WASHINGTON DOH GUIDANCE ON INDOOR AIR QUALITY SENSOR USE

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WA DOH School Env. Health & Safety and IAQ Program
October 2023 • ELI Fall Workshop
Overview

- Air quality groups at DOH
  - “Climate and Health” section
  - Wildfire Smoke Impacts Advisory Group
- WA Children and Youth Activities Guide for AQ
  - What it is
  - New sensors guidance (appendices)
- (For your review later - ongoing work at WA DOH)
AQ Groups at WA DOH
Air Quality at WA DOH: Two Groups

Environmental Public Health Division

Office of Environmental Health & Safety

Local Health Support Section

School Environmental Health & Safety and Indoor Air Quality Program

Office of Environmental Public Health Sciences

Climate & Health Section

Air Quality Unit

Other groups in our offices cover topics such as wildfire event health data, tobacco smoke, radon, toxicology
Air Quality at WA DOH: Climate & Health Section

- Environmental justice*
- **Wildfire smoke**, AQ
  - **Smoke From Fires**
- Harmful algal blooms*
- Extreme Heat
  - **Hot Weather Precautions**
- Pollen (new)
- Vector-borne disease

*Positions coming soon
Develop guidance & materials

Work with partners

Review evidence & best practices

Wildfire Smoke response across our offices

Emergency Preparedness & Response

Syndromic Surveillance

Share resources

(to be applied to other pollutants)
Formed at the request of local health jurisdictions in 2018.

**Goals**
- Develop and improve evidence-based health guidance
- Achieve more consistent health messaging across agencies

**33 Members, including:**
- WA Dept of Health and local health jurisdictions
- WA Depts of Ecology, Labor & Industries, and Natural Resources
- Regional clean air authorities
- Tribal communities
- University of Washington
- EPA and USFS

One-Pager: 333-242-WFSImpactsAdvisGroupFINAL.pdf (wa.gov)
WA Children and Youth Activities Guide for AQ
Big updates this summer!

Plus Appendices A, B, and C
Washington Children and Youth Activities Guide for Air Quality

The following public health recommendations are to protect children and youth (18 years and younger) from fine particulate matter (PM2.5). Apply this guide to school, child care, athletic practices and games, before and after school programs, camps, field trips, and other outdoor programming and activities.

Outside Air Quality Index (AQI): PM2.5

<table>
<thead>
<tr>
<th>Activity Duration</th>
<th>Good (6-50 AQI)</th>
<th>Moderate (51-100 AQI)</th>
<th>Unhealthy for Sensitive Groups (101-150 AQI)</th>
<th>Unhealthy, Very Unhealthy, or Hazardous (151+ AQI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 mins (e.g., recess, PE, classes typically held inside)</td>
<td>No restrictions</td>
<td>Allow children and youth with health conditions to opt out or stay indoors. Limit intensity of activities for those children and youth if needed.</td>
<td>Limit to moderate intensity activities or a 1-hour total duration with moderate intensity activities. If intensity level and time cannot be modified, consider canceling outdoor activity or move to an area with safer air quality.</td>
<td>Cancel outdoor activity or move to an area with safer air quality. Either indoors with filtered air or a different location. Limit to light intensity activities if outdoor PM2.5 levels are elevated.</td>
</tr>
<tr>
<td>1-4 hours (e.g., athletic events and practices)</td>
<td>No restrictions</td>
<td>Allow children and youth with health conditions to opt out or stay indoors. Limit intensity of activities for those children and youth if needed.</td>
<td>Limit to light intensity activities or a 1-hour total duration with moderate intensity activities. If intensity level and time cannot be modified, consider canceling outdoor activity or move to an area with safer air quality.</td>
<td>Cancel outdoor activity or move to an area with safer air quality. Either indoors with filtered air or a different location. Limit to light intensity activities if outdoor PM2.5 levels are elevated.</td>
</tr>
<tr>
<td>&gt; 4 hours (e.g., outdoor school or programming, day camp, overnight camp)</td>
<td>No restrictions</td>
<td>Move children and youth without health conditions to opt out or stay indoors and limit intensity of activities.</td>
<td>Limit to light intensity activities or a 1-hour total duration. If intensity level and time cannot be modified, cancel outdoor activity, or move to an area with safer air quality.</td>
<td>Cancel outdoor activity or move to an area with safer air quality. Either indoors with filtered air or a different location. Limit to light intensity activities if outdoor PM2.5 levels are elevated.</td>
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Limit to light intensity activities or to a 1-hour total duration with moderate intensity activities. If intensity level and time cannot be modified, consider canceling outdoor activity or move to an area with safer air quality, either indoors with filtered air or to a different location. Limit to light intensity activities if outdoor PM2.5 levels are elevated.
Outdoor Air Monitoring: Use air pollution forecasts and government agency monitors on AirNow.gov for non-wildfire smoke pollution. Use the Washington Smoke Blog for wildfire smoke. The Smoke Blog includes low-cost sensors and has the most relevant forecasts for Washington wildfire smoke. See Appendix A.

Indoor Air Monitoring: Indoor low-cost sensors can be used for indoor activities. Do not compare uncorrected sensor data to the AQI. Compare sensor data in locations throughout the facility and indoors vs outdoors. See Appendix B.
New to Activities Guide: Sensors

• Regional agencies, local health already deploying sensors to schools
  • School, public health partners asking for guidance
• Sensors fill important gap when used appropriately: Real-time info for decisions
• Not simply “plug-and-play” and require resources (marketing).

It would be great if people were using these sensors with guidance.

See the appendices.
Activities Guide: Appendix A

Appendix A: Outdoor Air Quality Monitoring for Decision Making During Wildfire Smoke Events

Appendix B: Indoor Air Quality Monitoring

Appendix C: Improving Indoor Air Quality

Where to find data:
- Airnow - sensors on Fire & Smoke Map
- WA Smoke Blog
- Data quality, caveats
- Decision scenarios
• Low-cost sensor data can be inaccurate
  • Correction factors help: AirNow Fire and Smoke Map – for wildfire smoke.
  • Proximity affects: Data differ by distance, elevation, terrain, weather...

• Data quality unknown
  • Location, indoor/outdoor could be wrong.
  • Sensor could be at someone’s barbecue.
Appendix A: Outdoor Air Quality Monitoring for Decision Making During Wildfire Smoke Events

Decision-making scenarios

- **Athletic events with logistics** (in the future)
- Use AQI forecasts - 24 hours; smoke can fluctuate
- **Summer camp activities** (long-duration)
  - Use [NowCast](https://nowcast.washington.gov) (hourly), keep checking
- **Recess** (within the hour)
  - Use 30 min sensor data: click on “trend”
Activities Guide: Appendix B

Appendix A: Outdoor Air Quality Monitoring for Decision Making During Wildfire Smoke Events

Appendix B: Indoor Air Quality Monitoring

Appendix C: Improving Indoor Air Quality

- If you don’t have indoor sensors
- Selection
- Decisions:
  - Comparing indoor to outdoor
  - Correction factors
  - Getting fresh air
  - Handheld data
Appendix B: Indoor Air Quality Monitoring

- Hardly anybody has indoor sensors yet
  - Assume indoor conc same as outdoor, take measures
- When and where to deploy indoor sensor types
  - Stationary sensors: track changes in IAQ over longer periods
  - Portable handheld sensors: variation throughout a facility
- Do when “Unhealthy for Sensitive Groups” outside
  - Focus where AQ worst, activity vigorous, sensitive kids
  - Goal: choose which rooms to occupy
An Indoor “Threshold”

- We kind of use 35.5 µg/m³ - effectively threshold for limiting outdoor activities
- Was on front table; now just in Appendix B
  - “During smoke periods, the threshold of 35.5 µg/m³ is a useful target of indoor concentration (the lower the better).”
- This concentration still not healthy
- Not every school needs an indoor sensor
Appendix B: Indoor Air Quality Monitoring

- Compare to verify – must be the same:
  - Correction factors applied
  - Averaging time interval
  - Measurement (AQI or PM$_{2.5}$ conc.)
  - *Indoor/outdoor ratios - can’t scale from non-wildfire*

https://wasmoke.blogspot.com/
Appendix B: Indoor Air Quality Monitoring

How to get 10-minute (corrected sensor data) or hourly (agency monitor) PM2.5 concentrations from the Washington Smoke Blog or Fire and Smoke Map:

1. Click or tap on the monitor (circle) or low-cost sensor (square) closest to you
2. A window like this should pop up
3. Scroll down within the pop-up window to get to “Recent History”
4. Select the “10 min” tab if available, otherwise select “Hourly Concentration”
5. Tap, click, or hover on the end of the graph
6. This number is NOT THE AQI. This is the PM2.5 measurement.

(Screenshots are from the "Smoke" tab of the AirNow phone app, April 2023.)
Tips for better IAQ:

- Reducing other pollutants
- Ventilation, filtration
  - Portable units - no added technologies
- Overlapping heat, airborne illness
  - Also see Recommendations for wildfire smoke and COVID-19 (heat too)
Ongoing Work on Sensors and Smoke in Washington

• **Sensor protocol** – how to use sensors (Climate & Health, in progress)
  • Benefits and limitations of different types of PM$_{2.5}$ sensors
  • Siting stationary sensors, instructions for using handheld sensors
  • Using sensor data for decision-making

• **Children and Youth Activities Guide**
  • Continuous, annual review through engagement, feedback, and revision

• **DOH School EHS Fall Workshop** – indoor air monitoring on the agenda
  • Updates to school, local health staff – to include sensor thoughts, case studies

• **Rulemaking on outdoor workers in wildfire smoke** (WA Labor and Industries)
  • Voluntary, required interventions at specific extreme PM$_{2.5}$ concentrations

• **Studies** (Climate & Health with partners) – in childcares (sensors), long-term care facilities (filtration), schools (HVAC), homes (cleaner air rooms)
Questions & Discussion

Thank You

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Read the following slides later for ongoing projects
Carbon Monoxide HB 1779 - 2023-24: Interagency Workgroup Formed

- Spurred by state patrollers in their vehicles
- Purpose of workgroup:
  - Look into tracking of exposures, causes
  - Recommend policy, other actions
  - Identify federal funding
- Please share ideas! Thanks to Florida DOH and Minnesota DOH.
Temperature in Schools (Forthcoming Two-Pager)

• Students do not learn well at elevated temperatures

• Min temp (WAC 246-366-090) 65 °F (60 °F gym)

• No statewide max temp
  • “Excessive heat” is prohibited (WAC 246-366-080)

• Recommend ASHRAE 55 for thermal comfort
  • Washington Sustainable Schools Protocol

• Please share resource ideas!

Resources We Like So Far:
ASHRAE Center for the Built Environment (CBE) Thermal Comfort Tool
Cooling indoor spaces without air conditioning (wa.gov)
Child Care Weather Watch (c-uphd.org)
Protecting-Californians-with-Heat-Resilient-Schools.pdf (ucla.edu)
Indoor Air Quality

Indoor air quality can have a significant effect on your health. Studies show that people spend 65 to 90 percent of their time indoors, and indoor air can be two to five times more polluted than outdoor air. The young, elderly, chronically ill, and those with respiratory or cardiovascular disease are often the most impacted by poor indoor air quality.

- Asbestos
- Asthma
- Bleach Mixing Dangers
- Carbon Monoxide
- Fiberglass
- Formaldehyde
- Hiring an Investigator or Contractor
- Mercury
- Mold
- Outdoor Air
- Pesticides
- Radon
- Renters, Landlords, and Mold
- School Indoor Air Quality
- Tobacco
- Vapor Intrusion

Handouts and Resources - Ventilation and cooling:

- Ventilation and Air Quality for Reducing Transmission of Airborne Illnesses (PDF)
- Cooling Indoor Spaces Without Air Conditioning (PDF)

Contacts:
Email: indoorairquality@doh.wa.gov
Mold information line: 360-236-3090
Our IAQ Website!  [www.doh.wa.gov/iaq](http://www.doh.wa.gov/iaq) - Videos

- Mold Prevention
- Asthma Trigger Control
- Healthy Home Air
  - Ventilation and exhaust systems
  - HRV/ERV systems
  - Installation, inspection, upgrades
- Schools - Hazardous Chemical Safety in:
  - Auto Shops
  - Art Classrooms
  - Science Classrooms
- Toxic Substances in Art Series
Other 2023 Updates

- Changed guidance language: “Consider canceling” 1-4 hour activities at Unhealthy for Sensitive Groups (AQI 101-150)
  - Language is key: recently added FAQs to address what “consider canceling” means
  - Concern from athletics organizers about opportunity for exercise, achievement
  - Some areas of WA inundated with smoke for weeks or longer: Clean Air Methow • The Fifth Season community listening project
  - With research on short-term smoke impacts for kids still developing, how much precaution should we recommend?

- Activity durations (broader, camps)
  - How do organizations match this guidance with their activities?

- Added “youth”
  - What is the definition of “child”? 18 or 21?

Measure of success: Vermont DOH adopted Washington’s Air Quality Guidance for schools.
Safer Products for Washington

- Regulates chemicals by class, reduces the likelihood of swapping out one toxic chemical for another (Department of Ecology, 2019).
- Cycle 1: Rule adopted May 2023. Manufacturers must restrict use if there is a safer alternative or report to Ecology (Jan 2025).
  - Priority chemical classes:
    - PFAS in aftermarket stain- and water-resistance treatments, carpets and rugs, and leather and textile furnishings.
    - Ortho-phthalates in vinyl flooring and in personal care product fragrances.
    - Organohalogen flame retardants in electric and electronic products.
    - Flame retardants (as defined in RCW 70A.350.010) in recreational polyurethane foam.
    - Phenolic compounds in laundry detergent, food and drink can linings, and thermal paper.
- Cycle 2: In Phase 1 (Identifying chemicals). Open for public comment.
  - Draft priority chemical classes:
    - Lead and lead compounds
    - Brominated and/or chlorinated substances (very broad)
    - BTEX substances
    - Formaldehyde and releasers
    - cVMS (cycle volatile methylsiloxanes such as D4, D5, D6)
    - 6PPD (N-(1,3-Dimethylbutyl)-N’-phenyl-p-phenylenediamine)

Perfluorooctanoic acid (PFOA; Wikipedia)
Orthophthalates (Wikipedia)
Decabromodiphenyl ether (decaBDE; Wikipedia)
2-[4-(2,4,4-trimethylpentan-2-yl)phenoxy]ethanol (Wikipedia)
Bisphenol A (BPA; Wikipedia)