRAPA Title 47 - Outdoor Burning Regulations

These rule changes will enable residents within Lowell city limits to conduct outdoor burning of woody yard trimmings during winter months under the same regulations as residents in surrounding areas within LRAPA’s jurisdiction.

The revisions may result in increases in PM emissions due to additional days of allowable burning. However, the quantity of emission increases as well as LRAPA’s sustained efforts to prohibit outdoor burning on stagnant days ensure continued attainment of PM NAAQS, which is described in greater detail in the following sections.

Monitoring against the NAAQS

LRAPA’s monitoring network meets the minimum requirements set out in 40 CFR Part 58 for the Eugene-Springfield metropolitan statistical area (MSA), which includes Lowell. Regulatory monitors in Eugene, Oakridge, and Cottage Grove adequately represent ambient PM_{2.5} concentrations for the entire MSA. Regulatory monitors in Eugene and Oakridge meet the network design criteria for monitoring PM₁₀. Historical data shows that the PM_{2.5} standard would be violated before the levels began to approach the PM₁₀ standard. An analysis of the air monitoring data underscores the effectiveness of LRAPA’s existing programs and measures, providing a compelling foundation for the proposed amendment to Title 47 - Outdoor Burning.

While there are no direct federal reference method (FRM) monitors located in Lowell, surrounding regulatory monitors provide coverage of the broader airshed including Lowell. The Eugene air monitoring site is located roughly 15 miles northwest of Lowell, Cottage Grove is 15 miles southwest, and Oakridge is 20 miles southeast. Lowell falls within the same CBSA and maintenance area designation for particulate matter as Eugene and Springfield. This arrangement is deemed adequate, as outlined in 40 CFR Part 58 for the Eugene-Springfield MSA.

For localized monitoring specifically in Lowell, a low-cost consumer grade PurpleAir sensor installed at Lowell’s Junior Senior High School provides community-level PM_{2.5} data. Analysis of winter data from this sensor corroborates regional monitors and shows no significant concerns regarding NAAQS thresholds in Lowell during the months of proposed increased burning.

The analysis of the gathered data illuminates three pivotal aspects that substantiate the feasibility of the proposed amendment to Title 47 - Outdoor Burning:

1. Maintenance of NAAQS Compliance for PM_{2.5} from the Eugene 99, Cottage Grove, and Oakridge FRM/FEM samplers and nephelometers:

The continuous monitoring conducted at these locations affirms the maintenance of NAAQS compliance for PM_{2.5} levels. The data extracted from these locations serve as a reliable indicator of the broader air quality dynamics, encompassing Lowell.

2. **The Lowell Consumer-Grade Sensor Indicates Favorable Conditions:**
The utilization of a low-cost consumer-grade Purple Air (PA) Sensor at Lowell’s Junior Senior High School offers a closer analysis of PM_{2.5} levels within the community. The data analyzed from this sensor underscores favorable conditions, with no significant concerns regarding approaching NAAQS thresholds, especially during the proposed outdoor burning period in winter.
3. **Design Value (DV) of Wintertime PM Concentrations Shows Adequate Margin for Additional Emissions in Winter:**
An estimated DV, calculated from the Purple Air Sensor data, demonstrates an adequate margin for managing the relatively minor increments in emissions expected from additional burning days in winter. This analysis reaffirms the region's capacity to accommodate the proposed outdoor burning revisions during winter months, without breaching NAAQS thresholds.
4. This multifaceted approach to monitoring, encompassing both standardized and localized data collection methods, fortifies the rationale for the proposed amendment. It reflects a thorough understanding and management of air quality dynamics, ensuring that the proposed changes to outdoor burning regulations during winter months in Lowell align with the overarching goal of maintaining compliance with NAAQS and other applicable Clean Air Act requirements.
5. The following sites were used for the analysis;

Site Name	AQS ID
Cottage Grove City Shops (CGCS)	410399004
Eugene Hwy 99 (E99)	410390058
Oakridge (OAK)	410392013

Table 1 below shows the maximum PM₁₀ values during Q1 and Q4, the winter months that are affected by the proposed change, for Eugene and Oakridge for the past 10 years. The values show that both Eugene and Oakridge are meeting the current PM₁₀ NAAQS with a very wide margin of safety. This data set does not include Q2 and Q3 data that might include wildfire influenced levels that are not part of the home wood heating season.

Table 1: Max PM₁₀ Values

Year	E99 Q1	E99 Q4	OAK Q1	OAK Q4
	Max ug/m3	Max ug/m3	Max ug/m3	Max ug/m3
2014	31	42	51	29
2015	31	31	37	25
2016	25	21	25	30

2017	56	52	42	55
2018	38	59	36	42
2019	43	46	45	41
2020	34	46	38	40
2021	44	28	30	18
2022	39	46	32	35
2023	44	39	40	29

Table 2 shows the maximum PM_{2.5} values during Q1 and Q4. These are the winter months that include the home wood heating (HWH) season that would be affected by the proposed change.

Table 2: Max PM_{2.5} Values

Year	CGCS Q1 Max ug/m3	CGCS Q4 Max ug/m3	E99 Q1 Max ug/m3	E99 Q4 Max ug/m3	OAK Q1 Max ug/m3	OAK Q4 Max ug/m3
2014	15.6	34.0	43.6	39.5	46.1	41.1
2015	20.1	27.6	23.5	42.1	34.2	39.3
2016	26.2	26.2	18.0	14.6	26.8	30.7
2017	27.7	21.1	42.5	46.8	35.7	41.6
2018	19.4	25.5	24.7	45.6	35.3	33.2
2019	21.6	29.1	30.9	30.1	42.0	36.7
2020	12.9	16.8	21.8	31.2	31.9	33.6
2021	16.4	17.5	31.5	18.7	23.2	16.9
2022	17.4	34.5*	31.9	41.5*	26.0	34.9*
2023	21.0	27.7	31.5	35.4	38.6	24.6

*Wildfire related values >35 ug/m3 in Q4 were removed

Table 3 shows the last 10 years for the Annual PM_{2.5} design values for Lowell (using purple air data), Cottage Grove, Eugene, and Oakridge. All wildfire data that is > 12 ug/m3 is excluded from this data (*The standard was revised on February 7, 2024 from 12 to 9 ug/m3*). Even though the exceptional events rule only allows for regulatorily significant values to be removed, all wildfire influenced values > 12 ug/m3 were removed to demonstrate the headroom available for meeting the Annual PM 2.5 NAAQS. These values show that all areas are meeting the current Annual PM_{2.5} NAAQS of 9 ug/m3.

Table 3: Annual DV Excludes WF Data >12 ug/m3

	Lowell*	CGCS	E99	OAK
	PA ug/m3	FRM/FEM ug/m3	FRM/FEM ug/m3	FRM/FEM ug/m3
2014		7.0	7.3	8.9

2015		7.1	7.7	9.4
2016		6.7	7.0	8.5
2017		6.6	7.0	8.1
2018		6.7	7.1	8.0
2019	3.0	7.2	7.9	8.8
2020	2.5	7.0	7.7	8.4
2021	2.7	6.4	7.0	7.6
2022	2.5	6.4	7.0	7.2
2023	2.6	6.6	7.4	7.5

*estimated from PA sensor data.

Table 4 shows the current daily PM_{2.5} design values, excluding wildfire data >35 ug/m³, for Lowell, Cottage Grove, Eugene, and Oakridge. All areas are currently well within the daily PM_{2.5} NAAQS when wildfire data > 35 ug/m³ is removed. Even though the exceptional events rule only allows for regulatorily significant values to be removed, all wildfire influenced values > 35 ug/m³ were removed to demonstrate the headroom available for meeting the 24-hour NAAQS.

Table 4: Daily DV Excludes WF Data >35 ug/m³

	Lowell*	CGCS	E99	OAK
	PA ug/m ³	FEM ug/m ³	FEM ug/m ³	FEM ug/m ³
2014		21	30	40
2015		22	32	37
2016		20	24	31
2017		19	25	29
2018		21	27	29
2019		21	31	34
2020		20	33	31
2021	11	18	23	27
2022	11	18	22	23
2023	10	19	24	23

*estimated from PA sensor data.

Table 5 compares the purple air PM_{2.5} values at Lowell to the below FRM/FEM samplers showing that Oakridge had the best correlation to Lowell when including wildfire data.

Table 5: Lowell Purple Air Comparison to FEM, Includes Wildfire Data

	CGCS	E99	OAK
Slope	0.116549	0.114854	0.754707
Int.	5.886705	6.836179	4.984422

Rsq	0.460486	0.420282	0.869767
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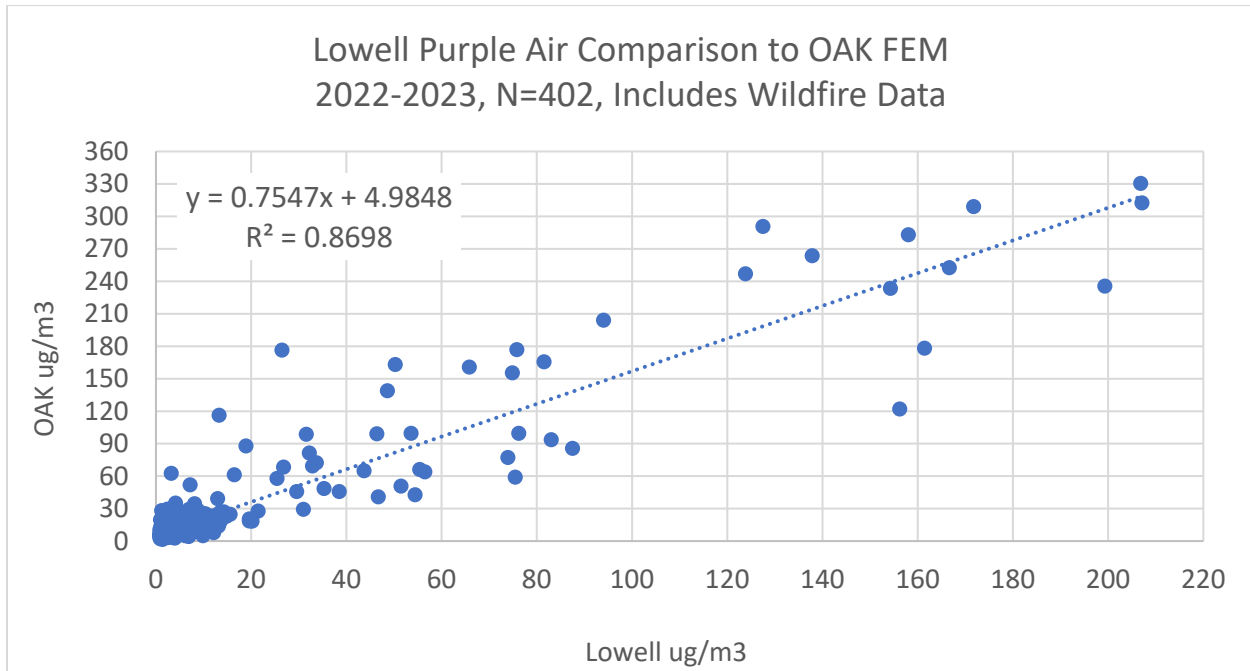


Figure 2: Lowell Purple Air Comparison to OAK FEM, 2022-2023, N=402, Includes Wildfire Data

When excluding wildfire data, the correlation to the sites was not very promising. The values without wildfire were low and did not compare well. However, the low values add to the argument that allowing outdoor burning in Lowell during the winter will not cause PM levels to exceed the NAAQS.

Table 5: Lowell Purple Air Comparison to FEM, Excludes Wildfire Data

	CGCS	E99	OAK
Slope	0.47769	0.602693	0.536944
Int.	3.88153	4.398734	5.445953
Rsq	0.287501	0.306841	0.224595

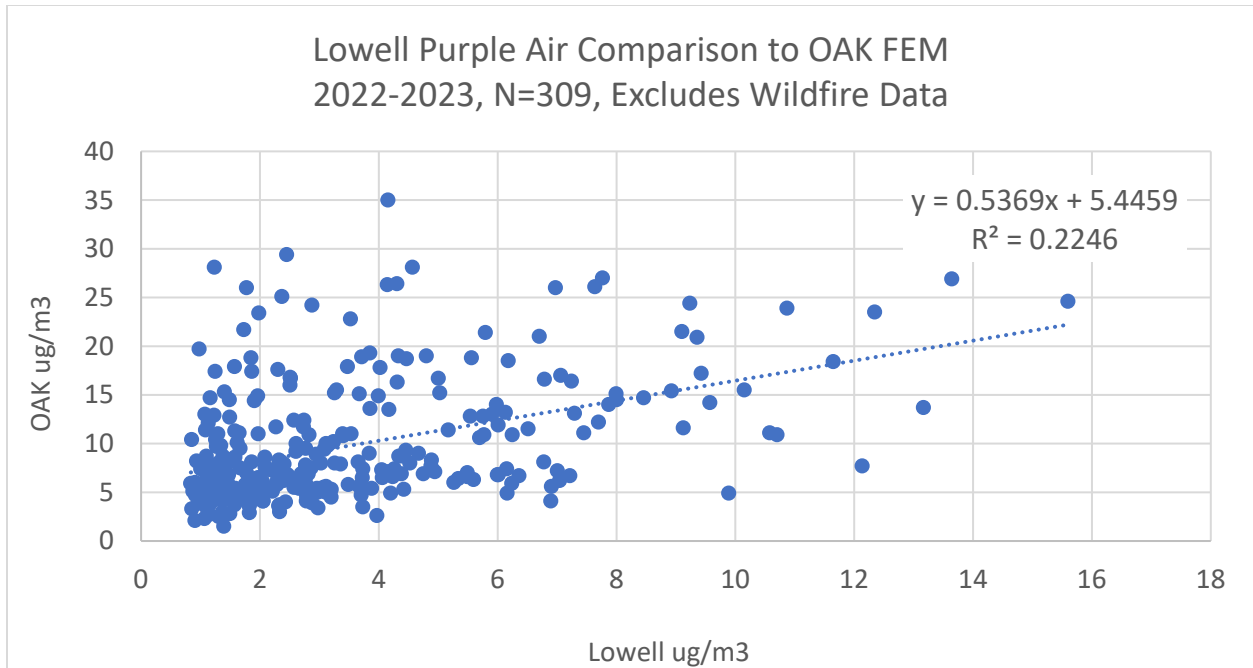


Figure 3: Lowell Purple Air Comparison to OAK FEM 2022-2023, N=309, Excludes Wildfire Data

NAAQS considerations

The consideration of the NAAQS is important ahead of proposing the amendment to LRAPA's rules in Title 47 - Outdoor Burning. This proposed revision to allow increased outdoor burning focuses on demonstrating noninterference specifically with the PM NAAQS. The 24-hour and annual PM_{2.5} standards are most relevant, along with the 24-hour PM₁₀ standard. The improving PM_{2.5} trend for the Eugene-Springfield MSA, including Lowell, in recent years provides confidence that these levels will continue being met with the relatively minor emissions increases from additional winter biomass burning.

Other criteria pollutants, such as ozone, NO₂, SO₂, CO, and lead, are not expected to be impacted by the small, proposed increase in wood smoke as biomass smoke emissions mainly consist of particulate matter.

LRAPA's established curtailment program, daily burning advisory, collaborative efforts with local fire protection agencies, a stringent permit process, and enforcement measures provide an established framework to mitigate air quality impacts from outdoor burning year-round.

Over the past five years, during the full months of November, December, January, and February, outdoor burning was prohibited for a total of 58 days in unincorporated Lane County due to unfavorable meteorological conditions. Residents of Lowell would be required to refer to this curtailment category before initiating outdoor burns following the approval of this rule change. In the same timeframe, LRAPA has taken only one enforcement action against a resident in Lowell for violating outdoor burning regulations.

These multi-faceted considerations fortify the rationale for the proposed amendment, indicating a comprehensive strategy for maintaining air quality standards while accommodating controlled outdoor burning during the winter months in Lowell.

1. The Oregon Department of Environmental Quality (DEQ) perspective on NAAQS: DEQ recognizes the need for a balanced approach that protects air quality while allowing for responsible outdoor burning practices. DEQ supports the overall efforts by LRAPA to maintain compliance with the National Ambient Air Quality Standards (NAAQS) through the proposed revisions to Title 47 - Outdoor Burning.

At the state level, DEQ implements Oregon Smoke Management Plan rules and requires smoke management plans for larger prescribed burns (OAR Chapter 629, Divisions 48 and 97). These include the Oregon Smoke Management Plan, smoke management rules for agricultural burning, and requirements for smoke management plans for prescribed burning. DEQ reviews and issues permits for larger prescribed burns to ensure they are conducted under favorable weather conditions using emission reduction techniques. During wildfire season, DEQ works closely with partner agencies to monitor air quality impacts and issue health advisories.

LRAPA retains sole authority to enforce local outdoor burning regulations under Title 47 within their jurisdiction. Public outreach on proper burning practices is also advised to minimize smoke impacts on neighbors. With LRAPA's daily curtailment program and stringent permitting process, DEQ concurs that the proposed revisions appear unlikely to interfere with maintenance of the NAAQS in the Lowell area during winter months. DEQ looks forward to continued partnership with LRAPA on protecting Oregon's air quality.

2. Established Curtailment Program:
LRAPA's daily burning advisory and curtailment program serves as an effective safeguard by restricting outdoor burning during unfavorable conditions. The program strategically utilizes meteorological data to foresee days when additional smoke could compound and cause air quality issues. On declared curtailment days, all outdoor burning is prohibited, including pile burning of woody yard trimmings. Residents are required to adhere to daily burn advisories before igniting permissible burns. Despite the proposed increase in allowable winter burning, LRAPA's curtailment notifications will continue mitigating wintertime air quality impacts by preventing uncontrolled smoke during adverse conditions.

Rigorous enforcement also bolsters the curtailment program's efficacy. Two dedicated staff investigate air quality complaints year-round, including issues related to outdoor burning. This oversight and commitment to education and compliance assurance ensures burning remains within acceptable limits.

The curtailment notifications and enforcement capacity provide confidence that the slight PM emissions increase from expanded winter backyard burning in Lowell can be accommodated without significant air quality degradation or interference with NAAQS attainment.

3. Daily Burning Advisory:
LRAPA issues a daily burning advisory at 7:00 PM for outdoor burning during the following calendar day. The advisory informs residents on the expected ventilation conditions. On days when burning is allowed, residents must adhere to the permissible

hours and extinguishment deadlines set in the advisory, as well as any additional requirements stipulated by their fire district permit. The advisory expressly prohibits ignition of new fires once the end time for a given day is reached.

4. Air Quality and Fire Season Restrictions:

The cooperation between LRAPA and the Lane County Fire Defense Board, as well as the Oregon Department of Forestry (ODF) local fire protection agencies in issuing temporary burn restrictions during different seasons further exemplifies the concerted effort to maintain air quality and fire safety. LRAPA's air quality restrictions are proactive, curbing residential outdoor burning when stagnant air and poor ventilation conditions prevail. Additionally, fire hazard restrictions by local fire agencies, although primarily aimed at fire prevention, also contribute to controlling outdoor burning, especially during summer and early fall, when fire risks are high.

5. Types of LRAPA Permitted Outdoor Burns:

The stringent permit process for outdoor burning under LRAPA's jurisdiction ensures that only controlled, approved burns occur, minimizing unauthorized or hazardous burning practices. This approach, coupled with the categorization of burns and the explicit listing of prohibited materials in 47-015(1)(e), further reiterates LRAPA's dedication to controlling substances that contribute to air pollution.

Quantification of Expected PM Emissions Increase

The proposed revisions to allow additional outdoor burning of woody yard trimmings in Lowell during winter months may result in minor increases in particulate matter emissions.

An analysis of the historical outdoor burning advisory from 2015-2024, for the winter months of November through February, shows that on average about 12 days each winter season, or about 10% of available days, burning is prohibited due to predicted air stagnation. For the other 90% of the days available during the winter months, burning is allowed because the predicted weather conditions indicate good ventilation for the day in question. Even on days when burning is allowed, it is limited to the hours of the day when good ventilation is predicted.

Based on the historical data showing that burning is allowed on approximately 90% of winter days (roughly 108 days per season), the proposed rule change could result in up to 108 additional burn days per year in Lowell. Assuming a constant rate of emissions on each burn day, this represents a potential 90% increase (near doubling) in wintertime outdoor burning emissions compared to the current rules. However, as noted above, any additional burning would be limited to days and hours with good ventilation, minimizing the impact on ambient PM_{2.5} levels.

Because outdoor burning is only allowed on days with good ventilation the impact of any additional emissions to the Lowell area would be insignificant and have little to no bearing on compliance with the NAAQS. This can also be inferred by looking at PM_{2.5} data from Cottage Grove (see tables 2, 3, and 4) which includes data from an area that allows outdoor burning during the winter season. This data shows that even including the extra potential for wintertime emissions, the Cottage Grove PM_{2.5} levels are lower than Eugene and Oakridge which prohibit outdoor burning during the winter season.

To quantify the magnitude, PM_{2.5} emissions from all residential outdoor burning in Lane County are estimated at 90.06 tons for the 2020 year of emissions data¹. This represents only 0.69% of the 13,012.90 tons of non-wildfire PM_{2.5} emissions county-wide. And just 0.07% of the 129,197.64 tons of total PM_{2.5} emissions county-wide including wildfire smoke contributions.

Lane County's population in 2021 was 383,189. Removing the population from jurisdictions where outdoor burning would remain prohibited during the winter months (i.e. the Cities of Eugene, Springfield, Florence, and Oakridge) is 133,122. Lowell's population of 1,221 comprises 0.91% of the population with the ability to conduct outdoor burning during winter months within Lane County. Applying the ratio of Lowell's population against the estimated emissions from residential outdoor burning in Lane County equates the community's proportional share of residential burning PM_{2.5} to ~0.82 tons per year.

$$\Delta \text{PM}_{2.5} \text{ Emissions} = \left(\frac{\text{Pop. of Lowell}}{\text{County Pop. of wintertime burning}} \right) \times \text{PM}_{2.5} \text{ OB Emissions}$$
$$0.819 \text{ tons} = \left(\frac{1,221 \text{ pop.}}{133,122 \text{ pop.}} \right) \times 90.06 \text{ tons}$$

Even assuming the rule change doubles Lowell’s residential outdoor burning emissions due to a 90% increase in burning days, the maximum yearly increase would still be under 2 tons of PM_{2.5}. This negligible emissions increase would not jeopardize the area’s continued attainment status for PM_{2.5}. Based on the clear margin between current PM_{2.5} levels and the NAAQS demonstrated through the area’s monitoring data, an addition of less than 2 tons per year in Lowell would not threaten to violate the health standards.

An assumption of emissions doubling is made to conservatively bound the maximum potential increase resulting from additional winter burn days. Even if this doubling overstates the actual expected burning activity, the negligible magnitude demonstrates noninterference.

Continuing this assumption that this rule change doubles Lowell’s residential outdoor burning emissions, contributing around 1.64 tons per year of PM_{2.5}, the comparison of this increase to Lowell’s total PM_{2.5} emissions excluding wildfires provides helpful insight into the protection of the NAAQS. Applying Lowell’s 0.91% population proportion to Lane County’s 13,012.90 tons of total annual non-wildfire PM_{2.5} generates an estimate of 118.42 tons for Lowell’s doubled emissions baseline PM_{2.5} emissions. By applying the same 0.91% proportion to Lane County’s overall non-wildfire emissions, we can project Lowell’s PM_{2.5} doubled emissions baseline.

The percentage change expected from the rule revision can then be quantified as:

$$\Delta\text{PercentChange} = \left(\frac{\text{Assumed Increase In Emissions}}{\text{Projected NonWildfire Emissions for Lowell}} \right) \times 100$$

$$.38\% = \left(\frac{1.64 \text{ tons}}{118.42 \text{ tons}} \right) \times 100$$

Additionally, the potential impact on PM_{2.5} air quality standards can be analyzed through an emissions scaling method. This analysis offers an understanding into whether the increased emissions could push PM_{2.5} levels beyond the NAAQS threshold, which is estimated below.

The combined metrics of percentage change and design value (DV) impact provide perspective on the negligible magnitude of emissions and high likelihood of continued PM_{2.5} attainment under the proposed rule revision.

Emissions Scaling Demonstration PM_{2.5} 24-hour NAAQS

As estimated previously, under the assumption that the proposed rule doubles Lowell’s winter residential burning emissions (due to a 90% increase in burning days), total PM_{2.5} would increase by 1.64 tons per year. Compared to the projected 118.42 tons of doubled emissions baseline non-wildfire emissions, this represents a 1.4% increase from current levels.

The impact of a 1.4% emission rise on PM_{2.5} design values can be modeled by proportionally scaling up Lowell’s emissions baseline reading. Excluding wildfire data, Lowell’s estimated 24-hour PM_{2.5} DV is 10 µg/m³. Applying the projected emissions increase percentage gives:

$$\text{Scaled 24 hour DV} = \text{Baseline DV} \times \left(1 + \frac{\% \text{ increase}}{100} \right)$$

$$10.14 \mu\text{g}/\text{m}^3 = 10 \mu\text{g}/\text{m}^3 \times \left(1 + \frac{1.4\%}{100}\right)$$

Therefore, even under hypothetical doubling of residential burning emissions from the proposed revisions, Lowell's 24-hour DV of 10.14 $\mu\text{g}/\text{m}^3$ would remain well under NAAQS threshold of 35 $\mu\text{g}/\text{m}^3$. Even if there were to be a 10-fold increase in the emissions this would only calculate to a 24-hour DV of 10.69 $\mu\text{g}/\text{m}^3$ still well within the $\text{PM}_{2.5}$ NAAQS. This emission scaling analysis corroborates expectations of continued attainment despite projected incremental emissions rises.

Emissions Scaling for Potential Annual $\text{PM}_{2.5}$ NAAQS Revisions

In addition to the 24-hour standard, the EPA recently lowered the annual $\text{PM}_{2.5}$ threshold to a 9 $\mu\text{g}/\text{m}^3$. Excluding wildfire event days, recent annual design values in Lowell are estimated around 2.6 $\mu\text{g}/\text{m}^3$ based on local sensor data.

To evaluate noninterference under a revised annual NAAQS, current Lowell annual DV can be scaled up proportionally using the same emissions increase percentage:

$$\text{Scaled annual DV} = \text{Estimated Lowell Annual DV} \times \left(1 + \frac{\% \text{ increase}}{100}\right)$$

$$2.64 \mu\text{g}/\text{m}^3 = 2.6 \mu\text{g}/\text{m}^3 \times \left(1 + \frac{1.4\%}{100}\right)$$

The scaled annual DV of 2.64 $\mu\text{g}/\text{m}^3$ is well under even the most stringent end of the proposed revised annual NAAQS range. Even if there were to be a 10-fold increase in the emissions this would only calculate to an annual DV of 2.78 $\mu\text{g}/\text{m}^3$ still well within the $\text{PM}_{2.5}$ NAAQS. This affirms that the small projected emissions increases would not interfere with attainment of the current annual $\text{PM}_{2.5}$ standards.

Conclusion

Based on the reasons described above, LRAPA believes allowing outdoor burning of woody yard trimmings in Lowell during winter months, while continuing to implement its curtailment program and other protective measures, will not interfere with attainment or maintenance of any NAAQS or with other applicable Clean Air Act requirements. Therefore, LRAPA requests that EPA approve this proposed revision to the Oregon State Implementation Plan as meeting the requirements of Section 110(l) of the Clean Air Act.

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