**Cleaner Air Shelter Guide**

Wildfires impact Northern California tribes nearly every year. A key public health impact of wildfires is exposure to wildfire smoke. One strategy to limit the health effects of wildfire smoke is to open a cleaner air shelter in your community for use by sensitive groups (elderly, children, and those with respiratory or heart health concerns). This guideline is intended to help tribes or health programs develop and implement a Class 2 cleaner air shelter in their community. A class 2 air shelter provides air filtration but the air shelter does not prevent the infiltration of contaminated air by maintaining the building under positive pressure relative to the outdoor environment.4

# **Preparing for Wildfire Smoke Event**

* Develop a community smoke alert and communication plan.
* Procure supplies and equipment needed for the operation and maintenance of a cleaner air shelter.
* Incorporate wildfire smoke education into home visiting program where providers educate sensitive groups on the health risks of wildfire smoke exposure and recommended prevention measures.
* Consider community distribution of N95 respirators and HEPA air purifiers to at risk group members prior to wildfire season.
* Before wildfire season, distribute wildfire smoke fact sheets through the tribal community center, health clinic and tribal social media.

# **Cleaner Air Shelter Planning**

Your Cleaner Air Shelter Plan should address the following:

## 1. Determine when and how your community will open a Cleaner Air Shelter.

* Determine at what AQI (Air Quality Index) level the community will open a Cleaner Air Shelter.
* Determine the hours the Cleaner Air Shelter will operate.
* Identify who will monitor AQI for your community.
* Identify what resource you will use to monitor AQI in your community. Suggestions include: your Local Air Quality Management District or at fire.airnow.gov.
* Identify who will initiate and coordinate the opening of the Cleaner Air Shelter when the AQI threshold is reached.
* Identify who will set up the equipment and supplies in the Cleaner Air Shelter.
* Identify the staff who will manage and operate the cleaner air shelter.
* Determine the operational hours for the cleaner air shelter based on available resources and public health risk.
* Identify what security is necessary at the cleaner air shelter during operation hours.
* Identify how you will communicate the opening of the Cleaner Air Shelter to the community.

## 2. Select the location of the Cleaner Air Shelter.

Key attributes of a suitable location for a cleaner air shelter include:

* ADA accessibility
* Central HVAC system with a smoke management plan that meets the guidelines in ASHRAE 44P
* tightly sealed windows and doors
* Building equipped with carbon monoxide detector
* Telephone for use in case of emergency
* Facility backup generator should the wildfire lead to a Public Safety Power Shutoff (PSPS)
* enough space for estimated occupancy
* potable water
* adequate number of toilets and handwashing sinks
* adequate number of solid waste receptacles
* adequate number of tables and chairs for expected occupancy
* Adequate number of electrical outlets and power strips for use in charging medical equipment and mobile devices
* adequate parking
* Onsite kitchen amenities, particularly a refrigerator for storing medications
* proximity to tribal housing
* Specific space designed for use by children and teen

Possible tribal facilities that could be suitable to serve as a Cleaner Air Shelter include:

* Tribal Community/Recreational Center
* Tribal Senior Center
* Tribal Gymnasium
* Tribal School

## 3. Decide what amenities you will offer at the Cleaner Air Shelter.

* Bottled water or water dispensers.
* Snacks and/or meals.
* Wi-Fi access.
* Visitor activities: board games, video games, movies, books, art and craft supplies, cultural classes.

## 4. Recommended Equipment and Supplies to Operate the Cleaner Air Shelter

* Items needed to provide selected guest amenities (Wi-Fi router, board games, bottled water, snacks, DVD player, projector, television, etc.)
* HEPA air scrubbers/air purifiers adequate in number and size to provide 5-6 air changes per hour for the Cleaner Air Shelter space.1
  + **Consult IHS DEHS for availability to use a Q-trak particle counter to determine effectiveness of air purifiers used in the shelter.**
* Replacement filters for HEPA air scrubbers/air purifiers.
* Low cost particle counter to monitor indoor air quality.
* Building cleaning supplies.
* Personal hygiene supplies: toilet paper, paper towels for hand drying, hand washing soap, feminine hygiene products, diapers.
* Adequate number of solid waste receptacles.
* Refrigerator to store medications that require refrigeration.
* AED.
* Fire extinguishers.
* Radio for center staff to receive updates on fire status.
* If food is cooked and served in an on-site or off-site commercial kitchen, reach out to your IHS environmental health specialist to perform a food safety survey prior to opening the shelter.

## 5. Cleaner Air Shelter Staffing

Create a staffing plan for your Cleaner Air Shelter. Ensure your staff receive appropriate training. The following training is recommended for all staff working at the Cleaner Air Shelter.

* CPR/AED.
* First Aid.
* Emergency evacuation procedures for the facility.

## 6. Additional Considerations:

* Managing Pets
* Resting areas (cots, pillows)
* Smoke management plan for shelter location HVAC system

# **AIR QUALITY IN SHELTER: HEPA Air Scrubber/Purifier Selection Guidance**

Ideally a facility used as a cleaner air shelter would have a smoke management plan for its HVAC system that follows the guidelines set by ASHRAE in their standard 44P: Protecting Building Occupants from Smoke During Wildfire and Prescribed Burn Events. When indoor air quality is not significantly improved by the implementation of the HVAC smoke management plan, HEPA air purifiers or scrubbers can be deployed to create cleaner indoor air quality during a smoke event.

**For a large public shelter, such as a gymnasium, it is recommended to follow ASHRAE Guideline 44P and implement a Smoke Readiness Plan. Once the plan has been implemented, reach out to your local IHS DEHS Environmental Health Specialist to verify that your indoor air quality is acceptable using a Q-TRAK air quality measuring device. Here is a link to ASHRAE Smoke Readiness Plan Guidance:** [**Planning Framework for Protecting Commercial Building Occupants from Smoke During Wildfire Events**](https://www.ashrae.org/file%20library/technical%20resources/covid-19/guidance-for-commercial-building-occupants-from-smoke-during-wildfire-events.pdf)**.**

Industrial HEPA air scrubbers can be purchased for $600 to $1,800 per unit. This equipment is capable of filtering from 200 cubic feet per minute (cfm) to 1,000 cfm. To determine the appropriate size of air scrubber to use in a cleaner air shelter, it is first necessary to calculate the volume of the space. To determine the volume of a room, measure the room’s length, width and height in the unit feet. Then multiply the room’s length by its width and by its height to get a result that is in cubic feet.

Room Volume Equation: Room length x Room width x Room height = L x W x H = Room Volume

Next, to calculate what size HEPA purifier you need, multiply the volume of the room by 5 (the number of desired air changes per hour) and then divide that number by 60. The result is the minimum CFM needed to pass 99% of the air in the room through the HEPA filter once every hour.5

Air Purifier Size Equation: Minimum CFM Needed = (5 x (Room Volume))

60

You can also use the Clean Air Delivery Rating (CADR) to determine the size of air purifier for a building. This is a separate efficiency rating that is sometimes provided for air purifiers. Three different CADR ratings are usually listed on the air purifier, 1 for tobacco smoke, 1 for dust, and 1 for pollen. Consider devices with a higher Clean Air Delivery Ratings (CADR) for Tobacco Smoke when selecting an air purifier to be used during a wildfire smoke event as tobacco smoke has properties similar to wildfire smoke.

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| **Portable Air Cleaner Sizing for Particle Removal** | | | | | | |
| Room Area (ft2) | 100 | 200 | 300 | 400 | 500 | 600 |
| Minimum CADR (cfm) | 65 | 130 | 195 | 260 | 325 | 390 |

This chart is for estimation purposes. The CADR in the table are calculated based on an 8-foot ceiling height. If you have a higher ceiling height you may want to select a portable air purifier filter with a higher CADR. This chart only applies to air cleaners with HEPA filters.

To achieve 5 air changes per hour, you want to choose a HEPA air purifier with a CADR for tobacco smoke that is at least 65% of the room size (Length x Width) with a ceiling height of approximately 8 feet. In large rooms, or rooms with a ceiling height higher than 8 feet, multiple HEPA air purifiers should be used.

Avoid air purifying units that use UV radiation, ozone generation, or advertise other disinfection features. Any device used should be labeled that it is certified by the California Air Resources Board (CARB), which can be verified at: <https://www.arb.ca.gov/research/indoor/aircleaners/certified.htm>

Possible suppliers for air purifiers include:

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| --- | --- | --- |
| Home Depot | Lowes | Amazon |
| Uline | Global Industrial | Grainger |

The aforementioned suppliers may also be resources for industrial HEPA air scrubbers. HEPA air scrubbers can be also ordered through a variety of industrial equipment venders listed on GSA Advantage, Grainger, Amazon, and other sources. Remediation and cleanup companies, such as SERVPRO or BELFOR, may also have equipment available for rent.

If you require air purifiers/scrubbers for your cleaner air shelter, ensure this equipment is staged nearby well before wildfire season. Demand for air cleaner equipment increases dramatically during smoke events. Furthermore, slow ground shipping of large items results in items being received too late to be useful.

# Cleaner Air Shelter Opening Checklist

1. At the cleaner air shelter location, implement the smoke management plan for the HVAC system.
2. Direct entry into and out of the shelter to a doorway that is away from the direction of prevailing winds by posting appropriate signage.
3. Seal all other doors in the location with painter’s tape.
4. If the building has automated double door vestibule, adjust the outer doors to close before the inner doors open.
5. Run HEPA air purifiers at least 2 hours before the building is occupied and ensure they are three feet away from obstructions and are not placed in corners, doorways, or walkways.
6. Ensure HEPA units don’t overload electrical components like extension cords or electrical circuits (e.g. a single 20A rated circuit may be limited to only 5 HEPA air purifier units).

# References:

1. ASHRAE Guideline 44P, Protecting Building Occupants from Smoke During Wildfire and Prescribed Burn Events. August 2023.
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4. Government of Northwest Territories. Smoke Exposure from Wildfire, Appendix A, 2016.
5. HVAC filtration for controlling infectious airborne disease transmission in indoor environments: Predicting risk reductions and operational costs Parham Azimi, Brent Stephens, Build Environ . 2013 Dec;70:150-160. doi: 10.1016/j.buildenv.2013.08.025. Epub 2013 Sep 4.
6. “List of Carb-Certified Air Cleaning Devices.” List of CARB-Certified Air Cleaning Devices, www.arb.ca.gov/research/indoor/aircleaners/certified.htm. Accessed 4 Apr. 2024.
7. Sacramento County Office of Emergency Services. Extreme Heat Emergency Hazard Annex, May 2022.
8. “Selection and Use of Portable Air Cleaners.” Selection and Use of Portable Air Cleaners to Protect Workers from Exposure to SARS-CoV-2, National Institute of Environmental Health Sciences, tools.niehs.nih.gov/wetp/public/hasl\_get\_blob.cfm?ID=13021. Accessed 4 Apr. 2024.