

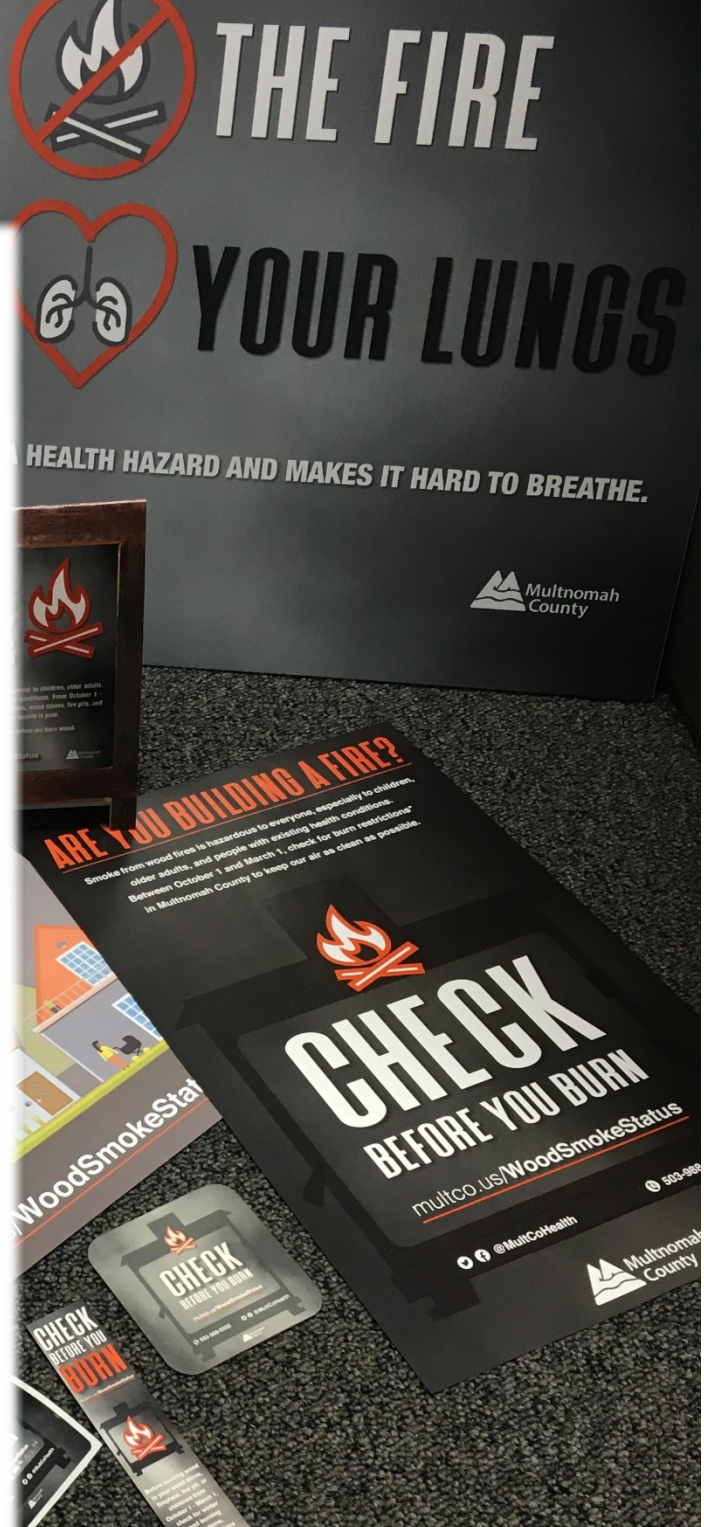
# WOOD SMOKE CURTAILMENT

## 2021-2022 Season Review

A REPORT TO THE  
MULTNOMAH COUNTY  
BOARD OF COMMISSIONERS

COMPILED BY:

Healthy Homes and Communities Team  
Multnomah County Environmental Health  
Services



Full Season

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*This report presents results from the fourth full season of the wood smoke curtailment ordinance for the period October 1, 2021 through March 1, 2022. Activities during the season are guided by a protocol that specifies guidance for air quality forecasting, internal communications, and public notifications. The protocol document is available by request.*

## LIST OF ACRONYMS

COVID-19- Coronavirus Disease 2019  
DCHS- Department of County Human Services, Multnomah County  
EHS- Environmental Health Services  
ESSENCE- Electronic Surveillance System for the Early Notification of Community-Based Epidemics  
EPA- Environmental Protection Agency  
NAAQS- National Ambient Air Quality Standards  
NWS- National Weather Service  
ODEQ- Oregon Department of Environmental Quality  
O3- Ozone  
OEC- Oregon Environmental Council  
OS- Office of Sustainability, Multnomah County  
PAH- Polycyclic aromatic hydrocarbon  
PDES- Program Design and Evaluation Services, Multnomah County/State of Oregon  
PM- Particulate Matter  
PM<sub>2.5</sub>- Particulate Matter (diameter of 2.5 micrometers or less)  
µg/m<sup>3</sup>- Micrograms per cubic meter  
WSFPDX- Wood Smoke Free Portland, community advocacy group

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# 2021-2022 Summary Points

- **The ordinance works: 82% of annual survey respondents are aware of the wood burning curtailment ordinance. Of survey respondents who burn wood, 81% of respondents indicated their wood burning behavior had changed (burned less) as a result of the advisories.**
- **27 advisory days were called (26 voluntary, 1 mandatory) in the winter wood burning ordinance's fourth season running October 1, 2021 to March 1, 2022.**
- **On February 17th, 2022, the Multnomah County Board of Commissioners strengthened the wood smoke ordinance to be year-round.**
- **Additional funds significantly expanded outreach: The Board of Commissioners allocated outreach funds and additional staff capacity that resulted in thousands of additional Multnomah County residents reached and informed of the curtailment ordinance and advisories between Oct 1 2021 and March 1 2022.**

## BACKGROUND

Burning wood is one of the biggest sources of harmful air pollution in Multnomah County. The County made a significant step to reduce that pollution in January 2018, when the Board of Health passed a wood smoke restriction ordinance. This law protects our communities and reduces the risk that wood burning may cause us to exceed federal air quality standards.

### Wood Smoke

Wood smoke is produced when there is incomplete combustion of wood. It is a complex mixture of fine particulate matter (PM<sub>2.5</sub>), carbon monoxide, formaldehyde, nitrogen dioxide, PAHs and other harmful substances. Year round in Multnomah County, residential wood smoke is the third leading source of particulate matter pollution, after wildfires and fugitive dust. When looking at wood smoke producing residential devices, wood stoves account for 62% of PM<sub>2.5</sub> emissions with fireplaces and outdoor burning devices each at 18%.<sup>1</sup>

### Public Health Impacts of Particulate Pollution

When we rely on combustion for heating and ambiance, wood smoke concentrations can increase and make the air unhealthy to breathe. The fine particles contained in wood smoke are so small they can settle deep inside our lungs and even flow through our bloodstream, affecting other parts of our bodies. Health conditions caused or made worse by exposure to wood smoke include heart disease, lung disease, respiratory distress, low birth weight, increased cancer risk, and cognitive impairment. In Multnomah County, residential wood

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<sup>1</sup> Department of Environmental Quality 2017 emissions data.

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smoke accounts for 11% of the excess cancer risk from all area sources of air toxics.<sup>2</sup> Evidence is also emerging showing that greater exposure to PM<sub>2.5</sub> is associated with an increased risk of dementia<sup>3</sup> and years of life lost<sup>4</sup>.

### *Sensitive Populations*

Exposure to wood smoke exacerbates, in both acute and long-term ways, several chronic health conditions which are prevalent in the population, and which disproportionately affect some people. People with diseases that affect their lungs, older adults, children, and people in lower socioeconomic conditions are at greater risk from exposure to wood smoke emissions. The Portland Air Toxics Solutions (PATs) study found that modeled residential wood smoke pollution within the Portland Metro region is generally higher in census block groups with a high proportion of Latinx households, as opposed to all other race/ethnicity demographics evaluated.<sup>5</sup> A national study published in March 2019 links PM<sub>2.5</sub> exposure to human activities responsible for PM<sub>2.5</sub> pollution. The study found that “on average, non-Hispanic whites experience a “pollution advantage”; estimated at ~17% less air pollution exposure than is caused by their consumption. They estimated that Blacks and Hispanics on average bear a “pollution burden” of 56% and 63% excess exposure, respectively, relative to the exposure caused by their consumption.”<sup>6</sup>

### *Wood Smoke and COVID-19*

Exposure to wood smoke may make people more susceptible to respiratory infections, including COVID-19<sup>7</sup>. People with, or recovering from COVID-19, may have diminished lung function. As a result, they might be at particularly high risk of respiratory health effects after exposure to smoke. Evidence suggests that air pollutant exposure may worsen COVID-19 symptoms and outcomes<sup>8</sup>.

## Regulatory Authorities and Wood Smoke

In addition to affecting public health, high PM<sub>2.5</sub> levels can put the County at risk of violating air quality standards set and enforced by the U.S. Environmental Protection Agency (EPA).

### *Federal*

The Environmental Protection Agency sets air quality standards for six criteria pollutants, including PM<sub>2.5</sub>, known to be of harm to public health and the environment, known as [National](#)

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<sup>2</sup> Environmental Protection Agency (U.S. EPA). *2014 National Air Toxics Assessment*. 2018.

<sup>3</sup> Peters R, Ee N, Peters J, Booth A, Mudway I, Anstey KJ. *Air Pollution and Dementia: A Systematic Review*. J Alzheimers Dis. 2019;70(s1):S145-S163. doi:10.3233/JAD-180631

<sup>4</sup> Health Effects Institute, State of Global Air 2020: Air pollution and life expectancy. Accessed from <https://www.stateofglobalair.org/health/life-expectancy>, June 2022.

<sup>5</sup> Oregon Department of Environmental Quality (ODEQ). *Portland Air Toxics Study*. 2012.

<sup>6</sup> Tessum CW, Apte JS, Goodkind AL, et al. *Inequity in consumption of goods and services adds to racial-ethnic disparities in air pollution exposure*. PNAS. <https://www.pnas.org/content/116/13/6001>. Published March 26, 2019. Accessed September 4, 2020.

<sup>7</sup> Environmental Protection Agency, Retrieved from <https://www.epa.gov/coronavirus/wood-smoke-and-covid-19>

<sup>8</sup> Centers for Disease Control. Retrieved from [https://www.cdc.gov/disasters/covid-19/wildfire\\_smoke\\_covid-19.html](https://www.cdc.gov/disasters/covid-19/wildfire_smoke_covid-19.html)



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[Ambient Air Quality Standards \(NAAQS\)](#). Currently, Multnomah County meets the federal standards. DEQ also monitors five additional criteria pollutants (including ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide) to ensure that limits are not exceeded. If standards are not met, this means our air is potentially unhealthy to breathe and the area is at risk of a “nonattainment” designation from EPA. A nonattainment designation can require restrictions on economic activities in order to come back into compliance with air quality standards.

### *State*

The Oregon Department of Environmental Quality (DEQ) exercises its delegated authority from the EPA over wood smoke through Oregon Administrative Rules (OAR Chapter 340, division 262) referred to as the Heat Smart program. The Heat Smart program requires that non-EPA certified wood stoves be removed upon a home’s sale. On days when the air quality is poor, DEQ issues public alerts, but these alerts do not include wood burning restrictions or enforcement. While DEQ does not regulate wood burning from wood stoves, DEQ does regulate the combustion of illegal materials, such as scrap wood from construction sites, pallets, garbage, plastics and other materials. When available, DEQ has provided competitive community level grants to reduce wood smoke in local jurisdictions. In 2019, Multnomah County successfully applied and received a \$25,000 outreach and communications grant.

### *County*

Historically, burn restrictions have been one tool for reducing PM<sub>2.5</sub> pollution. Multnomah County Environmental Health Services is responsible for implementing Multnomah County Code Chapter 21.450, known as the wood smoke curtailment, or restriction ordinance. On days when the County’s air quality is forecast to be poor and a curtailment day is called, households and businesses may not burn wood unless a qualified exemption is met. Prior to February 17 2022, curtailment days could be called between October 1 and March 1 of each year. This mandatory program applies when air quality conditions are forecast to be unhealthy due to high burning activity or poor weather conditions, such as air stagnation events. On curtailment days, the Health Department issues an advisory to restrict wood burning. Multiple violations of a curtailment advisory is punishable by citation and fine. The Board signed the original ordinance in January 2018, written into Multnomah County Code Chapter 21, and amended the ordinance on February 17, 2022. The amendments codified in February 2022 include a year-round program; elimination of EPA certified devices as exempt, and elimination of green day (“go”) language.

Fire departments may also issue seasonal wood burning bans. These bans are not enforced by the Health Department.

## **Multnomah County Wood Burning Curtailments and Advisories**

Multnomah County issues advisories in 24-hour increments, issued by 11 am and implemented at noon the same day. Lifting of an advisory is evaluated for each 24-hour period (noon-noon). There are two types of advisories that restrict wood burning in Multnomah County (see Figure 1).

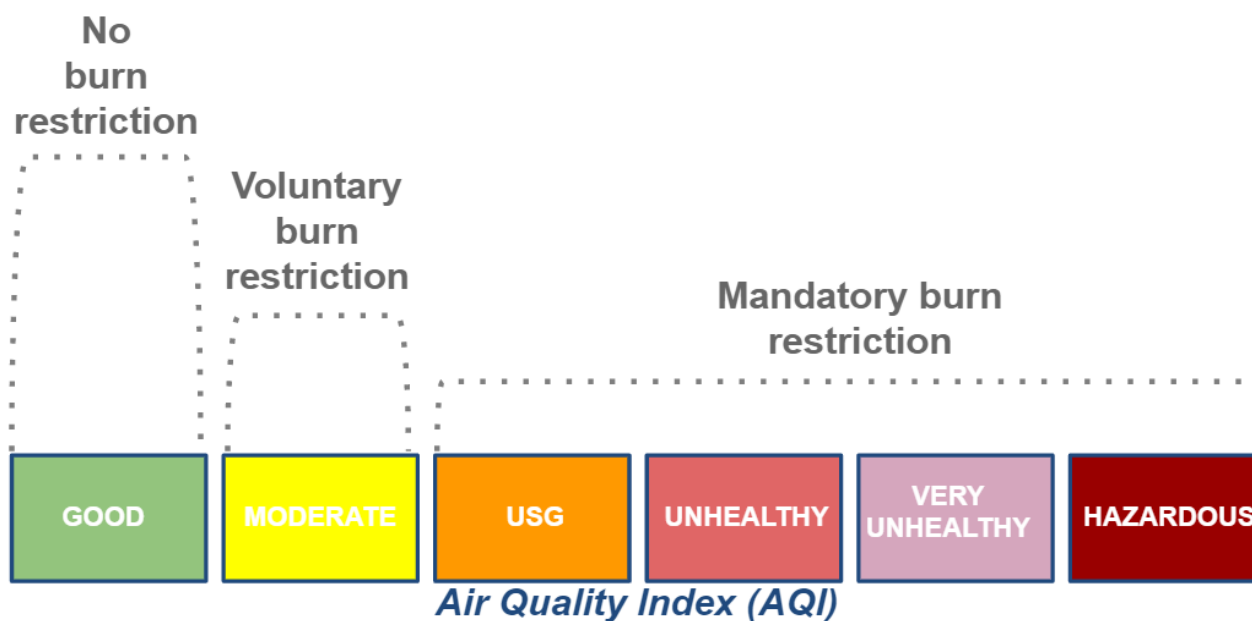
A mandatory burning restriction, or a red day, is declared when pollution is expected to reach the NAAQS for fine particles 24-hour average (short-term) concentration of  $35 \mu\text{g}/\text{m}^3$ . This level is considered unhealthy for sensitive groups. In an effort to caution people in time for them to reduce 24 hour exposure, a yellow day, or voluntary burn restriction may be declared. For a yellow day, Multnomah County uses the NAAQS for fine particles annual average concentration of  $12 \mu\text{g}/\text{m}^3$ . This level has been identified by EPA as the level where air quality is moderate, however sensitive groups should consider reducing exposure.

The ordinance exempts households and businesses from wood burning restrictions if wood burning:

- Is the sole source of heat,
- Is used for cooking,
- Is used in religious ceremonies,
- Because of economic need,
- In an emergency, or
- \* \*If a stove has a designated EPA emissions rating of 2.5 grams/hour or less.

*\*\*As of February 17 2022, EPA certified devices are no longer eligible for exemption.*

*Figure 1. Multnomah County Wood Smoke Advisory Thresholds and Messages by Color, compared to EPA's AQI*



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# 2021-2022 SEASON IN REVIEW

## Advisories and Curtailments

The 2021-2022 wood smoke curtailment season included 27 days of issued alerts (18% of season). There were 26 yellow days and 1 red day called (Figure 2).

For the second winter in a row, La Niña conditions persisted through the wood heating season and brought impacts to precipitation and temperature across our region. Multnomah County saw heavy rains and flooding in November, some snow in December, and below freezing temperatures in February.

While October saw the most advisory days, January and February weather resulted in some multi-day pollution events.

*Figure 2. Number of yellow and red days during the 2021-22 Season.*

Persistent inversions, a high-pressure system and localized trapped pollution resulted in a red day burning restriction after two issued voluntary curtailment days in February. Multiple news outlets, state agencies, and local groups spread the word of the wood burning restrictions, allowing the red day advisory to reach Multnomah County community members.



## Penalties and Warnings

Between March 2, 2021 and March 1, 2022, Multnomah County received a total of 288 wood smoke information requests and complaints from community members (203 of these were between Oct 1 2021-Mar 1 2022). A violation complaint occurs when wood smoke is reported on a 'red' or no-burn day. No violation fees were issued, as there were no repeat offenses.

No site visits occurred. A site visit occurs when multiple complaints or violations are reported on a red day. A site visit may also occur if a household that uses wood for heat or ambiance requests it for educational purposes.

Fifty exemptions\* were filed (compared to 15 during the 2020-2021 season and 10 during the 2019-2020 season). This season, 41 were homeowners, 8 renters and one business. Woodstoves accounted for 60% of exemptions. 17 of the 50 exemptions listed wood burning as their sole source of heat.

\*this number includes EPA certified exemptions until Feb 17, 2022

Exemption Status by Reason, Oct 1 2021 - Feb 14 2022

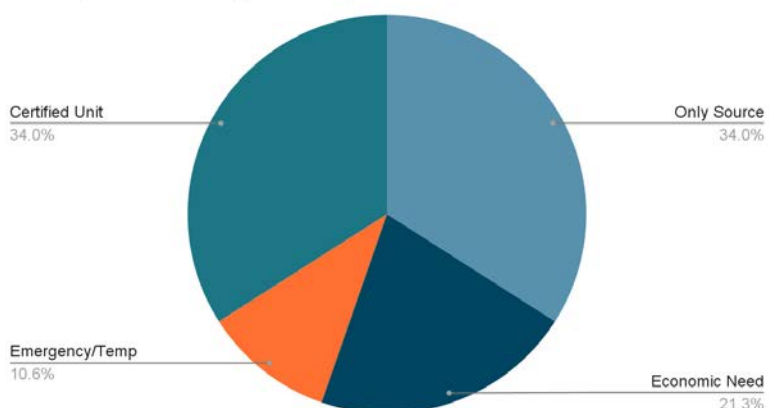


Figure 3: Exemption Status by Reason during the 2021-22 Season.

Table 1. Seasonal Enforcement Statistics for the 2021-2022 season

Type	Total
Exemption Requests	50
Violations issued, first offense	3 (+1, exempt)
Violations issued, second offense	0
Violations observed, third offense	0
Site Visit	0

## Public Outreach and Communications

Multnomah County has a population of 803,377 people living in approximately 359,778 households.<sup>9</sup> The Census estimates that 2,916 households<sup>10</sup> (.9% of occupied units) in Multnomah County use wood burning as their primary source of heat, although this may be an underestimate. It is unknown how many wood stoves, wood burning fireplaces, recreational fire pits and/or chimineas are in use across County households. As a result,

<sup>9</sup> U.S. Census Bureau. *QuickFacts: Multnomah County, Oregon*.

<https://www.census.gov/quickfacts/multnomahcountyoregon>. Published 2021. Accessed May 6, 2022.

<sup>10</sup> U.S. Census Bureau (2016-2020). *House Heating Fuel American Community Survey 5-year estimates*. Retrieved from <<https://censusreporter.org>>. Accessed May 6, 2022.



several thousand people are affected by the wood burning curtailment ordinance and public outreach is critical to its overall success.

Outreach efforts across the season reached thousands of people across the County (Table 2). Information about the County's ordinance through virtual, social, print, and advertising.

While the COVID-19 pandemic continued to restrict in-person outreach and education opportunities, people across the County received information about the wood smoke ordinance and the health impacts of wood smoke in multiple ways.

When advisories are issued, the County implements the following communications:

- WEB: Daily status is published on the county's Wood Winter Wood Burning Restriction page (English and Spanish).
- LISTSERV: People signed up, receive emails of curtailment notices (English & Spanish)
- TEXT: People signed up, receive text messages (implemented Feb 2022, English & Spanish)
- SOCIAL MEDIA: Advisories are shared through social media, including Facebook, Twitter, Instagram and Nextdoor (red only).
- PHONE: Advisory updates are recorded on the complaints line at 503.988.0035
- PUBLIC ALERTS: Notices of mandatory (red) wood burning restrictions are pushed out through Public Alerts.
- MEDIA: Red day advisories are shared with online, print and broadcast media more broadly.



*Figure 4: Trimet bus tail advertisement purchased from Oct 1-Mar 1.*

*Table 2. Outreach by type and estimated community members reached from March 2, 2021 to March 1, 2022 \* Does not include earned media.*

<b>DIGITAL MEDIA</b>	<b>316,331</b>
Webpages	30,783
Gresham Outlook e-blast and website	101,000
Portland Mercury	35,000
Willamette Week	135,000
Multnomah County Newsletters (Mult Co Matters & Wed Wire)	5,600
Email and Calls	168
Listserv subscribers	2564
Commissioner Newsletter	4832
Chef's Connection	1384
<b>VIRTUAL EVENTS</b>	<b>521</b>
Policy Workgroup Presentation	20
Board Presentation & web story	501
<b>PRINT</b>	<b>6,506,221</b>
Educational Mailers	6,325
Gresham Outlook	22,896
Portland Tribune	50,000
Tri-Met benches	1,540,000
Tri-met Bus tails	4,300,000
Billboards	587,000
<b>SOCIAL MEDIA</b>	<b>262,046</b>
Facebook Ads	89,000
Facebook Posts	33,750
Twitter	131,000
NextDoor	8296

*\*Overlap in reach may have occurred across different methods. These numbers are estimates. Social media reach is a total of daily averages due to limited access to metrics for all posts from the Central Health Department webpages. No in person events occurred due to the continuing COVID-19 pandemic.*

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## End of Season Survey Summary

At the end of the season, staff collaborated with Oregon State University's Center for Marketing and Consumer Insights (CMCI) to conduct a web-based survey. The intention of the survey is to understand the program's impact by capturing the extent of awareness of the ordinance and change in wood burning behavior.

### *Results*

The survey received 1,118 responses (965 English, 153 Spanish). In summary, 82% of survey respondents are aware of the wood burning curtailment ordinance. Of survey respondents who burn wood, **81% of respondents indicated their wood burning behavior had changed (burned less) as a result of the advisories.**

### *Distribution Methods*

The survey was available in English and Spanish and distributed to community members across the County. In previous years, the survey was a convenient sample, sent only to email listserv members. This year, outreach occurred through social media boosts, website banners, neighborhood association email lists and the wood burning restrictions newsletter, allowing for a broader pool of survey respondents. The survey implementation lined up with air quality awareness week and was open for approximately 2.5 weeks. The entire survey took 7-10 min per person to complete and included approximately 20 questions plus demographic information.

*Additional survey analysis and methods are available by request.*