

Creating Cleaner, Safer Community Spaces

Montana's Approach to Wildfire Smoke and Indoor Air Quality



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U.S. Department of
Health and Human Services
Centers for Disease
Control and Prevention

Agency for Toxic Substances and Disease Registry (ATSDR)

Notice of Funding Opportunity

Application due April 19, 2024

Advancing Health Equity in Asthma Control through EXHALE Strategies

Opportunity number: CDC-RFA-EH-24-0016



CDC EXHALE STRATEGIES



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Key Priority Areas



Public Health & Healthcare Infrastructure



Achievement of Guidelines-Based Medical Management



Patient & Caregiver Education



Tobacco Use Prevention & Cessation



Environmental Policies & Best Practices to Reduce Asthma Triggers



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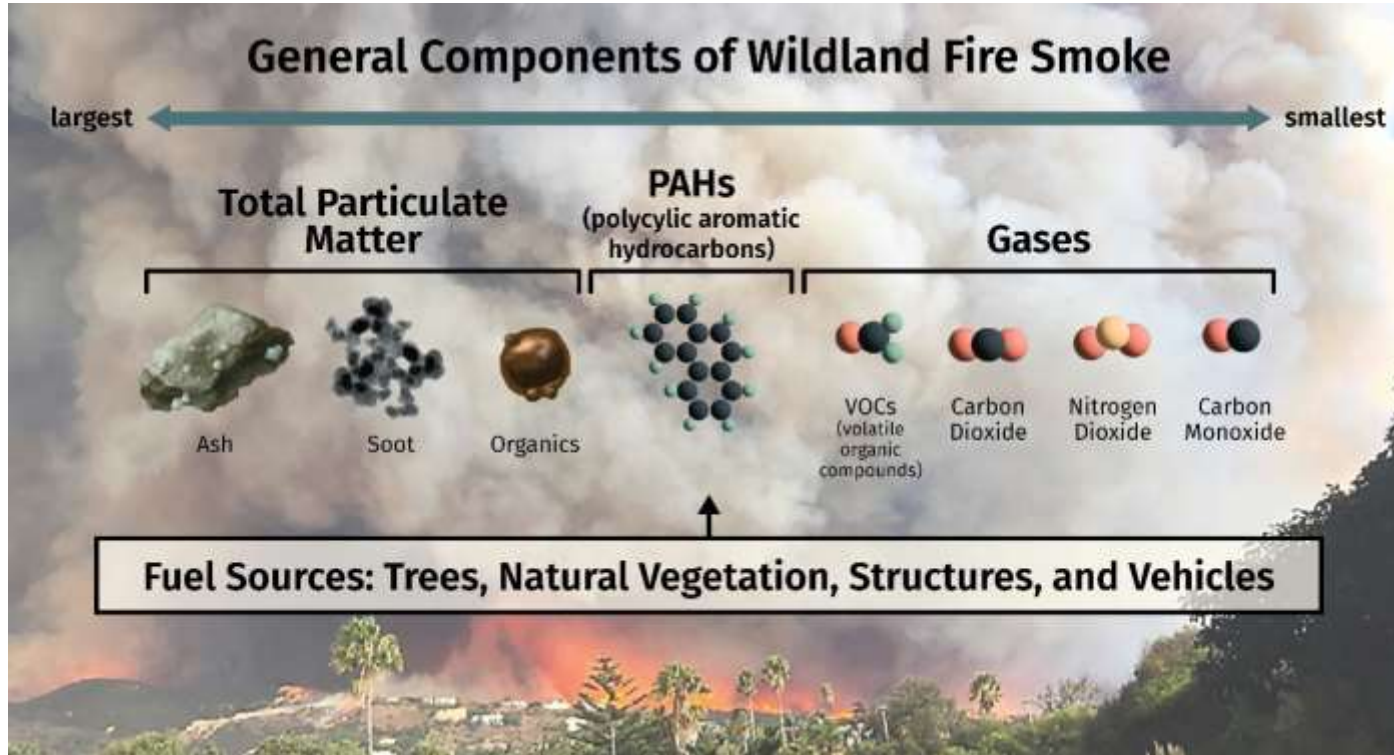
WHY ARE WE CONCERNED ABOUT WILDFIRE/WOOD SMOKE?

FOUR SEASONS OF SMOKE?



- Negatively affects the quality of ambient air (outdoor air, ventilation air)
- We consider outdoor air, (ambient air, ventilation air) to be generally cleaner than indoor air
- We use outdoor air to dilute indoor air pollutants
 - Smoke is not just from burning vegetation, it is also from human sources (think burning buildings and Human Made Stuff)

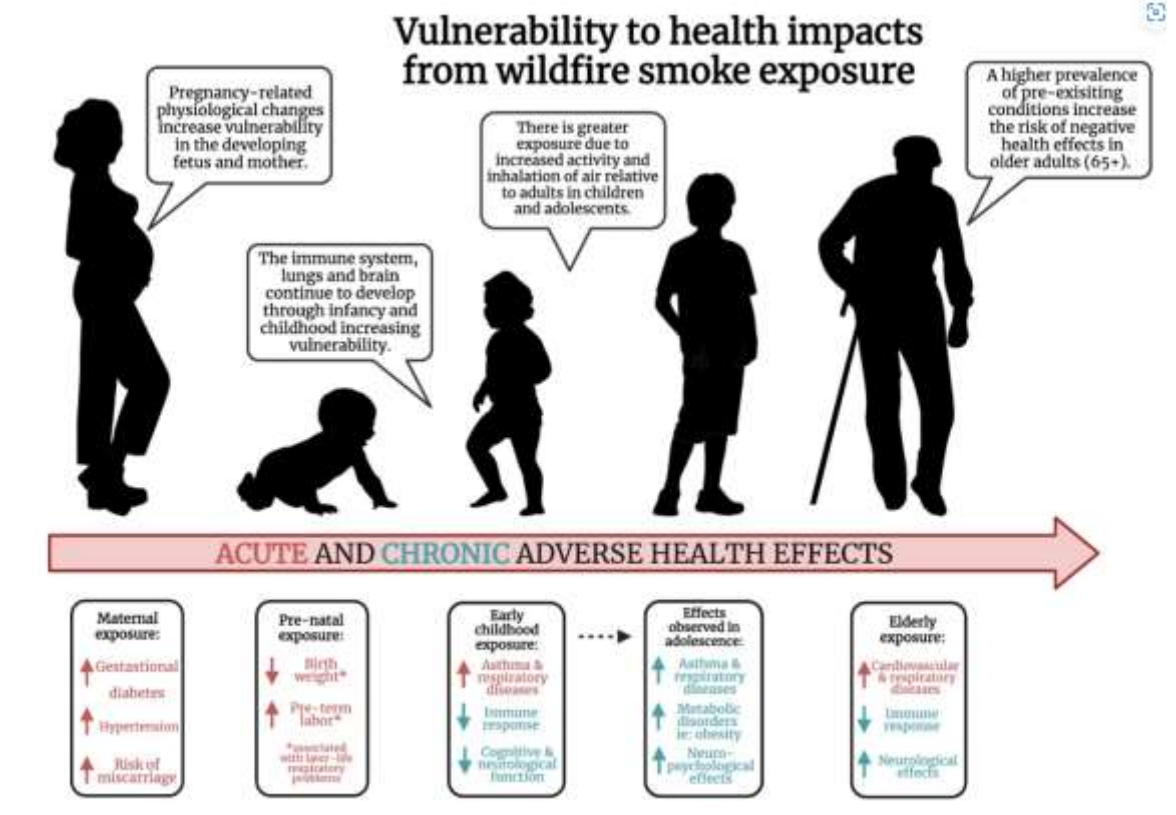
Wildfire Smoke Pollutants



- PM_{2.5} is of concern because these particles penetrate deep into lungs
- PM_{2.5} particles pick up other pollutants (VOCs, PAHs) by adsorption
- Systemic inflammation can affect other organs including immune system, heart, brain, kidneys, and increase in cancer rates
- Increase in hospital visits and higher healthcare costs

Wildfire Smoke Linked to...

- **Lower birthweight/preterm labor**
- **Lifetime risk** of respiratory issues, heart disease, cancer and dementia
- **Reduced Lung Function:** Recent UM study with younger adults in Missoula
- **Mortality:** MT had the highest fraction of mortality due to wildfire smoke from 2006-2018.



EPA AQI

Air Quality Levels of Concern (values of index)	Recommended Actions
Good (0-50)	Everyone: Don't see or smell smoke? It's a good time to open windows or go outdoors.
Moderate (51-100)	Everyone: Don't see or smell smoke? It's OK to open windows or go outdoors. Unusually Sensitive People: Consider making outdoor activities light and short. Go inside to cleaner air if you have symptoms.
Unhealthy for Sensitive Groups (101-150)	Everyone: Consider lighter and shorter outdoor activities. Sensitive Groups: Go inside to cleaner air if you have symptoms.
Unhealthy (151-200)	Everyone: Keep outdoor activities light and short. Go inside to cleaner air if you have symptoms. Sensitive Groups: Consider moving all activities inside. Go inside to cleaner air if you have symptoms.
Very Unhealthy (201-300)	Everyone: Limit outdoor physical activity. Go inside to cleaner air if you have symptoms. Sensitive Groups: Avoid all outdoor physical activity.
Hazardous (301-500)	Everyone: Avoid all outdoor physical activity. Sensitive Groups: Stay indoors and keep activity levels light. Stay indoors and consider creating a cleaner air room.

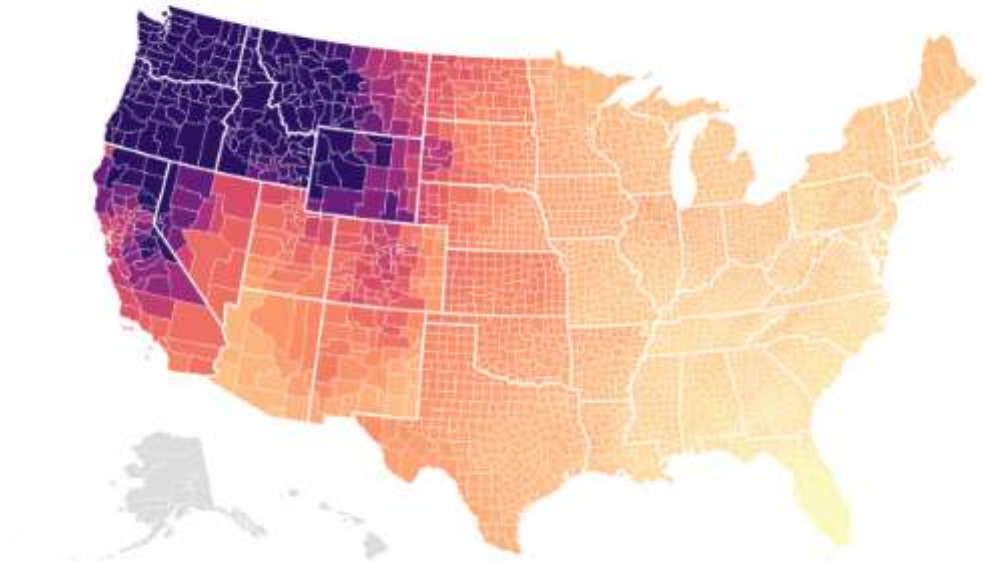


A Case for A Health Populations Approach to Wildfire

- Stanford researchers estimate wildfire smoke emissions caused 41,380 excess deaths/year from 2011 to 2020 in US
- That number is projected to increase to 70,000 deaths by 2050

Smoke PM2.5, 2050

Annual average concentration of PM2.5 from wildfire smoke, in micrograms per cubic meter, in 2050 (RCP7.0).

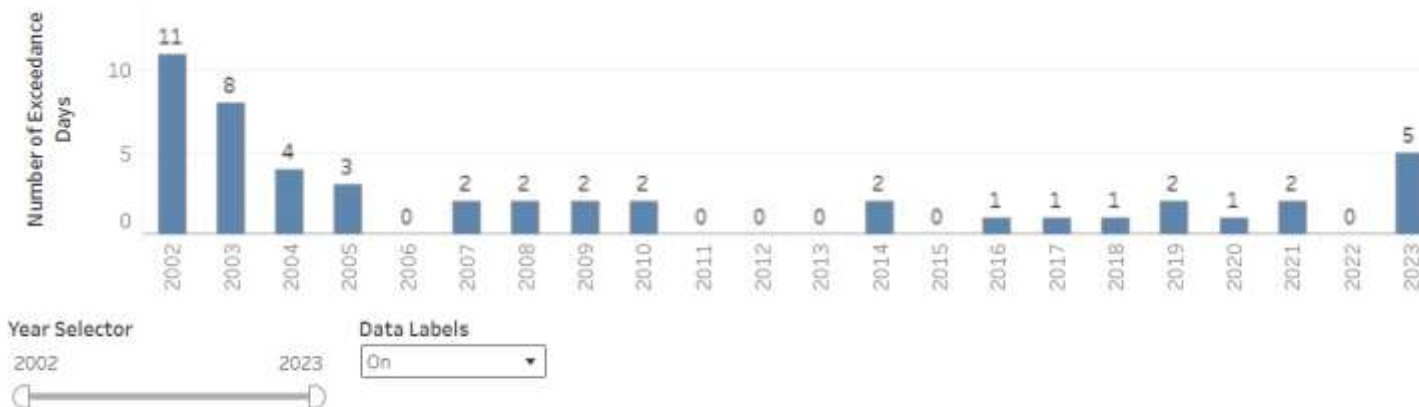


Created with Datawrapper

Maine Historical Air Quality Data

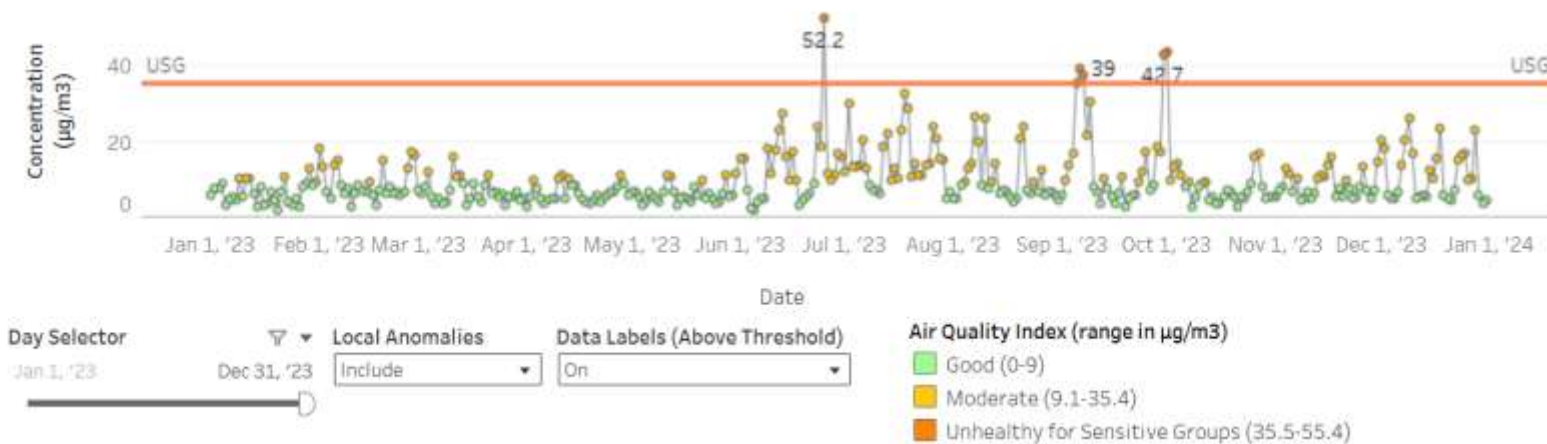
PM2.5 | Number of Days At or Above Unhealthy for Sensitive Groups Air Quality Threshold

Click an annual bar to show daily values in the bottom chart.



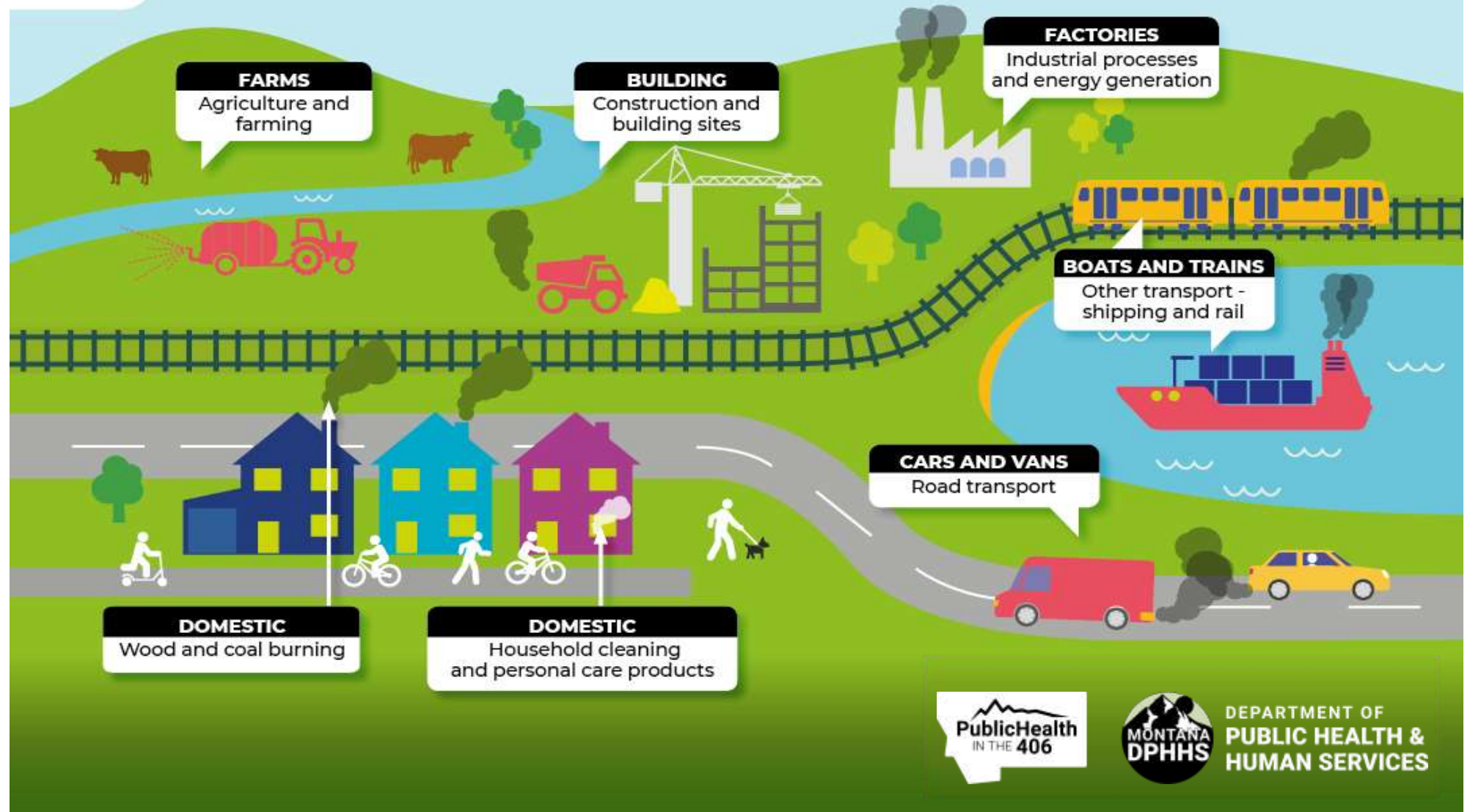
PM2.5 | Maximum Daily Concentration in Micrograms per Cubic Meter ($\mu\text{g}/\text{m}^3$)

January 1, 2023 - December 31, 2023



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Sources of air pollution



Wood Burning and Lung Health in Maine

- 9.4% of Maine homes use wood as their primary heating source, ranking the state second in the U.S. for primary wood heating after Vermont.
- Half of Maine households heat with at least some wood.
- Around 1 in 3 wood stove owners in Maine have a stove that is over 20 years old.



Supporting clean air among priority populations in Western Montana

Strategy 1: Develop communication to outreach to the public, including smoke readiness planning

- Develop and disseminate communication tools tailored to different populations
- Educate public on home air filter options
- Encourage and support coordination and participation in a smoke readiness awareness week

Strategy 2: Technical training

- Provide training opportunities to building and HVAC managers in ASHRAE guidance and other indoor air quality topics
- Create and provide educational materials for building managers on ventilation and air quality

Counties and Tribal Nations Receiving Focused EPA Air Quality Grant Support



Strategy 3: Clean air recognition program including the deployment of portable air cleaners, indoor and outdoor air quality monitoring and preparation of community cleaner air spaces

- Develop a cleaner air center recognition program that is replicable and scalable
- Identify six buildings per year to participate and commit to being a public space with cleaner air
- Deploy air quality monitors and air cleaners at these buildings

Strategy 1

Public Communication & Smoke Readiness Planning



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What is a smoke ready community?



A community that knows its sources of smoke and is actively working to reduce them.



A community whose residents understand the health risks associated with smoke exposure and have access to tools to protect themselves.

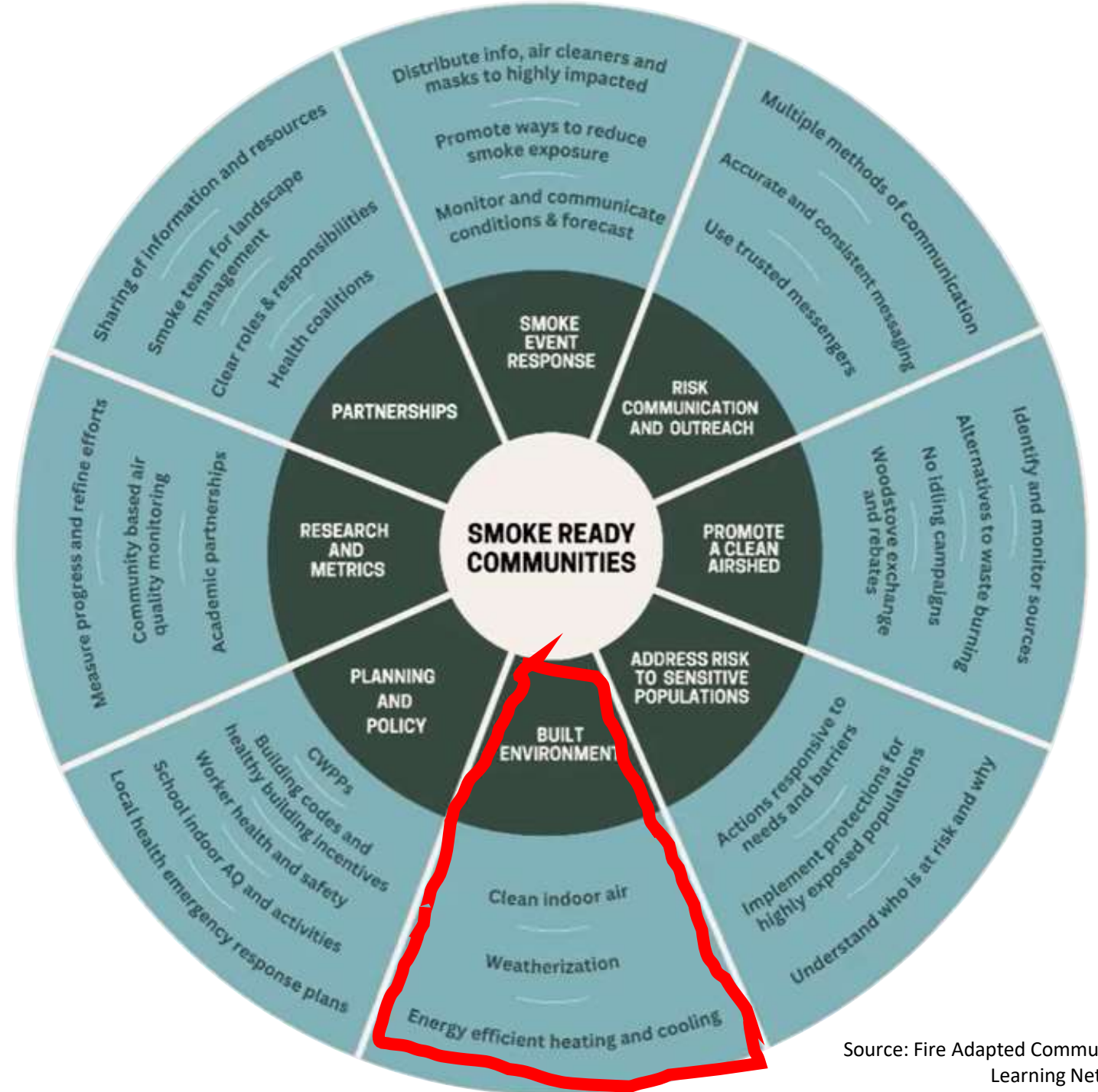


A community with the resources on hand to help vulnerable and underserved residents.



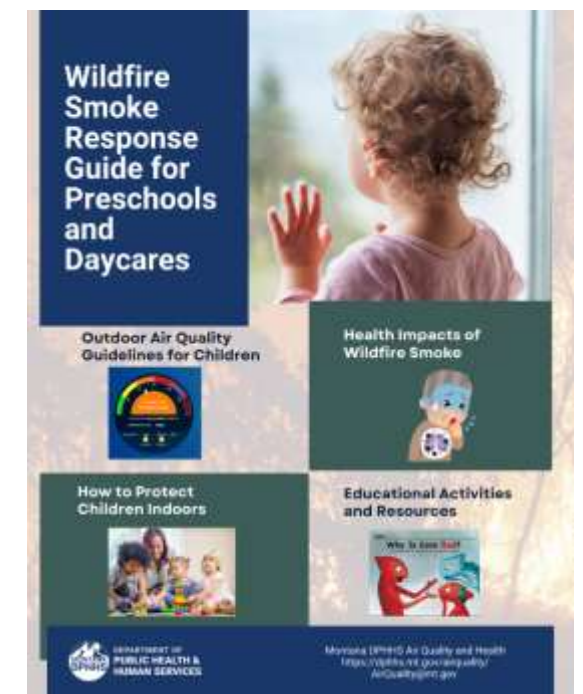
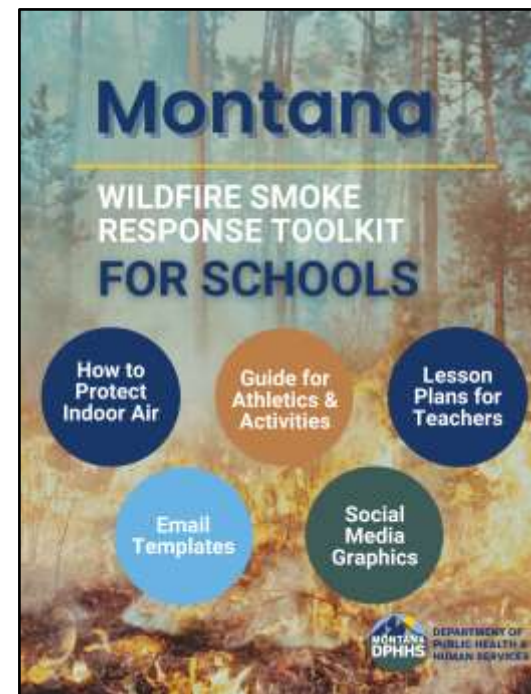
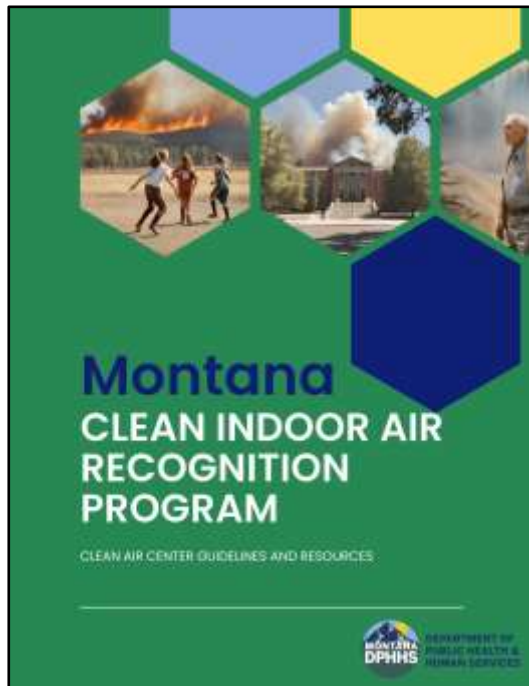
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Resource Creation



Communication Tools & Education

Toolkits Developed



In the toolkits

Sample Press Releases

Sample Press Release #1

CONTACT: [Name]
[County] County Health Department
Phone: (XXX) XXX-XXXX
Email: [email address]

High Temperatures and Smoky Air Could Cause Heat-Related Illnesses

[City, State] – County public health officials urge people across the state to take precautions to avoid heat-related illnesses as temperatures rise and air quality reaches potentially unhealthy levels.

The National Weather Service is predicting weather that could bring peak temperatures in the [region affected] area. Smoke levels can rise and fall, including wind direction.

"The combination of high temperatures and wildfire smoke in the [affected] area is a health concern, especially for older adults, young children, and people with asthma, said [Health Officer, position].

Public health officials urge all Montanans to take the following precautions to stay safe in hot, smoky conditions:

- Reduce the amount of time spent outdoors. This can usually be done by staying in a lightly shaded, air-conditioned house in which the air conditioning is running or by staying in a shaded area.
- Reduce the amount of time engaged in vigorous outdoor physical activity. If you must go outside, wear a wide-brimmed hat, sunglasses, and light-colored clothing. Take frequent breaks in the shade or indoors.
- Reduce other sources of indoor air pollution such as burning candles, incense, or incense burners, and avoid burning incense, candles, or incense burners.
- Individuals with heart disease or lung diseases such as asthma should seek medical advice about prevention and treatment of symptoms.

For more information about your community's air quality, visit [airquality.mt.gov](#) or call 1-800-368-6868.

For air quality advisories from the Montana Department of Environmental Quality, visit [mtdeq.gov/airquality](#).

Checklist for Clean Indoor Air During a Wildfire Smoke Event

Wildfire smoke affects both indoor and outdoor air. If you live in an area where wildfire or wildfire smoke risk is high, consider these steps to keep you and your loved ones stay safe.

- Follow AirNow.gov Fire and Smoke site for current air quality information.
- Keep doors and windows closed. If necessary, open windows at night to cool your home.
- Avoid stovetop cooking, candle burning, and smoking indoors.
- Use a HEPA Air Cleaner or DIY Box Fan Filter.

If you can't clean the air in your entire home, focus on one room and spend most of your time there.

Additional steps when traveling in the car or for those with air conditioning in their homes

- Replace system filter.
- Change A/C settings to recirculate.

For more information, visit the Montana DPHHS Air Quality website or [montanawildfiresmoke.org](#).

Wildfire Smoke Preparedness Week (Second full week of June)

Wildfire Smoke Preparedness Week

For a HEPA air purifier or a DIY filter, visit the Montana DPHHS website for more information.

Wildfire Smoke Preparedness Week

For more information, visit [airquality.mt.gov](#).

Wildfire Smoke Preparedness Week

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Wildfire Smoke Preparedness Week

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Wildfire Smoke & Your Health

Protecting Yourself Indoors

Why do we worry about indoor air and wildfire smoke?

Wildfire smoke contains particulate matter that is four times smaller and up to ten times more toxic than other pollutants. These tiny particles enter our homes and commercial buildings through open doors and windows, HVAC systems, and poorly sealed homes. They then travel into our lungs and, in high quantities, can enter the bloodstream. This is harmful to all of us, but can be dangerous (and in some cases, deadly) to those with lung or heart conditions or those who are pregnant, children, or senior citizens.

Symptoms of Smoke Exposure

Wildfire smoke exposure may increase the risk of respiratory infections like bronchitis and pneumonia. Persons with lung or heart conditions should keep their rescue medication stocked and available. Closely monitor those who are more vulnerable and seek medical attention if symptoms become more noticeable.

Protecting Your Indoor Air

During a smoke event, the air inside can become as unhealthy as the air outside. These strategies protect the air in your home, community buildings, and businesses.

- Keep doors and windows closed.
- Replace furnace filter with MERV 11 or higher.
- Use a HEPA air purifier or a DIY filter.
- Seal cracks in doors and windows.
- Change A/C setting to recirculate.

For more information visit [airquality.mt.gov](#).

Wildfire Smoke & Employee Health

It should be aware that wildfire smoke may adversely affect the health of their workforce and prepare to act to protect their workers' exposures when wildfire smoke is impacting a work environment.

- Check PM2.5**
Today's Air Quality Index (AQI) is 155, which is in the "Very Unhealthy" range. If the AQI is 151 or higher, employers should consider implementing workplace controls to protect their workers.
- Communication**
Implement a system for communicating about the health risks of wildfire smoke exposure in a manner understandable by all employees. Create a supportive environment for employees to express health concerns.
- Reduce Exposure**
Implement engineering controls, when feasible, to reduce exposure to PM2.5. Examples include: enclosed work areas or removal of employees if safe to do so when the air is poor.
- Workplace Controls**
Implement changes to work procedures or schedules when practical. Examples include changing work schedules or the location where employees work, reducing levels of strenuous physical activity, and taking frequent breaks when air quality is poor.
- Respirators**
Applying NIOSH masks or respirators for use on a voluntary basis when smoke is elevated due to wildfires and other environmental conditions have been found to be effective in reducing the exposure of workers to wildfire smoke. If use is required, the employer must institute a respirator protection program.
- Hydration**
Wildfire smoke can contribute to the effects of heat stress. Provide cool drinking water at the work site and encourage frequent rest breaks on hot days. Remind your workers to drink a glass of water at least every 15 to 20 minutes even if they aren't feeling thirsty.

For more information on how to protect your health during poor air quality conditions, visit [airquality.mt.gov](#).

Community Education & Resources

DYI Box fan filter demonstrations



Wildfire Smoke Preparedness Week



Outdoor/Migrant Worker Education



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AGING HORIZONS



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Track Air Quality: Fire.AirNow.gov

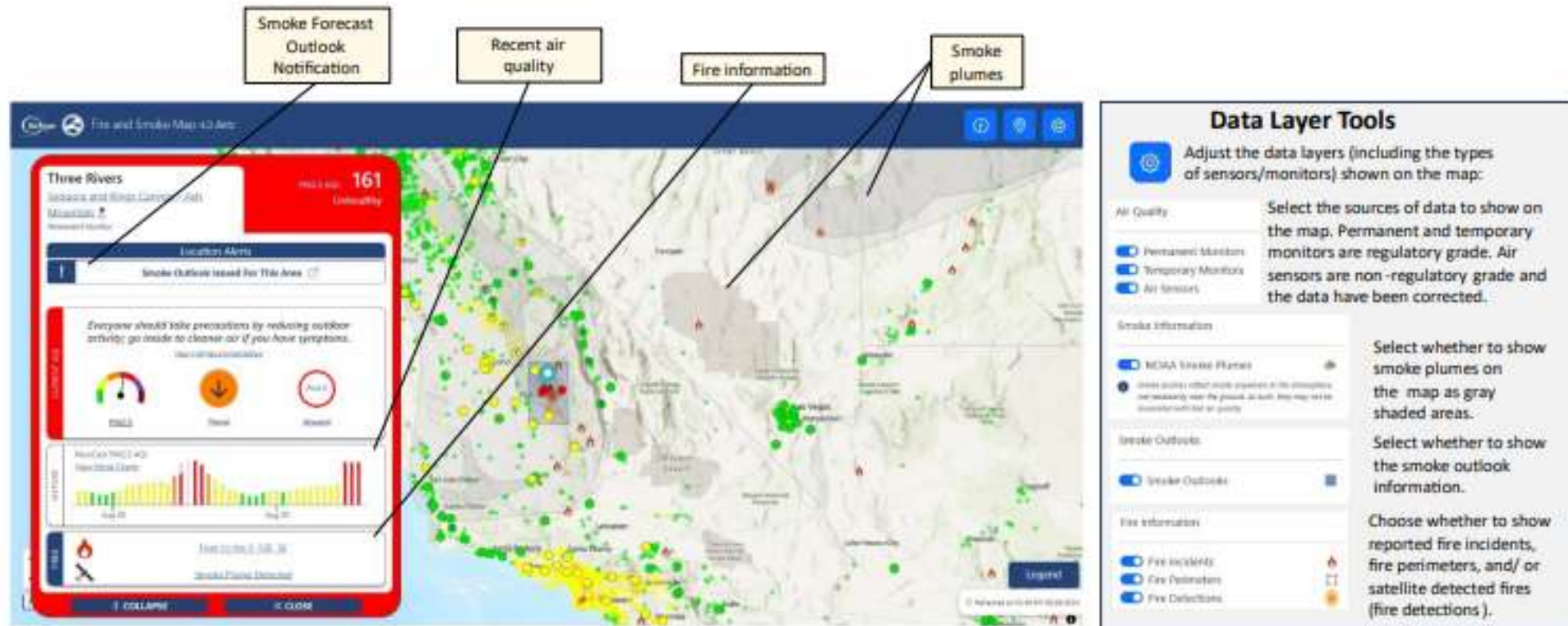


Figure 2. A screenshot from the AirNow Fire and Smoke Map.

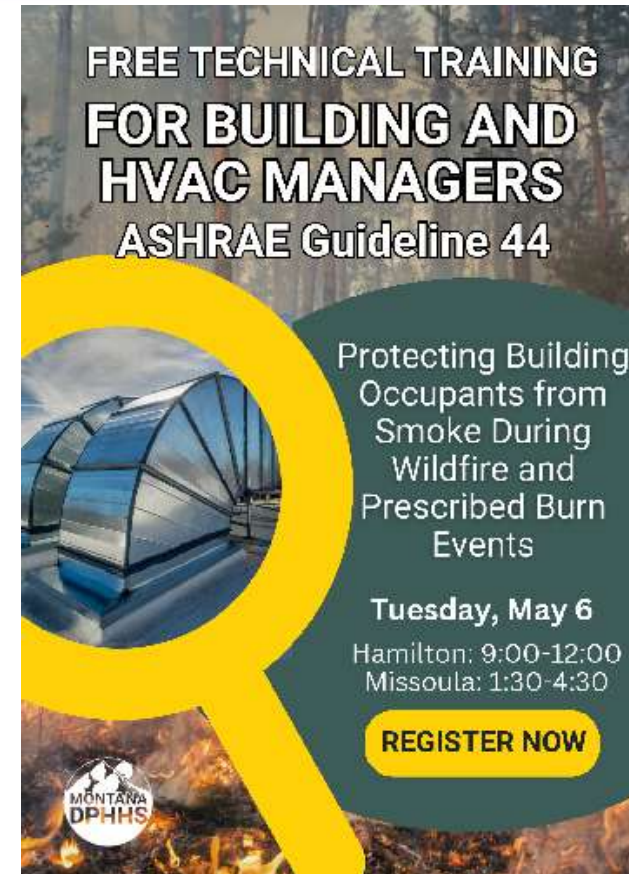
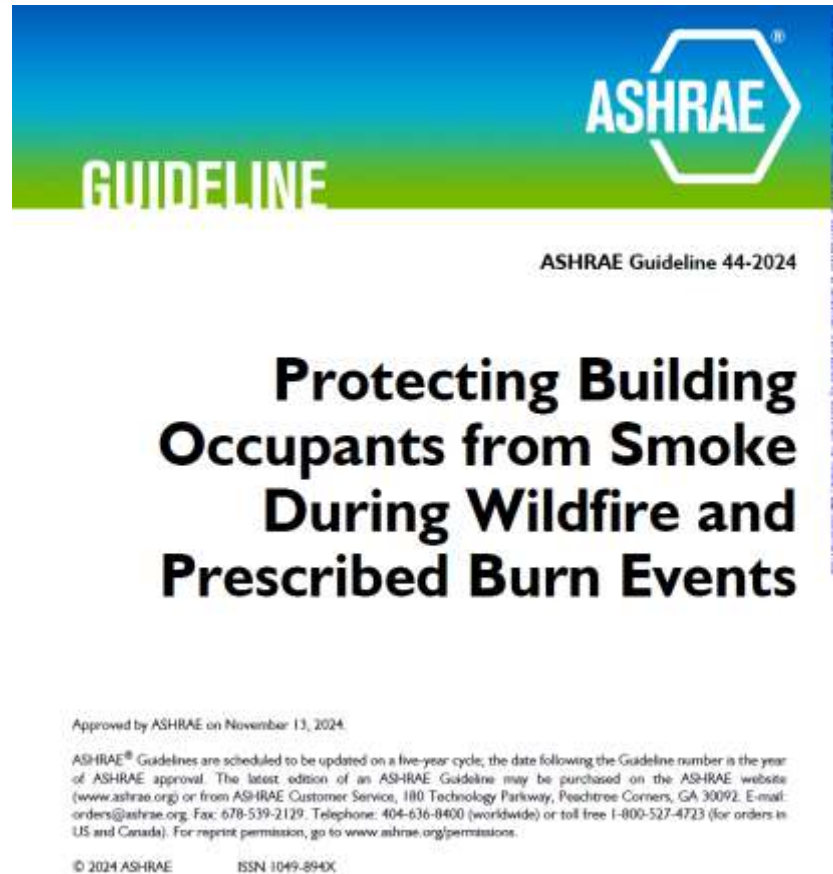
Strategy 2

Technical Training on IAQ & Wildfire Smoke



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ASHRAE Guideline 44-2024



HOW TO BETTER CONTROL SMOKE IN BUILDINGS & KEEP THE SMOKE OUT

Filter outdoor air entering the ventilation system to reduce the introduction of new pollutants, and filter indoor air to remove accumulated pollutants. Recirculate filtered air throughout the building.

Maintain positive pressure or cascading positive pressure, meaning the air pressure inside the building is higher than the air pressure outside to prevent outdoor air from being pushed or drawn into the building via infiltration.

Improve building air tightness to reduce infiltration of outdoor smoke and reduce sources of indoor air pollutants.

Continuously monitor indoor and outdoor PM_{2.5} to assess the performance of the SRP and risks to building occupants.



Smoke Readiness Plan

Planning and Documentation

1. Establish baseline PM_{2.5} levels and anticipate likely smoke exposure scenarios.
2. Review building design factors
3. Review engineering factors
4. Review administrative and occupant factors



During a Smoke Event

1. Monitor indoor and outdoor PM2.5
2. Make sure doors and windows stay closed
3. Do not vacuum
4. Turn OA to minimum
5. Check filters - add supplemental air filters
 - Check pressure drop across filters, no more than 2X clean pressure drop
6. Maintain a slight positive pressure in the building
7. Use Portable Air Cleaners made to filter out particles (HEPA)





HEPA Air Cleaner Considerations

- TRUE HEPA-not HEPA-like
- Consider Room Size
- Noise Level (And Your Tolerance)
- Energy Star Rating
- Cost

[List of CARB-Certified Air Cleaning Devices
\(California Air Resources Board\)](#)

Common HVAC Maintenance Issues

- **Filter bypass** (i.e. when smoky air gets around the filter) can be caused by poorly fitting filters, damaged filters, damaged gaskets, or damaged filter rack doors.
- **Broken Dampers** in the open position can let in large amounts of smoky air, while those broken in the closed position can impact the pressure balance of the HVAC system and not provide adequate ventilation.
- **Leaky Seals** on dampers can let smoky air leak through a closed damper.
- **Leaky Ducts** can let smoky air into the HVAC system potentially bypassing filtration sections.
- **Broken or uncalibrated sensors** can prevent the HVAC from operating as designed.

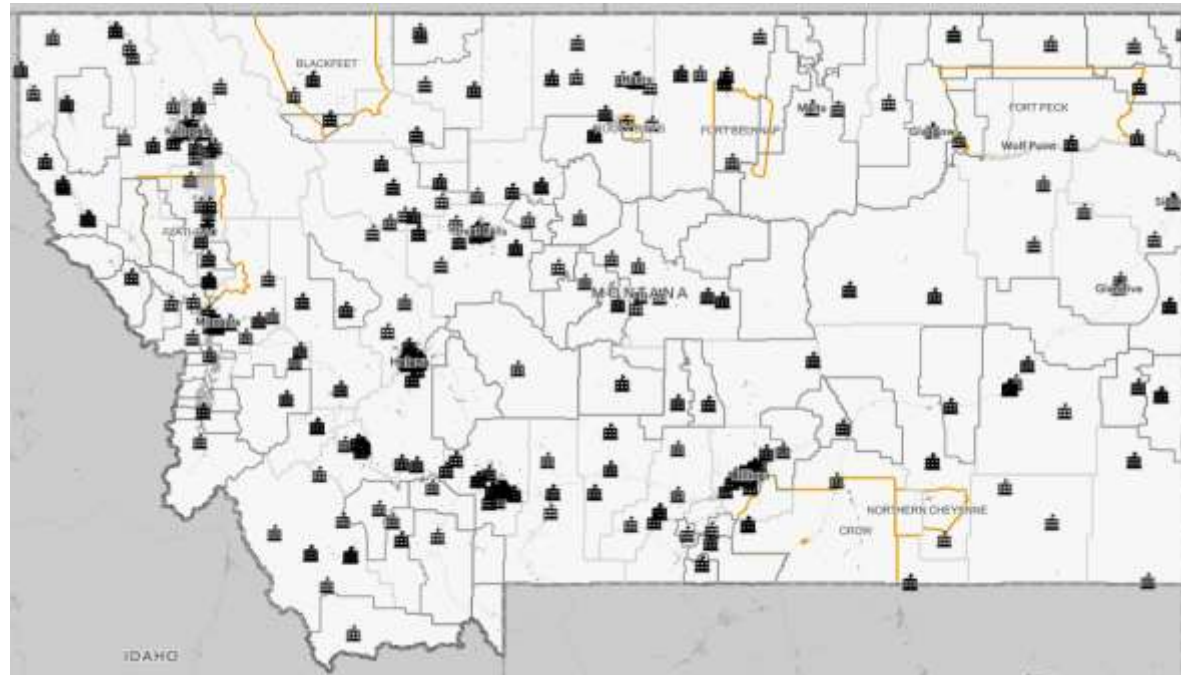


Hypothetical Scenario: Main door is causing air leakage into the building

<ul style="list-style-type: none">• Replace the door• Add vestibule• Install new self-closing door• Reseal current door• Add dedicated air filtration• Add air curtain• Stop using door during smoke• Minimize use during smoke <p>All options</p> <p>List all the options applicable to resolve the issue</p>	<ul style="list-style-type: none">• Replace the door• Add vestibule• Install new self-closing door• Reseal current door• Add dedicated air filtration• Add air curtain <p>Building appropriate</p> <p>Filter out options that are not possible for the building envelope</p>	<ul style="list-style-type: none">• Replace the door• Add vestibule• Install new self-closing door• Reseal current door• Add air curtain <p>Mechanically appropriate</p> <p>Filter out options that are not mechanically possible</p>	<ul style="list-style-type: none">• Replace the door• Install new self-closing door• Reseal current door <p>Financially appropriate</p> <p>Filter out options that are not financially appropriate</p>	<ul style="list-style-type: none">• Replace the door• Reseal current door <p>User appropriate</p> <p>Filter out options that are not user appropriate</p>	<ul style="list-style-type: none">• Reseal current door <p>Maintenance appropriate</p> <p>Filter out options that are not viable for maintenance</p>
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Air Cleaners in Schools

MACP coordinated the distribution of over 10,000 HEPA Air Cleaners to schools with support from federal COVID-19 School Reopening Funds.



BEST PRACTICES GUIDE FOR IMPROVING INDOOR AIR QUALITY IN COMMERCIAL/ PUBLIC BUILDINGS DURING WILDLAND FIRE SMOKE EVENTS



Office of Research and Development

Strategy 3

Clean Air Recognition Program



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What kind of facility do we need to use for a Clean Air Center?

- Ability to operate building differently during smoke event
- Good building envelope integrity
 - Sealing and weatherstripping to decrease infiltration
- Mechanical ventilation and air conditioning systems
 - OA Filtration
 - RA Filtration
- Vestibules
- Qualified HVAC staff or contractors
 - Readiness to make quick, temporary changes to OA

Clean Air Recognition Program

Our Objective: Empower public buildings in target communities to serve as clean air centers for citizens during wildfire smoke events.

What DPHHS Provides:

- Smoke readiness planning guidance and resources
- HEPA air cleaner(s)/other support tools
- Indoor air quality monitor
- \$1,500 stipend for incurred expenses
- HVAC system training for building manager/HVAC contractors

Partner Commitment:

- Adopt policies and protocols for protecting the building from wildfire smoke and improving indoor air quality conditions during smoke events
- Develop/adopt a building smoke readiness plan
- Meet regularly with DPHHS and other air quality partners to review actions taken and identify opportunities for improvement
- Share IAQ monitoring data with DPHHS
- Publicize Clean Indoor Air Center role in the community
(A 24-hour center is not necessary to be eligible for this opportunity.)



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Clean Air Centers



Bitterroot Library



Darby Library



Seeley Lake Library



North Valley Library



Lolo Library



Missoula County Library



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Clean Air Recognition Program

Indoor and Outdoor Air Quality Darby Library

This "Purple Air" sensor measures indoor Air Quality, specifically fine particulate matter: PM 2.5. It's connected to the internet!

Click this QR code to view the Purple Air map and air quality level inside this library (it's the circle with a border!).



Current Indoor Air:



Current Outdoor Air:



Wildfires and wood smoke contain many pollutants. We're most concerned with fine particulate matter PM2.5. These tiny particles can burrow deep into our lungs and even pass into our bloodstream, and they impact our health in multiple ways. Please see our brochure or montanawildfiresmoke.org for more information about health risks and what you can do in your home to prepare and stay healthy.

Darby also has an outdoor Air Quality sensor, and you can see the current air quality at AirNow.gov. Click this QR code.

Air Quality Activity Guidelines (AQI) provide the level of air quality and recommended actions

AQI	What should I do?
0-50	Good: You can breathe safe
51-100	Moderate: Some risk for those who are sensitive to air pollution
101-150	Unhealthy for Sensitive Groups: These folks should limit time outside and avoid strenuous outdoor activity
151-200	Unhealthy: Everyone should reduce exposure. Limit time and activity outside and take steps for clean indoor air.
201-500	Hazardous: Stay inside and filter indoor air. Go elsewhere for cleaner air if needed.



WILDFIRE SMOKE SEASON CHECKLIST

BEFORE SMOKE EVENT			
Task	Assigned To	Completed	Notes
Check supplies <ul style="list-style-type: none"> HEPA Air Cleaner is operable Extra HEPA filters available 			
Confirm Air Monitor is operating			
Confirm staff is familiar with Clean Air Center protocols, monitor & materials			
Publicize shelter availability incl. hours of operation			
Clean HVAC system			
Determine clean air shelter/room capacity			
Solicit resources from community partners, if applicable			
DURING SMOKE EVENT			
Switch HVAC System from "normal" mode to "smoke mode"			
Display Shelter Availability Sign on main & community room doors			
Display & update Current Air Quality sheet			
Display Keep Door Closed signs on all doors			
Make Daily Monitoring Checklist available to staff & complete daily			
Monitor IAQ with PurpleAir indoor sensor			
Check HVAC & HEPA filters every 3-7 days, depending on severity and length of smoke event			
Maintain indoor temp below 80°			
AFTER SMOKE EVENT			
Wet mop/dust surfaces			
Monitor IAQ & continue to use HEPA if needed			
Change filters in HEPA and/or HVAC if needed			
Thank community partners for resources, if applicable			
Record lessons learned if applicable			

Clean Indoor Air Center



Capacity:

Hours:

Entity Logo Here



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North Valley Library

AQI MONITORING SPREADSHEET ~ SMOKE EVENT

AQI 151+ for 24+ hours

Date _____				
Time (AM)	Outdoor AQ	Indoor AQ	Staff Initials	Notes (if applicable)
Time (PM)	Outdoor AQ	Indoor AQ	Staff Initials	
Date _____				
Time (AM)	Outdoor AQ	Indoor AQ	Staff Initials	Notes (if applicable)
Time (PM)	Outdoor AQ	Indoor AQ	Staff Initials	
Date _____				
Time (AM)	Outdoor AQ	Indoor AQ	Staff Initials	Notes (if applicable)
Time (PM)	Outdoor AQ	Indoor AQ	Staff Initials	
Date _____				
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Date _____				
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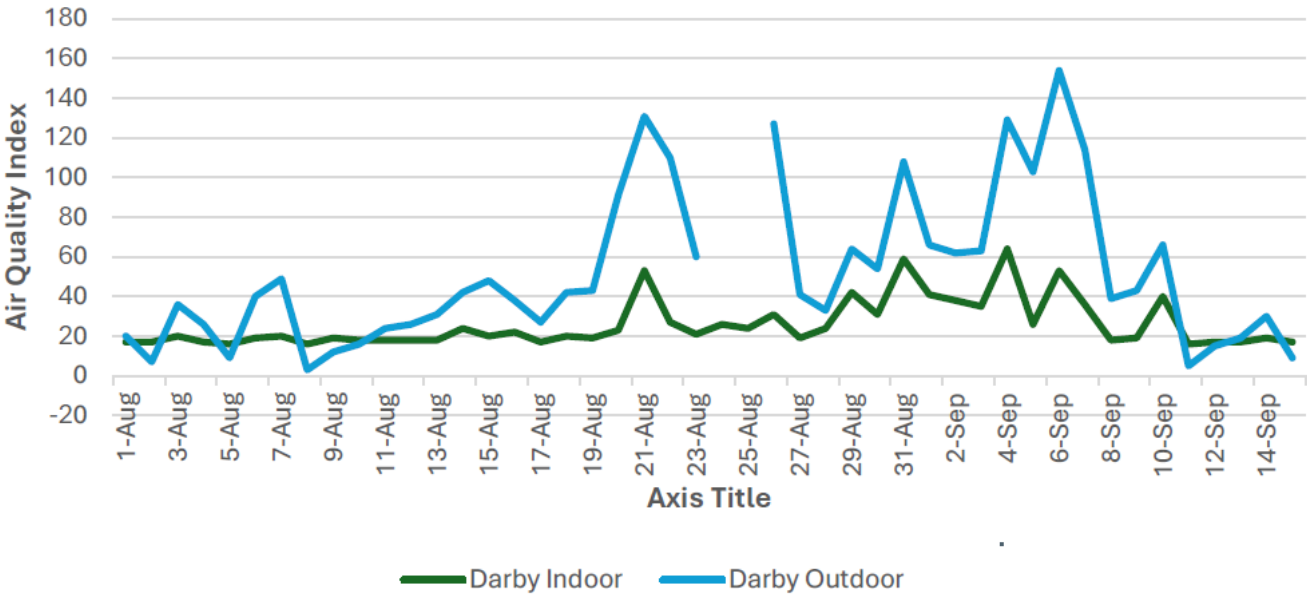
Sept. 30 - Give to Kayli to submit or submit all completed spreadsheets to mary.anderson2@nd.gov





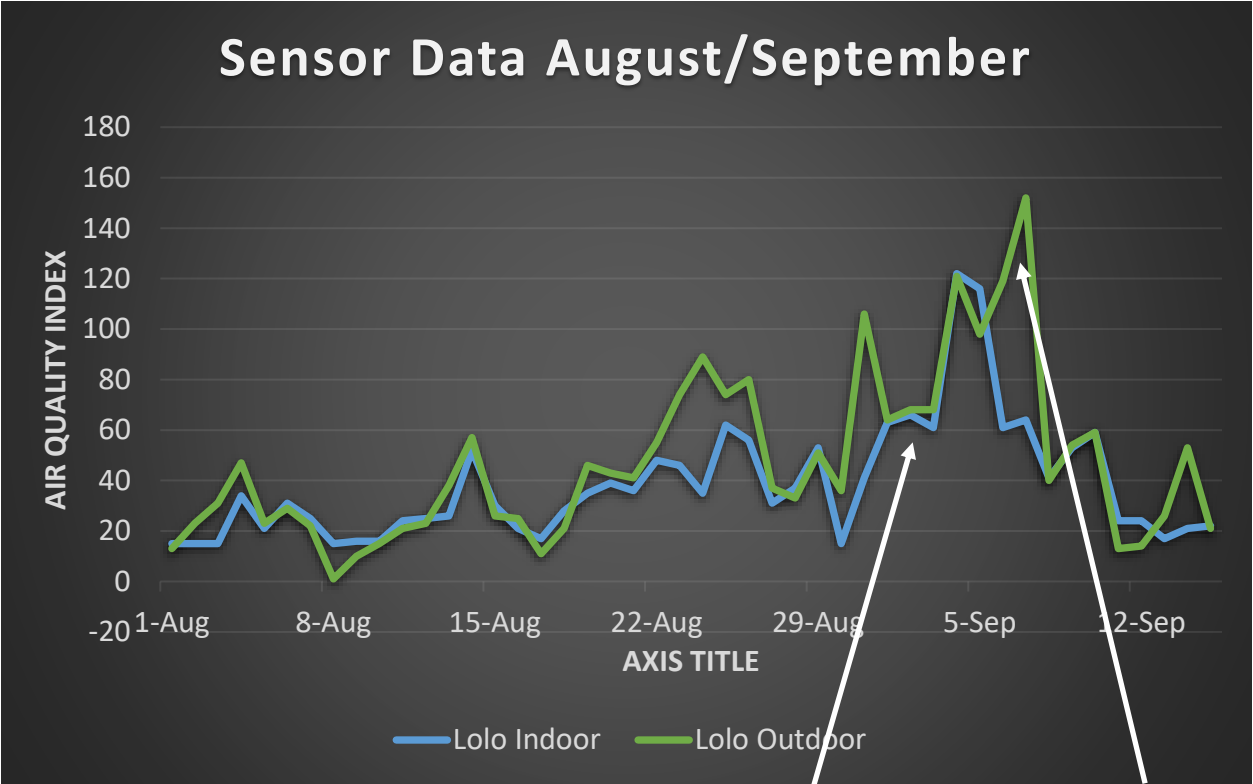
Darby Library

Sensor Data August/September



Lolo School and Library

Building opened for students: 2023



First day
of school

Weekend





Montana

CLEAN AIR CENTER RESOURCE GUIDE



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Lessons Learned



People need something to do



Every building/community is different



Don't box yourself in when looking for partners



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Thank You

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406-444-0995

Websites
Asthma.mt.gov
Airquality.mt.gov



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