Western Regional Air Study Efforts and Effects of CAA Requirements

February 19, 2015

Tom Moore
WRAP Air Quality Program Manager
WESTAR Council

CENRS Air Quality Research Subcommittee Meeting
Washington, DC
Topics

- Overview of the WESTAR/WRAP organization
- Key issues and areas of focus
- Recent projects and studies
Overview of WESTAR/WRAP

www.westar.org  www.wrapair2.org
Overview of WESTAR/WRAP (cont’d)

- **Purpose**
  - Service organization
  - Assist members in achieving their air quality management goals

- **Approach**
  - Training
  - Provide a forum for discussion
  - Inform policy-related discussions
  - Provide regional technical support
WRAP Key Issues and Areas of Focus

- **NAAQS Implementation and Maintenance**
  - Data for future infrastructure and transport SIPs

- **Exceptional Events**
  - Develop technical support data and analysis protocols

- **Implementation of Regional Haze SIPs**
  - Identify and execute technical work needed for 2018 plans

- **Needs of sub-regional groups of states**
  - Currently oil and gas, fire
  - Similar efforts in past – dust, BART, other topics
WRAP current projects and priorities

- precursors to Ozone, Particulates, and Regional Haze - key western sources
  - Power plants
  - Mobile sources
  - Fire activity and effects
  - Biogenics (natural) emissions
  - Oil and gas exploration and production
  - All sources studied in comprehensive regional modeling analysis
    - West-wide Jumpstart Air Quality Modeling Study (WestJumpAQMS)
The quantity of forest fuels and composition of vegetation in the wildlands of the Western U.S. motivate the land managers to increase the application of prescribed fire to the landscape (from 650,000 acres in 2002 to a projection of up to 3.6 MM acres in 2018).
Counties with Monitors Violating Primary 8-Hour Ground-Level Ozone Standard (0.075 ppb)

(Based on 2011-2013 Air Quality Data)

http://www.epa.gov/airquality/greenbook/map8hr_2008.html
3-year Average 4th Highest 8-Hour Ozone value by County 2011-2013
3-year Average 4th Highest 8-Hour Ozone value for Rural/Class I Sites 2011-2013

AQS Federal Reference Method data from rural or Class I area monitoring sites
Average Annual Count of Days with 8-Hour Ozone Averages >60 ppb for Rural/Class I Monitoring Sites – 2004 through 2013

AQS Federal Reference Method data from rural or Class I area monitoring sites
3-year Average 4th Highest 8-Hour Ozone Design Value for Selected Urban Counties currently in Attainment – 2011 through 2013

AQS Federal Reference Method data from the monitoring site in each County with the highest Ozone values
Recent Western Regional Studies and Projects
Example Oil & Gas Study: Williston Basin 2011 Baseline Results

NOx Emissions By Source Category

Basin-wide NOx Emissions (tons/year): 29,404

Source: BLM/WRAP Oil and Gas Inventory project
West-Wide Jumpstart Air Quality Modeling Study

- Regional results provide data and context for state and federal planning
  - Uses most current transport and background studies
  - Meteorological and emissions modeling
    - Regionally consistent, High resolution, Comprehensive
  - Photochemical modeling
    - 2008 base case model performance evaluation with Ozone / PM source apportionment
  - Most up-to-date and complete characterization of Western U.S. air quality available

- Study completed September 2013
  - Emissions and Modeling data foundation of 3-State Data Warehouse
  - All materials at: [http://www.wrapair2.org/WestJumpAQMS.aspx](http://www.wrapair2.org/WestJumpAQMS.aspx)
  - Advances goal to provide a regional modeling framework
WestJumpAQMS Area

Modeling Domain

36km: 148 x 112 (-2736, -2088) to (2592, 1944)
12km*: 227 x 230 (-2388, -1236) to (336, 1542)
04km*: 317 x 515 (-1480, -904) to (-212, 1156)

* includes buffer cells

Source: WestJumpAQMS
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 76 ppb

Source: WestJumpAQMS

Min(210,3) = 76.00, Max(45,67) = 113.30
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 70 ppb

Source: WestJumpAQMS

Min(107,1) = 70.00, Max(45,67) = 113.30
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) $\geq 65$ ppb

Source: WestJumpAQMS

Min($177,1$) = 65.00, Max($45,67$) = 113.30
Ozone Modeled Attainment Test Software – Unmonitored Area Analysis with Design Value (2006-2010) ≥ 60 ppb

Source: WestJumpAQMS

Min(45,2) = 60.00, Max(45,67) = 113.30
Contributions to Ozone at Rocky Mountain National Park

Contributions to MDA8 Ozone [ppb] at CO_Larimer0007

Rank (10) 05/01/08; Model = 68.8 ppb; Obs = 69.9 ppb; Bias = -1.6%; BC = 60.4 ppb (87.9%)

- MV:Rem 4.6%
- MV:UT 0.2%
- MV:CO 0.0%
- MV:NM 0.0%
- O&G:WY 0.2%
- O&G:CO 0.0%
- O&G:UT 0.0%
- O&G:NM 0.0%
- PT:CO 0.0%
- PT:NM 0.0%
- PT:UT 0.1%
- PT:WY 0.3%
- Can/Mex 1.8%
- NAT 2.7%
- AR:Rem 0.7%
- AR:NM 0.0%
- AR:CO 0.0%
- AR:UT 0.0%
- Fires 0.1%

Source: WestJumpAQMS
“Other Sources” Max Contrib. 4th High DMAX8 Ozone

Boundary Conditions

Natural

Anthropogenic

**Wildfire**

**Prescribed Fire**

**Agricultural Fire**
<table>
<thead>
<tr>
<th>Fire Type</th>
<th>76 (ppb)</th>
<th>70 (ppb)</th>
<th>65 (ppb)</th>
<th>60 (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td><img src="http://www.wrapair2.org/WestJumpAQMS.aspx" alt="Map" /></td>
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<td>Prescribed</td>
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<tr>
<td>Wildfire</td>
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</table>
Track activity and emissions

- Fire Activity Data (acres/day)
- Loading
- Moisture

Distribute emissions

DEASCO₃ & PMDETAIL

Chemical Profiles

loft emissions
Model Evaluation

Fire Contributions to AQ Impacts

Temporal Analysis Tools

Inter-annual Observational Analysis

Source: WRAP Fire Tools
2004

6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2005

6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2006
6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2007
6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2008

6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2009

6/21 – 9/21
Limited by bounding box

Source: WRAP Fire Tools
2011

6/21 – 9/21
Limited by bounding box

*Obtained additional small wildfire data for this inventory

Source: WRAP Fire Tools
Exceptional Events Support

The following case studies are related to the Exceptional Events Support analysis type. To begin click on one of the case studies to review it, or select Start a New Analysis to begin creating your own study.

The purpose of this analysis tool is to assist with understanding whether fire might have contributed to an ozone exceedance; and assist with knowing what kind of information might be helpful to a state for preparing an Exceptional Event demonstration package(s) for air quality excursions affected by fire and smoke. The effects of wildland fire on ozone are complex, and meeting the exceptional events requirement is difficult for most if not all fire occurrences. This is, in part, because wildland fires occur at the same time of high ozone caused by anthropogenic emissions. Thus, separating the contribution of wildland fire from anthropogenic emissions is challenging: the but-for test. Yet, EPA requires this for their concurrence. Using the combination of observed ozone and CMAX model output, this tool examines selected cases—planned, unplanned, and combinations of the two—fires contribution to ozone impacts.

Exceptional Events Support Overview

A State Exceptional Event demonstration package must provide evidence that:

A. The event affects air quality, is not reasonably controllable or preventable, and is an event caused by human activity that is unlikely to recur at a particular location or a natural event;
B. There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area;
C. The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and
D. There would have been no exceedance or violation but for the event.

States are responsible for demonstrating to EPA that unplanned fires or certain planned fires were responsible for an exceedance of the ozone standard at a particular monitoring site or group of sites. In attempting to make this demonstration, a state may request certain information from land managers. This might include: the smoke emissions; particulate monitoring particular to the fire or photographs; the timing of the burn along with how it was distributed through the day in terms of combustion and smoldering; and to what extent air quality management regulations were complied with.

Review a Related Analysis

<table>
<thead>
<tr>
<th>Title</th>
<th>Sections</th>
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<tbody>
<tr>
<td>Biscuit Wildfire</td>
<td>10</td>
</tr>
<tr>
<td>Chatfield, CO July 2004-2007</td>
<td>16</td>
</tr>
<tr>
<td>Chatfield, CO July 2008</td>
<td>12</td>
</tr>
<tr>
<td>Evans Road Wildfire (Pocosin NWR) / Peat burning</td>
<td>12</td>
</tr>
<tr>
<td>Fall burning in southern Louisiana, 2008</td>
<td>9</td>
</tr>
<tr>
<td>Flint Hills</td>
<td>8</td>
</tr>
<tr>
<td>McNally Wildfire</td>
<td>6</td>
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<tr>
<td>Missionary Ridge &amp; Hayman Wildfires</td>
<td>7</td>
</tr>
<tr>
<td>Northern California Wildfires, 2008</td>
<td>17</td>
</tr>
</tbody>
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edit list

These are the current analyses associated with Exceptional Events Support. To review an
Regional Haze: Reasonable Progress Reports + July 2018 SIP

- WRAP produced a comprehensive, regionally-consistent technical report – completed Summer 2013
  - Regional, state, and Class I area reports
    http://www.wrapair2.org/reghaze.aspx
  - Monitoring and emissions data analyses as required by Regional Haze Rule
  - Western states will use as a common basis in preparing individual SIP revisions – adding status of state actions to implement controls
  - Progress report SIP revisions are due in the 2013-16 timeframe

- Regional Haze Planning
  - WRAP providing western 2008, 2011, and associated projections (as well as eventually 2014) emissions data
  - Modeling platform leveraged from WestJumpAQMS
  - States will use to evaluate changes in monitored visibility

- Regional technical support for July 2018 SIPs in WRAP Work Plan
The Western Air Quality Data Warehouse provides air quality data and analysis tools to support regulatory, research, and academic applications. Available datasets include emissions inventories, meteorological data, monitoring data, and air quality modeling platforms. Available modeling platforms support consistent photochemical grid modeling for National Environmental Policy Act projects and other modeling studies.

**GET DATA**

Access a wide variety of monitored, modeled, emissions, and met data.

**DOCUMENT NEEDS REVIEW!**

3SAQS WRF 2011 Meteorological Model Performance Evaluation

**DOCUMENT NEEDS REVIEW!**

CAMx Photochemical Grid CAMx Model Draft Model Performance Evaluation

**DRAFT DOCUMENT AVAILABLE**

3SAOS WRF
Upcoming Meetings and Workshops

San Joaquin Valley Unified Air Pollution Control District – *Transboundary Ozone Pollution Conference* – March 31-April 2, Tenaya Lodge, Yosemite National Park

EPA *Emission Inventory Conference* – April 13-16, San Diego (western U.S. focus)

WRAP-EPA *Modeling Air Quality from the Global to Local Scale* Workshop – May 11-15, Boulder, CO

Thanks –

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