



WOOD SMOKE CURTAILMENT

2019-2020 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 second full season of the wood smoke curtailment ordinance for the period October 1st, 2019 through March 1st, 2020. 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

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
PM- Particulate Matter
PM_{2.5}- Particulate Matter (diameter of 2.5 micrometers or less)
µg/m³- Micrograms per cubic meter

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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 winter wood smoke restriction ordinance. This new 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 the burning of wood. It is a complex mixture of fine particulate matter (PM_{2.5}), carbon monoxide, formaldehyde, nitrogen dioxide, and other harmful substances.

Public Health Impacts of Particulate Pollution

When we rely on combustion for heating and ambiance, wood smoke concentrations can rise 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. 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 children, elders, Black communities, Indigenous communities, and communities of color. 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.¹ Evidence is also emerging showing that greater exposure to PM_{2.5} is associated with an increased risk of dementia.² A growing body of scientific literature suggests wood smoke can be harmful even when there isn't enough to see or smell.

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 higher proportionality of Latinx households, as opposed to all other race/ethnicity demographics evaluated.³ 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

¹ Environmental Protection Agency (U.S. EPA). *2014 National Air Toxics Assessment*. 2018.

² 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

³ Oregon Department of Environmental Quality (ODEQ). *Portland Air Toxics Study*. 2012.

average bear a “pollution burden” of 56% and 63% excess exposure, respectively, relative to the exposure caused by their consumption.⁴

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).

Regulatory Authorities and Wood Smoke

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 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.

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 they do not include wood burning restrictions. 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.

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 poor weather conditions, such as air stagnation events. It is on these curtailment days that the Health Department has been granted the authority to restrict wood burning. The ordinance was signed in January 2018 and written into Multnomah County Code Chapter 21.

⁴ 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.

Curtailments and Advisories

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 reaches 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.

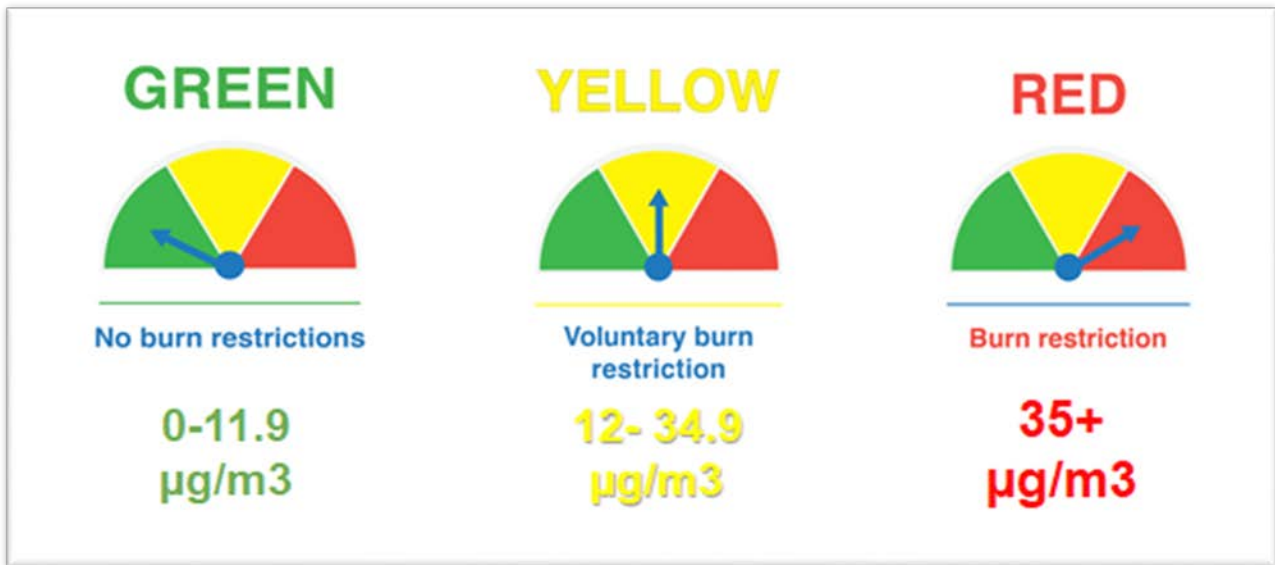


Figure 1. Multnomah County Wood Smoke Advisory Thresholds and Messages by Color

2019-2020 SEASON IN REVIEW

The ordinance's second full season began October 1, 2019 and went through March 1, 2020 (153 days). During the season, Air Quality Program Specialists provided forecasts on a daily basis to predict County PM_{2.5} pollution levels. When air quality was predicted to be poor, a yellow or red day advisory was issued to restrict wood burning and alert sensitive individuals to lessen their exposure to wood smoke. Thousands of Multnomah County residents were reached and informed of the advisories. An end of year survey indicated that a majority of respondents altered their wood burning behavior (burned less) as a result of the advisories.

Advisories and Curtailments Summary

The 2019-20 wood smoke curtailment season included 32 days of issued alerts (21% of season). There were 31 yellow days and 1 red day called (Figure 2).

Weather conditions were especially conducive to high PM_{2.5} concentrations during the months of November and December, as indicated by multi-day pollution episodes and multi-day air stagnation advisories issued by both the National Weather Service and the Department of Environmental Quality. A red day was called in December during an air stagnation event. January had no advisory days called. The primary factors that influence poor air quality include temperature inversions (a layer of cool air at the surface lays on top a layer of warmer air) as well as calm surface and transport winds. Other meteorological factors include mixing height, precipitation, and temperature. Many of the days called as yellow advisories were due to low elevation inversions at some point in the 24-hour period.

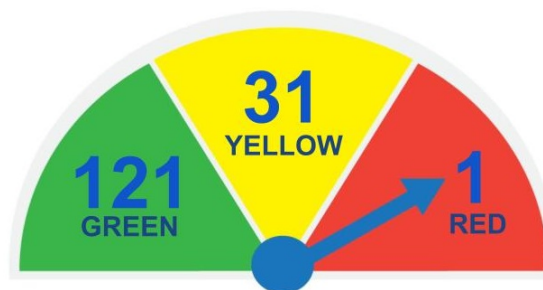


Figure 2. Number of green, yellow, and red days during the 2019-20 Season.

Penalties and Warnings Summary

Between March 2, 2019 and March 1, 2020, Multnomah County received a total of 131 wood smoke information requests and complaints from community members. A total of three violation complaints were received during the issued red day. 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 households or businesses subject to repeated complaints.

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.

Ten exemptions were requested and granted. Five were homeowners, four renters and one business. Woodstoves accounted for 80% of exemptions.

Table 1. Seasonal Enforcement Statistics for the 2019-2020 season

Type	Total
Exemption Fulfilled	10
Violations issued, first offense	3
Violations issued, second offense	0
Violations observed, third offense	0
Site Visit	0
Smoke calls/emails received on red days	19
Smoke calls/emails received on yellow days	59
Smoke calls/emails received on green days	53

Public Outreach and Communications Summary

Outreach efforts across this season are estimated to have reached thousands of people across the County (Table 2).

Multnomah County has a population of 812,855 people living in approximately 353,842 households.⁵ The Census estimates that 3,496 households⁶ in Multnomah County use wood burning as their primary source of heat, although 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 thousands of people are affected by the wood burning curtailment ordinance and public outreach is critical to its overall success.

Prior to the 2019-20 season, EHS conducted a brief OPB radio interview and issued a press release and social media messages, notifying people about the ordinance's start date. Media contacts helped raise awareness of the first yellow advisories of the season, as well as the red advisory. When advisories were issued, the County implemented the following communications:

⁵ U.S. Census Bureau. *QuickFacts: Multnomah County, Oregon*.

<https://www.census.gov/quickfacts/multnomahcountyoregon>. Published 2019. Accessed September 4, 2020.

⁶ U.S. Census Bureau. *2017 American Community Survey 1-Year Estimates (house heating fuel)*.

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

New community outreach print materials were created this season and staff tabled three community events, including the well-attended City of Portland's Fix it Fairs. Postcards and magnets with the message "Check before you Burn" were printed for future distribution at community centers and clinics across the County.

Facebook and Twitter continue to be popular engagement channels for community members. A County Nextdoor account was created this season, increasing our reach and engagement significantly. Through web communications, we sent emails to 866 *Wood Smoke Restrictions* subscribers (as of 3.6.20) and received thousands of unique visits to our website. Educational mailers were sent out, by request, to over 100 households in the cities of Portland and Gresham.

Table 2. Outreach by type and total community members reached for the 2019-2020 wood smoke season

Type	Total Members Engaged		
Education packets	101		
Listserv	866		
Emails/calls	131		
Wood smoke Pollution web page reach (total visits: 1/1/19-12/31/19*)	2,933		
Wood smoke Restrictions web page reach (total visits: 1/1/19-12/31/19*)	22,129		
Outreach Events	348		
Social Media Reach (1/1/19-12/31/19*)	131,309		
	Reactions/ Engagement	Comments/ Replies	Total Reach (all views)
AQ Facebook Posts	6535	240	11,691
NextDoor	179	145	61, 979
Twitter	829	121	57,639

***due to the COVID-19 emergency response, updated numbers for 2020 (Jan 1-Mar 1) from County Communications are not yet available.**

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 (866 people). We also posted a link to the survey on our website and on social media. 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 130 responses (15% response rate). In summary, **75%** of respondents indicated their wood burning behavior had changed (burned less) as a result of the advisories.

Staffing & Support

About halfway through this season, the Lead Air Quality Program Specialist went out on leave and an interim Program Specialist took over monitoring air quality each day, with support from other Environmental Health Program Specialists and Health Department Communications staff.

In late 2019, the County's Office of Sustainability successfully applied and received a \$25,000 grant to support staff in the development and dissemination of ordinance outreach materials, to be implemented in the period March 2020 to March 2021.

Questions about this report can be directed to
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