Wildfire Air Monitoring
Response Coordination, Data Gathering and Management

California Air Resources Board
Office of Emergency Response
Mission

• Provide accurate, relevant, and timely measurements of air pollutants during unplanned releases
• Support air district’s emergency air monitoring programs
• Coordinate best practices statewide
Air Response Model

Data

Data to Message

Message to Audience
Portable Smoke Monitoring Equipment

• E-BAM (30 units + 6 and 36 radios) - Portable PM2.5 monitoring instrument with accessible hourly data via satellite. PM2.5/WS/WD/RH/TEMP
  (4 storage caches-Redding, Sacramento, Mariposa, Santa Barbara)

• MicroDust (4 units) - Self-contained mobile monitor for rapid, short term, real-time PM2.5 monitoring.

• Portable Met Station (4 units) - Self-contained portable RAWS meteorological monitoring stations. (Mesowest data)
Cache and Loan Programs

- Each cache consists of two complete sets of PM2.5 monitor and deployment tools.
- Other loans available (AIRSIS Radios)
Monitoring Wildfire Smoke

Portable air monitor deployments during wildfires

![Image of smoke and urban scene]

![Image of portable air monitor setup]

**Graph:**
- **Klamath Fires E-BAM #29 Seiad Valley**
- **1-3 Hour PM$_{2.5}$ AQI (09/05/14 - 09/12/14)**
- **Graph shows PM$_{2.5}$ concentrations from 0 to 1,200 μg/m$^3$**
- **Legend:**
  - Hazardous
  - Very Unhealthy
  - Unhealthy
  - Unhealthy for Sensitive Groups
  - Moderate
  - Good
  - Avg. Conc. (μg/m$^3$)
Incident Information Systems

InciWeb
Incident Information System

California Incidents

Viewing 1-10 of 20 incidents sorted by MODIFIED in DESCENDING order.

<table>
<thead>
<tr>
<th>Incident</th>
<th>Type</th>
<th>Date/Time</th>
<th>Status</th>
<th>Active</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDF Fire</td>
<td>Prescribed Fire</td>
<td>09/21/2021</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rough Fire</td>
<td>2015 Sierra Nevada Fire</td>
<td>06/15/2015</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>River Campfire</td>
<td>Wildfire</td>
<td>06/17/2015</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake Tahoe Fire</td>
<td>Wildfire</td>
<td>06/10/2015</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rough Fire</td>
<td>Wildfire</td>
<td>06/09/2015</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gibraltar Fire</td>
<td>Wildfire</td>
<td>06/08/2015</td>
<td>Active</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Barham Fire
Prescribed Fire

TDF Fire
Prescribed Fire

Rough Fire
2015 Sierra Nevada Fire

River Campfire
Wildfire

Lake Tahoe Fire
Wildfire

Rough Fire
Wildfire

Gibraltar Fire
Wildfire

California Statewide Fire Map

Current Fire Information

This is the complete list of 2016 major incidents that have been posted to this site. You can see the location of these incidents on the California Statewide Fire Map.

Incidents sorted by: Default, Incidents per page: 5

Search

California Statewide Fire Map

2016 California Wildfires

VIDEOS

View California Fire Map For larger view

FIRE INFORMATION MORE INFO

- [Fire Information]
- [Incident ID]
- [Map & Data]
- [Fire Weather]
- [FIRE INFORMATION MORE INFO]

FOLLOW US ON

- [Incident ID Feed]
- [Incident RSS Feed]
- [Google Earth KML Feed]
Smoke Plume Model Runs

- Website automatically generates daily plume models twice a day (select your run).
- Estimates PM concentration values.
- Animated 72 hour outlook.
- Probability where smoke is predicted to go.

*Experimental Research Output. Use at your own Risk.*
Creating an Air Monitoring Network

Portable Samplers

Mobile Samplers

Network Monitors

Field GC/MS and IR Detectors

Summa Canisters
Layered Data Collection Strategy

- **Network Sites**
  Fixed sites designed for compliance monitoring

- **Portable Sites**
  Set up quickly, left unattended, transmit data

- **Mobile Sites**
  Rapidly changing conditions, requires support staff
Selecting Monitoring Locations

E-BAM Siting
- Appropriate outdoor location
- Access to electrical outlet
- Avoid obstructions
- Access to open air
- Away from sources

Safety and Security
- Counterweighted or staked
- Non pitched rooftops
- Tripod with rubber feet

Power
- Stable power source
- 12 volts DC max 48 watts (less than most laptops)
- Auto restart if power loss
Data Flow

Providers (Data):
ARB
US Forest Service
Air Districts
National Park Service
Other States

Users (Messaging):
Air Districts
Public Health
Media
Public
AQ Researchers
AQ Policy makers
Data QA/QC

Raw data undergoes automated QA/QC macros:

- during initial monitor stabilization (1st hour)
- improper flowrate
- abnormal temp or RH
- instruments electronic noise (negative values)
- duplicate data set
AirNow Wildfire Webpage

Dynamic map with selectable overlays:

- Nationwide
- Current PM2.5 AQI (Network & Portable)
- Fire locations
- Smoke plumes
- Incident information
- Scale able to include new data inputs
AirFire Webpage and Graphs

- Data available from all permanent, portable monitors (USFS, NPS, ARB, District, Tribal, others)
- Auto generates customizable reports
- Stable hyperlink
- Includes maps, PM concentration and daily trend data
Wildfire Smoke Guide

Table 3. Recommended Actions for Public Health Officials

<table>
<thead>
<tr>
<th>AQI Category (AQI Values)</th>
<th>PM2.5 or PM10 Levels (µg/m³)</th>
<th>Visibility - Arid Conditions (miles)</th>
<th>Recommended Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (0 to 50)</td>
<td>0 – 38</td>
<td>0 – 22</td>
<td>0 – 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- If smoke event forecast, implement communication plan</td>
</tr>
<tr>
<td>Moderate (51 to 100)</td>
<td>39 – 88</td>
<td>23 – 50</td>
<td>12.1 – 35.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Issue public service announcements (PSAs) advising public about health effects and symptoms and ways to reduce exposure avoidance</td>
</tr>
<tr>
<td>Unhealthy for Sensitive Groups (101 to 150)</td>
<td>89 – 138</td>
<td>51 – 79</td>
<td>35.5 – 55.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- If smoke event projected to be prolonged, evaluate and notify possible sites for cleaner air shelters</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- If smoke event projected to be prolonged, prepare evacuation plans</td>
</tr>
<tr>
<td>Unhealthy (151 to 200)</td>
<td>139 – 351</td>
<td>80 – 200</td>
<td>55.5 – 150.4</td>
</tr>
<tr>
<td></td>
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<td>- Consider “Smoke Day” for schools (i.e., no school that day), possibly based on school environment and travel considerations</td>
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<tr>
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<td></td>
<td></td>
<td>- Consider canceling public events, based on public health and travel considerations</td>
</tr>
<tr>
<td>Very Unhealthy (201 to 300)</td>
<td>352 – 526</td>
<td>201 – 300</td>
<td>150.5 – 250.4</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Consider closing some or all schools (Newer schools with a central air cleaning filter may be more protective than older, leakier homes. See “Closures”, below.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Cancel outdoor events (e.g., concerts and competitive sports)</td>
</tr>
<tr>
<td>Hazardous (&gt; 300)</td>
<td>&gt; 526</td>
<td>&gt; 300</td>
<td>&gt; 250.5 – 500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Close schools</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Cancel outdoor events (e.g., concerts and competitive sports)</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Consider closing workplaces not essential to public health</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- If PM level is projected to remain high for a prolonged time, consider evacuation of sensitive populations</td>
</tr>
</tbody>
</table>


2These 1- and 8-Hr PM2.5 levels are estimated using the 24-Hr breakpoints of the PM2.5 Air Quality Index included in the February 7, 2007 issue paper [http://www.epa.gov/airnow/epa_issue_paper_0070767.pdf](http://www.epa.gov/airnow/epa_issue_paper_0070767.pdf) by dividing the 24-Hr concentrations by the following ratios: 8-Hr ratio is 0.7, 1-Hr ratio is 0.4. Visibility is based on 1-Hr values. If only PM10 measurements are available during smoky conditions, it can be assumed that the PM10 is composed primarily of fine particles (PM2.5), and therefore the AQI and associated cautionary statements and advisories for PM2.5 may be used. This assumption is reflected in the column headings for Table 3.

Public Health Advisories

School Closures

Iron Man Triatholon Cancelled

Sporting Events Cancelled
Public Messaging Tools

- California Smoke Information (Blogspot)
- Smoke impact summaries
- Blog auto post to Twitter
California Wildfire Smoke Response Coordination Document

- Guide for smoke response coordination in California
- Compilation of CA best practices and approaches.
- Describes agencies duties and roles.
- Concise: only 10 pages of content (includes examples, templates and contact information)
- Lists recommended health actions.

https://www.arb.ca.gov/carpa/cawildfiresmokeresponsecoordinationaug14.pdf
Data sharing and coordination

- Daily intelligence briefing (email & phone)
  - InciWEB, CALFIRE, USFS, Media, Twitter, PFIRS, firetracker.scpr.org

- 1300hrs Smoke Call
  - 12hr to 96hr outlook (regional reports, weather forecasts)

- 1400hrs Monitoring Call (decisions made)
  - Everyone on same call (affected districts, ARA, ARB)
  - Districts needs
  - Coordinate activities (12hr to 96hr)
  - ARA reports/needs
  - Weekend and Resource Staffing (Thurs)

- Weekly Cal/EPA Call (Tuesday @0900)
Emergency Response Portal

CARPA Webpage

Password: carpa1

Contact Lists
- Air Response Coordination Contact List
- CalOES Emergency Service Coordinator

Air Monitoring Calls
- CARPA 1400 Call Number & Agenda

Request Forms
- OER Mission Request Procedure

Smoke Blog Info
- Guidelines
- How to Post on the Smoke Blog

2nd International Smoke Symposium
When: November 14, 2016 to November 17, 2016
Where: Long Beach, Ca

The International Smoke Symposium brings together researchers from the atmospheric sciences, the ecological sciences, mathematicians, computer sciences, climatologists, social scientists, health professionals, smoke responders and other groups to discuss the complex issues of wildland fire smoke. The symposium will assist in the identification of knowledge gaps and provide opportunities for innovation and development.

More information regarding the 2nd International Smoke Symposium can be found at this link.

Emergency Response Tools
- California Wildfire Smoke Response Coordination
- Heat and Air Quality Information
- Air Pollution Control District Information

Current, Continuous, and Upcoming Training Opportunities
- Cal OES Training Opportunities
- The Public Health Foundation's TRAIN

Historical Archives
- IASC/CARPA 2014 Workshop PowerPoint Presentations
- IASC/CARPA 2015 Workshop PowerPoint Presentations, Web Links, and Videos
Web Links

Incident Information
Inciweb (California)  http://inciweb.nwcg.gov/state/5/
CalFire  http://cdfdata.fire.ca.gov/incidents/incidents_current

Data Displays
Bluesky smoke plume model runs  http://viewer.smoke.airfire.org/
AirNOW wildfire monitoring page  http://airnow.gov/index.cfm?action=topics.smoke_wildfires
AirFire monitoring  http://smoke.airfire.org/monitoring/#/

Messaging
California Smoke Blog  http://californiasmokeinfo.blogspot.com/
California Smoke Blog Twitter  https://twitter.com/CASmokeBlog

Air Emergency Response Planning
CARPA website  http://www.arb.ca.gov/carpa/carpa.htm
For More Information

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