

WOOD SMOKE CURTAILMENT

2020-2021 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

3

This report presents results from the third full season of the wood smoke curtailment ordinance for the period October 1st, 2020 through March 1st, 2021. Activities conducted during the season were 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
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
OS- Office of Sustainability, Multnomah County
PAH- Polycyclic aromatic hydrocarbon
PM- Particulate Matter
PM_{2.5}- Particulate Matter (diameter of 2.5 micrometers or less)
µg/m³- Micrograms per cubic meter

TABLE OF CONTENTS

2020-2021 Summary Points	3
BACKGROUND	3
Wood Smoke	3
Public Health Impacts of Particulate Pollution.....	3
Regulatory Authorities and Wood Smoke	4
Multnomah County Wood Burning Curtailments and Advisories.....	5
2020-2021 SEASON IN REVIEW	7
Advisories and Curtailments Summary	7
Penalties and Warnings Summary.....	7
Public Outreach and Communications Summary	8
End of Season Survey Summary.....	11

2020-2021 Summary Points

- For the third year, a majority of survey respondents shared that they altered their wood burning behavior (burned less) as a result of the advisories.
- Additional outreach funds and efforts resulted in thousands of Multnomah County residents being reached and informed of the curtailment ordinance and advisories.
- The 2020-2021 wood heating season coincided with a record breaking wildfire season, pandemic related stay-at home orders, and saw a historic ice storm, all contributing to unpredictable air pollution levels and changes in wood burning behavior.

BACKGROUND

Burning wood in homes is one of the biggest wintertime 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 winter wood smoke restriction ordinance. This law was put in place to protect our communities and reduce the risk that winter wood burning may cause us to exceed federal air quality standards for small particulate pollution.

Wood Smoke

Wood smoke is produced when there is incomplete combustion of wood. It is a complex mixture of fine particulate matter (PM_{2.5}), 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_{2.5} emissions with fireplaces and outdoor burning devices each at 18%.¹

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 smoke accounts for 11% of the excess cancer risk from all area sources of air toxics.²

¹ Department of Environmental Quality 2017 emissions data. Requested November 2020.

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

Evidence is also emerging showing that greater exposure to PM_{2.5} is associated with an increased risk of dementia.³

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 impact 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.⁴ A national study published in March 2019 links PM_{2.5} exposure to human activities responsible for PM_{2.5} 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.⁵

Wood Smoke and COVID-19

Exposure to wood smoke may make people more susceptible to respiratory infections, including COVID-19⁶. 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 worsens COVID-19 symptoms and outcomes⁷.

Regulatory Authorities and Wood Smoke

In addition to affecting public health, high PM_{2.5} 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_{2.5}, known to be of harm to public health and the environment, known as [National Ambient Air Quality Standards \(NAAQS\)](#). Currently, Multnomah County meets the federal PM_{2.5} standard. DEQ also monitors five additional criteria pollutants (including ozone, lead, carbon monoxide, nitrogen dioxide, and sulfur dioxide) to ensure that limits aren’t exceeded. If standards are not being met, this means our air is potentially unhealthy to breathe and the

³ 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

⁴ Oregon Department of Environmental Quality (ODEQ). *Portland Air Toxics Study*. 2012.

⁵ 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.

⁶ Environmental Protection Agency, Retrieved from <https://www.epa.gov/coronavirus/wood-smoke-and-covid-19>

⁷ Centers for Disease Control. Retrieved from https://www.cdc.gov/disasters/covid-19/wildfire_smoke_covid-19.html

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 must 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 made available 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_{2.5} pollution. Multnomah County Environmental Health Services is responsible for implementing Ordinance 1253, 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. Curtailment days may be called between October 1st and March 1st 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 these 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 ordinance was signed in January 2018 and written into Multnomah County Code Chapter 21.

Outside of the winter wood smoke season, fire departments may issue seasonal wood burning bans. These bans are not enforced by the Health Department.

Multnomah County Wood Burning Curtailments and Advisories

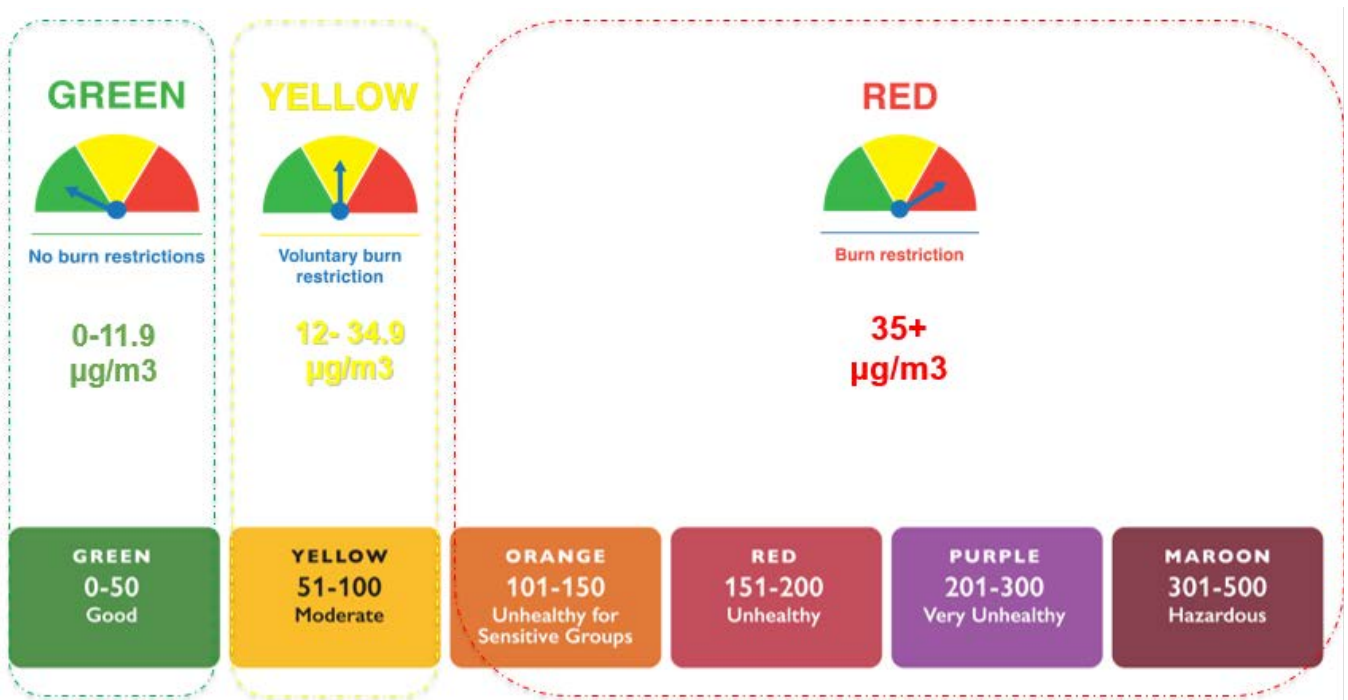
From October 1 to March 1, advisories are implemented in 24 hour increments, issued by 11 am and implemented at noon the same day. Lifting of the advisory is evaluated for each 24 hour period (noon-noon). There are two types of advisories that restrict wood burning in Multnomah County during the winter months (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 µg/m³. 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 µg/m³. 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.

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



2020-2021 SEASON IN REVIEW

In the midst of the COVID-19 pandemic, the winter wood burning ordinance's third full season began October 1, 2020 and went through March 1, 2021 (152 days). A total of 34 advisories were called. Additional outreach funds and efforts resulted in thousands of Multnomah County residents being reached and informed of the curtailment ordinance and advisories. For the third year, a majority of survey respondents shared that they altered their wood burning behavior (burned less) as a result of the advisories.

Advisories and Curtailments Summary

The 2020-2021 wood smoke curtailment season included 34 days of issued alerts (22% of season). There were 34 yellow days and 0 red days called (Figure 2).

The season started with an air stagnation event issued by the National Weather Service resulting in yellow advisories being extended across multiple days. The end of a historic wildfire season, beginning of wood heating season and weather conditions likely contributed to the early season high PM_{2.5} concentrations.

While October saw the most advisory days, November weather was also conducive to high PM as seen in some multi-day pollution episodes throughout the month.



Figure 2. Number of green, yellow, and red days during the 2020-21 Season.

In February, a winter storm caused widespread multi-day power outages. No advisories were issued during this time as particulate matter levels averaged below any advisory thresholds. However, power outages during this event would have qualified as an emergency exemption for households temporarily relying on wood for heat.

Penalties and Warnings Summary

Between March 2, 2020 and March 1, 2021, Multnomah County received a total of 181 wood smoke information requests and complaints from community members. 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 curtailments issued.

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.

Fifteen exemptions were requested and granted (compared to 10 during the 2019-2020 season and none the 2018-2019 season). This season, 12 were homeowners, 2 renters and one business. Woodstoves accounted for 67% of exemptions. Nine of the fifteen exemptions listed wood burning as their sole source of heat.

Table 1. Seasonal Enforcement Statistics for the 2020-2021 season

Type	Total
Exemption Fulfilled	15
Violations issued, first offense	0
Violations issued, second offense	0
Violations observed, third offense	0
Site Visit	0
Smoke calls/emails received on red days	0
Smoke calls/emails received on yellow days	43
Smoke calls/emails received on green days	63

Public Outreach and Communications Summary

Outreach efforts across this season have reached thousands of people across the County (Table 2). It is estimated that nearly 380,000 received information about the County’s ordinance through virtual, social, print, and/or in-person activities.

In 2019, the Office of Sustainability partnered with the Health Department to receive a wood smoke reduction grant from the Department of Environmental Quality to develop and implement additional outreach activities during the 2020-2021 season. While the COVID-19 pandemic restricted in person outreach and education opportunities, people across the County were able to receive information about the wood smoke ordinance and the health impacts of wood smoke. A summary of these activities is available in the final grant report submitted to DEQ in April 2021.

Multnomah County has a population of 812,855 people living in approximately 353,842 households.⁸ The Census estimates that 2,681 households⁹ 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, several thousand people are affected by the wood burning curtailment ordinance and public outreach is critical to its overall success.

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

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

⁸ U.S. Census Bureau. *QuickFacts: Multnomah County, Oregon*.

<https://www.census.gov/quickfacts/multnomahcountyoregon>. Published 2019. Accessed March 30, 2021.

⁹ U.S. Census Bureau. *2019 American Community Survey 1-Year Estimates (house heating fuel)*. Accessed March 30, 2021

*Table 2. Outreach by type and estimated community members reached from March 2, 2020 to March 1, 2021 **

DIGITAL MEDIA	135,536
Website	24,523
Gresham Outlook e-blast and website	101,000
Multnomah County Newsletters (Mult Co Matters & Wed Wire)	5,000
Commissioner Newsletter	4832
Email and Calls	181
VIRTUAL EVENTS	173
Focus Group	8
Board Briefing + recorded views	128
Webinar	37
PRINT	209,457
Portland Curbsider	186,561
Gresham Outlook	22,896
IN-PERSON EVENTS	18
Lawn Sign Distribution	18
SOCIAL MEDIA	29,716
Facebook Ads	1870
Facebook Posts	7493
Twitter	1938
NextDoor	18,415
TOTAL ESTIMATED REACH	379,429

**Overlap in reach may have occurred across different methods. These numbers are estimates. Social media reach is underestimated due to limited access to metrics for all posts from the Health Department webpages during the pandemic.*

End of Season Survey Summary

At the end of the season, staff conducted a web-based survey that was distributed to community members who voluntarily signed up for curtailment and advisory messages (1463 people). The intention of the survey was to get an understanding of the program's impact this season. Participants of the survey were asked five questions.

The survey received 278 responses (19% response rate). In summary, **77%** of respondents indicated their wood burning behavior had changed (burned less) as a result of the advisories.