Anniversary of the 2017 Northern California Wildfires and Update on Wildfire Program Development

November 7, 2018
Eric Stevenson, Director of Meteorology & Measurement
Dr. Judith Cutino, Health Officer
Lisa Fasano, Communications Officer
Wayne Kino, Deputy Air Pollution Control Officer
• Sunday, October 8, 2017, numerous wildfires started in Sonoma and Napa counties.

• Bay Area Air Quality Management District (Air District) provided support via air quality and smoke information, monitoring and N95 masks.

• Recurring and unprecedented wildfires throughout California has prompted a discussion on Air District role in wildfires.

• Staff is exploring and developing an Air District program for wildfire preparation, prevention, and response.
• Discussion on wildfire events and air quality impacts.

• Health information on smoke impacts.

• Air District actions in response to wildfires.

• Next Steps.
On the evening of Sunday, October 8, 2018, numerous wildfires started in parts of Sonoma and Napa counties.

Air quality became unhealthy, continued for several days due to ongoing fires and persistent northerly winds.

Relatively narrow but dense smoke plumes resulted in highly-variable air quality conditions.

Air District updated air quality forecasts early on Monday, October 9, 2018 to reflect wildfire smoke effects.

Air District provided regular air quality updates to partner agencies and organizations that requested them.
## Summary of Daily Average PM$_{2.5}$ Concentrations ($\mu$g/m$^3$)

Color Coded by AQI Category (numbers are in concentration units, not AQI)

<table>
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<tr>
<th>Location</th>
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1 Power/communications down at station
2 Monitor undergoing maintenance

### October 2017

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<tr>
<th>Air Quality Index</th>
<th>Good</th>
<th>Moderate</th>
<th>Unhealthy for Sensitive Groups</th>
<th>Unhealthy</th>
<th>Very Unhealthy</th>
<th>Temporary Monitor – Not yet deployed</th>
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</table>
• The County Fire started in the community of Guinda during the afternoon of June 30, 2018 in Yolo County

• Despite smoke moving over the Bay Area, air quality remained Good to low-Moderate

• A temperature inversion kept the smoke in the upper levels of the atmosphere

MODIS satellite image from Sunday 07/01/2018
Summary of Daily Average PM$_{2.5}$ Concentrations (µg/m$^3$)

Color Coded by AQI Category (numbers are in concentration units, not AQI)

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June/July 2018

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<th>Unhealthy for Sensitive Groups</th>
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<th>Very Unhealthy</th>
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A multi-fire event that included the Carr, Ferguson, and Mendocino Complex fires occurred from the latter part of July well into August across the Western U.S.

Smoke impacts were felt at ground level as the smoke moved over the ocean, moved to lower levels of the atmosphere and moved in with coastal fog.
Fires Visible from Space

Image from the International Space Station taken on August 3, 2018 of Northern California.
## Summary of Daily Average PM$_{2.5}$ Concentrations ($\mu g/m^3$)

Color Coded by AQI Category (numbers are in concentration units, not AQI)

<table>
<thead>
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<th>City</th>
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<th>Fri 08/24</th>
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### August 2018

<table>
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<th>Air Quality Index</th>
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<th>Unhealthy for Sensitive Groups</th>
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<th>Very Unhealthy</th>
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<tbody>
<tr>
<td>Color Code</td>
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<td>Orange</td>
<td>Red</td>
<td>Purple</td>
<td>Blue</td>
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Note: Concentrations are in concentration units, not AQI.
Wildfire particulate composition

- Fine particles and a mixture of various organic and inorganic gases
- Combustion products of trees - pine oils, eucalyptus
- Poison Oak and Ivy

Urban wildfires - potentially higher concentrations of

- Metals – lead, chromium, arsenic, copper, mercury from burned batteries, paint, electronics, solder, pipes
- PAHs - decomposition of plastics
- Asbestos, Fiberglass
Smoke Health Impacts

Exposure to high concentrations of smoke may cause:

- Irritation of eyes, nose, throat, airway and lungs
- Chest tightness, cough, wheezing and difficulty breathing

More serious effects may include:

- Exacerbation of pre-existing respiratory and cardiovascular disease, such as asthma, COPD, and heart failure
- Bronchitis – chronic inflammation of the airway
- Increased risk of heart attack and stroke
Studies on Health Effects

• One 2016 study of the statewide 2015 wildfires found

  - Smoke exposure was associated with cardiovascular and cerebrovascular ED visits for all adults, especially those over age 65 yrs.

• Few studies available on long term health effects of wildfire smoke

  - High concentration, shorter duration exposures

• Multiple studies of health effects are currently underway:

  - UC Davis, UC Berkeley, Univ. of Montana, OEHHA
Improving Understanding and Communication

California Department of Public Health (CDPH) and EPA

- Publishing new updated guidance documents to aid county health officials
- CDPH conducted wildfire smoke webinars for health officials, public
- U.S. EPA has updated AirNOW website

The Air District is working with county health officers to improve coordination and communication:

- Consistent health messaging
- Improved notification of smoke advisories
- Exploring pilot projects to place air filters in cooling/clean air centers
Communications Office - Better messaging focused following 2017 North Bay Wildfires

• Developed better approach to messaging about smoke - Air Quality Alerts

• Air Quality Alert vs Spare the Air Alert - Worked with Meteorology to determine when to call, under what conditions

• Met with ABAHO Public Health PIO’s – How do we partner on messaging

• Work in progress – Improving message delivery to other city/county PIO’s
Summer 2018 CalFire Incidents

June 2018

July 2018

August 2018

September 2018

Active CalFire Incidents 2018

Statewide Incidents Summer 2018
Lessons Learned

• Weather complexity makes forecasting impacts difficult.
• Deploy air monitoring and report data quickly.
• Must focus on fire prevention measures.
• Continue to develop, improve and maintain relationships with other agencies.
• Develop consistent and improved messaging.
Actions to Date

1. Improving forecasting by tracking smoke from all fires with potential impact in the western US
2. Working with US EPA and CA to develop wildfire response plans and messaging programs
3. Improving coordination and messaging with county health and response agencies
4. Developing a wildfire program strategy to prepare, prevent and respond to wildfires
### Public Health Guidance: School Outdoor Activities During Wildfire Events

Check the local Air Quality Index (AQI) online [http://www.deq.state.or.us/aqi/](http://www.deq.state.or.us/aqi/) and do a visual inspection outside. **Compare the AQI and visibility test to determine the air conditions in your community. Then, use the guide below to determine activity level for your students.**

<table>
<thead>
<tr>
<th>Air Quality Index</th>
<th>Visibility Scale</th>
<th>Recess (15 min)</th>
<th>PE (1 hr)</th>
<th>Athletic events and practices (2–3 hrs)</th>
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</thead>
<tbody>
<tr>
<td><strong>Good</strong></td>
<td>Over 5 miles</td>
<td>Great day to be active outdoors!</td>
<td>Great day to be active outdoors!</td>
<td>Great day to be active outdoors!</td>
</tr>
</tbody>
</table>
| Moderate          | 5–15 miles       | It is a good day for students to be active outside.  
• Watch students who are unusually sensitive to air pollution for symptoms of shortness of breath or coughing. |  
• Watch students who are unusually sensitive to air pollution.  
• Look for symptoms of shortness of breath or coughing.  
• Monitor symptoms and reduce or cease activity if symptoms arise. |  
• Watch students who are unusually sensitive to air pollution.  
• Look for symptoms of shortness of breath or coughing.  
• Increase rest periods and make substitutions for these students as needed.  
• Monitor symptoms and reduce or cease activity if symptoms arise. |
| Unhealthy for sensitive groups | 3–5 miles | It is an OK day for students to be active outside.  
• Allow students who are unusually sensitive to air pollution to stay indoors if they’d like. |  
• Move activities indoors for students sensitive to air pollution.  
• Limit other students to light outdoor activities or move the activities indoors.  
• Increase rest periods and make substitutions.  
• Monitor symptoms and reduce or cease activities if symptoms arise. |  
• Move activities indoors for students sensitive to air pollution.  
• Limit other students to light outdoor activities or move the activities indoors.  
• Increase rest periods and make substitutions.  
• Monitor symptoms and reduce or cease activities if symptoms arise. |
| Unhealthy         | 1–3 miles        | Consider keeping all students indoors or allowing only light outdoor activity.  
• Move activities indoors for students sensitive to air pollution. |  
• Move activities indoors for students sensitive to air pollution.  
• Consider moving all activities indoors.  
• Limit all students to light activities.  
• Increase rest periods and make substitutions. |  
• Consider any of the following:  
• Cancel the event.  
• Move the event indoors.  
• Postpone the event.  
• Move the event to an area with “good” air quality.  
Do any of the following:  
• Cancel the event.  
• Move the event indoors.  
• Postpone the event.  
• Move the event to an area with “good” air quality. |
| Very unhealthy/hazardous | 1 mile or less | Keep all students indoors. |  
• Move all activities indoors.  
• Limit all students to light activities.  
• Increase rest periods and make substitutions. |  
• Do any of the following:  
• Cancel the event.  
• Move the event indoors.  
• Postpone the event.  
• Move the event to an area with “good” air quality. |

*If you get conflicting results when you compare the AQI to your visual inspection, err on the side of caution. Follow the recommendations for the worse of the two assessments.  
**Students with asthma action plans should follow them closely. They should monitor their breathing and exposure to wildfire smoke. Anyone experiencing symptoms should contact a health care provider for further advice. They should call 911 in an emergency.
Air District Next Steps

• Continue to improve forecasting.
• Continue to work with CARB to locate temporary monitors.
• Enhance monitoring capabilities.
• Utilize sensor technology when applicable.
• Improve smoke health effects guidance and actions information.
• Enhance partnership by integrating Air District, federal and state programs.
• Continue to build coordination capability with local agencies.
• Develop guidance for masks and clean air locations.
• Define and address Air District role in wildfire response.
• Amend/develop regulations and guidance to aid in preparing, preventing, and responding to wildfires.
# Summary of Ozone Seasons

<table>
<thead>
<tr>
<th>Year</th>
<th>National 8-Hour</th>
<th>State 1-Hour</th>
<th>State 8-Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015*</td>
<td>5</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>2016</td>
<td>15</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Spare the Air Alerts: 6/22/18, 6/23/18, 6/30/18, 7/26/18, 8/8/18, 8/9/18, 8/18/18, 8/19/18, 8/23/18, 8/24/18, 9/3/18, 9/25/18, 9/26/18

Days > 0.070 ppm 8-hour NAAQS: 8/3/18, 8/9/18, 8/18/18

*Based on NAAQS of 0.075 ppm that was in place during that year
### Winter PM$_{2.5}$ Seasons

<table>
<thead>
<tr>
<th>Year</th>
<th>Days $&gt; 35$ µg/m$^3$</th>
<th>Winter Spare the Air Alerts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/2015</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>2015/2016</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2016/2017</td>
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<tr>
<td>2017/2018</td>
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<td>19</td>
</tr>
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</table>

- **Spare the Air Alert Called for:** 12/8/17 – 12/15/17, 12/22/17 – 12/26/17, 12/29/17 – 12/31/17, 1/1/18, 1/2/18, 1/15/18
- **Days $> 35$ µg/m$^3$ 24-hr NAAQS:** 12/15/17, 12/24/17, 12/30/17, 12/31/17, 1/1/18, 1/2/18, 1/3/18, 1/4/18
# Calendar Year Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>National Ozone Exceedances</th>
<th>Days &gt; 35 µg/m³ due to Wildfires (PM$_{2.5}$)</th>
<th>Total Days &gt; 35 µg/m³ (PM$_{2.5}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>5*</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>2015</td>
<td>5*</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>2016</td>
<td>15</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2017</td>
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<td>18</td>
</tr>
<tr>
<td>2018</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

For Ozone - Days > 0.070 ppm 8-hour NAAQS: 08/03/18, 8/9/18, 8/18/18

* Based on NAAQS of 0.075 ppm that was in place during those years

For Wintertime - Days > 35 µg/m³ 24-hr NAAQS: 12/15/17, 12/24/17, 12/30/17, 12/31/17, 1/1/18, 1/2/18, 1/3/18, 1/4/18

(Other exceedances occurred due to wildfires outside of the November 1 – February 28 timeframe)